Supplementary FCC Test Report (BT-EDR)

Report No.:	RF111028C08I-2
FCC ID:	UZ7211486030B
Test Model:	21-148603-0B
Received Date:	Jan. 09, 2019
Test Date:	Jan. 19 to Feb. 27, 2019
Issued Date:	Mar. 15, 2019
Applicant:	Zebra Technologies Corporation
Address:	1 Zebra Plaza, Holtsville, NY 11742
Manufacturer:	Symbol Technologies, Inc.
Address:	1 Zebra Plaza, Holtsville, NY 11742
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

Table of Contents

Report Issue History Record of EUT (21-148603-0B)

<table>
<tr><th>Attachment No.</th><th>Issue Date</th><th>Description</th></tr>
<tr><td>111028C08A</td><td>Mar. 09, 2012</td><td>Original release.</td></tr>
<tr><td>111028C08F</td><td>Apr. 27, 2016</td><td>Upgrade the standard to section 15.407 under new rule.</td></tr>
<tr><td>111028C08H-2</td><td>Sep. 13, 2017</td><td>Change RF Switch (2nd source pin to pin)</td></tr>
<tr><td>111028C08I-2</td><td></td><td>2nd source changed. Component changes as listed below table.
<table>
<tr><th>Alternative Parts Location</th><th>Description</th></tr>
<tr><td>U14</td><td>WiFi Dual Band Diplexer</td></tr>
<tr><td>C24</td><td>20pF cap for GPS</td></tr>
<tr><td>C55,C57,C60</td><td>8.2pF cap for WiFi</td></tr>
<tr><td>C9, C10, C11, C12, C13</td><td>1uF cap for WiFi BT</td></tr>
<tr><td>FLT1</td><td>Band Pass Filter for 2.4GHz WiFi</td></tr>
<tr><td>C23</td><td>1.8pF cap for GPS</td></tr>
<tr><td>C31</td><td>68pF cap for XTAL</td></tr>
<tr><td>C107,C108</td><td>10pF cap for WiFi</td></tr>
</table></td></tr>
</table>

Release Control Record

Issue No.	Description	Date Issued
RF111028C08I-2	Original release.	Mar. 15, 2019

1 Certificate of Conformity

Product:	Radio Module
Brand:	Zebra
Test Model:	21-148603-0B
Sample Status:	ENGINEERING SAMPLE
Applicant:	Zebra Technologies Corporation
Test Date:	Jan. 19 to Feb. 27, 2019
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:** Mar. 15, 2019

Claire Kuan / Specialist

Approved by : _____ , **Date:** Mar. 15, 2019

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.205 & 209 & 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.8dB at 2483.50MHz.

NOTE: 1. This is a supplementary report. (2nd source changed)

2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.16 dB
	6GHz ~ 18GHz	4.91 dB
	18GHz ~ 40GHz	5.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (BT-EDR)

Product	Radio Module
Brand	Zebra
Test Model	21-148603-0B
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V
Modulation Type	GFSK, π/4-DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	Up to 3Mbps
Operating Frequency	2402MHz ~ 2480MHz
Number of Channel	79
Output Power	13.709mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC Class II permissive change. The difference compared with the Report No.: RF111028C08H-2 design is as the following information:

   ◆ 2nd source changed. Component changes as listed below table.

Alternative Parts Location	Description
U14	WiFi Dual Band Diplexer
C24	20pF cap for GPS
C55,C57,C60	8.2pF cap for WiFi
C9, C10, C11, C12, C13	1uF cap for WiFi BT
FLT1	Band Pass Filter for 2.4GHz WiFi
C23	1.8pF cap for GPS
C31	68pF cap for XTAL
C107,C108	10pF cap for WiFi

2. According to above conditions, only Conducted power and Radiated emissions test item need to be performed. And all data was verified to meet the requirements.
3. There are Bluetooth technology, GPS technology and WLAN technology used for the EUT.
4. The antennas provided to the EUT, please refer to the following table:

No.	Type	Connector	Model	Peak Gain (dBi)	Cable loss (dB)	Net Peak Gain (dBi)	Trace
1	Dipole-1	Reverse SMA	ML-2452-APA2-01 Rev C	2.4GHz : 3 5GHz : 5	2.4GHz : 0.75 5GHz : 1.3	2.4GHz : 2.25 5GHz : 3.7	WiFi
2	Dipole-2	Reverse SMA	C492-510032-A	1.8	2.35	-0.55	BT
3	Chip	Reverse SMA	NA	-	-		GPS

5. The EUT was included two SKU, which are identical to each other in all aspects except for the following table:

	P/N	Description
SKU #1	21-148603-02	Diversity version with WLAN and BT on SHARED RF paths
SKU #2	21-148603-04	NON-Diversity version with WLAN and BT on SHARED RF paths

SKU #1, the worse case one, was chosen for final test.

6. Spurious Emission of the simultaneous operation (WiFi & Bluetooth) have been evaluated and no non-compliance found. (The device can transmit simultaneously on WLAN (5GHz) mode and Bluetooth mode; other modes can't support simultaneously ability.)
7. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

79 channels are provided for BT-EDR mode:

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE≥1G	RE<1G	APCM	
-	√	√	√	

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

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	39	FHSS	GFSK	DH5
0 to 78	39	FHSS	8DPSK	3DH5

Antenna Port Conducted Measurement:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

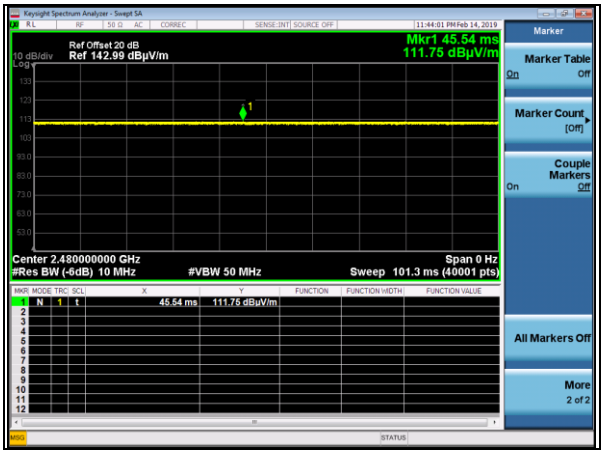
AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (system)	TESTED BY
RE≥1G	22deg. C, 65%RH	120Vac, 60Hz	Steven Chiang
RE<1G	24deg. C, 74%RH	120Vac, 60Hz	Frank Chuang
APCM	24deg. C, 60%RH	120Vac, 60Hz	Weiwei Lo

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.



3.4 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.	Test Tool	Zebra	NA	NA	NA	Supplied by client
B.	DC Powersupply	GOOD WILL INSTRUMENT CO., LTD	GPC-3030D	E847076	NA	Provided by Lab
C.	Laptop	Dell	E6400	NA	NA	Supplied by client

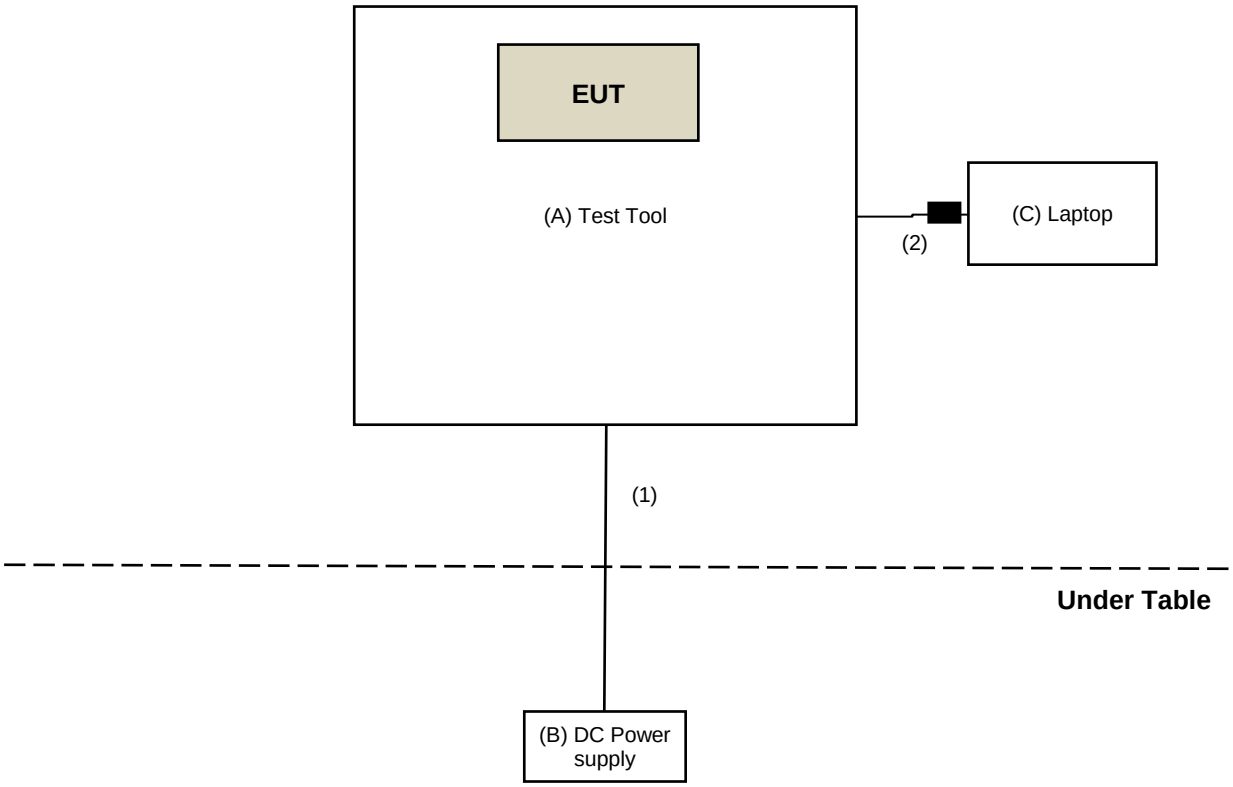
Note:

1. 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	1	1.8	No	0	Provided by Lab
2.	USB Cable	1	1	Yes	1	Supplied by client

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 15.247 Meas Guidance v05r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

4.1.2 Test Instruments

For radiated emissions test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-3-1	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-2	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200	160922	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	180601	June 12, 2018	June 11, 2019
RF Cable	EMC104-SM-SM-6000	180602	June 12, 2018	June 11, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 23, 2018	July 22, 2019
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 966 Chamber No. 3.
3. The CANADA Site Registration No. is 20331-1
4. Loop antenna was used for all emissions below 30 MHz.
5. Tested Date: Jan. 19, 2019

For output power test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019

Note:

1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Feb. 27, 2019

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. Parallel, perpendicular, and ground-parallel orientations 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:

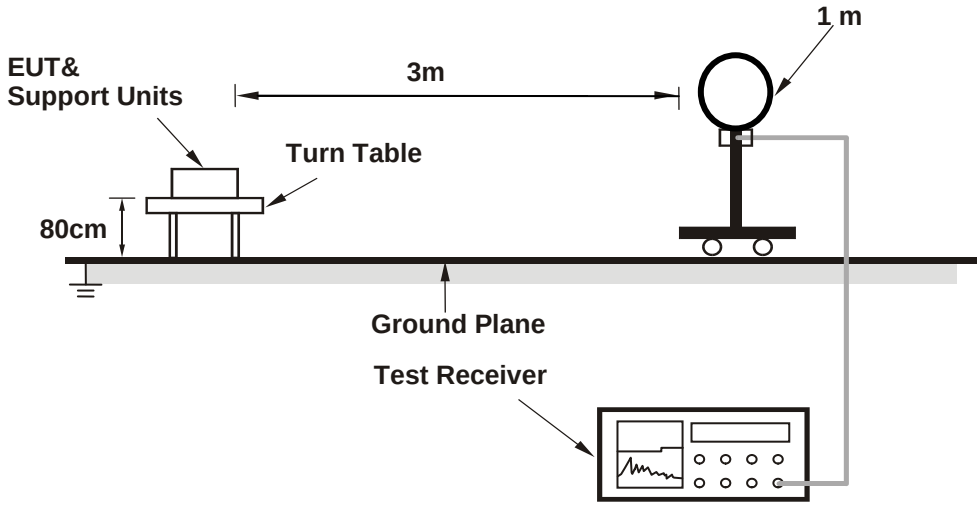
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

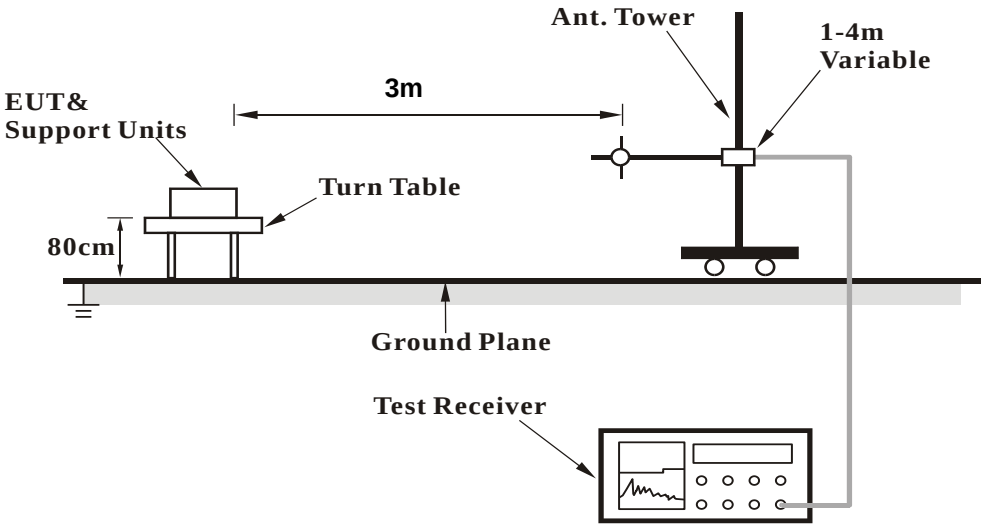
No deviation.

4.1.5 Test Setup

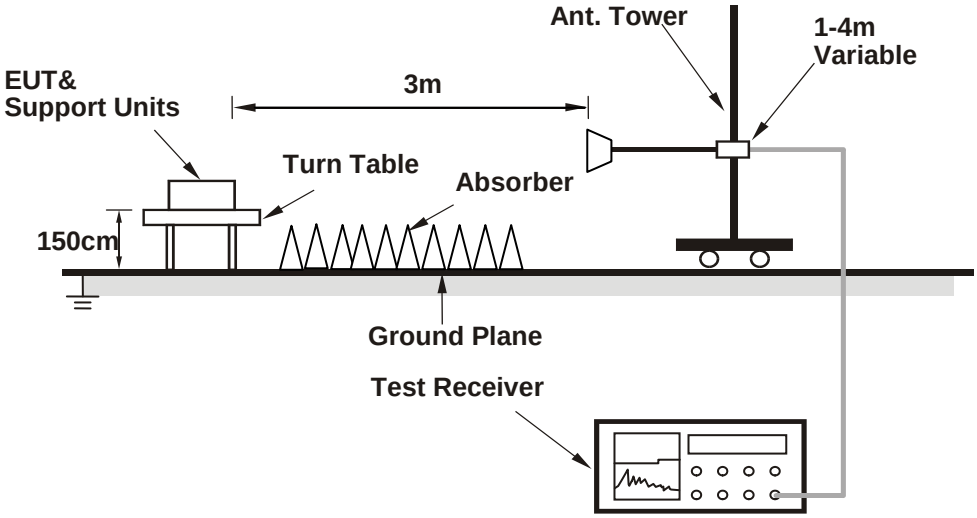
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connect the EUT with the support unit C (Laptop) which is placed on a testing table.

b. The communication partner run test program “HCITester (3.0.0.12) load BT Script.txt” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

BT_GFSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	55.2 PK	74.0	-18.8	3.27 H	55	57.3	-2.1
2	2390.00	42.8 AV	54.0	-11.2	3.27 H	55	44.9	-2.1
3	*2402.00	95.9 PK			3.27 H	55	98.0	-2.1
4	*2402.00	95.4 AV			3.27 H	55	97.5	-2.1
5	4804.00	49.4 PK	74.0	-24.6	3.80 H	147	47.3	2.1
6	4804.00	48.5 AV	54.0	-5.5	3.80 H	147	46.4	2.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	53.9 PK	74.0	-20.1	1.50 V	305	56.0	-2.1
2	2390.00	42.9 AV	54.0	-11.1	1.50 V	305	45.0	-2.1
3	*2402.00	105.8 PK			1.50 V	305	107.9	-2.1
4	*2402.00	105.5 AV			1.50 V	305	107.6	-2.1
5	4804.00	50.3 PK	74.0	-23.7	1.13 V	67	48.2	2.1
6	4804.00	49.6 AV	54.0	-4.4	1.13 V	67	47.5	2.1

REMARKS:

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

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK) 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	95.5 PK			1.30 H	66	97.8	-2.3
2	*2441.00	95.1 AV			1.30 H	66	97.4	-2.3
3	4882.00	49.4 PK	74.0	-24.6	3.71 H	156	47.3	2.1
4	4882.00	48.8 AV	54.0	-5.2	3.71 H	156	46.7	2.1
5	7323.00	46.4 PK	74.0	-27.6	1.30 H	238	38.4	8.0
6	7323.00	42.6 AV	54.0	-11.4	1.30 H	238	34.6	8.0
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	*2441.00	106.4 PK			1.44 V	328	108.7	-2.3
2	*2441.00	105.9 AV			1.44 V	328	108.2	-2.3
3	4882.00	50.3 PK	74.0	-23.7	1.16 V	92	48.2	2.1
4	4882.00	49.5 AV	54.0	-4.5	1.16 V	92	47.4	2.1
5	7323.00	50.7 PK	74.0	-23.3	1.33 V	98	42.7	8.0
6	7323.00	45.5 AV	54.0	-8.5	1.33 V	98	37.5	8.0

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

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK) 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	95.9 PK			1.45 H	51	98.3	-2.4
2	*2480.00	95.5 AV			1.45 H	51	97.9	-2.4
3	2483.50	55.6 PK	74.0	-18.4	1.45 H	51	58.0	-2.4
4	2483.50	43.0 AV	54.0	-11.0	1.45 H	51	45.4	-2.4
5	4960.00	48.5 PK	74.0	-25.5	3.81 H	151	46.2	2.3
6	4960.00	47.5 AV	54.0	-6.5	3.81 H	151	45.2	2.3
7	7440.00	46.6 PK	74.0	-27.4	1.19 H	236	38.3	8.3
8	7440.00	42.2 AV	54.0	-11.8	1.19 H	236	33.9	8.3
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	106.2 PK			1.53 V	309	108.6	-2.4
2	*2480.00	106.0 AV			1.53 V	309	108.4	-2.4
3	2483.50	56.2 PK	74.0	-17.8	1.53 V	309	58.6	-2.4
4	2483.50	45.5 AV	54.0	-8.5	1.53 V	309	47.9	-2.4
5	4960.00	49.9 PK	74.0	-24.1	1.10 V	70	47.6	2.3
6	4960.00	49.2 AV	54.0	-4.8	1.10 V	70	46.9	2.3
7	7440.00	51.0 PK	74.0	-23.0	1.40 V	104	42.7	8.3
8	7440.00	46.6 AV	54.0	-7.4	1.40 V	104	38.3	8.3

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.

BT_8DPSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.5 PK	74.0	-19.5	1.46 H	40	56.6	-2.1
2	2390.00	42.8 AV	54.0	-11.2	1.46 H	40	44.9	-2.1
3	*2402.00	96.3 PK			1.46 H	40	98.4	-2.1
4	*2402.00	91.6 AV			1.46 H	40	93.7	-2.1
5	4804.00	50.5 PK	74.0	-23.5	3.63 H	133	48.4	2.1
6	4804.00	41.2 AV	54.0	-12.8	3.63 H	133	39.1	2.1
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	57.7 PK	74.0	-16.3	1.56 V	319	59.8	-2.1
2	2390.00	43.1 AV	54.0	-10.9	1.56 V	319	45.2	-2.1
3	*2402.00	106.5 PK			1.56 V	319	108.6	-2.1
4	*2402.00	101.7 AV			1.56 V	319	103.8	-2.1
5	4804.00	52.4 PK	74.0	-21.6	1.14 V	115	50.3	2.1
6	4804.00	43.3 AV	54.0	-10.7	1.14 V	115	41.2	2.1

REMARKS:

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

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK) 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	95.9 PK			1.51 H	45	98.2	-2.3
2	*2441.00	90.2 AV			1.51 H	45	92.5	-2.3
3	4882.00	50.4 PK	74.0	-23.6	3.79 H	150	48.3	2.1
4	4882.00	40.9 AV	54.0	-13.1	3.79 H	150	38.8	2.1
5	7323.00	46.2 PK	74.0	-27.8	1.00 H	207	38.2	8.0
6	7323.00	37.7 AV	54.0	-16.3	1.00 H	207	29.7	8.0
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	*2441.00	106.7 PK			1.45 V	313	109.0	-2.3
2	*2441.00	101.8 AV			1.45 V	313	104.1	-2.3
3	4882.00	52.4 PK	74.0	-21.6	1.23 V	59	50.3	2.1
4	4882.00	42.7 AV	54.0	-11.3	1.23 V	59	40.6	2.1
5	7323.00	51.6 PK	74.0	-22.4	1.26 V	98	43.6	8.0
6	7323.00	43.3 AV	54.0	-10.7	1.26 V	98	35.3	8.0

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

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK) 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	97.8 PK			1.49 H	37	100.2	-2.4
2	*2480.00	92.8 AV			1.49 H	37	95.2	-2.4
3	2483.50	61.0 PK	74.0	-13.0	1.49 H	37	63.4	-2.4
4	2483.50	45.5 AV	54.0	-8.5	1.49 H	37	47.9	-2.4
5	4960.00	50.5 PK	74.0	-23.5	3.97 H	159	48.2	2.3
6	4960.00	41.5 AV	54.0	-12.5	3.97 H	159	39.2	2.3
7	7440.00	46.2 PK	74.0	-27.8	1.00 H	240	37.9	8.3
8	7440.00	38.2 AV	54.0	-15.8	1.00 H	240	29.9	8.3
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	107.7 PK			1.51 V	336	110.1	-2.4
2	*2480.00	102.9 AV			1.51 V	336	105.3	-2.4
3	**2483.50**	**70.2 PK**	**74.0**	**-3.8**	**1.51 V**	**336**	**72.6**	**-2.4**
4	2483.50	50.1 AV	54.0	-3.9	1.51 V	336	52.5	-2.4
5	4960.00	53.0 PK	74.0	-21.0	1.25 V	69	50.7	2.3
6	4960.00	43.2 AV	54.0	-10.8	1.25 V	69	40.9	2.3
7	7440.00	52.0 PK	74.0	-22.0	1.31 V	110	43.7	8.3
8	7440.00	42.5 AV	54.0	-11.5	1.31 V	110	34.2	8.3

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.

Below 1GHz Data:

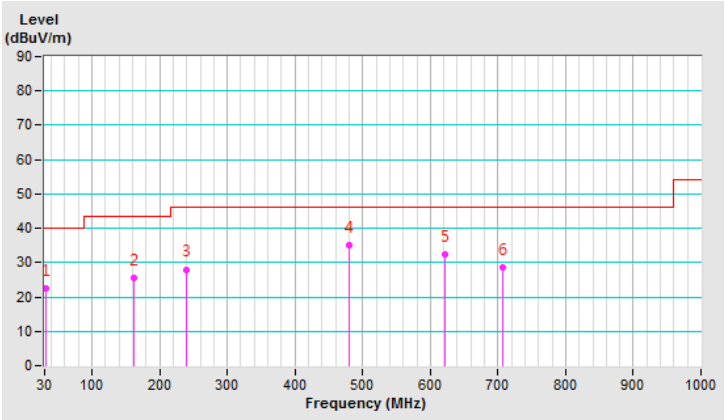
BT_GFSK

CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	31.84	22.4 QP	40.0	-17.6	1.00 H	103	32.2	-9.8
2	162.19	25.4 QP	43.5	-18.1	1.80 H	13	34.0	-8.6
3	239.90	28.0 QP	46.0	-18.0	1.00 H	260	37.3	-9.3
4	479.97	34.9 QP	46.0	-11.1	1.50 H	94	37.7	-2.8
5	622.11	32.4 QP	46.0	-13.6	1.50 H	152	31.9	0.5
6	706.94	28.7 QP	46.0	-17.3	1.50 H	245	27.0	1.7

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

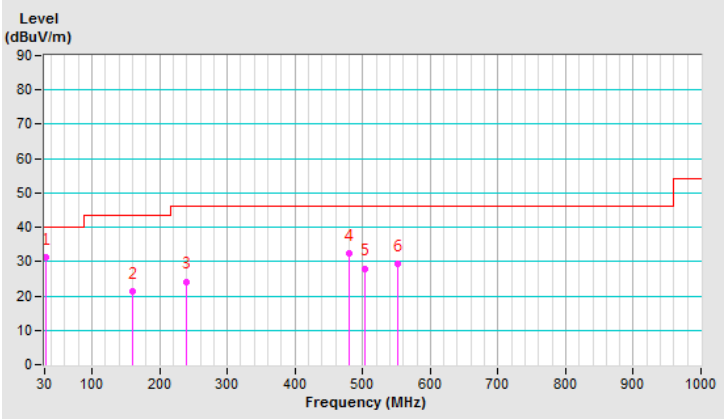


CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	32.02	31.3 QP	40.0	-8.7	1.00 V	85	41.1	-9.8
2	160.93	21.5 QP	43.5	-22.0	2.00 V	347	30.0	-8.5
3	240.01	24.2 QP	46.0	-21.8	1.00 V	67	33.5	-9.3
4	480.09	32.5 QP	46.0	-13.5	1.00 V	306	35.2	-2.7
5	503.97	28.0 QP	46.0	-18.0	1.00 V	37	29.9	-1.9
6	552.02	29.4 QP	46.0	-16.6	1.50 V	94	30.8	-1.4

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



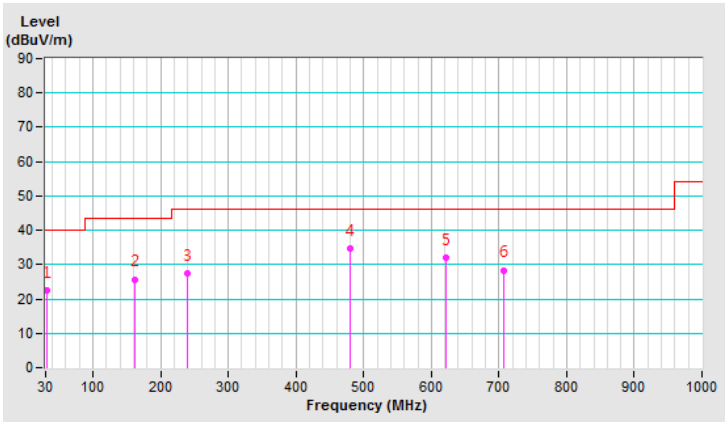
BT_8DPSK

CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	31.85	22.6 QP	40.0	-17.4	1.00 H	83	32.4	-9.8
2	162.21	25.7 QP	43.5	-17.8	1.00 H	83	34.3	-8.6
3	239.92	27.6 QP	46.0	-18.4	1.00 H	60	36.9	-9.3
4	479.99	34.6 QP	46.0	-11.4	1.00 H	144	37.4	-2.8
5	622.08	32.1 QP	46.0	-13.9	1.00 H	42	31.6	0.5
6	706.96	28.4 QP	46.0	-17.6	1.50 H	175	26.7	1.7

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

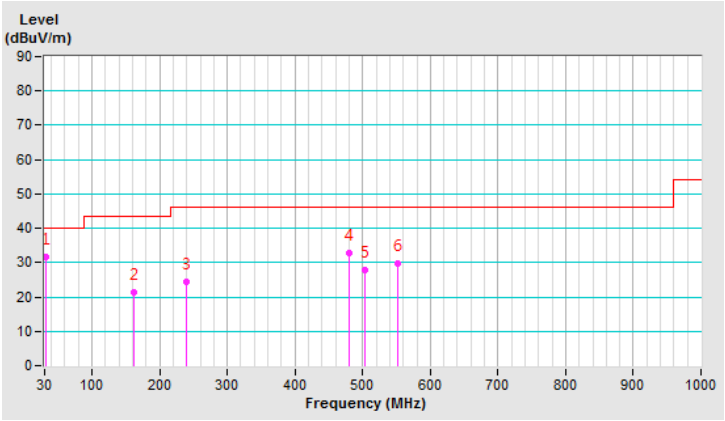


CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	31.97	31.5 QP	40.0	-8.5	1.50 V	125	41.3	-9.8
2	160.95	21.3 QP	43.5	-22.2	1.50 V	358	29.8	-8.5
3	240.03	24.4 QP	46.0	-21.6	2.00 V	117	33.7	-9.3
4	480.07	32.8 QP	46.0	-13.2	1.00 V	6	35.5	-2.7
5	503.99	27.8 QP	46.0	-18.2	1.50 V	97	29.7	-1.9
6	552.01	29.6 QP	46.0	-16.4	1.00 V	74	31.0	-1.4

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

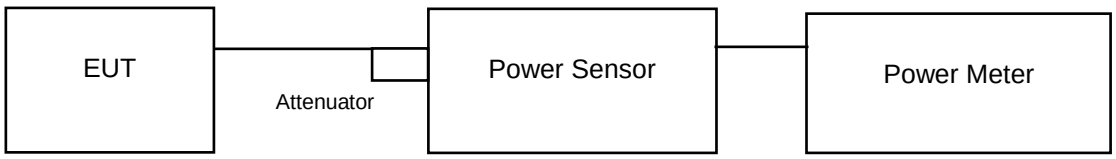


4.2 Maximum Output Power

4.2.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125mW.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

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

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Condition

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

4.2.7 Test Results

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	12.706	13.709	11.04	11.37	125	Pass
39	2441	10.641	11.508	10.27	10.61	125	Pass
78	2480	10.28	11.092	10.12	10.45	125	Pass

5 Pictures of Test Arrangements

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

Appendix – Information of 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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
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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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