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FCC TEST REPORT

REPORT NO.: RF110407E08 R1

MODEL NO.: AR5BBU22

FCC ID: PPD-AR5BBU22

IC ID: 4104A-AR5BBU22

RECEIVED: Apr. 07, 2011

TESTED: Apr. 15 to 26, 2011

ISSUED: May 26, 2011

APPLICANT: Atheros Communications, Inc.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF110407E08	Original release	May 11, 2011
RF110407E08 R1	1. Added power spectral density measurement for section 4.8. 2. Added IC ID on page 1	May 26, 2011



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1 CERTIFICATION

PRODUCT : Bluetooth USB module
BRAND NAME : Atheros
MODEL NO. : AR5BBU22
TEST SAMPLE : R&D SAMPLE
APPLICANT : Atheros Communications, Inc.
TESTED : Apr. 15 to 26, 2011
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.4-2003
ANSI C63.10-2009
Canada RSS-210 Issue 8 (2010-12)
Canada RSS-Gen Issue 3 (2010-12)

The above equipment (Model: AR5BBU22) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and was in 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 : Midoli Peng, **DATE:** May 26, 2011
(Midoli Peng, Specialist)

APPROVED BY : May Chen, **DATE:** May 26, 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, Canada RSS-210/ RSS-GEN					
Standard Section			Test Type and Limit	Result	REMARK
RSS-210	RSS-Gen	FCC Part 15			
-	7.2.4	15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -20.06dB at 0.373MHz
A8.1(d)	-	15.247(a)(1)(I)-(ii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit
A8.1(d)	-	15.247(a)(1)(ii)	Dwell Time on Each Channel Spec. : Max. 0.4 second within 30 second	PASS	Meet the requirement of limit
A8.1(b)	-	15.247(a)(1)(I)-(ii)	Hopping Channel Separation Spec. : Min. 25 kHz or two-thirds of 20 dB bandwidth, which ever is greater	PASS	Meet the requirement of limit
-	4.6	15.247(a)(2)	Spectrum Bandwidth of a Frequency Hopping Spread Spectrum System	PASS	Meet the requirement of limit
A8.4(2)	-	15.247(b)	Maximum Peak Output Power Spec.: max. 125mW	PASS	Meet the requirement of limit
A8.2(b)	-	15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit
A8.5	4.9	15.247(c)	Transmitter Radiated Emissions FCC Limit: Table 15.209 RSS-Gen Limit: Table 5, 6	PASS	Meet the requirement of limit Minimum passing margin is -3.0dB at 304.62MHz
-	6.1	-	Receiver Radiated Emissions RSS-Gen Limit: Table 2	PASS	Meet the requirement of limit Minimum passing margin is -3.0dB at 304.62MHz
A8.5	-	15.247(c)	Conducted Out-Band Emission Measurement	PASS	Meet the requirement of limit
-	-	15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 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:

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)	3.3 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.55 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth USB module
MODEL NO.	AR5BBU22
FCC ID	PPD-AR5BBU22
IC ID	4104A-AR5BBU22
POWER SUPPLY	DC 3.3V from host equipment
MODULATION TYPE	GFSK, $\pi/4$ -DQPSK, 8DPSK, GFSK(LE mode)
MODULATION TECHNOLOGY	FHSS
OPRTAING FREQUENCY	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	For Bluetooth 2.1+ EDR: 79 For Bluetooth LE: 40 (37 hopping + 3 advertising channel)
MAXIMUM OUTPUT POWER	GFSK: 7.2 mW 8DPSK: 12.3 mW $\pi/4$ – DQPSK: 11.5 mW GFSK(LE mode) : 6.6 mW
ANTENNA TYPE	See item 3.2
ANTENNA CONNECTOR	See item 3.2
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The Bluetooth supports version 4.0.
2. There are three versions of EUT which are identical to each other in all aspects except for the following table

Versions	Variations in memory
-80	EEPROM
-90	SFLASH
-180	OTP

From the above Versions, the worst case was found in **Version -80**. Therefore only the test data of the version was recorded in this report.

- * The EUT has two shielding design. The deviated version has two pins removed and 4 holes on the top of shielding.
- * The worst-case scenario has been investigated in radiated test with same power level and found no difference.
- * The test data reflects the worst-case scenarios.

3. For radiated : The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.

4. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF ANTENNA

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

Brand	Model	Antenna Type	Connector	Antenna Gain (dBi)
Atheros	NA	Printed	NA	1.14

3.3 DESCRIPTION OF TEST MODES

For Bluetooth 2.1+ EDR: 79

Seventy-nine 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		

For Bluetooth LE: 40 (37 hopping + 3 advertising channel)

Forty channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	
-	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission

RE < 1G: Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted 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).
- ☒ 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	FHSS	8DPSK	DH5

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).
- ☒ Radiated Emission Test Blow 1GHz: The receiving mode has shown equal or better performance than Tx mode during the pre-scan and hence the Tx mode data is re-used for.
- ☒ 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	FHSS	8DPSK	DH5
0 to 39	0	FHSS	GFSK (LE mode)	-

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
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	DH5
0 to 39	0, 19, 39	FHSS	GFSK (LE mode)	-
Receiver	0, 39, 78	FHSS	-	-
Receiver	0, 19, 39	FHSS		

Conducted Out-Band 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
0 to 78	0, 78	FHSS	GFSK	DH5
0 to 78	0, 78	FHSS	8DPSK	DH5
0 to 78	0, 78	FHSS	$\pi/4$ -DQPSK	DH5
0 to 39	0, 39	FHSS	GFSK (LE mode)	-

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
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	DH5
0 to 78	0, 39, 78	FHSS	$\pi/4$ -DQPSK	DH5
0 to 39	0, 19, 39	FHSS	GFSK (LE mode)	-



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TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE ³ 1G	17deg. C, 67%RH, 1023 hPa	120Vac, 60Hz	Kent Liu
RE<1G	15deg. C, 68%RH, 1023 hPa	120Vac, 60Hz	Frank Liu
PLC	21deg. C, 67%RH, 1023 hPa	120Vac, 60Hz	Frank Liu
APCM	25deg. C, 60%RH, 1023 hPa	120Vac, 60Hz	Rex Huang

3.5 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

Canada RSS-210 Issue 8 (2010-12)

Canada RSS-Gen Issue 3 (2010-12)

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.6 DESCRIPTION OF SUPPORT UNITS

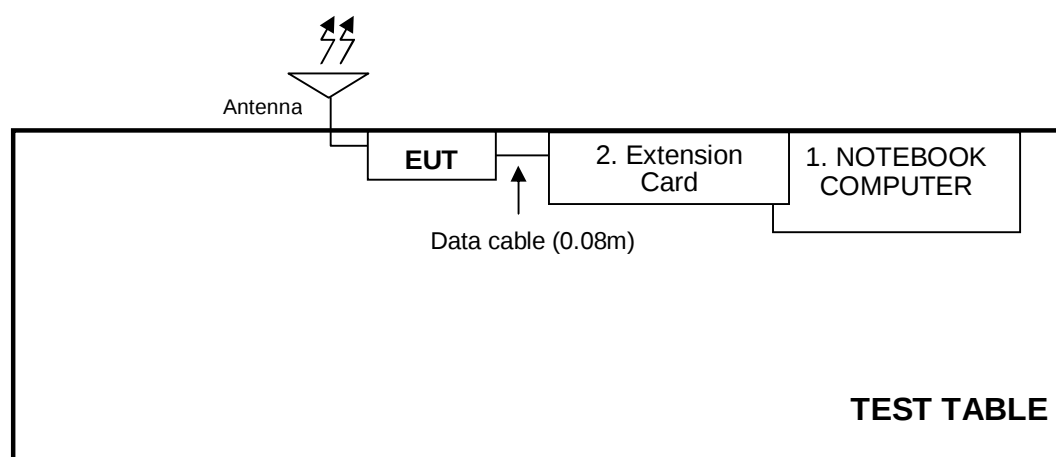
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC
2	EXTENSION CARD	Atheros	NA	NA	NA

No.	Signal cable description
1	NA
2	NA

Note: The power cords of the above support units were unshielded (1.8m).

3.7 CONFIGURATION OF SYSTEM UNDER TEST



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	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. 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

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)	NSLK 8127	8127-522	Sep. 08, 2010	Sep. 07, 2011
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 03, 2010	Nov. 02, 2011
RF Cable (JYEBAO)	5DFB	COCCAB-002	Aug. 30, 2010	Aug. 29, 2011
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

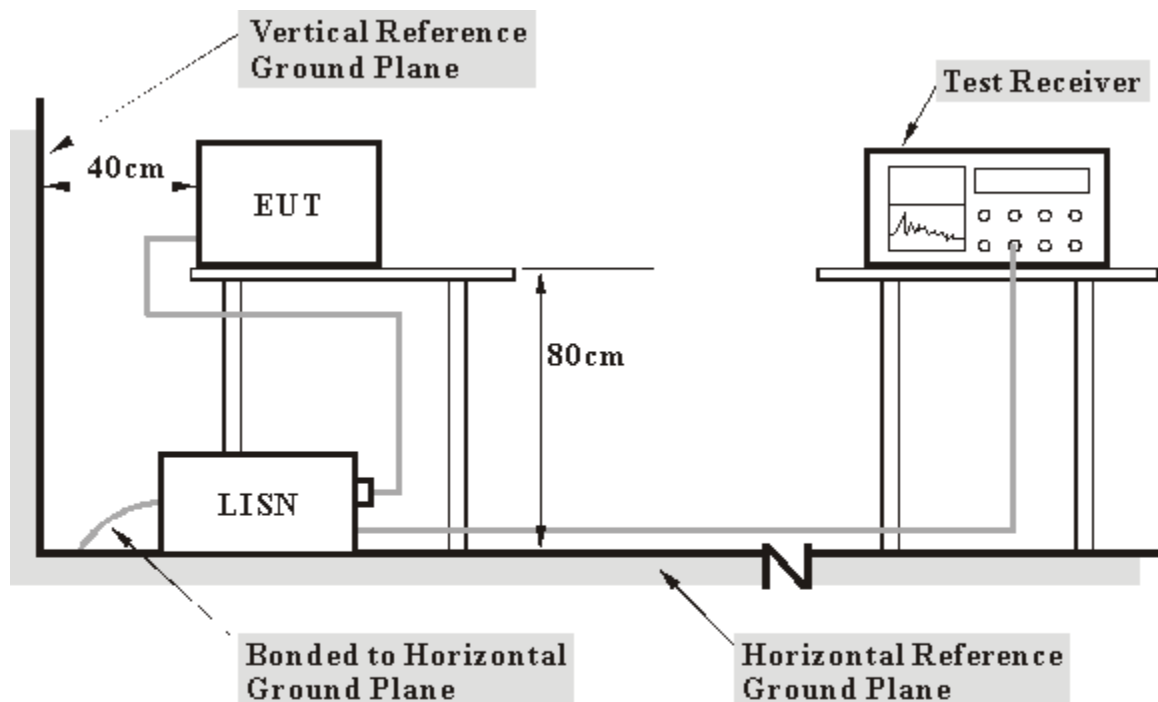
Note:

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

- 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.
- Both lines of the power mains connected to the EUT/HOST were checked for maximum conducted interference.
- 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:**
- Support units were connected to second LISN.
 - 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

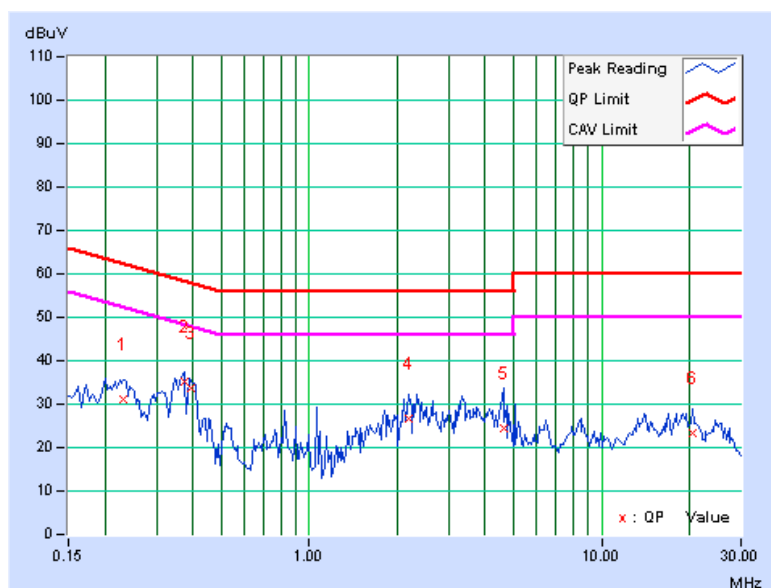
1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “BtTest_egret.exe V1_0_B17” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.6 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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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	0.232	0.13	30.97	-	31.10	-	62.38	52.38	-31.28	-
2	0.373	0.13	35.13	-	35.26	-	58.44	48.44	-23.18	-
3	0.392	0.13	33.69	-	33.82	-	58.02	48.02	-24.20	-
4	2.184	0.16	26.41	-	26.57	-	56.00	46.00	-29.43	-
5	4.633	0.23	24.20	-	24.43	-	56.00	46.00	-31.57	-
6	20.504	0.68	22.80	-	23.48	-	60.00	50.00	-36.52	-

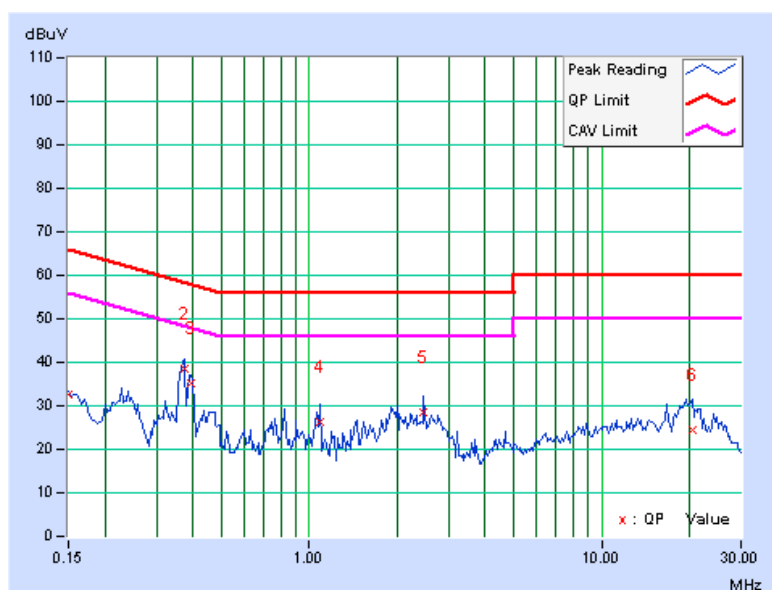
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
-------	-------------	---------------	-------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.12	32.52	-	32.64	-	66.00	56.00	-33.36	-
2	0.373	0.15	38.23	-	38.38	-	58.44	48.44	-20.06	-
3	0.392	0.15	34.88	-	35.03	-	58.02	48.02	-22.99	-
4	1.086	0.16	26.19	-	26.35	-	56.00	46.00	-29.65	-
5	2.465	0.21	28.20	-	28.41	-	56.00	46.00	-27.59	-
6	20.418	1.45	23.11	-	24.56	-	60.00	50.00	-35.44	-

- 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 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

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

4.2.2 TEST INSTRUMENTS

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.

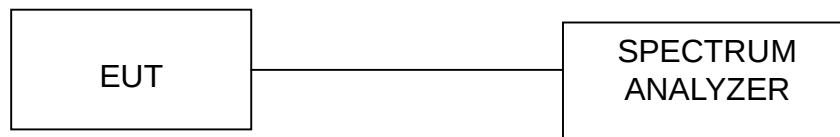
4.2.3 TEST PROCEDURES

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.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

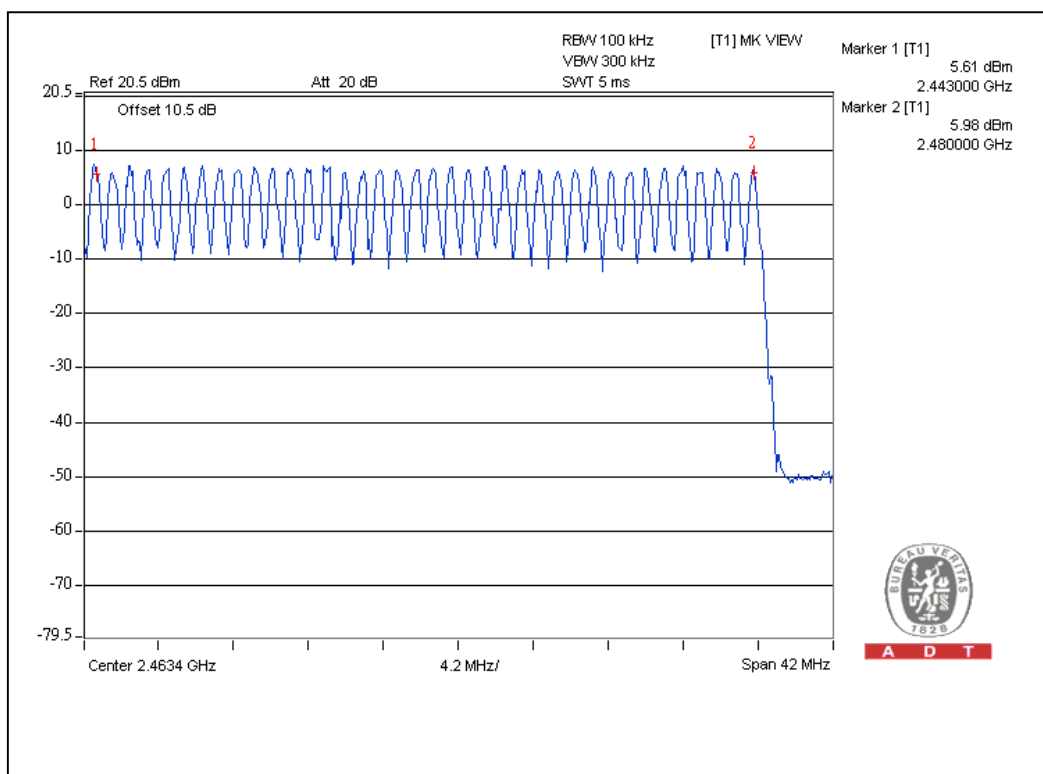
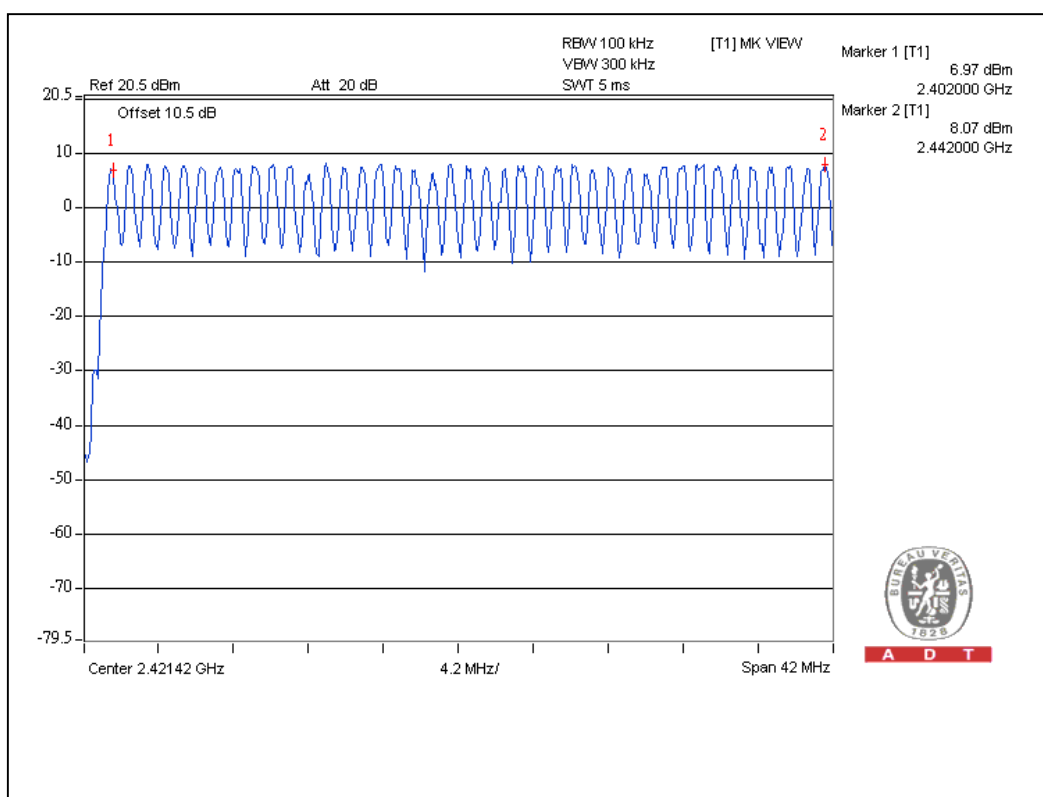
4.2.5 TEST SETUP



4.2.6 TEST RESULTS

There are 79 hopping frequencies for Bluetooth 2.1+ EDR and 40 hopping frequencies for Bluetooth 4.0 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.

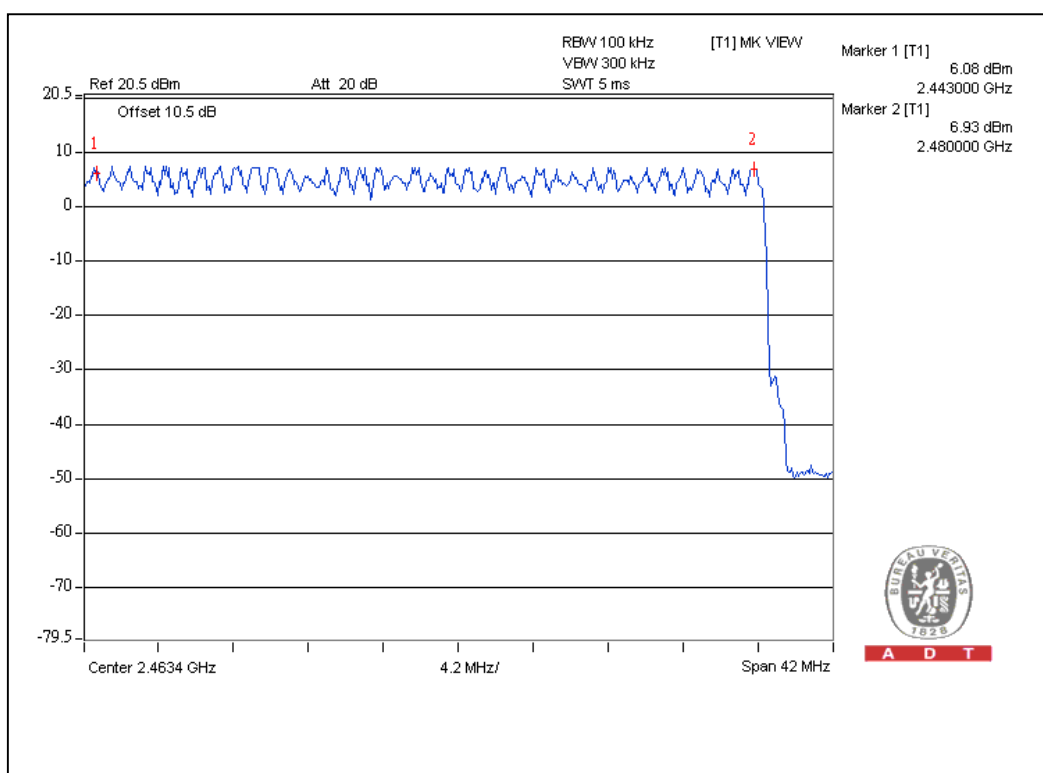
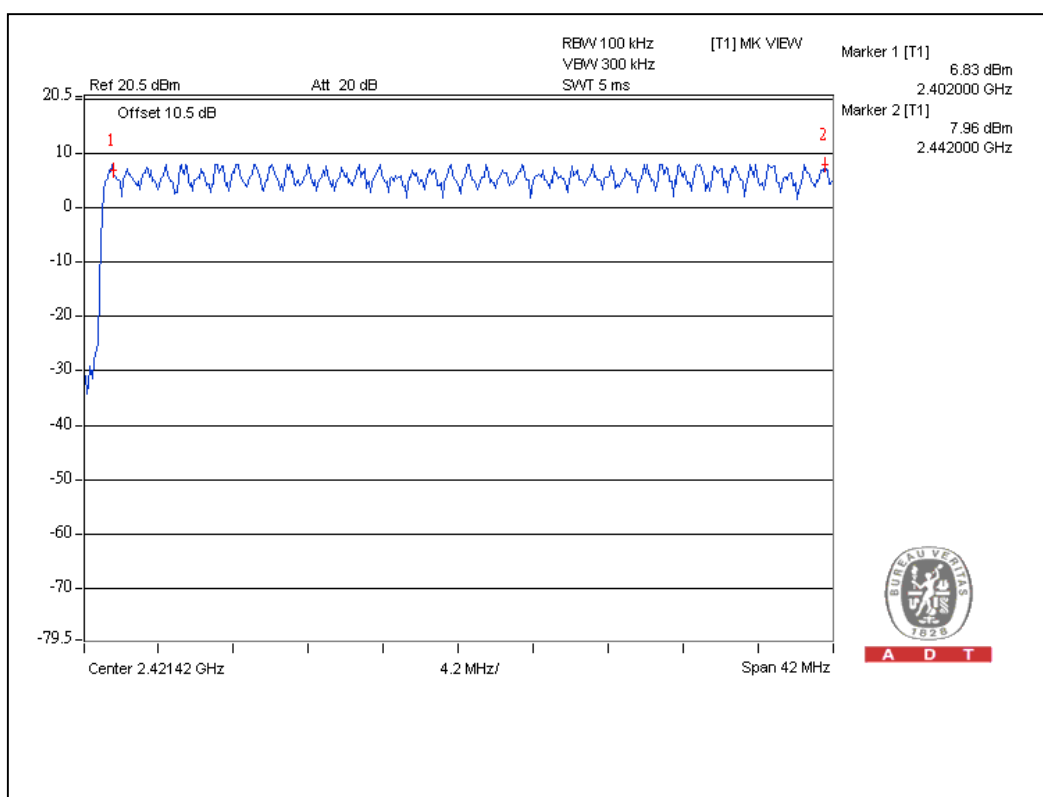
For GFSK:



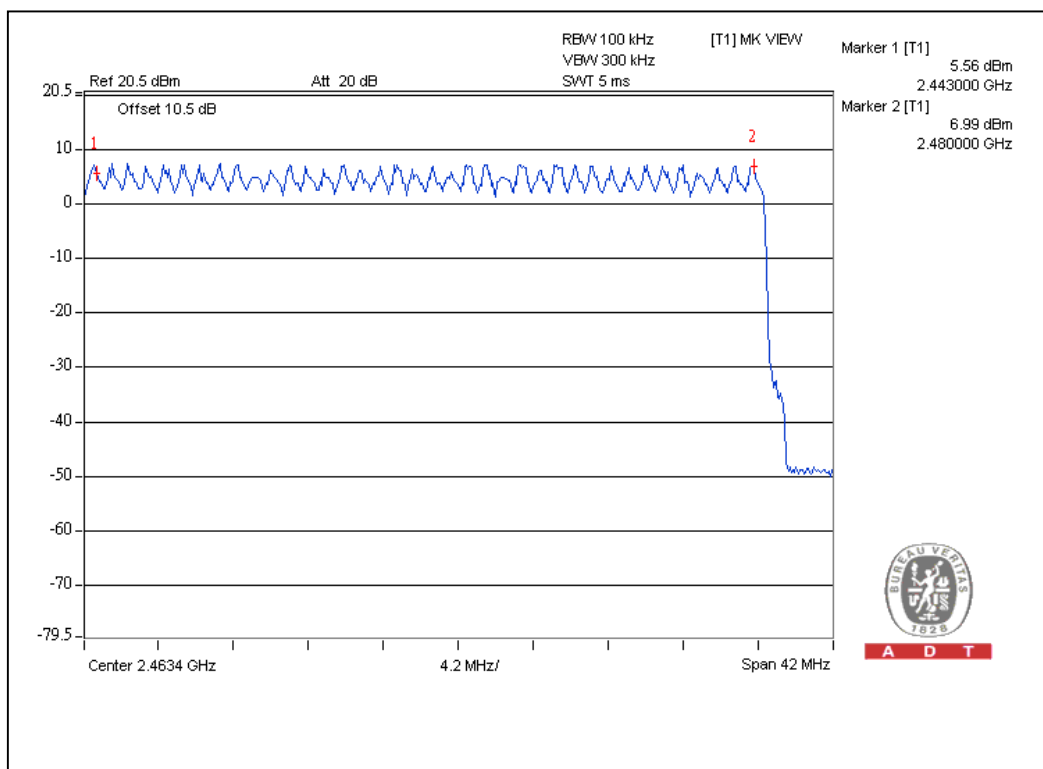
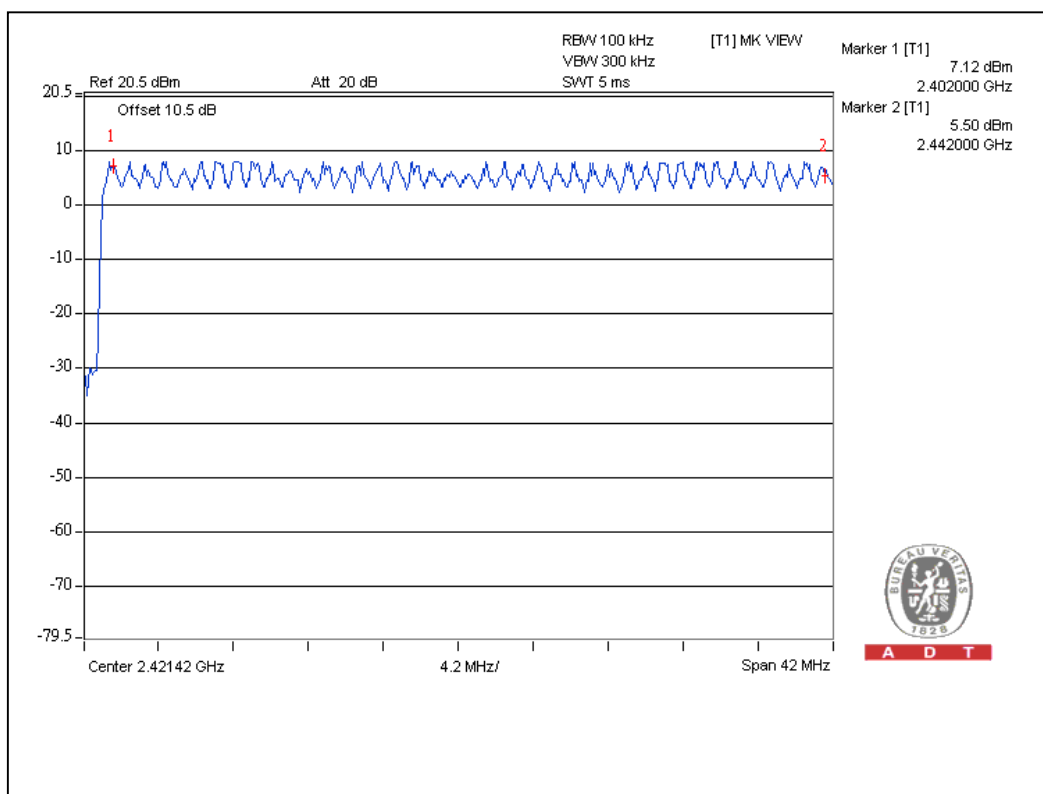


A D T

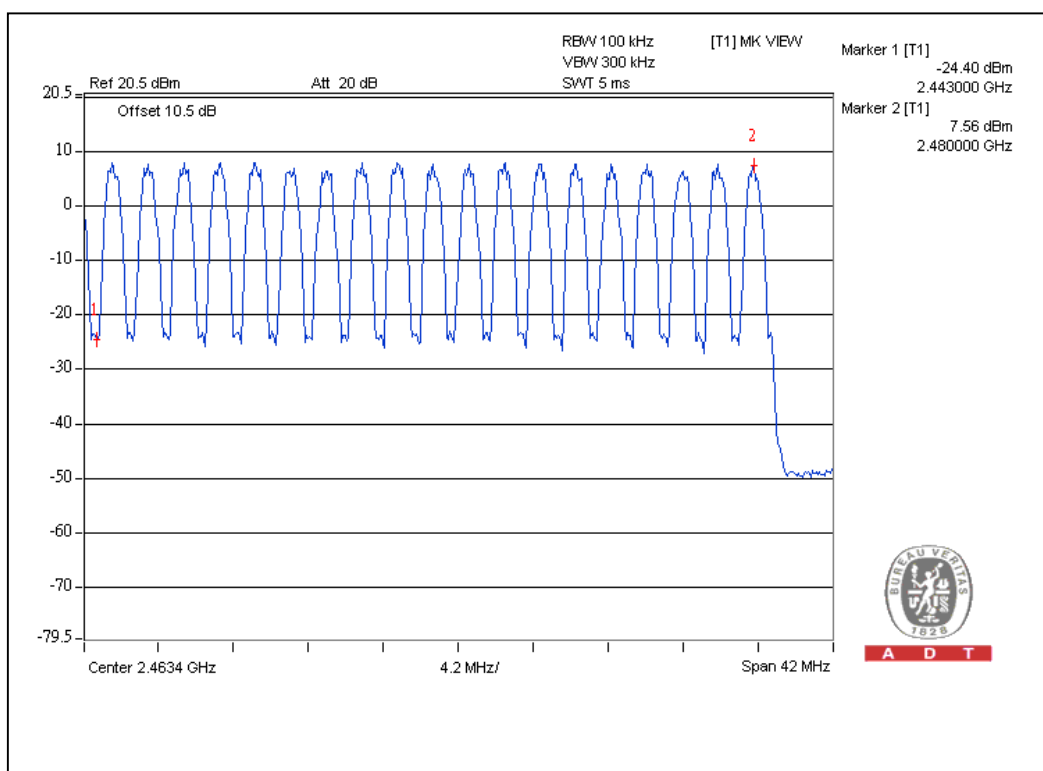
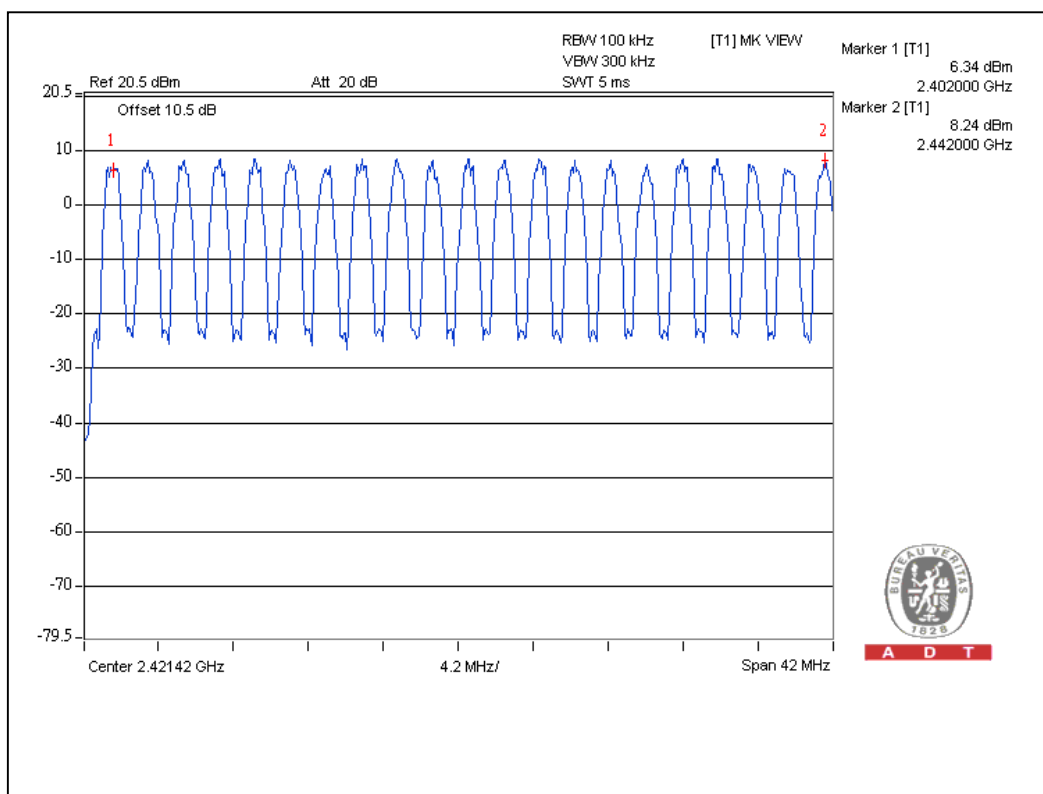
For 8DPSK:



For $\pi/4$ -DQPSK :



For GFSK(LE mode):



4.3 DWELL TIME ON EACH CHANNEL

4.3.1 LIMIT OF DWELL TIME USED

For FHSS, 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.

Note:

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period for traditional GFSK/($\pi/4$ -DQPSK) /8DPSK. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 16 second period for GFSK(LE mode)

4.3.2 TEST INSTRUMENTS

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. 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.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



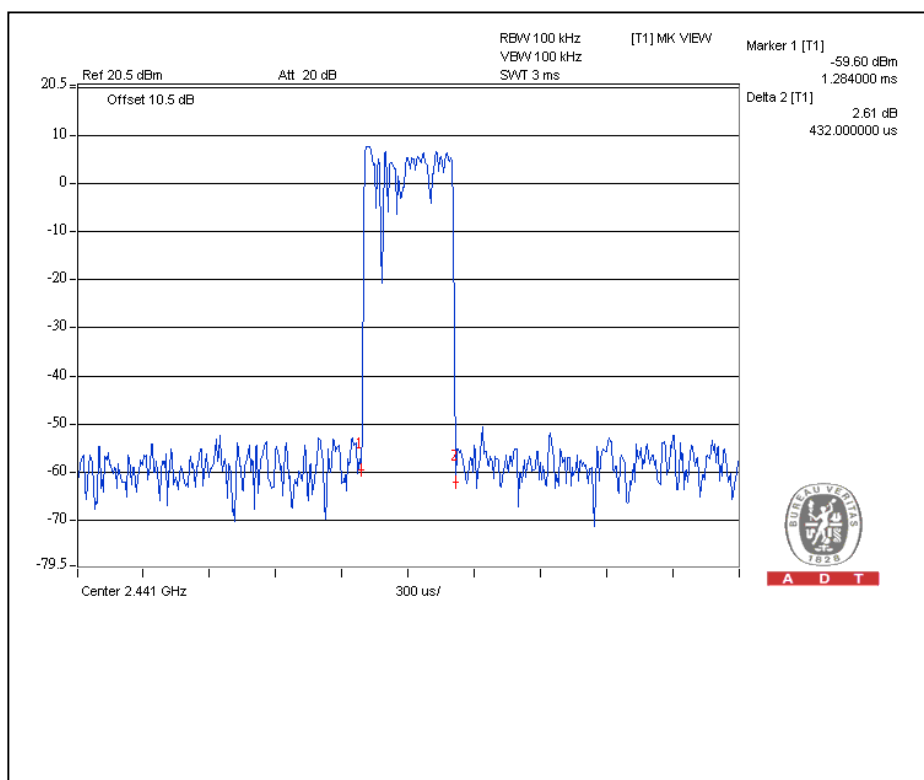
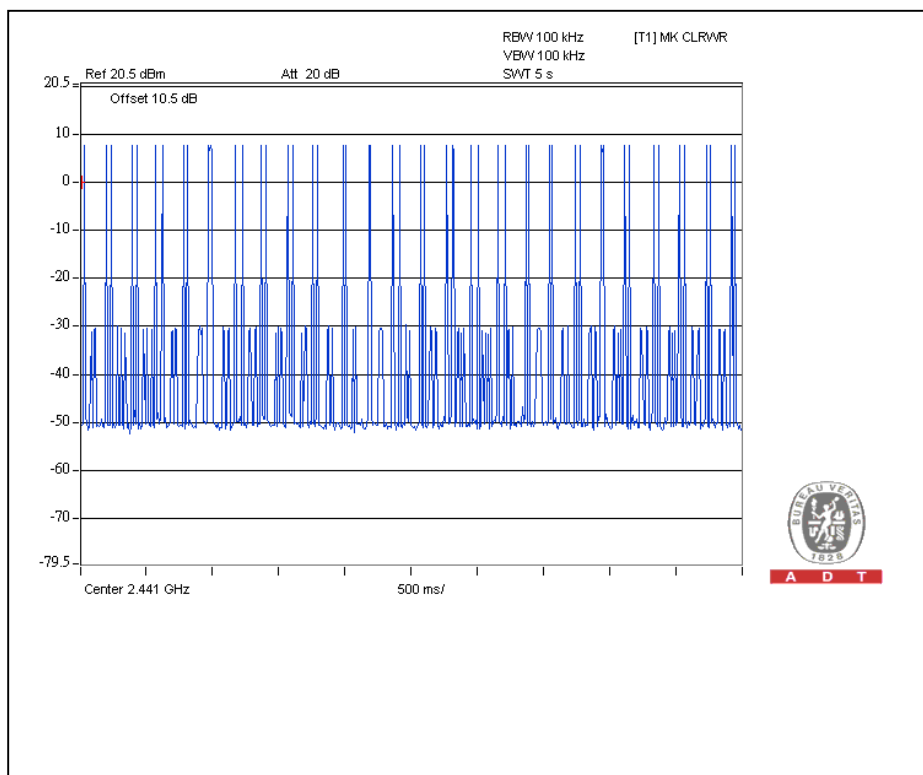
4.3.6 TEST RESULTS

For GFSK:

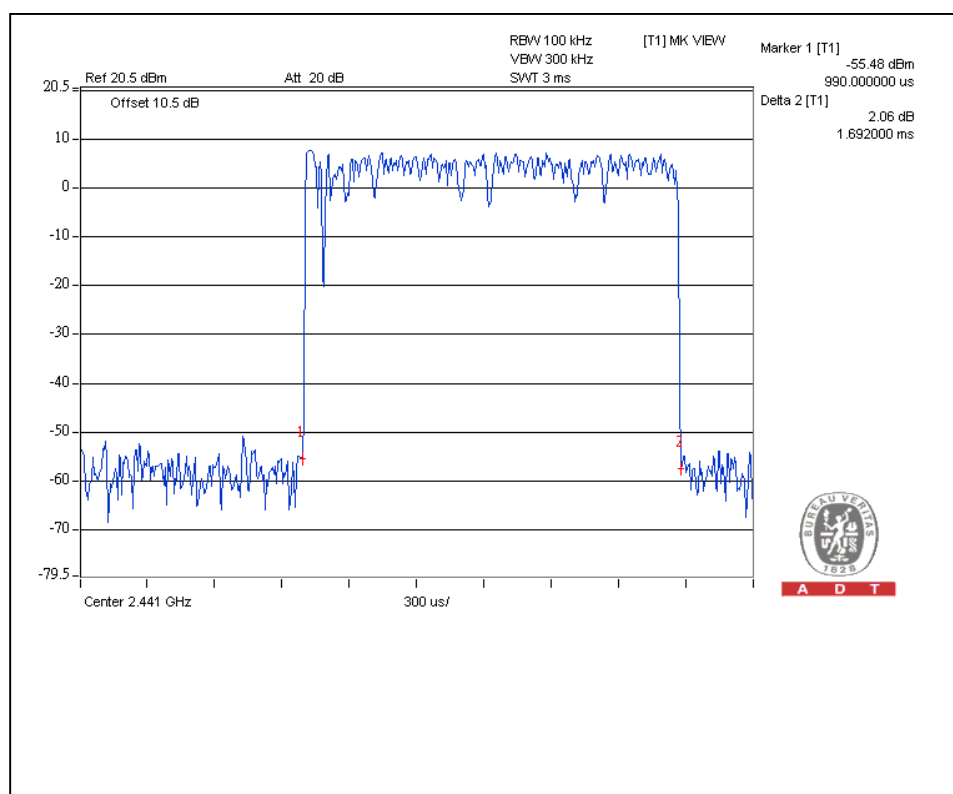
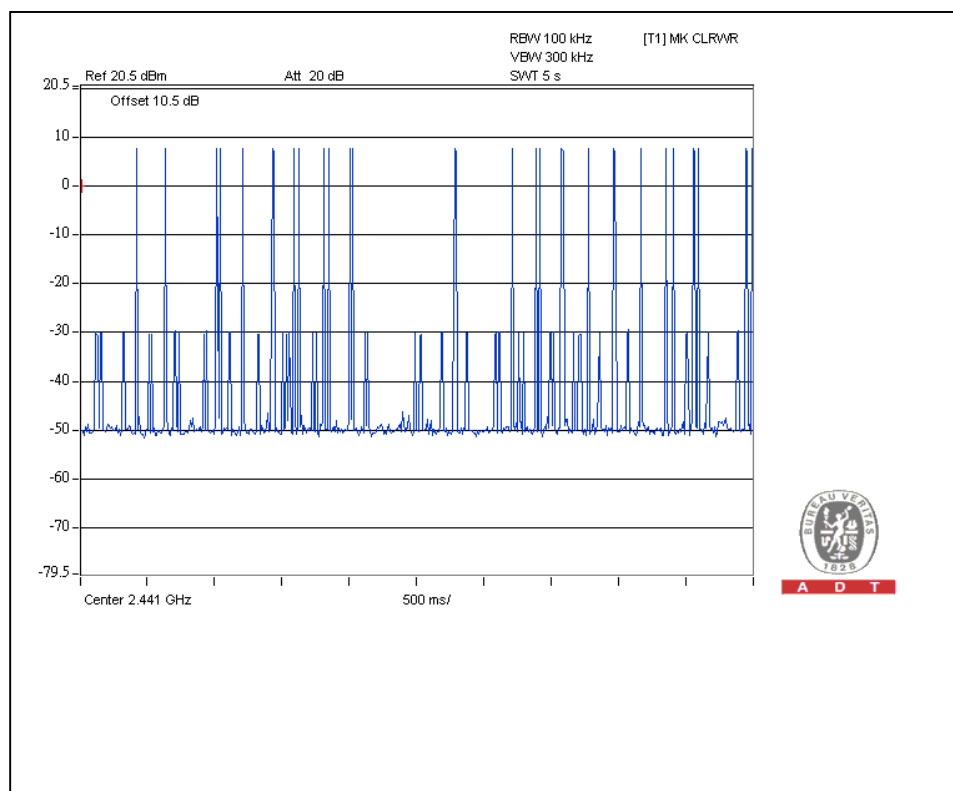
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316 times	0.432	136.51	400
DH3	25 (times / 5 sec) *6.32=158 times	1.692	267.34	400
DH5	18 (times / 5 sec) *6.32=113.76 times	2.990	340.14	400

Test plots of the transmitting time slot are shown on next three pages.

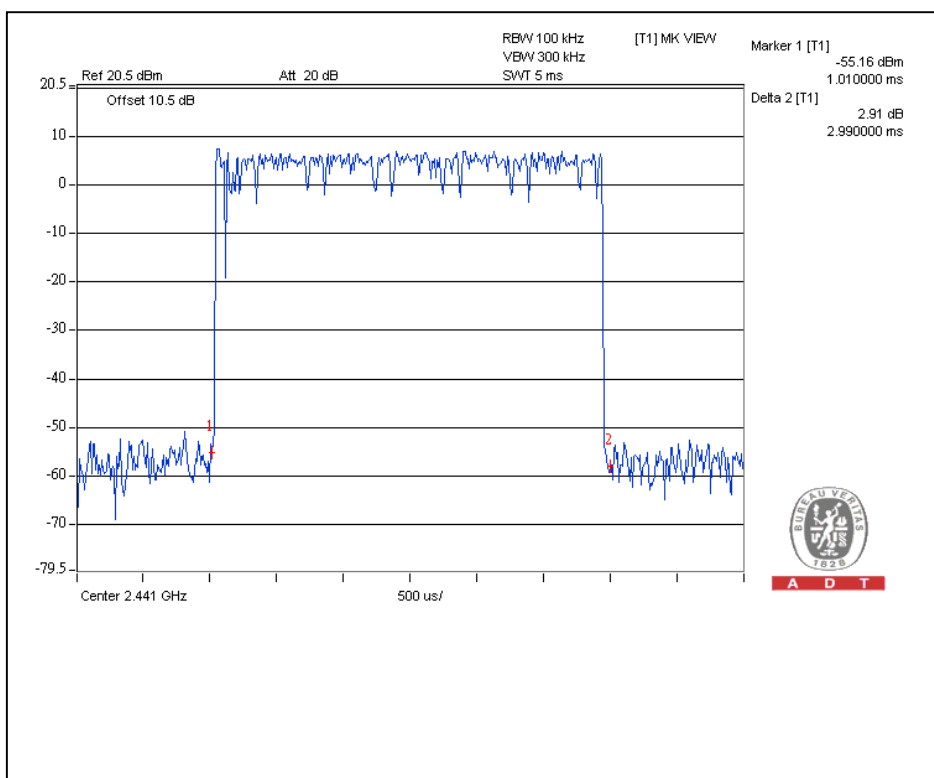
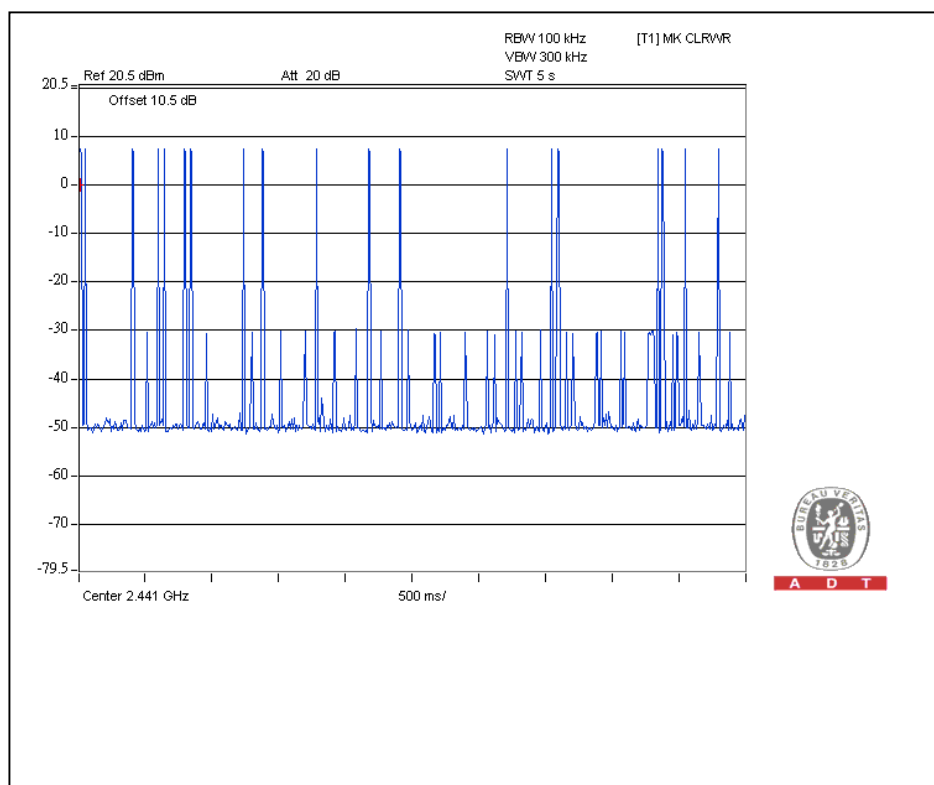
DH1



DH3



DH5

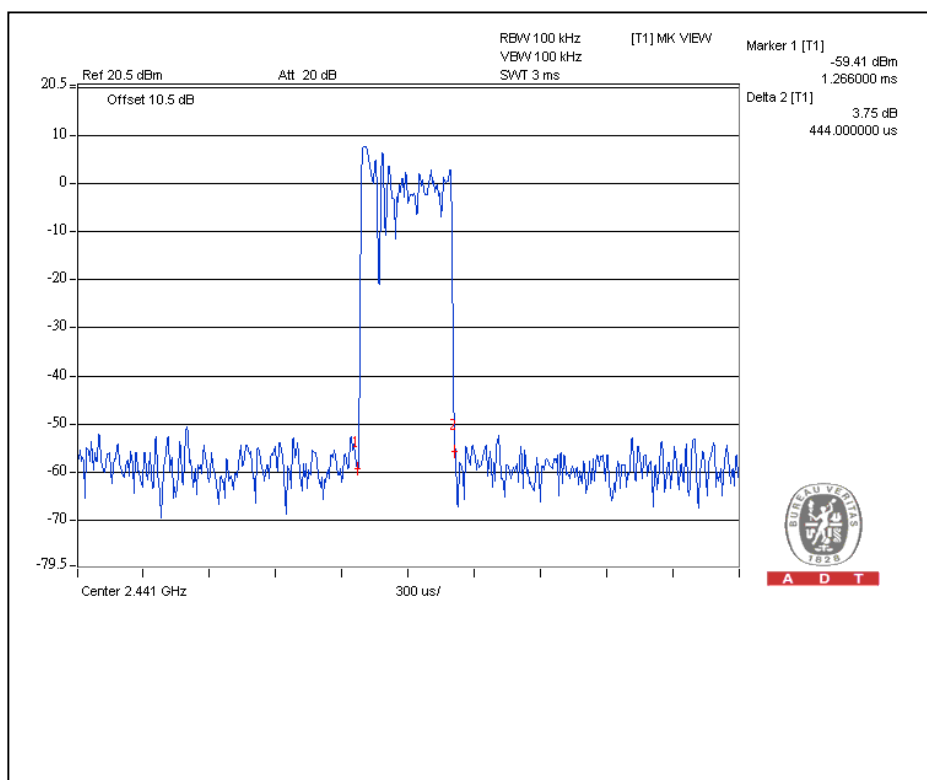
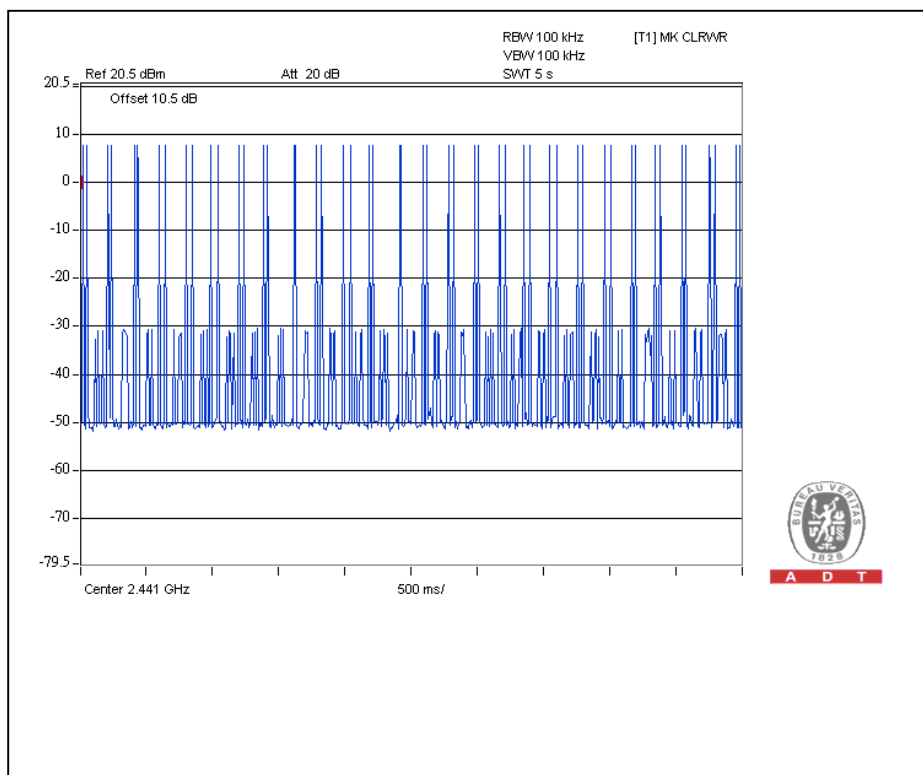


**A D T****For 8DPSK:**

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	0.444	140.30	400
DH3	25 (times / 5 sec) *6.32=158 times	1.692	267.34	400
DH5	17 (times / 5 sec) *6.32=107.44 times	2.970	319.10	400

Test plots of the transmitting time slot are shown on next three pages.

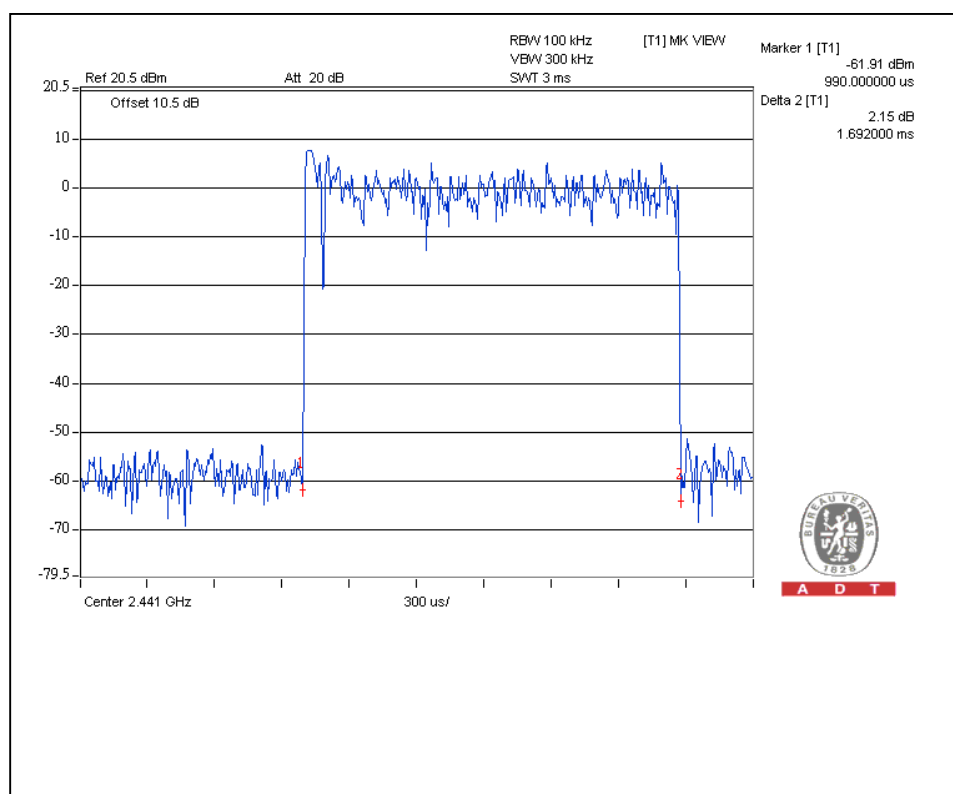
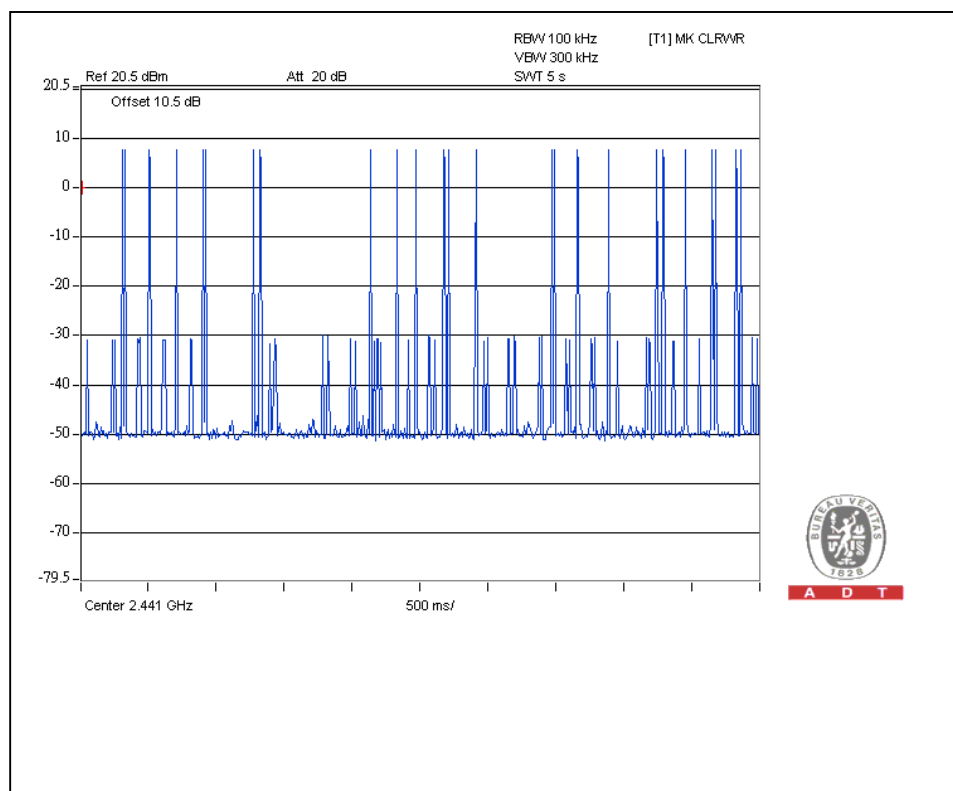
DH1



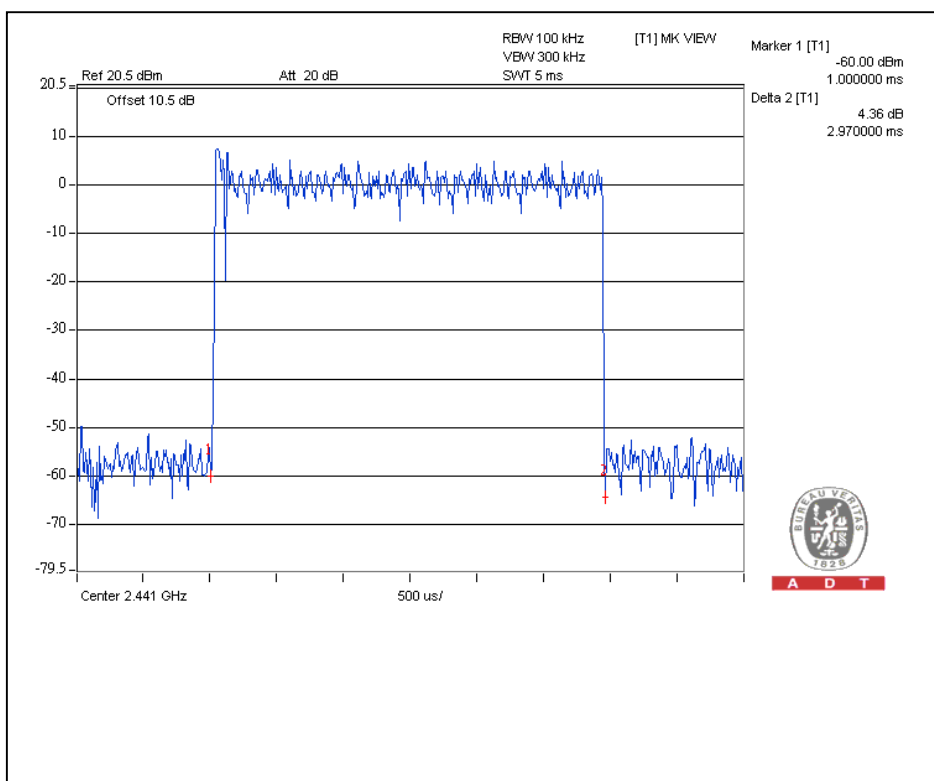
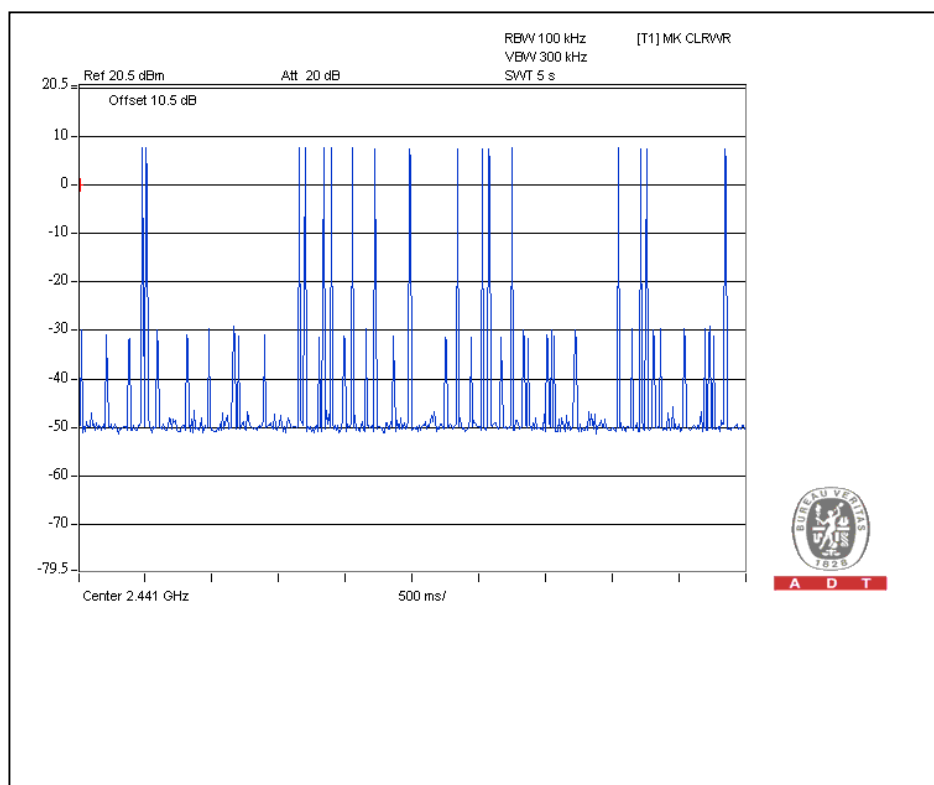


A D T

DH3



DH5



For $\pi/4$ – DQPSK :

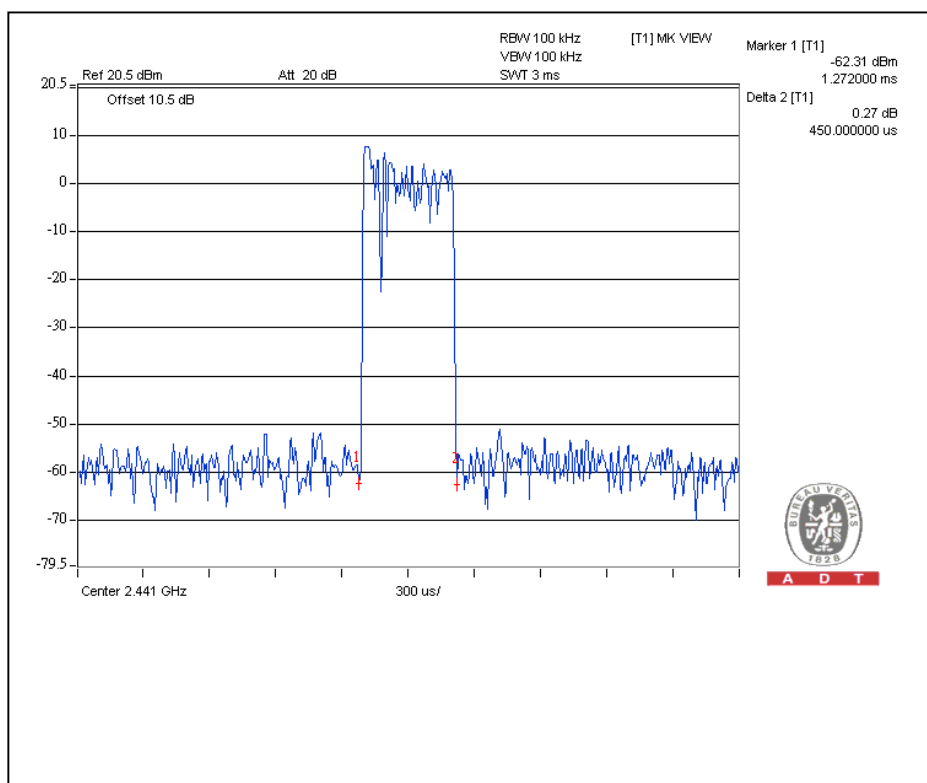
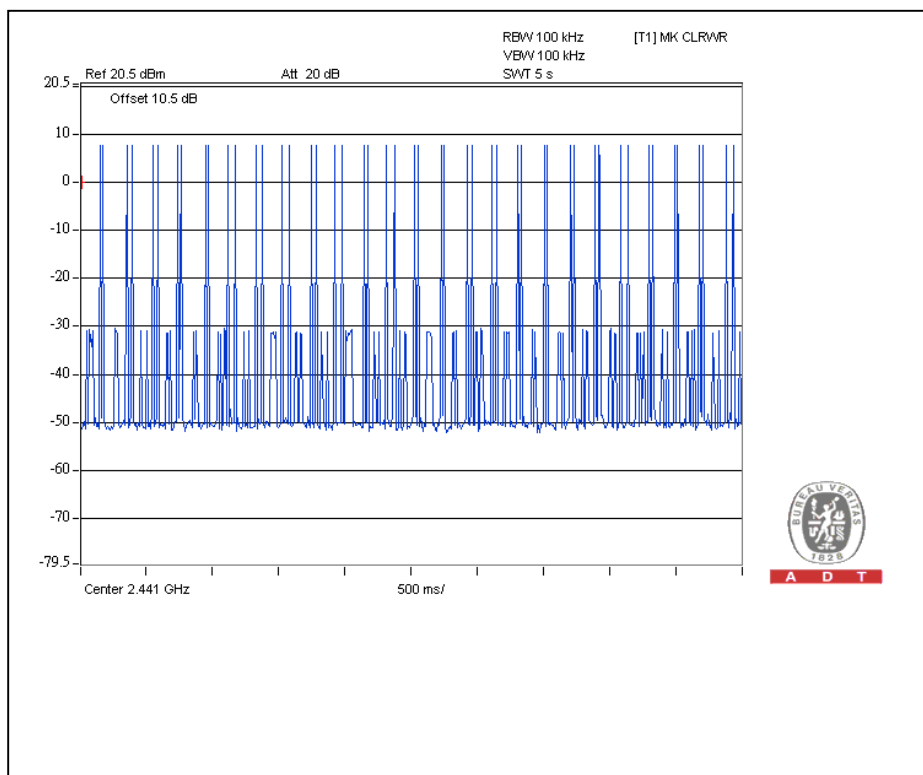
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316 times	0.45	142.20	400
DH3	26 (times / 5 sec) *6.32=164.32 times	1.716	281.97	400
DH5	16 (times / 5 sec) *6.32=101.12 times	2.97	300.33	400

Test plots of the transmitting time slot are shown on next three pages.

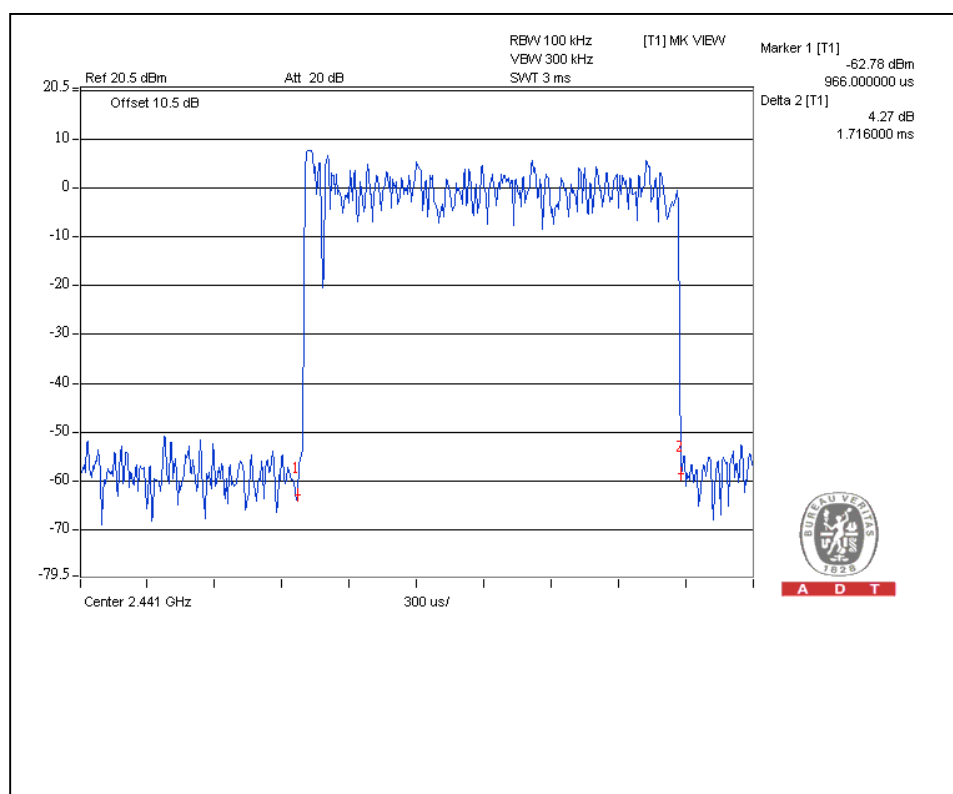
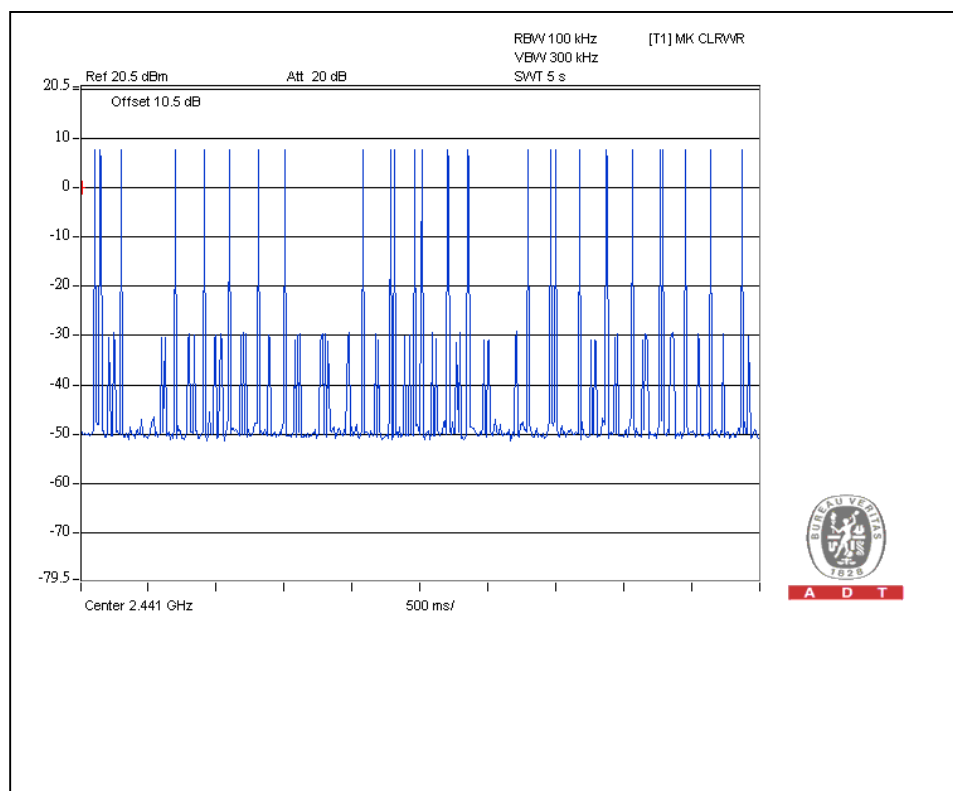


A D T

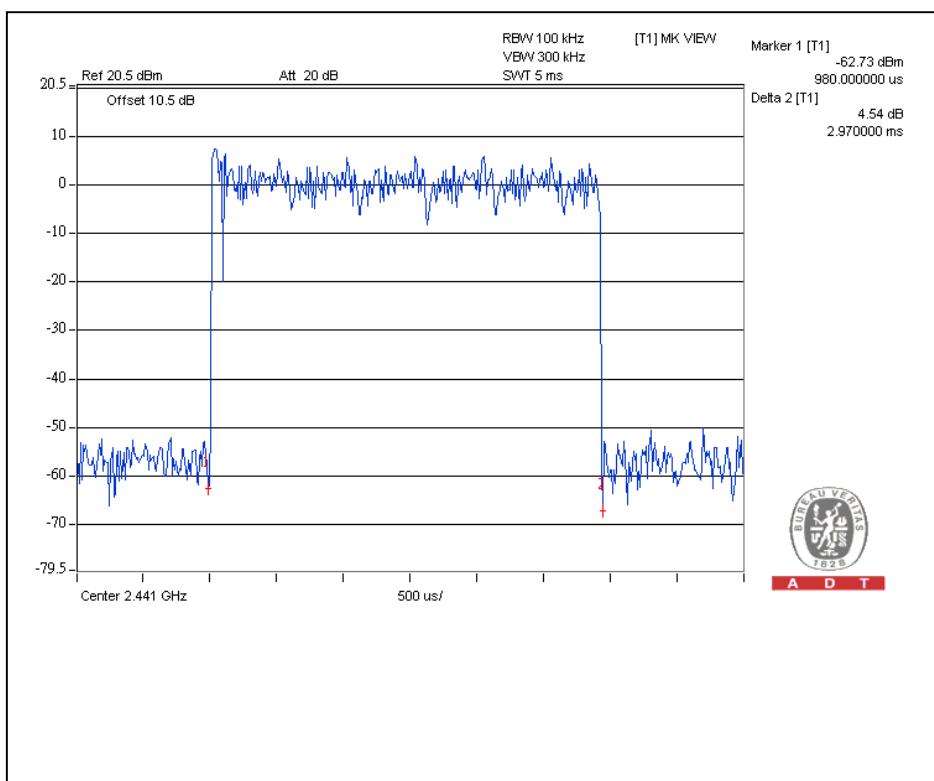
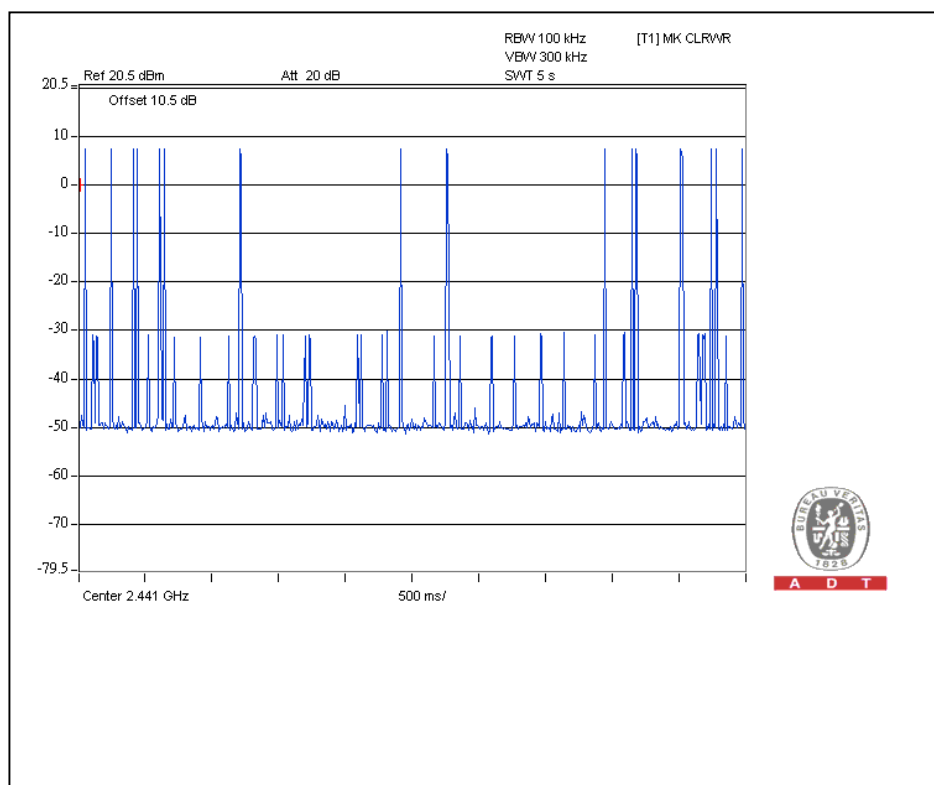
DH1



DH3



DH5





A D T

For GFSK(LE mode):

Mode	Number of transmission in a 16 (40Hopping*0.4)	Length of transmission time (msec)*	Result (msec)	Limit (msec)
DH1	5 (times / 5 sec) *3.2=16 times	0.77	12.32	400

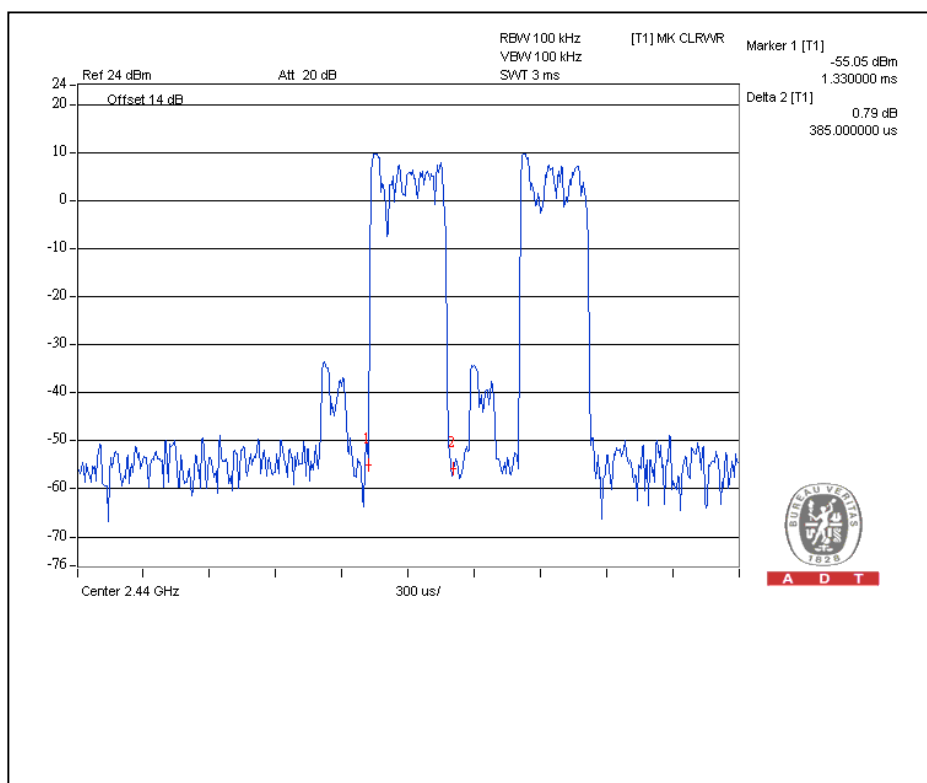
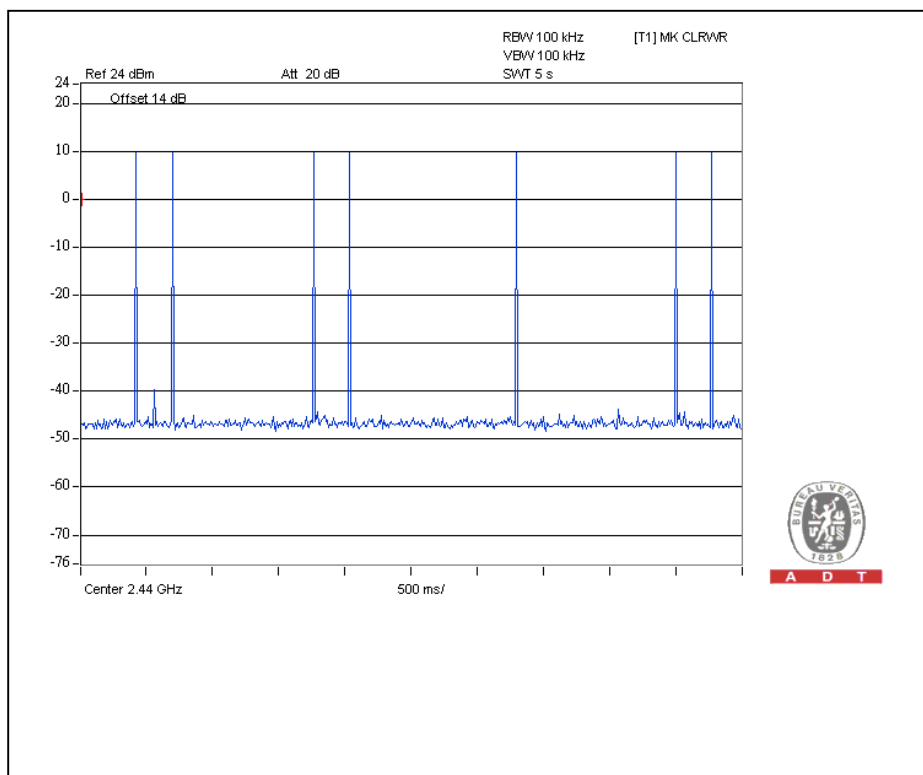
*There are two burst signal during transmission time period.

Test plots of the transmitting time slot are shown on next page.



A D T

DH1



4.4 CHANNEL BANDWIDTH

4.4.1 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 shall be a minimum limit for the hopping channel separation.

4.4.2 TEST INSTRUMENTS

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.

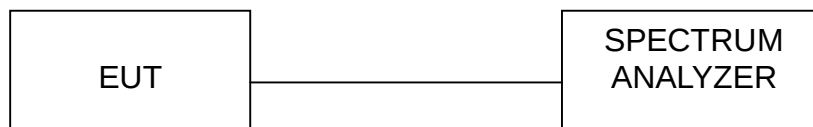
4.4.3 TEST PROCEDURE

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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITION

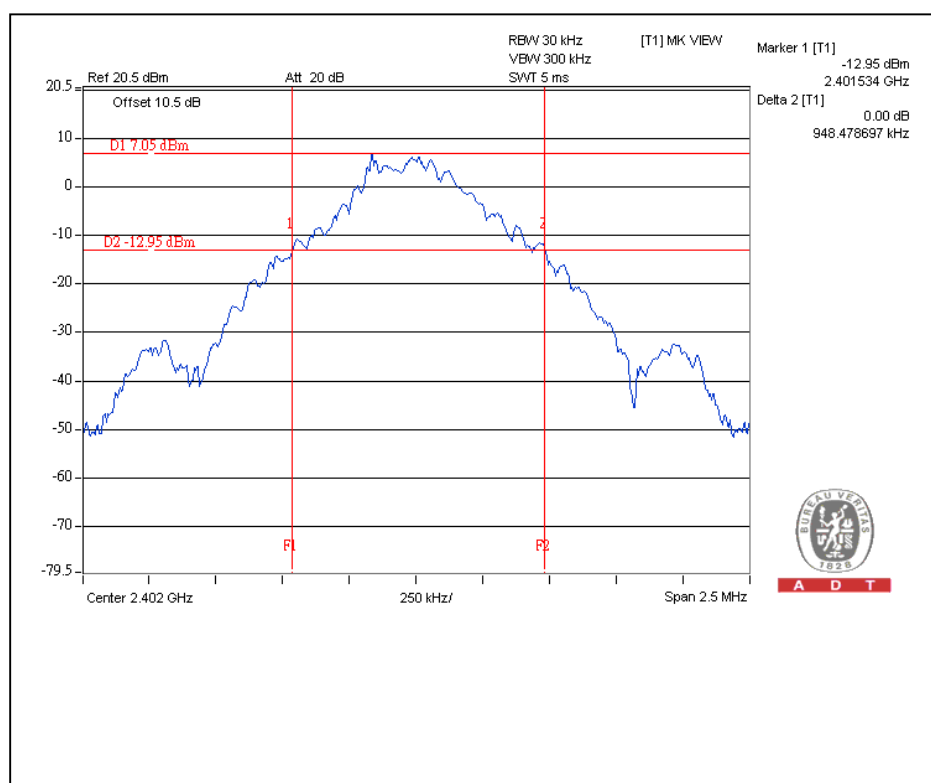
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.4.7 TEST RESULTS

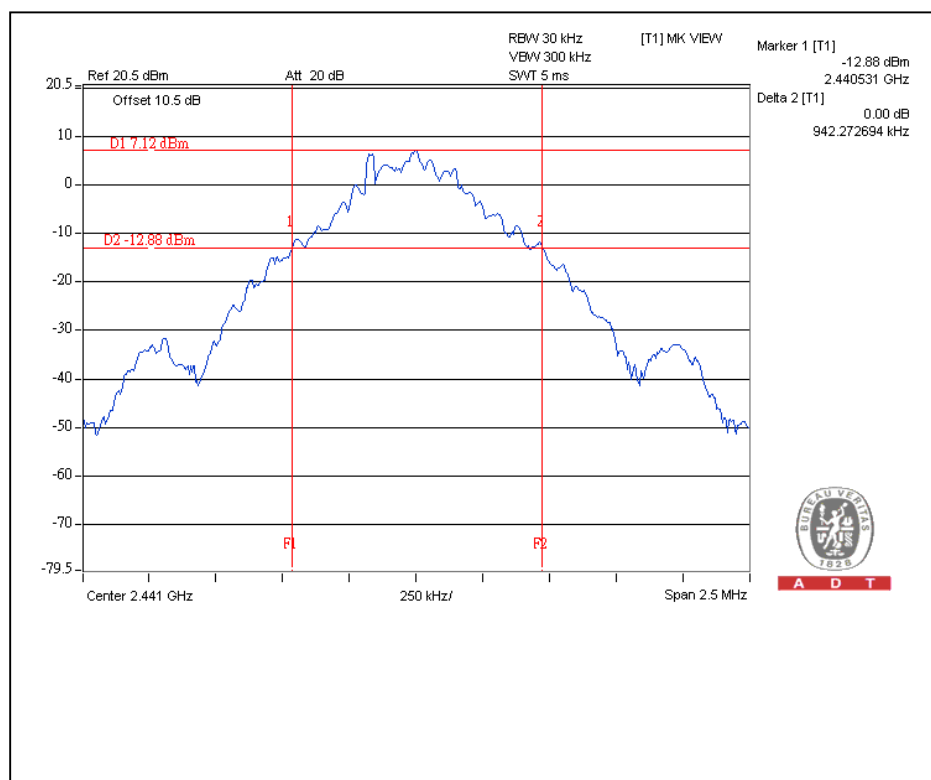
For GFSK:

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

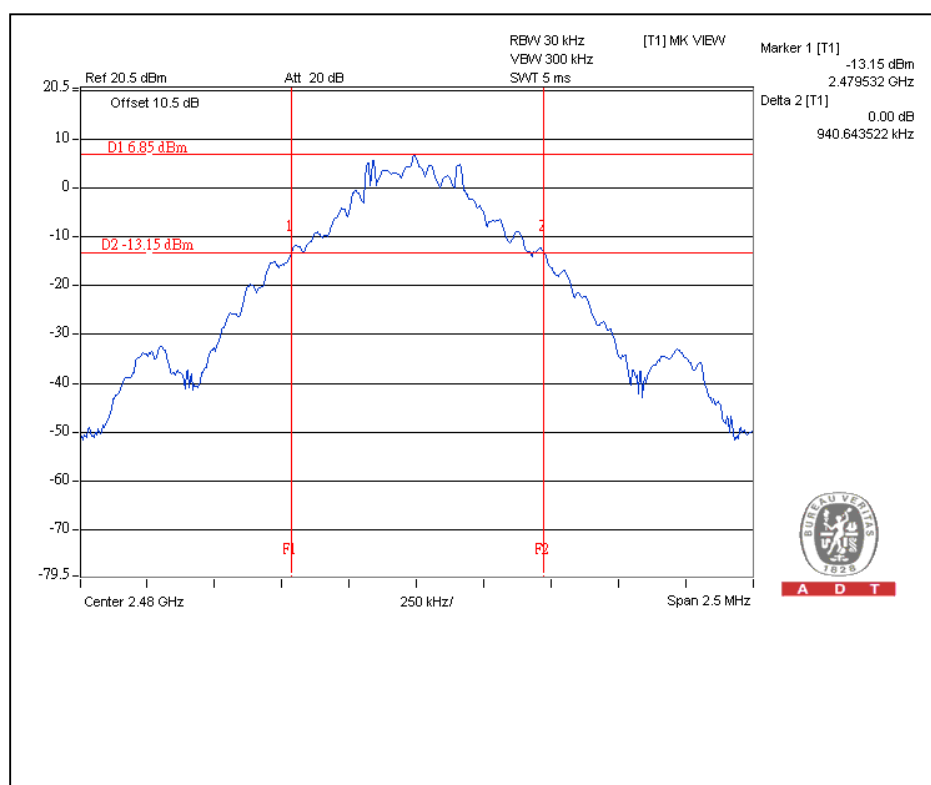
Channel 0



Channel 39



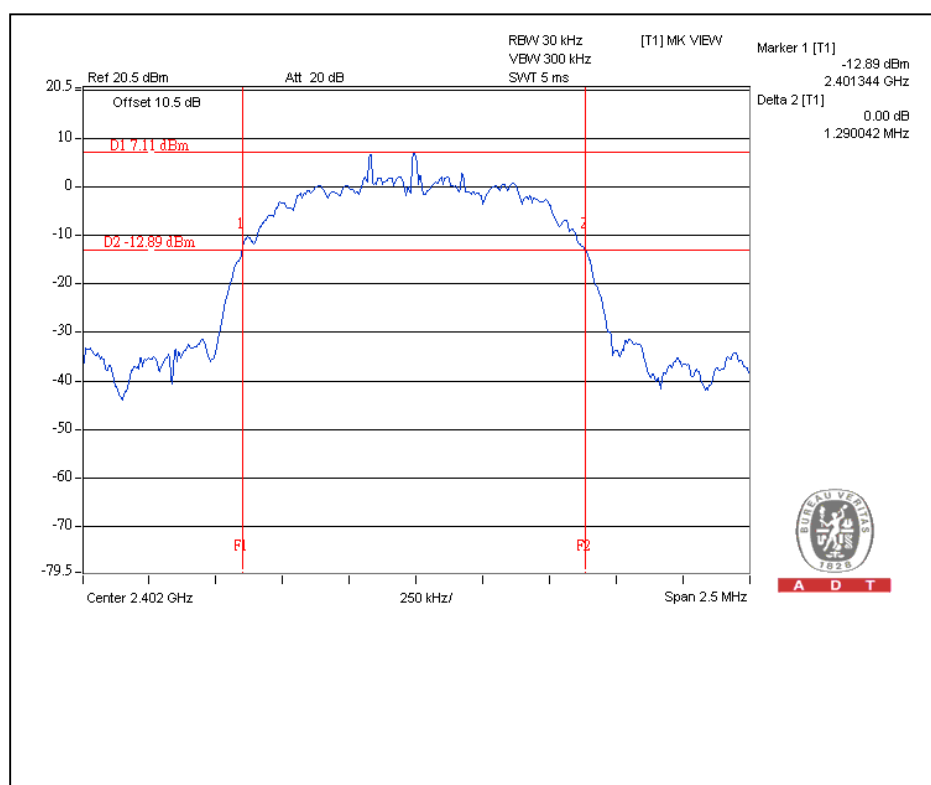
Channel 78



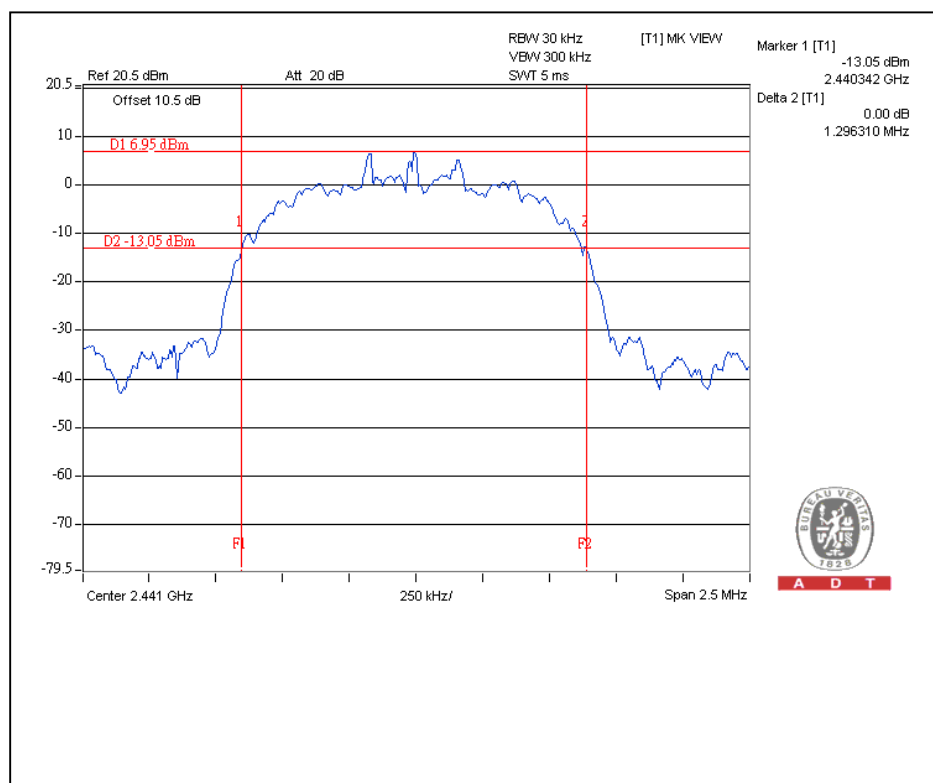
For 8DPSK:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.29
39	2441	1.29
78	2480	1.29

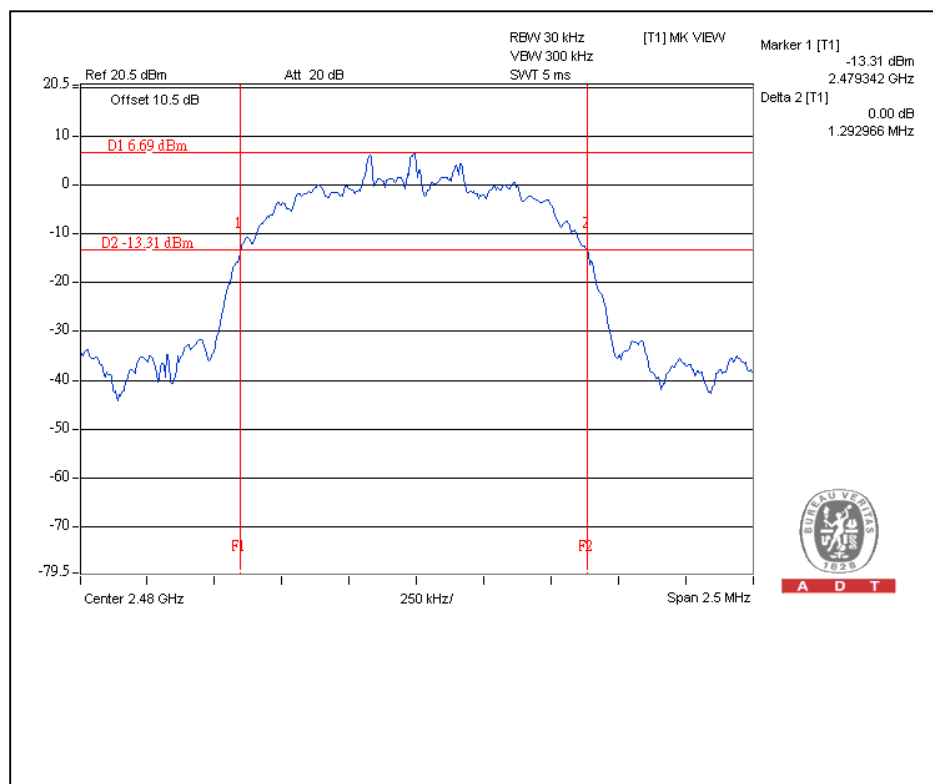
Channel 0



Channel 39



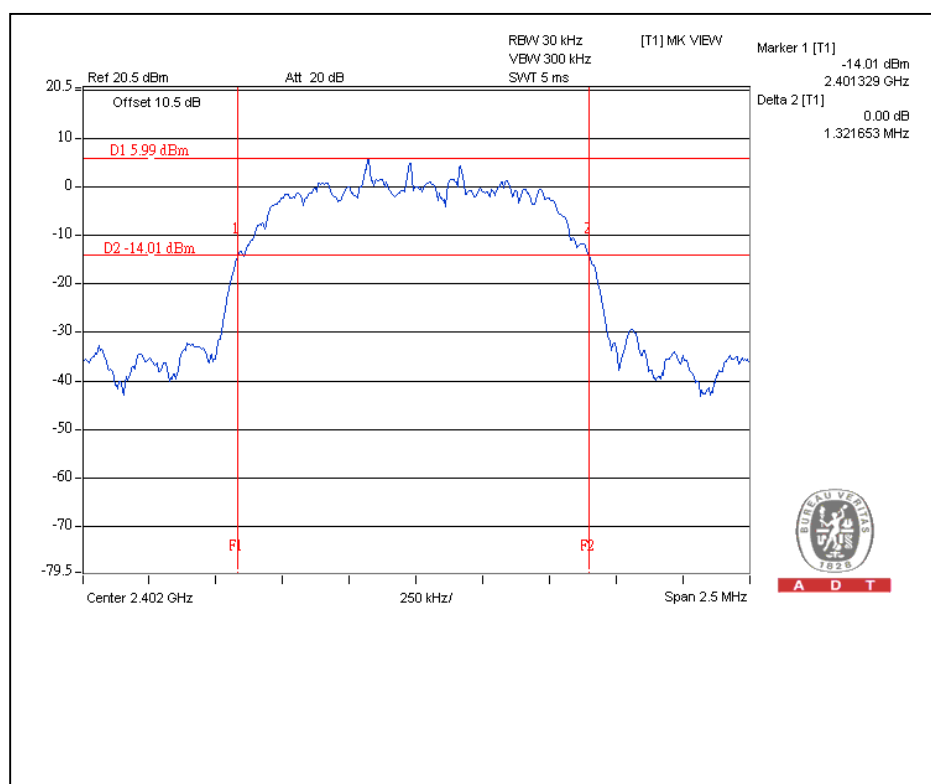
Channel 78



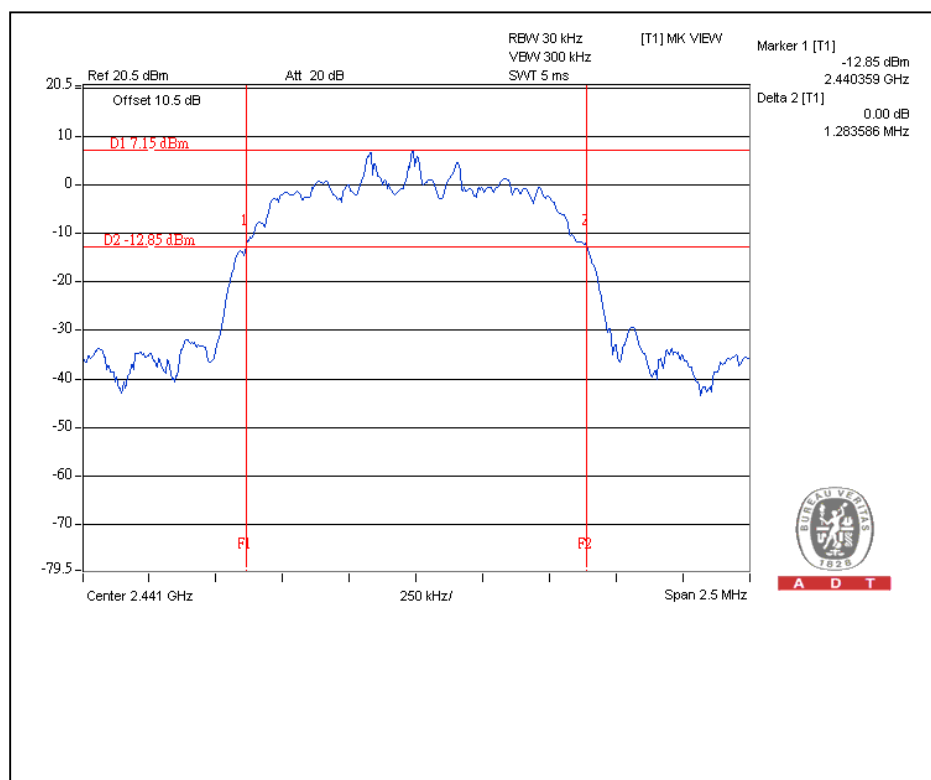
For $\pi/4$ -DQPSK:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.32
39	2441	1.28
78	2480	1.28

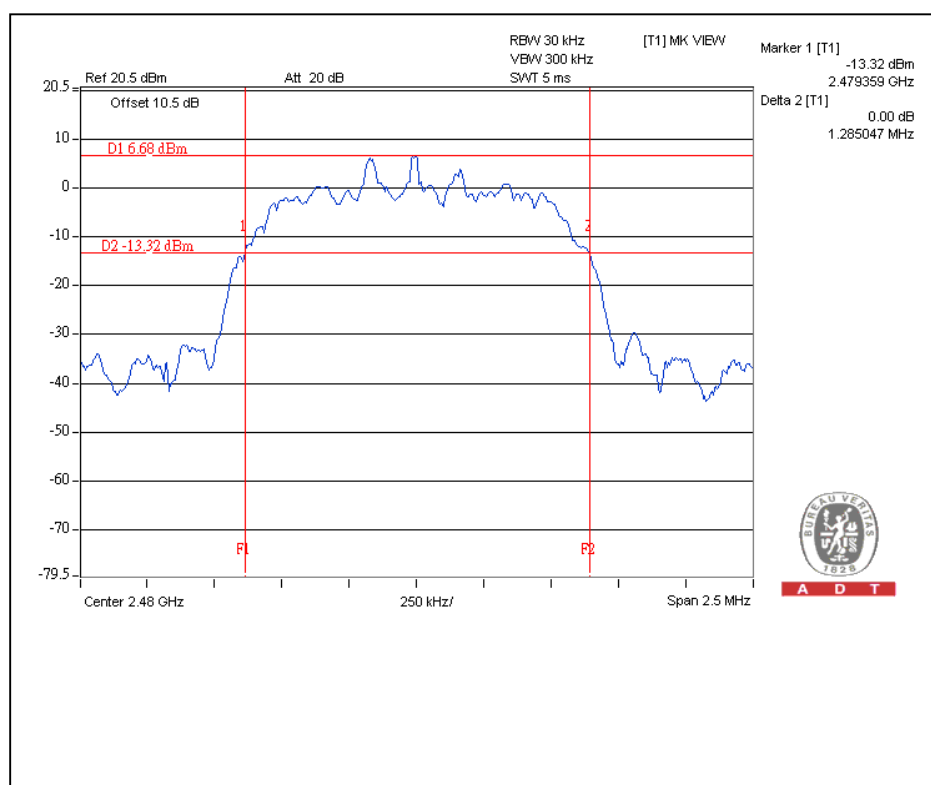
Channel 0



Channel 39



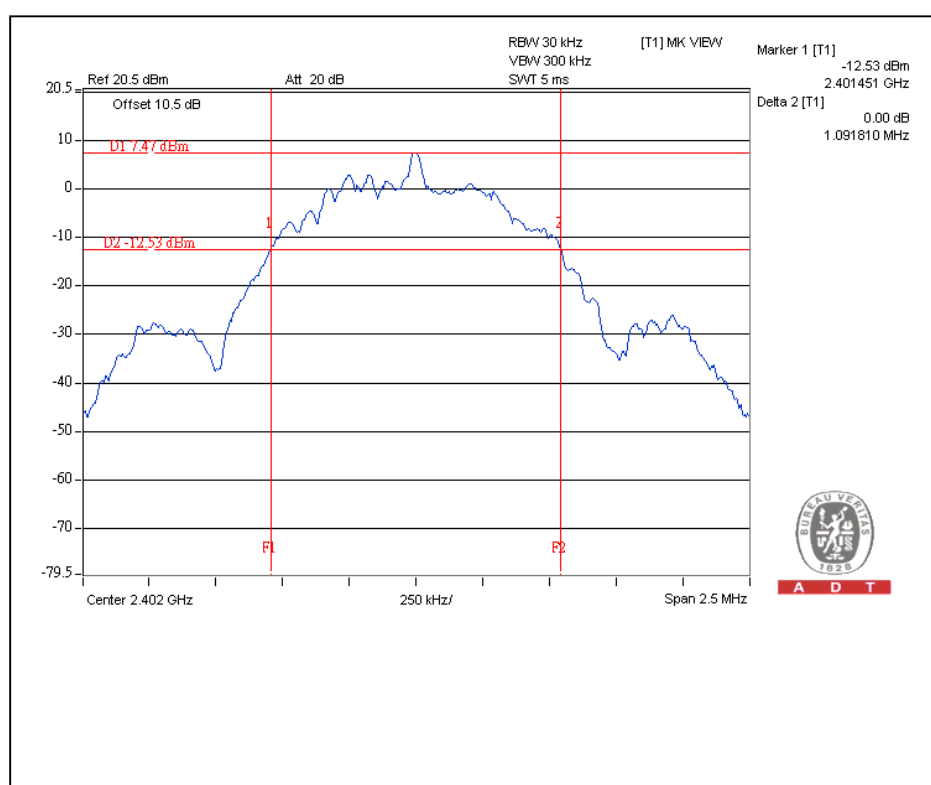
Channel 78



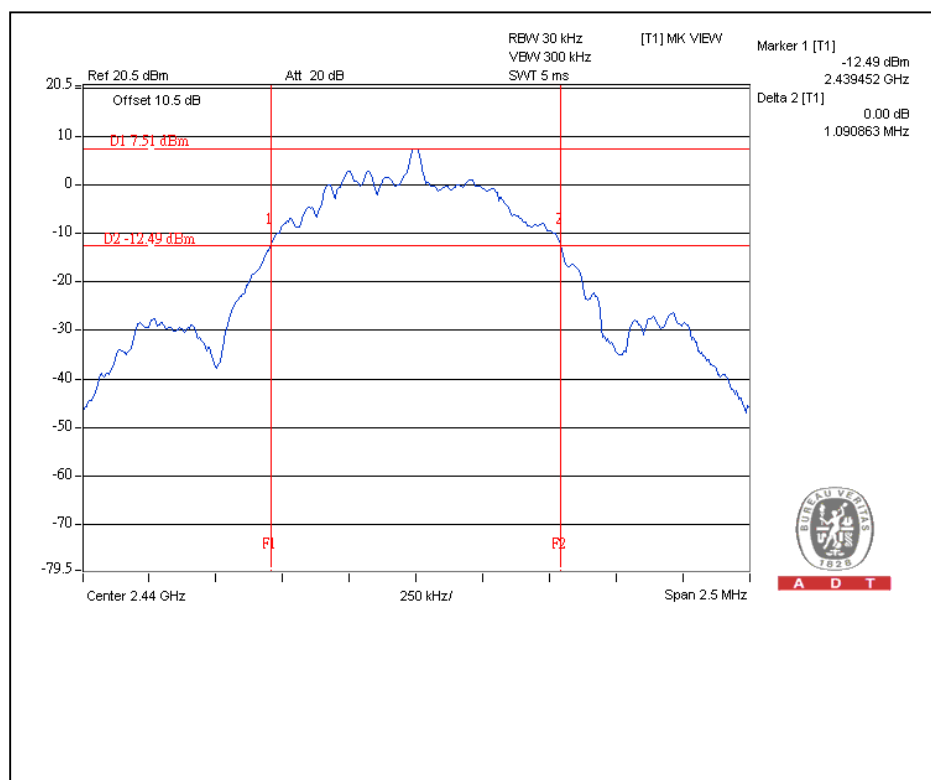
For GFSK(LE mode):

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.09
19	2440	1.09
39	2480	1.09

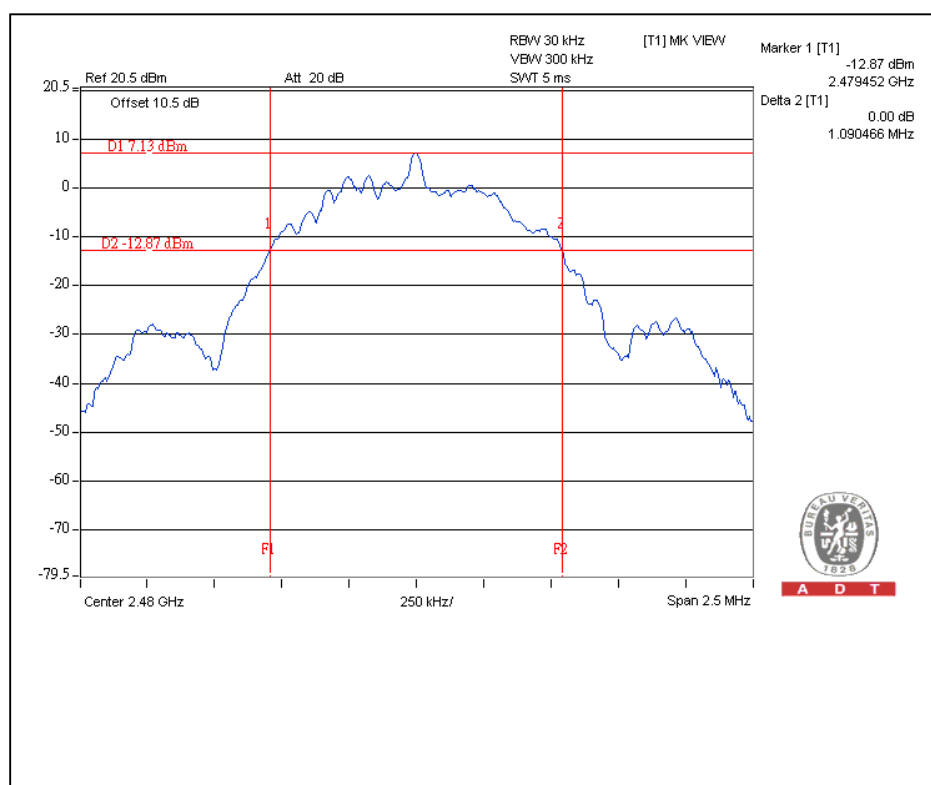
Channel 0



Channel 19



Channel 39



4.5 HOPPING CHANNEL SEPARATION

4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
PSA Series 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 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.

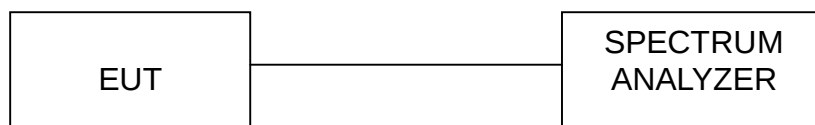


A D T

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



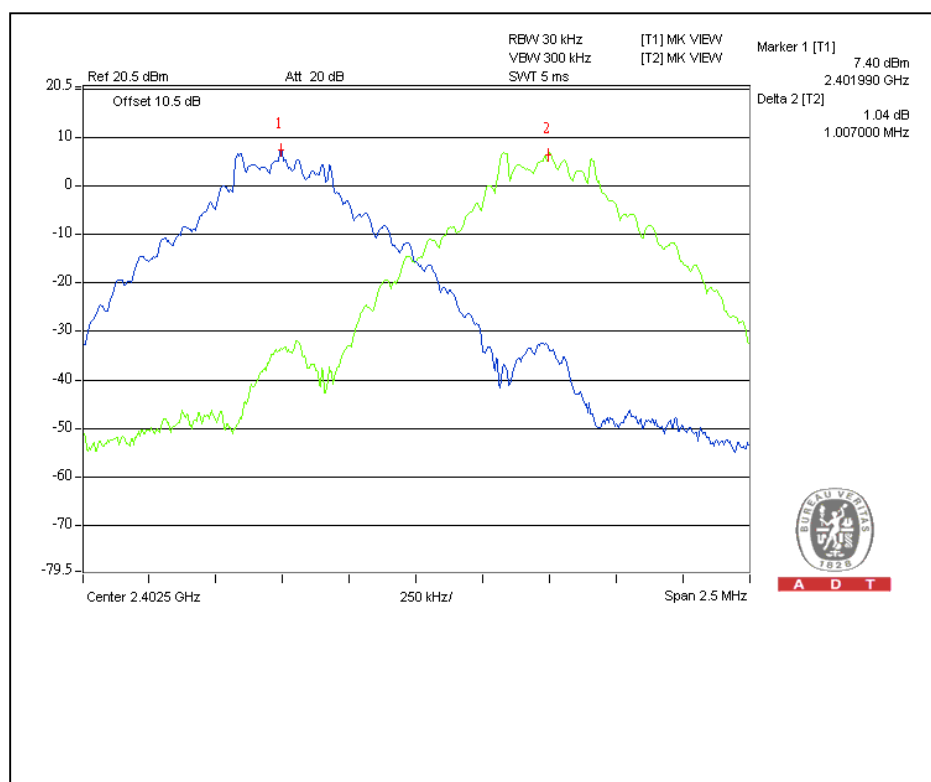
4.5.6 TEST RESULTS

For GFSK

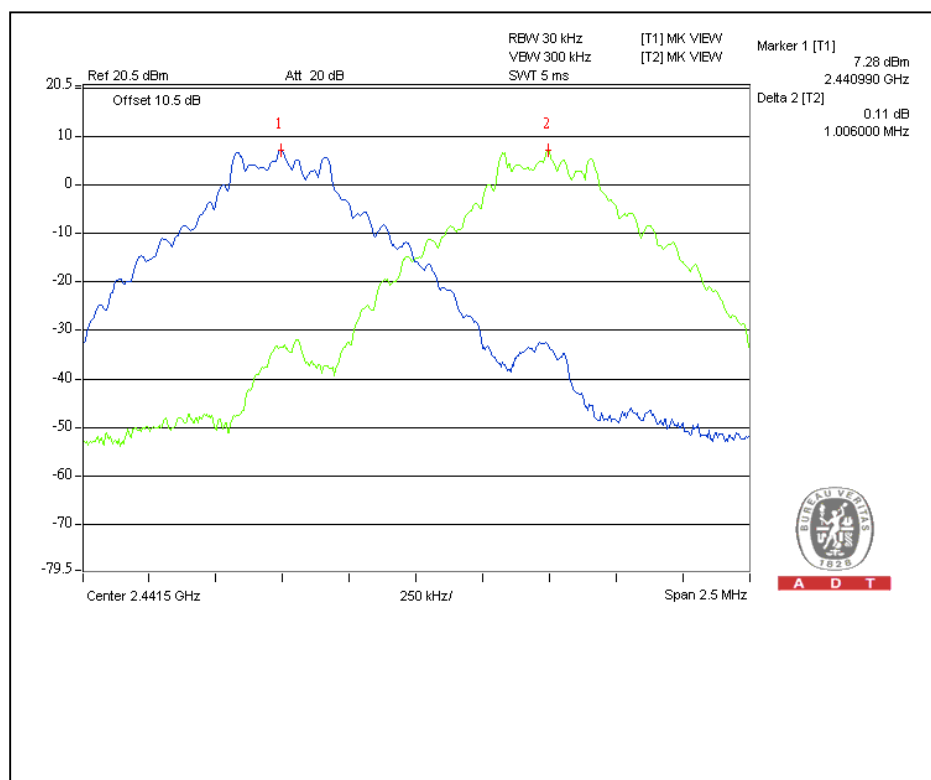
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.007	0.627	PASS
39	2441	1.006	0.627	PASS
78	2480	1.002	0.627	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to below pages.

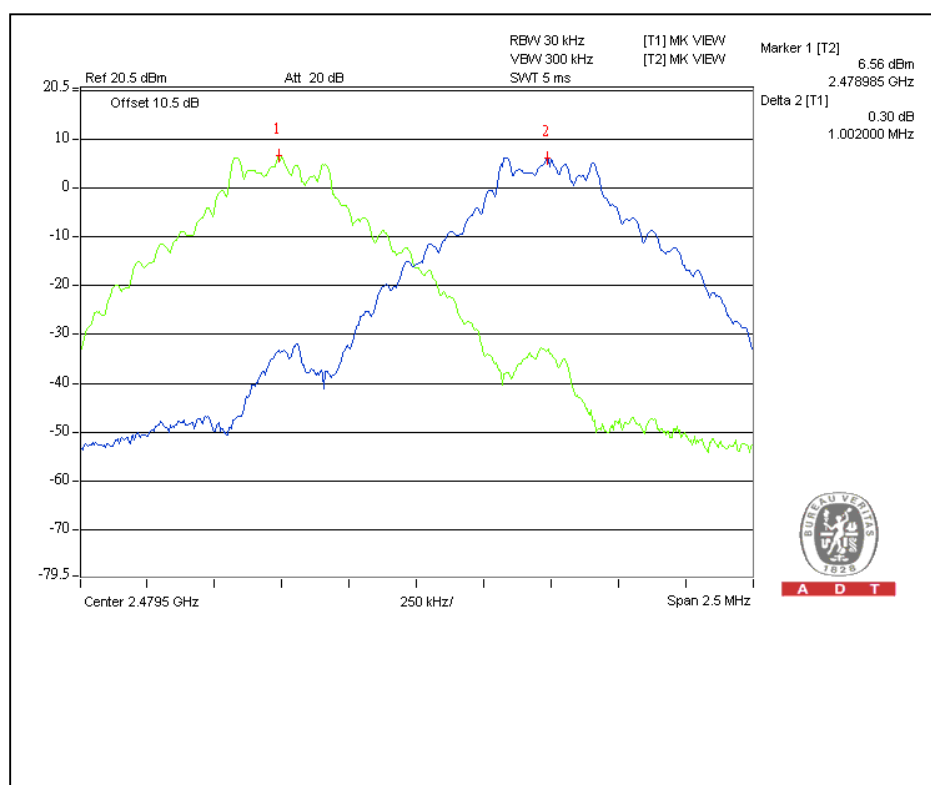
Channel 0



Channel 39



Channel 78

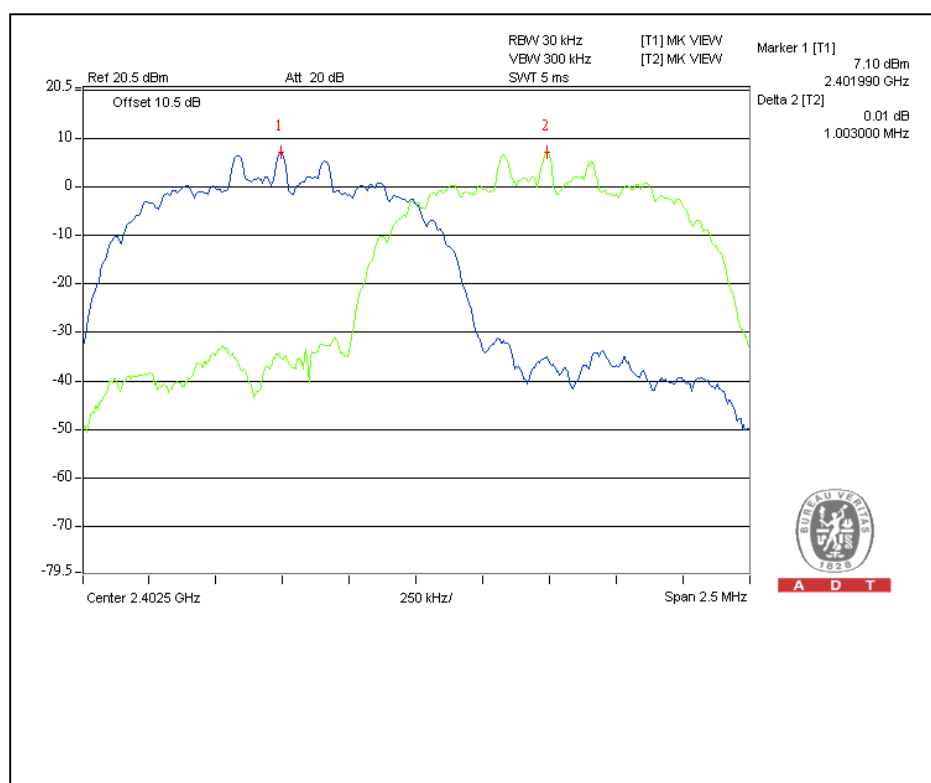


For 8DPSK

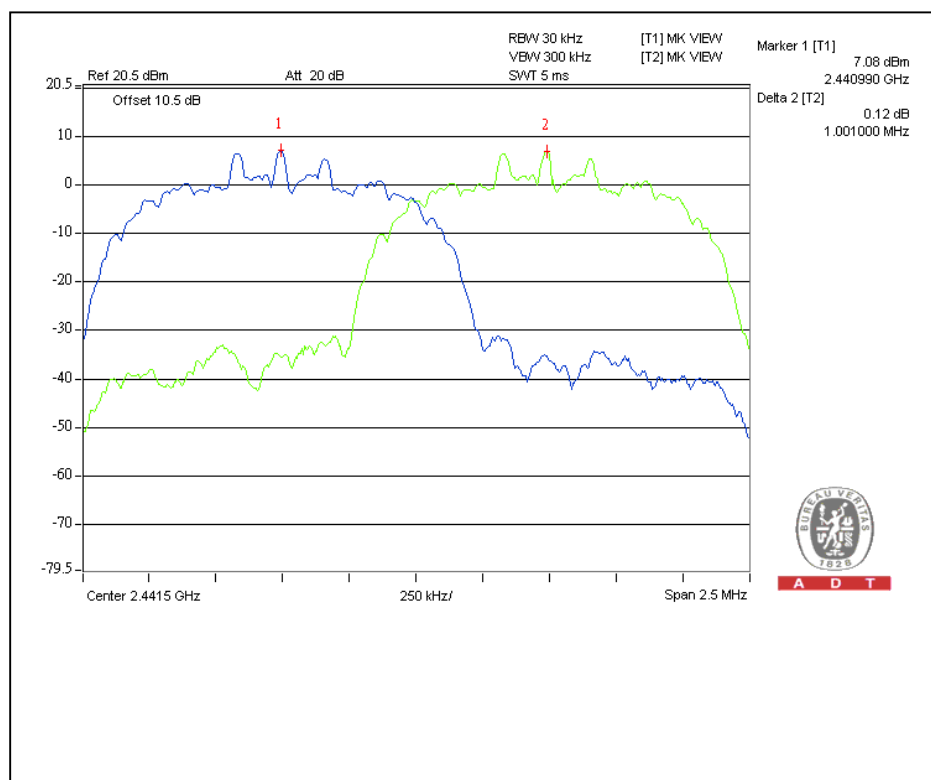
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.003	0.860	PASS
39	2441	1.001	0.860	PASS
78	2480	1.005	0.860	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to below pages.

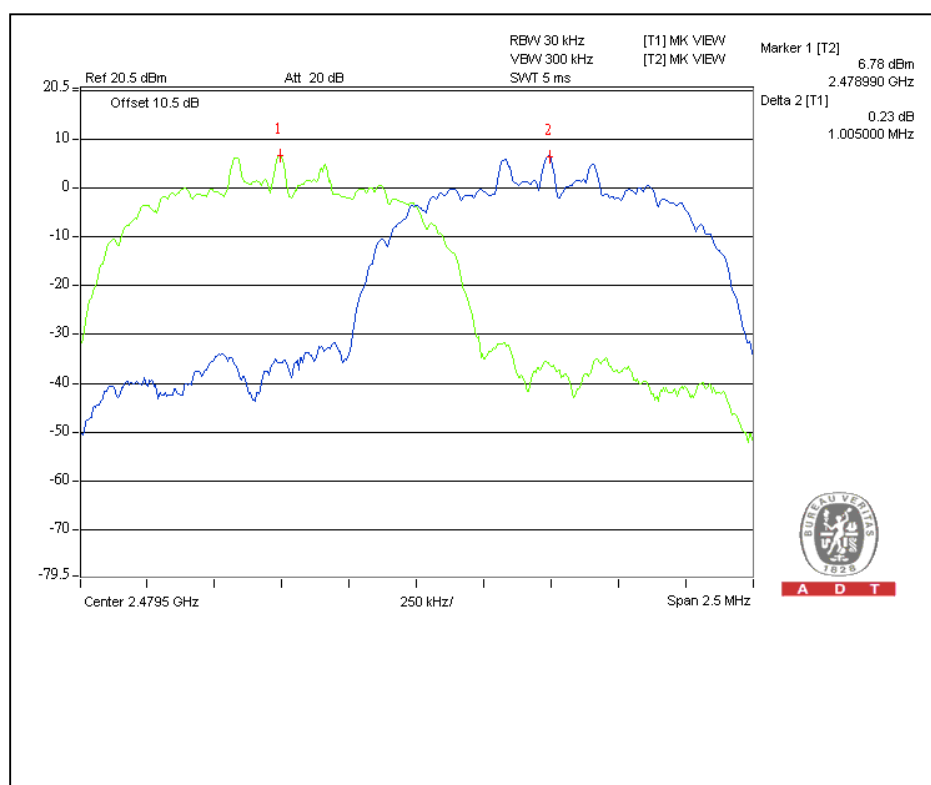
Channel 0



Channel 39



Channel 78

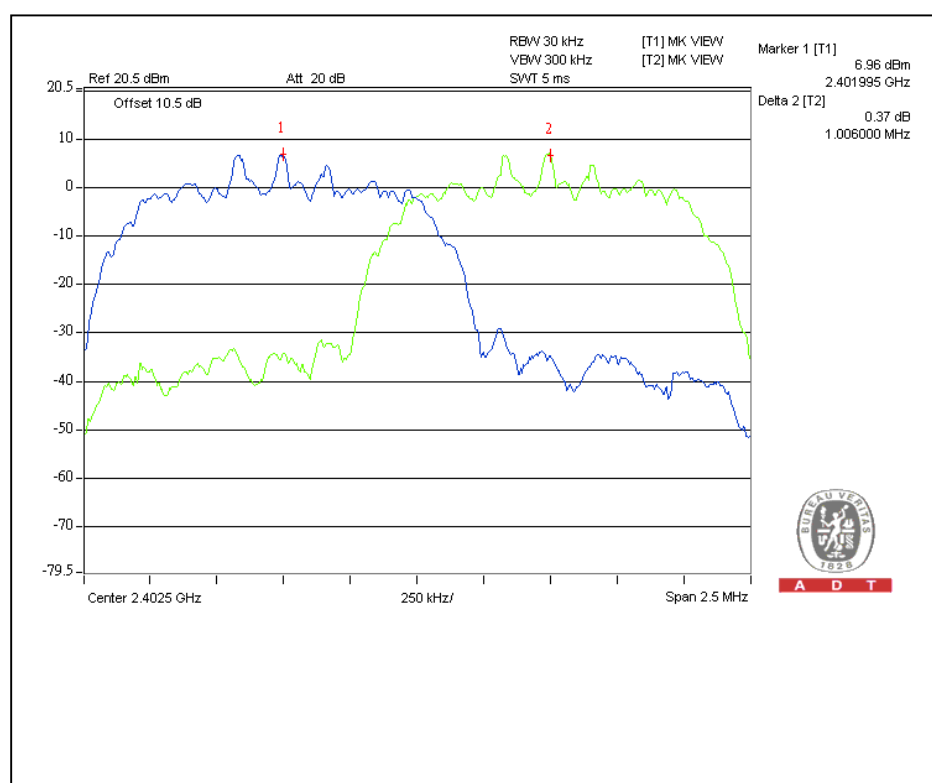


For $\pi/4$ -DQPSK

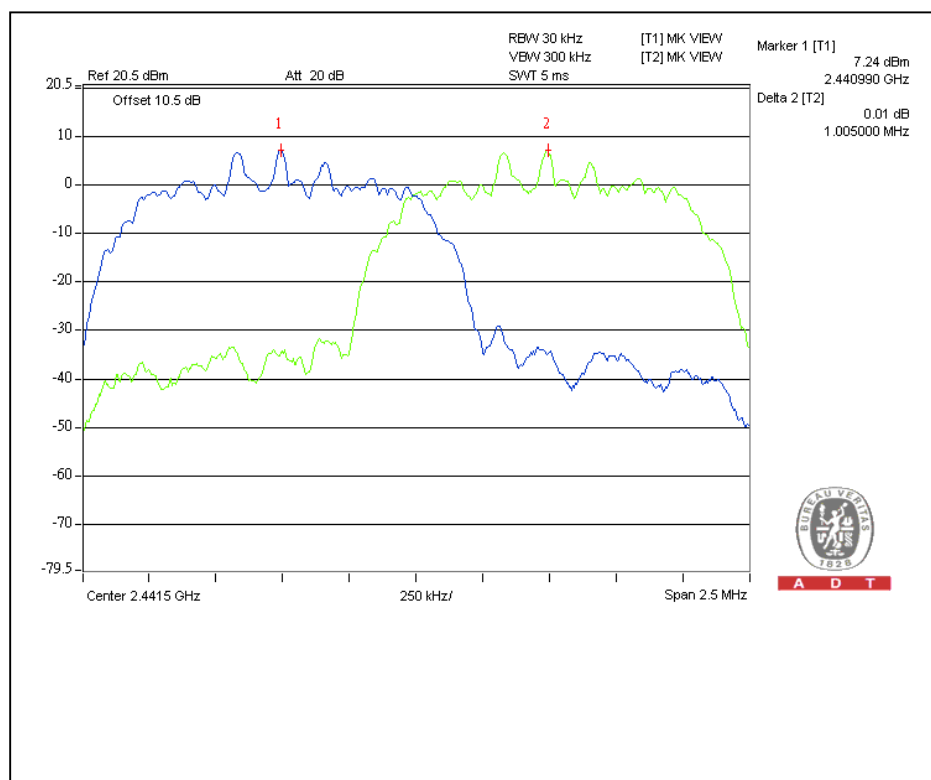
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.006	0.880	PASS
39	2441	1.005	0.853	PASS
78	2480	1.004	0.853	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to below pages.

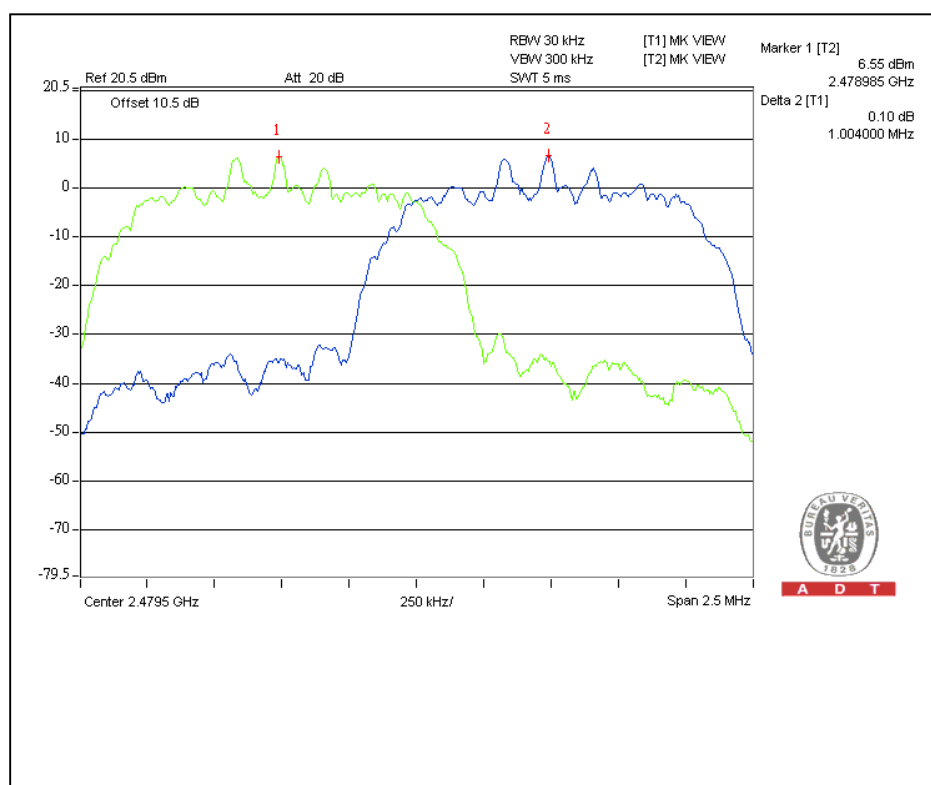
Channel 0



Channel 39



Channel 78

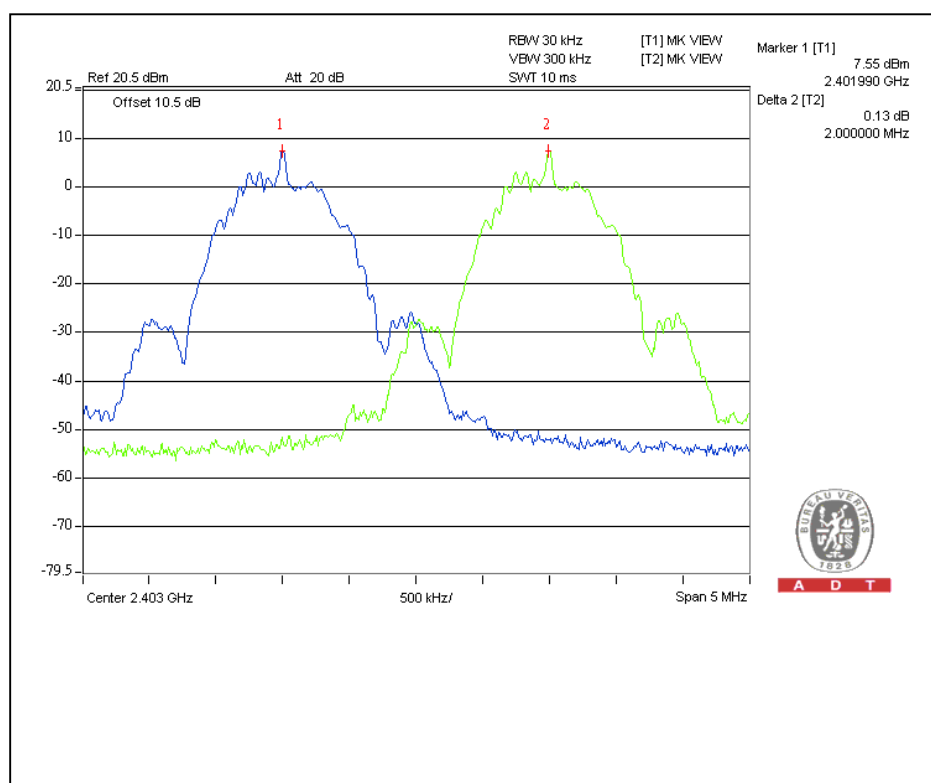


For GFSK(LE mode)

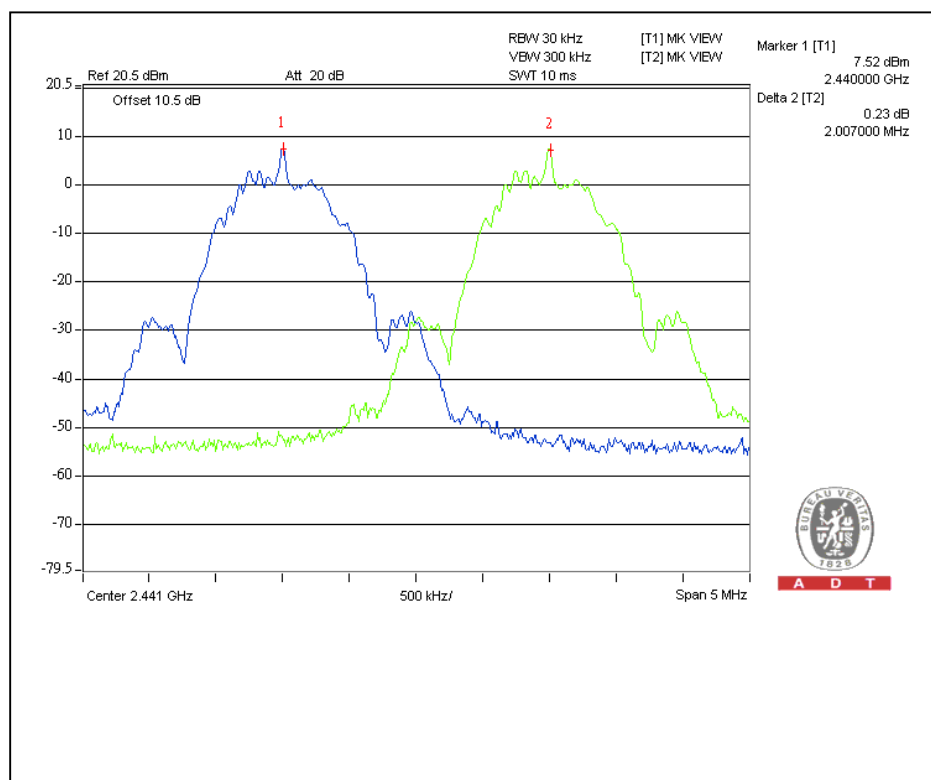
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	2.000	0.727	PASS
19	2440	2.007	0.727	PASS
39	2480	2.007	0.727	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to below pages.

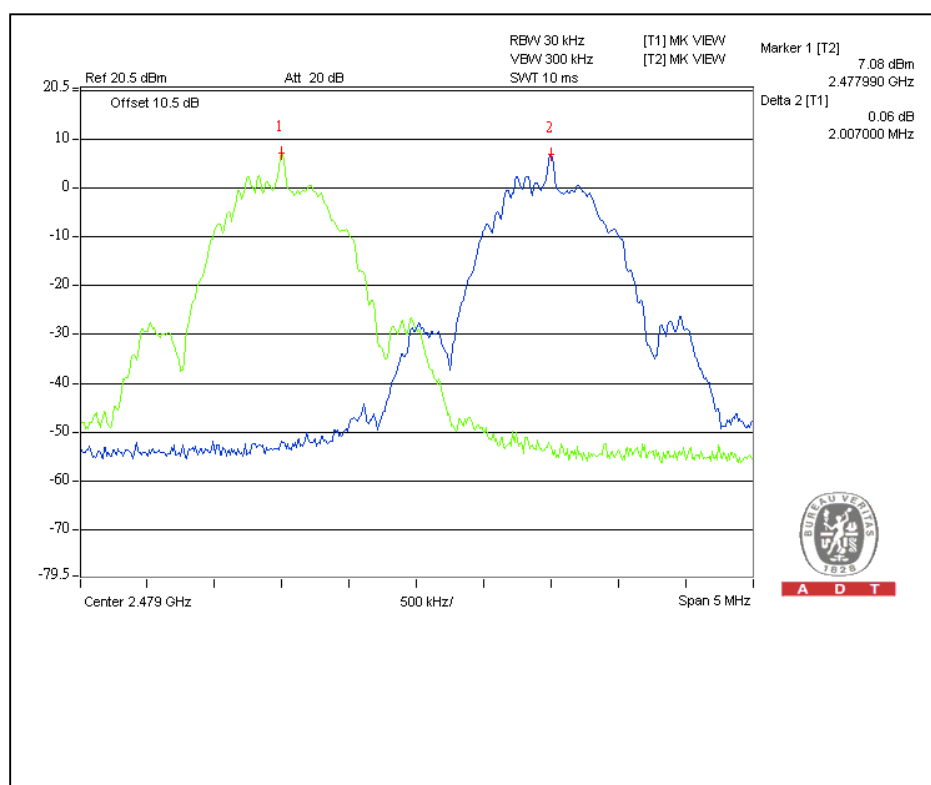
Channel 0



Channel 19



Channel 39



4.6 MAXIMUM PEAK OUTPUT POWER

4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 125mW.

4.6.2 INSTRUMENTS

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.

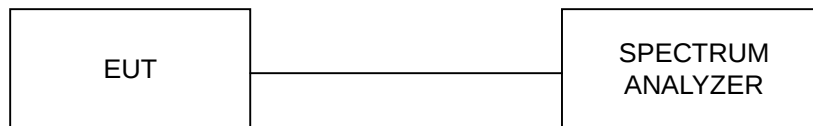
4.6.3 TEST PROCEDURES

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. 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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



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

4.6.6 EUT OPERATING CONDITION

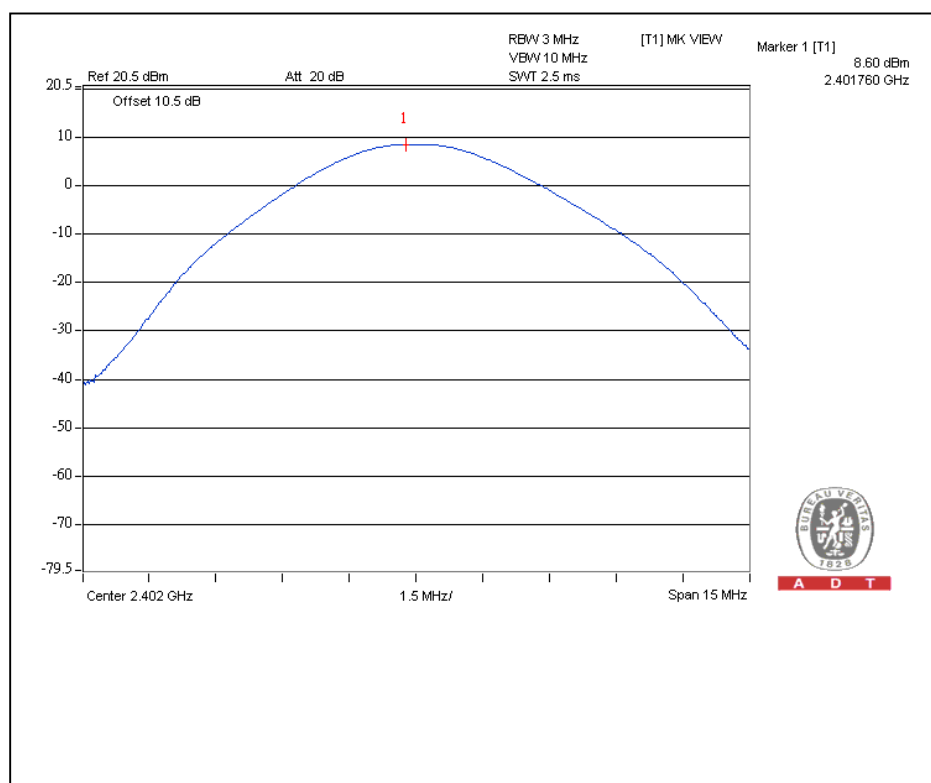
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.6.7 TEST RESULTS

For GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	8.6	7.2	125	PASS
39	2441	8.1	6.5	125	PASS
78	2480	7.7	5.9	125	PASS

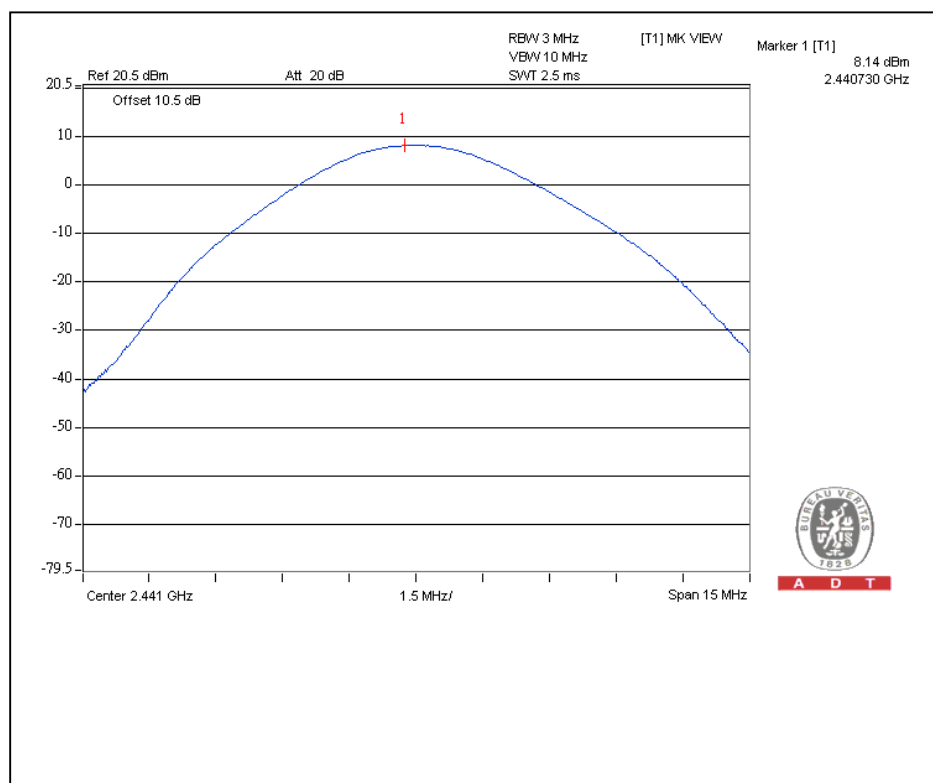
Channel 0



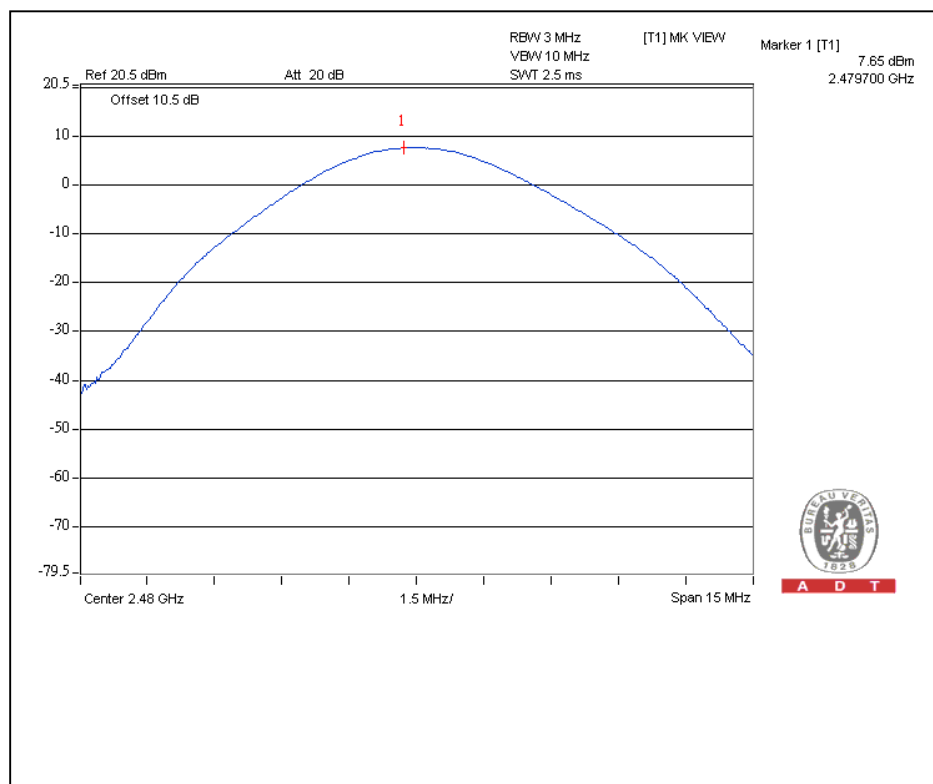


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Channel 39



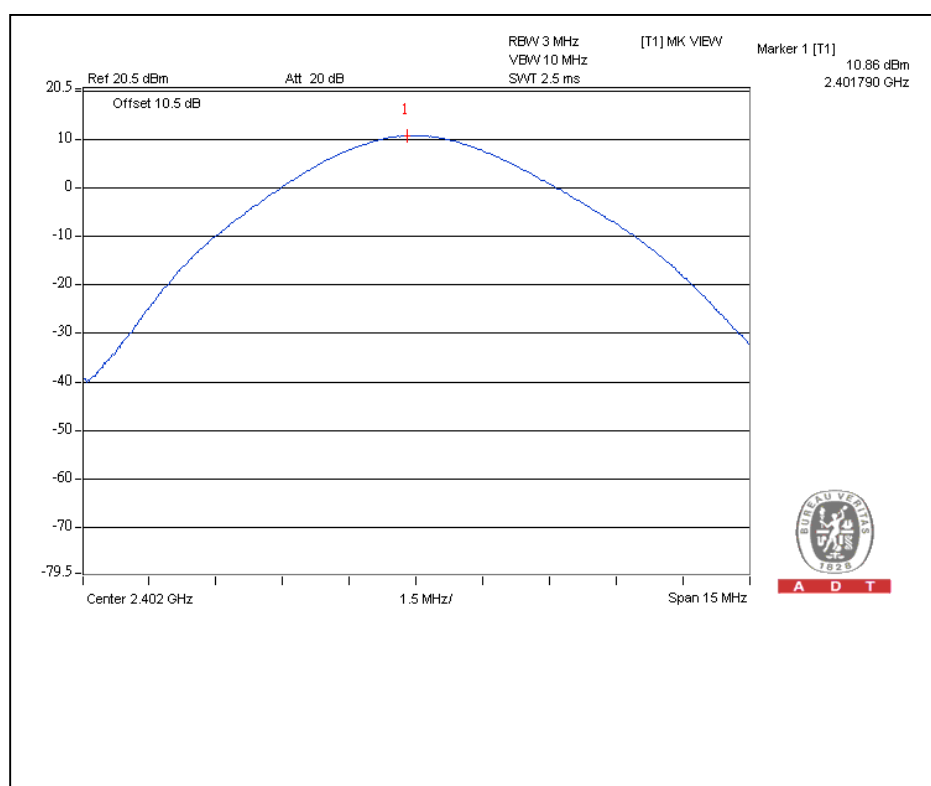
Channel 78



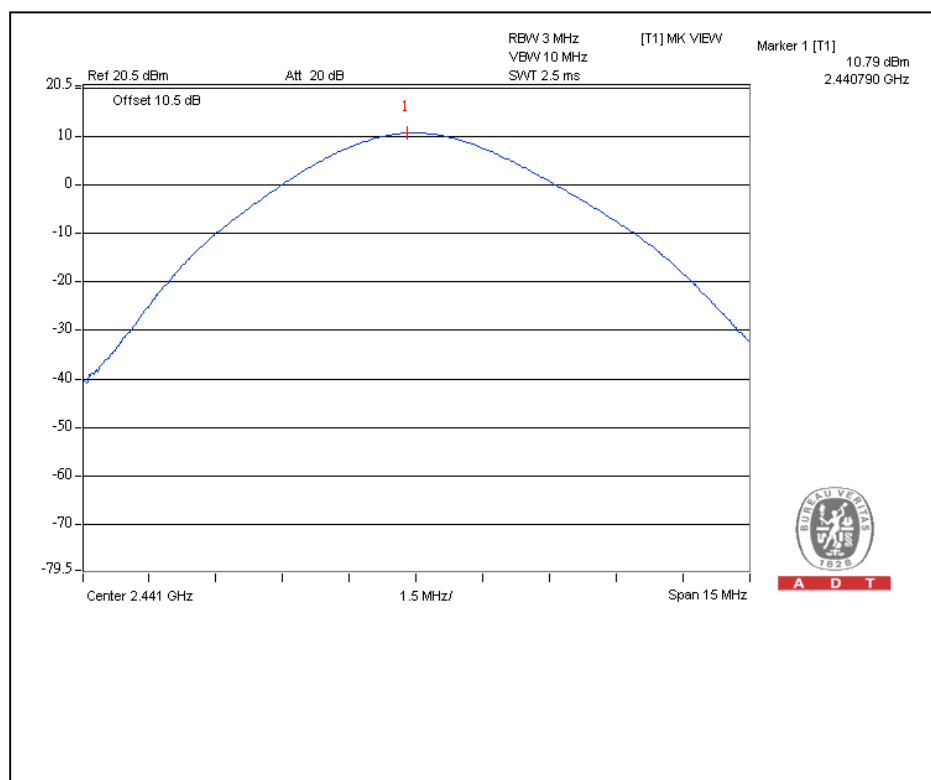
For 8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	10.9	12.3	125	PASS
39	2441	10.8	12.0	125	PASS
78	2480	10.5	11.2	125	PASS

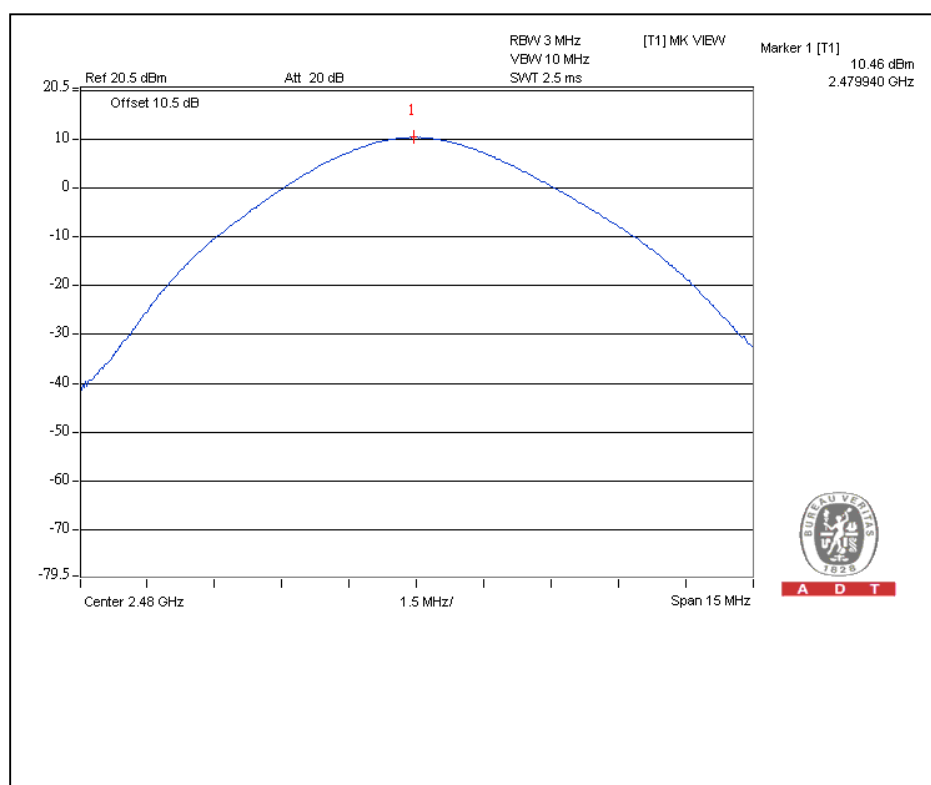
Channel 0



Channel 39



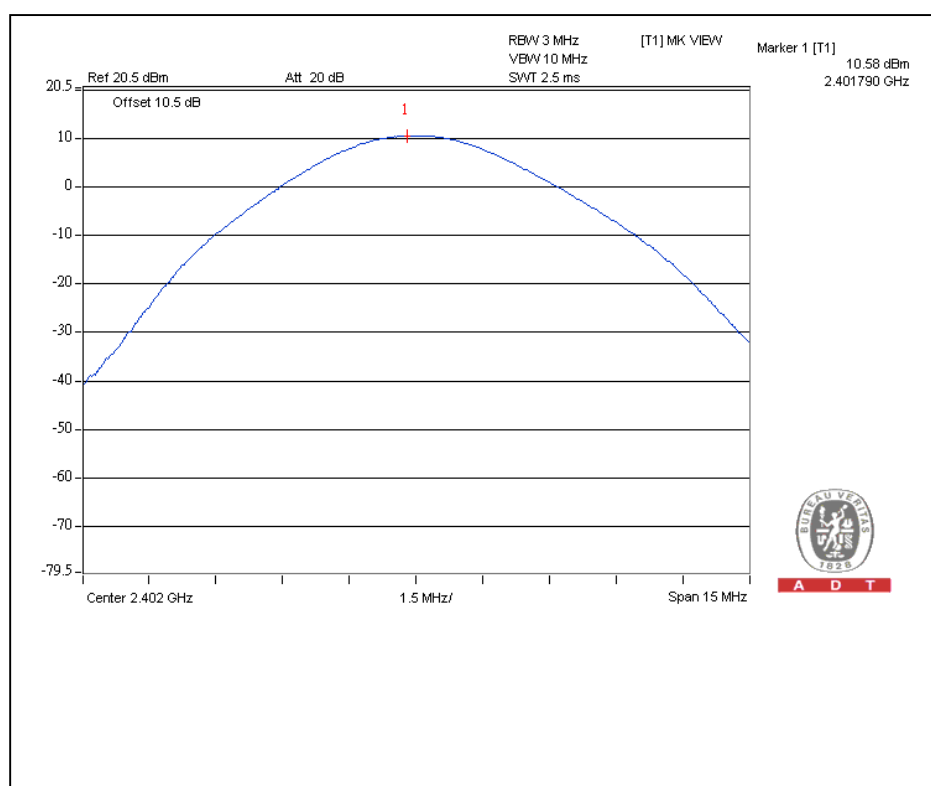
Channel 78



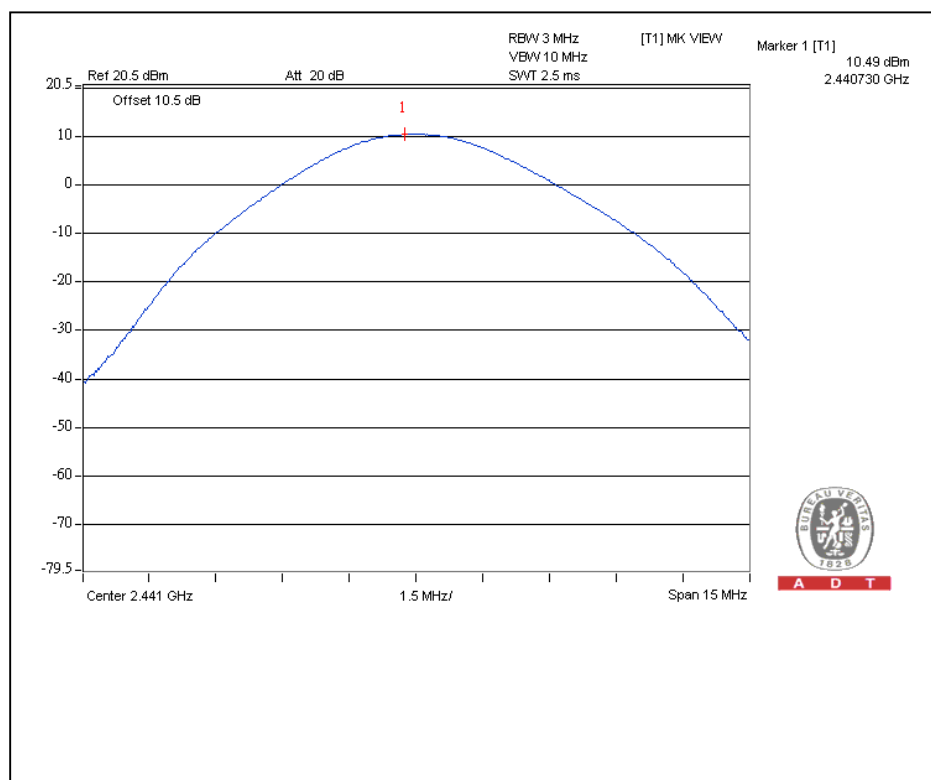
For $\pi/4$ -DQPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	10.6	11.5	125	PASS
39	2441	10.5	11.2	125	PASS
78	2480	10.0	10.0	125	PASS

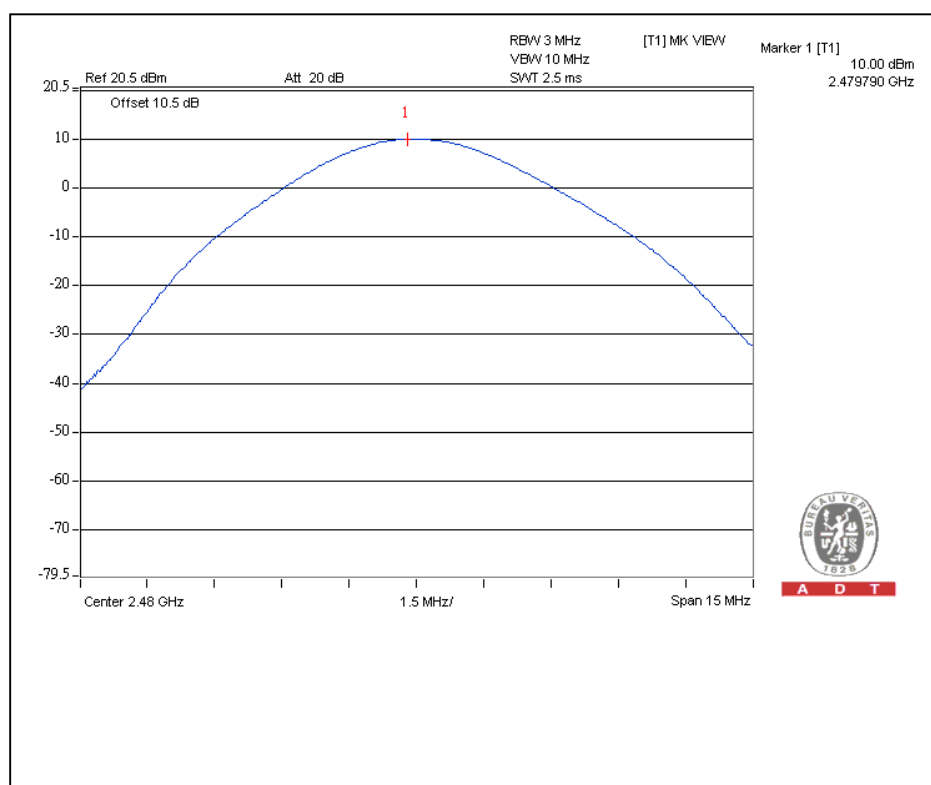
Channel 0



Channel 39



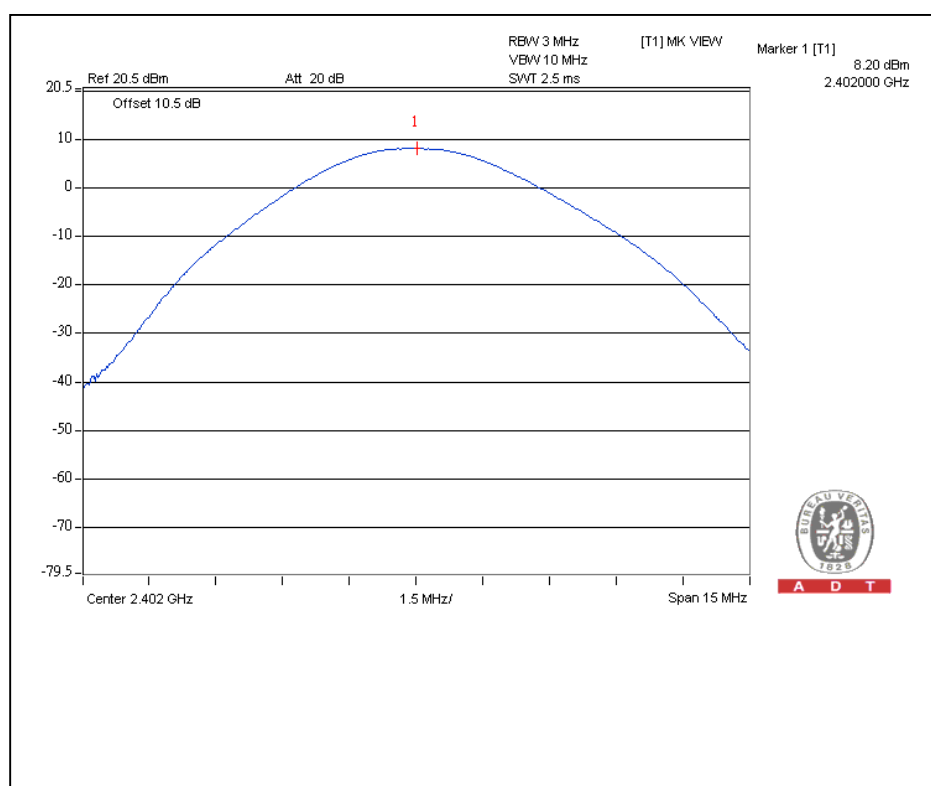
Channel 78



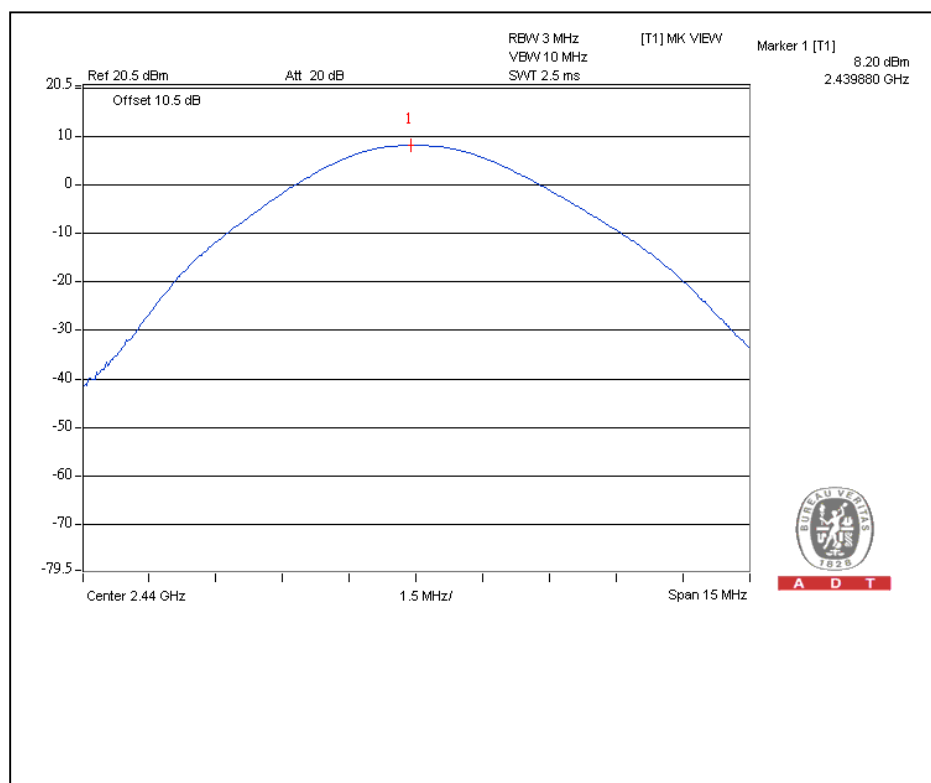
For GFSK(LE mode)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	8.2	6.6	125	PASS
19	2440	8.2	6.6	125	PASS
39	2480	7.7	5.9	125	PASS

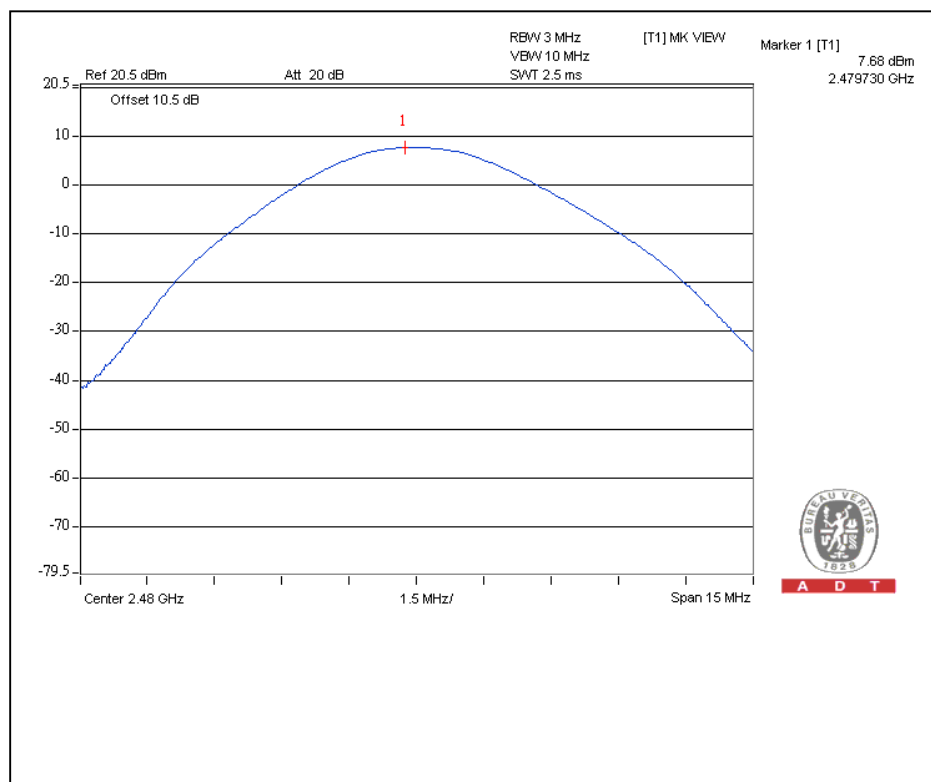
Channel 0



Channel 19



Channel 39



4.7 AVERAGE OUTPUT POWER

4.7.1 FOR REFERENCE.

4.7.2 INSTRUMENTS

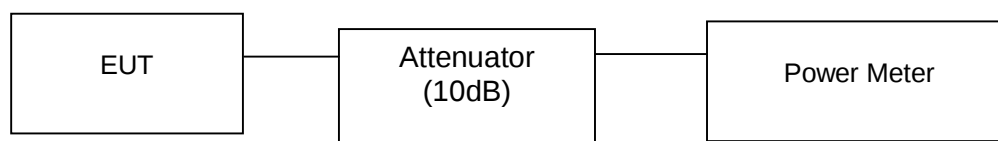
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Peak Power Meter	ML2495A	0824006	May 04, 2010	May 03, 2011
Power Sensor	MA2411B	0738172	May 04, 2010	May 03, 2011

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. The transmitter output was connected to the power meter through an attenuator, the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the average power level.

4.7.4 TEST SETUP



4.7.5 EUT OPERATING CONDITION

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

4.7.6 TEST RESULTS

For GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)
0	2402	8.7
39	2441	8.7
78	2480	8.3

For 8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)
0	2402	9.0
39	2441	8.8
78	2480	8.4

For $\pi/4$ -DQPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)
0	2402	8.9
39	2441	8.8
78	2480	8.3

For GFSK(LE mode)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)
0	2402	9.0
19	2440	8.8
39	2480	8.4

4.8 POWER SPECTRAL DENSITY MEASUREMENT

4.8.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.8.2 TEST INSTRUMENTS

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.

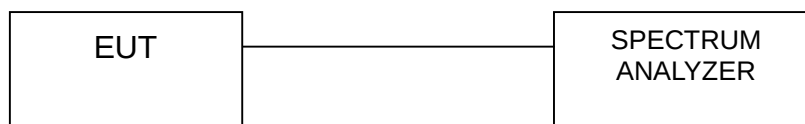
4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 TEST SETUP



4.8.6 EUT OPERATING CONDITION

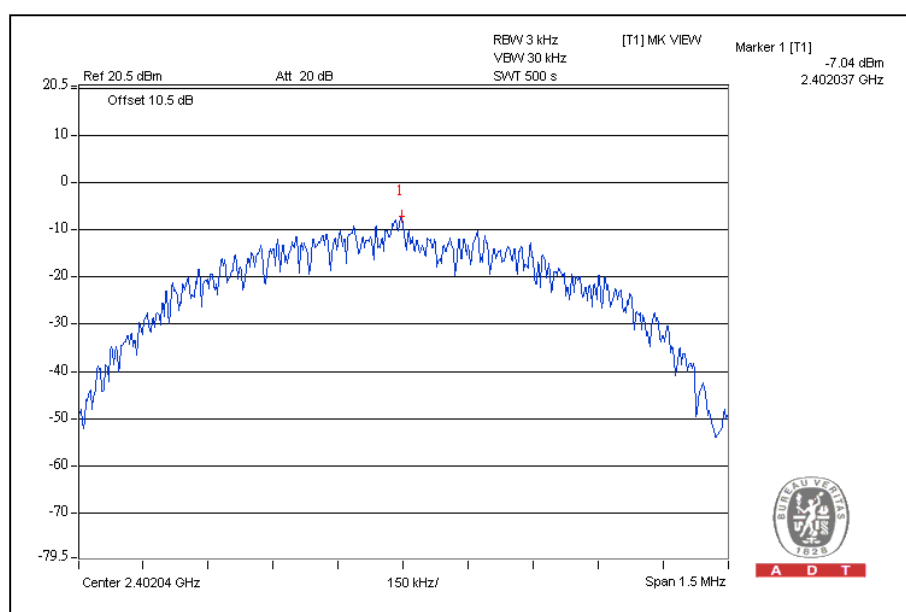
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.8.7 TEST RESULTS

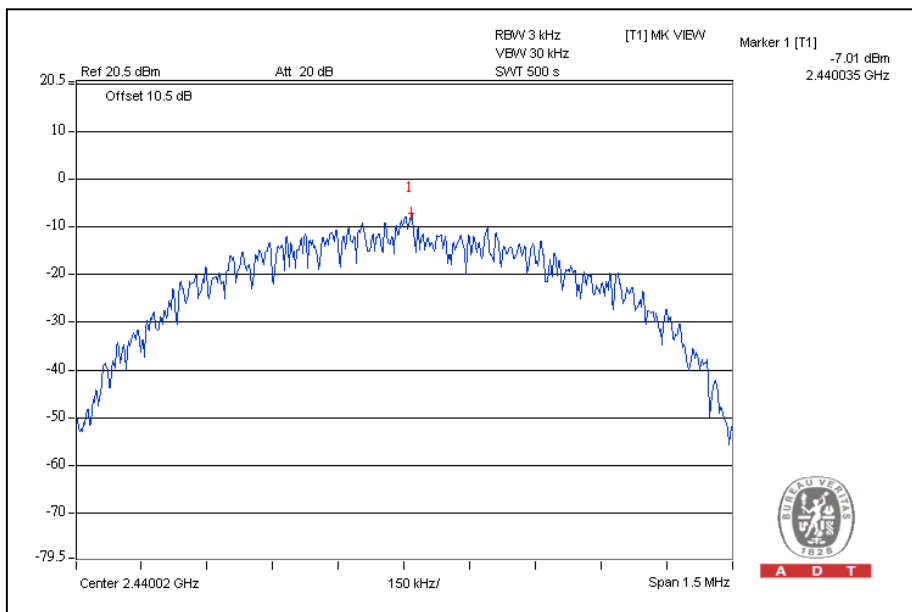
For GFSK(LE mode)

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
0	2402	-7.0	8	PASS
19	2440	-7.0	8	PASS
39	2480	-7.0	8	PASS

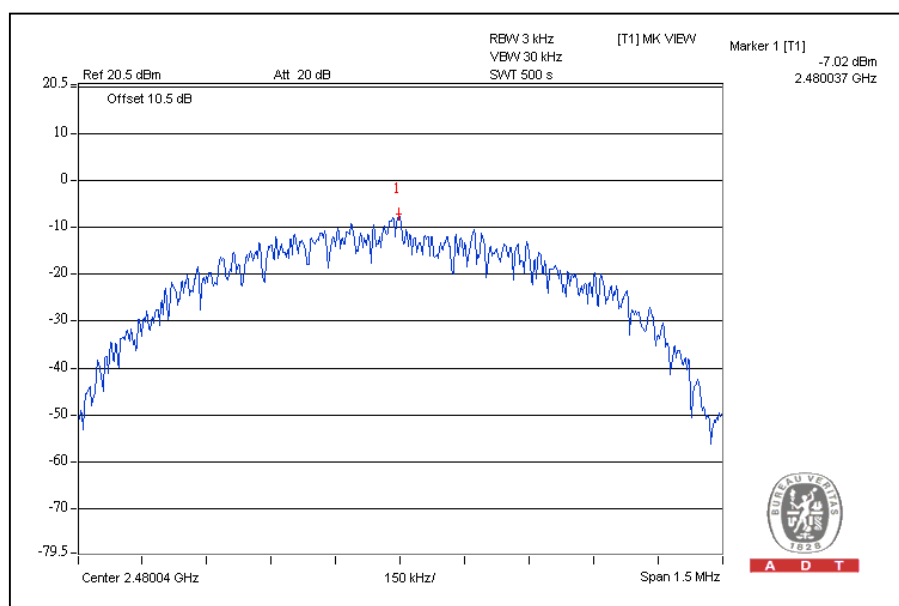
CH0



CH19



CH39



4.9 RADIATED EMISSION MEASUREMENT

4.9.1 LIMITS OF RADIATED EMISSION MEASUREMENT

For transmitter part:

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209(RSS-Gen table 5, 6) 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. 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.

For receiver part:

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in RSS-Gen table 2 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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. 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.

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4.9.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011
AISI Horn Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_V8.7.05	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) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. G.

4. The FCC Site Registration No. is 966073.

5. The VCCI Site Registration No. is G-137.

6. The CANADA Site Registration No. is IC 7450H-2.

4.9.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meters chamber room. 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.
- a. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

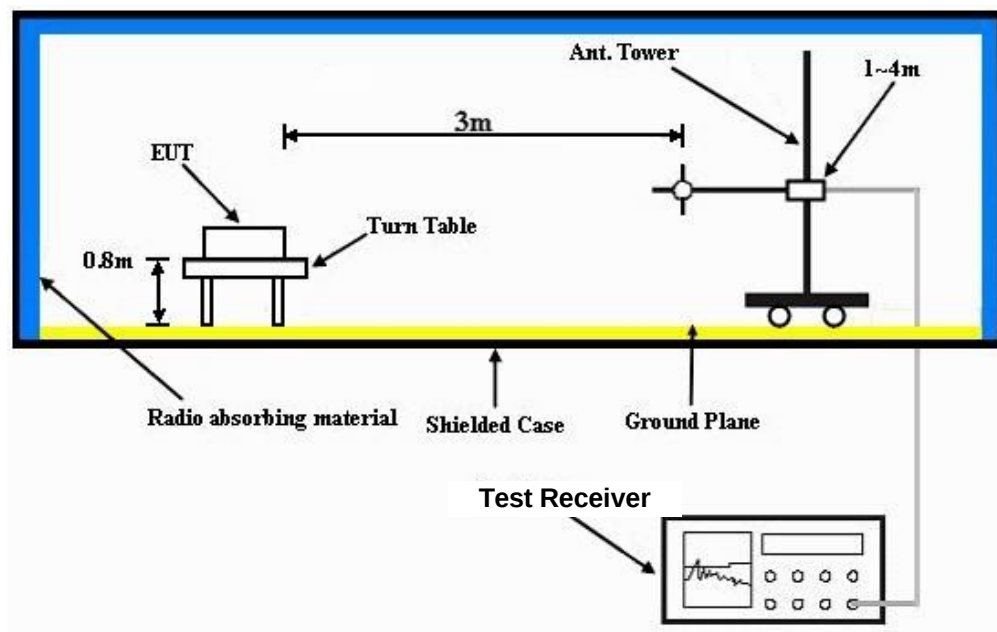
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

4.9.4 DEVIATION FROM TEST STANDARD

No deviation

4.9.5 TEST SETUP



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

4.9.6 TEST RESULTS (FOR TRANSMITTER PART)

4.9.6.1 TEST RESULTS (GFSK / 8DPSK)

BELOW 1GHz WORST-CASE DATA : 8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	15deg. C, 68%RH 1023 hPa	TESTED BY	Frank 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	161.33	36.7 QP	43.5	-6.8	2.00 H	264	22.18	14.54
2	239.96	34.8 QP	46.0	-11.2	1.00 H	114	21.91	12.90
3	304.62	43.0 QP	46.0	-3.0	1.00 H	283	27.44	15.56
4	321.79	40.3 QP	46.0	-5.7	1.00 H	280	24.38	15.94
5	498.01	35.3 QP	46.0	-10.7	2.00 H	202	15.25	20.05
6	604.82	33.2 QP	46.0	-12.8	1.00 H	278	10.77	22.44
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	36.04	36.9 QP	40.0	-3.1	1.00 V	269	23.33	13.54
2	161.09	36.5 QP	43.5	-7.0	1.00 V	130	21.97	14.57
3	303.08	34.5 QP	46.0	-11.5	1.50 V	73	18.93	15.53
4	497.77	37.3 QP	46.0	-8.7	1.50 V	274	17.26	20.05
5	607.07	31.0 QP	46.0	-15.0	1.00 V	240	8.53	22.47
6	900.64	34.6 QP	46.0	-11.4	1.00 V	281	7.80	26.81

- 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.



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ABOVE 1GHz WORST-CASE DATA :

GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	54.3 PK	74.0	-19.7	1.49 H	34	22.64	31.66
2	2390.00	43.4 AV	54.0	-10.6	1.49 H	34	11.74	31.66
3	*2402.00	101.5 PK			1.49 H	34	69.80	31.70
4	*2402.00	94.0 AV			1.49 H	34	62.30	31.70
5	4804.00	45.4 PK	74.0	-28.6	1.06 H	255	6.50	38.90
6	4804.00	36.9 AV	54.0	-17.1	1.06 H	255	-2.00	38.90
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	55.1 PK	74.0	-18.9	1.04 V	215	23.44	31.66
2	2390.00	43.6 AV	54.0	-10.4	1.04 V	215	11.94	31.66
3	*2402.00	103.4 PK			1.04 V	215	71.70	31.70
4	*2402.00	94.5 AV			1.04 V	215	62.80	31.70
5	4804.00	54.1 PK	74.0	-19.9	1.17 V	167	15.20	38.90
6	4804.00	46.1 AV	54.0	-7.9	1.17 V	167	7.20	38.90

- 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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	101.3 PK			1.46 H	57	69.47	31.83
2	*2441.00	93.9 AV			1.46 H	57	62.07	31.83
3	4882.00	45.4 PK	74.0	-28.6	1.00 H	248	6.23	39.17
4	4882.00	37.0 AV	54.0	-17.0	1.00 H	248	-2.17	39.17
5	7323.00	52.5 PK	74.0	-21.5	1.00 H	236	5.87	46.63
6	7323.00	41.1 AV	54.0	-12.9	1.00 H	236	-5.53	46.63
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	*2441.00	103.5 PK			1.04 V	219	71.67	31.83
2	*2441.00	94.1 AV			1.04 V	219	62.27	31.83
3	4882.00	49.0 PK	74.0	-25.0	1.36 V	140	9.83	39.17
4	4882.00	39.2 AV	54.0	-14.8	1.36 V	140	0.03	39.17
5	7323.00	52.3 PK	74.0	-21.7	1.03 V	253	5.67	46.63
6	7323.00	42.4 AV	54.0	-11.6	1.03 V	253	-4.23	46.63

- 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.



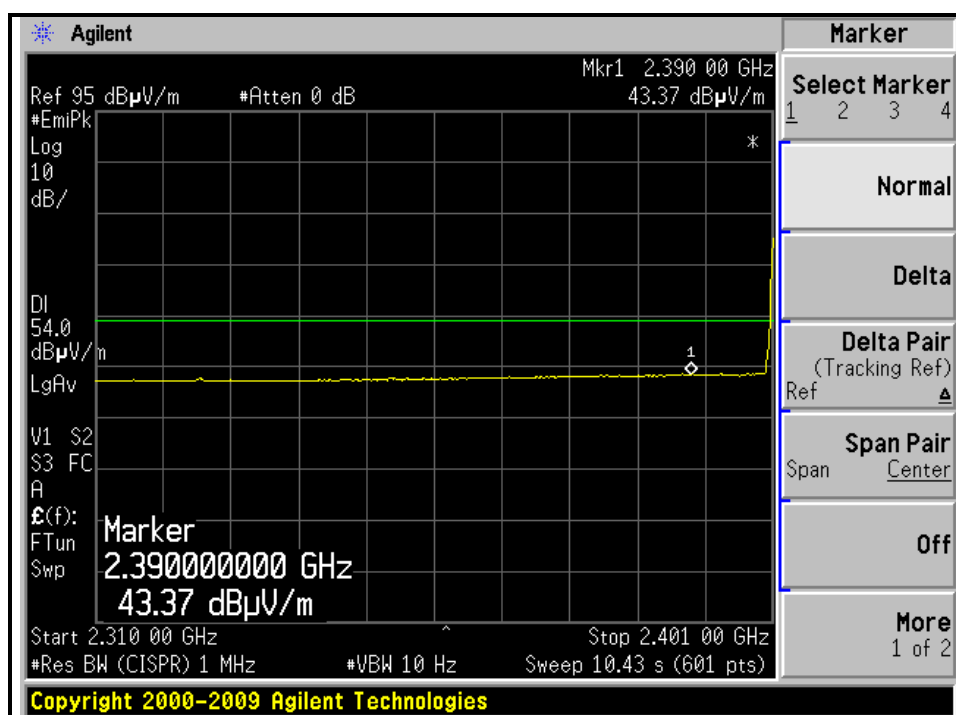
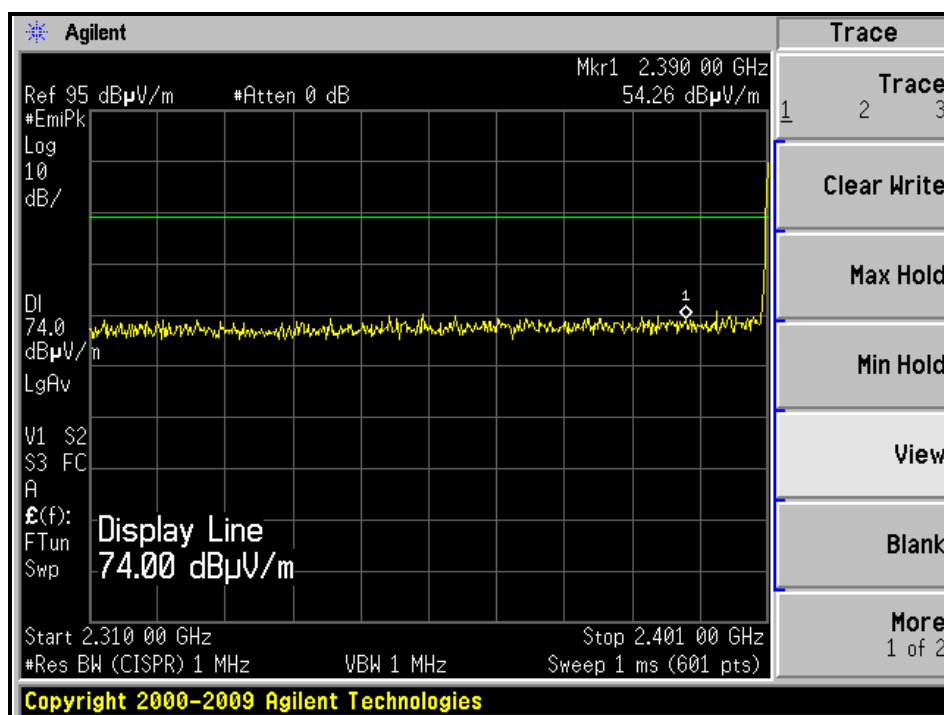
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	TESTED BY	Kent Liu

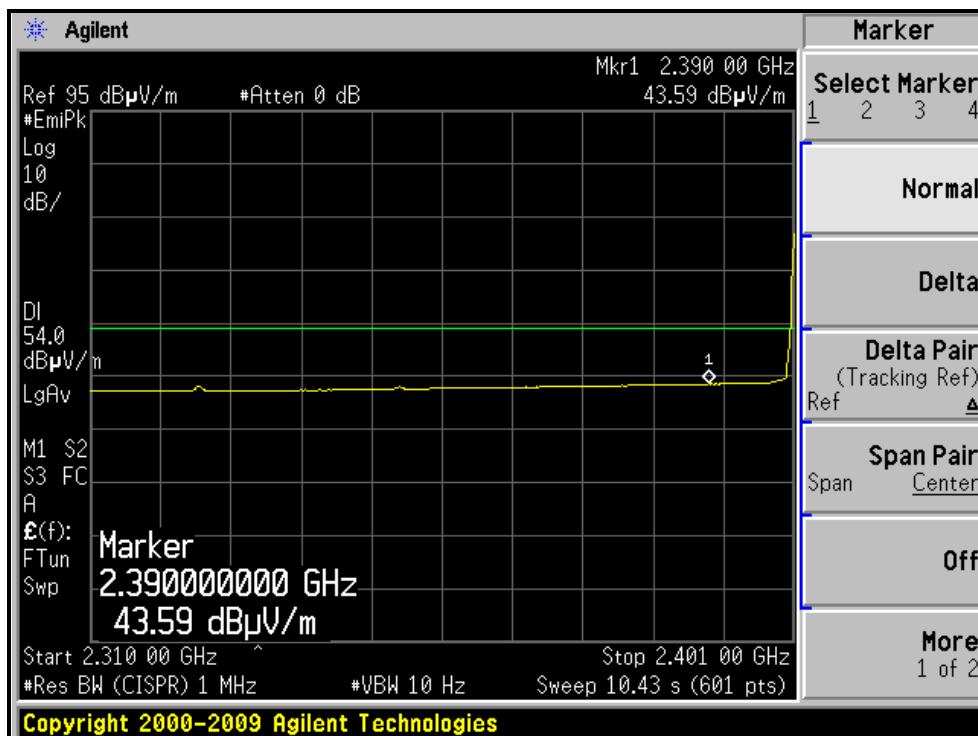
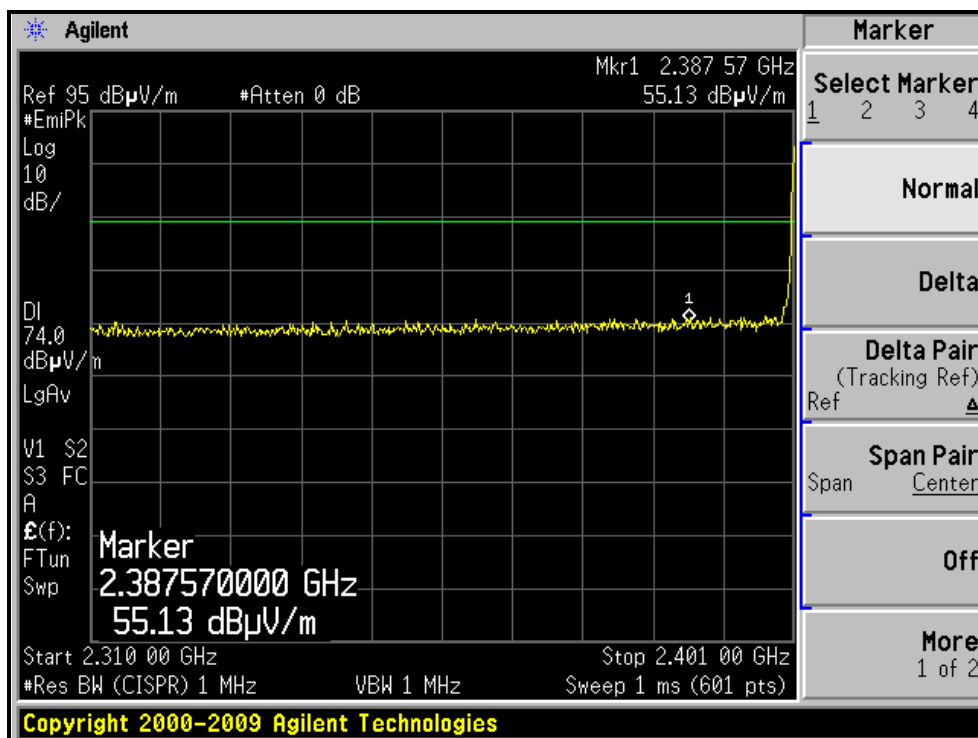
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	101.2 PK			1.49 H	34	69.25	31.95
2	*2480.00	93.8 AV			1.49 H	34	61.85	31.95
3	2483.60	54.6 PK	74.0	-19.4	1.49 H	34	22.63	31.97
4	2483.60	43.1 AV	54.0	-10.9	1.49 H	34	11.13	31.97
5	4960.00	45.3 PK	74.0	-28.7	1.02 H	244	5.88	39.42
6	4960.00	36.9 AV	54.0	-17.1	1.02 H	244	-2.52	39.42
7	7440.00	52.5 PK	74.0	-21.5	1.00 H	241	5.94	46.56
8	7440.00	41.2 AV	54.0	-12.8	1.00 H	241	-5.36	46.56
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	103.5 PK			1.04 V	219	71.55	31.95
2	*2480.00	94.3 AV			1.04 V	219	62.35	31.95
3	2483.50	55.4 PK	74.0	-18.6	1.04 V	219	23.43	31.97
4	2483.50	43.4 AV	54.0	-10.6	1.04 V	219	11.43	31.97
5	4960.00	49.2 PK	74.0	-24.8	1.33 V	141	9.78	39.42
6	4960.00	39.7 AV	54.0	-14.3	1.33 V	141	0.28	39.42
7	7440.00	52.4 PK	74.0	-21.6	1.00 V	241	5.84	46.56
8	7440.00	42.3 AV	54.0	-11.7	1.00 V	241	-4.26	46.56

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.

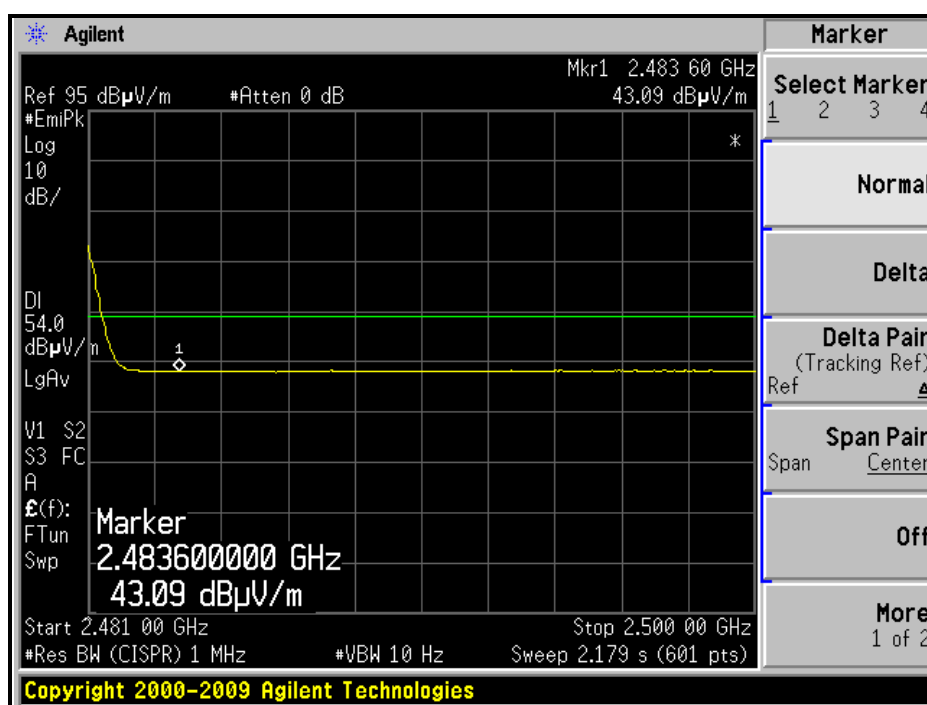
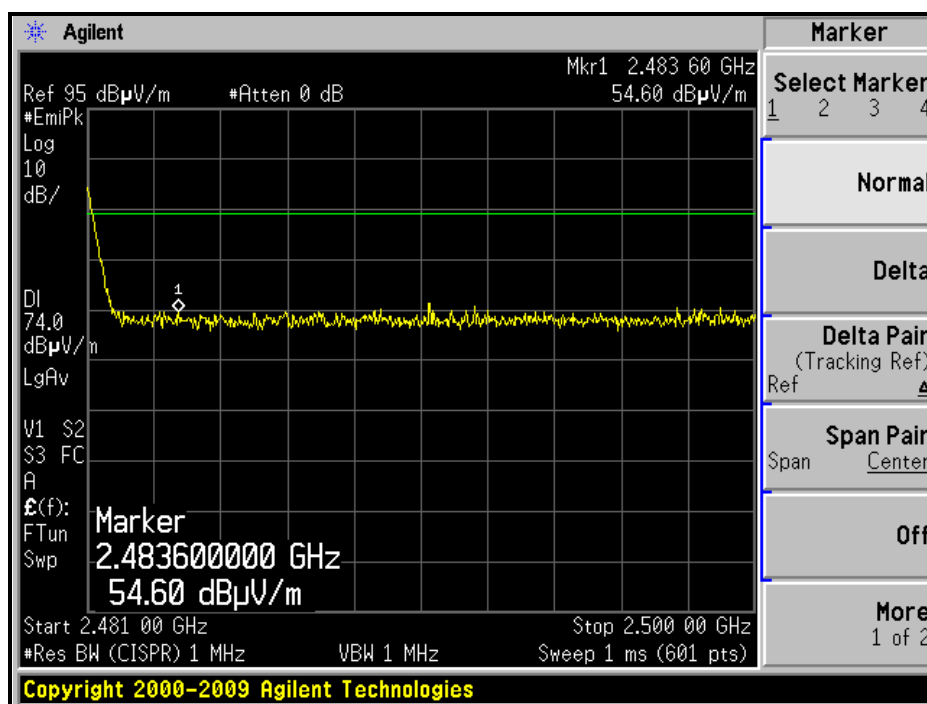
RESTRICTED BANDEDGE (GFSK MODE, CH0, HORIZONTAL)



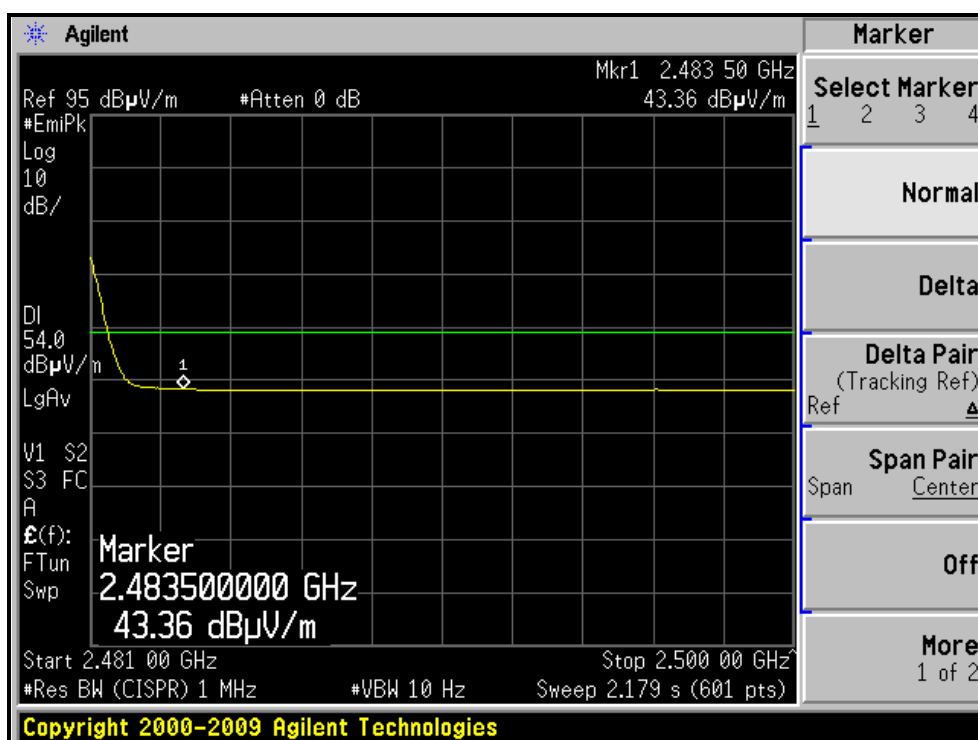
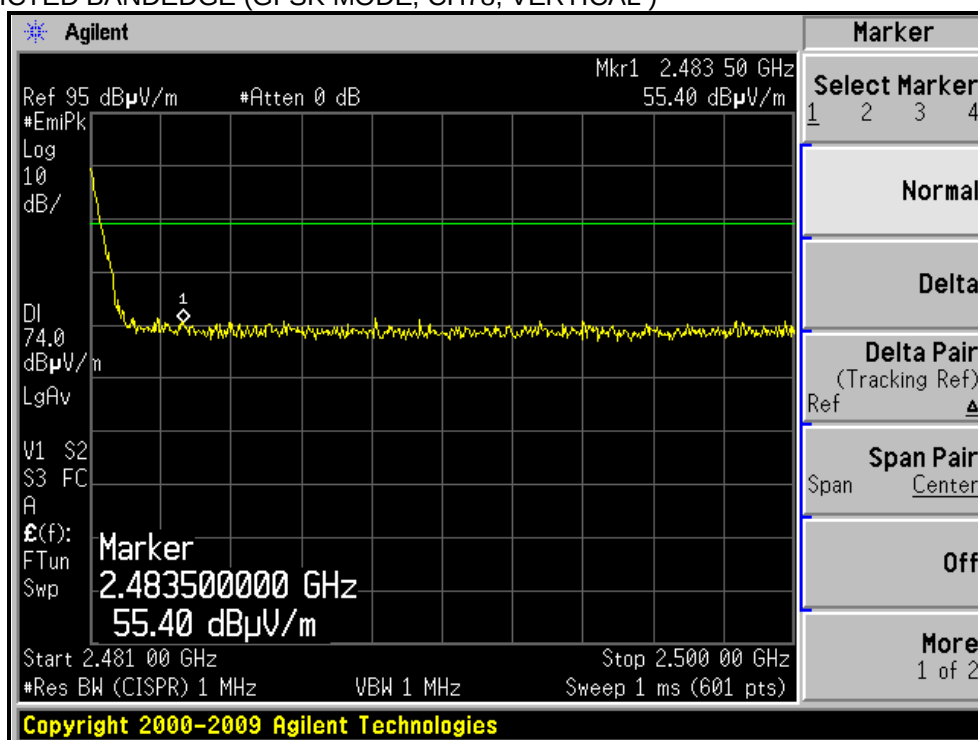
RESTRICTED BANDEDGE (GFSK MODE, CH0, VERTICAL)



RESTRICTED BANDEDGE (GFSK MODE, CH78, HORIZONTAL)



RESTRICTED BANDEDGE (GFSK MODE, CH78, VERTICAL)





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8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	55.5 PK	74.0	-18.5	1.46 H	35	23.84	31.66
2	2390.00	43.5 AV	54.0	-10.5	1.46 H	35	11.84	31.66
3	*2402.00	104.1 PK			1.46 H	35	72.40	31.70
4	*2402.00	92.7 AV			1.46 H	35	61.00	31.70
5	4804.00	44.9 PK	74.0	-29.1	1.08 H	248	6.00	38.90
6	4804.00	36.6 AV	54.0	-17.4	1.08 H	248	-2.30	38.90
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	55.7 PK	74.0	-18.3	1.04 V	215	24.04	31.66
2	2390.00	43.6 AV	54.0	-10.4	1.04 V	215	11.94	31.66
3	*2402.00	104.8 PK			1.04 V	215	73.10	31.70
4	*2402.00	93.2 AV			1.04 V	215	61.50	31.70
5	4804.00	55.7 PK	74.0	-18.3	1.04 V	82	16.80	38.90
6	4804.00	44.8 AV	54.0	-9.2	1.04 V	82	5.90	38.90

- 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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	104.2 PK			1.44 H	46	72.37	31.83
2	*2441.00	92.6 AV			1.44 H	46	60.77	31.83
3	4882.00	45.0 PK	74.0	-29.0	1.10 H	250	5.83	39.17
4	4882.00	36.7 AV	54.0	-17.3	1.10 H	250	-2.47	39.17
5	7323.00	52.3 PK	74.0	-21.7	1.00 H	231	5.67	46.63
6	7323.00	42.2 AV	54.0	-11.8	1.00 H	231	-4.43	46.63
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	*2441.00	104.9 PK			1.04 V	214	73.07	31.83
2	*2441.00	93.4 AV			1.04 V	214	61.57	31.83
3	4882.00	55.3 PK	74.0	-18.7	1.00 V	66	16.13	39.17
4	4882.00	44.6 AV	54.0	-9.4	1.00 V	66	5.43	39.17
5	7323.00	52.0 PK	74.0	-22.0	1.02 V	234	5.37	46.63
6	7323.00	42.2 AV	54.0	-11.8	1.02 V	234	-4.43	46.63

- 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.



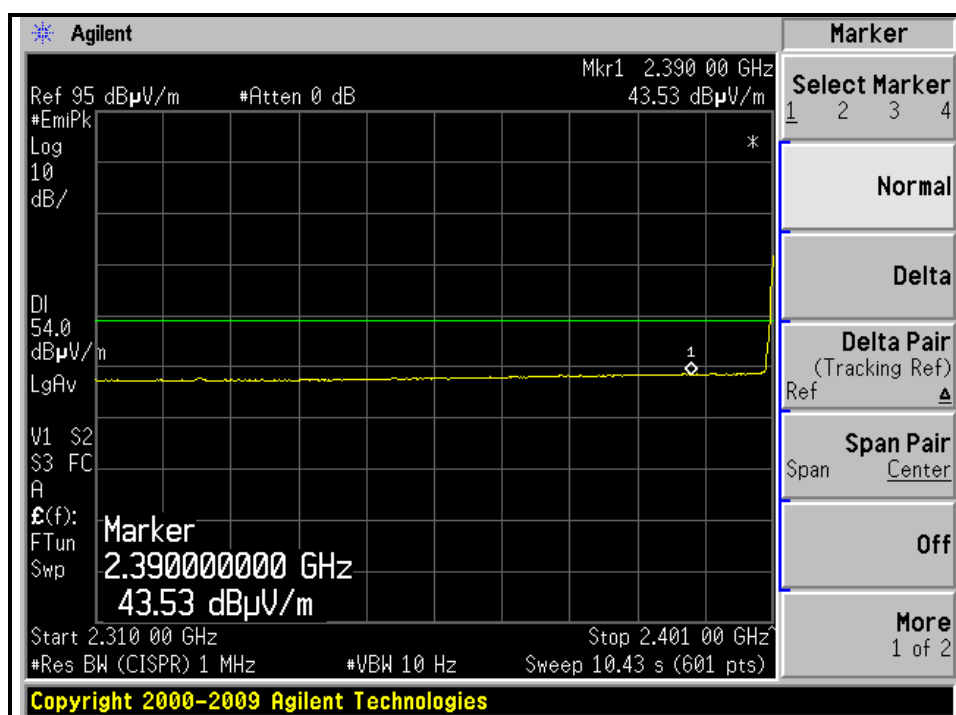
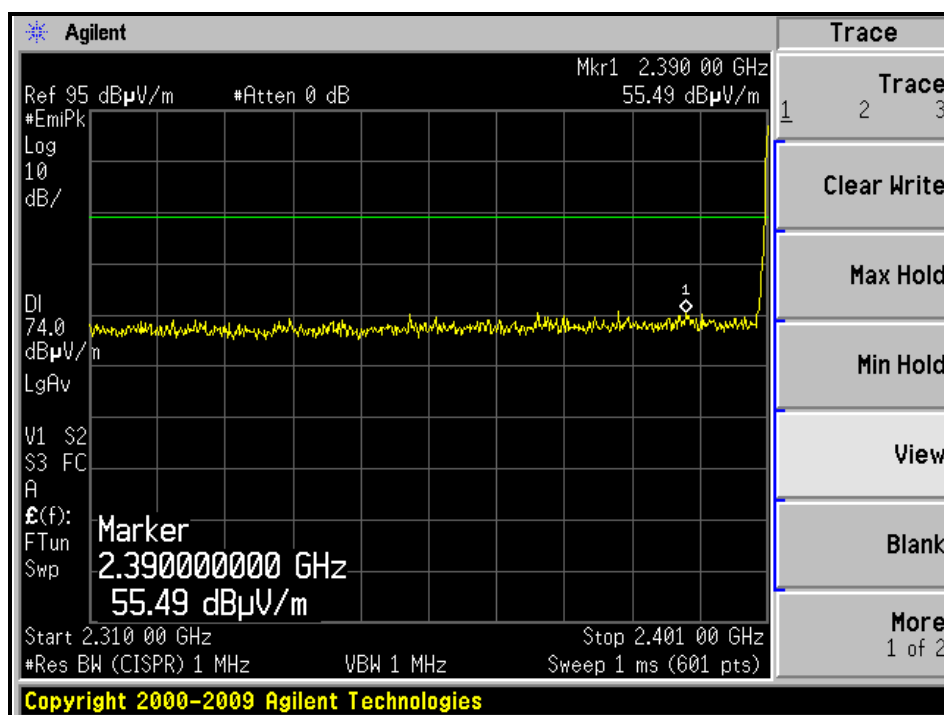
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	TESTED BY	Kent Liu

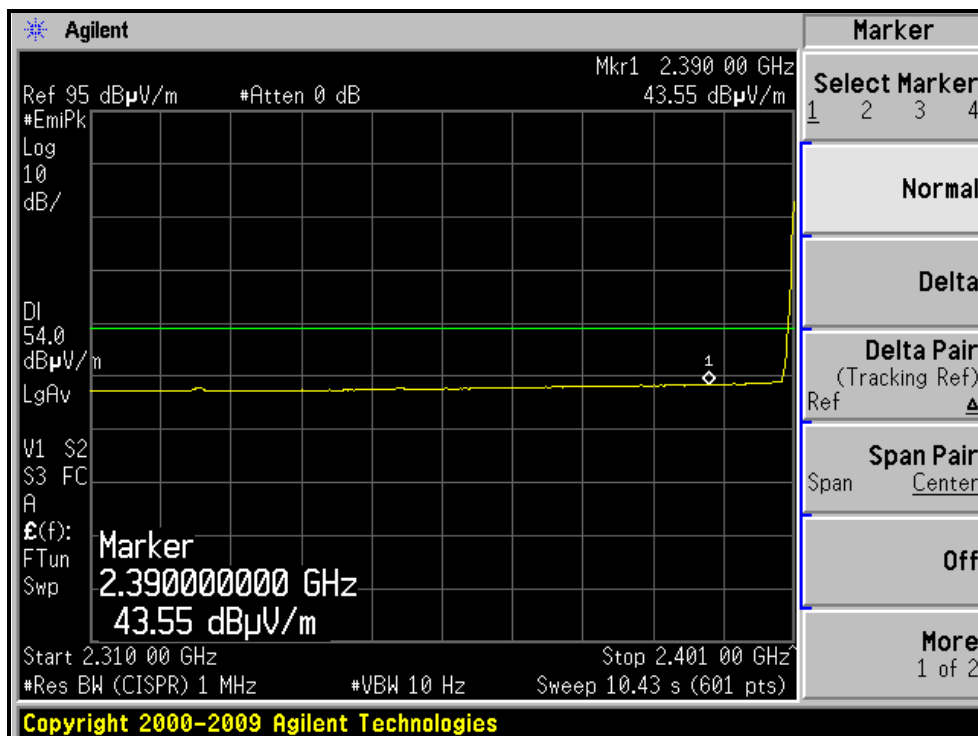
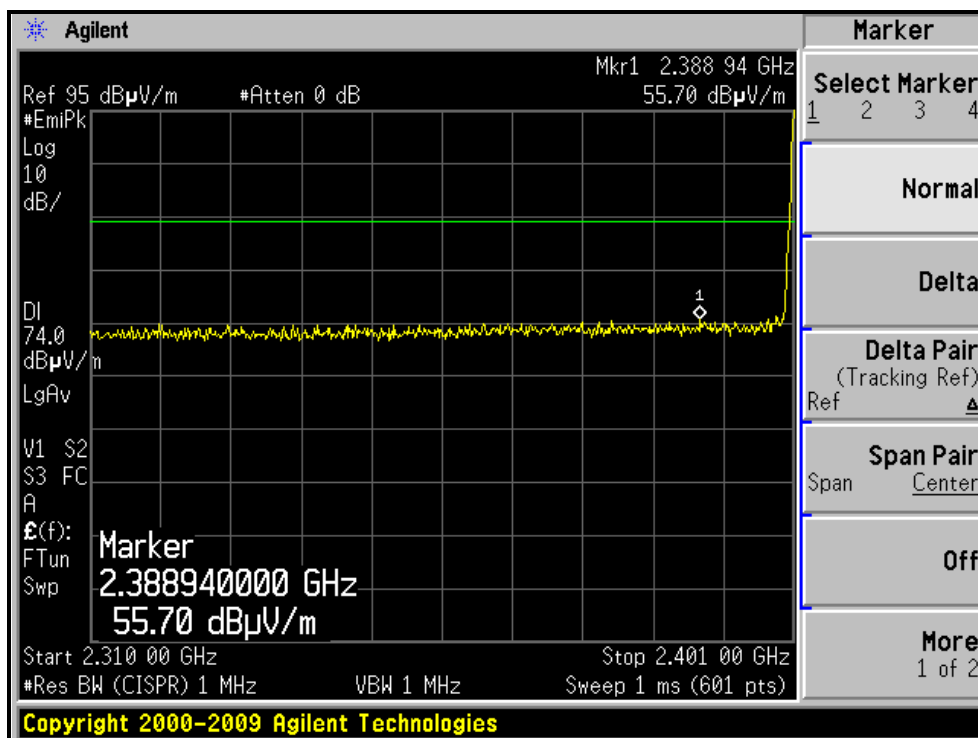
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NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	104.3 PK			1.49 H	36	72.35	31.95
2	*2480.00	92.8 AV			1.49 H	36	60.85	31.95
3	2483.50	53.8 PK	74.0	-20.2	1.49 H	36	21.83	31.97
4	2483.50	43.0 AV	54.0	-11.0	1.49 H	36	11.03	31.97
5	4960.00	44.9 PK	74.0	-29.1	1.05 H	239	5.48	39.42
6	4960.00	36.6 AV	54.0	-17.4	1.05 H	239	-2.82	39.42
7	7440.00	52.8 PK	74.0	-21.2	1.00 H	240	6.24	46.56
8	7440.00	42.4 AV	54.0	-11.6	1.00 H	240	-4.16	46.56
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	105.2 PK			1.04 V	218	73.25	31.95
2	*2480.00	93.3 AV			1.04 V	218	61.35	31.95
3	2483.50	55.1 PK	74.0	-18.9	1.04 V	218	23.13	31.97
4	2483.50	43.4 AV	54.0	-10.6	1.04 V	218	11.43	31.97
5	4960.00	55.2 PK	74.0	-18.8	1.00 V	72	15.78	39.42
6	4960.00	44.6 AV	54.0	-9.4	1.00 V	72	5.18	39.42
7	7440.00	52.4 PK	74.0	-21.6	1.00 V	241	5.84	46.56
8	7440.00	42.3 AV	54.0	-11.7	1.00 V	241	-4.26	46.56

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.

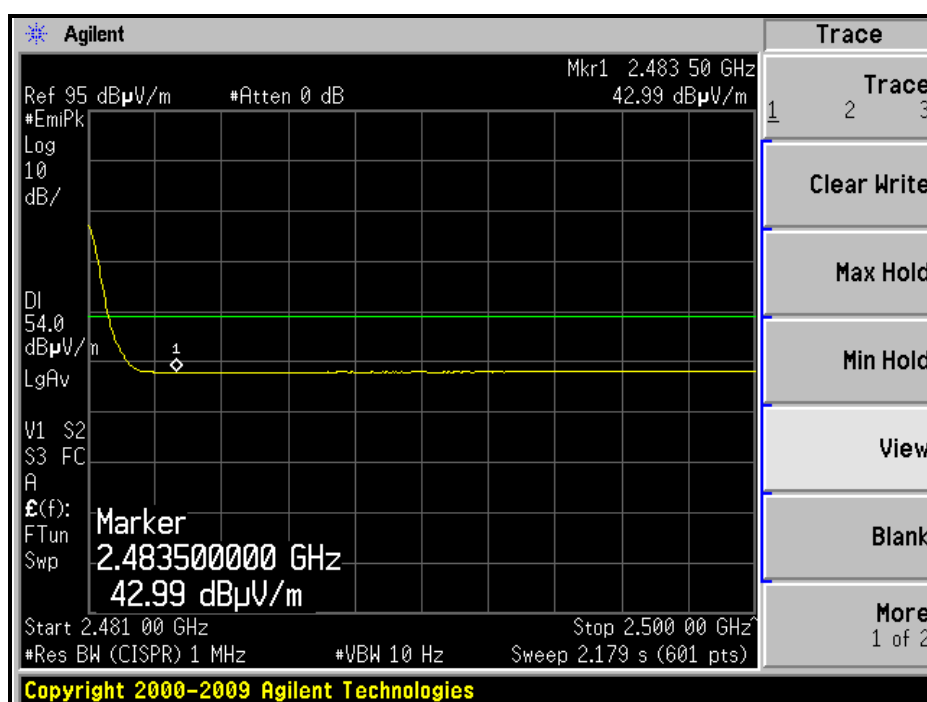
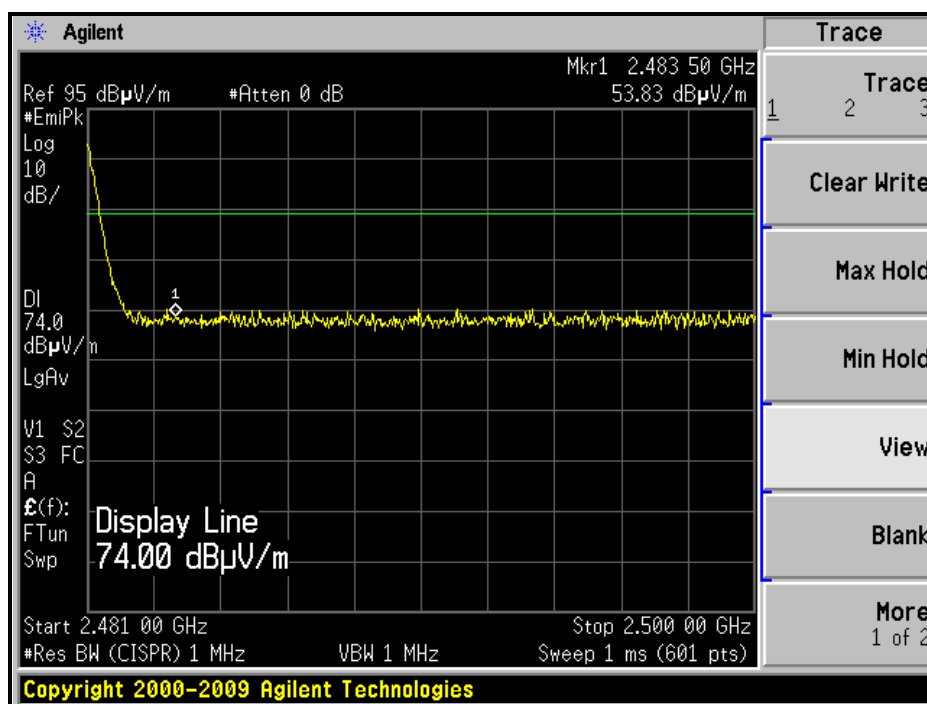
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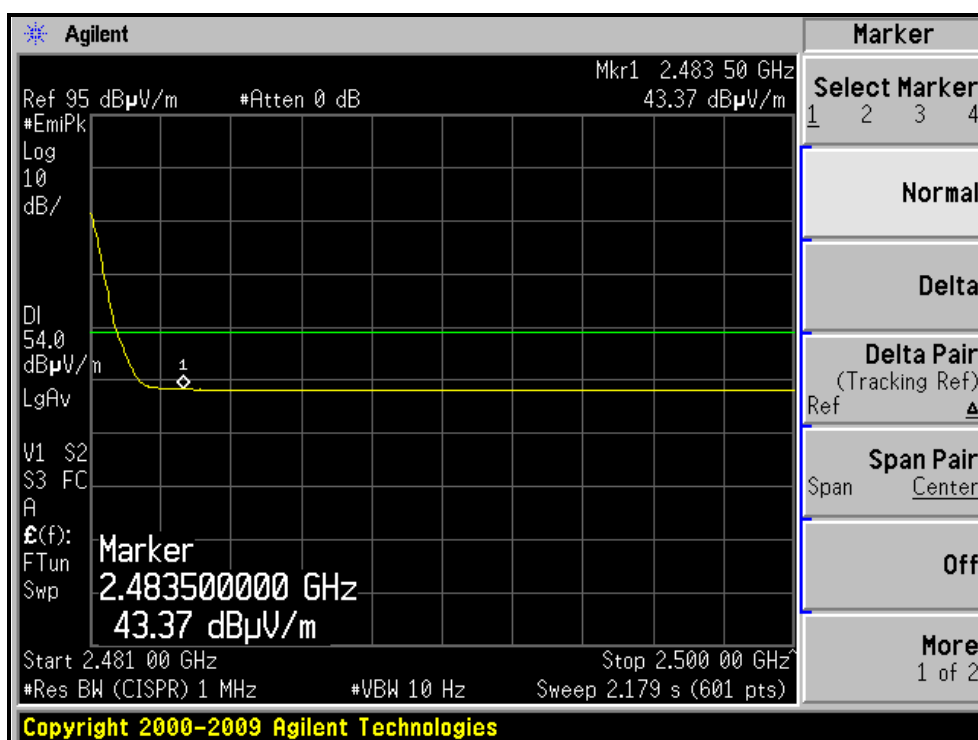
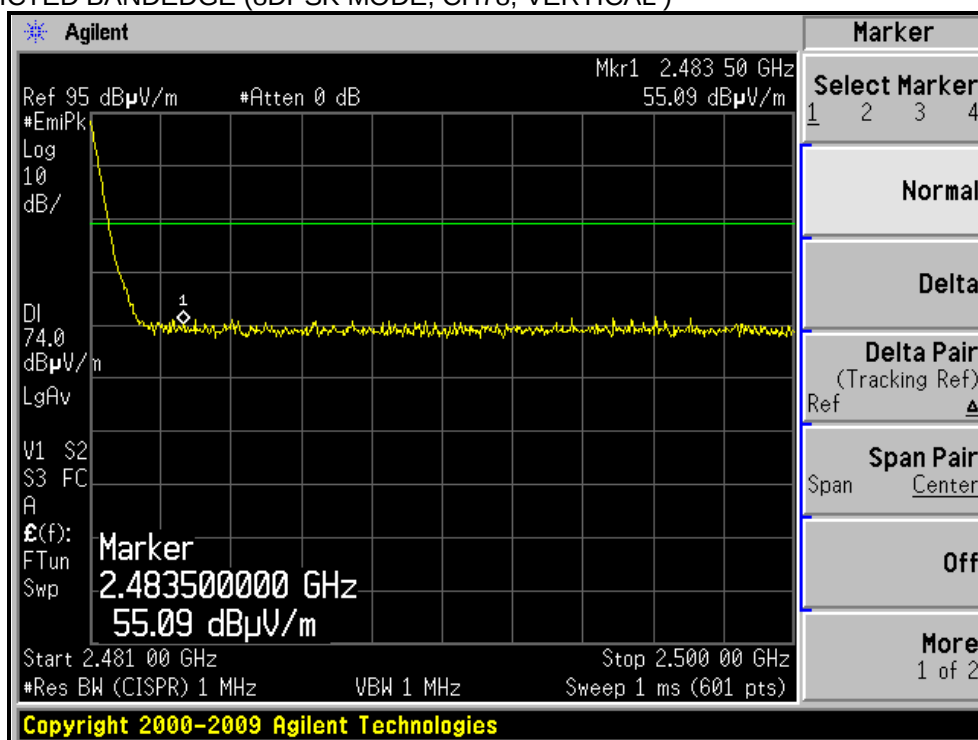
RESTRICTED BANDEDGE (8DPSK MODE, CH0, VERTICAL)



RESTRICTED BANDEDGE (8DPSK MODE, CH78, HORIZONTAL)



RESTRICTED BANDEDGE (8DPSK MODE, CH78, VERTICAL)





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4.9.6.2 TEST RESULTS (GFSK (LE mode))

BELOW 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	15deg. C, 68%RH 1023 hPa	TESTED BY	Frank 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	162.16	35.6 QP	43.5	-7.9	1.50 H	248	21.18	14.43
2	239.96	34.5 QP	46.0	-11.5	1.00 H	116	21.58	12.90
3	304.50	42.1 QP	46.0	-3.9	1.00 H	240	26.58	15.56
4	473.61	34.8 QP	46.0	-11.2	2.00 H	216	15.35	19.46
5	497.89	38.2 QP	46.0	-7.8	2.00 H	187	18.13	20.05
6	604.94	34.4 QP	46.0	-11.6	1.50 H	274	11.92	22.45
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	36.28	36.9 QP	40.0	-3.1	1.00 V	327	23.30	13.56
2	136.23	31.7 QP	43.5	-11.9	1.00 V	360	17.89	13.76
3	160.86	33.8 QP	43.5	-9.7	1.00 V	126	19.23	14.61
4	290.29	31.1 QP	46.0	-15.0	1.00 V	241	15.99	15.06
5	346.66	28.9 QP	46.0	-17.1	1.00 V	360	12.40	16.48
6	604.82	29.9 QP	46.0	-16.1	1.00 V	241	7.44	22.44

- 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.



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ABOVE 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	55.3 PK	74.0	-18.7	1.43 H	37	23.64	31.66
2	2390.00	43.9 AV	54.0	-10.1	1.43 H	37	12.24	31.66
3	*2402.00	103.9 PK			1.43 H	37	72.20	31.70
4	*2402.00	87.9 AV			1.43 H	37	56.20	31.70
5	4804.00	45.9 PK	74.0	-28.1	1.29 H	31	7.00	38.90
6	4804.00	39.6 AV	54.0	-14.4	1.29 H	31	0.70	38.90
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	55.5 PK	74.0	-18.5	1.07 V	216	23.84	31.66
2	2390.00	43.4 AV	54.0	-10.6	1.07 V	216	11.74	31.66
3	*2402.00	104.4 PK			1.07 V	216	72.70	31.70
4	*2402.00	88.4 AV			1.07 V	216	56.70	31.70
5	4804.00	48.4 PK	74.0	-25.6	1.36 V	209	9.50	38.90
6	4804.00	38.8 AV	54.0	-15.2	1.36 V	209	-0.10	38.90

- 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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 19	FREQUENCY RANGE	1 ~ 12.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	*2440.00	103.70 PK			1.42 H	64	71.88	31.82
2	*2440.00	87.80 AV			1.42 H	64	55.98	31.82
3	4880.00	46.00 PK	74.00	-28.00	1.28 H	45	6.84	39.16
4	4880.00	39.50 AV	54.00	-14.50	1.28 H	45	0.34	39.16
5	7320.00	54.20 PK	74.00	-19.80	1.25 H	62	7.57	46.63
6	7320.00	41.00 AV	54.00	-13.00	1.25 H	62	-5.63	46.63
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	*2440.00	104.00 PK			1.05 V	218	72.18	31.82
2	*2440.00	88.00 AV			1.05 V	218	56.18	31.82
3	4880.00	48.80 PK	74.00	-25.20	1.40 V	208	9.64	39.16
4	4880.00	39.10 AV	54.00	-14.90	1.40 V	208	-0.06	39.16
5	7320.00	54.60 PK	74.00	-19.40	1.22 V	37	7.97	46.63
6	7320.00	41.60 AV	54.00	-12.40	1.22 V	37	-5.03	46.63

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.



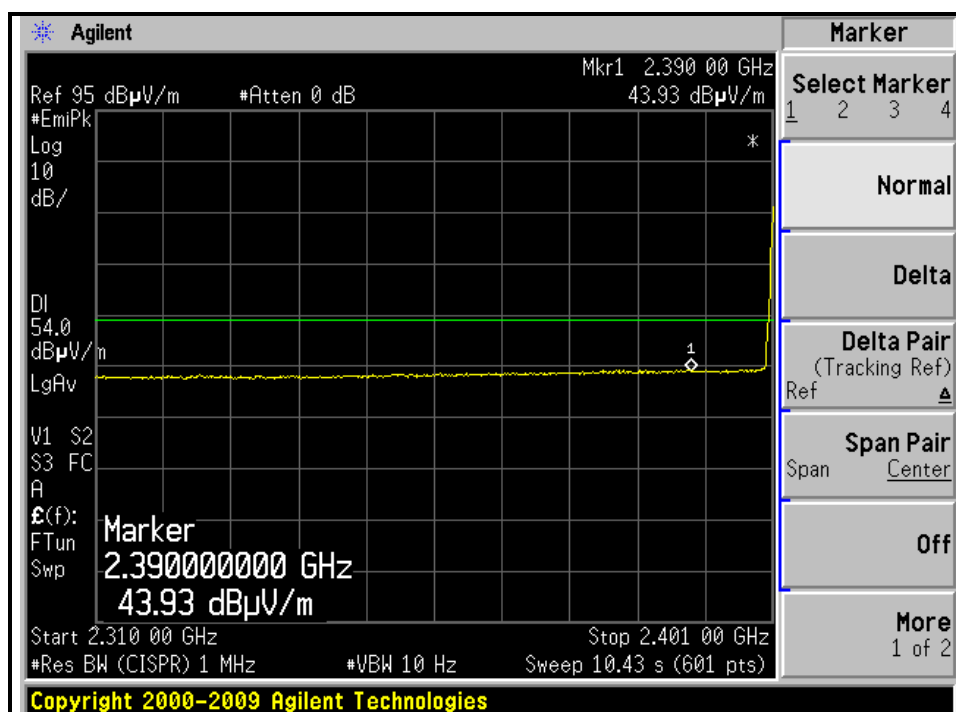
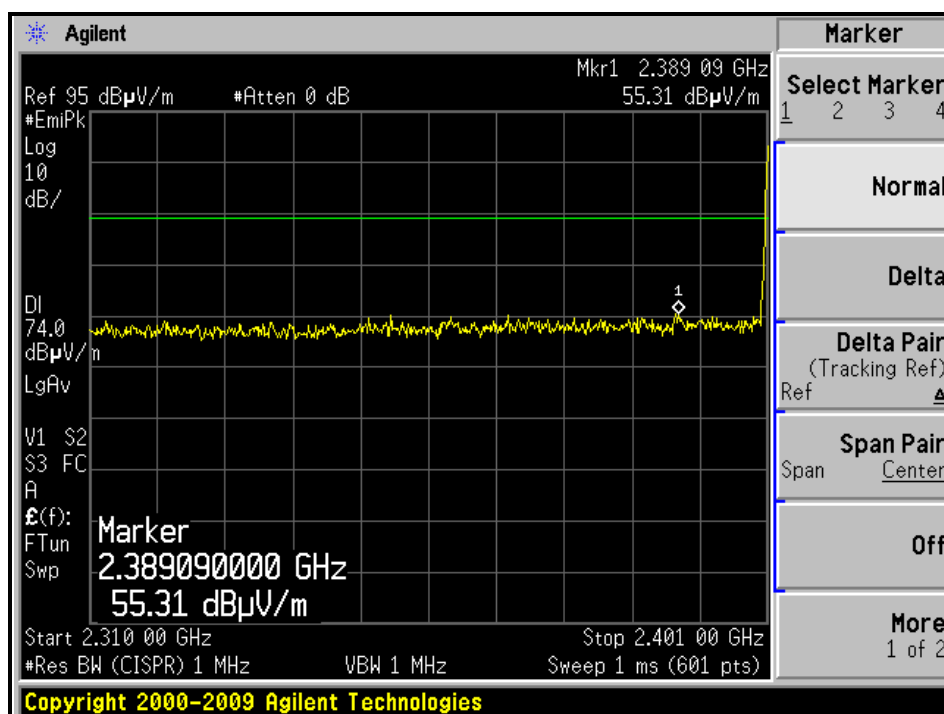
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 12.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	TESTED BY	Kent Liu

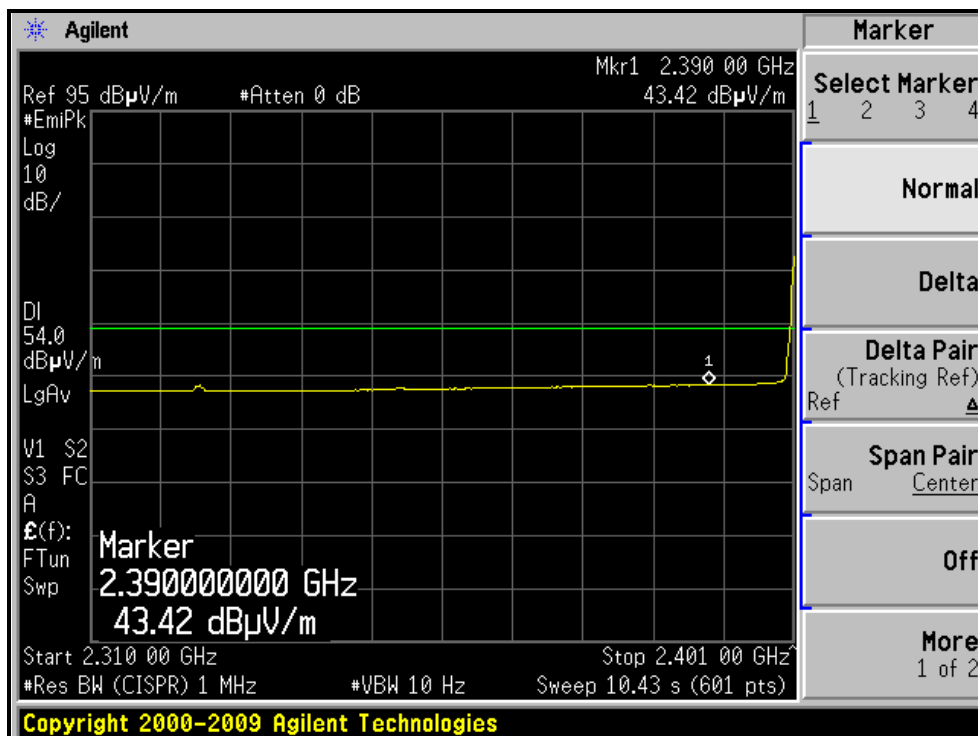
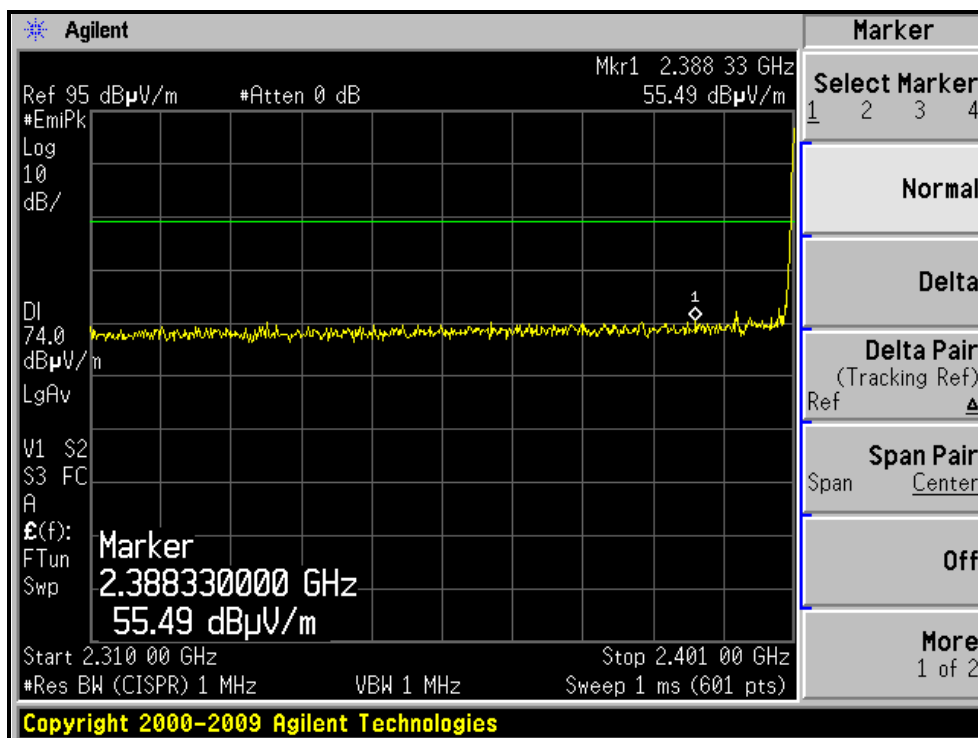
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	103.10 PK			1.44 H	41	71.15	31.95
2	*2480.00	87.40 AV			1.44 H	41	55.45	31.95
3	2483.50	55.10 PK	74.00	-18.90	1.44 H	41	23.13	31.97
4	2483.50	43.00 AV	54.00	-11.00	1.44 H	41	11.03	31.97
5	4960.00	45.90 PK	74.00	-28.10	1.25 H	44	6.48	39.42
6	4960.00	39.60 AV	54.00	-14.40	1.25 H	44	0.18	39.42
7	7440.00	54.60 PK	74.00	-19.40	1.29 H	59	8.04	46.56
8	7440.00	41.30 AV	54.00	-12.70	1.29 H	59	-5.26	46.56
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	103.40 PK			1.04 V	220	71.45	31.95
2	*2480.00	87.70 AV			1.04 V	220	55.75	31.95
3	2483.50	55.60 PK	74.00	-18.40	1.04 V	220	23.63	31.97
4	2483.50	43.30 AV	54.00	-10.70	1.04 V	220	11.33	31.97
5	4960.00	48.70 PK	74.00	-25.30	1.34 V	210	9.28	39.42
6	4960.00	38.90 AV	54.00	-15.10	1.34 V	210	-0.52	39.42
7	7440.00	54.90 PK	74.00	-19.10	1.21 V	36	8.34	46.56
8	7440.00	41.80 AV	54.00	-12.20	1.21 V	36	-4.76	46.56

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.

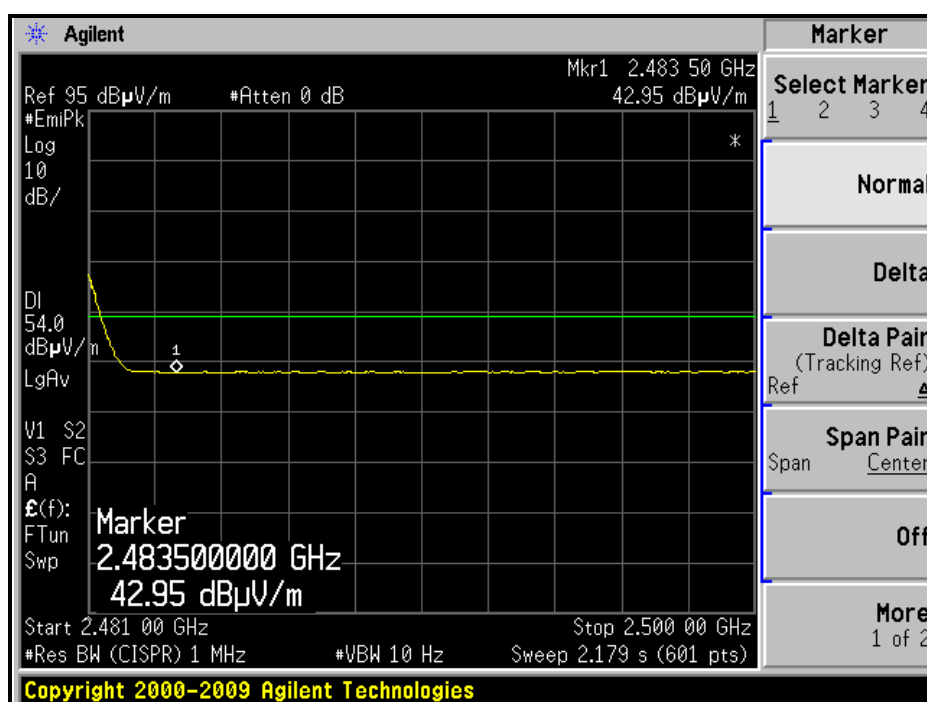
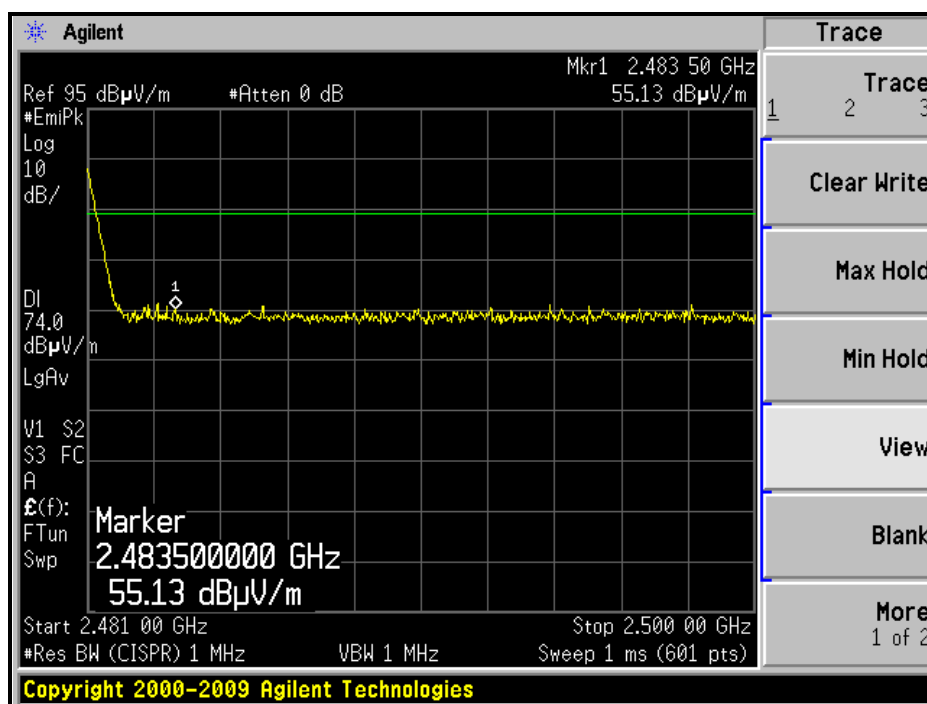
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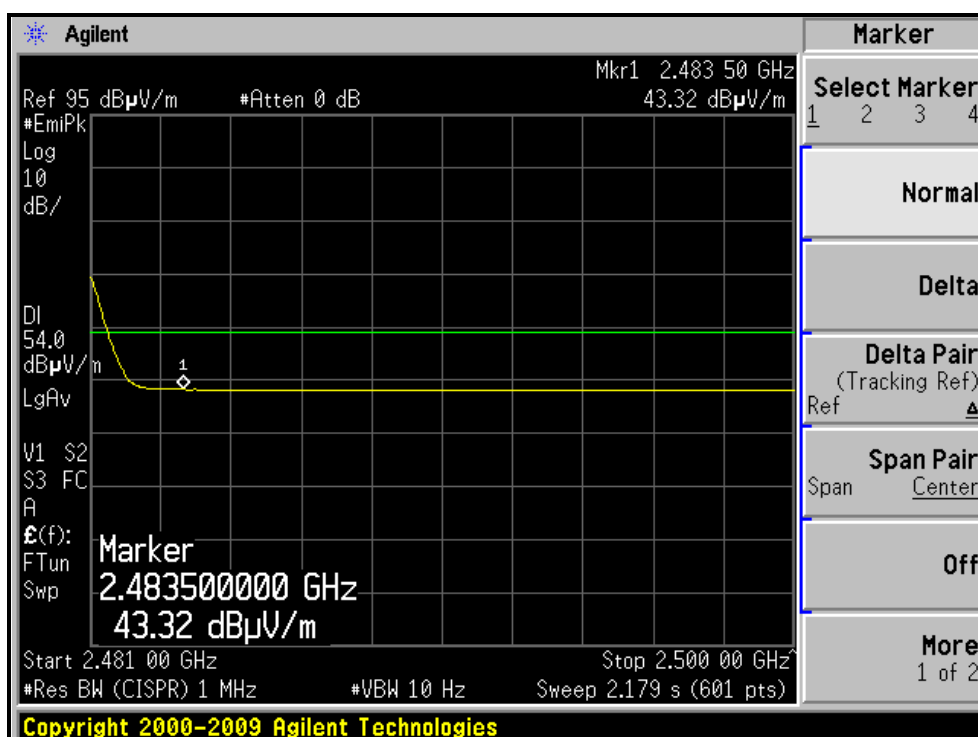
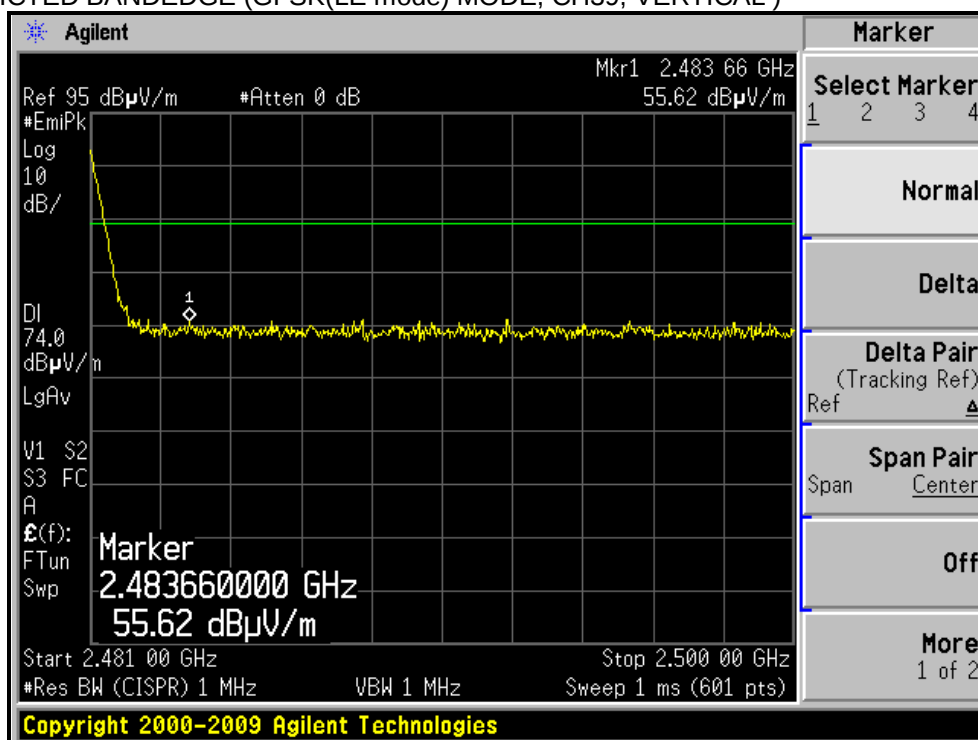
RESTRICTED BANDEDGE (GFSK(LE mode) MODE, CH0, VERTICAL)



RESTRICTED BANDEDGE (GFSK(LE mode) MODE, CH39, HORIZONTAL)



RESTRICTED BANDEDGE (GFSK(LE mode) MODE, CH39, VERTICAL)





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4.9.7 TEST RESULTS (FOR RECEIVER PART)

4.9.7.1 TEST RESULTS (GFSK / 8DPSK)

BELOW 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	15deg. C, 68%RH 1023 hPa	TESTED BY	Frank 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	161.33	36.7 QP	43.5	-6.8	2.00 H	264	22.18	14.54
2	239.96	34.8 QP	46.0	-11.2	1.00 H	114	21.91	12.90
3	304.62	43.0 QP	46.0	-3.0	1.00 H	283	27.44	15.56
4	321.79	40.3 QP	46.0	-5.7	1.00 H	280	24.38	15.94
5	498.01	35.3 QP	46.0	-10.7	2.00 H	202	15.25	20.05
6	604.82	33.2 QP	46.0	-12.8	1.00 H	278	10.77	22.44
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	36.04	36.9 QP	40.0	-3.1	1.00 V	269	23.33	13.54
2	161.09	36.5 QP	43.5	-7.0	1.00 V	130	21.97	14.57
3	303.08	34.5 QP	46.0	-11.5	1.50 V	73	18.93	15.53
4	497.77	37.3 QP	46.0	-8.7	1.50 V	274	17.26	20.05
5	607.07	31.0 QP	46.0	-15.0	1.00 V	240	8.53	22.47
6	900.64	34.6 QP	46.0	-11.4	1.00 V	281	7.80	26.81

- 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.



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ABOVE 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 7.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	2402.00	41.9 PK	74.0	-32.1	1.31 H	104	10.20	31.70
2	2402.00	28.4 AV	54.0	-25.6	1.31 H	104	-3.30	31.70
3	3000.00	46.9 PK	74.0	-27.1	1.31 H	129	13.86	33.04
4	3000.00	40.3 AV	54.0	-13.7	1.31 H	129	7.26	33.04
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	2402.00	40.7 PK	74.0	-33.3	1.06 V	319	9.00	31.70
2	2402.00	28.6 AV	54.0	-25.4	1.06 V	319	-3.10	31.70
3	3000.00	49.6 PK	74.0	-24.4	1.24 V	313	16.56	33.04
4	3000.00	46.2 AV	54.0	-7.8	1.24 V	313	13.16	33.04

- 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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 7.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	41.2 PK	74.0	-32.8	1.42 H	109	9.37	31.83
2	2441.00	28.1 AV	54.0	-25.9	1.42 H	109	-3.73	31.83
3	3000.00	46.3 PK	74.0	-27.7	1.27 H	131	13.26	33.04
4	3000.00	40.3 AV	54.0	-13.7	1.27 H	131	7.26	33.04
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	40.6 PK	74.0	-33.4	1.12 V	324	8.77	31.83
2	2441.00	28.3 AV	54.0	-25.7	1.12 V	324	-3.53	31.83
3	3000.00	49.1 PK	74.0	-24.9	1.34 V	319	16.06	33.04
4	3000.00	46.4 AV	54.0	-7.6	1.34 V	319	13.36	33.04

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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 7.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	41.6 PK	74.0	-32.4	1.43 H	104	9.65	31.95
2	2480.00	28.4 AV	54.0	-25.6	1.43 H	104	-3.55	31.95
3	3000.00	46.7 PK	74.0	-27.3	1.21 H	134	13.66	33.04
4	3000.00	40.2 AV	54.0	-13.8	1.21 H	134	7.16	33.04
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	40.7 PK	74.0	-33.3	1.13 V	326	8.75	31.95
2	2480.00	28.5 AV	54.0	-25.5	1.13 V	326	-3.45	31.95
3	3000.00	49.3 PK	74.0	-24.7	1.31 V	314	16.26	33.04
4	3000.00	46.6 AV	54.0	-7.4	1.31 V	314	13.56	33.04

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.



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4.9.7.2 TEST RESULTS (GFSK(LE mode))

BELOW 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	15deg. C, 68%RH 1023 hPa	TESTED BY	Frank 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	162.16	35.6 QP	43.5	-7.9	1.50 H	248	21.18	14.43
2	239.96	34.5 QP	46.0	-11.5	1.00 H	116	21.58	12.90
3	304.50	42.1 QP	46.0	-3.9	1.00 H	240	26.58	15.56
4	473.61	34.8 QP	46.0	-11.2	2.00 H	216	15.35	19.46
5	497.89	38.2 QP	46.0	-7.8	2.00 H	187	18.13	20.05
6	604.94	34.4 QP	46.0	-11.6	1.50 H	274	11.92	22.45
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	36.28	36.9 QP	40.0	-3.1	1.00 V	327	23.30	13.56
2	136.23	31.7 QP	43.5	-11.9	1.00 V	360	17.89	13.76
3	160.86	33.8 QP	43.5	-9.7	1.00 V	126	19.23	14.61
4	290.29	31.1 QP	46.0	-15.0	1.00 V	241	15.99	15.06
5	346.66	28.9 QP	46.0	-17.1	1.00 V	360	12.40	16.48
6	604.82	29.9 QP	46.0	-16.1	1.00 V	241	7.44	22.44

- 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.



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ABOVE 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 7.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	2402.00	41.9 PK	74.0	-32.1	1.31 H	104	10.20	31.70
2	2402.00	28.4 AV	54.0	-25.6	1.31 H	104	-3.30	31.70
3	3000.00	46.9 PK	74.0	-27.1	1.31 H	129	13.86	33.04
4	3000.00	40.3 AV	54.0	-13.7	1.31 H	129	7.26	33.04
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	2402.00	40.7 PK	74.0	-33.3	1.06 V	319	9.00	31.70
2	2402.00	28.6 AV	54.0	-25.4	1.06 V	319	-3.10	31.70
3	3000.00	49.6 PK	74.0	-24.4	1.24 V	313	16.56	33.04
4	3000.00	46.2 AV	54.0	-7.8	1.24 V	313	13.16	33.04

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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 19	FREQUENCY RANGE	1 ~ 7.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	2440.00	41.6 PK	74.0	-32.4	1.40 H	102	9.78	31.82
2	2440.00	28.3 AV	54.0	-25.7	1.40 H	102	-3.52	31.82
3	3000.00	46.6 PK	74.0	-27.4	1.35 H	131	13.56	33.04
4	3000.00	40.5 AV	54.0	-13.5	1.35 H	131	7.46	33.04
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	2440.00	40.8 PK	74.0	-33.2	1.13 V	321	8.98	31.82
2	2440.00	28.5 AV	54.0	-25.5	1.13 V	321	-3.32	31.82
3	3000.00	49.9 PK	74.0	-24.1	1.37 V	324	16.86	33.04
4	3000.00	46.6 AV	54.0	-7.4	1.37 V	324	13.56	33.04

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.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 7.5GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 67%RH 1023 hPa	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	41.6 PK	74.0	-32.4	1.43 H	104	9.65	31.95
2	2480.00	28.4 AV	54.0	-25.6	1.43 H	104	-3.55	31.95
3	3000.00	46.7 PK	74.0	-27.3	1.21 H	134	13.66	33.04
4	3000.00	40.2 AV	54.0	-13.8	1.21 H	134	7.16	33.04
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	40.7 PK	74.0	-33.3	1.13 V	326	8.75	31.95
2	2480.00	28.5 AV	54.0	-25.5	1.13 V	326	-3.45	31.95
3	3000.00	49.3 PK	74.0	-24.7	1.31 V	314	16.26	33.04
4	3000.00	46.6 AV	54.0	-7.4	1.31 V	314	13.56	33.04

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.

4.10 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

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.

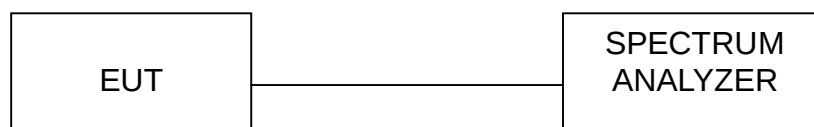
4.8.3 TEST PROCEDURE

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

4.10.1 TEST SETUP



4.8.5 EUT OPERATING CONDITION

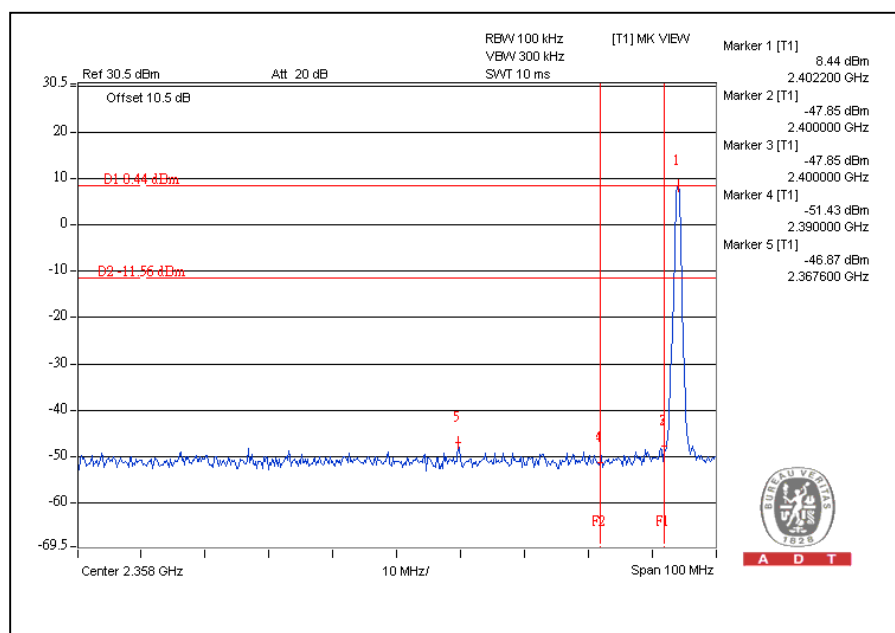
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.8.6 TEST RESULTS

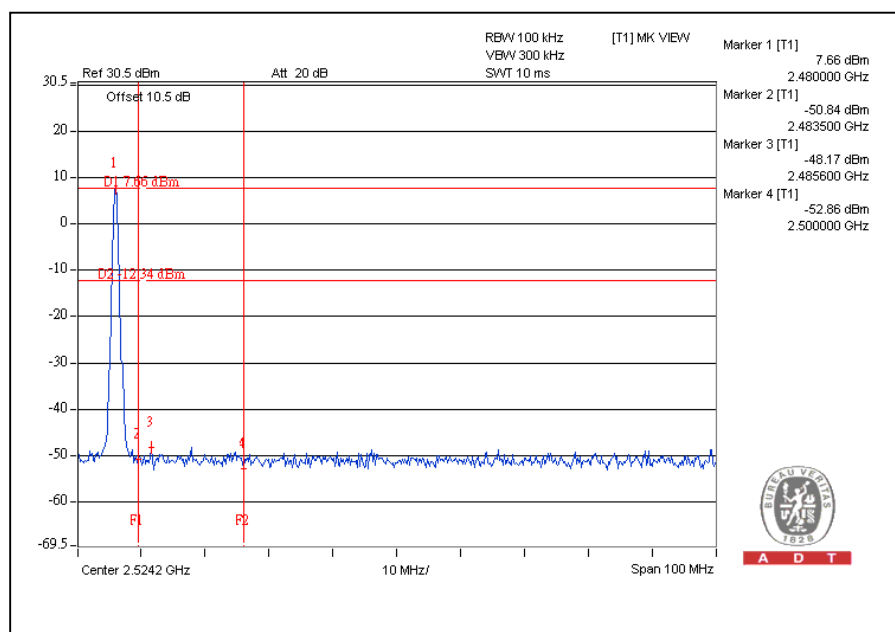
Emissions radiated outside of the specified frequency bands, please refer following pages for met the requirement of the general radiated emission limits in § 15.209.

For GFSK Modulation Type:

CH0



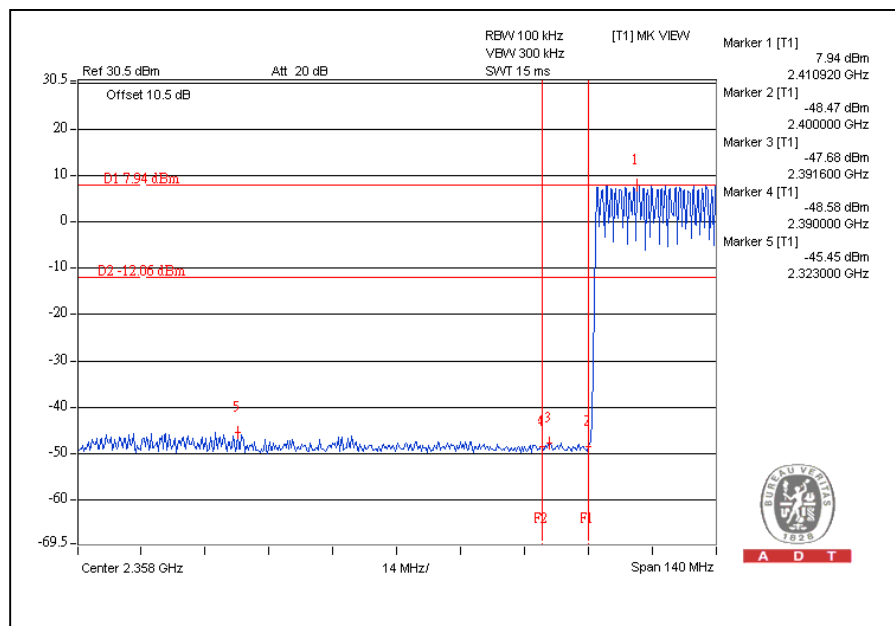
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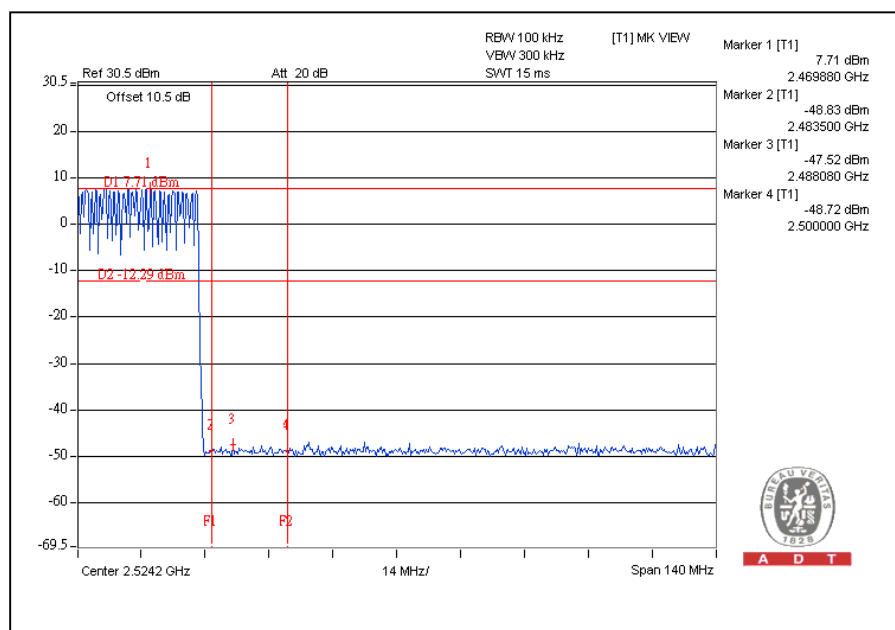


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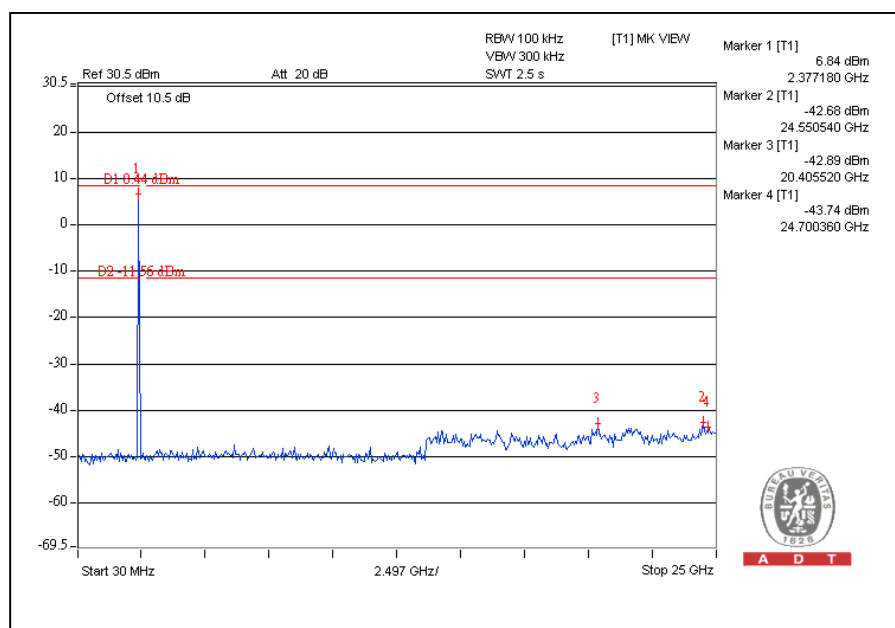
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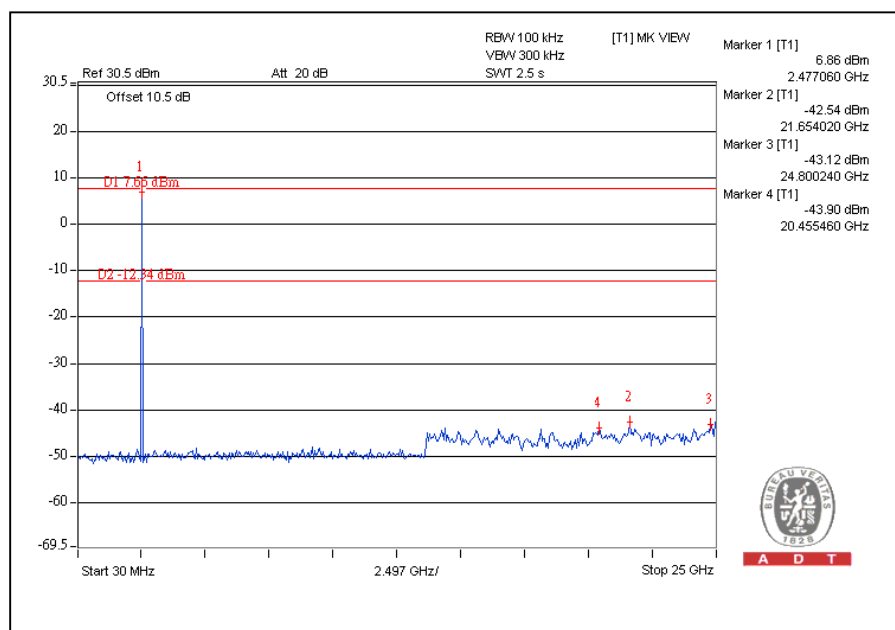
CH78



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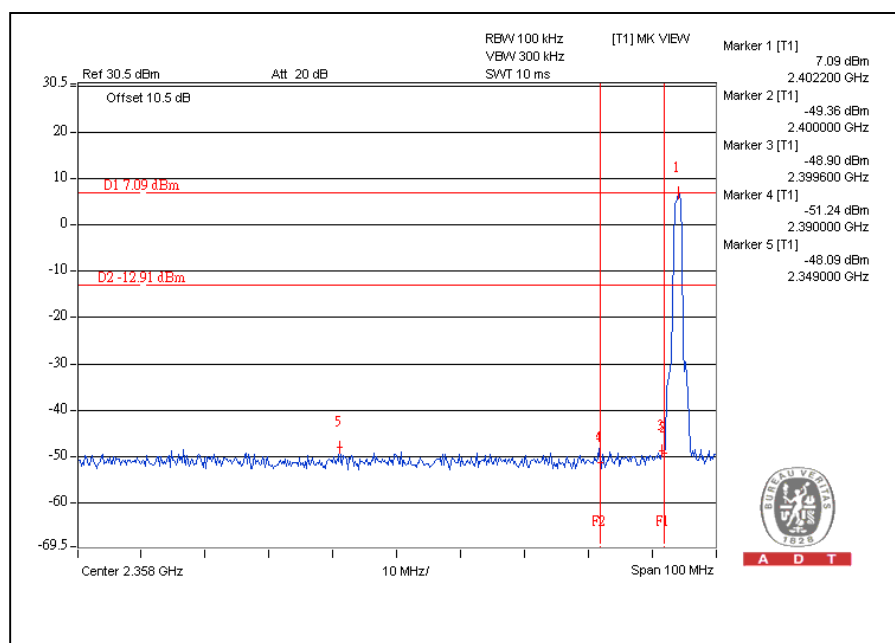


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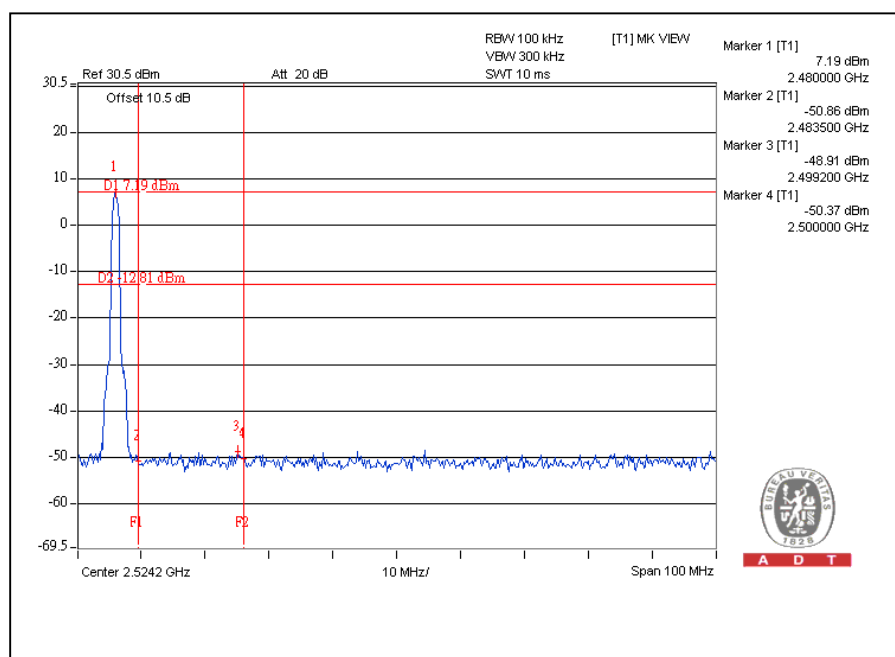


For 8DPSK Modulation Type:

CH0



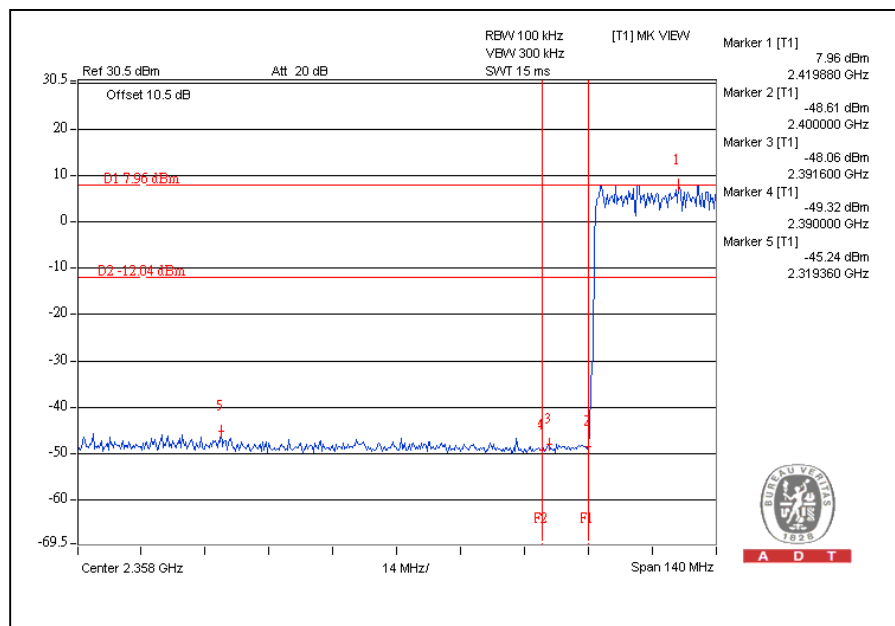
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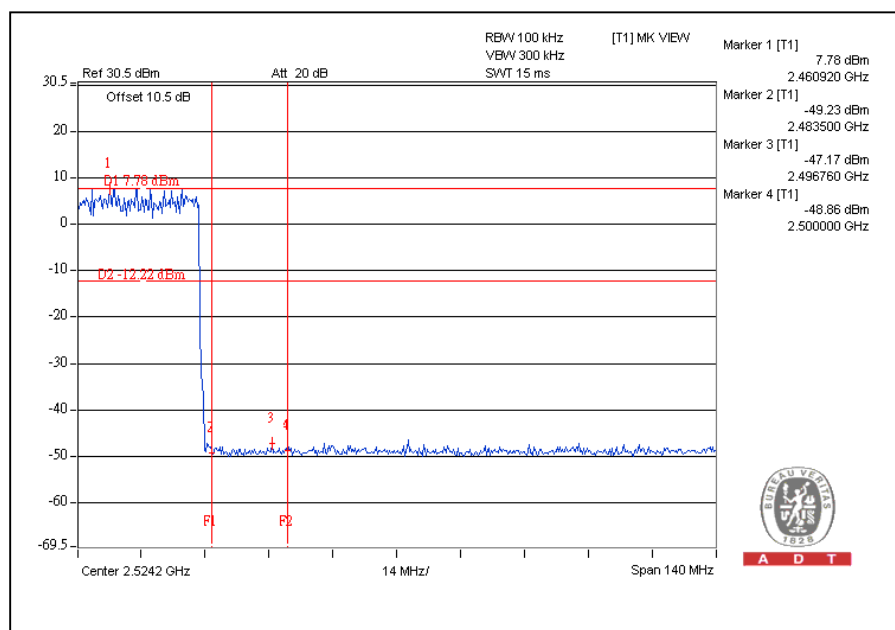


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CH0



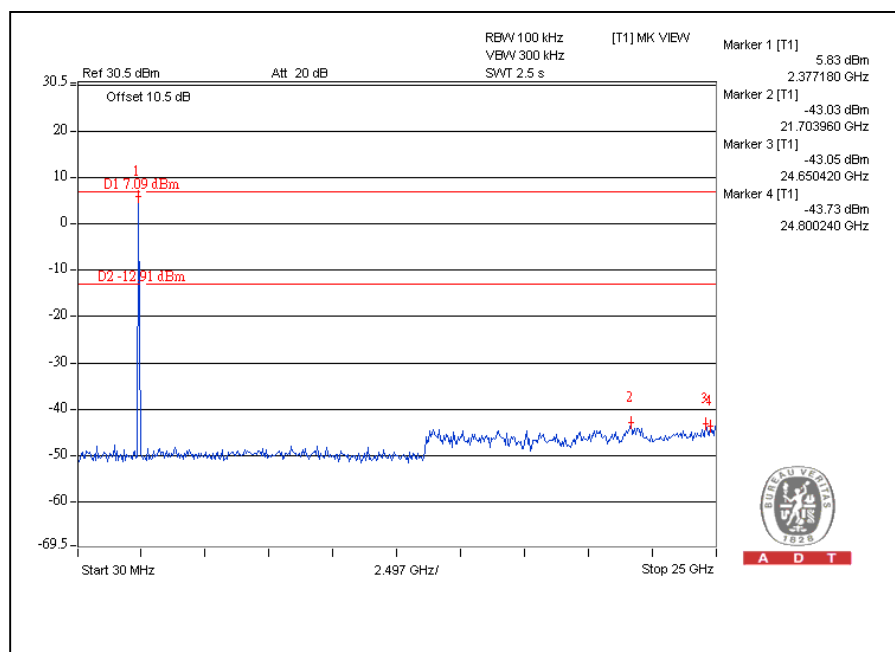
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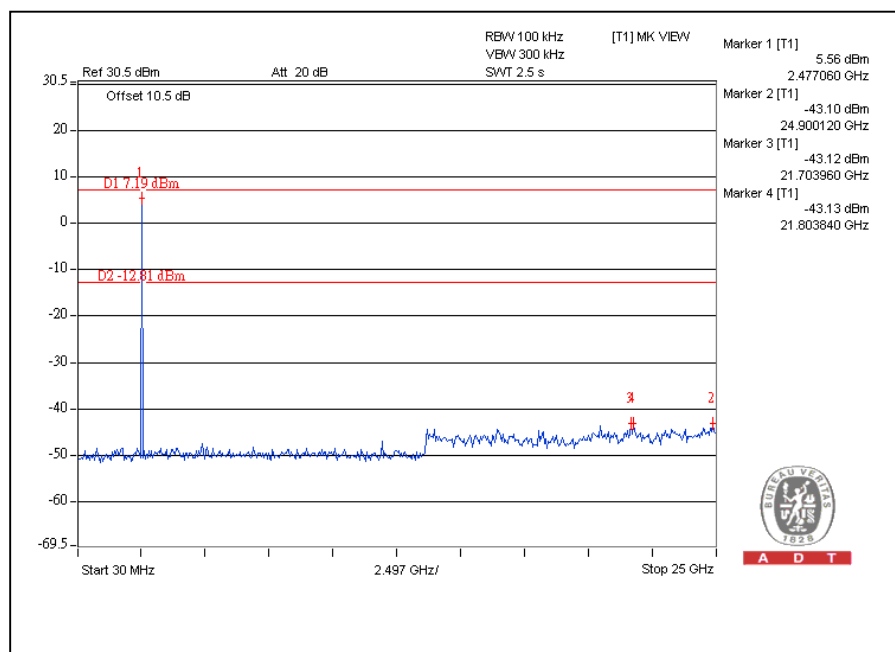


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CH0

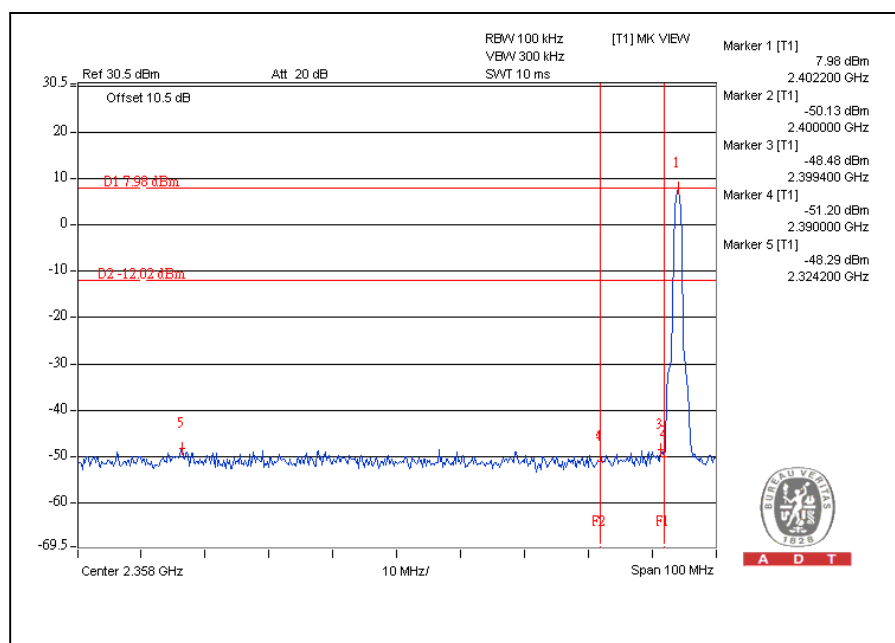


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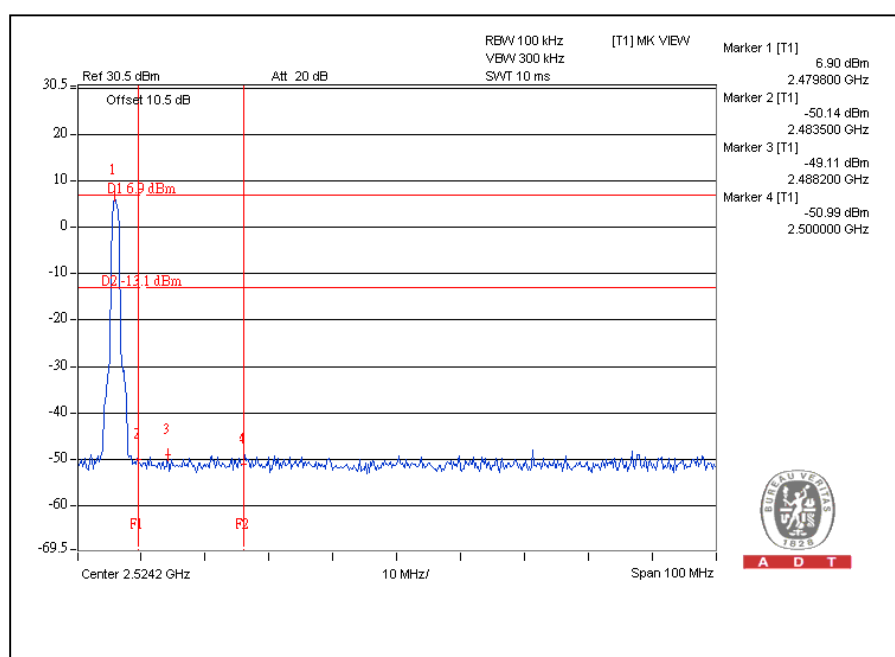


For $\pi/4$ -QPSK Modulation Type:

CH0



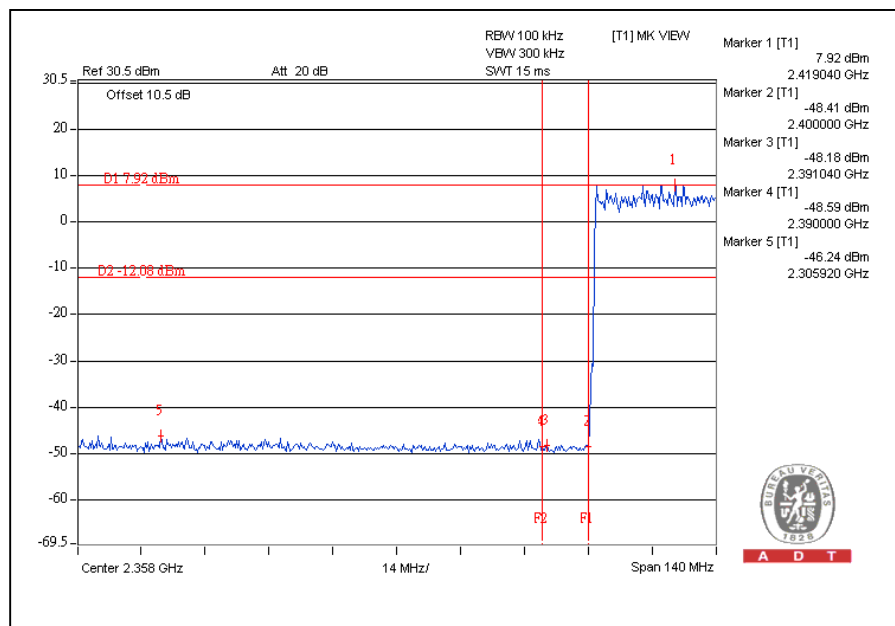
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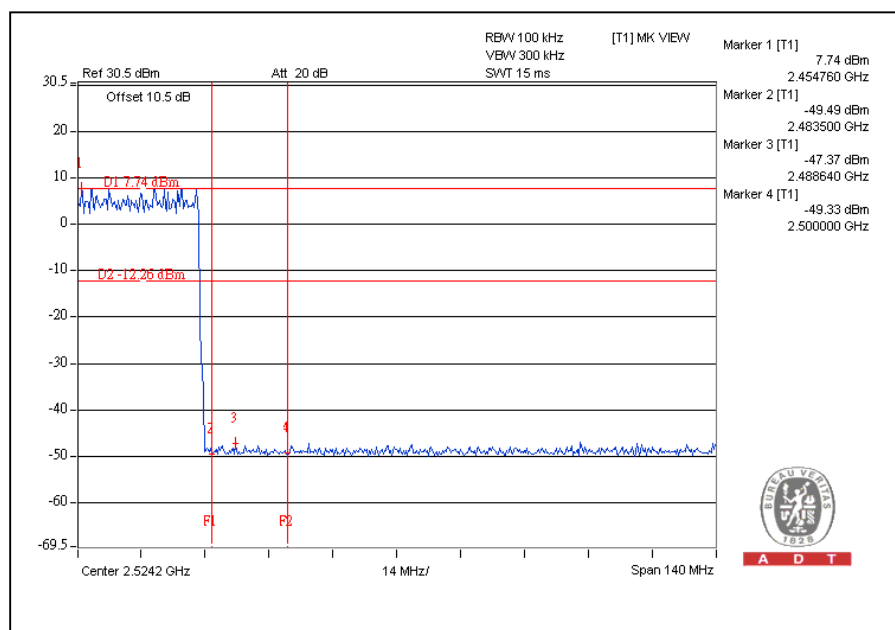


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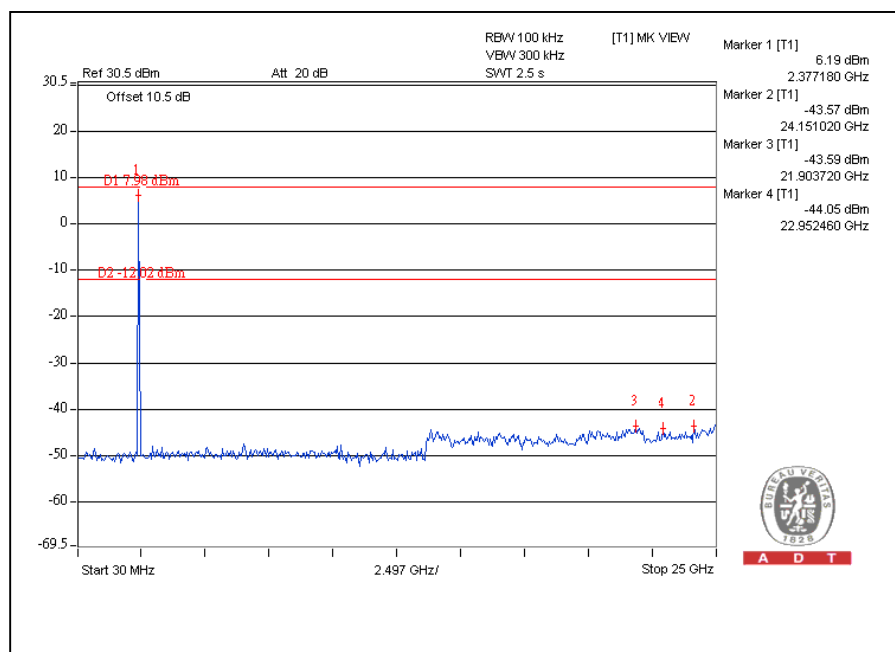
CH0



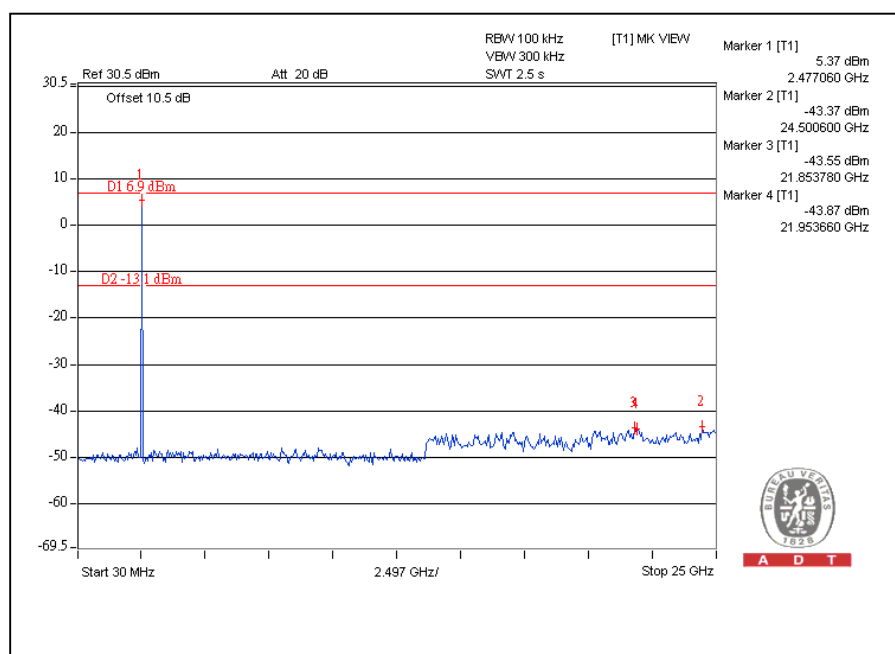
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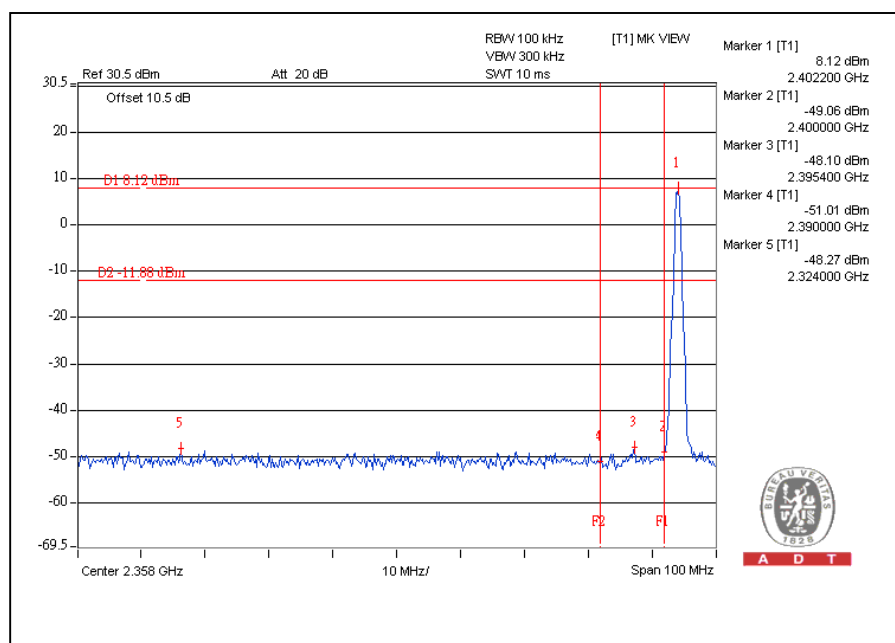


CH78

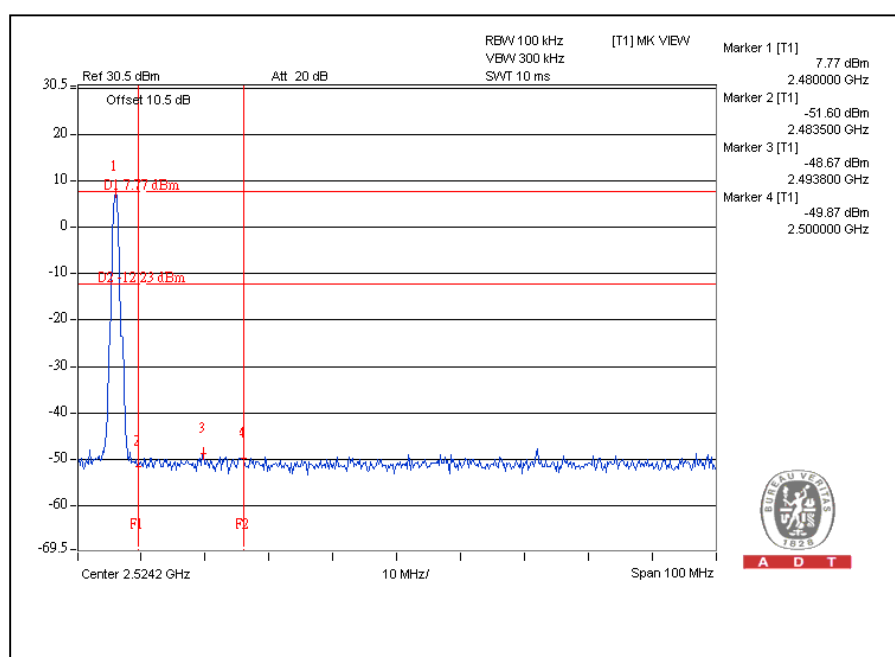


For GFSK(LE mode) Modulation Type:

CH0



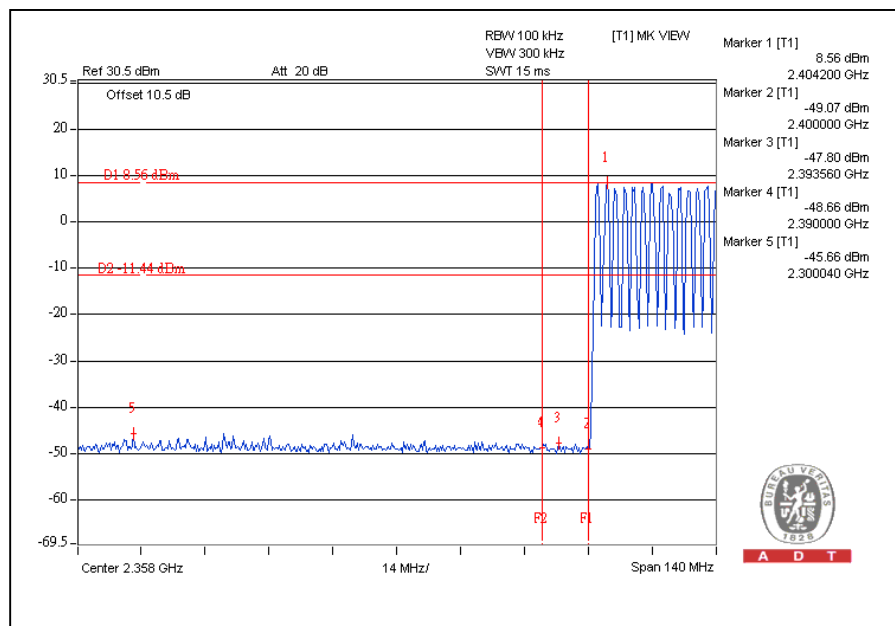
CH39



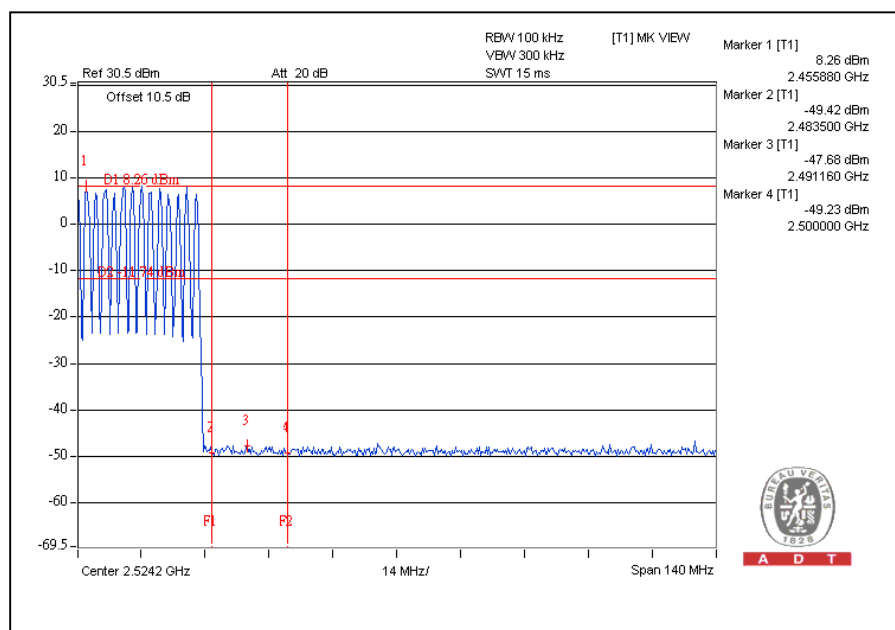


A D T

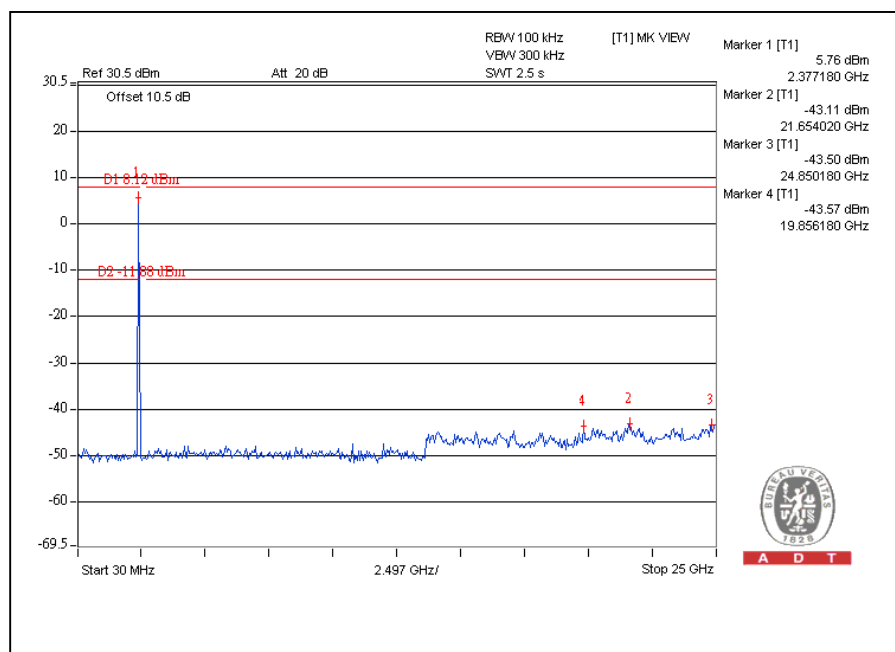
CH0



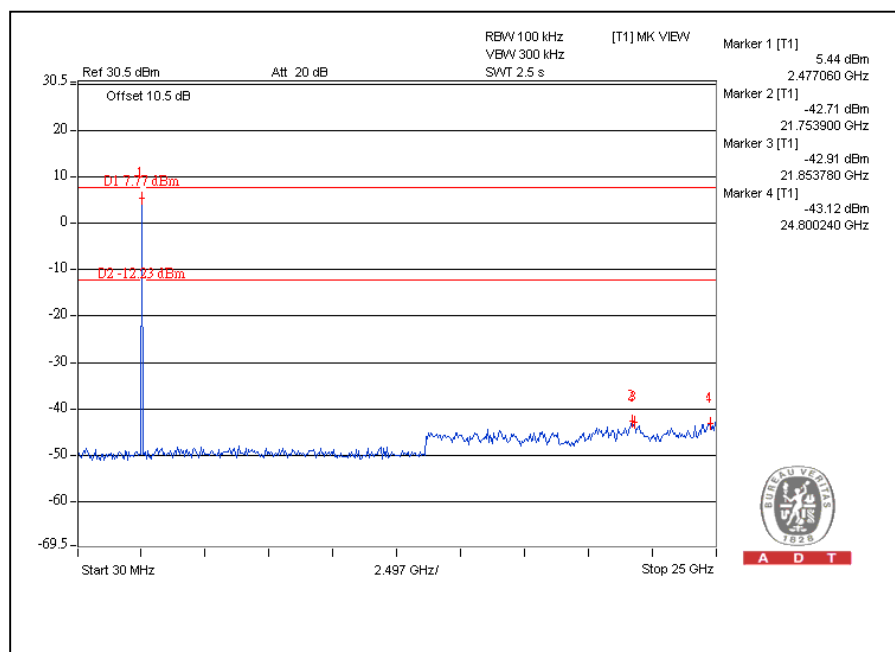
CH39



CH0



CH39



5 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

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

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Hwa Ya EMC/RF/Safety/Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Email: service@adt.com.tw

Web Site: www.adt.com.tw

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

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 ---