RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC IC_SL18121001-SEV-085A2_WCDMA LTE Rev_2.0
Supersede Report No.: FCC IC_SL18121001-SEV-085A2_WCDMA LTE Rev_1.0

FCC Applicant	ICOM Incorporated
IC Applicant	ICOM CANADA
Product Name	RoIP Gateway
Model No.	VE-PG4
HVIN	398900-01
Test Standard	47CFR Part 22/24/27 RSS-Gen Issue 5, RSS-130 Issue 2, RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 3
Test Method	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01
FCC ID:	AFJ398900
IC:	202D-398900
Date of test	01/25/2019 - 01/27/2019
Issue Date	03/11/2019
Test Result	Pass Fail
Equipment complied with the specification	[x]
Equipment did not comply with the specification	[ ]

Deon Dai	Chen Ge
Test Engineer	Engineer Reviewer

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Test result presented in this test report is applicable to the tested sample only

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, CA 95035 USA

ilac-MRA
A2LA ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF , Telecom
HongKong	OFTA (US002)	RF , Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC IC_SL18121001-SEV-085A2_WCDMA LTE	None	Original	01/31/2019
FCC IC_SL18121001-SEV-085A2_WCDMA LTE Rev_1.0	Rev_1.0	Updated Antenna Information	02/19/2019
FCC IC_SL18121001-SEV-085A2_WCDMA LTE Rev_2.0	Rev_2.0	Updated Per Review	03/11/2019

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company:	ICOM Incorporated
Product:	RoIP Gateway
Model:	VE-PG4

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

FCC

Applicant Name	ICOM Incorporated
Applicant Address	1-1-32 Kamiminami Hirano-ku Osaka 547-0003 Japan
Manufacturer Name	ICOM Incorporated
Manufacturer Address	1-1-32 Kamiminami Hirano-ku Osaka 547-0003 Japan

IC

Applicant Name	ICOM CANADA
Applicant Address	150-6165 Highway 17, Glenwood Ctr., Delta BC V4K 5B8 Canada
Manufacturer Name	ICOM CANADA
Manufacturer Address	150-6165 Highway 17, Glenwood Ctr., Delta BC V4K 5B8 Canada

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035 USA
FCC Test Site No.	540430
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name:	RoIP Gateway
Model No.:	VE-PG4
HVIN:	398900-01
Trade Name:	iCOM
Serial No.:	398921000531
Input Power:	12V DC, 8.3A
Hardware version:	N/A
Software version:	N/A
Date of EUT received:	December 13, 2018
Equipment Class/ Category:	PCB
Highest frequency generated or used in the device or on which the device operates or tunes:	1910MHz
Port/Connectors:	USB x3, LAN x2, MICx1, Console x1, EXT x4, DC x1
Remark:	-
AC Power Adapter Model No.:	NUA0-7120830-I3
AC Power Adapter Input:	100~240V 50/60Hz, 1.5A

6.2 Radio Description

Item	WCDMA	
Operating Band /Radio Type	Band 2	Band 5
Frequency TX(MHz)	TX: 1850 MHz to 1910 MHz RX: 1930 MHz to 1990 MHz	TX: 824 MHz to 849 MHz RX: 869 MHz to 894 MHz
Bandwidth	5MHz	5MHz
Modulation	QPSK/16QAM	QPSK/16QAM
Antenna Type	Dipole Antenna	Dipole Antenna
Antenna Connector Type	Reverse SMA	Reverse SMA
Antenna Gain (AVG)	-1.6 dBi	-4.5 dBi

Item	LTE		
Operating Band /Radio Type	Band 2	Band 4	Band 12
Frequency TX(MHz)	TX: 1850 MHz to 1910 MHz RX: 1930 MHz to 1990 MHz	TX: 1710 MHz to 1755 MHz RX: 2110 MHz to 2155 MHz	TX: 699 MHz to 716 MHz RX: 729 MHz to 746 MHz
\Bandwidth	1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz	1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz	1.4MHz, 3MHz, 5MHz, 10MHz
Modulation	QPSK/16QAM/64QAM	QPSK/16QAM/64QAM	QPSK/16QAM/64QAM
Antenna Type	Dipole Antenna	Dipole Antenna	Dipole Antenna
Antenna Connect Type	Reverse SMA	Reverse SMA	Reverse SMA
Antenna Gain (AVG)	-1.6 dBi	-2.5 dBi	-3.6 dBi

6.3 EUT test modes/configuration Description

Test mode

Final Test Mode		Note
Final_test_mode_1	Continuous transmission	LTE
Final_test_mode_2	Continuous transmission	WCDMA
-	-	-
Remark:		

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Wideband Radio Communicator	CMW500	108852	Rohde & Schwarz	-

7.2 Test Software Description

Test Item	Software	Description

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
E.R.P/ E.I.R.P	FCC IC	47CFR22.913(a)(5), 24.232(c), 27.50(d)(4) RSS-130 (4.6), RSS-132 (5.4), RSS-133 (6.4), RSS-139 (6.5)	FCC IC	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01	☒ Pass ☐ N/A
Occupied Bandwidth	FCC IC	2.1049 RSS-Gen (6.7), RSS-133 (2.3)	FCC IC	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01	☐ Pass ☒ N/A
Peak-Average Ratio	FCC IC	47CFR24.232(d), 27.50(d)(5) RSS-130 (4.6), RSS-132 (5.4), RSS-133 (6.4), RSS-139 (6.5)	FCC IC	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01	☐ Pass ☒ N/A
Spurious and harmonic Emission at antenna port	FCC IC	47CFR2.1051, 22.917(a), 24.238(a), 27.53(h) RSS-130 (4.7), RSS-132 (5.5), RSS-133 (6.5), RSS-139 (6.6)	FCC IC	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01	☐ Pass ☒ N/A
Band Edge	FCC IC	47CFR2.1051, 22.917(a), 24.238(a), 27.53(h) RSS-130 (4.7), RSS-132 (5.5), RSS-133 (6.5), RSS-139 (6.6)	FCC IC	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01	☐ Pass ☒ N/A
Radiated spurious and harmonic emission	FCC IC	47CFR2.1053, 22.917(a), 24.238(a), 27.53(h) RSS-130 (4.7), RSS-132 (5.5), RSS-133 (6.5), RSS-139 (6.6)	FCC IC	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01	☒ Pass ☐ N/A
Frequency stability	FCC IC	47CFR2.1053, 22.355, 24.135, 27.54 RSS-130 (4.5), RSS-132 (5.3), RSS-133(6.3), RSS-139 (6.4)	FCC IC	ANSI C63.26-2015, TIA-603-E: 2016, KDB 971168 D01 v03r01	☐ Pass ☒ N/A

Remark	
	1. All measurement uncertainties do not take into consideration for all presented test results. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. 3. Only radiated spurious emission is tested in this report, for other test items please refer to the RF reports for module SIM7500A. FCC ID: UDV-201606 (FCC Report No: I16D00113-RFA, I16Z41276-GTE01, BL-SZ1690342-501) IC: 23761-8PYA003 (IC Report No: I18D00227-SRD01, I18D00227-D02)

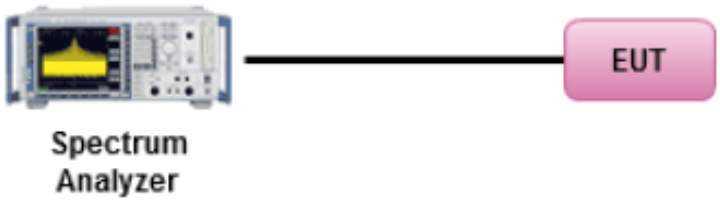
9 Measurement Uncertainty

Emissions			
Test Item	**Frequency Range**	**Description**	**Uncertainty**
AC Conducted Emissions	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
RF conducted measurement	150KHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±0.95dB
Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB
Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB

10 Measurements, Examination and Derived Results

10.1 E.R.P/E.I.R.P

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR22.913(a)(5), 24.232(c),	-	Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.	☒
47CFR27.50(d)(4)	-	The maximum effective radiated power (ERP) of fixed and base station must not exceed 1000 Watts.	☒
Test Setup			
Test Procedure	- EUT was set for low, mid, high channel with modulated mode and highest RF output power. - The spectrum analyzer was connected to the antenna terminal.		
Test Date	-	Environmental condition	Temperature 22°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	**ERP/EIRP is calculated as per below:** ERP = $P_{conducted}$ + G_{ant} - 2.15 EIRP= $P_{conducted}$ + G_{ant}		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

FCC-Maximum ERP/EIRP

Type	Conducted Power (dBm)	Antenna Gain (dBi)	ERP/EIRP (dBm)	Limit (dBm)
WCDMA Band 2	24.74	-1.6	23.14	40.61
WCDMA Band 5	24.82	-4.5	18.17	40.61

Type	Conducted Power (dBm)	Antenna Gain (dBi)	ERP/EIRP (dBm)	Limit (dBm)
LTE Band 2	22.98	-1.6	21.38	33.01
LTE Band 4	23.32	-2.5	20.82	30.00
LTE Band 12	21.91	-3.6	16.16	36.99

IC-Maximum ERP/EIRP

Type	Conducted Power (dBm)	Antenna Gain (dBi)	ERP/EIRP (dBm)	Limit (dBm)
WCDMA Band 2	23.49	-1.6	21.89	40.61
WCDMA Band 5	24.84	-4.5	18.19	40.61

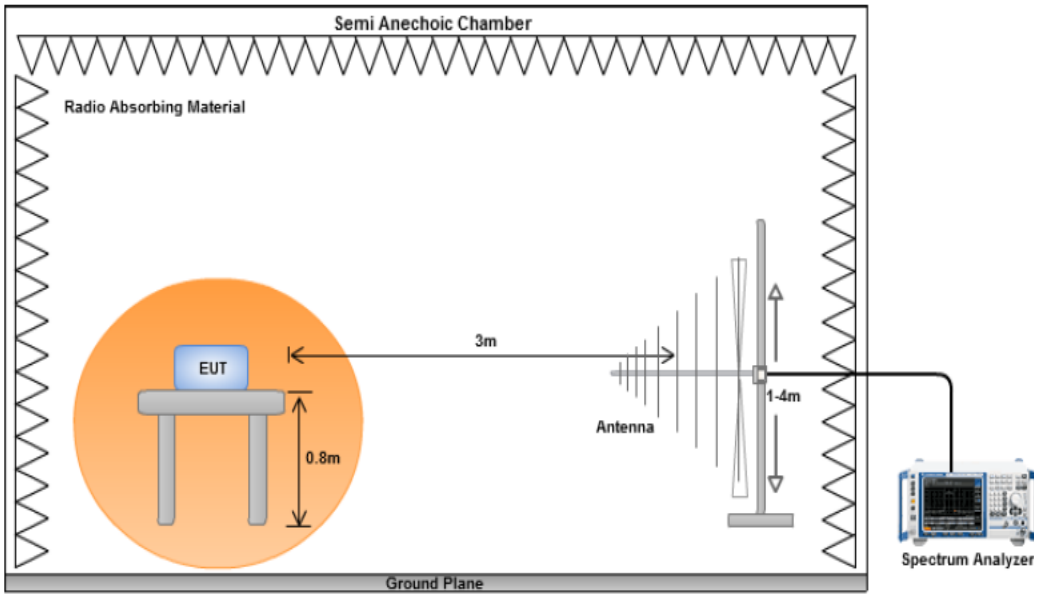
Type	Conducted Power (dBm)	Antenna Gain (dBi)	ERP/EIRP (dBm)	Limit (dBm)
LTE Band 2	24.03	-1.6	22.43	33.01
LTE Band 4	23.6	-2.5	21.1	30.00
LTE Band 12	24.88	-3.6	19.13	36.99

10.2 Radiated Spurious Emission below 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR22.913 24.232	-	Out of band emissions. 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.	☒
47CFR27.50	-	Out of band emissions. 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.	☒

Test Setup



Test Procedure

Substitution method:

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter.
4. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained.
5. Steps 4 were repeated for the next frequency point, until all selected frequency points were measured.

Test Date	12/18/2018 – 12/24/2018	Environmental condition	Temperature 23°C Relative Humidity 48% Atmospheric Pressure 1008mbar

Remark

The EUT was scanned up to 25GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.

Limit calculation:
Emission limit = PdBm – [43+ 10 log (PW)] = 10log(1000 x PW) - 43 - 10log(PW) = 30 dBm - 43 = -13 dBm
All different modulation and bandwidth configuration has been verified and only the test data of worst case with QPSK modulation and greatest bandwidth was presented in this report.

Result ☒ Pass ☐ Fail

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Deon Dai at 10m chamber.

External Antenna:

Radiated Emission Test Results (Below 1GHz) (Worst case only)

WCDMA band 2

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
207.2	-71.25	188	155	V	207.2	-66.4	0	0.45	-66.85	-13	-53.85
207.2	-70.65	146	160	H	207.2	-65.19	0	0.45	-65.64	-13	-52.64
750	-69.54	355	150	V	750	-63.44	0	0.89	-64.33	-13	-51.33
750	-70.5	298	149	H	750	-64.95	0	0.89	-65.84	-13	-52.84
875.05	-71.24	169	165	V	875.05	-66.28	0	0.96	-67.24	-13	-54.24
875.05	-72.05	281	153	H	875.05	-66.58	0	0.96	-67.54	-13	-54.54

LTE band 2

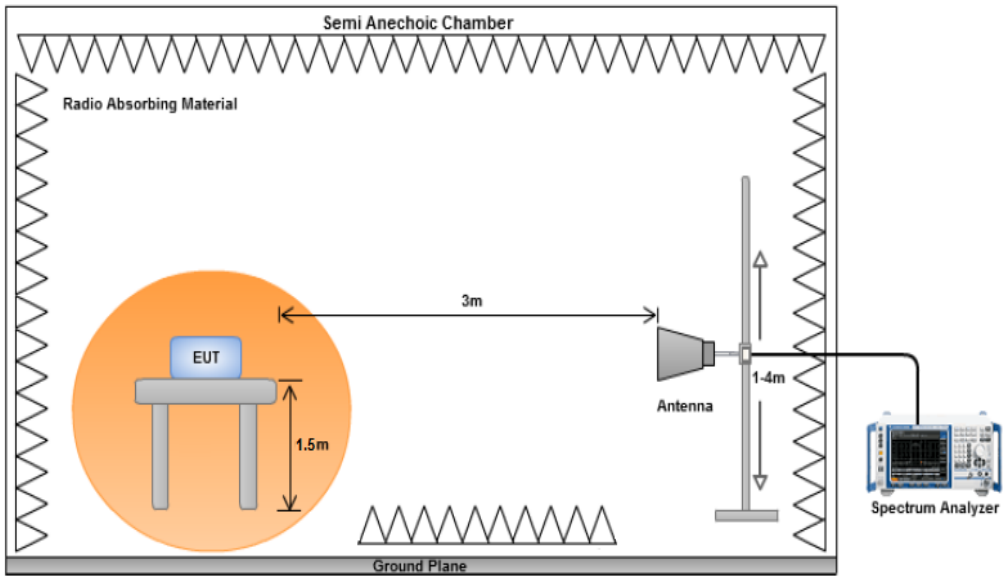
Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
207.12	-71.65	113	155	V	207.12	-65.32	0	0.45	-65.77	-13	-52.77
207.12	-72.44	214	180	H	207.12	-66.18	0	0.45	-66.63	-13	-53.63
460.79	-70.14	265	125	V	460.79	-64.85	0	0.65	-65.5	-13	-52.5
460.79	-71.09	29	192	H	460.79	-65.21	0	0.65	-65.86	-13	-52.86
624.97	-74.56	194	155	V	624.97	-70.2	0	0.77	-70.97	-13	-57.97
624.97	-73.88	269	198	H	624.97	-69.58	0	0.77	-70.35	-13	-57.35

10.3 Radiated Spurious Emissions above 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR22.913 24.232	-	Out of band emissions. 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.	☒
47CFR27.50	-	Out of band emissions. 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.	☒

Test Setup



Test Procedure

Substitution method:

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter.
4. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained.
5. Steps 4 were repeated for the next frequency point, until all selected frequency points were measured.

Test Date	12/18/2018 – 12/24/2018	Environmental condition	Temperature	23°C
			Relative Humidity	48%
			Atmospheric Pressure	1008mbar

Remark

The EUT was scanned up to 25GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.
Limit calculation:
Emission limit = PdBm – [43+ 10 log (PW)] = 10log(1000 x PW) - 43 - 10log(PW) = 30 dBm - 43 = -13 dBm

All different modulation and bandwidth configuration has been verified and only the test data of worst case with QPSK modulation and greatest bandwidth was presented in this report.

Result ☒ Pass ☐ Fail

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Gary Chou at 10m chamber.

Radiated Emission Test Results (Above 1GHz)

WCDMA band 2 Low Channel

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3704.8	-59.05	160	206	V	3704.8	-55.25	10.29	1.95	-46.91	-13	-33.91
3704.8	-62.9	310	156	H	3704.8	-59.1	10.29	1.95	-50.76	-13	-37.76
7871	-63.64	170	168	V	7871	-57.88	10.92	2.53	-49.49	-13	-36.49
7871	-62.84	62	194	H	7871	-57.08	10.92	2.53	-48.69	-13	-35.69

WCDMA band 2 Mid Channel

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3760	-60.32	232	210	V	3760	-56.44	9.98	1.95	-48.41	-13	-35.41
3760	-59.31	214	161	H	3760	-55.43	9.98	1.95	-47.4	-13	-34.4
7654	-64.81	252	215	V	7654	-59	11.05	2.47	-50.42	-13	-37.42
7654	-63.9	140	200	H	7654	-58.09	11.05	2.47	-49.51	-13	-36.51

WCDMA band 2 High Channel

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3815.2	-58.25	143	157	V	3815.2	-54.28	9.72	1.95	-46.51	-13	-33.51
3815.2	-60.86	320	182	H	3815.2	-56.89	9.72	1.95	-49.12	-13	-36.12
7216	-63.11	58	168	V	7216	-57.06	10.33	2.93	-49.66	-13	-36.66
7216	-57.75	113	160	H	7216	-51.7	10.33	2.93	-44.3	-13	-31.3

WCDMA band 5 Low Channel

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1652.8	-64.04	238	152	V	1652.8	-59.74	9.32	1.27	-51.69	-13	-38.69
1652.8	-66.21	352	207	H	1652.8	-61.91	9.32	1.27	-53.86	-13	-40.86
6014	-55.15	359	179	V	6014	-50.4	10.19	2.54	-42.75	-13	-29.75
6014	-60.46	170	160	H	6014	-55.71	10.19	2.54	-48.06	-13	-35.06

WCDMA band 5 Mid Channel

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1670	-66.18	119	213	V	1670	-62.01	9.29	1.29	-54.01	-13	-41.01
1670	-64.3	238	182	H	1670	-60.13	9.29	1.29	-52.13	-13	-39.13
6414	-58.73	19	208	V	6414	-53.55	10.61	2.67	-45.61	-13	-32.61
6414	-61.82	147	151	H	6414	-56.64	10.61	2.67	-48.7	-13	-35.7

WCDMA band 5 High Channel

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1693.2	-66.56	6	156	V	1693.2	-62.49	9.25	1.3	-54.54	-13	-41.54
1693.2	-62.2	349	188	H	1693.2	-58.13	9.25	1.3	-50.18	-13	-37.18
6127	-59.34	15	186	V	6127	-54.47	10.27	2.58	-46.78	-13	-33.78
6127	-62.62	294	197	H	6127	-57.75	10.27	2.58	-50.06	-13	-37.06

LTE band 2 Low Channel, 10MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3720	-57.75	126	165	V	3720	-53.93	10.21	1.95	-45.67	-13	-32.67
3720	-57.44	335	161	H	3720	-53.62	10.21	1.95	-45.36	-13	-32.36
7685	-56.8	141	207	V	7685	-51	11.06	2.48	-42.42	-13	-29.42
7685	-65.33	27	171	H	7685	-59.53	11.06	2.48	-50.95	-13	-37.95

LTE band 2 Mid Channel, 10MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3760	-61.28	209	201	V	3760	-57.4	9.98	1.95	-49.37	-13	-36.37
3760	-61.96	113	151	H	3760	-58.08	9.98	1.95	-50.05	-13	-37.05
7101	-60.27	179	188	V	7101	-54.34	10.42	2.89	-46.81	-13	-33.81
7101	-66.88	358	211	H	7101	-60.95	10.42	2.89	-53.42	-13	-40.42

LTE band 2 High Channel, 10MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3800	-56.49	94	213	V	3800	-52.54	9.76	1.95	-44.73	-13	-31.73
3800	-67.5	201	164	H	3800	-63.55	9.76	1.95	-55.74	-13	-42.74
7740	-58.99	158	175	V	7740	-53.2	11.04	2.49	-44.65	-13	-31.65
7740	-59.27	103	151	H	7740	-53.48	11.04	2.49	-44.93	-13	-31.93

LTE band 4 Low Channel, 10MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3440	-68.08	26	210	V	3440	-64.39	9.69	1.7	-56.4	-13	-43.4
3440	-64.6	152	166	H	3440	-60.91	9.69	1.7	-52.92	-13	-39.92
7592	-59.44	316	162	V	7592	-53.61	11	2.45	-45.06	-13	-32.06
7592	-59.63	46	175	H	7592	-53.8	11	2.45	-45.25	-13	-32.25

LTE band 4 Mid Channel, 10MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3465	-59.35	344	162	V	3465	-55.61	9.79	1.72	-47.54	-13	-34.54
3465	-61.58	275	178	H	3465	-57.84	9.79	1.72	-49.77	-13	-36.77
7190	-64.77	239	172	V	7190	-58.75	10.32	2.92	-51.35	-13	-38.35
7190	-63.62	164	175	H	7190	-57.6	10.32	2.92	-50.2	-13	-37.2

LTE band 4 High Channel, 10MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3490	-64.38	197	162	V	3490	-60.59	9.88	1.73	-52.44	-13	-39.44
3490	-67.07	216	211	H	3490	-63.28	9.88	1.73	-55.13	-13	-42.13
7397	-59.78	286	199	V	7397	-53.82	10.56	2.59	-45.85	-13	-32.85
7397	-60.16	161	194	H	7397	-54.2	10.56	2.59	-46.23	-13	-33.23

LTE band 12 Low Channel, 5MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
2112	-65.44	163	202	V	2112	-61	9.32	1.41	-53.09	-13	-40.09
2112	-61.17	255	193	H	2112	-56.73	9.32	1.41	-48.82	-13	-35.82
7950	-64.67	42	199	V	7950	-58.94	10.79	2.55	-50.7	-13	-37.7
7950	-58.39	35	192	H	7950	-52.66	10.79	2.55	-44.42	-13	-31.42

LTE band 12 Mid Channel, 5MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
2122.5	-65.11	175	180	V	2122.5	-60.66	9.34	1.41	-52.73	-13	-39.73
2122.5	-65.12	44	175	H	2122.5	-60.67	9.34	1.41	-52.74	-13	-39.74
7227	-58.01	52	176	V	7227	-51.95	10.34	2.93	-44.54	-13	-31.54
7227	-62.23	78	161	H	7227	-56.17	10.34	2.93	-48.76	-13	-35.76

LTE band 12 High Channel, 5MHz BW, QPSK

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
2133	-61.61	151	173	V	2133	-57.15	9.36	1.41	-49.2	-13	-36.2
2133	-66.88	292	169	H	2133	-62.42	9.36	1.41	-54.47	-13	-41.47
7743	-59.57	337	203	V	7743	-53.78	11.04	2.49	-45.23	-13	-32.23
7743	-59.89	21	194	H	7743	-54.1	11.04	2.49	-45.55	-13	-32.55

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Radiated Emissions						
Keysight EXA 44GHz Spectrum Analyzer	N9030B(PXA)	MY57140374	09/06/2018	1 Year	09/06/2019	☑
Wideband Radio Communicator	CMW 500	108852	08/03/2018	1 Year	08/03/2019	☑
Keysight Signal Generator	MXG N5182A	MY47071065	07/12/2018	1 Year	07/12/2019	☑
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	08/16/2018	1 Year	08/16/2019	☑
RF Preamplifier (100KHz-7GHz)	LPA-6-30	11170602	05/09/2018	1 Year	05/09/2019	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	03/09/2018	2 Year	03/09/2020	☑
Horn Antenna (1GHz~26GHz)	3115	100059	11/09/2018	1 Year	11/09/2019	☑
Horn Antenna (700MHz-18GHz)	SAS-571	411	05/13/2018	1 Year	05/13/2019	☑
Tuned Dipole Antenna 30 - 1000 MHz (4pcs set)	AD-100	40133	10/02/2018	1 Year	10/02/2019	☑

Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1, A2, A3, A4, B1, B2, B3, B4, C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		**Radio & Telecommunications Terminal Equipment:** EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I, Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
HongKong OFCA		**(Phase II)** OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		**Radio:** Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		**Radio** : A1. Terminal equipment for purpose of calling **Telecom** : B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		**EMI:** KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI**EMS:** KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS
		Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68
		Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measuremet
Australia CAB Regocnition		**EMC:** AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4
		Radiocommunications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771
		Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016,AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2