Report No.: GZ12030795-1

TEST REPORT

Applicant Name & Address	:	General Electric Company Appliance Park, AP2-126, Louisville, KENTUCKY
Sample Description		
Product	:	Window Air Conditioner
FCC ID	:	END-001
Model No.	:	AEG10AQQ1, AEG10AQH1
Electrical Rating	:	120VAC, 60Hz, 940W
Frequency	:	2.4GHz Zigbee Transceiver
Date Received	:	15 Mar.,2012
Date Test Conducted	:	21 Mar.,2012 – 22 Mar.,2012
Test standards	:	**FCC Part 15: 2010**
Test Result	:	Pass
Conclusion	:	The submitted samples complied with the above rules/standards.
Remark	:	None.

**********End of Page**********

Prepared and Checked By:

Helen Ma

Helen Ma
Project Engineer
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Approved By:

Signature
Carrie Chen
Technical Supervisor
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30 Mar.,,2012 ***Date***

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CONTENT

1.0 Summary of Test

General Electric Company
MODEL: AEG10AQQ1, AEG10AQH1
FCC ID: END-001

TEST	REFERENCE	RESULTS
Max. Output power	15.247(b)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Internal Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a Window Air Conditioner with internal Zigbee module operating at 2.405-2.470GHz, 14 channels with 5MHz channel spacing. The EUT has a IR controller for operation, and it has a button “Over ride”, it will be connected with Nucleus after the button being pressed and then be controlled by Nucleus.
Frequency List:
2405MHz, 2410MHz, 2415MHz, 2420MHz, 2425MHz, 2430MHz, 2435MHz, 2440MHz, 2445MHz, 2450MHz, 2455MHz, 2460MHz, 2465MHz, 2470MHz
Type of Modulation: Zigbee.
Antenna Type: Internal Integral Antenna.

For electronic filing, the circuit description is saved with filename: Technical description.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of:
DTS- Part 15 Digital Transmission Systems (Zigbee transmitter portion)

Remaining portions are subject to the following procedures:
1. Receiver portion of Zigbee: exempt from technical requirement of this Part.
2. The Window air conditioner function: exempt from FCC requirement.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003) and KDB 558074. 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. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are **Interterk Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, 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.

3.0 System Test Configuration

3.1 Justification

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, AC power line was manipulated to produce worst case emissions. It was powered by 120V/60Hz supply.

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

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 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed 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.

3.2 EUT Exercising Software

There was no special software to exercise the device.

3.3 Special Accessories

No special accessories used.

3.4 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.

3.5 Equipment Modification

Any modifications installed previous to testing by General Electric Company Will be incorporated in each production model sold / leased in the United States.

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

3.6 Support Equipment List and Description

This product was tested in the following configuration:

This product was tested in a standalone configuration

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

[ ] The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

[×] The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW> 6dB bandwidth and power was read directly in dBm. External attenuation and cable loss were compensated from the measured value.

Test mode: transmitting mode

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

Antenna Gain = -2.82dBi		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2405.00	19.40	87.10
Middle Channel: 2439.04	18.12	64.86
High Channel: 2469.18	17.27	53.33

Cable loss: 1.0 dB External Attenuation: 10 dB

EUT dBm max. output level = 19.40dBm

For electronic filing, the above plots are saved with filename: Conducted Power.pdf

For RF Safety, the information is saved with filename: RF exposure info.pdf.

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Test mode: transmitting mode

Frequency (MHz)	6 dB Bandwidth (MHz)
2405.08	1.61
2439.59	1.60
2469.58	1.60

Limit: at least 500 kHz

Refer to the following plots for 6 dB bandwidth sharp:

For electronic filing, the above plots are saved with filename: 6dB.pdf

4.3 Maximum Power Density Reading, FCC Rule 15.247(e) :

The spectrum analyzer RES BW was set to 3kHz. In order to look for a peak, the START and STOP frequencies were set to the band edges of the maximum output passband. If there is no clear maximum amplitude in any given portion of the band, it may be necessary to make measurements at a number of bands defined by several START and STOP frequency pairs.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Test mode: transmitting mode

Frequency (MHz)	Power Density (dBm/3kHz)
2404.397	4.39
2440.267	3.53
2469.940	2.73

Frequency Span = 1.5MHz

Sweep Time = Frequency Span/3kHz
= 500 seconds

Cable loss: 1.0 dB External Attenuation: 10 dB

Peak Power Density max.(at 2404.397MHz) = 4.39 dBm/3kHz

Limit: 8dBm/ 3 kHz

Refer to the following plots for power density data:

Plot 4: Low Channel power density
Plot 5: Middle Channel power density
Plot 6: High Channel power density

For electronic filing, the above plots are saved with filename: Maxpd.pdf

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Test mode: transmitting mode

The plots showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

For the electronic filing, the above Channel Emissions plots are saved with filename: Outofbandcon.pdf

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[×] Not required, since all emissions are more than 20dB below fundamental
[ ] See attached data sheet

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

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. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.7 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
FS = RA + Correct Factor + 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
Correct Factor = AF + CF – AG + PD

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 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB

Correct Factor = 7.4 + 1.6 – 29.0 + 0 = -20dB
FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dBμV/m
Level in mV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

4.8 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at
4810.000MHz

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

4.9 Radiated Emission Data

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 0.4 dB margin

Test mode: transmitting mode

Radiated Emissions (<1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	31.940	4.6	17.6	22.2	40.0	-17.8
Horizontal	43.095	4.5	11.4	15.9	40.0	-24.1
Horizontal	263.770	4.5	13.5	18.0	46.0	-28.0
Vertical	43.580	15.4	11.3	26.7	40.0	-13.3
Vertical	47.945	15.1	9.2	24.3	40.0	-15.7
Vertical	62.010	11.5	6.1	17.6	40.0	-22.4

NOTES:
1. Quasi-Peak detector is used except for others stated.
2. All measurements were made at 3 meters. 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 value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

Test mode: transmitting mode

Radiated Emissions(2405MHz)

Polarization	Frequency (MHz)	Reading (dBμV)	Correct Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4810.000	27.1	36.7	63.8	74.0	-10.2
Horizontal	*7215.000	17.2	36.8	54.0	74.0	-20.0
Horizontal	**2389.600	15.4	36.6	52.0	74.0	-22.0

Polarization	Frequency (MHz)	Reading (dBμV)	Correct Factor (dB)	Net at 3m (dBμV/m)	AV Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4810.000	16.9	36.7	53.6	54.0	-0.4
Horizontal	*7215.000	4.1	36.8	40.9	54.0	-13.1
Horizontal	**2389.600	3.3	36.6	39.9	54.0	-14.1

Radiated Emissions(2440MHz)

Polarization	Frequency (MHz)	Reading (dBμV)	Correct Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4880.000	25.1	36.7	61.8	74.0	-12.2
Horizontal	*7320.000	17.1	36.8	53.9	74.0	-20.1

Polarization	Frequency (MHz)	Reading (dBμV)	Correct Factor (dB)	Net at 3m (dBμV/m)	AV Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4880.000	15.2	36.7	51.9	54.0	-2.1
Horizontal	*7320.000	4.7	36.8	41.5	54.0	-12.5

Radiated Emissions(2470MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4940.000	21.1	36.7	57.8	74.0	-16.2
Horizontal	*7410.000	9.6	36.8	56.4	74.0	-17.6
Horizontal	**2483.6	16.5	36.6	53.1	74.0	-20.9

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Net at 3m (dBµV/m)	AV Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4940.000	12.7	36.7	49.4	54.0	-4.6
Horizontal	*7410.000	6.3	36.8	43.1	54.0	-10.9
Horizontal	**2483.6	3.3	36.6	39.9	54.0	-14.1

NOTES: 1. Peak and AV detectors are used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

** Emission on the bandedge meets the requirement of Section 15.209.

4.10 Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at 0.466 MHz

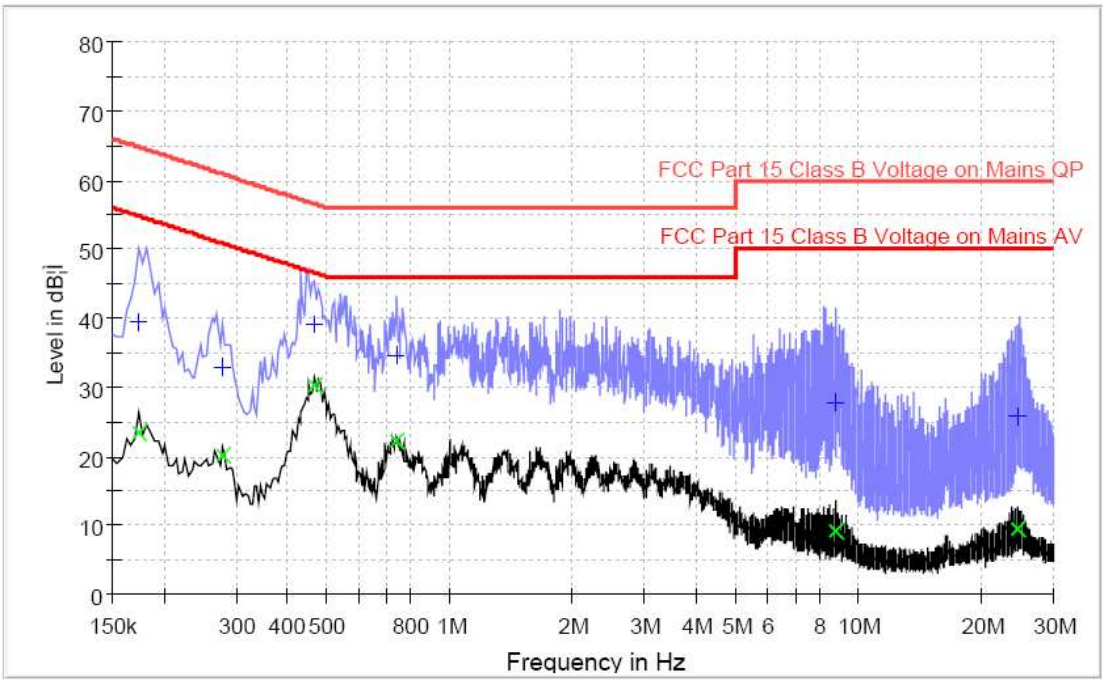
For electronic filing, the worst case conducted emission configuration photograph is saved with filename: Conducted photos.pdf.

4.11 Conducted Emission Data

Judgement: Passed by 17.4 dB margin

Test mode: transmitting mode

Conducted Emission Test - FCC



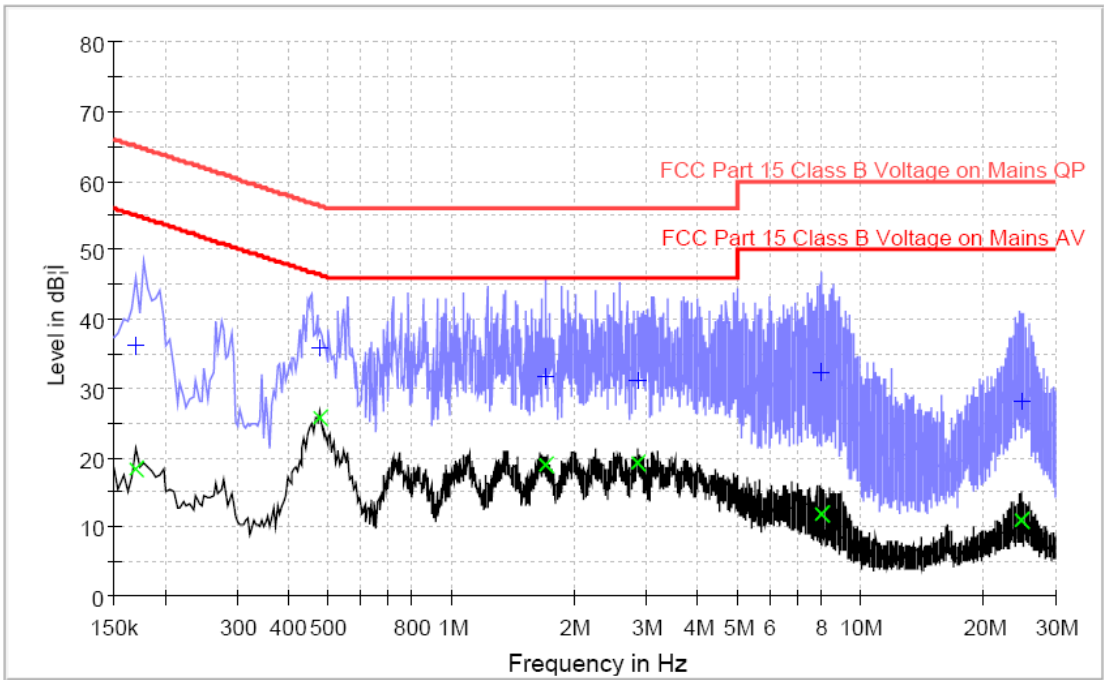
Result Table-QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr.	Margin (dB)	Limit (dB µ V)
0.174000	39.3	L1	9.6	25.5	64.8
0.278000	32.8	L1	9.6	28.1	60.9
0.466000	39.2	L1	9.6	17.4	56.6
0.742000	34.7	L1	9.7	21.3	56.0
8.818000	27.9	L1	9.9	32.1	60.0
24.606000	25.7	L1	10.1	34.3	60.0

Result Table-AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.174000	23.3	L1	9.6	31.5	54.8
0.278000	20.2	L1	9.6	30.7	50.9
0.466000	30.4	L1	9.6	16.2	46.6
0.742000	22.3	L1	9.7	23.7	46.0
8.818000	9.1	L1	9.9	40.9	50.0
24.606000	9.5	L1	10.1	40.5	50.0

Conducted Emission Test - FCC



Result Table-QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr.	Margin (dB)	Limit (dB µ V)
0.170000	36.1	N	9.6	28.9	65.0
0.478000	35.7	N	9.6	20.7	56.4
1.698000	31.7	N	9.8	24.3	56.0
2.858000	31.2	N	9.8	24.8	56.0
8.002000	32.4	N	10.0	27.6	60.0
24.770000	28.0	N	10.2	32.0	60.0

Result Table-AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.170000	18.3	N	9.6	36.7	55.0
0.478000	25.7	N	9.6	20.7	46.4
1.698000	19.0	N	9.8	27.0	46.0
2.858000	19.3	N	9.8	26.7	46.0
8.002000	11.9	N	10.0	38.1	50.0
24.770000	10.8	N	10.2	39.2	50.0

4.12 Transmitter Duty Cycle Calculation and 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 SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: External photos.doc & Internal photos.pdf.

6.0 Product Labelling

For electronic filing, the FCC ID label artwork and location is saved with filename: Label and location.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: Block diagram.pdf and Circuit diagram.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: User manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	16-Sep-11	16-Sep-12
SZ061-08	Horn Antenna	ETS	3115	00092346	16-Sep-11	16-Sep-12
SZ185-01	EMI Receiver	R&S	ESCI	100547	09-Mar-12	09-Mar-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	09-Mar-12	09-Mar-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	09-Mar-12	09-Mar-13
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	07-Mar-12	07-Mar-13
SZ062-02	RF Cable	RADIALL	RG 213U	--	26-Sep-11	26-Sep-12
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	17-Sep-11	17-Sep-12
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	17-Sep-11	17-Sep-12
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	13-Nov-11	13-Nov-12
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	13-Nov-11	13-Nov-12
SZ188-03	Shielding Room	ETS	RFD-100	4100	17-Sep-11	17-Sep-12
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	26-Sep-11	26-Sep-12
SZ070-01	Attenuator	Huber Suhner	10dB	--	05-Nov-11	05-May-12