



Espressif IOT ESP

Bluetooth Auto Test Report

Version 1.0



A2 Report Revision History:

Table 1

Revision	Date	Changes	Author



Module&Test Information

Table 2

Module Name:	ESP32_TestBoard
PCB Version:	V2
Sample number:	#1
Test Engineer:	hujinping
Test Date:	10/26/18 10:03:39
Test Place:	Second floor laboratory
Test Equipment:	WT200
Test Bin	V146
Cable loss/dB:	12.8
Backoff(4=1dB):	IC(1.5pf_2.4nH_1.0pf)/29-j12
Pi match/s11 smith:	2.0
Note:	



1. Test Item Summary

1.1. Static Performance

1.1.1. Basic rate TX

Table 3

No.	Test Items	Pass/Fail
1	Basic rate TX	Pass
2	2M EDR TX	Pass
3	3M EDR TX	Pass
4	BLE TX	Pass

1.1.2. Receiver sensitivity

Table 4

No.	Test Items	Pass/Fail
1	BR sensitivity	Pass
2	2M EDR sensitivity	Pass
3	3M EDR sensitivity	Pass
3	BLE sensitivity	Pass



2. Test Result

2.1. Test setup

a. Maximum Transmit Power Profile vs. Operation Channel

Test Setup:

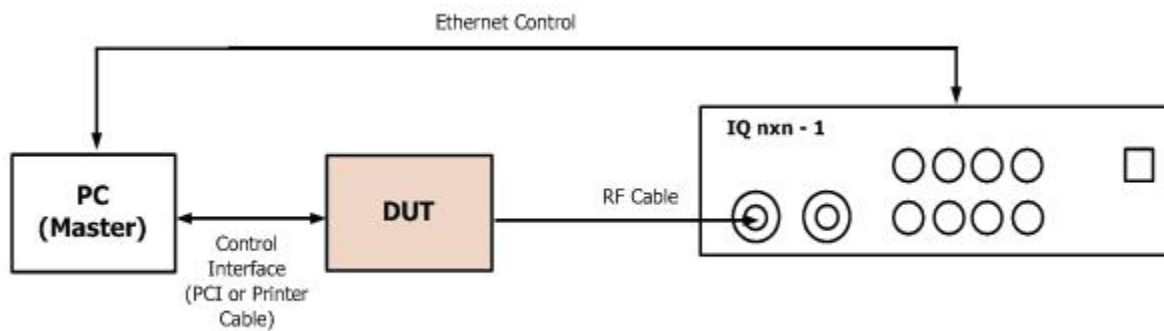


Figure 1: WiFi TX Performance Environment Setup

Note :

- 1、 Config the instrument setup as above.
- 2、 Select Tx Rate/Channel/BW as tables specified below.
- 3、 Run the Test script and record test results.



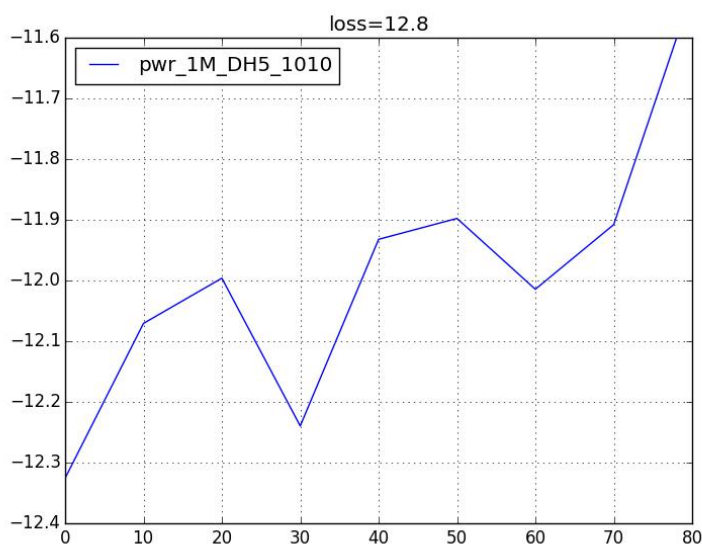
2.2. Basic rate TX

Requirement

Table 5

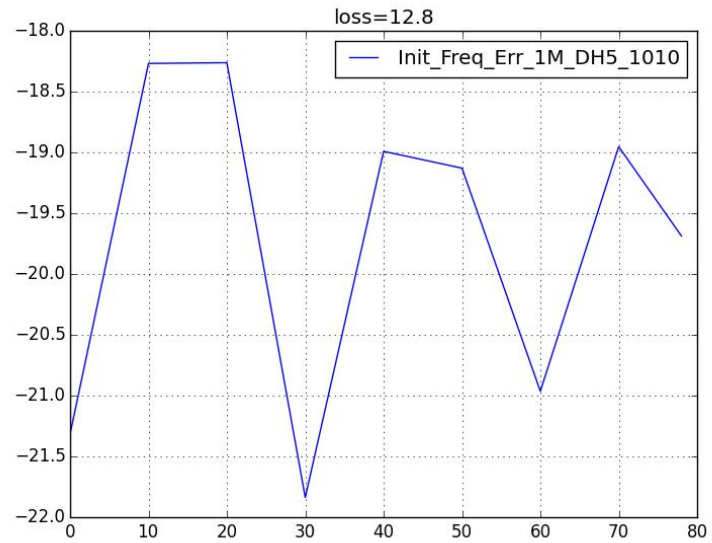
Specification	Requirement
Frequency range(MHz)	(2400,2483.5)
Output Power(dBm)	(-3, +3) @power_level=4;
Init Freq Error(kHz)	(-75kHz,+75kHz)
Bandwidth20dB(kHz)	≤ 1000kHz
deltaF2Max(kHz)	(115kHz ,500kHz)(at least 99%)
deltaF2Avg(kHz)	(112kHz, 500kHz)
deltaF1Avg(kHz)	(140kHz, 175kHz)

Table 6

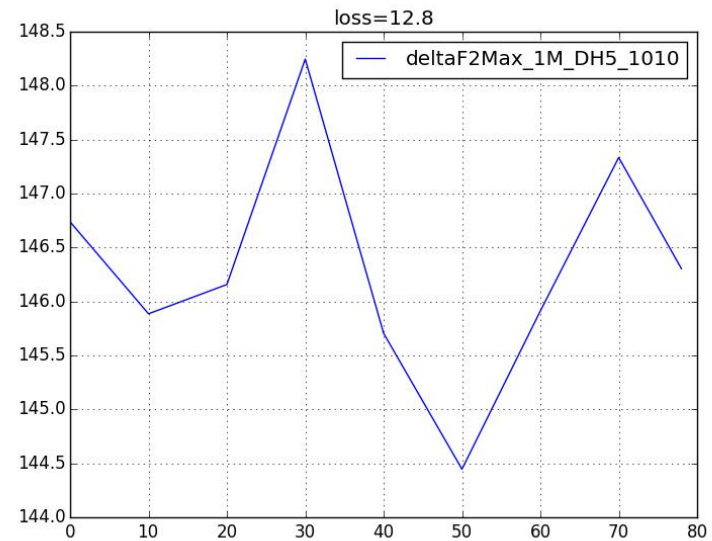
Data rate	1M_DH5_1010								
Channel	0	10	20	30	40	50	60	70	78
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.33	-12.07	-12.00	-12.24	-11.93	-11.90	-12.01	-11.91	-11.60
Init Freq Error(KHz)	-21.31	-18.27	-18.26	-21.84	-18.99	-19.13	-20.96	-18.95	-19.69
deltaF2Max(kHz)	146.74	145.89	146.16	148.25	145.71	144.45	145.91	147.33	146.30
deltaF2Avg(kHz)	140.33	139.26	139.95	141.45	139.21	138.05	139.47	140.86	140.22
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Power by channel									



Init Freq Error by channel



deltaF2Max by channel



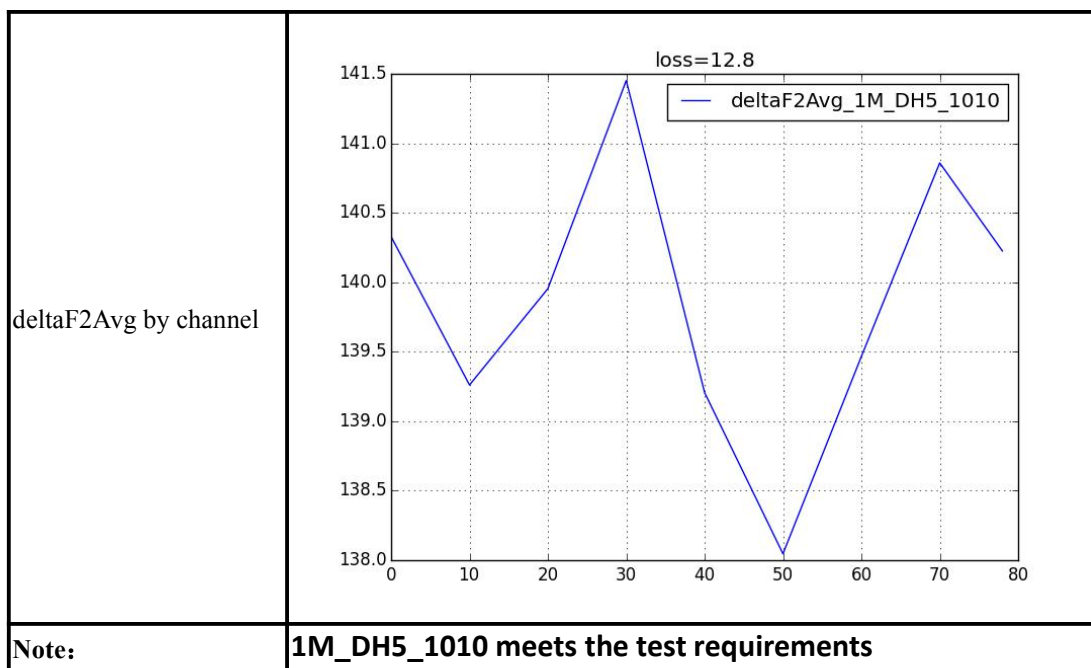
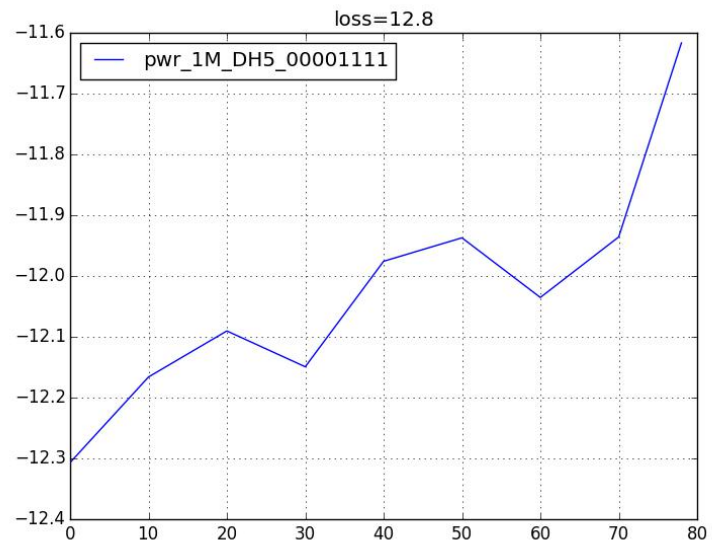


Table 7

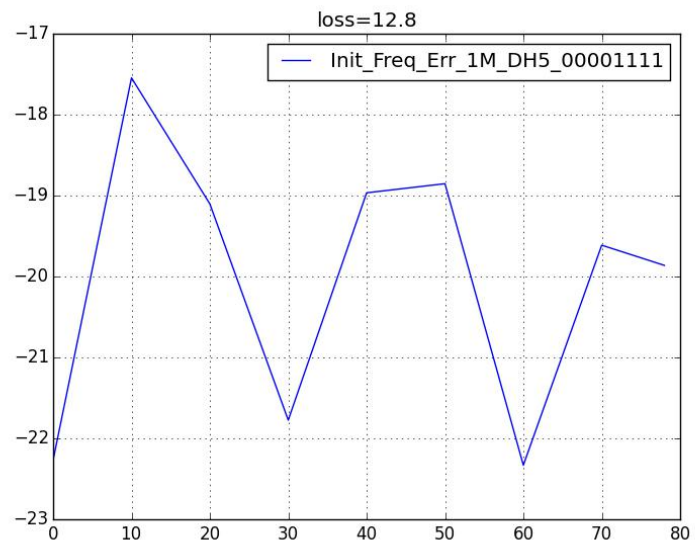
Data rate	1M_DH5_00001111								
Channel	0	10	20	30	40	50	60	70	78
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.31	-12.17	-12.09	-12.15	-11.98	-11.94	-12.04	-11.94	-11.62
Init Freq Error(KHz)	-22.27	-17.55	-19.10	-21.78	-18.97	-18.85	-22.33	-19.61	-19.86
deltaF1Avg(kHz)	154.92	157.05	157.18	155.28	156.07	153.38	155.27	158.37	156.51
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass



Power by channel



Init Freq Error by channel



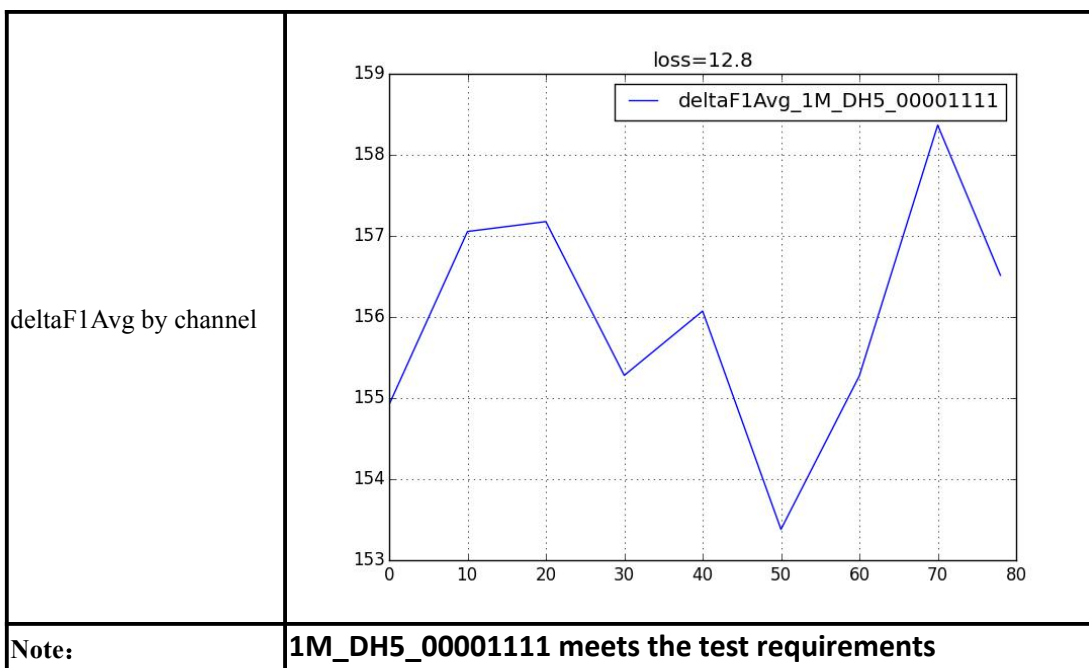


Table 8

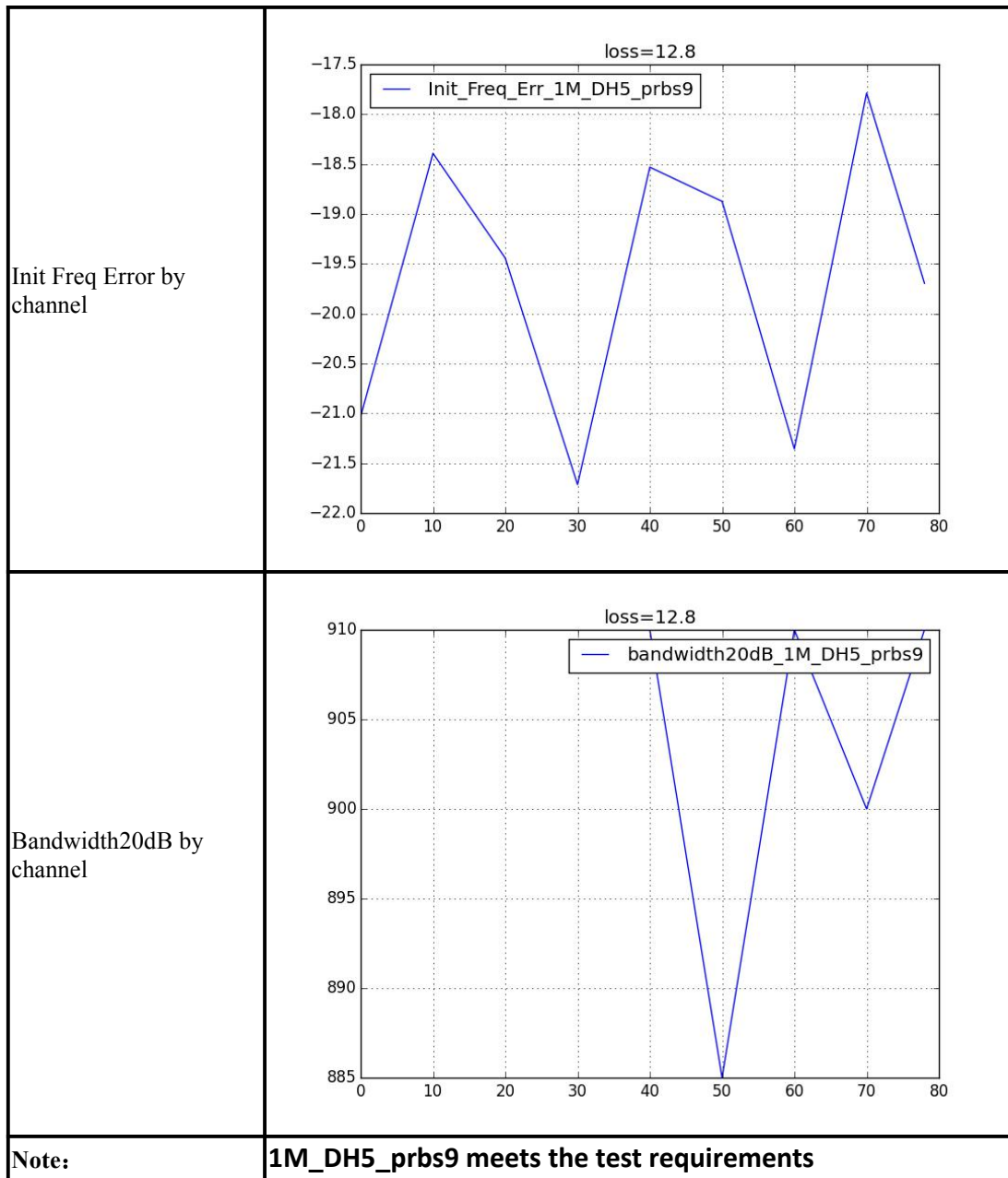
Data rate	1M_DH5_prbs9									
Channel	0	10	20	30	40	50	60	70	78	
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480	
Output Power(dBm)	-12.34	-12.13	-12.04	-12.16	-11.96	-12.00	-12.06	-11.86	-11.58	
Init Freq Error(KHz)	-21.03	-18.39	-19.44	-21.71	-18.53	-18.87	-21.36	-17.79	-19.70	
Bandwidth20dB(kHz)	910.00	910.00	910.00	910.00	910.00	885.00	910.00	900.00	910.00	
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass	

Power by channel

loss=12.8

pwr_1M_DH5_prbs9

Channel	Power (dBm)
0	-12.34
10	-12.13
20	-12.04
30	-12.16
40	-11.96
50	-12.00
60	-12.06
70	-11.86
78	-11.58



2.3 Enhanced data rate 2M TX

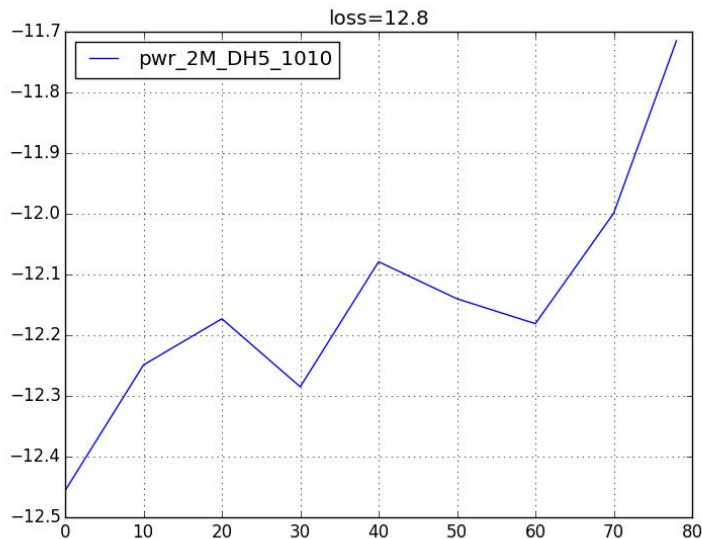
Table 9

Specification	Requirement
Output Power(dBm)	(-3, +3) @power_level=4;
Init Freq Error(kHz)	(-75,+75)
OMEGA_I(kHz)	(-75kHz, +75kHz), for all packets



OMEGA_O(kHz)	(-10kHz, 10kHz), for all block
OMEGA_IO(kHz)	(-75kHz, +75kHz), for all block
DEVM Average(%)	(0, 20) @ 2M
DEVM Peak(%)	(0, 35) @ 2M
EdrprobEVM99pass(%)	(0, 30) @ 2M
EdrPowDiffdB(dB)	(-4dBm, 1dBm)

Table 10

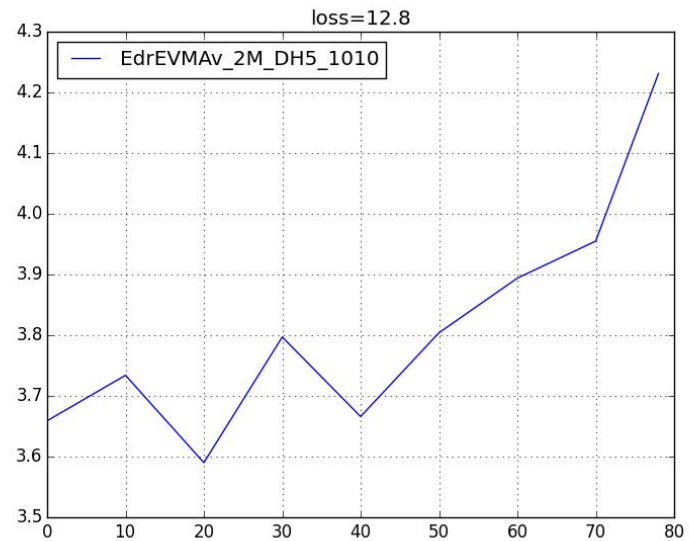
Data rate	2M_DH5_1010								
Channel	0	10	20	30	40	50	60	70	78
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.46	-12.25	-12.17	-12.28	-12.08	-12.14	-12.18	-12.00	-11.71
Init Freq Error(kHz)	-22.21	-18.33	-18.50	-21.48	-17.96	-19.00	-21.15	-19.21	-19.92
OMEGA_I(kHz)	-19.47	-18.85	-19.11	-19.67	-19.45	-19.58	-19.91	-20.04	-19.92
OMEGA_O(kHz)	-2.02	-1.79	-0.94	-2.66	-1.56	-1.83	-2.31	-2.42	-2.24
OMEGA_IO(kHz)	-21.49	-20.64	-20.05	-22.33	-21.01	-21.41	-22.22	-22.46	-22.16
DEVM Average(%)	3.66	3.73	3.59	3.80	3.67	3.80	3.89	3.96	4.23
DEVM Peak(%)	6.04	6.15	5.80	6.30	6.38	6.03	6.51	6.52	6.77
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.15	-0.16	-0.14	-0.14	-0.15	-0.15	-0.15	-0.13	-0.16
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Power by channel									



Init Freq Error by
channel



DEVM Average(%) by
channel



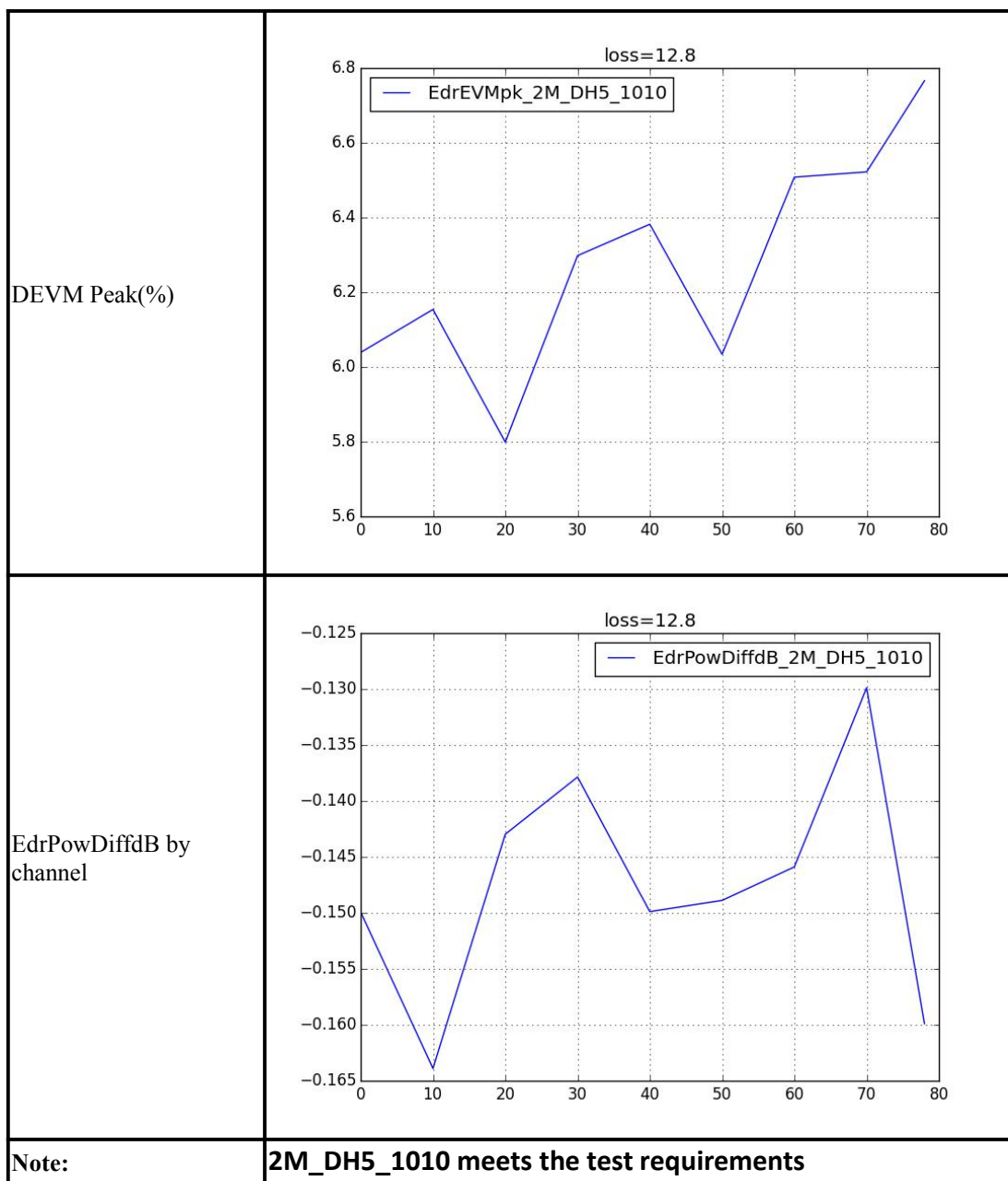
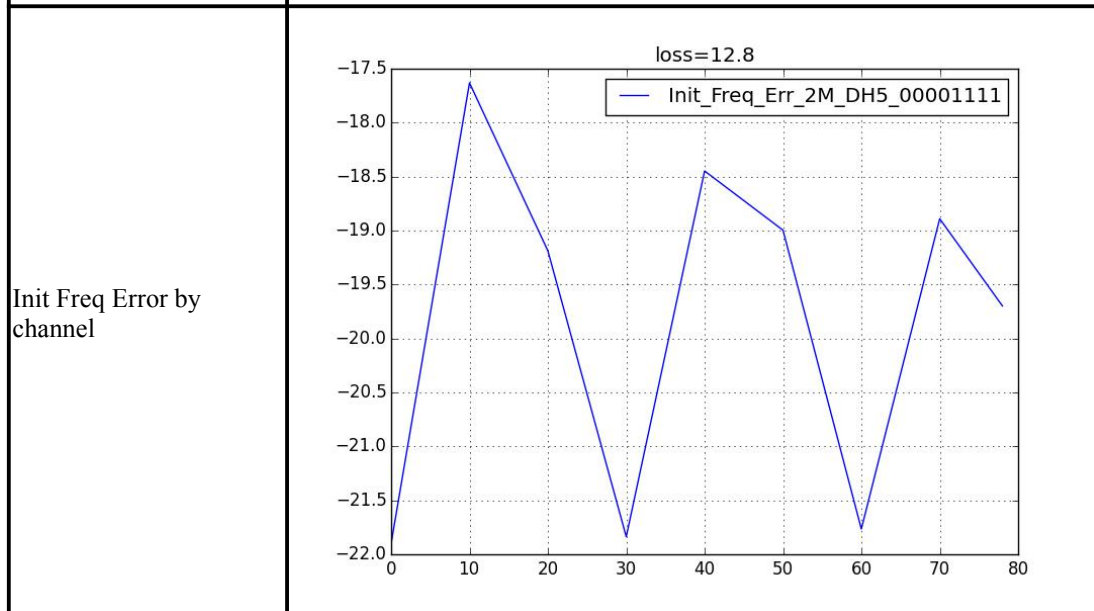
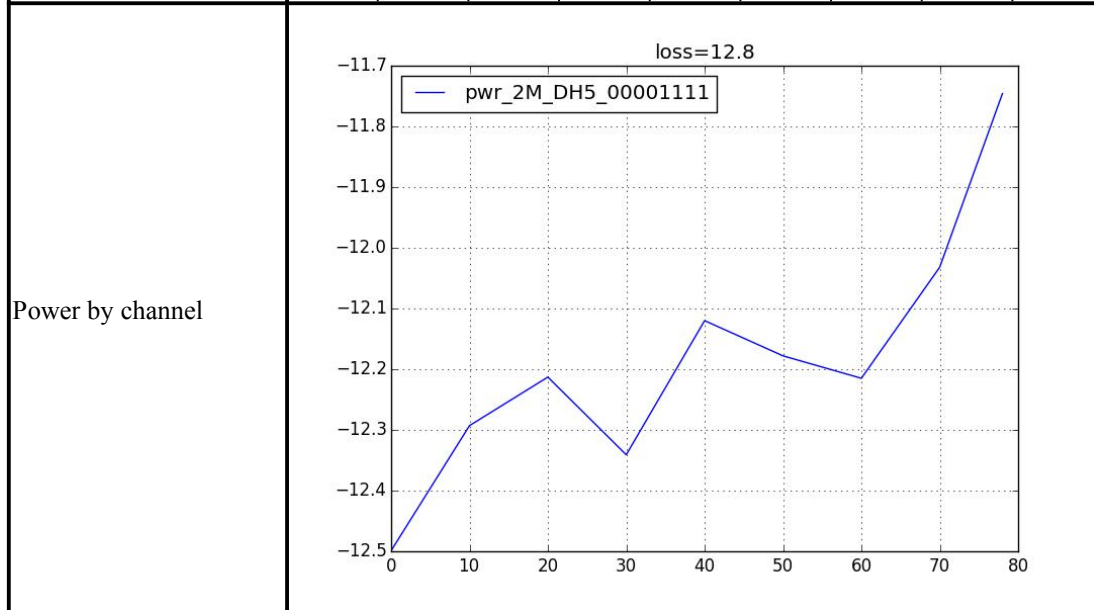


Table 11

Data rate	2M_DH5_00001111								
Channel	0	10	20	30	40	50	60	70	78
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.50	-12.29	-12.21	-12.34	-12.12	-12.18	-12.21	-12.03	-11.75
Init Freq Error(kHz)	-21.90	-17.63	-19.19	-21.84	-18.45	-19.00	-21.77	-18.89	-19.70
OMEGA_I(kHz)	-19.28	-18.97	-19.34	-19.81	-19.25	-19.89	-19.45	-19.64	-19.26

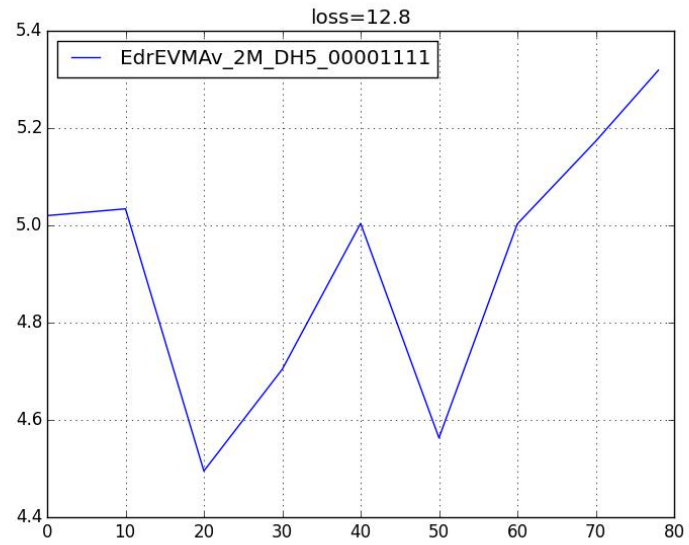


OMEGA_O(kHz)	-1.56	-1.75	-1.65	-2.27	-1.74	-2.15	-1.79	-1.97	-1.26
OMEGA_IO(kHz)	-20.84	-20.72	-20.99	-22.08	-20.99	-22.04	-21.24	-21.61	-20.52
DEVM Average(%)	5.02	5.03	4.50	4.70	5.00	4.56	5.00	5.17	5.32
DEVM Peak(%)	8.78	8.77	8.13	8.20	8.56	7.82	8.90	9.00	9.00
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.18	-0.20	-0.20	-0.19	-0.20	-0.18	-0.21	-0.19	-0.22
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

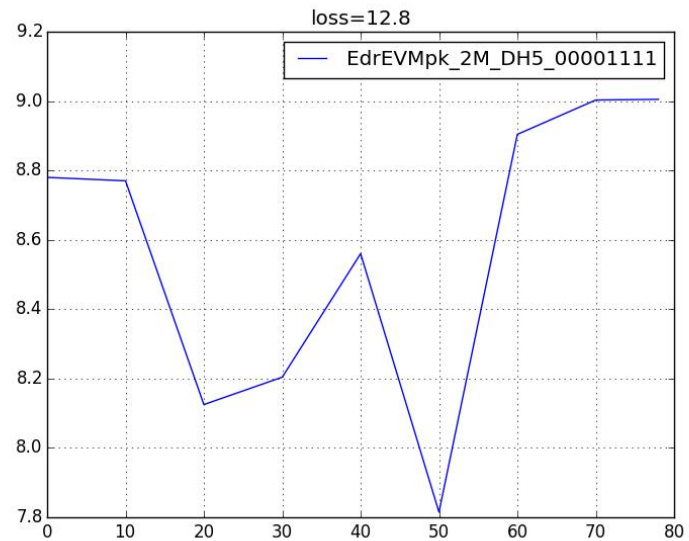




DEVM Average(%) by channel



DEVM Peak(%)



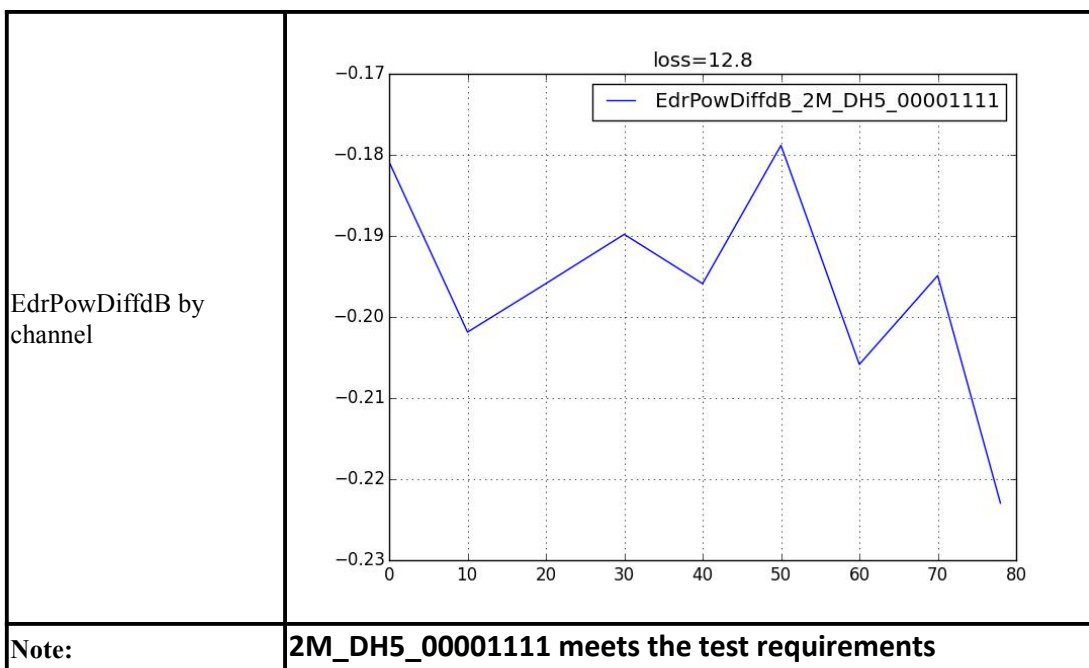
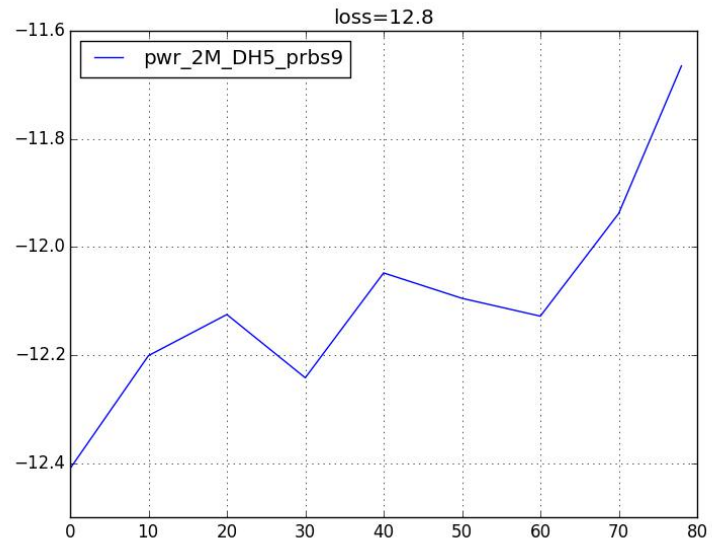


Table 12

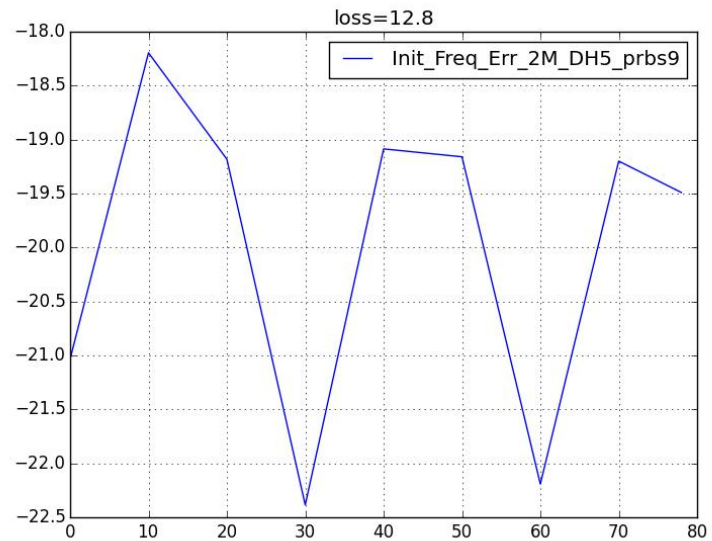
Data rate	2M_DH5_prbs9								
Channel	0	10	20	30	40	50	60	70	78
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.41	-12.20	-12.12	-12.24	-12.05	-12.09	-12.13	-11.94	-11.66
Init Freq Error(kHz)	-21.03	-18.20	-19.18	-22.39	-19.09	-19.16	-22.19	-19.20	-19.49
OMEGA_I(kHz)	-19.01	-18.49	-19.34	-19.49	-20.10	-19.36	-19.51	-19.18	-20.15
OMEGA_O(kHz)	-1.94	-1.92	-2.31	-2.31	-2.29	-1.55	-1.68	-1.49	-2.93
OMEGA_IO(kHz)	-20.95	-20.41	-21.65	-21.80	-22.39	-20.92	-21.19	-20.67	-23.08
DEVM Average(%)	5.22	5.36	4.99	5.12	5.29	5.12	5.25	5.23	5.24
DEVM Peak(%)	10.74	11.14	10.64	10.70	11.11	10.84	10.88	10.55	11.28
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.11	-0.12	-0.09	-0.11	-0.08	-0.10	-0.10	-0.11	-0.09
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass



Power by channel

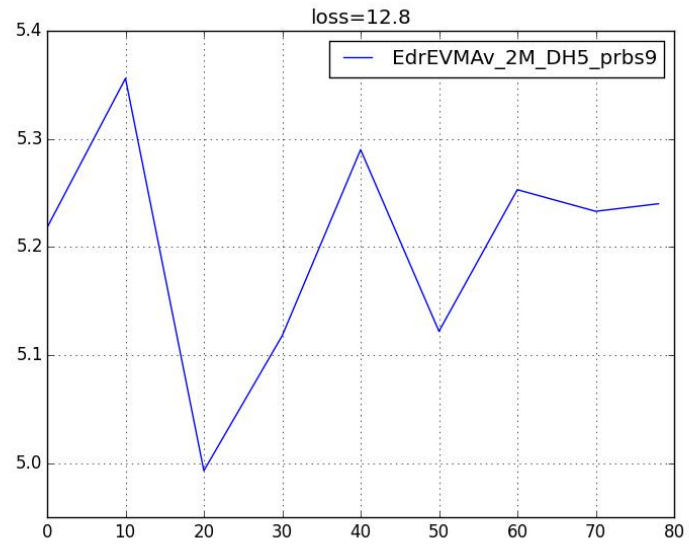


Init Freq Error by channel

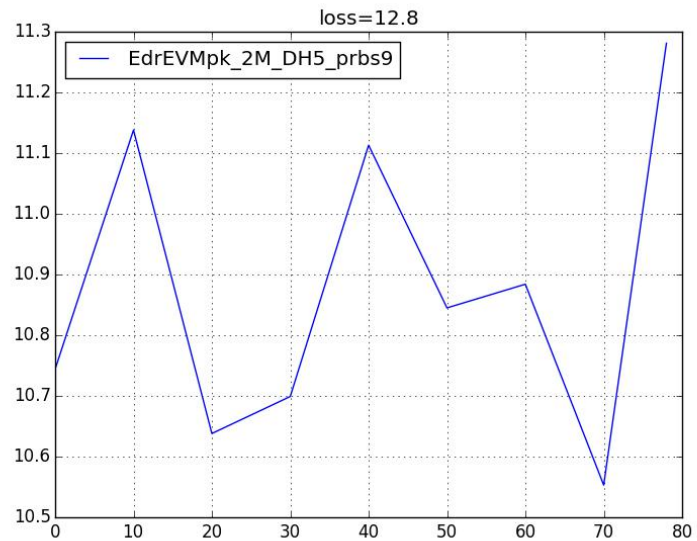


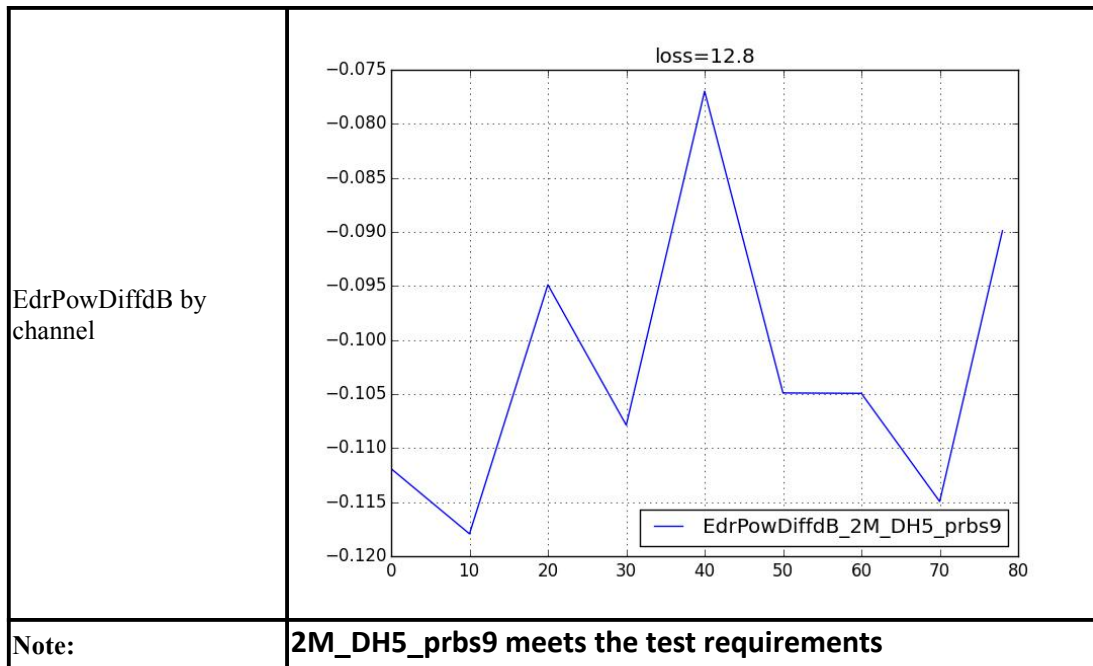


DEVm Average(%) by channel



DEVm Peak(%)





2.4Enhanced data rate 3M TX

Table 13

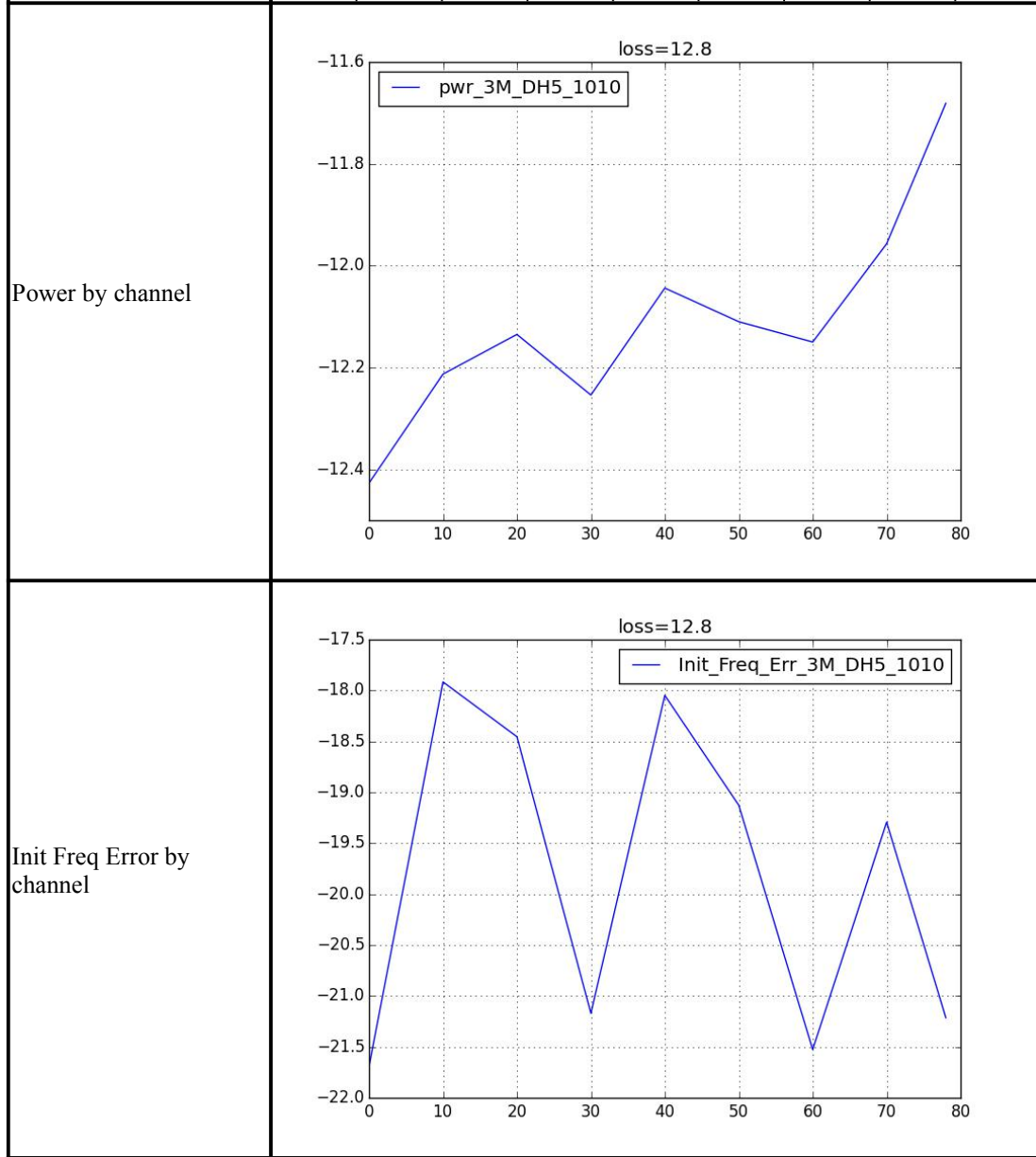
Specification	Requirement
Output Power(dBm)	(-3, +3) @power_level=4;
Init Freq Error(kHz)	(-75,+75)
OMEGA_I(kHz)	(-75kHz, +75kHz), for all packets
OMEGA_O(kHz)	(-10kHz, 10kHz), for all block
OMEGA_IO(kHz)	(-75kHz, +75kHz), for all block
DEVM Average(%)	(0, 13)@ 3M
DEVM Peak(%)	(0, 25)@ 3M
EdrprobEVM99pass(%)	(0, 20)@ 3M
EdrPowDiffdB(dB)	(-4dBm, 1dBm)

Table 14

Data rate	3M_DH5_1010									
Channel	0	10	20	30	40	50	60	70	78	
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480	

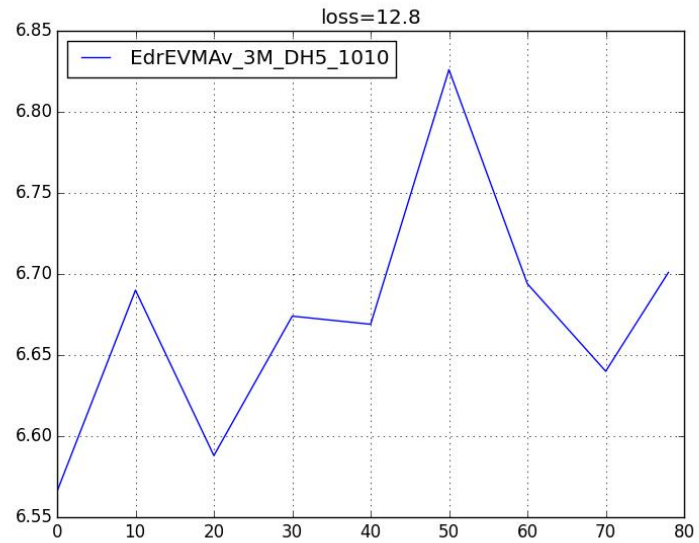


Output Power(dBm)	-12.43	-12.21	-12.13	-12.25	-12.04	-12.11	-12.15	-11.96	-11.68
Init Freq Error(kHz)	-21.69	-17.92	-18.45	-21.17	-18.05	-19.13	-21.53	-19.29	-21.21
OMEGA_I(kHz)	-19.02	-18.68	-18.97	-19.35	-18.57	-19.75	-20.19	-19.25	-19.71
OMEGA_O(kHz)	-1.32	-1.81	-2.33	-1.81	-2.74	-1.74	-3.39	-1.77	-1.69
OMEGA_IO(kHz)	-20.34	-20.49	-21.30	-21.17	-21.31	-21.48	-23.58	-21.02	-21.41
DEVM Average(%)	6.57	6.69	6.59	6.67	6.67	6.83	6.69	6.64	6.70
DEVM Peak(%)	9.91	10.32	10.05	10.13	10.31	10.20	10.22	10.27	10.30
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.11	-0.11	-0.11	-0.11	-0.13	-0.10	-0.10	-0.12	-0.12
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

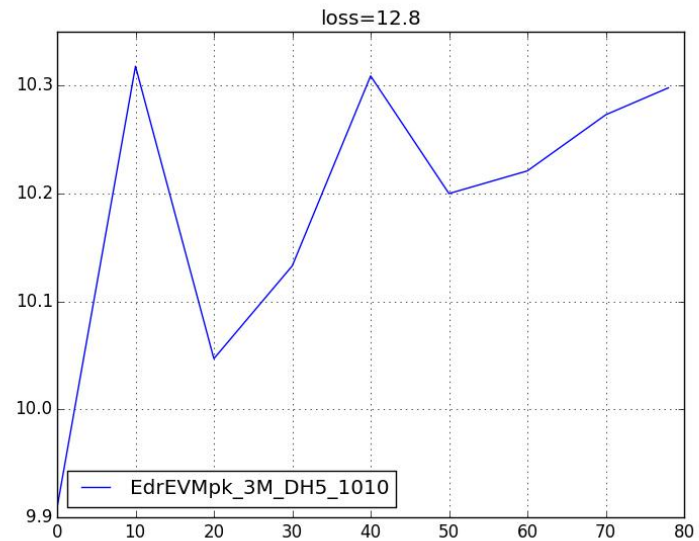




DEVM Average(%) by channel



DEVM Peak(%)



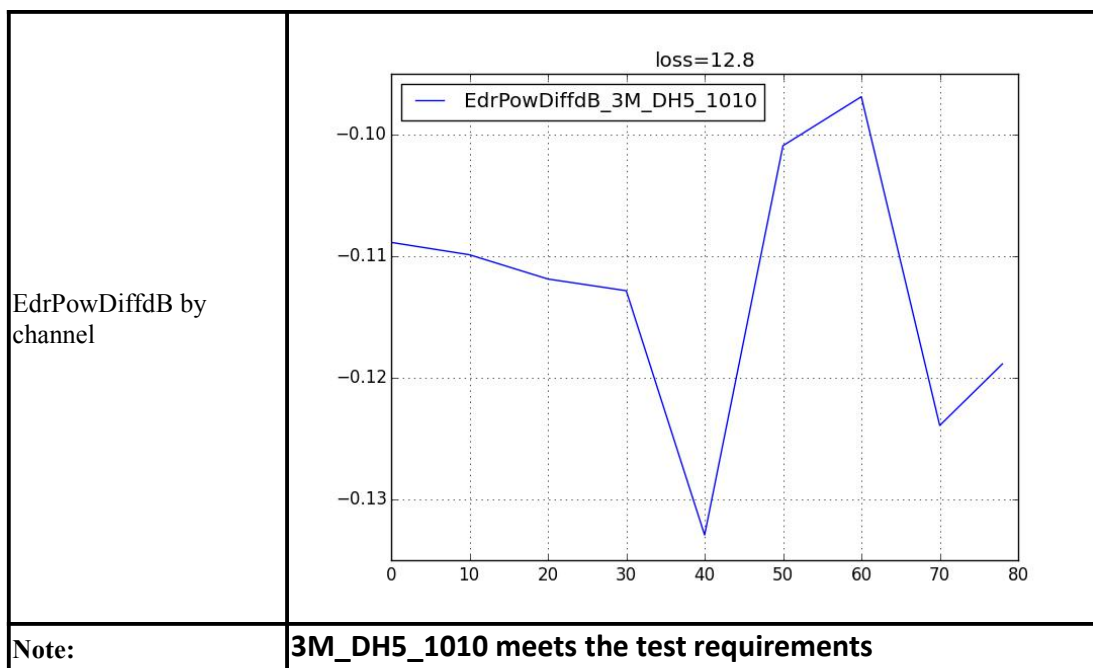
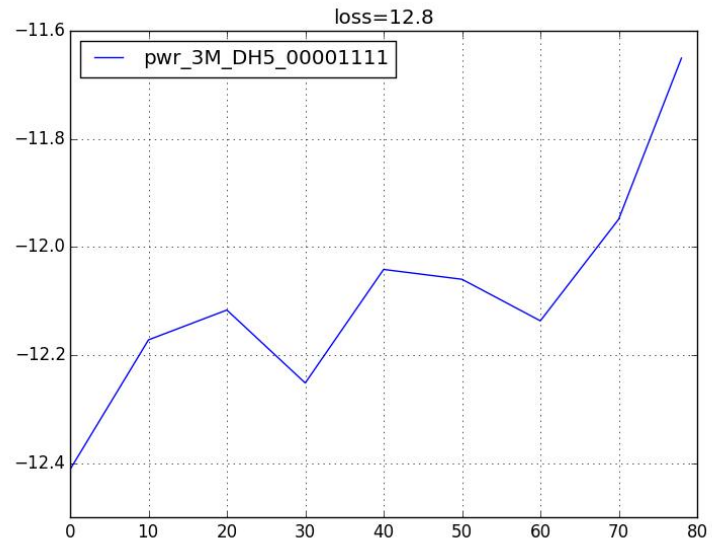


Table 15

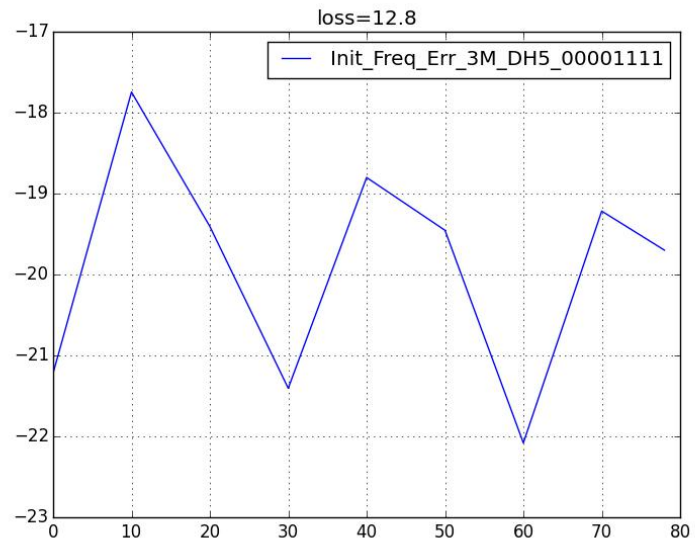
Data rate	3M_DH5_00001111								
Channel	0	10	20	30	40	50	60	70	78
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.41	-12.17	-12.12	-12.25	-12.04	-12.06	-12.14	-11.95	-11.65
Init Freq Error(kHz)	-21.22	-17.75	-19.41	-21.41	-18.80	-19.45	-22.08	-19.22	-19.70
OMEGA_I(kHz)	-18.85	-18.08	-18.60	-19.44	-19.18	-18.53	-19.24	-19.48	-19.40
OMEGA_O(kHz)	-2.05	-2.45	-2.59	-2.47	-2.54	-3.31	-2.16	-2.61	-2.25
OMEGA_IO(kHz)	-20.90	-20.53	-21.19	-21.91	-21.73	-21.83	-21.41	-22.09	-21.65
DEVM Average(%)	4.67	5.65	5.28	5.15	4.71	5.91	5.22	5.39	5.03
DEVM Peak(%)	7.92	9.29	8.88	8.23	8.04	9.53	8.51	8.99	8.78
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.11	-0.09	-0.10	-0.12	-0.11	-0.09	-0.11	-0.10	-0.09
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass



Power by channel

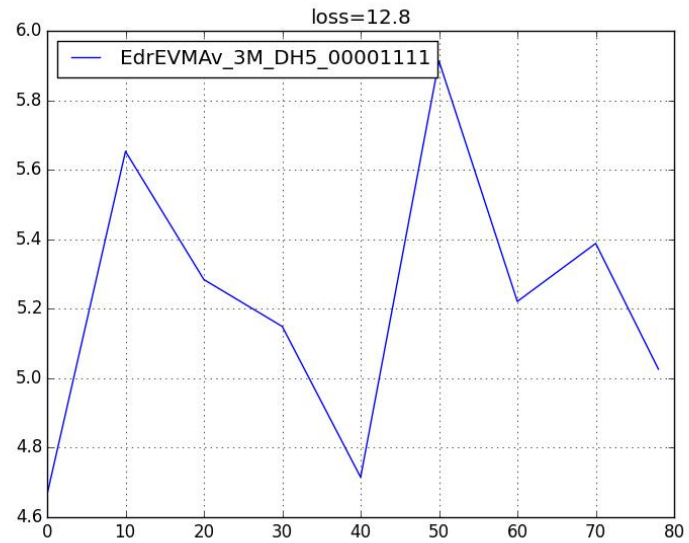


Init Freq Error by channel

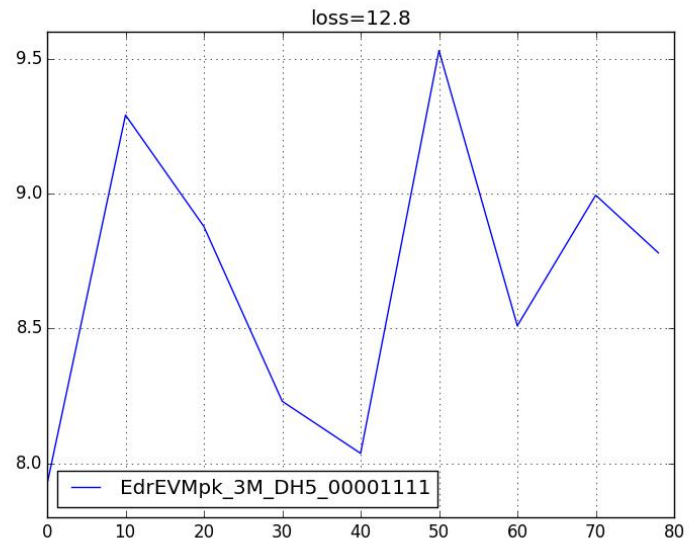




DEVm Average(%) by channel



DEVm Peak(%)



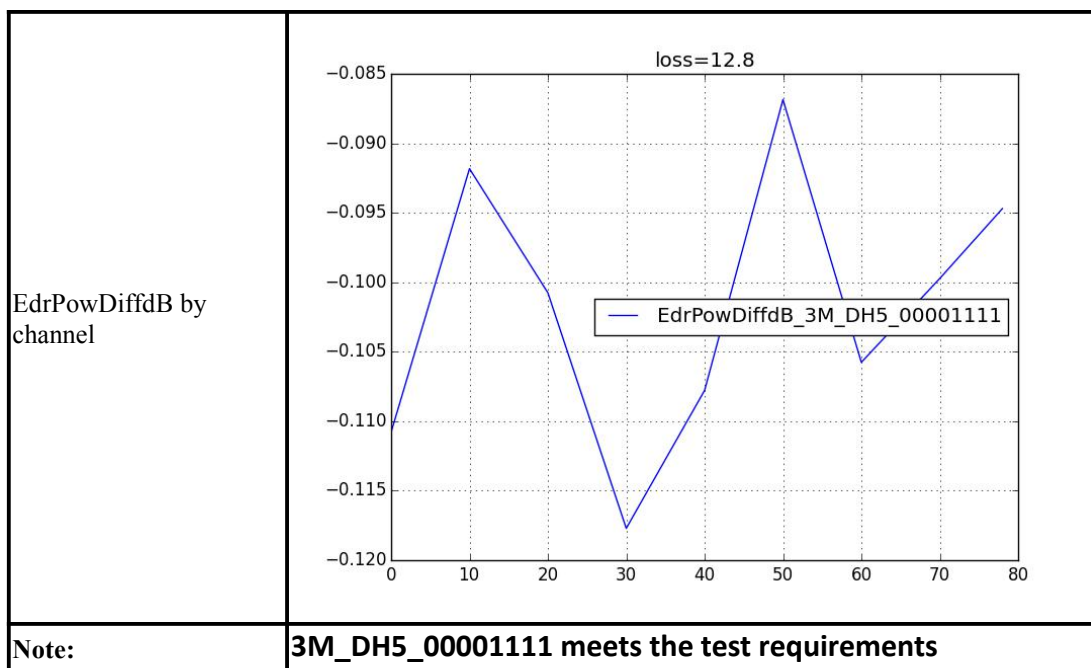
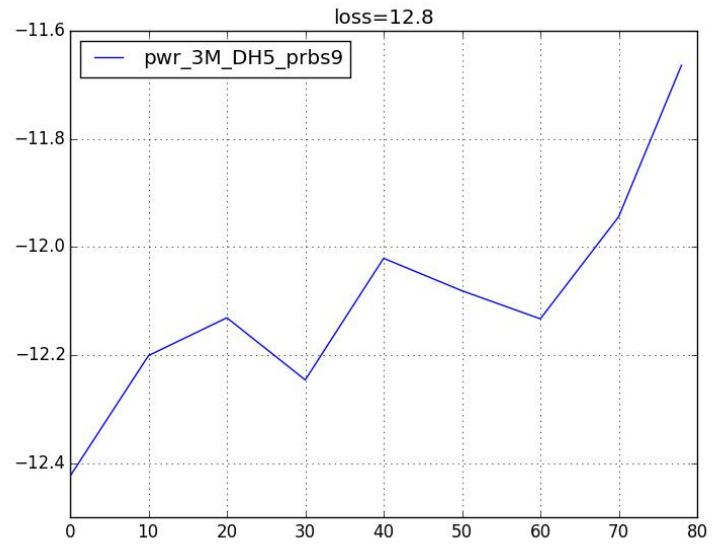


Table 16

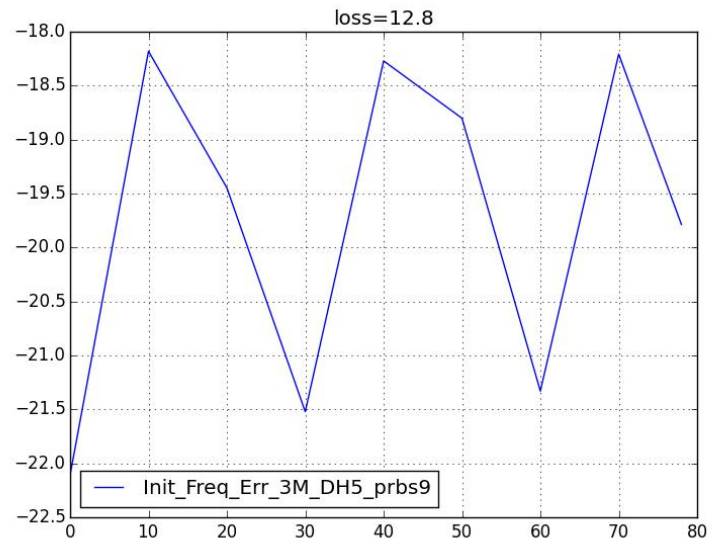
Data rate	3M_DH5_prbs9								
Channel	0	10	20	30	40	50	60	70	78
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.42	-12.20	-12.13	-12.25	-12.02	-12.08	-12.13	-11.94	-11.66
Init Freq Error(kHz)	-22.11	-18.18	-19.45	-21.52	-18.27	-18.80	-21.33	-18.21	-19.79
OMEGA_I(kHz)	-19.51	-18.51	-19.30	-19.55	-19.17	-19.10	-19.85	-19.02	-19.56
OMEGA_O(kHz)	-2.24	-2.14	-1.40	-2.09	-1.81	-1.76	-2.64	-1.62	-2.01
OMEGA_IO(kHz)	-21.75	-20.65	-20.70	-21.64	-20.97	-20.87	-22.49	-20.64	-21.57
DEVM Average(%)	5.15	5.39	5.10	5.15	5.28	5.18	5.41	5.24	5.01
DEVM Peak(%)	10.84	10.91	10.43	10.53	10.75	10.34	11.05	10.78	10.05
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.09	-0.11	-0.09	-0.10	-0.11	-0.12	-0.10	-0.11	-0.11
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass



Power by channel

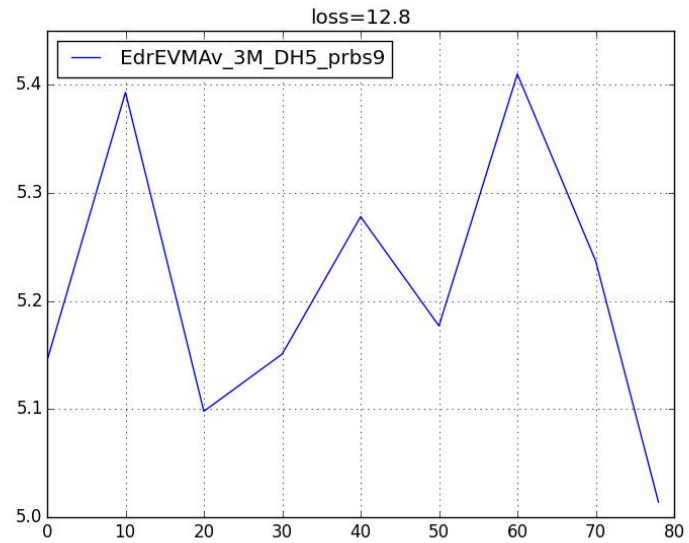


Init Freq Error by channel

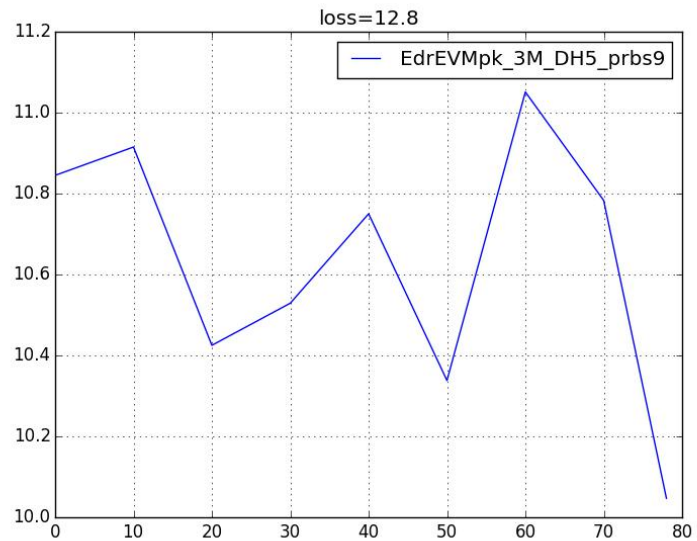


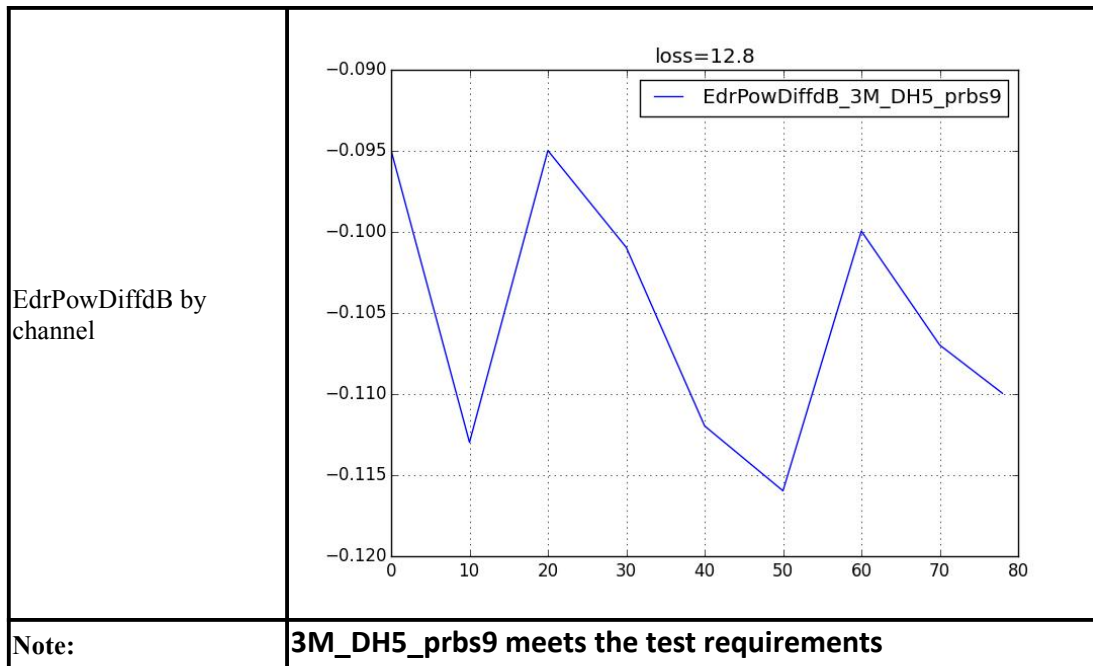


DEVM Average(%) by channel



DEVM Peak(%)





2.5 BLE TX

Requirement

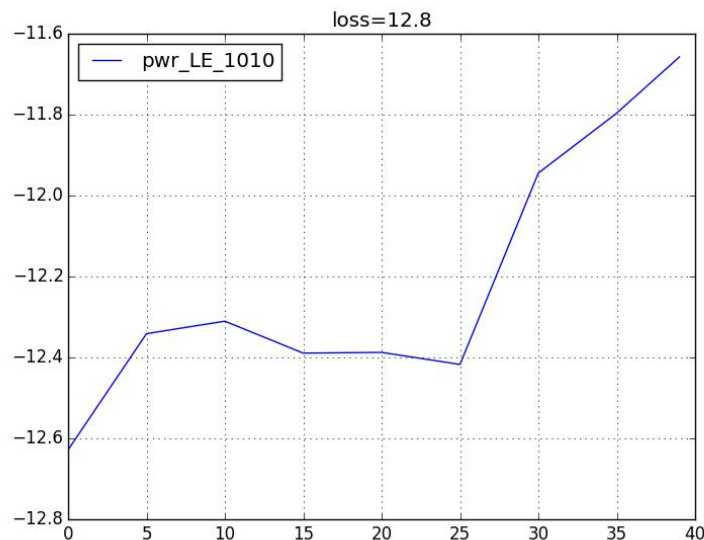
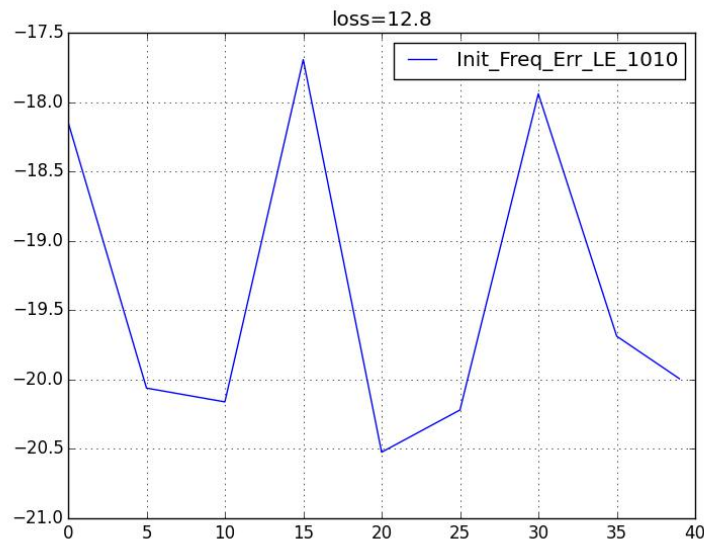
Table 17

Specification	Requirement
Frequency range(MHz)	(2400,2483.5)
Output Power(dBm)	(-3, +3) @power_level=4;
Init Freq Error(kHz)	(-150kHz,+150kHz)
deltaF2Max(kHz)	(185kHz ,500kHz)(at least 99%)
deltaF2Avg(kHz)	(180kHz, 500kHz)
deltaF1Avg(kHz)	(225kH, 275kHz)

Table1 18

Data rate	LE_1010								
Channel	0	5	10	15	20	25	30	35	39
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.63	-12.34	-12.31	-12.39	-12.39	-12.42	-11.94	-11.80	-11.66
Init Freq Error(kHz)	-18.14	-20.06	-20.16	-17.69	-20.52	-20.22	-17.94	-19.69	-19.99
deltaF2Max(kHz)	227.76	224.24	225.80	225.39	223.04	229.62	221.61	222.72	227.19
deltaF2Avg(kHz)	220.58	217.56	219.45	218.59	216.44	223.19	215.23	216.32	221.25



Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass																				
Power by channel	<div><div>loss=12.8</div><table><caption>Data for Power by channel</caption><tr><th>Channel</th><th>pwr_LE_1010</th></tr><tr><td>0</td><td>-12.6</td></tr><tr><td>5</td><td>-12.35</td></tr><tr><td>10</td><td>-12.3</td></tr><tr><td>15</td><td>-12.4</td></tr><tr><td>20</td><td>-12.4</td></tr><tr><td>25</td><td>-12.45</td></tr><tr><td>30</td><td>-11.95</td></tr><tr><td>35</td><td>-11.85</td></tr><tr><td>40</td><td>-11.7</td></tr></table></div>									Channel	pwr_LE_1010	0	-12.6	5	-12.35	10	-12.3	15	-12.4	20	-12.4	25	-12.45	30	-11.95	35	-11.85	40	-11.7
Channel	pwr_LE_1010																												
0	-12.6																												
5	-12.35																												
10	-12.3																												
15	-12.4																												
20	-12.4																												
25	-12.45																												
30	-11.95																												
35	-11.85																												
40	-11.7																												
Init Freq Error by channel	<div><div>loss=12.8</div><table><caption>Data for Init Freq Error by channel</caption><tr><th>Channel</th><th>Init_Freq_Err_LE_1010</th></tr><tr><td>0</td><td>-18.1</td></tr><tr><td>5</td><td>-20.1</td></tr><tr><td>10</td><td>-20.2</td></tr><tr><td>15</td><td>-17.7</td></tr><tr><td>20</td><td>-20.5</td></tr><tr><td>25</td><td>-20.2</td></tr><tr><td>30</td><td>-18.0</td></tr><tr><td>35</td><td>-19.7</td></tr><tr><td>40</td><td>-20.0</td></tr></table></div>									Channel	Init_Freq_Err_LE_1010	0	-18.1	5	-20.1	10	-20.2	15	-17.7	20	-20.5	25	-20.2	30	-18.0	35	-19.7	40	-20.0
Channel	Init_Freq_Err_LE_1010																												
0	-18.1																												
5	-20.1																												
10	-20.2																												
15	-17.7																												
20	-20.5																												
25	-20.2																												
30	-18.0																												
35	-19.7																												
40	-20.0																												

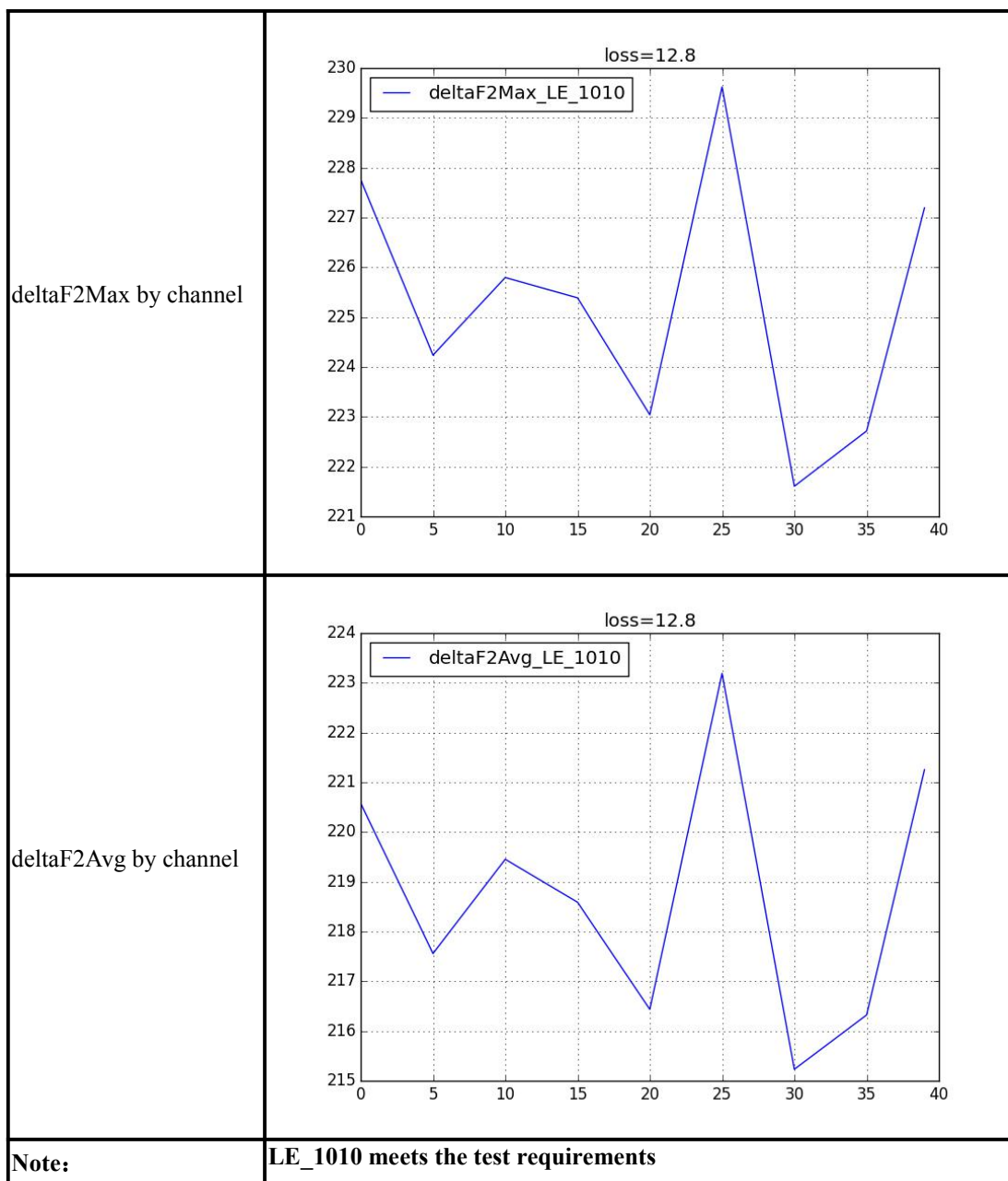
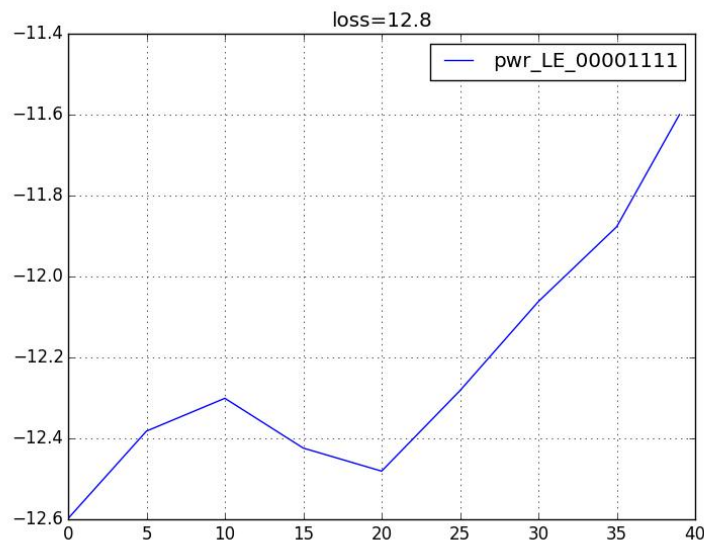
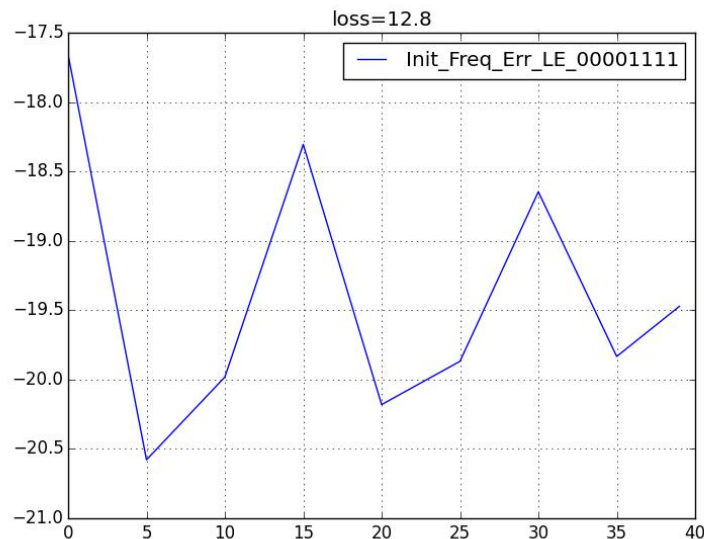


Table1 19

Data rate	LE_00001111								
Channel	0	5	10	15	20	25	30	35	39
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-12.60	-12.38	-12.30	-12.42	-12.48	-12.28	-12.06	-11.88	-11.60
Init Freq Error(kHz)	-17.66	-20.58	-19.98	-18.31	-20.18	-19.87	-18.65	-19.83	-19.47
deltaF1Avg(kHz)	246.18	244.48	245.39	242.58	247.89	242.71	241.82	243.29	242.20



Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass																				
Power by channel	<div><div>loss=12.8</div><table><caption>Power by channel data</caption><tr><th>Channel</th><th>Power (dBm)</th></tr><tr><td>0</td><td>-12.6</td></tr><tr><td>5</td><td>-12.4</td></tr><tr><td>10</td><td>-12.3</td></tr><tr><td>15</td><td>-12.4</td></tr><tr><td>20</td><td>-12.45</td></tr><tr><td>25</td><td>-12.3</td></tr><tr><td>30</td><td>-12.1</td></tr><tr><td>35</td><td>-11.9</td></tr><tr><td>40</td><td>-11.6</td></tr></table></div>									Channel	Power (dBm)	0	-12.6	5	-12.4	10	-12.3	15	-12.4	20	-12.45	25	-12.3	30	-12.1	35	-11.9	40	-11.6
Channel	Power (dBm)																												
0	-12.6																												
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10	-12.3																												
15	-12.4																												
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25	-12.3																												
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Init Freq Error by channel	<div><div>loss=12.8</div><table><caption>Init Freq Error by channel data</caption><tr><th>Channel</th><th>Init Freq Error (dBm)</th></tr><tr><td>0</td><td>-17.8</td></tr><tr><td>5</td><td>-20.6</td></tr><tr><td>10</td><td>-20.0</td></tr><tr><td>15</td><td>-18.3</td></tr><tr><td>20</td><td>-20.2</td></tr><tr><td>25</td><td>-19.9</td></tr><tr><td>30</td><td>-18.7</td></tr><tr><td>35</td><td>-19.8</td></tr><tr><td>40</td><td>-19.5</td></tr></table></div>									Channel	Init Freq Error (dBm)	0	-17.8	5	-20.6	10	-20.0	15	-18.3	20	-20.2	25	-19.9	30	-18.7	35	-19.8	40	-19.5
Channel	Init Freq Error (dBm)																												
0	-17.8																												
5	-20.6																												
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15	-18.3																												
20	-20.2																												
25	-19.9																												
30	-18.7																												
35	-19.8																												
40	-19.5																												

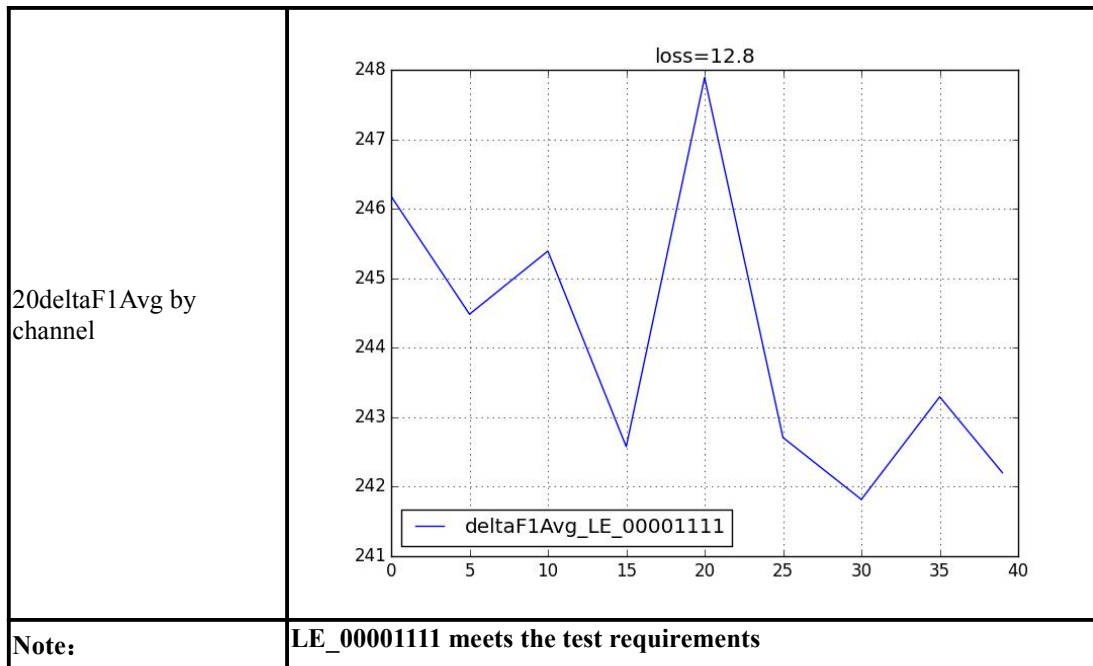


Table1 20

