9.4 Test Result and Data

Test Date: Mar. 19, 2018 Temperature: 26℃

Atmospheric pressure: 1000hPa Humidity: 55%

Modulation Standard	Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)
GFSK	0	2402	3.58	2.28
	38	2440	3.29	2.13
	78	2480	3.04	2.01
π/4DQPSK	0	2402	2.95	1.97
	38	2440	2.63	1.83
	78	2480	2.47	1.76
8DPSK	0	2402	2.35	1.72
	38	2440	2.16	1.64
	78	2480	1.89	1.55

10. Carrier Frequency Separation

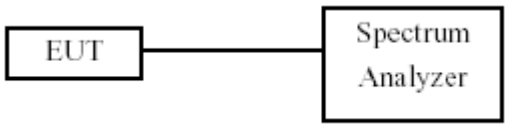
10.1 Test Limit

a. Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

10.2 Test Procedures

b. The transmitter output was connected to spectrum analyzer.
c. The spectrum analyzer's resolution bandwidth were set at 100KHz RBW and 300KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
d. The Carrier Frequency Separation was measured and recorded.

10.3 Test Setup Layout



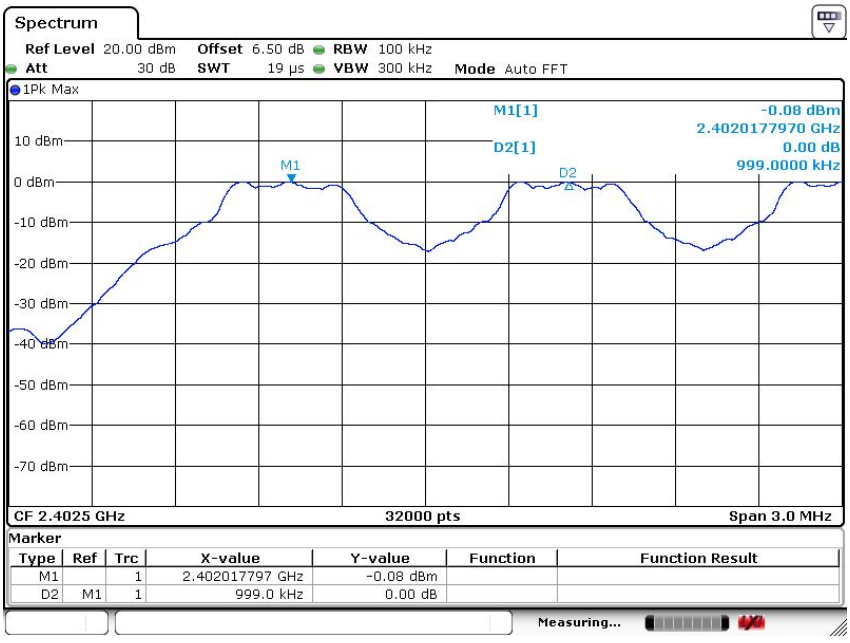
10.4 Test Result and Data

Test Date: Mar. 19, 2018 Temperature: 26℃

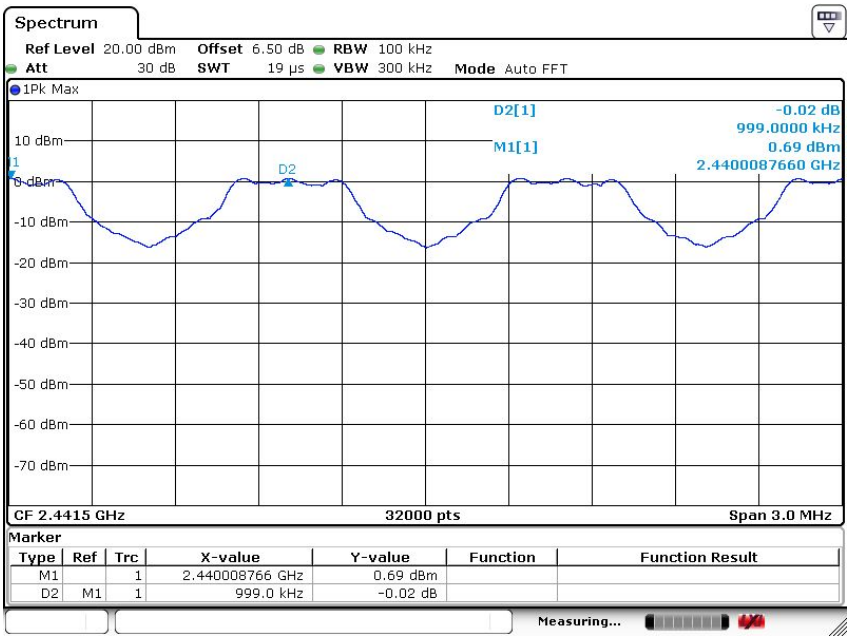
Atmospheric pressure: 1000 hPa Humidity: 55%

Mode/Channel	Channel separation (KHz)	20dB Bandwidth (MHz)	Conclusion
GFSK	999.0	1.1180	PASS
π/4 DQPSK	999.0	1.3680	PASS
8- DPSK	999.0	1.3535	PASS

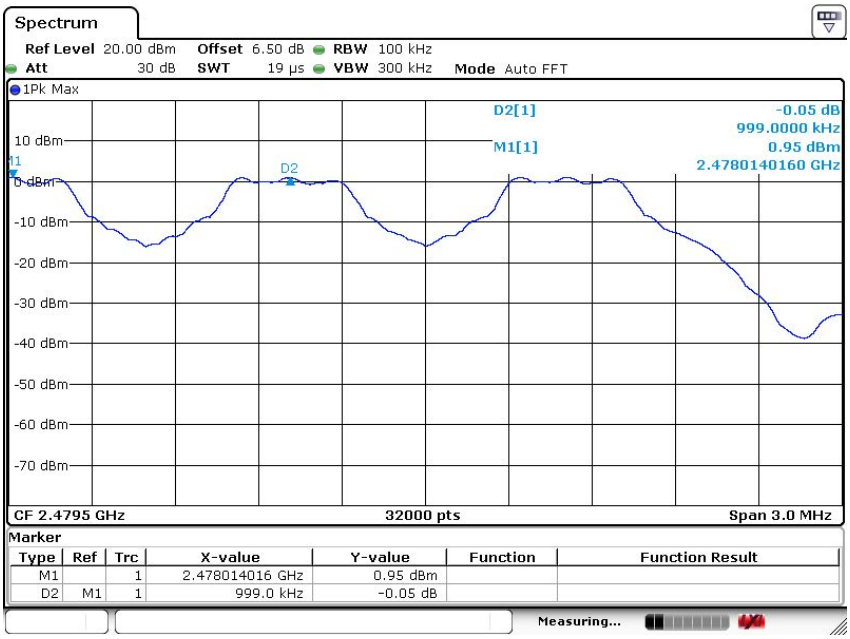
Modulation Standard: GFSK
Channel: 0



Modulation Standard: π/4 DQPSK
Channel: 39



Modulation Standard: 8- DPSK
Channel: 78



11. Number Of Hopping Channel

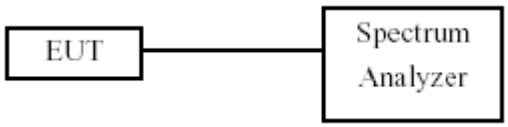
11.1 Test Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

11.2 Test Procedure

a. The transmitter output was connected to the spectrum analyzer via a low lose cable.
b. The transmitter output was coupled to a spectrum analyzer via a antenna. The number of hopping channel was measured by spectrum analyzer with 300kHz RBW and 1MHz VBW.
c. The number of hopping channel was measured and recorded.

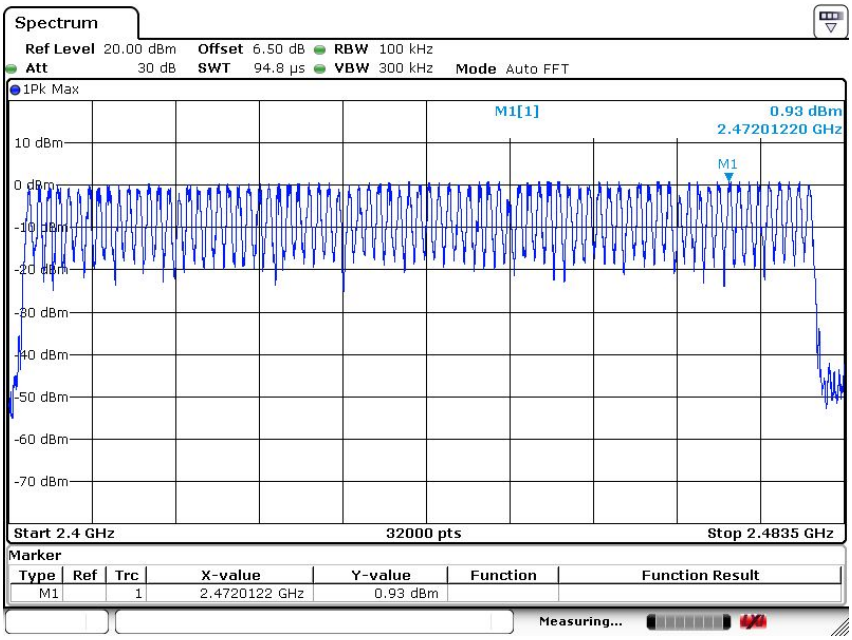
11.3 Test Setup Layout



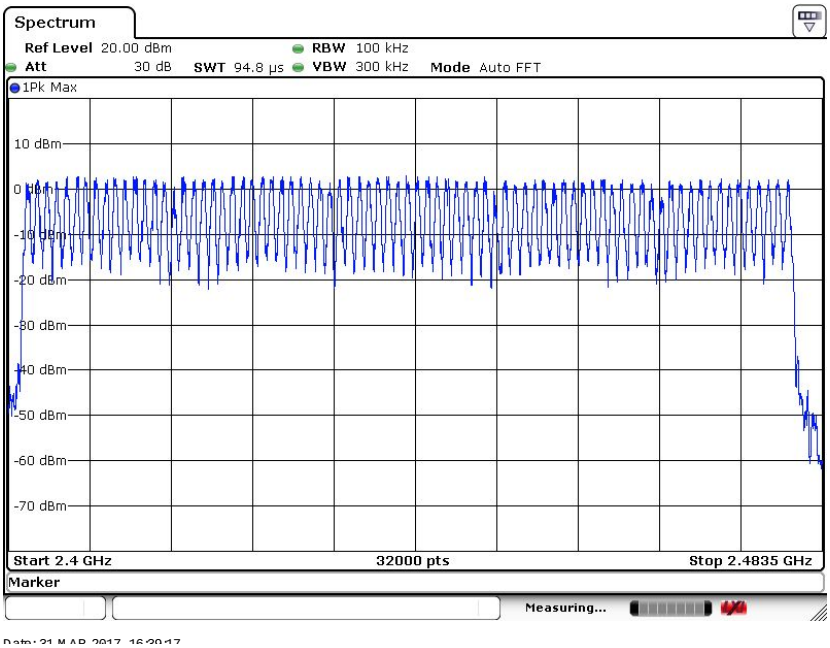
11.4 Test Result and Data

Original test data for hopping channel number

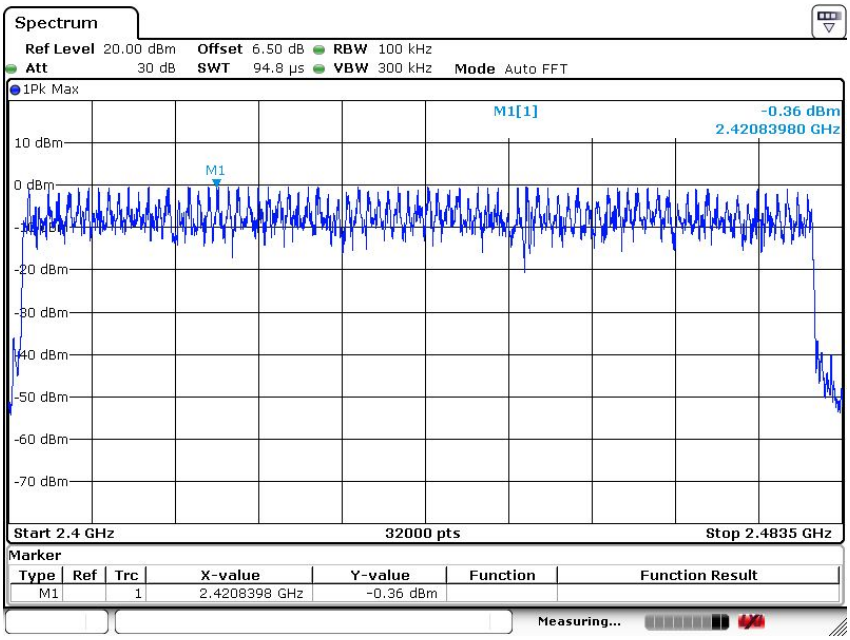
GFSK



π/4-QPSK



8- DPSK


Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1]
-0.36 dBm
2.42083980 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
Start 2.4 GHz
32000 pts
Stop 2.4835 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4208398 GHz -0.36 dBm
Measuring...

12. Dwell Time

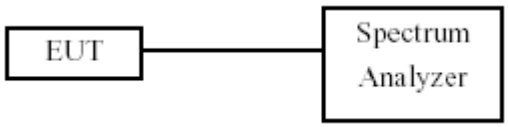
12.1 Test Limit

Please refer RSS-247 & section15.247

12.2 Test Procedure

d. The transmitter output was connected to the spectrum analyzer via a low lose cable.
e. The transmitter output was coupled to a spectrum analyzer via a antenna. Set center frequency of spectrum analyzer = operating frequency
f. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
g. Repeat above procedures until all frequency measured were complete

12.3 Test Setup Layout



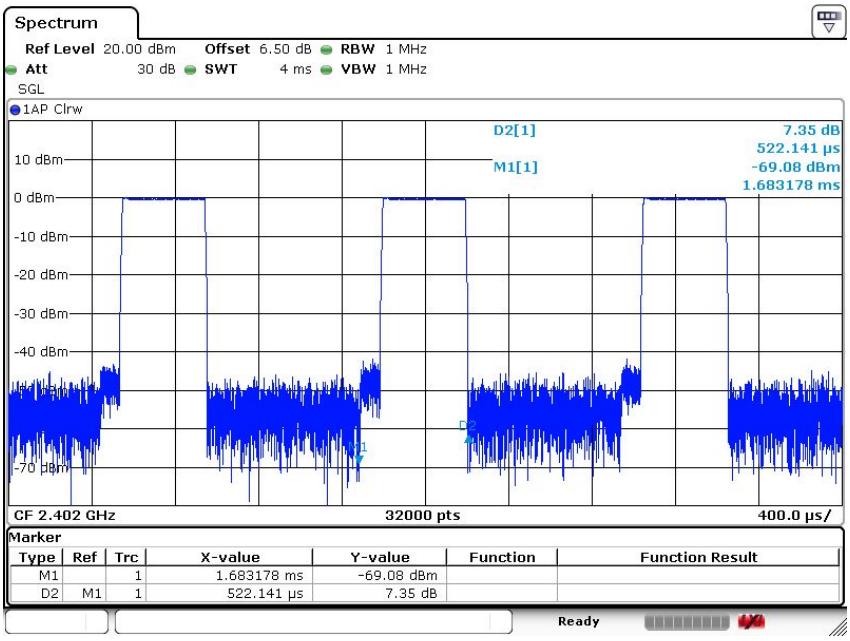
12.4 Test Result and Data

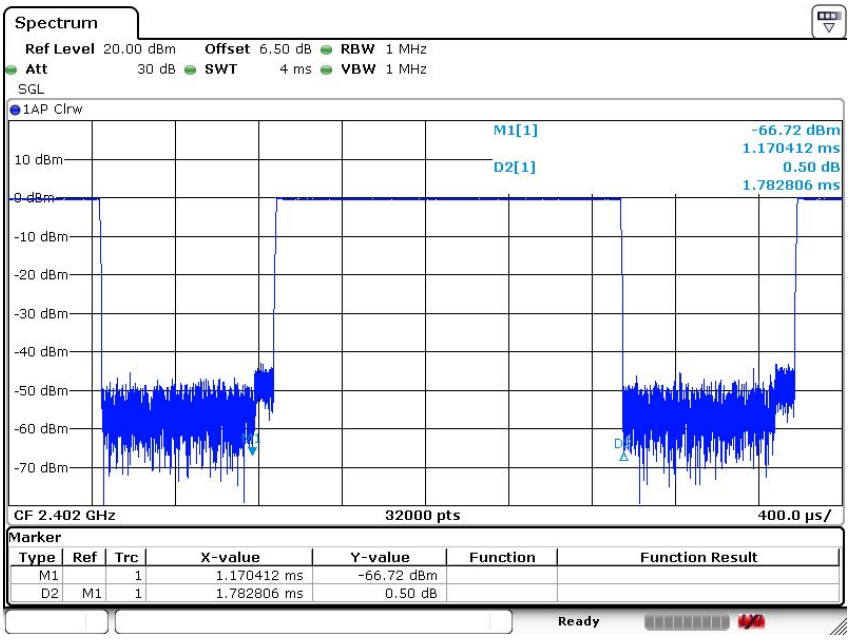
Original test data see the following page.

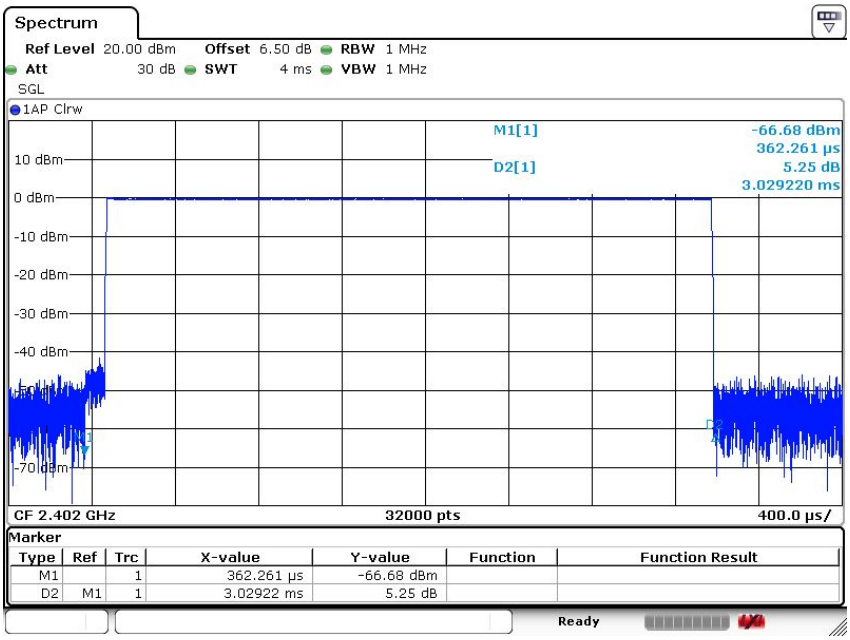
Mode	Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Conclusion
GFSK	DH1	2402	0.522	0.167	<0.4	PASS
	DH3	2402	1.783	0.296	<0.4	PASS
	DH5	2402	3.029	0.323	<0.4	PASS
π/4-QPSK	DH1	2402	0.378	0.121	<0.4	PASS
	DH3	2402	1.630	271	<0.4	PASS
	DH5	2402	2.879	0.307	<0.4	PASS
8- DPSK	DH1	2402	0.443	0.139	<0.4	PASS
	DH3	2402	1.693	0.281	<0.4	PASS
	DH5	2402	2.943	0.314	<0.4	PASS

Note: 1 A period time = 0.4 (s) * 79 = 31.6(s)
2 DH1 time slot = Pulse Duration * (1600/(1*79)) * A period time DH3 time slot = Pulse Duration * (1600/(3*79)) * A period time DH5 time slot = Pulse Duration * (1600/(5*79)) * A period time

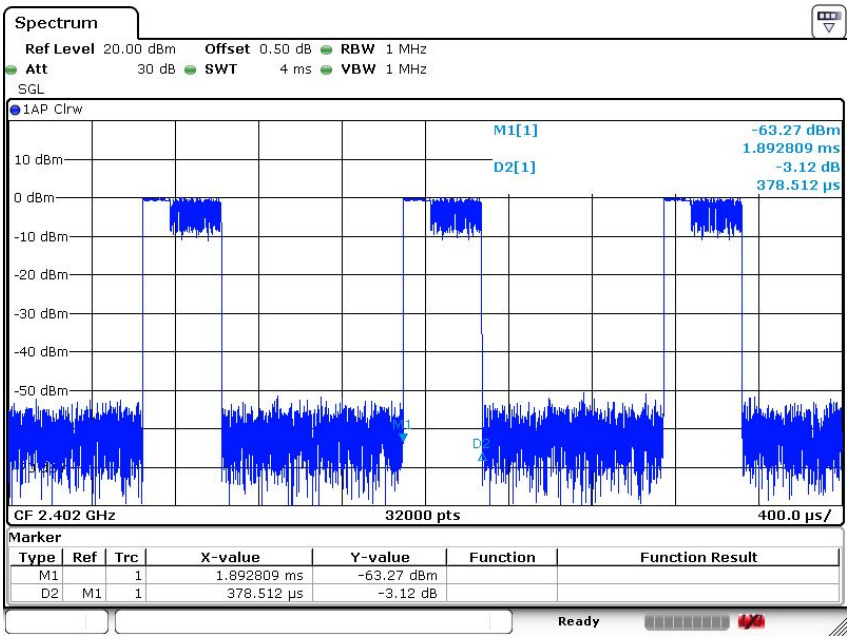
GFSK DH1/DH3/DH5

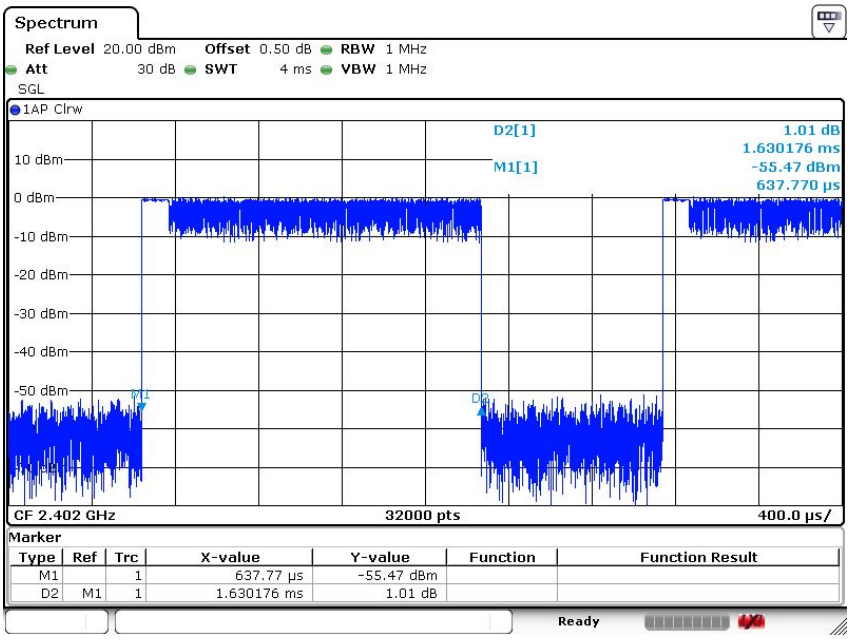


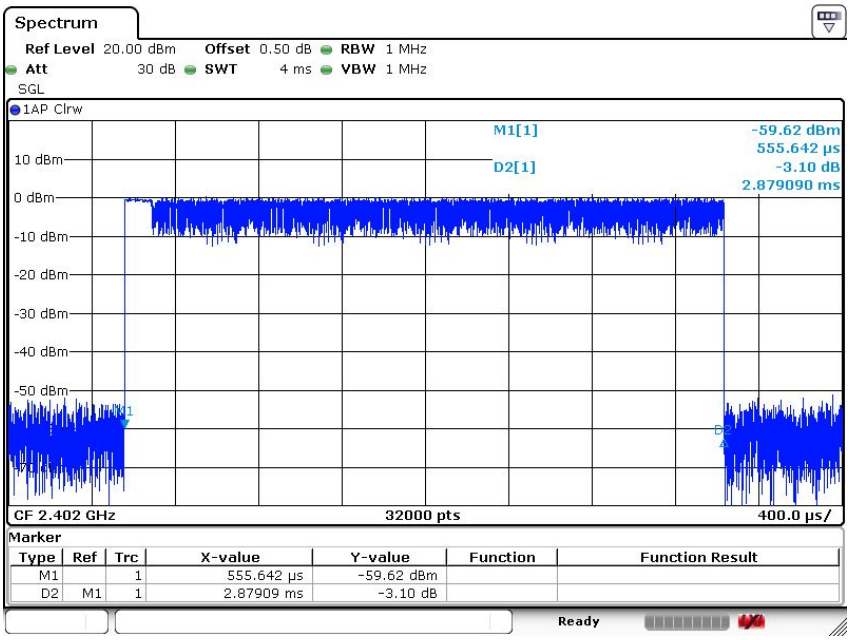



Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 4 ms VBW 1 MHz
SGL
1AP Clrw
M1[1] -66.68 dBm
362.261 µs
D2[1] 5.25 dB
3.029220 ms
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-70 dBm
CF 2.402 GHz
32000 pts
400.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 362.261 µs -66.68 dBm
D2 M1 1 3.02922 ms 5.25 dB
Ready

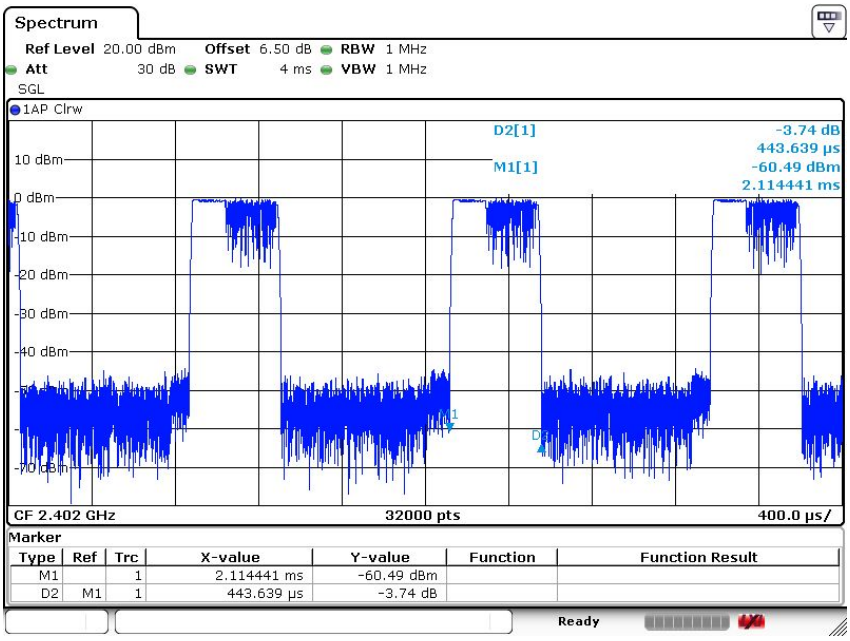
π/4-QPSK DH1/DH3/DH5

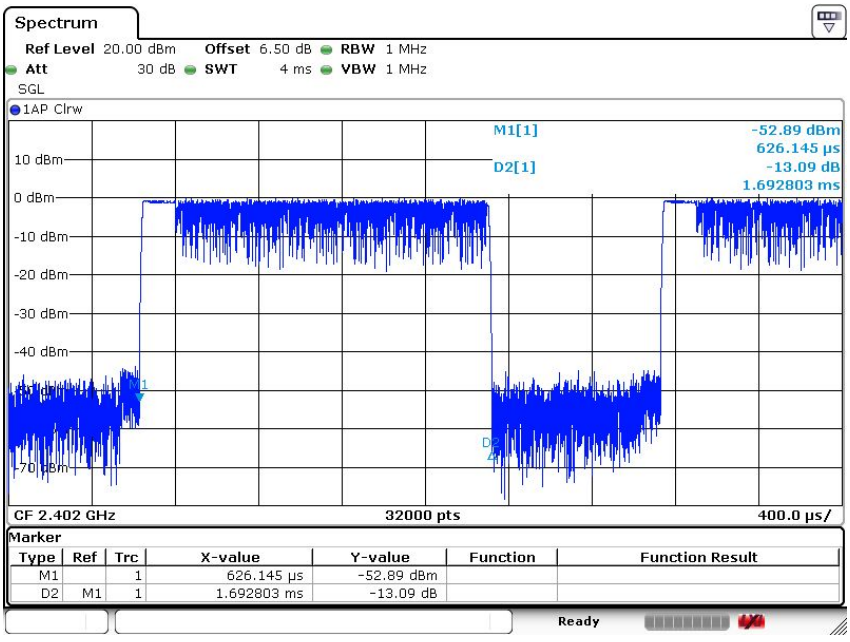


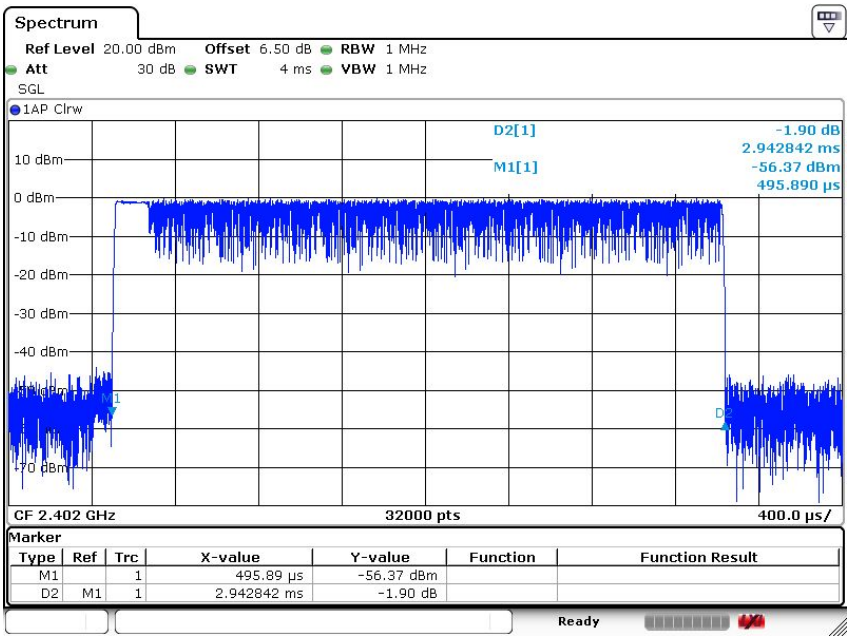



Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 1 MHz
Att 30 dB SWT 4 ms VBW 1 MHz
SGL
1AP Clrw
M1[1] -59.62 dBm
555.642 µs
D2[1] -3.10 dB
2.879090 ms
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
CF 2.402 GHz
32000 pts
400.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 555.642 µs -59.62 dBm
D2 M1 1 2.87909 ms -3.10 dB
Ready

8- DPSK DH1/DH3/DH5






Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 4 ms VBW 1 MHz
SGL
1AP Clrw
D2[1] -1.90 dB
2.942842 ms
M1[1] -56.37 dBm
495.890 µs
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-70 dBm
M1
D2
CF 2.402 GHz
32000 pts
400.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 495.89 µs -56.37 dBm
D2 M1 1 2.942842 ms -1.90 dB
Ready

13. Band Edges Measurement

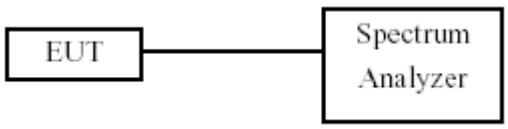
13.1 Test Limit

Below –20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

13.2 Test Procedure

h. The transmitter output was connected to the spectrum analyzer via a low lose cable.
i. Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
j. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
k. The band edges was measured and recorded.

13.3 Test Setup Layout

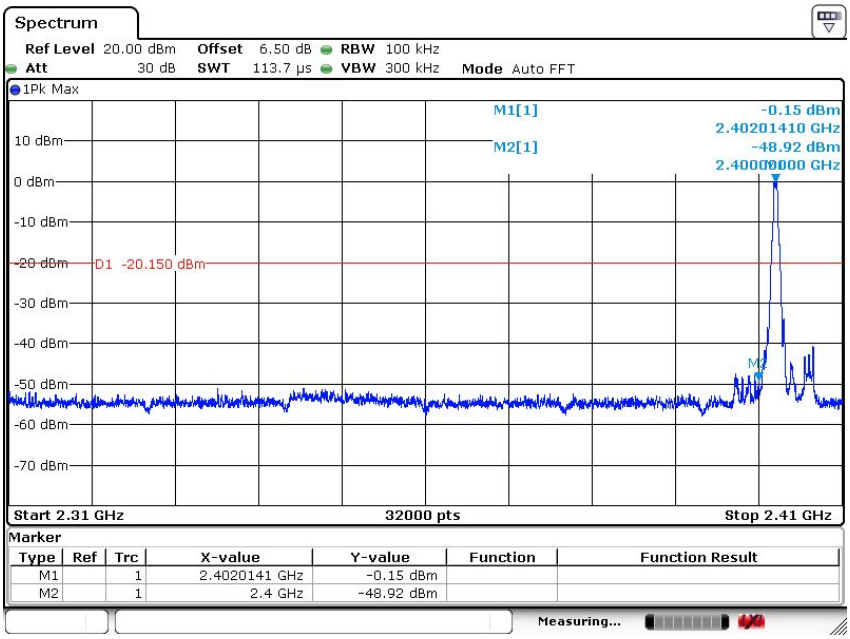


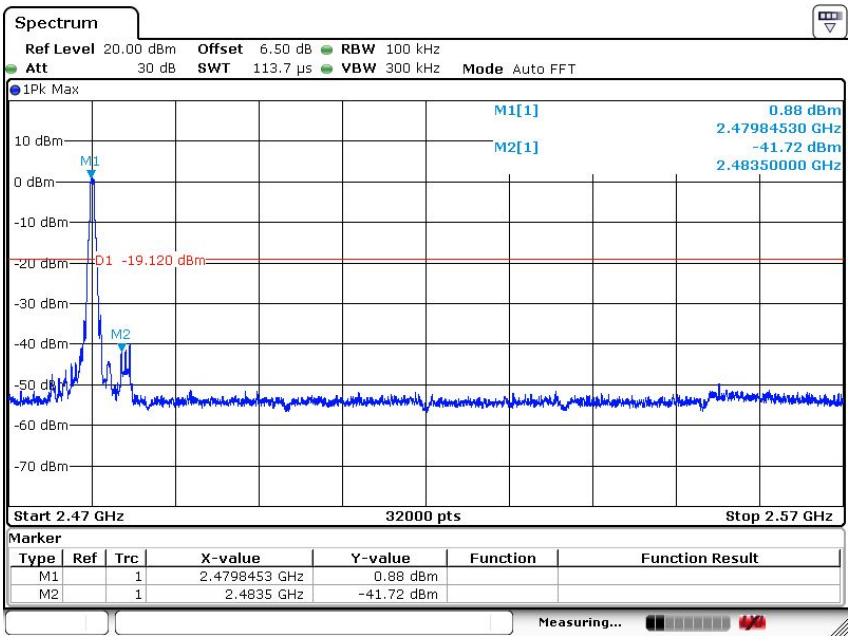
13.4 Test Result and Data

Test Date:Mar. 19, 2018 Temperature: 26℃

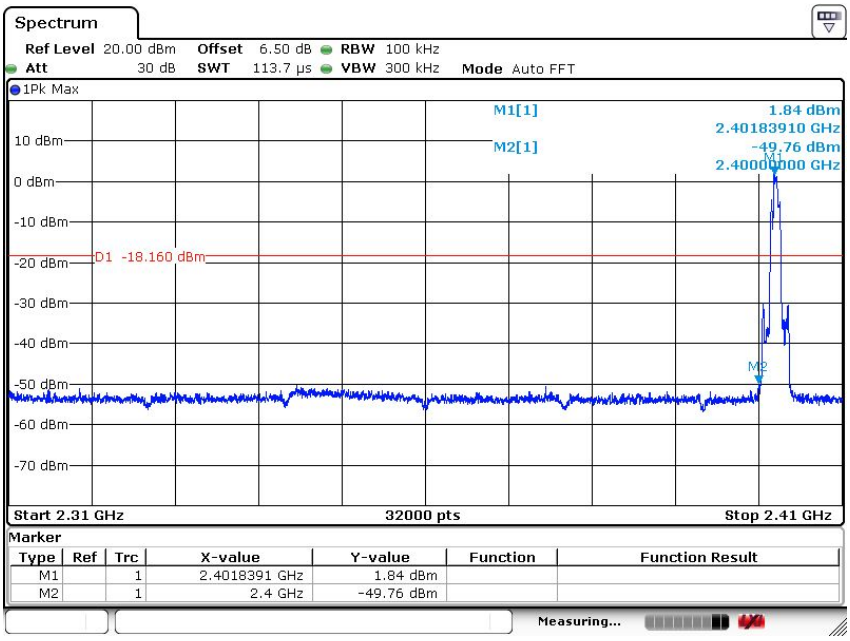
Atmospheric pressure: 1000hPa Humidity: 55%

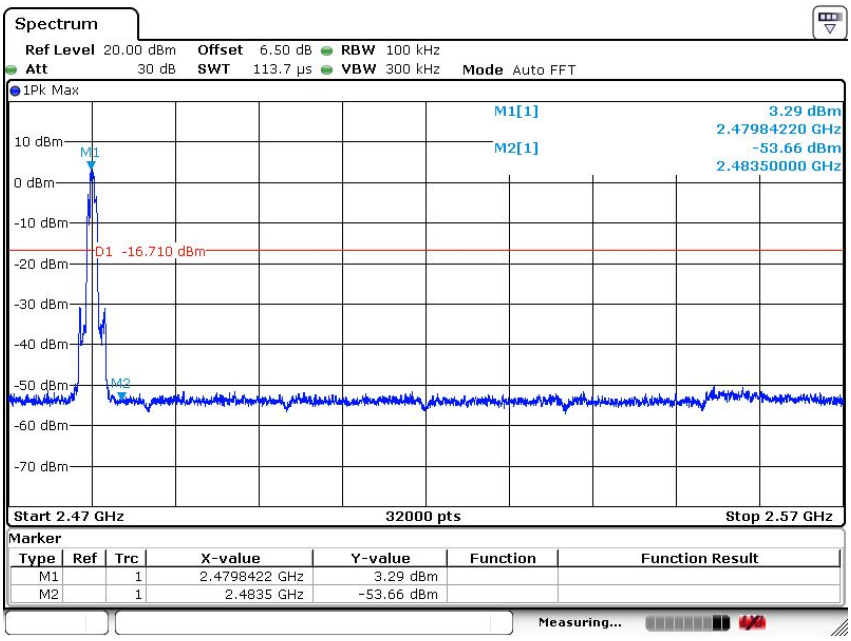
Modulation Standard: GFSK



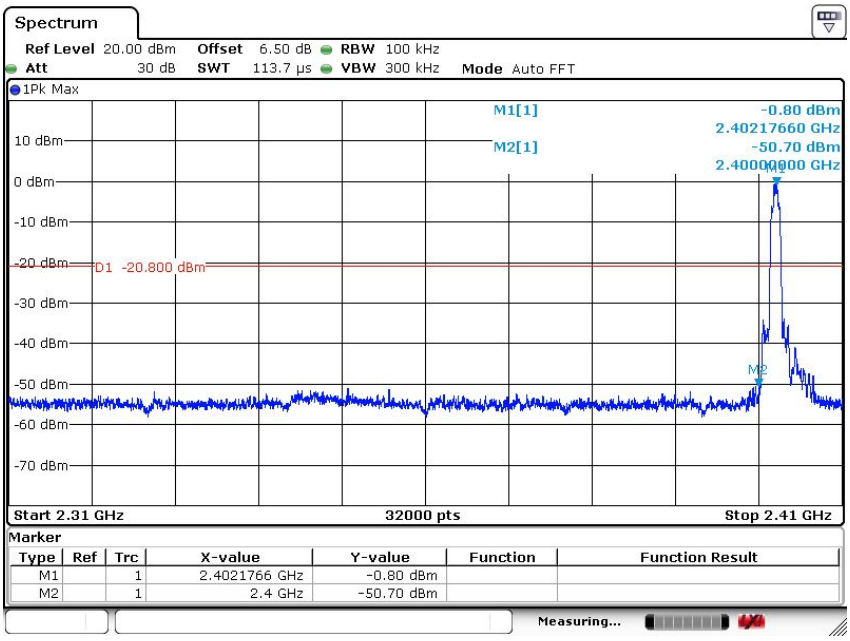


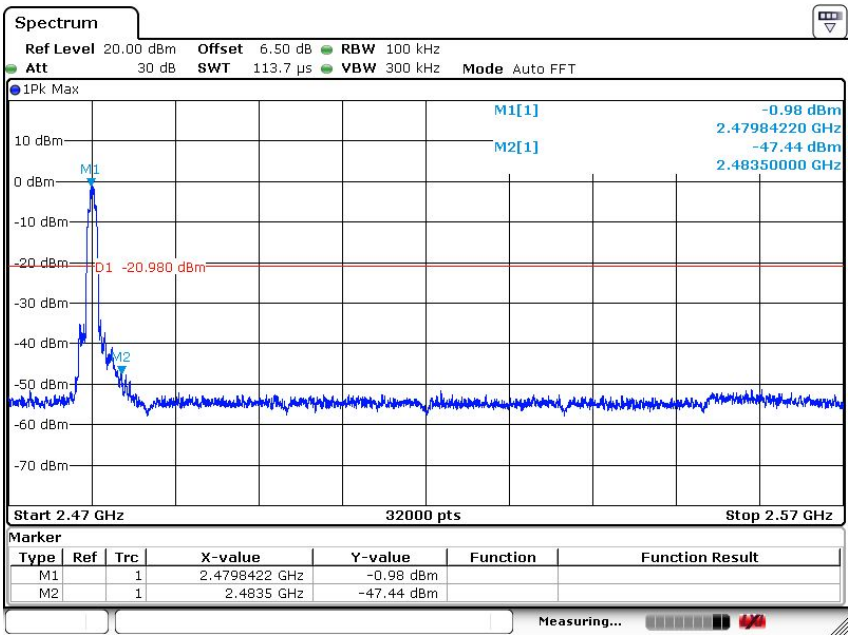
Modulation Standard: π/4-QPSK





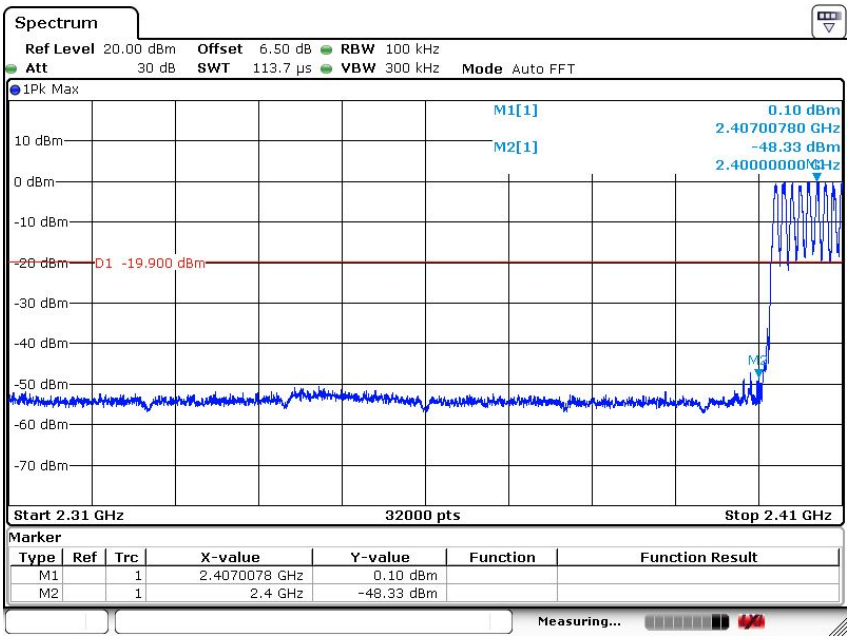
Modulation Standard: 8- DPSK

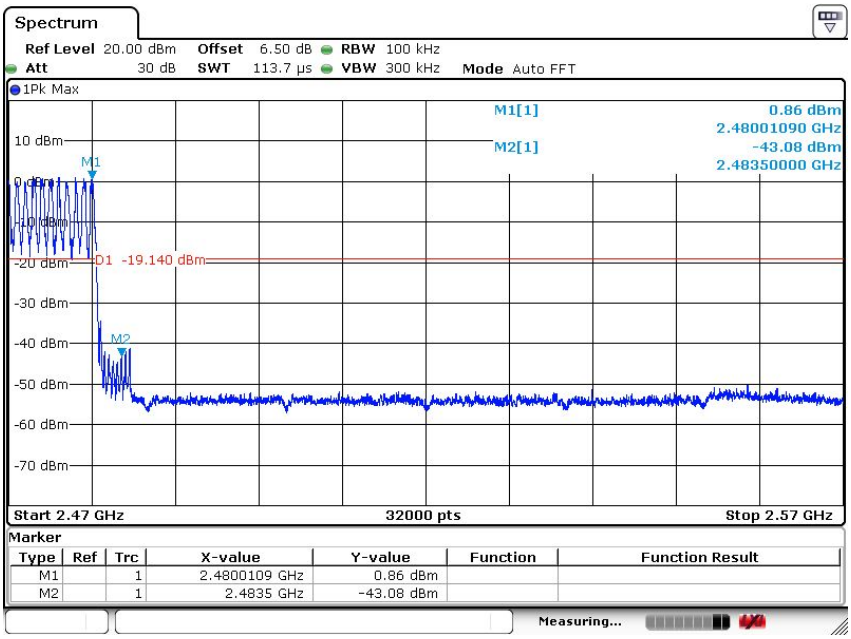




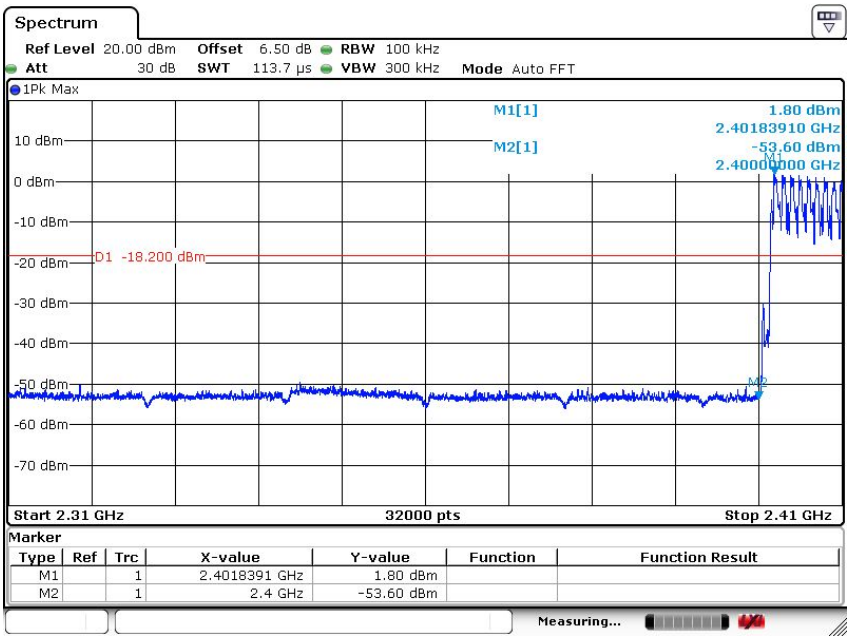
Hopping

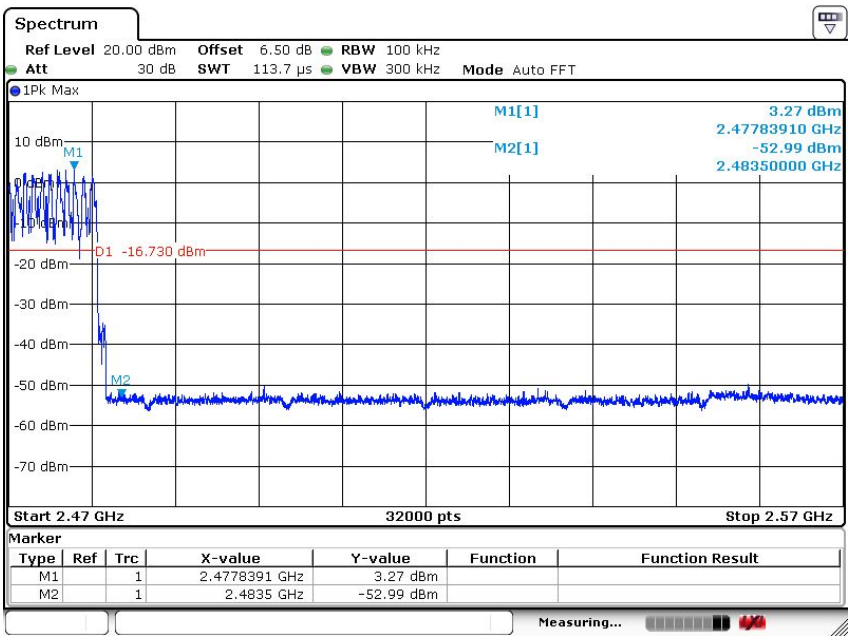
Modulation Standard: GFSK



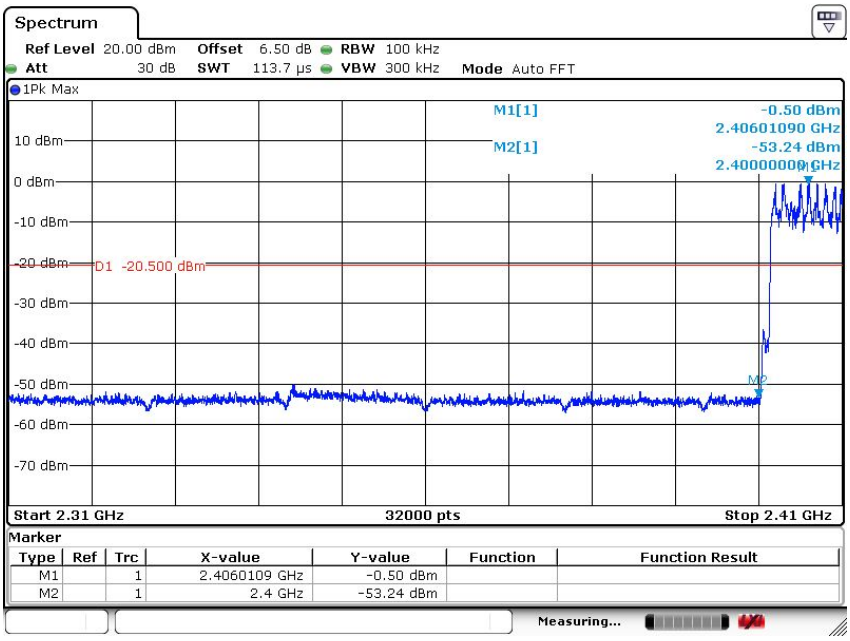


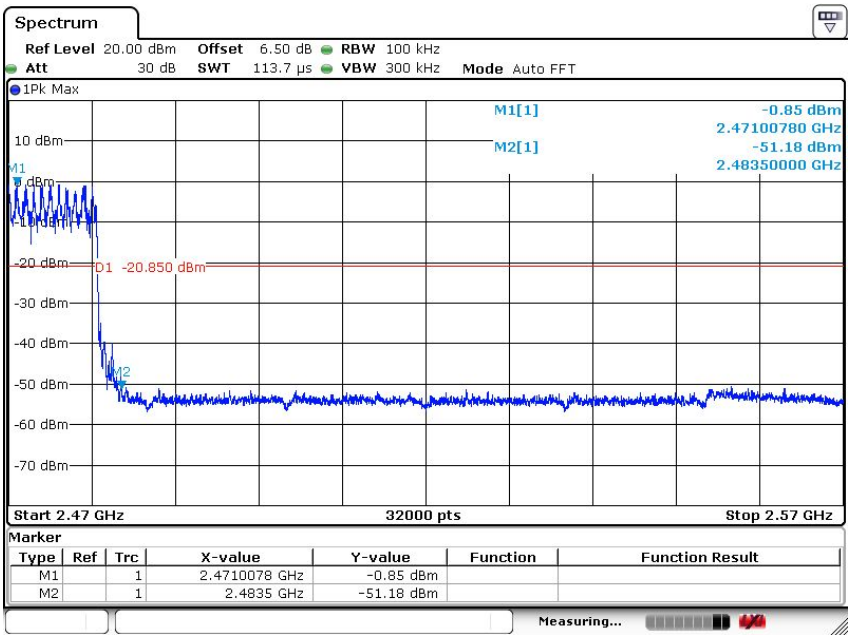
Modulation Standard: π/4-QPSK





Modulation Standard: 8- DPSK





14. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

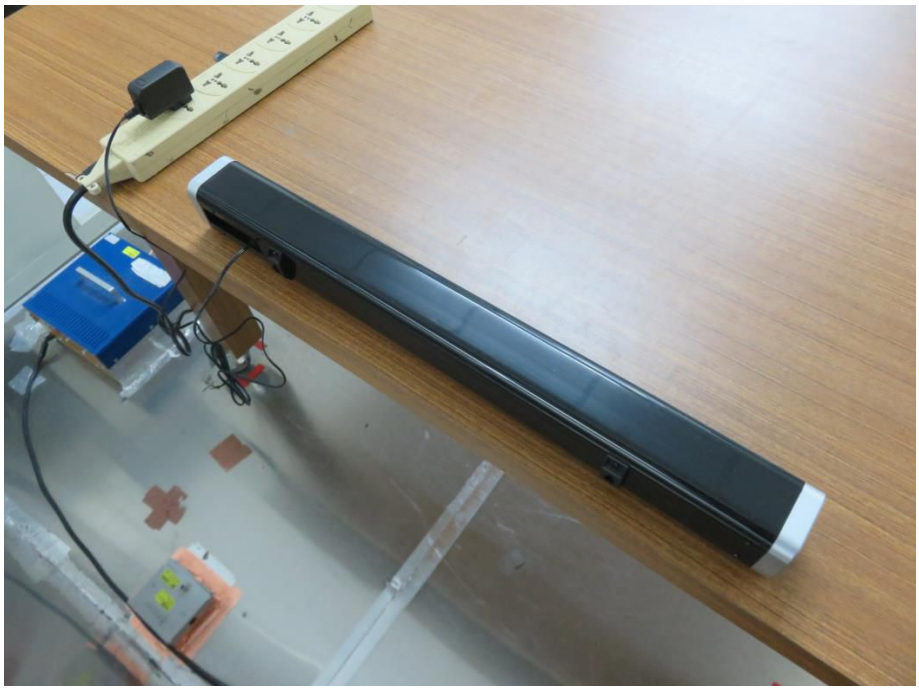
MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.150
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

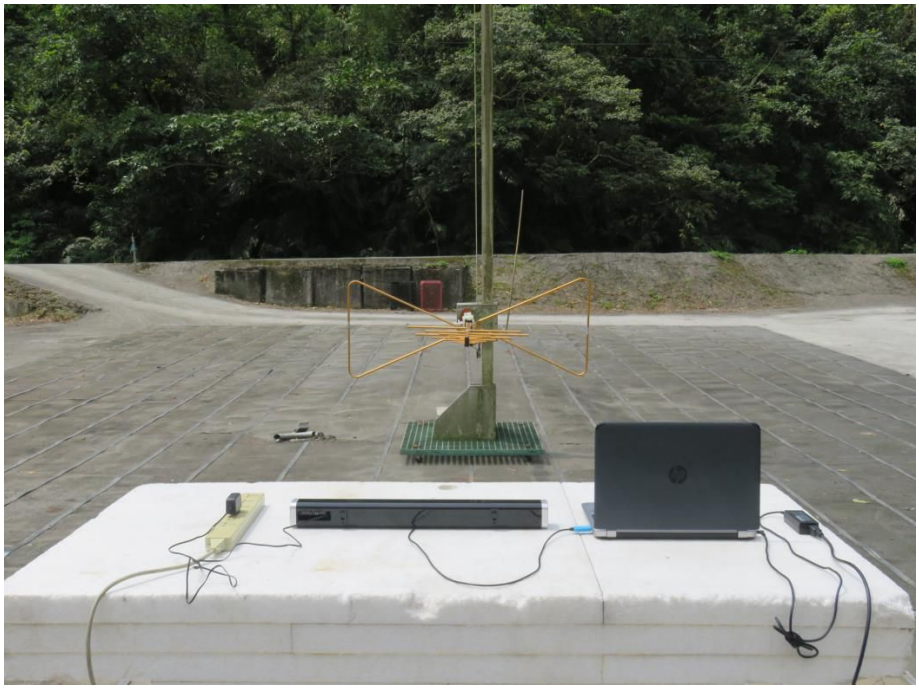
**: Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

14.1 Labeling Requirement

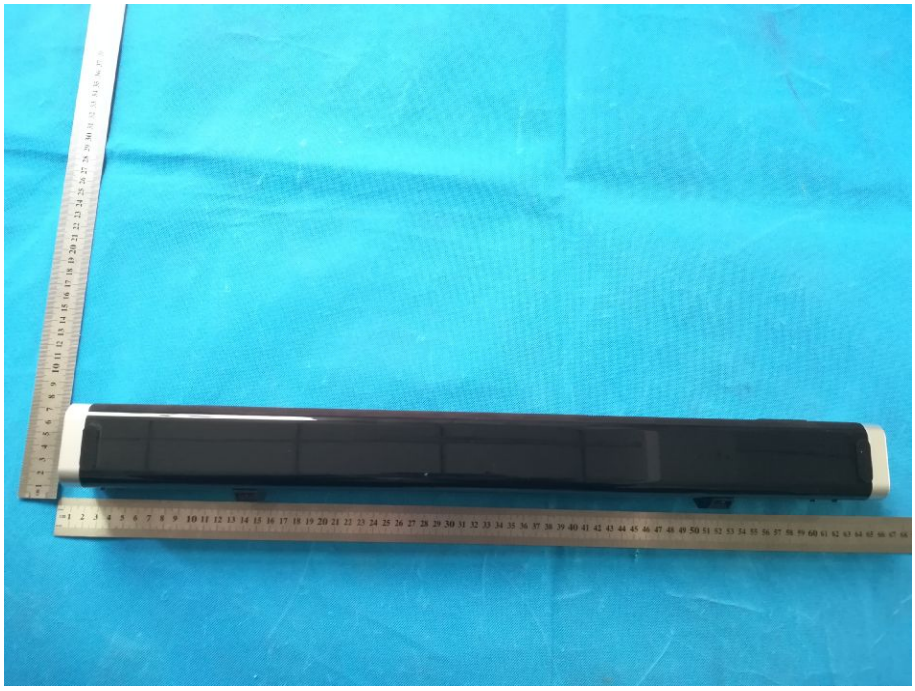
The device shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

APPENDIX 1 PHOTOS OF TEST CONFIGURATION

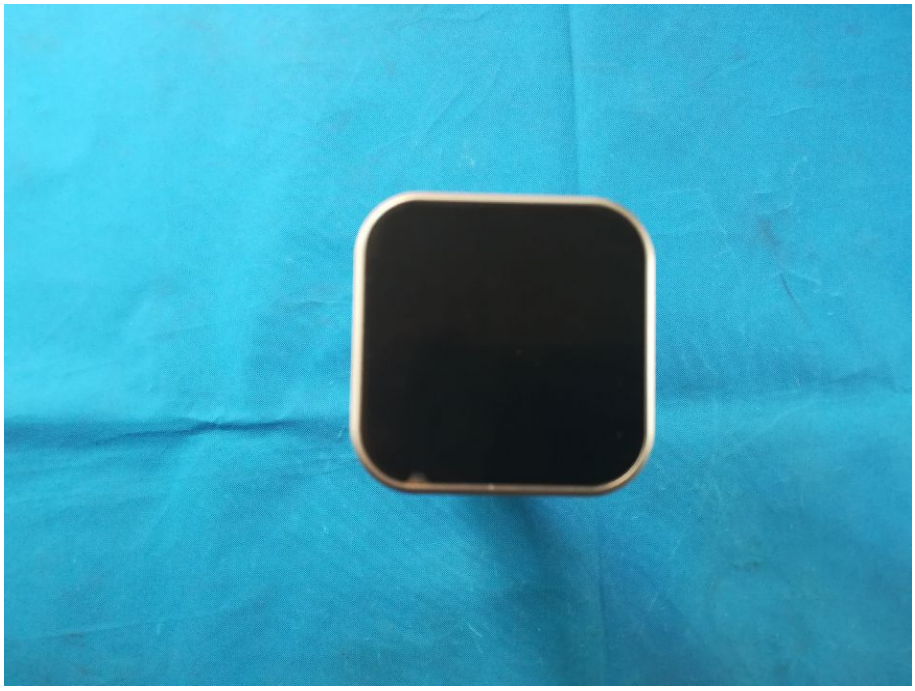


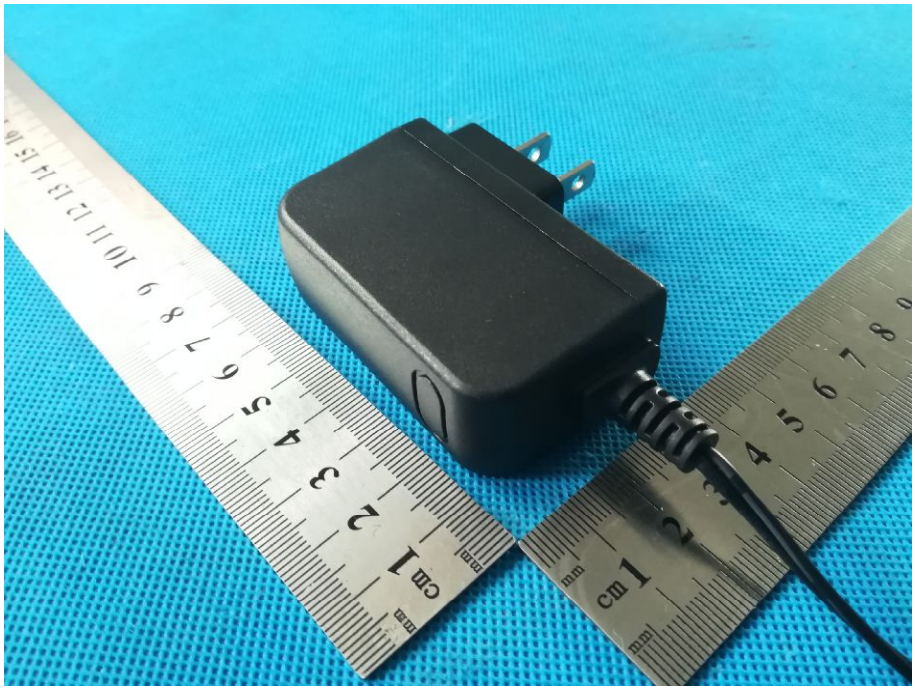


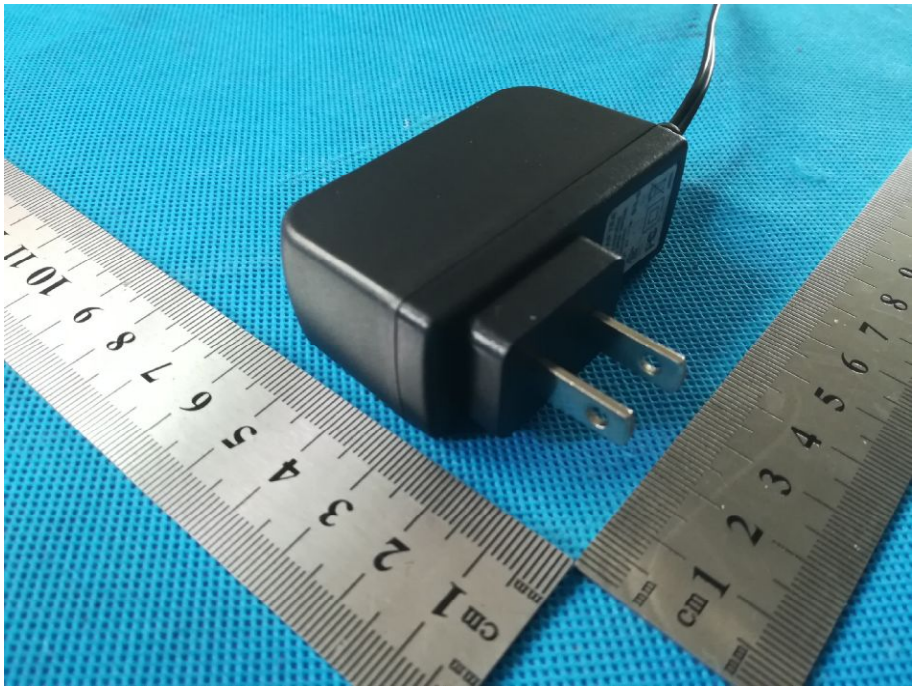
APPENDIX 2 PHOTOS OF EUT




VOL-/⏮
VOL+/⏭
PAIR/⏯
⏻/MODE

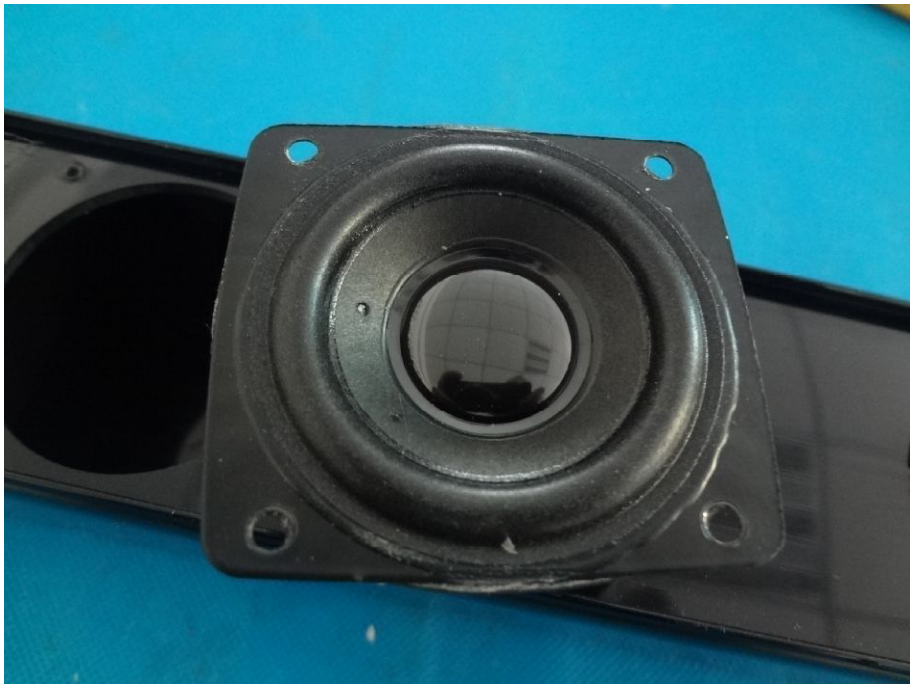


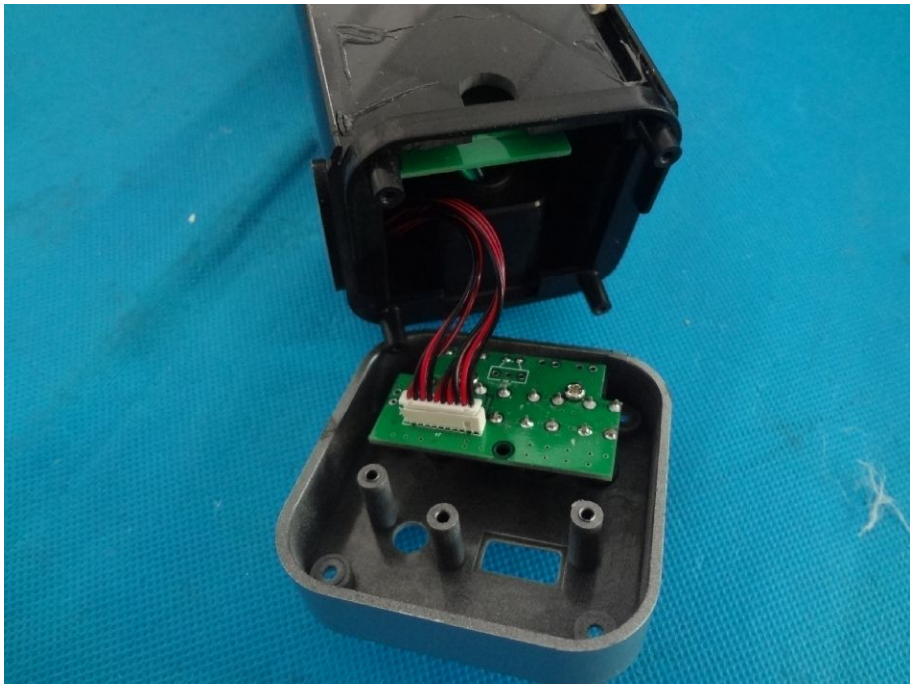


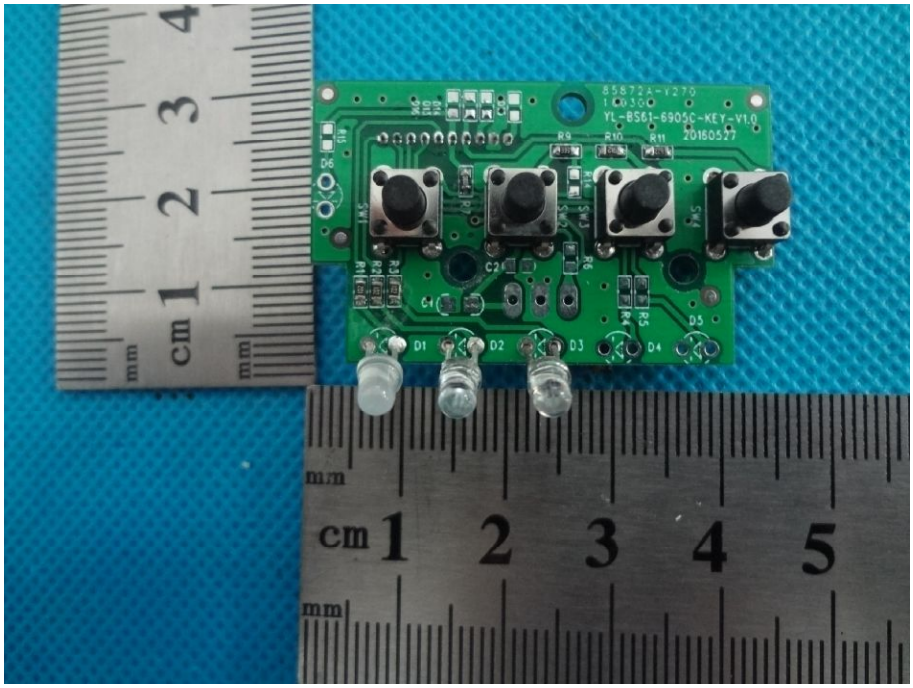



AC ADAPTER
MODEL: THX-050150KE
INPUT: 100-240V~50/60Hz
0.65A MAX
OUTPUT: 5V 1.5A
MADE IN CHINA


2018-03-09
SGF0052-711-016
4Ω5W



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D2
D3
D4
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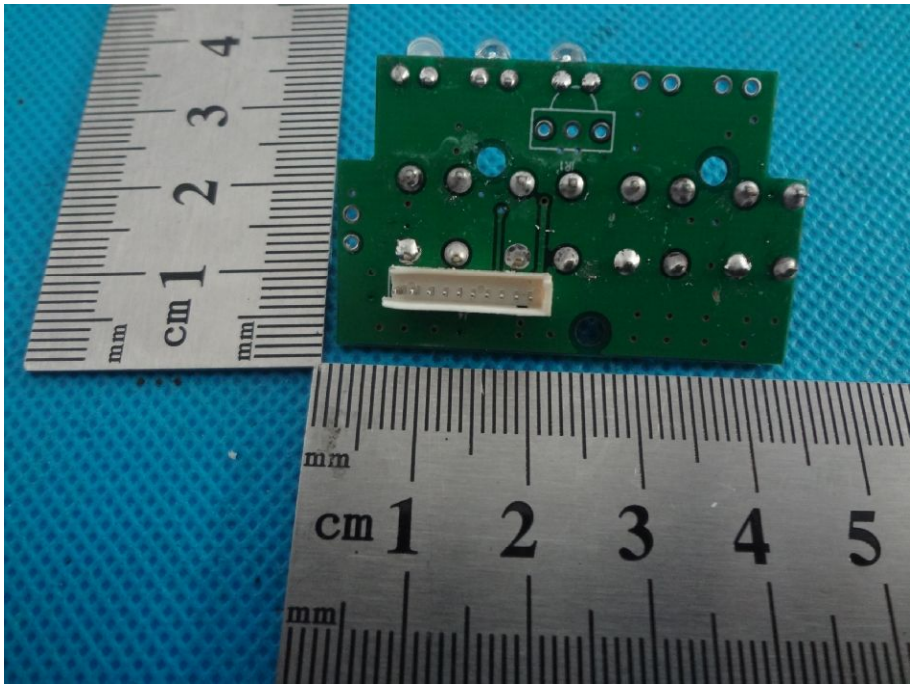
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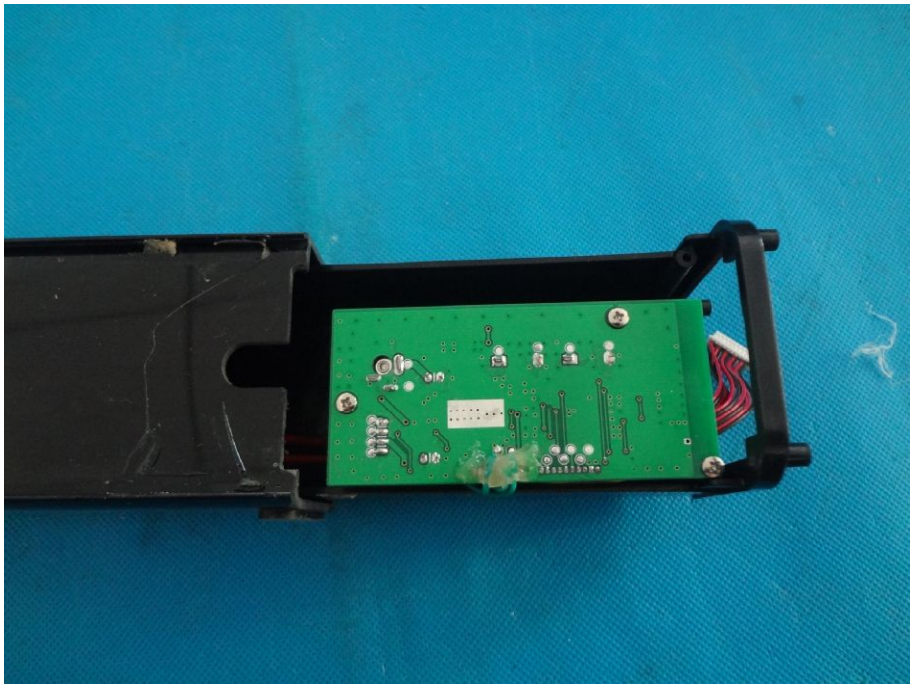

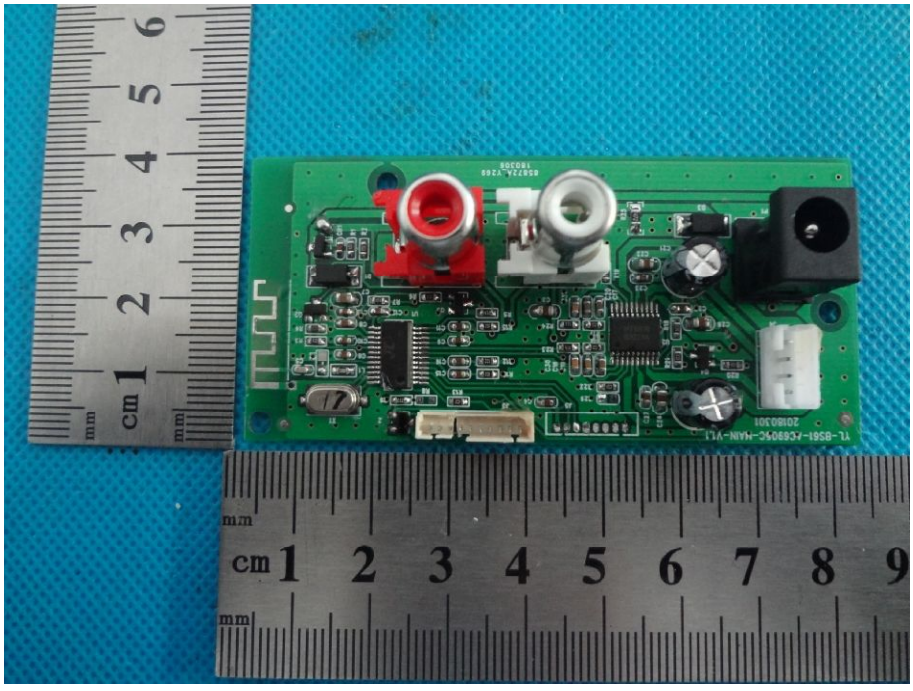
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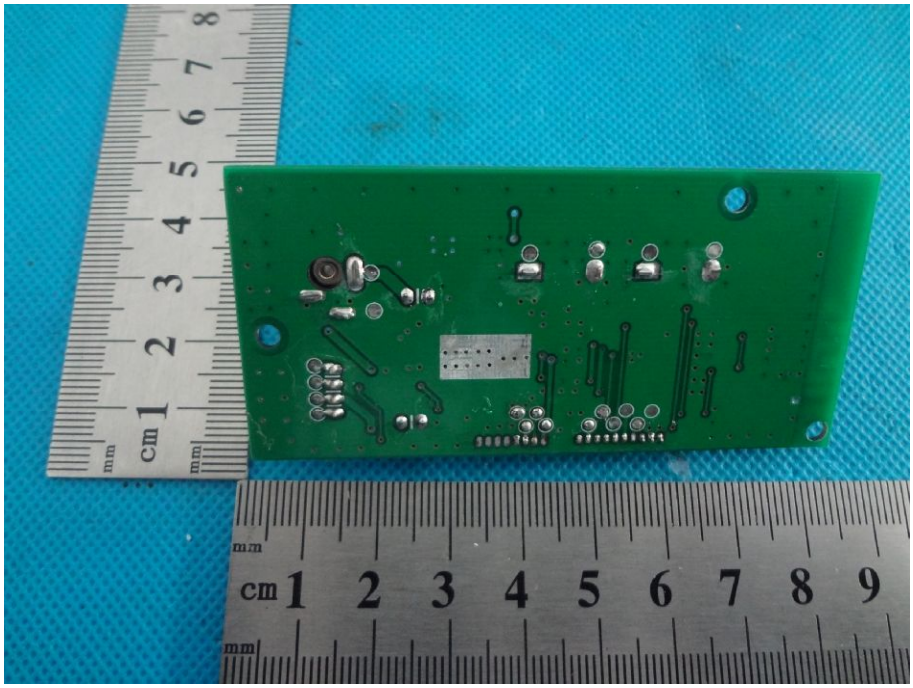
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