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TEST REPORT For FCC

Test Report No.	:	2010120048
Date of Issue	:	March 14, 2011
FCC ID	:	WLFSTM-7700
Model/Type No.	:	STM-7700
Kind of Product	:	Industrial PDA
Rule Part(s)	:	§24(E), §22(H), , §15(C), §2
TX Frequency Range	:	824.2 - 848.8 MHz(GSM850)/1850.2 - 1909.8 MHz(PCS1900)
RX Frequency Range	:	869.2 - 893.8 MHz(GSM850)/1930.2 - 1989.8 MHz(PCS1900)
Applicant	:	Woongjin System & Technology Co., Ltd.
Applicant Address	:	18th Floor. Ace High-End Tower 3, 371-50, Gasan-dong, Geumcheon-gu, Seoul, Korea
Manufacturer	:	Woongjin System & Technology Co., Ltd.
Manufacturer Address	:	18th Floor. Ace High-End Tower 3, 371-50, Gasan-dong, Geumcheon-gu, Seoul, Korea
Contact Person	:	Ki Seung Jung / Principal Research Engineer
Telephone	:	+82-2-2081-9321
Received Date	:	November 24, 2010
Test period	:	Start : November 24, 2010 End : March 14, 2011
Test Results	:	☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Y. T. Lee

Lee Young-taek
Test Engineer
Date: March 14, 2011

Reviewed by

Y. J. Park

Young-Joon, Park
Technical Manager
Date: March 14, 2011

REPORT REVISION HISTORY

Date	Revision	Revision
December 13, 2010	Issued (2010120048)	0.2
February 14, 2011	Correction	0.3
March 14, 2011	Correction	0.4

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1.0 General Product Description

Trade name	:	Industrial PDA
Model name	:	STM-7700
Serial number	:	Prototype
EUT condition	:	Pre-production, not damaged
GSM / GPRS Module	:	Telit Communications S.p.A. FCC ID: RI7GC864Q2
Antenna type	:	GSM850 / PCS1900 INTENNA Gain: -0.9 dBi for GSM850, Gain: 1.3 dBi for PCS1900 (Max)
RF output power	:	GSM850 31.2 dBm ERP / PCS1900 30.2 dBm EIRP
Modulation	:	GMSK
Power Source	:	Rechargeable Li-ion Battery Pack 7.4 Vdc/1800 mAh

1.1 Tested Frequency

Frequency	Channel	GSM850	Channel	PCS1900
Low frequency (MHz)	128	824.2	512	1850.2
Middle frequency (MHz)	190	836.6	661	1880.0
High frequency (MHz)	251	848.8	810	1909.8

1.2 Test Conditions

Operating Mode	Description
GSM850	A communication link is established between the EUT and CMU200. The EUT is operated at its maximum rated output power: 33 dBm (power class 4 = power control level 5)
PCS1900	A communication link is established between the EUT and CMU200. The EUT is operated at its maximum rated output power: 30 dBm (power class 1 = power control level 0)
Print	Continuous printing mode connected via USB cable between the EUT and Notebook

1.3 Model Differences

Not applicable

1.4 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.5 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
AC ADAPTER	NingBo ISO Electronics Co., Ltd.	KPA-045E	-	-
Cradle	Woongjin System & Technology Co, Ltd.	-	-	-
Personal Computer	Samsung Electronics Co., Ltd.	DB-A150	ZMSI96BSB00125F	DoC
LCD Monitor	VS17	Lite-ON Technology Corp.	CNN5130QMC	DoC
Keyboard(PS/2)	Samsung Electro-Mechanics Co., Ltd.	SEM-DT35	33008101	DoC
Mouse(USB)	Microsoft Corporation	Optical Mouse USB/PS2 Compatible	69657-492-4974533-40420	DoC

1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.

1.8 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	805871
JAPAN	**VCCI**	10 meter Open Area Test Site and one conducted site.	R-948, C-986 T-1843
KOREA	**KCC**	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	No. 51, KR0025
International	**KOLAS**	EMC	

2.0 Summary of tests

	Parameter	Limit	Test Condition	Status (note1)
I. FCC Part Section(s)				
GSM 850/1900 Terminal equipment is certified by FCC(FCC ID: RI7GC864Q2) Refer to the test report of FCC ID: RI7GC864Q2				
II. Additional items				
22.913	Effective Radiated Power	-	Radiated	C
24.232	Equivalent Isotropic Radiated Power	-	Radiated	C
2.1053	Field strength of spurious radiation.	-	Radiated	C
15.207	AC Conducted Emissions	EN 55022	Line Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

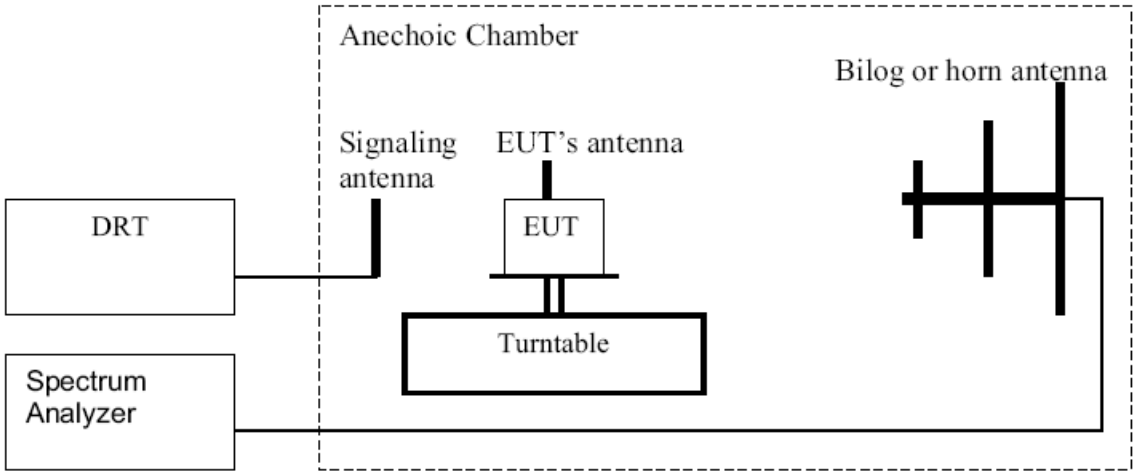
Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
ANSI/TIA-603-C : 2004

2.1 Effective Radiated Power(ERP)

FCC Part
FCC Part 22.913(a)

Test Measurement procedure:
Based on ANSI TIA-603-C Section 2.2.17.2



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a vertical orientation.
2. Adjust the settings of the Digital Radio communication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360. Record the peak level in dBm.
5. Replace the EUT with a vertically polarized substitution antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator.
7. The frequency of the signal generator shall be adjusted to the measurement frequency.
8. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the EUT is obtained in the test receiver.
9. Determine the ERP using the following equation:
ERP (dBm) = Power supplied by the signal generator
+ Gain of the substitution antenna
- Cable loss between the signal generator and the substitution antenna.
10. Determine the EIRP using the following equation:
EIRP (dBm) = ERP (dBm) + 2.14 (dB)
11. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
12. This measurement shall be repeated with horizontal polarization.

Test Results

Test mode : GSM 850

Frequency (MHz)	Channel No.	S·G Level (dBm)	Cable Loss(dB)	substitution antenna Gain (dB)	ERP(dBm)
824.2	128	28.13	1.30	4.37	31.2
836.6	190	27.52	1.35	4.63	30.8
848.8	251	27.52	1.39	4.77	30.9

Note. * S·G : Signal Generator

2.2 Equivalent Isotropic Radiated Power(EIRP)

FCC Part
FCC Part 24.232

Test Method Used
Based on ANSI TIA-603-C Section 2.2.17.2

Test Results

Test mode : PCS 1900

Frequency (MHz)	Channel No.	S·G Level (dBm)	Cable Loss(dB)	substitution antenna Gain (dB)	EIRP(dBm)
1850.2	512	24.42	1.88	7.36	29.9
1880.0	661	24.58	1.76	7.38	30.2
1909.8	810	24.49	1.88	7.39	30.0

Note. * S·G : Signal Generator

2.3 Field strength of spurious radiation.

FCC 2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

Test measurement procedure:

Based on ANSI TIA-603-C

The EUT was placed on a turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration

Limit

- FCC 22.917 Emission limitations for cellular.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

Out of band emissions. 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.

- FCC 24.238 Emission limits.

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log(P) dB.

Test Results(GSM850)

EUT	INDUSTRIAL PDA	Test Mode	With Cradle(Worst Case)
Model	STM-7700	Frequency Range	30 MHz – 10 GHz
Channel	Channel 128	Detector function	Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

Test Data – GSM

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss(dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1649.00	V	-33.73	1.81	7.23	-28.31	-13.0	15.31	Complied

Test Data – GPRS

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss(dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1648.00	V	-34.33	1.81	7.23	-28.91	-13.0	15.91	Complied

Test Results(GSM850)

EUT	INDUSTRIAL PDA	Test Mode	With Cradle(Worst Case)
Model	STM-7700	Frequency Range	30 MHz – 10 GHz
Channel	Channel 190	Detector function	Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

Test Data – GSM

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1673.2	V	-31.71	1.65	7.25	-26.11	-13.0	13.11	Complied

Test Data – GPRS

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1673.2	V	-31.83	1.65	7.25	-26.23	-13.0	13.23	Complied

Test Results(GSM850)

EUT	INDUSTRIAL PDA	Test Mode	Battery(Worst Case)
Model	STM-7700	Frequency Range	30 MHz – 10 GHz
Channel	Channel 251	Detector function	Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

Test Data – GSM

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1698.6	V	-32.65	1.83	7.26	-27.22	-13.0	14.22	Complied

Test Data – GPRS

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1698.6	V	-33.22	1.83	7.26	-27.79	-13.0	14.79	Complied

Test Results(PCS1900)

EUT	INDUSTRIAL PDA	Test Mode	With Cradle(Worst Case)
Model	STM-7700	Frequency Range	30 MHz – 20 GHz
Channel	Channel 512	Detector function	Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

Test Data – GSM

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3700.4	V	-38.11	2.95	10.77	-30.29	-13.0	17.29	Complied
5550.6	V	-46.36	3.37	10.86	-38.87	-13.0	25.87	Complied

Test Data – GPRS

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3700.4	V	-38.15	2.95	10.77	-30.33	-13.0	17.33	Complied
5550.6	V	-45.96	3.37	10.86	-38.47	-13.0	25.47	Complied

Test Results(PCS1900)

EUT	INDUSTRIAL PDA	Test Mode	With Cradle(Worst Case)
Model	STM-7700	Frequency Range	30 MHz – 20 GHz
Channel	Channel 661	Detector function	Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

Test Data – GSM

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3760.0	V	-37.24	2.75	10.78	-29.21	-13.0	16.21	Complied
5640.0	V	-45.92	3.43	10.81	-38.54	-13.0	25.54	Complied

Test Data – GPRS

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3760.0	V	-37.41	2.75	10.78	-29.38	-13.0	16.38	Complied
5640.0	V	-46.08	3.43	10.81	-38.70	-13.0	25.70	Complied

Test Results(PCS1900)

EUT	INDUSTRIAL PDA	Test Mode	With Cradle(Worst Case)
Model	STM-7700	Frequency Range	30 MHz – 20 GHz
Channel	Channel 810	Detector function	Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

Test Data – GSM

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3819.6	V	-39.94	2.90	10.79	-32.05	-13.0	19.05	Complied
5729.4	V	-49.56	4.03	10.75	-42.84	-13.0	29.84	Complied

Test Data – GPRS

Freq. (MHz)	POL (H/V)	S·G Level (dBm)	Cable Loss (dB)	substitution antenna Gain (dB)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3819.6	V	-40.81	2.90	10.79	-32.92	-13.0	19.92	Complied
5729.4	V	-50.49	4.03	10.75	-43.77	-13.0	30.77	Complied

2.4 AC Conducted Emissions

Test Date
September 17, 2007

Test Location
Shielded Room

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

Measurement Data: Complies

Limit

- **15.207(a)**

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

Test Results

Model	STM-7700	Test Mode	GSM850 mode
Channel	251	Detector function	Quasi-Peak / Average

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.4515	44.4	12.4	Quasi-Peak

Test Data

[HOT]

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	50.4	1000.0	9.000	On	L1	10.1	15.6	66.0
0.163500	48.6	1000.0	9.000	On	L1	10.3	16.7	65.3
0.163500	50.6	1000.0	9.000	On	L1	10.3	14.7	65.3
0.406500	36.3	1000.0	9.000	On	L1	10.1	21.4	57.7
0.415500	39.2	1000.0	9.000	On	L1	10.1	18.3	57.5
0.438000	43.9	1000.0	9.000	On	L1	10.2	13.2	57.1
9.271500	36.1	1000.0	9.000	On	L1	9.8	23.9	60.0
18.496500	42.4	1000.0	9.000	On	L1	9.9	17.6	60.0
21.057000	34.0	1000.0	9.000	On	L1	10.0	26.0	60.0
29.463000	32.4	1000.0	9.000	On	L1	10.1	27.6	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	22.9	1000.0	9.000	On	L1	10.1	33.1	56.0
0.451500	26.8	1000.0	9.000	On	L1	10.2	20.0	46.8
0.456000	26.5	1000.0	9.000	On	L1	10.2	20.3	46.8
3.664500	16.0	1000.0	9.000	On	L1	9.8	30.0	46.0
7.431000	12.4	1000.0	9.000	On	L1	9.8	37.6	50.0
9.334500	25.7	1000.0	9.000	On	L1	9.8	24.3	50.0
15.855000	22.2	1000.0	9.000	On	L1	9.9	27.8	50.0
18.487500	34.7	1000.0	9.000	On	L1	9.9	15.3	50.0
21.052500	30.0	1000.0	9.000	On	L1	10.0	20.0	50.0
29.458500	27.1	1000.0	9.000	On	L1	10.1	22.9	50.0

[NEUTRAL]

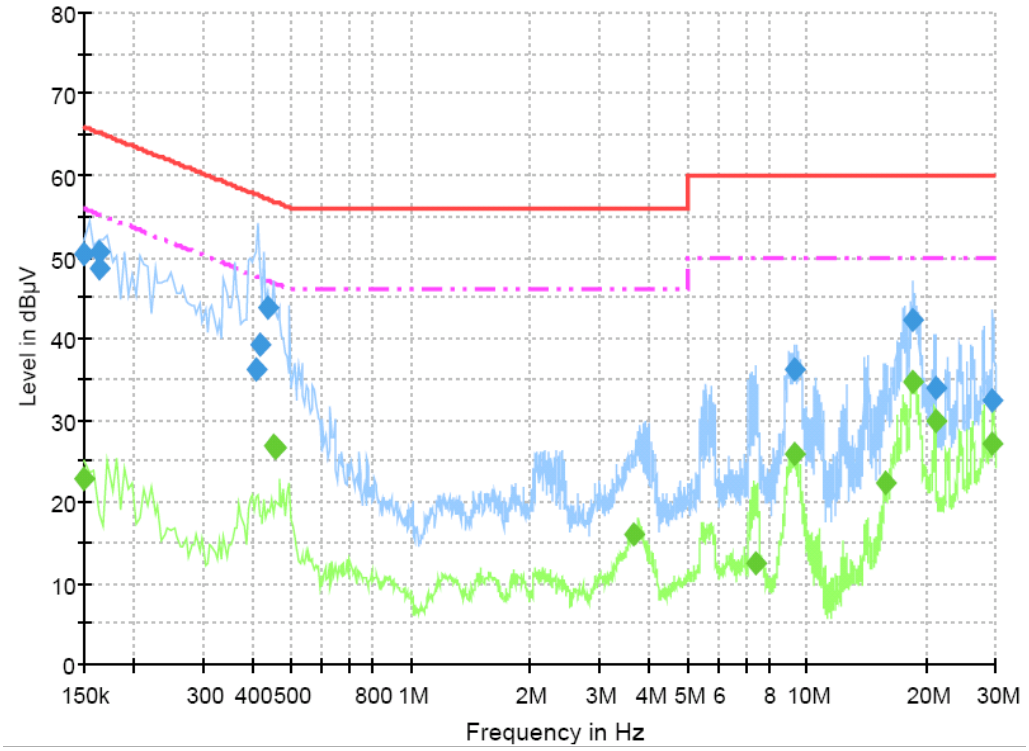
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	45.6	1000.0	9.000	On	N	10.2	19.9	65.5
0.163500	50.8	1000.0	9.000	On	N	10.3	14.5	65.3
0.168000	49.2	1000.0	9.000	On	N	10.3	15.9	65.1
0.217500	39.8	1000.0	9.000	On	N	10.0	23.1	62.9
0.424500	42.4	1000.0	9.000	On	N	10.1	15.0	57.4
0.433500	44.0	1000.0	9.000	On	N	10.1	13.2	57.2
0.451500	44.4	1000.0	9.000	On	N	10.2	12.4	56.8
9.334500	33.9	1000.0	9.000	On	N	9.8	26.1	60.0
18.379500	41.2	1000.0	9.000	On	N	10.0	18.8	60.0
29.791500	31.3	1000.0	9.000	On	N	10.2	28.7	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	23.9	1000.0	9.000	On	N	10.1	32.1	56.0
0.442500	20.9	1000.0	9.000	On	N	10.1	26.1	47.0
0.451500	21.5	1000.0	9.000	On	N	10.2	25.3	46.8
3.696000	16.8	1000.0	9.000	On	N	9.8	29.2	46.0
7.422000	18.8	1000.0	9.000	On	N	9.8	31.2	50.0
9.361500	25.2	1000.0	9.000	On	N	9.8	24.8	50.0
15.841500	22.2	1000.0	9.000	On	N	9.9	27.8	50.0
18.483000	35.4	1000.0	9.000	On	N	10.0	14.6	50.0
21.052500	29.5	1000.0	9.000	On	N	10.0	20.5	50.0
29.481000	27.5	1000.0	9.000	On	N	10.2	22.5	50.0

[HOT]



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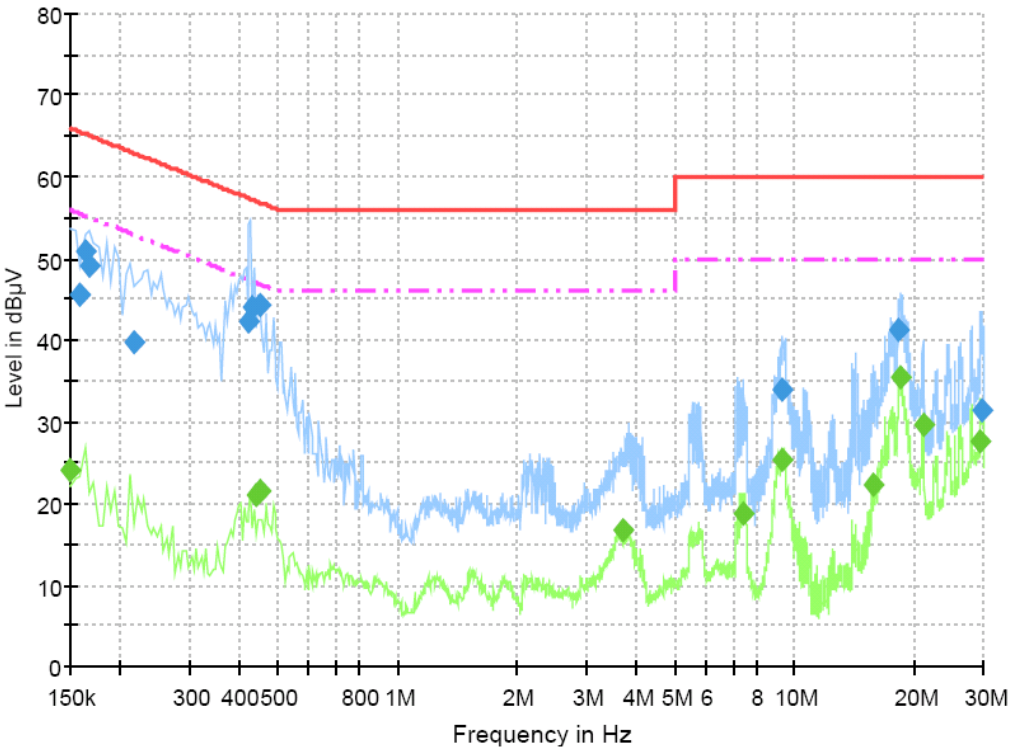

APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	2011-11-12
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2011-11-12
3	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2011-07-12
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2011-11-18
5	LOOP ANTENNA	EMCO	6502	9107-2652	2012-10-29
6	Attenuator	HP	8498A	1801A06913	2011-11-15
7	EPM Series Power Meter	HP	E4418A	GB38272734	2011-11-12
8	Power Sensor	HP	8487A	3318A03524	2011-07-12
9	Audio Analyzer	HP	8903B	2747A03432	2011-11-12
10	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2011-11-12
11	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2011-11-12
12	Modulation Analyzer	HP	8901B	3438A05228	2011-11-16
13	Attenuator	HP	8494A	3308A33351	2011-11-15
14	Temp&Humi Chamber	Kunpoong	JT-TH-556-1	9QE5-002	2012-11-14
15	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2011-11-12
16	EMC Analyzer	Agilent	E7405A	MY45110859	2012-02-11
17	Horn Antenna	ETS-Lindgren	3115	00078894	2012-12-18
18	Horn Antenna	ETS-Lindgren	3115	00078895	2012-12-18
19	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2011-09-18
20	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2011-09-18
21	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2011-03-31
22	PREAMPLIFIER	Agilent	8449B	3008A02307	2011-11-16
23	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2011-02-23
24	LISN	Rohde & Schwarz	ESH3-Z5	100207	2011-11-15
25	LISN	Rohde & Schwarz	ENV216	101151	2012-03-09
26	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2011-11-12
27	EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2012-02-09