

FCC ID: M82-TREK530LTE
Report No.: T170908D07-A-RP2

Page: 1 / 61
Rev.: 01

RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	FCC Part 15.247
Product name	Computer
Brand Name	ADVANTECH
Model No.	TREK-530
Test Result	Pass

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

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

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:



Sam Chuang
Manager

Tested by:



Jerry Chuang
Engineer

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部分複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Report No.: T170908D07-A-RP2

Page: 2 / 61

Rev.: 01

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 16, 2018	Initial Issue	ALL	Allison Chen
01	July 31, 2018	1. Revised antenna information in section 1.4. 2. Revised test summary in section 2. 3. Added FHSS characteristics in section 1.2.	P.5, 6, 10	Allison Chen

Table of contents

1. GENERAL INFORMATION	4
1.1 EUT INFORMATION	4
1.2 EUT CHANNEL INFORMATION	6
1.3 ANTENNA INFORMATION	6
1.4 MEASUREMENT UNCERTAINTY	7
1.5 FACILITIES AND TEST LOCATION	8
1.6 INSTRUMENT CALIBRATION	8
1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT	9
1.8 TEST METHODOLOGY AND APPLIED STANDARDS	9
2. TEST SUMMERY	10
3. DESCRIPTION OF TEST MODES	11
3.1 THE WORST MODE OF OPERATING CONDITION	11
3.2 THE WORST MODE OF MEASUREMENT	12
4. EUT DUTY CYCLE	13
5. TEST RESULT	14
5.1 AC POWER LINE CONDUCTED EMISSION	14
5.2 20DB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)	15
5.3 OUTPUT POWER MEASUREMENT	21
5.4 FREQUENCY SEPARATION	23
5.5 NUMBER OF HOPPING	27
5.6 CONDUCTED BANDEdge AND SPURIOUS EMISSION	29
5.7 TIME OF OCCUPANCY (DWELL TIME)	34
5.8 RADIATION BANDEdge AND SPURIOUS EMISSION	36
APPENDIX 1 - PHOTOGRAPHS OF EUT	

Report No.: T170908D07-A-RP2

Page: 4 / 61

Rev.: 01

1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Advantech Co.Ltd. No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan, R.O.C.
Manufacturer	Advantech Co.Ltd. No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan, R.O.C.
Equipment	Computer
Model No.	TREK-530
Model Discrepancy	N/A
Trade Name	ADVANTECH
Received Date	September 8, 2017
Date of Test	December 7, 2017 ~ January 9, 2018
Output Power (W)	GFSK : 0.01782 8DPSK : 0.01845
Power Supply	Powered from DC supply: DC 12V

1.2 INFORMATION ABOUT THE FHSS CHARACTERISTICS

1.2.1 Pseudorandom Frequency Hopping Sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; the phase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 1 600 hops/s.

1.2.2 Equal Hopping Frequency Use

The channels of this system will be used equally over the long-term distribution of the hopsets.

1.2.3 Example of a 79 hopping sequence in data mode:

02, 05, 31, 24, 20, 10, 43, 36, 30, 23, 40, 06, 21, 50, 44, 09, 71, 78, 01, 13, 73, 07, 70, 72, 35, 62, 42, 11, 41, 08, 16, 29, 60, 15, 34, 61, 58, 04, 67, 12, 22, 53, 57, 18, 27, 76, 39, 32, 17, 77, 52, 33, 56, 46, 37, 47, 64, 49, 45, 38, 69, 14, 51, 26, 79, 19, 28, 65, 75, 54, 48, 03, 25, 66, 05, 16, 68, 74, 59, 63, 55

1.2.4 System Receiver Input Bandwidth

Each channel bandwidth is 1MHz.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

1.2.5 Equipment Description

15.247(a)(1) that the Rx input bandwidths shift frequencies in synchronization with the transmitted signals.

15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.

15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

Report No.: T170908D07-A-RP2

1.3 EUT CHANNEL INFORMATION

Frequency Range	2402MHz-2480MHz
Modulation Type	1. GFSK for BDR-1Mbps 2. $\pi/4$ -DQPSK for EDR-2Mbps 3. 8DPSK for EDR-3Mbps
Number of channel	79 Channels

Remark:

Refer as ANSI 63.10:2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
<input type="checkbox"/> 1 MHz or less	1	Middle
<input type="checkbox"/> 1 MHz to 10 MHz	2	1 near top and 1 near bottom
<input checked="" type="checkbox"/> More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.4 ANTENNA INFORMATION

Antenna Type	<input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input checked="" type="checkbox"/> Dipole <input type="checkbox"/> Coils
Antenna Gain	Gain: -0.61dBi

1.5 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 1.4003
RF output power, conducted	+/- 1.1372
Power density, conducted	+/- 1.4003
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

Report No.: T170908D07-A-RP2

1.6 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	Eric Lee	
Radiation	Jerry Chuang	
RF Conducted	Jerry Chuang	

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.7 INSTRUMENT CALIBRATION

Wugu 966 Chamber A					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Bilog Antenna	Sunol Sciences	JB3	A030105	06/20/2017	06/19/2018
Pre-Amplifier	EMEC	EM330	60609	06/07/2017	06/06/2018
Spectrum Analyzer	Agilent	E4446A	US42510252	11/27/2017	11/26/2018
Loop Ant	COM-POWER	AL-130	121051	03/02/2017	03/01/2018
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Pre-Amplifier	HP	8449B	3008A00965	06/27/2017	06/26/2018
Filter	N/A	2400-2500	N/A	N/A	N/A
Filter	N/A	580-6000	N/A	N/A	N/A
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	07/31/2017	07/30/2018
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	07/31/2017	07/30/2018
Horn Antenna	EMCO	3117	55165	02/20/2017	02/19/2018

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2495A	1033009	04/11/2017	04/10/2018
Power Sensor	Anritsu	MA2411B	917072	07/03/2017	07/02/2018
Spectrum Analyzer	R&S	FSV 40	101073	10/02/2017	10/01/2018
Thermostatic/Hrgrosati c Chamber	GWINSTEK	GTC-288MH-CC	TH160402	05/23/2017	05/22/2018
Directional Coupler	Agilent	87301D	MY44350252	07/25/2017	07/24/2018
SUCOFLEX Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	07/31/2017	07/30/2018
Divider	Solvang Technology	2-18GHz 4Way	STI08-0015	07/26/2017	07/25/2018

Remark: Each piece of equipment is scheduled for calibration once a year.

Report No.: T170908D07-A-RP2

1.8 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
	N/A				

Support Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB	ASUS	M5200AE	N/A	PD9WM3B2100
2	DC Power Source	GWINSTEK	SPS-3610	N/A	N/A

1.9 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 662911.

Report No.: T170908D07-A-RP2

2. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.4	Antenna Requirement	Pass
15.207(a)	5.1	AC Conducted Emission	N/A
15.247(a)(1)	5.2	20 dB Bandwidth	-
-	5.2	Occupied Bandwidth (99%)	-
15.247(b)(1)	5.3	Output Power Measurement	Pass
15.247(a)(1)	5.4	Frequency Separation	Pass
15.247(a)(1)(iii)	5.5	Number of Hopping	Pass
15.247(d)	5.6	Conducted Band Edge	Pass
15.247(d)	5.6	Conducted spurious Emission	Pass
15.247(a)(1)(iii)	5.7	Time of Occupancy	Pass
15.247(d)	5.8	Radiation Band Edge	Pass
15.247(d)	5.8	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	GFSK for BDR-1Mbps (DH5) 8DPSK for EDR-3Mbps (3DH5)
Test Channel Frequencies	GFSK for BDR-1Mbps: 1.Lowest Channel : 2402MHz 2.Middle Channel : 2441MHz 3.Highest Channel : 2480MHz 8DPSK for EDR-3Mbps: 1.Lowest Channel : 2402MHz 2.Middle Channel : 2441MHz 3.Highest Channel : 2480MHz

Remark:

1. *EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.*

3.2 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	Band edge, Emission for Unwanted and Fundamental
DC Voltage	12V
Test Mode	Mode 1:EUT power by Battery
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Worst Position	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)
Worst Polarity	<input checked="" type="checkbox"/> Horizontal <input type="checkbox"/> Vertical

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
DC Voltage	12V
Test Mode	Mode 1:EUT power by Battery
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

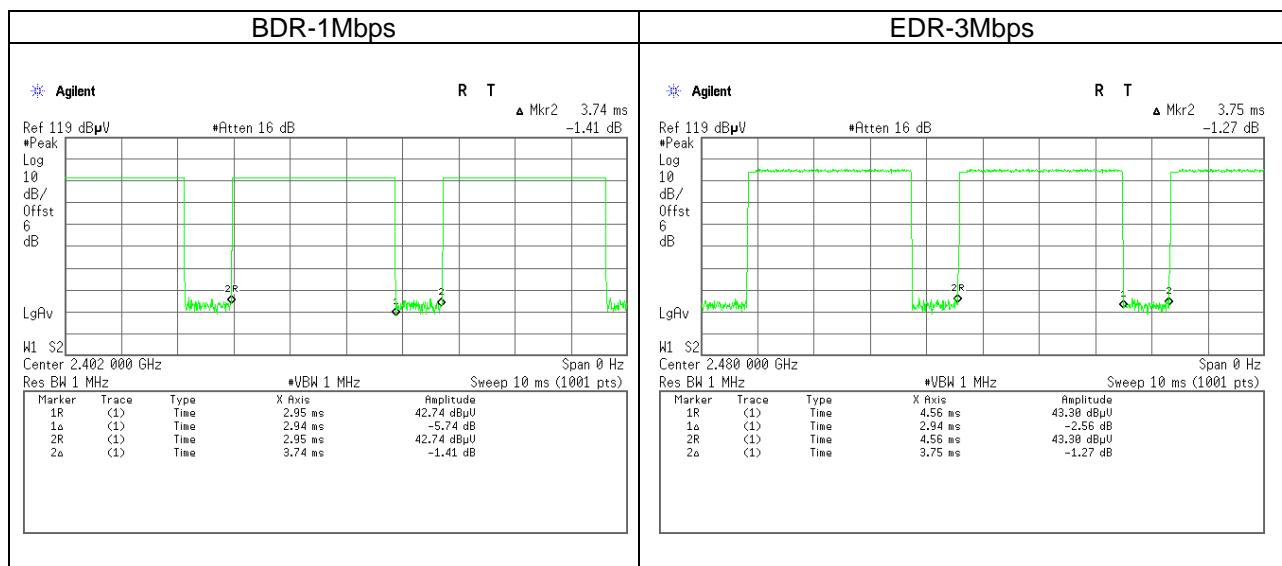
Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis, X, Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (Y-Plane and Horizontal) were recorded in this report
3. For below 1G, Radiation emission were performed the EUT transmit at the highest output power channel as worse case.

Report No.: T170908D07-A-RP2

4. EUT DUTY CYCLE

Duty Cycle				
Configuration	TX ON (ms)	TX ALL (ms)	Duty Cycle (%)	Duty Factor(dB)
BDR-1Mbps	2.9400	3.7400	78.61%	1.05
EDR-3Mbps	2.9400	3.7500	78.40%	1.06



5. TEST RESULT

5.1 AC POWER LINE CONDUCTED EMISSION

5.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

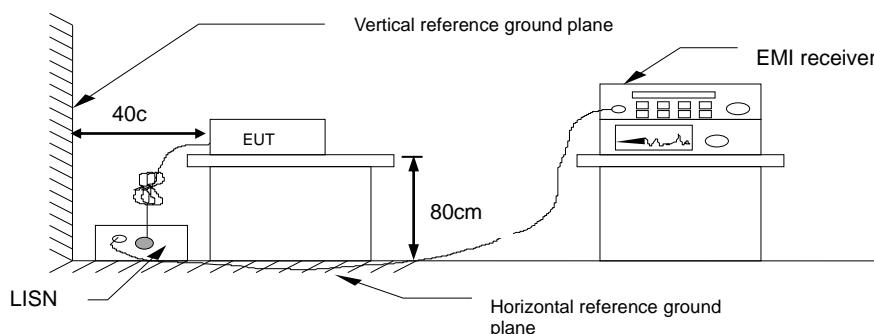
* Decreases with the logarithm of the frequency.

5.1.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

5.1.3 Test Setup



5.1.4 Test Result

Not applicable, because EUT not connect to AC Main Source direct.

5.2 20DB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

5.2.1 Test Limit

According to §15.247(a) (1),

20 dB Bandwidth : For reporting purposes only.

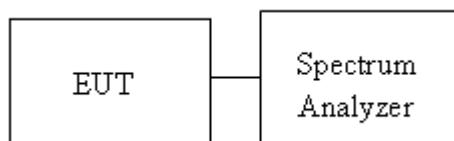
Occupied Bandwidth(99%) : For reporting purposes only.

5.2.2 Test Procedure

Test method Refer as Section 8.1 and ANSI 63.10:2013 clause 6.9.2 & 6.9.3,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 30kHz, VBW = 100kHz and Detector = Peak, to measurement 20 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 20 dB Bandwidth and 99% Bandwidth. in the test report.

5.2.3 Test Setup



5.2.4 Test Result

Test mode: GFSK_BDR-1Mbps mode / 2402-2480 MHz			
Channel	Frequency (MHz)	OBW(99%) (MHz)	20dB BW (MHz)
Low	2402	0.8856	1.1217
Mid	2441	0.8813	1.1173
High	2480	0.8769	1.1173

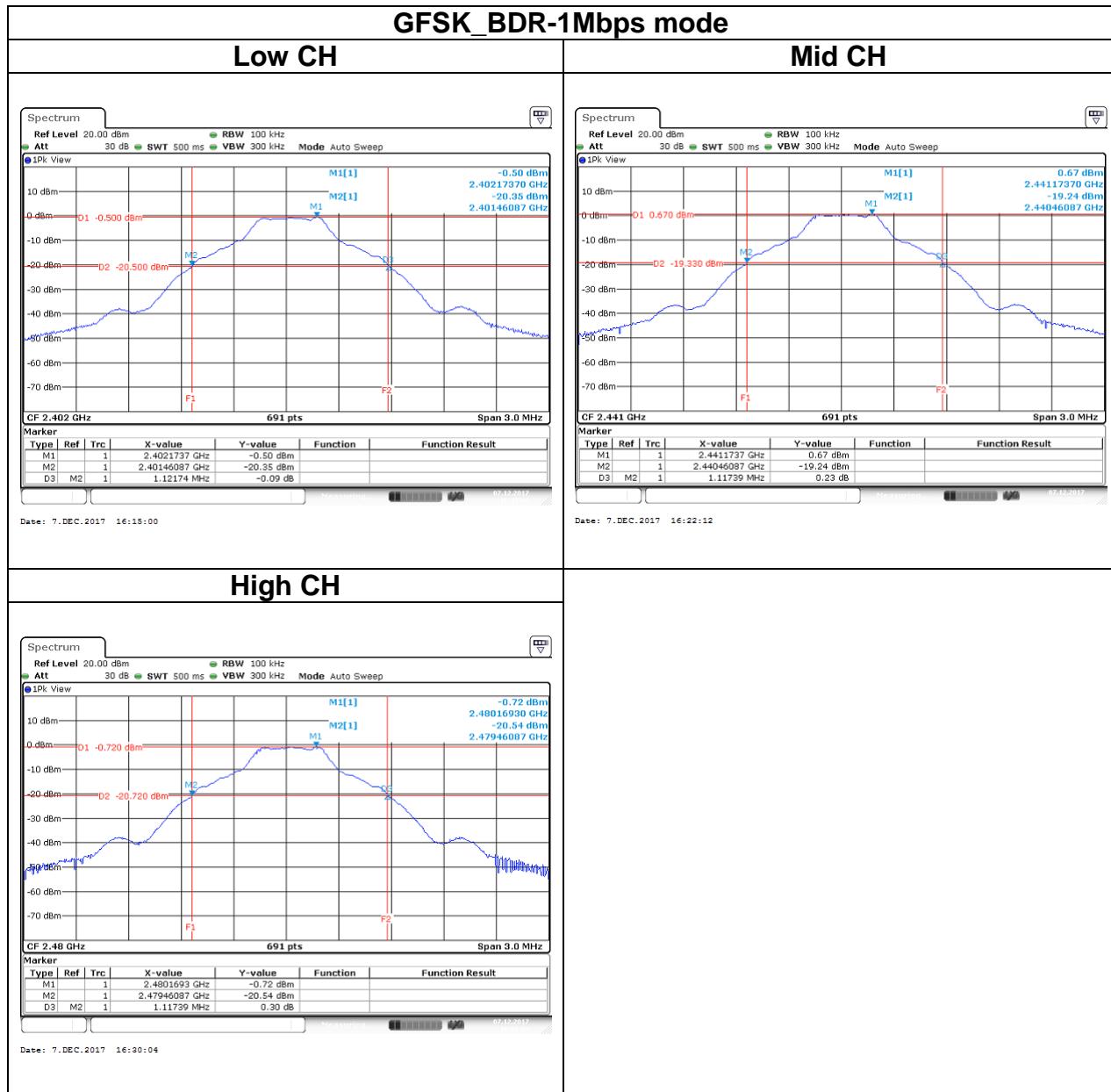
Test mode: 8DPSK_EDR-3Mbps mode / 2402-2480 MHz			
Channel	Frequency (MHz)	OBW(99%) (MHz)	20dB BW (MHz)
Low	2402	1.2026	1.3869
Mid	2441	1.1939	1.3869
High	2480	1.1852	1.3782



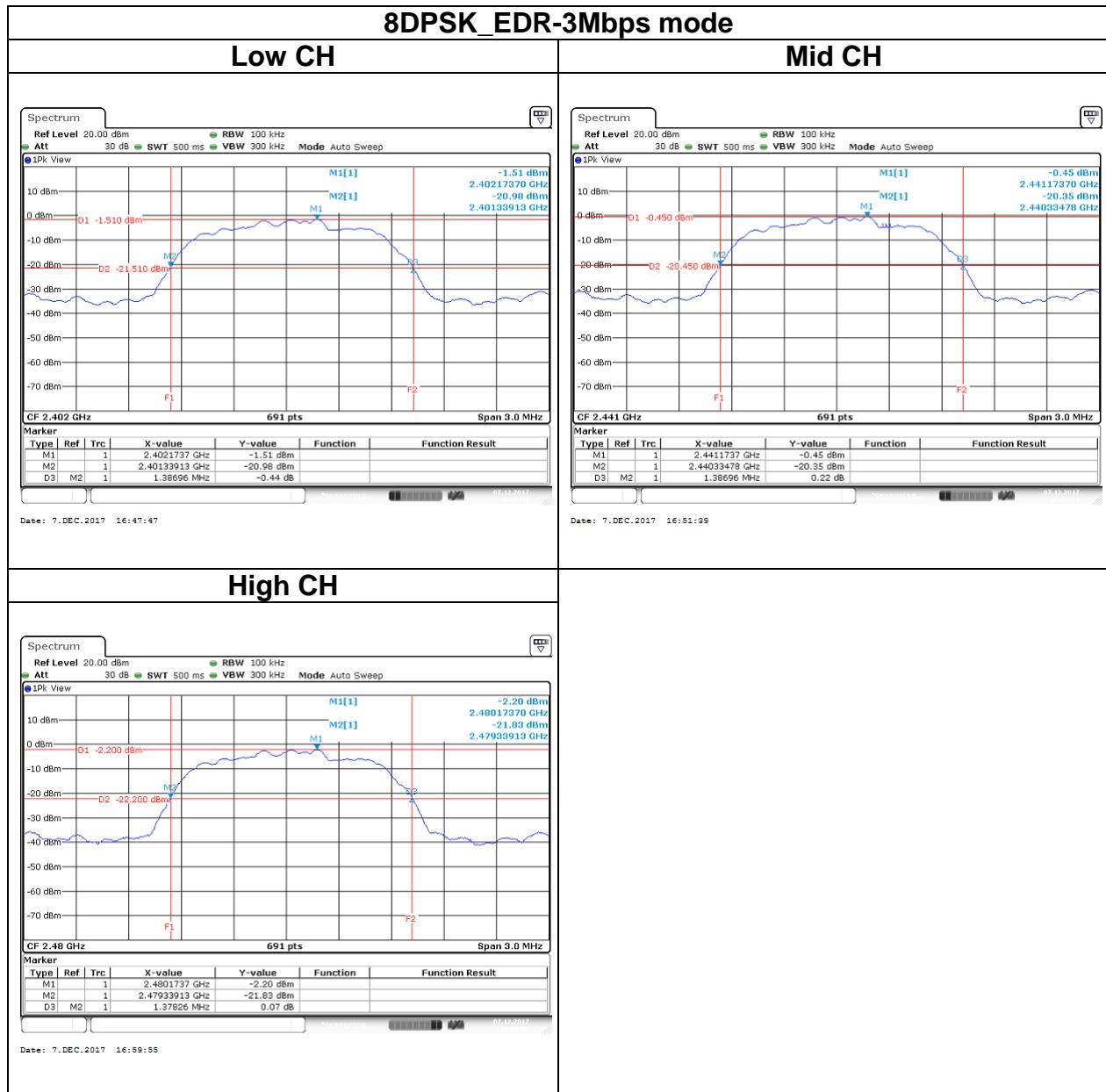
Report No.: T170908D07-A-RP2

Page: 16 / 61
Rev.: 01

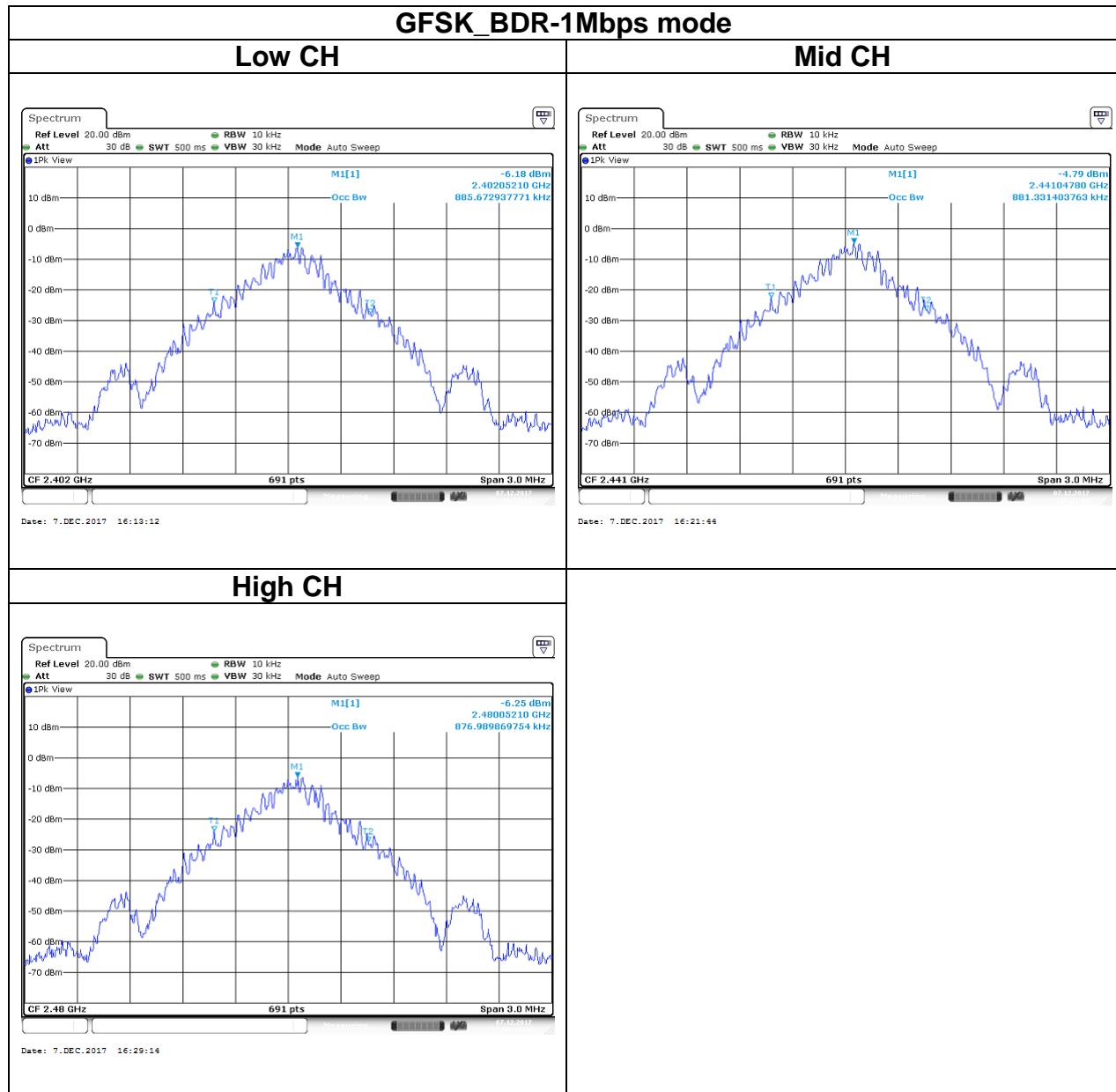
Report No.: T170908D07-A-RP2

Test Data**20dB**

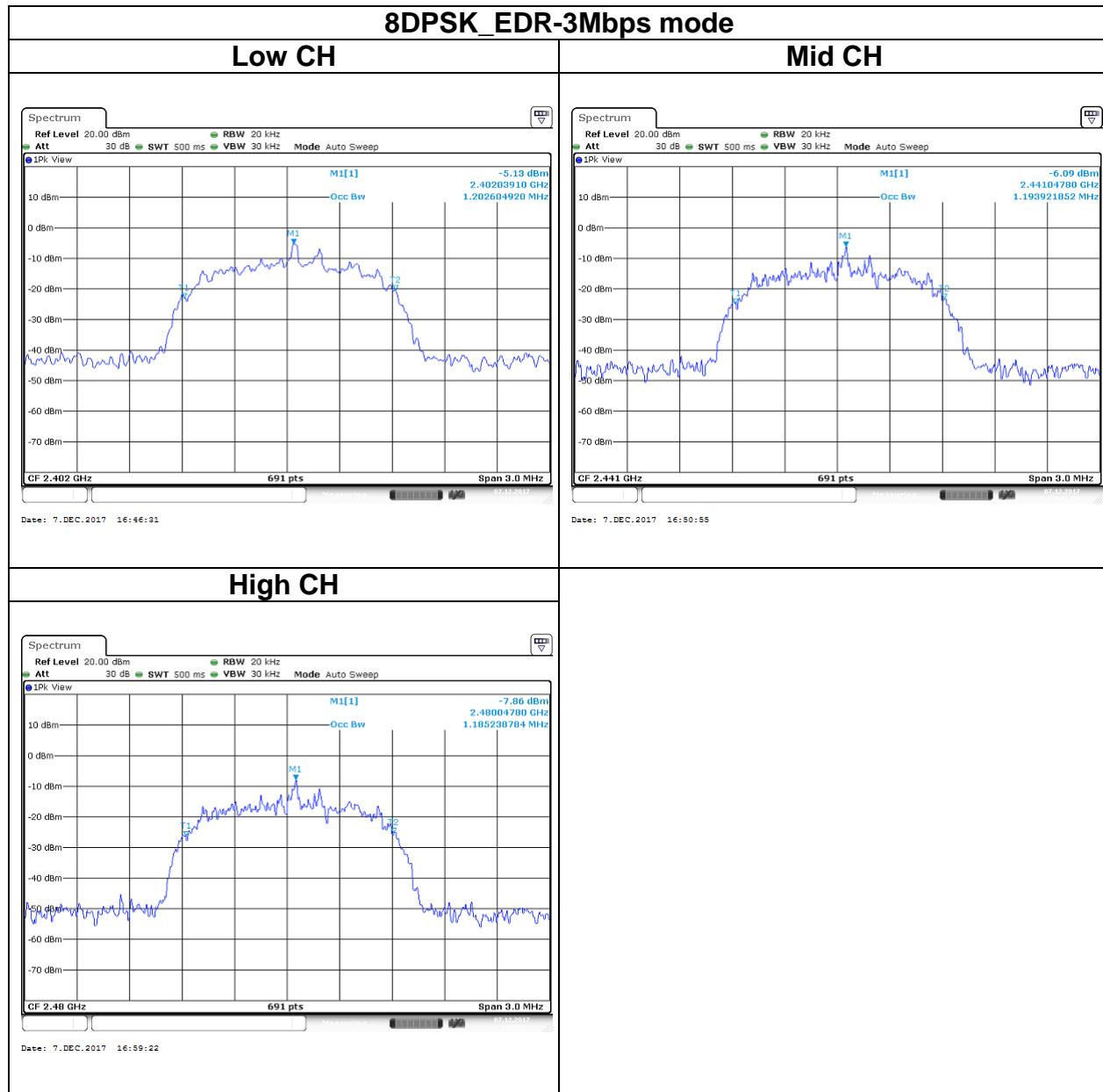
Report No.: T170908D07-A-RP2



Report No.: T170908D07-A-RP2

Test Data**99%OBW**

Report No.: T170908D07-A-RP2



Report No.: T170908D07-A-RP2

5.3 OUTPUT POWER MEASUREMENT

5.3.1 Test Limit

According to §15.247(a)(1).

Peak output power :

FCC

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.

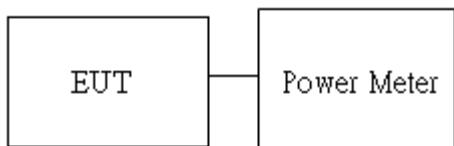
Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 21dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : 21dBm [Limit = 30 – (DG – 6)]
-------	--

Average output power : For reporting purposes only.

5.3.2 Test Procedure

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

5.3.3 Test Setup



Report No.: T170908D07-A-RP2

5.3.4 Test Result

Peak output power :

For GFSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	11.54	0.01426	0.125	PASS
Mid	2441	12.51	0.01782		PASS
High	2480	11.24	0.01330		PASS

For 8DPSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	11.62	0.01452	0.125	PASS
Mid	2441	12.66	0.01845		PASS
High	2480	11.46	0.01400		PASS

Average output power :

For GFSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2402	10.50	0.01122
Mid	2441	12.57	0.01807
High	2480	11.27	0.01340

For 8DPSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2402	9.93	0.00984
Mid	2441	11.02	0.01265
High	2480	9.50	0.00891

Report No.: T170908D07-A-RP2

5.4 FREQUENCY SEPARATION

5.4.1 Test Limit

According to §15.247(a)(1),

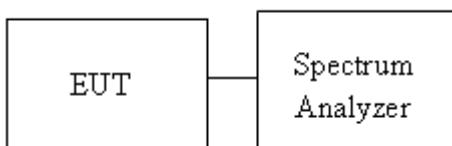
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

Limit	> two-thirds of the 20 dB bandwidth
-------	-------------------------------------

5.4.2 Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. EUT RF output port connected to the SA by RF cable.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = 300kHz, Sweep = auto. Max hold, mark 3 peaks of hopping channel and record the 3 peaks frequency

5.4.3 Test Setup



5.4.4 Test Result

Test mode: GFSK_BDR-1Mbps mode / 2402-2480 MHz				
Channel	Frequency (MHz)	Channel Separation (MHz)	Channel Separation Limits (MHz)	Result
Low	2402	0.9986	0.7478	PASS
Mid	2441	0.9986	0.7449	PASS
High	2480	0.9986	0.7449	PASS

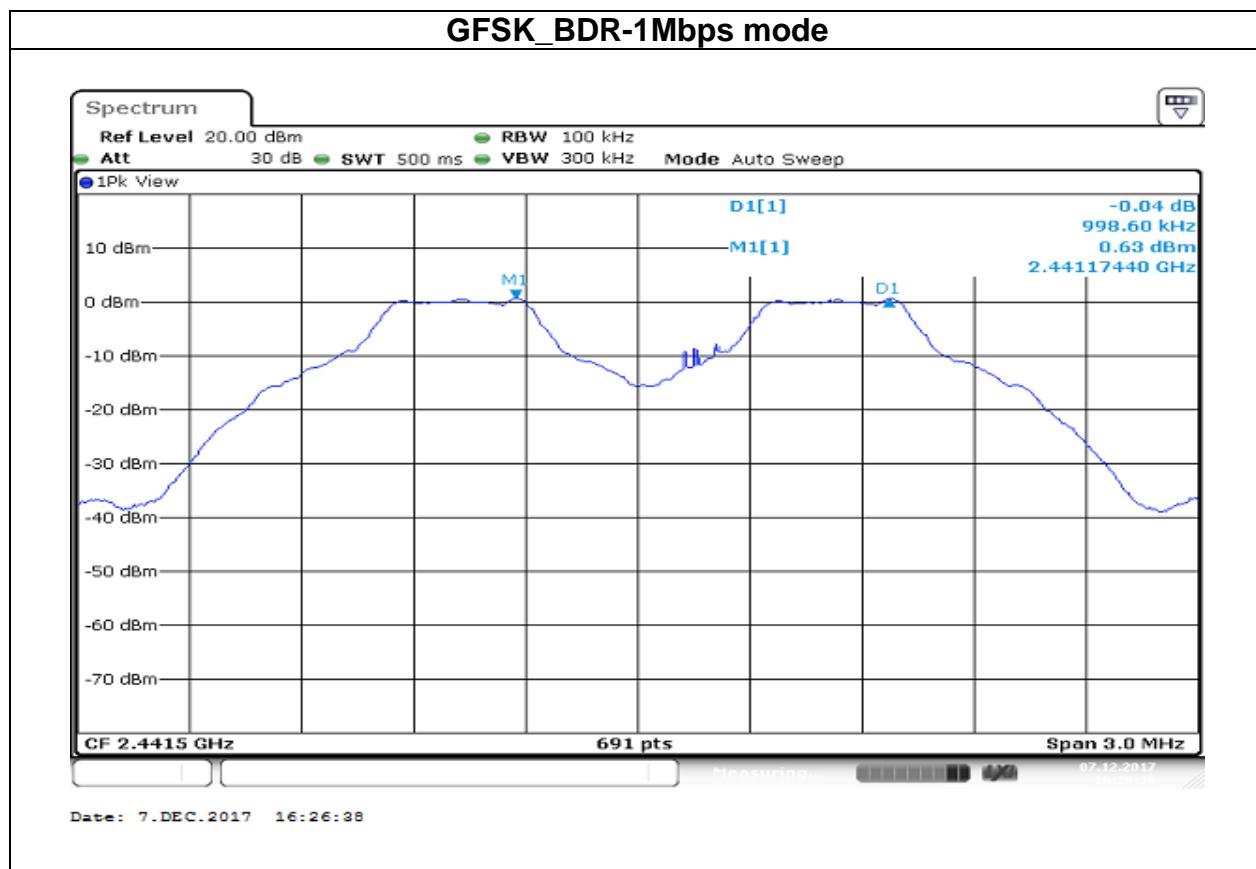
Test mode: 8DPSK_EDR-3Mbps mode / 2402-2480 MHz				
Channel	Frequency (MHz)	Channel Separation (MHz)	Channel Separation Limits (MHz)	Result
Low	2402	1.0029	0.9246	PASS
Mid	2441	1.0029	0.9246	PASS
High	2480	1.0029	0.9188	PASS

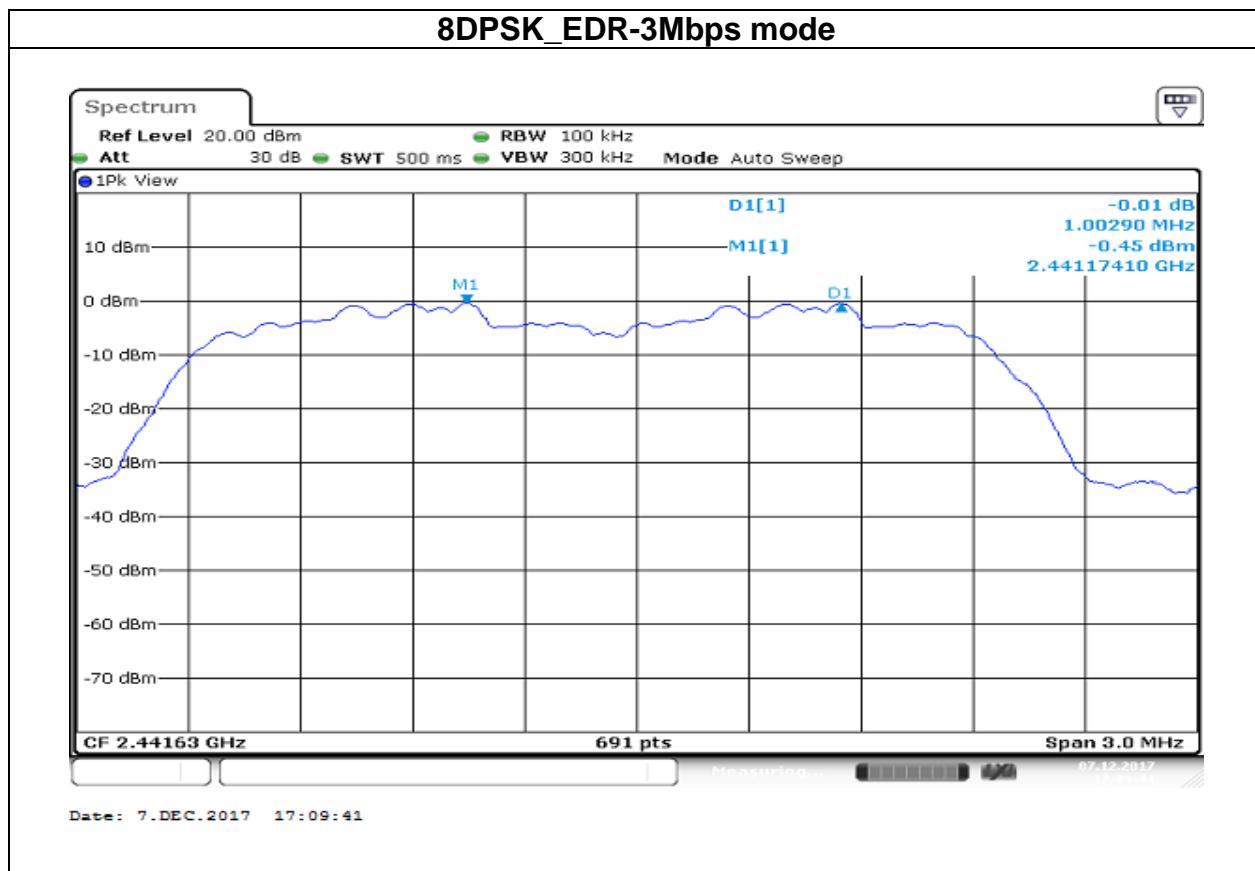


Report No.: T170908D07-A-RP2

Page: 24 / 61
Rev.: 01

Report No.: T170908D07-A-RP2

Test Data



5.5 NUMBER OF HOPPING

5.5.1 Test Limit

According to §15.247(a)(1)(iii)

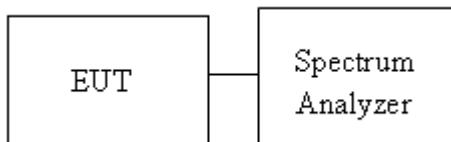
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

5.5.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 7.8.3

1. Place the EUT on the table and set it in transmitting mode.
2. EUT RF output port connected to the SA by RF cable.
3. Set spectrum analyzer Start Freq. = 2400 MHz, Stop Freq. = 2483.5 MHz, RBW =100KHz, VBW = 300KHz.
4. Max hold, view and count how many channel in the band.

5.5.3 Test Setup



5.5.4 Test Result

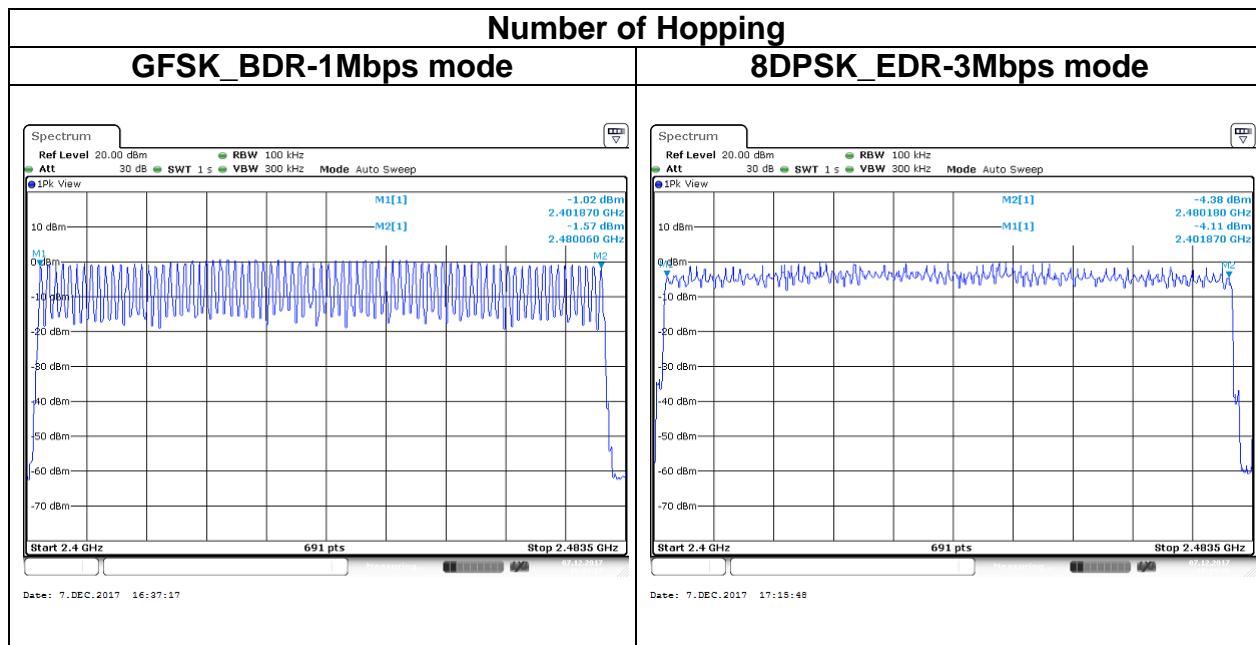
Number of Hopping				
Mode	Frequency (MHz)	Hopping Channel Number	Hopping Channel Number Limits	Result
BDR-1Mbps	2402-2480	79	15	Pass
EDR-3Mbps	2402-2480	79	15	

REMARK:

The frequency spectrum was broken up in to two sub-range to clearly show all of the hopping frequencies. In the AFH mode, this device operation was using 20 channels, so the requirement for minimum number of hopping channels is satisfied

Report No.: T170908D07-A-RP2

Test Data



5.6 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

5.6.1 Test Limit

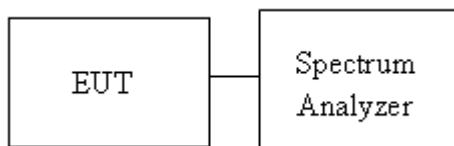
According to §15.247(d),

Limit	-20 dBc
-------	---------

5.6.2 Test Procedure

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. The Band Edge at 2.4GHz and 2.4835GHz are investigated with normal hopping mode.

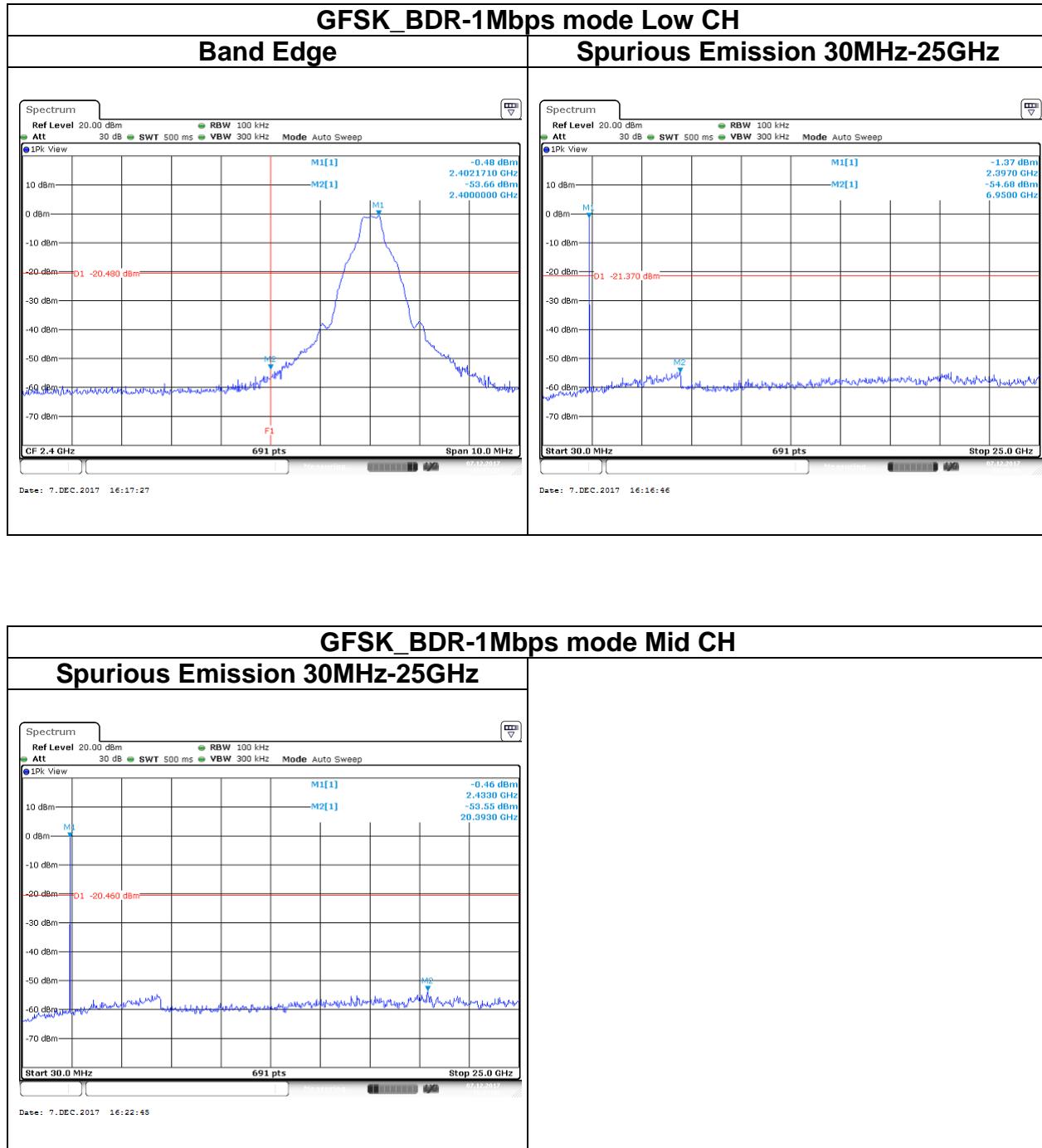
5.6.3 Test Setup



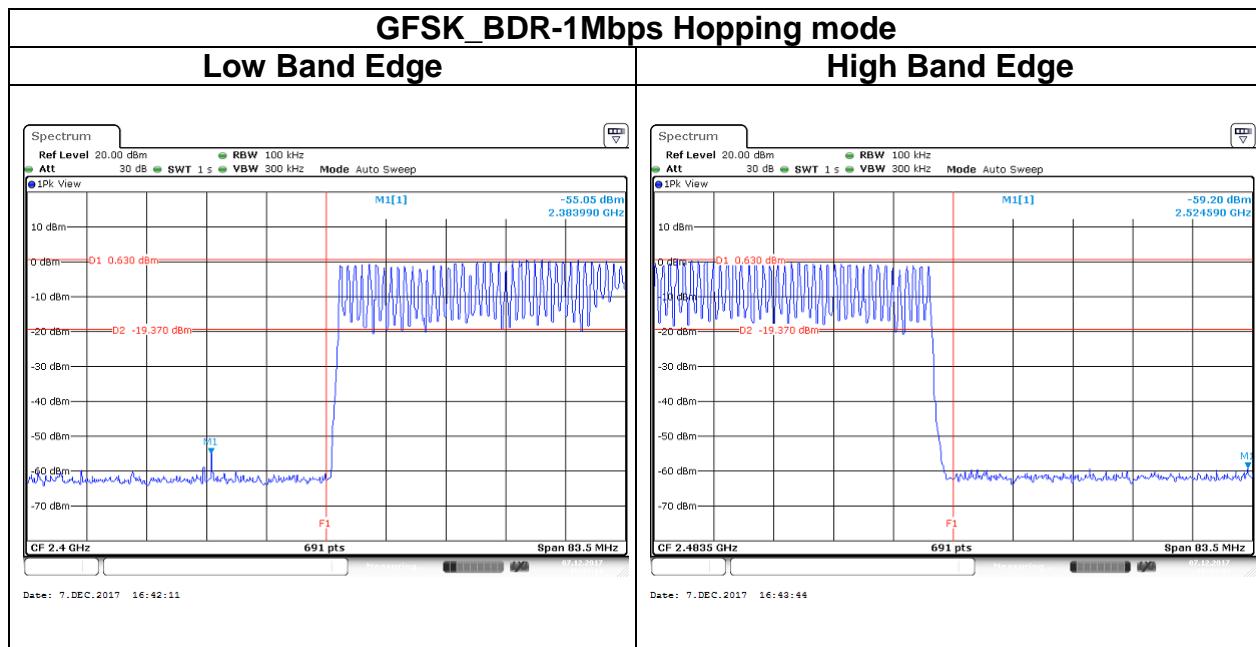
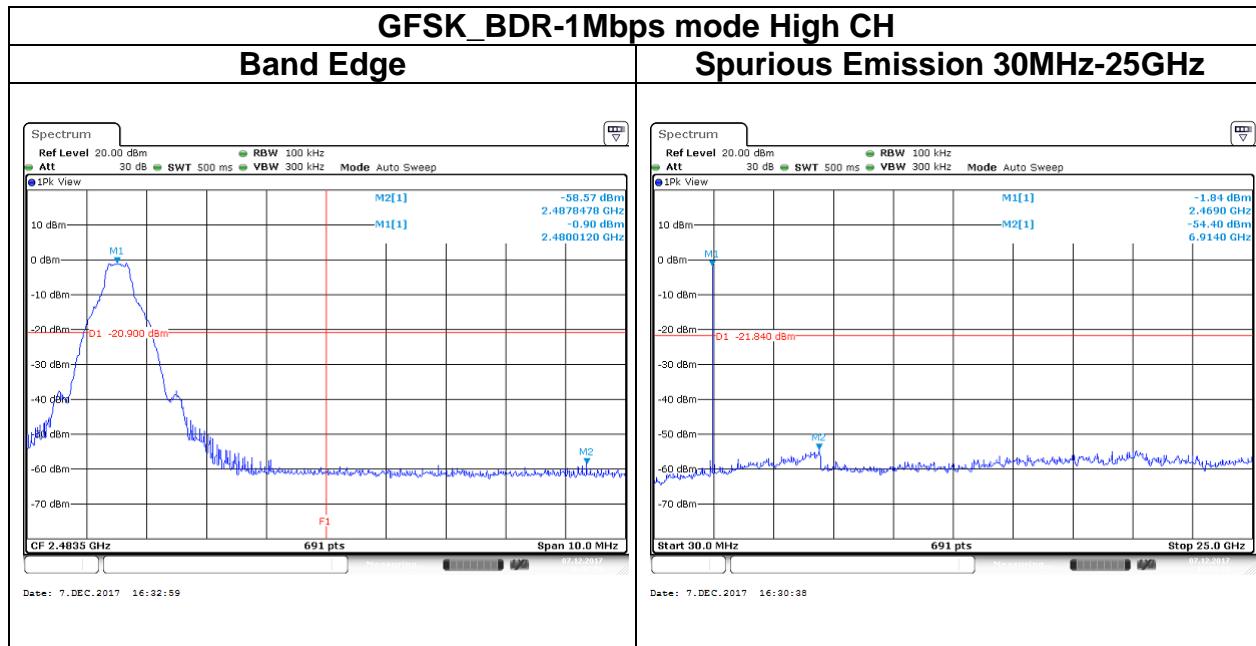
Report No.: T170908D07-A-RP2

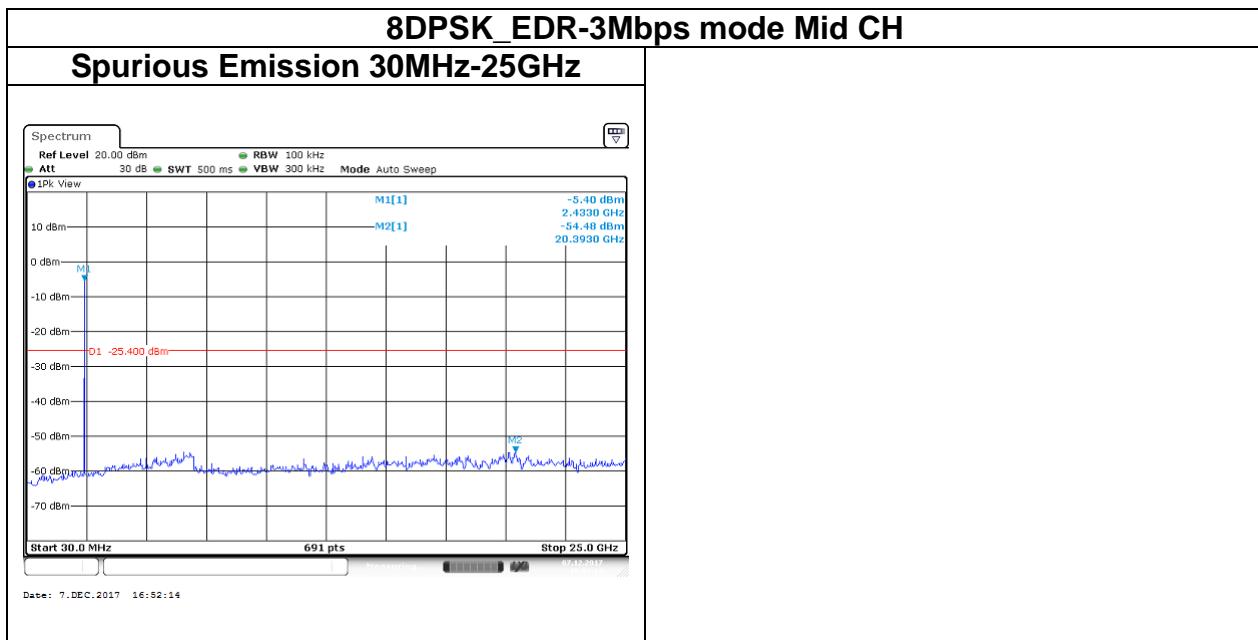
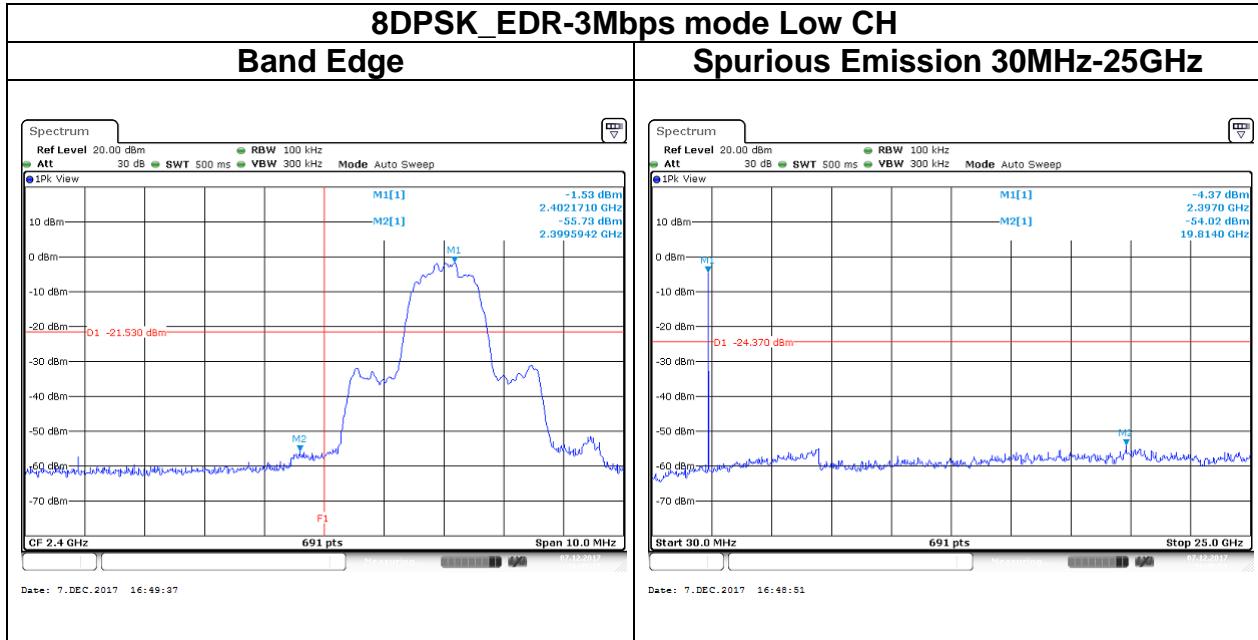
5.6.4 Test Result

Test Data

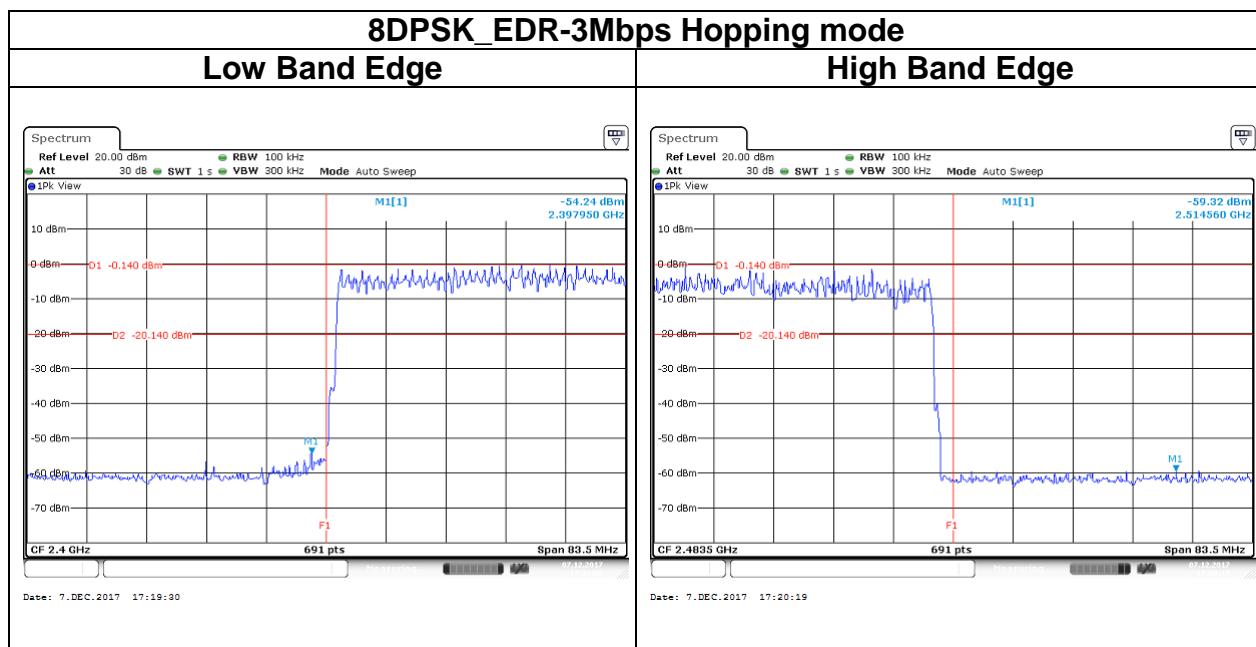
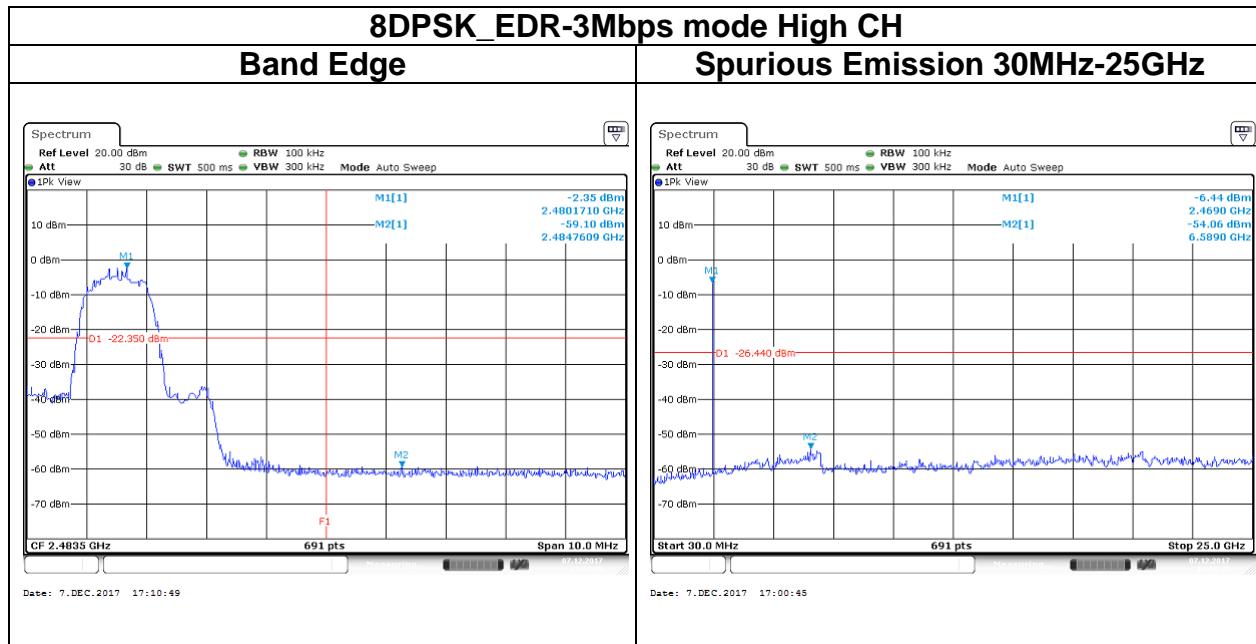


Report No.: T170908D07-A-RP2





Report No.: T170908D07-A-RP2



Report No.: T170908D07-A-RP2

5.7 TIME OF OCCUPANCY (DWELL TIME)

5.7.1 Test Limit

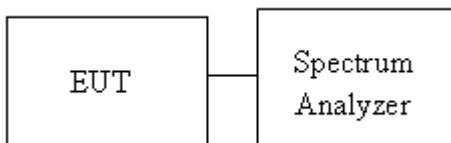
According to §15.247(a)(1)(iii),

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

5.7.2 Test Procedure

1. EUT RF output port connected to the SA by RF cable.
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW, VBW=1MHz, Sweep = 1 ms

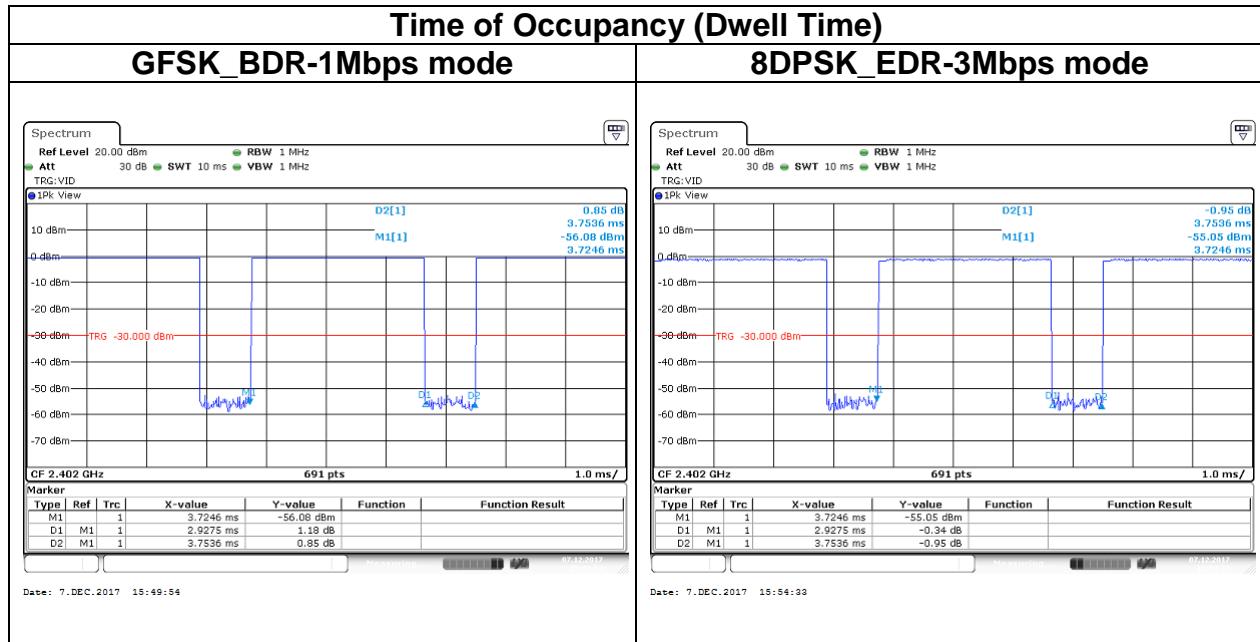
5.7.3 Test Setup



5.7.4 Test Result

Time of Occupancy (Dwell Time)								
Mode	Frequency (MHz)	Pulse Time Per Hopping (ms)	Minimum Number of Hopping Freq.	Number of pulse in (0.4 * N sec)	Dwell Time IN	Dwell Time Limits (s)	Result	
					(0.4 * N sec)			
BDR-1Mbps	2441	2.9275	79	106.67	0.3123	0.4	Pass	
EDR-3Mbps	2441	2.9275	79	106.67	0.3123	0.4		
Non-AFH: DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $3.37 * 0.4 * 79 = 106.6$								
AFH: DH5 Packet permit maximum $800 / 20 / 6 = 6.666$ hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $6.666 * 0.4 * 20 = 53.33$								

Report No.: T170908D07-A-RP2

Test Data

5.8 RADIATION BANDEdge AND SPURIOUS EMISSION

5.8.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Remark:

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

5.8.2 Test Procedure

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10, and the EUT set in a continuous mode.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.
3. Span shall wide enough to full capture the emission measured. The SA from 9kHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.

Note: No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)

4. For harmonic, the worst case of output power was BDR-1Mbps. Therefore only BDR-1Mbps record in the report.

5. The SA setting following :

(1) Below 1G : RBW = 100kHz, VBW \geq 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2) Above 1G :

(2.1) For Peak measurement : RBW = 1MHz, VBW \geq 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2.2) For Average measurement : RBW = 1MHz, VBW

· If Duty Cycle \geq 98%, VBW=10Hz.

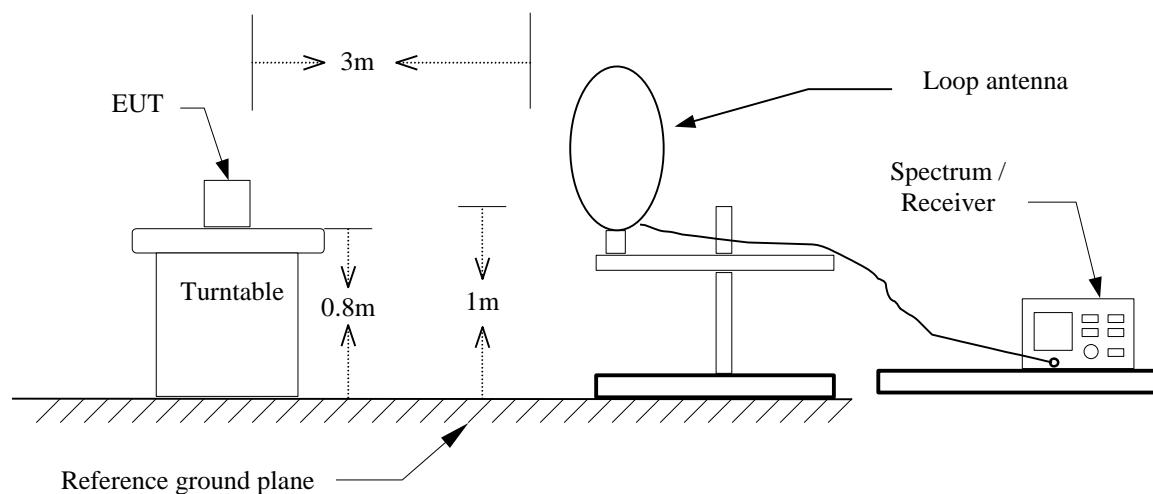
· If Duty Cycle < 98%, VBW \geq 1/T.

Configuration	Duty Cycle (%)	T(ms)	1/T (Hz)	VBW setting
GFSK_BDR-1Mbps	79%	2.9400	0.340	360Hz
8DPSK_EDR-3Mbps	78%	2.9400	0.340	360Hz

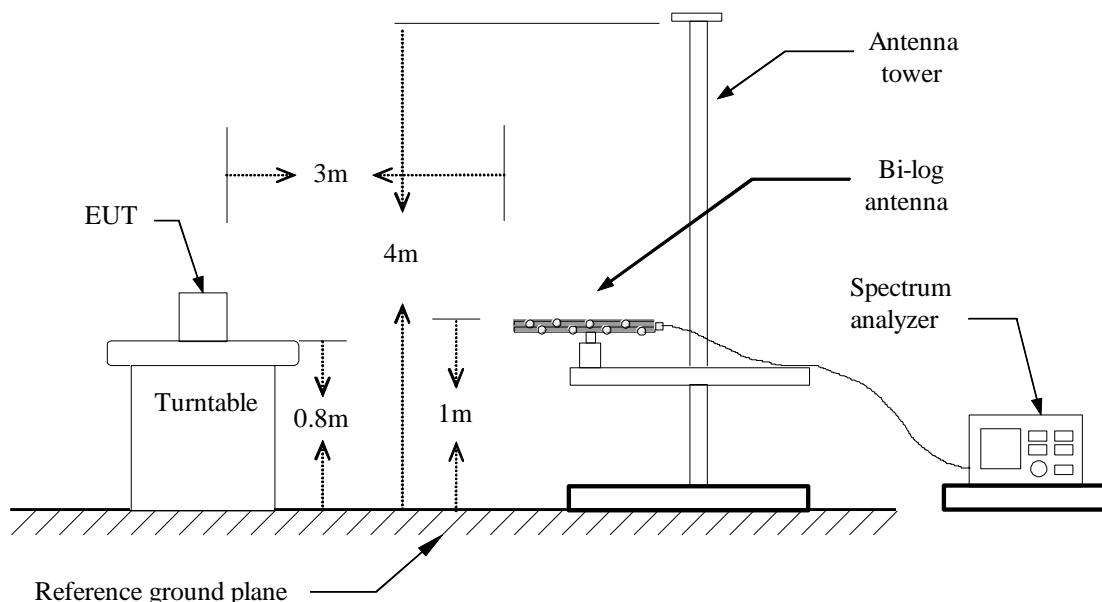
Report No.: T170908D07-A-RP2

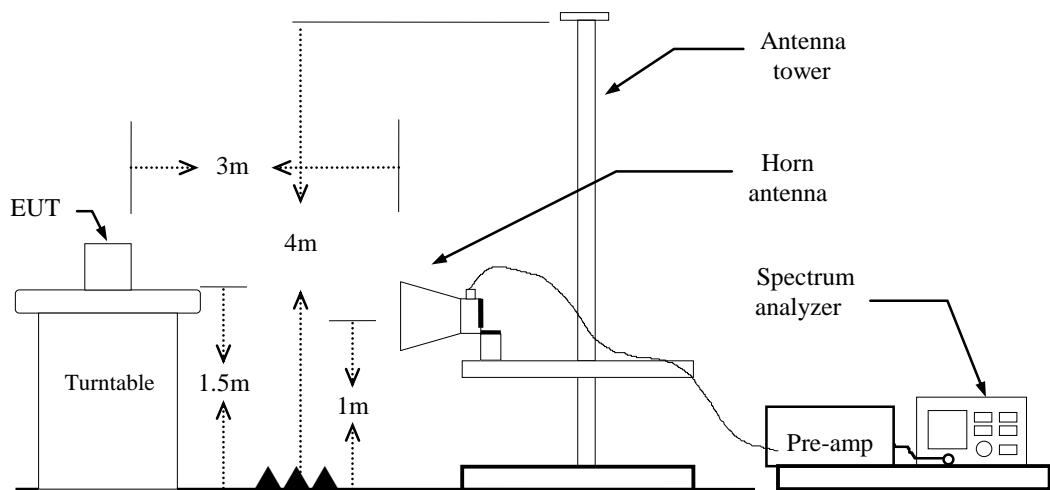
5.8.3 Test Setup

9kHz ~ 30MHz



30MHz ~ 1GHz



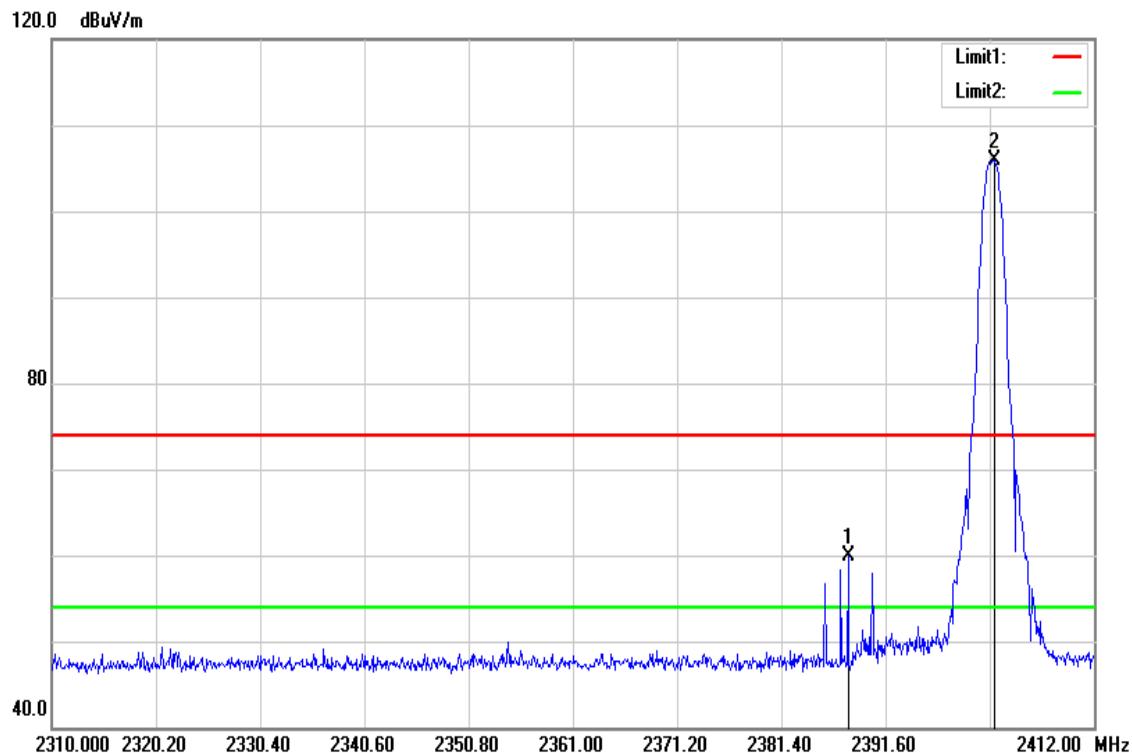
Above 1 GHz

Report No.: T170908D07-A-RP2

5.8.4 Test Result

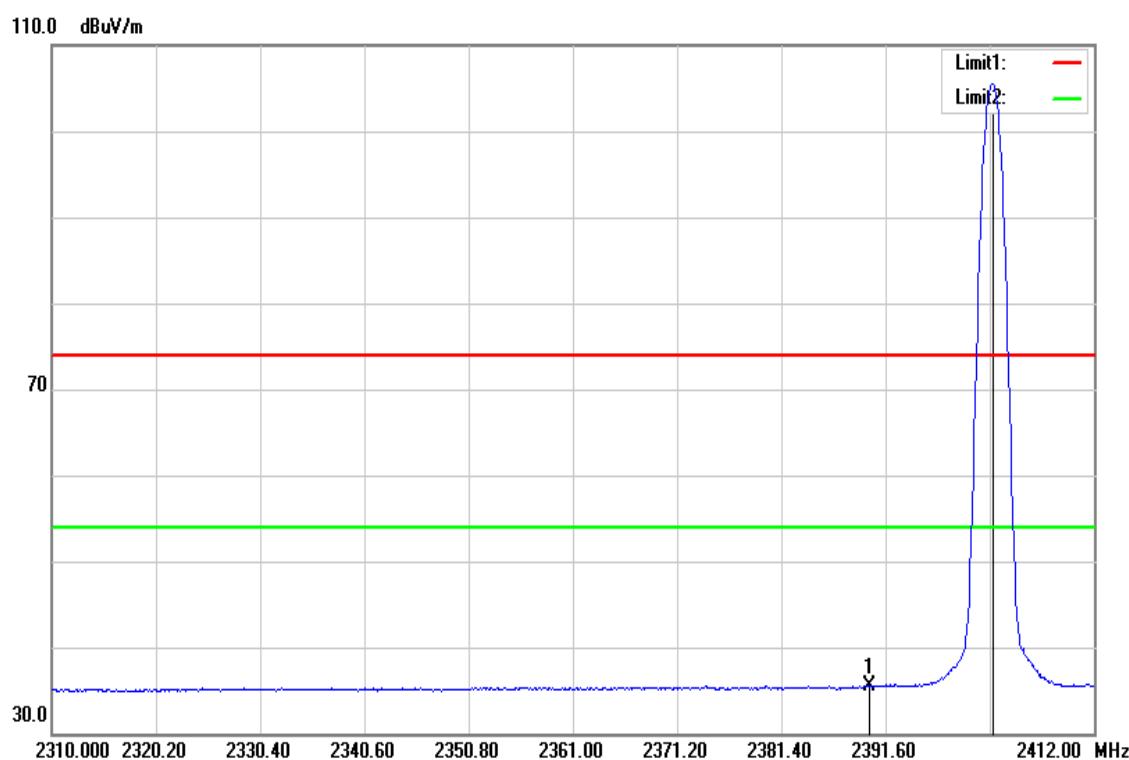
Band Edge Test Data

Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



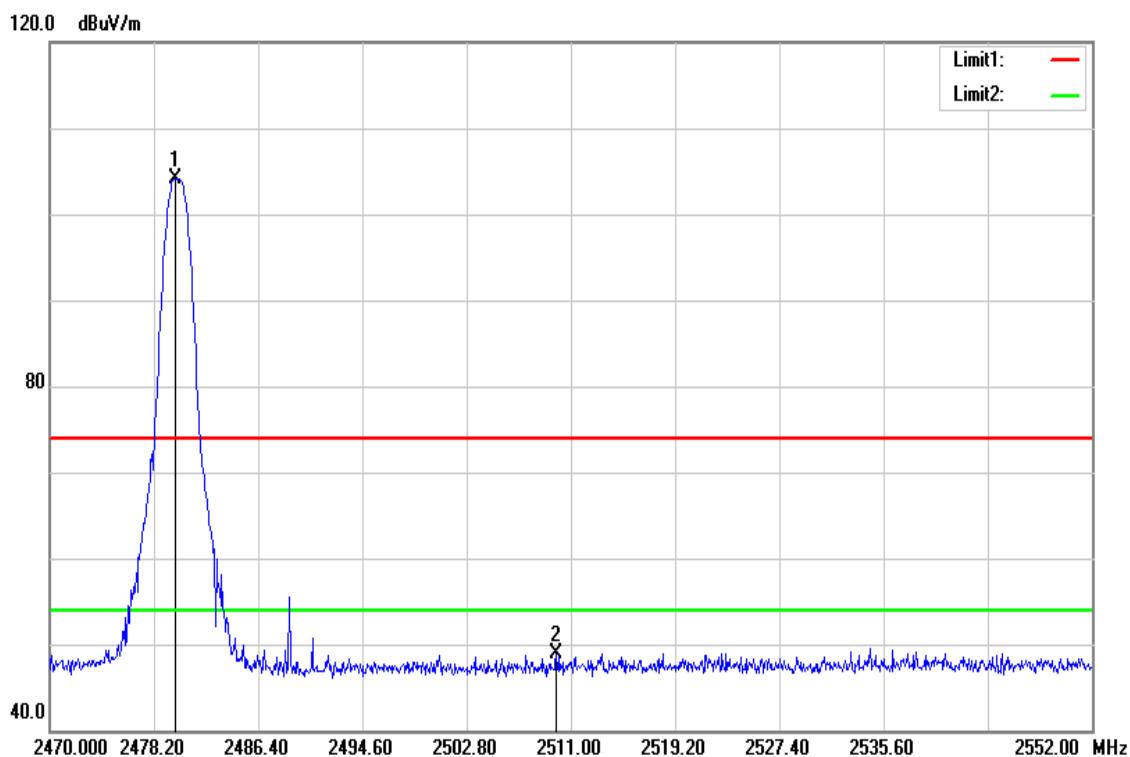
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2387.928	62.89	-2.98	59.91	74.00	-14.09	peak
2	2402.208	108.81	-2.95	105.86	-	-	peak

Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average		



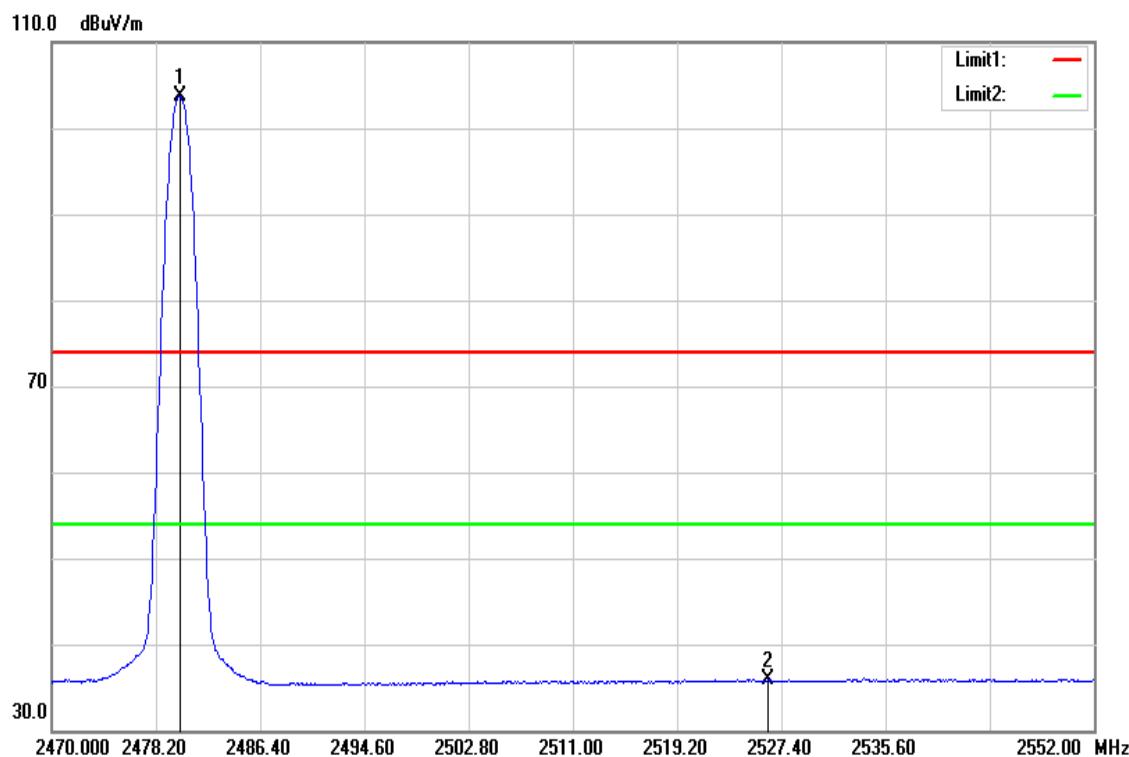
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2390.000	38.50	-2.98	35.52	54.00	-18.48	AVG
2	2402.106	108.40	-2.95	105.45	-	-	AVG

Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



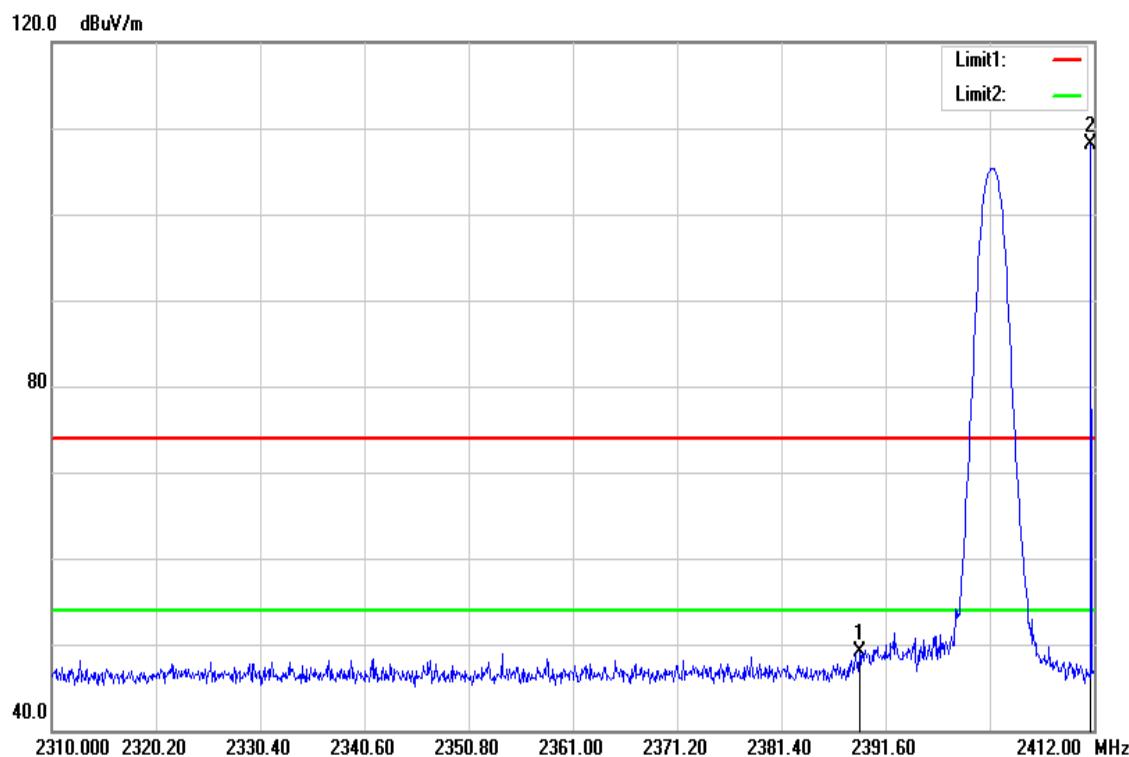
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dB _{uV})	Factor(dB/m)	(dB _{uV/m})	(dB _{uV/m})	(dB)	
1	2479.840	106.85	-2.70	104.15	-	-	peak
2	2509.852	51.55	-2.62	48.93	74.00	-25.07	peak

Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average	Test Voltage	DC 12V



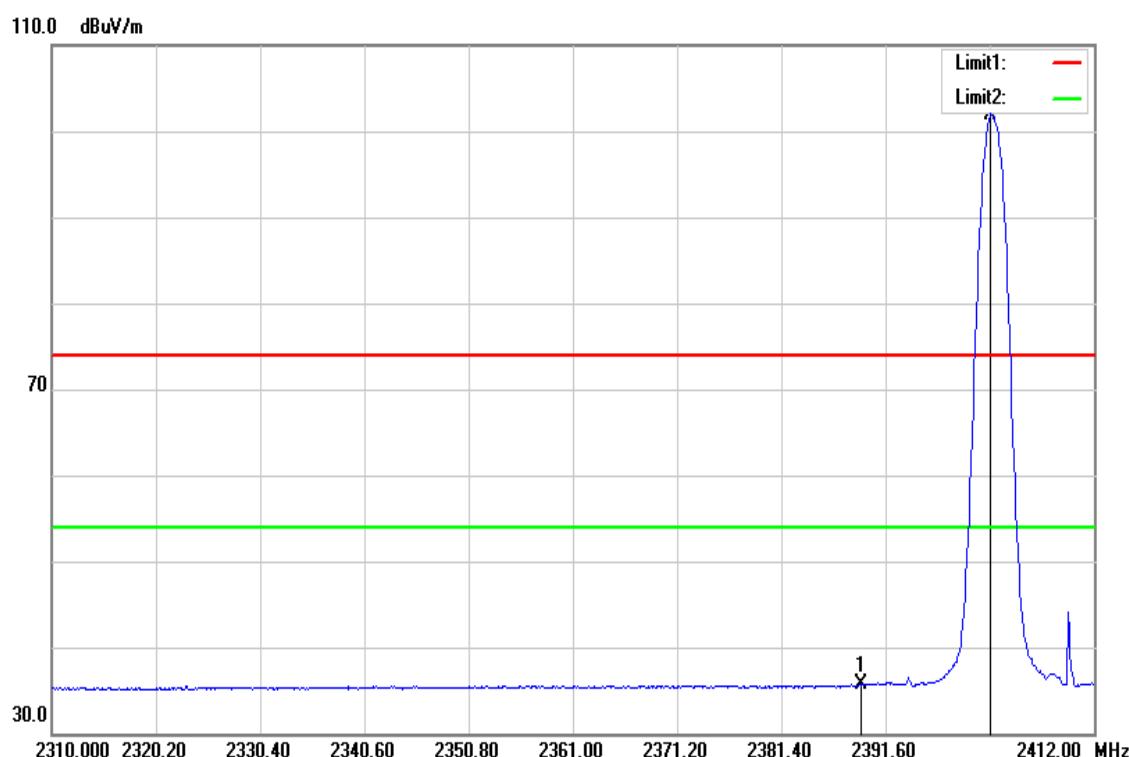
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dB _{UV})	Factor(dB/m)	(dB _{UV} /m)	(dB _{UV} /m)	(dB)	
1	2480.086	106.42	-2.70	103.72	-	-	AVG
2	2526.334	38.46	-2.58	35.88	54.00	-18.12	AVG

Test Mode:	8DPSK_EDR-3Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak	Test Voltage	DC 12V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.050	52.01	-2.98	49.03	74.00	-24.97	peak
2	2411.694	110.93	-2.92	108.01	-	-	peak

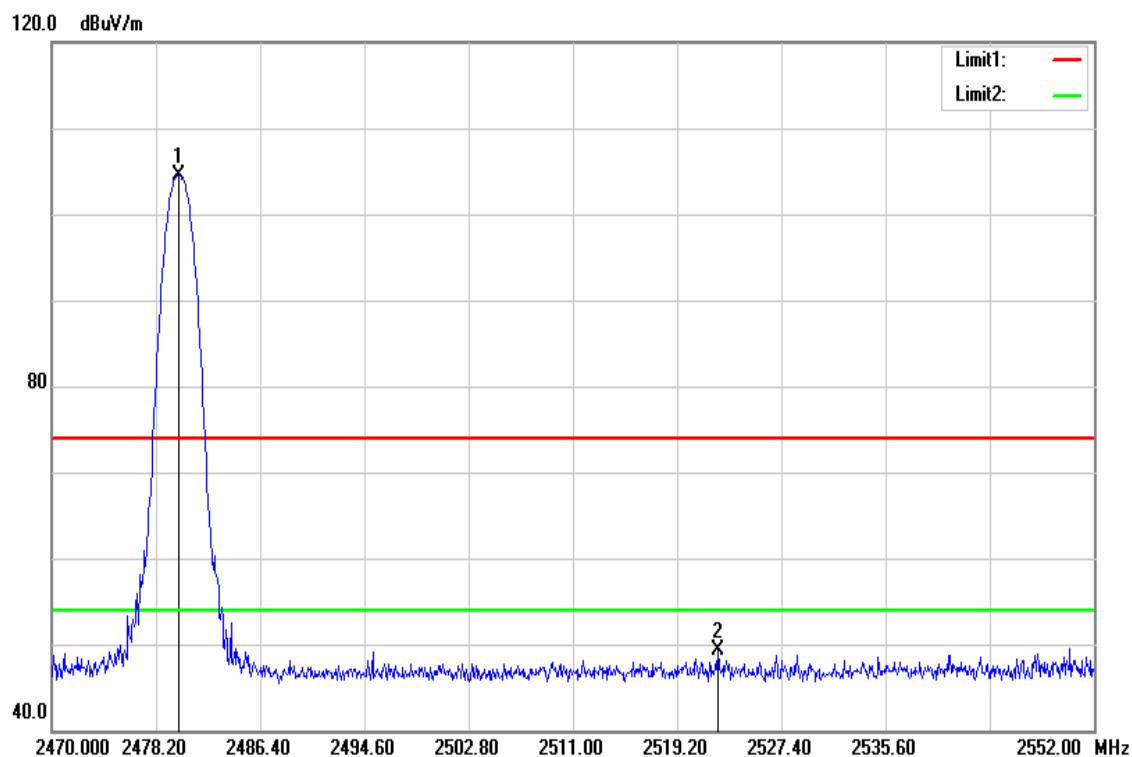
Test Mode:	8DPSK_EDR-3Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average	Test Voltage	DC 12V



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2389.152	38.62	-2.98	35.64	54.00	-18.36	AVG
2	2401.902	104.95	-2.95	102.00	-	-	AVG

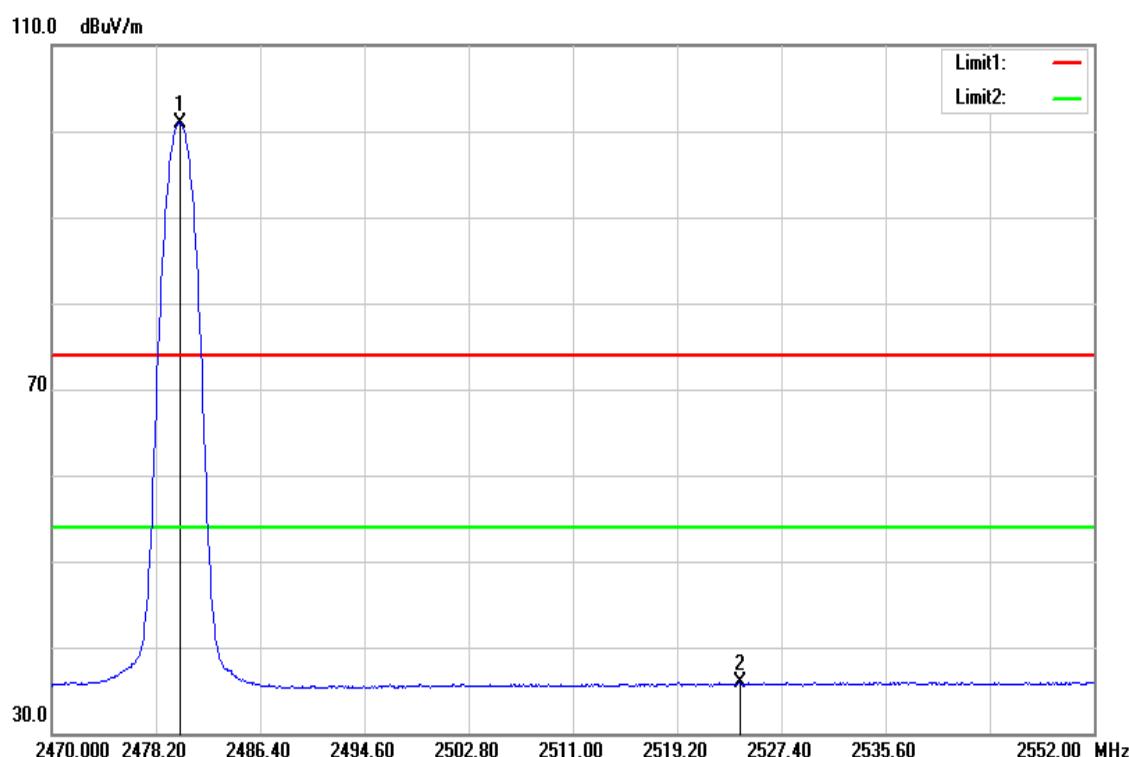
Report No.: T170908D07-A-RP2

Test Mode:	8DPSK_EDR-3Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak	Test Voltage	DC 12V



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.004	107.24	-2.70	104.54	-	-	peak
2	2522.398	51.88	-2.59	49.29	74.00	-24.71	peak

Test Mode:	8DPSK_EDR-3Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Band Edge	Test Date	December 22, 2017
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average	Test Voltage	DC 12V



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.086	103.67	-2.70	100.97	-	-	AVG
2	2524.202	38.46	-2.59	35.87	54.00	-18.13	AVG

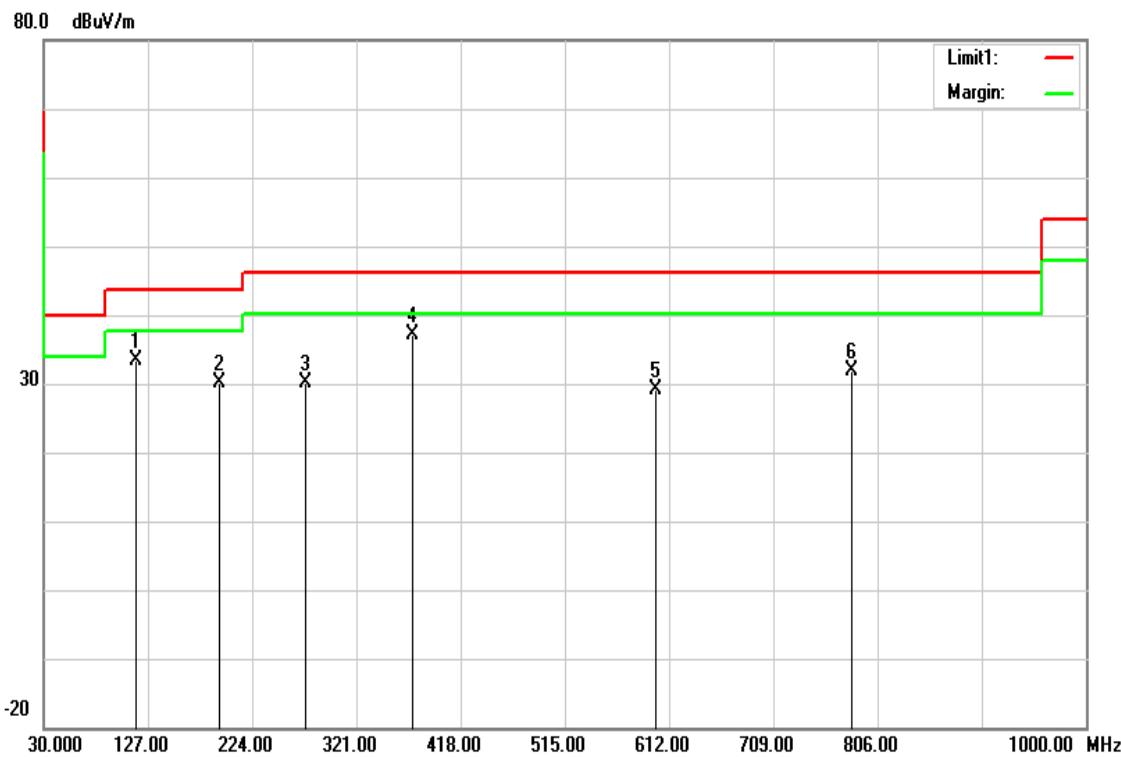
Report No.: T170908D07-A-RP2

Below 1G Test Data

Test Mode:	BT Mode		Temp/Hum	24(°C)/ 33%RH	
Test Item	30MHz-1GHz		Test Date	January 8, 2018	
Polarize	Vertical		Test Engineer	Jerry Chuang	
Detector	Peak		Test Voltage	DC 12V	

No.	frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	108.5700	52.41	-17.04	35.37	43.52	-8.15	peak
2	162.8900	46.02	-16.13	29.89	43.52	-13.63	peak
3	317.1200	47.77	-13.70	34.07	46.02	-11.95	peak
4	374.3500	49.98	-12.21	37.77	46.02	-8.25	peak
5	499.4800	40.39	-8.50	31.89	46.02	-14.13	peak
6	796.3000	34.27	-3.44	30.83	46.02	-15.19	peak

Test Mode:	BT Mode	Temp/Hum	24(°C)/ 33%RH
Test Item	30MHz-1GHz	Test Date	January 8, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak	Test Voltage	DC 12V

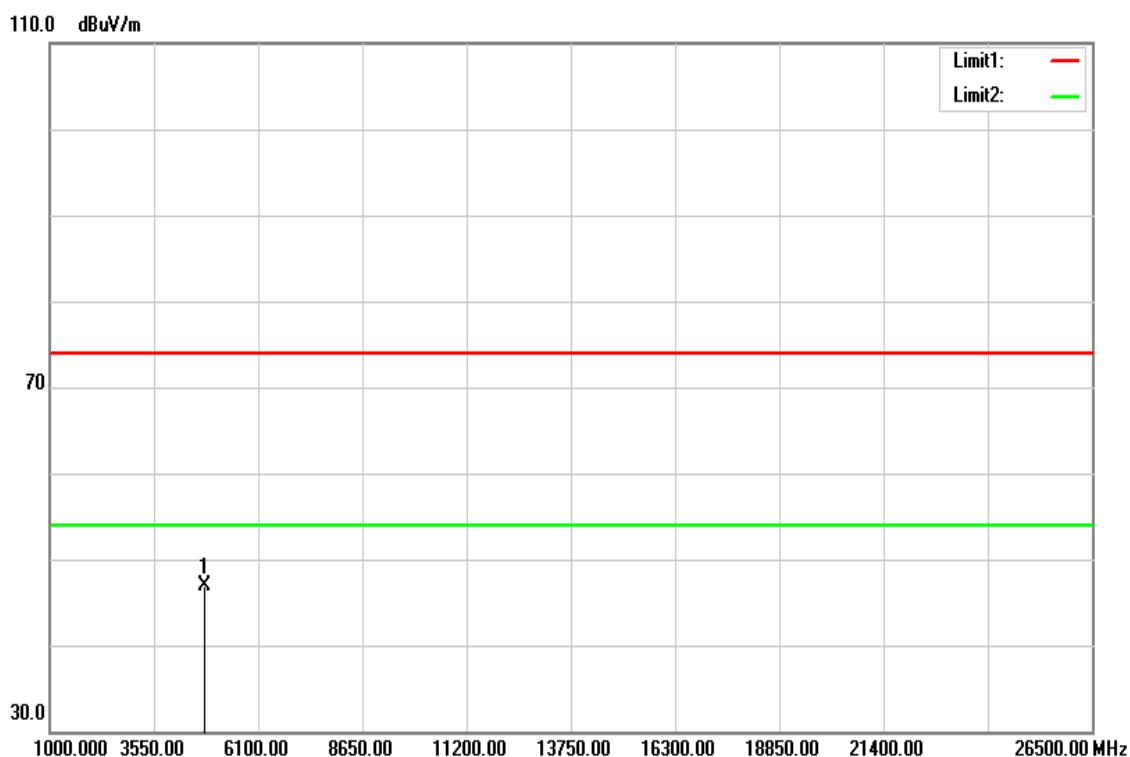


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	116.3300	48.93	-15.65	33.28	43.52	-10.24	peak
2	192.9600	46.08	-15.95	30.13	43.52	-13.39	peak
3	273.4700	44.83	-14.69	30.14	46.02	-15.88	peak
4	373.3800	49.42	-12.23	37.19	46.02	-8.83	peak
5	599.3900	36.15	-6.93	29.22	46.02	-16.80	peak
6	781.7500	35.49	-3.71	31.78	46.02	-14.24	peak

Report No.: T170908D07-A-RP2

Above 1G Test Data

Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V

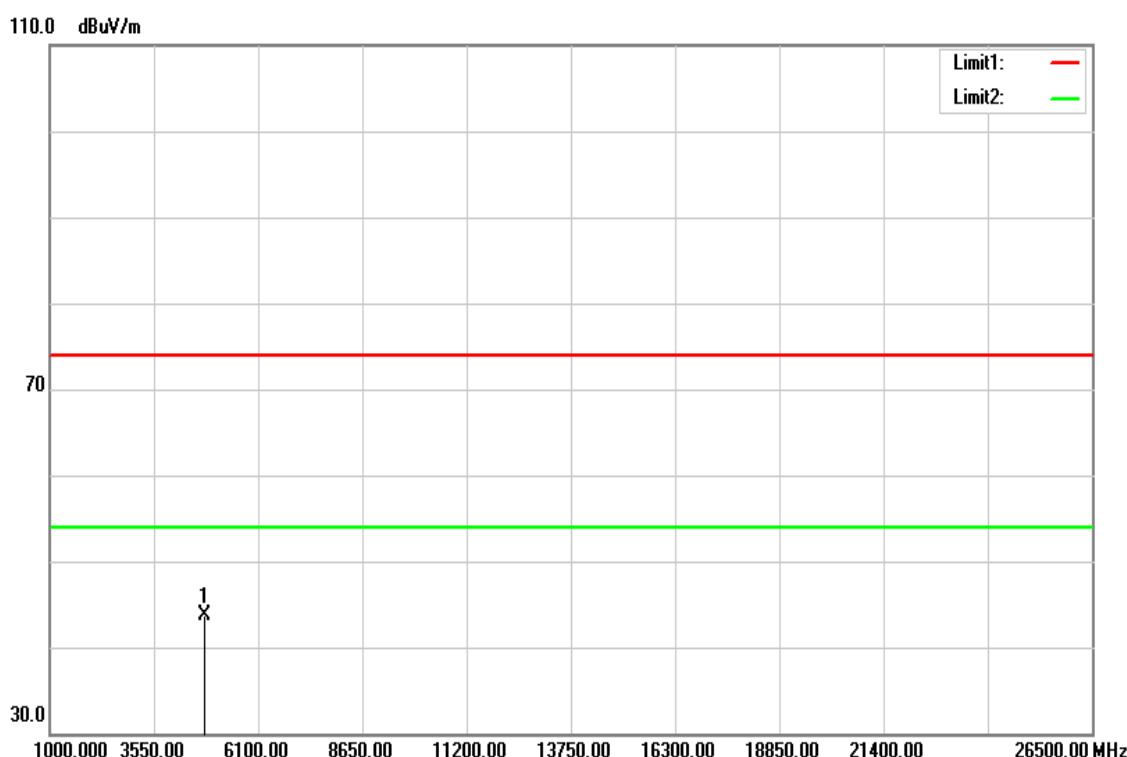


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	42.55	4.34	46.89	74.00	-27.11	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V

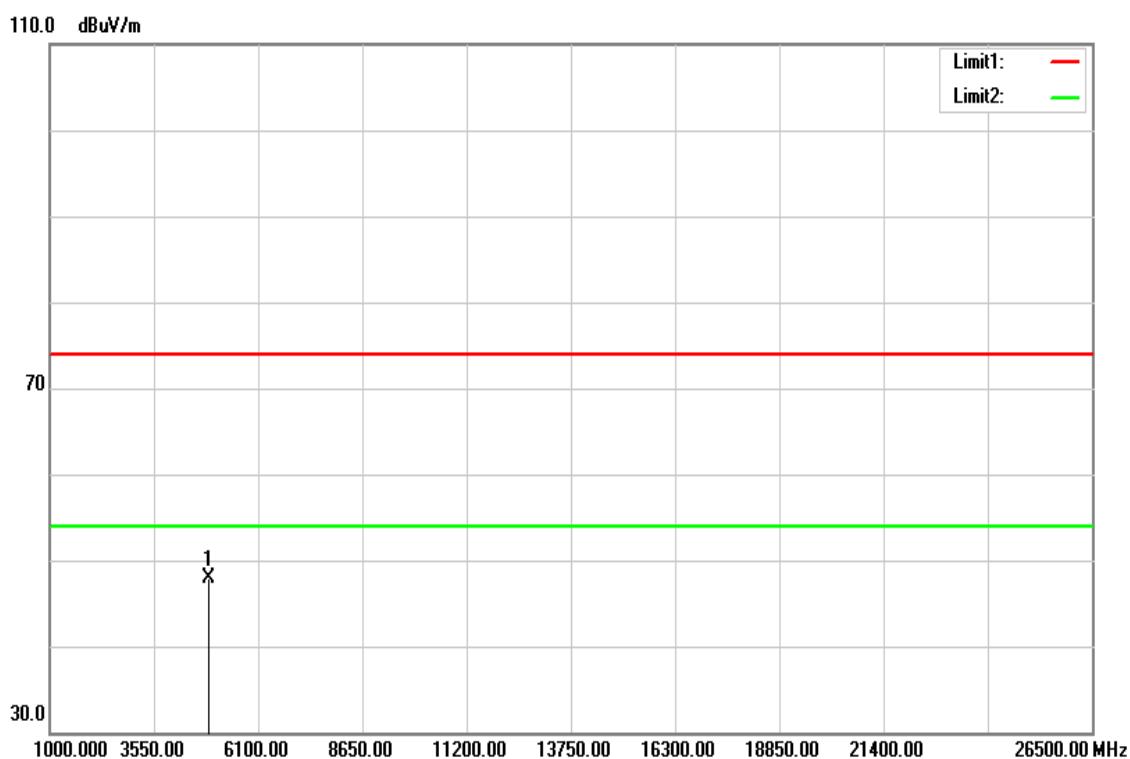


No.	Frequency (MHz)	Reading (dB _{UV})	Correct Factor(dB/m)	Result (dB _{UV} /m)	Limit (dB _{UV} /m)	Margin (dB)	Remark
1	4804.000	39.40	4.34	43.74	74.00	-30.26	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Test Mode:	GFSK_BDR-1Mbps Mid CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V

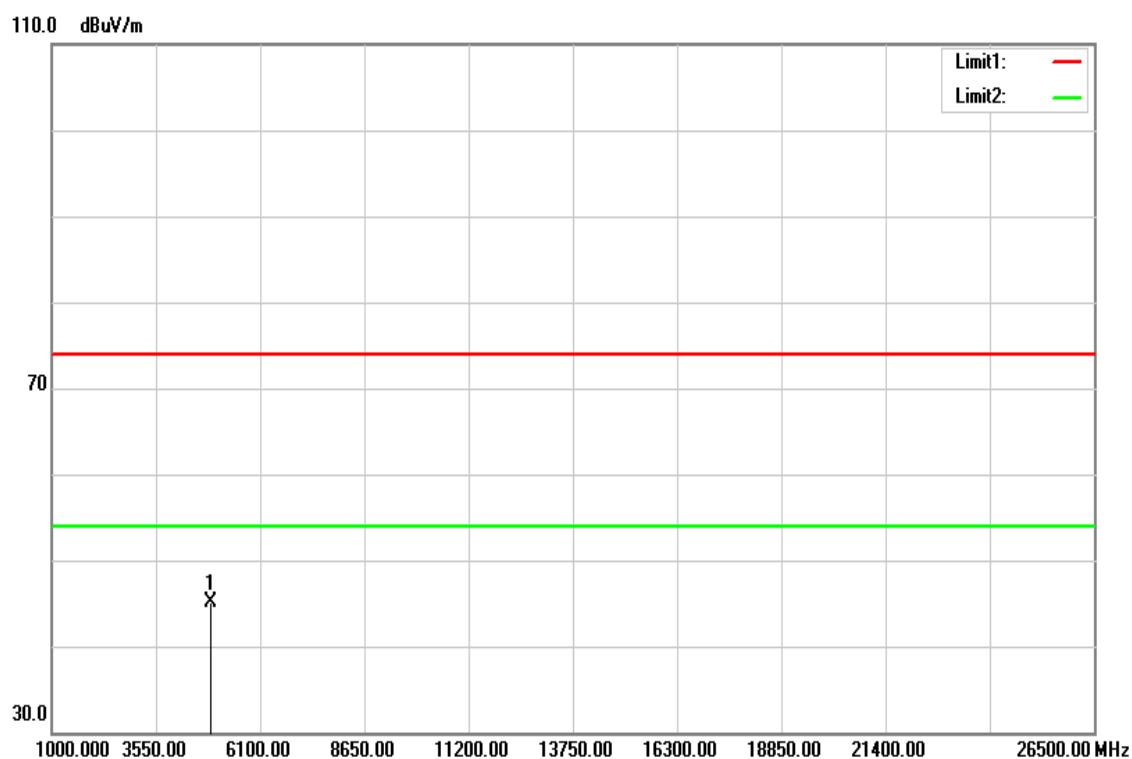


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dB _{UV})	Factor(dB/m)	(dB _{UV} /m)	(dB _{UV} /m)	(dB)	
1	4882.000	43.48	4.49	47.97	74.00	-26.03	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Test Mode:	GFSK_BDR-1Mbps Mid CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



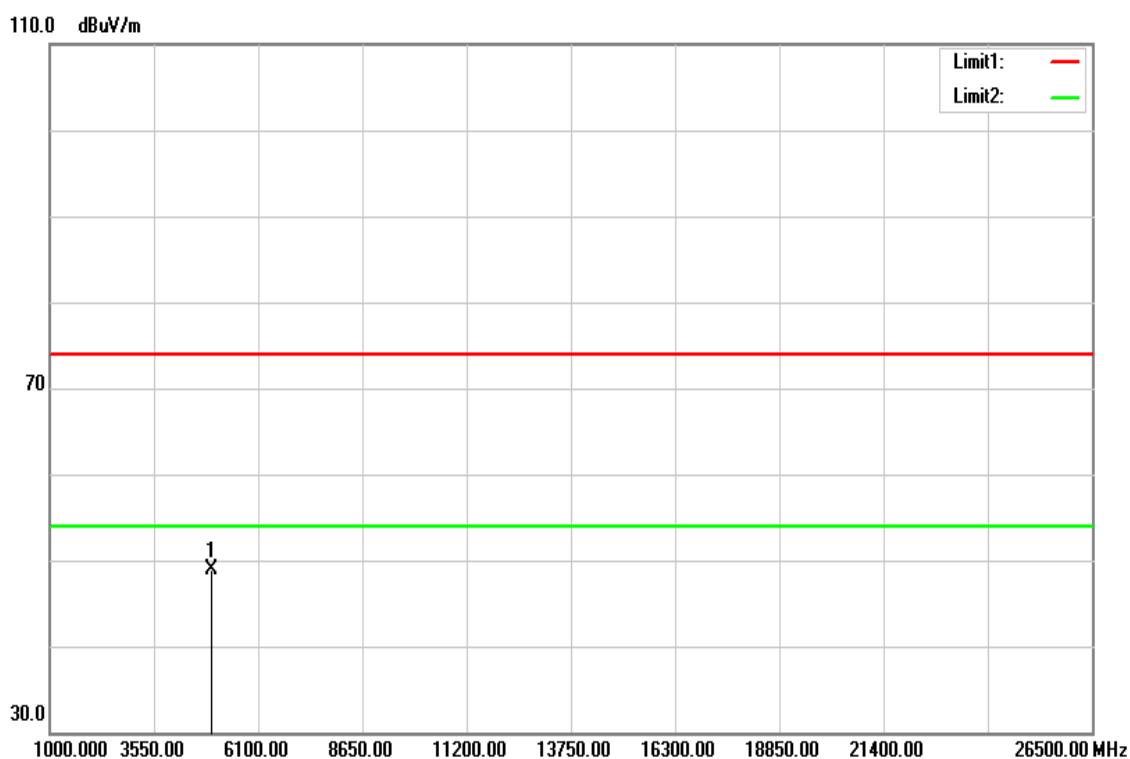
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dB _{UV})	Factor(dB/m)	(dB _{UV} /m)	(dB _{UV} /m)	(dB)	
1	4882.000	40.66	4.49	45.15	74.00	-28.85	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Report No.: T170908D07-A-RP2

Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



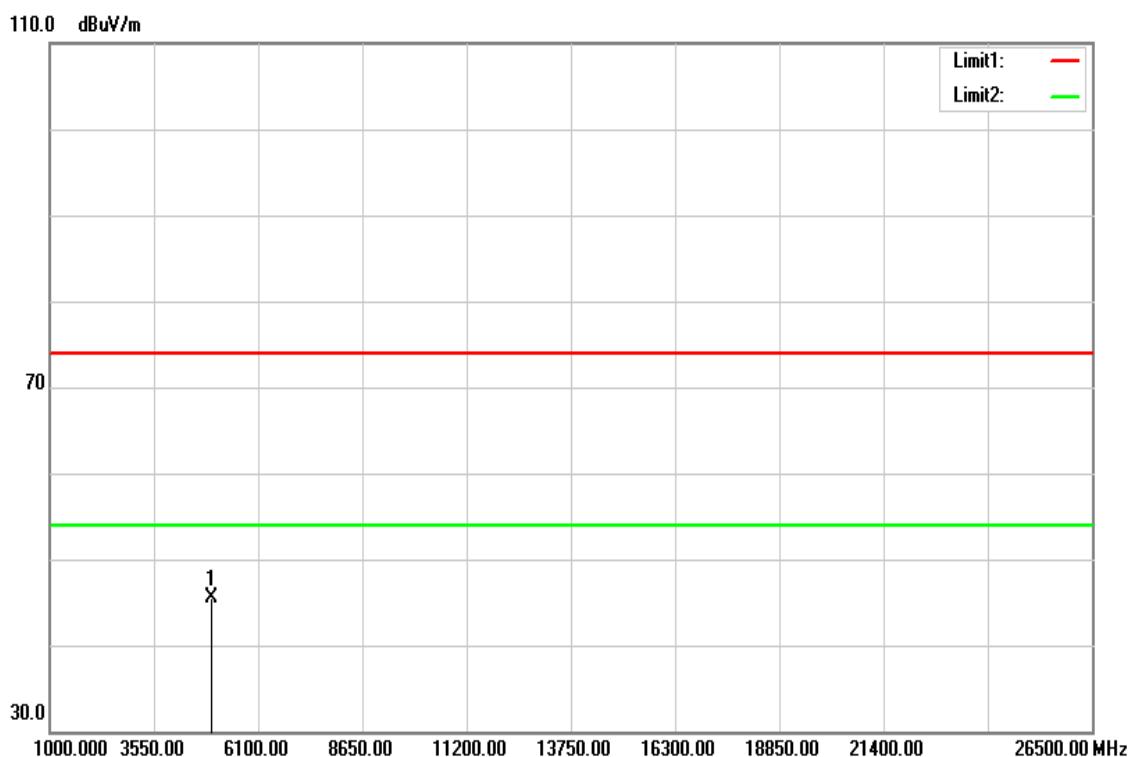
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dB _{UV})	Factor(dB/m)	(dB _{UV} /m)	(dB _{UV} /m)	(dB)	
1	4960.000	44.26	4.61	48.87	74.00	-25.13	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Report No.: T170908D07-A-RP2

Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



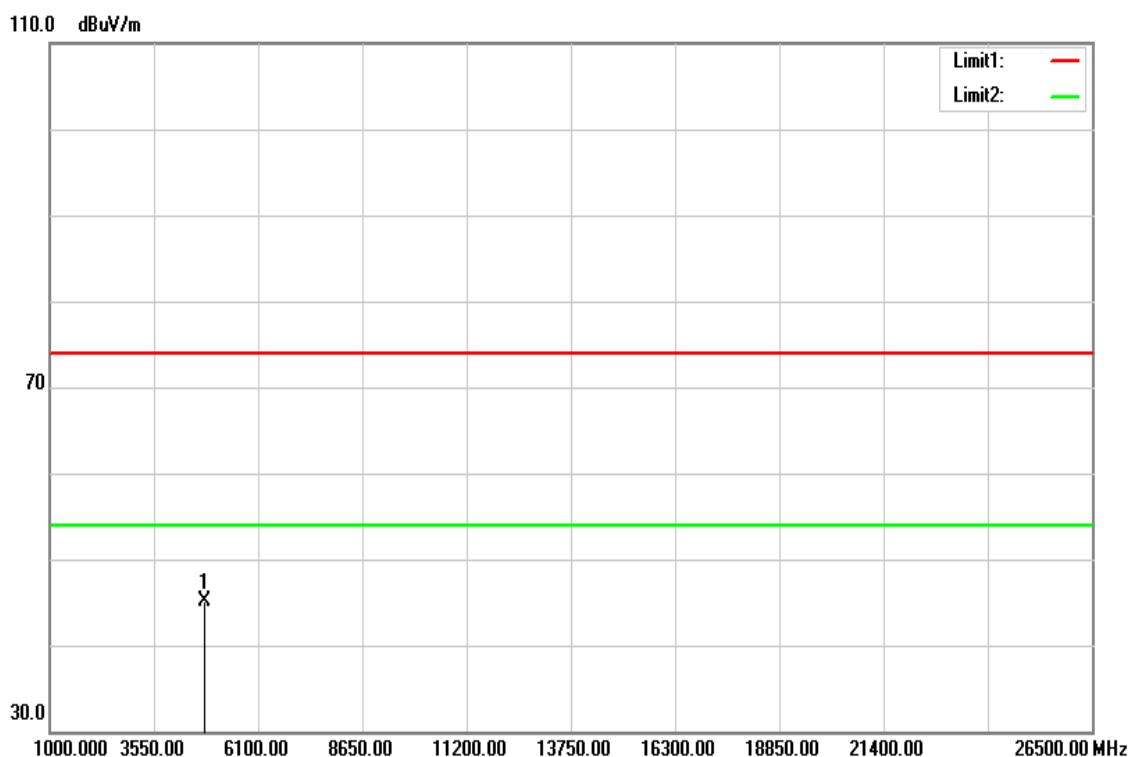
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4960.000	40.98	4.61	45.59	74.00	-28.41	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Report No.: T170908D07-A-RP2

Test Mode	8DPSK_EDR-3Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



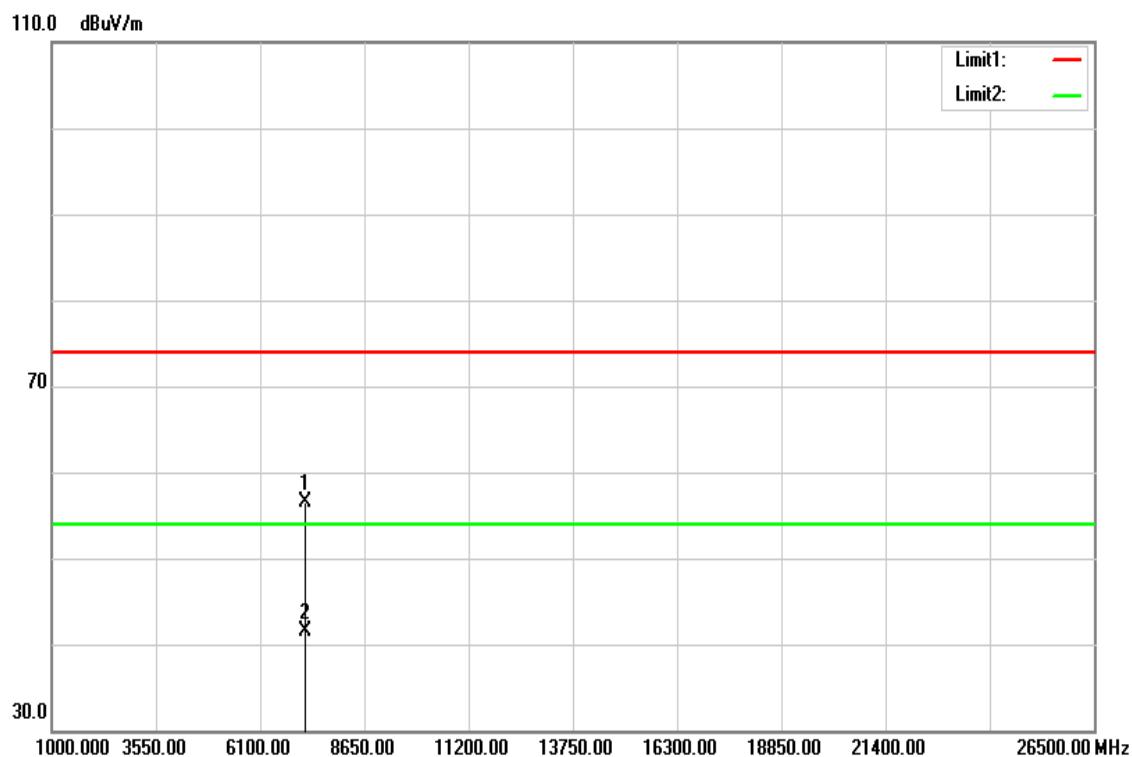
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	40.73	4.34	45.07	74.00	-28.93	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Report No.: T170908D07-A-RP2

Test Mode	8DPSK_EDR-3Mbps Low CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



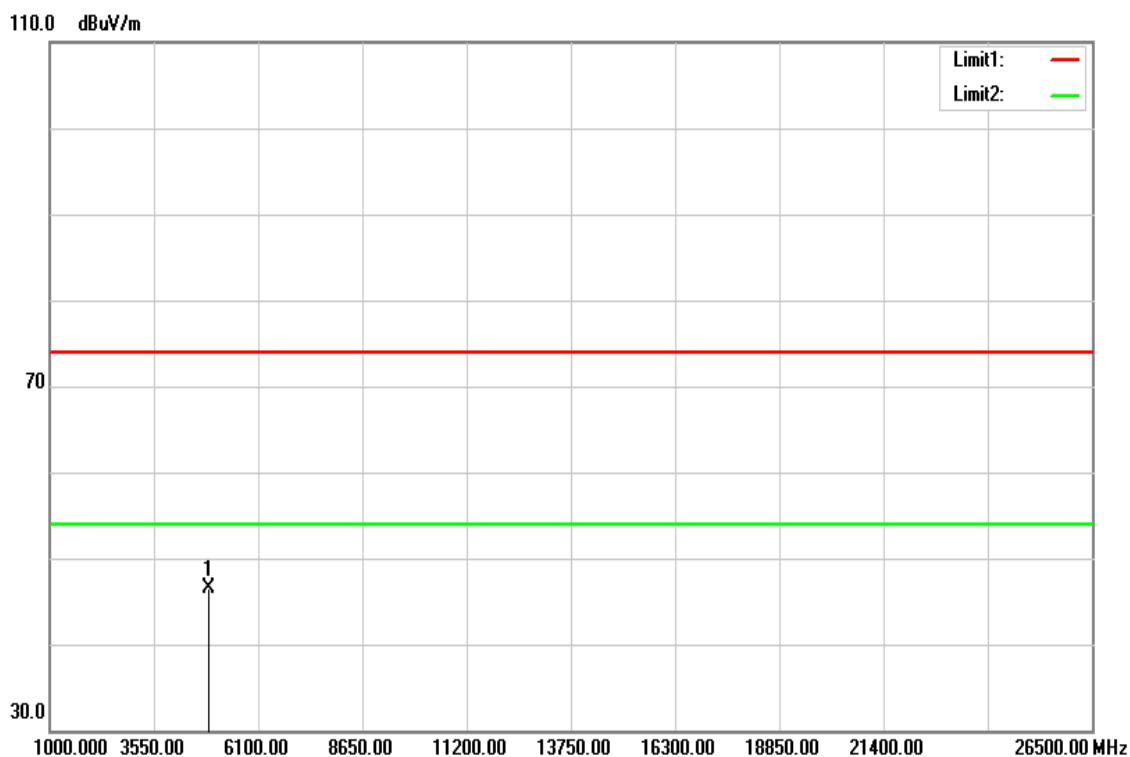
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	7207.000	46.14	10.39	56.53	74.00	-17.47	peak
2	7207.000	31.08	10.39	41.47	54.00	-12.53	AVG

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Report No.: T170908D07-A-RP2

Test Mode	8DPSK_EDR-3Mbps Mid CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



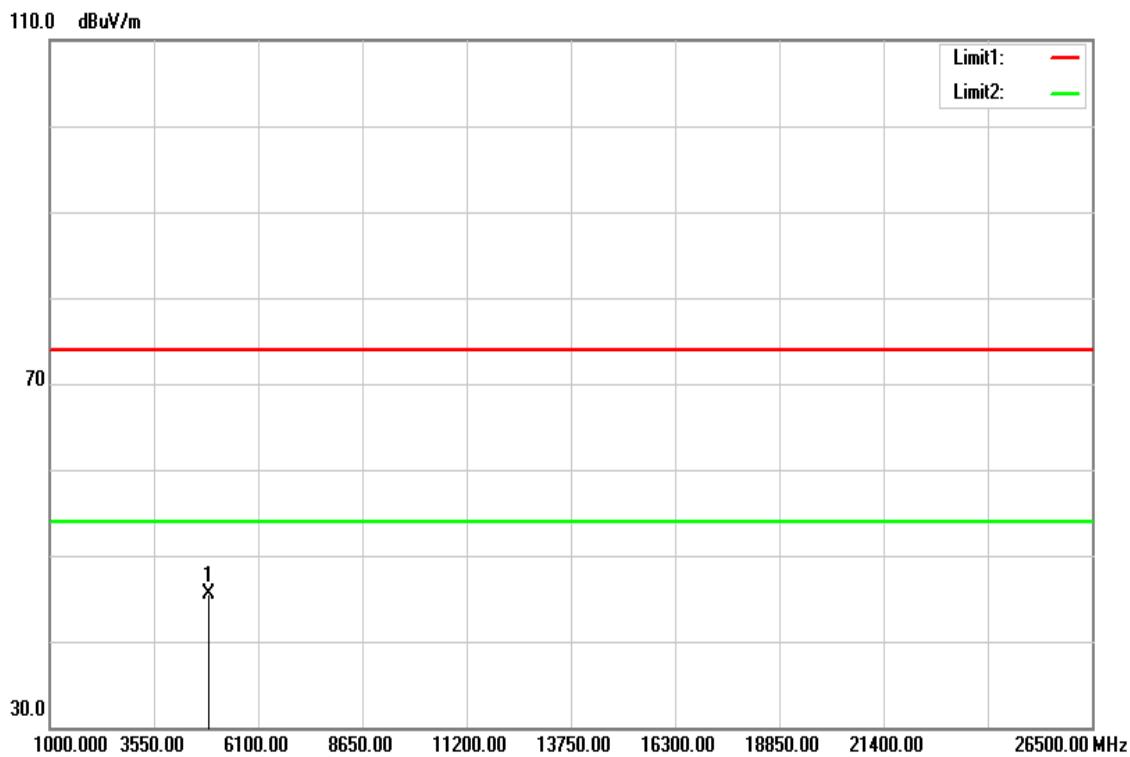
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4882.000	42.03	4.49	46.52	74.00	-27.48	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Report No.: T170908D07-A-RP2

Test Mode	8DPSK_EDR-3Mbps Mid CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V

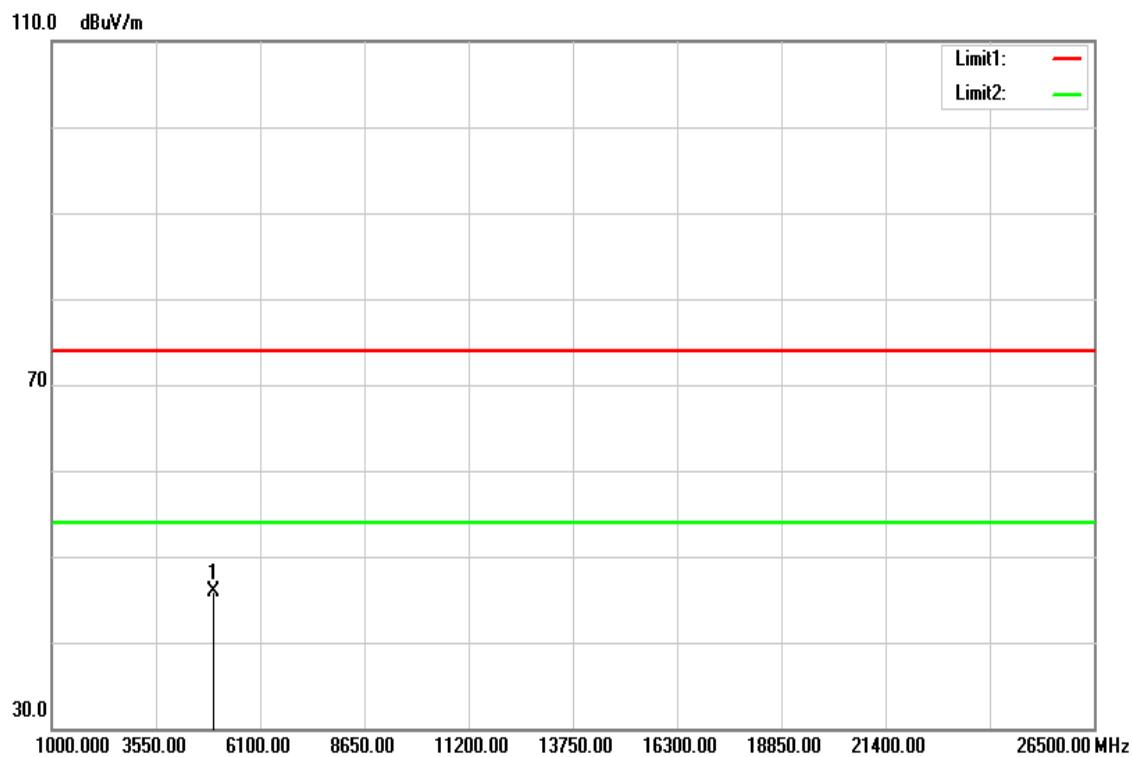


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	41.03	4.49	45.52	74.00	-28.48	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Test Mode	8DPSK_EDR-3Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



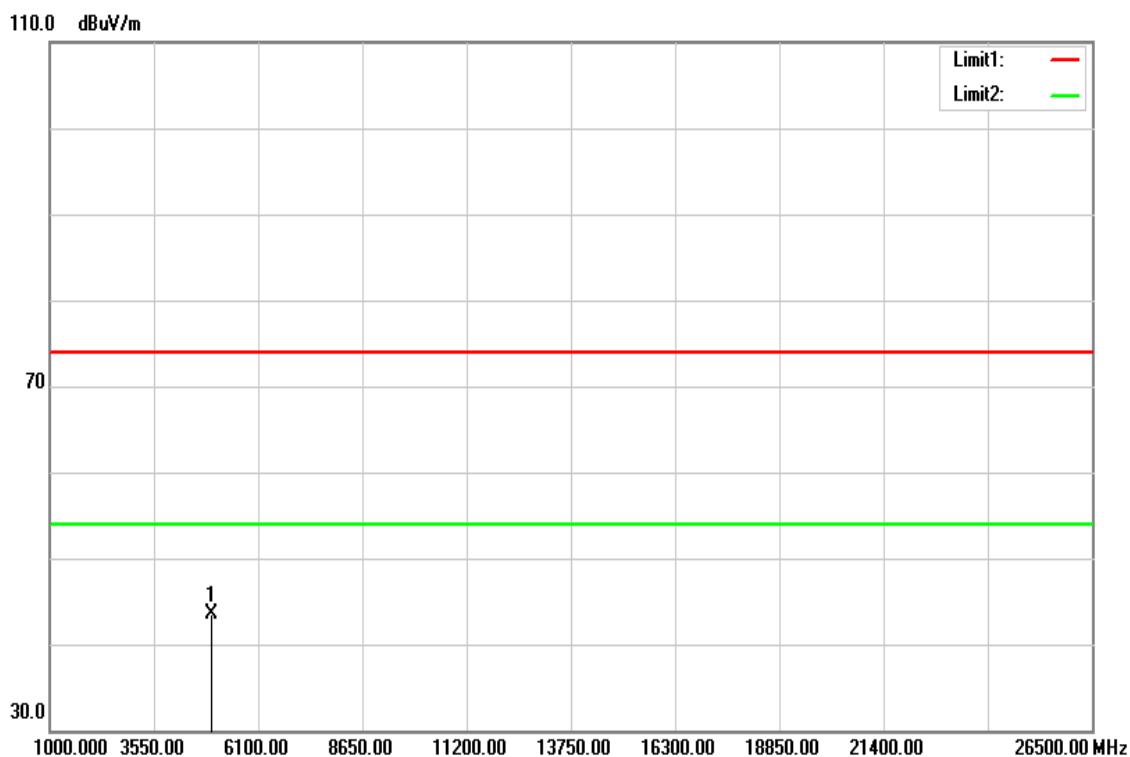
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4960.000	41.34	4.61	45.95	74.00	-28.05	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Report No.: T170908D07-A-RP2

Test Mode	8DPSK_EDR-3Mbps High CH	Temp/Hum	24(°C)/ 33%RH
Test Item	Harmonic	Test Date	January 9, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage	DC 12V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	38.91	4.61	43.52	74.00	-30.48	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

- End of Test Report -