



FCC RF Test Report

APPLICANT : Eroad, Ltd.
EQUIPMENT : Ehubo
BRAND NAME : EROAD
MODEL NAME : Ehubo2.2
FCC ID : Contains FCC ID : 2AA93-ELS61-US
STANDARD : 47 CFR Part 2, 22(H), 24(E), 27(L), 27(H)
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was installed a WWAN module (Brand Name: GEMALTO, Model Name: ELS61-US, FCC ID: 2AA93-ELS61-US) during test.

The product was received on Dec. 05, 2018 and completely tested on Jan. 16, 2019. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Approved by: James Huang / Manager

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone,
Jiangsu Province, China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG8D0502B	Rev. 01	Initial issue of report	Feb. 20, 2019

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power (Band 5)	ERP < 7 Watt	PASS	-
	§27.50(c)(10)	Effective Radiated Power (Band 12)	ERP < 3 Watt	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power (Band 2)	EIRP < 2Watt	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt	PASS	-
-	§24.232(d)	Peak-to-Average Ratio	<13 dB	Pass	1
-	§2.1049	Occupied Bandwidth	Reporting Only	Pass	1
-	§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 12)	< 43+10log ₁₀ (P[Watts])	Pass	1
-	§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 12)	< 43+10log ₁₀ (P[Watts])	Pass	1
-	§2.1055 §22.355	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22	Pass	1
	§2.1055 §24.235 §27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 12)	< 43+10log ₁₀ (P[Watts])	PASS	Under limit 35.55 dB at 1414.00 MHz
Remark 1: The test items were leverage from module RF report which can refer to Report No. "UL05420151102FCC/IC042-2".					



1 General Description

1.1 Applicant

Eroad, Ltd.

Level 3, 260 Oteha Valley Road Albany, Auckland, 0757 New Zealand

1.2 Manufacturer

Eroad, Ltd.

Level 3, 260 Oteha Valley Road Albany, Auckland, 0757 New Zealand

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Ehubo
Brand Name	EROAD
Model Name	Ehubo2.2
FCC ID	Contains FCC ID: 2AA93-ELS61-US
EUT supports Radios application	WCDMA/HSPA/LTE Bluetooth BR/EDR/LE
HW Version	Rev E1
SW Version	1.46
EUT Stage	Production Unit

Module Feature & Specification	
Equipment	ELS61-US
Brand Name	GEMALTO
Model Name	ELS61-US
FCC ID	2AA93-ELS61-US

Remark:

The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 12 : 699.7 MHz ~ 715.3 MHz
Rx Frequency	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 12 : 729.7 MHz ~ 745.3 MHz
Bandwidth	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 12 : 1.4MHz / 3MHz / 5MHz / 10MHz
Maximum Output Power to Antenna	LTE Band 2 : 21.66 dBm LTE Band 4 : 21.70 dBm LTE Band 5 : 22.22 dBm LTE Band 12 : 22.12 dBm
Antenna Gain	LTE Band 2 : 2.68 dBi LTE Band 4 : 2.68 dBi LTE Band 5 : 0.01 dBi LTE Band 12 : 0.01 dBi
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

No modifications are made to the EUT during all test items.



1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

LTE Band 2		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1850.7 ~ 1909.3	-	-	0.2529	-	-	0.2065
3	1851.5 ~ 1908.5	-	-	0.2466	-	-	0.2075
5	1852.5 ~ 1907.5	-	-	0.2477	-	-	0.2113
10	1855.0 ~ 1905.0	-	-	0.2636	-	-	0.2244
15	1857.5 ~ 1902.5	-	-	0.2692	-	-	0.2421
20	1860.0 ~ 1900.0	-	-	0.2716	-	-	0.2254
LTE Band 4		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1710.7 ~ 1754.3	-	-	0.2679	-	-	0.2153
3	1711.5 ~ 1753.5	-	-	0.2661	-	-	0.2377
5	1712.5 ~ 1752.5	-	-	0.2667	-	-	0.2312
10	1715.0 ~ 1750.0	-	-	0.2594	-	-	0.2265
15	1717.5 ~ 1747.5	-	-	0.2742	-	-	0.2466
20	1720.0 ~ 1745.0	-	-	0.2698	-	-	0.2371
LTE Band 5		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
1.4	824.7 ~ 848.3	-	-	0.1019	-	-	0.0830
3	825.5 ~ 847.5	-	-	0.0991	-	-	0.0935
5	826.5 ~ 846.5	-	-	0.0993	-	-	0.0871
10	829.0 ~ 844.0	-	-	0.1007	-	-	0.0897
LTE Band 12		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
1.4	699.7 ~ 715.3	-	-	0.0995	-	-	0.0796
3	700.5 ~ 714.5	-	-	0.0923	-	-	0.0752
5	701.5 ~ 713.5	-	-	0.0935	-	-	0.0817
10	704.0 ~ 711.0	-	-	0.0979	-	-	0.0780

1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province, China TEL : 86-512-57900158 FAX : 86-512-57900958		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	TH01-KS 03CH06-KS	CN5013	630927

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 22(H), 24(E), 27(L), 27(H)
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

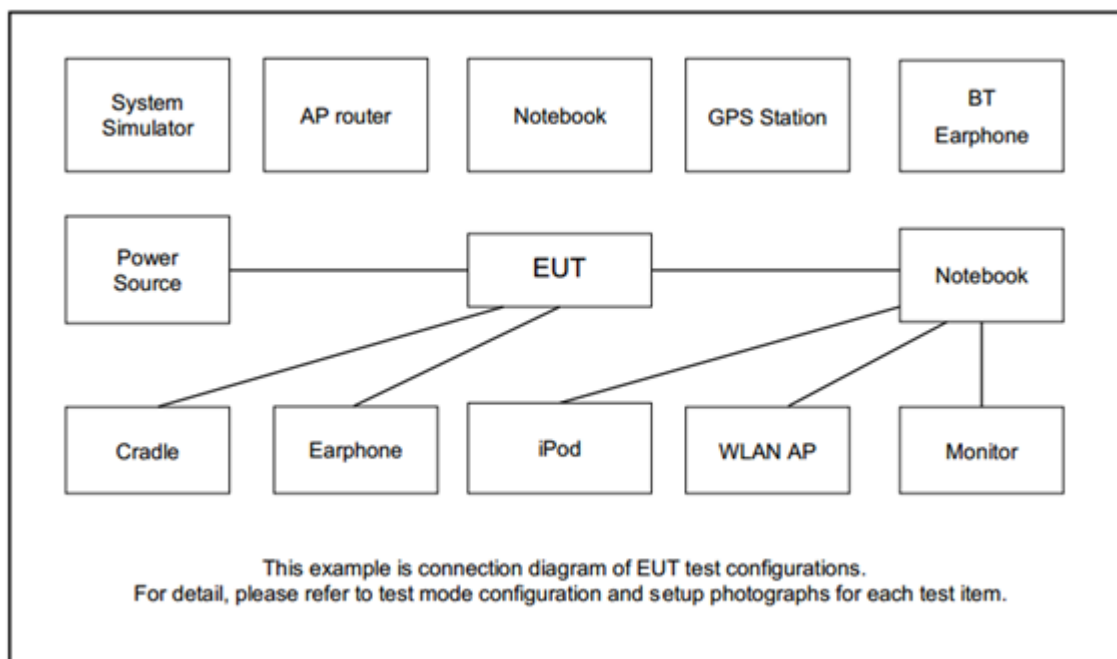
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	5	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
E.R.P / E.I.R.P	2	v	v	v	v	v	v	v	v	v			v	v	v
	4	v	v	v	v	v	v	v	v	v			v	v	v
	5	v	v	v	v	-	-	v	v	v			v	v	v
	12	v	v	v	v	-	-	v	v	v			v	v	v
Radiated Spurious Emission	2	Worst Case												v	
	4	Worst Case												v	
	5	Worst Case												v	
	12	Worst Case												v	
Note	1. The mark “v “ means that this configuration is chosen for testing 2. The mark “-“ means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.														

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m



2.4 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 4 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20050	20175	20300
	Frequency	1720	1732.5	1745
15	Channel	20025	20175	20325
	Frequency	1717.5	1732.5	1747.5
10	Channel	20000	20175	20350
	Frequency	1715	1732.5	1750
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3



LTE Band 5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	20450	20525	20600
	Frequency	829	836.5	844
5	Channel	20425	20525	20625
	Frequency	826.5	836.5	846.5
3	Channel	20415	20525	20635
	Frequency	825.5	836.5	847.5
1.4	Channel	20407	20525	20643
	Frequency	824.7	836.5	848.3

LTE Band 12 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	23060	23095	23130
	Frequency	704	707.5	711
5	Channel	23035	23095	23155
	Frequency	701.5	707.5	713.5
3	Channel	23025	23095	23165
	Frequency	700.5	707.5	714.5
1.4	Channel	23017	23095	23173
	Frequency	699.7	707.5	715.3

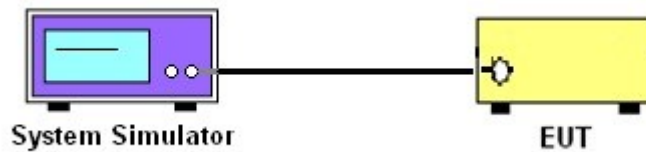
3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.2 Test Setup

Conducted Output Power



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 12.

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

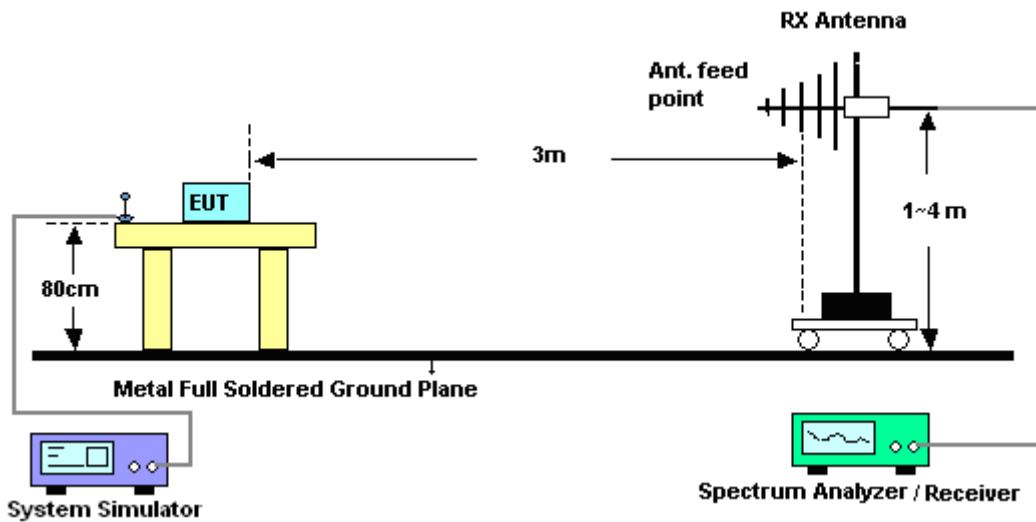
4 Radiated Test Items

4.1 Measuring Instruments

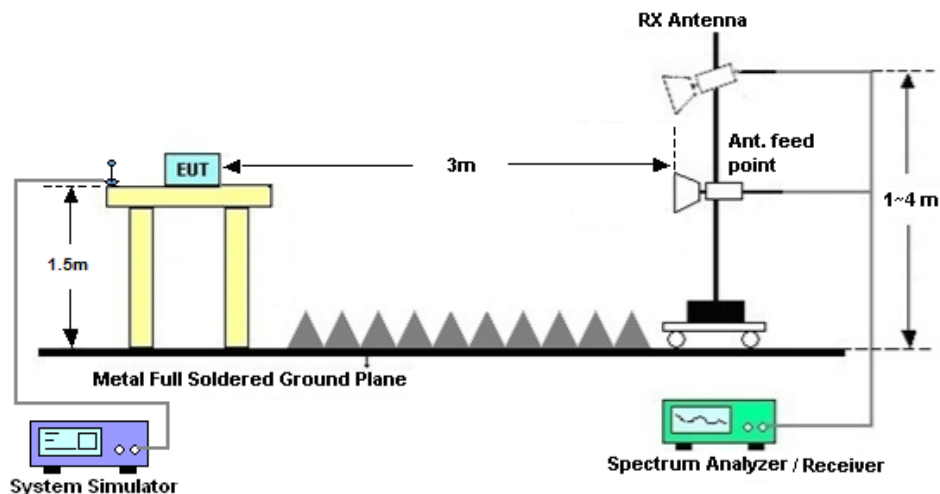
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
= $P(W) - [43 + 10\log(P)] \text{ (dB)}$
= $[30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
= -13dBm.



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 07, 2018	Jan. 16, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Nov. 19, 2018	Jan. 16, 2019	Nov. 18, 2019	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471084	10Hz~44GHz	Jun. 25, 2018	Jan. 09, 2019	Jun. 24, 2019	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz~1GHz	Jan. 29, 2018	Jan. 09, 2019	Jan. 28, 2019	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 20, 2018	Jan. 09, 2019	Oct. 19, 2019	Radiation (03CH06-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Jan. 09, 2019	Feb. 06, 2019	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	187289	9KHz ~1GHZ	Aug. 06, 2018	Jan. 09, 2019	Aug. 05, 2019	Radiation (03CH06-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Feb. 08, 2018	Jan. 09, 2019	Feb. 07, 2019	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P	2025788	1Ghz-18Ghz	Apr. 17, 2018	Jan. 09, 2019	Apr. 16, 2019	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270203	500MHz~26.5GHz	Apr. 18, 2018	Jan. 09, 2019	Apr. 17, 2019	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jan. 09, 2019	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jan. 09, 2019	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jan. 09, 2019	NCR	Radiation (03CH06-KS)

NCR: No Calibration Required



6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.5dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.0dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.0dB
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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	1	0	QPSK	21.66	21.49	21.49
20	1	0	16-QAM	20.83	20.85	20.51
15	1	0	QPSK	21.64	21.62	21.61
15	1	0	16-QAM	21.16	20.85	20.75
10	1	0	QPSK	21.44	21.53	21.35
10	1	0	16-QAM	20.65	20.56	20.83
5	1	0	QPSK	21.26	21.21	21.05
5	1	0	16-QAM	20.35	20.57	20.19
3	1	0	QPSK	21.22	21.24	20.98
3	1	0	16-QAM	20.46	20.38	20.49
1.4	1	0	QPSK	21.35	21.30	21.02
1.4	1	0	16-QAM	20.47	20.39	20.15
LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	1	0	QPSK	21.32	21.63	21.54
20	1	0	16-QAM	20.58	20.88	21.07
15	1	0	QPSK	21.66	21.70	21.50
15	1	0	16-QAM	21.23	21.24	20.84
10	1	0	QPSK	21.40	21.46	21.42
10	1	0	16-QAM	20.87	20.68	20.59
5	1	0	QPSK	21.58	21.51	21.43
5	1	0	16-QAM	20.96	20.86	20.52
3	1	0	QPSK	21.57	21.47	21.50
3	1	0	16-QAM	21.08	20.68	20.53
1.4	1	0	QPSK	21.60	21.40	21.31
1.4	1	0	16-QAM	20.65	20.57	20.52



LTE Band 5 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	22.17	21.92	21.77
10	1	0	16-QAM	21.67	21.14	20.90
5	8	17	QPSK	22.11	21.87	21.78
5	1	0	16-QAM	21.54	21.16	20.85
3	1	0	QPSK	22.10	21.93	21.78
3	1	0	16-QAM	21.30	21.00	21.85
1.4	1	0	QPSK	22.22	21.88	21.86
1.4	1	0	16-QAM	21.33	21.16	20.96
LTE Band 12 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	21.90	22.05	21.51
10	1	0	16-QAM	21.06	21.06	20.95
5	8	17	QPSK	21.66	21.44	21.85
5	1	0	16-QAM	20.82	21.26	20.98
3	1	0	QPSK	21.79	21.56	21.47
3	1	0	16-QAM	20.82	20.58	20.90
1.4	1	0	QPSK	22.12	21.93	21.88
1.4	1	0	16-QAM	21.15	21.06	20.86

Remark: The power of verification test was very close to the module, so we use the module's power

**ERP/EIRP**

LTE Band 2 (GT - LC = 2.68 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	18607	18900	19193	18615	18900	19185	18625	18900	19175
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1850.7	1880	1909.3	1851.5	1880	1908.5	1852.5	1880	1907.5
(MHz)									
Conducted Power (dBm)	21.35	21.30	21.02	21.22	21.24	20.98	21.26	21.21	21.05
Conducted Power (Watts)	0.1365	0.1349	0.1265	0.1324	0.1330	0.1253	0.1337	0.1321	0.1274
EIRP(dBm)	24.03	23.98	23.70	23.90	23.92	23.66	23.94	23.89	23.73
EIRP(Watts)	0.2529	0.2500	0.2344	0.2455	0.2466	0.2323	0.2477	0.2449	0.2360

LTE Band 2 (GT - LC = 2.68 dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	18650	18900	19150	18675	18900	19125	18650	18900	19100
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1855	1880	1905	1857.5	1880	1902.5	1860	1880	1900
(MHz)									
Conducted Power (dBm)	21.44	21.53	21.35	21.64	21.62	21.61	21.66	21.49	21.49
Conducted Power (Watts)	0.1393	0.1422	0.1365	0.1459	0.1452	0.1449	0.1466	0.1409	0.1409
EIRP(dBm)	24.12	24.21	24.03	24.32	24.30	24.29	24.34	24.17	24.17
EIRP(Watts)	0.2582	0.2636	0.2529	0.2704	0.2692	0.2685	0.2716	0.2612	0.2612



LTE Band 2 (GT - LC = 2.68 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	18607	18900	19193	18615	18900	19185	18625	18900	19175
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1850.7	1880	1909.3	1851.5	1880	1908.5	1852.5	1880	1907.5
(MHz)									
Conducted Power (dBm)	20.47	20.39	20.15	20.46	20.38	20.49	20.35	20.57	20.19
Conducted Power (Watts)	0.1114	0.1094	0.1035	0.1112	0.1091	0.1119	0.1084	0.1140	0.1045
EIRP(dBm)	23.15	23.07	22.83	23.14	23.06	23.17	23.03	23.25	22.87
EIRP(Watts)	0.2065	0.2028	0.1919	0.2061	0.2023	0.2075	0.2009	0.2113	0.1936

LTE Band 2 (GT - LC = 2.68 dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	18650	18900	19150	18675	18900	19125	18650	18900	19100
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1855	1880	1905	1857.5	1880	1902.5	1860	1880	1900
(MHz)									
Conducted Power (dBm)	20.65	20.56	20.83	21.16	20.85	20.75	20.83	20.85	20.51
Conducted Power (Watts)	0.1161	0.1138	0.1211	0.1306	0.1216	0.1189	0.1211	0.1216	0.1125
EIRP(dBm)	23.33	23.24	23.51	23.84	23.53	23.43	23.51	23.53	23.19
EIRP(Watts)	0.2153	0.2109	0.2244	0.2421	0.2254	0.2203	0.2244	0.2254	0.2084



LTE Band 4 (GT - LC = 2.68 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	19957	20175	20393	19965	20175	20385	19975	20175	20375
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
(MHz)									
Conducted Power (dBm)	21.60	21.40	21.31	21.57	21.47	21.50	21.58	21.51	21.43
Conducted Power (Watts)	0.1445	0.1380	0.1352	0.1435	0.1403	0.1413	0.1439	0.1416	0.1390
EIRP(dBm)	24.28	24.08	23.99	24.25	24.15	24.18	24.26	24.19	24.11
EIRP(Watts)	0.2679	0.2559	0.2506	0.2661	0.2600	0.2618	0.2667	0.2624	0.2576

LTE Band 4 (GT - LC = 2.68 dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	20000	20175	20350	20025	20175	20325	20050	20175	20300
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
(MHz)									
Conducted Power (dBm)	21.40	21.46	21.42	21.66	21.70	21.50	21.32	21.63	21.54
Conducted Power (Watts)	0.1380	0.1400	0.1387	0.1466	0.1479	0.1413	0.1355	0.1455	0.1426
EIRP(dBm)	24.08	24.14	24.10	24.34	24.38	24.18	24.00	24.31	24.22
EIRP(Watts)	0.2559	0.2594	0.2570	0.2716	0.2742	0.2618	0.2512	0.2698	0.2642



LTE Band 4 (GT - LC = 2.68 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	19957	20175	20393	19965	20175	20385	19975	20175	20375
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
(MHz)									
Conducted Power (dBm)	20.65	20.57	20.52	21.08	20.68	20.53	20.96	20.86	20.52
Conducted Power (Watts)	0.1161	0.1140	0.1127	0.1282	0.1169	0.1130	0.1247	0.1219	0.1127
EIRP(dBm)	23.33	23.25	23.20	23.76	23.36	23.21	23.64	23.54	23.20
EIRP(Watts)	0.2153	0.2113	0.2089	0.2377	0.2168	0.2094	0.2312	0.2259	0.2089

LTE Band 4 (GT - LC = 2.68 dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	20000	20175	20350	20025	20175	20325	20050	20175	20300
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
(MHz)									
Conducted Power (dBm)	20.87	20.68	20.59	21.23	21.24	20.84	20.58	20.88	21.07
Conducted Power (Watts)	0.1222	0.1169	0.1146	0.1327	0.1330	0.1213	0.1143	0.1225	0.1279
EIRP(dBm)	23.55	23.36	23.27	23.91	23.92	23.52	23.26	23.56	23.75
EIRP(Watts)	0.2265	0.2168	0.2123	0.2460	0.2466	0.2249	0.2118	0.2270	0.2371



LTE Band 5 (GT - LC = 0.01 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	20407	20525	20643	20415	20525	20635	20425	20525	20625
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	824.7	836.5	848.3	825.5	836.5	847.5	826.5	836.5	846.5
(MHz)									
Conducted Power (dBm)	22.22	21.88	21.86	22.10	21.93	21.78	22.11	21.87	21.78
Conducted Power (Watts)	0.1667	0.1542	0.1535	0.1622	0.1560	0.1507	0.1626	0.1538	0.1507
ERP(dBm)	20.08	19.74	19.72	19.96	19.79	19.64	19.97	19.73	19.64
ERP(Watts)	0.1019	0.0942	0.0938	0.0991	0.0953	0.0920	0.0993	0.0940	0.0920

LTE Band 5 (GT - LC = 0.01 dB) QPSK			
Bandwidth	10M		
Channel	20450	20525	20600
	(Low)	(Mid)	(High)
Frequency	829	836.5	844
(MHz)			
Conducted Power (dBm)	22.17	21.92	21.77
Conducted Power (Watts)	0.1648	0.1556	0.1503
ERP(dBm)	20.03	19.78	19.63
ERP(Watts)	0.1007	0.0951	0.0918



LTE Band 5 (GT - LC = 0.01 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	20407	20525	20643	20415	20525	20635	20425	20525	20625
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	824.7	836.5	848.3	825.5	836.5	847.5	826.5	836.5	846.5
(MHz)									
Conducted Power (dBm)	21.33	21.16	20.96	21.30	21.00	21.85	21.54	21.16	20.85
Conducted Power (Watts)	0.1358	0.1306	0.1247	0.1349	0.1259	0.1531	0.1426	0.1306	0.1216
ERP(dBm)	19.19	19.02	18.82	19.16	18.86	19.71	19.40	19.02	18.71
ERP(Watts)	0.0830	0.0798	0.0762	0.0824	0.0769	0.0935	0.0871	0.0798	0.0743

LTE Band 5 (GT - LC = 0.01 dB) 16QAM			
Bandwidth	10M		
Channel	20450	20525	20600
	(Low)	(Mid)	(High)
Frequency	829	836.5	844
(MHz)			
Conducted Power (dBm)	21.67	21.14	20.90
Conducted Power (Watts)	0.1469	0.1300	0.1230
ERP(dBm)	19.53	19.00	18.76
ERP(Watts)	0.0897	0.0794	0.0752



LTE Band 12 (GT - LC = 0.01 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	23017	23095	23173	23025	23095	23165	23035	23095	23155
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	699.7	707.5	715.3	700.5	707.5	714.5	701.5	707.5	713.5
(MHz)									
Conducted Power (dBm)	22.12	21.93	21.88	21.79	21.56	21.47	21.66	21.44	21.85
Conducted Power (Watts)	0.1629	0.1560	0.1542	0.1510	0.1432	0.1403	0.1466	0.1393	0.1531
ERP(dBm)	19.98	19.79	19.74	19.65	19.42	19.33	19.52	19.30	19.71
ERP(Watts)	0.0995	0.0953	0.0942	0.0923	0.0875	0.0857	0.0895	0.0851	0.0935

LTE Band 12 (GT - LC = 0.01 dB) QPSK			
Bandwidth	10M		
Channel	23060	23095	23130
	(Low)	(Mid)	(High)
Frequency	704	707.5	711
(MHz)			
Conducted Power (dBm)	21.90	22.05	21.51
Conducted Power (Watts)	0.1549	0.1603	0.1416
ERP(dBm)	19.76	19.91	19.37
ERP(Watts)	0.0946	0.0979	0.0865



LTE Band 12 (GT - LC = 0.01 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	23017	23095	23173	23025	23095	23165	23035	23095	23155
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	699.7	707.5	715.3	700.5	707.5	714.5	701.5	707.5	713.5
Conducted Power (dBm)	21.15	21.06	20.86	20.82	20.58	20.90	20.82	21.26	20.98
Conducted Power (Watts)	0.1303	0.1276	0.1219	0.1208	0.1143	0.1230	0.1208	0.1337	0.1253
ERP(dBm)	19.01	18.92	18.72	18.68	18.44	18.76	18.68	19.12	18.84
ERP(Watts)	0.0796	0.0780	0.0745	0.0738	0.0698	0.0752	0.0738	0.0817	0.0766

LTE Band 12 (GT - LC = 0.01 dB) 16QAM			
Bandwidth	10M		
Channel	23060	23095	23130
	(Low)	(Mid)	(High)
Frequency (MHz)	704	707.5	711
Conducted Power (dBm)	21.06	21.06	20.95
Conducted Power (Watts)	0.1276	0.1276	0.1245
ERP(dBm)	18.92	18.92	18.81
ERP(Watts)	0.0780	0.0780	0.0760



Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

LTE Band 2 / 20MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3741	-61.40	-13	-48.40	-66.27	3.55	8.42	H
	5613	-57.24	-13	-44.24	-63.58	4.34	10.68	H
	7485	-52.49	-13	-39.49	-59.29	5.14	11.94	H
	3741	-61.57	-13	-48.57	-66.44	3.55	8.42	V
	5613	-56.46	-13	-43.46	-62.80	4.34	10.68	V
	7485	-52.33	-13	-39.33	-59.13	5.14	11.94	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

LTE Band 4 / 20MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3453	-66.45	-13	-53.45	-69.81	2.32	5.68	H
	5178	-63.05	-13	-50.05	-65.83	3.02	5.80	H
	6903	-58.81	-13	-45.81	-63.42	3.27	7.88	H
	3453	-66.49	-13	-53.49	-69.85	2.32	5.68	V
	5178	-62.66	-13	-49.66	-65.44	3.02	5.80	V
	6903	-58.60	-13	-45.60	-63.21	3.27	7.88	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



LTE Band 5 / 10MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672	-67.59	-13	-54.59	-68.80	2.32	5.68	H
	2508	-66.06	-13	-53.06	-66.69	3.02	5.80	H
	3342	-65.65	-13	-52.65	-68.11	3.27	7.88	H
	1672	-67.76	-13	-54.76	-68.97	2.32	5.68	V
	2508	-66.24	-13	-53.24	-66.87	3.02	5.80	V
	3342	-65.64	-13	-52.64	-68.10	3.27	7.88	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

LTE Band 12 / 1.4MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1414	-52.18	-13	-39.18	-53.39	2.32	5.68	H
	2122	-64.77	-13	-51.77	-65.40	3.02	5.80	H
	2828	-65.79	-13	-52.79	-68.25	3.27	7.88	H
	1414	-48.55	-13	-35.55	-49.76	2.32	5.68	V
	2122	-64.90	-13	-51.90	-65.53	3.02	5.80	V
	2828	-65.64	-13	-52.64	-68.10	3.27	7.88	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.