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 17:57:14
Test Place:	Second floor laboratory
Test Equipment:	WT200
Test Bin	V146
Cable loss/dB:	12.8
Backoff(4=1dB):	
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:

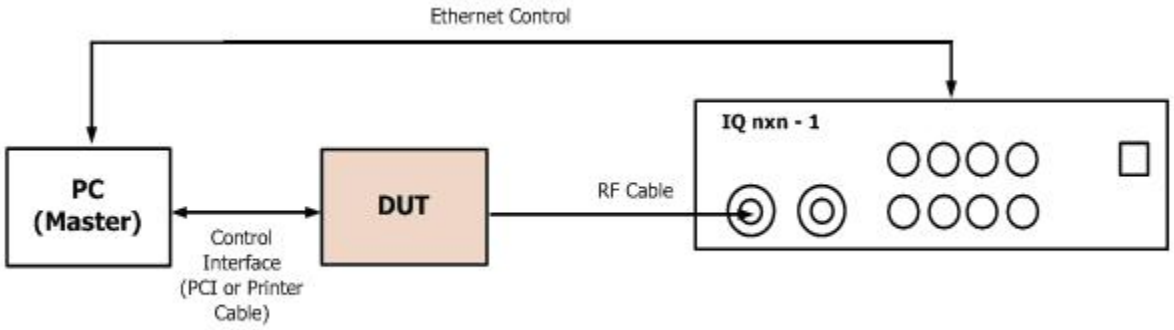


Figure 1: WiFi TX Performance Environment Setup

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.

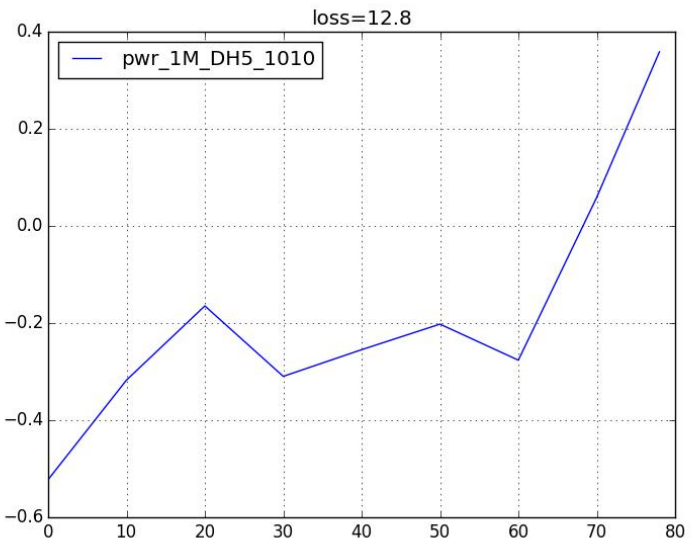
2.2. Basic rate TX

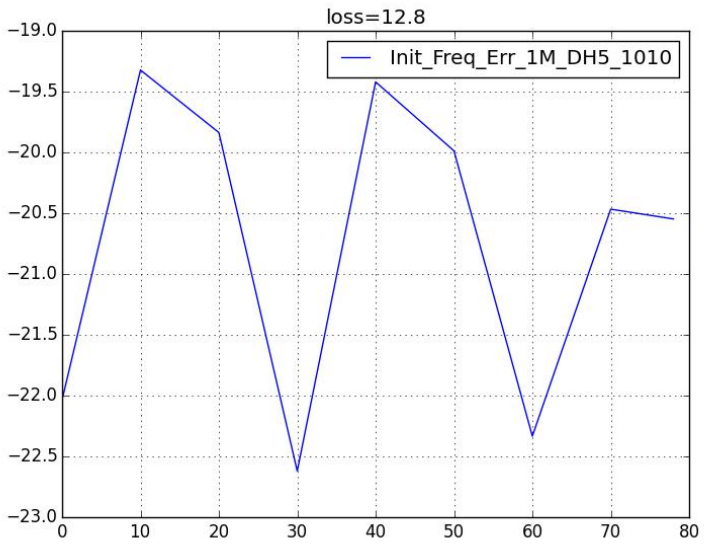
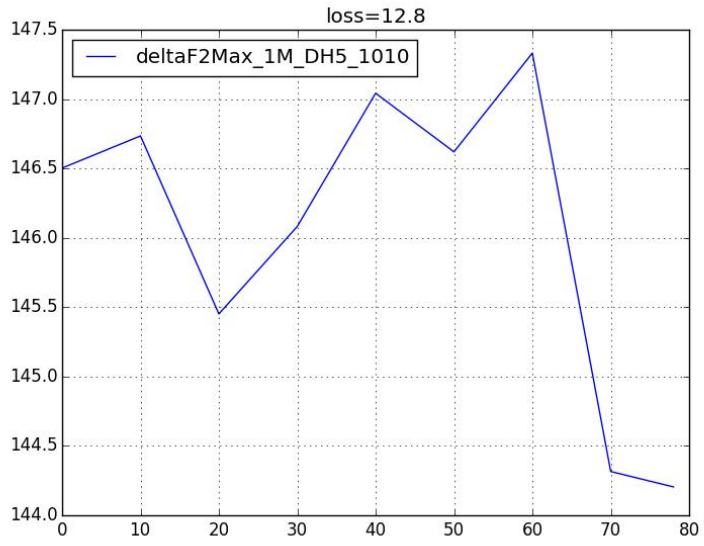
Requirement

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)	(140kH, 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)	-0.52	-0.32	-0.16	-0.31	-0.25	-0.20	-0.28	0.06	0.36
Init Freq Error(KHz)	-22.03	-19.32	-19.84	-22.62	-19.42	-19.99	-22.33	-20.47	-20.55
deltaF2Max(kHz)	146.50	146.73	145.45	146.08	147.04	146.62	147.33	144.32	144.20
deltaF2Avg(kHz)	140.25	140.26	139.97	139.98	140.44	140.56	141.38	137.97	138.38
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Power by channel									

Init Freq Error by channel	
deltaF2Max by channel	

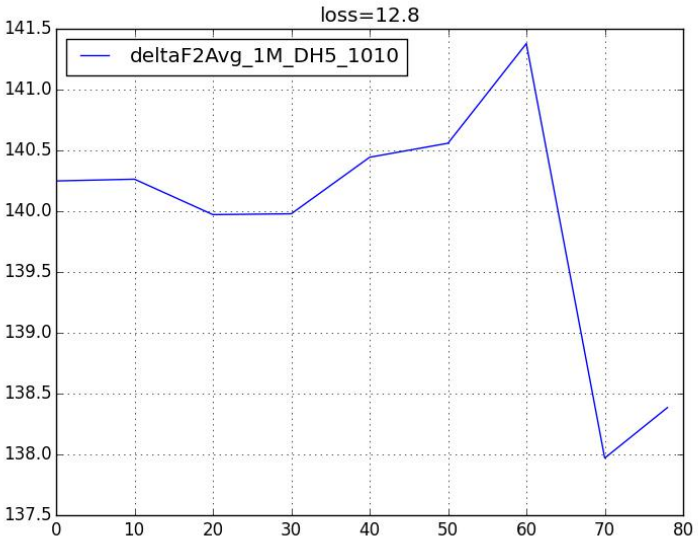
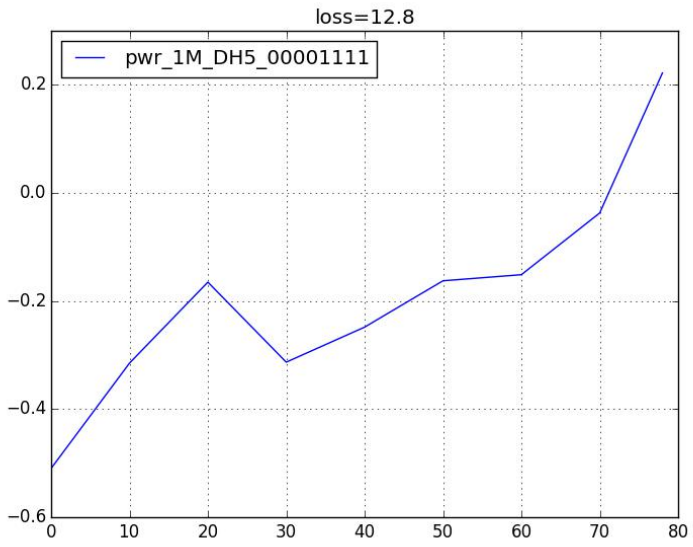
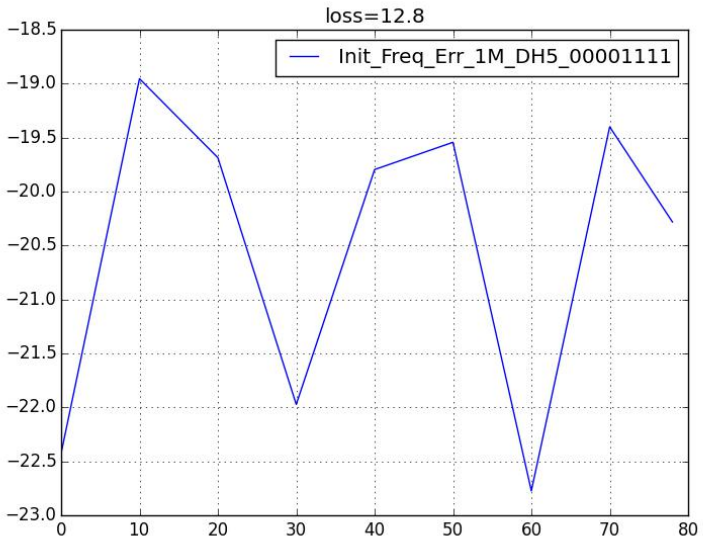
deltaF2Avg by channel	
Note:	**1M_DH5_1010 meets the test requirements**

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)	-0.51	-0.31	-0.17	-0.31	-0.25	-0.16	-0.15	-0.04	0.22
Init Freq Error(KHz)	-22.42	-18.95	-19.69	-21.97	-19.80	-19.54	-22.77	-19.40	-20.28
deltaF1Avg(kHz)	155.52	156.17	154.07	155.17	156.88	155.12	153.04	155.82	156.89
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

Power by channel	
Init Freq Error by channel	

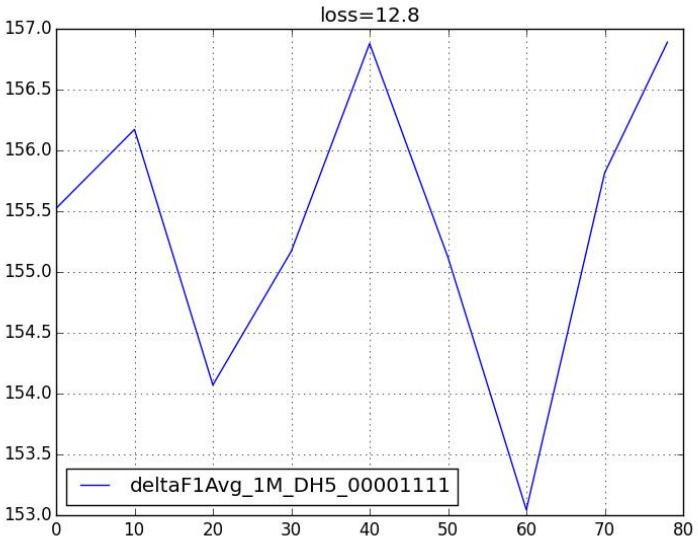
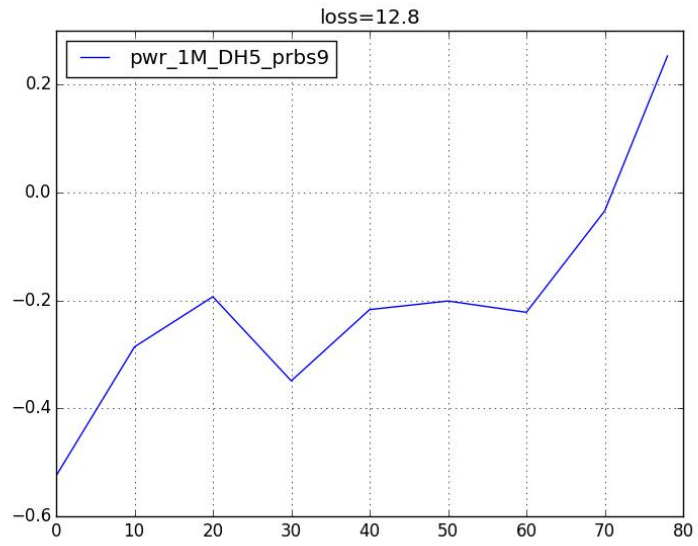
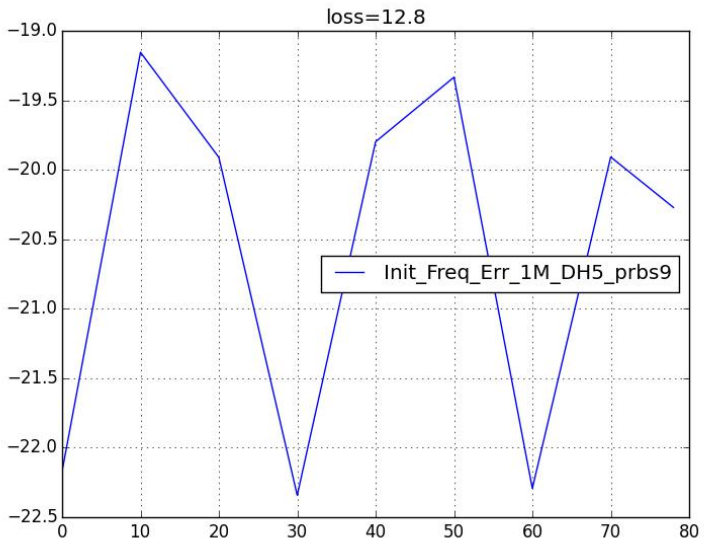
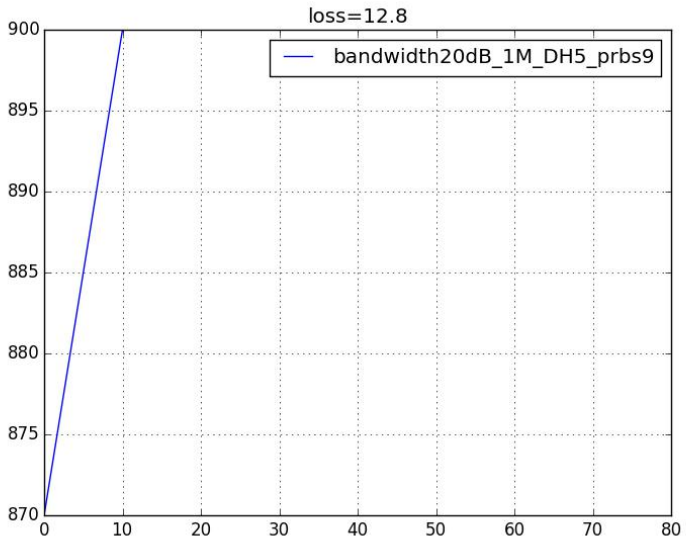
deltaF1Avg by channel	
Note:	**1M_DH5_00001111 meets the test requirements**

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)	-0.52	-0.29	-0.19	-0.35	-0.22	-0.20	-0.22	-0.03	0.25
Init Freq Error(KHz)	-22.17	-19.15	-19.91	-22.34	-19.80	-19.33	-22.29	-19.91	-20.27
Bandwidth20dB(kHz)	870.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Power by channel									

Init Freq Error by channel	
Bandwidth20dB by channel	
Note:	**1M_DH5_prbs9 meets the test requirements**

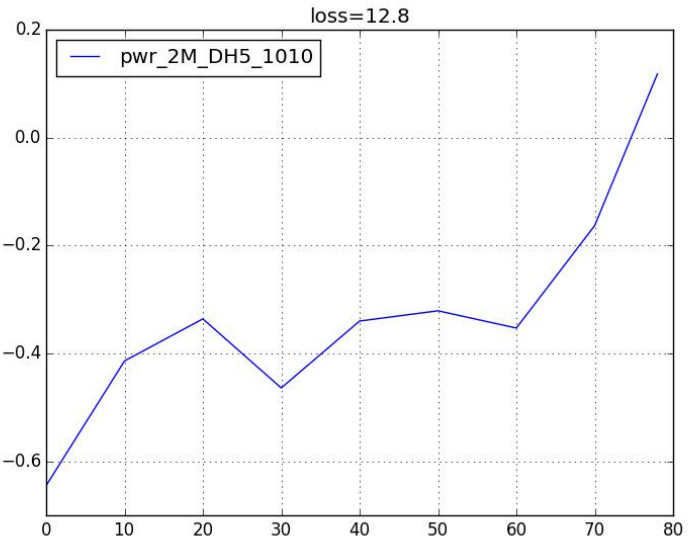
2.3 Enhanced data rate 2M TX

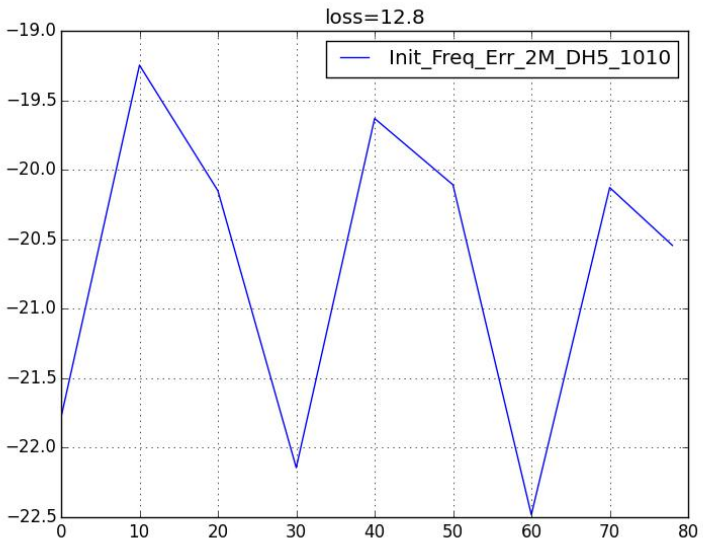
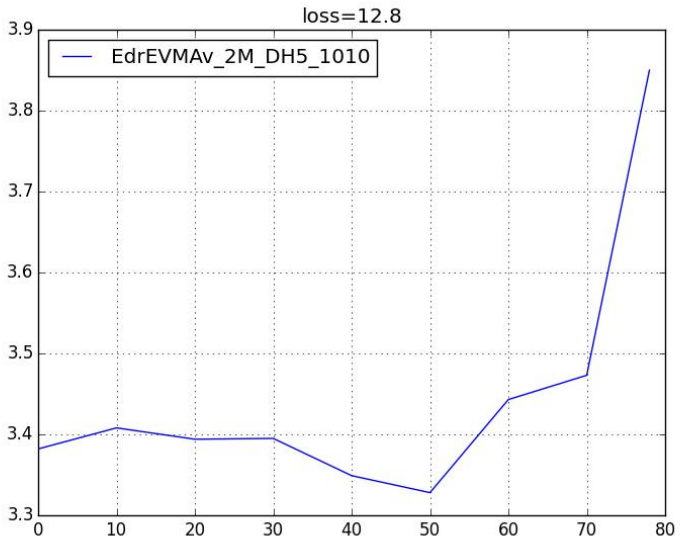
Table 9

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)	-0.64	-0.41	-0.34	-0.46	-0.34	-0.32	-0.35	-0.16	0.12
Init Freq Error(kHz)	-21.78	-19.25	-20.15	-22.14	-19.63	-20.11	-22.48	-20.13	-20.54
OMEGA_I(kHz)	-20.21	-20.35	-20.36	-20.79	-20.90	-21.23	-21.37	-21.14	-21.46
OMEGA_O(kHz)	-1.18	-1.15	-1.72	-1.43	-1.61	-1.35	-2.17	-1.78	-2.52
OMEGA_IO(kHz)	-21.39	-21.50	-22.09	-22.23	-22.51	-22.58	-23.54	-22.92	-23.98
DEVM Average(%)	3.38	3.41	3.39	3.39	3.35	3.33	3.44	3.47	3.85
DEVM Peak(%)	5.46	5.74	5.48	5.59	5.74	5.58	5.63	6.15	6.80
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.20	-0.19	-0.19	-0.18	-0.19	-0.17	-0.18	-0.19	-0.19
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Power by channel									

Init Freq Error by channel	
DEVM Average(%) by channel	

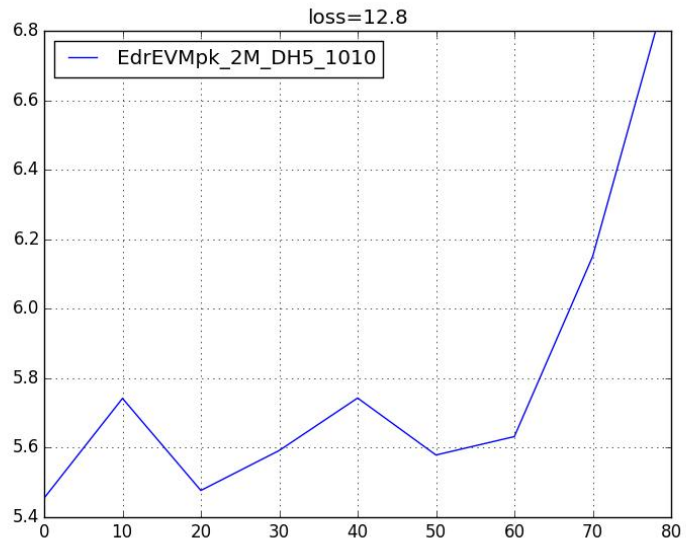
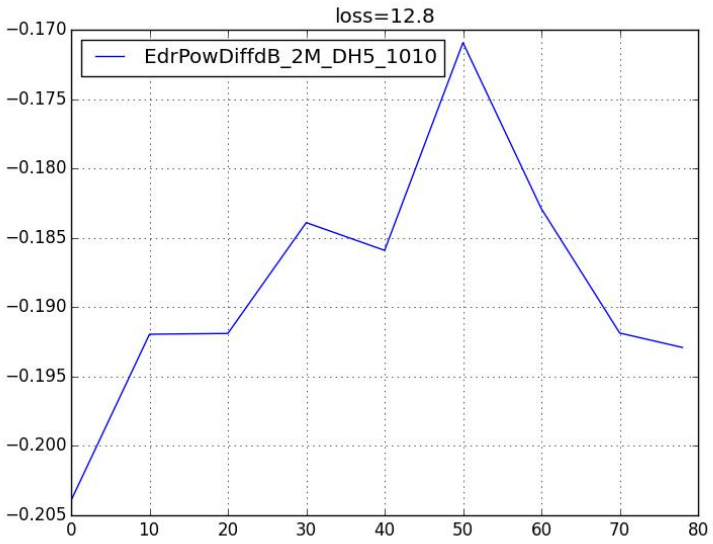
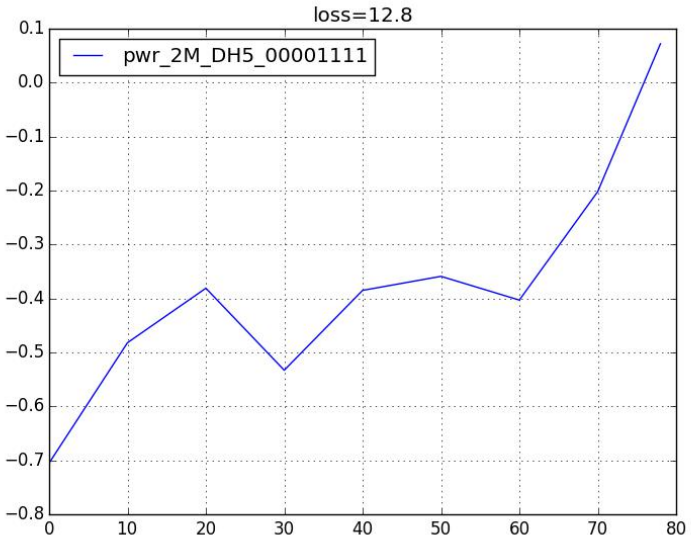
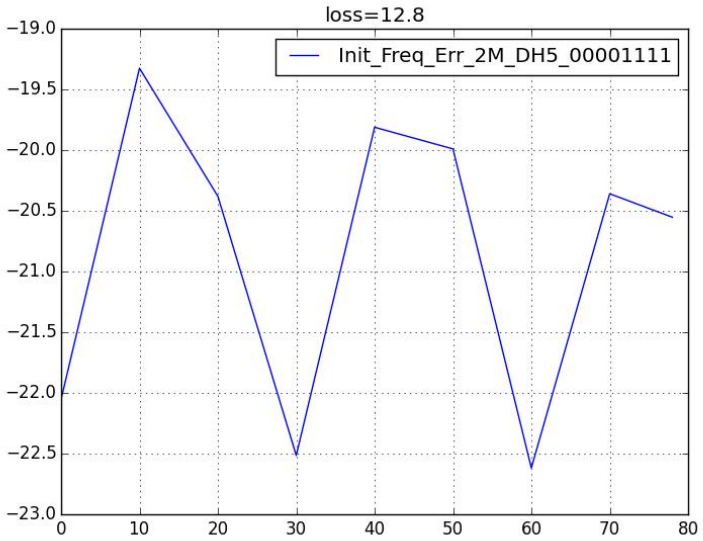
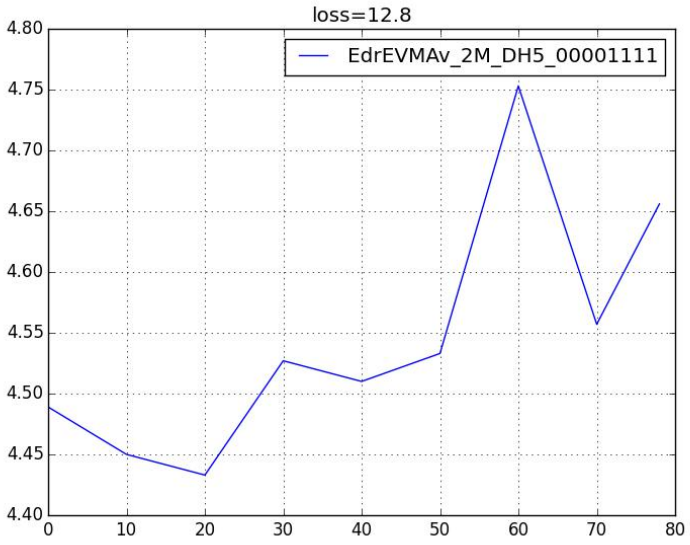
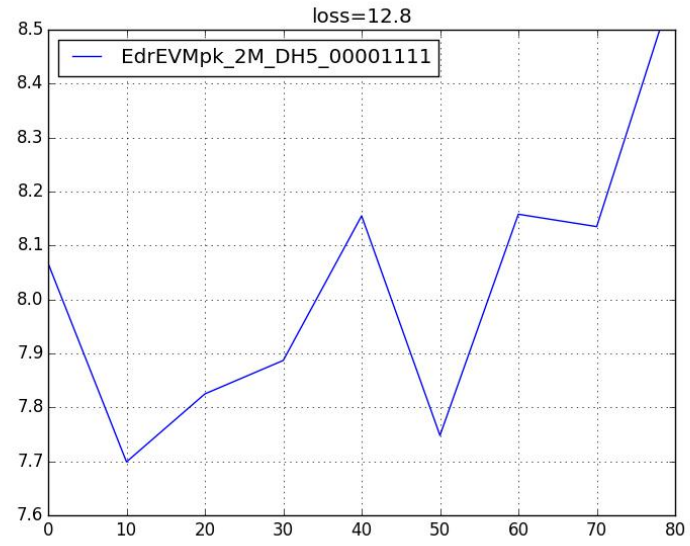
DEVM Peak(%)	
EdrPowDiffdB by channel	
Note:	**2M_DH5_1010 meets the test requirements**

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)	-0.70	-0.48	-0.38	-0.53	-0.38	-0.36	-0.40	-0.20	0.07
Init Freq Error(kHz)	-22.05	-19.33	-20.38	-22.52	-19.81	-19.99	-22.62	-20.36	-20.55
OMEGA_I(kHz)	-20.51	-20.79	-20.42	-20.93	-20.60	-20.86	-21.05	-20.49	-21.24

OMEGA_O(kHz)	-1.74	-1.61	-1.02	-1.84	-1.87	-1.35	-2.24	-2.24	-2.36
OMEGA_IO(kHz)	-22.25	-22.41	-21.44	-22.78	-22.48	-22.21	-23.29	-22.73	-23.61
DEVM Average(%)	4.49	4.45	4.43	4.53	4.51	4.53	4.75	4.56	4.66
DEVM Peak(%)	8.07	7.70	7.83	7.89	8.15	7.75	8.16	8.14	8.50
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.24	-0.23	-0.25	-0.24	-0.25	-0.24	-0.24	-0.26	-0.24
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(%)	

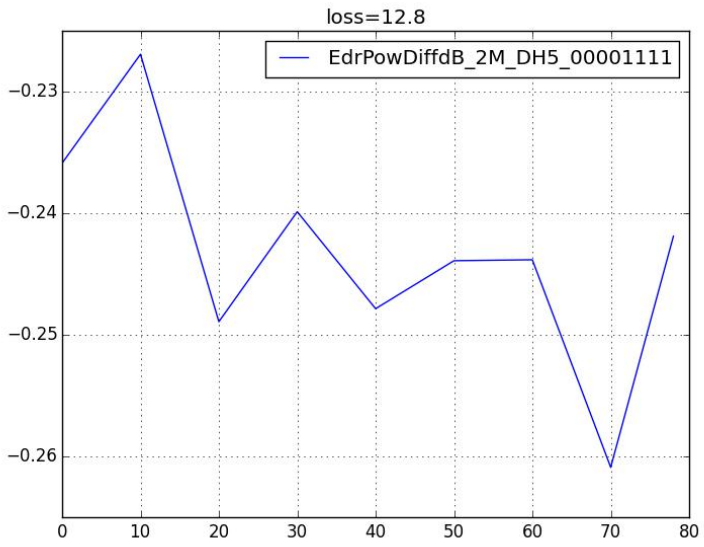
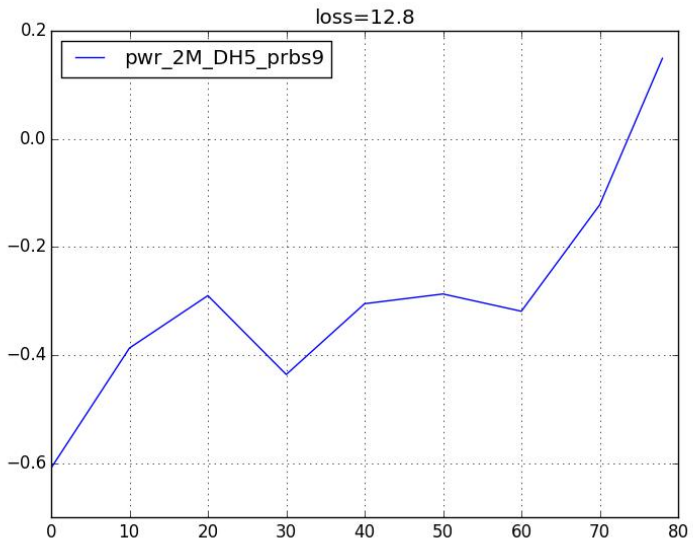
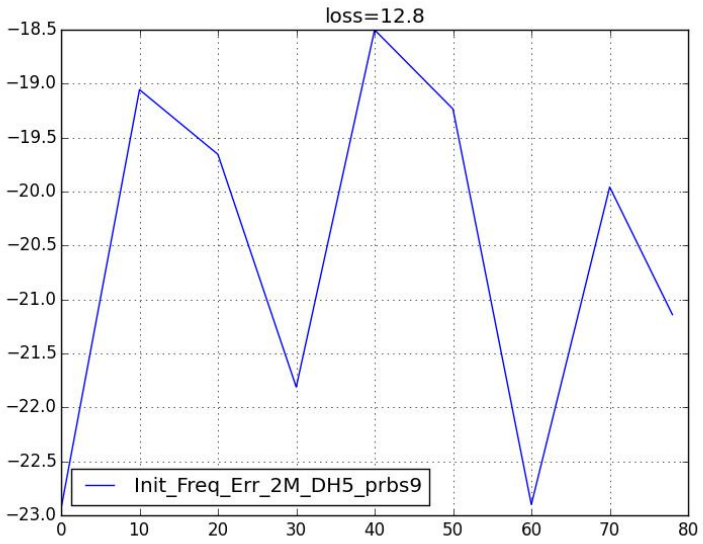
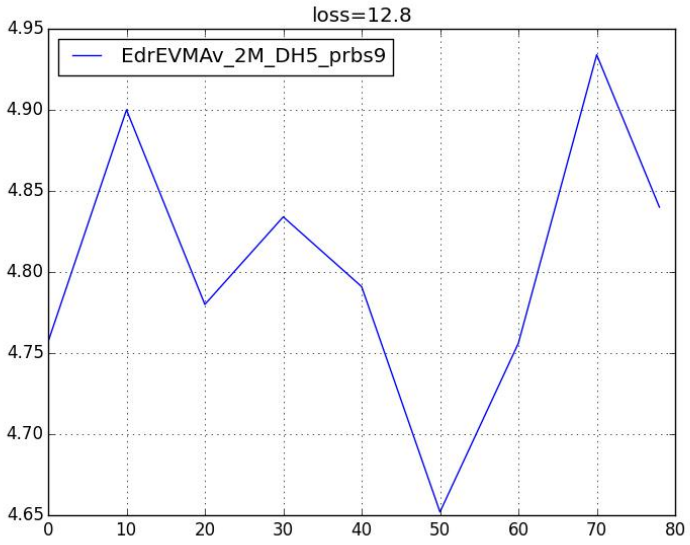
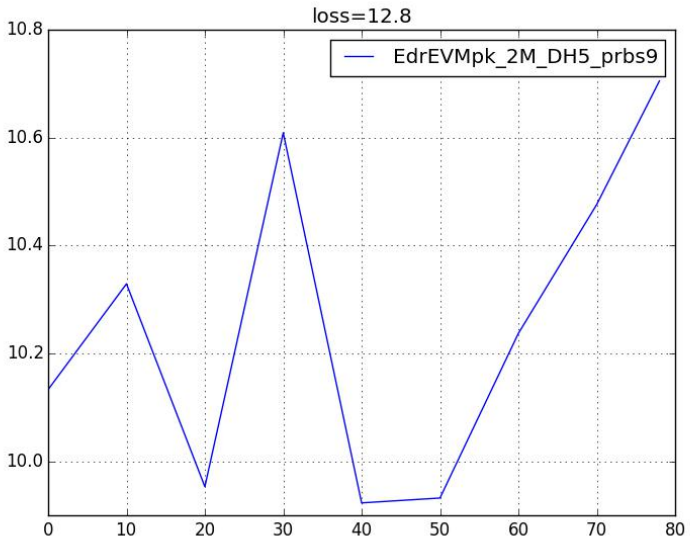
EdrPowDiffdB by channel	
Note:	**2M_DH5_00001111 meets the test requirements**

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)	-0.61	-0.39	-0.29	-0.44	-0.30	-0.29	-0.32	-0.12	0.15
Init Freq Error(kHz)	-22.94	-19.06	-19.65	-21.81	-18.50	-19.24	-22.90	-19.96	-21.14
OMEGA_I(kHz)	-20.56	-20.23	-20.48	-20.73	-20.32	-20.76	-21.27	-20.96	-21.10
OMEGA_O(kHz)	-1.75	-1.95	-0.93	-2.07	-1.36	-1.38	-2.17	-1.33	-2.02
OMEGA_IO(kHz)	-22.31	-22.18	-21.41	-22.80	-21.68	-22.14	-23.44	-22.29	-23.12
DEVM Average(%)	4.76	4.90	4.78	4.83	4.79	4.65	4.76	4.93	4.84
DEVM Peak(%)	10.13	10.33	9.95	10.61	9.92	9.93	10.24	10.48	10.71
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.14	-0.15	-0.16	-0.15	-0.16	-0.15	-0.15	-0.17	-0.15
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(%)	

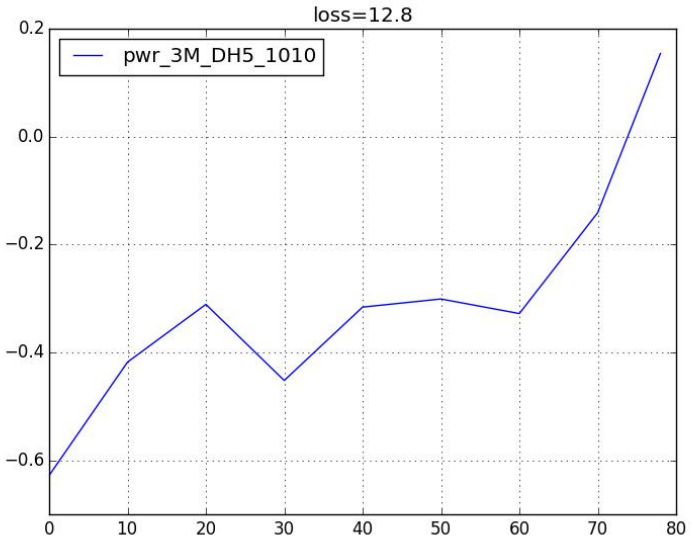
EdrPowDiffdB by channel	
Note:	**2M_DH5_prbs9 meets the test requirements**

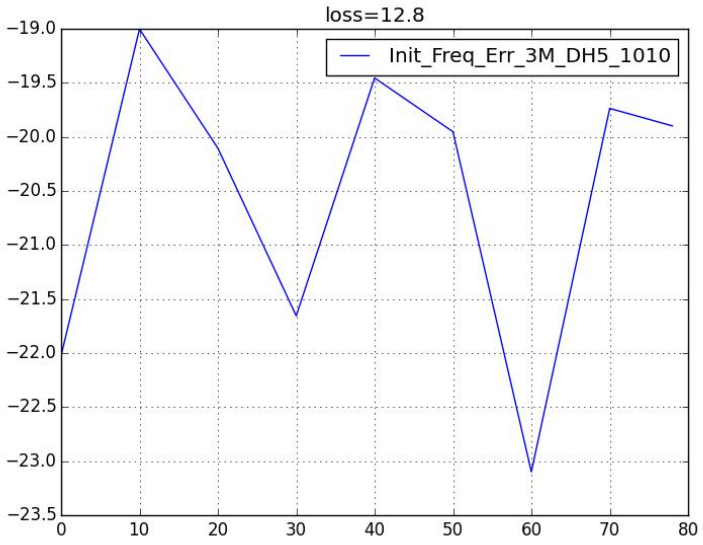
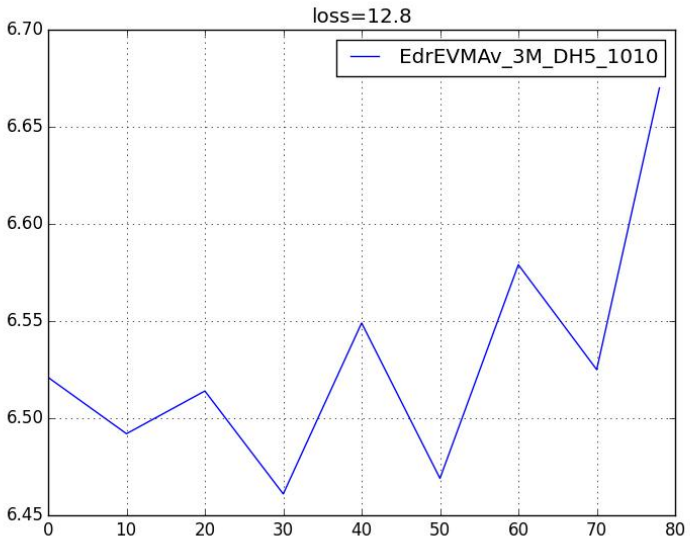
2.4Enhanced data rate 3M TX

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)	-0.63	-0.42	-0.31	-0.45	-0.32	-0.30	-0.33	-0.14	0.15
Init Freq Error(kHz)	-22.02	-19.00	-20.10	-21.66	-19.45	-19.95	-23.10	-19.74	-19.90
OMEGA_I(kHz)	-20.39	-20.70	-20.18	-20.17	-20.58	-20.72	-20.36	-20.18	-21.08
OMEGA_O(kHz)	-1.77	-1.68	-1.29	-1.44	-1.29	-1.38	-1.48	-2.14	-2.04
OMEGA_IO(kHz)	-22.16	-22.38	-21.46	-21.62	-21.87	-22.09	-21.84	-22.32	-23.13
DEVM Average(%)	6.52	6.49	6.51	6.46	6.55	6.47	6.58	6.53	6.67
DEVM Peak(%)	9.56	9.84	9.46	9.61	9.54	9.33	9.52	10.21	10.17
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.18	-0.14	-0.17	-0.17	-0.16	-0.17	-0.18	-0.17	-0.18
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Power by channel									

Init Freq Error by channel	
DEVM Average(%) by channel	

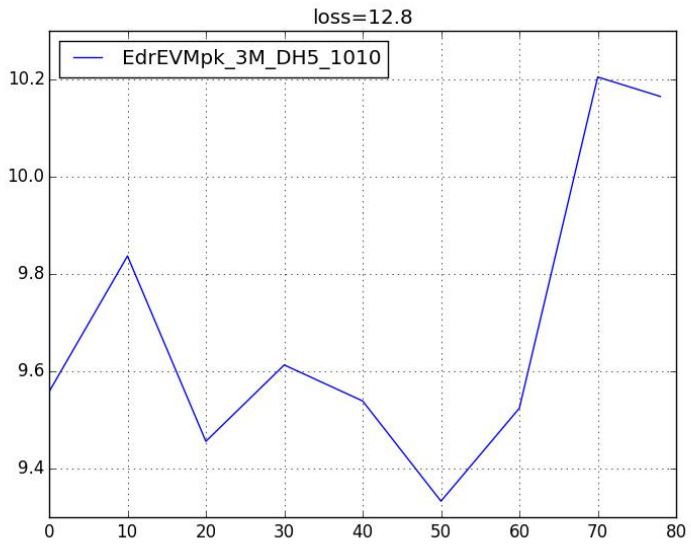
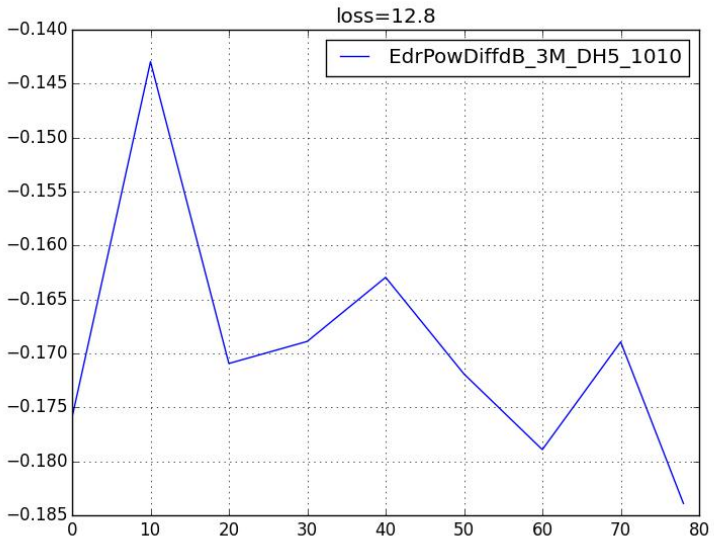
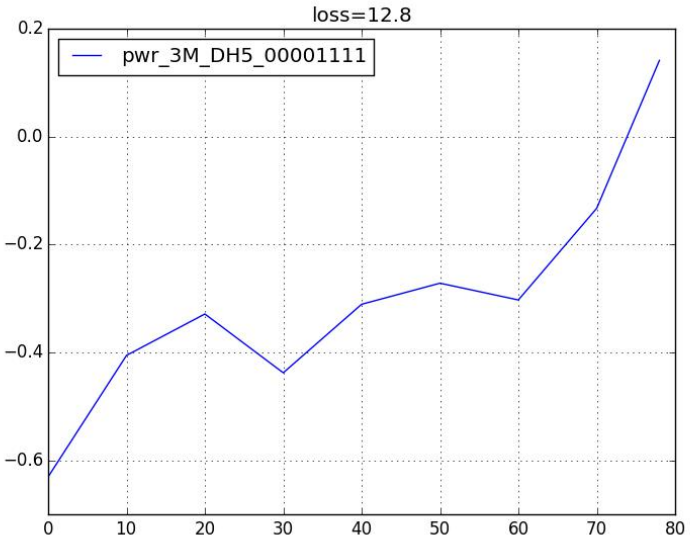
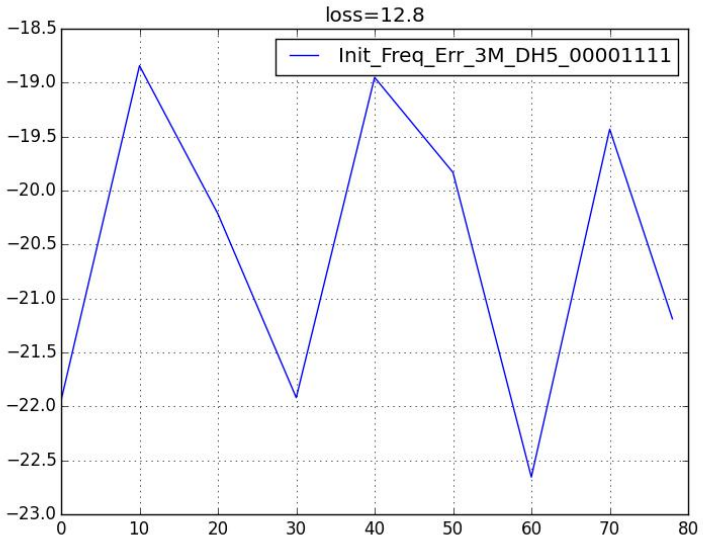
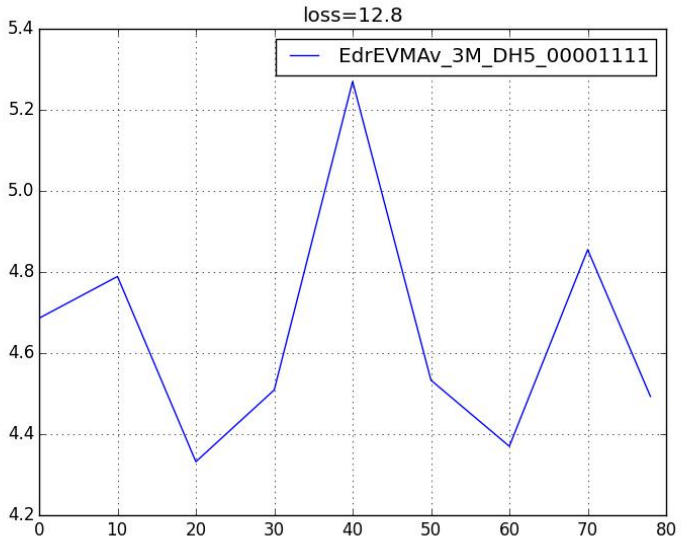
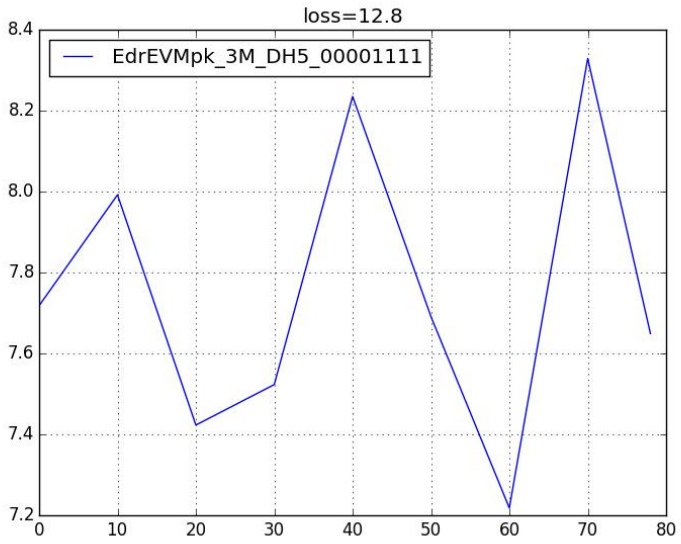
DEVM Peak(%)	
EdrPowDiffdB by channel	
Note:	**3M_DH5_1010 meets the test requirements**

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)	-0.63	-0.41	-0.33	-0.44	-0.31	-0.27	-0.30	-0.13	0.14
Init Freq Error(kHz)	-21.94	-18.84	-20.22	-21.92	-18.95	-19.83	-22.66	-19.43	-21.19
OMEGA_I(kHz)	-20.53	-20.03	-20.54	-20.42	-20.32	-20.39	-20.71	-20.48	-20.87
OMEGA_O(kHz)	-2.46	-1.21	-1.64	-1.56	-2.49	-1.55	-1.12	-1.93	-2.44

OMEGA_IO(kHz)	-22.99	-21.25	-22.18	-21.98	-22.81	-21.94	-21.83	-22.41	-23.31
DEVM Average(%)	4.69	4.79	4.33	4.51	5.27	4.53	4.37	4.85	4.49
DEVM Peak(%)	7.72	7.99	7.42	7.52	8.23	7.69	7.22	8.33	7.65
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.17	-0.18	-0.16	-0.16	-0.18	-0.15	-0.13	-0.15	-0.18
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(%)	

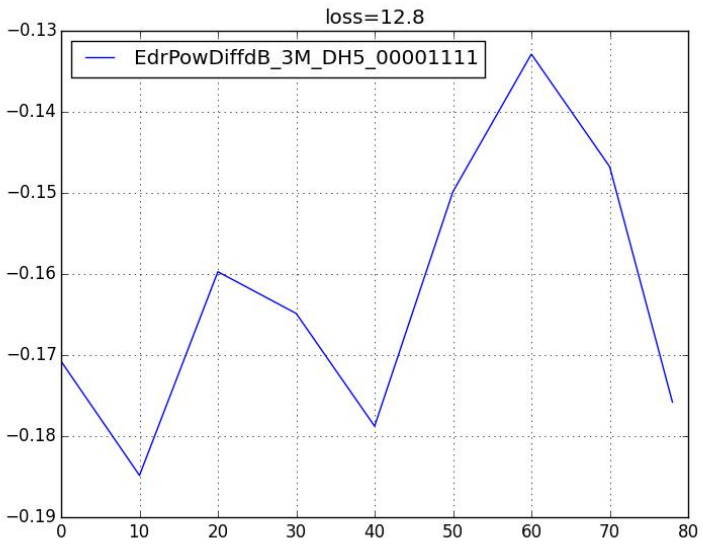
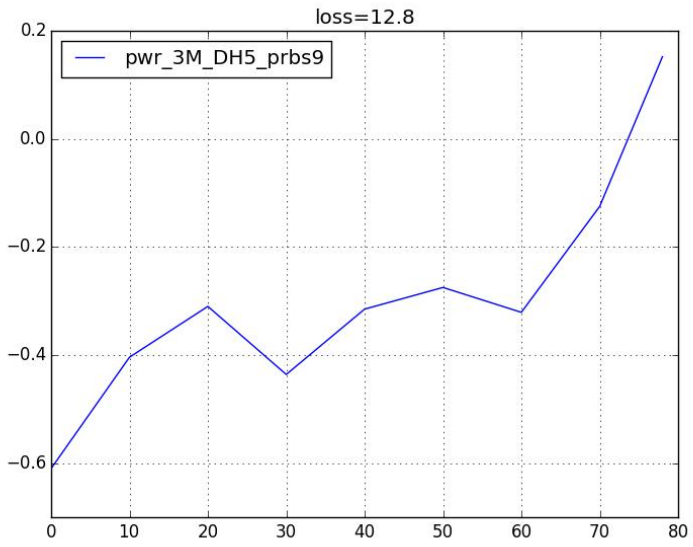
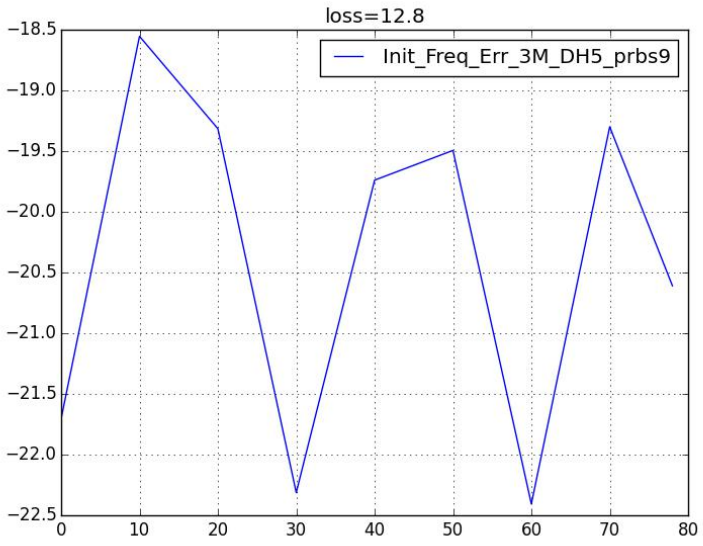
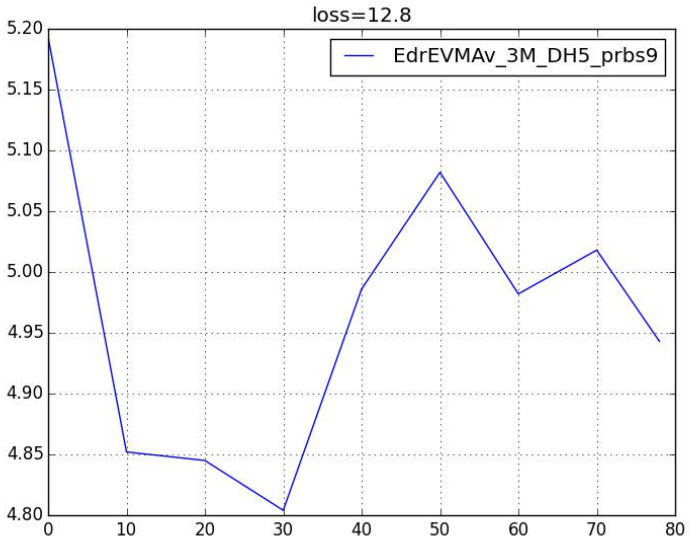
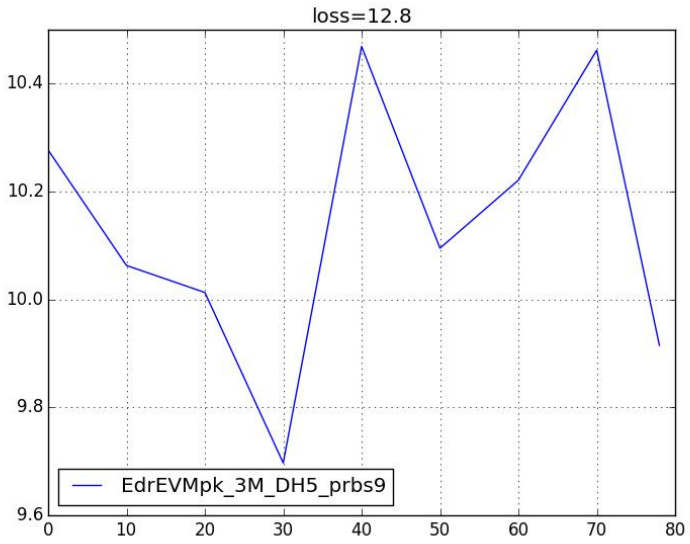
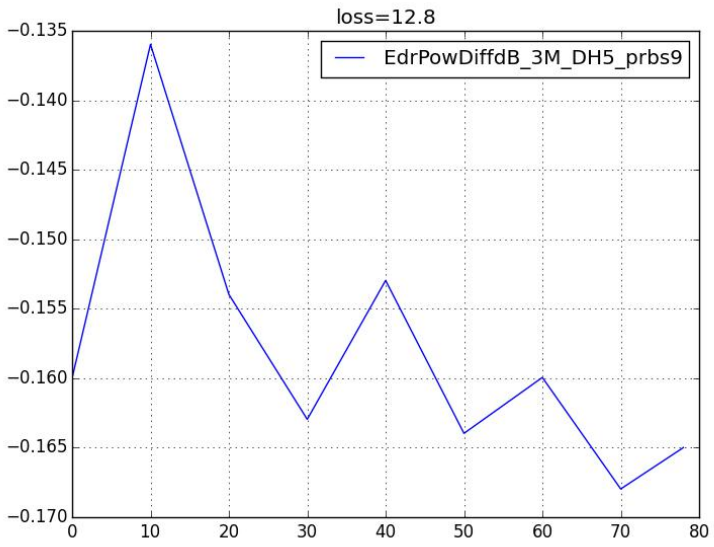
EdrPowDiffdB by channel	
Note:	**3M_DH5_00001111 meets the test requirements**

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)	-0.61	-0.40	-0.31	-0.44	-0.31	-0.27	-0.32	-0.12	0.15
Init Freq Error(kHz)	-21.70	-18.55	-19.32	-22.31	-19.74	-19.49	-22.41	-19.30	-20.61
OMEGA_I(kHz)	-20.10	-20.46	-20.47	-20.29	-20.81	-20.12	-20.80	-20.43	-20.23
OMEGA_O(kHz)	-1.63	-1.43	-1.35	-1.19	-2.53	-1.72	-1.83	-1.79	-1.51
OMEGA_IO(kHz)	-21.73	-21.89	-21.82	-21.48	-23.34	-21.84	-22.63	-22.22	-21.74
DEVM Average(%)	5.19	4.85	4.85	4.80	4.99	5.08	4.98	5.02	4.94
DEVM Peak(%)	10.28	10.06	10.01	9.70	10.47	10.10	10.22	10.46	9.92
EdrprobEVM99pass(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EdrPowDiffdB(dB)	-0.16	-0.14	-0.15	-0.16	-0.15	-0.16	-0.16	-0.17	-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	
DEVM Peak(%)	

EdrPowDiffdB by channel	
Note:	**3M_DH5_prbs9 meets the test requirements**

2.5 BLE TX

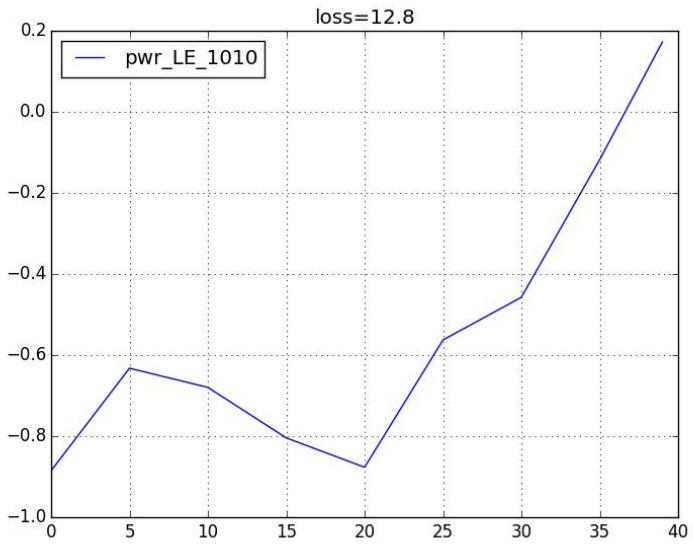
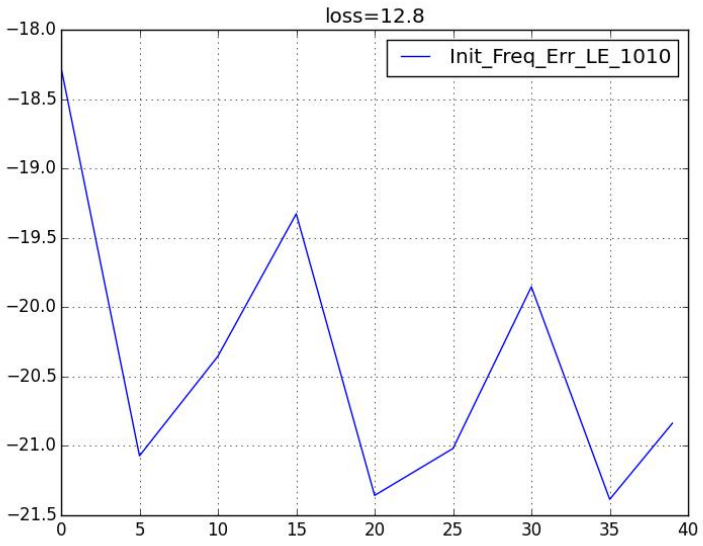
Requirement

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)	-0.89	-0.63	-0.68	-0.80	-0.88	-0.56	-0.46	-0.12	0.17
Init Freq Error(kHz)	-18.27	-21.07	-20.35	-19.33	-21.36	-21.02	-19.85	-21.38	-20.84
deltaF2Max(kHz)	225.83	222.12	225.86	227.07	224.55	222.97	228.19	224.13	224.41
deltaF2Avg(kHz)	218.38	215.90	220.20	220.11	218.22	216.82	222.01	217.71	218.25
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

Power by channel	
Init Freq Error by channel	

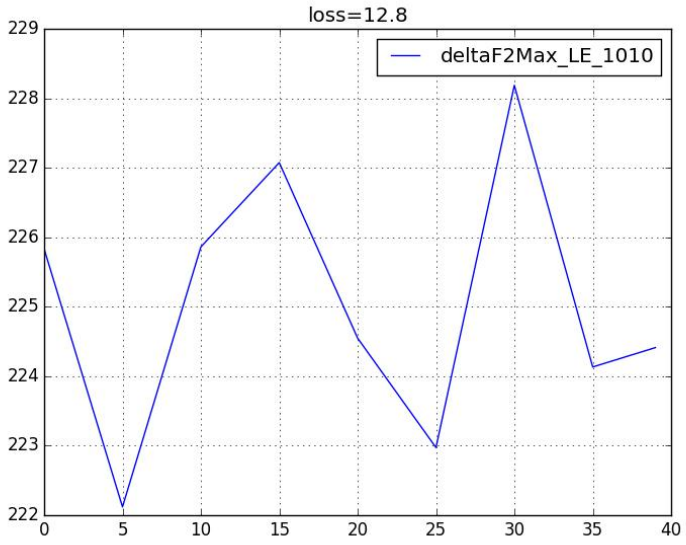
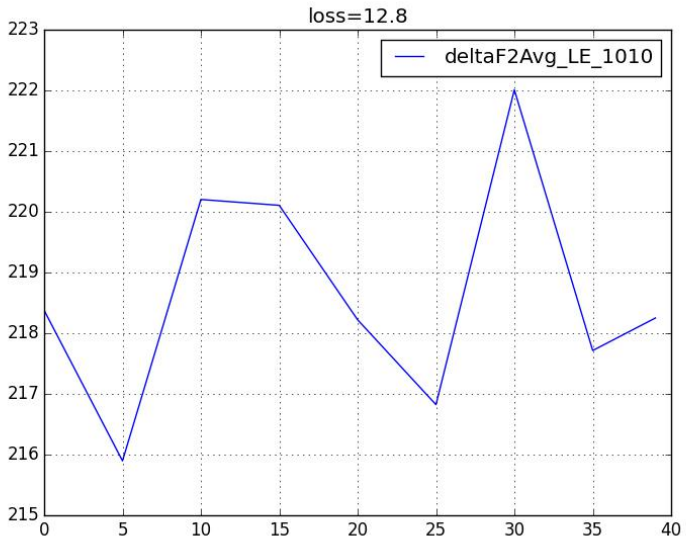
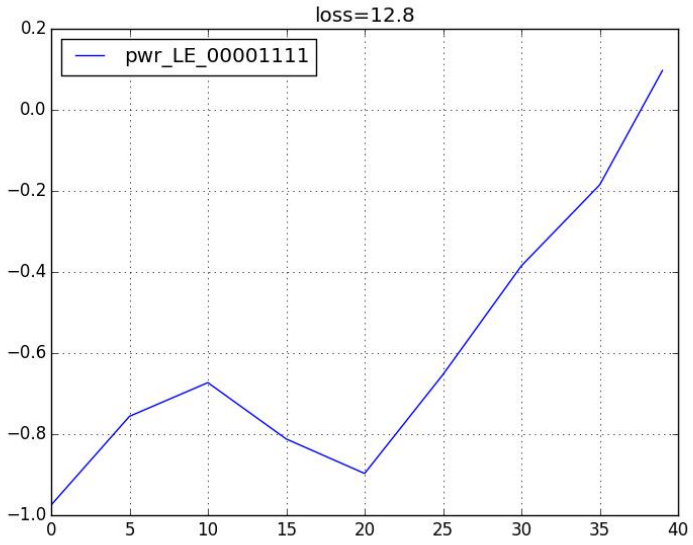
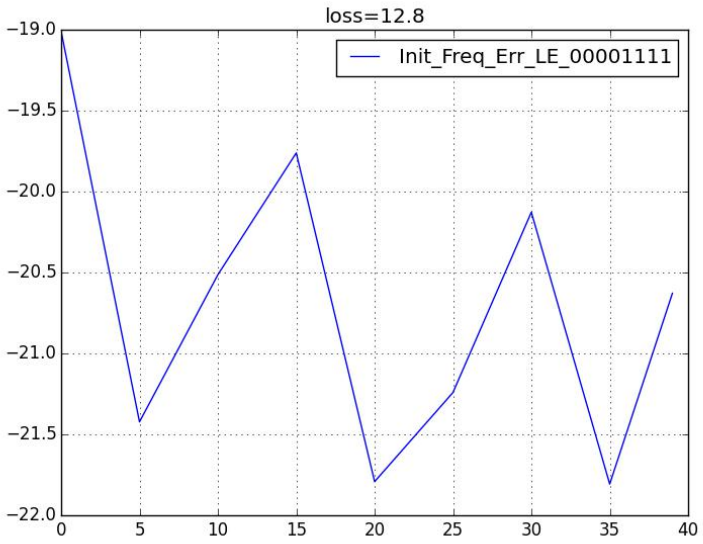
deltaF2Max by channel	
deltaF2Avg by channel	
Note:	**LE_1010 meets the test requirements**

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)	-0.97	-0.76	-0.67	-0.81	-0.90	-0.65	-0.38	-0.18	0.10
Init Freq Error(kHz)	-19.01	-21.42	-20.51	-19.76	-21.79	-21.24	-20.13	-21.81	-20.63
deltaF1Avg(kHz)	243.17	242.85	244.31	243.74	244.78	244.44	244.85	243.57	242.03
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

Power by channel	
Init Freq Error by channel	

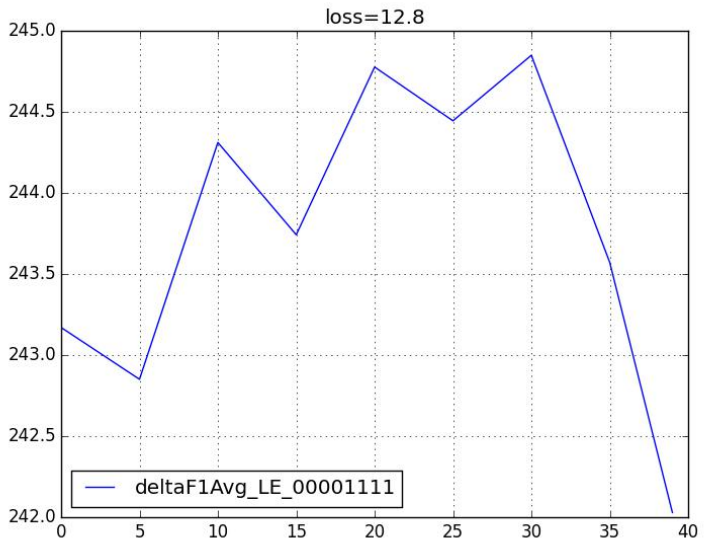
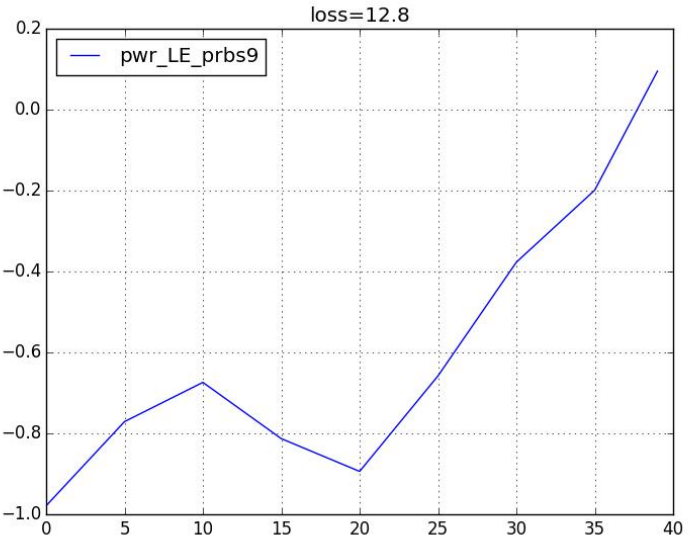
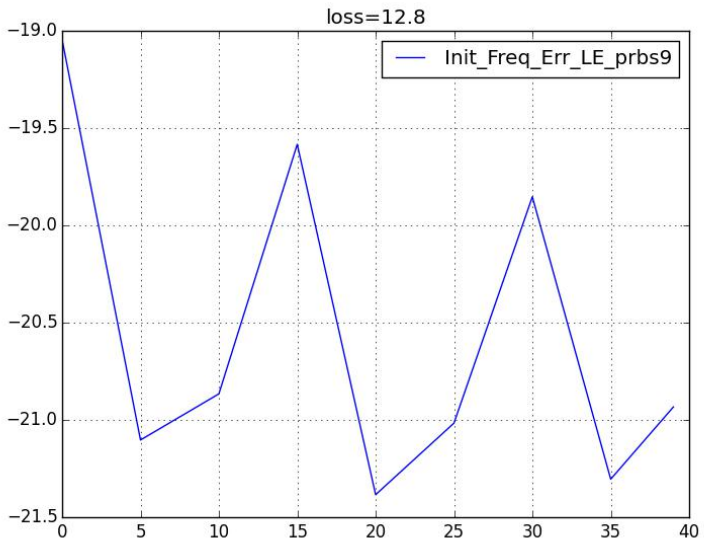
deltaF1Avg by channel	
Note:	**LE_00001111 meets the test requirements**

Table1 20

Data rate	**LE_prbs9**								
Channel	0	5	10	15	20	25	30	35	39
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
Output Power(dBm)	-0.98	-0.77	-0.67	-0.81	-0.89	-0.66	-0.38	-0.20	0.10
Init Freq Error(kHz)	-19.05	-21.10	-20.87	-19.58	-21.38	-21.02	-19.85	-21.30	-20.93
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Power by channel									

Init Freq Error by channel	
Note:	**LE_prbs9 meets the test requirements**

2.5 Receiver sensitivity

Requirement

Table 21

Data rate	Sensitivity
BR (dBm)	<-80 dBm @PER=30%
2M EDR(dBm)	<-80 dBm @PER=30%
3M EDR(dBm)	<-72 dBm @PER=30%
BLE(dBm)	<-85 dBm @PER=30%

Table1 22

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
sens	-87.00	-87.00	-87.00	-86.00	-86.00	-86.00	-86.00	-86.00	-86.00
rssi	-88.42	-88.42	-88.48	-87.59	-87.57	-87.48	-87.45	-87.56	-87.46
PER	15.02	27.06	20.80	19.90	19.50	8.16	13.33	14.03	24.38
BER	0.01	0.53	0.04	0.03	0.30	0.03	0.04	0.09	0.10
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

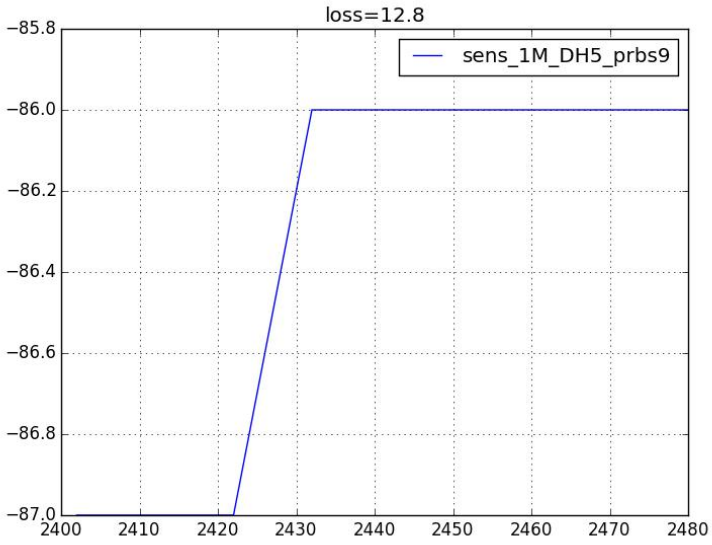
Sensitivity by channel	
Note：	**1M_DH5_prbs9 meets the test requirements**

Table1 23

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
sens	-88.00	-88.00	-88.00	-88.00	-87.00	-88.00	-87.00	-87.00	-84.00
rssi	-89.77	-89.75	-89.82	-90.01	-88.91	-89.95	-88.95	-88.91	-85.94
PER	7.96	19.90	14.33	18.01	22.59	25.67	9.85	6.47	14.03
BER	0.00	0.26	0.01	0.01	0.17	0.01	0.01	0.00	0.00
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

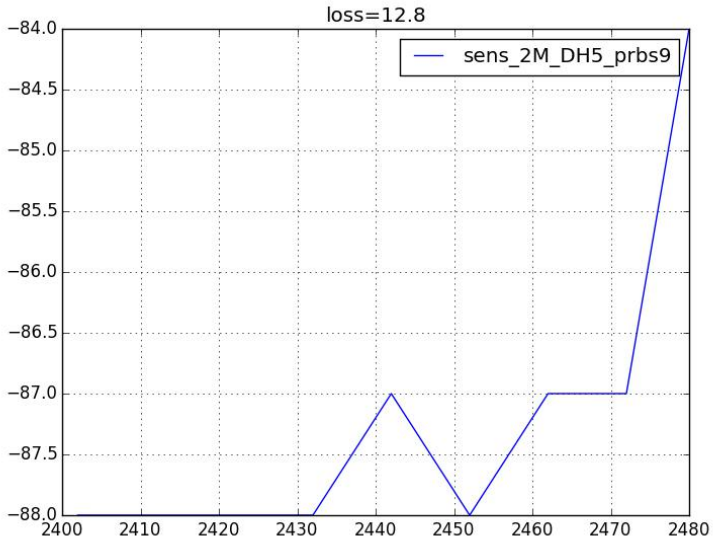
Sensitivity by channel	
Note：	**2M_DH5_prbs9 meets the test requirements**

Table1 24

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
sens	-82.00	-81.00	-81.00	-81.00	-81.00	-81.00	-81.00	-81.00	-77.00
rssi	-83.17	-82.02	-82.19	-82.29	-82.17	-82.20	-82.24	-82.28	-78.00
PER	27.06	21.19	12.84	17.81	29.35	23.38	27.86	22.79	13.43
BER	0.01	0.20	0.00	0.01	0.07	0.01	0.01	0.01	0.02
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass

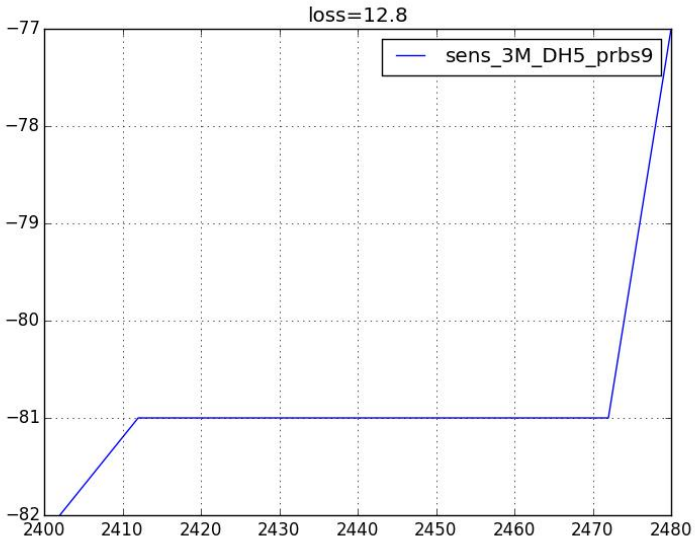
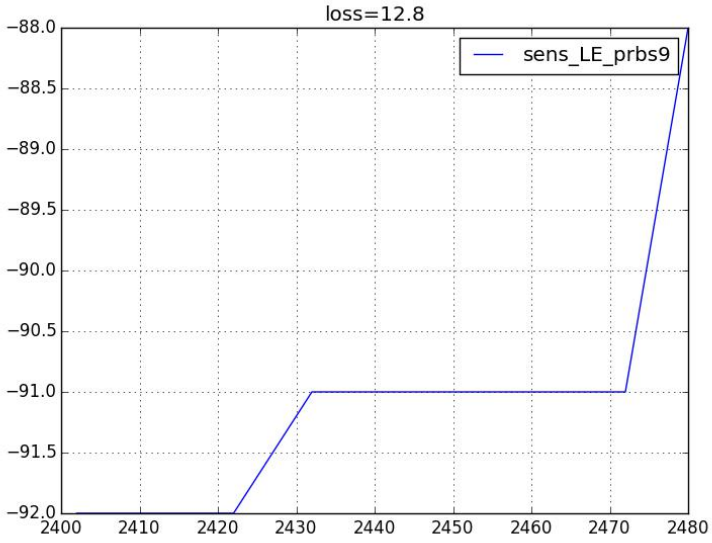
Sensitivity by channel	
Note：	**3M_DH5_prbs9 meets the test requirements**

Table1 25

Data rate	**LE_prbs9**								
Channel	0	5	10	15	20	25	30	35	39
Frequency	2402	2412	2422	2432	2442	2452	2462	2472	2480
sens	-92.00	-92.00	-92.00	-91.00	-91.00	-91.00	-91.00	-91.00	-88.00
rssi	-93.87	-93.86	-93.89	-93.13	-92.97	-92.96	-92.95	-93.18	-89.83
PER	21.19	28.36	29.25	10.65	23.78	13.83	21.00	16.32	28.56
Pass/Fail	pass	pass	pass	pass	pass	pass	pass	pass	pass
Sensitivity by channel									

Note：	**LE_prbs9 meets the test requirements**