Qbic technology Co., Ltd

Application
For
Certification

FCC ID: 2AF82-TD1050

Panel PC

Model: TD-1050

Additional Model: TD-10XX(The letters “X” in the model No. can be 0 to 9, A to Z or blank, for marketing use only)

13.56MHz Transceiver

Report No.: 151016020SZN-002

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-14]

Prepared and Checked by:

Sign on file
Harry Wu
Engineer

Approved by:

Andy Yan
Senior Project Engineer
Date: November 13, 2015

TRF No.: FCC 15C_TX_b

Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch
6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

GENERAL INFORMATION

Qbic technology Co., Ltd
Model: TD-1050

Grantee:	Qbic technology Co., Ltd
Grantee Address:	11F. -9, No.99, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City, Taiwan
Manufacturer:	Qbic technology Co., Ltd
Manufacturer Address:	11F. -9, No.99, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City, Taiwan
Model:	TD-1050
Additional Models:	D-1050, TD-10XX, D-10XX(The letters “X” in the model No. can be 0 to 9, A to Z or blank, for marketing use only)
Trademark:	Qbic
FCC ID:	2AF82-TD1050
Type of EUT:	13.56MHz Transceiver
Description of EUT:	Panel PC
Date of Sample Submitted:	16 October 2015
Date of Test:	26 October 2015
Report No.:	151016020SZN-002
Normal Environmental Conidtions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

Qbic technology Co., Ltd
Model: TD-1050

TEST SPECIFICATION	REFERENCE	RESULTS
Maximum Peak Output Power	15.247(b), (c) / RSS-210 A8.4	N/A
Hopping Channel Carrier Frequencies Separation	15.247(e) / RSS-210 A8.1	N/A
20dB Bandwidth of the Hopping Channel	15.247(a) / RSS-210 A8.1	N/A
Number of Hopping Frequencies	15.247(e) / RSS-210 A8.1	N/A
Average Time of Occupancy of Hopping Frequency	15.247(e) / RSS-210 A8.1	N/A
Anteann Conducted Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
Radiated Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
RF Exposure Compliance	15.247(i) / RSS-Gen 5.5	N/A
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.2	N/A
Transmitter Field Strength	15.225 / RSS-210 A2.6	Pass
Transmitter Field Strength	15.227 / RSS-310 3.8	N/A
Transmitter Field Strength	15.229 / RSS-210 A2.7	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(a) / RSS-210 A1.1.1	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(e) / RSS-210 A1.1.5	N/A
Transmitter Field Strength and Bandwidth Requirement	15.239 / RSS-210 A2.8	N/A
Transmitter Field Strength and Bandwidth Requirement	15.249 / RSS-210 A2.9	N/A
Transmitter Field Strength and Bandwidth Requirement	15.235 / RSS-310 3.9	N/A
Receiver / Digital Device Radiated Eissions	15.109 / ICES-003	N/A
Digital Device Conducted Emissions	15.107 / ICES-003	N/A

Note: 1. The EUT uses three integral antennas which, in accordance to section 15.203, is considered sufficient to comply with the pervisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB bandwidth of the emission was contained within the frequency band designated (13.110–14.010 MHz) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Table of Contents

1.0 General Description

1.1 Product Description

The equipment under test (EUT) is a transceiver for a Panel PC model: TD-1050 operating at 13.56 MHz. The EUT is powered by AC/DC adaptor through AC120V/60Hz. For more detail information pls. refer to the user manual.

The Models: TD-10XX(The letters “X” in the model No. can be 0 to 9, A to Z or blank, for marketing use only) are the same as the Model: TD-1050 in hardware aspect. The difference in model number and appearance serve as marketing strategy.

Antenna Type: Integral antenna
Type of modulation: ASK
For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is an application for certification of: NFC transmitter portion
Remaining portions are subject to the following procedures:

1. Receiver portion of NFC: exempt from technical requirement of this Part.
2. Wifi function subject to report: 151016020SZN-001.
3. Other Digital Function: Subject to FCC Part 15B DoC .

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the 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.

1.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are Intertek Test 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).

2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The EUT was powered by AC/DC adaptor through AC 120V/60Hz during test.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data report in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted Test was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified Test.

2.3 Special Accessories

There is no special accessories necessary for compliance of this product.

2.4 Equipment Modification

Any modifications installed previous to testing by Qbic technology 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.

2.5 Measurement Uncertainty

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

2.6 Support Equipment List and Description

Description	Manufacturer	Detail
Adapter	KUANTECH	Model: KSASB0241200150D5 Input: AC 100-240V, 50/60Hz, 0.6A Output: DC 12V, 1.5A for main unit
Network cable (RJ45)	N/A	unshielded, Length 500cm
RJ45 Terminal	N/A	N/A
USB Cable	N/A	unshielded, Length 150cm
Earphone	N/A	unshielded, Length 150cm
USB Disk	SanDisk	4GB
Mini SD Card	SanDisk	1GB
Laptop	HP	Model: 430
Hard Disk	Smart.drive	HD-001
USB Cable	Smart.drive	unshielded, Length 155cm

3.0 Emission Results

Data is 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.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG - 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
AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF

where FS = Field Strength in dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

3.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

Worst Case Radiated Emission at 826.307 MHz (Simultaneous transmission was considered)

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 4.0 dB

Applicant: Qbic technology Co., Ltd Date of test: October 26, 2015
Model: TD-1050
Test worst case mode: Transmit

Table 1
Fundamental & Spurious Emission Below 30MHz

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Vertical	13.560	69.3	0.0	10.8	80.1	124.0	-43.9
Vertical	27.120	42.3	20.0	9.5	31.8	69.5	-37.7

Table 2
Spurious emission (30MHz ~ 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	224.250	49.0	20.0	6.1	35.1	46.0	-10.9
Horizontal	524.431	47.2	20.0	10.3	37.5	46.0	-8.5
Horizontal	826.307	48.1	20.0	13.9	42.0	46.0	-4.0
Vertical	220.386	40.5	20.0	9.8	30.3	46.0	-15.7
Vertical	527.384	48.8	20.0	6.8	35.6	46.0	-10.4
Vertical	838.501	42.3	20.0	16.3	38.6	46.0	-7.4

NOTES:

1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Loop antenna is used for the emissions below 30 MHz.

5. Worst case band edge emission is 44.1 dBµV/m (80.1- 36.0) which is below the limit.

6. Limits at 3 meter for radiated emissions below 30 MHz is converted from the Limits at 30 meter according to the Formula:

$$\text{Limits}_{\text{at 3 meter (dBµV/m)}} = \text{Limits}_{\text{at 30 meter (dBµV/m)}} + 40 \log(30/3)$$

3.4 Conducted Emission at Mains Terminal

3.4.1 Conducted Emissions Configuration Photograph

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

3.4.2 Conducted Emissions

Worst Case Conducted Configuration
at
0.186 MHz

Judgement: Passed by 11.6 dB margin

TEST PERSONNEL:

Sign on file

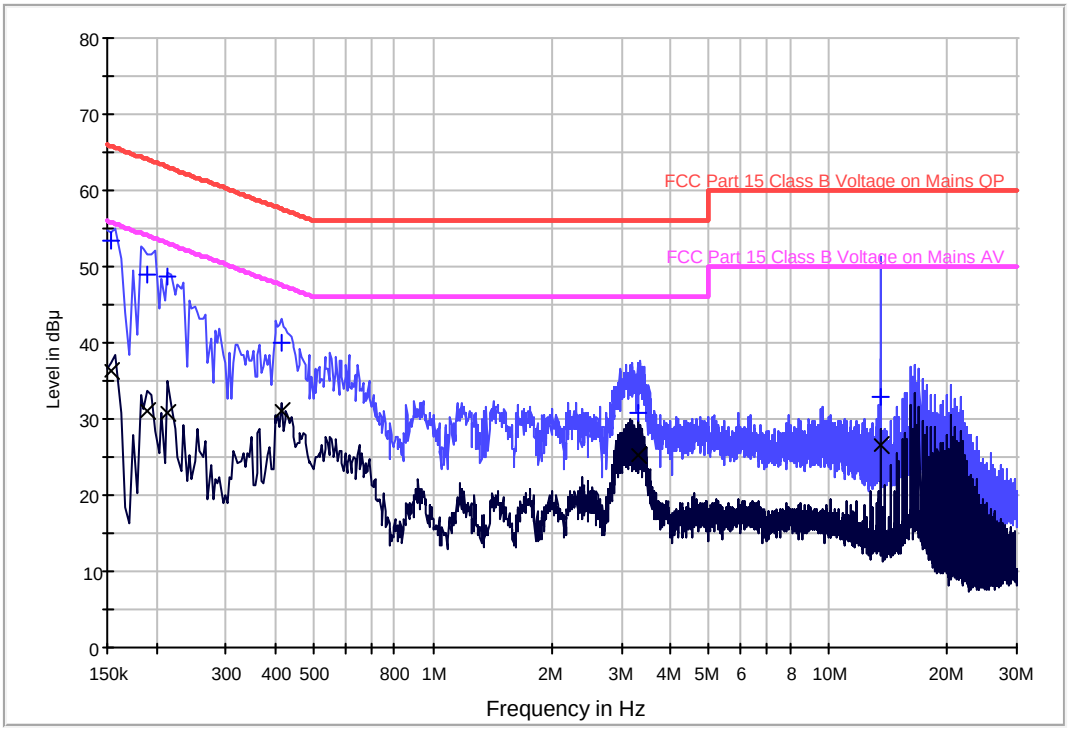
Harry Wu Engineer
Typed/Printed Name

October 26, 2015
Date

Applicant: Qbic technology Co., Ltd
Date of Test: October 26, 2015
Model: TD-1050
Sample: 1/1
Test worst case mode: Transmit

Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	53.3	L1	9.8	12.5	65.8
0.190000	49.0	L1	9.8	15.0	64.0
0.214000	48.8	L1	9.8	14.2	63.0
0.414000	40.1	L1	9.9	17.5	57.6
3.290000	30.9	L1	10.0	25.1	56.0
13.570000	32.9	L1	10.1	27.1	60.0

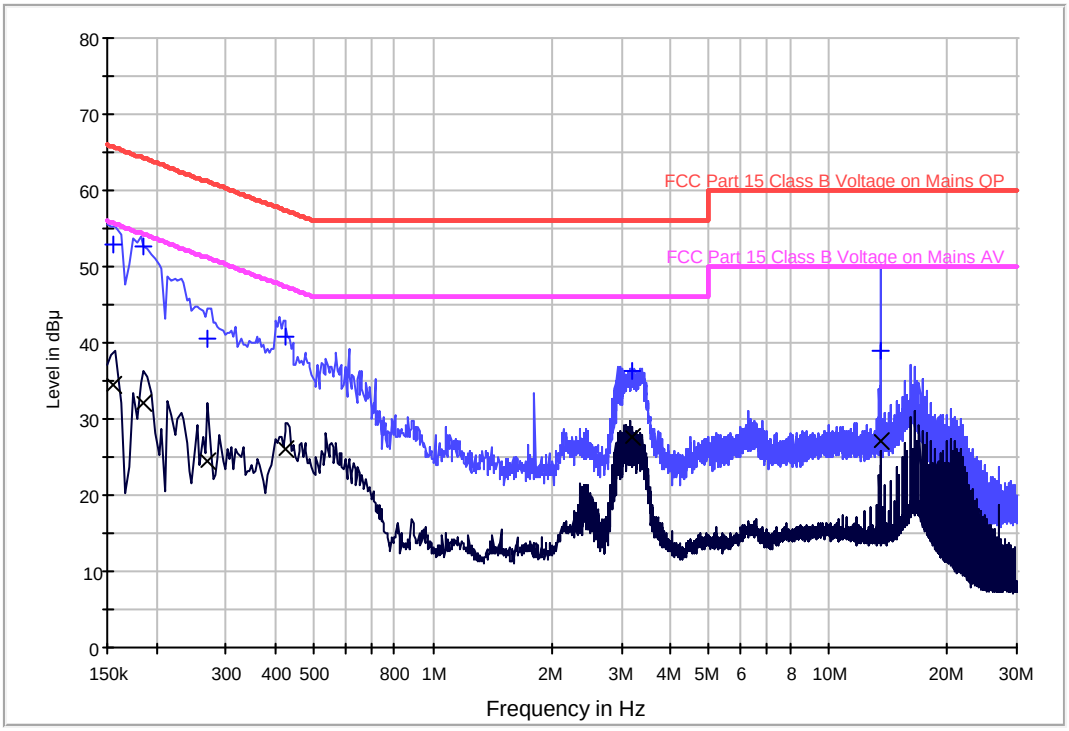
Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	36.2	L1	9.8	19.6	55.8
0.190000	31.0	L1	9.8	23.0	54.0
0.214000	30.8	L1	9.8	22.2	53.0
0.414000	31.1	L1	9.9	16.5	47.6
3.290000	25.3	L1	10.0	20.7	46.0
13.570000	26.7	L1	10.1	23.3	50.0

Applicant: Qbic technology Co., Ltd
Date of Test: October 26, 2015
Model: TD-1050
Sample: 1/1
Test worst case mode: Transmit

Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	53.0	N	10.2	12.8	65.8
0.186000	52.6	N	10.1	11.6	64.2
0.270000	40.6	N	10.2	20.5	61.1
0.426000	40.7	N	10.2	16.6	57.3
3.202000	36.4	N	10.3	19.6	56.0
13.566000	39.0	N	10.4	21.0	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	34.5	N	10.2	21.3	55.8
0.186000	32.1	N	10.1	22.1	54.2
0.270000	24.5	N	10.2	26.6	51.1
0.426000	26.2	N	10.2	21.1	47.3
3.202000	27.7	N	10.3	18.4	46.0
13.566000	27.1	N	10.4	22.9	50.0

3.5 Frequency Stability

Procedure: 15.225(e), Part 2.1055.

If required, the operating or transmitting frequency of an intentional radiator should be measured in accordance with the following procedure to ensure that the device operates outside certain precluded frequency bands and within the frequency range. No modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

The frequency stability of the transmitter is measured by:

a) Temperature: The temperature is varied from -20°C to + 50°C using an environmental chamber.

b) for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C.

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Measurement Result:

Voltage (%)	Power	Temperature (°C)	Frequency (MHz)	Limit	Result
100	120Vac	-20	13.559625	±0.01% (±1356Hz)	Pass
		-10	13.559621		Pass
		0	13.559630		Pass
		10	13.559752		Pass
		20	13.559914		Pass
		30	13.560024		Pass
		40	13.560030		Pass
		50	13.560028		Pass

Temperature (°C)	Power	Voltage (%)	Frequency (MHz)	Limit	Result
20	120Vac	85	13.560011	±0.01% (±1356Hz)	Pass
		90	13.559943		Pass
		95	13.559950		Pass
		100	13.560010		Pass
		105	13.559993		Pass
		110	13.560017		Pass
		115	13.559994		Pass

Note: The EUT is supplied by AC/DC adaptor through AC 120V/60Hz.

4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 Product Labelling

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 Technical Specifications

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.
This manual will be provided to the end-user with each unit sold/leased in the United States.

8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandwidth.

8.1 Measured Bandwidth

The plot of bandwidth which shows the fundamental emission is confined in the specified band. The emission of the fundamental is 80.1dBuV/m at 3m and it is below the limit of 90.5dBuV/m in the range of (13.410-13.553MHz and 13.567-13.710MHz) and the limit of 80.5dBuV/m in the frequency range of (13.110-13.410MHz and 13.710-14.010MHz). We cannot find any emission higher than the fundamental emission. Therefore they meet the requirement of Section 15.225(a), (b), (c).

A plot of the worst-case bandwidth as detected in this manner are saved with filename: bw.pdf. And it also shows that the emission is at least 36.01 dB below the carrier level at the band edge (13.110–14.010 MHz). It meets the requirement of Section 15.225 (d).

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (13.110–14.010 MHz) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

8.2 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2009.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz from the frequency band 150kHz to 30MHz.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz up to the 1GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

8.2 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 2009.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2).

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

9.0 **Equipment List**

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	14-Jun-2015	14-Jun-2016
SZ185-01	EMI Receiver	R&S	ESCI	100547	7-Feb-2015	7-Feb-2016
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	29-Apr-2015	29-Apr-2016
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	19-Apr-2015	19-Apr-2016
SZ062-02	RF Cable	RADIALL	RG 213U	--	27-Jun-2015	27-Dec-2015
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	27-Jun-2015	27-Dec-2015
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	27-Jun-2015	27-Dec-2015
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	1-Nov-2014	1-Nov-2015
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	1-Nov-2014	1-Nov-2015
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	24-Jun-2015	24-Jun-2016
SZ188-03	Shielding Room	ETS	RFD-100	4100	23-Aug-2014	23-Aug-2016
SZ016-12	Temperature & Humidity Chamber	Terchy	MHK-120NK	AB0105	7-Feb-2015	7-Feb-2016
SZ006-10	AC Power Source	OUYUAN	APW-150N	950600	28-Sep-2015	28-Mar-2016