

FCC Test Report

Report No.: RF150519C24

FCC ID: E90-002ZEAL03

Test Model: ZEAL-S03, ZEAL-C03 (refer to item 3.1 for more details)

Received Date: May 19, 2015

Test Date: May 25 ~ May 31, 2015

Issued Date: Jun. 03, 2015

Applicant: ADC Technology Inc.

Address: Meishin Bldg. 1-20-19 Nishiki Naka-ku, Nagoya, Aichi, 460-0003 JAPAN

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.)

Test Location: No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



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**Release Control Record**

Issue No.	Description	Date Issued
RF150519C24	Original release	Jun. 03, 2015

1 Certificate of Conformity

Product: Bluetooth module

Brand: ADC Technology

Test Model: ZEAL-S03, ZEAL-C03 (refer to item 3.1 for more details)

Sample Status: Engineering sample

Applicant: ADC Technology Inc.

Test Date: May 25 ~ May 31, 2015

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2009

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 :


Maggie Wu / Specialist

Date:

Jun. 03, 2015

Approved by :


Ken Liu / Senior Manager

Date:

Jun. 03, 2015

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 -34.31dB at 0.38047MHz.
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	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.5dB at 112.01MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -17.5dB at 2400.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is U.FL-R-SMT[HIROSE] 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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Bluetooth module
Brand	ADC Technology
Test Model	ZEAL-S03, ZEAL-C03
Model Difference	Refer to note
Status of EUT	Engineering sample
Power Supply Rating	3.7Vdc from host equipment
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	1/2/3Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	79
Output Power	9.162mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Data Cable Supplied	NA

Note:

- The following models are provided to the EUT. All models are hardware and electrically identical, and the differences are listed as below.

Brand	Model	Difference
ADC Technology	ZEAL-S03	Software (High power setting) / Antenna type (Chip & Monopole)
	ZEAL-C03	Software (Low power setting) / Antenna type (Chip)

- The following antennas were provided to the EUT.

No.	Type	Gain(dBi)	Connector
1	Chip	2.5	NA
2	Monopole	2.14	U.FL-R-SMT[HIROSE]

- 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 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		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Model: ZEAL-S03 with chip antenna
B	√	√	√	-	Model: ZEAL-S03 with monopole antenna
C	√	-	-	√	Model: ZEAL-C03 with chip antenna

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

NOTE:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-" means no effect.

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, C	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A, B, C	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

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	0	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, B	0 to 78	0	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, C	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A, C	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	18deg. C, 70%RH	3.7Vdc	Nick Hsu
RE<1G	18deg. C, 70%RH	3.7Vdc	Nick Hsu
PLC	18deg. C, 70%RH	3.7Vdc	Nick Hsu
APCM	25deg. C, 60%RH	3.7Vdc	Nick Chen

3.3 Description of Support Units

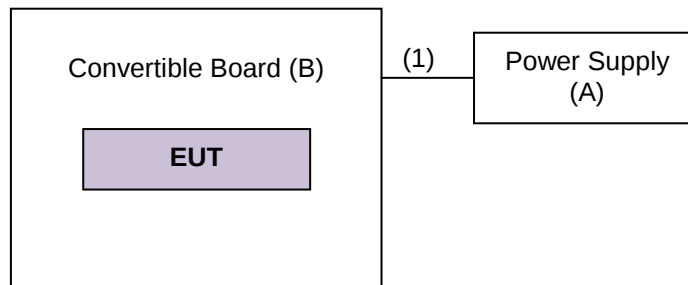
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Power Supply	TOP WARD	6306A	713585	NA	-
B.	Convertible Board	NA	NA	NA	NA	-

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	2	1	N	0	-

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specification of the EUT declared by the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

FCC Public Notice DA 00-705

ANSI C63.10-2009

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

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

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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Apr. 07, 2015	Apr. 06, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8447D	2944A10738	Oct.18, 2014	Oct. 17, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 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. The test was performed in HwaYa Chamber 3.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters 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 detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note:

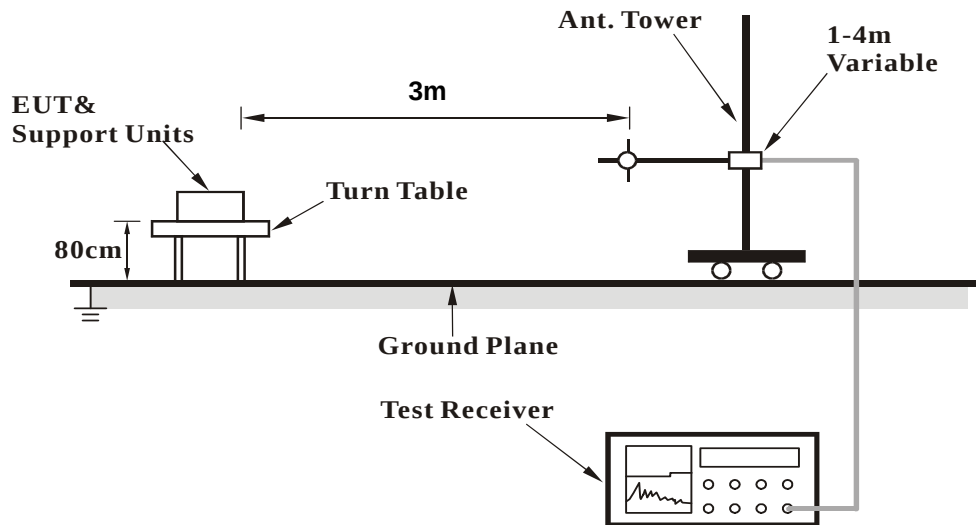
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. For Average measurement, due to the DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB, therefore Average value = peak reading + $20\log(\text{duty cycle})$.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

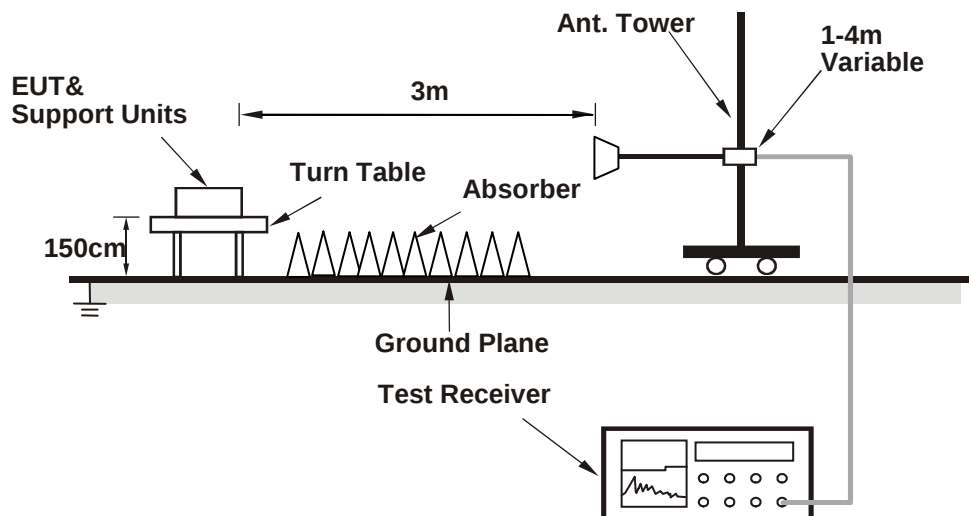
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1GHz Data:

GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	A		

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	2376.00	48.5 PK	74.0	-25.5	1.21 H	217	50.10	-1.60
2	2376.00	37.1 AV	54.0	-16.9	1.21 H	217	38.70	-1.60
3	#2400.00	47.9 PK	74.5	-26.6	1.19 H	217	49.50	-1.60
4	#2400.00	17.8 AV	44.4	-26.6	1.19 H	217	19.40	-1.60
5	*2402.00	94.5 PK			1.19 H	218	61.90	32.60
6	*2402.00	64.4 AV			1.19 H	218	31.80	32.60
7	4804.00	49.0 PK	74.0	-25.0	1.00 H	232	43.10	5.90
8	4804.00	18.9 AV	54.0	-35.1	1.00 H	232	13.00	5.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2376.00	47.9 PK	74.0	-26.1	1.03 V	78	49.50	-1.60
2	2376.00	36.4 AV	54.0	-17.6	1.03 V	78	38.00	-1.60
3	#2400.00	46.7 PK	73.0	-26.3	1.00 V	85	48.30	-1.60
4	#2400.00	16.6 AV	42.9	-26.3	1.00 V	85	18.20	-1.60
5	*2402.00	93.0 PK			1.00 V	85	60.40	32.60
6	*2402.00	62.9 AV			1.00 V	85	30.30	32.60
7	4804.00	51.6 PK	74.0	-22.4	1.08 V	150	45.70	5.90
8	4804.00	21.5 AV	54.0	-32.5	1.08 V	150	15.60	5.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– 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 worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
7. Average value = peak reading + $20\log(\text{duty cycle})$
8. "#":The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	A		

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	97.2 PK			1.02 H	220	64.50	32.70
2	*2441.00	67.1 AV			1.02 H	220	34.40	32.70
3	4882.00	49.8 PK	74.0	-24.2	1.00 H	230	44.00	5.80
4	4882.00	19.7 AV	54.0	-34.3	1.00 H	230	13.90	5.80
5	7323.00	55.2 PK	74.0	-18.8	1.11 H	71	43.50	11.70
6	7323.00	25.1 AV	54.0	-28.9	1.11 H	71	13.40	11.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	94.7 PK			1.00 V	85	62.00	32.70
2	*2441.00	64.6 AV			1.00 V	85	31.90	32.70
3	4882.00	53.5 PK	74.0	-20.5	1.55 V	134	47.70	5.80
4	4882.00	23.4 AV	54.0	-30.6	1.55 V	134	17.60	5.80
5	7323.00	55.3 PK	74.0	-18.7	1.10 V	129	43.60	11.70
6	7323.00	25.2 AV	54.0	-28.8	1.10 V	129	13.50	11.70

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * *: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	A		

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	96.4 PK			1.01 H	221	63.70	32.70
2	*2480.00	66.3 AV			1.01 H	221	33.60	32.70
3	2483.50	47.2 PK	74.0	-26.8	1.01 H	221	48.70	-1.50
4	2483.50	17.1 AV	54.0	-36.9	1.01 H	221	18.60	-1.50
5	4960.00	51.4 PK	74.0	-22.6	1.00 H	228	45.30	6.10
6	4960.00	21.3 AV	54.0	-32.7	1.00 H	228	15.20	6.10
7	7440.00	55.4 PK	74.0	-18.6	1.11 H	81	43.60	11.80
8	7440.00	25.3 AV	54.0	-28.7	1.11 H	81	13.50	11.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	92.9 PK			1.00 V	86	60.20	32.70
2	*2480.00	62.8 AV			1.00 V	86	30.10	32.70
3	2483.50	44.7 PK	74.0	-29.3	1.00 V	86	46.20	-1.50
4	2483.50	14.6 AV	54.0	-39.4	1.00 V	86	16.10	-1.50
5	4960.00	54.5 PK	74.0	-19.5	1.60 V	133	48.40	6.10
6	4960.00	24.4 AV	54.0	-29.6	1.60 V	133	18.30	6.10
7	7440.00	56.6 PK	74.0	-17.4	1.16 V	132	44.80	11.80
8	7440.00	26.5 AV	54.0	-27.5	1.16 V	132	14.70	11.80

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * *: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	A		

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	48.0 PK	74.0	-26.0	1.10 H	228	49.60	-1.60
2	2390.00	36.0 AV	54.0	-18.0	1.10 H	228	37.60	-1.60
3	#2400.00	46.8 PK	72.9	-26.1	1.00 H	243	48.40	-1.60
4	#2400.00	16.7 AV	42.8	-26.1	1.00 H	243	18.30	-1.60
5	*2402.00	92.9 PK			1.01 H	243	60.30	32.60
6	*2402.00	62.8 AV			1.01 H	243	30.20	32.60
7	4804.00	49.0 PK	74.0	-25.0	1.55 H	109	43.10	5.90
8	4804.00	18.9 AV	54.0	-35.1	1.55 H	109	13.00	5.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	48.0 PK	74.0	-26.0	1.07 V	97	49.60	-1.60
2	2390.00	36.1 AV	54.0	-17.9	1.07 V	97	37.70	-1.60
3	#2400.00	45.0 PK	71.4	-26.4	1.00 V	83	46.60	-1.60
4	#2400.00	14.9 AV	41.3	-26.4	1.00 V	83	16.50	-1.60
5	*2402.00	91.4 PK			1.00 V	83	58.80	32.60
6	*2402.00	61.3 AV			1.00 V	83	28.70	32.60
7	4804.00	49.9 PK	74.0	-24.1	1.00 V	148	44.00	5.90
8	4804.00	19.8 AV	54.0	-34.2	1.00 V	148	13.90	5.90

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- "*": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
- Average value = peak reading + $20\log(\text{duty cycle})$
- "#": The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	A		

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	95.1 PK			1.03 H	220	62.40	32.70
2	*2441.00	65.0 AV			1.03 H	220	32.30	32.70
3	4882.00	49.4 PK	74.0	-24.6	1.07 H	229	43.60	5.80
4	4882.00	19.3 AV	54.0	-34.7	1.07 H	229	13.50	5.80
5	7323.00	53.2 PK	74.0	-20.8	1.15 H	80	41.50	11.70
6	7323.00	23.1 AV	54.0	-30.9	1.15 H	80	11.40	11.70
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	92.6 PK			1.00 V	86	59.90	32.70
2	*2441.00	62.5 AV			1.00 V	86	29.80	32.70
3	4882.00	52.9 PK	74.0	-21.1	1.62 V	131	47.10	5.80
4	4882.00	22.8 AV	54.0	-31.2	1.62 V	131	17.00	5.80
5	7323.00	54.3 PK	74.0	-19.7	1.03 V	128	42.60	11.70
6	7323.00	24.2 AV	54.0	-29.8	1.03 V	128	12.50	11.70

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	A		

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	93.1 PK			1.00 H	216	60.40	32.70
2	*2480.00	63.0 AV			1.00 H	216	30.30	32.70
3	2483.50	45.4 PK	74.0	-28.6	1.00 H	216	46.90	-1.50
4	2483.50	15.3 AV	54.0	-38.7	1.00 H	216	16.80	-1.50
5	4960.00	49.4 PK	74.0	-24.6	1.06 H	226	43.30	6.10
6	4960.00	19.3 AV	54.0	-34.7	1.06 H	226	13.20	6.10
7	7440.00	52.8 PK	74.0	-21.2	1.06 H	90	41.00	11.80
8	7440.00	22.7 AV	54.0	-31.3	1.06 H	90	10.90	11.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.8 PK			1.00 V	88	58.10	32.70
2	*2480.00	60.7 AV			1.00 V	88	28.00	32.70
3	2483.50	43.4 PK	74.0	-30.6	1.00 V	88	44.90	-1.50
4	2483.50	13.3 AV	54.0	-40.7	1.00 V	88	14.80	-1.50
5	4960.00	53.2 PK	74.0	-20.8	1.71 V	132	47.10	6.10
6	4960.00	23.1 AV	54.0	-30.9	1.71 V	132	17.00	6.10
7	7440.00	53.7 PK	74.0	-20.3	1.17 V	129	41.90	11.80
8	7440.00	23.6 AV	54.0	-30.4	1.17 V	129	11.80	11.80

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * “: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	B		

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	2376.00	48.2 PK	74.0	-25.8	1.64 H	110	49.80	-1.60
2	2376.00	38.9 AV	54.0	-15.1	1.64 H	110	40.50	-1.60
3	#2400.00	48.9 PK	78.0	-29.1	1.63 H	112	50.50	-1.60
4	#2400.00	18.8 AV	47.9	-29.1	1.63 H	112	20.40	-1.60
5	*2402.00	98.0 PK			1.63 H	112	65.40	32.60
6	*2402.00	67.9 AV			1.63 H	112	35.30	32.60
7	4804.00	57.7 PK	74.0	-16.3	1.61 H	49	51.80	5.90
8	4804.00	27.6 AV	54.0	-26.4	1.61 H	49	21.70	5.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2376.00	50.6 PK	74.0	-23.4	1.58 V	110	52.20	-1.60
2	2376.00	43.2 AV	54.0	-10.8	1.58 V	110	44.80	-1.60
3	#2400.00	53.4 PK	85.5	-32.1	1.59 V	182	55.00	-1.60
4	#2400.00	23.3 AV	55.4	-32.1	1.59 V	182	24.90	-1.60
5	*2402.00	105.5 PK			1.59 V	182	72.90	32.60
6	*2402.00	75.4 AV			1.59 V	182	42.80	32.60
7	4804.00	58.8 PK	74.0	-15.2	1.59 V	129	52.90	5.90
8	4804.00	28.7 AV	54.0	-25.3	1.59 V	129	22.80	5.90

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- "*": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
- Average value = peak reading + $20\log(\text{duty cycle})$
- "#": The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	B		

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	99.3 PK			1.60 H	113	66.60	32.70
2	*2441.00	69.2 AV			1.60 H	113	36.50	32.70
3	4882.00	56.7 PK	74.0	-17.3	1.59 H	56	50.90	5.80
4	4882.00	26.6 AV	54.0	-27.4	1.59 H	56	20.80	5.80
5	7323.00	56.0 PK	74.0	-18.0	1.32 H	88	44.30	11.70
6	7323.00	25.9 AV	54.0	-28.1	1.32 H	88	14.20	11.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	104.1 PK			1.75 V	198	71.40	32.70
2	*2441.00	74.0 AV			1.75 V	198	41.30	32.70
3	4882.00	58.3 PK	74.0	-15.7	1.43 V	41	52.50	5.80
4	4882.00	28.2 AV	54.0	-25.8	1.43 V	41	22.40	5.80
5	7323.00	54.9 PK	74.0	-19.1	1.00 V	132	43.20	11.70
6	7323.00	24.8 AV	54.0	-29.2	1.00 V	132	13.10	11.70

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * *: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	B		

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	100.7 PK			1.59 H	85	68.00	32.70
2	*2480.00	70.6 AV			1.59 H	85	37.90	32.70
3	2483.50	50.6 PK	74.0	-23.4	1.59 H	85	52.10	-1.50
4	2483.50	20.5 AV	54.0	-33.5	1.59 H	85	22.00	-1.50
5	4960.00	56.6 PK	74.0	-17.4	1.60 H	49	50.50	6.10
6	4960.00	26.5 AV	54.0	-27.5	1.60 H	49	20.40	6.10
7	7440.00	54.9 PK	74.0	-19.1	1.00 H	82	43.10	11.80
8	7440.00	24.8 AV	54.0	-29.2	1.00 H	82	13.00	11.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	106.1 PK			1.79 V	116	73.40	32.70
2	*2480.00	76.0 AV			1.79 V	116	43.30	32.70
3	2483.50	54.4 PK	74.0	-19.6	1.79 V	116	55.90	-1.50
4	2483.50	24.2 AV	54.0	-29.8	1.79 V	116	25.70	-1.50
5	4960.00	57.9 PK	74.0	-16.1	1.36 V	127	51.80	6.10
6	4960.00	27.8 AV	54.0	-26.2	1.36 V	127	21.70	6.10
7	7440.00	54.5 PK	74.0	-19.5	1.40 V	119	42.70	11.80
8	7440.00	24.4 AV	54.0	-29.6	1.40 V	119	12.60	11.80

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * “: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	B		

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	2376.00	48.8 PK	74.0	-25.2	1.65 H	109	50.40	-1.60
2	2376.00	37.7 AV	54.0	-16.3	1.65 H	109	39.30	-1.60
3	#2400.00	44.0 PK	70.8	-26.8	1.48 H	115	45.60	-1.60
4	#2400.00	13.9 AV	40.7	-26.8	1.48 H	115	15.50	-1.60
5	*2402.00	90.8 PK			1.48 H	115	58.20	32.60
6	*2402.00	60.7 AV			1.48 H	115	28.10	32.60
7	4804.00	57.2 PK	74.0	-16.8	1.44 H	93	51.30	5.90
8	4804.00	27.1 AV	54.0	-26.9	1.44 H	93	21.20	5.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2376.00	48.8 PK	74.0	-25.2	1.11 V	146	50.40	-1.60
2	2376.00	37.3 AV	54.0	-16.7	1.11 V	146	38.90	-1.60
3	#2400.00	54.7 PK	81.3	-26.6	1.12 V	149	56.30	-1.60
4	#2400.00	24.6 AV	51.2	-26.6	1.12 V	149	26.20	-1.60
5	*2402.00	101.3 PK			1.12 V	149	68.70	32.60
6	*2402.00	71.2 AV			1.12 V	149	38.60	32.60
7	4804.00	56.2 PK	74.0	-17.8	1.60 V	138	50.30	5.90
8	4804.00	26.1 AV	54.0	-27.9	1.60 V	138	20.20	5.90

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- "*": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$
- "#": The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	B		

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	93.0 PK			1.61 H	161	60.30	32.70
2	*2441.00	62.9 AV			1.61 H	161	30.20	32.70
3	4882.00	56.5 PK	74.0	-17.5	1.59 H	102	50.70	5.80
4	4882.00	26.4 AV	54.0	-27.6	1.59 H	102	20.60	5.80
5	7323.00	54.9 PK	74.0	-19.1	1.11 H	111	43.20	11.70
6	7323.00	24.8 AV	54.0	-29.2	1.11 H	111	13.10	11.70
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	103.1 PK			1.24 V	148	70.40	32.70
2	*2441.00	73.0 AV			1.24 V	148	40.30	32.70
3	4882.00	58.7 PK	74.0	-15.3	1.66 V	128	52.90	5.80
4	4882.00	28.6 AV	54.0	-25.4	1.66 V	128	22.80	5.80
5	7323.00	54.1 PK	74.0	-19.9	1.00 V	235	42.40	11.70
6	7323.00	24.0 AV	54.0	-30.0	1.00 V	235	12.30	11.70

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * *: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	88.7 PK			1.52 H	202	56.00	32.70
2	*2480.00	58.6 AV			1.52 H	202	25.90	32.70
3	2483.50	44.2 PK	74.0	-29.8	1.52 H	202	45.70	-1.50
4	2483.50	14.1 AV	54.0	-39.9	1.52 H	202	15.60	-1.50
5	4960.00	55.5 PK	74.0	-18.5	1.28 H	105	49.40	6.10
6	4960.00	25.4 AV	54.0	-28.6	1.28 H	105	19.30	6.10
7	7440.00	52.5 PK	74.0	-21.5	1.25 H	35	40.70	11.80
8	7440.00	22.4 AV	54.0	-31.6	1.25 H	35	10.60	11.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	104.4 PK			1.98 V	115	71.70	32.70
2	*2480.00	74.3 AV			1.98 V	115	41.60	32.70
3	2483.50	52.4 PK	74.0	-21.6	1.98 V	115	53.90	-1.50
4	2483.50	22.3 AV	54.0	-31.7	1.98 V	115	23.80	-1.50
5	4960.00	56.6 PK	74.0	-17.4	1.62 V	131	50.50	6.10
6	4960.00	26.5 AV	54.0	-27.5	1.62 V	131	20.40	6.10
7	7440.00	52.9 PK	74.0	-21.1	1.37 V	267	41.10	11.80
8	7440.00	22.8 AV	54.0	-31.2	1.37 V	267	11.00	11.80

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * *: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	C		

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	47.8 PK	74.0	-26.2	1.13 H	251	49.40	-1.60
2	2390.00	35.8 AV	54.0	-18.2	1.13 H	251	37.40	-1.60
3	#2400.00	42.5 PK	64.1	-21.6	1.04 H	236	44.10	-1.60
4	#2400.00	12.4 AV	34.0	-21.6	1.04 H	236	14.00	-1.60
5	*2402.00	84.1 PK			1.03 H	237	51.50	32.60
6	*2402.00	54.0 AV			1.03 H	237	21.40	32.60
7	4804.00	47.4 PK	74.0	-26.6	1.43 H	132	41.50	5.90
8	4804.00	17.3 AV	54.0	-36.7	1.43 H	132	11.40	5.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	48.3 PK	74.0	-25.7	1.13 V	127	49.90	-1.60
2	2390.00	36.2 AV	54.0	-17.8	1.13 V	127	37.80	-1.60
3	#2400.00	43.1 PK	65.4	-22.3	1.00 V	111	44.70	-1.60
4	#2400.00	13.0 AV	35.3	-22.3	1.00 V	111	14.60	-1.60
5	*2402.00	85.4 PK			1.00 V	111	52.80	32.60
6	*2402.00	55.3 AV			1.00 V	111	22.70	32.60
7	4804.00	48.1 PK	74.0	-25.9	1.63 V	155	42.20	5.90
8	4804.00	18.0 AV	54.0	-36.0	1.63 V	155	12.10	5.90

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- "*": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
- Average value = peak reading + $20\log(\text{duty cycle})$
- "#": The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	C		

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	87.2 PK			1.01 H	236	54.50	32.70
2	*2441.00	57.1 AV			1.01 H	236	24.40	32.70
3	4882.00	46.2 PK	74.0	-27.8	1.00 H	249	40.40	5.80
4	4882.00	16.1 AV	54.0	-37.9	1.00 H	249	10.30	5.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	88.7 PK			1.00 V	81	56.00	32.70
2	*2441.00	58.6 AV			1.00 V	81	25.90	32.70
3	4882.00	48.9 PK	74.0	-25.1	1.64 V	139	43.10	5.80
4	4882.00	18.8 AV	54.0	-35.2	1.64 V	139	13.00	5.80

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	C		

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	82.8 PK			1.00 H	235	50.10	32.70
2	*2480.00	52.7 AV			1.00 H	235	20.00	32.70
3	2483.50	42.9 PK	74.0	-31.1	1.00 H	235	44.40	-1.50
4	2483.50	12.8 AV	54.0	-41.2	1.00 H	235	14.30	-1.50
5	4960.00	47.9 PK	74.0	-26.1	1.07 H	79	41.80	6.10
6	4960.00	17.8 AV	54.0	-36.2	1.07 H	79	11.70	6.10
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	84.0 PK			1.00 V	82	51.30	32.70
2	*2480.00	53.9 AV			1.00 V	82	21.20	32.70
3	2483.50	43.0 PK	74.0	-31.0	1.00 V	82	44.50	-1.50
4	2483.50	12.8 AV	54.0	-41.2	1.00 V	82	14.30	-1.50
5	4960.00	50.2 PK	74.0	-23.8	1.70 V	162	44.10	6.10
6	4960.00	20.1 AV	54.0	-33.9	1.70 V	162	14.00	6.10

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * *: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	C		

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	48.6 PK	74.0	-25.4	1.31 H	232	50.20	-1.60
2	2390.00	36.3 AV	54.0	-17.7	1.31 H	232	37.90	-1.60
3	#2400.00	43.4 PK	61.0	-17.6	1.18 H	216	45.00	-1.60
4	#2400.00	13.3 AV	30.8	-17.5	1.18 H	216	14.90	-1.60
5	*2402.00	81.0 PK			1.18 H	216	48.40	32.60
6	*2402.00	50.9 AV			1.18 H	216	18.30	32.60
7	4804.00	47.1 PK	74.0	-26.9	1.72 H	77	41.20	5.90
8	4804.00	17.0 AV	54.0	-37.0	1.72 H	77	11.10	5.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	48.4 PK	74.0	-25.6	1.16 V	97	50.00	-1.60
2	2390.00	36.2 AV	54.0	-17.8	1.16 V	97	37.80	-1.60
3	#2400.00	43.0 PK	63.8	-20.8	1.30 V	112	44.60	-1.60
4	#2400.00	12.9 AV	33.7	-20.8	1.30 V	112	14.50	-1.60
5	*2402.00	83.8 PK			1.30 V	112	51.20	32.60
6	*2402.00	53.7 AV			1.30 V	112	21.10	32.60
7	4804.00	47.3 PK	74.0	-26.7	1.64 V	160	41.40	5.90
8	4804.00	17.2 AV	54.0	-36.8	1.64 V	160	11.30	5.90

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- "*": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
- Average value = peak reading + $20\log(\text{duty cycle})$
- "#": The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	C		

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	85.1 PK			1.00 H	236	52.40	32.70
2	*2441.00	55.0 AV			1.00 H	236	22.30	32.70
3	4882.00	47.3 PK	74.0	-26.7	1.39 H	64	41.50	5.80
4	4882.00	17.2 AV	54.0	-36.8	1.39 H	64	11.40	5.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	86.6 PK			1.28 V	111	53.90	32.70
2	*2441.00	56.5 AV			1.28 V	111	23.80	32.70
3	4882.00	48.2 PK	74.0	-25.8	1.51 V	155	42.40	5.80
4	4882.00	18.1 AV	54.0	-35.9	1.51 V	155	12.30	5.80

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		
TEST MODE	C		

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	82.4 PK			1.00 H	233	49.70	32.70
2	*2480.00	52.3 AV			1.00 H	233	19.60	32.70
3	2483.50	43.0 PK	74.0	-31.0	1.00 H	233	44.50	-1.50
4	2483.50	12.9 AV	54.0	-41.1	1.00 H	233	14.40	-1.50
5	4960.00	48.2 PK	74.0	-25.8	1.31 H	64	42.10	6.10
6	4960.00	18.1 AV	54.0	-35.9	1.31 H	64	12.00	6.10
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	86.6 PK			1.25 V	114	53.90	32.70
2	*2480.00	56.5 AV			1.25 V	114	23.80	32.70
3	2483.50	45.5 PK	74.0	-28.5	1.25 V	114	47.00	-1.50
4	2483.50	15.4 AV	54.0	-38.6	1.25 V	114	16.90	-1.50
5	4960.00	48.7 PK	74.0	-25.3	1.61 V	123	42.60	6.10
6	4960.00	18.6 AV	54.0	-35.4	1.61 V	123	12.50	6.10

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- * *: Fundamental frequency.
- The DH5 packet was the worst case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
- Average value = peak reading + $20\log(\text{duty cycle})$

BELOW 1GHz WORST-CASE DATA: GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	A		

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	57.12	30.2 QP	40.0	-9.8	1.51 H	12	44.80	-14.60
2	119.34	27.1 QP	43.5	-16.4	1.51 H	91	43.80	-16.70
3	144.61	33.1 QP	43.5	-10.4	1.01 H	203	47.50	-14.40
4	171.83	23.7 QP	43.5	-19.8	1.51 H	323	38.10	-14.40
5	179.61	23.0 QP	43.5	-20.5	1.51 H	96	38.20	-15.20
6	379.87	18.9 QP	46.0	-27.1	1.01 H	299	29.80	-10.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	23.3 QP	40.0	-16.7	1.49 V	119	37.90	-14.60
2	74.62	17.0 QP	40.0	-23.0	2.00 V	235	34.30	-17.30
3	119.34	24.2 QP	43.5	-19.3	1.49 V	178	40.90	-16.70
4	144.61	24.2 QP	43.5	-19.3	1.49 V	16	38.60	-14.40
5	171.83	19.5 QP	43.5	-24.0	1.00 V	13	33.90	-14.40
6	523.75	23.1 QP	46.0	-22.9	1.49 V	83	31.00	-7.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	B		

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	57.12	32.0 QP	40.0	-8.0	1.99 H	133	46.60	-14.60
2	112.01	42.0 QP	43.5	-1.5	1.46 H	98	59.30	-17.30
3	148.50	37.7 QP	43.5	-5.8	1.99 H	17	51.70	-14.00
4	171.83	37.9 QP	43.5	-5.6	1.50 H	279	52.30	-14.40
5	216.55	24.1 QP	46.0	-21.9	1.50 H	68	40.50	-16.40
6	521.81	29.2 QP	46.0	-16.8	1.00 H	328	37.20	-8.00
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	59.06	24.0 QP	40.0	-16.0	1.00 V	14	38.50	-14.50
2	111.56	39.6 QP	43.5	-3.9	1.00 V	77	56.90	-17.30
3	119.34	37.1 QP	43.5	-6.4	1.00 V	67	53.80	-16.70
4	148.50	30.8 QP	43.5	-12.7	1.00 V	5	44.80	-14.00
5	171.83	31.6 QP	43.5	-11.9	1.00 V	84	46.00	-14.40
6	216.55	22.6 QP	46.0	-23.4	1.00 V	322	39.00	-16.40

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- 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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2014	Dec. 29, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 10, 2014	Jul. 09, 2015
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 HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

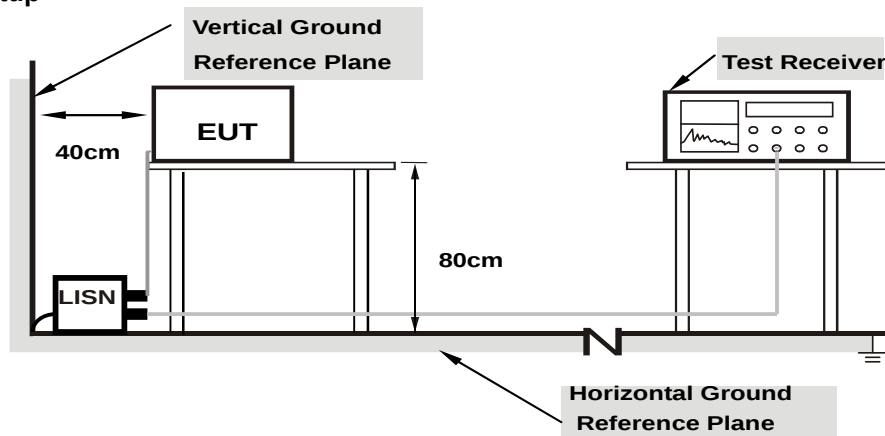
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

Same as 4.1.6.

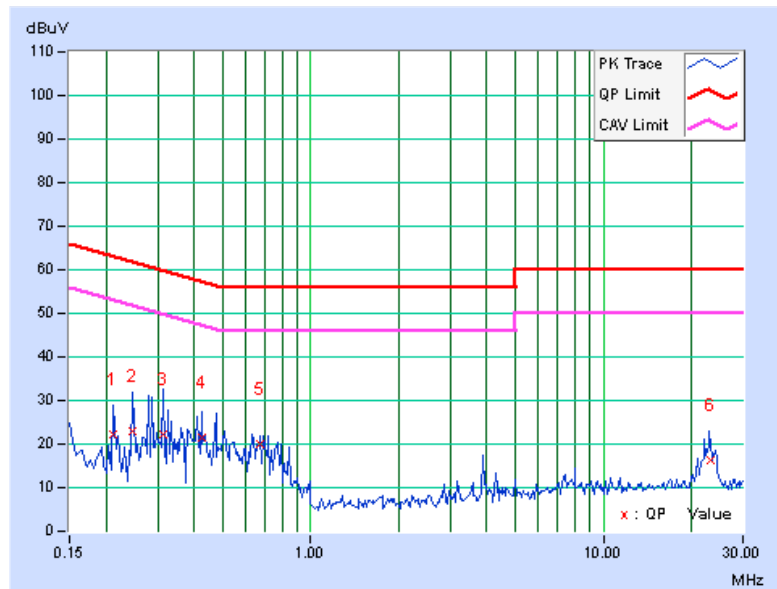
4.2.7 Test Results

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

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.21250	0.17	21.90	12.08	22.07	12.25	63.11	53.11	-41.04	-40.86
2	0.24766	0.17	22.62	13.98	22.79	14.15	61.84	51.84	-39.04	-37.68
3	0.31406	0.18	21.95	11.42	22.13	11.60	59.86	49.86	-37.74	-38.27
4	0.42344	0.18	21.29	9.45	21.47	9.63	57.38	47.38	-35.91	-37.75
5	0.67344	0.20	19.69	7.64	19.89	7.84	56.00	46.00	-36.11	-38.16
6	23.12909	0.56	15.87	14.01	16.43	14.57	60.00	50.00	-43.57	-35.43

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.

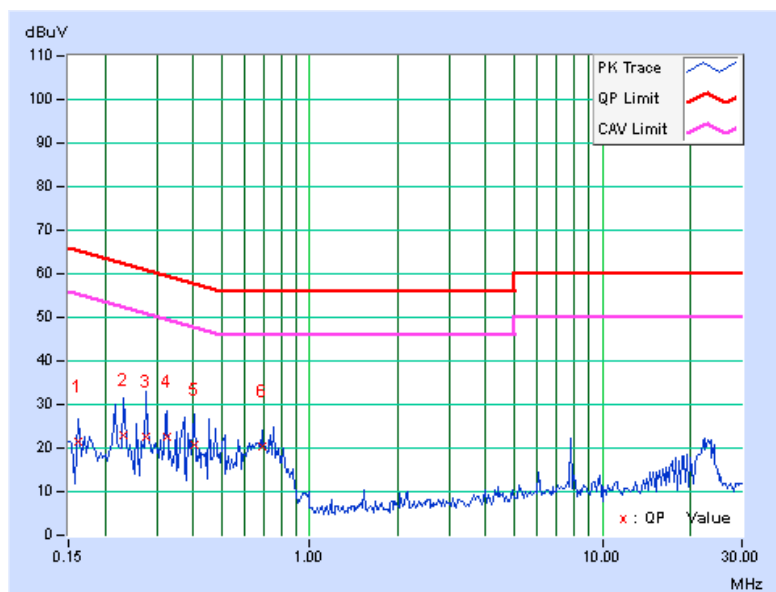


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.18	21.37	12.92	21.55	13.10	65.38	55.38	-43.83	-42.28
2	0.23203	0.18	22.88	11.11	23.06	11.29	62.38	52.38	-39.31	-41.08
3	0.27500	0.19	22.22	8.08	22.41	8.27	60.97	50.97	-38.56	-42.70
4	0.32578	0.19	22.30	8.81	22.49	9.00	59.56	49.56	-37.07	-40.56
5	0.40391	0.20	20.53	8.82	20.73	9.02	57.77	47.77	-37.04	-38.75
6	0.68516	0.22	20.03	9.94	20.25	10.16	56.00	46.00	-35.75	-35.84

REMARKS:

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

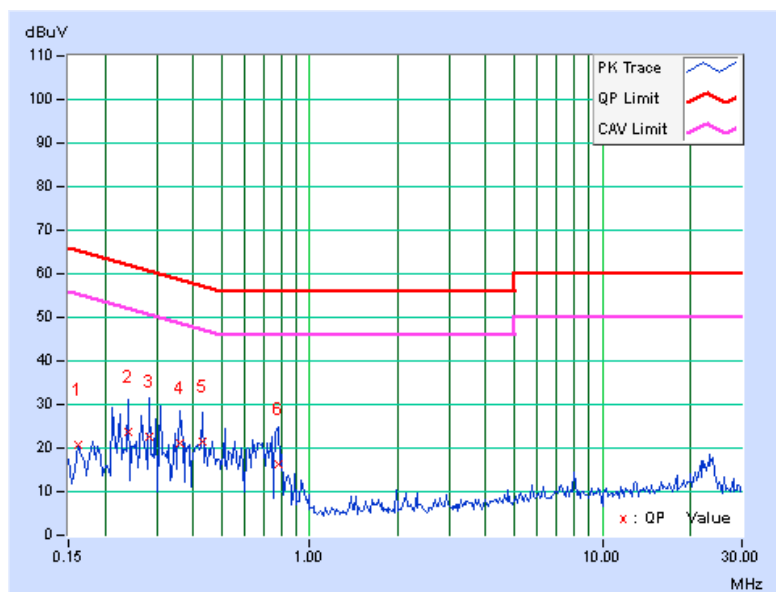


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.17	20.48	11.45	20.65	11.62	65.38	55.38	-44.73	-43.76
2	0.23984	0.17	23.50	13.86	23.67	14.03	62.10	52.10	-38.43	-38.07
3	0.28281	0.17	22.51	9.37	22.68	9.54	60.73	50.73	-38.05	-41.19
4	0.36094	0.18	20.87	9.80	21.05	9.98	58.71	48.71	-37.66	-38.73
5	0.43125	0.18	21.23	8.13	21.41	8.31	57.23	47.23	-35.82	-38.92
6	0.77891	0.21	15.99	6.88	16.20	7.09	56.00	46.00	-39.80	-38.91

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.

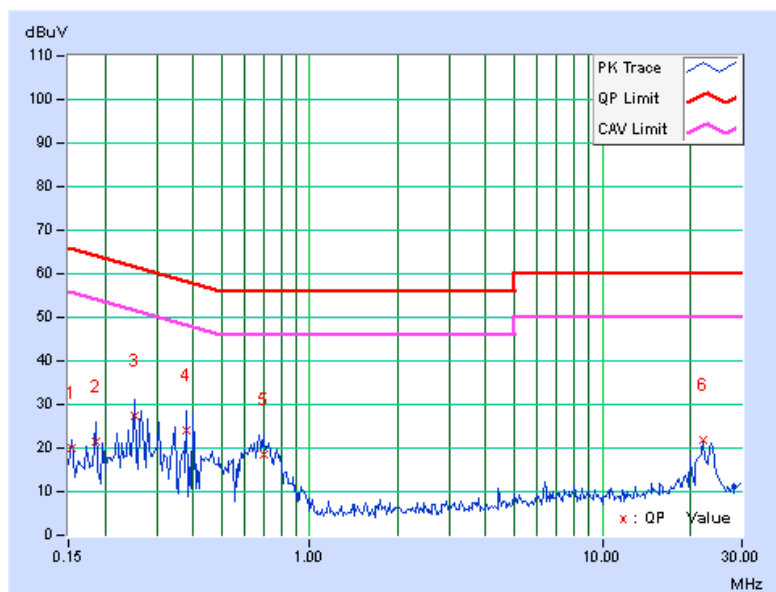


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.18	19.85	5.71	20.03	5.89	65.79	55.79	-45.76	-49.90
2	0.18516	0.18	21.30	6.84	21.48	7.02	64.25	54.25	-42.77	-47.23
3	0.25156	0.19	27.31	8.58	27.50	8.77	61.71	51.71	-34.21	-42.94
4	0.38047	0.20	23.76	7.98	23.96	8.18	58.27	48.27	-34.31	-40.09
5	0.69688	0.22	18.43	10.17	18.65	10.39	56.00	46.00	-37.35	-35.61
6	22.15234	0.74	21.14	13.86	21.88	14.60	60.00	50.00	-38.12	-35.40

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.

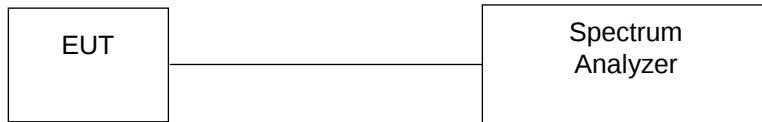


4.3 Number of Hopping Frequency Used

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 from Test Standard

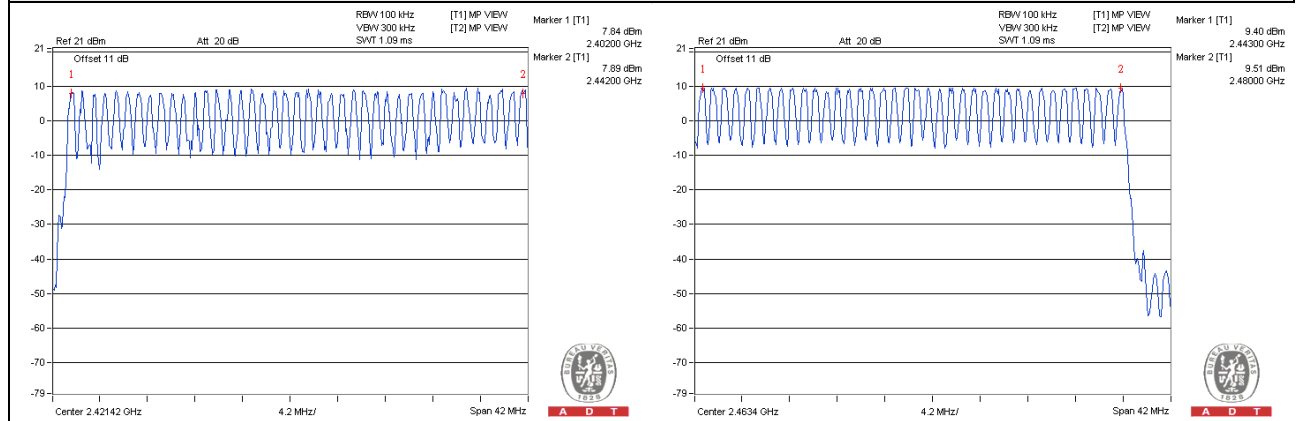
No deviation.

4.3.6 Test Results

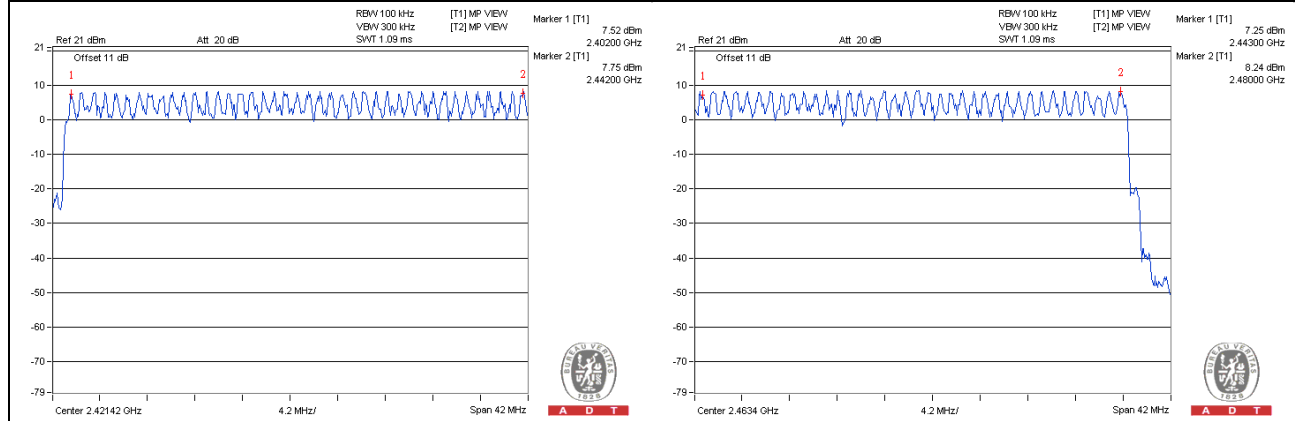
There are 79 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

<Test Mode A>

GFSK

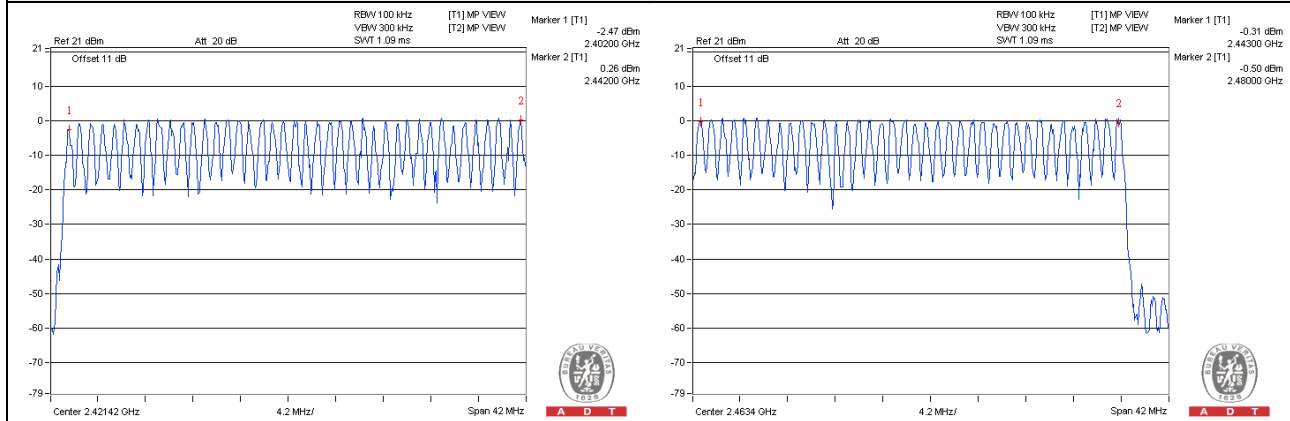


8DPSK

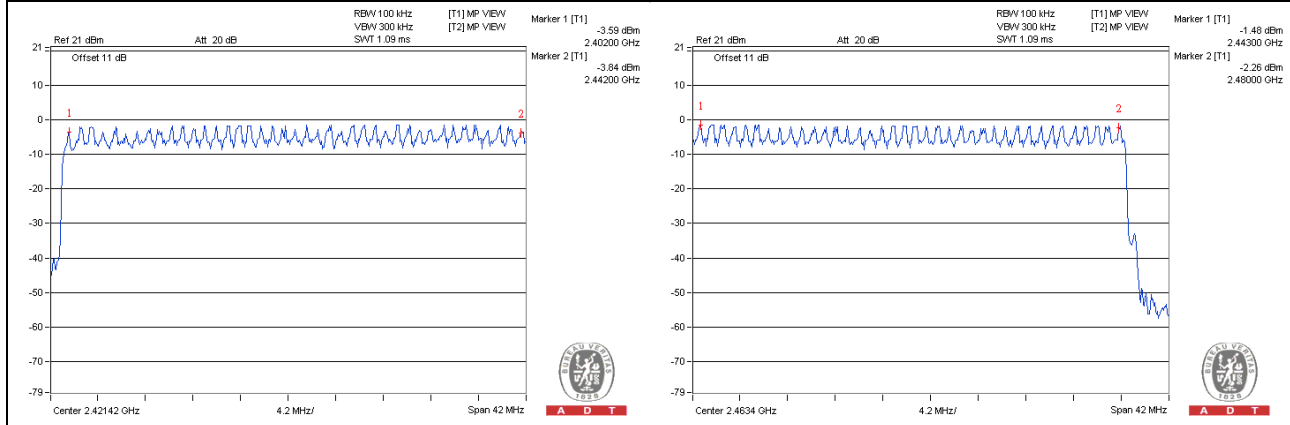


<Test Mode C>

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

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 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.
- 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.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- 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

<Test Mode A>
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	0.462	145.99	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.710	270.18	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.990	321.25	400

Note: Test plots of the transmitting time slot are shown as below.



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	0.480	151.68	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.780	281.24	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.050	327.69	400

Note: Test plots of the transmitting time slot are shown as below.



<Test Mode C> 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	0.438	138.41	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.740	274.92	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.980	320.17	400

Note: Test plots of the transmitting time slot are shown as below.



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	0.456	146.98	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.750	276.50	400
DH5	16 (times / 5 sec) * 6.32 = 101.12 times	3.010	304.37	400

Note: Test plots of the transmitting time slot are shown as below.



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 20dB bandwidth of hopping channel shall 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

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 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.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

4.5.5 Deviation from Test Standard

No deviation.

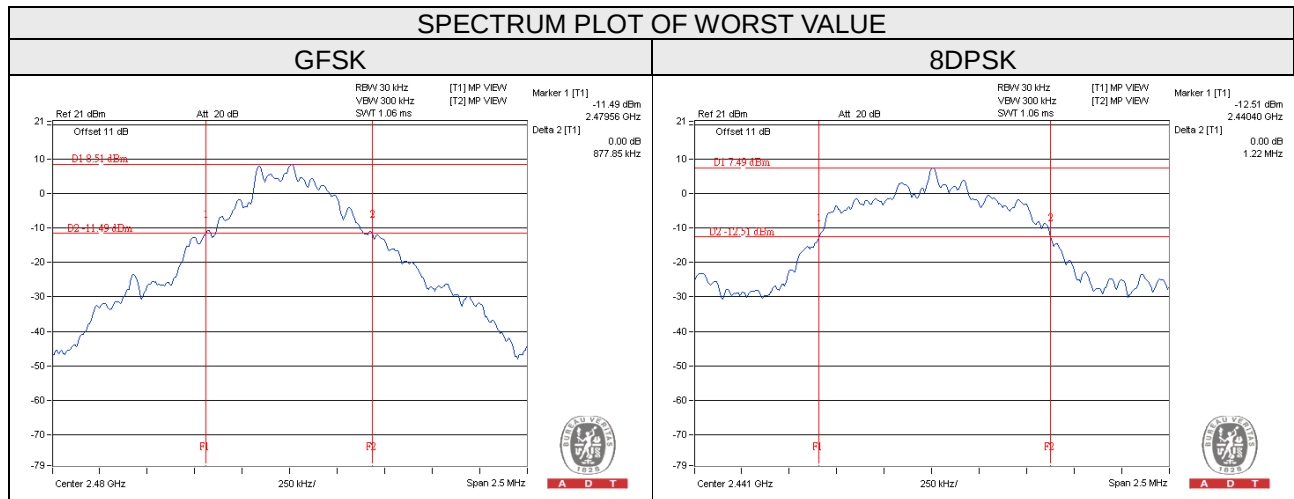
4.5.6 EUT Operating Condition

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

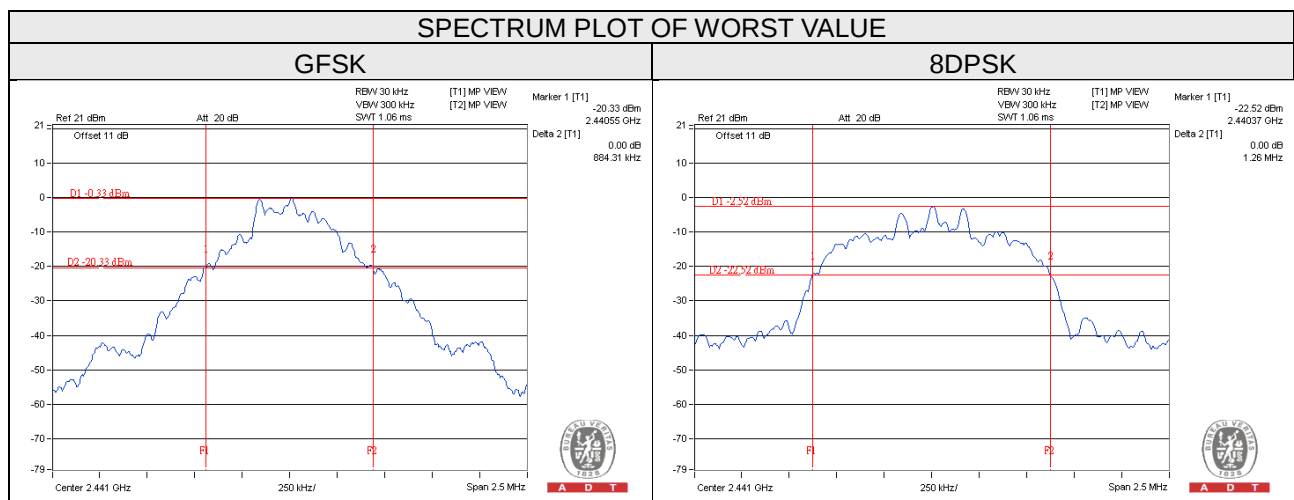
<Test Mode A>

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	
		GFSK	8DPSK
0	2402	0.85	1.22
39	2441	0.87	1.22
78	2480	0.87	1.22



<Test Mode C>

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	
		GFSK	8DPSK
0	2402	0.87	1.25
39	2441	0.88	1.26
78	2480	0.88	1.26



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

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

4.6.5 Deviation from Test Standard

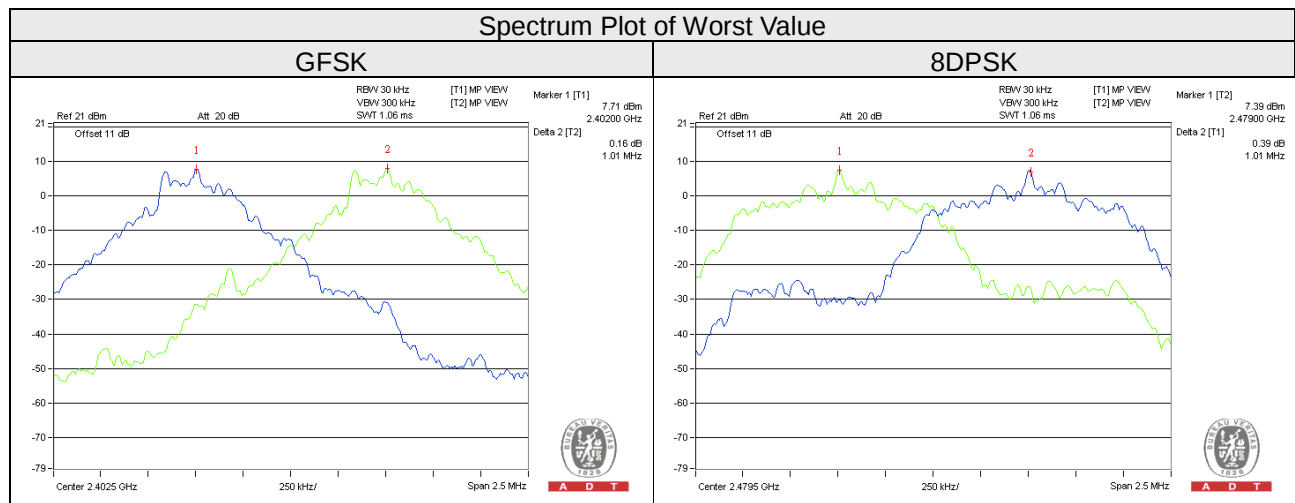
No deviation.

4.6.6 Test Results

<Test Mode A>

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)		20dB Bandwidth (MHz)		Minimum Limit (MHz)		Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK	GFSK	8DPSK	
0	2402	1.01	1.01	0.85	1.22	0.57	0.81	Pass
39	2441	1.00	1.00	0.87	1.22	0.58	0.81	Pass
78	2480	1.00	1.01	0.87	1.22	0.58	0.81	Pass

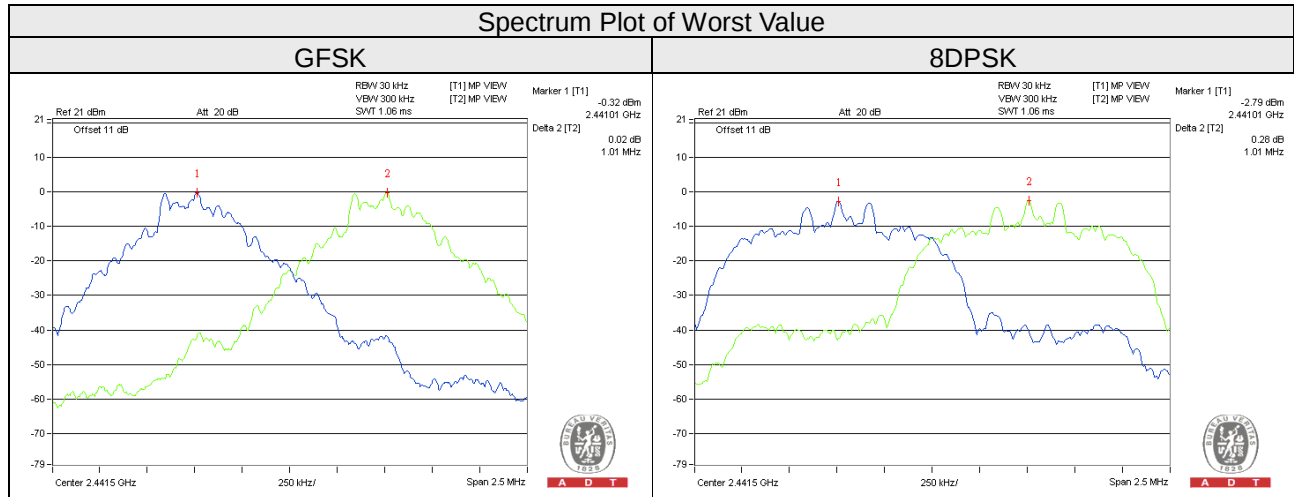
Note: The minimum limit is two-third 20dB bandwidth.



<Test Mode C>

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	0.87	1.25	0.58	0.83	Pass
39	2441	1.01	1.01	0.88	1.26	0.59	0.84	Pass
78	2480	1.00	1.01	0.88	1.26	0.59	0.84	Pass

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



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

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 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.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

4.7.5 Deviation from Test Standard

No deviation.

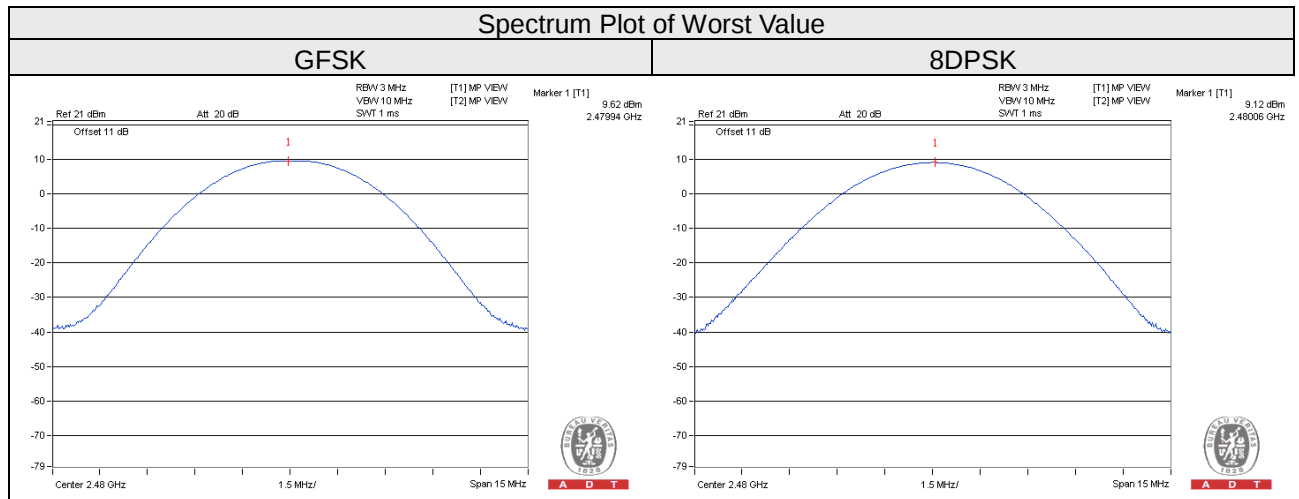
4.7.6 EUT Operating Condition

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

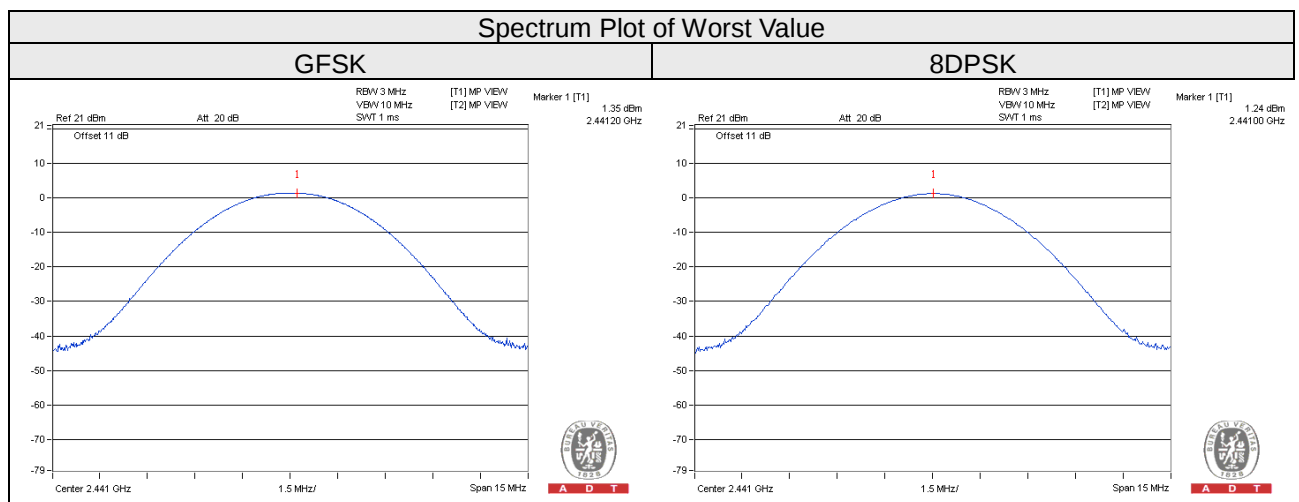
<Test Mode A>

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	7.499	6.668	8.75	8.24	125	Pass
39	2441	8.892	8.072	9.49	9.07	125	Pass
78	2480	9.162	8.166	9.62	9.12	125	Pass



<Test Mode C>

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	0.766	0.757	-1.16	-1.21	125	Pass
39	2441	1.365	1.330	1.35	1.24	125	Pass
78	2480	1.233	1.205	0.91	0.81	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

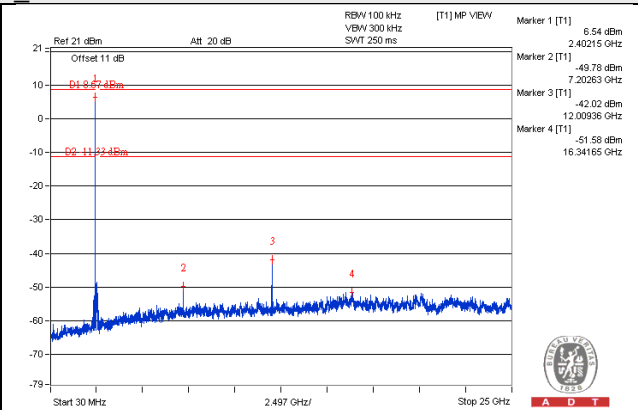
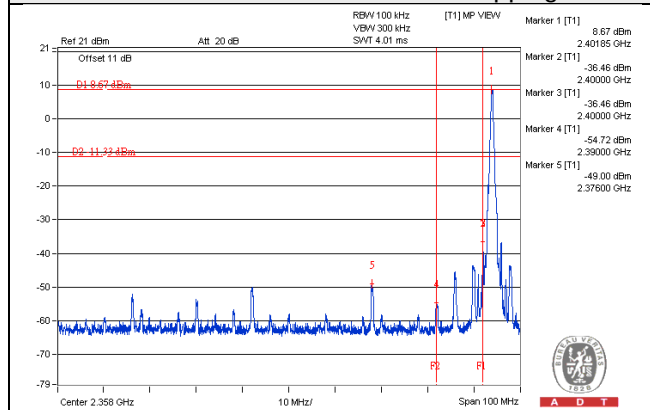
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.8.6 Test Results

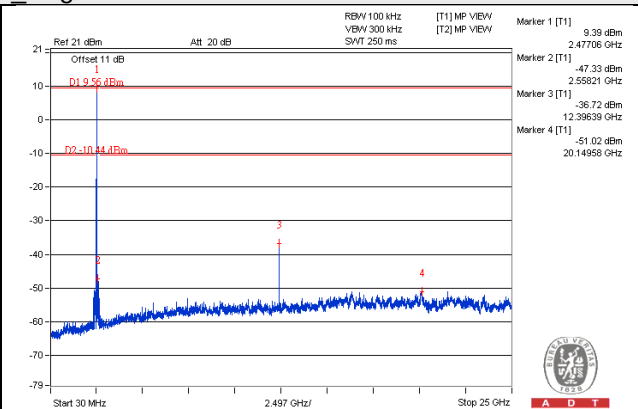
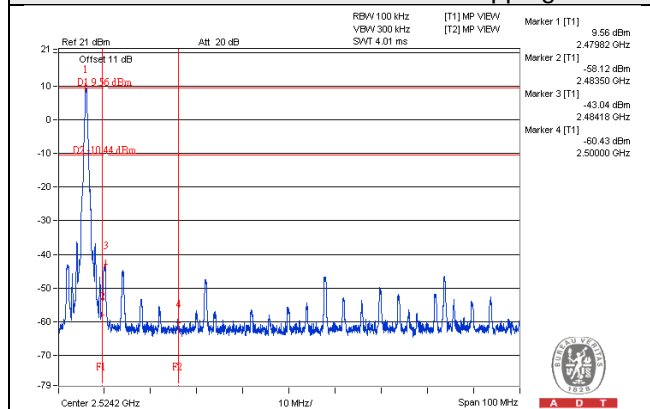
The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

<Test Mode A>
GFSK

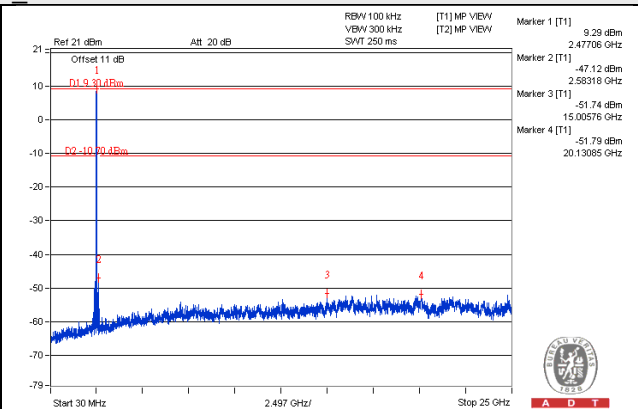
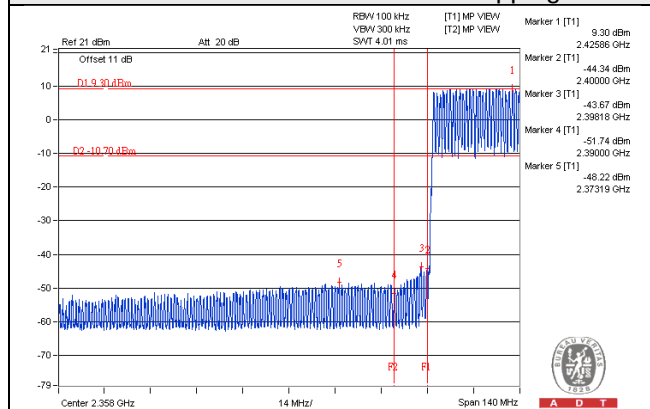
Hopping disabled Low Channel



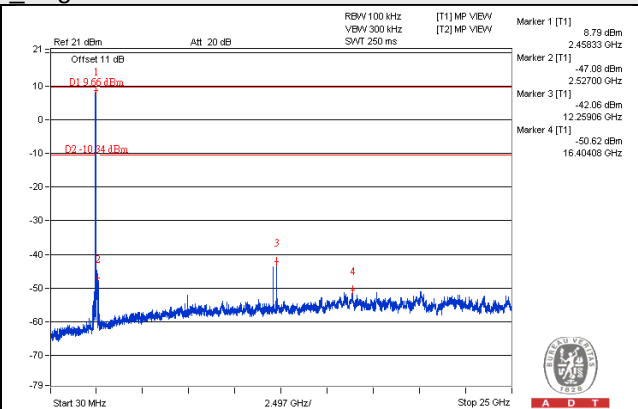
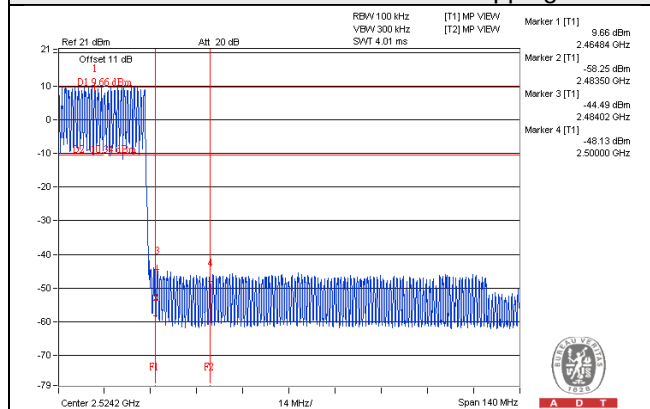
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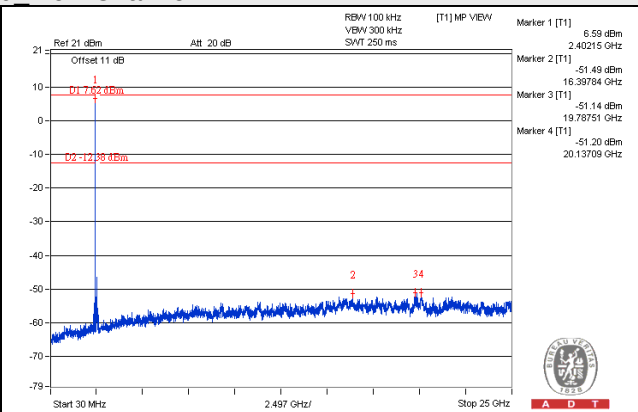
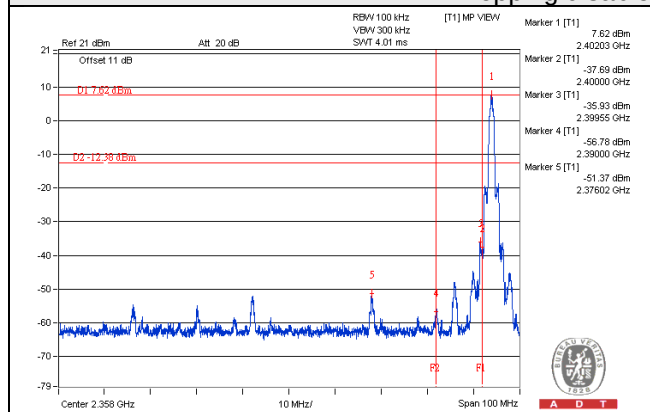


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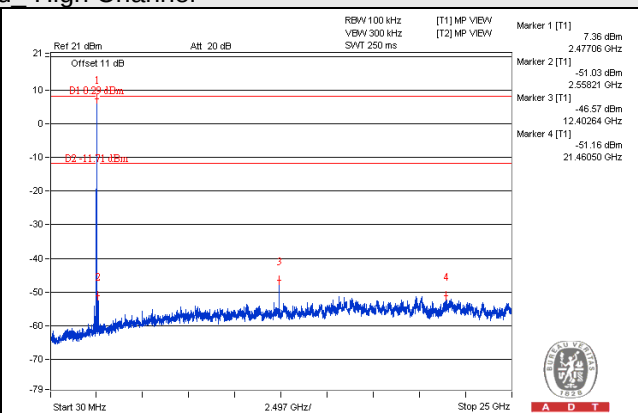
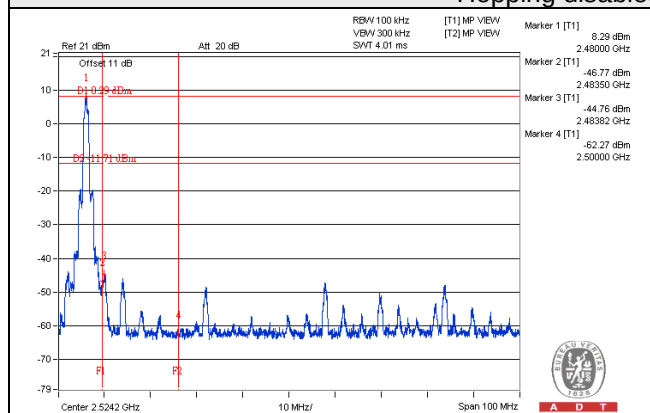


8DPSK

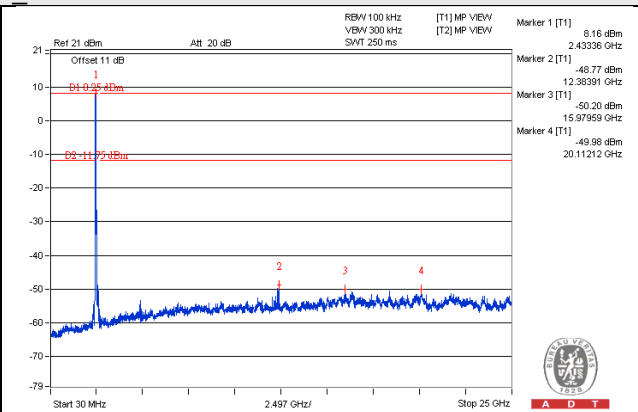
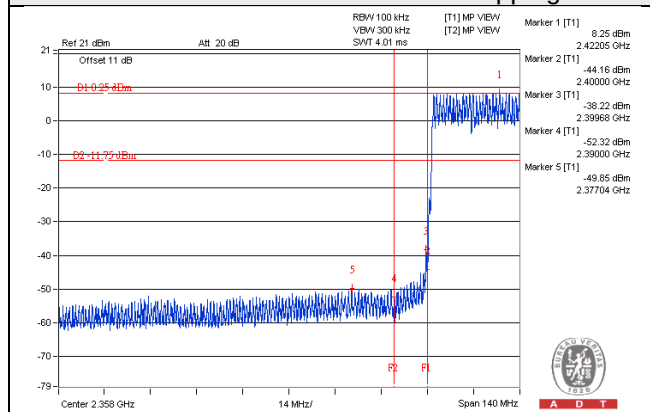
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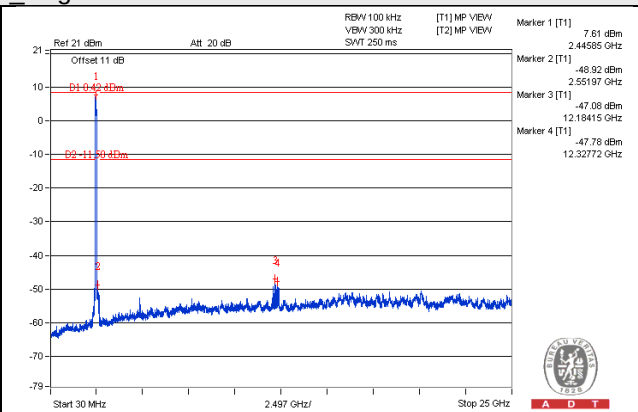
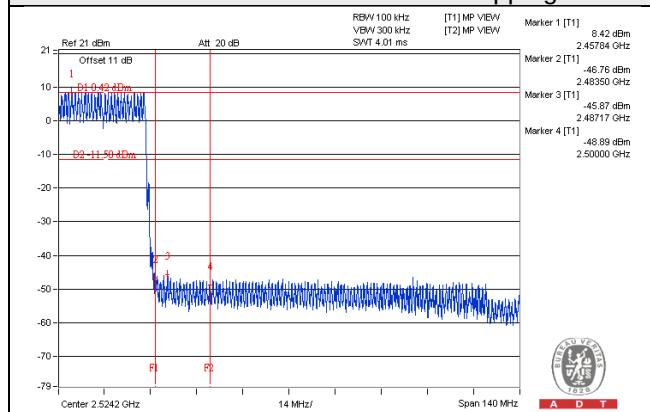
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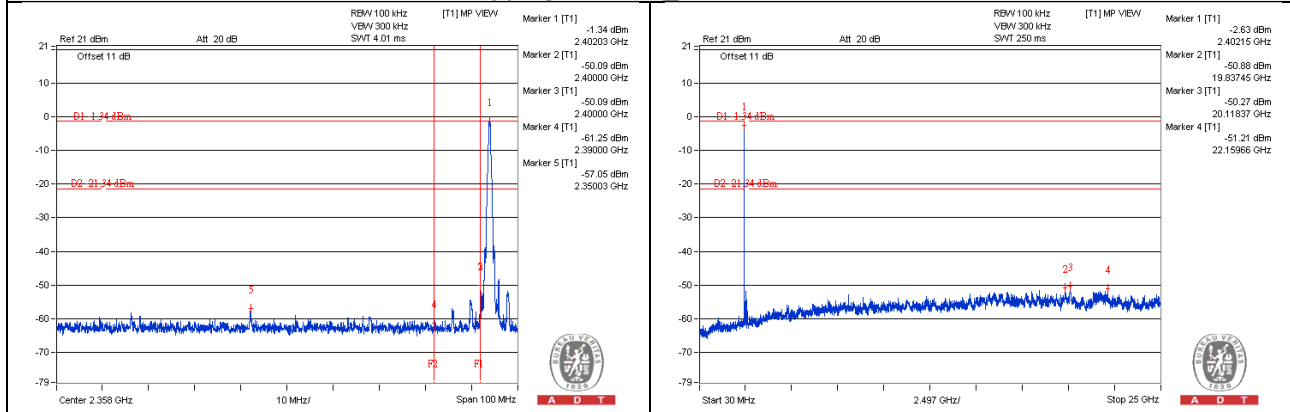


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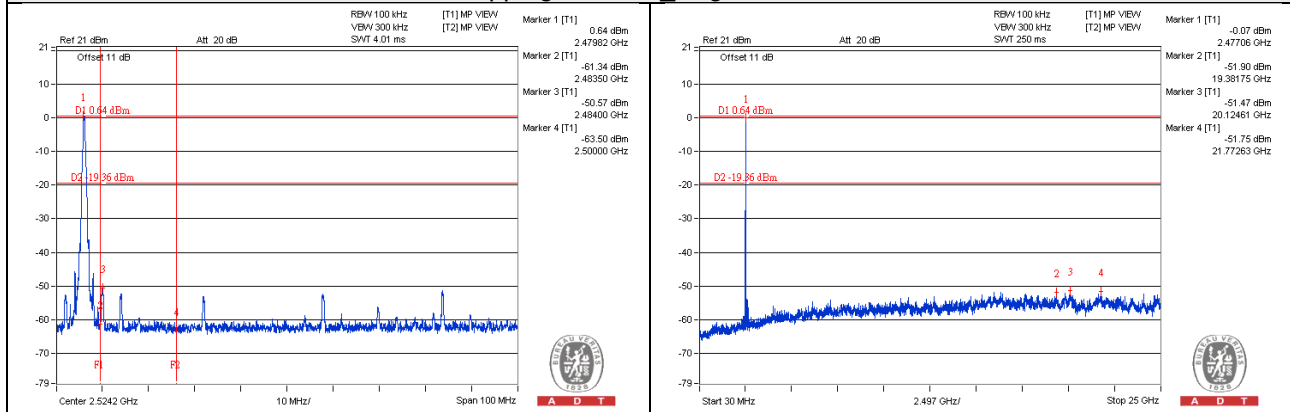


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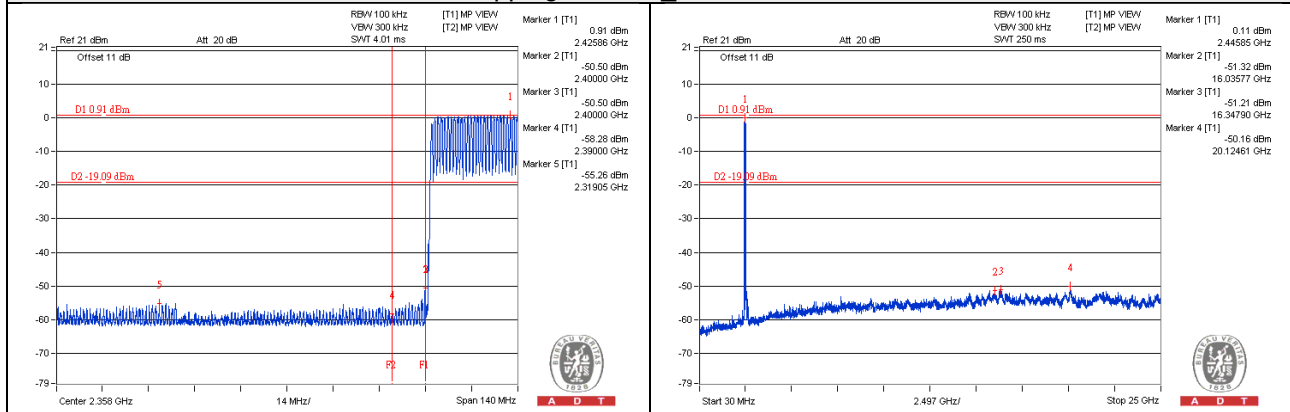
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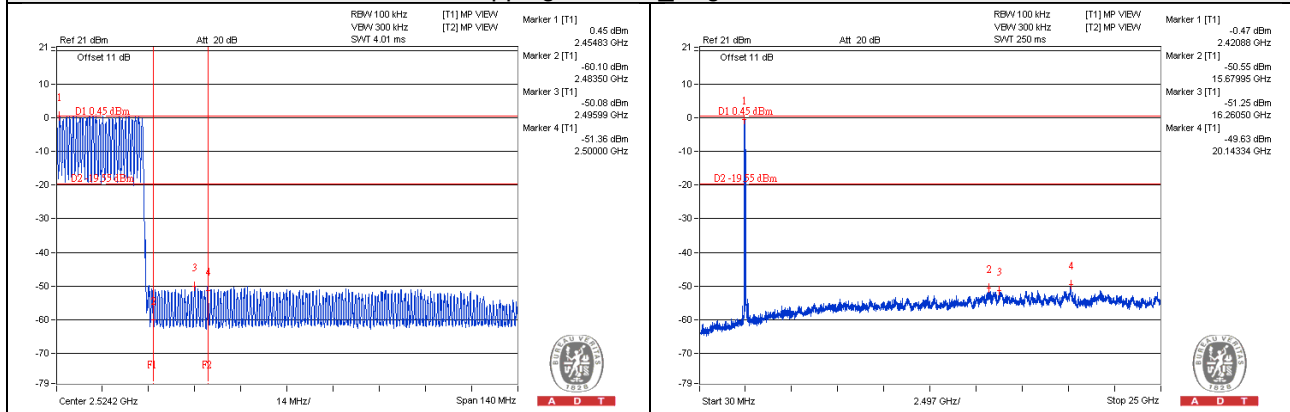
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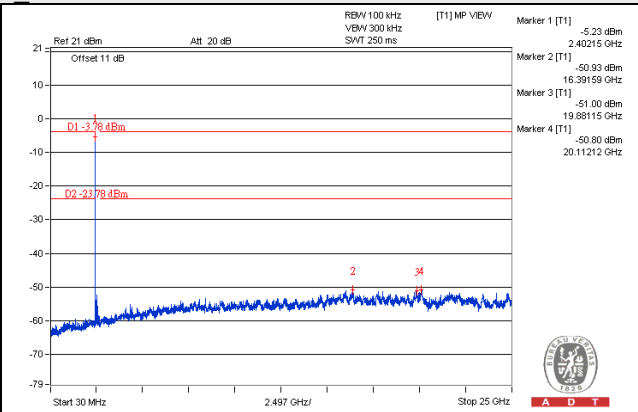
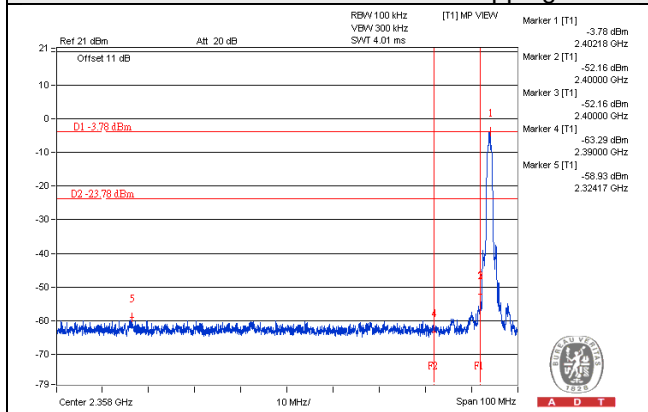


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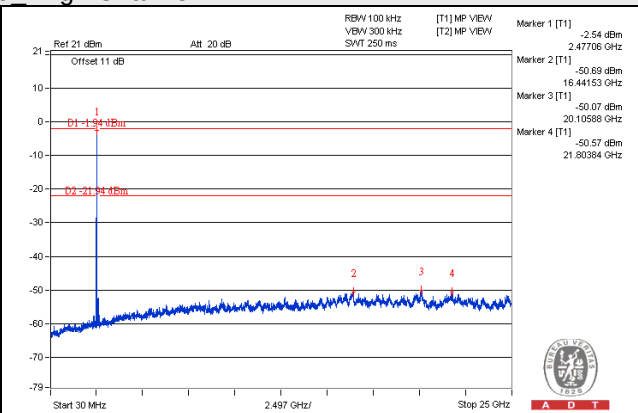
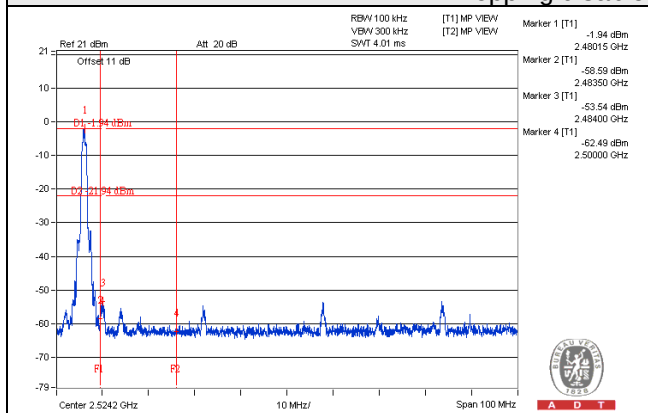


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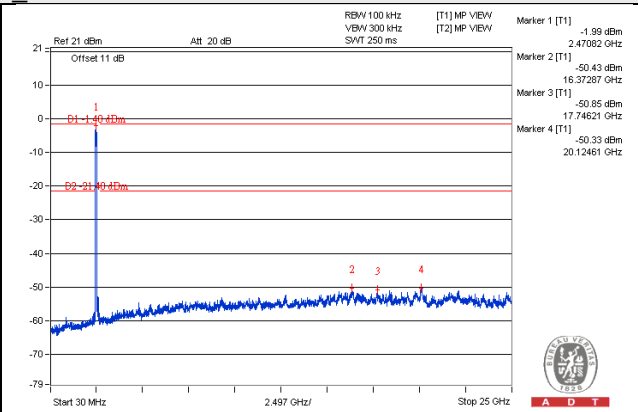
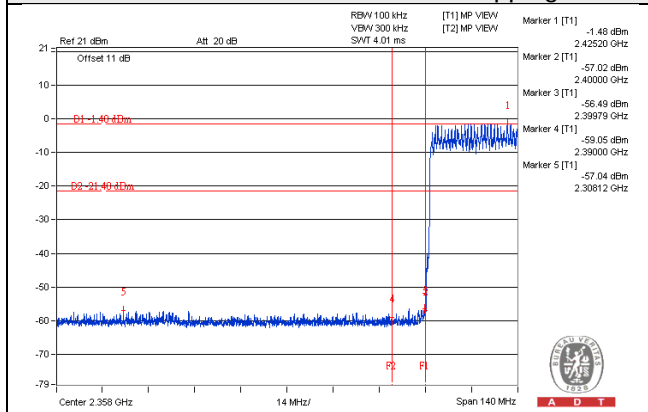
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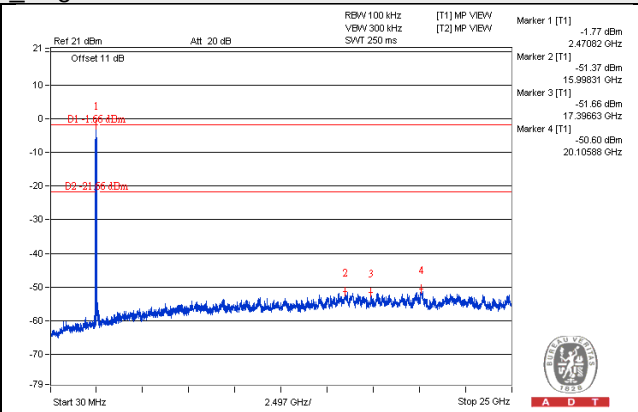
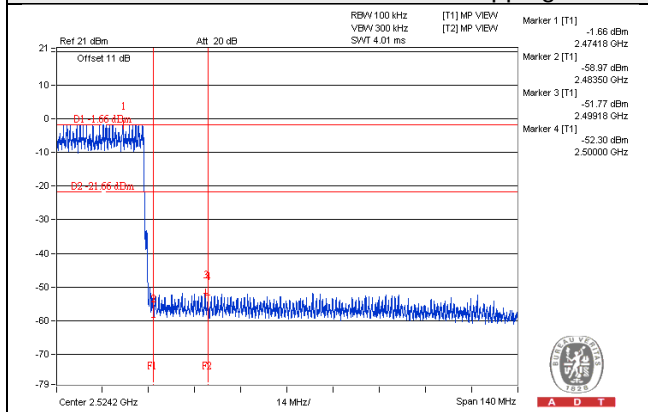
Hopping disabled High Channel



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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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