FCC Test Report

FCC ID	:	**NKR-SY30**
Equipment	:	**WLAN/BT Module**
Model No.	:	**DHSR-SY30**
Brand Name	:	**Wistron NeWeb Corp.**
Applicant	:	**Wistron NeWeb Corp.**
Address	:	**20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Dec. 07, 2015**
Tested Date	:	**Dec. 31, 2015 ~ Jan. 21, 2016**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Gary Chang / Manager

Testing Laboratory
2732

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Release Record

Report No.	Version	Description	Issued Date
FR5D0701AD	Rev. 01	Initial issue	Jan. 29, 2016

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 21.260MHz 18.29 (Margin -31.71dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 51.34MHz 29.85 (Margin -10.15dB) - PK	Pass
15.247(d)	Band Edge	Meet the requirement of limit	Pass
15.247(b)(1)	Conducted Output Power	Power [dBm]: 10.22	Pass
15.247(a)(1)(iii)	Number of Hopping Channels	Meet the requirement of limit	Pass
15.247(a)(1)	Hopping Channel Separation	Meet the requirement of limit	Pass
15.247(a)(1)(iii)	Dwell Time	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	**Bluetooth Mode**	**Ch. Frequency (MHz)**	**Channel Number**	**Data Rate**
2400-2483.5	BR	2402-2480	0-78 [79]	1 Mbps
2400-2483.5	EDR	2402-2480	0-78 [79]	2 Mbps
2400-2483.5	EDR	2402-2480	0-78 [79]	3 Mbps
Note 1: RF output power specifies that Maximum Peak Conducted Output Power. Note 2: Bluetooth BR uses a GFSK. Note 3: Bluetooth EDR uses a combination of π/4-DQPSK and 8DPSK.				

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Gain (dBi)
1	Antenna 1 (Green PCB, Cable 1)	Dipole	UFL	0.21
2	Antenna 2 (Blue PCB, Cable 2)	Dipole	UFL	1.25

Note: Antenna 2 with highest gain was chosen for final test.

The following antenna cables are used in this EUT. The only difference is cable length.

For Antenna 1 (Green PCB, Cable 1)

Cable No.	Model (Cable Color: Black)	Cable No.	Model (Cable Color: Gray)	Cable Length (mm)
1	8JJEKQ1990000001H1	22	8JJEKR1990000001H1	199
2	8JJEKQ2100000001H1	23	8JJEKR2100000001H1	210
3	8JJEKQ2200000001H1	24	8JJEKR2200000001H1	220
4	8JJEKQ2300000001H1	25	8JJEKR2300000001H1	230
5	8JJEKQ2400000001H1	26	8JJEKR2400000001H1	240
6	8JJEKQ2500000001H1	27	8JJEKR2500000001H1	250
7	8JJEKQ2600000001H1	28	8JJEKR2600000001H1	260
8	8JJEKQ2700000001H1	29	8JJEKR2700000001H1	270
9	8JJEKQ2800000001H1	30	8JJEKR2800000001H1	280
10	8JJEKQ2900000001H1	31	8JJEKR2900000001H1	290
11	8JJEKQ3000000001H1	32	8JJEKR3000000001H1	300
12	8JJEKQ3100000001H1	33	8JJEKR3100000001H1	310
13	8JJEKQ3200000001H1	34	8JJEKR3200000001H1	320
14	8JJEKQ3300000001H1	35	8JJEKR3300000001H1	330
15	8JJEKQ3400000001H1	36	8JJEKR3400000001H1	340
16	8JJEKQ3500000001H1	37	8JJEKR3500000001H1	350
17	8JJEKQ3600000001H1	38	8JJEKR3600000001H1	360
18	8JJEKQ3700000001H1	39	8JJEKR3700000001H1	370
19	8JJEKQ3800000001H1	40	8JJEKR3800000001H1	380
20	8JJEKQ3900000001H1	41	8JJEKR3900000001H1	390
21	8JJEKQ4000000001H1	42	8JJEKR4000000001H1	400

For Antenna 2 (Blue PCB, Cable 2)

Cable No.	Model (Cable Color: Black)	Cable No.	Model (Cable Color: Gray)	Cable No.	Model (Cable Color: White)	Cable Length (mm)
1	8JJEKQ4000000001H1	52	8JJEKR4000000001H1	103	8JJEKP4000000001H1	400
2	8JJEKQ4100000001H1	53	8JJEKR4100000001H1	104	8JJEKP4100000001H1	410
3	8JJEKQ4200000001H1	54	8JJEKR4200000001H1	105	8JJEKP4200000001H1	420
4	8JJEKQ4300000001H1	55	8JJEKR4300000001H1	106	8JJEKP4300000001H1	430
5	8JJEKQ4400000001H1	56	8JJEKR4400000001H1	107	8JJEKP4400000001H1	440
6	8JJEKQ4500000001H1	57	8JJEKR4500000001H1	108	8JJEKP4500000001H1	450
7	8JJEKQ4600000001H1	58	8JJEKR4600000001H1	109	8JJEKP4600000001H1	460
8	8JJEKQ4700000001H1	59	8JJEKR4700000001H1	110	8JJEKP4700000001H1	470
9	8JJEKQ4800000001H1	60	8JJEKR4800000001H1	111	8JJEKP4800000001H1	480
10	8JJEKQ4900000001H1	61	8JJEKR4900000001H1	112	8JJEKP4900000001H1	490
11	8JJEKQ5000000001H1	62	8JJEKR5000000001H1	113	8JJEKP5000000001H1	500
12	8JJEKQ5100000001H1	63	8JJEKR5100000001H1	114	8JJEKP5100000001H1	510
13	8JJEKQ5200000001H1	64	8JJEKR5200000001H1	115	8JJEKP5200000001H1	520
14	8JJEKQ5300000001H1	65	8JJEKR5300000001H1	116	8JJEKP5300000001H1	530
15	8JJEKQ5400000001H1	66	8JJEKR5400000001H1	117	8JJEKP5400000001H1	540
16	8JJEKQ5500000001H1	67	8JJEKR5500000001H1	118	8JJEKP5500000001H1	550
17	8JJEKQ5600000001H1	68	8JJEKR5600000001H1	119	8JJEKP5600000001H1	560
18	8JJEKQ5700000001H1	69	8JJEKR5700000001H1	120	8JJEKP5700000001H1	570
19	8JJEKQ5800000001H1	70	8JJEKR5800000001H1	121	8JJEKP5800000001H1	580
20	8JJEKQ5900000001H1	71	8JJEKR5900000001H1	122	8JJEKP5900000001H1	590
21	8JJEKQ6000000001H1	72	8JJEKR6000000001H1	123	8JJEKP6000000001H1	600
22	8JJEKQ6100000001H1	73	8JJEKR6100000001H1	124	8JJEKP6100000001H1	610
23	8JJEKQ6200000001H1	74	8JJEKR6200000001H1	125	8JJEKP6200000001H1	620
24	8JJEKQ6300000001H1	75	8JJEKR6300000001H1	126	8JJEKP6300000001H1	630
25	8JJEKQ6400000001H1	76	8JJEKR6400000001H1	127	8JJEKP6400000001H1	640
26	8JJEKQ6500000001H1	77	8JJEKR6500000001H1	128	8JJEKP6500000001H1	650
27	8JJEKQ6600000001H1	78	8JJEKR6600000001H1	129	8JJEKP6600000001H1	660
28	8JJEKQ6700000001H1	79	8JJEKR6700000001H1	130	8JJEKP6700000001H1	670
29	8JJEKQ6800000001H1	80	8JJEKR6800000001H1	131	8JJEKP6800000001H1	680
30	8JJEKQ6900000001H1	81	8JJEKR6900000001H1	132	8JJEKP6900000001H1	690
31	8JJEKQ7000000001H1	82	8JJEKR7000000001H1	133	8JJEKP7000000001H1	700
32	8JJEKQ7100000001H1	83	8JJEKR7100000001H1	134	8JJEKP7100000001H1	710
33	8JJEKQ7200000001H1	84	8JJEKR7200000001H1	135	8JJEKP7200000001H1	720
34	8JJEKQ7300000001H1	85	8JJEKR7300000001H1	136	8JJEKP7300000001H1	730
35	8JJEKQ7400000001H1	86	8JJEKR7400000001H1	137	8JJEKP7400000001H1	740
36	8JJEKQ7500000001H1	87	8JJEKR7500000001H1	138	8JJEKP7500000001H1	750
37	8JJEKQ7600000001H1	88	8JJEKR7600000001H1	139	8JJEKP7600000001H1	760

38	8JJEKQ7700000001H1	89	8JJEKR7700000001H1	140	8JJEKP7700000001H1	770
39	8JJEKQ7800000001H1	90	8JJEKR7800000001H1	141	8JJEKP7800000001H1	780
40	8JJEKQ7900000001H1	91	8JJEKR7900000001H1	142	8JJEKP7900000001H1	790
41	8JJEKQ8000000001H1	92	8JJEKR8000000001H1	143	8JJEKP8000000001H1	800
42	8JJEKQ8100000001H1	93	8JJEKR8100000001H1	144	8JJEKP8100000001H1	810
43	8JJEKQ8200000001H1	94	8JJEKR8200000001H1	145	8JJEKP8200000001H1	820
44	8JJEKQ8300000001H1	95	8JJEKR8300000001H1	146	8JJEKP8300000001H1	830
45	8JJEKQ8400000001H1	96	8JJEKR8400000001H1	147	8JJEKP8400000001H1	840
46	8JJEKQ8500000001H1	97	8JJEKR8500000001H1	148	8JJEKP8500000001H1	850
47	8JJEKQ8600000001H1	98	8JJEKR8600000001H1	149	8JJEKP8600000001H1	860
48	8JJEKQ8700000001H1	99	8JJEKR8700000001H1	150	8JJEKP8700000001H1	870
49	8JJEKQ8800000001H1	100	8JJEKR8800000001H1	151	8JJEKP8800000001H1	880
50	8JJEKQ8900000001H1	101	8JJEKR8900000001H1	152	8JJEKP8900000001H1	890
51	8JJEKQ9000000001H1	102	8JJEKR9000000001H1	153	8JJEKP9000000001H1	900

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	DC 4V/1A

1.1.4 Accessories

N/A

1.1.5 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	WCN Combo Tool, ver.2.1417.00

1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)		
	2402	2441	2480
GFSK/1Mbps	7	7	7
8DPSK/3Mbps	7	7	7

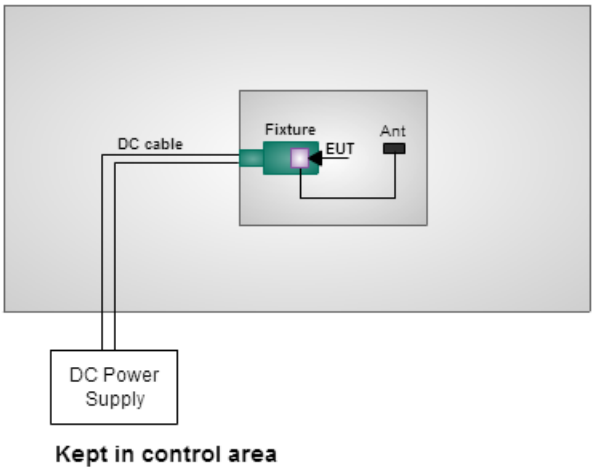
1.2 Local Support Equipment List

Support Equipment List						
No.	**Equipment**	**Brand**	**Model**	**S/N**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	Latitude E6440	2ZC4Z52	DoC	---
2	DC Power Supply	GW INSTEK	GPC-3060D	EM884797	---	---
3	Fixture	---	---	---	---	---

Note: Fixture was supplied by applicant.

1.3 Test Setup Chart

Test Setup Diagram



Note: The support notebook was disconnected from EUT and removed from test table when EUT is set to transmit continuously.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Dec. 31, 2015				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
EMC Receiver	R&S	ESCS 30	100169	Oct. 21, 2015	Oct. 20, 2016
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 13, 2015	Nov. 12, 2016
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 21, 2015	Dec. 20, 2016
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Jan. 21, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Feb. 03, 2015	Feb. 02, 2016
Receiver	R&S	ESR3	101658	Nov. 04, 2015	Nov. 03, 2016
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 20, 2015	Aug. 19, 2016
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Oct. 07, 2015	Oct. 06, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016
Loop Antenna	R&S	HFH2-Z2	11900	Nov. 16, 2015	Nov. 15, 2016
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 10, 2015	Dec. 09, 2016
Preamplifier	Burgeon	BPA-530	SN:100219	Sep. 10, 2015	Sep. 09, 2016
Preamplifier	Agilent	83017A	MY39501308	Oct. 02, 2015	Oct. 01, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Jan. 21, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Feb. 03, 2015	Feb. 02, 2016
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016
DC POWER SOURCE	GW INSTEK	GPC-3060D	EM884797	Oct. 20, 2015	Oct. 19, 2016
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247
FCC Public notice DA 00-705
ANSI C63.10-2013

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.134 Hz
Conducted power	±0.808 dB
Power density	±0.463 dB
Conducted emission	±2.670 dB
AC conducted emission	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	20°C / 59%	Peter Lin
Radiated Emissions	03CH01-WS	22°C / 63%	Vincent Yeh Felix Sung
RF Conducted	TH01-WS	23°C / 65%	Alex Huang

- FCC site registration No.: 657002
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate (Mbps)
Conducted Emissions	8DPSK	2402	3Mbps
Radiated Emissions ≤ 1GHz	8DPSK	2402	3Mbps
Radiated Emissions > 1GHz	GFSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480	1Mbps 3Mbps
Conducted Output Power	GFSK Л/4 QDPSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480 2402, 2441, 2480	1Mbps 2Mbps 3Mbps
Number of Hopping Channels	GFSK 8DPSK	2402~2480 2402~2480	1Mbps 3Mbps
Hopping Channel Separation	GFSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480	1Mbps 3Mbps
Dwell Time	GFSK 8DPSK	2402 2402	1Mbps 3Mbps

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** result was found as the worst case and was shown in this report.
2. See item 1.1.2 antenna sheet list. **Cable length 400mm & 900mm** were selected for radiated emission below 1GHz test. **Cable length 400mm** was for radiated emission above 1GHz test.
3. Test configurations are listed as below:
   1) Configuration 1: Antenna cable length: 400mm.
   2) Configuration 2: Antenna cable length: 900mm.

3 Transmitter Test Results

3.1 Conducted Emissions

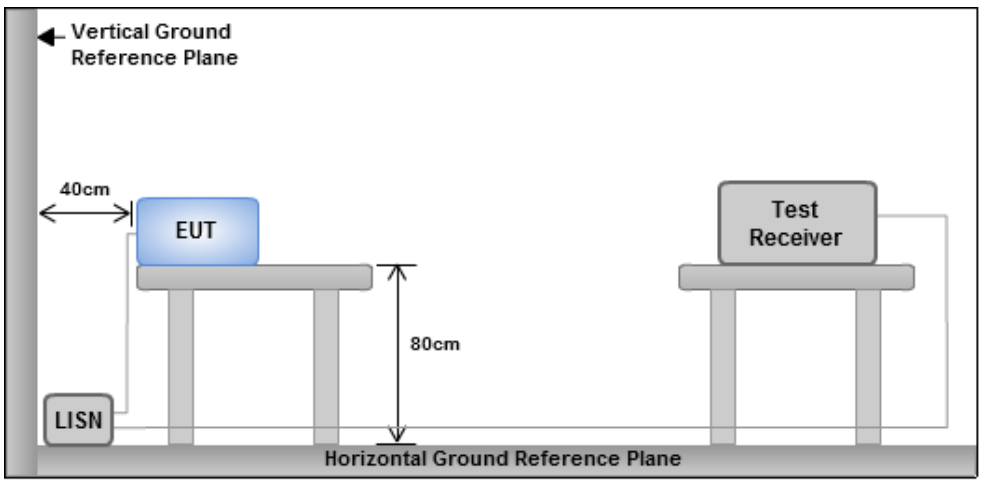
3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

3.1.3 Test Setup

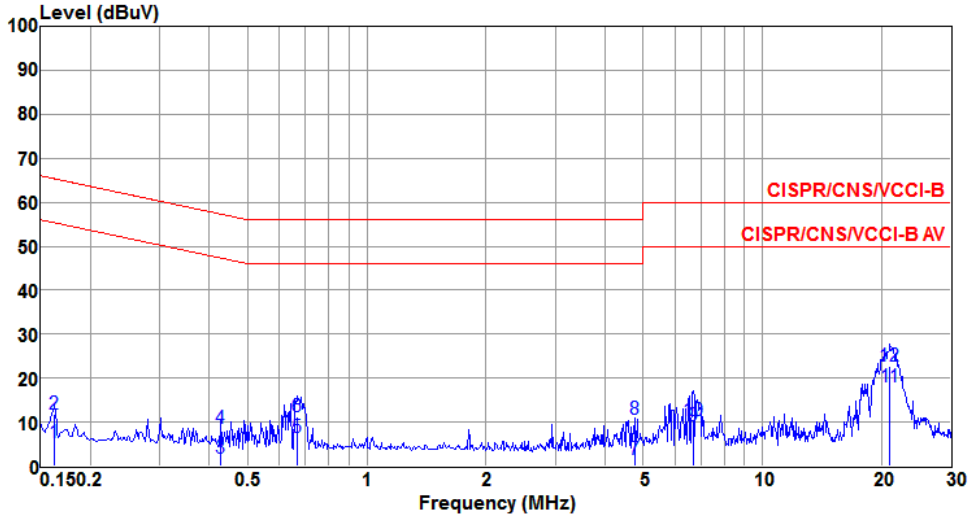


Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

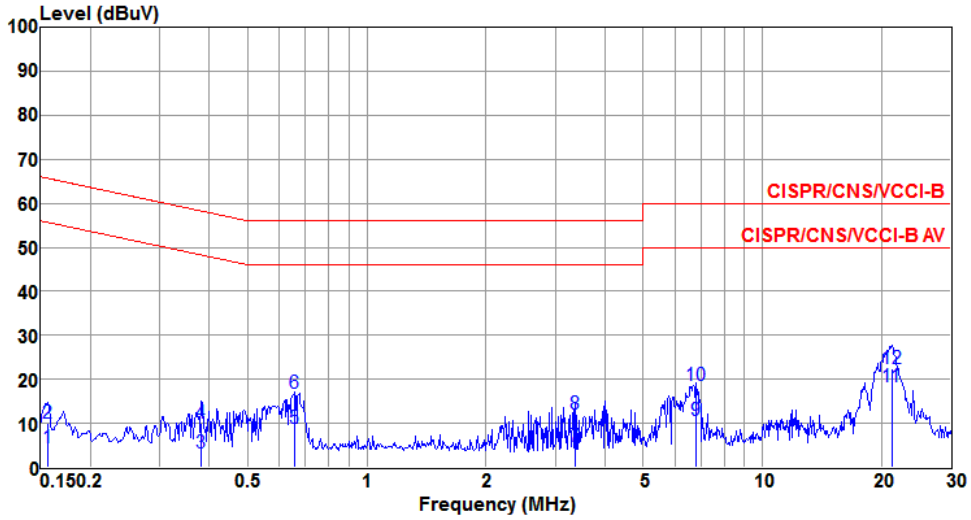
Modulation Mode	8DPSK	Test Freq. (MHz)	2402
Power Phase	Line		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.162	5.26	55.34	-50.08	5.13	0.11	0.02	Average
2	0.162	11.67	65.34	-53.67	11.54	0.11	0.02	QP
3	0.428	1.90	47.29	-45.39	1.74	0.13	0.03	Average
4	0.428	8.56	57.29	-48.73	8.40	0.13	0.03	QP
5	0.668	6.50	46.00	-39.50	6.32	0.13	0.05	Average
6	0.668	11.32	56.00	-44.68	11.14	0.13	0.05	QP
7	4.746	1.40	46.00	-44.60	1.07	0.20	0.13	Average
8	4.746	10.72	56.00	-45.28	10.39	0.20	0.13	QP
9	6.698	9.29	50.00	-40.71	8.93	0.22	0.14	Average
10	6.698	10.22	60.00	-49.78	9.86	0.22	0.14	QP
11@	21.035	18.02	50.00	-31.98	17.45	0.38	0.19	Average
12	21.035	22.73	60.00	-37.27	22.16	0.38	0.19	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation Mode	8DPSK	Test Freq. (MHz)	2402
Power Phase	Neutral		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.156	4.31	55.65	-51.34	4.16	0.13	0.02	Average
2	0.156	9.96	65.65	-55.69	9.81	0.13	0.02	QP
3	0.381	3.13	48.25	-45.12	2.96	0.14	0.03	Average
4	0.381	10.05	58.25	-48.20	9.88	0.14	0.03	QP
5	0.658	8.77	46.00	-37.23	8.59	0.13	0.05	Average
6	0.658	16.81	56.00	-39.19	16.63	0.13	0.05	QP
7	3.364	4.76	46.00	-41.24	4.48	0.17	0.11	Average
8	3.364	12.16	56.00	-43.84	11.88	0.17	0.11	QP
9	6.805	10.57	50.00	-39.43	10.20	0.23	0.14	Average
10	6.805	18.63	60.00	-41.37	18.26	0.23	0.14	QP
11@	21.260	18.29	50.00	-31.71	17.69	0.41	0.19	Average
12	21.260	22.55	60.00	-37.45	21.95	0.41	0.19	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 Unwanted Emissions into Restricted Frequency Bands

3.2.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.2.2 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

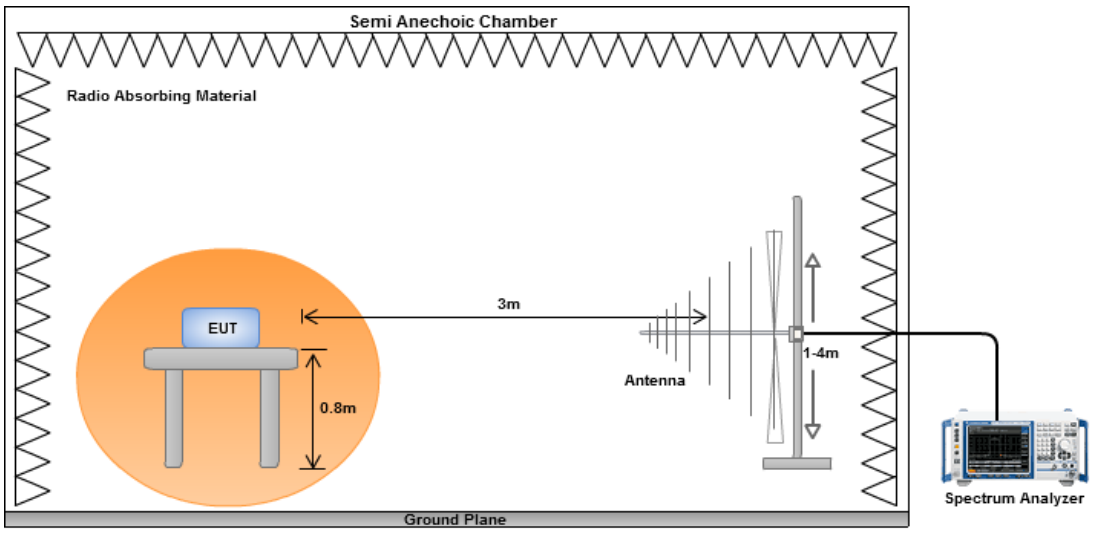
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. Radiated emission above 1GHz / Peak value
   RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value for harmonics
   The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula for DH5 packet type which has worst duty factor:

$$20\log(\text{Duty cycle}) = 20\log\frac{1\text{s} / 1600 * 5}{100\text{ ms}} = -30.1\text{dB}$$

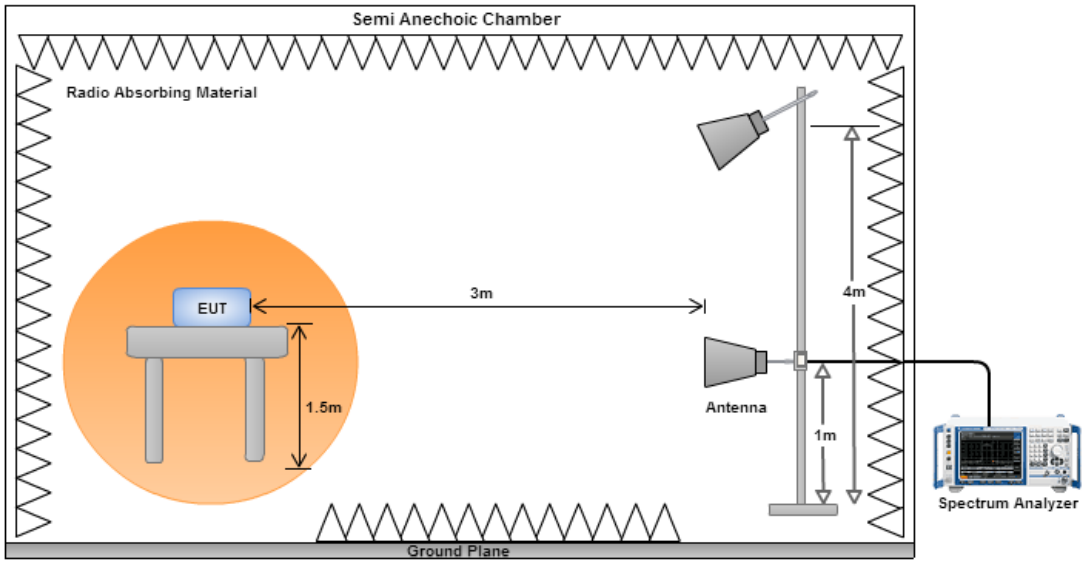
4. Radiated emission above 1GHz / Average value for other emissions
   RBW=1MHz, VBW=1/T and Peak detector

3.2.3 Test Setup

Radiated Emissions below 1 GHz

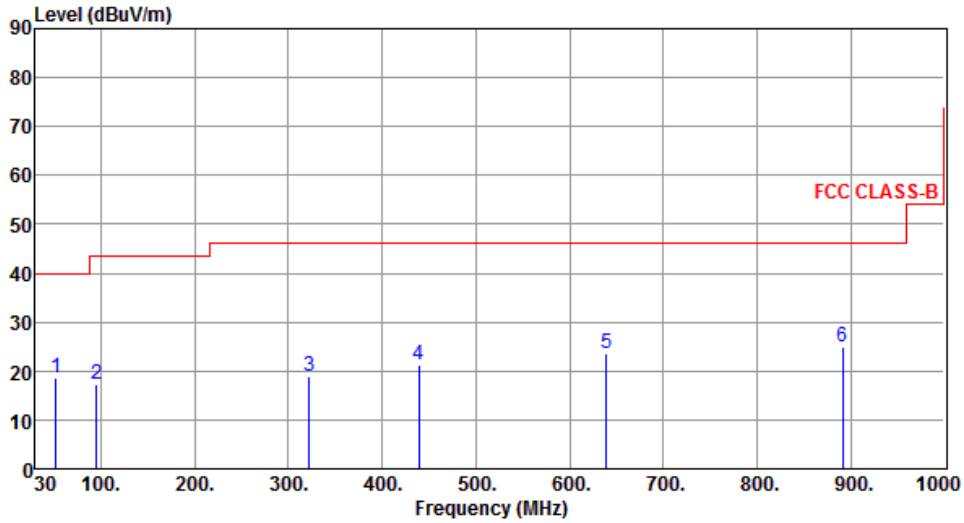


Radiated Emissions above 1 GHz



3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

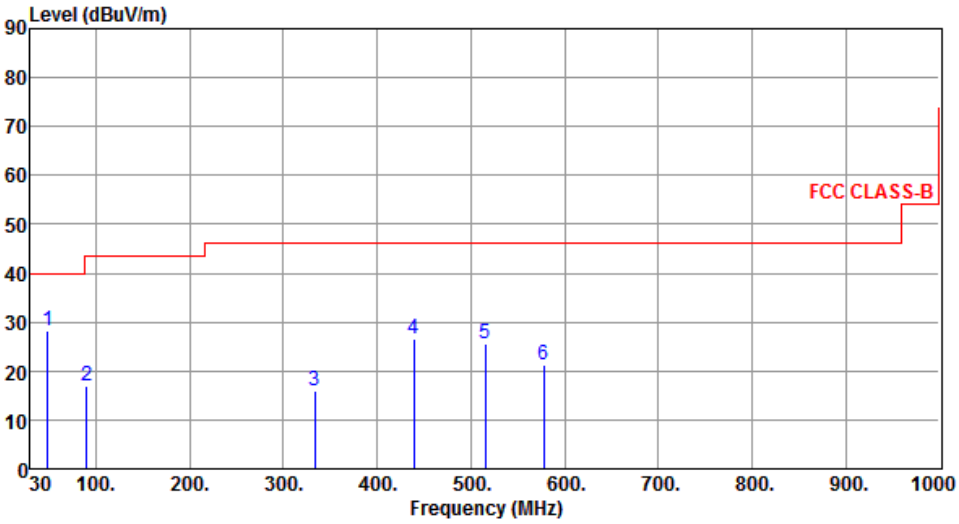
Modulation	8DPSK	Test Freq. (MHz)	2402
Polarization	Horizontal	Test Configuration	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	52.31	18.76	40.00	-21.24	35.39	-16.63	Peak	---	---
2	94.99	17.30	43.50	-26.20	39.46	-22.16	Peak	---	---
3	321.97	19.00	46.00	-27.00	34.34	-15.34	Peak	---	---
4	439.34	21.34	46.00	-24.66	33.77	-12.43	Peak	---	---
5	639.16	23.58	46.00	-22.42	32.43	-8.85	Peak	---	---
6	891.36	24.92	46.00	-21.08	30.25	-5.33	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

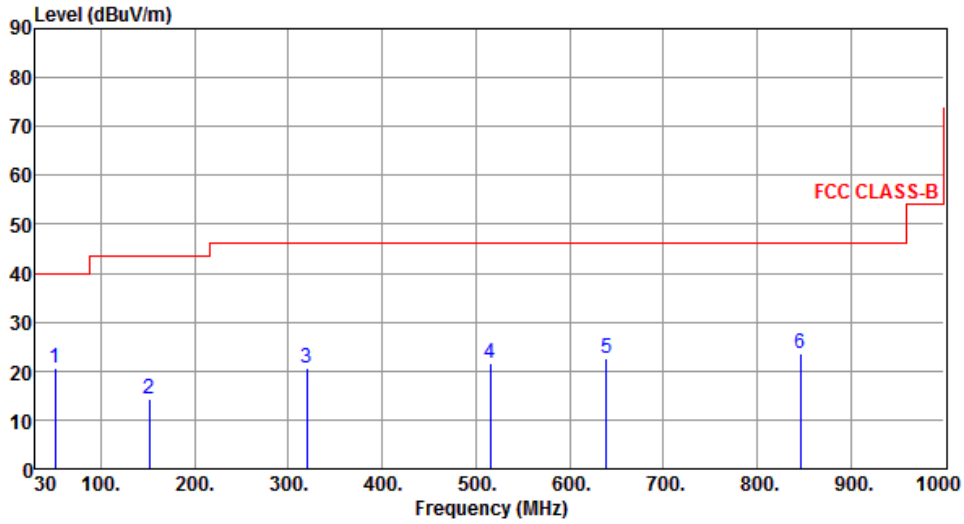
Modulation	8DPSK	**Test Freq. (MHz)**	2402
Polarization	Vertical	**Test Configuration**	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	48.43	28.17	40.00	-11.83	44.51	-16.34	Peak	---	---
2	90.14	16.88	43.50	-26.62	39.85	-22.97	Peak	---	---
3	333.61	15.85	46.00	-30.15	30.98	-15.13	Peak	---	---
4	439.34	26.57	46.00	-19.43	39.00	-12.43	Peak	---	---
5	515.00	25.63	46.00	-20.37	36.55	-10.92	Peak	---	---
6	578.05	21.33	46.00	-24.67	31.27	-9.94	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

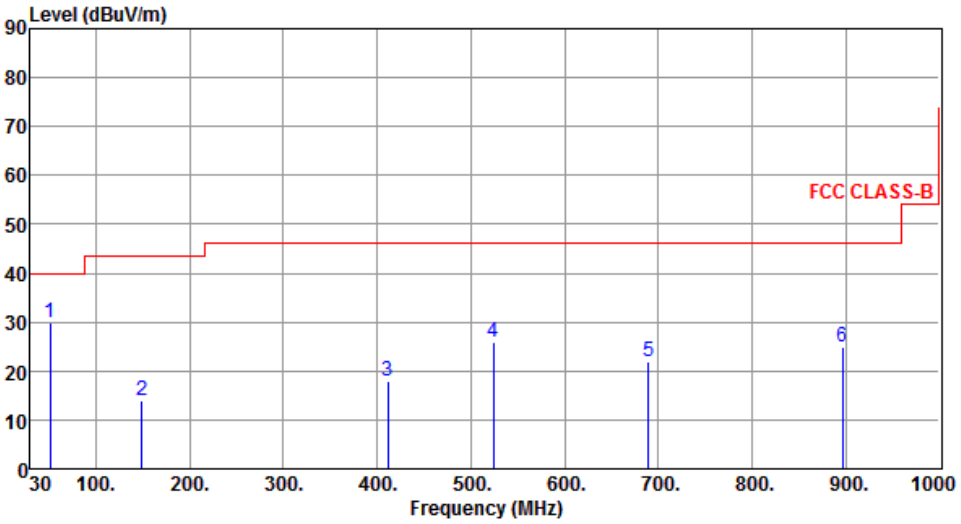
Modulation	8DPSK	Test Freq. (MHz)	2402
Polarization	Horizontal	Test Configuration	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	51.34	20.47	40.00	-19.53	36.99	-16.52	Peak	---	---
2	151.25	14.42	43.50	-29.08	31.15	-16.73	Peak	---	---
3	320.03	20.46	46.00	-25.54	35.84	-15.38	Peak	---	---
4	515.00	21.73	46.00	-24.27	32.65	-10.92	Peak	---	---
5	639.16	22.51	46.00	-23.49	31.36	-8.85	Peak	---	---
6	846.74	23.63	46.00	-22.37	29.55	-5.92	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	8DPSK	**Test Freq. (MHz)**	2402
Polarization	Vertical	**Test Configuration**	2

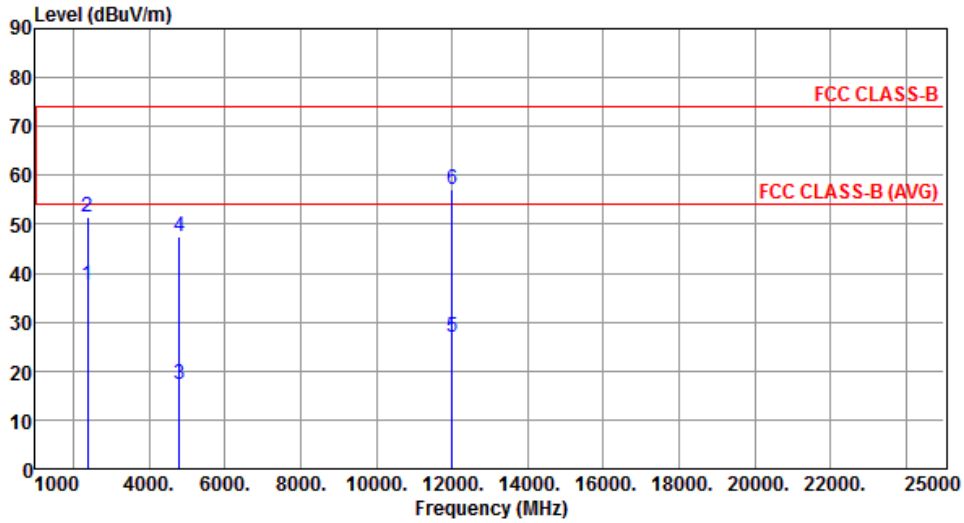


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	51.34	29.85	40.00	-10.15	46.37	-16.52	Peak	---	---
2	149.31	13.82	43.50	-29.68	30.56	-16.74	Peak	---	---
3	411.21	17.99	46.00	-28.01	31.11	-13.12	Peak	---	---
4	523.73	25.82	46.00	-20.18	36.64	-10.82	Peak	---	---
5	689.60	22.04	46.00	-23.96	30.23	-8.19	Peak	---	---
6	896.21	25.06	46.00	-20.94	30.34	-5.28	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.2.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for GFSK

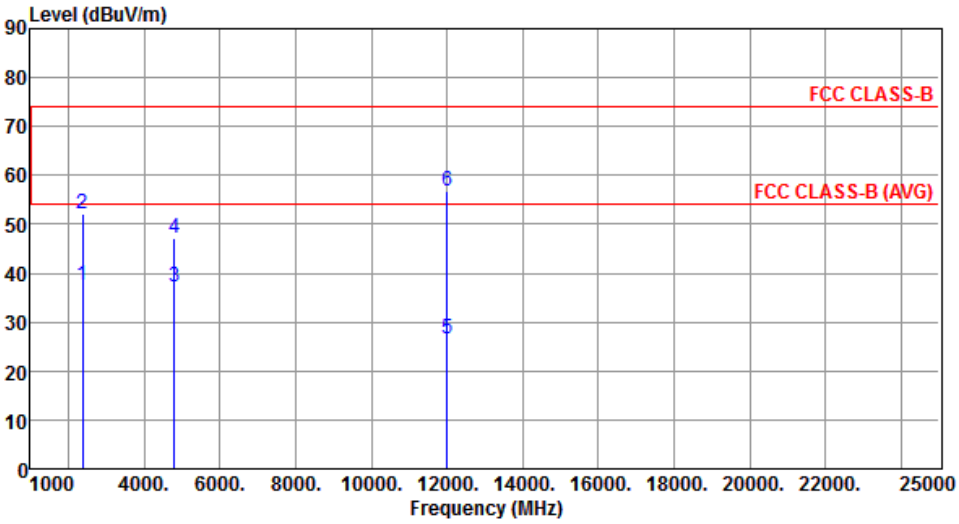
Modulation	GFSK	Test Freq. (MHz)	2402
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.56	54.00	-16.44	40.91	-3.35	Average	125	357
2	2390.00	51.35	74.00	-22.65	54.70	-3.35	Peak	125	357
3	4804.00	17.38	54.00	-36.62	13.85	3.53	Average	126	338
4	4804.00	47.48	74.00	-26.52	43.95	3.53	Peak	126	338
5	12010.00	27.03	54.00	-26.97	12.95	14.08	Average	152	326
6	12010.00	57.13	74.00	-16.87	43.05	14.08	Peak	152	326

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

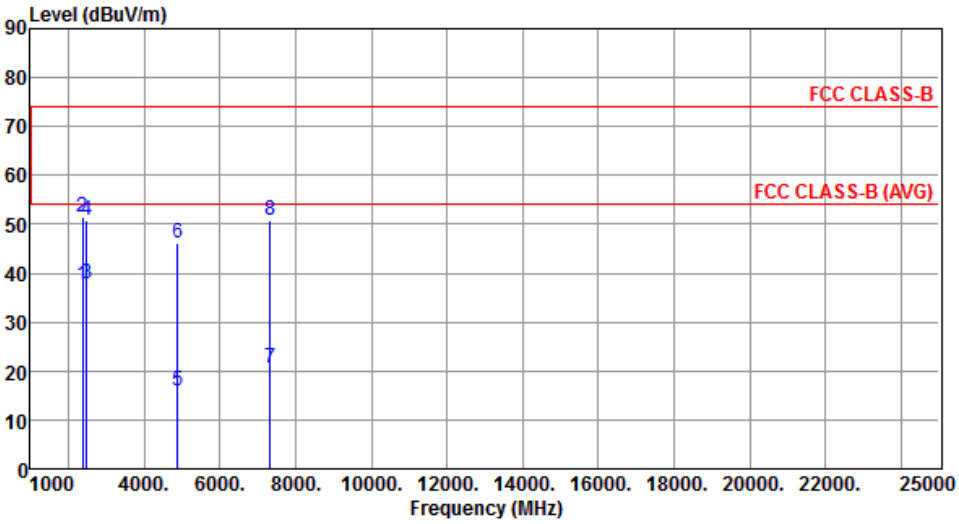
Modulation	GFSK	**Test Freq. (MHz)**	2402
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.48	54.00	-16.52	40.83	-3.35	Average	168	331
2	2390.00	52.18	74.00	-21.82	55.53	-3.35	Peak	168	331
3	4804.00	37.06	54.00	-16.94	33.53	3.53	Average	166	309
4	4804.00	47.16	74.00	-26.84	43.63	3.53	Peak	166	309
5	12010.00	26.57	54.00	-27.43	12.49	14.08	Average	211	118
6	12010.00	56.67	74.00	-17.33	42.59	14.08	Peak	211	118

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

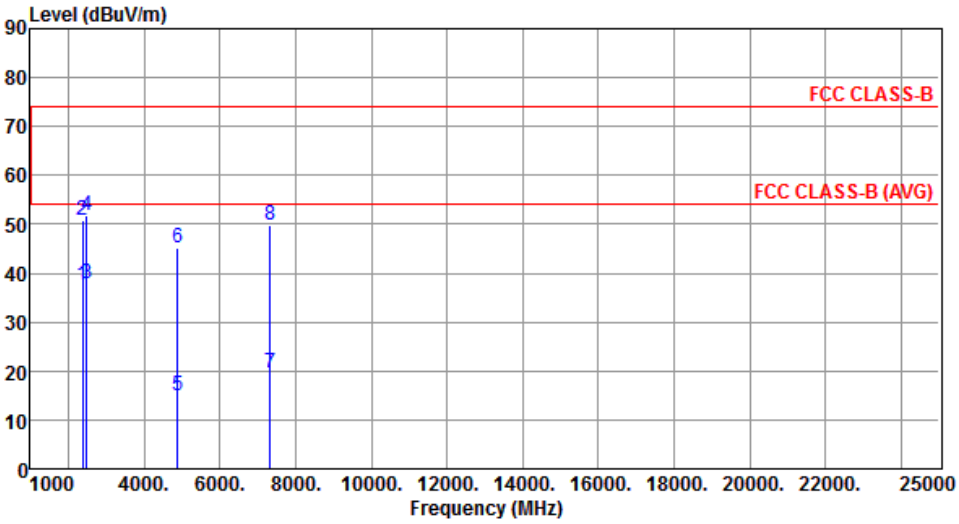
Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.56	54.00	-16.44	40.91	-3.35	Average	120	353
2	2390.00	51.53	74.00	-22.47	54.88	-3.35	Peak	120	353
3	2483.50	37.82	54.00	-16.18	40.75	-2.93	Average	120	353
4	2483.50	50.92	74.00	-23.08	53.85	-2.93	Peak	120	353
5	4882.00	15.95	54.00	-38.05	12.17	3.78	Average	102	9
6	4882.00	46.05	74.00	-27.95	42.27	3.78	Peak	102	9
7	7323.00	20.62	54.00	-33.38	12.19	8.43	Average	111	29
8	7323.00	50.72	74.00	-23.28	42.29	8.43	Peak	111	29

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

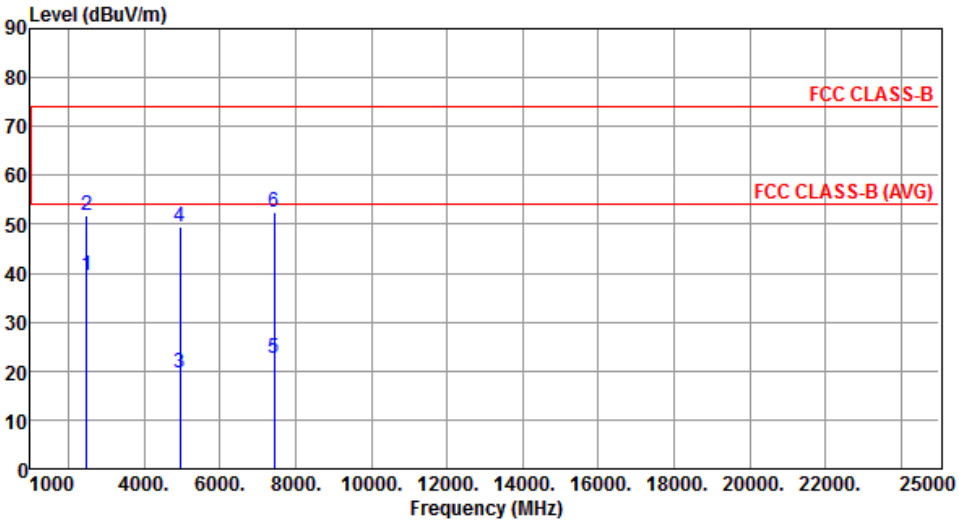
Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.45	54.00	-16.55	40.80	-3.35	Average	182	337
2	2390.00	50.70	74.00	-23.30	54.05	-3.35	Peak	182	337
3	2483.50	37.78	54.00	-16.22	40.71	-2.93	Average	182	337
4	2483.50	51.92	74.00	-22.08	54.85	-2.93	Peak	182	337
5	4882.00	14.99	54.00	-39.01	11.21	3.78	Average	150	353
6	4882.00	45.09	74.00	-28.91	41.31	3.78	Peak	150	353
7	7323.00	19.62	54.00	-34.38	11.19	8.43	Average	150	22
8	7323.00	49.72	74.00	-24.28	41.29	8.43	Peak	150	22

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

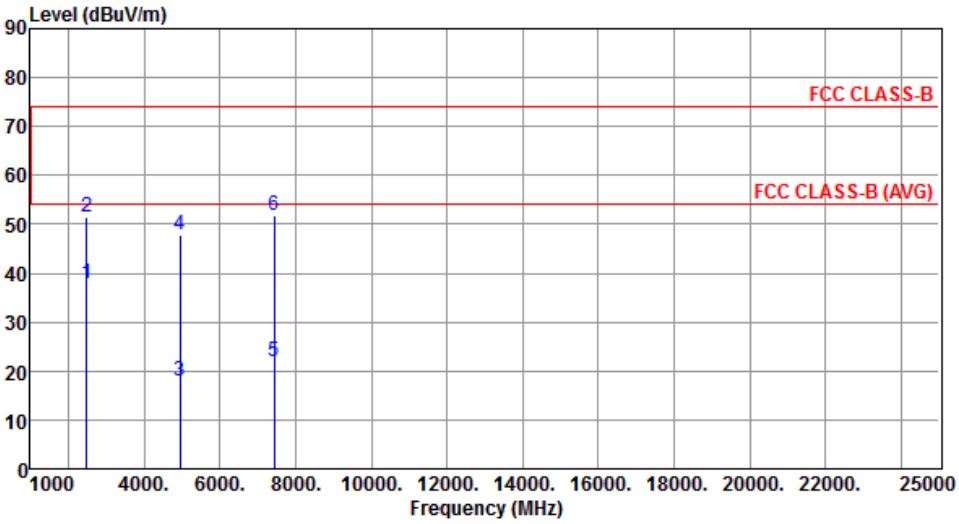
Modulation	GFSK	**Test Freq. (MHz)**	2480
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	39.62	54.00	-14.38	42.55	-2.93	Average	123	352
2	2483.50	51.75	74.00	-22.25	54.68	-2.93	Peak	123	352
3	4960.00	19.46	54.00	-34.54	15.42	4.04	Average	126	332
4	4960.00	49.56	74.00	-24.44	45.52	4.04	Peak	126	332
5	7440.00	22.51	54.00	-31.49	13.95	8.56	Average	166	188
6	7440.00	52.61	74.00	-21.39	44.05	8.56	Peak	166	188

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	GFSK	**Test Freq. (MHz)**	2480
Polarization	Vertical		

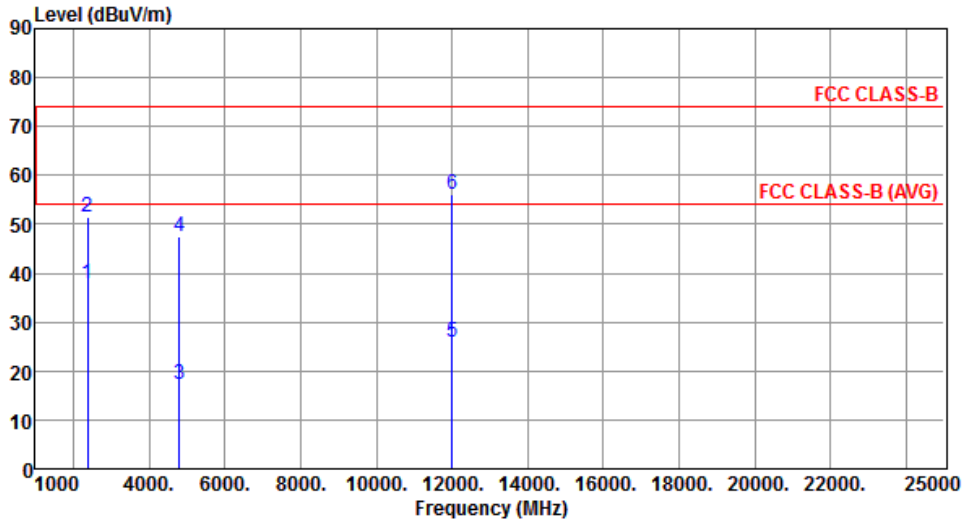


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	37.93	54.00	-16.07	40.86	-2.93	Average	147	333
2	2483.50	51.43	74.00	-22.57	54.36	-2.93	Peak	147	333
3	4960.00	17.78	54.00	-36.22	13.74	4.04	Average	165	228
4	4960.00	47.88	74.00	-26.12	43.84	4.04	Peak	165	228
5	7440.00	21.77	54.00	-32.23	13.21	8.56	Average	173	215
6	7440.00	51.87	74.00	-22.13	43.31	8.56	Peak	173	215

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.2.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 8DPSK

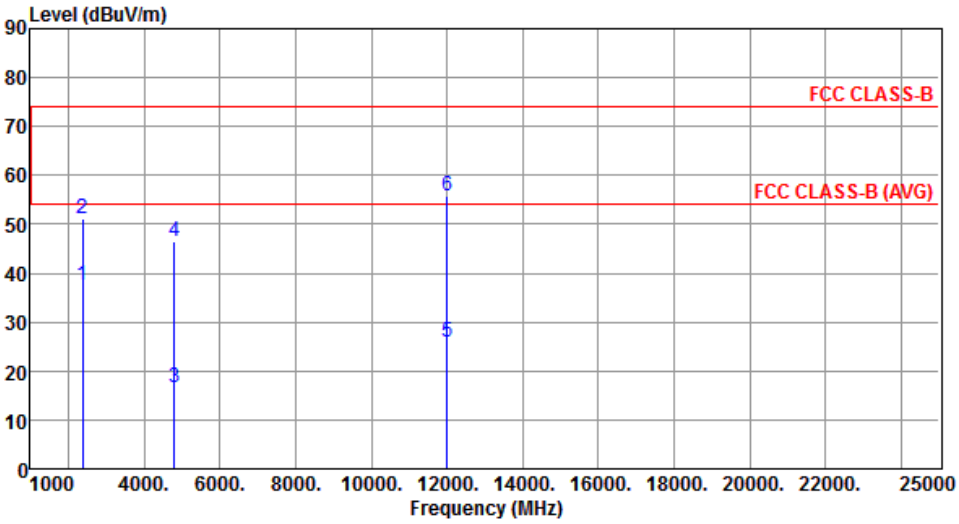
Modulation	8DPSK	Test Freq. (MHz)	2402
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.78	54.00	-16.22	41.13	-3.35	Average	124	356
2	2390.00	51.47	74.00	-22.53	54.82	-3.35	Peak	124	356
3	4804.00	17.26	54.00	-36.74	13.73	3.53	Average	116	357
4	4804.00	47.36	74.00	-26.64	43.83	3.53	Peak	116	357
5	12010.00	25.95	54.00	-28.05	11.87	14.08	Average	211	229
6	12010.00	56.05	74.00	-17.95	41.97	14.08	Peak	211	229

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

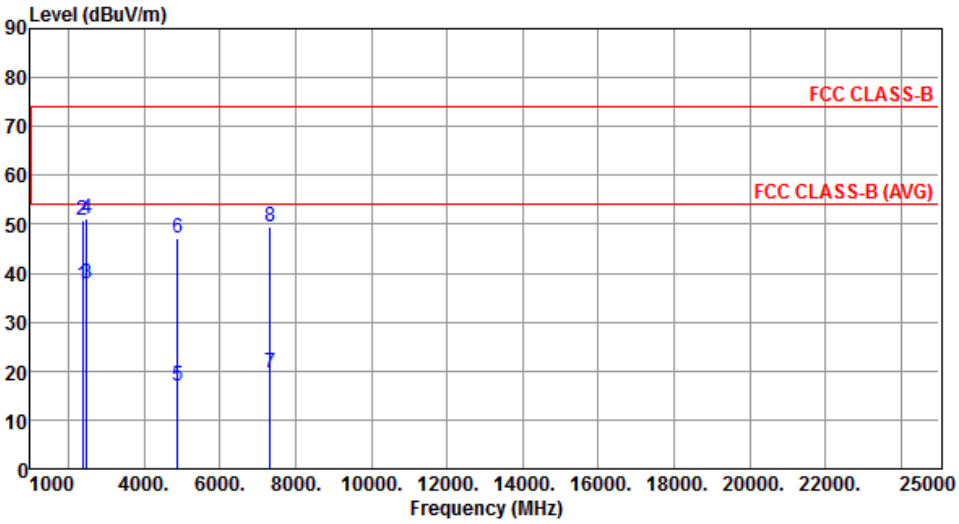
Modulation	8DPSK	**Test Freq. (MHz)**	2402
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.47	54.00	-16.53	40.82	-3.35	Average	165	334
2	2390.00	51.17	74.00	-22.83	54.52	-3.35	Peak	165	334
3	4804.00	16.48	54.00	-37.52	12.95	3.53	Average	157	343
4	4804.00	46.58	74.00	-27.42	43.05	3.53	Peak	157	343
5	12010.00	25.80	54.00	-28.20	11.72	14.08	Average	213	224
6	12010.00	55.90	74.00	-18.10	41.82	14.08	Peak	213	224

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

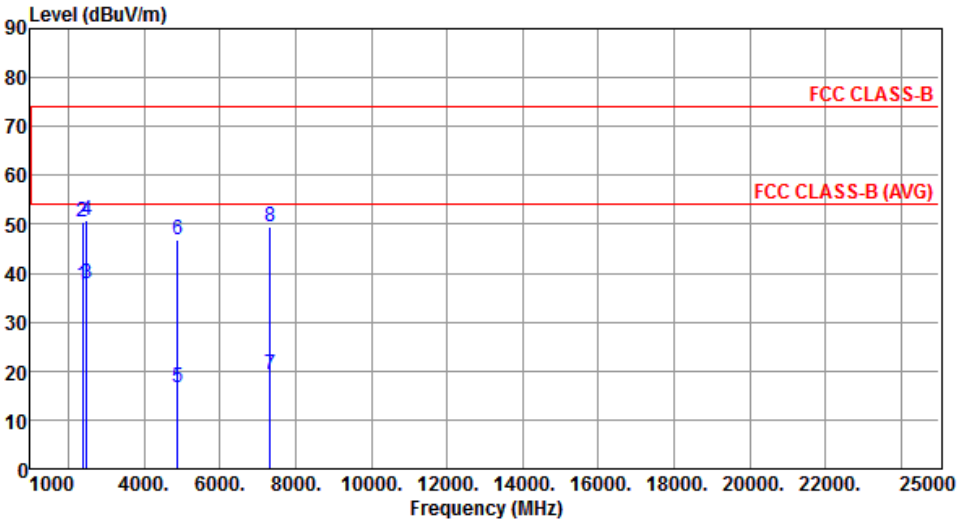
Modulation	8DPSK	Test Freq. (MHz)	2441
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.62	54.00	-16.38	40.97	-3.35	Average	107	353
2	2390.00	50.87	74.00	-23.13	54.22	-3.35	Peak	107	353
3	2483.50	37.82	54.00	-16.18	40.75	-2.93	Average	107	353
4	2483.50	51.23	74.00	-22.77	54.16	-2.93	Peak	107	353
5	4882.00	17.03	54.00	-36.97	13.25	3.78	Average	109	8
6	4882.00	47.13	74.00	-26.87	43.35	3.78	Peak	109	8
7	7323.00	19.52	54.00	-34.48	11.09	8.43	Average	109	8
8	7323.00	49.62	74.00	-24.38	41.19	8.43	Peak	109	8

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

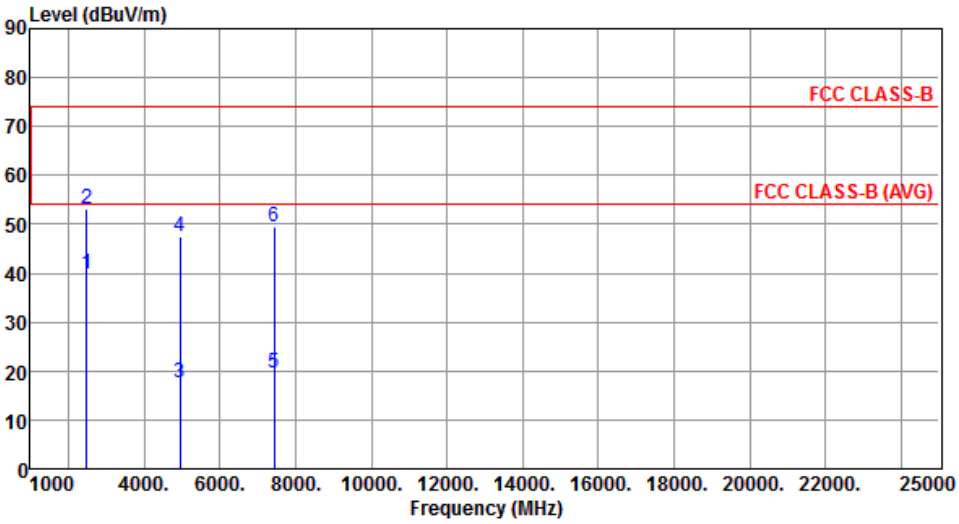
Modulation	8DPSK	**Test Freq. (MHz)**	2441
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.39	54.00	-16.61	40.74	-3.35	Average	159	332
2	2390.00	50.51	74.00	-23.49	53.86	-3.35	Peak	159	332
3	2483.50	37.73	54.00	-16.27	40.66	-2.93	Average	159	332
4	2483.50	50.95	74.00	-23.05	53.88	-2.93	Peak	159	332
5	4882.00	16.76	54.00	-37.24	12.98	3.78	Average	153	351
6	4882.00	46.86	74.00	-27.14	43.08	3.78	Peak	153	351
7	7323.00	19.39	54.00	-34.61	10.96	8.43	Average	153	351
8	7323.00	49.49	74.00	-24.51	41.06	8.43	Peak	153	351

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

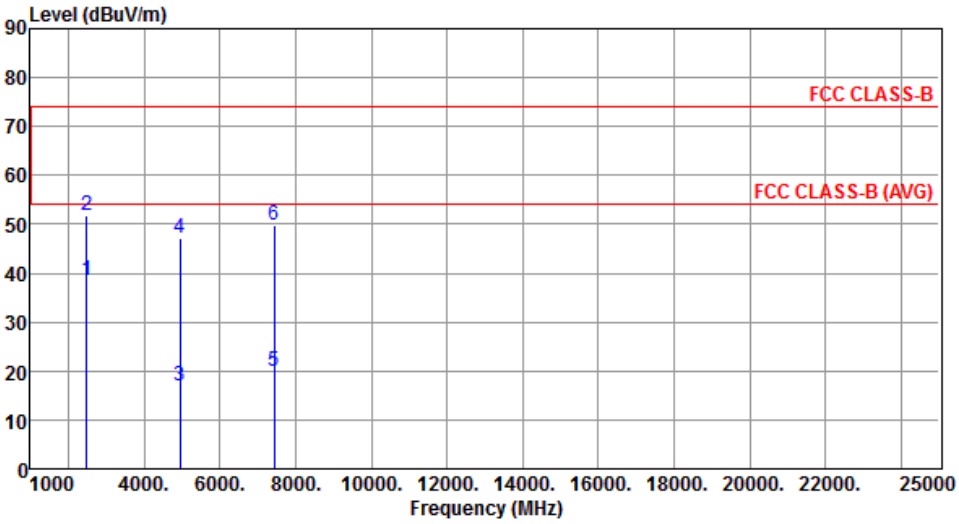
Modulation	8DPSK	Test Freq. (MHz)	2480
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	39.90	54.00	-14.10	42.83	-2.93	Average	121	354
2	2483.50	52.97	74.00	-21.03	55.90	-2.93	Peak	121	354
3	4960.00	17.55	54.00	-36.45	13.51	4.04	Average	110	5
4	4960.00	47.65	74.00	-26.35	43.61	4.04	Peak	110	5
5	7440.00	19.45	54.00	-34.55	10.89	8.56	Average	155	215
6	7440.00	49.55	74.00	-24.45	40.99	8.56	Peak	155	215

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	8DPSK	Test Freq. (MHz)	2480
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	38.53	54.00	-15.47	41.46	-2.93	Average	169	335
2	2483.50	51.80	74.00	-22.20	54.73	-2.93	Peak	169	335
3	4960.00	17.09	54.00	-36.91	13.05	4.04	Average	162	358
4	4960.00	47.19	74.00	-26.81	43.15	4.04	Peak	162	358
5	7440.00	19.78	54.00	-34.22	11.22	8.56	Average	226	321
6	7440.00	49.88	74.00	-24.12	41.32	8.56	Peak	226	321

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.3 Unwanted Emissions into Non-Restricted Frequency Bands

3.3.1 Limit of Unwanted Emissions into Non-Restricted Frequency Bands

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.3.2 Test Procedures

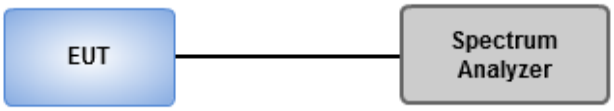
Reference Level Measurement

1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Set Sweep time = auto couple, Trace mode = max hold.
3. Allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

Unwanted Emissions Level Measurement

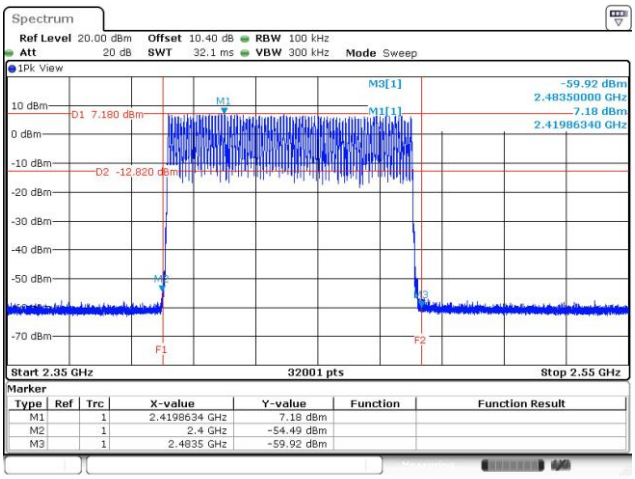
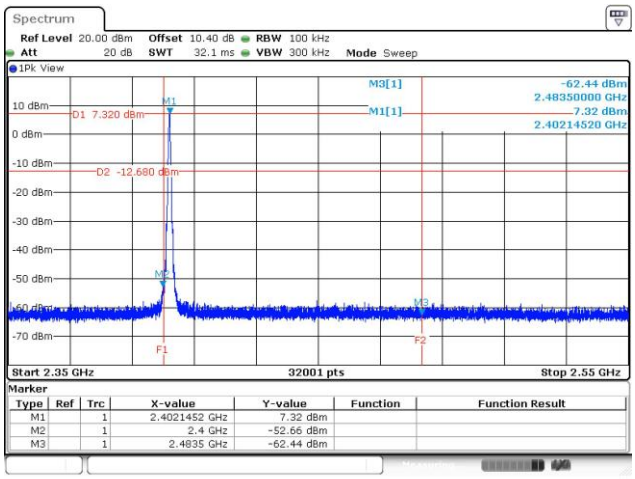
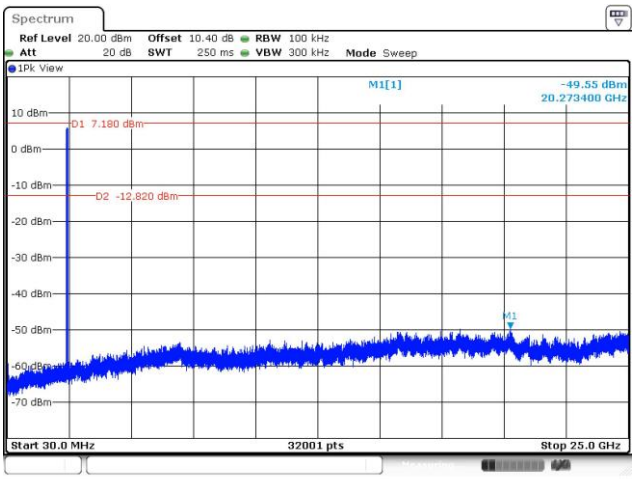
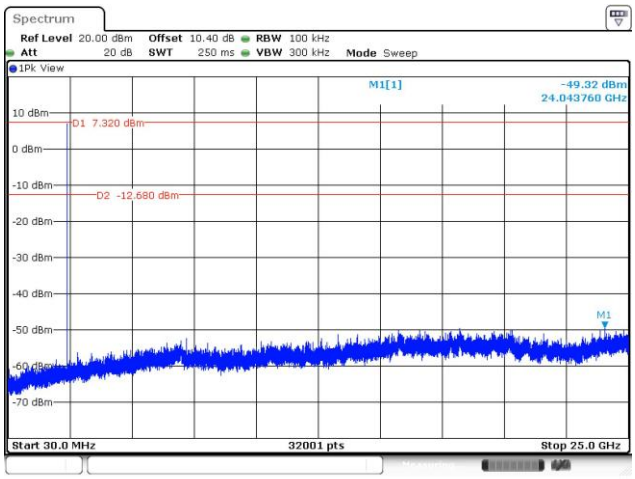
1. Set RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Trace Mode = max hold, Sweep = auto couple.
3. Allow the trace to stabilize.
4. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

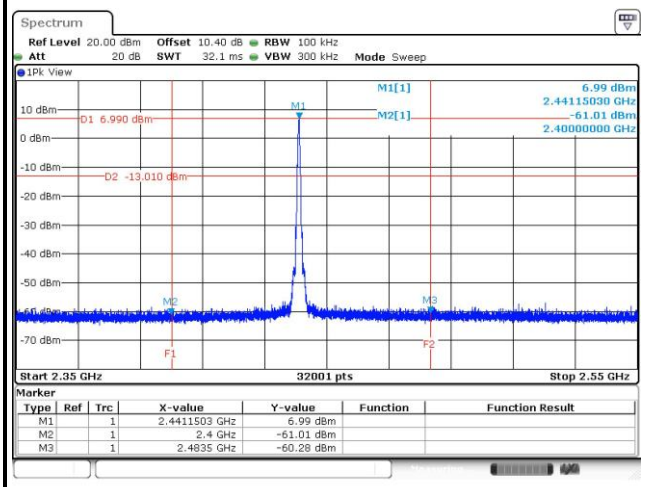
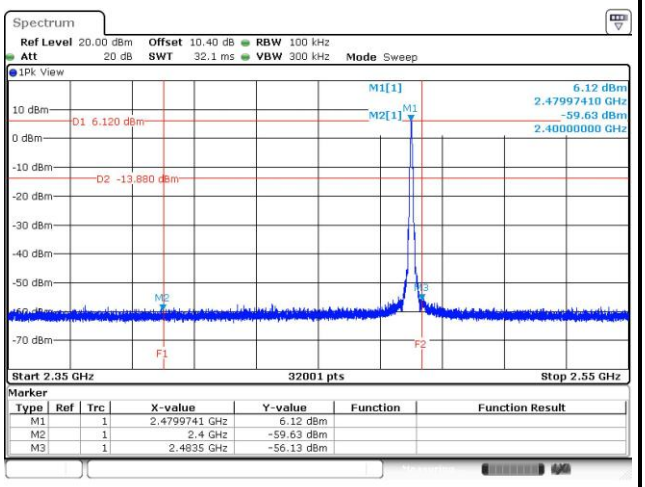
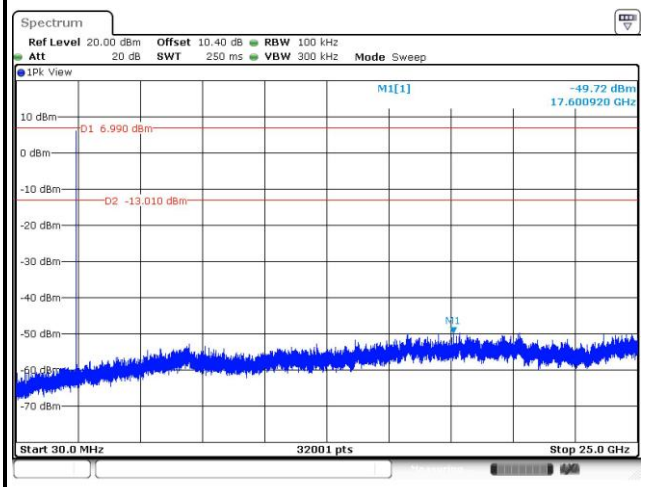
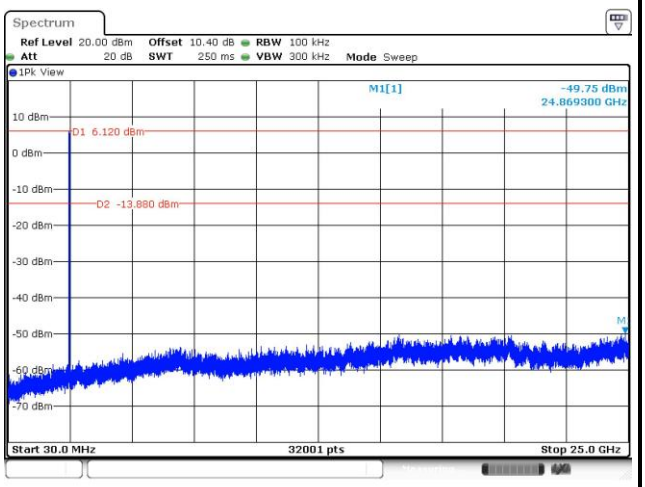
3.3.3 Test Setup



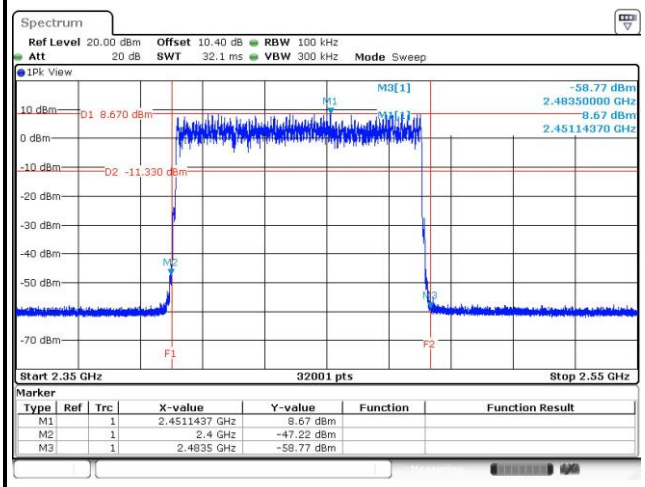
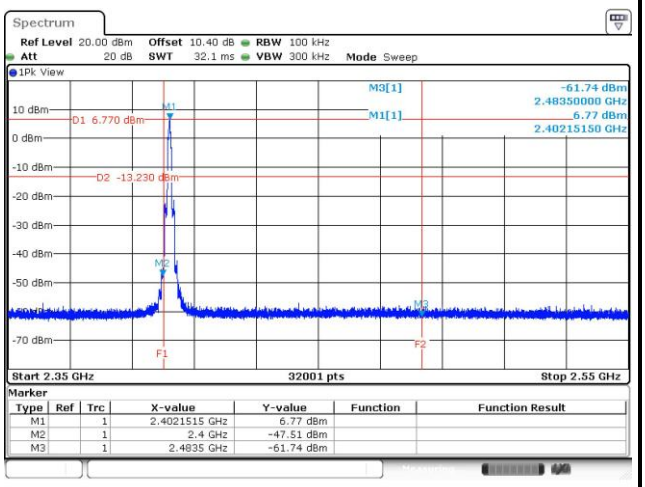
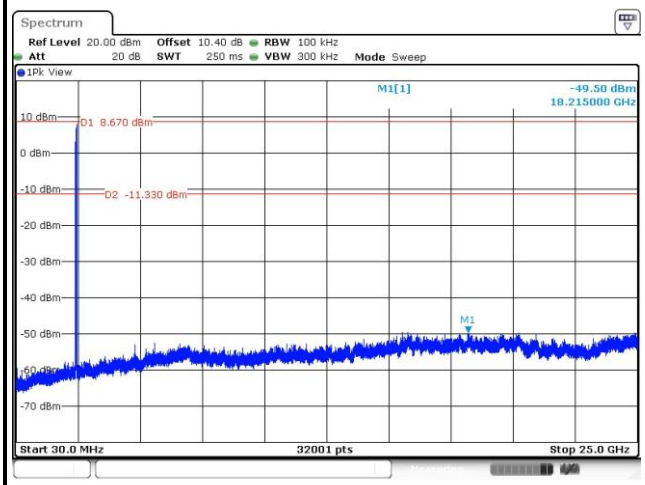
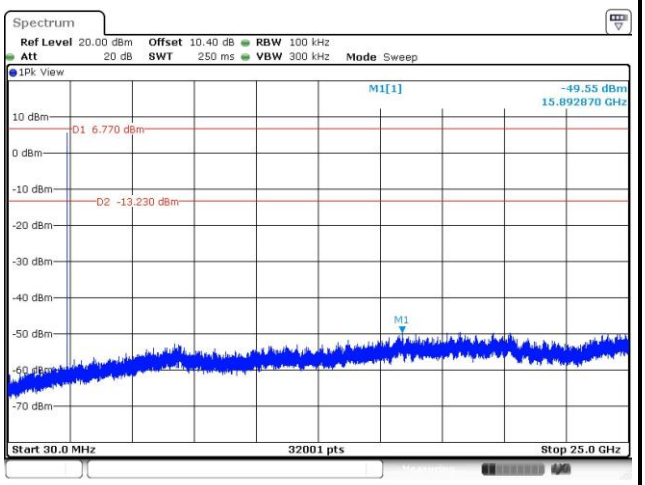
3.3.4 Unwanted Emissions into Non-Restricted Frequency Bands

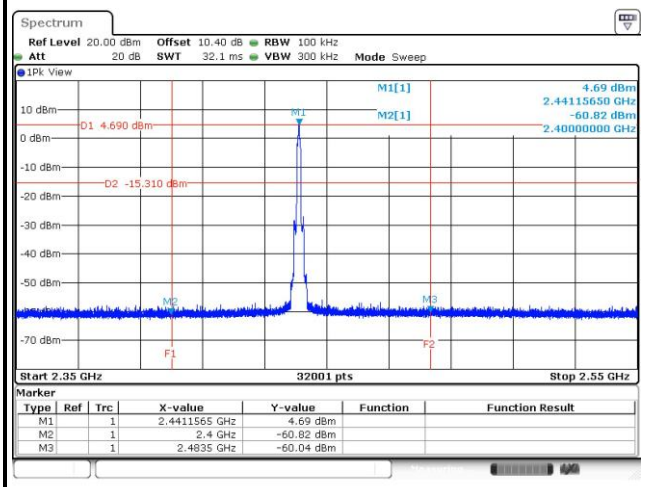
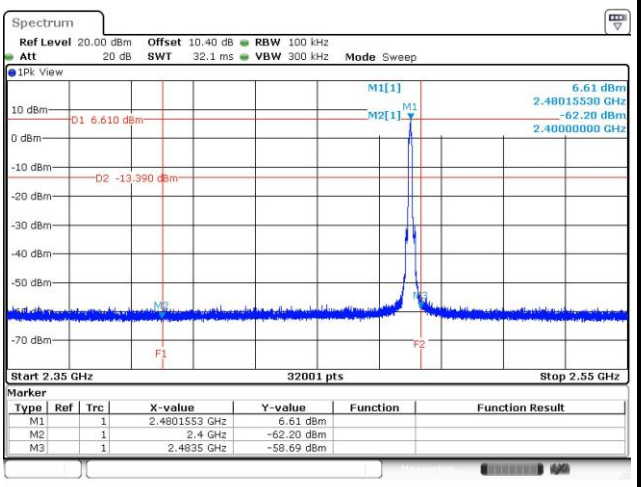
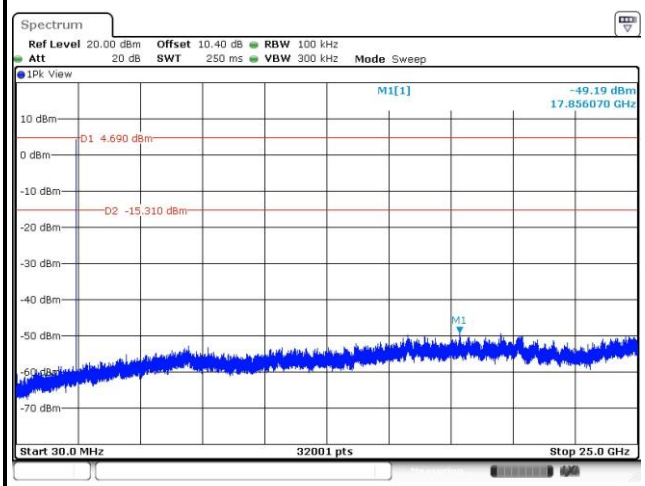
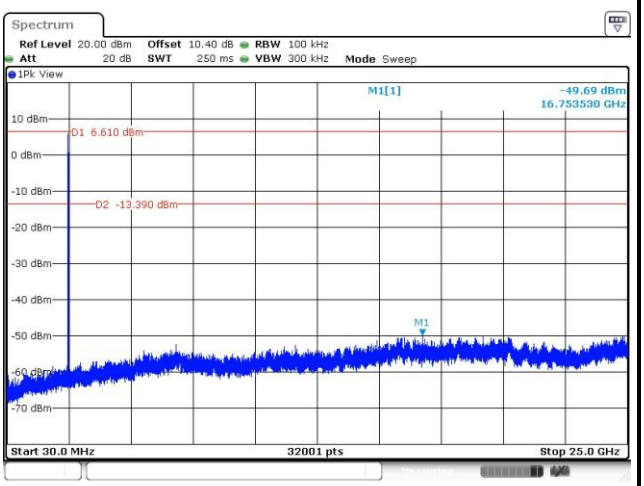
GFSK

Hopping on	Hopping off
30MHz~25GHz (down 20dBc)	TX Freq 2402MHz / 30MHz~25GHz (down 20dBc)
	
	

Hopping off	Hopping off
TX Freq 2441MHz / 30MHz~25GHz (down 20dBc)	TX Freq 2480MHz / 30MHz~25GHz (down 20dBc)
	
	

8DPSK

Hopping on	Hopping off
30MHz~25GHz (down 20dBc)	**TX Freq 2402MHz / 30MHz~25GHz (down 20dBc)**
	
	

Hopping off	Hopping off
TX Freq 2441MHz / 30MHz~25GHz (down 20dBc)	TX Freq 2480MHz / 30MHz~25GHz (down 20dBc)
	
	

3.4 Conducted Output Power

3.4.1 Limit of Conducted Output Power

☐ 1 Watt
For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band.

☒ 0.125 Watt
For all other frequency hopping systems in the 2400–2483.5 MHz band.

☐ 0.125 Watt
For Frequency hopping systems operating in the 2400–2483.5 MHz band have hopping channel carrier frequencies that are separated by two-thirds of the 20 dB bandwidth of the hopping channel.

3.4.2 Test Procedures

1. A wideband power meter is used for power measurement. Bandwidth of power senor and meter is 50MHz
2. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power

3.4.3 Test Setup

3.4.4 Test Result of Conducted Output Power

Modulation Mode	Freq. (MHz)	Output Power (mW)	Output Power (dBm)	Limit (mW)
GFSK	2402	7.60	8.81	125
GFSK	2441	7.38	8.68	125
GFSK	2480	7.14	8.54	125
л/4 DQPSK	2402	10.28	10.12	125
л/4 DQPSK	2441	10.05	10.02	125
л/4 DQPSK	2480	9.75	9.89	125
8DPSK	2402	10.52	**10.22**	125
8DPSK	2441	10.26	10.11	125
8DPSK	2480	9.79	9.91	125

Modulation Mode	Freq. (MHz)	AV Output Power (mW)	AV Output Power (dBm)
GFSK	2402	**7.38**	**8.68**
GFSK	2441	7.00	8.45
GFSK	2480	6.49	8.12
л/4 DQPSK	2402	6.76	8.3
л/4 DQPSK	2441	6.62	8.21
л/4 DQPSK	2480	6.37	8.04
8DPSK	2402	6.87	8.37
8DPSK	2441	6.67	8.24
8DPSK	2480	6.38	8.05

Note: Average power is for reference only.

3.5 Number of Hopping Frequency

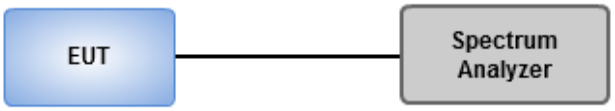
3.5.1 Limit of Number of Hopping Frequency

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

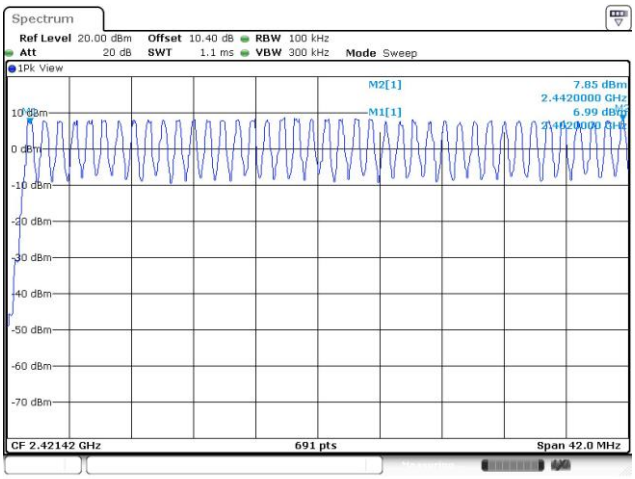
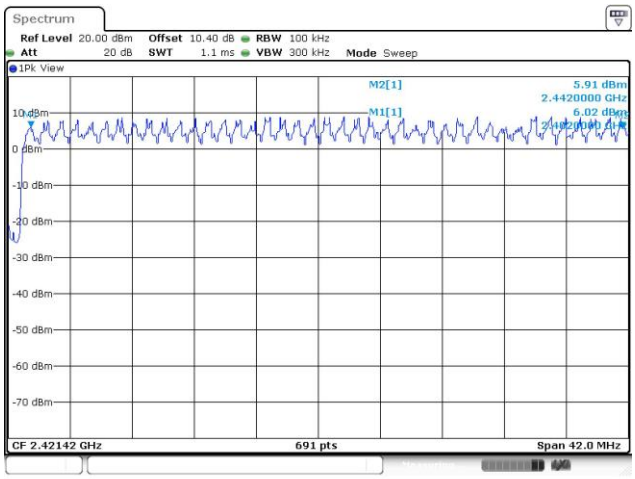
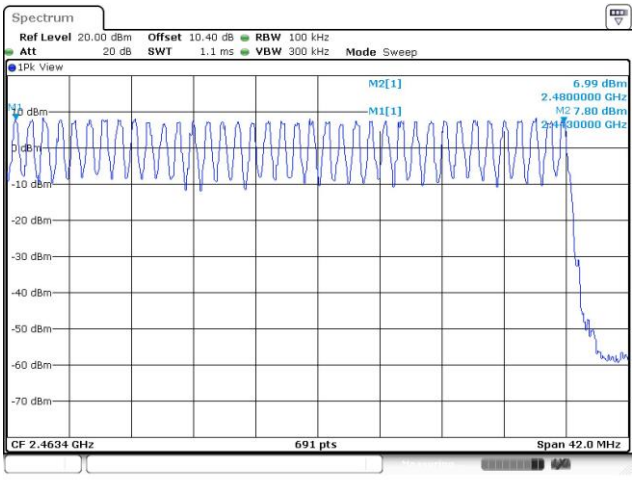
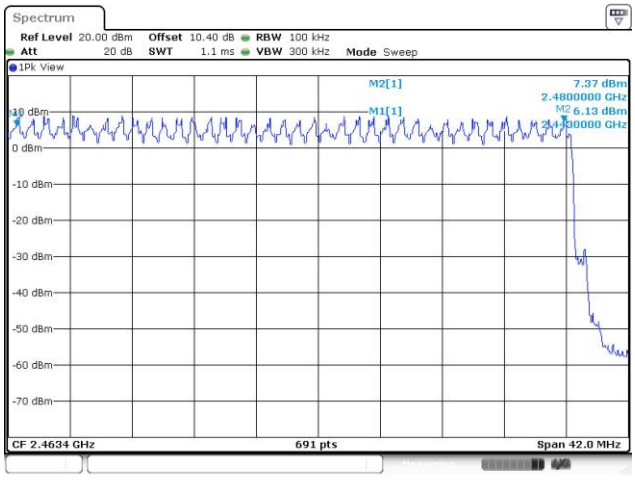
3.5.2 Test Procedures

1. Set RBW = 100kHz, VBW = 300kHz, Sweep time = Auto, Detector = Peak Trace max hold.
2 Allow trace to stabilize.

3.5.3 Test Setup



3.5.4 Test Result of Number of Hopping Frequency

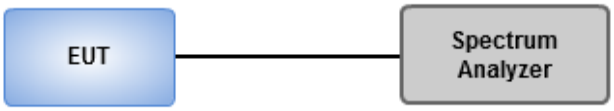
GFSK	8DPSK
	
	

3.6 20dB and Occupied Bandwidth

3.6.1 Test Procedures

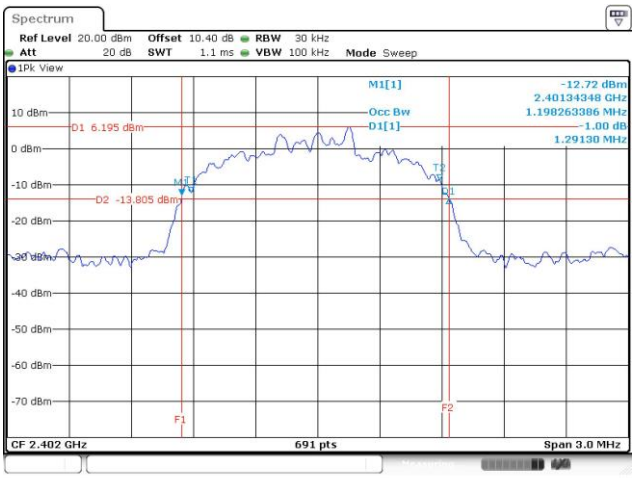
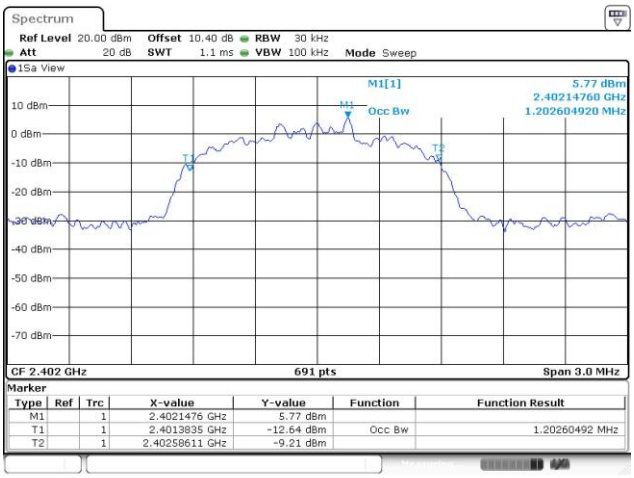
1. Set RBW=30kHz, VBW=100kHz,Sweep time = Auto, Detector=Peak Trace max hold
2 Allow trace to stabilize
3 Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.
4. Use Occupied bandwidth function of spectrum analyzer to measuring 99% occupied bandwidth

3.6.2 Test Setup



3.6.3 Test result of 20dB and Occupied Bandwidth

Modulation Mode	Freq. (MHz)	20dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
GFSK	2402	0.961	0.899
GFSK	2441	0.961	0.899
GFSK	2480	0.961	0.894
8DPSK	2402	1.291	1.203
8DPSK	2441	1.287	1.181
8DPSK	2480	1.287	1.172

Worst Plot of 20dB Bandwidth	Worst Plot of Occupied Bandwidth
	

3.7 Channel Separation

3.7.1 Limit of Channel Separation

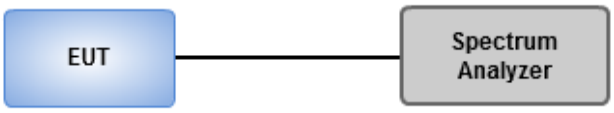
☐ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☒ Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

3.7.2 Test Procedures

1. Set RBW=100kHz, VBW=300kHz,Sweep time = Auto, Detector=Peak Trace max hold
2 Allow trace to stabilize
3 Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The EUT shall show compliance with the appropriate regulatory limit

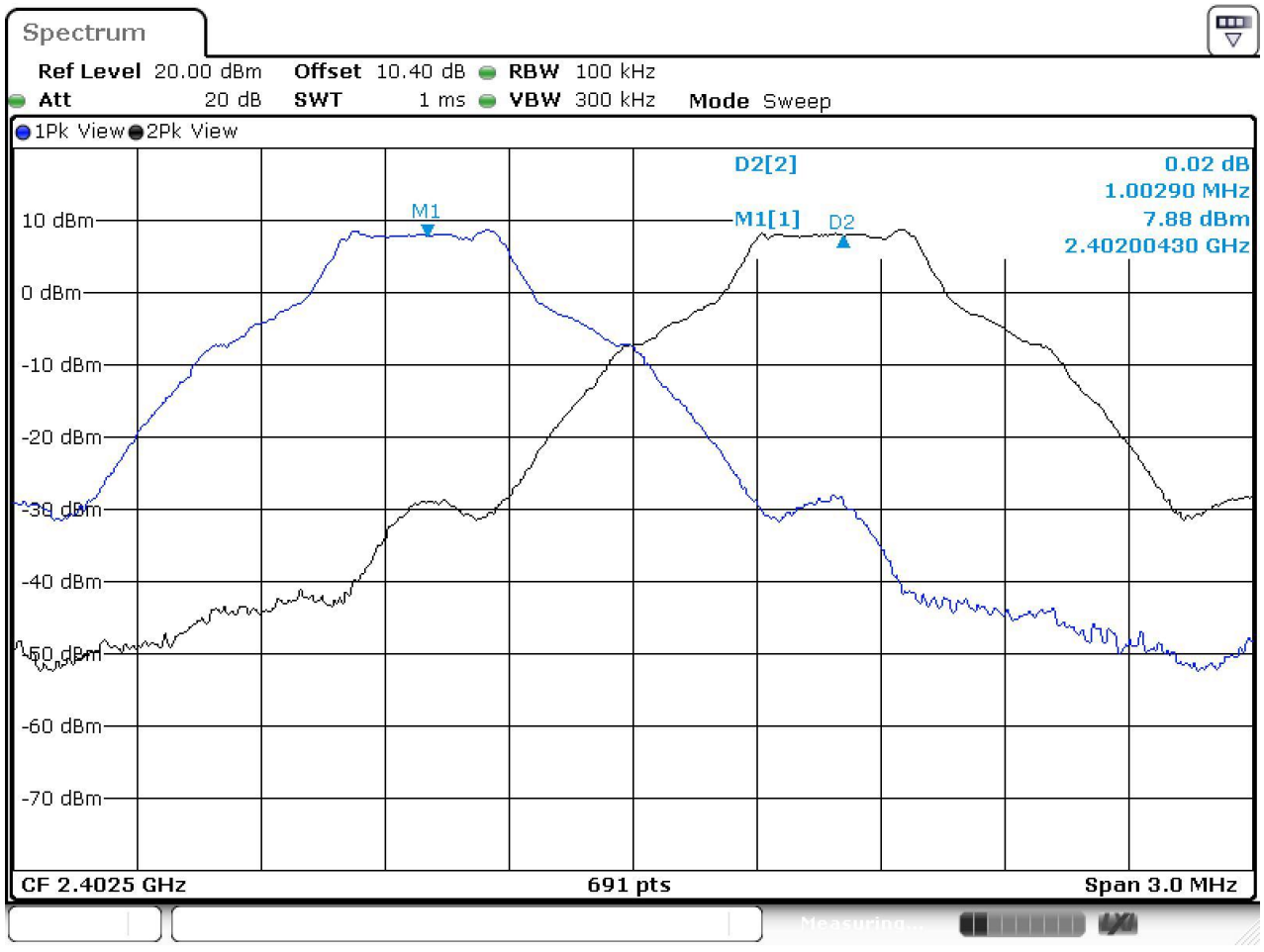
3.7.3 Test Setup



3.7.4 Test result of Channel Separation

Modulation Mode	Freq. (MHz)	Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)
GFSK	2402	1.003	0.961	0.641
GFSK	2441	1.003	0.961	0.641
GFSK	2480	1.003	0.961	0.641
8DPSK	2402	1.003	1.291	0.861
8DPSK	2441	1.003	1.287	0.858
8DPSK	2480	1.003	1.287	0.858

Worst Plots



3.8 Number of Dwell Time

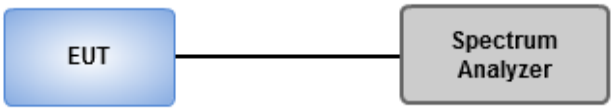
3.8.1 Limit of Dwell time

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

3.8.2 Test Procedures

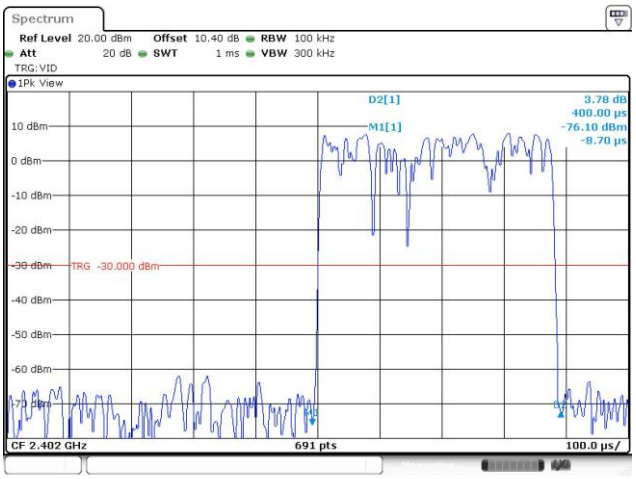
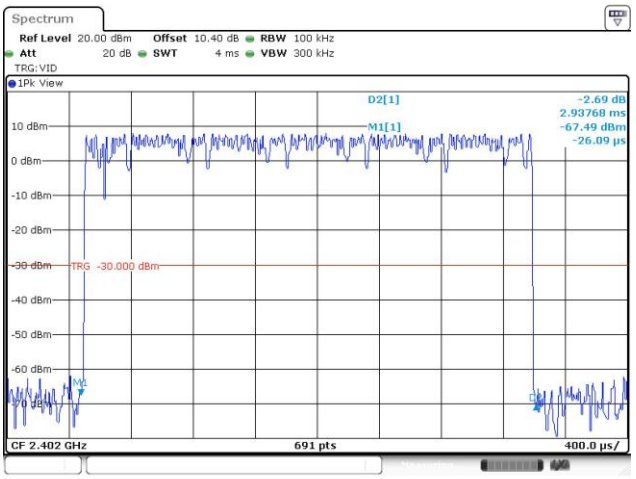
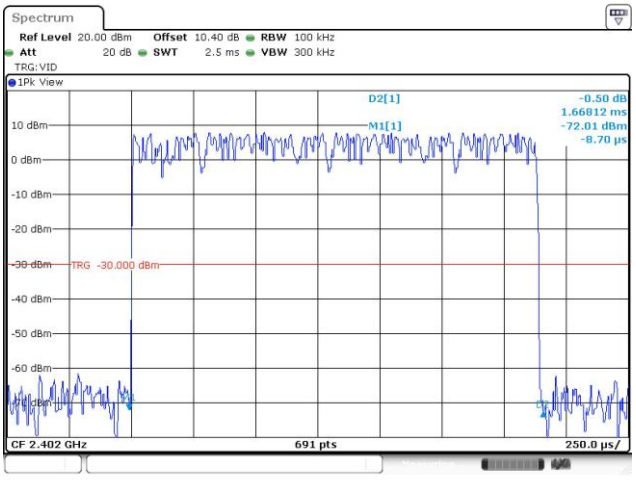
1. Set RBW=100kHz,VBW=300kHz,Sweep time = 500us(DH1),2ms(DH3),4ms(DH5), Detector=Peak, Span=0Hz,Trace max hold
2. Enable gating and trigger function of spectrum analyzer to measure burst on time.
3. The DH1 packet can cover a single time slot. A maximum length packet has duration of 1 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 1/1600 seconds, or 0.625ms. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.
4. The DH3 packet can cover up to 3 time slots. A maximum length packet has duration of 3 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 3/1600 seconds, or 1.875ms. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.
5. The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds

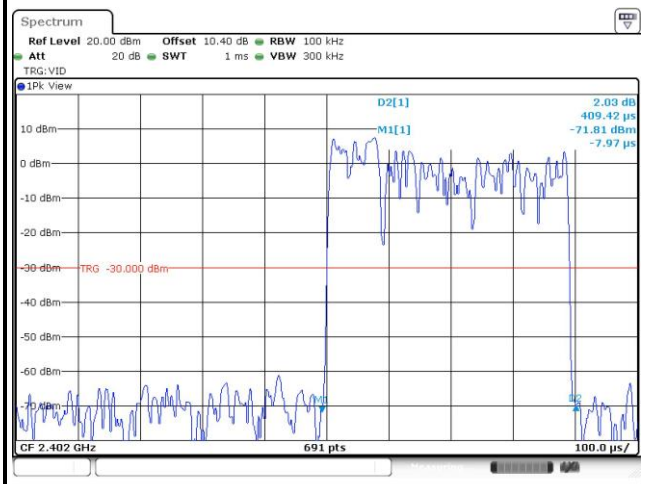
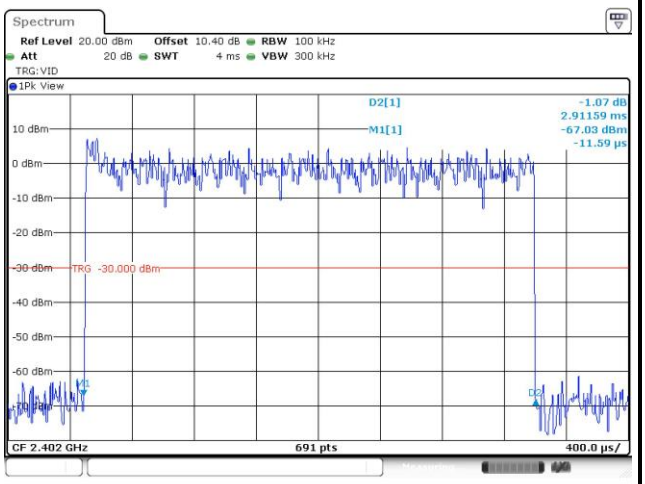
3.8.3 Test Setup



3.8.4 Test Result of Dwell Time

Modulation Mode	Freq. (MHz)	Length of Transmission Time (msec)	Number of Transmission in a 31.6 (79 Hopping*0.4)	Result (s)	Limit (s)
GFSK-DH1	2402	0.40000	320	0.128	0.4
GFSK-DH3	2402	1.66812	160	0.267	0.4
GFSK-DH5	2402	2.93768	106.6	0.313	0.4
8DPSK-DH1	2402	0.40942	320	0.131	0.4
8DPSK-DH3	2402	1.65942	160	0.266	0.4
8DPSK-DH5	2402	2.91159	106.6	0.310	0.4

GFSK	
DH1	**DH5**
	
DH3	**--**
	--

8DPSK	
3DH1	**3DH5**
	
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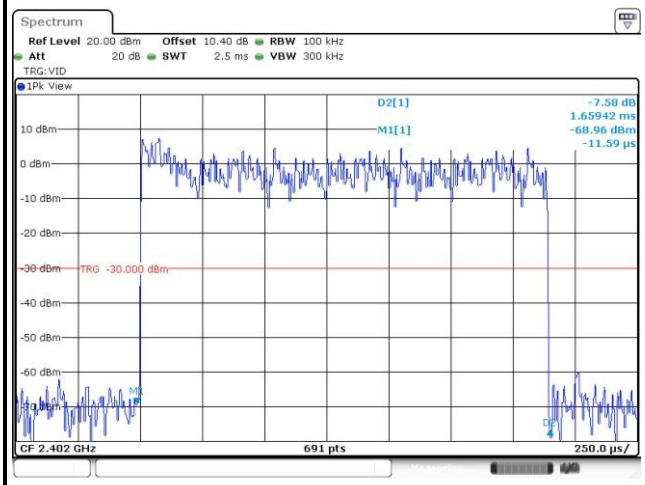	--

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
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If you have any suggestion, please feel free to contact us as below information

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