FCC Test Report (BT EDR)

Report No.:	RF170713D01-3
FCC ID:	2ALJ3AP24X
Test Model:	AP241, AP241e
Received Date:	Jul. 13, 2017
Test Date:	Oct. 24 ~ Nov. 10, 2017
Issued Date:	Nov. 14, 2017
Applicant:	HAN Networks Co., Ltd.
Address:	5/F, Building 37, No.8 Dongbeiwang West Road, HaiDian District, Beijing, China
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.
FCC Registration / Designation Number:	198487 / TW2021

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Release Control Record

Issue No.	Description	Date Issued
RF170713D01-3	Original release.	Nov. 14, 2017

1 Certificate of Conformity

Product:	HAN Access Point
Brand:	HAN
Test Model:	AP241, AP241e
Sample Status:	Engineering sample
Applicant:	HAN Networks Co., Ltd.
Test Date:	Oct. 24 ~ Nov. 10, 2017
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

The above equipment 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 : Jessica Cheng , **Date:** Nov. 14, 2017

Jessica Cheng / Senior Specialist

Approved by : Rex. Lai , **Date:** Nov. 14, 2017

Rex Lai / Associate Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.77 dB at 0.52500 MHz
15.247(a)(1)(iii)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.205 & 209 & 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -9.11dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is I-PEX not a standard connector.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.77 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.54 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.77 dB
	Above 6GHz	5.48 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (BT-EDR)

Product	HAN Access Point
Brand	HAN
Test Model	AP241, AP241e
Model Difference	Refer to note as below
Status of EUT	Engineering Sample
Power Supply Rating	48Vdc from Adapter or 55Vdc from PoE
Modulation Type	GFSK, π/4-DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	1/ 2/ 3Mbps
Operating Frequency	2402MHz ~ 2480MHz
Number of Channel	79
Output Power	3.097mW
Antenna Type	Refer to note as below
Antenna Connector	Refer to note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. All models are listed as below.

Brand	Model	Difference
HAN	AP241	Internal PIFA antenna for Bluetooth function, and internal PIFA antenna for WLAN function
	AP241e	Internal PIFA antenna for Bluetooth function, and external Dipole antenna for WLAN function

2. The EUT was pre-tested with the following modes:
   - ✧ Operating Mode (EUT Powered from Adapter)
   - ✧ Operating Mode (EUT Powered from PoE)

   The worst emission level was found when the EUT tested under **Operating Mode (EUT + Adapter)**, therefore, only its test data was recorded in this report.

3. The antennas provided to the EUT, please refer to the following table:

Model	Antenna Type	Antenna Gain (dBi)	Connector Type
AP241	PIFA	4.89	I-PEX
AP241e	PIFA	3.42	I-PEX

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 Description of Test Modes

79 channels are provided for BT-EDR mode:

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Model: AP241 (Int. antenna), Powered from Adapter
B	√	√	√	√	Model: AP241e (Ext. antenna), Powered from Adapter
C	-	-	√	-	Model: AP241 (Int. antenna), Powered from PoE
D	-	-	√	-	Model: AP241e (Ext. antenna), Powered from PoE

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

NOTE:
The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**. (Mode A)
The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**. (Mode B)

Radiated Emission Test (Above 1GHz):

☒ 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.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A & B	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A & B	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Radiated Emission Test (Below 1GHz):

☒ 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.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A & B	0 to 78	39	FHSS	GFSK	DH5

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.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0 to 78	39	FHSS	GFSK	DH5
B	0 to 78	39	FHSS	GFSK	DH5
C	0 to 78	39	FHSS	GFSK	DH5
D	0 to 78	39	FHSS	GFSK	DH5

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A & B	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A & B	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	27deg. C, 69%RH	120Vac, 60Hz	Ian Chang
RE<1G	27deg. C, 69%RH	120Vac, 60Hz	Ian Chang
PLC	23deg. C, 77%RH	120Vac, 60Hz	Dalen Dai
APCM	25deg. C, 76%RH	120Vac, 60Hz	Saxon Lee

3.3 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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Adapter	APD	WB-18D12R	N/A	N/A	Supplied by client
B.	NOTEBOOK PC	DELL	PP27L	8SNZ12S	FCC DoC Approved	Provided by Lab
C.	PoE	Microsemi	PD-9001GR/AT/AC	N/A	N/A	Supplied by client

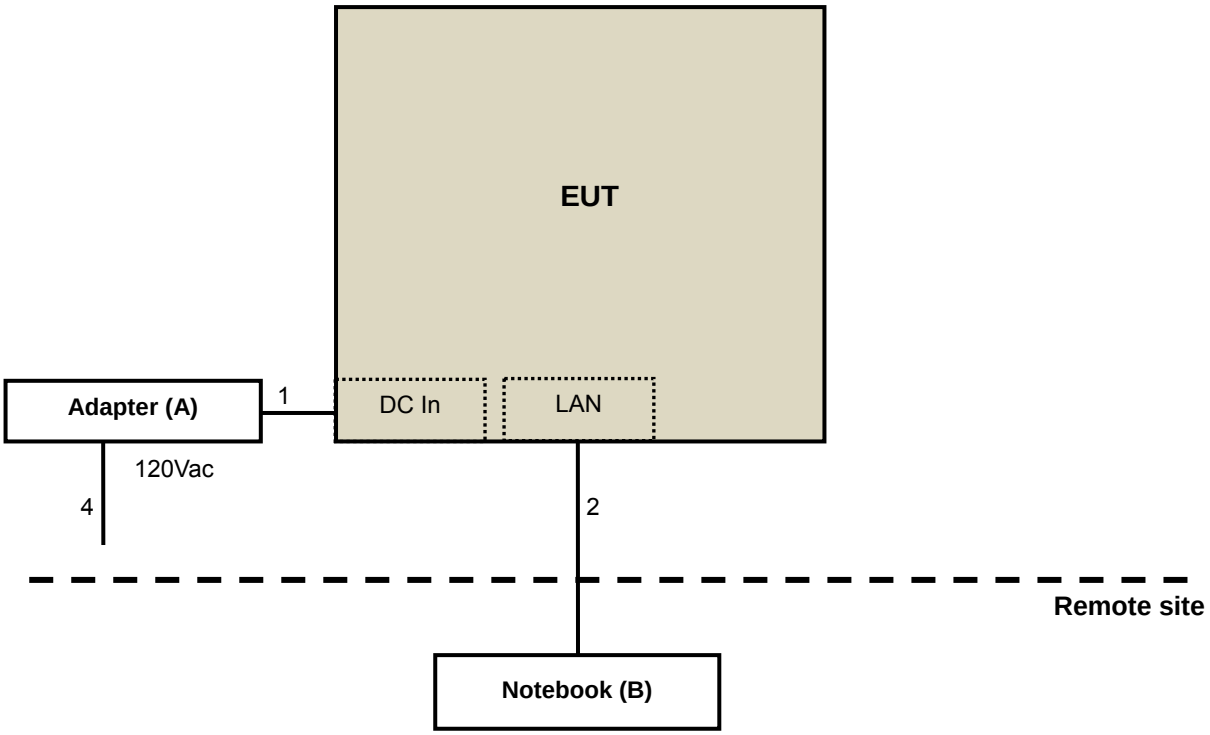
Note:
1. All power cords of the above support units are non-shielded (1.8m).
2. Item B ~ C acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.5	N	0	Supplied by client
2.	LAN cable	1	10	N	0	Provided by Lab
3.	LAN cable	1	1.5	N	0	Provided by Lab
4.	AC cable	1	1.8	N	0	Provided by Lab

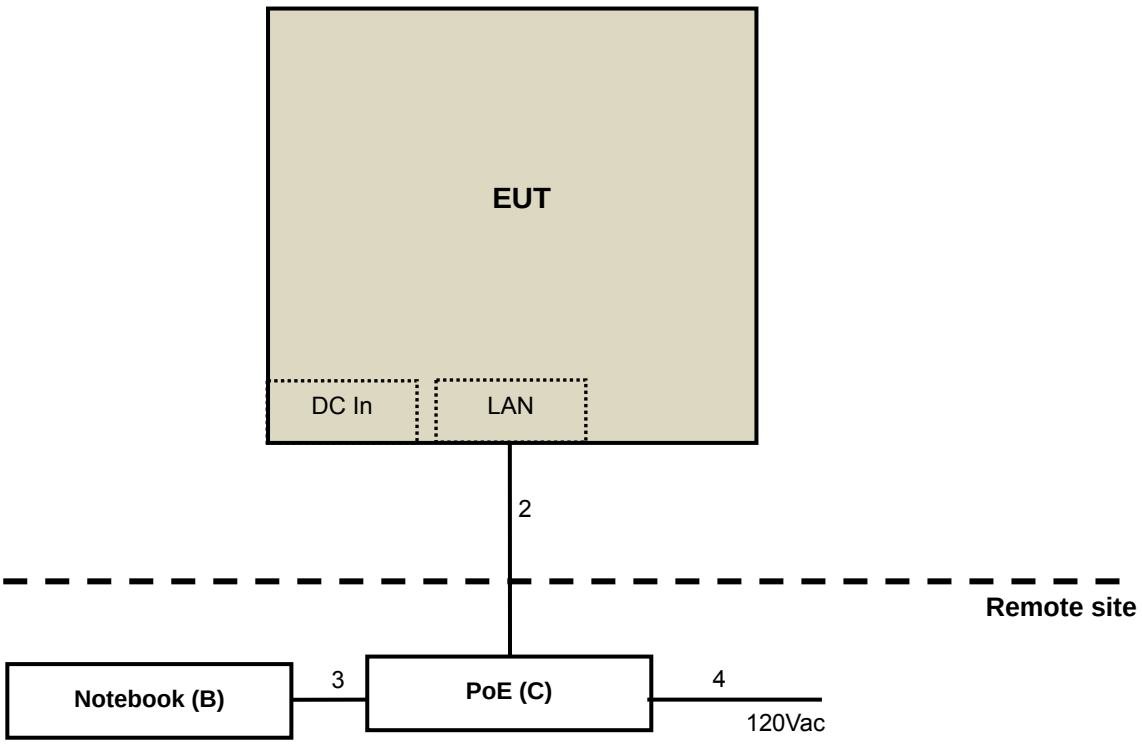
Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

Mode A & B:



Mode C & D:



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 C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge 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. 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.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 21, 2017	Feb. 20, 2018
HP Preamplifier	8449B	3008A01201	Feb. 22, 2017	Feb. 21, 2018
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2017	Feb. 20, 2018
Agilent TEST RECEIVER	N9038A	MY51210129	Feb. 08, 2017	Feb. 07, 2018
Schwarzbeck Antenna	VULB 9168	139	Dec. 13, 2016	Dec. 12, 2017
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 30, 2016	Dec. 29, 2017
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Dec. 27, 2016	Dec. 26, 2017
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF104	CABLE-CH6	Aug. 14, 2017	Aug. 13, 2018
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 14, 2017	Aug. 13, 2018
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	May 31, 2017	May 30, 2018
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 26, 2017	Jul. 25, 2018
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Dec. 15, 2016	Dec. 14, 2017
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 29, 2017	Sep. 28, 2018
Anritsu Power Sensor	MA2411B	0738404	Apr. 24, 2017	Apr. 23, 2018
Anritsu Power Meter	ML2495A	0842014	Apr. 24, 2017	Apr. 23, 2018

NOTE: 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. Tested Date: Oct. 24 ~ Nov. 10, 2017

4.1.3 Test Procedures

For Radiated emission below 30MHz

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. Both X and Y axes of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case 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.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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:

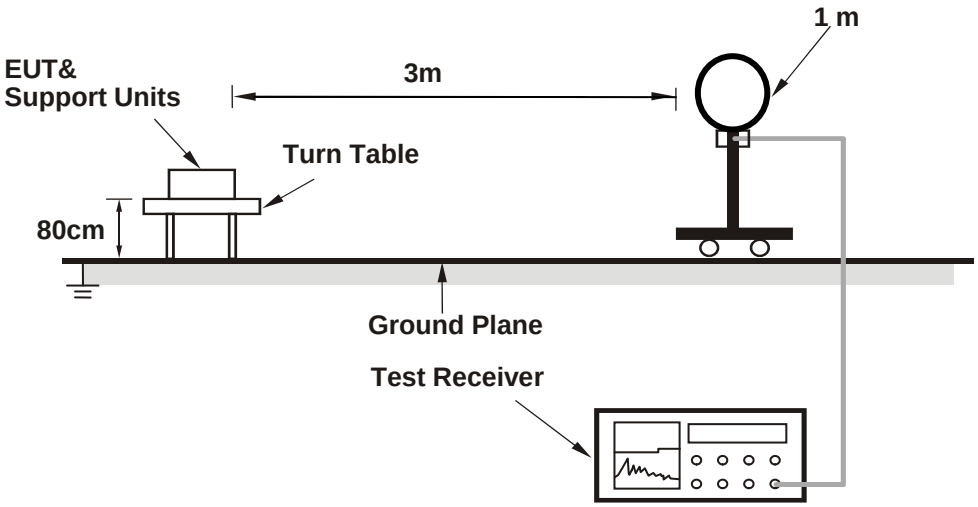
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

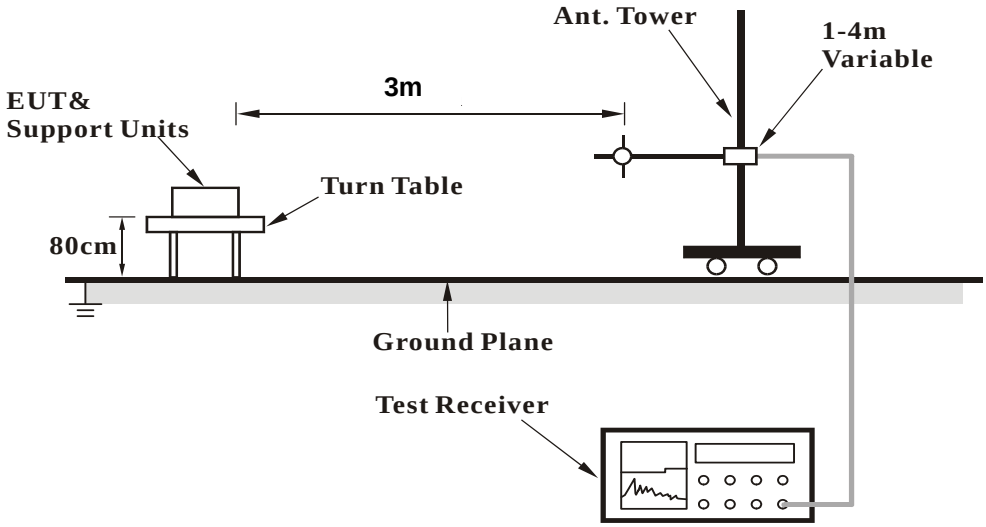
No deviation.

4.1.5 Test Setup

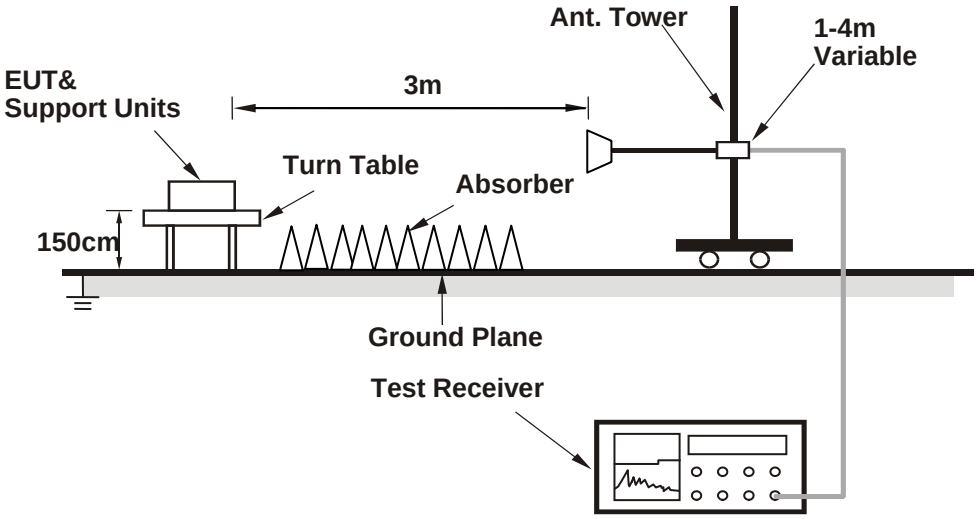
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with AC adapter placed on testing table.
b. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Mode A

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	56.20 PK	74.00	-17.80	2.50 H	320	58.51	-2.31
2	2390.00	40.56 AV	54.00	-13.44	2.50 H	320	42.87	-2.31
3	*2402.00	109.16 PK			2.50 H	320	111.40	-2.24
4	*2402.00	79.06 AV			2.50 H	320	81.30	-2.24
5	4804.00	44.51 PK	74.00	-29.49	1.59 H	158	40.38	4.13
6	4804.00	14.41 AV	54.00	-39.59	1.59 H	158	10.28	4.13
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	54.69 PK	74.00	-19.31	2.99 V	291	57.00	-2.31
2	2390.00	38.94 AV	54.00	-15.06	2.99 V	291	41.25	-2.31
3	*2402.00	102.70 PK			2.99 V	291	104.94	-2.24
4	*2402.00	72.60 AV			2.99 V	291	74.84	-2.24
5	4804.00	45.03 PK	74.00	-28.97	1.64 V	231	40.90	4.13
6	4804.00	14.93 AV	54.00	-39.07	1.64 V	231	10.80	4.13

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

CHANNEL	TX Channel 39	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	*2441.00	109.53 PK			2.49 H	318	111.52	-1.99
2	*2441.00	79.43 AV			2.49 H	318	81.42	-1.99
3	4882.00	44.99 PK	74.00	-29.01	1.69 H	167	40.74	4.25
4	4882.00	14.89 AV	54.00	-39.11	1.69 H	167	10.64	4.25
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	103.49 PK			3.02 V	296	105.48	-1.99
2	*2441.00	73.39 AV			3.02 V	296	75.38	-1.99
3	4882.00	45.24 PK	74.00	-28.76	1.69 V	228	40.99	4.25
4	4882.00	15.14 AV	54.00	-38.86	1.69 V	228	10.89	4.25

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

CHANNEL	TX Channel 78	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	*2480.00	110.85 PK			1.84 H	320	112.58	-1.73
2	*2480.00	80.75 AV			1.84 H	320	82.48	-1.73
3	2483.50	57.79 PK	74.00	-16.21	1.84 H	320	59.50	-1.71
4	**2483.50**	**44.89 AV**	**54.00**	**-9.11**	**1.84 H**	**320**	**46.60**	**-1.71**
5	4960.00	44.67 PK	74.00	-29.33	1.48 H	155	40.35	4.32
6	4960.00	14.57 AV	54.00	-39.43	1.48 H	155	10.25	4.32
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	104.41 PK			3.06 V	235	106.14	-1.73
2	*2480.00	74.31 AV			3.06 V	235	76.04	-1.73
3	2483.50	56.55 PK	74.00	-17.45	3.06 V	235	58.26	-1.71
4	2483.50	43.55 AV	54.00	-10.45	3.06 V	235	45.26	-1.71
5	4960.00	44.76 PK	74.00	-29.24	1.52 V	144	40.44	4.32
6	4960.00	14.66 AV	54.00	-39.34	1.52 V	144	10.34	4.32

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

BT_8DPSK

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	52.98 PK	74.00	-21.02	2.50 H	319	55.29	-2.31
2	2390.00	39.45 AV	54.00	-14.55	2.50 H	319	41.76	-2.31
3	*2402.00	107.37 PK			2.50 H	319	109.61	-2.24
4	*2402.00	77.27 AV			2.50 H	319	79.51	-2.24
5	4804.00	44.71 PK	74.00	-29.29	1.44 H	162	40.58	4.13
6	4804.00	14.61 AV	54.00	-39.39	1.44 H	162	10.48	4.13
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	51.87 PK	74.00	-22.13	3.06 V	289	54.18	-2.31
2	2390.00	37.95 AV	54.00	-16.05	3.06 V	289	40.26	-2.31
3	*2402.00	100.74 PK			3.06 V	289	102.98	-2.24
4	*2402.00	70.64 AV			3.06 V	289	72.88	-2.24
5	4804.00	45.09 PK	74.00	-28.91	1.69 V	238	40.96	4.13
6	4804.00	14.99 AV	54.00	-39.01	1.69 V	238	10.86	4.13

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

CHANNEL	TX Channel 39	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	*2441.00	107.89 PK			2.46 H	318	109.88	-1.99
2	*2441.00	77.79 AV			2.46 H	318	79.78	-1.99
3	4882.00	44.92 PK	74.00	-29.08	1.55 H	177	40.67	4.25
4	4882.00	14.82 AV	54.00	-39.18	1.55 H	177	10.57	4.25
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	100.59 PK			3.06 V	294	102.58	-1.99
2	*2441.00	70.49 AV			3.06 V	294	72.48	-1.99
3	4882.00	45.14 PK	74.00	-28.86	1.63 V	352	40.89	4.25
4	4882.00	15.04 AV	54.00	-38.96	1.63 V	352	10.79	4.25

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

CHANNEL	TX Channel 78	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	*2480.00	108.56 PK			2.44 H	317	110.29	-1.73
2	*2480.00	78.46 AV			2.44 H	317	80.19	-1.73
3	2483.50	57.06 PK	74.00	-16.94	2.44 H	317	58.77	-1.71
4	2483.50	43.45 AV	54.00	-10.55	2.44 H	317	45.16	-1.71
5	4960.00	44.56 PK	74.00	-29.44	1.58 H	159	40.24	4.32
6	4960.00	14.46 AV	54.00	-39.54	1.58 H	159	10.14	4.32
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	101.90 PK			3.16 V	277	103.63	-1.73
2	*2480.00	71.80 AV			3.16 V	277	73.53	-1.73
3	2483.50	55.51 PK	74.00	-18.49	3.16 V	277	57.22	-1.71
4	2483.50	42.42 AV	54.00	-11.58	3.16 V	277	44.13	-1.71
5	4960.00	44.91 PK	74.00	-29.09	1.75 V	220	40.59	4.32
6	4960.00	14.81 AV	54.00	-39.19	1.75 V	220	10.49	4.32

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

Mode B

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	54.85 PK	74.00	-19.15	2.42 H	316	57.16	-2.31
2	2390.00	39.32 AV	54.00	-14.68	2.42 H	316	41.63	-2.31
3	*2402.00	109.30 PK			2.42 H	316	111.54	-2.24
4	*2402.00	79.20 AV			2.42 H	316	81.44	-2.24
5	4804.00	44.28 PK	74.00	-29.72	1.62 H	234	40.15	4.13
6	4804.00	14.18 AV	54.00	-39.82	1.62 H	234	10.05	4.13
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	54.02 PK	74.00	-19.98	2.96 V	263	56.33	-2.31
2	2390.00	38.54 AV	54.00	-15.46	2.96 V	263	40.85	-2.31
3	*2402.00	102.12 PK			2.96 V	263	104.36	-2.24
4	*2402.00	72.02 AV			2.96 V	263	74.26	-2.24
5	4804.00	44.82 PK	74.00	-29.18	2.01 V	154	40.69	4.13
6	4804.00	14.72 AV	54.00	-39.28	2.01 V	154	10.59	4.13

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

CHANNEL	TX Channel 39	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	*2441.00	109.88 PK			2.39 H	320	111.87	-1.99
2	*2441.00	79.78 AV			2.39 H	320	81.77	-1.99
3	4882.00	44.75 PK	74.00	-29.25	1.57 H	264	40.50	4.25
4	4882.00	14.65 AV	54.00	-39.35	1.57 H	264	10.40	4.25
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	102.97 PK			3.02 V	258	104.96	-1.99
2	*2441.00	72.87 AV			3.02 V	258	74.86	-1.99
3	4882.00	45.13 PK	74.00	-28.87	1.97 V	168	40.88	4.25
4	4882.00	15.03 AV	54.00	-38.97	1.97 V	168	10.78	4.25

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

CHANNEL	TX Channel 78	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	*2480.00	110.69 PK			2.98 H	271	112.42	-1.73
2	*2480.00	80.59 AV			2.98 H	271	82.32	-1.73
3	2483.50	56.92 PK	74.00	-17.08	2.98 H	271	58.63	-1.71
4	2483.50	44.17 AV	54.00	-9.83	2.98 H	271	45.88	-1.71
5	4960.00	45.09 PK	74.00	-28.91	1.95 H	162	40.77	4.32
6	4960.00	14.99 AV	54.00	-39.01	1.95 H	162	10.67	4.32
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	104.13 PK			2.36 V	331	105.86	-1.73
2	*2480.00	74.03 AV			2.36 V	331	75.76	-1.73
3	2483.50	55.06 PK	74.00	-18.94	2.36 V	331	56.77	-1.71
4	2483.50	42.48 AV	54.00	-11.52	2.36 V	331	44.19	-1.71
5	4960.00	44.55 PK	74.00	-29.45	1.78 V	220	40.23	4.32
6	4960.00	14.45 AV	54.00	-39.55	1.78 V	220	10.13	4.32

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

BT_8DPSK

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	55.11 PK	74.00	-18.89	2.56 H	320	57.42	-2.31
2	2390.00	39.70 AV	54.00	-14.30	2.56 H	320	42.01	-2.31
3	*2402.00	109.39 PK			2.56 H	320	111.63	-2.24
4	*2402.00	79.29 AV			2.56 H	320	81.53	-2.24
5	4804.00	43.79 PK	74.00	-30.21	1.69 H	208	39.66	4.13
6	4804.00	13.69 AV	54.00	-40.31	1.69 H	208	9.56	4.13
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	53.54 PK	74.00	-20.46	2.36 V	309	55.85	-2.31
2	2390.00	37.72 AV	54.00	-16.28	2.36 V	309	40.03	-2.31
3	*2402.00	102.60 PK			2.36 V	309	104.84	-2.24
4	*2402.00	72.50 AV			2.36 V	309	74.74	-2.24
5	4804.00	44.68 PK	74.00	-29.32	1.97 V	142	40.55	4.13
6	4804.00	14.58 AV	54.00	-39.42	1.97 V	142	10.45	4.13

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

CHANNEL	TX Channel 39	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	*2441.00	109.70 PK			2.47 H	311	111.69	-1.99
2	*2441.00	79.60 AV			2.47 H	311	81.59	-1.99
3	4882.00	44.87 PK	74.00	-29.13	1.52 H	205	40.62	4.25
4	4882.00	14.77 AV	54.00	-39.23	1.52 H	205	10.52	4.25
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	102.78 PK			3.06 V	266	104.77	-1.99
2	*2441.00	72.68 AV			3.06 V	266	74.67	-1.99
3	4882.00	45.11 PK	74.00	-28.89	1.94 V	148	40.86	4.25
4	4882.00	15.01 AV	54.00	-38.99	1.94 V	148	10.76	4.25

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

CHANNEL	TX Channel 78	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	*2480.00	110.39 PK			2.39 H	325	112.12	-1.73
2	*2480.00	80.29 AV			2.39 H	325	82.02	-1.73
3	2483.50	56.70 PK	74.00	-17.30	2.39 H	325	58.41	-1.71
4	2483.50	44.52 AV	54.00	-9.48	2.39 H	325	46.23	-1.71
5	4960.00	44.55 PK	74.00	-29.45	1.68 H	239	40.23	4.32
6	4960.00	14.45 AV	54.00	-39.55	1.68 H	239	10.13	4.32
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	103.90 PK			2.88 V	272	105.63	-1.73
2	*2480.00	73.80 AV			2.88 V	272	75.53	-1.73
3	2483.50	54.64 PK	74.00	-19.36	2.88 V	272	56.35	-1.71
4	2483.50	40.45 AV	54.00	-13.55	2.88 V	272	42.16	-1.71
5	4960.00	45.26 PK	74.00	-28.74	1.99 V	165	40.94	4.32
6	4960.00	15.16 AV	54.00	-38.84	1.99 V	165	10.84	4.32

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

Mode A

BELOW 1GHz WORST-CASE DATA

BT_GFSK

CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	42.66	20.09 QP	40.00	-19.91	1.52 H	98	29.58	-9.49
2	228.41	33.77 QP	46.00	-12.23	1.24 H	280	45.16	-11.39
3	312.85	28.74 QP	46.00	-17.26	1.00 H	101	35.71	-6.97
4	400.01	34.03 QP	46.00	-11.97	2.51 H	81	39.35	-5.32
5	477.75	34.19 QP	46.00	-11.81	1.87 H	26	37.66	-3.47
6	732.86	31.03 QP	46.00	-14.97	1.00 H	219	29.21	1.82
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	46.20	26.42 QP	40.00	-13.58	1.24 V	158	35.46	-9.04
2	106.34	24.55 QP	43.50	-18.95	1.18 V	125	37.61	-13.06
3	234.62	36.30 QP	46.00	-9.70	2.03 V	163	46.91	-10.61
4	400.01	31.63 QP	46.00	-14.37	1.17 V	334	36.95	-5.32
5	475.62	28.48 QP	46.00	-17.52	2.41 V	235	31.97	-3.49
6	519.85	28.96 QP	46.00	-17.04	2.25 V	243	31.41	-2.45

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

Mode B

BELOW 1GHz WORST-CASE DATA

BT_GFSK

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	56.92	20.70 QP	40.00	-19.30	2.63 H	164	29.90	-9.20
2	228.22	34.85 QP	46.00	-11.15	2.25 H	288	46.24	-11.39
3	313.92	28.21 QP	46.00	-17.79	1.85 H	280	35.14	-6.93
4	400.06	33.90 QP	46.00	-12.10	1.94 H	68	39.22	-5.32
5	473.53	34.31 QP	46.00	-11.69	1.55 H	35	37.79	-3.48
6	664.96	28.90 QP	46.00	-17.10	2.08 H	0	28.65	0.25
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	79.66	25.49 QP	40.00	-14.51	1.39 V	231	39.39	-13.90
2	114.58	23.85 QP	43.50	-19.65	1.18 V	247	36.07	-12.22
3	248.35	36.33 QP	46.00	-9.67	1.09 V	261	45.85	-9.52
4	400.06	30.38 QP	46.00	-15.62	1.81 V	360	35.70	-5.32
5	504.81	30.67 QP	46.00	-15.33	2.06 V	239	33.38	-2.71
6	670.01	29.68 QP	46.00	-16.32	1.55 V	146	29.29	0.39

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 10, 2017	Apr. 9, 2018
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 22, 2017	May 21, 2018
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 22, 2017	May 21, 2018
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 23, 2016	Nov. 22, 2017
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 9, 2017	May 8, 2018
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 14, 2017	Feb. 13, 2018
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 18, 2017	May 17, 2018
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 8, 2016	Nov. 7, 2017
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 8, 2016	Nov. 7, 2017

Notes: 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. 10.
3. Tested Date: Oct. 25, 2017

4.2.3 Test Procedures

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

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

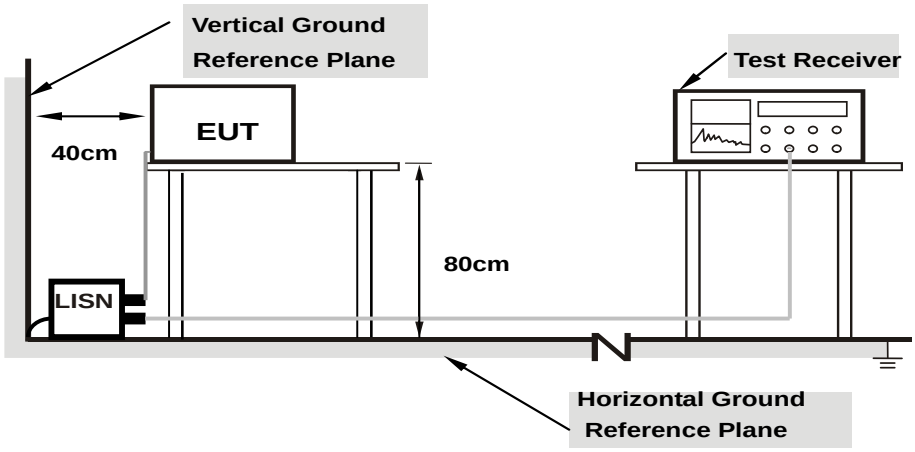
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation From Test Standard

No deviation.

4.2.5 Test Setup



Note: Support units were connected to second LISN.

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

4.2.6 EUT Operating Condition

a. Connected the EUT with AC adapter or PoE placed on testing table.

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

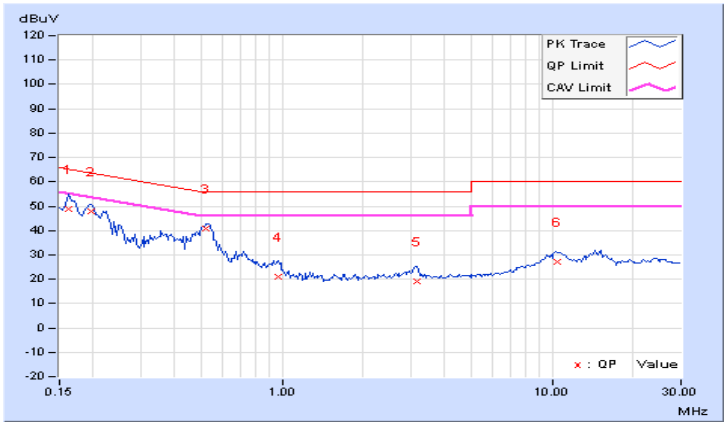
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode A		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.65	39.38	25.74	49.03	35.39	65.38	55.38	-16.35	-19.99
2	0.19687	9.65	38.46	29.35	48.11	39.00	63.74	53.74	-15.63	-14.74
3	0.52500	9.67	30.92	25.51	40.59	35.18	56.00	46.00	-15.41	-10.82
4	0.96641	9.70	11.38	4.99	21.08	14.69	56.00	46.00	-34.92	-31.31
5	3.14063	9.80	9.12	3.49	18.92	13.29	56.00	46.00	-37.08	-32.71
6	10.51563	9.93	17.14	12.32	27.07	22.25	60.00	50.00	-32.93	-27.75

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

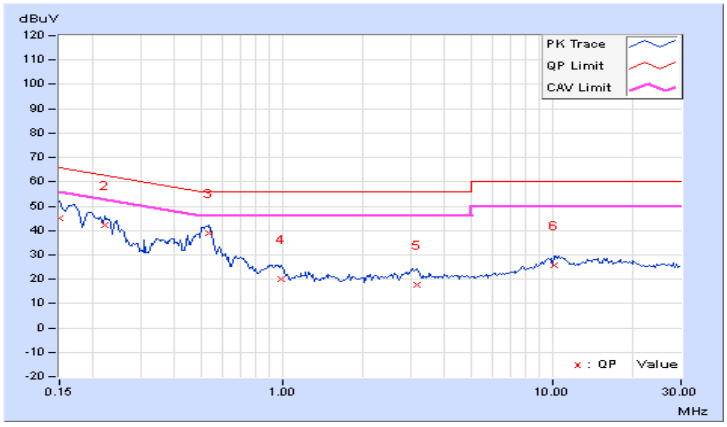


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode A		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.68	35.53	24.27	45.21	33.95	66.00	56.00	-20.79	-22.05
2	0.22031	9.67	32.34	24.10	42.01	33.77	62.81	52.81	-20.80	-19.04
3	0.53672	9.69	29.15	23.39	38.84	33.08	56.00	46.00	-17.16	-12.92
4	0.99766	9.71	10.17	3.86	19.88	13.57	56.00	46.00	-36.12	-32.43
5	3.14453	9.81	8.06	2.44	17.87	12.25	56.00	46.00	-38.13	-33.75
6	10.17188	9.95	15.56	10.42	25.51	20.37	60.00	50.00	-34.49	-29.63

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

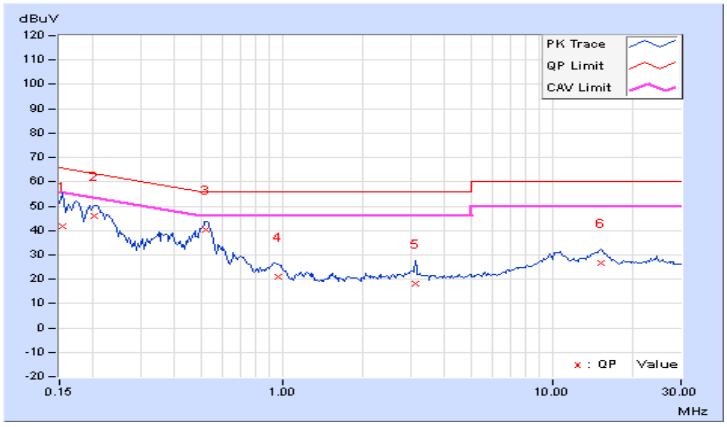


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode B		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.65	32.31	17.62	41.96	27.27	65.79	55.79	-23.83	-28.52
2	0.20078	9.65	36.13	29.74	45.78	39.39	63.58	53.58	-17.80	-14.19
3	**0.52500**	**9.67**	**30.82**	**25.56**	**40.49**	**35.23**	**56.00**	**46.00**	**-15.51**	**-10.77**
4	0.96641	9.70	11.19	4.61	20.89	14.31	56.00	46.00	-35.11	-31.69
5	3.10938	9.80	8.23	3.13	18.03	12.93	56.00	46.00	-37.97	-33.07
6	15.10156	9.96	16.77	10.99	26.73	20.95	60.00	50.00	-33.27	-29.05

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

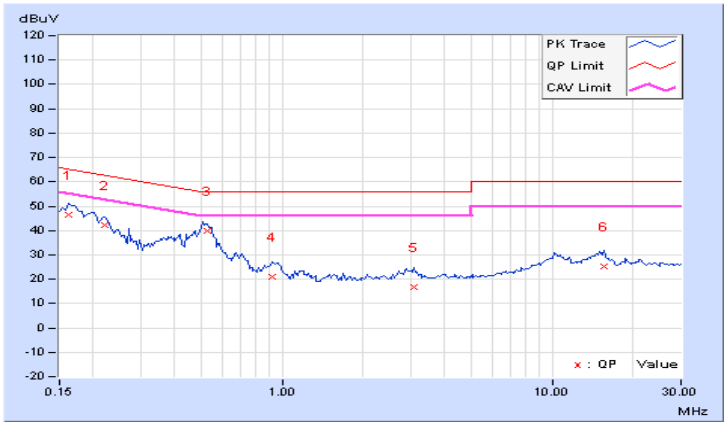


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode B		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.67	36.63	25.60	46.30	35.27	65.38	55.38	-19.08	-20.11
2	0.22031	9.67	32.71	25.58	42.38	35.25	62.81	52.81	-20.43	-17.56
3	0.52891	9.69	30.22	24.74	39.91	34.43	56.00	46.00	-16.09	-11.57
4	0.91953	9.71	11.13	4.77	20.84	14.48	56.00	46.00	-35.16	-31.52
5	3.06641	9.81	7.11	4.09	16.92	13.90	56.00	46.00	-39.08	-32.10
6	15.49609	10.01	15.02	9.30	25.03	19.31	60.00	50.00	-34.97	-30.69

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

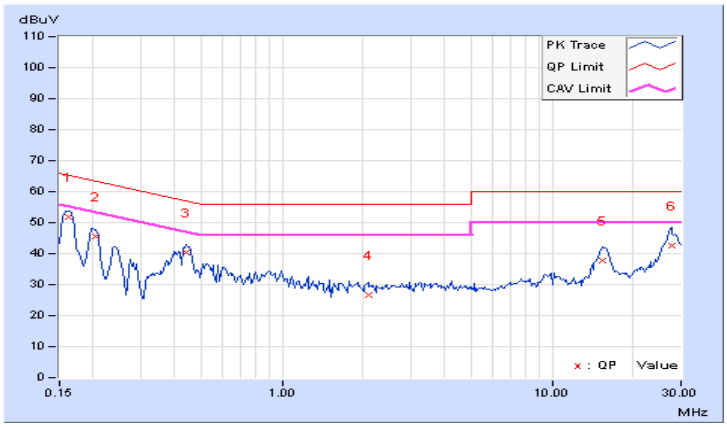


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode C		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.65	42.21	32.14	51.86	41.79	65.38	55.38	-13.52	-13.59
2	0.20469	9.65	36.08	25.35	45.73	35.00	63.42	53.42	-17.69	-18.42
3	0.43906	9.66	30.80	23.85	40.46	33.51	57.08	47.08	-16.62	-13.57
4	2.08203	9.74	16.94	8.12	26.68	17.86	56.00	46.00	-29.32	-28.14
5	15.36328	9.96	27.86	22.71	37.82	32.67	60.00	50.00	-22.18	-17.33
6	27.64063	10.12	32.47	26.43	42.59	36.55	60.00	50.00	-17.41	-13.45

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

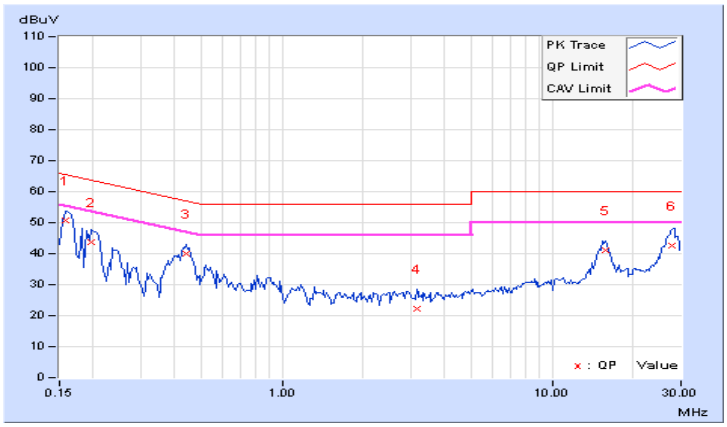


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode C		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.67	41.06	27.90	50.73	37.57	65.58	55.58	-14.85	-18.01
2	0.19687	9.67	33.93	20.96	43.60	30.63	63.74	53.74	-20.14	-23.11
3	0.43906	9.68	30.14	23.04	39.82	32.72	57.08	47.08	-17.26	-14.36
4	3.15234	9.81	12.49	4.61	22.30	14.42	56.00	46.00	-33.70	-31.58
5	15.86328	10.01	31.09	26.18	41.10	36.19	60.00	50.00	-18.90	-13.81
6	27.81641	10.11	32.40	27.67	42.51	37.78	60.00	50.00	-17.49	-12.22

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

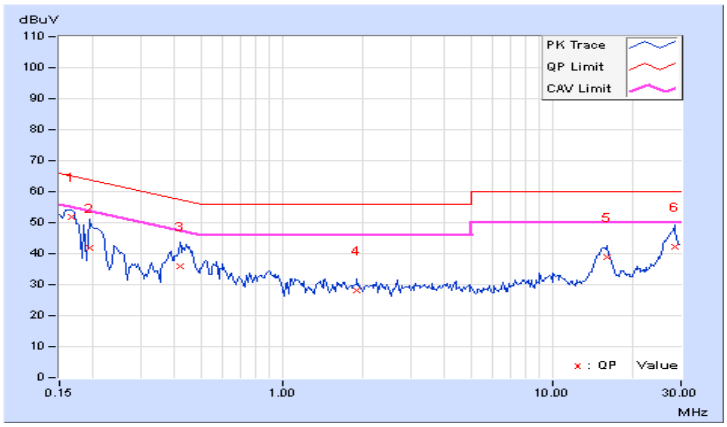


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode D		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	9.65	42.31	30.55	51.96	40.20	65.18	55.18	-13.22	-14.98
2	0.19297	9.65	32.11	16.95	41.76	26.60	63.91	53.91	-22.15	-27.31
3	0.41953	9.66	26.11	18.37	35.77	28.03	57.46	47.46	-21.69	-19.43
4	1.89844	9.74	18.23	10.54	27.97	20.28	56.00	46.00	-28.03	-25.72
5	15.92188	9.97	28.77	23.29	38.74	33.26	60.00	50.00	-21.26	-16.74
6	28.33203	10.13	32.02	27.25	42.15	37.38	60.00	50.00	-17.85	-12.62

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

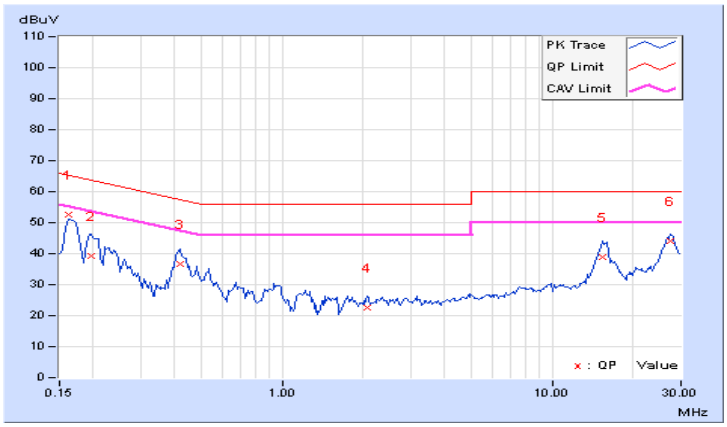


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode D		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.67	42.79	30.27	52.46	39.94	65.38	55.38	-12.92	-15.44
2	0.19687	9.67	29.50	18.25	39.17	27.92	63.74	53.74	-24.57	-25.82
3	0.41953	9.68	26.86	18.94	36.54	28.62	57.46	47.46	-20.92	-18.84
4	2.05859	9.75	12.74	1.47	22.49	11.22	56.00	46.00	-33.51	-34.78
5	15.36328	10.01	28.71	24.00	38.72	34.01	60.00	50.00	-21.28	-15.99
6	27.39453	10.11	34.12	28.26	44.23	38.37	60.00	50.00	-15.77	-11.63

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

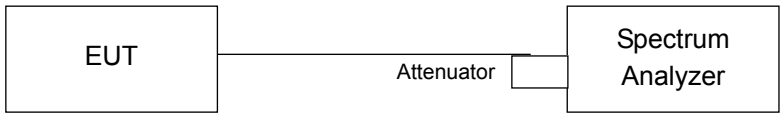


4.3 Number of Hopping Frequency Used

4.3.1 Limits of Hopping Frequency Used Measurement

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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.

4.3.5 Deviation fromTest Standard

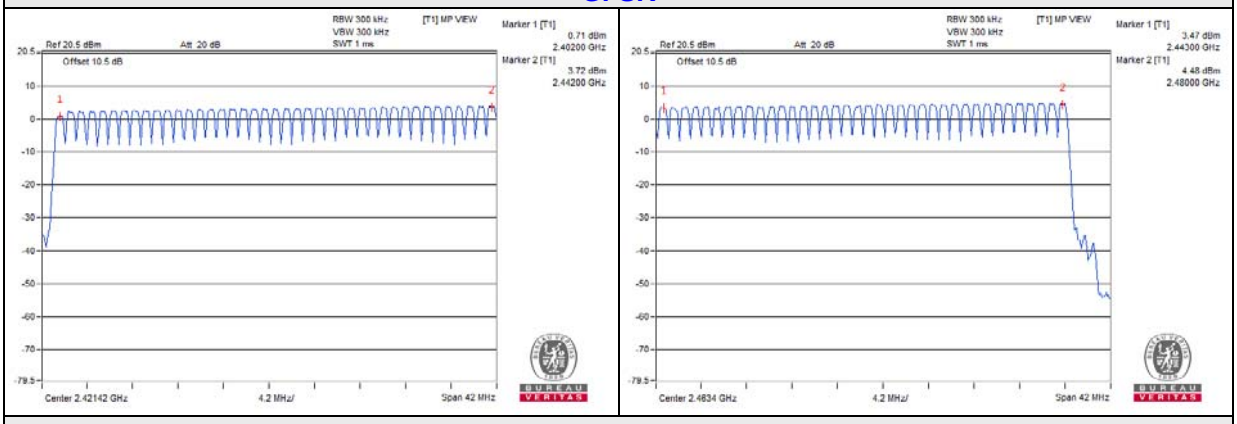
No deviation.

4.3.6 Test Results

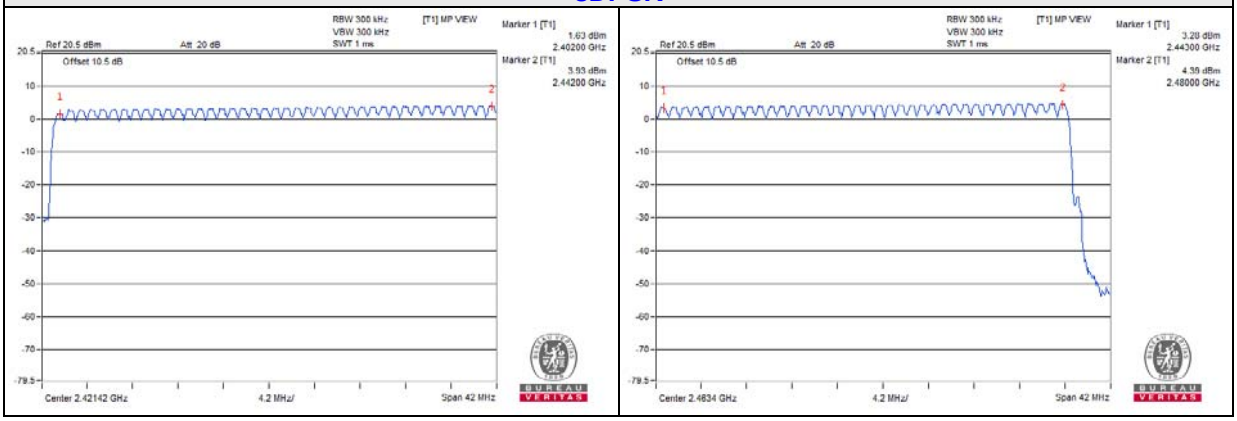
There are 79 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

Mode A & Mode B

GFSK



8DPSK

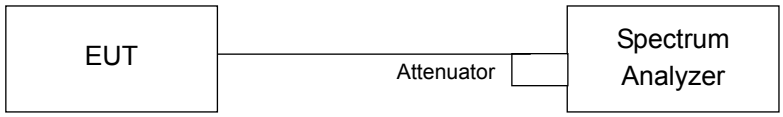


4.4 Dwell Time on Each Channel

4.4.1 Limits of Dwell Time on Each Channel Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 Test Results

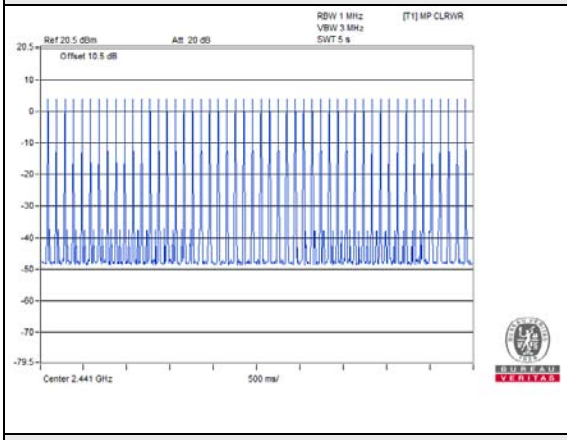
Mode A & Mode B

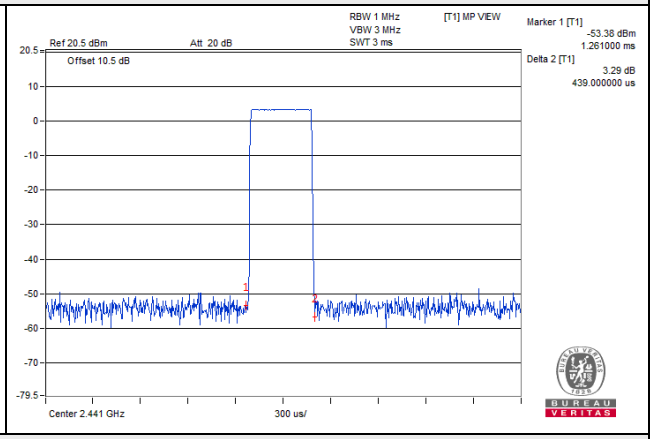
GFSK

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 = 316.00 times	0.439	138.72	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.681	265.6	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.986	320.82	400

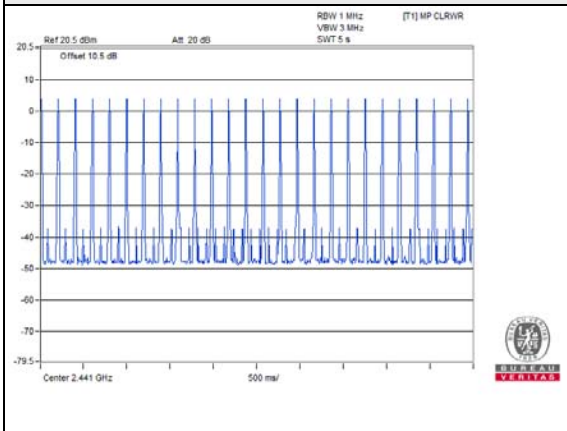
NOTE: Test plots of the transmitting time slot are shown on below.

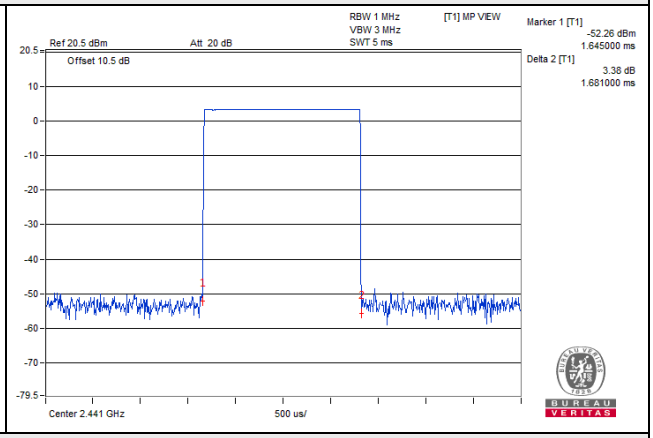
DH1



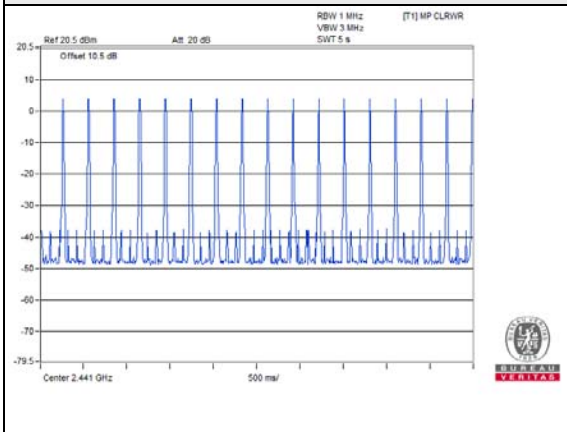


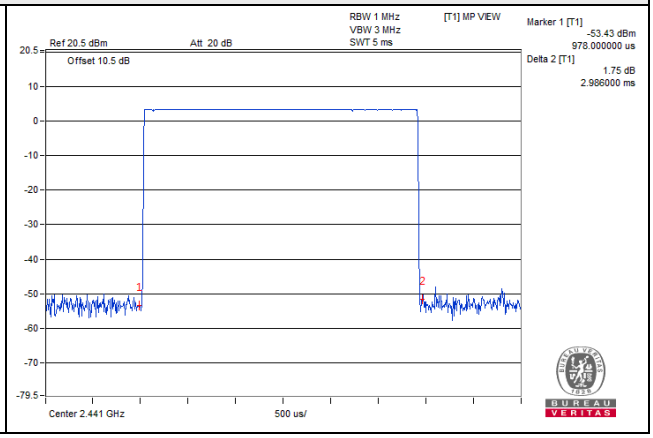
DH3





DH5



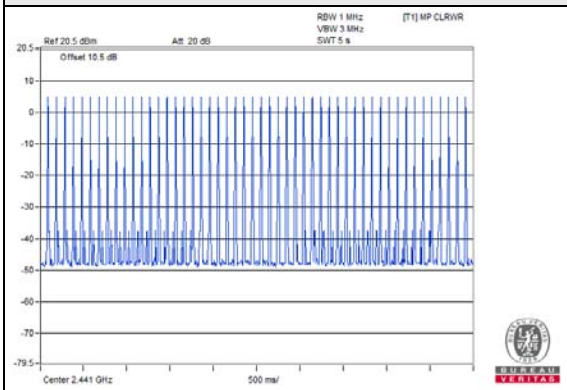


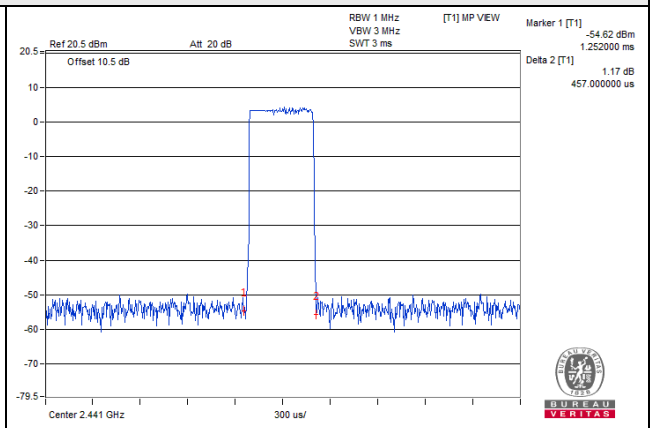
8DPSK

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 = 316.00 times	0.457	144.41	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.739	274.76	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.971	319.2	400

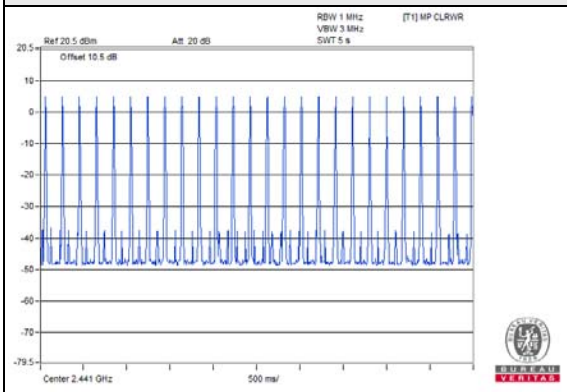
NOTE: Test plots of the transmitting time slot are shown on below.

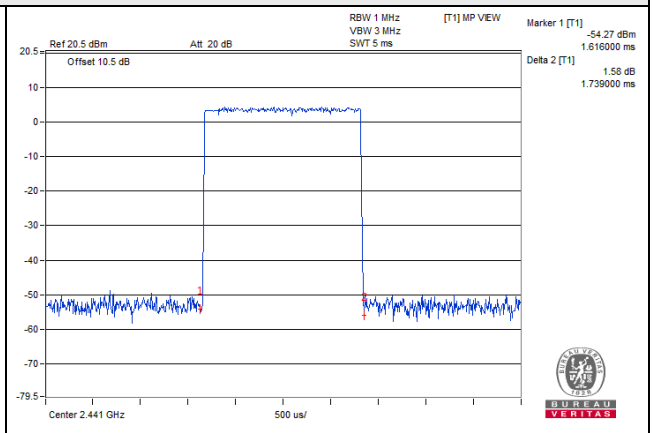
DH1



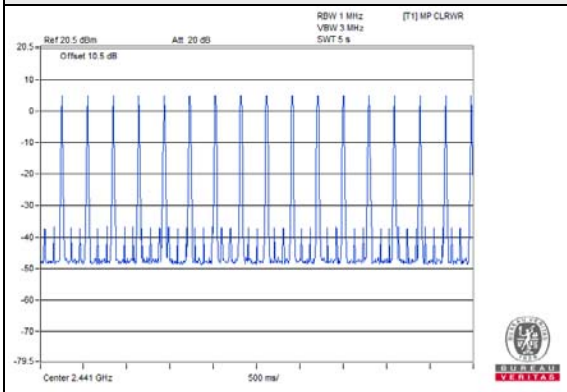


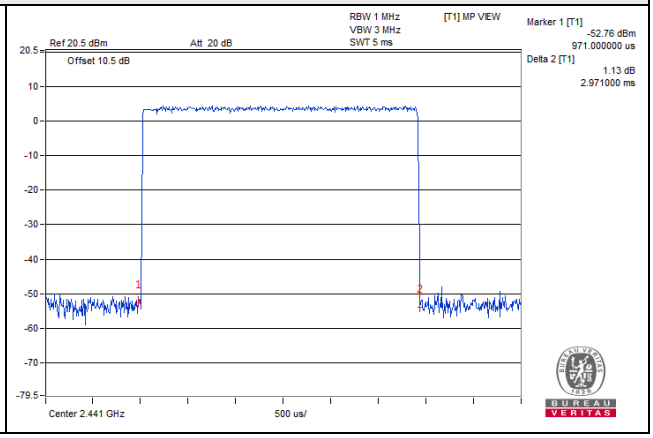
DH3





DH5



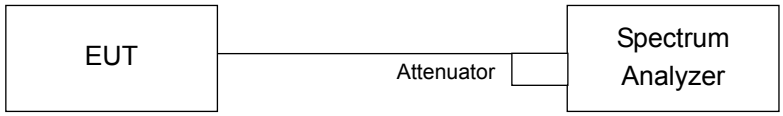


4.5 Channel Bandwidth

4.5.1 Limits of Channel Bandwidth Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
d. Repeat above procedures until all frequencies measured were complete.

4.5.5 Deviation from Test Standard

No deviation.

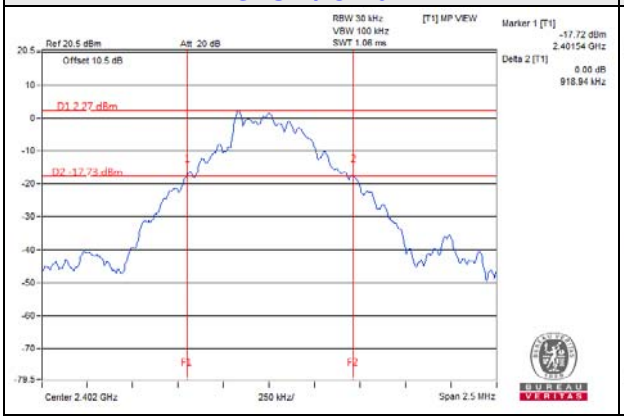
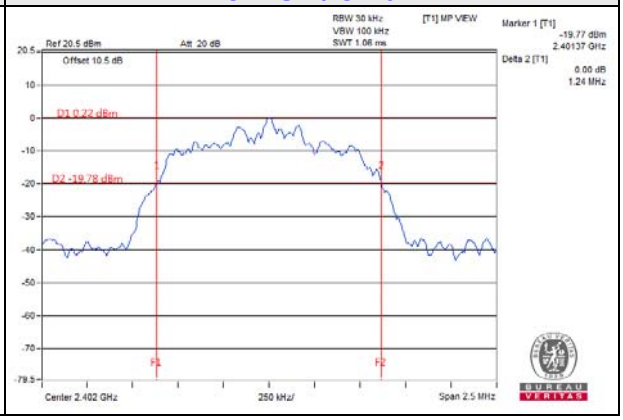
4.5.6 EUT Operating Condition

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

4.5.7 Test Results

Mode A & Mode B

CHANNEL	FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	
		GFSK	8DPSK
0	2402	0.91	1.24
39	2441	0.89	1.23
78	2480	0.88	1.24

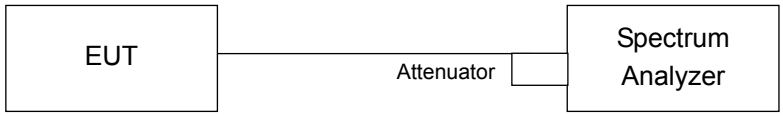
Spectrum Plot of Worst Value	
GFSK / CH 0	8DPSK / CH 0
	

4.6 Hopping Channel Separation

4.6.1 Limits of Hopping Channel Separation Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

Measurement Procedure REF

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.

4.6.5 Deviation from Test Standard

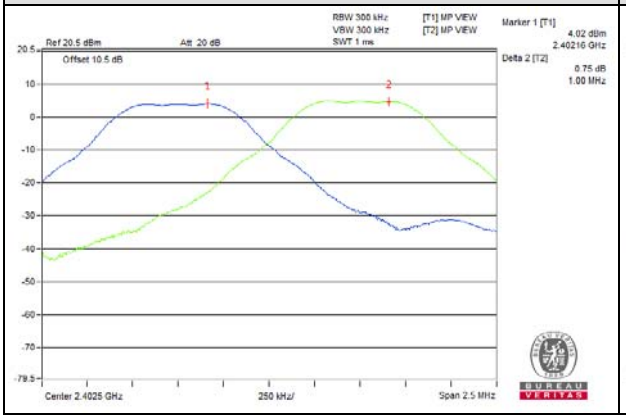
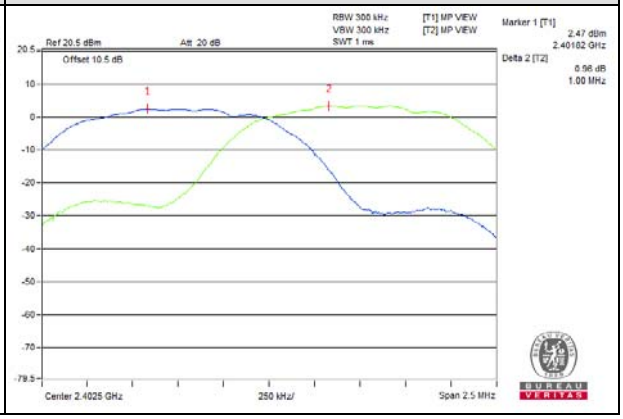
No deviation.

4.6.6 Test Results

Mode A & Mode B

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	0.91	1.24	0.61	0.83	Pass
39	2441	1.00	1.00	0.89	1.23	0.60	0.82	Pass
78	2480	1.00	1.00	0.88	1.24	0.59	0.83	Pass

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

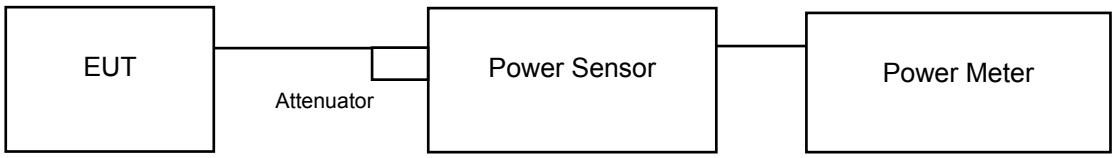
SPECTRUM PLOT OF WORST VALUE	
GFSK / CH 0	8DPSK / CH 0
	

4.7 Maximum Output Power

4.7.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125mW.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

Mode A & Mode B

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	3.048	2.113	4.84	3.25	125	Pass
39	2441	3.076	**3.097**	4.88	4.91	125	Pass
78	2480	3.062	3.083	4.86	4.89	125	Pass

4.8 Conducted Out of Band Emission Measurement

4.8.1 Limits of Conducted Out of Band Emission Measurement

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

4.8.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.8.3 Test Procedure

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

4.8.4 Deviation from Test Standard

No deviation.

4.8.5 EUT Operating Condition

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

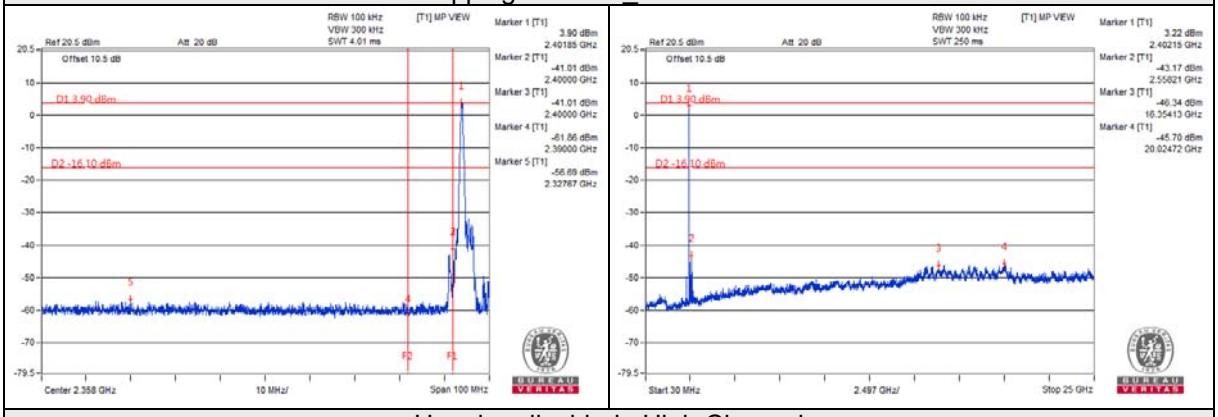
4.8.6 Test Results

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

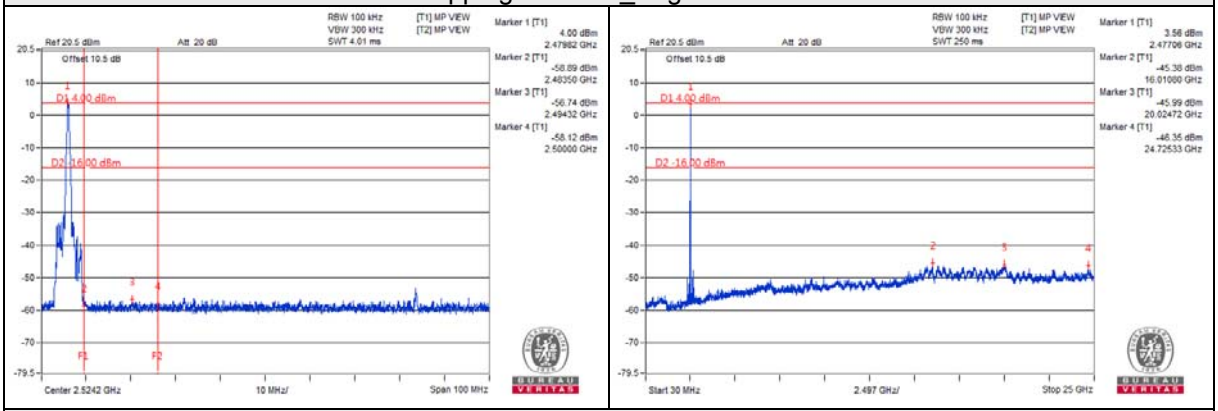
Mode A & Mode B

GFSK

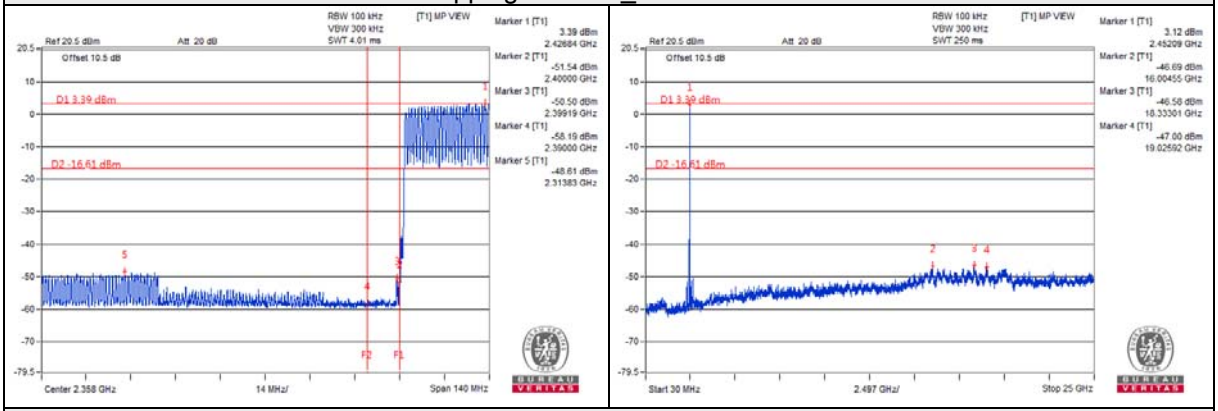
Hopping disabled_ Low Channel



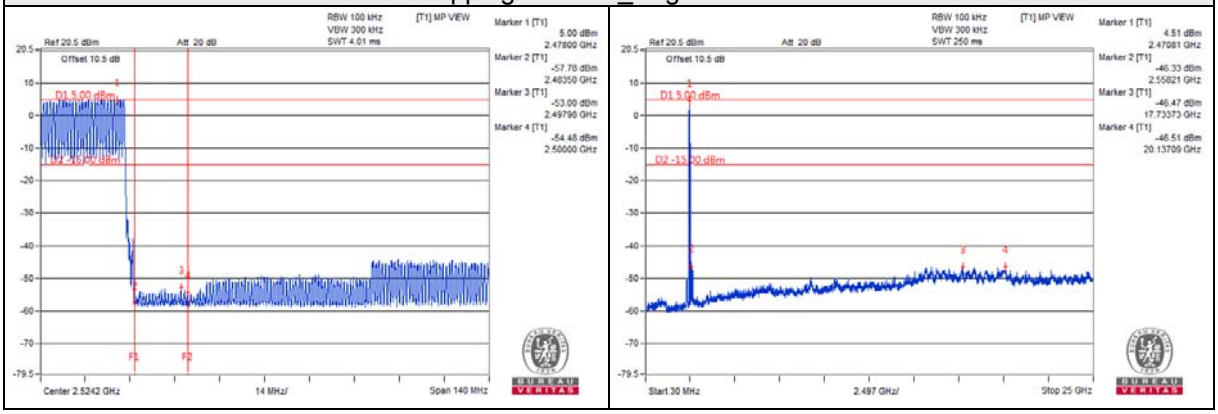
Hopping disabled_ High Channel



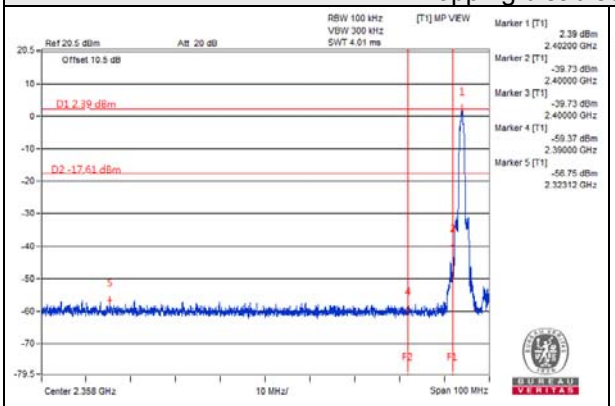
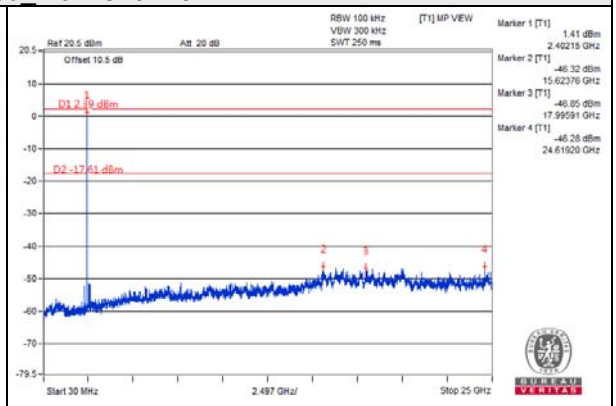
Hopping enabled_ Low Channel

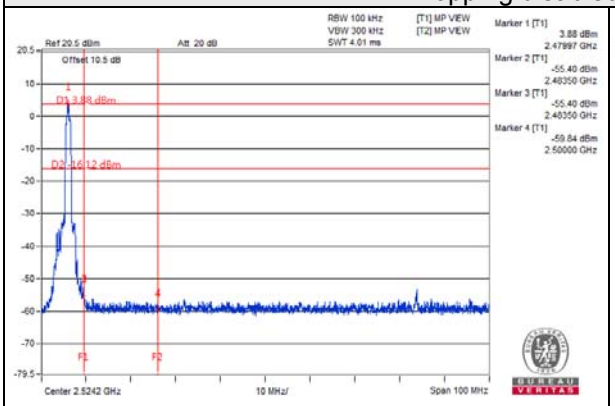
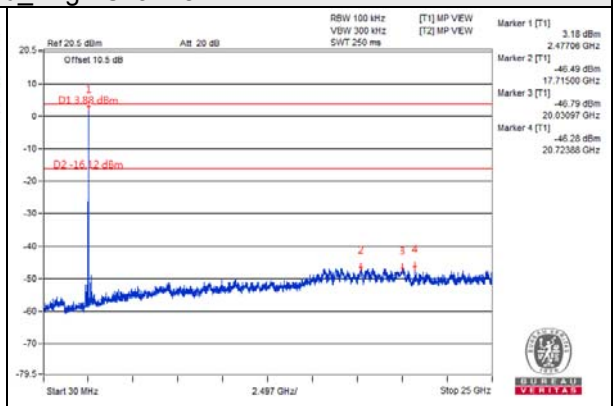


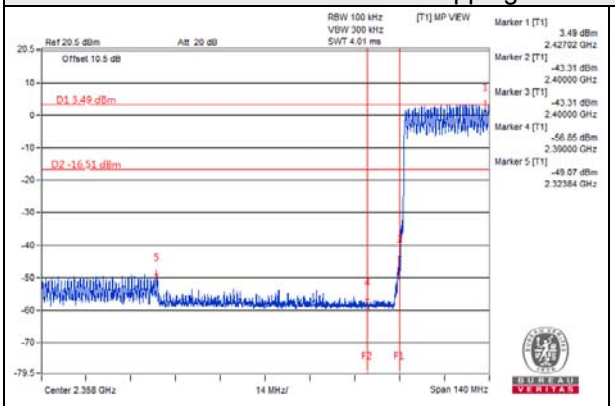
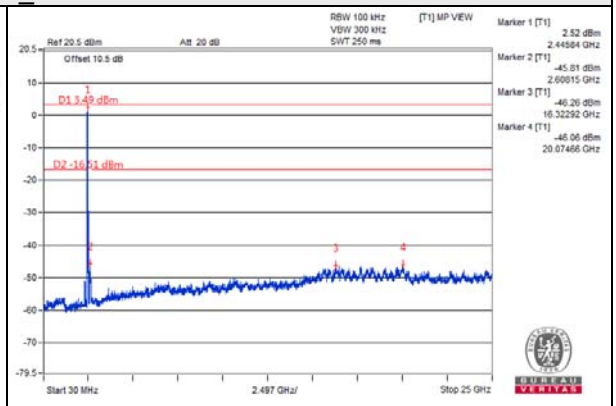
Hopping enabled_ High Channel

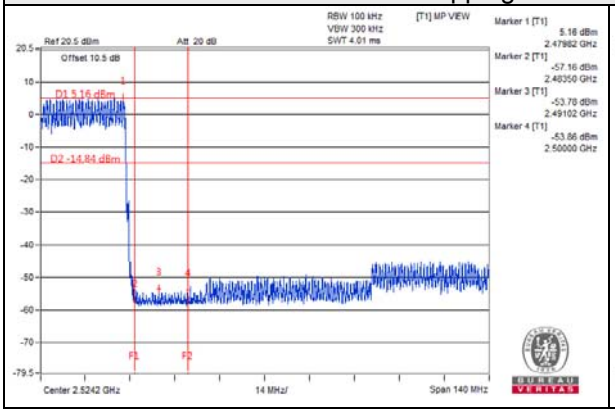
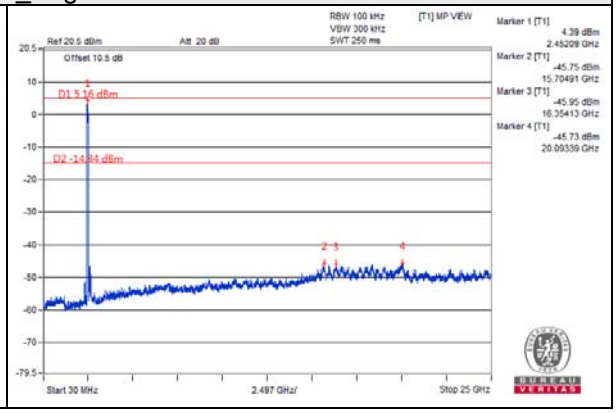


8DPSK

Hopping disabled_ Low Channel	
	

Hopping disabled_ High Channel	
	

Hopping enabled_ Low Channel	
	

Hopping enabled_ High Channel	
	

5 Pictures of Test Arrangements

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

Appendix – 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:

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

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