

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 96
47 CFR FCC Part 2

Report No.: RFBCMA-WTW-P23030799-10

FCC ID: RAXTMOG4AR

Product: 5G Gateway

Brand: T-Mobile

Model No.: TMO-G4AR

Received Date: 2023/3/15

Test Date: 2023/4/10 ~ 2023/4/11

Issued Date: 2023/5/23

Applicant: Arcadyan Technology Corporation

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration / 788550 / TW0003

Designation Number:

Approved by: Jeremy Lin , **Date:** 2023/5/23
Jeremy Lin / Project Engineer

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Prepared by : Celine Chou / Senior Specialist



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Release Control Record

Issue No.	Description	Date Issued
RFBCMA-WTW-P23030799-10	Original release.	2023/5/23

1 Certificate

Product: 5G Gateway

Brand: T-Mobile

Test Model: TMO-G4AR

Sample Status: Engineering sample

Applicant: Arcadyan Technology Corporation

Test Date: 2023/4/10 ~ 2023/4/11

Standard: 47 CFR FCC Part 96

47 CFR FCC Part 2

Measurement ANSI/TIA/EIA-603-E 2016

procedure: ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 940660 D01 Part 96 CBRS Eqpt v03

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.

2 Summary of Test Results

47 CFR FCC Part 96 47 CFR FCC Part 2			
Standard / Clause	Test Item	Result	Remark
FCC 47 CFR Part 2.1046 FCC 47 CFR Part 96.41(b)	Maximum EIRP	Pass	Meet the requirement of limit. Refer to Note 3
FCC 47 CFR Part 2.1047	Modulation Characteristics	N/A	Refer to Note 1
FCC 47 CFR Part 2.1046 FCC 47 CFR Part 96.41(b)	Maximum Power Spectral Density	N/A	Refer to Note 1 & 2
FCC 47 CFR Part 96.41(g)	Peak to Average Ratio	N/A	Refer to Note 1
FCC 47 CFR Part 2.1049	Bandwidth	N/A	Refer to Note 1
FCC 47 CFR Part 2.1051 FCC 47 CFR Part 96.41(e)	Conducted Spurious Emissions	N/A	Refer to Note 1
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 96.41(e)	Radiated Spurious Emissions below 1GHz	Pass	Minimum passing margin is -6.74 dB at 101.78 MHz
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 96.41(e)	Radiated Spurious Emissions above 1GHz	Pass	Minimum passing margin is -3.57 dB at 7380.00 MHz
FCC 47 CFR Part 2.1055	Frequency Stability	N/A	Refer to Note 1

Note:

1. The only test item of Equivalent Isotropically Radiated Power and Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to SGS-CSRC Standards Technical Services (Suzhou) Co., Ltd. Report No.: KSCR221000187201 (LTE Module, Brand: Fibocom, Model: FG360-NA, FCC ID: ZMOFG360NA08).
2. The Device doesn't need to test.
3. The conducted output power was copied from the original module report.
4. 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:

Parameter	Specification	Uncertainty (±)
Radiated Spurious Emissions below 1GHz	9 kHz ~ 30 MHz	2.44 dB
	30 MHz ~ 1 GHz	2.95 dB
Radiated Spurious Emissions above 1GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	5G Gateway
Brand	T-Mobile
Test Model	TMO-G4AR
Status of EUT	Engineering sample
Power Supply Rating	20Vdc or 15Vdc or 12Vdc or 9Vdc or 5Vdc (From adapter)

Note:

1. Base on the conducted power and all conducted result no change, the device WWAN conducted data leverage 5G module (Fibocom FG360-NA), and record ERP/EIRP in the report with Internal Antenna to prove it not over the limit.

2. EUT Overview

Band / Bandwidth	TX Frequency Range (MHz)	Max. EIRP Power			
		QPSK	16QAM	64QAM	256QAM
LTE Band 48 (CA 48C) (10MHz + 20MHz)	3555.5-3690.0	145.211mW (21.62dBm/channel bandwidth)	116.413mW (20.66dBm/channel bandwidth)	91.622mW (19.62dBm/channel bandwidth)	51.523mW (17.12dBm/channel bandwidth)
LTE Band 48 (CA 48C) (15MHz + 20MHz)	3557.8-3690.0	147.911mW (21.70dBm/channel bandwidth)	122.462mW (20.88dBm/channel bandwidth)	90.991mW (19.59dBm/channel bandwidth)	52.845mW (17.23dBm/channel bandwidth)
LTE Band 48 (CA 48C) (20MHz + 10MHz)	3560.0-3694.5	144.544mW (21.60dBm/channel bandwidth)	115.345mW (20.62dBm/channel bandwidth)	87.297mW (19.41dBm/channel bandwidth)	52.845mW (17.23dBm/channel bandwidth)
LTE Band 48 (CA 48C) (20MHz + 15MHz)	3560.0-3692.2	142.561mW (21.54dBm/channel bandwidth)	114.025mW (20.57dBm/channel bandwidth)	86.099mW (19.35dBm/channel bandwidth)	50.466mW (17.03dBm/channel bandwidth)
LTE Band 48 (CA 48C) (20MHz + 20MHz)	3560.0-3690.0	139.959mW (21.46dBm/channel bandwidth)	112.460mW (20.51dBm/channel bandwidth)	85.901mW (19.34dBm/channel bandwidth)	50.003mW (16.99dBm/channel bandwidth)
LTE Band 48 (CA 48C) (20MHz + 5MHz)	3560.0-3696.7	141.579mW (21.51dBm/channel bandwidth)	128.529mW (21.09dBm/channel bandwidth)	100.693mW (20.03dBm/channel bandwidth)	54.075mW (17.33dBm/channel bandwidth)
LTE Band 48 (CA 48C) (5MHz + 20MHz)	3553.3-(3690.0	115.878mW (20.64dBm/channel bandwidth)	96.383mW (19.84dBm/channel bandwidth)	72.611mW (18.61dBm/channel bandwidth)	61.235mW (17.87dBm/channel bandwidth)

3. The EUT uses following accessories.

AC Adapter 1		
Brand	Model	Specification
LUCENT TRANS	1A78	AC Input : 100~240V, 1.2A, 50-60Hz DC Output : 5.0V, 3.0A, 15W or 9.0V, 3.0A, 27W or 12.0V, 3.0A, 36W or 15.0V, 3.0A, 45W or 20.0V, 2.25A, 45W DC Output Cable : 1.85 M , non-shielded cable, W/O ferrite core Plug : US
AC Adapter 2		
Brand	Model	Specification
MASS POWER	PD045E-C1C0AVU	AC Input : 100~240V, 1.0A, 50-60Hz DC Output : 5.0V, 3.0A or 9.0V, 3.0A or 12.0V, 3.0A or 15.0V, 3.0A or 20.0V, 2.25A, 45W DC Output Cable : 1.8 M , non-shielded cable, W/O ferrite core Plug : US

*The adapter 1 was chosen for final test.

4. For CA mode configuration, please consult the manufacturer to declare the test mode.

5. The EUT support the following CA Configuration.

Band Configuration
2C
48C

6. 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.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency range	Antenna Type	Connector Type
WWAN Antenna (Internal)	B71 (TRx) (M2)	PSA	RFPCA811609IMMB403_B	3.17	663-698 MHz	Monopole	ipex(MHF1)
	B71 (Rx)(M1)		RFPCA811609IMMB402_A	3.10	663-698 MHz	Monopole	ipex(MHF1)
	B71 (Rx) (D1)		RFPCA652018IMMB401_A	2.09	663-698 MHz	Monopole	ipex(MHF1)
	B71 (Rx)(D2)		RFFPA656320IMMB401_B	2.01	663-698 MHz	Monopole	ipex(MHF1)
	B12 (TRx)(M2)	PSA	RFPCA811609IMMB403_B	3.34	698-716 MHz	Monopole	ipex(MHF1)
	B12 (Rx)(D2)		RFFPA656320IMMB401_B	2.05	698-716 MHz	Monopole	ipex(MHF1)
	B5 (TRx)(M2)	PSA	RFPCA811609IMMB403_B	1.68	824-849 MHz	Monopole	ipex(MHF1)
	B5 (Rx) (D2)		RFFPA656320IMMB401_B	0.63	824-849 MHz	Monopole	ipex(MHF1)
	B4/B66 (TRx) (M2)	PSA	RFPCA811609IMMB403_B	3.69	1710-1780 MHz	Monopole	ipex(MHF1)
	B4/B66 (TRx) (M1)		RFPCA811609IMMB402_A	5.13	1710-1780 MHz	Monopole	ipex(MHF1)
	B4/B66 (Rx) (D1)		RFPCA652018IMMB401_A	4.26	1710-1780 MHz	Monopole	ipex(MHF1)
	B4/B66 (Rx) (D2)		RFFPA656320IMMB401_B	4.10	1710-1780 MHz	Monopole	ipex(MHF1)
	B2/B25 (TRx) (M2)	PSA	RFPCA811609IMMB403_B	3.33	1850-1915 MHz	Monopole	ipex(MHF1)
	B2/B25 (TRx) (M1)		RFPCA811609IMMB402_A	4.78	1850-1915 MHz	Monopole	ipex(MHF1)
	B2/B25 (Rx) (D1)		RFPCA652018IMMB401_A	3.79	1850-1915 MHz	Monopole	ipex(MHF1)
	B2/B25 (Rx) (D2)		RFFPA656320IMMB401_B	4.11	1850-1915 MHz	Monopole	ipex(MHF1)
	B41 (TRx) (M2)	PSA	RFPCA811609IMMB403_B	2.78	2496-2690 MHz	Monopole	ipex(MHF1)
	B41 (TRx) (M1)		RFPCA811609IMMB402_A	3.02	2496-2690 MHz	Monopole	ipex(MHF1)
	B41 (Rx) (Omni-Antenna HC1O)		RFPCA380906IMMB401_A	4.45	2496-2690 MHz	Dipole	ipex(MHF1)
	B41 (Rx) (Omni-Antenna HC2O)		RFPCA380912IMMB401_A	3.67	2496-2690 MHz	Dipole	ipex(MHF1)
	B41 (Rx) (Semi-Antenna HC1S)		RFPCA474709IMMB401_A	7.59	2496-2690 MHz	Dipole	ipex(MHF1)
	B41 (Rx) (Semi-Antenna HC2S)		RFPCA474709IMMB401_A	7.76	2496-2690 MHz	Dipole	ipex(MHF1)
	B48 (TRx) (M2)	PSA	RFPCA811609IMMB403_B	0.94	3550-3700 MHz	Monopole	ipex(MHF1)
	B48 (TRx) (M1)		RFPCA811609IMMB402_A	1.02	3550-3700 MHz	Monopole	ipex(MHF1)
	B48 (Rx) (Omni-Antenna HC1O)		RFPCA380906IMMB401_A	4.64	3550-3700 MHz	Dipole	ipex(MHF1)
	B48 (Rx) (Omni-Antenna HC2O)		RFPCA380912IMMB401_A	4.03	3550-3700 MHz	Dipole	ipex(MHF1)
	B48 (Rx) (Semi-Antenna HC1S)		RFPCA474709IMMB401_A	7.67	3550-3700 MHz	Dipole	ipex(MHF1)
	B48 (Rx) (Semi-Antenna HC2S)		RFPCA474709IMMB401_A	8.01	3550-3700 MHz	Dipole	ipex(MHF1)
	B77 (TRx) (M2)	PSA	RFPCA811609IMMB403_B	0.84	3300-4200 MHz	Monopole	ipex(MHF1)
	B77(TRx) (M1)		RFPCA811609IMMB402_A	0.91	3300-4200 MHz	Monopole	ipex(MHF1)
B77 (Rx) (Omni-Antenna HC1O)	RFPCA380906IMMB401_A		4.73	3300-4200 MHz	Dipole	ipex(MHF1)	
B77 (Rx) (Omni-Antenna HC2O)	RFPCA380912IMMB401_A		4.14	3300-4200 MHz	Dipole	ipex(MHF1)	
B77 (Rx) (Semi-Antenna HC1S)	RFPCA474709IMMB401_A		7.98	3300-4200 MHz	Dipole	ipex(MHF1)	
B77 (Rx) (Semi-Antenna HC2S)	RFPCA474709IMMB401_A		8.13	3300-4200 MHz	Dipole	ipex(MHF1)	

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

* Only B2/B4/B25 bands support 1TX diversity.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition.
Worst Case:	X-axis/ Y-axis/ Z-axis Worst Condition: Z-axis

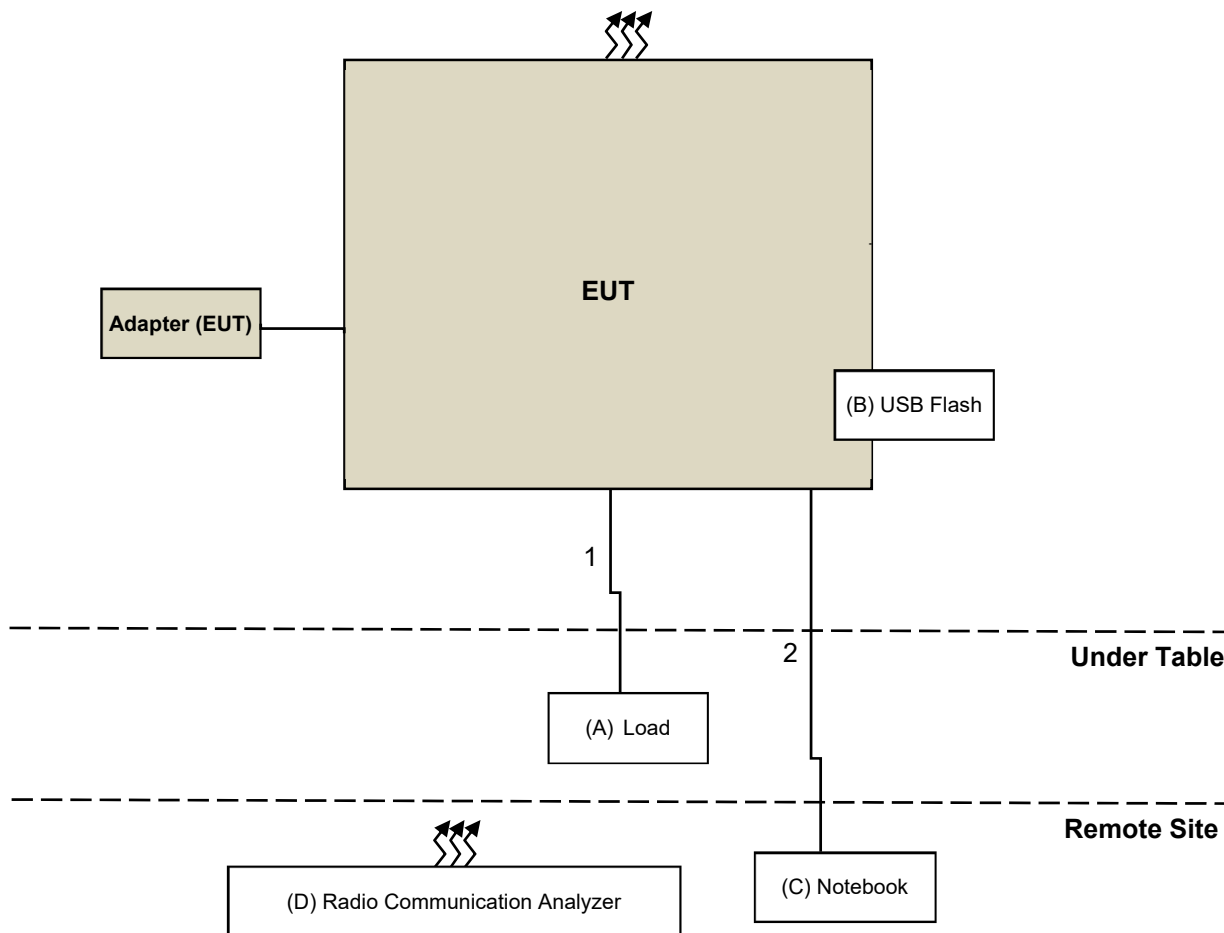
For LTE Band 48 (CA 48C)

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	55295 (3555.5MHz) + 55439 (3569.9MHz) 55896 (3615.6MHz) + 56040 (3630.0MHz) 56490 (3675.0MHz) + 56640 (3690.0MHz)	10MHz + 20MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB Half RB Full RB
	55318 (3557.8MHz) + 55489 (3574.9MHz) 55893 (3615.3MHz) + 56064 (3632.4MHz) 56469 (3672.9MHz) + 56640 (3690.0MHz)	15MHz + 20MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB Half RB Full RB
	55340 (3560.0MHz) + 55484 (3574.4MHz) 55941 (3620.1MHz) + 56085 (3634.5MHz) 56541 (3680.1MHz) + 56685 (3694.5MHz)	20MHz + 10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB Half RB Full RB
	55340 (3560.0MHz) + 55511 (3577.1MHz) 55916 (3617.6MHz) + 56087 (3634.7MHz) 56491 (3675.1MHz) + 56662 (3692.2MHz)	20MHz + 15MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB Half RB Full RB
	55340 (3560.0MHz) + 55538 (3579.8MHz) 55891 (3615.1MHz) + 56089 (3634.9MHz) 56442 (3670.2MHz) + 56640 (3690.0MHz)	20MHz + 20MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB Half RB Full RB
	55340 (3560.0MHz) + 55457 (3571.7MHz) 55965 (3622.5MHz) + 56082 (3634.2MHz) 56590 (3685.0MHz) + 56707 (3696.7MHz)	20MHz + 5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB Half RB Full RB
	55273 (3553.3MHz) + 55390 (3565.0MHz) 55898 (3615.8MHz) + 56015 (3627.5MHz) 56523 (3678.3MHz) + 56640 (3690.0MHz)	5MHz + 20MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB Half RB Full RB
RE Below 1GHz	56469 (3672.9MHz) + 56640 (3690.0MHz)	15MHz + 20MHz	QPSK	1 RB
RE Above 1GHz	56469 (3672.9MHz) + 56640 (3690.0MHz)	15MHz + 20MHz	QPSK	1 RB

3.4 Test Program Used and Operation Descriptions

There is no need to controlling software during the test, and the EUT can be paired with the Radio Communication Analyzer to test the connection when it is powered on.

3.5 Connection Diagram of EUT and Peripheral Devices



3.6 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Load	NA	NA	NA	NA	Provided by Lab
B	USB Flash	SanDisk	SDDDC3-032	NA	NA	Provided by Lab
C	Notebook	Lenovo	80Q7	PF0KUGU6	FCC DoC Approved	Provided by Lab
D	Radio Communication Analyzer	Anritsu	MT8821C	6201462755	NA	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	RJ-45 Cable	1	1.5	No	0	Provided by Lab
2	RJ-45 Cable	1	10	No	0	Provided by Lab

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Radiated Spurious Emissions below 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB9168	9168-472	2022/10/21	2023/10/20
Loop Antenna EMCI	EM-6879	269	2022/9/19	2023/9/18
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Pre-Amplifier EMCI	EMC 330H	980112	2022/10/1	2023/9/30
Pre-amplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
RF Coaxial Cable WORKEN	8D-FB	Cable-Ch10-01	2022/10/1	2023/9/30
Signal Analyzer Agilent	N9010A	MY52220207	2023/1/3	2024/1/2
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Test Receiver KEYSIGHT	N9038A	MY55420137	2022/4/27	2023/4/26
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2023/4/10

4.2 Radiated Spurious Emissions above 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	7	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-969	2022/11/13	2023/11/12
	BBHA 9170	148	2022/11/13	2023/11/12
Pre-Amplifier EMCI	EMC 184045	980116	2022/10/1	2023/9/30
Pre-Amplifier EMCI	EMC 012645	980115	2022/10/1	2023/9/30
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2022/7/9	2023/7/8
	EMC102-KM-KM-3000	150929	2022/7/9	2023/7/8
	EMC104-SM-SM- 8000+3000	171005	2022/10/1	2023/9/30
RF Coaxial Cable HUBER SUHNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	2022/10/1	2023/9/30
RF FLITER MICRO-TRONICS	BRM17690	004	2023/1/11	2024/1/10
	BRM50716	060	2023/1/11	2024/1/10
Signal Analyzer Agilent	N9010A	MY52220207	2023/1/3	2024/1/2
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Test Receiver KEYSIGHT	N9038A	MY55420137	2022/4/27	2023/4/26
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2023/4/11

5 Limits of Test Items

5.1 Maximum EIRP

Device		Maximum EIRP (dBm/10 MHz)
<input checked="" type="checkbox"/>	End User Device	23
<input type="checkbox"/>	Category A CBSD	30
<input type="checkbox"/>	Category B CBSD	47

5.2 Radiated Spurious Emissions below 1GHz

Power of any emissions outside the Fundamental	Limit
Within 0-10 mHz above the Assigned Channel	-13 dBm/MHz
Within 0-10 mHz below the Assigned Channel	
Greater than 10 mHz above the Assigned Channel	-25 dBm/MHz
Greater than 10 mHz below the Assigned Channel	
Power of any emission below 3530 MHz	-40 dBm/MHz
Power of any emission above 3720 MHz	

5.3 Radiated Spurious Emissions above 1GHz

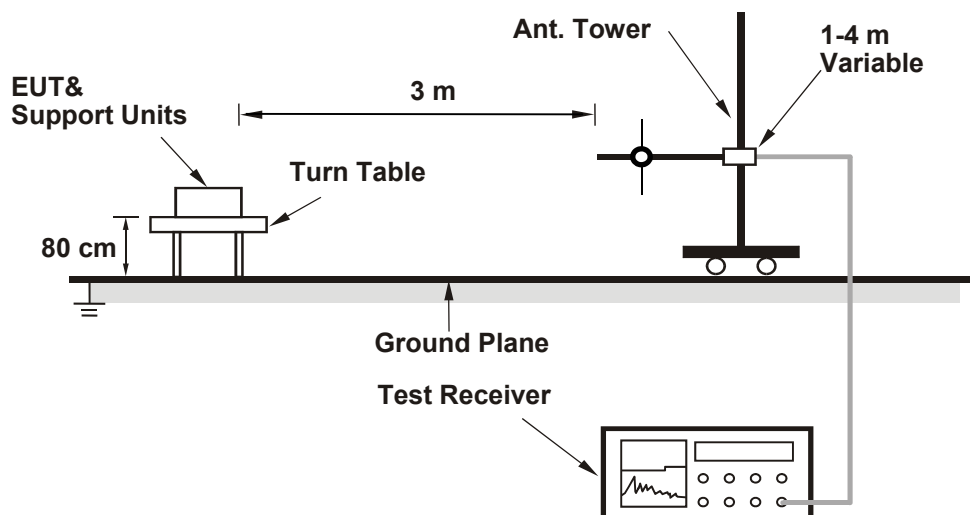
Power of any emissions outside the Fundamental	Limit
Within 0-10 mHz above the Assigned Channel	-13 dBm/MHz
Within 0-10 mHz below the Assigned Channel	
Greater than 10 mHz above the Assigned Channel	-25 dBm/MHz
Greater than 10 mHz below the Assigned Channel	
Power of any emission below 3530 MHz	-40 dBm/MHz
Power of any emission above 3720 MHz	

6 Test Arrangements

6.1 Radiated Spurious Emissions below 1GHz

6.1.1 Test Setup

For radiated emission 30 MHz to 1 GHz



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

6.1.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) 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 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- 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.
- 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.
- Following C63.26 section 5.5 and 5.2.7
- $EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.
- $ERP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8 - 2.15$; where D is the measurement distance (in the far field region) in m.

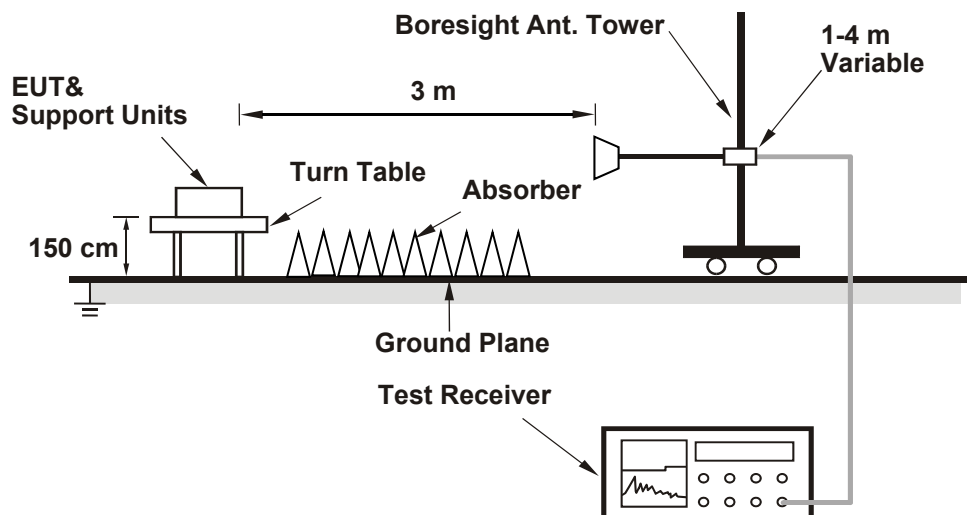
Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.
- 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.

6.2 Radiated Spurious Emissions above 1GHz

6.2.1 Test Setup

For radiated emission above 1 GHz



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

6.2.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- In the semi-anechoic chamber, EUT placed on the 1.5 m 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 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- 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.
- 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.
- 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:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.

7 Test Results of Test Item

7.1 Maximum EIRP

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	22°C, 70% RH	Tested By:	James Yang
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7.1.1 LTE Band 48 (CA 48C)

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Output Power (dBm)	EIRP Power (dBm)
CA 48C	10MHz + 20MHz	QPSK	55295 + 55439	1RB#0 + 0RB#0	20.14	21.16
			55295 + 55439	50RB#0 + 100RB#0	18.43	19.45
			55896 + 56040	1RB#0 + 0RB#0	20.43	21.45
			55896 + 56040	50RB#0 + 100RB#0	18.86	19.88
			56496 + 56640	1RB#0 + 0RB#0	20.6	21.62
			56496 + 56640	50RB#0 + 100RB#0	19.08	20.1
		16QAM	55295 + 55439	1RB#0 + 0RB#0	19.2	20.22
			55295 + 55439	50RB#0 + 100RB#0	17.47	18.49
			55896 + 56040	1RB#0 + 0RB#0	19.47	20.49
			55896 + 56040	50RB#0 + 100RB#0	17.89	18.91
			56496 + 56640	1RB#0 + 0RB#0	19.64	20.66
			56496 + 56640	50RB#0 + 100RB#0	18.09	19.11
		64QAM	55295 + 55439	1RB#0 + 0RB#0	17.97	18.99
			55295 + 55439	50RB#0 + 100RB#0	17.48	18.5
			55896 + 56040	1RB#0 + 0RB#0	18.23	19.25
			55896 + 56040	50RB#0 + 100RB#0	17.91	18.93
			56496 + 56640	1RB#0 + 0RB#0	18.6	19.62
			56496 + 56640	50RB#0 + 100RB#0	18.08	19.1
		256QAM	55295 + 55439	1RB#0 + 0RB#0	15.17	16.19
			55295 + 55439	50RB#0 + 100RB#0	15.48	16.5
			55896 + 56040	1RB#0 + 0RB#0	15.43	16.45
			55896 + 56040	50RB#0 + 100RB#0	15.91	16.93
			56496 + 56640	1RB#0 + 0RB#0	15.61	16.63
			56496 + 56640	50RB#0 + 100RB#0	16.1	17.12

Note:

1. The conducted output power was copied from the original module report.
2. $EIRP (dBm / Channel Bandwidth) = \text{Conducted Output Power (dBm / Channel Bandwidth)} + \text{Antenna Gain (dBi)}$.

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Output Power (dBm)	EIRP Power (dBm)
CA 48C	15MHz + 20MHz	QPSK	55318 + 55489	1RB#0 + 0RB#0	20.32	21.34
			55318 + 55489	75RB#0 + 100RB#0	18.41	19.43
			55893 + 56064	1RB#0 + 0RB#0	20.54	21.56
			55893 + 56064	75RB#0 + 100RB#0	18.79	19.81
			56469 + 56640	1RB#0 + 0RB#0	20.68	21.7
			56469 + 56640	75RB#0 + 100RB#0	19	20.02
		16QAM	55318 + 55489	1RB#0 + 0RB#0	19.35	20.37
			55318 + 55489	75RB#0 + 100RB#0	17.44	18.46
			55893 + 56064	1RB#0 + 0RB#0	19.57	20.59
			55893 + 56064	75RB#0 + 100RB#0	17.82	18.84
			56469 + 56640	1RB#0 + 0RB#0	19.86	20.88
			56469 + 56640	75RB#0 + 100RB#0	18.04	19.06
		64QAM	55318 + 55489	1RB#0 + 0RB#0	18.13	19.15
			55318 + 55489	75RB#0 + 100RB#0	17.43	18.45
			55893 + 56064	1RB#0 + 0RB#0	18.57	19.59
			55893 + 56064	75RB#0 + 100RB#0	17.82	18.84
			56469 + 56640	1RB#0 + 0RB#0	18.49	19.51
			56469 + 56640	75RB#0 + 100RB#0	18.03	19.05
		256QAM	55318 + 55489	1RB#0 + 0RB#0	15.36	16.38
			55318 + 55489	75RB#0 + 100RB#0	15.45	16.47
			55893 + 56064	1RB#0 + 0RB#0	15.51	16.53
			55893 + 56064	75RB#0 + 100RB#0	15.81	16.83
			56469 + 56640	1RB#0 + 0RB#0	16.21	17.23
			56469 + 56640	75RB#0 + 100RB#0	15.45	16.47

- Note:
1. The conducted output power was copied from the original module report.
 2. $EIRP (dBm / Channel Bandwidth) = \text{Conducted Output Power (dBm / Channel Bandwidth)} + \text{Antenna Gain (dBi)}$.

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Output Power (dBm)	EIRP Power (dBm)
CA 48C	20MHz + 10MHz	QPSK	55340 + 55484	100RB#0 + 50RB#0	18.39	19.41
			55340 + 55484	1RB#0 + 0RB#0	20.17	21.19
			55941 + 56085	100RB#0 + 50RB#0	18.79	19.81
			55941 + 56085	1RB#0 + 0RB#0	20.43	21.45
			56541 + 56685	100RB#0 + 50RB#0	18.98	20
			56541 + 56685	1RB#0 + 0RB#0	20.58	21.6
		16QAM	55340 + 55484	100RB#0 + 50RB#0	17.45	18.47
			55340 + 55484	1RB#0 + 0RB#0	19.41	20.43
			55941 + 56085	100RB#0 + 50RB#0	17.85	18.87
			55941 + 56085	1RB#0 + 0RB#0	19.48	20.5
			56541 + 56685	100RB#0 + 50RB#0	18.04	19.06
			56541 + 56685	1RB#0 + 0RB#0	19.6	20.62
		64QAM	55340 + 55484	100RB#0 + 50RB#0	17.44	18.46
			55340 + 55484	1RB#0 + 0RB#0	18.04	19.06
			55941 + 56085	100RB#0 + 50RB#0	17.86	18.88
			55941 + 56085	1RB#0 + 0RB#0	18.24	19.26
			56541 + 56685	100RB#0 + 50RB#0	18.04	19.06
			56541 + 56685	1RB#0 + 0RB#0	18.39	19.41
		256QAM	55340 + 55484	100RB#0 + 50RB#0	15.45	16.47
			55340 + 55484	1RB#0 + 0RB#0	15.21	16.23
			55941 + 56085	100RB#0 + 50RB#0	15.88	16.9
			55941 + 56085	1RB#0 + 0RB#0	15.42	16.44
			56541 + 56685	100RB#0 + 50RB#0	16.05	17.07
			56541 + 56685	1RB#0 + 0RB#0	16.21	17.23

- Note:
1. The conducted output power was copied from the original module report.
 2. $EIRP (dBm / Channel Bandwidth) = \text{Conducted Output Power (dBm / Channel Bandwidth)} + \text{Antenna Gain (dBi)}$.

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Output Power (dBm)	EIRP Power (dBm)
CA 48C	20MHz + 15MHz	QPSK	55340 + 55511	100RB#0 + 75RB#0	18.36	19.38
			55340 + 55511	1RB#0 + 0RB#0	20.15	21.17
			55916 + 56087	100RB#0 + 75RB#0	18.76	19.78
			55916 + 56087	1RB#0 + 0RB#0	20.37	21.39
			56491 + 56662	100RB#0 + 75RB#0	18.97	19.99
			56491 + 56662	1RB#0 + 0RB#0	20.52	21.54
		16QAM	55340 + 55511	100RB#0 + 75RB#0	17.41	18.43
			55340 + 55511	1RB#0 + 0RB#0	19.18	20.2
			55916 + 56087	100RB#0 + 75RB#0	17.8	18.82
			55916 + 56087	1RB#0 + 0RB#0	19.38	20.4
			56491 + 56662	100RB#0 + 75RB#0	18.01	19.03
			56491 + 56662	1RB#0 + 0RB#0	19.55	20.57
		64QAM	55340 + 55511	100RB#0 + 75RB#0	17.41	18.43
			55340 + 55511	1RB#0 + 0RB#0	17.99	19.01
			55916 + 56087	100RB#0 + 75RB#0	17.8	18.82
			55916 + 56087	1RB#0 + 0RB#0	18.21	19.23
			56491 + 56662	100RB#0 + 75RB#0	18	19.02
			56491 + 56662	1RB#0 + 0RB#0	18.33	19.35
		256QAM	55340 + 55511	100RB#0 + 75RB#0	15.41	16.43
			55340 + 55511	1RB#0 + 0RB#0	15.18	16.2
			55916 + 56087	100RB#0 + 75RB#0	15.81	16.83
			55916 + 56087	1RB#0 + 0RB#0	15.36	16.38
			56491 + 56662	100RB#0 + 75RB#0	16.01	17.03
			56491 + 56662	1RB#0 + 0RB#0	15.54	16.56

- Note:
1. The conducted output power was copied from the original module report.
 2. $EIRP (dBm / Channel Bandwidth) = \text{Conducted Output Power (dBm / Channel Bandwidth)} + \text{Antenna Gain (dBi)}$.

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Output Power (dBm)	EIRP Power (dBm)
CA 48C	20MHz + 20MHz	QPSK	55340 + 55538	100RB#0 + 100RB#0	18.37	19.39
			55340 + 55538	1RB#0 + 0RB#0	20.08	21.1
			55891 + 56089	100RB#0 + 100RB#0	18.75	19.77
			55891 + 56089	1RB#0 + 0RB#0	20.28	21.3
			56442 + 56640	100RB#0 + 100RB#0	18.94	19.96
			56442 + 56640	1RB#0 + 0RB#0	20.44	21.46
		16QAM	55340 + 55538	100RB#0 + 100RB#0	17.42	18.44
			55340 + 55538	1RB#0 + 0RB#0	19.33	20.35
			55891 + 56089	100RB#0 + 100RB#0	17.78	18.8
			55891 + 56089	1RB#0 + 0RB#0	19.32	20.34
			56442 + 56640	100RB#0 + 100RB#0	17.97	18.99
			56442 + 56640	1RB#0 + 0RB#0	19.49	20.51
		64QAM	55340 + 55538	100RB#0 + 100RB#0	17.39	18.41
			55340 + 55538	1RB#0 + 0RB#0	17.99	19.01
			55891 + 56089	100RB#0 + 100RB#0	17.76	18.78
			55891 + 56089	1RB#0 + 0RB#0	18.18	19.2
			56442 + 56640	100RB#0 + 100RB#0	17.96	18.98
			56442 + 56640	1RB#0 + 0RB#0	18.32	19.34
		256QAM	55340 + 55538	100RB#0 + 100RB#0	15.41	16.43
			55340 + 55538	1RB#0 + 0RB#0	15.21	16.23
			55891 + 56089	100RB#0 + 100RB#0	15.76	16.78
			55891 + 56089	1RB#0 + 0RB#0	15.33	16.35
			56442 + 56640	100RB#0 + 100RB#0	15.97	16.99
			56442 + 56640	1RB#0 + 0RB#0	15.54	16.56

Note:

1. The conducted output power was copied from the original module report.
2. $EIRP (dBm / Channel Bandwidth) = \text{Conducted Output Power (dBm / Channel Bandwidth)} + \text{Antenna Gain (dBi)}$.

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Output Power (dBm)	EIRP Power (dBm)
CA 48C	20MHz + 5MHz	QPSK	55340 + 55457	100RB#0 + 25RB#0	18.3	19.32
			55340 + 55457	1RB#0 + 0RB#0	19.56	20.58
			55965 + 56082	100RB#0 + 25RB#0	18	19.02
			55965 + 56082	1RB#0 + 0RB#0	19.47	20.49
			56590 + 56707	100RB#0 + 25RB#0	19.33	20.35
			56590 + 56707	1RB#0 + 0RB#0	20.49	21.51
		16QAM	55340 + 55457	100RB#0 + 25RB#0	17.35	18.37
			55340 + 55457	1RB#0 + 0RB#0	18.56	19.58
			55965 + 56082	100RB#0 + 25RB#0	17.07	18.09
			55965 + 56082	1RB#0 + 0RB#0	18.46	19.48
			56590 + 56707	100RB#0 + 25RB#0	18.34	19.36
			56590 + 56707	1RB#0 + 0RB#0	20.07	21.09
		64QAM	55340 + 55457	100RB#0 + 25RB#0	17.34	18.36
			55340 + 55457	1RB#0 + 0RB#0	17.53	18.55
			55965 + 56082	100RB#0 + 25RB#0	17.05	18.07
			55965 + 56082	1RB#0 + 0RB#0	17.46	18.48
			56590 + 56707	100RB#0 + 25RB#0	18.34	19.36
			56590 + 56707	1RB#0 + 0RB#0	19.01	20.03
		256QAM	55340 + 55457	100RB#0 + 25RB#0	15.31	16.33
			55340 + 55457	1RB#0 + 0RB#0	15.56	16.58
			55965 + 56082	100RB#0 + 25RB#0	15.05	16.07
			55965 + 56082	1RB#0 + 0RB#0	15.45	16.47
			56590 + 56707	100RB#0 + 25RB#0	16.31	17.33
			56590 + 56707	1RB#0 + 0RB#0	16.06	17.08

Note:

1. The conducted output power was copied from the original module report.
2. $EIRP (dBm / Channel Bandwidth) = \text{Conducted Output Power (dBm / Channel Bandwidth)} + \text{Antenna Gain (dBi)}$.

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Output Power (dBm)	EIRP Power (dBm)
CA 48C	5MHz + 20MHz	QPSK	55273 + 55390	1RB#0 + 0RB#0	19.61	20.63
			55273 + 55390	25RB#0 + 100RB#0	18.18	19.2
			55898 + 56015	1RB#0 + 0RB#0	19.5	20.52
			55898 + 56015	25RB#0 + 100RB#0	18.15	19.17
			56523 + 56640	1RB#0 + 0RB#0	19.62	20.64
			56523 + 56640	25RB#0 + 100RB#0	18.42	19.44
		16QAM	55273 + 55390	1RB#0 + 0RB#0	18.62	19.64
			55273 + 55390	25RB#0 + 100RB#0	17.17	18.19
			55898 + 56015	1RB#0 + 0RB#0	18.45	19.47
			55898 + 56015	25RB#0 + 100RB#0	17.15	18.17
			56523 + 56640	1RB#0 + 0RB#0	18.82	19.84
			56523 + 56640	25RB#0 + 100RB#0	17.44	18.46
		64QAM	55273 + 55390	1RB#0 + 0RB#0	17.52	18.54
			55273 + 55390	25RB#0 + 100RB#0	17.18	18.2
			55898 + 56015	1RB#0 + 0RB#0	17.43	18.45
			55898 + 56015	25RB#0 + 100RB#0	17.13	18.15
			56523 + 56640	1RB#0 + 0RB#0	17.59	18.61
			56523 + 56640	25RB#0 + 100RB#0	17.43	18.45
		256QAM	55273 + 55390	1RB#0 + 0RB#0	16.52	17.54
			55273 + 55390	25RB#0 + 100RB#0	15.19	16.21
			55898 + 56015	1RB#0 + 0RB#0	16.78	17.8
			55898 + 56015	25RB#0 + 100RB#0	15.2	16.22
			56523 + 56640	1RB#0 + 0RB#0	16.85	17.87
			56523 + 56640	25RB#0 + 100RB#0	15.46	16.48

- Note:
1. The conducted output power was copied from the original module report.
 2. $EIRP (dBm / Channel Bandwidth) = \text{Conducted Output Power (dBm / Channel Bandwidth)} + \text{Antenna Gain (dBi)}$.

7.2 Radiated Spurious Emissions below 1GHz

7.2.1 LTE Band 48 (CA 48C)

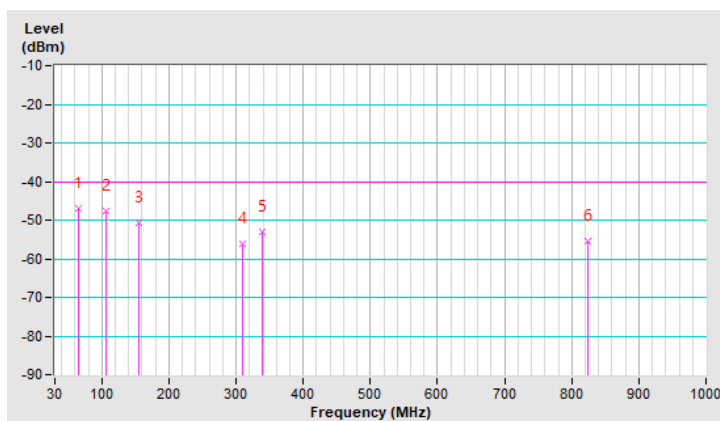
RF Mode	LTE Band 48 (CA 48C) Channel Bandwidth: 15MHz + 20MHz	Channel	CH 56469 (3672.9MHz) + 56640 (3690.0MHz)
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	1 MHz/3 MHz (RMS)
Input Power	120 Vac, 60 Hz	Environmental Conditions	24°C, 78% RH
Tested By	Vincent Chen		

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	-47.06	-40.00	-7.06	1.00 H	2	61.96	-109.02
2	106.63	-47.56	-40.00	-7.56	2.00 H	51	63.36	-110.92
3	155.13	-50.60	-40.00	-10.60	2.00 H	71	57.14	-107.74
4	310.33	-56.03	-40.00	-16.03	1.00 H	253	50.74	-106.77
5	339.43	-53.03	-40.00	-13.03	1.50 H	17	53.16	-106.19
6	824.43	-55.33	-40.00	-15.33	2.00 H	2	41.41	-96.74

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 of frequency range 30 MHz ~ 1 GHz.
5. The EIRP levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

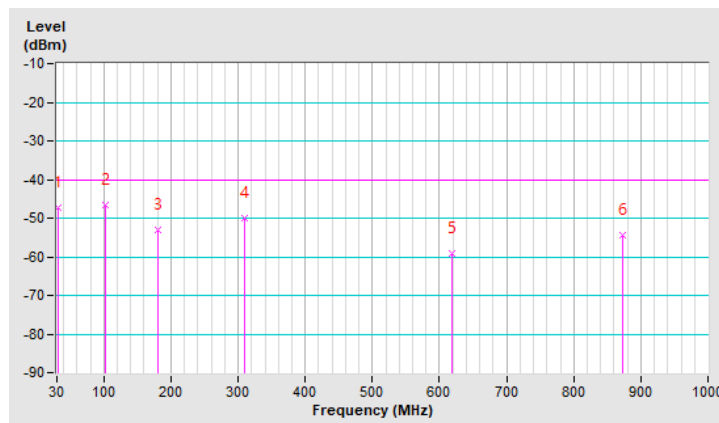


RF Mode	LTE Band 48 (CA 48C) Channel Bandwidth: 15MHz + 20MHz	Channel	CH 56469 (3672.9MHz) + 56640 (3690.0MHz)
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	1 MHz/3 MHz (RMS)
Input Power	120 Vac, 60 Hz	Environmental Conditions	24°C, 78% RH
Tested By	Vincent Chen		

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	32.91	-47.24	-40.00	-7.24	1.00 V	160	60.95	-108.19
2	101.78	-46.74	-40.00	-6.74	1.00 V	302	65.00	-111.74
3	181.32	-53.10	-40.00	-13.10	1.00 V	2	56.36	-109.46
4	309.36	-50.15	-40.00	-10.15	2.00 V	148	56.65	-106.80
5	618.79	-59.22	-40.00	-19.22	1.50 V	2	40.89	-100.11
6	871.96	-54.53	-40.00	-14.53	1.50 V	227	42.14	-96.67

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 of frequency range 30 MHz ~ 1 GHz.
5. The EIRP levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



7.3 Radiated Spurious Emissions above 1GHz

7.3.1 LTE Band 48 (CA 48C)

RF Mode	LTE Band 48 (CA 48C) Channel Bandwidth: 15MHz + 20MHz	Channel	CH 56469 (3672.9MHz) + 56640 (3690.0MHz)
Frequency Range	1 GHz ~ 40 GHz	Detector Function & Bandwidth	1 MHz/3 MHz (RMS)
Input Power	120 Vac, 60 Hz	Environmental Conditions	24°C, 78% RH
Tested By	Vincent Chen		

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	7345.80	-43.87	-40.00	-3.87	1.98 H	114	55.43	-99.30
2	7380.00	-43.57	-40.00	-3.57	1.27 H	152	55.72	-99.29

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	7345.80	-45.95	-40.00	-5.95	1.63 V	258	53.35	-99.30
2	7380.00	-45.66	-40.00	-5.66	1.57 V	177	53.63	-99.29

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.

8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)



9 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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