



Hi3137 V100 Sample Chip

# Test Report

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## About This Document

### Purpose

This document lists the performance test data for the Hi3137 V100 sample chip.

### Related Versions

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

Product Name	Version
Hi3137	V1XX




### Intended Audience

This document is intended for:



- Technical support engineers
- Hardware 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.
 <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.



Symbol	Description
 <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.



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# 1 Test Preparations

## 1.1 Connecting Devices



### NOTE

This section describes the common device connection modes, which can be quoted directly in the test report. If the actual connection is different, describe it accurately in the corresponding test table. The number of devices connected to the splitter in the following figure is variable. The merger can be the splitter used in the reverse direction.

Figure 1-1 shows the default SFU connection mode 1 (single SFU mode). This connection mode is used in most scenarios.

**Figure 1-1** Single SFU mode

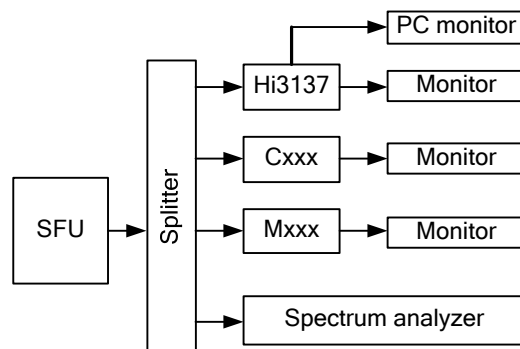
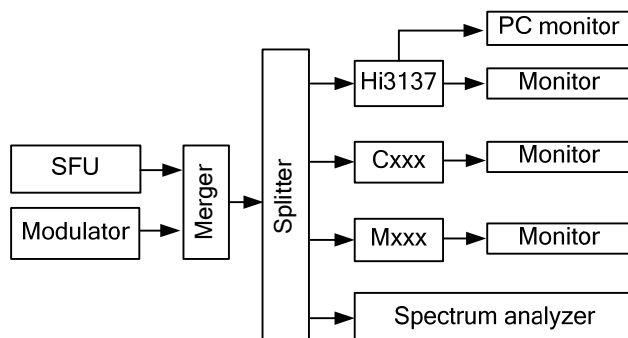


Figure 1-2 shows the default SFU connection mode 2 (SFU+external interfering source). The external interfering source can be E4438C or the modulator.





**Figure 1-2** SFU+external interfering source



## 1.2 Setting Device Parameters



### NOTE

This section describes the common device parameters, which can be quoted directly in the test report. If the actual parameters are different or not described in this section, describe them accurately in the corresponding test table.

Table 1-1 describes the device parameters.

**Table 1-1** Device parameters

Parameter	Value	Remarks
Signal strength	−50 dBm	Specifies the strength of signals transmitted through the splitter.
Radio frequency (RF)	UHF: 666 MHz VHF: 198.5 MHz	If the RF is 666 MHz, the signal bandwidth is 8 MHz; if the RF is 198.5 MHz, the signal bandwidth is 7 MHz.
Noise bandwidth coupling	ON	Indicates that the noise power statistic bandwidth is the same as the signal bandwidth.

## 1.3 Test Criteria

The common criteria are as follows:

- Threshold of visibility (TOV): It is frequently used for determining picture failures. At most one picture failure that can be observed is allowed within each of three consecutive 20-second periods.
- Quasi error free (QEF): The bit error rate (BER) after forward error correction (FEC) is about  $(1e-10)$  to  $(1e-11)$ . In DVB-T2, the packet error rate (PER) of TSs after FEC is  $(1.0e-7)$ ; in DVB-T, the BER before Reed-Solomon (RS) decoding is  $(2.0e-4)$ .
- Specified error rates (BER, byteER, and PER)



You can fill in the following information in the test criteria box: TOV, QEF, BER =  $x_e - y$ ;  
byteER =  $x_e - y$ ; PER =  $x_e - y$ .



## CAUTION

- As the BER cannot be provided in the solutions used for comparison, only the TOV can be used for comparison.
  - The TOV test takes a long time period. Therefore, during the later phase of the test, if the design is not changed significantly (for only confirmation), and the relationship between the TOV and BER is confirmed, the BER can be used to accelerate the test.
-



# 2 Performance Tests

## 2.1 D-Book Standard Test

The D-Book is the technical test specification published by the UK Digital TV Group (DTG). The test specifications of version 7.1 are used in this document.

### 2.1.1 Test Parameters

#### Signal Parameters

[Table 2-1](#) describes the signal parameters.

**Table 2-1** Signal parameters

Test Mode	T/T2	FFT	Guard Interval	Constellation	Bit Rate	Pilot Pattern	L1_MOD	Ldata	LDP C	Carrier Mode
Opt1	DVB-T	2K	1/32	64QAM	2/3	-	-	-	-	-
Opt2	DVB-T	2K	1/32	16QAM	3/4	-	-	-	-	-
Opt3	DVB-T	8K	1/32	64QAM	2/3	-	-	-	-	-
Opt4	DVB-T 2	8K	1/32	64QAM, rotation	4/5	PP7	64QAM	242	64K	Ext
Opt5	DVB-T 2	32K	1/128	256QAM, rotation	3/5	PP7	64QAM	59	64K	Ext
Opt6	DVB-T 2	32K	1/128	256QAM, rotation	2/3	PP7	64QAM	59	64K	Ext

#### Pulse Noise Models

The D-Book provides six different pulse noise models for simulating the possible pulse interference scenarios during DVB-T/DVB-T2 reception. For details, see [Table 2-2](#).



**Table 2-2** Pulse noise models

Model Number	Noise Cycle (ms)	MinSpace	MaxSpace	Pulse Number
1	10	N/A	N/A	1
2	10	1.5	45	2
3	10	15	35	4
4	10	10	15	12
5	10	1	2	20
6	10	0.5	1	40

## Fading Channel Models

Different fading channel models are used to simulate different reception scenarios.

**Table 2-3** Fading channel models

Short Echo Profiles			Medium Echo Profiles			Long Echo Profiles		
Dly (μs)	Att. (dB)	Phase	Dly (μs)	Att. (dB)	Phase	Dly (μs)	Att. (dB)	Phase
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

## Echo Outside Guard Interval Model

The parameters in [Table 2-4](#) are positions of multi-echo (which can be divided into pre-echo and post-echo) relative to the main path.

**Table 2-4** Echo outside guard interval model

Test Mode	Model A (μs)	Model B (μs)	Model C (μs)	Model D (μs)	Model E (μs)
Opt1/2	7	15	30	50	60
Opt3	28	60	120	200	260



Test Mode	Model A ( $\mu$ s)	Model B ( $\mu$ s)	Model C ( $\mu$ s)	Model D ( $\mu$ s)	Model E ( $\mu$ s)
Opt4	28	30	33	-	-
Opt5/6	28	60	119	135	-

## 0 dB Echo Model

**Table 2-5** 0 dB echo model

Delay ( $\mu$ s)	Att. (dB)	Phase
0	0	0
Dly (echo length, variable)	0	90°

## 0 dB Dynamic Echo Model

**Table 2-6** 0 dB dynamic echo model

Delay ( $\mu$ s)	Att. (dB)	Echo Type
0	0	Constant phase
20	0	Pure Doppler (20 Hz)

## Time Varing Echo in SFN

**Table 2-7** Time varing echo in SFN

Delay ( $\mu$ s)	Att. (dB)	Echo Type
0	0	Constant phase, phase = 0
Dly (echo length, variable)	0	Constant phase, phase = 0
Dly (echo length, variable)	1	Pure Doppler (0.1 Hz/1 Hz/5 Hz)



## 2.1.2 DVB-T C/N Threshold

**Table 2-8** DVB-T C/N threshold

<b>Purpose</b>	Test the DVB-T Gaussian carrier-to-noise ratio (C/N) threshold (dB) at different bit rates and constellations.							
<b>Test Personnel</b>	Zhao Xiaoxiang							
<b>Date</b>	2014-02-16							
<b>Test Criteria</b>	TOV							
<b>Data Precision</b>	0.1 dB							
<b>Device Connection</b>	Default single SFU mode, 8 MHz bandwidth							
<b>Test Conditions</b>	Prepare the test conditions based on the data record table.							
<b>Test Procedure</b>	Set parameters according to the table, perform comparative tests, and record the SFU C/N thresholds.							
<b>Data Record</b>	2K, 1/32	QPSK	1/2	1.9	2.6	2.7		5.5
			2/3	3.7	4.2	4.4		7.3
			3/4	4.6	5.1	5.4		8.3
		16QAM	1/2	7.2	7.7	8.0		11.
			2/3	9.6	10	10.3		13.
			3/4	10.8	11.2	11.4		14.
		64QAM	1/2	11.5	11.9	12.3		15.
			2/3	14.7	15.2	15.5		18.
			3/4	16.3	16.9	17.2		20.
	8K, 1/32	QPSK	1/2	1.9	2.5	2.6		5.5
			2/3	3.7	4.1	4.3		7.3
			3/4	4.7	5.1	5.3		8.3
		16QAM	1/2	7.2	7.7	8.0		11.
			2/3	9.5	9.9	10.2		13.
			3/4	10.7	11.1	11.5		14.
		64QAM	1/2	11.4	11.9	12.2		15.



			2/3	14.6	15.0	15.2		18.	
			3/4	16.2	16.6	16.8		20.	
Remarks	The smaller the values, the better.								
Conclusion	The DVB-T C/N threshold performance for the Hi3137 is better than that for the CX37 and MX472.								



## 2.1.3 DVB-T2 C/N Threshold

<b>Purpose</b>	Test the DVB-T2 Gaussian C/N threshold (dB) at different bit rates and constellations.						
<b>Test Personnel</b>	Zhao Xiaoxiang						
<b>Date</b>	2014-02-16						
<b>Test Criteria</b>	TOV						
<b>Data Precision</b>	0.1 dB						
<b>Device Connection</b>	Default single SFU mode						
<b>Test Conditions</b>	Prepare the test conditions based on the data record table.						
<b>Test Procedure</b>	Set parameters according to the table, perform comparative tests, and record the SFU C/N thresholds.						
<b>Data Record</b>	<b>FFT/GI</b>	<b>Constellation</b>	<b>Bit Rate</b>	<b>Hi3137</b>	<b>CX37</b>	<b>MX472</b>	<b>Limit</b>
	32K, GI=1/128, PP7, Ldata=59, 666 MHz, Ext, rotation, 64K LDPC 8 MHz	QPSK	1/2	1.35	1.4	1.55	3.2
			3/5	2.60	2.65	2.70	4.5
			2/3	3.50	3.55	3.70	5.3
			3/4	4.50	4.5	4.60	6.3
			4/5	5.10	5.10	5.20	6.9
			5/6	5.60	5.6	5.70	7.3
		16QAM	1/2	6.60	6.55	6.70	8.3
			3/5	8.05	8.05	8.15	10.0
			2/3	9.30	9.3	9.40	11.3
			3/4	10.35	10.4	10.55	12.4
			4/5	11.20	11.20	11.35	13.2
			5/6	11.75	11.75	11.90	13.9
		64QAM	1/2	11.00	11	11.10	12.4
			3/5	12.80	12.85	12.90	14.70
			2/3	14.10	14.1	14.20	16.1
			3/4	15.55	15.58	15.70	17.8
			4/5	16.65	16.65	16.80	18.9





			5/6	17.30	17.25	17.45	19.5
		256QAM	1/2	15.10	15.2	15.20	15.9
			3/5	17.40	17.60	17.50	18.9
			2/3	18.70	18.80	19.50	20.8
			3/4	20.70	20.80	21.10	23.0
			4/5	22.00	22	22.20	24.5
			5/6	22.80	22.90	23.10	25.4
	32K, GI=1/128, PP7, Ldata=59, 198.5 MHz Ext, rotation, 64K LDPC 7 MHz	QPSK	1/2	1.35	1.4	1.60	3.2
			3/5	2.60	2.65	2.75	4.5
			2/3	3.55	3.55	3.65	5.3
			3/4	4.45	4.5	4.60	6.3
			4/5	5.10	5.15	5.20	6.9
			5/6	5.60	5.6	5.65	7.3
		16QAM	1/2	6.50	6.60	6.70	8.3
			3/5	8.00	8.05	8.15	10.0
			2/3	9.30	9.3	9.40	11.3
			3/4	10.40	10.4	10.50	12.4
			4/5	11.20	11.2	11.30	13.2
			5/6	11.80	11.8	11.90	13.9
		64QAM	1/2	11.00	11	11.05	12.4
			3/5	12.80	12.85	12.90	14.70
			2/3	14.10	14.0	14.25	16.1
			3/4	15.60	15.6	15.75	17.8
			4/5	16.55	16.6	16.80	18.9
			5/6	17.25	17.25	17.45	19.5
		256QAM	1/2	15.10	15.2	15.20	15.9
			3/5	17.40	17.5	17.50	18.9
			2/3	18.70	18.75	18.95	20.8
			3/4	20.80	20.75	21.00	23.0
			4/5	22.00	22.0	22.30	24.5
			5/6	22.80	22.85	23.10	25.4



<b>Remarks</b>	The smaller the values, the better.
<b>Conclusion</b>	The DVB-T2 C/N threshold performance for the Hi3137 is better than that for the MX472 and slightly better than that for the CX37.



## 2.1.4 DVB-T Minimum RX Level

**Table 2-9** DVB-T minimum RX level

Purpose	Test the DVB-T minimum RX level (dBm) at different bit rates and constellations.							
Test Personnel	Zhao Xiaoxiang							
Date	2014-02-16							
Test Criteria	TOV							
Data Precision	0.1 dB							
Device Connection	Default single SFU mode, 8 MHz bandwidth, and 666 MHz RF							
Test Conditions	Prepare the test conditions based on the data record table.							
Test Procedure	Set parameters according to the table, perform comparative tests, and record the SFU output level at the threshold.							
Data Record	FFT/GI	Constellation	Bit Rate	Hi3137	CX37	MX472	Limit	
	2K, 1/32	QPSK	1/2	-97	-95	-95.7	-91.7	
			2/3	-95.2	-94	-94	-89.9	
			3/4	-94.2	-93	-93.2	-88.9	
		16QAM	1/2	-91.8	-90	-89.5	-85.9	
			2/3	-89.3	-87.7	-87.6	-83.8	
			3/4	-88.1	-86.8	-86.4	-82.5	
		64QAM	1/2	-87.3	-86	-85.4	-81.3	
			2/3	-84.3	-82.5	-83	-78.3	
			3/4	-82.7	-81.3	-81	-76.8	
Remarks	The smaller the values, the better.							
Conclusion	The DVB-T minimum RX level performance for the Hi3137 is better than that for the CX37 and MX472. The result varies according to the solution and tuner.							



## 2.1.5 DVB-T2 Minimum RX Level

**Table 2-10** DVB-T2 minimum RX level

<b>Purpose</b>	Test the DVB-T2 minimum RX level (dBm) at different bit rates and constellations.							
<b>Test Personnel</b>	Zhao Xiaoxiang							
<b>Date</b>	2014-02-16							
<b>Test Criteria</b>	TOV							
<b>Data Precision</b>	0.1 dB							
<b>Device Connection</b>	Default single SFU mode							
<b>Test Conditions</b>	Prepare the test conditions based on the data record table.							
<b>Test Procedure</b>	Set parameters according to the table, perform comparative tests, and record the SFU output level at the threshold.							
<b>Data Record</b>	<b>FFT/GI</b>	<b>Constellation</b>	<b>Bit Rate</b>	<b>Hi3137</b>	<b>CX37</b>	<b>MX472</b>	<b>Limit</b>	
	32K, GI=1/128, PP7, Ldata=59, 666 MHz, Ext, rotation, 64K LDPC 8 MHz	QPSK	1/2	-97.60	-96.80	-96.10	-93.9	
			3/5	-96.40	-95.70	-95.00	-92.6	
			2/3	-95.50	-94.80	-94.10	-91.8	
			3/4	-94.50	-93.90	-93.20	-90.8	
			4/5	-93.90	-93.30	-92.60	-90.2	
			5/6	-93.40	-92.80	-92.10	-89.8	
		16QAM	1/2	-92.50	-91.80	-91.10	-88.8	
			3/5	-91.00	-90.30	-89.60	-87.1	
			2/3	-89.50	-89.10	-88.40	-85.7	
			3/4	-88.60	-88.00	-87.30	-84.6	
			4/5	-87.80	-87.10	-86.40	-83.8	
			5/6	-87.20	-86.50	-85.80	-83.2	
		64QAM	1/2	-88.00	-87.30	-86.60	-84.6	
			3/5	-86.30	-85.40	-84.70	-82.4	
			2/3	-85.00	-84.30	-83.60	-81.0	
			3/4	-83.40	-82.80	-82.10	-79.2	



			4/5	-82.40	-81.70	-81.00	-78.2		
			5/6	-81.70	-81.00	-80.30	-77.6		
		256QAM	1/2	-83.90	-83.00	-82.30	-81.2		
			3/5	-81.50	-80.90	-80.20	-78.2		
			2/3	-80.30	-79.60	-78.90	-76.3		
			3/4	-78.40	-77.70	-77.00	-74		
			4/5	-77.10	-76.30	-75.60	-72.6		
			5/6	-76.20	-75.50	-74.80	-71.7		
		Remarks	The smaller the values, the better.						
Conclusion	The DVB-T2 minimum RX level performance for the Hi3137 is better than that for the CX37 and MX472.								



## 2.1.6 DVB-T/DVB-T2 Analog Co-Channel and Adjacent Channel Performance

**Table 2-11** DVB-T/DVB-T2 analog co-channel and adjacent channel performance

<b>Purpose</b>	Test the carrier-to-interference rate (C/I) performance (dB) of the DVB-T/DVB-T2 analog co-channel, analog adjacent channel, and digital adjacent channel.				
<b>Test Personnel</b>	Zhao Xiaoxiang				
<b>Date</b>	2014-02-16				
<b>Test Criteria</b>	TOV				
<b>Data Precision</b>	0.1 dB				
<b>Device Connection</b>	Default single SFU mode, 8 MHz bandwidth				
<b>Test Conditions</b>	Prepare the test conditions based on the data record table.				
<b>Test Procedure</b>	<ol style="list-style-type: none"> <li>1. Select the PAL-I1 standard for the analog co-channel or adjacent channel in the SFU, and select DVB-T/DVB-T2 signals for the digital adjacent channel.</li> <li>2. Fix the interference amplitude at -25 dbm when testing the adjacent channel performance, and fix the amplitude at -50 dbm when testing the co-channel performance.</li> <li>3. Set parameters according to the table, perform the comparative tests, record the SFU or interfering signal level at the threshold (the frequency can be relocked after being unlocked), and calculate the current C/I value.</li> <li>4. Perform the digital adjacent channel test. Simulate the DVB-T adjacent channel interfering signal by using the Dektec modulator, mix the interfering signals simulated by the modulator with the DVB-T/DVB-T2 signals output by the SFU by using the merger, and record the difference between the useful signals output by the SFU and the interfering signals output by the modulator at the threshold. The recorded value is the C/I value.</li> </ol>				
<b>Data Record</b>	<b>Parameter</b>	<b>Analog Co-Channel (N)</b>			
		<b>Hi3137</b>	<b>CX37</b>	<b>MX472</b>	<b>Limit</b>
	Opt1	-4	-2	-2	2.0
	Opt2	-6	-5	-4	-2.0
	Opt3	-6	-5	-5	2
	Opt4	-3.5	-4	1	6.4
	Opt5	-7	-3	1	6.3
	Opt6	-7	-3	1	8.2
	<b>Parameter</b>	<b>Analog Adjacent Channel (N+1)</b>			
		<b>Hi3137</b>	<b>CX37</b>	<b>MX472</b>	<b>Limit</b>



	Opt1	-49	-49	-50	-37	
	Opt2	-54	-53	-53	-39	
	Opt3	-49	-50	-49	-37	
	Opt4	-47	-48	-47	-35	
	Opt5	-47	-48	-47	-34	
	Opt6	-46	-46	-46	-32	
	Parameter	Analog Adjacent Channel (N-1)				
		Hi3137	CX37	MX472	Limit	
	Opt1	-50	-51	-46	-37	
	Opt2	-54	-54	-48	-39	
	Opt3	-50	-52	-48	-37	
	Opt4	-49	-50	-48	-35	
	Opt5	-48	-49	-44	-34	
	Opt6	-47	-48	-44	-32	
	Parameter	Digital Adjacent Channel (N+1)				
		Hi3137	CX37	MX472	Limit	
	Opt1	-47	-46	-45	-29	
	Opt2	-51	-50	-51	-31	
	Opt3	-49	-48	-48	-29	
	Opt4	-44	-44	-43	-27	
	Opt5	-43	-43	-42	-26	
	Opt6	-41	-42	-41	-24	
	Parameter	Digital Adjacent Channel (N-1)				
		Hi3137	CX37	MX472	Limit	
	Opt1	-47	-44	-45	-29	
	Opt2	-52	-49	-52	-31	
	Opt3	-49	-46	-48	-29	
	Opt4	-44	-44	-43	-27	
	Opt5	-43	-43	-42	-26	
	Opt6	-41	-42	-41	-24	



<b>Remarks</b>	The smaller the values, the better. The performance of the adjacent channel is determined by the RF chip.
<b>Conclusion</b>	The analog co-channel performance of the Hi3137 is optimal, and the adjacent performances of all tested solutions are of the same level.





## 2.1.7 Multi-Path Performance

**Table 2-12** Multi-path performance

<b>Purpose</b>	Test the DVB-T/DVB-T2 multi-path C/N performance (dB).				
<b>Test Personnel</b>	Zhao Xiaoxiang				
<b>Date</b>	2014-02-16				
<b>Test Criteria</b>	TOV				
<b>Data Precision</b>	0.1 dB				
<b>Device Connection</b>	Default single SFU mode, 8 MHz bandwidth				
<b>Test Conditions</b>	Prepare the test conditions based on the data record table.				
<b>Test Procedure</b>	Set parameters according to the table, select the corresponding channel model, perform the comparative tests, and record the SFU C/N value at the threshold.				
<b>Data Record</b>	<b>Parameter</b>	<b>0 dB, 0.5 GI Echo</b>			
		<b>Hi3137</b>	<b>CX37</b>	<b>MX472</b>	<b>Limit</b>
	Opt1	17.4	18.2	19.3	23
	Opt2	14.7	15.2	17.2	22
	Opt3	17.4	18.1	18.9	22.8
	Opt4	20.95	20.9	21.5	23.5
	Opt5	20.1	20.2	20.5	22.1
	Opt6	21.9	21.9	22.4	24.1
	<b>Parameter</b>	<b>0 dB, 0.95 GI Echo</b>			
		<b>Hi3137</b>	<b>CX37</b>	<b>MX472</b>	<b>Limit</b>
	Opt3	17.4	18.2	18.9	22.8
	Opt4	21.0	21.0	21.8	23.5
	Opt5	20.1	20.2	20.4	22.1
	Opt6	21.9	21.9	22.4	24.1
	<b>Parameter</b>	<b>0 dB, 20 <math>\mu</math>s, the value of C/N for reference BER increases with the frequency difference</b>			
		<b>Hi3137</b>	<b>CX37</b>	<b>MX472</b>	<b>Limit</b>
	Opt3 (20 Hz)	0.2	0.4	0.5	3



	Opt4 (20 Hz)	0.3	1.2	0.3	3	
	Opt5 (10 Hz)	0.7	1.1	0.5	3	
	Opt6 (10 Hz)	1.2	1.2	0.8	3	
	Parameter	Short Delay Echo				
		Hi3137	CX37	MX472	Limit	
	Opt1	16.1	16.7	17.6	22.2	
	Opt2	13	13.5	14.2	19.5	
	Opt3	16	16.5	17.2	22.2	
	Opt4	18.8	18.8	19.3	23.1	
	Opt5	18.6	18.7	18.9	21.6	
	Opt6	20.4	20.3	20.8	23.6	
	Parameter	Medium Delay Echo				
		Hi3137	CX37	MX472	Limit	
	Opt4	18.2	18.0	18.5	21.3	
	Parameter	Long Delay Echo				
		Hi3137	CX37	MX472	Limit	
	Opt1	16.7	17.2	19.5	22.2	
	Opt2	12.3	12.9	13.7	18.0	
	Opt3	15.4	16.1	16.4	21.0	
	Opt5	18.1	18.1	18.4	19.7	
	Opt6	19.7	19.5	20.0	21.8	
Remarks	The smaller the values, the better.					
Conclusion	The DVB-T multi-path performance for the Hi3137 is better than that for the CX37 and MX472, and the DVB-T2 multi-path performance for the Hi3137 is better than that for the MX472 and is comparable to that for the CX37.					



## 2.1.8 Echo Outside Guard Interval

**Table 2-13** Echo outside guard interval

Purpose	Test the DVB-T/DVB-T2 echo outside guard interval performance.					
Test Personnel	Zhao Xiaoxiang					
Date	2014-02-16					
Test Criteria	TOV					
Data Precision	0.1 dB					
Device Connection	Default single SFU mode, 8 MHz bandwidth					
Test Conditions	Prepare the test conditions based on the data record table.					
Test Procedure	Set parameters according to the table, select the corresponding channel model, perform the comparative tests, and record the fading values of the pre echo and post echo at the threshold.					
Data Record	Parameter	Model A (Pre Echo)				
		Hi3137	CX37	MX472	Limit	
	Opt1	0	0	0	3.0	
	Opt2	0	0	0	3.0	
	Opt3	0	0	0	3.0	
	Opt4	0	0	0	2.0	
	Opt5	0	0	0	2.0	
	Opt6	0	0	0	2.0	
	Parameter	Model A (Post Echo)				
		Hi3137	CX37	MX472	Limit	
	Opt1	0	0	0	3.0	
	Opt2	0	0	0	3.0	
	Opt3	0	0	0	3.0	
	Opt4	0	0	0	2.0	
	Opt5	0	0	0	2.0	
	Opt6	0	0	0	2.0	
	Parameter	Model B (Pre Echo)				
		Hi3137	CX37	MX472	Limit	



	Opt1	0.3	2.1	2.4	9.0	
	Opt2	0.3	1.6	1.6	9.0	
	Opt3	0	1.5	1.9	9.0	
	Opt4	0	0	0	2.0	
	Opt5	0	0	0	3.5	
	Opt6	0	0	1.5	5.5	
	Parameter	Model B (Post Echo)				
		Hi3137	CX37	MX472	Limit	
	Opt1	0.3	1.4	2.8	9.0	
	Opt2	0.3	0	1.4	9.0	
	Opt3	0	0	1.8	9.0	
	Opt4	0	0	0	2.0	
	Opt5	0	0	0	3.5	
	Opt6	0	0	1.5	5.5	
	Parameter	Model C (Pre Echo)				
		Hi3137	CX37	MX472	Limit	
	Opt1	1.8	4.6	2.8	12.7	
	Opt2	0.3	2.5	1.9	12.7	
	Opt3	1.5	3.9	2.3	12.7	
	Opt4	0.5	0	3.5	22.5	
	Opt5	0	0	0.9	8.0	
	Opt6	0	0	1.5	10	
	Parameter	Model C (Post Echo)				
		Hi3137	CX37	MX472	Limit	
	Opt1	1.8	1.4	4	12.7	
	Opt2	0.3	1.7	4.6	12.7	
	Opt3	1.5	0	2.2	12.7	
	Opt4	0.5	0	3.5	22.5	
	Opt5	0	0	0.8	8	
	Opt6	0	0	1.5	10	
	Parameter	Model D (Pre Echo)				



		Hi3137	CX37	MX472	Limit
	Opt1	4.1	6	4.3	15.0
	Opt2	2.2	3.8	3	15.0
	Opt3	4.1	5.5	3.5	15.0
	Opt5	0	0	1.5	23
	Opt6	1.5	0	2.5	25
	Parameter	Model D (Post Echo)			
		Hi3137	CX37	MX472	Limit
	Opt1	4.1	1.8	5.8	15.0
	Opt2	2.2	1.7	5.3	15.0
	Opt3	4.1	0.4	3	15.0
	Opt5	0	0	1.5	23
	Opt6	1.5	0	2.5	25
	Parameter	Model E (Pre Echo)			
		Hi3137	CX37	MX472	Limit
	Opt1	5.6	6.4	4.5	19.3
	Opt2	3.1	4.3	3.6	19.3
	Opt3	7.8	6.2	4.7	19.3
	Parameter	Model E (Post Echo)			
		Hi3137	CX37	MX472	Limit
	Opt1	5.4	1.3	6	19.3
	Opt2	3.1	0.9	5.4	19.3
	Opt3	7.9	0.5	3.4	19.3
Remarks	The smaller the values, the better.				
Conclusion	The echo outside guard interval performance for the Hi3137 is comparable to that for the CX37 and better than that for the MX472.				



## 2.1.9 Pulse Noise

**Table 2-14** Pulse noise

Purpose	Test the DVB-T/DVB-T2 pulse noise performance C/I threshold (dB) in different modes.					
Test Personnel	Zhao Xiaoxiang					
Date	2014-02-16					
Test Criteria	TOV					
Data Precision	0.1 dB					
Device Connection	Default single SFU, 8 MHz bandwidth, and −60 dBm signal output level					
Test Conditions	Prepare the test conditions based on the data record table.					
Test Procedure	Set parameters according to the table, set different pulse noise models, perform comparative tests, and record the SFU C/I values at the threshold.					
Data Record	Parameter	Pulse Noise Model 1				
		Hi3137	CX37	MX472	Limit	
	Opt1	−35	−35	−23	−10.1	
	Opt2	−35	−35	−35	−15.7	
	Opt3	−35	−35	−35	−30	
	Opt4	−35	−35	−35	−30	
	Opt5	−35	−35	−35	−30	
	Opt6	−35	−35	−35	−30	
	Parameter	Pulse Noise Model 2				
		Hi3137	CX37	MX472	Limit	
	Opt1	−19	−15	−14	−7.1	
	Opt2	−35	−35	−35	−12.7	
	Opt3	−35	−35	−35	−26.4	
	Opt4	−35	−35	−35	−30	
	Opt5	−35	−35	−35	−30	
	Opt6	−35	−35	−32	−30	
	Parameter	Pulse Noise Model 3				
		Hi3137	CX37	MX472	Limit	



	Opt1	-11	-7	-8	-4.1	
	Opt2	-23	-25	-18	-9.7	
	Opt3	-31	-31	-23	-11.4	
	Opt4	-35	-35	-35	-30	
	Opt5	-35	-35	-35	-30	
	Opt6	-35	-35	-35	-30	
	Parameter	Pulse Noise Model 4				
		Hi3137	CX37	MX472	Limit	
	Opt1	-4	-3	-3	-0.8	
	Opt2	-10	-9	-8	-4.9	
	Opt3	-13	-11	-10	-6.7	
	Opt4	-35	-35	-35	-30	
	Opt5	-35	-35	-35	-30	
	Opt6	-33	-35	-33	-30	
	Parameter	Pulse Noise Model 5				
		Hi3137	CX37	MX472	Limit	
	Opt1	-2	-1	-1	1.4	
	Opt2	-7	-5	-5	-2.7	
	Opt3	-7	-8	-7	-4.4	
	Opt4	-35	-35	-35	-18	
	Opt5	-35	-35	-35	-18	
	Opt6	-34	-32	-32	-16	
	Parameter	Pulse Noise Model 6				
		Hi3137	CX37	MX472	Limit	
	Opt1	1	2	2	4.4	
	Opt2	-2	-3	-2	0.3	
	Opt3	-5	-4	-3	-1.4	
	Opt4	-35	-28	-35	-8	
	Opt5	-29	-29	-32	-8	
	Opt6	-29	-20	-24	-6	



<b>Remarks</b>	The smaller the values, the better.
<b>Conclusion</b>	The anti-pulse-interference performance for the Hi3137 is optimal.





## 2.2 Minimum RX Level

**Table 2-15** Minimum RX level

<b>Purpose</b>	Test the DVB-T/DVB-T2 minimum RX level (dBm) at different RF frequencies.			
<b>Test Personnel</b>	Zhao Xiaoxiang			
<b>Date</b>	2014/2/22			
<b>Test Criteria</b>	TOV			
<b>Data Precision</b>	0.15 dBuV			
<b>Device Connection</b>	Default single SFU mode			
<b>Test Conditions</b>	Prepare the test conditions based on the data record table.			
<b>Test Procedure</b>	Set parameters according to the table, and record the SFU output level at the threshold.			
<b>Data Record</b>	<b>DVB-T2</b>		<b>DVB-T</b>	
	<b>Frequency (MHz)</b>	<b>32K, 256QAM, PP6, 5/6,1/32 GI, 8 MHz</b>	<b>Frequency (MHz)</b>	<b>8K, 64QAM, 7/8, 1/4 GI, 8 MHz</b>
	474	-75.5	474	-80.5
	498	-76.5	498	-81.5
	522	-76	522	-80.5
	546	-76.5	546	-81.5
	570	-76	570	-80
	594	-76	594	-81
	618	-76.5	618	-81
	642	-76.5	642	-81
	666	-76.5	666	-81
	690	-76.5	690	-80.5
	714	-76.5	714	-81
	738	-76	738	-81
	762	-76.5	762	-81
	794	-75.5	794	-79.5
	818	-76	818	-80



	842	-74.5	842	-79	
	858	-76	858	-80.5	
	<b>Frequency (MHz)</b>	<b>32K, 256QAM, PP6, 5/6, 1/32 GI, 7 MHz</b>	<b>Frequency (MHz)</b>	<b>8K, 64QAM, 7/8, 1/4 GI, 7 MHz</b>	
	177.5	-74	177.5	-81	
	191.5	-74	191.5	-79.5	
	205.5	-74	205.5	-79	
	219.5	-77	219.5	-82	
	226.5	-77	226.5	-82	
<b>Exceptions</b>	None				
<b>Remarks</b>	The minimum RX level is related to the RF and solutions.				
<b>Conclusion</b>	The minimum RX level of the Hi3137 meets requirements.				



## 2.3 Maximum RX Level

Purpose	Test the DVB-T/DVB-T2 minimum RX level (dBm) at different bit rates and constellations.								
Test Personnel	Zhao Xiaoxiang								
Date	2014/2/22								
Test Criteria	TOV								
Data Precision	0.1 dB								
Device Connection	Default single SFU mode, 8 MHz bandwidth, and 666 MHz RF								
Test Conditions	Prepare the test conditions based on the data record table.								
Test Procedure	Set parameters according to the table, perform comparative tests, and record the SFU output level at the threshold.								
Data Record	FFT/Bit Rate	Constellation	GI	Hi3137	CX37	MX472	Limit		
	DVBT 8K 7/8	64QAM	1/32	0	0	0	-25		
			1/16	0	0	0	-25		
			1/4	0	0	0	-25		
	DVB-T2 32K 5/6	256QAM	1/128	0	0	0	-25		
			1/32	0	0	0	-25		
			1/8	0	0	0	-25		
	Remarks	The greater the values, the better.							
	Conclusion	The value greater than 0 dBm is meaningless.							



## 2.4 Carrier Acquisition Range

**Table 2-16** Carrier acquisition range

Purpose	Test the DVB-T/DVB-T2 carrier acquisition range.						
Test Personnel	Zhao Xiaoxiang						
Date	2014/2/22						
Test Criteria	TOV						
Data Precision							
Device Connection	Default single SFU mode, 8 MHz bandwidth, and 666 MHz RF						
Test Conditions	Prepare the test conditions based on the data record table.						
Test Procedure	Set parameters according to the table, and perform comparative tests.						
Data Record	FFT/Bit Rate	Constellation	Hi3137 (kHz)	CX37 (kHz)	MX472 (kHz)	Limit (kHz)	
	DVB-T, 8K 7/8	64QAM	900	900	700	+150	
			-800	-750	-700	-150	
	DVB-T2, 32K 5/6	256QAM	1000	1000	1000	+150	
			-1000	-1000	1000	-150	
Remarks	The wider the value range, the better.						
Conclusion	The carrier acquisition range of the Hi3137 is greater than ±800 kHz, which is comparable to that of the CX37 and better than that of the MX472.						