74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC LTE REPORT

FCC Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 Rep. of Korea

Date of Issue:
June 22, 2015

Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCT-R-1506-F052

HCT FRN: 0005866421

FCC ID: A3LSMJ500M

APPLICANT: SAMSUNG Electronics Co., Ltd.

FCC Model(s): SM-J500M/DS
Additional FCC Model(s): SM-J500M
EUT Type: Mobile Phone
FCC Classification: Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s): §22, §24, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band2 (1.4)	1850.7 - 1909.3	1M10G7D	QPSK	0.170	22.32
		1M10W7D	16QAM	0.126	21.01
LTE – Band2 (3)	1851.5 - 1908.5	2M70G7D	QPSK	0.172	22.37
		2M70W7D	16QAM	0.125	20.99
LTE – Band2 (5)	1852.5 - 1907.5	4M51G7D	QPSK	0.172	22.35
		4M51W7D	16QAM	0.127	21.04
LTE – Band2 (10)	1855.0 - 1905.0	9M01G7D	QPSK	0.189	22.76
		8M97W7D	16QAM	0.131	21.17
LTE – Band2 (15)	1857.5 - 1902.5	13M5G7D	QPSK	0.184	22.64
		13M5W7D	16QAM	0.135	21.29
LTE – Band2 (20)	1860.0 - 1900.0	17M9G7D	QPSK	0.174	22.40
		18M0W7D	16QAM	0.126	20.99

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band5 (1.4)	824.7 – 848.3	1M10G7D	QPSK	0.028	14.54
		1M10W7D	16QAM	0.026	14.09
LTE – Band5 (3)	825.5 – 847.5	2M71G7D	QPSK	0.031	14.98
		2M70W7D	16QAM	0.024	13.82
LTE – Band5 (5)	826.5 – 846.5	4M51G7D	QPSK	0.029	14.68
		4M50W7D	16QAM	0.025	13.93
LTE – Band5 (10)	829.0 – 844.0	8M99G7D	QPSK	0.031	14.89
		8M96W7D	16QAM	0.025	13.97

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a).

Report prepared by
: Kyoung Houn Seo
Test engineer of RF Team

Approved by
: Sang Jun Lee
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1506-F052	June 22, 2015	- First Approval Report

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 Rep. of Korea
FCC ID:	A3LSMJ500M
Application Type:	Certification
FCC Classification:	Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22, §24, §2
EUT Type:	Mobile Phone
FCC Model(s):	SM-J500M/DS
Additional FCC Model(s):	SM-J500M
Tx Frequency:	1850.7 MHz – 1909.3 MHz (LTE – Band2 (1.4 MHz)) 1851.5 MHz – 1908.5 MHz (LTE – Band2 (3 MHz)) 1852.5 MHz – 1907.5 MHz (LTE – Band2 (5 MHz)) 1855.0 MHz – 1905.0 MHz (LTE – Band2 (10 MHz)) 1857.5 MHz – 1902.5 MHz (LTE – Band2 (15 MHz)) 1860.0 MHz – 1900.0 MHz (LTE – Band2 (20 MHz)) 824.7 MHz – 848.3 MHz (LTE – Band 5 (1.4 MHz)) 825.5 MHz – 847.5 MHz (LTE – Band 5 (3 MHz)) 826.5 MHz – 846.5 MHz (LTE – Band 5 (5 MHz)) 829.0 MHz – 844.0 MHz (LTE – Band 5 (10 MHz))

Max. RF Output Power:	Band 2 (1.4 MHz) :	0.170 W (QPSK) (22.32 dBm) 0.126 W (16-QAM) (21.01 dBm)
	Band 2 (3 MHz) :	0.172 W (QPSK) (22.37 dBm) 0.125 W (16-QAM) (20.99 dBm)
	Band 2 (5 MHz) :	0.172 W (QPSK) (22.35 dBm) 0.127 W (16-QAM) (21.04 dBm)
	Band 2 (10 MHz) :	0.189 W (QPSK) (22.76 dBm) 0.131 W (16-QAM) (21.17 dBm)
	Band 2 (15 MHz) :	0.184 W (QPSK) (22.64 dBm) 0.135 W (16-QAM) (21.29 dBm)
	Band 2 (20 MHz) :	0.174 W (QPSK) (22.40 dBm) 0.126 W (16-QAM) (20.99 dBm)
	Band 5 (1.4 MHz) :	0.028 W (QPSK) (14.54 dBm) 0.026 W (16-QAM) (14.09 dBm)
	Band 5 (3 MHz) :	0.031 W (QPSK) (14.98 dBm) 0.024 W (16-QAM) (13.82 dBm)
	Band 5 (5 MHz) :	0.029 W (QPSK) (14.68 dBm) 0.025 W (16-QAM) (13.93 dBm)
	Band 5 (10 MHz) :	0.031 W (QPSK) (14.89 dBm) 0.025 W (16-QAM) (13.97 dBm)

Emission Designator(s):	Band 2 (1.4 MHz) :	1M10G7D (QPSK) / 1M10W7D (16-QAM)
	Band 2 (3 MHz)	2M70G7D (QPSK) / 2M70W7D (16-QAM)
	Band 2 (5 MHz) :	4M51G7D (QPSK) / 4M51W7D (16-QAM)
	Band 2 (10 MHz)	9M01G7D (QPSK) / 8M97W7D (16-QAM)
	Band 2 (15 MHz) :	13M5G7D (QPSK) / 13M5W7D (16-QAM)
	Band 2 (20 MHz)	17M9G7D (QPSK) / 18M0W7D (16-QAM)
	Band 5 (1.4 MHz) :	1M10G7D (QPSK) / 1M10W7D (16-QAM)
	Band 5 (3 MHz) :	2M71G7D (QPSK) / 2M70W7D (16-QAM)
	Band 5 (5 MHz) :	4M51G7D (QPSK) / 4M50W7D (16-QAM)
	Band 5 (10 MHz) :	8M99G7D (QPSK) / 8M96W7D (16-QAM)
Date(s) of Tests:	May 29, 2015 ~ June 18, 2015	
Antenna Specification	Manufacturer: TE Connectivity	
	Antenna type: Internal Antenna	
	Peak Gain: Band 2 : 0.01 dBi	
	Peak Gain: Band 5 : -1.72 dBi	

2. INTRODUCTION

2.1. EUT DESCRIPTION

The SAMSUNG Electronics Co., Ltd. SM-J500M/DS Mobile Phone consists of LTE 2 and 5.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea**.

3. DESCRIPTION OF TESTS

3.1 ERP/ EIRP RADIATED POWER AND RADIATED SPURIOUS EMISSIONS

Note: ERP(Effective Radiated Power), EIRP(Effective Isotropic Radiated Power)

Test Procedure

Radiated emission measurements are performed in the Fully-anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-C-2004 Clause 2.2.17. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission. The level and position of the maximized emission is recorded with the spectrum analyzer using a RMS detector.
A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
The power is calculated by the following formula;

$$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

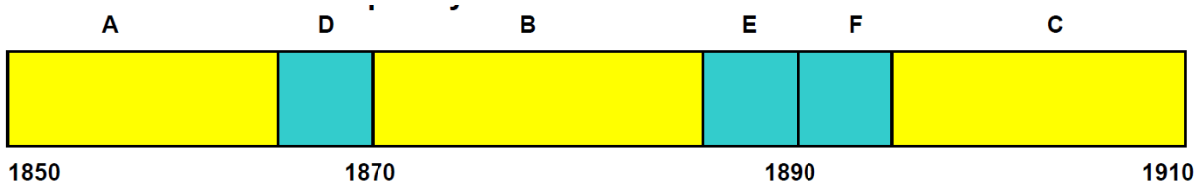
The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

Radiated spurious emissions

: Frequency Range : 30 MHz ~ 10th Harmonics of highest channel fundamental frequency.

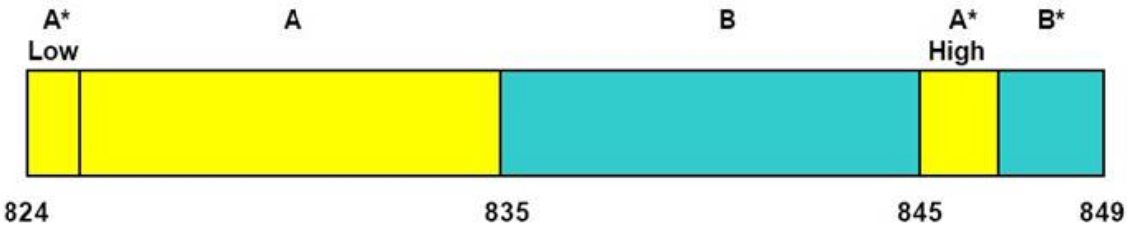
3.2 FREQUENCY RANGE

§ 24.229: PCS – Mobile Frequency Blocks



BLOCK 1: 1850 – 1865 MHz (A)
BLOCK 2: 1865 – 1870 MHz (D)
BLOCK 3: 1870 – 1885 MHz (B)
BLOCK 4: 1885 – 1890 MHz (E)
BLOCK 5: 1890 – 1895 MHz (F)
BLOCK 6: 1895 – 1910 MHz (C)

§22.917(a): Cellular – Mobile Frequency Blocks



BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)
BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

3.3 PEAK-AVERAGE RATIO.

Test Procedure

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 5.7.

- Section 5.7.1 CCDF Procedure

a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
b) Set the number of counts to a value that stabilizes the measured CCDF curve;
c) Set the measurement interval as follows:
   1) for continuous transmissions, set to 1 ms,
   2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
d) Record the maximum PAPR level associated with a probability of 0.1%.

- Section 5.7.2 Alternate Procedure

Use one of the procedures presented in 5.1 to measure the total peak power and record as P_{Pk}. Use one of the applicable procedures presented 5.2 to measure the total average power and record as P_{Avg}. Determine the P.A.R. from: $P.A.R_{(dB)} = P_{Pk\ (dBm)} - P_{Avg\ (dBm)}$ (P_{Avg} = Average Power + Duty cycle Factor)

5.1.1 Peak power measurements with a spectrum/signal analyzer or EMI receiver

The following procedure can be used to determine the total peak output power.

a) Set the RBW ≥ OBW.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 2 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Ensure that the number of measurement points ≥ span/RBW.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the peak amplitude level.

5.2.2 Procedures for use with a spectrum/signal analyzer when EUT cannot be configured to transmit continuously and sweep triggering/signal gating cannot be properly implemented

If the EUT cannot be configured to transmit continuously (burst duty cycle < 98%), then one of the following procedures can be used. The selection of the applicable procedure will depend on the characteristics of the measured burst duty cycle.

Measure the burst duty cycle with a spectrum/signal analyzer or EMC receiver can be used in zero-span mode if the response time and spacing between bins on the sweep are sufficient to permit accurate measurement of the burst on/off time of the transmitted signal.

5.2.2.2 Constant burst duty cycle

If the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then:

a) Set span to at least 1.5 times the OBW.

b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.

c) Set VBW ≥ 3 x RBW.

d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

e) Sweep time = auto.

f) Detector = RMS (power averaging).

g) Set sweep trigger to “free run”.

h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

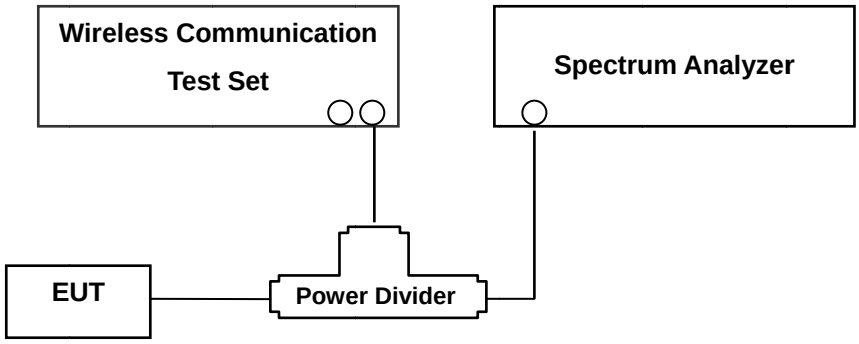
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

j) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission).

For example, add 10 log (1/0.25) = 6 dB if the duty cycle is a constant 25%.

3.4 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

Test Procedure

OBW is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 4.2..

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels(low, middle and high operational range.)

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

Spurious and harmonic emissions at antenna terminal is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 6.0.

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.

The EUT was setup to maximum output power at its lowest channel. The Resolution BW of the analyzer is set to 1 % of the emission bandwidth to show compliance with the -13 dBm limit, in the 1 MHz bands immediately outside and adjacent to the edge of the frequency block. The 1 MHz RBW was used to scan from 30 MHz to 10th Harmonics. A display line was placed at -13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.

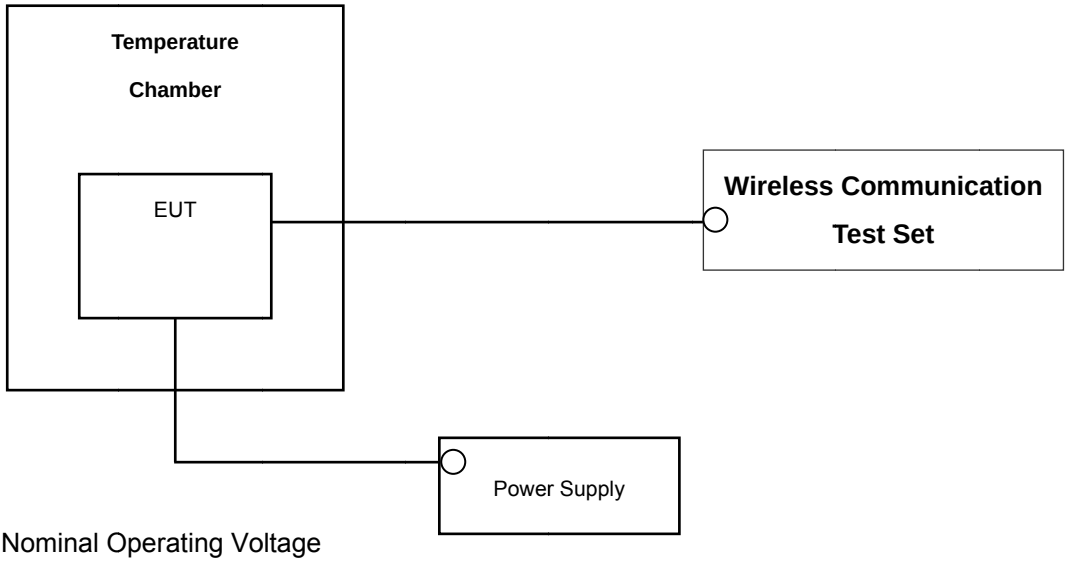
- Band Edge Requirement : In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13 dBm.

NOTES: The analyzer plot offsets were determined by below conditions.

- For LTE Band 2, total offset 27.6 dBm = 20 dBm attenuator + 6 dBm Divider + 1.6 dBm RF cables.
- For LTE Band 5, total offset 27.0 dB = 20 dB attenuator + 6 dB Divider + 1.0 dB RF cables.

3.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



* Nominal Operating Voltage

Test Procedure

Frequency stability is tested in accordance with ANSI/TIA-603-D-2010 section 2.2.2

The frequency stability of the transmitter is measured by:
a.) **Temperature:** The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from the end point to 100 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block(LTE Band2). The frequency stability of the transmitter shall be maintained within ± 0.000 25 %(± 2.5 ppm) of the center frequency. (LTE Band5).

Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
1. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

2. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

NOTE: The EUT is tested down to the battery endpoint.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
Agilent	N1921A/ Power Sensor	MY45241059	Annual	07/09/2015
Agilent	N1911A/ Power Meter	MY45100523	Annual	01/15/2016
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	Annual	09/04/2015
Wainwright	WHK1.2/15G-10EF/H.P.F	4	Annual	04/27/2016
Wainwright	WHK3.3/18G-10EF/H.P.F	2	Annual	04/27/2016
Hewlett Packard	11667B / Power Splitter	10545	Annual	02/22/2016
Hewlett Packard	11667B / Power Splitter	11275	Annual	04/29/2016
Digital	EP-3010/ Power Supply	3110117	Annual	10/29/2015
Schwarzbeck	UHAP/ Dipole Antenna	557	Biennial	03/23/2017
Schwarzbeck	UHAP/ Dipole Antenna	558	Biennial	03/23/2017
Korea Engineering	KR-1005L / Chamber	KRAC05063-3CH	Annual	10/29/2015
Schwarzbeck	BBHA 9120D/ Horn Antenna	147	Biennial	09/01/2016
Schwarzbeck	BBHA 9120D/ Horn Antenna	1151	Biennial	07/05/2015
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170541	Biennial	07/05/2015
WEINSCHEL	ATTENUATOR	BR0592	Annual	10/22/2015
REOHDE&SCHWARZ	FSV40/Spectrum Analyzer	1307.9002K40-100931-NK	Annual	06/04/2016
Agilent	8960 (E5515C)/ Base Station	MY48360222	Annual	08/26/2015
Agilent	N9020A/ Signal Analyzer	MY51240695	Annual	02/12/2016
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6200863156	Annual	03/24/2016

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS
2.1051, 22.917(a), 24.238(a)	Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions		PASS
2.1046	*Conducted Output Power	N/A		PASS
24.232(d)	Peak- to- Average Ratio	< 13 dB		PASS
2.1055, 22.355	Frequency stability / variation of ambient temperature	< 2.5 ppm (Part22)		PASS
24.235		Emission must remain in band (Part24)		
22.913(a)(2)	Effective Radiated Power (Band 5)	< 7 Watts max. ERP	RADIATED	PASS
24.232(c)	Equivalent Isotropic Radiated Power (Band 2)	< 2 Watts max. EIRP		PASS
2.1053, 22.917(a), 24.238(a)	Radiated Spurious and Harmonic Emissions	< 43 + 10log10 (P[Watts]) for all out-of band emissions		PASS

*See SAR Report

6. SAMPLE CALCULATION

A. EIRP Sample Calculation

Mode	Ch./ Freq.		Measured Level(dBm)	Substitude LEVEL(dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
	channel	Freq.(MHz)						W	dBm
LTE Band5	20525	836.60	-6.73	40.89	-10.54	0.96	V	0.869	29.39

ERP = SubstitudeLEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a wooden tripod is 2.5 meter above test site ground level.
2) During the test , the turn table is rotated and the antenna height is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power (**ERP**).

B. Emission Designator

QPSK Modulation

5MHz Bandwidth
Emission Designator = 4M48G7D
LTE BW = 4.48 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

10MHz Bandwidth
Emission Designator = 8M95G7D
LTE BW = 8.95 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

16QAM Modulation

5MHz Bandwidth
Emission Designator = 4M48W7D
LTE BW = 4.48 MHz
W = main carrier modulated in a combination of two or more of the following modes; amplitude, angle, pulse
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

10MHz Bandwidth
Emission Designator = 8M95W7D
LTE BW = 8.95 MHz
W = main carrier modulated in a combination of two or more of the following modes; amplitude, angle, pulse
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

7. TEST DATA

7.1 EQUIVALENT ISOTROPIC RADIATED POWER (Band 2)

Freq (MHz)	Band Width (MHz)	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
1850.7	1.4	QPSK	-19.05	13.64	10.04	1.36	H	0.170	22.32
		16-QAM	-20.36	12.33	10.04	1.36	H	0.126	21.01
1880.0		QPSK	-20.13	12.83	10.05	1.37	H	0.142	21.51
		16-QAM	-21.42	11.54	10.05	1.37	H	0.105	20.22
1909.3		QPSK	-20.76	12.44	10.06	1.38	H	0.130	21.12
		16-QAM	-21.98	11.22	10.06	1.38	H	0.098	19.90

Equivalent Isotropic Radiated Power Output Data (1.4 MHz Band 2 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

Freq (MHz)	Band Width (MHz)	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
1851.5	3	QPSK	-19.00	13.69	10.04	1.36	H	0.172	22.37
		16-QAM	-20.38	12.31	10.04	1.36	H	0.125	20.99
1880.0		QPSK	-20.08	12.88	10.05	1.37	H	0.143	21.56
		16-QAM	-21.36	11.60	10.05	1.37	H	0.107	20.28
1908.5		QPSK	-20.42	12.75	10.06	1.38	H	0.139	21.43
		16-QAM	-21.81	11.36	10.06	1.38	H	0.101	20.04

Equivalent Isotropic Radiated Power Output Data (3 MHz Band 2 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

Freq (MHz)	Band Width (MHz)	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
1852.5	5	QPSK	-19.02	13.67	10.04	1.36	H	0.172	22.35
		16-QAM	-20.33	12.36	10.04	1.36	H	0.127	21.04
1880.0		QPSK	-19.98	12.98	10.05	1.37	H	0.146	21.66
		16-QAM	-21.32	11.64	10.05	1.37	H	0.108	20.32
1907.5		QPSK	-20.32	12.82	10.06	1.38	H	0.141	21.50
		16-QAM	-21.76	11.38	10.06	1.38	H	0.101	20.06

Equivalent Isotropic Radiated Power Output Data (5 MHz Band 2 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

Freq (MHz)	Band Width (MHz)	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
1855.0	10	QPSK	-18.61	14.08	10.04	1.36	H	0.189	22.76
		16-QAM	-20.20	12.49	10.04	1.36	H	0.131	21.17
1880.0		QPSK	-19.62	13.33	10.05	1.37	H	0.159	22.01
		16-QAM	-21.02	11.93	10.05	1.37	H	0.115	20.61
1905.0		QPSK	-19.88	13.18	10.05	1.38	H	0.153	21.85
		16-QAM	-21.53	11.53	10.05	1.38	H	0.105	20.20

Equivalent Isotropic Radiated Power Output Data (10 MHz Band 2 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

Freq (MHz)	Band Width (MHz)	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
1857.5	15	QPSK	-18.73	13.96	10.04	1.36	H	0.184	22.64
		16-QAM	-20.08	12.61	10.04	1.36	H	0.135	21.29
1880.0		QPSK	-19.70	13.24	10.04	1.36	H	0.156	21.92
		16-QAM	-20.86	12.08	10.04	1.36	H	0.119	20.76
1902.5		QPSK	-19.90	13.15	10.05	1.38	H	0.152	21.82
		16-QAM	-21.30	11.75	10.05	1.38	H	0.110	20.42

Equivalent Isotropic Radiated Power Output Data (15 MHz Band 2 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

Freq (MHz)	Band Width (MHz)	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
1860.0	20	QPSK	-18.97	13.72	10.04	1.36	H	0.174	22.40
		16-QAM	-20.38	12.31	10.04	1.36	H	0.126	20.99
1880.0		QPSK	-19.47	13.46	10.04	1.36	H	0.164	22.14
		16-QAM	-21.06	11.87	10.04	1.36	H	0.114	20.55
1900.0		QPSK	-19.94	13.12	10.05	1.38	H	0.151	21.79
		16-QAM	-21.34	11.72	10.05	1.38	H	0.109	20.39

Equivalent Isotropic Radiated Power Output Data (20 MHz Band 2 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. Turntable rotation was adjusted for the highest reading on the receive spectrum analyzer.

A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading.

The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is x plane in LTE mode. Also worst case of detecting Antenna is horizontal polarization in LTE mode.

7.2 EFFECTIVE RADIATED POWER (Band 5)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBd)	C.L	Pol	ERP	
								W	dBm
824.7	1.4 MHz	QPSK	-35.92	26.01	-10.59	0.88	V	0.028	14.54
		16-QAM	-36.37	25.56	-10.59	0.88	V	0.026	14.09
836.5		QPSK	-36.34	25.42	-10.54	0.89	V	0.025	13.99
		16-QAM	-37.12	24.64	-10.54	0.89	V	0.021	13.21
848.3		QPSK	-36.01	24.95	-10.49	0.89	V	0.023	13.57
		16-QAM	-36.79	24.17	-10.49	0.89	V	0.019	12.79

Effective Radiated Power Data (1.4 MHz Band 5 LTE)

Note: All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBd)	C.L	Pol	ERP	
								W	dBm
825.5	3 MHz	QPSK	-35.48	26.45	-10.59	0.88	V	0.031	14.98
		16-QAM	-36.64	25.29	-10.59	0.88	V	0.024	13.82
836.5		QPSK	-36.42	25.28	-10.54	0.89	V	0.024	13.85
		16-QAM	-37.05	24.65	-10.54	0.89	V	0.021	13.22
847.5		QPSK	-36.16	24.91	-10.50	0.89	V	0.023	13.52
		16-QAM	-36.85	24.22	-10.50	0.89	V	0.019	12.83

Effective Radiated Power Data (3 MHz Band 5 LTE)

Note: All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBd)	C.L	Pol	ERP	
								W	dBm
826.5	5 MHz	QPSK	-35.76	26.15	-10.59	0.88	V	0.029	14.68
		16-QAM	-36.51	25.40	-10.59	0.88	V	0.025	13.93
836.5		QPSK	-36.25	25.50	-10.55	0.89	V	0.025	14.06
		16-QAM	-37.20	24.55	-10.55	0.89	V	0.020	13.11
846.5		QPSK	-36.04	25.35	-10.51	0.89	V	0.025	13.95
		16-QAM	-37.15	24.24	-10.51	0.89	V	0.019	12.84

Effective Radiated Power Data (5 MHz Band 5 LTE)

Note: All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBd)	C.L	Pol	ERP	
								W	dBm
829.0	10 MHz	QPSK	-35.52	26.36	-10.59	0.88	V	0.031	14.89
		16-QAM	-36.44	25.44	-10.59	0.88	V	0.025	13.97
836.5		QPSK	-36.20	25.70	-10.56	0.89	V	0.027	14.25
		16-QAM	-36.95	24.95	-10.56	0.89	V	0.022	13.50
844.0		QPSK	-36.24	25.28	-10.52	0.89	V	0.024	13.87
		16-QAM	-37.18	24.34	-10.52	0.89	V	0.020	12.93

Effective Radiated Power Data (10 MHz Band 5 LTE)

Note: All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is y plane in LTE mode. Also worst case of detecting Antenna is vertical polarization in LTE mode.

7.3 RADIATED SPURIOUS EMISSIONS

7.3.1 RADIATED SPURIOUS EMISSIONS (1.4 MHz Band 2 LTE)

▣ OPERATING FREQUENCY : 1850.70 MHz

▣ MEASURED OUTPUT POWER: 22.32 dBm = 0.170 W

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 35.32 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
18607 (1850.7)	3,701.40	-53.57	12.32	-57.23	2.02	H	-46.93	69.25
	5,552.10	-53.96	13.02	-52.84	2.52	H	-42.34	64.66
	7,402.80	-51.31	11.06	-41.94	2.91	H	-33.79	56.11
18900 (1880.0)	3,760.00	-53.94	12.29	-57.54	1.93	H	-47.18	69.50
	5,640.00	-52.94	13.12	-52.01	2.57	H	-41.46	63.78
	7,520.00	-50.17	11.09	-41.33	3.03	H	-33.27	55.59
19193 (1909.3)	3,818.60	-53.03	12.28	-56.06	2.04	H	-45.82	68.14
	5,727.90	-51.33	13.06	-50.14	2.55	H	-39.63	61.95
	7,637.20	-49.78	11.37	-40.34	3.13	H	-32.10	54.42

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010, June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

7.3.2 RADIATED SPURIOUS EMISSIONS (3 MHz Band 2 LTE)

▣ OPERATING FREQUENCY : 1851.50 MHz

▣ MEASURED OUTPUT POWER: 22.37 dBm = 0.172 W

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 35.37 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
18615 (1851.5)	3,703.00	-53.31	12.32	-56.95	2.02	H	-46.65	69.02
	5,554.50	-54.81	13.03	-53.70	2.52	H	-43.19	65.56
	7,406.00	-51.71	11.05	-42.27	2.92	H	-34.14	56.51
18900 (1880.0)	3,760.00	-53.72	12.29	-57.32	1.93	H	-46.96	69.33
	5,640.00	-52.21	13.12	-51.28	2.57	H	-40.73	63.10
	7,520.00	-51.07	11.09	-42.23	3.03	H	-34.17	56.54
19185 (1908.5)	3,817.00	-52.53	12.28	-55.64	2.04	H	-45.40	67.77
	5,725.50	-51.02	13.07	-49.83	2.56	H	-39.32	61.69
	7,634.00	-50.09	11.37	-40.64	3.16	H	-32.43	54.80

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010, June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

7.3.3 RADIATED SPURIOUS EMISSIONS (5 MHz Band 2 LTE)

▣ OPERATING FREQUENCY : 1852.50 MHz

▣ MEASURED OUTPUT POWER: 22.35 dBm = 0.172 W

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 35.35 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
18625 (1852.5)	3,705.00	-54.96	12.32	-58.59	2.01	H	-48.28	70.63
	5,557.50	-55.16	13.04	-54.04	2.53	H	-43.53	65.88
	7,410.00	-53.50	11.05	-44.00	2.92	H	-35.87	58.22
18900 (1880.0)	3,760.00	-54.21	12.29	-57.81	1.93	H	-47.45	69.80
	5,640.00	-53.18	13.12	-52.25	2.57	H	-41.70	64.05
	7,520.00	-51.66	11.09	-42.82	3.03	H	-34.76	57.11
19175 (1907.5)	3,815.00	-54.09	12.29	-57.30	2.04	H	-47.05	69.40
	5,722.50	-51.54	13.08	-50.35	2.57	H	-39.84	62.19
	7,630.00	-52.50	11.36	-43.04	3.19	H	-34.87	57.22

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010, June 24, 2010
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

7.3.4 RADIATED SPURIOUS EMISSIONS (10 MHz Band 2 LTE)

▣ OPERATING FREQUENCY : 1855.00 MHz

▣ MEASURED OUTPUT POWER: 22.76 dBm = 0.189 W

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 35.76 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
18650 (1855.0)	3,710.00	-51.93	12.31	-55.51	1.99	H	-45.19	67.95
	5,565.00	-53.00	13.05	-51.84	2.51	H	-41.30	64.06
	7,420.00	-53.00	11.05	-43.52	2.93	H	-35.40	58.16
18900 (1880.0)	3,760.00	-54.78	12.29	-58.38	1.93	H	-48.02	70.78
	5,640.00	-53.23	13.12	-52.30	2.57	H	-41.75	64.51
	7,520.00	-51.00	11.09	-42.16	3.03	H	-34.10	56.86
19150 (1905.0)	3,810.00	-51.53	12.29	-54.98	2.03	H	-44.72	67.48
	5,715.00	-53.89	13.10	-52.55	2.54	H	-41.99	64.75
	7,620.00	-54.83	11.33	-45.49	3.08	H	-37.24	60.00

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010, June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

7.3.5 RADIATED SPURIOUS EMISSIONS (15 MHz Band 2 LTE)

▣ OPERATING FREQUENCY : 1857.50 MHz

▣ MEASURED OUTPUT POWER: 22.64 dBm = 0.184 W

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 35.64 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
18675 (1857.5)	3,715.00	-54.06	12.31	-57.75	2.03	H	-47.47	70.11
	5,572.50	-52.50	13.06	-51.28	2.50	H	-40.72	63.36
	7,430.00	-53.50	11.04	-44.34	2.92	H	-36.22	58.86
18900 (1880.0)	3,760.00	-53.77	12.29	-57.37	1.93	H	-47.01	69.65
	5,640.00	-54.34	13.12	-53.41	2.57	H	-42.86	65.50
	7,520.00	-52.83	11.09	-43.99	3.03	H	-35.93	58.57
19125 (1902.5)	3,805.00	-51.93	12.30	-55.30	2.04	H	-45.04	67.68
	5,707.50	-55.00	13.12	-53.59	2.51	H	-42.98	65.62
	7,610.00	-53.00	11.31	-43.87	3.09	H	-35.65	58.29

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010, June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

7.3.6 RADIATED SPURIOUS EMISSIONS (20 MHz Band 2 LTE)

▣ OPERATING FREQUENCY : 1860.00 MHz

▣ MEASURED OUTPUT POWER: 22.40 dBm = 0.174 W

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 35.40 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
18700 (1860.0)	3,720.00	-54.07	12.31	-57.86	2.07	H	-47.62	70.02
	5,580.00	-53.52	13.07	-52.24	2.51	H	-41.68	64.08
	7,440.00	-53.16	11.04	-43.85	2.92	H	-35.73	58.13
18900 (1880.0)	3,760.00	-53.14	12.29	-56.74	1.93	H	-46.38	68.78
	5,640.00	-53.43	13.12	-52.50	2.57	H	-41.95	64.35
	7,520.00	-52.40	11.09	-43.56	3.03	V	-35.50	57.90
19100 (1900.0)	3,800.00	-51.87	12.30	-55.16	2.04	H	-44.90	67.30
	5,700.00	-52.61	13.13	-51.43	2.52	H	-40.82	63.22
	7,600.00	-48.25	11.29	-39.01	3.05	V	-30.77	53.17

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010, June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

7.4 RADIATED SPURIOUS EMISSIONS

7.4.1 RADIATED SPURIOUS EMISSIONS (1.4 MHz Band 5 LTE)

▣ OPERATING FREQUENCY : 824.70 MHz

▣ MEASURED OUTPUT POWER: 14.54 dBm = 0.028 W

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 27.54 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
20407 (824.7)	1,649.40	-53.89	9.71	-61.93	1.29	V	-53.51	68.05
	2,474.10	-58.32	10.54	-63.44	1.60	V	-54.50	69.04
	3,298.80	-58.39	12.23	-63.47	1.85	V	-53.09	67.63
20525 (836.5)	1,673.00	-53.94	9.78	-62.11	1.28	V	-53.61	68.15
	2,509.50	-60.37	10.65	-65.37	1.61	V	-56.33	70.87
	3,346.00	-59.03	12.41	-64.51	1.86	V	-53.96	68.50
20643 (848.3)	1,696.60	-55.79	9.84	-64.01	1.30	V	-55.47	70.01
	2,544.90	-58.79	10.72	-63.68	1.63	V	-54.59	69.13
	3,393.20	-59.30	12.40	-64.59	1.87	V	-54.06	68.60

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

7.4.2 RADIATED SPURIOUS EMISSIONS (3 MHz Band 5 LTE)

▣ OPERATING FREQUENCY : 825.50 MHz

▣ MEASURED OUTPUT POWER: 14.98 dBm = 0.031 W

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 27.98 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
20415 (825.5)	1,651.00	-54.33	9.71	-62.37	1.29	V	-53.95	68.93
	2,476.50	-58.91	10.54	-63.98	1.61	V	-55.05	70.03
	3,302.00	-58.54	12.25	-63.67	1.85	V	-53.27	68.25
20525 (836.5)	1,673.00	-54.46	9.78	-62.63	1.28	V	-54.13	69.11
	2,509.50	-58.47	10.65	-63.47	1.61	V	-54.43	69.41
	3,346.00	-58.50	12.41	-63.98	1.86	V	-53.43	68.41
20635 (847.5)	1,695.00	-55.65	9.84	-63.89	1.30	V	-55.35	70.33
	2,542.50	-57.53	10.72	-62.39	1.63	V	-53.30	68.28
	3,390.00	-58.58	12.40	-63.81	1.84	V	-53.25	68.23

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

7.4.3 RADIATED SPURIOUS EMISSIONS (5 MHz Band 5 LTE)

▣ OPERATING FREQUENCY : 826.50 MHz

▣ MEASURED OUTPUT POWER: 14.68 dBm = 0.029 W

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 27.68 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
20425 (826.5)	1,653.00	-53.14	9.72	-61.19	1.29	V	-52.76	67.44
	2,479.50	-58.43	10.54	-63.45	1.61	V	-54.52	69.20
	3,306.00	-57.72	12.26	-62.91	1.86	V	-52.51	67.19
20525 (836.5)	1,673.00	-56.95	9.78	-65.12	1.28	V	-56.62	71.30
	2,509.50	-58.57	10.65	-63.57	1.61	V	-54.53	69.21
	3,346.00	-58.47	12.41	-63.95	1.86	V	-53.40	68.08
20625 (846.5)	1,693.00	-54.30	9.83	-62.55	1.30	V	-54.02	68.70
	2,539.50	-57.36	10.71	-62.18	1.63	V	-53.10	67.78
	3,386.00	-58.57	12.40	-63.96	1.84	V	-53.40	68.08

NOTES:
1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

7.4.4 RADIATED SPURIOUS EMISSIONS (10 MHz Band 5 LTE)

▣ OPERATING FREQUENCY : 829.00 MHz

▣ MEASURED OUTPUT POWER: 14.89 dBm = 0.031 W

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 27.89 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
20450 (829.0)	1,658.00	-52.83	9.73	-60.90	1.28	V	-52.45	67.34
	2,487.00	-58.41	10.54	-63.39	1.62	V	-54.47	69.36
	3,316.00	-57.58	12.30	-62.89	1.89	H	-52.48	67.37
20525 (836.5)	1,673.00	-58.18	9.78	-66.35	1.28	V	-57.85	72.74
	2,509.50	-57.72	10.65	-62.72	1.61	H	-53.68	68.57
	3,346.00	-58.68	12.41	-64.16	1.86	V	-53.61	68.50
20600 (844.0)	1,688.00	-54.54	9.81	-62.78	1.30	V	-54.27	69.16
	2,532.00	-58.38	10.69	-63.15	1.62	H	-54.08	68.97
	3,376.00	-58.71	12.41	-64.24	1.85	V	-53.68	68.57

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. All of RB size has been tested for emissions and ERP, with the 1RB configuration observed as the worst case

7.5 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Band 2	1.4 MHz	1880.0	QPSK	6	0	4.89
			16-QAM	6	0	5.39
	3 MHz		QPSK	15	0	4.99
			16-QAM	15	0	5.87
	5 MHz		QPSK	25	0	4.96
			16-QAM	25	0	5.75
	10 MHz		QPSK	50	0	4.99
			16-QAM	50	0	5.75
	15 MHz		QPSK	75	0	4.73
			16-QAM	75	0	5.61
	20 MHz		QPSK	100	0	4.76
			16-QAM	100	0	5.59

- Plots of the EUT's Peak- to- Average Ratio are shown Page 61 ~ 66

7.6 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Band 2	1.4 MHz	1880.0	QPSK	6	0	1.0964
			16-QAM	6	0	1.0993
	3 MHz		QPSK	15	0	2.7009
			16-QAM	15	0	2.7023
	5 MHz		QPSK	25	0	4.5067
			16-QAM	25	0	4.5118
	10 MHz		QPSK	50	0	9.0055
			16-QAM	50	0	8.9698
	15 MHz		QPSK	75	0	13.4660
			16-QAM	75	0	13.4570
	20 MHz		QPSK	100	0	17.9200
			16-QAM	100	0	17.9520

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Band 5	1.4 MHz	836.5	QPSK	6	0	1.0968
			16-QAM	6	0	1.0963
	3 MHz		QPSK	15	0	2.7083
			16-QAM	15	0	2.7019
	5 MHz		QPSK	25	0	4.5114
			16-QAM	25	0	4.5036
	10 MHz		QPSK	50	0	8.9870
			16-QAM	50	0	8.9609

- Plots of the EUT's Occupied Bandwidth are shown Page 51 ~ 60.

7.7 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Frequency of Maximum Harmonic (GHz)	Maximum Data [dBm]
Band 2	1.4	1850.7	QPSK	1	0	16.5890	-29.00
		1880.0				16.7685	-29.67
		1909.3				19.0455	-29.52
	3	1851.5				16.5990	-29.23
		1880.0				16.7355	-29.16
		1908.5				16.6485	-29.11
	5	1852.5				16.2795	-28.82
		1880.0				16.6695	-27.82
		1907.5				16.9250	-29.10
	10	1855.0				16.6095	-29.51
		1880.0				16.7500	-29.44
		1905.0				16.6645	-28.98
	15	1857.5				16.9220	-28.92
		1880.0				16.6590	-29.27
		1902.5				16.6400	-28.84
	20	1860.0				16.6740	-29.52
		1880.0				16.5695	-28.87
		1900.0				16.6670	-29.80

Band	Band Width (MHz)	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Frequency of Maximum Harmonic (GHz)	Maximum Data [dBm]
Band 5	1.4	824.7	QPSK	1	0	6.622500	-32.17
		836.5				5.232000	-32.38
		848.3				5.846500	-32.28
	3	825.5				3.158118	-31.97
		836.5				3.293799	-31.87
		847.5				3.054245	-31.80
	5	826.5				6.038000	-31.90
		836.5				5.191500	-31.16
		846.5				3.212788	-32.34
	10	829.0				5.978000	-31.95
		836.5				3.147184	-31.37
		844.0				2.645711	-31.50

- Plots of the EUT's Conducted Spurious Emissions are shown Page 97 ~ 126.

7.7.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 67 ~ 96.

7.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

7.8.1 FREQUENCY STABILITY (1.4 MHz Band 2 LTE)

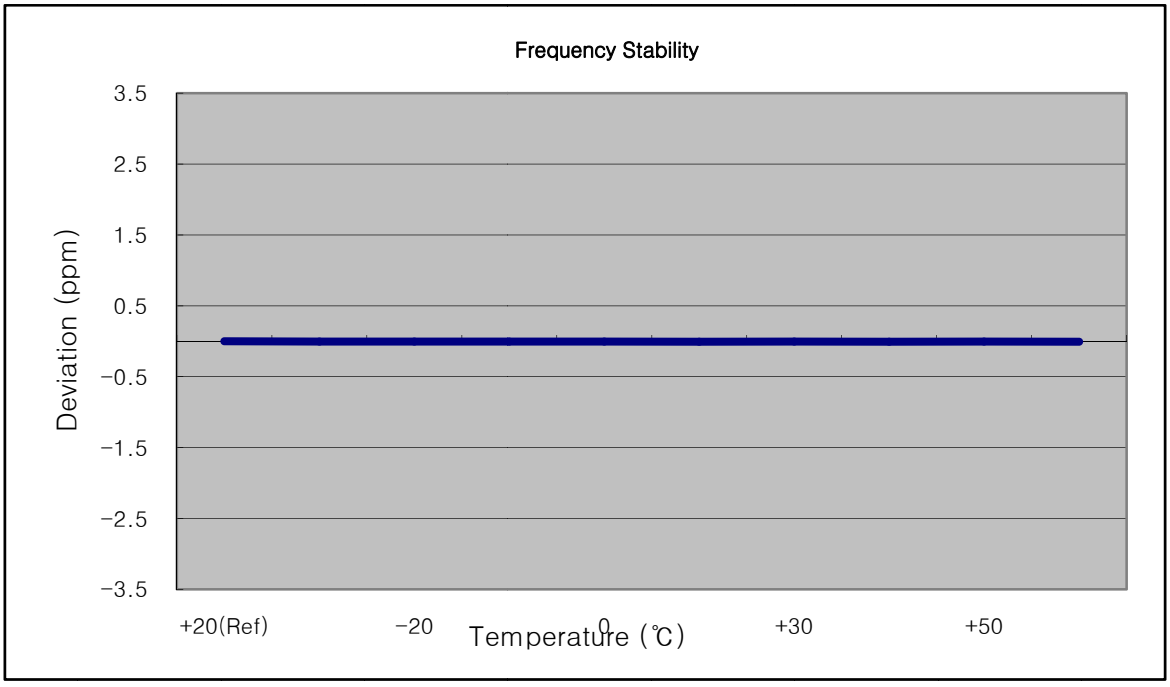
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: -

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1880 000 010	0	0.000 000	0.000
100%		-30	1880 000 001	-8.60	0.000 000	-0.005
100%		-20	1880 000 002	-8.10	0.000 000	-0.004
100%		-10	1880 000 002	-7.80	0.000 000	-0.004
100%		0	1880 000 003	-6.80	0.000 000	-0.004
100%		+10	1879 999 999	-11.20	-0.000 001	-0.006
100%		+30	1880 000 003	-6.60	0.000 000	-0.004
100%		+40	1879 999 999	-11.40	-0.000 001	-0.006
100%		+50	1880 000 001	-8.50	0.000 000	-0.005
Batt. Endpoint	3.23	+20	1879 999 996	-13.60	-0.000 001	-0.007



7.8.2 FREQUENCY STABILITY (3 MHz Band 2 LTE)

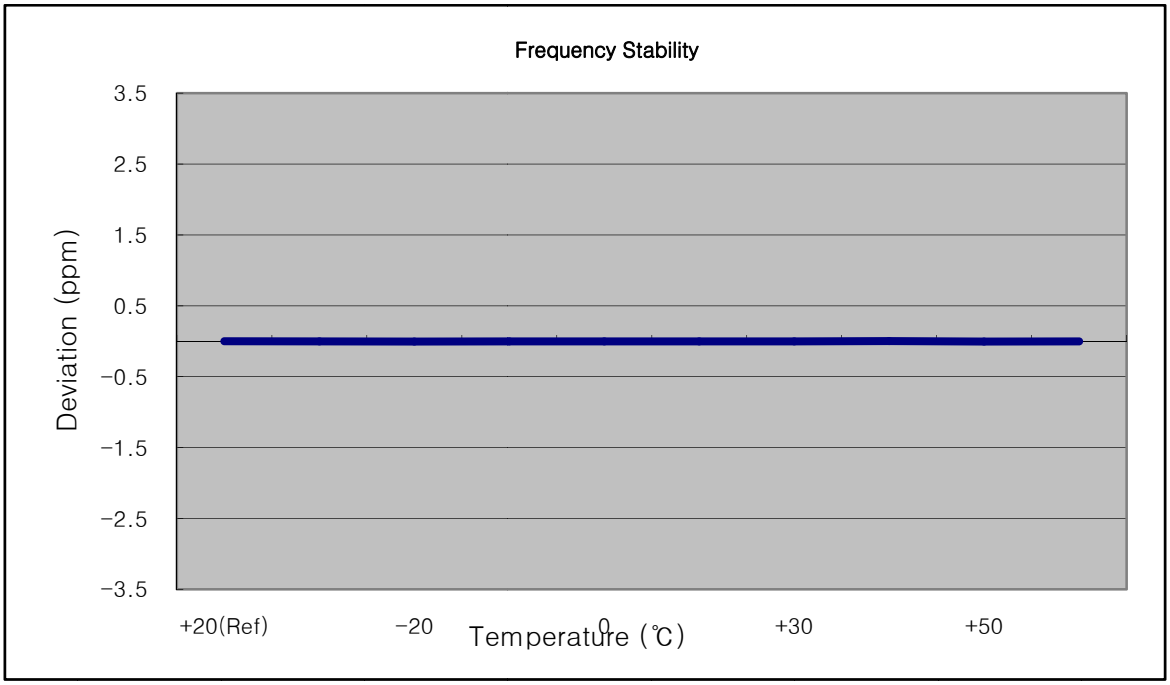
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (3 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: -

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1879 999 995	0	0.000 000	0.000
100%		-30	1879 999 989	-6.00	0.000 000	-0.003
100%		-20	1879 999 985	-9.20	0.000 000	-0.005
100%		-10	1879 999 989	-5.60	0.000 000	-0.003
100%		0	1879 999 988	-6.30	0.000 000	-0.003
100%		+10	1879 999 991	-3.90	0.000 000	-0.002
100%		+30	1879 999 992	-3.00	0.000 000	-0.002
100%		+40	1879 999 999	4.70	0.000 000	0.003
100%		+50	1879 999 987	-7.40	0.000 000	-0.004
Batt. Endpoint	3.23	+20	1879 999 990	-4.10	0.000 000	-0.002



7.8.3 FREQUENCY STABILITY (5 MHz Band 2 LTE)

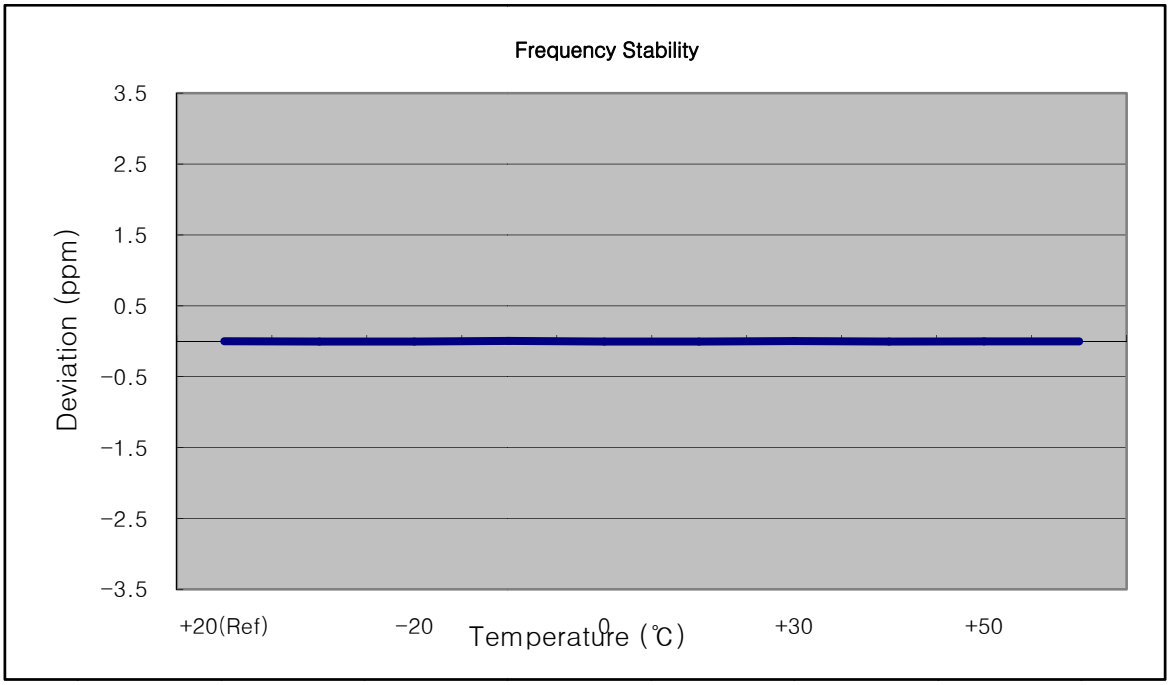
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (5 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: -

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1880 000 010	0	0.000 000	0.000
100%		-30	1880 000 002	-7.60	0.000 000	-0.004
100%		-20	1880 000 001	-8.30	0.000 000	-0.004
100%		-10	1880 000 019	9.00	0.000 000	0.005
100%		0	1880 000 001	-9.00	0.000 000	-0.005
100%		+10	1880 000 001	-8.30	0.000 000	-0.004
100%		+30	1880 000 016	6.00	0.000 000	0.003
100%		+40	1880 000 002	-7.40	0.000 000	-0.004
100%		+50	1880 000 004	-5.30	0.000 000	-0.003
Batt. Endpoint	3.23	+20	1880 000 005	-5.00	0.000 000	-0.003



7.8.4 FREQUENCY STABILITY (10 MHz Band 2 LTE)

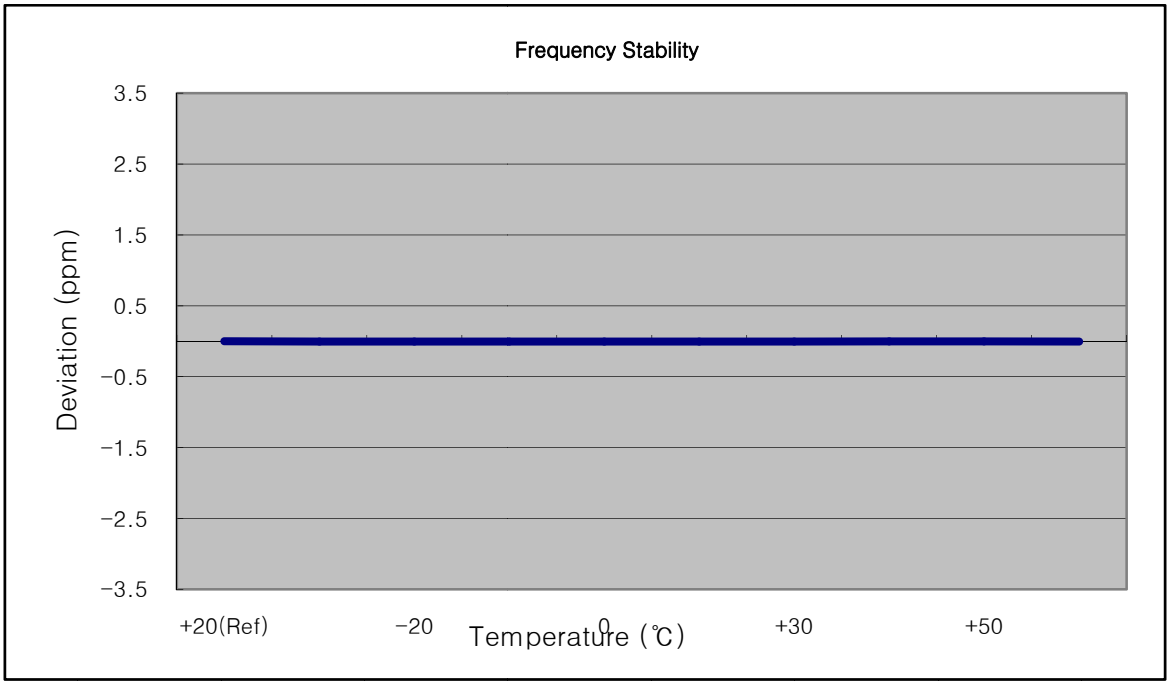
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (10 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: -

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1879 999 992	0	0.000 000	0.000
100%		-30	1879 999 984	-7.80	0.000 000	-0.004
100%		-20	1879 999 984	-7.90	0.000 000	-0.004
100%		-10	1879 999 985	-7.20	0.000 000	-0.004
100%		0	1879 999 985	-6.80	0.000 000	-0.004
100%		+10	1879 999 985	-7.20	0.000 000	-0.004
100%		+30	1879 999 984	-8.10	0.000 000	-0.004
100%		+40	1879 999 986	-5.60	0.000 000	-0.003
100%		+50	1879 999 986	-5.50	0.000 000	-0.003
Batt. Endpoint	3.23	+20	1879 999 985	-6.40	0.000 000	-0.003



7.8.5 FREQUENCY STABILITY (15 MHz Band 2 LTE)

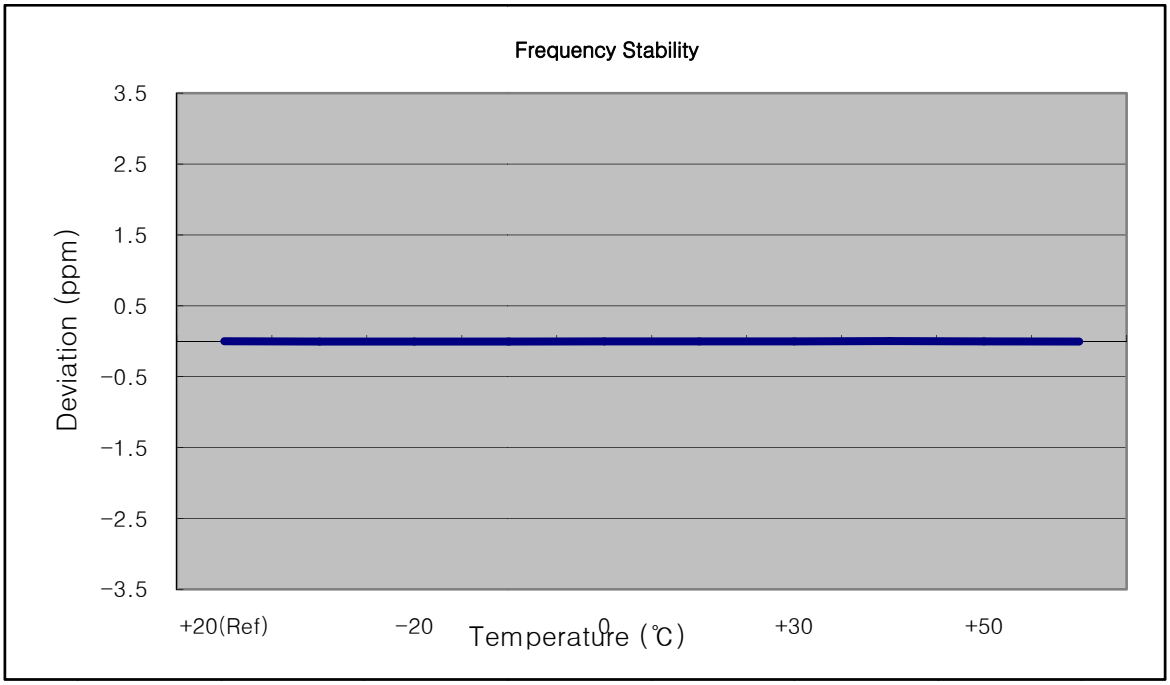
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (15 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: -

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1880 000 011	0	0.000 000	0.000
100%		-30	1880 000 002	-8.60	0.000 000	-0.005
100%		-20	1880 000 004	-6.60	0.000 000	-0.004
100%		-10	1880 000 004	-6.40	0.000 000	-0.003
100%		0	1880 000 005	-6.20	0.000 000	-0.003
100%		+10	1880 000 006	-5.00	0.000 000	-0.003
100%		+30	1880 000 007	-3.90	0.000 000	-0.002
100%		+40	1880 000 016	5.50	0.000 000	0.003
100%		+50	1880 000 006	-4.60	0.000 000	-0.002
Batt. Endpoint	3.23	+20	1880 000 004	-6.50	0.000 000	-0.003



7.8.6 FREQUENCY STABILITY (20 MHz Band 2 LTE)

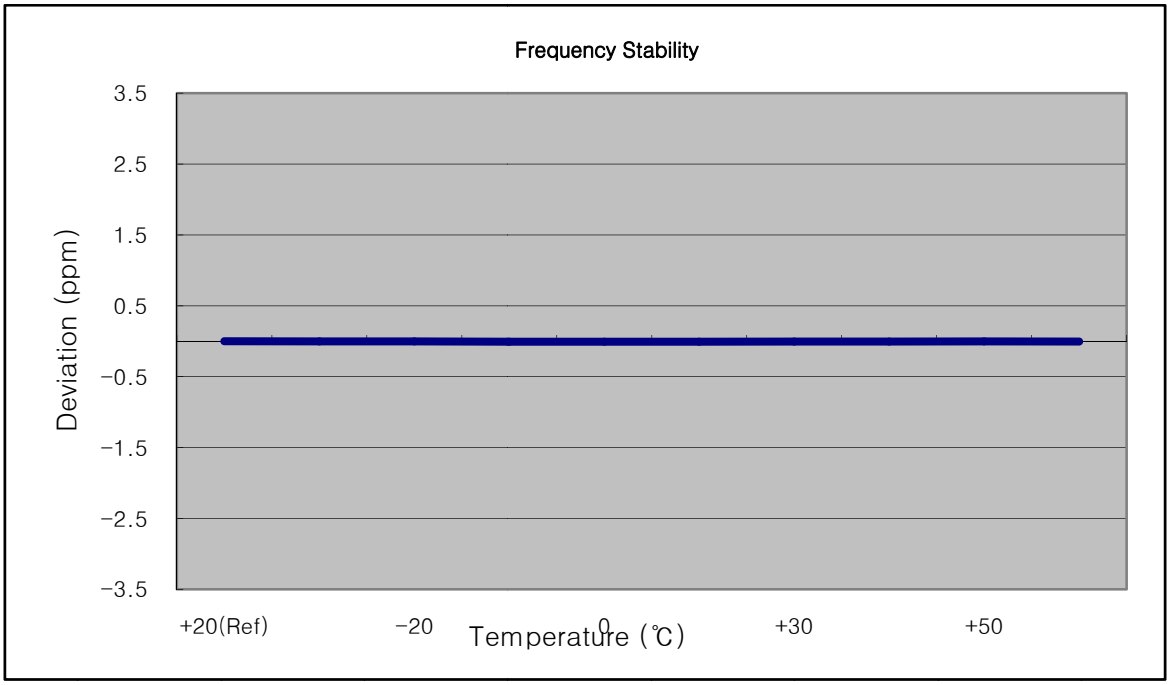
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (20 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: -

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1880 000 004	0	0.000 000	0.000
100%		-30	1879 999 998	-5.90	0.000 000	-0.003
100%		-20	1879 999 998	-6.10	0.000 000	-0.003
100%		-10	1879 999 991	-13.80	-0.000 001	-0.007
100%		0	1879 999 993	-11.30	-0.000 001	-0.006
100%		+10	1879 999 992	-12.10	-0.000 001	-0.006
100%		+30	1879 999 995	-9.00	0.000 000	-0.005
100%		+40	1879 999 997	-7.80	0.000 000	-0.004
100%		+50	1880 000 000	-4.00	0.000 000	-0.002
Batt. Endpoint	3.23	+20	1879 999 996	-8.80	0.000 000	-0.005



7.8.7 FREQUENCY STABILITY (1.4 MHz Band 5 LTE)

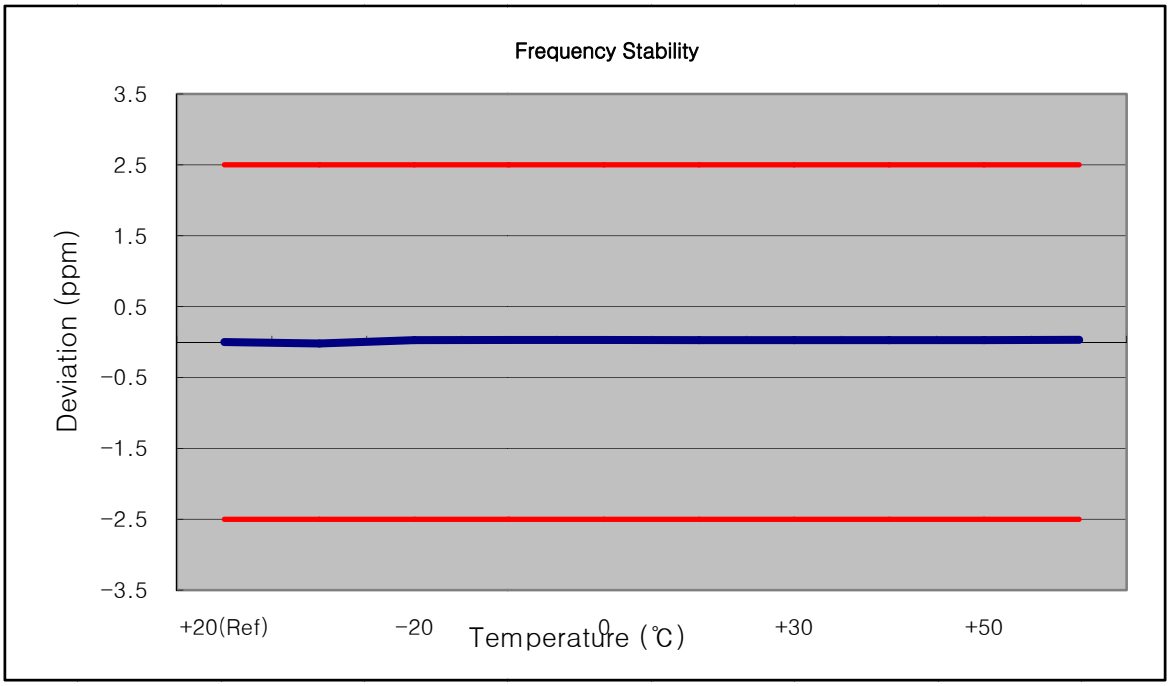
▣ OPERATING FREQUENCY: 836,500,000 Hz

▣ CHANNEL: 20525 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	836 500 023	0	0.000 000	0.000
100%		-30	836 500 005	-17.60	-0.000 002	-0.021
100%		-20	836 500 046	23.40	0.000 003	0.028
100%		-10	836 500 046	23.70	0.000 003	0.028
100%		0	836 500 047	24.60	0.000 003	0.029
100%		+10	836 500 045	22.70	0.000 003	0.027
100%		+30	836 500 046	22.90	0.000 003	0.027
100%		+40	836 500 046	23.10	0.000 003	0.028
100%		+50	836 500 046	23.50	0.000 003	0.028
Batt. Endpoint	3.23	+20	836 500 049	26.30	0.000 003	0.031



7.8.8 FREQUENCY STABILITY (3 MHz Band 5 LTE)

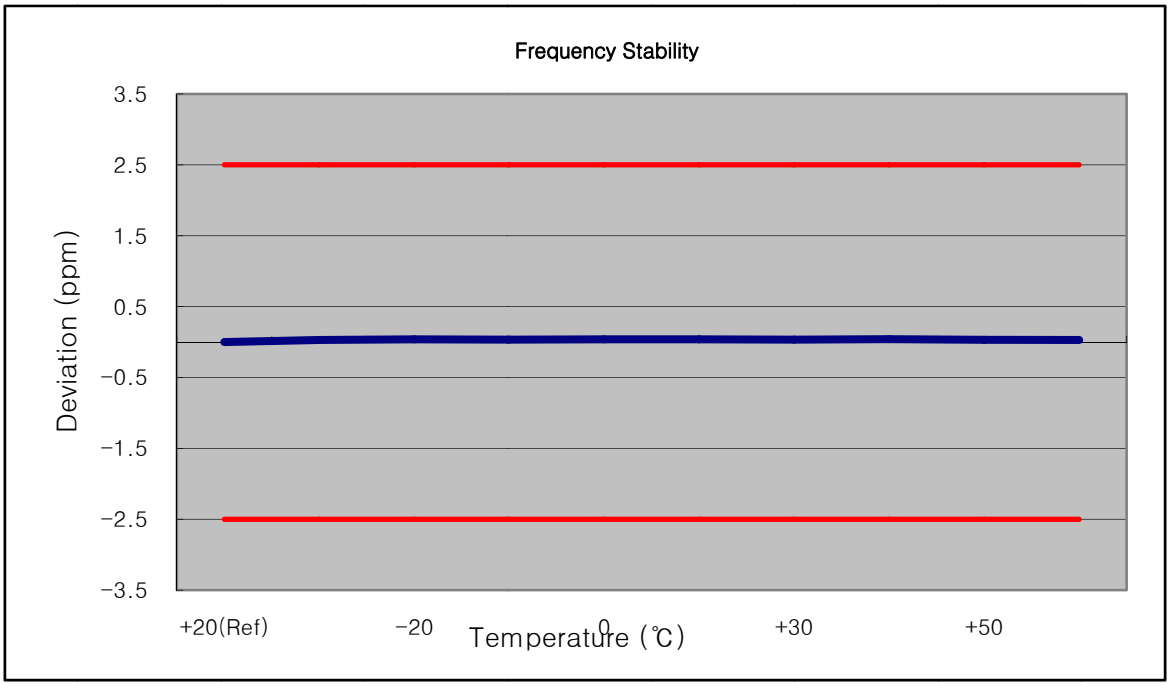
▣ OPERATING FREQUENCY: 836,500,000 Hz

▣ CHANNEL: 20525 (3 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	836 500 031	0	0.000 000	0.000
100%		-30	836 500 057	25.40	0.000 003	0.030
100%		-20	836 500 063	31.70	0.000 004	0.038
100%		-10	836 500 060	28.60	0.000 003	0.034
100%		0	836 500 064	32.90	0.000 004	0.039
100%		+10	836 500 064	32.30	0.000 004	0.039
100%		+30	836 500 061	29.20	0.000 003	0.035
100%		+40	836 500 065	33.30	0.000 004	0.040
100%		+50	836 500 058	26.30	0.000 003	0.031
Batt. Endpoint	3.23	+20	836 500 057	25.40	0.000 003	0.030



7.8.9 FREQUENCY STABILITY (5 MHz Band 5 LTE)

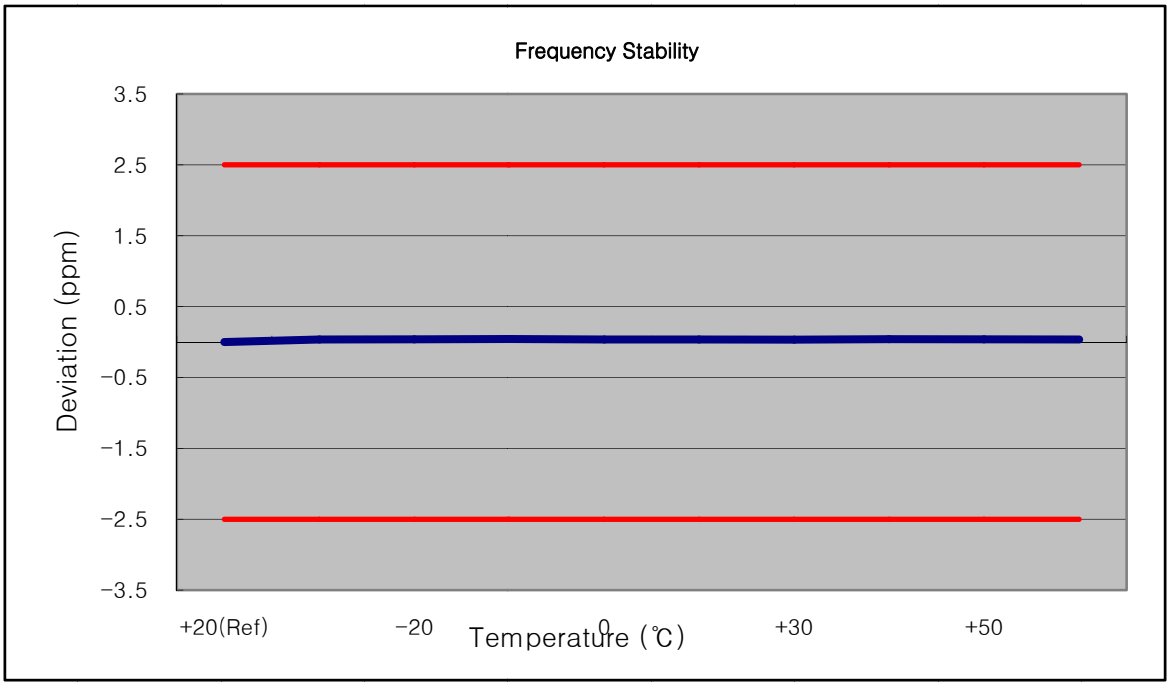
▣ OPERATING FREQUENCY: 836,500,000 Hz

▣ CHANNEL: 20525 (5 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	836 500 003	0	0.000 000	0.000
100%		-30	836 500 033	29.90	0.000 004	0.036
100%		-20	836 500 034	31.50	0.000 004	0.038
100%		-10	836 500 038	35.40	0.000 004	0.042
100%		0	836 500 034	30.60	0.000 004	0.037
100%		+10	836 500 033	30.10	0.000 004	0.036
100%		+30	836 500 031	28.40	0.000 003	0.034
100%		+40	836 500 036	33.40	0.000 004	0.040
100%		+50	836 500 035	32.50	0.000 004	0.039
Batt. Endpoint	3.23	+20	836 500 034	31.00	0.000 004	0.037



7.8.10 FREQUENCY STABILITY (10 MHz Band 5 LTE)

▣ OPERATING FREQUENCY: 836,500,000 Hz

▣ CHANNEL: 20525 (10 MHz)

▣ REFERENCE VOLTAGE: 3.80 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	836 500 025	0	0.000 000	0.000
100%		-30	836 500 055	30.40	0.000 004	0.036
100%		-20	836 500 052	27.20	0.000 003	0.033
100%		-10	836 500 055	30.00	0.000 004	0.036
100%		0	836 500 053	28.00	0.000 003	0.033
100%		+10	836 500 053	28.40	0.000 003	0.034
100%		+30	836 500 055	29.90	0.000 004	0.036
100%		+40	836 500 052	27.00	0.000 003	0.032
100%		+50	836 500 054	29.20	0.000 003	0.035
Batt. Endpoint	3.23	+20	836 500 054	28.60	0.000 003	0.034