



Hi3137 V100 Channel Specifications Tests  
**User Guide**

Issue            00B01

Date            2014-03-31

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## **HiSilicon Technologies Co., Ltd.**

Address:    Huawei Industrial Base  
              Bantian, Longgang  
              Shenzhen 518129  
              People's Republic of China

Website:    <http://www.hisilicon.com>  
Email:        [support@hisilicon.com](mailto:support@hisilicon.com)



# About This Document

## Purpose

This document provides guidance for the DVB-T2 and DVB-T channel specifications tests for the channel demodulation chip Hi3137.

## Related Version

The following table lists the product version related to this document.

Product Name	Version
Hi3137 V100	V100

## Intended Audience

This document is intended for:

- Technical support engineers
- Hardware development engineers
- Software development engineers

## Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
<b>DANGER</b>	Alerts you to a high risk hazard that could, if not avoided, result in serious injury or death.
<b>WARNING</b>	Alerts you to a medium or low risk hazard that could, if not avoided, result in moderate or minor injury.

Symbol	Description
 <b>CAUTION</b>	Alerts you to a potentially hazardous situation that could, if not avoided, result in equipment damage, data loss, performance deterioration, or unanticipated results.
 <b>TIP</b>	Provides a tip that may help you solve a problem or save time.
 <b>NOTE</b>	Provides additional information to emphasize or supplement important points in the main text.

## Change History

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made in previous issues.

### Issue 00B01 (2014-03-31)

This issue is the first draft release.



# Contents

<b>About This Document.....</b>	<b>i</b>
<b>1 Test Description .....</b>	<b>1</b>
<b>2 D-Book 7.0 DVB-T2 Tests.....</b>	<b>4</b>
2.1 Gaussian Threshold Test.....	4
2.1.1 Test Guide .....	4
2.1.2 Test Instance.....	5
2.2 PAL (I1) Analog Co-Channel Test.....	8
2.2.1 Test Guide .....	8
2.2.2 Test Instance.....	9
2.3 PAL (I1) Analog Adjacent Channel Test (N±1).....	12
2.3.1 Test Guide .....	12
2.3.2 Test Instance.....	13
2.4 Digital ACI (N±1) Test.....	15
2.4.1 Test Guide .....	16
2.4.2 Test Instance.....	17
2.5 LTE (BS-A) Channel Rejection Ratio Test.....	23
2.5.1 Test Guide .....	23
2.5.2 Test Instance.....	24
2.6 LTE (BS-B) Channel Rejection Ratio Test.....	27
2.6.1 Test Guide .....	27
2.6.2 Test Instance.....	28
2.7 LTE (UE-A) Channel Rejection Ratio Test .....	31
2.7.1 Test Guide .....	31
2.7.2 Test Instance.....	32
2.8 LTE (UE-C) Channel Rejection Ratio Test .....	35
2.8.1 Test Guide .....	35
2.8.2 Test Instance.....	36
2.9 Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI).....	39
2.9.1 Test Guide .....	39
2.9.2 Test Instance.....	40
2.10 Test with a 0 dB Echo, 10 Hz/20 Hz Doppler .....	44
2.10.1 Test Guide .....	44
2.10.2 Test Instance.....	45



2.11 Test with an Echo Outside the Guard Interval .....	48
2.11.1 Test Guide .....	48
2.11.2 Test Instance .....	49
2.12 Test with an Echo Outside the Guard Interval, 1 Hz Doppler .....	52
2.12.1 Test Guide .....	52
2.12.2 Test Instance .....	53
2.13 Short, Medium, and Long Echo Profile Test .....	56
2.13.1 Test Guide .....	56
2.13.2 Test Instance .....	57
2.14 Impulsive Noise Test .....	60
2.14.1 Test Guide .....	60
2.14.2 Test Instance .....	60
2.15 Sensitivity Test .....	64
2.15.1 Test Guide .....	64
2.15.2 Test Instance .....	64
<b>3 D-Book 7.0 DVB-T Tests.....</b>	<b>67</b>
3.1 Gaussian Threshold Test.....	67
3.1.1 Test Guide .....	67
3.1.2 Test Instance .....	68
3.2 PAL (I1) Analog Co-Channel Test.....	70
3.2.1 Test Guide .....	70
3.2.2 Test Instance .....	71
3.3 PAL (I1) Analog Adjacent Channel Test (N±1).....	73
3.3.2 Test Instance .....	74
3.4 Digital ACI (N±1) Test.....	76
3.4.1 Test Guide .....	77
3.4.2 Test Instance .....	78
3.5 LTE (BS-A) Channel Rejection Ratio Test.....	83
3.5.1 Test Guide .....	83
3.5.2 Test Instance .....	84
3.6 LTE (BS-B) Channel Rejection Ratio Test.....	86
3.6.1 Test Guide .....	86
3.6.2 Test Instance .....	87
3.7 LTE (UE-A) Channel Rejection Ratio Test .....	89
3.7.1 Test Guide .....	89
3.7.2 Test Instance .....	90
3.8 LTE (UE-C) Channel Rejection Ratio Test .....	92
3.8.1 Test Guide .....	92
3.8.2 Test Instance .....	93
3.9 Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI).....	95
3.9.1 Test Guide .....	95
3.9.2 Test Instance .....	96



3.10 Test with a 0 dB Echo, 20 Hz Doppler .....	99
3.10.1 Test Guide .....	99
3.10.2 Test Instance .....	100
3.11 Test with an Echo Outside the Guard Interval .....	103
3.11.1 Test Guide .....	103
3.11.2 Test Instance .....	104
3.12 Short, Medium, and Long Echo Profile Test .....	106
3.12.1 Test Guide .....	106
3.12.2 Test Instance .....	107
3.13 Impulsive Noise Test .....	110
3.13.1 Test Guide .....	110
3.13.2 Test Instance .....	111
3.14 Sensitivity Test .....	114
3.14.1 Test Guide .....	114
3.14.2 Test Instance .....	115
<b>4 NorDig 2.2.1 DVB-T2 Tests.....</b>	<b>117</b>
4.1 Gaussian Threshold Test.....	117
4.1.1 Test Guide .....	117
4.1.2 Test Instance .....	118
4.2 PAL (G) Analog Co-Channel Test .....	122
4.2.1 Test Guide .....	122
4.2.2 Test Instance .....	123
4.3 PAL (G) Analog Adjacent Channel Test ( $N \pm 1/N \pm 2$ ) .....	125
4.3.1 Test Guide .....	125
4.3.2 Test Instance .....	126
4.4 LTE (BS-A) Channel Rejection Ratio Test.....	129
4.4.1 Test Guide .....	129
4.4.2 Test Instance .....	130
4.5 LTE (BS-B) Channel Rejection Ratio Test.....	132
4.5.1 Test Guide .....	132
4.5.2 Test Instance .....	133
4.6 LTE (UE-A) Channel Rejection Ratio Test .....	136
4.6.1 Test Guide .....	136
4.6.2 Test Instance .....	137
4.7 LTE (UE-C) Channel Rejection Ratio Test .....	140
4.7.1 Test Guide .....	140
4.7.2 Test Instance .....	141
4.8 Test with a 0 dB Echo, 1 Hz/10 Hz Doppler .....	144
4.8.1 Test Guide .....	144
4.8.2 Test Instance .....	145
4.9 Test with an Echo Outside the Guard Interval .....	148
4.9.1 Test Guide .....	148



4.9.2 Test Instance.....	149
4.10 Sensitivity Test .....	152
4.10.1 Test Guide .....	152
4.10.2 Test Instance.....	152
<b>5 NorDig 2.2.1 DVB-T Tests.....</b>	<b>155</b>
5.1 Gaussian Threshold Test.....	155
5.1.1 Test Guide .....	155
5.1.2 Test Instance.....	156
5.2 PAL (G) Analog Co-Channel Test.....	158
5.2.1 Test Guide .....	158
5.2.2 Test Instance.....	159
5.3 LTE (BS-A) Channel Rejection Ratio Test.....	161
5.3.1 Test Guide .....	162
5.3.2 Test Instance.....	162
5.4 LTE (BS-B) Channel Rejection Ratio Test.....	164
5.4.1 Test Guide .....	164
5.4.2 Test Instance.....	165
5.5 LTE (UE-A) Channel Rejection Ratio Test .....	167
5.5.1 Test Guide .....	167
5.5.2 Test Instance.....	168
5.6 LTE (UE-C) Channel Rejection Ratio Test .....	170
5.6.1 Test Guide .....	170
5.6.2 Test Instance.....	171
5.7 Test with a 0 dB Echo Within the Guard Interval (1.95 µs/0.5GI/0.95GI).....	173
5.7.1 Test Guide .....	173
5.7.2 Test Instance.....	174
5.8 Test with an Echo Outside the Guard Interval.....	177
5.8.1 Test Guide .....	177
5.8.2 Test Instance.....	178
5.9 Sensitivity Test .....	180
5.9.1 Test Guide .....	180
5.9.2 Test Instance.....	181



## Figures

<b>Figure 2-1</b> D-Book DVB-T2 test block diagram .....	4
<b>Figure 2-2</b> Setting the test model and signal parameters .....	6
<b>Figure 2-3</b> FRAMING + OFDM settings .....	6
<b>Figure 2-4</b> BICM settings .....	7
<b>Figure 2-5</b> NOISE settings .....	7
<b>Figure 2-6</b> Adjusting the C/N value .....	8
<b>Figure 2-7</b> Setting the test model and signal parameters .....	10
<b>Figure 2-8</b> FRAMING + OFDM settings .....	10
<b>Figure 2-9</b> BICM settings .....	11
<b>Figure 2-10</b> INTERFERER settings .....	11
<b>Figure 2-11</b> Adjusting the INTERFERER ATTENUATION value .....	12
<b>Figure 2-12</b> Setting the test model and signal parameters .....	13
<b>Figure 2-13</b> FRAMING + OFDM settings .....	14
<b>Figure 2-14</b> BICM settings .....	14
<b>Figure 2-15</b> INTERFERER settings .....	15
<b>Figure 2-16</b> Adjusting the LEVEL value .....	15
<b>Figure 2-17</b> Block diagram for the digital ACI test .....	15
<b>Figure 2-18</b> Setting the test model and signal parameters .....	17
<b>Figure 2-19</b> DekTec modulator settings .....	18
<b>Figure 2-20</b> RF Output Control .....	19
<b>Figure 2-21</b> Setting Level to -25 dBm .....	20
<b>Figure 2-22</b> Clicking the play button .....	21
<b>Figure 2-23</b> FRAMING + OFDM settings .....	22
<b>Figure 2-24</b> BICM settings .....	22
<b>Figure 2-25</b> Adjusting the LEVEL value .....	23
<b>Figure 2-26</b> Block diagram for the LTE channel rejection ratio test .....	23
<b>Figure 2-27</b> Setting the SFU test model .....	25



<b>Figure 2-28</b> FRAMING + OFDM settings .....	26
<b>Figure 2-29</b> BICM settings .....	26
<b>Figure 2-30</b> Adjusting the LEVEL value .....	27
<b>Figure 2-31</b> Setting the SFU test model .....	29
<b>Figure 2-32</b> FRAMING + OFDM settings .....	30
<b>Figure 2-33</b> BICM settings .....	30
<b>Figure 2-34</b> Adjusting the LEVEL value .....	31
<b>Figure 2-35</b> Setting the SFU test model .....	33
<b>Figure 2-36</b> FRAMING + OFDM settings .....	34
<b>Figure 2-37</b> BICM settings .....	34
<b>Figure 2-38</b> Adjusting the LEVEL value .....	35
<b>Figure 2-39</b> Setting the SFU test model .....	37
<b>Figure 2-40</b> FRAMING + OFDM settings .....	38
<b>Figure 2-41</b> BICM settings .....	38
<b>Figure 2-42</b> Adjusting the LEVEL value .....	39
<b>Figure 2-43</b> Setting the SFU test model .....	41
<b>Figure 2-44</b> FRAMING + OFDM settings .....	41
<b>Figure 2-45</b> BICM settings .....	42
<b>Figure 2-46</b> PROFILE settings .....	43
<b>Figure 2-47</b> Adjusting the C/N value .....	43
<b>Figure 2-48</b> Setting the SFU test model .....	45
<b>Figure 2-49</b> FRAMING + OFDM settings .....	46
<b>Figure 2-50</b> BICM settings .....	46
<b>Figure 2-51</b> PROFILE settings .....	47
<b>Figure 2-52</b> Adjusting the C/N value .....	47
<b>Figure 2-53</b> Setting the SFU test model .....	49
<b>Figure 2-54</b> FRAMING + OFDM settings .....	50
<b>Figure 2-55</b> BICM settings .....	50
<b>Figure 2-56</b> PROFILE settings .....	51
<b>Figure 2-57</b> Adjusting the PATH LOSS value in the 1-1 column .....	51
<b>Figure 2-58</b> Setting the SFU test model .....	53
<b>Figure 2-59</b> FRAMING + OFDM settings .....	54
<b>Figure 2-60</b> BICM settings .....	54
<b>Figure 2-61</b> PROFILE settings .....	55



<b>Figure 2-62</b> Adjusting the PATH LOSS value in the 2-2 column .....	55
<b>Figure 2-63</b> Setting the SFU test model .....	57
<b>Figure 2-64</b> FRAMING + OFDM settings .....	58
<b>Figure 2-65</b> BICM settings .....	58
<b>Figure 2-66</b> Delay, Relative Attenuation, and Phase settings .....	59
<b>Figure 2-67</b> Adjusting the C/N value .....	59
<b>Figure 2-68</b> Setting the SFU test model .....	61
<b>Figure 2-69</b> NOISE settings .....	61
<b>Figure 2-70</b> FRAMING + OFDM settings .....	62
<b>Figure 2-71</b> BICM settings .....	62
<b>Figure 2-72</b> Setting Pulse Per Burst, Min. Pulse Space, and Max. Pulse Space .....	63
<b>Figure 2-73</b> Adjusting the C/I value .....	63
<b>Figure 2-74</b> Setting the SFU test model .....	65
<b>Figure 2-75</b> FRAMING + OFDM settings .....	65
<b>Figure 2-76</b> BICM settings .....	66
<b>Figure 2-77</b> Adjusting the LEVEL value .....	66
<b>Figure 3-1</b> D-book DVB-T test block diagram .....	67
<b>Figure 3-2</b> Setting the SFU test model and signal parameters .....	68
<b>Figure 3-3</b> CODING settings .....	69
<b>Figure 3-4</b> NOISE settings .....	69
<b>Figure 3-5</b> Adjusting the C/N value .....	70
<b>Figure 3-6</b> Setting the SFU test model .....	72
<b>Figure 3-7</b> CODING settings .....	72
<b>Figure 3-8</b> INTERFERER settings .....	73
<b>Figure 3-9</b> Adjusting the INTERFERER ATTENUATION value .....	73
<b>Figure 3-10</b> Setting the SFU test model .....	75
<b>Figure 3-11</b> CODING settings .....	75
<b>Figure 3-12</b> INTERFERER settings .....	76
<b>Figure 3-13</b> Adjusting the LEVEL value .....	76
<b>Figure 3-14</b> Block diagram for the digital ACI test .....	76
<b>Figure 3-15</b> Setting the SFU test model .....	78
<b>Figure 3-16</b> Setting the DekTec modulator .....	79
<b>Figure 3-17</b> RF Output Control .....	80
<b>Figure 3-18</b> Setting the signal strength .....	81



<b>Figure 3-19</b> Clicking the play button.....	82
<b>Figure 3-20</b> CODING settings.....	82
<b>Figure 3-21</b> Adjusting the LEVEL value.....	83
<b>Figure 3-22</b> Block diagram for the LTE channel rejection ratio test .....	83
<b>Figure 3-23</b> Setting the SFU test model .....	85
<b>Figure 3-24</b> CODING settings.....	85
<b>Figure 3-25</b> Adjusting the LEVEL value.....	86
<b>Figure 3-26</b> Setting the SFU test model .....	88
<b>Figure 3-27</b> CODING settings.....	88
<b>Figure 3-28</b> Adjusting the LEVEL value.....	89
<b>Figure 3-29</b> Setting the SFU test model .....	91
<b>Figure 3-30</b> CODING settings.....	91
<b>Figure 3-31</b> Adjusting the LEVEL value.....	92
<b>Figure 3-32</b> Setting the SFU test model .....	94
<b>Figure 3-33</b> CODING settings.....	94
<b>Figure 3-34</b> Adjusting the LEVEL value.....	95
<b>Figure 3-35</b> Setting the SFU test model .....	97
<b>Figure 3-36</b> CODING settings.....	97
<b>Figure 3-37</b> PROFILE settings.....	98
<b>Figure 3-38</b> Adjusting the C/N value.....	99
<b>Figure 3-39</b> Setting the SFU test model .....	101
<b>Figure 3-40</b> CODING settings.....	101
<b>Figure 3-41</b> PROFILE settings.....	102
<b>Figure 3-42</b> Adjusting the C/N value.....	102
<b>Figure 3-43</b> Setting the SFU test model .....	104
<b>Figure 3-44</b> CODING settings.....	105
<b>Figure 3-45</b> PROFILE settings.....	105
<b>Figure 3-46</b> Adjusting the PATH LOSS value in the 2-1 column .....	106
<b>Figure 3-47</b> Setting the SFU test model .....	108
<b>Figure 3-48</b> CODING settings.....	108
<b>Figure 3-49</b> Delay, Relative Attenuation, and Phase settings .....	109
<b>Figure 3-50</b> Adjusting the C/N value.....	110
<b>Figure 3-51</b> Setting the SFU test model .....	112
<b>Figure 3-52</b> NOISE settings .....	112



<b>Figure 3-53</b> CODING settings.....	113
<b>Figure 3-54</b> Setting Pulse Per Burst, Min. Pulse Space, and Max. Pulse Space.....	113
<b>Figure 3-55</b> Adjusting the C/I value .....	114
<b>Figure 3-56</b> Setting the SFU test model .....	115
<b>Figure 3-57</b> CODING settings.....	116
<b>Figure 3-58</b> Adjusting the LEVEL value.....	116
<b>Figure 4-1</b> Nordig DVB-T2 test block diagram .....	117
<b>Figure 4-2</b> Setting the SFU test model and signal parameters.....	119
<b>Figure 4-3</b> T2 SYSTEM settings .....	119
<b>Figure 4-4</b> FRAMING + OFDM settings.....	120
<b>Figure 4-5</b> BICM settings.....	120
<b>Figure 4-6</b> NOISE settings .....	121
<b>Figure 4-7</b> Adjusting the C/N value.....	121
<b>Figure 4-8</b> Setting the SFU test model .....	123
<b>Figure 4-9</b> FRAMING + OFDM settings.....	124
<b>Figure 4-10</b> BICM settings.....	124
<b>Figure 4-11</b> INTERFERER settings .....	124
<b>Figure 4-12</b> Adjusting the INTERFERER ATTENUATION value .....	125
<b>Figure 4-13</b> Setting the SFU test model .....	127
<b>Figure 4-14</b> FRAMING + OFDM settings .....	127
<b>Figure 4-15</b> BICM settings.....	128
<b>Figure 4-16</b> INTERFERER settings .....	128
<b>Figure 4-17</b> Adjusting the LEVEL value.....	128
<b>Figure 4-18</b> Block diagram for the LTE channel rejection ratio test .....	129
<b>Figure 4-19</b> Setting the SFU test model .....	130
<b>Figure 4-20</b> FRAMING + OFDM settings .....	131
<b>Figure 4-21</b> BICM settings.....	131
<b>Figure 4-22</b> Adjusting the LEVEL value.....	132
<b>Figure 4-23</b> Setting the SFU test model .....	134
<b>Figure 4-24</b> FRAMING + OFDM settings .....	135
<b>Figure 4-25</b> BICM settings.....	135
<b>Figure 4-26</b> Adjusting the LEVEL value.....	136
<b>Figure 4-27</b> Setting the SFU test model .....	138
<b>Figure 4-28</b> FRAMING + OFDM settings .....	139



<b>Figure 4-29</b> BICM settings .....	139
<b>Figure 4-30</b> Adjusting the LEVEL value .....	140
<b>Figure 4-31</b> Setting the SFU test model .....	142
<b>Figure 4-32</b> FRAMING + OFDM settings .....	143
<b>Figure 4-33</b> BICM settings .....	143
<b>Figure 4-34</b> Adjusting the LEVEL value .....	144
<b>Figure 4-35</b> Setting the SFU test model .....	146
<b>Figure 4-36</b> FRAMING + OFDM settings .....	146
<b>Figure 4-37</b> BICM settings .....	147
<b>Figure 4-38</b> PROFILE settings .....	147
<b>Figure 4-39</b> Adjusting the C/N value .....	148
<b>Figure 4-40</b> Setting the SFU test model .....	150
<b>Figure 4-41</b> FRAMING + OFDM settings .....	150
<b>Figure 4-42</b> BICM settings .....	151
<b>Figure 4-43</b> PROFILE settings .....	151
<b>Figure 4-44</b> Adjusting the PATH LOSS value in the 2-1 column .....	151
<b>Figure 4-45</b> Setting the SFU test model .....	153
<b>Figure 4-46</b> FRAMING + OFDM settings .....	153
<b>Figure 4-47</b> BICM settings .....	154
<b>Figure 4-48</b> Adjusting the LEVEL value .....	154
<b>Figure 5-1</b> Nordig DVB-T test block diagram .....	155
<b>Figure 5-2</b> Setting the SFU test model and signal parameters .....	156
<b>Figure 5-3</b> CODING settings .....	157
<b>Figure 5-4</b> NOISE settings .....	157
<b>Figure 5-5</b> Adjusting the C/N value .....	158
<b>Figure 5-6</b> Setting the SFU test model .....	160
<b>Figure 5-7</b> CODING settings .....	160
<b>Figure 5-8</b> INTERFERER settings .....	161
<b>Figure 5-9</b> Adjusting the INTERFERER ATTENUATION value .....	161
<b>Figure 5-10</b> Block diagram for the LTE channel rejection ratio test .....	161
<b>Figure 5-11</b> Setting the SFU test model .....	163
<b>Figure 5-12</b> CODING settings .....	163
<b>Figure 5-13</b> Adjusting the LEVEL value .....	164
<b>Figure 5-14</b> Setting the SFU test model .....	166



<b>Figure 5-15</b> CODING settings.....	166
<b>Figure 5-16</b> Adjusting the LEVEL value.....	167
<b>Figure 5-17</b> Setting the SFU test model .....	169
<b>Figure 5-18</b> CODING settings.....	169
<b>Figure 5-19</b> Adjusting the LEVEL value.....	170
<b>Figure 5-20</b> Setting the SFU test model .....	172
<b>Figure 5-21</b> CODING settings.....	172
<b>Figure 5-22</b> Adjusting the LEVEL value.....	173
<b>Figure 5-23</b> Setting the SFU test model .....	175
<b>Figure 5-24</b> CODING settings.....	175
<b>Figure 5-25</b> PROFILE settings.....	176
<b>Figure 5-26</b> Adjusting the C/N value.....	177
<b>Figure 5-27</b> Setting the SFU test model .....	179
<b>Figure 5-28</b> CODING settings.....	179
<b>Figure 5-29</b> PROFILE settings.....	180
<b>Figure 5-30</b> Adjusting the PATH LOSS value in the 2-1 column.....	180
<b>Figure 5-31</b> Setting the SFU test model .....	182
<b>Figure 5-32</b> CODING settings.....	182
<b>Figure 5-33</b> Adjusting the LEVEL value.....	183



# Tables

<b>Table 1-1</b> DVB-T/T2 test modes.....	1
<b>Table 1-2</b> Echo outside guard interval model .....	2
<b>Table 1-3</b> Short, medium, and long echo test models .....	2
<b>Table 1-4</b> Impulsive noise test models.....	2
<b>Table 1-5</b> DVB-T2 guard interval.....	3
<b>Table 1-6</b> DVB-T guard interval.....	3
<b>Table 2-1</b> Selecting the guard interval .....	42
<b>Table 2-2</b> Echo delay settings.....	50
<b>Table 2-3</b> Echo delay settings .....	54
<b>Table 2-4</b> Delay echo parameters.....	58
<b>Table 2-5</b> Selecting II TEST 2 test parameters .....	62
<b>Table 3-1</b> Selecting the guard interval .....	98
<b>Table 3-2</b> Echo delay settings .....	105
<b>Table 3-3</b> Echo delay parameters.....	109
<b>Table 3-4</b> Test parameters .....	113
<b>Table 5-1</b> Guard interval .....	176



# 1 Test Description

The following explains some terms in this document:

- SFU: The R&S®SFU broadcast test system is a multistandard signal generator that is used worldwide. It provides a platform that supports all conventional TV and audio broadcasting standards and is used as a reference signal source. This all-in-one compact solution combines many applications in a single instrument of only four height units.
- Digital video broadcasting-terrestrial (DVB-T): It is the first-generation European terrestrial digital television standard.
- Digital video broadcasting-second generation terrestrial (DVB-T2): It is the second-generation European terrestrial digital television standard and the extension of the television standard [DVB-T](#).
- D-Book: It is the UK technical specifications for [digital terrestrial television](#) (DTT).
- NorDig: NorDig is specifying a common platform for digital television to be used within the Nordic region (Denmark, Finland, Iceland, Norway, Sweden) and Éire.

This document provides guidance for the channel specifications test for the Hi3137. The test contents are based on the *Hi3137 Channel Test Report*. The following two test standards are involved:

- D-Book 7.0 (including DVB-T2 and DVB-T)
- NorDig 2.2.1 (including DVB-T2 and DVB-T)

[Table 1-1](#) to [Table 1-6](#) describe the six test modes (opt1 to opt6) and channel test models.

**Table 1-1** DVB-T/T2 test modes

Parameter	DVB-T			DVB-T2		
	opt1	opt2	opt3	opt4	opt5	opt6
FFT	2K	2K	8K	8KE	32KE	32KE
Constellation	64QAM	16QAM	64QAM	64QAM	256QAM	256QAM
CR	2/3	3/4	2/3	4/5	3/5	2/3
GI	1/32	1/32	1/32	1/32	1/128	1/128
Pilot pattern	N/A	N/A	N/A	PP7	PP7	PP7



Parameter	DVB-T			DVB-T2		
	opt1	opt2	opt3	opt4	opt5	opt6
Frame length	N/A	N/A	N/A	242	59	59

**Table 1-2** Echo outside guard interval model

Test Reference		A	B	C	D	E
opt1	Delay (μs)	7	15	30	50	60
opt2	Delay (μs)	7	15	30	50	60
opt3	Delay (μs)	±28	±60	±120	±200	±260
opt4	Delay (μs)	±28	±30	±33	N/A	N/A
opt5	Delay (μs)	±28	±60	±119	±135	N/A
opt6	Delay (μs)	±28	±60	±119	±135	N/A

**Table 1-3** Short, medium, and long echo test models

Short Delay Echo Profile			Medium Delay Echo Profile			Long Delay Echo Profile		
Delay (μs)	Relative Attenuation (dB)	Phase (Degree)	Delay (μs)	Relative Attenuation (dB)	Phase (Degree)	Delay (μs)	Relative Attenuation (dB)	Phase (Degree)
0	2.8	0	0	0	0	0	0	0
0.05	0	0	1	8.6	0	5	9	0
0.4	3.8	0	5	12.6	0	14	22	0
1.45	0.1	0	8	18	0	35	25	0
2.3	2.6	0	12	20.7	0	54	27	0
2.8	1.3	0	21	22.2	0	75	28	0

**Table 1-4** Impulsive noise test models

Test No.	Pulse Per Burst	Min. Pulse Space (μs)	Max. Pulse Space (μs)
1	1	N/A	N/A
2	2	1.5	45
3	4	15	35



Test No.	Pulse Per Burst	Min. Pulse Space (μs)	Max. Pulse Space (μs)
4	12	10	15
5	20	1	2
6	40	0.5	1

**Table 1-5** DVB-T2 guard interval

DVB-T2	Guard Interval							
FFT	1/128	1/32	1/16	19/256	1/8	19/128	1/4	
32K	28	112	224	266	448	532	N/A	
16K	14	56	112	133	224	266	448	
8K	7	28	56	66.5	112	133	224	
4K	N/A	14	28	N/A	56	N/A	112	
2K	N/A	7	14	N/A	28	N/A	56	
1K	N/A	N/A	7	N/A	14	N/A	28	

**Table 1-6** DVB-T guard interval

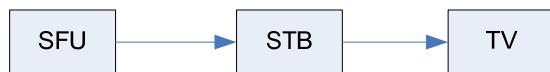
DVB-T	8K				2K			
GI	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
Character length	896 μs				224 μs			
ΔTu	224 μs	112 μs	56 μs	28 μs	56 μs	28 μs	14 μs	7 μs
Total length	1120 μs	1008 μs	952 μs	924 μs	280 μs	252 μs	238 μs	231 μs



# 2 D-Book 7.0 DVB-T2 Tests

Figure 2-1 shows the block diagram for testing the DVB-T2 modes in the D-Book standard.

**Figure 2-1** D-Book DVB-T2 test block diagram



## 2.1 Gaussian Threshold Test

### 2.1.1 Test Guide

Gaussian Threshold Test
Test Object: Hi3137 Gaussian performance
Test Conditions: <ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>– Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>– Set <b>NOISE</b> to <b>ADD</b>.</li><li>– Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>– Set <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● SFU signal parameters<ul style="list-style-type: none"><li>– Set <b>FFT SIZE</b> to the <b>32K EXT</b>.</li><li>– Set <b>GUARD INTERVAL</b> to <b>1/128</b>.</li><li>– Set <b>PILOT PATTERN</b> to <b>PP7</b>.</li><li>– Set <b>L_DATA</b> to <b>59</b>.</li></ul></li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .



### Gaussian Threshold Test

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set a group of constellation mode, internal code rate, signal frequency, and bandwidth to be tested to the SFU according to the test report.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output audio/video (AV) signals properly.
- Step 4** Gradually decrease the carrier-to-noise ratio (C/N) value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 5** Repeat steps 2 to 4 until all Gaussian threshold tests are complete.

----End

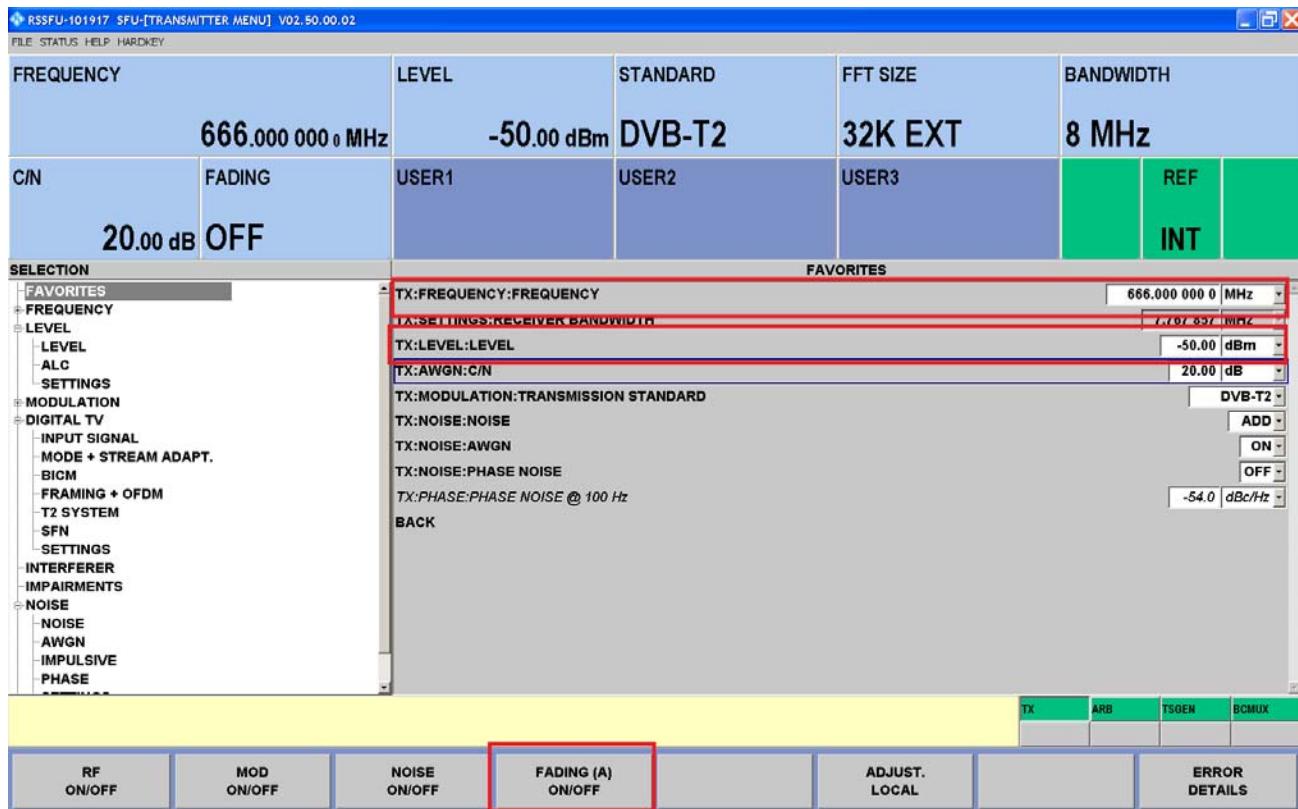
### 2.1.2 Test Instance

The signal parameters are as follows: FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=64QAM, CR=3/5, Freq=666 MHz, Bandwidth=8 MHz.

- Step 1** Set **FADING** to **OFF** by clicking the **FADING (A)** ON/OFF button at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**.

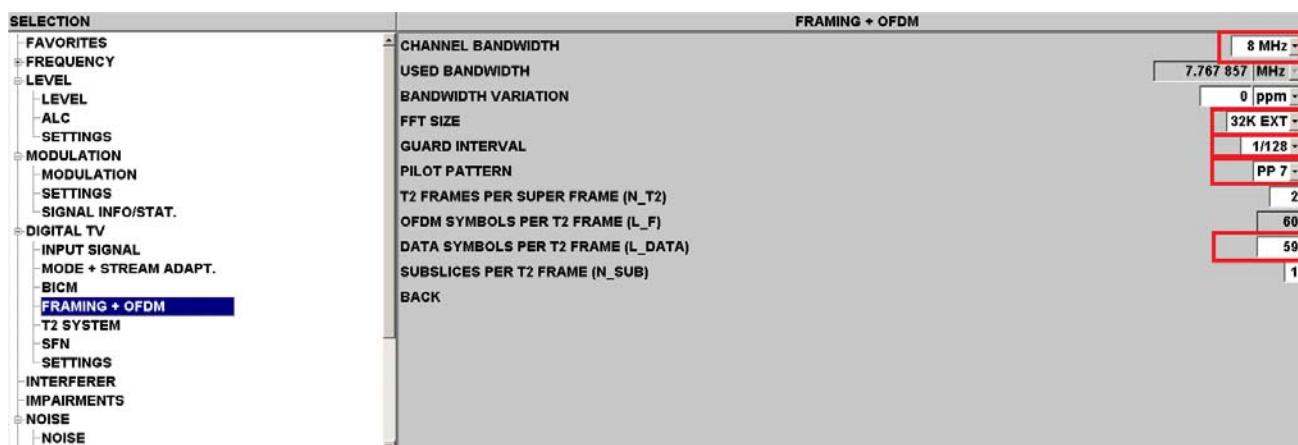


Figure 2-2 Setting the test model and signal parameters



**Step 2** Choose **DIGITAL TV > FRAMING + OFDM**, set **CHANNEL BANDWIDTH** to **8 MHz**, **FFT SIZE** to **32K EXT**, **GUARD INTERVAL** to **1/128**, **PILOT PATTERN** to **PP7**, and **L\_DATA** to **59**. See [Figure 2-3](#).

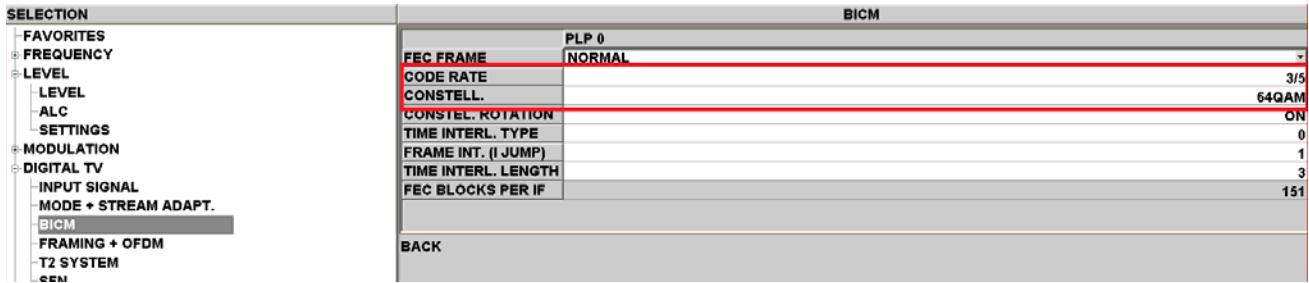
Figure 2-3 FRAMING + OFDM settings



**Step 3** Choose **DIGITAL TV > BICM**, and set **CODE RATE** to **3/5** and **CONSTELL.** to **64QAM**. See [Figure 2-4](#).

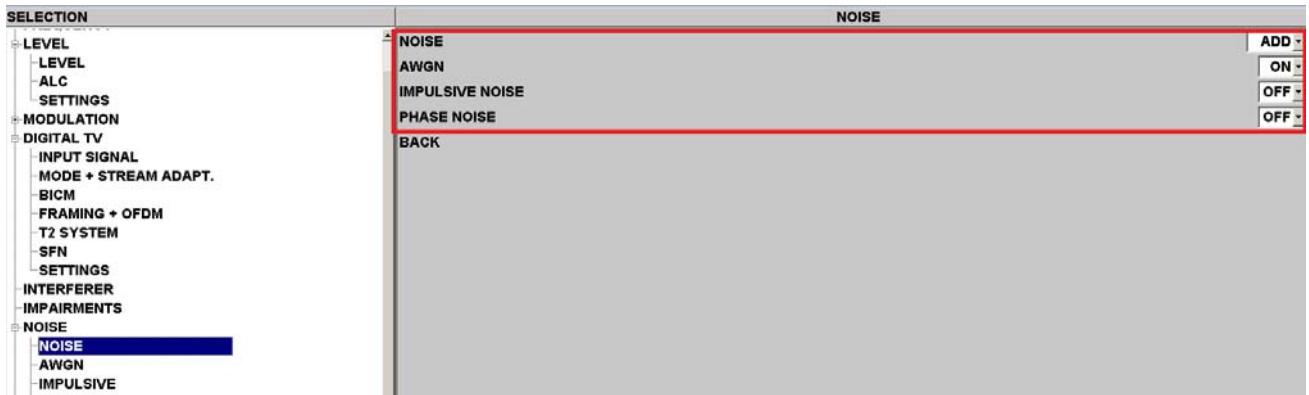


Figure 2-4 BICM settings



**Step 4** Choose NOISE > NOISE, set NOISE to ADD, AWGN to ON, and set others to OFF. See [Figure 2-5](#).

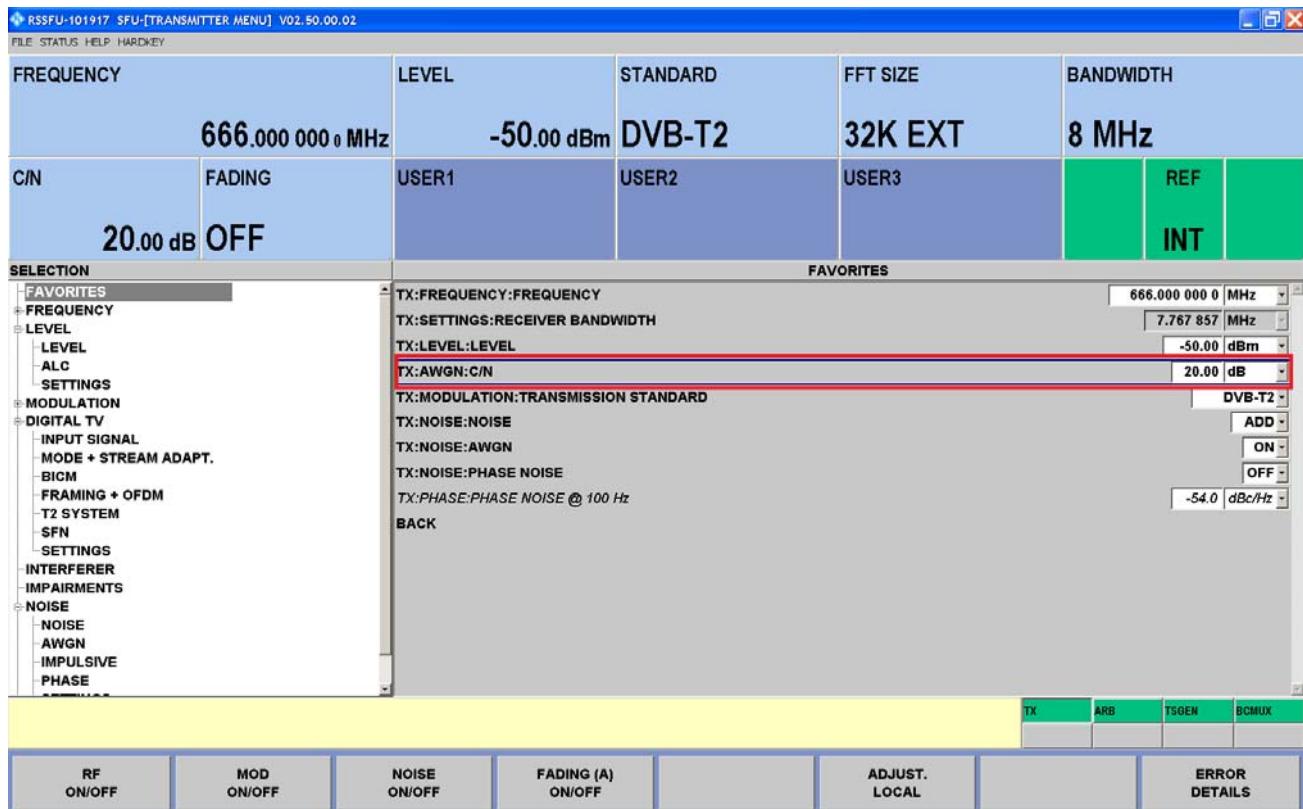
Figure 2-5 NOISE settings



**Step 5** Adjust the C/N value to complete the C/N threshold test. See [Figure 2-6](#).



Figure 2-6 Adjusting the C/N value



----End

## 2.2 PAL (I1) Analog Co-Channel Test

### 2.2.1 Test Guide

PAL (I1) Analog Co-Channel Test
Test Object: Hi3137 performance with analog co-channel PAL interference
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Choose <b>INTERFERER</b>, and set <b>INTERFERER SOURCE</b> to <b>ATV PREDEF</b>.</li><li>- Set <b>ATV PREDEFINED STANDARD</b> to <b>I1 PREDEF</b>, and retain the default value of <b>INTERFERER ADDITION</b> (the test is not affected no matter it is set to <b>AFTER NOISE</b> or <b>BEFORE NOISE</b>).</li><li>- Set <b>INTERFERER REFERENCE</b> to <b>ATTENUATION</b>.</li></ul></li></ul>



PAL (I1) Analog Co-Channel Test
<ul style="list-style-type: none"><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>-2.75 MHz</b>.</li><li>- Set <b>SIGNAL FREQUENCY OFFSET</b> to <b>0 MHz</b>.</li><li>• SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in <a href="#">Table 1-1</a>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>INTERFERER ATTENUATION</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>INTERFERER ATTENUATION</b> value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

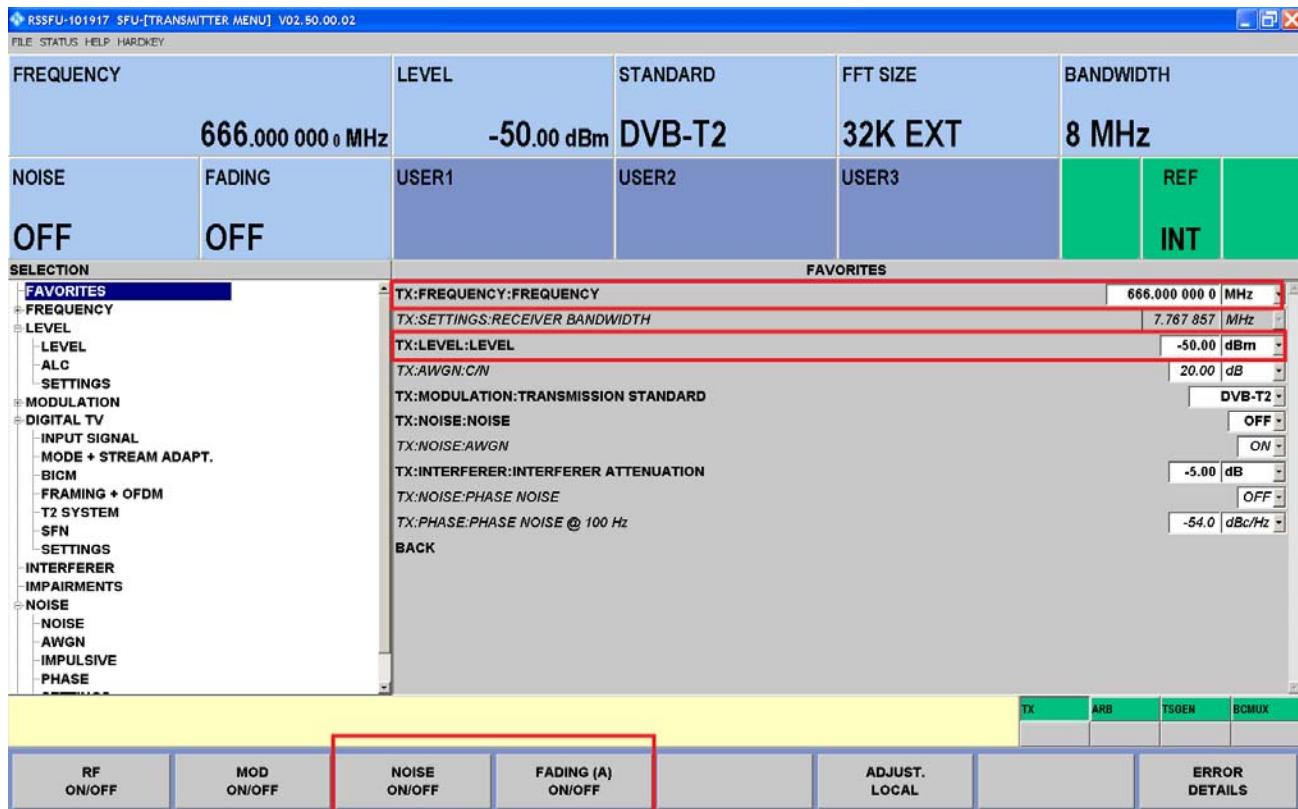
## 2.2.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 2-7](#).



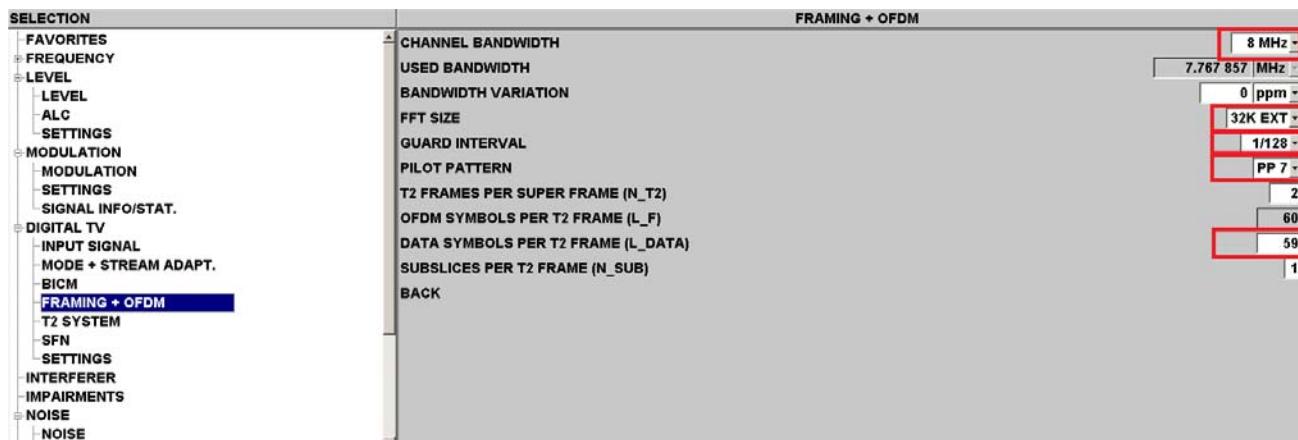
Figure 2-7 Setting the test model and signal parameters



Step 2 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in Figure 2-8.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

Figure 2-8 FRAMING + OFDM settings

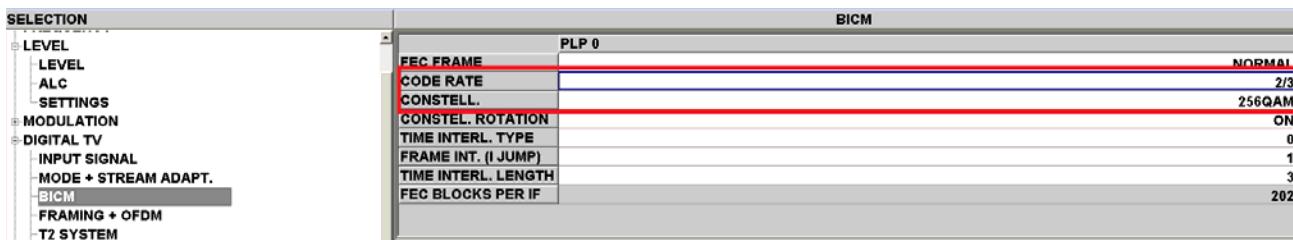




**Step 3** Choose **DIGITAL TV > BICM**, as shown in Figure 2-9.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

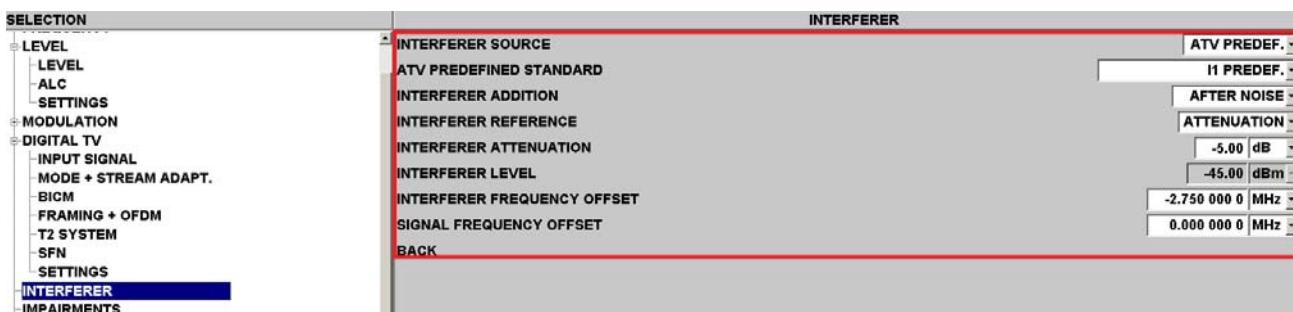
**Figure 2-9** BICM settings



**Step 4** Choose **INTERFERER**, as shown in Figure 2-10.

- Set **INTERFERER SOURCE** to **ATV PREDEF.**
- Set **ATV PREDEFINED STANDARD** to **I1 PREDEF.**
- Retain the default value of **INTERFERER ADDITION** (the test is not affected no matter it is set to **AFTER NOISE** or **BEFORE NOISE**).
- Set **INTERFERER REFERENCE** to **ATTENUATION**.
- Set **INTERFERER FREQUENCY OFFSET** to **-2.75 MHz**.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.

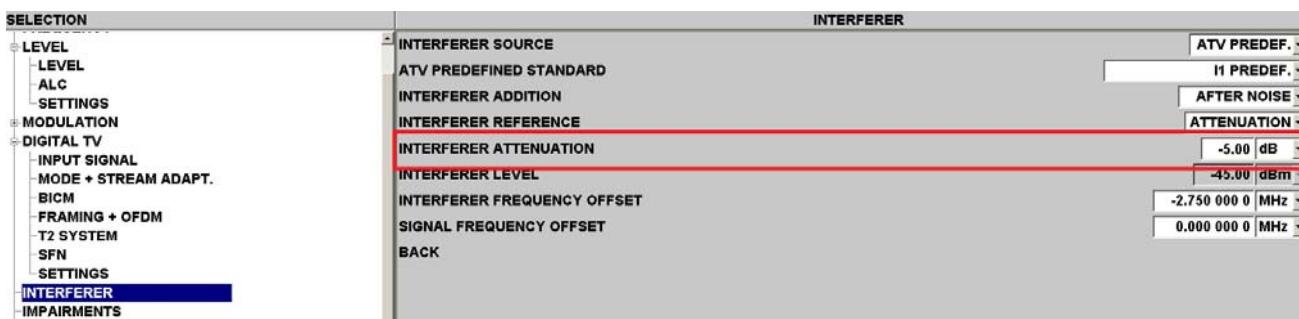
**Figure 2-10** INTERFERER settings



**Step 5** Adjust the value of **INTERFERER ATTENUATION** to complete the co-channel interference test. See Figure 2-11.



**Figure 2-11** Adjusting the INTERFERER ATTENUATION value



----End

## 2.3 PAL (I1) Analog Adjacent Channel Test ( $N\pm 1$ )

### 2.3.1 Test Guide

PAL (I1) Analog Adjacent Channel Test ( $N\pm 1$ )
Test Object: Hi3137 performance with analog adjacent channel PAL interference
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Choose <b>INTERFERER</b>, and set <b>INTERFERER SOURCE</b> to <b>ATV PREDEF.</b>.</li><li>- Set <b>ATV PREDEFINED STANDARD</b> to <b>I1 PREDEF.</b>.</li><li>- Retain the default value of <b>INTERFERER ADDITION</b> (the test is not affected no matter it is set to <b>AFTER NOISE</b> or <b>BEFORE NOISE</b>).</li><li>- Set <b>INTERFERER REFERENCE</b> to <b>LEVEL</b>.</li><li>- Set <b>INTERFERER LEVEL</b> to <b>-25 dBm</b>.</li><li>- Set <b>SIGNAL FREQUENCY OFFSET</b> to <b>0 MHz</b>.</li><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>5.25 MHz</b> for the <math>N+1</math> mode.</li><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>-10.75MHz</b> for the <math>N-1</math> mode.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in <a href="#">Table 1-1</a>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p>



### PAL (I1) Analog Adjacent Channel Test (N±1)

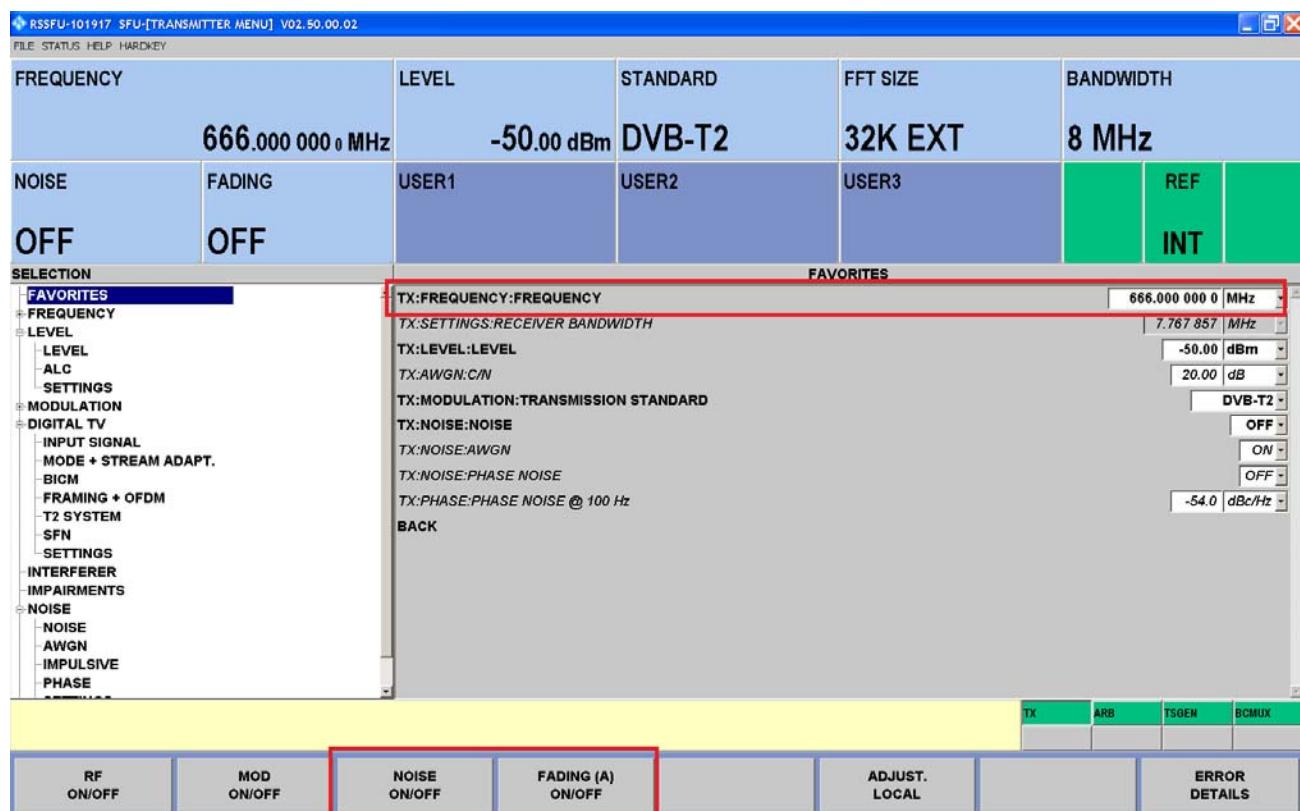
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value (not the **INTERFERER LEVEL** value) until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract –25 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.
- End

## 2.3.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, N+1 mode.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz**. See [Figure 2-12](#).

**Figure 2-12** Setting the test model and signal parameters

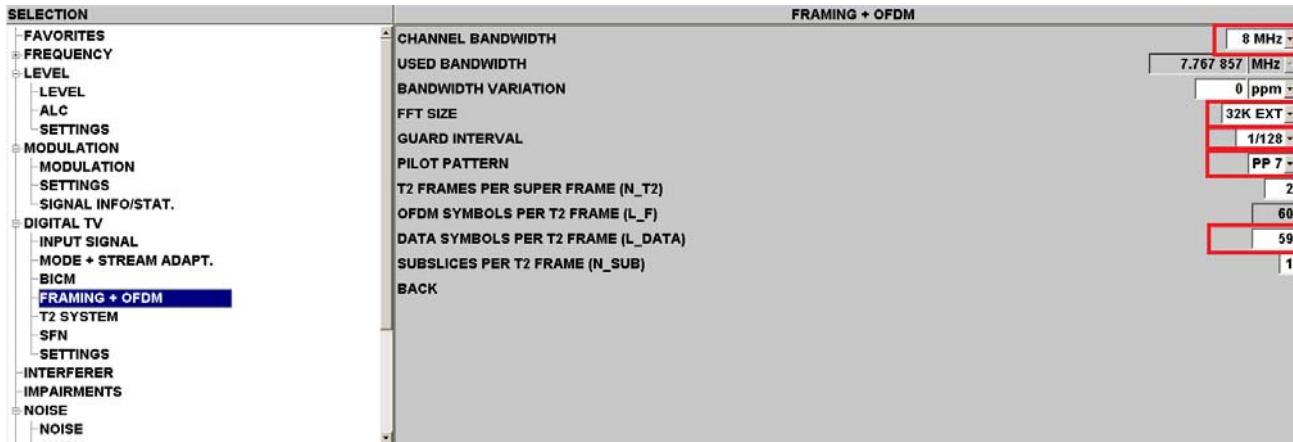


- Step 2** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-13](#).



- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

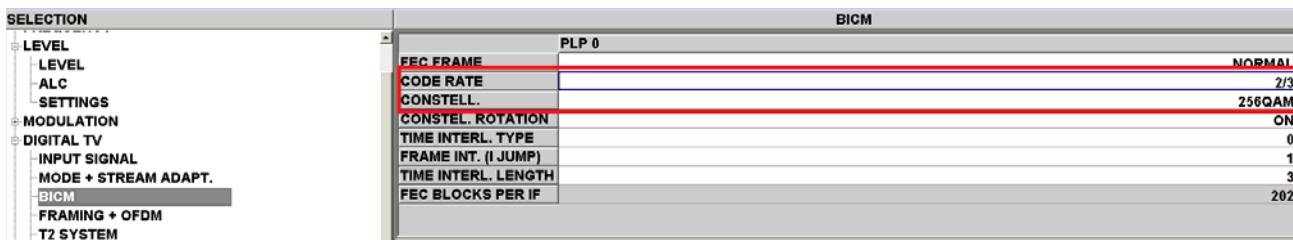
Figure 2-13 FRAMING + OFDM settings



Step 3 Choose **DIGITAL TV > BICM**, as shown in Figure 2-14.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

Figure 2-14 BICM settings

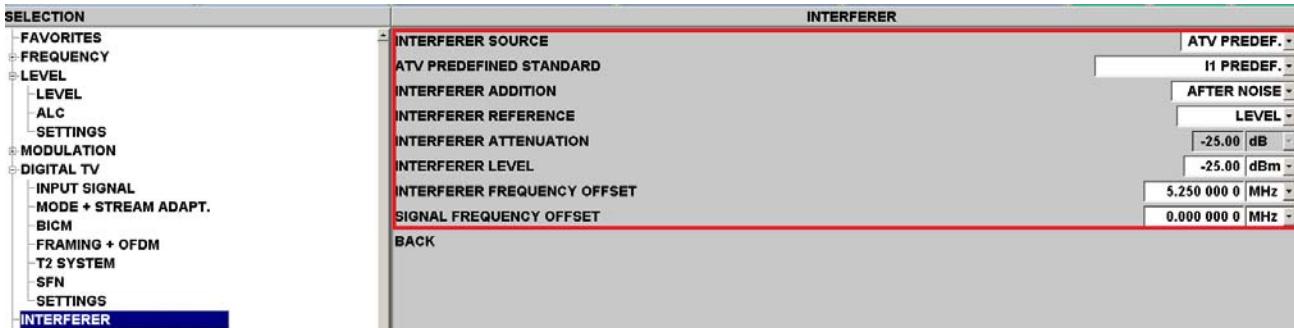


Step 4 Choose **INTERFERER**, as shown in Figure 2-15.

- Set **INTERFERER SOURCE** to **ATV PREDEF**.
- Set **ATV PREDEFINED STANDARD** to **I1 PREDEF**.
- Retain the default value of **INTERFERER ADDITION** (the test is not affected no matter it is set to **AFTER NOISE** or **BEFORE NOISE**).
- Set **INTERFERER REFERENCE** to **LEVEL**.
- Set **INTERFERER LEVEL** to **-25 dBm**.
- Set **INTERFERER FREQUENCY OFFSET** to **5.25 MHz** for the N+1 mode.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.

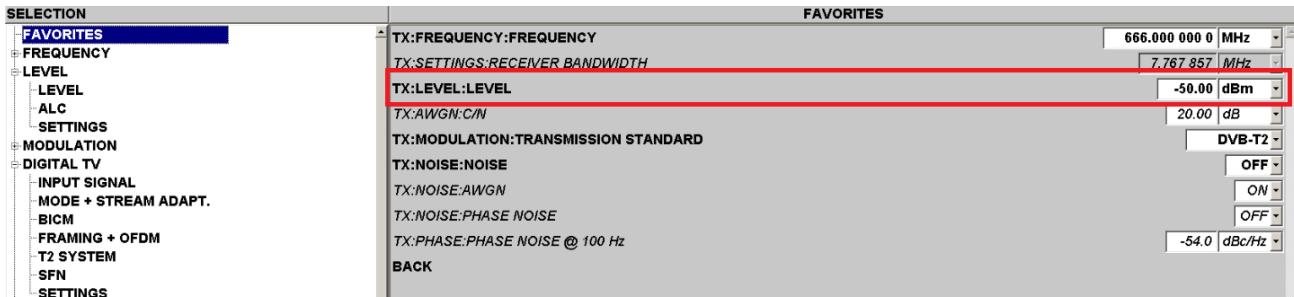


Figure 2-15 INTERFERER settings



**Step 5** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract –25 dBm from the value to obtain the C/I value.

Figure 2-16 Adjusting the LEVEL value

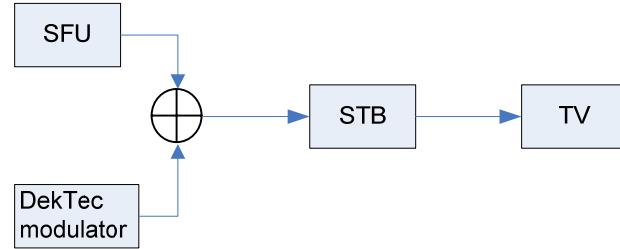


----End

## 2.4 Digital ACI ( $N \pm 1$ ) Test

Figure 2-17 shows the block diagram for the digital adjacent-channel interference (ACI) test.

Figure 2-17 Block diagram for the digital ACI test





## 2.4.1 Test Guide

### Digital ACI (N±1) Test

Test Object: Hi3137 performance with digital ACI

Test Conditions:

- SFU test model
  - Set **FREQUENCY** to **666 MHz**.
  - Set **BANDWIDTH** to **8 MHz**.
  - Set **NOISE** and **FADING** to **OFF**.
- DekTec modulator parameters
  - Set the modulation mode to **DVB-T**.
  - Set the FFT size to **8K**.
  - Set the constellation to **64-QAM**.
  - Set the internal code rate to **2/3**.
  - Set the guard interval to **G=1/32**.
  - Set the bandwidth to **8 MHz**.
  - Set the signal level to **-25 dBm**.
  - Set the output signal frequency to **674 MHz** for the N+1 test.
  - Set the output signal frequency to **658 MHz** for the N-1 test.
- SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in [Table 1-1](#).

Test Networking: See [Figure 2-17](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the DekTec parameters to the DekTec modulator.
- Step 2** Set the mode (opt4, opt5, or opt6) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -25 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

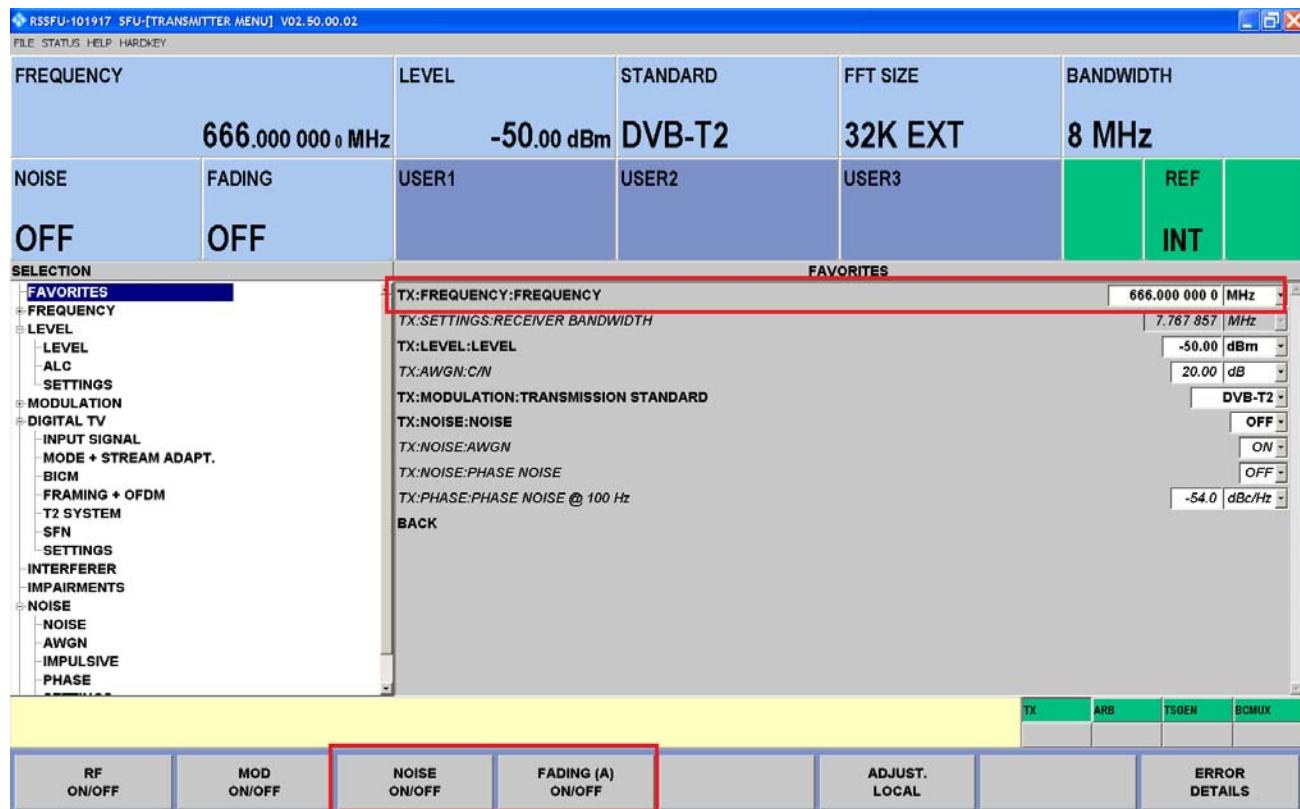


## 2.4.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, N+1 mode.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz**. See [Figure 2-18](#).

**Figure 2-18** Setting the test model and signal parameters

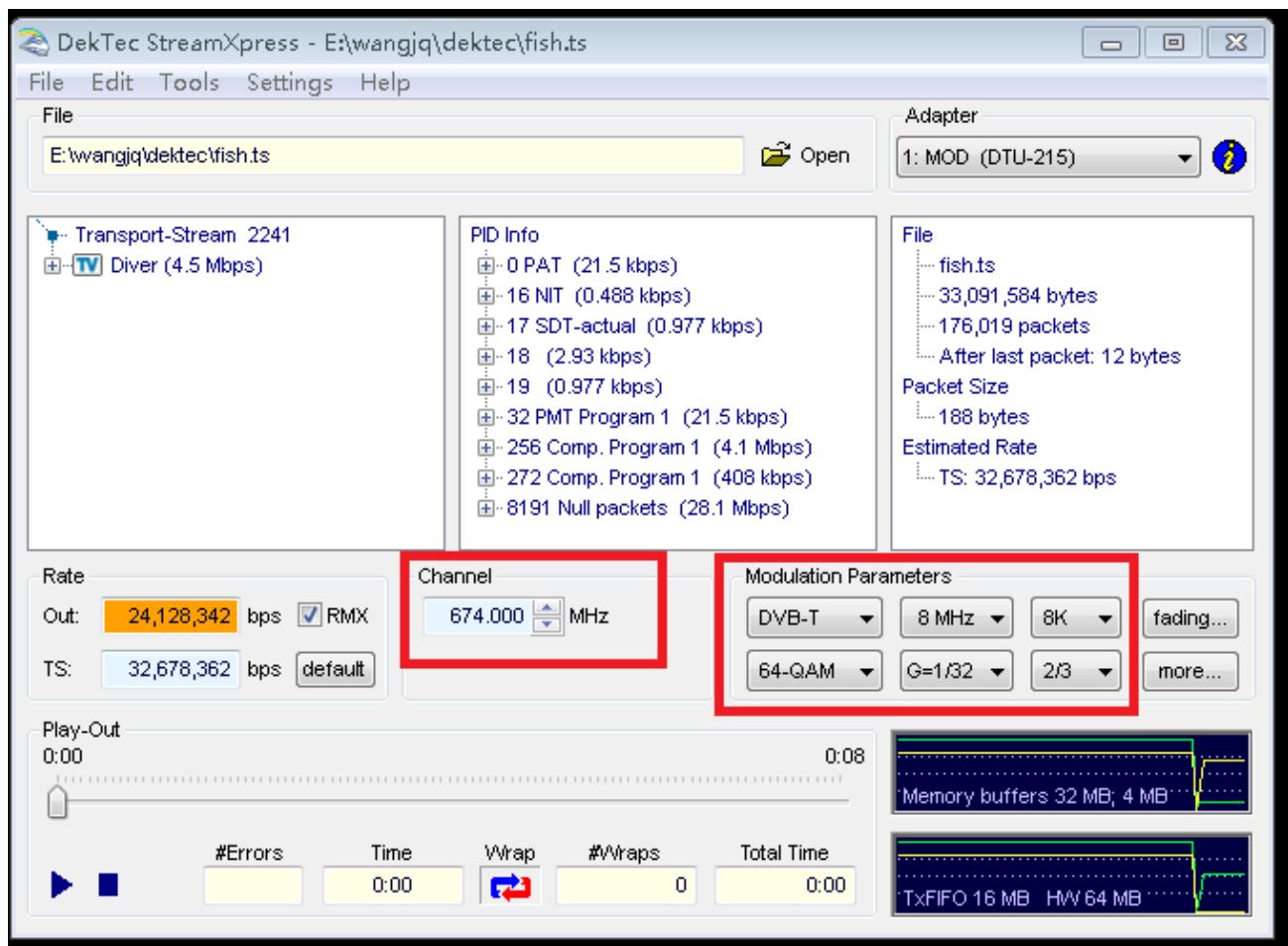


**Step 2** Set the DekTec modulator as shown in [Figure 2-19](#).

- Set the modulation mode to **DVB-T**.
- Set the FFT size to **8K**.
- Set the constellation to **64-QAM**.
- Set the internal code rate to **2/3**.
- Set the guard interval to **G=1/32**.
- Set the frequency to **674 MHz**.
- Set the bandwidth to **8 MHz**.
- Set the signal level to **-25 dBm**.



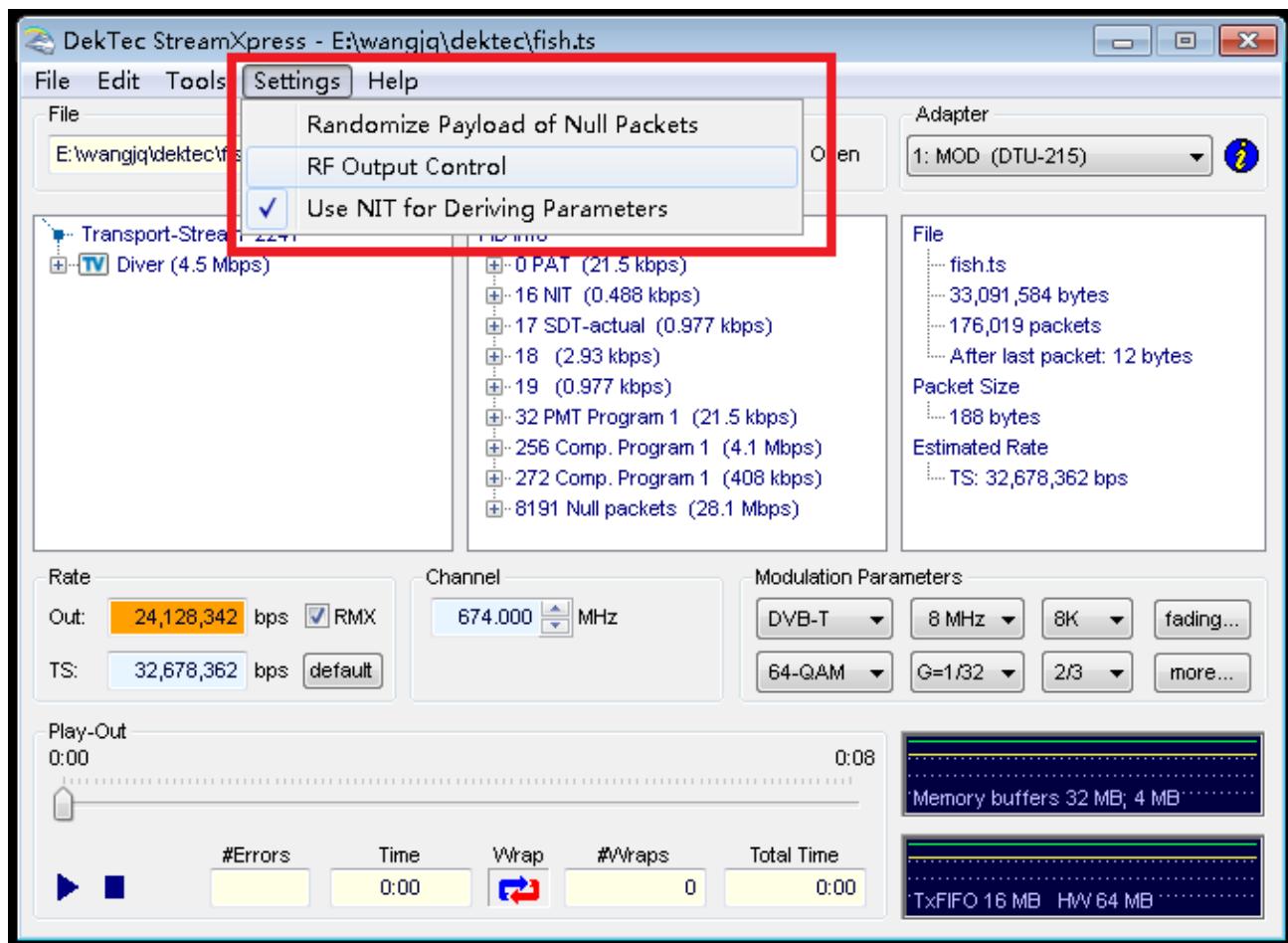
Figure 2-19 DekTec modulator settings



Step 3 Choose Settings > RF Output Control, as shown in Figure 2-20.



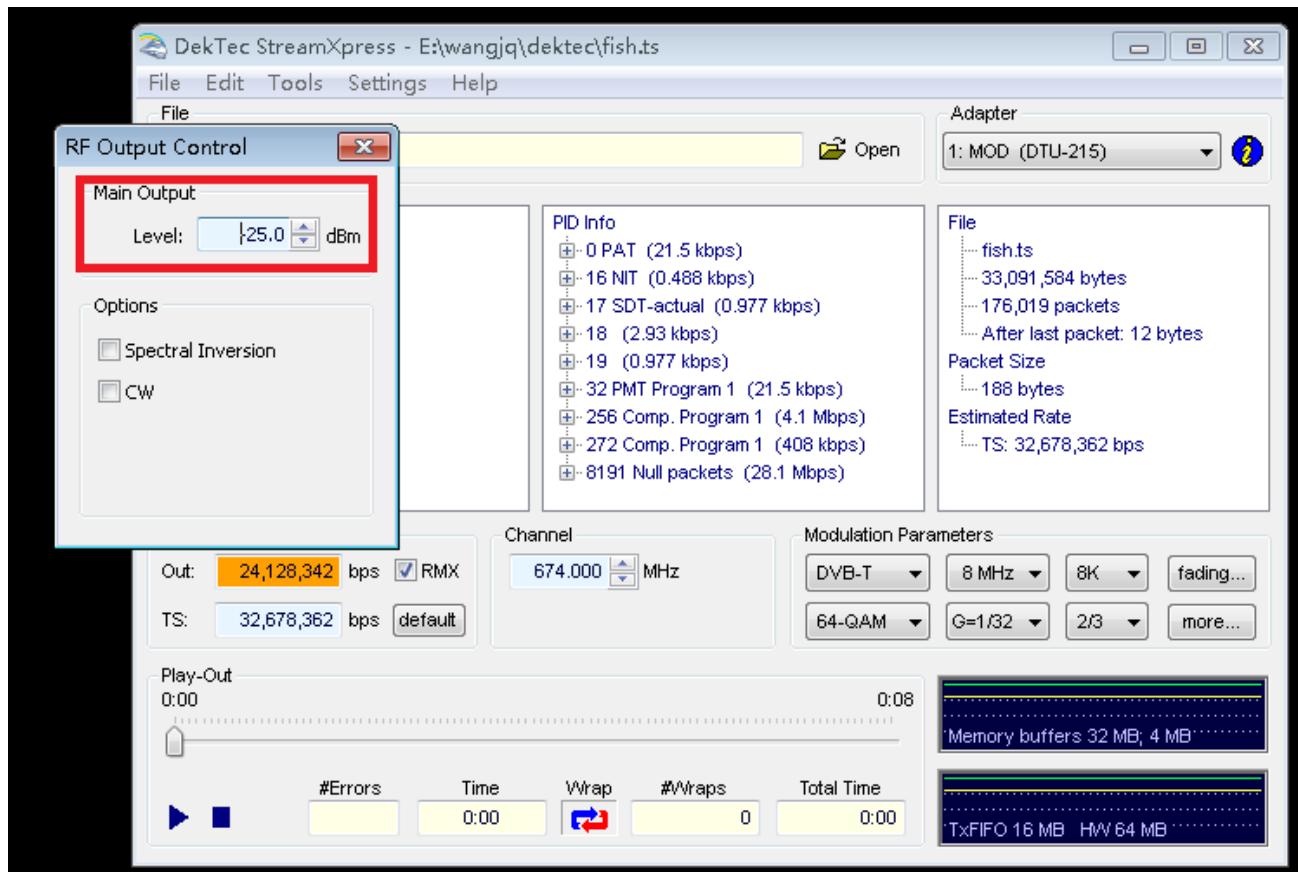
Figure 2-20 RF Output Control



Step 4 Set Level to **-25 dBm**, as shown in Figure 2-21.



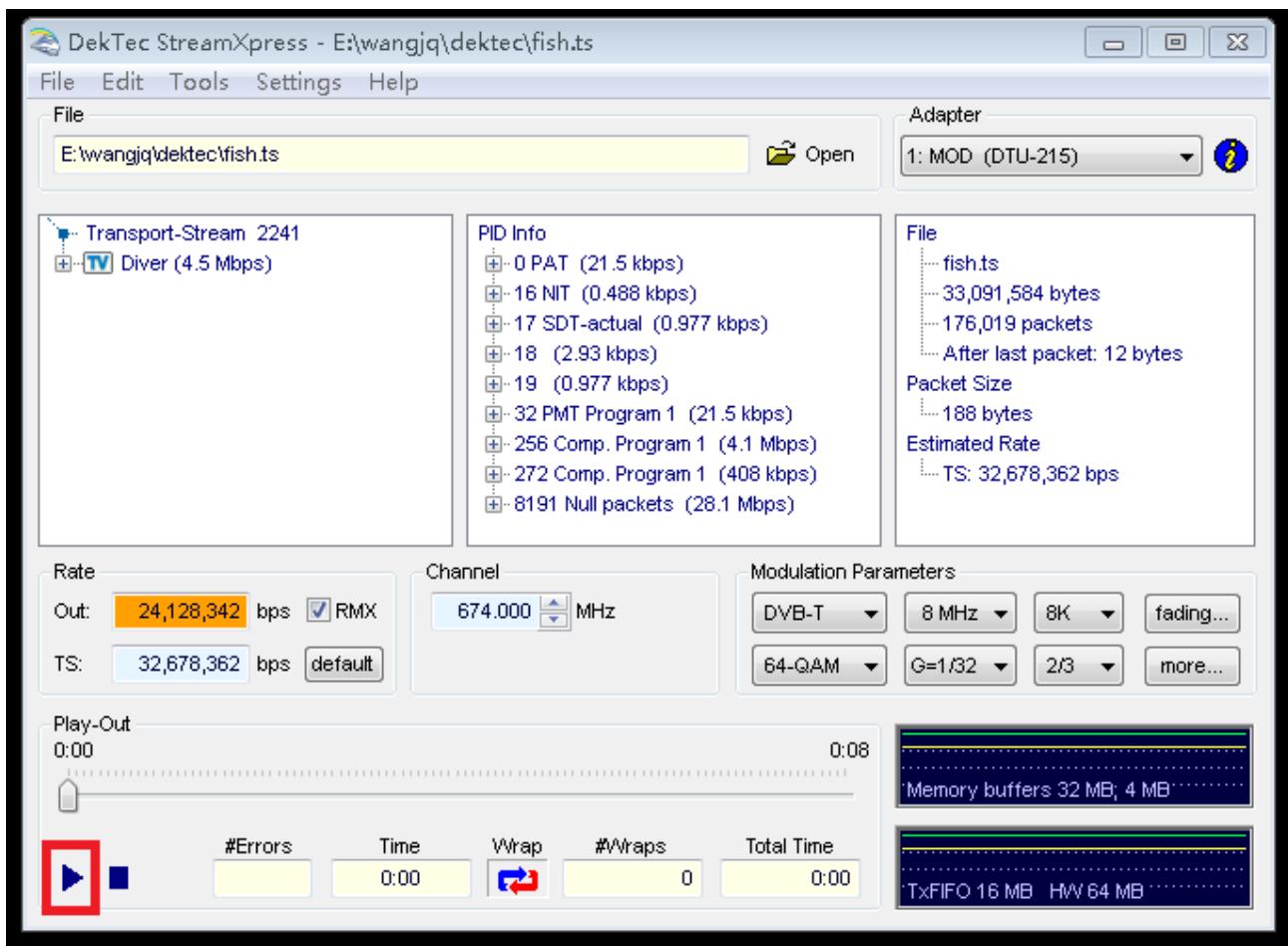
Figure 2-21 Setting Level to -25 dBm



Step 5 Click the play button in the lower left corner to start playback, as shown in Figure 2-22.



Figure 2-22 Clicking the play button

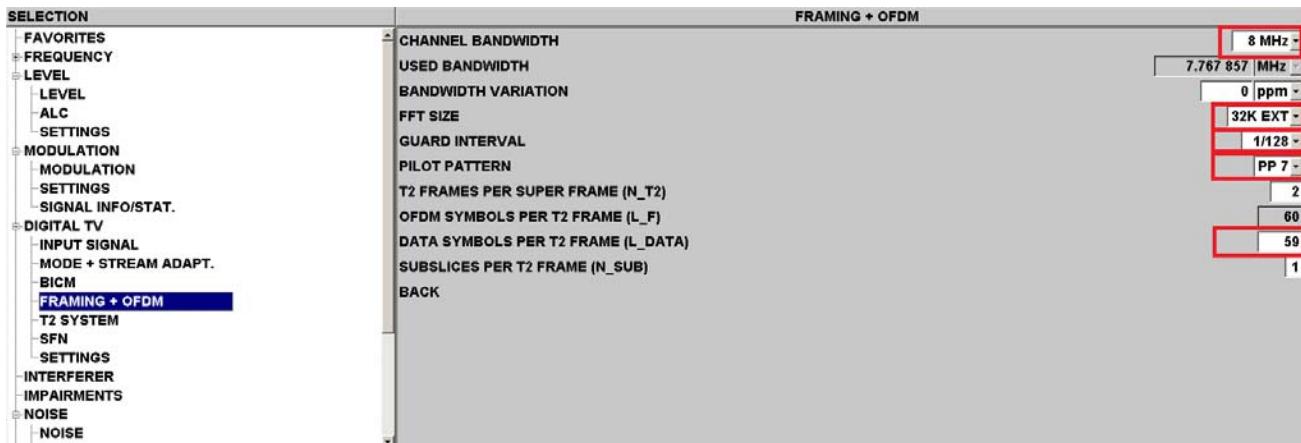


**Step 6** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-23](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



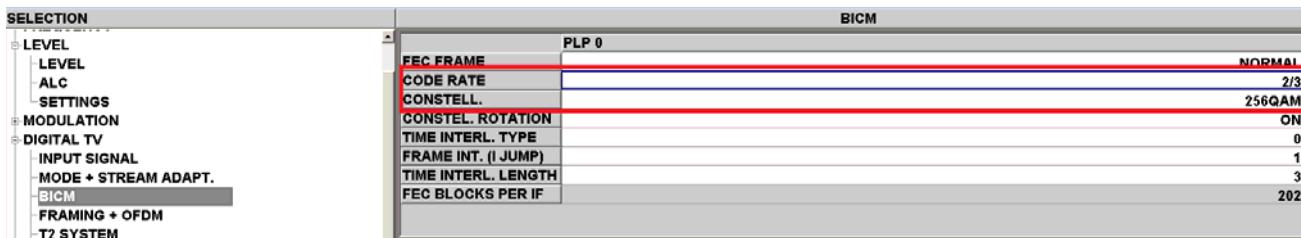
Figure 2-23 FRAMING + OFDM settings



Step 7 Choose **DIGITAL TV > BICM**, as shown in Figure 2-24.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

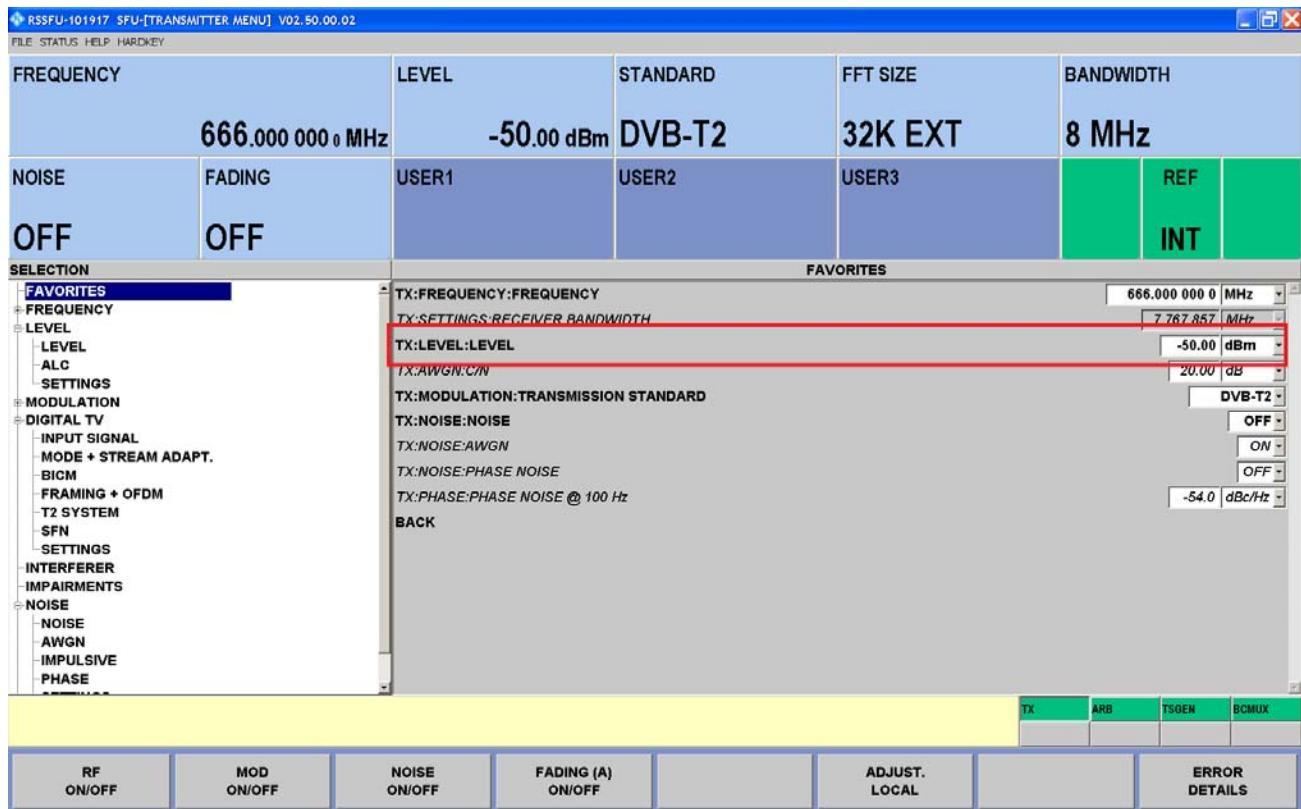
Figure 2-24 BICM settings



Step 8 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract **-25** dBm from the value to obtain the C/I value.



Figure 2-25 Adjusting the LEVEL value

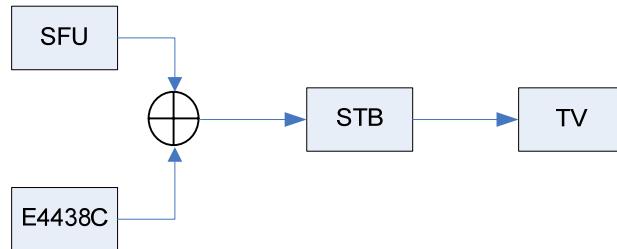


----End

## 2.5 LTE (BS-A) Channel Rejection Ratio Test

Figure 2-26 shows the networking for the LTE channel rejection ratio test.

Figure 2-26 Block diagram for the LTE channel rejection ratio test



### 2.5.1 Test Guide

#### LTE (BS-A) Channel Rejection Ratio Test

Test Object: Hi3137 LTE (BS-A) suppression performance



### LTE (BS-A) Channel Rejection Ratio Test

Test Conditions:

- SFU test model
  - Set **FREQUENCY** to **786 MHz**.
  - Set **BANDWIDTH** to **8 MHz**.
  - Set **NOISE** and **FADING** to **OFF**.
- E4438C parameters
  - Set the E4438C to enable it to play BS\_100% streams.
  - Set the output frequency to 796 MHz, and set the bandwidth to 10 MHz.
  - Set the output signal strength to -15 dBm.
- SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in [Table 1-1](#).

Test Networking: See [Figure 2-26](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.
- Step 2** Set the mode (opt4, opt5, or opt6) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -15 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

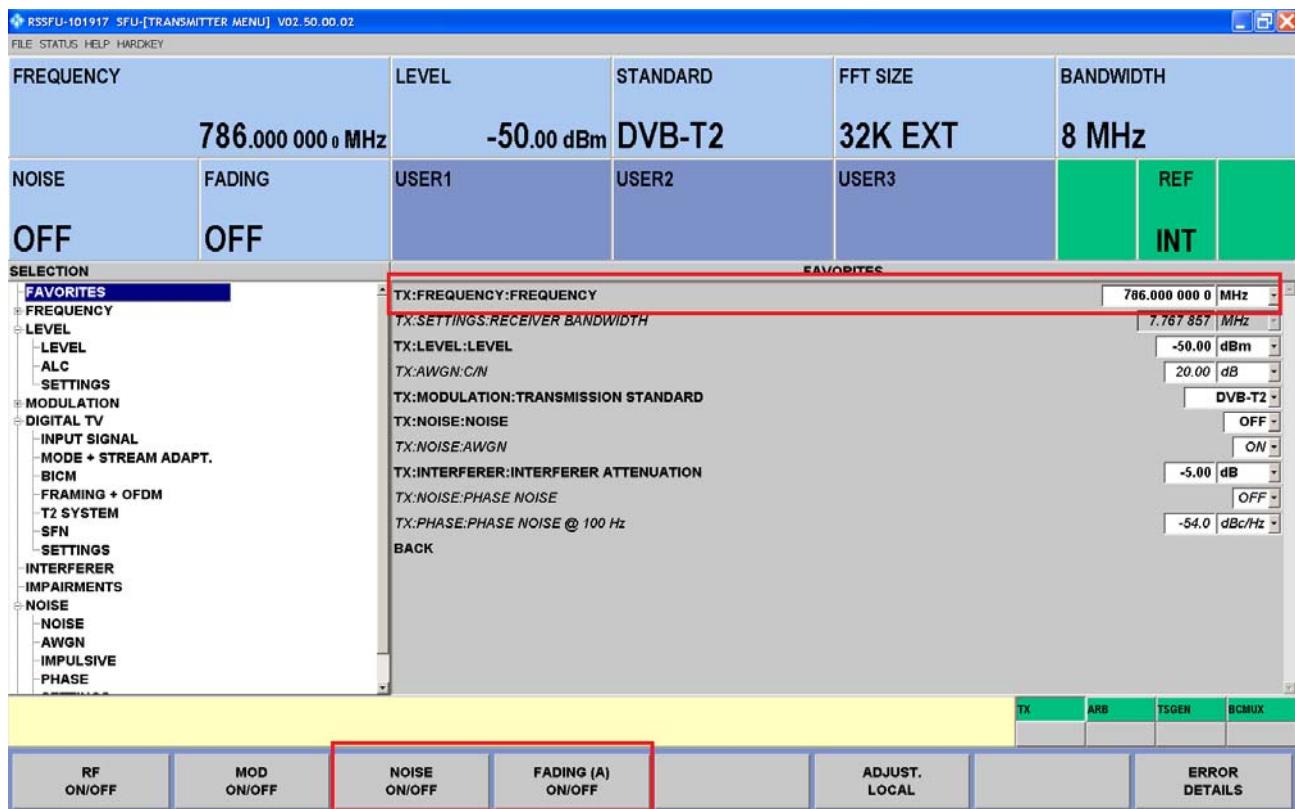
### 2.5.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A)** **ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 2-27](#).



Figure 2-27 Setting the SFU test model



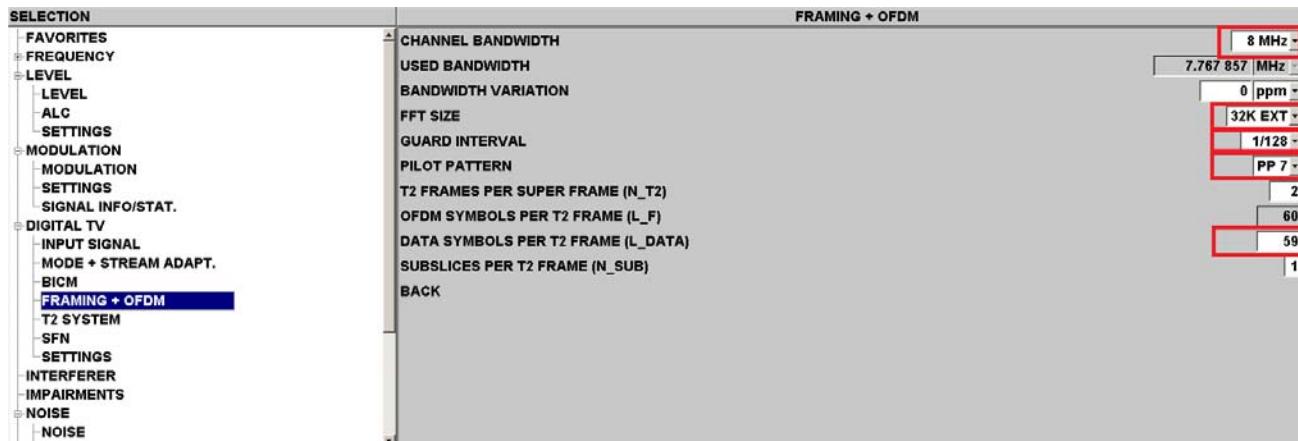
**Step 2** Set the E4438C to enable it to play BS\_100% streams, set the output frequency to 796 MHz, set the bandwidth to 10 MHz, and set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-28](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



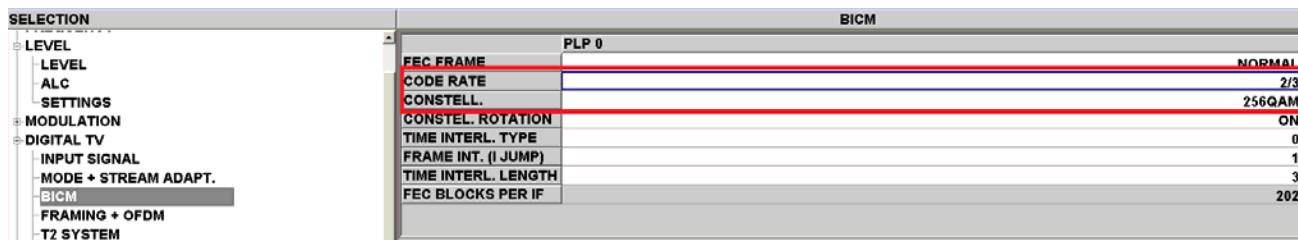
Figure 2-28 FRAMING + OFDM settings



Step 4 Choose **DIGITAL TV > BICM**, as shown in Figure 2-29.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

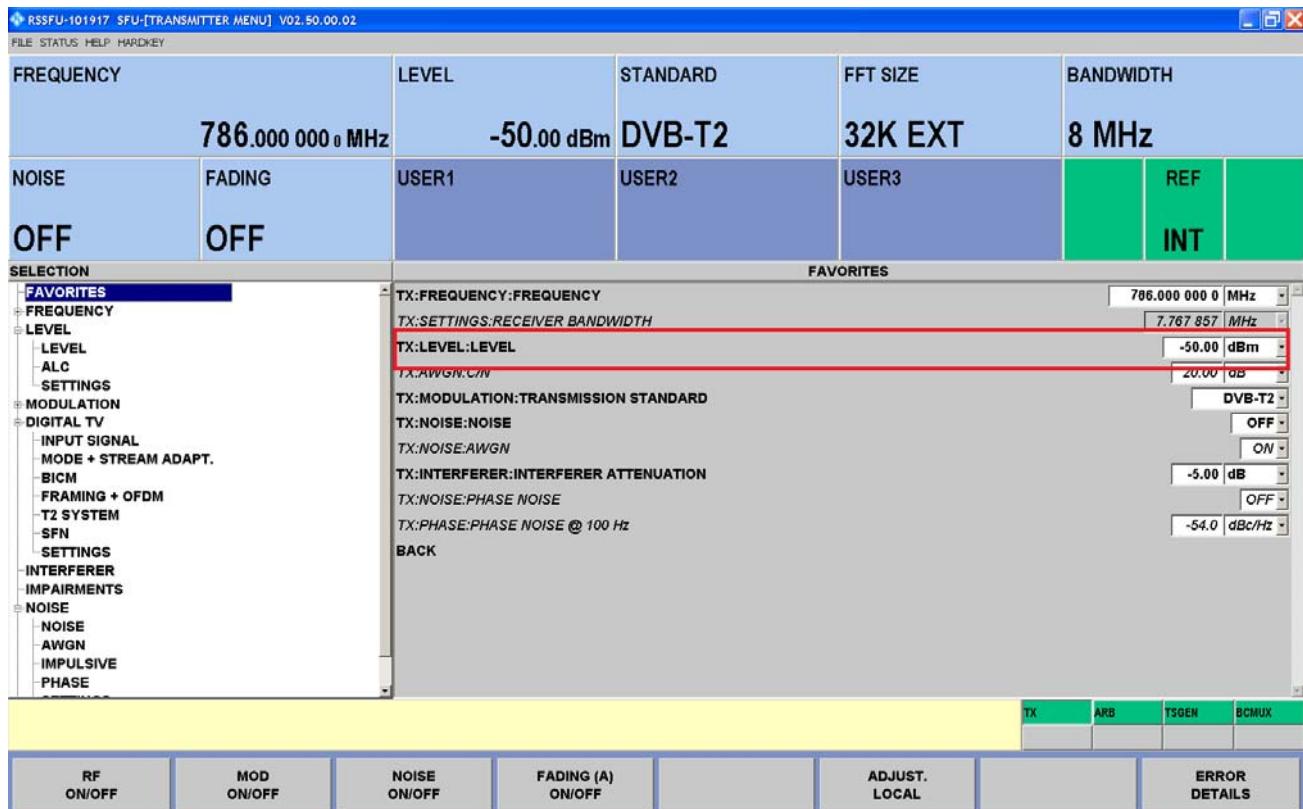
Figure 2-29 BICM settings



Step 5 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract **-15** dBm from the value to obtain the C/I value.



Figure 2-30 Adjusting the LEVEL value



----End

## 2.6 LTE (BS-B) Channel Rejection Ratio Test

### 2.6.1 Test Guide

LTE (BS-B) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (BS-B) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play BS_100% streams.</li><li>- Set the output frequency to 806 MHz.</li><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4,</li></ul>



LTE (BS-B) Channel Rejection Ratio Test
opt5, and opt6 in <a href="#">Table 1-1</a> .
Test Networking: See <a href="#">Figure 2-26</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract –15 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

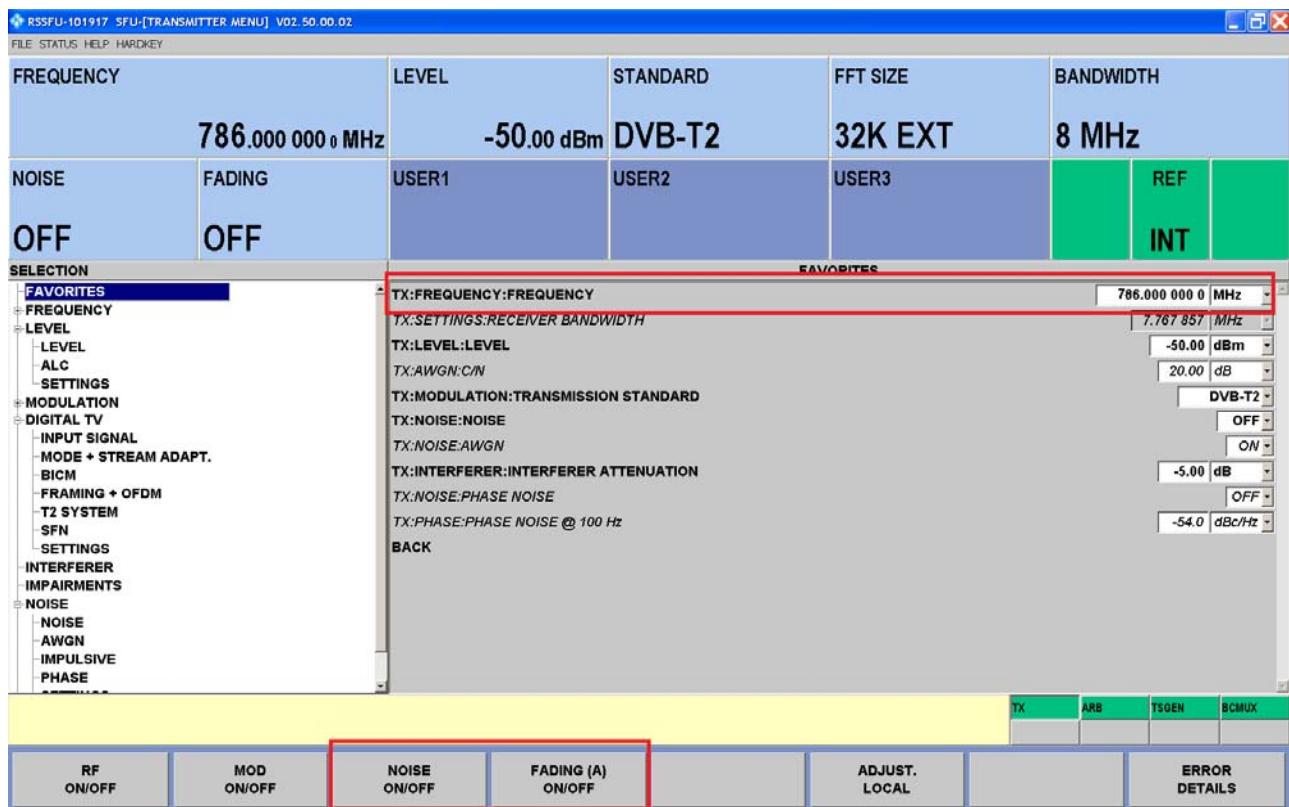
## 2.6.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 2-31](#).



Figure 2-31 Setting the SFU test model



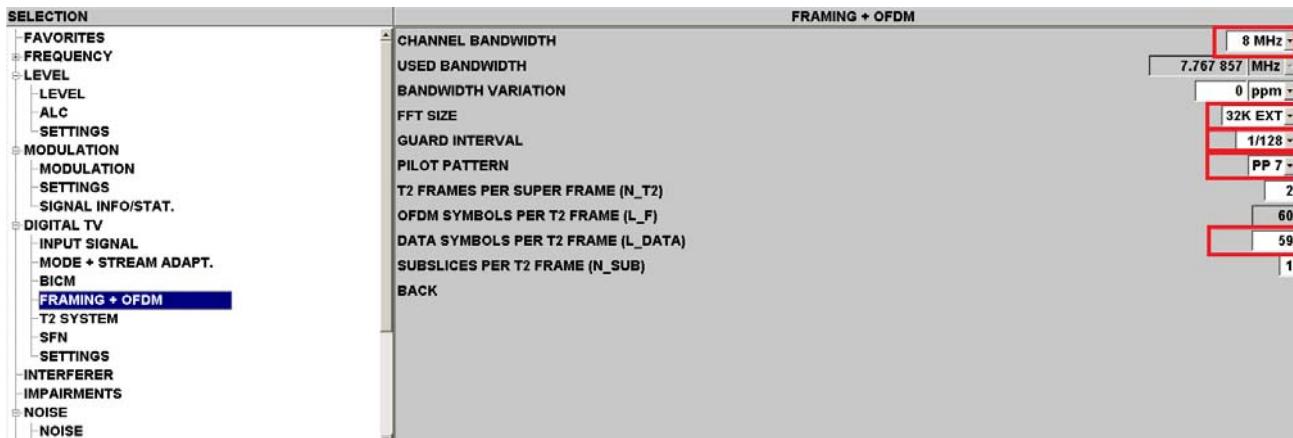
**Step 2** Set the E4438C to enable it to play BS\_100% streams, set the output frequency to 806 MHz, set the bandwidth to 10 MHz, and set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-32](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



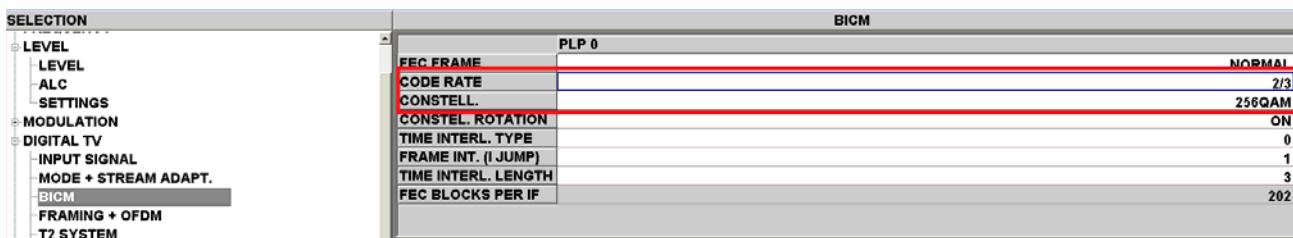
Figure 2-32 FRAMING + OFDM settings



Step 4 Choose **DIGITAL TV > BICM**, as shown in Figure 2-33.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

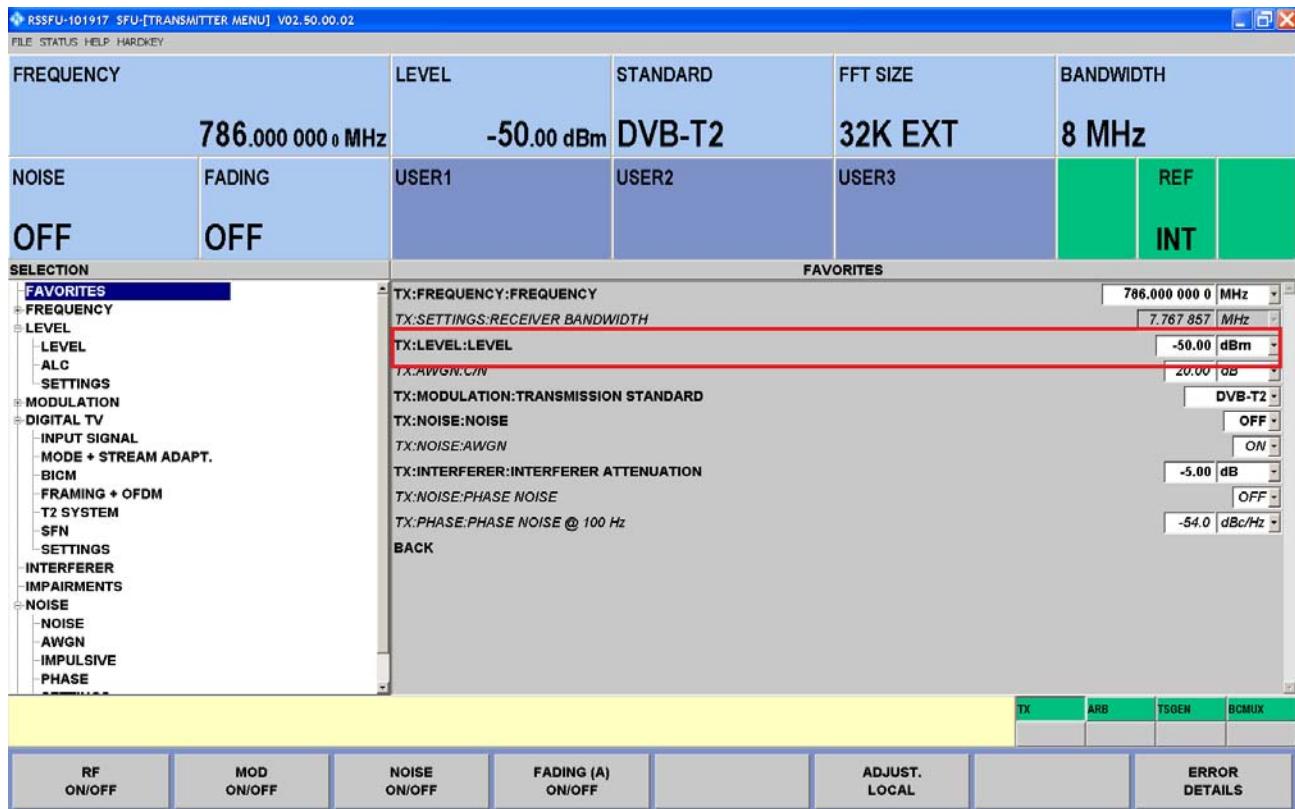
Figure 2-33 BICM settings



Step 5 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract **-15** dBm from the value to obtain the C/I value.



Figure 2-34 Adjusting the LEVEL value



----End

## 2.7 LTE (UE-A) Channel Rejection Ratio Test

### 2.7.1 Test Guide

LTE (UE-A) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (UE-A) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play UE_20Mbs streams.</li><li>- Set the output frequency to 837 MHz.</li><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4,</li></ul>



LTE (UE-A) Channel Rejection Ratio Test
opt5, and opt6 in <a href="#">Table 1-1</a> .
Test Networking: See <a href="#">Figure 2-26</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract –15 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

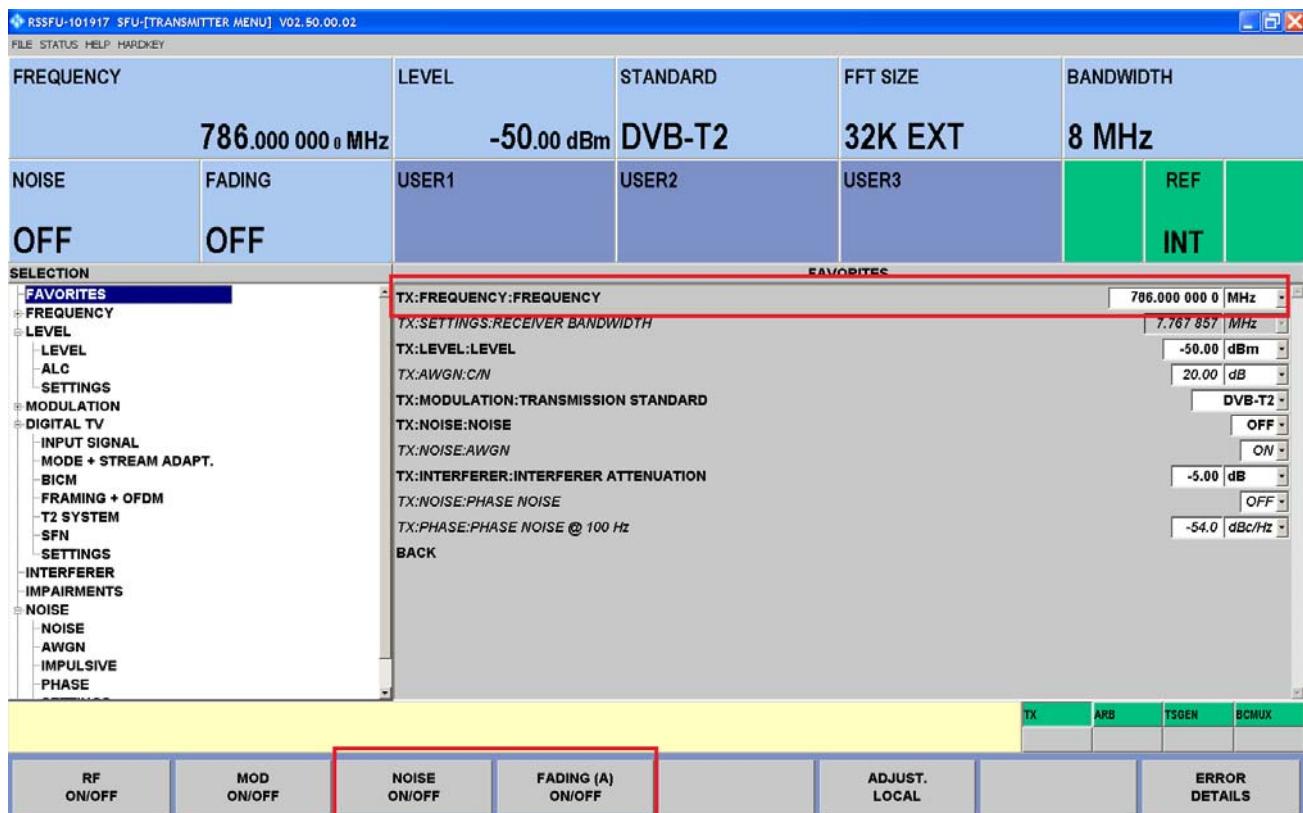
## 2.7.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 2-35](#).



Figure 2-35 Setting the SFU test model



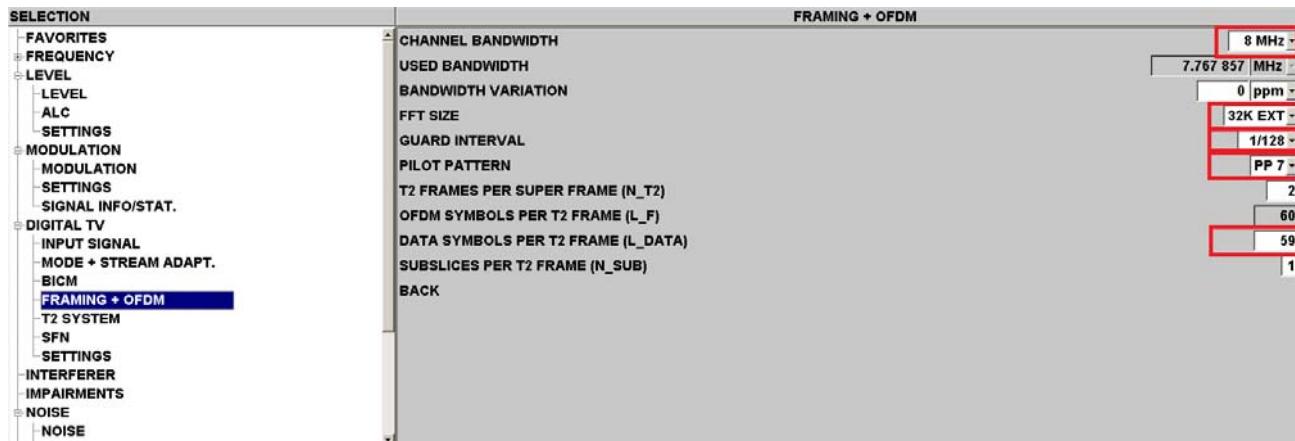
**Step 2** Set the E4438C to enable it to play UE\_20Mbs streams, set the output frequency to 837 MHz, set the bandwidth to 10 MHz, and set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-36](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



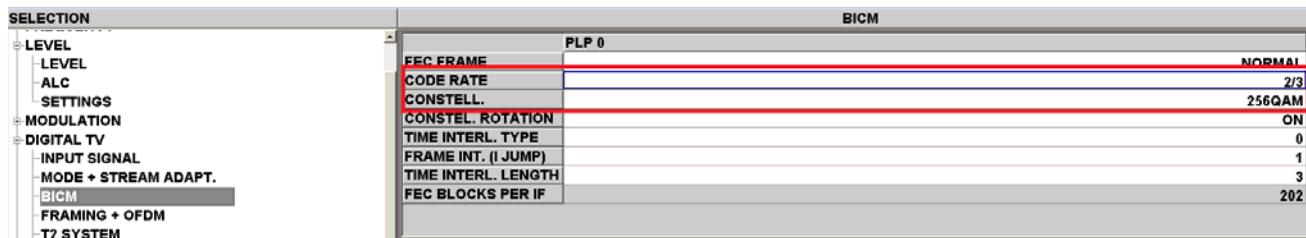
Figure 2-36 FRAMING + OFDM settings



Step 4 Choose **DIGITAL TV > BICM**, as shown in Figure 2-37.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

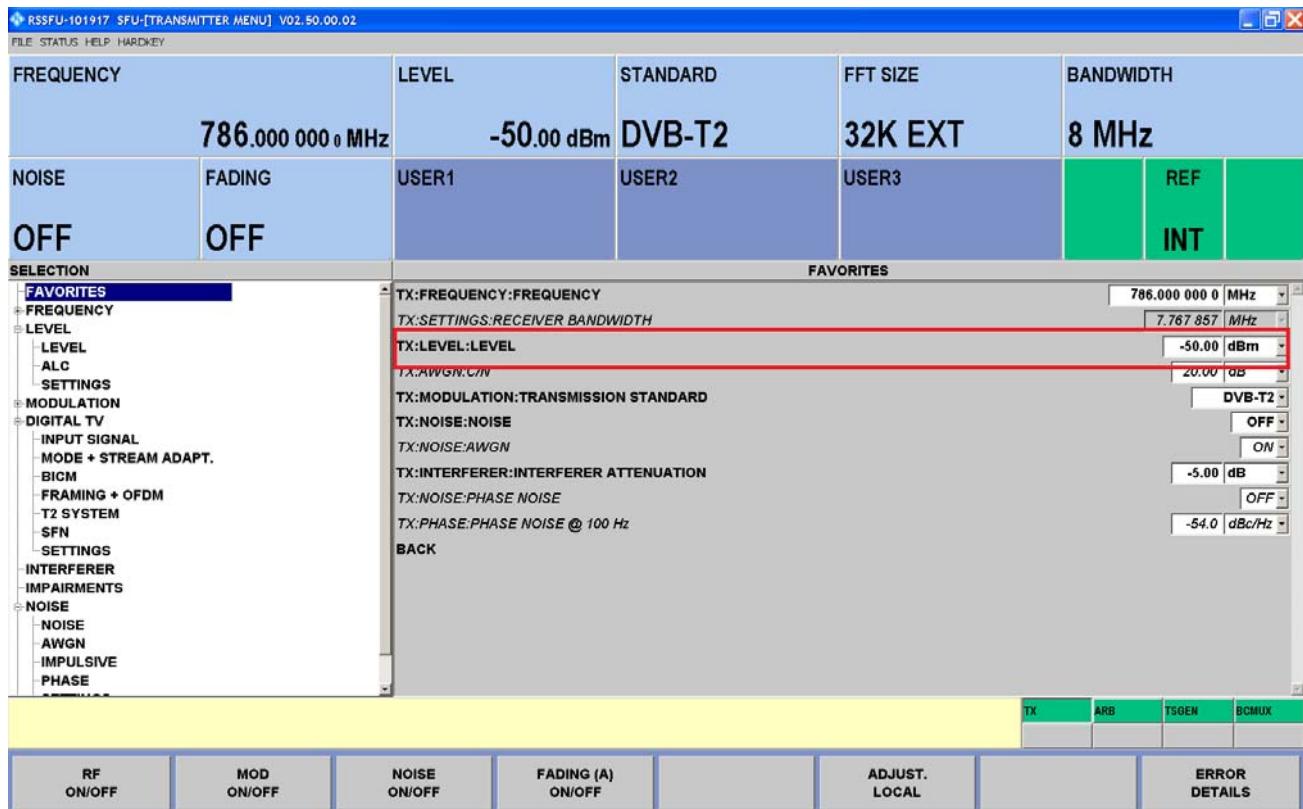
Figure 2-37 BICM settings



Step 5 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract **-15** dBm from the value to obtain the C/I value.



Figure 2-38 Adjusting the LEVEL value



----End

## 2.8 LTE (UE-C) Channel Rejection Ratio Test

### 2.8.1 Test Guide

LTE (UE-C) Channel Rejection Ratio Test	
Test Object: Hi3137 LTE (UE-C) suppression performance	
Test Conditions:	
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play UE_20Mbs streams.</li><li>- Set the output frequency to 857 MHz.</li><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4,</li></ul>	



LTE (UE-C) Channel Rejection Ratio Test
opt5, and opt6 in <a href="#">Table 1-1</a> .
Test Networking: See <a href="#">Figure 2-26</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract –15 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

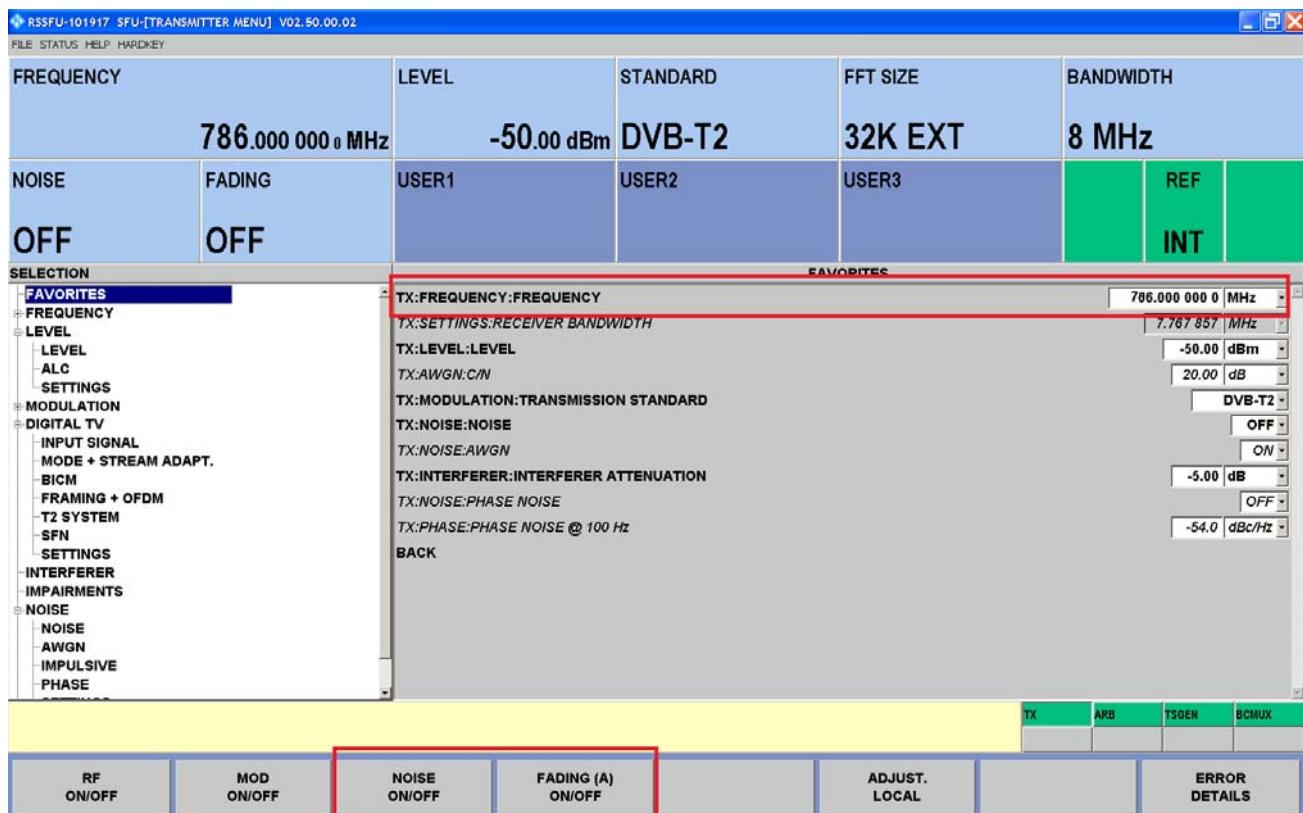
## 2.8.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 2-39](#).



Figure 2-39 Setting the SFU test model



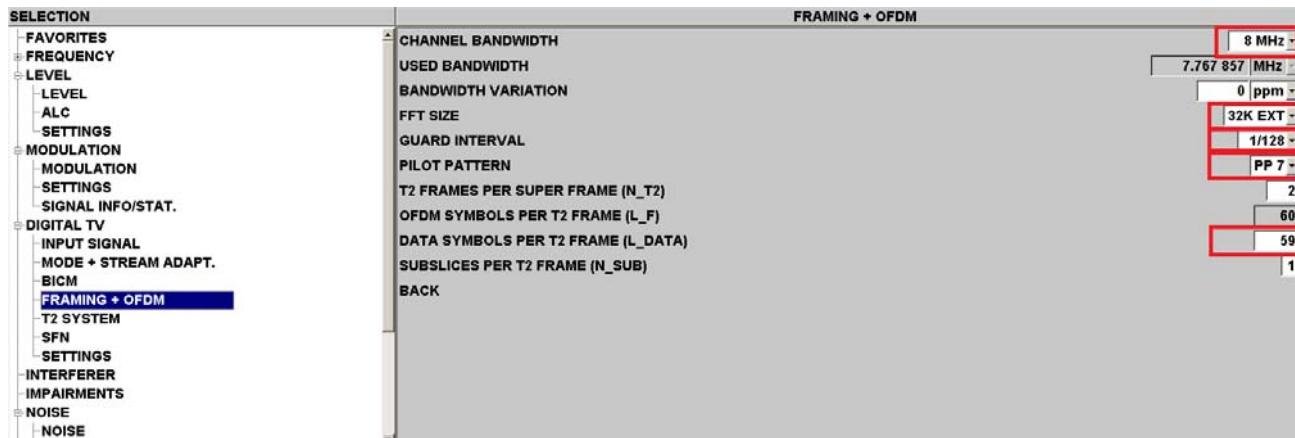
**Step 2** Set the E4438C to enable it to play UE\_20Mbs streams, set the output frequency to 857 MHz, set the bandwidth to 10 MHz, and set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-40](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



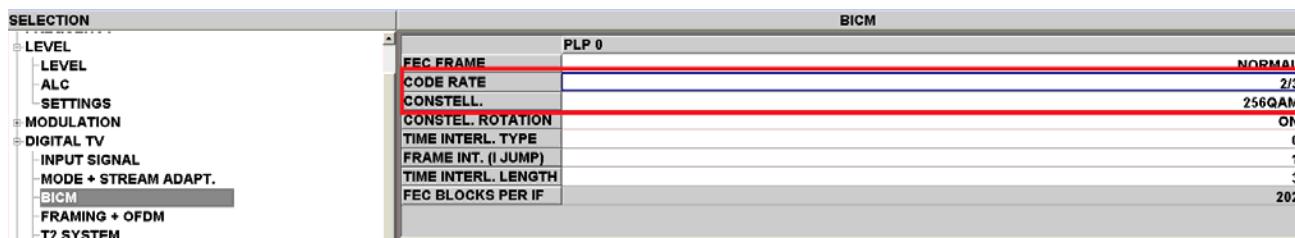
Figure 2-40 FRAMING + OFDM settings



Step 4 Choose **DIGITAL TV > BICM**, as shown in Figure 2-41.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

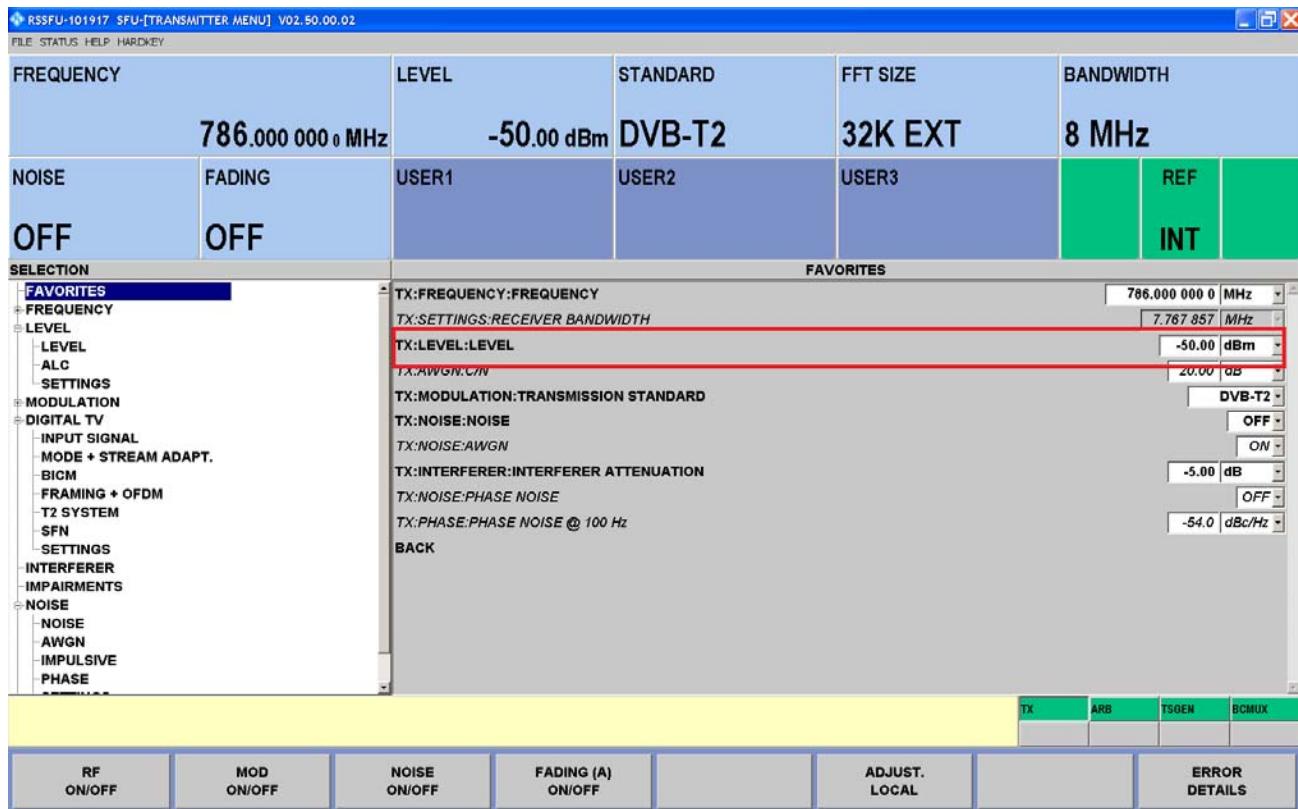
Figure 2-41 BICM settings



Step 5 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract **-15** dBm from the value to obtain the C/I value.



Figure 2-42 Adjusting the LEVEL value



----End

## 2.9 Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI)

### 2.9.1 Test Guide

Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI)	
Test Object: Hi3137 performance with echoes	
Test Conditions:	
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>.</li><li>- Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Set <b>FADING</b> to <b>ON</b>.</li><li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>ON</b></li></ul></li></ul>	



### Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI)

- (set STATE in other columns to OFF).
- Set PROFILE to CONST.PHASE.
  - Set PATH LOSS to 0.
  - Set ADDIT.DELAY to 0.
  - Set CONST PHASE in the 1-1 column to 0.
  - Set CONST PHASE in the 2-1 column to 90.
  - SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in [Table 1-1](#).

Test Networking: See [Figure 2-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set the mode (opt4, opt5, or opt6) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).
- Step 3** Select the guard interval of the test mode (opt4, opt5, or opt6) based on [Table 1-5](#), multiply the guard interval by 0.5 or 0.95, and set **BASIC DELAY** in the 2-1 column in the SFU to the obtained delay value.
- Step 4** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 5** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 6** Repeat steps 2 to 5 until all tests are complete.

----End

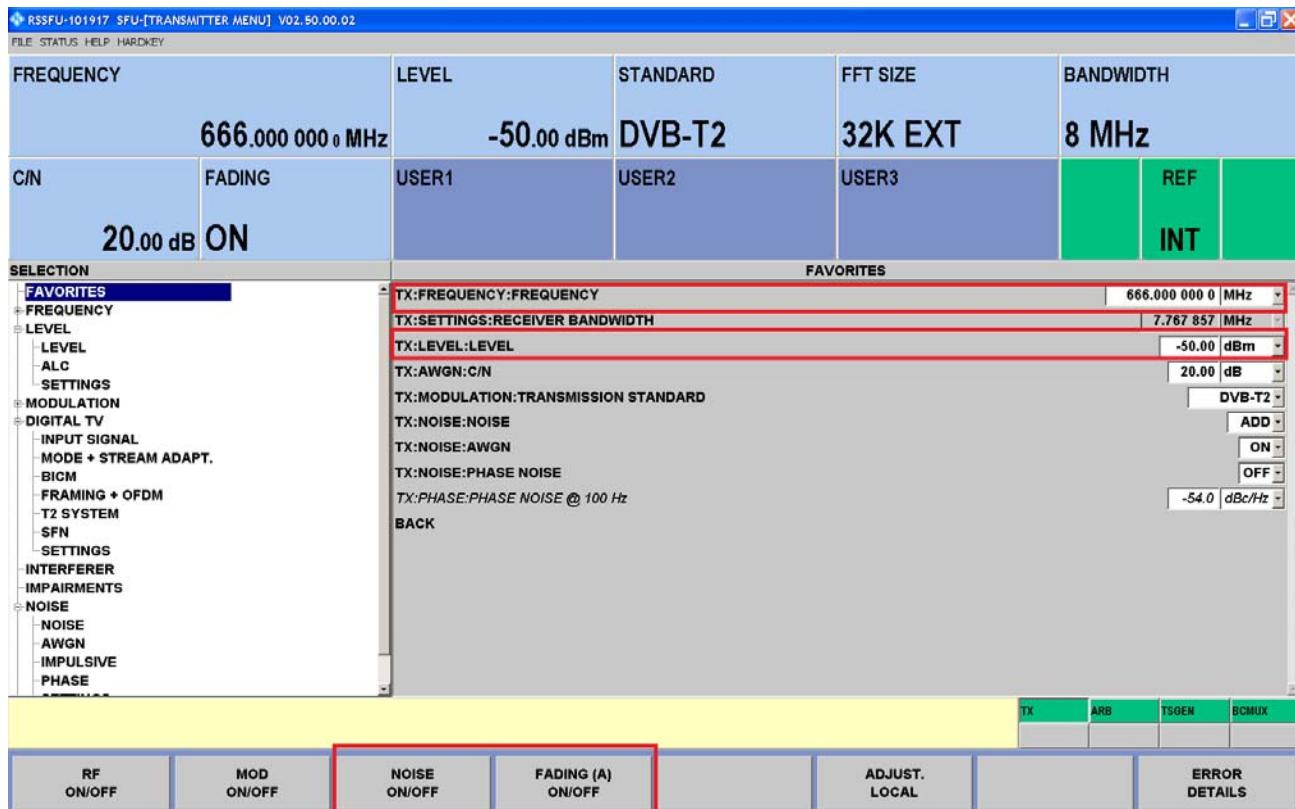
## 2.9.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, 0.5GI.

- Step 1** Set **NOISE** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 2-43](#).



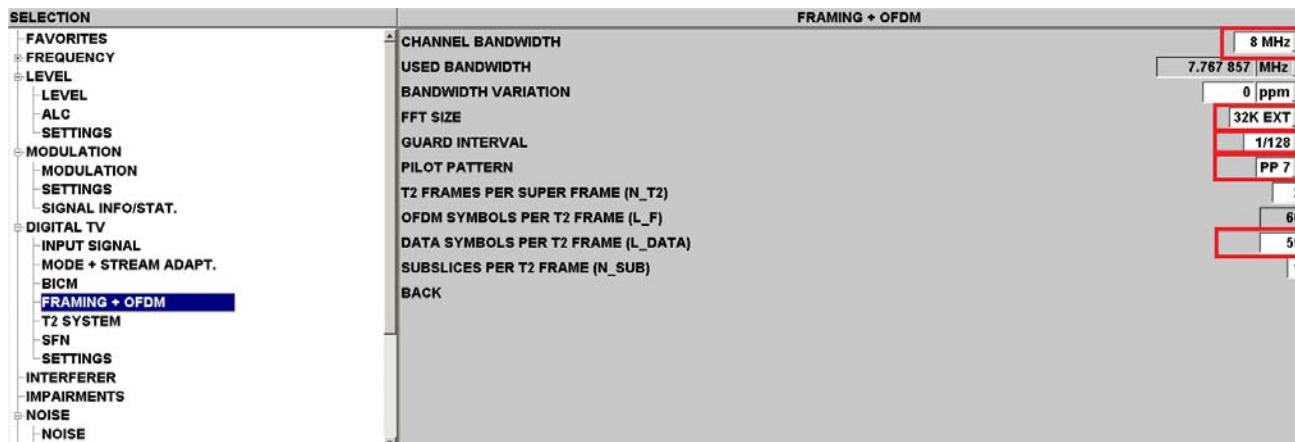
Figure 2-43 Setting the SFU test model



Step 2 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-44](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

Figure 2-44 FRAMING + OFDM settings

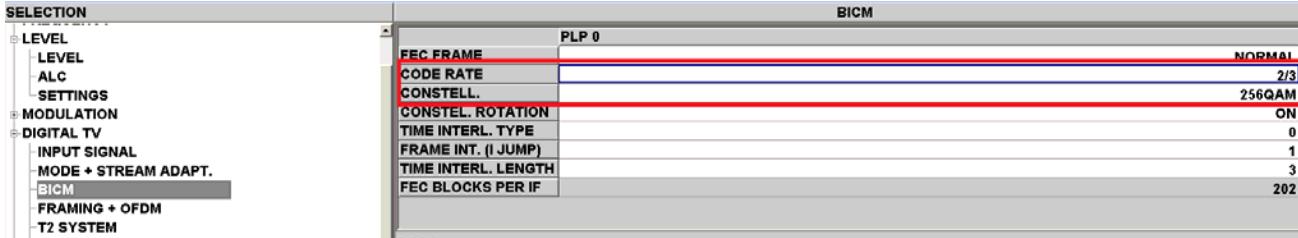




**Step 3** Choose **DIGITAL TV > BICM**, as shown in [Figure 2-45](#).

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

**Figure 2-45** BICM settings



**Step 4** Multiply the guard interval corresponding to opt6 (28  $\mu$ s according to [Table 2-1](#)) by 0.5. The result is 14  $\mu$ s.

**Table 2-1** Selecting the guard interval

DVB-T2	Guard Interval							
FFT	1/128	1/32	1/16	19/256	1/8	19/128	1/4	
32K	28	112	224	266	448	532	N/A	
16K	14	56	112	133	224	266	448	
8K	7	28	56	66.5	112	133	224	
4K	N/A	14	28	N/A	56	N/A	112	
2K	N/A	7	14	N/A	28	N/A	56	
1K	N/A	N/A	7	N/A	14	N/A	28	

**Step 5** Choose **FADING > PROFILE**, as shown in [Figure 2-46](#).

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **PATH LOSS** to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST PHASE** in the **1-1** column to **0**.
- Set **CONST PHASE** in the **2-1** column to **90**.
- Set **BASIC DELAY** in the **2-1** column to **14  $\mu$ s**, which is obtained in step 4.



**Figure 2-46 PROFILE settings**

The screenshot shows the 'PROFILE' settings window. On the left, there's a tree view of configuration categories: SETTINGS, MODULATION, DIGITAL TV, INPUT SIGNAL, MODE + STREAM ADAPT., BICM, FRAMING + OFDM, T2 SYSTEM, SFN, SETTINGS, INTERFERER, IMPAIRMENTS, NOISE, NOISE, AWGN, IMPULSIVE, PHASE, SETTINGS, FADING, and FADING. The main area is titled 'STANDARD' under 'PARAMETER SET' and 'CONFIGURATION'. It lists parameters such as STATE, PROFILE, CONST.PHASE, PATH LOSS [dB], BASIC DELAY [us], ADDIT. DELAY [us], RESULTING DELAY [us], POWER RATIO [dB], CONST PHASE [Deg], SPEED [m/s], FREQ. RATIO, RES. DOPPLER SHIFT [Hz], CORRELATION PATH, COEFFICIENT [%], PHASE [Deg], LOGNORMAL STATE, LOCAL CONSTANT [m], and STANDARD DEV. [dB]. Red boxes highlight the 'CONST.PHASE' column and the 'ON' column for the first two rows.

**Step 6** Adjust the C/N value to complete the test. See Figure 2-47.

**Figure 2-47** Adjusting the C/N value

The screenshot shows the 'TRANSMITTER MENU' interface. At the top, it displays 'RSSFU-101917 SFU-[TRANSMITTER MENU] V02.50.00.02'. Below that are sections for 'FREQUENCY' (666.000 000 MHz), 'LEVEL' (-50.00 dBm), 'STANDARD' (DVB-T2), and 'BANDWIDTH' (8 MHz). In the middle, there's a row for 'C/N' with 'FADING' selected, and '20.00 dB ON' highlighted. To the right, there are buttons for 'REF' and 'INT'. On the left, a 'SELECTION' tree includes FAVORITES, FREQUENCY, LEVEL, SETTINGS, MODULATION, DIGITAL TV, INPUT SIGNAL, MODE + STREAM ADAPT., BICM, FRAMING + OFDM, T2 SYSTEM, SFN, SETTINGS, INTERFERER, IMPAIRMENTS, NOISE, NOISE, AWGN, IMPULSIVE, and PHASE. The right side has a 'FAVORITES' section with fields for TX:LEVEL:LEVEL (-50.00 dBm), TX:AWGN:C/N (20.00 dB), TX:MODULATION:TRANSMISSION STANDARD (DVB-T2), and TX:PHASE:PHASE NOISE (@ 100 Hz). A yellow bar at the bottom contains buttons for TX, ARB, TSGEN, and BCMUX. Below that is a row of buttons for RF ON/OFF, MOD ON/OFF, NOISE ON/OFF, FADING (A) ON/OFF, ADJUST. LOCAL, and ERROR DETAILS.

----End



## 2.10 Test with a 0 dB Echo, 10 Hz/20 Hz Doppler

### 2.10.1 Test Guide

Test with a 0 dB Echo, 10 Hz/20 Hz Doppler
Test Object: Hi3137 performance with echoes
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>, and set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Set <b>FADING</b> to <b>ON</b>.</li><li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li><li>- Set <b>PROFILE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>CONST.PHASE</b> and <b>PURE DOPP</b> respectively.</li><li>- Set <b>RES DOPPLER SHIFT</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>0</b> and <b>10/20</b> respectively.</li><li>- Set <b>PATH LOSS</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>0</b>.</li><li>- Set <b>ADDIT.DELAY</b> to <b>0</b>.</li><li>- Set <b>CONST PHASE</b> to <b>0</b>.</li><li>- Set <b>BASIC DELAY</b> in the <b>2-1</b> column to <b>20</b>.</li><li>- Set <b>FREQ RATIO</b> to <b>1</b>.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in <a href="#">Table 1-1</a>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .
Test Procedure: <ol style="list-style-type: none"><li><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</li><li><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</li><li><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</li><li><b>Step 4</b> Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.</li><li><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete. ----End</li></ol>

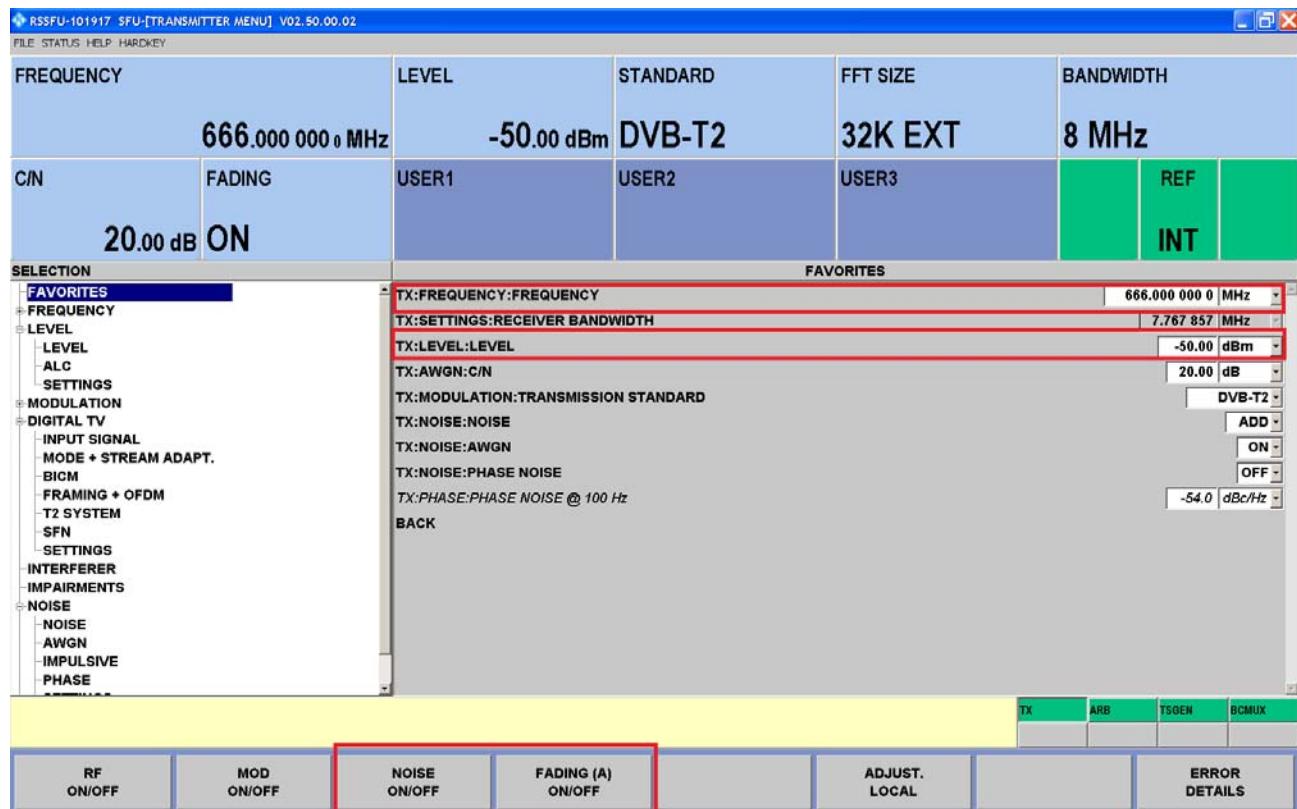


## 2.10.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, Doppler=20 Hz.

**Step 1** Set **NOISE** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 2-48](#).

**Figure 2-48** Setting the SFU test model

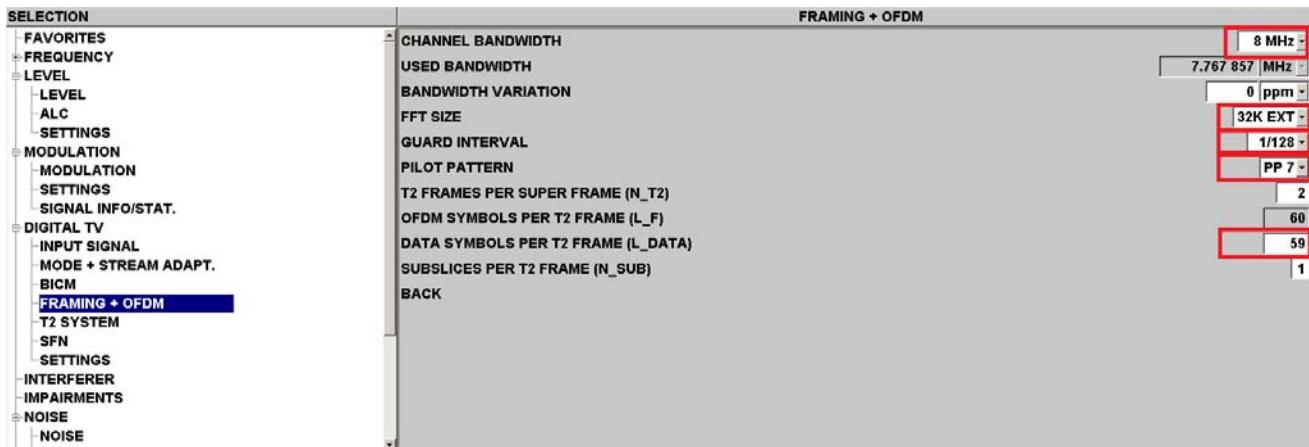


**Step 2** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-49](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



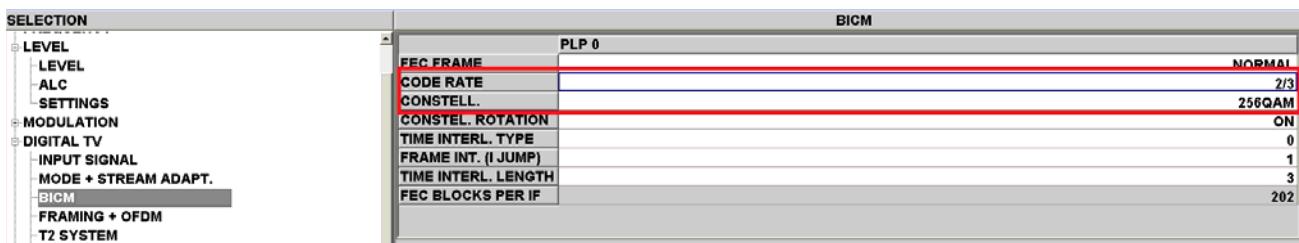
Figure 2-49 FRAMING + OFDM settings



Step 3 Choose **DIGITAL TV > BICM**, as shown in Figure 2-50.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

Figure 2-50 BICM settings



Step 4 Choose **FADING > PROFILE**, as shown in Figure 2-51.

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** in the **1-1** and **2-1** columns to **CONST.PHASE** and **PURE DOPP** respectively.
- Set **RES DOPPLER SHIFT** in the **1-1** and **2-1** columns to **0** and **20** respectively.
- Set **PATH LOSS** in the **1-1** and **2-1** columns to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST.PHASE** to **0**.
- Set **BASIC DELAY** in the **2-1** column to **20**.
- Set **FREQ RATIO** to **1**.



**Figure 2-51 PROFILE settings**

SELECTION		PROFILE						USER	
		STANDARD			PARAMETER SET			d:/FADING/USER/unsaved_profile.fad	
		CONFIGURATION						STANDARD DELAY	
STATE	ON	2	OFF	OFF	OFF	OFF	ON	OFF	OFF
PROFILE	PURE DOPP.	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH
CONST.PHASE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PATH LOSS [dB]	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00
BASIC DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ADDT. DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RESULTING DELAY [us]	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00
POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	9.00	20.00	20.00	20.00
CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEED [m/s]	0.00	20.00	20.00	20.00	20.0	9.00	20.00	20.00	20.00
FREQ. RATIO	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RES DOPPLER SHIFT [Hz]	0.00	44.43	44.43	44.43	44.43	20.00	44.43	44.43	44.43
CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
COEFFICIENT [%]	0	0	0	0	0	0	0	0	0
PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0

**Step 5** Adjust the C/N value to complete the test. See [Figure 2-52](#).

**Figure 2-52 Adjusting the C/N value**

FREQUENCY		LEVEL	STANDARD	FFT SIZE	BANDWIDTH		
666.000 000 0 MHz		-50.00 dBm	DVB-T2	32K EXT	8 MHz		
C/N	FADING	USER1	USER2	USER3	REF	INT	
20.00 dB ON							

SELECTION		FAVORITES					
FAVORITES		TX:FREQUENCY:FREQUENCY					
FREQUENCY		TX:SETTINGS:RECEIVER BANDWIDTH					
LEVEL		TX:LEVEL:LEVEL					
LEVEL		TX:AWGN:C/N					
ALC		TX:MODULATION:TRANSMISSION STANDARD					
SETTINGS		TX:NOISE:NOISE					
MODULATION		TX:NOISE:AWGN					
DIGITAL TV		TX:NOISE:PHASE NOISE					
INPUT SIGNAL		TX:PHASE:PHASE NOISE @ 100 Hz					
MODE + STREAM ADAPT.		BACK					
BICM							
FRAMING + OFDM							
T2 SYSTEM							
SFN							
SETTINGS							
INTERFERER							
IMPAIRMENTS							
NOISE							
NOISE							
AWGN							
IMPULSIVE							
PHASE							

----End



## 2.11 Test with an Echo Outside the Guard Interval

### 2.11.1 Test Guide

Test with an Echo Outside the Guard Interval
Test Object: Hi3137 performance with echoes
Test Conditions: <ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>– Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>– Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>– Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>– Set <b>NOISE</b> to <b>OFF</b>.</li><li>– Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1</b> and <b>2-2</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li><li>– Set <b>PROFILE</b> to <b>CONST.PHASE</b>.</li><li>– Set <b>ADDIT. DELAY</b> to <b>0</b>.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in <a href="#">Table 1-1</a>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .
Test Procedure: <p><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p> <p><b>Step 3</b> Select the echo delay according to <a href="#">Table 1-2</a> based on the test mode (opt4, opt5, or opt6) and items to be tested in the test report.</p> <p><b>Step 4</b> Set <b>BASIC DELAY</b> of the SFU multipath model 2-1 to the echo delay obtained in step 3.<ul style="list-style-type: none"><li>● If the post echo type is to be tested, set <b>PATH LOSS</b> of the SFU multipath model 1-1 to <b>0</b>, and set that of the SFU multipath model 2-1 to the item to be tested.</li><li>● If the pre echo type is to be tested, set <b>PATH LOSS</b> of the SFU multipath model 2-1 to <b>0</b>, and set that of the SFU multipath model 1-1 to the item to be tested.</li></ul></p> <p><b>Step 5</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 6</b> Gradually decrease the <b>PATH LOSS</b> value configured in step 4 until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>PATH LOSS</b> value.</p> <p><b>Step 7</b> Repeat steps 2 to 6 until all tests are complete.</p> <p>----End</p>

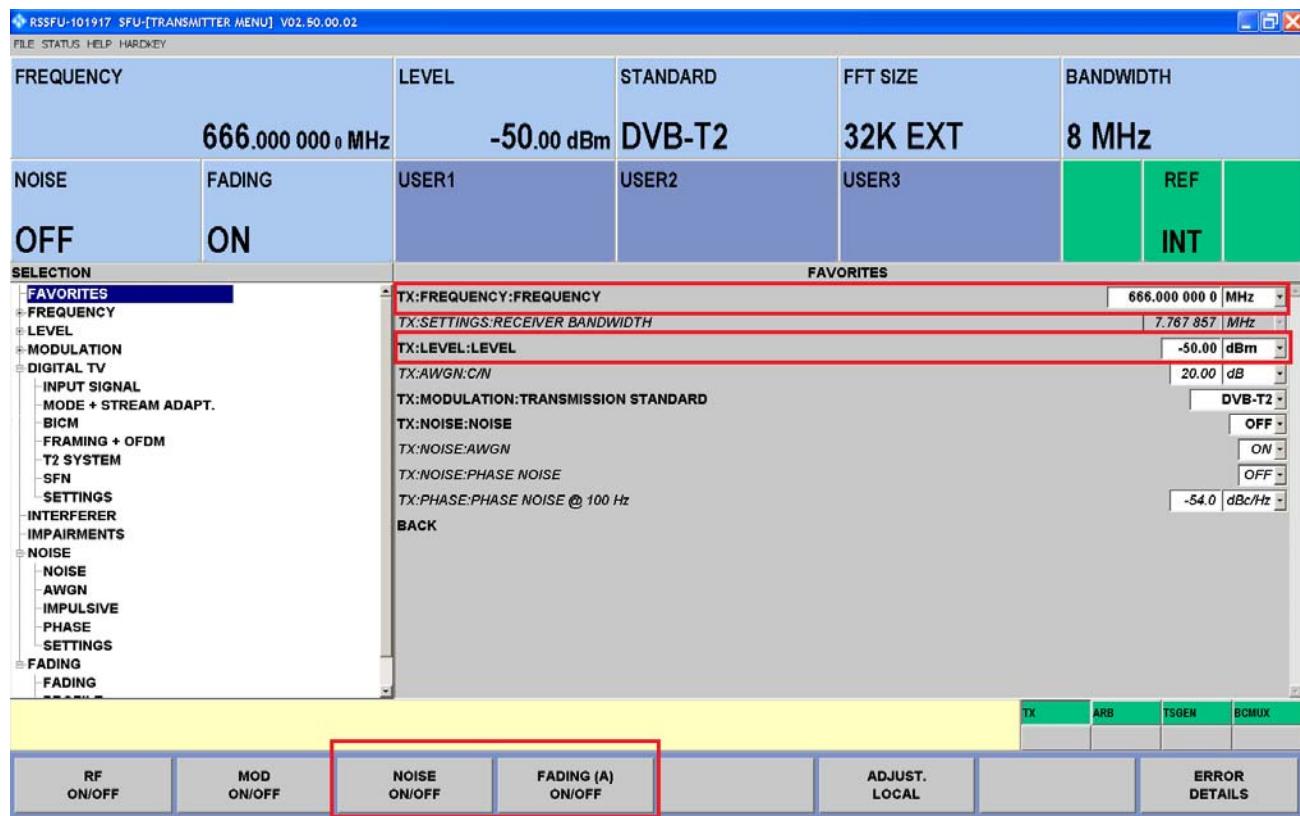


## 2.11.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, TESTA, Pre Echo, -28  $\mu$ s.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 2-53](#).

[Figure 2-53](#) Setting the SFU test model

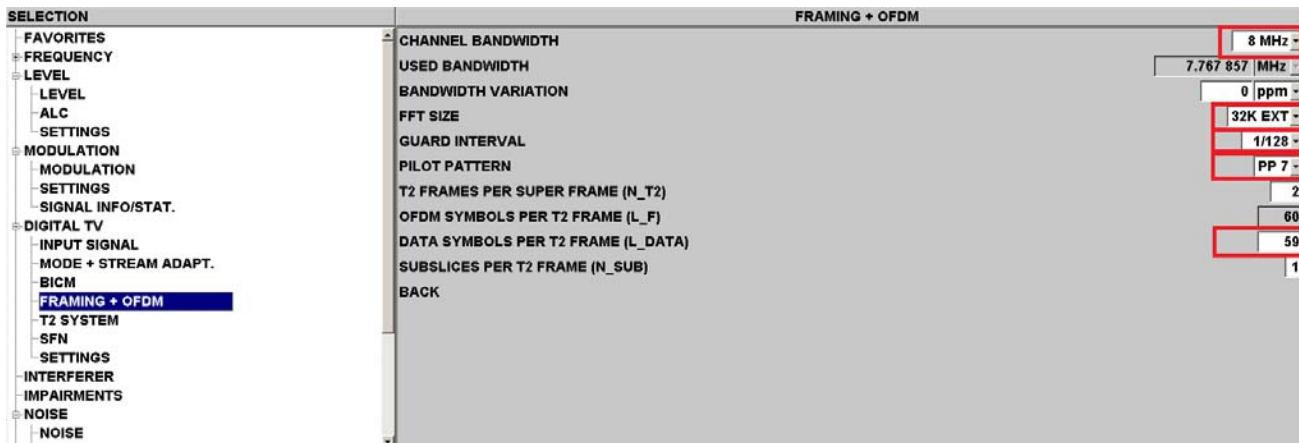


**Step 2** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-54](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



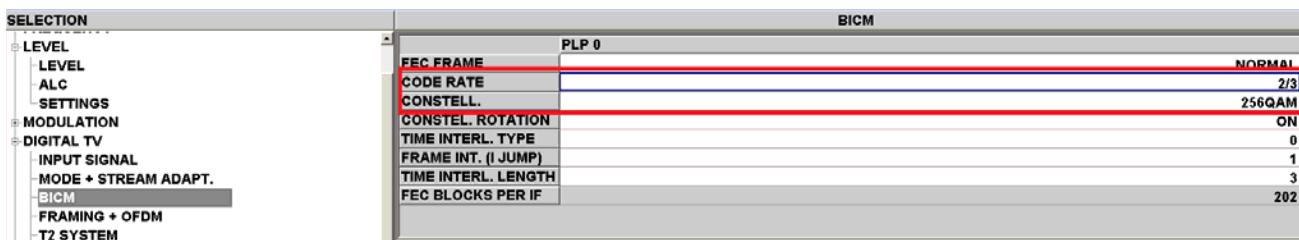
Figure 2-54 FRAMING + OFDM settings



Step 3 Choose **DIGITAL TV > BICM**, as shown in Figure 2-55.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

Figure 2-55 BICM settings



Step 4 Select the echo delay  $-28 \mu\text{s}$  according to Table 2-2 based on the item to be tested (TESTA, Pre Echo) and the test mode opt6.

Table 2-2 Echo delay settings

Test Reference		A	B	C	D	E
opt1	Delay ( $\mu\text{s}$ )	7	15	30	50	60
opt2	Delay ( $\mu\text{s}$ )	7	15	30	50	60
opt3	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 60$	$\pm 120$	$\pm 200$	$\pm 260$
opt4	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 30$	$\pm 33$	N/A	N/A
opt5	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 60$	$\pm 119$	$\pm 135$	N/A
opt6	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 60$	$\pm 119$	$\pm 135$	N/A

Step 5 Choose **FADING > PROFILE**, as shown in Figure 2-56.



- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **ADIT. DELAY** to **0**.
- Set **BASIC DELAY** in the **2-1** column to the absolute value of the echo delay obtained in step 4 (28 μs).
- Set **PATH LOSS** to **0**.

**Figure 2-56 PROFILE settings**

SELECTION		PROFILE										
		STANDARD					PROFILE					USER
		PARAMETER SET					d:/FADING/USER/unsaved_profile.fad					STANDARD DELAY
		STATE	1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	2 - 1	2 - 2	2 - 3	2 - 4	2 - 5
		PROFILE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	CONST.PHASE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH
		PATH LOSS [dB]	5.00	0.00	0.00	0.00	5.00	0.00	0.00	28.00	28.00	28.00
		BASIC DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		ADIT. DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		RESULTING DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	28.00	28.00	28.00	28.00
		POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		SPEED [m/s]	0.00	14.23	14.23	14.23	14.23	0.00	0.00	14.23	14.23	14.23
		FREQ RATIO	-1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		RES DOPPLER SHIFT [Hz]	0.00	31.62	31.62	31.62	31.62	0.00	0.00	31.62	31.62	31.62
		CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
		COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	0
		PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
		LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
		STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0

**Step 6** Adjust the **PATH LOSS** value in the **1-1** column to complete the test. See [Figure 2-57](#).

**Figure 2-57 Adjusting the PATH LOSS value in the 1-1 column**

SELECTION		PROFILE										
		STANDARD					PROFILE					USER
		PARAMETER SET					d:/FADING/USER/unsaved_profile.fad					STANDARD DELAY
		STATE	1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	2 - 1	2 - 2	2 - 3	2 - 4	2 - 5
		PROFILE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	CONST.PHASE	CONST.PHASE	RAYLEIGH	RAYLEIGH
		PATH LOSS [dB]	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
		BASIC DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	28.00	28.00	28.00	28.00
		ADIT. DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		RESULTING DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	28.00	28.00	28.00	28.00
		POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		SPEED [m/s]	0.00	14.23	14.23	14.23	14.23	0.00	0.00	14.23	14.23	14.23
		FREQ RATIO	-1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		RES DOPPLER SHIFT [Hz]	0.00	31.62	31.62	31.62	31.62	0.00	0.00	31.62	31.62	31.62
		CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
		COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	0
		PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
		LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
		STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0

----End



## 2.12 Test with an Echo Outside the Guard Interval, 1 Hz Doppler

### 2.12.1 Test Guide

Test with an Echo Outside the Guard Interval, 1 Hz Doppler
Test Object: Hi3137 performance with echoes
Test Conditions:
<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>OFF</b>.</li><li>- Set <b>FADING</b> to <b>ON</b>.</li><li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li><li>- Set <b>PROFILE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>CONST.PHASE</b> and <b>PURE DOPP</b> respectively.</li><li>- Set <b>ADDIT. DELAY</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>0</b>.</li><li>- Set <b>PATH LOSS</b> in the <b>1-1</b> column to <b>0</b>.</li><li>- Set <b>RATIO</b> in the <b>2-1</b> column to <b>1</b>.</li><li>- Set <b>RES DOPPLER SHIFT</b> to <b>1</b>.</li></ul></li><li>• SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in <a href="#">Table 1-1</a>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p> <p><b>Step 3</b> Select the echo delay according to <a href="#">Table 1-2</a> based on the test mode (opt4, opt5, or opt6) and items to be tested in the test report.</p> <p><b>Step 4</b> Set <b>BASIC DELAY</b> of the SFU multipath model 2-1 to the echo delay obtained in step 3.</p> <p><b>Step 5</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 6</b> Gradually decrease the <b>PATH LOSS</b> value of the SFU multipath model 2-1 until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>PATH LOSS</b> value.</p> <p><b>Step 7</b> Repeat steps 2 to 6 until all tests are complete.</p>



### Test with an Echo Outside the Guard Interval, 1 Hz Doppler

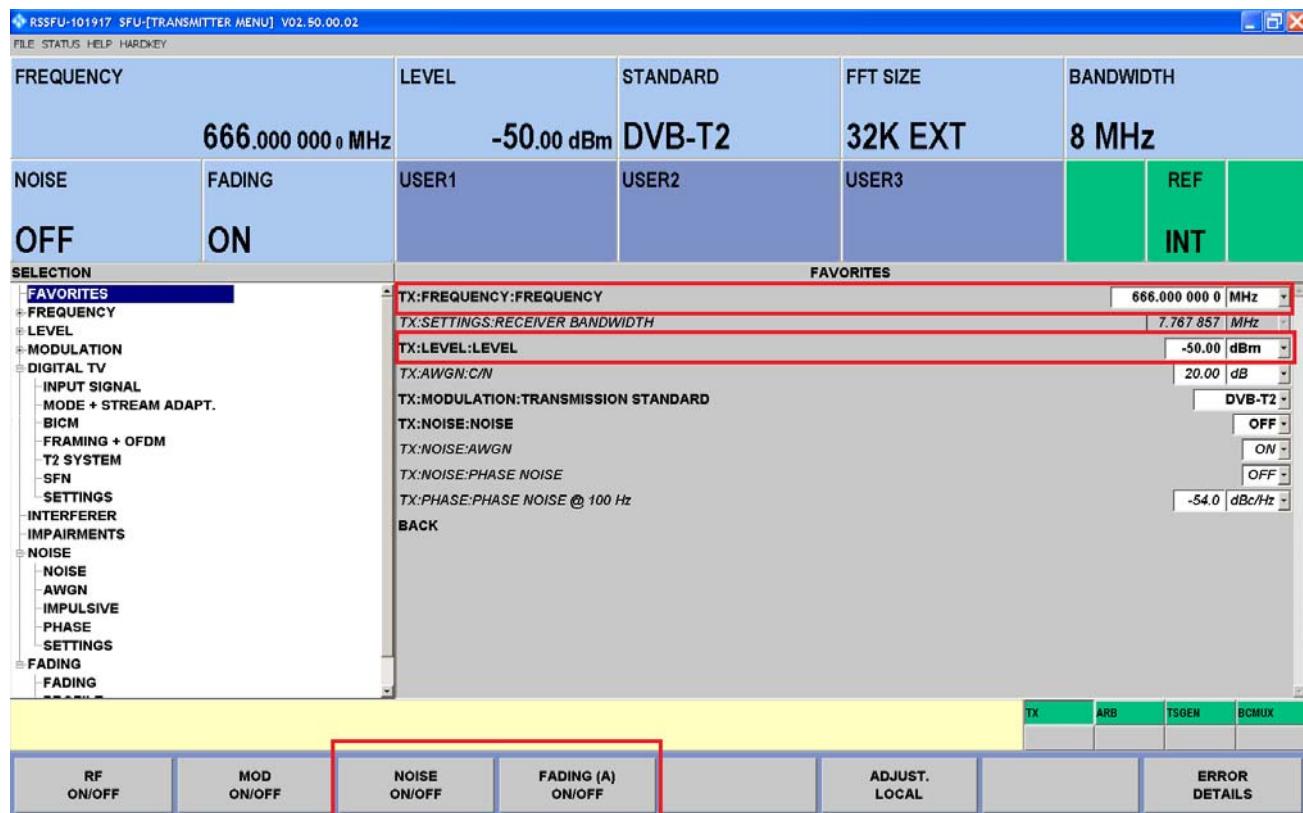
----End

## 2.12.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, TESTA, Post Echo, 28  $\mu$ s, Doppler=1 Hz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 2-58](#).

**Figure 2-58** Setting the SFU test model

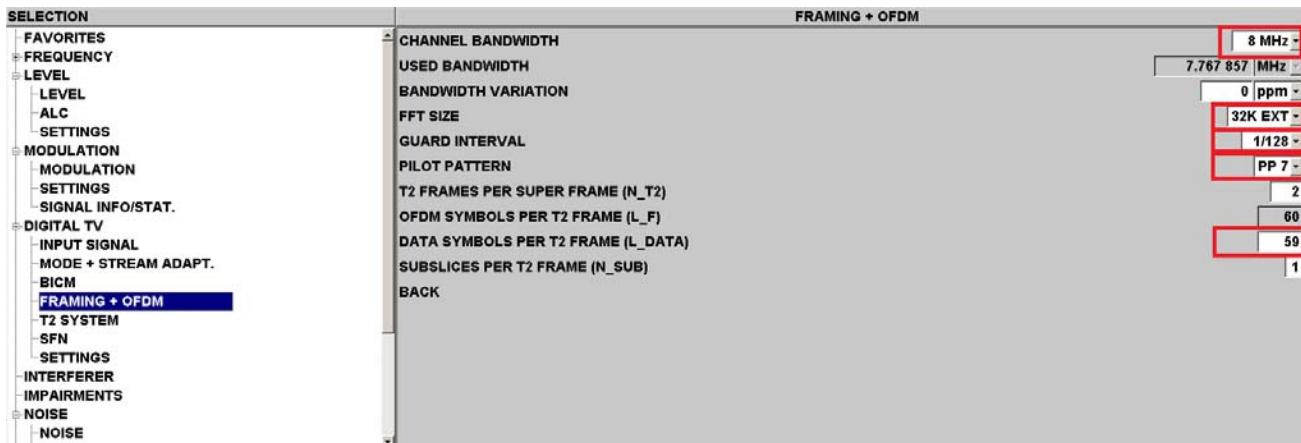


**Step 2** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-59](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L DATA** to **59**.



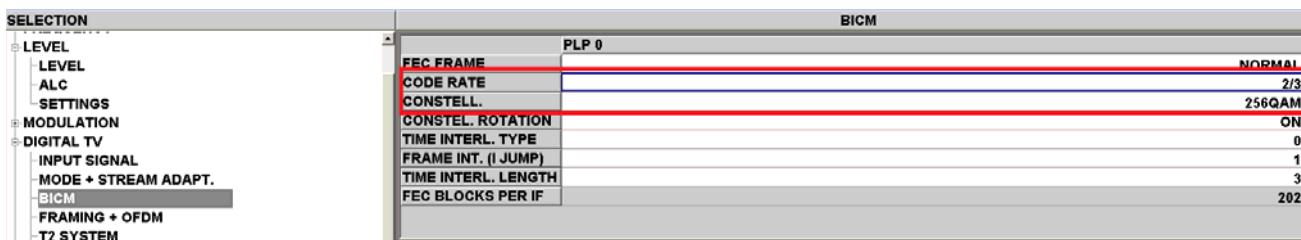
Figure 2-59 FRAMING + OFDM settings



Step 3 Choose **DIGITAL TV > BICM**, as shown in Figure 2-60.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

Figure 2-60 BICM settings



Step 4 Select the echo delay 28  $\mu$ s according to Table 2-3 based on the item to be tested (TESTA, Post Echo) and the test mode opt6.

Table 2-3 Echo delay settings

Test Reference	A	B	C	D	E	
opt1	Delay ( $\mu$ s)	7	15	30	50	60
opt2	Delay ( $\mu$ s)	7	15	30	50	60
opt3	Delay ( $\mu$ s)	$\pm 28$	$\pm 60$	$\pm 120$	$\pm 200$	$\pm 260$
opt4	Delay ( $\mu$ s)	$\pm 28$	$\pm 30$	$\pm 33$	N/A	N/A
opt5	Delay ( $\mu$ s)	$\pm 28$	$\pm 60$	$\pm 119$	$\pm 135$	N/A
opt6	Delay ( $\mu$ s)	$\pm 28$	$\pm 60$	$\pm 119$	$\pm 135$	N/A

Step 5 Choose **FADING > PROFILE**, as shown in Figure 2-61.



- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** in the **1-1** column to **CONST.PHASE**.
- Set **PROFILE** in the **2-1** column to **PURE DOPP.**.
- Set **ADDIT. DELAY** in the **1-1** and **2-1** columns to **0**.
- Set **BASIC DELAY** in the **2-1** column to the absolute value of the echo delay obtained in step 4 (28 µs).
- Set **PATH LOSS** in the **1-1** column to **0**.
- Set **RATIO** in the **2-1** column to **1**.
- Set **RES DOPPLER SHIFT** to **1**.

**Figure 2-61 PROFILE settings**

SELECTION		PROFILE																			
		STANDARD					USER														
		PARAMETER SET					d:/FADING/USER/unsaved_profile.fad														
CONFIGURATION																					
1 - 1      2 - 1																					
STATE      STATE																					
FAVORITES	ON	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF										
FREQUENCY	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	PURE DOPP.	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH										
LEVEL	0.00	0.00	0.00	0.00	0.00	5.00	0.00	28.00	28.00	28.00	28.00										
LEVEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
ALC	0.00	0.00	0.00	0.00	0.00	28.00	28.00	28.00	28.00	28.00	28.00										
SETTINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
MODULATION	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
MODULATION	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
SETTINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
SIGNAL INFO/STAT.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
DIGITAL TV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
INPUT SIGNAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
CODING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
SPECIAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
SETTINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
INTERFERER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
IMPAIRMENTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
NOISE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
FADING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
FADING	0	0	0	0	0	0	0	0	0	0	0										
PROFILE	0	0	0	0	0	0	0	0	0	0	0										
BACK																					

**Step 6** Adjust the **PATH LOSS** value in the **2-2** column to complete the test. See [Figure 2-62](#).

**Figure 2-62** Adjusting the PATH LOSS value in the 2-2 column

SELECTION		PROFILE																			
		STANDARD					USER														
		PARAMETER SET					d:/FADING/USER/unsaved_profile.fad														
CONFIGURATION																					
1 - 1      2 - 2																					
STATE      STATE																					
SETTINGS	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF										
MODULATION	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	PURE DOPP.	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH										
DIGITAL TV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
INPUT SIGNAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
MODE + STREAM ADAPT.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
BICM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
FRAMING + OFDM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
T2 SYSTEM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
SFN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
SETTINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
INTERFERER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
IMPAIRMENTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
NOISE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
AWGN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
IMPULSIVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
PHASE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
SETTINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
FADING	0	0	0	0	0	0	0	0	0	0	0										
PROFILE	0	0	0	0	0	0	0	0	0	0	0										
BACK																					



## 2.13 Short, Medium, and Long Echo Profile Test

### 2.13.1 Test Guide

Short, Medium, and Long Echo Profile Test
Test Object: Hi3137 performance with echoes
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>.</li><li>- Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Set <b>FADING</b> to <b>ON</b>.</li><li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1, 1-2, 1-3, 1-4, 1-5, and 2-1</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li><li>- Set <b>PROFILE</b> to <b>CONST.PHASE</b>.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in <a href="#">Table 1-1</a>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .
Test Procedure:  <b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU. <b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata). <b>Step 3</b> Select an echo delay profile (short, medium, or long delay echo profile) from <a href="#">Table 1-3</a> based on the item to be tested in the test report, and set <b>ADDIT DELAY</b> , <b>PATH LOSS</b> , and <b>CONST.PHASE</b> in the SFU to the <b>Delay</b> , <b>Relative Attenuation</b> , and <b>Phase</b> values in the profile respectively. <b>Step 4</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly. <b>Step 5</b> Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value. <b>Step 6</b> Repeat steps 2 to 5 until all tests are complete. ----End

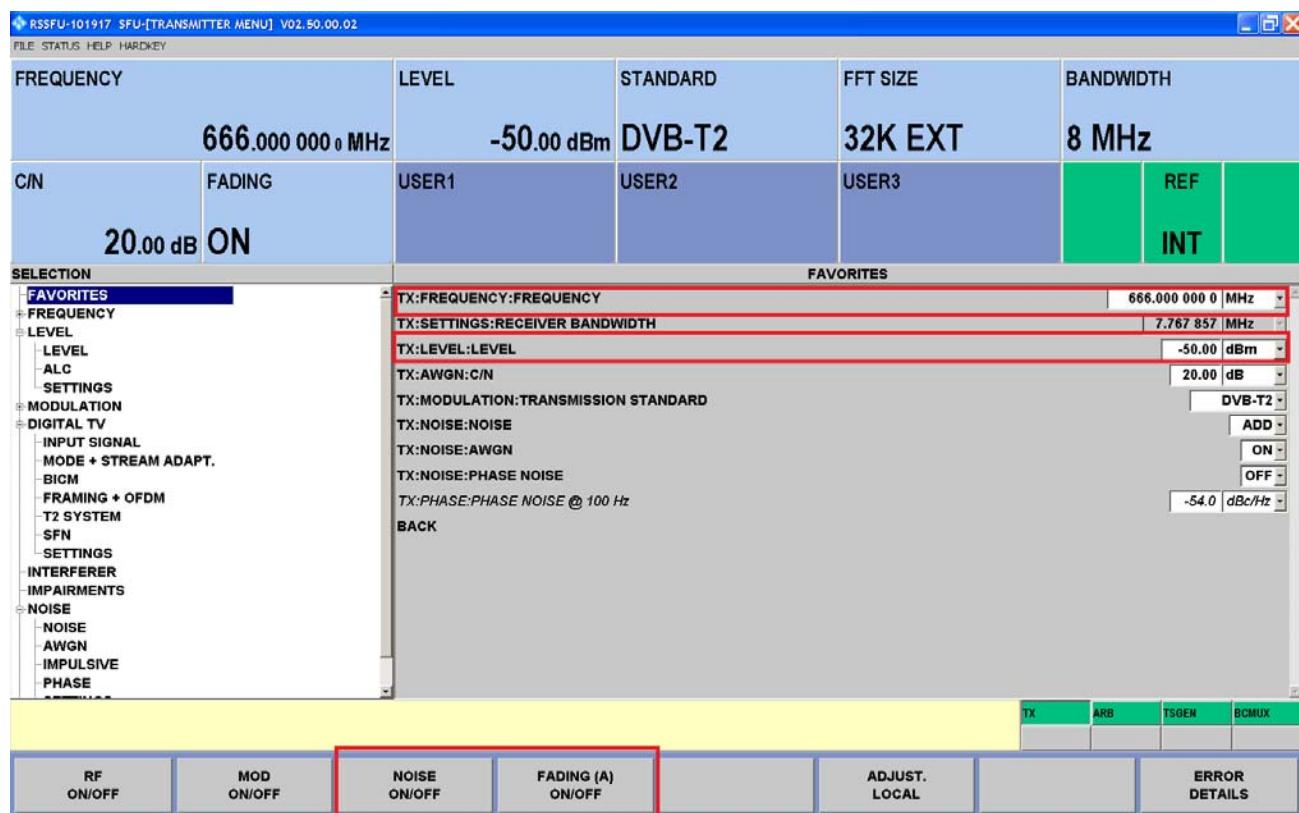


## 2.13.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, short delay echo profile.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 2-63](#).

**Figure 2-63** Setting the SFU test model

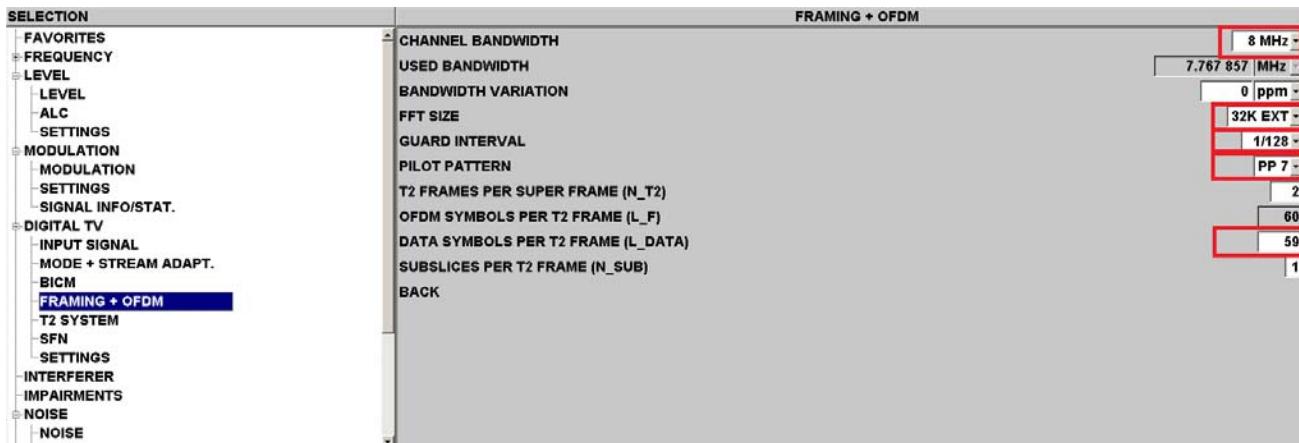


**Step 2** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-64](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



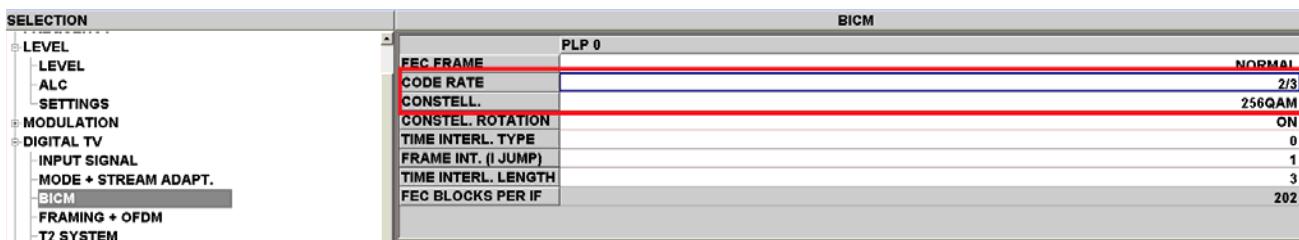
Figure 2-64 FRAMING + OFDM settings



Step 3 Choose **DIGITAL TV > BICM**, as shown in Figure 2-65.

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

Figure 2-65 BICM settings



Step 4 Select the short delay echo profile from Table 2-4.

Table 2-4 Delay echo parameters

Short Delay Echo Profile			Medium Delay Echo Profile			Long Delay Echo Profile		
Delay (μs)	Relative Attenuation (dB)	Phase (Degree)	Delay (μs)	Relative Attenuation (dB)	Phase (Degree)	Delay (μs)	Relative Attenuation (dB)	Phase (Degree)
0	2.8	0	0	0	0	0	0	0
0.05	0	0	1	8.6	0	5	9	0
0.4	3.8	0	5	12.6	0	14	22	0
1.45	0.1	0	8	18	0	35	25	0
2.3	2.6	0	12	20.7	0	54	27	0
2.8	1.3	0	21	22.2	0	75	28	0



**Step 5** Set ADDIT DELAY, PATH LOSS, and CONST.PHASE in the SFU to the Delay, Relative Attenuation, and Phase values in the profile selected in step 4 respectively. See [Figure 2-66](#).

**Figure 2-66** Delay, Relative Attenuation, and Phase settings

SELECTION		PROFILE												USER	
		STANDARD						d:/FADING/USER/short_echo.fad							
		PARAMETER SET						STANDARD DELAY							
<b>CONFIGURATION</b>															
STATE	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
PROFILE	CONST.PHASE	CONST.PHASE	CONST.PHASE	CONST.PHASE	CONST.PHASE	CONST.PHASE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH
PATH LOSS [dB]	2.00	0.00	3.00	0.10	2.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BASIC DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ADDIT. DELAY [us]	0.00	0.05	0.40	1.45	2.30	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RESULTING DELAY [us]	0.00	0.05	0.40	1.45	2.30	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEED [m/s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FREQ RATIO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RES DOPPLER SHIFT [Hz]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LOCAL CONSTANT [m]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Step 6** Adjust the C/N value to complete the test. See [Figure 2-67](#).

**Figure 2-67** Adjusting the C/N value

RSSFU-101917 SFU-[TRANSMITTER MENU] V02.50.00.02															
FILE STATUS HELP HARDKEY															
FREQUENCY				LEVEL		STANDARD			FFT SIZE			BANDWIDTH			
666.000 000 0 MHz				-50.00 dBm		DVB-T2			32K EXT			8 MHz			
C/N	FADING	USER1	USER2	USER3								REF	INT		
20.00 dB	ON														
SELECTION															
FAVORITES															
FAVORITES		TX:FREQUENCY:FREQUENCY													
FREQUENCY		TX:SETTINGS:RECEIVER BANDWIDTH													
LEVEL		7.767 857 MHz													
LEVEL		LEVEL		-50.00 dBm											
ALC		ALC		20.00 dB											
SETTINGS		SETTINGS		DVB-T2											
MODULATION		MODULATION		ADD											
DIGITAL TV		DIGITAL TV		ON											
INPUT SIGNAL		INPUT SIGNAL		OFF											
MODE + STREAM ADAPT.		MODE + STREAM ADAPT.		-54.0 dBc/Hz											
BICM		BICM													
FRAMING + OFDM		FRAMING + OFDM													
T2 SYSTEM		T2 SYSTEM													
SFN		SFN													
SETTINGS		SETTINGS													
INTERFERER		INTERFERER													
IMPAIRMENTS		IMPAIRMENTS													
NOISE		NOISE													
AWGN		AWGN													
IMPULSIVE		IMPULSIVE													
PHASE		PHASE													
FAVORITES															
TX:LEVEL:LEVEL															
TX:AWGN:C/N															
TX:MODULATION:TRANSMISSION STANDARD															
TX:NOISE:NOISE															
TX:NOISE:AWGN															
TX:NOISE:PHASE NOISE															
TX:PHASE:PHASE NOISE @ 100 Hz															
BACK															
RF ON/OFF	MOD ON/OFF	NOISE ON/OFF	FADING (A) ON/OFF		ADJUST. LOCAL		ERROR DETAILS								



## 2.14 Impulsive Noise Test

### 2.14.1 Test Guide

Impulsive Noise Test	
Test Object: Hi3137 anti impulsive noise performance	
Test Conditions:	
	<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-60 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>.</li><li>- Set <b>IMPULSIVE</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Set <b>FADING</b> to <b>OFF</b>.</li><li>- Choose <b>NOISE &gt; IMPULSIVE</b>, and set <b>PULSES PER BURST</b> to <b>10 ms</b>.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters based on the test items and opt4, opt5, and opt6 in <a href="#">Table 1-1</a>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .	
Test Procedure:	
	<p><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</p> <p><b>Step 2</b> Set the mode (opt4, opt5, or opt6) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, pilot pattern, constellation, internal code rate, and Ldata).</p> <p><b>Step 3</b> Select the impulsive noise model from <a href="#">Table 1-4</a> based on the item to be tested in the test report, and set <b>PULSES PER BURST</b>, <b>PULSE SPACING MIN</b>, and <b>PULSE SPACE MAX</b> in the SFU to the values of <b>Pulse Per Burst</b>, <b>Min. Pulse Space</b>, and <b>Max. Pulse Space</b> respectively.</p> <p><b>Step 4</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 5</b> Gradually decrease the C/I value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/I value.</p> <p><b>Step 6</b> Repeat steps 2 to 5 until all tests are complete.</p> <p>----End</p>

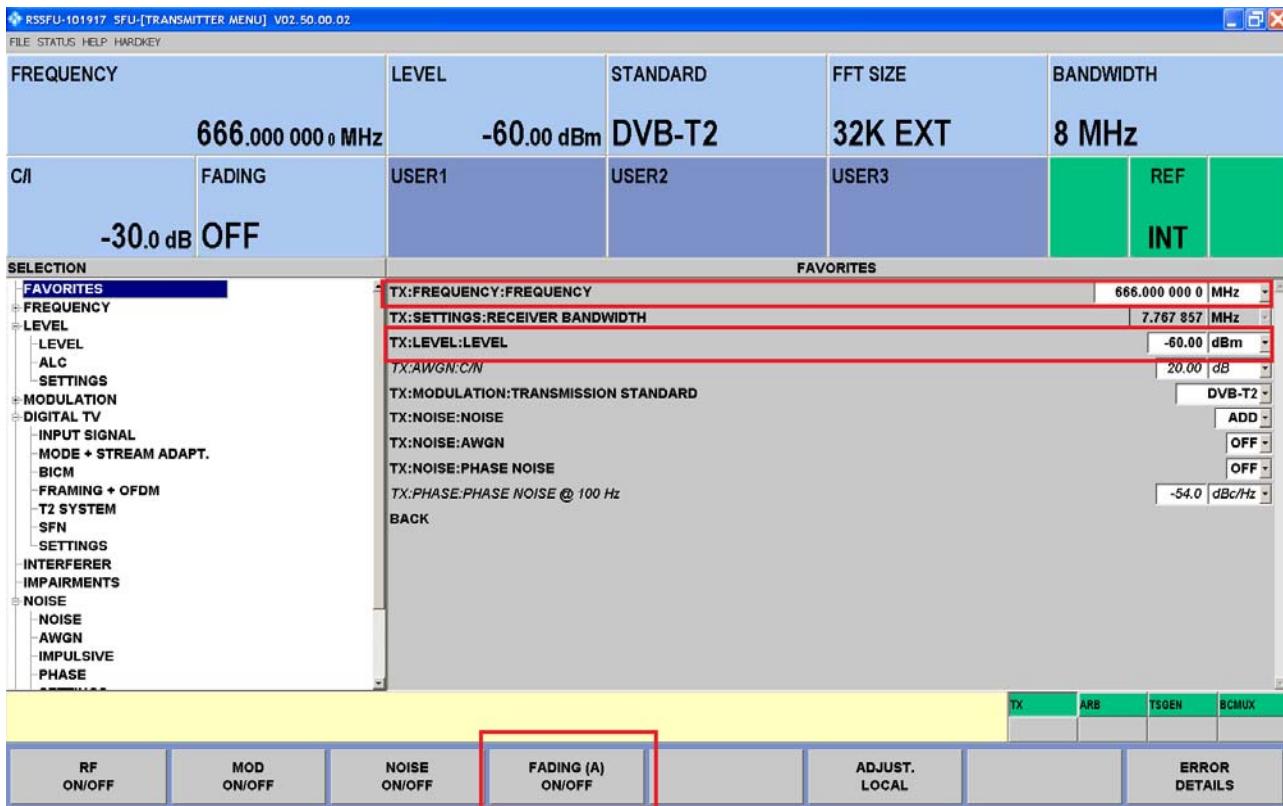
### 2.14.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, II TEST 2.



**Step 1** Set **FADING** to **OFF** by clicking the **FADING (A) ON/OFF** button at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-60 dBm**. See [Figure 2-68](#).

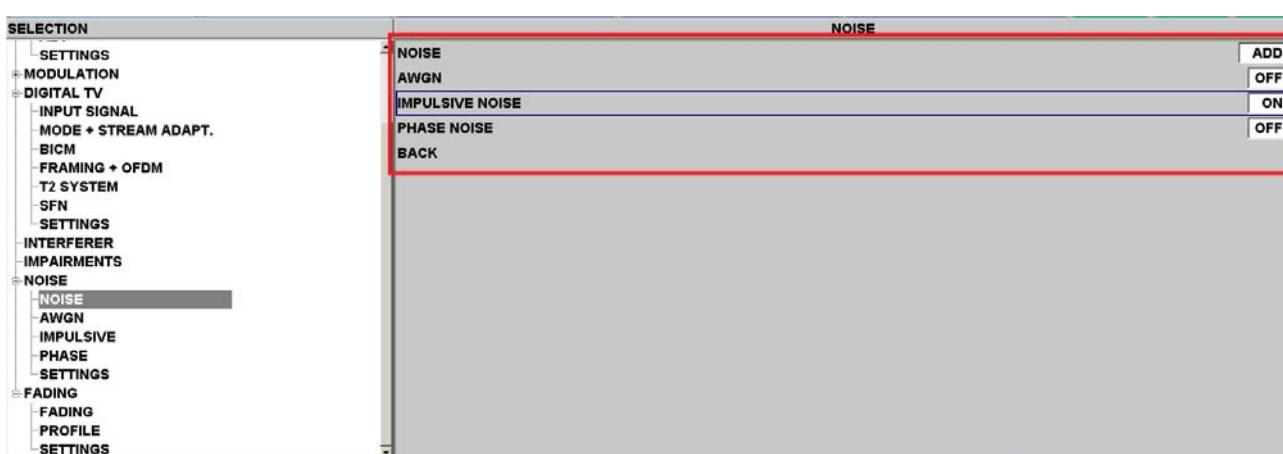
**Figure 2-68** Setting the SFU test model



**Step 2** Choose **NOISE > NOISE**, as shown in [Figure 2-69](#).

- Set **NOISE** to **ADD**.
- Set **IMPULSIVE NOISE** to **ON**.
- Set others to **OFF**.

**Figure 2-69** NOISE settings

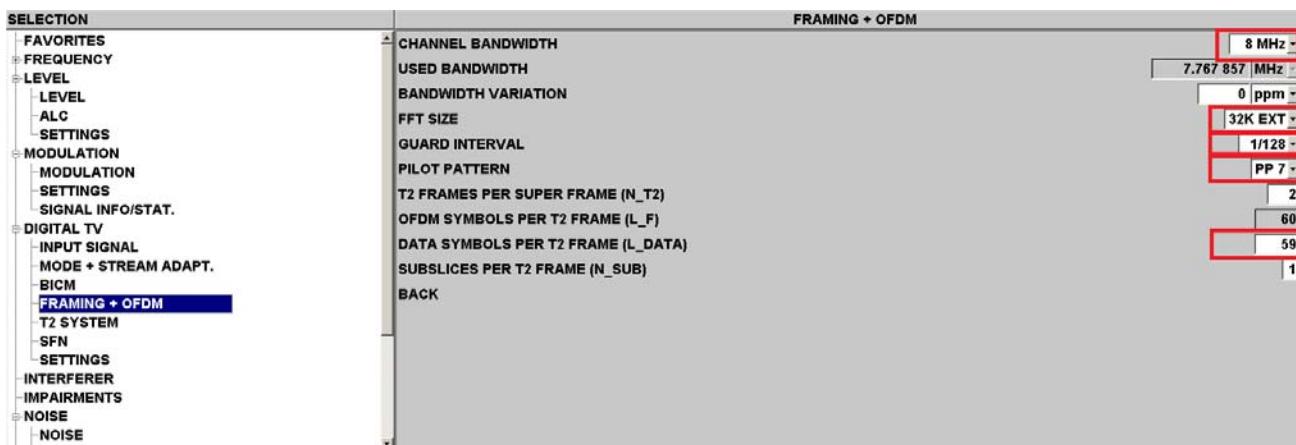




**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-70](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT.**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

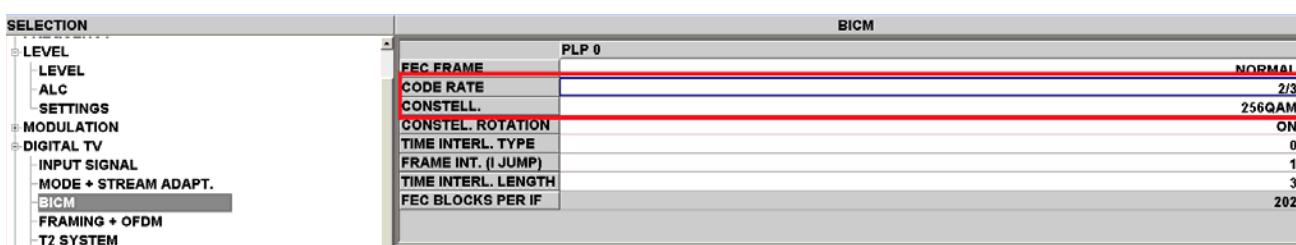
**Figure 2-70** FRAMING + OFDM settings



**Step 4** Choose **DIGITAL TV > BICM**, as shown in [Figure 2-71](#).

- Set **CODE RATE** to **2/3**.
- Set **CONSTELL.** to **256QAM**.

**Figure 2-71** BICM settings



**Step 5** Set the test parameters according to [Table 2-5](#) based on the item to be tested (II TEST 2).

**Table 2-5** Selecting II TEST 2 test parameters

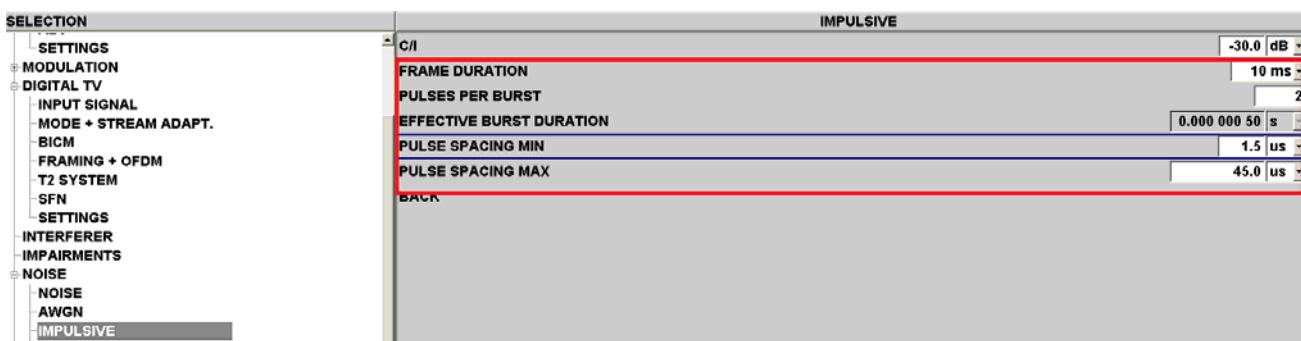
Test No.	Pulse Per Burst	Min. Pulse Space (μs)	Max. Pulse Space (μs)
1	1	N/A	N/A
2	2	1.5	45



Test No.	Pulse Per Burst	Min. Pulse Space (μs)	Max. Pulse Space (μs)
3	4	15	35
4	12	10	15
5	20	1	2
6	40	0.5	1

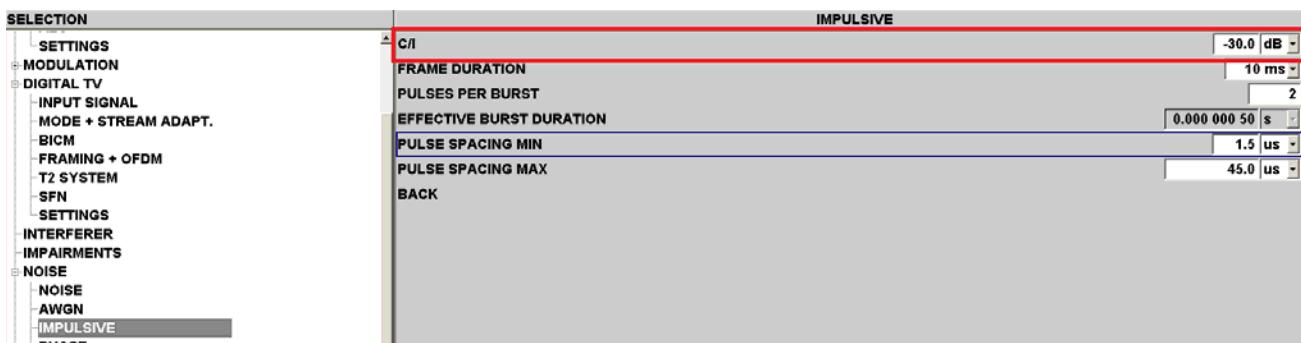
**Step 6** Set **PULSES PER BURST**, **PULSE SPACING MIN**, and **PULSE SPACE MAX** in the SFU to the values of **Pulse Per Burst**, **Min. Pulse Space**, and **Max. Pulse Space** respectively, and set **PULSES PER BURST** to **10 ms**.

**Figure 2-72** Setting Pulse Per Burst, Min. Pulse Space, and Max. Pulse Space



**Step 7** Adjust the C/I value to complete the test. See [Figure 2-73](#).

**Figure 2-73** Adjusting the C/I value



----End



## 2.15 Sensitivity Test

### 2.15.1 Test Guide

Sensitivity Test
Test Object: Hi3137 sensitivity
Test Conditions:  SFU test model <ul style="list-style-type: none"><li>● Set <b>NOISE</b> to <b>OFF</b>.</li><li>● Set <b>FADING</b> to <b>OFF</b>.</li></ul>
Test Networking: See <a href="#">Figure 2-1</a> .
Test Procedure:  <b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU. <b>Step 2</b> Set the mode to be tested to the SFU according to the test report (including the frequency, bandwidth, FFT size, guard interval, pilot pattern, constellation, and internal code rate). <b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly. <b>Step 4</b> For the minimum level test, gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value. <b>Step 5</b> For the maximum level test, gradually increase the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually decrease the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value. <b>Step 6</b> Repeat steps 2 to 5 until all tests are complete. ----End

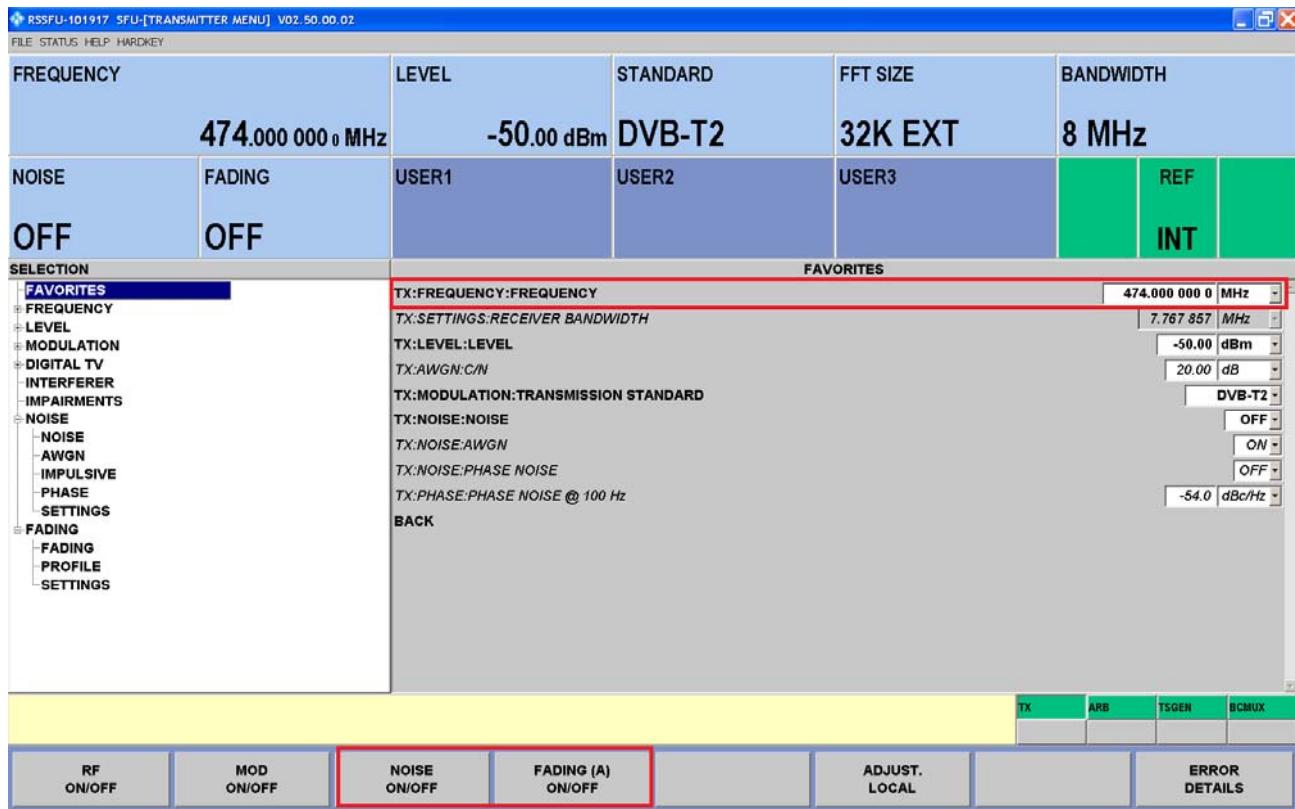
### 2.15.2 Test Instance

The signal parameters are as follows: FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=3/5, Freq=474 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **474 MHz**. See [Figure 2-74](#).



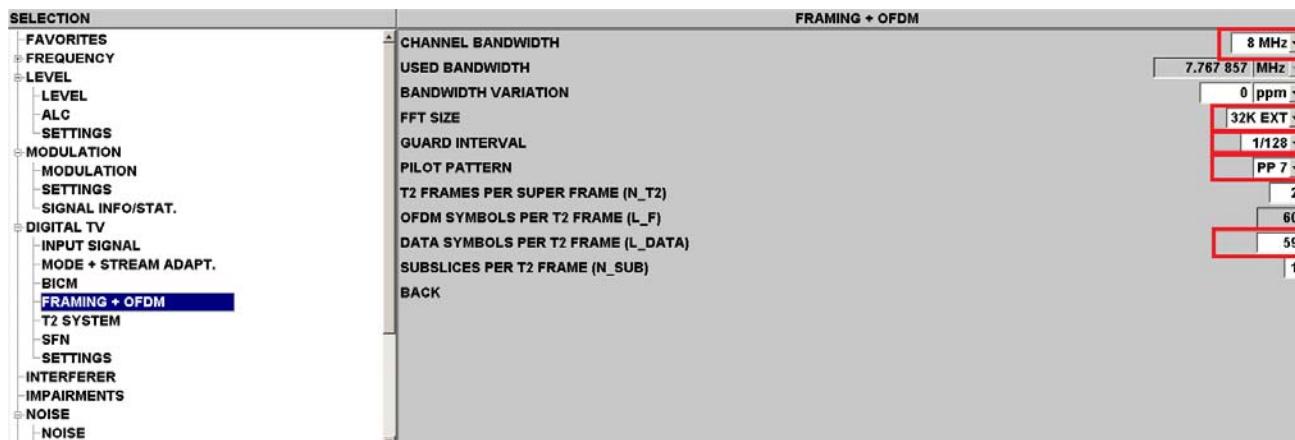
Figure 2-74 Setting the SFU test model



Step 2 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 2-75](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

Figure 2-75 FRAMING + OFDM settings

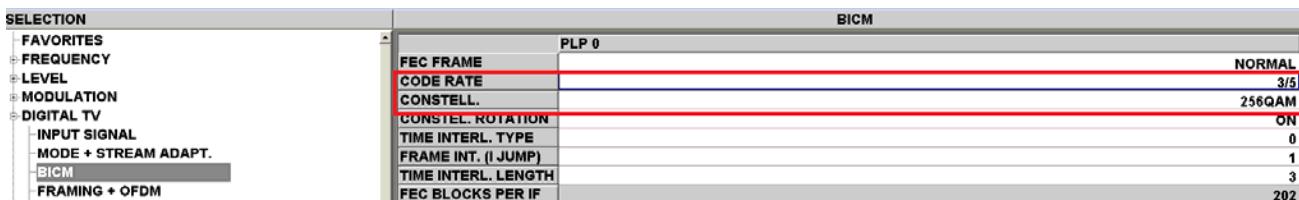




**Step 3** Choose **DIGITAL TV > BICM**, as shown in Figure 2-76.

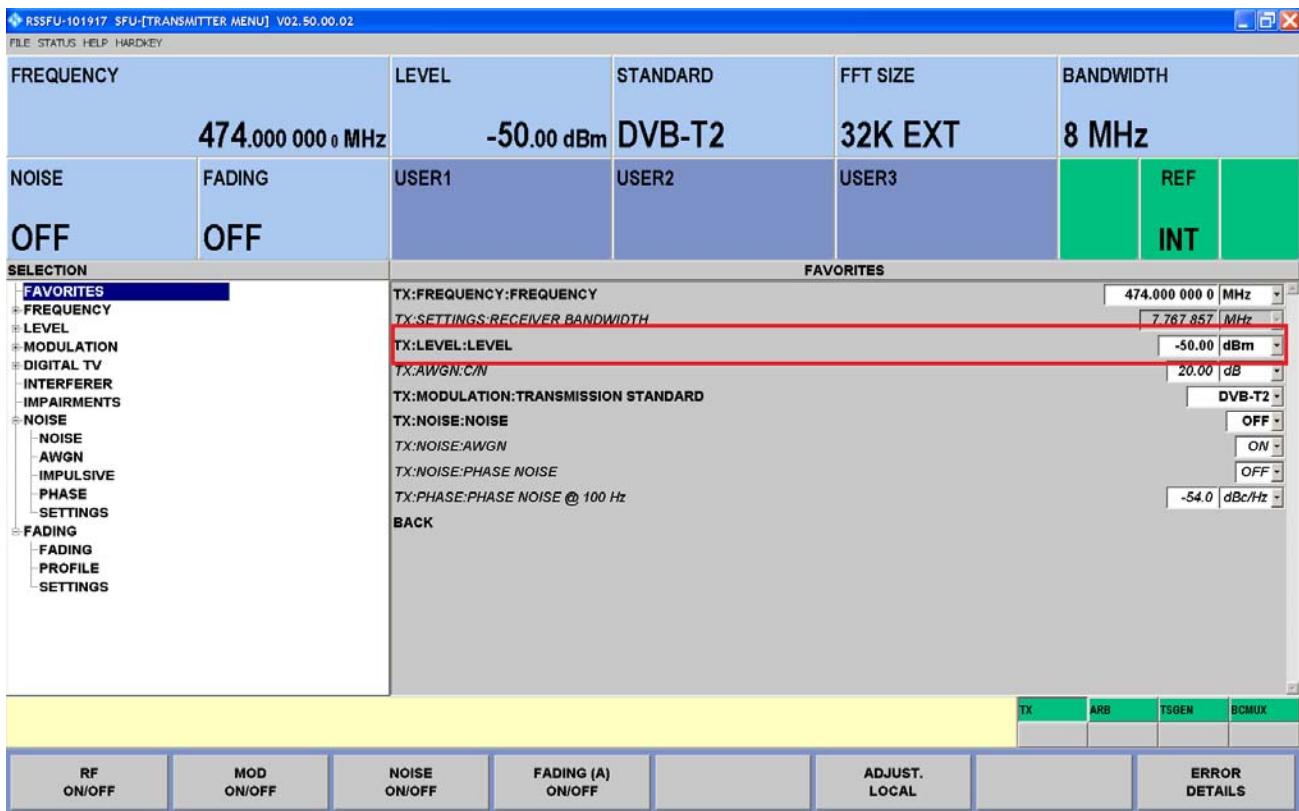
- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

**Figure 2-76** BICM settings



**Step 4** Adjust the **LEVEL** value to complete the test. See Figure 2-77.

**Figure 2-77** Adjusting the LEVEL value



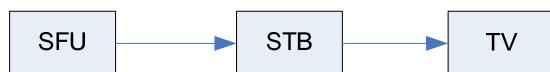
----End



# 3 D-Book 7.0 DVB-T Tests

Figure 3-1 shows the block diagram for testing the DVB-T modes in the D-Book standard.

**Figure 3-1** D-book DVB-T test block diagram



## 3.1 Gaussian Threshold Test

### 3.1.1 Test Guide

Gaussian Threshold Test	
Test Object: Hi3137 Gaussian performance	
Test Conditions:	
	<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>.</li><li>- Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Set <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>• SFU signal parameters<ul style="list-style-type: none"><li>- Set <b>FFT SIZE</b> to <b>8K</b>.</li><li>- Set <b>GUARD INTERVAL</b> to <b>1/32</b>.</li></ul></li></ul>
Test Networking:	See <a href="#">Figure 3-1</a> .
Test Procedure:	<p><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</p> <p><b>Step 2</b> Set the constellation mode, internal code rate, signal frequency, and bandwidth to be tested to the SFU according to the test report.</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under</p>



### Gaussian Threshold Test

test to output AV signals properly.

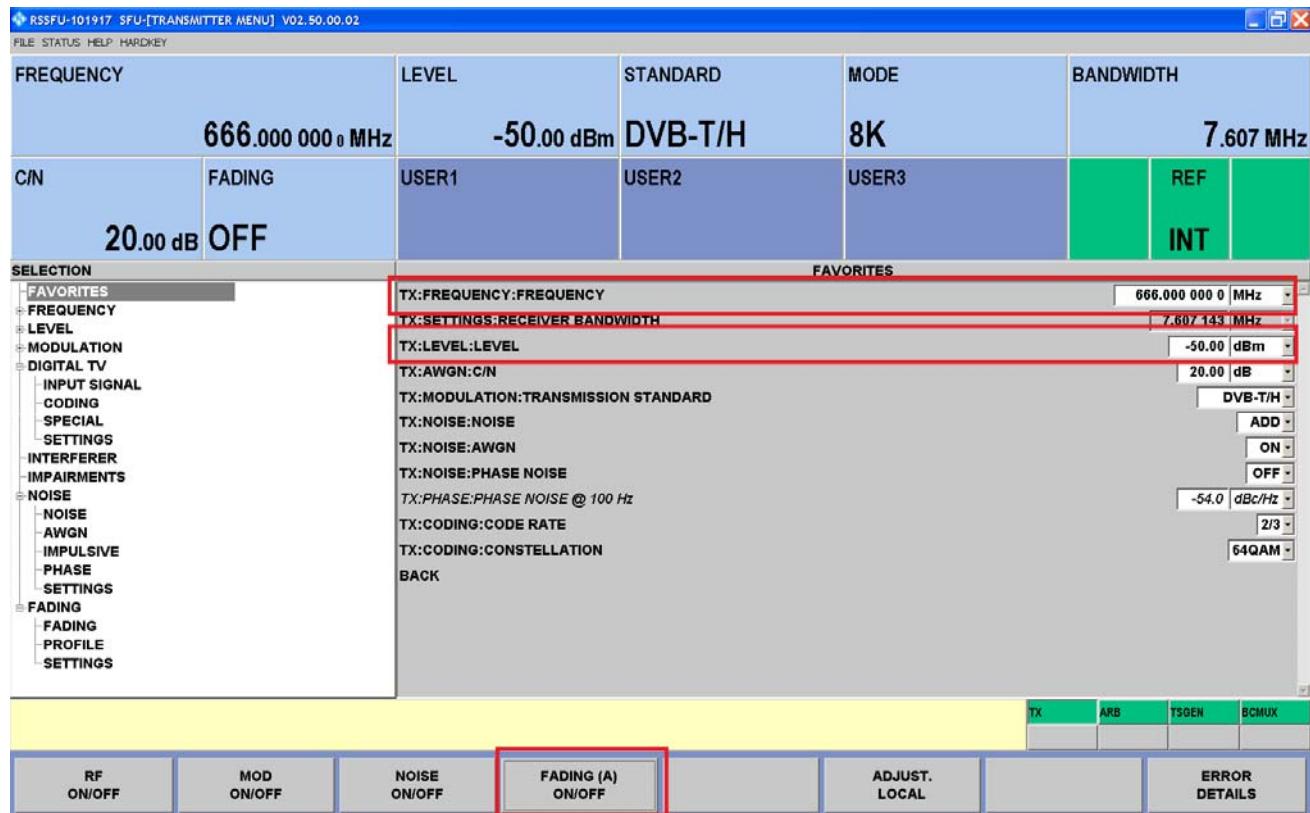
- Step 4** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 5** Repeat steps 2 to 4 until all Gaussian threshold tests are complete.
- End

### 3.1.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz.

- Step 1** Set **FADING** to **OFF** by clicking the **FADING (A) ON/OFF** button at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 3-2](#).

**Figure 3-2** Setting the SFU test model and signal parameters



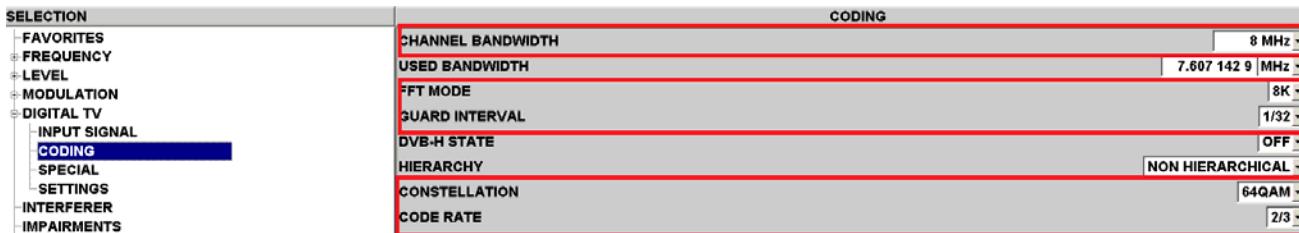
- Step 2** Choose **DIGITAL TV > CODING**, as shown in [Figure 3-3](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.



- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

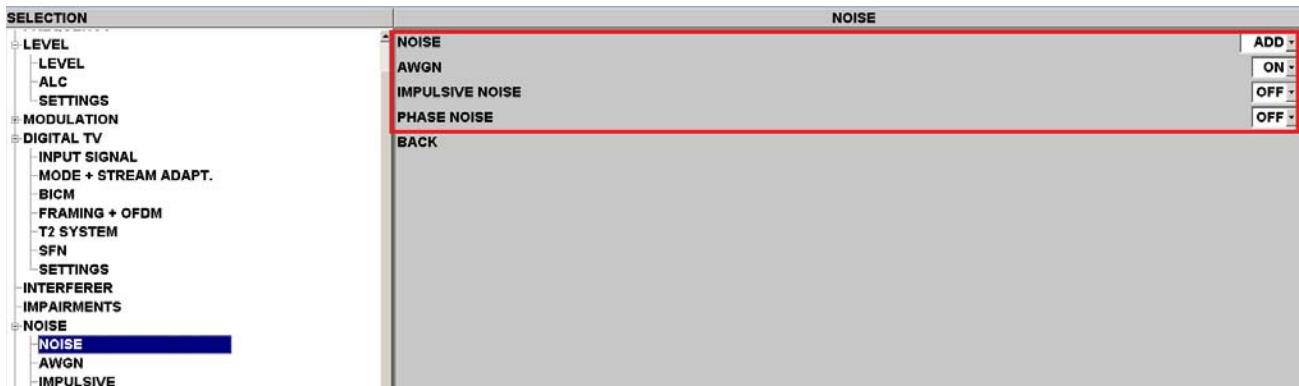
**Figure 3-3** CODING settings



**Step 3** Choose **NOISE > NOISE**, as shown in [Figure 3-4](#).

- Set **NOISE** to **ADD**.
- Set **AWGN** to **ON**.
- Set others to **OFF**.

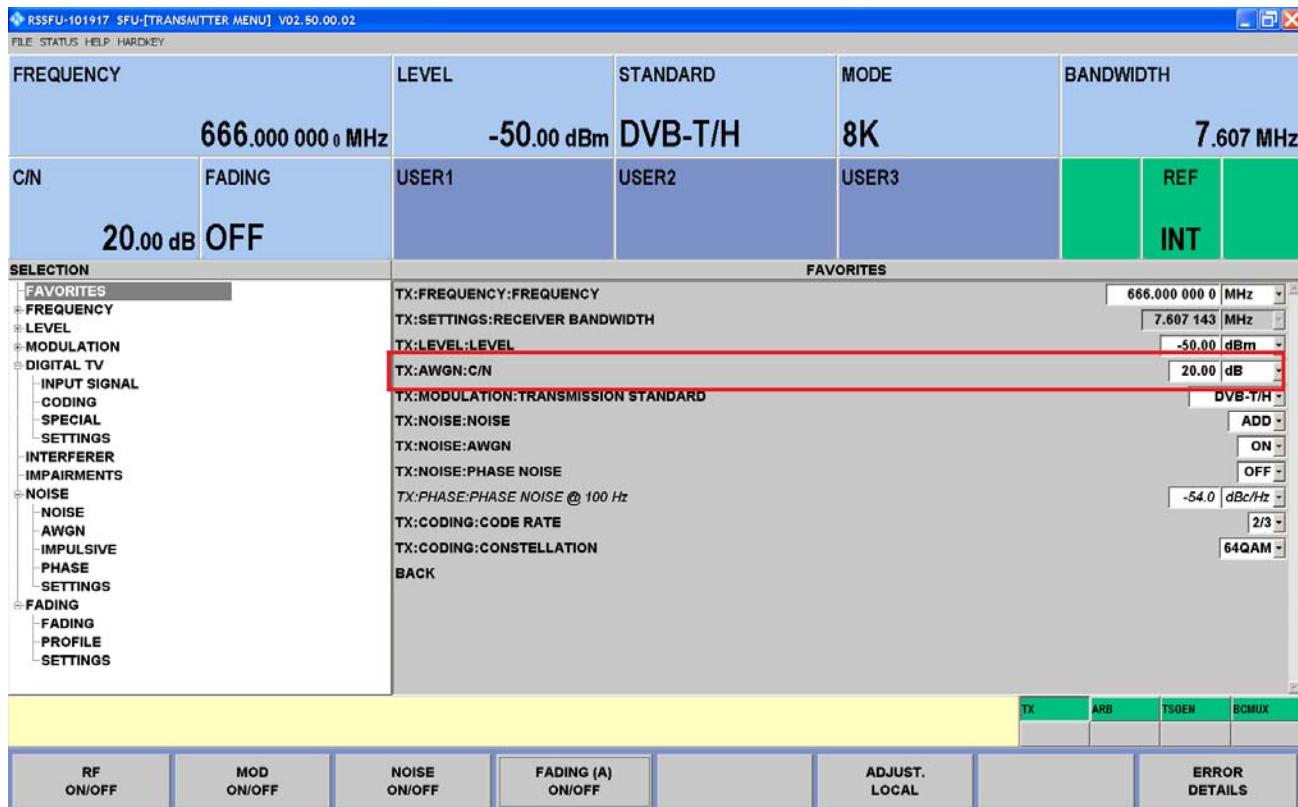
**Figure 3-4** NOISE settings



**Step 4** Adjust the C/N value to complete the C/N threshold test. See [Figure 3-5](#).



Figure 3-5 Adjusting the C/N value



----End

## 3.2 PAL (I1) Analog Co-Channel Test

### 3.2.1 Test Guide

PAL (I1) Analog Co-Channel Test
Test Object: Hi3137 performance with analog co-channel PAL interference
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Choose <b>INTERFERER</b>, and set <b>INTERFERER SOURCE</b> to <b>ATV PREDEF</b>.</li><li>- Set <b>ATV PREDEFINED STANDARD</b> to <b>I1 PREDEF</b>.</li><li>- Retain the default value of <b>INTERFERER ADDITION</b> (the test is not affected no matter it is set to <b>AFTER NOISE</b> or <b>BEFORE NOISE</b>).</li><li>- Set <b>INTERFERER REFERENCE</b> to <b>ATTENUATION</b>.</li></ul></li></ul>



#### PAL (I1) Analog Co-Channel Test

- Set **INTERFERER FREQUENCY OFFSET** to **-2.75 MHz**.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.
- SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **INTERFERER ATTENUATION** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **INTERFERER ATTENUATION** value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

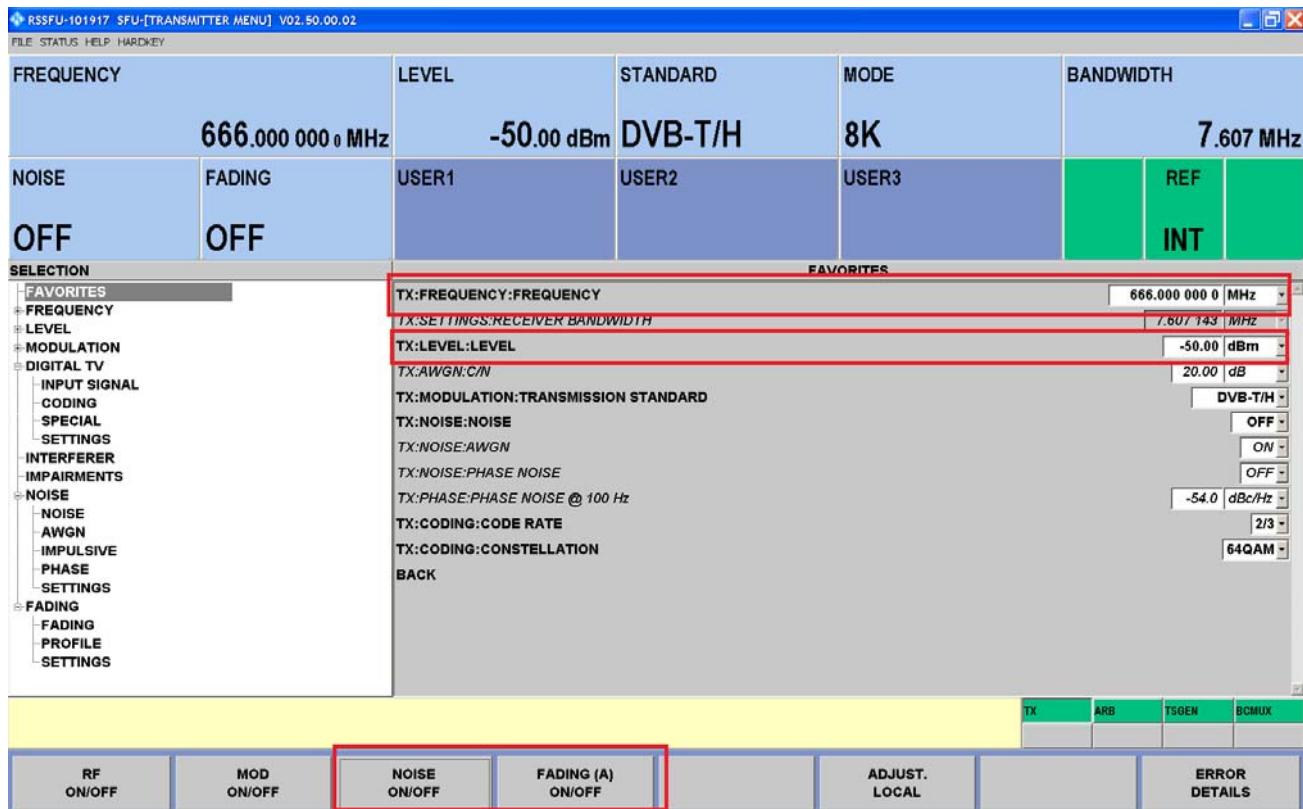
### 3.2.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz.

- Step 1** Set **FADING** to **OFF** by clicking the **FADING (A) ON/OFF** button at the bottom of the SFU, and set the frequency (**FREQUENCY**) to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 3-6](#).



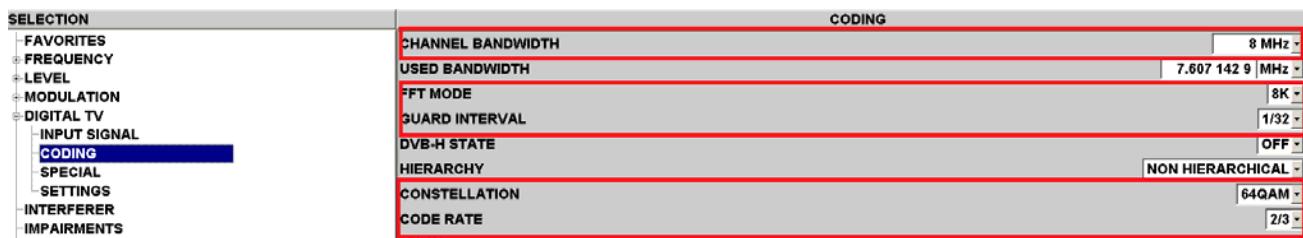
Figure 3-6 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in Figure 3-7.

- Set CHANNEL BANDWIDTH to 8 MHz.
- Set FFT MODE to 8K.
- Set GUARD INTERVAL to 1/32.
- Set CONSTELLATION to 64QAM.
- Set CODE RATE to 2/3.

Figure 3-7 CODING settings



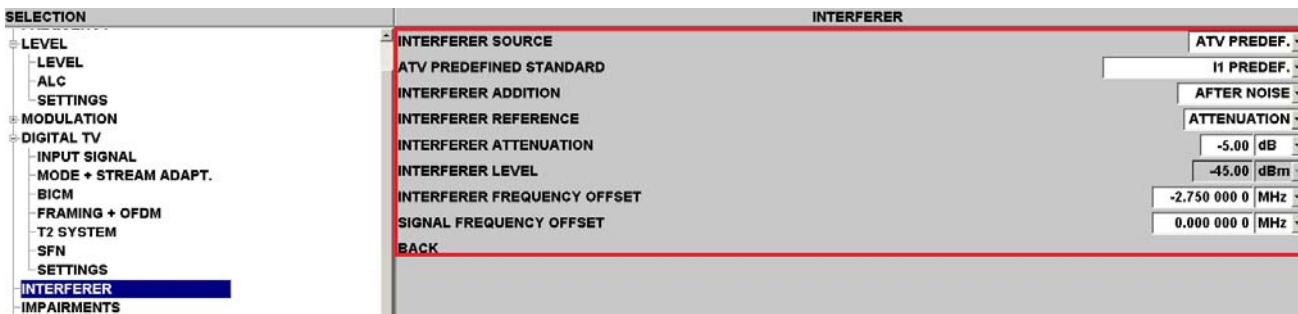
Step 3 Choose **INTERFERER**, as shown in Figure 3-8.

- Set INTERFERER SOURCE to ATV PREDEF.
- Set ATV PREDEFINED STANDARD to I1 PREDEF.
- Retain the default value of INTERFERER ADDITION (the test is not affected no matter it is set to AFTER NOISE or BEFORE NOISE).



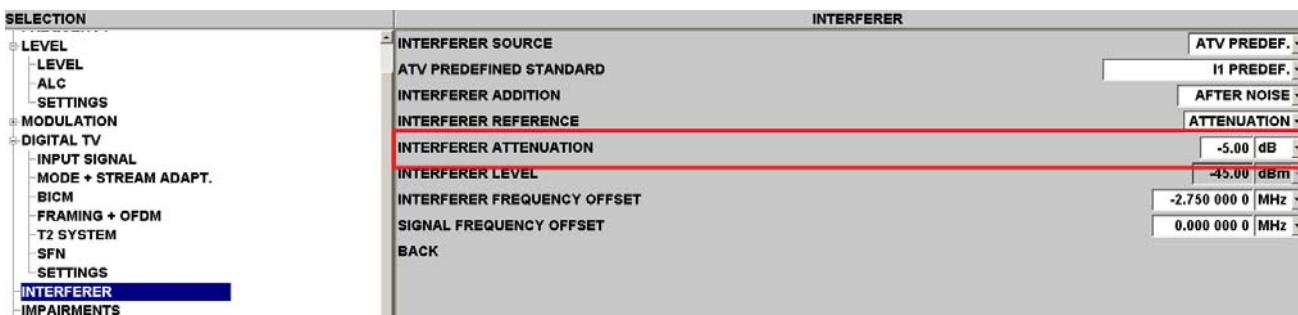
- Set **INTERFERER REFERENCE** to **ATTENUATION**.
- Set **INTERFERER FREQUENCY OFFSET** to **-2.75 MHz**.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.

**Figure 3-8** INTERFERER settings



**Step 4** Adjust the value of **INTERFERER ATTENUATION** to complete the co-channel interference test. See [Figure 3-9](#).

**Figure 3-9** Adjusting the INTERFERER ATTENUATION value



----End

### 3.3 PAL (I1) Analog Adjacent Channel Test ( $N \pm 1$ )

#### PAL (I1) Analog Adjacent Channel Test ( $N \pm 1$ )

Test Object: Hi3137 performance with analog adjacent channel PAL interference

Test Conditions:

- SFU test model
  - Set **NOISE** and **FADING** to **OFF**.
  - Set **FREQUENCY** to **666 MHz**.
  - Set **BANDWIDTH** to **8 MHz**.
  - Choose **INTERFERER**, and set **INTERFERER SOURCE** to **ATV PREDEF.**.
  - Set **ATV PREDEFINED STANDARD** to **I1 PREDEF.**.
  - Retain the default value of **INTERFERER ADDITION** (the test is not affected no



### PAL (I1) Analog Adjacent Channel Test (N±1)

- matter it is set to **AFTER NOISE** or **BEFORE NOISE**).
- Set **INTERFERER REFERENCE** to **LEVEL**.
  - Set **INTERFERER LEVEL** to **-25 dBm**.
  - Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.
  - Set **INTERFERER FREQUENCY OFFSET** to **5.25 MHz** for the N+1 mode.
  - Set **INTERFERER FREQUENCY OFFSET** to **-10.75 MHz** for the N-1 mode.
  - SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
  - Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
  - Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
  - Step 4** Gradually decrease the **LEVEL** value (not the **INTERFERER LEVEL** value) until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and minus -25 dBm to obtain the C/I value.
  - Step 5** Repeat steps 2 to 4 until all tests are complete.
- End

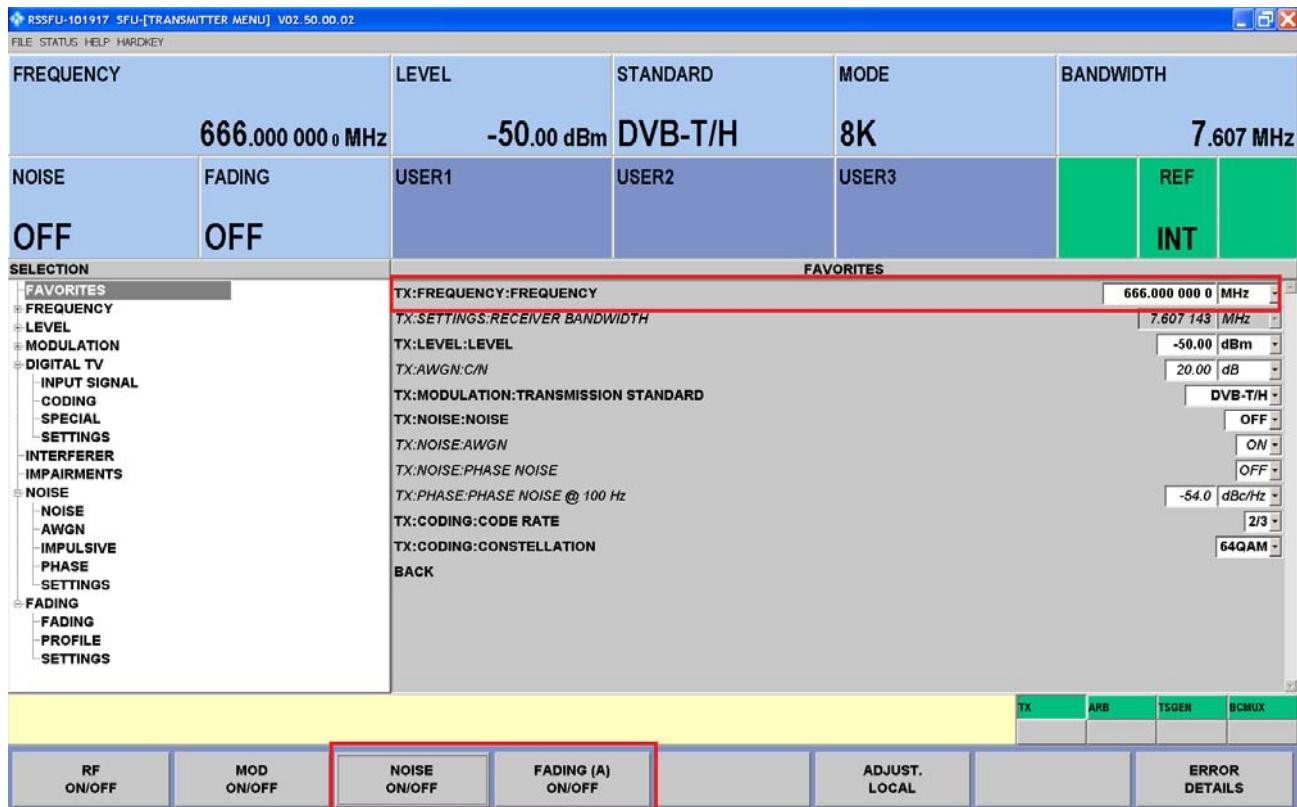
### 3.3.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, N+1 mode.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz**. See [Figure 3-10](#).



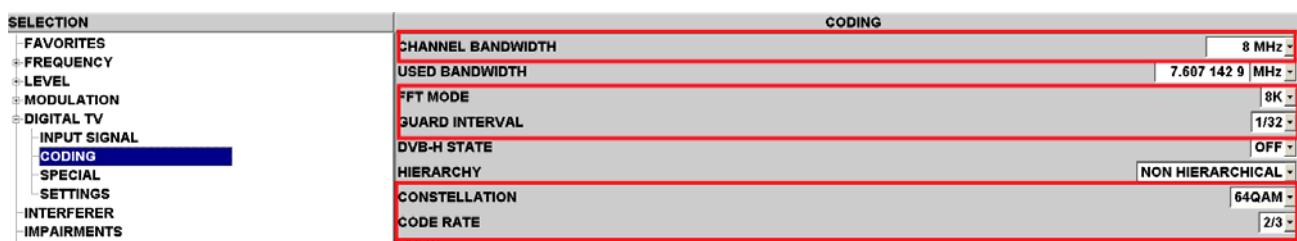
Figure 3-10 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in Figure 3-11.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 3-11 CODING settings



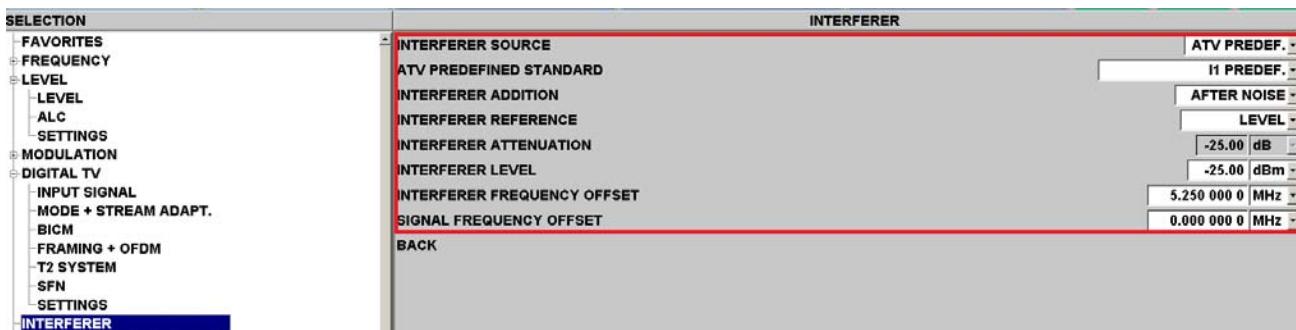
Step 3 Choose **INTERFERER**, as shown in Figure 3-12.

- Set **INTERFERER SOURCE** to **ATV PREDEF**.
- Set **ATV PREDEFINED STANDARD** to **I1 PREDEF**.
- Retain the default value of **INTERFERER ADDITION** (the test is not affected no matter it is set to **AFTER NOISE** or **BEFORE NOISE**).



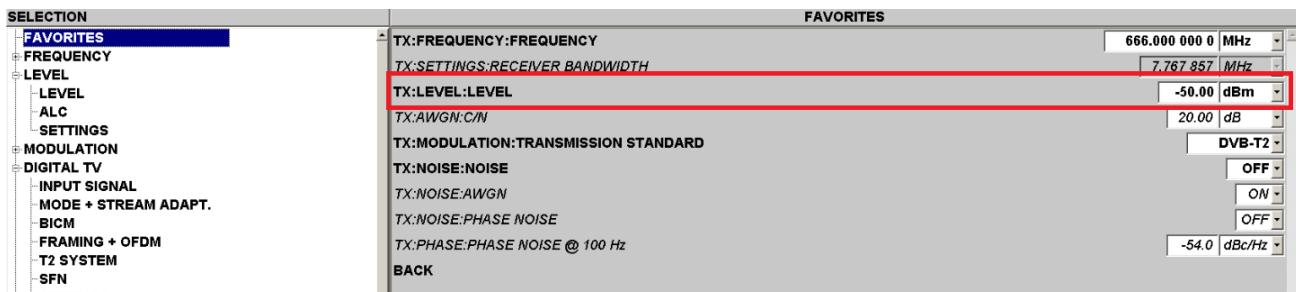
- Set **INTERFERER REFERENCE** to **LEVEL**.
- Set **INTERFERER LEVEL** to **-25 dBm**.
- Set **INTERFERER FREQUENCY OFFSET** to **5.25 MHz** for the N+1 mode.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.

**Figure 3-12** INTERFERER settings



**Step 4** Adjust the **LEVEL** value to complete the analog adjacent channel interference test. See [Figure 3-13](#).

**Figure 3-13** Adjusting the **LEVEL** value

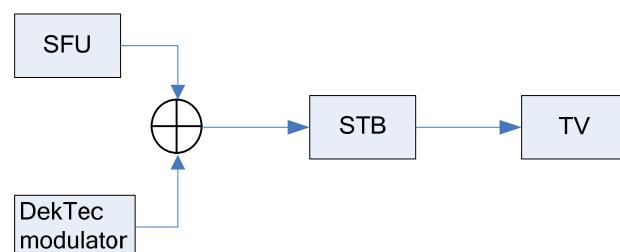


----End

### 3.4 Digital ACI (N±1) Test

[Figure 3-14](#) shows the block diagram for the digital ACI test.

**Figure 3-14** Block diagram for the digital ACI test





### 3.4.1 Test Guide

Digital ACI (N±1) Test
Test Object: Hi3137 performance with digital ACI
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>– Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>– Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>– Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● DekTec modulator parameters<ul style="list-style-type: none"><li>– Set the modulation mode to <b>DVB-T</b>.</li><li>– Set the FFT size to <b>8K</b>.</li><li>– Set the constellation to <b>64-QAM</b>.</li><li>– Set the internal code rate to <b>2/3</b>.</li><li>– Set the guard interval to <b>G=1/32</b>.</li><li>– Set the bandwidth to <b>8 MHz</b>.</li><li>– Set the signal level to <b>-25 dBm</b>.</li><li>– Set the output signal frequency to <b>674 MHz</b> for the N+1 test.</li><li>– Set the output signal frequency to <b>658 MHz</b> for the N-1 test.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in <a href="#">Table 1-1</a> based on the test items.</li></ul>
Test Networking: See <a href="#">Figure 3-14</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the DekTec parameters to the DekTec modulator.</p> <p><b>Step 2</b> Set the mode (opt1, opt2, or opt3) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract -25 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

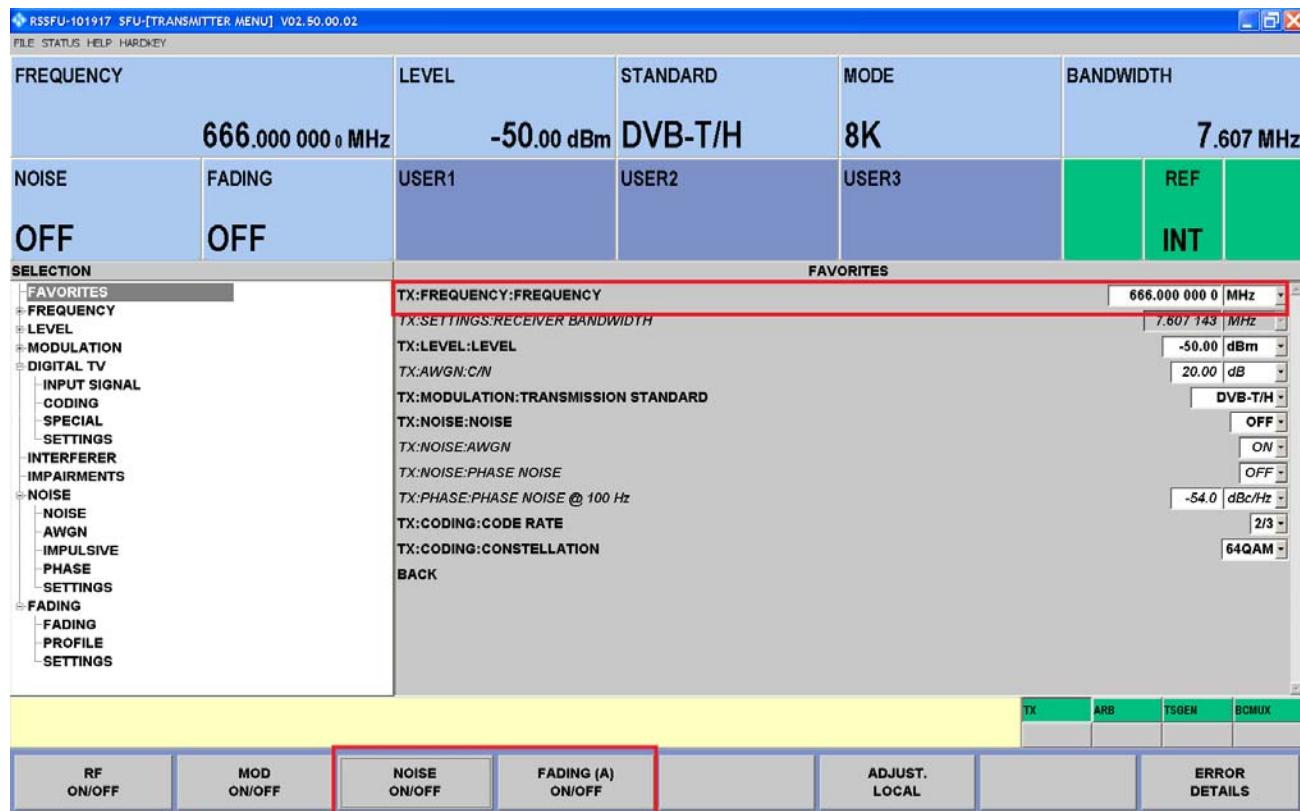


### 3.4.2 Test Instance

The signal parameters are as follows: opt6, FFT=32KE, GI=1/128, Pilot=PP7, Ldata=59, Constellation=256QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, N+1 mode.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz**. See [Figure 3-15](#).

**Figure 3-15** Setting the SFU test model

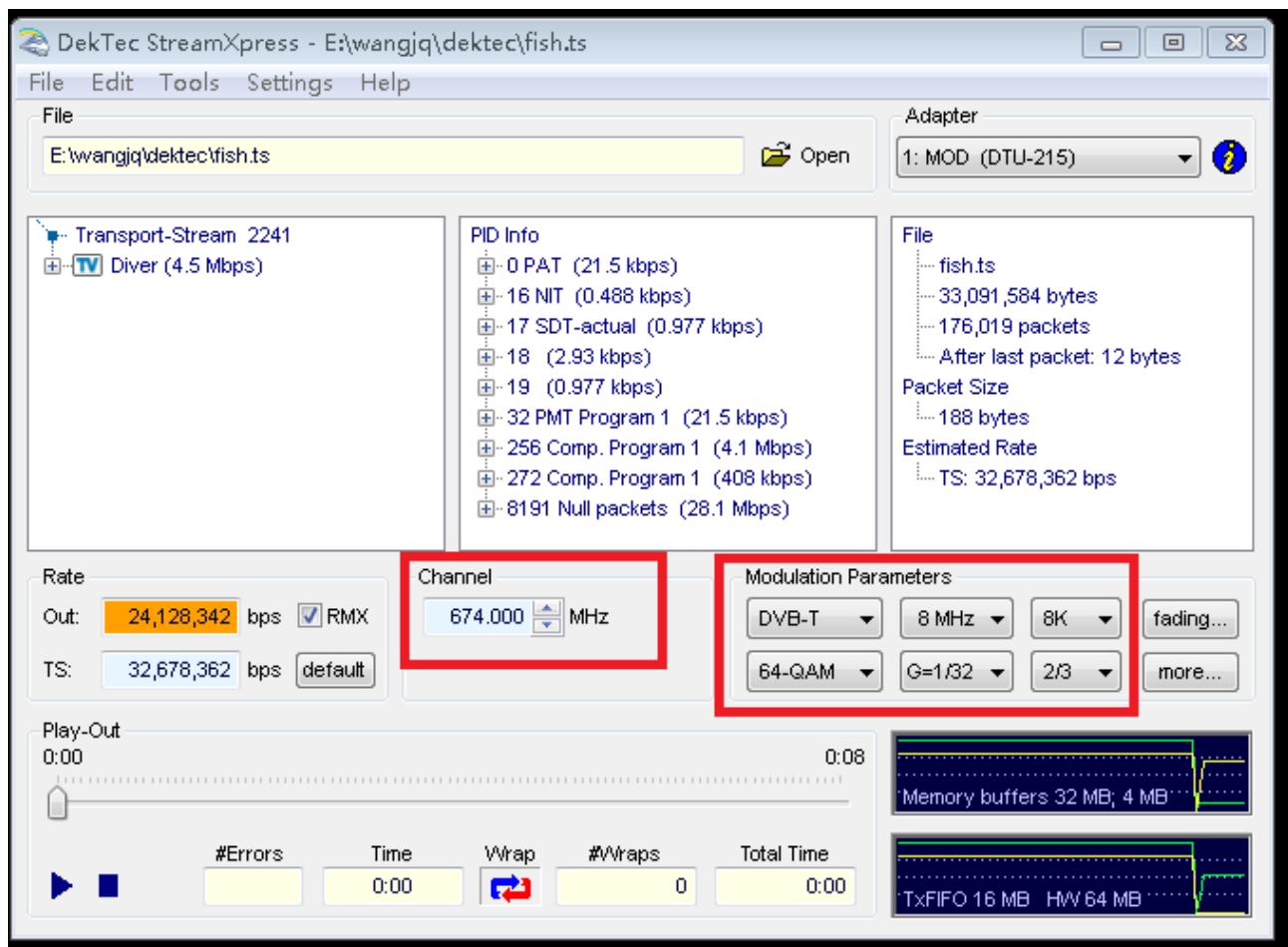


**Step 2** Set the DekTec modulator as shown in [Figure 3-16](#).

- Set the modulation mode to **DVB-T**.
- Set the FFT size to **8K**.
- Set the constellation to **64-QAM**.
- Set the internal code rate to **2/3**.
- Set the guard interval to **G=1/32**.
- Set the frequency to **674 MHz**.
- Set the bandwidth to **8 MHz**.
- Set the signal level to **-25 dBm**.



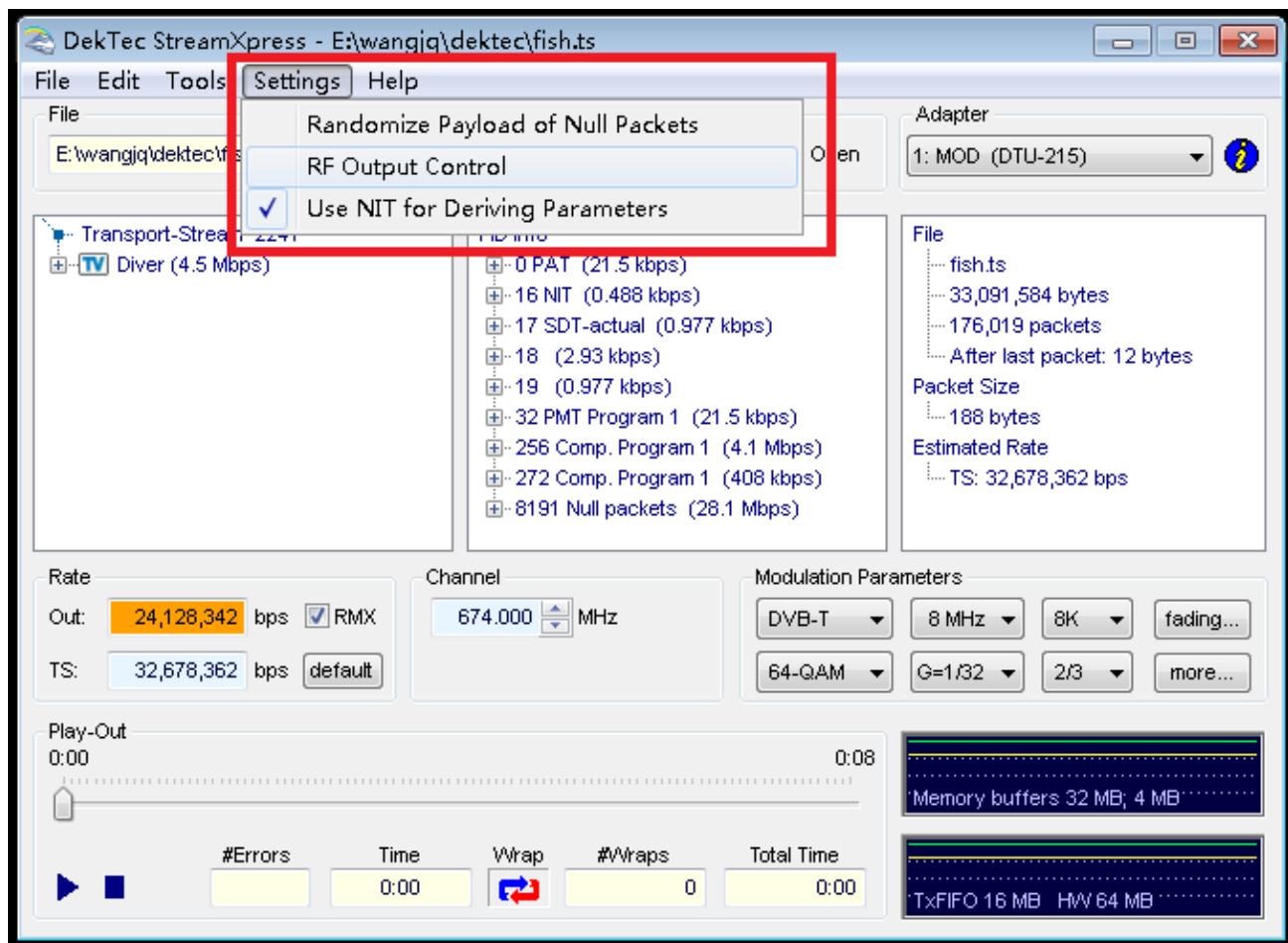
Figure 3-16 Setting the DekTec modulator



Step 3 Choose **Settings > RF Output Control**, as shown in Figure 3-17.



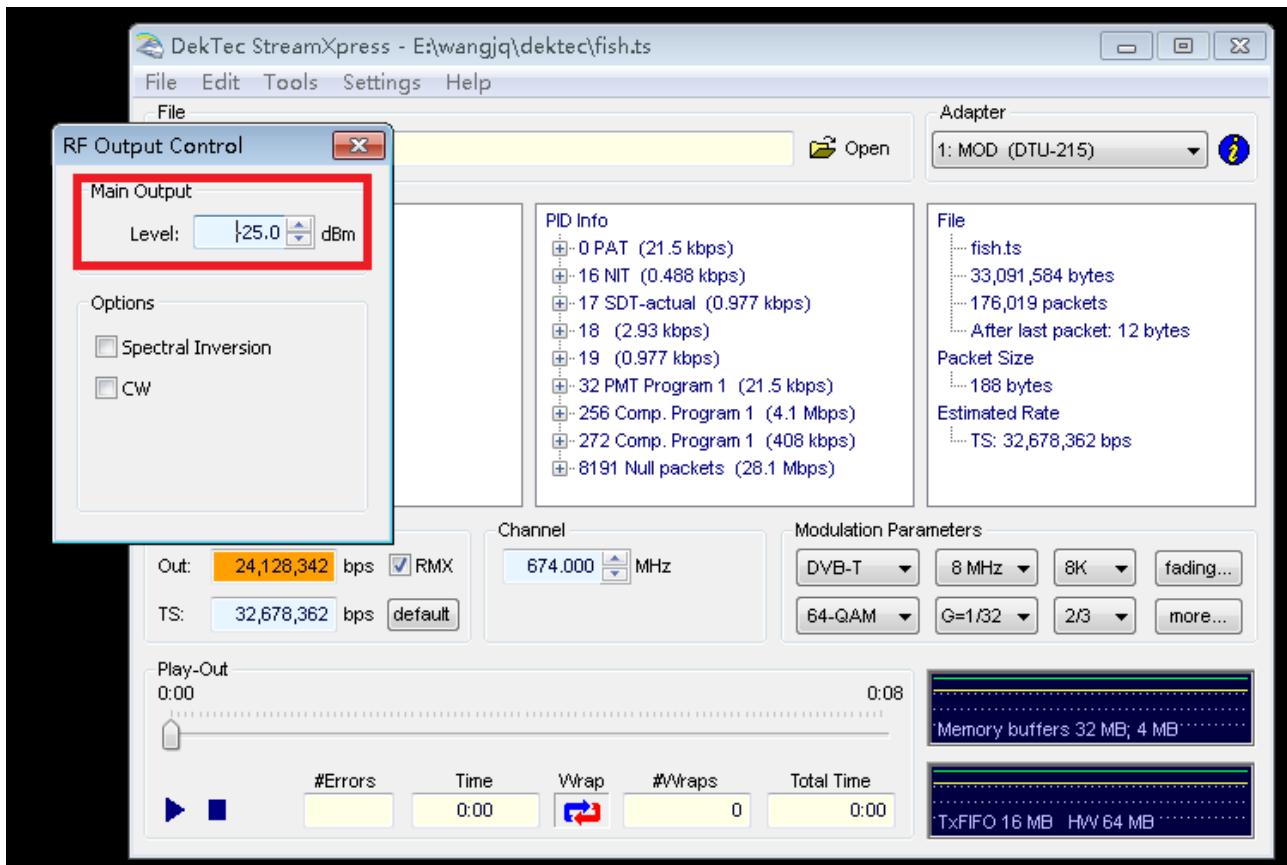
Figure 3-17 RF Output Control



Step 4 Set Level to **-25 dBm**, as shown in Figure 3-18.



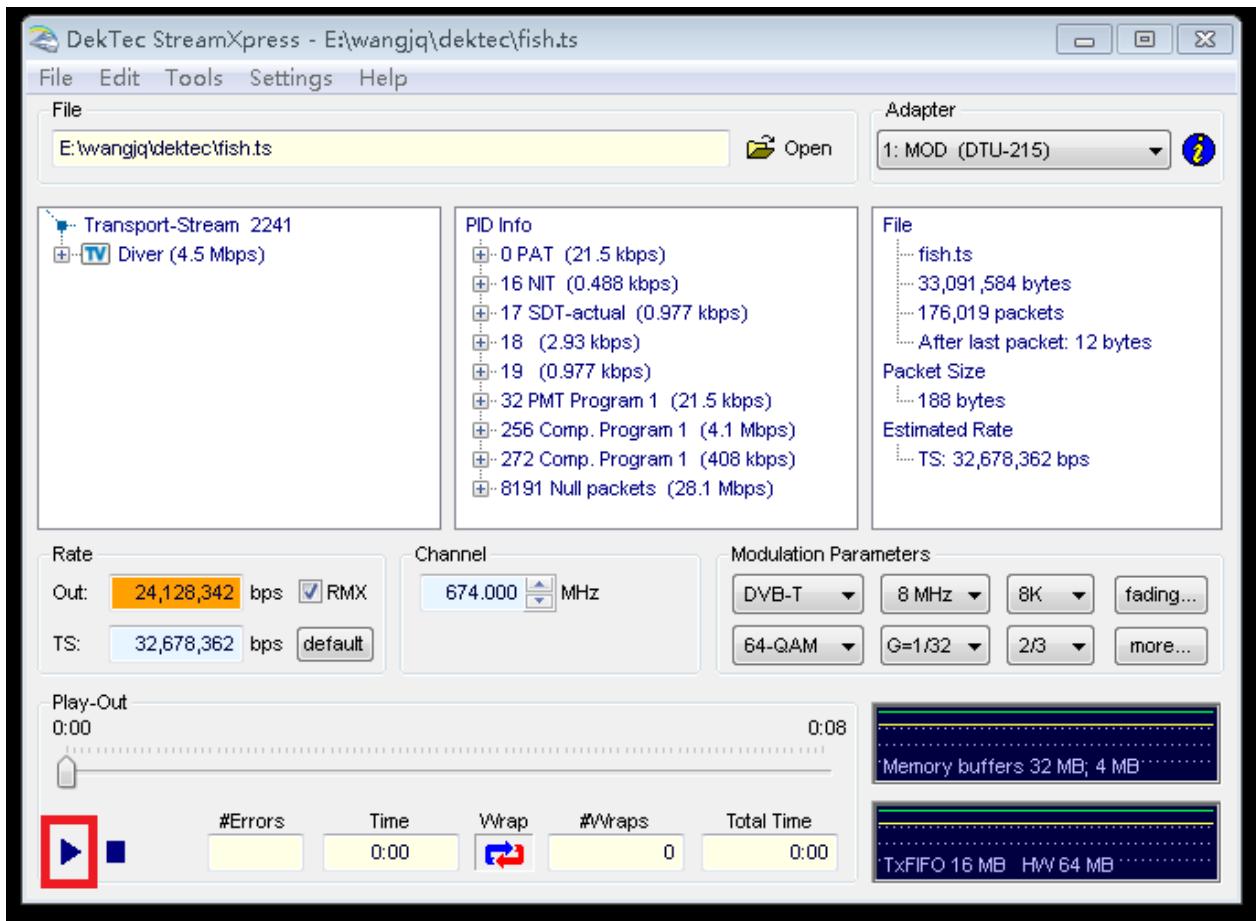
Figure 3-18 Setting the signal strength



Step 5 Click the play button in the lower left corner to start playback, as shown in Figure 3-19.



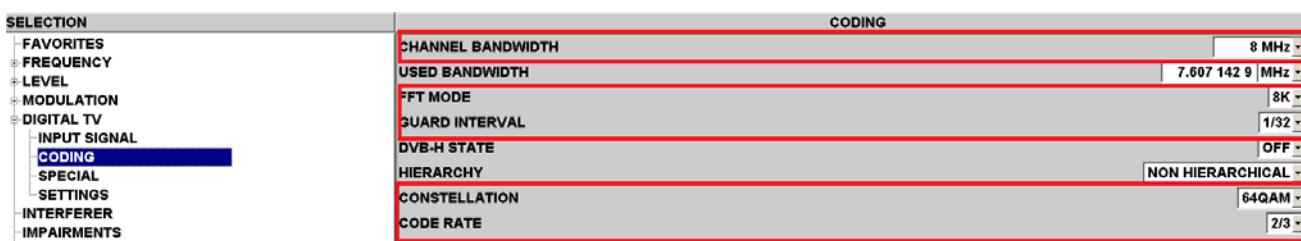
Figure 3-19 Clicking the play button



**Step 6** Choose **DIGITAL TV > CODING**, as shown in [Figure 3-20](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

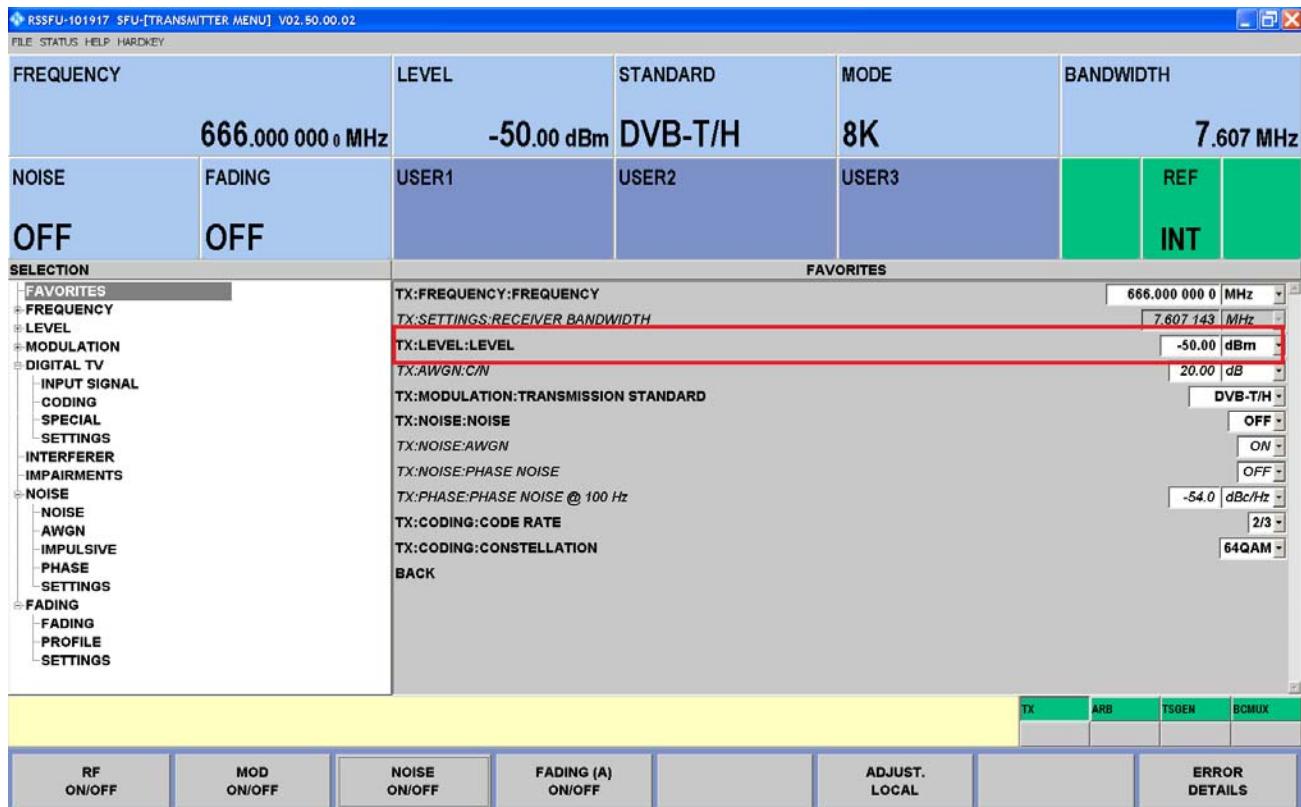
Figure 3-20 CODING settings



**Step 7** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract  $-25$  dBm from the value to obtain the C/I value.



Figure 3-21 Adjusting the LEVEL value

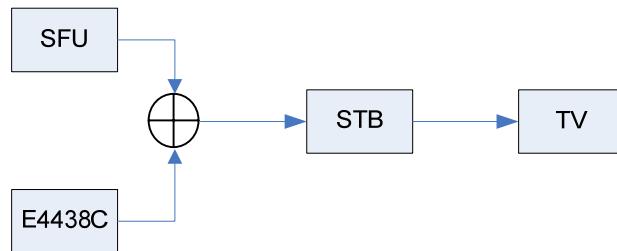


----End

## 3.5 LTE (BS-A) Channel Rejection Ratio Test

Figure 3-22 shows the networking for the LTE channel rejection ratio test.

Figure 3-22 Block diagram for the LTE channel rejection ratio test



### 3.5.1 Test Guide

#### LTE (BS-A) Channel Rejection Ratio Test

Test Object: Hi3137 LTE (BS-A) suppression performance



### LTE (BS-A) Channel Rejection Ratio Test

Test Conditions:

- SFU test model
  - Set **FREQUENCY** to **786 MHz**.
  - Set **BANDWIDTH** to **8 MHz**.
  - Set **NOISE** and **FADING** to **OFF**.
- E4438C parameters
  - Set the E4438C to enable it to play BS\_100% streams.
  - Set the output frequency to 796 MHz.
  - Set the bandwidth to 10 MHz.
  - Set the output signal strength to -15 dBm.
- SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-22](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -15 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

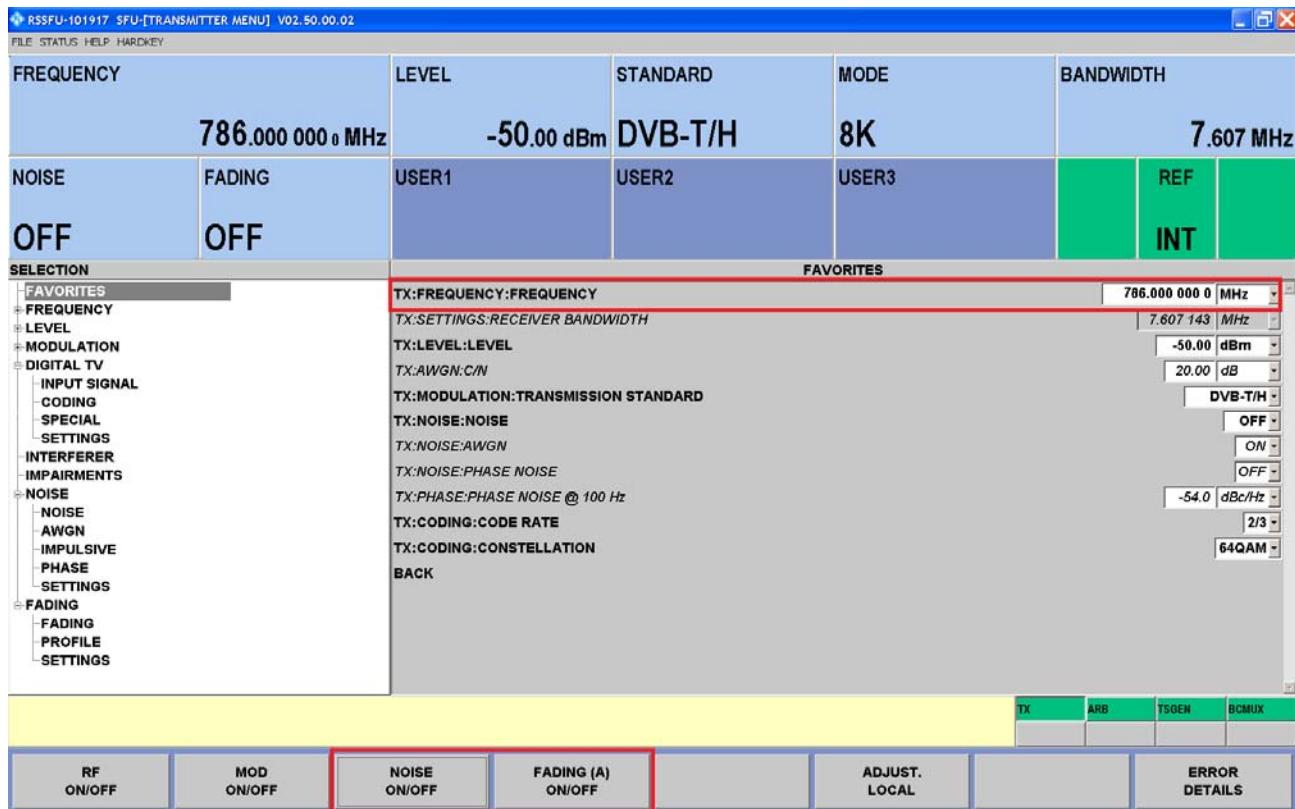
### 3.5.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A)** **ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 3-23](#).



Figure 3-23 Setting the SFU test model



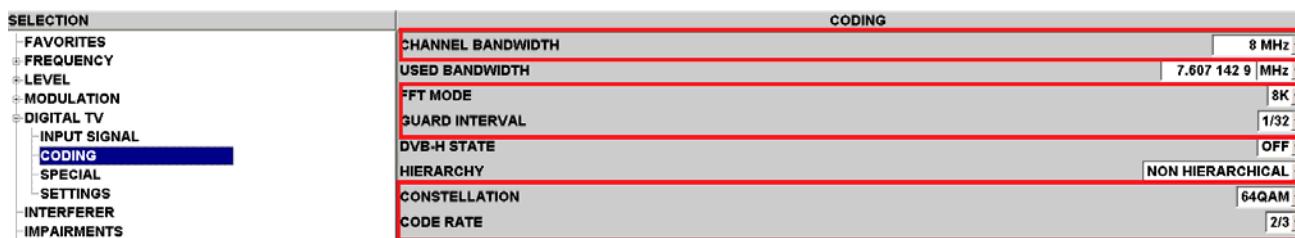
**Step 2** Set the E4438C to enable it to play BS\_100% streams.

- Set the output frequency to 796 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > CODING**, as shown in Figure 3-24.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

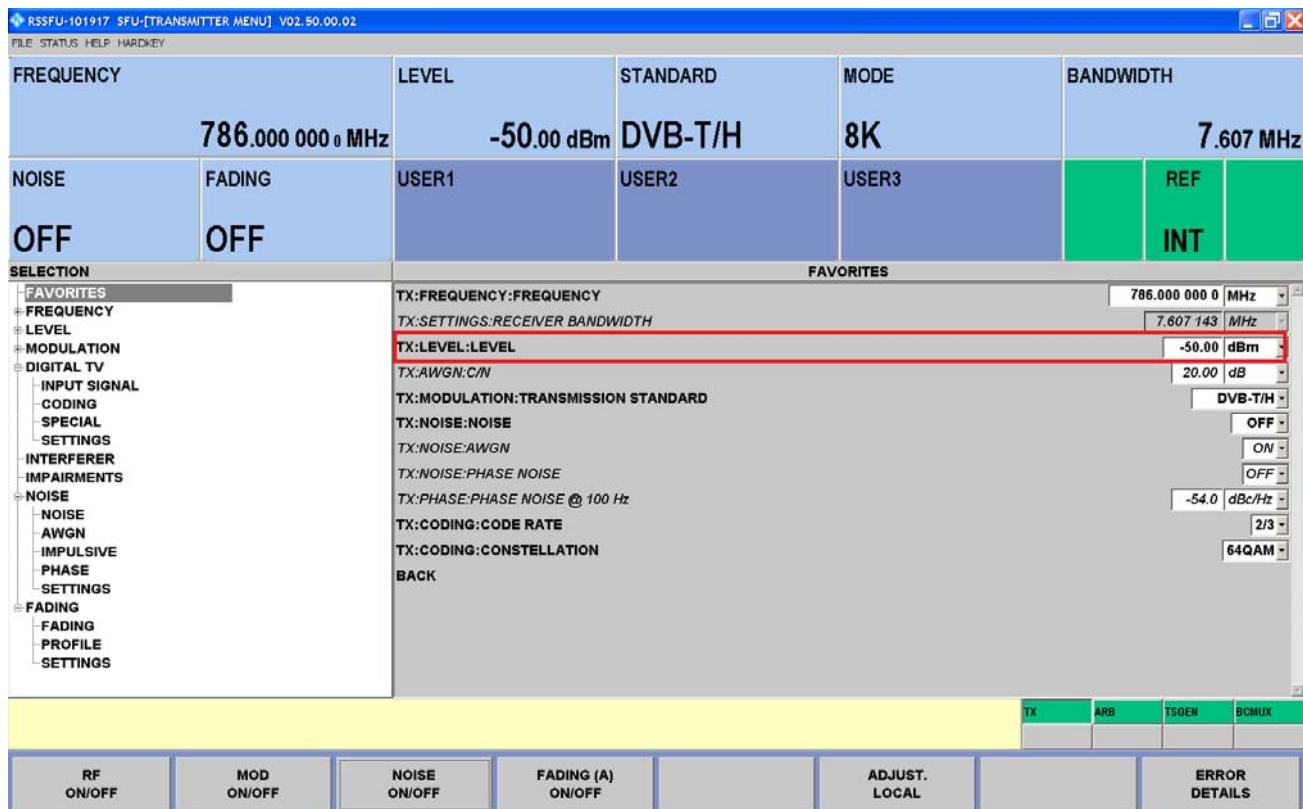
Figure 3-24 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract -15 dBm from the value to obtain the C/I value.

**Figure 3-25** Adjusting the LEVEL value



----End

## 3.6 LTE (BS-B) Channel Rejection Ratio Test

### 3.6.1 Test Guide

LTE (BS-B) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (BS-B) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play BS_100% streams.</li><li>- Set the output frequency to 806 MHz.</li></ul></li></ul>



### LTE (BS-B) Channel Rejection Ratio Test

- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.
- SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-22](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -15 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

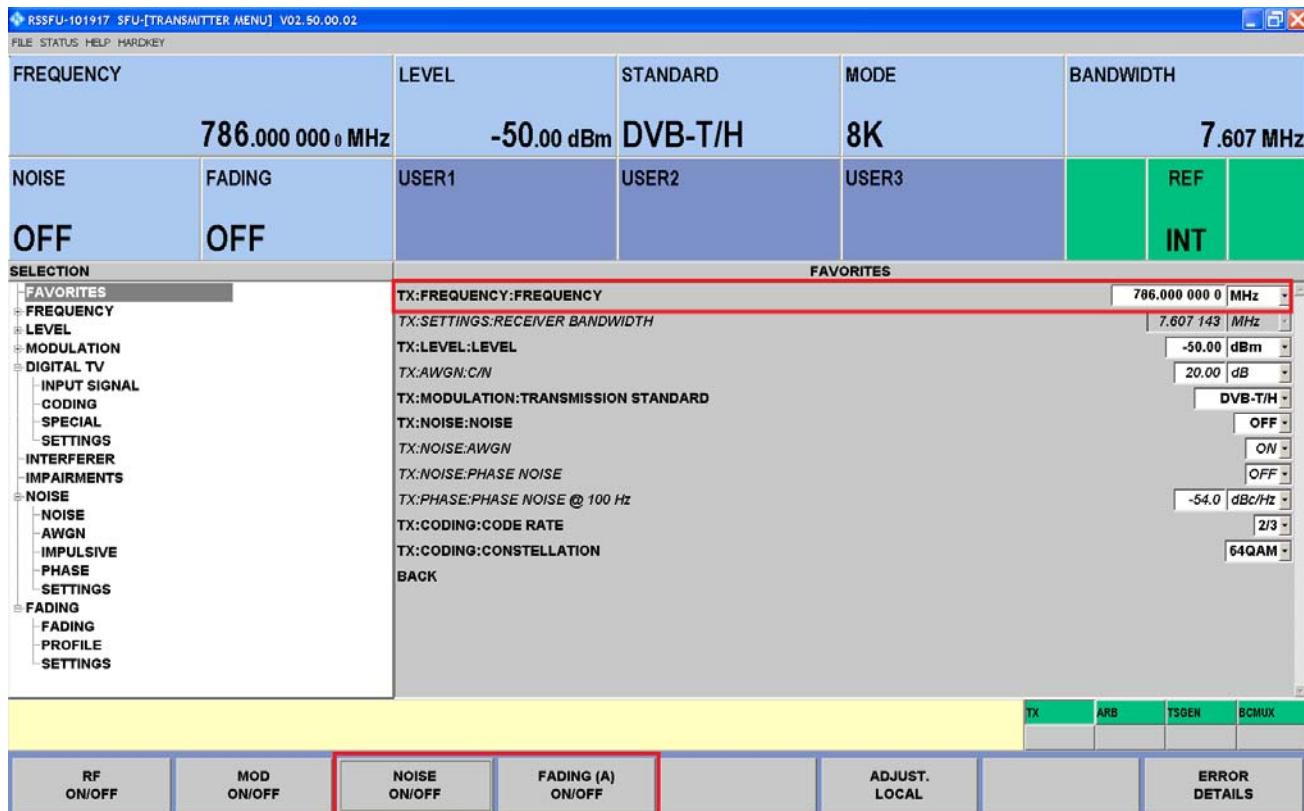
## 3.6.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 3-26](#).



Figure 3-26 Setting the SFU test model



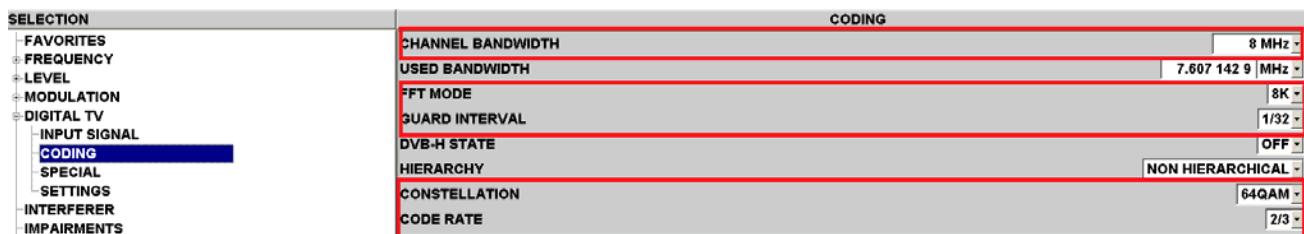
**Step 2** Set the E4438C to enable it to play BS\_100% streams.

- Set the output frequency to 806 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > CODING**, as shown in Figure 3-27.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

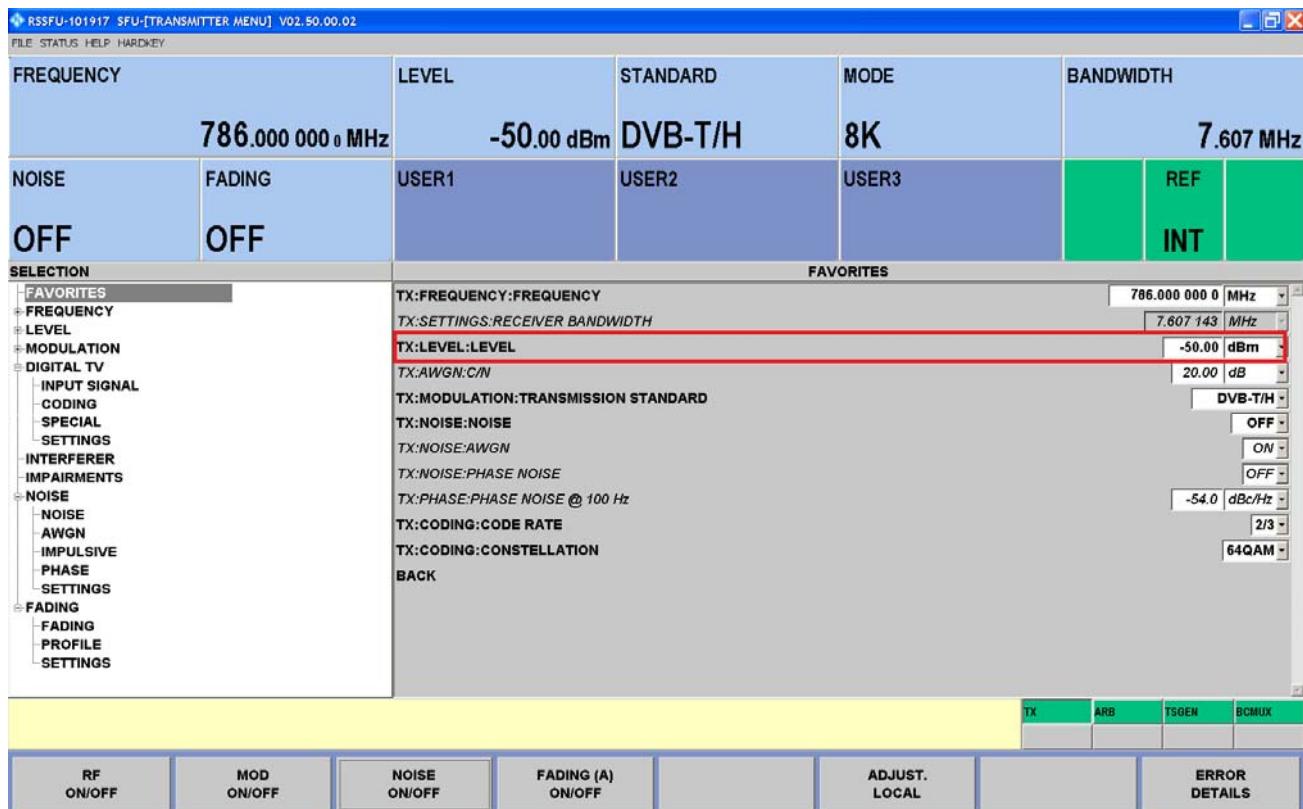
Figure 3-27 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract -15 dBm from the value to obtain the C/I value. See [Figure 3-28](#).

**Figure 3-28** Adjusting the LEVEL value



----End

## 3.7 LTE (UE-A) Channel Rejection Ratio Test

### 3.7.1 Test Guide

LTE (UE-A) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (UE-A) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play UE_20Mbs streams.</li><li>- Set the output frequency to 837 MHz.</li></ul></li></ul>



### LTE (UE-A) Channel Rejection Ratio Test

- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.
- SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-22](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -15 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

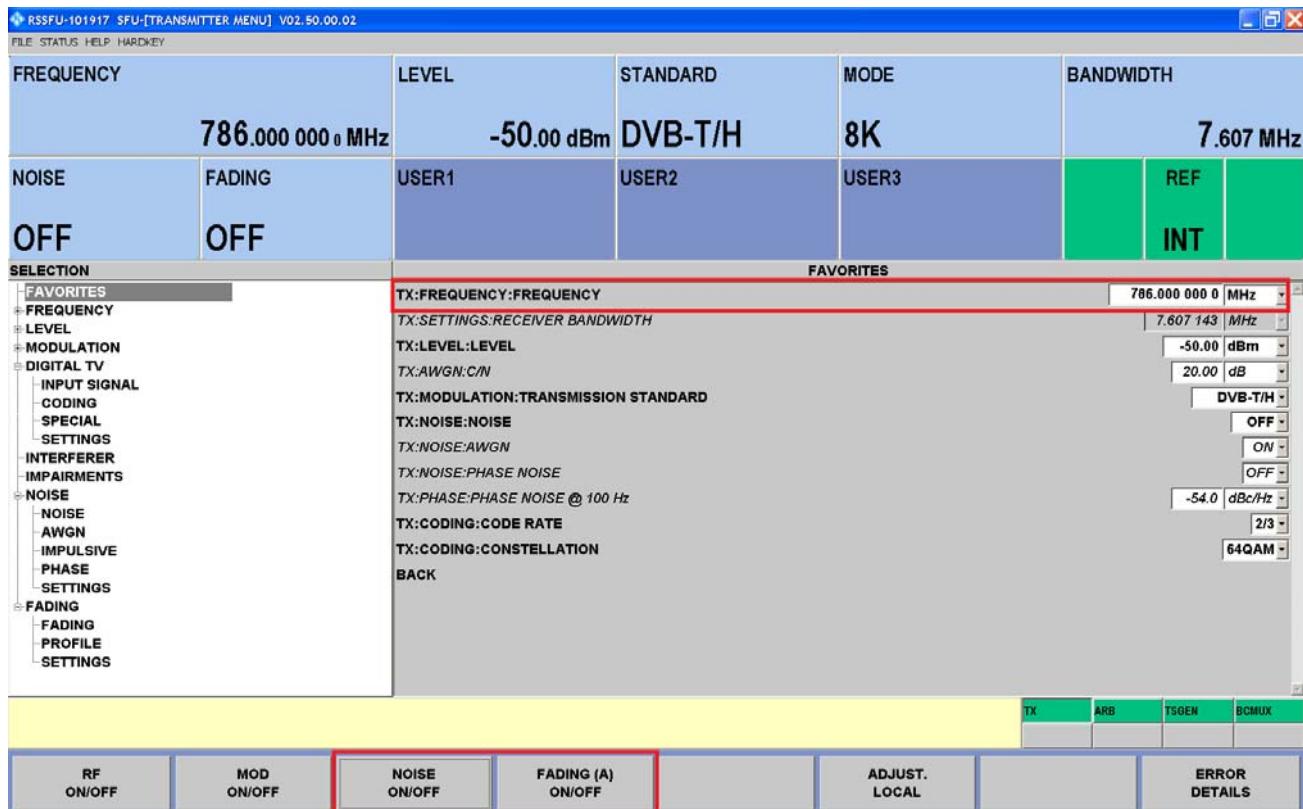
## 3.7.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 3-29](#).



Figure 3-29 Setting the SFU test model



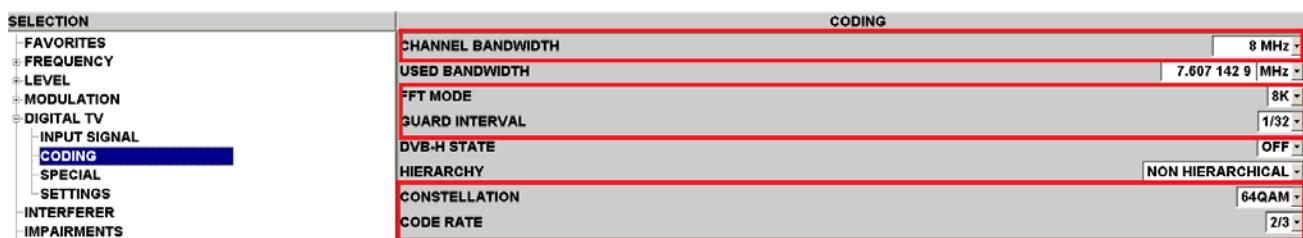
**Step 2** Set the E4438C to enable it to play UE\_20Mbs streams.

- Set the output frequency to 837 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > CODING**, as shown in Figure 3-30.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

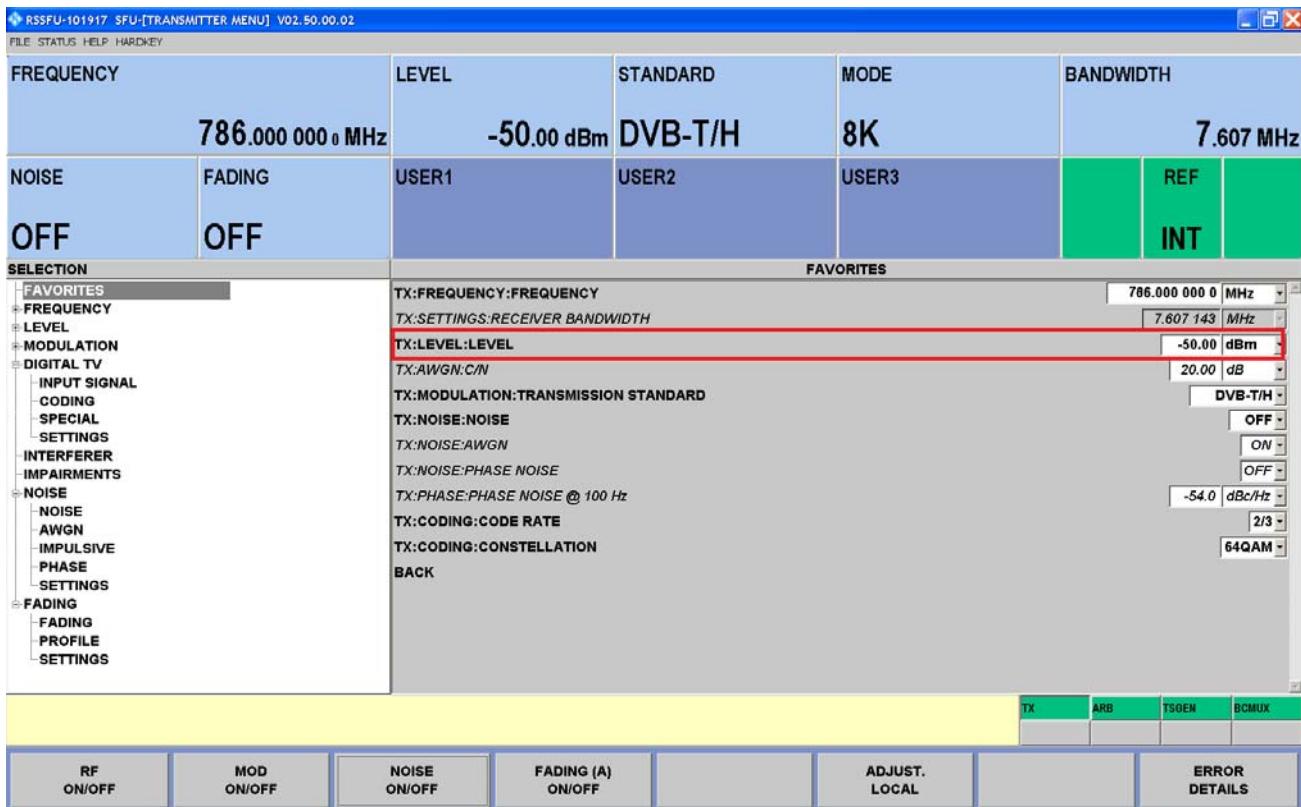
Figure 3-30 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract -15 dBm from the value to obtain the C/I value.

**Figure 3-31** Adjusting the LEVEL value



----End

## 3.8 LTE (UE-C) Channel Rejection Ratio Test

### 3.8.1 Test Guide

LTE (UE-C) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (UE-C) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>• E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play UE_20Mbs streams.</li><li>- Set the output frequency to 857 MHz.</li></ul></li></ul>



### LTE (UE-C) Channel Rejection Ratio Test

- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.
- SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-22](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -15 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

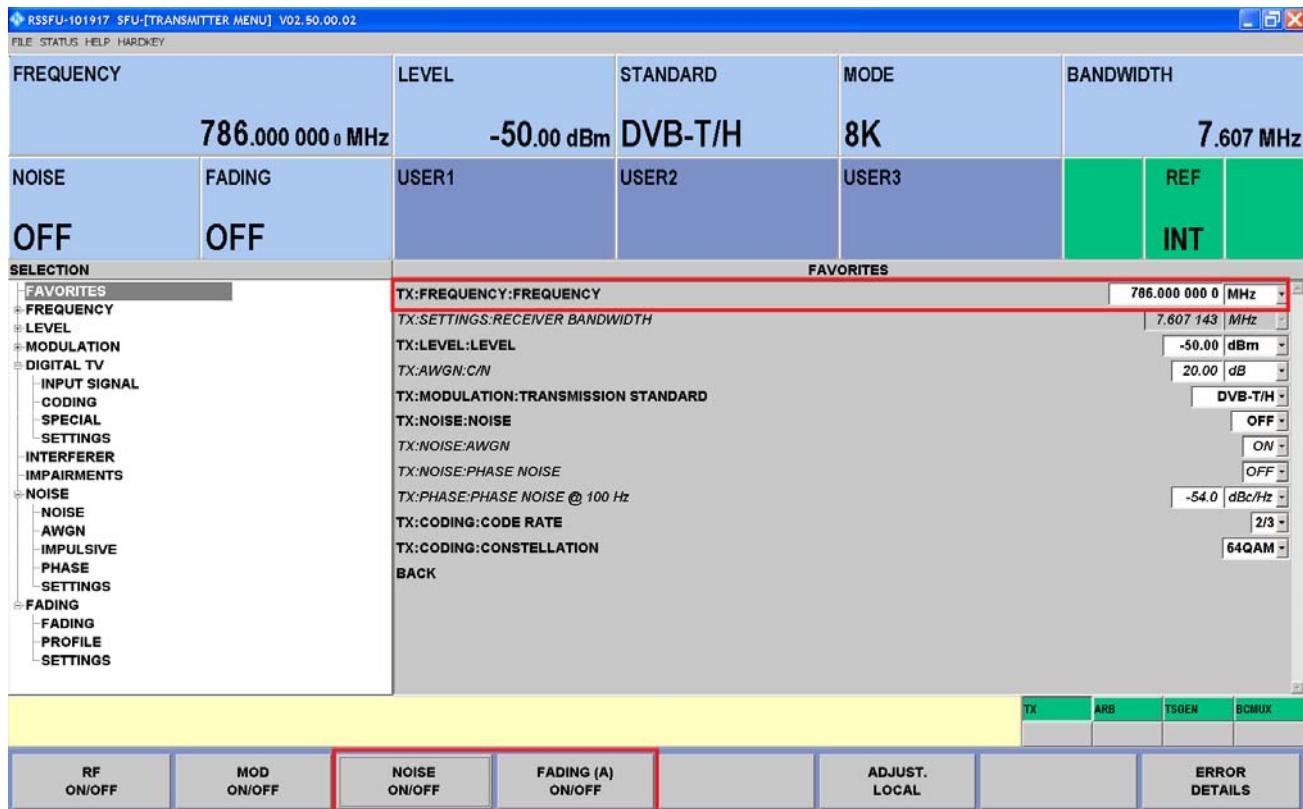
### 3.8.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 3-32](#).



Figure 3-32 Setting the SFU test model



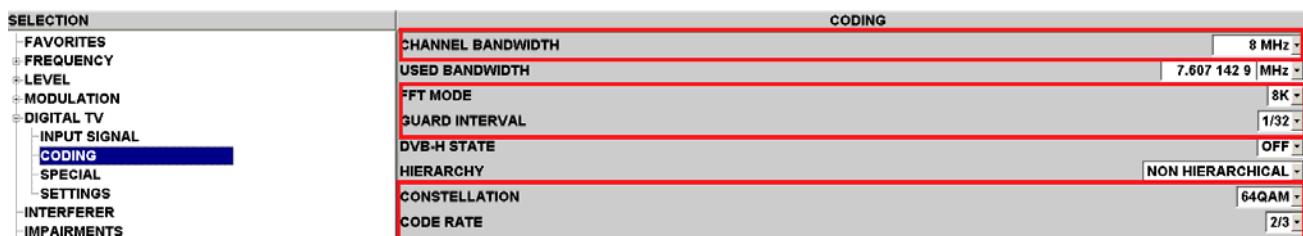
**Step 2** Set the E4438C to enable it to play UE\_20Mbs streams.

- Set the output frequency to 857 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > CODING**, as shown in Figure 3-33.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

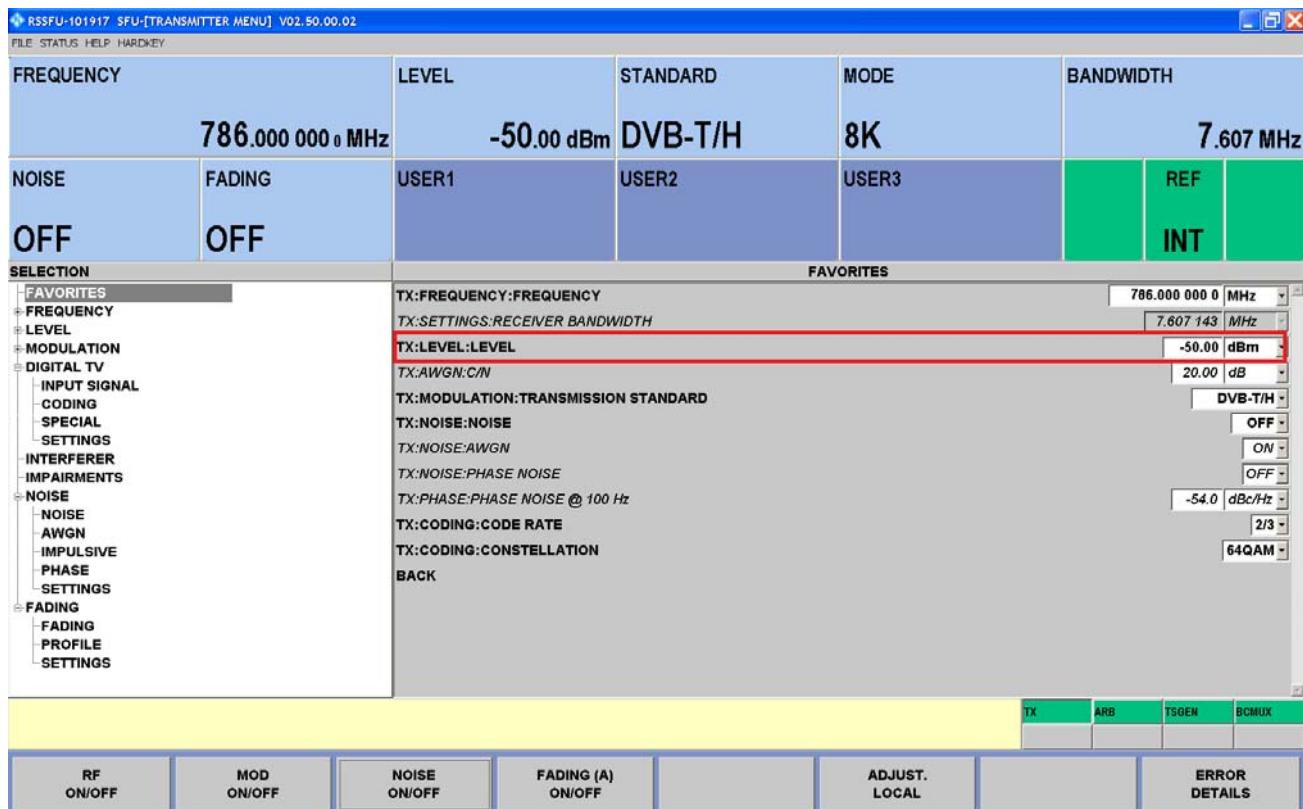
Figure 3-33 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract  $-15$  dBm from the value to obtain the C/I value.

**Figure 3-34** Adjusting the LEVEL value



----End

## 3.9 Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI)

### 3.9.1 Test Guide

Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI)	
Test Object: Hi3137 performance with echoes	
Test Conditions:	
<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>– Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>– Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>– Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>– Set <b>NOISE</b> to <b>ADD</b>.</li><li>– Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li></ul></li></ul>	



#### Test with a 0 dB Echo Within the Guard Interval (0.5GI/0.95GI)

- Choose **FADING > PROFILE**, and set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
  - Set **PROFILE** to **CONST.PHASE**.
  - Set **PATH LOSS** to **0**.
  - Set **ADDIT.DELAY** to **0**.
  - Set **CONST PHASE** in the **1-1** column to **0**.
  - Set **CONST PHASE** in the **2-1** column to **90**.
  - Set **FADING** to **ON**.
- SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Select the guard interval of the test mode (opt1, opt2, or opt3) based on [Table 1-5](#), multiply the guard interval by 0.5 or 0.95, and set **BASIC DELAY** in the **2-1** column in the SFU to the obtained delay value.
- Step 4** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 5** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 6** Repeat steps 2 to 5 until all tests are complete.

----End

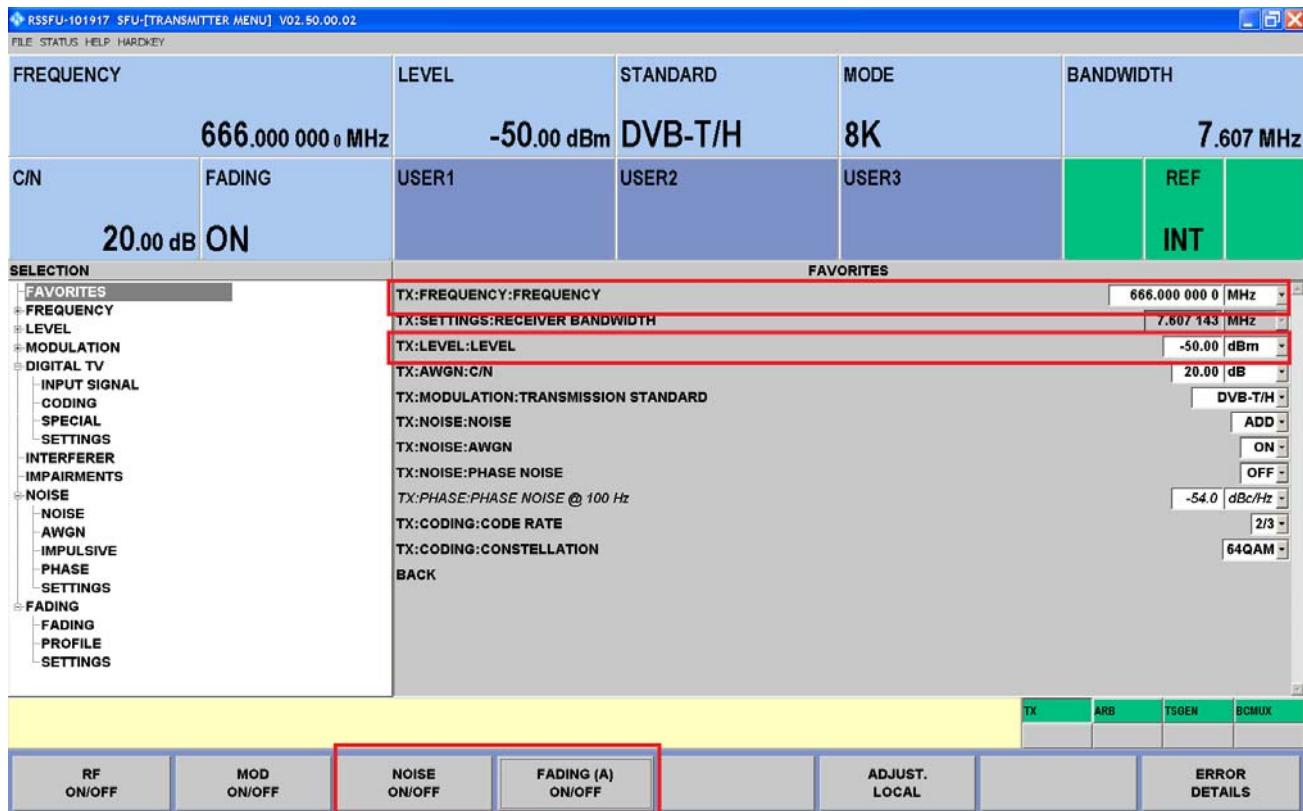
### 3.9.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, 0.5GI.

- Step 1** Set **NOISE** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 3-35](#).



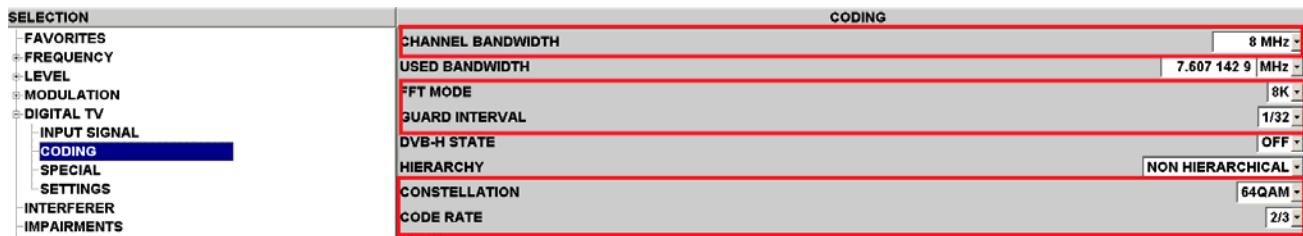
Figure 3-35 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in Figure 3-36.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 3-36 CODING settings



Step 3 Multiply the guard interval corresponding to the mode to be tested (28  $\mu$ s according to Table 3-1) by 0.5. The result is 14  $\mu$ s.



**Table 3-1** Selecting the guard interval

DVB-T	8K				2K			
GI	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
Character length	896 μs				224 μs			
ΔTu	224 μs	112 μs	56 μs	28 μs	56 μs	28 μs	14 μs	7 μs
Total length	1120 μs	1008 μs	952 μs	924 μs	280 μs	252 μs	238 μs	231 μs

**Step 4** Choose **FADING > PROFILE**, as shown in [Figure 3-37](#).

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **PATH LOSS** to **0**.
- Set **ADIT.DELAY** to **0**.
- Set **CONST PHASE** in the **1-1** column to **0**.
- Set **CONST PHASE** in the **2-1** column to **90**.
- Set **BASIC DELAY** in the **2-1** column to **14 μs**, which is obtained in step 3.

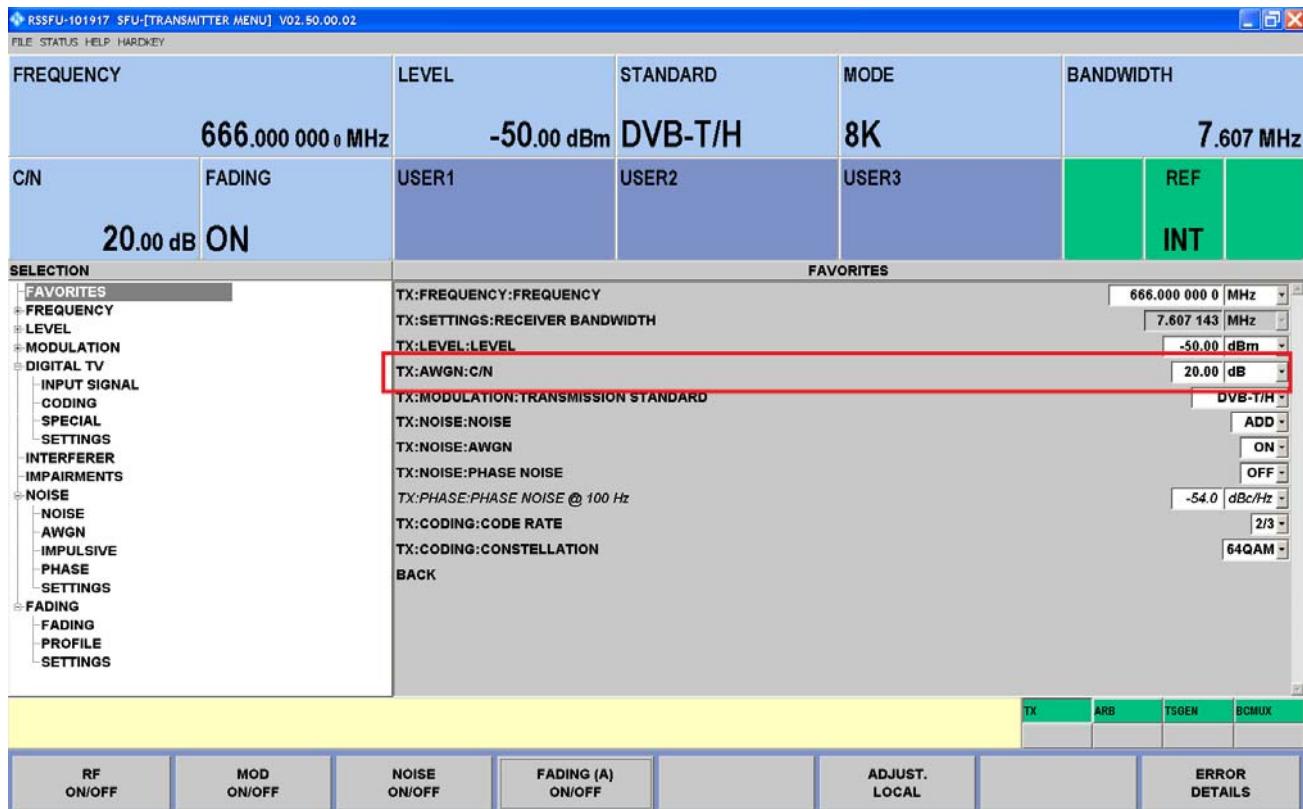
**Figure 3-37** PROFILE settings

STATE	1-1					2-1				
	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	
PROFILE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	
PATH LOSS [dB]	0.00	0.00	0.00	0.00	0.00	14.00	14.00	14.00	14.00	
BASIC DELAY [μs]	0.00	0.00	0.00	0.00	0.00	90.0	0.0	0.0	0.0	
ADIT. DELAY [μs]	0.00	0.00	0.00	0.00	0.00	14.00	14.00	14.00	14.00	
RESULTING DELAY [μs]	0.00	0.00	0.00	0.00	0.00	90.0	0.0	0.0	0.0	
POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
SPEED [m/s]	0.00	20.00	20.00	20.00	20.00	0.00	20.00	20.00	20.00	
FREQ RATIO	-1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
RES DOPPLER SHIFT [Hz]	0.00	44.43	44.43	44.43	44.43	0.00	44.43	44.43	44.43	
CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	
PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	
STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	

**Step 5** Adjust the C/N value to complete the test. See [Figure 3-38](#).



Figure 3-38 Adjusting the C/N value



## 3.10 Test with a 0 dB Echo, 20 Hz Doppler

### 3.10.1 Test Guide

Test with a 0 dB Echo, 20 Hz Doppler	
Test Object: Hi3137 performance with echoes	
Test Conditions:	
	<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>.</li><li>- Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Set <b>FADING</b> to <b>ON</b>.</li><li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li><li>- Set <b>PROFILE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>CONST.PHASE</b> and <b>PURE DOPP</b> respectively.</li></ul></li></ul>



#### Test with a 0 dB Echo, 20 Hz Doppler

- Set **RES DOPPLER SHIFT** in the **1-1** and **2-1** columns to **0** and **20** respectively.
- Set **PATH LOSS** in the **1-1** and **2-1** columns to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST PHASE** to **0**.
- Set **BASIC DELAY** in the **2-1** column to **20**.
- Set **FREQ RATIO** to **1**.
- SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in [Table 1-1](#) based on the test items.

Test Networking: See [Figure 3-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

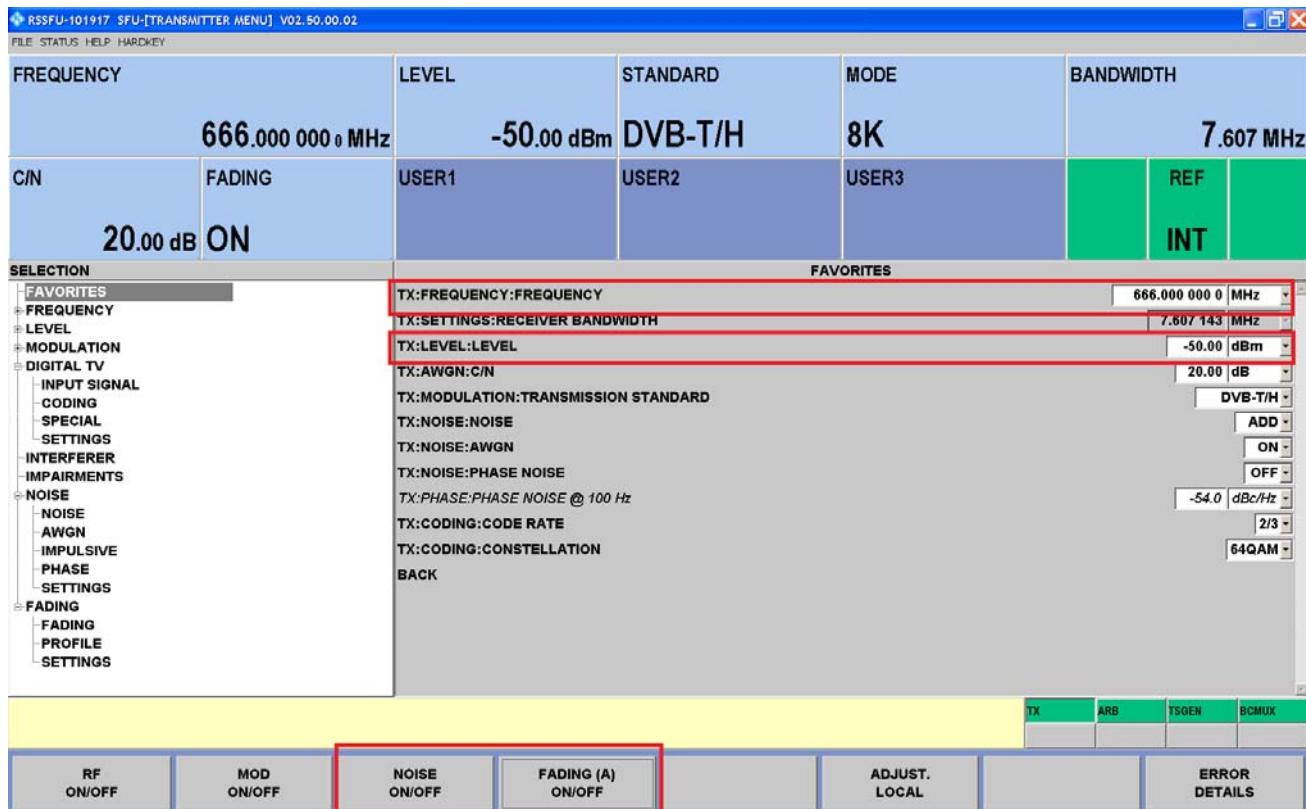
### 3.10.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, Doppler=20 Hz.

- Step 1** Set **NOISE** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A)** **ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 3-39](#).



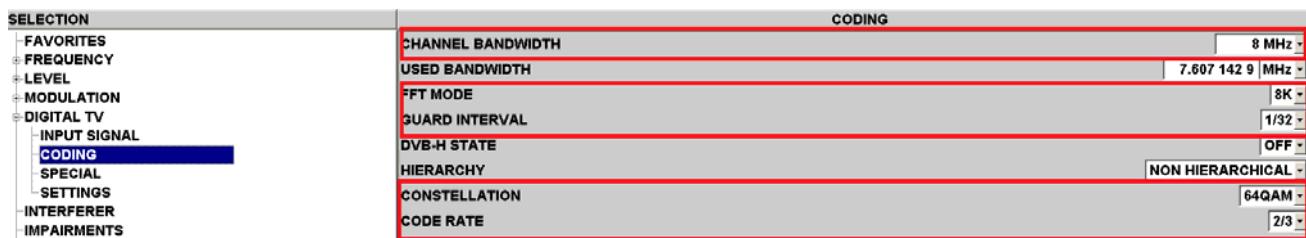
Figure 3-39 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in Figure 3-40.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 3-40 CODING settings



Step 3 Choose **FADING > PROFILE**, as shown in Figure 3-41.

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** in the **1-1** and **2-1** columns to **CONST.PHASE** and **PURE DOPP** respectively.
- Set **RES DOPPLER SHIFT** in the **1-1** and **2-1** columns to **0** and **20** respectively.



- Set **PATH LOSS** in the **1-1** and **2-1** columns to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST. PHASE** to **0**.
- Set **BASIC DELAY** in the **2-1** column to **20**.
- Set **FREQ RATIO** to **1**.

**Figure 3-41 PROFILE settings**

SELECTION		PROFILE										USER	
		STANDARD					d:/FADING/USER/unsaved_profile.fad					STANDARD DELAY	
		PARAMETER SET											
		CONFIGURATION											
SETTINGS		1-1	2	1-3	1-4	1-5	2-1	ON	OFF	OFF	OFF	OFF	OFF
MODULATION		ON	OFF	OFF	OFF	OFF	OFF	0.00	0.00	0.00	0.00	0.00	0.00
DIGITAL TV		PROFILE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	PURE DOPP.	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH
INPUT SIGNAL		CONST.PHASE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MODE + STREAM ADAPT.		PATH LOSS [dB]	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00	20.00	20.00
BICM		BASIC DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FRAMING + OFDM		ADDIT. DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T2 SYSTEM		RESULTING DELAY [us]	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00	20.00	20.00
SFN		POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SETTINGS		CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERFERER		SPEED [m/s]	0.00	20.00	20.00	20.00	20.00	0.00	20.00	20.00	20.00	20.00	20.00
IMPAIRMENTS		FREQ RATIO	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NOISE		RES DOPPLER SHIFT [Hz]	0.00	44.43	44.43	44.43	44.43	44.43	20.00	44.43	44.43	44.43	44.43
AWGN		CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
IMPULSIVE		COEFICIENT [%]	0	0	0	0	0	0	0	0	0	0	0
PHASE		PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SETTINGS		LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
FADING		LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
PROFILE		STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0	0
SETTINGS													

**Step 4** Adjust the C/N value to complete the test. See Figure 3-42.

**Figure 3-42 Adjusting the C/N value**

FREQUENCY		LEVEL	STANDARD	MODE	BANDWIDTH	
666.000 000 MHz		-50.00 dBm	DVB-T/H	8K	7.607 MHz	
C/N	FADING	USER1	USER2	USER3	REF	INT
20.00 dB ON						
SELECTION		FAVORITES				
FAVORITES		TX:FREQUENCY:FREQUENCY				666.000 000 MHz
FREQUENCY		TX:SETTINGS:RECEIVER BANDWIDTH				7.607 143 MHz
LEVEL		TX:LEVEL:LEVEL				-50.00 dBm
MODULATION		TX:AWGN:C/N				20.00 dB
DIGITAL TV		TX:MODULATION:TRANSMISSION STANDARD				DVB-T/H
INPUT SIGNAL		TX:NOISE:NOISE				ADD
CODING		TX:NOISE:AWGN				ON
SPECIAL		TX:NOISE:PHASE NOISE				OFF
SETTINGS		TX:PHASE:PHASE NOISE @ 100 Hz				-54.0 dBc/Hz
INTERFERER		TX:CODING:CODE RATE				2/3
IMPAIRMENTS		TX:CODING:CONSTELLATION				64QAM
NOISE		BACK				
AWGN						
IMPULSIVE						
PHASE						
SETTINGS						
FADING						
FADING						
PROFILE						
SETTINGS						



----End

## 3.11 Test with an Echo Outside the Guard Interval

### 3.11.1 Test Guide

Test with an Echo Outside the Guard Interval
Test Object: Hi3137 performance with echoes
Test Conditions: <ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>OFF</b>.</li><li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li><li>- Set <b>PROFILE</b> to <b>CONST.PHASE</b>.</li><li>- Set <b>ADDIT. DELAY</b> to <b>0</b>.</li><li>- Set <b>FADING</b> to <b>ON</b>.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in <a href="#">Table 1-1</a> based on the test items.</li></ul>
Test Networking: See <a href="#">Figure 3-1</a> .
Test Procedure: <ol style="list-style-type: none"><li><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</li><li><b>Step 2</b> Set the mode (opt1, opt2, or opt3) to be tested in <a href="#">Table 1-1</a> to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).</li><li><b>Step 3</b> Select the echo delay according to <a href="#">Table 1-2</a> based on the test mode (opt1, opt2, or opt3) and items to be tested in the test report.</li><li><b>Step 4</b> Set <b>BASIC DELAY</b> of the SFU multipath model 2-1 to the echo delay obtained in step 3.<ul style="list-style-type: none"><li>● If the post echo type is to be tested, set <b>PATH LOSS</b> of the SFU multipath model 1-1 to <b>0</b>, and set that of the SFU multipath model 2-1 to the item to be tested.</li><li>● If the pre echo type is to be tested, set <b>PATH LOSS</b> of the SFU multipath model 2-1 to <b>0</b>, and set that of the SFU multipath model 1-1 to the item to be tested.</li></ul></li><li><b>Step 5</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</li><li><b>Step 6</b> Gradually decrease the <b>PATH LOSS</b> value set in step 4 until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>PATH LOSS</b> value.</li><li><b>Step 7</b> Repeat steps 2 to 6 until all tests are complete.</li></ol>



### Test with an Echo Outside the Guard Interval

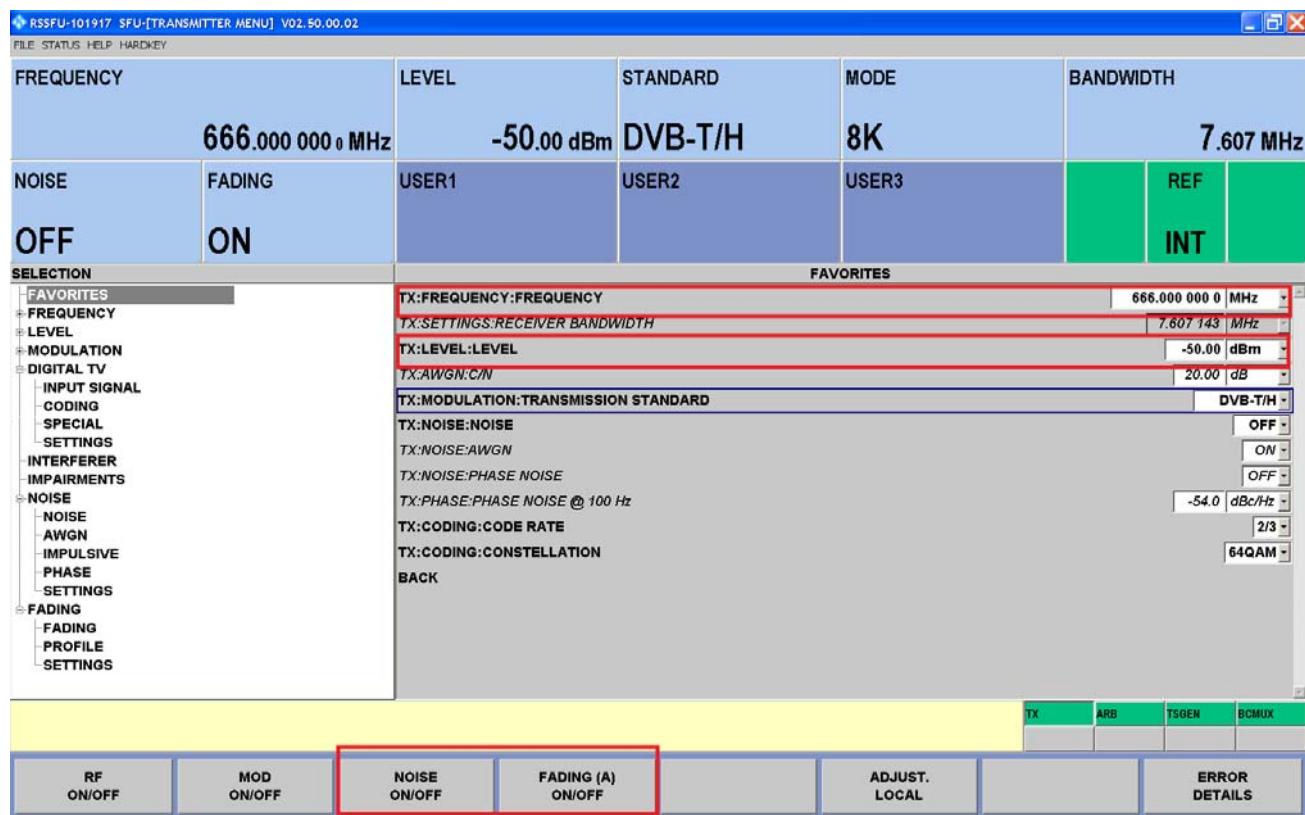
----End

## 3.11.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, TESTA, Pre Echo.

**Step 1** Set **NOISE** to **OFF** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 3-43](#).

**Figure 3-43** Setting the SFU test model

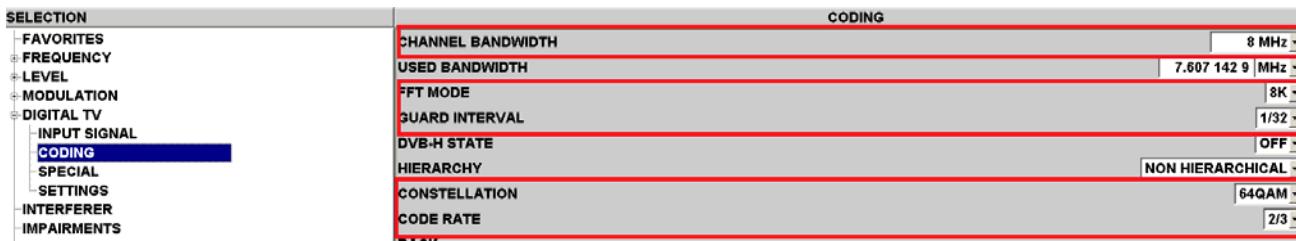


**Step 2** Choose **DIGITAL TV > CODING**, as shown in [Figure 3-44](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.



**Figure 3-44 CODING settings**



**Step 3** Select the echo delay  $-28 \mu\text{s}$  according to [Table 3-2](#) based on the item to be tested (TESTA, Pre Echo) and the test mode opt3.

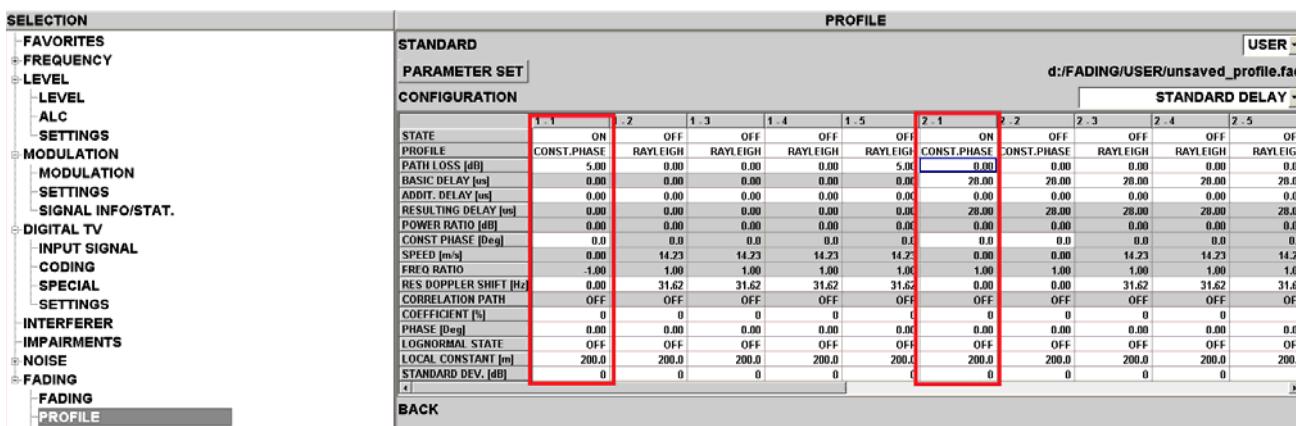
**Table 3-2** Echo delay settings

Test Reference	A	B	C	D	E
opt1	Delay ( $\mu\text{s}$ )	7	15	30	50
opt2	Delay ( $\mu\text{s}$ )	7	15	30	60
opt3	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 60$	$\pm 120$	$\pm 200$
opt4	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 30$	$\pm 33$	N/A
opt5	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 60$	$\pm 119$	$\pm 135$
opt6	Delay ( $\mu\text{s}$ )	$\pm 28$	$\pm 60$	$\pm 119$	$\pm 135$

**Step 4** Choose **FADING > PROFILE**, as shown in [Figure 3-45](#).

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **ADDIT. DELAY** to **0**.
- Set **BASIC DELAY** in the **2-1** column to the absolute value of the echo delay obtained in step 4 ( $28 \mu\text{s}$ ).
- Set **PATH LOSS** to **0**.

**Figure 3-45** PROFILE settings





**Step 5** Adjust the **PATH LOSS** value in the **2-1** column to complete the test. See [Figure 3-46](#).

**Figure 3-46** Adjusting the PATH LOSS value in the 2-1 column

STATE	1 - 1	1 - 2	1 - 3	1 - 4	1 - 5	2 - 1	2 - 2	2 - 3	2 - 4	2 - 5
	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
PROFILE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	CONST.PHASE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH
PATH LOSS [dB]	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
BASIC DELAY [us]	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00	20.00
ADDIT. DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RESULTING DELAY [us]	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00	20.00
POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEED [m/s]	0.00	14.23	14.23	14.23	14.23	0.00	0.00	14.23	14.23	14.23
FREQ RATIO	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RES DOPPLER SHIFT [Hz]	0.00	31.62	31.62	31.62	31.62	0.00	0.00	31.62	31.62	31.62
CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	0
PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0

----End

## 3.12 Short, Medium, and Long Echo Profile Test

### 3.12.1 Test Guide

Short, Medium, and Long Echo Profile Test
Test Object: Hi3137 performance with echoes
Test Conditions:
<ul style="list-style-type: none"> <li>• SFU test model <ul style="list-style-type: none"> <li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li> <li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li> <li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li> <li>- Set <b>NOISE</b> to <b>ADD</b>.</li> <li>- Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li> <li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1, 1-2, 1-3, 1-4, 1-5</b>, and <b>2-1</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li> <li>- Set <b>PROFILE</b> to <b>CONST.PHASE</b>.</li> <li>- Set <b>ADDIT. DELAY</b> to <b>0</b>.</li> <li>- Set <b>CONST.PHASE</b> to <b>0</b>.</li> <li>- Set <b>FADING</b> to <b>ON</b>.</li> </ul> </li> <li>• SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in <a href="#">Table 1-1</a> based on the test items.</li> </ul>
Test Networking: See <a href="#">Figure 3-1</a> .
Test Procedure:



### Short, Medium, and Long Echo Profile Test

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Select an echo delay profile (short, medium, or long echo delay profile) from [Table 1-3](#) based on the item to be tested in the test report, and set **ADDIT DELAY**, **PATH LOSS**, and **CONST.PHASE** in the SFU to the **Delay**, **Relative Attenuation**, and **Phase** values in the profile respectively.
- Step 4** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 5** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 6** Repeat steps 2 to 5 until all tests are complete.

----End

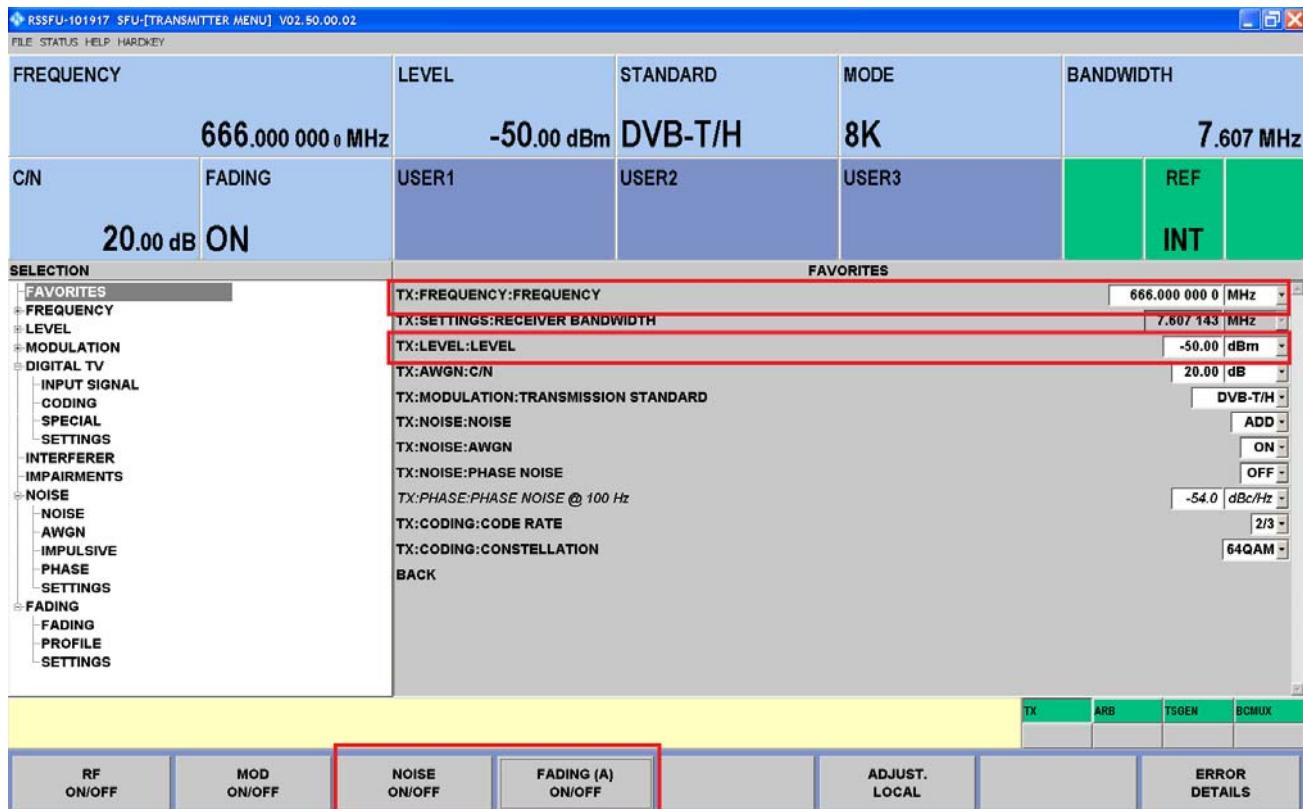
### 3.12.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, short delay echo profile.

- Step 1** Set **NOISE** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A)** **ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 3-47](#).



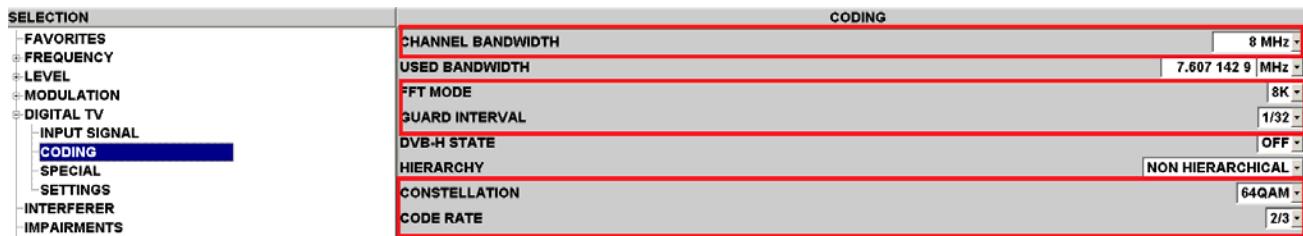
Figure 3-47 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in Figure 3-48.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 3-48 CODING settings



Step 3 Select the short delay echo profile from Table 3-3.

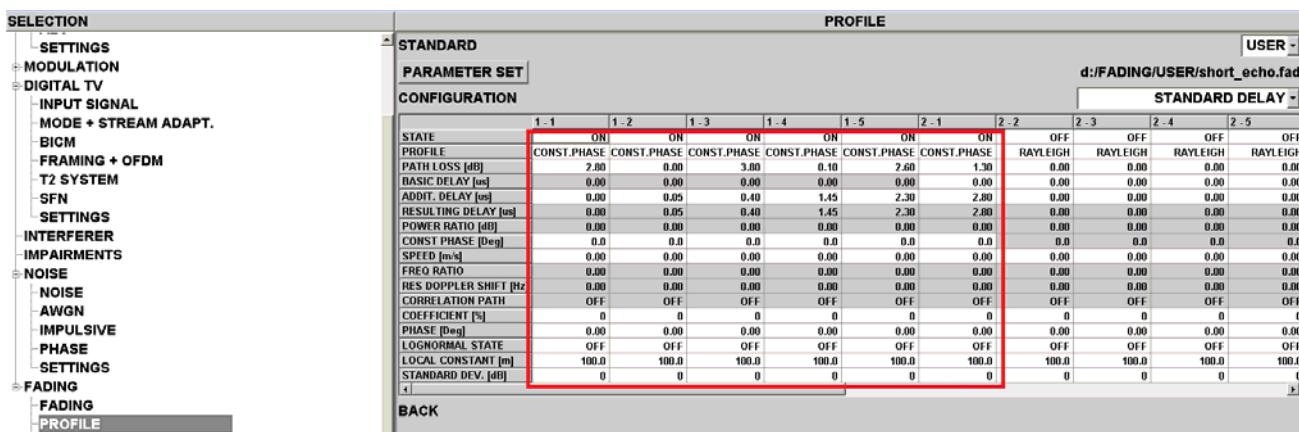


**Table 3-3** Echo delay parameters

Short Delay Echo Profile			Medium Delay Echo Profile			Long Delay Echo Profile		
Delay ( $\mu$ s)	Relative Attenuation (dB)	Phase (Degree)	Delay ( $\mu$ s)	Relative Attenuation (dB)	Phase (Degree)	Delay ( $\mu$ s)	Relative Attenuation (dB)	Phase (Degree)
0	2.8	0	0	0	0	0	0	0
0.05	0	0	1	8.6	0	5	9	0
0.4	3.8	0	5	12.6	0	14	22	0
1.45	0.1	0	8	18	0	35	25	0
2.3	2.6	0	12	20.7	0	54	27	0
2.8	1.3	0	21	22.2	0	75	28	0

**Step 4** Set **ADDIT DELAY**, **PATH LOSS**, and **CONST.PHASE** in the SFU to the **Delay**, **Relative Attenuation**, and **Phase** values in the profile selected in step 3 respectively. See [Figure 3-49](#).

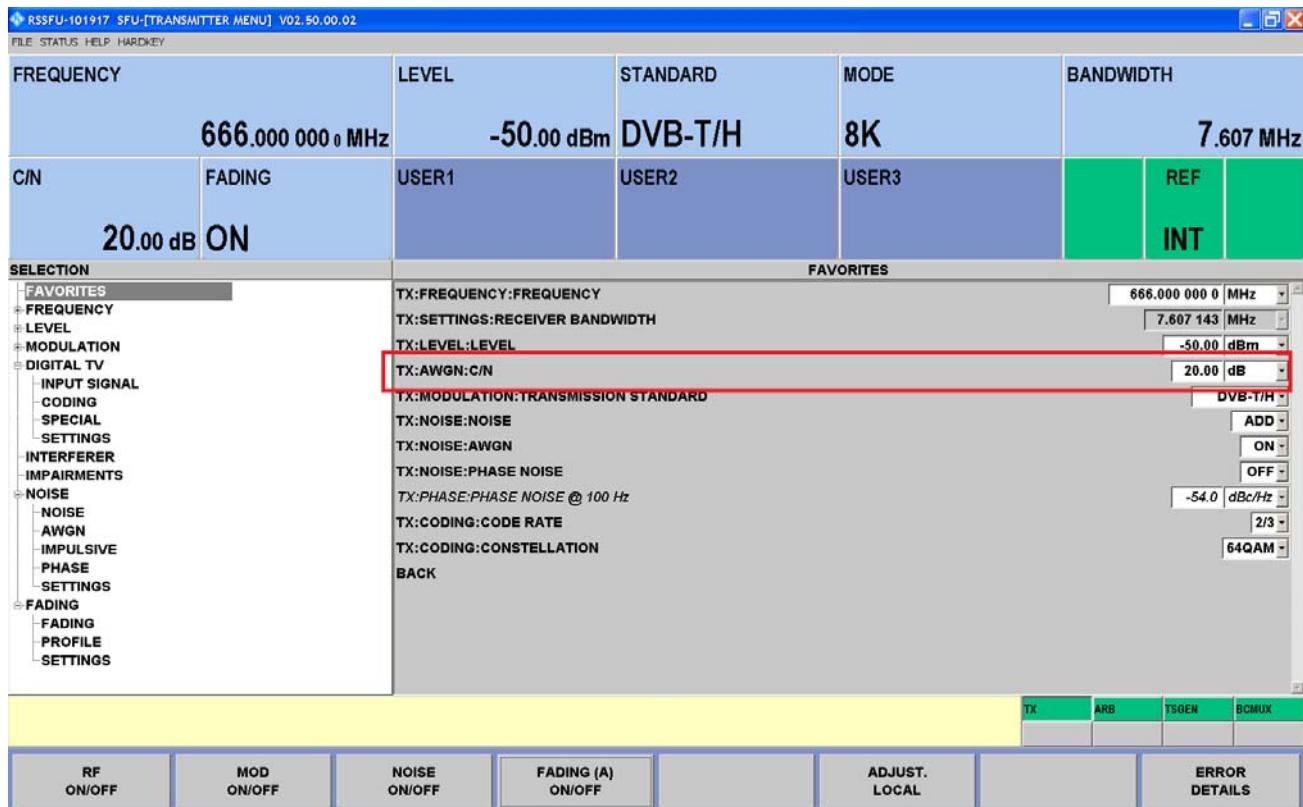
**Figure 3-49** Delay, Relative Attenuation, and Phase settings



**Step 5** Adjust the C/N value to complete the test. See [Figure 3-50](#).



Figure 3-50 Adjusting the C/N value



----End

## 3.13 Impulsive Noise Test

### 3.13.1 Test Guide

Impulsive Noise Test	
Test Object: Hi3137 anti impulsive noise performance	
Test Conditions:	
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-60 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>.</li><li>- Set <b>IMPULSIVE</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Set <b>FADING</b> to <b>OFF</b>.</li><li>- Choose <b>NOISE &gt; IMPULSIVE</b>, and set <b>PULSES PER BURST</b> to <b>10 ms</b>.</li></ul></li><li>● SFU signal parameters: Set the SFU signal parameters according to opt1, opt2, and opt3 in <a href="#">Table 1-1</a> based on the test items.</li></ul>	



### Impulsive Noise Test

Test Networking: See [Figure 3-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set the mode (opt1, opt2, or opt3) to be tested in [Table 1-1](#) to the SFU according to the test report (including the FFT size, guard interval, constellation, and internal code rate).
- Step 3** Select the impulsive noise model from [Table 1-4](#) based on the item to be tested in the test report, and set **PULSES PER BURST**, **PULSE SPACING MIN**, and **PULSE SPACE MAX** in the SFU to the values of **Pulse Per Burst**, **Min. Pulse Space**, and **Max. Pulse Space** respectively.
- Step 4** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 5** Gradually decrease the C/I value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/I value.
- Step 6** Repeat steps 2 to 5 until all tests are complete.

----End

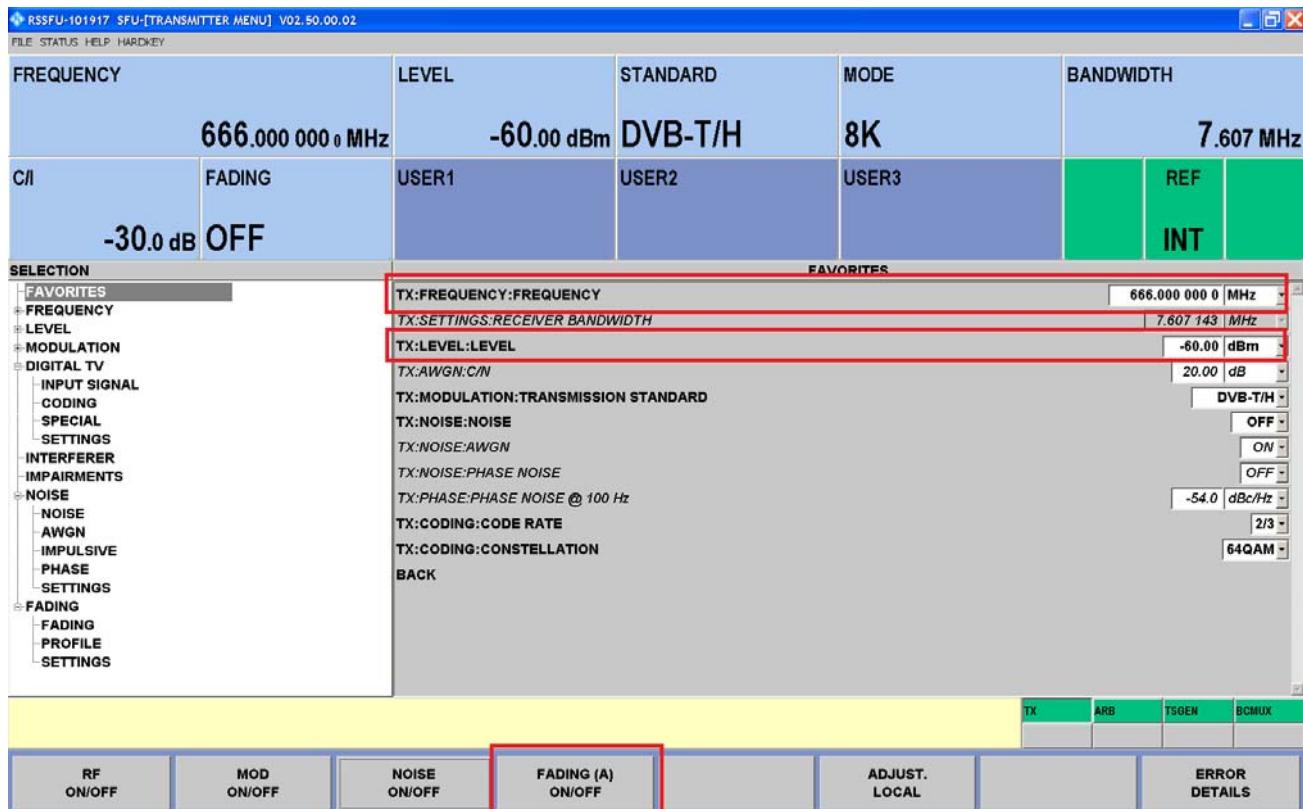
### 3.13.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, II TEST 2.

- Step 1** Set **FADING** to **OFF** by clicking the **FADING (A)** ON/OFF button at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-60 dBm**. See [Figure 3-51](#).



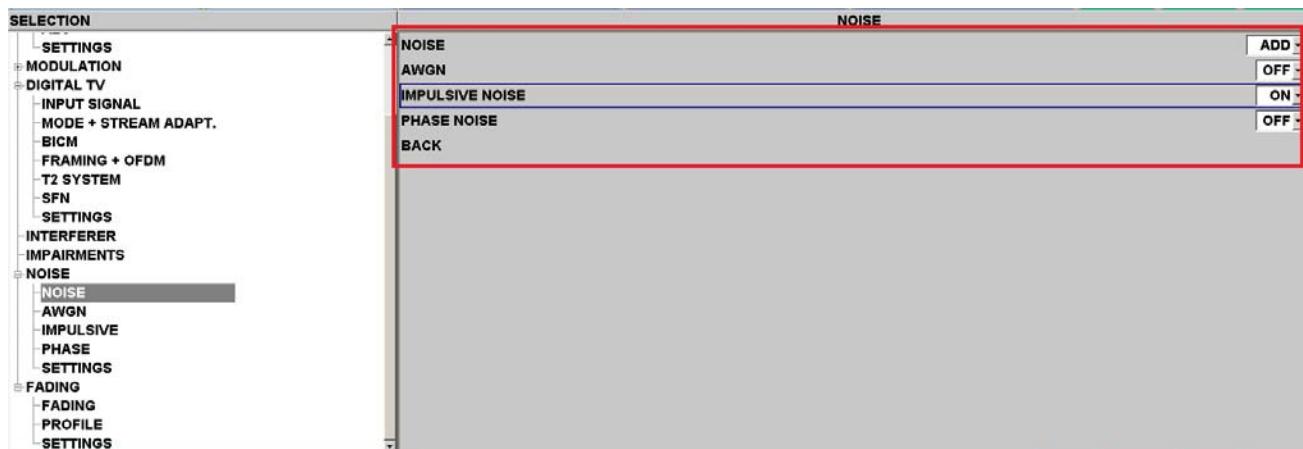
Figure 3-51 Setting the SFU test model



Step 2 Choose NOISE > NOISE, as shown in Figure 3-52.

- Set NOISE to ADD.
- Set IMPULSIVE NOISE to ON.
- Set others to OFF.

Figure 3-52 NOISE settings

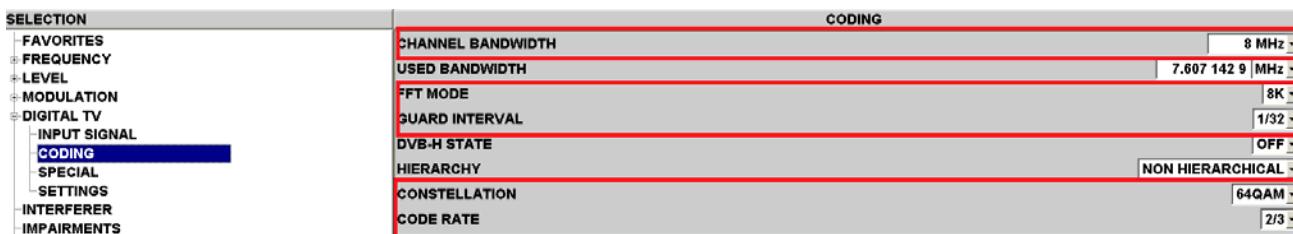


Step 3 Choose DIGITAL TV > CODING, as shown in Figure 3-53.



- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 3-53 CODING settings



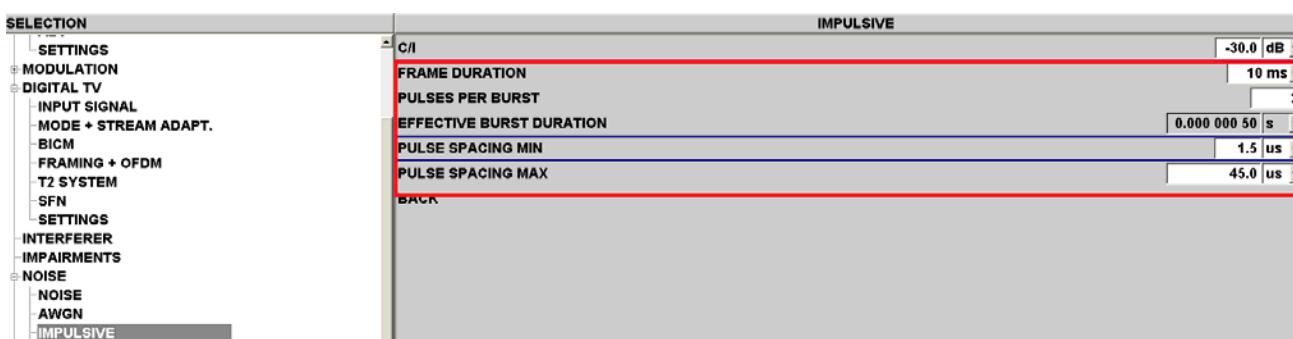
**Step 4** Set the test parameters according to [Table 3-4](#) based on the item to be tested (II TEST 2).

Table 3-4 Test parameters

Test No.	Pulse Per Burst	Min. Pulse Space (μs)	Max. Pulse Space (μs)
1	1	N/A	N/A
2	2	1.5	45
3	4	15	35
4	12	10	15
5	20	1	2
6	40	0.5	1

**Step 5** Set **PULSES PER BURST**, **PULSE SPACING MIN**, and **PULSE SPACE MAX** in the SFU to the values of **Pulse Per Burst**, **Min. Pulse Space**, and **Max. Pulse Space** respectively, and set **PULSES PER BURST** to **10 ms**.

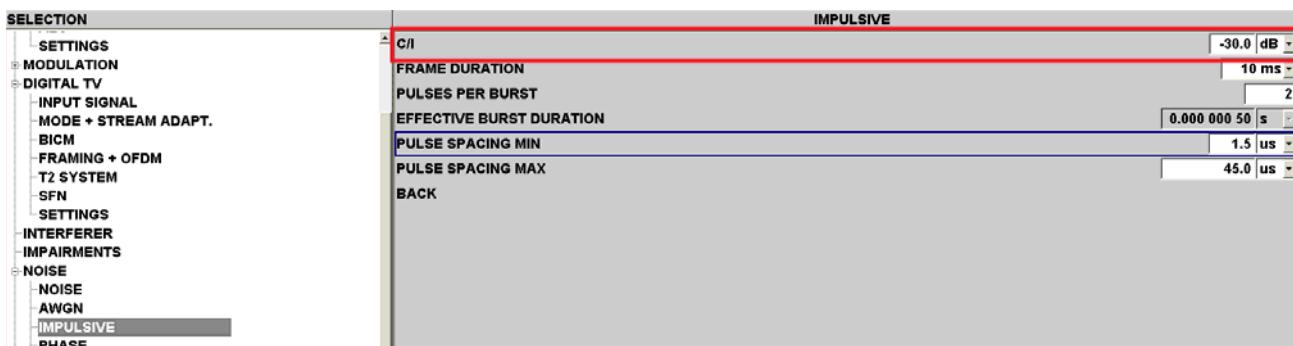
Figure 3-54 Setting Pulse Per Burst, Min. Pulse Space, and Max. Pulse Space





**Step 6** Adjust the C/I value to complete the test. See [Figure 3-55](#).

**Figure 3-55** Adjusting the C/I value



----End

## 3.14 Sensitivity Test

### 3.14.1 Test Guide

Sensitivity Test
Test Object: Hi3137 sensitivity
Test Conditions:  SFU test model <ul style="list-style-type: none"><li>• Set <b>NOISE</b> to <b>OFF</b>.</li><li>• Set <b>FADING</b> to <b>OFF</b>.</li></ul>
Test Networking: See <a href="#">Figure 3-1</a> .
Test Procedure:  <b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU. <b>Step 2</b> Set the mode to be tested to the SFU according to the test report (including the frequency, bandwidth, FFT size, guard interval, constellation, and internal code rate). <b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly. <ul style="list-style-type: none"><li>• For the minimum level test, gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value.</li><li>• For the maximum level test, gradually increase the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually decrease the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value.</li></ul> <b>Step 4</b> Repeat steps 2 to 3 until all tests are complete.



## Sensitivity Test

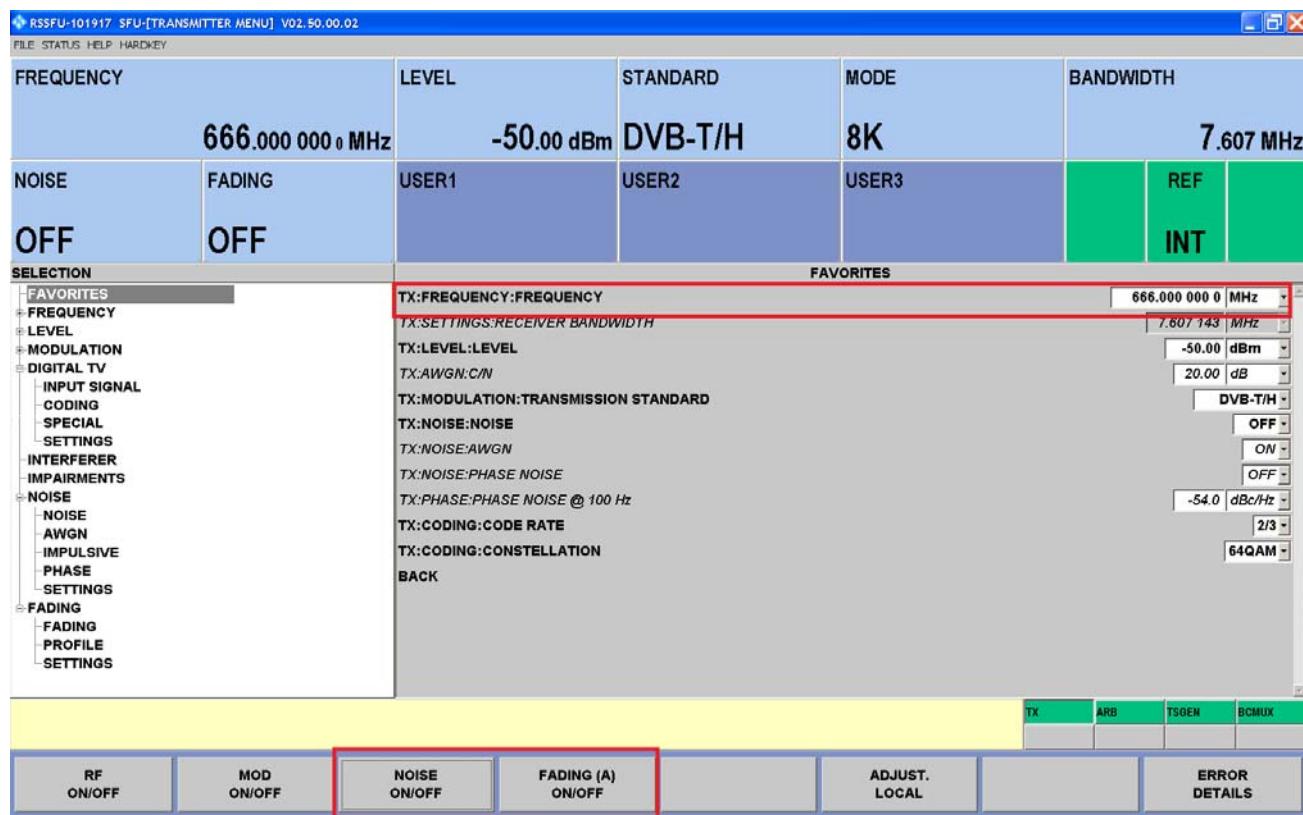
----End

### 3.14.2 Test Instance

The signal parameters are as follows: opt3, FFT=8K, GI=1/32, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz**. See [Figure 3-56](#).

**Figure 3-56** Setting the SFU test model

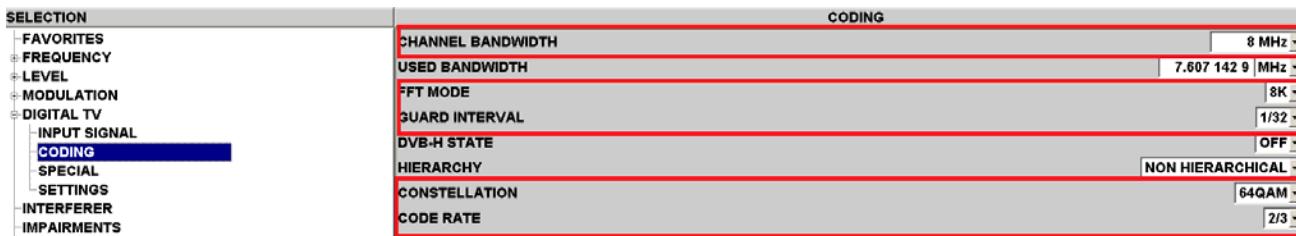


**Step 2** Choose **DIGITAL TV > CODING**, as shown in [Figure 3-57](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

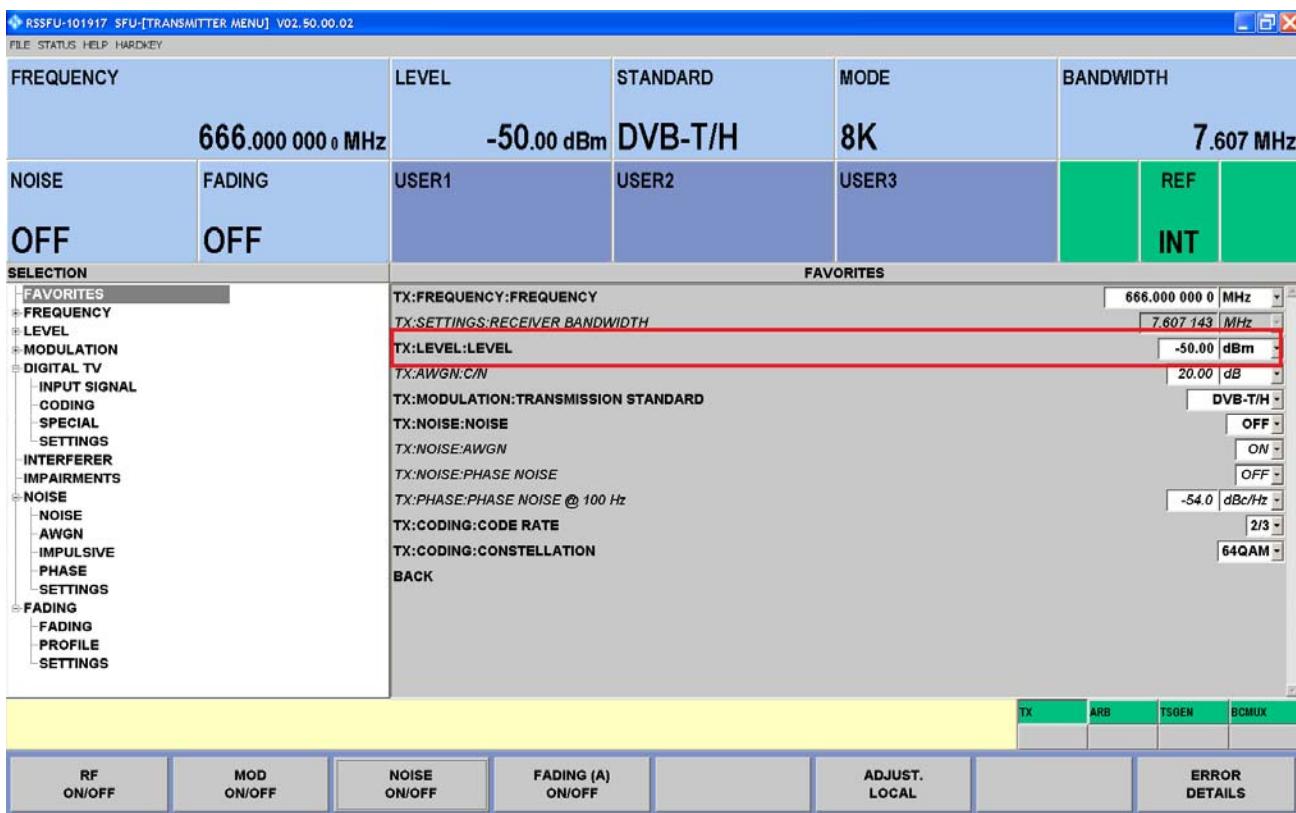


Figure 3-57 CODING settings



Step 3 Adjust the LEVEL value to complete the test. See Figure 3-58.

Figure 3-58 Adjusting the LEVEL value



----End



# 4 NorDig 2.2.1 DVB-T2 Tests

Figure 4-1 shows the block diagram for testing the DVB-T2 modes in the NorDig standard.

**Figure 4-1** Nordig DVB-T2 test block diagram



## 4.1 Gaussian Threshold Test

### 4.1.1 Test Guide

Gaussian Threshold Test
Test Object: Hi3137 Gaussian performance
Test Conditions: <ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>– Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>– Set <b>NOISE</b> to <b>ADD</b>.</li><li>– Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>– Set <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● SFU signal parameters<ul style="list-style-type: none"><li>– Set <b>FFT SIZE</b> to the <b>32K EXT</b>.</li><li>– Set <b>GUARD INTERVAL</b> to <b>1/128</b>.</li><li>– Set <b>PAPR</b> to <b>TR</b>.</li><li>– Set <b>PILOT PATTERN</b> to <b>PP7</b>.</li><li>– Set <b>FEC FRAME</b> to <b>NORMAL</b>.</li><li>– Set <b>TRANSMISSION SYSTEM</b> to <b>SISO</b>.</li><li>– Set <b>CONSTEL. ROTATION</b> to <b>ON</b>.</li></ul></li></ul>
Test Networking: See <a href="#">Figure 4-1</a> .



### Gaussian Threshold Test

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set a group of constellation mode, internal code rate, signal frequency, and bandwidth to be tested to the SFU according to the test report.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 5** Repeat steps 2 to 4 until all Gaussian threshold tests are complete.

----End

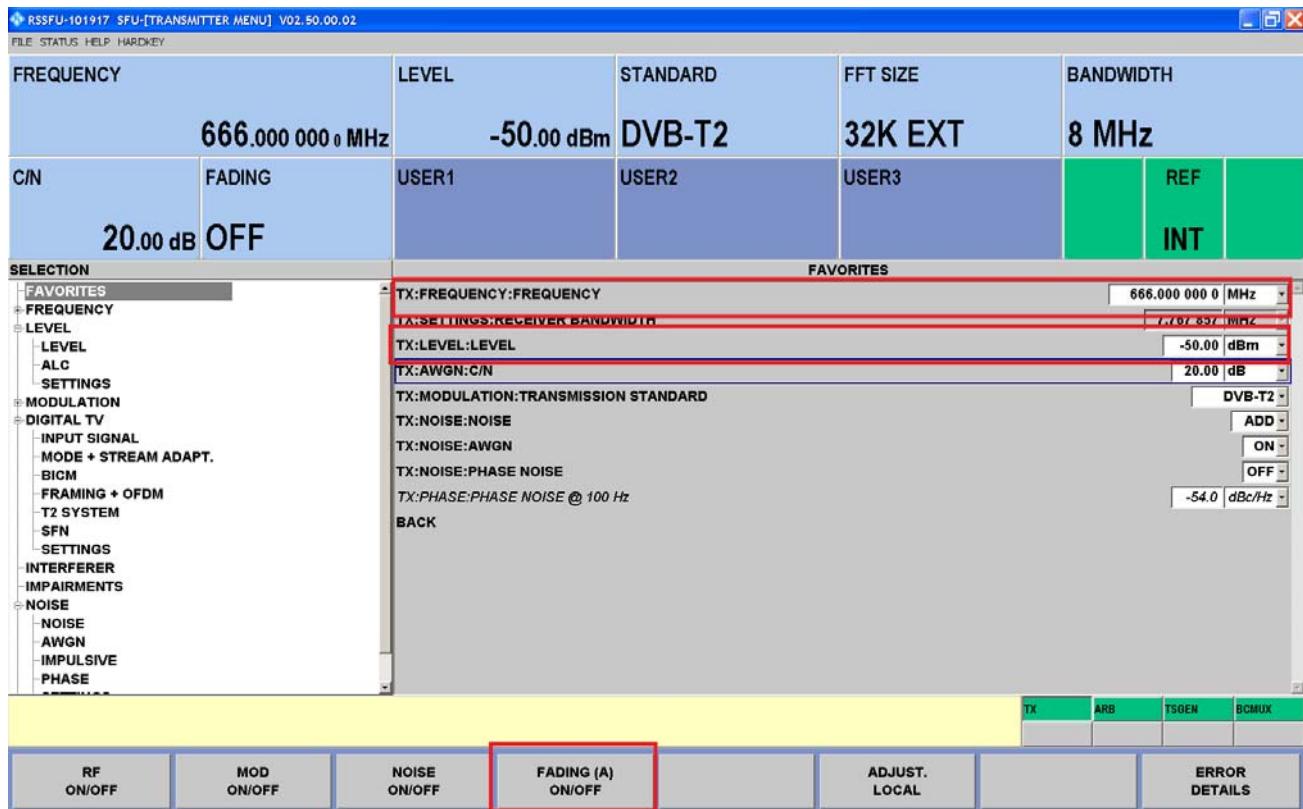
### 4.1.2 Test Instance

The signal parameters are as follows: FFT=32K Ext, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=666 MHz, Bandwidth=8 MHz, Fec\_frame=NORMAL, Rotation=ON, PAPR=TR, Transmission System=SISO.

- Step 1** Set **FADING** to **OFF** by clicking the **FADING (A) ON/OFF** button at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 4-2](#).



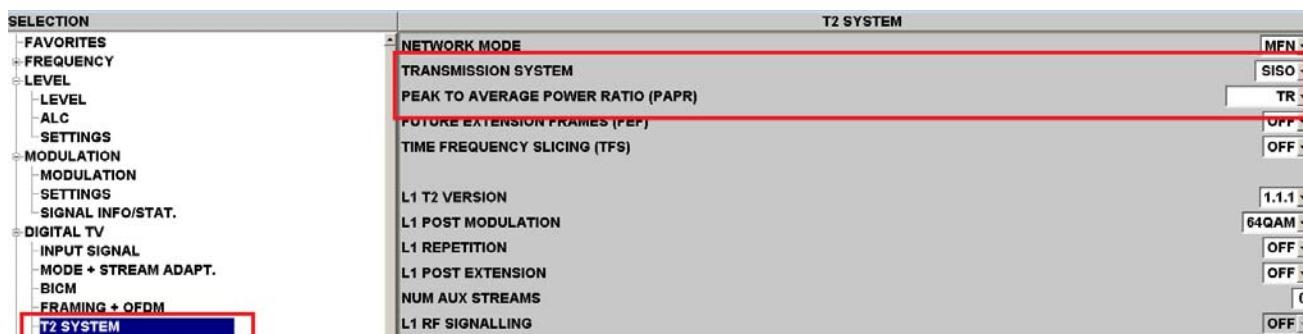
Figure 4-2 Setting the SFU test model and signal parameters



Step 2 Choose **DIGITAL TV > T2 SYSTEM**, as shown in Figure 4-3.

- Set **TRANSMISSION SYSTEM** to **SISO**.
- Set **PAPR** to **TR**.

Figure 4-3 T2 SYSTEM settings



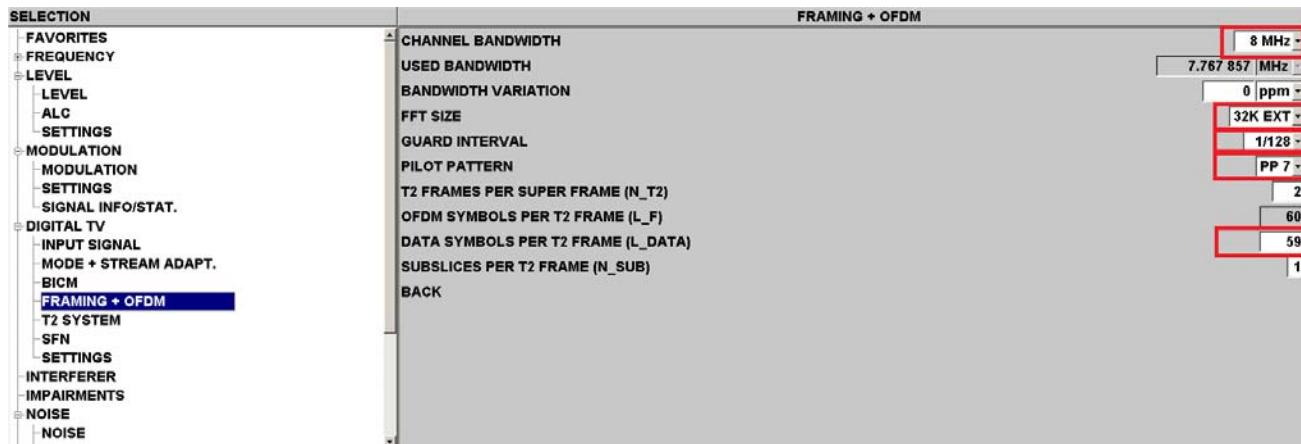
Step 3 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in Figure 4-4.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.



- Set **L\_DATA** to **59**.

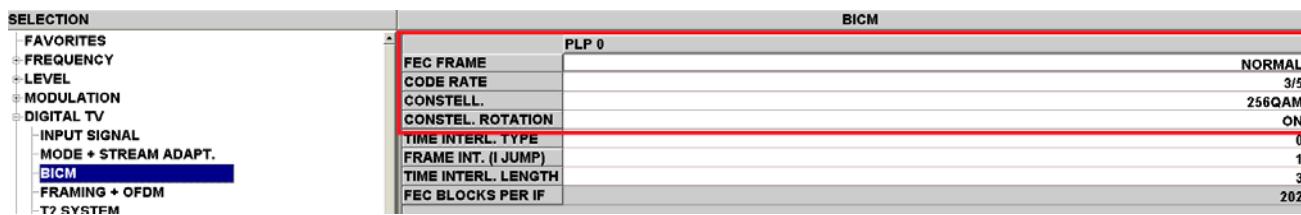
**Figure 4-4** FRAMING + OFDM settings



**Step 4** Choose **DIGITAL TV > BICM**, as shown in [Figure 4-5](#).

- Set **FEC FRAME** to **NORMAL**.
- Set **CONSTEL. ROTATION** to **ON**.
- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

**Figure 4-5** BICM settings

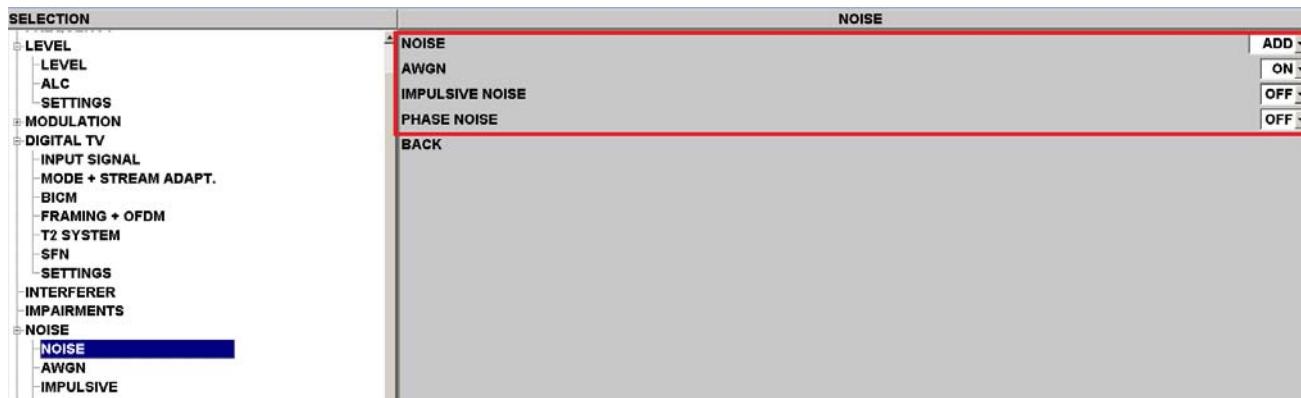


**Step 5** Choose **NOISE > NOISE**, as shown in [Figure 4-6](#).

- Set **NOISE** to **ADD**.
- Set **AWGN** to **ON**.
- Set others to **OFF**.

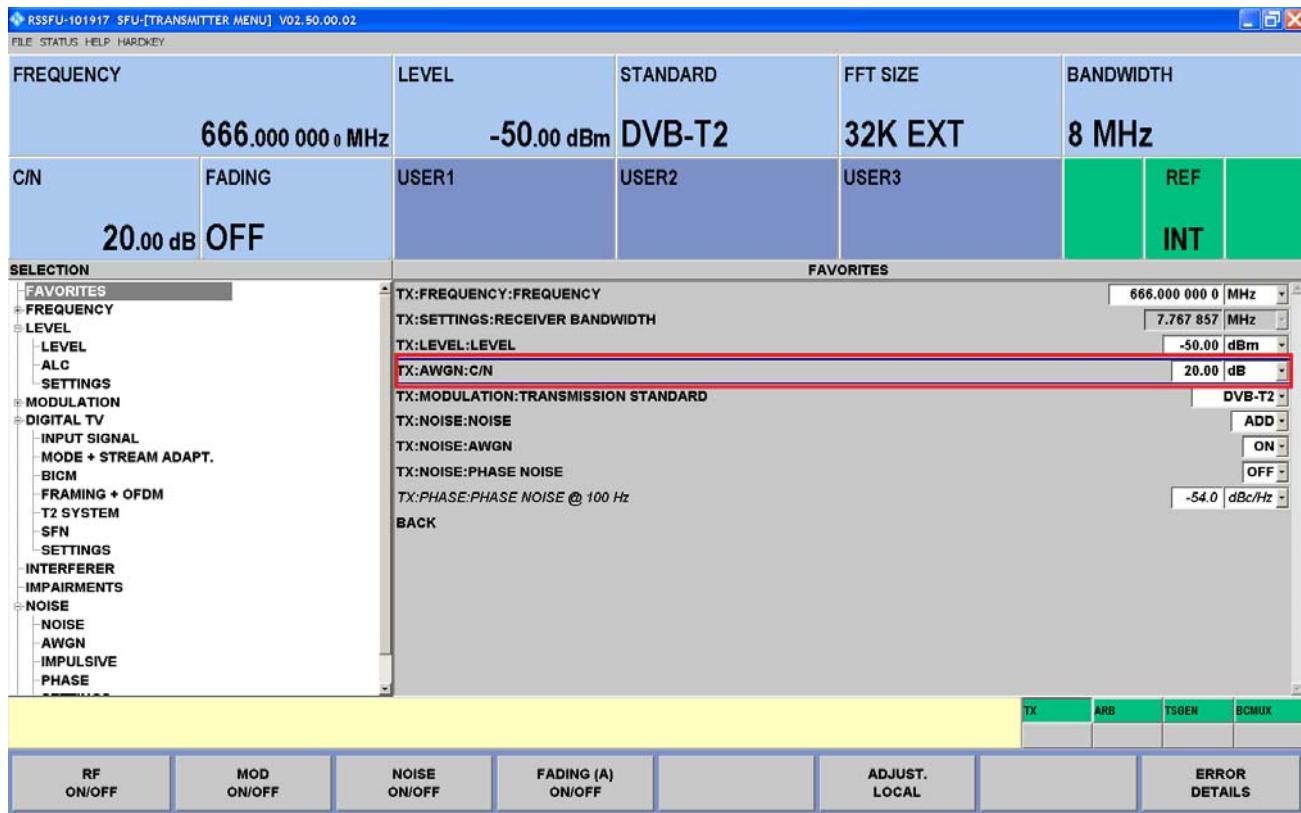


Figure 4-6 NOISE settings



Step 6 Adjust the C/N value to complete the C/N threshold test. See Figure 4-7.

Figure 4-7 Adjusting the C/N value



----End



## 4.2 PAL (G) Analog Co-Channel Test

### 4.2.1 Test Guide

PAL (G) Analog Co-Channel Test
Test Object: Hi3137 performance with analog co-channel PAL interference
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>FFT SIZE</b> to the <b>32K EXT</b>.</li><li>- Set <b>GUARD INTERVAL</b> to <b>1/128</b>.</li><li>- Set <b>PILOT PATTERN</b> to <b>PP7</b>.</li><li>- Choose <b>INTERFERER</b>, and set <b>INTERFERER SOURCE</b> to <b>ATV PREDEF</b>.</li><li>- Set <b>ATV PREDEFINED STANDARD</b> to <b>B/G N PREDEF</b>.</li><li>- Retain the default value of <b>INTERFERER ADDITION</b> (the test is not affected no matter it is set to <b>AFTER NOISE</b> or <b>BEFORE NOISE</b>).</li><li>- Set <b>INTERFERER REFERENCE</b> to <b>ATTENUATION</b>.</li><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>-2.75 MHz</b>.</li><li>- Set <b>SIGNAL FREQUENCY OFFSET</b> to <b>0 MHz</b>.</li></ul></li><li>● SFU signal parameters: Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.</li></ul>
Test Networking: See <a href="#">Figure 4-1</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</p> <p><b>Step 2</b> Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>INTERFERER ATTENUATION</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>INTERFERER ATTENUATION</b> value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

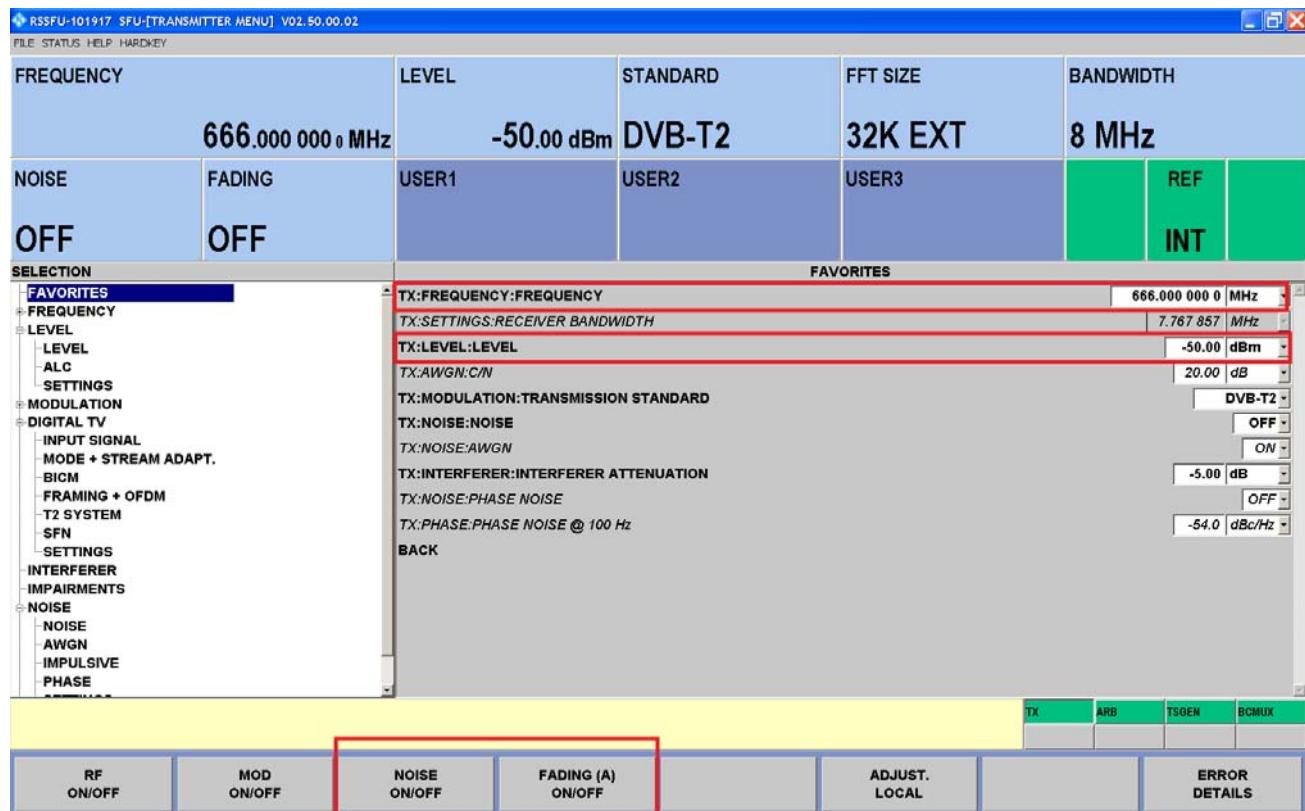


## 4.2.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=666 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 4-8](#).

**Figure 4-8** Setting the SFU test model

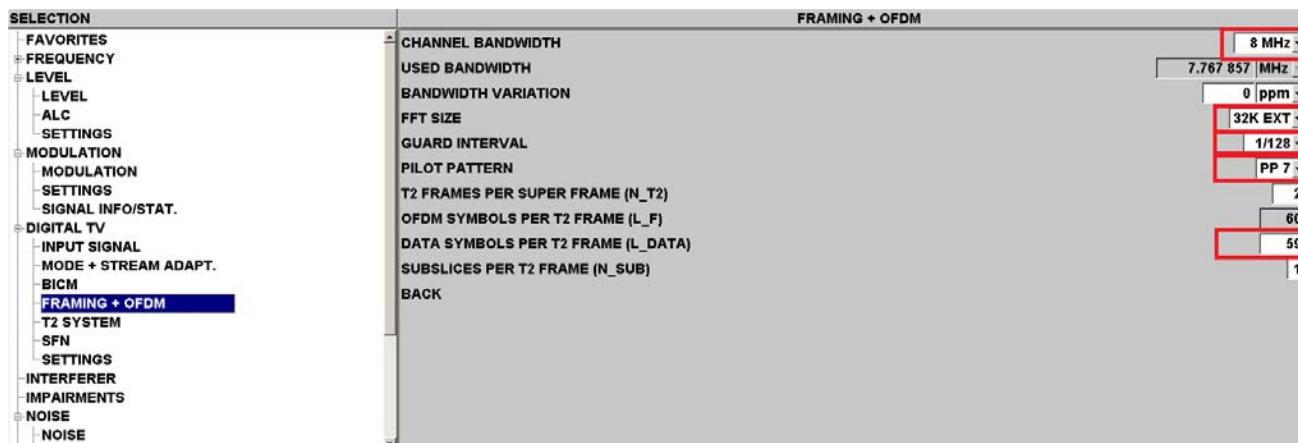


**Step 2** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 4-9](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

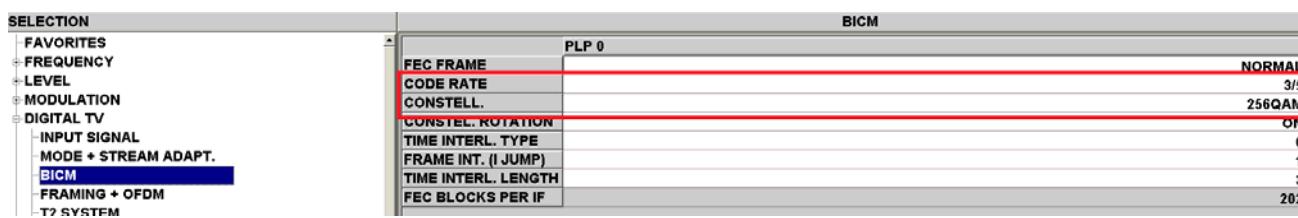


Figure 4-9 FRAMING + OFDM settings



**Step 3** Choose **DIGITAL TV > BICM**, and set **CODE RATE** to **3/5** and **CONSTELL.** to **256QAM**. See [Figure 4-10](#).

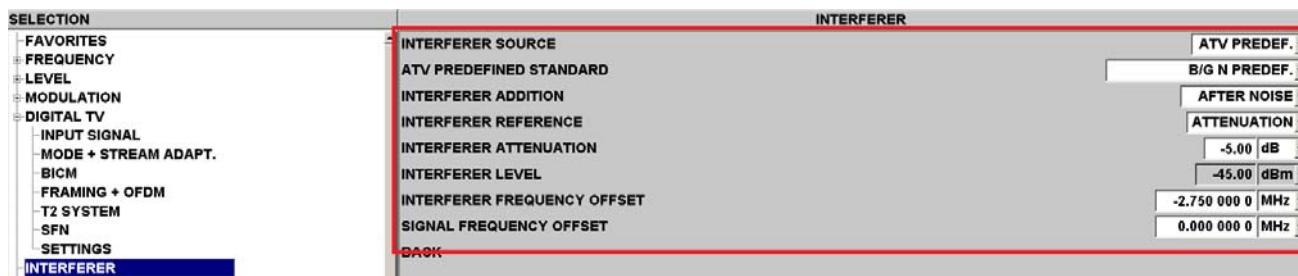
Figure 4-10 BICM settings



**Step 4** Choose **INTERFERER**, as shown in [Figure 4-11](#).

- Set **INTERFERER SOURCE** to **ATV PREDEF.**
- Set **ATV PREDEFINED STANDARD** to **B/G N PREDEF.**
- Retain the default value of **INTERFERER ADDITION** (the test is not affected no matter it is set to **AFTER NOISE** or **BEFORE NOISE**).
- Set **INTERFERER REFERENCE** to **ATTENUATION**.
- Set **INTERFERER FREQUENCY OFFSET** to **-2.75 MHz**.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.

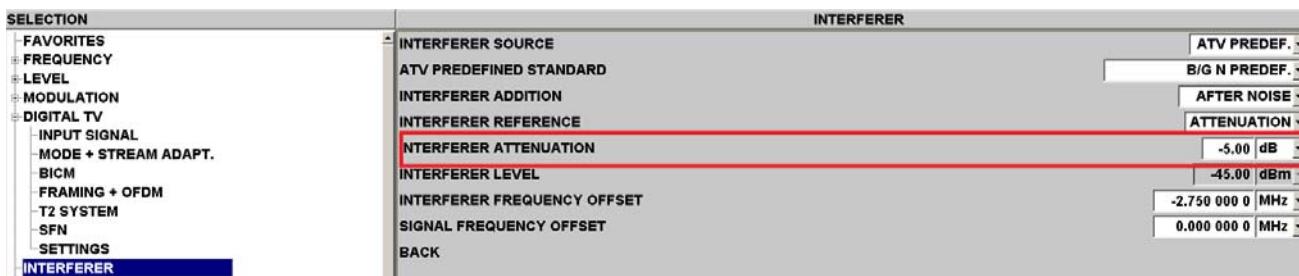
Figure 4-11 INTERFERER settings





**Step 5** Adjust the value of **INTERFERER ATTENUATION** to complete the co-channel interference test. See [Figure 4-12](#).

**Figure 4-12** Adjusting the INTERFERER ATTENUATION value



----End

## 4.3 PAL (G) Analog Adjacent Channel Test ( $N\pm 1/N\pm 2$ )

### 4.3.1 Test Guide

PAL (G) Analog Adjacent Channel Test ( $N\pm 1/N\pm 2$ )
Test Object: Hi3137 performance with analog adjacent channel PAL interference
Test Conditions:
<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Choose <b>INTERFERER</b>, and set <b>INTERFERER SOURCE</b> to <b>ATV PREDEF.</b>.</li><li>- Set <b>ATV PREDEFINED STANDARD</b> to <b>B/G N PREDEF.</b>.</li><li>- Retain the default value of <b>INTERFERER ADDITION</b> (the test is not affected no matter it is set to <b>AFTER NOISE</b> or <b>BEFORE NOISE</b>).</li><li>- Set <b>INTERFERER REFERENCE</b> to <b>LEVEL</b>.</li><li>- Set <b>INTERFERER LEVEL</b> to <b>-25 dBm</b>.</li><li>- Set <b>SIGNAL FREQUENCY OFFSET</b> to <b>0 MHz</b>.</li><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>5.25 MHz</b> for the <math>N+1</math> mode.</li><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>-10.75 MHz</b> for the <math>N-1</math> mode.</li><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>13.25 MHz</b> for the <math>N+2</math> mode.</li><li>- Set <b>INTERFERER FREQUENCY OFFSET</b> to <b>-18.75 MHz</b> for the <math>N-2</math> mode.</li></ul></li><li>• SFU signal parameters: Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.</li></ul>
Test Networking: See <a href="#">Figure 4-1</a> .
Test Procedure:



### PAL (G) Analog Adjacent Channel Test ( $N\pm 1/N\pm 2$ )

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value (not the **INTERFERER LEVEL** value) until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -25 dBm to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

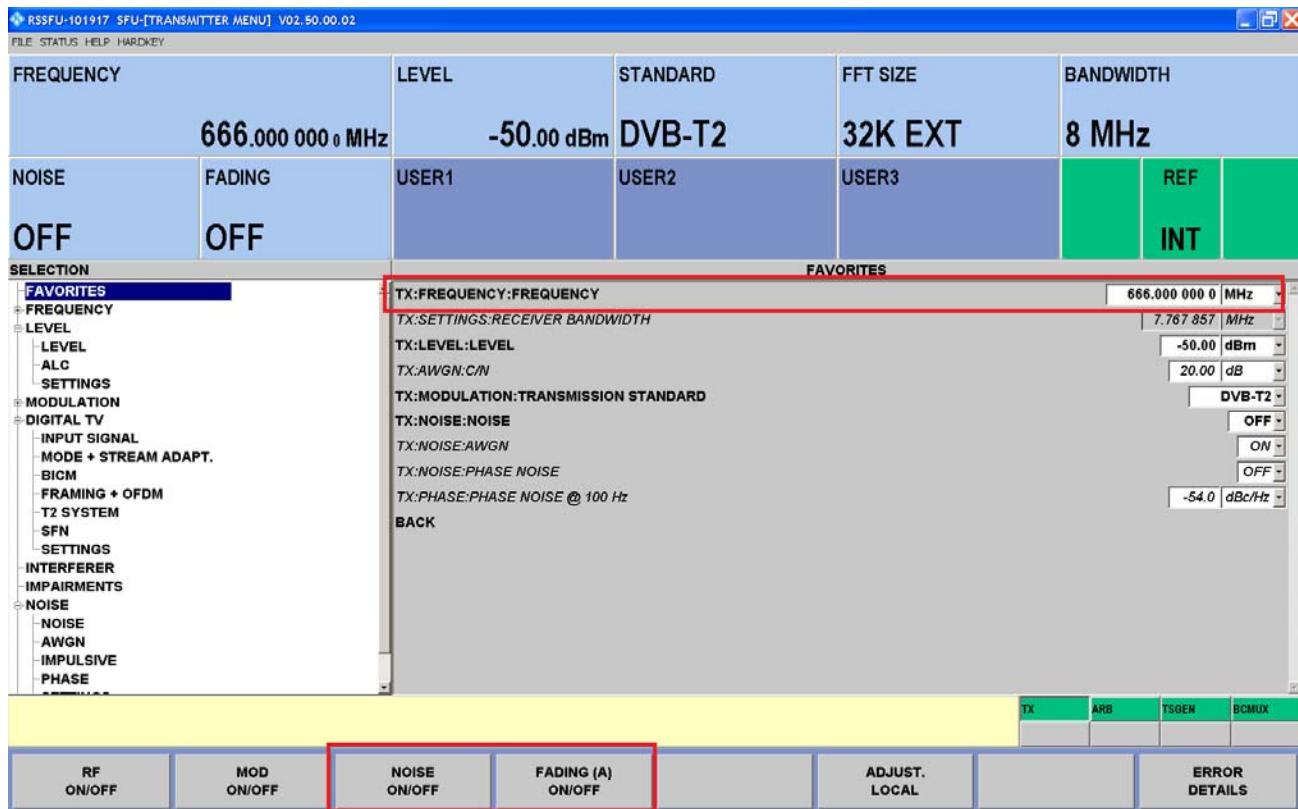
## 4.3.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=666 MHz, Bandwidth=8 MHz, N-2 mode.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz**. See [Figure 4-13](#).



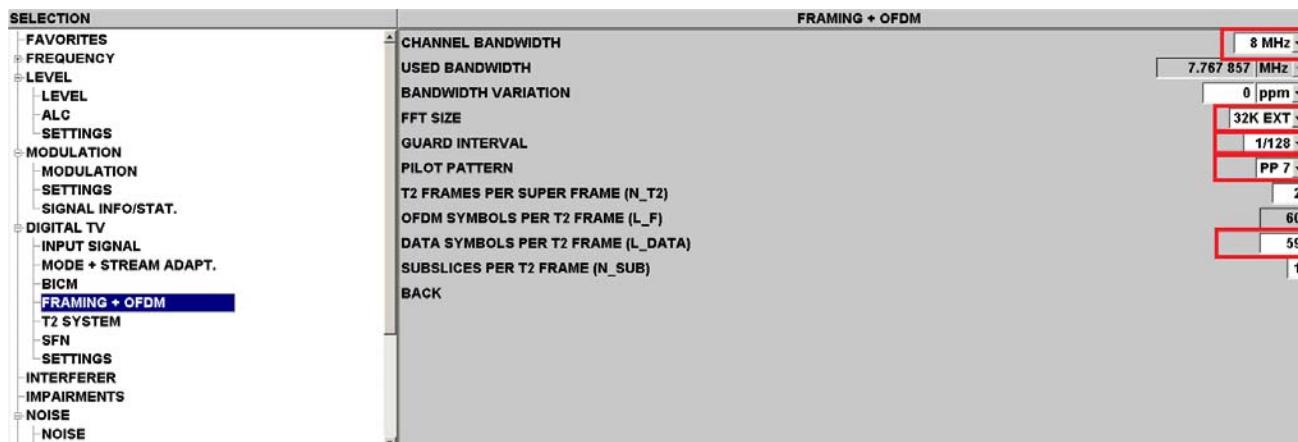
Figure 4-13 Setting the SFU test model



Step 2 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in Figure 4-14.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

Figure 4-14 FRAMING + OFDM settings

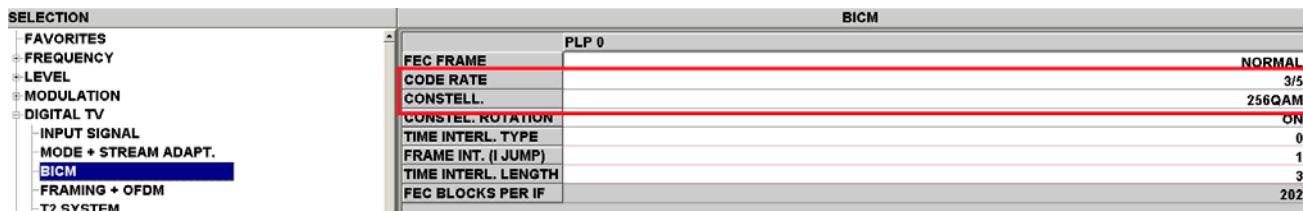




**Step 3** Choose **DIGITAL TV > BICM**, as shown in Figure 4-15.

- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

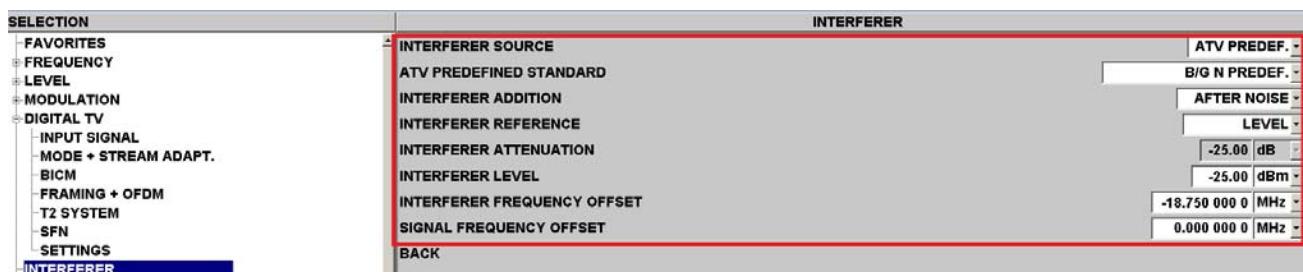
**Figure 4-15** BICM settings



**Step 4** Choose **INTERFERER**, as shown in Figure 4-16.

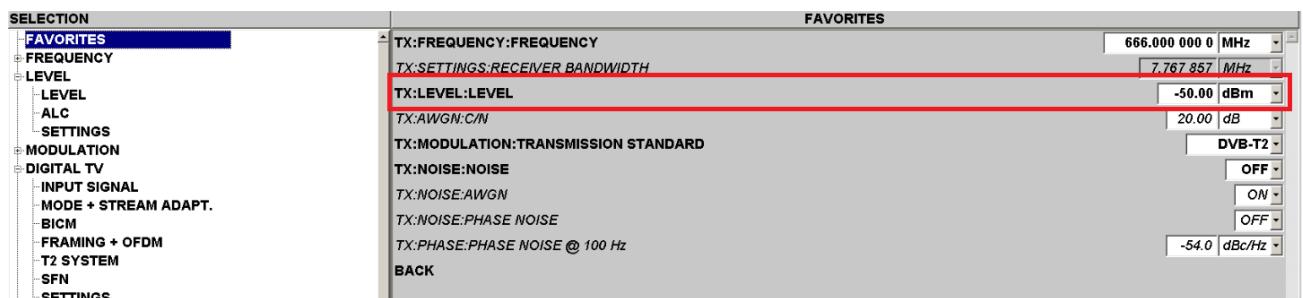
- Set **INTERFERER SOURCE** to **ATV PREDEF**.
- Set **ATV PREDEFINED STANDARD** to **B/G N PREDEF**.
- Retain the default value of **INTERFERER ADDITION** (the test is not affected no matter it is set to **AFTER NOISE** or **BEFORE NOISE**).
- Set **INTERFERER REFERENCE** to **LEVEL**.
- Set **INTERFERER LEVEL** to **-25 dBm**.
- Set **INTERFERER FREQUENCY OFFSET** to **-18.75 MHz** for the N-2 mode.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.

**Figure 4-16** INTERFERER settings



**Step 5** Adjust the **LEVEL** value to complete the test. See Figure 4-17.

**Figure 4-17** Adjusting the LEVEL value



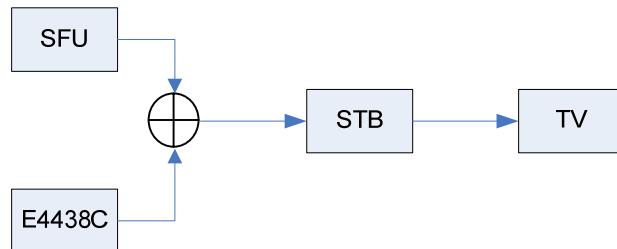


----End

## 4.4 LTE (BS-A) Channel Rejection Ratio Test

Figure 4-18 shows the networking for the LTE channel rejection ratio test.

**Figure 4-18** Block diagram for the LTE channel rejection ratio test



### 4.4.1 Test Guide

LTE (BS-A) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (BS-A) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>– Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>– Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>– Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>• E4438C parameters<ul style="list-style-type: none"><li>– Set the E4438C to enable it to play BS_100% streams.</li><li>– Set the output frequency to 796 MHz.</li><li>– Set the bandwidth to 10 MHz.</li><li>– Set the output signal strength to –15 dBm.</li></ul></li><li>• SFU signal parameters: Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.</li></ul>
Test Networking: See <a href="#">Figure 4-18</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV</p>



### LTE (BS-A) Channel Rejection Ratio Test

screen in a 60-second period. Record the **LEVEL** value and subtract –15 dBm from the value to obtain the C/I value.

**Step 5** Repeat steps 2 to 4 until all tests are complete.

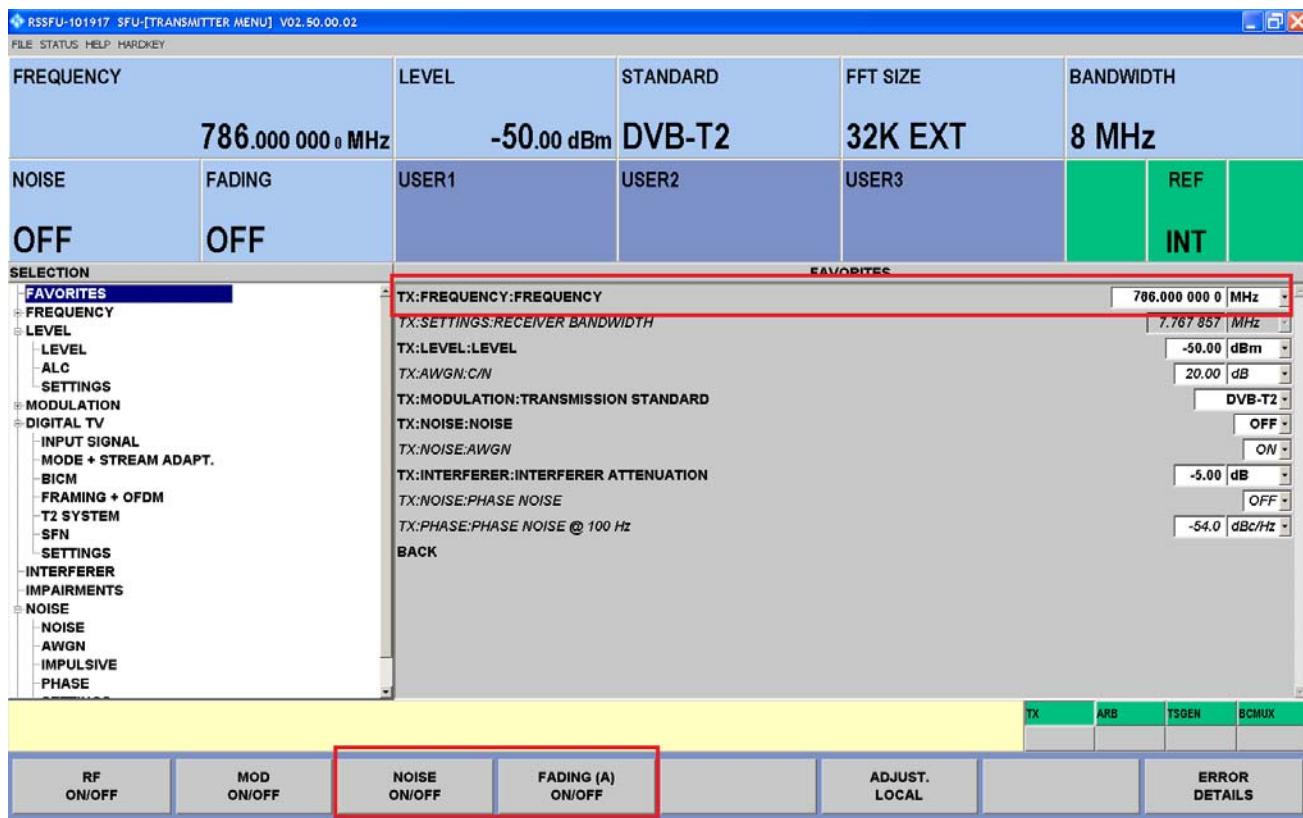
----End

## 4.4.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 4-19](#).

**Figure 4-19** Setting the SFU test model



**Step 2** Set the E4438C to enable it to play BS\_100% streams.

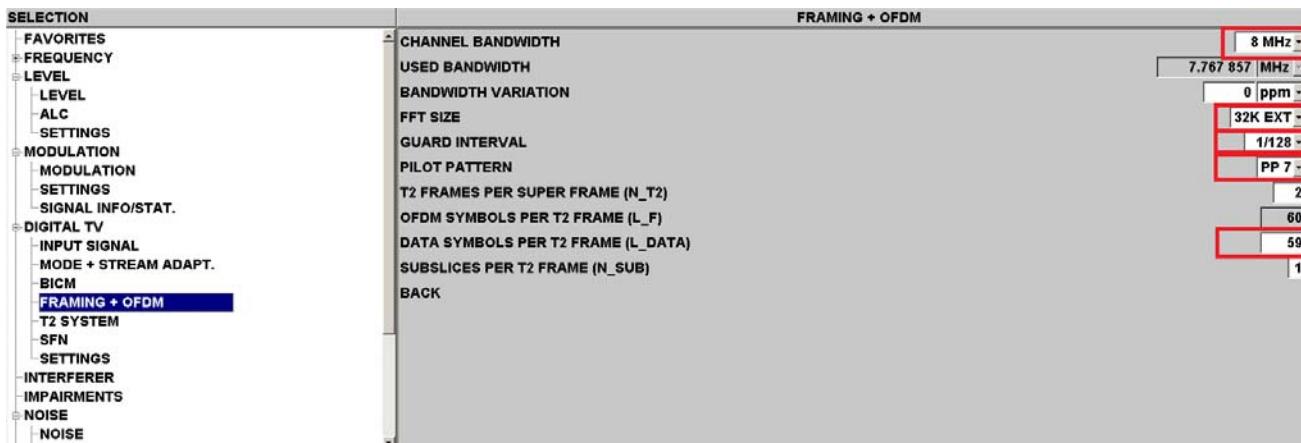
- Set the output frequency to 796 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to –15 dBm.



**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 4-20](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

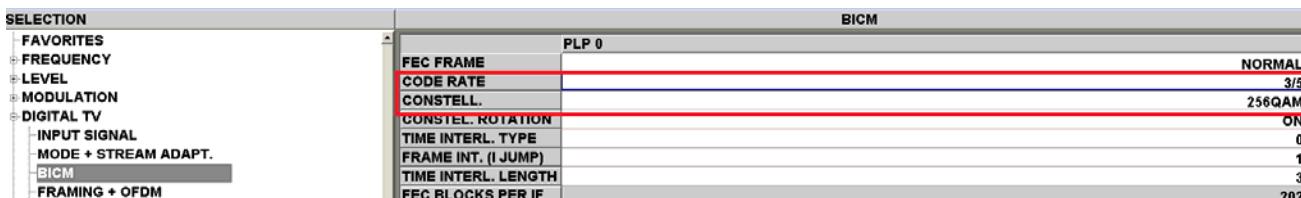
**Figure 4-20** FRAMING + OFDM settings



**Step 4** Choose **DIGITAL TV > BICM**, as shown in [Figure 4-21](#).

- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

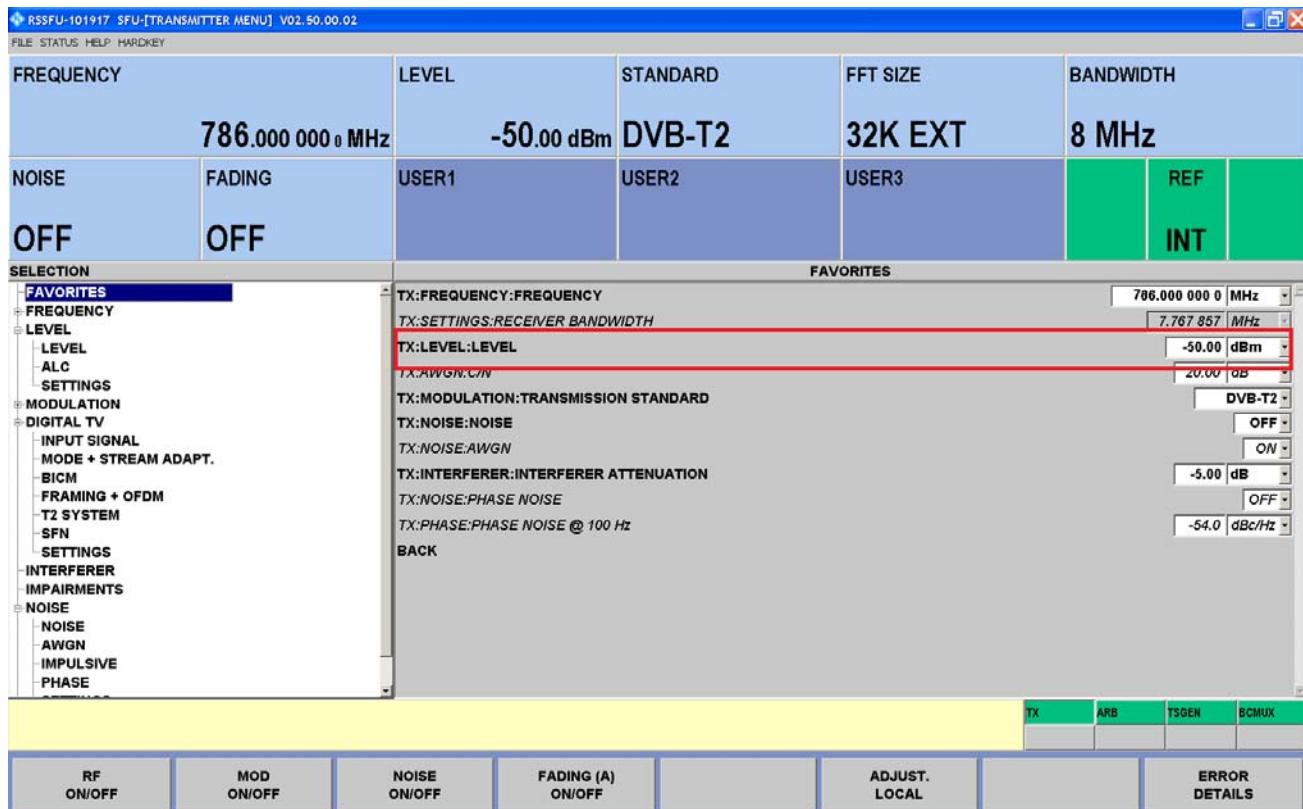
**Figure 4-21** BICM settings



**Step 5** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract  $-15$  dBm from the value to obtain the C/I value.



Figure 4-22 Adjusting the LEVEL value



----End

## 4.5 LTE (BS-B) Channel Rejection Ratio Test

### 4.5.1 Test Guide

LTE (BS-B) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (BS-B) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play BS_100% streams.</li><li>- Set the output frequency to 806 MHz.</li><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li></ul></li><li>● Set different constellation and internal code rate combinations to the SFU based on the</li></ul>



item to be tested in the test report.
Test Networking: See <a href="#">Figure 4-18</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract –15 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

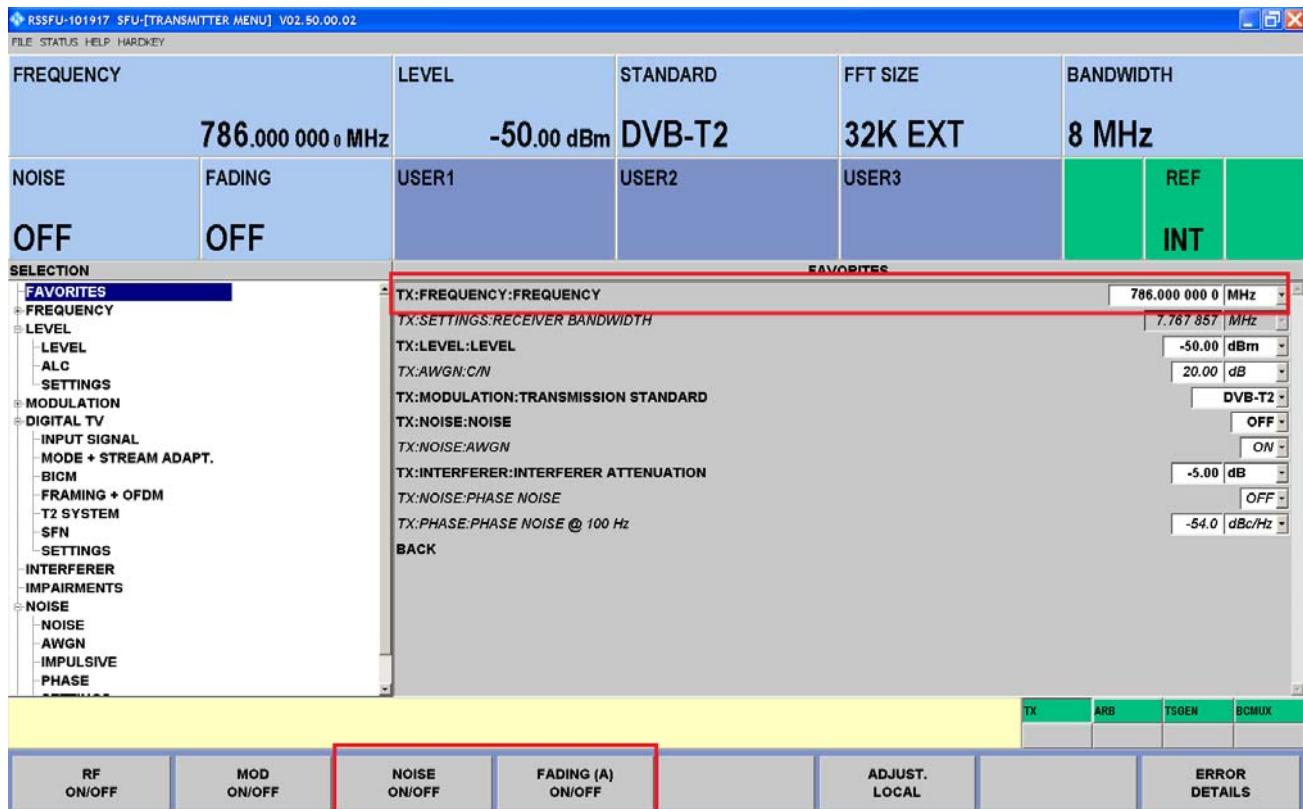
## 4.5.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 4-23](#).



Figure 4-23 Setting the SFU test model



**Step 2** Set the E4438C to enable it to play BS\_100% streams.

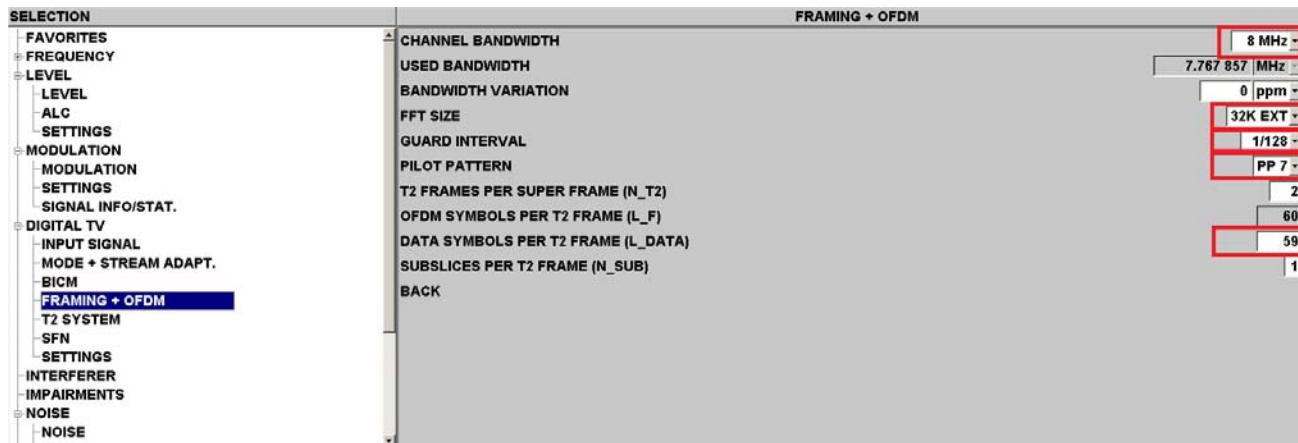
- Set the output frequency to 806 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 4-24](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



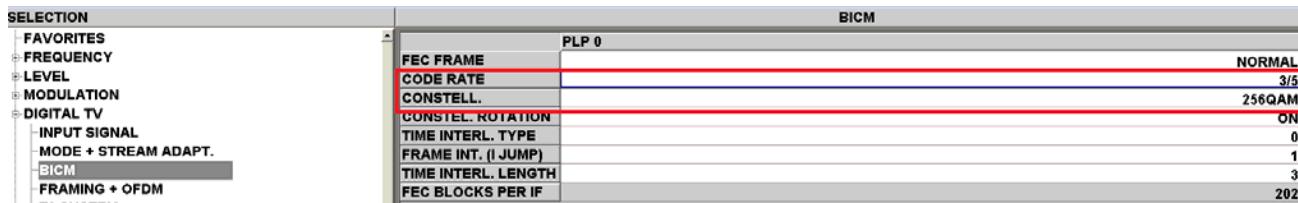
Figure 4-24 FRAMING + OFDM settings



Step 4 Choose **DIGITAL TV > BICM**, as shown in Figure 4-25.

- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

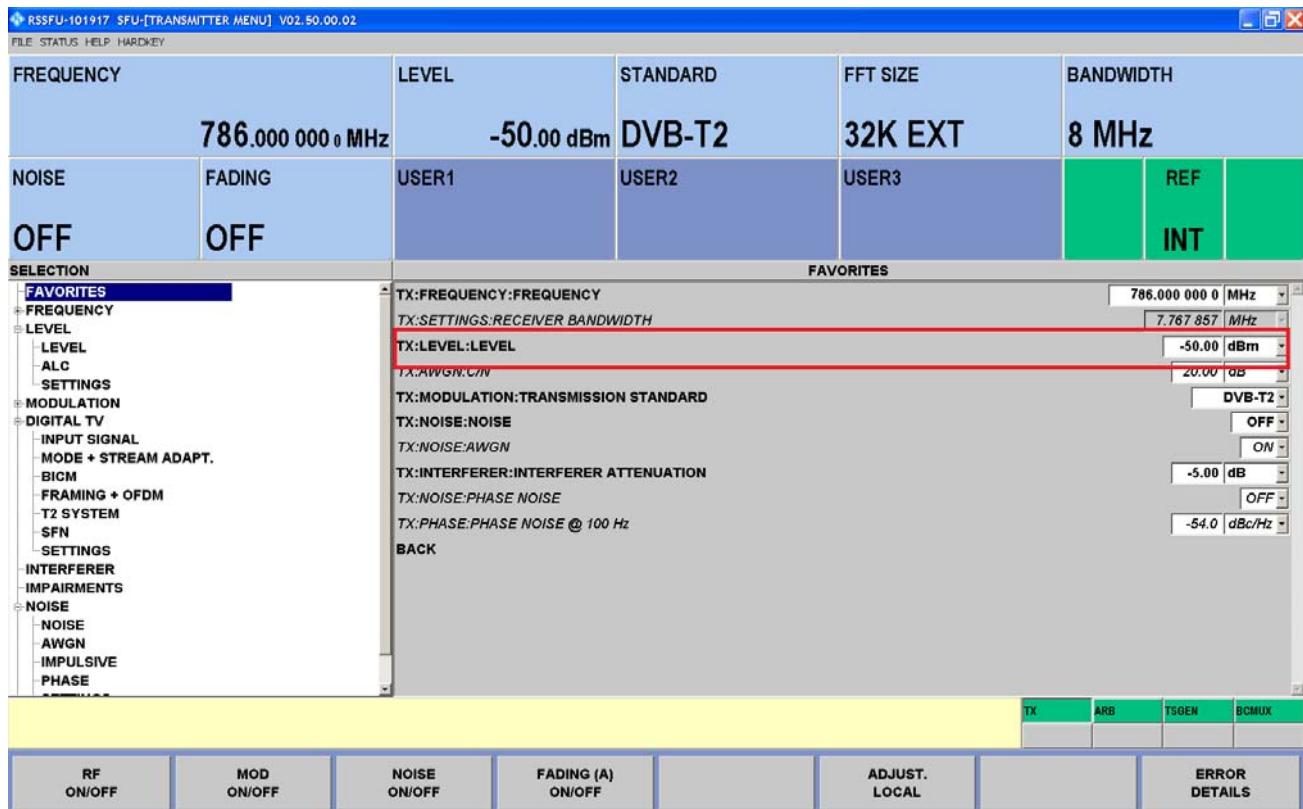
Figure 4-25 BICM settings



Step 5 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract **-15** dBm from the value to obtain the C/I value.



Figure 4-26 Adjusting the LEVEL value



----End

## 4.6 LTE (UE-A) Channel Rejection Ratio Test

### 4.6.1 Test Guide

LTE (UE-A) Channel Rejection Ratio Test	
Test Object: Hi3137 LTE (UE-A) suppression performance	
Test Conditions:	
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play UE_20Mbs streams.</li><li>- Set the output frequency to 837 MHz.</li><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li></ul></li><li>● Set different constellation and internal code rate combinations to the SFU based on the</li></ul>	



### LTE (UE-A) Channel Rejection Ratio Test

item to be tested in the test report.

Test Networking: See [Figure 4-18](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.
- Step 2** Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -15 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

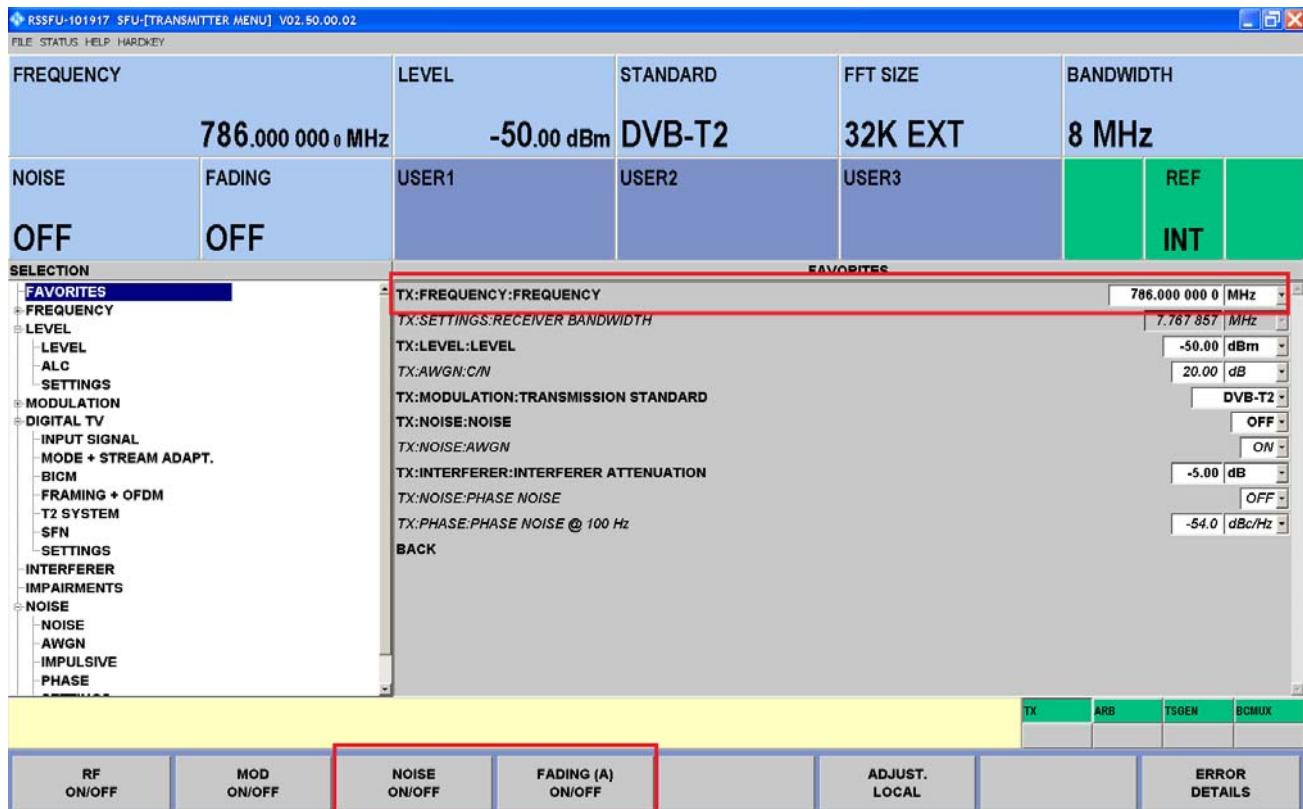
## 4.6.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 4-27](#).



Figure 4-27 Setting the SFU test model



**Step 2** Set the E4438C to enable it to play UE\_20Mbs streams.

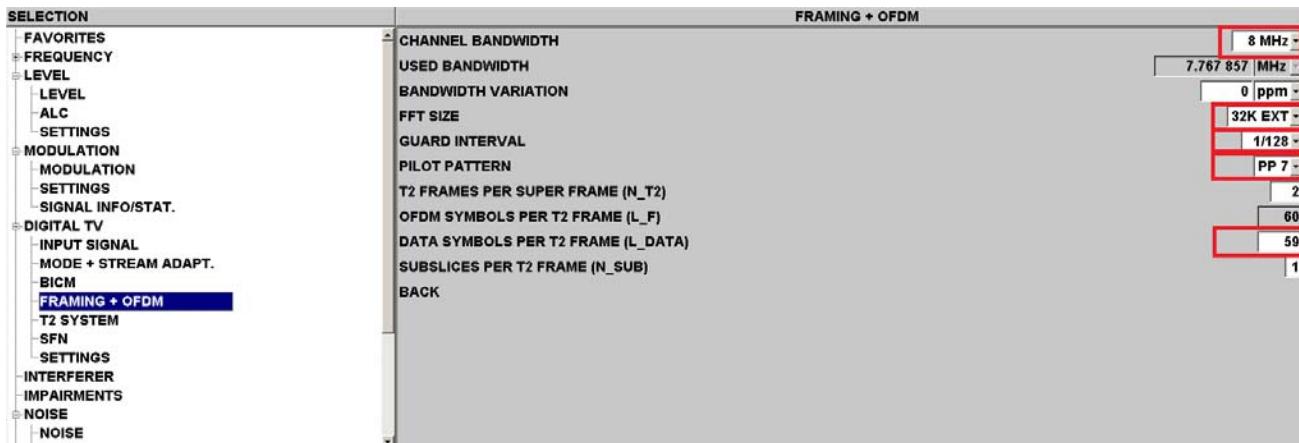
- Set the output frequency to 837 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 4-28](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



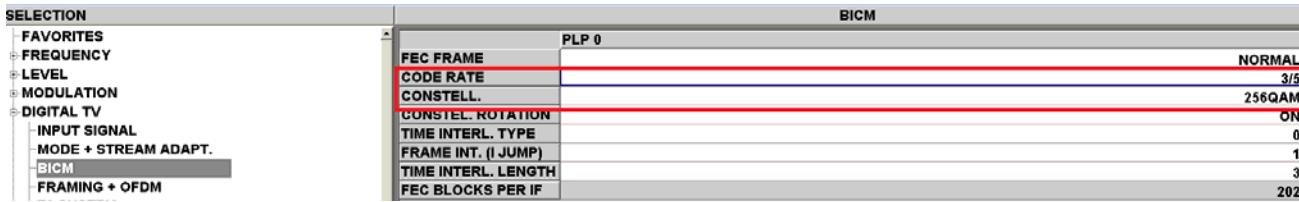
Figure 4-28 FRAMING + OFDM settings



Step 4 Choose **DIGITAL TV > BICM**, as shown in Figure 4-29.

- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

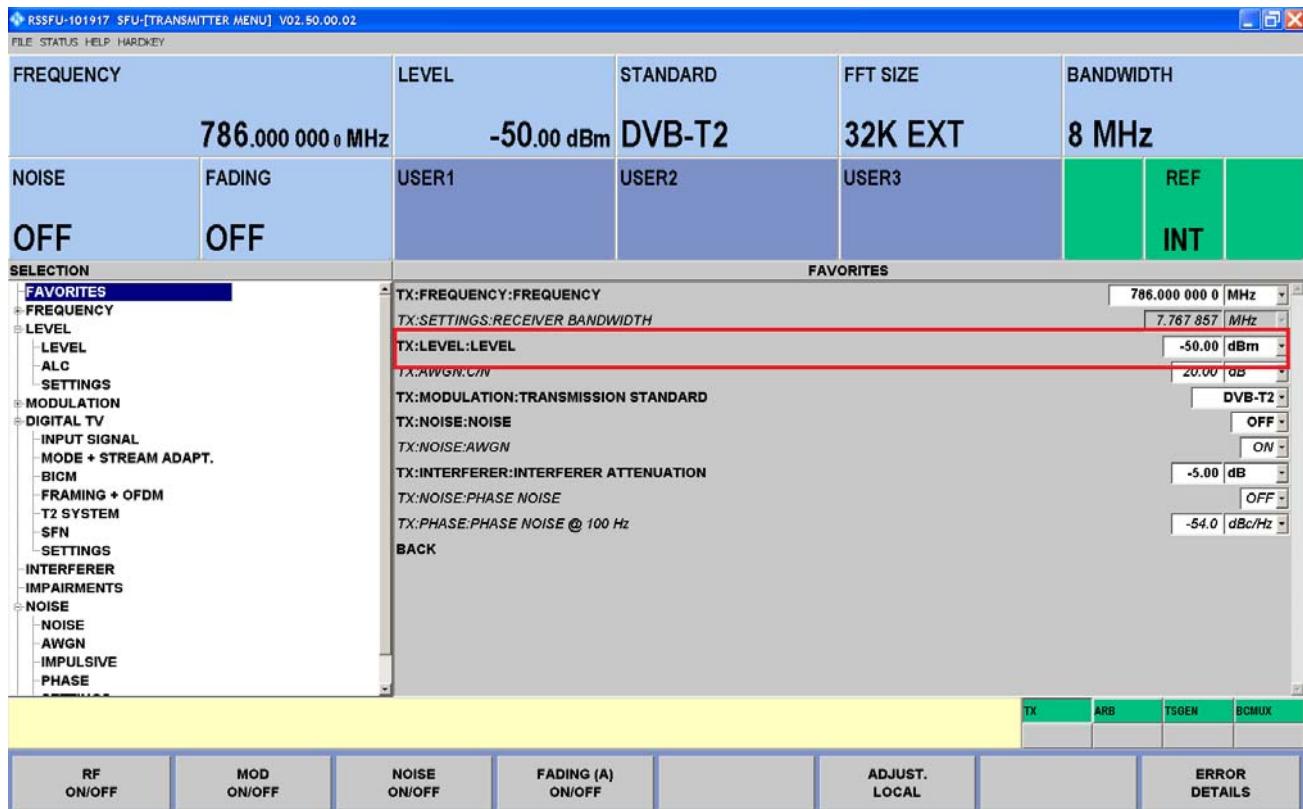
Figure 4-29 BICM settings



Step 5 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract **-15** dBm from the value to obtain the C/I value.



Figure 4-30 Adjusting the LEVEL value



----End

## 4.7 LTE (UE-C) Channel Rejection Ratio Test

### 4.7.1 Test Guide

LTE (UE-C) Channel Rejection Ratio Test	
Test Object: Hi3137 LTE (UE-C) suppression performance	
Test Conditions:	
• SFU test model <ul style="list-style-type: none"><li>– Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>– Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>– Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul>	• E4438C parameters <ul style="list-style-type: none"><li>– Set the E4438C to enable it to play UE_20Mbs streams.</li><li>– Set the output frequency to 857 MHz.</li><li>– Set the bandwidth to 10 MHz.</li><li>– Set the output signal strength to -15 dBm.</li></ul>



LTE (UE-C) Channel Rejection Ratio Test
item to be tested in the test report.
Test Networking: See <a href="#">Figure 4-18</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract –15 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

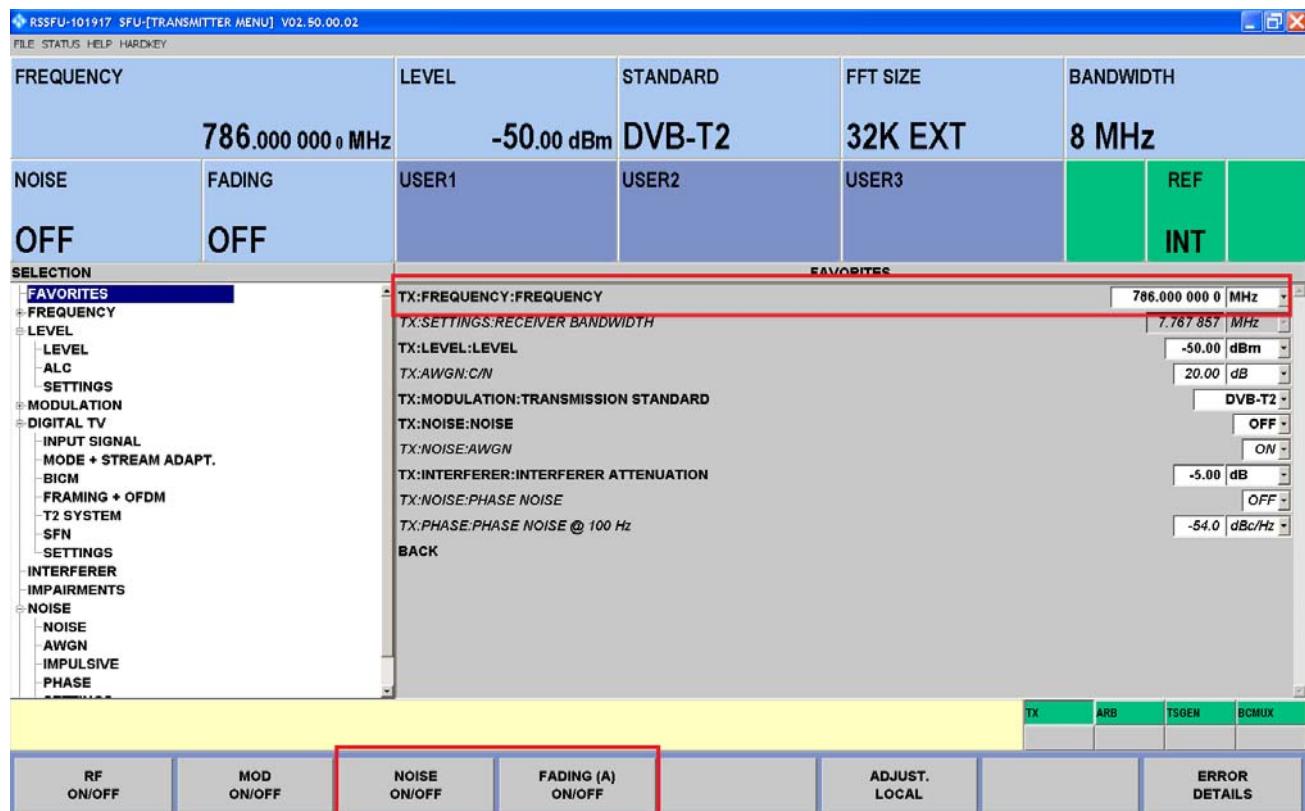
## 4.7.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 4-31](#).



Figure 4-31 Setting the SFU test model



**Step 2** Set the E4438C to enable it to play UE\_20Mbs streams.

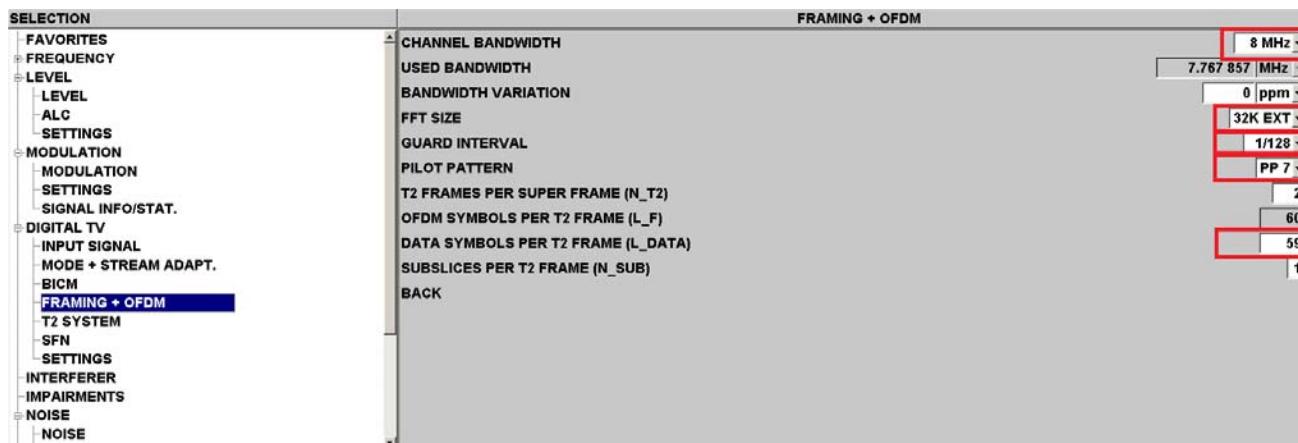
- Set the output frequency to 857 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 4-32](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.



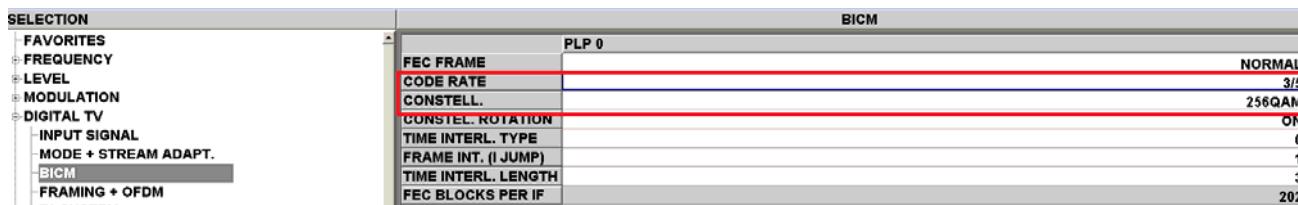
Figure 4-32 FRAMING + OFDM settings



Step 4 Choose **DIGITAL TV > BICM**, as shown in Figure 4-33.

- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

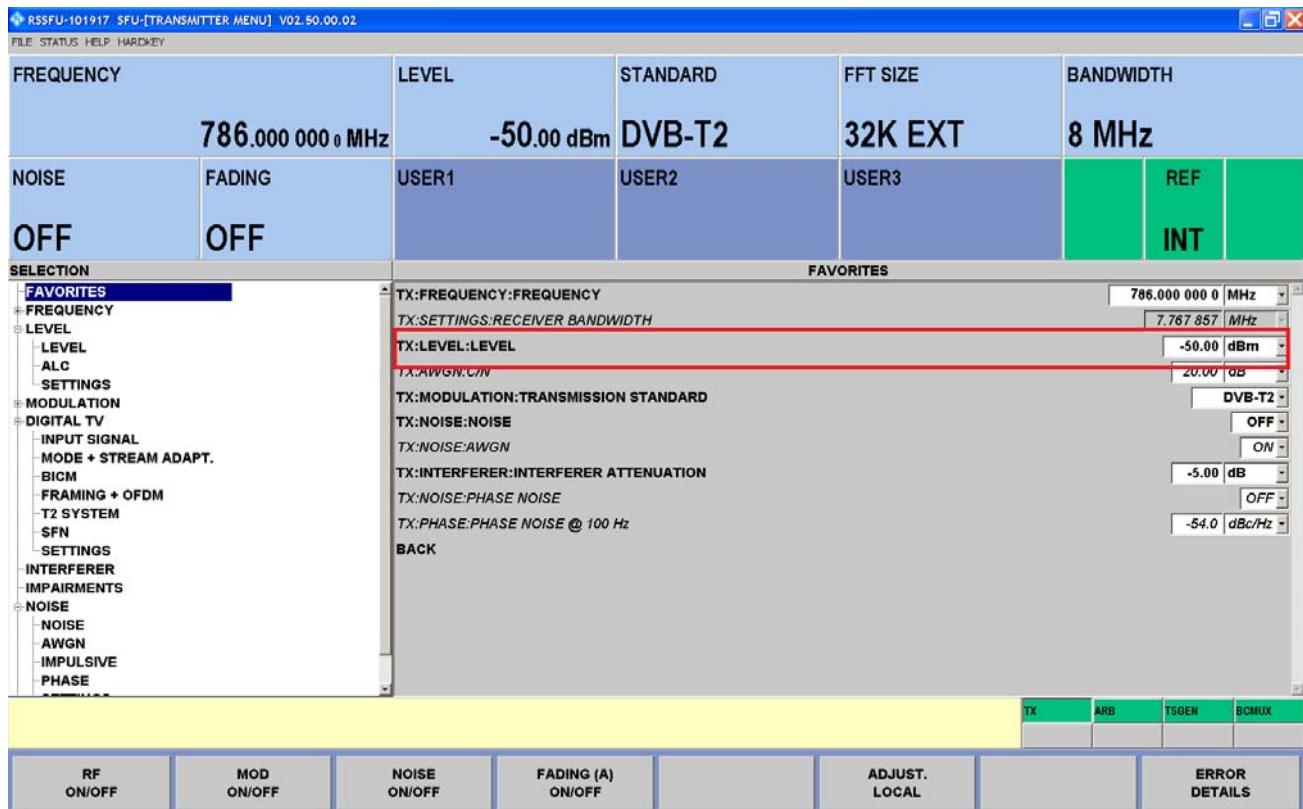
Figure 4-33 BICM settings



Step 5 Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract  $-15$  dBm from the value to obtain the C/I value.



Figure 4-34 Adjusting the LEVEL value



----End

## 4.8 Test with a 0 dB Echo, 1 Hz/10 Hz Doppler

### 4.8.1 Test Guide

Test with a 0 dB Echo, 1 Hz/10 Hz Doppler	
Test Object: Hi3137 performance with echoes	
Test Conditions:	
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>NOISE</b> to <b>ADD</b>.</li><li>- Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>- Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li><li>- Set <b>PROFILE</b> in the <b>1-1</b> and <b>2-1</b> columns to <b>CONST.PHASE</b> and <b>PURE DOPP</b> respectively.</li></ul></li></ul>	



### Test with a 0 dB Echo, 1 Hz/10 Hz Doppler

- Set **RES DOPPLER SHIFT** in the **1-1** column to **0**.
- Set **PATH LOSS** in the **1-1** and **2-1** columns to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST.PHASE** to **0**.
- Set **BASIC DELAY** in the **2-1** column to **20**.
- Set **FREQ RATIO** to **1**.
- Set **FADING** to **ON**.
- Set **RES DOPPLER SHIFT** in the **2-1** column to **1** for the 1 Hz Doppler test.
- Set **RES DOPPLER SHIFT** in the **2-1** column to **10** for the 10 Hz Doppler test.
- SFU signal parameters: Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.

Test Networking: See [Figure 4-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set different constellation and internal code rate combinations to the SFU based on the item to be tested in the test report.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

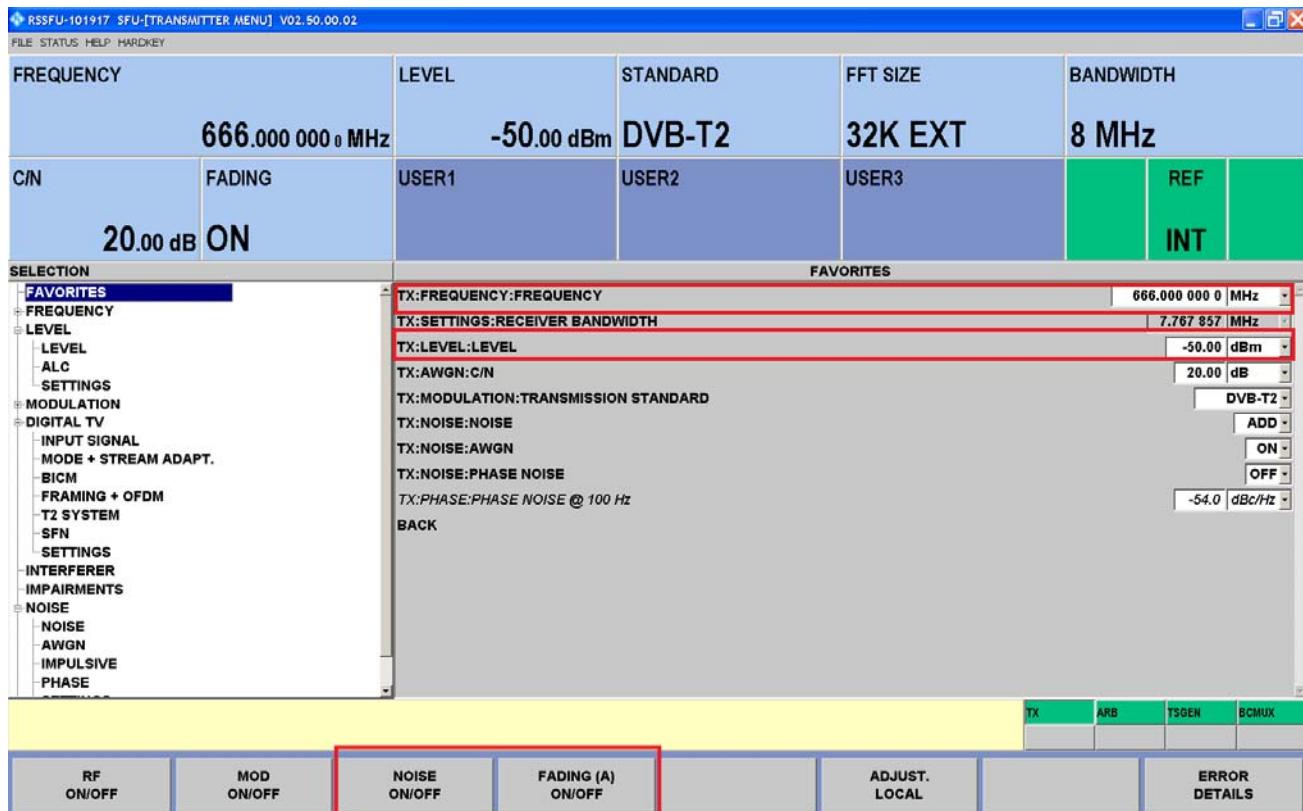
## 4.8.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=666 MHz, Bandwidth=8 MHz, Doppler=10 Hz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 4-35](#).



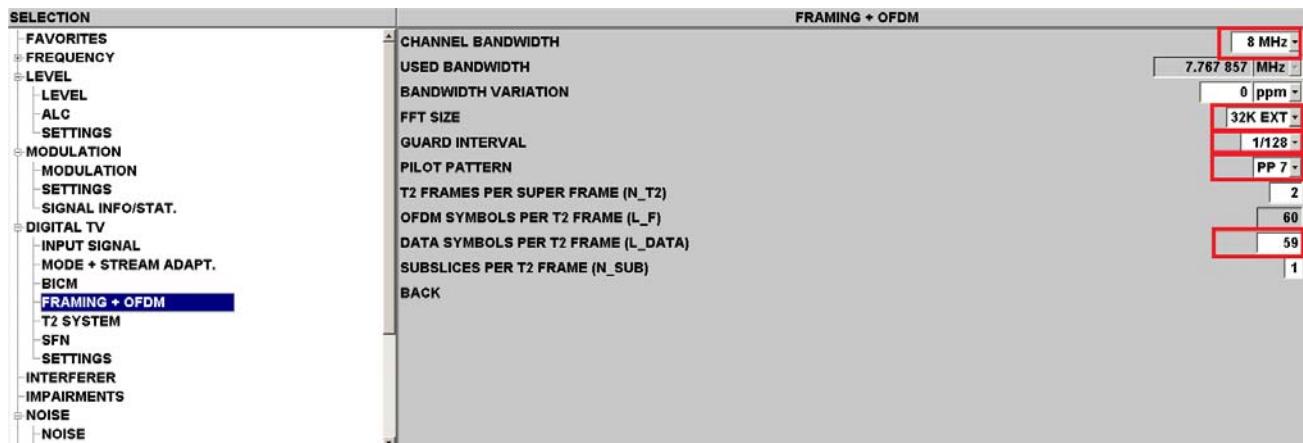
Figure 4-35 Setting the SFU test model



Step 2 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in Figure 4-36.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

Figure 4-36 FRAMING + OFDM settings





**Step 3** Choose **DIGITAL TV > BICM**, as shown in Figure 4-37.

- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

**Figure 4-37** BICM settings

SELECTION		BICM	
FAVORITES			
FREQUENCY			
LEVEL			
MODULATION			
DIGITAL TV			
INPUT SIGNAL			
MODE + STREAM ADAPT.			
<b>BICM</b>			
FRAMING + OFDM			
T2 SYSTEM			

PLP 0

	NORMAL	3/5	1	3	202
<b>FEC FRAME</b>					
<b>CODE RATE</b>					
<b>CONSTELL.</b>					
CONSTEL. ROTATION					
TIME INTERL. TYPE					
FRAME INT. (JUMP)					
TIME INTERL. LENGTH					
FEC BLOCKS PER IF					

**Step 4** Choose **FADING > PROFILE**, as shown in Figure 4-38.

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** in the **1-1** and **2-1** columns to **CONST.PHASE** and **PURE DOPP** respectively.
- Set **RES DOPPLER SHIFT** in the **1-1** and **2-1** columns to **0** and **10** respectively.
- Set **PATH LOSS** in the **1-1** and **2-1** columns to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST.PHASE** to **0**.
- Set **BASIC DELAY** in the **2-1** column to **20**.
- Set **FREQ RATIO** to **1**.

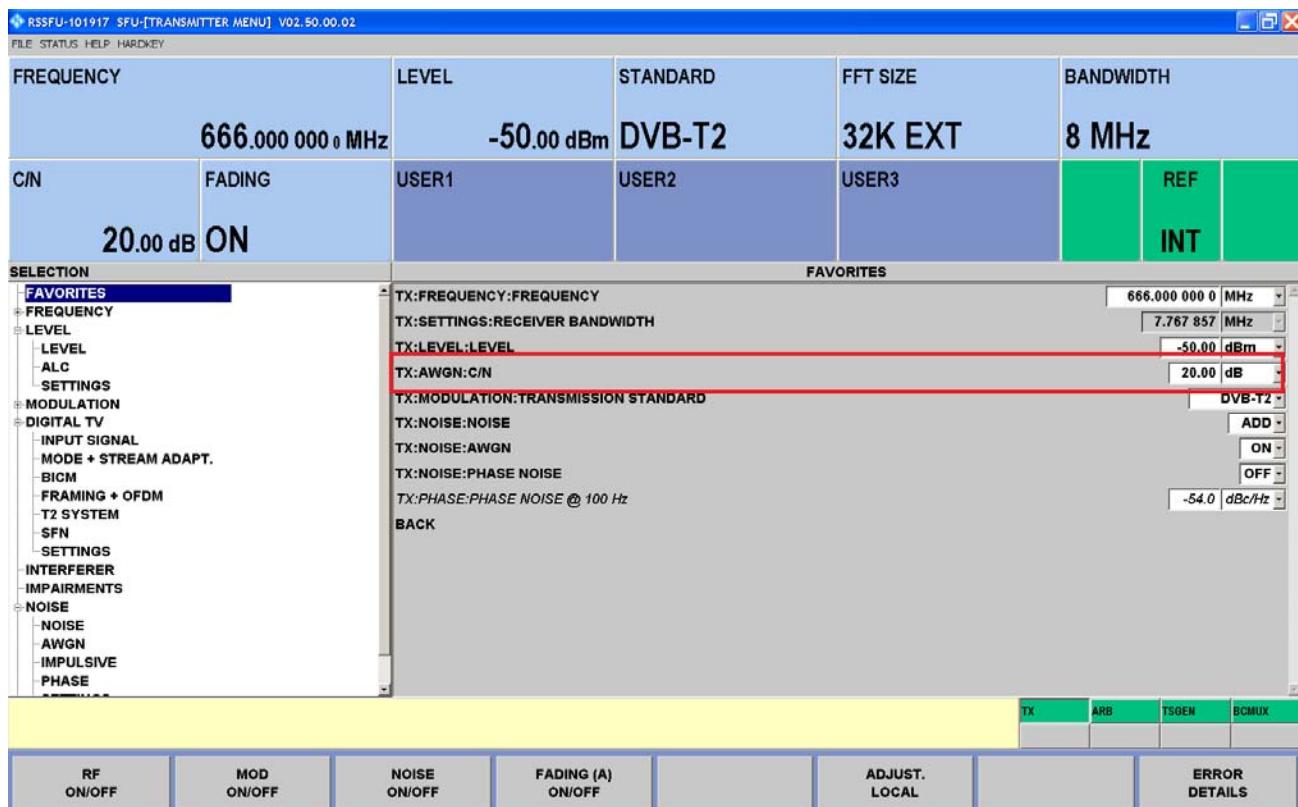
**Figure 4-38** PROFILE settings

SELECTION		PROFILE											
		STANDARD											
		PARAMETER SET											
		CONFIGURATION											
LEVEL		1 - 1	.2	1 - 3	1 - 4	1 - 5	<b>2 - 1</b>	ON	OFF	OFF	OFF	OFF	OFF
MODULATION		CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	PURE DOPP.	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH
DIGITAL TV		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INPUT SIGNAL		0.00	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00	20.00	20.00
MODE + STREAM ADAPT.		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>BICM</b>		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FRAMING + OFDM		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T2 SYSTEM		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SFN		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SETTINGS		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INTERFERER		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IMPAIRMENTS		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOISE		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- NOISE		-1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
- AWGN		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- IMPULSIVE		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- PHASE		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- SETTINGS		200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
FADING		0	0	0	0	0	0	0	0	0	0	0	0
- FADING													
<b>PROFILE</b>													

**Step 5** Adjust the C/N value to complete the test. See Figure 4-39.



Figure 4-39 Adjusting the C/N value



----End

## 4.9 Test with an Echo Outside the Guard Interval

### 4.9.1 Test Guide

Test with an Echo Outside the Guard Interval	
Test Object: Hi3137 performance with echoes	
Test Conditions:	
SFU test model	<ul style="list-style-type: none"><li>Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>Set <b>NOISE</b> to <b>OFF</b>.</li><li>Set <b>CONSTELL.</b> to <b>256QAM</b>.</li><li>Set <b>FFT SIZE</b> to <b>32K</b>.</li><li>Set <b>PILOT PATTERN</b> to <b>PP4</b>.</li><li>Set <b>GUARD INTERVAL</b> to <b>1/32</b>.</li></ul>



#### Test with an Echo Outside the Guard Interval

- Choose **FADING > PROFILE**, and set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **ADDITIONAL DELAY** to **0**.
- Set **FADING** to **ON**.

Test Networking: See [Figure 4-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set **BASIC DELAY** of the SFU multipath model 2-1 to the echo delay of the item to be tested.
- If the post echo type is to be tested, set **PATH LOSS** of the SFU multipath model 1-1 to **0**, and set that of the SFU multipath model 2-1 to the item to be tested.
  - If the pre echo type is to be tested, set **PATH LOSS** of the SFU multipath model 2-1 to **0**, and set that of the SFU multipath model 1-1 to the item to be tested.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **PATH LOSS** value set in step 2 until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **PATH LOSS** value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.
- End

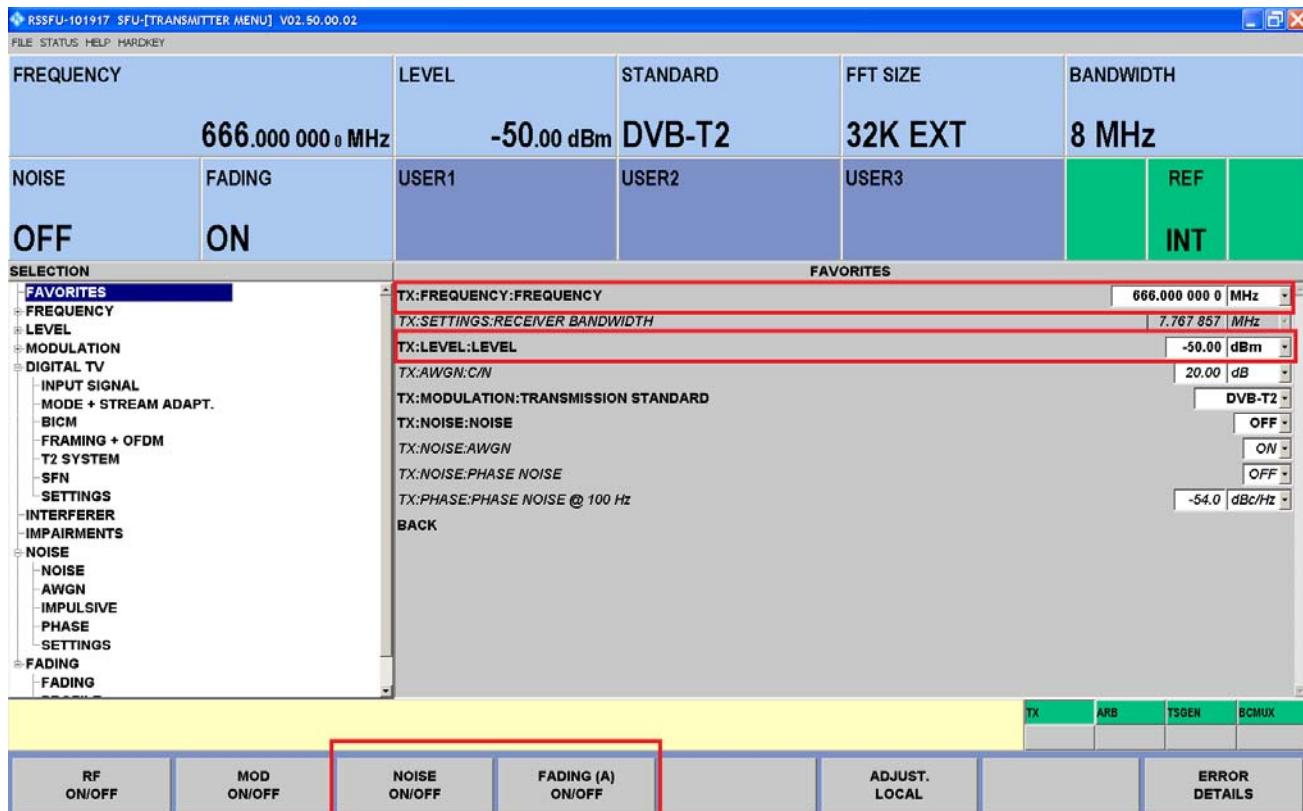
#### 4.9.2 Test Instance

The signal parameters are as follows: FFT=32K, GI=1/32, Pilot=PP4, Constellation=256QAM, CR=3/5, Freq=666 MHz, Bandwidth=8 MHz, 200  $\mu$ s echo delay.

- Step 1** Set **NOISE** to **OFF** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A)** **ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 4-40](#).



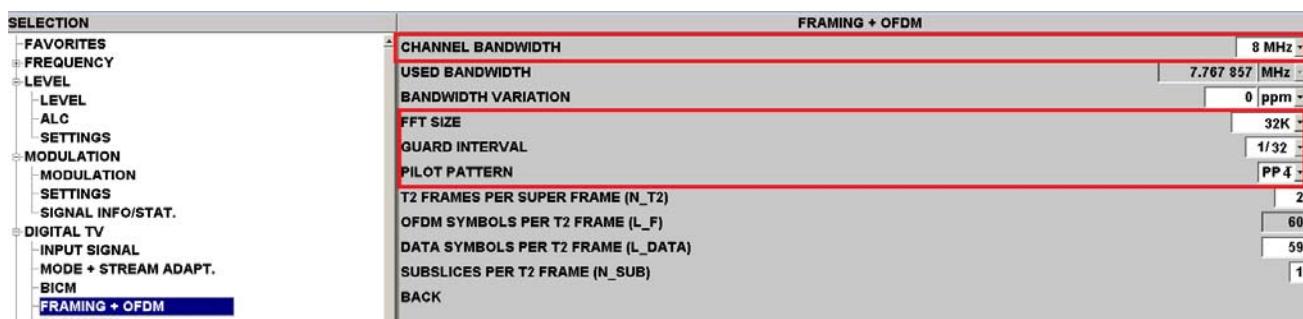
Figure 4-40 Setting the SFU test model



Step 2 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in Figure 4-41.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K**.
- Set **GUARD INTERVAL** to **1/32**.
- Set **PILOT PATTERN** to **PP4**.

Figure 4-41 FRAMING + OFDM settings

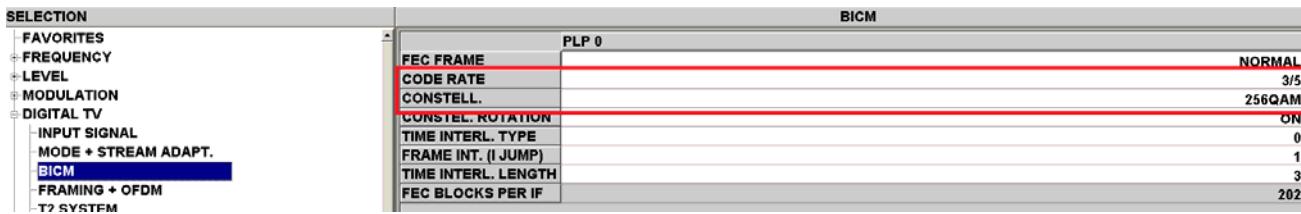


Step 3 Choose **DIGITAL TV > BICM**, as shown in Figure 4-42.

- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.



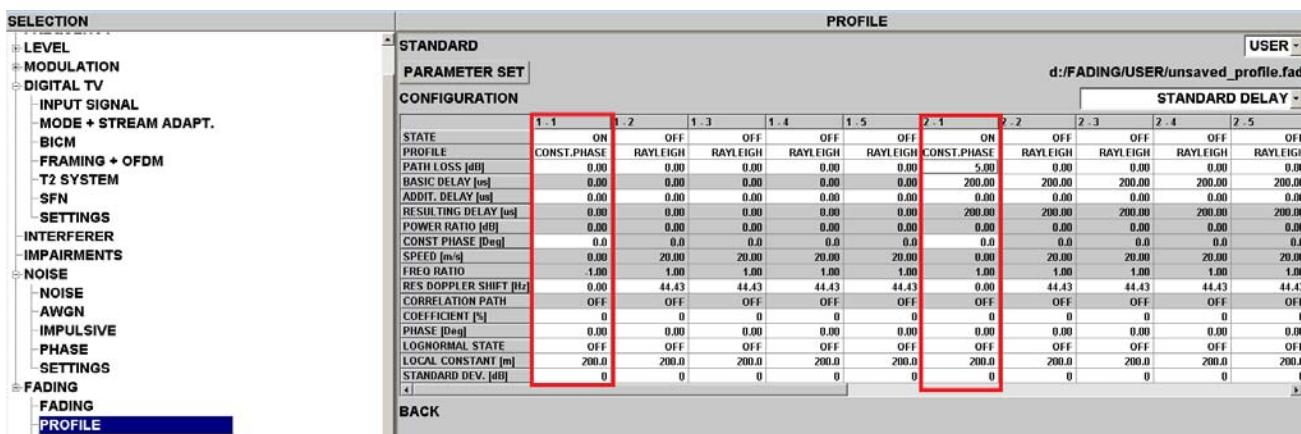
**Figure 4-42** BICM settings



**Step 4** Choose FADING > PROFILE, as shown in [Figure 4-43](#).

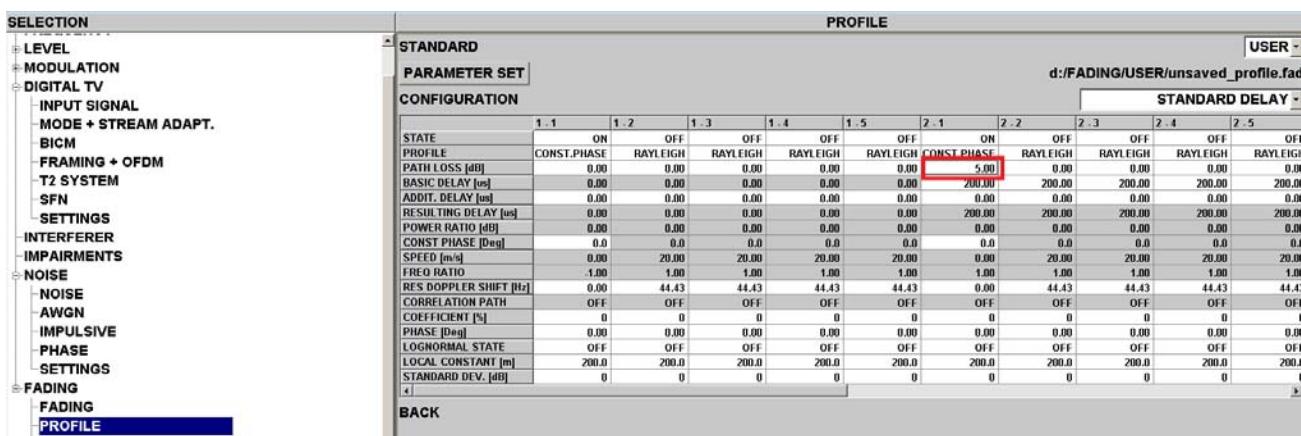
- Set STATE in the 1-1 and 2-1 columns to ON (set STATE in other columns to OFF).
- Set PROFILE to CONST.PHASE.
- Set ADDIT. DELAY to 0.
- Set PATH LOSS in the 1-1 column to 0.
- Set BASIC DELAY in the 2-1 column to 200.

**Figure 4-43** PROFILE settings



**Step 5** Adjust the PATH LOSS value in the 2-1 column to complete the test. See [Figure 4-44](#).

**Figure 4-44** Adjusting the PATH LOSS value in the 2-1 column





----End

## 4.10 Sensitivity Test

### 4.10.1 Test Guide

Sensitivity Test
Test Object: Hi3137 sensitivity
Test Conditions:  SFU test model <ul style="list-style-type: none"><li>● Set <b>NOISE</b> to <b>OFF</b>.</li><li>● Set <b>FADING</b> to <b>OFF</b>.</li></ul>
Test Networking: See <a href="#">Figure 4-1</a> .
Test Procedure:  <b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU. <b>Step 2</b> Set the FFT size, bandwidth, constellation, internal code rate, guard interval, pilot pattern, and frequency in the SFU based on the item to be tested in the test report. <b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly. <ul style="list-style-type: none"><li>● For the minimum level test, gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value.</li><li>● For the maximum level test, gradually increase the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually decrease the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value.</li></ul> <b>Step 4</b> Repeat steps 2 to 3 until all tests are complete. ----End

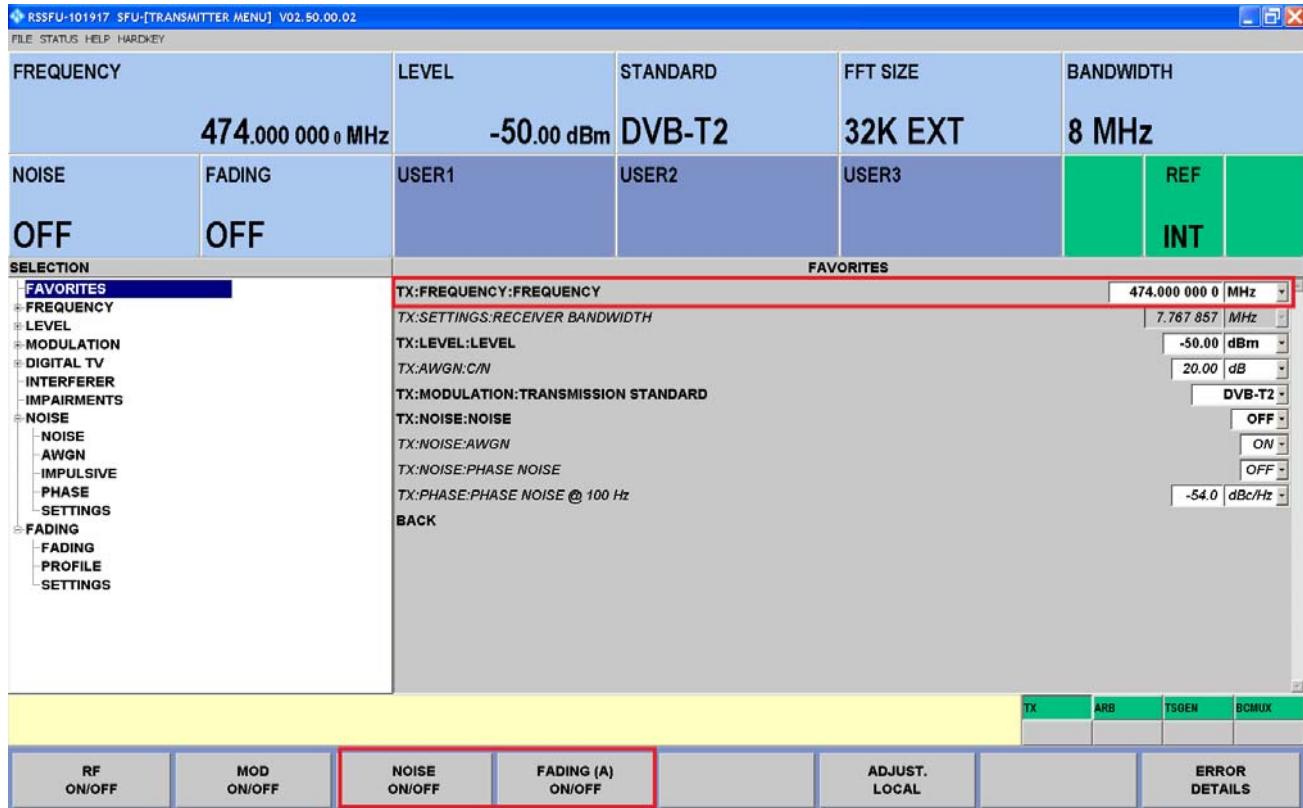
### 4.10.2 Test Instance

The signal parameters are as follows: FFT=32K EXT, GI=1/128, Pilot=PP7, Constellation=256QAM, CR=3/5, Freq=474 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **474 MHz**. See [Figure 4-45](#).



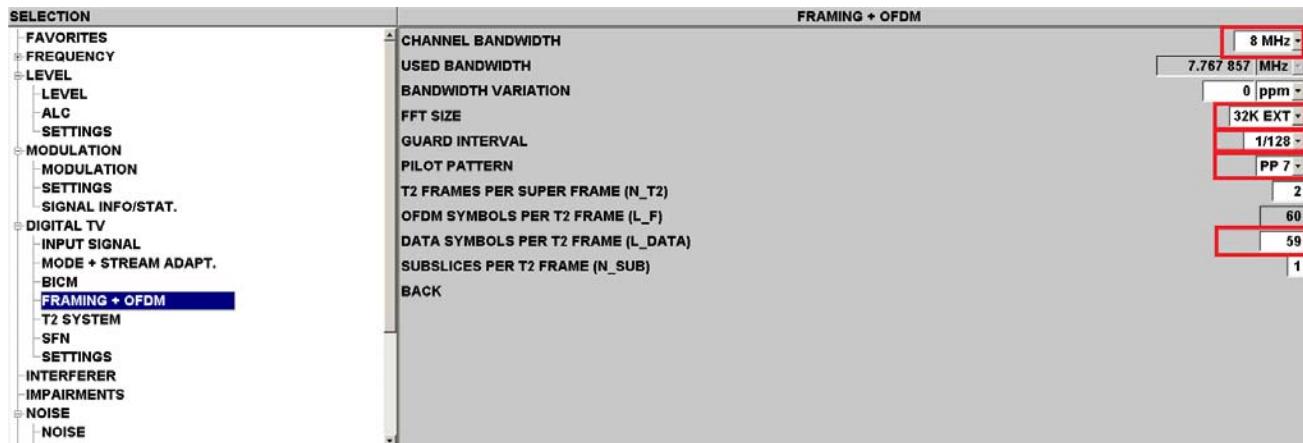
Figure 4-45 Setting the SFU test model



Step 2 Choose **DIGITAL TV > FRAMING + OFDM**, as shown in [Figure 4-46](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT SIZE** to **32K EXT**.
- Set **GUARD INTERVAL** to **1/128**.
- Set **PILOT PATTERN** to **PP7**.
- Set **L\_DATA** to **59**.

Figure 4-46 FRAMING + OFDM settings

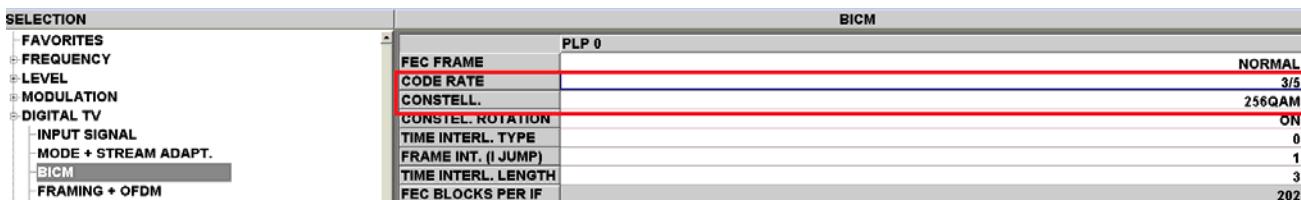




**Step 3** Choose **DIGITAL TV > BICM**, as shown in Figure 4-47.

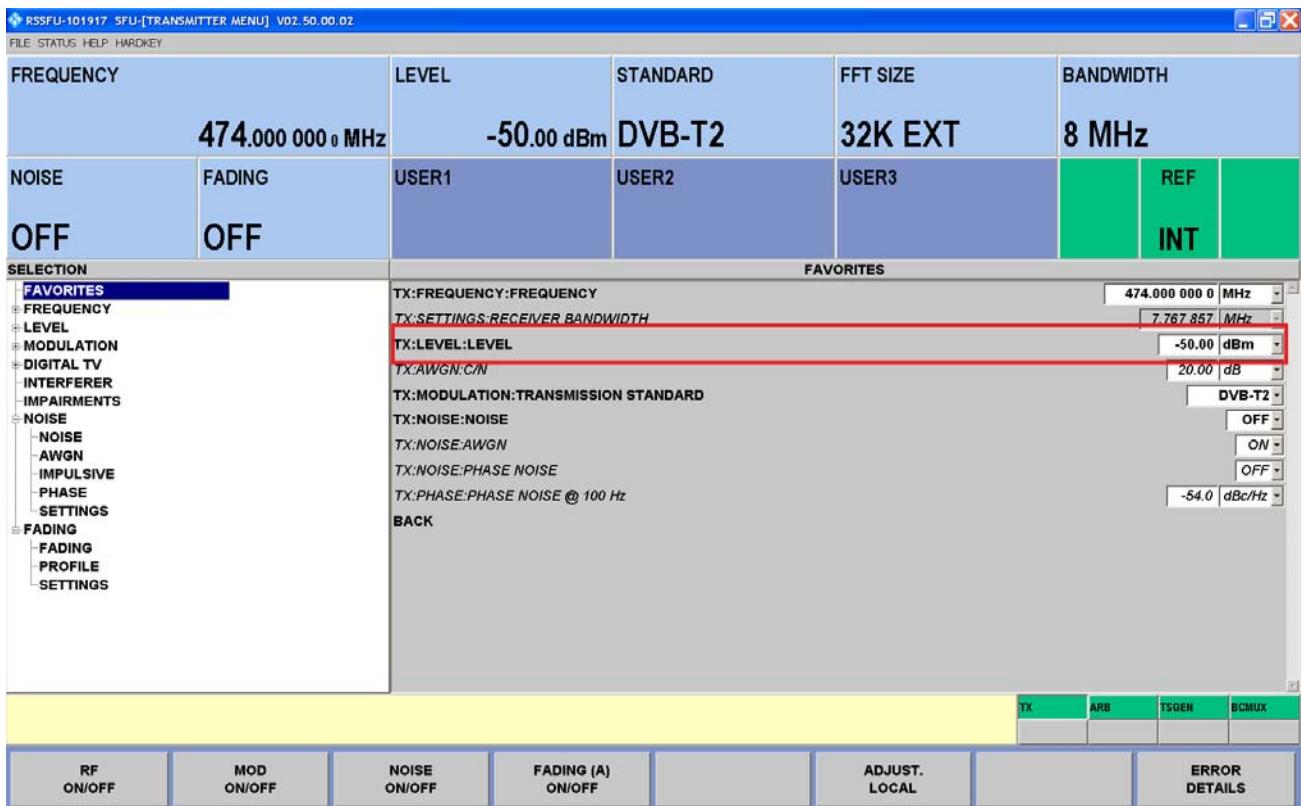
- Set **CODE RATE** to **3/5**.
- Set **CONSTELL.** to **256QAM**.

**Figure 4-47** BICM settings



**Step 4** Adjust the **LEVEL** value to complete the test. See Figure 4-48.

**Figure 4-48** Adjusting the LEVEL value



----End



# 5 NorDig 2.2.1 DVB-T Tests

Figure 5-1 shows the block diagram for testing the DVB-T modes in the NorDig standard.

**Figure 5-1** Nordig DVB-T test block diagram



## 5.1 Gaussian Threshold Test

### 5.1.1 Test Guide

Gaussian Threshold Test
Test Object: Hi3137 Gaussian performance
Test Conditions: <ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>– Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>– Set <b>NOISE</b> to <b>ADD</b>.</li><li>– Set <b>AWGN</b> to <b>ON</b> (set others to <b>OFF</b>).</li><li>– Set <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>• SFU signal parameters<ul style="list-style-type: none"><li>– Set <b>FFT SIZE</b> to <b>8K</b>.</li><li>– Set <b>GUARD INTERVAL</b> to <b>1/4</b>.</li></ul></li></ul>
Test Networking: See <a href="#">Figure 5-1</a> .
Test Procedure: <ol style="list-style-type: none"><li><b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU.</li><li><b>Step 2</b> Set a group of constellation mode, internal code rate, signal frequency, and bandwidth to be tested to the SFU according to the test report.</li><li><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under</li></ol>



### Gaussian Threshold Test

test to output AV signals properly.

**Step 4** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.

**Step 5** Repeat steps 2 to 4 until all Gaussian threshold tests are complete.

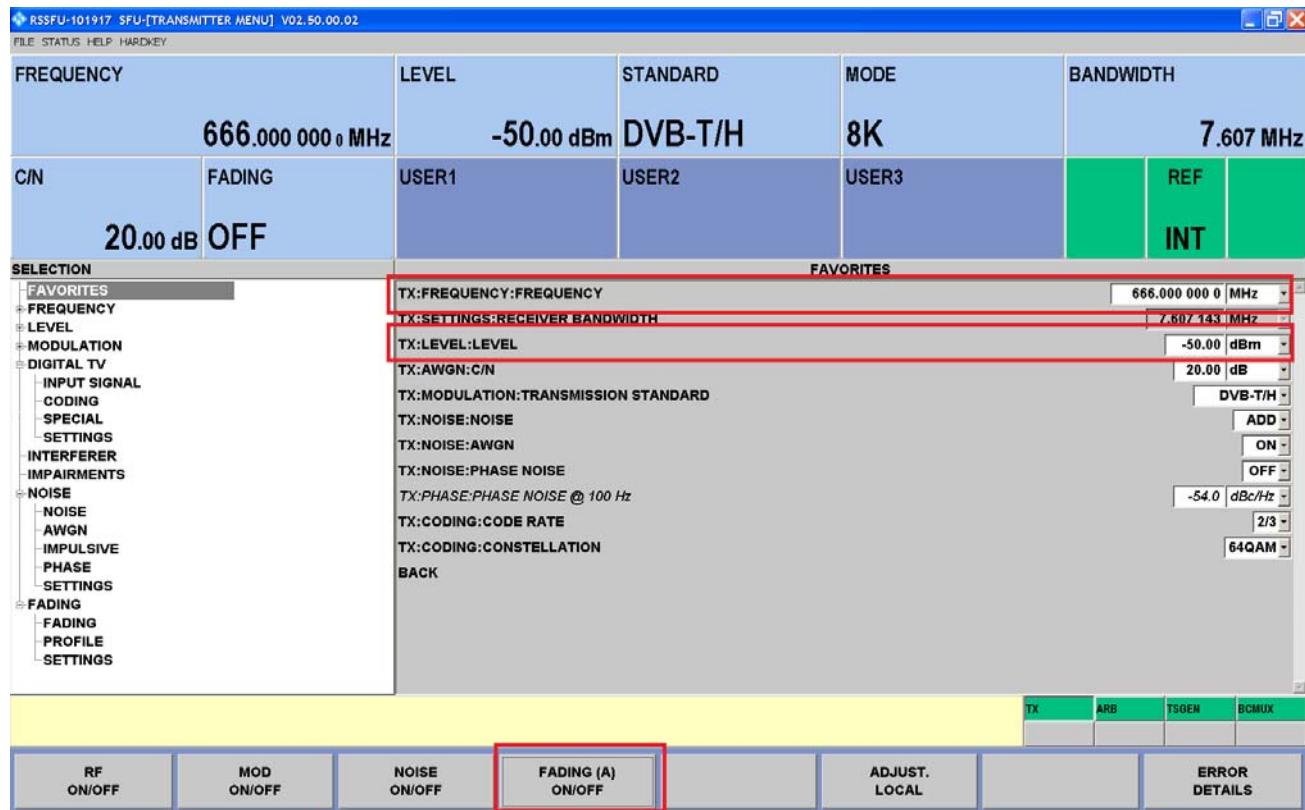
----End

## 5.1.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz.

**Step 1** Set **FADING** to **OFF** by clicking the **FADING (A) ON/OFF** button at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 5-2](#).

**Figure 5-2** Setting the SFU test model and signal parameters



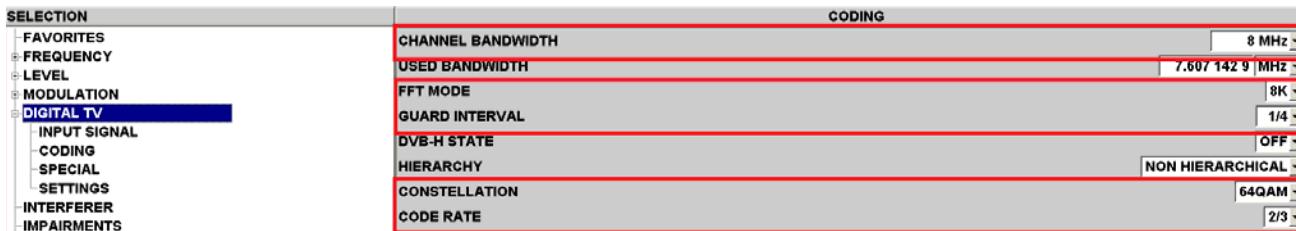
**Step 2** Choose **DIGITAL TV > CODING**, as shown in [Figure 5-3](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.



- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

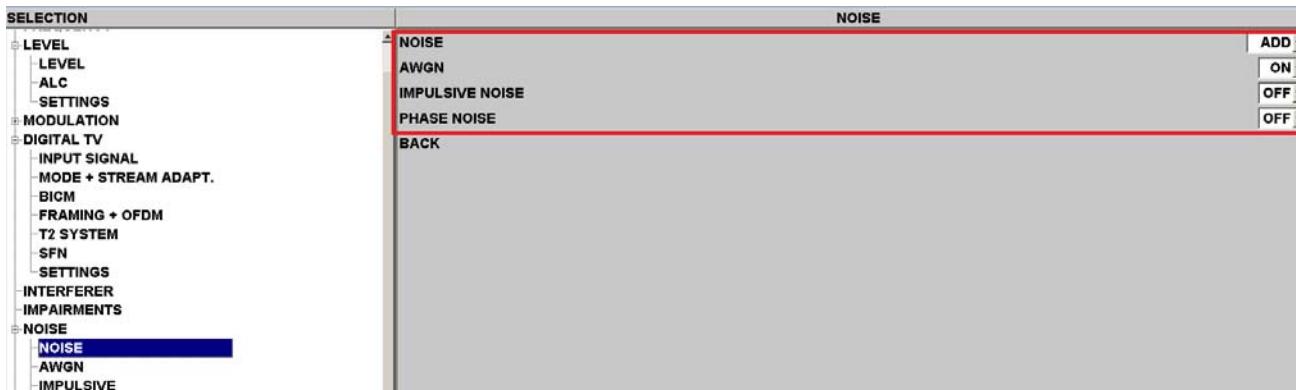
**Figure 5-3** CODING settings



**Step 3** Choose **NOISE > NOISE**, as shown in [Figure 5-4](#).

- Set **NOISE** to **ADD**.
- Set **AWGN** to **ON**.
- Set others to **OFF**.

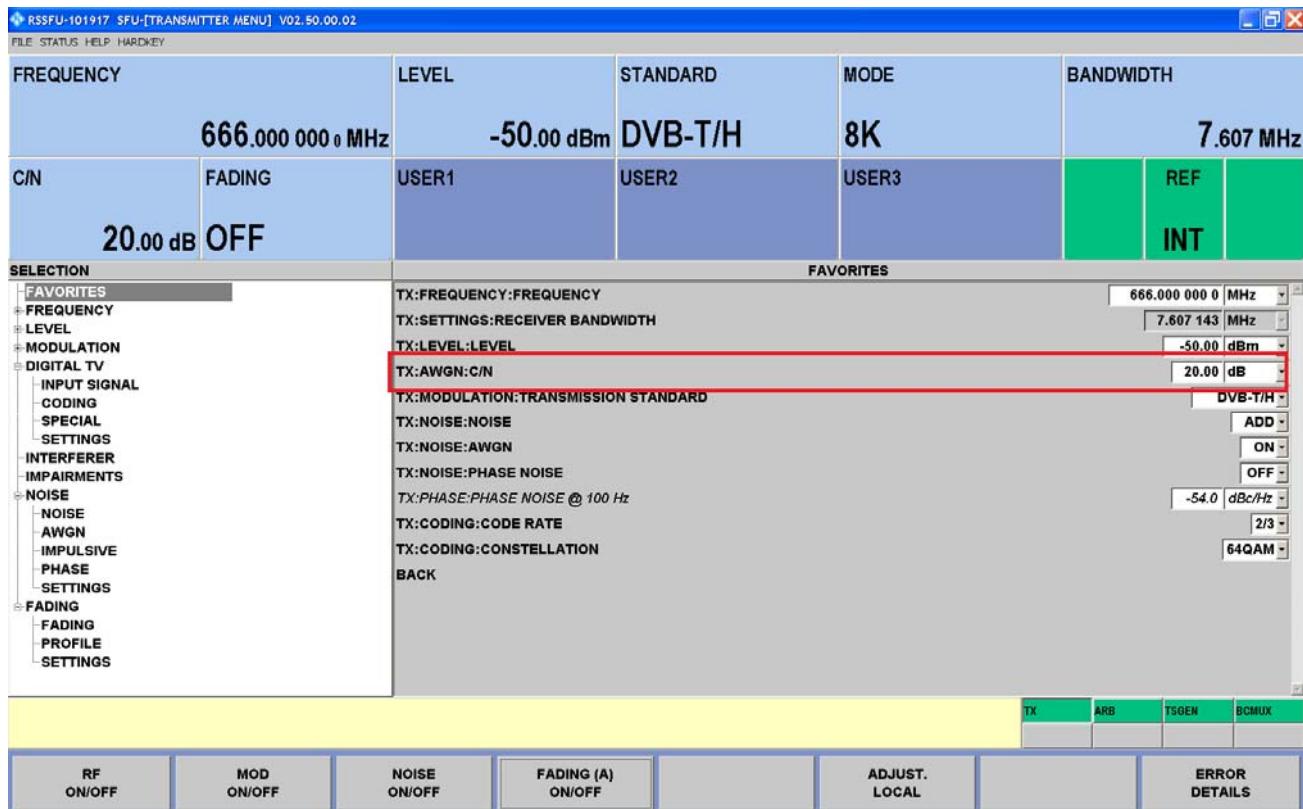
**Figure 5-4** NOISE settings



**Step 4** Adjust the C/N value to complete the C/N threshold test. See [Figure 5-5](#).



Figure 5-5 Adjusting the C/N value



----End

## 5.2 PAL (G) Analog Co-Channel Test

### 5.2.1 Test Guide

PAL (G) Analog Co-Channel Test
Test Object: Hi3137 performance with analog co-channel PAL interference
Test Conditions:
<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li><li>- Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>- Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>FFT SIZE</b> to <b>8K</b>.</li><li>- Choose <b>INTERFERER</b>, and set <b>INTERFERER SOURCE</b> to <b>ATV PREDEF</b>.</li><li>- Set <b>ATV PREDEFINED STANDARD</b> to <b>B/G N PREDEF</b>.</li><li>- Retain the default value of <b>INTERFERER ADDITION</b> (the test is not affected no matter it is set to <b>AFTER NOISE</b> or <b>BEFORE NOISE</b>).</li></ul></li></ul>



### PAL (G) Analog Co-Channel Test

- Set **INTERFERER REFERENCE** to **ATTENUATION**.
- Set **INTERFERER FREQUENCY OFFSET** to **-2.75 MHz**.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.
- SFU signal parameters: Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.

Test Networking: See [Figure 5-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **INTERFERER ATTENUATION** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **INTERFERER ATTENUATION** value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

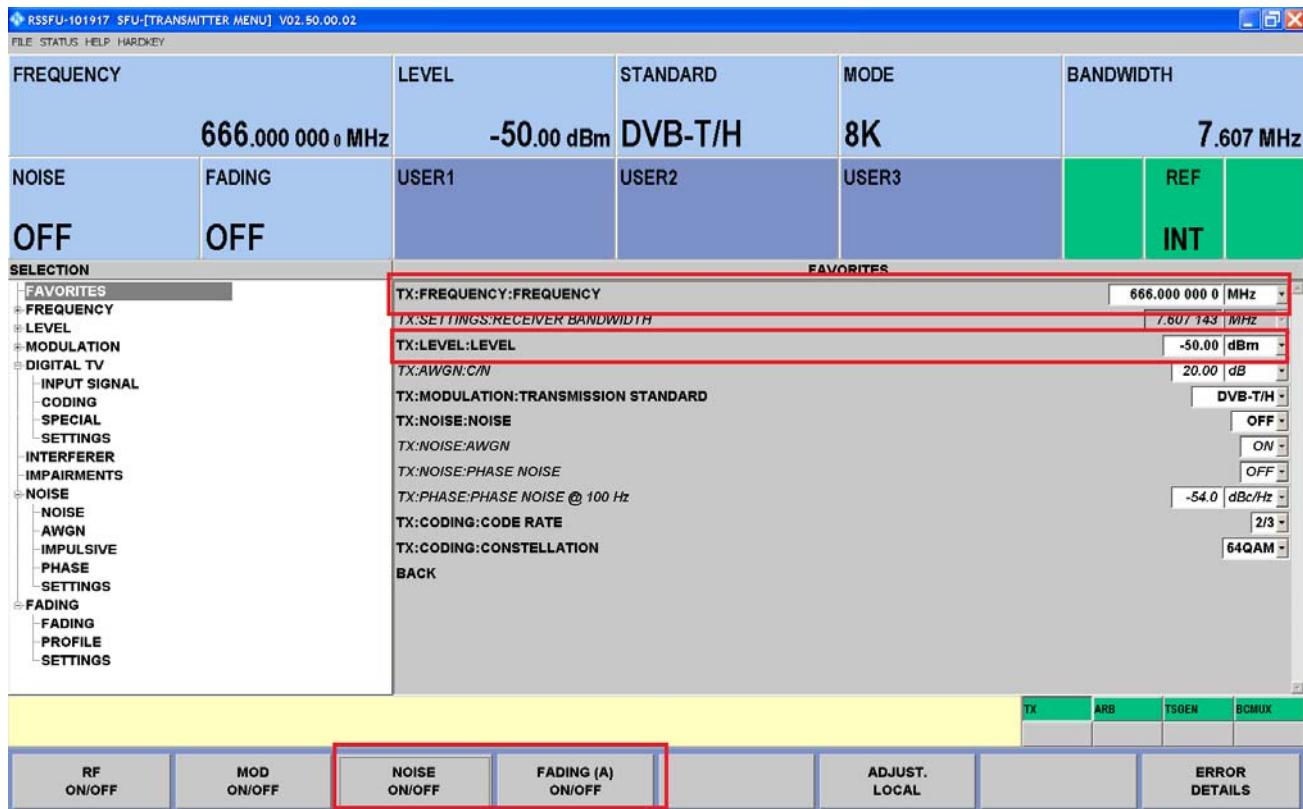
## 5.2.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 5-6](#).



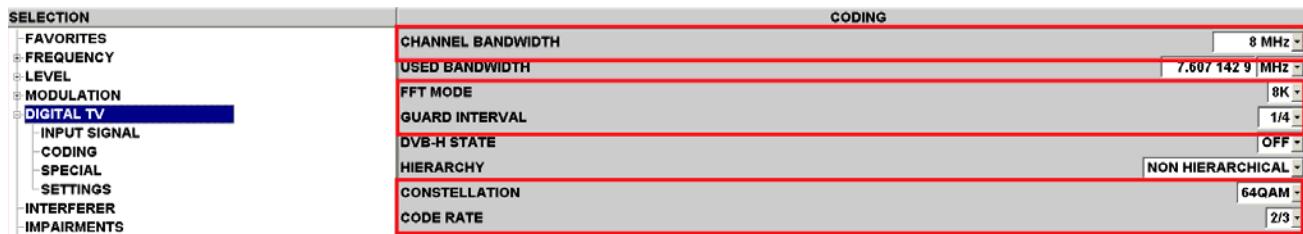
Figure 5-6 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in [Figure 5-7](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 5-7 CODING settings



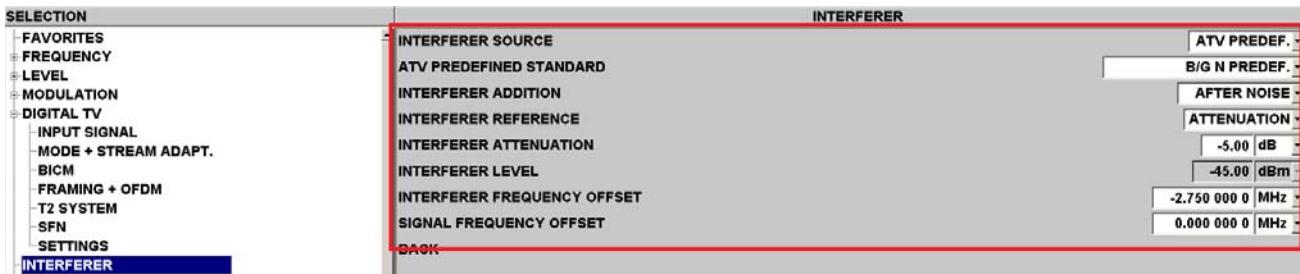
Step 3 Choose **INTERFERER**, as shown in [Figure 5-8](#).

- Set **INTERFERER SOURCE** to **ATV PREDEF**.
- Set **ATV PREDEFINED STANDARD** to **B/G N PREDEF**.
- Retain the default value of **INTERFERER ADDITION** (the test is not affected no matter it is set to **AFTER NOISE** or **BEFORE NOISE**).



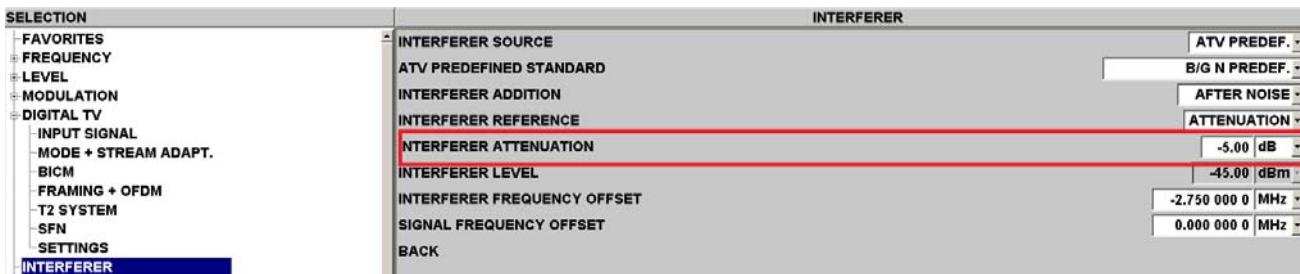
- Set **INTERFERER REFERENCE** to ATTENUATION.
- Set **INTERFERER FREQUENCY OFFSET** to **-2.75 MHz**.
- Set **SIGNAL FREQUENCY OFFSET** to **0 MHz**.

**Figure 5-8** INTERFERER settings



**Step 4** Adjust the value of **INTERFERER ATTENUATION** to complete the test. See [Figure 5-9](#).

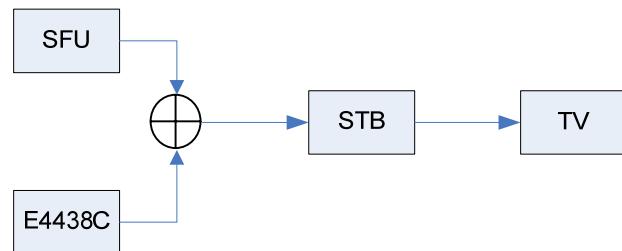
**Figure 5-9** Adjusting the INTERFERER ATTENUATION value



## 5.3 LTE (BS-A) Channel Rejection Ratio Test

[Figure 5-10](#) shows the networking for the LTE channel rejection ratio test.

**Figure 5-10** Block diagram for the LTE channel rejection ratio test





### 5.3.1 Test Guide

LTE (BS-A) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (BS-A) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play BS_100% streams.</li><li>- Set the output frequency to 796 MHz.</li><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li></ul></li><li>● SFU signal parameters: Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.</li></ul>
Test Networking: See <a href="#">Figure 5-10</a> .
Test Procedure:  <b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C. <b>Step 2</b> Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report. <b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly. <b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract -15 dBm from the value to obtain the C/I value. <b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.  ----End

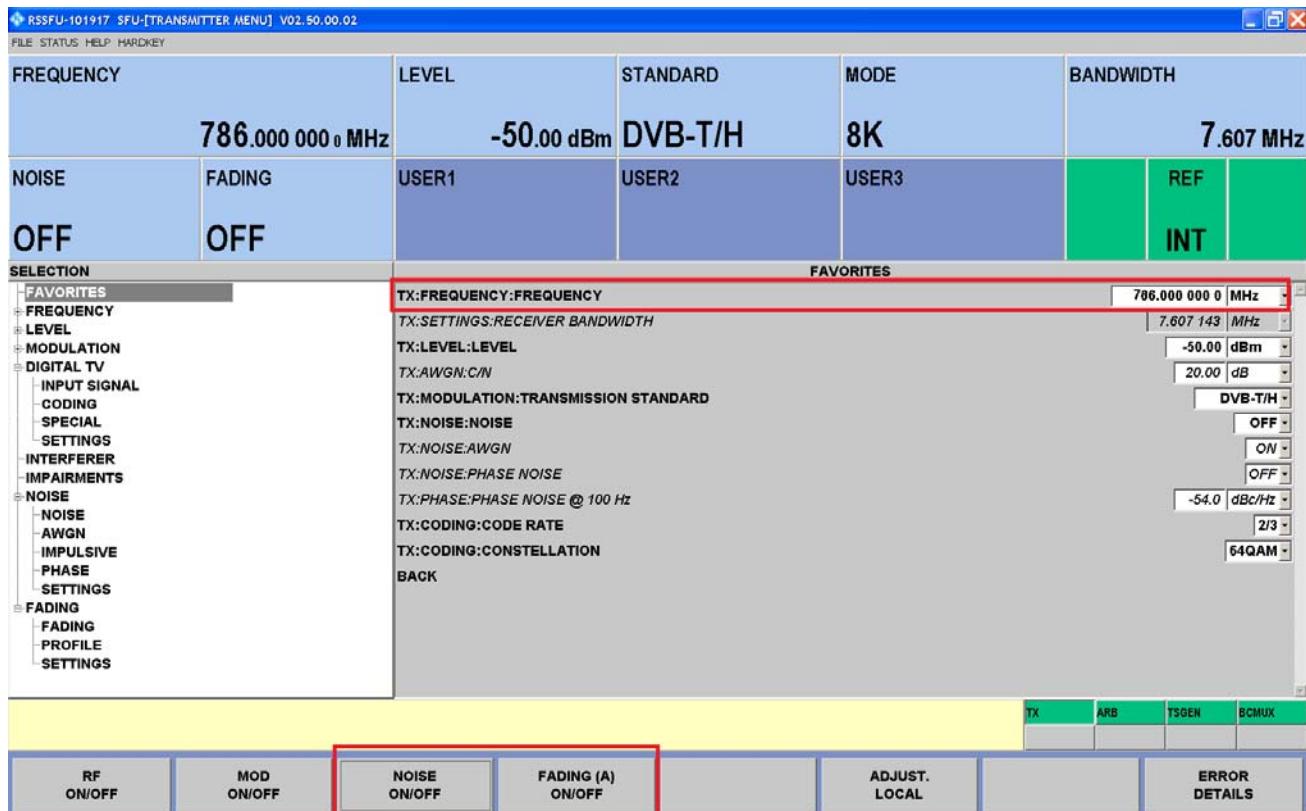
### 5.3.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 5-11](#).



Figure 5-11 Setting the SFU test model



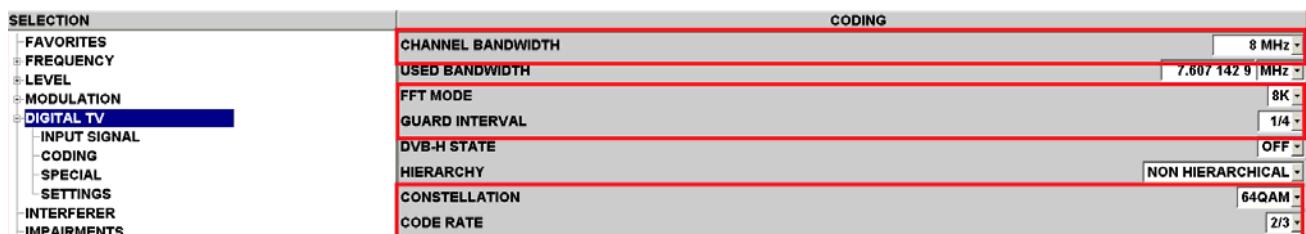
**Step 2** Set the E4438C to enable it to play BS\_100% streams.

- Set the output frequency to 796 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > CODING**, as shown in Figure 5-12.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

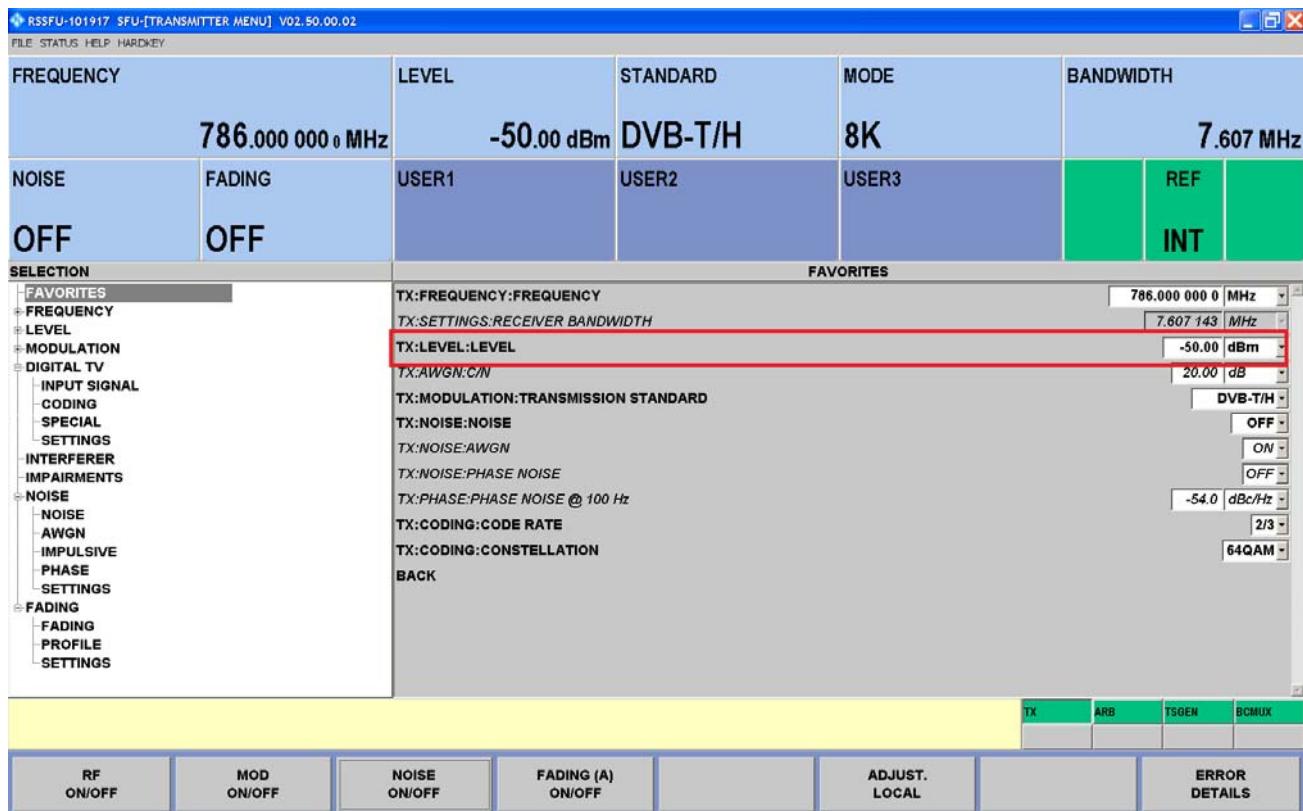
Figure 5-12 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract -15 dBm from the value to obtain the C/I value.

**Figure 5-13** Adjusting the LEVEL value



----End

## 5.4 LTE (BS-B) Channel Rejection Ratio Test

### 5.4.1 Test Guide

LTE (BS-B) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (BS-B) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play BS_100% streams.</li><li>- Set the output frequency to 806 MHz.</li></ul></li></ul>



LTE (BS-B) Channel Rejection Ratio Test
<ul style="list-style-type: none"><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li><li>● SFU signal parameters: Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.</li></ul>
Test Networking: See <a href="#">Figure 5-10</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract -15 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

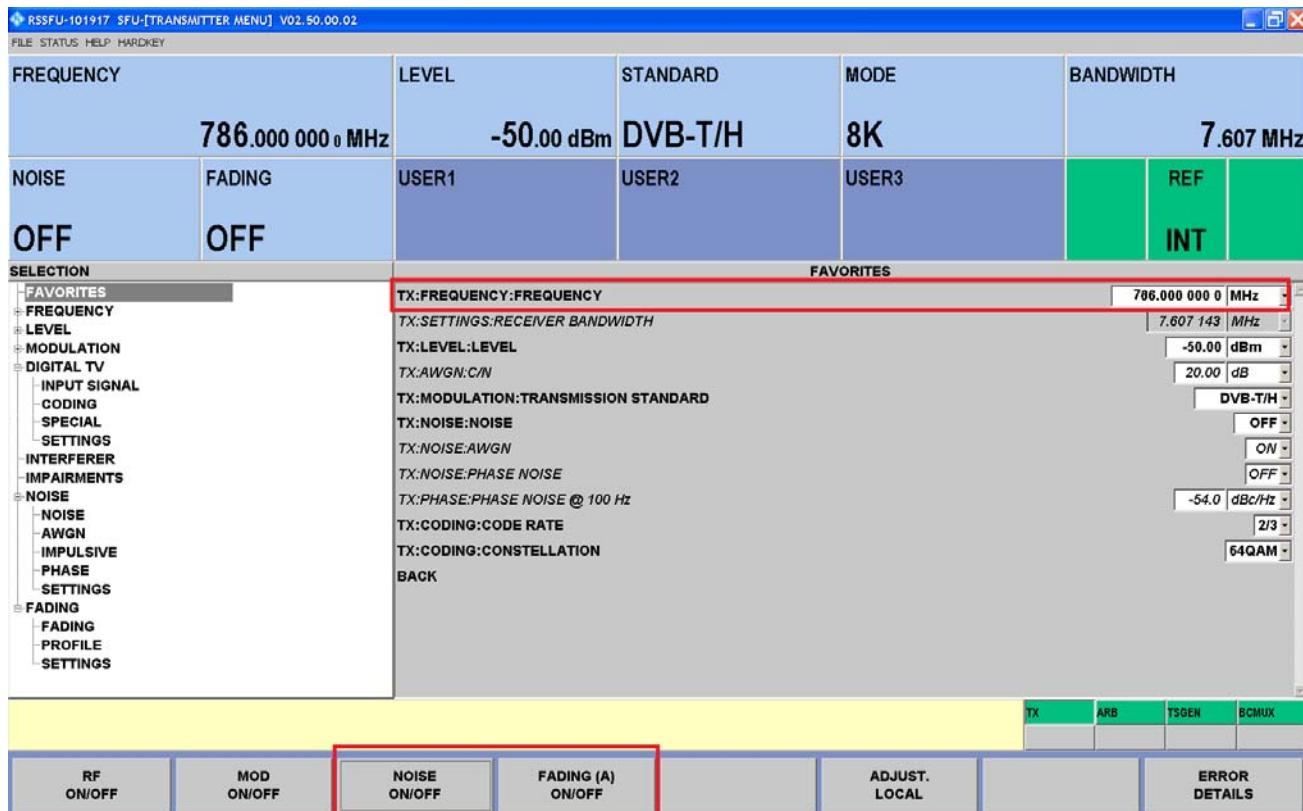
## 5.4.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 5-14](#).



Figure 5-14 Setting the SFU test model



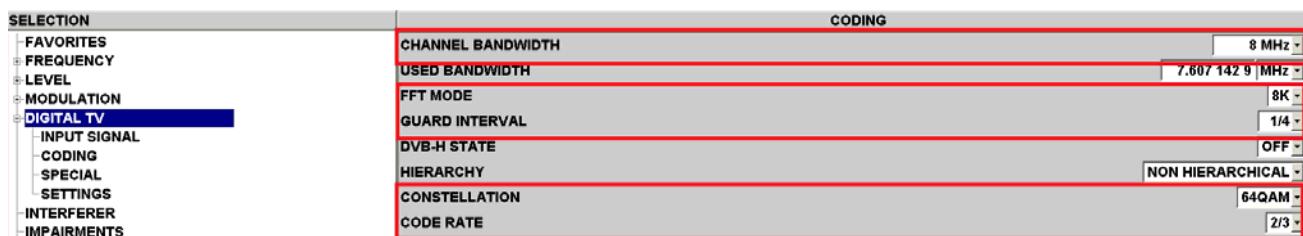
**Step 2** Set the E4438C to enable it to play BS\_100% streams.

- Set the output frequency to 806 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > CODING**, as shown in Figure 5-15.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

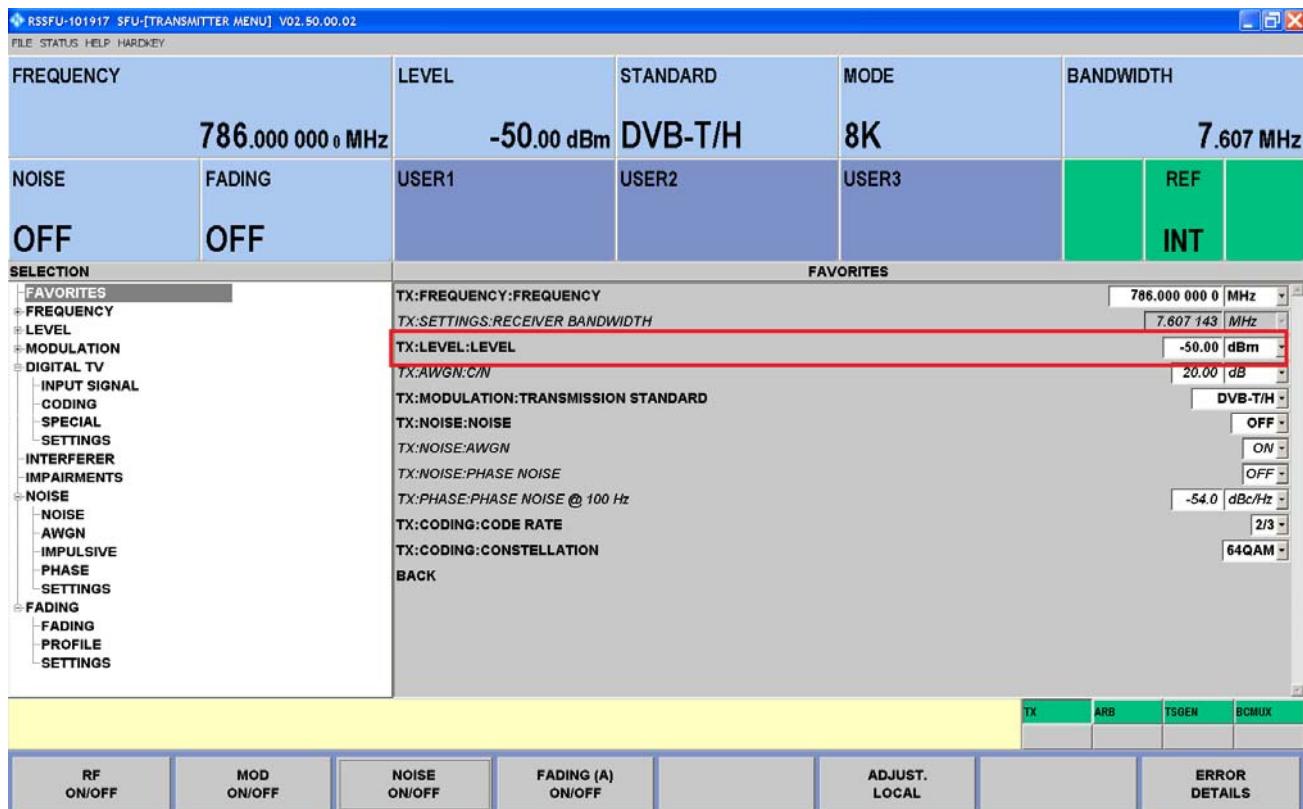
Figure 5-15 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract -15 dBm from the value to obtain the C/I value.

**Figure 5-16** Adjusting the LEVEL value



----End

## 5.5 LTE (UE-A) Channel Rejection Ratio Test

### 5.5.1 Test Guide

LTE (UE-A) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (UE-A) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>- Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>- Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>- Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>● E4438C parameters<ul style="list-style-type: none"><li>- Set the E4438C to enable it to play UE_20Mbs streams.</li><li>- Set the output frequency to 837 MHz.</li></ul></li></ul>



### LTE (UE-A) Channel Rejection Ratio Test

- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.
- SFU signal parameters: Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.

Test Networking: See [Figure 5-10](#).

Test Procedure:

- Step 1** Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.
- Step 2** Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.
- Step 3** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 4** Gradually decrease the **LEVEL** value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **LEVEL** value and subtract -15 dBm from the value to obtain the C/I value.
- Step 5** Repeat steps 2 to 4 until all tests are complete.

----End

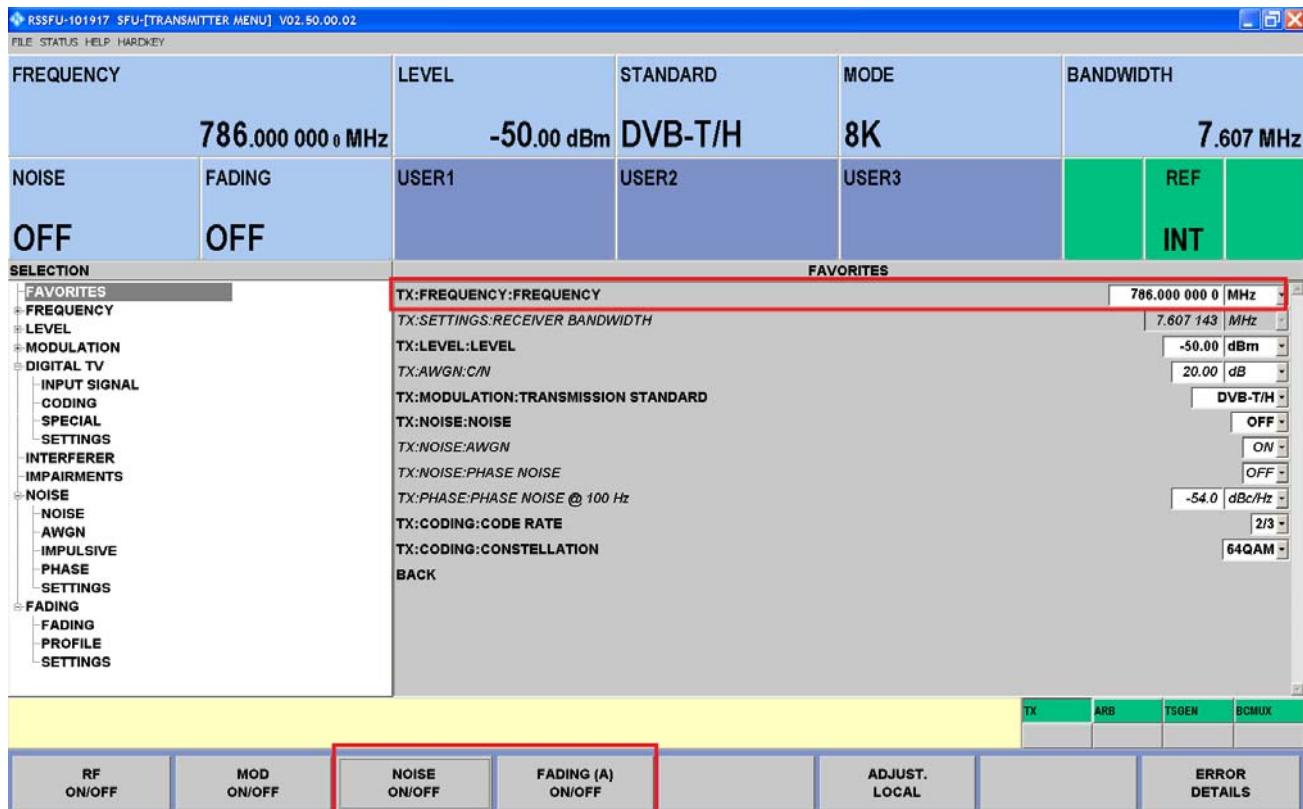
## 5.5.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

- Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 5-17](#).



Figure 5-17 Setting the SFU test model



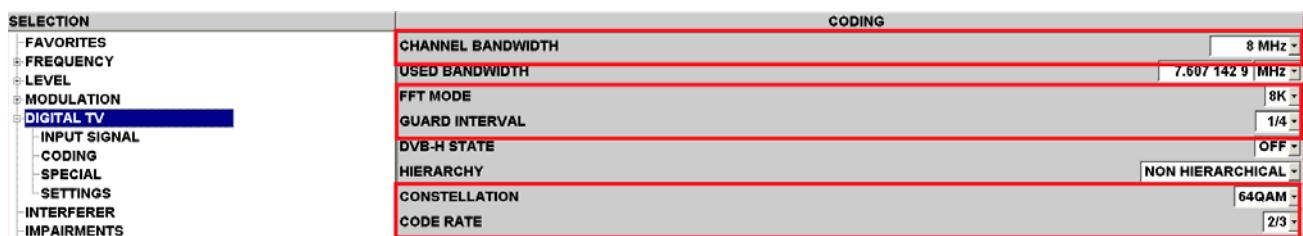
**Step 2** Set the E4438C to enable it to play UE\_20Mbs streams.

- Set the output frequency to 837 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

**Step 3** Choose **DIGITAL TV > CODING**, as shown in Figure 5-18.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

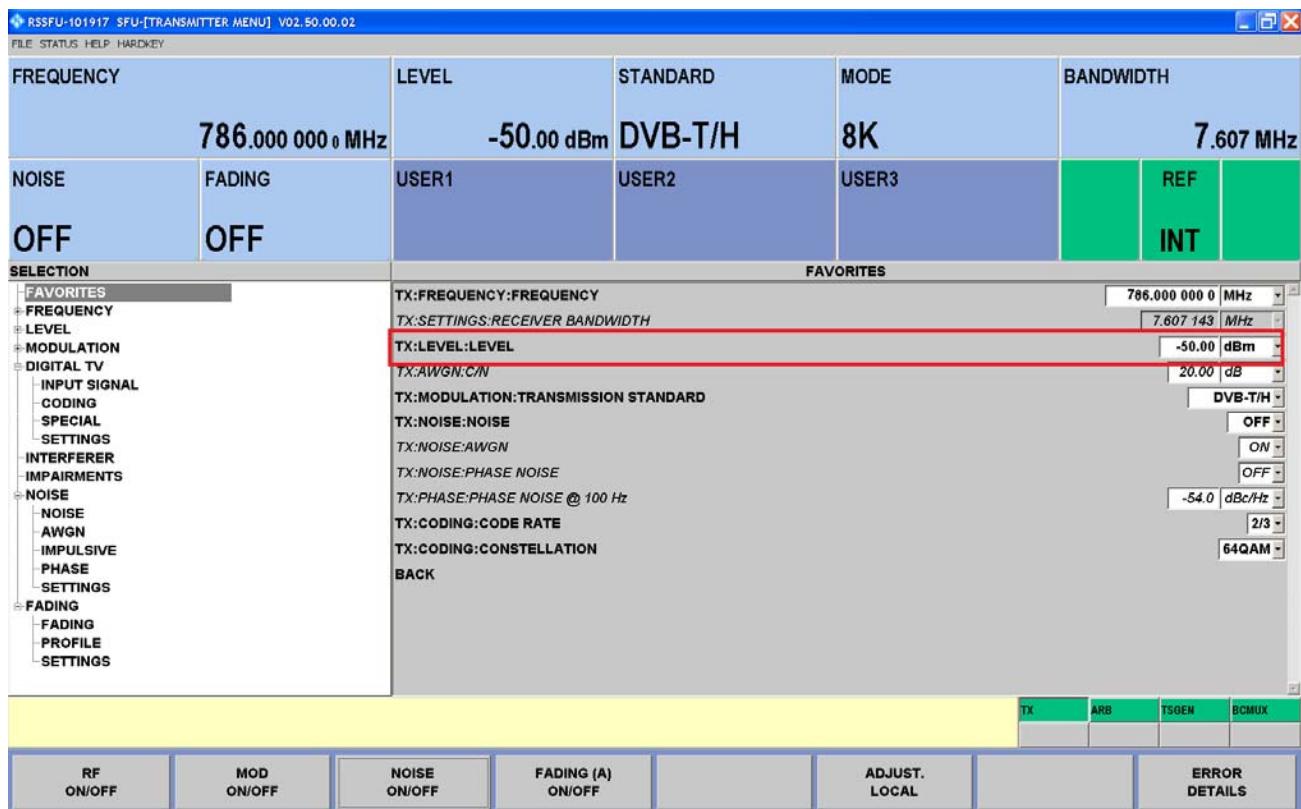
Figure 5-18 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract –15 dBm from the value to obtain the C/I value.

**Figure 5-19** Adjusting the LEVEL value



----End

## 5.6 LTE (UE-C) Channel Rejection Ratio Test

### 5.6.1 Test Guide

LTE (UE-C) Channel Rejection Ratio Test
Test Object: Hi3137 LTE (UE-C) suppression performance
Test Conditions:
<ul style="list-style-type: none"><li>• SFU test model<ul style="list-style-type: none"><li>– Set <b>FREQUENCY</b> to <b>786 MHz</b>.</li><li>– Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>– Set <b>NOISE</b> and <b>FADING</b> to <b>OFF</b>.</li></ul></li><li>• E4438C parameters<ul style="list-style-type: none"><li>– Set the E4438C to enable it to play UE_20Mbs streams.</li><li>– Set the output frequency to 857 MHz.</li></ul></li></ul>



LTE (UE-C) Channel Rejection Ratio Test
<ul style="list-style-type: none"><li>- Set the bandwidth to 10 MHz.</li><li>- Set the output signal strength to -15 dBm.</li><li>● SFU signal parameters: Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.</li></ul>
Test Networking: See <a href="#">Figure 5-10</a> .
Test Procedure:
<p><b>Step 1</b> Set the SFU test model in the test conditions to the SFU, and set the E4438C parameters to the E4438C.</p> <p><b>Step 2</b> Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.</p> <p><b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.</p> <p><b>Step 4</b> Gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value and subtract -15 dBm from the value to obtain the C/I value.</p> <p><b>Step 5</b> Repeat steps 2 to 4 until all tests are complete.</p> <p>----End</p>

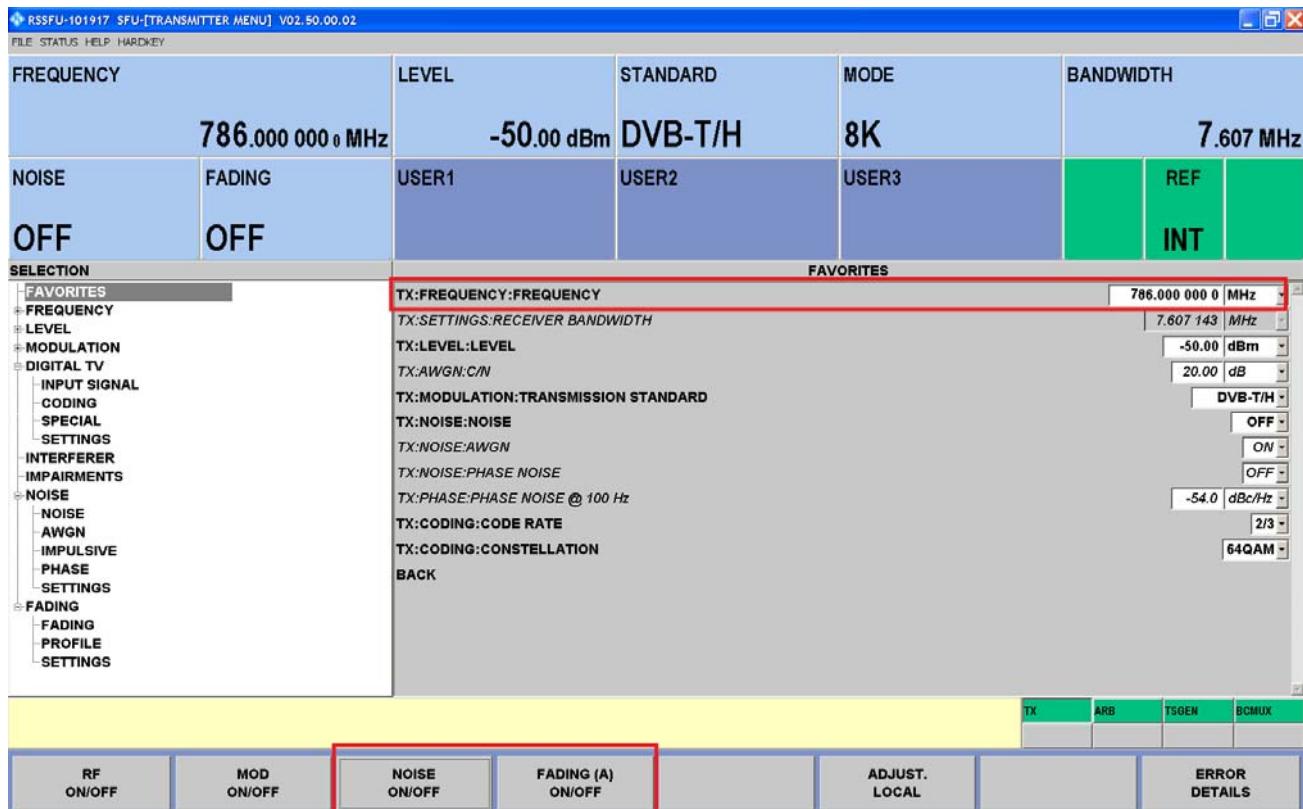
## 5.6.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=786 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **786 MHz**. See [Figure 5-20](#).



Figure 5-20 Setting the SFU test model



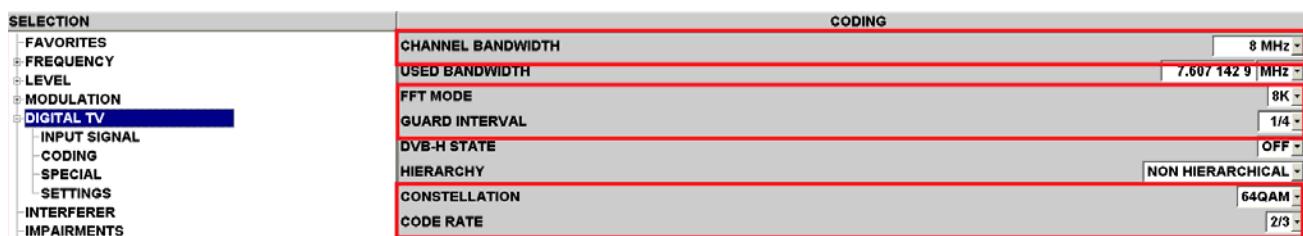
Step 2 Set the E4438C to enable it to play UE\_20Mbs streams.

- Set the output frequency to 857 MHz.
- Set the bandwidth to 10 MHz.
- Set the output signal strength to -15 dBm.

Step 3 Choose **DIGITAL TV > CODING**, as shown in Figure 5-21.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

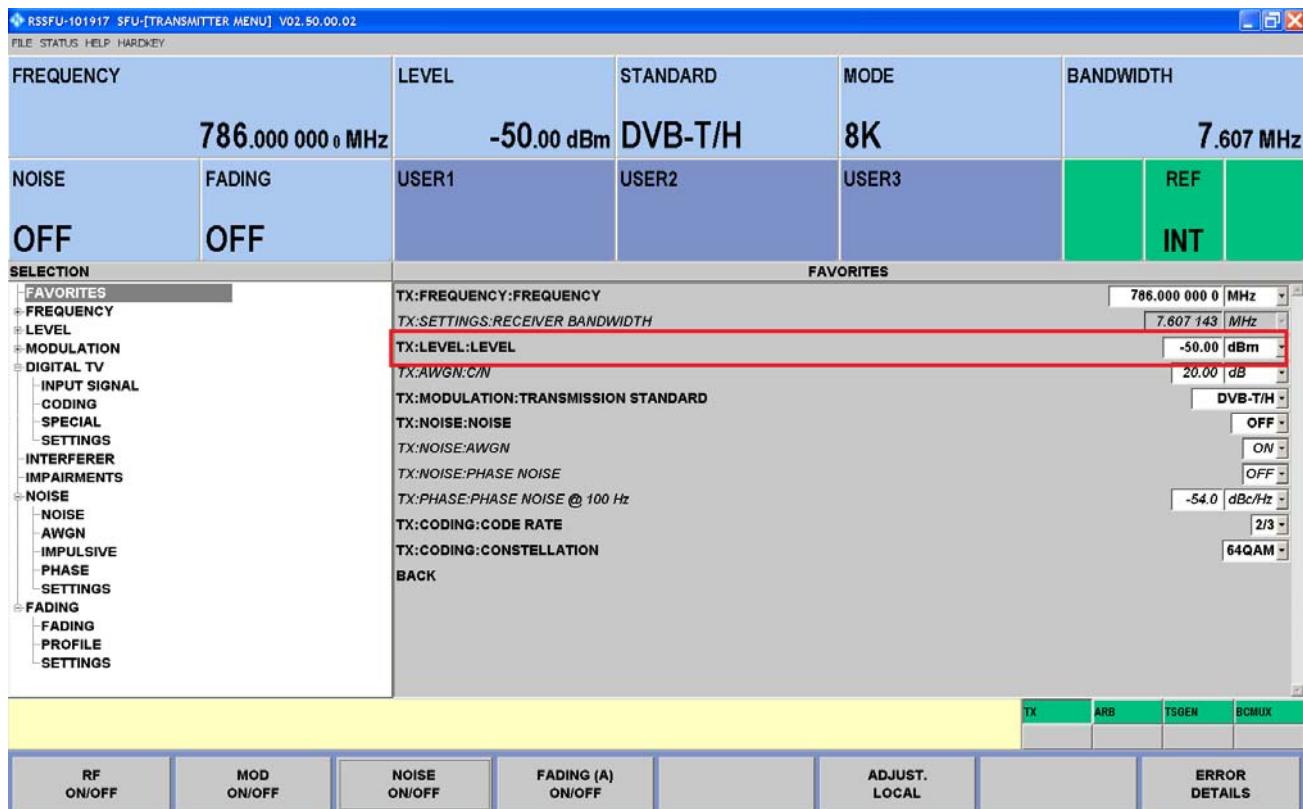
Figure 5-21 CODING settings





**Step 4** Adjust the **LEVEL** value to obtain the **LEVEL** value at the critical point, and subtract  $-15$  dBm from the value to obtain the C/I value.

**Figure 5-22** Adjusting the LEVEL value



----End

## 5.7 Test with a 0 dB Echo Within the Guard Interval (1.95 $\mu$ s/0.5GI/0.95GI)

### 5.7.1 Test Guide

Test with a 0 dB Echo Within the Guard Interval (1.95 $\mu$ s/0.5GI/0.95GI)	
Test Object: Hi3137 performance with echoes	
Test Conditions:	
<ul style="list-style-type: none"><li>● SFU test model<ul style="list-style-type: none"><li>– Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>– Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>– Set <b>CONSTELL.</b> to <b>64QAM</b>.</li><li>– Set <b>FFT SIZE</b> to <b>8K</b>.</li><li>– Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li></ul></li></ul>	



### Test with a 0 dB Echo Within the Guard Interval (1.95 μs/0.5GI/0.95GI)

- Set **NOISE** to **ADD**.
- Set **AWGN** to **ON** (set others to **OFF**).
- Choose **FADING > PROFILE**, and set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **PATH LOSS** to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST PHASE** to **0**.
- Set **FADING** to **ON**.
- SFU signal parameters: Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.

Test Networking: See [Figure 5-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.
- Step 3** Select the guard interval delay  $\Delta Tu$  according to [Table 1-6](#) based on the guard interval of the item to be tested in the test report, multiply  $\Delta Tu$  by 0.5 or 0.95 (or use 1.95 μs) to obtain the echo delay, and set **BASIC DELAY** of the SFU 2-1 model to the obtained echo delay.
- Step 4** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 5** Gradually decrease the C/N value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the C/N value.
- Step 6** Repeat steps 2 to 5 until all tests are complete.

----End

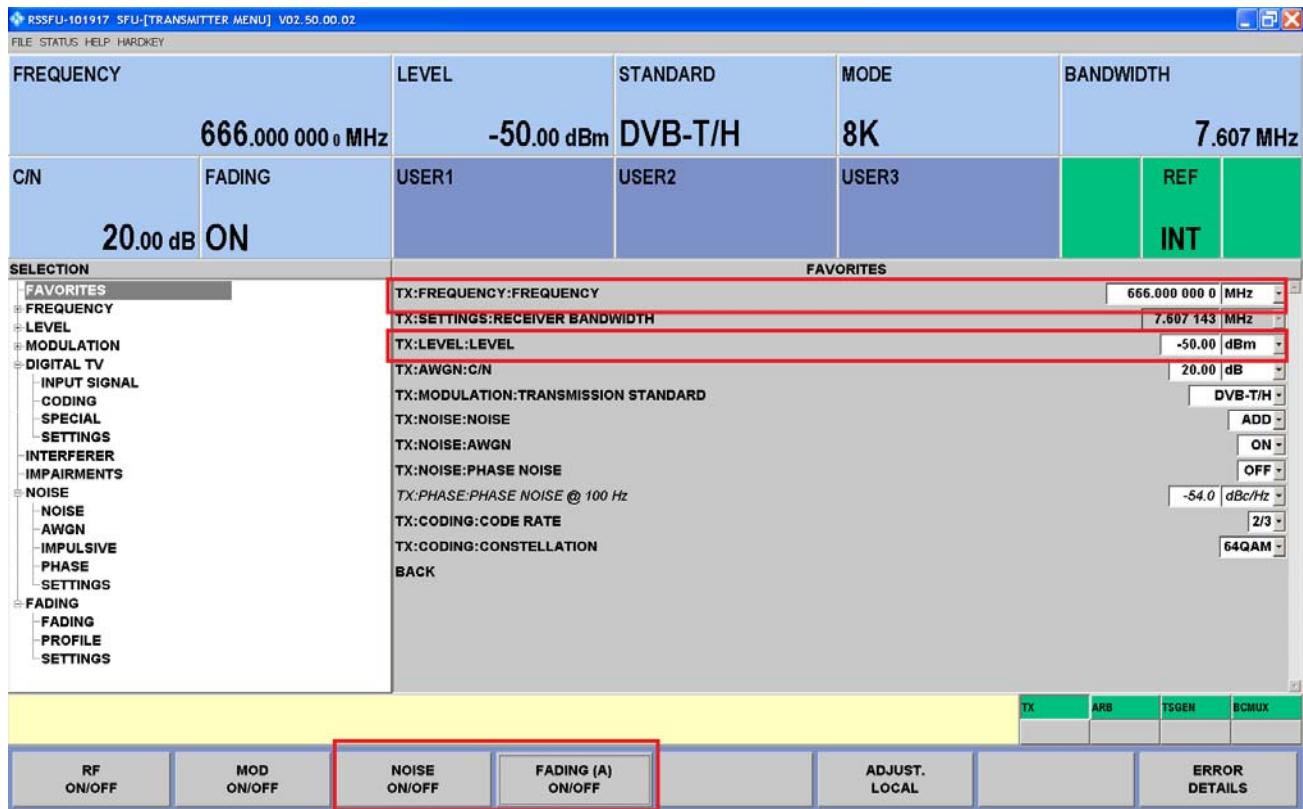
## 5.7.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, 0.5GI.

- Step 1** Set **NOISE** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A)** **ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 5-23](#).



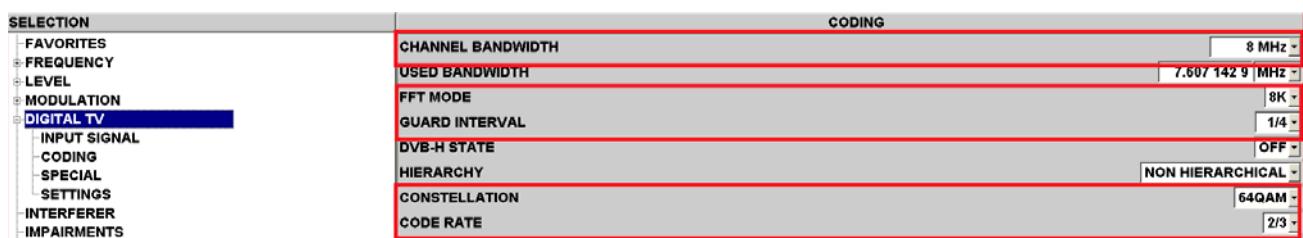
Figure 5-23 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in [Figure 5-24](#).

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 5-24 CODING settings



Step 3 Multiply the guard interval corresponding to the mode to be tested (224  $\mu$ s according to [Table 5-1](#)) by 0.5. The result is 112  $\mu$ s.



**Table 5-1** Guard interval

DVB-T	8K				2K			
GI	1/4    1/8    1/16    1/32				1/4    1/8    1/16    1/32			
Character length	896 μs				224 μs			
ΔTu	224 μs	112 μs	56 μs	28 μs	56 μs	28 μs	14 μs	7 μs
Total length	1120 μs	1008 μs	952 μs	924 μs	280 μs	252 μs	238 μs	231 μs

**Step 4** Choose **FADING > PROFILE**, as shown in [Figure 5-25](#).

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **PATH LOSS** to **0**.
- Set **ADDIT.DELAY** to **0**.
- Set **CONST PHASE** to **0**.
- Set **BASIC DELAY** in the **2-1** column to **112 μs**, which is obtained in step 3.

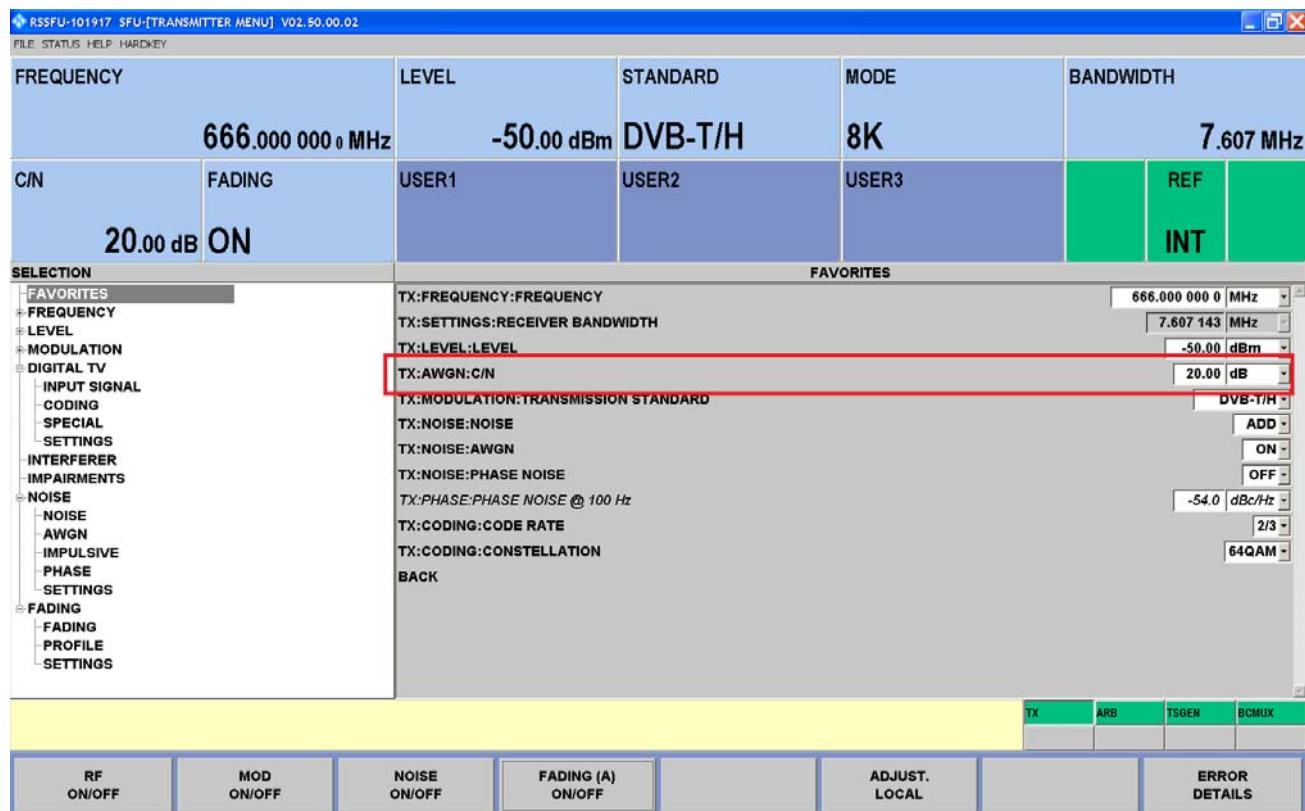
**Figure 5-25** PROFILE settings

STANDARD		PROFILE									
PARAMETER SET		USER									
CONFIGURATION		d:/FADING/USER/unsaved_profile.fad									
STATE	1-1	1-2	1-3	1-4	1-5	2-1	2-2	2-3	2-4	2-5	STANDARD DELAY
PROFILE	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
CONST.PHASE	0.00	0.00	0.00	0.00	0.00	112.00	112.00	112.00	112.00	112.00	112.00
PATH LOSS [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BASIC DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ADDIT. DELAY [μs]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RESULTING DELAY [μs]	0.00	0.00	0.00	0.00	0.00	112.00	112.00	112.00	112.00	112.00	112.00
POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEED [m/s]	0.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
FREQ RATIO	-1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RES DOPPLER SHIFT [Hz]	0.00	44.43	44.43	44.43	44.43	44.43	44.43	44.43	44.43	44.43	44.43
CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	0	0
PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0	0

**Step 5** Adjust the C/N value to complete the test. See [Figure 5-26](#).



Figure 5-26 Adjusting the C/N value



----End

## 5.8 Test with an Echo Outside the Guard Interval

### 5.8.1 Test Guide

Test with an Echo Outside the Guard Interval	
Test Object: Hi3137 performance with echoes	
Test Conditions:	
SFU test model	<ul style="list-style-type: none"><li>Set <b>FREQUENCY</b> to <b>666 MHz</b>.</li><li>Set <b>BANDWIDTH</b> to <b>8 MHz</b>.</li><li>Set the signal strength (<b>LEVEL</b>) to <b>-50 dBm</b>.</li><li>Set <b>NOISE</b> to <b>OFF</b>.</li><li>Set <b>CONSTELL.</b> to <b>64QAM</b>.</li><li>Set <b>FFT SIZE</b> to <b>8K</b>.</li><li>Choose <b>FADING &gt; PROFILE</b>, and set <b>STATE</b> in the <b>2-1</b> and <b>2-2</b> columns to <b>ON</b> (set <b>STATE</b> in other columns to <b>OFF</b>).</li></ul>



#### Test with an Echo Outside the Guard Interval

- Set **PROFILE** to **CONST.PHASE**.
- Set **ADDIT.DELAY** to **0**.
- Set **FADING** to **ON**.

Test Networking: See [Figure 5-1](#).

Test Procedure:

- Step 1** Set the SFU test model and signal parameters in the test conditions to the SFU.
- Step 2** Set different internal code rate and guard interval combinations to the SFU based on the item to be tested in the test report.
- Step 3** Set **BASIC DELAY** of the SFU multipath model 2-1 to the echo delay obtained in step 2.
- If the post echo type is to be tested, set **PATH LOSS** of the SFU multipath model 1-1 to **0**, and set that of the SFU multipath model 2-1 to the item to be tested.
  - If the pre echo type is to be tested, set **PATH LOSS** of the SFU multipath model 2-1 to **0**, and set that of the SFU multipath model 1-1 to the item to be tested.
- Step 4** Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly.
- Step 5** Gradually decrease the **PATH LOSS** value set in step 3 until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.1 until no more than one mosaic appears on the TV screen in a 60-second period. Record the **PATH LOSS** value.
- Step 6** Repeat steps 2 to 4 until all tests are complete.

----End

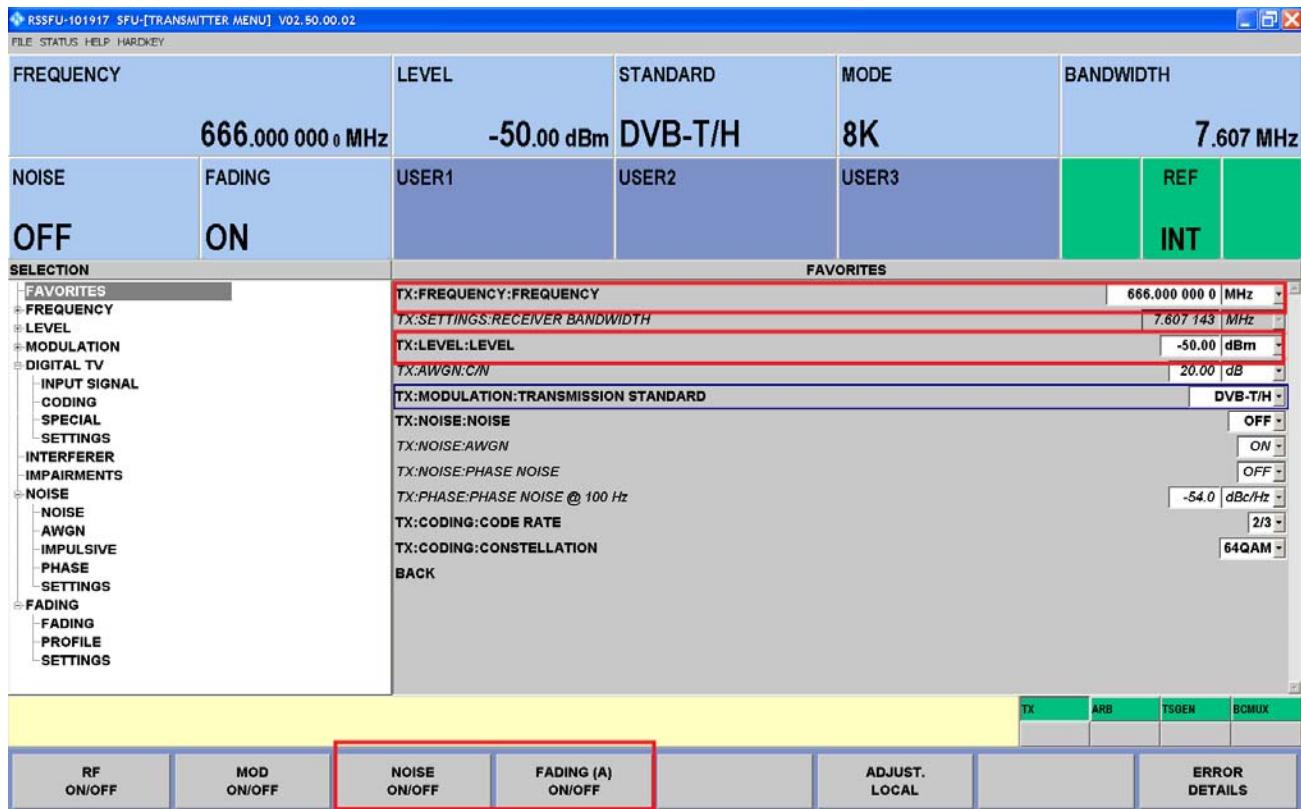
### 5.8.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz, 200  $\mu$ s echo delay.

- Step 1** Set **NOISE** to **OFF** and **FADING** to **ON** by clicking the **NOISE ON/OFF** and **FADING (A)** **ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz** and signal strength (**LEVEL**) to **-50 dBm**. See [Figure 5-27](#).



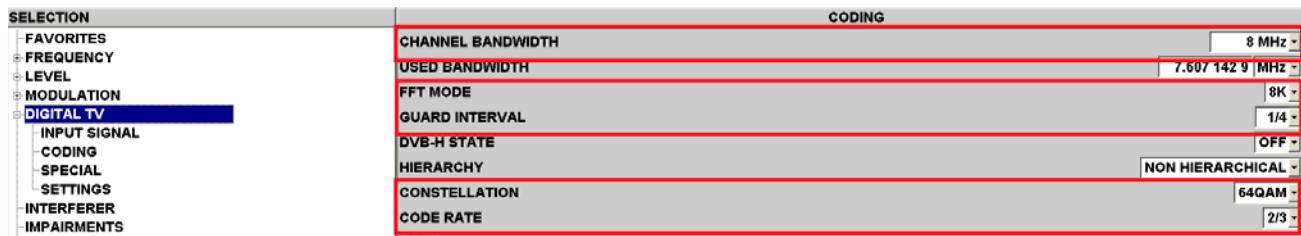
Figure 5-27 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in Figure 5-28.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

Figure 5-28 CODING settings



Step 3 Choose **FADING > PROFILE**, as shown in Figure 5-29.

- Set **STATE** in the **1-1** and **2-1** columns to **ON** (set **STATE** in other columns to **OFF**).
- Set **PROFILE** to **CONST.PHASE**.
- Set **ADDIT. DELAY** to **0**.



- Set **PATH LOSS** in the **1-1** column to **0**.
- Set **BASIC DELAY** in the **2-1** column to **200**.

**Figure 5-29 PROFILE settings**

STATE	ON	1 - 1					2 - 1					2 - 2					2 - 3					2 - 4						
		OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		
PROFILE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	CONST.PHASE	RAYLEIGH																				
PATH LOSS [dB]	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
BASIC DELAY [us]	0.00	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	
ADDITIONAL DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
RESULTING DELAY [us]	0.00	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	
POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEED [m/s]	0.00	20.00	20.00	20.00	20.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FREQ RATIO	-1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
RES DOPPLER SHIFT [Hz]	0.00	44.43	44.43	44.43	44.43	44.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	
STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Step 4** Adjust the **PATH LOSS** value in the **2-1** column to complete the test. See [Figure 5-30](#).

**Figure 5-30** Adjusting the PATH LOSS value in the 2-1 column

STATE	ON	1 - 1					2 - 1					2 - 2					2 - 3					2 - 4							
		OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		
PROFILE	CONST.PHASE	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	RAYLEIGH	CONST.PHASE	RAYLEIGH																				
PATH LOSS [dB]	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
BASIC DELAY [us]	0.00	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	
ADDITIONAL DELAY [us]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
RESULTING DELAY [us]	0.00	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	
POWER RATIO [dB]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONST PHASE [Deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEED [m/s]	0.00	20.00	20.00	20.00	20.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FREQ RATIO	-1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RES DOPPLER SHIFT [Hz]	0.00	44.43	44.43	44.43	44.43	44.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORRELATION PATH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
COEFFICIENT [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHASE [Deg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOGNORMAL STATE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LOCAL CONSTANT [m]	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	
STANDARD DEV. [dB]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

----End

## 5.9 Sensitivity Test

### 5.9.1 Test Guide

Sensitivity Test
Test Object: Hi3137 sensitivity
Test Conditions:



Sensitivity Test
SFU test model <ul style="list-style-type: none"><li>● Set <b>NOISE</b> to <b>OFF</b>.</li><li>● Set <b>FADING</b> to <b>OFF</b>.</li></ul>
Test Networking: See <a href="#">Figure 5-1</a> .
Test Procedure:  <b>Step 1</b> Set the SFU test model and signal parameters in the test conditions to the SFU. <b>Step 2</b> Set the FFT size, bandwidth, constellation, internal code rate, guard interval, and frequency in the SFU based on the item to be tested in the test report. <b>Step 3</b> Set the STB parameters, search for and save program channels, and enable the STB under test to output AV signals properly. <ul style="list-style-type: none"><li>● For the minimum level test, gradually decrease the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually increase the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value.</li><li>● For the maximum level test, gradually increase the <b>LEVEL</b> value until mosaics appear on the TV screen. Then gradually decrease the value in steps of 0.5 until no more than one mosaic appears on the TV screen in a 60-second period. Record the <b>LEVEL</b> value.</li></ul> <b>Step 4</b> Repeat steps 2 to 3 until all tests are complete. ----End

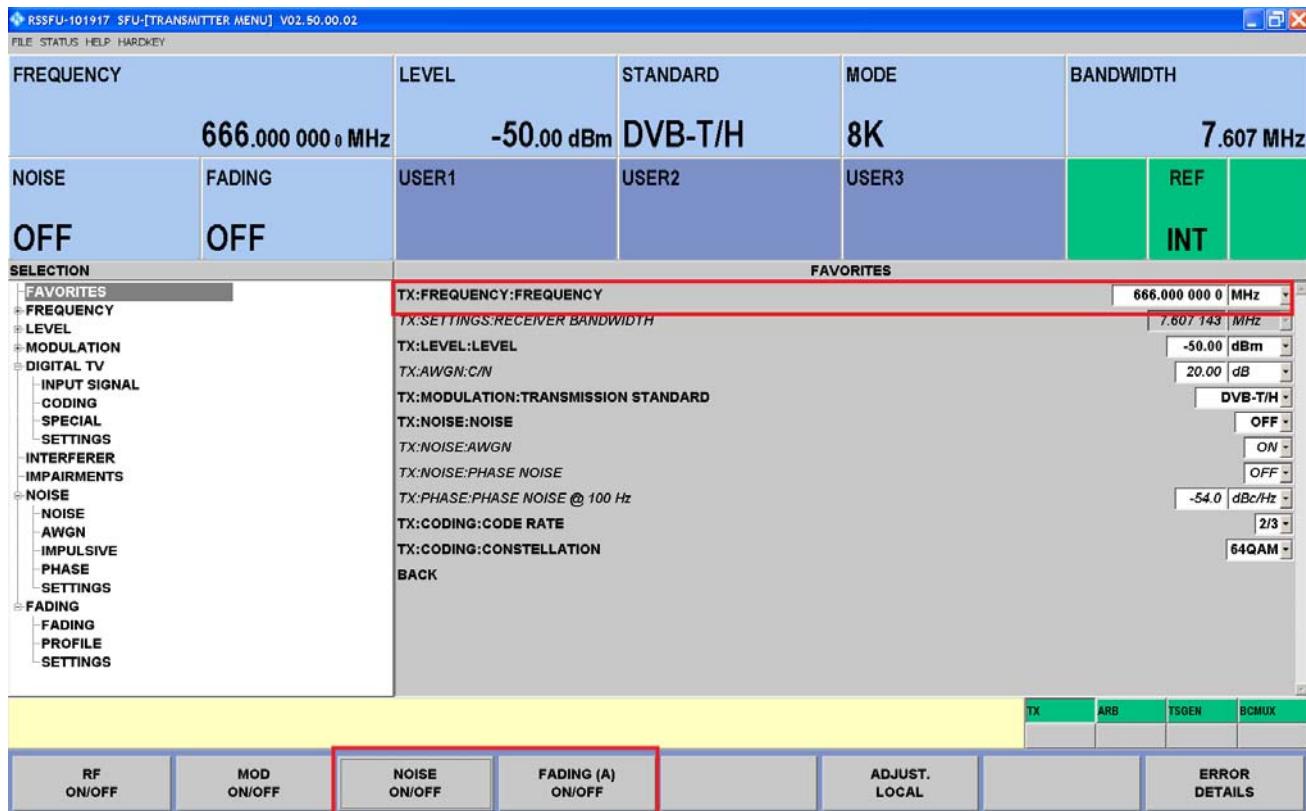
## 5.9.2 Test Instance

The signal parameters are as follows: FFT=8K, GI=1/4, Constellation=64QAM, CR=2/3, Freq=666 MHz, Bandwidth=8 MHz.

**Step 1** Set **NOISE** and **FADING** to **OFF** by clicking the **NOISE ON/OFF** and **FADING (A) ON/OFF** buttons at the bottom of the SFU, and set **FREQUENCY** to **666 MHz**. See [Figure 5-31](#).



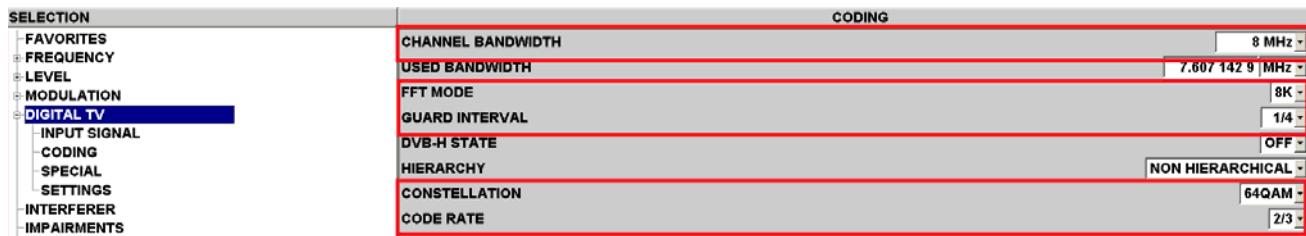
Figure 5-31 Setting the SFU test model



Step 2 Choose **DIGITAL TV > CODING**, as shown in Figure 5-32.

- Set **CHANNEL BANDWIDTH** to **8 MHz**.
- Set **FFT MODE** to **8K**.
- Set **GUARD INTERVAL** to **1/4**.
- Set **CONSTELLATION** to **64QAM**.
- Set **CODE RATE** to **2/3**.

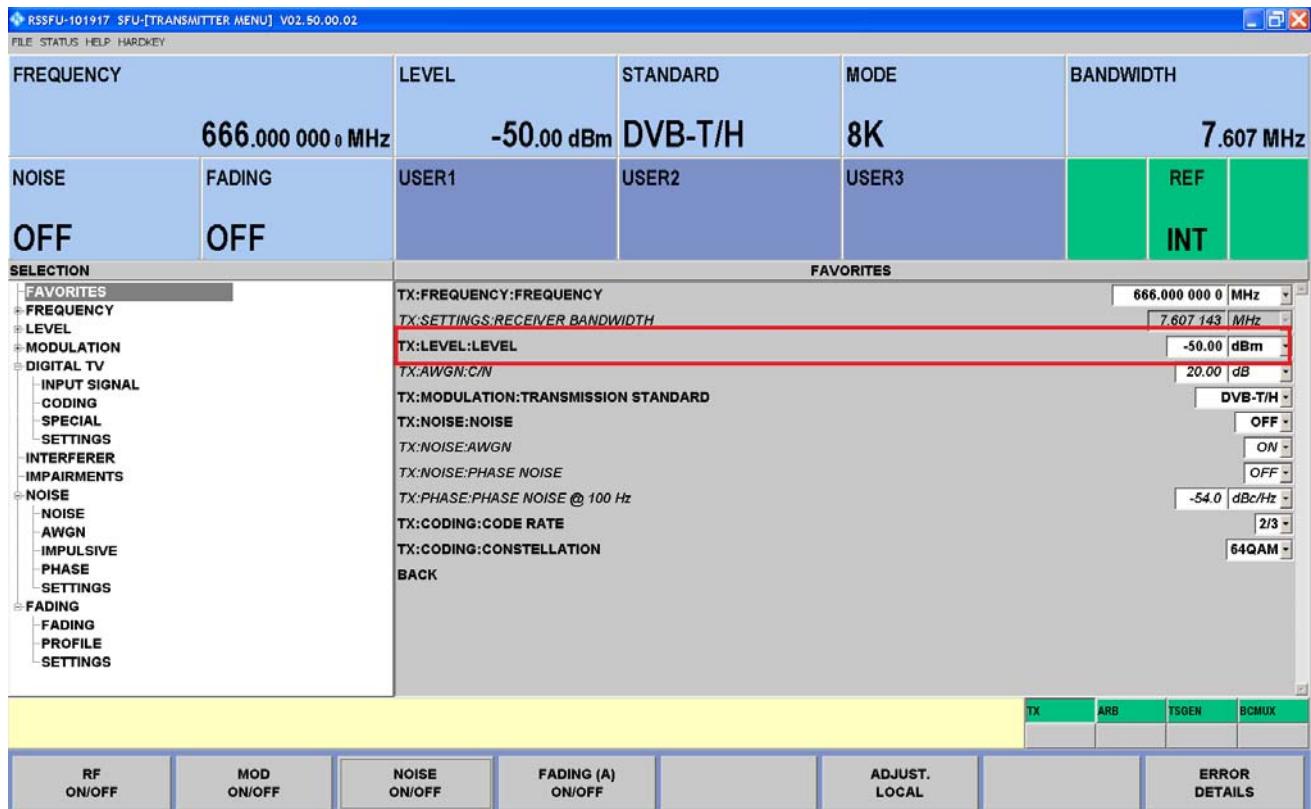
Figure 5-32 CODING settings



Step 3 Adjust the **LEVEL** value to complete the test. See Figure 5-33.



Figure 5-33 Adjusting the LEVEL value



----End