FCC TEST REPORT

Product Name:	Featurephone
Trade Mark:	ecom
Model No.:	Ex-Handy 10
Report Number:	210506008RFM-1
Test Standards:	FCC 47 CFR Part 22 Subpart H FCC 47 CFR Part 24 Subpart E FCC 47 CFR Part 27 Subpart L
FCC ID:	XAM500080GR01
Test Result:	PASS
Date of Issue:	August 24, 2021

Prepared for:

ecom instruments GmbH
Industriestrasse 2, 97959 Assamstadt, Germany

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by: Gavin Xu — Project Engineer

Reviewed by: Henry Lu — Team Leader

Approved by: Kevin Liang — Assistant Manager

Date: August 24, 2021

Version

Version No.	Date	Description
V1.0	August 24, 2021	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	ecom instruments GmbH
Address of Applicant:	Industriestrasse 2, 97959 Assamstadt, Germany
Manufacturer:	Pepperl+Fuchs SE
Address of Manufacturer:	Lilienthalstrasse 200, 68307 Mannheim, Germany

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Featurephone		
Model No.:	Ex-Handy 10		
Trade Mark:	ecom		
DUT Stage:	Production Unit		
EUT Supports Function:	GSM Bands:	GSM850/ PCS 1900	
	UTRA Bands:	Band II/ Band IV/ Band V	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 7/ Band 12/ Band 13/ Band 25/ Band 26/ Band 66/ Band 71	
		TDD Band 41	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth V4.2	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n
	NFC:	13.553 MHz to 13.567 MHz	
Sample Received Date:	May 12, 2021		
Sample Tested Date:	May 12, 2021 to June 10, 2021		

1.2.2 Description of Accessories

AC Adapter	
Model No.:	S008ACM0500200
Input:	100-240 V~50/60 Hz 300 mA
Output:	5.0 V ⎓ 2000 mA
Manufacturer:	TEN PAO INTERNATIONAL LTD.

Battery	
Model No.:	Ex-BP H10
Rated Voltage:	3.7 Vdc
Limited Charge Voltage:	4.14 Vdc
Rated Capacity:	4400 mAh
Manufacturer:	ecom instruments GmbH

Cable	
Connector:	USB Changing Cable
Cable Type:	Shielded without ferrite
Length:	1.20 Meter

Manufacturer:	Dongguan YongGu Electronics Prouduction Co., Ltd.

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA	
Type of Modulation:	GSM/GPRS:	GMSK
	EDGE:	GMSK, 8PSK
	WCDMA	BPSK
	HSDPA/DC-HSDPA:	QPSK
	HSUPA:	QPSK
	HSPA+:	16QAM
Frequency Range:	GSM/GPRS/EDGE 850:	824.2-848.8 MHz
	GSM/GPRS/EDGE 1900:	1850.2-1909.8 MHz
	WCDMA Band II:	1852.4-1907.6 MHz
	WCDMA Band IV:	1712.4-1752.6 MHz
	WCDMA Band V:	826.4-846.6 MHz
IMEI:	Radiation: 356248101018922	
	Conducted: 356248101028855	
Antenna Type:	Internal Antenna	
Antenna Gain:	GSM 850:	-3 dBi
	PCS 1900:	0 dBi
	WCDMA Band II:	0 dBi
	WCDMA Band IV:	0 dBi
	WCDMA Band V:	-3 dBi
GPRS/EDGE Class:	Class 12	
Normal Test Voltage:	3.7 Vdc	
Extreme Test Voltage:	3.5 to 4.2Vdc	
Extreme Test Temperature:	-10 °C to +45 °C	

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.30 Meter	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.6 TEST FACILITY

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 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

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 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

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	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated spurious emissions 30MHz-1GHz	± 4.9 dB
4	Radiated spurious emissions 1GHz-18GHz	± 4.8 dB
5	Radiated spurious emissions 18GHz-40GHz	± 5.1 dB
6	Occupied Bandwidth	± 1.86 %
7	DC Supply Voltages	± 0.68 %
8	Temperature	± 0.62 °C
9	Humidity	± 3.9 %
10	Conducted spurious emissions	± 2.7 dB
11	DC Supply Voltages	± 0.68 %
12	AC Supply Voltages	± 1.2 %
13	Radio Frequency	$\pm 6.5 \times 10^{-8}$
14	RF Power, Conducted	± 0.9 dB

2. TEST SUMMARY

FCC 47 CFR Part 22 Subpart H Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Note: 1) This report is based on the previous report that changed the baseband processor. The main difference is that the new baseband processor doesn't support CA. After the evaluation, the technical data is referred to previous report: no. R1901H0001-R5 dated July 5, 2019.			

FCC 47 CFR Part 24 Subpart E Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 24.232(d)	KDB 971168 D01v03r01	Verified (SEE Note 1)
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Note: 1) This report is based on the previous report that changed the baseband processor. The main difference is that the new baseband processor doesn't support CA. After the evaluation, the technical data is referred to previous report: no. R1901H0001-R6 dated July 5, 2019.			

FCC 47 CFR Part 27 Subpart L Test Cases			
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 C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03r01	Verified (SEE Note 1)
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI C63.26-2015 & KDB 971168 D01v03r01	Verified (SEE Note 1)

Note:

1) This report is based on the previous report that changed the baseband processor. The main difference is that the new baseband processor doesn't support CA. After the evaluation, the technical data is referred to previous report: no. R1901H0001-R7 dated July 5, 2019.

3. EQUIPMENT LIST

Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	3M SAC	ETS-LINDGREN	3M	N/A	Jan. 22, 2021	Jan. 21, 2024
☒	Receiver	R&S	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 14, 2020	Nov. 13, 2022
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 14, 2020	Nov. 13, 2022
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 14, 2020	Nov. 13, 2022
☒	Preamplifier	HP	8447F	2805A02960	Nov. 10, 2020	Nov. 9, 2021
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 30, 2021	Apr. 29, 2023
☒	Pre-amplifier	ETS-Lindgren	118385	00201874	Nov. 10, 2020	Nov. 9, 2021
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 14, 2020	Nov. 13, 2022
☒	Pre-amplifier	ETS-Lindgren	00118384	00202652	Nov. 17, 2020	Nov. 16, 2022
☒	Wideband Radio Communication Tester	R&S	CMW500	120932	Jul. 20, 2020	Jul. 19, 2021
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.7	20 to 75
TL/VL	-10	3.5	20 to 75
TH/VL	+45	3.5	20 to 75
TL/VH	-10	4.2	20 to 75
TH/VH	+45	4.2	20 to 75

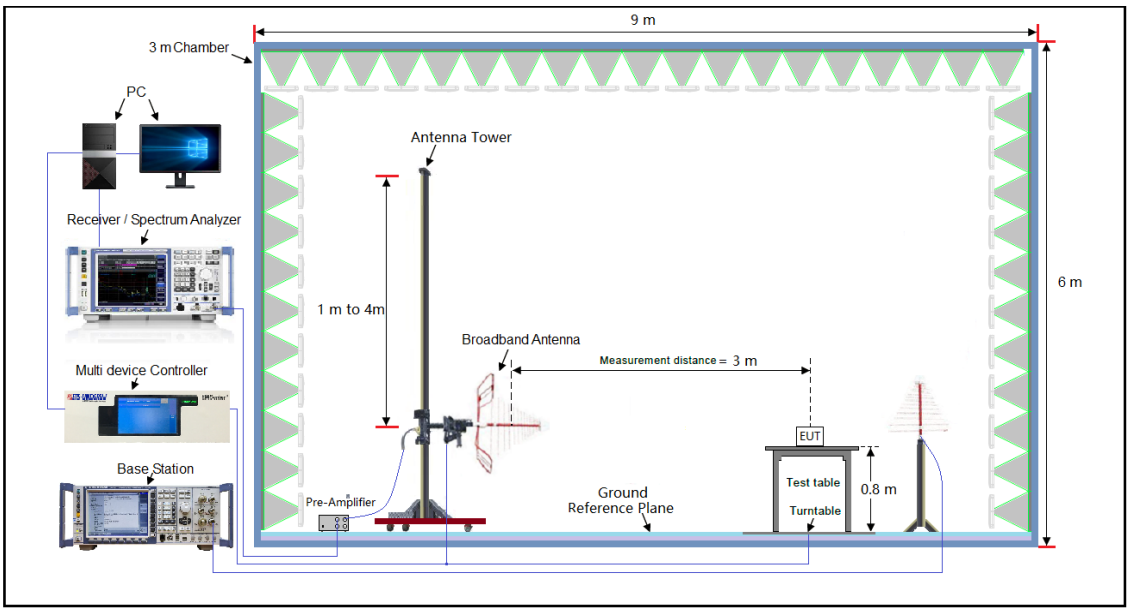
Remark:

1) The EUT just work in such extreme temperature of -10 °C to +45 °C and the extreme voltage of 3.5 V to 4.2 V, so here the EUT is tested in the temperature of -10 °C to +45 °C and the voltage of 3.5 V to 4.2 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.

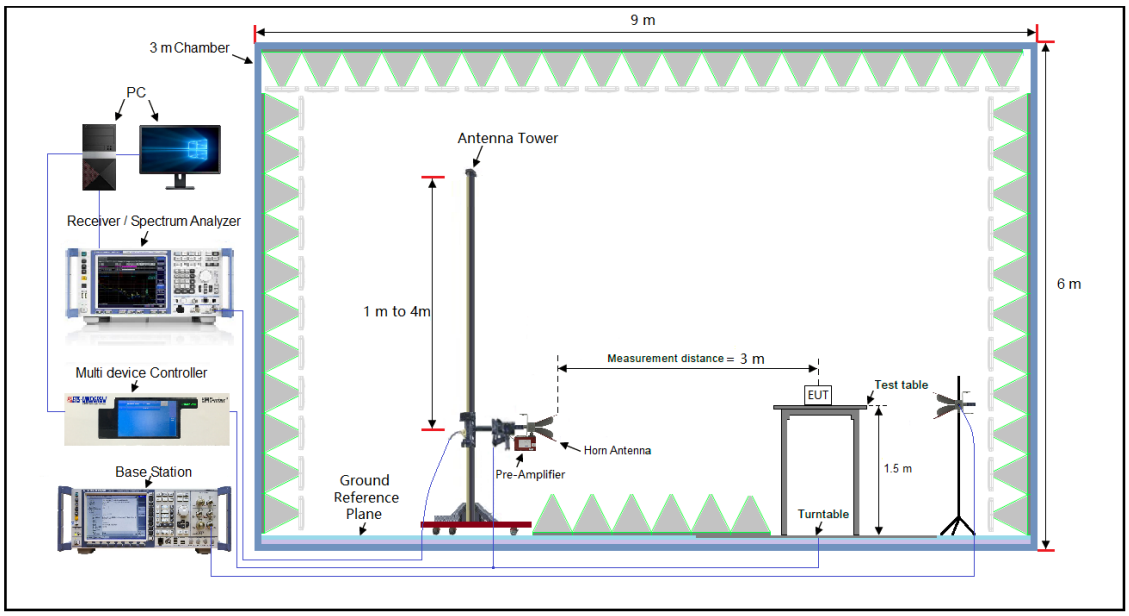
4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup

Radiated Emissions 30MHz to 1GHz Test setup

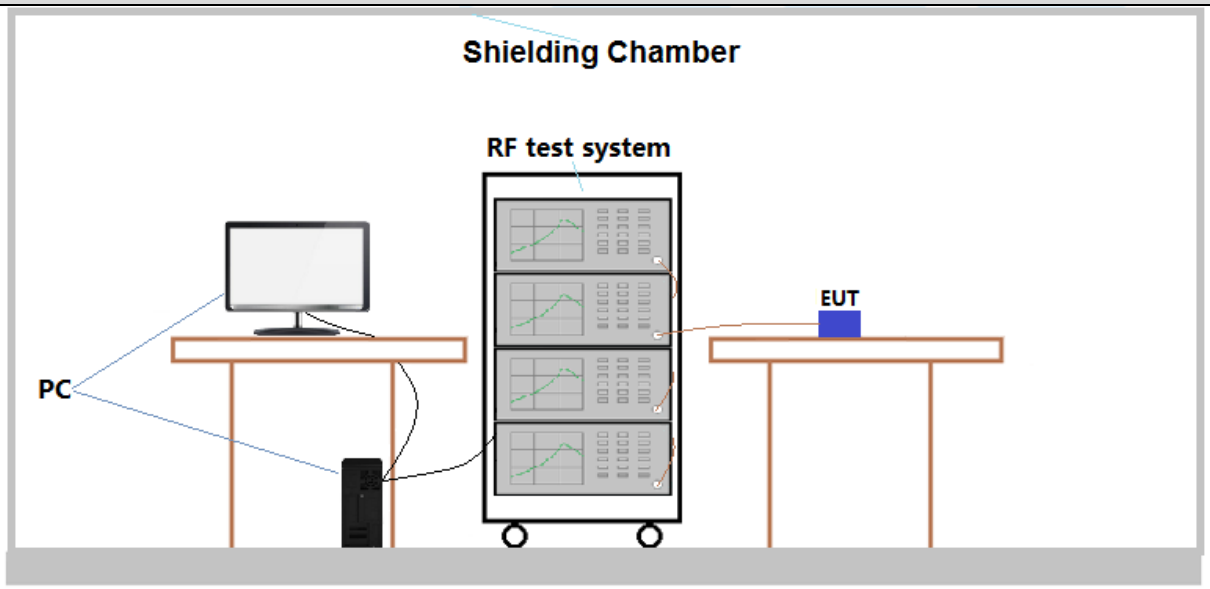


Radiated Emissions Above 1GHz Test setup

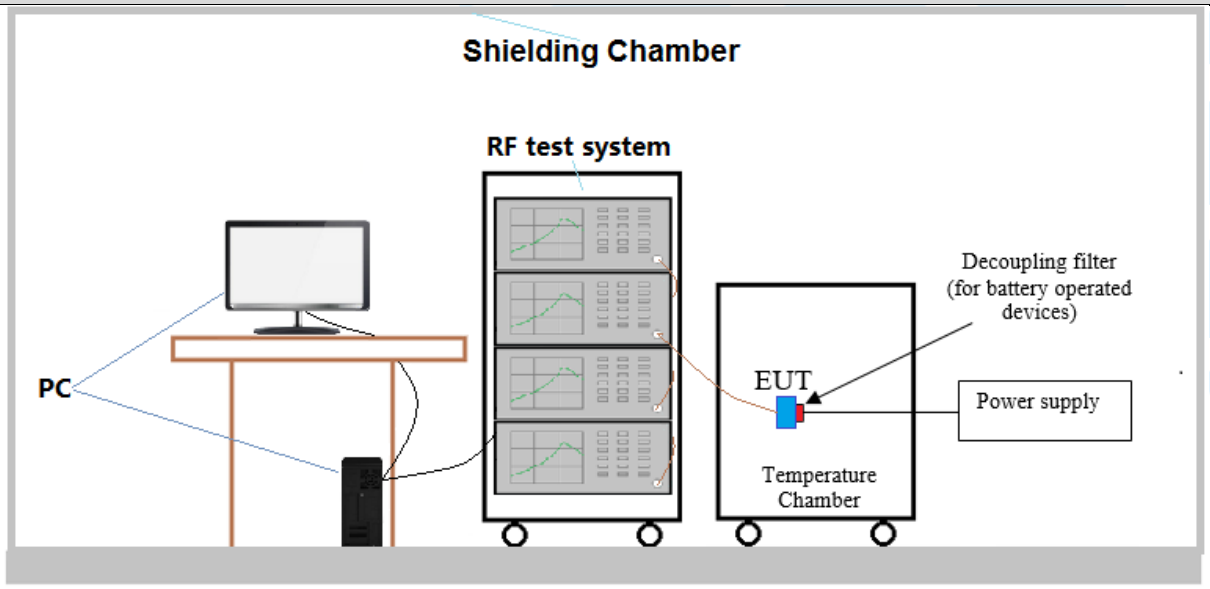


4.2.2 For Conducted RF test setup

Normal Environment



Extreme Environment



4.3 TEST CHANNELS

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/ EDGE850	Tx (824 MHz ~ 849 MHz)	Channel 128	Channel 190	Channel 251
		824.2 MHz	836.6 MHz	848.8 MHz
WCDMA band V	Tx (824 MHz ~ 849 MHz)	Channel 4132	Channel 4182	Channel 4233
		826.4 MHz	836.4 MHz	846.6 MHz

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/ EDGE1900	Tx (1850 MHz-1910 MHz)	Channel 512	Channel 661	Channel 810
		1850.2 MHz	1880.0 MHz	1909.8 MHz
WCDMA Band II	Tx (1850 MHz-1910 MHz)	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz

Bands	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 3.7Vdc battery. 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.
The worst case was found when positioned as the table below.

Bands	Mode	Antenna Port	Worst-case axis positioning
GSM 850	1TX	Chain 0	X axis
PCS 1900	1TX	Chain 0	X axis
WCDMA Band II	1TX	Chain 0	X axis
WCDMA Band IV	1TX	Chain 0	X axis
WCDMA Band V	1TX	Chain 0	X axis

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:
SIM 1 Card Conducted transmitter power measurement result.

GSM 850 Maximum Average Power (dBm)			
Channel	**128**	**190**	**251**
Frequency(MHz)	**824.2 MHz**	**836.6 MHz**	**848.8 MHz**
GSM (GMSK, 1Tx-slot)	32.86	32.58	32.35
GPRS (GMSK, 1Tx-slot)	**32.89**	32.61	32.41
GPRS (GMSK, 2Tx-slot)	32.58	32.28	32.02
GPRS (GMSK, 3Tx-slot)	29.68	29.98	29.56
GPRS (GMSK, 4Tx-slot)	26.91	26.80	26.83
EDGE (8PSK, 1Tx-slot)	27.38	27.21	27.08
EDGE (8PSK, 2Tx-slot)	24.09	23.88	23.69
EDGE (8PSK, 3Tx-slot)	21.78	21.58	21.48
EDGE (8PSK, 4Tx-slot)	20.83	20.46	20.30

PCS 1900 Maximum Average Power (dBm)			
Channel	**512**	**661**	**810**
Frequency(MHz)	**1850.2 MHz**	**1880.0 MHz**	**1909.8 MHz**
GSM (GMSK, 1Tx-slot)	29.49	29.67	29.70
GPRS (GMSK, 1Tx-slot)	29.54	**29.72**	29.71
GPRS (GMSK, 2Tx-slot)	29.39	29.56	29.57
GPRS (GMSK, 3Tx-slot)	29.18	29.42	29.41
GPRS (GMSK, 4Tx-slot)	28.97	29.16	29.17
EDGE (8PSK, 1Tx-slot)	25.84	25.91	25.89
EDGE (8PSK, 2Tx-slot)	25.68	25.70	25.72
EDGE (8PSK, 3Tx-slot)	25.41	25.47	25.44
EDGE (8PSK, 4Tx-slot)	25.19	25.20	25.13

WCDMA Band II Maximum Average Power (dBm)			
Channel	**9262**	**9400**	**9538**
Frequency(MHz)	**1852.4 MHz**	**1880.0 MHz**	**1907.6 MHz**
RMC 12.2kbps	23.25	**23.29**	23.01
HSDPA Subtest-1	22.47	22.56	22.41
HSDPA Subtest-2	22.06	22.15	22.01
HSDPA Subtest-3	22.08	22.11	21.98
HSDPA Subtest-4	22.07	22.21	21.97
HSUPA Subtest-1	22.54	22.66	22.40
HSUPA Subtest-2	22.08	22.16	21.91
HSUPA Subtest-3	22.57	22.64	22.41
HSUPA Subtest-4	22.58	22.63	22.32
HSUPA Subtest-5	22.60	22.59	22.41
DC-HSDPA Subtest-1	22.65	22.76	22.46
DC-HSDPA Subtest-2	22.63	22.66	22.68
DC-HSDPA Subtest-3	22.01	22.24	22.00
DC-HSDPA Subtest-4	22.15	22.22	21.95
HSPA+	22.71	22.65	22.14

WCDMA Band IV Maximum Average Power (dBm)			
Channel	**1312**	**1412**	**1513**
Frequency(MHz)	**1712.4 MHz**	**1732.4 MHz**	**1752.6 MHz**
RMC 12.2kbps	23.56	**23.60**	23.46
HSDPA Subtest-1	22.76	22.74	22.72
HSDPA Subtest-2	22.22	22.24	22.26
HSDPA Subtest-3	22.31	22.26	22.29
HSDPA Subtest-4	22.26	22.21	22.25
HSUPA Subtest-1	22.73	22.74	22.79
HSUPA Subtest-2	22.24	22.19	22.35
HSUPA Subtest-3	22.67	22.72	22.69
HSUPA Subtest-4	22.80	22.71	22.73
HSUPA Subtest-5	22.73	22.67	22.74
DC-HSDPA Subtest-1	22.53	22.67	22.39
DC-HSDPA Subtest-2	22.50	22.49	22.35
DC-HSDPA Subtest-3	21.80	22.06	21.94
DC-HSDPA Subtest-4	22.12	22.05	21.69
HSPA+	22.82	22.76	22.85

WCDMA Band V Maximum Average Power (dBm)			
Channel	**4132**	**4182**	**4233**
Frequency(MHz)	**826.4 MHz**	**836.4 MHz**	**846.6 MHz**
RMC 12.2kbps	**22.92**	22.85	22.82
HSDPA Subtest-1	22.08	22.03	22.11
HSDPA Subtest-2	21.76	21.56	21.60
HSDPA Subtest-3	21.80	21.62	21.54
HSDPA Subtest-4	21.45	21.56	21.61
HSUPA Subtest-1	22.22	22.10	22.05
HSUPA Subtest-2	21.61	21.56	21.53
HSUPA Subtest-3	22.30	22.12	22.08
HSUPA Subtest-4	22.12	22.08	22.12
HSUPA Subtest-5	22.17	22.14	22.09
DC-HSDPA Subtest-1	21.96	21.82	21.73
DC-HSDPA Subtest-2	21.28	21.75	21.91
DC-HSDPA Subtest-3	21.64	21.31	21.26
DC-HSDPA Subtest-4	21.32	21.20	21.30
HSPA+	22.41	22.32	22.19

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
GSM/GPRS/ EDGE 850/1900	1) GSM (GMSK, 1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link	1) GSM (GMSK,1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link
WCDMA Band II/IVV	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	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 22	Public Mobile Services
3	FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services
4	FCC 47 CFR Part 24	Personal Communications Services
5	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
6	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01

5.2 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a),
FCC 47 CFR Part 22.913(a),
FCC 47 CFR Part 24.232(c),
FCC 47 CFR Part 27.50(d)(4)

Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 22.913(a)

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC 47 CFR Part 24.232(c)

Mobile and portable stations are limited to 2 watts EIRP.

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 GSM, GPRS, EDGE, WCDMA, CDMA2000, 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: The full result refer to section 4.5 for details.

5.3 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: FCC 47 CFR Part 2.1053,
FCC 47 CFR Part 22.917(a)(b),
FCC 47 CFR Part 24.238(a)(b),
FCC 47 CFR Part 27.53(h)(1)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 7

Limits:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13 dBm.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

Below 1G

GSM 850							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
GPRS_ Lowest Channel							
1	89.787	-84.07	15.30	-68.77	-13.00	-55.77	Horizontal
2	412.539	-89.63	25.41	-64.22	-13.00	-51.22	Horizontal
3	527.571	-88.30	27.90	-60.40	-13.00	-47.40	Horizontal
4	89.787	-84.32	15.30	-69.02	-13.00	-56.02	Vertical
5	200.043	-88.25	17.93	-70.32	-13.00	-57.32	Vertical
6	698.804	-89.25	30.00	-59.25	-13.00	-46.25	Vertical
GPRS_ Middle Channel							
1	89.787	-84.37	15.30	-69.07	-13.00	-56.07	Horizontal
2	478.139	-89.00	26.53	-62.47	-13.00	-49.47	Horizontal
3	684.226	-88.50	30.82	-57.68	-13.00	-44.68	Horizontal
4	89.787	-84.11	15.30	-68.81	-13.00	-55.81	Vertical
5	531.291	-89.33	27.92	-61.41	-13.00	-48.41	Vertical
6	684.226	-88.75	29.22	-59.53	-13.00	-46.53	Vertical
GPRS_ Highest Channel							
1	89.787	-84.34	15.30	-69.04	-13.00	-56.04	Horizontal
2	471.467	-88.99	26.39	-62.60	-13.00	-49.60	Horizontal
3	693.910	-88.85	31.03	-57.82	-13.00	-44.82	Horizontal
4	89.787	-84.39	15.30	-69.09	-13.00	-56.09	Vertical
5	481.511	-88.81	26.78	-62.03	-13.00	-49.03	Vertical
6	744.427	-88.12	29.38	-58.74	-13.00	-45.74	Vertical

PCS 1900							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
GPRS_ Lowest Channel							
1	204.305	-70.33	-10.32	-80.65	-13.00	-67.65	Horizontal
2	223.848	-69.55	-9.44	-78.99	-13.00	-65.99	Horizontal
3	945.334	-80.83	4.91	-75.92	-13.00	-62.92	Horizontal
4	76.926	-64.72	-14.25	-78.97	-13.00	-65.97	Vertical
5	97.002	-65.68	-12.98	-78.66	-13.00	-65.66	Vertical
6	815.635	-80.28	2.04	-78.24	-13.00	-65.24	Vertical
GPRS_ Middle Channel							
1	624.490	-80.54	0.21	-80.33	-13.00	-67.33	Horizontal
2	787.475	-81.15	2.18	-78.97	-13.00	-65.97	Horizontal
3	945.334	-81.68	4.91	-76.77	-13.00	-63.77	Horizontal
4	54.517	-64.87	-14.92	-79.79	-13.00	-66.79	Vertical
5	74.793	-64.23	-14.32	-78.55	-13.00	-65.55	Vertical
6	97.002	-65.11	-12.98	-78.09	-13.00	-65.09	Vertical
GPRS_ Highest Channel							
1	708.694	-81.32	1.54	-79.78	-13.00	-66.78	Horizontal
2	809.924	-81.24	2.42	-78.82	-13.00	-65.82	Horizontal
3	958.714	-81.38	4.90	-76.48	-13.00	-63.48	Horizontal
4	55.288	-64.96	-14.91	-79.87	-13.00	-66.87	Vertical
5	74.793	-64.33	-14.32	-78.65	-13.00	-65.65	Vertical
6	93.653	-65.49	-13.24	-78.73	-13.00	-65.73	Vertical

WCDMA Band II							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps_ Lowest Channel							
1	346.074	-80.57	-5.04	-85.61	-13.00	-72.61	Horizontal
2	698.804	-80.87	1.71	-79.16	-13.00	-66.16	Horizontal
3	912.695	-81.12	3.92	-77.20	-13.00	-64.20	Horizontal
4	74.793	-64.43	-14.32	-78.75	-13.00	-65.75	Vertical
5	96.323	-65.02	-13.04	-78.06	-13.00	-65.06	Vertical
6	952.000	-80.97	3.58	-77.39	-13.00	-64.39	Vertical
RMC 12.2kbps_ Middle Channel							
1	703.731	-80.87	1.65	-79.22	-13.00	-66.22	Horizontal
2	798.620	-81.07	2.43	-78.64	-13.00	-65.64	Horizontal
3	972.283	-81.81	4.62	-77.19	-13.00	-64.19	Horizontal
4	74.793	-64.79	-14.32	-79.11	-13.00	-66.11	Vertical
5	97.002	-65.40	-12.98	-78.38	-13.00	-65.38	Vertical
6	844.803	-81.01	2.13	-78.88	-13.00	-65.88	Vertical
RMC 12.2kbps_ Highest Channel							
1	689.051	-80.67	1.49	-79.18	-13.00	-66.18	Horizontal
2	781.961	-80.57	2.05	-78.52	-13.00	-65.52	Horizontal
3	932.141	-82.14	4.46	-77.68	-13.00	-64.68	Horizontal
4	73.750	-64.10	-14.36	-78.46	-13.00	-65.46	Vertical
5	79.676	-65.08	-14.16	-79.24	-13.00	-66.24	Vertical
6	97.002	-65.95	-12.98	-78.93	-13.00	-65.93	Vertical

WCDMA Band IV							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps_ Lowest Channel							
1	594.514	-80.27	-0.53	-80.80	-13.00	-67.80	Horizontal
2	793.028	-80.99	2.31	-78.68	-13.00	-65.68	Horizontal
3	952.000	-82.35	5.03	-77.32	-13.00	-64.32	Horizontal
4	73.750	-62.97	-14.36	-77.33	-13.00	-64.33	Vertical
5	94.979	-66.29	-13.15	-79.44	-13.00	-66.44	Vertical
6	912.695	-80.33	3.47	-76.86	-13.00	-63.86	Vertical
RMC 12.2kbps_ Middle Channel							
1	602.929	-80.83	-0.16	-80.99	-13.00	-67.99	Horizontal
2	765.648	-80.41	1.69	-78.72	-13.00	-65.72	Horizontal
3	979.139	-81.34	4.57	-76.77	-13.00	-63.77	Horizontal
4	71.705	-64.36	-14.43	-78.79	-13.00	-65.79	Vertical
5	97.002	-65.51	-12.98	-78.49	-13.00	-65.49	Vertical
6	919.132	-80.94	3.55	-77.39	-13.00	-64.39	Vertical
RMC 12.2kbps_ Highest Channel							
1	401.105	-80.61	-3.33	-83.94	-13.00	-70.94	Horizontal
2	689.051	-81.29	1.49	-79.80	-13.00	-66.80	Horizontal
3	958.714	-82.35	4.90	-77.45	-13.00	-64.45	Horizontal
4	71.203	-64.46	-14.44	-78.90	-13.00	-65.90	Vertical
5	97.002	-65.21	-12.98	-78.19	-13.00	-65.19	Vertical
6	698.804	-79.60	0.57	-79.03	-13.00	-66.03	Vertical

WCDMA Band V							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
RMC 12.2kbps_ Lowest Channel							
1	89.787	-84.61	15.30	-69.31	-13.00	-56.31	Horizontal
2	403.934	-89.28	25.47	-63.81	-13.00	-50.81	Horizontal
3	633.328	-88.31	29.69	-58.62	-13.00	-45.62	Horizontal
4	89.787	-84.91	15.30	-69.61	-13.00	-56.61	Vertical
5	427.292	-89.87	25.88	-63.99	-13.00	-50.99	Vertical
6	569.969	-89.39	28.70	-60.69	-13.00	-47.69	Vertical
RMC 12.2kbps_ Middle Channel							
1	89.787	-84.30	15.30	-69.00	-13.00	-56.00	Horizontal
2	448.836	-88.85	25.66	-63.19	-13.00	-50.19	Horizontal
3	538.811	-88.80	27.87	-60.93	-13.00	-47.93	Horizontal
4	91.700	-85.24	15.44	-69.80	-13.00	-56.80	Vertical
5	348.514	-89.08	23.47	-65.61	-13.00	-52.61	Vertical
6	502.247	-87.89	27.29	-60.60	-13.00	-47.60	Vertical
RMC 12.2kbps_ Highest Channel							
1	89.787	-85.26	15.30	-69.96	-13.00	-56.96	Horizontal
2	406.782	-89.66	25.45	-64.21	-13.00	-51.21	Horizontal
3	703.731	-87.24	31.08	-56.16	-13.00	-43.16	Horizontal
4	89.787	-84.49	15.30	-69.19	-13.00	-56.19	Vertical
5	550.290	-88.91	28.27	-60.64	-13.00	-47.64	Vertical
6	723.793	-88.06	29.82	-58.24	-13.00	-45.24	Vertical

Above 1G

GSM 850							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
GPRS_ Lowest Channel							
1	1648.400	-58.13	0.40	-57.73	-13.00	-44.73	Horizontal
2	2472.600	-63.85	3.13	-60.72	-13.00	-47.72	Horizontal
3	1648.400	-59.62	-0.38	-60.00	-13.00	-47.00	Vertical
4	2472.600	-64.33	2.73	-61.60	-13.00	-48.60	Vertical
GPRS_ Middle Channel							
1	1673.200	-63.13	0.56	-62.57	-13.00	-49.57	Horizontal
2	2509.800	-64.48	3.22	-61.26	-13.00	-48.26	Horizontal
3	1673.200	-61.56	-0.20	-61.76	-13.00	-48.76	Vertical
4	2509.800	-64.21	2.81	-61.40	-13.00	-48.40	Vertical
GPRS_ Highest Channel							
1	1697.600	-64.31	0.72	-63.59	-13.00	-50.59	Horizontal
2	2546.400	-65.46	3.34	-62.12	-13.00	-49.12	Horizontal
3	1697.600	-61.98	-0.02	-62.00	-13.00	-49.00	Vertical
4	2546.400	-65.33	2.91	-62.42	-13.00	-49.42	Vertical

PCS 1900							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
GPRS_ Lowest Channel							
1	3700.400	-63.24	7.14	-56.10	-13.00	-43.10	Horizontal
2	5550.600	-65.50	11.16	-54.34	-13.00	-41.34	Horizontal
3	3700.400	-63.99	7.12	-56.87	-13.00	-43.87	Vertical
4	5550.600	-65.66	11.65	-54.01	-13.00	-41.01	Vertical
GPRS_ Middle Channel							
1	3760.000	-64.42	7.28	-57.14	-13.00	-44.14	Horizontal
2	5640.000	-64.11	11.11	-53.00	-13.00	-40.00	Horizontal
3	3760.000	-64.27	7.28	-56.99	-13.00	-43.99	Vertical
4	5640.000	-65.07	11.59	-53.48	-13.00	-40.48	Vertical
GPRS_ Highest Channel							
1	3819.600	-64.02	7.42	-56.60	-13.00	-43.60	Horizontal
2	5729.400	-64.52	11.08	-53.44	-13.00	-40.44	Horizontal
3	3819.600	-63.93	7.45	-56.48	-13.00	-43.48	Vertical
4	5729.400	-64.99	11.53	-53.46	-13.00	-40.46	Vertical

WCDMA Band II							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps_ Lowest Channel							
1	3704.800	-61.21	7.14	-54.07	-13.00	-41.07	Horizontal
2	5557.200	-64.58	11.15	-53.43	-13.00	-40.43	Horizontal
3	3704.800	-60.39	7.12	-53.27	-13.00	-40.27	Vertical
4	5557.200	-64.19	11.64	-52.55	-13.00	-39.55	Vertical
RMC 12.2kbps_ Middle Channel							
1	3760.000	-59.97	7.28	-52.69	-13.00	-39.69	Horizontal
2	5640.000	-62.73	11.11	-51.62	-13.00	-38.62	Horizontal
3	3760.000	-64.25	7.28	-56.97	-13.00	-43.97	Vertical
4	5640.000	-65.13	11.59	-53.54	-13.00	-40.54	Vertical
RMC 12.2kbps_ Highest Channel							
1	3815.200	-55.89	7.41	-48.48	-13.00	-35.48	Horizontal
2	5722.800	-60.13	11.08	-49.05	-13.00	-36.05	Horizontal
3	3815.200	-60.72	7.44	-53.28	-13.00	-40.28	Vertical
4	5722.800	-58.65	11.53	-47.12	-13.00	-34.12	Vertical

WCDMA Band IV							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps_ Lowest Channel							
1	3424.800	-62.13	6.30	-55.83	-13.00	-42.83	Horizontal
2	5137.200	-65.29	9.47	-55.82	-13.00	-42.82	Horizontal
3	3424.800	-58.39	6.09	-52.30	-13.00	-39.30	Vertical
4	5137.200	-65.53	9.82	-55.71	-13.00	-42.71	Vertical
RMC 12.2kbps_ Middle Channel							
1	3464.800	-61.63	6.43	-55.20	-13.00	-42.20	Horizontal
2	5197.200	-65.43	9.66	-55.77	-13.00	-42.77	Horizontal
3	3464.800	-62.94	6.28	-56.66	-13.00	-43.66	Vertical
4	5197.200	-66.31	10.04	-56.27	-13.00	-43.27	Vertical
RMC 12.2kbps_ Highest Channel							
1	3505.200	-59.69	6.56	-53.13	-13.00	-40.13	Horizontal
2	5257.800	-64.48	9.96	-54.52	-13.00	-41.52	Horizontal
3	3505.200	-59.66	6.47	-53.19	-13.00	-40.19	Vertical
4	5257.800	-65.62	10.36	-55.26	-13.00	-42.26	Vertical

WCDMA Band V							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps_ Lowest Channel							
1	1652.800	-63.36	0.43	-62.93	-13.00	-49.93	Horizontal
2	2479.200	-64.24	3.14	-61.10	-13.00	-48.10	Horizontal
3	1652.800	-63.22	-0.35	-63.57	-13.00	-50.57	Vertical
4	2479.200	-64.15	2.74	-61.41	-13.00	-48.41	Vertical
RMC 12.2kbps_ Middle Channel							
1	1672.800	-63.43	0.56	-62.87	-13.00	-49.87	Horizontal
2	2509.200	-65.13	3.22	-61.91	-13.00	-48.91	Horizontal
3	1672.800	-63.23	-0.20	-63.43	-13.00	-50.43	Vertical
4	2509.200	-63.86	2.81	-61.05	-13.00	-48.05	Vertical
RMC 12.2kbps_ Highest Channel							
1	1693.200	-62.76	0.70	-62.06	-13.00	-49.06	Horizontal
2	2539.800	-65.71	3.32	-62.39	-13.00	-49.39	Horizontal
3	1693.200	-62.10	-0.05	-62.15	-13.00	-49.15	Vertical
4	2539.800	-65.47	2.89	-62.58	-13.00	-49.58	Vertical

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

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 ***
