FCC Test Report

Report No.:	RF170427C12-5
FCC ID:	UZ7TC25AJ
Test Model:	TC25AJ
Received Date:	Apr. 27, 2017
Test Date:	May 06 ~ Aug. 16, 2017
Issued Date:	Sep. 14, 2017
Applicant:	Zebra Technologies Corporation
Address:	1 Zebra Plaza Holtsville New York United States 11742
Manufacturer:	Zebra Technologies Corporation
Address:	1 Zebra Plaza Holtsville New York United States 11742
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.

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF170427C12-5	Original release.	Sep. 14, 2017

1 Certificate of Conformity

Product:	Touch Computer
Brand:	ZEBRA
Test Model:	TC25AJ
Sample Status:	Engineering sample
Applicant:	Zebra Technologies Corporation
Test Date:	May 06 ~ Aug. 16, 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 : _____ , **Date:** Sep. 14, 2017

Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Sep. 14, 2017

Ken Liu / Senior 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 -12.58dB at 0.32786MHz.
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 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -5.2dB at 68.71MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

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	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 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	Touch Computer
Brand	ZEBRA
Test Model	TC25AJ
Status of EUT	Engineering sample
MFD	11JUL17
HW Version	DV
SW Version	90-06-05-N-00-E1
Power Supply Rating	5Vdc from adapter or host equipment 12 or 24Vdc from Vehicle Cigarette Adaptor 5Vdc from power pack 3.85Vdc from battery
Modulation Type	GFSK, π/4-DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	1/2/3Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	79
Output Power	2.588mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter, Gun Handle, Arm Mount, Holster , Vehicle Cigarette Adaptor, Power pack (Refer to note 3 for more details)
Data Cable Supplied	1.5m shielded USB Type C to Type A cable without core (Refer to note 3 for more details)

Note:
1. The EUT has 2 types for sale.

Brand	Model	Difference
ZEBRA	TC25AJ	Scanner SE4710 with camera
		Scanner SE2100 with camera

2. The EUT consumes power from the following adapter, Vehicle Cigarette Adaptor, battery and power pack.

Adapter	
Brand	ZEBRA
Model	SAWA-65-20005A
Input Power	100-240Vac, 0.5A, 50-60Hz
Output Power	5Vdc, 2.5A

Vehicle Cigarette Adaptor	
Brand	ZEBRA
Model	SAWA-68-25005A
Input Power	12-24V(3.5A)
Output Power	5V(2.5A)

Battery	
Brand	ZEBRA
Model	BT-000334
Rate capacity	3000mAh
Min capacity	2800mAh
Rate Voltage	3.85Vdc

Power Pack	
Brand	ZEBRA
Model	BT-000343
Rate capacity	2900mAh
Min capacity	2800mAh
Rate Voltage	3.85Vdc

3. Accessory devices of EUT are list as below.

Specification of Accessory		
AC Adapter	Brand Name	ZEBRA
	Model Name	SAWA-65-20005A
USB Type C cable	Brand Name	ZEBRA
	P/N Number	CBL-MPM-USB1-01
Gun Handle	Brand Name	ZEBRA
	P/N Number	TRG-TC2X-SNP1-01
Arm Mount	Brand Name	ZEBRA
	P/N Number	SG-TC2X-ARMNT-01
Holster	Brand Name	ZEBRA
	P/N Number	SG-TC2X-HLSTR1-01
Vehicle Cigarette Adaptor	Brand Name	ZEBRA
	Model Name	SAWA-68-25005A
Power pack	Brand Name	ZEBRA
	Model Name	BT-000343

4. The following antennas were provided to the EUT.

Type	Connector	Gain (dBi)		
		WLAN 2.4GHz	WLAN 5GHz	BT
PIFA	NA	2.25	4.20	2.24

5. 2.4GHz & 5GHz cannot transmit at the same time.

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	√	√	√	√	Scanner SE4710, EUT+USB cable+adapter
B	-	√	√	-	Scanner SE4710, EUT+USB cable+adapter+power pack
C	-	√	√	-	Scanner SE4710, EUT+USB cable+adapter+Gun Handle
D	-	√	√	-	Scanner SE4710, EUT+USB cable+Vehicle Cigarette Adaptor
E	-	√	√	-	Scanner SE2100, EUT+USB cable+adapter

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 Y-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	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A	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, C, D, E	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, B, C, D, E	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	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Matthew Yang
RE<1G	25deg. C, 70%RH	120Vac, 60Hz	Luis Lee
PLC	25deg. C, 75%RH	120Vac, 60Hz	Luis Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

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.

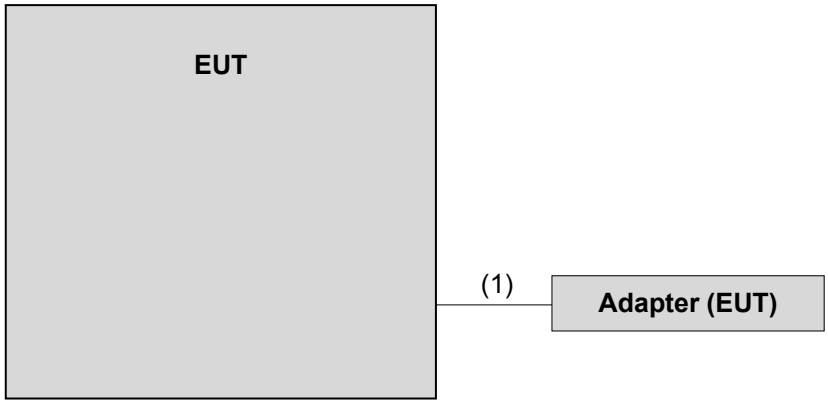
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	DC power supply	Keysight	U8002A	MY56330015	NA	-

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

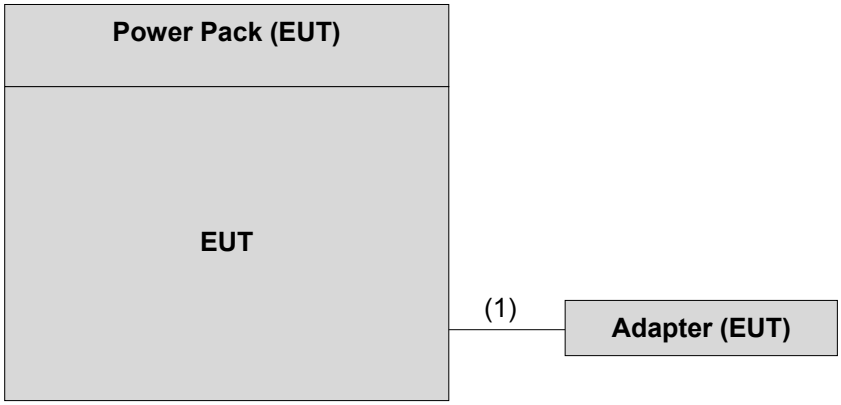
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Type C	1	1.5	Y	1	Accessory of EUT
2.	DC cable	1	1.0	N	0	-

3.3.1 Configuration of System under Test

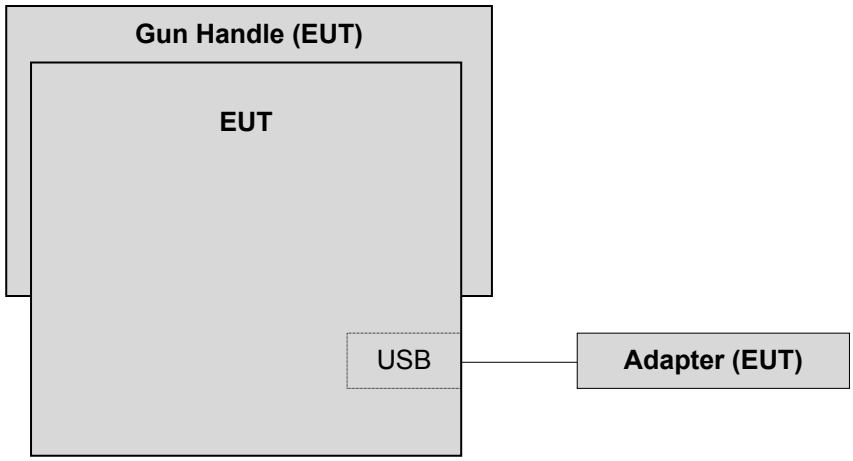
Test Mode A, E



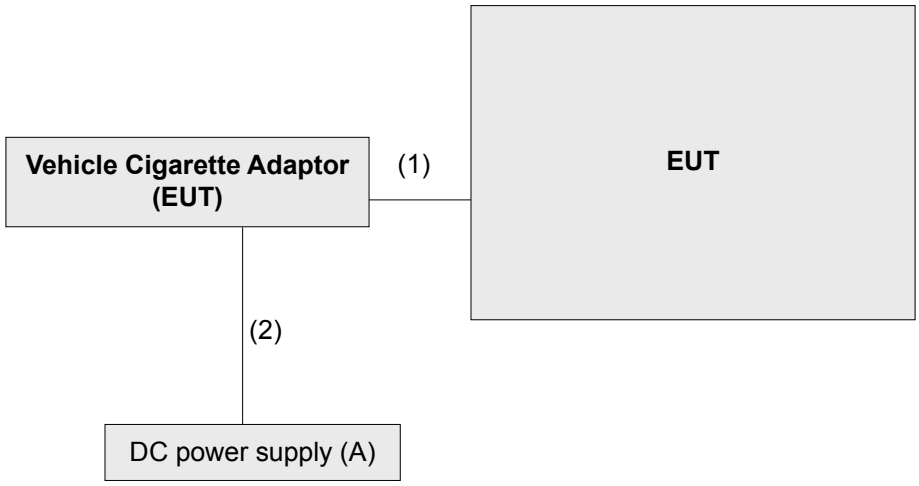
Test Mode B



Test Mode C



Test Mode 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.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). 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.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Mar. 27, 2017	Mar. 26, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Nov. 16, 2016	Nov. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 27, 2016	Dec. 26, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna ETS-LINDGREN	3127-1880	00099260	Sep. 26, 2015	Sep. 27, 2017
Loop Antenna TESEQ	HLA 6121	45745	May 19, 2017	May 18, 2018
Preamplifier Agilent	8449B	3008A01638	Feb. 22, 2017	Feb. 21, 2018
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2016	Aug. 08, 2017
			Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02 (248780+MY13377)	Aug. 09, 2016	Aug. 08, 2017
			Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/ 4)	Aug. 09, 2016	Aug. 08, 2017
			Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 09, 2016	Aug. 08, 2017
			Aug. 01, 2017	Jul. 31, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
High Speed Peak Power Meter	ML2495A	0842014	Apr. 24, 2017	Apr. 23, 2018
Power Sensor	MA2411B	0738404	Apr. 24, 2017	Apr. 23, 2018

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 4.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC7450F-4.

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:

1. 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:

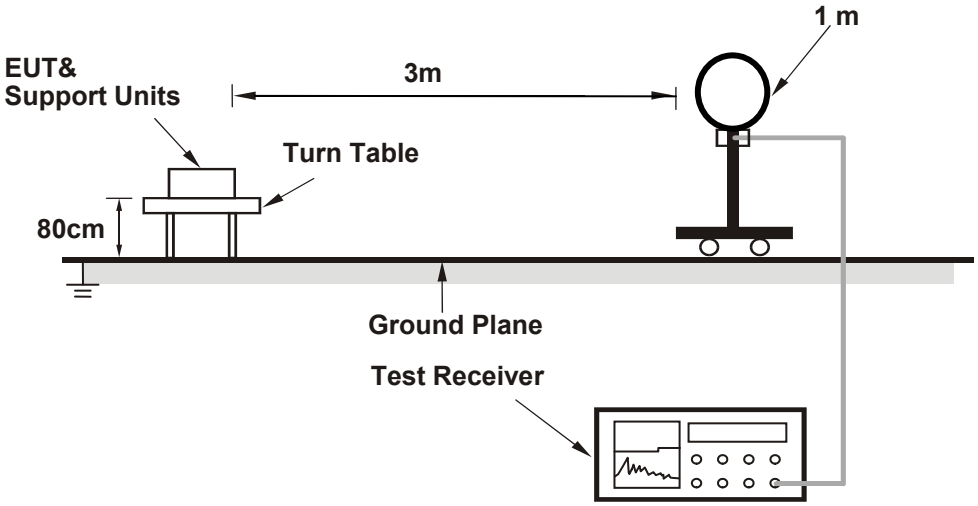
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

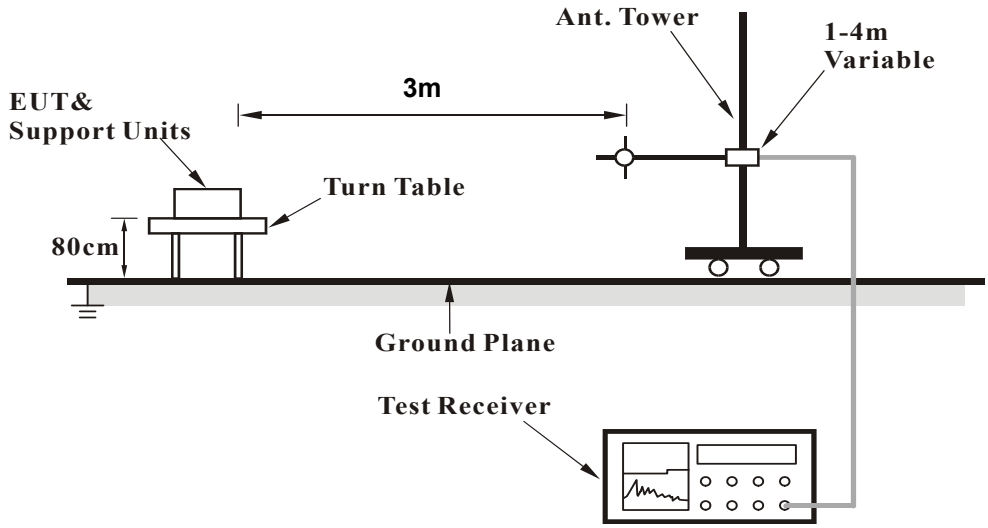
No deviation.

4.1.5 Test Set Up

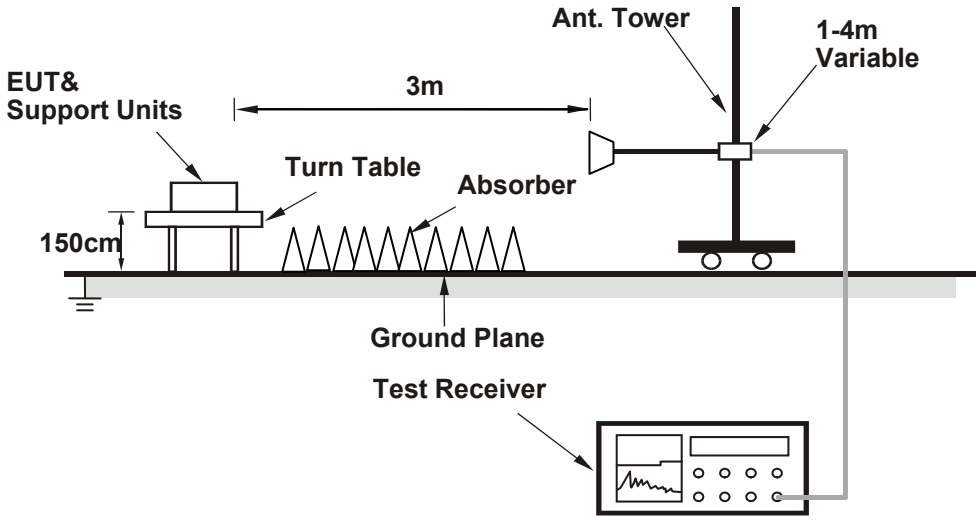
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



4.1.6 EUT Operating Conditions

The EUT has been tested as an independent unit together with other necessary accessories or support units.

4.1.7 Test Results

Above 1GHz Data:

GFSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	50.0 PK	74.0	-24.0	1.21 H	5	51.5	-1.5
2	2390.00	37.9 AV	54.0	-16.1	1.21 H	5	39.4	-1.5
3	#2400.00	41.9 PK	74.0	-32.1	1.21 H	5	43.4	-1.5
4	#2400.00	11.8 AV	54.0	-42.2	1.21 H	5	13.3	-1.5
5	*2402.00	96.2 PK			1.21 H	5	63.3	32.9
6	*2402.00	66.1 AV			1.21 H	5	33.2	32.9
7	4804.00	50.6 PK	74.0	-23.4	2.08 H	112	43.9	6.7
8	4804.00	20.5 AV	54.0	-33.5	2.08 H	112	13.8	6.7
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	50.0 PK	74.0	-24.0	1.66 V	303	51.5	-1.5
2	2390.00	37.9 AV	54.0	-16.1	1.66 V	303	39.4	-1.5
3	#2400.00	41.4 PK	74.0	-32.6	1.66 V	303	42.9	-1.5
4	#2400.00	11.3 AV	54.0	-42.7	1.66 V	303	12.8	-1.5
5	*2402.00	95.7 PK			1.66 V	303	62.8	32.9
6	*2402.00	64.6 AV			1.66 V	303	31.7	32.9
7	4804.00	49.8 PK	74.0	-24.2	1.35 V	89	43.1	6.7
8	4804.00	19.7 AV	54.0	-34.3	1.35 V	89	13.0	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB
7. Average value = peak reading + 20log(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	97.8 PK			1.18 H	45	64.7	33.1
2	*2441.00	47.7 AV			1.18 H	45	14.6	33.1
3	4882.00	50.9 PK	74.0	-23.1	2.11 H	136	44.1	6.8
4	4882.00	20.8 AV	54.0	-33.2	2.11 H	136	14.0	6.8
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	97.0 PK			1.67 V	312	63.9	33.1
2	*2441.00	66.9 AV			1.67 V	312	33.8	33.1
3	4882.00	50.3 PK	74.0	-23.7	1.41 V	92	43.5	6.8
4	4882.00	20.2 AV	54.0	-33.8	1.41 V	92	13.4	6.8

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB
7. Average value = peak reading + 20log(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	96.4 PK			1.28 H	41	63.1	33.3
2	*2480.00	66.3 AV			1.28 H	41	33.0	33.3
3	2483.50	41.2 PK	74.0	-32.8	1.28 H	41	42.3	-1.1
4	2483.50	11.1 AV	54.0	-42.9	1.28 H	41	12.2	-1.1
5	4960.00	50.7 PK	74.0	-23.3	1.99 H	101	43.7	7.0
6	4960.00	20.6 AV	54.0	-33.4	1.99 H	101	13.6	7.0
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	95.3 PK			1.51 V	278	62.0	33.3
2	*2480.00	65.2 AV			1.51 V	278	31.9	33.3
3	2483.50	41.7 PK	74.0	-32.3	1.51 V	278	42.8	-1.1
4	2483.50	11.6 AV	54.0	-42.4	1.51 V	278	12.7	-1.1
5	4960.00	50.2 PK	74.0	-23.8	1.44 V	66	43.2	7.0
6	4960.00	20.1 AV	54.0	-33.9	1.44 V	66	13.1	7.0

REMARKS:

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

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	49.1 PK	74.0	-24.9	1.00 H	53	50.6	-1.5
2	2390.00	37.7 AV	54.0	-16.3	1.00 H	53	39.2	-1.5
3	#2400.00	45.4 PK	74.0	-28.6	1.00 H	53	46.9	-1.5
4	#2400.00	15.3 AV	54.0	-38.7	1.00 H	53	16.8	-1.5
5	*2402.00	95.2 PK			1.00 H	53	62.3	32.9
6	*2402.00	65.1 AV			1.00 H	53	32.2	32.9
7	4804.00	50.5 PK	74.0	-23.5	2.25 H	133	43.8	6.7
8	4804.00	20.4 AV	54.0	-33.6	2.25 H	133	13.7	6.7
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	50.5 PK	74.0	-23.5	1.68 V	306	52.0	-1.5
2	2390.00	37.8 AV	54.0	-16.2	1.68 V	306	39.3	-1.5
3	#2400.00	44.6 PK	74.0	-29.4	1.68 V	306	46.1	-1.5
4	#2400.00	14.5 AV	54.0	-39.5	1.68 V	306	16.0	-1.5
5	*2402.00	94.8 PK			1.68 V	306	61.9	32.9
6	*2402.00	64.7 AV			1.68 V	306	31.8	32.9
7	4804.00	50.2 PK	74.0	-23.8	1.12 V	239	43.5	6.7
8	4804.00	20.1 AV	54.0	-33.9	1.12 V	239	13.4	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB
7. Average value = peak reading + 20log(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	96.2 PK			1.04 H	55	63.1	33.1
2	*2441.00	66.1 AV			1.04 H	55	33.0	33.1
3	4882.00	50.8 PK	74.0	-23.2	2.28 H	137	44.0	6.8
4	4882.00	20.7 AV	54.0	-33.3	2.28 H	137	13.9	6.8
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	95.7 PK			1.79 V	315	62.6	33.1
2	*2441.00	65.6 AV			1.79 V	315	32.5	33.1
3	4882.00	50.3 PK	74.0	-23.7	1.18 V	245	43.5	6.8
4	4882.00	20.2 AV	54.0	-33.8	1.18 V	245	13.4	6.8

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB
7. Average value = peak reading + 20log(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	95.3 PK			1.00 H	54	62.0	33.3
2	*2480.00	65.2 AV			1.00 H	54	31.9	33.3
3	2483.50	42.5 PK	74.0	-31.5	1.00 H	54	43.6	-1.1
4	2483.50	12.4 AV	54.0	-41.6	1.00 H	54	13.5	-1.1
5	4960.00	50.8 PK	74.0	-23.2	2.22 H	149	43.8	7.0
6	4960.00	20.7 AV	54.0	-33.3	2.22 H	149	13.7	7.0
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	94.6 PK			1.54 V	276	61.3	33.3
2	*2480.00	64.5 AV			1.54 V	276	31.2	33.3
3	2483.50	41.3 PK	74.0	-32.7	1.54 V	276	42.4	-1.1
4	2483.50	11.2 AV	54.0	-42.8	1.54 V	276	12.3	-1.1
5	4960.00	50.3 PK	74.0	-23.7	1.09 V	265	43.3	7.0
6	4960.00	20.2 AV	54.0	-33.8	1.09 V	265	13.2	7.0

REMARKS:

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

Below 1GHz worst-case data:

GFSK

CHANNEL	TX Channel 39	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	68.71	25.6 QP	40.0	-14.4	1.50 H	192	41.5	-15.9
2	119.16	27.9 QP	43.5	-15.6	1.50 H	340	44.0	-16.1
3	210.36	19.6 QP	43.5	-23.9	1.00 H	210	35.7	-16.1
4	602.32	23.7 QP	46.0	-22.3	2.00 H	181	29.7	-6.0
5	681.87	24.2 QP	46.0	-21.8	1.00 H	19	28.7	-4.5
6	870.09	27.5 QP	46.0	-18.5	1.00 H	63	28.6	-1.1
7	970.99	29.6 QP	54.0	-24.4	2.00 H	77	28.7	0.9
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	41.54	31.3 QP	40.0	-8.7	1.50 V	282	46.2	-14.9
2	111.40	29.8 QP	43.5	-13.7	1.00 V	255	46.8	-17.0
3	280.21	17.2 QP	46.0	-28.8	1.50 V	222	29.6	-12.4
4	666.35	24.2 QP	46.0	-21.8	1.50 V	128	29.0	-4.8
5	747.85	28.1 QP	46.0	-17.9	1.24 V	6	30.9	-2.8
6	949.65	29.5 QP	46.0	-16.5	1.00 V	93	28.8	0.7

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

CHANNEL	TX Channel 39	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	68.71	28.1 QP	40.0	-11.9	2.00 H	167	44.0	-15.9
2	109.46	33.3 QP	43.5	-10.2	1.50 H	322	50.5	-17.2
3	204.54	34.0 QP	43.5	-9.5	1.24 H	285	50.2	-16.2
4	253.05	35.6 QP	46.0	-10.4	1.00 H	274	49.5	-13.9
5	414.10	29.4 QP	46.0	-16.6	2.00 H	186	39.5	-10.1
6	918.60	28.1 QP	46.0	-17.9	1.50 H	6	28.1	0.0
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	103.64	24.3 QP	43.5	-19.2	1.24 V	247	42.1	-17.8
2	198.71	29.0 QP	43.5	-14.5	1.50 V	242	45.2	-16.2
3	245.28	27.8 QP	46.0	-18.2	2.00 V	181	42.0	-14.2
4	408.28	29.0 QP	46.0	-17.0	1.00 V	150	39.1	-10.1
5	582.91	25.5 QP	46.0	-20.5	1.50 V	172	32.1	-6.6
6	961.29	29.0 QP	54.0	-25.0	2.00 V	269	28.2	0.8

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	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	68.71	27.3 QP	40.0	-12.7	1.50 H	189	43.2	-15.9
2	119.16	22.8 QP	43.5	-20.7	1.50 H	339	38.9	-16.1
3	214.24	18.7 QP	43.5	-24.8	1.50 H	187	34.8	-16.1
4	439.32	20.0 QP	46.0	-26.0	1.00 H	163	29.4	-9.4
5	763.37	26.2 QP	46.0	-19.8	2.00 H	326	28.8	-2.6
6	938.01	34.6 QP	46.0	-11.4	2.00 H	357	34.1	0.5
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	**68.71**	**34.8 QP**	**40.0**	**-5.2**	**1.00 V**	**281**	**50.7**	**-15.9**
2	128.86	22.8 QP	43.5	-20.7	1.00 V	7	38.2	-15.4
3	254.99	19.5 QP	46.0	-26.5	1.24 V	20	33.3	-13.8
4	561.57	22.1 QP	46.0	-23.9	1.00 V	7	29.4	-7.3
5	809.94	26.7 QP	46.0	-19.3	1.24 V	233	28.5	-1.8
6	959.35	29.0 QP	46.0	-17.0	1.00 V	178	28.2	0.8

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	D

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	74.53	22.8 QP	40.0	-17.2	1.00 H	322	39.4	-16.6
2	99.75	27.6 QP	43.5	-15.9	2.00 H	97	46.1	-18.5
3	124.98	26.8 QP	43.5	-16.7	2.00 H	104	42.5	-15.7
4	315.14	29.2 QP	46.0	-16.8	1.00 H	255	40.8	-11.6
5	441.26	28.5 QP	46.0	-17.5	2.00 H	88	37.8	-9.3
6	939.95	39.8 QP	46.0	-6.2	1.25 H	189	39.2	0.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	49.30	23.9 QP	40.0	-16.1	1.99 V	12	38.3	-14.4
2	74.53	28.9 QP	40.0	-11.1	1.50 V	238	45.5	-16.6
3	134.68	21.1 QP	43.5	-22.4	1.00 V	298	35.8	-14.7
4	315.14	22.2 QP	46.0	-23.8	1.99 V	297	33.8	-11.6
5	441.26	24.4 QP	46.0	-21.6	1.00 V	157	33.7	-9.3
6	939.95	37.3 QP	46.0	-8.7	1.00 V	132	36.7	0.6

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	E

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	39.60	24.6 QP	40.0	-15.4	1.25 H	283	39.7	-15.1
2	68.71	22.5 QP	40.0	-17.5	1.50 H	254	38.4	-15.9
3	111.40	28.3 QP	43.5	-15.2	1.50 H	153	45.3	-17.0
4	280.21	20.2 QP	46.0	-25.8	2.00 H	149	32.6	-12.4
5	664.41	23.9 QP	46.0	-22.1	1.01 H	128	28.7	-4.8
6	965.17	29.5 QP	54.0	-24.5	1.50 H	11	28.6	0.9
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	45.42	27.2 QP	40.0	-12.8	1.00 V	79	41.9	-14.7
2	64.83	28.6 QP	40.0	-11.4	1.00 V	261	43.9	-15.3
3	117.22	27.4 QP	43.5	-16.1	1.00 V	232	43.7	-16.3
4	280.21	17.6 QP	46.0	-28.4	1.50 V	210	30.0	-12.4
5	639.19	24.5 QP	46.0	-21.5	1.00 V	13	29.6	-5.1
6	953.53	30.3 QP	46.0	-15.7	1.50 V	117	29.5	0.8

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

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	ESCI	100613	Nov. 21, 2016	Nov. 20, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
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 1.
3. The VCCI Site Registration No. is C-2040.

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.

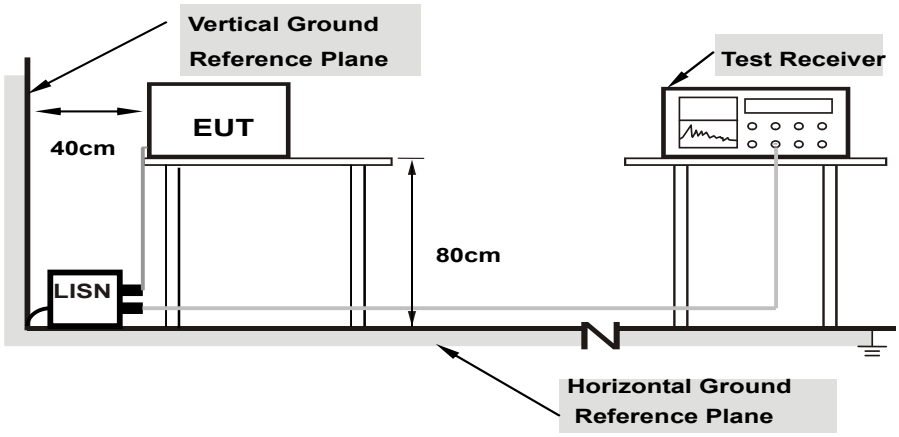
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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: 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

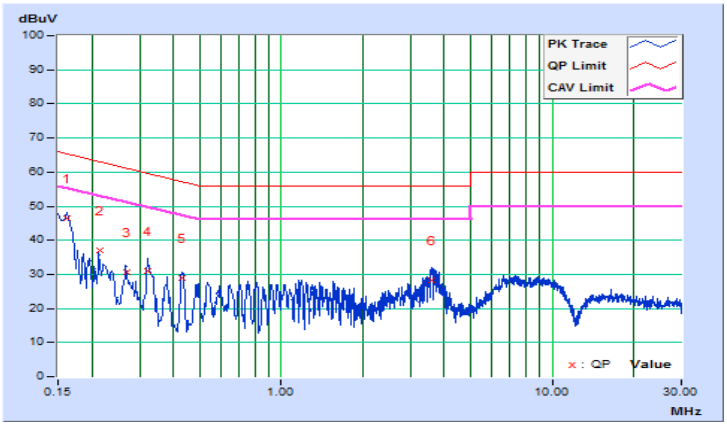
GFSK

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	A

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16096	10.41	36.17	26.28	46.58	36.69	65.41	55.41	-18.83	-18.72
2	0.21282	10.44	26.46	17.97	36.90	28.41	63.09	53.09	-26.19	-24.68
3	0.26765	10.46	20.28	12.82	30.74	23.28	61.19	51.19	-30.45	-27.91
4	0.32017	10.48	20.64	12.17	31.12	22.65	59.70	49.70	-28.58	-27.05
5	0.42895	10.51	18.35	12.09	28.86	22.60	57.27	47.27	-28.41	-24.67
6	3.58298	10.63	17.56	2.86	28.19	13.49	56.00	46.00	-27.81	-32.51

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.

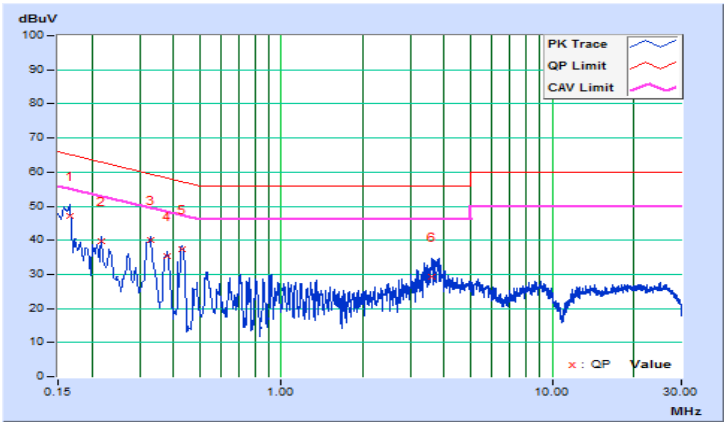


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	A

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16526	10.17	36.96	27.01	47.13	37.18	65.20	55.20	-18.07	-18.02
2	0.21565	10.20	29.53	22.13	39.73	32.33	62.98	52.98	-23.25	-20.65
3	**0.32786**	**10.22**	**29.86**	**26.71**	**40.08**	**36.93**	**59.51**	**49.51**	**-19.43**	**-12.58**
4	0.37700	10.23	25.24	21.07	35.47	31.30	58.35	48.35	-22.88	-17.05
5	0.42895	10.23	27.08	23.93	37.31	34.16	57.27	47.27	-19.96	-13.11
6	3.58298	10.40	18.85	5.29	29.25	15.69	56.00	46.00	-26.75	-30.31

REMARKS:

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

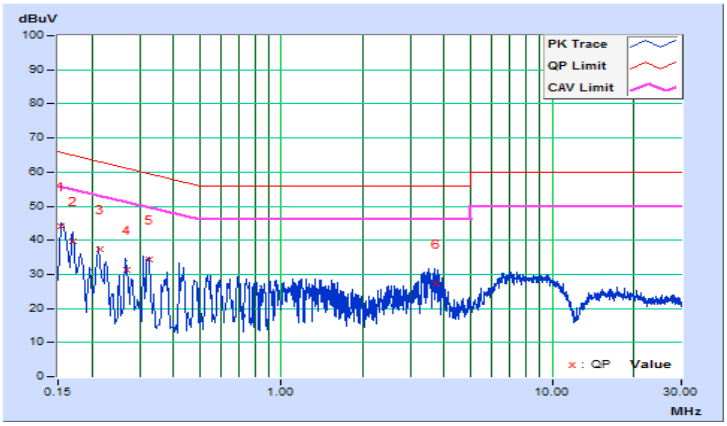


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	B

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.41	33.53	21.49	43.94	31.90	65.79	55.79	-21.85	-23.89
2	0.16967	10.41	29.40	16.26	39.81	26.67	64.98	54.98	-25.17	-28.31
3	0.21282	10.44	27.10	19.71	37.54	30.15	63.09	53.09	-25.55	-22.94
4	0.26765	10.46	20.89	15.22	31.35	25.68	61.19	51.19	-29.84	-25.51
5	0.32357	10.48	23.85	17.01	34.33	27.49	59.61	49.61	-25.28	-22.12
6	3.72765	10.64	16.56	1.36	27.20	12.00	56.00	46.00	-28.80	-34.00

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.

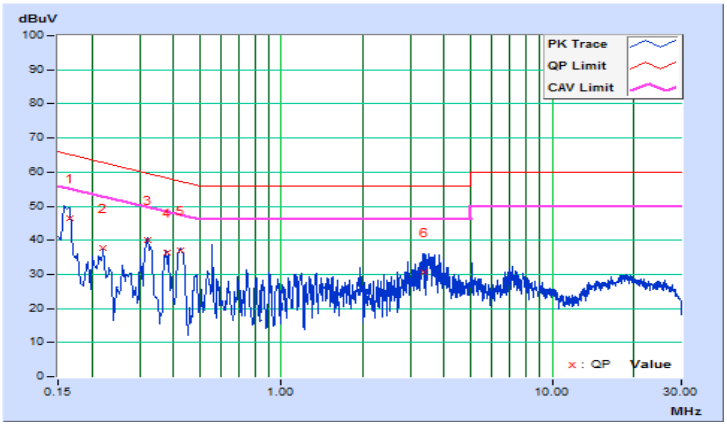


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	B

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16526	10.17	36.44	25.14	46.61	35.31	65.20	55.20	-18.59	-19.89
2	0.21851	10.20	27.61	18.58	37.81	28.78	62.88	52.88	-25.07	-24.10
3	0.32017	10.22	29.69	25.97	39.91	36.19	59.70	49.70	-19.79	-13.51
4	0.37700	10.23	26.12	21.22	36.35	31.45	58.35	48.35	-22.00	-16.90
5	0.42334	10.23	26.64	21.69	36.87	31.92	57.38	47.38	-20.51	-15.46
6	3.35229	10.38	20.24	5.26	30.62	15.64	56.00	46.00	-25.38	-30.36

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.

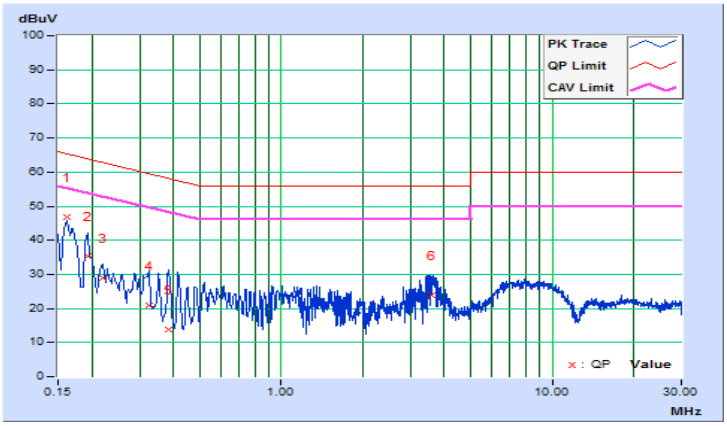


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	C

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16096	10.41	36.52	26.58	46.93	36.99	65.41	55.41	-18.48	-18.42
2	0.19255	10.43	24.82	16.84	35.25	27.27	63.93	53.93	-28.68	-26.66
3	0.21851	10.44	18.53	9.27	28.97	19.71	62.88	52.88	-33.91	-33.17
4	0.32357	10.48	10.36	1.71	20.84	12.19	59.61	49.61	-38.77	-37.42
5	0.38199	10.50	3.23	-2.75	13.73	7.75	58.24	48.24	-44.51	-40.49
6	3.57907	10.63	13.36	2.67	23.99	13.30	56.00	46.00	-32.01	-32.70

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.

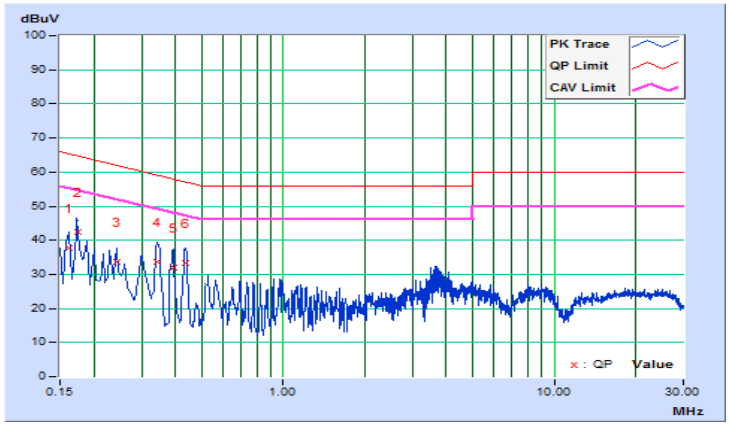


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	C

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16096	10.16	27.43	17.00	37.59	27.16	65.41	55.41	-27.82	-28.25
2	0.17374	10.18	32.25	22.10	42.43	32.28	64.78	54.78	-22.35	-22.50
3	0.24215	10.21	23.46	18.10	33.67	28.31	62.02	52.02	-28.35	-23.71
4	0.34108	10.22	23.38	18.55	33.60	28.77	59.18	49.18	-25.58	-20.41
5	0.39219	10.23	21.73	6.78	31.96	17.01	58.02	48.02	-26.06	-31.01
6	0.43350	10.23	22.96	11.61	33.19	21.84	57.19	47.19	-24.00	-25.35

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.

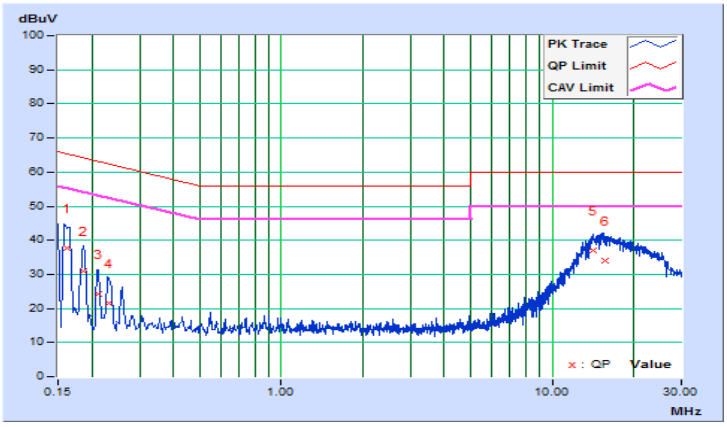


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	D

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16224	10.41	27.30	2.55	37.71	12.96	65.35	55.35	-27.64	-42.39
2	0.18508	10.42	20.54	-0.57	30.96	9.85	64.25	54.25	-33.29	-44.40
3	0.21256	10.44	13.97	-2.24	24.41	8.20	63.10	53.10	-38.69	-44.90
4	0.23211	10.44	11.25	-2.81	21.69	7.63	62.37	52.37	-40.68	-44.74
5	14.11261	11.11	25.94	17.70	37.05	28.81	60.00	50.00	-22.95	-21.19
6	15.61405	11.19	22.93	15.51	34.12	26.70	60.00	50.00	-25.88	-23.30

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.

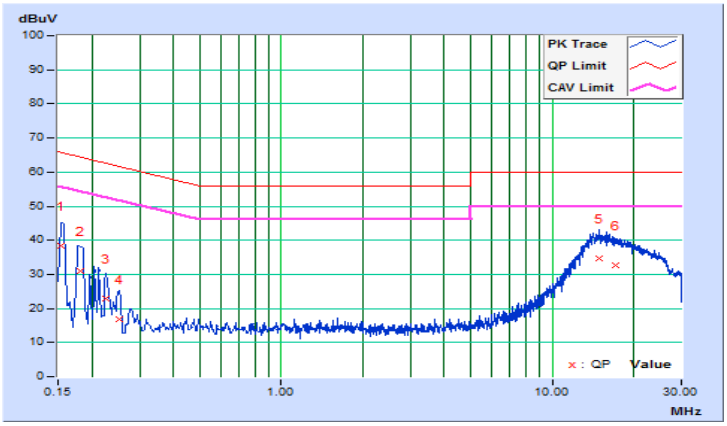


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	D

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.16	28.11	3.04	38.27	13.20	65.79	55.79	-27.52	-42.59
2	0.18128	10.18	20.95	-0.23	31.13	9.95	64.43	54.43	-33.30	-44.48
3	0.22434	10.20	12.77	-2.45	22.97	7.75	62.66	52.66	-39.69	-44.91
4	0.25125	10.21	6.73	-3.37	16.94	6.84	61.72	51.72	-44.78	-44.88
5	14.84281	10.83	23.98	16.30	34.81	27.13	60.00	50.00	-25.19	-22.87
6	17.08421	10.93	21.81	14.60	32.74	25.53	60.00	50.00	-27.26	-24.47

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.

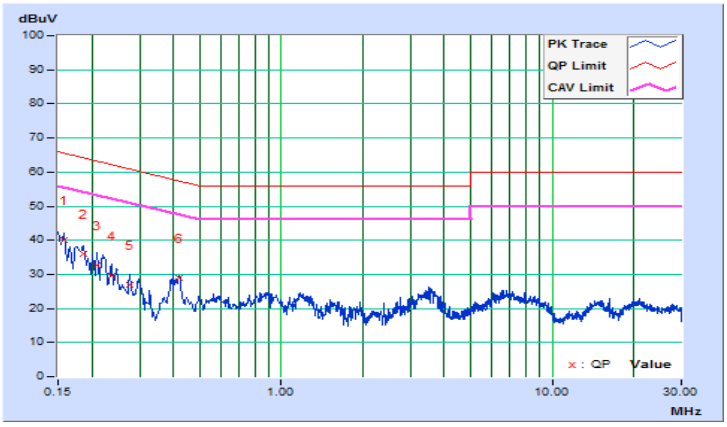


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	E

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15719	10.41	29.61	17.52	40.02	27.93	65.61	55.61	-25.59	-27.68
2	0.18508	10.42	25.51	12.70	35.93	23.12	64.25	54.25	-28.32	-31.13
3	0.20783	10.43	22.29	9.39	32.72	19.82	63.29	53.29	-30.57	-33.47
4	0.23586	10.44	19.21	7.20	29.65	17.64	62.24	52.24	-32.59	-34.60
5	0.27480	10.46	16.32	5.43	26.78	15.89	60.97	50.97	-34.19	-35.08
6	0.41780	10.51	18.30	11.41	28.81	21.92	57.49	47.49	-28.68	-25.57

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.

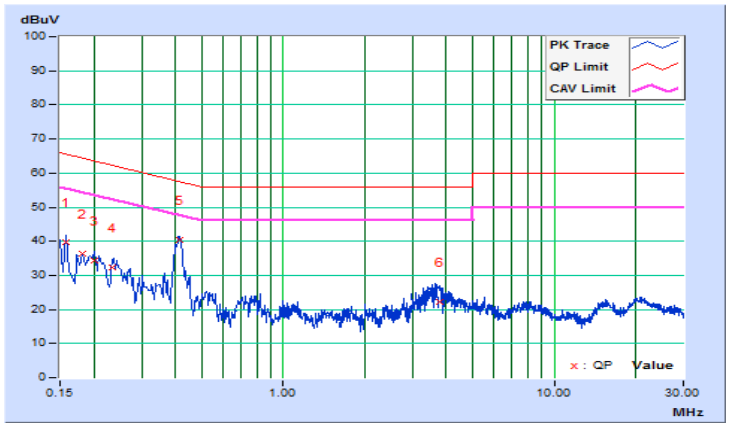


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 39	Test Mode	E

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15719	10.16	29.49	17.89	39.65	28.05	65.61	55.61	-25.96	-27.56
2	0.18075	10.18	26.32	14.60	36.50	24.78	64.45	54.45	-27.95	-29.67
3	0.19978	10.20	24.29	14.39	34.49	24.59	63.62	53.62	-29.13	-29.03
4	0.23277	10.20	22.23	12.16	32.43	22.36	62.35	52.35	-29.92	-29.99
5	0.41197	10.23	30.17	23.11	40.40	33.34	57.61	47.61	-17.21	-14.27
6	3.75893	10.41	11.88	3.75	22.29	14.16	56.00	46.00	-33.71	-31.84

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.



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.

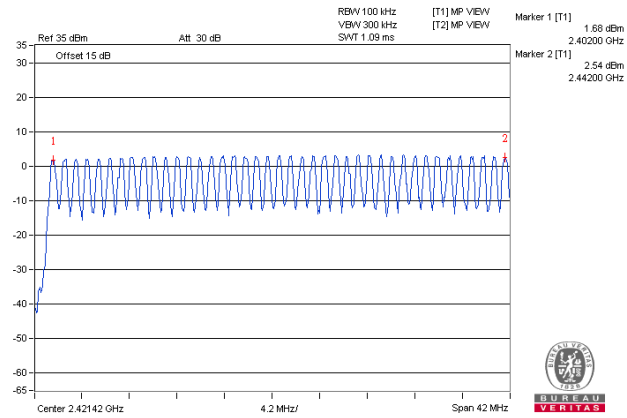
4.3.5 Deviation from Test Standard

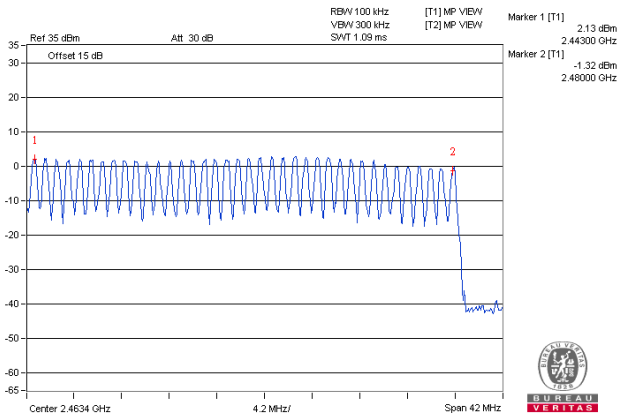
No deviation.

4.3.6 Test Results

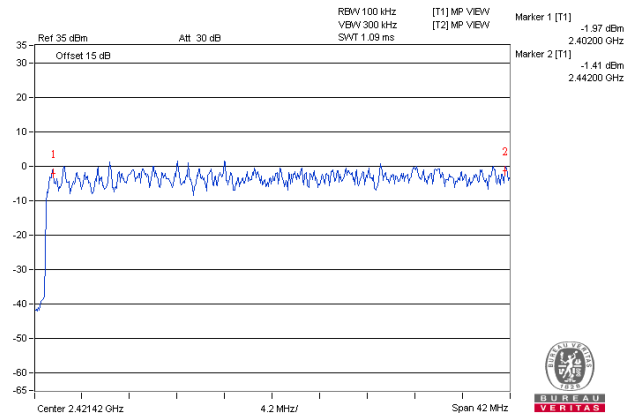
There are 79 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

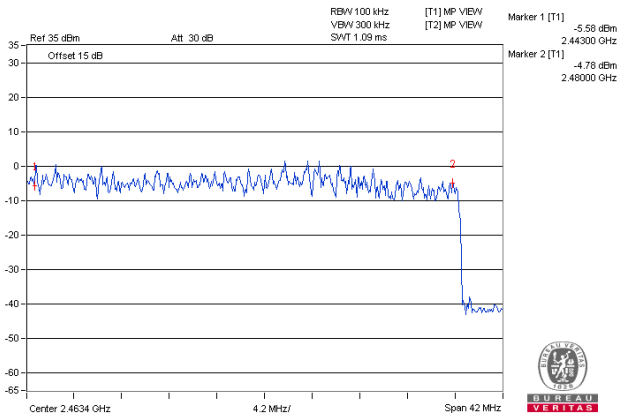
GFSK


RBW 100 kHz
VBW 300 kHz
SWT 1.09 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
1.68 dBm
2.40200 GHz
Marker 2 [T1]
2.54 dBm
2.44200 GHz
Ref 35 dBm
Att 30 dB
Offset 15 dB
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


RBW 100 kHz
VBW 300 kHz
SWT 1.09 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
2.13 dBm
2.44300 GHz
Marker 2 [T1]
-1.32 dBm
2.48000 GHz
Ref 35 dBm
Att 30 dB
Offset 15 dB
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

8DPSK


RBW 100 kHz
VBW 300 kHz
SWT 1.09 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
-1.97 dBm
2.40200 GHz
Marker 2 [T1]
-1.41 dBm
2.44200 GHz
Ref 35 dBm
Att 30 dB
Offset 15 dB
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz

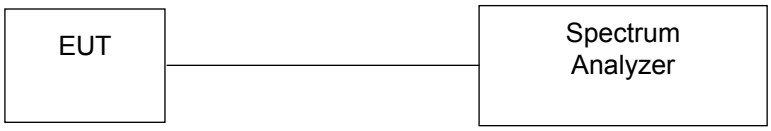

RBW 100 kHz
VBW 300 kHz
SWT 1.09 ms
[T1] MP VIEW
[T2] MP VIEW
Marker 1 [T1]
-5.58 dBm
2.44300 GHz
Marker 2 [T1]
-4.78 dBm
2.48000 GHz
Ref 35 dBm
Att 30 dB
Offset 15 dB
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

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.

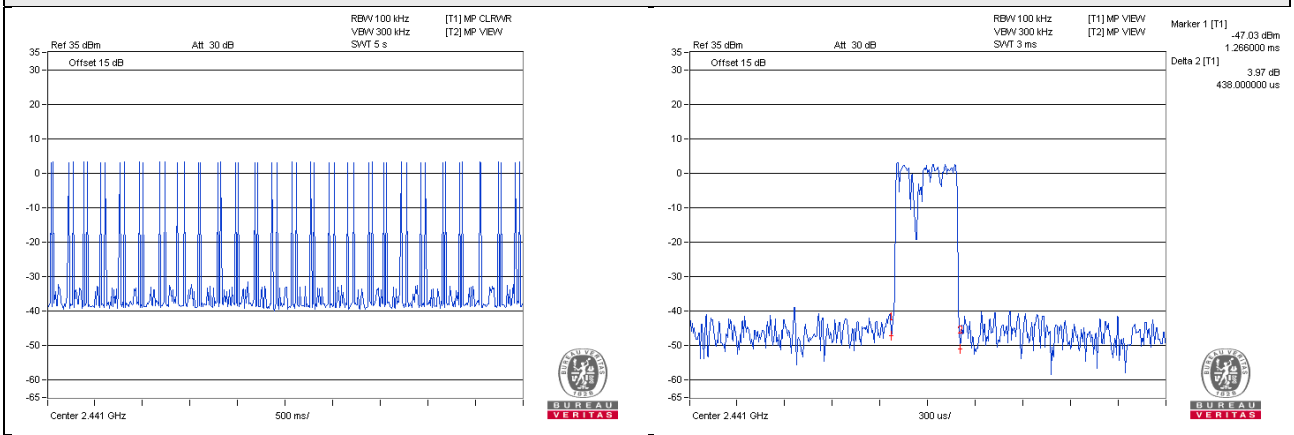
4.4.6 Test Results

GFSK

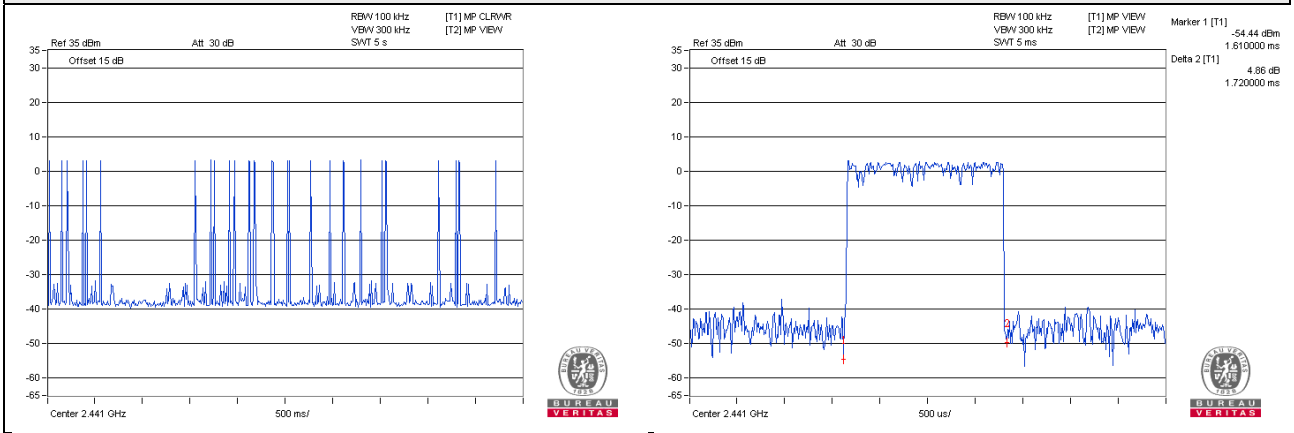
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) * 6.32 = 322.32 times	0.438	141.18	400
DH3	26 (times / 5 sec) * 6.32 = 164.32 times	1.720	282.63	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.928	314.58	400

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

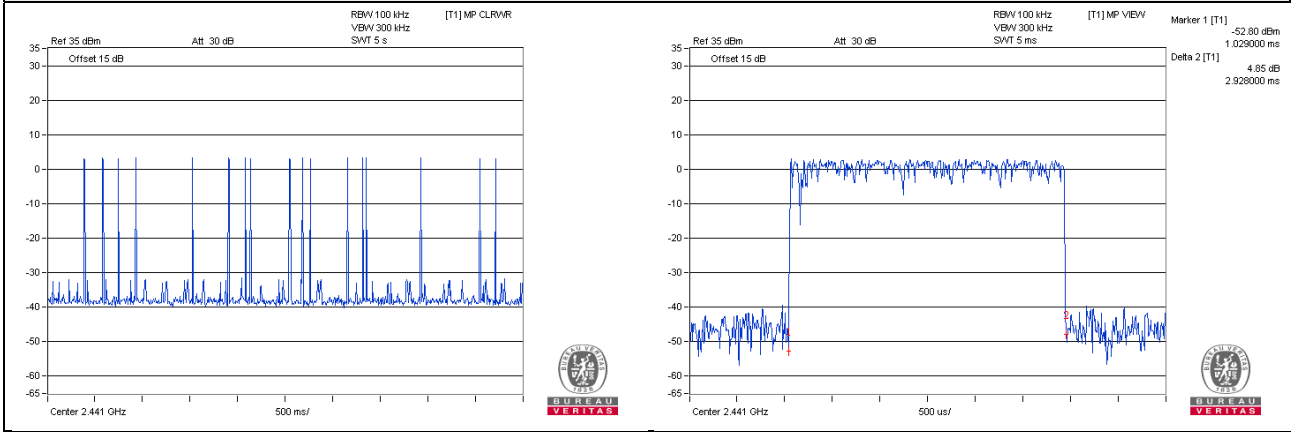
DH1



DH3



DH5

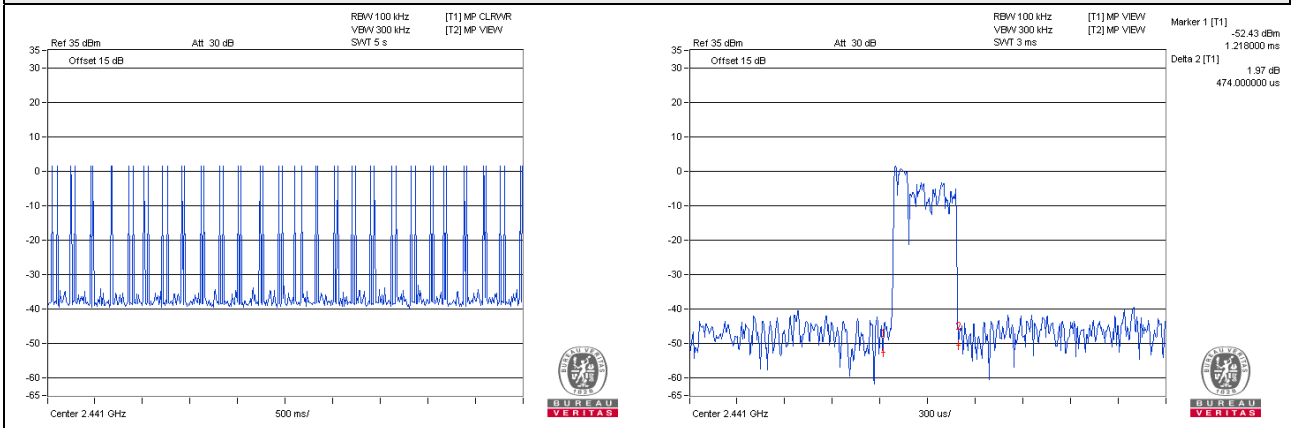


8DPSK

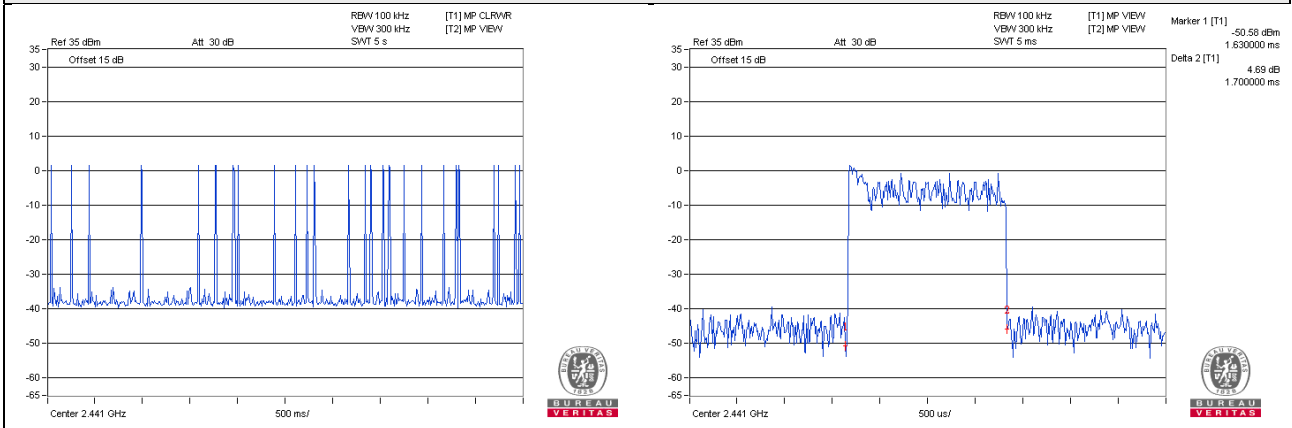
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.474	149.78	400
DH3	26 (times / 5 sec) * 6.32 = 164.32 times	1.700	279.34	400
DH5	16 (times / 5 sec) * 6.32 = 101.12 times	2.980	301.34	400

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

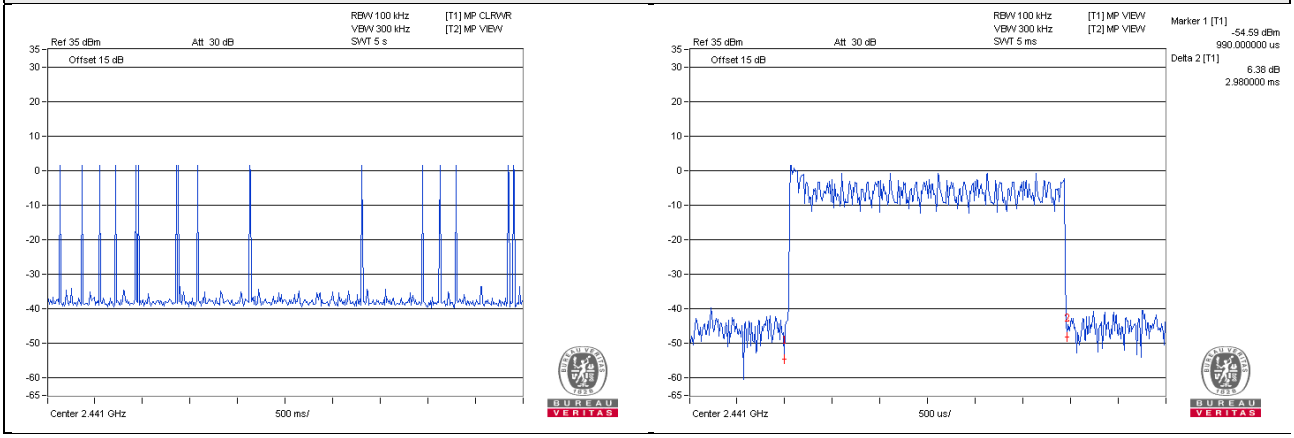
DH1



DH3



DH5

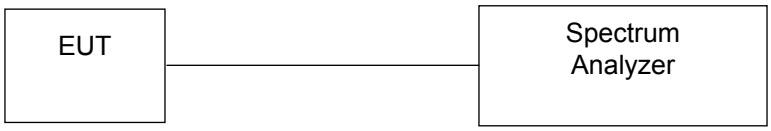


4.5 Channel Bandwidth

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.

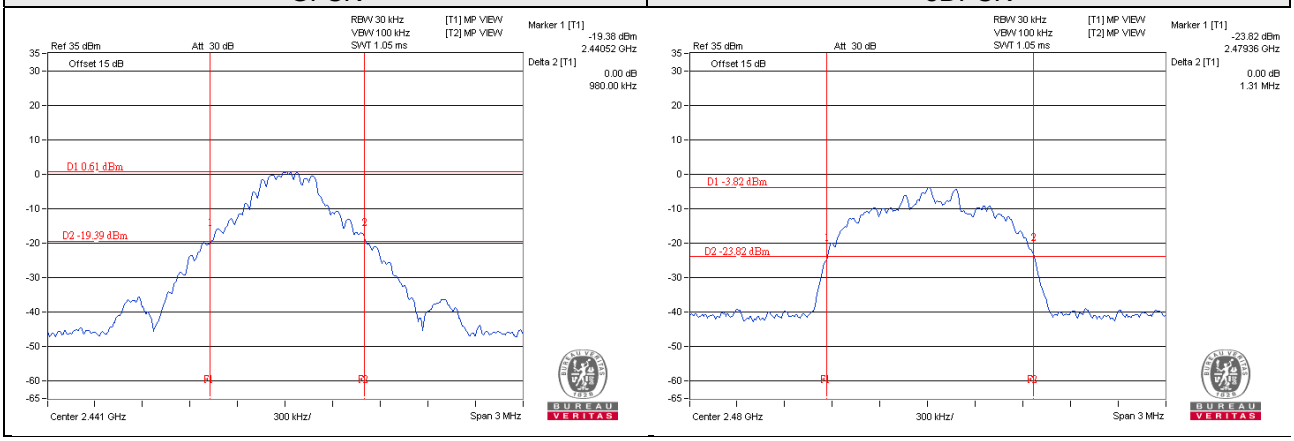
4.5.6 EUT Operating Condition

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

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	
		GFSK	8DPSK
0	2402	0.96	1.30
39	2441	0.98	1.30
78	2480	0.97	1.31

SPECTRUM PLOT OF WORST VALUE	
GFSK	8DPSK



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.

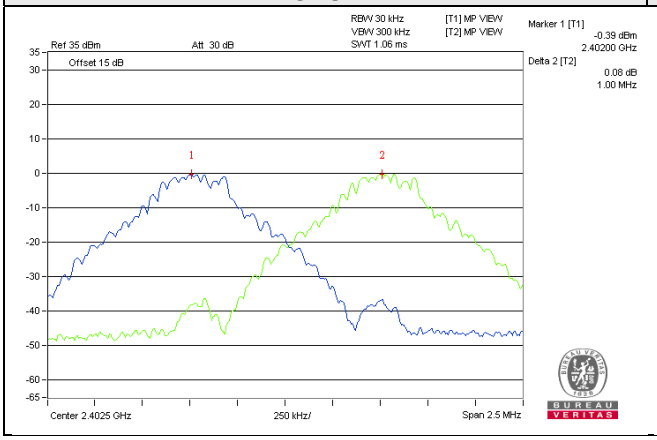
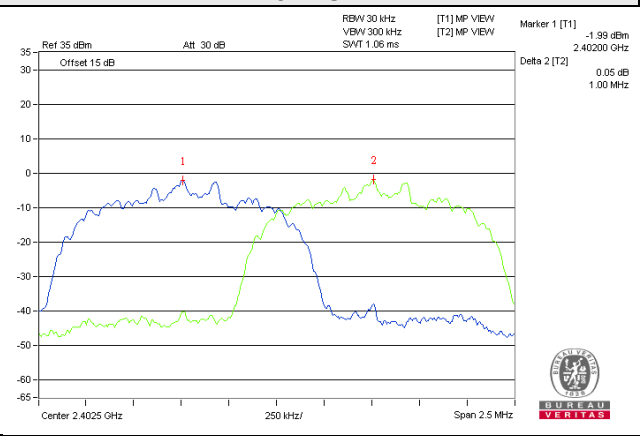
4.6.5 Deviation from Test Standard

No deviation.

4.6.6 Test Results

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	0.96	1.30	0.64	0.87	Pass
39	2441	1.00	1.00	0.98	1.30	0.66	0.87	Pass
78	2480	1.00	1.00	0.97	1.31	0.65	0.88	Pass

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

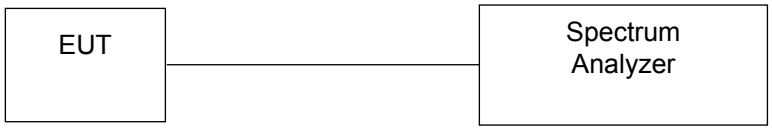
Spectrum Plot of Worst Value	
GFSK	8DPSK
	

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

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

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

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

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

4.7.5 Deviation fromTest Standard

No deviation.

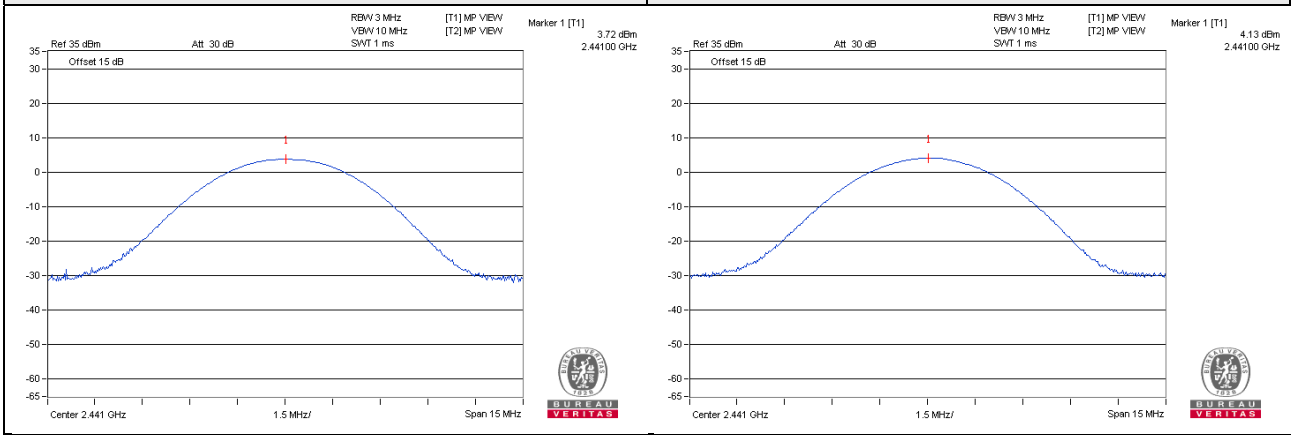
4.7.6 EUT Operating Condition

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

Channel	Frequency (MHz)	Peak Power (mW)		Peak Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	1.858	2.037	2.69	3.09	125	Pass
39	2441	2.355	**2.588**	3.72	4.13	125	Pass
78	2480	1.186	1.256	0.74	0.99	125	Pass

Spectrum Plot of Worst Value	
GFSK	8DPSK



Channel	Frequency (MHz)	Average Power (mW)		Average Power (dBm)	
		GFSK	8DPSK	GFSK	8DPSK
0	2402	1.500	1.112	1.76	0.46
39	2441	1.770	1.503	2.48	1.77
78	2480	1.199	0.959	0.79	-0.18

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

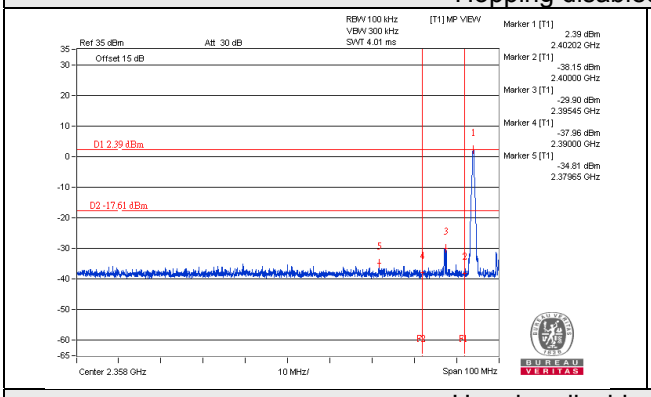
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

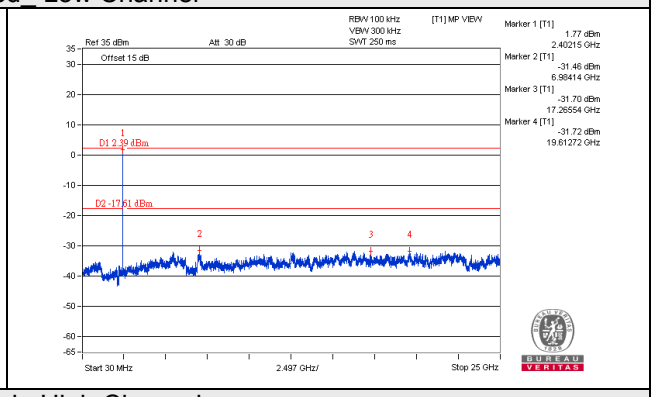
4.8.6 Test Results

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.

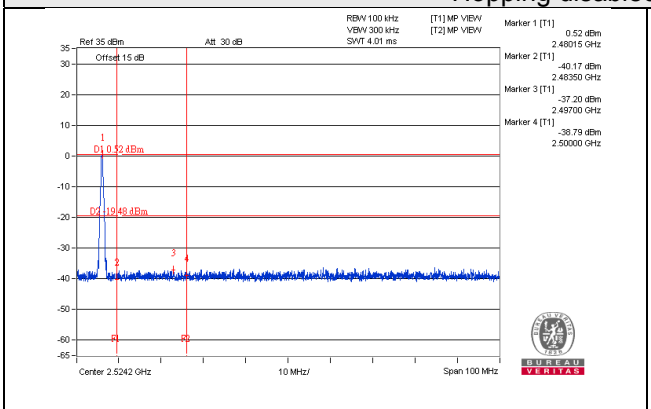
GFSK

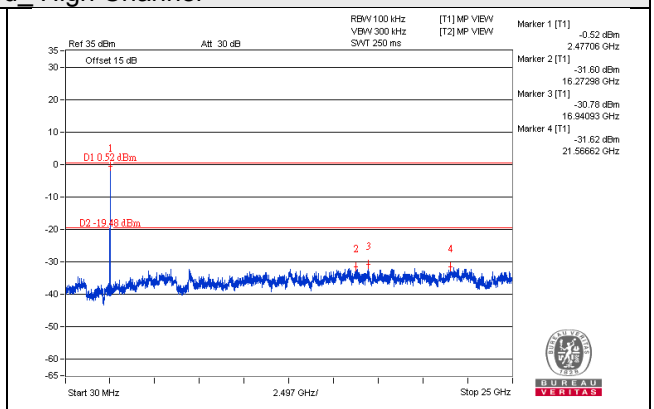
Hopping disabled_ Low Channel



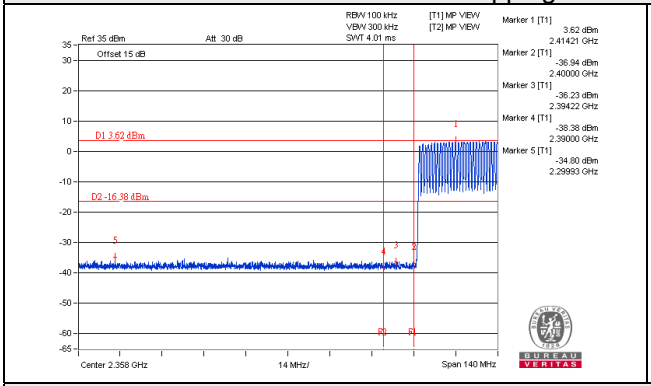


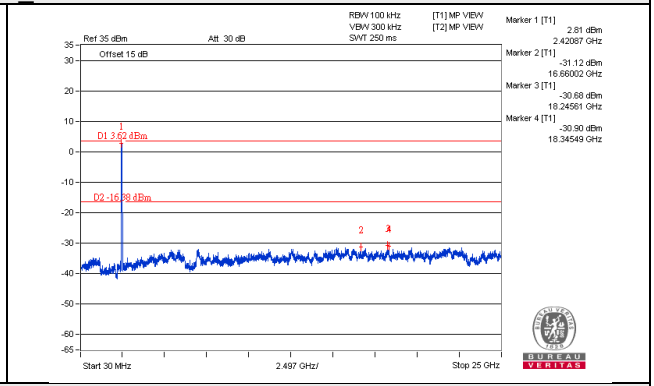
Hopping disabled_ High Channel



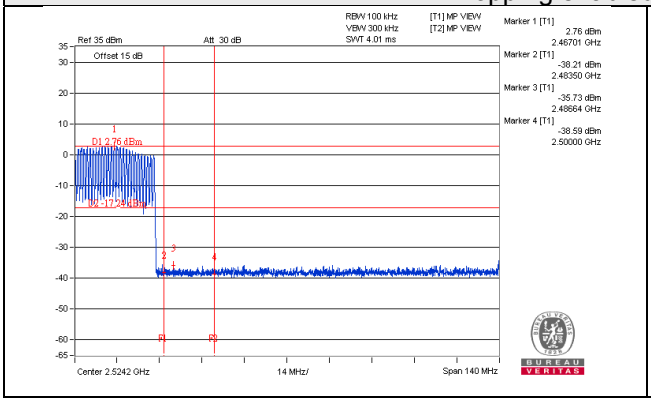


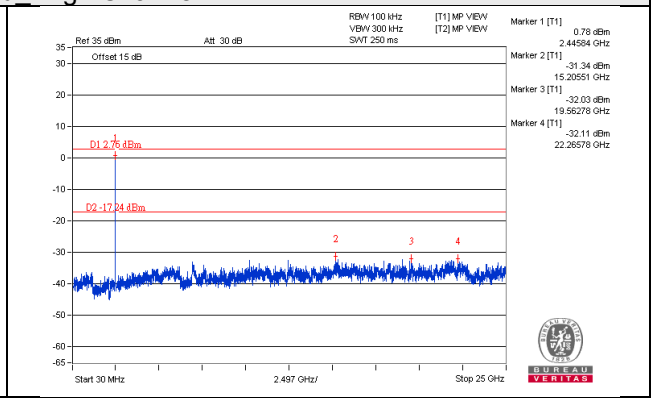
Hopping enabled_ Low Channel





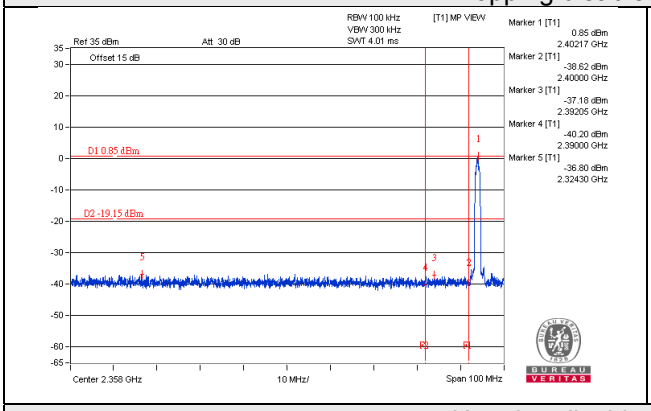
Hopping enabled_ High Channel

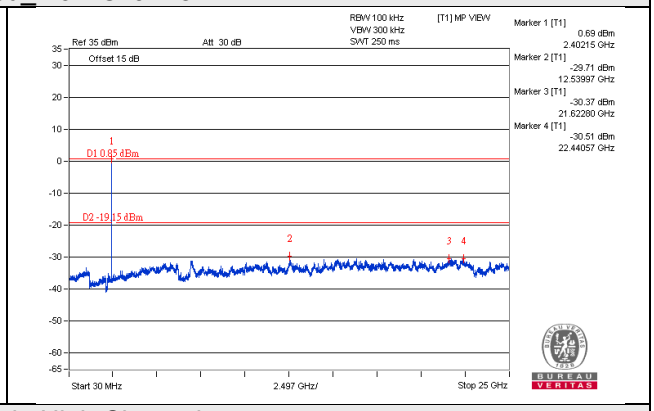




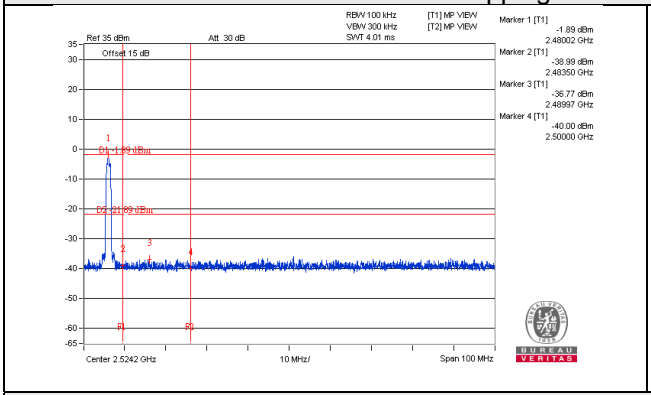
8DPSK

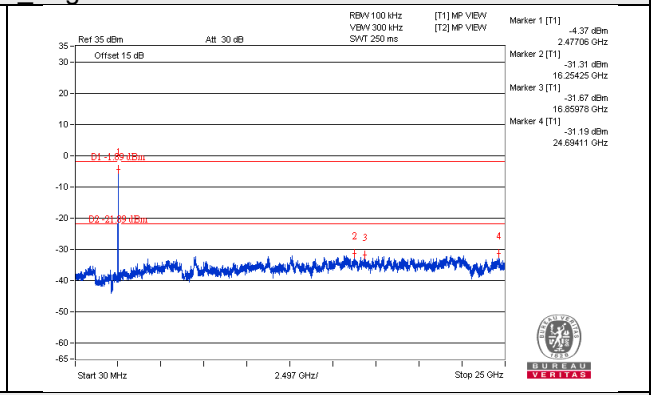
Hopping disabled_ Low Channel



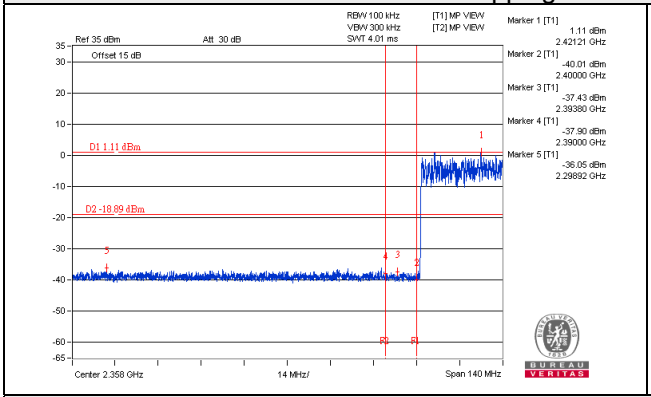


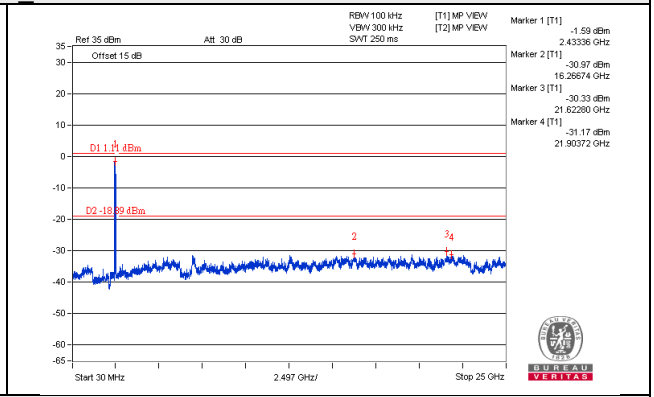
Hopping disabled_ High Channel



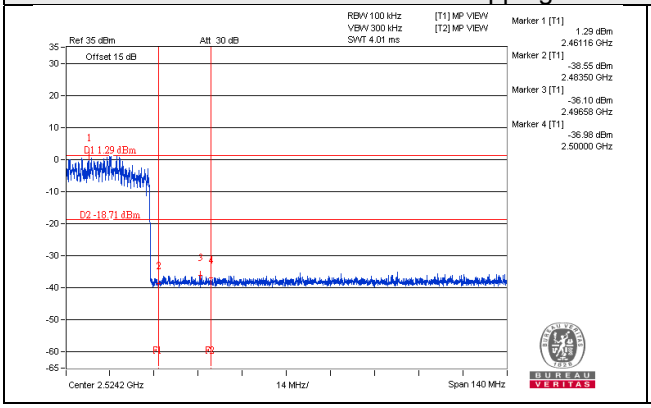


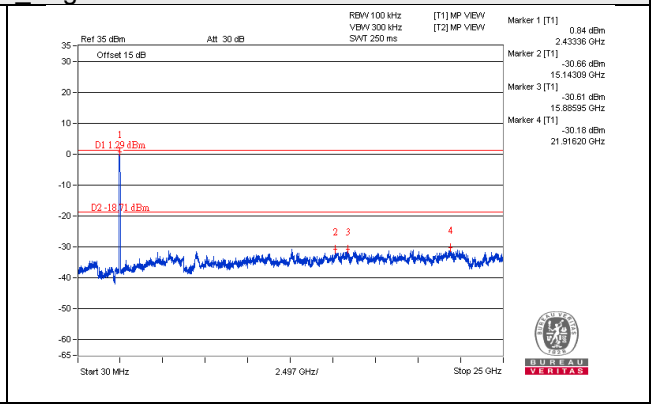
Hopping enabled_ Low Channel





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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