



SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

NCC RADIO TEST REPORT

Applicant's company	香港商極進網路有限公司台灣分公司
Applicant Address	台北市松山區復勢里南京東路 4 段 126 號 5 樓
Manufacturer's company	啟碁科技股份有限公司
Manufacturer Address	新竹科學工業園區新竹縣園區二路 20 號

Product Name	無線接入點
Brand Name	Extreme Networks
Model Name	AP-8432I
Test Rule	NCC LP0002 Section 3.10.1
Test Freq. Range	2402 ~ 2480MHz
Received Date	Feb. 01, 2016
Final Test Date	Jul. 12, 2017
Submission Type	Original Equipment

Statement

Test result included is only for the Bluetooth BR/EDR of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2013, DA-00705** and **NCC LP0002 (Aug. 23, 2016)**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.



Table of Contents

1. VERIFICATION OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	3
3.3. Table for Filed Antenna.....	4
3.4. Table for Carrier Frequencies	5
3.5. Table for Test Modes	6
3.6. Table for Testing Locations.....	9
3.7. Table for Supporting Units	10
3.8. Table for Parameters of Test Software Setting	12
3.9. EUT Operation during Test	12
3.10. Duty Cycle.....	12
3.11. Test Configurations	13
4. TEST RESULT	21
4.1. AC Power Line Conducted Emissions Measurement.....	21
4.2. Maximum Conducted Output Power Measurement.....	31
4.3. Hopping Channel Separation Measurement	33
4.4. Number of Hopping Frequency Measurement.....	44
4.5. Dwell Time Measurement.....	46
4.6. Radiated Emissions Measurement	53
4.7. Emissions Measurement	78
4.8. Antenna Requirements	92
5. LIST OF MEASURING EQUIPMENTS	93
6. MEASUREMENT UNCERTAINTY.....	95
APPENDIX A. TEST PHOTOS	A1 ~ A7

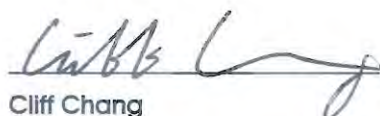
History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
TR592302-23AA	Rev. 01	Initial issue of report	Sep. 12, 2017

1. VERIFICATION OF COMPLIANCE

Product Name : 無線接入點
Brand Name : Extreme Networks
Model No. : AP-8432I
Applicant : 香港商極進網路有限公司台灣分公司
Test Rule Part(s) : NCC LP0002 Section 3.10.1

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Feb. 01, 2016 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Cliff Chang

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: NCC LP0002 (Aug. 23, 2016)			
Part	Rule Section	Description of Test	Result
4.1	2.3	AC Power Line Conducted Emissions	Complies
4.2	3.10.1.2	Maximum Conducted Output Power	Complies
4.3	3.10.1.6	Hopping Channel Separation	Complies
4.4	3.10.1.6	Number of Hopping Frequency	Complies
4.5	3.10.1.6	Dwell Time	Complies
4.6	3.10.1.5	Radiated Emissions	Complies
4.7	3.10.1.5	Band Edge Emissions	Complies
4.8	3.10.1.4	Antenna Requirements	Complies

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From Power Adapter or PoE
Modulation	FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK)
Data Rate (Mbps)	GFSK: 1 ; $\pi/4$ -DQPSK: 2 ; 8DPSK: 3
Frequency Range	2402 ~ 2480MHz
Channel Number	79
Channel Band Width (99%)	BR (GFSK) 1 Mbps: 0.9030 MHz EDR ($\pi/4$ -DQPSK) 2 Mbps: 1.2214 MHz EDR (8DPSK) 3 Mbps: 1.2214 MHz
Maximum Conducted Peak Output Power	BR (GFSK) 1 Mbps: 6.22 dBm EDR ($\pi/4$ -DQPSK) 2 Mbps: 5.78 dBm EDR (8DPSK) 3 Mbps: 6.06 dBm
Maximum Conducted Average Output Power	BR (GFSK) 1 Mbps: 5.43 dBm EDR ($\pi/4$ -DQPSK) 2 Mbps: 4.99 dBm EDR (8DPSK) 3 Mbps: 5.27 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3
Note 1: Bluetooth BR uses a combination of GFSK (1Mbps). Note 2: Bluetooth EDR uses a combination of $\pi/4$-DQPSK (2Mbps) and 8DPSK (3Mbps). Note 3: This device contains two radio transmitter module, radio 1 (Model Name: CDR5G) and radio 2 (Model Name: CDRDB).	

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Set	Brand	Model Name (Part Number)	Antenna Type	Connector	Indoor/ Outdoor	Rmark	EUT/ R(Radio)
1	ZEBRA	CEDAR-INT-ANT	Monopole	U.FL	Indoor	WLAN/BT	R1 ~R3

Note 1:

Set	Antenna Gain (dBi)			
	Radio 1 / 5G			
	Chain 1	Chain 2	Chain 3	Chain 4
1	6.8	6.7	6.6	5.9

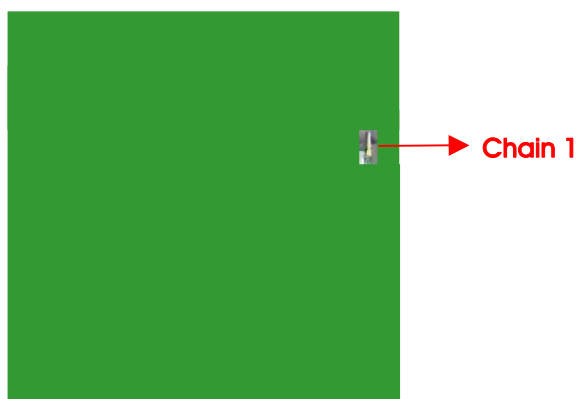
Set	Antenna Gain (dBi)					
	Radio 2 / 2.4G			Radio 2 / 5G		
	Chain 1	Chain 2	Chain 3	Chain 1	Chain 2	Chain 3
1	4.1	4.4	4.4	5.9	5.4	5.9

Set	Antenna Gain (dBi)	
	Radio 3 / BT	
1	7.7	

Note 2:

The EUT has three radios, Radio 1 supports WLAN 5GHz, Radio 2 supports WLAN 2.4GHz + 5GHz and Radio 3 supports Bluetooth functions.

For Bluetooth Function	
Mode	Chain 1
For 1TX	TX/RX



3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	0	2402 MHz	40	2442 MHz
	1	2403 MHz	:	:
	:	:	77	2479 MHz
	38	2440 MHz	78	2480 MHz
	39	2441 MHz	-	-

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Chain
AC Power Conducted Emissions	Intentional – CTX	-	-	-
	Unintentional – Normal Link	-	-	-
Maximum Conducted Output Power	BR (GFSK)	1 Mbps	0/39/78	1
	EDR ($\pi/4$ -DQPSK)	2 Mbps	0/39/78	1
	EDR (8DPSK)	3 Mbps	0/39/78	1
Hopping Channel Separation	BR (GFSK)	1 Mbps	0~1 39~40 77~78	1
	EDR ($\pi/4$ -DQPSK)	2 Mbps	0~1 39~40 77~78	1
	EDR (8DPSK)	3 Mbps	0~1 39~40 77~78	1
Number of Hopping Frequency	EDR (8DPSK)	3 Mbps	0~78	1
Dwell Time	BR (GFSK) (DH1, DH3, DH5)	1 Mbps	0/39/78	1
Radiated Emissions Below 1GHz	Intentional – CTX	-	-	-
	Unintentional – Normal Link	-	-	-
Radiated Emissions Unintentional 1GHz~5 th Harmonic	Unintentional – Normal Link	-	-	-
Radiated Emissions 1GHz~10 th Harmonic	BR (GFSK)	1 Mbps	0/39/78	1
	EDR (8DPSK)	3 Mbps	0/39/78	1
Band Edge Emissions	BR (GFSK)	1 Mbps	0/39/78	1
	EDR (8DPSK)	3 Mbps	0/39/78	1

Note1:

The adapter and PoE are for measurement only, would not be marketed.

The adapter and PoE information as below:

Power	Brand	Model
PoE 1	Symbol	PD-9001GR/AT/AC
PoE 2	Symbol	AP-PSBIAS-2P3-ATY
Adapter	PHIHONG	PSAC45W-480

Note2: The power does not affect the test result of RF tests, so only adapter was tested and recorded in this report for Radiated Emission above 1GHz test.

Note3: All the specification of test configurations and test modes were based on customer's request

Note4: The USB port can not be used by end user. It is generally used for updating FW by professional installer.

The following test modes were performed for all tests:

AC Power Line Conducted Emissions					
Operating Mode	Intentional – CTX				
The EUT was performed at Y axis and Z axis position for Radiated emission below 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.					
Mode	Y axis	Z axis	Set 1	Adapter	PoE
1	●	-	● Radio3/BT	●	-
2	●	-	● Radio3/BT	-	●
Mode 2 is the worst case, so it was selected to record in this test report.					
Operating Mode	Unintentional – Normal Link				
The EUT was performed at Y axis and Z axis position for Radiated emission below 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.					
Mode	Y axis	Z axis	Set 1	Adapter	PoE
1	●	-	● Radio1/5G Radio2/2.4G Radio3/BT	●	-
2	●	-	● Radio1/5G Radio2/5G Radio3/BT	●	-
3 Note1	●	-	● Radio1/5G Radio2/2.4G Radio3/BT	-	●
Note1: Mode 1 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 will follow this same test mode. All test results were recorded in the report.					

Radiated Emissions Below 1GHz					
Operating Mode	Intentional – CTX				
The EUT was performed at Y axis and Z axis position, and the worst case was found at Y axis. So the measurement will follow this same test configuration.					
Mode	Y axis	Z axis	Set 1	Adapter	PoE
1	●	-	● Radio3/BT	●	-
2	●	-	● Radio3/BT	-	●
Mode 1 is the worst case, so it was selected to record in this test report.					
Operating Mode	Unintentional – Normal Link				
Mode	Y axis	Z axis	Set 1	Adapter	PoE
1	●	-	● Radio1/5G Radio2/2.4G Radio3/BT	●	-
2	-	●	● Radio1/5G Radio2/2.4G Radio3/BT	●	-
3 Note1	●	-	● Radio1/5G Radio2/5G Radio3/BT	●	-
4 Note2	●	-	● Radio1/5G Radio2/5G Radio3/BT	-	●
Note1: Mode 1 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 will follow this same test mode.					
Note2: Mode 3 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4 will follow this same test mode.					
All test results were recorded in the report.					

Radiated Emissions Unintentional 1GHz~5 th Harmonic					
Operating Mode	Unintentional – Normal Link				
EUT in Z axis (Radio1/5G+Radio2/5G+Radio3/BT)+Adapter generated the worst test result for Radiated emission unintentional below 1GHz test, thus the measurement for Radiated emission unintentional 1GHz~5 th Harmonic test will follow this same test configuration					
Mode	Y axis	Z axis	Set 1	Adapter	PoE
1	●	-	● Radio1/5G Radio2/5G Radio3/BT	●	-

Radiated Emissions Intentional 1GHz~10 th Harmonic and Band Edge Emissions				
Operating Mode	CTX			
The EUT was performed at Y axis and Z axis position, and the worst case was found at Y axis. So the measurement will follow this same test configuration.				
Mode	Y axis	Z axis	Set 1	Adapter
1	●	-	●	●

3.6. Table for Testing Locations

Test Site Location				
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.			
TEL:	886-3-656-9065			
FAX:	886-3-656-9085			
Test Site No.	Site Category	Location	FCC Designation No.	IC File No.
03CH01-CB	SAC	Hsin Chu	TW0006	IC 4086D
CO01-CB	Conduction	Hsin Chu	TW0006	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

3.7. Table for Supporting Units

For Test Site No: 03CH01-CB (below 1GHz)

Operating Mode: Intentional – CTX

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
Flash disk3.0	Silicon Power	B06	DoC
Adapter	PHIHONG	PSAC45W-480	N/A

Operating Mode: Unintentional – Normal Link

For Adapter mode:

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E4300	DoC
Bluetooth tester	Anritsu	MT8852B	DoC
Flash disk	Transcend	JF700	DoC
PoE PD Simulator (PD load)	WNC	PDS-16	DoC
Adapter	PHIHONG	PSAC45W-480	N/A

For PoE mode:

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E4300	DoC
Bluetooth tester	Anritsu	MT8852B	DoC
Flash disk	Transcend	JF700	DoC
PoE PD Simulator (PD load)	WNC	PDS-16	DoC
PoE 1	Symbol	PD-9001GR/AT/AC	DoC

For Test Site No: 03CH01-CB (Unintentional 1GHz~5th Harmonic)

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E4300	DoC
Bluetooth tester	Anritsu	MT8852B	DoC
Flash disk	Transcend	JF700	DoC
PoE PD Simulator (PD load)	WNC	PDS-16	DoC
Adapter	PHIHONG	PSAC45W-480	N/A

For Test Site No: 03CH01-CB (Intentional 1GHz~10th Harmonic)

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
Adapter	PHIHONG	PSAC45W-480	N/A

For Test Site No: CO01-CB

Operating Mode: Intentional – CTX

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC
Flash disk3.0	Transcend	639205 7755	DoC
PoE 2	Symbol	AP-PSBIAS-2P3-ATY	DoC

Operating Mode: Unintentional – Normal Link

For Adapter mode:

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E6430	DoC
Bluetooth tester	Anritsu	MT8852B	DoC
Flash disk	Silicon	I-Series	DoC
PoE PD Simulator (PD load)	WNC	PDS-16	DoC
Adapter	PHIHONG	PSAC45W-480	N/A

For PoE mode:

Support Unit	Brand	Model	FCC ID
NB*4	DELL	E6430	DoC
Bluetooth tester	Anritsu	MT8852B	DoC
Flash disk	Silicon	I-Series	DoC
PoE PD Simulator (PD load)	WNC	PDS-16	DoC
PoE 1	Symbol	PD-9001GR/AT/AC	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
Adapter	PHIHONG	PSAC45W-480	N/A

3.8. Table for Parameters of Test Software Setting

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters of Bluetooth

For BR (GFSK) 1 Mbps:

Test Software Version	DoS		
Frequency	2402 MHz	2441 MHz	2480 MHz
Power Parameters	Default	Default	Default

For EDR ($\pi/4$ -DQPSK) 2 Mbps:

Test Software Version	DoS		
Frequency	2402 MHz	2441 MHz	2480 MHz
Power Parameters	Default	Default	Default

For EDR (8DPSK) 3 Mbps:

Test Software Version	DoS		
Frequency	2402 MHz	2441 MHz	2480 MHz
Power Parameters	Default	Default	Default

3.9. EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

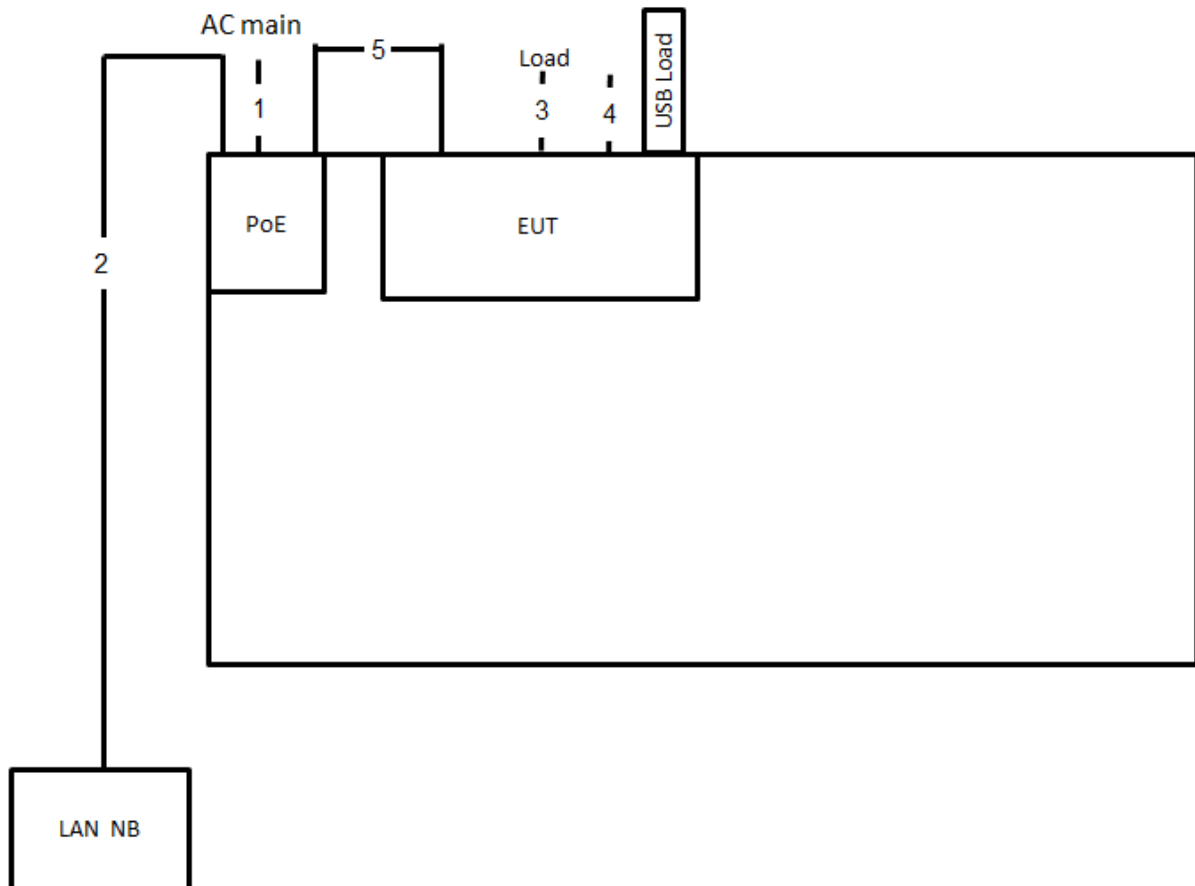
3.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
BR (GFSK)	2.894	3.738	77.42%	1.11	0.35
EDR ($\pi/4$ -DQPSK)	2.909	3.738	77.81%	1.09	0.34
EDR (8DPSK)	2.880	3.724	77.33%	1.12	0.35

3.11. Test Configurations

3.11.1. AC Power Line Conduction Emissions Test Configuration

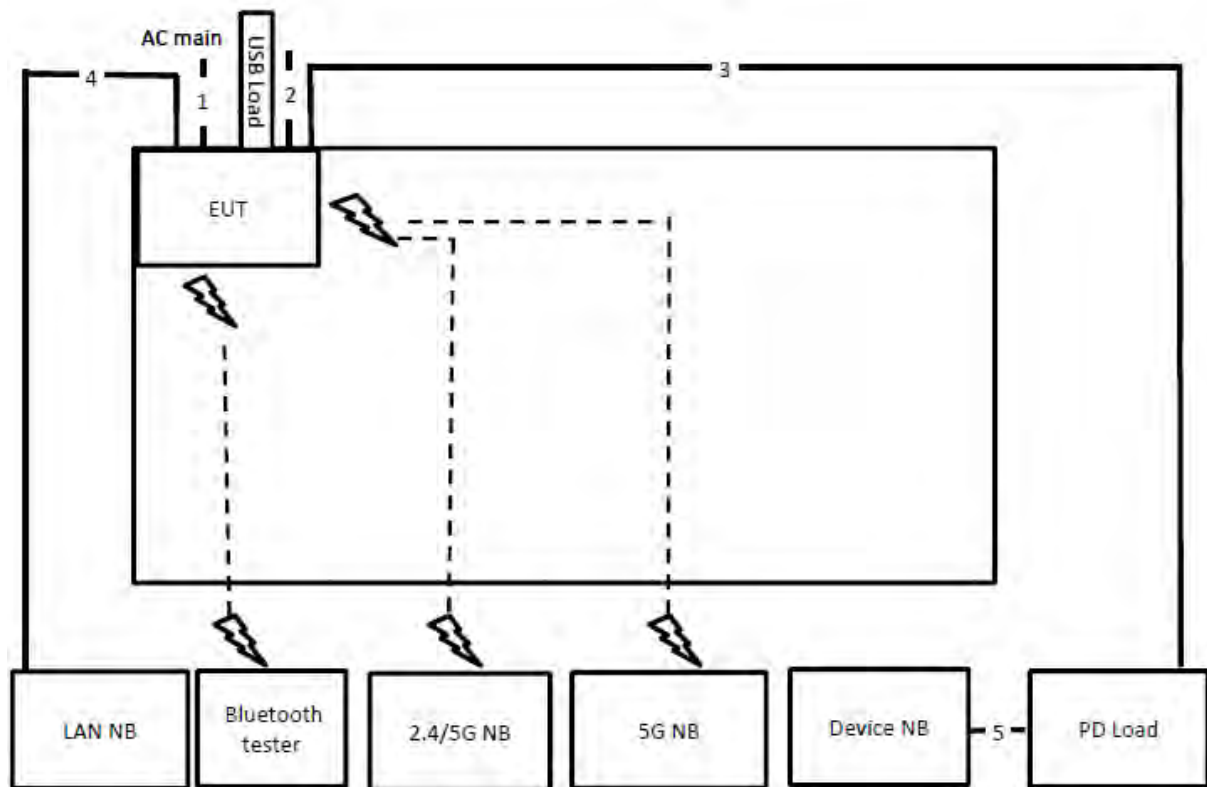
Operating Mode: Intentional – CTX



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1m
4	Console cable	No	1.8m
5	RJ-45 cable	No	1.5m

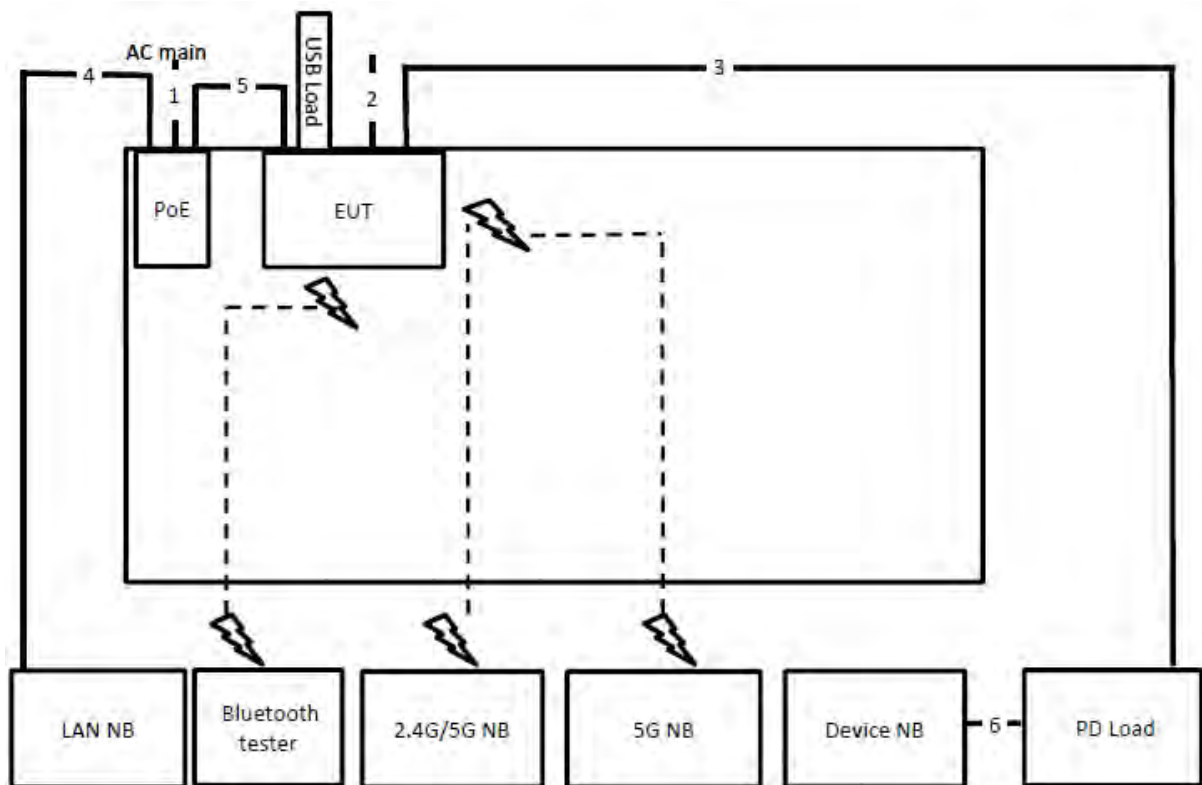
Operating Mode: Unintentional – Normal Link

For Adapter Mode:



Item	Connection	Shielded	Length
1	Power cable	No	4.3m
2	Console cable	No	1.5m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	10m
5	RJ-45 cable	No	1.5m

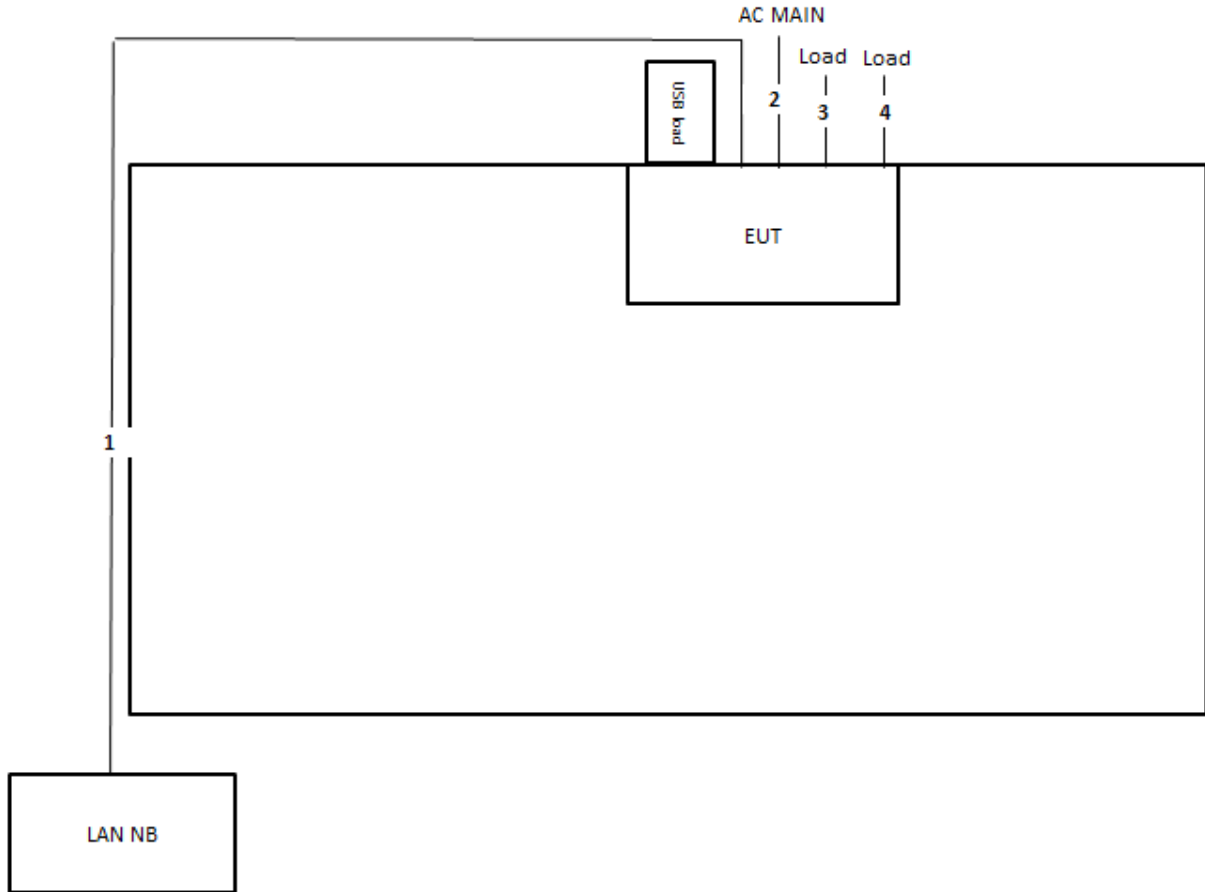
For PoE Mode:



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	Console cable	No	1.5m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	10m
5	RJ-45 cable	No	1.5m
6	RJ-45 cable	No	1.5m

3.11.2. Radiation Emissions 30MHz~1GHz Test Configuration

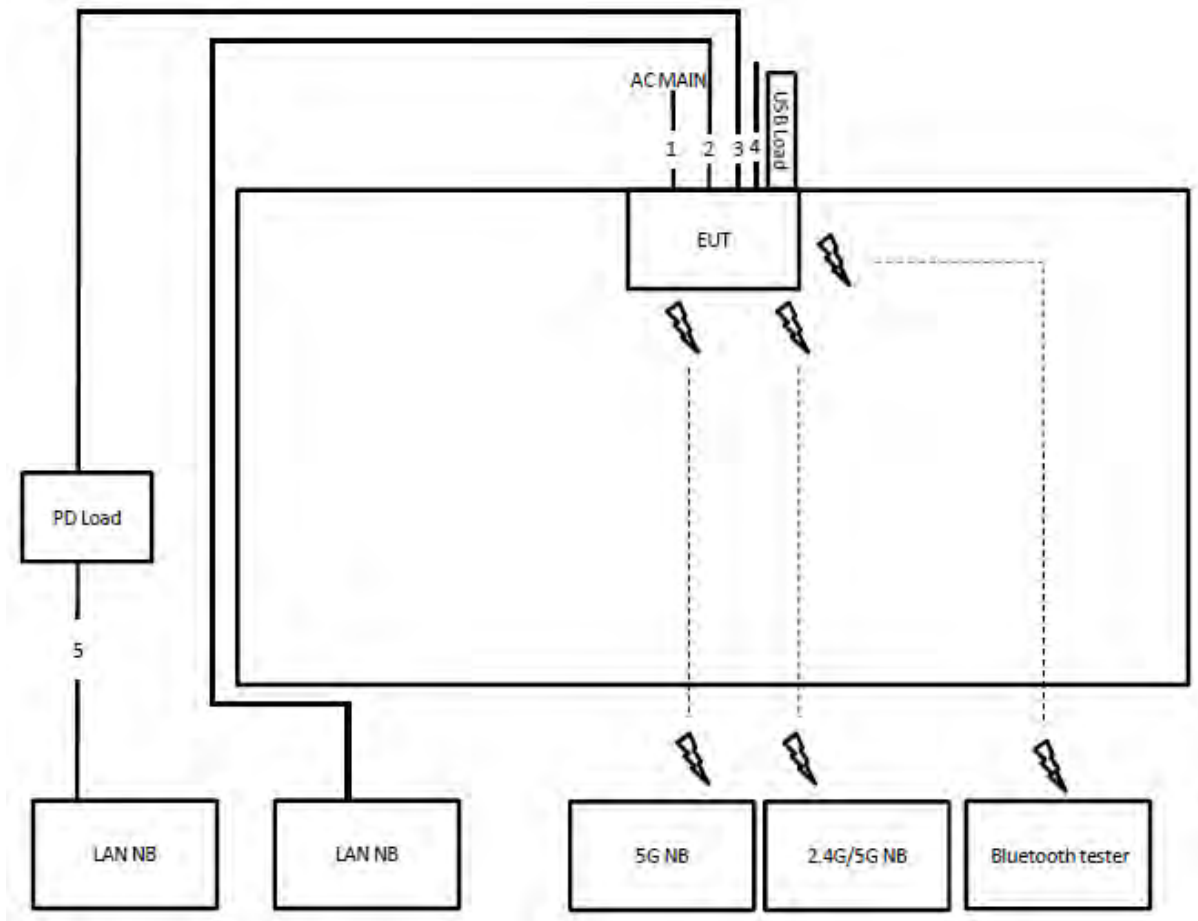
Operating Mode: Intentional – CTX



Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	Power cable	No	3.5m
3	RJ-45 cable*2	No	1.5m
4	Console cable	No	1.8m

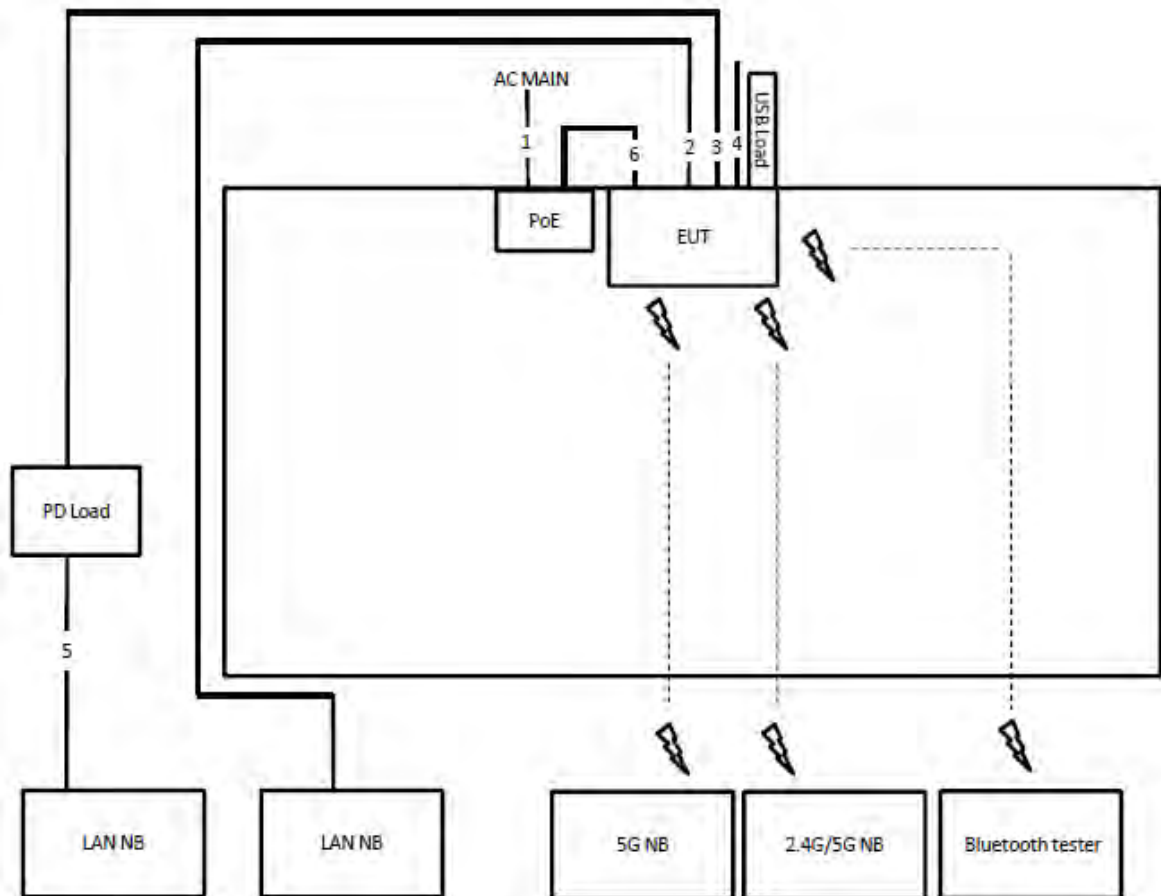
Operating Mode: Unintentional – Normal Link

For Adapter Mode:



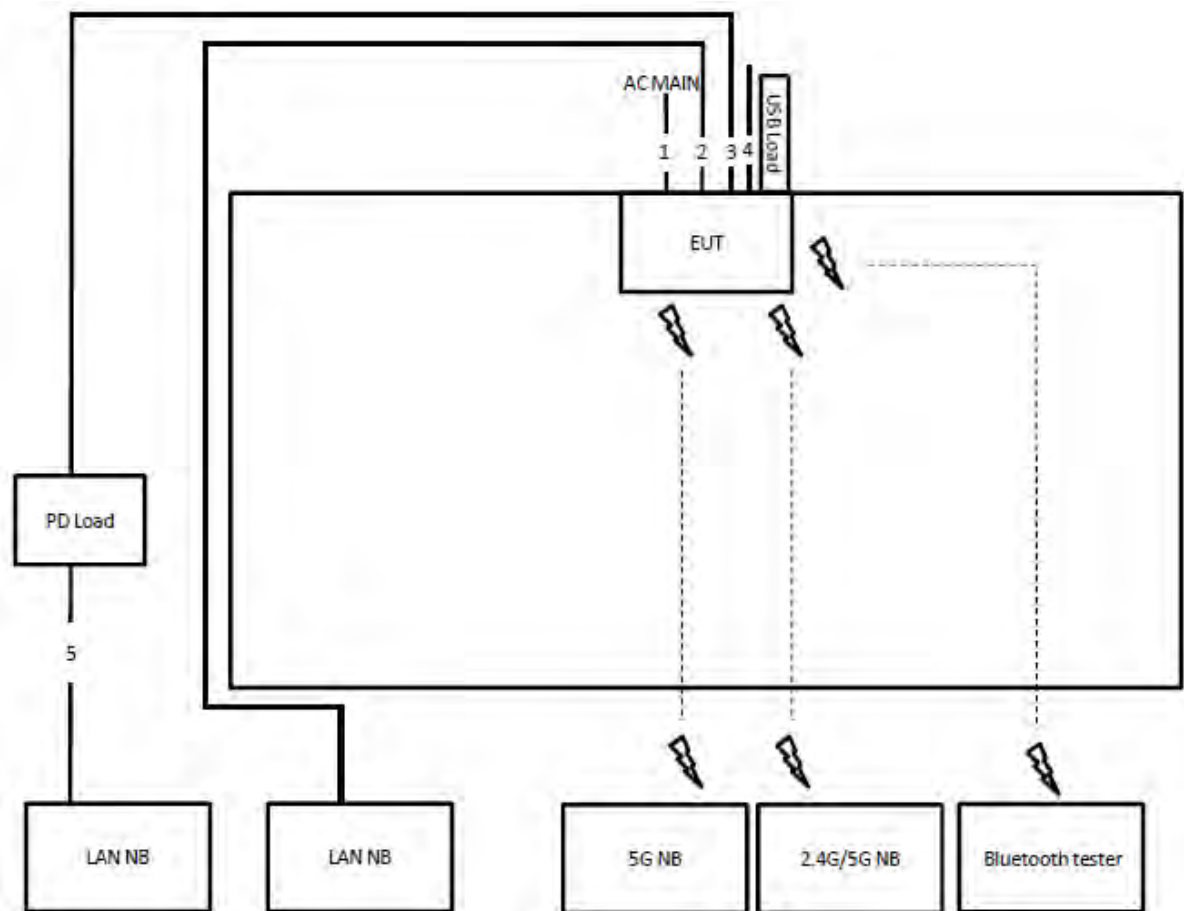
Item	Connection	Shielded	Length
1	Power cable	No	4.3m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	Console cable	No	1.5m
5	RJ-45 cable	No	1m

For PoE Mode:



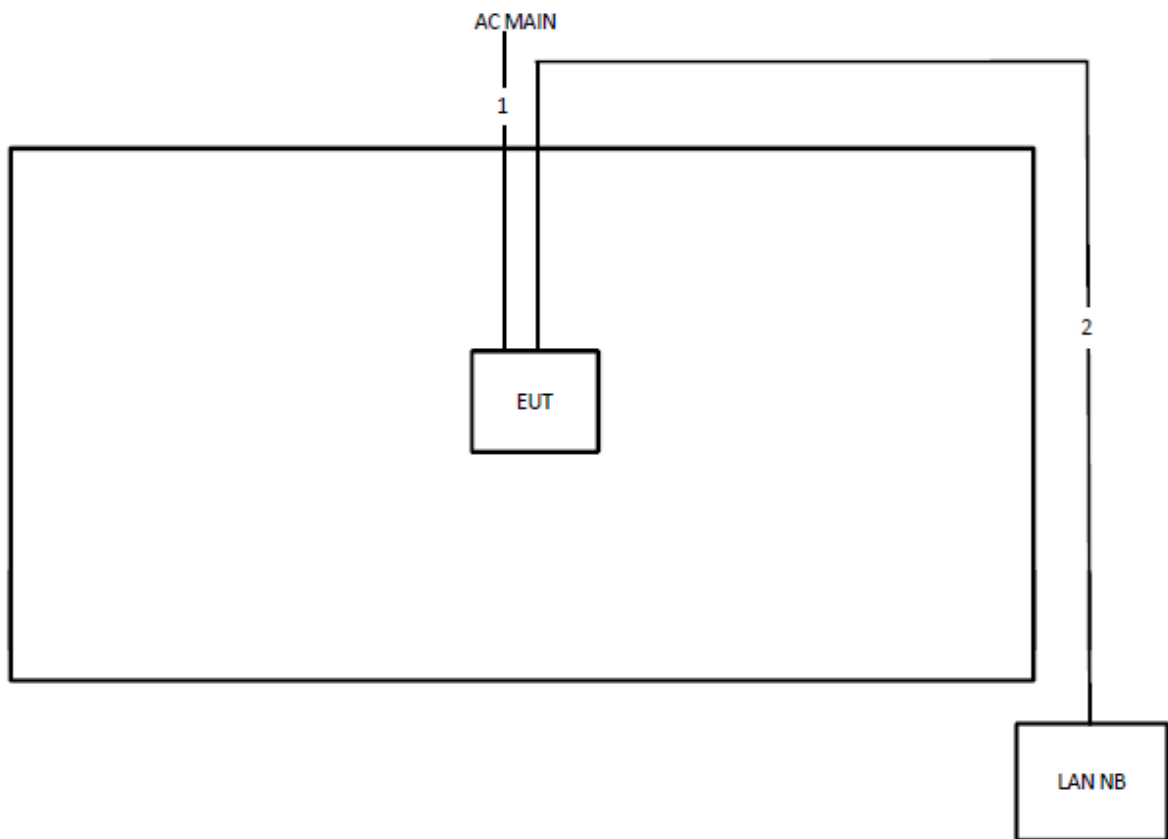
Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	Console cable	No	1.5m
5	RJ-45 cable	No	1m
6	RJ-45 cable	No	1.5m

3.11.3. Radiation Emissions Unintentional 1GHz~5th Harmonic Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	4.3m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	Console cable	No	1.5m
5	RJ-45 cable	No	1m

3.11.4. Radiation Emissions Intentional 1GHz~10th Harmonic Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	4.3m
2	RJ-45 cable	No	10m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For a Low-power Radio-frequency Device which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

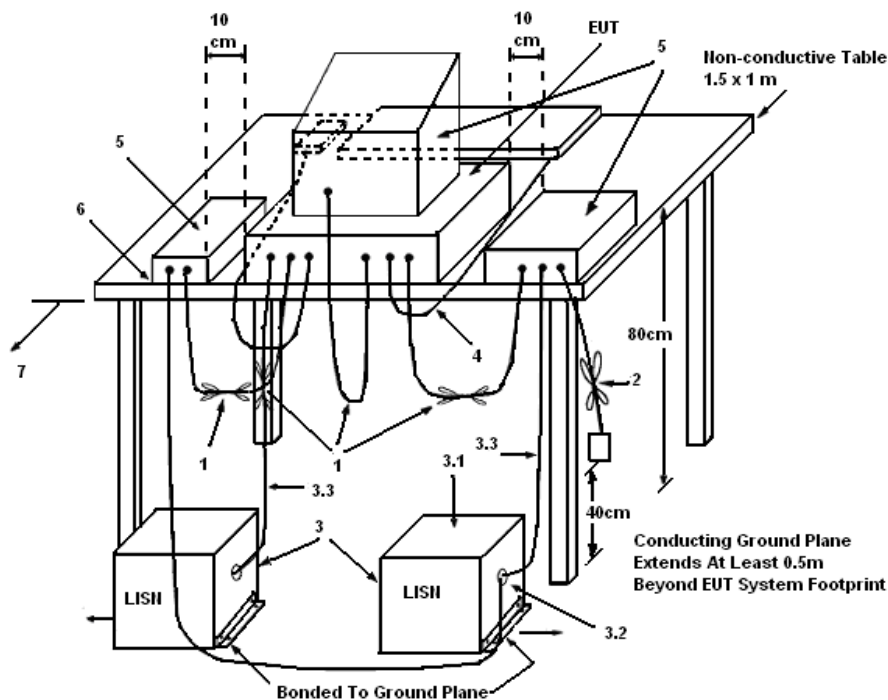
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

- (1) 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.
- (2) 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.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω . LISN can be placed on top of, or immediately beneath, reference ground plane.
- (3.1) All other equipment powered from additional LISN(s).
- (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
- (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

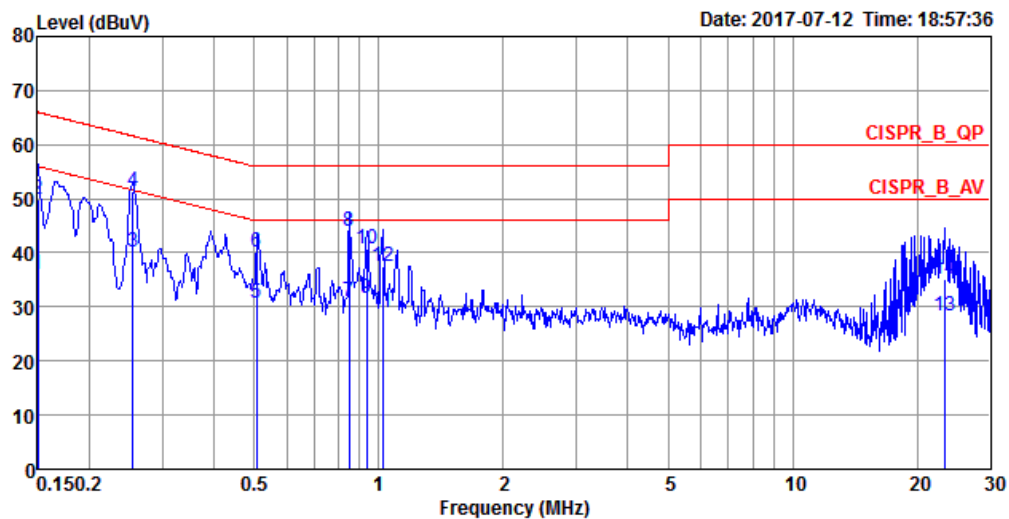
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

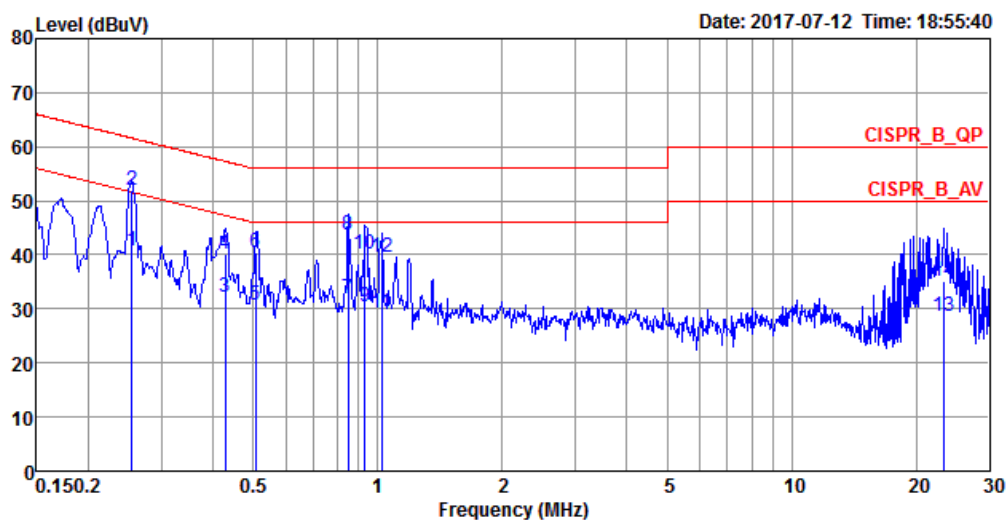
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	22°C	Humidity	52%
Test Engineer	Rick Yeh	Phase	Line
Configuration	Intentional – CTX	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	35.97	-20.03	56.00	25.81	10.00	0.16	Average	LINE
2	0.1500	50.00	-16.00	66.00	39.84	10.00	0.16	QP	LINE
3	0.2545	40.20	-11.41	51.61	30.19	9.92	0.09	Average	LINE
4	0.2545	51.38	-10.23	61.61	41.37	9.92	0.09	QP	LINE
5	0.5069	30.57	-15.43	46.00	20.56	9.95	0.06	Average	LINE
6	0.5069	40.05	-15.95	56.00	30.04	9.95	0.06	QP	LINE
7	0.8480	31.14	-14.86	46.00	21.02	9.96	0.16	Average	LINE
8	0.8480	43.94	-12.06	56.00	33.82	9.96	0.16	QP	LINE
9	0.9343	31.57	-14.43	46.00	21.43	9.96	0.18	Average	LINE
10	0.9343	40.81	-15.19	56.00	30.67	9.96	0.18	QP	LINE
11	1.0232	29.32	-16.68	46.00	19.17	9.96	0.19	Average	LINE
12	1.0232	37.60	-18.40	56.00	27.45	9.96	0.19	QP	LINE
13	23.3869	28.29	-21.71	50.00	17.66	10.40	0.23	Average	LINE
14	23.3869	35.24	-24.76	60.00	24.61	10.40	0.23	QP	LINE

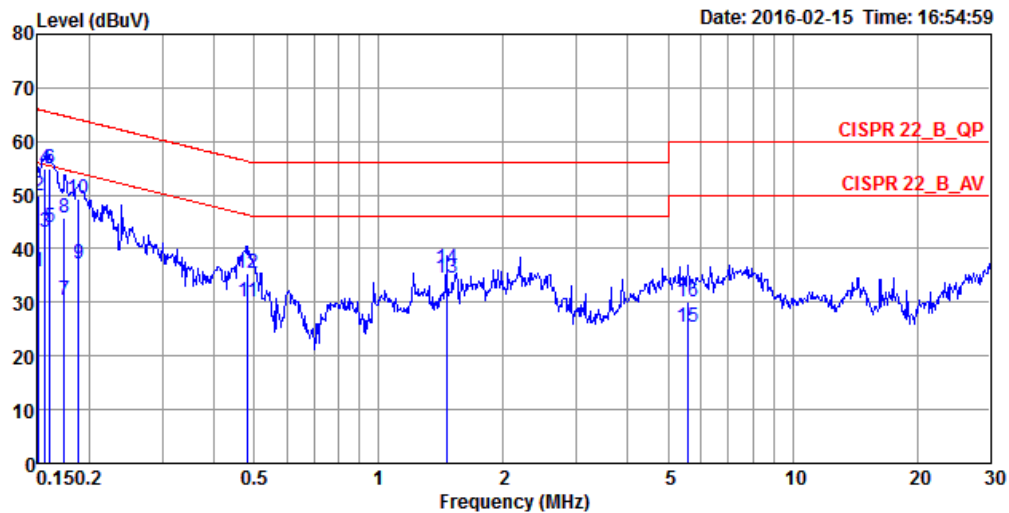
Temperature	22°C	Humidity	52%
Test Engineer	Rick Yeh	Phase	Neutral
Configuration	Intentional – CTX	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.2545	40.76	-10.85	51.61	30.59	10.08	0.09	Average	NEUTRAL
2	0.2545	51.99	-9.62	61.61	41.82	10.08	0.09	QP	NEUTRAL
3	0.4276	32.21	-15.09	47.30	21.94	10.25	0.02	Average	NEUTRAL
4	0.4276	40.19	-17.11	57.30	29.92	10.25	0.02	QP	NEUTRAL
5	0.5069	30.85	-15.15	46.00	20.57	10.22	0.06	Average	NEUTRAL
6	0.5069	40.32	-15.68	56.00	30.04	10.22	0.06	QP	NEUTRAL
7	0.8497	31.91	-14.09	46.00	21.65	10.10	0.16	Average	NEUTRAL
8	0.8497	43.78	-12.22	56.00	33.52	10.10	0.16	QP	NEUTRAL
9	0.9331	30.40	-15.60	46.00	20.15	10.07	0.18	Average	NEUTRAL
10	0.9331	40.07	-15.93	56.00	29.82	10.07	0.18	QP	NEUTRAL
11	1.0211	29.09	-16.91	46.00	18.85	10.05	0.19	Average	NEUTRAL
12	1.0211	39.49	-16.51	56.00	29.25	10.05	0.19	QP	NEUTRAL
13	23.4045	28.58	-21.42	50.00	17.93	10.42	0.23	Average	NEUTRAL
14	23.4045	35.22	-24.78	60.00	24.57	10.42	0.23	QP	NEUTRAL

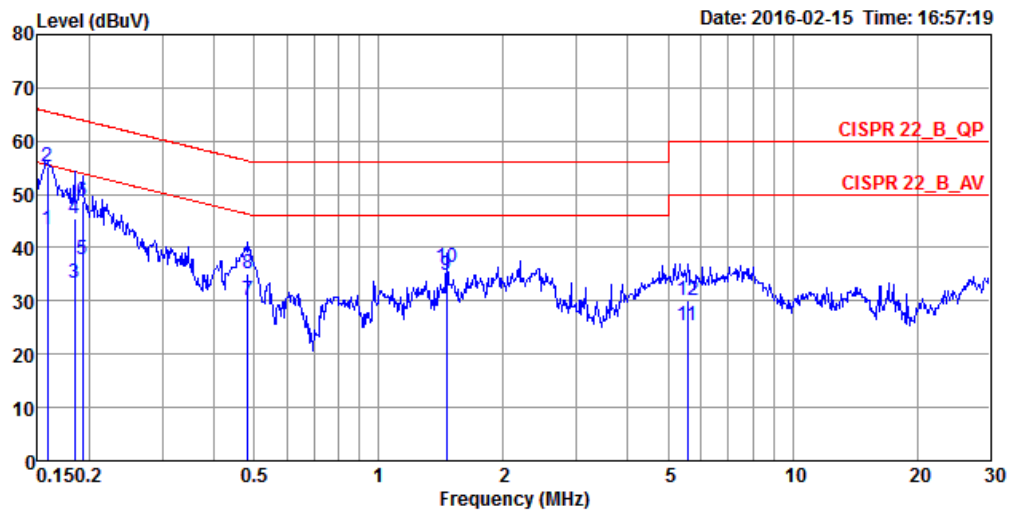
Note: Level = Read Level + LISN Factor + Cable Loss.

Temperature	20°C	Humidity	50%
Test Engineer	Deven Huang	Phase	Line
Configuration	Unintentional – Normal Link	Test Mode	Mode 1



	Freq	Level	Over	Limit	Read	LISN	Cable		
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1508	35.69	-20.27	55.96	25.74	9.93	0.02	LINE	Average
2	0.1508	49.83	-16.13	65.96	39.88	9.93	0.02	LINE	QP
3	0.1565	42.98	-12.67	55.65	33.03	9.93	0.02	LINE	Average
4	0.1565	54.99	-10.66	65.65	45.04	9.93	0.02	LINE	QP
5	0.1607	43.92	-11.51	55.43	33.97	9.93	0.02	LINE	Average
6	0.1607	54.87	-10.56	65.43	44.92	9.93	0.02	LINE	QP
7	0.1740	30.46	-24.31	54.77	20.51	9.93	0.02	LINE	Average
8	0.1740	45.88	-18.89	64.77	35.93	9.93	0.02	LINE	QP
9	0.1884	37.32	-16.79	54.11	27.37	9.93	0.02	LINE	Average
10	0.1884	49.31	-14.80	64.11	39.36	9.93	0.02	LINE	QP
11	0.4837	29.97	-16.30	46.27	19.99	9.94	0.04	LINE	Average
12	0.4837	35.32	-20.95	56.27	25.34	9.94	0.04	LINE	QP
13	1.4562	34.55	-11.45	46.00	24.51	9.98	0.06	LINE	Average
14	1.4562	36.38	-19.62	56.00	26.34	9.98	0.06	LINE	QP
15	5.5936	25.49	-24.51	50.00	15.30	10.08	0.11	LINE	Average
16	5.5936	30.18	-29.82	60.00	19.99	10.08	0.11	LINE	QP

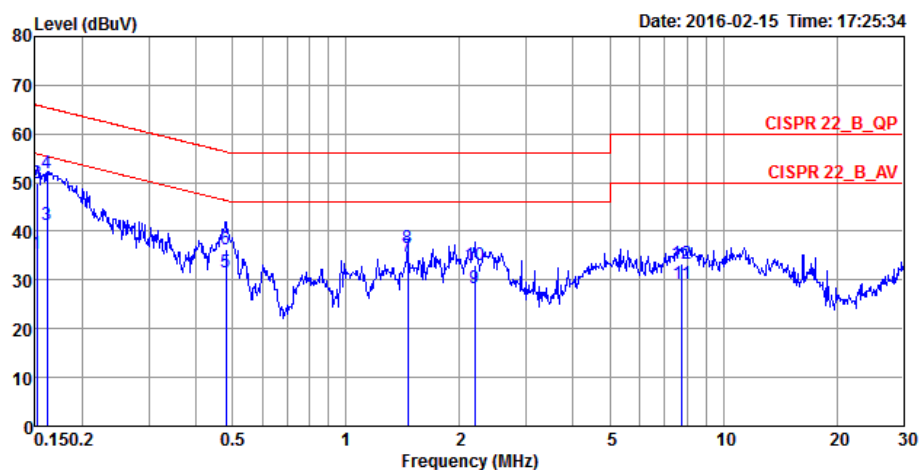
Temperature	20°C	Humidity	50%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Unintentional – Normal Link	Test Mode	Mode 1



	Freq	Level	Over	Limit	Read	LISN	Cable		
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Pol/Phase	Remark
			dB	dBuV	dBuV	dB	dB		
1	0.1582	43.40	-12.16	55.56	33.60	9.78	0.02	NEUTRAL	Average
2	0.1582	55.06	-10.50	65.56	45.26	9.78	0.02	NEUTRAL	QP
3	0.1844	33.27	-21.01	54.28	23.46	9.79	0.02	NEUTRAL	Average
4	0.1844	45.55	-18.73	64.28	35.74	9.79	0.02	NEUTRAL	QP
5	0.1924	37.90	-16.03	53.93	28.09	9.79	0.02	NEUTRAL	Average
6	0.1924	48.76	-15.17	63.93	38.95	9.79	0.02	NEUTRAL	QP
7	0.4837	30.13	-16.14	46.27	20.30	9.79	0.04	NEUTRAL	Average
8	0.4837	35.23	-21.04	56.27	25.40	9.79	0.04	NEUTRAL	QP
9	1.4562	34.75	-11.25	46.00	24.86	9.83	0.06	NEUTRAL	Average
10	1.4562	36.44	-19.56	56.00	26.55	9.83	0.06	NEUTRAL	QP
11	5.5641	25.25	-24.75	50.00	15.22	9.92	0.11	NEUTRAL	Average
12	5.5641	30.19	-29.81	60.00	20.16	9.92	0.11	NEUTRAL	QP

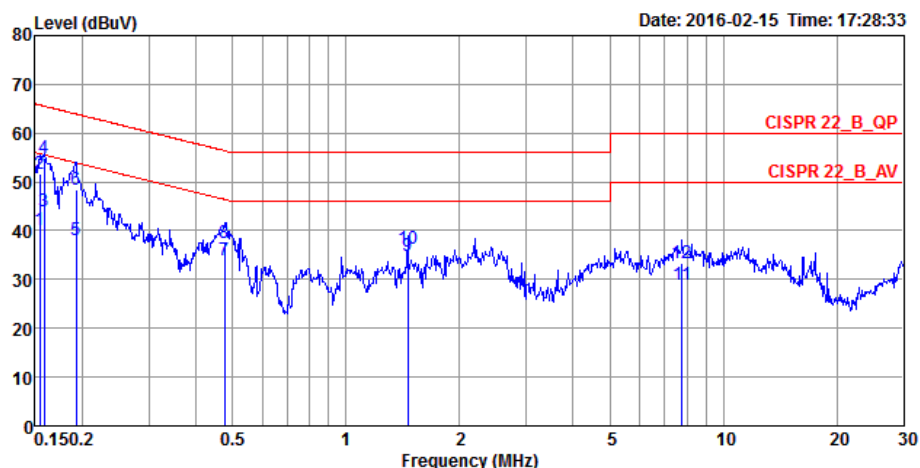
Note: Level = Read Level + LISN Factor + Cable Loss.

Temperature	20°C	Humidity	50%
Test Engineer	Deven Huang	Phase	Line
Configuration	Unintentional – Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1516	35.44	-20.47	55.91	25.49	9.93	0.02	LINE	Average
2	0.1516	49.87	-16.04	65.91	39.92	9.93	0.02	LINE	QP
3	0.1616	41.41	-13.97	55.38	31.46	9.93	0.02	LINE	Average
4	0.1616	51.93	-13.45	65.38	41.98	9.93	0.02	LINE	QP
5	0.4812	31.57	-14.75	46.32	21.59	9.94	0.04	LINE	Average
6	0.4812	36.43	-19.89	56.32	26.45	9.94	0.04	LINE	QP
7	1.4562	34.83	-11.17	46.00	24.79	9.98	0.06	LINE	Average
8	1.4562	36.63	-19.37	56.00	26.59	9.98	0.06	LINE	QP
9	2.1898	28.36	-17.64	46.00	18.31	9.99	0.06	LINE	Average
10	2.1898	33.12	-22.88	56.00	23.07	9.99	0.06	LINE	QP
11	7.7689	29.22	-20.78	50.00	18.93	10.13	0.16	LINE	Average
12	7.7689	33.25	-26.75	60.00	22.96	10.13	0.16	LINE	QP

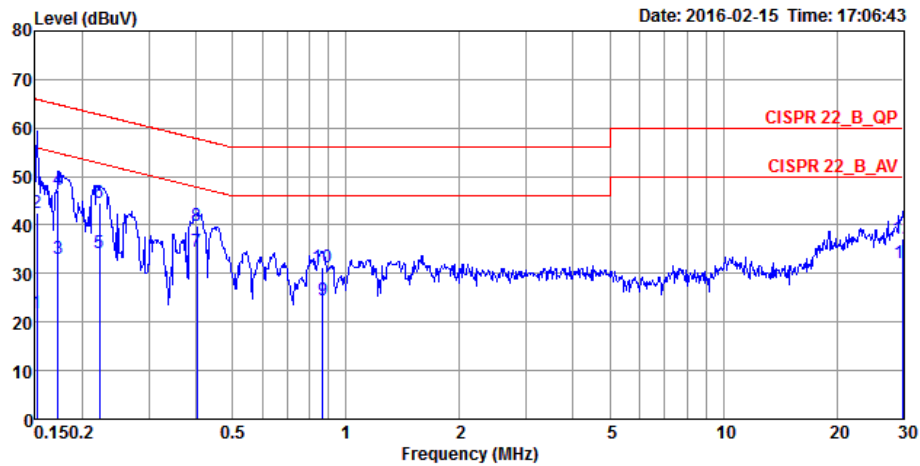
Temperature	20°C	Humidity	50%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Unintentional – Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1540	40.07	-15.71	55.78	30.27	9.78	0.02	NEUTRAL	Average
2	0.1540	51.64	-14.14	65.78	41.84	9.78	0.02	NEUTRAL	QP
3	0.1582	44.10	-11.46	55.56	34.30	9.78	0.02	NEUTRAL	Average
4	0.1582	54.86	-10.70	65.56	45.06	9.78	0.02	NEUTRAL	QP
5	0.1924	38.04	-15.89	53.93	28.23	9.79	0.02	NEUTRAL	Average
6	0.1924	48.44	-15.49	63.93	38.63	9.79	0.02	NEUTRAL	QP
7	0.4761	34.02	-12.39	46.41	24.19	9.79	0.04	NEUTRAL	Average
8	0.4761	37.54	-18.87	56.41	27.71	9.79	0.04	NEUTRAL	QP
9	1.4562	34.75	-11.25	46.00	24.86	9.83	0.06	NEUTRAL	Average
10	1.4562	36.44	-19.56	56.00	26.55	9.83	0.06	NEUTRAL	QP
11	7.7689	28.92	-21.08	50.00	18.79	9.97	0.16	NEUTRAL	Average
12	7.7689	33.45	-26.55	60.00	23.32	9.97	0.16	NEUTRAL	QP

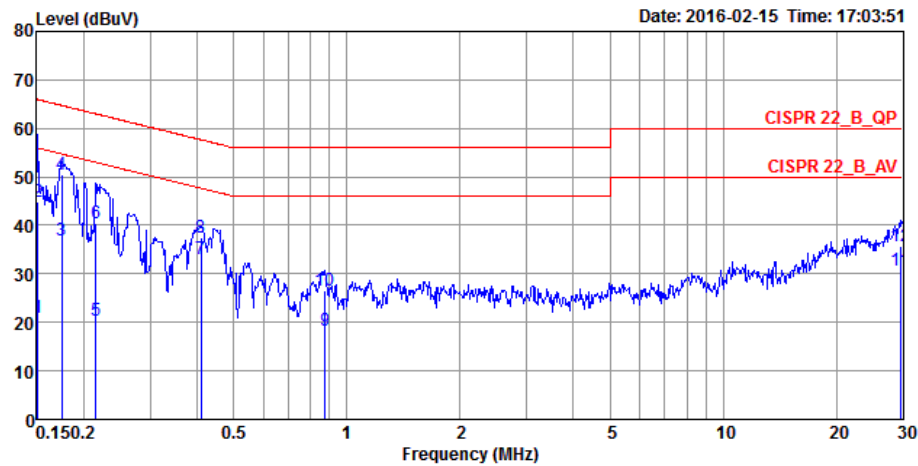
Note: Level = Read Level + LISN Factor + Cable Loss.

Temperature	20°C	Humidity	50%
Test Engineer	Deven Huang	Phase	Line
Configuration	Unintentional – Normal Link	Test Mode	Mode 3



	Freq	Level	Over	Limit	Read	LISN	Cable		
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1516	21.77	-34.14	55.91	11.82	9.93	0.02	LINE	Average
2	0.1516	42.55	-23.36	65.91	32.60	9.93	0.02	LINE	QP
3	0.1722	33.08	-21.78	54.86	23.13	9.93	0.02	LINE	Average
4	0.1722	47.34	-17.52	64.86	37.39	9.93	0.02	LINE	QP
5	0.2220	34.11	-18.63	52.74	24.15	9.93	0.03	LINE	Average
6	0.2220	44.53	-18.21	62.74	34.57	9.93	0.03	LINE	QP
7	0.4019	34.47	-13.34	47.81	24.50	9.93	0.04	LINE	Average
8	0.4019	39.75	-18.06	57.81	29.78	9.93	0.04	LINE	QP
9	0.8664	24.53	-21.47	46.00	14.53	9.96	0.04	LINE	Average
10	0.8664	31.21	-24.79	56.00	21.21	9.96	0.04	LINE	QP
11	30.0000	32.28	-17.72	50.00	21.32	10.68	0.28	LINE	Average
12	30.0000	37.13	-22.87	60.00	26.17	10.68	0.28	LINE	QP

Temperature	20°C	Humidity	50%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Unintentional – Normal Link	Test Mode	Mode 3



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1508	20.88	-35.08	55.96	11.08	9.78	0.02	NEUTRAL	Average
2	0.1508	45.01	-20.95	65.96	35.21	9.78	0.02	NEUTRAL	QP
3	0.1749	36.99	-17.73	54.72	27.18	9.79	0.02	NEUTRAL	Average
4	0.1749	50.50	-14.22	64.72	40.69	9.79	0.02	NEUTRAL	QP
5	0.2151	20.36	-32.65	53.01	10.55	9.79	0.02	NEUTRAL	Average
6	0.2151	40.58	-22.43	63.01	30.77	9.79	0.02	NEUTRAL	QP
7	0.4105	33.03	-14.61	47.64	23.20	9.79	0.04	NEUTRAL	Average
8	0.4105	37.45	-20.19	57.64	27.62	9.79	0.04	NEUTRAL	QP
9	0.8757	18.32	-27.68	46.00	8.46	9.81	0.05	NEUTRAL	Average
10	0.8757	26.71	-29.29	56.00	16.85	9.81	0.05	NEUTRAL	QP
11	29.5269	30.80	-19.20	50.00	20.18	10.34	0.28	NEUTRAL	Average
12	29.5269	35.62	-24.38	60.00	25.00	10.34	0.28	NEUTRAL	QP

Note: Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, the limit for peak output power is 1Watt (30dBm).

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts (21 dBm).

4.2.2. Measuring Instruments and Setting

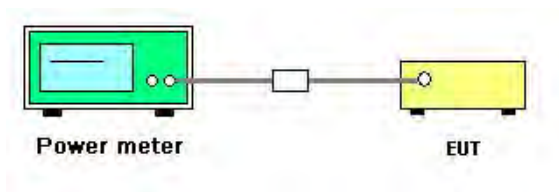
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
Detector	Peak and Average

4.2.3. Test Procedures

This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

Temperature	25°C	Humidity	59%
Test Engineer	Peter Wu	Configurations	GFSK, $\pi/4$ -DQPSK, 8DPSK
Test Date	Feb. 18, 2016		

For BR (GFSK) 1 Mbps:

Channel	Frequency	Conducted Peak Power (dBm)	Conducted Average Power (dBm)	Max. Limit (dBm)	Result
0	2402 MHz	6.22	5.43	21.00	Complies
39	2441 MHz	6.08	5.29	21.00	Complies
78	2480 MHz	5.31	4.52	21.00	Complies

For EDR ($\pi/4$ -DQPSK) 2 Mbps:

Channel	Frequency	Conducted Peak Power (dBm)	Conducted Average Power (dBm)	Max. Limit (dBm)	Result
0	2402 MHz	5.71	4.92	21.00	Complies
39	2441 MHz	5.78	4.99	21.00	Complies
78	2480 MHz	4.70	3.91	21.00	Complies

For EDR (8DPSK) 3 Mbps:

Channel	Frequency	Conducted Peak Power (dBm)	Conducted Average Power (dBm)	Max. Limit (dBm)	Result
0	2402 MHz	6.06	5.27	21.00	Complies
39	2441 MHz	5.87	5.08	21.00	Complies
78	2480 MHz	4.94	4.15	21.00	Complies

4.3. Hopping Channel Separation Measurement

4.3.1. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

4.3.2. Measuring Instruments and Setting

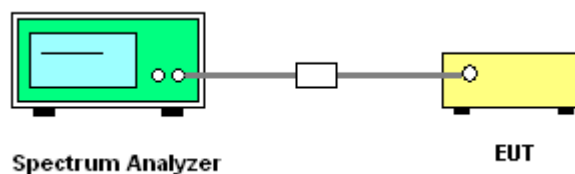
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VBW	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilized for 20 dB bandwidth measurement.
3. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were utilized for channel separation measurement.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Hopping Channel Separation

Temperature	25°C	Humidity	59%
Test Engineer	Peter Wu	Configurations	GFSK, $\pi/4$ -DQPSK, 8DPSK

For BR (GFSK) 1 Mbps:

Frequency	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Ch. Separation (MHz)	Two-Thirds of 20dB Bandwidth (MHz)	Result
2402 MHz	1.0058	0.9030	1.00	0.671	Complies
2441 MHz	0.9913	0.9030	1.00	0.661	Complies
2480 MHz	0.9884	0.8973	1.00	0.659	Complies

Ch. Separation Limits: >20dB bandwidth or > Two-Thirds of 20dB bandwidth

For EDR ($\pi/4$ -DQPSK) 2 Mbps:

Frequency	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Ch. Separation (MHz)	Two-Thirds of 20dB Bandwidth (MHz)	Result
2402 MHz	1.3449	1.2214	1.00	0.897	Complies
2441 MHz	1.3420	1.2214	1.00	0.895	Complies
2480 MHz	1.3391	1.2185	1.00	0.893	Complies

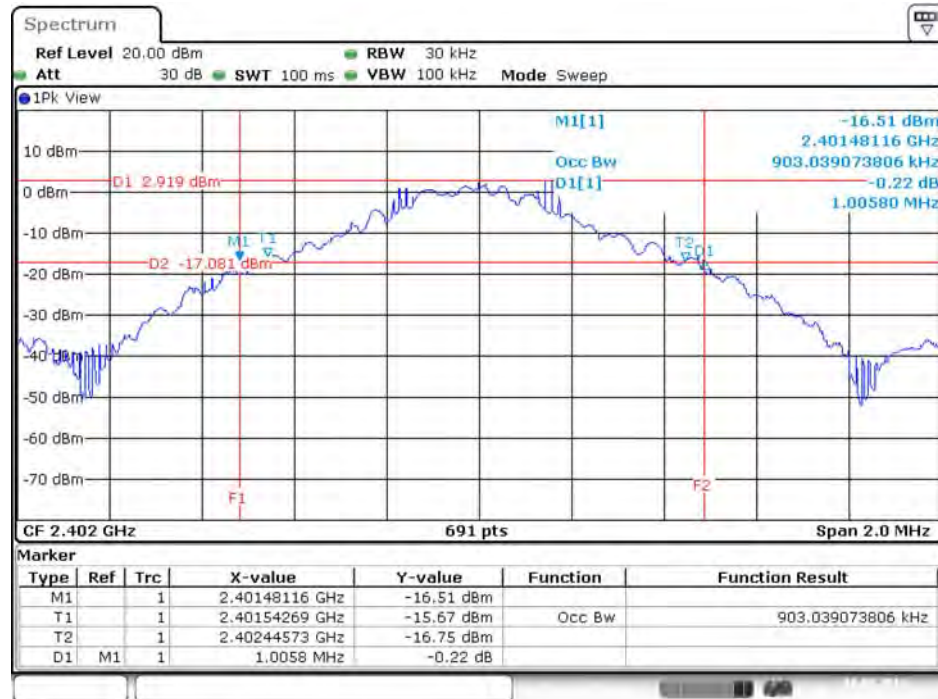
Ch. Separation Limits: >20dB bandwidth or > Two-Thirds of 20dB bandwidth

For EDR (8DPSK) 3 Mbps:

Frequency	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Ch. Separation (MHz)	Two-Thirds of 20dB Bandwidth (MHz)	Result
2402 MHz	1.3044	1.2185	1.00	0.870	Complies
2441 MHz	1.3246	1.2214	1.00	0.883	Complies
2480 MHz	1.3217	1.2127	1.00	0.881	Complies

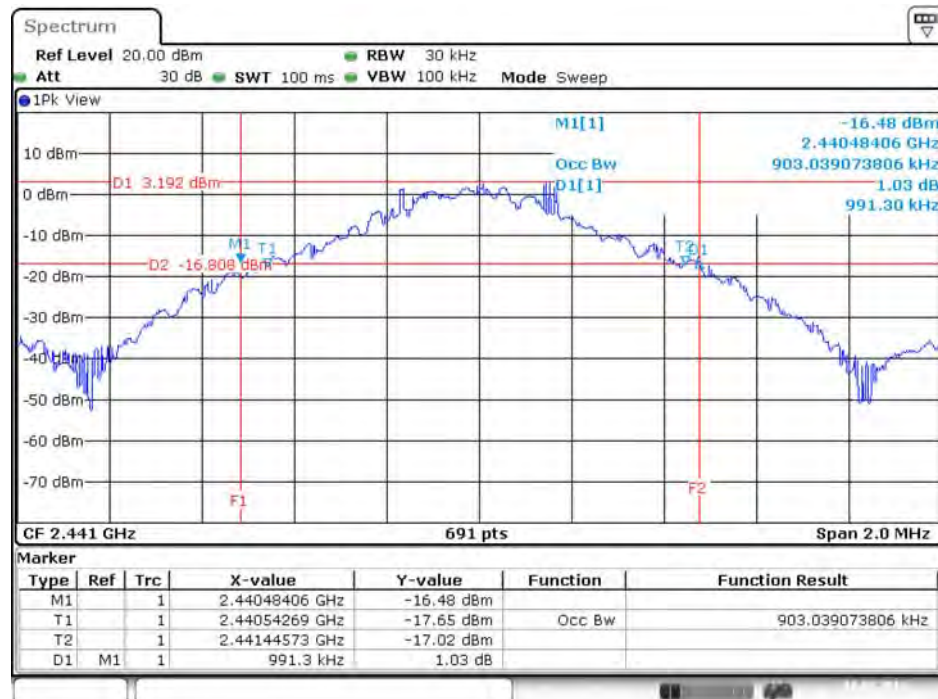
Ch. Separation Limits: >20dB bandwidth or > Two-Thirds of 20dB bandwidth

20 dB Bandwidth Plot on BR (GFSK) 1 Mbps / Channel 0 / 2402 MHz



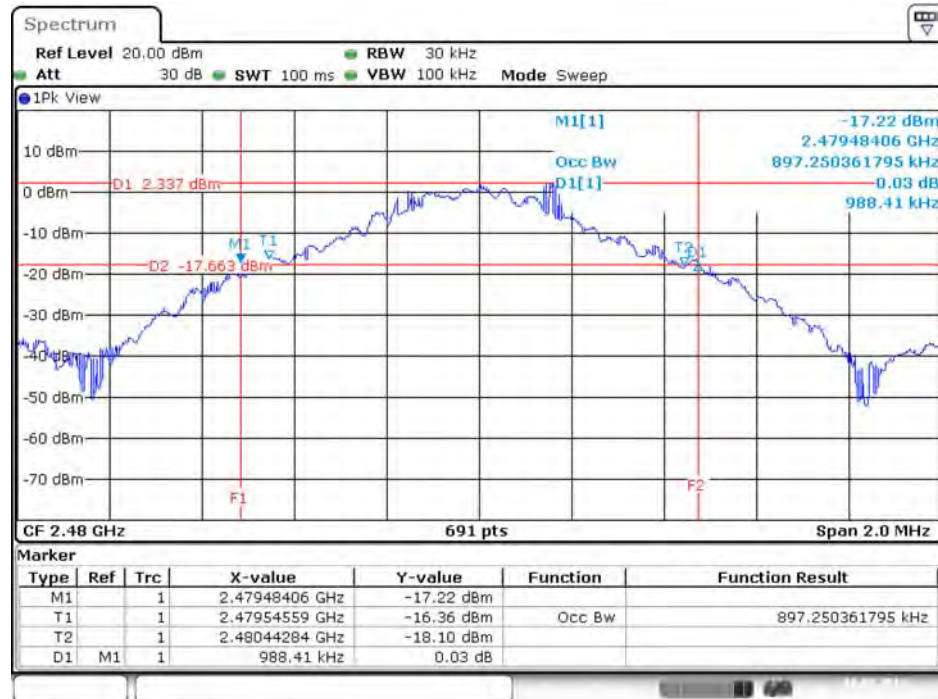
Date: 18.FEB.2016 14:12:49

20 dB Bandwidth Plot on BR (GFSK) 1 Mbps / Channel 39 / 2441 MHz



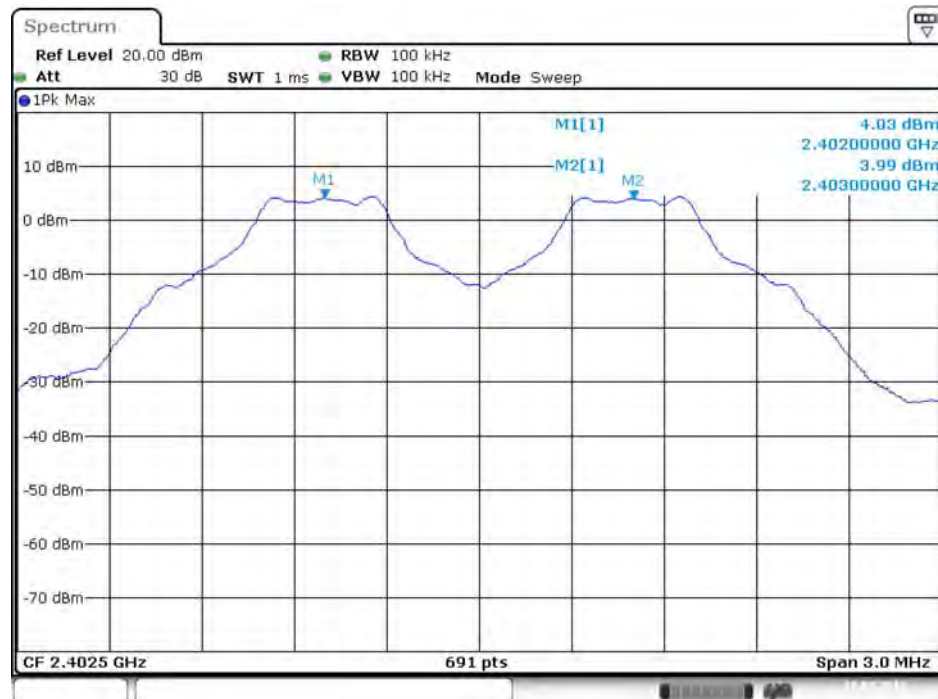
Date: 18.FEB.2016 14:09:15

20 dB Bandwidth Plot on BR (GFSK) 1 Mbps / Channel 78 / 2480 MHz



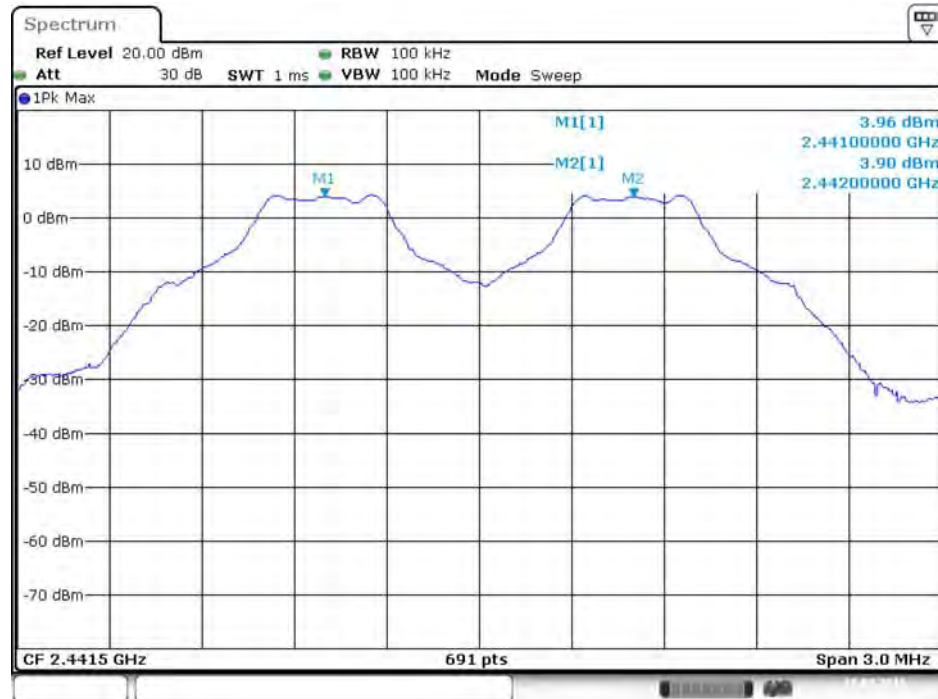
Date: 18.FEB.2016 14:08:14

Channel Separation Plot on BR (GFSK) 1 Mbps / Channel 0~1 / 2402 MHz ~ 2403 MHz



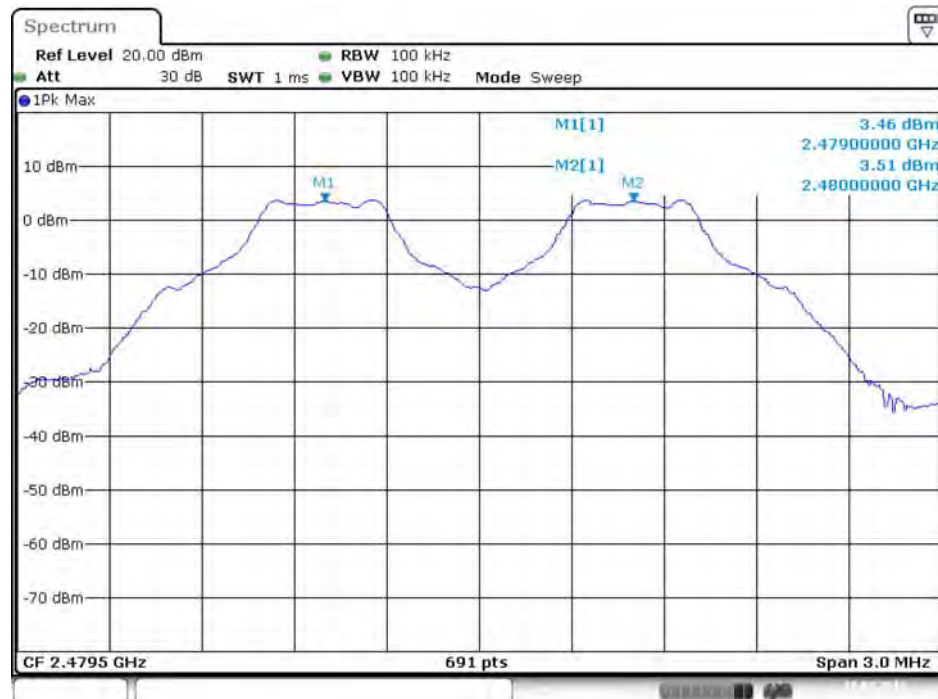
Date: 18.FEB.2016 14:38:01

Channel Separation Plot on BR (GFSK) 1 Mbps / Channel 39~40 / 2441 MHz ~ 2442 MHz



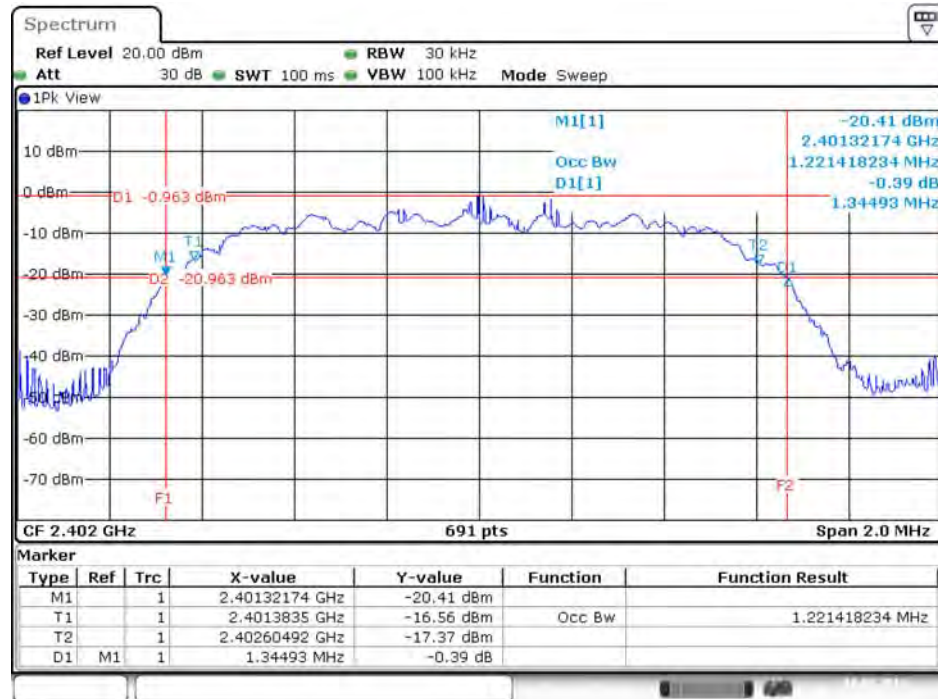
Date: 18.FEB.2016 14:48:02

Channel Separation Plot on BR (GFSK) 1 Mbps / Channel 77~78 / 2479 MHz ~ 2480 MHz



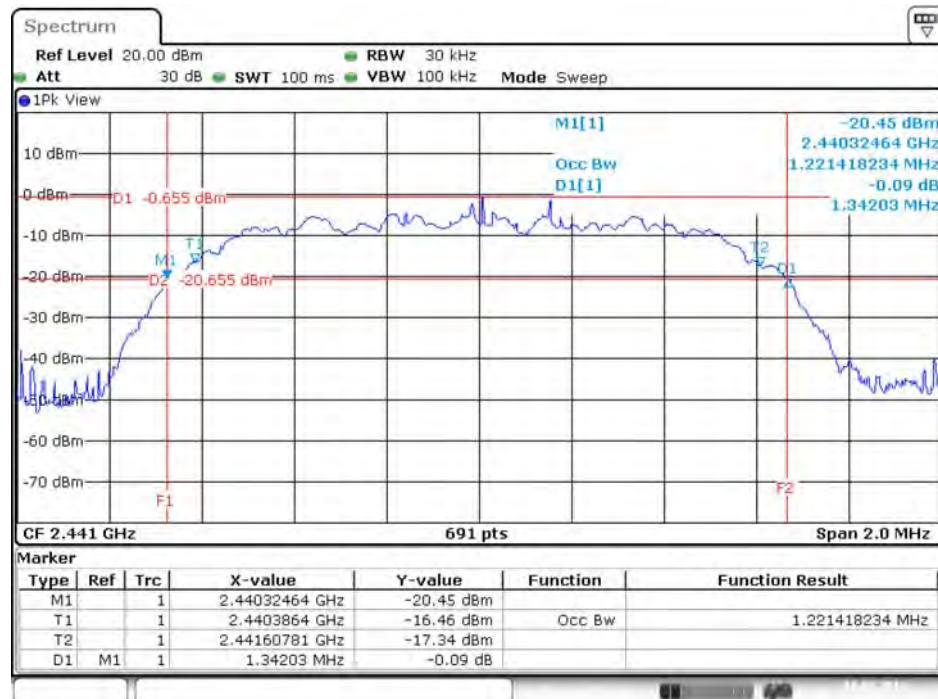
Date: 18.FEB.2016 14:50:13

20 dB Bandwidth Plot on EDR ($\pi/4$ -DQPSK) 2 Mbps / Channel 0 / 2402 MHz



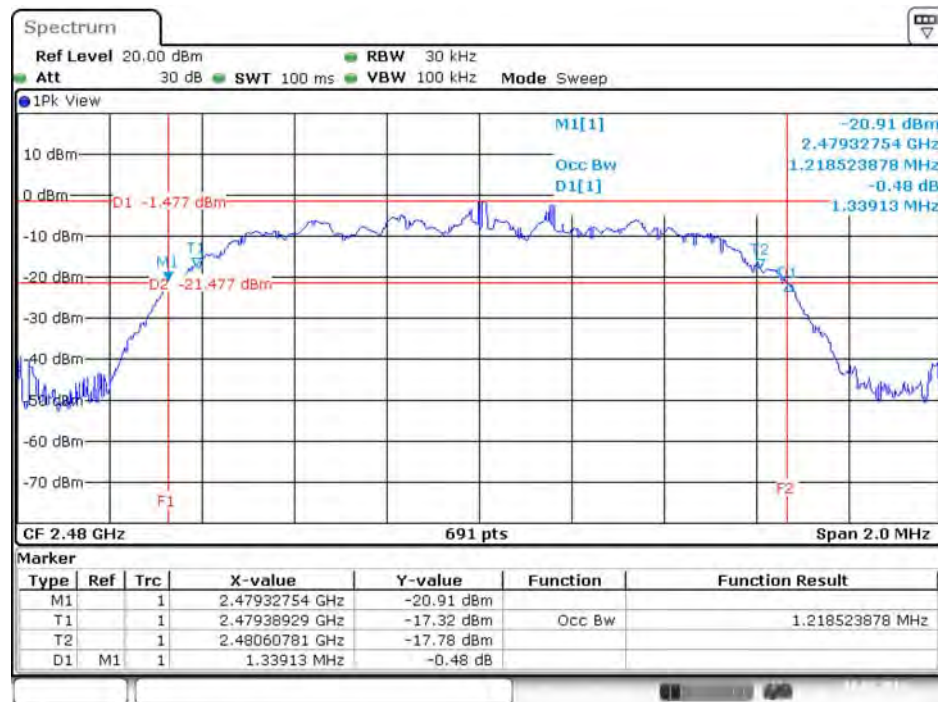
Date: 18.FEB.2016 14:12:08

20 dB Bandwidth Plot on EDR ($\pi/4$ -DQPSK) 2 Mbps / Channel 39 / 2441 MHz



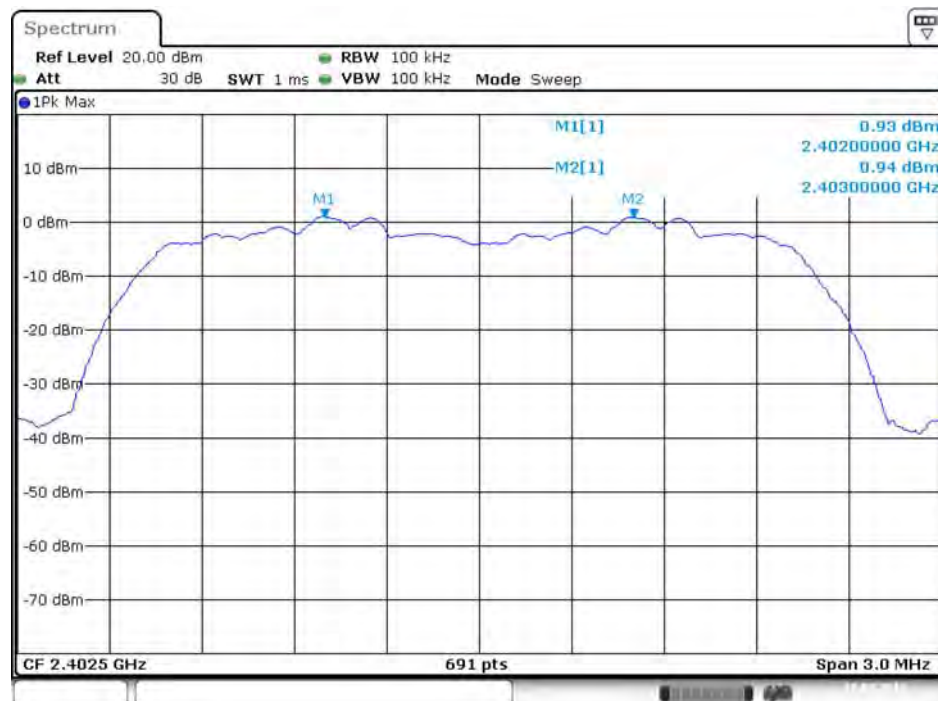
Date: 18.FEB.2016 14:10:11

20 dB Bandwidth Plot on EDR ($\pi/4$ -DQPSK) 2 Mbps / Channel 78 / 2480 MHz



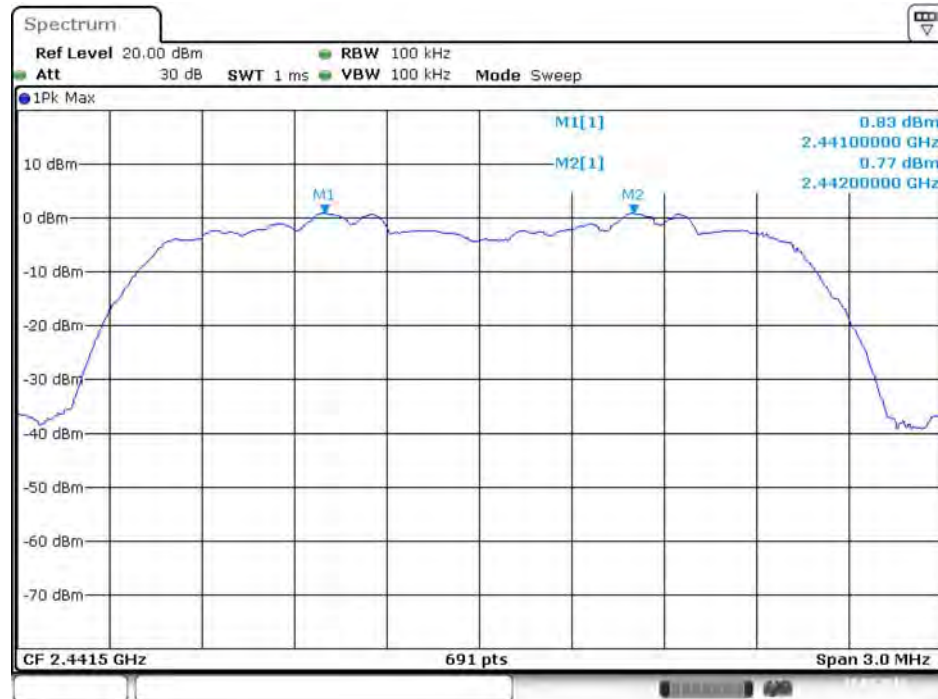
Date: 18.FEB.2016 14:07:26

Channel Separation Plot on EDR ($\pi/4$ -DQPSK) 2 Mbps / Channel 0~1 / 2402 MHz ~ 2403 MHz



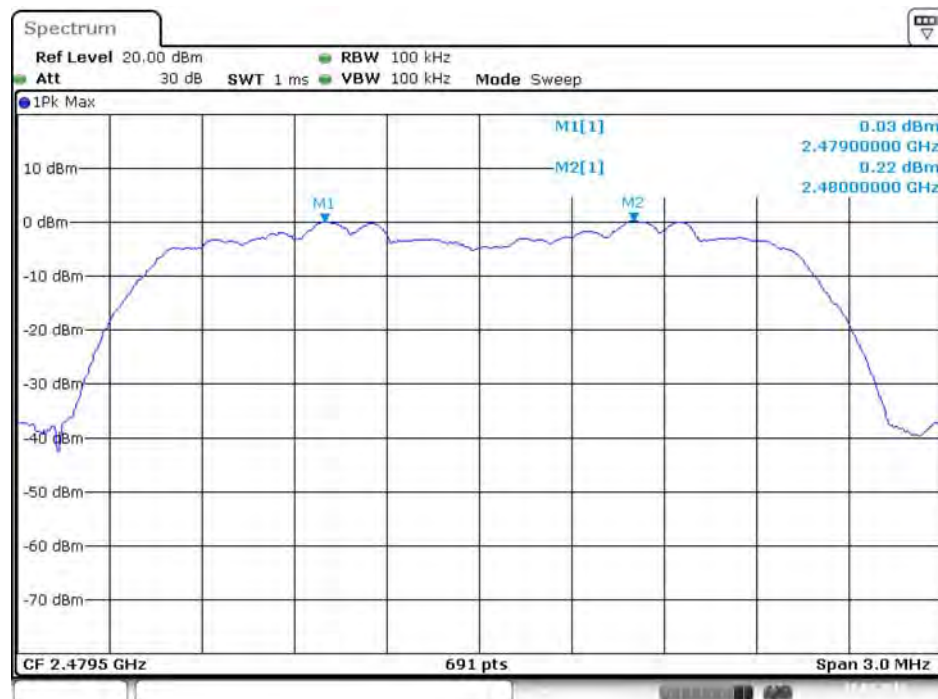
Date: 18.FEB.2016 14:42:18

Channel Separation Plot on EDR ($\pi/4$ -DQPSK) 2 Mbps / Channel 39~40 / 2441 MHz ~ 2442 MHz



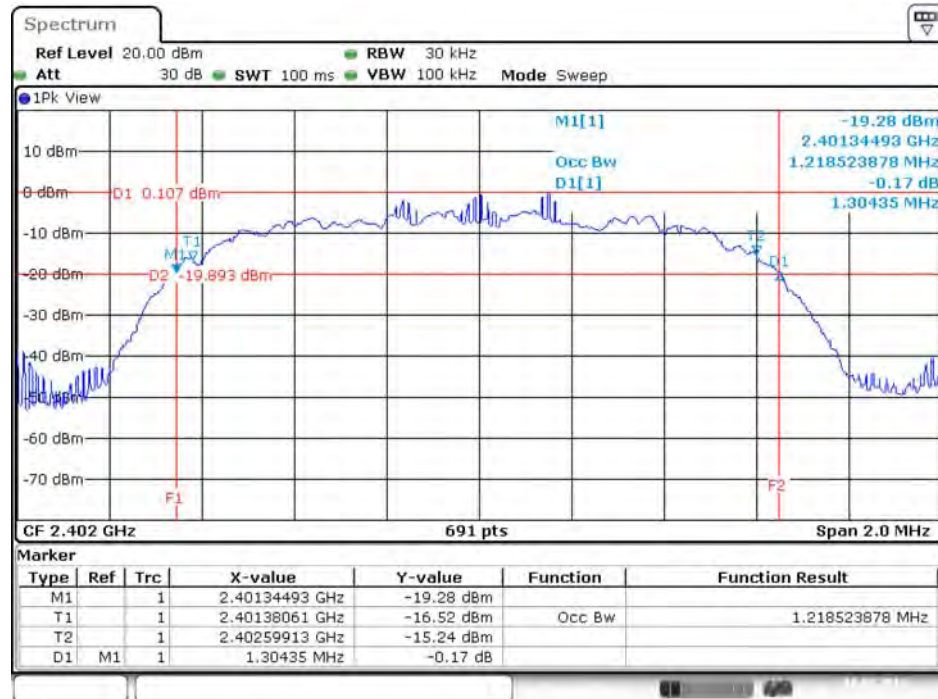
Date: 18.FEB.2016 14:47:06

Channel Separation Plot on EDR ($\pi/4$ -DQPSK) 2 Mbps / Channel 77~78 / 2479 MHz ~ 2480 MHz



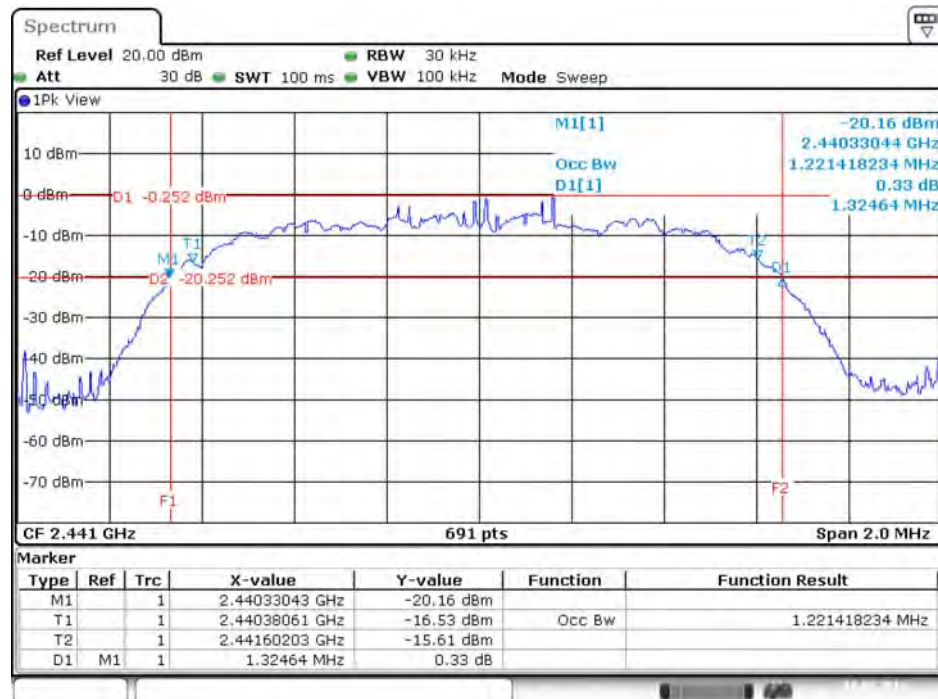
Date: 18.FEB.2016 14:51:25

20 dB Bandwidth Plot on EDR (8DPSK) 3 Mbps / Channel 0 / 2402 MHz



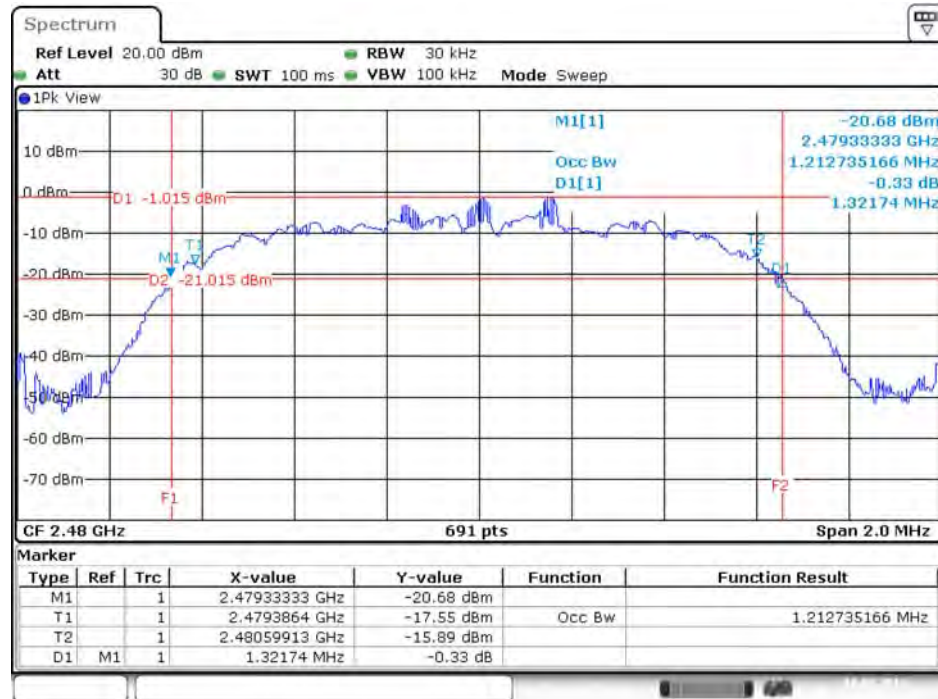
Date: 18.FEB.2016 14:11:31

20 dB Bandwidth Plot on EDR (8DPSK) 3 Mbps / Channel 39 / 2441 MHz



Date: 18.FEB.2016 14:10:44

20 dB Bandwidth Plot on EDR (8DPSK) 3 Mbps / Channel 78 / 2480 MHz



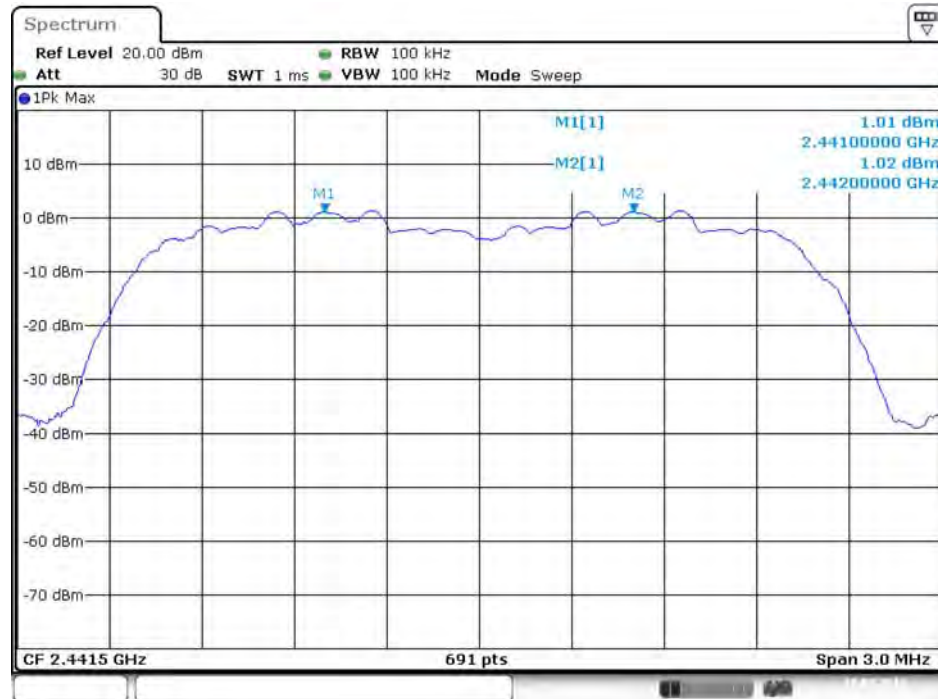
Date: 18.FEB.2016 14:05:38

Channel Separation Plot on EDR (8DPSK) 3 Mbps / Channel 0~1 / 2402 MHz ~ 2403 MHz



Date: 18.FEB.2016 14:43:16

Channel Separation Plot on EDR (8DPSK) 3 Mbps / Channel 39~40 / 2441 MHz ~ 2442 MHz



Date: 18.FEB.2016 14:45:50

Channel Separation Plot on EDR (8DPSK) 3 Mbps / Channel 77~78 / 2479 MHz ~ 2480 MHz



Date: 18.FEB.2016 14:52:49

4.4. Number of Hopping Frequency Measurement

4.4.1. Limit

At least 15 hopping frequencies, and should be equally spaced.

4.4.2. Measuring Instruments and Setting

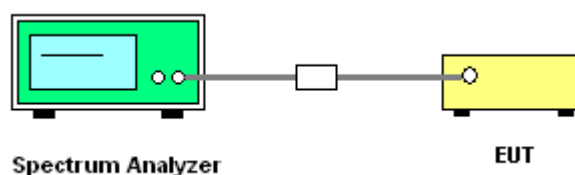
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RBW	1000 kHz
VBW	1000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 1000 kHz and the video bandwidth of 1000 kHz were utilized.
3. Observe frequency hopping in 2400MHz~2483.5MHz, there are at least 75 non-overlapping channels.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

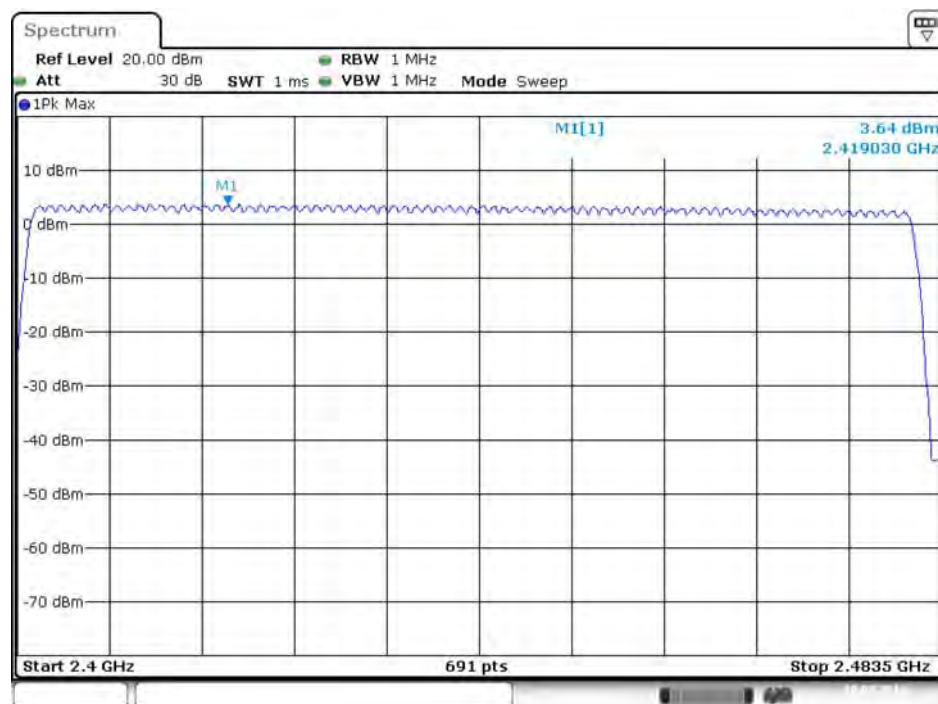
The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Number of Hopping Frequency

Temperature	25°C	Humidity	59%
Test Engineer	Peter Wu	Configurations	EDR (8DPSK)

Modulation Type	Channel No.	Frequency (MHz)	Hopping Ch. (Channels)	Min. Limit (Channels)	Test Result
EDR (8DPSK)	0 ~ 78	2402 ~ 2480MHz	79	15	Complies

Number of Hopping Channel Plot on EDR (8DPSK) / Channel 0~78 / 2402 MHz ~ 2480 MHz



Date: 18.FEB.2016 14:30:22

4.5. Dwell Time Measurement

4.5.1. Limit

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

4.5.2. Measuring Instruments and Setting

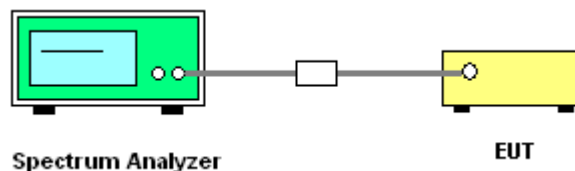
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	0 MHz
RBW	1000 kHz
VBW	1000 kHz
Detector	Peak
Trace	Single Trigger

4.5.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer
2. Set RBW of spectrum analyzer to 1000kHz and VBW to 1000kHz.
3. Use a video trigger with the trigger level set to enable triggering only on full pulses.
4. Sweep Time is more than once pulse time.
5. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
6. Measure the maximum time duration of one single pulse.
7. Set the EUT for DH1, DH3, DH5 packet transmitting.
8. Measure the maximum time duration of one single pulse.

4.5.4. Test Setup Layout



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Dwell Time

Temperature	25°C	Humidity	59%
Test Engineer	Peter Wu	Configurations	BR (GFSK) / DH1, DH3, DH5

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH1	2402 MHz	0.3826	0.1224	0.4000	Complies
DH3	2402 MHz	1.6348	0.2616	0.4000	Complies
DH5	2402 MHz	2.8812	0.3073	0.4000	Complies
DH1	2441 MHz	0.3841	0.1229	0.4000	Complies
DH3	2441 MHz	1.6377	0.2620	0.4000	Complies
DH5	2441 MHz	2.8812	0.3073	0.4000	Complies
DH1	2480 MHz	0.3884	0.1243	0.4000	Complies
DH3	2480 MHz	1.6406	0.2625	0.4000	Complies
DH5	2480 MHz	2.8725	0.3064	0.4000	Complies

Note: Pulse Duration * Number of Pulses*(Dwell time / measure time)

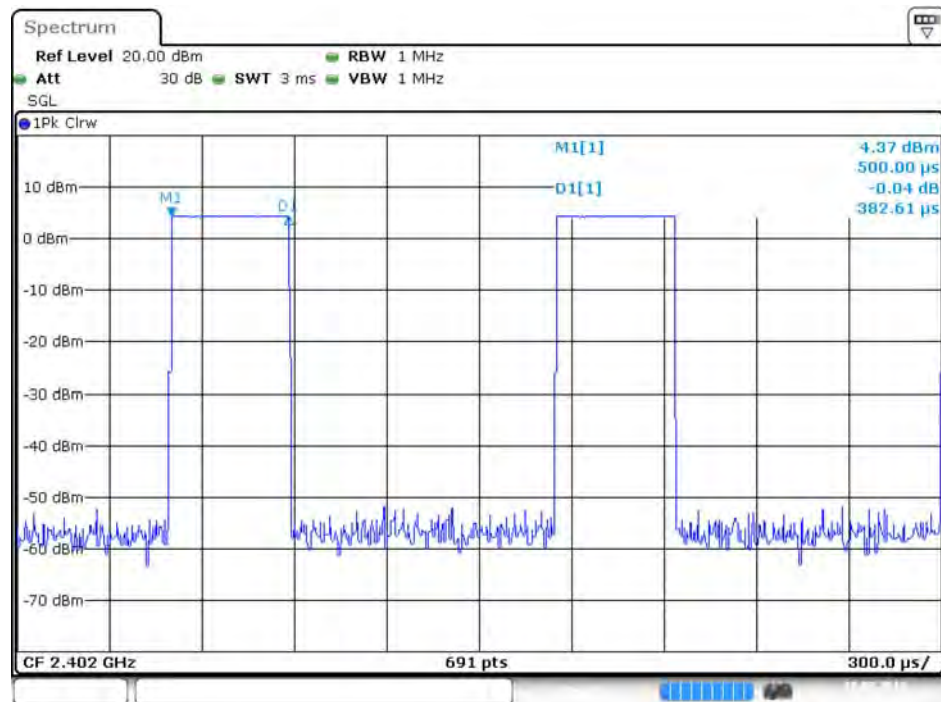
Remark:

Dwell Time= 79(channels) x 0.4(s) x average hopping channel x package transfer time (us)

79 channels come from the Hopping Channel number.

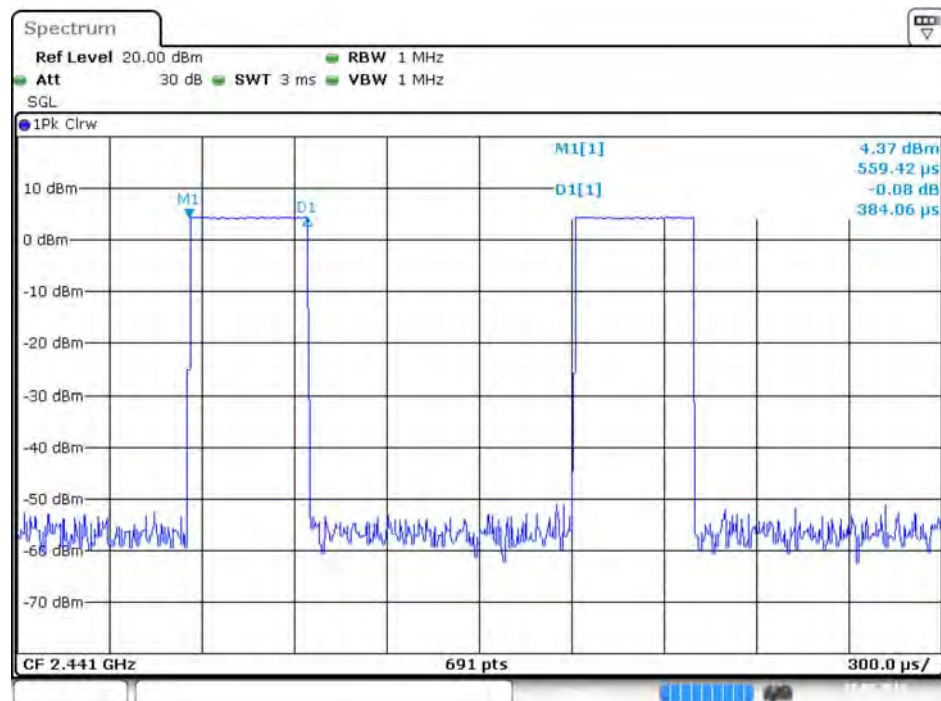
Average Hopping Channel = hops / sweep time

Dwell Time Plot on BR (GFSK) / Channel 0 / DH1 / 2402 MHz



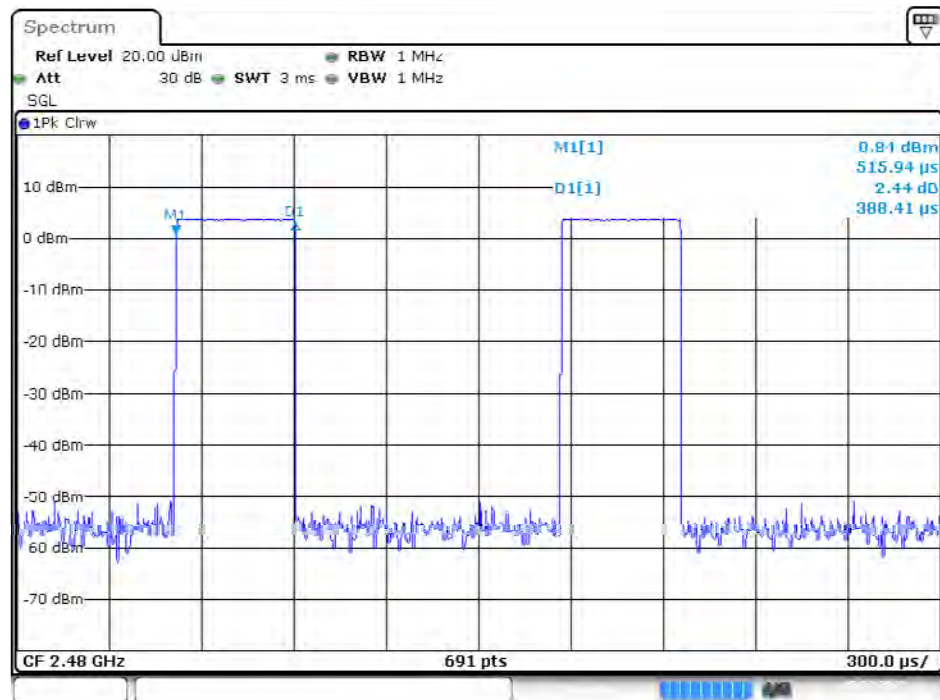
Date: 18.FEB.2016 15:00:29

Dwell Time Plot on BR (GFSK) / Channel 39 / DH1 / 2441 MHz



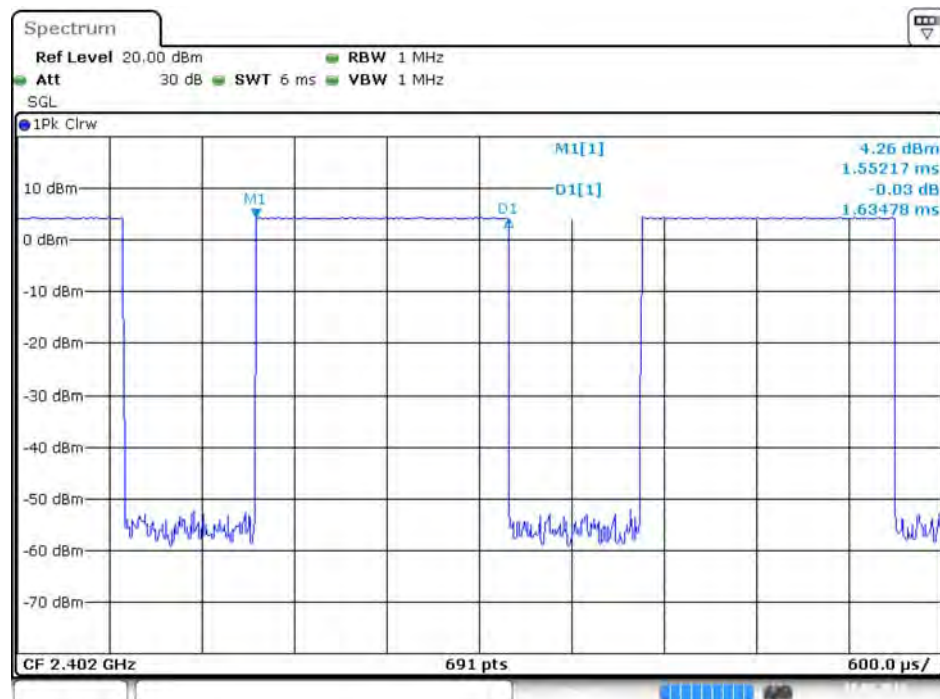
Date: 18.FEB.2016 15:09:23

Dwell Time Plot on BR (GFSK) / Channel 78 / DH1 / 2480 MHz



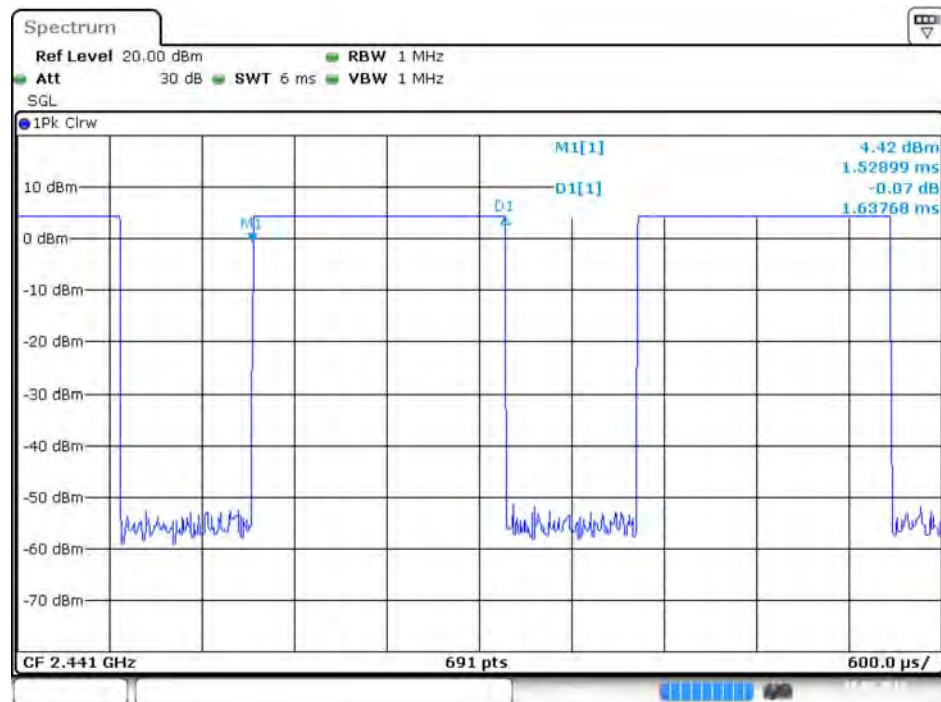
Date: 18.FEB.2016 15:10:43

Dwell Time Plot on BR (GFSK) / Channel 0 / DH3 / 2402 MHz



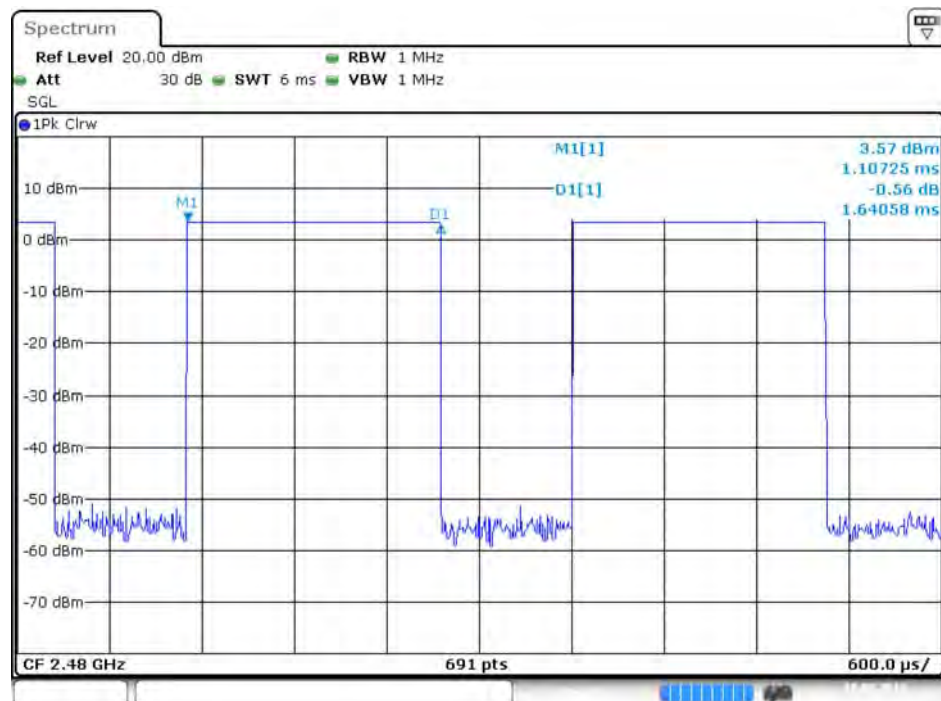
Date: 18.FEB.2016 15:02:27

Dwell Time Plot on BR (GFSK) / Channel 39 / DH3 / 2441 MHz



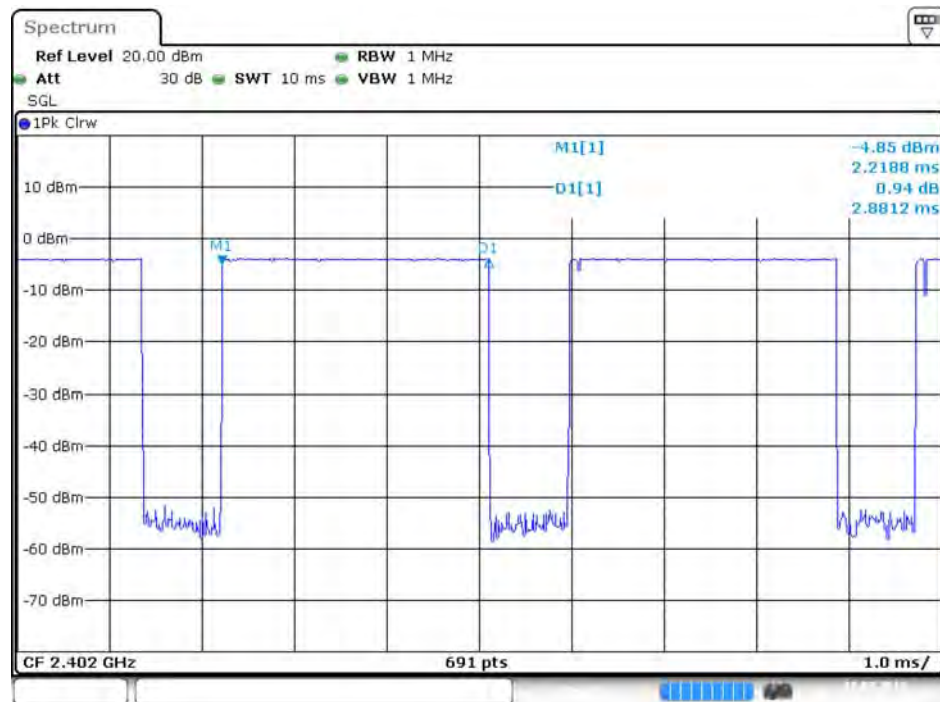
Date: 18.FEB.2016 15:07:50

Dwell Time Plot on BR (GFSK) / Channel 78 / DH3 / 2480 MHz



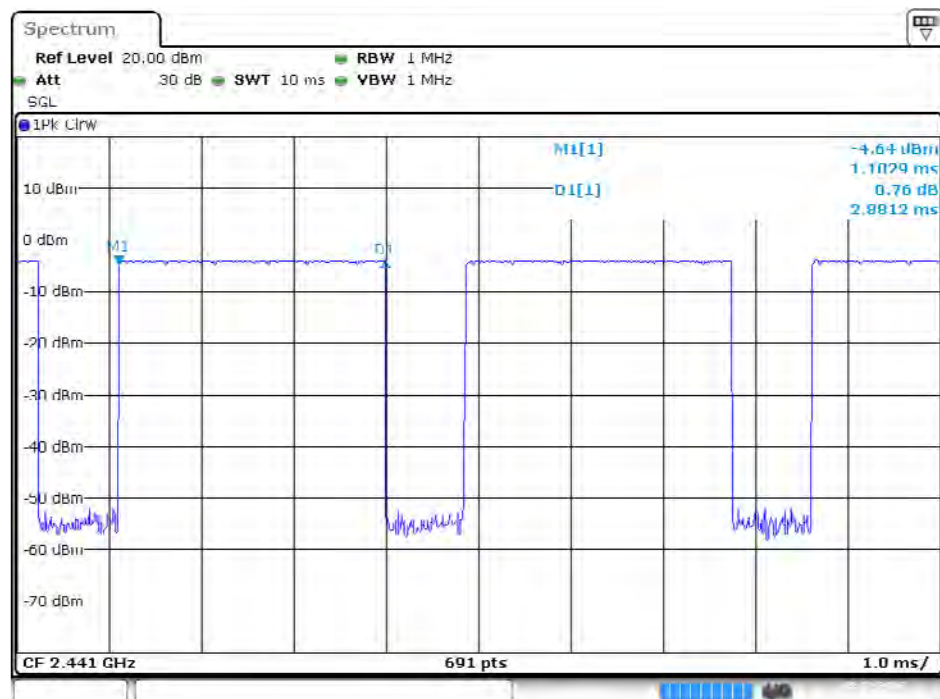
Date: 18.FEB.2016 15:12:24

Dwell Time Plot on BR (GFSK) / Channel 0 / DH5 / 2402 MHz



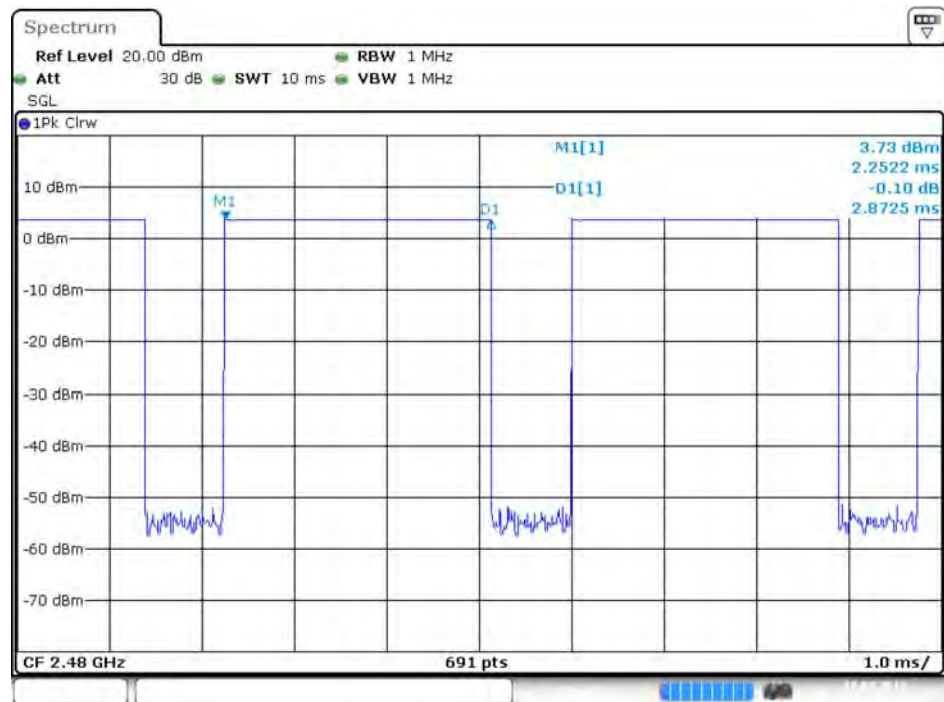
Date: 18.FEB.2016 15:05:14

Dwell Time Plot on BR (GFSK) / Channel 39 / DH5 / 2441 MHz



Date: 18.FEB.2016 15:06:21

Dwell Time Plot on BR (GFSK) / Channel 78 / DH5 / 2480 MHz



Date: 18.FEB.2016 15:14:02

4.6. Radiated Emissions Measurement

4.6.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 2.7, then the 2.8 limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

4.6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	100kHz, 300kHz for peak

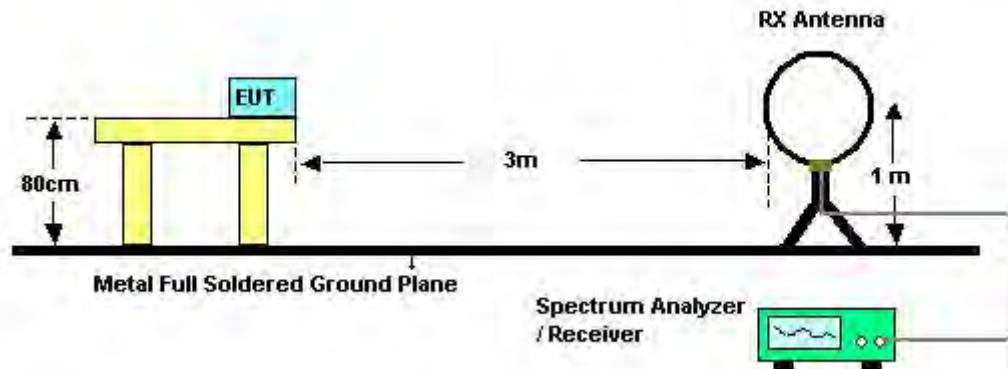
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz, RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz, RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz, RBW 120kHz for QP

4.6.3. Test Procedures

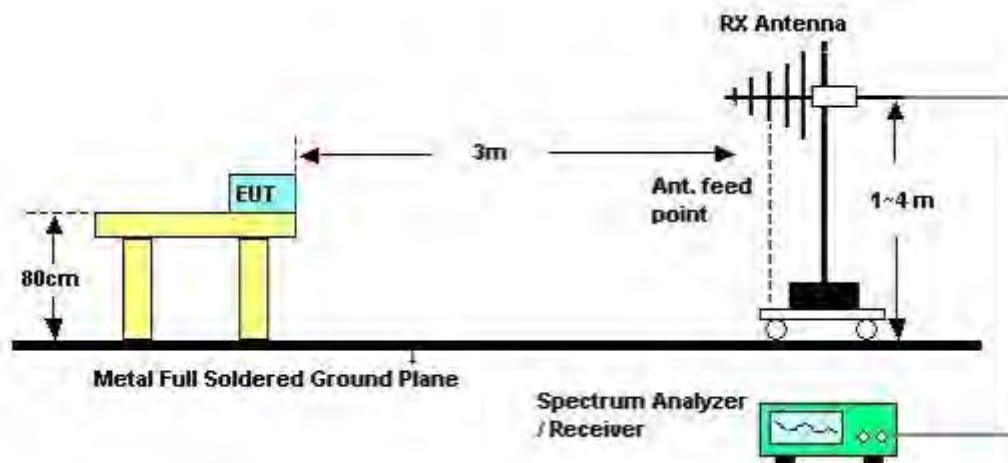
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 1/T VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.6.4. Test Setup Layout

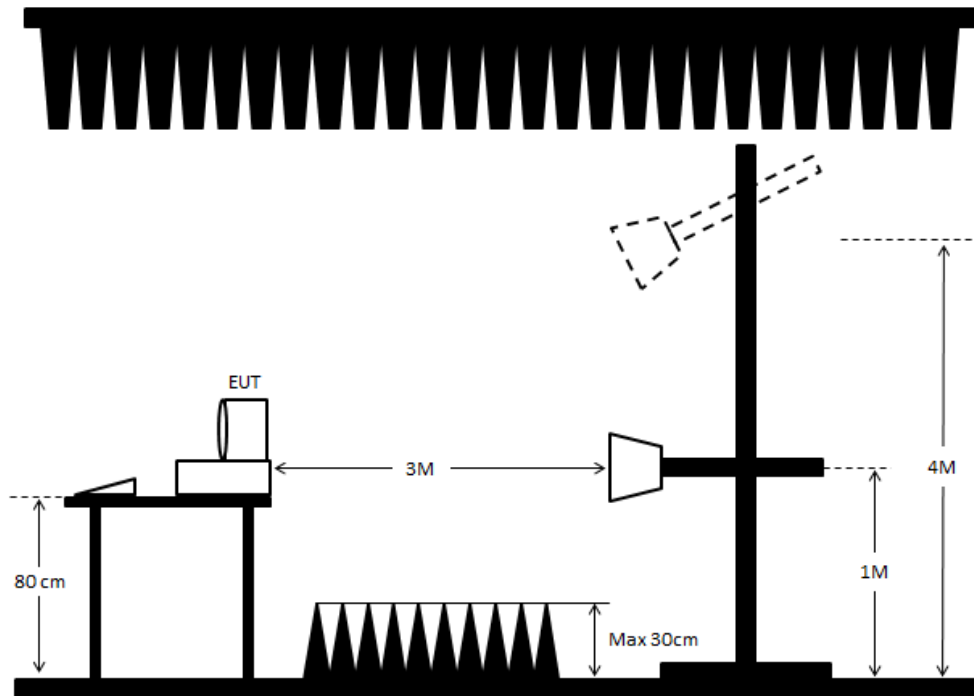
For Radiated Emissions: 9kHz ~30MHz



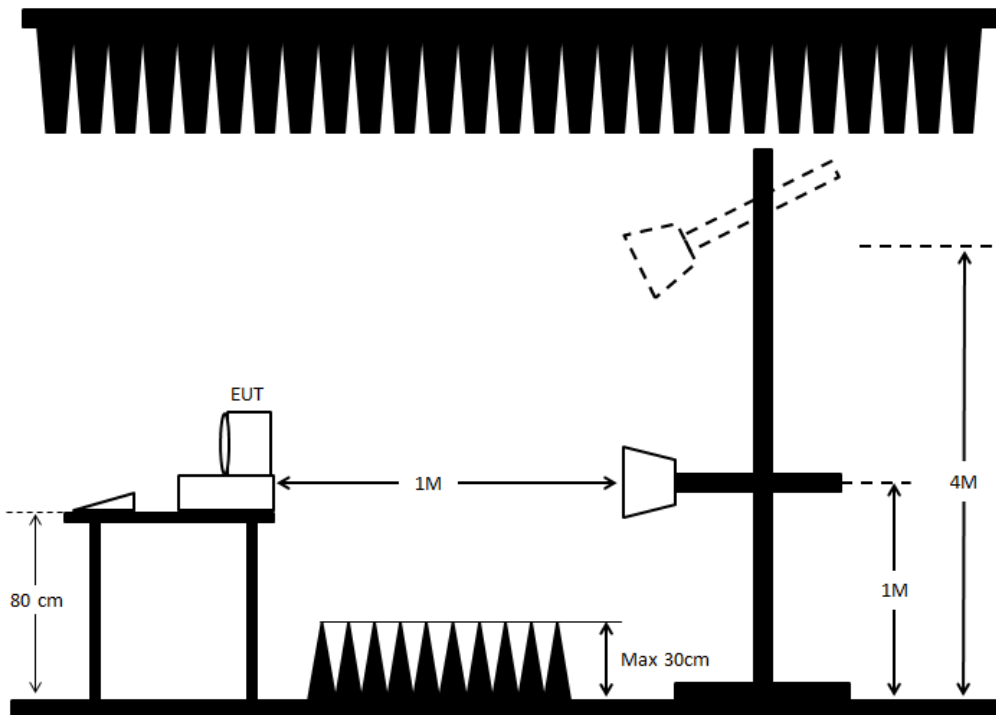
For Radiated Emissions: 30MHz~1GHz



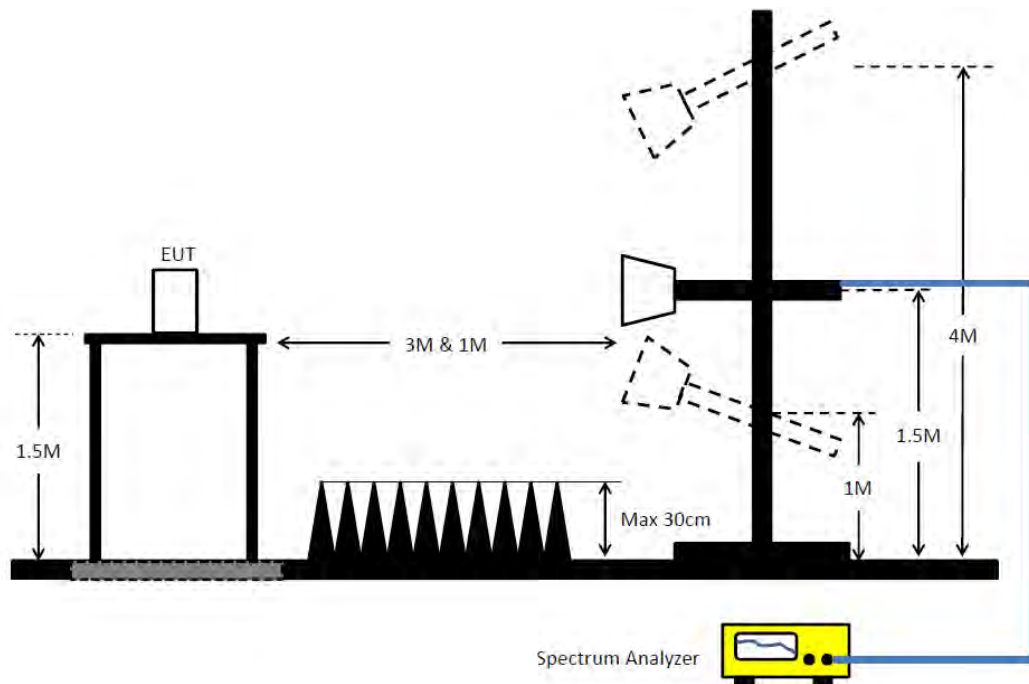
For Radiated Emissions: Unintentional 1GHz~5th Harmonic
 1,000~18,000 MHz



18,000~30,000 MHz



For Radiated Emissions: Intentional 1GHz~10th Harmonic



4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	22°C	Humidity	54%
Test Engineer	Mars Lin	Test Date	Jul. 08, 2017
Configurations	Intentional – CTX	Test Mode	Mode 1

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Test Date	Feb. 05, 2016
Configurations	Unintentional – Normal Link	Test Mode	Mode 1~Mode 4

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

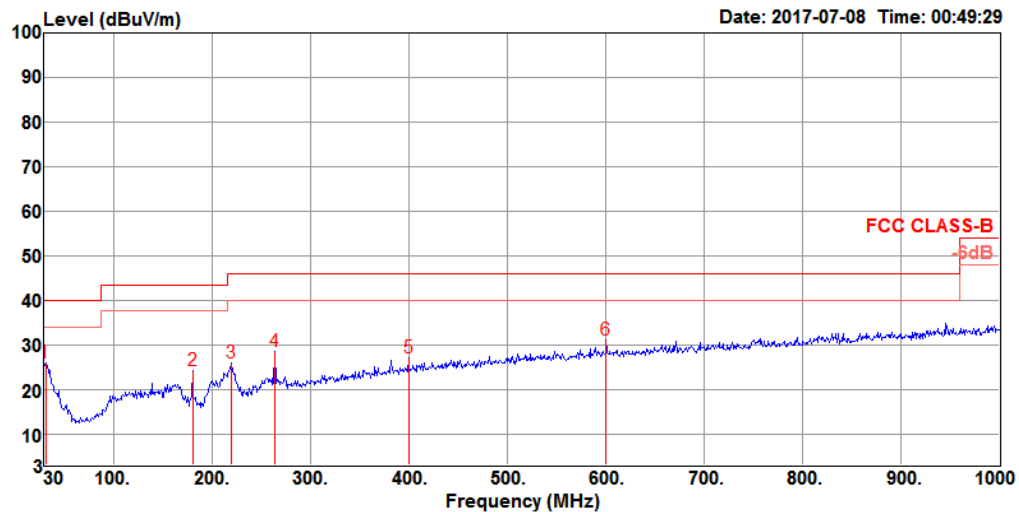
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.6.8. Results of Radiated Emissions (30MHz~1GHz)

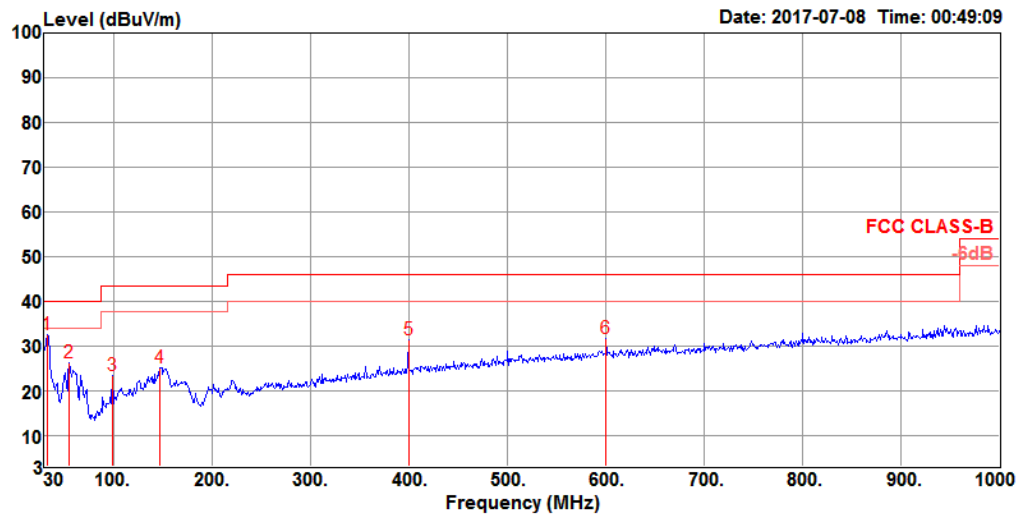
Temperature	22°C	Humidity	54%
Test Engineer	Mars Lin	Configurations	Intentional – CTX
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.97	25.77	40.00	-14.23	32.22	0.89	25.19	32.53	100	299	Peak	HORIZONTAL
2	180.35	24.14	43.50	-19.36	38.74	2.31	15.59	32.50	200	0	Peak	HORIZONTAL
3	219.15	25.77	46.00	-20.23	39.28	2.56	16.41	32.48	150	258	Peak	HORIZONTAL
4	263.77	28.43	46.00	-17.57	38.54	2.82	19.53	32.46	125	200	Peak	HORIZONTAL
5	399.57	26.95	46.00	-19.05	33.63	3.50	22.27	32.45	125	268	Peak	HORIZONTAL
6	600.36	30.95	46.00	-15.05	34.27	4.35	24.90	32.57	200	251	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	32.91	32.43	40.00	-7.57	40.01	0.92	24.03	32.53	100	58 Peak	VERTICAL
2	55.22	26.14	40.00	-13.86	43.86	1.23	13.56	32.51	125	162 Peak	VERTICAL
3	98.87	23.37	43.50	-20.13	37.45	1.67	16.81	32.56	150	111 Peak	VERTICAL
4	147.37	25.13	43.50	-18.37	38.27	2.08	17.30	32.52	125	333 Peak	VERTICAL
5	399.57	31.42	46.00	-14.58	38.10	3.50	22.27	32.45	100	259 Peak	VERTICAL
6	600.36	31.53	46.00	-14.47	34.85	4.35	24.90	32.57	125	289 Peak	VERTICAL

Note:

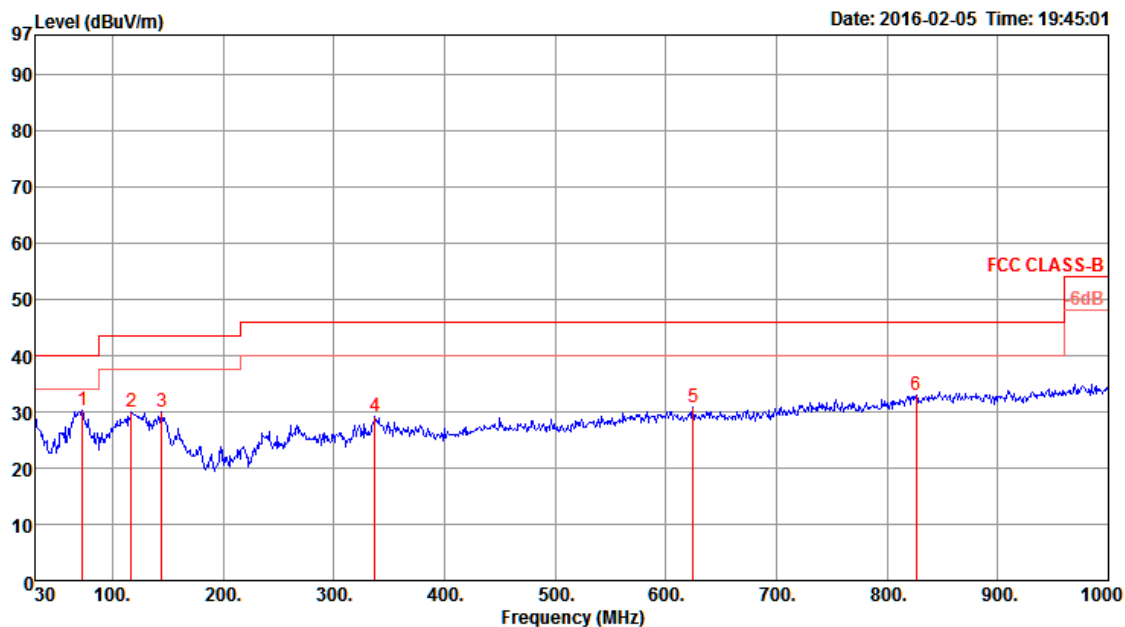
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

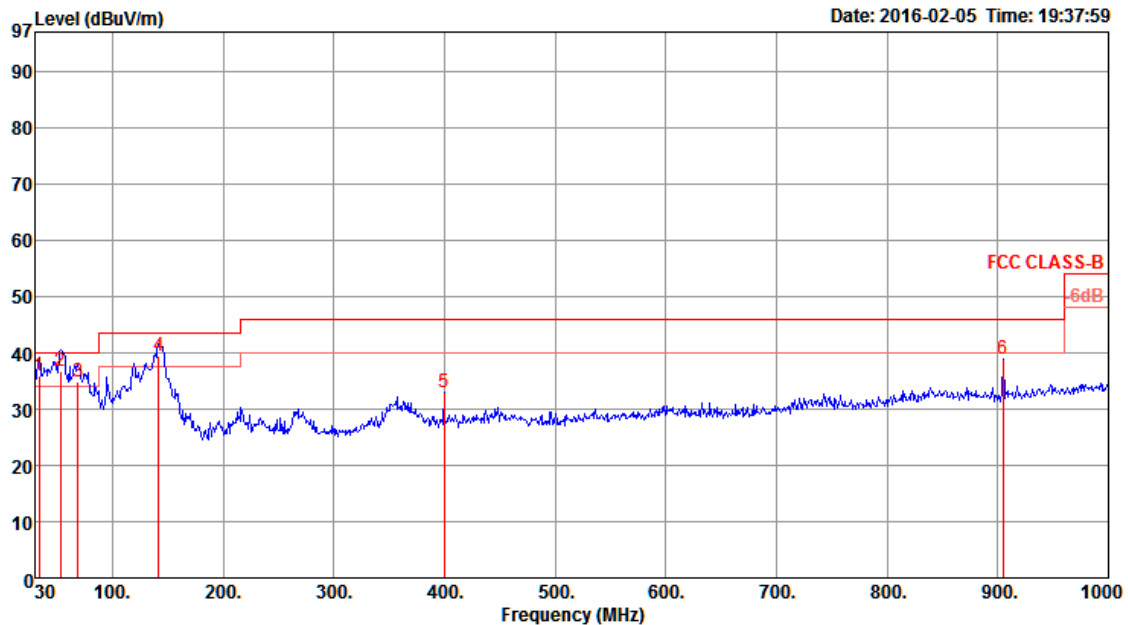
Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	Unintentional – Normal Link
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	72.68	30.19	40.00	-9.81	46.59	0.52	12.44	29.36	137	100	Peak	HORIZONTAL
2	117.30	30.07	43.50	-13.43	40.23	0.79	18.22	29.17	188	125	Peak	HORIZONTAL
3	144.46	29.94	43.50	-13.56	40.83	0.90	17.24	29.03	237	100	Peak	HORIZONTAL
4	337.49	29.15	46.00	-16.85	35.50	1.62	20.65	28.62	258	100	Peak	HORIZONTAL
5	624.61	30.81	46.00	-15.19	32.36	2.35	25.21	29.11	151	150	Peak	HORIZONTAL
6	826.37	32.95	46.00	-13.05	31.54	2.85	26.98	28.42	234	100	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm	
1	33.88	36.06	40.00	-3.94	42.22	0.22	23.11	29.49	212	100 QP	VERTICAL
2	53.28	36.82	40.00	-3.18	52.11	0.41	13.74	29.44	178	100 QP	VERTICAL
3	68.80	34.94	40.00	-5.06	51.62	0.48	12.21	29.37	155	104 QP	VERTICAL
4	141.55	39.43	43.50	-4.07	50.11	0.89	17.48	29.05	122	182 QP	VERTICAL
5	399.57	32.86	46.00	-13.14	37.76	1.79	22.36	29.05	132	125 Peak	VERTICAL
6	904.94	38.80	46.00	-7.20	36.22	2.96	27.54	27.92	119	100 Peak	VERTICAL

Note:

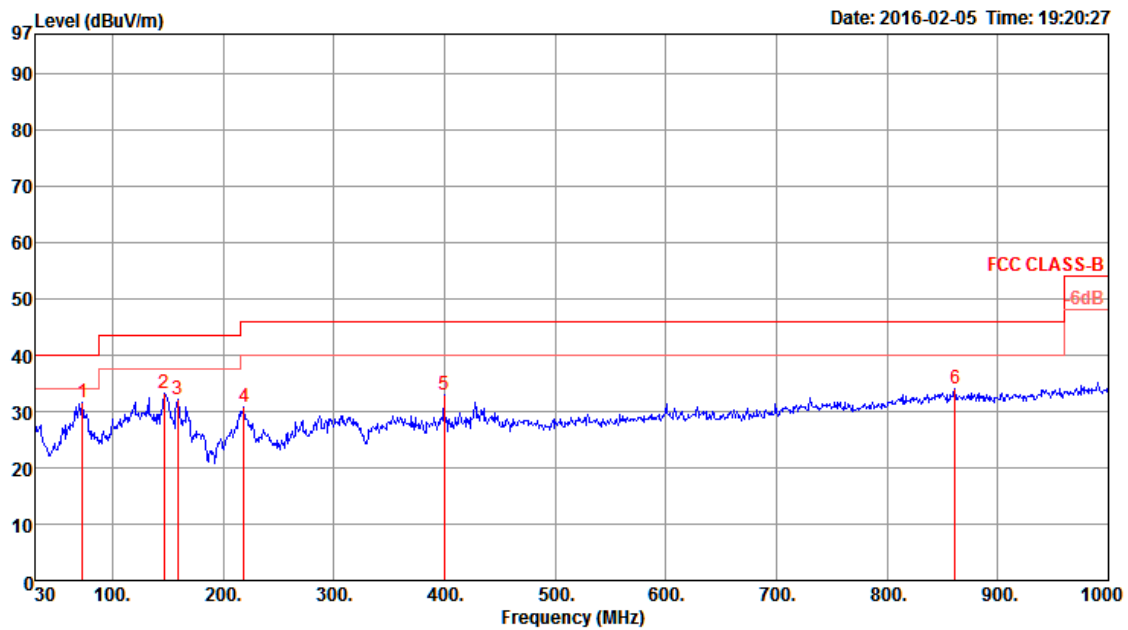
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

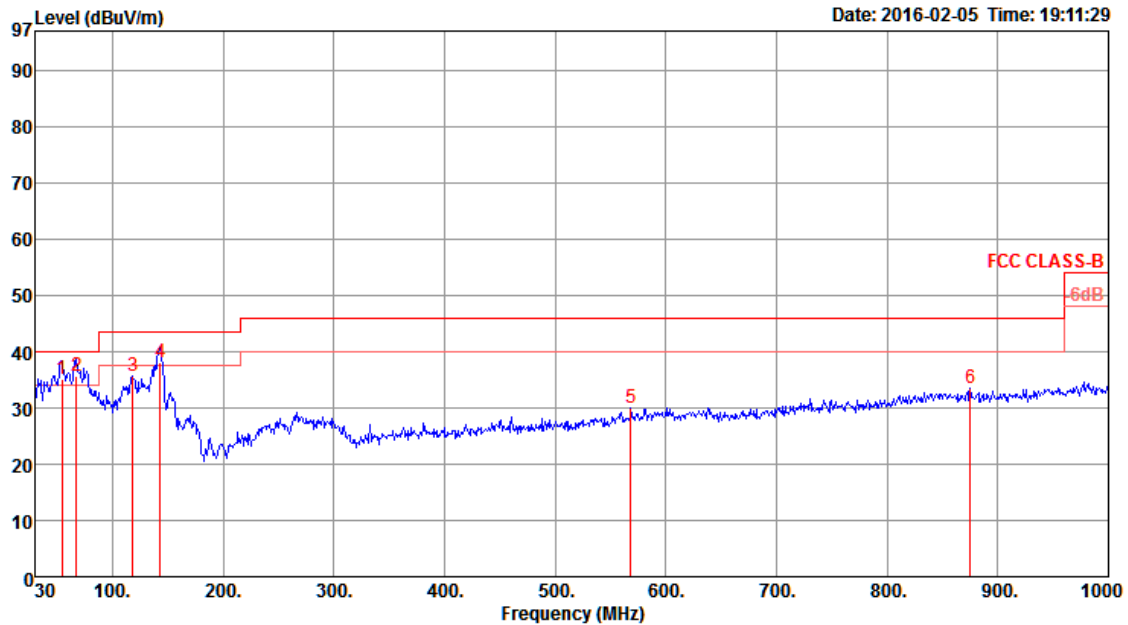
Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	Unintentional – Normal Link
Test Mode	Mode 2		

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	deg	cm		
1	72.68	31.61	40.00	-8.39	48.01	0.52	12.44	29.36	251	100	Peak	HORIZONTAL
2	146.40	33.30	43.50	-10.20	44.34	0.91	17.08	29.03	137	120	Peak	HORIZONTAL
3	159.01	32.07	43.50	-11.43	43.68	0.95	16.42	28.98	189	150	Peak	HORIZONTAL
4	219.15	30.75	46.00	-15.25	42.05	1.21	16.21	28.72	178	100	Peak	HORIZONTAL
5	399.57	32.85	46.00	-13.15	37.75	1.79	22.36	29.05	231	100	Peak	HORIZONTAL
6	861.29	34.06	46.00	-11.94	32.12	2.90	27.26	28.22	331	200	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	54.25	35.23	40.00	-4.77	50.73	0.41	13.53	29.44	136	100	QP	VERTICAL
2	67.83	35.78	40.00	-4.22	52.46	0.48	12.22	29.38	102	125	QP	VERTICAL
3	118.27	35.71	43.50	-7.79	45.83	0.79	18.25	29.16	156	100	Peak	VERTICAL
4	143.49	38.19	43.50	-5.31	49.01	0.90	17.32	29.04	77	100	QP	VERTICAL
5	568.35	30.04	46.00	-15.96	32.32	2.21	24.75	29.24	247	100	Peak	VERTICAL
6	874.87	33.47	46.00	-12.53	31.31	2.93	27.35	28.12	308	125	Peak	VERTICAL

Note:

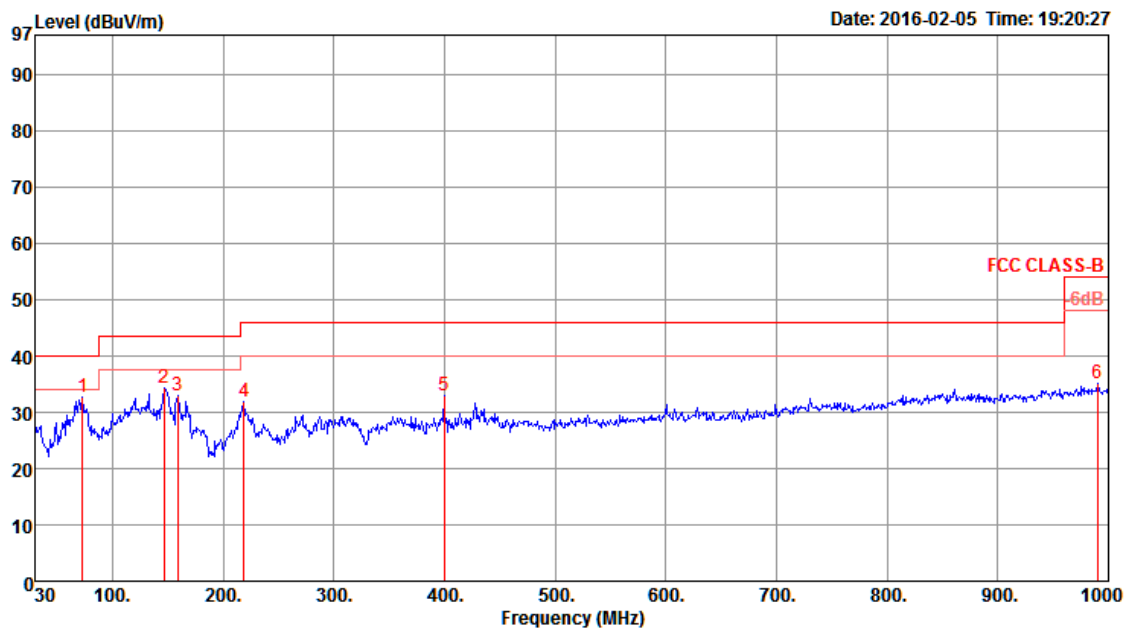
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

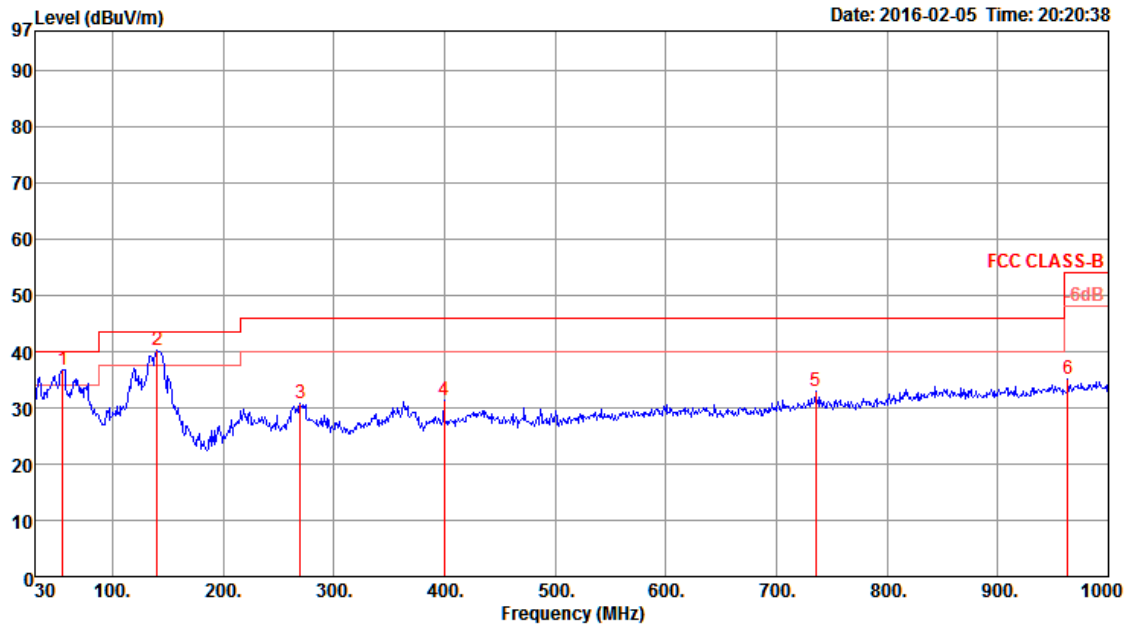
Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	Unintentional – Normal Link
Test Mode	Mode 3		

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	72.68	32.61	40.00	-7.39	49.01	0.52	12.44	29.36	0	100	Peak	HORIZONTAL
2	146.40	34.30	43.50	-9.20	45.34	0.91	17.08	29.03	0	100	Peak	HORIZONTAL
3	159.01	33.07	43.50	-10.43	44.68	0.95	16.42	28.98	0	100	Peak	HORIZONTAL
4	219.15	31.75	46.00	-14.25	43.05	1.21	16.21	28.72	0	100	Peak	HORIZONTAL
5	399.57	32.85	46.00	-13.15	37.75	1.79	22.36	29.05	0	100	Peak	HORIZONTAL
6	990.30	35.19	54.00	-18.81	31.53	3.01	27.96	27.31	0	100	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	55.22	36.87	40.00	-3.13	52.56	0.42	13.32	29.43	0	400	Peak	VERTICAL
2	140.58	40.28	43.50	-3.22	50.88	0.89	17.56	29.05	0	400	Peak	VERTICAL
3	269.59	30.91	46.00	-15.09	38.55	1.40	19.42	28.46	0	400	Peak	VERTICAL
4	399.57	31.29	46.00	-14.71	36.19	1.79	22.36	29.05	0	400	Peak	VERTICAL
5	735.19	32.85	46.00	-13.15	32.92	2.64	26.09	28.80	0	400	Peak	VERTICAL
6	963.14	35.01	54.00	-18.99	31.67	3.00	27.85	27.51	0	400	Peak	VERTICAL

Note:

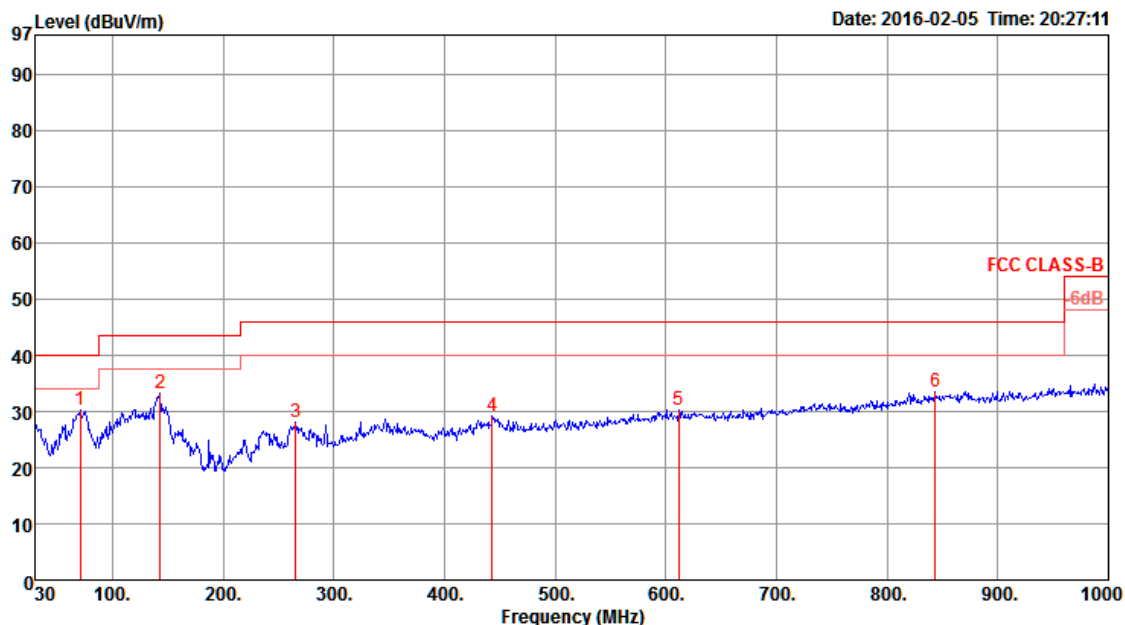
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

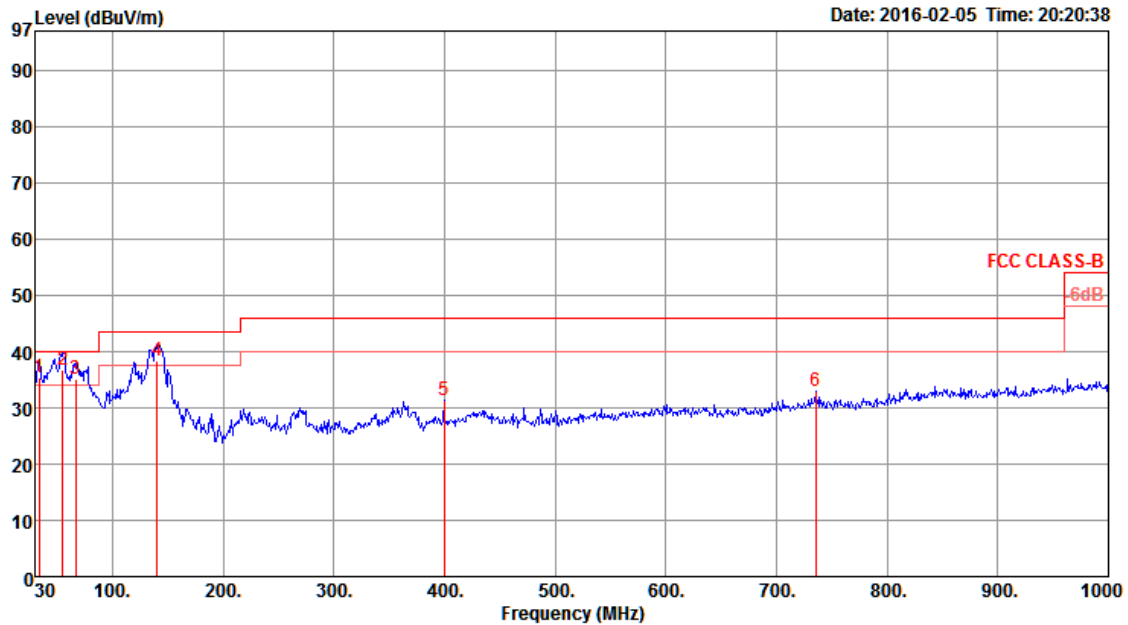
Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	Unintentional – Normal Link
Test Mode	Mode 4		

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	70.74	30.29	40.00	-9.71	46.89	0.49	12.27	29.36	158	100	Peak	HORIZONTAL
2	143.49	33.13	43.50	-10.37	43.95	0.90	17.32	29.04	132	100	Peak	HORIZONTAL
3	265.71	28.04	46.00	-17.96	35.65	1.38	19.49	28.48	115	100	Peak	HORIZONTAL
4	443.22	29.18	46.00	-16.82	33.47	1.90	23.02	29.21	254	200	Peak	HORIZONTAL
5	612.00	30.32	46.00	-15.68	32.05	2.32	25.10	29.15	152	150	Peak	HORIZONTAL
6	843.83	33.63	46.00	-12.37	31.93	2.88	27.14	28.32	92	100	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	33.88	35.27	40.00	-4.73	41.43	0.22	23.11	29.49	178	100	QP	VERTICAL
2	55.22	36.63	40.00	-3.37	52.32	0.42	13.32	29.43	157	100	QP	VERTICAL
3	66.86	35.00	40.00	-5.00	51.68	0.47	12.23	29.38	167	125	QP	VERTICAL
4	140.58	38.42	43.50	-5.08	49.02	0.89	17.56	29.05	258	192	QP	VERTICAL
5	399.57	31.29	46.00	-14.71	36.19	1.79	22.36	29.05	211	100	Peak	VERTICAL
6	735.19	32.85	46.00	-13.15	32.92	2.64	26.09	28.80	151	100	Peak	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

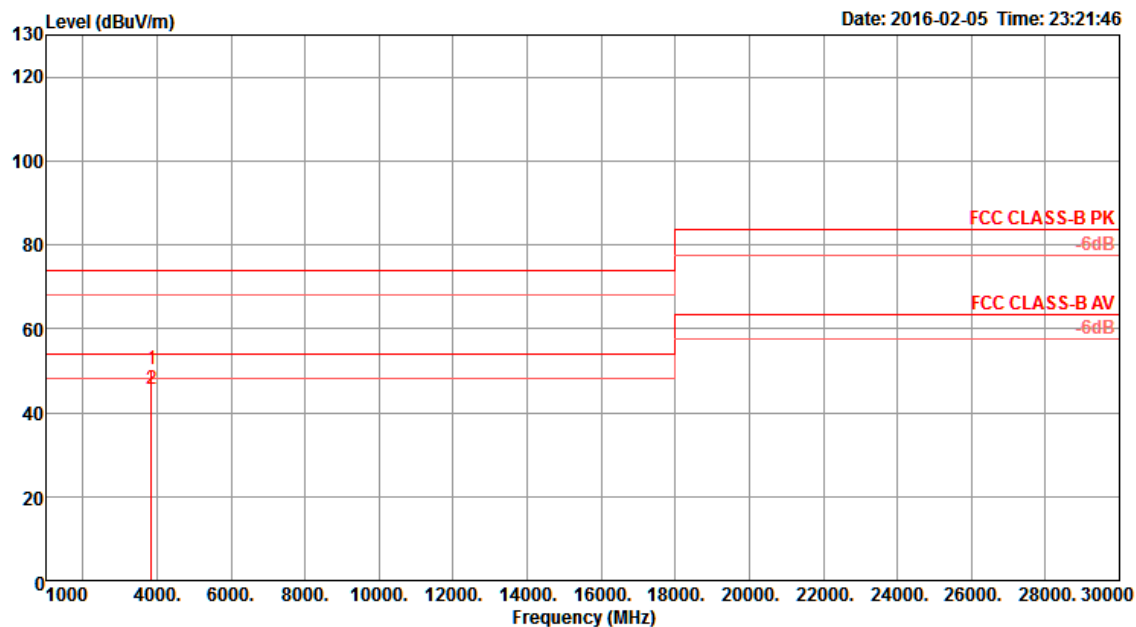
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.6.9. Results of Radiated Emissions (Unintentional 1GHz~5th Harmonic)

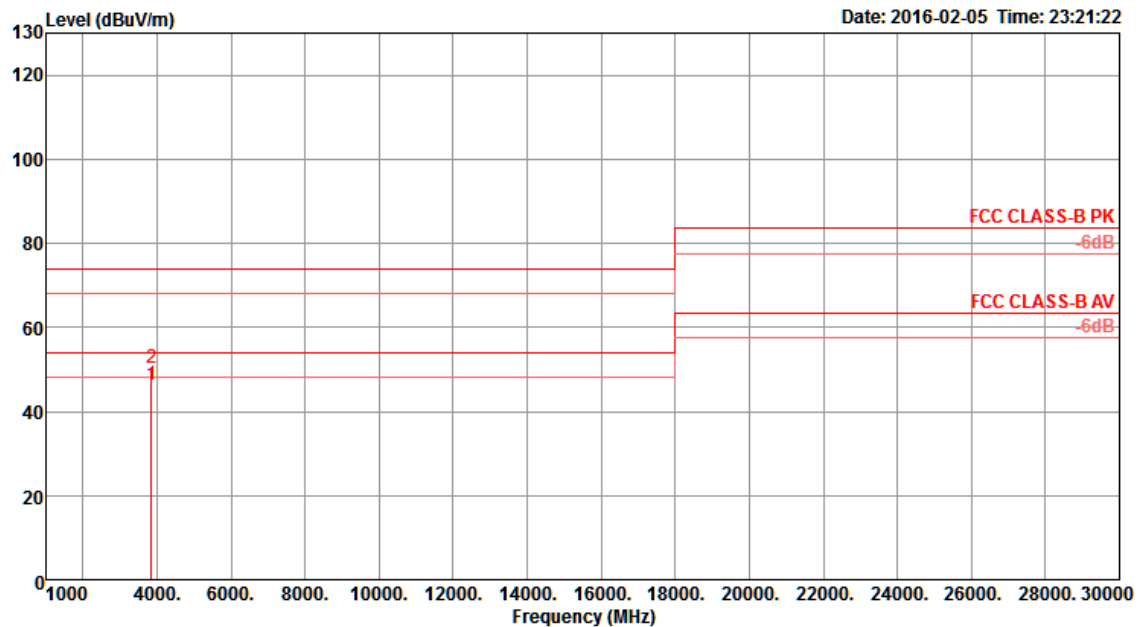
Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	Unintentional – Normal Link

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	3851.84	50.25	74.00	-23.75	48.27	5.00	31.44	34.46	240	109	Peak	HORIZONTAL
2	3851.91	45.69	54.00	-8.31	43.71	5.00	31.44	34.46	240	109	Average	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	3851.94	46.24	54.00	-7.76	44.26	5.00	31.44	34.46	82	109	Average	VERTICAL
2	3852.07	50.27	74.00	-23.73	48.29	5.00	31.44	34.46	82	109	Peak	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.6.10. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	BR (GFSK) / Channel 0
Test Date	Feb. 04, 2016		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4802.21	49.65	74.00	-24.35	41.36	8.15	33.08	32.94	150	260	Peak	HORIZONTAL
2	4802.21	7.27	54.00	-46.73	-1.02	8.15	33.08	32.94	150	260	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4804.99	49.40	74.00	-24.60	41.11	8.15	33.08	32.94	150	248	Peak	VERTICAL
2	4804.99	7.02	54.00	-46.98	-1.27	8.15	33.08	32.94	150	248	Average	VERTICAL

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	BR (GFSK) / Channel 39
Test Date	Feb. 04, 2016		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4881.56	49.39	74.00	-24.61	41.16	7.90	33.26	32.93	150	223	Peak	HORIZONTAL
2	4881.56	7.01	54.00	-46.99	-1.22	7.90	33.26	32.93	150	223	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4884.22	49.51	74.00	-24.49	41.28	7.90	33.26	32.93	150	181	Peak	VERTICAL
2	4884.22	7.13	54.00	-46.87	-1.10	7.90	33.26	32.93	150	181	Average	VERTICAL

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	BR (GFSK) / Channel 78
Test Date	Feb. 04, 2016		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4961.11	49.86	74.00	-24.14	41.67	7.69	33.41	32.91	150	175	Peak	HORIZONTAL
2	4961.11	7.48	54.00	-46.52	-0.71	7.69	33.41	32.91	150	175	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4958.05	49.12	74.00	-24.88	40.93	7.69	33.41	32.91	150	157	Peak	VERTICAL
2	4958.05	6.74	54.00	-47.26	-1.45	7.69	33.41	32.91	150	157	Average	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	EDR (8DPSK) / Channel 0
Test Date	Feb. 04, 2016		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4805.10	49.57	74.00	-24.43	41.28	8.15	33.08	32.94	150	136	Peak	HORIZONTAL
2	4805.10	24.84	54.00	-29.16	16.55	8.15	33.08	32.94	150	136	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.96	49.40	74.00	-24.60	41.11	8.15	33.08	32.94	150	125	Peak	VERTICAL
2	4803.96	24.67	54.00	-29.33	16.38	8.15	33.08	32.94	150	125	Average	VERTICAL

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	EDR (8DPSK) / Channel 39
Test Date	Feb. 04, 2016		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4881.45	48.91	74.00	-25.09	40.68	7.90	33.26	32.93	150	107	Peak	HORIZONTAL
2	4881.45	24.18	54.00	-29.82	15.95	7.90	33.26	32.93	150	107	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4881.03	49.17	74.00	-24.83	40.93	7.94	33.23	32.93	150	84	Peak	VERTICAL
2	4881.03	24.44	54.00	-29.56	16.20	7.94	33.23	32.93	150	84	Average	VERTICAL

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	EDR (8DPSK) / Channel 78
Test Date	Feb. 04, 2016		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4959.07	49.41	74.00	-24.59	41.22	7.69	33.41	32.91	150	61	Peak	HORIZONTAL
2	4959.07	24.68	54.00	-29.32	16.49	7.69	33.41	32.91	150	61	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4961.49	49.40	74.00	-24.60	41.21	7.69	33.41	32.91	150	42	Peak	VERTICAL
2	4961.49	24.67	54.00	-29.33	16.48	7.69	33.41	32.91	150	42	Average	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.7. Emissions Measurement

4.7.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 2.7, then the 2.8 limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

4.7.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (20dBc in any 100 kHz bandwidth emission)	100 kHz /100 kHz for Peak

4.7.3. Test Procedures

For Radiated band edges Measurement:

The test procedure is the same as section 4.6.3.

For Radiated Out of Band Emission Measurement:

The test procedure is follow 3.10.1.5.

4.7.4. Test Setup Layout

For Radiated band edges Measurement:

This test setup layout is the same as that shown in section 4.6.4.

For Radiated Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 4.6.4.

4.7.5. Test Deviation

There is no deviation with the original standard.

4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	BR (GFSK) / Channel 0, 39, 78
Test Date	Feb. 03, 2016		

Channel 0

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2381.80	60.51	74.00	-13.49	27.84	4.37	28.30	0.00	226	356	Peak	HORIZONTAL
2	2381.80	18.13	54.00	-35.87	-14.54	4.37	28.30	0.00	226	356	Average	HORIZONTAL
3	2402.20	104.07			71.34	4.39	28.34	0.00	226	356	Peak	HORIZONTAL
4	2402.20	61.69			28.96	4.39	28.34	0.00	226	356	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 39

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2371.00	57.16	74.00	-16.84	24.51	4.36	28.29	0.00	227	343	Peak	VERTICAL
2	2371.00	14.78	54.00	-39.22	-17.87	4.36	28.29	0.00	227	343	Average	VERTICAL
3	2441.00	105.25			72.39	4.45	28.41	0.00	227	343	Peak	VERTICAL
4	2441.00	62.87			30.01	4.45	28.41	0.00	227	343	Average	VERTICAL
5	2487.40	56.64	74.00	-17.36	23.66	4.50	28.48	0.00	227	343	Peak	VERTICAL
6	2487.40	14.26	54.00	-39.74	-18.72	4.50	28.48	0.00	227	343	Average	VERTICAL

Item 3, 4 are the fundamental frequency at 2441 MHz.

Channel 78

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2480.00	103.15			70.20	4.49	28.46	0.00	196	360	Peak	VERTICAL
2	2480.00	60.77			27.82	4.49	28.46	0.00	196	360	Average	VERTICAL
3	2499.80	59.33	74.00	-14.67	26.31	4.52	28.50	0.00	196	360	Peak	VERTICAL
4	2499.80	16.95	54.00	-37.05	-16.07	4.52	28.50	0.00	196	360	Average	VERTICAL

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Temperature	24°C	Humidity	55%
Test Engineer	Lucke Hsieh	Configurations	EDR (8DPSK) / Channel 0, 39, 78
Test Date	Feb. 03, 2016		

Channel 0

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2382.20	59.71	74.00	-14.29	27.04	4.37	28.30	0.00	222	357	Peak	HORIZONTAL
2	2382.20	34.98	54.00	-19.02	2.31	4.37	28.30	0.00	222	357	Average	HORIZONTAL
3	2401.80	102.17			69.44	4.39	28.34	0.00	222	357	Peak	HORIZONTAL
4	2401.80	77.44			44.71	4.39	28.34	0.00	222	357	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 39

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2359.00	56.88	74.00	-17.12	24.26	4.35	28.27	0.00	218	338	Peak	VERTICAL
2	2359.00	32.15	54.00	-21.85	-0.47	4.35	28.27	0.00	218	338	Average	VERTICAL
3	2441.00	103.48			70.62	4.45	28.41	0.00	218	338	Peak	VERTICAL
4	2441.00	78.75			45.89	4.45	28.41	0.00	218	338	Average	VERTICAL
5	2492.60	56.59	74.00	-17.41	23.59	4.51	28.49	0.00	218	338	Peak	VERTICAL
6	2492.60	31.86	54.00	-22.14	-1.14	4.51	28.49	0.00	218	338	Average	VERTICAL

Item 3, 4 are the fundamental frequency at 2441 MHz.

Channel 78

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2480.00	102.39			69.44	4.49	28.46	0.00	215	348	Peak	HORIZONTAL
2	2480.00	77.66			44.71	4.49	28.46	0.00	215	348	Average	HORIZONTAL
3	2499.80	58.06	74.00	-15.94	25.04	4.52	28.50	0.00	215	348	Peak	HORIZONTAL
4	2499.80	33.33	54.00	-20.67	0.31	4.52	28.50	0.00	215	348	Average	HORIZONTAL

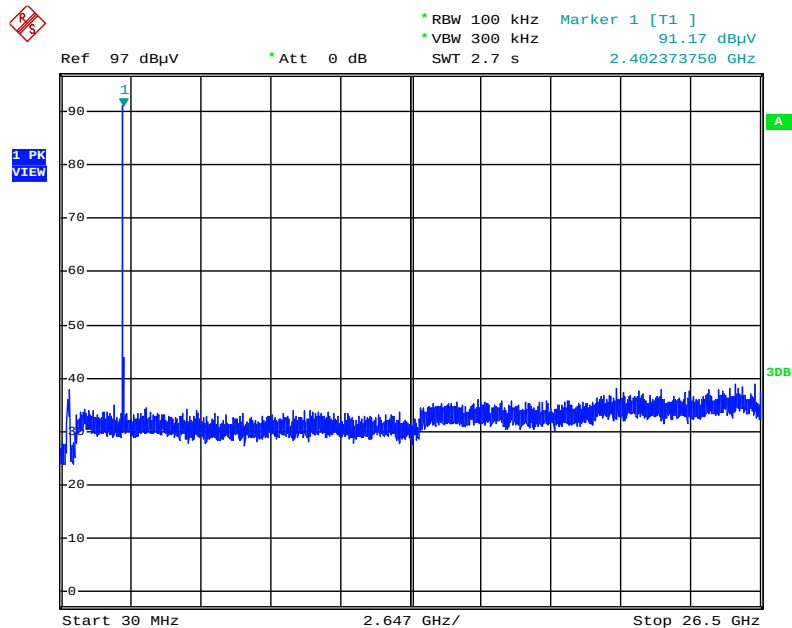
Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

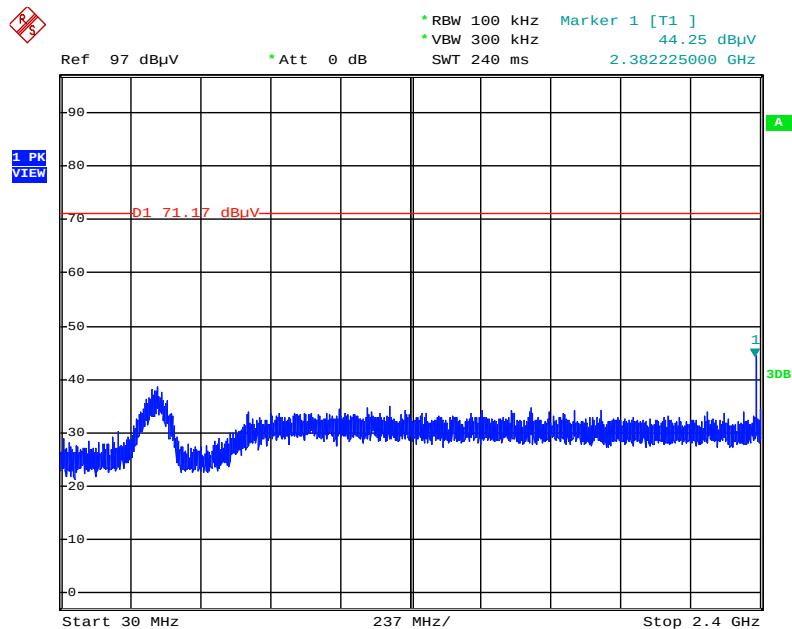
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Plot on Configuration For BR (GFSK) / Channel 0 / Reference Level



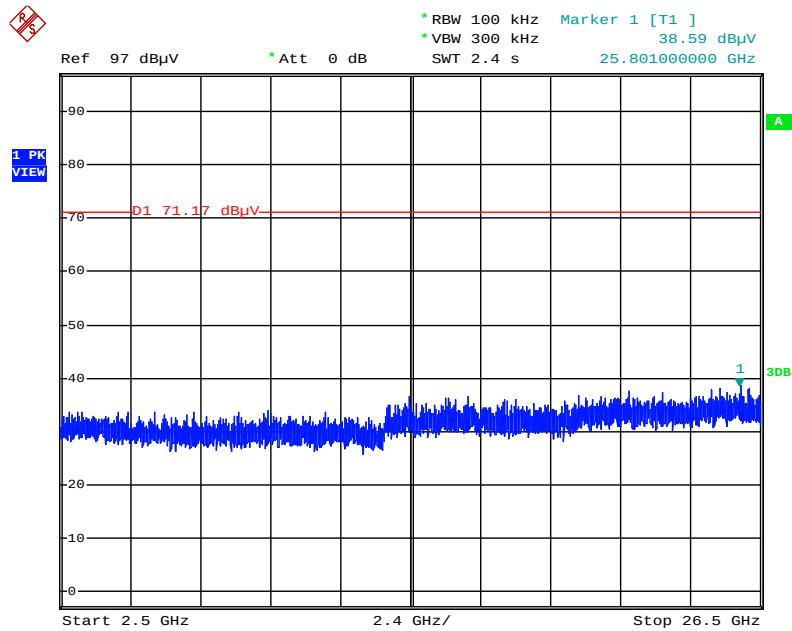
Date: 3.FEB.2016 19:22:53

Plot on Configuration For BR (GFSK) / Channel 0 / 30MHz~2400MHz (down 20dBc)



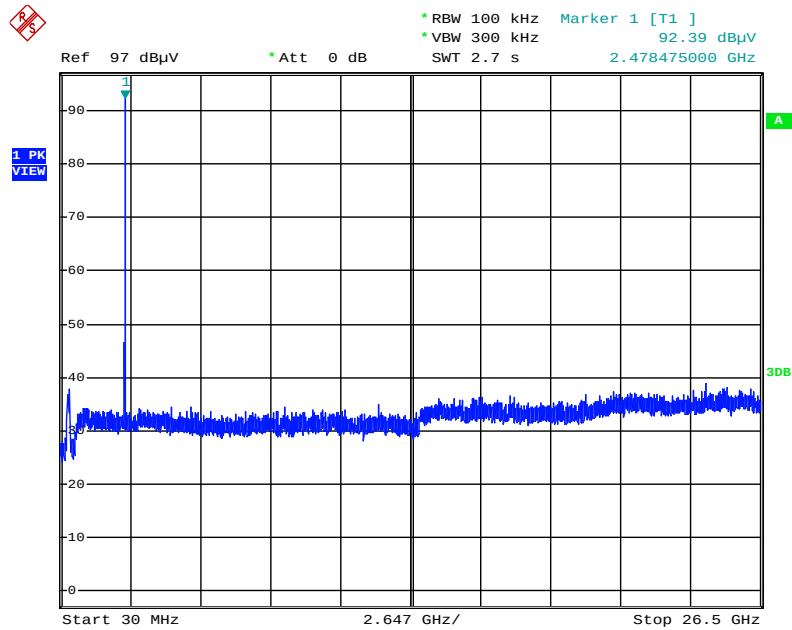
Date: 3.FEB.2016 19:23:52

Plot on Configuration For BR (GFSK) / Channel 0 / 2500MHz~26500MHz (down 20dBc)



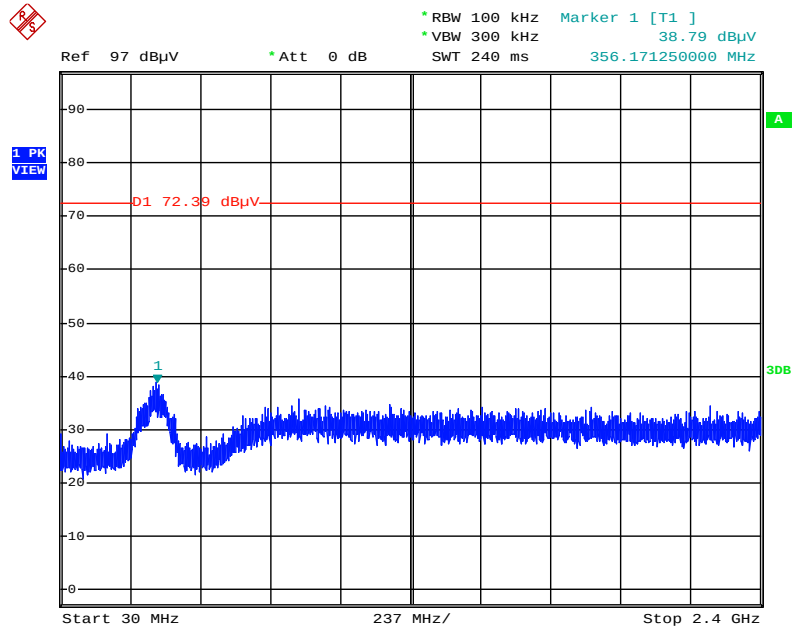
Date: 3.FEB.2016 19:24:33

Plot on Configuration For BR (GFSK) / Channel 78 / Reference Level



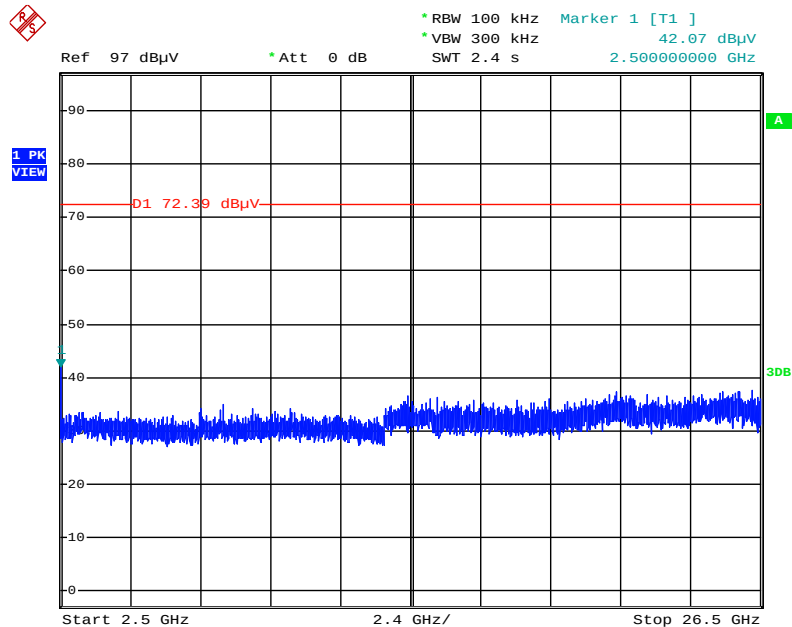
Date: 3.FEB.2016 19:30:05

Plot on Configuration For BR (GFSK) / Channel 78 / 30MHz~2400MHz (down 20dBc)



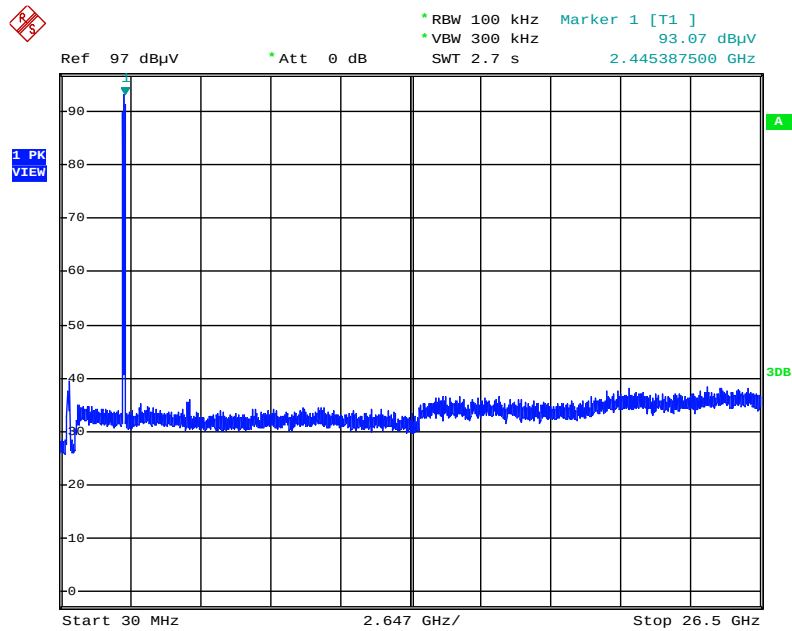
Date: 3.FEB.2016 19:31:34

Plot on Configuration For BR (GFSK) / Channel 78 / 2500MHz~26500MHz (down 20dBc)



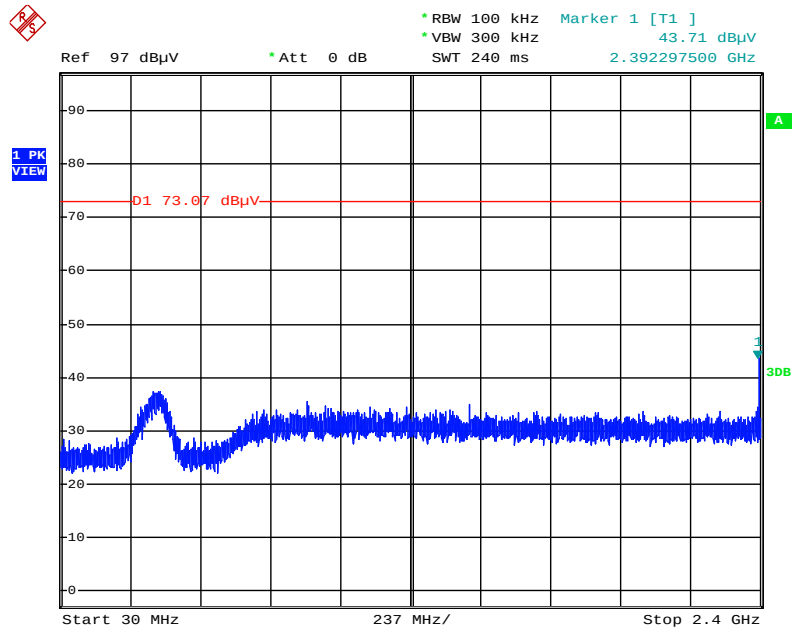
Date: 3.FEB.2016 19:32:18

Plot on Configuration For BR (GFSK) / Hopping / Reference Level



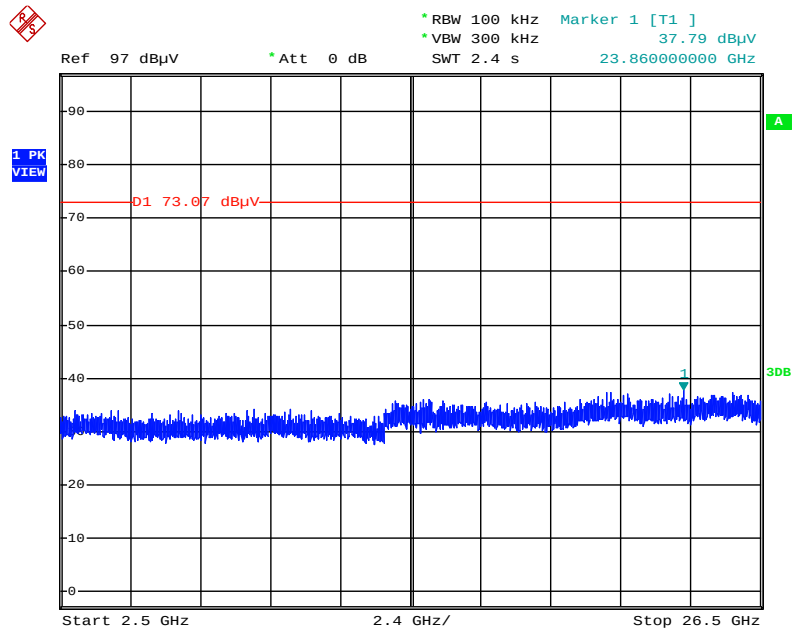
Date: 3.FEB.2016 19:50:41

Plot on Configuration For BR (GFSK) / Hopping / 30MHz~2400MHz (down 20dBc)



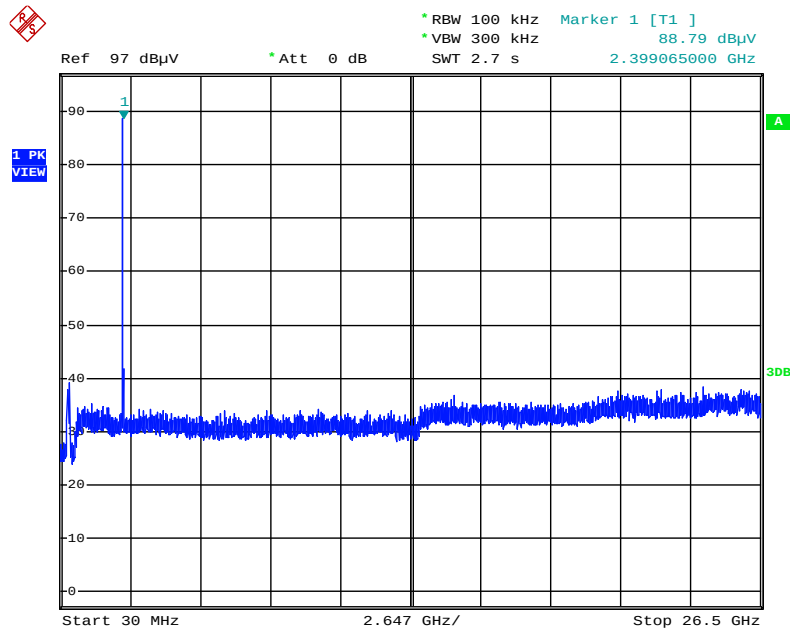
Date: 3.FEB.2016 19:58:40

Plot on Configuration For BR (GFSK) / Hopping / 2500MHz~26500MHz (down 20dBc)



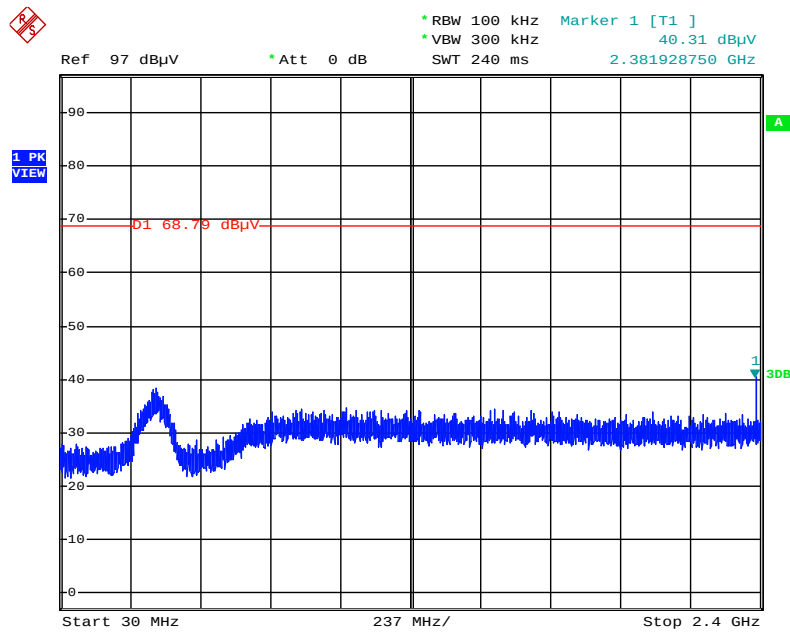
Date: 3.FEB.2016 19:59:18

Plot on Configuration For EDR (8DPSK) / Channel 0 / Reference Level



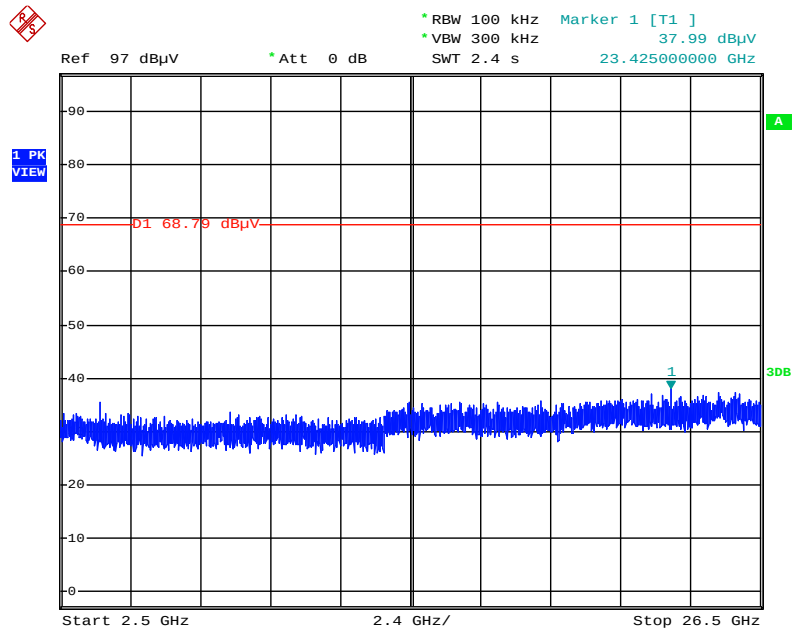
Date: 3.FEB.2016 19:33:23

Plot on Configuration For EDR (8DPSK) / Channel 0 / 30MHz~2400MHz (down 20dBc)



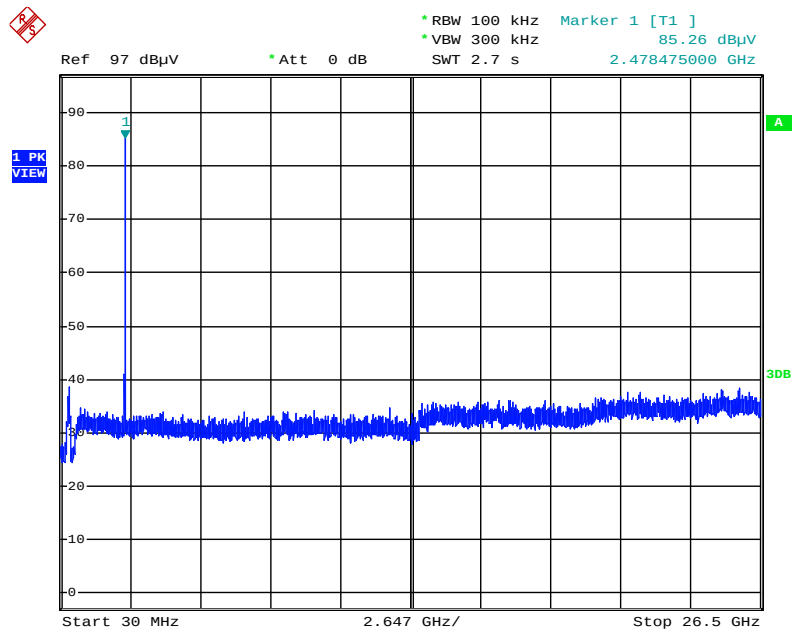
Date: 3.FEB.2016 19:34:10

Plot on Configuration For EDR (8DPSK) / Channel 0 / 2500MHz~26500MHz (down 20dBc)



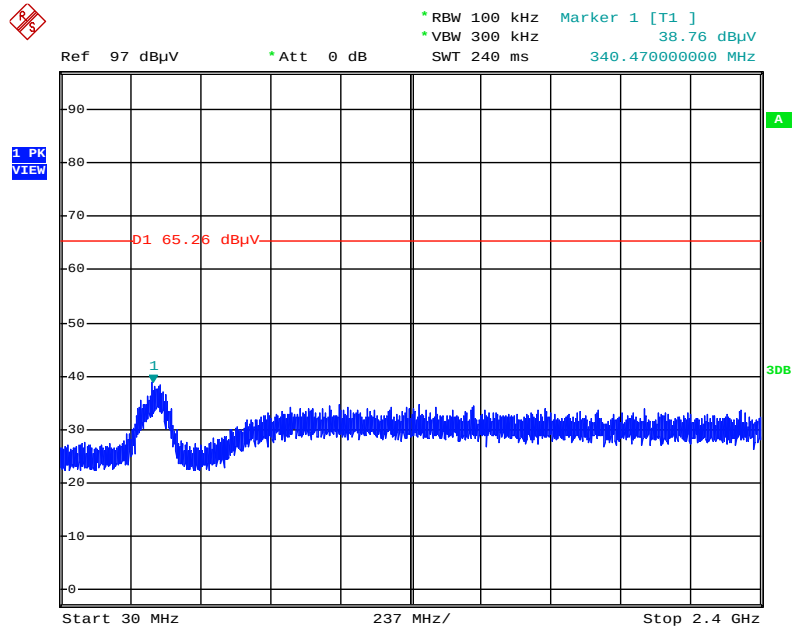
Date: 3.FEB.2016 19:34:35

Plot on Configuration For EDR (8DPSK) / Channel 78 / Reference Level



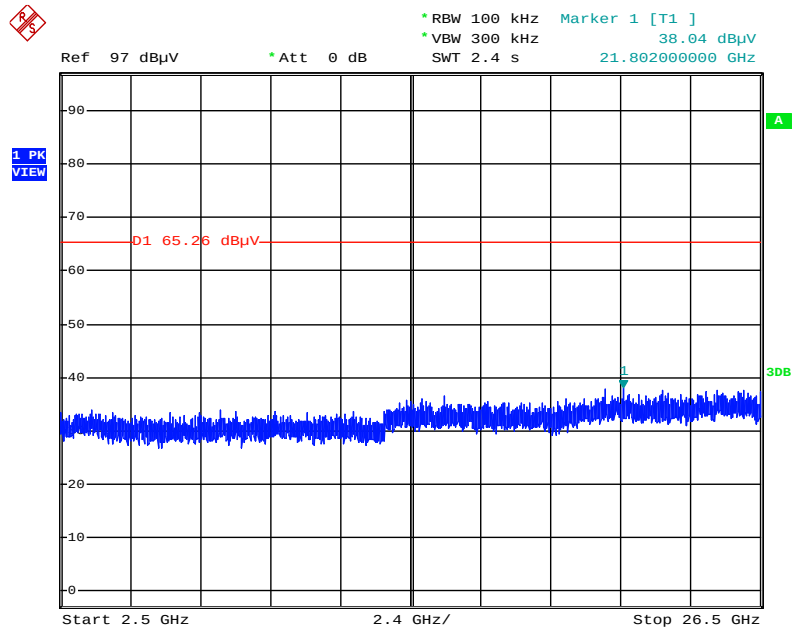
Date: 3.FEB.2016 19:35:58

Plot on Configuration For EDR (8DPSK) / Channel 78 / 30MHz~2400MHz (down 20dBc)



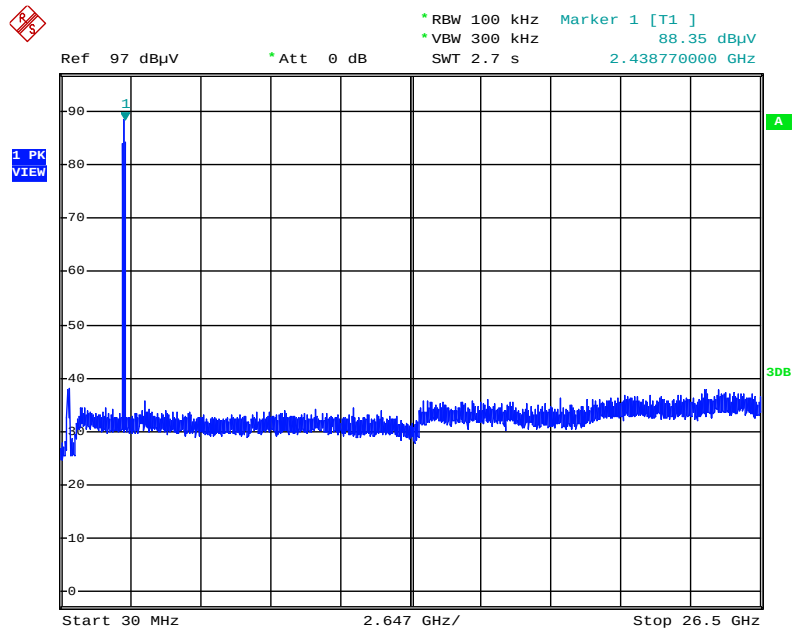
Date: 3.FEB.2016 19:36:34

Plot on Configuration For EDR (8DPSK) / Channel 78 / 2500MHz~26500MHz (down 20dBc)



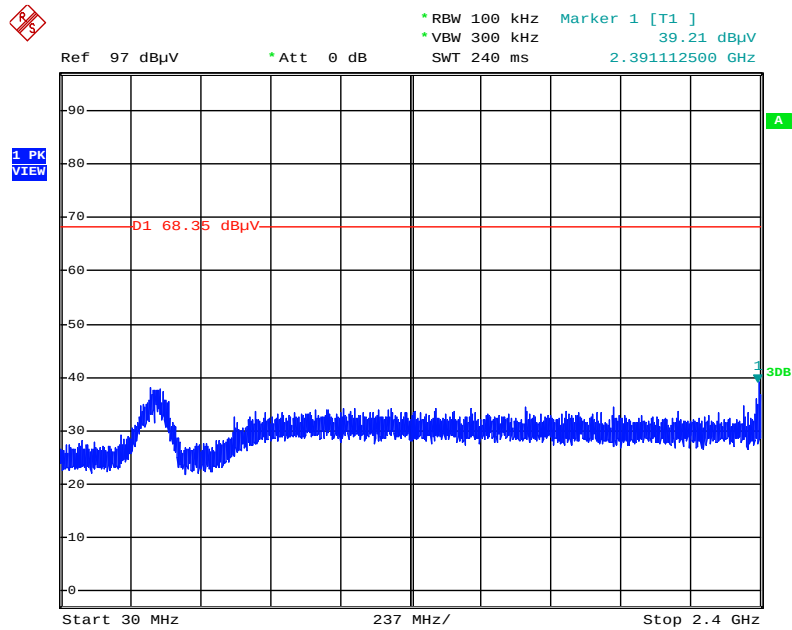
Date: 3.FEB.2016 19:37:10

Plot on Configuration For EDR (8DPSK) / Hopping / Reference Level



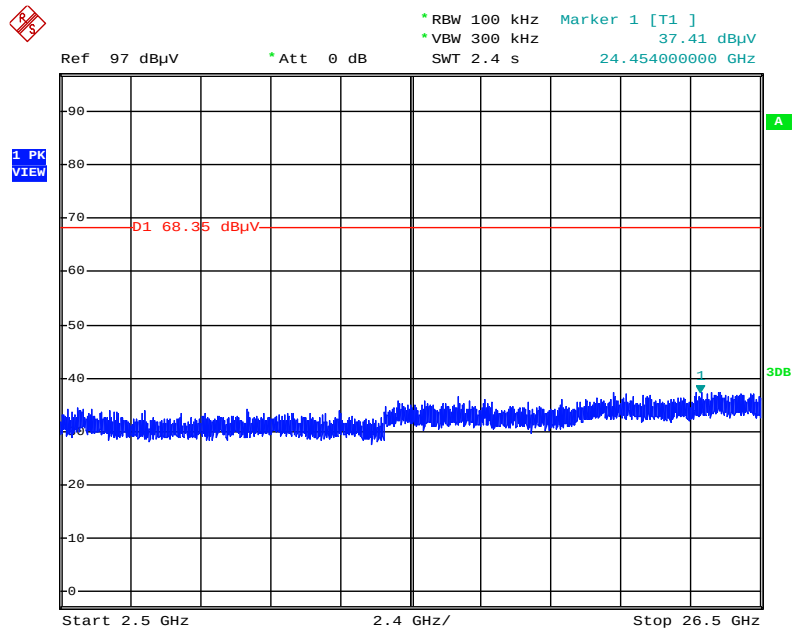
Date: 3.FEB.2016 20:00:45

Plot on Configuration For EDR (8DPSK) / Hopping / 30MHz~2400MHz (down 20dBc)



Date: 3.FEB.2016 20:01:41

Plot on Configuration For EDR (8DPSK) / Hopping / 2500MHz~26500MHz (down 20dBc)



Date: 3.FEB.2016 20:02:23

4.8. Antenna Requirements

4.8.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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 the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

4.8.2. Antenna Connector Construction

Please refer to section 3.3 in this test report, antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 23, 2017	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 08, 2015	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 14, 2016	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 23, 2015	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 21, 2016	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 25, 2015	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 23, 2017	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep. 03, 2015	Radiation (03CH01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCi	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2016	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2017	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 18, 2016	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Feb.10, 2015	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jun. 23, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 22, 2016	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 27, 2016	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 06, 2017	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 24, 2016	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 09, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY54320014	50MHz~18GHz	Mar. 23, 2015	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

* Calibration Interval of instruments listed above is two years.

N.C.R. means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%
Output Power Measurement	1.33 dB	Confidence levels of 95%
Bandwidth Measurement	9.74×10^{-8}	Confidence levels of 95%

Appendix A. Test Photos

1. Photographs of Conducted Emissions Test Configuration

Operating Mode: Intentional – CTX

Test Mode: Mode 2

FRONT VIEW



REAR VIEW



Operating Mode: Unintentional – Normal Link

Test Mode: Mode 1

FRONT VIEW



REAR VIEW

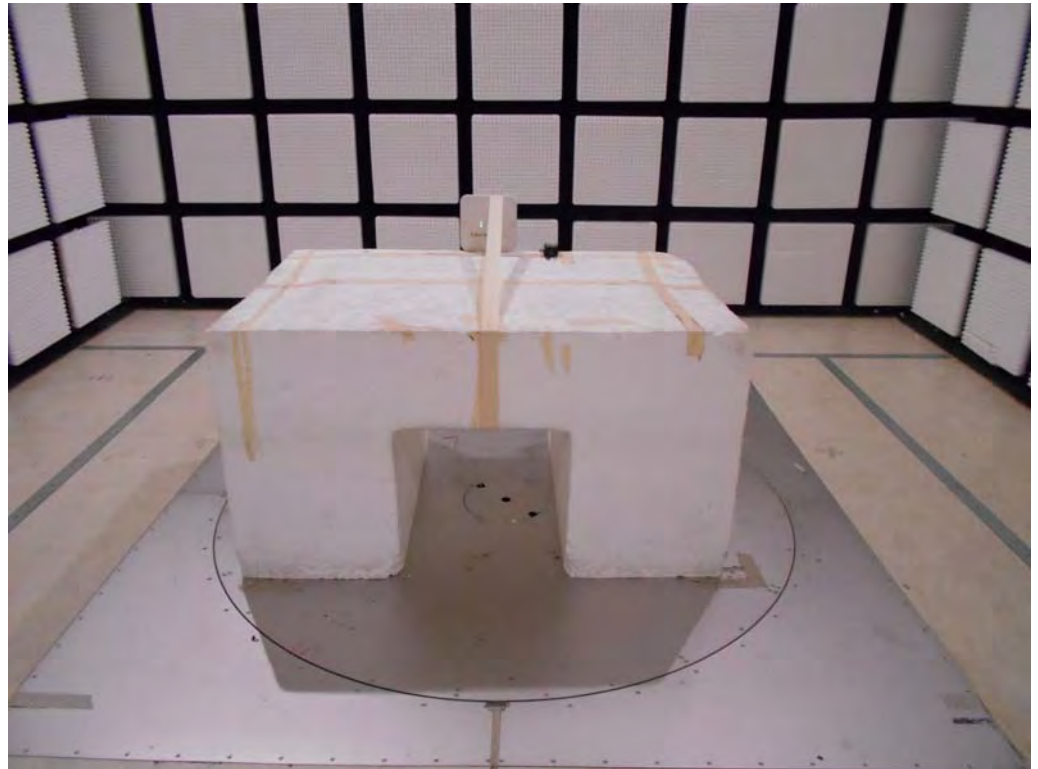


2. Photographs of Radiated Emissions Test Configuration

Test Configuration: 30MHz~1GHz

Operating Mode: Intentional – CTX / Test Mode: Mode 1

FRONT VIEW

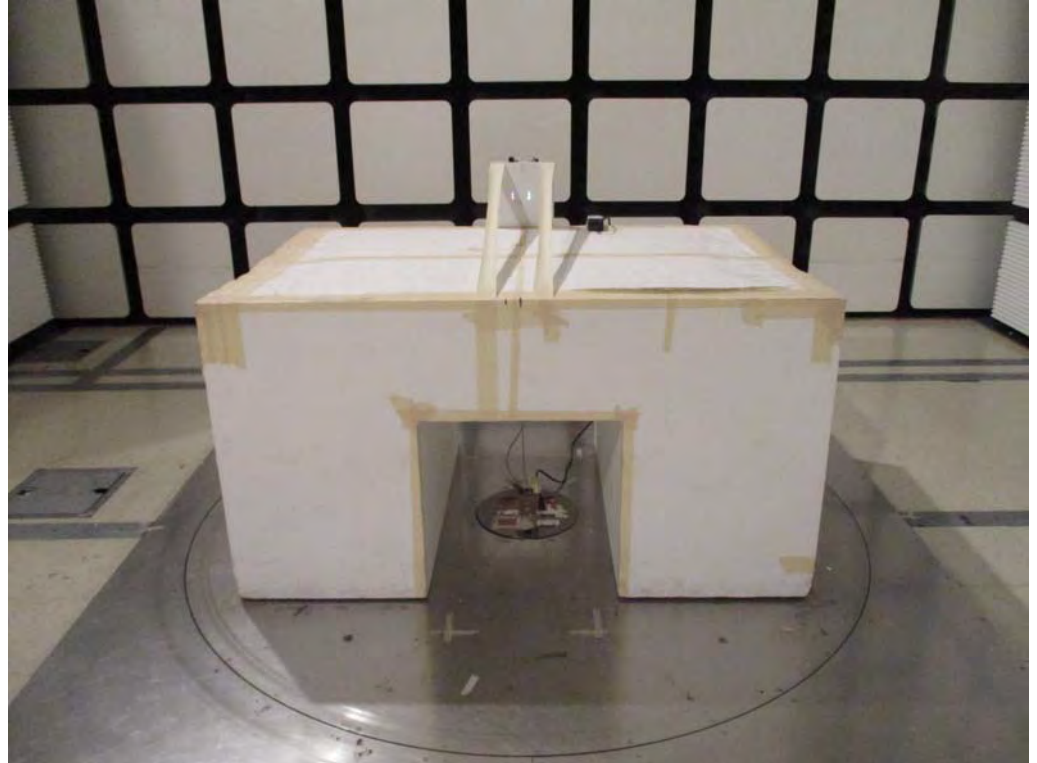


REAR VIEW

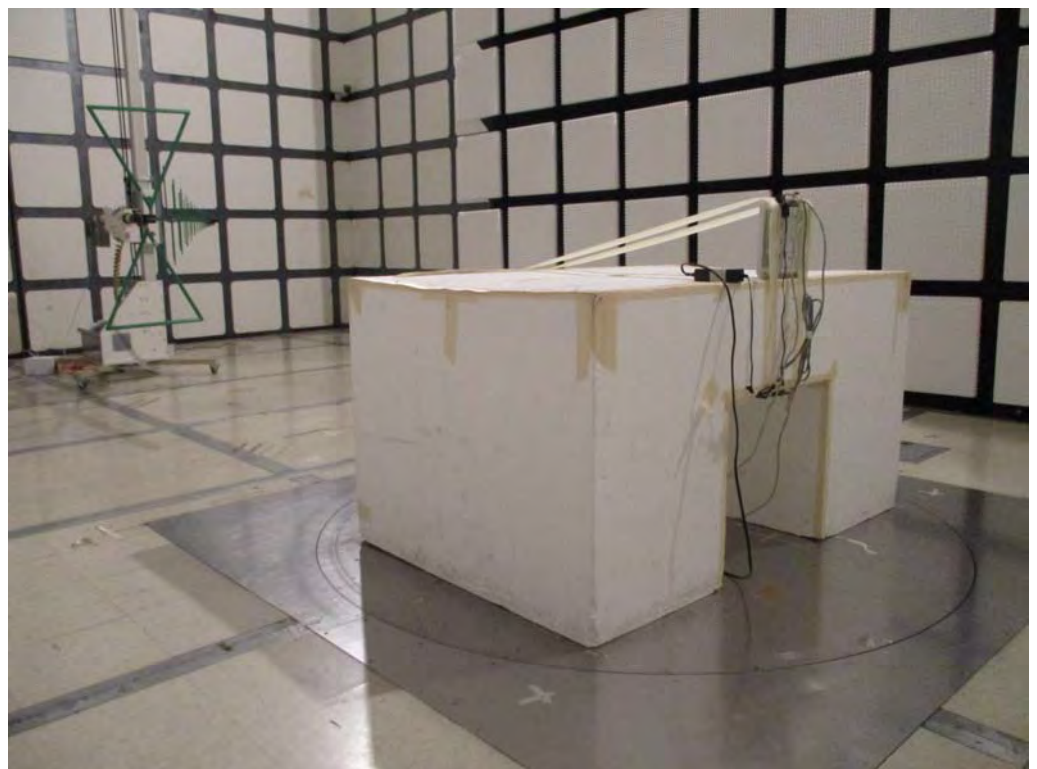


Operating Mode: Unintentional – Normal Link / Mode 3

FRONT VIEW



REAR VIEW

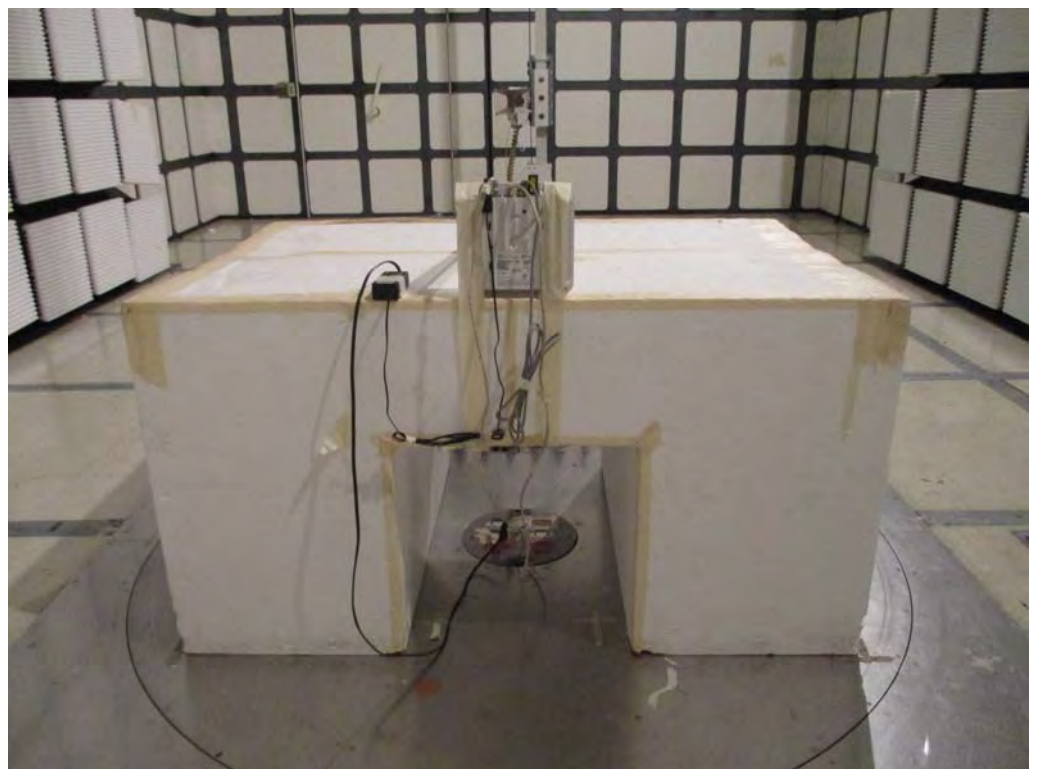


Test Configuration: Unintentional 1GHz~5th Harmonic

FRONT VIEW

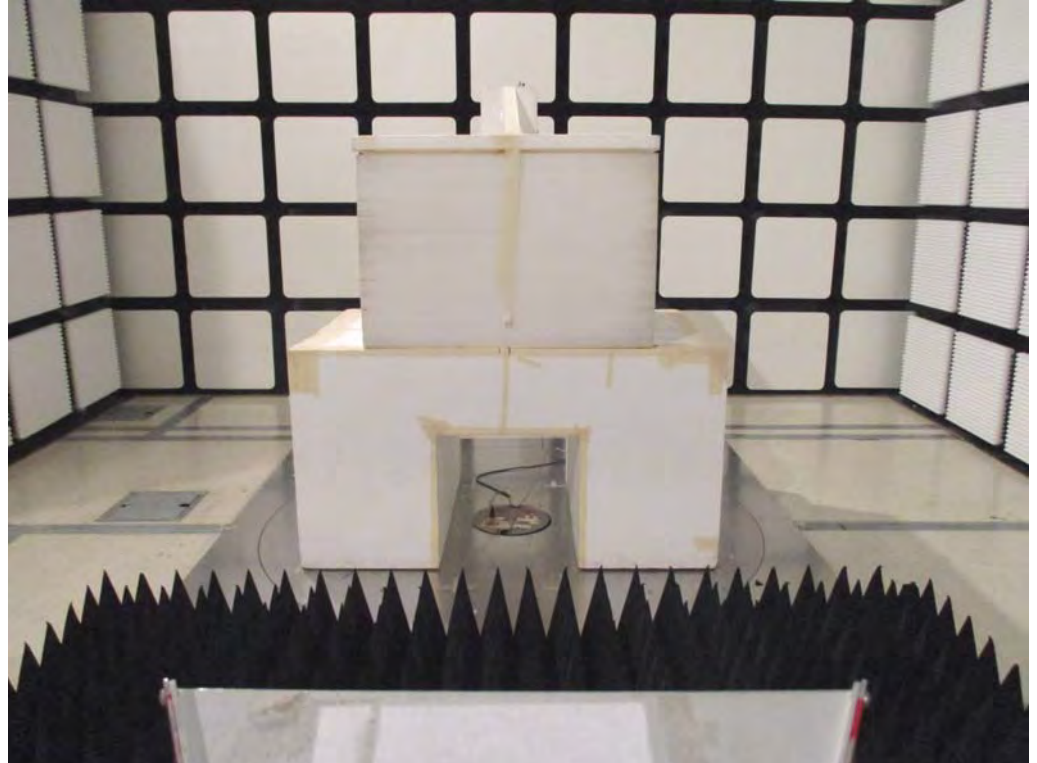


REAR VIEW



Test Configuration: Intentional 1GHz~10th Harmonic

FRONT VIEW



REAR VIEW

