FCC Radio Test Report

FCC ID: 2ABHA0008

FCC 47 CFR Part 15 Subpart C
RSS 247 Issue 1:2015

Product： Bluetooth speaker

Trade Name： CSTAR

Model Number： TEK175

Firmware Version Identification Number (FVIN): 1.0

Issued for

NINGBO CSTAR IMP&EXP CO., LTD.

Floor 4, Building E, No. 655-90, Qiming Road, Yinzhou Investment & Innovation Center, Ningbo, China.

Issued by

Shenzhen ATL Testing Technology Co., Ltd.

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Website: www.atllab.org

TEST RESULT CERTIFICATION

Product	:	Bluetooth speaker
Applicant	:	NINGBO CSTAR IMP&EXP CO., LTD.
Address	:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China
Manufacturer	:	ShenZhen C-Star Electronic Tech. Co., Ltd.
Address	:	2, 3/F, building B, No. 2 Bada Industrial Park, Yongfu Road, Heping Community, Fuyong Town, Baoan District, Shenzhen, China
Model No.	:	TEK175
Standards	:	FCC Part 15 Subpart C (15.247) RSS 247 Issue 1: 2015
Test Method	:	ANSI C63.10: 2014

The above equipment has been tested by Shenzhen ATL Testing Technology Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Test.....:

Date of receipt of test item 2016-04-20

Date(s) of performance of test ..... 2016-04-21 to 2016-04-25

Test Result.....: Pass

Testing by	:	Sifeifei	Date	:	2016-04-25
		(Si feifei)			
Check by	:	XieLingling	Date	:	2016-04-25
		(Xie Lingling)			
Approved by	:	Xu Peng	Date	:	2016-04-26
		(Xu Peng)			

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1. TEST SUMMARY

Test procedures according to the technical standards:

FCC Part 15 Subpart C (15.247)				
Standard Section		Test Item	Judgment	Remark
15.207	RSS Gen 7.2.4	AC Power Conducted Emission	PASS	
15.247(c)	RSS 247 5.5	Transmitter Radiated Emissions	PASS	
15.247(b)(1)	RSS 247 5.1	Output Power	PASS	
15.247(a)(1)	RSS 247 5.1	20dB RF Bandwidth	PASS	
15.247(a)(1)(iii)	RSS 247 5.1	Carrier Frequency Separation	PASS	
15.247(a)(1)(iii)	RSS 247 5.1	Hopping Number	PASS	
15.247(a)(1)(iii)	RSS 247 5.1	Dwell Time	PASS	
15.247(c)	RSS 247 5.1	Occupied Bandwidth Measurement	PASS	
15.247(c)	RSS 247 5.5	Out of Band Conducted Spurious Emission	PASS	
15.247(c)	RSS 247 5.5	Band Edge Measurement	PASS	
15.203		Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2)The test results of this report relate only to the tested sample(s) identified in this report.

1.1 TEST FACILITY

Shenzhen ATL Testing Technology Co., Ltd.
Add. : F/4, Building 10, Dayuan Industrial Zone, Xili Town, Nanshan District, Shenzhen, China

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %.

A. Conducted Emission :

The measurement uncertainty is evaluated as ± 3.2 dB.

B. Radiated Measurement :

The measurement uncertainty is evaluated as ± 3.7 dB.

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Bluetooth speaker
Model Name	TEK175
Additional Model Number(s)	N/A
Model Difference	N/A
Frequency Range	Bluetooth V3.0+EDR: 2402~2480 MHz
Modulation Type	Bluetooth: GFSK/ π /4-DQPSK/8-DPSK
RF Output Power	Bluetooth: GFSK: 4.03 dBm 8-DPSK: 3.20 dBm
Antenna Type	FPC Antenna (Gain: 0 dBi)
Power Source	DC Powered by host system.
Power Rating	DC 5V from USB interference.
Remark	More details EUT technical specifications, please refer to the User's Manual.

Note:

(1) This Test Report is FCC Part 15 Subpart C, 15.247 for Bluetooth. And the Test procedure follows the FCC Public Notice DA 00-705-Filing and Measurement Guidance for Frequency Hopping Spectrum Systems.

(2) More information about the Wifi, please refer to other test report.

(3) Transmitting mode with antennas

Mode	TX Antenna (s)
Bluetooth	1

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	BT TX(GFSK) Mode
Mode 2	BT TX(π /4-DQPSK) Mode
Mode 3	BT TX(8-DPSK) Mode

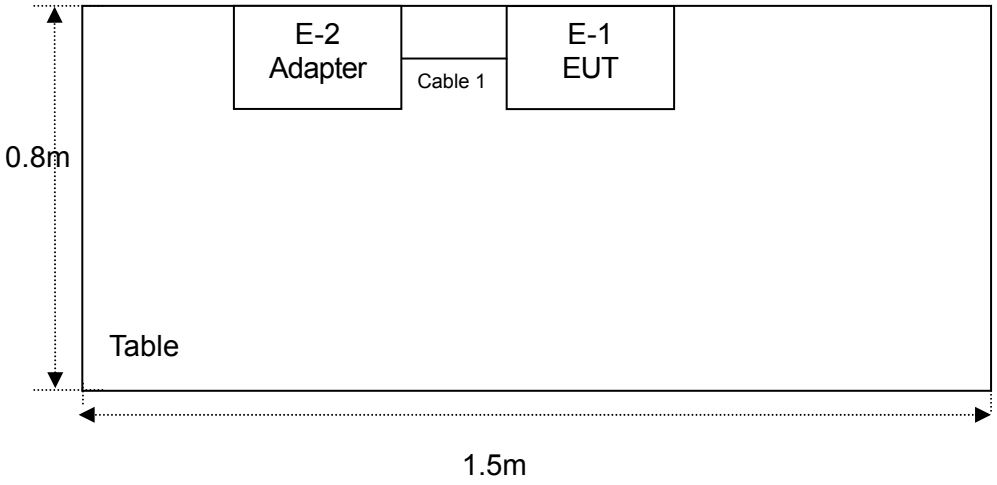
For Conducted Test	
Final Test Mode	Description
Mode 1	BT TX(GFSK) Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	BT TX(GFSK) Mode
Mode 2	BT TX(8-DPSK) Mode

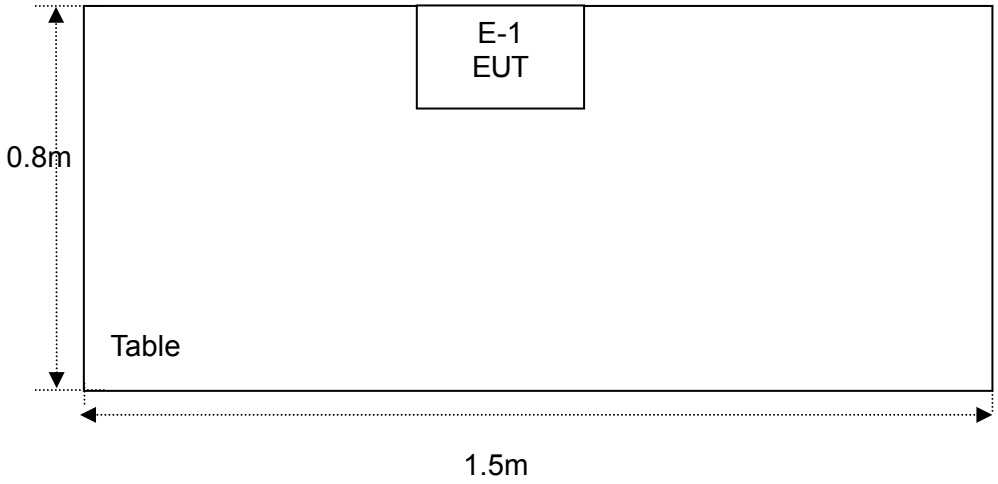
Note:
(1) Software used to control the EUT for staying in continuous transmitting mode was programmed. After verification, all tests were carried out with the worst case test modes as shown below.
(2) GFSK Mode:
Channel (2402/2441/2480 MHz) with DH1 data packet were chosen for full testing.
(3) 8-DPSK Mode:
Channel (2402/2441/2480 MHz) with DH1 data packet were chosen for full testing.
(4) By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “X axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

2.3 DESCRIPTION OF TEST SETUP

Conducted Emission



Radiated Emission



2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Bluetooth speaker	Cstar	TEK175	N/A	EUT
E-2	Adapter	HUAWEI	N/A	DOC	

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	15cm	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.
(3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.5 EUT Exercise Software

Test Software: Bluetooth RF Test.exe

GFSK: The command set for RF power-DEF
8-DPSK:The command set for RF power-DEF

3. CONDUCTED EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Quasi-peak	Average
	dBuV	dBuV
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

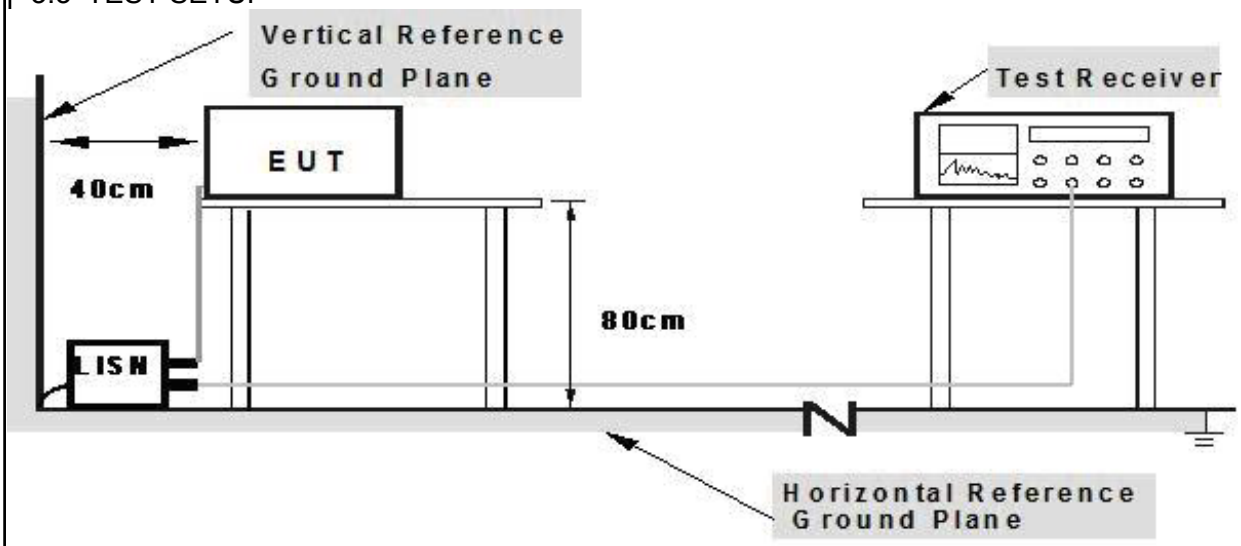
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.4 TEST INSTRUMENTS

Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
LISN	R&S	NSLK81	8126466	Jul. 05, 2015	Jul. 04. 2016	1 year
LISN	R&S	NSLK81	8126487	Dec. 23, 2015	Dec. 22, 2016	1 year
50Ω Switch	ANRITSU CORP	MP59B	6200983704	Jul. 05, 2015	Jul. 04. 2016	1 year
Test Cable	N/A	C01	N/A	Jul. 05, 2015	Jul. 04. 2016	1 year
Test Cable	N/A	C02	N/A	Jul. 05, 2015	Jul. 04. 2016	1 year
Test Cable	N/A	C03	N/A	Jul. 05, 2015	Jul. 04. 2016	1 year
EMI Test Receiver	R&S	ESCI	1166.595	Jul. 05, 2015	Jul. 04. 2016	1 year
Passive Voltage Probe	ESH2-Z3	R&S	100196	Jul. 05, 2015	Jul. 04. 2016	1 year

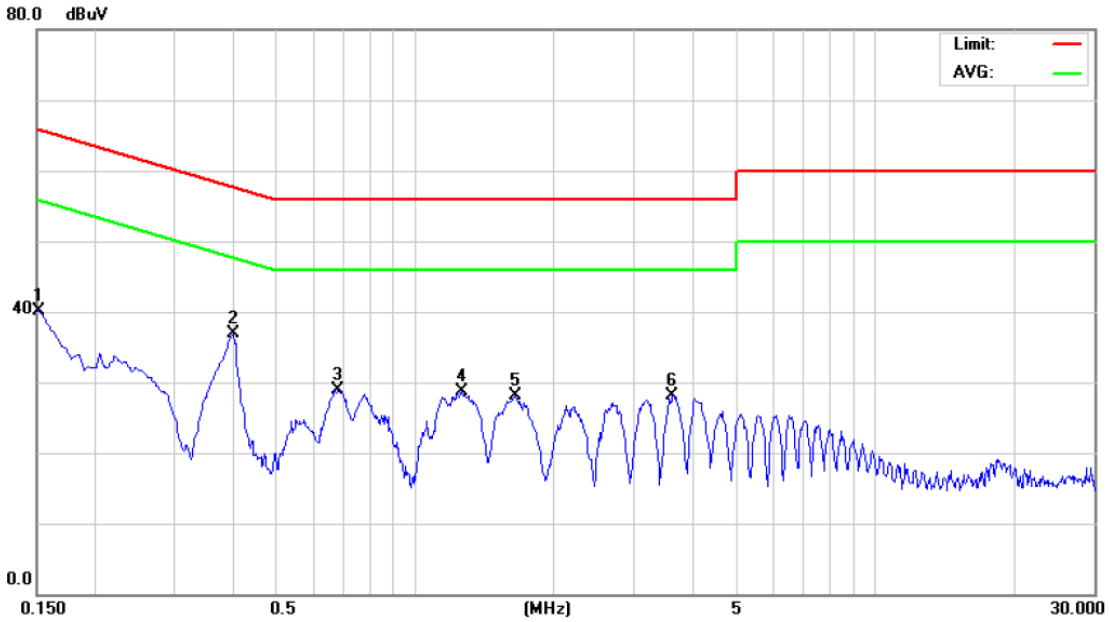
3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.6 TEST RESULTS

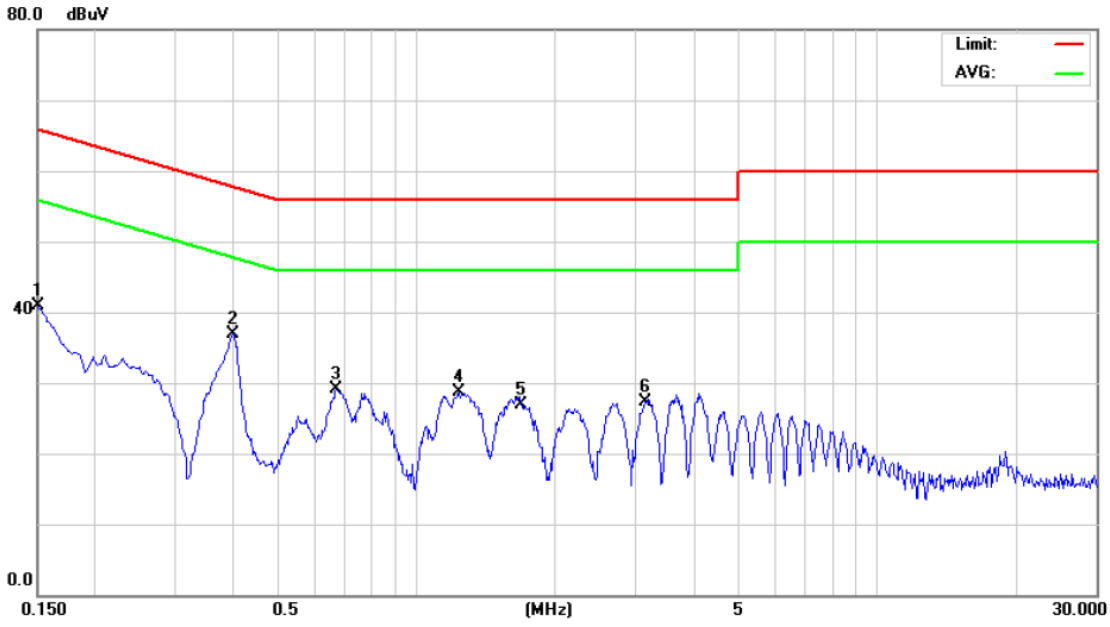
EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Test Date：	2016-04-22
Test Mode：	Mode 1	Phase：	Line
Test Voltage ：	120V/ 60Hz		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1516	30.15	9.92	40.07	65.91	-25.84	peak
2	*	0.4020	26.81	10.02	36.83	57.81	-20.98	peak
3		0.6820	18.81	10.11	28.92	56.00	-27.08	peak
4		1.2660	18.58	10.06	28.64	56.00	-27.36	peak
5		1.6580	18.01	10.06	28.07	56.00	-27.93	peak
6		3.6340	18.06	10.01	28.07	56.00	-27.93	peak



EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Test Date：	2016-04-22
Test Mode：	Mode 1	Phase：	Neutral
Test Voltage ：	120V/ 60Hz		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	30.69	10.12	40.81	66.00	-25.19	peak
2	*	0.3980	26.79	10.05	36.84	57.90	-21.06	peak
3		0.6700	19.02	10.02	29.04	56.00	-26.96	peak
4		1.2420	18.50	10.14	28.64	56.00	-27.36	peak
5		1.6900	16.76	10.09	26.85	56.00	-29.15	peak
6		3.1420	17.21	10.06	27.27	56.00	-28.73	peak



4. RADIATED EMISSION MEASUREMENT

4.1 RADIATED EMISSION LIMIT (Frequency Range 9KHz-1000MHz)

20 dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table bellow has to be followed.

FREQUENCY (MHz)	Field Strength (uV/m at meter)	Measurement Distance (meters)
0.009 -0.490	2400/F(KHz)	300
0.490 -1.705	24000/F(KHz)	30
1.705 -30.0	30	30
30 -88	100	3
88 -216	150	3
216~960	200	3
Above 960	500	3

RADIATED EMISSION LIMITS (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m)(at 3 M)		Class B (dBuV/m)(at 3 M)	
	Peak	Average		Peak
Above 1000	80	60	74	54

Note:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

The following table is the setting of the receiver

Receiver Parameter	Setting
Attenuation	Auto
Start Frequency~ Stop Frequency	9kHz~150kHz/ RB 200Hz for QP
Start Frequency~ Stop Frequency	150kHz~30MHz/ RB 9kHz for QP
Start Frequency~ Stop Frequency	30MHz~1000MHz/ RB120kHz for QP

The following table is the setting of the spectrum

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10^{th} carrier harmonic
RB/ VB (emission in restricted band)	1MHz/ 3 MHz for Peak, 1MHz/ 10Hz for Average

4.2 TEST PROCEDURE

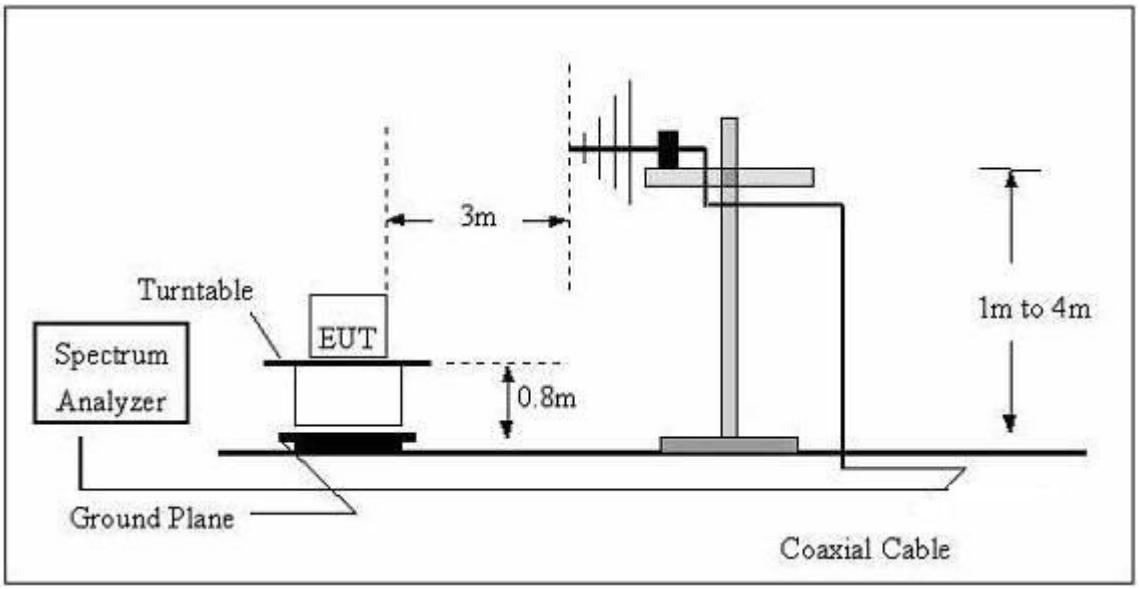
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured, above 1G Average detector mode will be instead.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

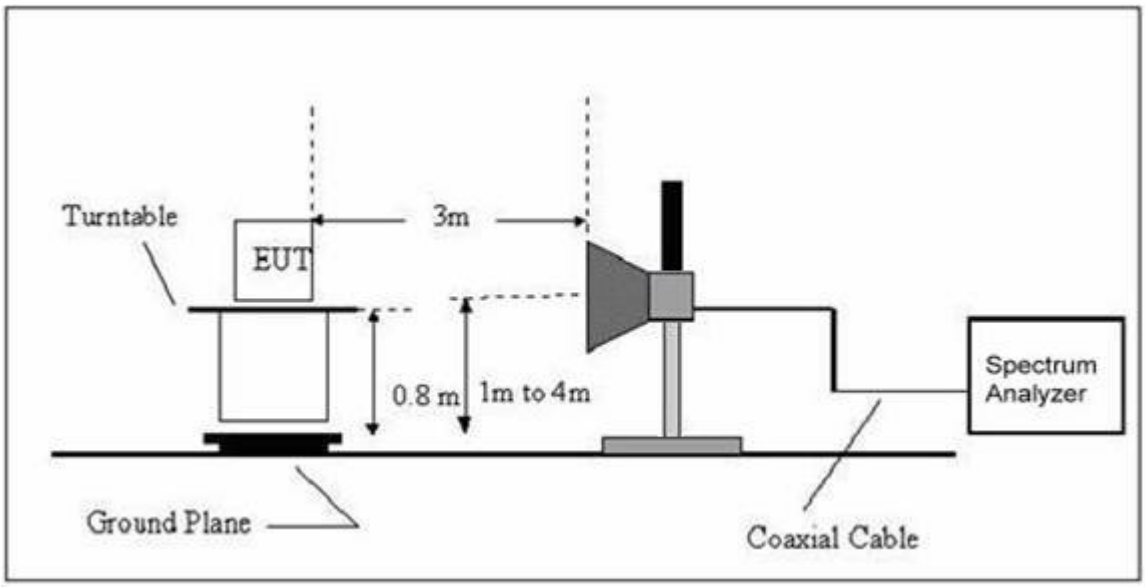
Note:
Both horizontal and vertical antenna polarities were tested.
And performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



4.4 TEST INSTRUMENTS

Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Broadband Antenna	R&S	VULB 9168	VULB 9168-456	Jul. 05, 2015	Jul. 04. 2016	1 year
Test Cable	N/A	R-01	N/A	Dec. 23, 2015	Dec. 22, 2016	1 year
Test Cable	N/A	R-02	N/A	Dec. 23, 2015	Dec. 22, 2016	1 year
EMI Test Receiver	R&S	ESCI	101324	Jul. 05, 2015	Jul. 04. 2016	1 year
Antenna Mast	EM	SC100_1	N/A	N/A	N/A	N/A
Turn Table	EM	SC100	060531	N/A	N/A	N/A
50Ω Switch	Anritsu Corp	MP59B	6200983705	Jul. 05, 2015	Jul. 04. 2016	1 year
Spectrum Analyzer	R&S	FSP40	100154	Jul. 05, 2015	Jul. 04. 2016	1 year
Horn Antenna	R&S	HF906	10029	Jul. 05, 2015	Jul. 04. 2016	1 year
Amplifier	EM	EM-30180	060538	Jul. 05, 2015	Jul. 04. 2016	1 year

4.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

4.6 TEST RESULTS

4.6.1 TEST RESULTS (Bellow 1GHz)

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	BT TX Mode	Polarization：	Horizontal
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		113.4200	55.63	-20.97	34.66	43.50	-8.84	QP	
2		186.1700	56.37	-20.50	35.87	43.50	-7.63	QP	
3		327.7900	52.21	-14.66	37.55	46.00	-8.45	QP	
4		388.9000	49.82	-12.58	37.24	46.00	-8.76	QP	
5	*	555.7400	49.25	-9.48	39.77	46.00	-6.23	QP	
6		659.5300	45.37	-8.87	36.50	46.00	-9.50	QP	

Remark:
Factor = Antenna Factor + Cable Loss.

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	BT TX Mode	Polarization：	Vertical
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		70.8000	55.25	-22.51	32.74	40.00	-7.26	QP	
2	*	88.9000	61.50	-23.90	37.60	43.50	-5.90	QP	
3		345.7700	57.64	-19.31	38.33	46.00	-7.67	QP	
4		560.3200	51.71	-15.12	36.59	46.00	-9.41	QP	
5		654.8800	50.33	-13.50	36.83	46.00	-9.17	QP	
6		734.7700	49.82	-12.31	37.51	46.00	-8.49	QP	

Remark:
Factor = Antenna Factor + Cable Loss.

4.6.2 TEST RESULTS (Above 1GHz)

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	GFSK TX 2402MHz	Polarization：	Horizontal
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	46.11	0.77	46.88	74.00	-27.12	peak	
2		2390.000	34.34	0.77	35.11	54.00	-18.89	AVG	
3	X	2402.100	90.50	0.82	91.32	74.00	17.32	peak	Fundamental Frequency
4	*	2402.100	88.58	0.82	89.40	54.00	35.40	AVG	Fundamental Frequency

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.120	42.59	8.18	50.77	74.00	-23.23	peak	
2	*	4804.120	36.47	8.18	44.65	54.00	-9.35	AVG	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	GFSK TX 2402MHz	Polarization：	Vertical
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	45.57	0.77	46.34	74.00	-27.66	peak	
2		2390.000	34.73	0.77	35.50	54.00	-18.50	AVG	
3	X	2402.000	89.05	0.82	89.87	74.00	15.87	peak	Fundamental Frequency
4	*	2402.100	86.38	0.82	87.20	54.00	33.20	AVG	Fundamental Frequency

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.120	37.80	8.18	45.98	54.00	-8.02	AVG	
2		4804.140	43.47	8.18	51.65	74.00	-22.35	peak	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	GFSK TX 2441MHz	Polarization：	Horizontal
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.110	35.66	8.21	43.87	54.00	-10.13	AVG	
2		4882.112	42.02	8.21	50.23	74.00	-23.77	peak	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	GFSK TX 2441MHz	Polarization：	Vertical
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.010	43.01	8.21	51.22	74.00	-22.78	peak	
2	*	4882.020	36.52	8.21	44.73	54.00	-9.27	AVG	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	GFSK TX 2480MHz	Polarization：	Horizontal
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2479.900	89.96	1.15	91.11	74.00	17.11	peak	Fundamental Frequency
2	*	2480.000	88.13	1.15	89.28	54.00	35.28	AVG	Fundamental Frequency
3		2483.500	50.91	1.17	52.08	74.00	-21.92	peak	
4		2483.500	46.70	1.17	47.87	54.00	-6.13	AVG	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.220	35.55	8.23	43.78	54.00	-10.22	AVG	
2		4960.540	43.00	8.23	51.23	74.00	-22.77	peak	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	GFSK TX 2480MHz	Polarization：	Vertical
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.100	88.60	1.15	89.75	74.00	15.75	peak	Fundamental Frequency
2	*	2480.100	85.87	1.15	87.02	54.00	33.02	AVG	Fundamental Frequency
3		2483.500	50.06	1.17	51.23	74.00	-22.77	peak	
4		2483.500	45.38	1.17	46.55	54.00	-7.45	AVG	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.120	37.10	8.23	45.33	54.00	-8.67	AVG	
2		4960.241	43.43	8.23	51.66	74.00	-22.34	peak	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	8DPSK TX 2402MHz	Polarization：	Horizontal
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	44.78	0.77	45.55	74.00	-28.45	peak	
2		2390.000	35.35	0.77	36.12	54.00	-17.88	AVG	
3	X	2401.900	87.83	0.82	88.65	74.00	14.65	peak	Fundamental Frequency
4	*	2402.000	84.94	0.82	85.76	54.00	31.76	AVG	Fundamental Frequency

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.090	42.17	8.18	50.35	74.00	-23.65	peak	
2	*	4804.100	35.88	8.18	44.06	54.00	-9.94	AVG	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	8DPSK TX 2402MHz	Polarization：	Vertical
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	45.55	0.77	46.32	74.00	-27.68	peak	
2		2390.000	34.99	0.77	35.76	54.00	-18.24	AVG	
3	*	2402.000	84.64	0.82	85.46	54.00	31.46	AVG	Fundamental Frequency
4	X	2402.110	86.68	0.82	87.50	74.00	13.50	peak	Fundamental Frequency

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4804.021	35.27	8.18	43.45	54.00	-10.55	AVG	
2		4804.043	42.17	8.18	50.35	74.00	-23.65	peak	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	8DPSK TX 2441MHz	Polarization：	Horizontal
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.024	41.84	8.21	50.05	74.00	-23.95	peak	
2	*	4882.025	35.04	8.21	43.25	54.00	-10.75	AVG	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	8DPSK TX 2441MHz	Polarization：	Vertical
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4881.020	35.15	8.21	43.36	54.00	-10.64	AVG	
2		4882.021	42.88	8.21	51.09	74.00	-22.91	peak	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	8DPSK TX 2480MHz	Polarization：	Horizontal
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	44.78	0.77	45.55	74.00	-28.45	peak	
2		2390.000	35.35	0.77	36.12	54.00	-17.88	AVG	
3	X	2401.900	87.83	0.82	88.65	74.00	14.65	peak	Fundamental Frequency
4	*	2402.000	84.94	0.82	85.76	54.00	31.76	AVG	Fundamental Frequency

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.250	34.85	8.23	43.08	54.00	-10.92	AVG	
2		4960.270	41.66	8.23	49.89	74.00	-24.11	peak	

EUT：	Bluetooth speaker	Model Name. ：	TEK175
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010 hPa	Test Date：	2016-04-22
Test Mode ：	8DPSK TX 2480MHz	Polarization：	Vertical
Test Power ：	DC 5V		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.100	83.97	1.15	85.12	74.00	11.12	peak	Fundamental Frequency
2	*	2480.120	82.80	1.15	83.95	54.00	29.95	AVG	Fundamental Frequency
3		2483.500	49.26	1.17	50.43	74.00	-23.57	peak	
4		2483.500	42.71	1.17	43.88	54.00	-10.12	AVG	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.240	42.09	8.23	50.32	74.00	-23.68	peak	
2	*	4960.240	35.43	8.23	43.66	54.00	-10.34	AVG	

5. CONDUCTED OUTPUT POWER MEASUREMENT

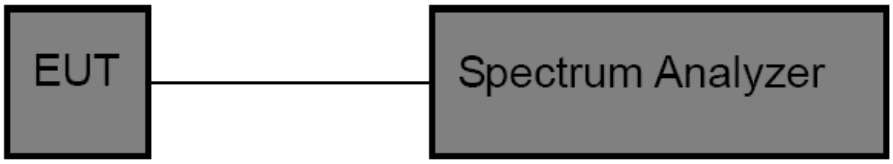
5.1 LIMITS

Peak Output Power	For frequency Hopping systems in 2400~2483.5MHz band and employing at least 75 non-overlapping hopping channels< 1 watt (30 dBm).

5.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as bellow.

5.3 TEST SETUP



5.4 TEST INSTRUMENTS

Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Spectrum Analyzer	R&S	FSP40	100154	Jul. 05, 2015	Jul. 04. 2016	1 year

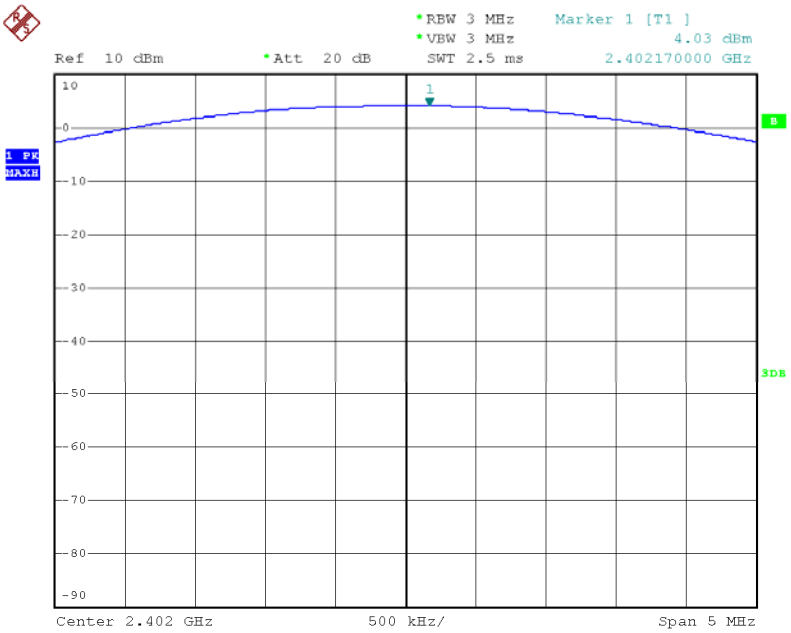
5.5 EUT OPERATING CONDITIONS

The EUT was set to continuously transmitting in the maximum power during the test.

5.6 TEST RESULTS

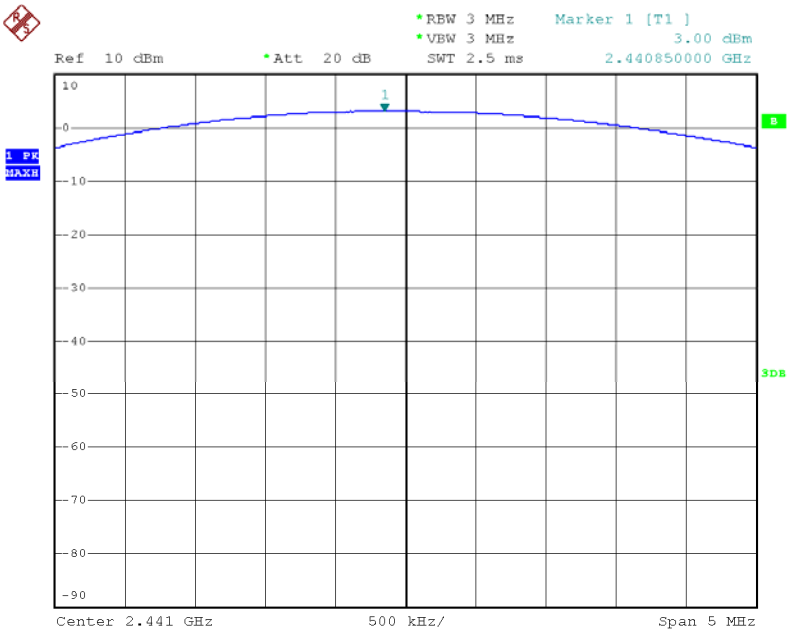
GFSK (1Mbps)		
Frequency (MHz)	**Peak Output Power (dBm)**	**Limit (dBm)**
2402	4.03	<30
2441	3.00	
2480	1.97	

2402 MHz



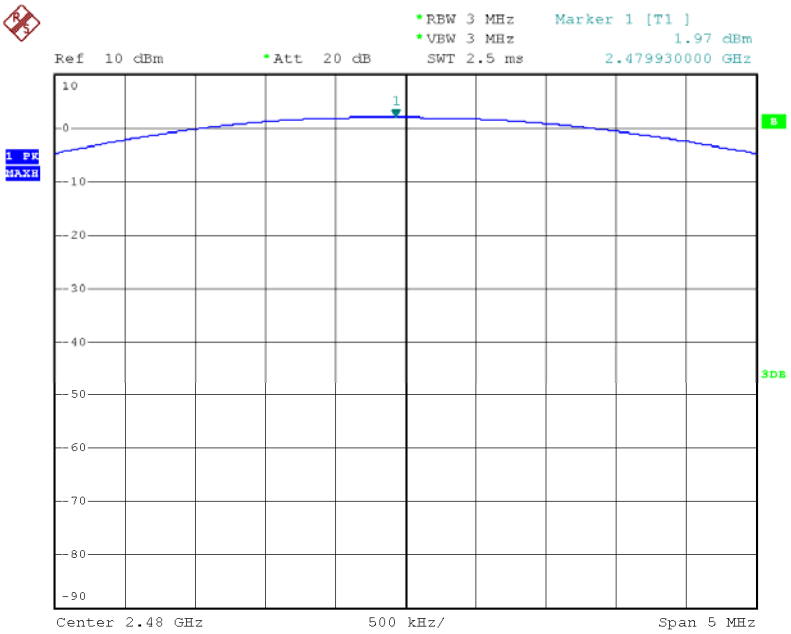
Date: 24.APR.2016 16:49:18

2441 MHz



Date: 24.APR.2016 16:50:30

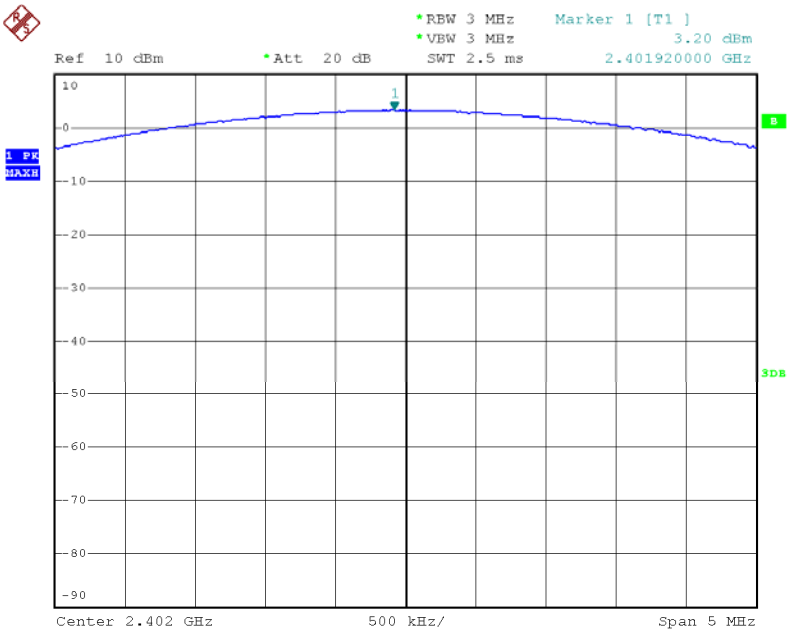
2480 MHz



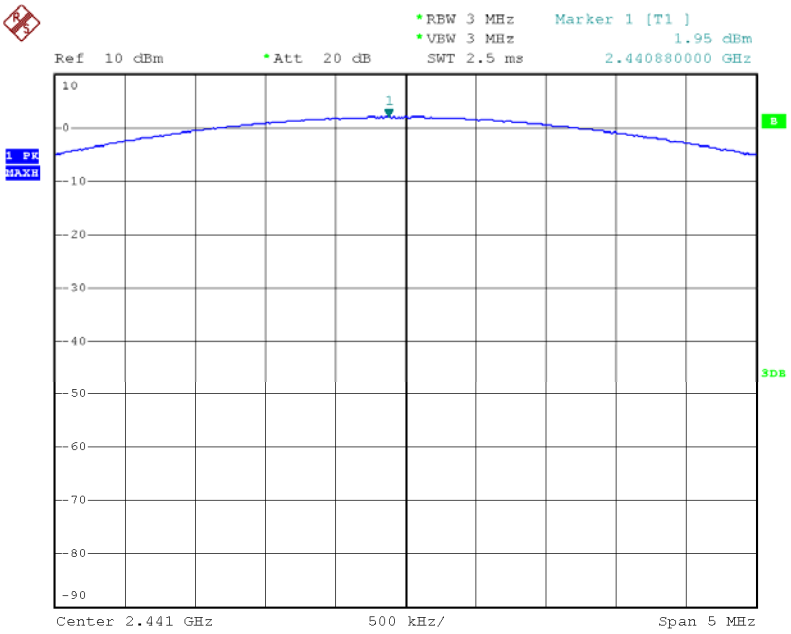
Date: 24.APR.2016 16:50:59

8-DPSK (3Mbps)		
Frequency (MHz)	**Peak Output Power (dBm)**	**Limit (dBm)**
2402	3.20	<30
2441	1.95	
2480	0.76	

2402 MHz

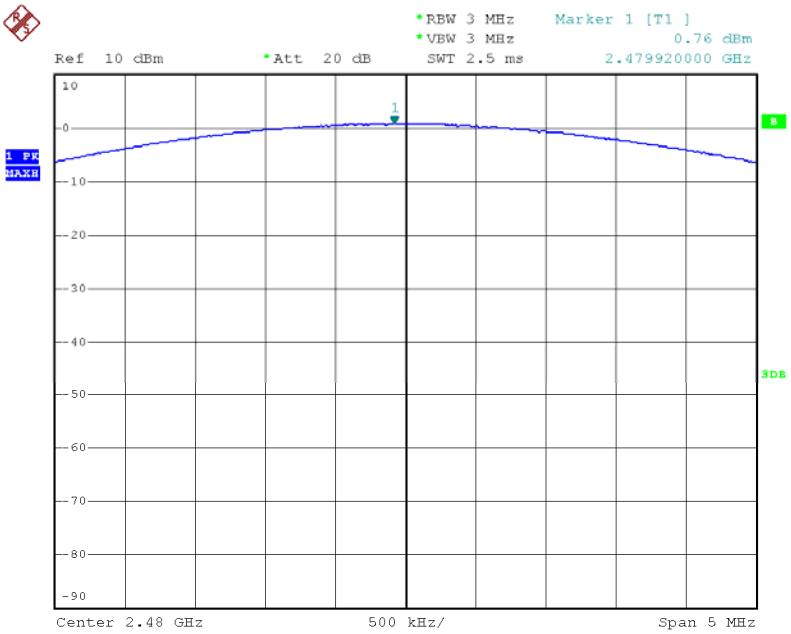


2441 MHz



Date: 24.APR.2016 17:49:42

2480 MHz



Date: 24.APR.2016 17:49:57

6. OCCUPIED BANDWIDTH MEASUREMENT

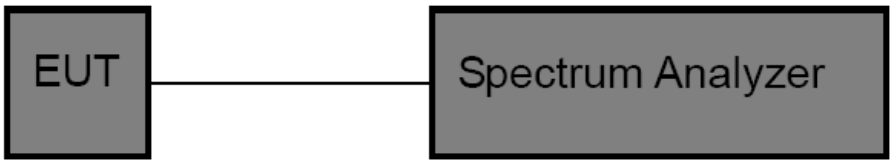
6.1 LIMITS

20dB Bandwidth	N/A
99% Occupied Bandwidth	N/A

6.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as bellow.

6.3 TEST SETUP



6.4 TEST INSTRUMENTS

Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Spectrum Analyzer	R&S	FSP40	100154	Jul. 05, 2015	Jul. 04. 2016	1 year

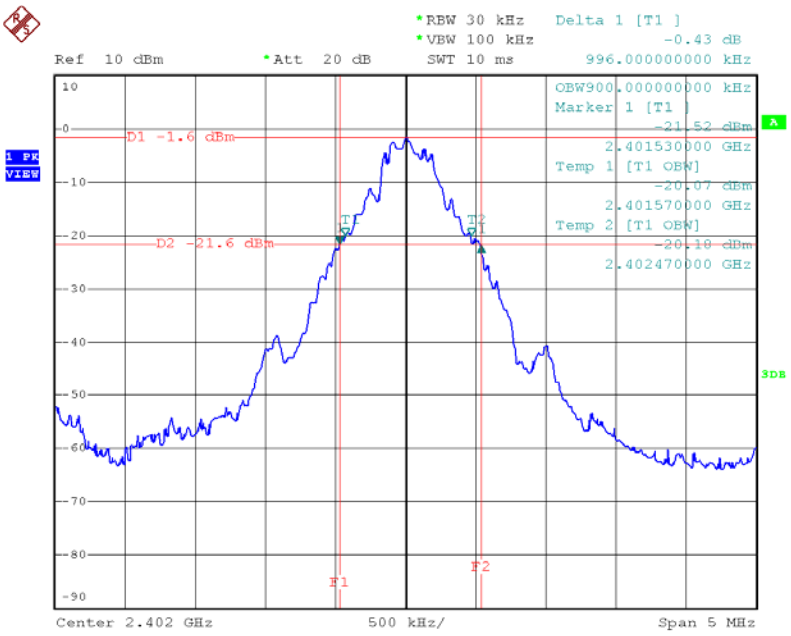
6.5 EUT OPERATING CONDITIONS

The EUT was set to continuously transmitting in the maximum power during the test.

6.6 TEST RESULTS

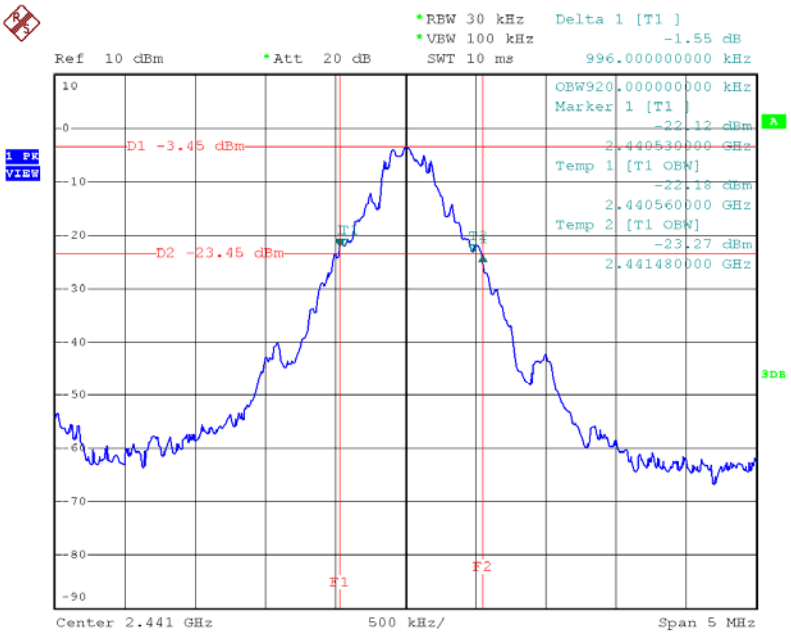
GFSK Mode (1Mbps)			
Frequency (MHz)	**20dB Bandwidth (kHz)**	**99% OBW (kHz)**	**Limit**
2402	996.00	900.00	N/A
2441	996.00	920.00	
2480	996.00	930.00	
8-DPSK Mode (3Mbps)			
Frequency (MHz)	**20dB Bandwidth (kHz)**	**99% OBW (kHz)**	**Limit**
2402	1128.00	1170.00	N/A
2441	1370.00	1220.00	
2480	1370.00	1210.00	
Note: Test plots please refer following pages.			

2402 MHz(GFSK) Bandwidth



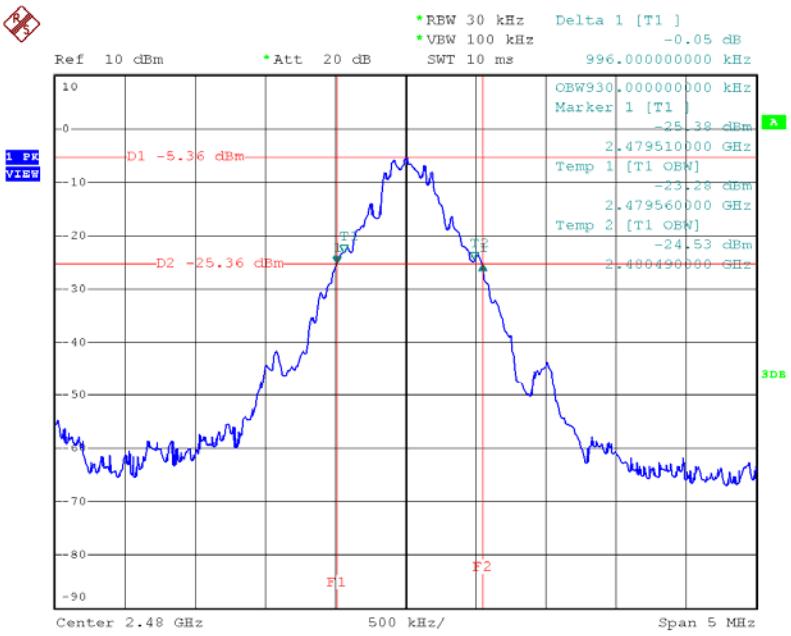
Date: 24.APR.2016 04:11:48

2441 MHz(GFSK) Bandwidth



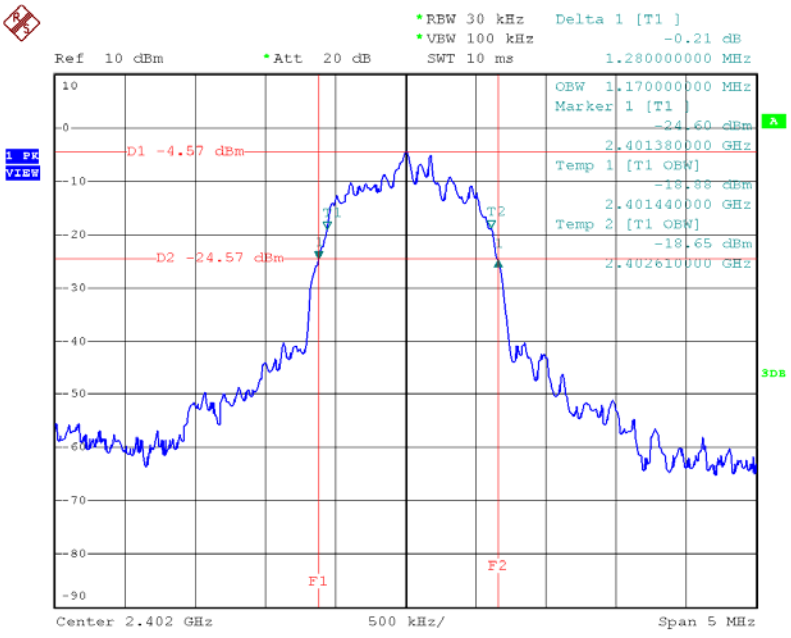
Date: 24.APR.2016 04:26:05

2480 MHz(GFSK) Bandwidth



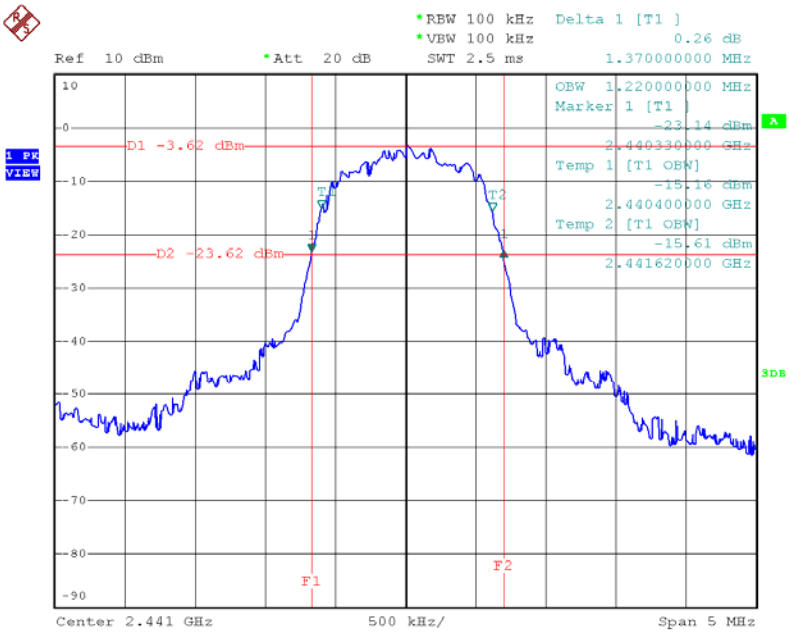
Date: 24.APR.2016 04:27:52

2402 MHz(8-DPSK) Bandwidth



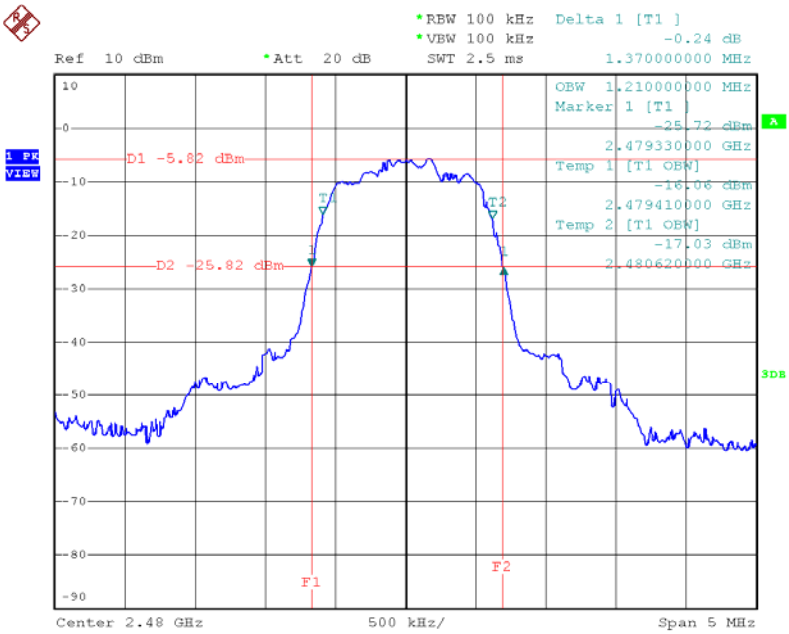
Date: 24.APR.2016 04:46:43

2441 MHz(8-DPSK) Bandwidth



Date: 24.APR.2016 04:53:05

2480 MHz(8-DPSK) Bandwidth



Date: 24.APR.2016 04:54:30

7. CARRIER FREQUENCY SEPARATION MEASUREMENT

7.1 LIMITS

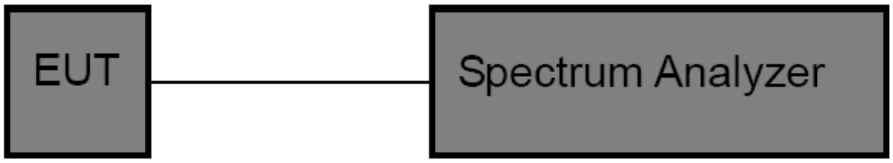
Frequency Separation	The channel spacing shall be a minimum of 25 kHz or two-thirds of the 20 dB Bandwidth

7.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as bellow.

a. Set span= wide enough to capture the peaks of two adjacent channels.
b. Set the RBW≥1% of the span
c. Set the VBW≥3 RBW (30kHz/ 100kHz)
d. Detector= Peak.
e. Sweep time= auto couple
f. Trace mode= max hold.
g. Allow trace to fully stabilize.
h. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

7.3 TEST SETUP



7.4 TEST INSTRUMENTS

Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Spectrum Analyzer	R&S	FSP40	100154	Jul. 05, 2015	Jul. 04. 2016	1 year

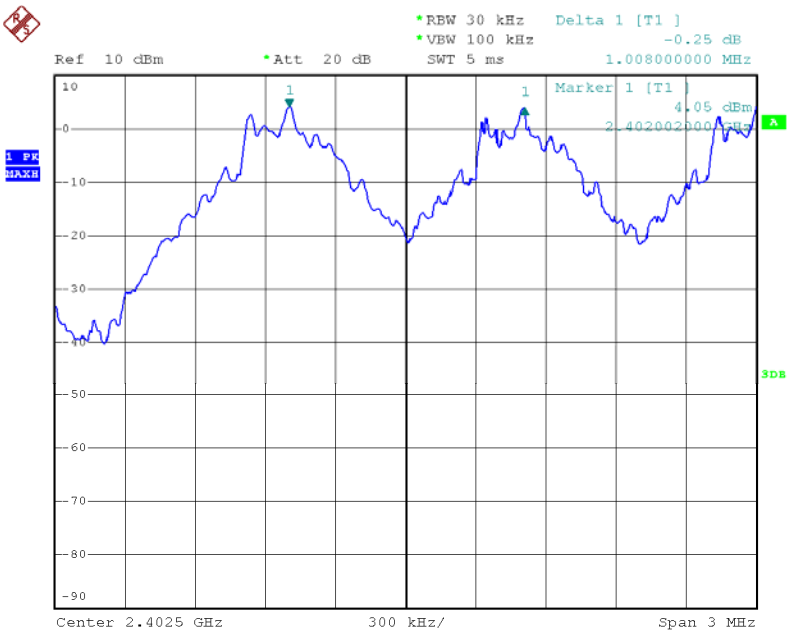
7.5 EUT OPERATING CONDITIONS

The EUT was set to continuously transmitting in the maximum power during the test.

7.6 TEST RESULTS

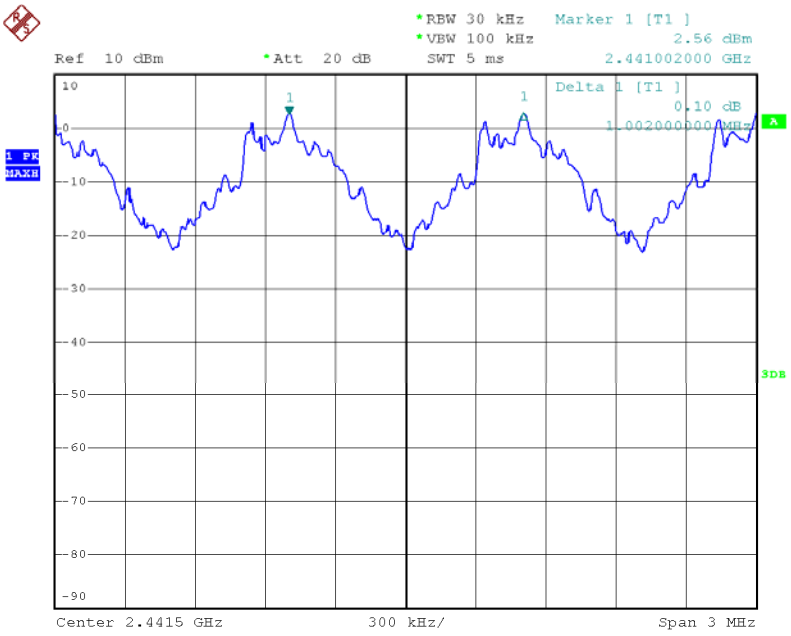
GFSK Mode (1Mbps)		
Frequency (MHz)	**Channel Separation (kHz)**	**Limit (kHz)**
2402	1008.00	>664
2441	1002.00	
2480	996.00	
GFSK Mode (1Mbps)		
Frequency (MHz)	**Frequency (kHz)**	**Frequency (kHz)**
2402	1008.00	>913
2441	1008.00	
2480	996.00	
Note: Test plots please refer following pages.		

2402 MHz(GFSK)-Channel Separation



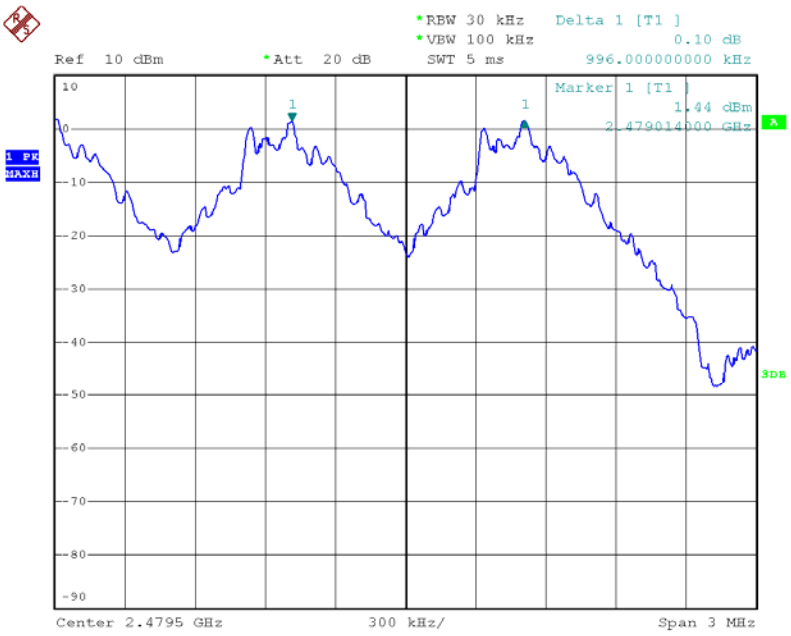
Date: 24.APR.2016 20:32:07

2441 MHz(GFSK)-Channel Separation



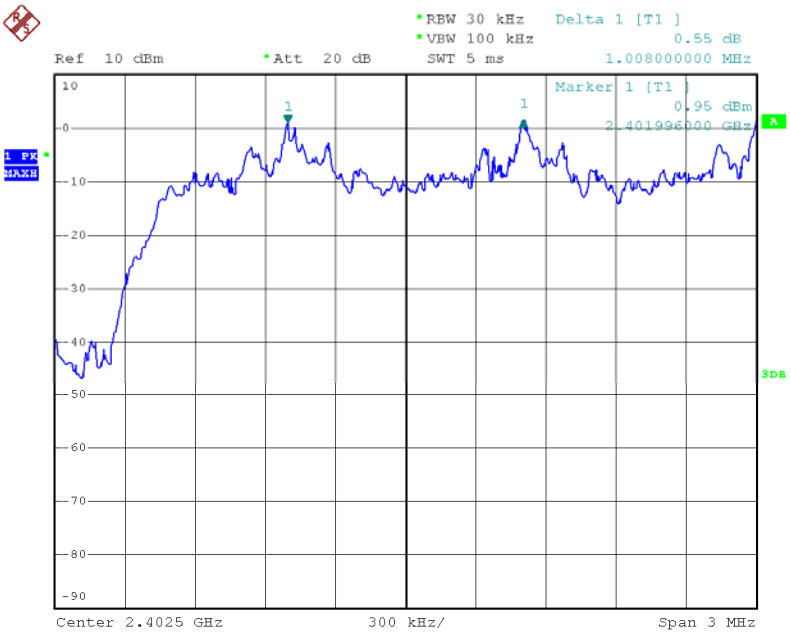
Date: 24.APR.2016 20:42:07

2480 MHz(GFSK)-Channel Separation



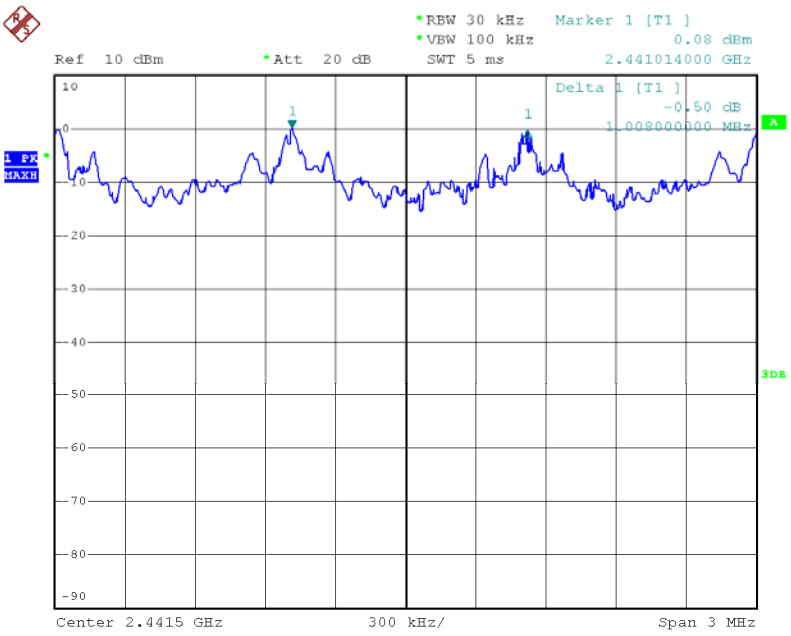
Date: 24.APR.2016 20:30:47

2402 MHz(8-DPSK)-Channel Separation



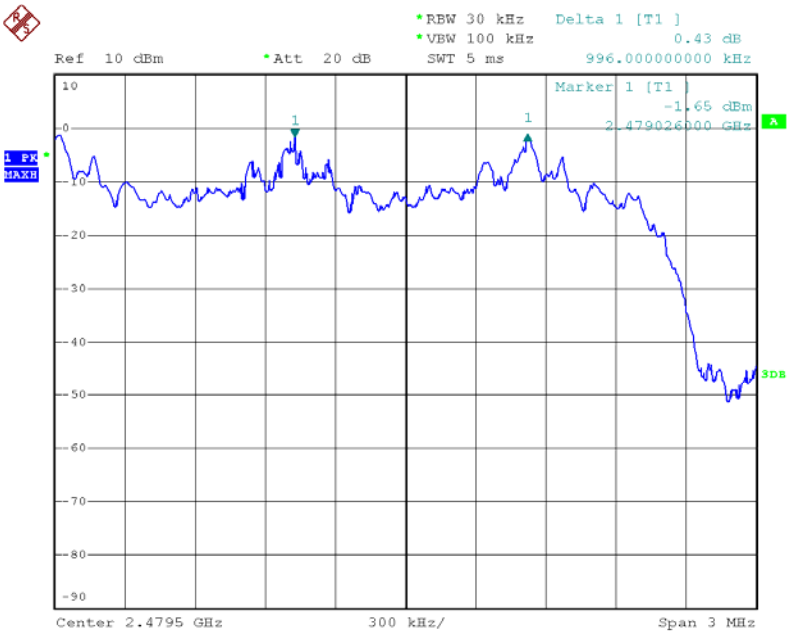
Date: 24.APR.2016 04:51:25

2441 MHz(8-DPSK)-Channel Separation



Date: 24.APR.2016 17:48:40

2480 MHz(8-DPSK)-Channel Separation



Date: 24.APR.2016 04:57:57

8. NUMBER OF HOPPING

8.1 LIMITS

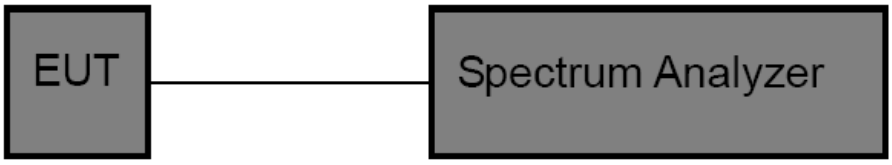
Hopping Number	Frequency hopping systems in 2400-2483.5 MHz band shall use at least 15 channels.

8.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as bellow.

a. Set span= the frequency band of operation.
b. Set the RBW≥1% of the span
c. Set the VBW≥3 RBW (100kHz/ 300kHz)
d. Detector= Peak.
e. Sweep time= auto couple
f. Trace mode= max hold.
g. Allow trace to fully stabilize.

8.3 TEST SETUP



8.4 TEST INSTRUMENTS

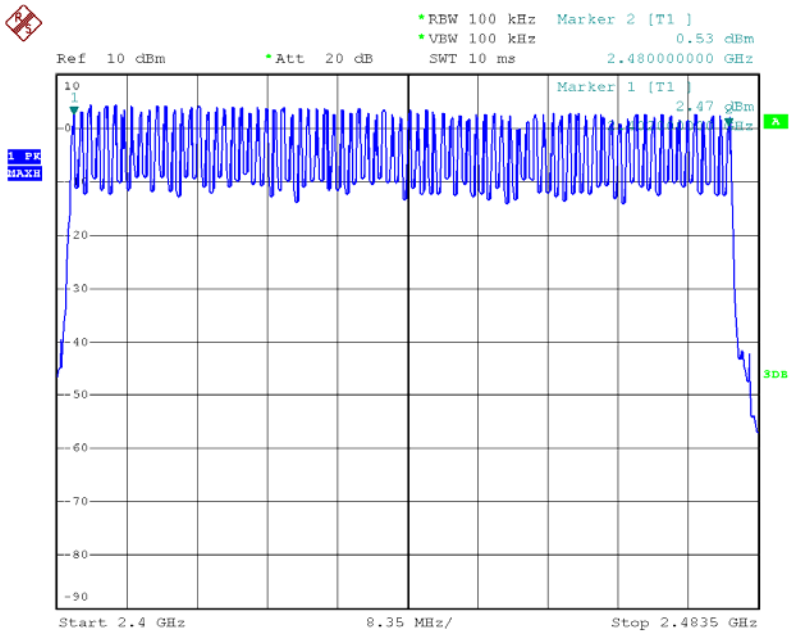
Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Spectrum Analyzer	R&S	FSP40	100154	Jul. 05, 2015	Jul. 04. 2016	1 year

8.5 EUT OPERATING CONDITIONS

The EUT was set to continuously transmitting in the maximum power during the test.

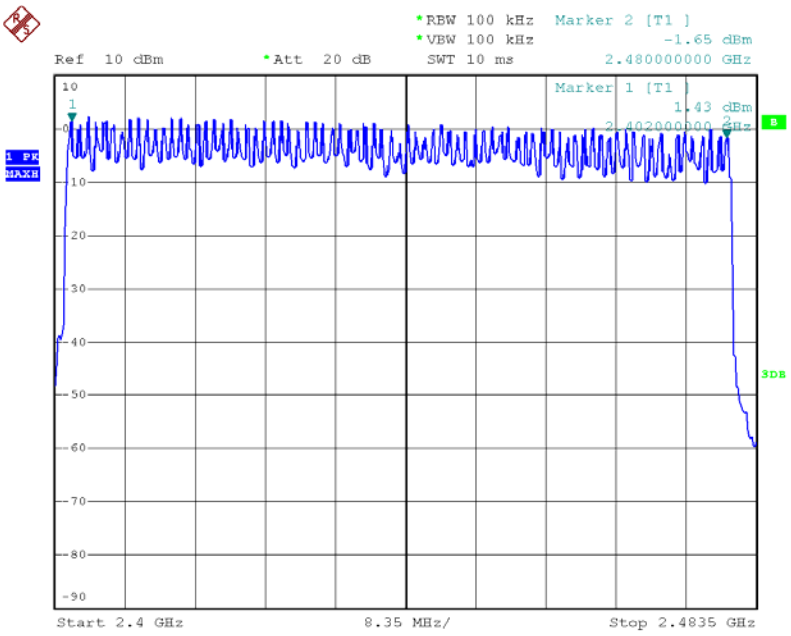
8.6 TEST RESULTS

GFSK Mode (1Mbps)	
Measurement Number	**Limit**
79	>15



Date: 24.APR.2016 04:34:16

8-DPSK Mode (3Mbps)	
Measurement Number	**Limit**
79	>15



Date: 24.APR.2016 04:45:15

9. DWELL TIME

9.1 LIMITS

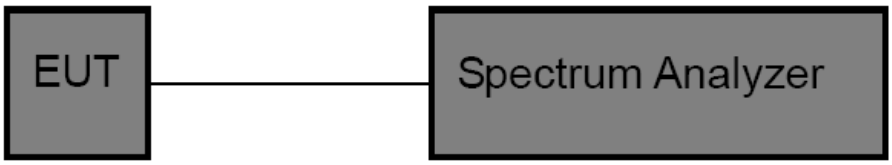
Dwell Time	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied the number of hopping channels employed.

9.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as bellow.

a. Set span= zero
b. Set the RBW= 1 MHz
c. Set the VBW≥ RBW
d. Detector= Peak.
e. Sweep time= as necessary to capture the entire dwell time per hopping channel
f. Trace mode= max hold
g. Use the marker-delta function to determine the dwell time

9.3 TEST SETUP



9.4 TEST INSTRUMENTS

Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Spectrum Analyzer	R&S	FSP40	100154	Jul. 05, 2015	Jul. 04. 2016	1 year

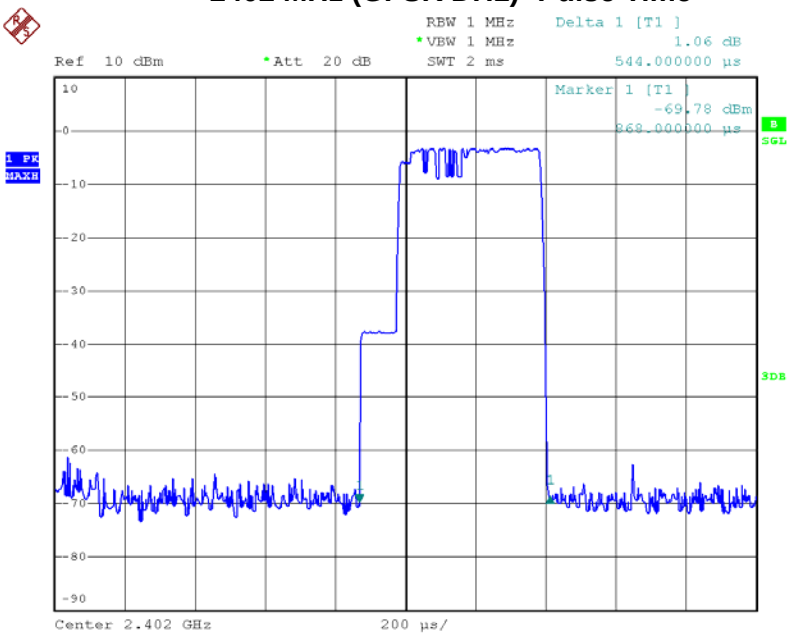
9.5 EUT OPERATING CONDITIONS

The EUT was set to continuously transmitting in the maximum power during the test.

9.6 TEST RESULTS

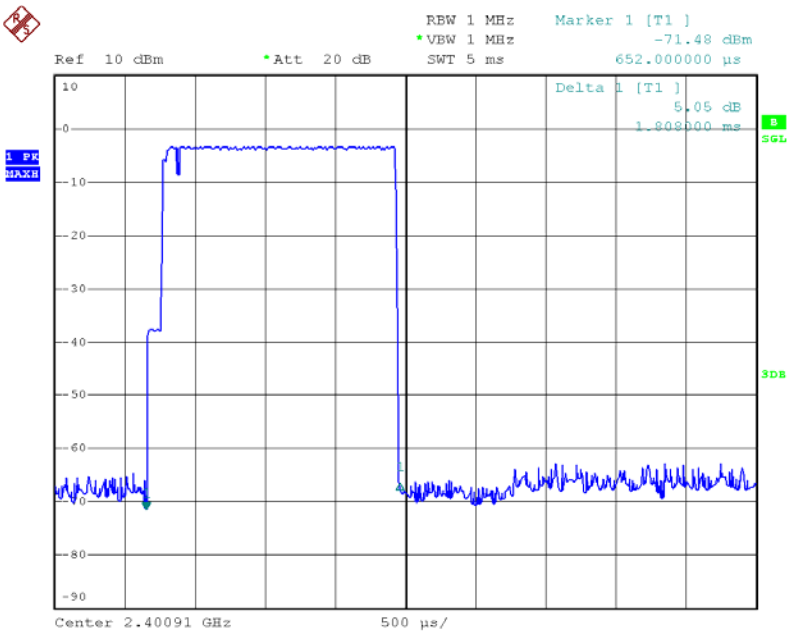
GFSK Mode (1Mbps)				
Frequency: 2402 MHz				
Packet Type	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**
DH1	0.544	174.08	31.60	<400
DH3	1.808	289.28	31.60	
DH5	3.08	328.53	31.60	
Frequency: 2441 MHz				
Packet Type	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**
DH1	0.428	121.60	31.60	<400
DH3	1.82	291.20	31.60	
DH5	3.08	328.53	31.60	
Frequency: 2480 MHz				
Packet Type	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**
DH1	0.54	172.80	31.60	<400
DH3	1.81	289.60	31.60	
DH5	3.08	328.53	31.60	

2402 MHz (GFSK DH1)- Pulse Time



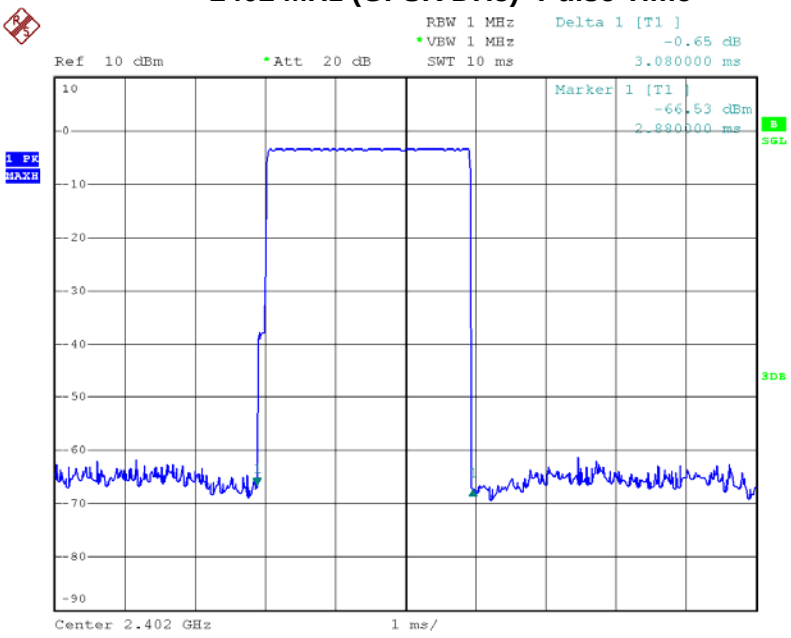
Date: 24.APR.2016 20:32:37

2402 MHz (GFSK DH3)- Pulse Time



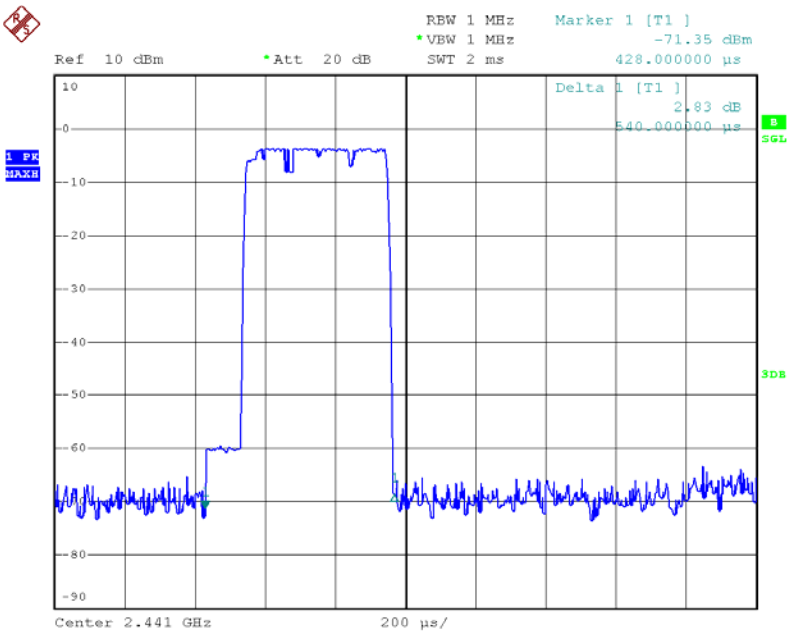
Date: 24.APR.2016 20:32:46

2402 MHz (GFSK DH5)- Pulse Time



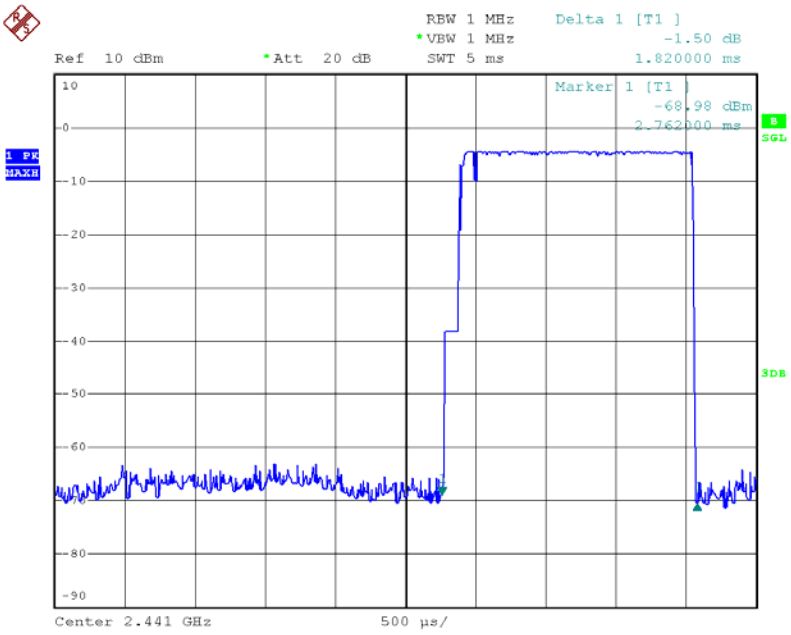
Date: 24.APR.2016 20:34:47

2441 MHz (GFSK DH1)- Pulse Time



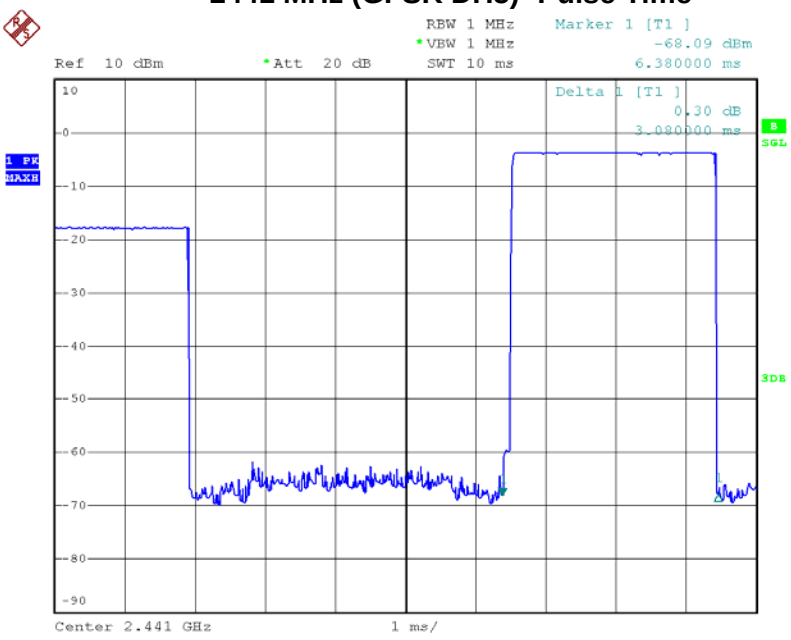
Date: 24.APR.2016 20:40:07

2441 MHz (GFSK DH3)- Pulse Time



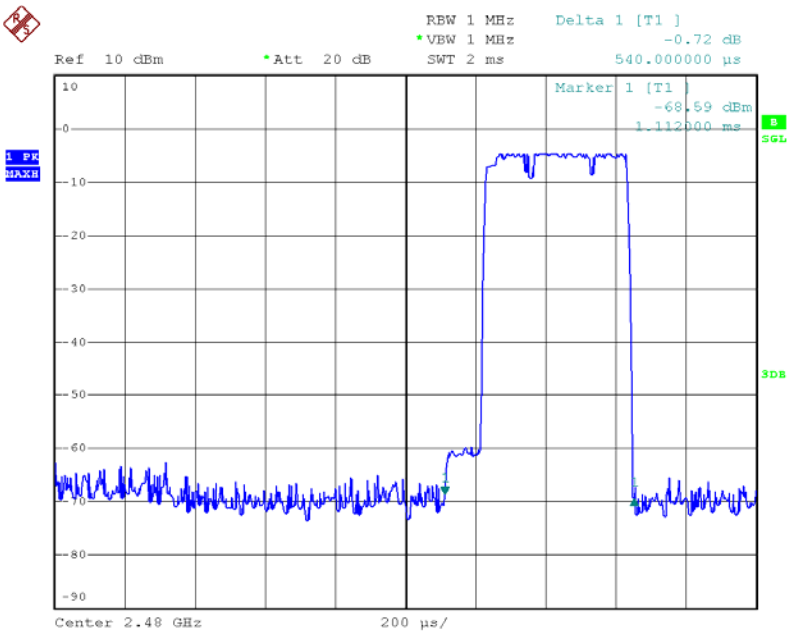
Date: 24.APR.2016 20:31:11

2441 MHz (GFSK DH5)- Pulse Time



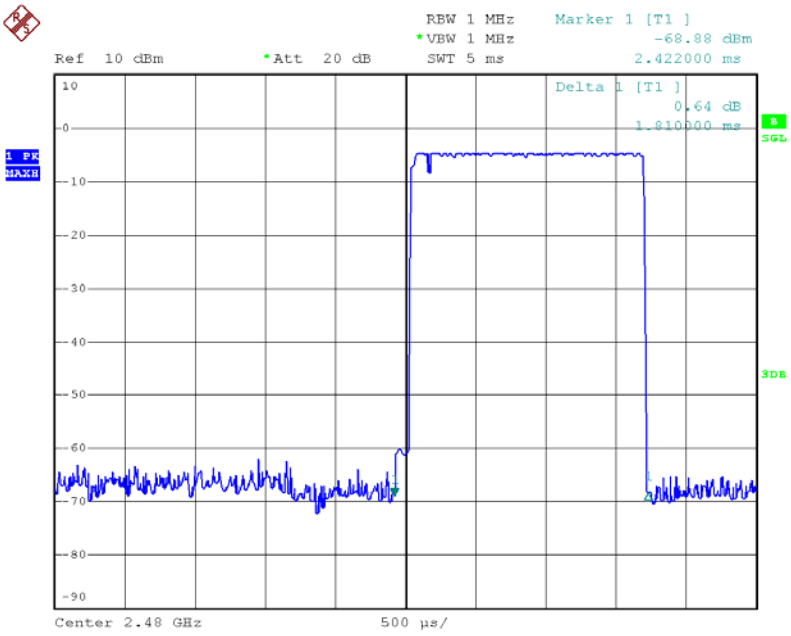
Date: 24.APR.2016 20:48:17

2480 MHz (GFSK DH1)- Pulse Time



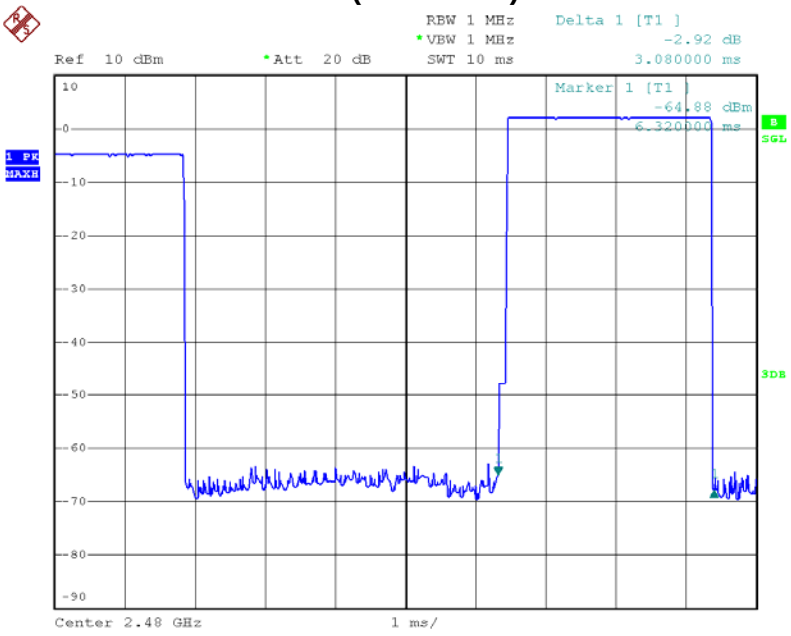
Date: 24.APR.2016 20:32:16

2480 MHz (GFSK DH3)- Pulse Time



Date: 24.APR.2016 20:34:37

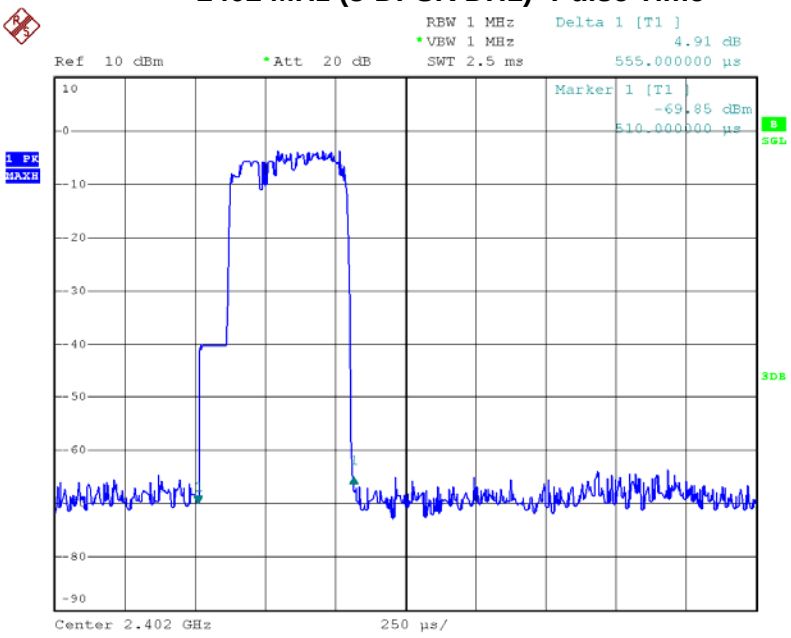
2480 MHz (GFSK DH5)- Pulse Time



Date: 24.APR.2016 20:34:17

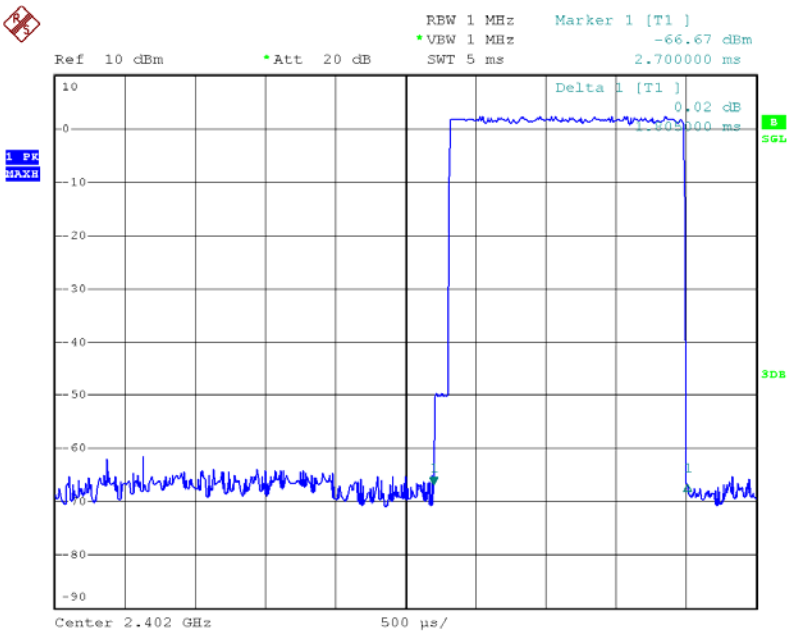
8-DPSK Mode (3Mbps)				
Frequency: 2402 MHz				
Packet Type	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**
DH1	0.555	177.60	31.60	<400
DH3	1.805	288.80	31.60	
DH5	3.085	329.07	31.60	
Frequency: 2441 MHz				
Packet Type	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**
DH1	0.555	177.60	31.60	<400
DH3	1.815	290.40	31.60	
DH5	3.105	331.02	31.60	
Frequency: 2480 MHz				
Packet Type	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**
DH1	0.555	177.60	31.60	<400
DH3	1.815	290.40	31.60	
DH5	3.085	329.07	31.60	

2402 MHz (8-DPSK DH1)- Pulse Time



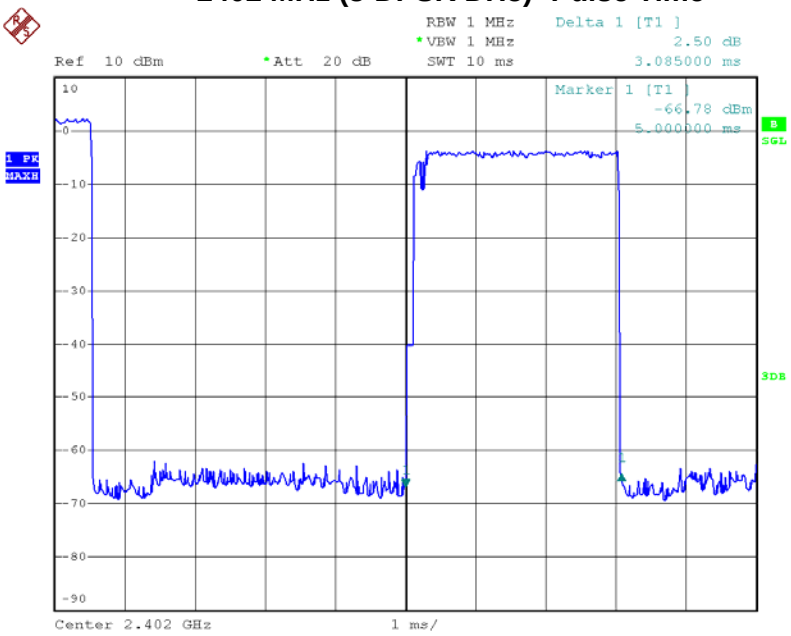
Date: 24.APR.2016 04:52:32

2402 MHz (8-DPSK DH3)- Pulse Time



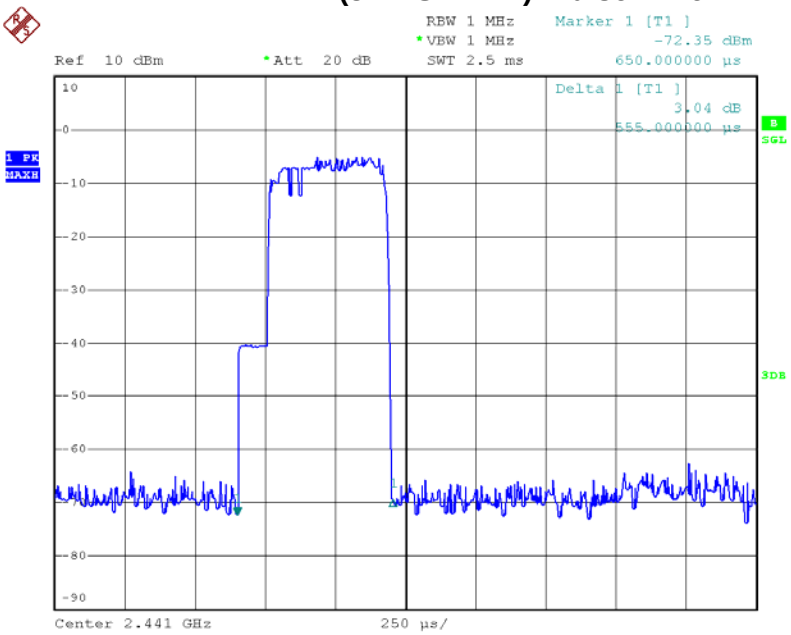
Date: 24.APR.2016 04:52:26

2402 MHz (8-DPSK DH5)- Pulse Time



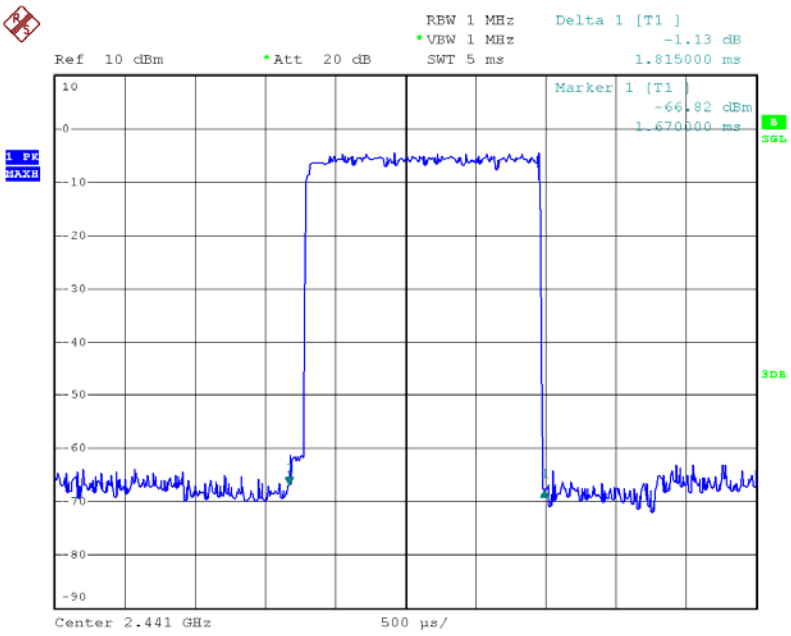
Date: 24.APR.2016 04:54:55

2441 MHz (8-DPSK DH1)- Pulse Time



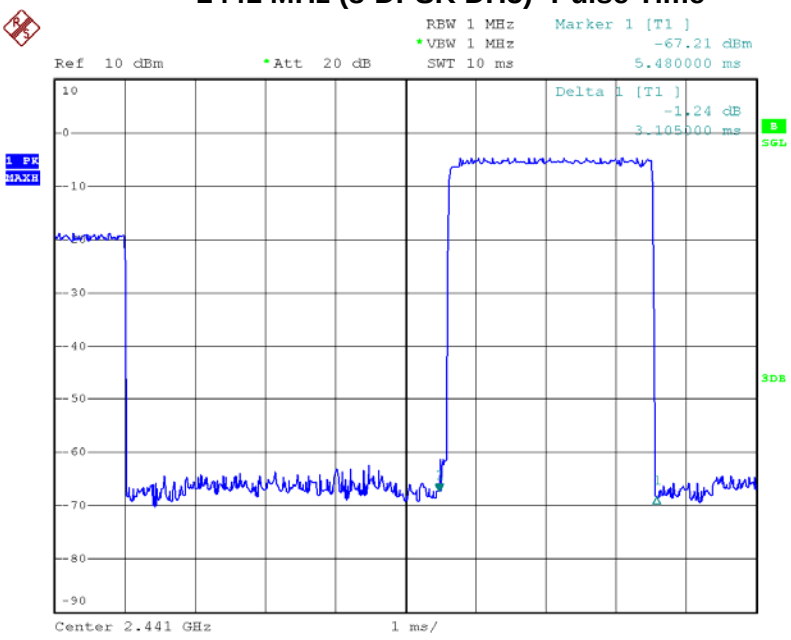
Date: 24.APR.2016 17:47:50

2441 MHz (8-DPSK DH3)- Pulse Time



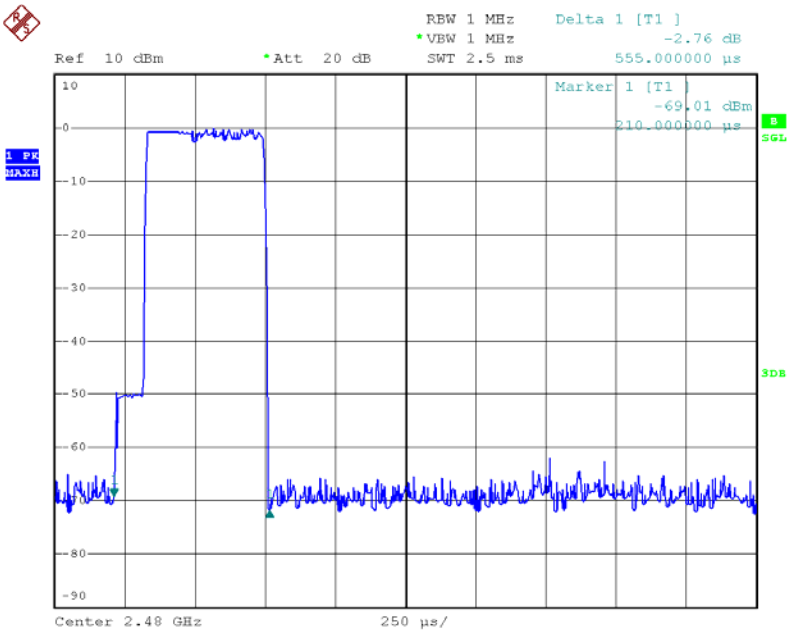
Date: 24.APR.2016 17:58:48

2441 MHz (8-DPSK DH5)- Pulse Time



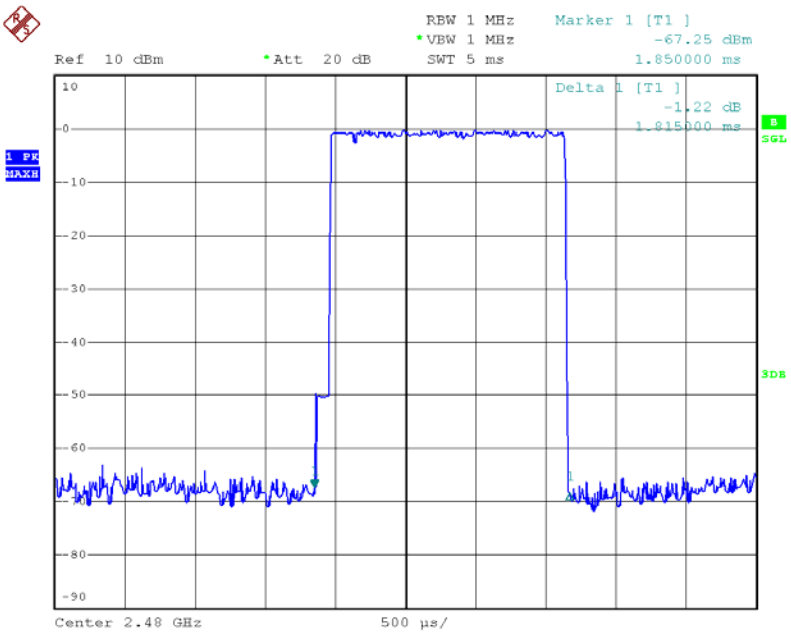
Date: 24.APR.2016 17:57:51

2480 MHz (8-DPSK DH1)- Pulse Time



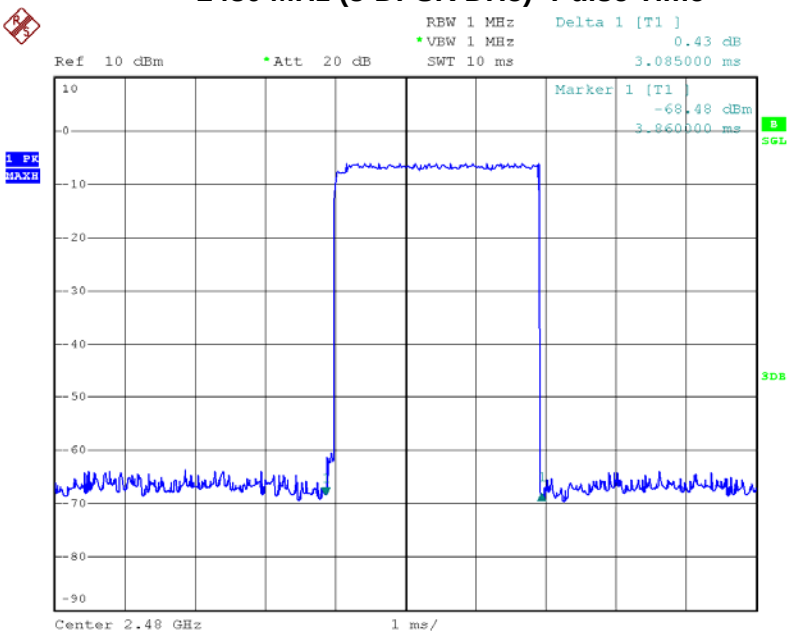
Date: 24.APR.2016 04:49:19

2480 MHz (8-DPSK DH3)- Pulse Time



Date: 24.APR.2016 04:49:57

2480 MHz (8-DPSK DH5)- Pulse Time



Date: 24.APR.2016 17:50:50

10. BAND EDGES MEASUREMENT

10.1 LIMITS

Band Edges Requirement	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

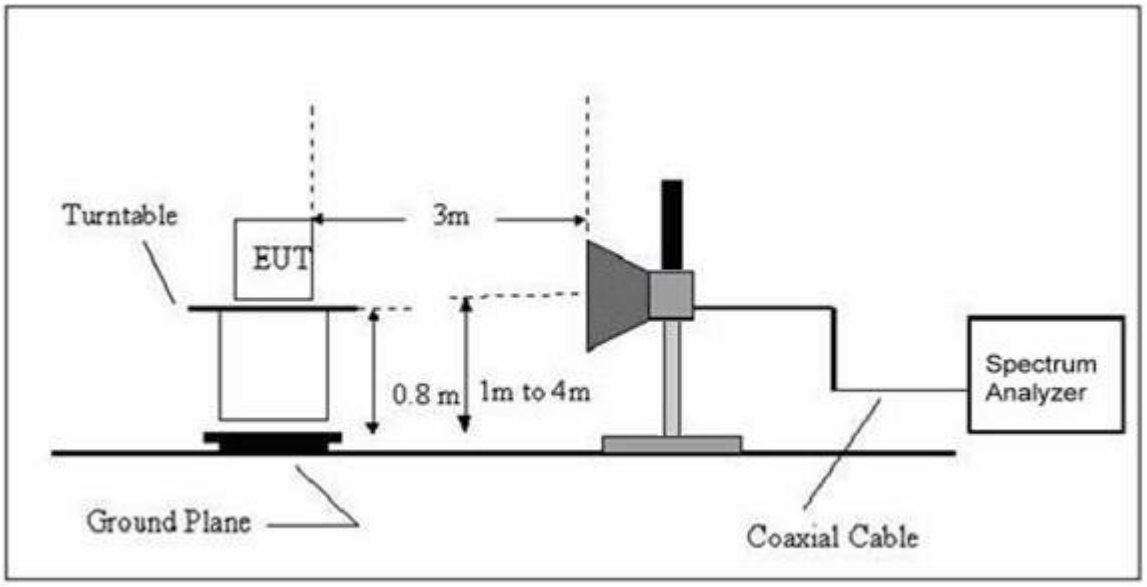
10.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as bellow.

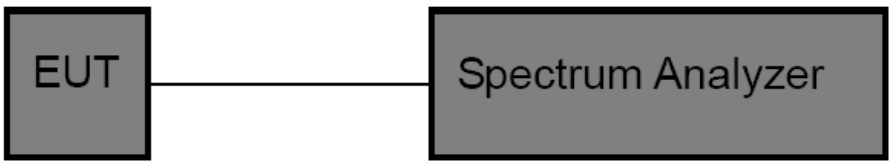
a. Set frequency range to capture low band-edge from 2310 MHz up to 2390 MHz, and for up band-edge from 2483.5 MHz up to 2500 MHz
b. For low band-edge set the equipment transmit at the lowest channel, and for up band-edge set the equipment transmit at the highest channel
c. Set the VBW≥3 RBW (100kHz/ 300kHz) for conducted measurement
d. For radiated measurements the RBW set to 1 MHz, and the VBW set to 1 MHz for peak measurements and 10 Hz for average measurement

10.3 TEST SETUP

(A) Radiated Emission Test Set-Up



(B) Conducted Emission Test Setup



10.4 TEST INSTRUMENTS

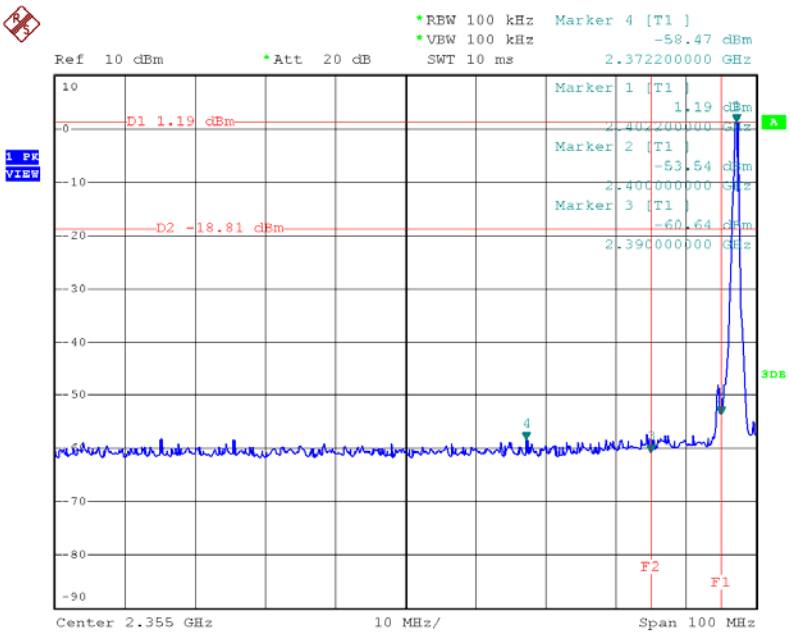
Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Spectrum Analyzer	R&S	FSP40	100154	Jul. 05, 2015	Jul. 04. 2016	1 year

10.5 EUT OPERATING CONDITIONS

The EUT was set to continuously transmitting in the maximum power during the test.

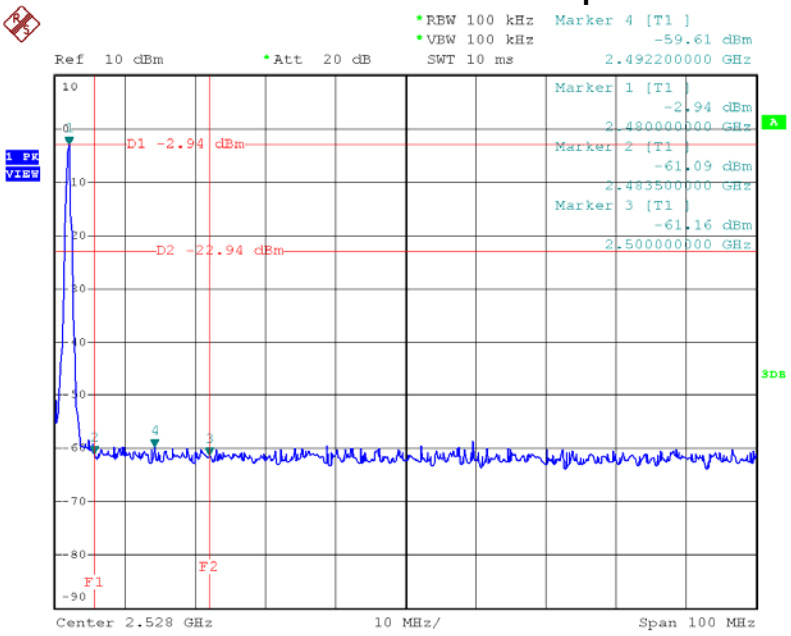
10.6 TEST RESULTS

Fixed GFSK Mode Low



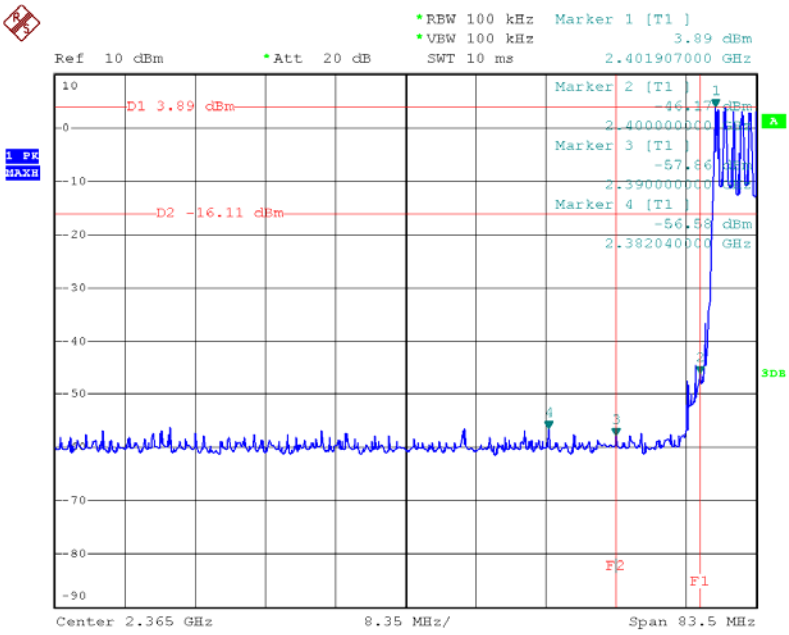
Date: 24.APR.2016 04:24:25

Fixed GFSK Mode Up



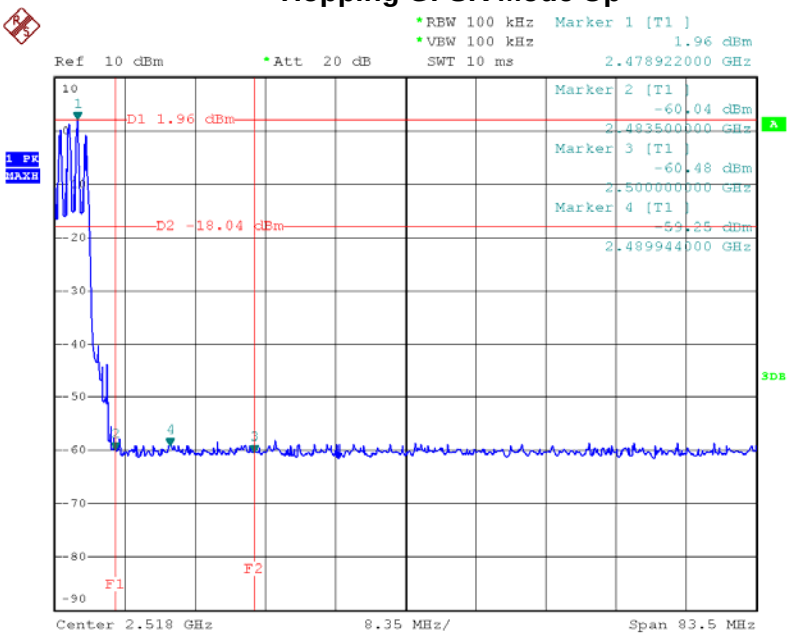
Date: 24.APR.2016 04:28:50

Hopping GFSK Mode Low



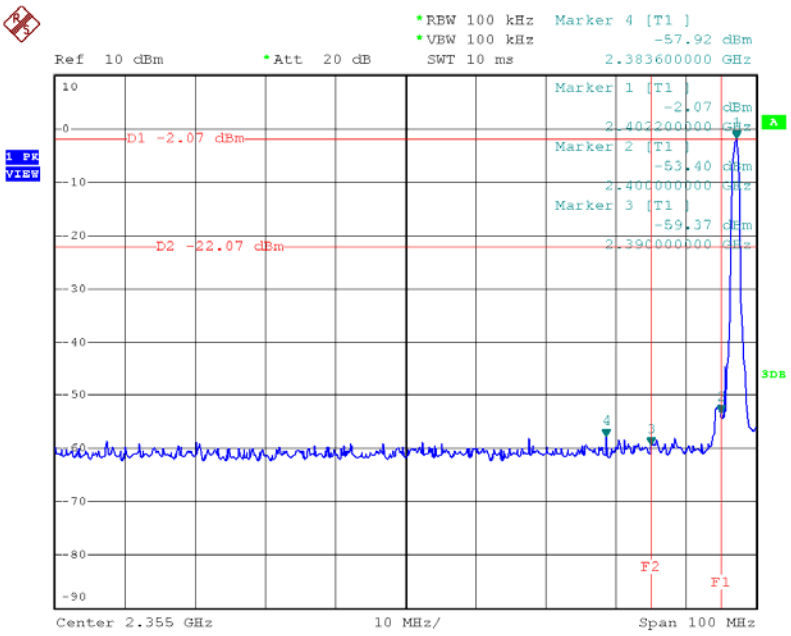
Date: 24.APR.2016 04:32:36

Hopping GFSK Mode Up



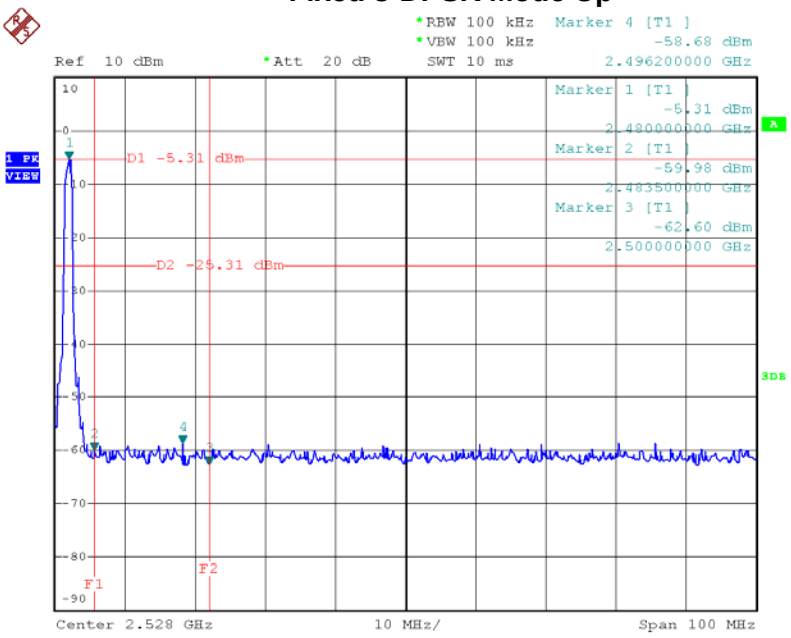
Date: 24.APR.2016 04:34:36

Fixed 8-DPSK Mode Low



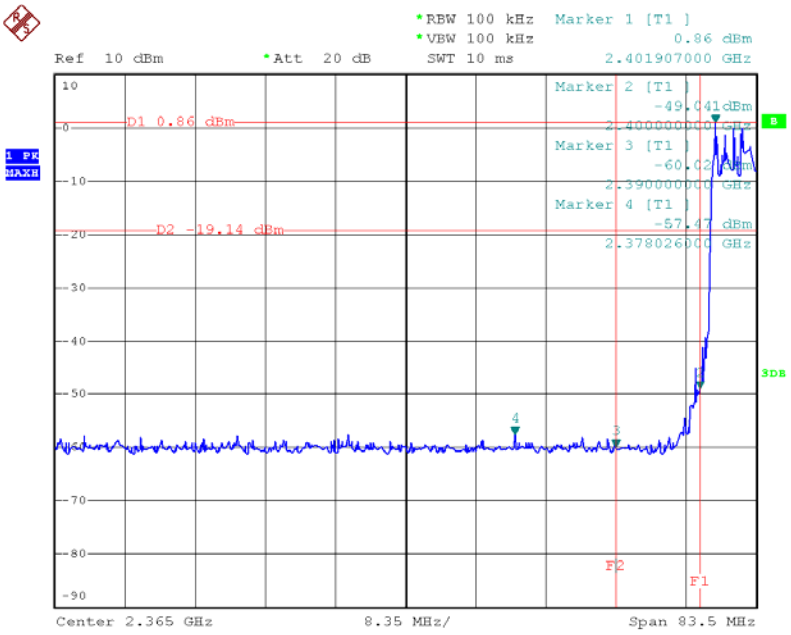
Date: 24.APR.2016 04:48:32

Fixed 8-DPSK Mode Up



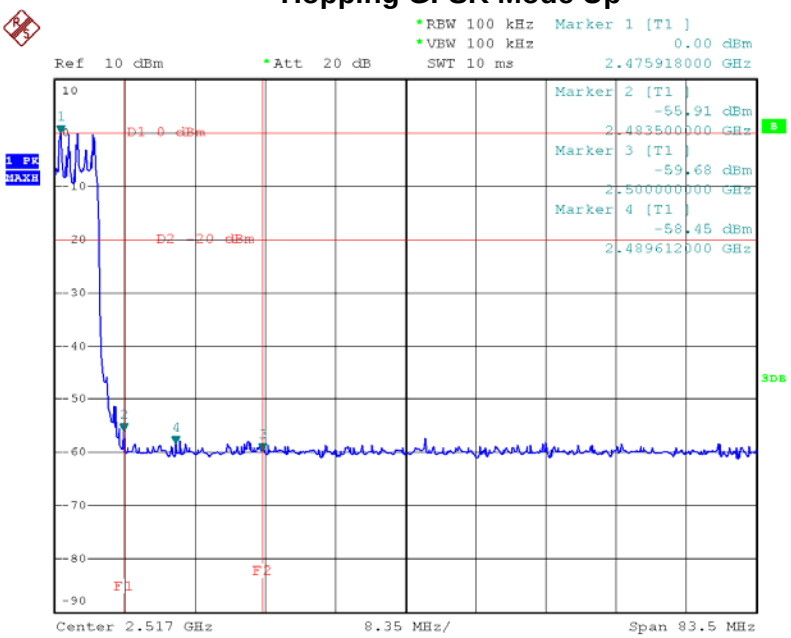
Date: 24.APR.2016 04:56:09

Hopping 8-DPSK Mode Low



Date: 24.APR.2016 04:47:46

Hopping GFSK Mode Up



Date: 24.APR.2016 04:57:56

11. OUT OF BAND CONDUCTED EMISSIONS MEASUREMENT

11.1 LIMITS

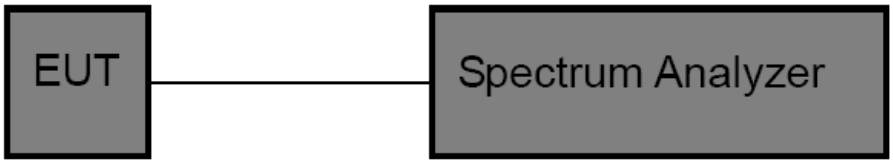
Requirement	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

11.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as bellow.

a. Set spectrum frequency range from 30 MHz~26.5 GHz.
b. Set spectrum RBW=100 kHz, RBW=300 kHz.
c. Detector= Peak.
d. Sweep time= auto couple
e. Trace mode= maxhold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level within the RBW.

11.3 TEST SETUP



11.4 TEST INSTRUMENTS

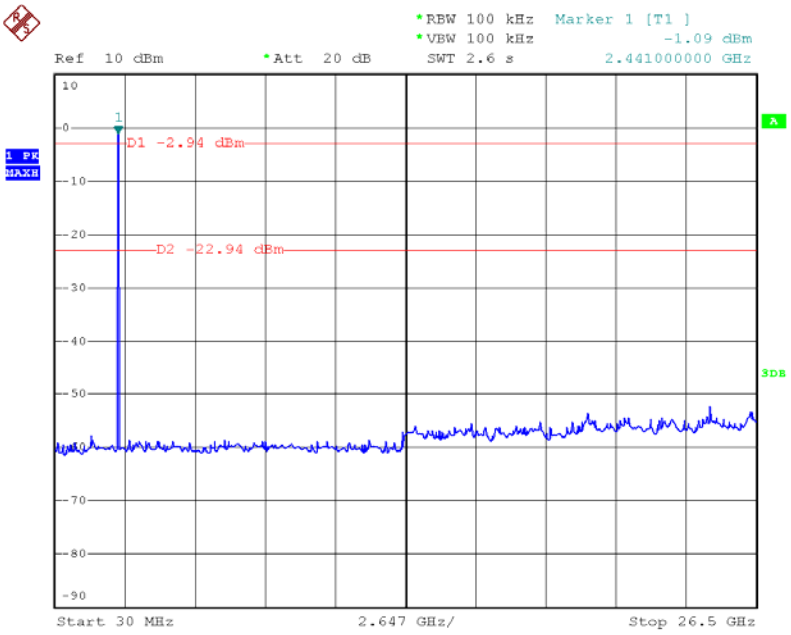
Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
Spectrum Analyzer	R&S	FSP40	MY45108040	Jul. 05, 2015	Jul. 04. 2016	1 year

11.5 EUT OPERATING CONDITIONS

The EUT was set to continuously transmitting in the maximum power during the test.

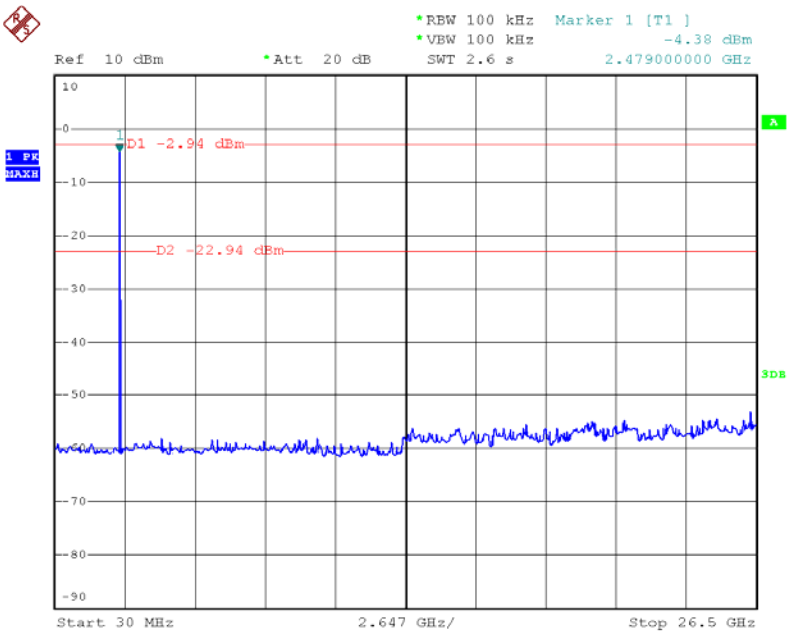
11.6 TEST RESULTS

GFSK 2402 MHz



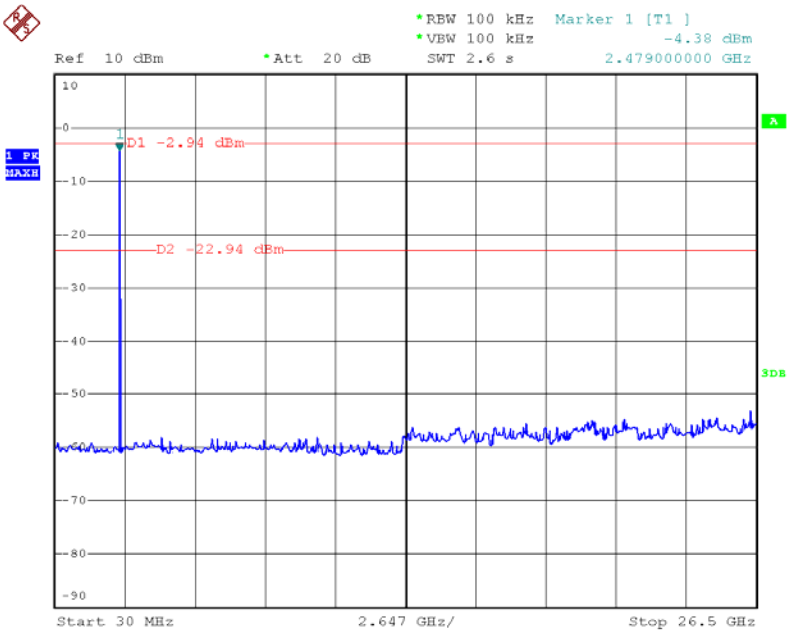
Date: 24.APR.2016 04:32:26

GFSK 2441 MHz



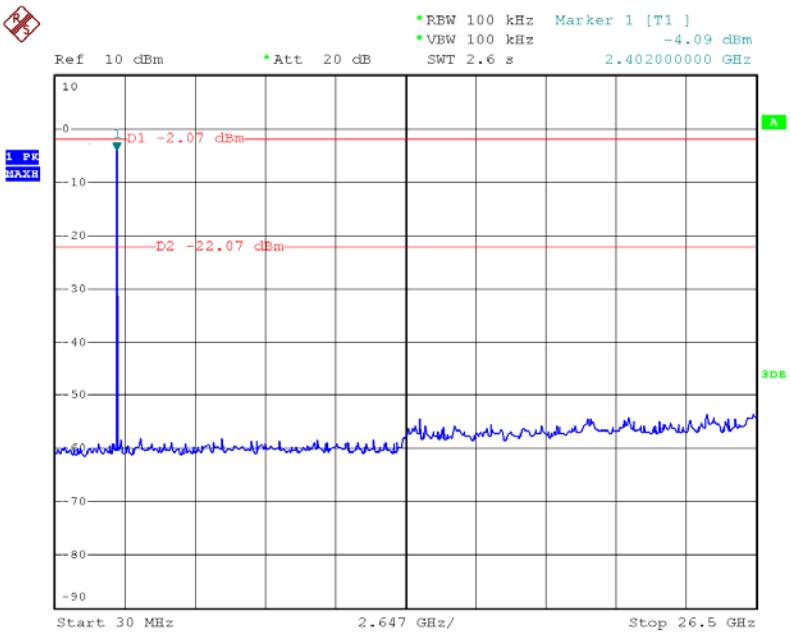
Date: 24.APR.2016 04:31:19

GFSK 2480 MHz



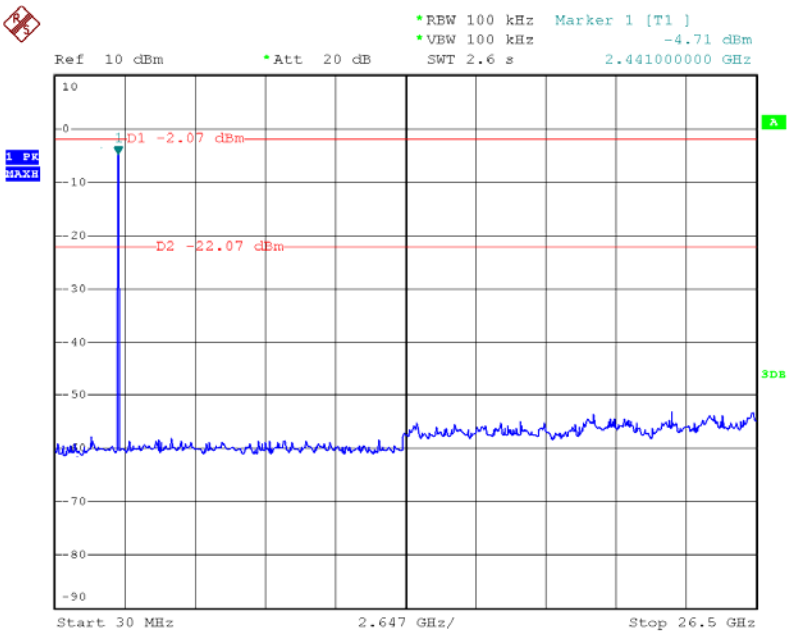
Date: 24.APR.2016 04:31:19

8-DPSK 2402 MHz



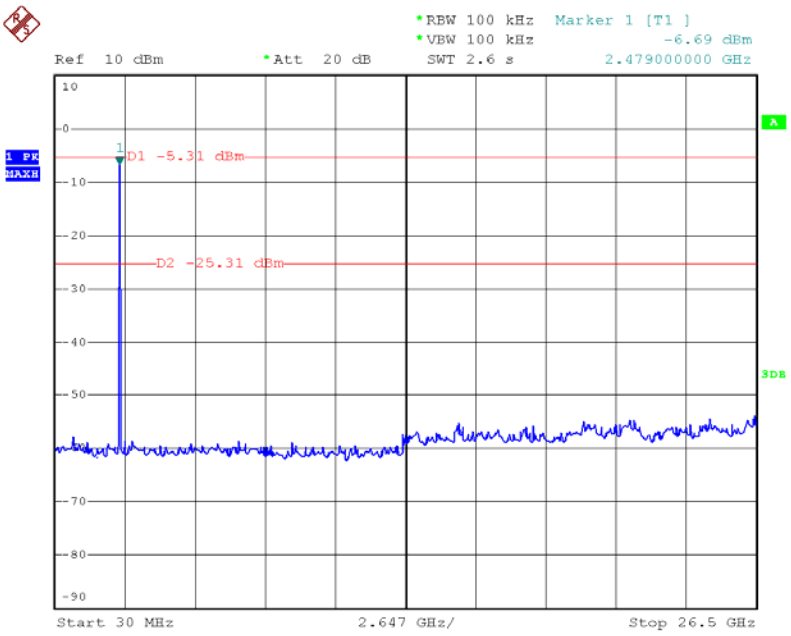
Date: 24.APR.2016 04:50:37

8-DPSK 2441 MHz



Date: 24.APR.2016 04:51:44

8-DPSK 2480 MHz



Date: 24.APR.2016 04:57:17

12. ANTENNA REQUIREMENT

12.1 REQUIREMENT

Antenna Requirement (15.203)	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
Antenna Requirement (15.247)	If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

12.2 ANTENNA CONNECTOR CONSTRUCTION

The EUT antenna is a PCB Antenna. And the maximum gain of this antenna is 0 dBi.
It complies with the standard requirement.