FCC TEST REPORT (BLUETOOTH)

REPORT NO.:	RF110906E03 R1
MODEL NO.:	MC2180
FCC ID:	UZ7MC2180
RECEIVED:	Sep. 06, 2011
TESTED:	Sep. 09 to Oct. 05, 2011
ISSUED:	Nov. 03, 2011
APPLICANT:	Motorola Solution Inc.
ADDRESS:	One Motorola Plaza Holts ville NY 11742-1300 USA
ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS:	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
TEST LOCATION (2):	No.49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF110906E03	Original release	Oct. 28, 2011
RF110906E03-1 R1	Modified section 3.1 notes	Nov. 03, 2011

1 CERTIFICATION

PRODUCT :	Mobile Computer
BRAND NAME :	MOTOROLA
MODEL NO. :	MC2180
TEST SAMPLE :	ENGINEERING SAMPLE
APPLICANT :	Motorola Solution Inc.
TESTED DATE :	Sep. 09 to Oct. 05, 2011
STANDARDS :	FCC Part 15, Subpart C (Section 15.247) ANSI C63.4-2003 ANSI C63.10-2009

The above equipment (Model: MC2180) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Elsie Hsu , **DATE:** Nov. 03, 2011
(Elsie Hsu, Specialist)

APPROVED BY : , **DATE:** Nov. 03, 2011
(May Chen, Deputy Manager)

2 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 -14.05dB at 0.185MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation Spec.: Min. 25 kHz or 20 dB bandwidth, whichever is greater 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Spec.: max. 21dBm	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -6.6dB at 68.33MHz.
15.247(d)	Conducted Out-Band Emission 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.

2.1 ME ASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	4 dB
Radiated emissions (1GHz ~18GHz)	2.49 dB
Radiated emissions (18GHz ~40GHz)	2.70 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Computer
MODEL NO.	MC2180
FCC ID	UZ7MC2180
POWER SUPPLY	DC 3.7V from battery, DC 5.4V from cradle or power adapter
MODULATION TYPE	GFSK, π/4-DQPSK, 8DPSK
MODULATION TECHNOLOGY	FHSS
DATE RATE	1/2/3Mbps
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
MAX. OUTPUT POWER	7.8mW
ANTENNA TYPE	Please see note
DATA CABLE	NA
I/O PORTS	microUSB port x 1
ASSOCIATED DEVICES	Battery x 1

NOTE:

1. There are Bluetooth technology (BT2.0+EDR) and WLAN technology used for the EUT. <the WLAN test data please refer "RF110906E03-1 R1">

2. WLAN and Bluetooth technology cannot transmit at same time.

3. There is one antenna provided to this EUT, please refer to the following table:

WLAN & Bluetooth			
Antenna Type	**Gain (dBi) include cable loss**	**Connecter Type**	**Frequency range (MHz)**
PIFA	3.2	NA	2400~2500

4. The EUT has three samples which are identical to each other in all aspects except for the following table:

Sample	Brand	Model Name	Data capture (with different touch panel)	Description
1	MOTOROLA	MC2180	SE655 (linear imager)	With WiFi & Bluetooth
2			SE960 (LASER scanner)	
3			SE4500 (imager)	

From the above samples, after pre-tested sample1 was the worst case and it was selected as representative model for the test and its data was recorded in this report.

5. The EUT could be supplied from a Cradle, power adapter and battery as below table:

1-slot Cradle (not for sale together)	
Brand:	MOTOROLA
Model No.:	CRD2100-1000UR
Part No.:	CCRD2100-1000UR
Output power :	5.4V, 3.0A
Adapter (not for sale together)	
Brand:	MOTOROLA
Model No.:	86-14000-249R
Input power :	100-240V, 50/60Hz, 0.6A
Output power :	5.4V, 3.0A DC output cable (unshielded, 1.85m with one core)
Li-ion Battery	
Brand:	MOTOROLA
Part No.:	82-150612-01
Rating:	3.7V, 2400mAh, 8.88Wh

6. The EUT was pre-tested in chamber for radiated test (below 1GHz) under following test modes :

Test Mode	Description
Mode A	**Sample1 : X-Z plane: EUT + Adapter**
Mode B	Sample1 : Y-Z plane: EUT + Adapter
Mode C	Sample1 : X-Y plane: EUT + Adapter
Mode D	Sample1 : X-Z plane: EUT + USB Charger Cable + Battery
Mode E	Sample1 : X-Z plane: EUT + USB Charger Cable + Adapter
Mode F	Sample1 : X-Z plane: EUT + Cradle + USB Cable + Adapter
Mode G	Sample1 : X-Z plane: EUT + Headset Adapter + Battery
Mode H	Sample1 : X-Z plane: EUT + Headset Adapter + Adapter
Mode I	Sample1 : X-Z plane: EUT + Battery

From the above modes, the worst radiated test (below 1GHz) was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

7. The EUT also was pre-tested in chamber for radiated test (above 1GHz) under following test modes :

Test Mode	Description
Mode A	**Sample1 : X-Y plane: EUT + Adapter**
Mode B	Sample1 : Y-Z plane: EUT + Adapter
Mode C	Sample1 : X-Z plane: EUT + Adapter

From the above modes, the worst radiated test (above 1GHz) was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

8. The EUT is 1 * 1 spatial SISO (1Tx & 1Rx) without beam forming function.

9. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7.

10. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

Seventy-nine channels are provided for bluetooth.

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		

3.3 TEST MODE APPLICABLITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	APCM	OB	
A	√			√	√	X-Y plane : EUT
B		√				X-Z plane : EUT + Adapter
C			√			X-Y plane : EUT + Adapter
D	√					EUT + Headset Adapter + Adapter
E	√					EUT + USB Charger Cable + Adapter
F	√					EUT + Cradle + USB Cable + Adapter

Where **PLC:** Power Line Conducted Emission **RE < 1G:** Radiated Emission below 1GHz

RE ³ 1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

OB: Conducted Out-Band Emission Measurement

Power Line Conducted Emission Test:

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

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT CONFIGURE MODE
0 to 78	39	FHSS	GFSK	DH5	A

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

Radiated Emission Test (Below 1 GHz):

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

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

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT CONFIGURE MODE
0 to 78	39	FHSS	GFSK	DH5	B

Radiated Emission Test (Above 1 GHz):

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

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

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT CONFIGURE MODE
0 to 78	0, 39, 78	FHSS	GFSK	DH5	C
0 to 78	0, 39, 78	FHSS	8DPSK	DH5	C

Antenna Port Conducted Measurement:

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

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

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT CONFIGURE MODE
0 to 78	0, 39, 78	FHSS	GFSK	DH5	A
0 to 78	0, 39, 78	FHSS	8DPSK	DH5	A
0 to 78	0, 39, 78	FHSS	π/4-DQPSK	DH5	A

Conducted Out-Band Emission Measurement:

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

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

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT CONFIGURE MODE
0 to 78	0, 78	FHSS	GFSK	DH5	A
0 to 78	0, 78	FHSS	8DPSK	DH5	A

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (system)	TESTED BY
PLC	26deg. C, 67%RH	120Vac, 60 Hz	Kent Liu
RE<1G	26deg. C, 62%RH	120Vac, 60 Hz	Kent Liu
RE≥1G	26deg. C, 62%RH	120Vac, 60 Hz	Kent Liu
APCM	25deg. C, 60%RH	120Vac, 60 Hz	Kent Liu
OB	25deg. C, 60%RH	120Vac, 60 Hz	Kent Liu

3.4 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. (15.247)
ANSI C63.4-2003
ANSI C63.10-2009

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

NOTE: 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.

3.5 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.

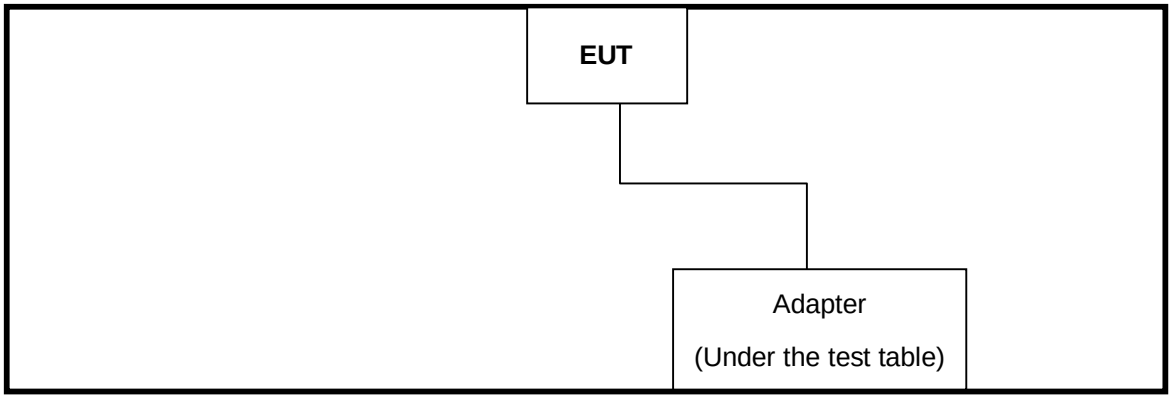
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	PP32LA	FSLB32S	FCC DOC
2	iPod	Apple	MC749TA/A	CC4DMFJUDFDM	NA
3	Earphone	Motorola	1117	NA	NA

No.	Signal cable description of the above support units
1	NA
2	USB cable, 0.1m
3	Audio cable, 1.2m

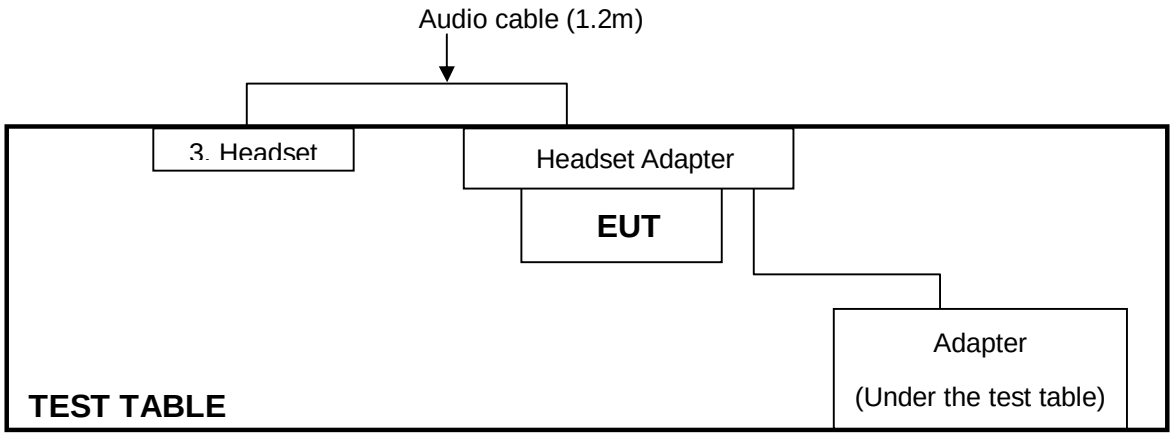
NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

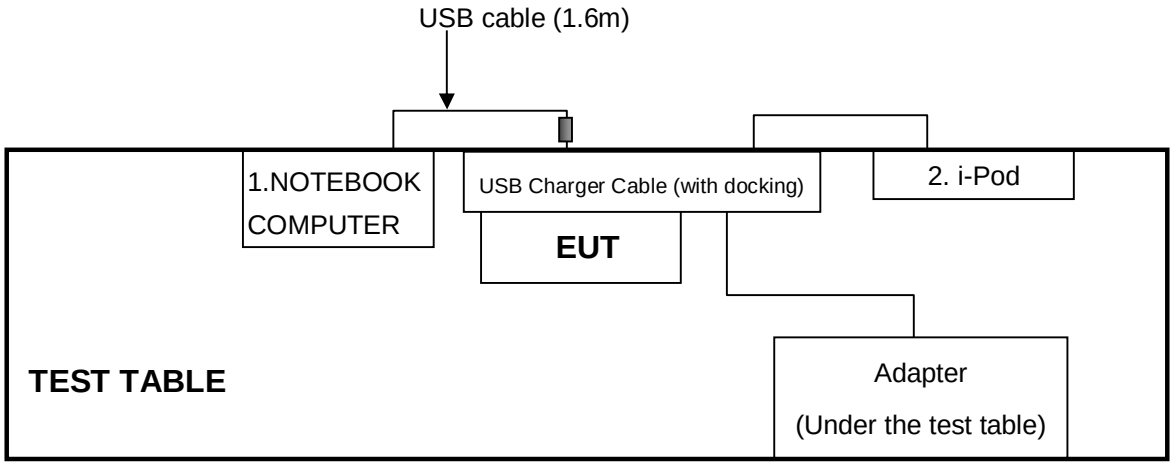
For Conducted test (mode A) and other test items :



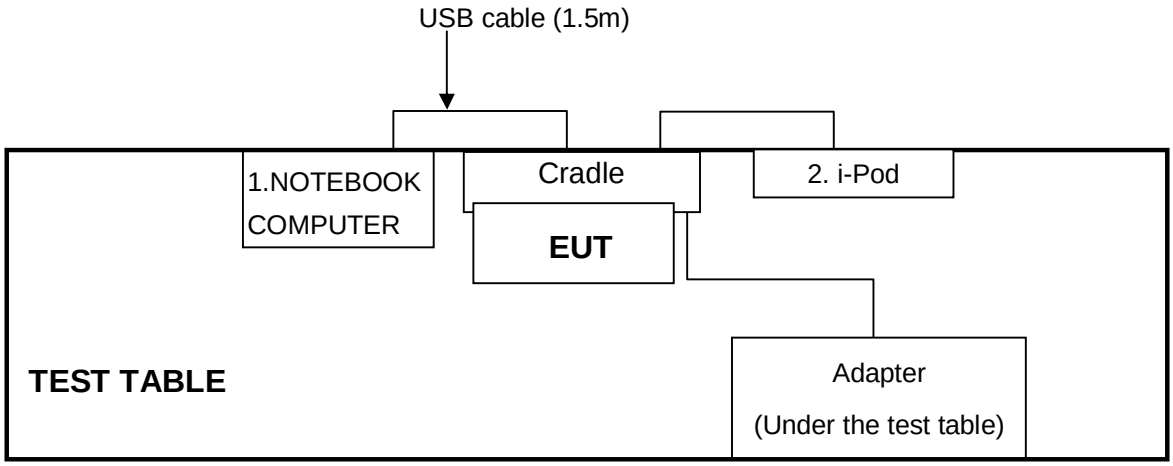
For Conducted test (mode D) :



For Conducted test (mode E) :



For Conducted test (mode F) :



4 TEST PROCEDURES 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 0.5-5 5-30	66 to 56 56 60	56 to 46 46 50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class 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

Test date: Oct. 05, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2011	Mar. 08, 2012
Line-Impedance Stabilization Network (for EUT)	ENV216	100072	Jun. 10, 2011	Jun. 09, 2012
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 03, 2010	Nov. 02, 2011
RF Cable (JYEBAO)	5DFB	COCCAB-002	Aug. 29, 2011	Aug. 28, 2012
50 ohms Terminator	50	3	Oct. 07, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.

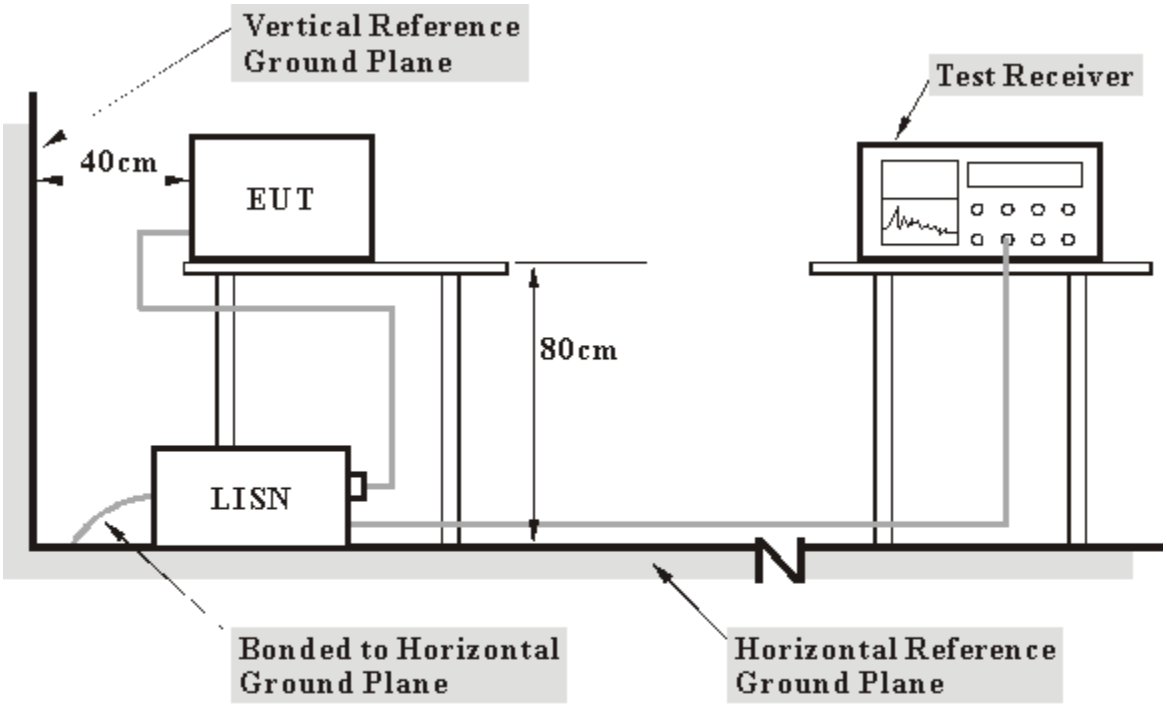
4.1.3 TEST PROCEDURES

a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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/HOST were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 TEST SETUP



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

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.5 EUT OPERATING CONDITIONS

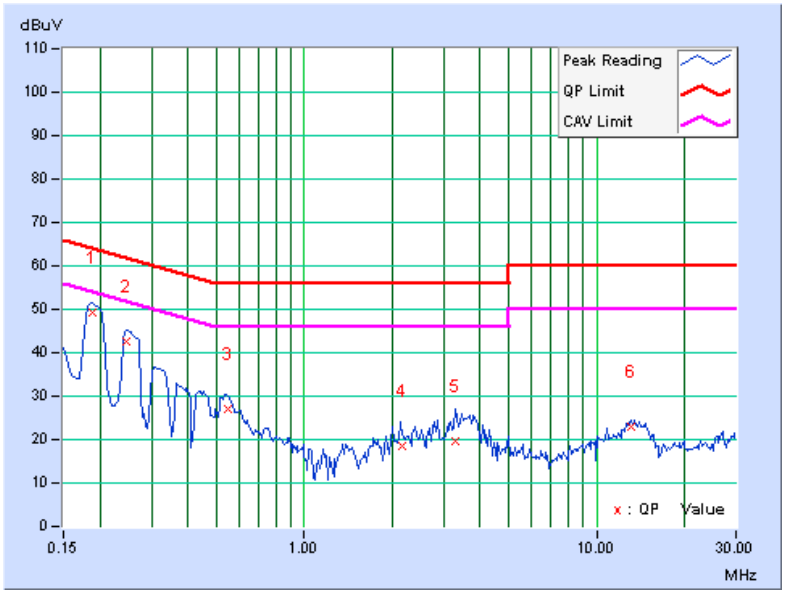
1. Turn on the power of EUT.
2. The EUT run test program “NanoBTRegTestver3.53.exe” under transmission / receiver condition continuously at specific channel frequency.

4.1.6 TEST RESULTS (MODE A)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.189	0.35	48.83	36.75	49.18	37.10	64.08	54.08	-14.89	-16.97
2	0.248	0.35	42.31	29.41	42.66	29.76	61.84	51.84	-19.18	-22.08
3	0.548	0.35	26.73	9.17	27.08	9.52	56.00	46.00	-28.92	-36.48
4	2.148	0.46	18.19	8.68	18.65	9.14	56.00	46.00	-37.35	-36.86
5	3.309	0.51	19.17	10.88	19.68	11.39	56.00	46.00	-36.32	-34.61
6	13.176	0.83	22.11	15.86	22.94	16.69	60.00	50.00	-37.06	-33.31

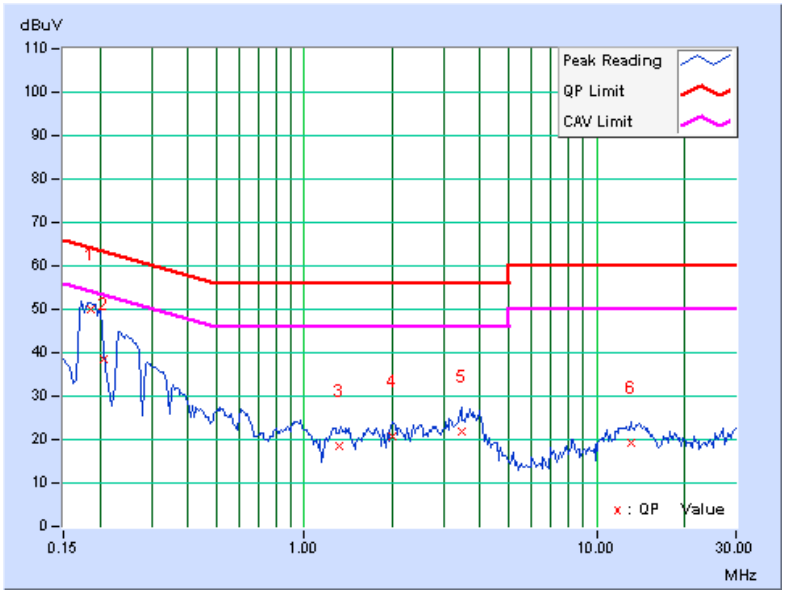
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.185	0.09	50.02	35.17	50.11	35.26	64.25	54.25	-14.14	-18.99
2	0.207	0.09	38.42	19.53	38.51	19.62	63.32	53.32	-24.81	-33.70
3	1.313	0.14	18.43	9.52	18.57	9.66	56.00	46.00	-37.43	-36.34
4	2.012	0.19	20.49	13.08	20.68	13.27	56.00	46.00	-35.32	-32.73
5	3.445	0.25	21.76	14.11	22.01	14.36	56.00	46.00	-33.99	-31.64
6	13.086	0.71	18.49	12.45	19.20	13.16	60.00	50.00	-40.80	-36.84

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

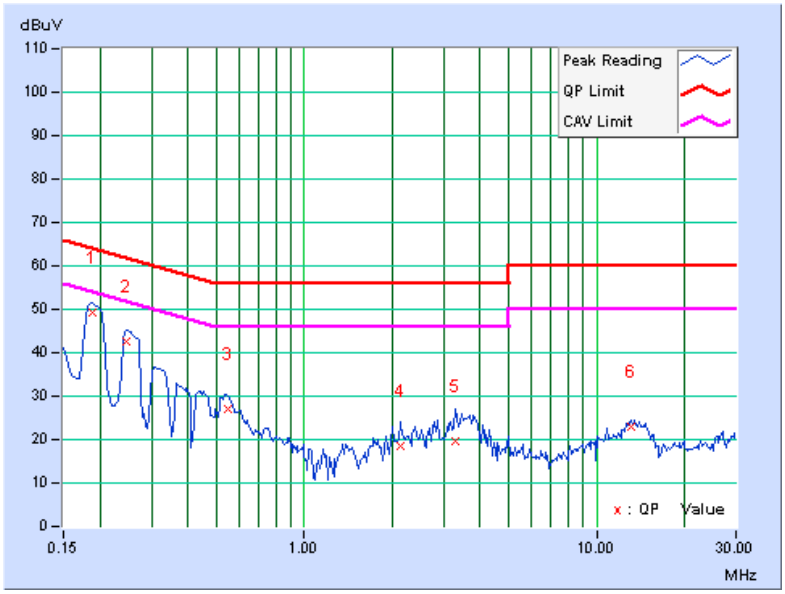


4.1.7 TEST RESULTS (MODE D)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.189	0.35	48.91	36.97	49.26	37.32	64.08	54.08	-14.81	-16.75
2	0.248	0.35	42.34	29.79	42.69	30.14	61.84	51.84	-19.15	-21.70
3	0.548	0.35	26.83	9.41	27.18	9.76	56.00	46.00	-28.82	-36.24
4	2.148	0.46	18.16	8.86	18.62	9.32	56.00	46.00	-37.38	-36.68
5	3.309	0.51	19.14	10.88	19.65	11.39	56.00	46.00	-36.35	-34.61
6	13.176	0.83	22.03	15.86	22.86	16.69	60.00	50.00	-37.14	-33.31

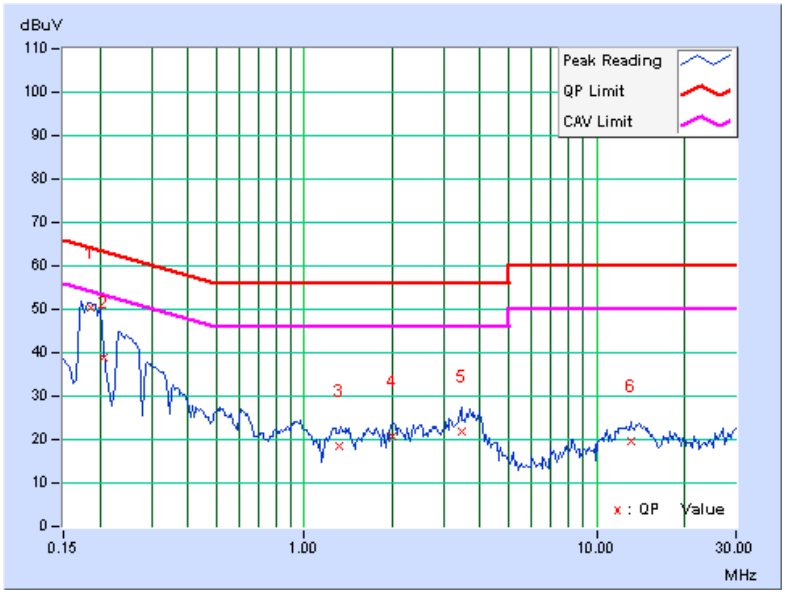
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.185**	**0.09**	**50.11**	**35.31**	**50.20**	**35.40**	**64.25**	**54.25**	**-14.05**	**-18.85**
2	0.207	0.09	38.86	19.53	38.95	19.62	63.32	53.32	-24.37	-33.70
3	1.313	0.14	18.52	9.73	18.66	9.87	56.00	46.00	-37.34	-36.13
4	2.012	0.19	20.49	13.08	20.68	13.27	56.00	46.00	-35.32	-32.73
5	3.445	0.25	21.75	14.16	22.00	14.41	56.00	46.00	-34.00	-31.59
6	13.086	0.71	18.77	12.61	19.48	13.32	60.00	50.00	-40.52	-36.68

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

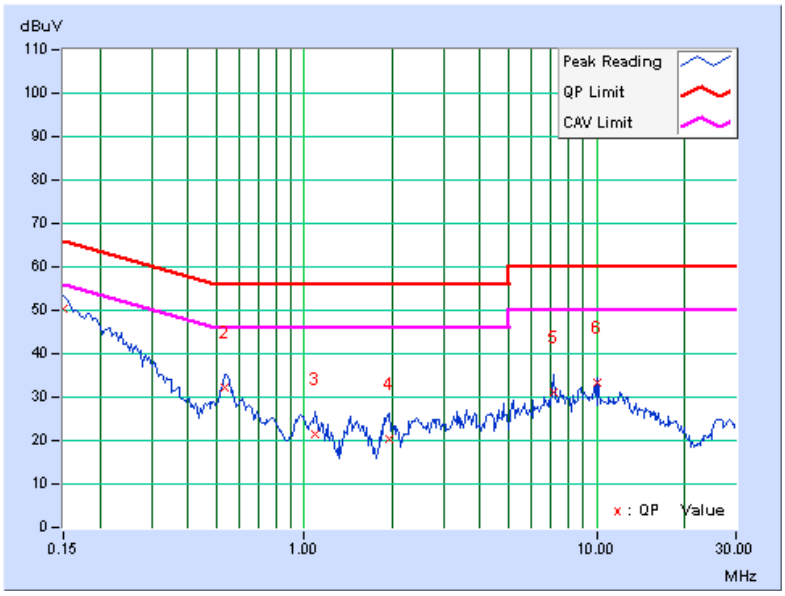


4.1.8 TEST RESULTS (MODE E)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.09	50.19	33.87	50.28	33.96	66.00	56.00	-15.72	-22.04
2	0.533	0.12	32.10	24.24	32.22	24.36	56.00	46.00	-23.78	-21.64
3	1.090	0.15	21.41	15.08	21.56	15.23	56.00	46.00	-34.44	-30.77
4	1.949	0.20	20.18	16.00	20.38	16.20	56.00	46.00	-35.62	-29.80
5	7.168	0.44	30.76	26.19	31.20	26.63	60.00	50.00	-28.80	-23.37
6	10.074	0.55	32.78	30.42	33.33	30.97	60.00	50.00	-26.67	-19.03

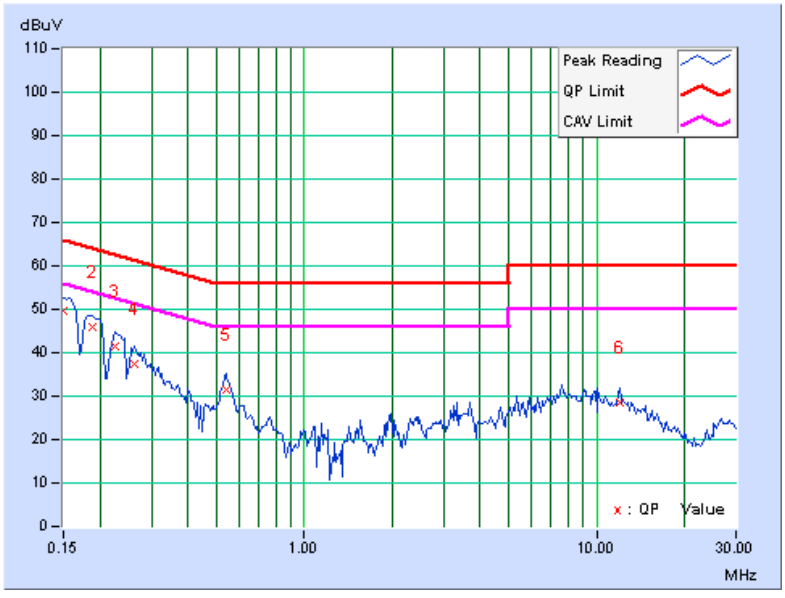
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.07	49.67	37.29	49.74	37.36	66.00	56.00	-16.26	-18.64
2	0.189	0.09	45.67	31.55	45.76	31.64	64.08	54.08	-18.32	-22.44
3	0.224	0.09	41.49	24.14	41.58	24.23	62.66	52.66	-21.08	-28.43
4	0.263	0.10	37.34	20.69	37.44	20.79	61.33	51.33	-23.89	-30.54
5	0.541	0.11	31.35	23.45	31.46	23.56	56.00	46.00	-24.54	-22.44
6	11.949	0.46	28.17	24.00	28.63	24.46	60.00	50.00	-31.37	-25.54

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

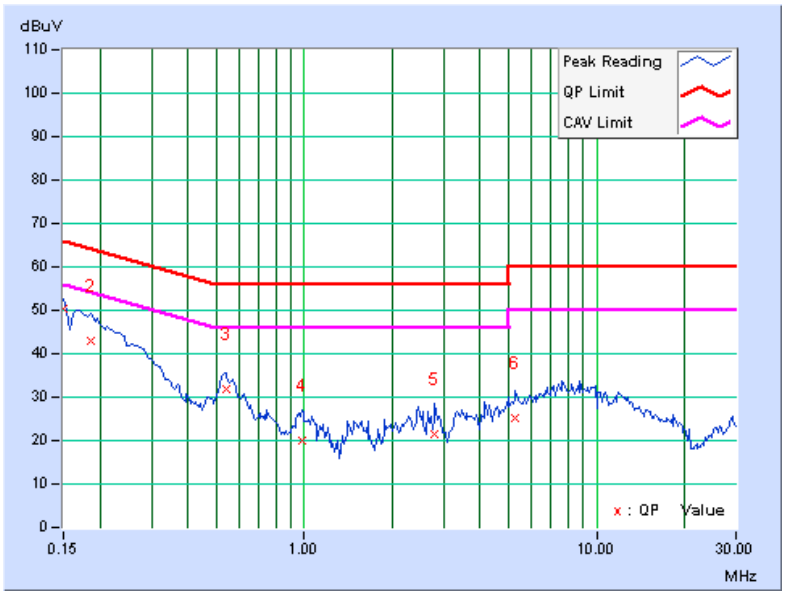


4.1.9 TEST RESULTS (MODE F)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.09	50.36	20.41	50.45	20.50	66.00	56.00	-15.55	-35.50
2	0.185	0.10	42.96	24.02	43.06	24.12	64.25	54.25	-21.20	-30.14
3	0.541	0.12	31.88	25.11	32.00	25.23	56.00	46.00	-24.00	-20.77
4	0.978	0.15	20.03	12.18	20.18	12.33	56.00	46.00	-35.82	-33.67
5	2.805	0.25	21.06	16.75	21.31	17.00	56.00	46.00	-34.69	-29.00
6	5.293	0.37	24.81	17.84	25.18	18.21	60.00	50.00	-34.82	-31.79

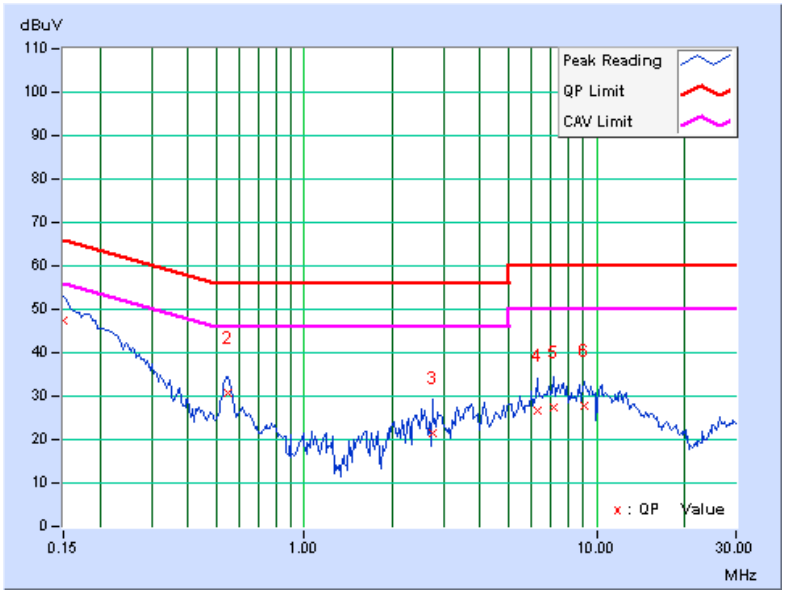
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.07	47.51	33.99	47.58	34.06	66.00	56.00	-18.42	-21.94
2	0.548	0.11	30.74	24.24	30.85	24.35	56.00	46.00	-25.15	-21.65
3	2.746	0.20	21.32	16.53	21.52	16.73	56.00	46.00	-34.48	-29.27
4	6.250	0.30	26.22	20.40	26.52	20.70	60.00	50.00	-33.48	-29.30
5	7.094	0.33	27.17	21.48	27.50	21.81	60.00	50.00	-32.50	-28.19
6	9.031	0.38	27.36	21.94	27.74	22.32	60.00	50.00	-32.26	-27.68

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



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

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. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.

4.2.2 TEST INSTRUMENTS

Test date: Sep. 29, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011
Agilent PSA Spectrum Analyzer	E4446A	MY48250113	Nov. 30 , 2010	Nov. 29 , 2011
HP Pre_Amplifier	8449B	300801923	Nov. 01, 2010	Oct. 31, 2011
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Sep. 02, 2011	Sep. 01, 2012
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 14, 2011	Apr. 13, 2012
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 17, 2010	Dec. 16, 2011
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 17, 2011	Jan. 16, 2012
RF Switches	EMH-011	1001	Sep. 24, 2011	Sep. 23, 2012
RF CABLE (Chaintek)	Sucoflex 106	RF106-102	Jan. 27, 2011	Jan. 26, 2012
RF Cable	8DFB	STCCAB-30M-1GHz	Sep. 24, 2011	Sep. 23, 2012
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

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 10 meters open field site. 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 height of antenna 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

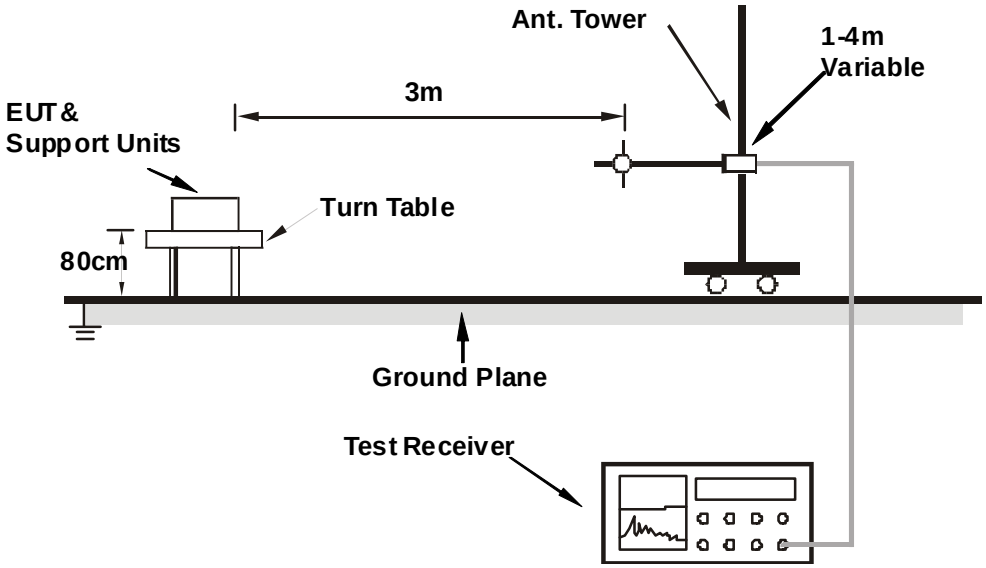
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

1. Turn on the power of EUT.
2. The EUT run test program “NanoBTRegTestver3.53.exe” under transmission / receiver condition continuously at specific channel frequency.

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA：GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	**FREQUENCY RANGE**	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION**	Quasi-Peak
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH	**TESTED BY**	Kent Liu

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	120.00	33.7 QP	43.5	-9.8	4.00 H	244	21.18	12.48
2	200.00	32.7 QP	43.5	-10.9	4.00 H	120	21.45	11.20
3	300.00	39.3 QP	46.0	-6.8	2.85 H	164	23.22	16.03
4	400.00	39.3 QP	46.0	-6.8	1.75 H	226	20.62	18.63
5	500.00	36.6 QP	46.0	-9.4	1.69 H	215	15.33	21.26
6	896.50	39.3 QP	46.0	-6.7	1.00 H	157	11.18	28.10
7	960.01	41.5 QP	54.0	-12.5	1.00 H	267	12.50	29.02
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	**68.33**	**33.5 QP**	**40.0**	**-6.6**	**1.00 V**	**352**	**21.02**	**12.43**
2	122.31	34.5 QP	43.5	-9.0	1.00 V	12	21.73	12.79
3	144.00	34.0 QP	43.5	-9.5	1.00 V	174	19.16	14.86
4	200.00	34.0 QP	43.5	-9.5	1.00 V	133	22.78	11.20
5	480.00	38.6 QP	46.0	-7.5	1.00 V	121	17.82	20.73
6	960.01	41.6 QP	54.0	-12.4	1.70 V	22	12.56	29.02

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.

GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH	TESTED BY	Kent Liu

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	2389.50	56.3 PK	74.0	-17.7	1.19 H	181	24.98	31.32
2	2389.50	26.2 AV	54.0	-27.8	1.19 H	181	-5.12	31.32
3	*2402.00	113.0 PK			1.19 H	181	81.64	31.36
4	*2402.00	82.9 AV			1.19 H	181	51.54	31.36
5	4804.00	49.3 PK	74.0	-24.7	1.91 H	222	13.19	36.11
6	4804.00	19.2 AV	54.0	-34.8	1.91 H	222	-16.91	36.11
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	2389.70	55.6 PK	74.0	-18.4	1.00 V	348	24.28	31.32
2	2389.70	25.5 AV	54.0	-28.5	1.00 V	348	-5.82	31.32
3	*2402.00	99.3 PK			1.00 V	348	67.94	31.36
4	*2402.00	69.2 AV			1.00 V	348	37.84	31.36
5	4804.00	49.2 PK	74.0	-24.8	1.07 V	124	13.09	36.11
6	4804.00	19.1 AV	54.0	-34.9	1.07 V	124	-17.01	36.11

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH	TESTED BY	Kent Liu

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	114.1 PK			1.42 H	189	82.60	31.50
2	*2441.00	84.0 AV			1.42 H	189	52.50	31.50
3	4882.00	48.1 PK	74.0	-25.9	1.00 H	216	11.77	36.33
4	4882.00	18.0 AV	54.0	-36.0	1.00 H	216	-18.33	36.33
5	7323.00	49.8 PK	74.0	-24.2	1.02 H	93	7.52	42.28
6	7323.00	19.7 AV	54.0	-34.3	1.02 H	93	-22.58	42.28
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	102.5 PK			1.27 V	88	71.00	31.50
2	*2441.00	72.4 AV			1.27 V	88	40.90	31.50
3	4882.00	44.9 PK	74.0	-29.1	1.05 V	106	8.57	36.33
4	4882.00	14.8 AV	54.0	-39.2	1.05 V	106	-21.53	36.33
5	7323.00	50.6 PK	74.0	-23.4	1.58 V	79	8.32	42.28
6	7323.00	20.5 AV	54.0	-33.5	1.58 V	79	-21.78	42.28

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).

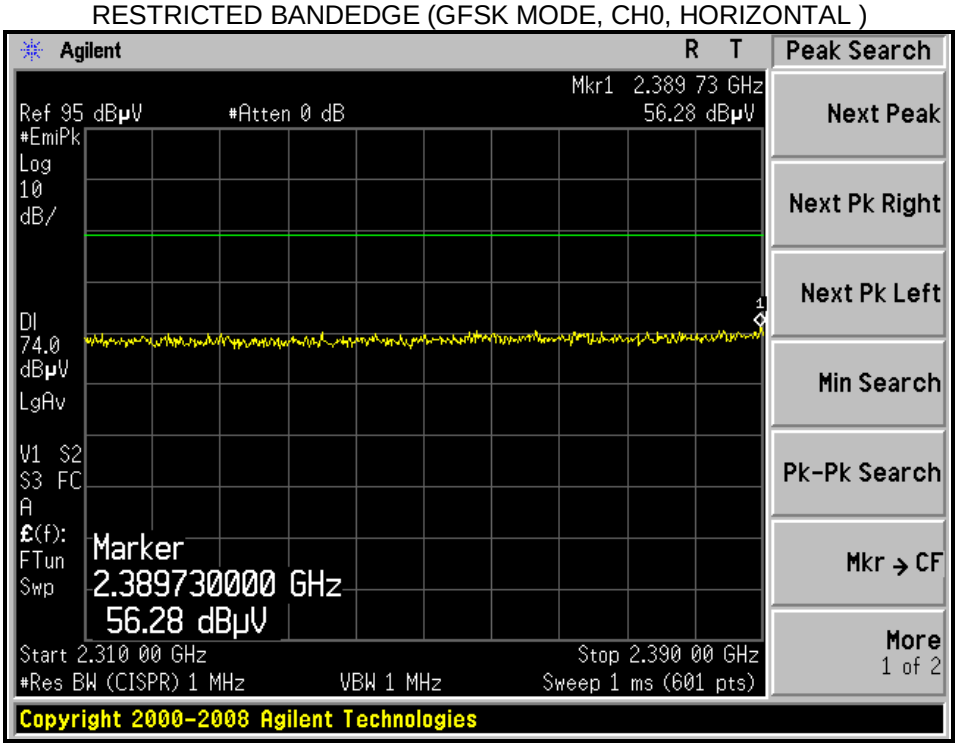
EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH	TESTED BY	Kent Liu

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	113.8 PK			1.39 H	22	82.15	31.65
2	*2480.00	83.7 AV			1.39 H	22	52.05	31.65
3	2483.90	60.0 PK	74.0	-14.0	1.39 H	22	28.34	31.66
4	2483.90	29.9 AV	54.0	-24.1	1.39 H	22	-1.76	31.66
5	4960.00	48.9 PK	74.0	-25.1	1.02 H	196	12.42	36.48
6	4960.00	18.8 AV	54.0	-35.2	1.02 H	196	-17.68	36.48
7	7440.00	49.9 PK	74.0	-24.1	1.62 H	92	7.27	42.63
8	7440.00	19.8 AV	54.0	-34.2	1.62 H	92	-22.83	42.63
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	100.4 PK			1.29 V	112	68.75	31.65
2	*2480.00	70.3 AV			1.29 V	112	38.65	31.65
3	2483.50	56.3 PK	74.0	-17.7	1.29 V	112	24.64	31.66
4	2483.50	26.2 AV	54.0	-27.8	1.29 V	112	-5.46	31.66
5	4960.00	44.6 PK	74.0	-29.4	1.14 V	98	8.12	36.48
6	4960.00	14.5 AV	54.0	-39.5	1.14 V	98	-21.98	36.48
7	7440.00	50.6 PK	74.0	-23.4	1.00 V	125	7.97	42.63
8	7440.00	20.5 AV	54.0	-33.5	1.00 V	125	-22.13	42.63

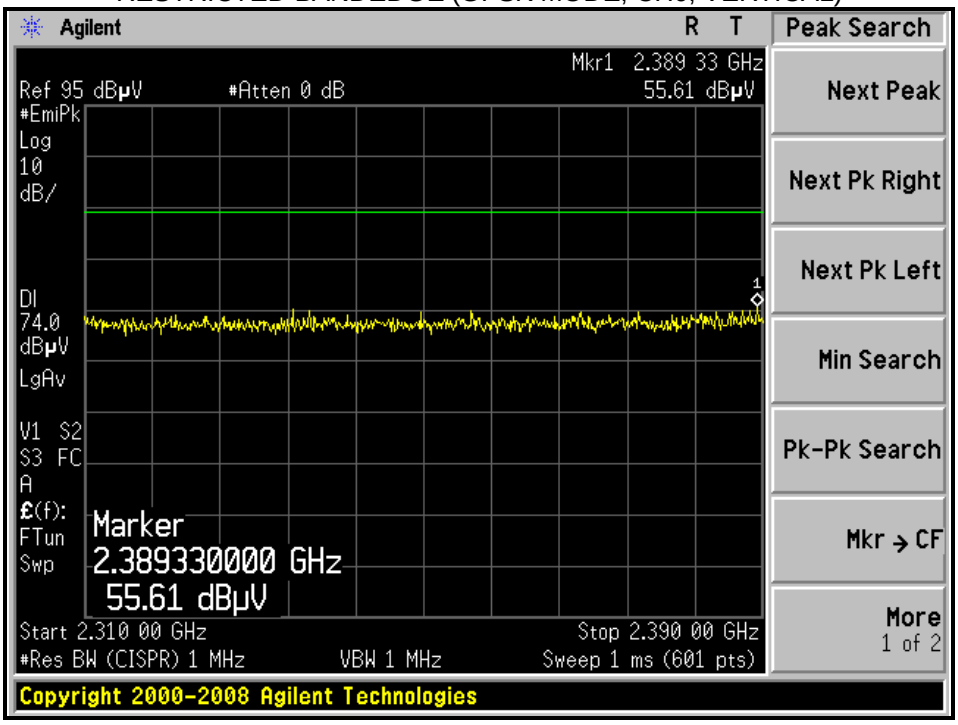
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).

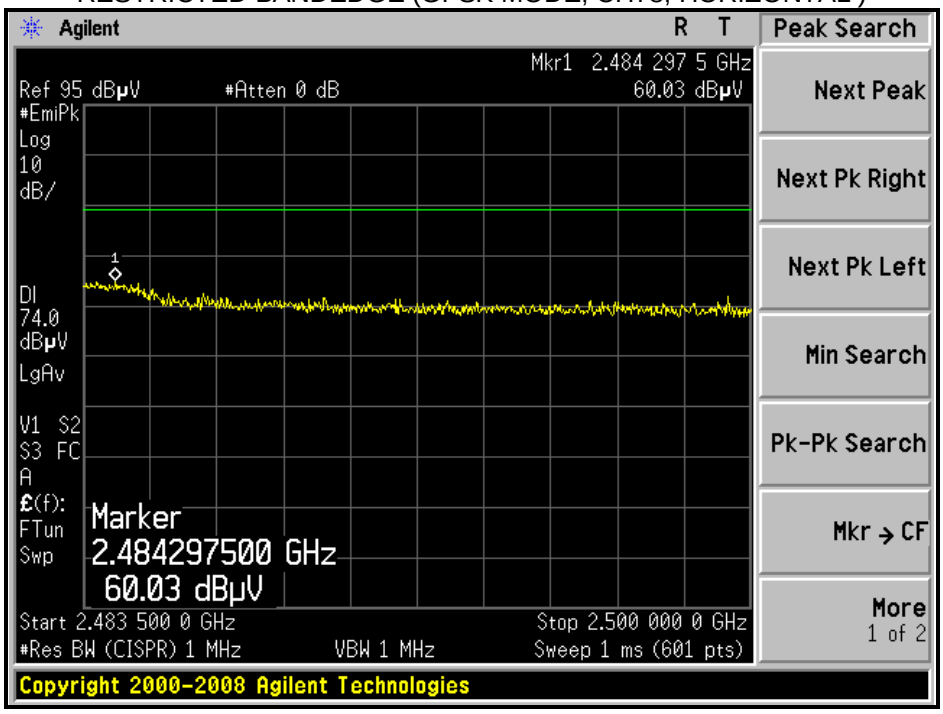
RESTRICTED BANDEDGE (GFSK MODE, CH0, HORIZONTAL)



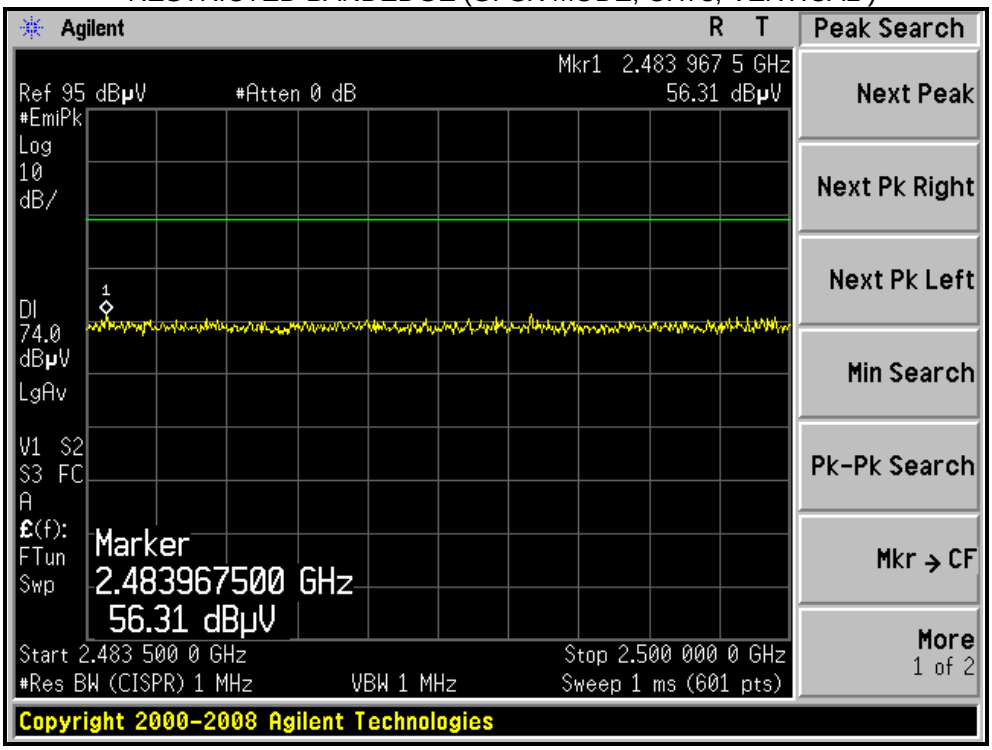
RESTRICTED BANDEDGE (GFSK MODE, CH0, VERTICAL)



RESTRICTED BANDEDGE (GFSK MODE, CH78, HORIZONTAL)



RESTRICTED BANDEDGE (GFSK MODE, CH78, VERTICAL)



The average value is Average value = peak reading + 20log(duty cycle). And it meets the requirement of limit.

8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH	TESTED BY	Kent Liu

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	61.9 PK	74.0	-12.1	1.39 H	10	30.58	31.32
2	2390.00	31.8 AV	54.0	-22.2	1.39 H	10	0.48	31.32
3	*2402.00	112.7 PK			1.39 H	10	81.34	31.36
4	*2402.00	82.6 AV			1.39 H	10	51.24	31.36
5	4003.00	44.4 PK	74.0	-29.6	1.08 H	180	10.25	34.15
6	4003.00	14.3 AV	54.0	-39.7	1.08 H	180	-19.85	34.15
7	4804.00	51.4 PK	74.0	-22.6	1.12 H	195	15.29	36.11
8	4804.00	21.3 AV	54.0	-32.7	1.12 H	195	-14.81	36.11
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	2389.70	55.3 PK	74.0	-18.7	1.00 V	51	23.98	31.32
2	2389.70	25.2 AV	54.0	-28.8	1.00 V	51	-6.12	31.32
3	*2402.00	100.2 PK			1.00 V	51	68.84	31.36
4	*2402.00	70.1 AV			1.00 V	51	38.74	31.36
5	4003.00	41.8 PK	74.0	-32.2	1.17 V	118	7.65	34.15
6	4003.00	11.7 AV	54.0	-42.3	1.17 V	118	-22.45	34.15
7	4804.00	45.8 PK	74.0	-28.2	1.08 V	121	9.69	36.11
8	4804.00	15.7 AV	54.0	-38.3	1.08 V	121	-20.41	36.11

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH	TESTED BY	Kent Liu

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	113.1 PK			1.40 H	167	81.60	31.50
2	*2441.00	83.0 AV			1.40 H	167	51.50	31.50
3	4882.00	46.0 PK	74.0	-28.0	1.13 H	200	9.67	36.33
4	4882.00	15.9 AV	54.0	-38.1	1.13 H	200	-20.43	36.33
5	7323.00	48.8 PK	74.0	-25.2	1.03 H	96	6.52	42.28
6	7323.00	18.7 AV	54.0	-35.3	1.03 H	96	-23.58	42.28
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	100.6 PK			1.28 V	115	69.10	31.50
2	*2441.00	70.5 AV			1.28 V	115	39.00	31.50
3	4882.00	43.6 PK	74.0	-30.4	1.30 V	117	7.27	36.33
4	4882.00	13.5 AV	54.0	-40.5	1.30 V	117	-22.83	36.33
5	7323.00	49.2 PK	74.0	-24.8	1.21 V	187	6.92	42.28
6	7323.00	19.1 AV	54.0	-34.9	1.21 V	187	-23.18	42.28

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).

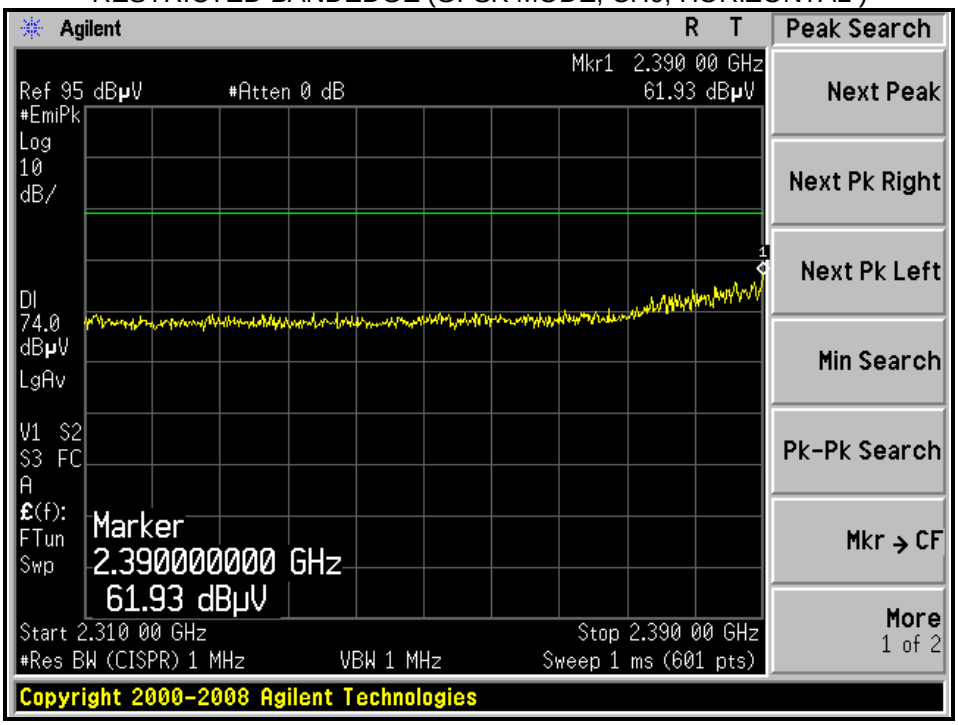
EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH	TESTED BY	Kent Liu

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	112.7 PK			1.39 H	167	81.05	31.65
2	*2480.00	82.6 AV			1.39 H	167	50.95	31.65
3	2483.50	65.5 PK	74.0	-8.5	1.39 H	166	33.84	31.66
4	2483.50	35.4 AV	54.0	-18.6	1.39 H	166	3.74	31.66
5	4960.00	47.8 PK	74.0	-26.2	1.00 H	179	11.32	36.48
6	4960.00	17.7 AV	54.0	-36.3	1.00 H	179	-18.78	36.48
7	7440.00	50.8 PK	74.0	-23.2	1.00 H	285	8.17	42.63
8	7440.00	20.7 AV	54.0	-33.3	1.00 H	285	-21.93	42.63
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	99.6 PK			1.00 V	167	67.95	31.65
2	*2480.00	69.5 AV			1.00 V	167	37.85	31.65
3	2483.50	56.2 PK	74.0	-17.8	1.00 V	167	24.54	31.66
4	2483.50	26.1 AV	54.0	-27.9	1.00 V	167	-5.56	31.66
5	4960.00	44.1 PK	74.0	-29.9	1.13 V	91	7.62	36.48
6	4960.00	14.0 AV	54.0	-40.0	1.13 V	91	-22.48	36.48
7	7440.00	50.6 PK	74.0	-23.4	1.13 V	84	7.97	42.63
8	7440.00	20.5 AV	54.0	-33.5	1.13 V	84	-22.13	42.63

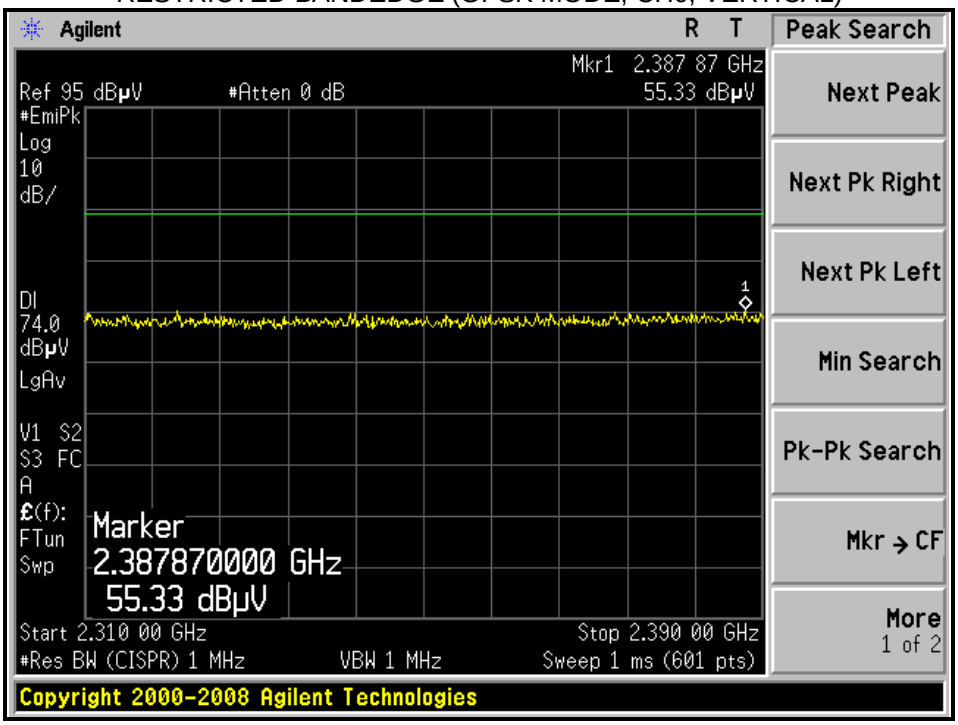
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).

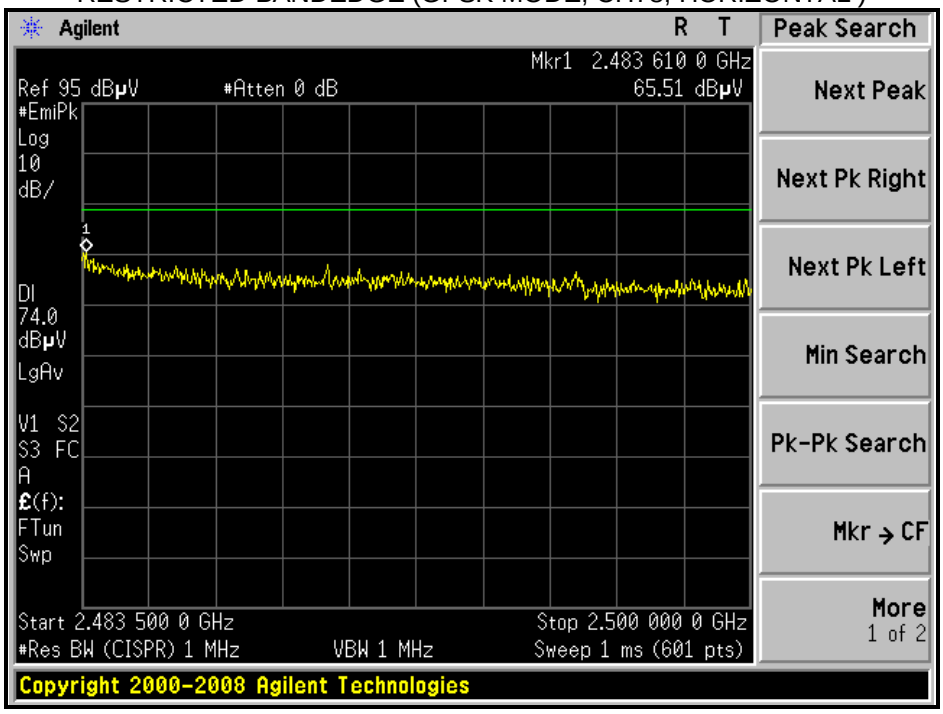
RESTRICTED BANDEDGE (GFSK MODE, CH0, HORIZONTAL)



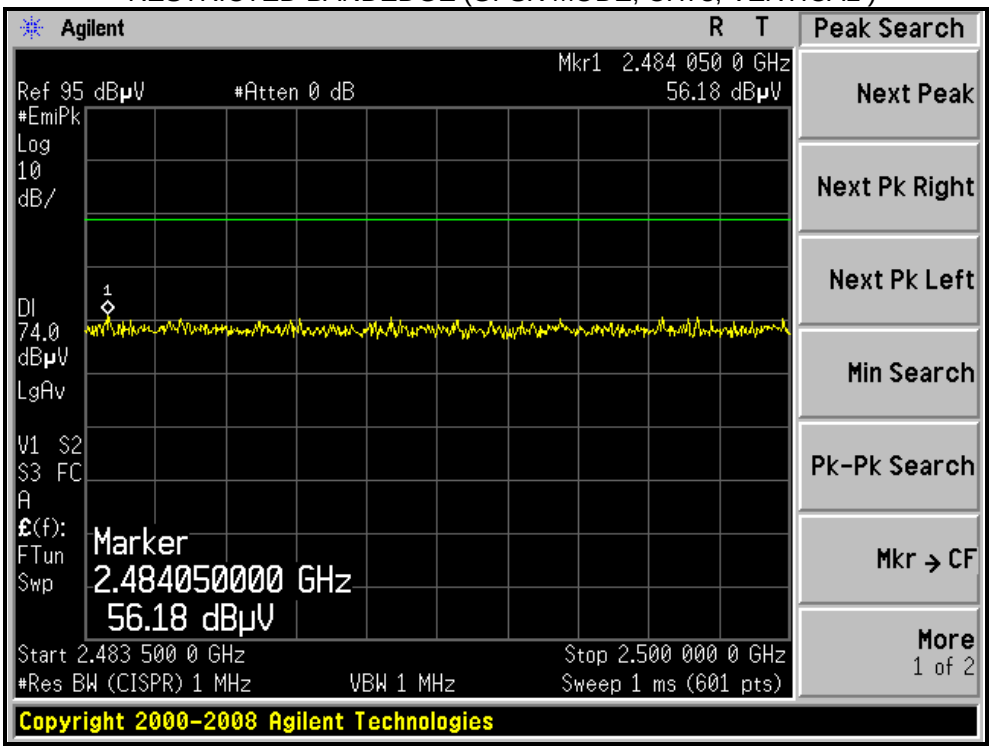
RESTRICTED BANDEDGE (GFSK MODE, CH0, VERTICAL)



RESTRICTED BANDEDGE (GFSK MODE, CH78, HORIZONTAL)



RESTRICTED BANDEDGE (GFSK MODE, CH78, VERTICAL)



* The average value is Average value = peak reading + 20log(duty cycle). And it meets the requirement of limit.

4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

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

4.3.2 TEST INSTRUMENTS

Test date: Sep. 09, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

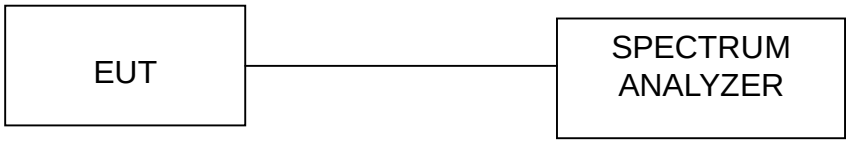
4.3.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. 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.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

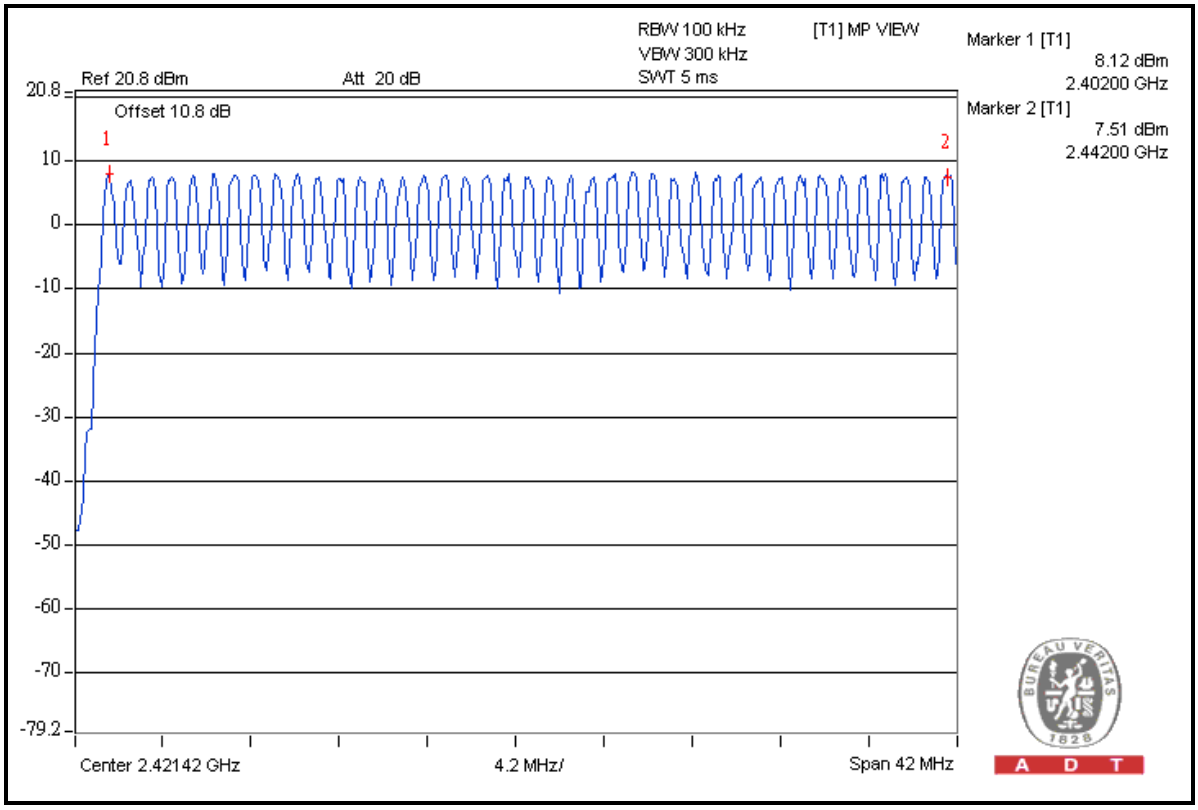
4.3.5 TEST SETUP

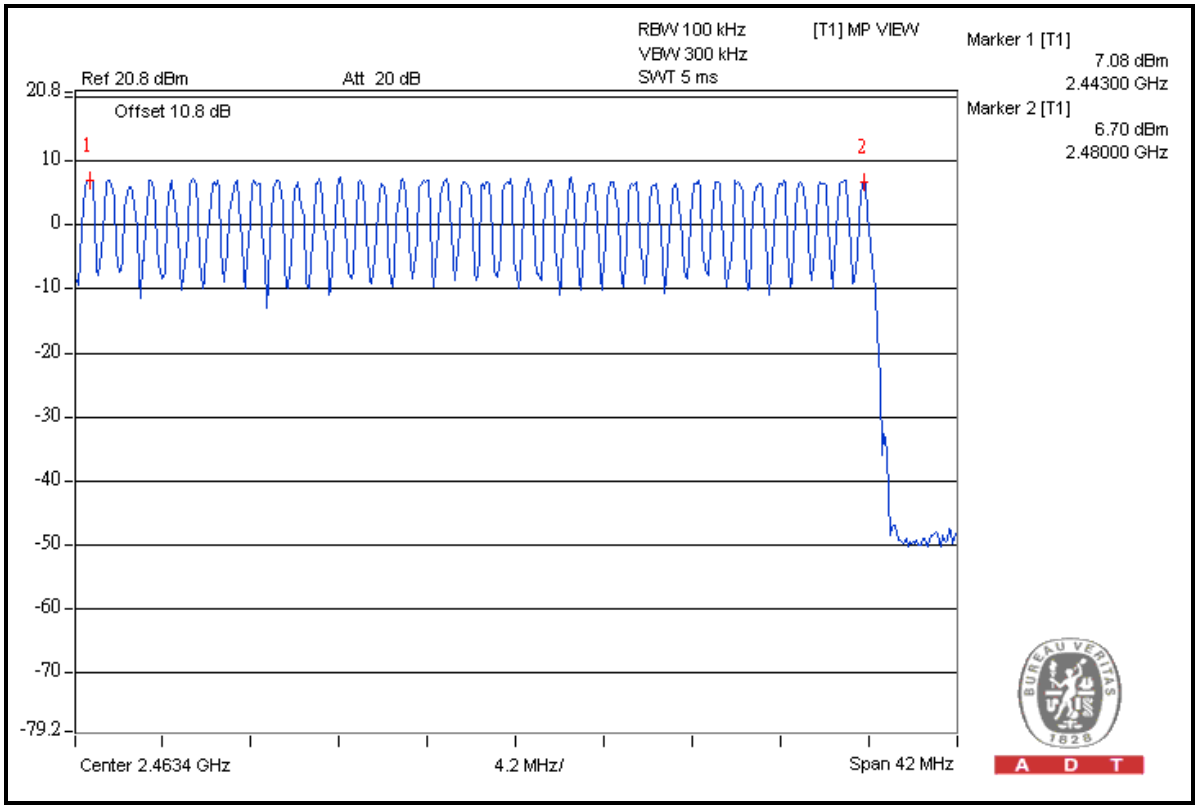


4.3.6 TEST RESULTS

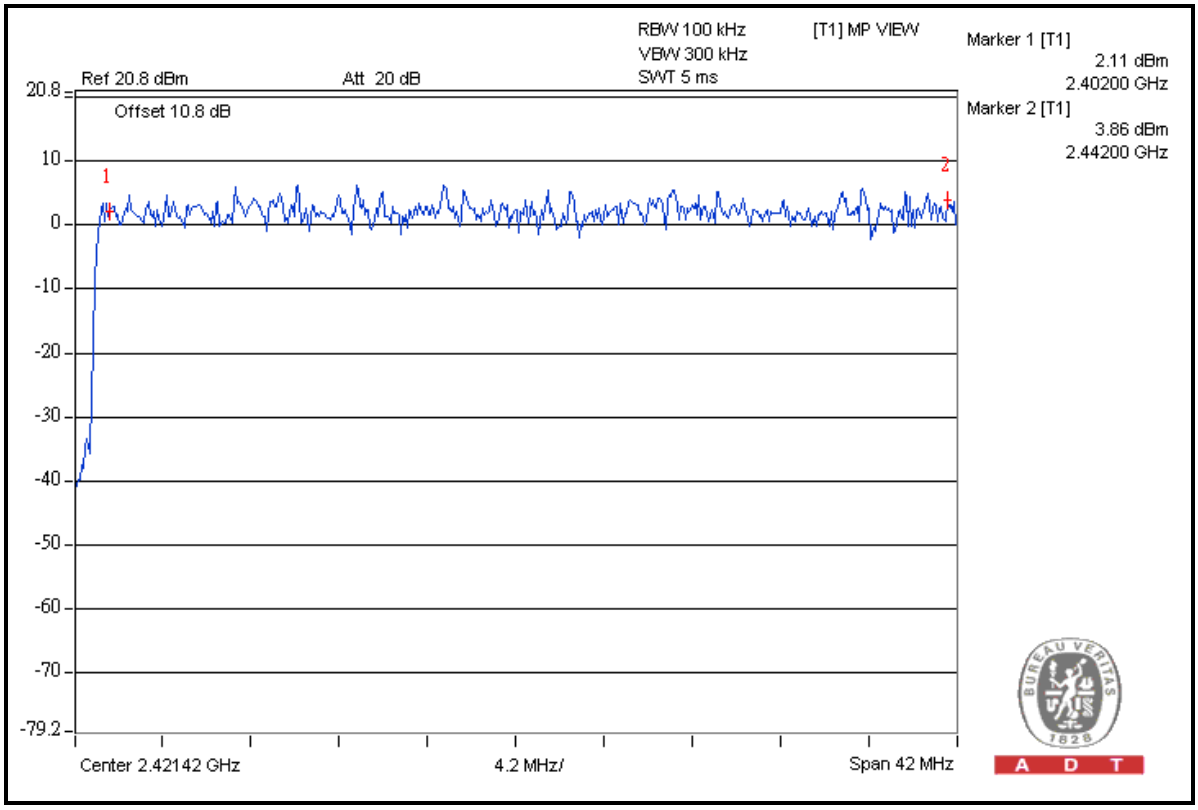
There are 79 hopping frequencies in the hopping mode. Please refer to next pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

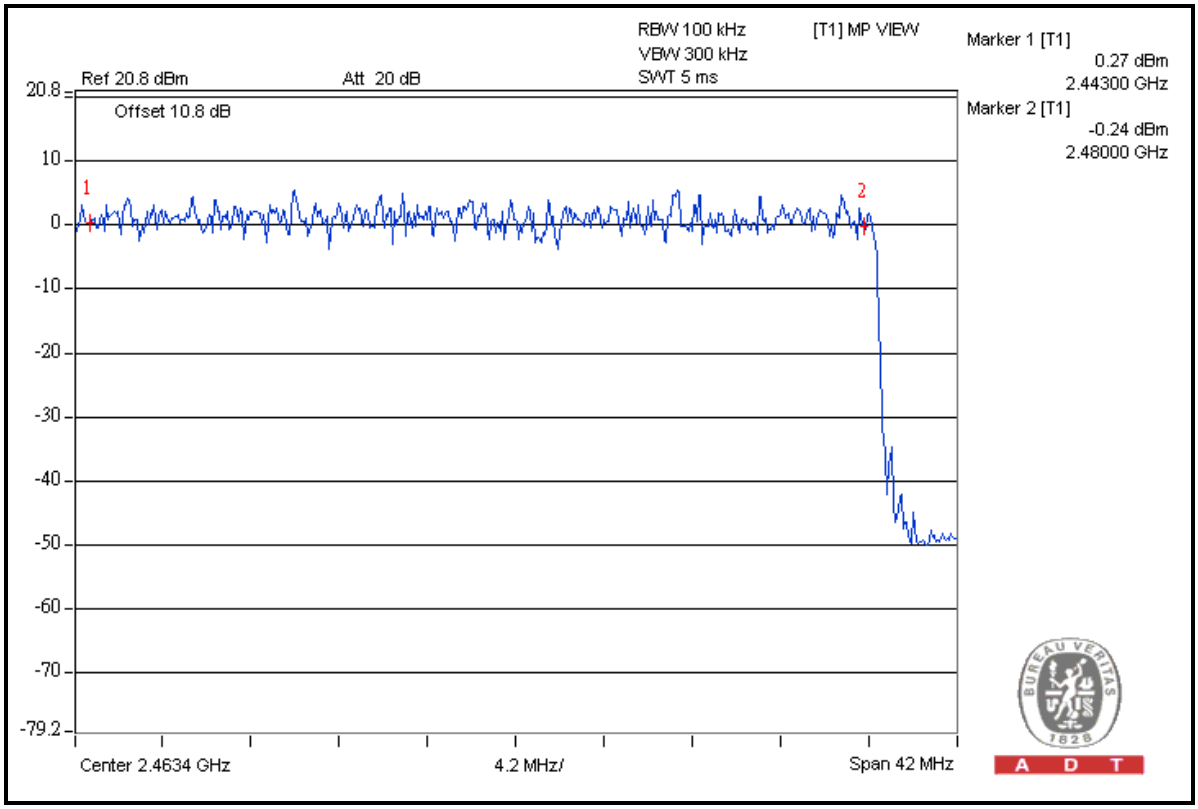
For GFSK


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
8.12 dBm
2.40200 GHz
Marker 2 [T1]
7.51 dBm
2.44200 GHz
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz

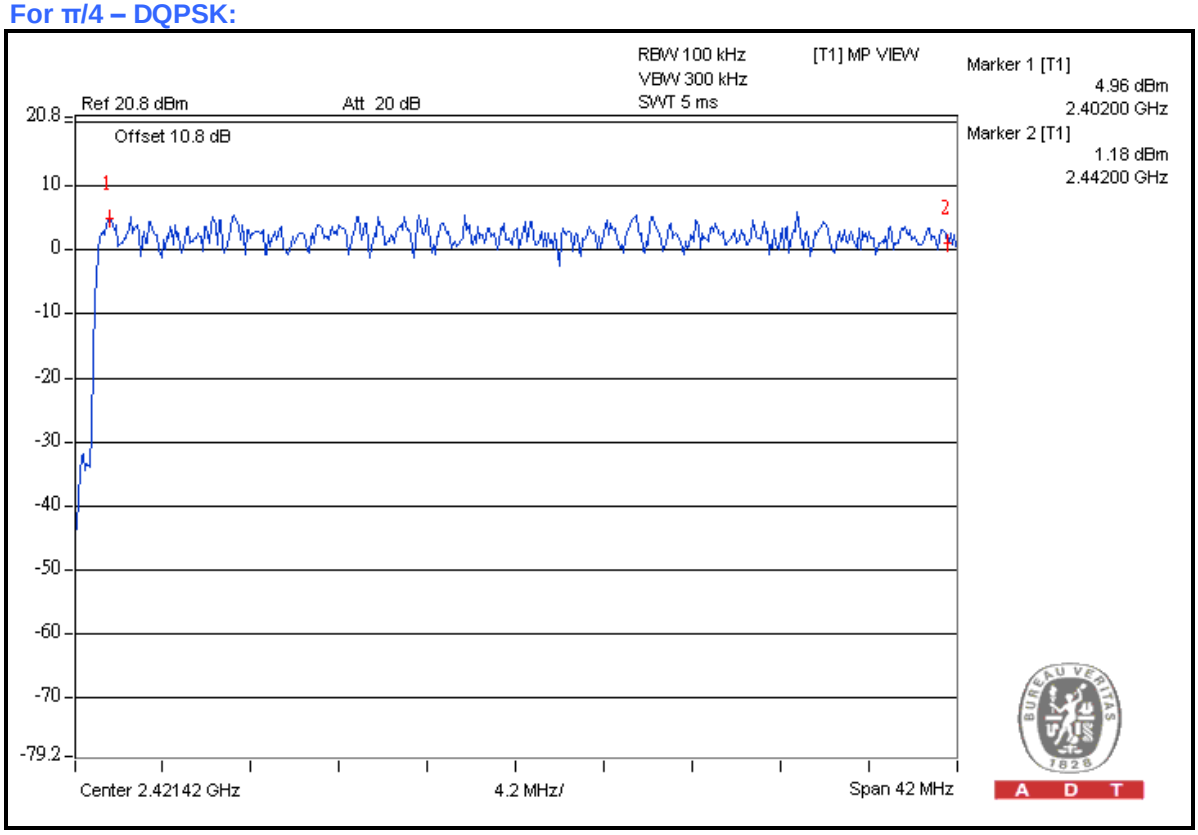

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
7.08 dBm
2.44300 GHz
Marker 2 [T1]
6.70 dBm
2.48000 GHz
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

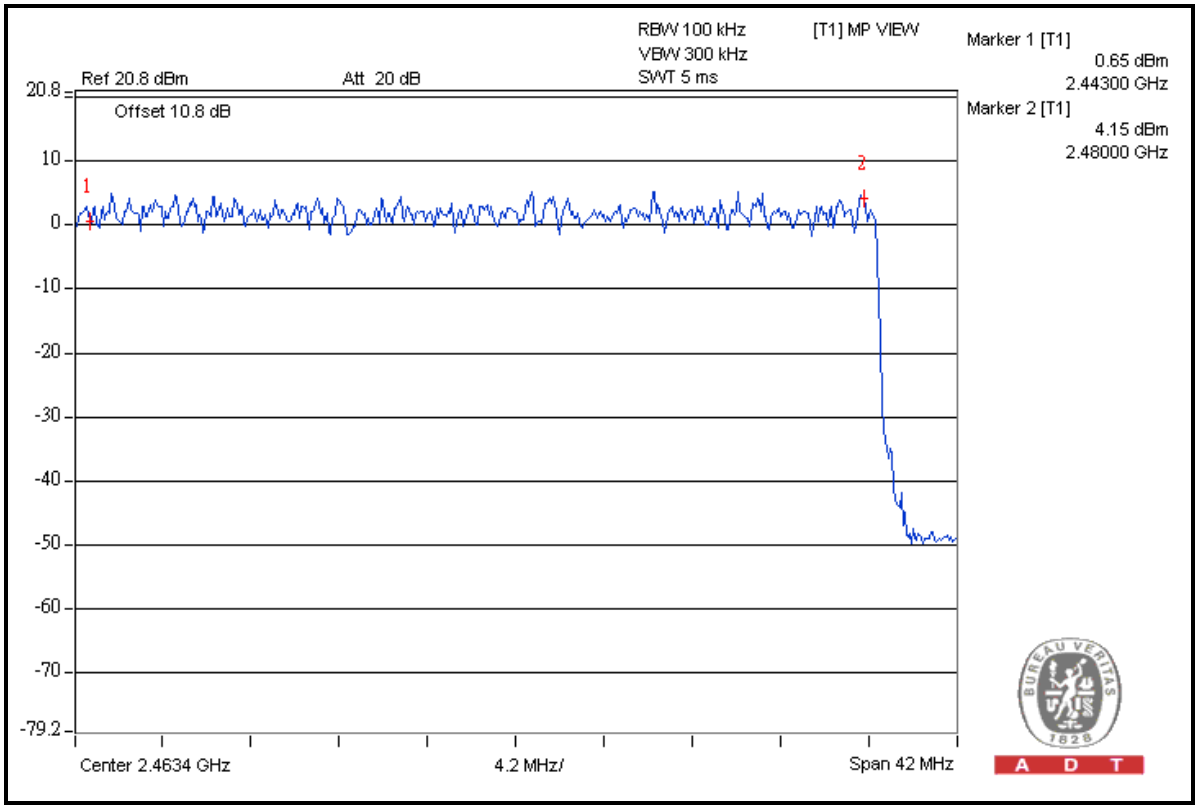
For 8DPSK


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
2.11 dBm
2.40200 GHz
Marker 2 [T1]
3.86 dBm
2.44200 GHz
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
0.27 dBm
2.44300 GHz
Marker 2 [T1]
-0.24 dBm
2.48000 GHz
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

For π/4 – DQPSK:


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
4.96 dBm
2.40200 GHz
Marker 2 [T1]
1.18 dBm
2.44200 GHz
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
0.65 dBm
2.44300 GHz
Marker 2 [T1]
4.15 dBm
2.48000 GHz
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
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

For FHSS, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period. For hybrid systems, the average time of occupancy on any frequency should not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

4.4.2 TEST INSTRUMENTS

Test date: Sep. 09, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

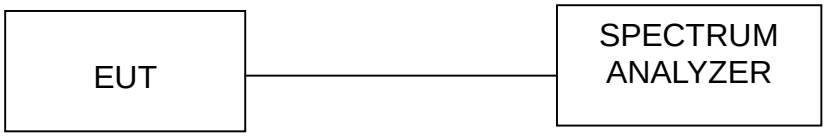
4.4.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. 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.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



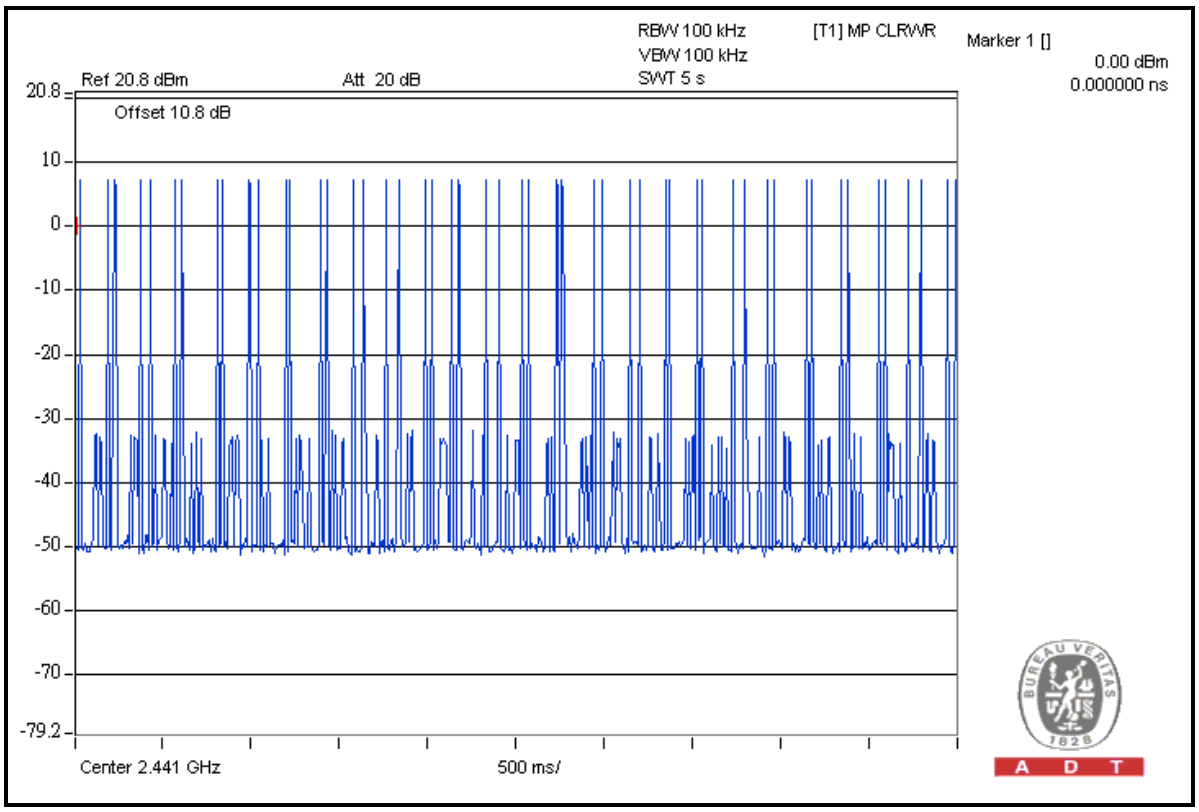
4.4.6 TEST RESULTS

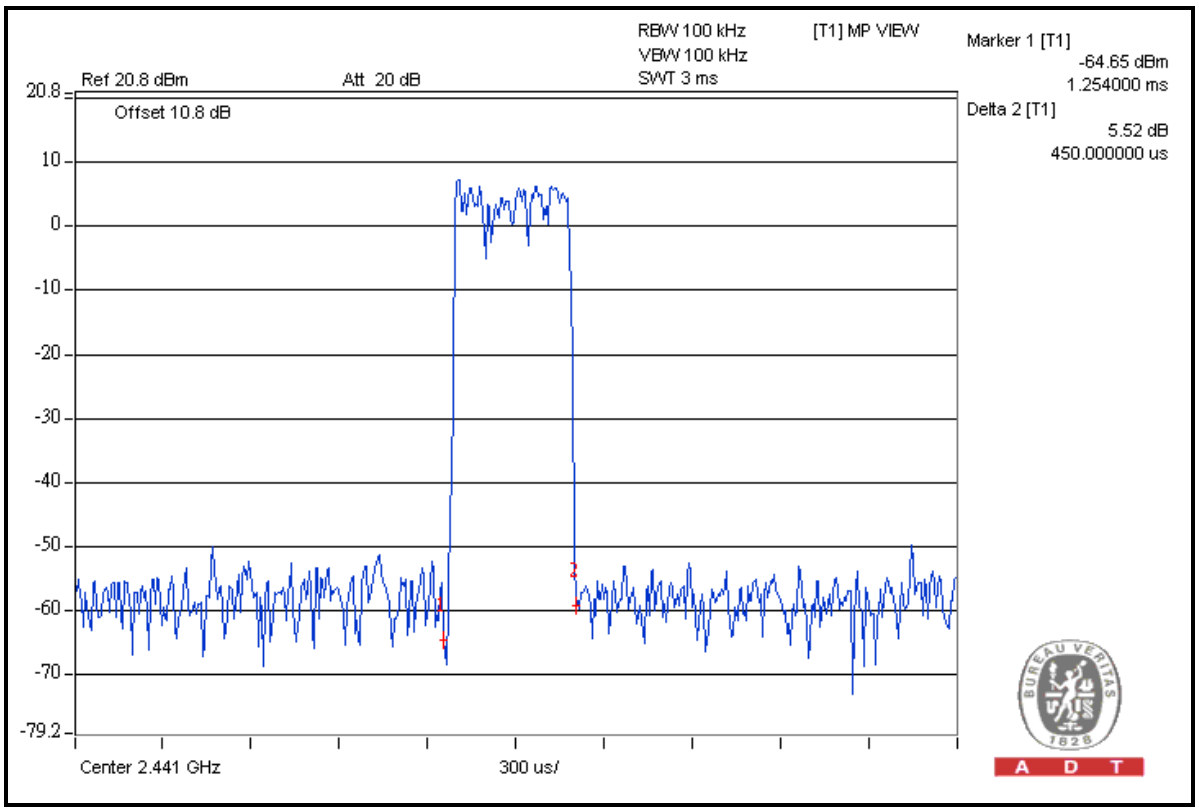
For GFSK:

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316times	0.45	142.2	400
DH3	26 (times / 5 sec) *6.32=164.32 times	1.698	279	400
DH5	17 (times / 5 sec) *6.32=107.44 times	2.95	316.9	400

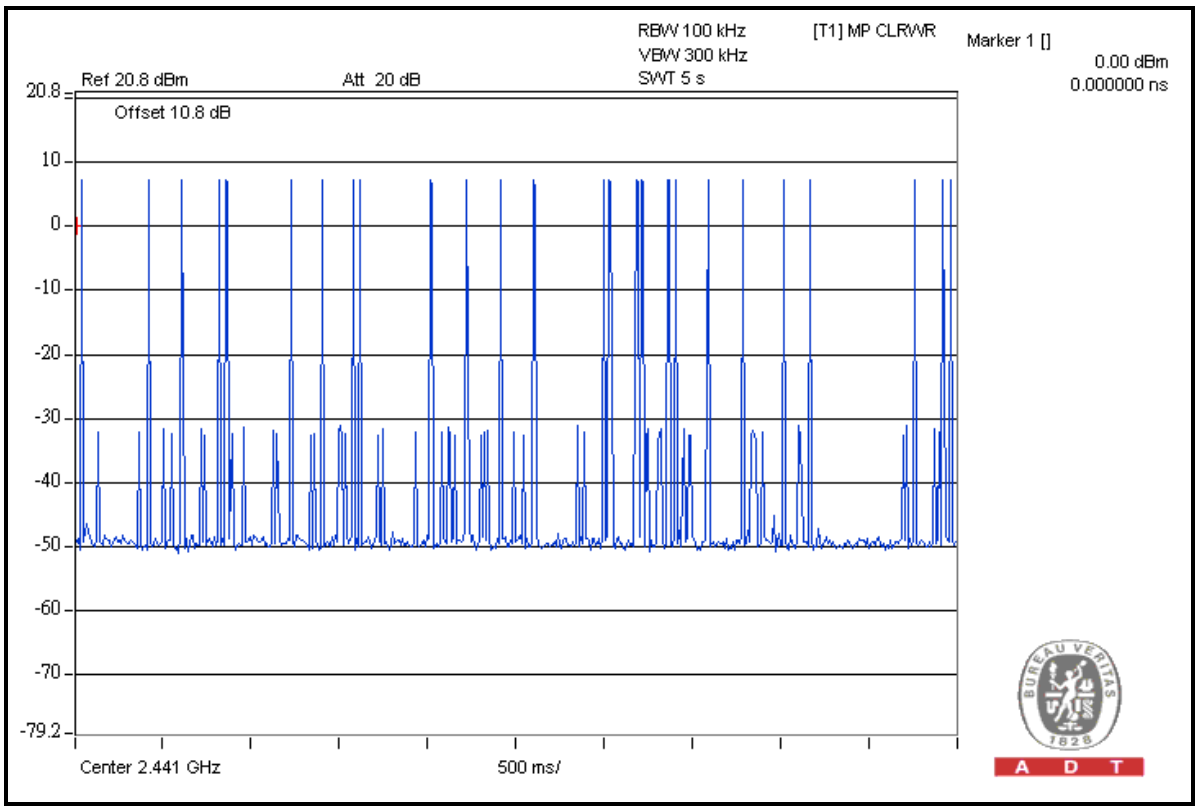
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

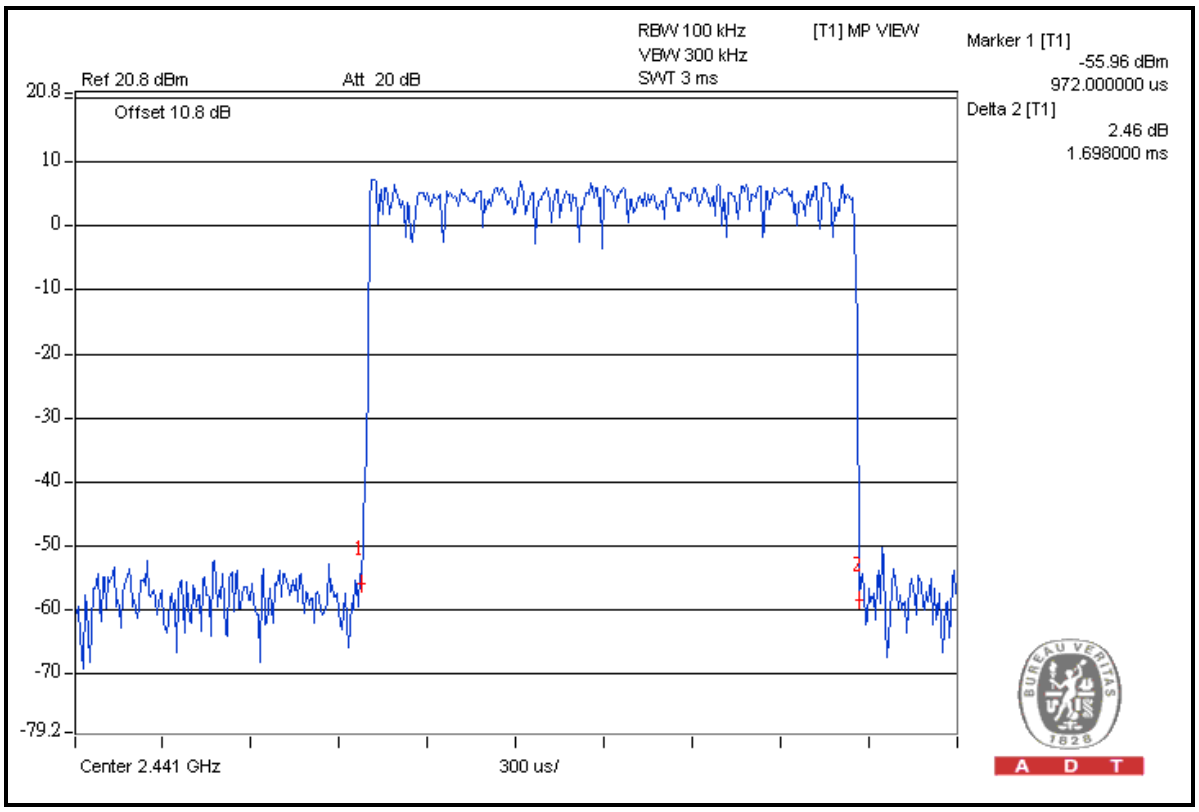
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/

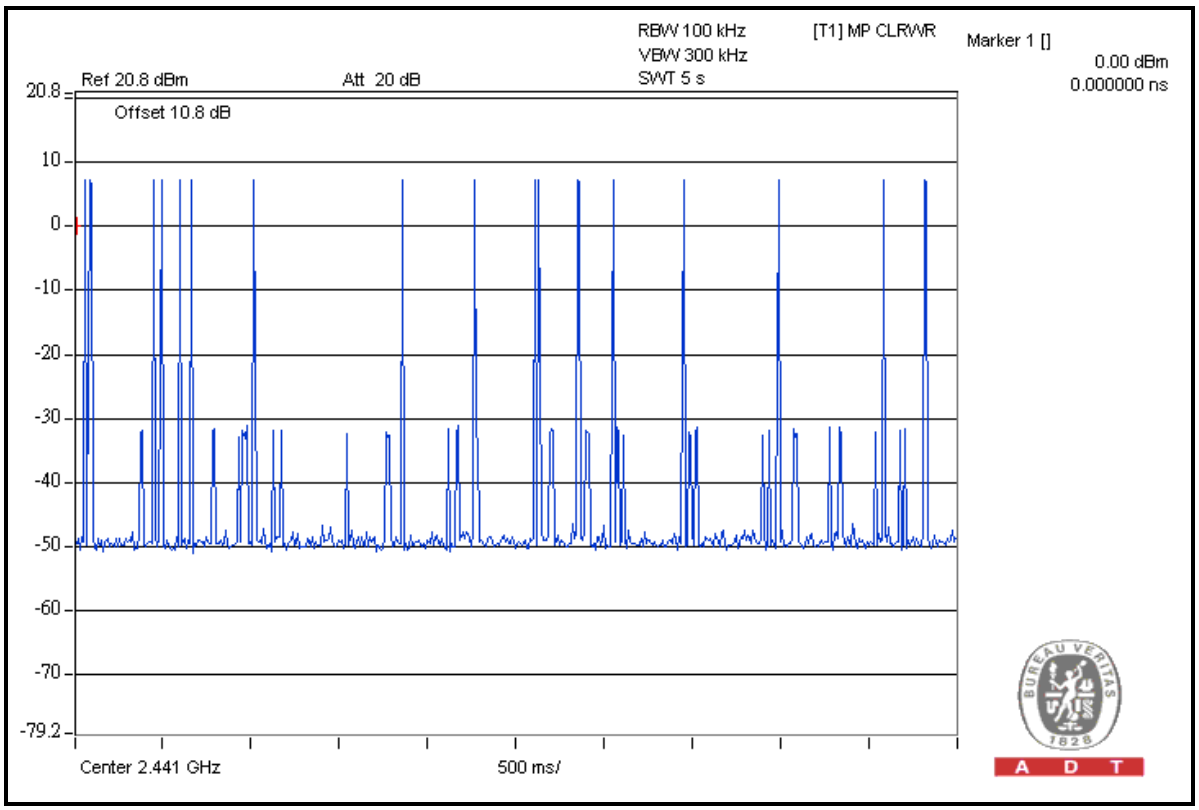

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-64.65 dBm
1.254000 ms
Delta 2 [T1]
5.52 dB
450.000000 us
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
300 us/

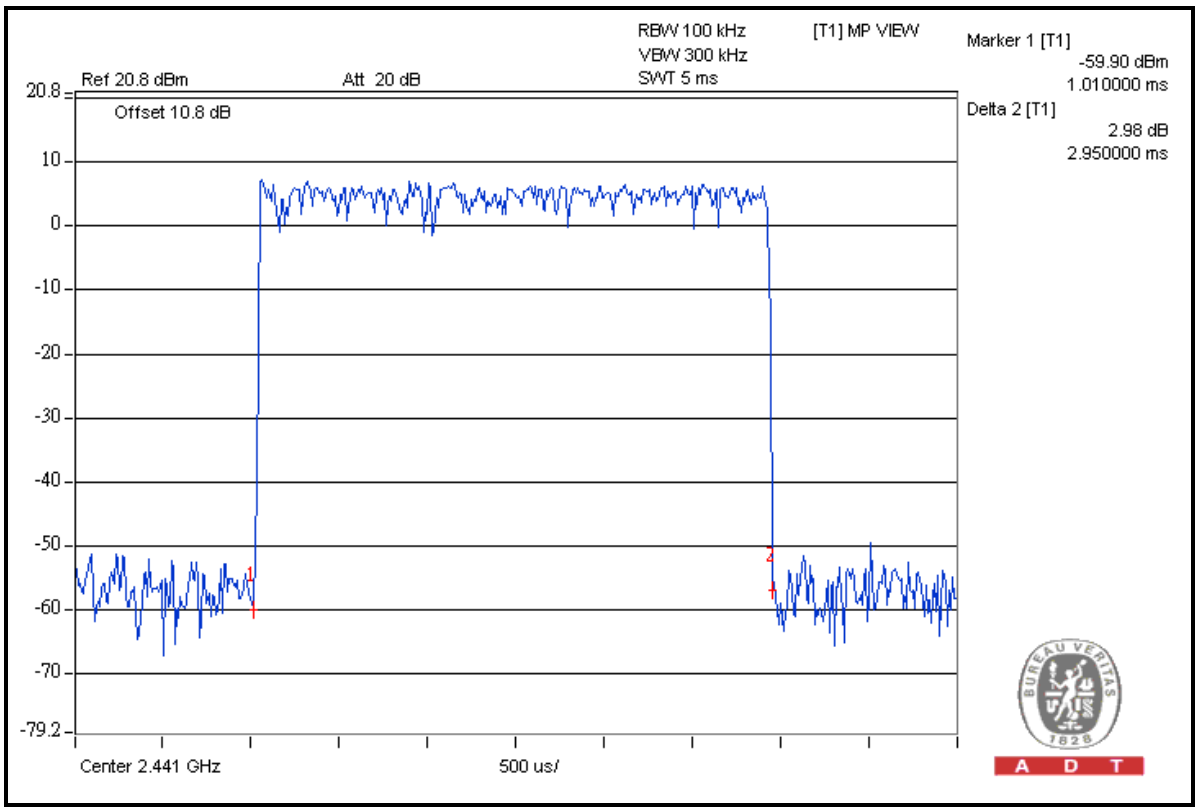
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-55.96 dBm
972.000000 us
Delta 2 [T1]
2.46 dB
1.698000 ms
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/

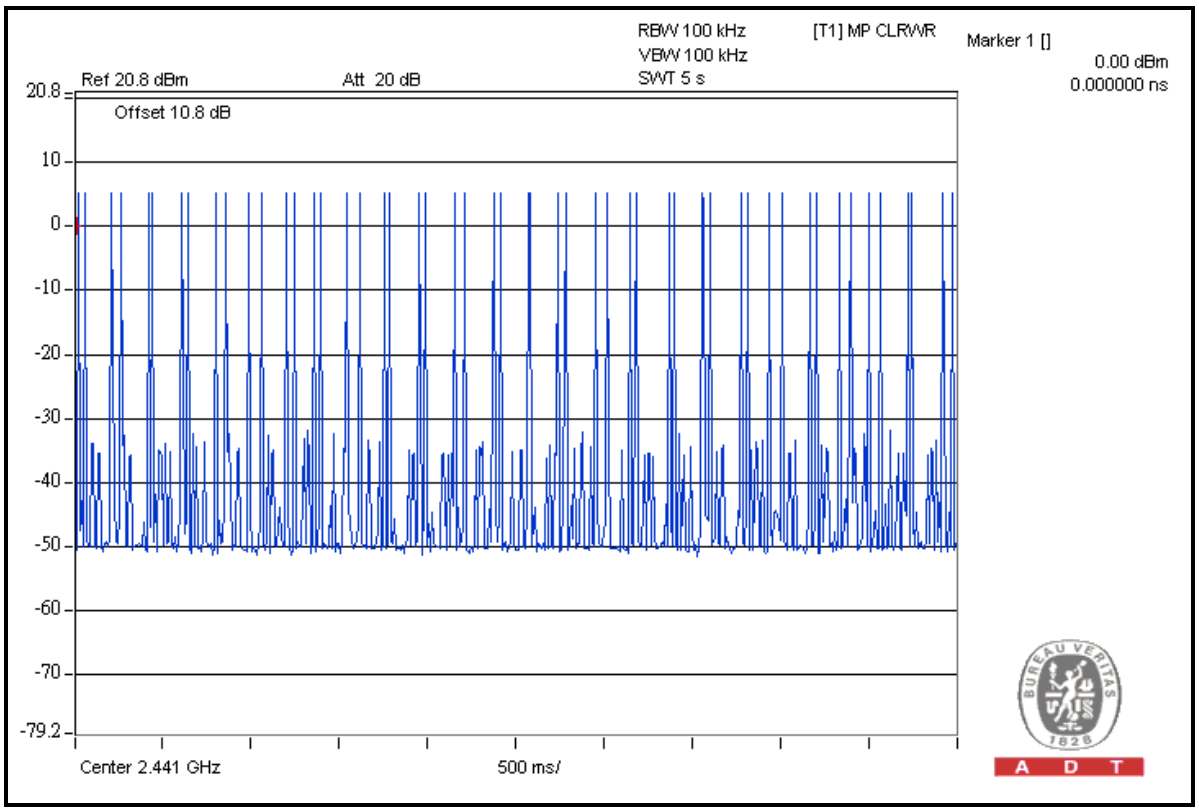

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-59.90 dBm
1.010000 ms
Delta 2 [T1]
2.98 dB
2.950000 ms
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 us/

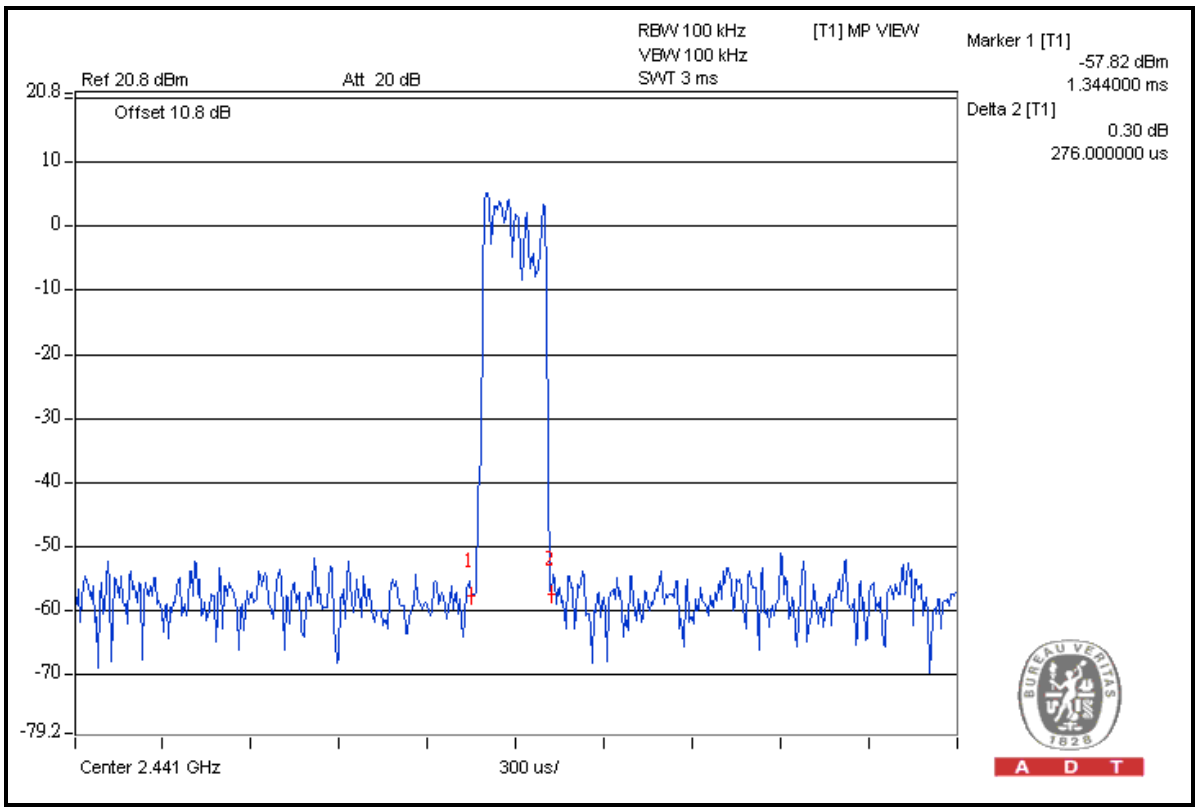
For 8DPSK :

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) *6.32=322.32 times	0.276	89	400
DH3	25 (times / 5 sec) *6.32=158 times	1.692	267.3	400
DH5	18 (times / 5 sec) *6.32=113.76 times	2.9	329.9	400

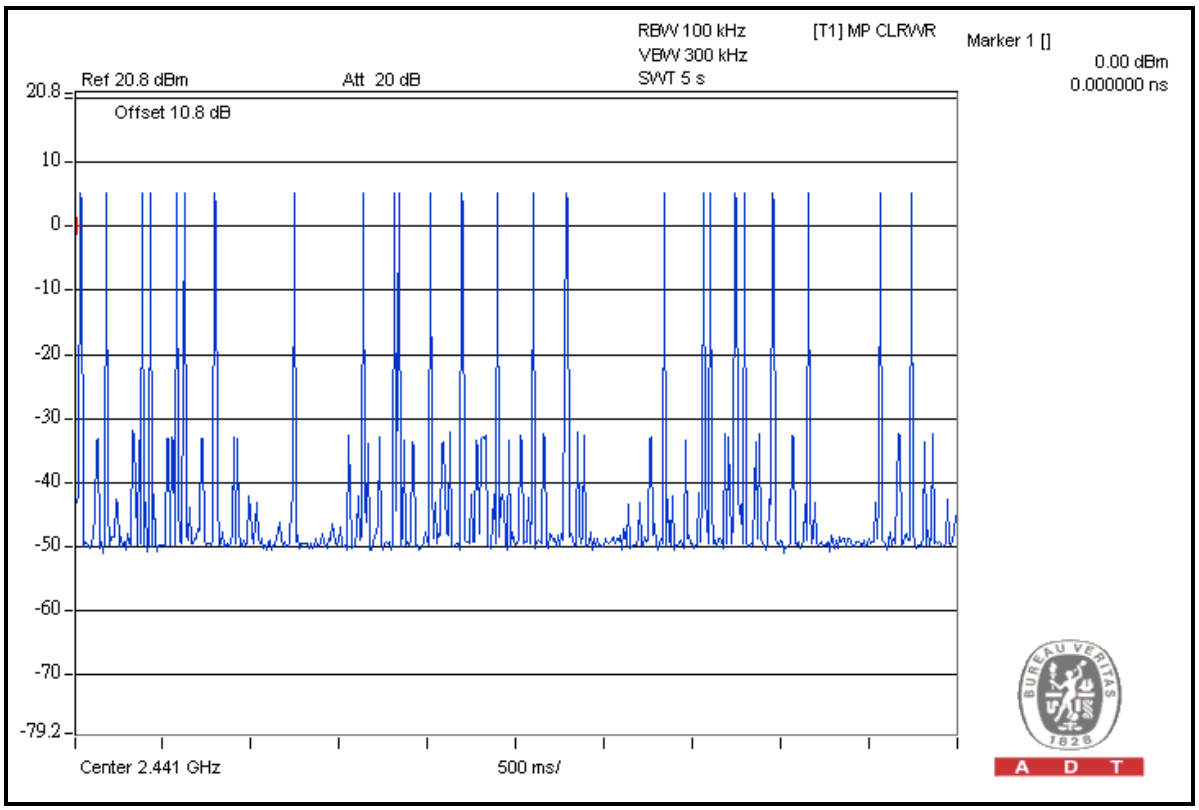
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

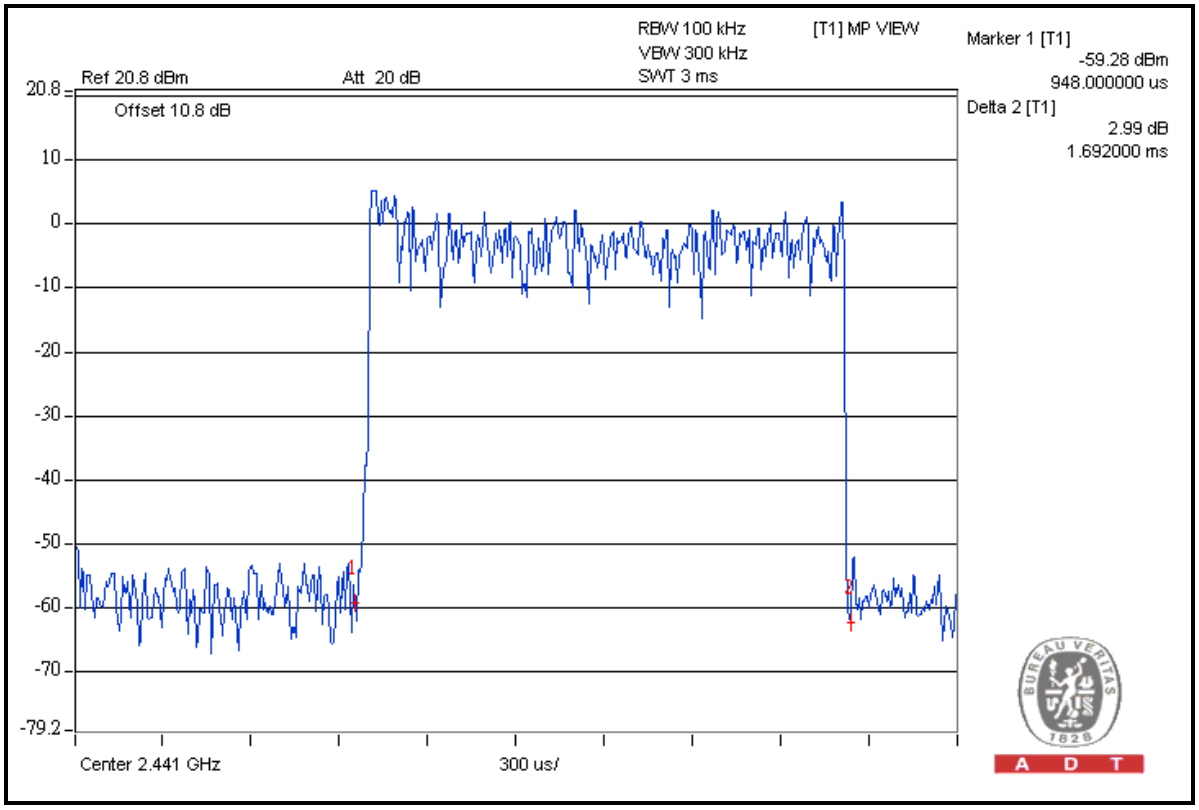
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/

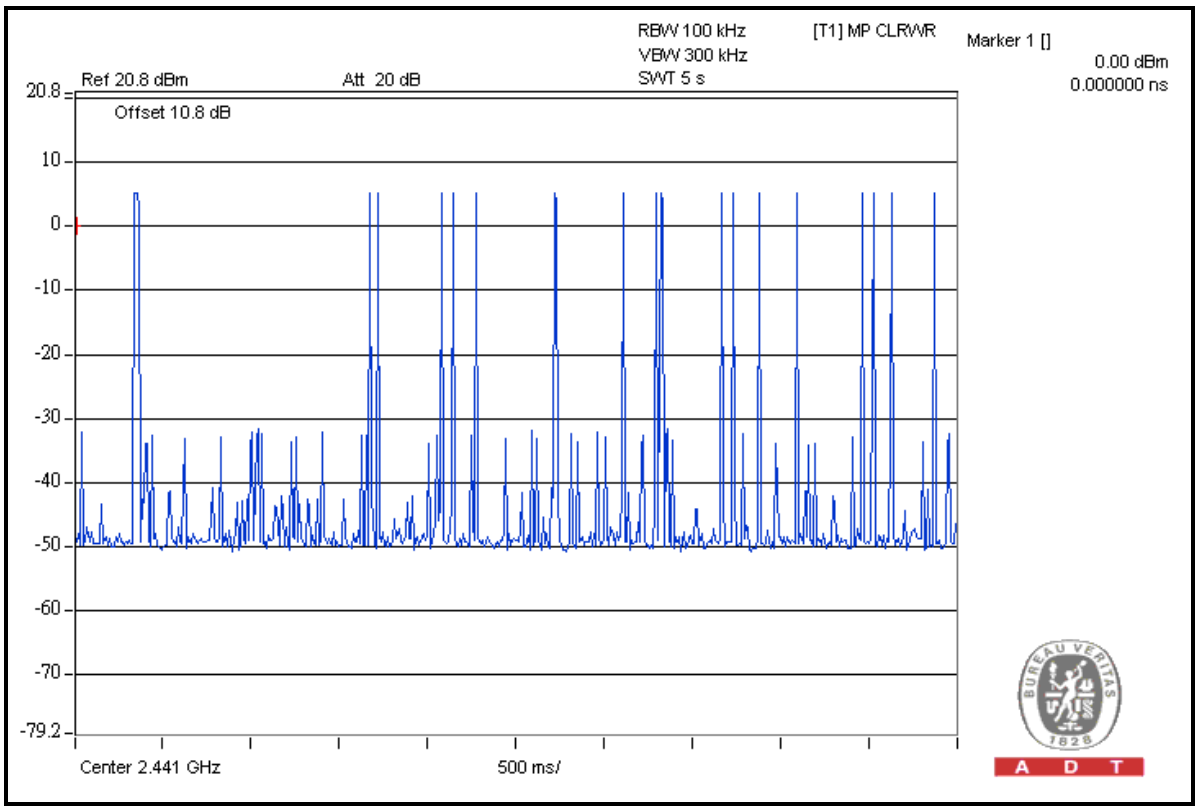

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-57.82 dBm
1.344000 ms
Delta 2 [T1]
0.30 dB
276.000000 us
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
300 us/

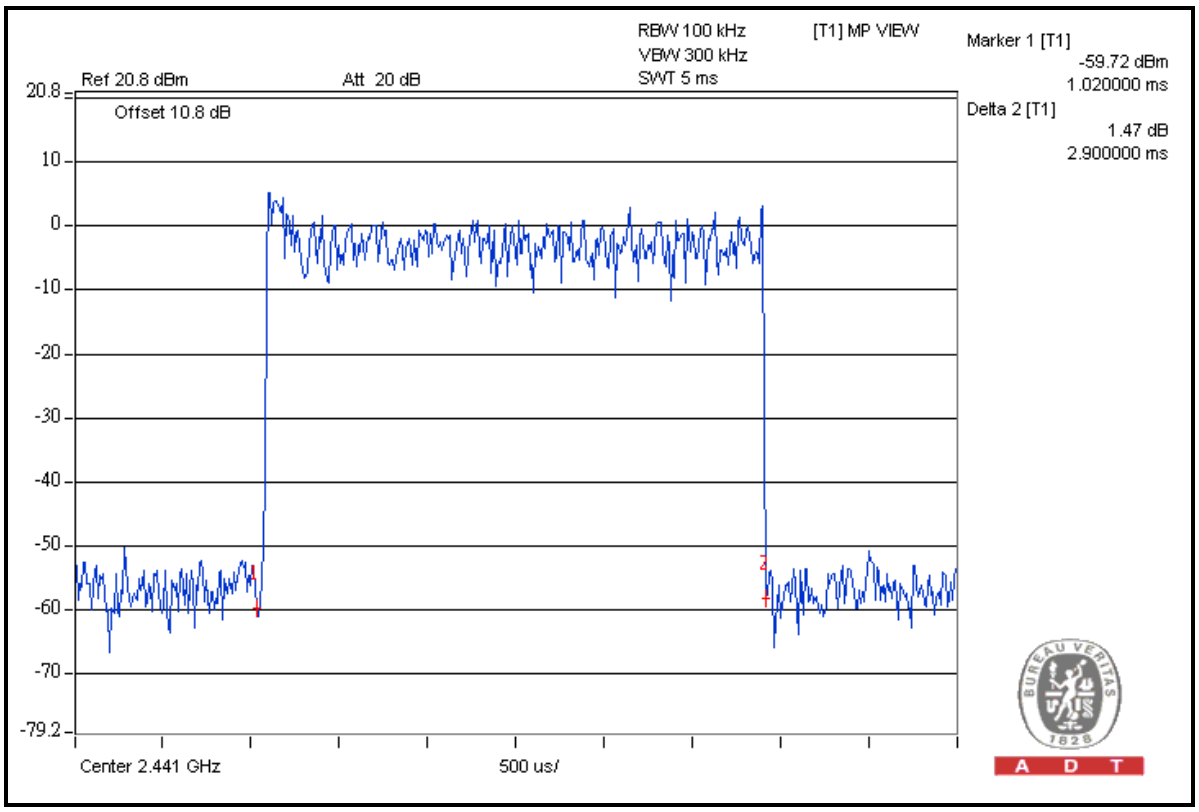
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-59.28 dBm
948.000000 us
Delta 2 [T1]
2.99 dB
1.692000 ms
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/

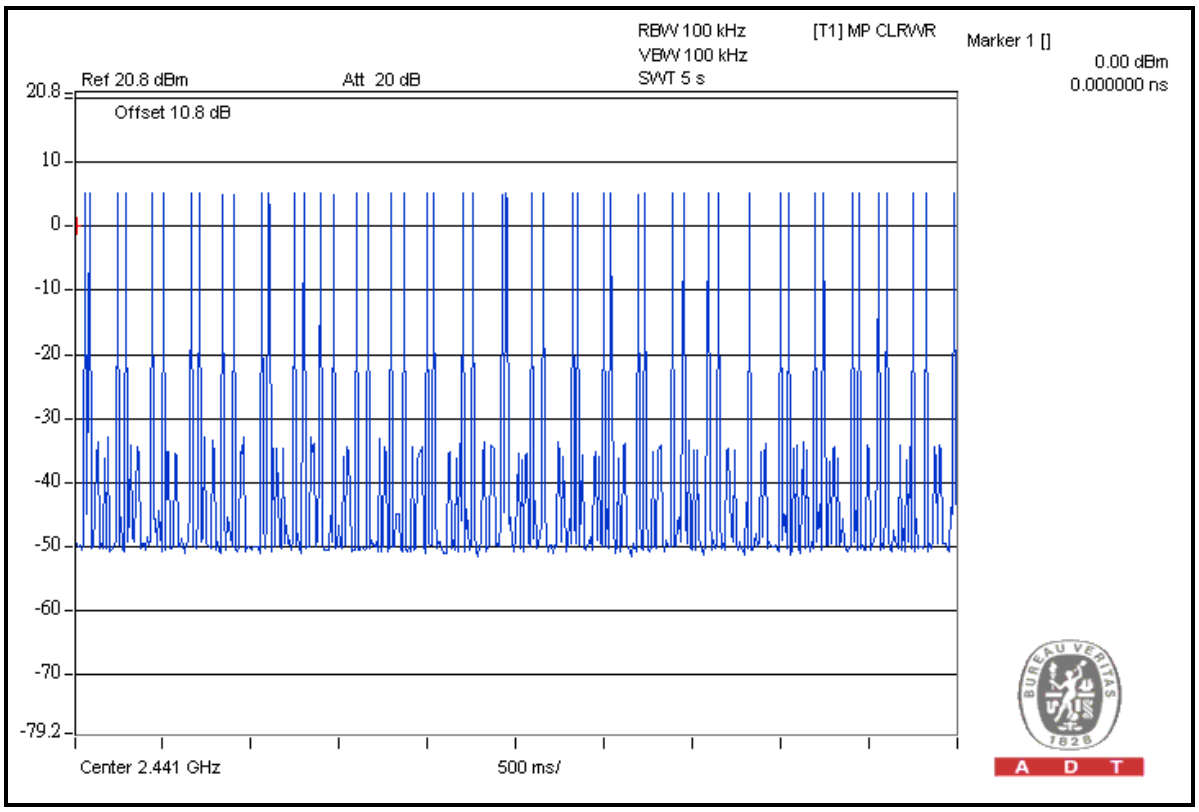

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-59.72 dBm
1.020000 ms
Delta 2 [T1]
1.47 dB
2.900000 ms
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 us/

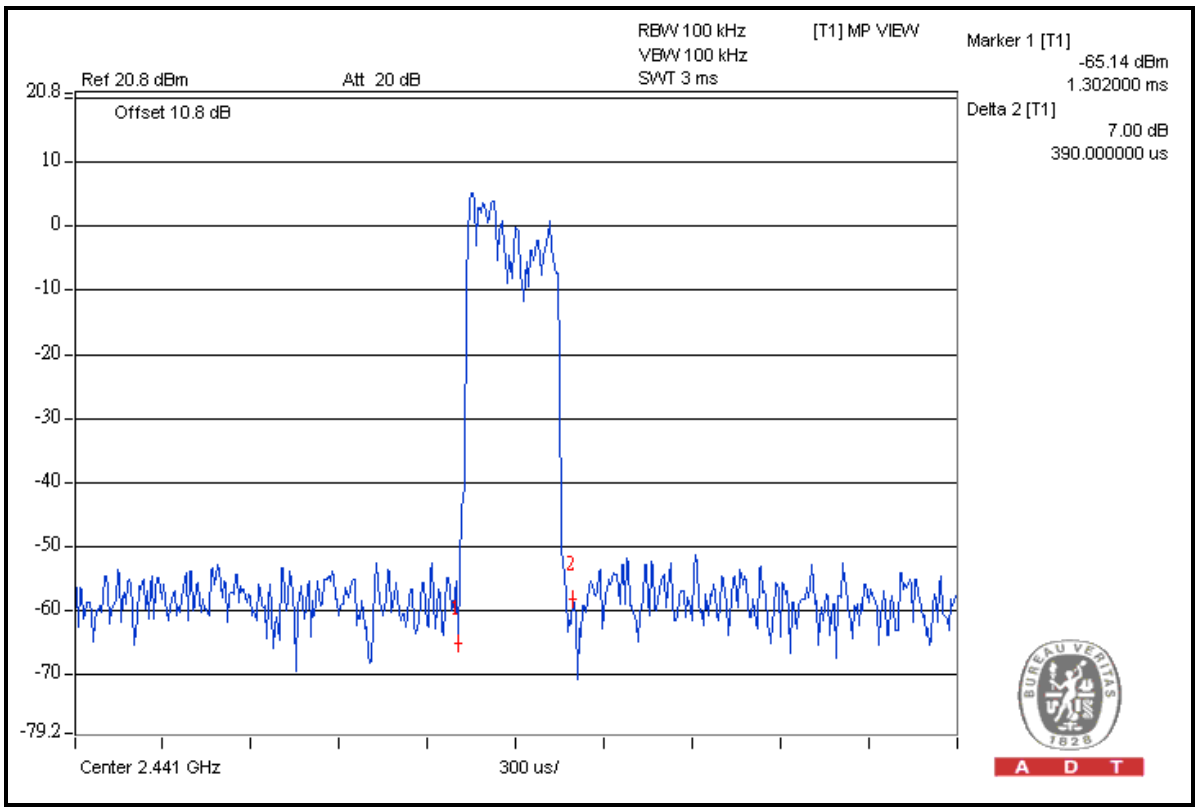
For $\pi/4$ – DQPSK :

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316 times	0.39	123.2	400
DH3	27 (times / 5 sec) *6.32=170.64times	1.686	287.7	400
DH5	17 (times / 5 sec) *6.32=107.44 times	2.87	308.4	400

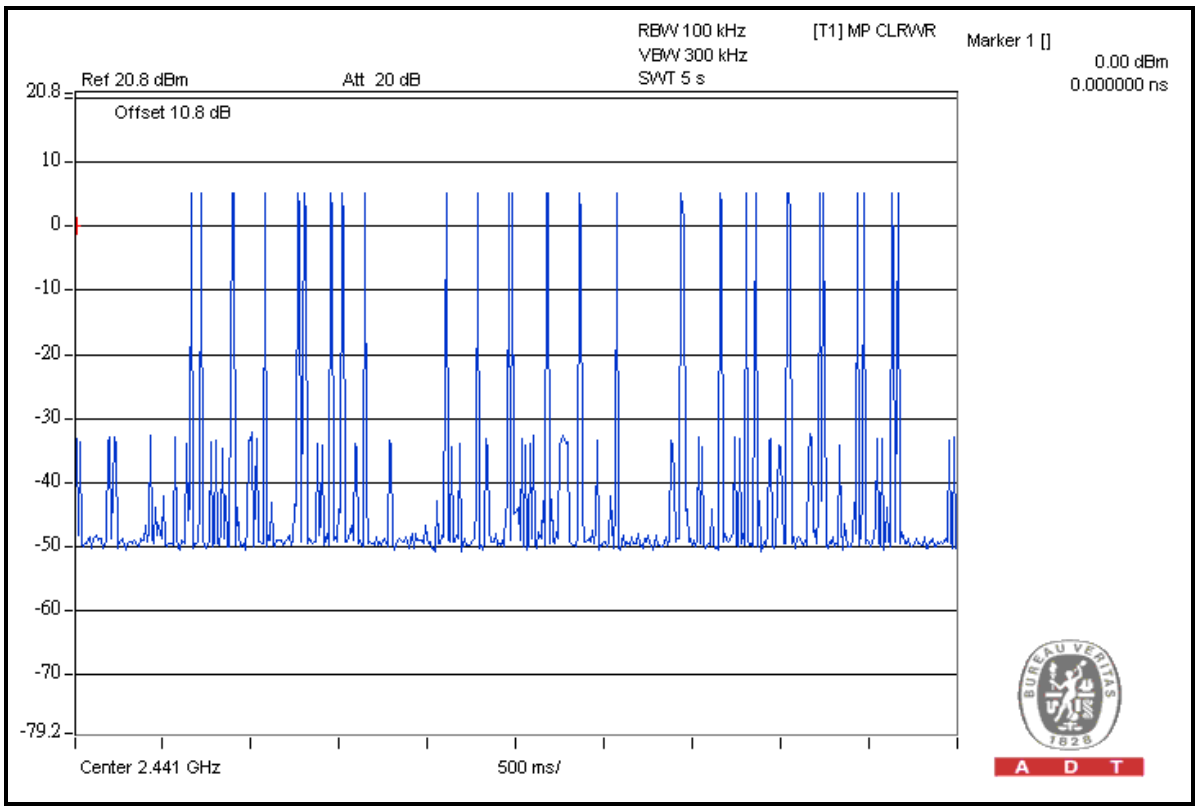
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

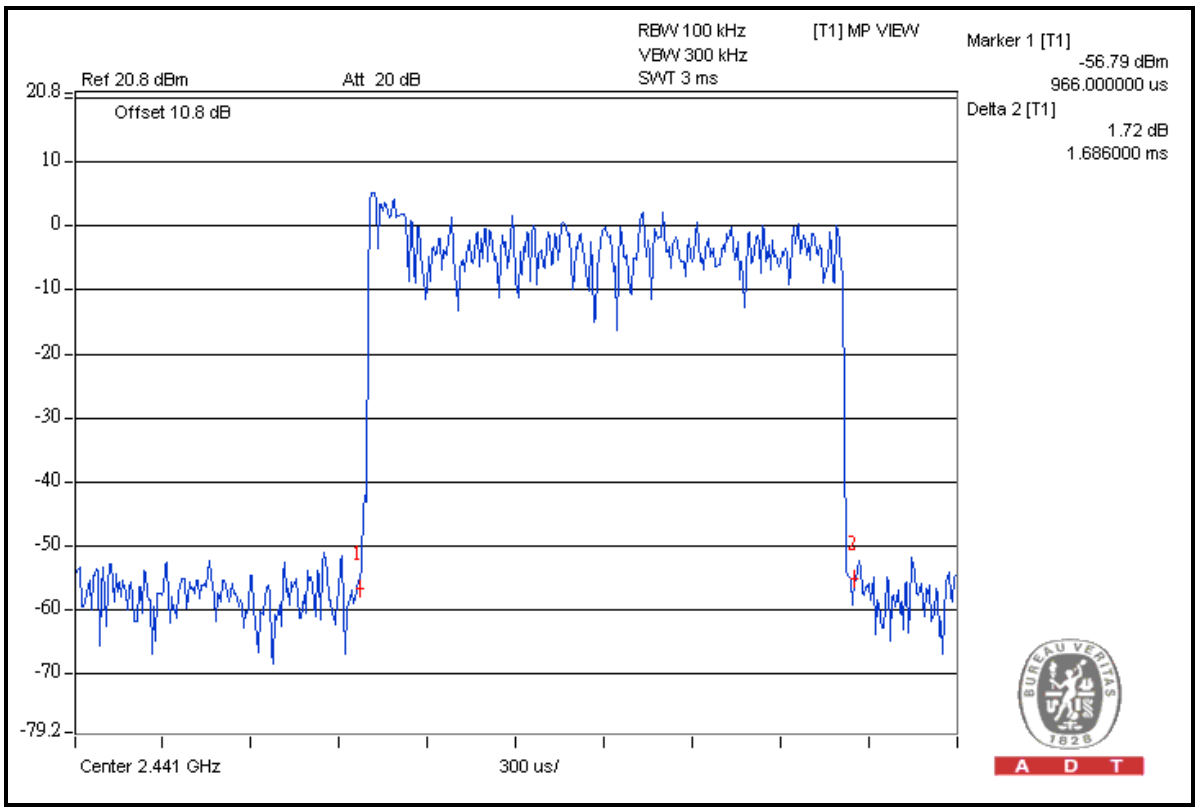
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/

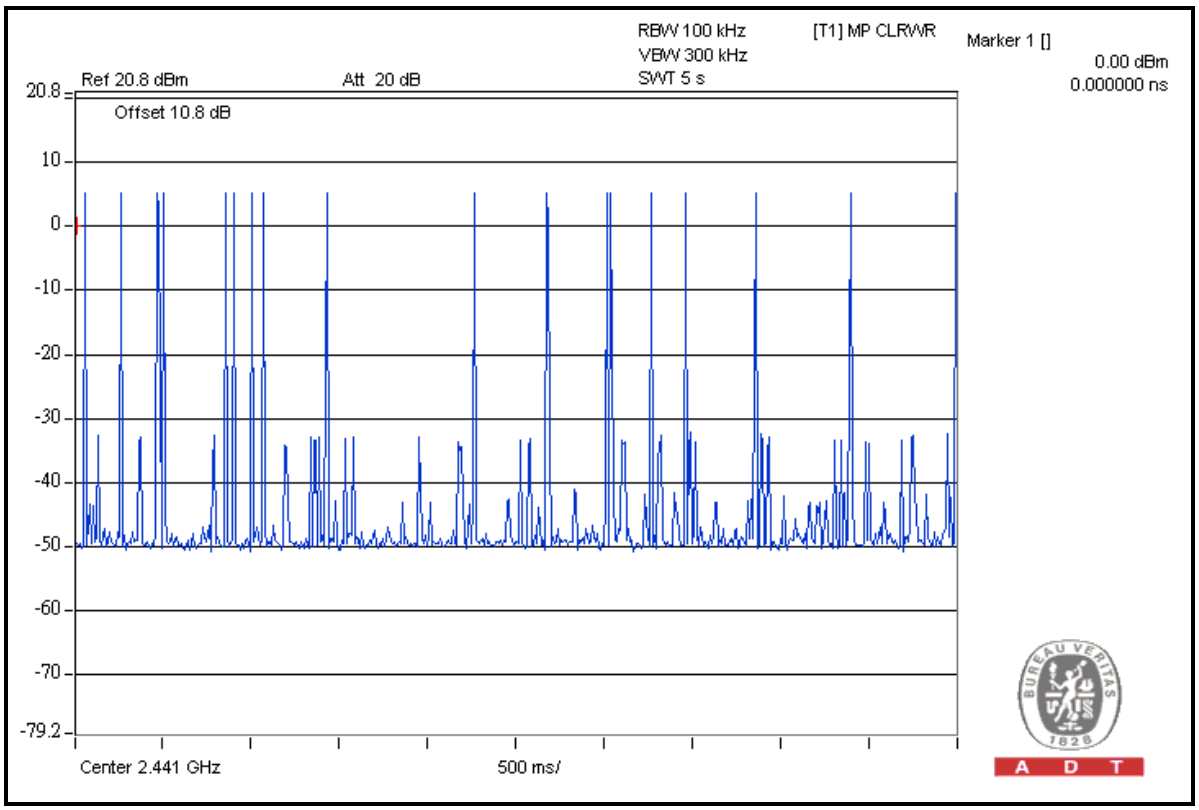

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-65.14 dBm
1.302000 ms
Delta 2 [T1]
7.00 dB
390.000000 us
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
300 us/

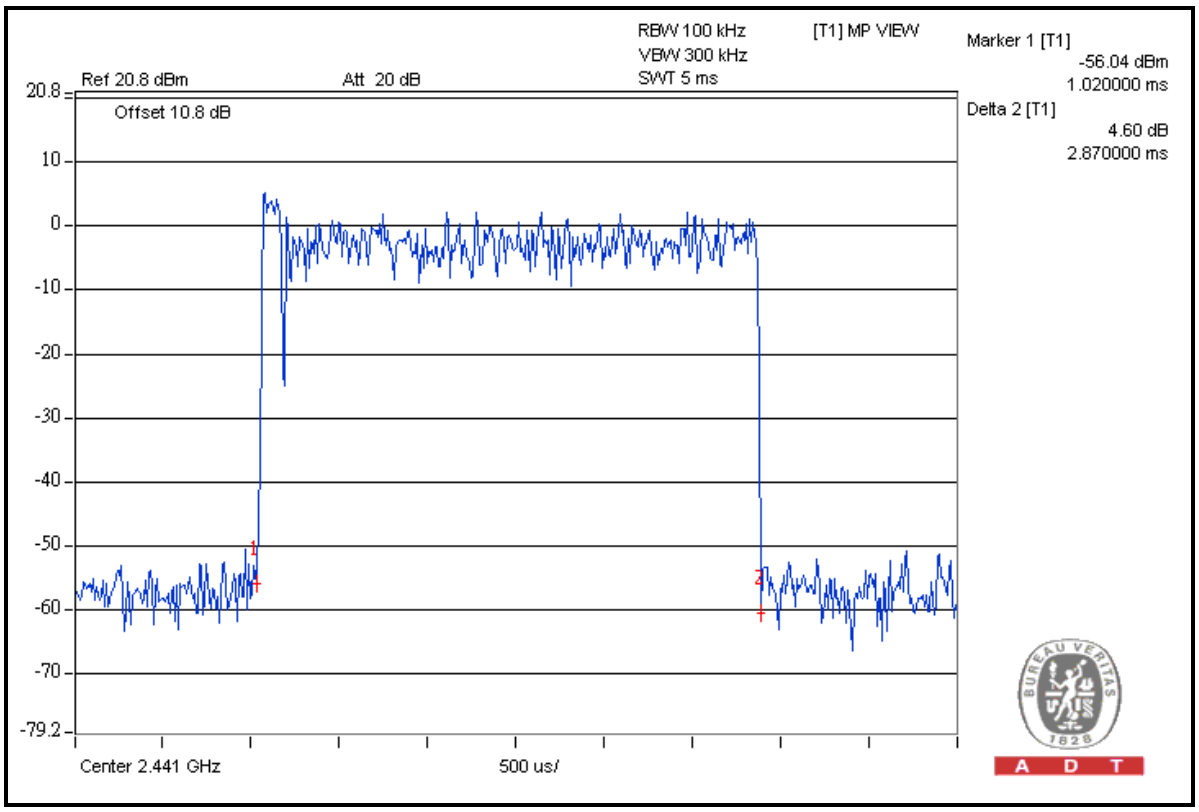
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-56.79 dBm
966.000000 us
Delta 2 [T1]
1.72 dB
1.686000 ms
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Marker 1 []
0.00 dBm
0.000000 ns
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-56.04 dBm
1.020000 ms
Delta 2 [T1]
4.60 dB
2.870000 ms
Ref 20.8 dBm
Att 20 dB
Offset 10.8 dB
20.8
10
0
-10
-20
-30
-40
-50
-60
-70
-79.2
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 two-thirds 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

4.5.2 TEST INSTRUMENTS

Test date: Sep. 09, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

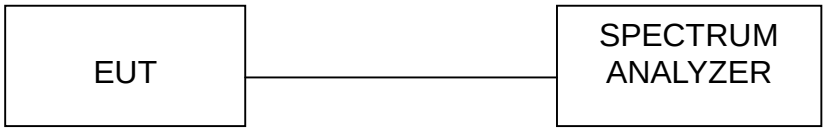
4.5.3 TEST PROCEDURE

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. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

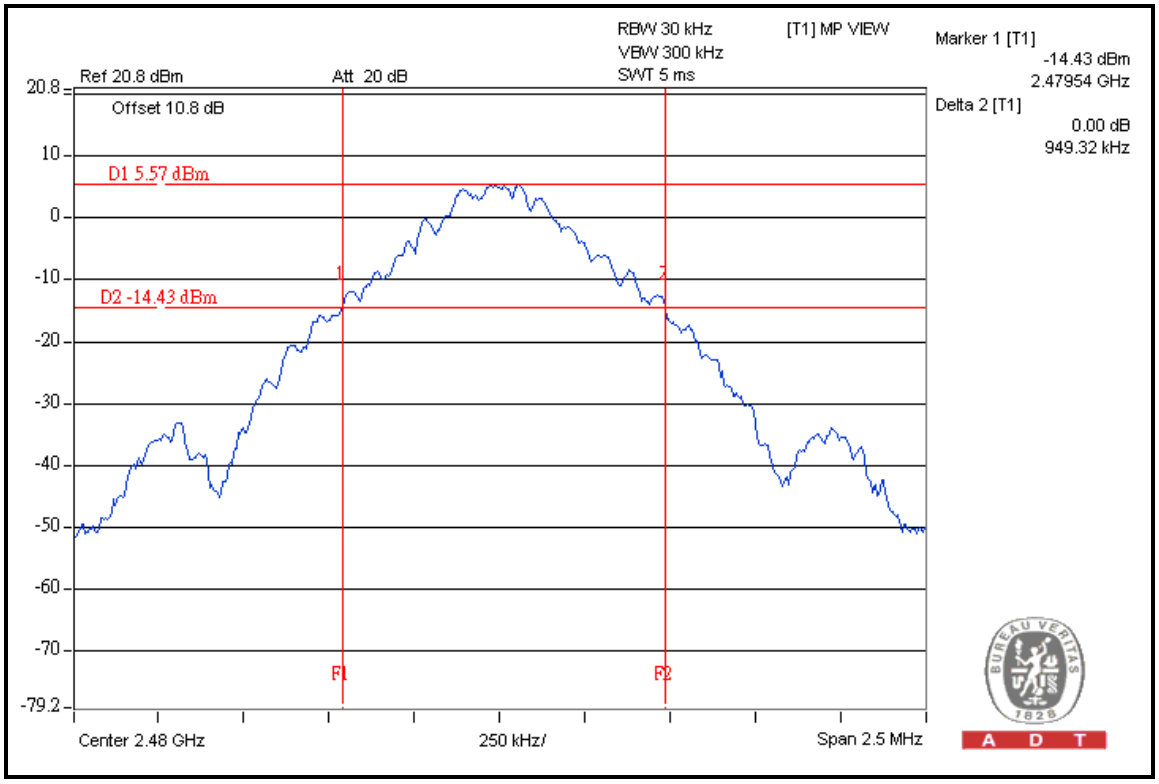
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 TEST RESULTS

For GFSK:

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

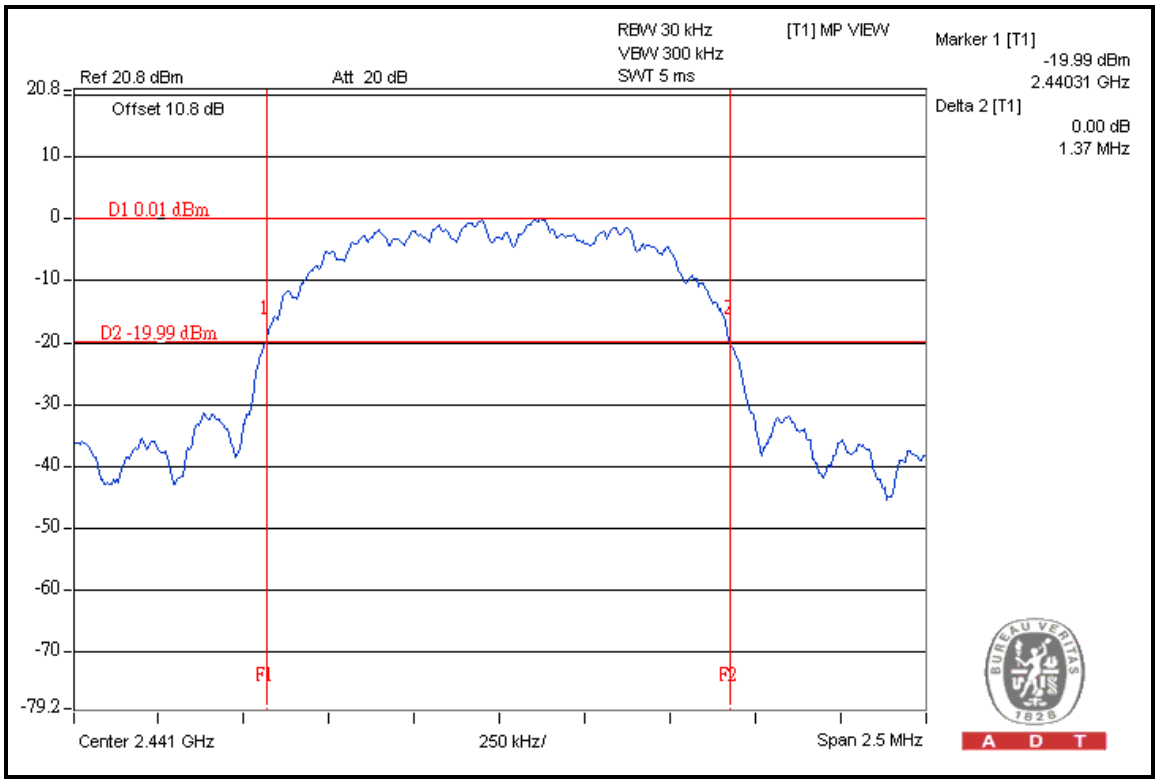
CH 78



For 8DPSK:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.37
39	2441	1.37
78	2480	1.36

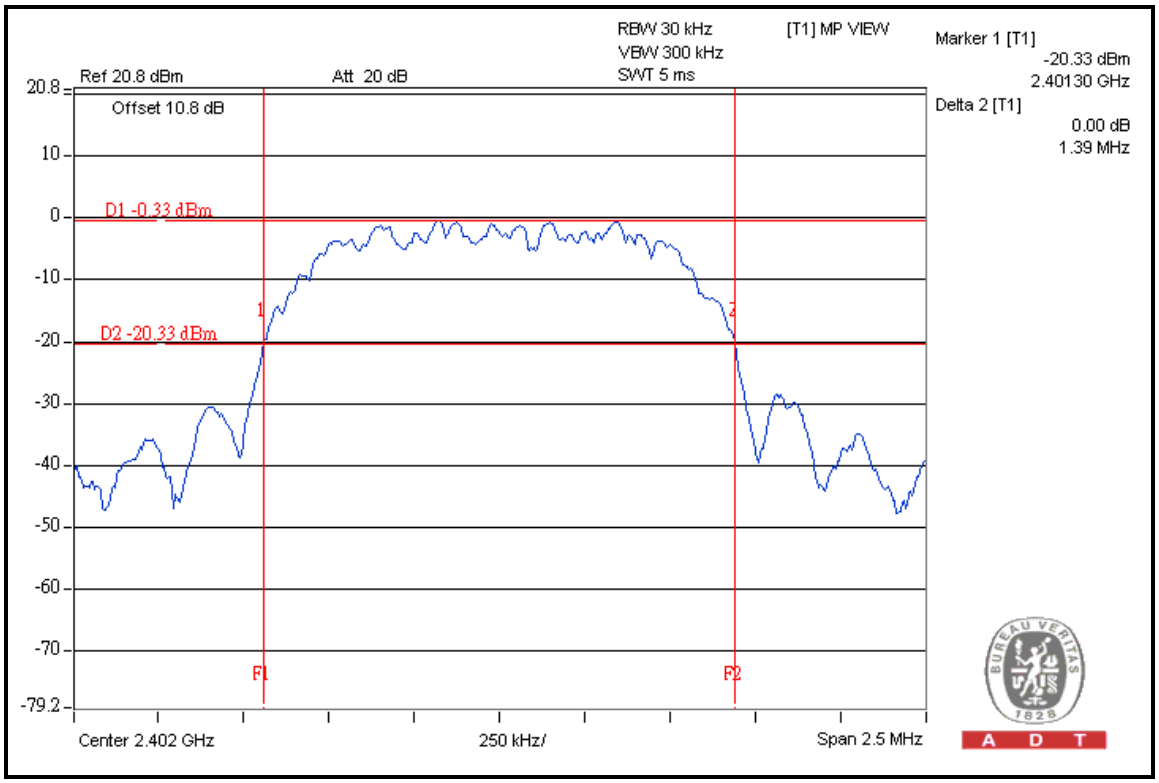
CH 39



For π/4-DQPSK:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.39
39	2441	1.38
78	2480	1.38

CH 0



4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

4.6.2 TEST INSTRUMENTS

Test date: Sep. 09, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

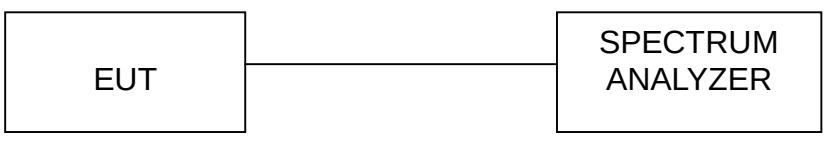
4.6.3 TEST PROCEDURES

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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



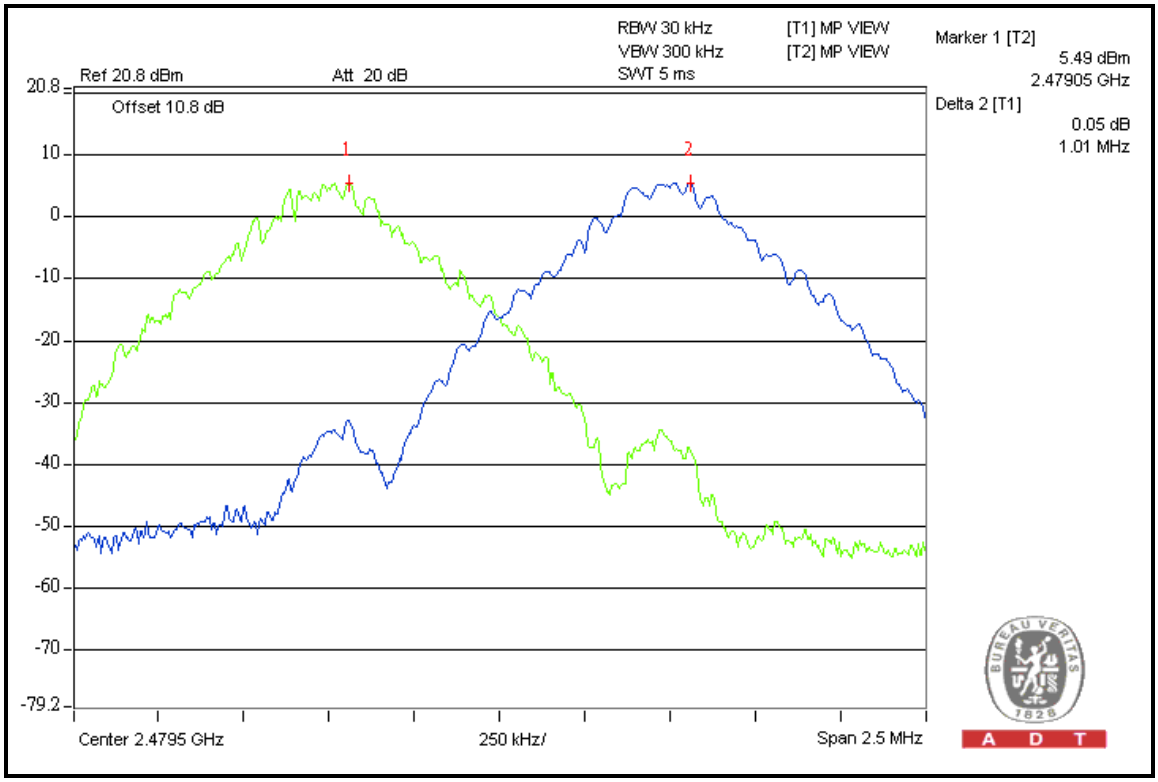
4.6.6 TEST RESULTS

For GFSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	0.627	PASS
39	2441	1.00	0.627	PASS
78	2480	1.01	0.627	PASS

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

CH 78

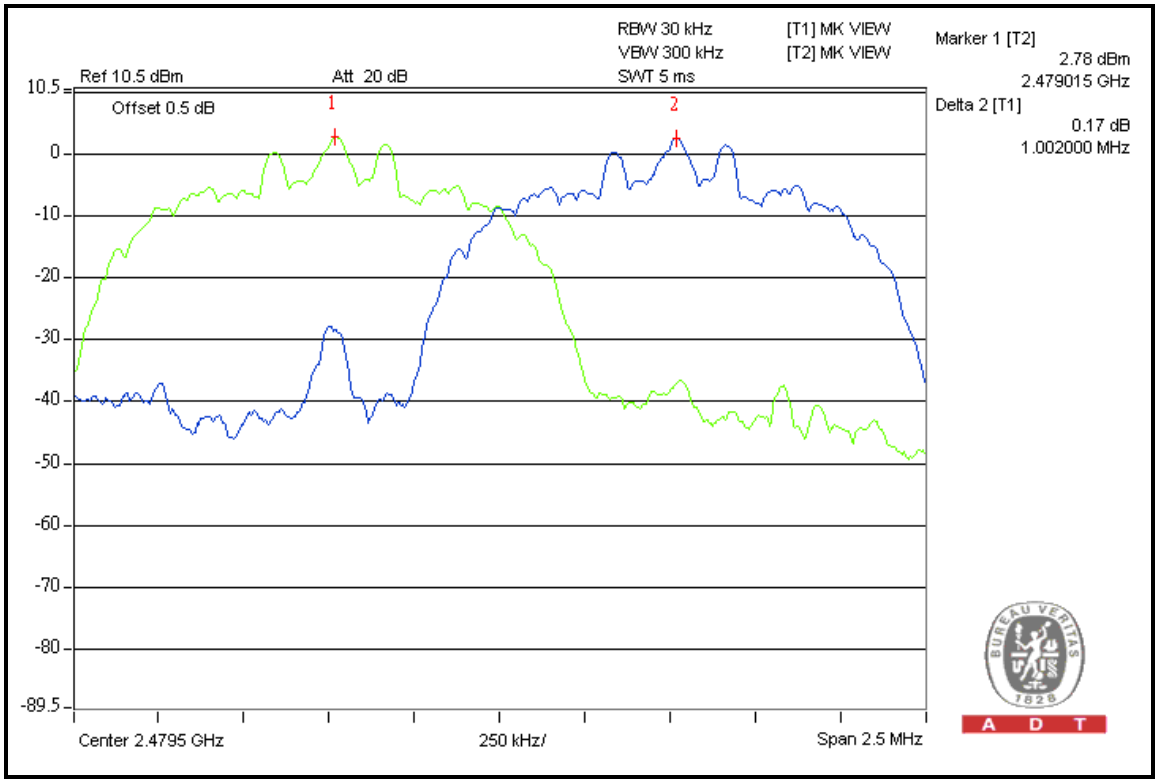


For 8DPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.001	0.847	PASS
39	2441	1.001	0.847	PASS
78	2480	1.002	0.860	PASS

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

CH 78

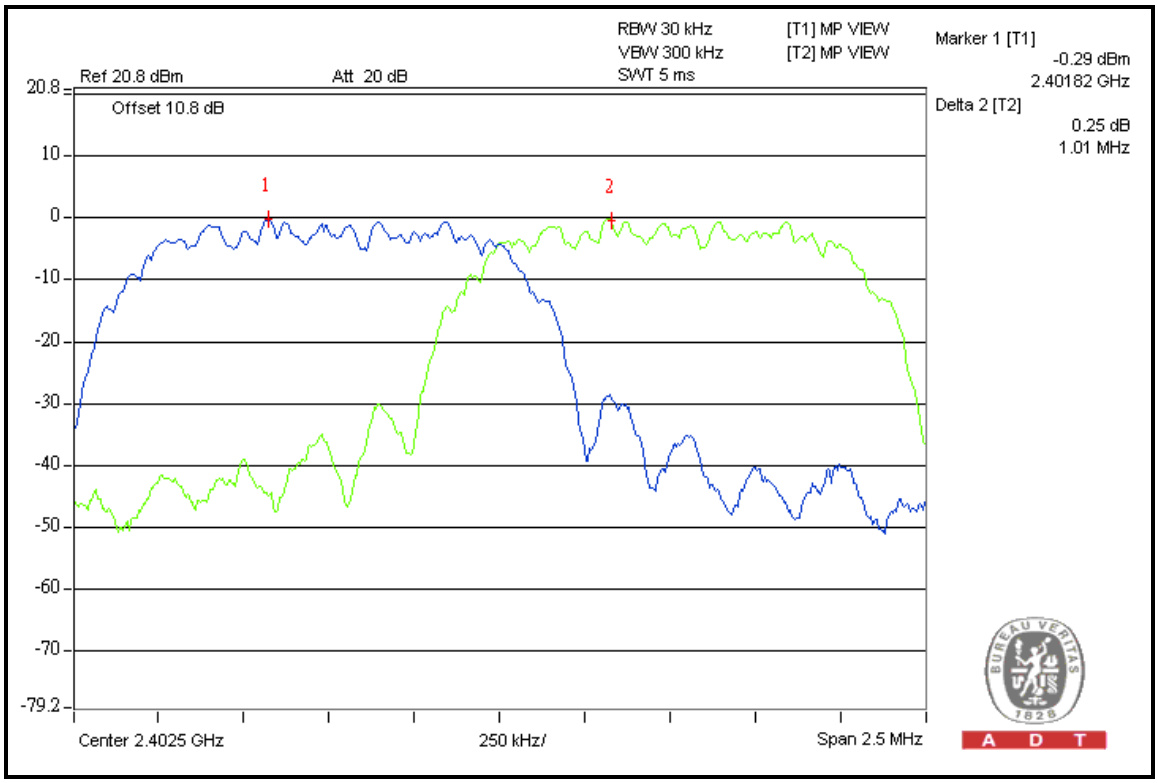


For π/4-DQPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.01	0.927	PASS
39	2441	1.00	0.920	PASS
78	2480	1.00	0.920	PASS

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

CH 0



4.7 MAXIMUM PEAK OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 125mW.

4.7.2 INSTRUMENTS

Test date: Sep. 09, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

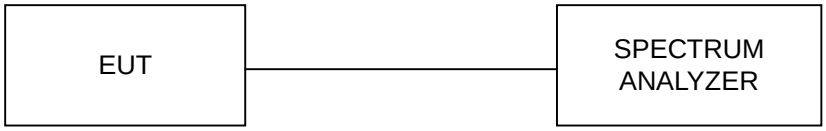
4.7.3 TEST PROCEDURES

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. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies measured were complete.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.7.6 EUT OPERATING CONDITION

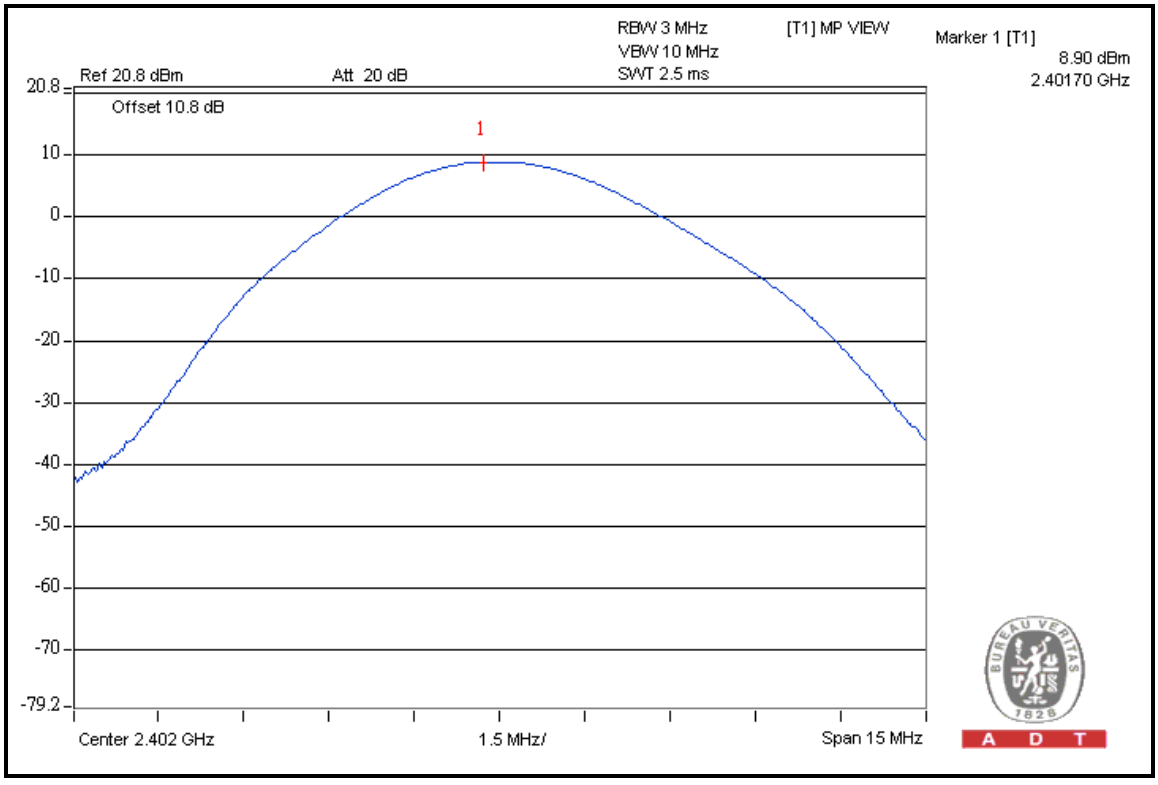
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 TEST RESULTS

GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (dBm)	POWER OUTPUT (mW)	POWER LIMIT (mW)	PASS/FAIL
0	2402	8.9	7.800	21	PASS
39	2441	8.8	7.600	21	PASS
78	2480	8.0	6.300	21	PASS

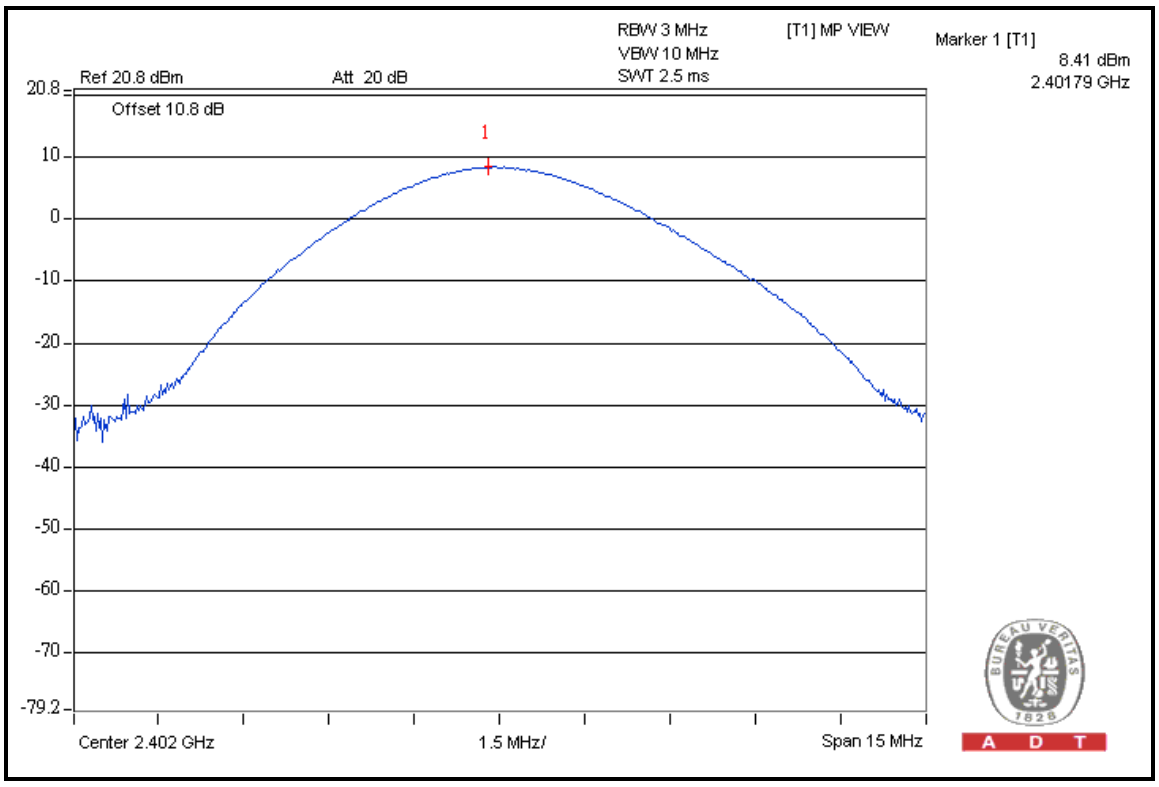
CH 0



For 8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (dBm)	POWER OUTPUT (mW)	POWER LIMIT (mW)	PASS/FAIL
0	2402	8.4	6.900	21	PASS
39	2441	8.3	6.800	21	PASS
78	2480	8.3	6.800	21	PASS

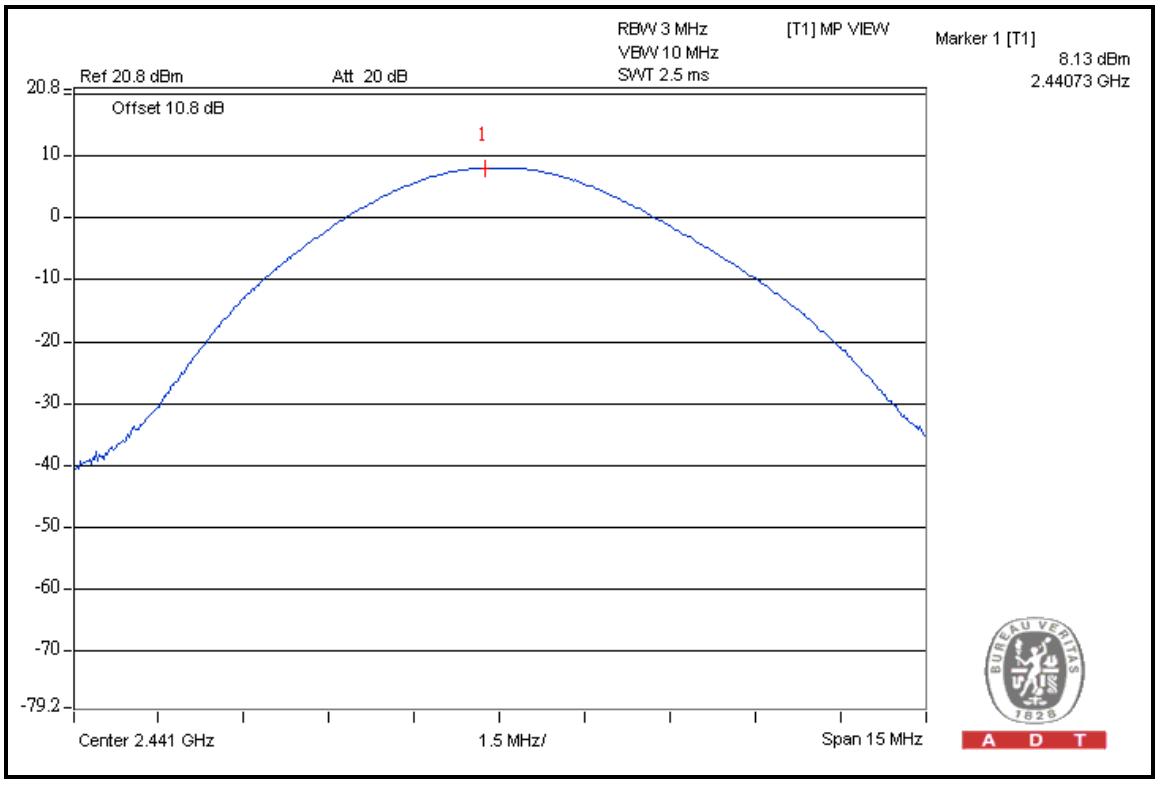
CH 0



For π/4-DQPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (dBm)	POWER OUTPUT (mW)	POWER LIMIT (mW)	PASS/FAIL
0	2402	8.1	6.500	21	PASS
39	2441	8.1	6.500	21	PASS
78	2480	7.8	6.000	21	PASS

CH 39



4.8 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

Test date: Sep. 09, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW a of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 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

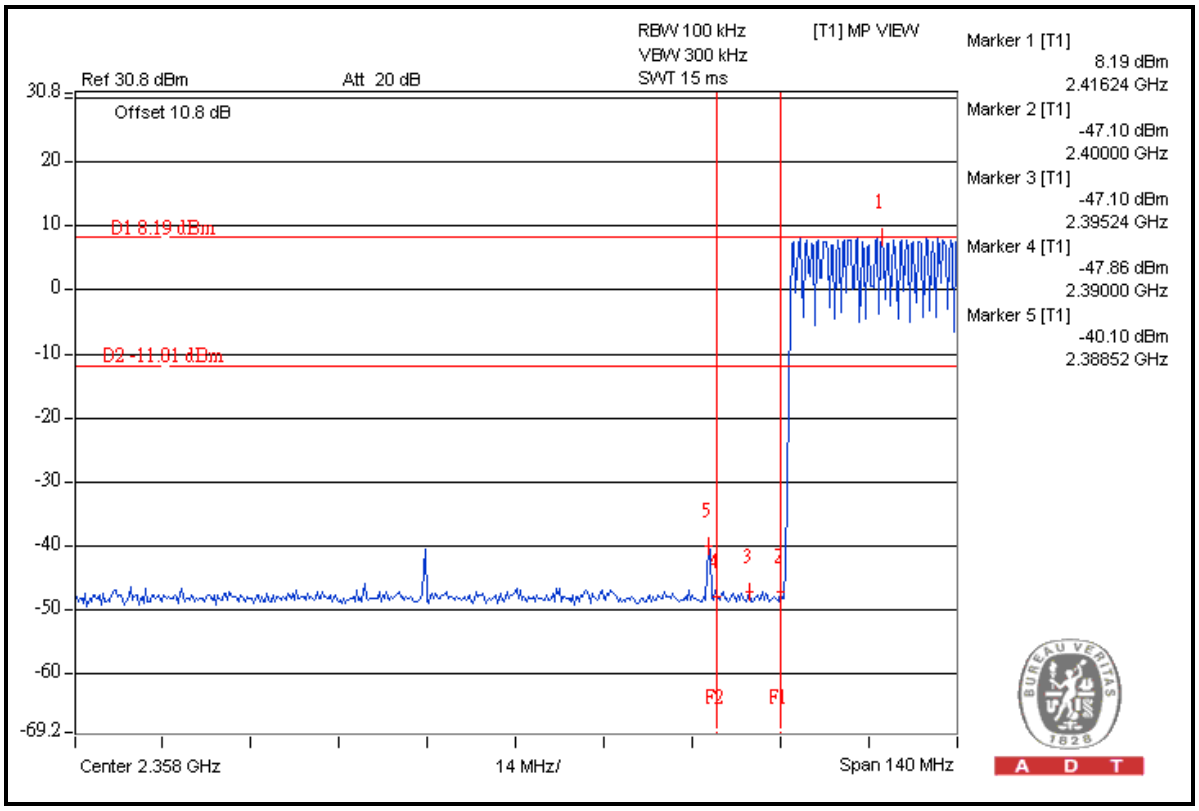
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

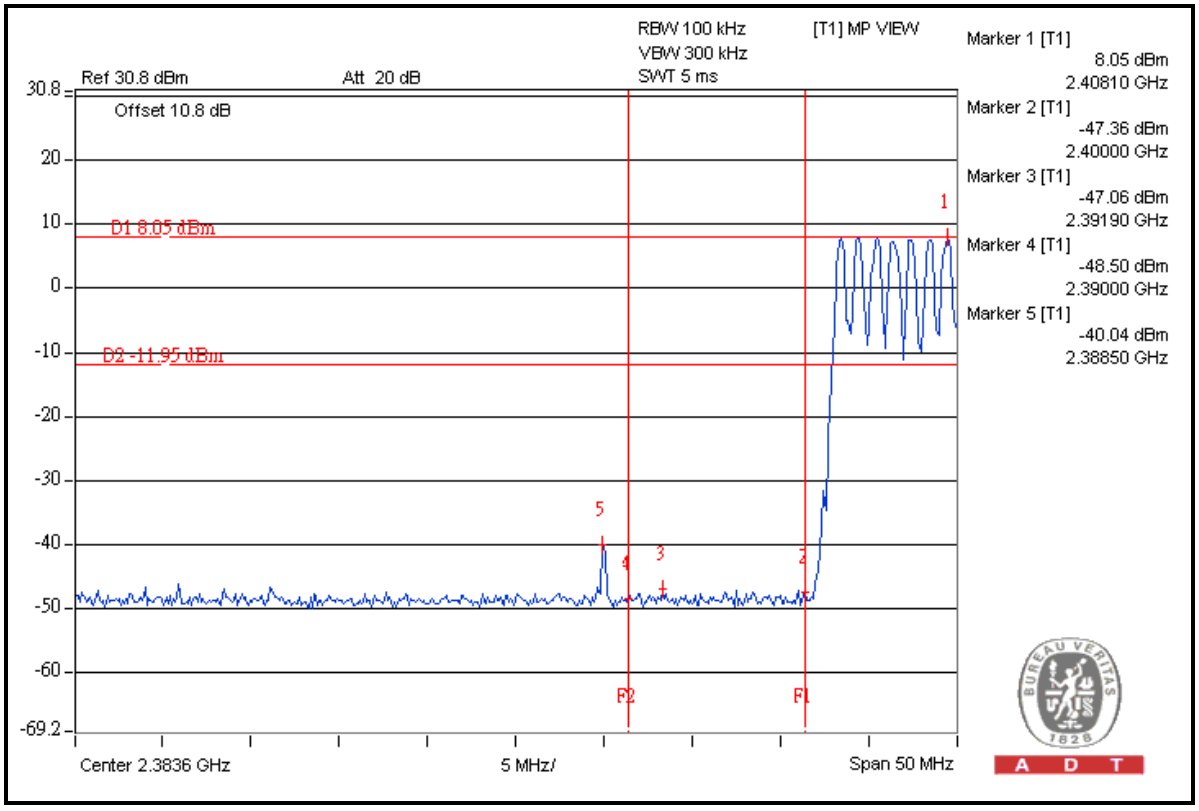
4.8.6 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

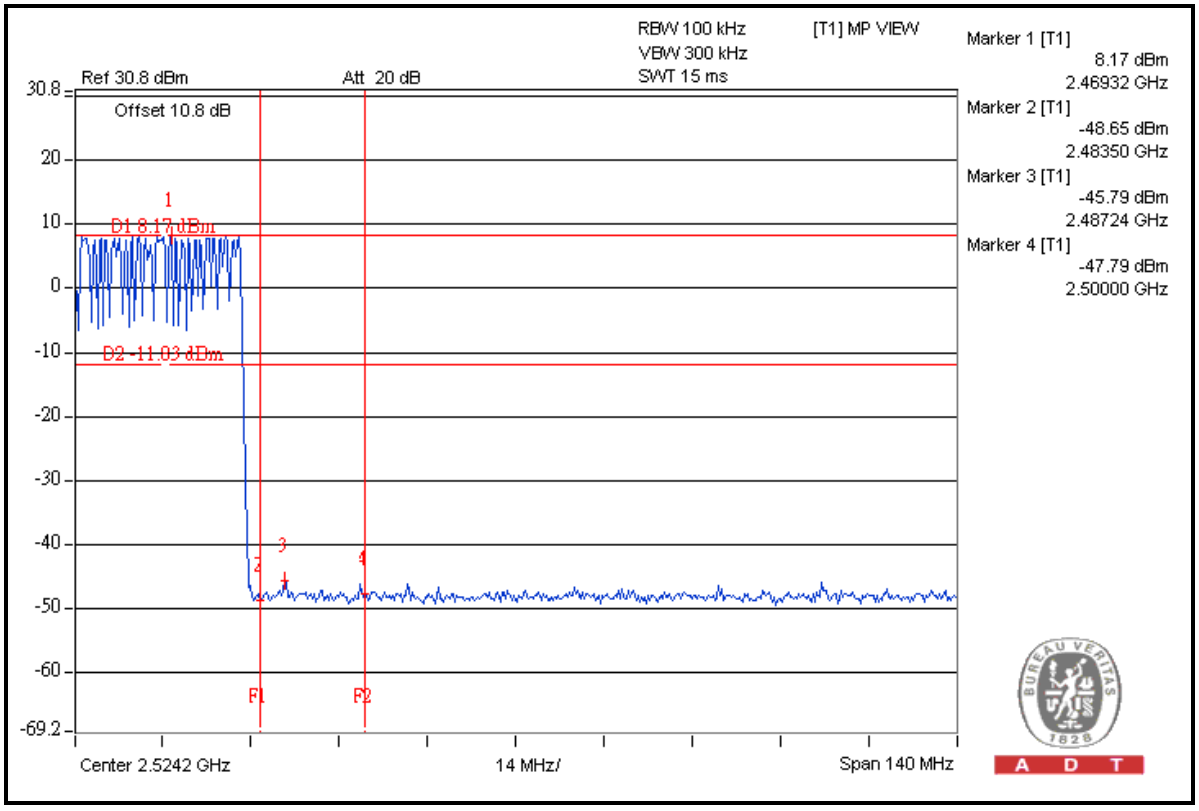
For GFSK Modulation Type:

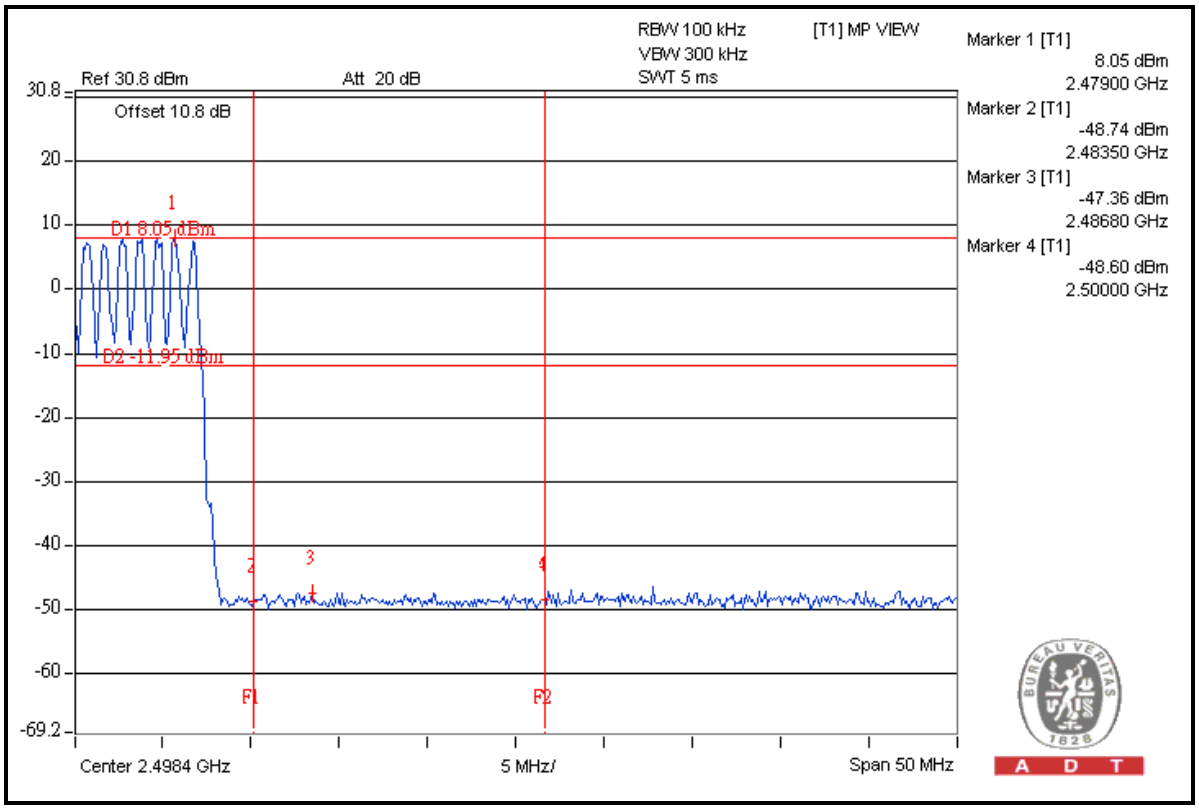
CH 0





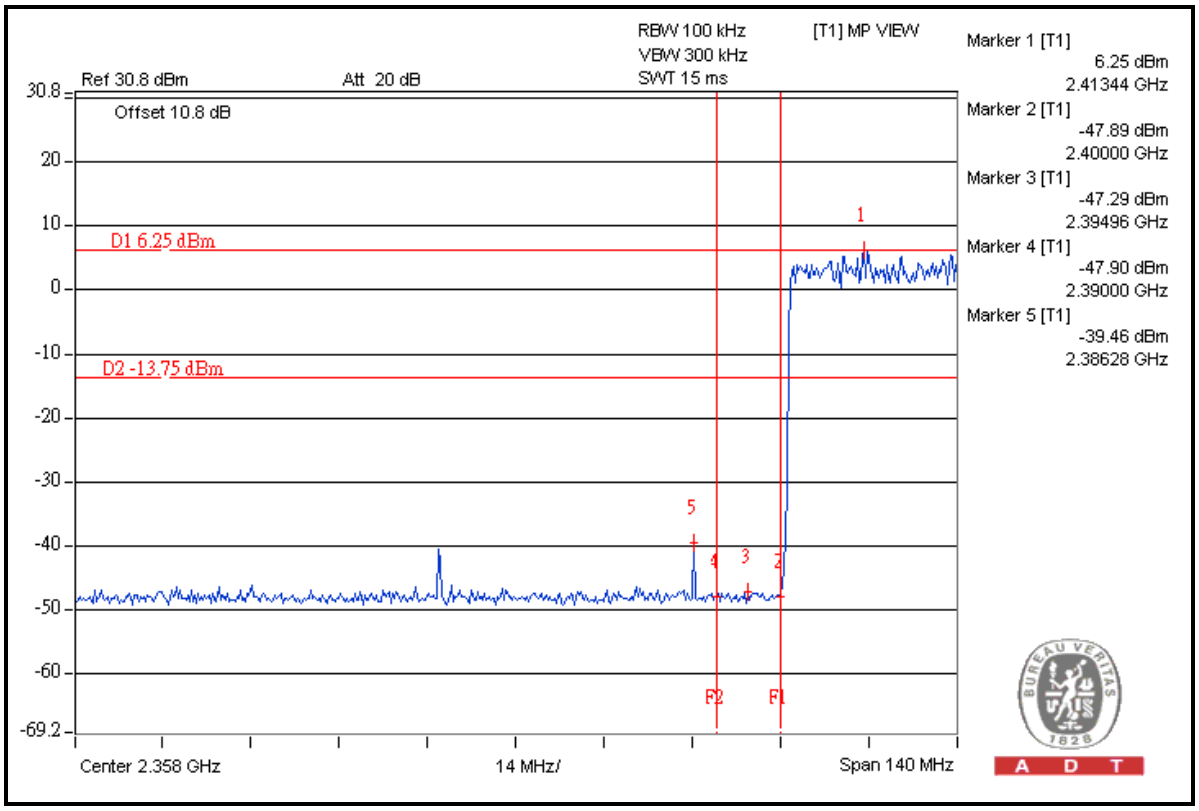
CH 78

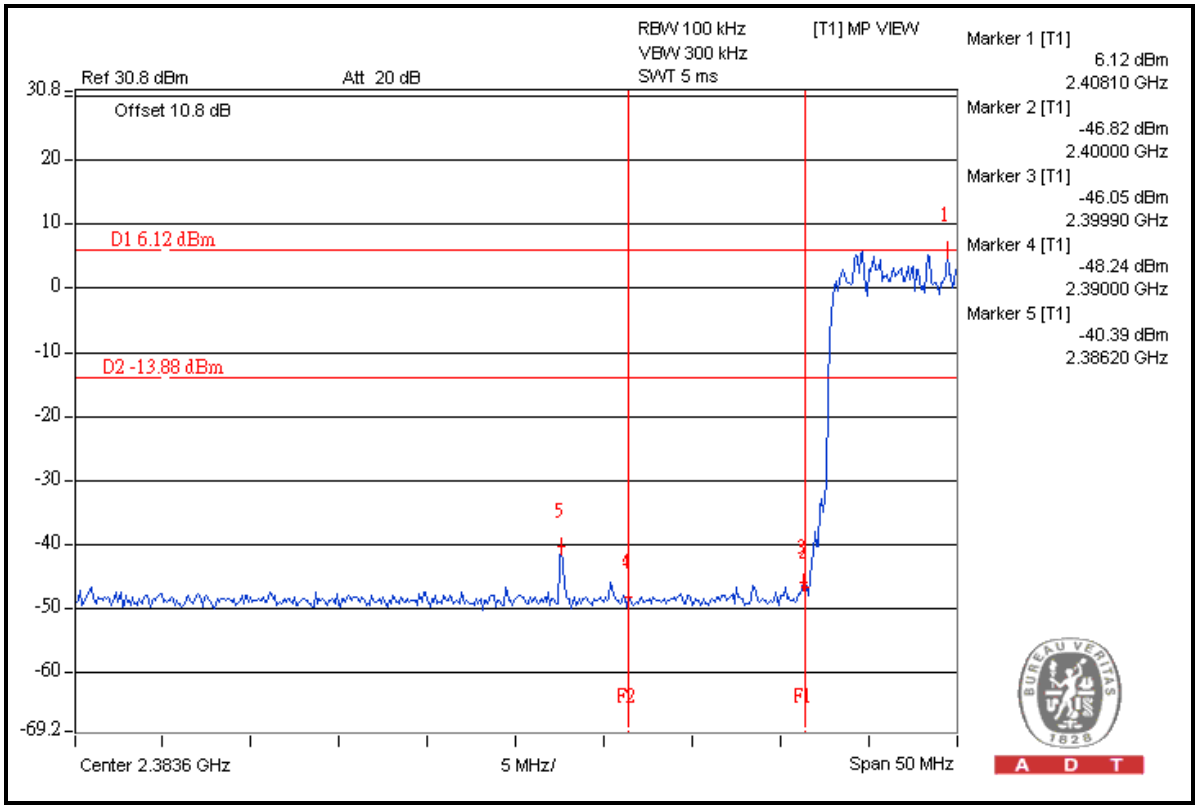

RBW 100 kHz
VBW 300 kHz
SWT 15 ms
[T1] MP VIEW
Ref 30.8 dBm
Att 20 dB
Offset 10.8 dB
D1 8.17 dBm
D2 -11.83 dBm
Marker 1 [T1]
8.17 dBm
2.46932 GHz
Marker 2 [T1]
-48.65 dBm
2.48350 GHz
Marker 3 [T1]
-45.79 dBm
2.48724 GHz
Marker 4 [T1]
-47.79 dBm
2.50000 GHz
30.8
20
10
0
-10
-20
-30
-40
-50
-60
-69.2
F1
F2
Center 2.5242 GHz
14 MHz/
Span 140 MHz


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Ref 30.8 dBm
Att 20 dB
Offset 10.8 dB
D1 8.05 dBm
D2 -11.95 dBm
Marker 1 [T1]
8.05 dBm
2.47900 GHz
Marker 2 [T1]
-48.74 dBm
2.48350 GHz
Marker 3 [T1]
-47.36 dBm
2.48680 GHz
Marker 4 [T1]
-48.60 dBm
2.50000 GHz
30.8
20
10
0
-10
-20
-30
-40
-50
-60
-69.2
F1
F2
Center 2.4984 GHz
5 MHz/
Span 50 MHz

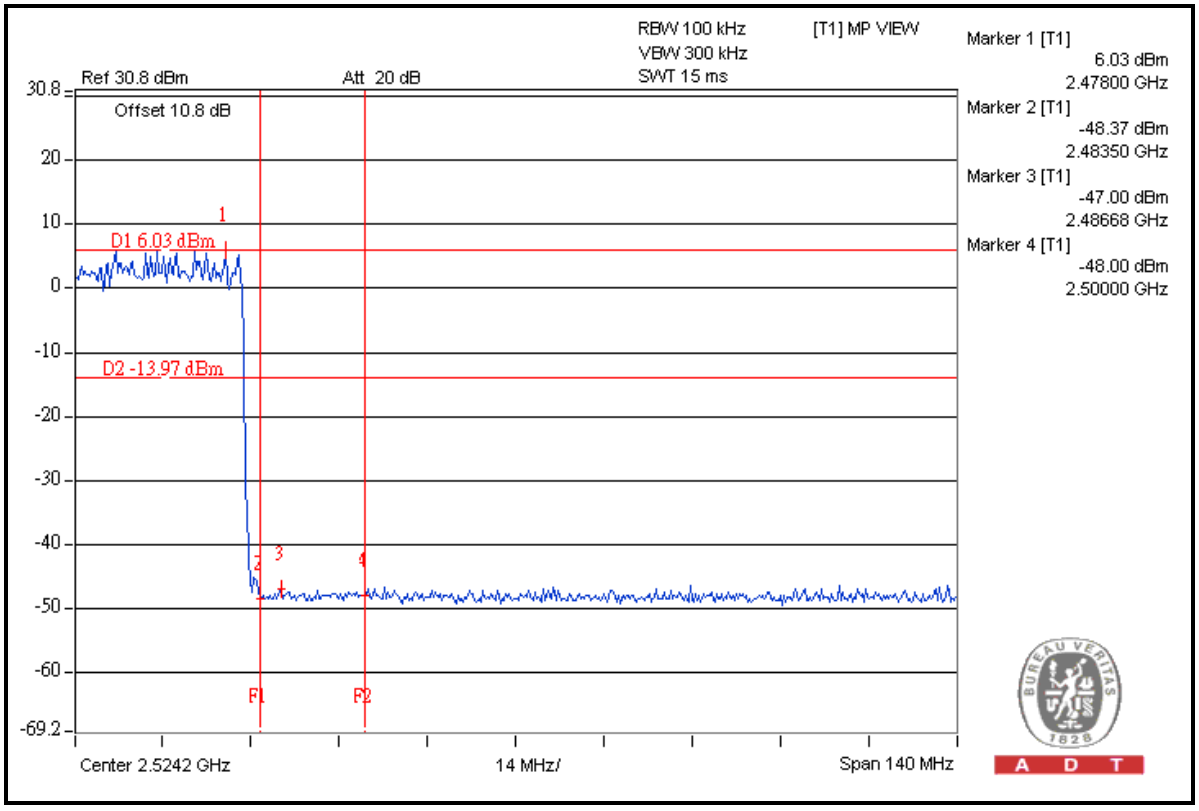
For 8DPSK Modulation Type:

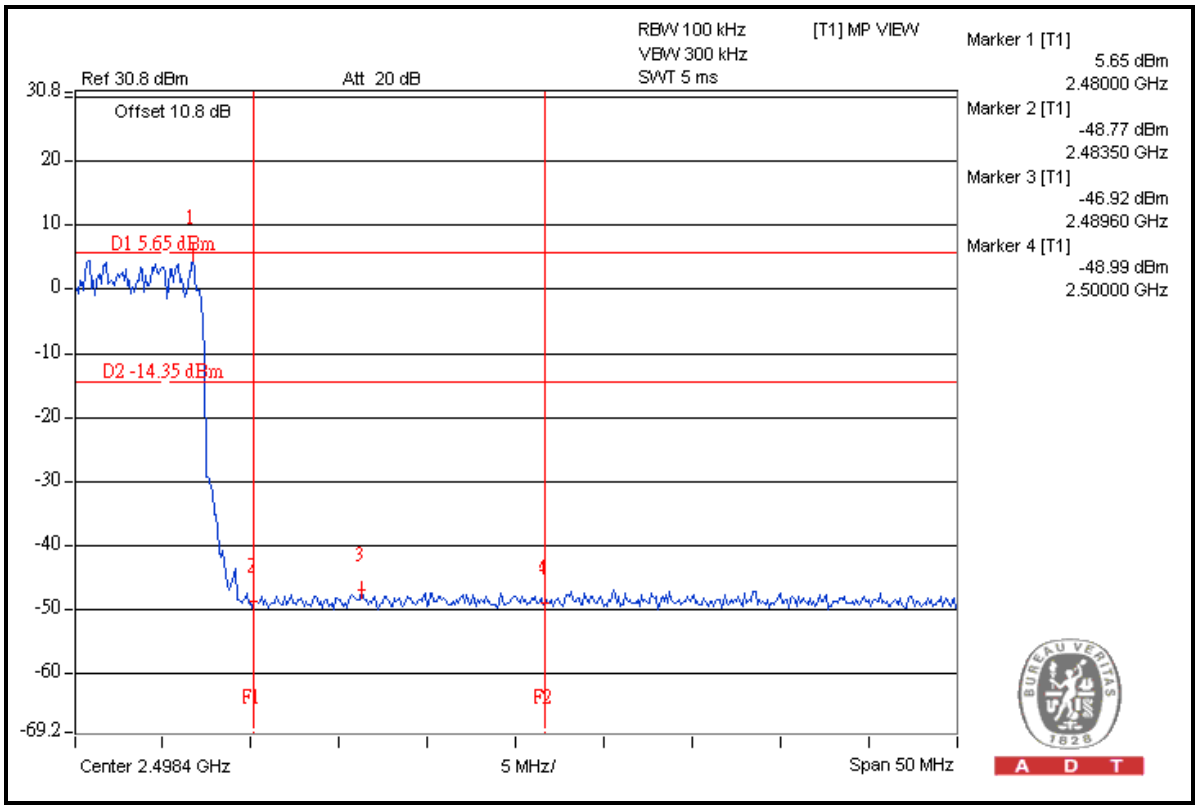
CH 0





CH 78


RBW 100 kHz
VBW 300 kHz
SWT 15 ms
[T1] MP VIEW
Ref 30.8 dBm
Att 20 dB
Offset 10.8 dB
D1 6.03 dBm
D2 -13.97 dBm
Marker 1 [T1]
6.03 dBm
2.47800 GHz
Marker 2 [T1]
-48.37 dBm
2.48350 GHz
Marker 3 [T1]
-47.00 dBm
2.48668 GHz
Marker 4 [T1]
-48.00 dBm
2.50000 GHz
Center 2.5242 GHz
14 MHz/
Span 140 MHz


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Ref 30.8 dBm
Att 20 dB
Offset 10.8 dB
D1 5.65 dBm
D2 -14.35 dBm
Marker 1 [T1]
5.65 dBm
2.48000 GHz
Marker 2 [T1]
-48.77 dBm
2.48350 GHz
Marker 3 [T1]
-46.92 dBm
2.48960 GHz
Marker 4 [T1]
-48.99 dBm
2.50000 GHz
Center 2.4984 GHz
5 MHz/
Span 50 MHz

1. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5.phtml.
If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

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Fax: 886-3-3185050

Email: service.adt@tw.bureauveritas.com
Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

2. 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 ---