

FCC Test Report (Co-located)

Report No.: RFBFKV-WTW-P23050559-6

FCC ID: L6AITH100-1

Test Model: ITH100-1

Received Date: May 23, 2023

Test Date: Aug. 01, 2023

Issued Date: Aug. 02, 2023

Applicant: BlackBerry Limited

Address: 2200 University Avenue East, Waterloo, Ontario, Canada N2K 0A7

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

**FCC Registration /
Designation Number:** 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBFKV-WTW-P23050559-6	Original Release	Aug. 02, 2023

1 Certificate of Conformity

Product: Radar H2M IS

Brand: BlackBerry

Test Model: ITH100-1

Sample Status: Engineering Sample

Applicant: BlackBerry Limited

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)

ANSI C63.10-2013

FCC Part 22, Subpart H

FCC Part 24, Subpart E

FCC Part 27, Subpart C, F, H, L

FCC Part 90, Subpart I, S

FCC Part 2

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 RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen, **Date:** Aug. 02, 2023
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin, **Date:** Aug. 02, 2023
Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247) FCC Part 22, Subpart H FCC Part 24, Subpart E FCC Part 27, Subpart C, F, H, L FCC Part 90 FCC Part 2			
FCC Clause	Test Item	Result	Remarks
15.205 /15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.1 dB at 4960.00 MHz.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -27.22 dB at 3490.00 MHz.

Note: 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) (\pm)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~1000MHz	2.92 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Radar H2M IS	
Brand	BlackBerry	
Test Model	ITH100-1	
Status of EUT	Engineering Sample	
Power Supply Rating	7.2Vdc from battery	
Modulation Type	904-926MHz	80kbps: half-sine shaped OQPSK 500kbps: 2GFSK
	2405-2480MHz	half-sine shaped O-QPSK
	Cat-M1	QPSK, 16QAM
Operating Frequency	904-926MHz	904-926MHz
	2405-2480MHz	2405-2480MHz
	Cat-M1	
	Cat-M1 Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7MHz ~ 1909.3MHz
	Cat-M1 Band 2 (Channel Bandwidth: 3 MHz)	1851.5MHz ~ 1908.5MHz
	Cat-M1 Band 2 (Channel Bandwidth: 5 MHz)	1852.5MHz ~ 1907.5MHz
	Cat-M1 Band 2 (Channel Bandwidth: 10 MHz)	1855.0MHz ~ 1905.0MHz
	Cat-M1 Band 2 (Channel Bandwidth: 15 MHz)	1857.5MHz ~ 1902.5MHz
	Cat-M1 Band 2 (Channel Bandwidth: 20 MHz)	1860.0MHz ~ 1900.0MHz
	Cat-M1 Band 5 (Channel Bandwidth 1.4MHz)	824.7MHz ~ 848.3MHz
	Cat-M1 Band 5 (Channel Bandwidth 3MHz)	825.5MHz ~ 847.5MHz
	Cat-M1 Band 5 (Channel Bandwidth 5MHz)	826.5MHz ~ 846.5MHz
	Cat-M1 Band 5 (Channel Bandwidth 10MHz)	829.0MHz ~ 844.0MHz
	Cat-M1 Band 4 (Channel Bandwidth: 1.4 MHz)	1710.7MHz ~ 1754.3MHz
	Cat-M1 Band 4 (Channel Bandwidth: 3 MHz)	1711.5MHz ~ 1753.5MHz
	Cat-M1 Band 4 (Channel Bandwidth: 5 MHz)	1712.5MHz ~ 1752.5MHz
	Cat-M1 Band 4 (Channel Bandwidth: 10 MHz)	1715.0MHz ~ 1750.0MHz
	Cat-M1 Band 4 (Channel Bandwidth: 15 MHz)	1717.5MHz ~ 1747.5MHz
	Cat-M1 Band 4 (Channel Bandwidth: 20 MHz)	1720.0MHz ~ 1745.0MHz
	Cat-M1 Band 12 (Channel Bandwidth: 1.4 MHz)	699.7MHz ~ 715.3MHz
	Cat-M1 Band 12 (Channel Bandwidth: 3 MHz)	700.5MHz ~ 714.5MHz
	Cat-M1 Band 12 (Channel Bandwidth: 5 MHz)	701.5MHz ~ 713.5MHz
	Cat-M1 Band 12 (Channel Bandwidth: 10 MHz)	704.0MHz ~ 711.0MHz
	Cat-M1 Band 13 (Channel Bandwidth: 5 MHz)	779.5MHz ~ 784.5MHz
	Cat-M1 Band 13 (Channel Bandwidth: 10 MHz)	782.0MHz
	Cat-M1 Band 25 (Channel Bandwidth: 1.4 MHz)	1850.7MHz ~ 1914.3MHz
	Cat-M1 Band 25 (Channel Bandwidth: 3 MHz)	1851.5MHz ~ 1913.5MHz
	Cat-M1 Band 25 (Channel Bandwidth: 5 MHz)	1852.5MHz ~ 1912.5MHz
Cat-M1 Band 25 (Channel Bandwidth: 10 MHz)	1855.0MHz ~ 1910.0MHz	
Cat-M1 Band 25 (Channel Bandwidth: 15 MHz)	1857.5MHz ~ 1907.5MHz	
Cat-M1 Band 25 (Channel Bandwidth: 20 MHz)	1860.0MHz ~ 1905.0MHz	

Operating Frequency	Part 22	Cat-M1 Band 26 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz
		Cat-M1 Band 26 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz
		Cat-M1 Band 26 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz
		Cat-M1 Band 26 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz
		Cat-M1 Band 26 (Channel Bandwidth: 15 MHz)	831.5 ~ 841.5 MHz
	Part 90	Cat-M1 Band 26 (Channel Bandwidth: 1.4 MHz)	814.7MHz ~ 823.3MHz
		Cat-M1 Band 26 (Channel Bandwidth: 3 MHz)	815.5MHz ~ 822.5MHz
		Cat-M1 Band 26 (Channel Bandwidth: 5 MHz)	816.5MHz ~ 821.5MHz
		Cat-M1 Band 26 (Channel Bandwidth: 10 MHz)	819.0MHz
	Cat-M1 Band 66 (Channel Bandwidth: 1.4 MHz)		1710.7 ~ 1779.3 MHz
	Cat-M1 Band 66 (Channel Bandwidth: 3 MHz)		1711.5 ~ 1778.5 MHz
	Cat-M1 Band 66 (Channel Bandwidth: 5 MHz)		1712.5 ~ 1777.5 MHz
	Cat-M1 Band 66 (Channel Bandwidth: 10 MHz)		1715.0 ~ 1775.0 MHz
	Cat-M1 Band 66 (Channel Bandwidth: 15 MHz)		1717.5 ~ 1772.5 MHz
Cat-M1 Band 66 (Channel Bandwidth: 20 MHz)		1720.0 ~ 1770.0 MHz	
Cat-M1 Band 85 (Channel Bandwidth: 5 MHz)		700.5MHz ~ 713.5MHz	
Cat-M1 Band 85 (Channel Bandwidth: 10 MHz)		703.0MHz ~ 711.0MHz	
Antenna Type	Refer to Note		
Antenna Connector	Refer to Note		
Accessory Device	Refer to Note		
Data Cable Supplied	Refer to Note		

Note:

1. The EUT consumes power from the following batteries.

Battery 1	
Brand	EVE
Model	BAT-63705-001
Power Rating	7.2V, 38Ah, 274 Wh

Battery 2	
Brand	Vitrocell
Model	BAT-63705-002
Power Rating	7.2V, 38Ah, 274 Wh

2. The antenna information is listed as below.

Type	Monopole with gnd resonator							
Connector	Murata MM8030-2610B/RJ3/RK0							
Antenna gain (dBi)								
Cat-M1 Band								
2	4	5	12	13	25	26	66	85
3.51	3.27	1.94	-0.33	0.69	3.51	1.94	3.84	-0.33

Frequency Range	Antenna Type	Connector	Gain(dBi)
904-926MHz	Monopole	Murata MM8030-2610B/RJ3/RK0	2
2405 ~ 2480MHz	Inverted F	Murata MM8030-2610B/RJ3/RK0	4.63

* Detail antenna specification please refer to antenna datasheet or an antenna gain measurement report.

3. 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

For 904-926MHz:

23 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	904	11	914	21	924
2	905	12	915	22	925
3	906	13	916	23	926
4	907	14	917		
5	908	15	918		
6	909	16	919		
7	910	17	920		
8	911	18	921		
9	912	19	922		
10	913	20	923		

For 2405 ~ 2480MHz:

16 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2405	5	2425	9	2445	13	2465
2	2410	6	2430	10	2450	14	2470
3	2415	7	2435	11	2455	15	2475
4	2420	8	2440	12	2460	16	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to		Description
	RE \geq 1G	RE<1G	
-	√	√	-

Where RE \geq 1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-axis**.

Radiated Emission Test (Above 1 GHz):

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

EUT Configure Mode	Mode	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Type
-	904~926MHz (80kbps) + Cat-M1 Band 66 (BW: 20MHz)	904~926	1, 12, 23	1+132072	half-sine shaped OQPSK
		1720.0~1770.0	132072, 132322, 132572		QPSK
-	2405~2480MHz + Cat-M1 Band 66 (BW: 20MHz)	2405~2480	1, 8, 16	16+132072	DSSS
		1720.0~1770.0	132072, 132322, 132572		QPSK

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	Mode	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Type
-	904~926MHz (80kbps) + Cat-M1 Band 66 (BW: 20MHz)	904~926	1, 12, 23	1+132072	half-sine shaped OQPSK
		1720.0~1770.0	132072, 132322, 132572		QPSK
-	2405~2480MHz + Cat-M1 Band 66 (BW: 20MHz)	2405~2480	1, 8, 16	16+132072	DSSS
		1720.0~1770.0	132072, 132322, 132572		QPSK

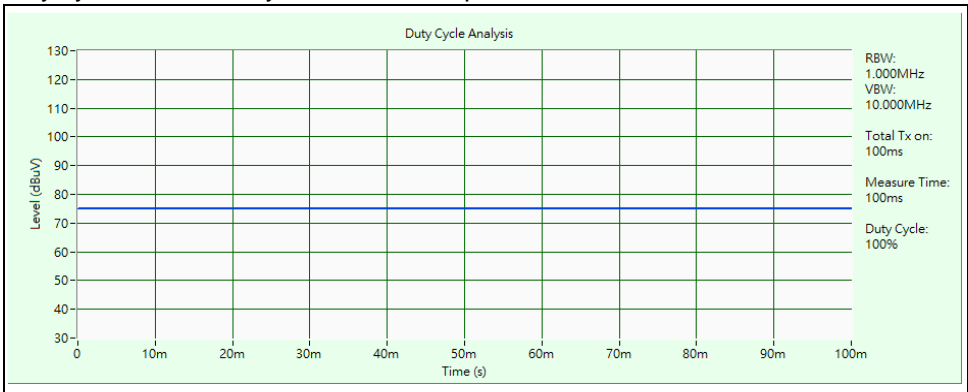
Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE \geq 1G	20 deg. C, 64 % RH	7.2Vdc	Edison Lee
RE<1G	20 deg. C, 64 % RH	7.2Vdc	Edison Lee

3.3 Duty Cycle of Test Signal

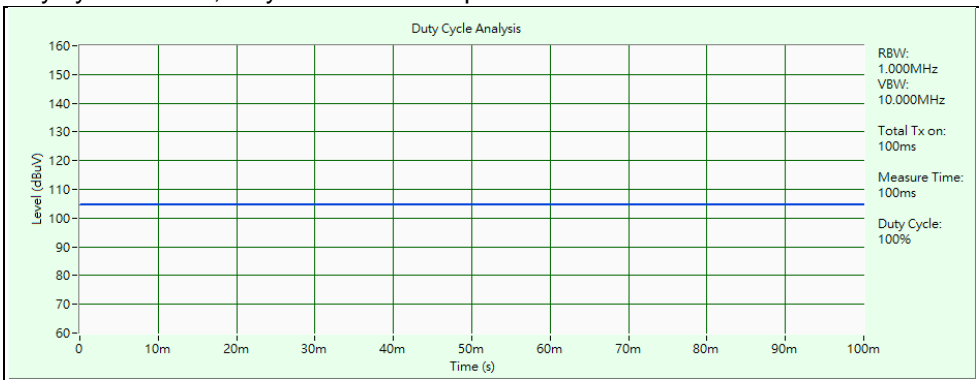
For 904~926MHz

Duty cycle =100%, duty factor is not required.



For 2405~2480MHz

Duty cycle =100%, duty factor is not required.

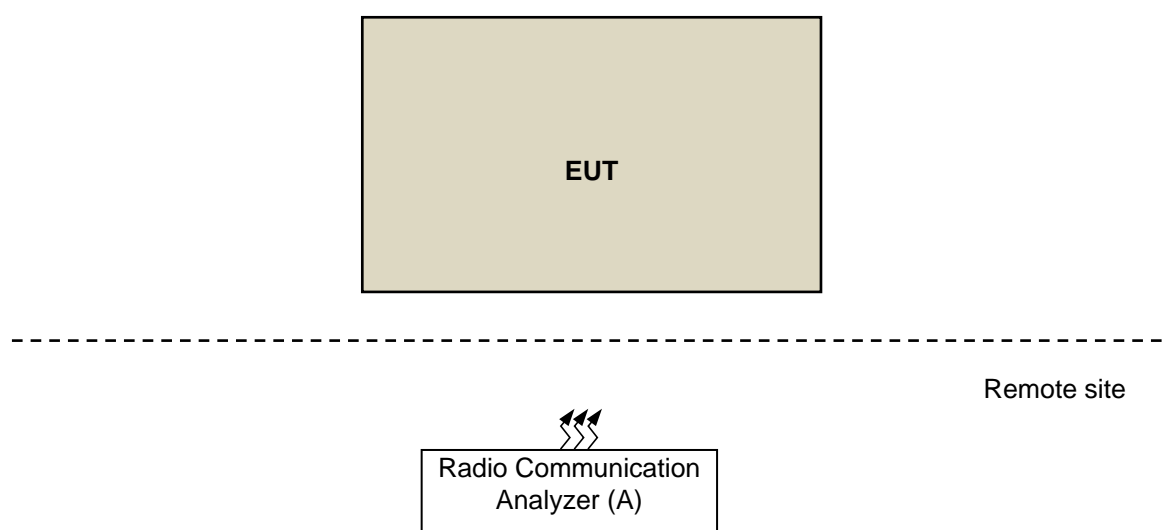


3.4 Description of Support Units

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	Radio Communication Analyzer	Anritsu	MT8821C	6201462755	N/A	Provided by Lab

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 and references:

Test Standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

FCC 47 CFR Part 2

FCC 47 CFR Part 22

FCC 47 CFR Part 24

FCC 47 CFR Part 27

FCC 47 CFR Part 90

ANSI 63.26-2015

ANSI/TIA/EIA-603-E 2016

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

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 971168 D02 Misc Rev Approv License Devices v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

For 904~926MHz / 2405~2480MHz

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 20 dB 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 1000 MHz, 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 20 dB under any condition of modulation.

For WWAN

According to FCC 27.53(h) for operations in the 1695-1710MHz, 1710-1755MHz, 1755-1780 MHz, 1915-1920MHz, 1995-2000 MHz, 2000-2020MHz, 2110-2155MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log (P)$ dB.

4.1.2 Test Instruments

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Max-Full	MF-7802BS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208674	NA	NA
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Signal & Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Loop Antenna Electro-Metrics	EM-6879	269	2022/9/19	2023/9/18
Preamplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
Preamplifier EMCI	EMC330N	980782	2023/1/16	2024/1/15
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-1213	2022/10/20	2023/10/19
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-500	201233	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-3000	201235	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-9000	201236(with PAD)	2023/1/16	2024/1/15
Horn Antenna RFSPIN	DRH18-E	210103A18E	2022/11/13	2023/11/12
Preamplifier EMCI	EMC118A45SE	980808	2022/12/29	2023/12/28
RF Coaxial Cable EMCI	EMC104-SM-SM-1000	210102	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC104-SM-SM-3000	201231	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC104-SM-SM-9000	201243	2023/1/16	2024/1/15
Preamplifier EMCI	EMC184045SE	980788	2023/1/16	2024/1/15
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2022/11/13	2023/11/12
RF Coaxial Cable EMCI	EMC101G-KM-KM-5000	201260	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC101G-KM-KM-3000	201257	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2023/1/16	2024/1/15
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/ MY55190007/MY55210005	2023/7/19	2024/7/18
Wideband Radio Communication Tester R&S	CMW500	151084	2023/1/16	2024/1/15
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2
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 WM Chamber 8.

4.1.3 Test Procedures

For 904~926MHz / 2405~2480MHz

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 $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

For WWAN

- a. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. 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.
- c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- d. Following C63.26 section 5.5 and 5.2.7
 - $EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.
 - $ERP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8 - 2.15$; where D is the measurement distance (in the far field region) in m.

NOTE:

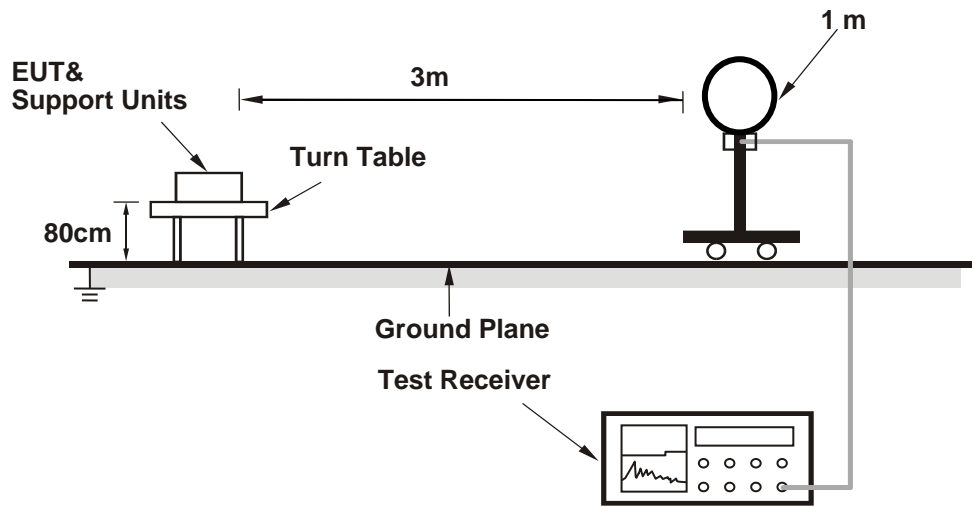
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz. Set detector = average.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.1.4 Deviation from Test Standard

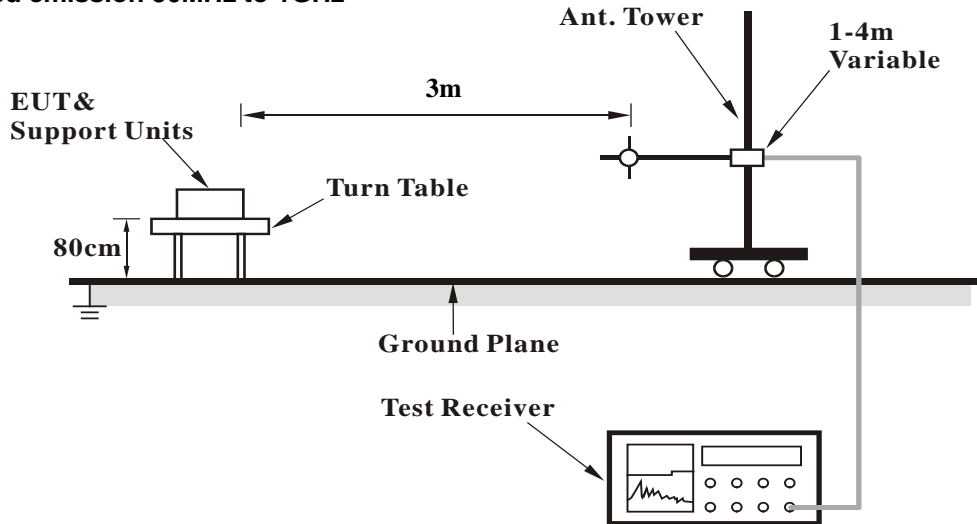
No deviation.

4.1.5 Test Setup

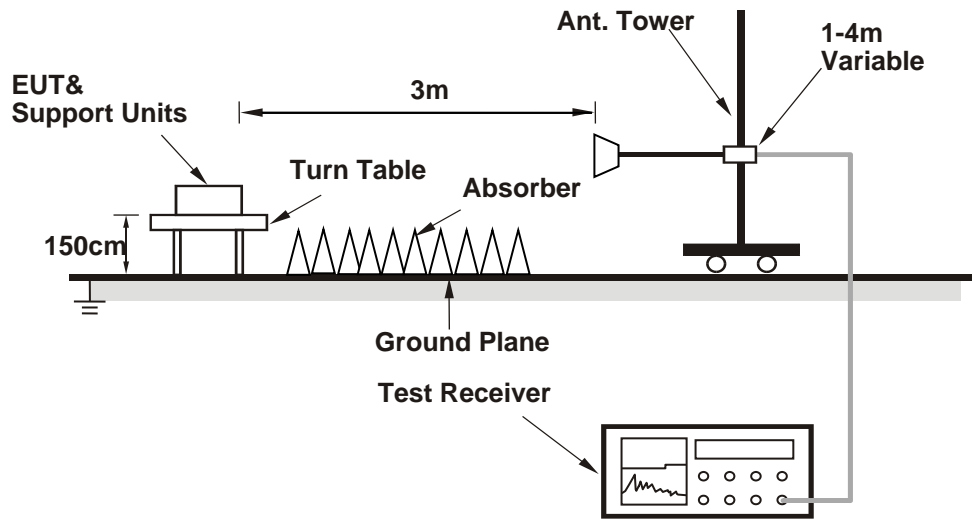
For Radiated emission below 30MHz



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

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

4.1.7 Test Results

Above 1 GHz Data :

904~926MHz (80kbps) Ch 1 + Cat-M1 Band 66 (BW: 20MHz) Ch 132072

Frequency Range	902MHz ~ 928MHz	Detector Function	Quasi-Peak (QP) Peak (PK)
-----------------	-----------------	-------------------	------------------------------

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	902.00	60.9 QP	98.2	-37.3	1.01 H	223	31.1	29.8
2	*904.00	117.4 QP			1.01 H	223	87.5	29.9
3	*904.00	118.2 PK			1.01 H	223	88.3	29.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	902.00	57.3 QP	91.7	-34.4	1.62 V	267	27.5	29.8
2	*904.00	110.9 QP			1.62 V	267	81.0	29.9
3	*904.00	111.7 PK			1.62 V	267	81.8	29.9

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 other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

Frequency Range	1 GHz ~ 10 GHz	Detector Function	Peak (PK) Average (AV)
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Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1808.00	61.1 PK	98.2	-37.1	1.93 H	191	66.8	-5.7
2	1808.00	58.4 AV	78.2	-19.8	1.93 H	191	64.1	-5.7
3	2712.00	44.5 PK	74.0	-29.5	1.88 H	181	47.0	-2.5
4	2712.00	35.6 AV	54.0	-18.4	1.88 H	181	38.1	-2.5

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1808.00	57.7 PK	91.7	-34.0	2.93 V	255	63.4	-5.7
2	1808.00	54.8 AV	71.7	-16.9	2.93 V	255	60.5	-5.7
3	2712.00	43.9 PK	74.0	-30.1	2.99 V	266	46.4	-2.5
4	2712.00	35.0 AV	54.0	-19.0	2.99 V	266	37.5	-2.5

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 other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

Frequency Range	1 GHz ~ 18 GHz
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Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3490.00	-43.66	-13.00	-30.66	1.05 H	91	52.19	-95.85

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3490.00	-40.22	-13.00	-27.22	1.13 V	41	55.63	-95.85

Remarks:

1. $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

2405~2480MHz Ch 16 + Cat-M1 Band 66 (BW: 20MHz) Ch 132072

Frequency Range	1 GHz ~ 25 GHz	Detector Function	Peak (PK) Average (AV)
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Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	113.5 PK			1.05 H	290	81.2	32.3
2	*2480.00	113.0 AV			1.05 H	290	80.7	32.3
3	2483.50	62.9 PK	74.0	-11.1	1.05 H	290	30.5	32.4
4	2483.50	52.4 AV	54.0	-1.6	1.05 H	290	20.0	32.4
5	4960.00	58.0 PK	74.0	-16.0	1.01 H	77	54.0	4.0
6	4960.00	52.9 AV	54.0	-1.1	1.01 H	77	48.9	4.0
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	109.9 PK			2.21 V	270	77.6	32.3
2	*2480.00	108.8 AV			2.21 V	270	76.5	32.3
3	2483.50	59.8 PK	74.0	-14.2	2.21 V	270	27.4	32.4
4	2483.50	49.2 AV	54.0	-4.8	2.21 V	270	16.8	32.4
5	4960.00	54.4 PK	74.0	-19.6	1.33 V	264	50.4	4.0
6	4960.00	47.4 AV	54.0	-6.6	1.33 V	264	43.4	4.0

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

Frequency Range	1 GHz ~ 18 GHz
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Antenna Polarity & Test Distance : Horizontal at 3 m								
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No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3490.00	-43.69	-13.00	-30.69	1.06 H	90	52.16	-95.85

Antenna Polarity & Test Distance : Vertical at 3 m								
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No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3490.00	-40.39	-13.00	-27.39	1.12 V	44	55.46	-95.85

Remarks:

1. $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

Below 1GHz data:

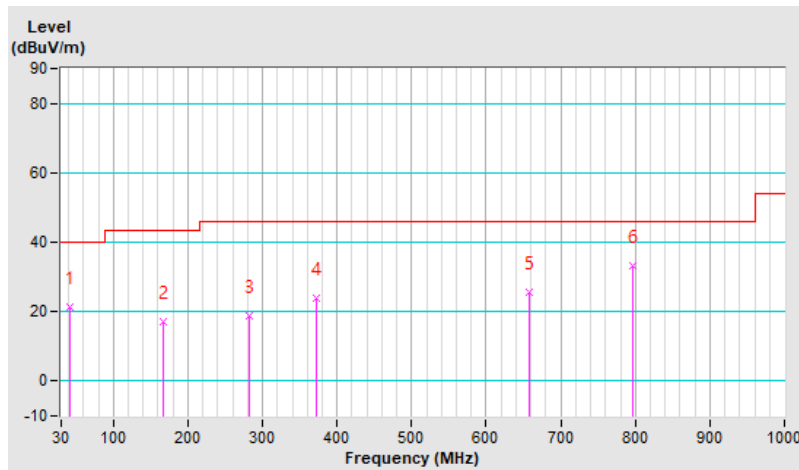
904~926MHz (80kbps) Ch 1 + Cat-M1 Band 66 (BW: 20MHz) Ch 132072

Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
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Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	41.64	21.5 QP	40.0	-18.5	2.00 H	150	34.9	-13.4
2	166.77	17.2 QP	43.5	-26.3	1.00 H	223	30.5	-13.3
3	283.17	18.8 QP	46.0	-27.2	1.00 H	186	31.9	-13.1
4	371.44	24.1 QP	46.0	-21.9	1.00 H	127	35.1	-11.0
5	658.56	25.6 QP	46.0	-20.4	1.50 H	27	30.4	-4.8
6	796.30	33.4 QP	46.0	-12.6	1.00 H	330	36.1	-2.7

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 other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

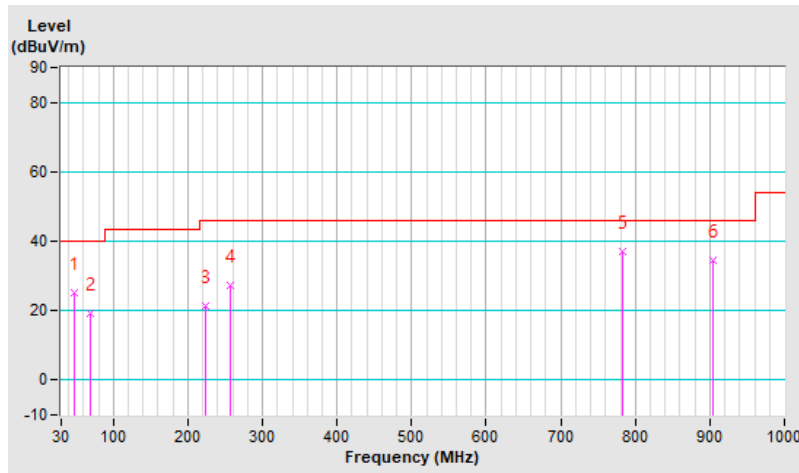


Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
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Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	48.43	25.1 QP	40.0	-14.9	2.00 V	333	38.2	-13.1
2	68.80	19.4 QP	40.0	-20.6	1.00 V	141	35.0	-15.6
3	223.03	21.4 QP	46.0	-24.6	1.00 V	50	38.1	-16.7
4	256.01	27.2 QP	46.0	-18.8	1.50 V	45	41.7	-14.5
5	783.69	37.0 QP	46.0	-9.0	1.00 V	79	39.6	-2.6
6	903.97	34.3 QP	46.0	-11.7	1.50 V	289	35.6	-1.3

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



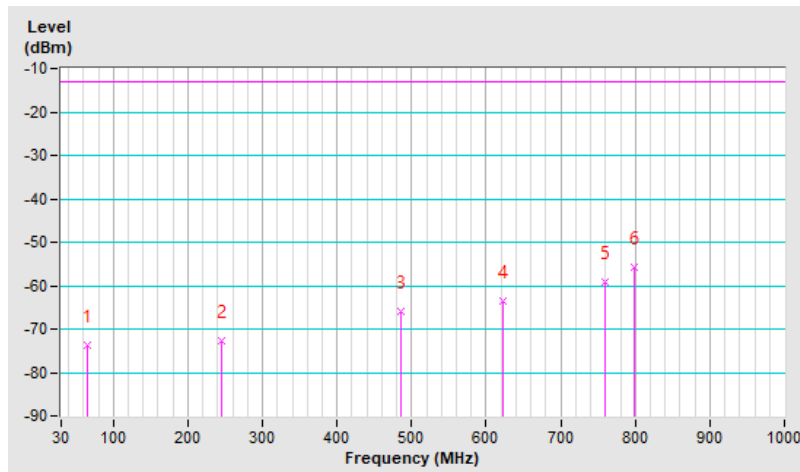
Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	65.89	-73.60	-13.00	-60.60	2.00 H	324	36.70	-110.30
2	245.34	-72.70	-13.00	-59.70	1.00 H	2	37.30	-110.00
3	484.93	-66.00	-13.00	-53.00	1.50 H	274	37.40	-103.40
4	622.67	-63.50	-13.00	-50.50	2.00 H	18	37.00	-100.50
5	759.44	-59.30	-13.00	-46.30	1.00 H	288	38.70	-98.00
6	799.21	-55.70	-13.00	-42.70	1.00 H	117	42.20	-97.90

Remarks:

1. $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

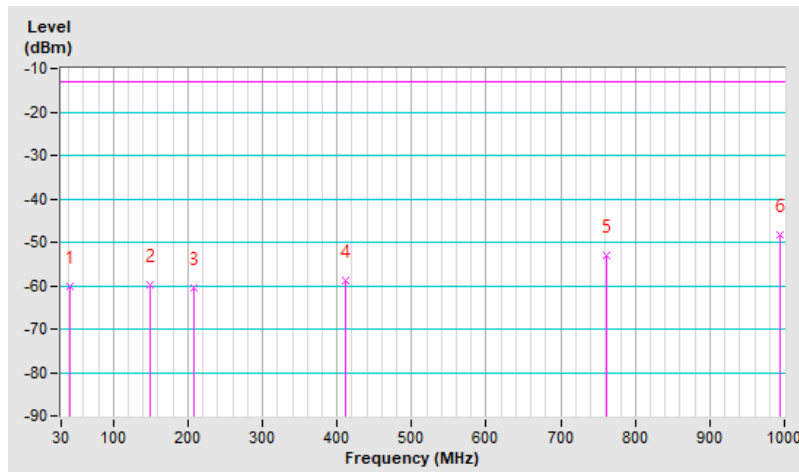


Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	42.61	-60.30	-13.00	-47.30	2.00 V	282	48.40	-108.70
2	148.34	-59.90	-13.00	-46.90	1.00 V	83	48.60	-108.50
3	207.51	-60.40	-13.00	-47.40	1.00 V	79	51.90	-112.30
4	412.18	-58.80	-13.00	-45.80	1.50 V	192	46.50	-105.30
5	762.35	-53.10	-13.00	-40.10	1.00 V	312	44.90	-98.00
6	993.21	-48.40	-13.00	-35.40	1.50 V	319	46.90	-95.30

Remarks:

1. $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.



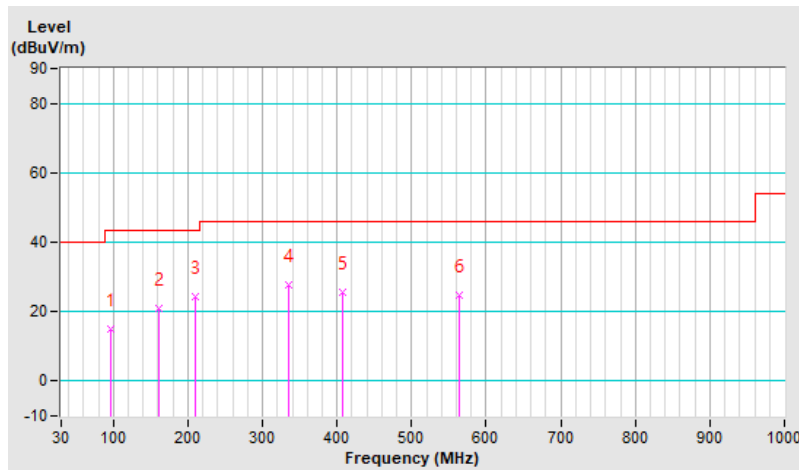
2405~2480MHz Ch 16 + Cat-M1 Band 66 (BW: 20MHz) Ch 132072

Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
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Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	95.96	14.9 QP	43.5	-28.6	1.50 H	115	33.2	-18.3
2	161.92	20.9 QP	43.5	-22.6	1.00 H	317	34.0	-13.1
3	209.45	24.2 QP	43.5	-19.3	1.00 H	159	41.2	-17.0
4	334.58	27.7 QP	46.0	-18.3	2.00 H	141	39.4	-11.7
5	408.30	25.6 QP	46.0	-20.4	1.00 H	292	35.7	-10.1
6	563.50	24.7 QP	46.0	-21.3	2.00 H	219	31.4	-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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

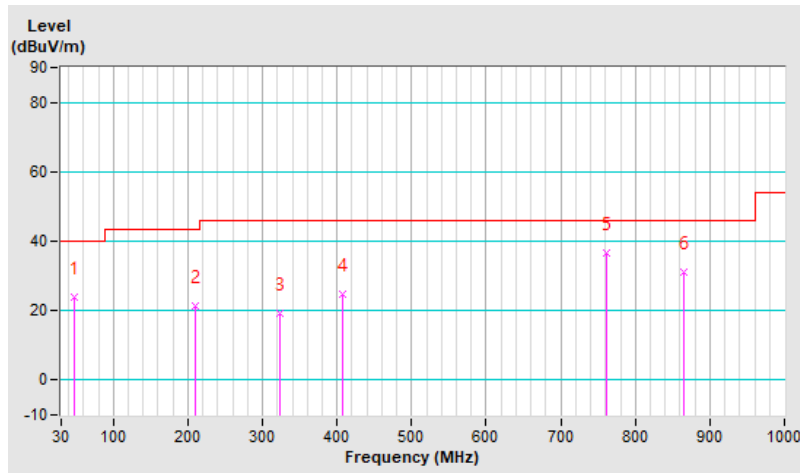


Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
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Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	48.43	23.8 QP	40.0	-16.2	1.49 V	263	36.9	-13.1
2	209.45	21.3 QP	43.5	-22.2	1.49 V	139	38.3	-17.0
3	323.91	19.2 QP	46.0	-26.8	1.00 V	325	31.1	-11.9
4	408.30	24.6 QP	46.0	-21.4	1.99 V	306	34.7	-10.1
5	762.35	36.4 QP	46.0	-9.6	1.99 V	2	39.1	-2.7
6	865.17	31.1 QP	46.0	-14.9	1.99 V	300	32.9	-1.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



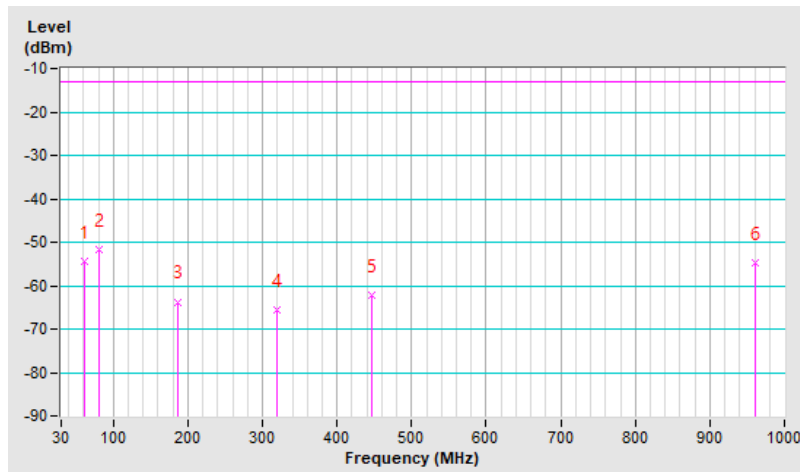
Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	62.01	-54.30	-13.00	-41.30	1.50 H	36	55.40	-109.70
2	81.41	-51.80	-13.00	-38.80	1.00 H	123	62.00	-113.80
3	186.17	-63.70	-13.00	-50.70	1.00 H	96	47.20	-110.90
4	320.03	-65.50	-13.00	-52.50	2.00 H	15	41.80	-107.30
5	446.13	-62.30	-13.00	-49.30	1.00 H	132	41.90	-104.20
6	961.20	-54.60	-13.00	-41.60	2.00 H	10	41.10	-95.70

Remarks:

1. $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

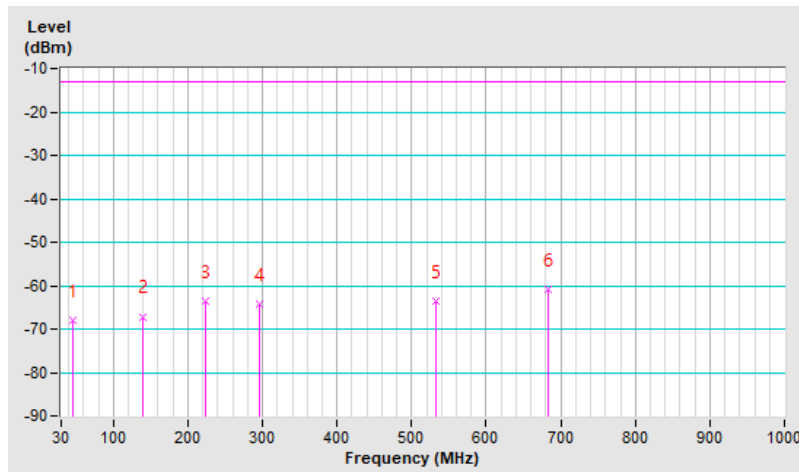


Frequency Range	Below 1000 MHz
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Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBUV)	Correction Factor (dB/m)
1	45.52	-68.00	-13.00	-55.00	1.50 V	156	40.50	-108.50
2	139.61	-67.10	-13.00	-54.10	1.00 V	59	41.80	-108.90
3	223.03	-63.60	-13.00	-50.60	2.00 V	3	48.40	-112.00
4	296.75	-64.30	-13.00	-51.30	2.00 V	207	43.70	-108.00
5	532.46	-63.40	-13.00	-50.40	1.00 V	63	39.20	-102.60
6	683.78	-60.80	-13.00	-47.80	1.00 V	354	38.80	-99.60

Remarks:

1. $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.



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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Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

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

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