

FCC 15.247 DSS
(Class II Permissive Change)
2.4 GHz Report

for

Elitegroup Computer Systems Co., Ltd.

No. 239, Sec. 2, TiDing Blvd,
Taipei, Taiwan 11493

Brand : ECS
Product Name : Intelligent Gateway
Model Name : GWS-QX.
FCC ID : WL6GWS-QX

TABLE OF CONTENTS

Description	Page
TEST REPORT CERTIFICATION	4
1. REPORT HISTORY.....	4
2. SUMMARY OF TEST RESULTS	5
3. GENERAL INFORMATION	6
3.1. Description of EUT	6
3.2. Description of Key Component Lists	7
3.3. Antenna Information	7
3.4. EUT Specifications Assessed in Current Report	8
3.5. Test Configuration	9
3.6. Tested Supporting System List	9
3.7. Setup Configuration	10
3.8. Operating Condition of EUT	10
3.9. Description of Test Facility	11
3.10. Measurement Uncertainty	11
4. MEASUREMENT EQUIPMENT LIST	12
4.1. Conducted Emission Measurement	12
4.2. Radiated Emission Measurement	12
4.3. RF Conducted Measurement	12
5. CONDUCTED EMISSION MEASUREMENT	13
5.1. Block Diagram of Test Setup	13
5.2. Power Line Conducted Emission Limit	13
5.3. Test Procedure	13
5.4. Conducted Emission Measurement Results	14
6. RADIATED EMISSION MEASUREMENT	16
6.1. Block Diagram of Test Setup	16
6.2. Radiated Emission Limits	17
6.3. Test Procedure	18
6.4. Measurement Result Explanation	19
6.5. Test Results	19
7. MAXIMUM PEAK OUTPUT POWER MEASUREMENT	32
7.1. Block Diagram of Test Setup	32
7.2. Specification Limits	32
7.3. Test Procedure	32
7.4. Test Results	33
8. DEVIATION TO TEST SPECIFICATIONS.....	35
 APPENDIX A TEST PHOTOGRAPHS	

TEST REPORT CERTIFICATION (Class II Permissive Change)

Applicant : Elitegroup Computer Systems Co., Ltd.
Manufacture : Golden Elite Technology (SHENZHEN) CO., LTD.
Product Name : Intelligent Gateway
Model No. : GWS-QX.
Serial No. : N/A
Brand : ECS

Applicable Standards:

FCC Rules and Regulations Part 15 Subpart C:2015
ANSI C63.10:2013
FCC Public Notice DA 00-705

AUDIX Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report. **AUDIX Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Test: 2016. 02. 01 ~ 03

Date of Report: 2016. 06. 14

Producer: Sabrina Wang
(Sabrina Wang/Administrator)

Signatory: Ben Cheng
(Ben Cheng/Manager)

1. REPORT HISTORY

Edition No.	Date of Rev.	Revision Summary	Report No.
0	2016. 06. 14	Original Report.	EM-F160088

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	PASS
15.247(d)/ 15.205	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(b)(1)	Maximum Peak Output Power	PASS
15.203	Antenna Requirement	PASS

3. GENERAL INFORMATION

3.1. Description of EUT

Product	Intelligent Gateway
Model Number	GWS-QX. (The dots "." in the model name cab be 0 to 9, A to Z, a to z, "-", "_", "\\", "/" or blank, for marketing use only.) The model GWS-QX is test in this report
Serial Number	N/A
Brand Name	ECS
Applicant	Elitegroup Computer Systems Co., Ltd. No. 239, Sec. 2., TiDing Blvd., Taipei, Taiwan 11493
Manufacturer	Golden Elite Technology (SHENZHEN) CO., LTD. No.1, Nan-Huan Rd., ShaJing, BaoAn, Shenzhen, China
RF Features	WLAN:802.11b/g/n Bluetooth: BT and BLE
Date of Receipt of Sample	2016. 01. 20
Information for Class II Change Permissive:	<p>1. The difference with original FCC ID: WL6GWS-QX is as follow:</p> <ul style="list-style-type: none"> (1) To add new Appearance for New Main Board, Adapter, Power Rating and remove Analog & Digital Board. (The difference original Appearance is to remove Analog & Digital IO) (2) To add new Main Board (Type B). (The difference original Main Board is modify component of original Main Board) (3) To add a new Adapter. (Asian Power Devices Inc., M/N: WA-15I05FU) (4) To add a new Power Rating. (DC 5V, 3A) (5) To remove Analog & Digital Board. <p>2. Due to difference can't influence on RF circuit</p>

3.2. Description of Key Component Lists

Item	Supplier	Model / Type	Character
Main Board	ECS	GWB-QX	Type A
	ECS	GWB-QX*	Type B
CPU	Intel	Quark SoC X1021	400MHz
Memory	---	---	DDR3 1G (512MB x 2)
Storage	---	---	Mirco SD 8GB up to 32G
Wi-Fi +BT Combo Module	AzureWave (REALTEK)	AW-NB159H (RTL8723BE)	Wi-Fi with Bluetooth 4.0/3.0 + HS Combo Half Mini Card
AC Adapter	Asian Power Devices Inc.	DA-120B24	Input: AC 100-240V, 47-63Hz, 2.0A Output: DC 24V, 5A (For Main Board Type A Used)
	DC Power Cord: Unshielded, Undetachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.8m (3C)		
	Asian Power Devices Inc.	WA-15I05FU*	Input: AC 100-240V, 50-60Hz, 0.5A Output: DC 5V, 3A (For Main Board Type B Used)
	DC Power Cord: Unshielded, Undetachable, 1.8m (Wall-mount, 2C)		
RS-232 Cable	Shielded, Detachable, 1.6m		
Note: "*" Standing for adding new configuration.			

Remark: For more detailed features description, please refer to the manufacturer's specifications or the user manual.

3.3. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Max Gain (dBi)
13-130-764090	VSO	External Dipole Antenna + RF Cable Assembly	3.1dBi

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
Bluetooth	2402-2480	79	FHSS (GFSK, $\pi/4$ DQPSK, 8-DPSK)	1/2/3

Channel List					
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3.5. Test Configuration

Item		Modulation	Data Rate	Test Channel
Radiated Test Case	Radiated Spurious Emission ^{Note1}	8DPSK	3Mbps	00/39/78
Conducted Test Case ^{Note2}	Maximum Peak Output Power	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78

Note 1:

Mobile Device

Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:

- Lie
- Side
- Stand

Note 2: We performed testing of the highest and lowest data rate.

3.6. Tested Supporting System List

3.6.1. Support Peripheral Unit

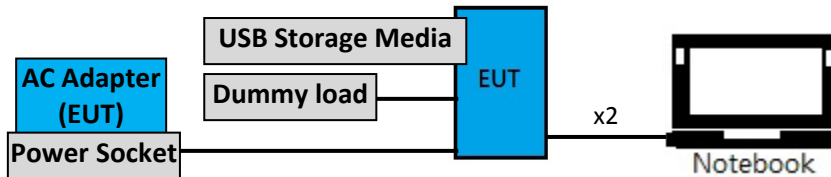
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC (For Power Line and Radiated Emission)	DELL	P20G	P20G001	FCC ID: PPD-AR5B-95
	Notebook PC (For Conducted)	acer	MS2362	N/A	FCC ID: PPD-AR5B22
2.	USB Storage Media	Toshiba	32GB	N/A	N/A
3.	Dummy load	N/A	N/A	N/A	N/A
4.	Power Socket	N/A	N/A	N/A	N/A

3.6.2. Cable Lists

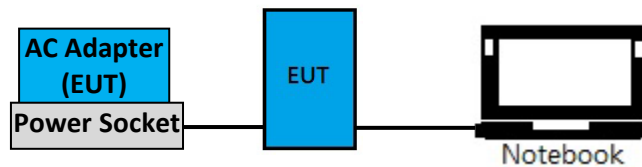
No.	Cable Description Of The Above Support Units
1.	USB Cable: Unshielded, Detachable, 1.5m LAN Cable: Unshielded, Detachable, 0.5m Adapter: Chicony, M/N CPA09-A065N1, DC Power Cord: Unshielded, Detachable, 1.8m AC Power Cord: Unshielded, Undetachable, 1.8m. Bonded a ferrite core
	LAN Cable: Unshielded, Detachable, 0.5m Adapter: ACBEL, M/N AA90PM111, DC Power Cord: Unshielded, Detachable, 1.8m AC Power Cord: Unshielded, Undetachable, 1.8m. Bonded a ferrite core
2.	---
3.	RS232 Cable: Unshielded, Detachable, 1.2m
4.	Power Cord: Unshielded, Undetachable, 1.8m

3.7. Setup Configuration

3.7.1. EUT Configuration for Power Line and Radiated Emission



3.7.2. EUT Configuration for Conducted Test Items



3.8. Operating Condition of EUT

EUT was set into test mode by Notebook to set channels / hopping / modulations.

3.9. Description of Test Facility

Test Firm Name	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility	:	No. 8 Shielded Room Semi Anechoic Chamber & Fully Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724
FCC OET Designation	:	TW1004 & TW1090

3.10. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
Maximum peak Output power	± 0.52dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCS 30	101265	2015. 08. 20	1 Year
2.	A.M.N.	R&S	ENV4200	100169	2015. 05. 08	1 Year
3.	Pulse Limiter	R&S	ESH3-Z2	100354	2016. 01. 17	1 Year
4.	Test Software	Audix	e3	V.6.120424	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

4.2.1. Frequency Range 9kHz~1000MHz

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2015. 09. 14	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2015. 06. 24	1 Year
3.	Amplifier	HP	8447D	2944A06305	2016. 02. 23	1 Year
4.	Bilog Antenna	CHASE	CBL6112D	33821	2016. 01. 30	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2015. 12. 24	1 Year
6.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.2.2. Frequency Range Above 1GHz

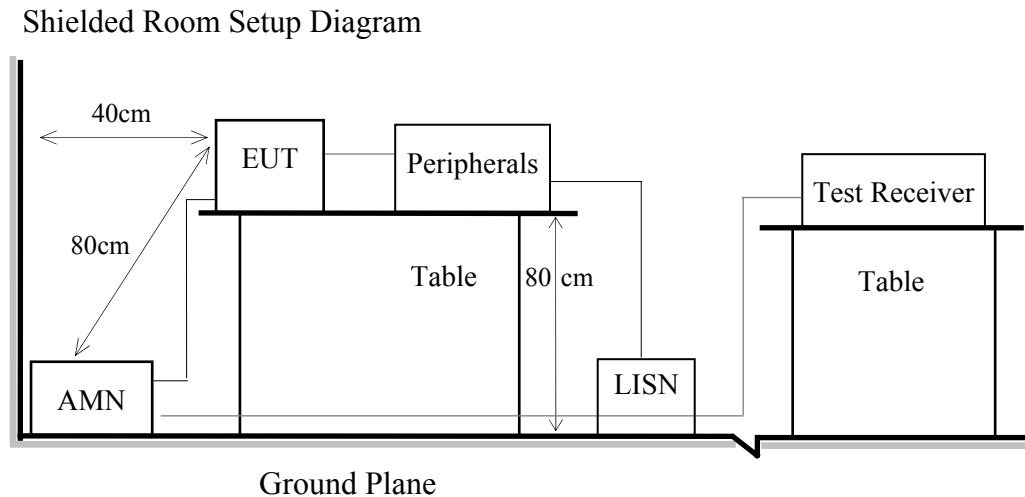
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	2015. 08. 20	1 Year
2.	Amplifier	Sonoma	310N	187161	2015. 06. 17	1 Year
3.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-00	1	2015. 07. 28	1 Year
4.	Horn Antenna	ETS-Lindgren	3117	00135902	2016. 03. 05	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2015. 12. 24	1 Year
6.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2015. 11. 28	1 Year

5. CONDUCTED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. Power Line Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

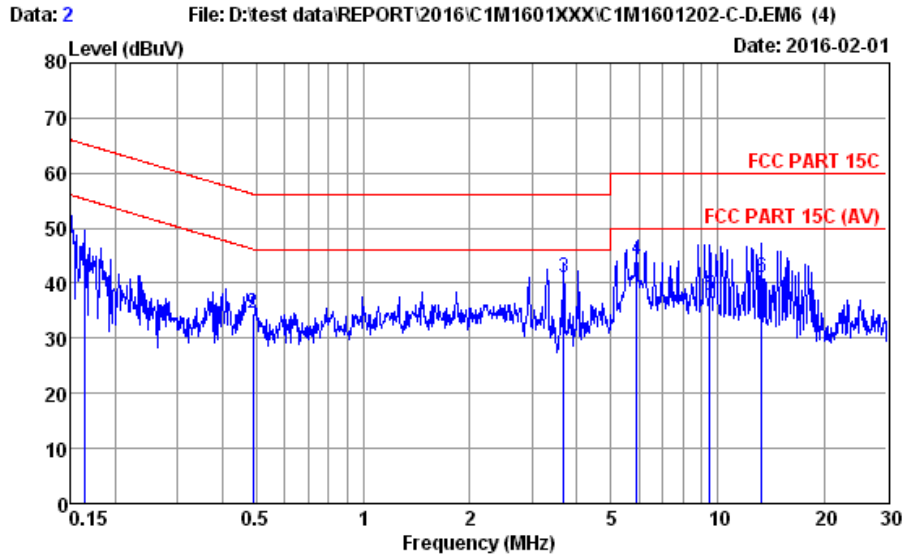
5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Conducted Emission Measurement Results

PASSED.

Test Date	2016/02/01	Temp./Hum.	22°C/52%
Test Voltage	AC 120V, 60Hz		

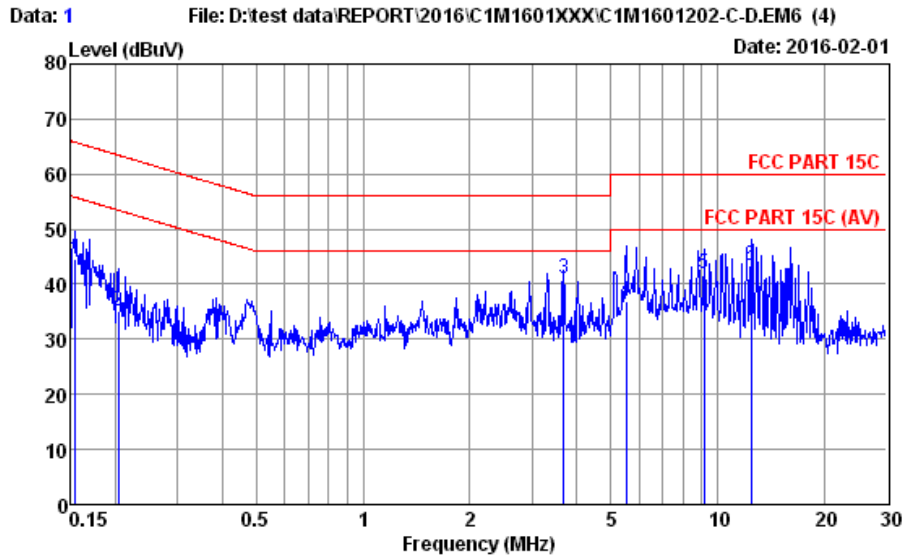


Site no. : No.8 Shielded Room Data no. : 2
 Condition : ENV4200 100169 Phase : NEUTRAL
 Limit : FCC PART 15C
 Env. / Ins. : 22°C / 52% ESCS (265) Engineer : Tim
 EUT : GWS-QX
 Power Rating : 120Vac/60Hz
 Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.163	11.38	0.03	9.87	21.71	42.99	65.30	22.31	QP
2	0.489	10.99	0.03	9.88	13.73	34.63	56.19	21.56	QP
3	3.681	11.15	0.12	9.88	19.80	40.95	56.00	15.05	QP
4	5.898	11.55	0.16	9.90	22.73	44.34	60.00	15.66	QP
5	9.502	12.03	0.20	9.90	15.58	37.71	60.00	22.29	QP
6	13.267	12.95	0.23	9.91	17.80	40.89	60.00	19.11	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

Test Date	2016/02/01	Temp./Hum.	22°C/52%
Test Voltage	AC 120V, 60Hz		



Site no. : No.8 Shielded Room Data no. : 1
 Condition : ENV4200 100169 Phase : LINE
 Limit : FCC PART 15C
 Env. / Ins. : 22°C / 52% ESCS (265) Engineer : Tim
 EUT : GWS-QX
 Power Rating : 120Vac/60Hz
 Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.154	10.75	0.03	9.87	23.83	44.48	65.78	21.30	QP
2	0.204	10.68	0.03	9.87	14.57	35.15	63.45	28.30	QP
3	3.681	10.64	0.12	9.88	20.43	41.07	56.00	14.93	QP
4	5.505	10.85	0.15	9.90	16.07	36.97	60.00	23.03	QP
5	9.156	11.16	0.20	9.90	20.73	41.99	60.00	18.01	QP
6	12.449	11.81	0.23	9.91	21.39	43.34	60.00	16.66	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

6. RADIATED EMISSION MEASUREMENT

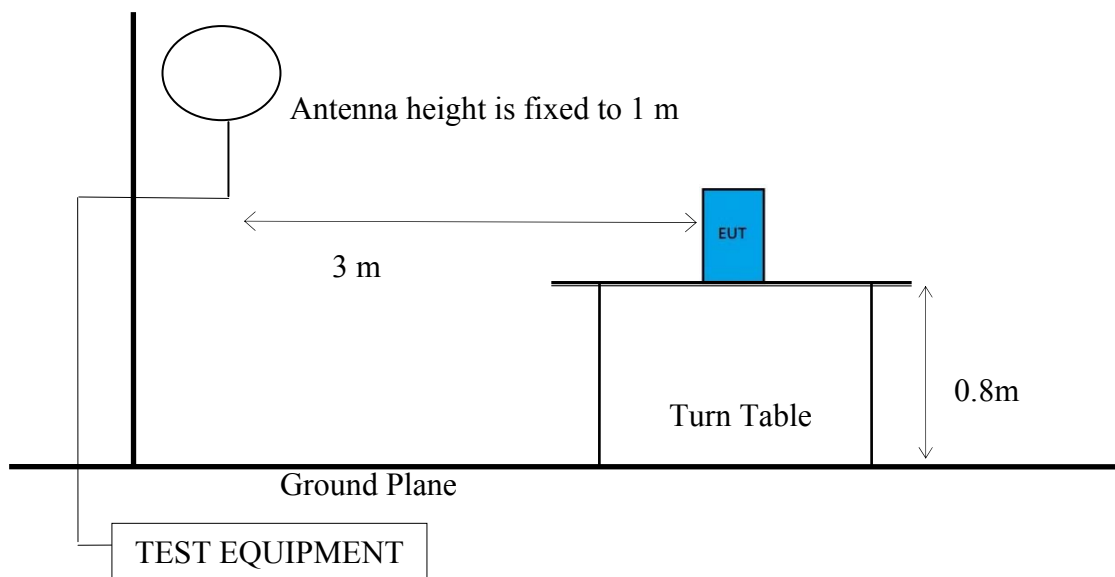
6.1. Block Diagram of Test Setup

6.1.1. Block Diagram of EUT

Indicated as section 3.7

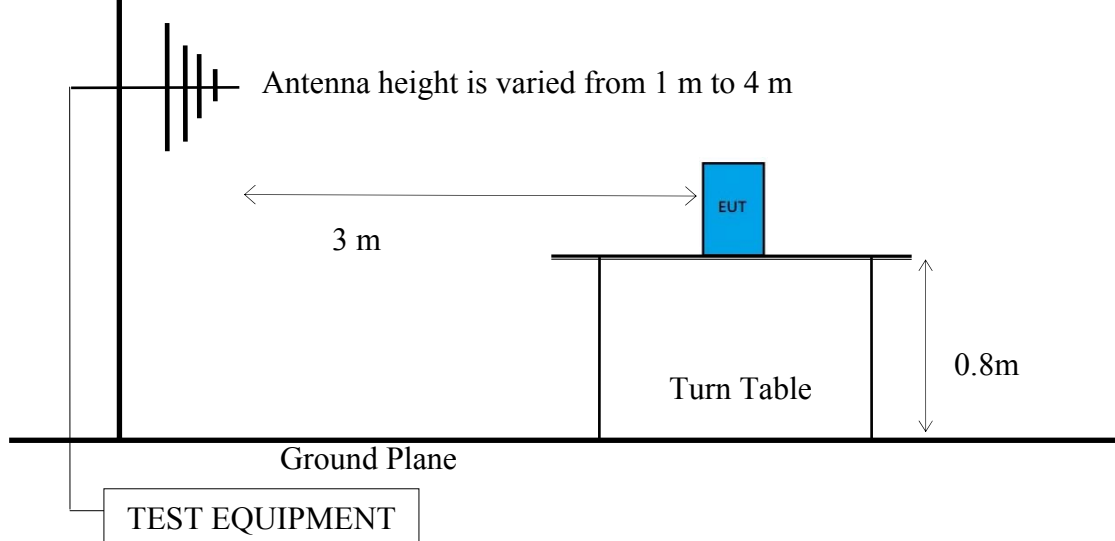
6.1.2. Semi Anechoic Chamber (3m) Setup Diagram for 9kHz-30MHz

Antenna Tower

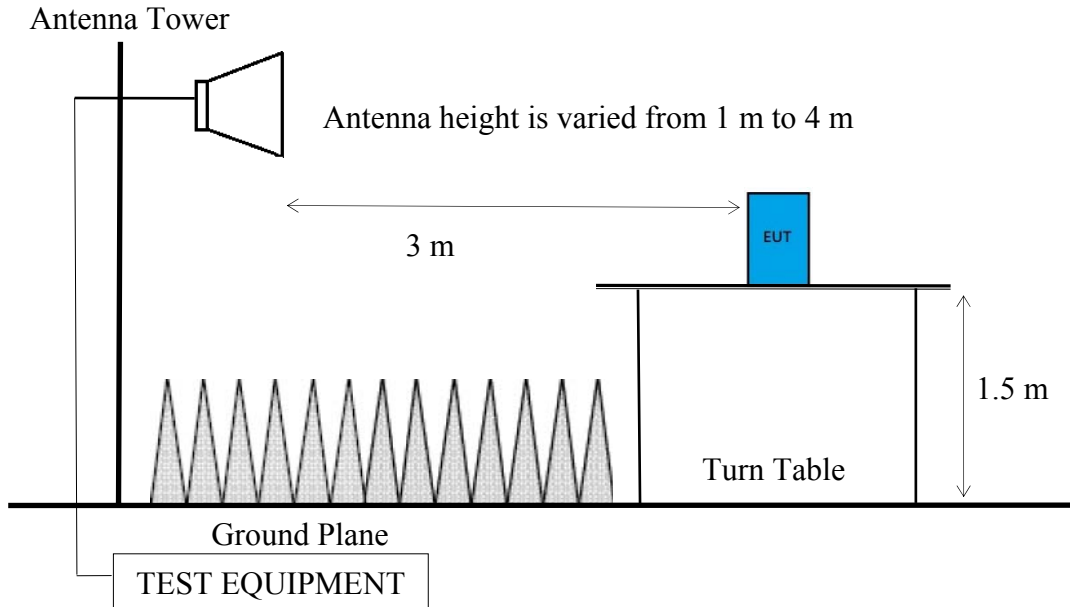


6.1.3. Semi Anechoic Chamber (3m) Setup Diagram for 30-1000 MHz

Antenna Tower



6.1.4. Fully Anechoic Chamber (3m) Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205 Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6	2400/kHz
0.490 - 1.705	30	87.6	24000/kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 40GHz:

The EUT setup on the turn find table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW \geq 3 x RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic:

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average for finally measurement.

Average Detector:

Option 1:

- (1) RBW = 1 MHz
- (2) VBW = 1/T
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Option 2:

Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation

- Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading
- Average Emission Level = Antenna Factor + Cable Loss + Meter Reading
- Average Emission Level = Peak Emission Level + DCCF
 Duty Cycle Correction Factor (DCCF) = $20 \log (TX_{on}/TX_{on+off})$ presented in section 3.5
- EPR = Peak Emission Level - 95.2dB - 2.14dB

6.5. Test Results

PASSED.

Test Date	2016/02/03	Temp./Hum.	22°C/58%
Test Voltage	AC 120V, 60Hz		

6.5.1. Emissions within Restricted Frequency Bands

6.5.1.1. Frequency Below 1 GHz

[Note: We performed testing of the highest data rate.]

Modulation	8-DPSK	Frequency	TX 2402MHz
------------	--------	-----------	------------

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
235.64	11.57	4.24	21.72	37.53	46.00	8.47	Peak
482.02	16.73	6.32	15.44	38.49	46.00	7.51	Peak
599.39	18.32	6.50	11.26	36.08	46.00	9.92	Peak
828.31	20.18	7.27	9.54	36.99	46.00	9.01	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
81.41	7.68	3.01	27.21	37.90	40.00	2.10	Peak
116.33	12.06	3.34	24.38	39.78	43.50	3.72	Peak
599.39	18.32	6.50	14.40	39.22	46.00	6.78	Peak
828.31	20.18	7.27	13.60	41.05	46.00	4.95	Peak

Modulation	8-DPSK	Frequency	TX 2441MHz
------------	--------	-----------	------------

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
233.70	11.42	4.22	28.05	43.69	46.00	2.31	Peak
480.08	16.71	6.30	16.83	39.84	46.00	6.16	Peak
720.64	19.04	6.82	13.99	39.85	46.00	6.15	Peak
827.34	20.18	7.27	12.00	39.45	46.00	6.55	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
82.38	7.83	3.02	27.11	37.96	40.00	2.04	Peak
114.39	11.95	3.33	24.09	39.37	43.50	4.13	Peak
599.39	18.32	6.50	17.71	42.53	46.00	3.47	Peak
827.34	20.18	7.27	11.98	39.43	46.00	6.57	Peak

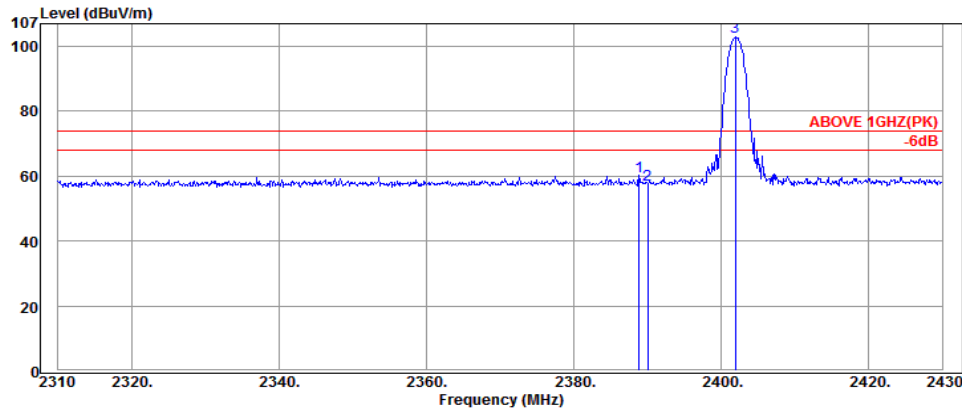
Modulation	8-DPSK		Frequency	TX 2480MHz			
Antenna at Horizontal Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
236.61	11.62	4.24	27.85	43.71	46.00	2.29	Peak
480.08	16.71	6.30	16.07	39.08	46.00	6.92	Peak
717.73	18.97	6.80	13.28	39.05	46.00	6.95	Peak
828.31	20.18	7.27	13.43	40.88	46.00	5.12	Peak
Antenna at Vertical Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
81.41	7.68	3.01	26.50	37.19	40.00	2.81	Peak
115.36	12.00	3.34	24.59	39.93	43.50	3.57	Peak
600.36	18.32	6.50	15.95	40.77	46.00	5.23	Peak
830.25	20.20	7.28	12.99	40.47	46.00	5.53	Peak

6.5.1.2. Frequency Above 1 GHz to 10th harmonics

Band Edge:

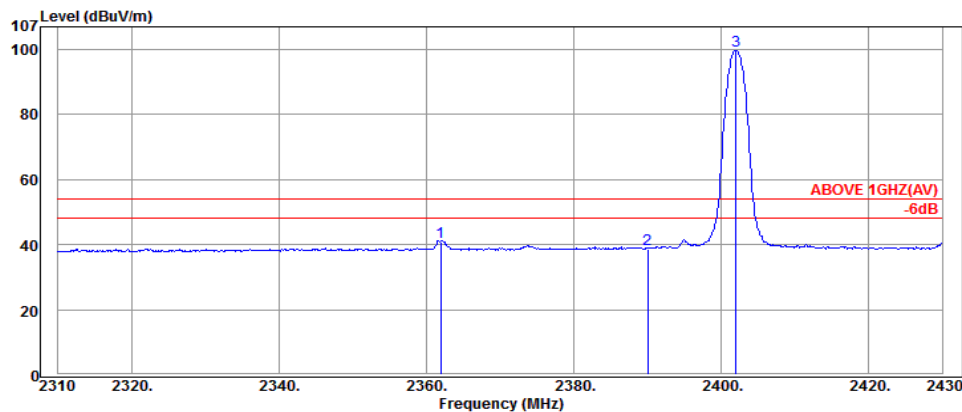
Mode	8-DPSK	Frequency	TX 2402MHz
------	--------	-----------	------------

Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.84	28.40	5.24	26.32	59.96	74.00	14.04	Peak
2390.04	28.40	5.24	23.88	57.52	74.00	16.48	Peak
2401.92	28.41	5.26	69.31	102.98	---	---	Peak

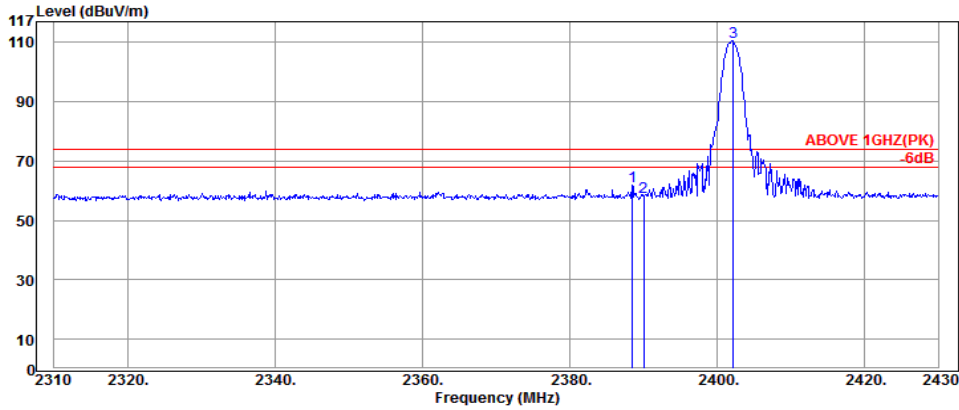
Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2361.96	28.37	5.20	7.34	40.91	54.00	13.09	Average
2390.04	28.40	5.24	5.03	38.67	54.00	15.33	Average
2402.04	28.41	5.26	65.90	99.57	---	---	Average

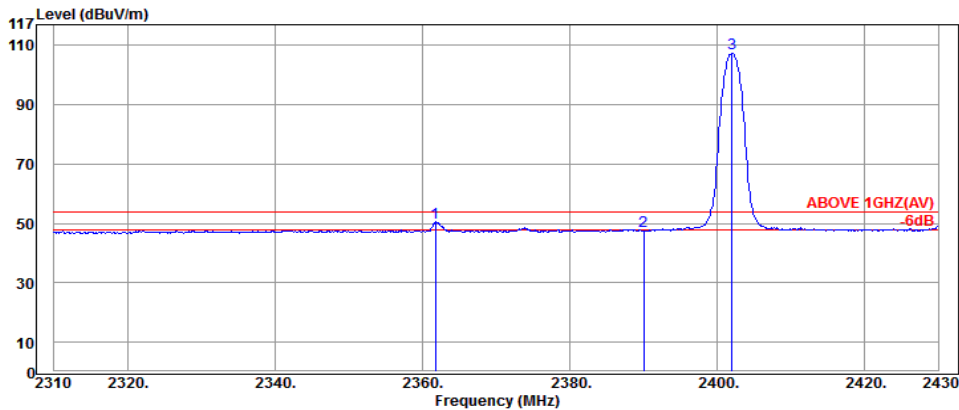
Mode	8-DPSK	Frequency	TX 2402MHz
------	--------	-----------	------------

Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.48	28.40	5.24	28.07	61.71	74.00	12.29	Peak
2390.04	28.40	5.24	24.15	57.79	74.00	16.21	Peak
2402.16	28.41	5.26	76.64	110.31	---	---	Peak

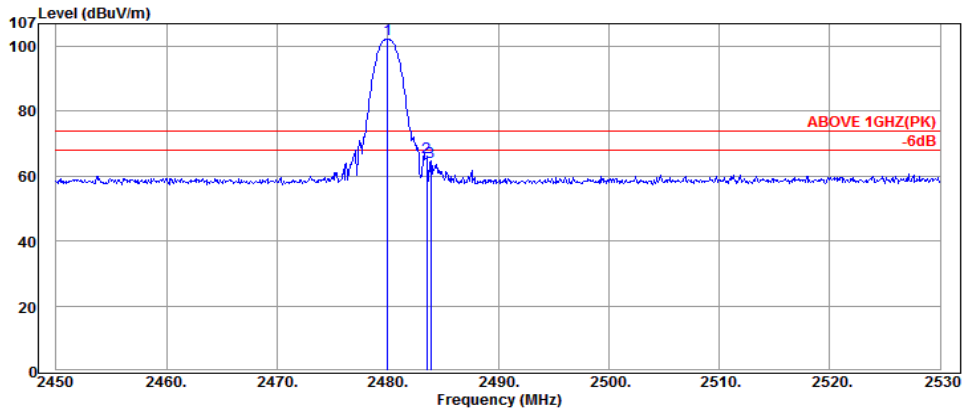
Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2361.72	28.37	5.20	16.84	50.41	54.00	3.59	Average
2390.04	28.40	5.24	13.69	47.33	54.00	6.67	Average
2402.04	28.41	5.26	73.49	107.16	---	---	Average

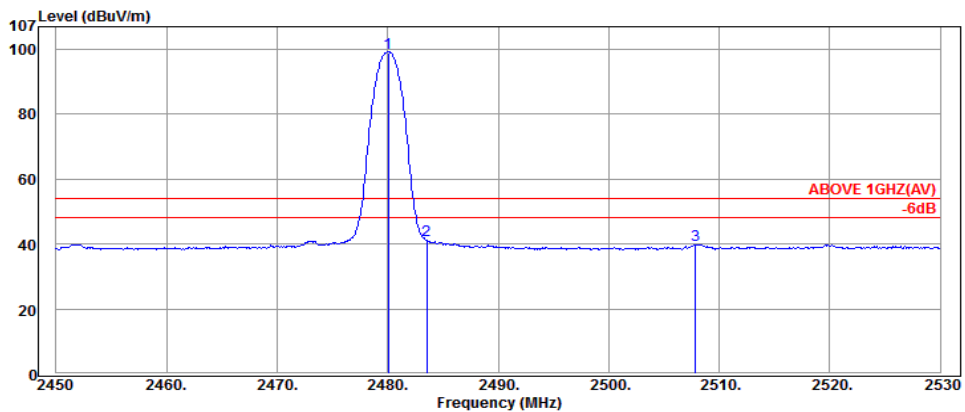
Mode	8-DPSK	Frequency	TX 2480MHz
------	--------	-----------	------------

Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.48	5.36	68.34	102.18	---	---	Peak
2483.52	28.49	5.37	31.94	65.80	74.00	8.20	Peak
2483.92	28.49	5.37	30.34	64.20	74.00	9.80	Peak

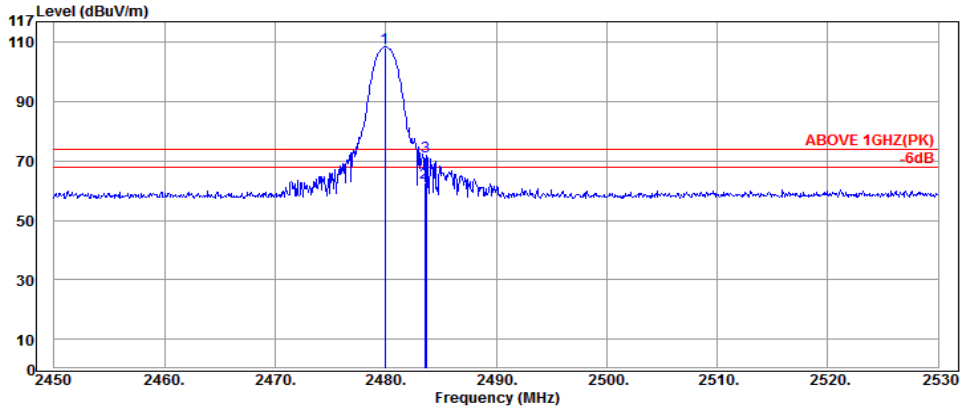
Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	28.48	5.36	65.25	99.09	---	---	Average
2483.52	28.49	5.37	7.23	41.09	54.00	12.91	Average
2507.84	28.53	5.41	5.83	39.77	54.00	14.23	Average

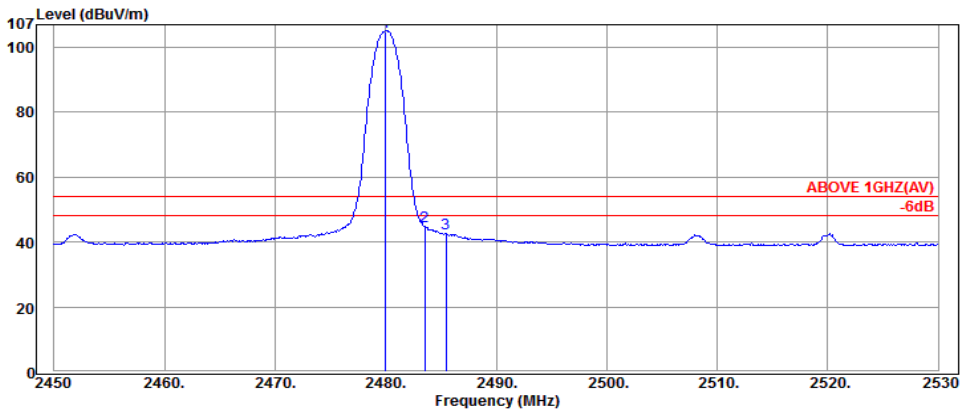
Mode	8-DPSK	Frequency	TX 2480MHz
------	--------	-----------	------------

Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.92	28.48	5.36	74.36	108.20	---	---	Peak
2483.52	28.49	5.37	28.96	62.82	74.00	11.18	Peak
2483.68	28.49	5.37	37.76	71.62	74.00	2.38	Peak

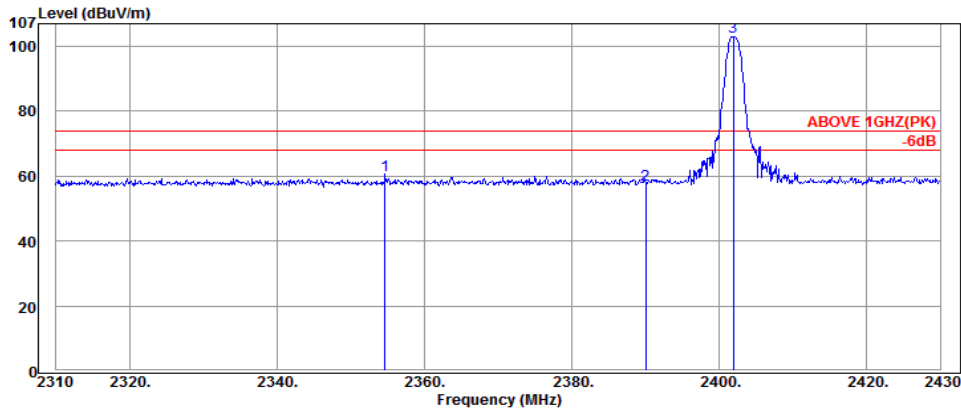
Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.48	5.36	71.09	104.93	---	---	Average
2483.52	28.49	5.37	10.96	44.82	54.00	9.18	Average
2485.44	28.49	5.37	8.86	42.72	54.00	11.28	Average

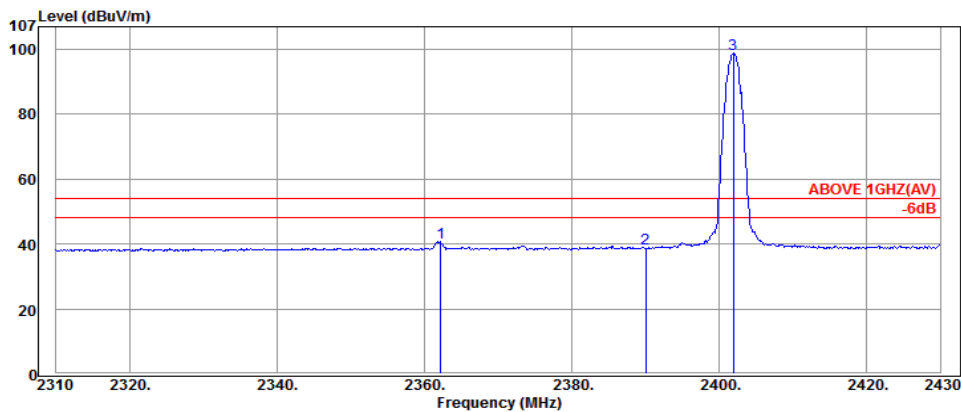
Mode	GFSK	Frequency	TX 2402MHz
------	------	-----------	------------

Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2354.64	28.36	5.19	26.85	60.40	74.00	13.60	Peak
2390.04	28.40	5.24	23.86	57.50	74.00	16.50	Peak
2401.92	28.41	5.26	69.24	102.91	---	---	Peak

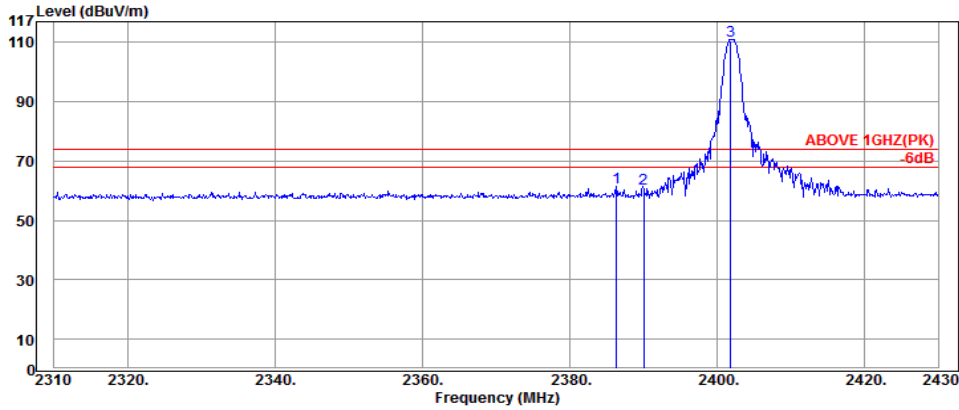
Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2362.20	28.37	5.20	7.01	40.58	54.00	13.42	Average
2390.04	28.40	5.24	5.03	38.67	54.00	15.33	Average
2401.92	28.41	5.26	65.01	98.68	---	---	Average

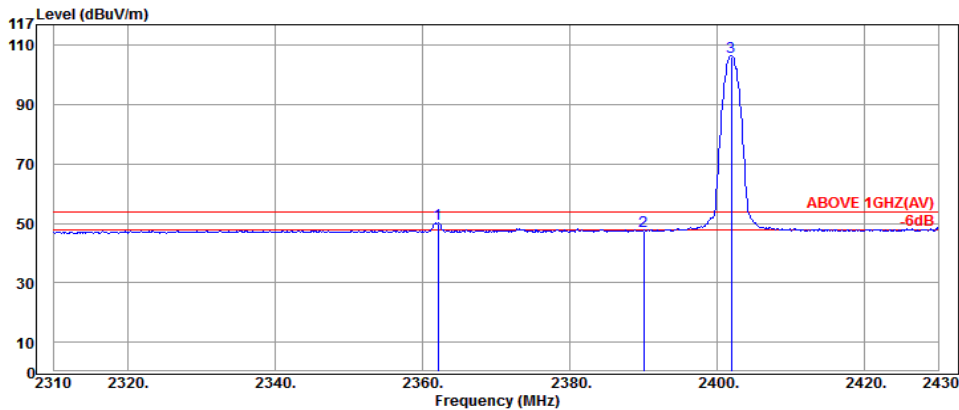
Mode	GFSK	Frequency	TX 2402MHz
------	------	-----------	------------

Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2386.32	28.40	5.23	27.58	61.21	74.00	12.79	Peak
2390.04	28.40	5.24	26.96	60.60	74.00	13.40	Peak
2401.80	28.41	5.25	77.06	110.72	---	---	Peak

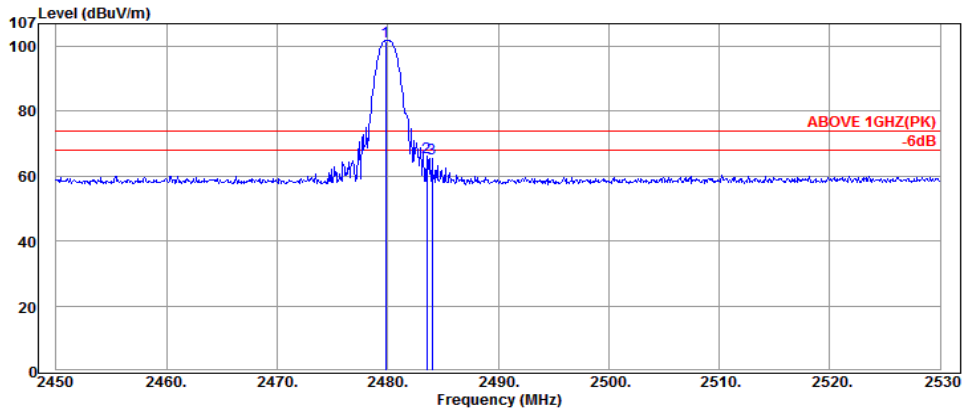
Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2362.08	28.37	5.20	16.44	50.01	54.00	3.99	Average
2390.04	28.40	5.24	13.84	47.48	54.00	6.52	Average
2401.92	28.41	5.26	72.46	106.13	---	---	Average

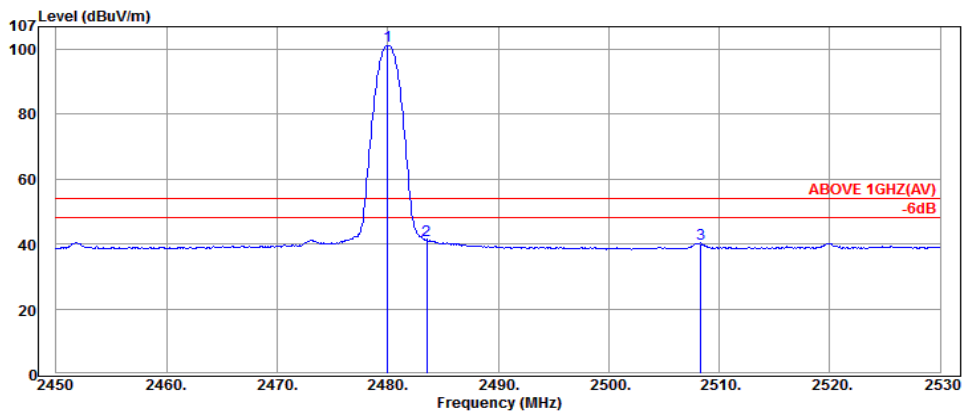
Mode	GFSK	Frequency	TX 2480MHz
------	------	-----------	------------

Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.84	28.48	5.36	67.79	101.63	---	---	Peak
2483.52	28.49	5.37	32.08	65.94	74.00	8.06	Peak
2484.00	28.49	5.37	31.54	65.40	74.00	8.60	Peak

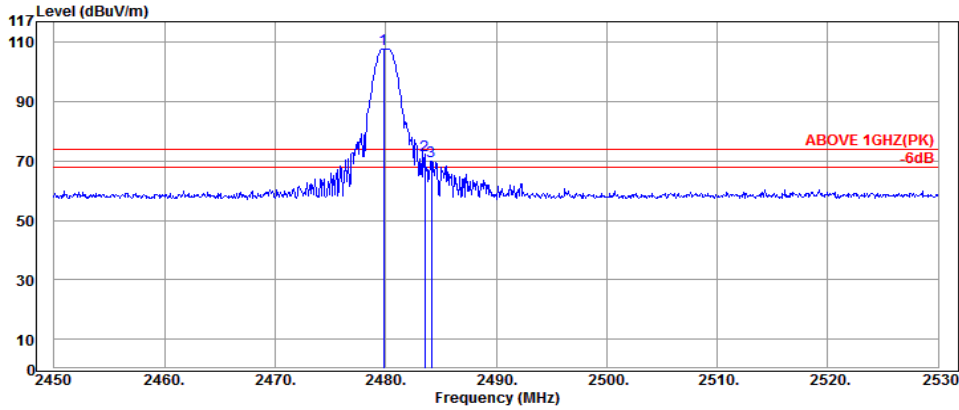
Antenna at Horizontal Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.48	5.36	67.30	101.14	---	---	Average
2483.52	28.49	5.37	7.35	41.21	54.00	12.79	Average
2508.32	28.53	5.41	6.16	40.10	54.00	13.90	Average

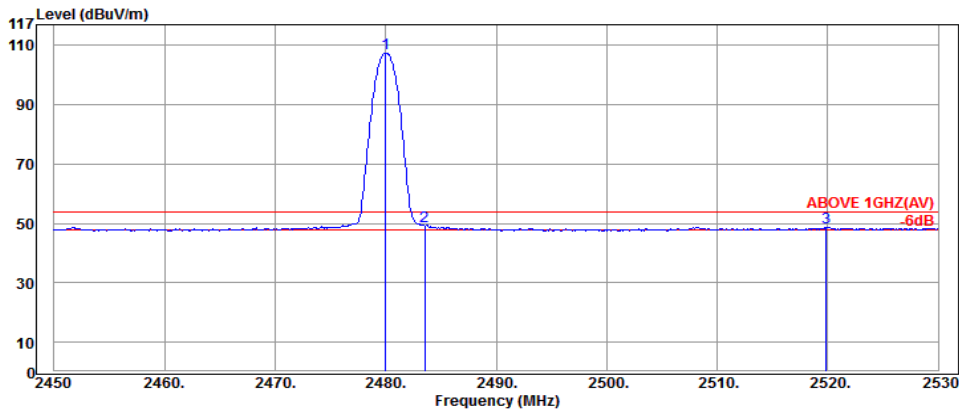
Mode	GFSK	Frequency	TX 2480MHz
------	------	-----------	------------

Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.84	28.48	5.36	73.85	107.69	---	---	Peak
2483.52	28.49	5.37	38.24	72.10	74.00	1.90	Peak
2484.32	28.49	5.37	32.84	66.70	74.00	7.30	Peak

Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.48	5.36	73.42	107.26	---	---	Average
2483.52	28.49	5.37	15.14	49.00	54.00	5.00	Average
2519.84	28.58	5.44	14.51	48.53	54.00	5.47	Average

6.5.2. Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

Modulation	8-DPSK			Frequency	TX 2402MHz		
Antenna at Horizontal Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4975.00	34.29	8.73	0.47	43.49	54.00	10.51	Peak
6660.00	36.01	10.06	-1.32	44.75	54.00	9.25	Peak
Antenna at Vertical Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3235.00	32.86	6.53	3.52	42.91	54.00	11.09	Peak
4990.00	34.30	8.78	1.70	44.78	54.00	9.22	Peak

Modulation	8-DPSK			Frequency	TX 2441MHz		
Antenna at Horizontal Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4360.00	33.89	7.88	0.89	42.66	54.00	11.34	Peak
6765.00	35.94	10.02	-1.49	44.47	54.00	9.53	Peak
Antenna at Vertical Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3200.00	32.86	6.43	3.36	42.65	54.00	11.35	Peak
4985.00	34.29	8.73	0.93	43.95	54.00	10.05	Peak

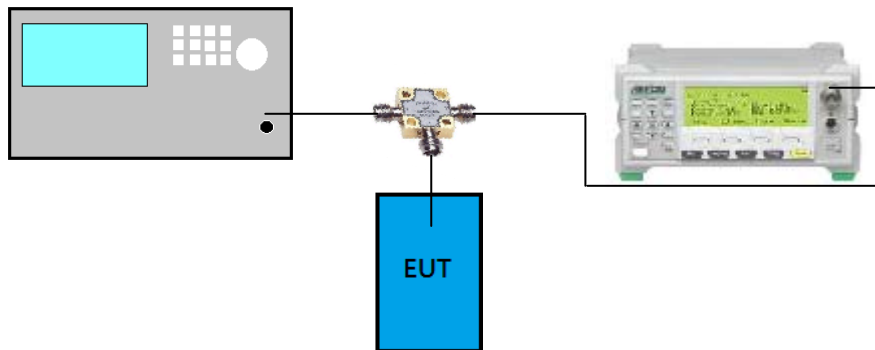
Modulation	8-DPSK			Frequency	TX 2480MHz		
Antenna at Horizontal Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5090.00	34.40	8.95	-0.60	42.75	54.00	11.25	Peak
6750.00	35.96	10.06	-1.22	44.80	54.00	9.20	Peak
Antenna at Vertical Polarization							
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4990.00	34.30	8.78	0.94	44.02	54.00	9.98	Peak
7640.00	35.83	10.84	-0.73	45.94	54.00	8.06	Peak

6.5.3. Emissions in Non-restricted Frequency Bands

All emission levels below the 15.209 general radiated emissions limits is not required.

7. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

7.3. Test Procedure

Following measurement procedure is reference to DA00-705:

- (1) Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
- (2) RBW \geq 1% of the span
- (3) VBW \geq RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

7.4. Test Results

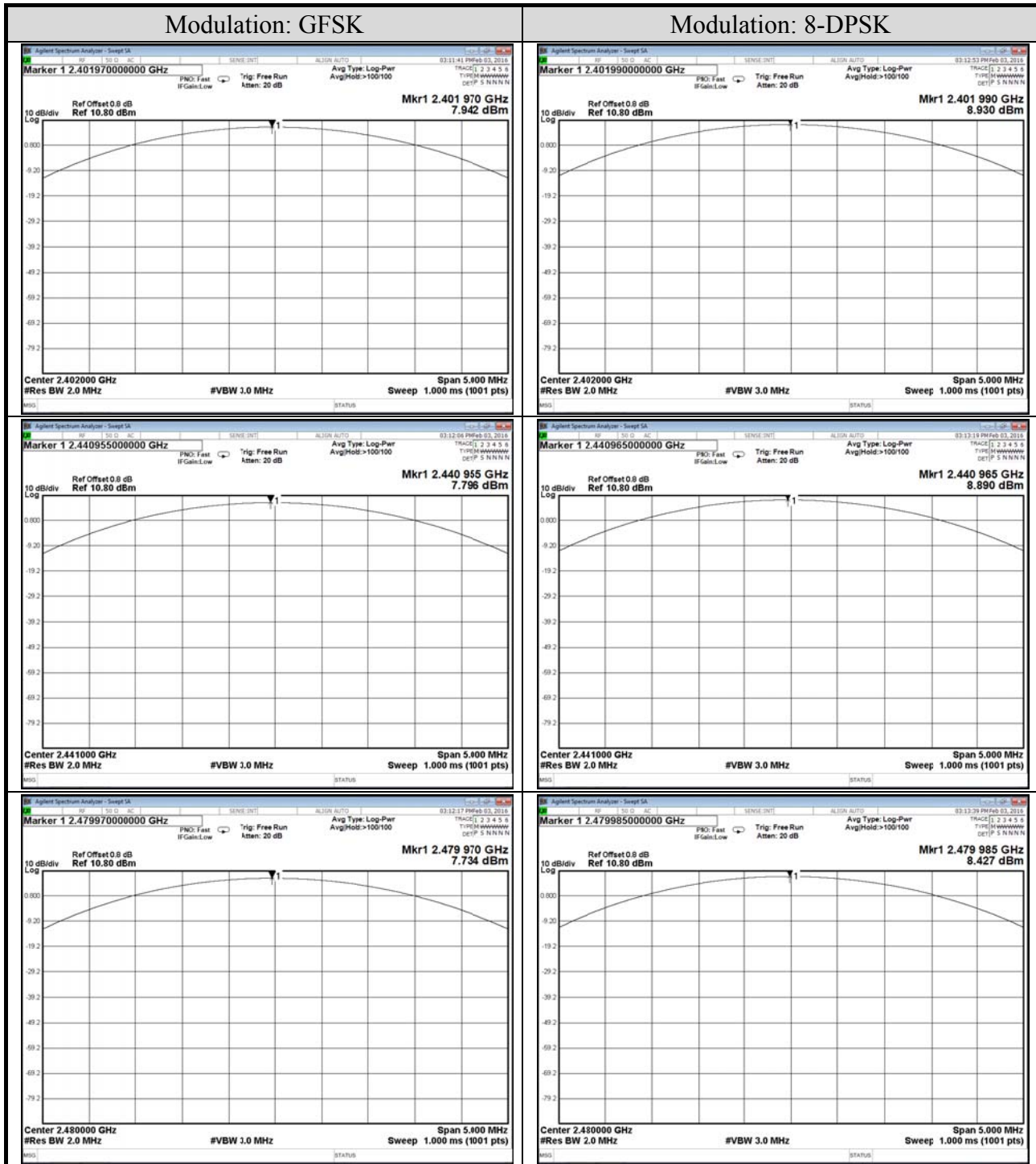
Test Date	2016/02/03	Temp./Hum.	23°C/48%
Cable Loss	0.8 dB	Test Voltage	DC 12V

7.4.1. Output Power

Modulation	Centre Frequency (MHz)	Peak Output Power		Limit
		dBm	W	
GFSK	2402	7.942	0.006226	21dBm (0.125W)
	2441	7.796	0.006020	
	2480	7.734	0.005935	
8-DPSK	2402	8.930	0.007816	21dBm (0.125W)
	2441	8.890	0.007745	
	2480	8.427	0.006961	

Note: All results have been included cable loss.

7.4.2. Measurement Plots



8. DEVIATION TO TEST SPECIFICATIONS

【NONE】