Supplemental “Transmit Simultaneously” Test Report

Report No.:	RFBEOE-WTW-P23060395-6
FCC ID:	MQT-AT150E18U
Test Model:	XCL_AT-150-E-18U
Received Date:	2023/6/15
Test Date:	2023/7/15 ~ 2023/7/28
Issued Date:	2023/9/1
Applicant:	XAC AUTOMATION CORP.
Address:	4F, No. 30, INDUSTRY E. RD. IX, SCIENCE-BASED INDUSTRIAL PARK, HSINCHU, TAIWAN
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. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
FCC Registration / Designation Number:	198487 / TW2021

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Release Control Record

Issue No.	Description	Date Issued
RFBEOE-WTW-P23060395-6	Original release.	2023/9/1

1 Certificate of Conformity

Product:	Terminal
Brand:	XAC
Test Model:	XCL_AT-150-E-18U
Sample Status:	Engineering sample
Applicant:	XAC AUTOMATION CORP.
Test Date:	2023/7/15 ~ 2023/7/28
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10: 2013 FCC Part 24, Subpart E FCC Part 27, Subpart D / F / H / L / M

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 : Vito Lung , **Date:** **2023/9/1**

Vito Lung / Specialist

Approved by : , **Date:** **2023/9/1**

Mei Chen / Manager

2 Summary of Test Results

FCC Part 15, Subpart C, E (SECTION 15.247, 15.407)			
FCC Clause	Test Item	Result	Remarks
15.207 15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -14.79 dB at 0.61094 MHz.
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -4.1 dB at 4874.00 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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.00 dB
Conducted emissions	-	2.63 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1GHz	5.7 dB
Radiated Emissions above 1 GHz	1 GHz ~ 6 GHz	4.83 dB
	1GHz ~ 18GHz	5.37 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Terminal
Brand	XAC
Test Model	xCL_AT-150-E-18U
Status of EUT	Engineering sample
Power Supply Rating	3.88 Vdc from Battery / DC 5V from USB type C or DC 9V from PIGO PIN
Modulation Type	**WLAN:** CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode **BT-EDR:** GFSK, π/4-DQPSK, 8DPSK **BT-LE:** GFSK **NFC:** ASK
Modulation Technology	**WLAN:** DSSS, OFDM **BT-EDR:** FHSS **BT-LE:** DTS **NFC:** Refer to Note 5
Transfer Rate	**WLAN:** 802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 150 Mbps 802.11ac: up to 433.3 Mbps **BT-EDR:** Up to 2 Mbps **BT-LE:** 1 Mbps **NFC:** Refer to Note 5
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462 GHz **5GHz:** 5.18 ~ 5.24 GHz, 5.25 ~ 5.32 GHz, 5.50 ~ 5.70 GHz, 5.745 ~ 5.825 GHz **BT-EDR:** 2.402 GHz ~ 2.48 GHz **BT-LE:** 2.402 GHz ~ 2.48 GHz **NFC:** 13.56 MHz
	LTE
	LTE Band 2: 1850.7MHz ~ 1909.3MHz
	LTE Band 4: 1710.7 ~ 1754.3 MHz
	LTE Band 12: 699.7-715.3 MHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 24 802.11n (HT40), 802.11ac (VHT40): 11 802.11ac (VHT80): 5 **BT-EDR:** 79 **BT-LE:** 40 **NFC:** 1
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT uses following accessories.

Battery 1		
Brand	Model	Power Rating
IES	IDS155GA	3.88V, 3780mAh

2. The EUT has below radios as following table:

Radio 1	Radio 2	Radio 3
WLAN 2.4GHz + WLAN 5GHz + Bluetooth	WWAN(LTE)	NFC

3. Simultaneously transmission condition.

Condition	Technology			
1	WWAN(LTE)	WLAN (2.4 GHz)	WLAN (5 GHz)	NFC
2	WWAN(LTE)	WLAN (5 GHz)	Bluetooth	NFC
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.				

4. The EUT has one type according to NFC technology as following table:

Mode	Type	Modulation	Data rate
Active	A	ASK	106 kbit/s

5. The antenna information is listed as below.

Antenna	Brand	Model	Gain (dBi)			Antenna Type
			1850~1910MHz	1710~1755MHz	699~716MHz	
WWAN	AWAN	ALF6P-100013	2.42	2.56	0.13	PIFA
Antenna	Brand	Model	2.4~2.4835GHz		5.15~5.85GHz	Antenna Type
WLAN / BT	AWAN	AYF6P-100002	2.59		4.47	PIFA
Antenna	Brand	Model	13.56MHz			Antenna Type
NFC	XAC	RTOS	5			Loop

6. The EUT incorporates a SISO function.

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	1TX	1RX
802.11g	1TX	1RX
802.11n (HT20)	1TX	1RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	1TX	1RX
802.11n (HT20)	1TX	1RX
802.11n (HT40)	1TX	1RX
802.11ac (VHT20)	1TX	1RX
802.11ac (VHT40)	1TX	1RX
802.11ac (VHT80)	1TX	1RX

7. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
8. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.1.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	OB	
1	√	√	√	√	WWAN(LTE) + WLAN(2.4GHz) + WLAN(5GHz) + NFC
2	√	√	√	√	WWAN(LTE) + WLAN(5GHz) + Bluetooth + NFC

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **OB:** Conducted Out-Band Emission Measurement

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

Radiated Emission Test (Above 1GHz):

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.
☒ Following channel(s) was (were) selected for the final test as listed below.

Configure Mode	MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	WWAN (LTE B12) + 2.4GHz: 802.11b + 5GHz: 802.11ac (VHT40) + NFC	23095	-	-
		6	DSSS	DBPSK
		54	OFDM	BPSK
		1	-	ASK
2	WWAN (LTE B12) + 5GHz: 802.11ac (VHT40) + BT-EDR + NFC	23095	-	-
		54	OFDM	BPSK
		39	FHSS	GFSK
		1	-	ASK

Radiated Emission Test (Below 1GHz):

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.

Configure Mode	MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	WWAN (LTE B12) + 2.4GHz: 802.11b + 5GHz: 802.11ac (VHT40) + NFC	23095	-	-
		6	DSSS	DBPSK
		54	OFDM	BPSK
		1	-	ASK
2	WWAN (LTE B12) + 5GHz: 802.11ac (VHT40) + BT-EDR + NFC	23095	-	-
		54	OFDM	BPSK
		39	FHSS	GFSK
		1	-	ASK

Power Line Conducted Emission Test:

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.
☒ Following channel(s) was (were) selected for the final test as listed below.

Configure Mode	MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	WWAN (LTE B12) + 2.4GHz: 802.11b + 5GHz: 802.11ac (VHT40) + NFC	23095	-	-
		6	DSSS	DBPSK
		54	OFDM	BPSK
		1	-	ASK
2	WWAN (LTE B12) + 5GHz: 802.11ac (VHT40) + BT-EDR + NFC	23095	-	-
		54	OFDM	BPSK
		39	FHSS	GFSK
		1	-	ASK

Conducted Out-Band Emission Measurement:

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.
☒ Following channel(s) was (were) selected for the final test as listed below.

Configure Mode	MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	WWAN (LTE B12) + 2.4GHz: 802.11b + 5GHz: 802.11ac (VHT40) + NFC	23095	-	-
		6	DSSS	DBPSK
		54	OFDM	BPSK
		1	-	ASK
2	WWAN (LTE B12) + 5GHz: 802.11ac (VHT40) + BT-EDR + NFC	23095	-	-
		54	OFDM	BPSK
		39	FHSS	GFSK
		1	-	ASK

Test Condition:

Applicable To	Environmental Conditions	INPUT POWER	Tested By
RE≥1G	22deg. C, 70%RH 20deg. C, 70%RH	120Vac, 60Hz	Louis Yang Ryan Du
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Ryan Du
PLC	25deg. C, 75%RH	120Vac, 60Hz	Ryan Du
OB	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

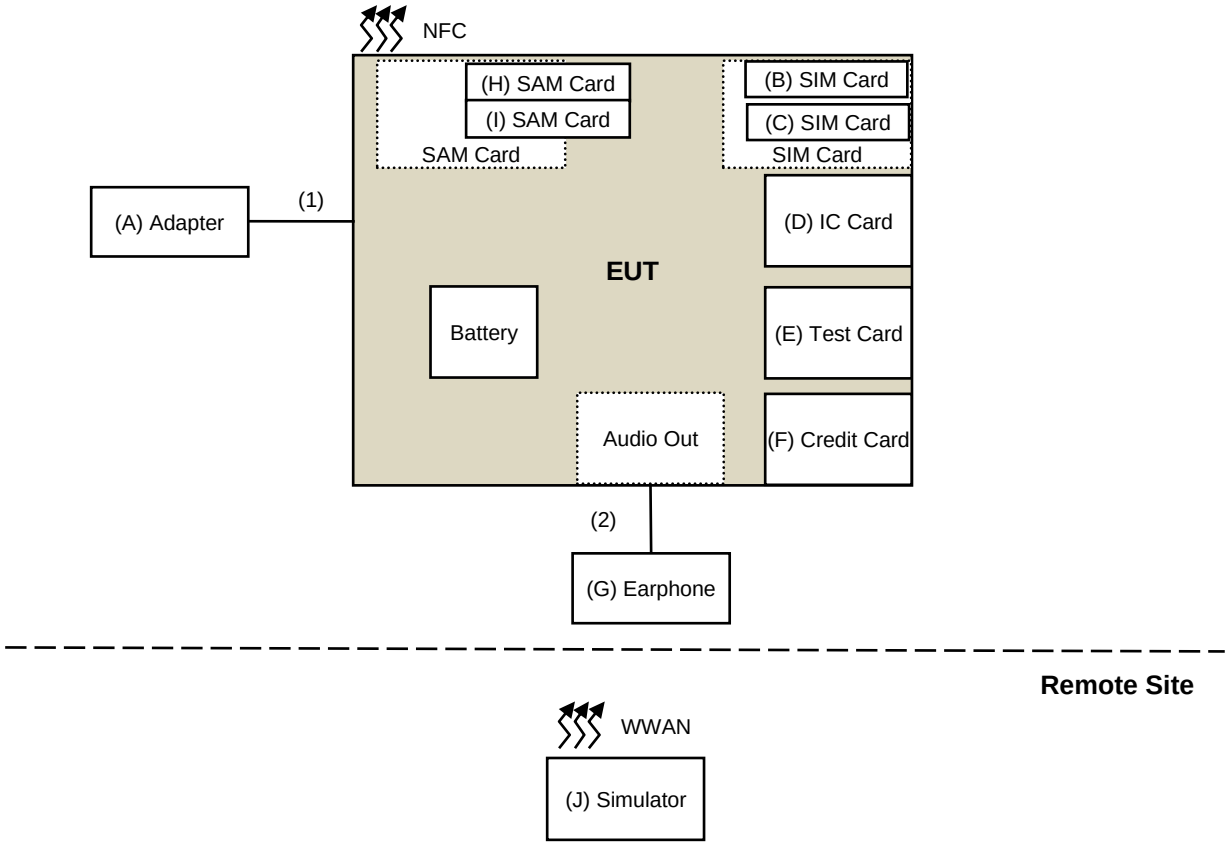
3.2 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Adapter	MASS POWER	NBS10B050200VUU	NA	NA	Supplied by applicant
B	SIM Card	XAC	NA	NA	NA	Supplied by applicant
C	SIM Card	XAC	NA	NA	NA	Supplied by applicant
D	IC Card	XAC	NA	NA	NA	Supplied by applicant
E	Test Card	XAC	NA	NA	NA	Supplied by applicant
F	Credit Card	Cathay	NA	NA	NA	Provided by Lab
G	Earphone	Amkor	IE2	NA	NA	Provided by Lab
H	SAM Card	XAC	NA	NA	NA	Supplied by applicant
I	SAM Card	XAC	NA	NA	NA	Supplied by applicant
J	Simulator	Anritsu	MT8820C	6201127458	NA	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Type A to USB Type C cable	1	1.2	Yes	0	Supplied by applicant
2	Audio Cable	1	1.2	No	0	Provided by Lab

3.2.1 Configuration of System under Test



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.

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.

Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK:74 (dBμV/m)	AV:54 (dBμV/m)
Frequency Band	Applicable To	EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4

*1 beyond 75 MHz or more above of the band edge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

FCC Part 24 & 27:

LTE Band 2

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

LTE Band 4

According to FCC 27.53(h) AWS emission limits— General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 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 log10 (P) dB.

LTE Band 12

According to FCC 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

4.1.2 Test Instruments

For Radiated emission test:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
EMI Test Receiver R&S	ESR3	102528	2023/2/10	2024/2/9
PXA Signal Analyzer Keysight	N9030B	MY57141948	2023/5/19	2024/5/18
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Preamplifier Agilent	8447D	2944A10636	2023/3/12	2024/3/11
Loop Antenna Electro-Metrics	EM-6879	264	2023/2/21	2024/2/20
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2022/12/19	2023/12/18
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-002	2022/12/19	2023/12/18
MXA Signal Analyzer Keysight	N9020B	MY60112410	2023/3/6	2024/3/5
Preamplifier EMCI	EMC330N	980538	2023/4/6	2024/4/5
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-0842	2022/10/24	2023/10/23
RF Coaxial Cable COMMATE/PEWC	8D	966-5-1	2023/2/18	2024/2/17
RF Coaxial Cable COMMATE/PEWC	8D	966-5-2	2023/4/6	2024/4/5
RF Coaxial Cable COMMATE/PEWC	8D	966-5-3	2023/2/18	2024/2/17
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	2022/12/28	2023/12/27
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-1819	2022/11/13	2023/11/12
Preamplifier EMCI	EMC12630SE	980509	2023/4/7	2024/4/6
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180503	2023/4/7	2024/4/6
RF Coaxial Cable EMCI	EMC104-SM-SM-2000	180501	2023/4/7	2024/4/6
RF Coaxial Cable EMCI	EMC104-SM-SM-6000	180506	2023/4/7	2024/4/6
Preamplifier EMCI	EMC184045SE	980387	2022/12/28	2023/12/27
Horn Antenna Schwarzbeck	BBHA 9170	9170-739	2022/11/13	2023/11/12
RF Coaxial Cable EMCI	EMC102-KM-KM-1200	160924	2022/12/28	2023/12/27
RF Coaxial Cable EMCI	EMC-KM-KM-4000	200214	2023/2/20	2024/2/19

Note:

1. The test was performed in 966 Chamber No. 5.
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: 2023/7/17 ~ 2023/7/28

For other test

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
MXA Signal Analyzer Keysight	N9020B	MY60112409	2023/2/18	2024/2/17
Fixed Attenuator Woken	MDCS18N-10	MDCS18N-10-01	2023/3/27	2024/3/26
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

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: 2023/7/15 ~ 2023/7/20

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 detects 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.

FCC Part 24 & 27:

a. The field strength was measured with Spectrum Analyzer.

b. Measurement in the semi-anechoic chamber, EUT placed on the 1.5m 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 field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor.

c. Perform a field strength measurement and then mathematically convert the measured field strength level to EIRP level.

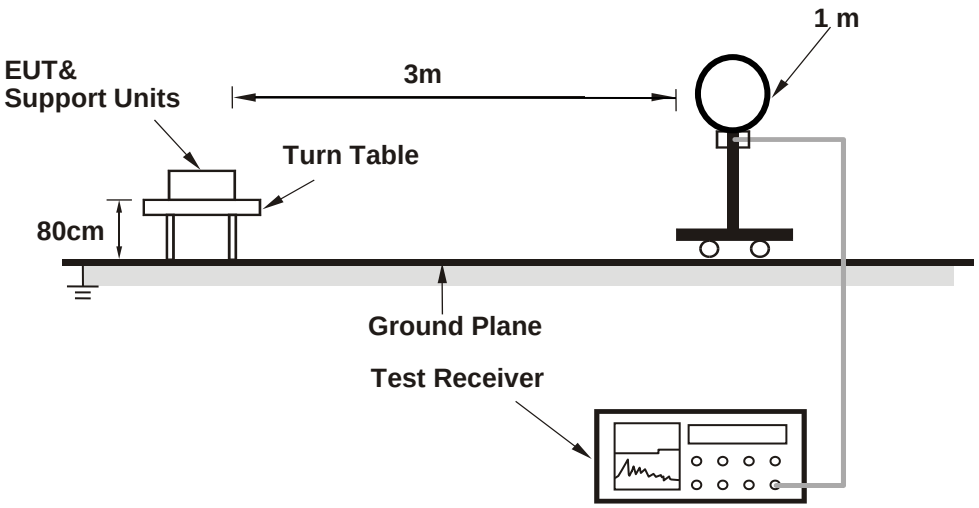
d. Follow ANSI 63.26 section 5.2.7 d), Emission Value (dBm) = Read Value (dBµV/m) + Correction Factor @ 3m

e. Correction Factor (dB) @ 3m = 20log(D) − 104.8; where D is the measurement distance @3m =-95.26dB

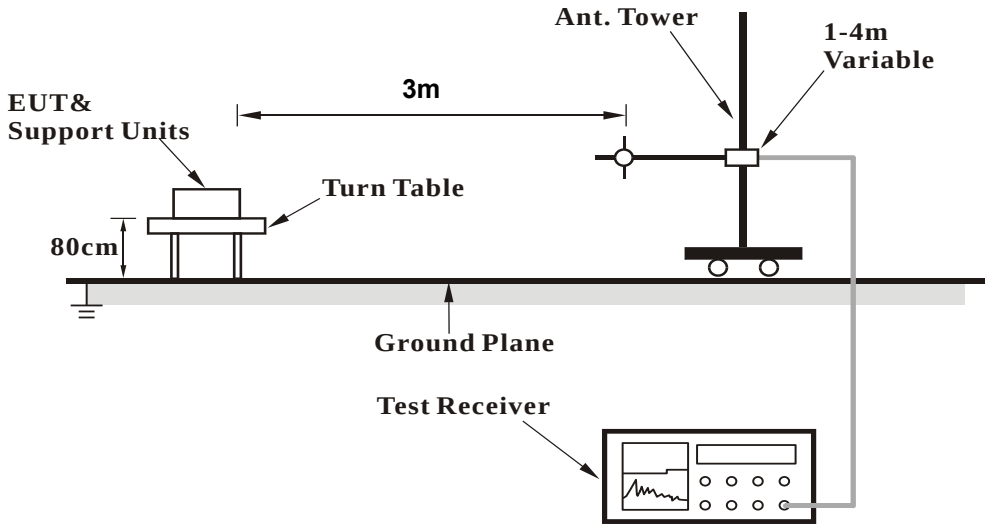
f. EIRP (dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.
ERP (dBm) = E (dBµV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

4.1.5 Test Setup

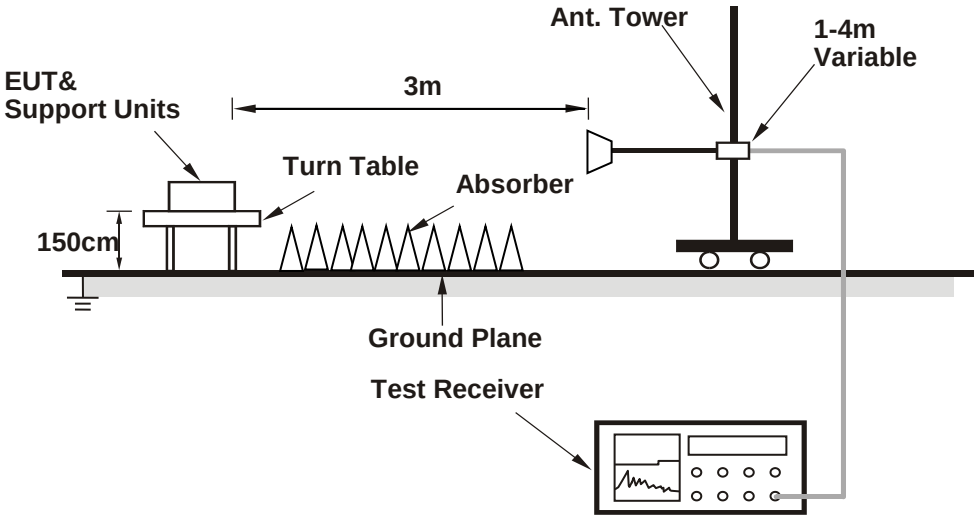
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Simulator which is placed on remote site.

b. Controlling software (QDART_WIN_4_8_Installer_00057_1; NFC:P-test) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

Mode 1

Mode	TX channel 23095	Frequency Range	Above 1000 MHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**ERP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	1415.00	-50.50	-13.00	-37.50	1.59 H	252	-45.44	-5.06
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**ERP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	1415.00	-53.10	-13.00	-40.10	1.99 V	234	-48.04	-5.06

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), Emission Value (dBm) = E (dB μ V/m) + Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @ 3m.
3. ERP=EIRP-2.15

FREQUENCY RANGE	1GHz ~ 40GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)

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	4874.00	42.3 PK	74.0	-31.7	1.00 H	33	40.6	1.7
2	4874.00	40.3 AV	54.0	-13.7	1.00 H	33	38.6	1.7
3	7311.00	44.9 PK	74.0	-29.1	1.08 H	219	37.0	7.9
4	7311.00	32.4 AV	54.0	-21.6	1.08 H	219	24.5	7.9
5	#10540.00	46.9 PK	68.2	-21.3	2.02 H	132	35.3	11.6
6	15810.00	50.6 PK	74.0	-23.4	1.49 H	154	39.4	11.2
7	15810.00	38.9 AV	54.0	-15.1	1.49 H	154	27.7	11.2
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	4874.00	51.2 PK	74.0	-22.8	3.06 V	354	49.5	1.7
2	**4874.00**	**49.9 AV**	**54.0**	**-4.1**	**3.06 V**	**354**	**48.2**	**1.7**
3	7311.00	44.4 PK	74.0	-29.6	2.08 V	244	36.5	7.9
4	7311.00	31.7 AV	54.0	-22.3	2.08 V	244	23.8	7.9
5	#10540.00	47.4 PK	68.2	-20.8	1.95 V	250	35.8	11.6
6	15810.00	52.3 PK	74.0	-21.7	1.81 V	268	41.1	11.2
7	15810.00	40.4 AV	54.0	-13.6	1.81 V	268	29.2	11.2

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. " # ": The radiated frequency is out of the restricted band.

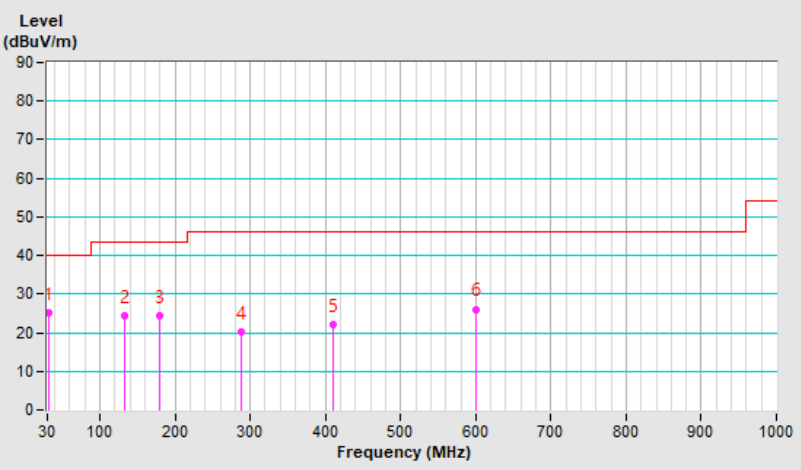
Below 1GHz Data:

FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)

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	32.52	25.1 QP	40.0	-14.9	3.00 H	279	38.2	-13.1
2	132.18	24.3 QP	43.5	-19.2	2.00 H	253	37.5	-13.2
3	179.59	24.4 QP	43.5	-19.1	2.00 H	157	38.1	-13.7
4	288.33	20.2 QP	46.0	-25.8	1.00 H	339	32.1	-11.9
5	409.50	22.1 QP	46.0	-23.9	1.00 H	291	30.8	-8.7
6	601.12	26.1 QP	46.0	-19.9	3.00 H	305	30.1	-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 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.

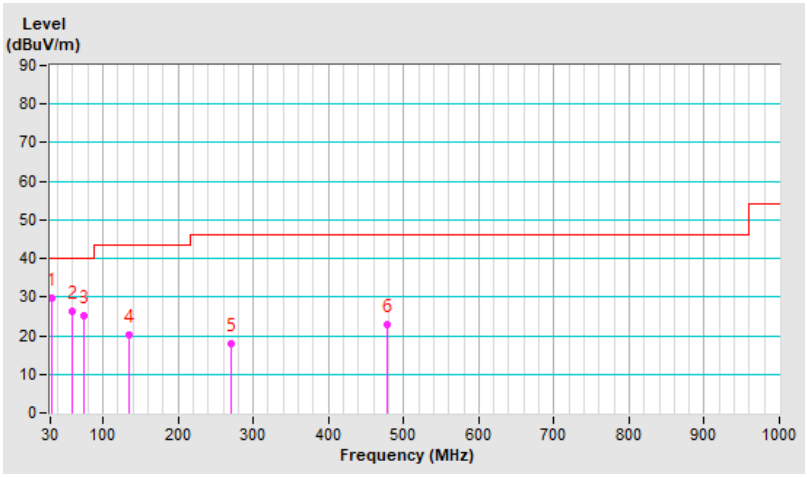


FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)

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	32.72	29.7 QP	40.0	-10.3	1.00 V	231	42.8	-13.1
2	59.51	26.2 QP	40.0	-13.8	1.00 V	55	39.2	-13.0
3	74.96	25.1 QP	40.0	-14.9	1.00 V	304	40.9	-15.8
4	135.58	20.2 QP	43.5	-23.3	1.00 V	49	33.0	-12.8
5	271.19	17.9 QP	46.0	-28.1	1.00 V	324	30.4	-12.5
6	477.50	23.0 QP	46.0	-23.0	3.00 V	14	30.0	-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) – 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.



Mode 2

Mode	TX channel 23095	Frequency Range	Above 1000 MHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**ERP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	1415.00	-49.30	-13.00	-36.30	1.43 H	181	-44.24	-5.06
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**ERP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	1415.00	-52.70	-13.00	-39.70	1.73 V	241	-47.64	-5.06

Remarks:

1. Follow ANSI 63.26 section 5.2.7 d), Emission Value (dBm) = E (dB μ V/m) + Correction Factor @ 3m.
2. Correction Factor (dB) = 20log(D) − 104.8; where D is the measurement distance @ 3m.
3. ERP=EIRP-2.15

FREQUENCY RANGE	1GHz ~ 40GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)

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	4882.00	48.0 PK	74.0	-26.0	2.02 H	110	46.3	1.7
2	4882.00	37.1 AV	54.0	-16.9	2.02 H	110	35.4	1.7
3	7323.00	51.4 PK	74.0	-22.6	1.45 H	290	43.6	7.8
4	7323.00	40.7 AV	54.0	-13.3	1.45 H	290	32.9	7.8
5	#10540.00	46.4 PK	68.2	-21.8	2.10 H	103	34.8	11.6
6	15810.00	51.5 PK	74.0	-22.5	1.53 H	171	40.3	11.2
7	15810.00	39.6 AV	54.0	-14.4	1.53 H	171	28.4	11.2
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	4882.00	49.6 PK	74.0	-24.4	1.91 V	216	47.9	1.7
2	4882.00	38.5 AV	54.0	-15.5	1.91 V	216	36.8	1.7
3	7323.00	52.4 PK	74.0	-21.6	1.64 V	120	44.6	7.8
4	7323.00	41.2 AV	54.0	-12.8	1.64 V	120	33.4	7.8
5	#10540.00	48.5 PK	68.2	-19.7	1.94 V	259	36.9	11.6
6	15810.00	51.7 PK	74.0	-22.3	1.83 V	288	40.5	11.2
7	15810.00	39.7 AV	54.0	-14.3	1.83 V	288	28.5	11.2

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. " # ": The radiated frequency is out of the restricted band.

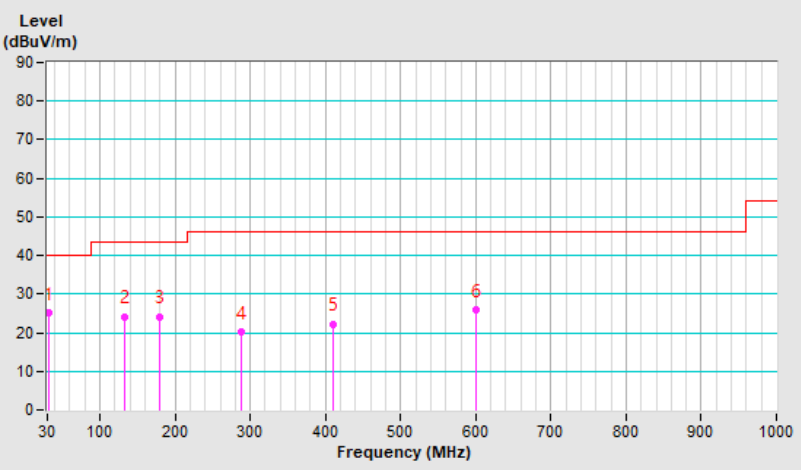
Below 1GHz Data:

FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)

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	32.43	25.3 QP	40.0	-14.7	3.00 H	294	38.4	-13.1
2	132.13	24.2 QP	43.5	-19.3	2.00 H	264	37.4	-13.2
3	179.53	24.2 QP	43.5	-19.3	2.00 H	133	37.9	-13.7
4	288.27	20.1 QP	46.0	-25.9	1.00 H	346	32.0	-11.9
5	409.43	22.3 QP	46.0	-23.7	1.00 H	303	31.0	-8.7
6	601.03	26.0 QP	46.0	-20.0	3.00 H	318	30.0	-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 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.

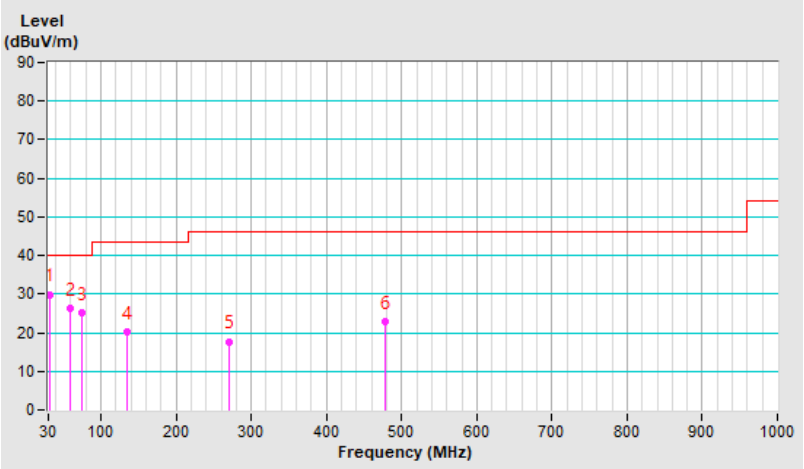


FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)

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	32.82	29.9 QP	40.0	-10.1	1.00 V	224	43.0	-13.1
2	59.59	26.4 QP	40.0	-13.6	1.00 V	71	39.4	-13.0
3	75.01	25.2 QP	40.0	-14.8	1.00 V	292	41.1	-15.9
4	135.59	20.3 QP	43.5	-23.2	1.00 V	55	33.1	-12.8
5	271.21	17.7 QP	46.0	-28.3	1.00 V	334	30.2	-12.5
6	477.42	22.9 QP	46.0	-23.1	3.00 V	24	29.9	-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) – 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.



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.	Calibrated Date	Calibrated Until
EMI Test Receiver R&S	ESCS 30	847124/029	2022/10/14	2023/10/13
LISN R&S	ESH3-Z5	848773/004	2022/10/18	2023/10/17
50 ohm terminal resistance NA	NA	EMC-01	2022/9/27	2023/9/26
RF Coaxial Cable JYEBO	5D-FB	COCCAB-001	2022/8/24	2023/8/23
Fixed Attenuator STI	STI02-2200-10	005	2022/8/24	2023/8/23
Software BVADT	BVADT_Cond_V7.3.7.4	NA	NA	NA

Note:
1. The test was performed in Conduction 1.
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: 2023/7/17

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.

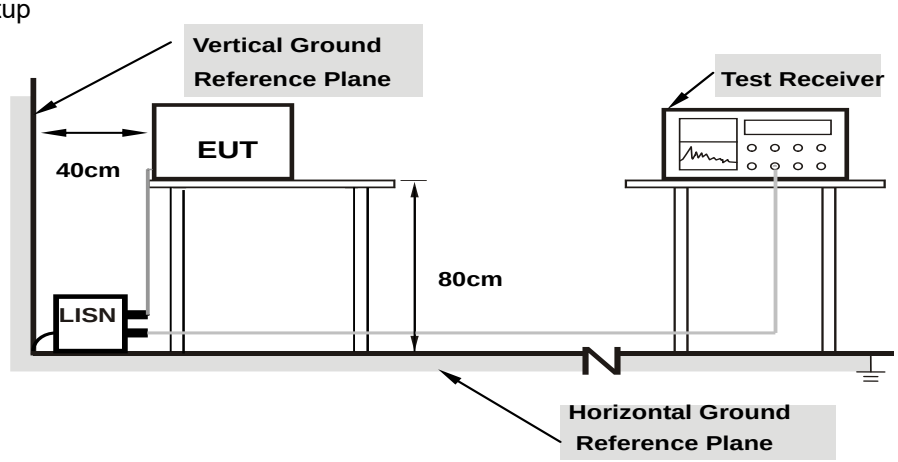
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

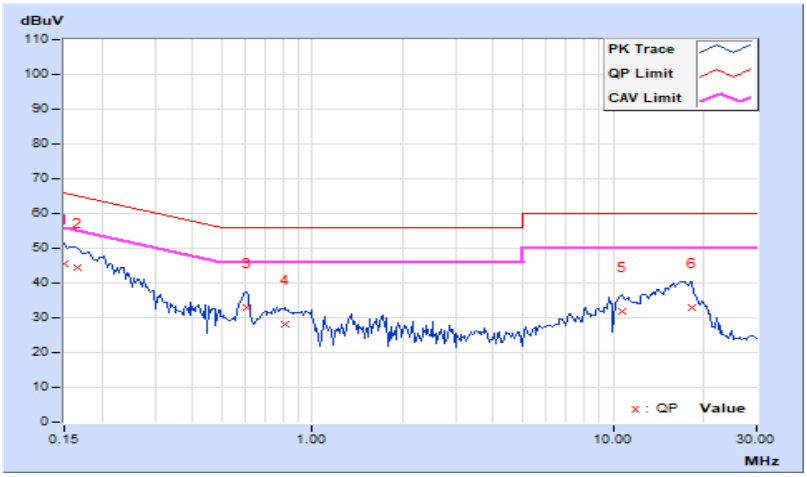
Mode 1

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.96	35.55	20.50	45.51	30.46	66.00	56.00	-20.49	-25.54
2	0.16562	9.95	34.47	19.26	44.42	29.21	65.18	55.18	-20.76	-25.97
3	0.60313	9.97	23.09	13.69	33.06	23.66	56.00	46.00	-22.94	-22.34
4	0.81406	9.99	18.34	5.38	28.33	15.37	56.00	46.00	-27.67	-30.63
5	10.65234	10.69	20.99	10.26	31.68	20.95	60.00	50.00	-28.32	-29.05
6	18.29297	11.12	21.90	11.76	33.02	22.88	60.00	50.00	-26.98	-27.12

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

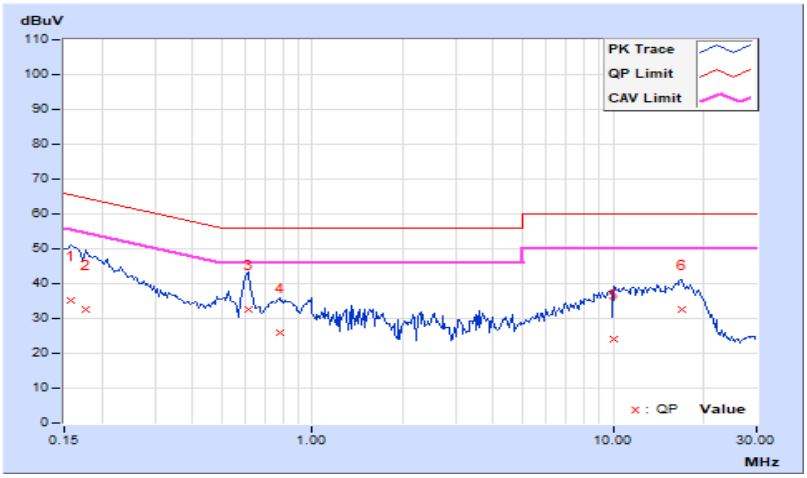


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.00	25.30	4.79	35.30	14.79	65.58	55.58	-30.28	-40.79
2	0.17734	10.00	22.43	6.99	32.43	16.99	64.61	54.61	-32.18	-37.62
3	0.61094	10.02	22.39	11.63	32.41	21.65	56.00	46.00	-23.59	-24.35
4	0.78672	10.04	15.77	7.02	25.81	17.06	56.00	46.00	-30.19	-28.94
5	10.08203	10.65	13.59	6.00	24.24	16.65	60.00	50.00	-35.76	-33.35
6	16.92969	10.92	21.54	10.41	32.46	21.33	60.00	50.00	-27.54	-28.67

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



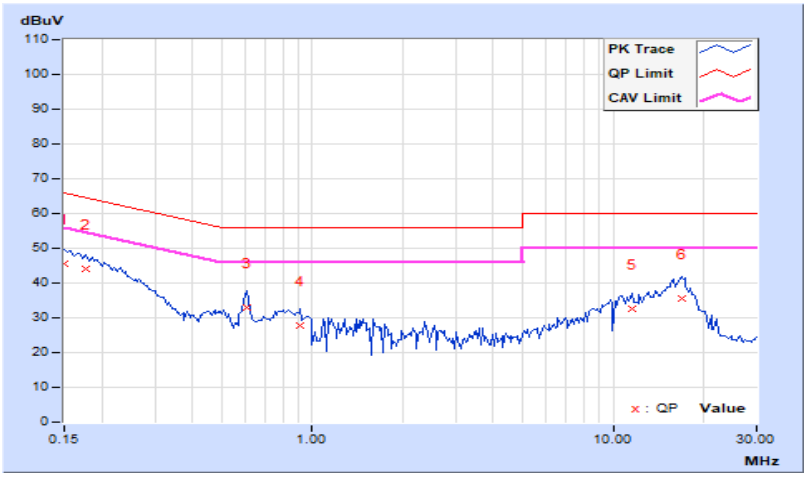
Mode 2

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.96	35.49	20.16	45.45	30.12	66.00	56.00	-20.55	-25.88
2	0.17734	9.95	34.01	19.13	43.96	29.08	64.61	54.61	-20.65	-25.53
3	0.60313	9.97	22.85	13.35	32.82	23.32	56.00	46.00	-23.18	-22.68
4	0.91172	9.99	17.61	3.32	27.60	13.31	56.00	46.00	-28.40	-32.69
5	11.52344	10.74	21.73	11.26	32.47	22.00	60.00	50.00	-27.53	-28.00
6	16.91016	11.04	24.55	13.43	35.59	24.47	60.00	50.00	-24.41	-25.53

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

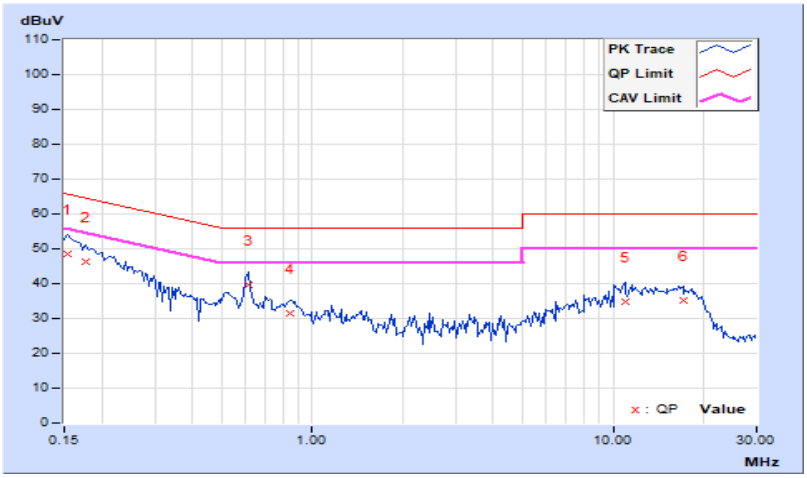


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.00	38.53	23.98	48.53	33.98	65.79	55.79	-17.26	-21.81
2	0.17734	10.00	36.33	22.48	46.33	32.48	64.61	54.61	-18.28	-22.13
3	**0.61094**	**10.02**	**29.46**	**21.19**	**39.48**	**31.21**	**56.00**	**46.00**	**-16.52**	**-14.79**
4	0.84531	10.04	21.39	13.66	31.43	23.70	56.00	46.00	-24.57	-22.30
5	10.95313	10.69	24.18	15.15	34.87	25.84	60.00	50.00	-25.13	-24.16
6	17.07031	10.93	24.36	16.62	35.29	27.55	60.00	50.00	-24.71	-22.45

Remarks:

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

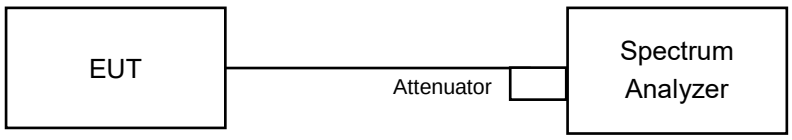


4.3 Conducted Out of Band Emission Measurement

4.3.1 Limits of Conducted Out of Band Emission Measurement

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

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 Procedures

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.3.5 Deviation from Test Standard

No deviation.

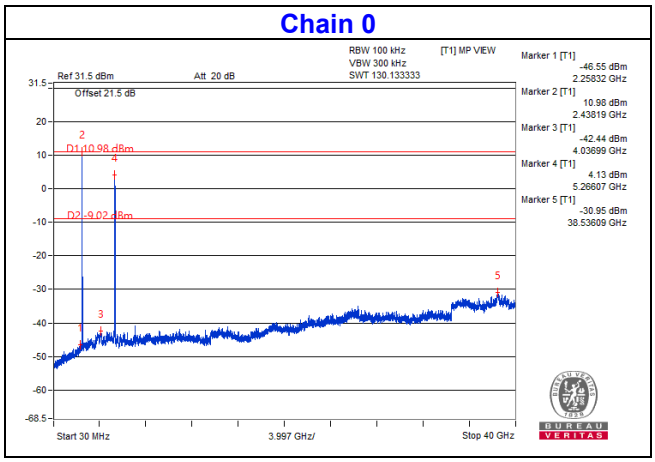
4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

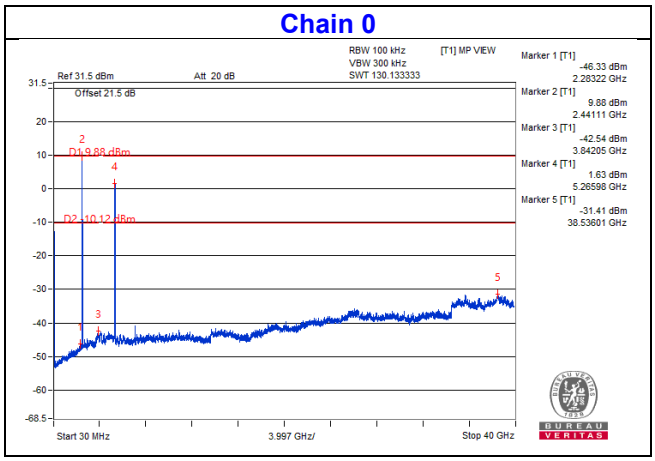
4.3.7 Test Results

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

WWAN (LTE B12) + 2.4GHz_802.11b CH6 + 5GHz_802.11ac (VHT40) CH54 + NFC CH1



WWAN (LTE B12) + 5GHz_802.11ac (VHT40) + BT-EDR CH 39 + CH54 + NFC CH1



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

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