

TEST REPORT

Report Number: 140623027SZN-001

Application
for
Original Grant
of 47 CFR Part 22 and Part 24 Certification

WCDMA Digital Mobile Phone

FCC ID: QISY221-U33

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July 13, 2014

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TRF No.: FCC 22H&24E_b

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GENERAL INFORMATION

Applicant Name:	Huawei Technologies Co.,Ltd
Applicant Address:	Bantian, Longgang District, Shenzhen, China
FCC Specification Standard:	FCC Part 22: 2013 FCC Part 24: 2013
FCC ID:	QISY221-U33
FCC Model(s):	HUAWEI Y221-U33
Type of EUT:	WCDMA/HSDPA/HSUPA/HSPA+/GSM/GPRS /EDGE Digital Mobile Phone with Bluetooth and WiFi
Description of EUT:	WCDMA Digital Mobile Phone
Serial Number:	J7TBBA451300297
Sample Receipt Date:	June 23, 2014
Date of Test:	June 29, 2014 ~ July 13, 2014
Report Date:	July 13, 2014
Environmental Conditions:	Temperature: 25 ± 10°C Humidity: 10 to 90%

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List of Exhibits

Exhibit Type	File Description	Filename
Test Report	Test Report	report.pdf
Operational Description	Technical Description	descri.pdf
Test Report	Bandwidth Plot	bw.pdf
Test Report	Spurious Emissions	cspurious.pdf
Test Report	Bandedge Plot	be.pdf
RF Exposure Info	SAR Report	sar report. pdf
External Photos	External Photo	external photos.pdf
Internal Photos	Internal Photo	internal photos.pdf
ID Label/Location Info	Label Artwork and Location	label.pdf
Cover Letter	Label Location Justification	justification.pdf
Block Diagrams	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
User Manual	User Manual	manual.pdf
Part List/Tune Up Info	Tune Up Procedure	tuneup.pdf
Part List/Tune Up Info	Part List	partlist.pdf
Cover Letter	Letter of Agency	letter of agency.pdf
Cover Letter	Confidentiality Request	request.pdf

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1.0 Summary of Test Results

Test Items	FCC Section	Results	Details see section
Channels for Cellular and Broadband PCS Services	22.905 24.229	Pass	4.1
RF Output Power	2.1046 22.913 24.232	Pass	4.3
Occupied Bandwidth	2.1049	Pass	4.4
Spurious Emissions at Antenna Terminals	2.1051 2.1057 22.917 24.238	Pass	4.5
Power of Spurious Emissions	2.1053 2.1057 22.917 24.238	Pass	4.6
Blockage at antenna terminal	22.917 24.238	Pass	4.7
Frequency Stability	2.1055 22.355 24.235	Pass	4.8
RF Exposure	1.1307 2.1093	Pass	4.9

1.1 Statement of Compliance

The equipment under test is found to be complying with the applicable requirements of following standards:

FCC Part 22: 2013

FCC Part 24: 2013

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2.0 General Description

2.1 Product Description

The HUAWEI Y221-U33 is a WCDMA Digital Mobile Phone.

The Cellular radiotelephone service and personal communications services frequency ranges of the EUT are as below:

GSM/GPRS/EDGE 850MHz:

Tx: 824.20 - 848.80MHz (at intervals of 200kHz)

Rx: 869.20 - 893.80MHz (at intervals of 200kHz)

GSM/GPRS/EGPRS 1900MHz:

Tx: 1850.20 - 1909.80MHz (at intervals of 200kHz)

Rx: 1930.20 - 1989.80MHz (at intervals of 200kHz)

WCDMA/HSDPA/HSUPA 850MHz:

Tx: 826.40 - 846.60MHz (at intervals of 200kHz) & 826.50 – 842.50MHz (at intervals of 5MHz)

Rx: 871.40 - 891.60MHz (at intervals of 200kHz) & 871.50 – 887.50MHz (at intervals of 5MHz)

WCDMA/HSDPA/HSUPA 1900MHz:

Tx: 1852.40 – 1907.60MHz (at intervals of 200kHz) & 1852.50 – 1907.50 (at intervals of 5MHz)

Rx: 1832.40 – 1987.60MHz (at intervals of 200kHz) & 1832.50 – 1987.50 (at intervals of 5MHz)

The EUT is powered by Lithium type rechargeable battery pack.

The antenna used in the EUT is integral, and the test sample is a prototype.

The circuit description is attached and saved with filename: descri.pdf.

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2.3 Test Methodology

Preliminary radiated scans and all radiated measurements were performed in semi-anechoic chamber. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. All measurements were made in accordance with the procedures in 47 CFR Part 2, Part 22, Part 24 and TIA-603-C.

2.4 Test Facility

The facilities used to collect the radiated data and conducted data are in **Interterk Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

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3.0 System Test Configuration

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was controlled by communication tester to produce maximum power. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered separately by the fully charged Lithium batteries of types listed in report page 6 respectively and all the accessories were considered, only the worst case was reported.

For the measurements, the EUT is attached to a plastic stand if necessary and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational to simulate typical use.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna polarization are varied during the search for maximum signal level. Only the worst-case polarization is reported. For each spurious, raise and lower the test antenna from 1m to 4m to obtain a maximum reading on the spectrum analyzer. Radiated emissions are taken at three meters. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

The power level of EUT is set by the communication tester are the maximum power levels emitted by the EUT.

For the 850MHz band, according to 22.917, compliance with the rule is based on the use of instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter is employed. The 26dB emission bandwidth taken in section 4.4 is used for calculating the resolution bandwidth.

For the 1900MHz band, according to 24.238, compliance with the rule is based on the use of instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter is employed. The 26dB emission bandwidth taken in section 4.4 is used for calculating the resolution bandwidth.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion are measured, and the limit are according to FCC Part 15 Section 15.109.

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3.1 Justification - Cont'd

Detector function for radiated emissions is in peak mode.

All relevant operation modes have been tested, and the worst case data is included in this report.

Simultaneous transmission (Bluetooth and WiFi in this case) was investigated and no new emissions were found.

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3.2 Details of EUT Accessories

Description	Manufacturer	Model No.
Earphone	Goertek	HA1-3
	Quancheng	1293#+3283#3.5MM-150
	Lianchuang	MEMD1532B528000
USB Cable	/	Shielded 100 cm
Battery	BYD	HB5N1
	COSLIGHT	
	SCUD	HB5N1H
	SDDG	
AC/DC Adapter (Huawei)	BYD / HuntKey	HW-050055U1W Input: 100-240Vac, 50/60Hz, 0.2A; Output: 5Vdc, 550mA
	BYD /UE	HW-050055A1W Input: 100-240Vac, 50/60Hz, 0.2A; Output: 5Vdc, 550mA
	BYD /UE	HW-050055R1W Input: 100-240Vac, 50/60Hz, 0.2A; Output: 5Vdc, 550mA
	BYD / HuntKey	HW-050055E1W Input: 100-240Vac, 50/60Hz, 0.2A; Output: 5Vdc, 550mA
	BYD / HuntKey	HW-050055B1W Input: 100-240Vac, 50/60Hz, 0.2A; Output: 5Vdc, 550mA

3.3 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

3.4 Equipment Modification

Any modifications installed previous to testing by Huawei Technologies Co.,Ltd will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

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4.0 Test Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). Configuration photographs and data tables of the emissions are included.

4.1 Channels for Cellular and Broadband PCS Services (FCC Part 22.905, Part 24.229)

The following frequency bands are allocated for assignment to service providers in the Cellular Radiotelephone and Broadband PCS Services by FCC:

850MHz band

(a) Channel Block A:

869 - 880 MHz paired with 824 - 835 MHz

890 - 891.5 MHz paired with 845 - 846.5 MHz

(b) Channel Block B:

880 - 890 MHz paired with 835 - 845 MHz

891.5 - 894 MHz paired with 846 - 849 MHz

1900MHz band

The following frequency blocks are available for assignment on a Major Trading Areas (MTA) basis:

Block A: 1850 - 1865 MHz paired with 1930 - 1945 MHz; and

Block B: 1870 - 1885 MHz paired with 1950 - 1965 MHz.

The following frequency blocks are available for assignment on a Basic Trading Areas (BTA) basis:

Block C: 1895 - 1910 MHz paired with 1975 - 1990 MHz

Block D: 1865 - 1870 MHz paired with 1945 - 1950 MHz

Block E: 1885 - 1890 MHz paired with 1965 - 1970 MHz

Block F: 1890 - 1895 MHz paired with 1970 - 1975 MHz

The frequency range of the EUT is as below:

GSM/GPRS/EDGE 850MHz:

Tx: 824.20 - 848.80MHz (at intervals of 200kHz)

Rx: 869.20 - 893.80MHz (at intervals of 200kHz)

GSM/GPRS/EGPRS 1900MHz:

Tx: 1850.20 - 1909.80MHz (at intervals of 200kHz)

Rx: 1930.20 - 1989.80MHz (at intervals of 200kHz)

WCDMA/HSDPA/HSUPA 850MHz:

Tx: 826.40 - 846.60MHz (at intervals of 200kHz) & 826.50 – 842.50MHz (at intervals of 5MHz)

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Rx: 871.40 - 891.60MHz (at intervals of 200kHz) & 871.50 – 887.50MHz (at intervals of 5MHz)

WCDMA/HSDPA/HSUPA 1900MHz:

Tx: 1852.40 – 1907.60MHz (at intervals of 200kHz) & 1852.50 – 1907.50 (at intervals of 5MHz)

Rx: 1832.40 – 1987.60MHz (at intervals of 200kHz) & 1832.50 – 1987.50 (at intervals of 5MHz)

As a result, the frequency range of the EUT fits into the allocated frequency blocks.

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4.2 RF Power Output (FCC Part 2.1046, 22.913 & 24.232)

The RF power output is measured at the RF output terminal. The limit is as follows:

Part 22.913 (for 850MHz band):

[] ≤ 500W ERP (57dBm) for base stations and cellular repeaters

[√] ≤ 7W ERP (38.5dBm) for mobile and auxiliary test transmitters

Part 24.232 (for 1900MHz band):

[] ≤ 1640W e.i.r.p. (62.1dBm) for base stations up to 300m HAAT;

[√] ≤ 2W e.i.r.p. (33dBm) peak output power for portable mobile

Test results:

Band	ARFCN	Frequency (MHz)	Antenna Gain (dBi)	Measured output power (dBm)	*ERP (dBm)	Limit (dBm)	Verdict
GSM 850MHz	190	836.6	-3.6	31.5	25.8	38.5	Pass
GPRS 850MHz	190	836.6	-3.6	31.4	25.7	38.5	Pass
EGPRS 850MHz	190	836.6	-3.6	31.5	25.8	38.5	Pass
WCDMA 850MHz	4183	836.6	-3.8	25.8	19.9	38.5	Pass
HSDPA 850MHz	4183	836.6	-3.8	25.8	19.9	38.5	Pass
HSUPA 850MHz	4183	836.6	-3.8	24.4	18.5	38.5	Pass

Band	ARFCN	Frequency (MHz)	Antenna Gain (dBi)	Measured output power (dBm)	#EIRP (dBm)	Limit (dBm)	Verdict
GSM 1900MHz	661	1880.0	-2.5	29.4	26.9	33.0	Pass
GPRS 1900MHz	661	1880.0	-2.5	29.4	26.9	33.0	Pass
EGPRS 1900MHz	661	1880.0	-2.5	29.0	26.5	33.0	Pass
WCDMA 1900MHz	9400	1880.0	-3.5	25.3	21.8	33.0	Pass
HSDPA 1900MHz	9400	1880.0	-3.5	25.2	21.7	33.0	Pass
HSUPA 1900MHz	9400	1880.0	-3.5	23.9	20.4	33.0	Pass

*ERP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi) - 2.15dB

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#EIRP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi)

Remark: PK detector was used for output power measurement.

The PAR of the transmission for GSM is 9.3.

The PAR of the transmission for WCDMA is 9.4.

RBW: 1MHz and VBW: 3MHz were used when testing the GSM mode.

RBW: 10MHz and VBW: 10MHz were used when testing the WCDMA mode.

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4.3 Occupied Bandwidth (FCC Part 2.1049)

From 2.1049, occupied bandwidth is defined as the measured spectral width of an emission. The measurement determines occupied bandwidth as the difference between upper and lower frequencies where 0.5% of the emission power is above the upper frequency and 0.5% of the emission power is below the lower frequency.

The 26dB bandwidth is also recorded to determine the resolution bandwidth used in measurements, as specified in 22.917 and 24.238.

Test results:

Band	ARFCN	Frequency (MHz)	99% Bandwidth (kHz)	26dB Bandwidth (kHz)
GSM 850MHz	190	836.6	246	320
GPRS 850MHz	190	836.6	248	320
EGPRS 850MHz	190	836.6	242	314
GSM 1900MHz	661	1880.0	246	314
GPRS 1900MHz	661	1880.0	246	322
EGPRS 1900MHz	661	1880.0	246	316
WCDMA 850MHz	4183	836.6	4160	4700
HSDPA 850MHz	4183	836.6	4180	4700
HSUPA 850MHz	4183	836.6	4160	4700
WCDMA 1900MHz	9400	1880.0	4180	4720
HSDPA 1900MHz	9400	1880.0	4180	4720
HSUPA 1900MHz	9400	1880.0	4180	4720

The plots of 99% and 26dB bandwidth are saved in the file bw.pdf.

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4.4 Spurious Emissions at Antenna Terminals (FCC Part 2.1051, 2.1057, 22.917, 24.238)

The conducted spurious emissions are measured from 9kHz up to the 10th harmonic of fundamental emission.

According to 22.917 and 24.238, 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, i.e. at or below -13dBm.

Test results:

Band	ARFCN	Frequency (MHz)	Verdict
GSM 850MHz	190	836.6	Pass
GSM 1900MHz	661	1880.0	Pass
GPRS 850MHz	190	836.6	Pass
GPRS 1900MHz	661	1880.0	Pass
EGPRS 850MHz	190	836.6	Pass
EGPRS 1900MHz	661	1880.0	Pass
WCDMA 850MHz	4183	836.6	Pass
WCDMA 1900MHz	9400	1880.0	Pass
HSDPA 850MHz	4183	836.6	Pass
HSDPA 1900MHz	9400	1880.0	Pass
HSUPA 850MHz	4183	836.6	Pass
HSUPA 1900MHz	9400	1880.0	Pass

The plots are saved in the file cspurious.pdf.

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4.5 Power of Spurious Emissions (FCC Part 2.1053, 2.1057, 22.917, 24.238)

The radiated spurious emissions are tested per TIA/EIA-603 using the Substitution Method and measured from 9KHz up to the 10th harmonic of fundamental emission.

According to 22.917 and 24.238, 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, i.e. at or below -13dBm.

Test results:

GSM 850MHz (ARFCN = 190, Channel frequency = 836.6MHz):

Polarization	Frequency (MHz)	Measured ERP (dBm)	Limit ERP (dBm)	Margin (dB)
H	1673.2	-37.2	-13	-24.2
H	2509.8	-47.1	-13	-34.1

GPRS 850MHz (ARFCN = 190, Channel frequency = 836.6MHz):

Polarization	Frequency (MHz)	Measured ERP (dBm)	Limit ERP (dBm)	Margin (dB)
H	1673.2	-38.5	-13	-25.5
H	2509.8	-48.7	-13	-35.7

EGPRS 850MHz (ARFCN = 190, Channel frequency = 836.6MHz):

Polarization	Frequency (MHz)	Measured ERP (dBm)	Limit ERP (dBm)	Margin (dB)
H	1673.2	-38.2	-13	-25.2
H	2509.8	-49.0	-13	-36.0

GSM 1900MHz (ARFCN = 661, Channel frequency = 1880.0MHz):

Polarization	Frequency (MHz)	Calculated EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)
H	3760	-47.4	-13	-34.4
H	5640	-43.8	-13	-30.8

GPRS 1900MHz (ARFCN = 661, Channel frequency = 1880.0MHz):

Polarization	Frequency (MHz)	Calculated EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)
H	3760	-48.1	-13	-35.1
H	5640	-44.5	-13	-31.5

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EGPRS 1900MHz (ARFCN = 661, Channel frequency = 1880.0MHz):

Polarization	Frequency (MHz)	*Calculated EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)
H	3760	-47.4	-13	-34.4
H	5640	-43.9	-13	-30.9

WCDMA 850MHz (ARFCN = 4183, Channel frequency = 836.6MHz):

Polarization	Frequency (MHz)	Measured ERP (dBm)	Limit ERP (dBm)	Margin (dB)
H	1673.2	-38.7	-13	-25.7
H	2509.8	-48.1	-13	-35.1

HSDPA 850MHz (ARFCN = 4183, Channel frequency = 836.6MHz):

Polarization	Frequency (MHz)	Measured ERP (dBm)	Limit ERP (dBm)	Margin (dB)
H	1673.2	-39.7	-13	-26.7
H	2509.8	-48.1	-13	-35.1

HSUPA 850MHz (ARFCN = 4183, Channel frequency = 836.6MHz):

Polarization	Frequency (MHz)	Measured ERP (dBm)	Limit ERP (dBm)	Margin (dB)
H	1673.2	-39.4	-13	-26.4
H	2509.8	-48.6	-13	-35.6

WCDMA 1900MHz (ARFCN = 9400, Channel frequency = 1880.0MHz):

Polarization	Frequency (MHz)	*Calculated EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)
H	3760	-48.6	-13	-35.6
H	5640	-44.2	-13	-31.2

HSDPA 1900MHz (ARFCN = 9400, Channel frequency = 1880.0MHz):

Polarization	Frequency (MHz)	*Calculated EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)
H	3760	-48.1	-13	-35.1
H	5640	-44.5	-13	-31.5

HSUPA 1900MHz (ARFCN = 9400, Channel frequency = 1880.0MHz):

Polarization	Frequency (MHz)	*Calculated EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)
H	3760	-48.4	-13	-35.4
H	5640	-45.3	-13	-32.3

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*EIRP = ERP + 2.15dB

Remarks: the magnitudes of spurious emission which are attenuated more than 20 dB below the permissible value are not reported.

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4.6 Blockage at Antenna Terminals (FCC Part 22.917, 24.238)

In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter is employed. The 26dB emission bandwidth taken in section 4.4 is used for calculating the resolution bandwidth.

The power of any emission at the blockage must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB, i.e. at or below -13dBm when using 1% emissions bandwidth.

According to the FCC KDB with Publication Number: 890810, measurements using narrower resolution bandwidths are acceptable and must sum the power from all contiguous reduced resolution bandwidths within the 1% resolution specified, an alternative is to add an additional correction factor of $10 \log(RBW1/RBW2)$ to the $43 + 10 \log(P)$ limit. RBW1 is the narrower measurement resolution bandwidth and RBW2 is the 1% emissions bandwidth.

Correction factor = $10 \log(RBW1/RBW2) = 10 \log(1/3.22) = -5.1\text{dB}$ for GSM.

Correction factor = $10 \log(RBW1/RBW2) = 10 \log(30/47.2) = -2.0\text{dB}$ for WCDMA.

Test results:

Band	ARFC N	Channel Frequency (MHz)	Worst case bandedge emission with RBW 1KHz(dBm)	Correction Factor (dB)	Worst case bandedge emission with RBW 3.22KHz(dBm)	Limit (dBm)	Verdict
GSM 850MHz	128	824.2	-19.1	5.1	-14.0	-13	PASS
	251	848.8	-18.6	5.1	-13.5	-13	PASS
GPRS 850MHz	128	824.2	-18.4	5.1	-13.3	-13	PASS
	251	848.8	-21.0	5.1	-15.9	-13	PASS
EGPRS 850MHz	128	824.2	-20.5	5.1	-15.4	-13	PASS
	251	848.8	-20.8	5.1	-15.7	-13	PASS
GSM 1900MHz	512	1850.2	-20.2	5.1	-15.1	-13	PASS
	810	1909.8	-21.0	5.1	-15.9	-13	PASS
GPRS 1900MHz	512	1850.2	-21.0	5.1	-15.9	-13	PASS
	810	1909.8	-21.4	5.1	-16.3	-13	PASS
EGPRS1900MHz	512	1850.2	-21.6	5.1	-16.5	-13	PASS
	810	1909.8	-21.9	5.1	-16.8	-13	PASS

Band	ARFC N	Channel Frequency (MHz)	Worst case bandedge emission with RBW 30KHz(dBm)	Correction Factor (dB)	Worst case bandedge emission with RBW 47.6KHz(dBm)	Limit (dBm)	Verdict
WCDMA 850MHz	4132	826.4	-23.8	2.0	-21.8	-13	PASS
	4233	846.6	-22.3	2.0	-20.3	-13	PASS
HSDPA 850MHz	4132	826.4	-23.8	2.0	-21.8	-13	PASS
	4233	846.6	-23.9	2.0	-21.9	-13	PASS
HSUPA 850MHz	4132	826.4	-24.7	2.0	-22.7	-13	PASS
	4233	846.6	-23.6	2.0	-21.6	-13	PASS
WCDMA1900MHz	9262	1852.4	-23.0	2.0	-21.0	-13	PASS
	9538	1907.6	-18.9	2.0	-16.9	-13	PASS
HSDPA1900MHz	9262	1852.4	-23.3	2.0	-21.3	-13	PASS
	9538	1907.6	-19.7	2.0	-17.7	-13	PASS
HSUPA1900MHz	9262	1852.4	-24.2	2.0	-22.2	-13	PASS

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	9538	1907.6	-19.2	2.0	-17.2	-13	PASS
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The plots are saved in the file be.pdf.

INTERTEK TESTING SERVICES

4.7 Frequency Stability (FCC Part 2.1055, 22.355, 24.235)

The frequency stability is measured with the temperature variation range of -30°C to +50°C (10°C increment), and voltage supply variation range of 85% to 115% of nominal AC supply voltage, and/or nominal to battery end points for hand-carried battery-powered supplies.

[☒] AC nominal supply voltage: 120VAC

[☒] Battery nominal voltage: 3.8 VDC; End points: 3.5 VDC

20°C is taken as temperature in normal condition.

For the 850MHz band, according to 22.355, the stability requirements are: ± 2.5 ppm for portable units.

For the 1900MHz band, according to 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test results for battery operation:

GSM 850MHz (AFRCN = 190, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
3.8	-30	-28	± 2091.5	PASS
	-20	-32		PASS
	-10	-35		PASS
	0	-29		PASS
	+10	-27		PASS
	+20	-25		PASS
	+30	-27		PASS
	+40	-32		PASS
	+50	-35		PASS
3.5	+20	-27		PASS

GSM 1900MHz (AFRCN = 512, Channel frequency = 1850.2MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1850.199949	1850 - 1910	PASS
	-20	1850.199947		PASS
	-10	1850.199949		PASS
	0	1850.199950		PASS
	+10	1850.199953		PASS
	+20	1850.199958		PASS
	+30	1850.199949		PASS
	+40	1850.199945		PASS
	+50	1850.199934		PASS
3.5	+20	1850.199950		PASS

INTERTEK TESTING SERVICES

GSM 1900MHz (AFRCN = 810, Channel frequency = 1909.8MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1909.799938	1850 - 1910	PASS
	-20	1909.799939		PASS
	-10	1909.799942		PASS
	0	1909.799945		PASS
	+10	1909.799947		PASS
	+20	1909.799949		PASS
	+30	1909.799938		PASS
	+40	1909.799937		PASS
	+50	1909.799938		PASS
3.5	+20	1909.799949		PASS

GPRS 850MHz (AFRCN = 190, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
3.8	-30	-38	±2091.5	PASS
	-20	-32		PASS
	-10	-30		PASS
	0	-31		PASS
	+10	-32		PASS
	+20	-31		PASS
	+30	-33		PASS
	+40	-35		PASS
	+50	-39		PASS
3.5	+20	-28		PASS

GPRS 1900MHz (AFRCN = 512, Channel frequency = 1850.2MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1850.199929	1850 - 1910	PASS
	-20	1850.199934		PASS
	-10	1850.199938		PASS
	0	1850.199939		PASS
	+10	1850.199942		PASS
	+20	1850.199945		PASS
	+30	1850.199941		PASS
	+40	1850.199940		PASS
	+50	1850.199940		PASS
3.5	+20	1850.199934		PASS

INTERTEK TESTING SERVICES

GPRS 1900MHz (AFRCN = 810, Channel frequency = 1909.8MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1909.799935	1850 - 1910	PASS
	-20	1909.799938		PASS
	-10	1909.799939		PASS
	0	1909.799942		PASS
	+10	1909.799939		PASS
	+20	1909.799943		PASS
	+30	1909.799947		PASS
	+40	1909.799945		PASS
	+50	1909.799946		PASS
3.5	+20	1909.799944		PASS

EGPRS 850MHz (AFRCN = 190, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
3.8	-30	-49	±2091.5	PASS
	-20	-42		PASS
	-10	-42		PASS
	0	-40		PASS
	+10	-41		PASS
	+20	-43		PASS
	+30	-47		PASS
	+40	-49		PASS
	+50	-52		PASS
3.5	+20	-39		PASS

EGPRS 1900MHz (AFRCN = 512, Channel frequency = 1850.2MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1850.199938	1850 - 1910	PASS
	-20	1850.199937		PASS
	-10	1850.199939		PASS
	0	1850.199936		PASS
	+10	1850.199925		PASS
	+20	1850.199926		PASS
	+30	1850.199924		PASS
	+40	1850.199922		PASS
	+50	1850.199920		PASS
3.5	+20	1850.199946		PASS

INTERTEK TESTING SERVICES

EGPRS 1900MHz (AFRCN = 810, Channel frequency = 1909.8MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1909.799945	1850 - 1910	PASS
	-20	1909.799945		PASS
	-10	1909.799947		PASS
	0	1909.799952		PASS
	+10	1909.799945		PASS
	+20	1909.799946		PASS
	+30	1909.799943		PASS
	+40	1909.799942		PASS
	+50	1909.799940		PASS
3.5	+20	1909.799951		PASS

WCDMA 850MHz (AFRCN = 4183, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
3.8	-30	-28	±2091.5	PASS
	-20	-26		PASS
	-10	-22		PASS
	0	-26		PASS
	+10	-25		PASS
	+20	-26		PASS
	+30	-29		PASS
	+40	-33		PASS
	+50	-37		PASS
3.5	+20	-25		PASS

WCDMA 1900MHz (AFRCN = 9262, Channel frequency = 1852.4MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1852.399943	1850 - 1910	PASS
	-20	1852.399943		PASS
	-10	1852.399941		PASS
	0	1852.399944		PASS
	+10	1852.399945		PASS
	+20	1852.399937		PASS
	+30	1852.399935		PASS
	+40	1852.399925		PASS
	+50	1852.399932		PASS
3.5	+20	1852.399935		PASS

INTERTEK TESTING SERVICES

WCDMA 1900MHz (AFRCN = 9538, Channel frequency = 1907.6MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1907.599934	1850 - 1910	PASS
	-20	1907.599933		PASS
	-10	1907.599934		PASS
	0	1907.599932		PASS
	+10	1907.599943		PASS
	+20	1907.599942		PASS
	+30	1907.599931		PASS
	+40	1907.599929		PASS
	+50	1907.599927		PASS
3.5	+20	1907.599945		PASS

HSDPA 850MHz (AFRCN = 4183, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
3.8	-30	-30	±2091.5	PASS
	-20	-26		PASS
	-10	-29		PASS
	0	-34		PASS
	+10	-31		PASS
	+20	-35		PASS
	+30	-37		PASS
	+40	-39		PASS
	+50	-42		PASS
3.5	+20	-35		PASS

HSDPA 1900MHz (AFRCN = 9262, Channel frequency = 1852.4MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1852.399936	1850 - 1910	PASS
	-20	1852.399935		PASS
	-10	1852.399932		PASS
	0	1852.399937		PASS
	+10	1852.399941		PASS
	+20	1852.399936		PASS
	+30	1852.399929		PASS
	+40	1852.399926		PASS
	+50	1852.399922		PASS
3.5	+20	1852.399936		PASS

INTERTEK TESTING SERVICES

HSDPA 1900MHz (AFRCN = 9538, Channel frequency = 1907.6MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1907.599938	1850 - 1910	PASS
	-20	1907.599936		PASS
	-10	1907.599941		PASS
	0	1907.599939		PASS
	+10	1907.599933		PASS
	+20	1907.599934		PASS
	+30	1907.599932		PASS
	+40	1907.599930		PASS
	+50	1907.599929		PASS
3.5	+20	1907.599938		PASS

HSUPA 850MHz (AFRCN = 4183, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
3.8	-30	-36	±2091.5	PASS
	-20	-34		PASS
	-10	-35		PASS
	0	-35		PASS
	+10	-31		PASS
	+20	-33		PASS
	+30	-34		PASS
	+40	-28		PASS
	+50	-26		PASS
3.5	+20	-37		PASS

HSUPA 1900MHz (AFRCN = 9262, Channel frequency = 1852.4MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1852.399924	1850 - 1910	PASS
	-20	1852.399923		PASS
	-10	1852.399926		PASS
	0	1852.399923		PASS
	+10	1852.399925		PASS
	+20	1852.399928		PASS
	+30	1852.399921		PASS
	+40	1852.399914		PASS
	+50	1852.399916		PASS
3.5	+20	1852.399925		PASS

INTERTEK TESTING SERVICES

HSUPA 1900MHz (AFRCN = 9538, Channel frequency = 1907.6MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
3.8	-30	1907.599934	1850 - 1910	PASS
	-20	1907.599932		PASS
	-10	1907.599941		PASS
	0	1907.599942		PASS
	+10	1907.599937		PASS
	+20	1907.599934		PASS
	+30	1907.599935		PASS
	+40	1907.599932		PASS
	+50	1907.599925		PASS
3.5	+20	1907.599933		PASS

Test results for battery operation charged by AC voltage:

GSM 850MHz (AFRCN = 190, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
120	-30	-28	±2091.5	PASS
	-20	-28		PASS
	-10	-30		PASS
	0	-32		PASS
	+10	-32		PASS
	+20	-34		PASS
	+30	-35		PASS
	+40	-40		PASS
	+50	-42		PASS
102	+20	-33		PASS
138	+20	-33		PASS

GSM 1900MHz (AFRCN = 512, Channel frequency = 1850.2MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1850.199925	1850 - 1910	PASS
	-20	1850.199927		PASS
	-10	1850.199926		PASS
	0	1850.199931		PASS
	+10	1850.199933		PASS
	+20	1850.199936		PASS
	+30	1850.199936		PASS
	+40	1850.199940		PASS
	+50	1850.199943		PASS
102	+20	1850.199938		PASS
138	+20	1850.199936		PASS

INTERTEK TESTING SERVICES

GSM 1900MHz (AFRCN = 810, Channel frequency = 1909.8MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1909.799934	1850 - 1910	PASS
	-20	1909.799935		PASS
	-10	1909.799934		PASS
	0	1909.799937		PASS
	+10	1909.799933		PASS
	+20	1909.799935		PASS
	+30	1909.799932		PASS
	+40	1909.799930		PASS
	+50	1909.799930		PASS
102	+20	1909.799935		PASS
138	+20	1909.799934		PASS

GPRS 850MHz (AFRCN = 190, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
120	-30	-43	±2091.5	PASS
	-20	-44		PASS
	-10	-44		PASS
	0	-43		PASS
	+10	-45		PASS
	+20	-44		PASS
	+30	-45		PASS
	+40	-49		PASS
	+50	-49		PASS
102	+20	-45		PASS
138	+20	-44		PASS

GPRS 1900MHz (AFRCN = 512, Channel frequency = 1850.2MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1850.199945	1850 - 1910	PASS
	-20	1850.199946		PASS
	-10	1850.199953		PASS
	0	1850.199949		PASS
	+10	1850.199952		PASS
	+20	1850.199955		PASS
	+30	1850.199954		PASS
	+40	1850.199946		PASS
	+50	1850.199944		PASS
102	+20	1850.199952		PASS
138	+20	1850.199953		PASS

INTERTEK TESTING SERVICES

GPRS 1900MHz (AFRCN = 810, Channel frequency = 1909.8MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1909.799955	1850 - 1910	PASS
	-20	1909.799953		PASS
	-10	1909.799953		PASS
	0	1909.799939		PASS
	+10	1909.799956		PASS
	+20	1909.799962		PASS
	+30	1909.799947		PASS
	+40	1909.799944		PASS
	+50	1909.799945		PASS
102	+20	1909.799962		PASS
138	+20	1909.799960		PASS

EGPRS 850MHz (AFRCN = 190, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
120	-30	-47	±2091.5	PASS
	-20	-43		PASS
	-10	-42		PASS
	0	-45		PASS
	+10	-42		PASS
	+20	-40		PASS
	+30	-41		PASS
	+40	-49		PASS
	+50	-51		PASS
102	+20	-40		PASS
138	+20	-39		PASS

EGPRS 1900MHz (AFRCN = 512, Channel frequency = 1850.2MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1850.199962	1850 - 1910	PASS
	-20	1850.199959		PASS
	-10	1850.199960		PASS
	0	1850.199961		PASS
	+10	1850.199955		PASS
	+20	1850.199957		PASS
	+30	1850.199954		PASS
	+40	1850.199952		PASS
	+50	1850.199949		PASS
102	+20	1850.199955		PASS
138	+20	1850.199953		PASS

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EGPRS 1900MHz (AFRCN = 810, Channel frequency = 1909.8MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1909.799959	1850 - 1910	PASS
	-20	1909.799957		PASS
	-10	1909.799957		PASS
	0	1909.799949		PASS
	+10	1909.799943		PASS
	+20	1909.799945		PASS
	+30	1909.799942		PASS
	+40	1909.799940		PASS
	+50	1909.799950		PASS
102	+20	1909.799946		PASS
138	+20	1909.799945		PASS

WCDMA 850MHz (AFRCN = 4183, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
120	-30	-29	±2091.5	PASS
	-20	-35		PASS
	-10	-37		PASS
	0	-33		PASS
	+10	-28		PASS
	+20	-29		PASS
	+30	-32		PASS
	+40	-35		PASS
	+50	-36		PASS
102	+20	-33		PASS
138	+20	-31		PASS

WCDMA 1900MHz (AFRCN = 9262, Channel frequency = 1852.4MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1852.399954	1850 - 1910	PASS
	-20	1852.399956		PASS
	-10	1852.399955		PASS
	0	1852.399957		PASS
	+10	1852.399953		PASS
	+20	1852.399950		PASS
	+30	1852.399946		PASS
	+40	1852.399946		PASS
	+50	1852.399942		PASS
102	+20	1852.399952		PASS
138	+20	1852.399953		PASS

INTERTEK TESTING SERVICES

WCDMA 1900MHz (AFRCN = 9538, Channel frequency = 1907.6MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1907.599943	1850 - 1910	PASS
	-20	1907.599945		PASS
	-10	1907.599945		PASS
	0	1907.599947		PASS
	+10	1907.599943		PASS
	+20	1907.599940		PASS
	+30	1907.599939		PASS
	+40	1907.599937		PASS
	+50	1907.599935		PASS
102	+20	1907.599942		PASS
138	+20	1907.599943		PASS

HSDPA 850MHz (AFRCN = 4183, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
120	-30	-38	±2091.5	PASS
	-20	-41		PASS
	-10	-36		PASS
	0	-37		PASS
	+10	-35		PASS
	+20	-34		PASS
	+30	-39		PASS
	+40	-38		PASS
	+50	-42		PASS
102	+20	-40		PASS
138	+20	-41		PASS

HSDPA 1900MHz (AFRCN = 9262, Channel frequency = 1852.4MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1852.399956	1850 - 1910	PASS
	-20	1852.399954		PASS
	-10	1852.399952		PASS
	0	1852.399955		PASS
	+10	1852.399951		PASS
	+20	1852.399953		PASS
	+30	1852.399947		PASS
	+40	1852.399943		PASS
	+50	1852.399945		PASS
102	+20	1852.399954		PASS
138	+20	1852.399952		PASS

INTERTEK TESTING SERVICES

HSDPA 1900MHz (AFRCN = 9538, Channel frequency = 1907.6MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1907.599949	1850 - 1910	PASS
	-20	1907.599953		PASS
	-10	1907.599954		PASS
	0	1907.599952		PASS
	+10	1907.599946		PASS
	+20	1907.599945		PASS
	+30	1907.599942		PASS
	+40	1907.599946		PASS
	+50	1907.599942		PASS
102	+20	1907.599945		PASS
138	+20	1907.599942		PASS

HSUPA 850MHz (AFRCN = 4183, Channel frequency = 836.6MHz):

Input voltage (VDC)	Temperature (°C)	Frequency deviation (Hz)	Limit (Hz)	Verdict
120	-30	-38	±2091.5	PASS
	-20	-41		PASS
	-10	-36		PASS
	0	-34		PASS
	+10	-35		PASS
	+20	-35		PASS
	+30	-38		PASS
	+40	-39		PASS
	+50	-42		PASS
102	+20	-35		PASS
138	+20	-35		PASS

HSUPA 1900MHz (AFRCN = 9262, Channel frequency = 1852.4MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1852.399957	1850 - 1910	PASS
	-20	1852.399954		PASS
	-10	1852.399956		PASS
	0	1852.399953		PASS
	+10	1852.399951		PASS
	+20	1852.399954		PASS
	+30	1852.399948		PASS
	+40	1852.399946		PASS
	+50	1852.399942		PASS
102	+20	1852.399954		PASS
138	+20	1852.399956		PASS

INTERTEK TESTING SERVICES

HSUPA 1900MHz (AFRCN = 9538, Channel frequency = 1907.6MHz):

Input voltage (VDC)	Temperature (°C)	Measured Frequency (MHz)	Limit (MHz)	Verdict
120	-30	1907.599949	1850 - 1910	PASS
	-20	1907.599952		PASS
	-10	1907.599950		PASS
	0	1907.599953		PASS
	+10	1907.599943		PASS
	+20	1907.599946		PASS
	+30	1907.599941		PASS
	+40	1907.599943		PASS
	+50	1907.599940		PASS
102	+20	1907.599945		PASS
138	+20	1907.599943		PASS

INTERTEK TESTING SERVICES

4.8 Radio Frequency Exposure Compliance

EUT is subject to the radio frequency exposure requirements specified in FCC Rule §§ 1.1307(b), 2.1093. It shall be considered to operate in a “general population / uncontrolled” environment.

- ☒ Portable unit: EUT was evaluated for Specific Absorption Rate (SAR) evaluation compliance according to KDB 447498. It is in compliance with the SAR evaluation requirements. A SAR test report was submitted at same time and saved as SAR Report.pdf.
- ☐ Mobile unit: EUT was evaluated for Maximum Permissible Exposure (MPE) evaluation compliance according to KDB 447498. The evaluation calculation results are saved as filename: RF exposure info.pdf.

INTERTEK TESTING SERVICES

5.0 Equipment List

Equipment	EMI Test Receiver	EMI Test Receiver	Spectrum Analyzer	Universal Radio Communication Tester
Registration No.	SZ185-02	SZ185-01	SZ056-03	SZ065-1
Manufacturer	R&S	R&S	R&S	R&S
Model No.	ESCI	ESCI	FSP30	CMU200
Calibration Date	09-Nov-2013	09-Nov-2013	10-Mar-2014	23-Jun-2014
Calibration Due Date	09-Nov-2014	09-Nov-2014	10-Mar-2015	23-Jun-2015

Equipment	BiConLog Antenna	Horn Antennas	Signal Generator	Active Loop Antenna
Registration No.	SZ061-03	SZ061-08 SZ061-09	SZ180-01	SZ061-06
Manufacturer	ETS	ETS	R&S	Electro-Metrics
Model No.	3142C	3115	SML03	EM-6876
Calibration Date	28-Jun-2014	26-Oct-2013	21-May-2014	29-April-2014
Calibration Due Date	28-Jun-2015	26-Oct-2014	21-May-2015	29-April-2015

Equipment	RF Power Meter	Temperature & Humidity Chamber	Roberts Antennas
Registration No.	SZ182-01	SZ016-02	EW-0159
Manufacturer	BOONTON	Dongzhix	CDI
Model No.	4232A	WGD/SJ-415-A	A100
Calibration Date	10-Mar-2014	4-Nov-2013	12-May-2014
Calibration Due Date	10-Mar-2015	4-Nov-2014	12-May-2015

Equipment	Notch Filter	Notch Filter	Highpass Filter
Registration No.	SZ067-05	SZ067-08	SZ067-11
Manufacturer	Micro-Tronics	Wainwright	Wainwright
Model No.	BRM50707-02	WRCT800/960-0.2/40-8SSK	WHKX1.0/15G-10S
Calibration Date	21-May-2014	17-Oct-2013	21-May-2014
Calibration Due Date	21-May-2015	17-Oct-2014	21-May-2015

END OF TEST REPORT