Test Lab
Cert 2951.01

TEST REPORT

Applicant	Lenovo Mobile Communication Technology Ltd.
Address	No.999, Qishan North 2nd Road, Information & Optoelectronics Park, Torch Hi-tech Industry Development Zone, Xiamen, P.R.China

Manufacturer or Supplier	Lenovo PC HK Limited
Address	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong
Product	Lenovo Mobile Phone
Brand Name	lenovo
Model	Lenovo S850
Additional Model & Model Difference	N/A
Date of tests	Jan. 23 , 2014 ~ Mar. 15 , 2014

the tests have been carried out according to the requirements of the following standards:

☒ **FCC Part 15, Subpart C, Section 15.247(2012-10)**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Venless Long Project Engineer / EMC Department	Approved by Glyn He Supervisor / EMC Department
	 Date：Mar. 17 , 2014

TABLE OF CONTENTS

RELEASE CONTROL RECORD 5
1 SUMMARY OF TEST RESULTS 6
2 MEASUREMENT UNCERTAINTY 6
3 GENERAL INFORMATION 7
3.1 GENERAL DESCRIPTION OF EUT 7
3.2 DESCRIPTION OF TEST MODES 7
3.2.1. CONFIGURATION OF SYSTEM UNDER TEST 9
3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL 9
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS 11
3.4 DESCRIPTION OF SUPPORT UNITS 11
4 TEST TYPES AND RESULTS 12
4.1. CONDUCTED EMISSION MEASUREMENT 12
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 12
4.1.2 TEST INSTRUMENTS 12
4.1.3 TEST PROCEDURES 13
4.1.4 DEVIATION FROM TEST STANDARD 13
4.1.5 TEST SETUP 14
4.1.6 EUT OPERATING CONDITIONS 14
4.1.7 TEST RESULTS 15
4.2. RADIATED EMISSION AND BANDEDGE MEASUREMENT 17
4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT 17
4.2.2 TEST INSTRUMENTS 18
4.2.3 TEST PROCEDURES 19
4.2.4 DEVIATION FROM TEST STANDARD 19
4.2.5 TEST SETUP 20
4.2.6 EUT OPERATING CONDITIONS 20
4.2.7 TEST RESULTS 21
4.3. NUMBER OF HOPPING FREQUENCY USED 21
4.3.1. LIMIT OF HOPPING FREQUENCY USED 29
4.3.2. TEST SETUP 29
4.3.3. TEST INSTRUMENTS 29
4.3.4. TEST PROCEDURES 29
4.3.5. DEVIATION FROM TEST STANDARD 30
4.3.6. TEST RESULTS 30
4.4. DWELL TIME ON EACH CHANNEL 33

4.4.1 LIMIT OF DWELL TIME USED 33
4.4.2 TEST SETUP 33
4.4.3 TEST INSTRUMENTS 33
4.4.4 TEST PROCEDURES 33
4.4.5 DEVIATION FROM TEST STANDARD 34
4.4.6 TEST RESULTS 34
4.5. CHANNEL BANDWIDTH 42
4.5.1 LIMITS OF CHANNEL BANDWIDTH 42
4.5.2 TEST SETUP 42
4.5.3 TEST INSTRUMENTS 42
4.5.4 TEST PROCEDURE 42
4.5.5 DEVIATION FROM TEST STANDARD 43
4.5.6 EUT OPERATING CONDITION 43
4.5.7 TEST RESULTS 43
4.6. HOPPING CHANNEL SEPARATION 47
4.6.1. LIMIT OF HOPPING CHANNEL SEPARATION 47
4.6.2. TEST SETUP 47
4.6.3. TEST INSTRUMENTS 47
4.6.4. TEST PROCEDURES 47
4.6.5. DEVIATION FROM TEST STANDARD 47
4.6.6. TEST RESULTS 48
4.7. MAXIMUM OUTPUT POWER 52
4.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT 52
4.7.2 TEST SETUP 52
4.7.3 TEST INSTRUMENTS 52
4.7.4 TEST PROCEDURES 52
4.7.5 DEVIATION FROM TEST STANDARD 53
4.7.6 EUT OPERATING CONDITION 53
4.7.7 TEST RESULTS 53
4.8. OUT OF BAND MEASUREMENT 54
4.8.1 LIMITS OF OUT OF BAND MEASUREMENT 54
4.8.2 TEST INSTRUMENTS 54
4.8.3 TEST PROCEDURE 54
4.8.4 DEVIATION FROM TEST STANDARD 54
4.8.5 EUT OPERATING CONDITION 54
4.8.6 TEST RESULTS 54
5. PHOTOGRAPHS OF THE TEST CONFIGURATION 57

6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 58

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140123N013-3	Original release	Mar. 17 , 2014

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -12.50dB at 4.1773MHz
15.247(a)(1) (iii)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.247(d)& 15.209	Transmitter Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.7dB at 2400.00MHz.
15.247(d)	Out of band Measurement	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

NOTE: If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.67dB
Radiated emissions	9KHz ~ 30MHz	2.74 dB
	30MHz ~ 1GMHz	4.81dB
	1GHz ~ 18GHz	4.3 dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Lenovo Mobile Phone
MODEL NO.	Lenovo S850
MID	85000011
FCC ID	YCNS850
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion, polymer)
MODULATION TECHNOLOGY	FHSS
MODULATION TYPE	GFSK, 8DPSK, π/4 DQPSK
OPERATING FREQUENCY	2402MHz~2480MHz
NUMBER OF CHANNEL	79
MAX. OUTPUT POWER	7.75dBm (Max. Measured)
ANTENNA TYPE	Monopole Antenna with -2.0dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB cable: Shielded, detachable, 1.0m Earphone cable: Unshielded, detachable, 1.0m

NOTE:

1. The EUT was powered by the following adapters:

ADAPTER 1	
BRAND:	lenovo
MODEL:	C-P56
INPUT:	AC 100-240V, 50/60Hz,150mA
OUTPUT:	DC 5V, 1000mA
DC LINE:	N/A

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

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (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		

3.2.1. CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photograph of the test configuration for reference.

3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports
The worst case was found when positioned on X axis for radiated emission.
Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
-	√	√	√	-	**Power by adapter with Bluetooth link**
-	-	-	-	√	Powered by Battery with Bluetooth link

Where **RE<1G:** Radiated Emission below 1GHz **RE≥1G:** Radiated Emission above 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	39	FHSS	GFSK	DH5

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	DH5

POWER LINE CONDUCTED EMISSION TEST:

The EUT was tested with the following mode

EUT CONFIGURE MODE	TESTED CONDITION
-	BT link + WIFI link + earphone + adapter + USB cable

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	DH5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE<1G	23deg. C, 62%RH	DC 5V By Adapter	Blue Zheng
RE≥1G	23deg. C, 62%RH	DC 5V By Adapter	Blue Zheng
PLC	24deg. C, 61%RH	DC 5V By Adapter	Eric Yu
APCM	23.5deg. C, 60%RH	DC 3.8V By battery	Venless Long

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. Section 15.247(2012-10)
ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

NOTE: 1. All test items have been performed and recorded as per the above standards.

2. The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B （DoC）. The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	5P2PM2X	12400120329	N/A
2	Mouse	DELL	M056UOA	01688082	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1.	AC Line :Unshielded, Detachable,1.5m;DC Line: Unshielded, Undetachable,1.8m; HDMI Cable: Shielded, Detachable,1.6m, with a core
2	USB Line: Unshielded, undetachable,1.5m.

4 TEST TYPES AND RESULTS

4.1. CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE: 1.The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU 26	100005	May 14,13	May 13,14
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	May 14,13	May 13,14
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	May 14,13	May 13,14
Test software	ADT	ADT_Cond_ V7.3.7	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in Shielding Room 553.

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

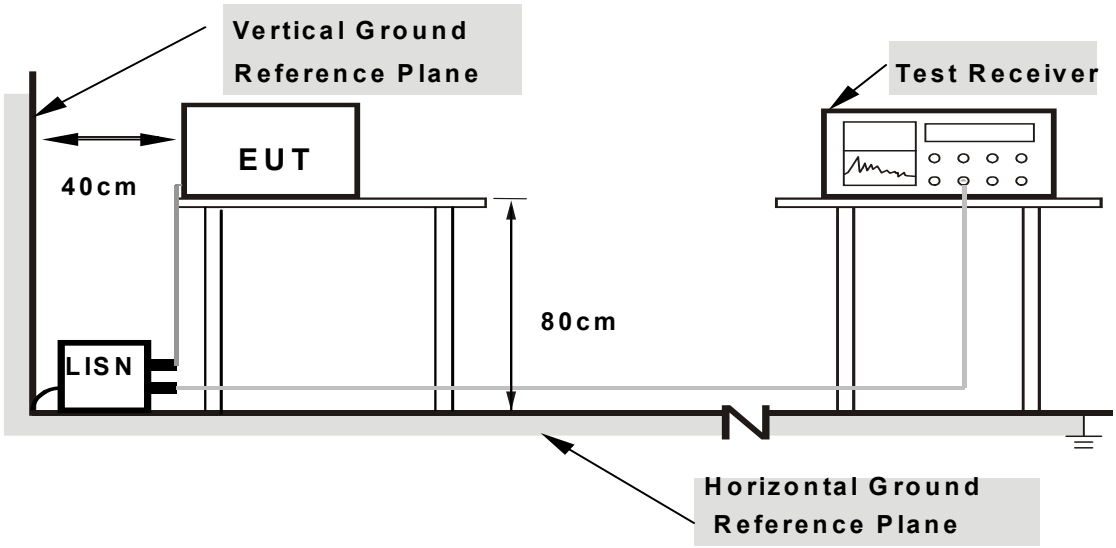
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

a. Turned on the power and connected of all equipment.
b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

4.1.7 TEST RESULTS

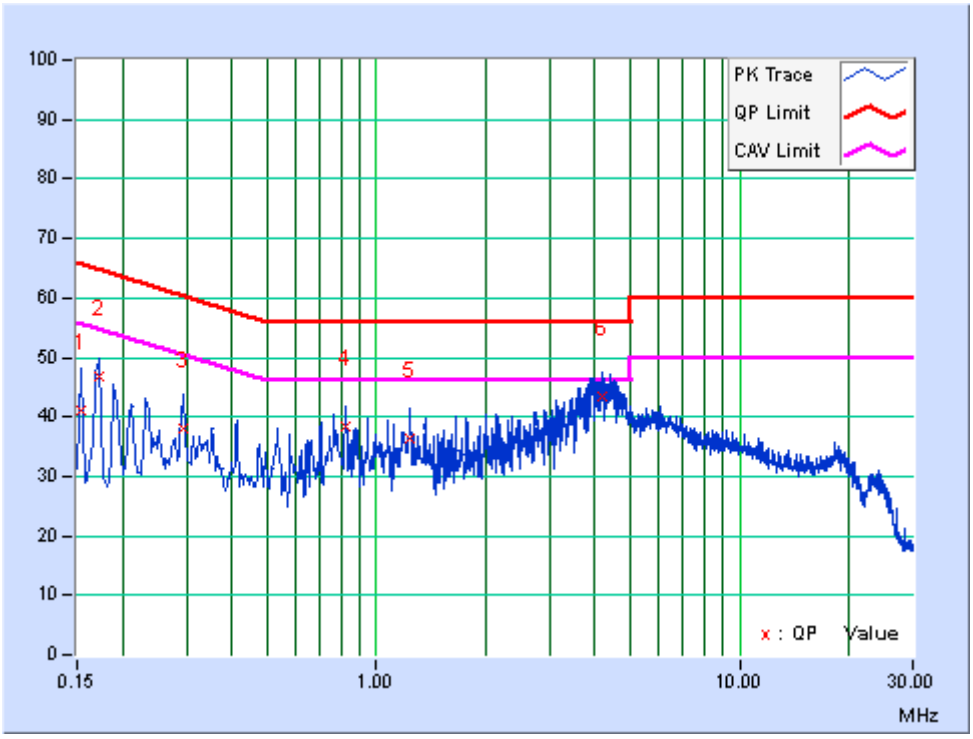
CONDUCTED WORST-CASE DATA:

GFSK

PHASE	Line	6dB BANDWIDTH	9kHz

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.61	30.54	16.77	41.15	27.38	65.79	55.79	-24.63	-28.40
2	0.17283	10.54	36.21	25.52	46.75	36.06	64.82	54.82	-18.07	-18.76
3	0.29467	10.36	27.56	19.41	37.92	29.77	60.39	50.39	-22.47	-20.62
4	0.82643	10.09	28.13	18.24	38.22	28.33	56.00	46.00	-17.78	-17.67
5	1.24042	10.01	26.36	17.59	36.37	27.60	56.00	46.00	-19.63	-18.40
6	**4.17730**	**9.95**	**33.55**	**20.10**	**43.50**	**30.05**	**56.00**	**46.00**	**-12.50**	**-15.95**

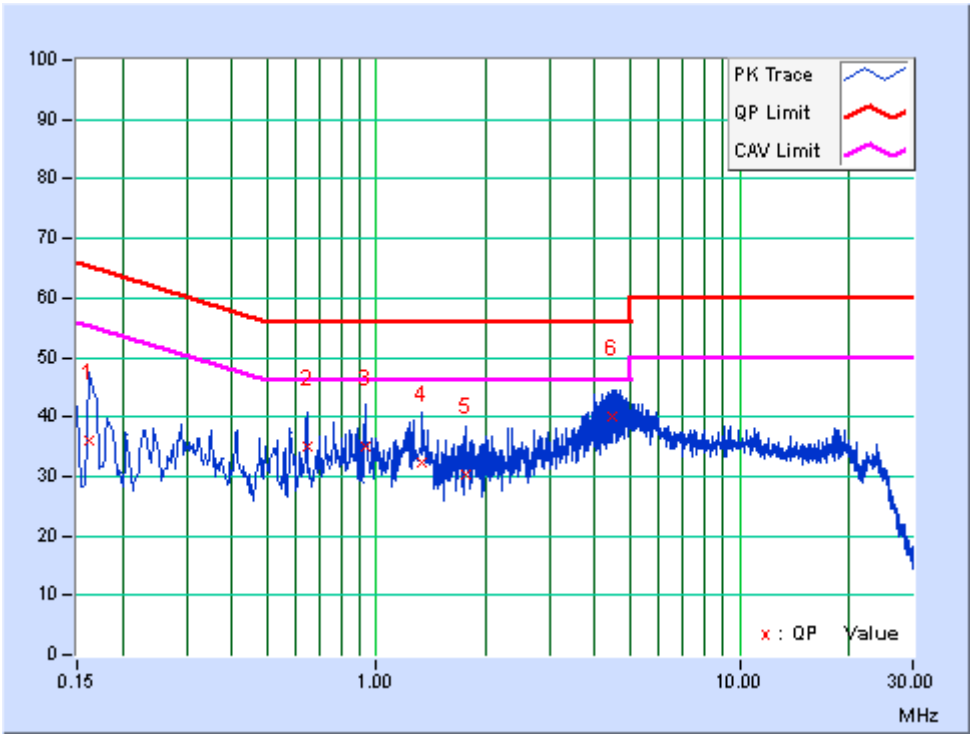
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



PHASE	Neutral	6dB BANDWIDTH	9kHz

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16181	10.48	25.54	14.02	36.02	24.50	65.37	55.37	-29.35	-30.87
2	0.64266	10.19	24.94	18.60	35.13	28.79	56.00	46.00	-20.87	-17.21
3	0.93200	9.94	25.24	18.06	35.18	28.00	56.00	46.00	-20.82	-18.00
4	1.34245	9.84	22.37	15.63	32.21	25.47	56.00	46.00	-23.79	-20.53
5	1.75638	9.76	20.39	13.03	30.15	22.79	56.00	46.00	-25.85	-23.21
6	4.48228	9.76	30.24	19.50	40.00	29.26	56.00	46.00	-16.00	-16.74

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



4.2. RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). Other emissions shall be at least 20dB below the highest level of the desired power.

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 24,13	Apr. 23,14
EMI Test Receiver	Rohde&Schwarz	ESU 26	100005	May 14,13	May 13,14
Loop antenna (9kHz~30MHz)	Daze	ZN30900A	0708	Nov. 28,13	Nov. 27,14
Bilog Antenna (20MHz -2GHz)	Teseq	CBL 6111D	27089	Jul. 27, 13	Jul. 26, 14
Horn Antenna (1GHz -18GHz)	EMCO	3117	00062558	Oct.18,12	Oct.17,14
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Feb. 13,14	Feb. 12,17
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 14,13	May 13,14
Power Meter	Anritsu	ML2495A	1139001	Nov. 04,13	Nov. 03,14
Power Sensor	Anritsu	MA2411B	1126068	Feb. 21,14	Feb. 20,15
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8.8m	NSEMC006	Jun. 10,13	Jun. 11,14
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 30, 13	Oct. 29, 14
Spectrum Analyzer (9KHz-25GHz)	Agilent	E7405A	MY45118807	May 14,13	May 13,14
Power Meter	Anritsu	ML2495A	1139001	Nov. 04,13	Nov. 03,14
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep. 17,13	Sep. 16,14
Bluetooth tester	Rohde&Schwarz	CBT	100325	N/A	N/A
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in Chamber

3. The FCC Site Registration No. is 502831.

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

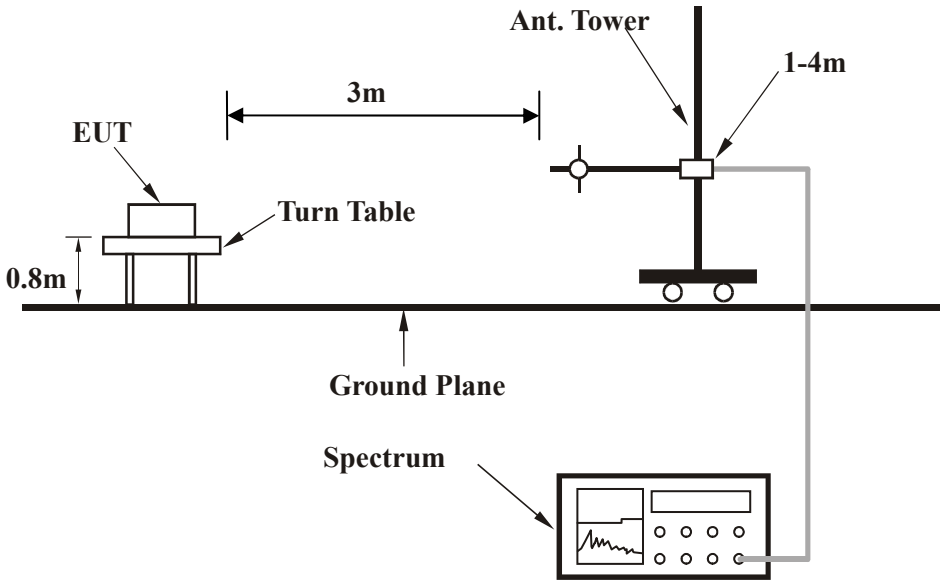
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

a. Set the EUT under full load condition and placed them on a testing table.

b. Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

c. The necessary accessories enable the EUT in full functions.

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA:

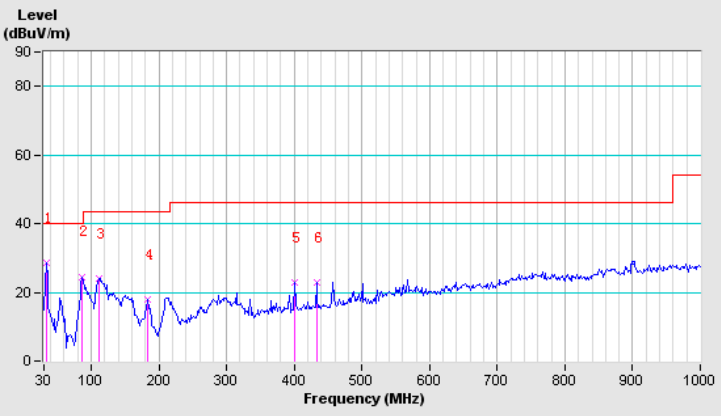
GFSK DH5

CHANNEL	Channel 39	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	33.23	28.7 QP	40.0	-11.3	1.00 H	188	10.49	18.24
2	86.58	24.6 QP	40.0	-15.4	1.00 H	204	14.86	9.70
3	110.83	24.0 QP	43.5	-19.5	1.00 H	218	11.18	12.83
4	183.58	17.9 QP	43.5	-25.6	1.00 H	235	6.92	10.95
5	400.22	22.9 QP	46.0	-23.1	1.00 H	168	2.49	20.37
6	432.55	23.0 QP	46.0	-23.1	1.00 H	157	2.59	20.36

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

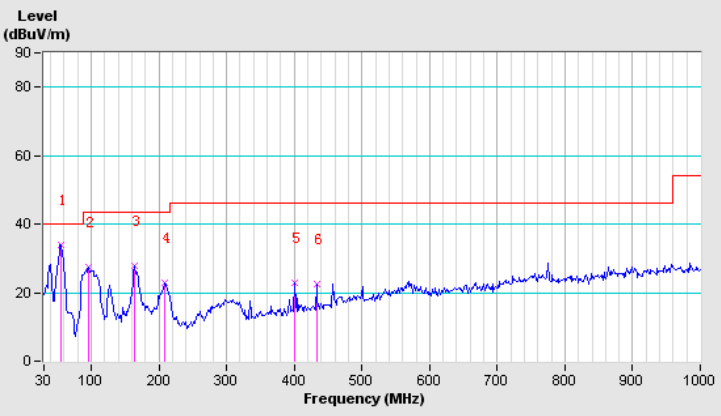


CHANNEL	Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	**55.87**	**34.0 QP**	**40.0**	**-6.0**	**1.00 V**	**280**	**26.63**	**7.41**
2	96.28	27.5 QP	43.5	-16.0	1.00 V	262	16.26	11.24
3	164.18	27.7 QP	43.5	-15.8	1.00 V	250	15.46	12.25
4	209.45	22.8 QP	43.5	-20.7	1.00 V	228	11.84	10.98
5	400.22	22.8 QP	46.0	-23.2	1.00 V	215	2.39	20.37
6	432.55	22.4 QP	46.0	-23.6	1.00 V	198	2.05	20.36

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



ABOVE 1GHz WORST-CASE DATA:

GFSK DH5

CHANNEL	Channel 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1 ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	45.8 PK	74.0	-28.2	1.04 H	195	7.36	38.44
2	2390.00	32.4 AV	54.0	-21.6	1.04 H	195	-6.04	38.44
3	#2400.00	52.3 PK	72.6	-20.3	1.04 H	195	13.84	38.46
4	#2400.00	38.4 AV	43.6	-5.2	1.04 H	195	-0.06	38.46
5	*2402.00	92.6 PK			1.04 H	195	54.14	38.46
6	*2402.00	63.6 AV			1.04 H	195	25.14	38.46
7	4804.00	53.5 PK	74.0	-20.5	1.00 H	60	10.03	43.47
8	4804.00	41.6 AV	54.0	-12.4	1.00 H	60	-1.87	43.47
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	46.6 PK	74.0	-27.4	1.00 V	161	8.16	38.44
2	2390.00	34.4 AV	54.0	-19.6	1.00 V	161	-4.04	38.44
3	#2400.00	47.3 PK	67.0	-19.7	1.00 V	161	8.80	38.46
4	#2400.00	36.4 AV	40.2	-3.8	1.00 V	161	-2.10	38.46
5	*2402.00	87.0 PK			1.00 V	161	48.54	38.46
6	*2402.00	60.2 AV			1.00 V	161	21.70	38.46
7	4804.00	53.2 PK	74.0	-20.8	1.00 V	120	9.73	43.47
8	4804.00	39.1 AV	54.0	-14.9	1.00 V	120	-4.37	43.47

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	Channel 39	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1 ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	93.9 PK			1.00 H	202	55.35	38.55
2	*2441.00	64.5 AV			1.00 H	202	25.95	38.55
3	4882.00	51.7 PK	74.0	-22.3	1.00 H	100	8.15	43.55
4	4882.00	39.4 AV	54.0	-14.6	1.00 H	100	-4.15	43.55
5	7323.00	56.3 PK	74.0	-17.7	1.00 H	200	8.23	48.07
6	7323.00	41.5 AV	54.0	-12.5	1.00 H	200	-6.57	48.07
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	90.3 PK			1.00 V	234	51.75	38.55
2	*2441.00	62.4 AV			1.00 V	234	23.85	38.55
3	4882.00	51.7 PK	74.0	-22.3	1.00 V	220	8.15	43.55
4	4882.00	38.4 AV	54.0	-15.6	1.00 V	220	-5.15	43.55
5	7323.00	56.3 PK	74.0	-17.7	1.00 V	160	8.23	48.07
6	7323.00	42.1 AV	54.0	-11.9	1.00 V	160	-5.97	48.07

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

CHANNEL	Channel 78	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1 ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.9 PK			1.00 H	205	52.27	38.63
2	*2480.00	69.8 AV			1.00 H	205	31.17	38.63
3	2483.50	46.1 PK	74.0	-27.9	1.00 H	205	7.46	38.64
4	2483.50	34.6 AV	54.0	-19.4	1.00 H	205	-4.04	38.64
5	4960.00	51.3 PK	74.0	-22.7	1.00 H	260	7.67	43.63
6	4960.00	36.4 AV	54.0	-17.6	1.00 H	260	-7.23	43.63
7	7440.00	57.6 PK	74.0	-16.4	1.00 H	120	9.45	48.15
8	7440.00	43.5 AV	54.0	-10.5	1.00 H	120	-4.65	48.15
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.9 PK			1.00 V	228	52.27	38.63
2	*2480.00	70.7 AV			1.00 V	228	32.07	38.63
3	2483.50	46.8 PK	74.0	-27.2	1.00 V	228	8.16	38.64
4	2483.50	34.7 AV	54.0	-19.3	1.00 V	228	-3.94	38.64
5	4960.00	51.6 PK	74.0	-22.4	1.00 V	200	7.97	43.63
6	4960.00	37.9 AV	54.0	-16.1	1.00 V	200	-5.73	43.63
7	7440.00	57.1 PK	74.0	-16.9	1.00 V	160	8.95	48.15
8	7440.00	42.3 AV	54.0	-11.7	1.00 V	160	-5.85	48.15

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

ABOVE 1GHz WORST-CASE DATA:

BT_8DPSK DH5

CHANNEL	Channel 0	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1 ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	48.5 PK	74.0	-25.5	1.00 H	200	10.06	38.44
2	2390.00	37.1 AV	54.0	-16.9	1.00 H	200	-1.34	38.44
3	#2400.00	57.8 PK	73.5	-15.7	1.00 H	200	19.34	38.46
4	#2400.00	38.7 AV	42.8	-4.1	1.00 H	200	0.24	38.46
5	*2402.00	93.5 PK			1.00 H	200	55.04	38.46
6	*2402.00	62.8 AV			1.00 H	200	24.34	38.46
7	4804.00	54.3 PK	74.0	-19.7	1.00 H	260	10.83	43.47
8	4804.00	41.2 AV	54.0	-12.8	1.00 H	260	-2.27	43.47
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	48.1 PK	74.0	-25.9	1.00 V	230	9.66	38.44
2	2390.00	36.4 AV	54.0	-17.6	1.00 V	230	-2.04	38.44
3	#2400.00	54.7 PK	67.9	-13.2	1.00 V	230	16.24	38.46
4	**#2400.00**	**36.4 AV**	**40.1**	**-3.7**	**1.00 V**	**230**	**-2.06**	**38.46**
5	*2402.00	87.9 PK			1.00 V	230	49.44	38.46
6	*2402.00	60.1 AV			1.00 V	230	21.64	38.46
7	4804.00	54.8 PK	74.0	-19.2	1.00 V	220	11.33	43.47
8	4804.00	39.8 AV	54.0	-14.2	1.00 V	220	-3.67	43.47

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	Channel 39	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1 ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	94.1 PK			1.00 H	196	55.55	38.55
2	*2441.00	63.1 AV			1.00 H	196	24.55	38.55
3	4882.00	54.4 PK	74.0	-19.6	1.00 H	150	10.85	43.55
4	4882.00	42.4 AV	54.0	-11.6	1.00 H	150	-1.15	43.55
5	7323.00	60.2 PK	74.0	-13.8	1.00 H	220	12.13	48.07
6	7323.00	45.4 AV	54.0	-8.6	1.00 H	220	-2.67	48.07
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	90.2 PK			1.00 V	233	51.65	38.55
2	*2441.00	60.9 AV			1.00 V	233	22.35	38.55
3	4882.00	54.2 PK	74.0	-19.8	1.00 V	280	10.65	43.55
4	4882.00	38.6 AV	54.0	-15.4	1.00 V	280	-4.95	43.55
5	7323.00	59.4 PK	74.0	-14.6	1.00 V	160	11.33	48.07
6	7323.00	42.1 AV	54.0	-11.9	1.00 V	160	-5.97	48.07

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

CHANNEL	Channel 78	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1 ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.7 PK			1.00 H	205	52.07	38.63
2	*2480.00	67.5 AV			1.00 H	205	28.87	38.63
3	2483.50	47.5 PK	74.0	-26.5	1.00 H	205	8.86	38.64
4	2483.50	35.0 AV	54.0	-19.0	1.00 H	205	-3.64	38.64
5	4960.00	53.6 PK	74.0	-20.4	1.00 H	80	9.97	43.63
6	4960.00	41.3 AV	54.0	-12.7	1.00 H	80	-2.33	43.63
7	7440.00	60.1 PK	74.0	-13.9	1.00 H	155	11.95	48.15
8	7440.00	45.6 AV	54.0	-8.4	1.00 H	155	-2.55	48.15
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.4 PK			1.00 V	240	51.77	38.63
2	*2480.00	69.7 AV			1.00 V	240	31.07	38.63
3	2483.50	48.1 PK	74.0	-25.9	1.00 V	240	9.46	38.64
4	2483.50	35.1 AV	54.0	-18.9	1.00 V	240	-3.54	38.64
5	4960.00	53.8 PK	74.0	-20.2	1.00 V	280	10.17	43.63
6	4960.00	41.5 AV	54.0	-12.5	1.00 V	280	-2.13	43.63
7	7440.00	59.6 PK	74.0	-14.4	1.00 V	280	11.45	48.15
8	7440.00	45.6 AV	54.0	-8.4	1.00 V	280	-2.55	48.15

REMARKS:

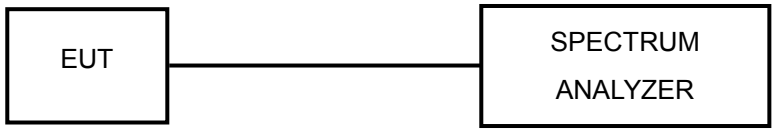
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

4.3. NUMBER OF HOPPING FREQUENCY USED

4.3.1. LIMIT OF HOPPING FREQUENCY USED

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

4.3.2. TEST SETUP



4.3.3. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer (9KHz–40GHz)	Agilent	E4446A	MY46180622	Apr. 24,13	Apr. 23,14
Power Meter	Anritsu	ML2495A	1139001	Nov. 04,13	Nov. 03,14
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 30, 13	Oct. 29, 14

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in oven room.

4.3.4. TEST PROCEDURES

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.

d. Set the SA on View mode and then plot the result on SA screen.

e. Repeat above procedures until all frequencies measured were completed.

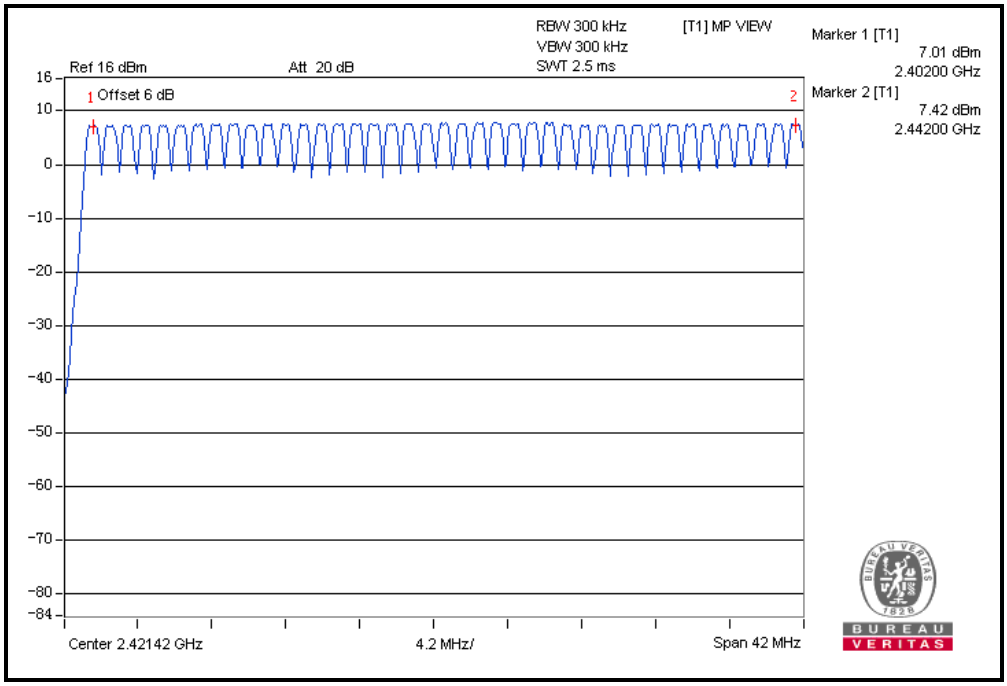
4.3.5. DEVIATION FROM TEST STANDARD

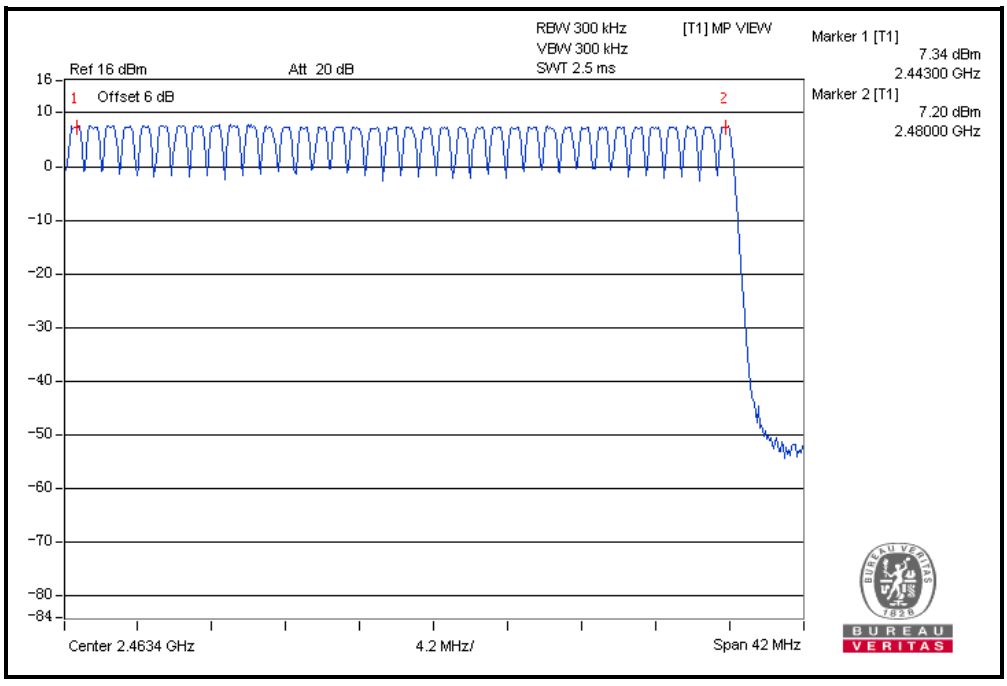
No deviation.

4.3.6. TEST RESULTS

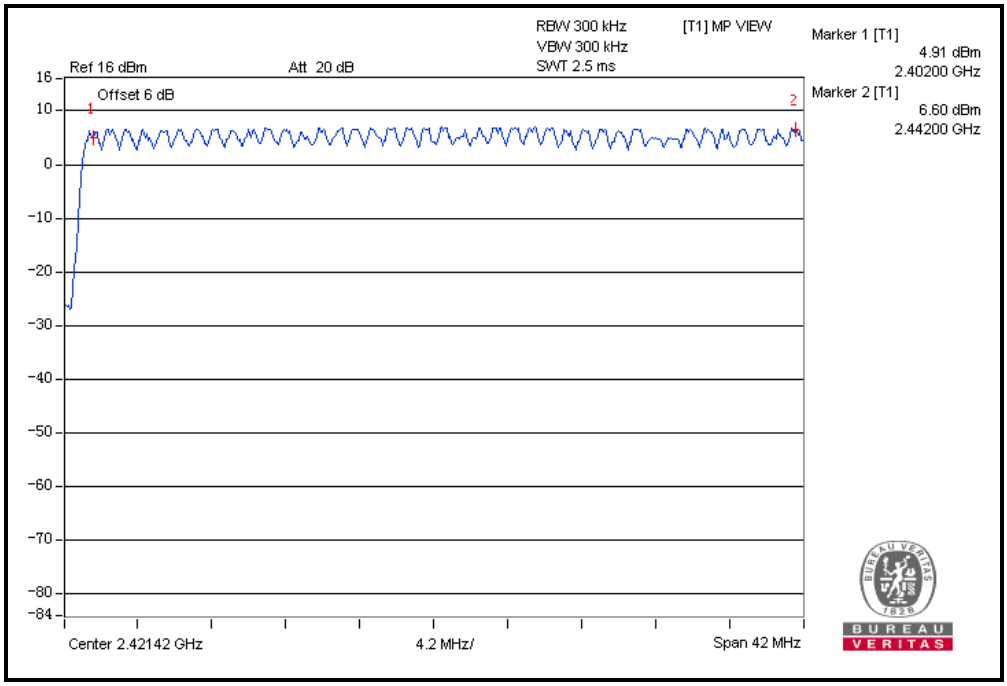
There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

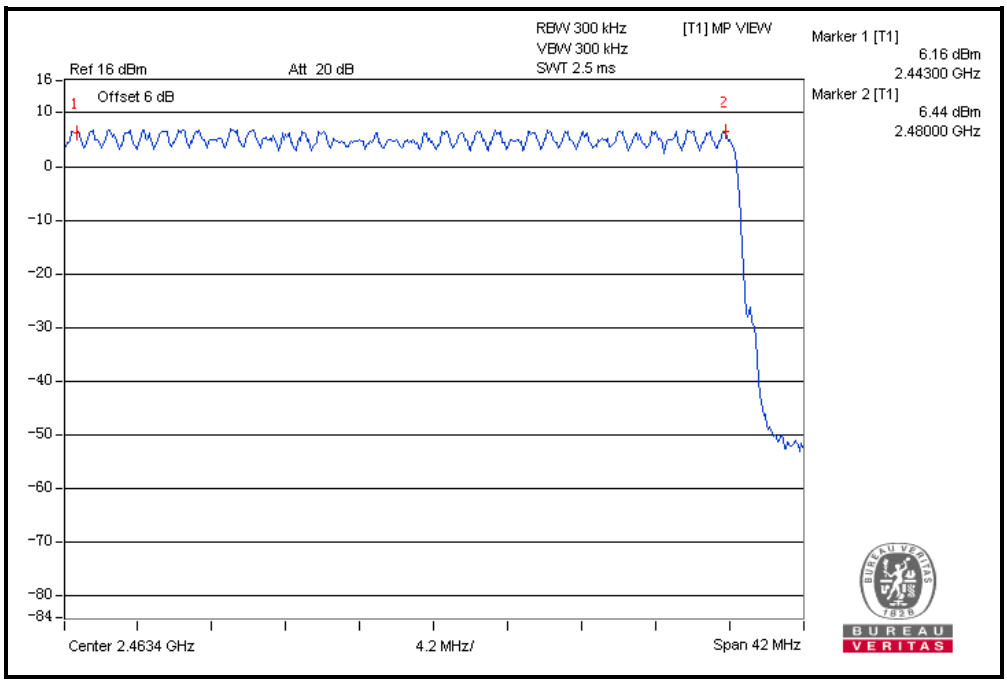
GFSK


RBW 300 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MP VIEW
Marker 1 [T1]
7.01 dBm
2.40200 GHz
Marker 2 [T1]
7.42 dBm
2.44200 GHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


RBW 300 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MP VIEW
Marker 1 [T1]
7.34 dBm
2.44300 GHz
Marker 2 [T1]
7.20 dBm
2.48000 GHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

8DPSK


RBW 300 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MP VIEW
Marker 1 [T1]
4.91 dBm
2.40200 GHz
Marker 2 [T1]
6.60 dBm
2.44200 GHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz

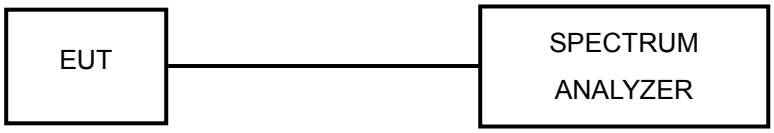

RBW 300 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MP VIEW
Marker 1 [T1]
6.16 dBm
2.44300 GHz
Marker 2 [T1]
6.44 dBm
2.48000 GHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

4.4. DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

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.

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

4.4.4 TEST PROCEDURES

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.

d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.

e. Repeat above procedures until all different time-slot modes have been completed.

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

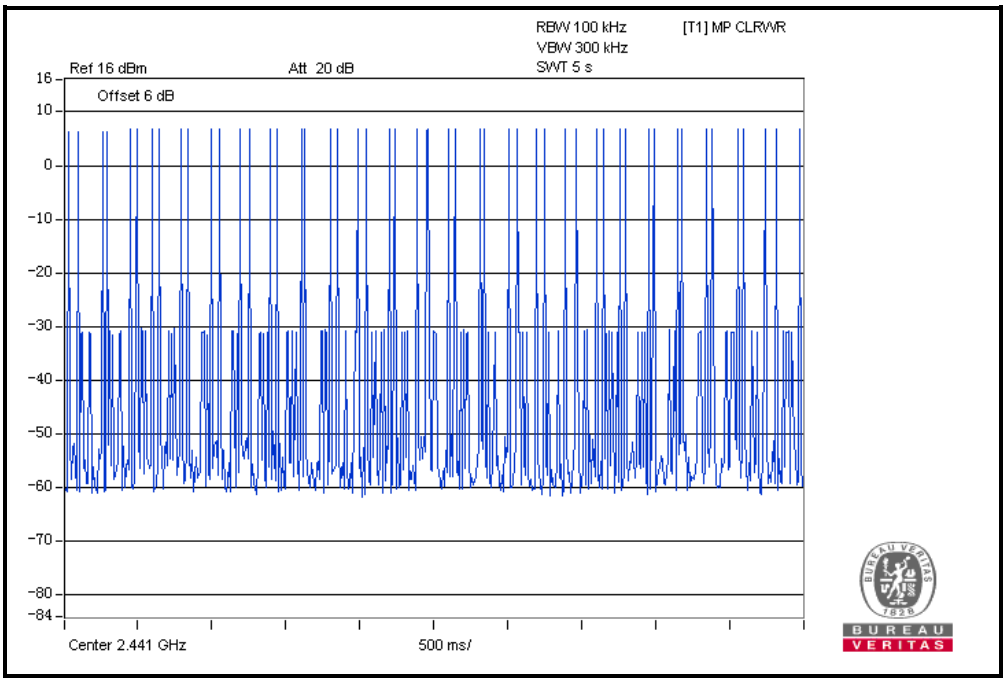
4.4.6 TEST RESULTS

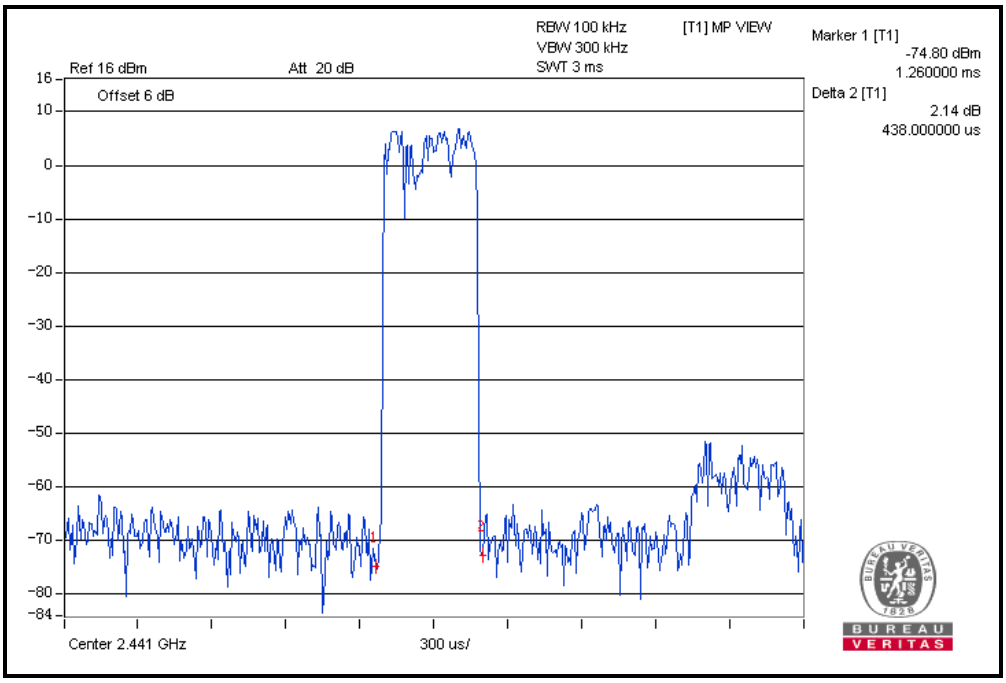
GFSK

Mode	Number of Hopping Channel	Number of transmission in a period(channel number*0.4 sec)				Length of transmission time (msec)	Result (msec)	Limit (msec)	PASS / FAIL
		period (sec)	sweep time (sec)	times in a sweep	times in a period				
DH1	79	31.6	5	51	322.32	0.438	141.18	400	PASS
DH3	79	31.6	5	26	164.32	1.71	280.99	400	PASS
DH5	79	31.6	5	14	88.48	2.96	261.9	400	PASS

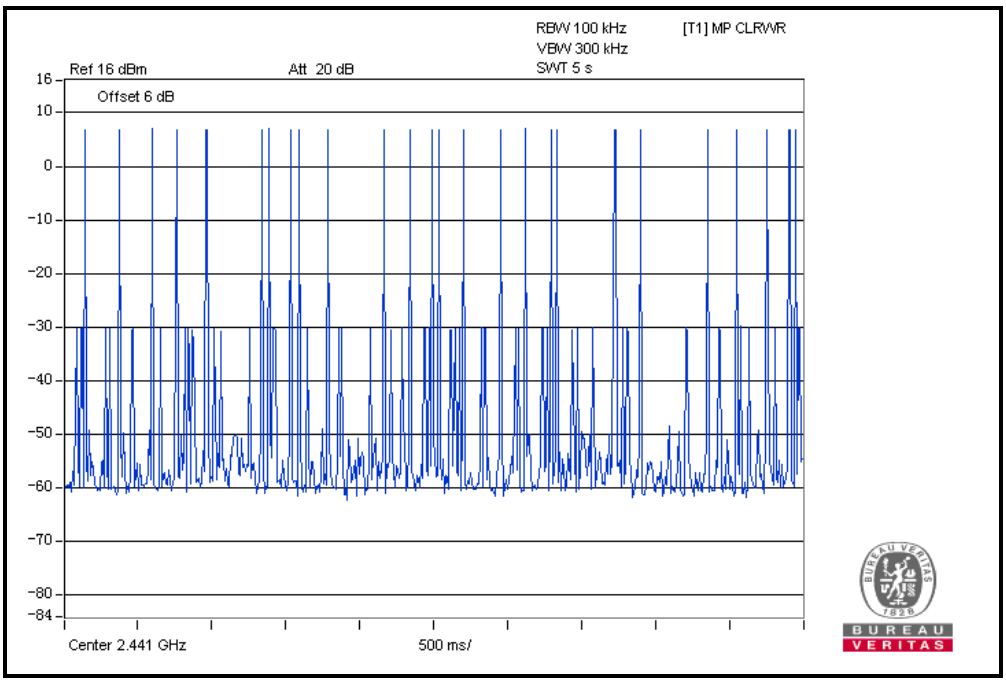
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

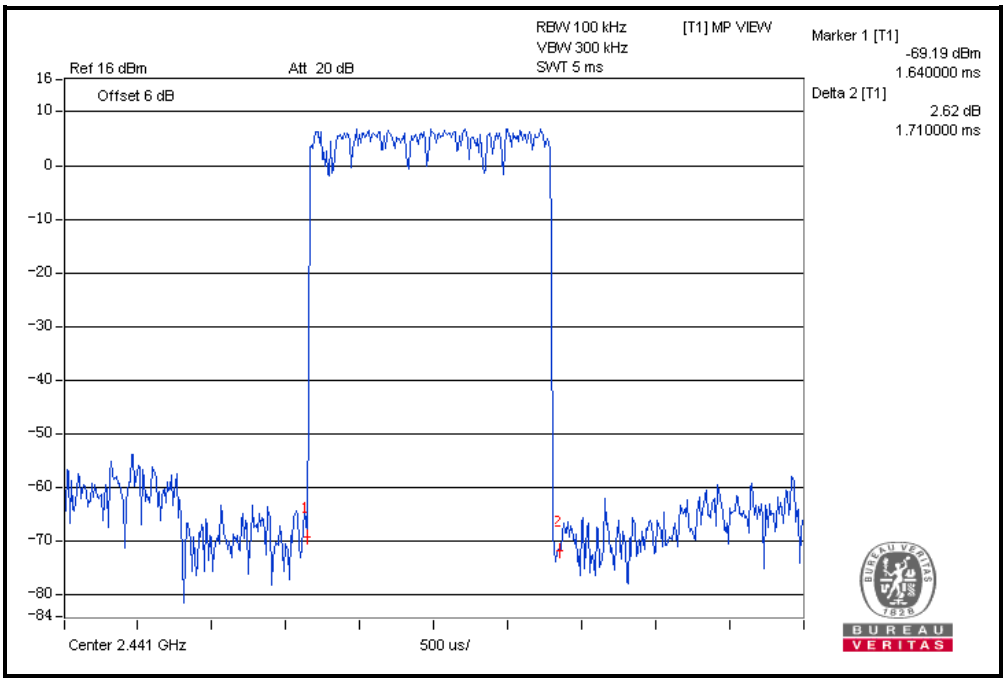
DH1


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 ms/

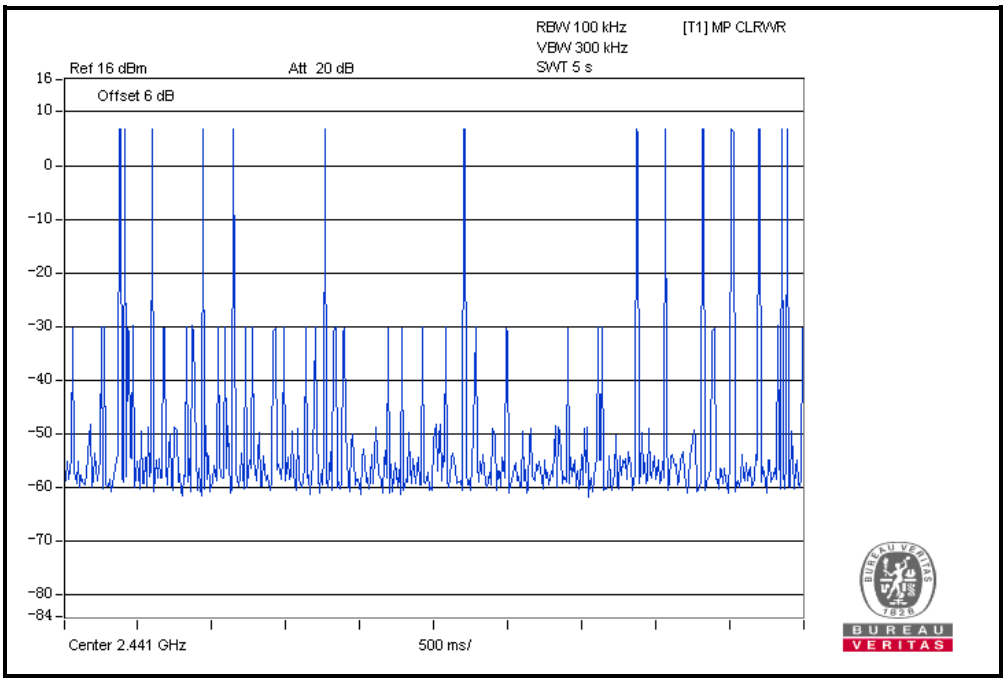

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-74.80 dBm
1.260000 ms
Delta 2 [T1]
2.14 dB
438.000000 us
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
300 us/

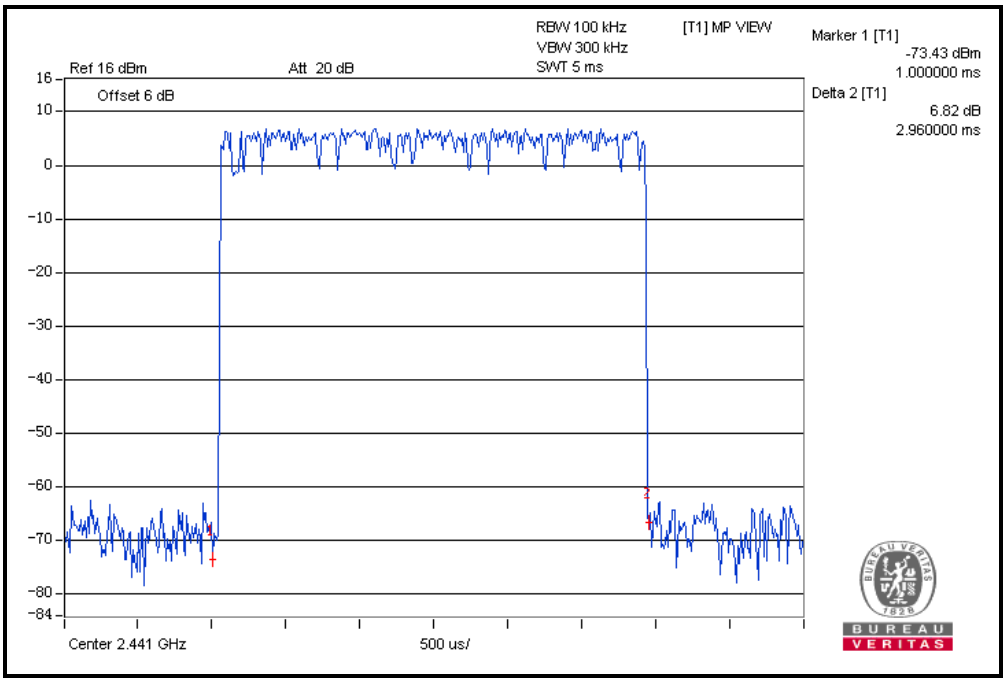
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-69.19 dBm
1.640000 ms
Delta 2 [T1]
2.62 dB
1.710000 ms
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 ms/

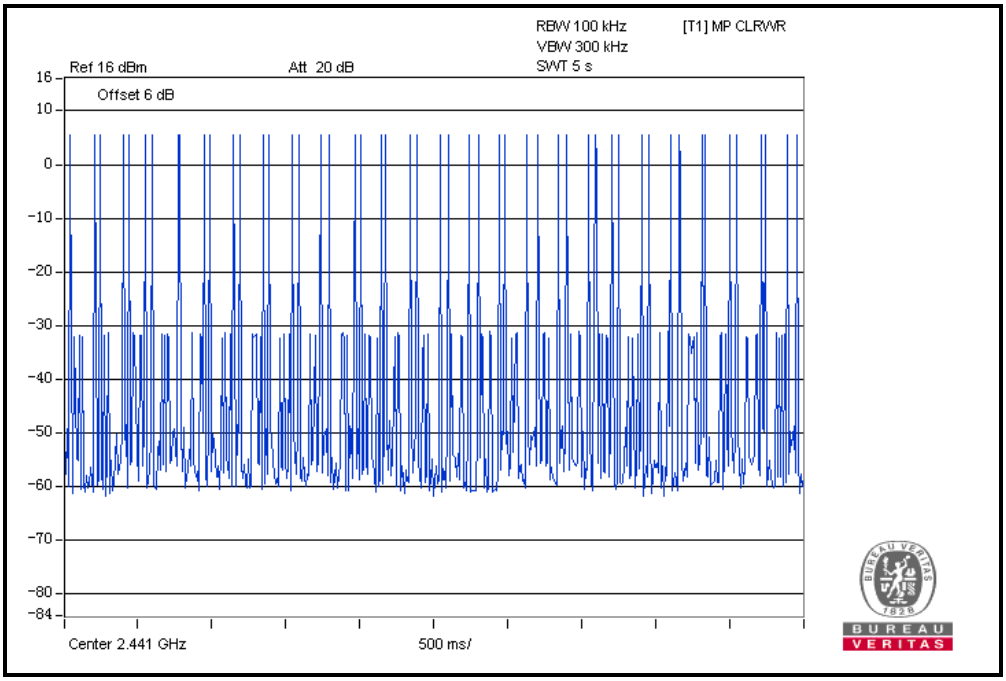

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-73.43 dBm
1.000000 ms
Delta 2 [T1]
6.82 dB
2.960000 ms
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 us/

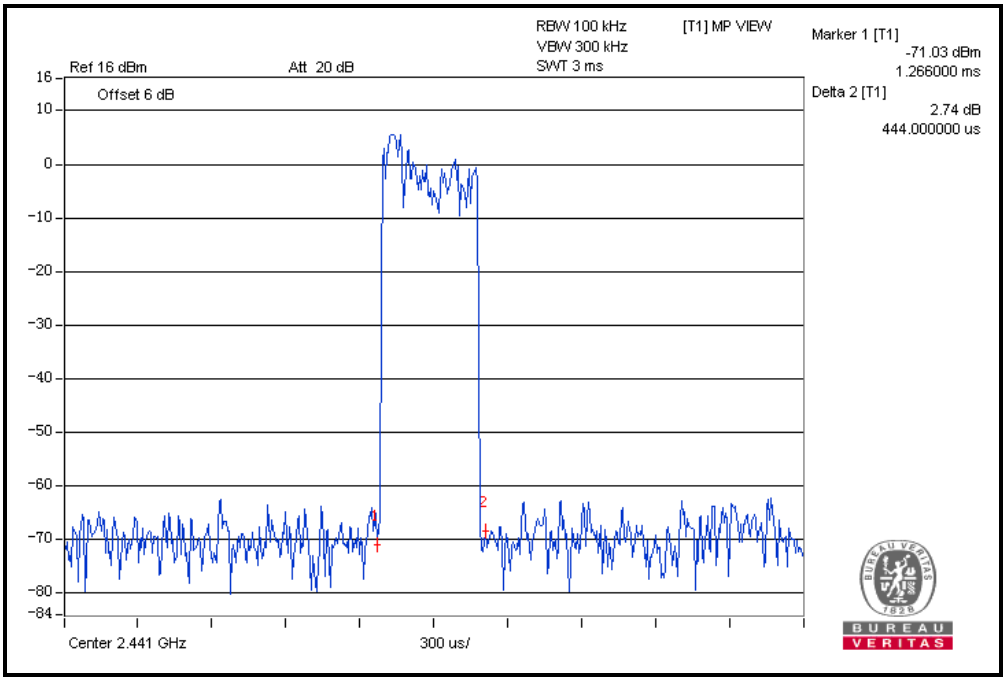
8DPSK

Mode	Number of Hopping Channel	Number of transmission in a period(channel number*0.4 sec)				Length of transmission time (msec)	Result (msec)	Limit (msec)	PASS / FAIL
		period (sec)	sweep time (sec)	times in a sweep	times in a period				
DH1	79	31.6	5	50	316	0.444	140.3	400	PASS
DH3	79	31.6	5	24	151.68	1.74	263.92	400	PASS
DH5	79	31.6	5	16	101.12	2.93	296.28	400	PASS

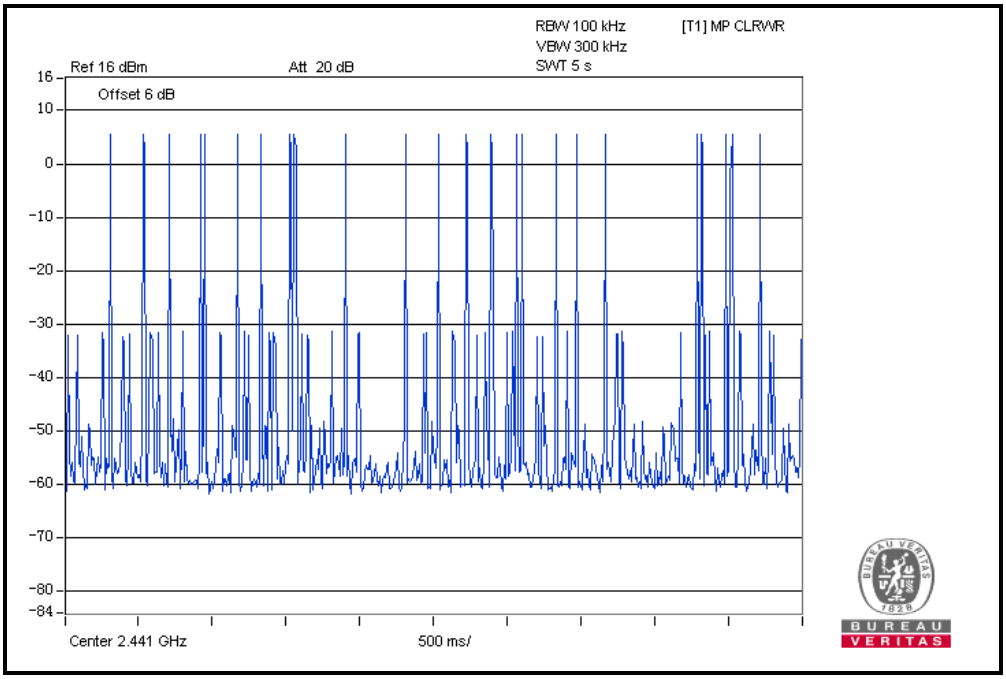
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

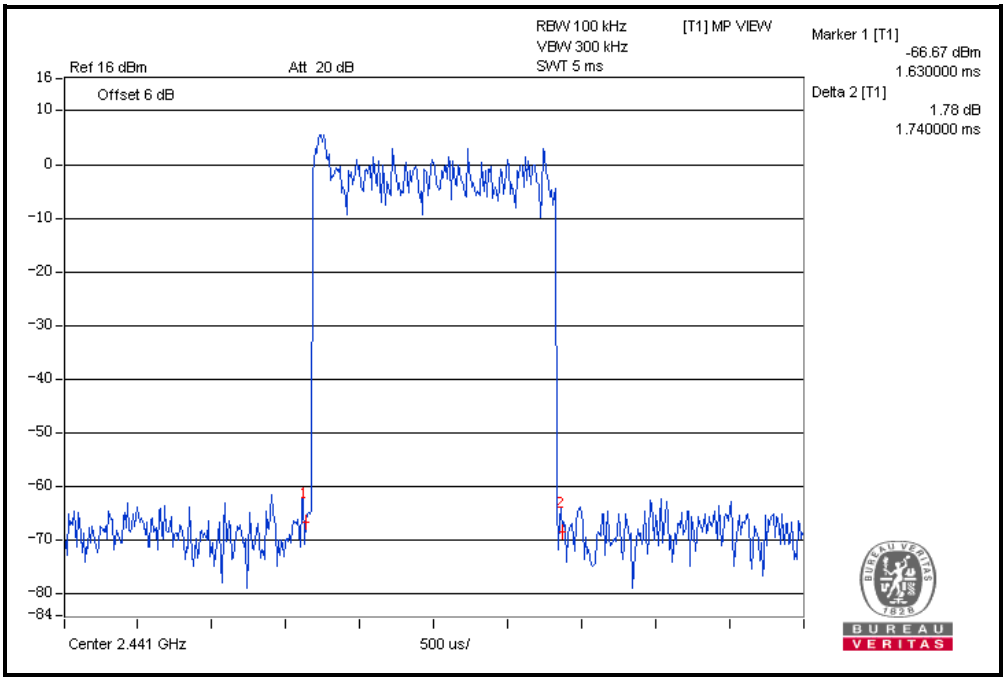
DH1


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 ms/

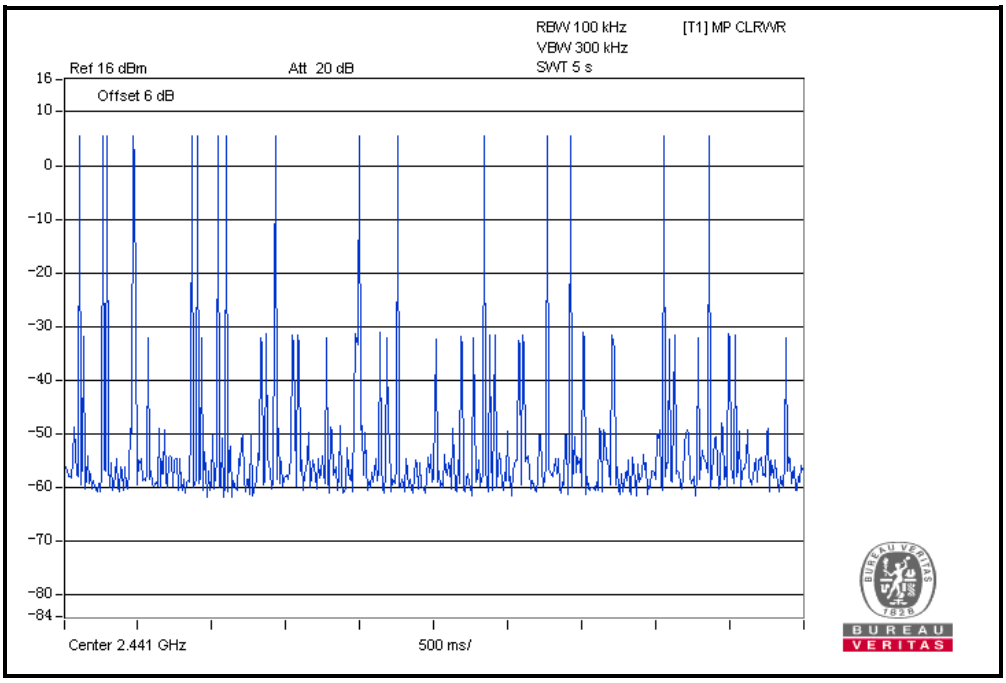

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-71.03 dBm
1.266000 ms
Delta 2 [T1]
2.74 dB
444.000000 us
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
300 us/

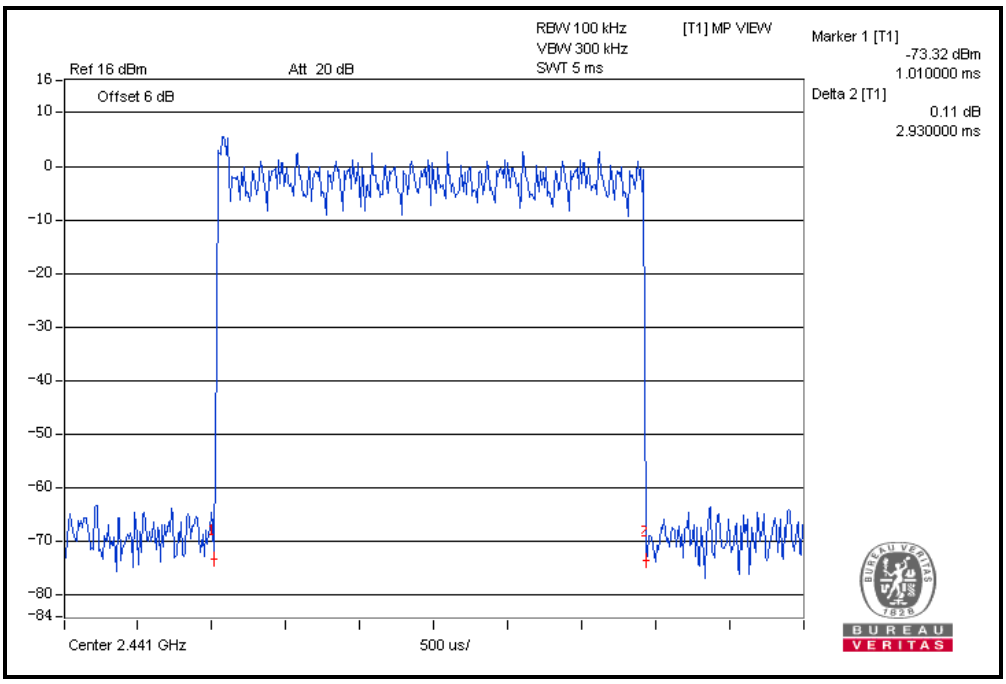
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-66.67 dBm
1.630000 ms
Delta 2 [T1]
1.78 dB
1.740000 ms
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 ms/

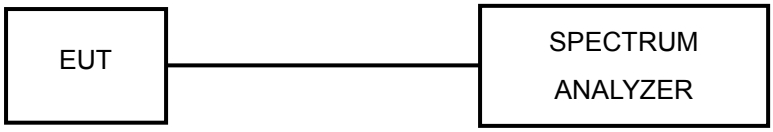

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-73.32 dBm
1.010000 ms
Delta 2 [T1]
0.11 dB
2.930000 ms
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.441 GHz
500 us/

4.5. CHANNEL BANDWIDTH

4.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer (9KHz-25GHz)	Agilent	E7405A	MY45118807	May 14,13	May 13,14
Power Meter	Anritsu	ML2495A	1139001	Nov. 04,13	Nov. 03,14
Digital Multimeter	FLUKE	15B	A1220010D G	Oct. 30,13	Oct. 29,14

4.5.4 TEST PROCEDURE

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.

d. Repeat above procedures until all frequencies measured were complete.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

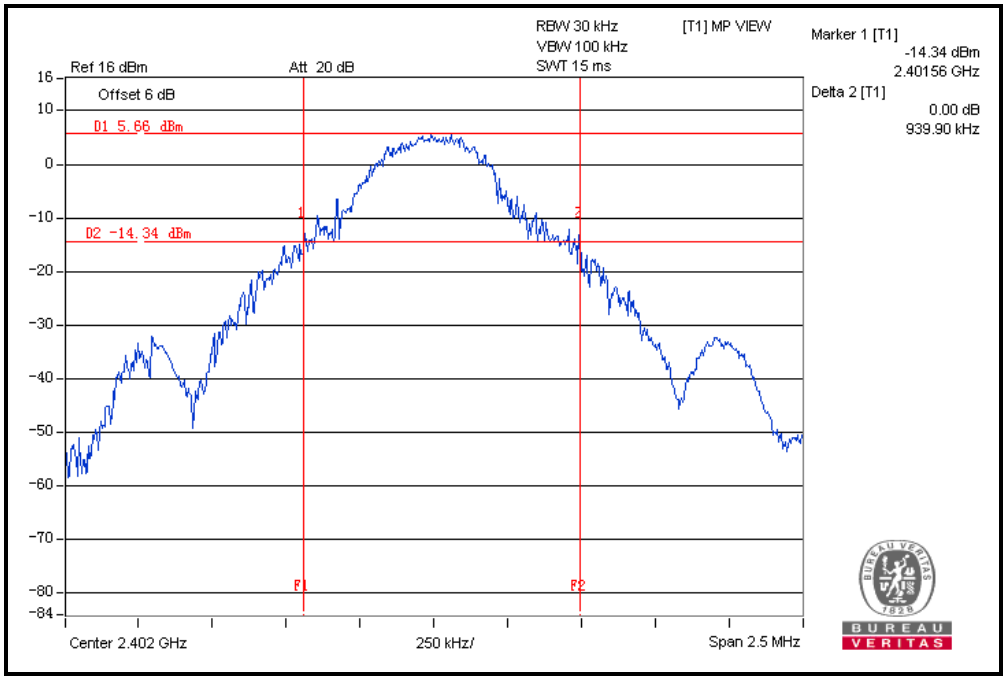
Same as item 4.2.6

4.5.7 TEST RESULTS

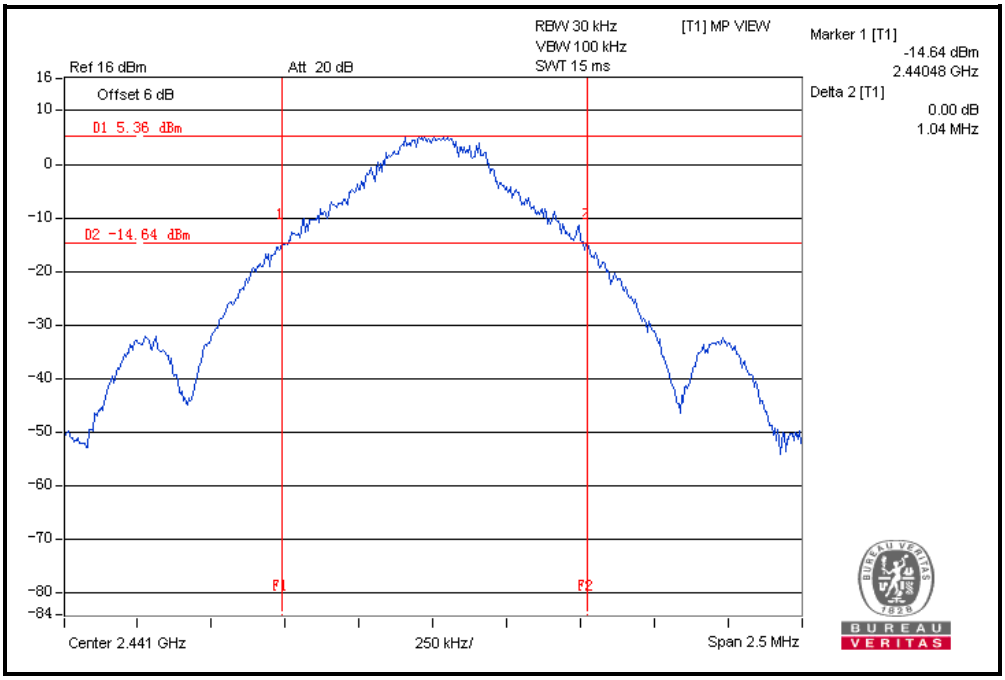
GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.94
39	2441	1.04
78	2480	1.01

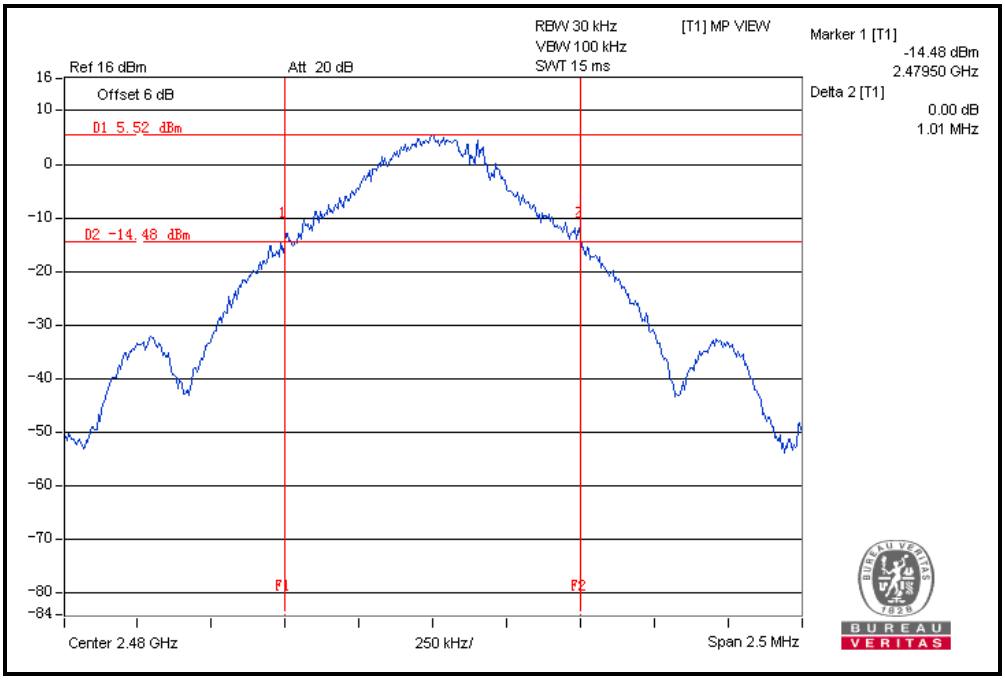
CH 0



CH 39


RBW 30 kHz
VBW 100 kHz
SWT 15 ms
[T1] MP VIEW
Marker 1 [T1]
-14.64 dBm
2.44048 GHz
Delta 2 [T1]
0.00 dB
1.04 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
D1 5.36 dBm
D2 -14.64 dBm
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

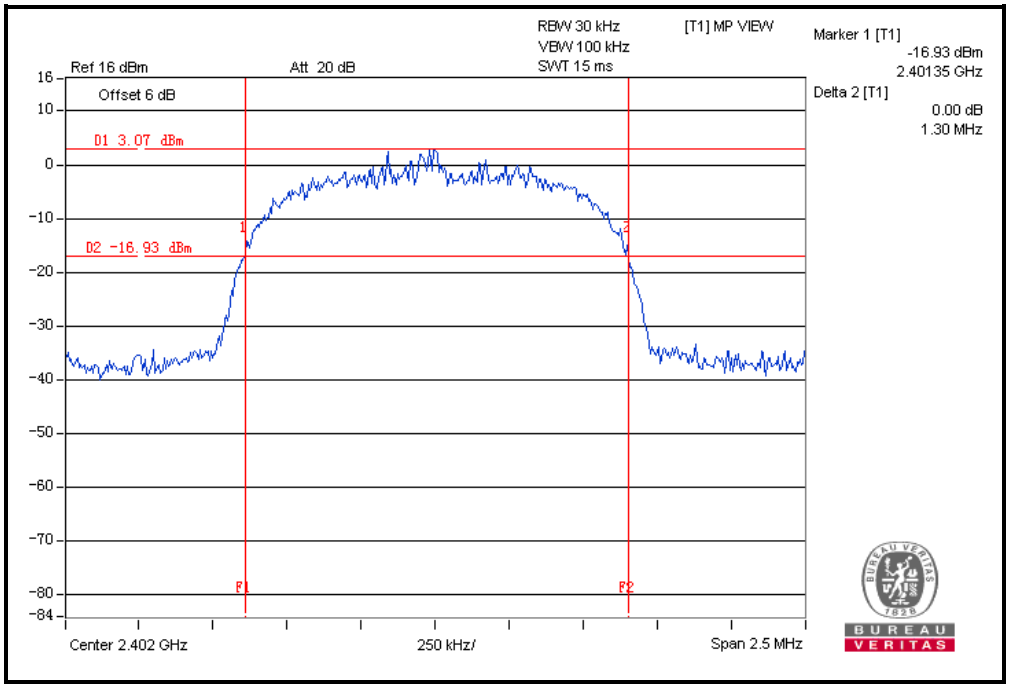
CH 78


RBW 30 kHz
VBW 100 kHz
SWT 15 ms
[T1] MP VIEW
Marker 1 [T1]
-14.48 dBm
2.47950 GHz
Delta 2 [T1]
0.00 dB
1.01 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
D1 5.52 dBm
D2 -14.48 dBm
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

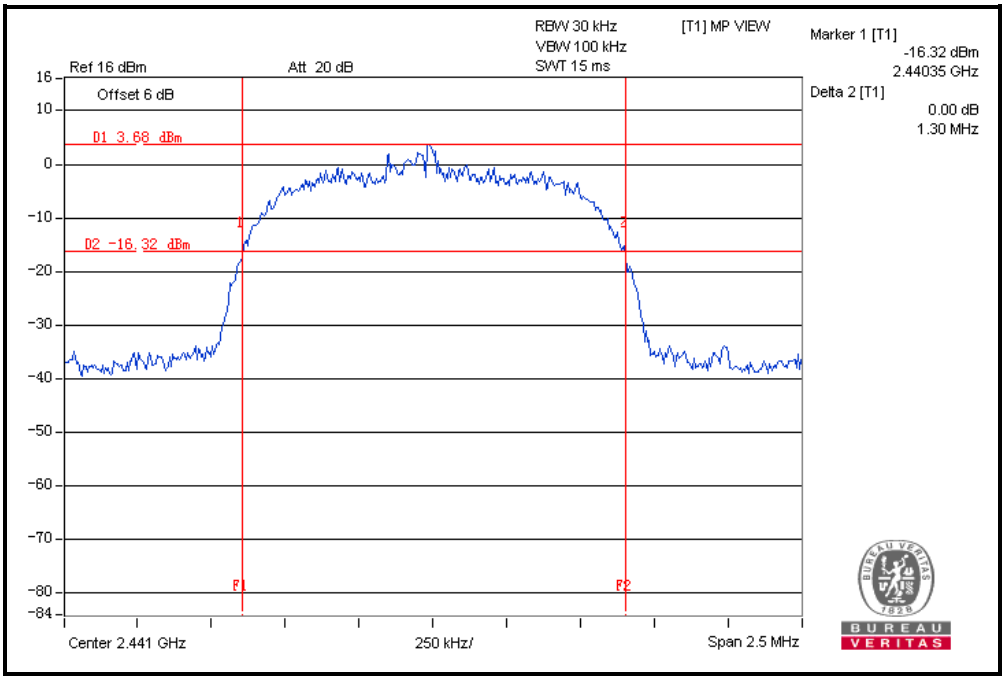
8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.30
39	2441	1.30
78	2480	1.30

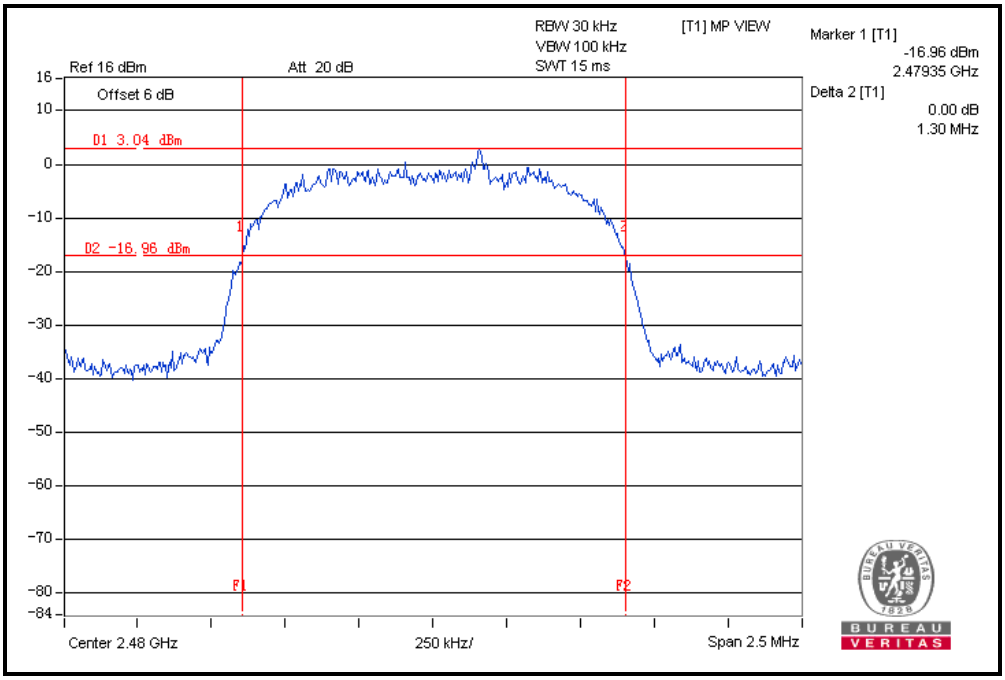
CH 0



CH 39


RBW 30 kHz
VBW 100 kHz
SWT 15 ms
[T1] MP VIEW
Marker 1 [T1]
-16.32 dBm
2.44035 GHz
Delta 2 [T1]
0.00 dB
1.30 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
D1 3.68 dBm
D2 -16.32 dBm
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

CH 78

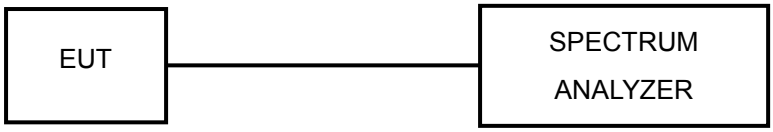

RBW 30 kHz
VBW 100 kHz
SWT 15 ms
[T1] MP VIEW
Marker 1 [T1]
-16.96 dBm
2.47935 GHz
Delta 2 [T1]
0.00 dB
1.30 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
D1 3.04 dBm
D2 -16.96 dBm
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

4.6. HOPPING CHANNEL SEPARATION

4.6.1. LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

4.6.2. TEST SETUP



4.6.3. TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

4.6.4. TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.6.5. DEVIATION FROM TEST STANDARD

No deviation.

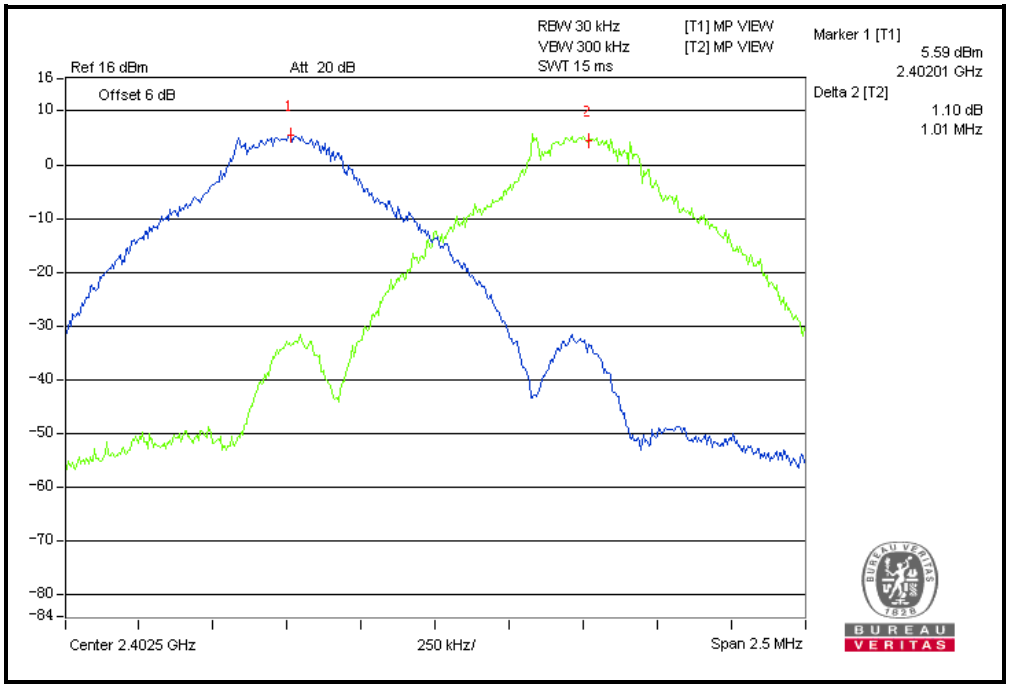
4.6.6. TEST RESULTS

GFSK

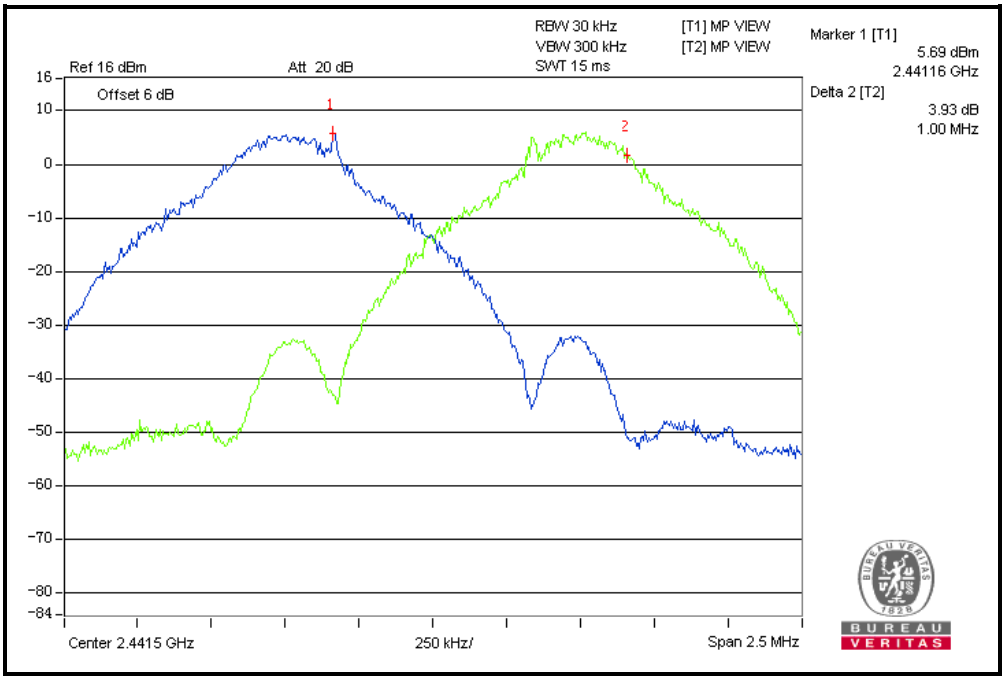
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.01	0.94	0.627	PASS
39	2441	1.00	1.04	0.693	PASS
78	2480	1.00	1.01	0.673	PASS

NOTE: The minimum limit is two-third 20dB bandwidth.

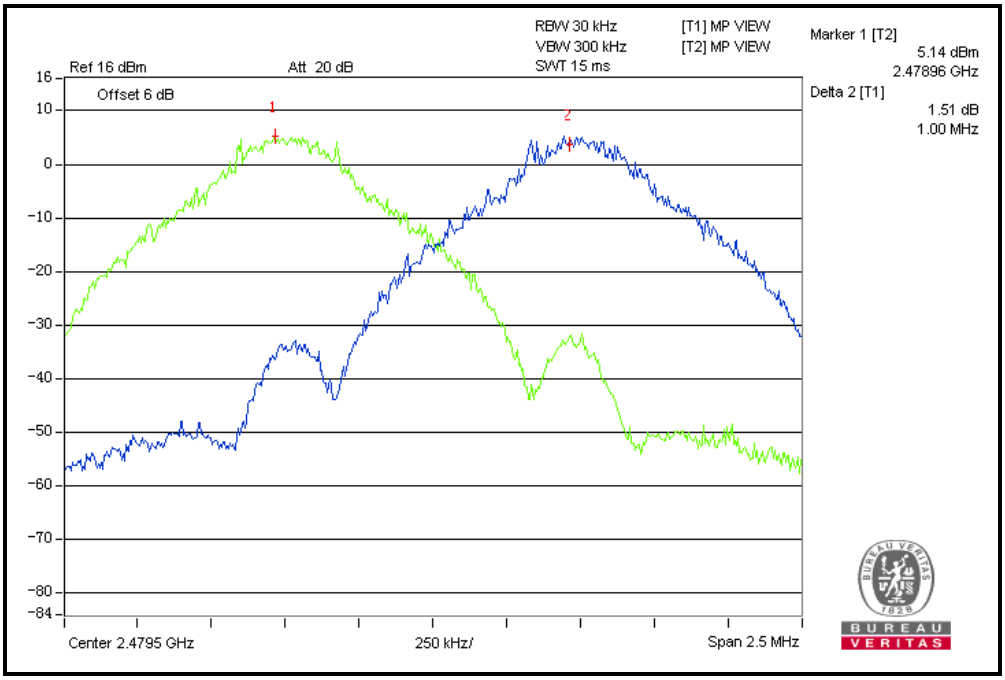
CH 0



CH 39


RBW 30 kHz
VBW 300 kHz
SWT 15 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
5.69 dBm
2.44116 GHz
Delta 2 [T2]
3.93 dB
1.00 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz
BUREAU VERITAS

CH 78

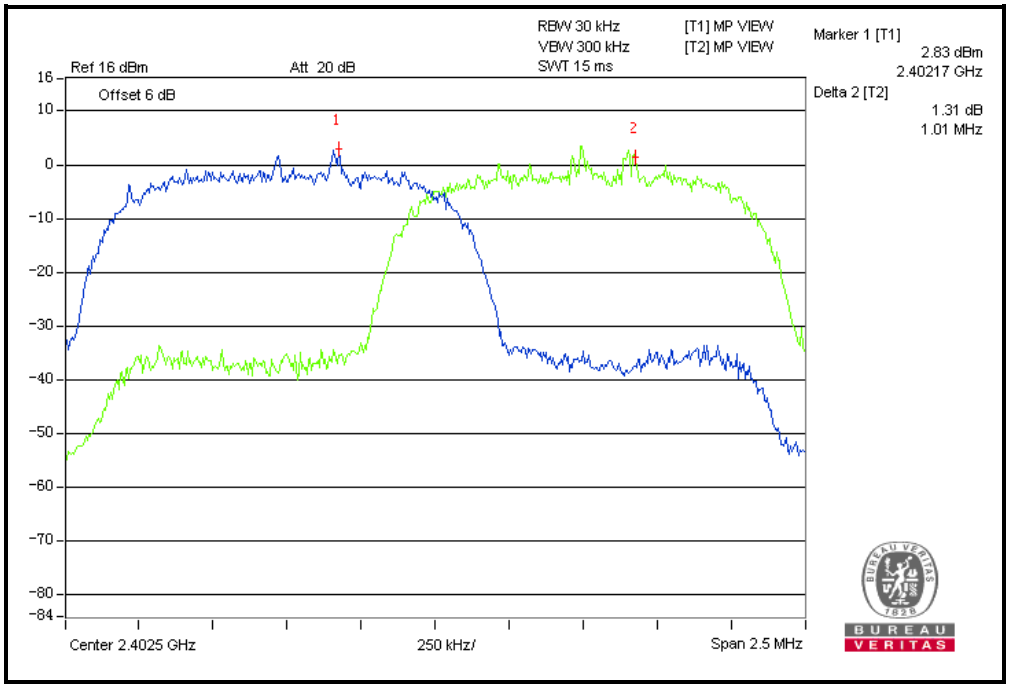

RBW 30 kHz
VBW 300 kHz
SWT 15 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T2]
5.14 dBm
2.47896 GHz
Delta 2 [T1]
1.51 dB
1.00 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz
BUREAU VERITAS

8DPSK

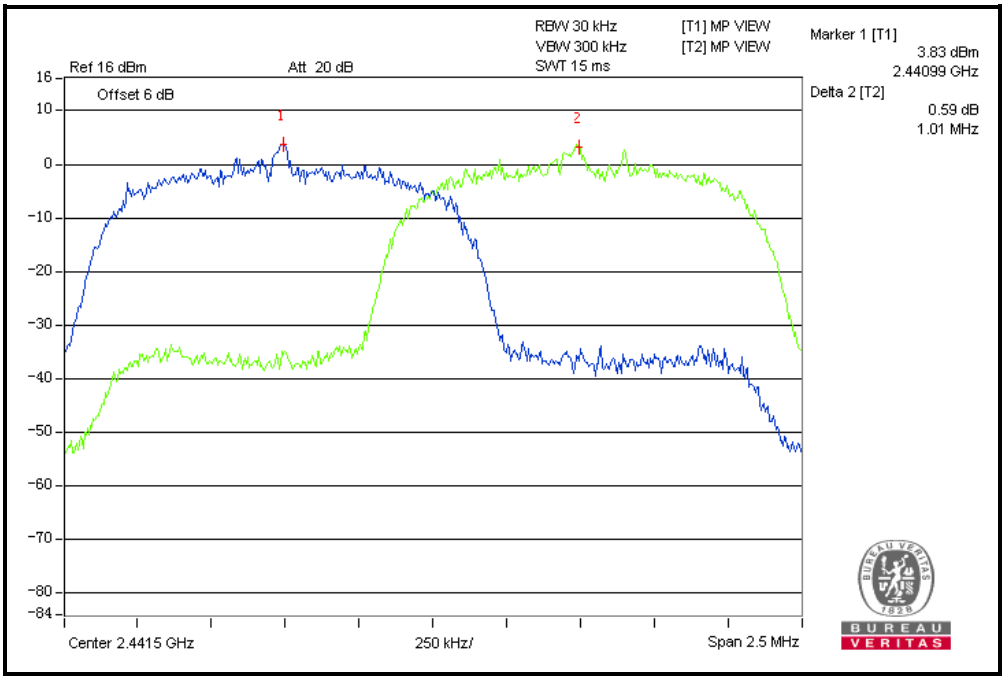
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.01	1.30	0.867	PASS
39	2441	1.01	1.30	0.867	PASS
78	2480	1.00	1.30	0.867	PASS

NOTE: The minimum limit is two-third 20dB bandwidth.

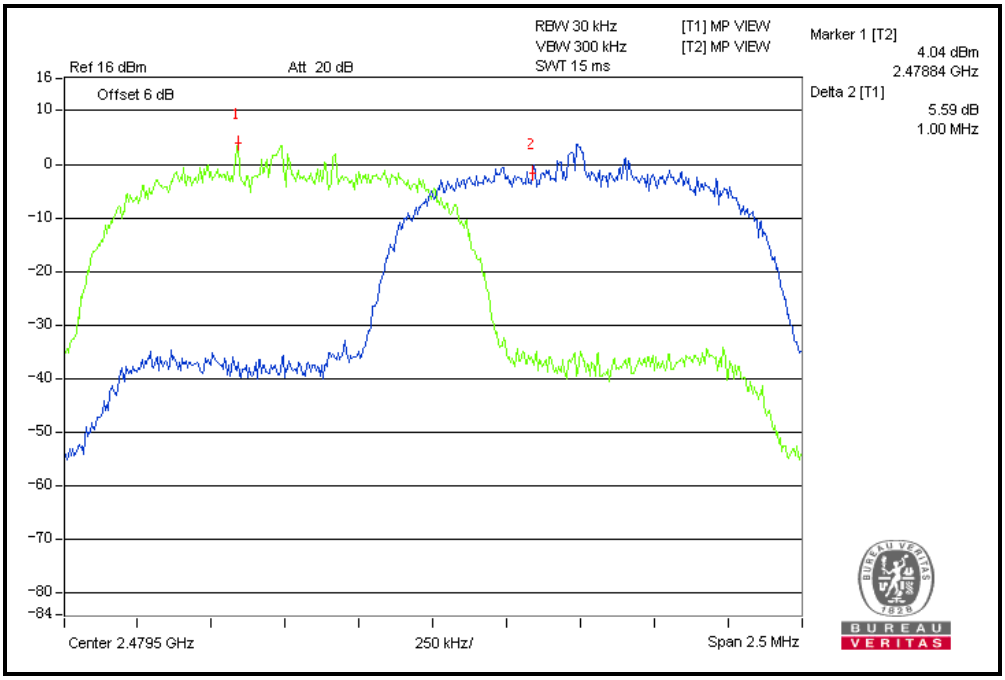
CH 0



CH 39


RBW 30 kHz
VBW 300 kHz
SWT 15 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
3.83 dBm
2.44099 GHz
Delta 2 [T2]
0.59 dB
1.01 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz
BUREAU VERITAS

CH 78

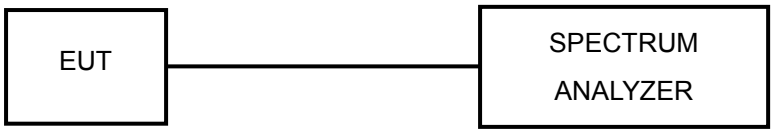

RBW 30 kHz
VBW 300 kHz
SWT 15 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T2]
4.04 dBm
2.47884 GHz
Delta 2 [T1]
5.59 dB
1.00 MHz
Ref 16 dBm
Att 20 dB
Offset 6 dB
16
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-84
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz
BUREAU VERITAS

4.7. MAXIMUM OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 125mW.

4.7.2 TEST SETUP



4.7.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

4.7.4 TEST PROCEDURES

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.

d. Measure the captured power within the band and recording the plot.

e. Repeat above procedures until all frequencies required were complete.

4.7.5 DEVIATION FROM TEST STANDARD

No deviation.

4.7.6 EUT OPERATING CONDITION

Same as item 4.1.6.

4.7.7 TEST RESULTS

GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (dBm)	POWER OUTPUT (mW)	POWER LIMIT (mW)	PASS/FAIL
0	2402	7.49	5.610	125	PASS
39	2441	**7.75**	5.957	125	PASS
78	2480	7.58	5.728	125	PASS

8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (dBm)	POWER OUTPUT (mW)	POWER LIMIT (mW)	PASS/FAIL
0	2402	7.25	5.309	125	PASS
39	2441	7.52	5.649	125	PASS
78	2480	7.32	5.395	125	PASS

4.8. OUT OF BAND MEASUREMENT

4.8.1 LIMITS OF OUT OF BAND MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

4.8.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

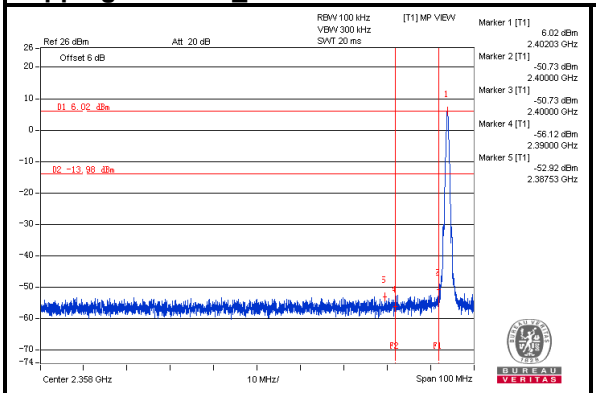
Same as item 4.2.6

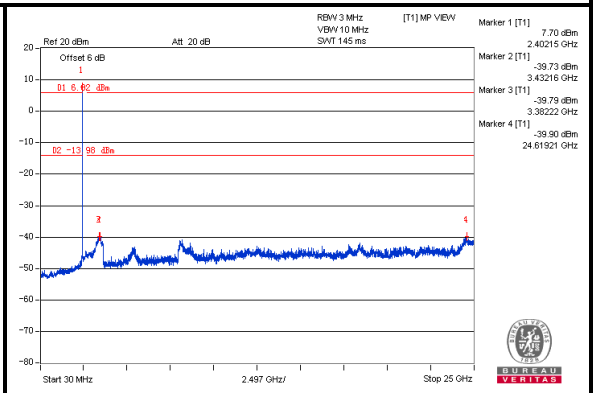
4.8.6 TEST RESULTS

The spectrum plots are attached on the following images., D1 line indicates the 20dB offset below D1.

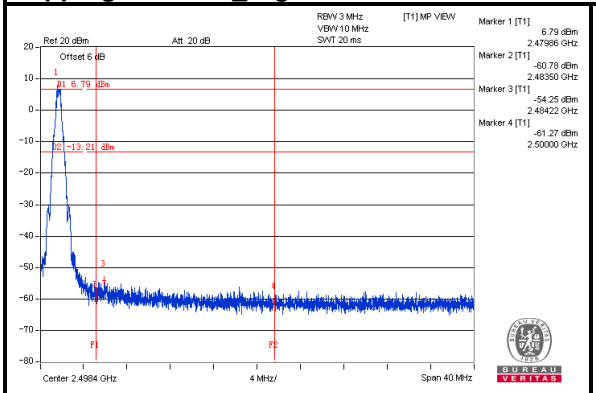
GFSK

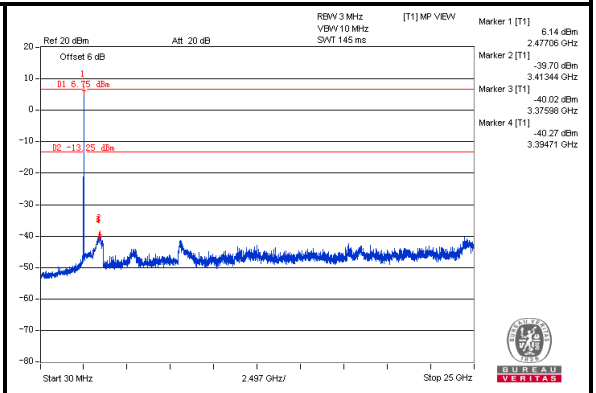
Hopping disabled_Low Channel



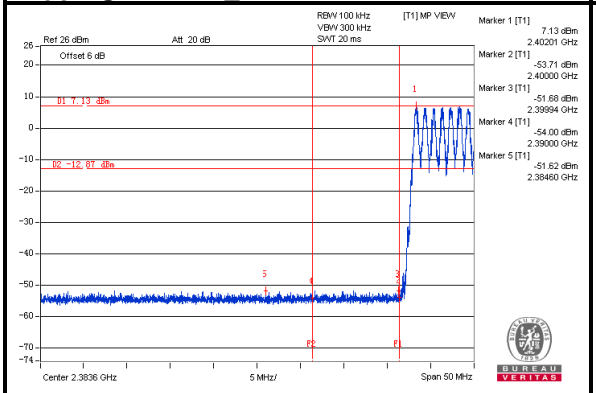


Hopping disabled_High Channel

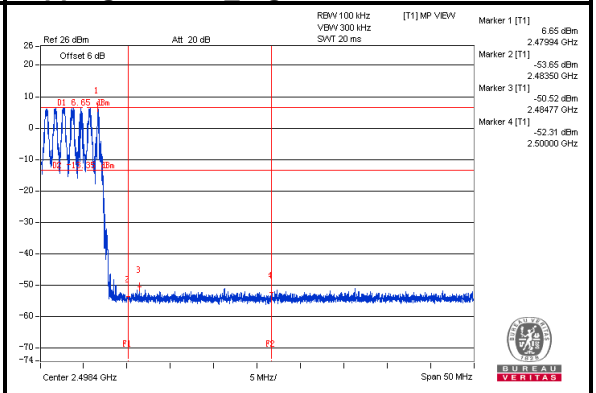




Hopping enabled_Low Channel

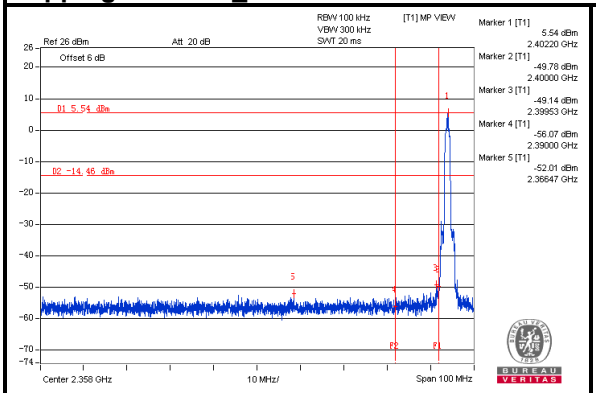


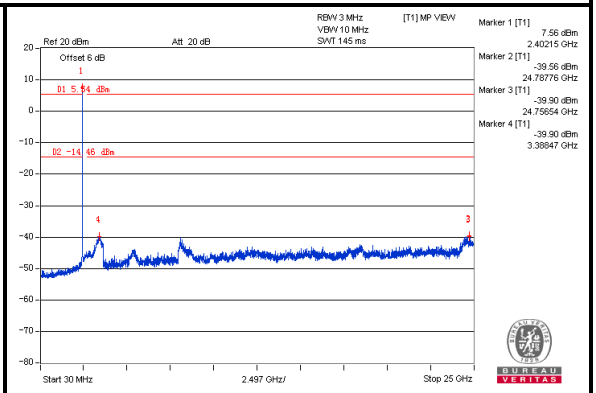
Hopping enabled_High Channel



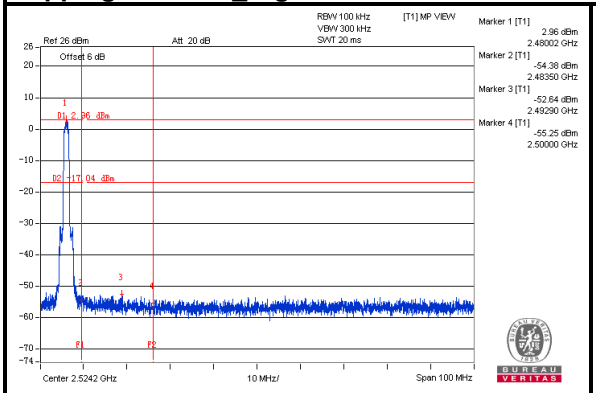
8DPSK

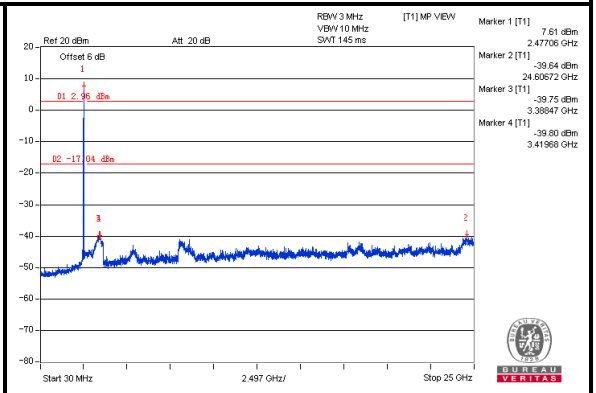
Hopping disabled_Low Channel



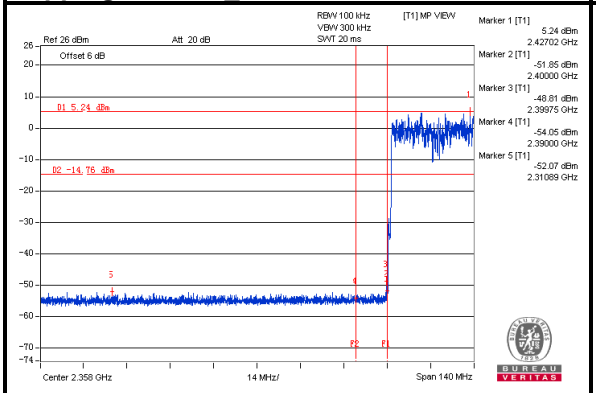


Hopping disabled_High Channel

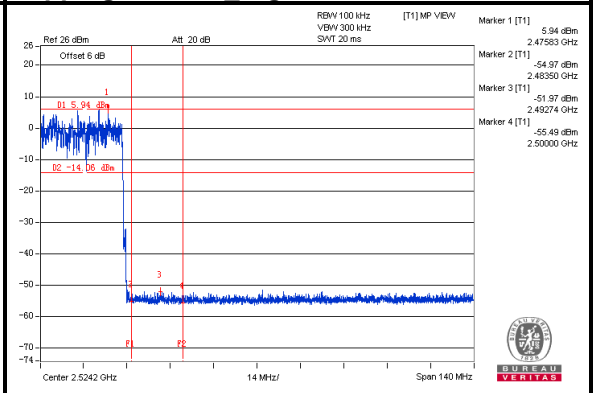




Hopping enabled_Low Channel



Hopping enabled_High Channel



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---