

FCC TEST REPORT

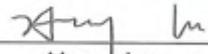
Product Name: Computador de Bordo
Trade Mark: solinftec
Model No.: MAG100R
Report Number: 180516002RFM-3
Test Standards: FCC 47 CFR Part 27
 FCC 47 CFR Part 2
FCC ID: 2AQWE-GC170424
Test Result: PASS
Date of Issue: October 16, 2018

Prepared for:

TECSOIL AUTOMACAO E SISTEMAS S.A.
RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil

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Version

Version No.	Date	Description
V1.0	October 16, 2018	Original

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	TECSOIL AUTOMACAO E SISTEMAS S.A.
Address of Applicant:	RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil
Manufacturer:	TECSOIL AUTOMACAO E SISTEMAS S.A.
Address of Manufacturer:	RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil

1.2 EUT INFORMATION

Product Name:	Computador de Bordo	
Model No.:	MAG100R	
Add. Model No.:	N/A	
Trade Mark:	solinftec	
DUT Stage:	Identical Prototype	
EUT Supports Function:	UTRA Bands:	Band II/ Band IV/ Band V
Sample Received Date:	May 13, 2018	
Sample Tested Date:	May 13, 2018 to September 5, 2018	

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	WCDMA, HSDPA, HSUPA	
Type of Modulation:	WCDMA Band IV	BPSK
	HSDPA Band IV:	QPSK
	HSUPA Band IV:	QPSK
Frequency Range:	WCDMA Band IV:	1712.4-1752.6 MHz
Max RF Output Power:	WCDMA Band IV:	22.38dBm
Type of Emission:	WCDMA Band IV:	4M17F9W
Antenna Type:	External Antenna	
Antenna Gain:	6 dBi	
Normal Test Voltage:	24 Vdc	
Extreme Test Voltage:	12 to 30Vdc	
Extreme Test Temperature:	-30 °C to +50 °C	

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested independently

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
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 Fax: +86 (0) 755 2823 0886

1.6 TEST FACILITY

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China
 Tel: +86-755-28230888 Fax: +86-755-28230886 E-mail: info@uttlab.com [Http://www.uttlab.com](http://www.uttlab.com)

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194
 Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 27 Test Cases (WCDMA Band IV)			
Test Item	Test Requirement	Test Method	Result
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 27.53(h)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 20, 2015	Dec. 19, 2018
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 17, 2017	Dec. 17, 2018
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May 19, 2018	May 19, 2019
<input checked="" type="checkbox"/>	Horn Antenna	ETS-LINDGREN	3117	00164202	Dec. 17, 2017	Dec. 17, 2018
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 22, 2018	May 22, 2019
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	Universal Radio Communication Tester	R&S	CMU200	114713	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

RF Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec.10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Universal Radio Communication Tester	R&S	CMU200	114713	Dec. 10, 2017	Dec. 10, 2018
<input type="checkbox"/>	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 14, 2017	Sep. 13, 2018
<input checked="" type="checkbox"/>	Temp & Humidity chamber	Votisch	VT4002	58566133290020	June 05, 2018	June 05, 2019

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

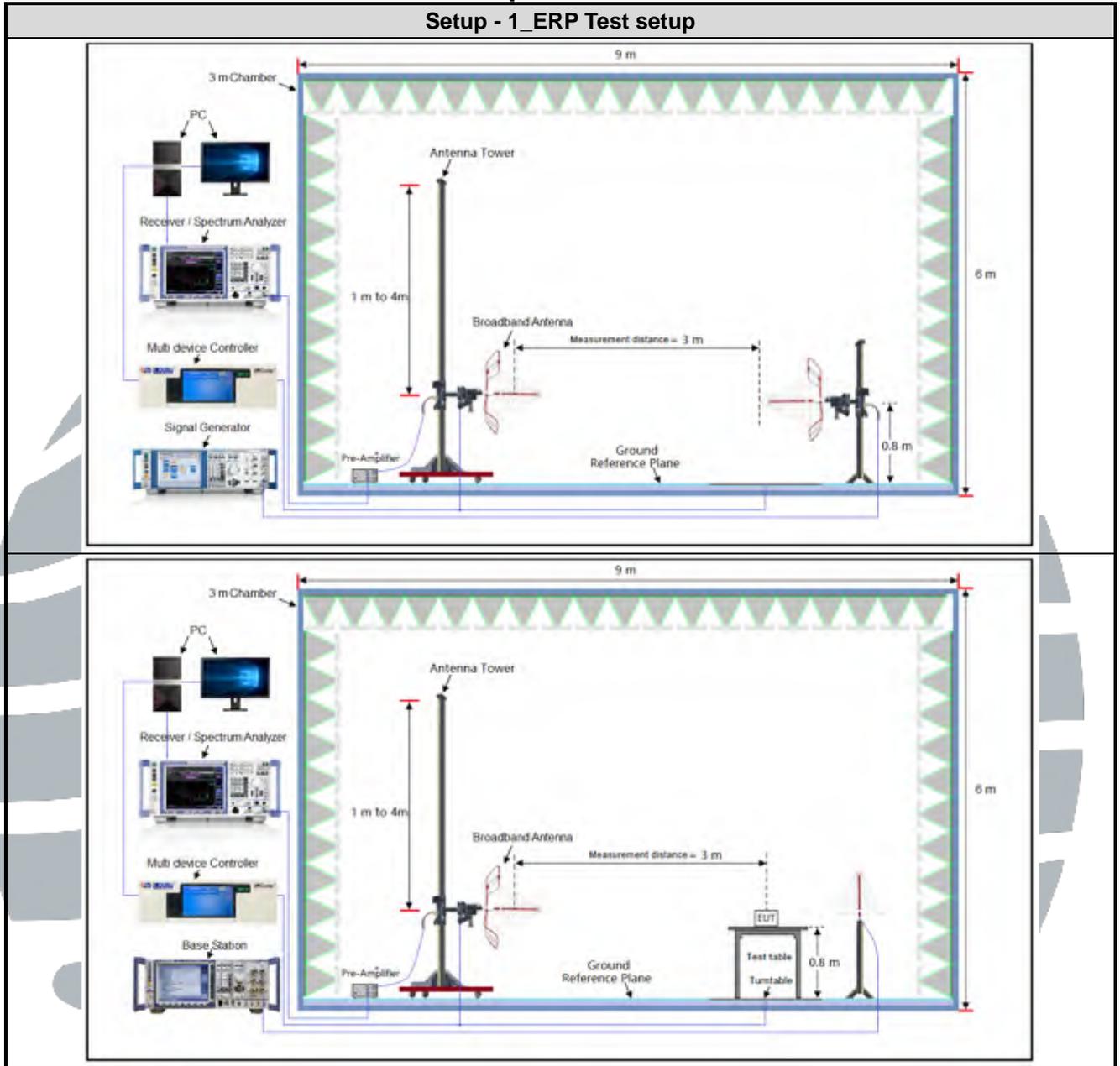
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (Vdc)	Relative Humidity (%)
TN/VN	+15 to +35	24	20 to 75
TL/VL	-30	12	20 to 75
TH/VL	+50	12	20 to 75
TL/VH	-30	30	20 to 75
TH/VH	+50	30	20 to 75

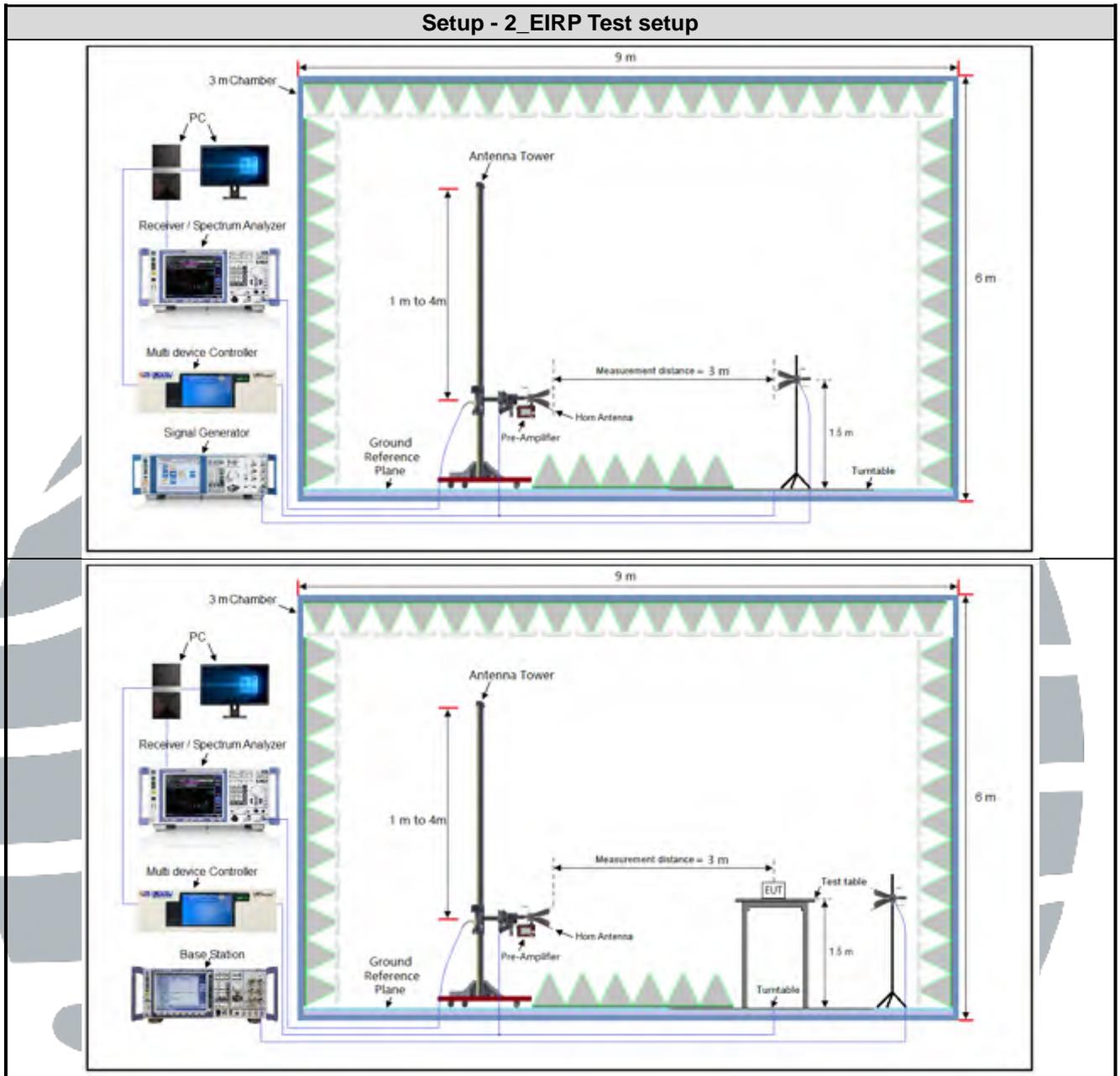
Remark:

- 1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 12 V to 30 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 12 V to 30 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
 TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
 VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

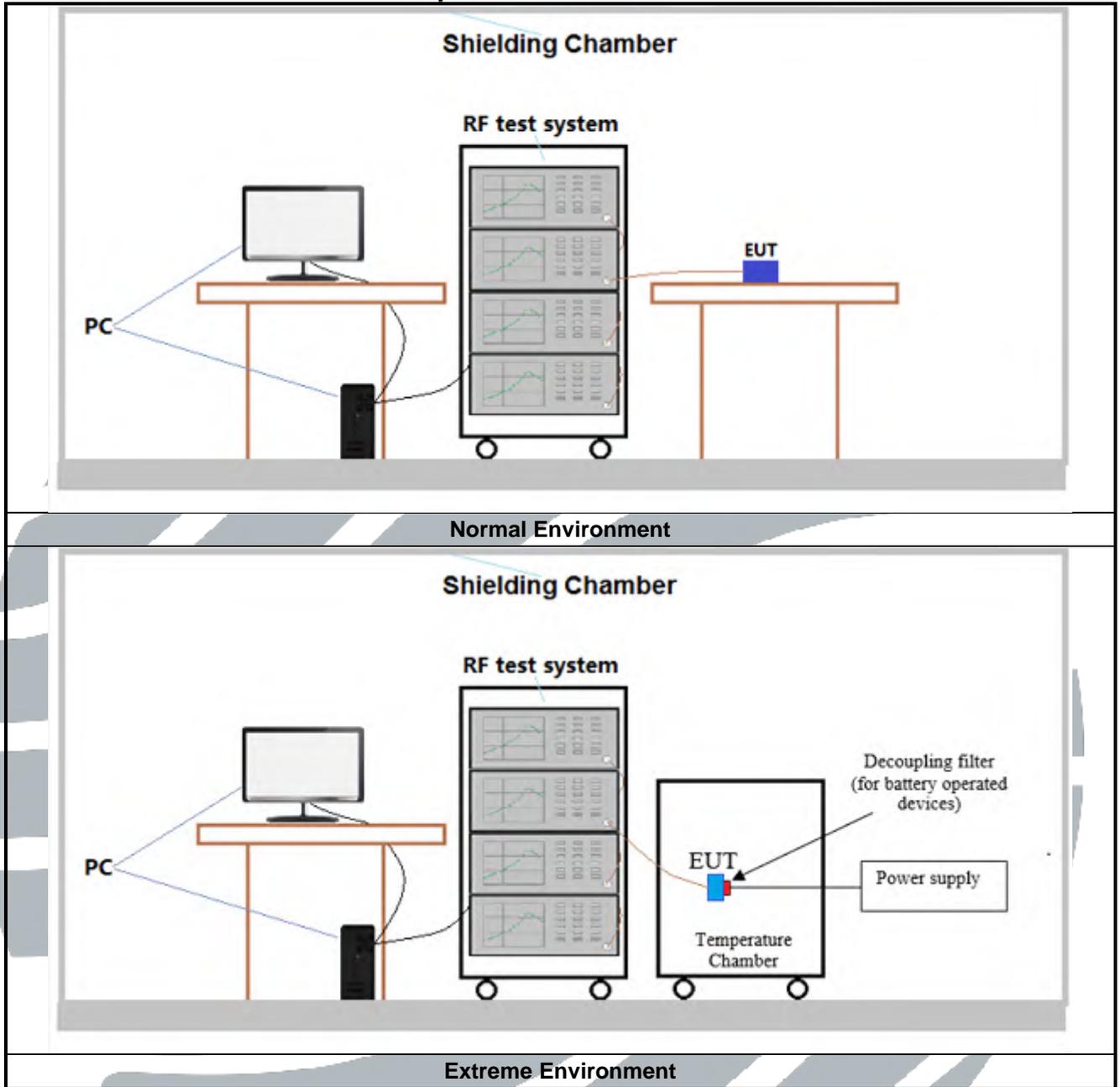
4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup





4.2.2 For Conducted RF test setup



4.3 TEST CHANNELS

Band	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
WCDMA Band IV	Tx (1710 MHz-1755 MHz)	Channel 1312	Channel 1412	Channel 1513
		1712.4 MHz	1732.4 MHz	1752.6 MHz

4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 24Vdc. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below.

WCDMA Band IV Maximum Average Power (dBm)			
Channel	1312	1412	1513
Frequency(MHz)	1712.4 MHz	1732.4 MHz	1752.6 MHz
RMC 12.2K	22.00	22.08	22.38
HSDPA Subtest-1	21.47	21.45	21.38
HSDPA Subtest-2	21.42	21.18	22.24
HSDPA Subtest-3	21.35	21.04	21.97
HSDPA Subtest-4	21.18	21.09	22.07
HSUPA Subtest-1	20.99	21.00	22.01
HSUPA Subtest-2	20.30	20.35	20.07
HSUPA Subtest-3	20.34	20.24	21.31
HSUPA Subtest-4	19.83	19.76	19.76
HSUPA Subtest-5	21.28	21.16	21.99

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the worse mode applicability and tested channel detail as below:

Band	Radiated	Conducted
WCDMA Band IV	RMC 12.2Kbps Link	RMC 12.2Kbps Link

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION
5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2 Subpart J	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services
3	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
4	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03



5.2 OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a)
WCDMA Band IV & LTE Band 4: FCC 47 CFR Part 27.50(d)(4)

Test Method: KDB 971168 D01v03 & ANSI/TIA-603-E-2016

Limit:

FCC 47 CFR Part 27.50(d)(4): Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

Test Procedure:

The EUT was set up for the maximum power with WCDMA and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Maximum EIRP (dBm)				
Channel	WCDMA RMC 12.2Kbps Maximum Average Conducted Power	EIRP (dBm)	Limit (dBm)	Result
Lowest	22.00	28.00	38.45	Pass
Middle	22.08	28.08	38.45	Pass
Highest	22.38	28.38	38.45	Pass

Note: EIRP = Conducted output power + Antenna Gain (6dBi)

5.3 PEAK-TO-AVERAGE RATIO

Test Requirement: FCC 47 CFR Part 24.232(d)

Test Method: KDB 971168 D01v03

Limit: In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

- a) Set resolution/measurement bandwidth \geq signal's occupied bandwidth
- b) Set the number of counts to a value that stabilizes the measured CCDF curve
- c) Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

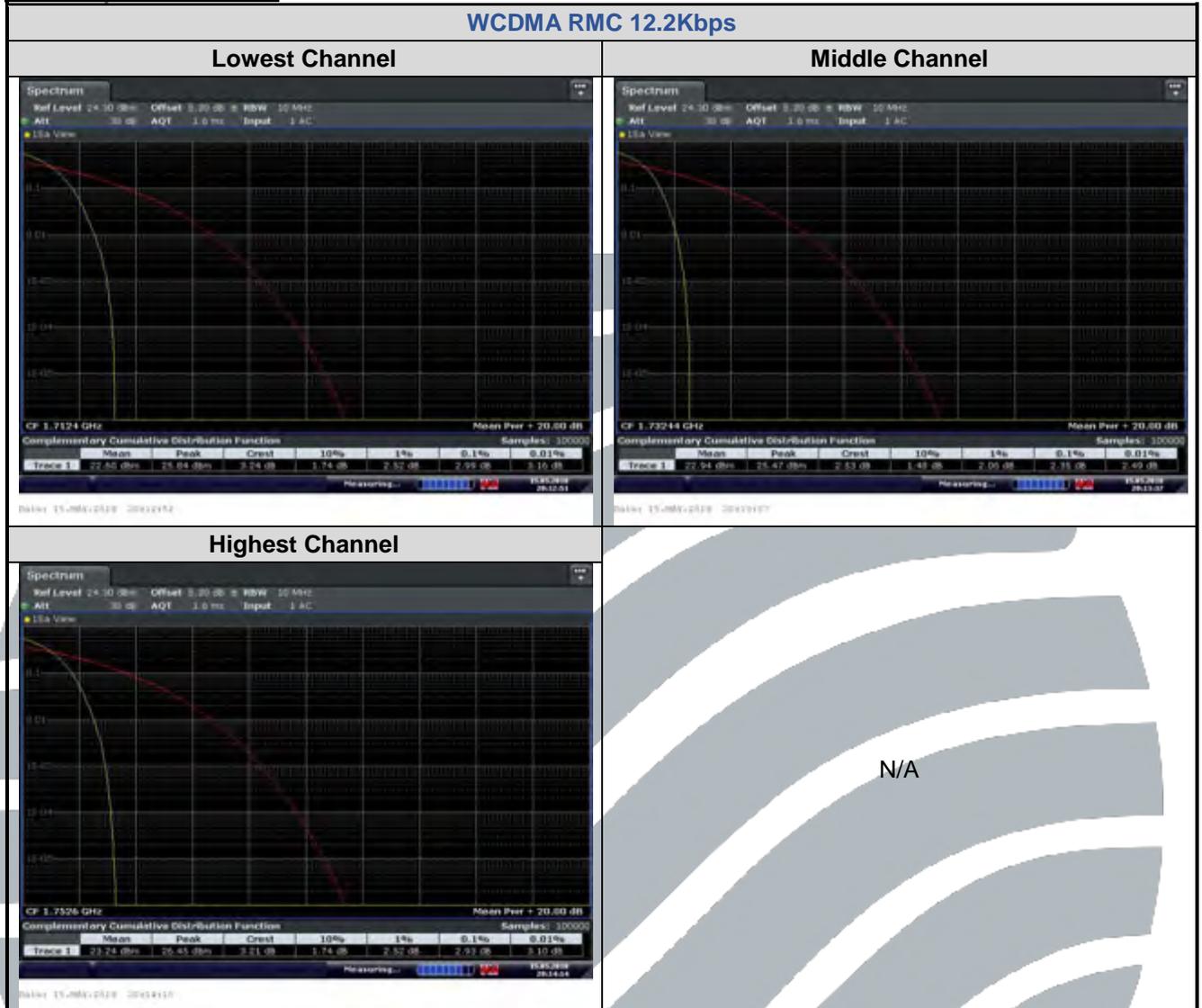
Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Channel	WCDMA RMC 12.2Kbps	Limit (dBm)	Result
Lowest	2.41	13	Pass
Middle	2.96	13	Pass
Highest	2.52	13	Pass

The test plot as follows:



5.4 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

Limit: No Limit

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

99% & 26 dB Bandwidth				
Test Mode	Channel	Frequency (MHz)	26 dB BW (MHz)	99% BW (MHz)
WCDMA RMC 12.2Kbps	1312	1712.4	4.712	4.1695
	1412	1732.4	4.744	4.1738
	1513	1752.6	4.686	4.1709

The test plot as follows:



5.5 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: WCDMA Band IV & LTE Band 4: FCC 47 CFR Part 27.53(h)(1)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

Limit:

FCC 47 CFR Part 27.53(h)(1): Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log₁₀ (P) dB. The emission limit equal to -13 dBm.

FCC 47 CFR Part 27.53(h)(3): Measurement procedure. (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

For each band edge measurement:

- 1) Set the spectrum analyzer span to include the block edge frequency.
- 2) Set a marker to point the corresponding band edge frequency in each test case.
- 3) Set display line at -13 dBm
- 4) Set resolution bandwidth to at least 1% of emission bandwidth.
- 5) Set spectrum analyzer with RMS detector.
- 6) Record the max trace plot into the test report

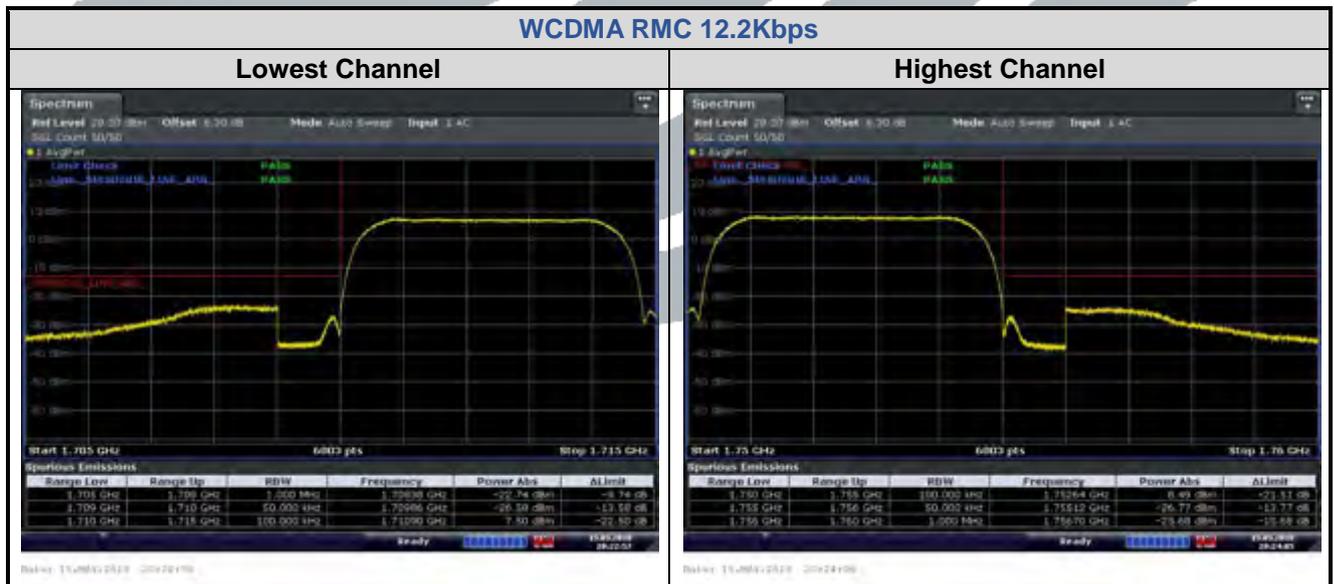
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass



5.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: WCDMA Band IV & LTE Band 4: FCC 47 CFR Part 27.53(h)(1)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

Limit:

FCC 47 CFR Part 27.53(h)(1): Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB. The emission limit equal to -13 dBm.

FCC 47 CFR Part 27.53(h)(3): Measurement procedure. (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

Test Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

The test plot as follows:



5.7 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: WCDMA Band IV & LTE Band 4: FCC 47 CFR Part 27.53(h)(1)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

Limits:

FCC 47 CFR Part 27.53(h)(1): Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB. The emission limit equal to -13 dBm.

FCC 47 CFR Part 27.53(h)(3): Measurement procedure. (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures:

1. Scan up to 10th harmonic, find the maximum radiation frequency to measure.
2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Test procedure as below:

- 1) The EUT was powered ON and placed on a 0.8/1.5m high table at a 3 meter semi/fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 4) Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 5) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
- 6) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.
- 7) The output power into the substitution antenna was then measured.
- 8) Steps 6) and 7) were repeated with both antennas polarized.
- 9) Calculate power in dBm by the following formula:

$$ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$EIRP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$EIRP = ERP + 2.15dB$$

where:

Pg is the generator output power into the substitution antenna.

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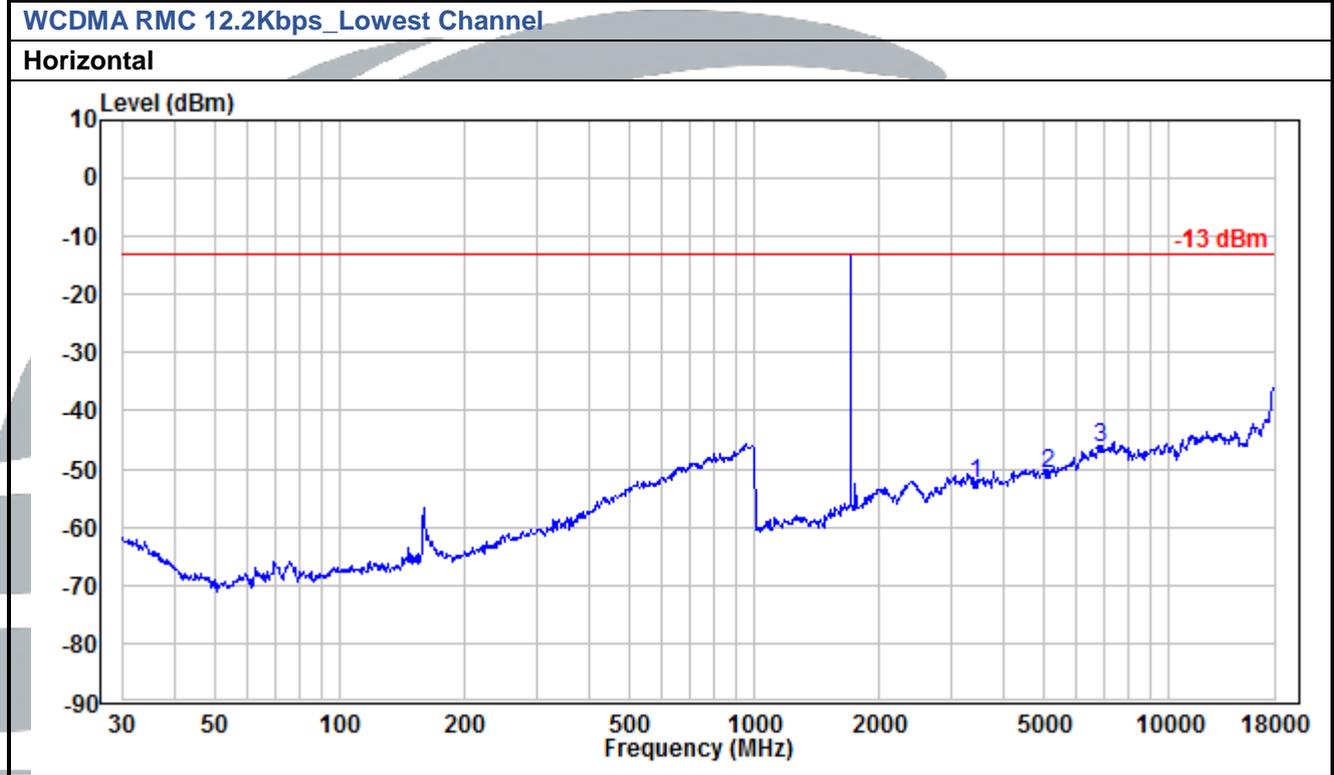
- 10) Test the EUT in the lowest channel, the middle channel the Highest channel
- 11) The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode, and found the Y axis positioning which it is worse case.
- 12) Repeat above procedures until all frequencies measured was complete.

Equipment Used: Refer to section 3 for details.

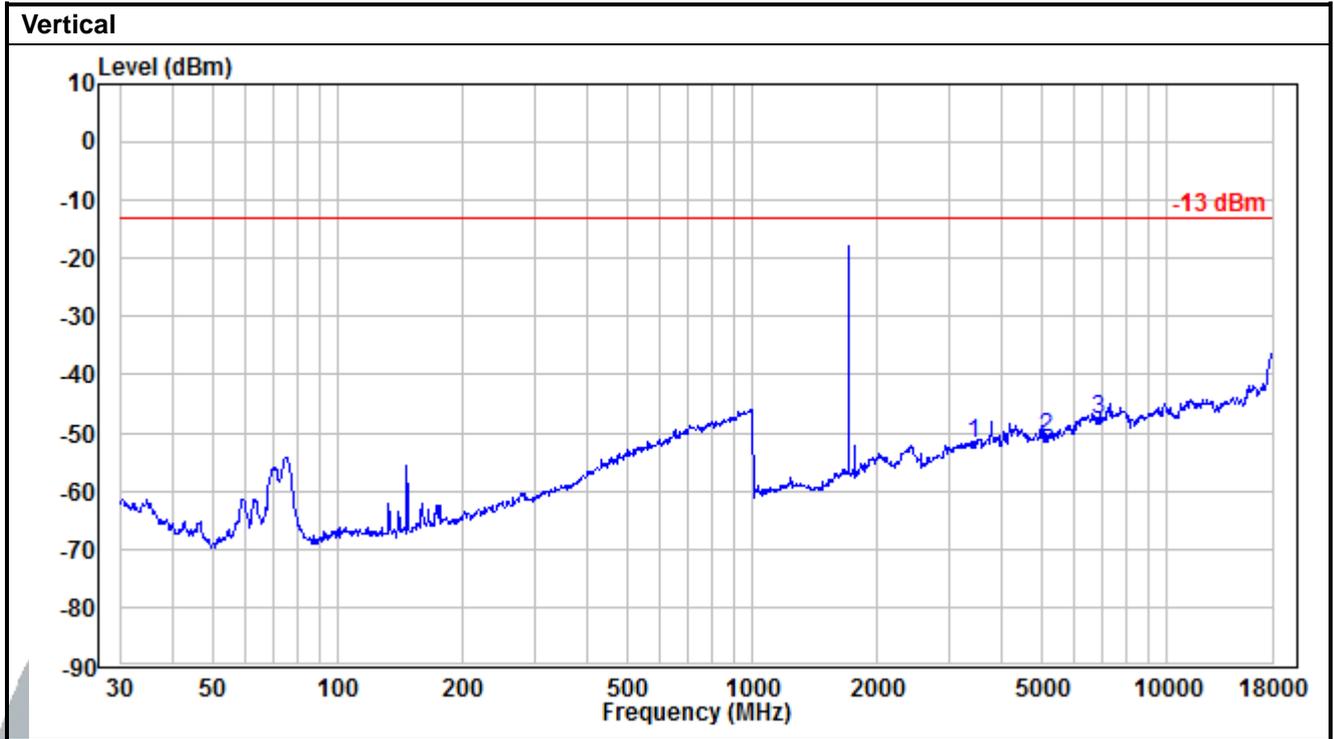
Test Result: Pass

The measurement data as follows:

Radiated Emission Test Data



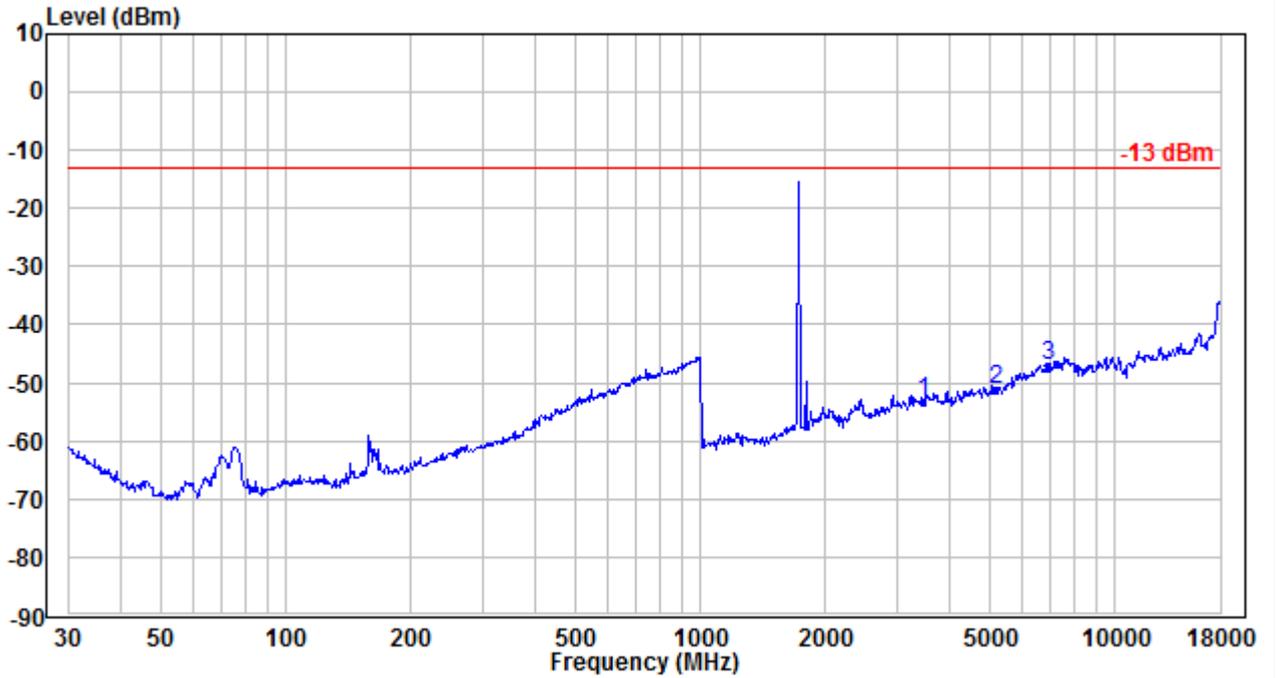
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3424.800	-65.78	13.30	-52.48	-13.00	-39.48	Peak
2	5137.200	-65.81	15.02	-50.79	-13.00	-37.79	Peak
3	6849.600	-65.20	18.73	-46.47	-13.00	-33.47	Peak



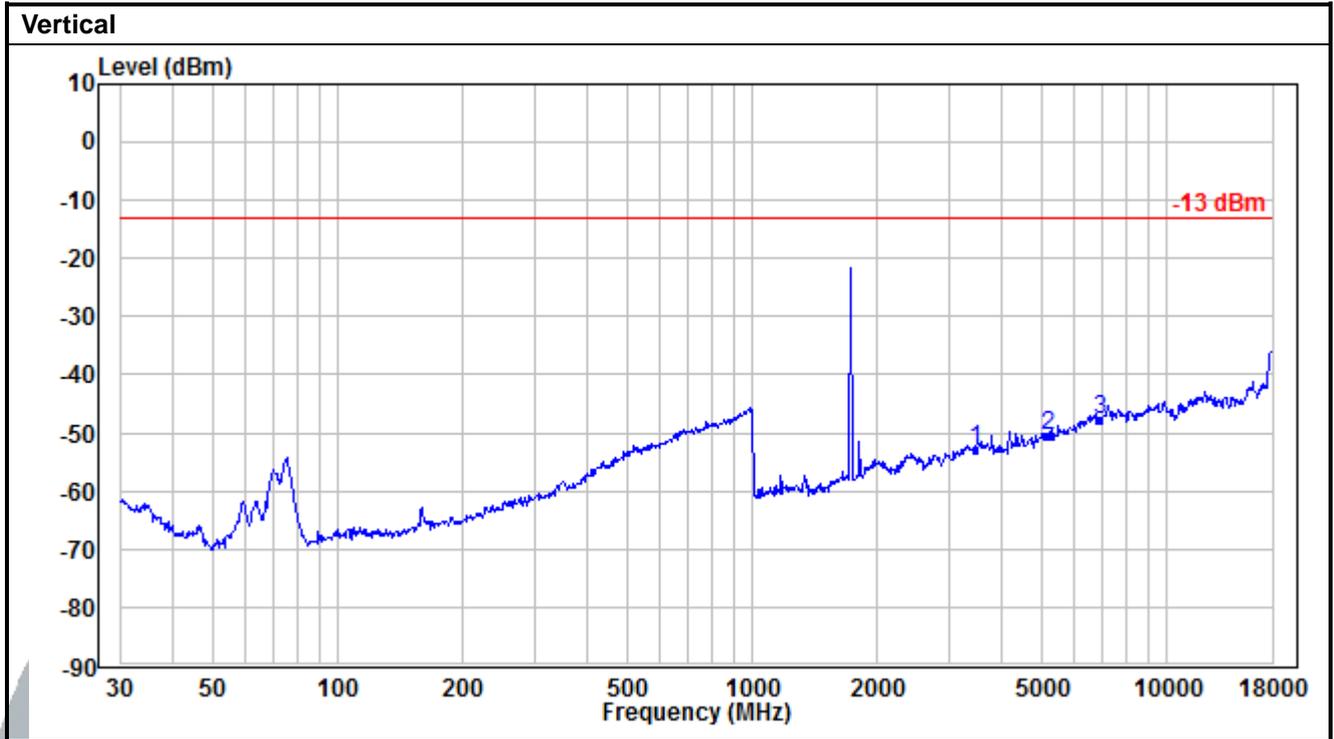
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3424.800	-65.27	13.30	-51.97	-13.00	-38.97	Peak
2	5137.200	-65.83	15.02	-50.81	-13.00	-37.81	Peak
3	6849.600	-66.61	18.73	-47.88	-13.00	-34.88	Peak

WCDMA RMC 12.2Kbps_Middle Channel

Horizontal



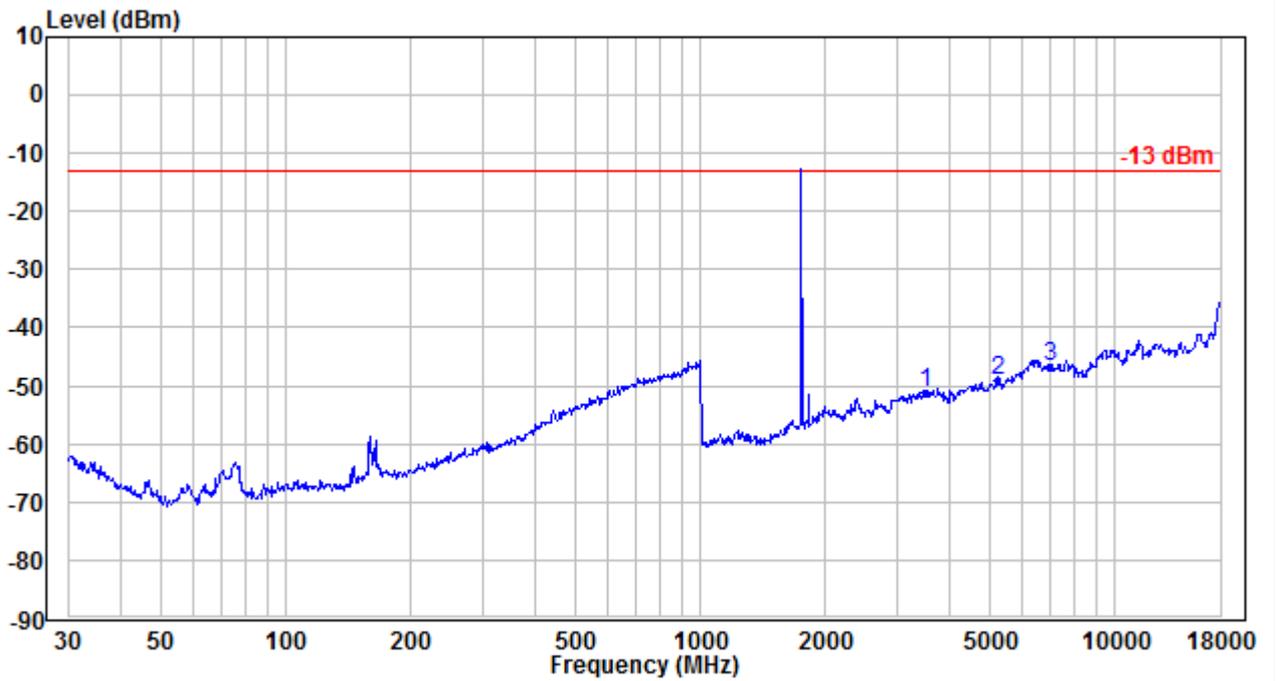
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3464.800	-66.86	13.57	-53.29	-13.00	-40.29	Peak
2	5197.200	-66.51	15.30	-51.21	-13.00	-38.21	Peak
3	6929.600	-65.80	18.60	-47.20	-13.00	-34.20	Peak



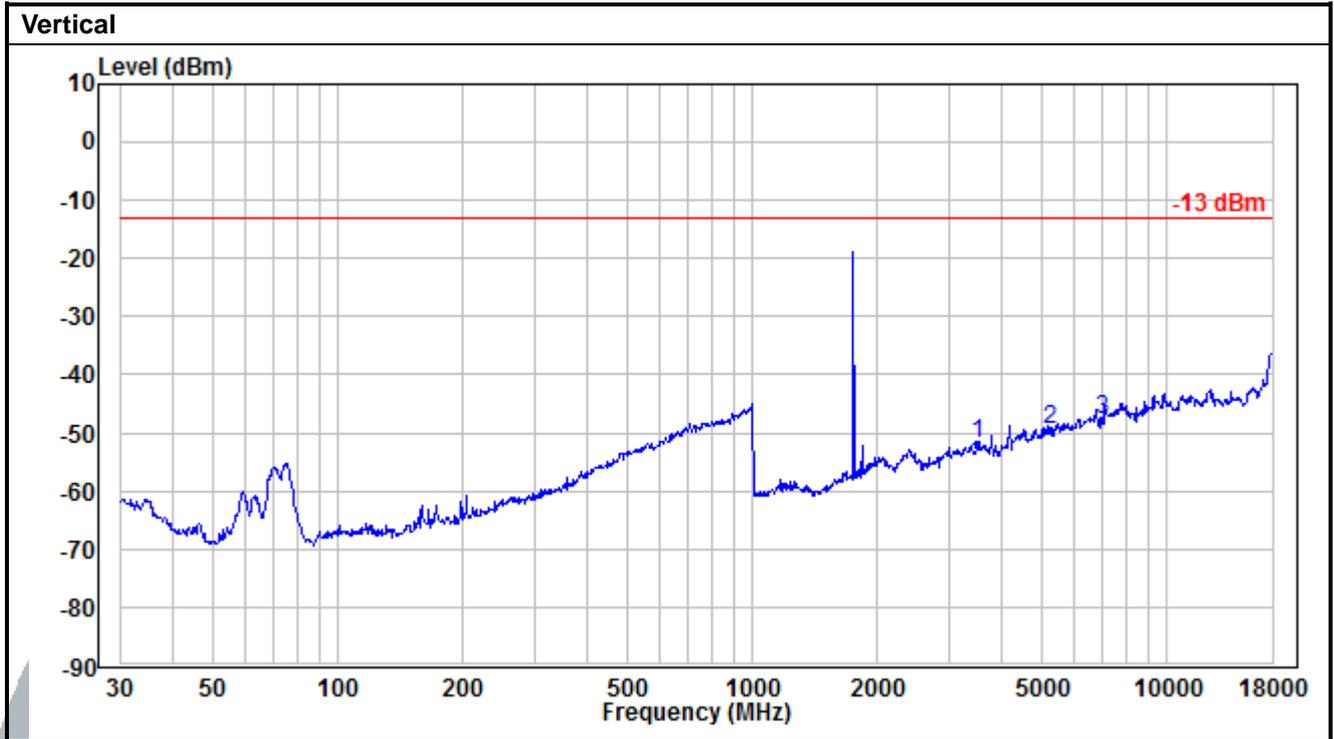
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3464.800	-66.34	13.57	-52.77	-13.00	-39.77	Peak
2	5197.200	-65.78	15.30	-50.48	-13.00	-37.48	Peak
3	6929.600	-66.19	18.60	-47.59	-13.00	-34.59	Peak

WCDMA RMC 12.2Kbps_Highest Channel

Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3505.200	-64.99	13.81	-51.18	-13.00	-38.18	Peak
2	5257.800	-64.71	15.48	-49.23	-13.00	-36.23	Peak
3	7010.400	-65.22	18.46	-46.76	-13.00	-33.76	Peak



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3505.200	-65.71	13.81	-51.90	-13.00	-38.90	Peak
2	5257.800	-64.86	15.48	-49.38	-13.00	-36.38	Peak
3	7010.400	-66.17	18.46	-47.71	-13.00	-34.71	Peak

Remark:

- 1) All tested is under the condition of the main wave is filtered out.
- 2) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.

5.8 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

Limits: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

- 1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
 - a) Temp. = -30° to + 50°C
 - b) Voltage =low voltage, 12 Vdc, Normal, 24 Vdc and High voltage, 30 Vdc.

2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Pass/ Fail
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
WCDMA RMC 12.2Kbps							
BPSK	1412 / 1732.4	VL	TN	-24	-0.0139	Note 1	Pass
		VN		-20	-0.0115		Pass
		VH		-29	-0.0167		Pass
		VN	50	-29	-0.0167		Pass
			40	-28	-0.0162		Pass
			30	-24	-0.0139		Pass
			20	-27	-0.0156		Pass
			10	-26	-0.0150		Pass
			0	-27	-0.0156		Pass
			-10	-28	-0.0162		Pass
			-20	-27	-0.0156		Pass
			-30	29	0.0167		Pass

Note1: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.



APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
