FCC TEST REPORT(Bluetooth)

REPORT NO.:	RF140313E05-2
MODEL NO.:	QCNFA34AC
FCC ID:	PPD-QCNFA34AC
IC:	4104A-QCNFA34AC
RECEIVED:	Mar. 13, 2014
TESTED:	Mar. 26 to May 13, 2014
ISSUED:	May 20, 2013

APPLICANT:	Qualcomm Atheros, Inc.
ADDRESS:	1700 Technology Drive, San Jose, CA 95110

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140313E05-2	Original release	May 20, 2013

1 CERTIFICATION

PRODUCT :	802.11 a/b/g/n/ac+ BT 4.1 M.2 Type Card
BRAND NAME :	Qualcomm Atheros
MODEL NO. :	QCNFA34AC
TEST SAMPLE :	R&D SAMPLE
APPLICANT :	Qualcomm Atheros, Inc.
TESTED :	Mar. 26 to May 13, 2014
STANDARDS :	FCC Part 15, Subpart C (Section 15.247) ANSI C63.10-2009 Canada RSS-210 Issue 8 (2010-12) Canada RSS-Gen Issue 3 (2010-12)

The above equipment (Model: QCNFA34AC) 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 : _____ , **DATE:** May 20, 2014
(Midoli Peng, Specialist)

APPROVED BY : _____ , **DATE:** May 20, 2014
(May Chen, Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C; RSS-210; RSS-Gen				
STANDARD SECTION		TEST TYPE AND LIMIT	RESULT	REMARK
FCC Part 15	RSS-Gen RSS-210			
15.207	RSS-Gen 7.2.4	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -18.42dB at 1.72182MHz.
15.247(a)(1)(iii)	RSS-210 A8.1(b)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	RSS-210 A8.1(d)	Dwell Time on Each Channel	PASS	Meet the requirement of limit.
15.247(a)(1)	RSS-210 A8.1(d)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	RSS-210 A8.4(2)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.247(d)	RSS-210 A8.5	Transmitter Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -5.6dB at 906.64MHz.
15.247(d)	RSS-210 A8.5	Conducted Out-Band Emission Measurement	PASS	Meet the requirement of limit.
-	RSS-Gen 4.6	Occupied Bandwidth Measurement	-	Meet the requirement.
15.203	-	Antenna Requirement	PASS	Antenna connector is IPEX not a standard connector.

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

2.1 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	2.86 dB
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT(BLUETOOTH)

PRODUCT	802.11 a/b/g/n/ac+ BT 4.1 M.2 Type Card
MODEL NO.	QCNFA34AC
POWER SUPPLY	DC 3.3V from host equipment
MODULATION TYPE	GFSK, π/4-DQPSK, 8DPSK
MODULATION TECHNOLOGY	FHSS
OPRTAING FREQUENCY	2402MHz ~ 2480MHz
DATE RATE	Up to 3Mbps
NUMBER OF CHANNEL	Bluetooth 2.1+ EDR: 79
MAXIMUM OUTPUT POWER	GFSK: 13.002 mW 8DPSK: 15.776 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. There are Bluetooth technology and WLAN technology used for the EUT.
2. The Bluetooth supports version 4.1.
3. The modular has two variant designs as following table:

Variant No.	Description
SKU #1	NFA344: This SKU supports 2T2R MIMO.
SKU #2	NFA345: This SKU supports 1T2R.

4. WLAN/BT coexistence mode:

◆ **NFA344:**
2TX 5GHz WLAN (Main + Aux) + BT (Main) concurrent.
2TX 2.4GHz WLAN+ BT timely shared at Main antenna.

◆ **NFA345:**
1TX 2.4GHz WLAN+ BT timely shared at Main antenna.
1TX 5GHz WLAN+ BT concurrent

5. Spurious Emission (radiated emission) of the simultaneous operation (WiFi <5GHz> & Bluetooth) have been evaluated and no non-compliance found. The detail combinations of transmitters / frequencies / modes as below table

Mode	Available Channel	Tested Channel	Modulation Technology
5 GHz (802.11ac(VHT20)) + Bluetooth (GFSK)	149 to 165	157	OFDM
	0 to 78	78	FHSS

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

3.2 DESCRIPTION OF ANTENNA

The antenna provided to the EUT, please refer to the following table:

Brand	Model	Antenna Type	2.4G Gain with cable loss (dBi)	5G Gain with cable loss (dBi)	2.4G Cable Loss (dBi)	5G Cable Loss (dBi)	Connector Type	Cable Length (mm)
WNC	81.EBJ15.005	PIFA	3.62	Band 1&2: 3.08 Band 3: 4.76 Band 4: 4.76	1.15	Band1&2: 1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300

Note: 1. Above antenna gains of antenna are Total (H+V).
2. All of antenna can be application for WLAN and Bluetooth.

3.3 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT.

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

3.4 TEST MODE APPLICABLITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	OB	
1	√	-	-	-	-	SKU #2(NFA345)
2	√	√	√	√	√	SKU #1(NFA344)

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

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

OB: Conducted Out-Band Emission Measurement

Note 1. The EUT's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane.**

2. Mode 2, the worse case one, was chosen for final test except for Power Line Conducted Emission.

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 Type	Packet Type
0 to 78	78	GFSK	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).

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

Available Channel	Tested Channel	Modulation Type	Packet Type
0 to 78	78	GFSK	DH5

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, 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 Type	Packet Type
0 to 78	0, 39, 78	GFSK	DH5
0 to 78	0, 39, 78	8DPSK	DH5

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 Type	Packet Type
0 to 78	0, 39, 78	GFSK	DH5
0 to 78	0, 39, 78	8DPSK	DH5

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 Type	Packet Type
0 to 78	0, 39, 78	GFSK	DH5
0 to 78	0, 39, 78	8DPSK	DH5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	25deg. C, 64%RH	120Vac, 60Hz	Gavin Peng
RE<1G	23deg. C, 69%RH	120Vac, 60Hz	Tim Ho
RE≥1G	24deg. C, 65%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee
OB	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee

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 (Section 15.247)

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.

3.6 DESCRIPTION OF SUPPORT UNITS

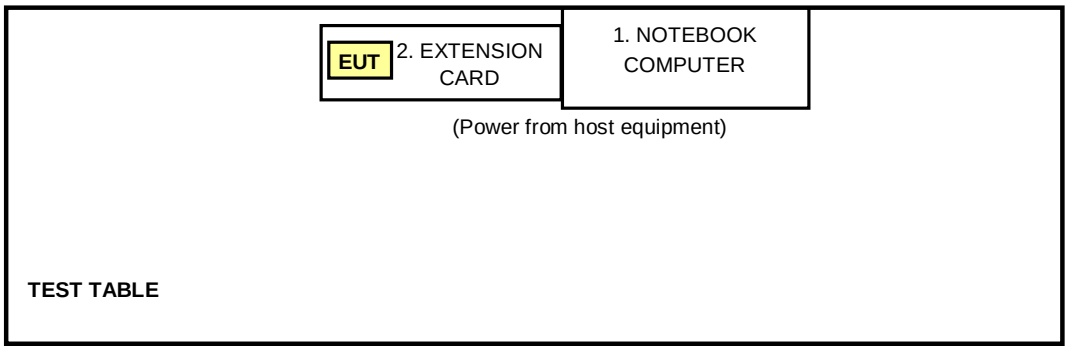
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	E6420	H62T3R1	FCC DoC
2	EXTENSION CARD	Qualcomm Atheros	HPCBM194-0	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 MAXIMUM PEAK OUTPUT POWER

4.1.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 125mW.

4.1.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 2014

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. Tested date : May 13, 2014

4.1.3 TEST PROCEDURES

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

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

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

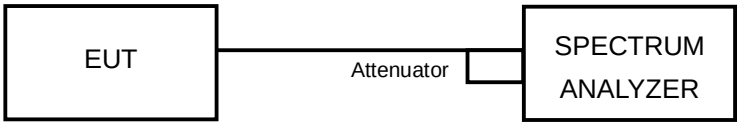
d. Measure the captured power within the band and recording the plot.

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITION

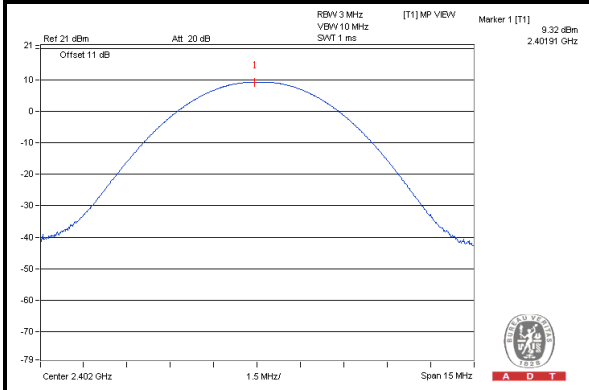
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.1.7 TEST RESULTS

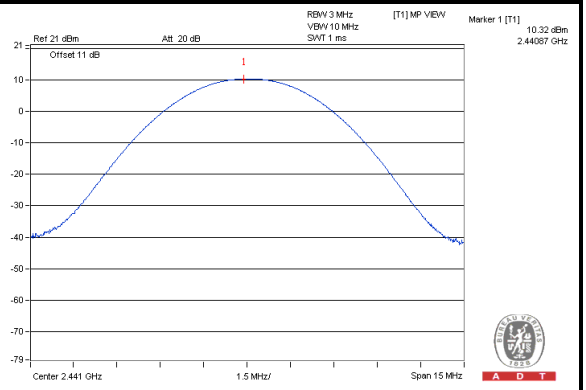
CHANNEL	FREQUENCY (MHz)	OUTPUT POWER (mW)		OUTPUT POWER (dBm)		POWER LIMIT (mW)	PASS / FAIL
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	8.551	11.350	9.32	10.55	125	PASS
39	2441	10.765	13.900	10.32	11.43	125	PASS
78	2480	13.002	15.776	11.14	11.95	125	PASS

For GFSK

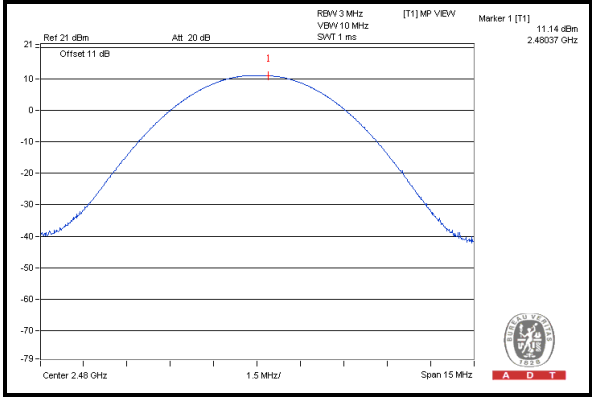
CH0



CH39

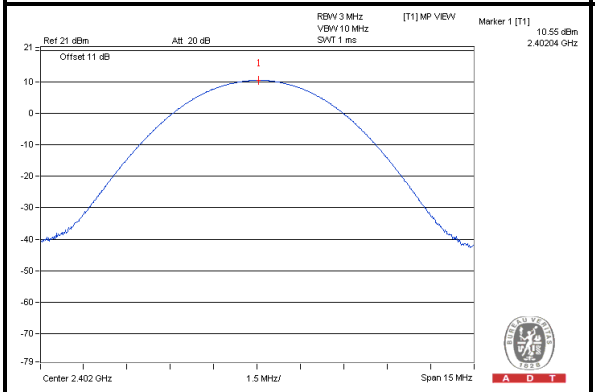


CH78

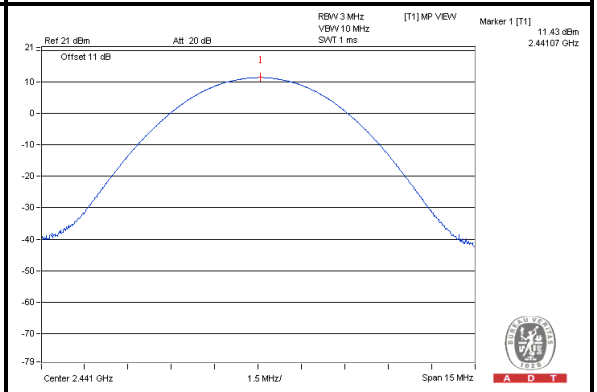


For 8DPSK

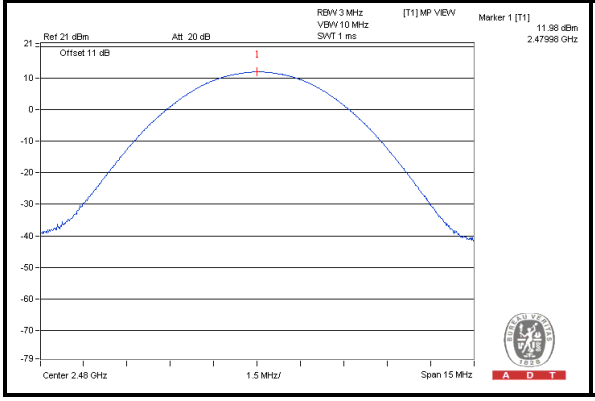
CH0



CH39



CH78



4.2 AVERAGE OUTPUT POWER

4.2.1 FOR REFERENCE.

4.2.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter Anritsu	ML2495A	1014008	Apr. 30, 2014	Apr. 29, 2015
Power Sensor Anritsu	MA2411B	0917122	Apr. 30, 2014	Apr. 29, 2015

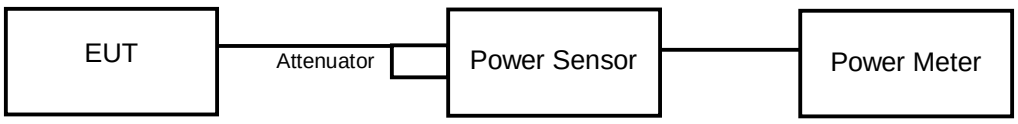
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : May 13, 2014

4.2.3 TEST PROCEDURES

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak / average power sensor. Record the peak power level.

4.2.4 TEST SETUP



4.2.5 EUT OPERATING CONDITION

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

4.2.6 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)	
		GFSK	8DPSK
0	2402	9.24	7.88
39	2441	10.19	8.92
78	2480	11.03	9.81

4.3 CHANNEL BANDWIDTH

4.3.1 LIMITS OF CHANNEL BANDWIDTH

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

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 2014

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. Tested date : May 13, 2013

4.3.3 TEST PROCEDURE

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

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

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

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP

4.3.6 EUT OPERATING CONDITION

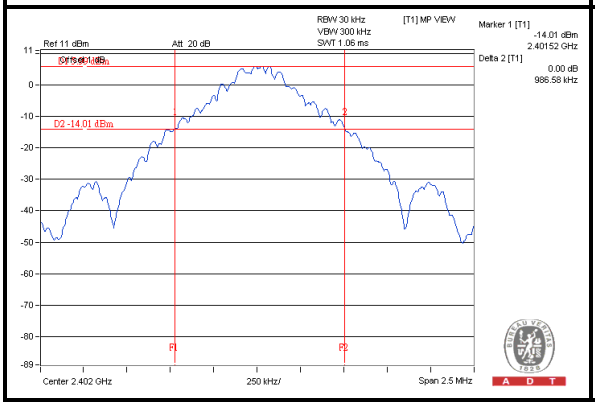
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

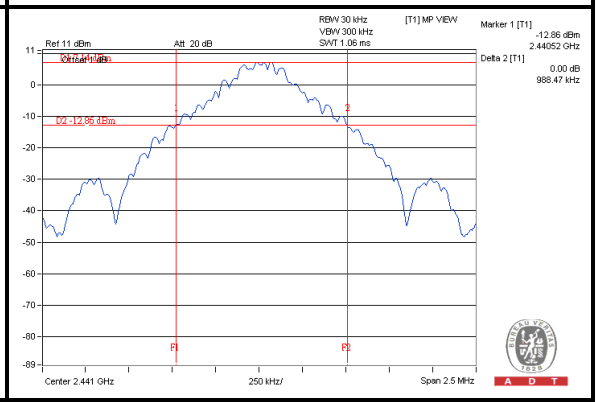
CHANNEL	FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	
		GFSK	8DPSK
0	2402	0.98	1.35
39	2441	0.98	1.35
78	2480	0.98	1.36

For GFSK

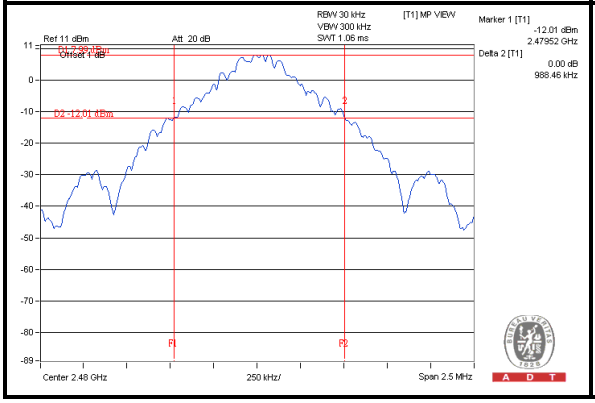
CH0



CH39

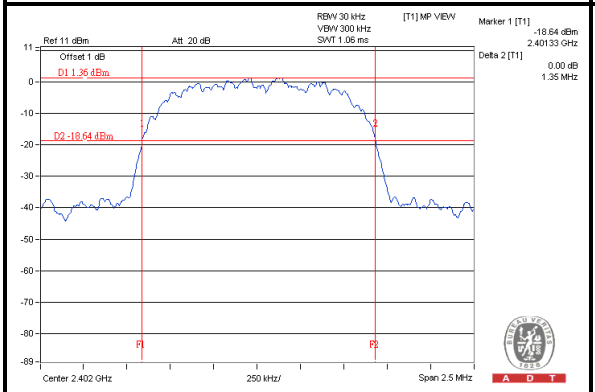


CH78

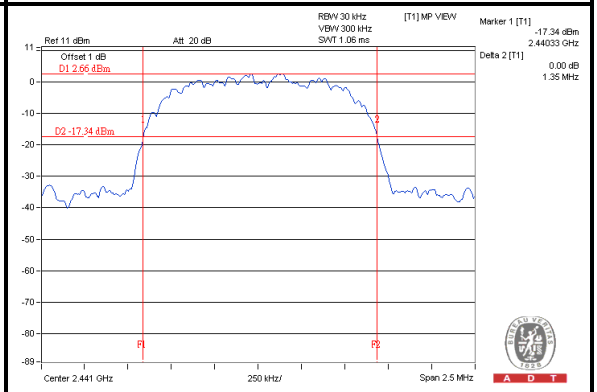


For 8DPSK

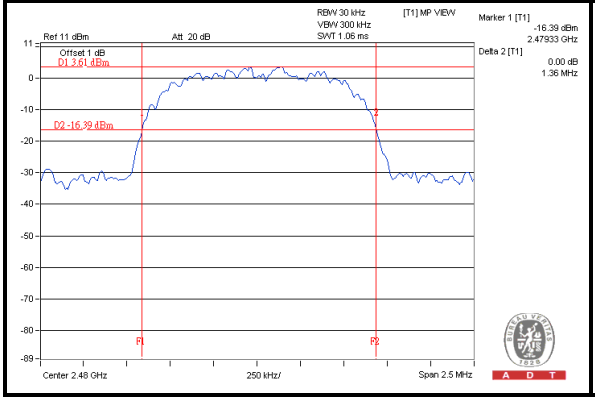
CH0



CH39



CH78



4.4 OCCUPIED BANDWIDTH MEASUREMENT

4.4.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 2014

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. Tested date : May 13, 2014

4.4.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.4.3 DEVIATION FROM TEST STANDARD

No deviation

4.4.4 TEST SETUP

4.4.5 EUT OPERATING CONDITION

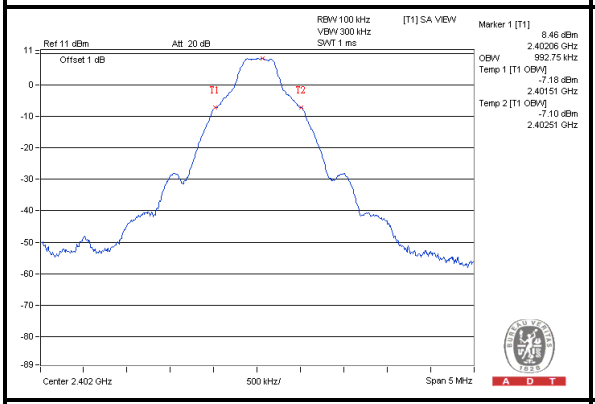
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.6 TEST RESULTS

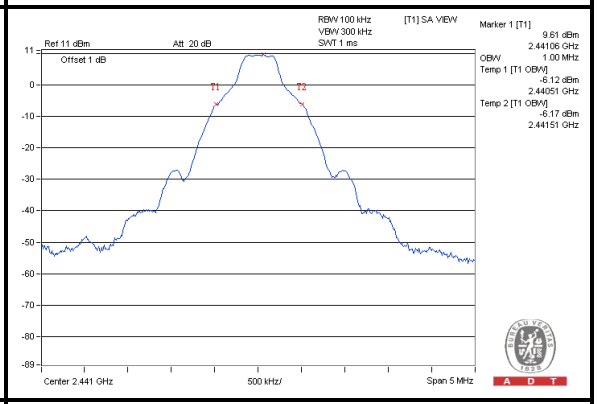
CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)	
		GFSK	8DPSK
0	2402	0.99	1.24
39	2441	1.00	1.24
78	2480	1.00	1.25

For GFSK

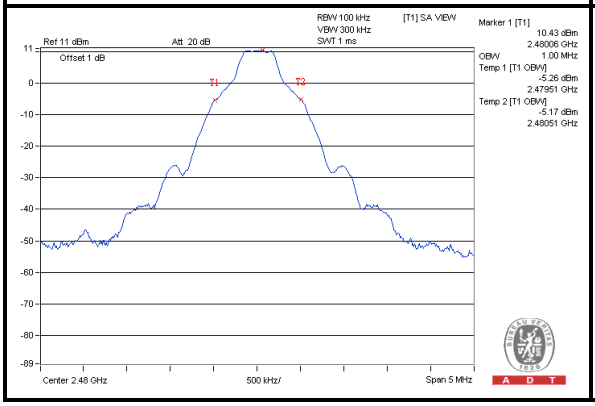
CH0



CH39

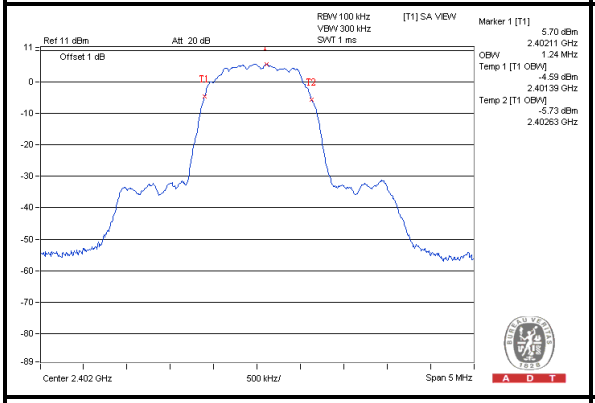


CH78

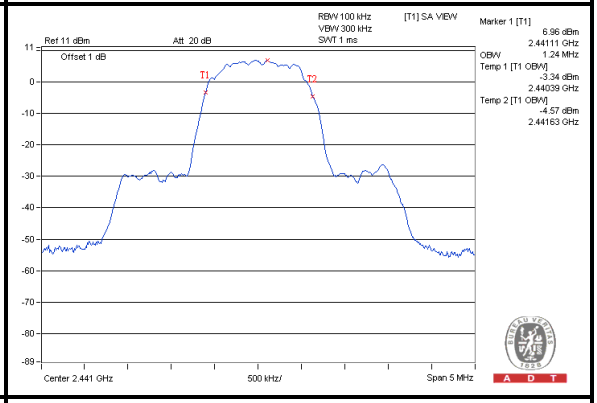


For 8DPSK

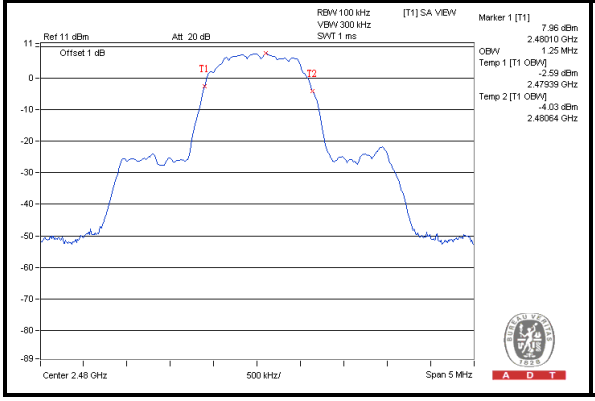
CH0



CH39



CH78



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
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 2014

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. Tested date : May 13, 2014

4.5.3 TEST PROCEDURES

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

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.

c. By using the MaxHold function record the separation of two adjacent channels.

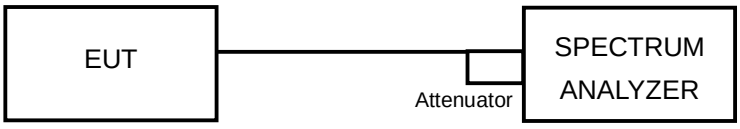
d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



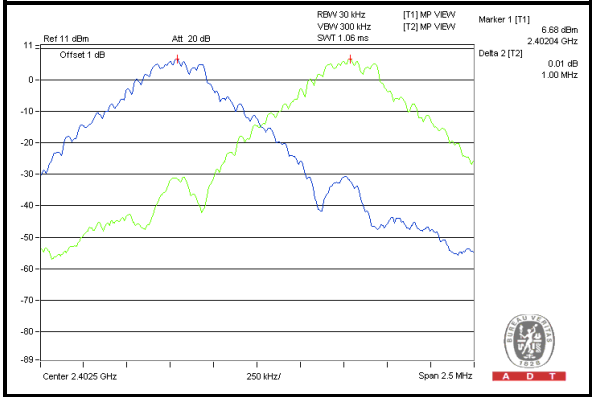
4.5.6 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)		20dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)		PASS / FAIL
		GFSK	8DPSK	GFSK	8DPSK	GFSK	8DPSK	
0	2402	1.00	1.00	0.98	1.35	0.66	0.9	PASS
39	2441	1.00	1.00	0.98	1.35	0.66	0.9	PASS
78	2480	1.00	1.01	0.98	1.36	0.66	0.91	PASS

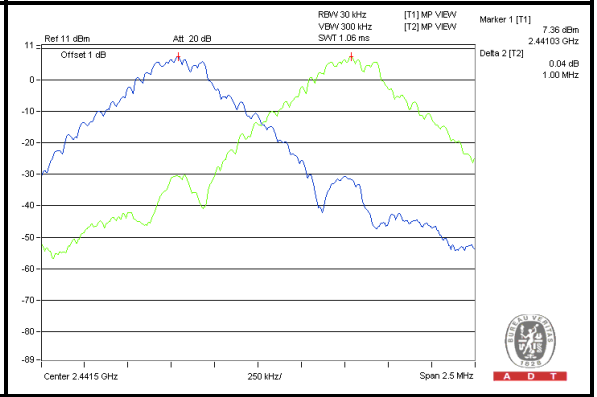
NOTE: The minimum limit is two-third 20dB bandwidth.

For GFSK

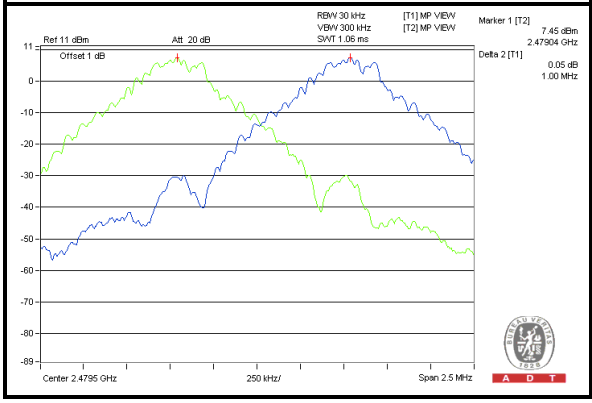
CH0



CH39

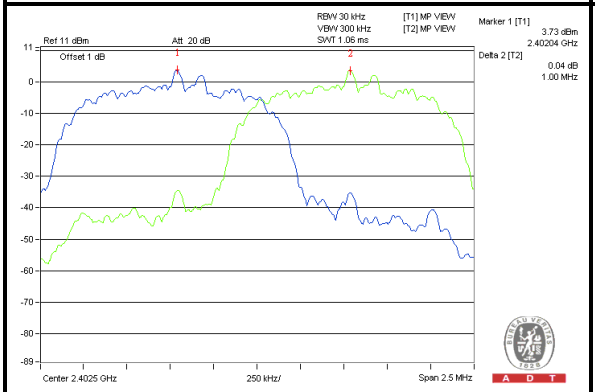


CH78

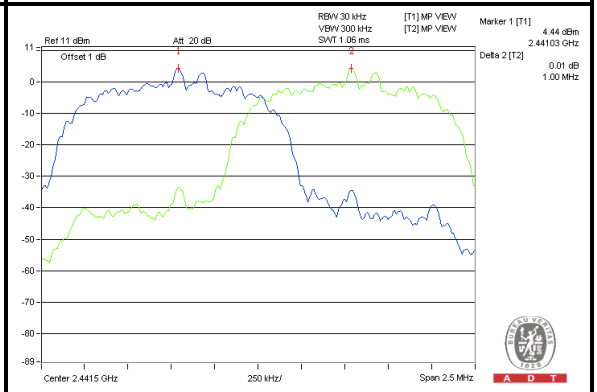


For 8DPSK

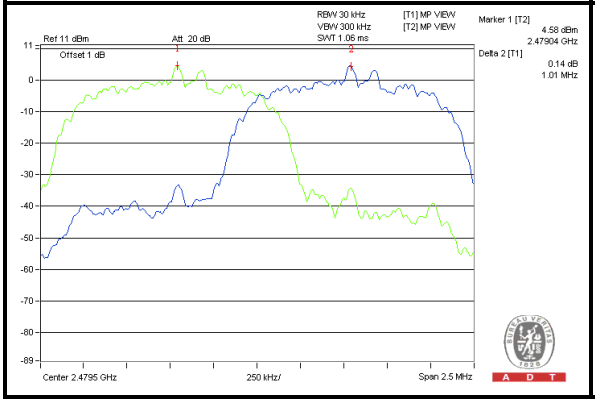
CH0



CH39



CH78



4.6 NUMBER OF HOPPING FREQUENCY USED

4.6.1 LIMIT OF HOPPING FREQUENCY USED

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 2014

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. Tested date : May 08, 2014

4.6.3 TEST PROCEDURES

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

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

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

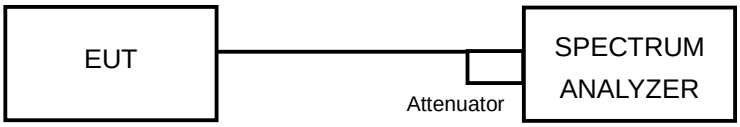
d. Set the SA on View mode and then plot the result on SA screen.

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

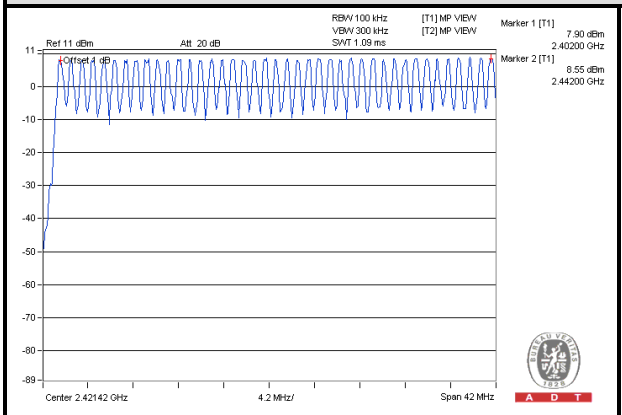
4.6.5 TEST SETUP

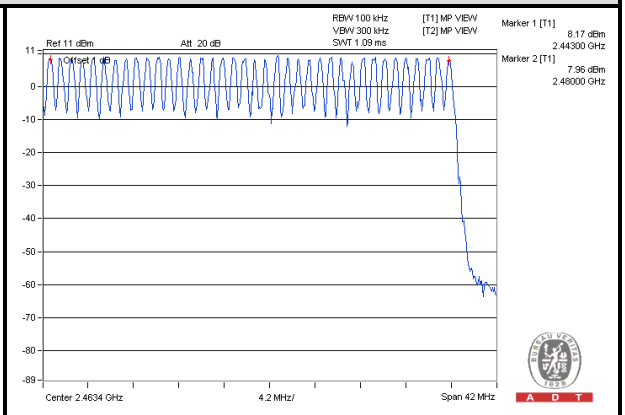


4.6.6 TEST RESULTS

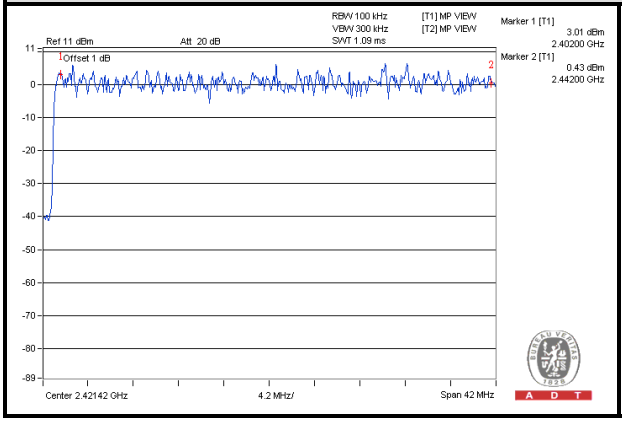
There are 79 hopping frequencies in the hopping mode. Please refer to next pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

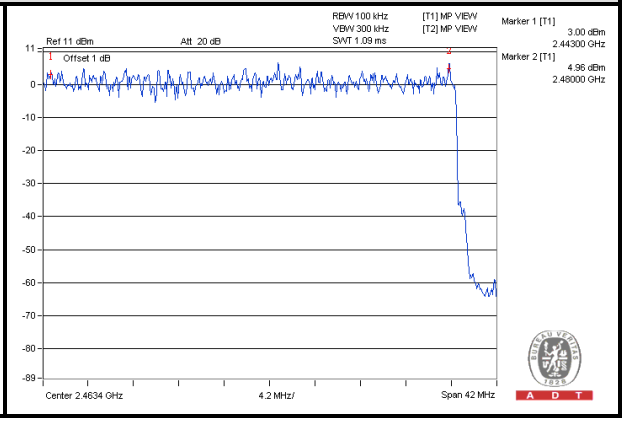
GFSK





8DPSK





4.7 DWELL TIME ON EACH CHANNEL

4.7.1 LIMIT OF DWELL TIME USED

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

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 2014

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. Tested date : May 08 to 13, 2014

4.7.3 TEST PROCEDURES

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

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

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

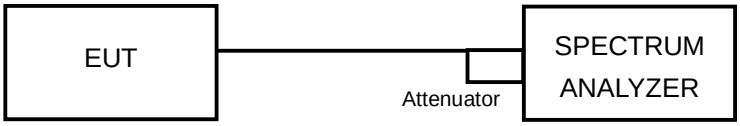
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



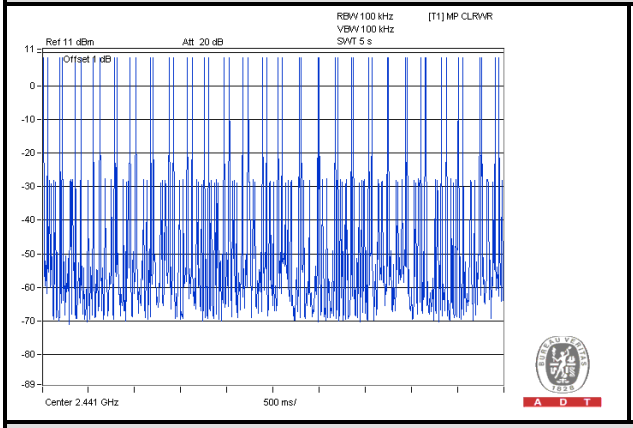
4.7.6 TEST RESULTS

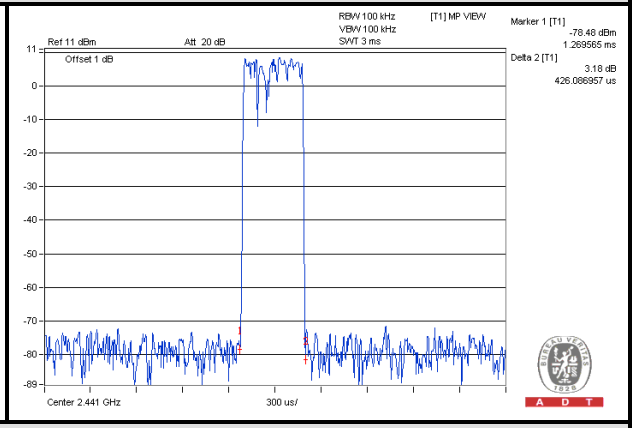
For GFSK:

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) *6.32=322.32 times	0.426	137.31	400
DH3	27 (times / 5 sec) *6.32=170.64 times	1.717	292.99	400
DH5	18 (times / 5 sec) *6.32=113.76 times	2.991	340.26	400

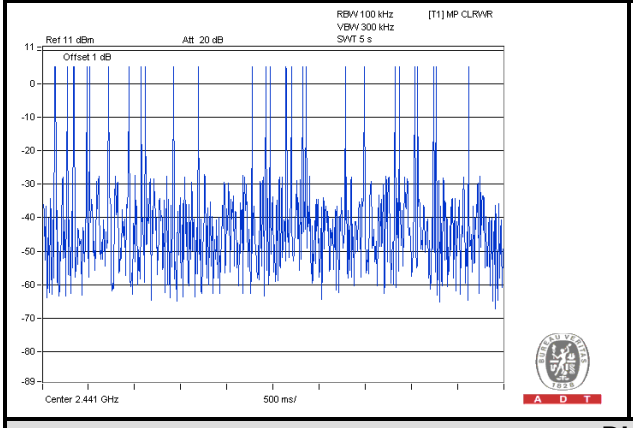
NOTE: Test plots of the transmitting time slot are shown on next page.

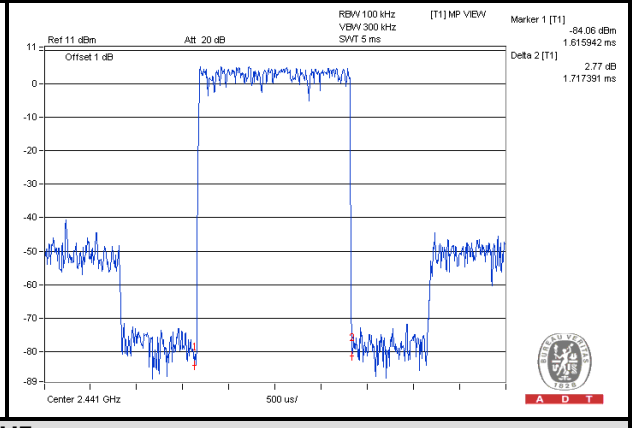
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MP CLRWR
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 ms/

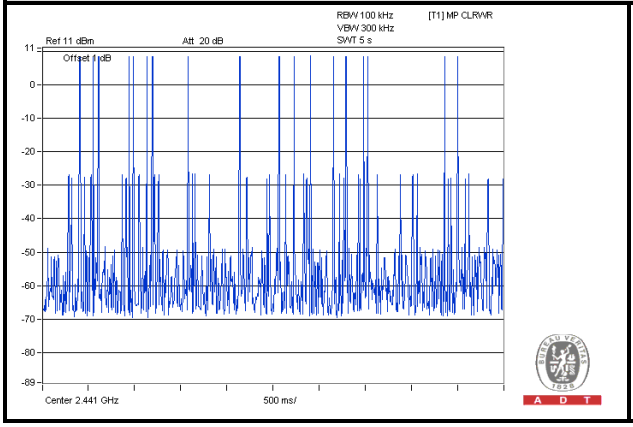

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-78.48 dBm
1.269565 ms
Delta 2 [T1]
3.18 dB
426.086957 us
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
300 us/

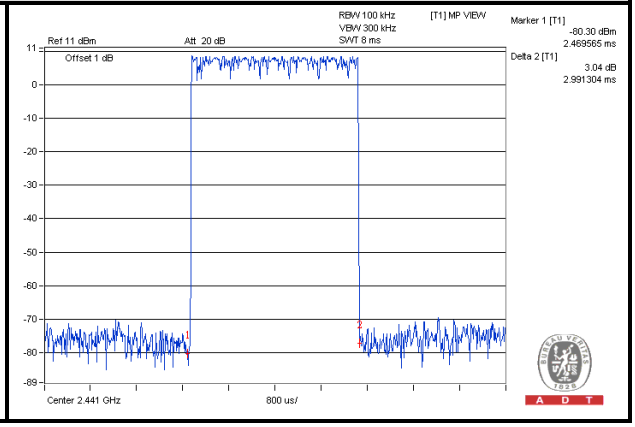
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-84.06 dBm
1.615942 ms
Delta 2 [T1]
2.77 dB
1.717391 ms
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 ms/

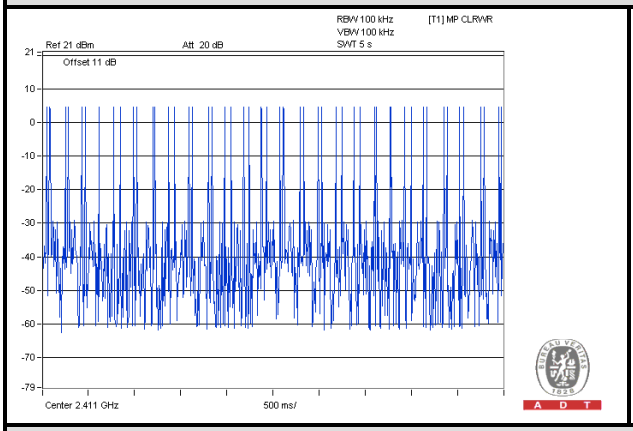

RBW 100 kHz
VBW 300 kHz
SWT 8 ms
[T1] MP VIEW
Marker 1 [T1]
-80.30 dBm
2.469565 ms
Delta 2 [T1]
3.04 dB
2.991304 ms
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
800 us/

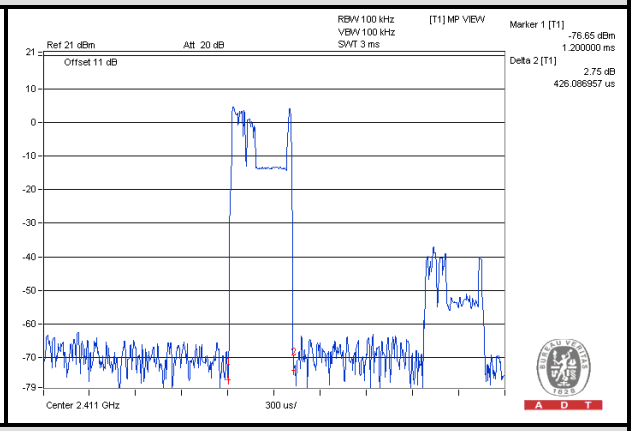
For GFSK(AFH):

Mode	Number of transmission in a 8 (20Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) *1.6=81.6 times	0.426	34.762	400
DH3	26 (times / 5 sec) *1.6=41.6 times	1.71	71.136	400
DH5	18 (times / 5 sec) *1.6=28.8 times	2.991	86.141	400

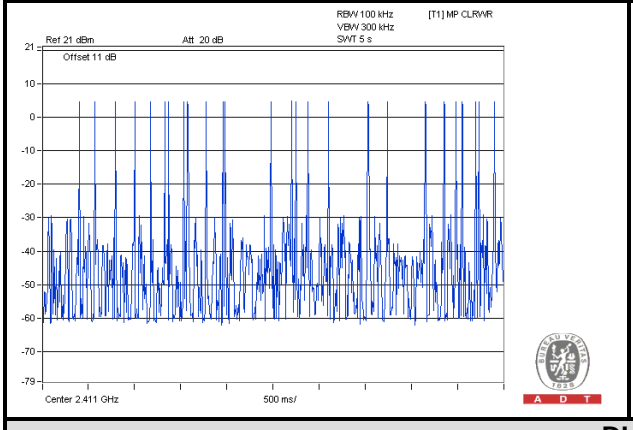
NOTE: Test plots of the transmitting time slot are shown on next page.

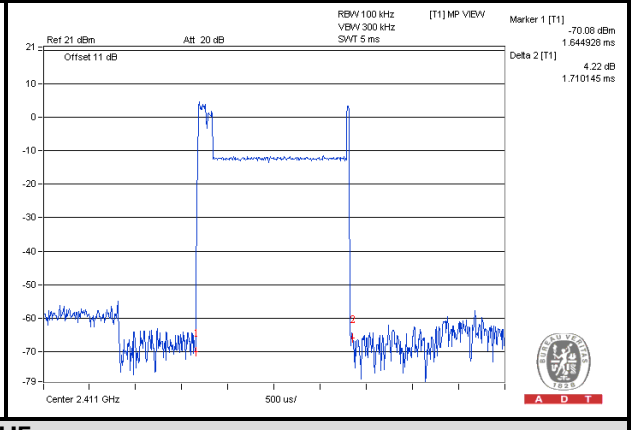
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MP CLRWR
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 ms/

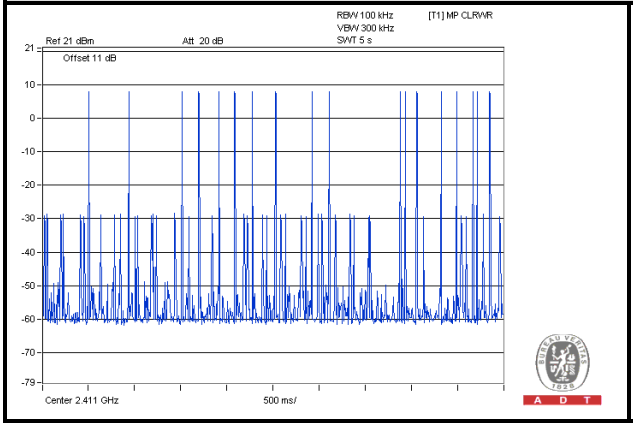

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-76.65 dBm
1.200000 ms
Delta 2 [T1]
2.75 dB
426.086957 us
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
300 us/

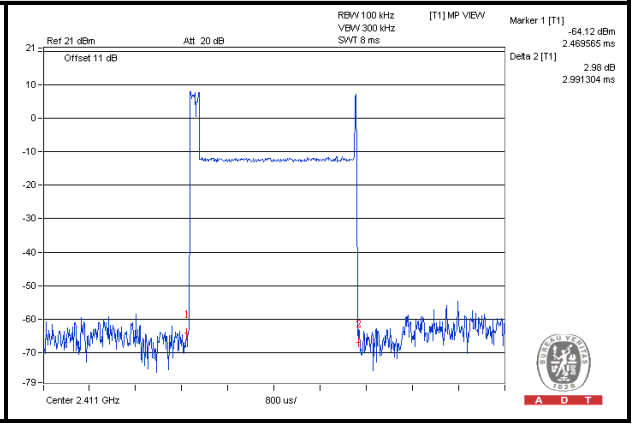
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-70.08 dBm
1.644928 ms
Delta 2 [T1]
4.22 dB
1.710145 ms
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 ms/

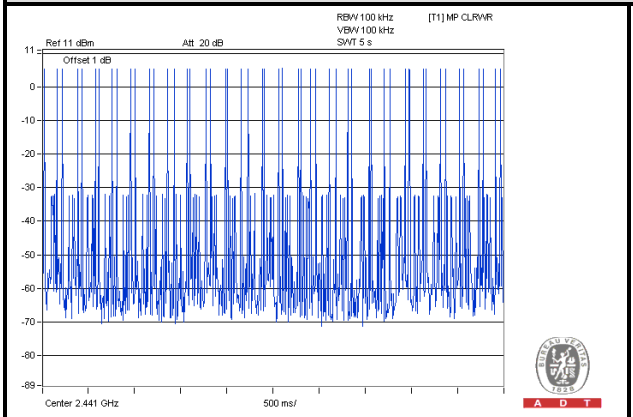

RBW 100 kHz
VBW 300 kHz
SWT 8 ms
[T1] MP VIEW
Marker 1 [T1]
-64.12 dBm
2.469565 ms
Delta 2 [T1]
2.98 dB
2.991304 ms
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
800 us/

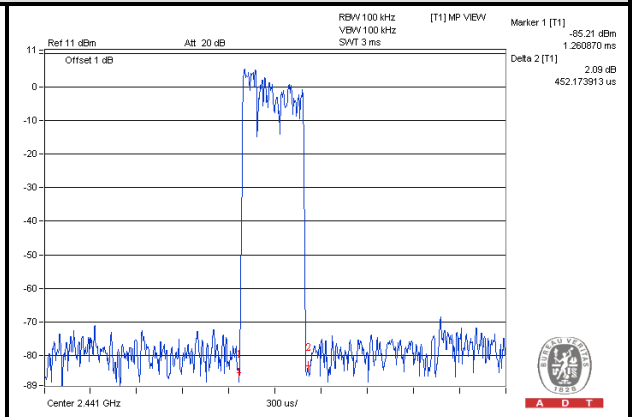
For 8DPSK:

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) *6.32=322.32 times	0.452	145.69	400
DH3	25 (times / 5 sec) *6.32=158 times	1.681	265.6	400
DH5	18 (times / 5 sec) *6.32=113.76 times	2.991	340.26	400

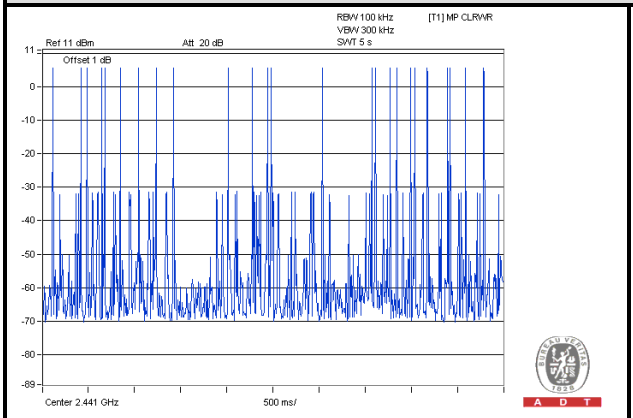
NOTE: Test plots of the transmitting time slot are shown on next page.

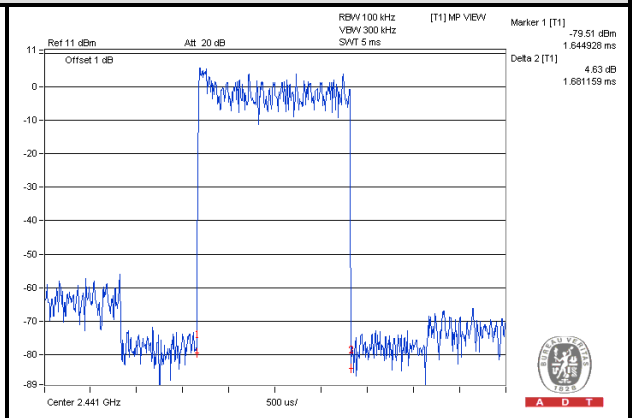
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MP CLRWR
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 ms/

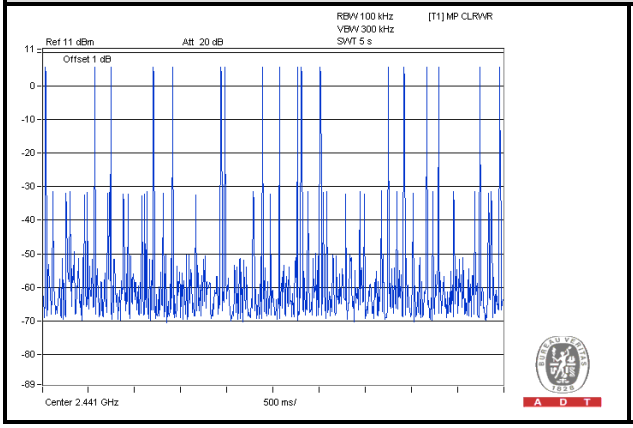

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-85.21 dBm
1.260870 ms
Delta 2 [T1]
2.09 dB
452.173913 us
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
300 us/

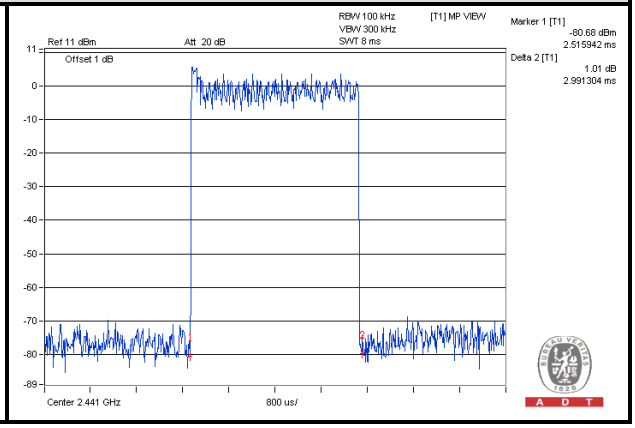
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-79.51 dBm
1.644928 ms
Delta 2 [T1]
4.63 dB
1.681159 ms
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
500 ms/

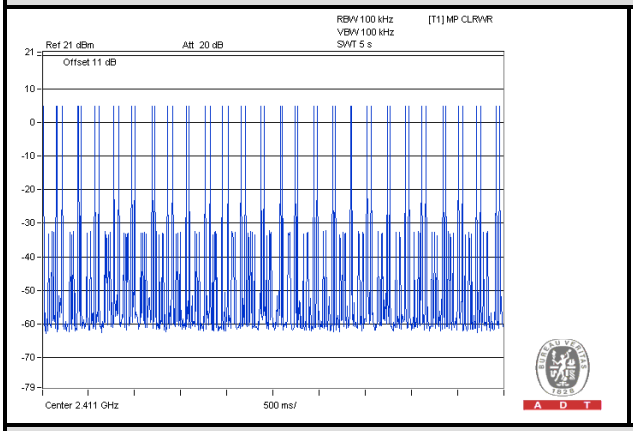

RBW 100 kHz
VBW 300 kHz
SWT 8 ms
[T1] MP VIEW
Marker 1 [T1]
-80.68 dBm
2.515942 ms
Delta 2 [T1]
1.01 dB
2.991304 ms
Ref 11 dBm
Att 20 dB
Offset 1 dB
Center 2.441 GHz
800 us/

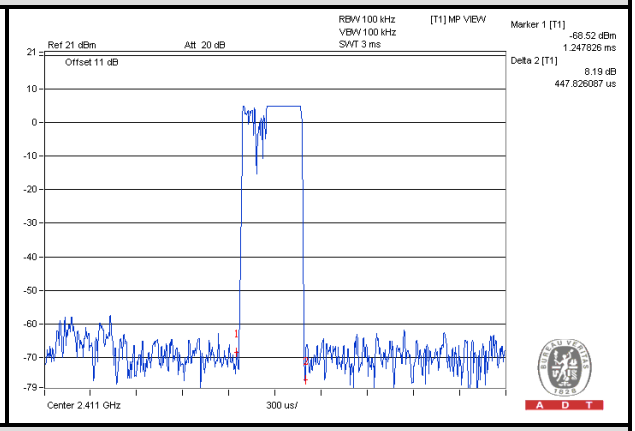
For 8DPSK(AFH):

Mode	Number of transmission in a 8 (20Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *1.6=80 times	0.448	35.84	400
DH3	25 (times / 5 sec) *1.6=40 times	1.681	67.24	400
DH5	17 (times / 5 sec) *1.6=27.2 times	2.945	80.104	400

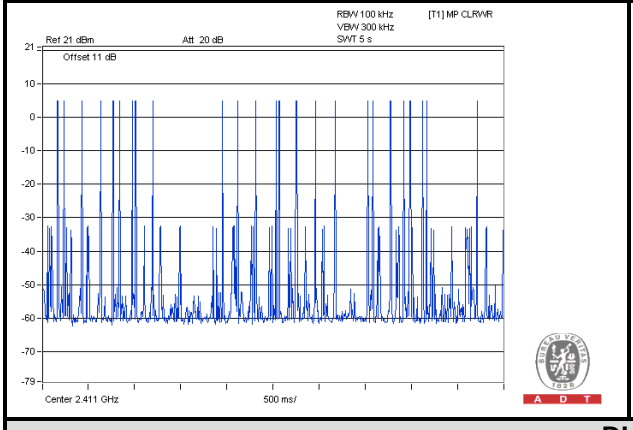
NOTE: Test plots of the transmitting time slot are shown on next page.

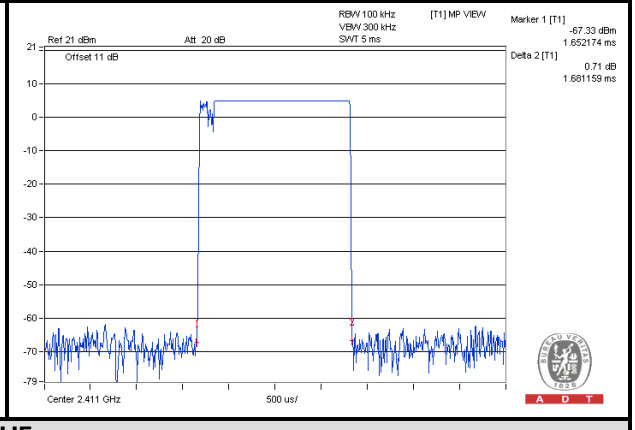
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MP CLRWR
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 ms/

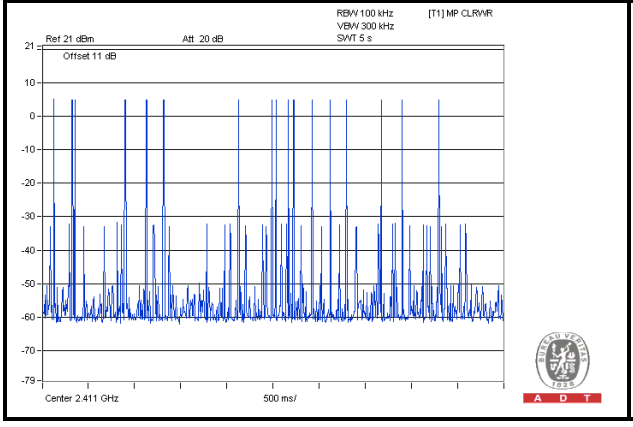

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MP VIEW
Marker 1 [T1]
-68.52 dBm
1.247826 ms
Delta 2 [T1]
8.19 dB
447.826087 us
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
300 us/

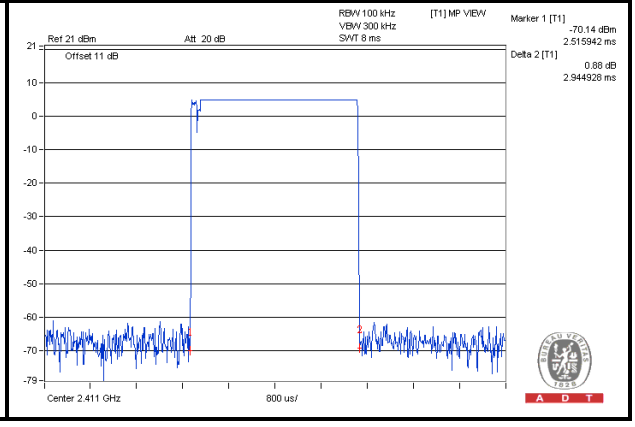
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-67.33 dBm
1.652174 ms
Delta 2 [T1]
0.71 dB
1.681159 ms
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MP CLRWR
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 8 ms
[T1] MP VIEW
Marker 1 [T1]
-70.14 dBm
2.515942 ms
Delta 2 [T1]
0.88 dB
2.944928 ms
Ref 21 dBm
Att 20 dB
Offset 11 dB
Center 2.411 GHz
800 us/

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
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 2014

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. Tested date : May 08, 2014

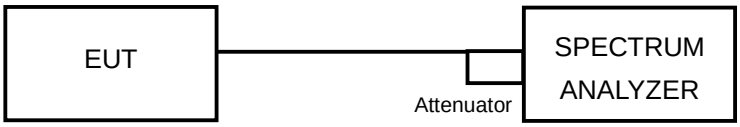
4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW a of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.1 TEST SETUP



4.8.5 EUT OPERATING CONDITION

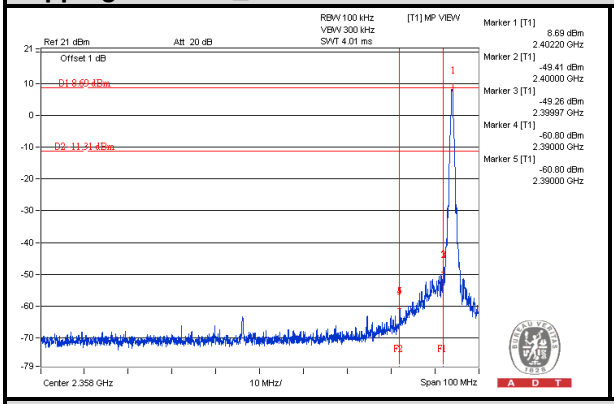
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

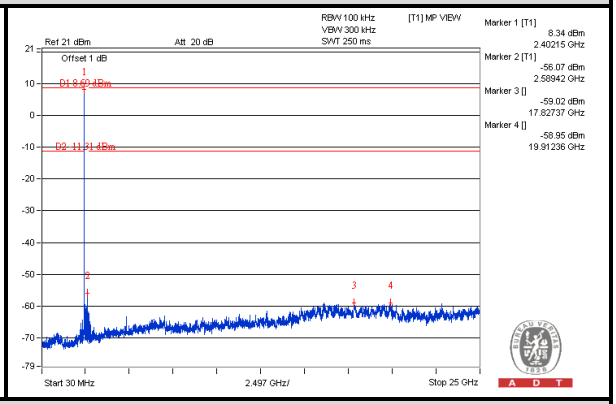
4.8.6 TEST RESULTS

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

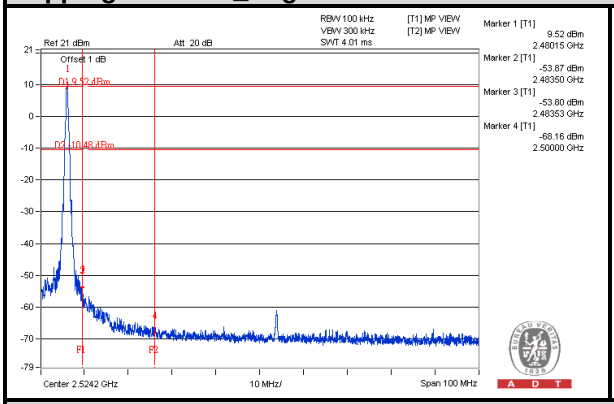
For GFSK

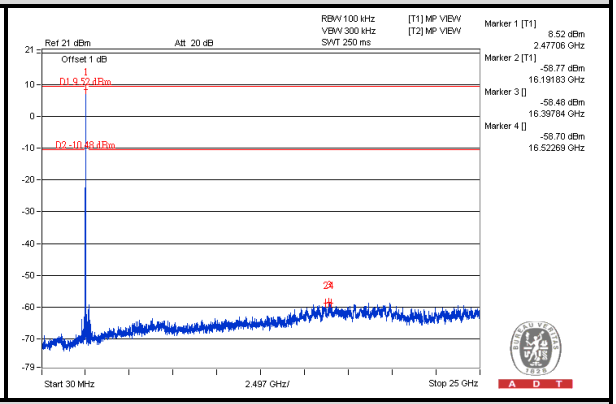
Hopping disabled_ Low Channel



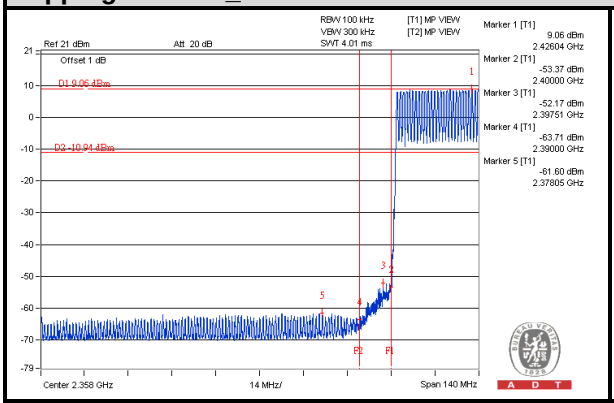


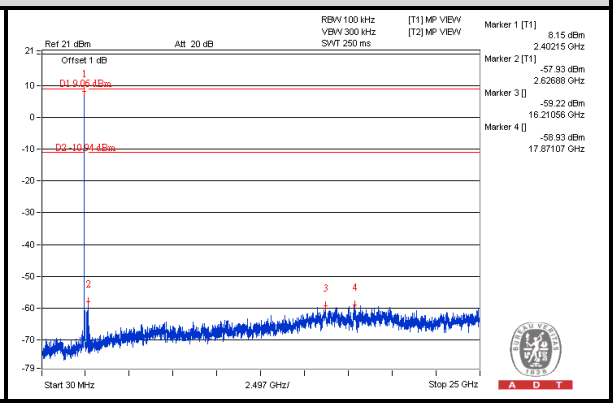
Hopping disabled_ High Channel



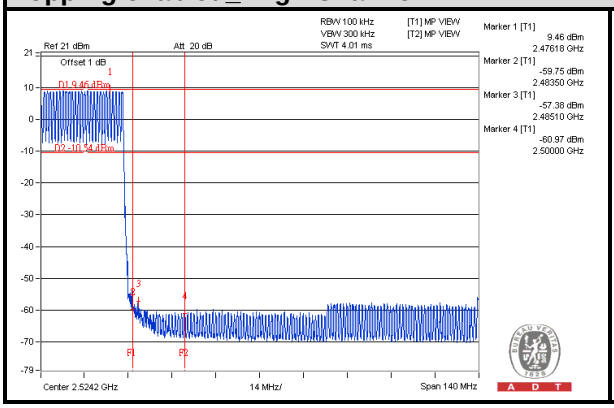


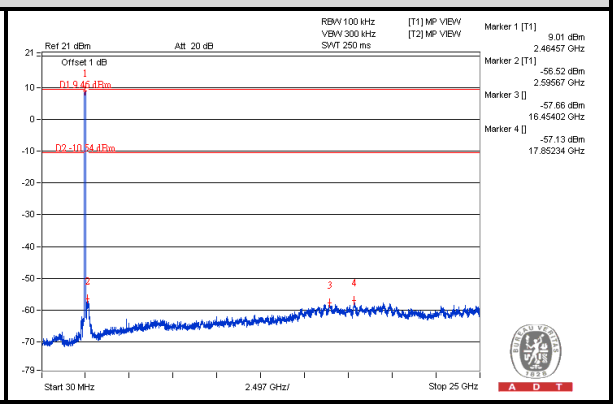
Hopping enabled_ Low Channel





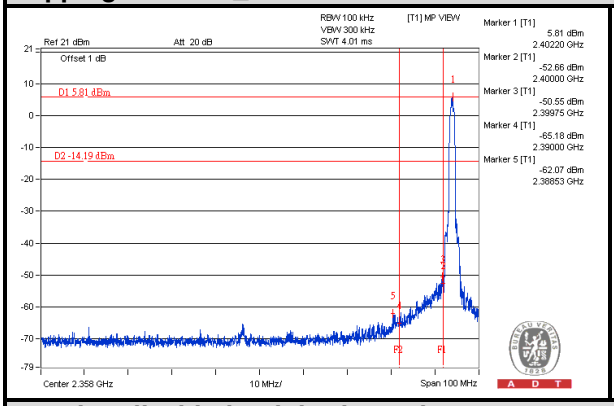
Hopping enabled_ High Channel

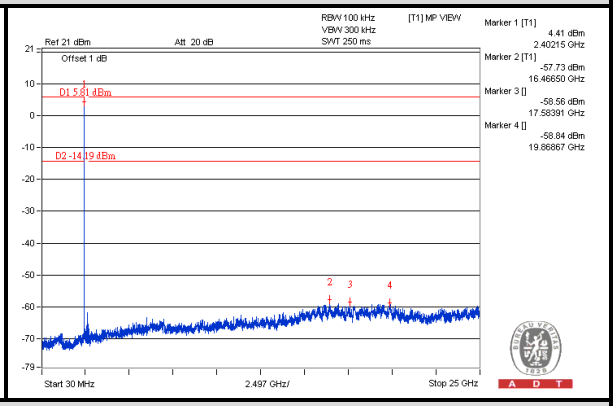




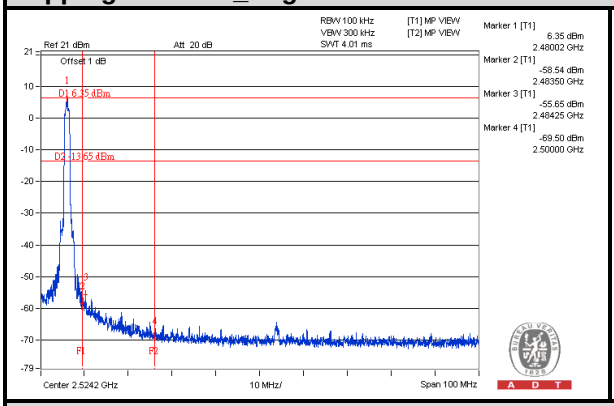
For 8DPSK

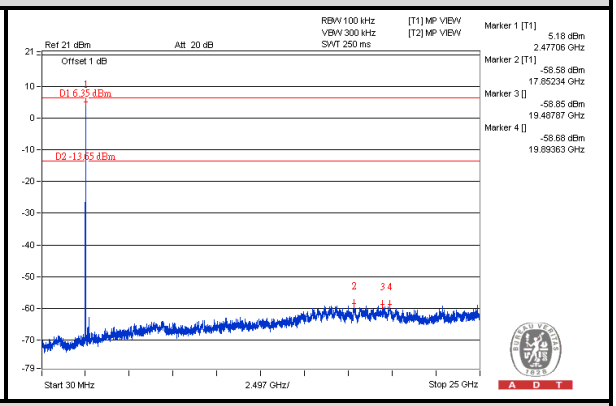
Hopping disabled_ Low Channel



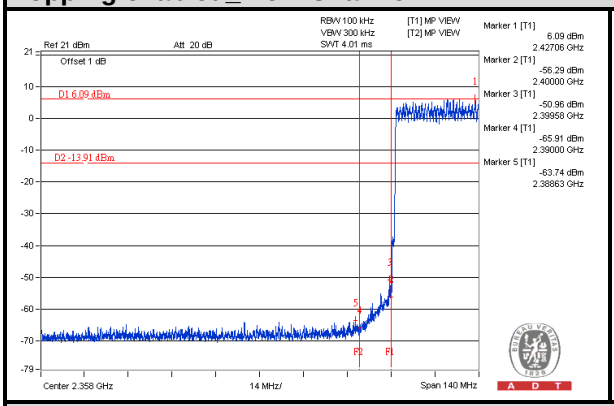


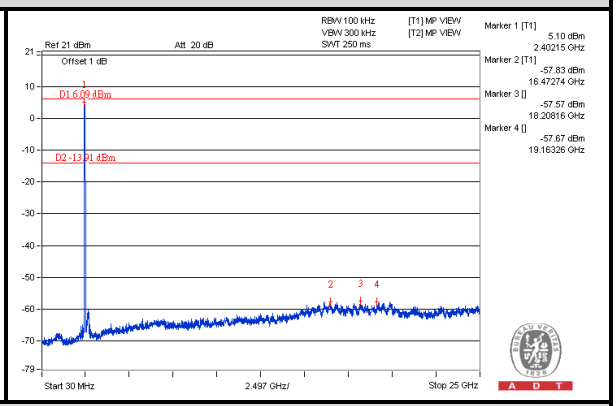
Hopping disabled_ High Channel



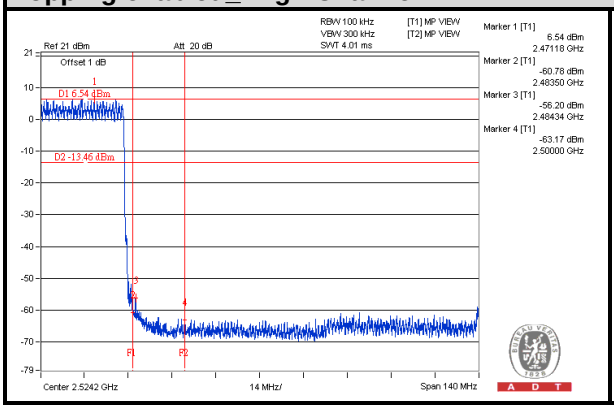


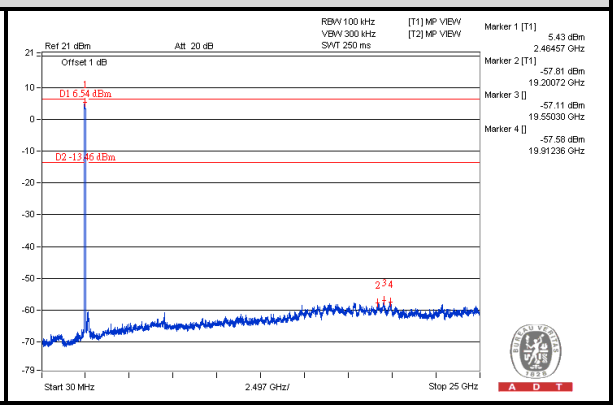
Hopping enabled_ Low Channel





Hopping enabled_ High Channel





4.9 RADIATED EMISSION MEASUREMENT

4.9.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

4.9.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 21, 2014	Jan. 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 18, 2013	Nov. 17, 2014
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	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.
7 Tested Date: Apr. 02 to May 13, 2014

4.9.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter 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.

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

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

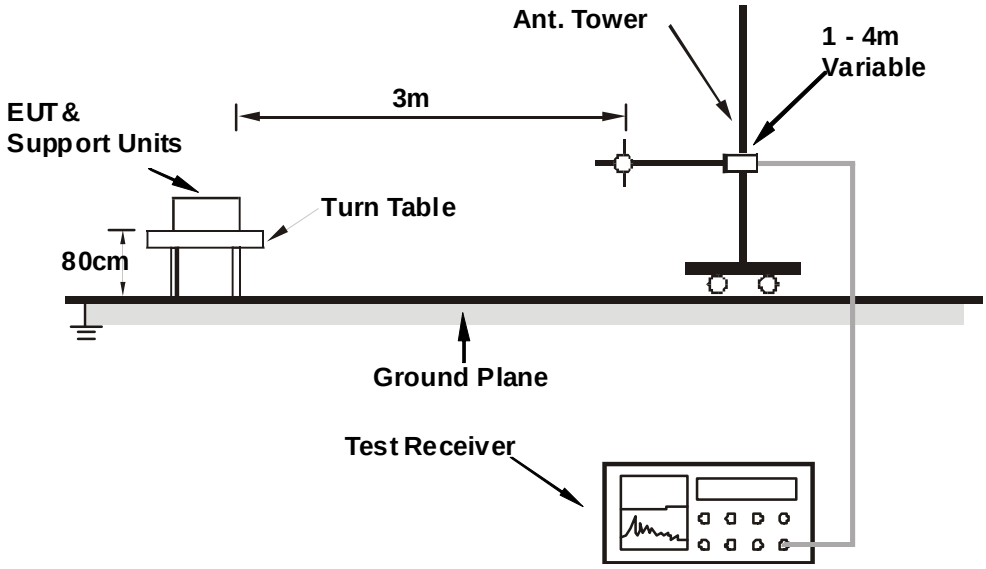
NOTE:

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

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 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 “QCRT Version3.0 22.0” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.9.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

BT_GFSK

CHANNEL	TX Channel 78	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	54.11	25.4 QP	40.0	-14.6	2.00 H	93	38.96	-13.55
2	166.04	35.2 QP	43.5	-8.3	2.00 H	118	48.68	-13.49
3	233.22	38.3 QP	46.0	-7.7	1.00 H	11	53.78	-15.46
4	428.38	33.6 QP	46.0	-12.5	2.00 H	66	42.30	-8.75
5	666.47	31.8 QP	46.0	-14.2	1.00 H	42	35.75	-3.99
6	770.69	33.6 QP	46.0	-12.4	2.00 H	107	35.20	-1.63
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	49.40	22.8 QP	40.0	-17.2	1.00 V	32	36.36	-13.52
2	166.58	24.4 QP	43.5	-19.1	2.00 V	202	37.94	-13.52
3	311.74	26.3 QP	46.0	-19.7	1.50 V	181	38.31	-11.98
4	428.33	26.7 QP	46.0	-19.3	2.00 V	133	35.42	-8.75
5	663.85	32.1 QP	46.0	-13.9	1.50 V	130	36.16	-4.03
6	**906.64**	**40.4 QP**	**46.0**	**-5.6**	**1.50 V**	**116**	**40.17**	**0.23**

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

ABOVE 1GHz DATA

BT_GFSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	50.2 PK	74.0	-23.8	1.00 H	96	51.90	-1.70
2	2390.00	37.2 AV	54.0	-16.8	1.00 H	96	38.90	-1.70
3	*2402.00	98.3 PK			1.00 H	96	99.94	-1.64
4	*2402.00	97.7 AV			1.00 H	96	99.34	-1.64
5	4804.00	49.1 PK	74.0	-24.9	1.00 H	240	41.96	7.14
6	4804.00	35.7 AV	54.0	-18.3	1.00 H	240	28.56	7.14
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	59.1 PK	74.0	-14.9	1.12 V	102	60.80	-1.70
2	2390.00	44.1 AV	54.0	-9.9	1.12 V	102	45.80	-1.70
3	*2402.00	106.6 PK			1.12 V	102	108.24	-1.64
4	*2402.00	105.8 AV			1.12 V	102	107.44	-1.64
5	4804.00	48.1 PK	74.0	-25.9	1.38 V	193	40.96	7.14
6	4804.00	37.1 AV	54.0	-16.9	1.38 V	193	29.96	7.14

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

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	98.2 PK			1.00 H	29	99.68	-1.48
2	*2441.00	97.6 AV			1.00 H	29	99.08	-1.48
3	4882.00	48.4 PK	74.0	-25.6	1.00 H	253	41.05	7.35
4	4882.00	35.3 AV	54.0	-18.7	1.00 H	253	27.95	7.35
5	7323.00	54.1 PK	74.0	-19.9	1.00 H	246	39.15	14.95
6	7323.00	40.1 AV	54.0	-13.9	1.00 H	246	25.15	14.95
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	106.8 PK			1.01 V	111	108.28	-1.48
2	*2441.00	106.1 AV			1.01 V	111	107.58	-1.48
3	4882.00	48.3 PK	74.0	-25.7	1.35 V	198	40.95	7.35
4	4882.00	37.9 AV	54.0	-16.1	1.35 V	198	30.55	7.35
5	7323.00	52.4 PK	74.0	-21.6	1.00 V	324	37.45	14.95
6	7323.00	40.3 AV	54.0	-13.7	1.00 V	324	25.35	14.95

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

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	97.7 PK			1.00 H	43	99.01	-1.31
2	*2480.00	97.2 AV			1.00 H	43	98.51	-1.31
3	2483.50	50.7 PK	74.0	-23.3	1.00 H	43	51.98	-1.28
4	2483.50	37.6 AV	54.0	-16.4	1.00 H	43	38.88	-1.28
5	4960.00	49.1 PK	74.0	-24.9	1.00 H	239	41.52	7.58
6	4960.00	35.7 AV	54.0	-18.3	1.00 H	239	28.12	7.58
7	7440.00	52.9 PK	74.0	-21.1	1.00 H	232	38.05	14.85
8	7440.00	39.9 AV	54.0	-14.1	1.00 H	232	25.05	14.85
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	106.7 PK			1.06 V	99	108.01	-1.31
2	*2480.00	106.0 AV			1.06 V	99	107.31	-1.31
3	2483.50	59.1 PK	74.0	-14.9	1.06 V	99	60.38	-1.28
4	2483.50	45.3 AV	54.0	-8.7	1.06 V	99	46.58	-1.28
5	4960.00	48.1 PK	74.0	-25.9	1.40 V	212	40.52	7.58
6	4960.00	37.2 AV	54.0	-16.8	1.40 V	212	29.62	7.58
7	7440.00	53.1 PK	74.0	-20.9	1.00 V	335	38.25	14.85
8	7440.00	40.1 AV	54.0	-13.9	1.00 V	335	25.25	14.85

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) – Pre-Amplifier 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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CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	47.2 PK	74.0	-26.8	1.04 H	59	48.90	-1.70
2	2390.00	34.4 AV	54.0	-19.6	1.04 H	59	36.10	-1.70
3	*2402.00	97.3 PK			1.04 H	59	98.94	-1.64
4	*2402.00	96.8 AV			1.04 H	59	98.44	-1.64
5	4804.00	49.2 PK	74.0	-24.8	1.00 H	243	42.06	7.14
6	4804.00	36.4 AV	54.0	-17.6	1.00 H	243	29.26	7.14
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	58.1 PK	74.0	-15.9	1.05 V	74	59.80	-1.70
2	2390.00	43.4 AV	54.0	-10.6	1.05 V	74	45.10	-1.70
3	*2402.00	106.6 PK			1.05 V	74	108.24	-1.64
4	*2402.00	102.8 AV			1.05 V	74	104.44	-1.64
5	4804.00	49.1 PK	74.0	-24.9	1.49 V	223	41.96	7.14
6	4804.00	37.2 AV	54.0	-16.8	1.49 V	223	30.06	7.14

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

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	97.4 PK			1.00 H	28	98.88	-1.48
2	*2441.00	96.9 AV			1.00 H	28	98.38	-1.48
3	4882.00	48.2 PK	74.0	-25.8	1.00 H	226	40.85	7.35
4	4882.00	35.2 AV	54.0	-18.8	1.00 H	226	27.85	7.35
5	7323.00	52.8 PK	74.0	-21.2	1.03 H	252	37.85	14.95
6	7323.00	40.0 AV	54.0	-14.0	1.03 H	252	25.05	14.95
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	106.8 PK			1.00 V	74	108.28	-1.48
2	*2441.00	102.9 AV			1.00 V	74	104.38	-1.48
3	4882.00	49.2 PK	74.0	-24.8	1.54 V	214	41.85	7.35
4	4882.00	37.4 AV	54.0	-16.6	1.54 V	214	30.05	7.35
5	7323.00	53.6 PK	74.0	-20.4	1.00 V	358	38.65	14.95
6	7323.00	40.4 AV	54.0	-13.6	1.00 V	358	25.45	14.95

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

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	97.7 PK			1.00 H	43	99.01	-1.31
2	*2480.00	97.1 AV			1.00 H	43	98.41	-1.31
3	2483.50	48.2 PK	74.0	-25.8	1.00 H	43	49.48	-1.28
4	2483.50	35.6 AV	54.0	-18.4	1.00 H	43	36.88	-1.28
5	4960.00	48.4 PK	74.0	-25.6	1.00 H	234	40.82	7.58
6	4960.00	36.7 AV	54.0	-17.3	1.00 H	234	29.12	7.58
7	7440.00	53.6 PK	74.0	-20.4	1.04 H	243	38.75	14.85
8	7440.00	39.6 AV	54.0	-14.4	1.04 H	243	24.75	14.85
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	106.7 PK			1.04 V	82	108.01	-1.31
2	*2480.00	102.6 AV			1.04 V	82	103.91	-1.31
3	2483.50	59.2 PK	74.0	-14.8	1.05 V	89	60.48	-1.28
4	2483.50	44.5 AV	54.0	-9.5	1.05 V	89	45.78	-1.28
5	4960.00	49.6 PK	74.0	-24.4	1.55 V	214	42.02	7.58
6	4960.00	37.8 AV	54.0	-16.2	1.55 V	214	30.22	7.58
7	7440.00	54.1 PK	74.0	-19.9	1.00 V	349	39.25	14.85
8	7440.00	40.1 AV	54.0	-13.9	1.00 V	349	25.25	14.85

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

4.10 CONDUCTED EMISSION MEASUREMENT

4.10.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.10.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 05, 2013	Sep. 04, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 06, 2013	June 05, 2014
RF Cable (JYEBAO)	5DFB	CONCAB-003	Mar. 07, 2014	Mar. 06, 2015
50 ohms Terminator	50	EMC-03	Sep. 24, 2013	Sep. 23, 2014
Software ADT	BV ADT_Cond_V7.3.7.3	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 Tested Date: Mar. 26 to 27, 2014

4.10.3 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.

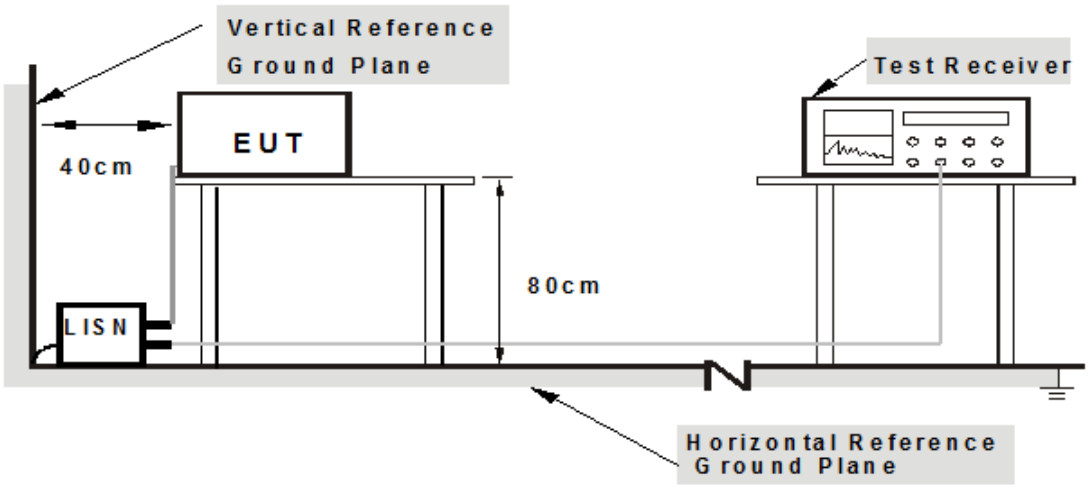
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

NOTE: The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.10.4 DEVIATION FROM TEST STANDARD

No deviation

4.10.5 TEST SETUP



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

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

4.10.6 EUT OPERATING CONDITIONS

Same as Item 4.9.6

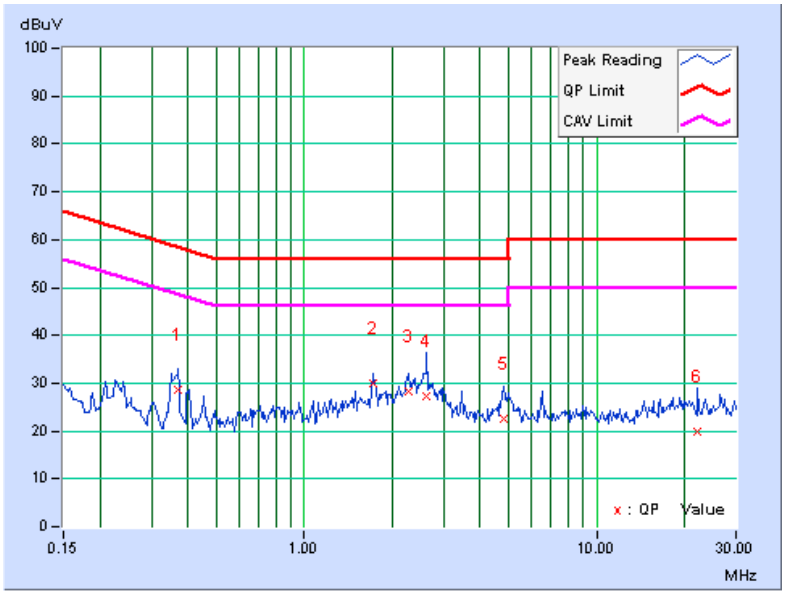
4.10.7 TEST RESULTS(MODE 1)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.36896	9.98	18.76	18.52	28.74	28.50	58.52	48.52	-29.79	-20.03
2	1.72182	10.02	20.12	17.49	30.14	27.51	56.00	46.00	-25.86	-18.49
3	2.28877	10.04	18.27	9.09	28.31	19.13	56.00	46.00	-27.69	-26.87
4	2.60939	10.05	17.38	8.16	27.43	18.21	56.00	46.00	-28.57	-27.79
5	4.79117	10.13	12.39	4.32	22.52	14.45	56.00	46.00	-33.48	-31.55
6	22.14375	10.63	9.25	3.25	19.88	13.88	60.00	50.00	-40.12	-36.12

REMARKS:

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

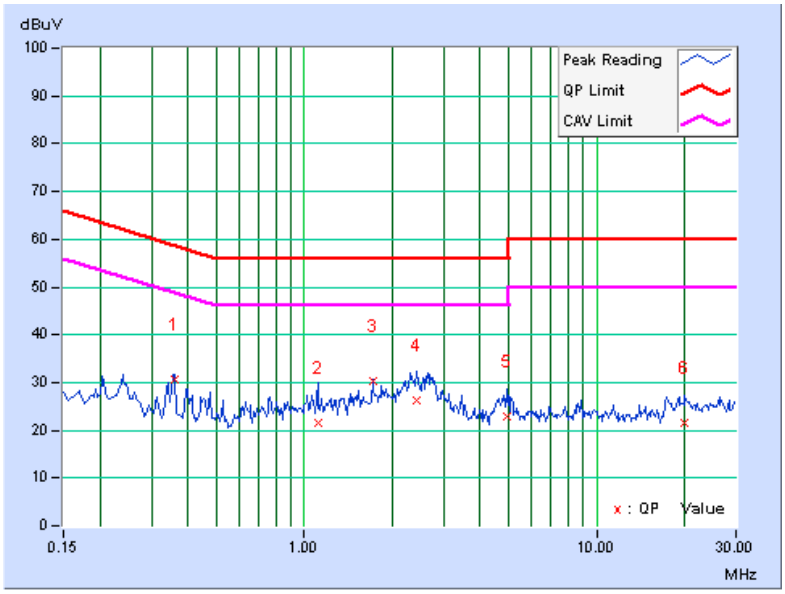


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.36083	9.98	20.64	13.86	30.62	23.84	58.71	48.71	-28.09	-24.87
2	1.11186	10.00	11.60	4.55	21.60	14.55	56.00	46.00	-34.40	-31.45
3	**1.72182**	**10.03**	**20.27**	**17.55**	**30.30**	**27.58**	**56.00**	**46.00**	**-25.70**	**-18.42**
4	2.43735	10.06	16.17	9.25	26.23	19.31	56.00	46.00	-29.77	-26.69
5	4.96712	10.14	12.87	4.46	23.01	14.60	56.00	46.00	-32.99	-31.40
6	20.07536	10.55	11.14	5.02	21.69	15.57	60.00	50.00	-38.31	-34.43

REMARKS:

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



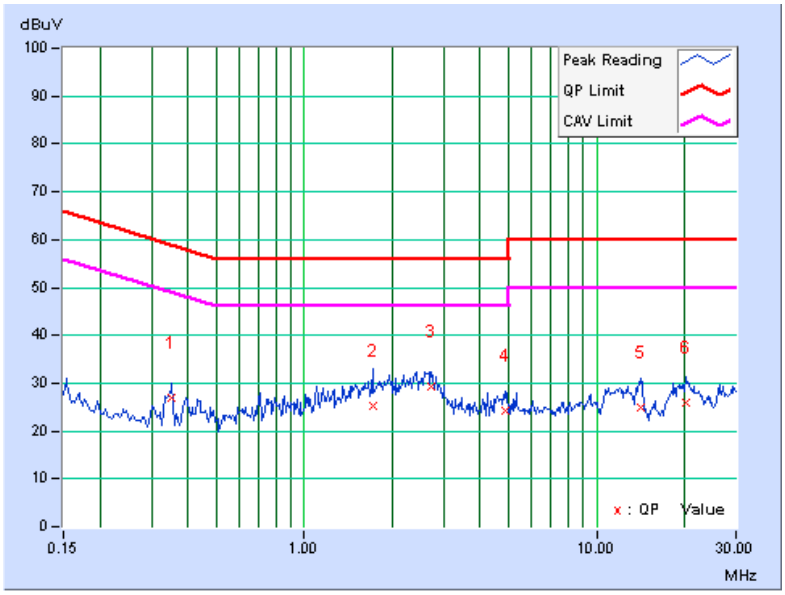
4.10.8 TEST RESULTS(MODE 2)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.35327	9.98	16.80	10.95	26.78	20.93	58.89	48.89	-32.11	-27.96
2	1.72182	10.02	15.36	9.30	25.38	19.32	56.00	46.00	-30.62	-26.68
3	2.72669	10.06	19.28	8.93	29.34	18.99	56.00	46.00	-26.66	-27.01
4	4.84982	10.14	13.99	5.44	24.13	15.58	56.00	46.00	-31.87	-30.42
5	14.18690	10.42	14.35	6.71	24.77	17.13	60.00	50.00	-35.23	-32.87
6	20.19266	10.57	15.41	8.30	25.98	18.87	60.00	50.00	-34.02	-31.13

REMARKS:

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

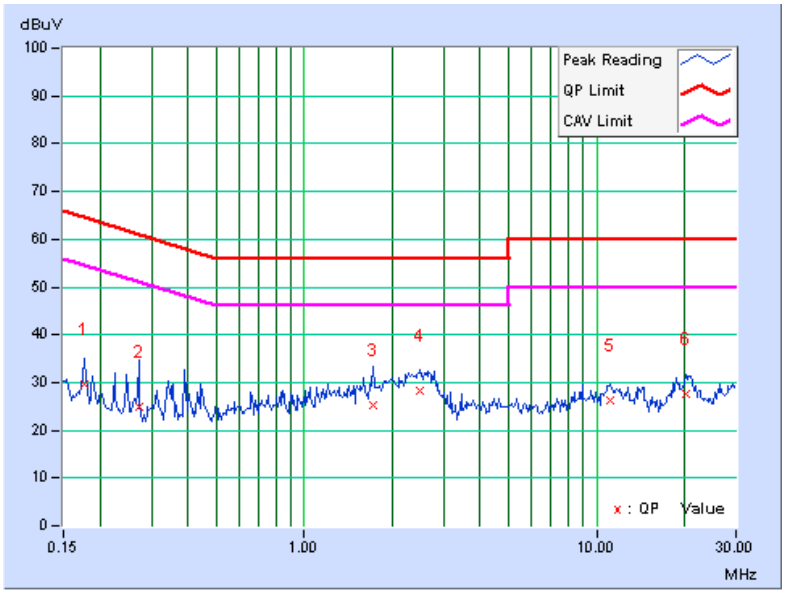


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17737	9.96	19.57	6.81	29.53	16.77	64.61	54.61	-35.08	-37.84
2	0.27120	9.97	14.92	-3.20	24.89	6.77	61.08	51.08	-36.19	-44.31
3	1.72182	10.03	15.19	9.38	25.22	19.41	56.00	46.00	-30.78	-26.59
4	2.49991	10.06	18.08	9.74	28.14	19.80	56.00	46.00	-27.86	-26.20
5	11.10191	10.32	15.87	7.20	26.19	17.52	60.00	50.00	-33.81	-32.48
6	20.27086	10.56	17.14	10.13	27.70	20.69	60.00	50.00	-32.30	-29.31

REMARKS:

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



5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6 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.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
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Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
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The address and road map of all our labs can be found in our web site also.

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

No modifications were made to the EUT by the lab during the test.

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