



FCC TEST REPORT (Bluetooth)

REPORT NO.: RF991201E03-3

MODEL NO.: MC319ZUS

FCC ID: UZ7MC319ZUS

RECEIVED: Dec. 01, 2010

TESTED: Dec. 07 to 21, 2010

ISSUED: Mar. 09, 2011

APPLICANT: Motorola Solutions Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	NA	Mar. 09, 2011



1 CERTIFICATION

PRODUCT : Mobile Computing Terminal
BRAND NAME : MOTOROLA
MODEL NO. : MC319ZUS
APPLICANT : Motorola Solutions Inc.
TESTED DATE : Dec. 07 to 21, 2010
TEST SAMPLE : ENGINEERING SAMPLE
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247)
ANSI C63.4-2003
ANSI C63.10-2009

The above equipment (Model: MC319ZUS) 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 :  , **DATE:** Mar. 09, 2011
(Claire Kuan, Specialist)

APPROVED BY :  , **DATE:** Mar. 09, 2011
(May Chen, Deputy Manager)



2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR 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 -14.07dB at 0.150MHz
15.247(a)(1)(I)-(ii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit
15.247(a)(1)(ii)	Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit
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
15.247(a)(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. 125mW	PASS	Meet the requirement of limit
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -9.0dB at 146.05MHz
15.247(c)	Conducted Out-Band Emissions Measurement	PASS	Meet the requirement of limit
15.203	Antenna Requirement	PASS	Antenna connector is U.FL connector.

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)	3.30 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	Mobile Computing Terminal
MODEL NO.	MC319ZUS
FCC ID	UZ7MC319ZUS
POWER SUPPLY	DC 3.7V from battery, DC 12V to cradle or DC 5.4V to cable adapter
MODULATION TYPE	GFSK, $\pi/4$ -DQPSK, 8DPSK
MODULATION TECHNOLOGY	FHSS
TRANSFER RATE	DH 1, DH 3, DH 5 +EDR
FREQUENCY RANGE	2.402GHz ~ 2.48GHz
NUMBER OF CHANNEL	79
CHANNEL SPACING	1 MHz
MAXIMUM OUTPUT POWER	GFSK: 1.8mW $\pi/4$ – DQPSK: 2.7mW 8DPSK: 2.9mW
ANTENNA TYPE	Please see note 2
ANTENNA CONNECTOR	Please see note 2
DATA CABLE	Charger cable(Unshielded, 1.8m with one core) x 1 RS232 cable(Unshielded, 1.8m)x 1 USB cable(Shielded, 1.55m) x 1
I/O PORTS	micro SD port x 1
ASSOCIATED DEVICES	Battery x 1 (Part No.: 82-127909-02 Rev B)

NOTE:

1. There are Bluetooth technology (BT2.1+EDR), WLAN and RFID technology used for the EUT:

Technology	Report No.
DFS	RF991201E03
15.247	RF991201E03-1
15.407	RF991201E03-2
Bluetooth	RF991201E03-3
RFID	RF991201E03-4



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2. There are antennas provided to this EUT, please refer to the following table:

WLAN Antenna Spec.								
NO.	Brand	Antenna Type	Peak Gain(dBi) with cable loss	Connecter Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length	
1	Auden	Monopole + coupling	3.4 dBi (2.4GHz) 4.5 dBi (5GHz)	hirose	2.4 ~ 2.5 GHz 4.92 ~ 5.85 GHz	-0.2640 dB -0.6168 dB	52 mm	
2	Auden	PIFA	1.3 dBi (2.4GHz) 3.6 dBi (5GHz)	hirose	2.4 ~ 2.5 GHz 4.92 ~ 5.85 GHz	-0.6409 dB -1.0418 dB	68 mm	
RFID Antenna Spec.								
NO.	Brand	Antenna Type	Peak Gain(dBi) with cable loss	Connecter Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length	
1	Auden	Dipole	3.66	hirose	902 ~ 928 MHz	-0.43 dB	85 mm	
2	Auden	Slot Dipole	1.95	hirose	902 ~ 928 MHz	-0.43 dB	85 mm	
Bluetooth Antenna Spec.								
NO.	Brand	Model No.	Antenna Type	Peak Gain(dBi)	Connecter Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length
1	Antenova	(Mica 2.4GHz) 303DA5654-01	Chip Antenna	-1.34	U.FL	2400-2500	0.185	74 mm

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

Battery	
Brand:	MOTOROLA
Part No.:	82-127909-02 Rev B
Rating:	3.7V, 4800mAh/17.8Wh
Cable adapter (not for sale together)	
Brand:	MOTOROLA
Model No.:	EADP-16BB A
Part No.:	PWRS-14000-249R
Input power :	100-240V, 50-60Hz, 0.4A AC input cable (unshielded, 1.85m)
Output power :	5.4V ----- 3A
Cradle (not for sale together)	
Brand:	SYMBOL TECHNOLOGIES INC.
Model No.:	CRD3000-1000R
Part No.:	CRD3000-1001RR
Rating:	12V, 3.33A
Adapter for Cradle (not for sale together)	
Brand:	HIPRO
Model No.:	HP-O204D43
Part No.:	50-14000-148R
Input power :	100-240V, 50-60Hz, 1.5A AC input cable (unshielded, 1.8m)
Output power :	+12V ----- 3.33A DC output cable (unshielded, 1.8m with one core)

4. The EUT was pre-tested in chamber under following test modes :

Pre-test Mode	Description
Mode A	X-Y plane: EUT + Battery
Mode B	X-Z plane: EUT + Battery
Mode C	Y-Z plane: EUT + Battery
Mode D	X-Y plane: EUT + Cable adapter
Mode E	X-Z plane: EUT + Cable adapter
Mode F	Y-Z plane: EUT + Cable adapter
Mode G	Y-Z plane: EUT + Cradle + adapter

The worse spurious emission (Below 1GHz) was found in **Mode G**. And the spurious emission (Above 1GHz) was found in **Mode E**. Therefore only the test data of the modes were recorded in this report.

5. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a, 802.11b, 802.11g, Bluetooth technology and RFID in the 900MHz Band.
6. The above EUT information was declared by the manufacturer and for more detailed feature descriptions, please refer to the manufacturer's specifications or User's Manual.



3.2 DESCRIPTION OF TEST MODES

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		

3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE [≥] 1G	APCM	
A	√	-	-	-	X-Y plane: EUT + Cable adapter
B	√	√	-	-	Y-Z plane: EUT + Cradle + adapter
C	-	-	√	√	Y-Z plane: EUT + Cable adapter

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	CONFIGURE MODE
WORST CHANNEL	-	-	-	-	A ~ B

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	CONFIGURE MODE
0 to 78	0	FHSS	8DPSK	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	CONFIGURE MODE
0 to 78	0, 39, 78	FHSS	GFSK	DH5	C
0 to 78	0, 39, 78	FHSS	8DPSK	DH5	C

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	CONFIGURE MODE
0 to 78	0, 78	FHSS	GFSK	DH5	C
0 to 78	0, 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	CONFIGURE MODE
0 to 78	0, 39, 78	FHSS	GFSK	DH5	C
0 to 78	0, 39, 78	FHSS	8DPSK	DH5	C
0 to 78	0, 39, 78	FHSS	$\pi/4$ -DQPSK	DH5	C



TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE ³ 1G	20deg. C, 70%RH, 1023 hPa	120Vac, 60Hz	Kent Liu
RE<1G	23deg. C, 71%RH, 1023 hPa	120Vac, 60Hz	Kent Liu
PLC	25deg. C, 60%RH, 1023 hPa	120Vac, 60Hz	Max Tseng
APCM	25deg. C, 60%RH, 1023 hPa	120Vac, 60Hz	Rex Huang

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 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.

For conducted test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	PERSONAL COMPUTER	DELL	DCSCMF	9KKB32S	FCC DoC
2	MONITOR	DELL	E2210Hc	CN-OG337R-6418 0-97S-OQDS	FCC DoC
3	PRINTER	EPSON	LQ-300+II	G88Y074083	FCC DoC
4	MODEM	ACEEX	1414	0206026778	IFAXDM1414
5	KEYBOARD	DELL	SK-8115	MY-0DJ325-71619- 99B-0476	FCC DoC
6	MOUSE	DELL	MOC5UO	I1401LVG	FCC DoC
7	EARPHONE	Hawk	HKC920	H001	FCC DoC
8	Wireless Access Point	Air Station	WLA-G54	NA	FCC DoC

For radiated test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	DSL32S	FCC DoC
2	EARPHONE	MOTOROLA	NA	NA	NA

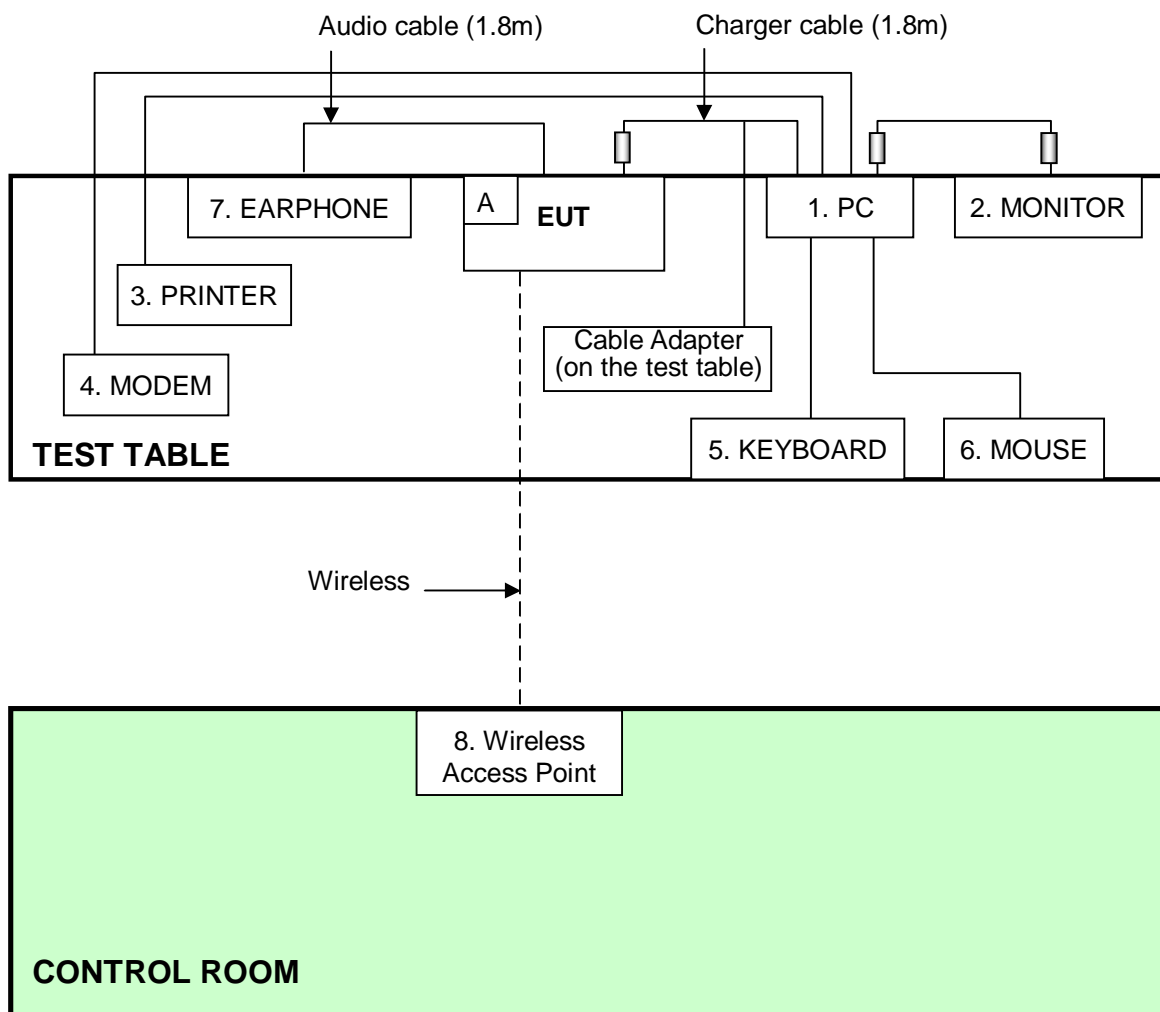
For conducted test	
No.	Signal cable description
1	NA
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, with two cores
3	1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
5	1.9 m foil shielded wire, USB connector, w/o core.
6	1.8 m foil shielded wire, USB connector, w/o core.
7	1.8 m Audio cable
8	NA

For radiated test	
No.	Signal cable description
1	NA
2	0.9 m Audio cable

Note: 1. All power cords of the above support units are unshielded (1.8m).

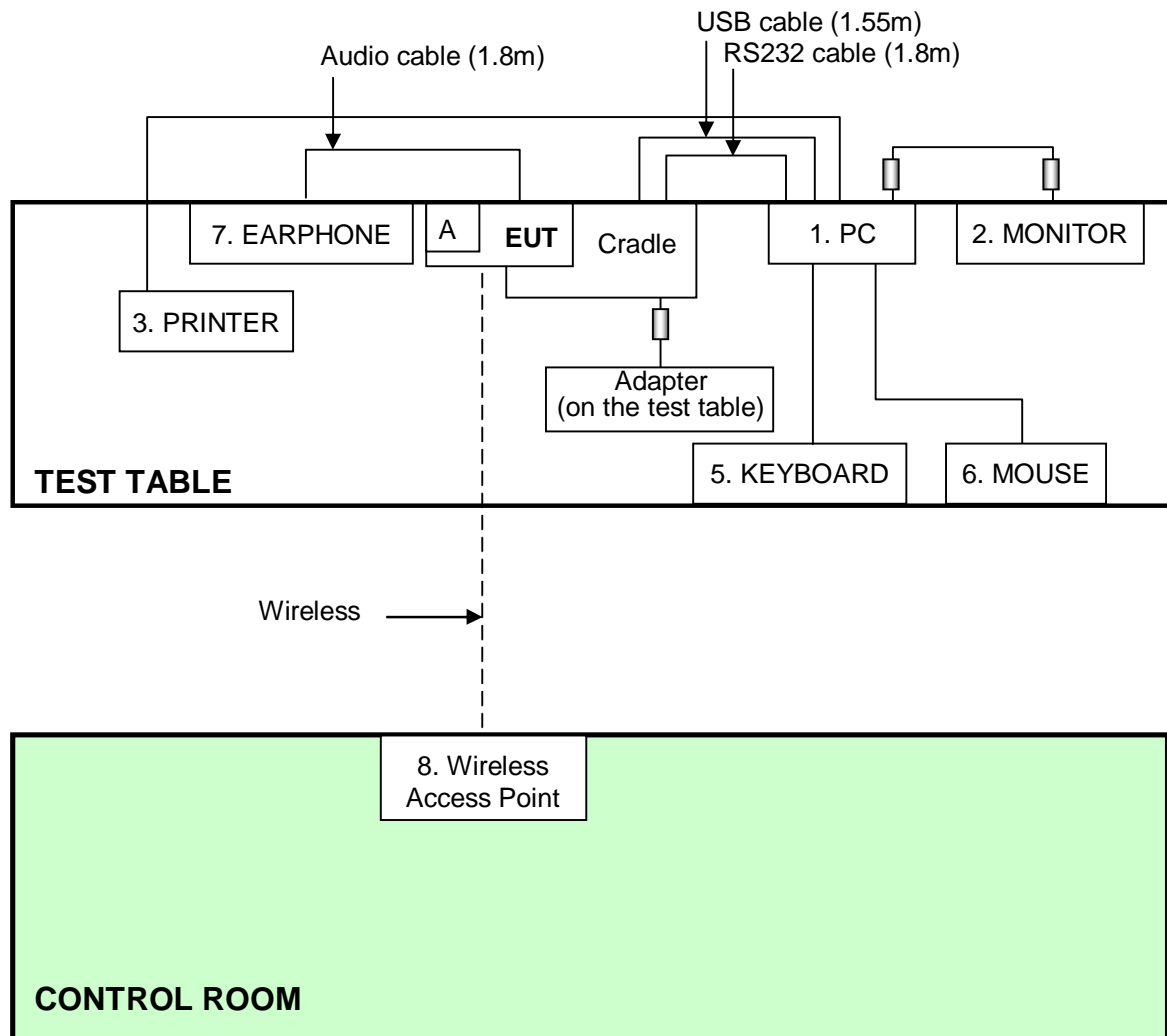
3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted test mode 1:



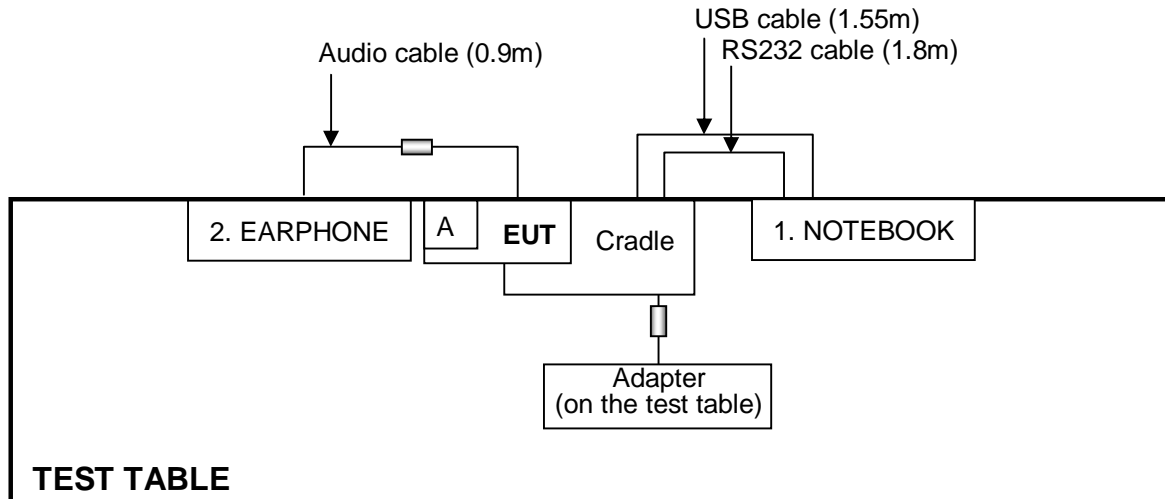
NOTE: 1. Item A is the micro SD card.

For Conducted test mode 2:



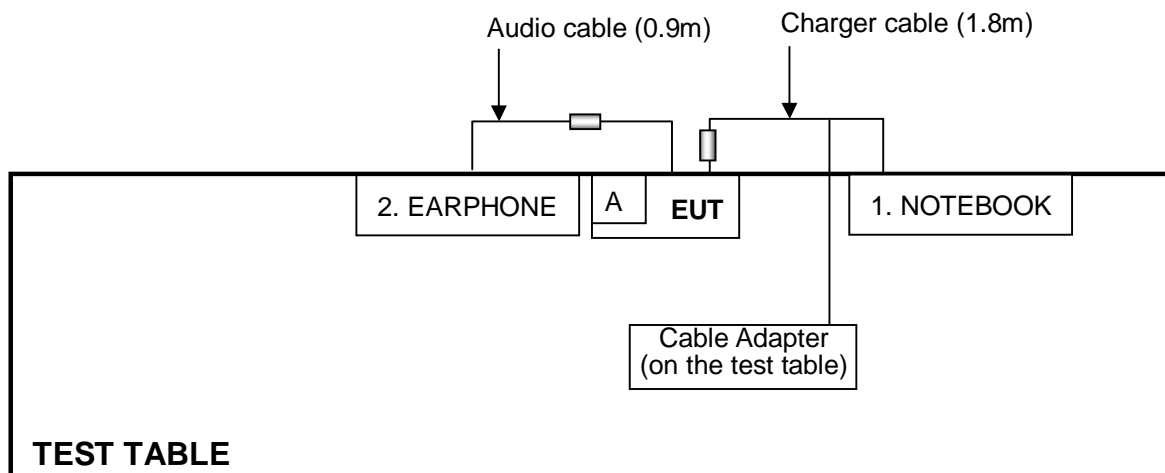
NOTE: 1. Item A is the micro SD Card.

For Radiated below 1GHz test:



NOTE: 1. Item A is the micro SD Card.

For Radiated above 1GHz test:



NOTE: 1. Item A is the micro SD Card.

4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	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, 2010	Mar. 08, 2011
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

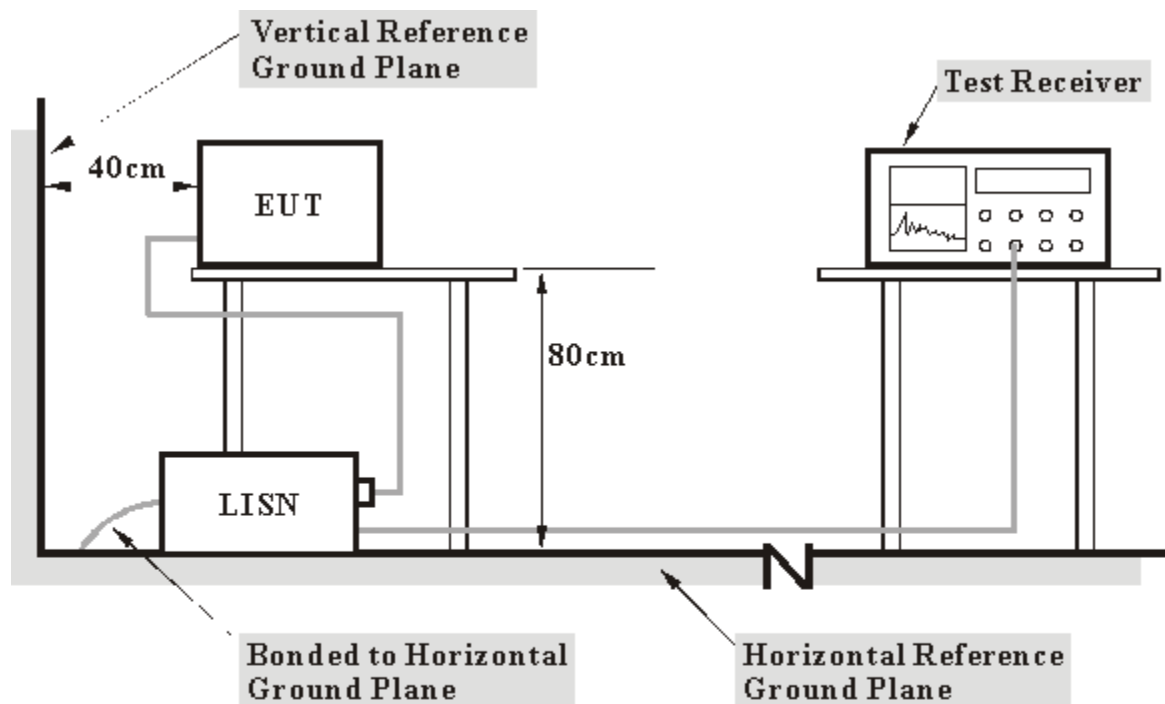
Note:

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

- 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

- a. Turn on the power of EUT.
- b. The EUT run test program “BTRegTest_ver3.5” to enable EUT under transmission / receiver condition continuously at specific channel frequency.



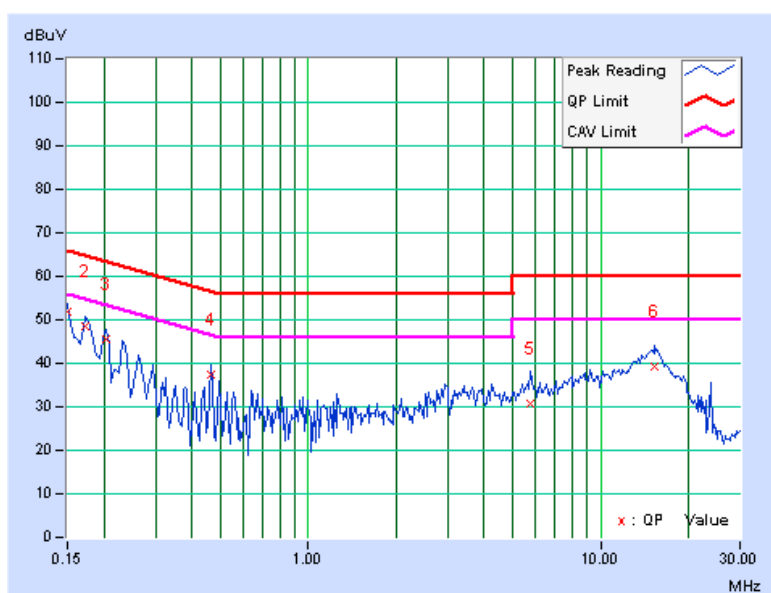
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4.1.6 TEST RESULTS (MODE A)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	51.83	-	51.93	-	66.00	56.00	-14.07	-
2	0.173	0.12	48.23	-	48.35	-	64.79	54.79	-16.45	-
3	0.205	0.13	45.42	-	45.55	-	63.42	53.42	-17.87	-
4	0.466	0.13	37.44	-	37.57	-	56.58	46.58	-19.01	-
5	5.762	0.28	30.41	-	30.69	-	60.00	50.00	-29.31	-
6	15.277	0.57	38.82	-	39.39	-	60.00	50.00	-20.61	-

- 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.



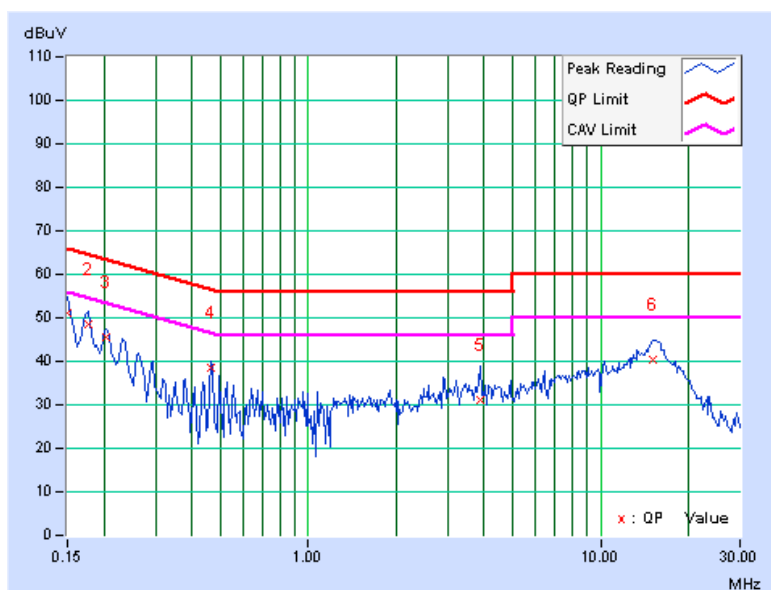


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PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.12	51.16	-	51.28	-	66.00	56.00	-14.72	-
2	0.177	0.13	48.29	-	48.42	-	64.61	54.61	-16.19	-
3	0.205	0.14	45.40	-	45.54	-	63.42	53.42	-17.88	-
4	0.466	0.15	38.24	-	38.39	-	56.58	46.58	-18.19	-
5	3.855	0.27	30.74	-	31.01	-	56.00	46.00	-24.99	-
6	15.090	1.13	39.18	-	40.31	-	60.00	50.00	-19.69	-

- 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.



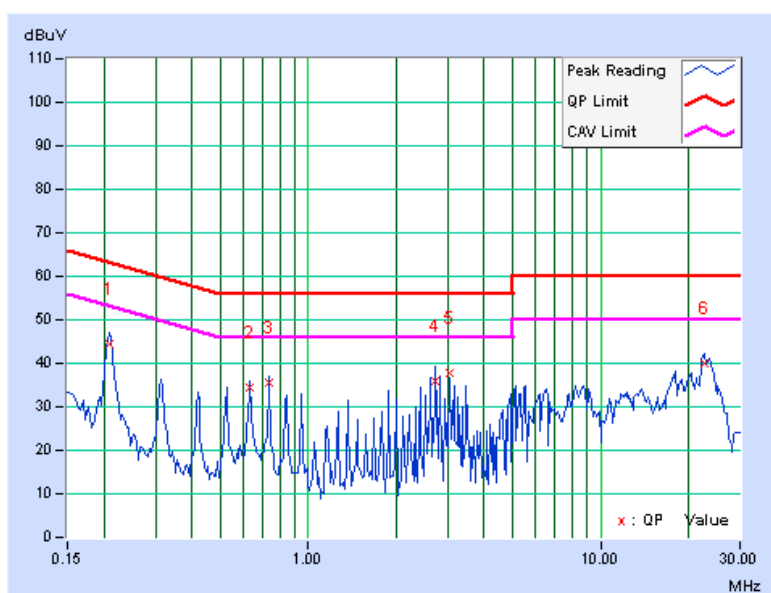


4.1.7 TEST RESULTS (MODE B)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.209	0.13	44.47	-	44.60	-	63.26	53.26	-18.66	-
2	0.630	0.13	34.13	-	34.26	-	56.00	46.00	-21.74	-
3	0.736	0.14	35.41	-	35.55	-	56.00	46.00	-20.45	-
4	2.734	0.17	35.74	-	35.91	-	56.00	46.00	-20.09	-
5	3.047	0.18	37.45	-	37.63	-	56.00	46.00	-18.37	-
6	22.797	0.75	39.12	-	39.87	-	60.00	50.00	-20.13	-

- 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.



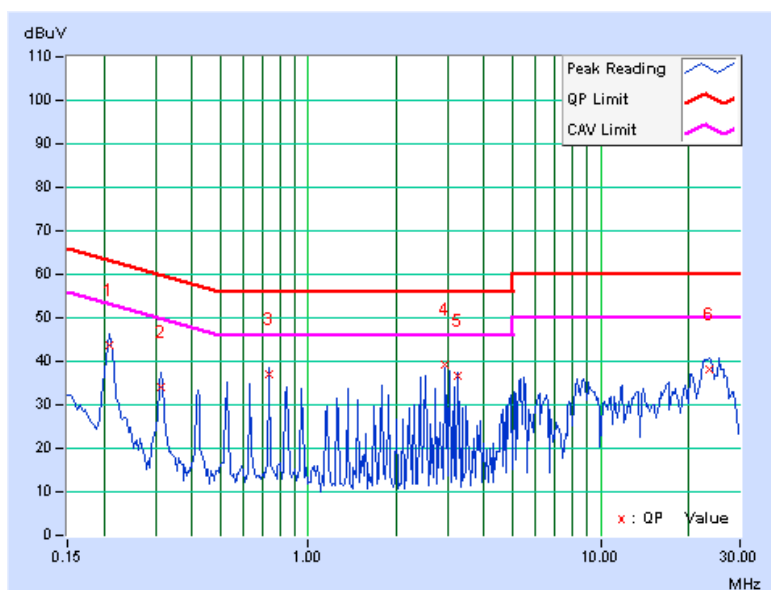


A D T

PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.209	0.14	43.47	-	43.61	-	63.26	53.26	-19.65	-
2	0.314	0.15	34.07	-	34.22	-	59.86	49.86	-25.65	-
3	0.736	0.16	36.88	-	37.04	-	56.00	46.00	-18.96	-
4	2.941	0.23	39.05	-	39.28	-	56.00	46.00	-16.72	-
5	3.258	0.25	36.38	-	36.63	-	56.00	46.00	-19.37	-
6	23.531	1.69	36.61	-	38.30	-	60.00	50.00	-21.70	-

- 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
PSA Seviess Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE:

1. 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.

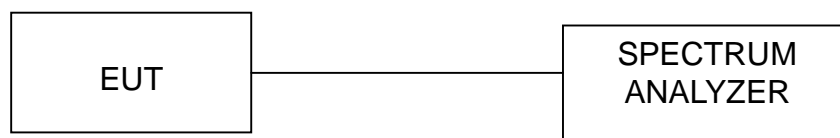
NOTE:

The EUT was setup to ANSI C63.4, tested to FHSS test procedure of DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



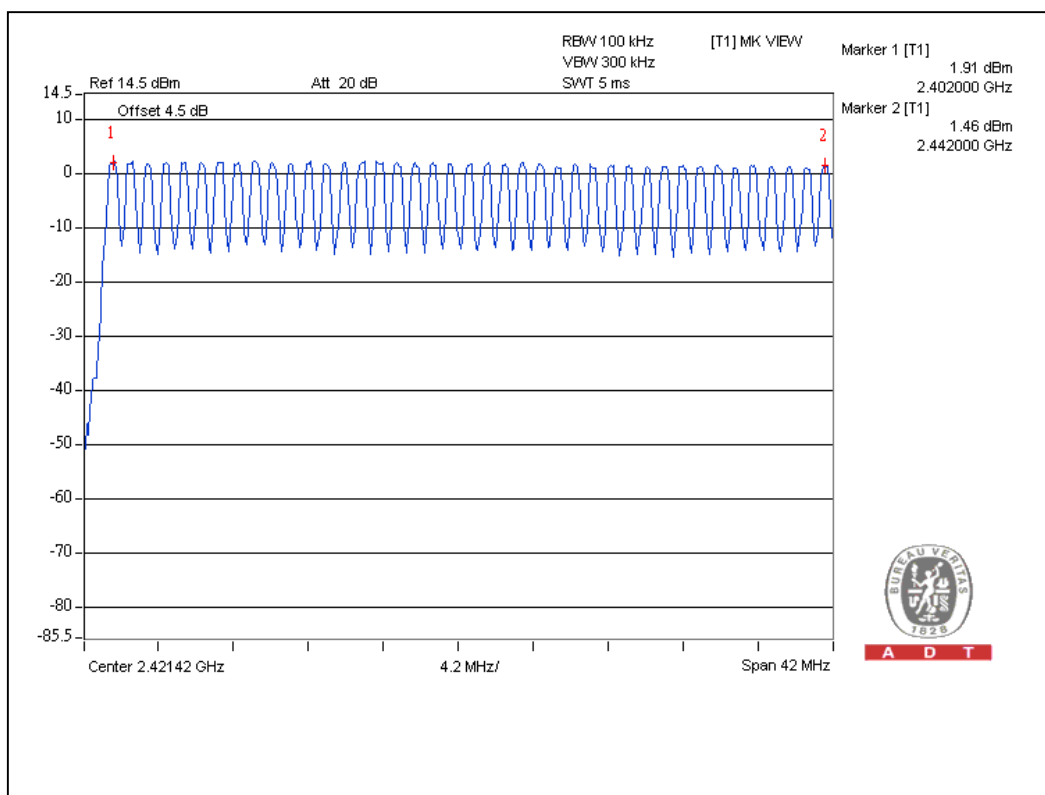
4.2.6 TEST RESULTS

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.

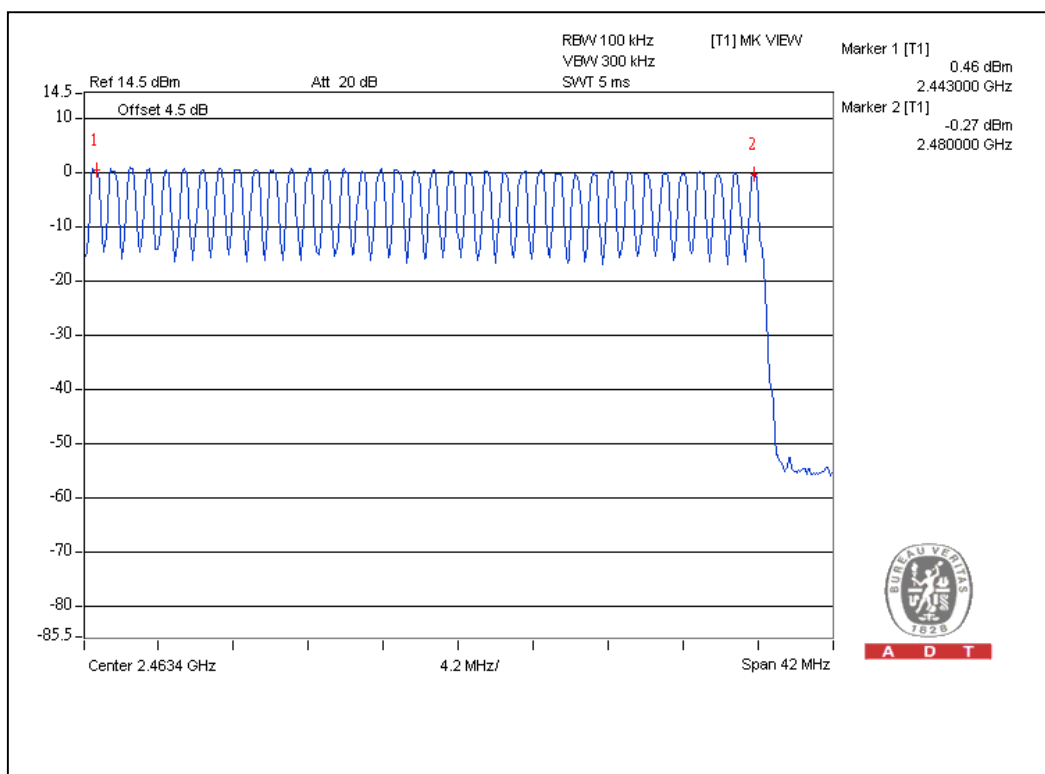


A D T

For GFSK:



A D T

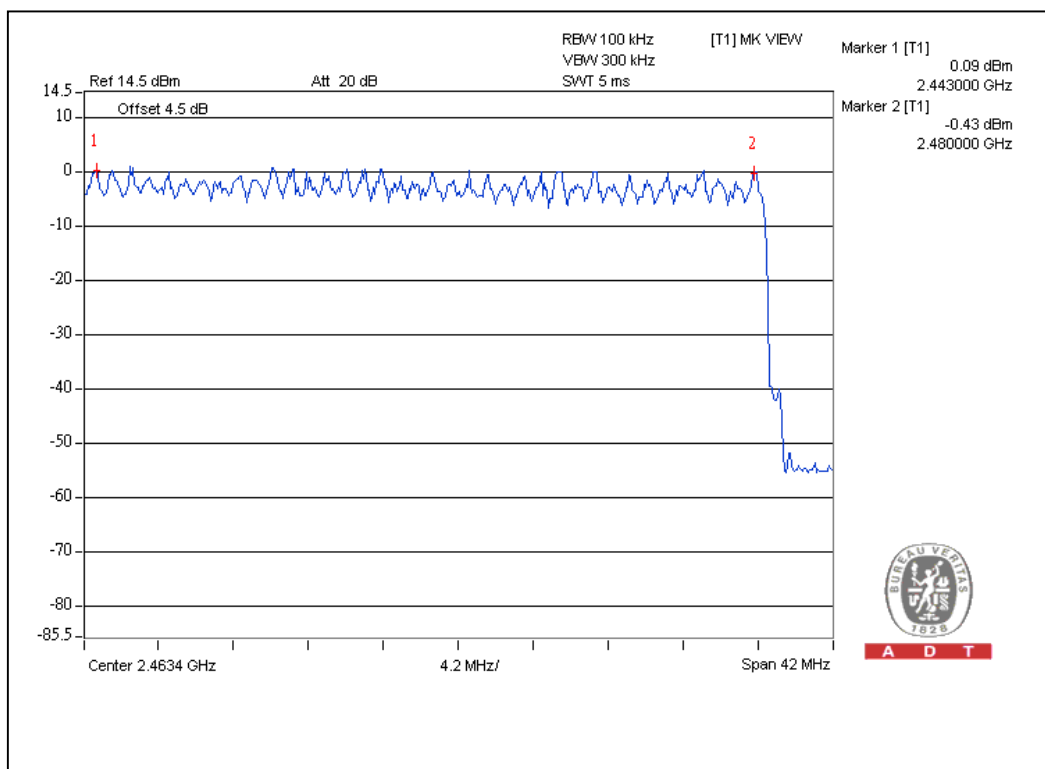
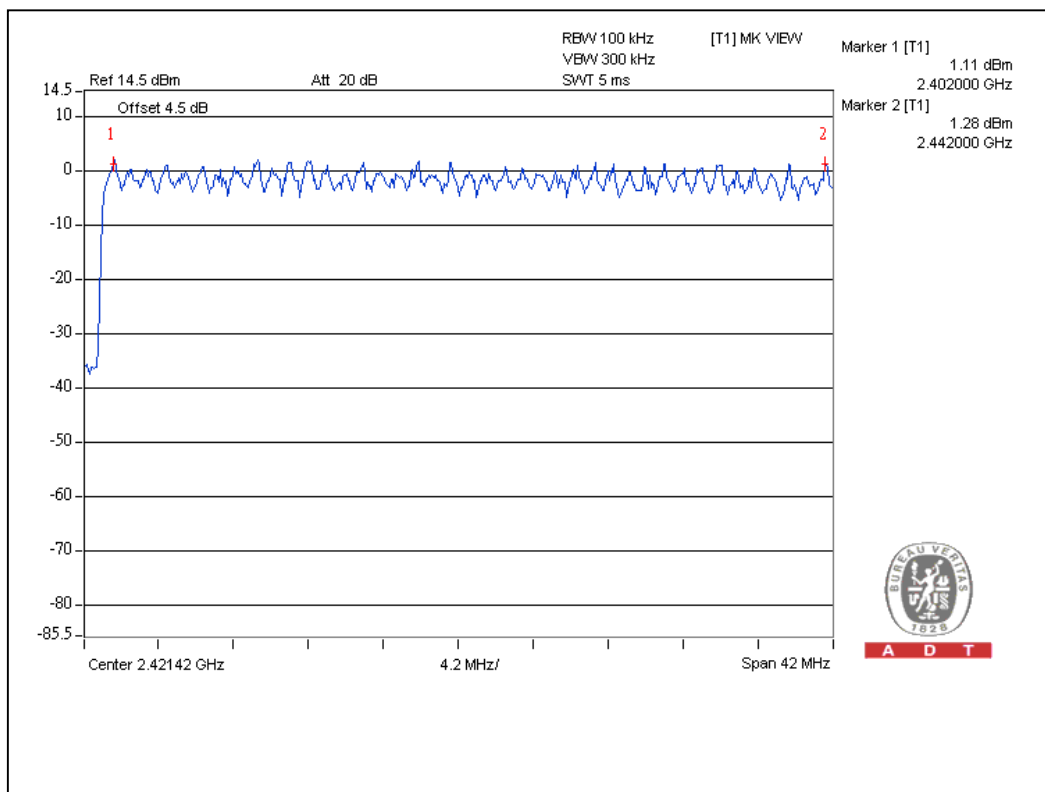


A D T



A D T

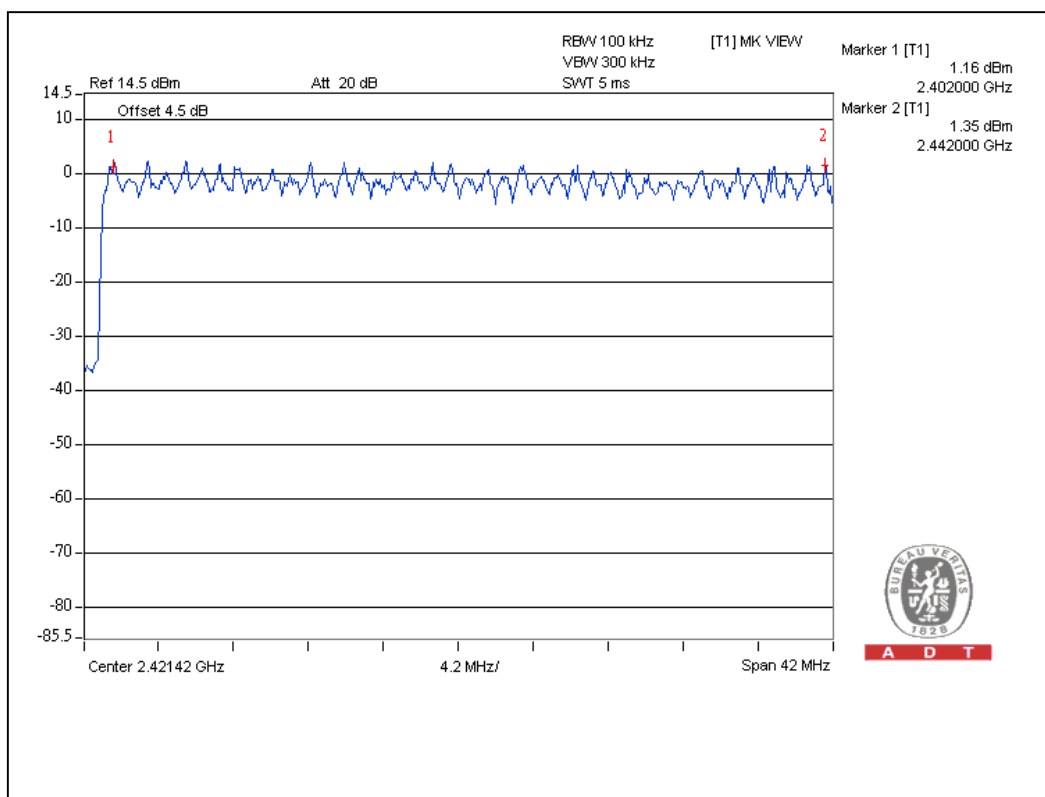
For $\pi/4$ -DQPSK :



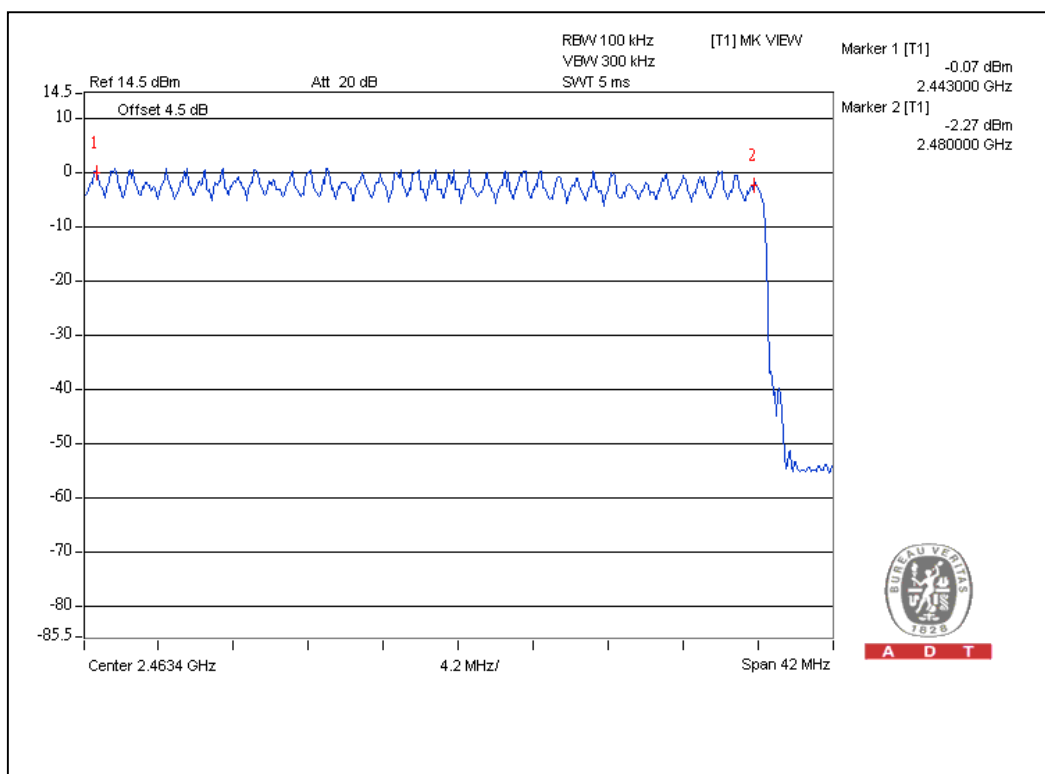


A D T

For 8DPSK:



A D T



A D T

4.3 DWELL TIME ON EACH CHANNEL

4.3.1 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.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
PSA Seviex Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

NOTE:

1. 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.

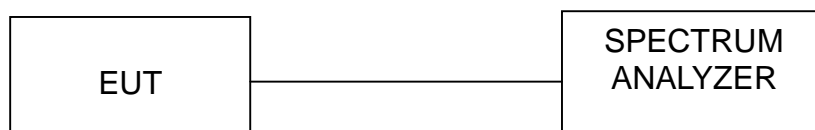
NOTE:

The EUT was setup to ANSI C63.4, tested to FHSS test procedure of DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 TEST RESULTS

For GFSK:

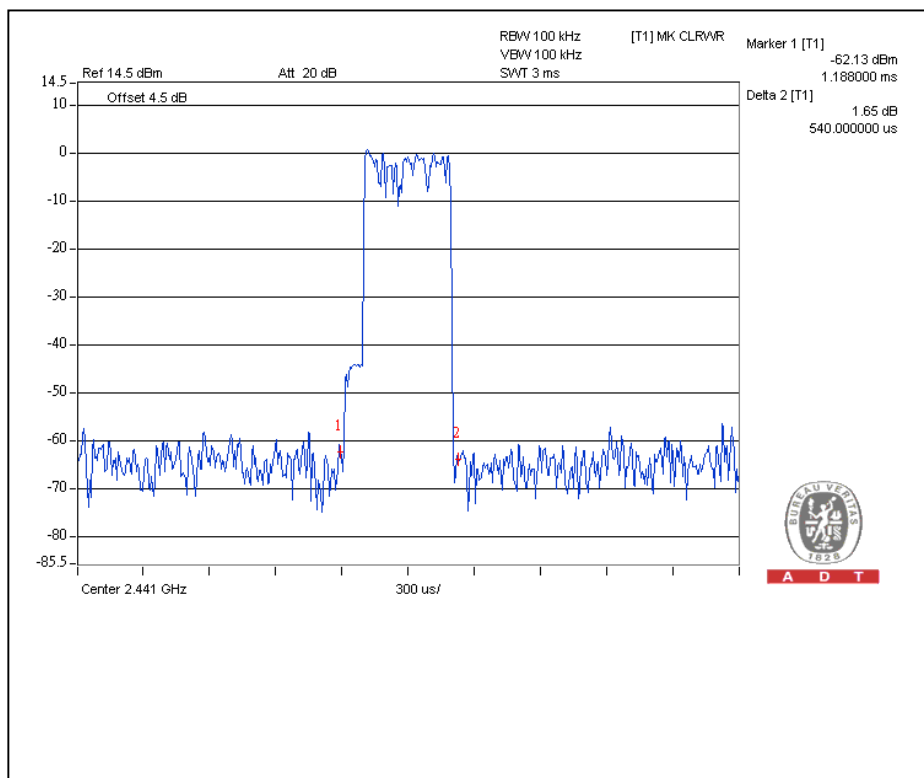
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316 times	0.54	171.0	400
DH3	25 (times / 5 sec) *6.32=158 times	1.80	284.0	400
DH5	18 (times / 5 sec) *6.32=113.8 times	3.04	346.0	400

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



A D T

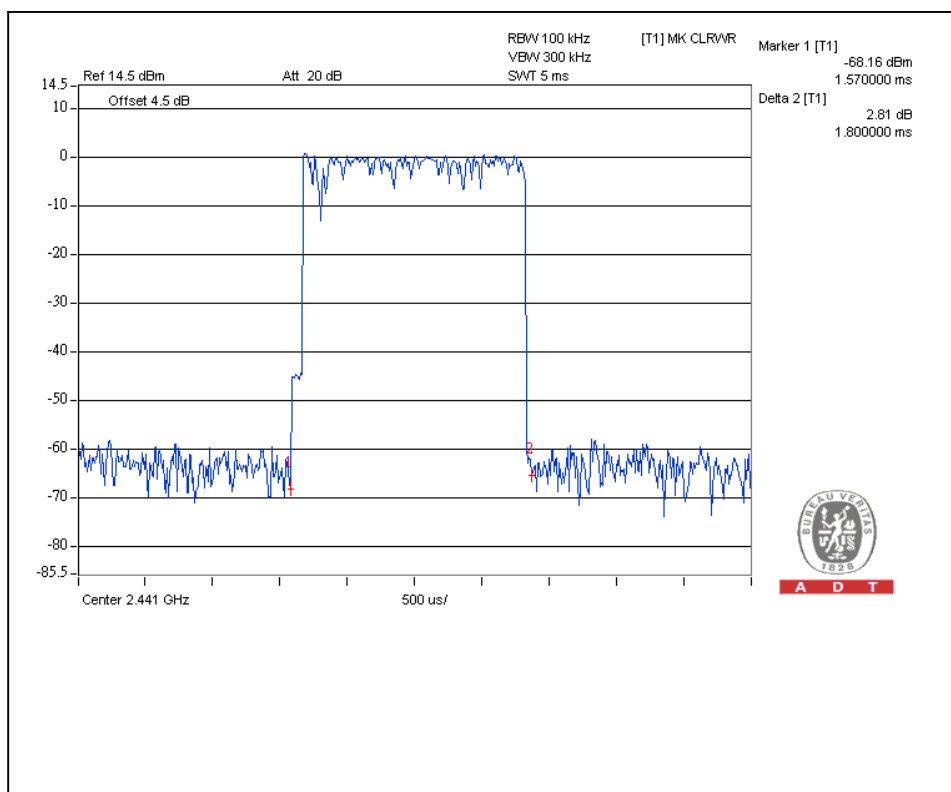
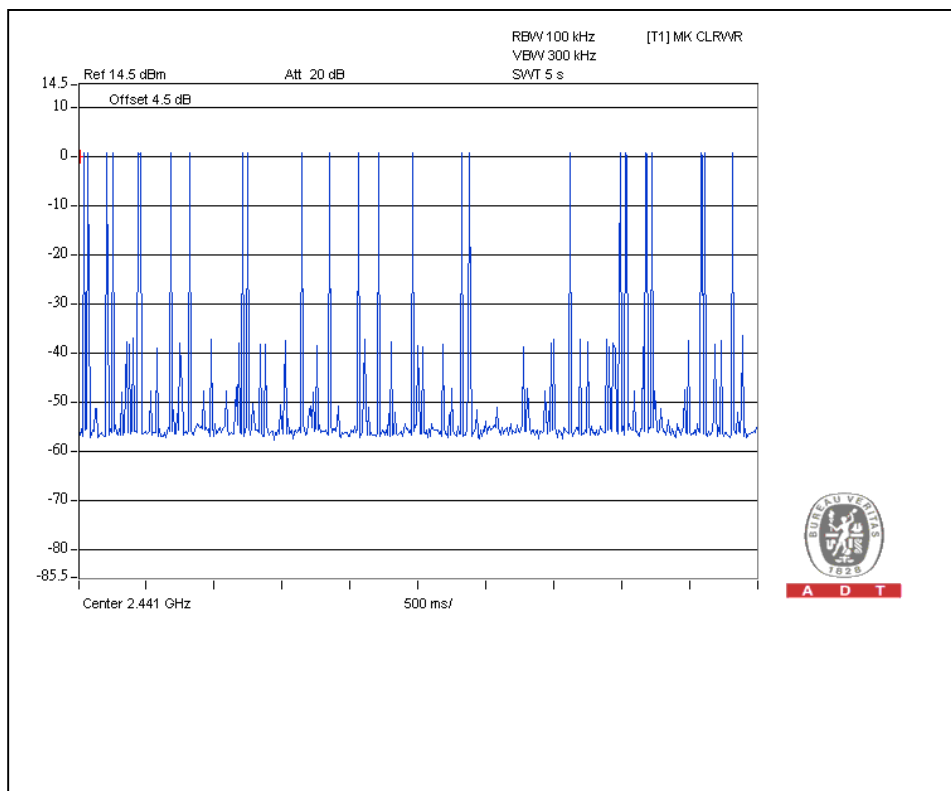
DH1





A D T

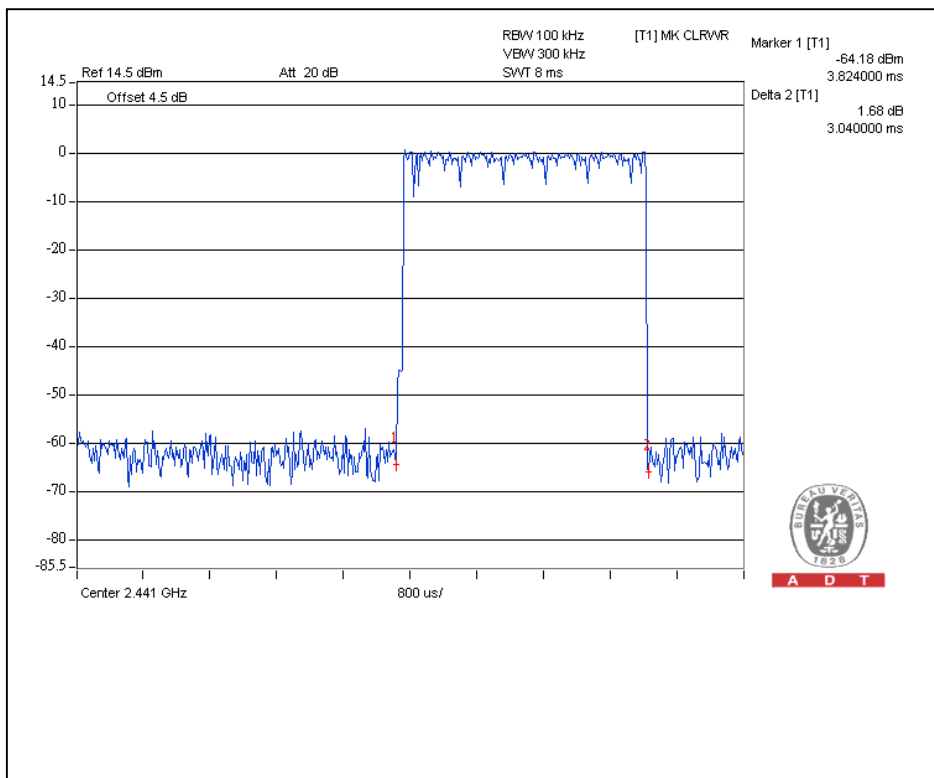
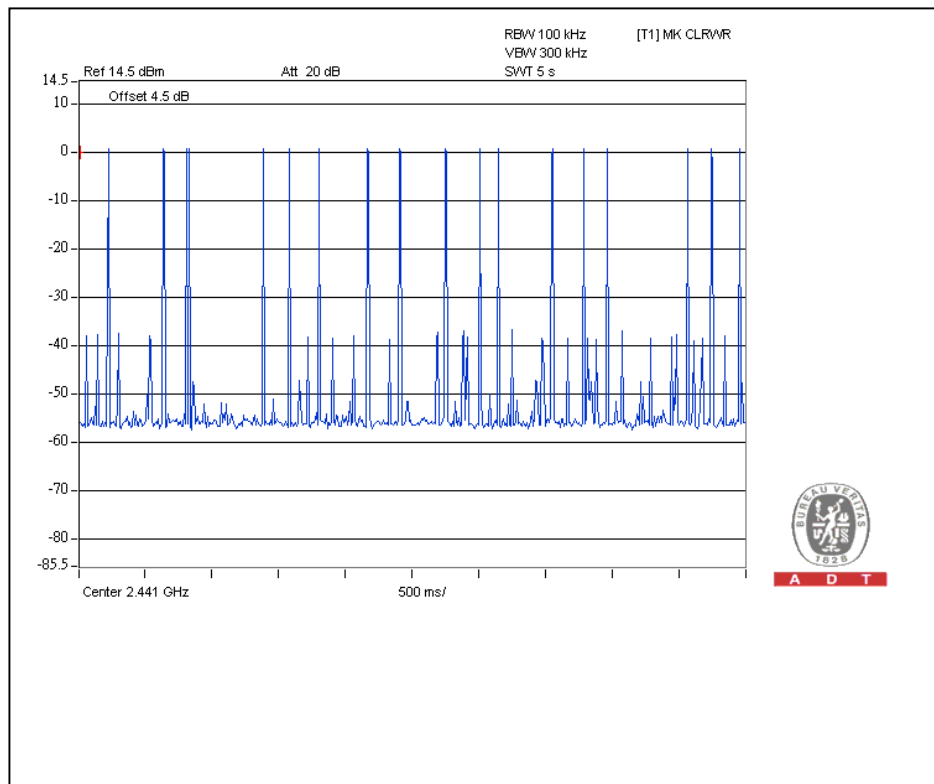
DH3





A D T

DH5





A D T

For $\pi/4$ -DQPSK :

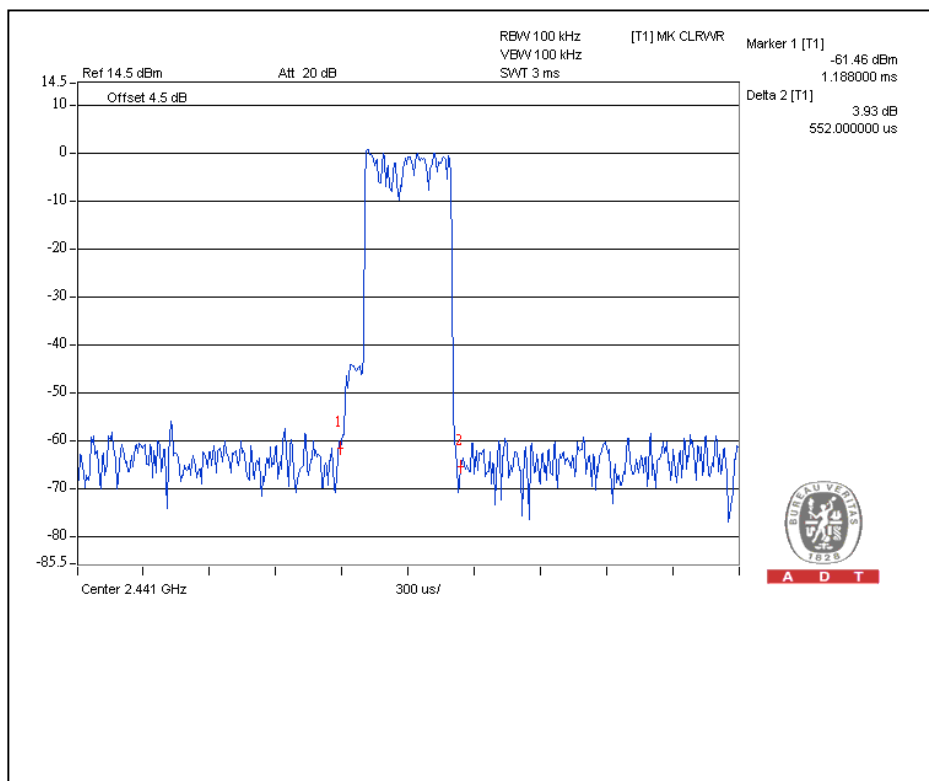
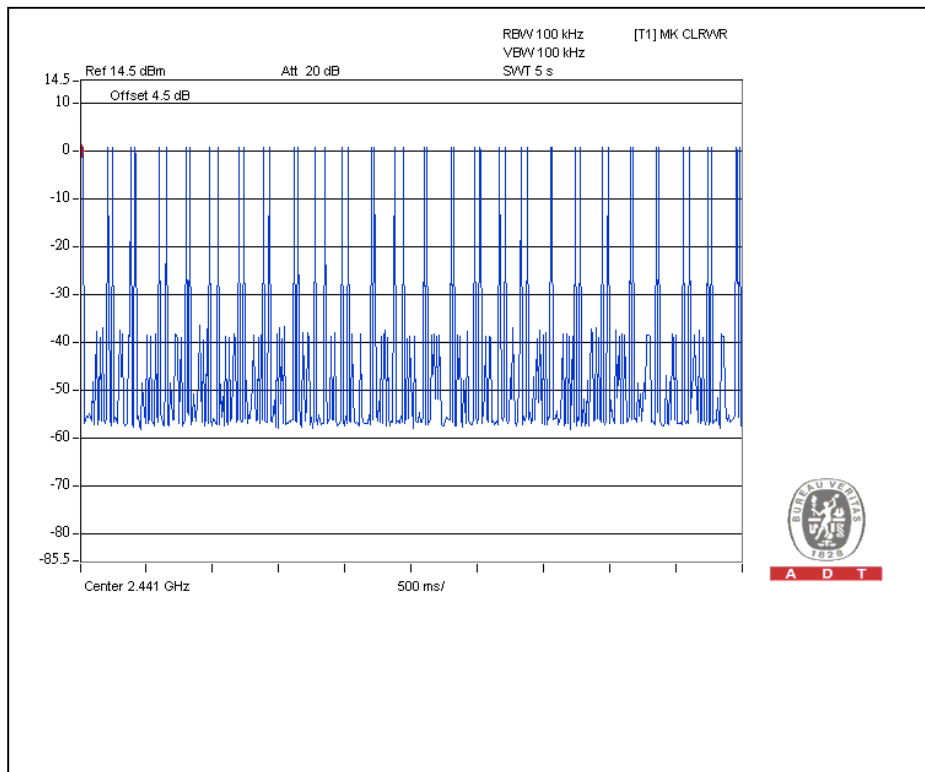
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316 times	0.552	174.0	400
DH3	25 (times / 5 sec) *6.32=158 times	1.840	291.0	400
DH5	14 (times / 5 sec) *6.32=88.48 times	3.168	280.0	400

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



A D T

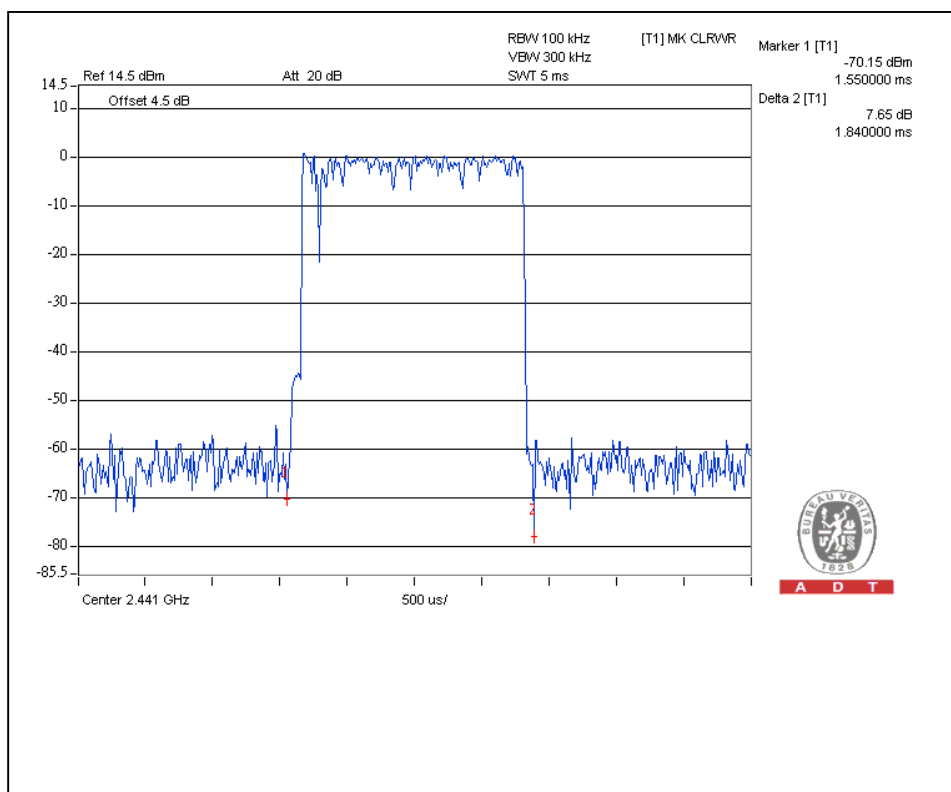
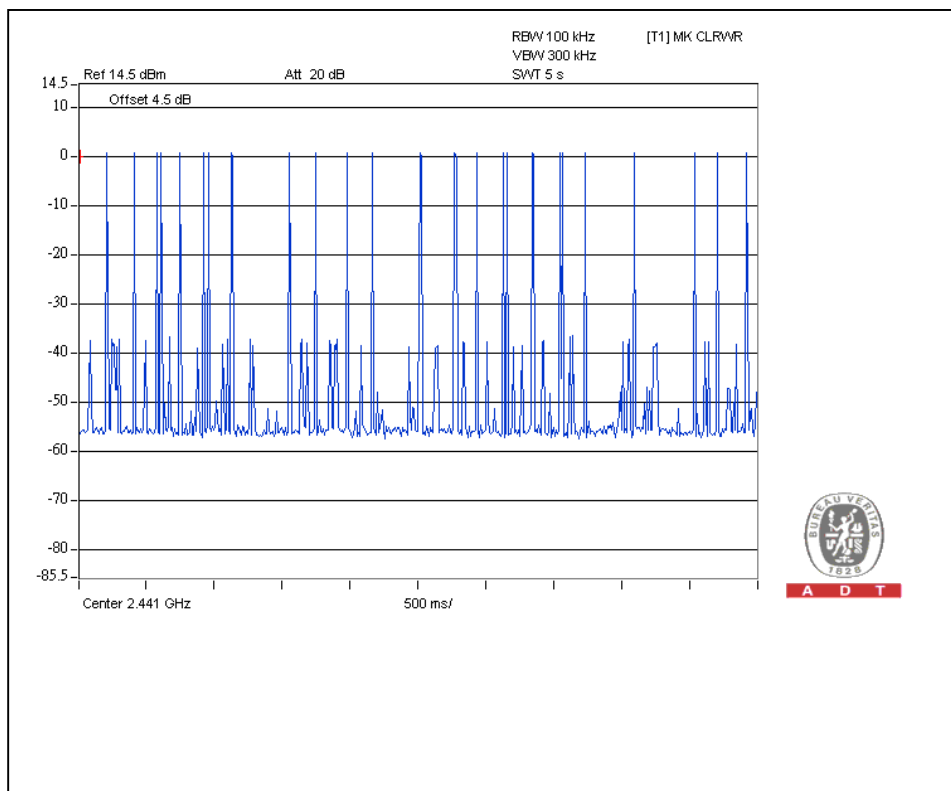
DH1





A D T

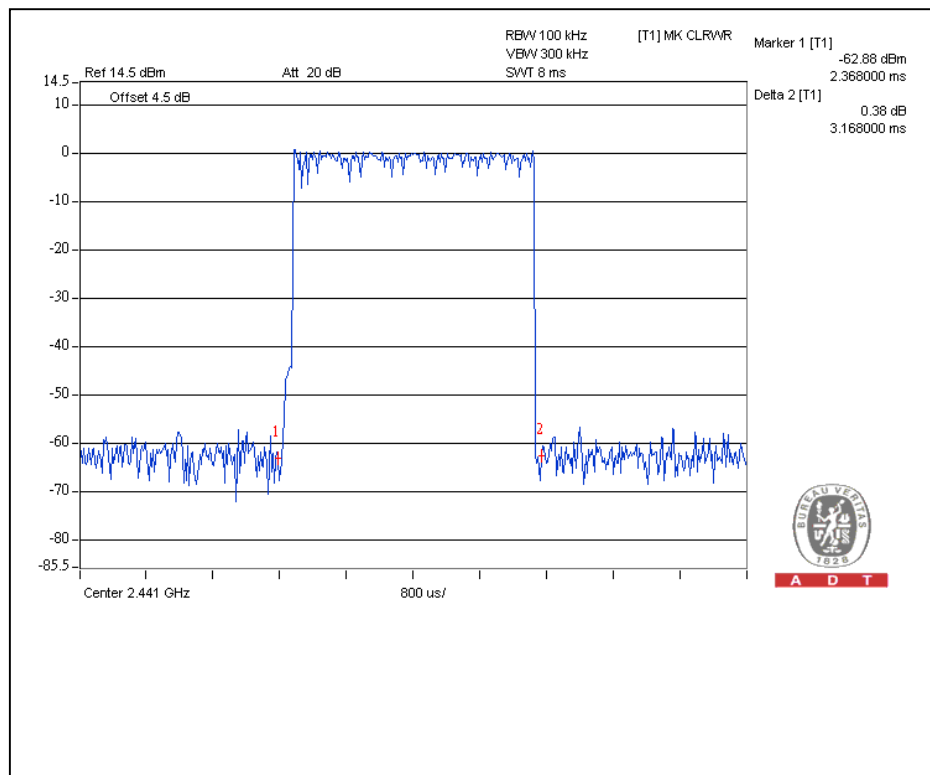
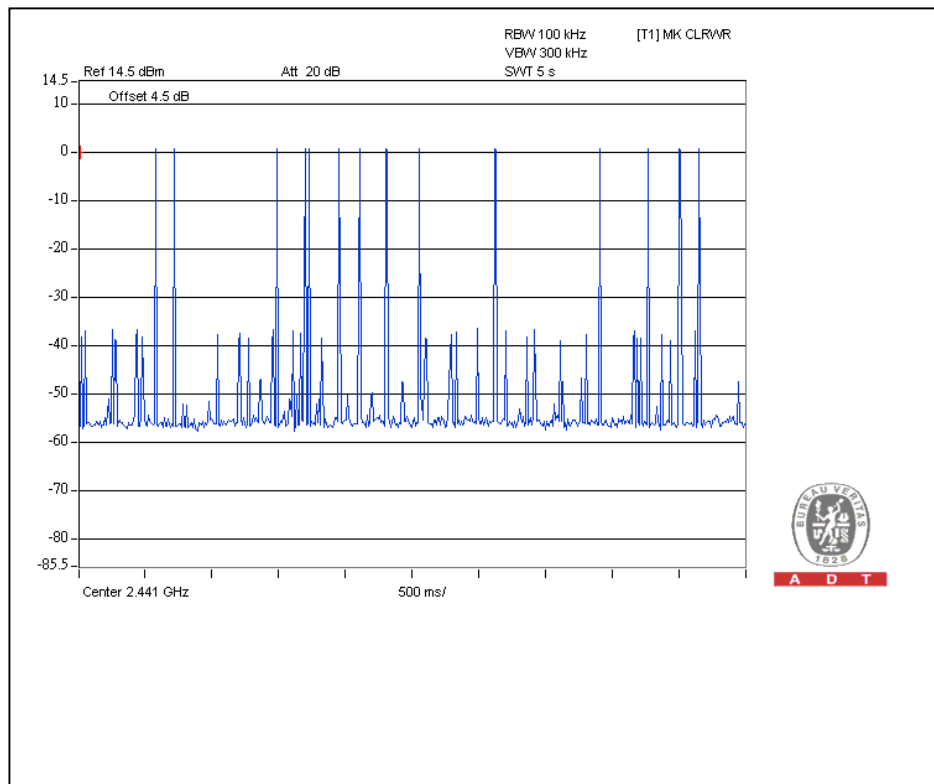
DH3





A D T

DH5





A D T

For 8DPSK:

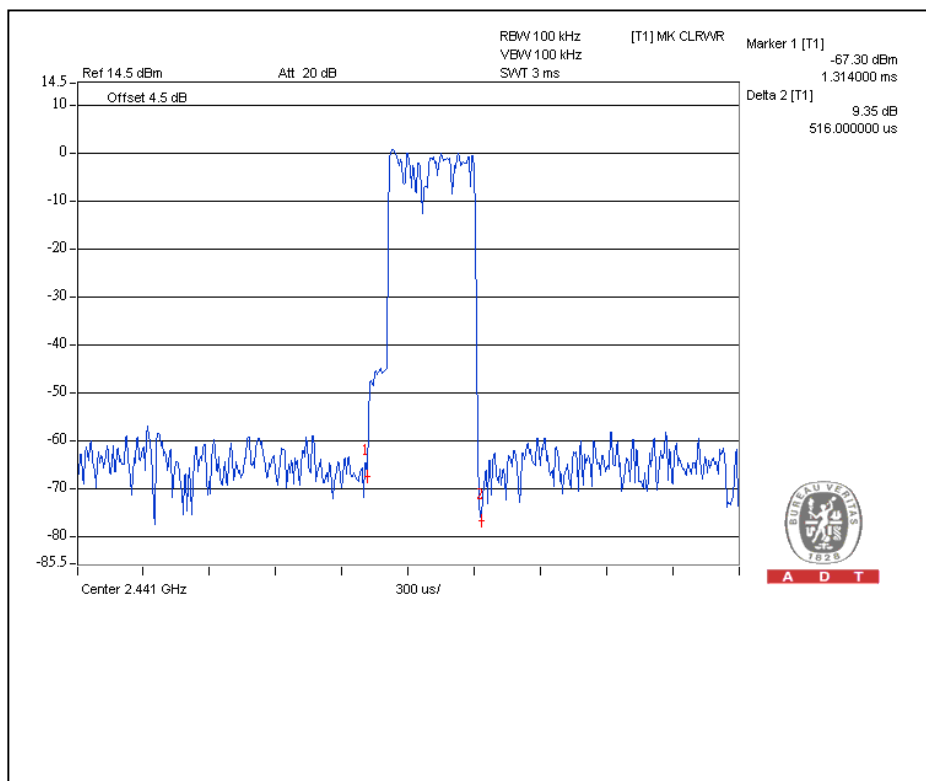
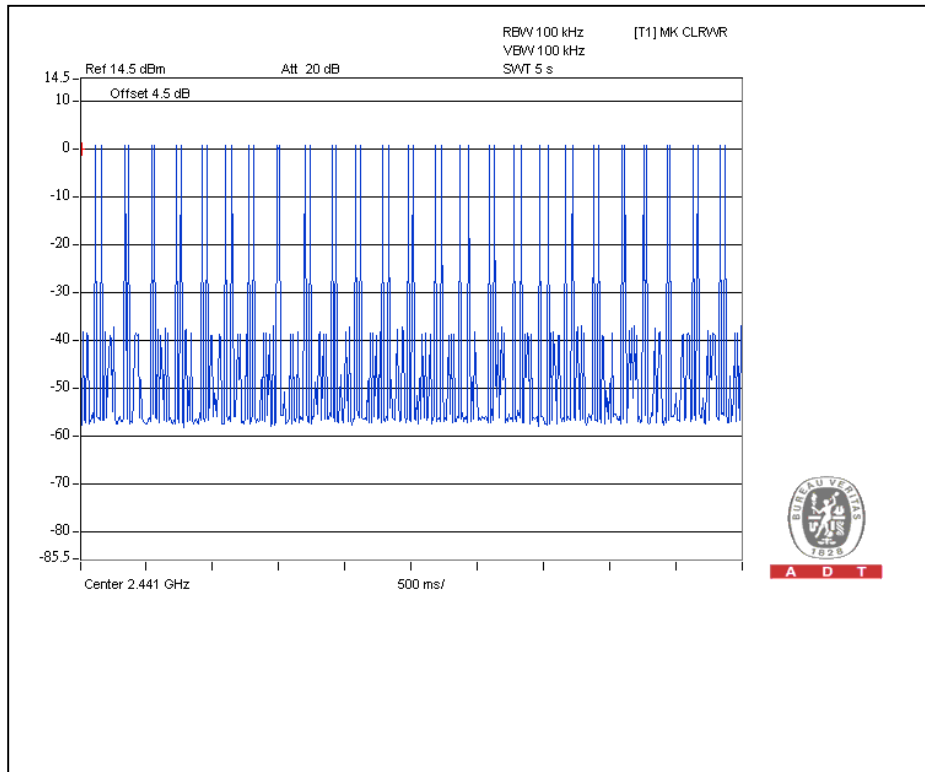
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316 times	0.516	163.0	400
DH3	26 (times / 5 sec) *6.32=164.3 times	1.810	297.0	400
DH5	15 (times / 5 sec) *6.32=94.8 times	3.152	299.0	400

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



A D T

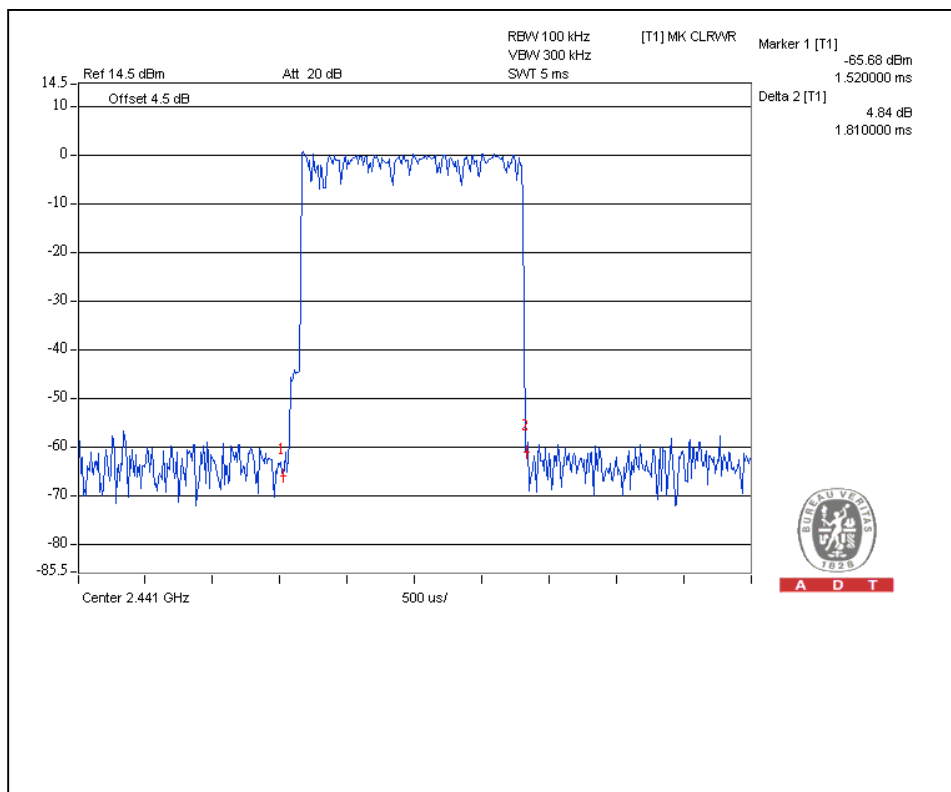
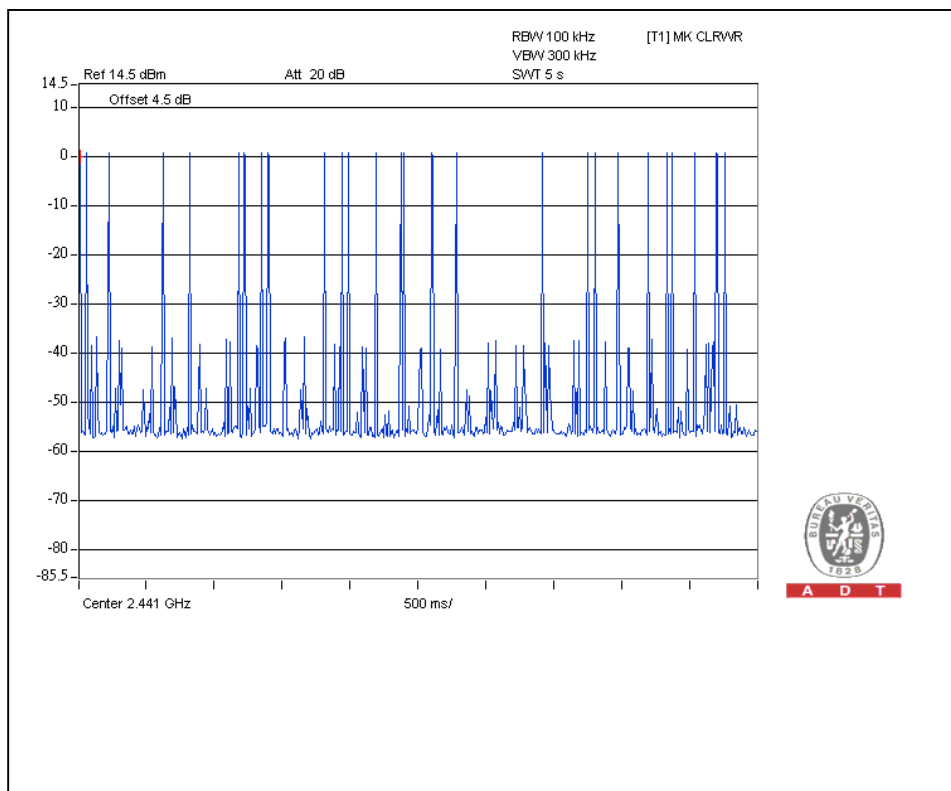
DH1





A D T

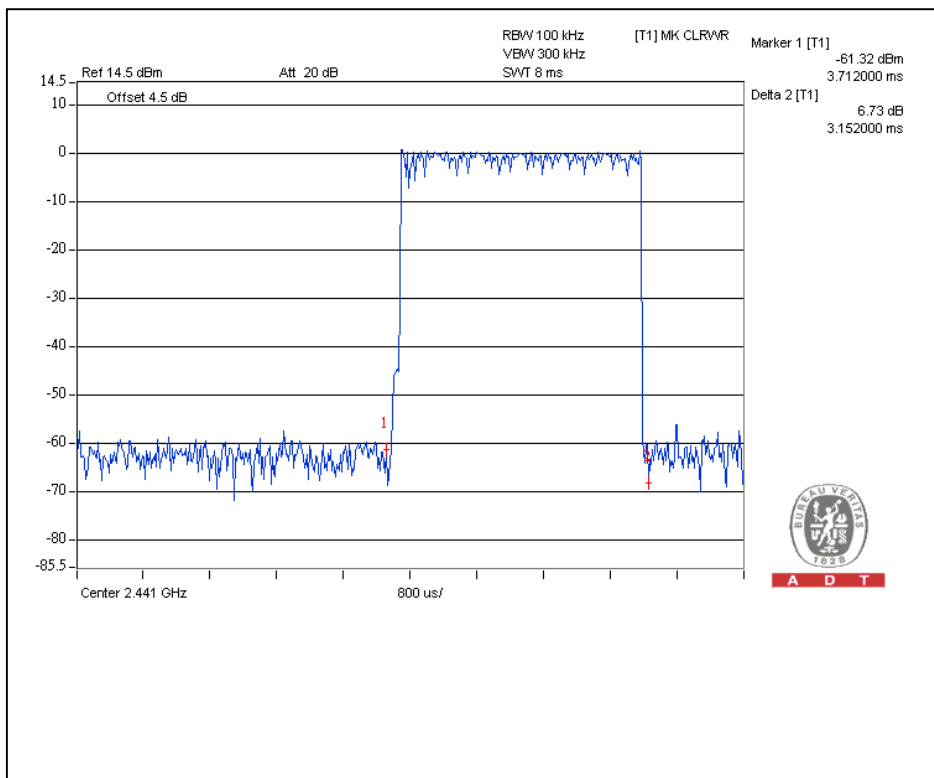
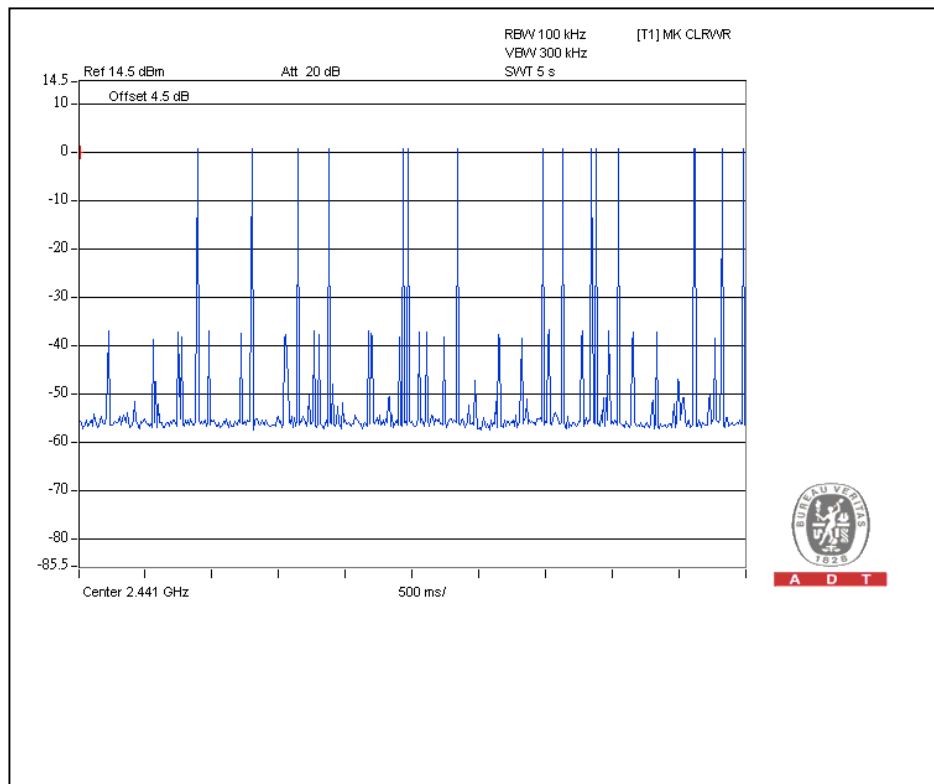
DH3





A D T

DH5



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
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.

4.4.3 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.

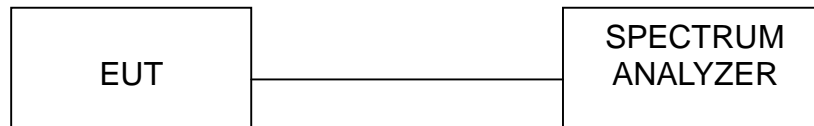
NOTE:

The EUT was setup to ANSI C63.4, tested to FHSS test procedure of DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

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.



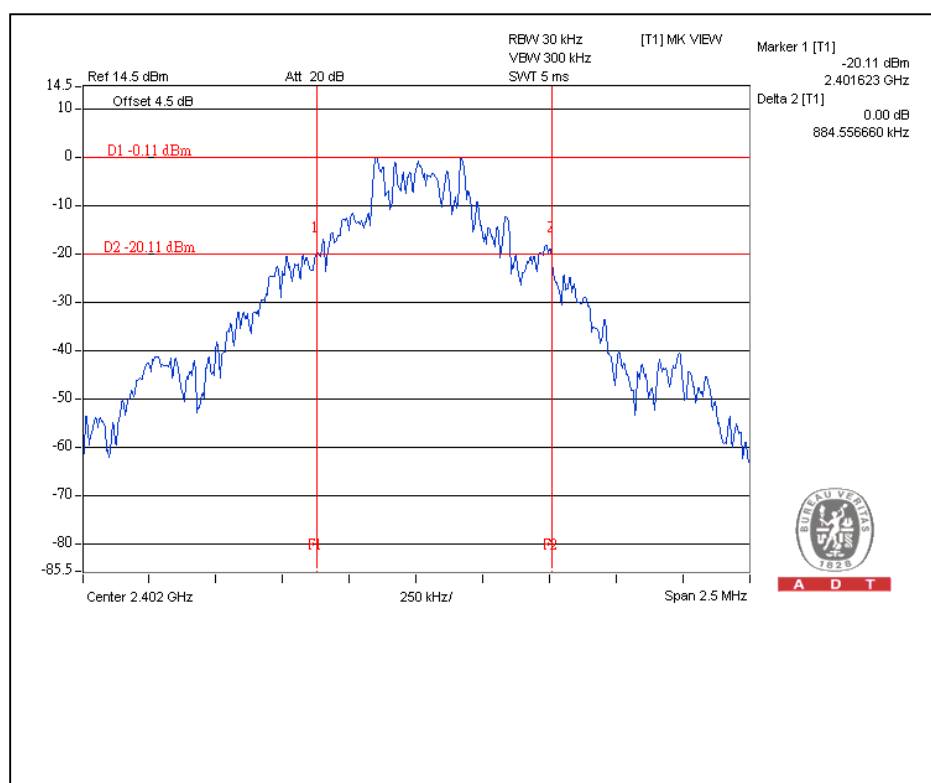
A D T

4.4.7 TEST RESULTS

For GFSK:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.88
39	2441	1.01
78	2480	0.88

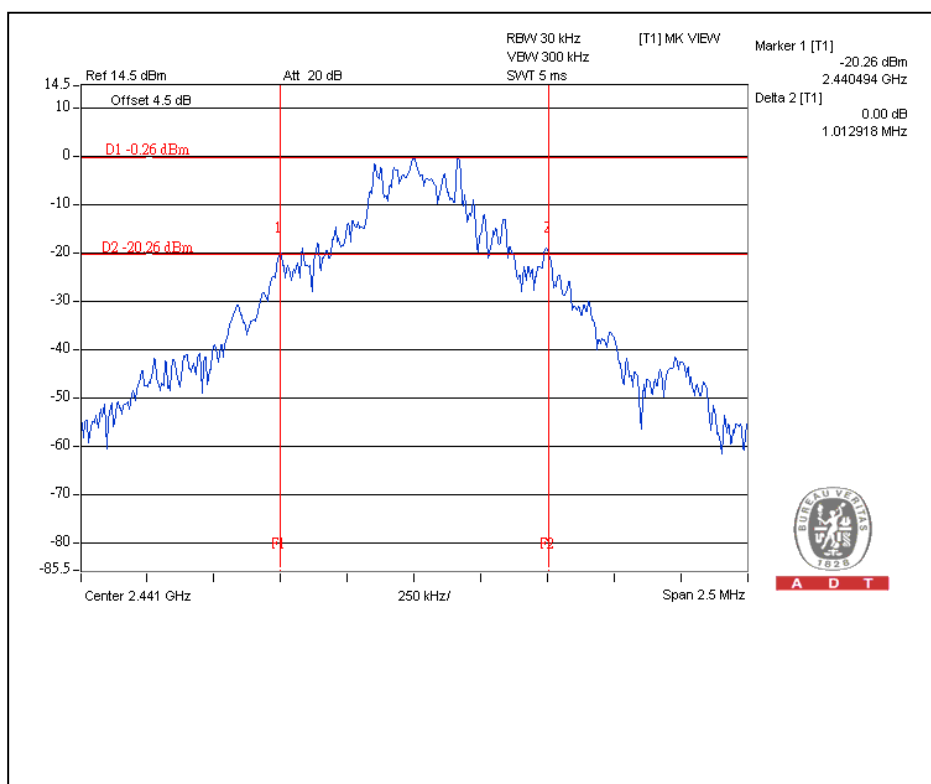
Channel 0



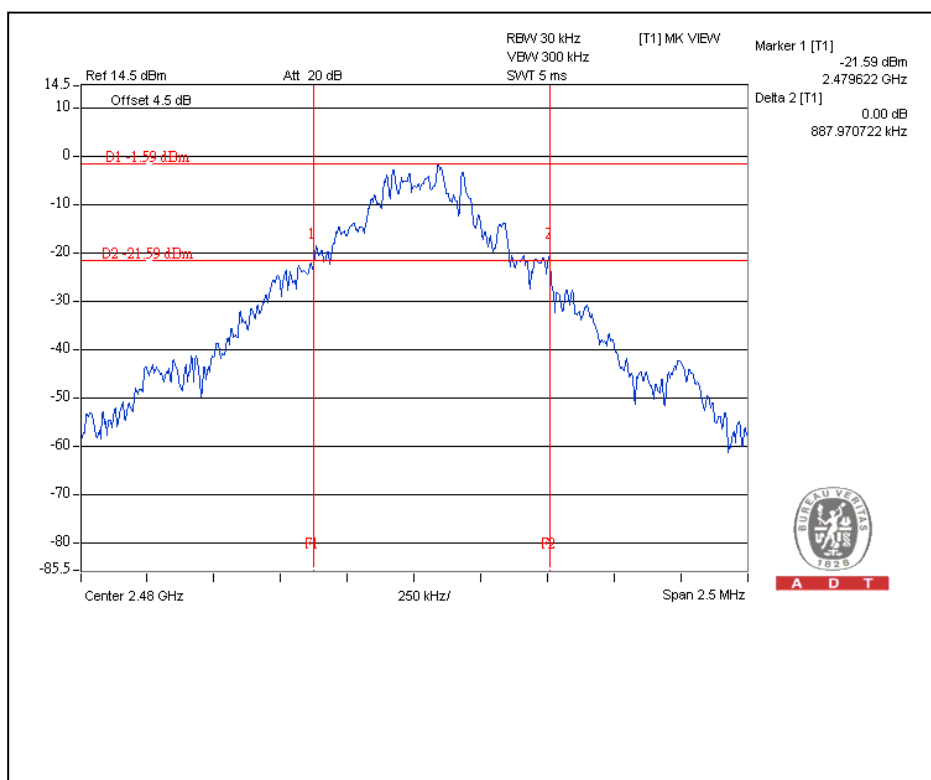


A D T

Channel 39



Channel 78



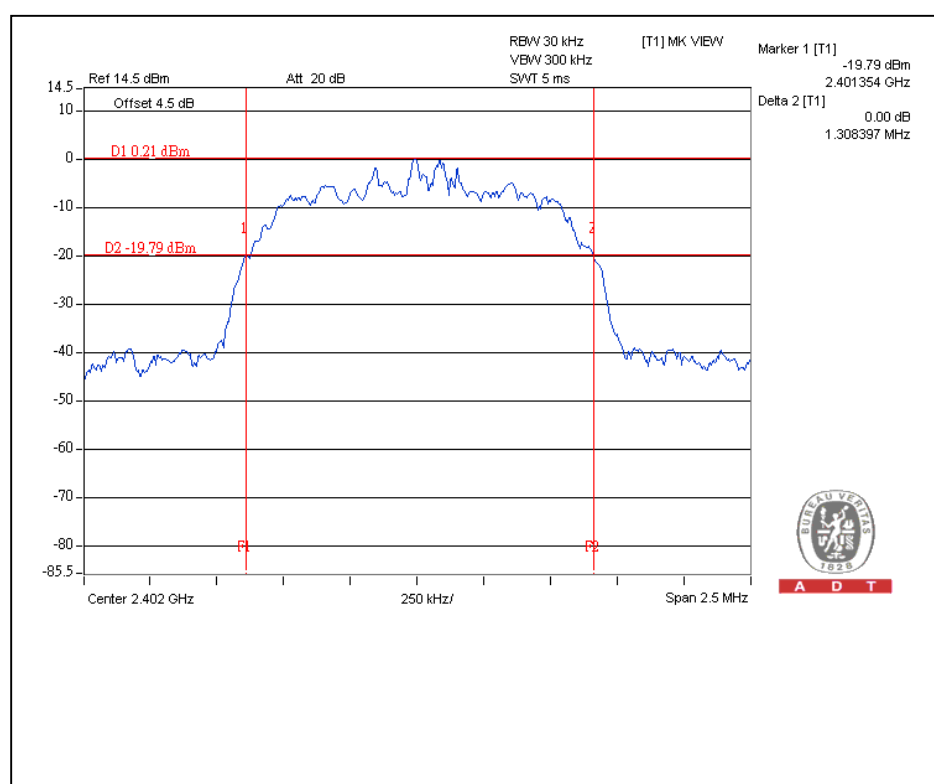


A D T

For $\pi/4$ -DQPSK:

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.30
39	2441	1.31
78	2480	1.31

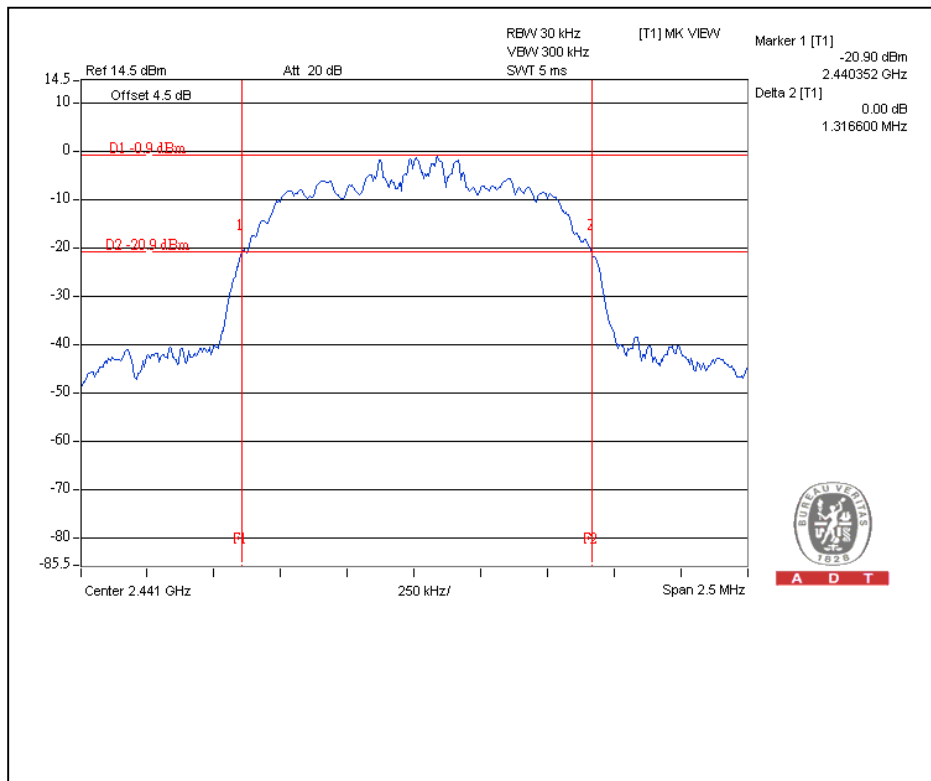
Channel 0



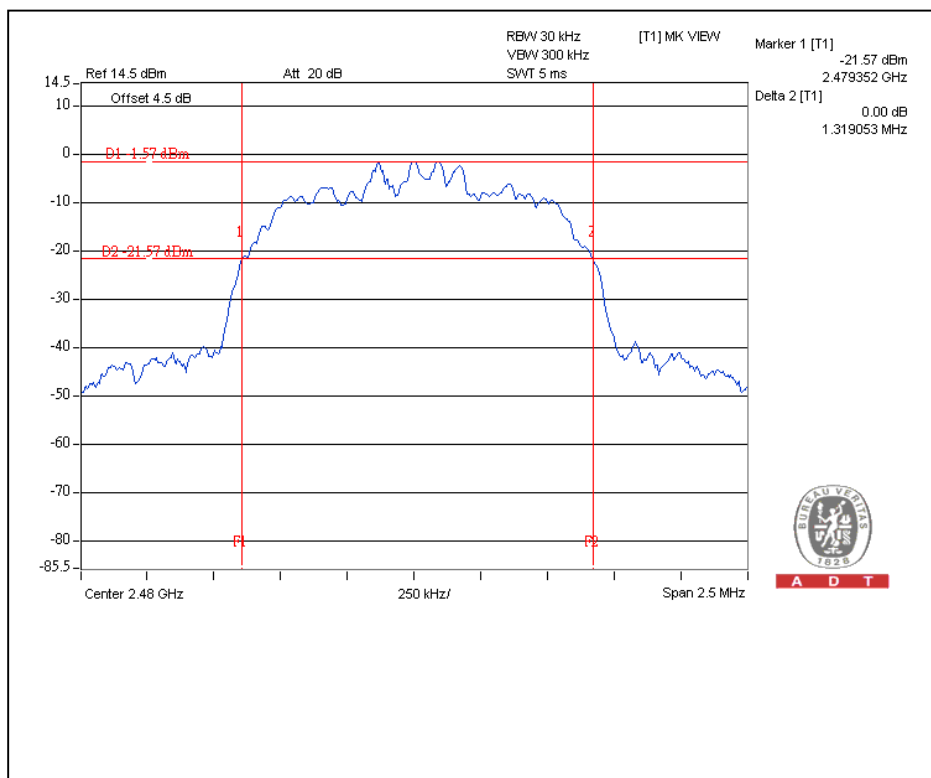


A D T

Channel 39



Channel 78



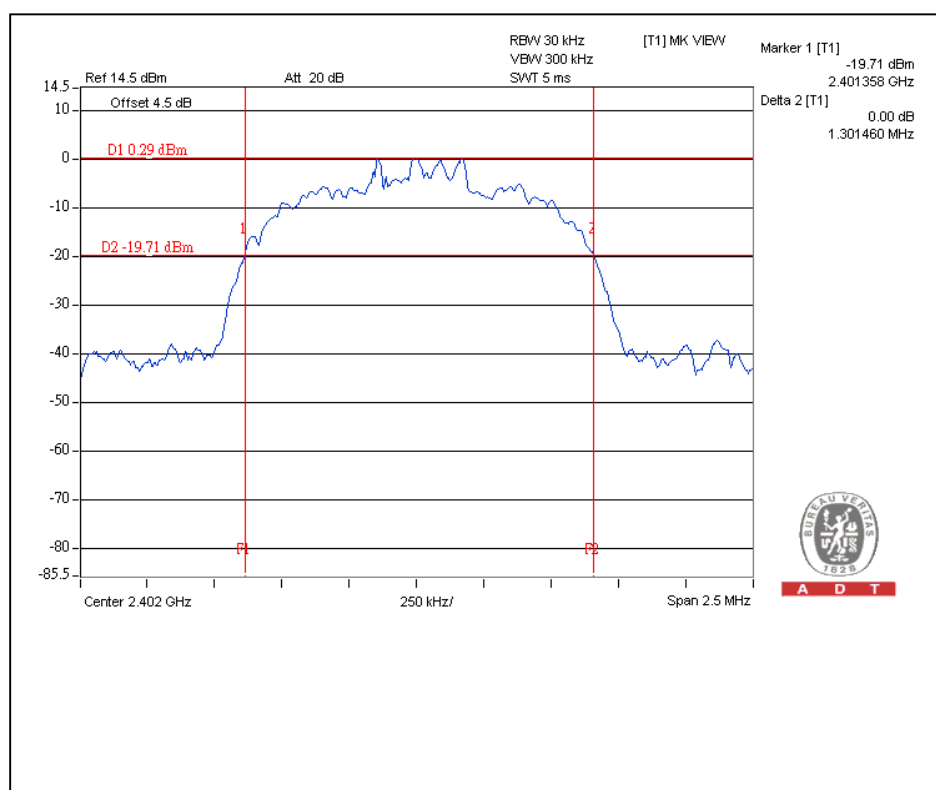


A D T

For 8DPSK:

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

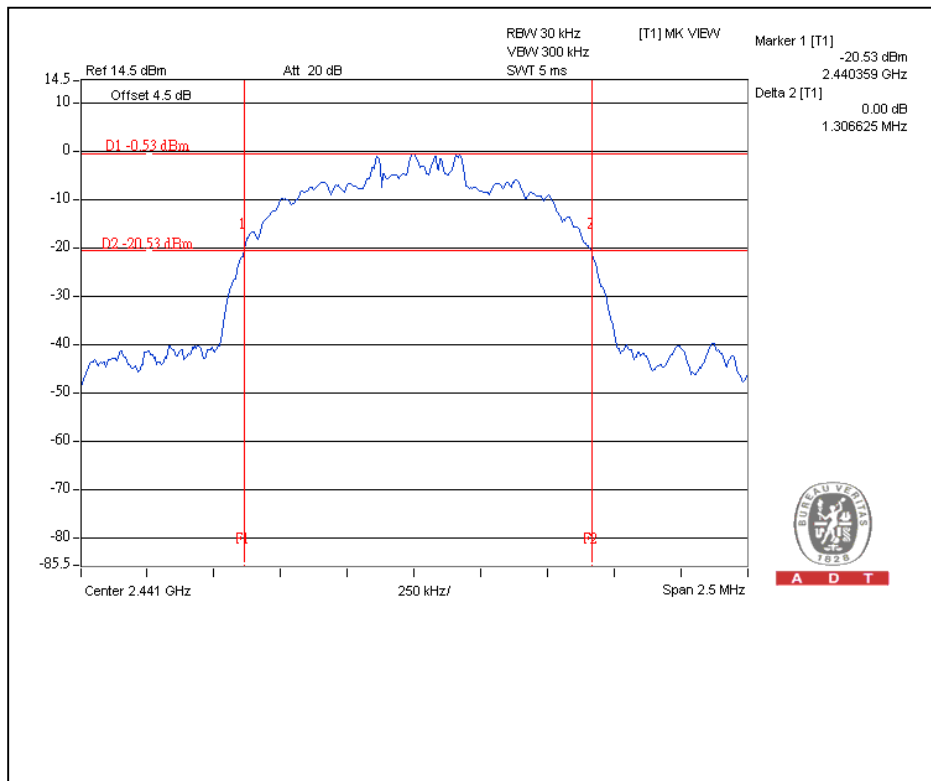
Channel 0



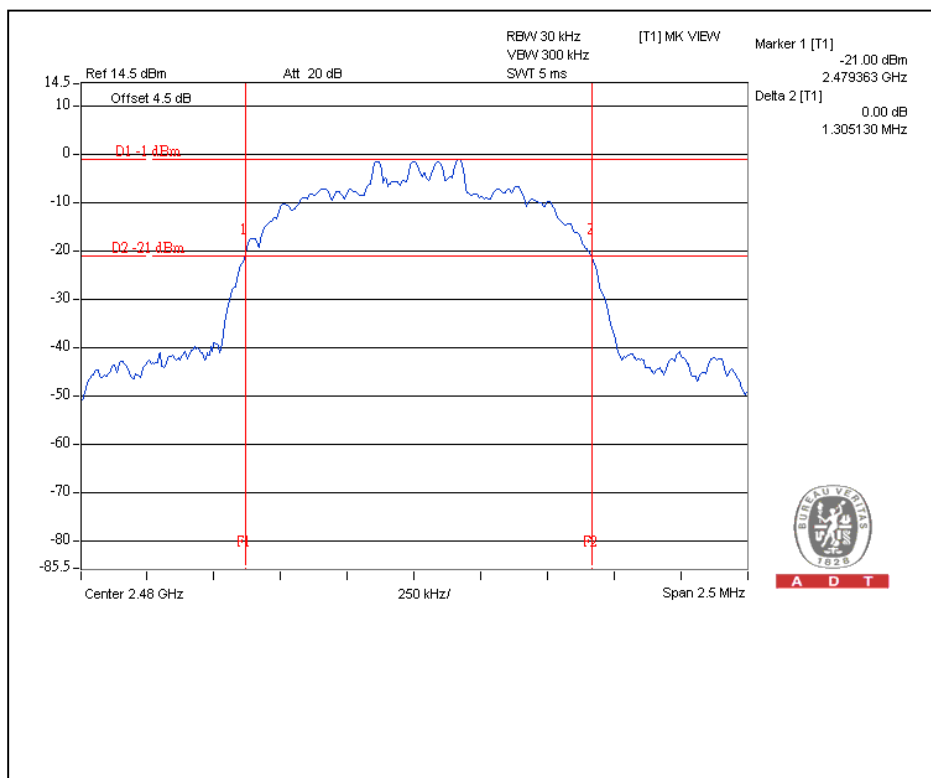


A D T

Channel 39



Channel 78



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 Sevius 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.

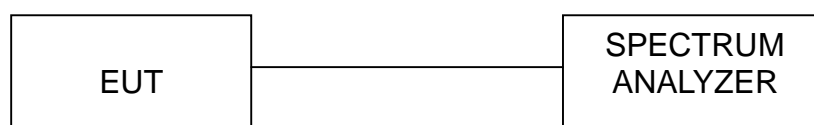
NOTE:

The EUT was setup to ANSI C63.4, tested to FHSS test procedure of DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP





A D T

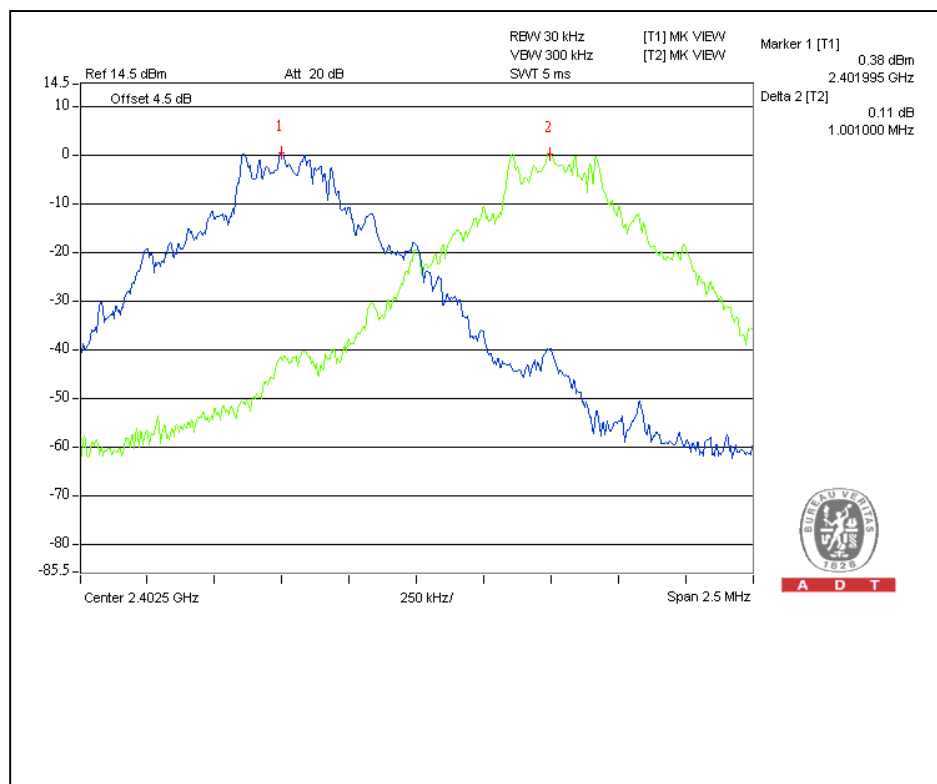
4.5.6 TEST RESULTS

For GFSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.001	0.587	PASS
39	2441	1.007	0.673	PASS
78	2480	1.004	0.587	PASS

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

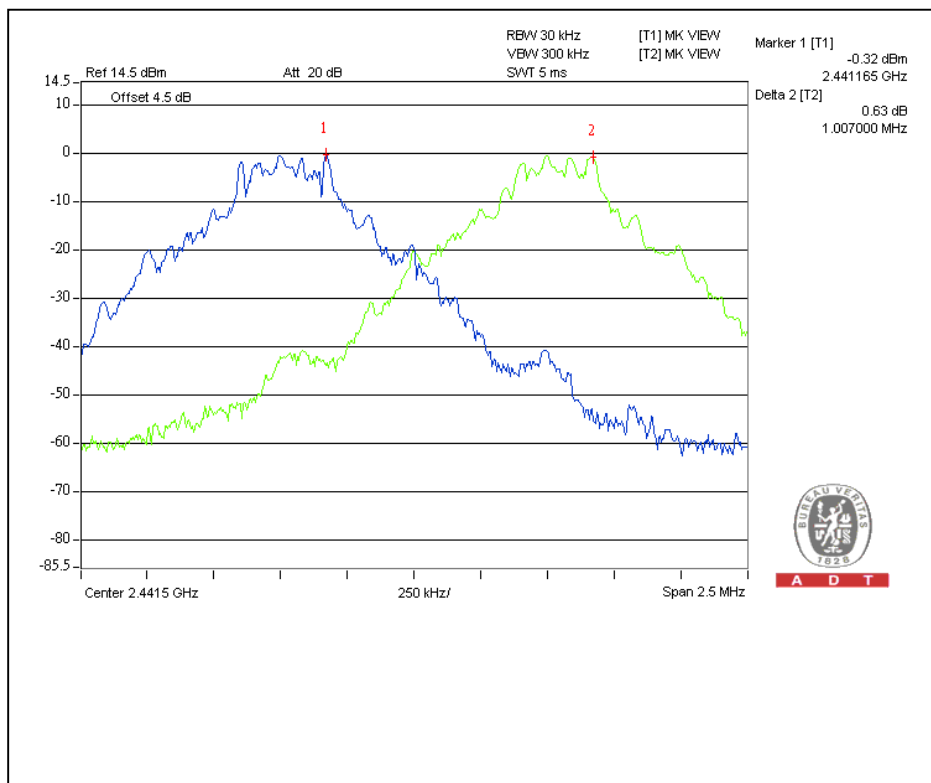
Channel 0



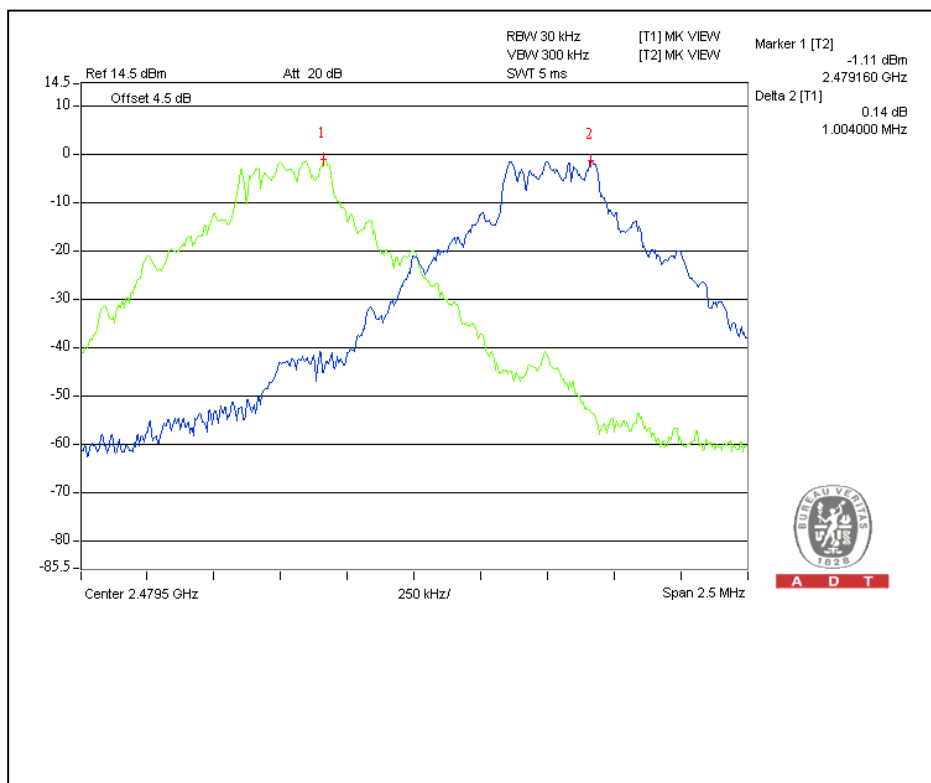


A D T

Channel 39



Channel 78





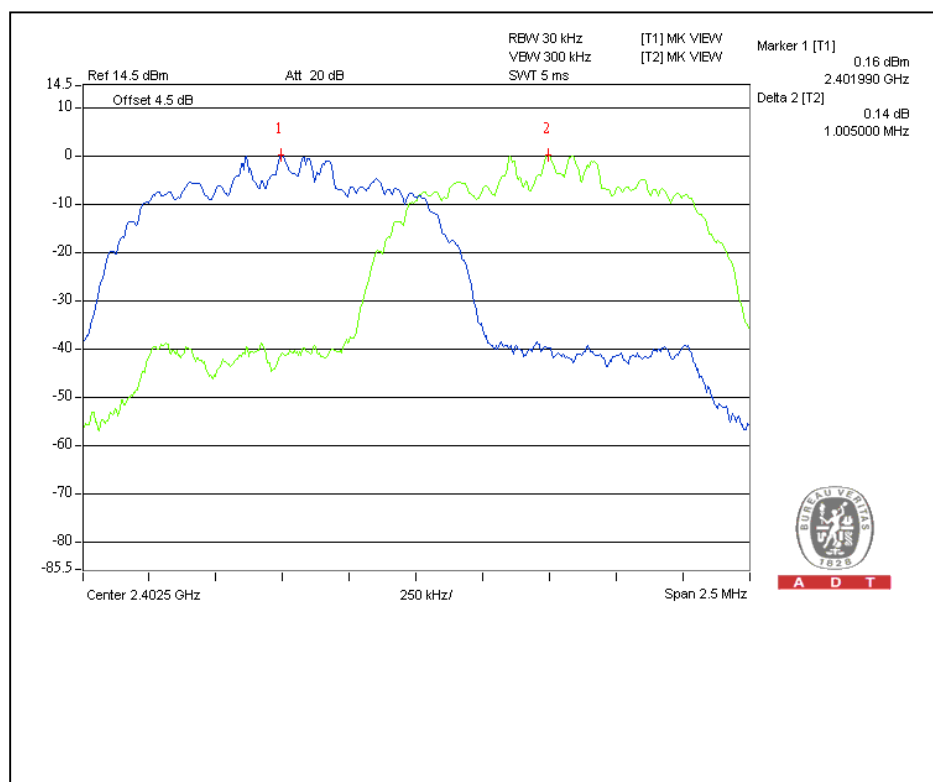
A D T

For $\pi/4$ -DQPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.005	0.867	PASS
39	2441	1.001	0.873	PASS
78	2480	1.003	0.873	PASS

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

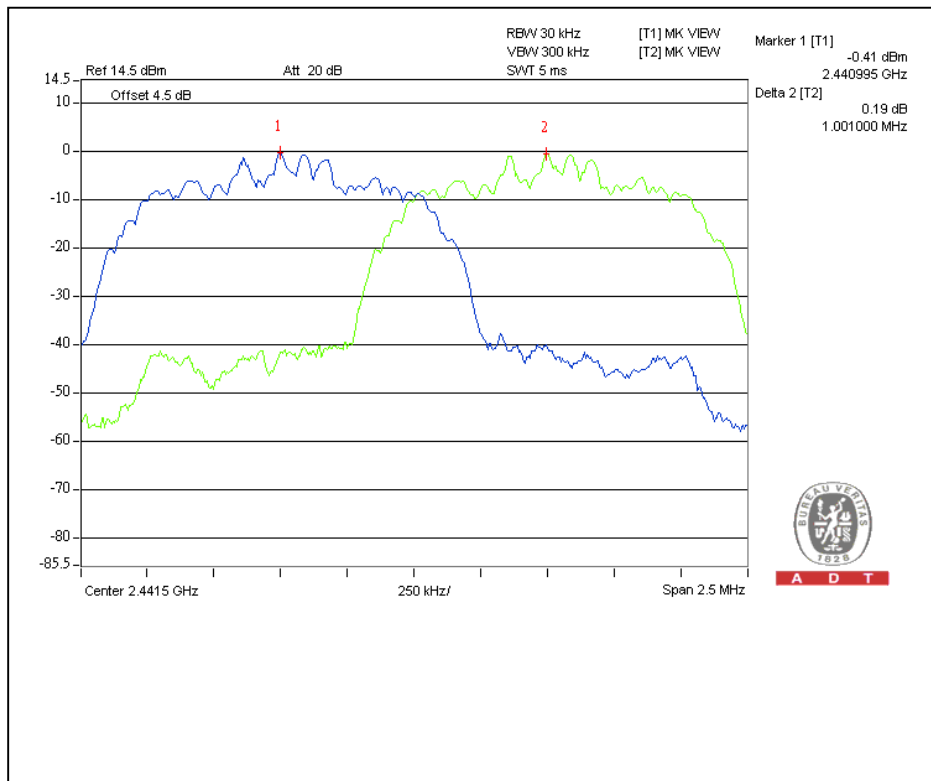
Channel 0



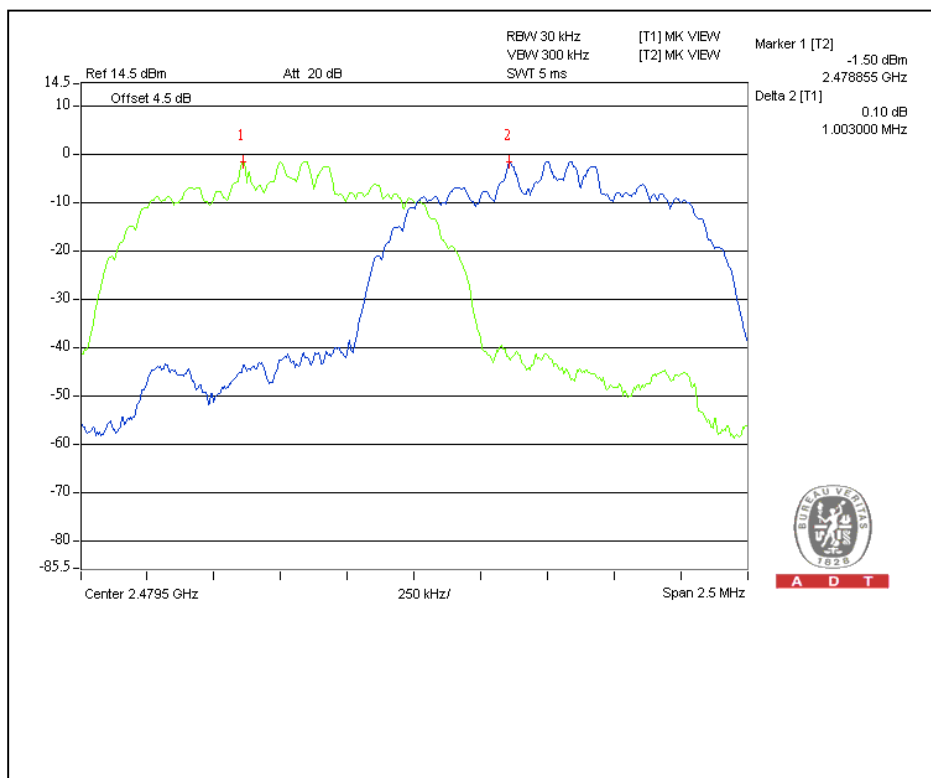


A D T

Channel 39



Channel 78





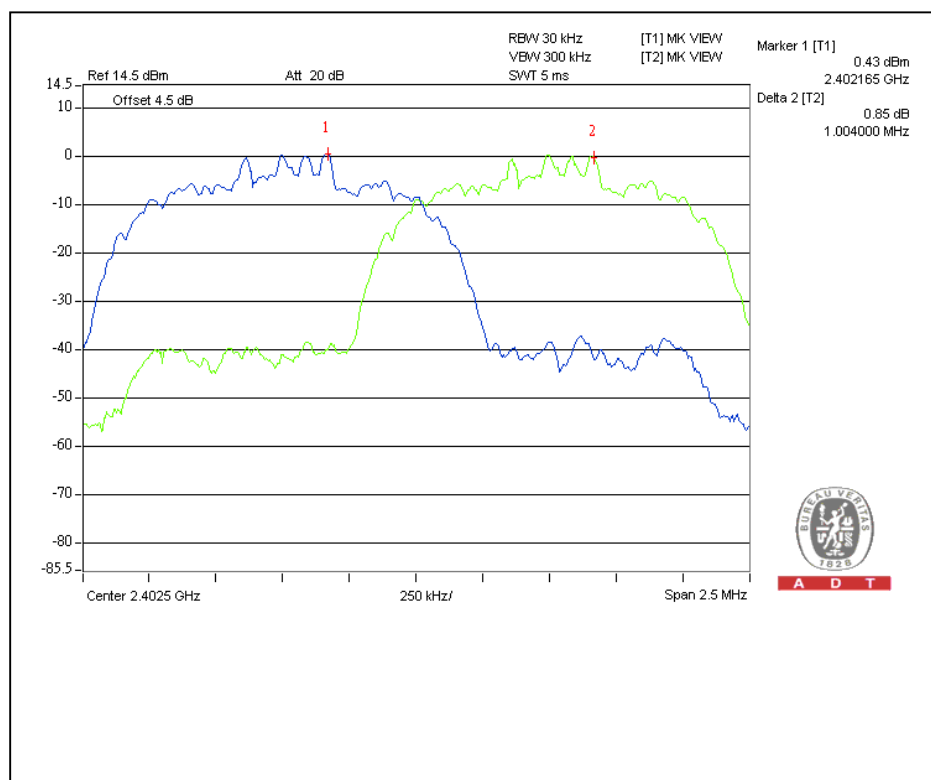
A D T

For 8DPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.004	0.867	PASS
39	2441	1.003	0.867	PASS
78	2480	1.004	0.867	PASS

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

Channel 0

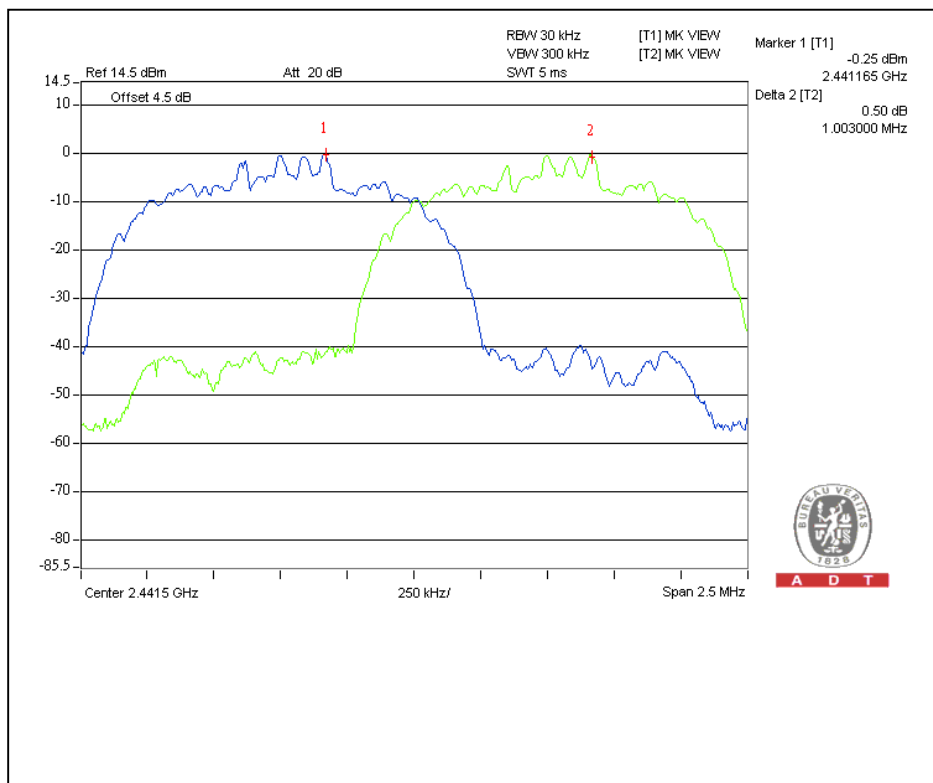


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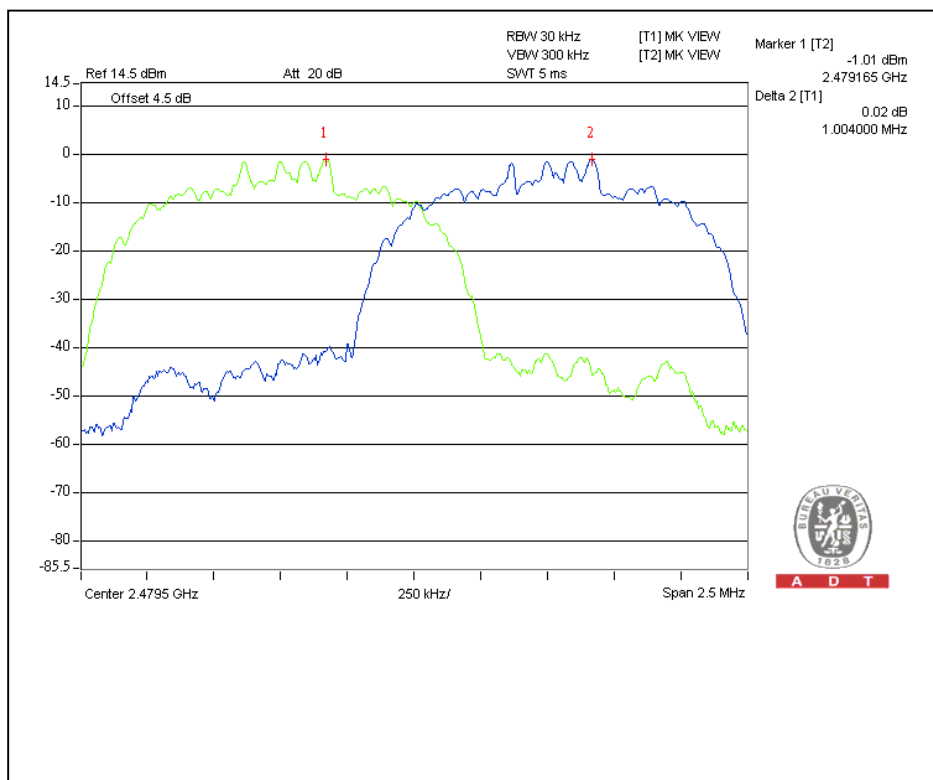


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Channel 39



Channel 78



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
PSA Seviés 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.

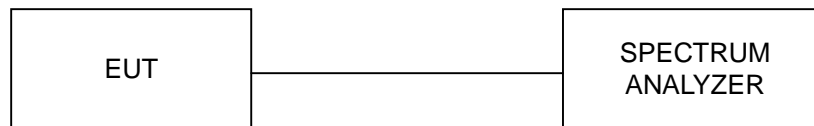
NOTE:

The EUT was setup to ANSI C63.4, tested to FHSS test procedure of DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

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.



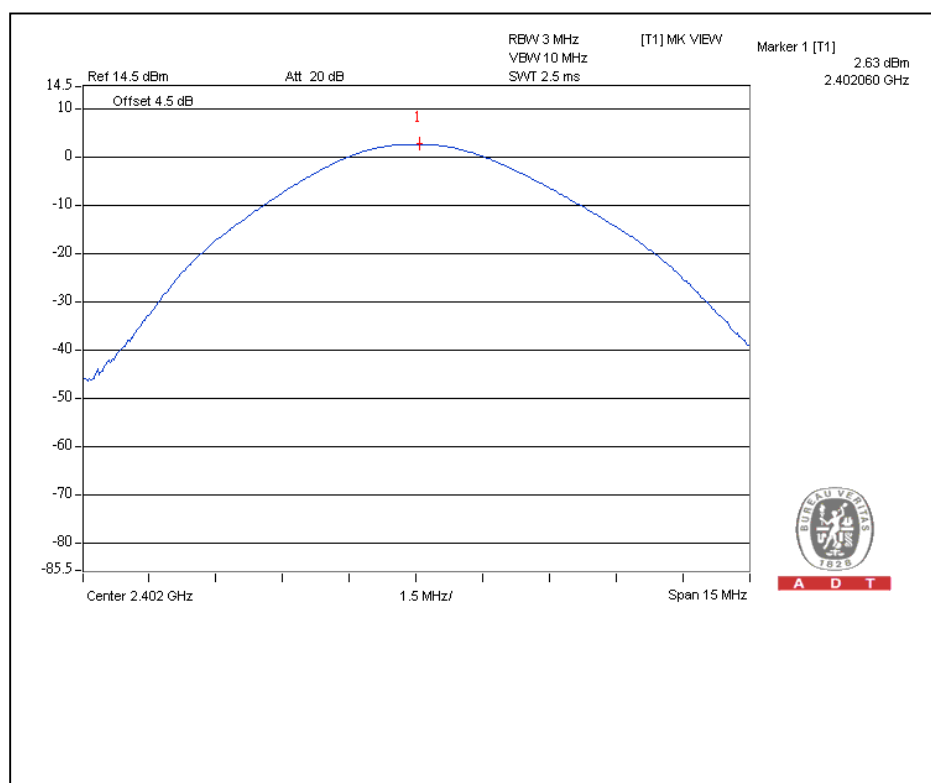
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4.6.7 TEST RESULTS

For GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	2.6	1.8	125	PASS
39	2441	1.7	1.5	125	PASS
78	2480	1.1	1.3	125	PASS

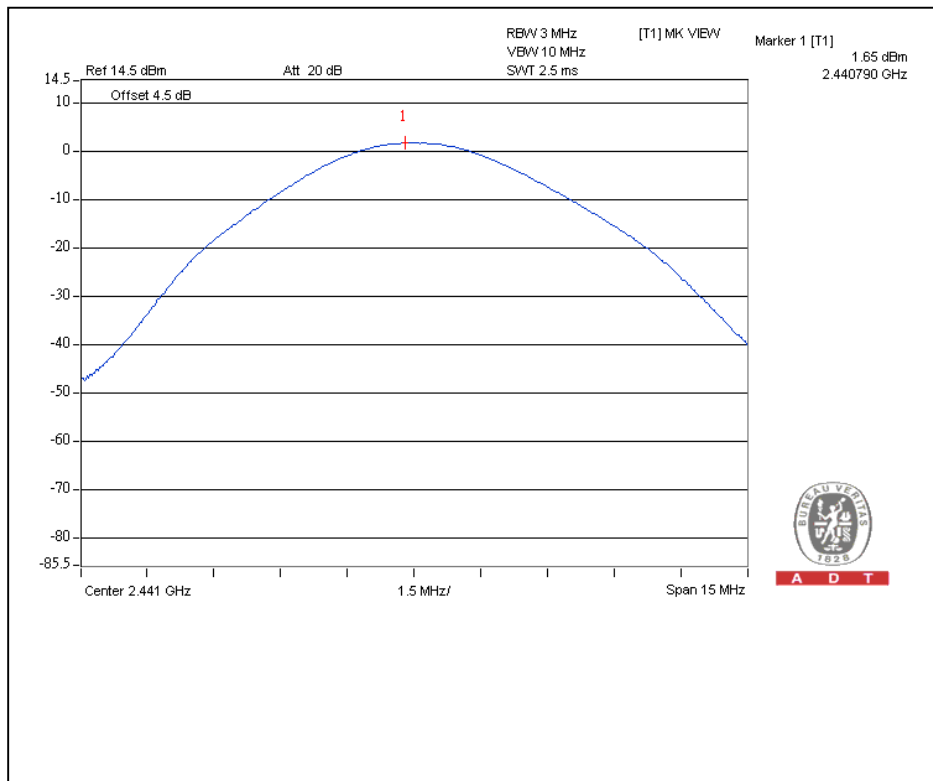
Channel 0



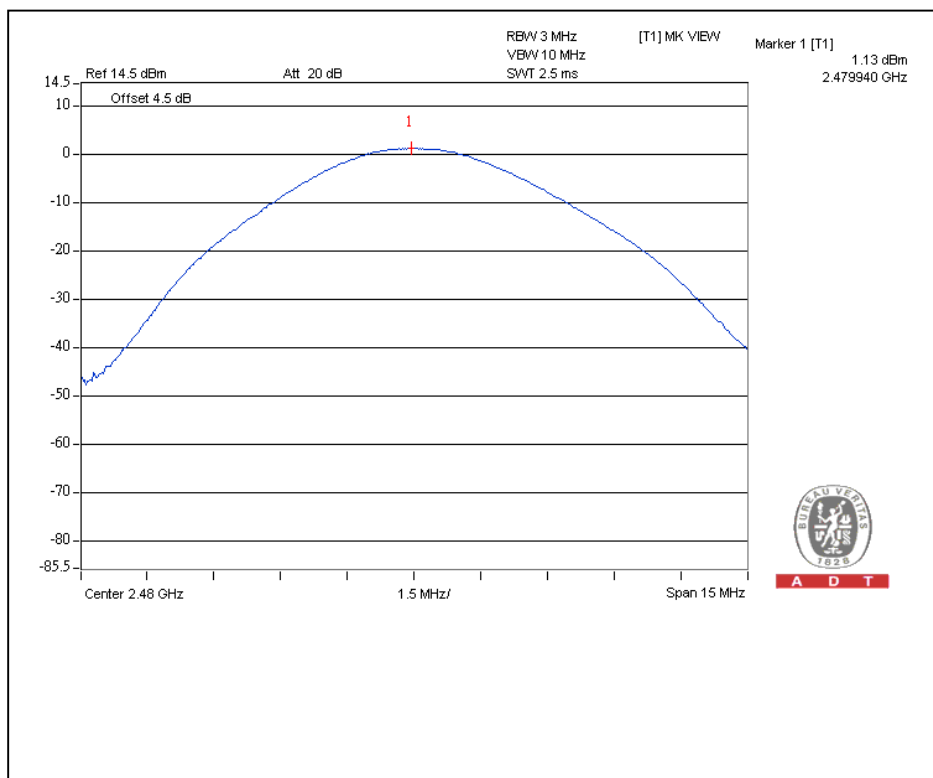


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Channel 39



Channel 78



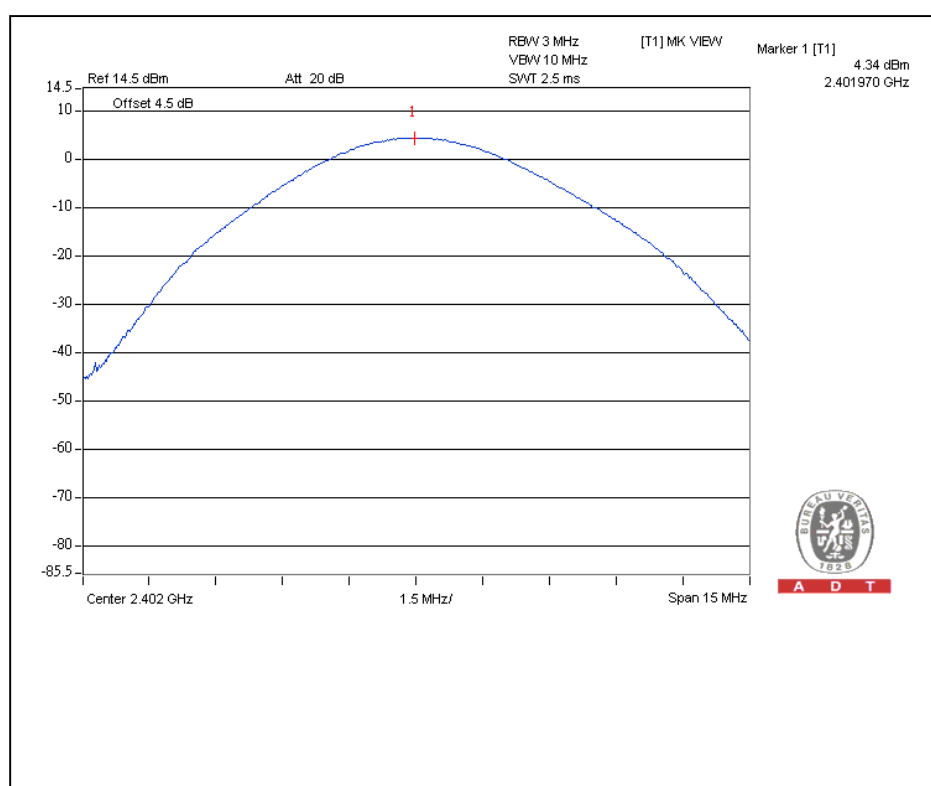


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For $\pi/4$ -DQPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	4.3	2.7	125	PASS
39	2441	3.7	2.3	125	PASS
78	2480	3.2	2.1	125	PASS

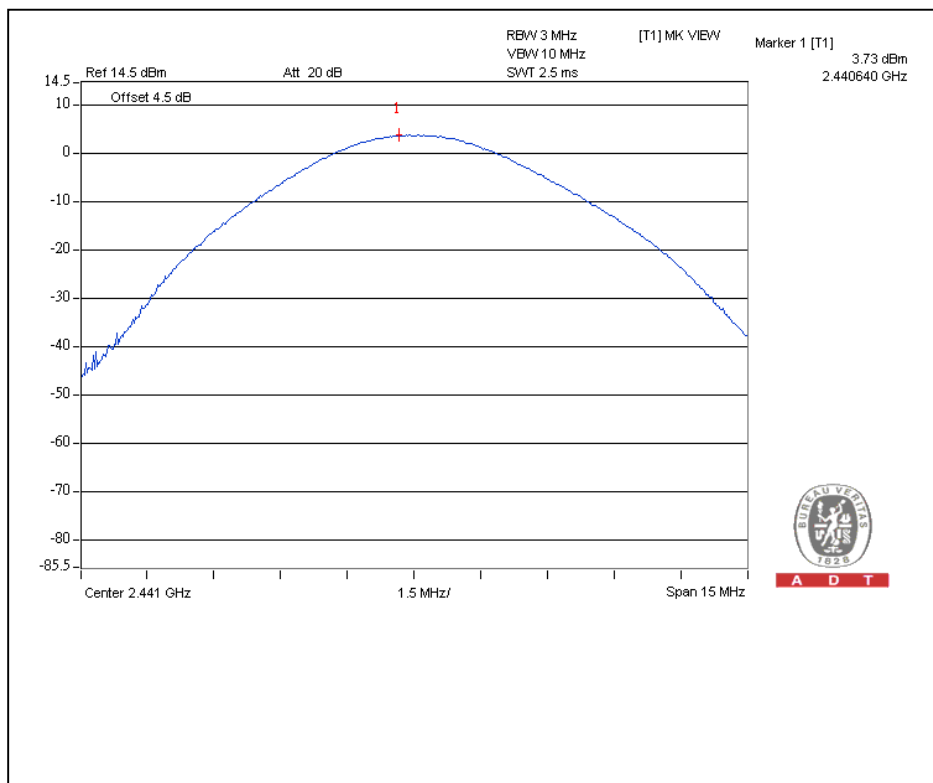
Channel 0



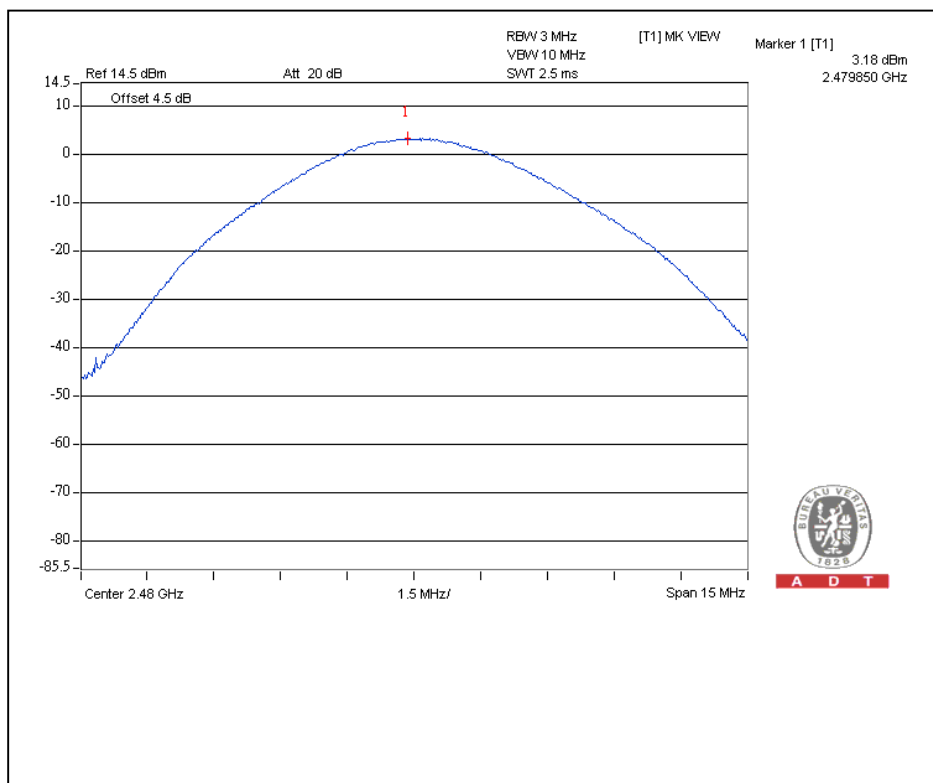


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Channel 39



Channel 78



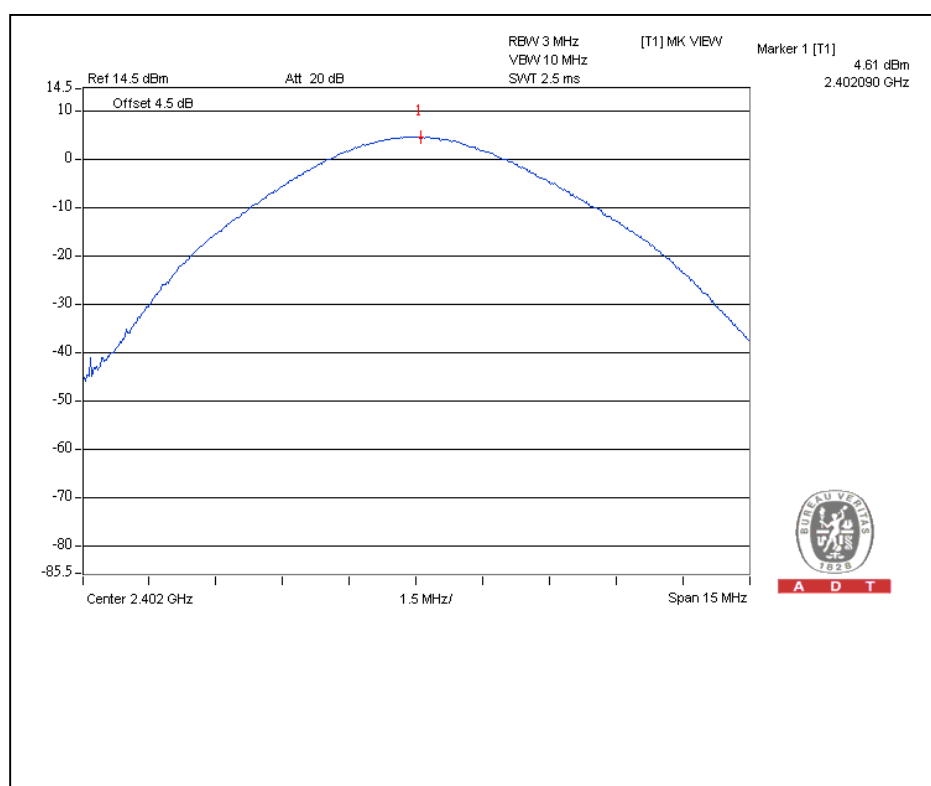


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For 8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	4.6	2.9	125	PASS
39	2441	4.1	2.6	125	PASS
78	2480	3.4	2.2	125	PASS

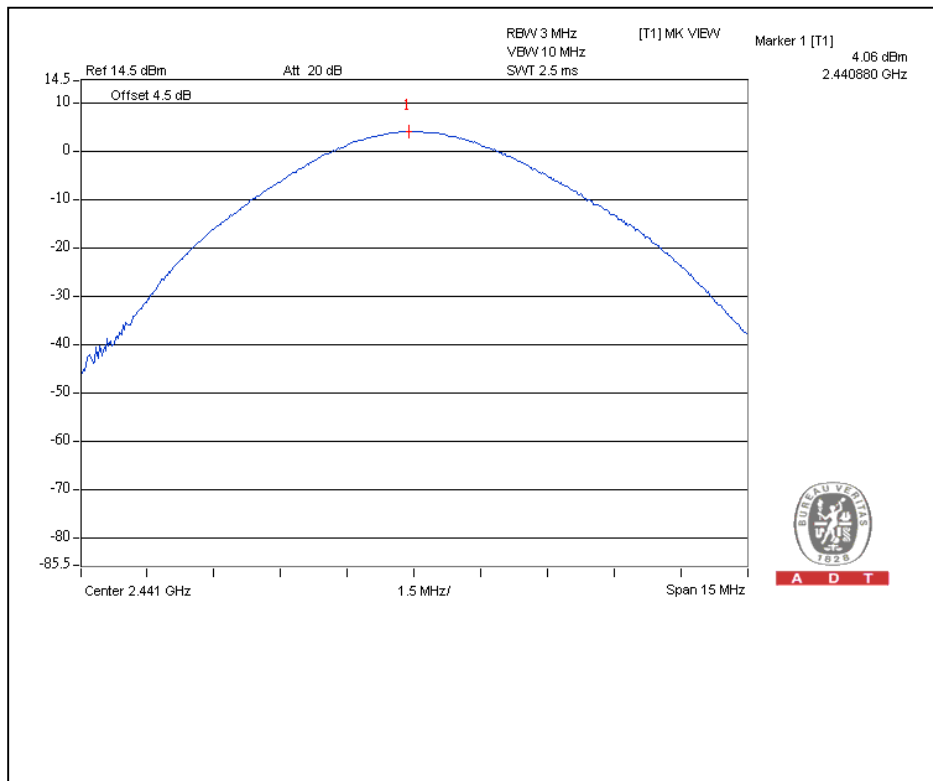
Channel 0



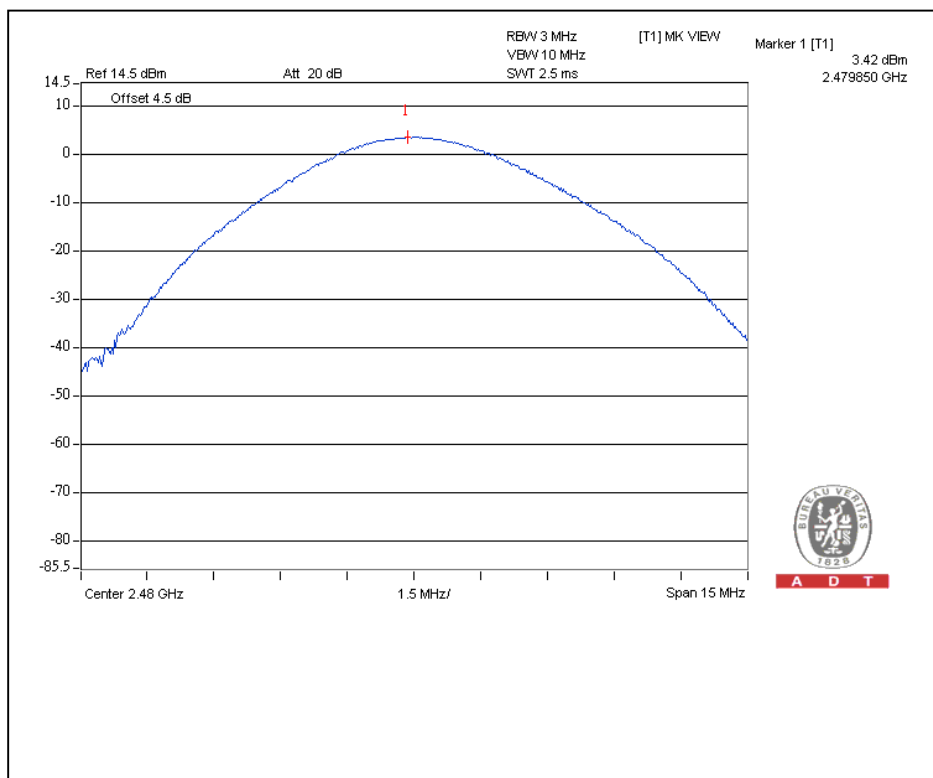


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Channel 39



Channel 78



4.7 RADIATED EMISSION MEASUREMENT

4.7.1 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

1. 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.
2. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.

4.7.2 TEST INSTRUMENTS

For below 1GHz test: (Test date: Dec. 07, 2010)

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. 24, 2009	Dec. 23, 2010
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.



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For Above 1GHz test: (Test date: Dec. 21, 2010)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 23, 2010	Aug. 22, 2011
Agilent Pre-Selector	N9039A	MY46520310	Aug. 23, 2010	Aug. 22, 2011
Agilent Signal Generator	N5181A	MY49060347	July 30, 2010	July 29, 2011
LIG NEX1 Test Receiver	ER-265	L09068005	Oct. 25, 2010	Oct. 24, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-04	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02465	Mar. 01, 2010	Feb. 28, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-361	Apr. 28, 2010	Apr. 27, 2011
AISI Horn_Antenna	AIH.8018	0000220091110	Nov. 22, 2010	Nov. 21, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-205 RF104-207 RF104-208	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHHCAB_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. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.

4.7.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 10 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 antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

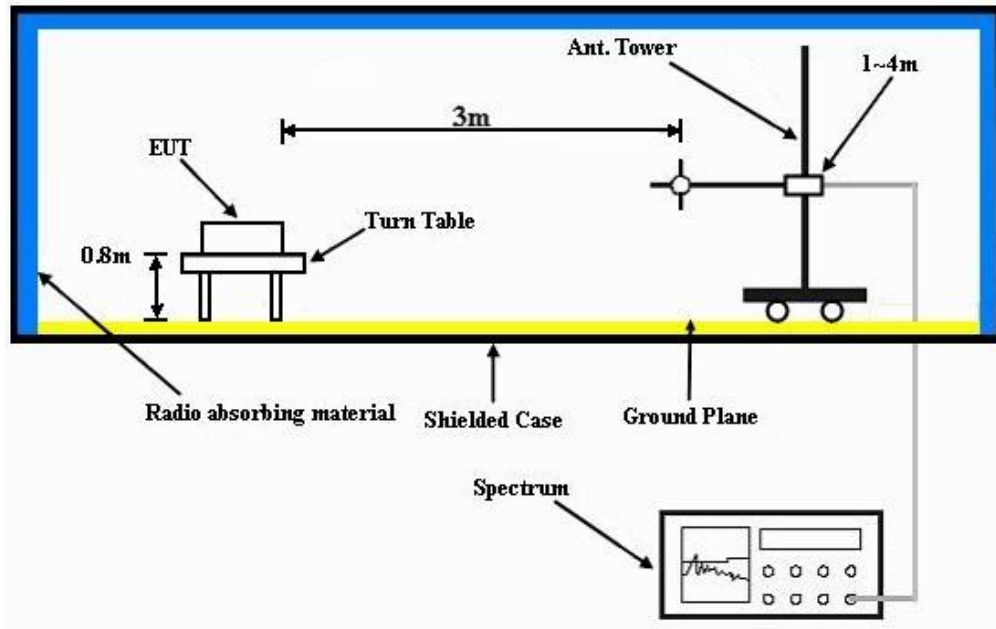
NOTE:

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.

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 TEST RESULTS

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	23deg. C, 71%RH 1024 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	106.03	32.9 QP	43.50	-10.6	1.75 H	297	22.52	10.42
2	145.94	33.9 QP	43.50	-9.6	2.00 H	284	19.90	14.00
3	201.12	33.6 QP	43.50	-9.9	1.00 H	81	22.76	10.88
4	264.83	30.7 QP	46.00	-15.3	1.00 H	37	16.71	14.03
5	500.02	26.2 QP	46.00	-19.9	1.50 H	346	6.05	20.10
6	599.97	26.1 QP	46.00	-19.9	1.50 H	360	3.73	22.38
7	700.04	32.7 QP	46.00	-13.3	1.25 H	12	9.04	23.67
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	104.01	31.7 QP	43.50	-11.9	1.75 V	344	21.55	10.10
2	132.67	31.7 QP	43.50	-11.8	1.00 V	360	18.22	13.52
3	146.05	34.5 QP	43.50	-9.0	1.00 V	356	20.50	14.00
4	385.74	28.0 QP	46.00	-18.0	1.50 V	0	10.63	17.37
5	434.89	28.3 QP	46.00	-17.7	1.00 V	356	9.76	18.52
6	700.04	27.5 QP	46.00	-18.5	1.00 V	69	3.79	23.67
7	799.98	27.7 QP	46.00	-18.3	1.75 V	270	2.70	25.00

- 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	20deg. C, 70%RH 1024 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	55.8 PK	74.00	-18.2	1.00 H	252	24.01	31.79
2	2390.00	25.7 AV	54.00	-28.3	1.00 H	252	-6.09	31.79
3	*2402.00	89.4 PK			1.00 H	252	57.57	31.83
4	*2402.00	59.3 AV			1.00 H	252	27.47	31.83
5	4804.00	48.0 PK	74.00	-26.0	1.10 H	192	7.07	40.93
6	4804.00	17.9 AV	54.00	-36.1	1.10 H	192	-23.03	40.93
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	55.3 PK	74.00	-18.7	1.00 V	205	23.51	31.79
2	2390.00	25.2 AV	54.00	-28.8	1.00 V	205	-6.59	31.79
3	*2402.00	93.0 PK			1.00 V	205	61.17	31.83
4	*2402.00	62.9 AV			1.00 V	205	31.07	31.83
5	4804.00	47.6 PK	74.00	-26.4	1.01 V	205	6.67	40.93
6	4804.00	17.5 AV	54.00	-36.5	1.01 V	205	-23.43	40.93

- 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: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.



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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	20deg. C, 70%RH 1024 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	89.2 PK			1.00 H	250	57.25	31.95
2	*2441.00	59.1 AV			1.00 H	250	27.15	31.95
3	4882.00	47.8 PK	74.00	-26.2	1.11 H	196	6.73	41.07
4	4882.00	17.7 AV	54.00	-36.3	1.11 H	196	-23.37	41.07
5	7323.00	54.1 PK	74.00	-19.9	1.05 H	33	8.59	45.51
6	7323.00	24.0 AV	54.00	-30.0	1.05 H	33	-21.51	45.51
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	94.3 PK			1.00 V	215	62.35	31.95
2	*2441.00	64.2 AV			1.00 V	215	32.25	31.95
3	4882.00	47.2 PK	74.00	-26.8	1.04 V	203	6.13	41.07
4	4882.00	17.1 AV	54.00	-36.9	1.04 V	203	-23.97	41.07
5	7323.00	55.5 PK	74.00	-18.5	1.20 V	230	9.99	45.51
6	7323.00	25.4 AV	54.00	-28.6	1.20 V	230	-20.11	45.51

- 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: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.



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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	20deg. C, 70%RH 1024 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	88.9 PK			1.01 H	221	56.83	32.07
2	*2480.00	58.8 AV			1.01 H	221	26.73	32.07
3	2483.50	56.2 PK	74.00	-17.8	1.01 H	227	24.12	32.08
4	2483.50	26.1 AV	54.00	-27.9	1.01 H	227	-5.98	32.08
5	4960.00	47.2 PK	74.00	-26.8	1.10 H	185	5.98	41.22
6	4960.00	17.1 AV	54.00	-36.9	1.10 H	185	-24.12	41.22
7	7440.00	54.9 PK	74.00	-19.1	1.09 H	26	9.10	45.80
8	7440.00	24.8 AV	54.00	-29.2	1.09 H	26	-21.00	45.80
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	96.2 PK			1.01 V	205	64.13	32.07
2	*2480.00	66.1 AV			1.01 V	205	34.03	32.07
3	2483.50	54.4 PK	74.00	-19.6	1.01 V	205	22.32	32.08
4	2483.50	24.3 AV	54.00	-29.7	1.01 V	205	-7.78	32.08
5	4960.00	47.9 PK	74.00	-26.1	1.02 V	211	6.68	41.22
6	4960.00	17.8 AV	54.00	-36.2	1.02 V	211	-23.42	41.22
7	7440.00	55.6 PK	74.00	-18.4	1.22 V	242	9.80	45.80
8	7440.00	25.5 AV	54.00	-28.5	1.22 V	242	-20.30	45.80

- 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: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.



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	20deg. C, 70%RH 1024 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	56.0 PK	74.00	-18.0	1.00 H	90	24.21	31.79
2	2390.00	25.9 AV	54.00	-28.1	1.00 H	90	-5.89	31.79
3	*2402.00	90.8 PK			1.00 H	90	58.97	31.83
4	*2402.00	60.7 AV			1.00 H	90	28.87	31.83
5	4804.00	47.1 PK	74.00	-26.9	1.20 H	231	6.17	40.93
6	4804.00	17.0 AV	54.00	-37.0	1.20 H	231	-23.93	40.93

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	56.7 PK	74.00	-17.3	1.34 V	181	24.91	31.79
2	2390.00	26.6 AV	54.00	-27.4	1.34 V	181	-5.19	31.79
3	*2402.00	92.1 PK			1.34 V	181	60.27	31.83
4	*2402.00	62.0 AV			1.34 V	181	30.17	31.83
5	4804.00	47.5 PK	74.00	-26.5	1.00 V	125	6.57	40.93
6	4804.00	17.4 AV	54.00	-36.6	1.00 V	125	-23.53	40.93

- REMARKS:**
- Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 - Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 - The other emission levels were very low against the limit.
 - Margin value = Emission level – Limit value.
 - “ * ”: Fundamental frequency.
 - 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: $20\log(3.125 / 100) = -30.1$ dB.
 - Average value = peak reading + $20\log(\text{duty cycle})$.



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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	20deg. C, 70%RH 1024 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	91.4 PK			1.00 H	85	59.45	31.95
2	*2441.00	61.3 AV			1.00 H	85	29.35	31.95
3	4882.00	46.9 PK	74.00	-27.1	1.21 H	205	5.83	41.07
4	4882.00	16.8 AV	54.00	-37.2	1.21 H	205	-24.27	41.07
5	7323.00	54.8 PK	74.00	-19.2	1.07 H	39	9.29	45.51
6	7323.00	24.7 AV	54.00	-29.3	1.07 H	39	-20.81	45.51
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	91.7 PK			1.33 V	180	59.75	31.95
2	*2441.00	61.6 AV			1.33 V	180	29.65	31.95
3	4882.00	47.7 PK	74.00	-26.3	1.02 V	122	6.63	41.07
4	4882.00	17.6 AV	54.00	-36.4	1.02 V	122	-23.47	41.07
5	7323.00	55.2 PK	74.00	-18.8	1.24 V	208	9.69	45.51
6	7323.00	25.1 AV	54.00	-28.9	1.24 V	208	-20.41	45.51

- 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: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.



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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	20deg. C, 70%RH 1024 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	91.5 PK			1.00 H	74	59.43	32.07
2	*2480.00	61.4 AV			1.00 H	74	29.33	32.07
3	2483.50	56.2 PK	74.00	-17.8	1.00 H	74	24.12	32.08
4	2483.50	26.1 AV	54.00	-27.9	1.00 H	74	-5.98	32.08
5	4960.00	47.3 PK	74.00	-26.7	1.20 H	211	6.08	41.22
6	4960.00	17.2 AV	54.00	-36.8	1.20 H	211	-24.02	41.22
7	7440.00	55.1 PK	74.00	-18.9	1.05 H	33	9.30	45.80
8	7440.00	25.0 AV	54.00	-29.0	1.05 H	33	-20.80	45.80

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	92.4 PK			1.35 V	188	60.33	32.07
2	*2480.00	62.3 AV			1.35 V	188	30.23	32.07
3	2483.50	55.2 PK	74.00	-18.8	1.35 V	188	23.12	32.08
4	2483.50	25.1 AV	54.00	-28.9	1.35 V	188	-6.98	32.08
5	4960.00	47.8 PK	74.00	-26.2	1.00 V	129	6.58	41.22
6	4960.00	17.7 AV	54.00	-36.3	1.00 V	129	-23.52	41.22
7	7440.00	55.9 PK	74.00	-18.1	1.24 V	225	10.10	45.80
8	7440.00	25.8 AV	54.00	-28.2	1.24 V	225	-20.00	45.80

- REMARKS:**
- Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 - Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 - The other emission levels were very low against the limit.
 - Margin value = Emission level – Limit value.
 - * * *: Fundamental frequency.
 - 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: $20\log(3.125 / 100) = -30.1$ dB.
 - Average value = peak reading + $20\log(\text{duty cycle})$.



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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
PSA Sevius Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

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.

NOTE:

The EUT was setup to ANSI C63.4, tested to FHSS test procedure of DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

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.

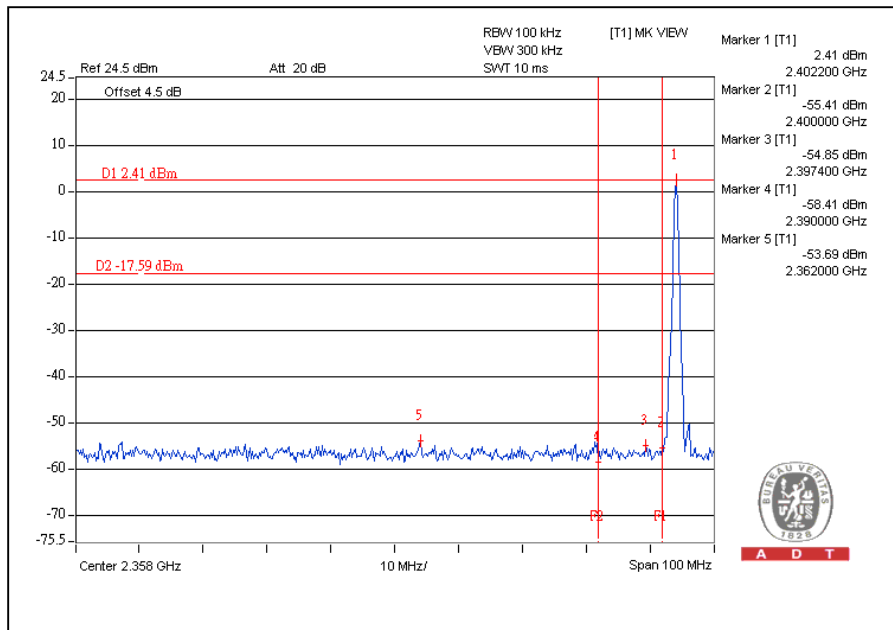


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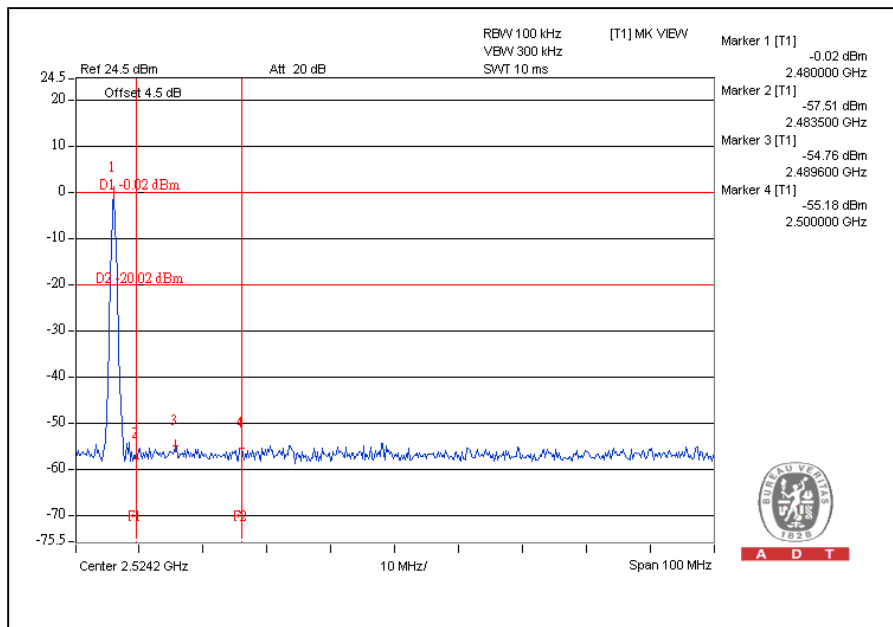
4.8.6 TEST RESULTS

For GFSK Modulation Type:

CH0



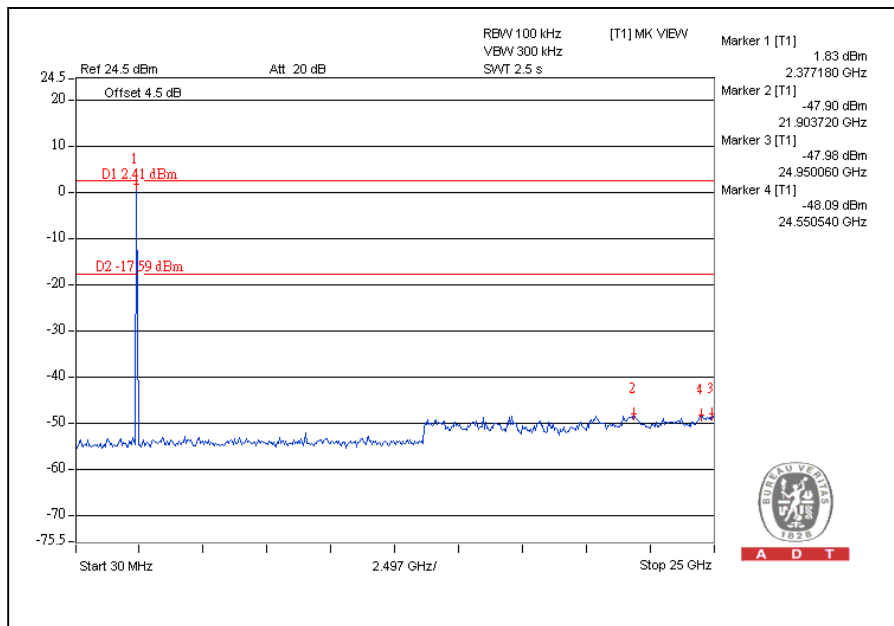
CH78



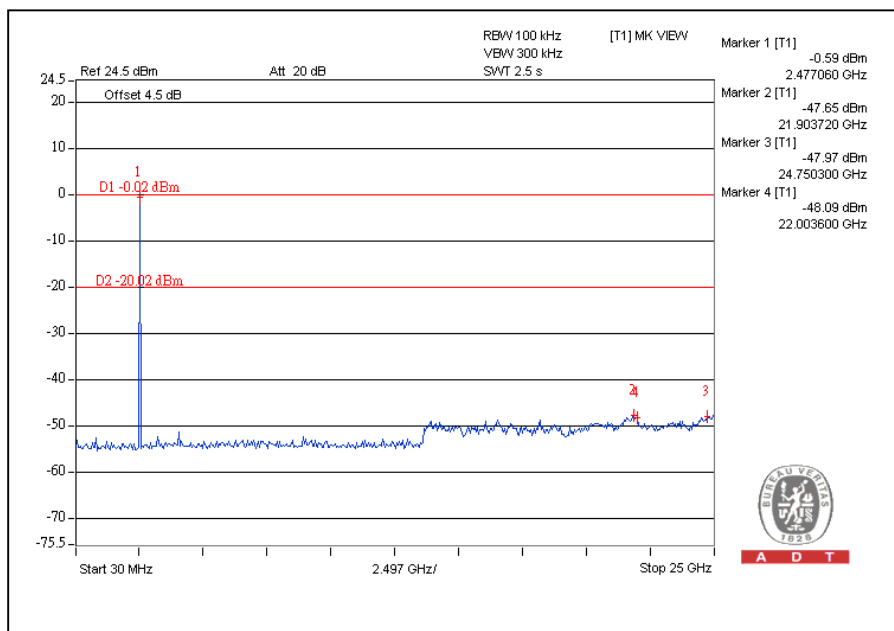


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CH0

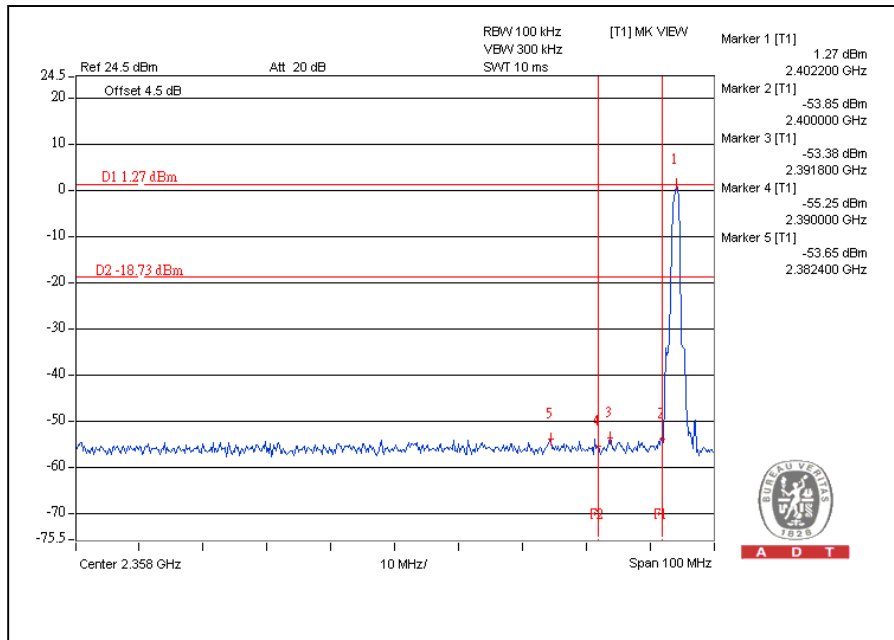


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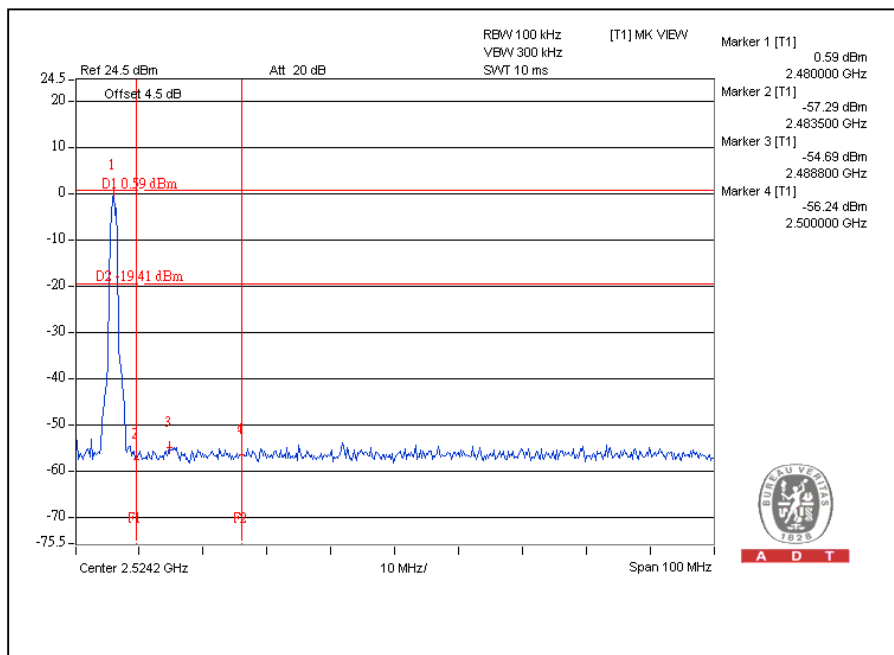


For 8DPSK Modulation Type:

CH0



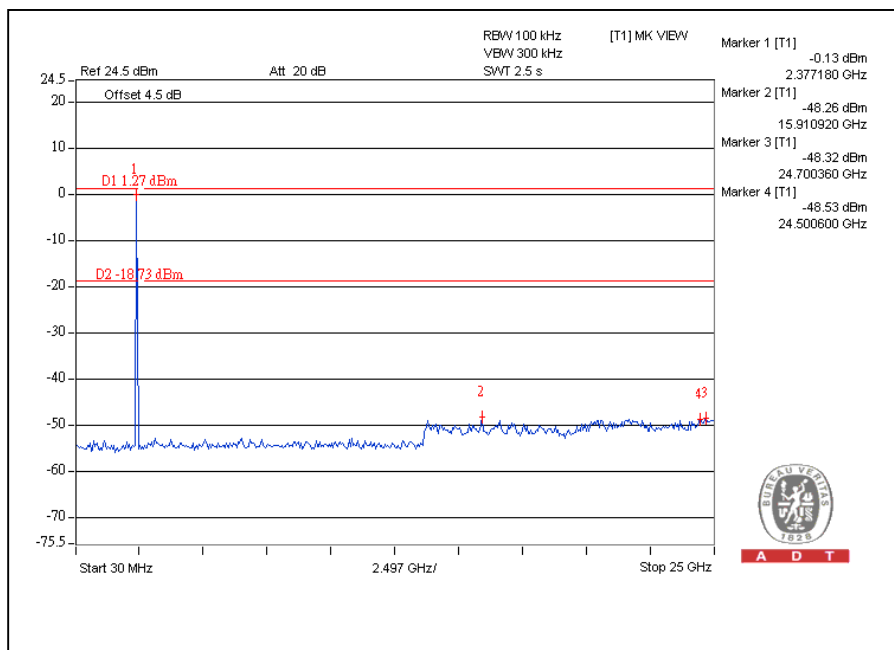
CH78



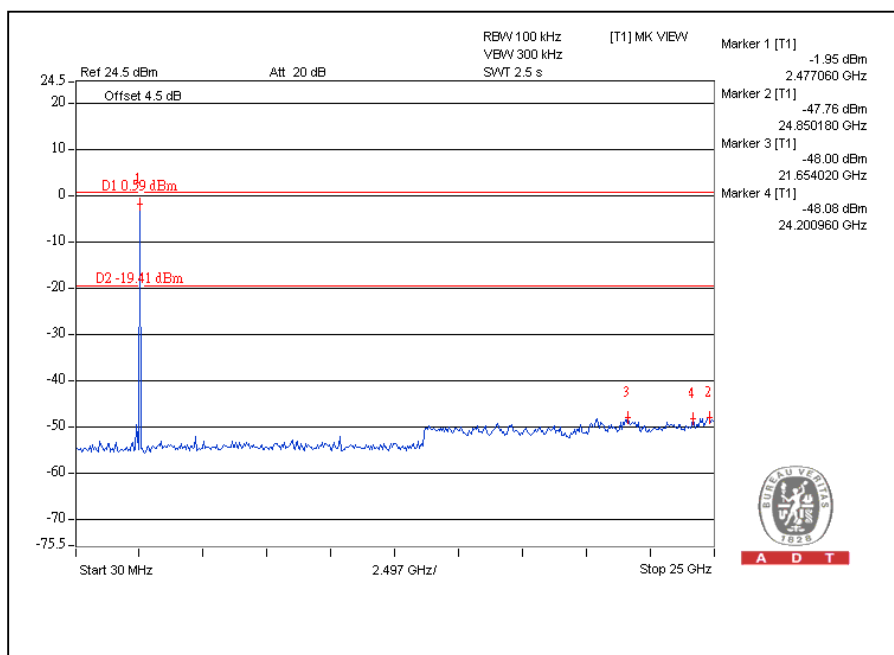


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5 INFORMATION ON THE TESTING LABORATORIES

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

Fax: 886-3-5935342

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 ---