

TEST REPORT

Report Number: 17060694HKG-001

Application For Class II Permissive Change of 47 CFR Part 15 Certification

Unlicensed Personal Communication Service Devices

FCC ID: EW780-0381-00

PREPARED AND CHECKED BY:

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Date: June 28, 2017

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TEST REPORT

GENERAL INFORMATION

Grantee:	VTech Telecommunications Ltd.
Grantee Address:	23/F., Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road, Tai Po, Hong Kong.
FCC Specification Standard:	FCC Part 15, October 1, 2015 Edition
FCC ID:	EW780-0381-00
FCC Model(s):	TL96457, TL96547, TL96XY7, TL96457 BS, TL96457 HS, TL96547 BS, TL96547 HS, TL96XY7 BS, TL96XY7 HS, TL90077, TL900Y7, TL90077 HS, TL900Y7 HS
Type of EUT:	Unlicensed Personal Communications Service Devices
Description of EUT:	DECT 6.0 Cordless Phone with Bluetooth
Serial Number:	N/A
Sample Receipt Date:	June 09, 2017
Date of Test:	June 12- June 20, 2017
Report Date:	June 28, 2017
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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EXHIBIT 1 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

GENERAL TECHNICAL REQUIREMENTS				
TEST ITEMS	FCC PART 15 SECTION	TEST PROCEDURE ANSI C63.17 / ANSI C63.4*	RESULTS	DETAILS SEE SECTION
AC Power Line Conducted Emissions from EUT	15.315	7 *	Pass	4.2
Security Code Information	---	---	Pass	2.2

SPECIFIC REQUIREMENTS FOR UPCS DEVICE				
TEST ITEMS	FCC PART 15 SECTION	TEST PROCEDURE ANSI C63.17	RESULTS	DETAILS SEE SECTION
Emissions Outside the Sub-Band	15.323(d)	6.1.6.2	Pass	4.1

1.2 Statement of Compliance

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

FCC Part 15, October 1, 2015 Edition

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EXHIBIT 2 GENERAL DESCRIPTION

2.0 GENERAL DESCRIPTION

2.1 Product Description

The TL96457 is a 1.9GHz Digital Modulation Cordless Phone with Caller ID, Speakerphone and Bluetooth. It operates at frequency range of 1921.536MHz to 1928.448MHz with 5 channels (1921.536MHz, 1923.264MHz, 1924.992MHz, 1926.720MHz and 1928.448MHz) and Bluetooth Transmitter operates with 79 channels (2402MHz - 2480MHz). The Base Unit is powered by an adaptor 100-120VAC 60Hz 200mA to 6VDC 600mA, and it also has a Bluetooth transceiver that manages Bluetooth connections to a Bluetooth-equipped mobile device. With Bluetooth and 1.9GHz wireless communications enabled, the Base Unit allows user uses the cordless handset to make or receive cellular phone calls via the cellular network. The Handset is powered by a Ni-MH type rechargeable battery pack (2.4V, 400mAh).

The antennas used in base unit and handset are integral, and the test sample is a prototype.

The Model(s): TL96547, TL96XY7, TL96457 BS, TL96547 BS, TL96XY7 BS are the same as the Model: TL96457 in electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models are color, model number, package type and number of handsets and chargers to be sold for marketing purpose. Suffix (X, Y) indicates any alphanumeric character is representing different number of handsets and chargers and different package type or color of enclosure. Model(s): TL96457 HS, TL96547 HS, TL96XY7 HS, TL90077, TL900Y7, TL90077 HS and TL900Y7 HS are an identical handset(s) with charger(s) for selling handset(s) standalone.

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

2.2 Technical Description

The circuit description and digital modulation techniques description are saved with filename: descri.pdf.

2.3 Purpose of Change

The purpose of change is saved with filename: product change.pdf

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2.4 Test Methodology

The radiated emission measurements for unintentional radiator (if any) and AC power line-conducted emission measurements were performed according to the test procedures specified in ANSI C63.4 (2014). The radiated emission measurements for intentional radiator contained in UPCS device, conducted emission measurements, Listen Before Transmit (LBT) tests, Time Frame and Frequency Stability tests were performed according to the test procedures specified in ANSI C63.17 (2013). All radiated measurements were performed in radiated emission test site. Preliminary scans were performed in the radiated emission test site only to determine worst case modes. 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 other measurements were made in accordance with the procedures in 47 CFR Part 2 / RSS-Gen Issue 4 (2014).

2.5 Test Facility

The radiated emission test site, AC power line conducted measurement facility and antenna port conducted measurement facility used to collect the radiated data, AC Power Line conducted data, and conductive data are at Intertek Testing Services Hong Kong Ltd., which is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been fully placed on file with FCC.

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EXHIBIT 3 SYSTEM TEST CONFIGURATION

3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For emissions testing, the equipment under test (EUT) was set up to transmit continuously in burst mode with pseudo-random data to simplify the measurement methodology. 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 Base Unit was powered by a 100-120VAC 60Hz 200mA to 6VDC 600mA adaptor. The handset was powered by a fully charged battery.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the EUT is attached to accessories, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Detector function was in peak mode. Radiated emissions are taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For UPCS transmitter radiated measurement, the spectrum analyzer resolution bandwidth was approximately 1% of EUT emission bandwidth, unless otherwise specified.

Radiated emission measurements for UPCS transmitter 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.

RF module and antenna for base unit and handset of TL96XY7 is the same with original granted model TL96XY6. Therefore conducted emission measurement for emission bandwidth, power spectral density, unwanted emission inside sub-band, jitter, frame repetition stability, carrier stability and listen before transmit requirements for TL96XY7 are skipped.

As the base unit has 2 antennas, both have been checked. While conducting the test on one of antennas, another one was being disable its transmission. The data in this report represented the worst-case.

Bluetooth module was mounted onto the EUT and switched on when taking radiated emission for determining worst-case spurious emission.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

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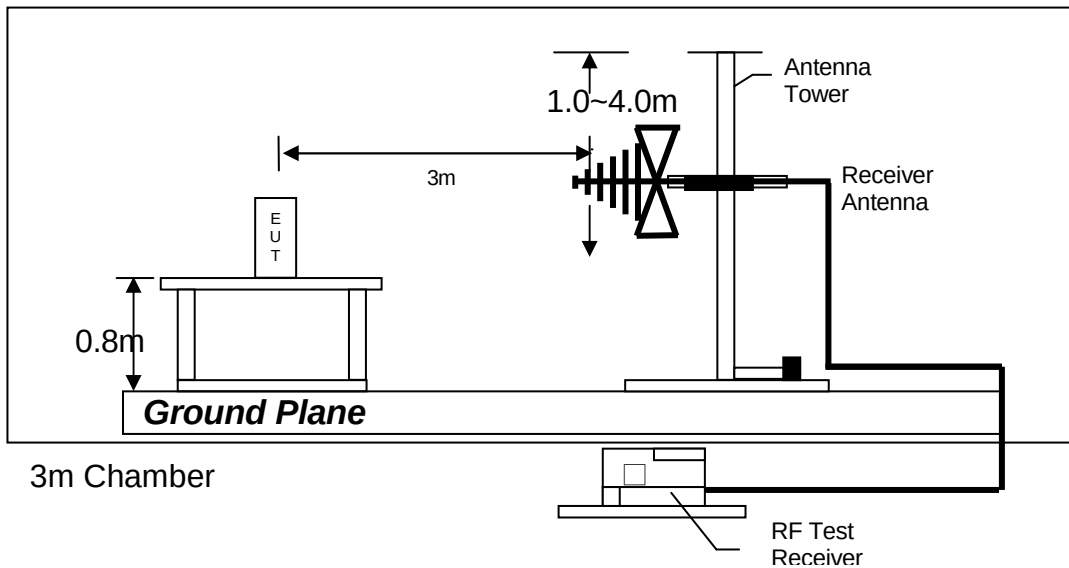
All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

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

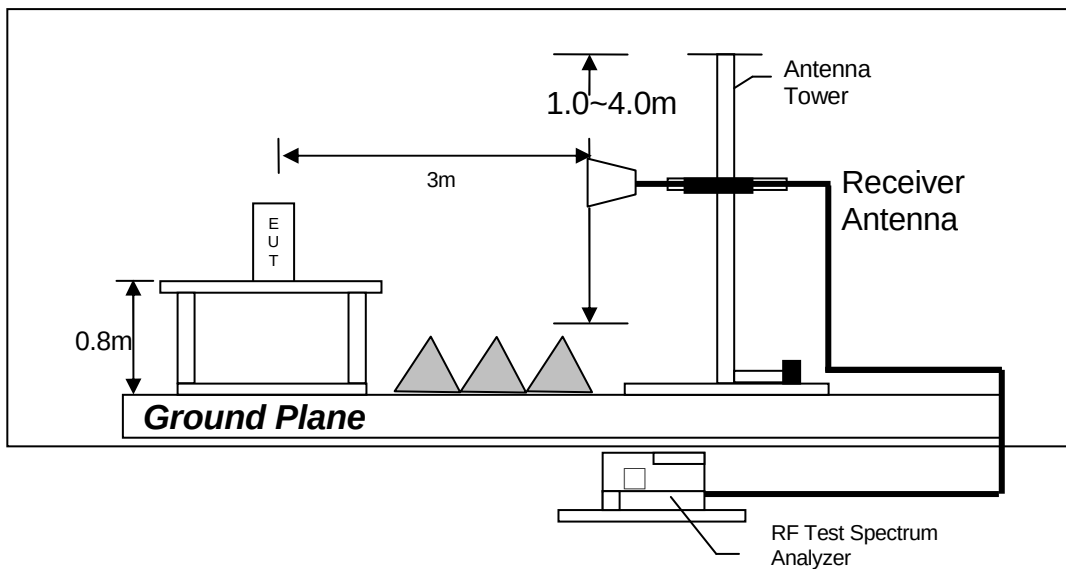
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3.2 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

Figure 3.2.1

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3.3 AC Line Conducted Emission Test Setup

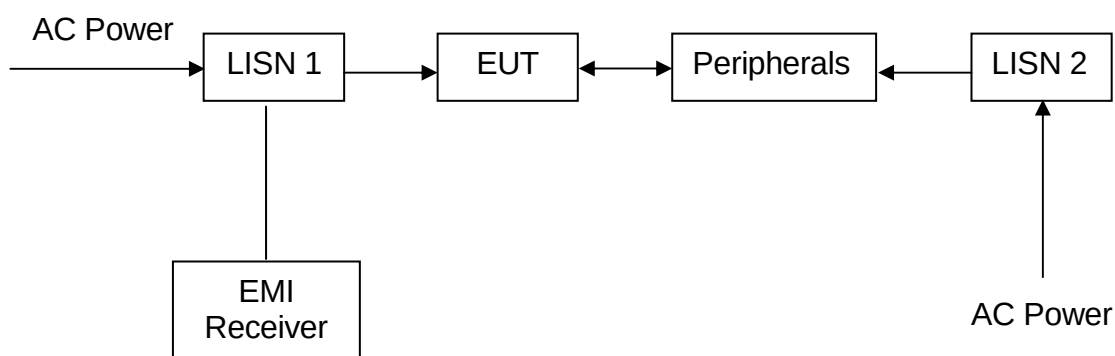


Figure 3.3.1

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3.4 Conducted Emission Test Configuration

The setup and equipment setting were made in accordance with ANSI C63.17. The antenna of EUT transmitter was replaced by a coaxial cable. The impedance matching of connection, cable loss and external RF attenuator are taken into account. The EUT was arranged to communicate via a fixed carrier frequency between its transmitter and a companion device. The transmission was configured in burst mode with pseudo-random data as typical as normal operation.

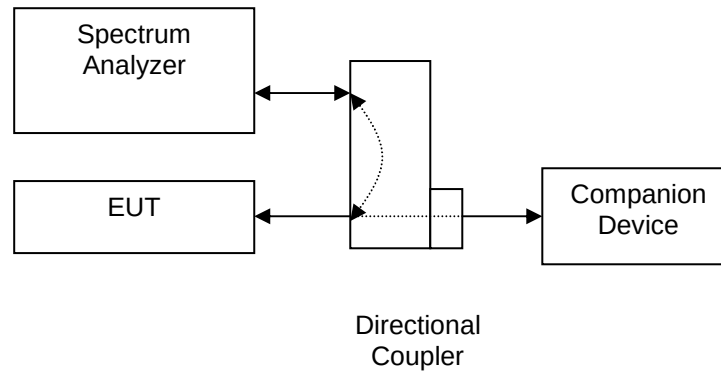


Figure 3.4.1

3.5 Conducted Monitoring and Operation Test Configuration

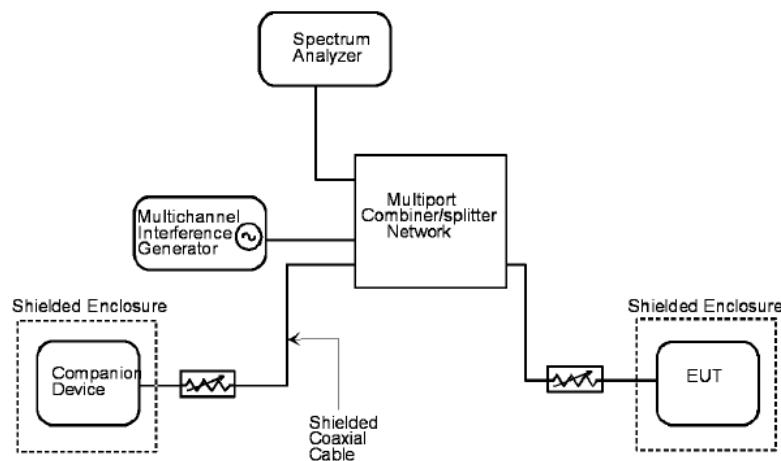


Figure 3.5.1

3.6 EUT Exercising Software

The EUT exercise program (if any) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

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3.7 Details of EUT and Description of Accessories

Details of EUT:

An AC adaptor and/or a battery (provided with the unit) were used to power the device. Their descriptions are listed below.

- (1) Base Unit: An AC adaptor (100-120VAC 60Hz 200mA to 6VDC 600mA, Model: S006AKU0600060) (Supplied by Client)
- (2) Handset: A Ni-MH type rechargeable battery (2.4V 400mAh, Model: BT183342/BT283342, Brand: GPI) (Supplied by Client)
- (3) Handset: A Ni-MH type rechargeable battery (2.4V 400mAh, Model: BT183342/BT283342, Brand: Corun) (Supplied by Client)
- (4) Handset: A Ni-MH type rechargeable battery (2.4V 400mAh, Model: BT183342/BT283342, Brand: Coslight) (Supplied by Client)

Description of Accessories:

- (1) Telephone Line Simulator, Model: TLS-5D-01, S/N: 151101 (Supplied by Intertek)
- (2) iPhone 5c, Model: A1529, FCC ID: BCG-E2694A (Supplied by Intertek)
- (3) 3m Telephone Line (Supplied by Intertek)
- (4) 1m Telephone Line with Termination (Supplied by Intertek)

3.8 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered. The values of the Measurement uncertainty for radiated emission test, AC line conducted emission are $\pm 5.3\text{dB}$, $\pm 4.2\text{dB}$ respectively.

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.

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EXHIBIT 4 TEST RESULTS

4.0 MEASUREMENT RESULTS

4.1 Emissions Outside the Sub-Band, FCC Rule 15.323(d):

Emissions outside the sub-band shall be attenuated below a reference power of 112 mW (20.5 dBm) as follows:

1. 30 dB between the band edge and 1.25 MHz above or below the band;
2. 50 dB between 1.25 and 2.5 MHz above or below the band; and
3. 60 dB at 2.5 MHz or greater above or below the band, or shall meet the requirement of FCC Rule 15.319(g) which shall not exceed the limits of FCC Rule 15.209 / RSS-210 Clause 2.5.

Example: Calculation of Limit for emissions between the band edge and 1.25 MHz (1920.000 – 1918.750 MHz)

The emissions shall not exceed the Limit: 20.5 dBm – 30 dB = -9.5 dBm

Measurements are made in accordance with ANSI C63.17 sub-clause 6.1.6.2. Radiated emissions test method is used. Emissions that are directly caused by digital circuits in the transmit path and transmitter portion are measured.

Test setup is shown in section 3.2 Figure 3.2.1

Test Results:

Channel	Carrier Frequency (MHz)	Measured Band (MHz)	Limit (dBm)	Results
Lowest	1921.536	1920.000 - 1918.750	-9.5	Pass
		1918.750 - 1917.500	-29.5	Pass
		0.009 - 1917.500 & 1932.500 - 19300.000	-39.5 / FCC Rule 15.209	Pass
Highest	1928.448	1930.000 - 1931.250	-9.5	Pass
		1931.250 - 1932.500	-29.5	Pass
		0.009 – 1917.500 & 1932.500 - 19300.000	-39.5 / FCC Rule 15.209	Pass

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4.1.1 Radiated Emissions Configuration Photographs:

Worst Case Radiated Emission
at

Base Unit: 5785.344 MHz

Handset: 5764.608 MHz

The worst case radiated emission configuration photographs are saved with filename: config photos.pdf

4.1.2 Radiated Emissions Data:

Data are included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data in table 1-6 list the significant emission frequencies, the limit and the margin of compliance.

Judgement:

Base Unit - Passed by 3.4 dB margin

Handset - Passed by 5.8 dB margin

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RADIATED EMISSIONS DATA

Mode: Transmission

Table 1, Base Unit

Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Lowest Channel

Polarization	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
V	1917.166	-56.6	-39.5	-17.1
V	1918.687	-52.9	-29.5	-23.4
V	1919.828	-43.9	-9.5	-34.4
V	3843.072	-45.7	-39.5	-6.2
V	5764.608	-45.6	-39.5	-6.1
V	7686.144	-46.5	-39.5	-7.0
V	9607.680	-47.3	-39.5	-7.8
V	11529.216	-50.4	-39.5	-10.9

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.

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Mode: Transmission

Table 2, Base Unit

Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Highest Channel

Polarization	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
V	1930.014	-43.6	-9.5	-34.1
V	1931.610	-54.8	-29.5	-25.3
V	1933.160	-56.4	-39.5	-16.9
V	3856.896	-44.8	-39.5	-5.3
V	5785.344	-42.9	-39.5	-3.4
V	7713.792	-43.6	-39.5	-4.1
V	9642.240	-46.7	-39.5	-7.2
V	11570.688	-51.6	-39.5	-12.1

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.

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Mode: Talk

Table 3, Base Unit

Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Polarization	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
V	292.454	-73.0	-39.5	-33.5
V	313.656	-71.9	-39.5	-32.4
V	554.845	-69.8	-39.5	-30.3
V	695.456	-71.7	-39.5	-32.2
V	776.756	-70.6	-39.5	-31.1
V	961.045	-72.7	-39.5	-33.2

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.

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Mode: Transmission

Table 4, Handset

Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Lowest Channel

Polarization	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
V	1917.120	-57.2	-39.5	-17.7
V	1918.219	-52.9	-29.5	-23.4
V	1919.965	-44.5	-9.5	-35.0
V	3843.072	-46.1	-39.5	-6.6
V	5764.608	-45.3	-39.5	-5.8
V	7686.144	-46.6	-39.5	-7.1
V	9607.680	-47.9	-39.5	-8.4
V	11529.216	-51.1	-39.5	-11.6

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.

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Mode: Transmission

Table 5, Handset

Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Highest Channel

Polarization	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
V	1930.021	-45.4	-9.5	-35.9
V	1931.461	-53.6	-29.5	-24.1
V	1933.018	-56.6	-39.5	-17.1
V	3856.896	-45.8	-39.5	-6.3
V	5785.344	-46.7	-39.5	-7.2
V	7713.792	-45.6	-39.5	-6.1
V	9642.240	-47.5	-39.5	-8.0
V	11570.688	-50.4	-39.5	-10.9

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.

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Mode: Talk

Table 6, Handset

Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Polarization	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
H	207.469	-76.6	-39.5	-37.1
V	391.905	-69.2	-39.5	-29.7
V	518.456	-69.8	-39.5	-30.3
H	622.620	-66.6	-39.5	-27.1
H	830.397	-63.8	-39.5	-24.3
V	933.569	-61.3	-39.5	-21.8

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.

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4.1.3 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

Where FS = Field Strength in dBμV/m

RA = Receiver Amplitude (including preamplifier) in dBμV

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Example

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0 dBμV/m. This value in dBμV/m is converted to its corresponding level in μV/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0.0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62.0 + 7.4 + 1.6 - 29.0 + 0.0 + (-10.0) = 32.0 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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4.1.4 Average Factor Calculation and Transmitter ON Time Measurements, FCC Rule 15.35(b, c)

- [] The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SPAN function on the analyzer was set to ZERO. The transmitter ON time was determined from the resultant time-amplitude display:

Please refer to the attached plots for more details:

The plots of Transmitter ON Time Measurements are as below.

- [] Please refer to the attached transmitter timing diagram that are provided by manufacturer
- [x] Not applicable - No average factor is required.
- [] Please refer to Technical Description (descri.pdf) for more details

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4.2 AC Power Line Conducted Emissions, FCC Rule 15.315:

The AC power line conducted emission shall not exceed the limits of FCC Rule 15.207.

Measurements are made in accordance with ANSI C63.4 sub-clause 7. Emissions that are directly caused by digital circuits in the transmit path and transmitter portion are measured.

Test setup is shown in section 3.3 Figure 3.3.1.

- ☐ Not applicable – EUT is only powered by battery for operation.
- ☐ EUT connects to AC power line. Emission Data is listed in following pages.
- ☒ Base Unit connects to AC power line and has transmission. Handset connects to AC power line (indirectly) but has no transmission. Emission Data of Base Unit is listed in following pages
- ☐ Handset connects to AC power line (indirectly) only during charging. Emission Data is listed in following pages.

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4.2.1 AC Power Line Conducted Emissions Configuration Photographs:

Worst Case AC Power Line Conducted Emission
at

Base Unit: 343.5 kHz

The worst case AC power Line conducted emission configuration photographs are saved with filename: config photos.pdf

4.2.2 AC Power Line Conducted Emissions Data:

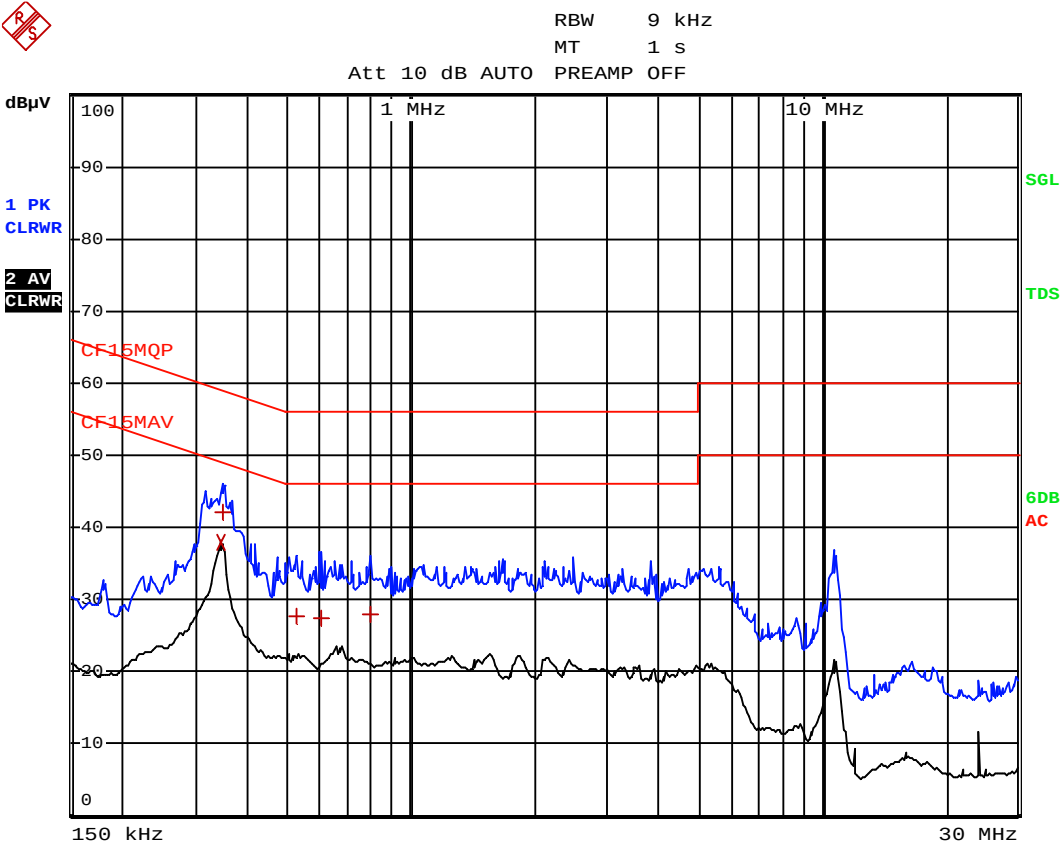
The plot(s) and data in the following pages list the significant emission frequencies, the limit and the worst case margin of compliance.

Judgment:

Base unit: Passed by 11.21 dB margin compared with average limit

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Worst Case: Talk



TEST REPORT

Worst Case:

Talk

EDIT PEAK LIST (Final Measurement Results)						
Trace1:		CF15MQP				
Trace2:		CF15MAV				
Trace3:		---				
TRACE		FREQUENCY	LEVEL dBμV		DELTA	LIMIT dB
2	CISPR Average	343.5 kHz	37.90	L1	-11.21	
1	Quasi Peak	348 kHz	42.22	L1	-16.78	
1	Quasi Peak	523.5 kHz	27.67	L1	-28.32	
1	Quasi Peak	604.5 kHz	27.49	L1	-28.51	
1	Quasi Peak	793.5 kHz	27.99	N	-28.00	

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EXHIBIT 5 EQUIPMENT LIST

5.0 Equipment List

1) Radiated Emissions Test

EQUIPMENT	Biconilog Antenna	Log Periodic Antenna	Spectrum Analyzer
Registration No.	EW-3061	EW-0447	EW-3110
Manufacturer	EMCO	EMCO	R&S
Model No.	3412E	3146	FSP30
Calibration Date	Sep. 23, 2016	May 18, 2016	Feb. 06, 2017
Calibration Due Date	Sep. 23, 2017	Nov 18, 2017	Feb. 06, 2018

EQUIPMENT	Emi Test Receiver (9khz To 26.5ghz)	Broad-Band Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-3156	EW-1679	EW-0194
Manufacturer	ROHDESCHWARZ	SCHWARZBECK	EMCO
Model No.	ESR26	BBHA9170	3115
Calibration Date	Dec. 06, 2016	Jun. 28, 2016	Aug. 10, 2016
Calibration Due Date	Dec. 06, 2017	Jun. 28, 2017	Feb. 10, 2018

2) Conducted Emissions Test

EQUIPMENT	EMI Test Receiver	LISN
Registration No.	EW-2500	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Nov. 17, 2016	Mar. 16, 2017
Calibration Due Date	Nov. 15, 2017	Mar. 16, 2018

- End of Test Report -