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Report On

FCC Testing of the
Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular
Phone with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15B

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00158

Document 75914914 Report 07 Issue 1

September 2011



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REPORT ON

FCC Testing of the
Sharp CDMA SH113, Tri Band CDMA (BC0, BC3 and BC6) Cellular
Phone with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15B

Document 75914914 Report 07 Issue 1

September 2011

PREPARED FOR

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DATED

28 September 2011

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15B. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler



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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth,
WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15B



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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth, WLAN, FeliCa and GPS to the requirements of FCC CFR 47 Part 15B.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sharp Corporation
Model Number(s)	SHI13
Serial Number(s)	SSHFN000886
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B (2010)
Incoming Release Date	Application Form 09 August 2011
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	8723 05 September 2011
Start of Test	11 September 2011
Finish of Test	11 September 2011
Name of Engineer(s)	G Lawler



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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15B is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
AC Powered/USB				
2.1	15.107	AC Line Conducted Emissions	Pass	
2.2	15.109	Radiated Emissions	Pass	



1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	CDMA SHI13
Part Number	
FCC ID (if applicable)	APYHRO00158
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	Tri-Band CDMA(800MHz_BC0/3, 1900MHz_BC6) Cellular Phone with Bluetooth, W-LAN, FeliCa and GPS receiver enabled.

EXTREME TEMPERATURE RANGE over which the equipment is to be type tested
☐ -20°C to +55°C ☒ Other (2) ☐ Not applicable (no extreme temperature testing required)
Extreme temperature range for the host(s): -20C to +60C

(2) The equipment shall be tested over the following temperature ranges :

- a) 0°C to +35°C for equipment for indoor use only, or intended for used in areas where the temperature is controlled within this range.
- b) Over the extremes of the temperature range(s) of the declared host equipment(s) in case of plug-in radio devices.

TYPE OF ANTENNA	
☒ Integral	
Temporary RF connector provided:	☒ Yes ☐ No
☐ Antenna connector	
☐ Number of antenna assembly(ies) submitted	
Gain of the antenna intended for normal use:	
0	dBi for assembly identified as Bluetooth
0	dBi for assembly identified as WLAN
	dBi for assembly identified as
	dBi for assembly identified as
	dBi for assembly identified as

TRANSMITTER TECHNICAL CHARACTERISTICS		
TRANSMITTER OPERATING FREQUENCY RANGE(S)		
	FCC and/or Industry Canada	EU
Bluetooth	2402 to 2480 MHz	2402 to 2480 MHz
WLAN	2412 to 2462 MHz	2412 to 2472 MHz
FCC and/or Industry Canada (only)		
Highest Internally Generated Frequency 1401.6 MHz		



SPREAD SPECTRUM PARAMETERS			
☒ Bluetooth			
FHSS:	Channel	☒ 79 Other	EDR ☒ Yes ☐ No
Medium Access Protocol (Customer Declaration)			
"We have implemented Bluetooth protocol which satisfies the medium access protocol requirement of EN 300 328".			
☒ WLAN			
IEEE 802.11(b) – DSSS ☒			
IEEE 802.11(g) – OFDM ☒			
IEEE 802.11(n) – OFDM ☒			
Supported Spatial Streams		2.4 GHz	5GHz
Transmitter (Tx)		Yes	No
Receiver (Rx)		Yes	No
GI (Guard Interval)		☒ 800 ns ☐ 400 ns	
Band Width		☒ 20 MHz ☐ 40 MHz	
☐ Other Technology			
Direct Sequence ☐ Frequency Hopping ☐ Combined ☐ Other			
DSSS		Chip Sequence Length	bit
		Spectrum Width	MHz
FHSS		Total Number of Hops	
		Dwell Time	ms
		Bandwidth Per Hop	MHz
		Maximum Separation of Hops	MHz for ETSI EN 300 328
Other			
Medium Access Protocol (Customer Declaration)			
"We have implemented IEEE 802.11 (b/g/n) protocol which satisfies the medium access protocol requirement of EN 300 328".			



TRANSMITTER POWER CHARACTERISTICS				
Bluetooth				
Maximum Rated Transmitter Output				
Effective radiated power (for equipment with antenna connector)	0.0025	W		
Effective radiated power (for equipment with integral antenna)	0.0025	W		
Minimum Rated Transmitter Output				
Effective radiated power (for equipment with antenna connector)	0.00025	W		
Effective radiated power (for equipment with integral antenna)	0.00025	W		
Is transmitter intended for :				
Continuous duty	☒	Yes	☐	No
Intermittent duty	☐	Yes	☒	No
If intermittent state DUTY CYCLE				
Transmitter ON	seconds	Transmitter OFF	minutes	
Is continuous operation possible for testing purposes?				
	☒	Yes	☐	No
Is transmitter output power variable:				
	☐	Yes	☒	No
State during the test:				
Transmitter duty cycle	Tx on	Seconds	Tx Off	Seconds
Duty cycle (Tx on /(Tx on +Tx off))				
%				
☐ Continuously variable ☐ Stepped				
dB per step				
WLAN				
Maximum Rated Transmitter Output				
Effective radiated power (for equipment with antenna connector)	0.065(b/0.025(g.n	W		
	)			
Effective radiated power (for equipment with integral antenna)	0.065(b/0.025(g/n	W		
	)			
Minimum Rated Transmitter Output				
Effective radiated power (for equipment with antenna connector)		W		
Effective radiated power (for equipment with integral antenna)		W		
Is transmitter intended for :				
Continuous duty	☒	Yes	☐	No
Intermittent duty	☐	Yes	☐	No
If intermittent state DUTY CYCLE				
Transmitter ON	seconds	Transmitter OFF	minutes	
Is continuous operation possible for testing purposes?				
	☒	Yes	☐	No
Is transmitter output power variable:				
	☐	Yes	☒	No
State during the test:				
Transmitter duty cycle	Tx on	Seconds	Tx Off	Seconds
Duty cycle (Tx on /(Tx on +Tx off))				
%				
☐ Continuously variable ☐ Stepped				
dB per step				



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TRANSMITTER POWER SOURCE (3)				
☒ Common power source for transmitter and receiver				
☐ AC mains AC supply frequency (Hz) ☐ Single phase And / Or ☐ External DC supply Nominal voltage Extreme upper voltage Battery ☐ Nickel Cadmium ☐ Lead acid (Vehicle regulated) ☐ Alkaline ☒ Lithium ☐ Other Details : 4.0 Volts nominal. End point voltage as quoted by equipment manufacturer State voltage VAC Max Current Max Current Extreme lower voltage 3.7 V Hz Three phase A				

(3) If a transmitter and receiver use the same power source, this should be declared. In such cases only the box for the transmitter power source should be filled in.

AUTOMATIC EQUIPMENT SWITCH OFF	
If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.	
☒ Applies	3.4 V cut-off voltage
☐ Does not apply	



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RECEIVER POWER SOURCE (4)				
☐ AC mains	State voltage			
AC supply frequency	(Hz)	VAC	Max Current	Hz
☐ Single phase		☐ Three phase		
And / Or				
☐ External DC supply				
Nominal voltage		Max Current		A
Extreme upper voltage		Extreme lower voltage		
Battery				
☐ Nickel Cadmium				
☐ Lead acid (Vehicle regulated)				
☐ Alkaline				
☐ Lithium				
☐ Other Details :				
Volts nominal.				
End point voltage as quoted by equipment manufacturer				V

(4) If a transmitter and receiver use the same power source, this should be declared. In such cases only the box for the transmitter power source should be filled in.

AUTOMATIC EQUIPMENT SWITCH OFF	
If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.	
☐ Applies	V cut-off voltage
☐ Does not apply	

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature: Yasuhiro Kawauchi Name: Yasuhiro Kawauchi

Position held: Manager Date: 09, Aug.2011



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth, WLAN, FeliCa and GPS. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 4.0 V DC supply.

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1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



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SECTION 2

TEST DETAILS

FCC Testing of the
Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth,
WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15B



2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15B, Clause 15.107

2.1.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000886 - Modification State 0

2.1.3 Date of Test

11 September 2011

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The EUT is set up on a test table 800mm above a horizontal ground plane. A vertical ground plane is also required and is placed 400mm from the EUT. Where a EUT is floor standing it will be stood on but insulated from the ground plane by up to 12mm.

The EUT is powered through a Line Impedance Stabilisation Network (LISN) which is bonded to the ground plane. The EUT is located so that the distance between the EUT and the LISN is no less than 800mm. Where possible the cable between the mains input of the EUT and the LISN is 1m. Where this is not possible the cable is non inductively bundled with the bundle not exceeding 400mm in length.

A preliminary profile of the Conducted Emissions is obtained over the frequency range 150kHz to 30MHz. Any points of interest are noted for formal measurements.

During formal measurements, the measuring receiver is tuned to the emission of interest where Quasi – Peak and Average measurements are performed in a 9kHz Video and Resolution Bandwidth.

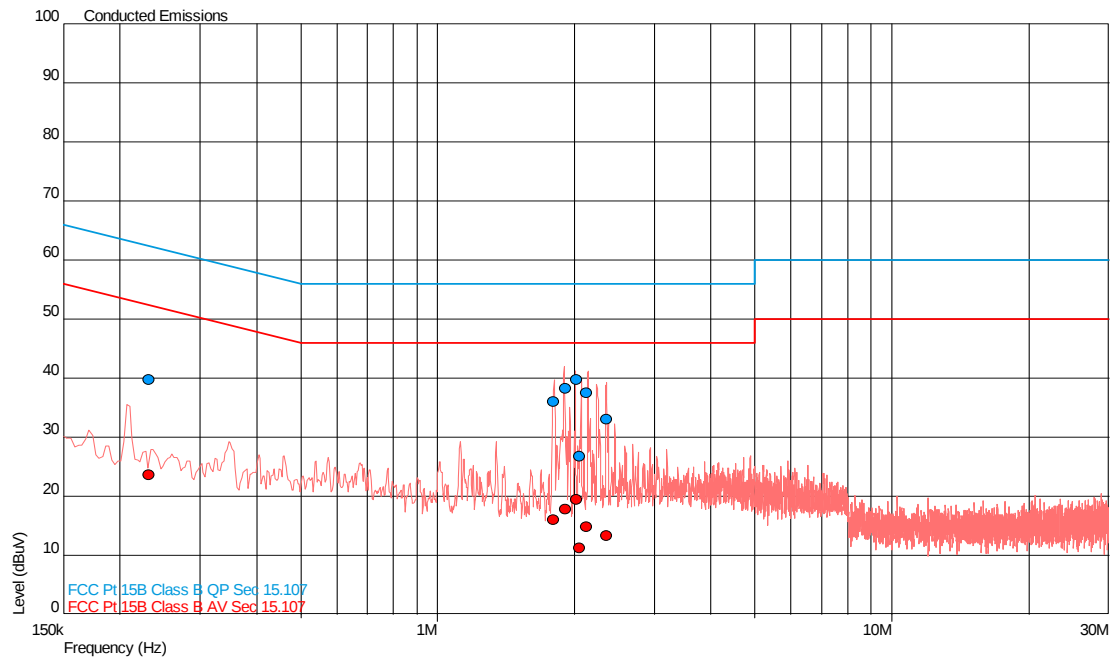
2.1.6 Environmental Conditions

Ambient Temperature	22.7°C
Relative Humidity	51.0%



2.1.7 Test Results

Live Line

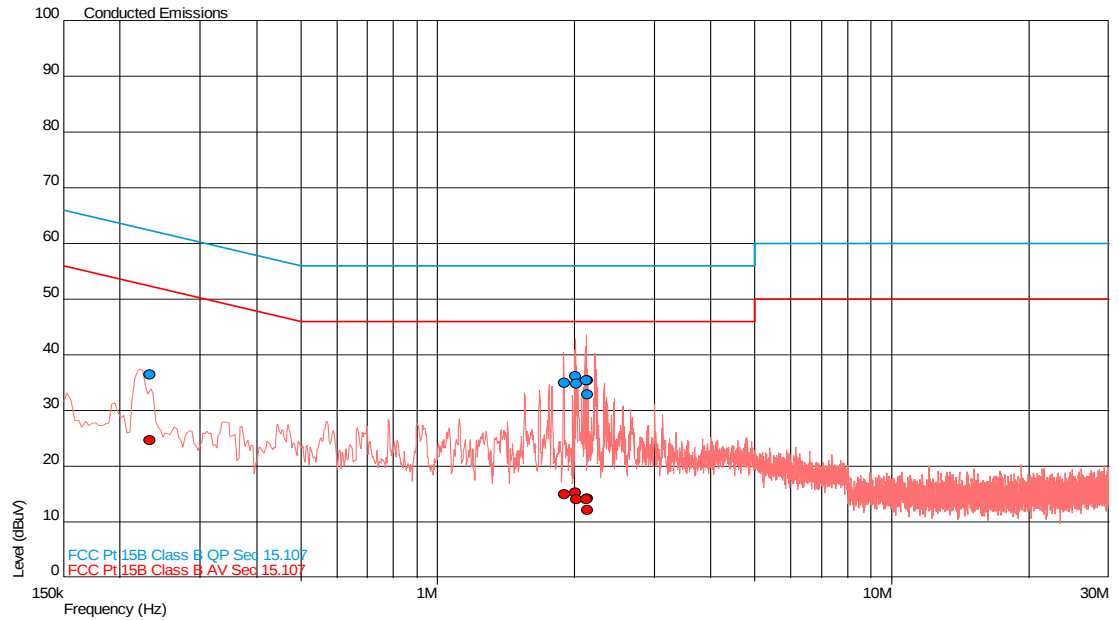


Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.232	39.7	62.4	-22.7	23.7	52.4	-28.7
1.797	36.0	56.0	-20.0	16.0	46.0	-30.0
1.911	38.3	56.0	-17.7	17.8	46.0	-28.2
2.021	39.8	56.0	-16.2	19.5	46.0	-26.5
2.050	26.8	56.0	-29.2	11.3	46.0	-34.7
2.130	37.5	56.0	-18.5	14.9	46.0	-31.1
2.358	33.1	56.0	-22.9	13.3	46.0	-32.7



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Neutral Line



Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.232	36.4	62.4	-25.9	24.7	52.4	-27.7
1.898	34.9	56.0	-21.1	15.0	46.0	-31.0
2.011	36.3	56.0	-19.7	15.2	46.0	-30.8
2.023	34.8	56.0	-21.2	14.1	46.0	-31.9
2.125	35.5	56.0	-20.5	14.1	46.0	-31.9
2.134	35.4	56.0	-20.6	14.3	46.0	-31.7
2.141	32.8	56.0	-23.2	12.2	46.0	-33.8



2.2 RADIATED EMISSIONS

2.2.1 Specification Reference

FCC CFR 47 Part 15B, Clause 15.109

2.2.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000886 - Modification State 0

2.2.3 Date of Test

11 September 2011

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

A preliminary profile of the Spurious Radiated Emissions is obtained up to the 5th harmonic of the EUT's highest internally generated fundamental frequency. For frequencies from 30MHz to 18GHz the EUT is placed on a test table 800mm above the ground plane. For frequencies above 18GHz, the EUT height is increased by 200mm to a height of 1000mm. This is to ensure the beam width of the measuring antenna gives sufficient vertical coverage of the EUT.

During characterisation the turntable azimuth is adjusted from 0 to 360 degrees with the measuring antenna in one polarity. It is then repeated for the other polarity. Any frequencies of interest are noted for formal measuring later. The distance from the measuring antenna to the boundary of the EUT is 3m. Above 18GHz this distance may be reduced to 1m.

During formal measurement the spectrum analyser is tuned to the frequency of the emission. The turntable azimuth is adjusted from 0 to 360 degrees to determine the point at which the maximum emission level occurs. Then the height of the measuring antenna is adjusted from a height of 1m to 4m to determine the height at which the maximum emission level occurs. Once the point of maximum emission has been determined the emission is measured. Emissions in the 30MHz to 1GHz range are measured using a CISPR Quasi – Peak detector function in a 120kHz bandwidth. Emissions in the range 1GHz to 40GHz require Peak and Average measurements. The Peak measurements are made using a peak detector with 1MHz Resolution and Video bandwidths. The average measurements employ a peak detector with a Resolution bandwidth of 1MHz and a Video bandwidth of 10Hz. If measurements are made at a 1m measuring distance, then 10dB is added to the specification limit.

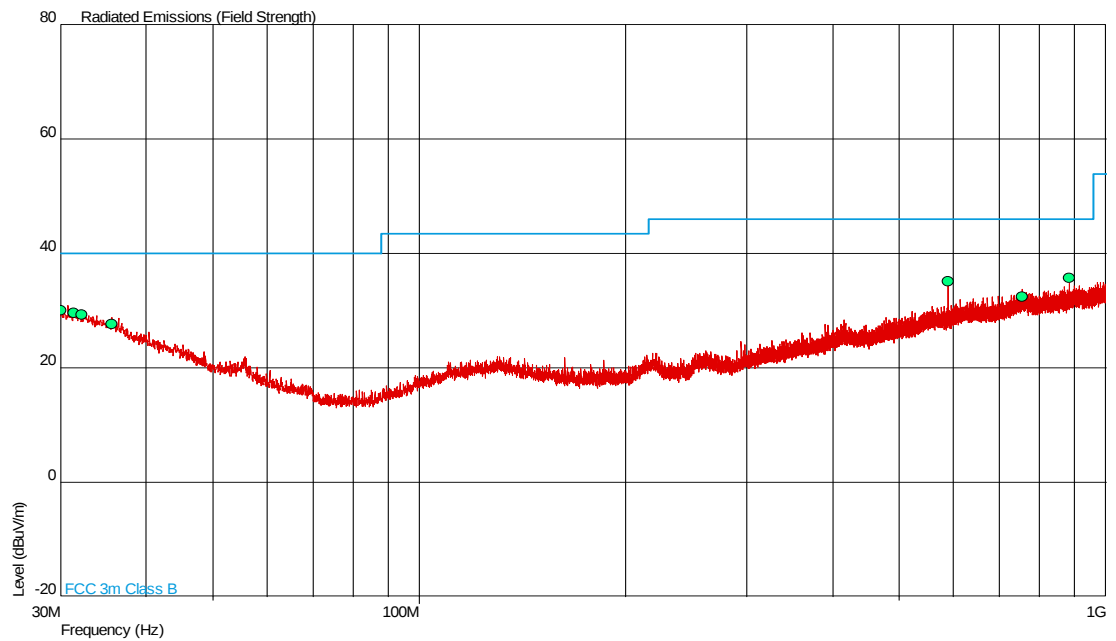
2.2.6 Environmental Conditions

Ambient Temperature	21.0°C
Relative Humidity	50.0%



2.2.7 Test Results

30 MHz to 1 GHz

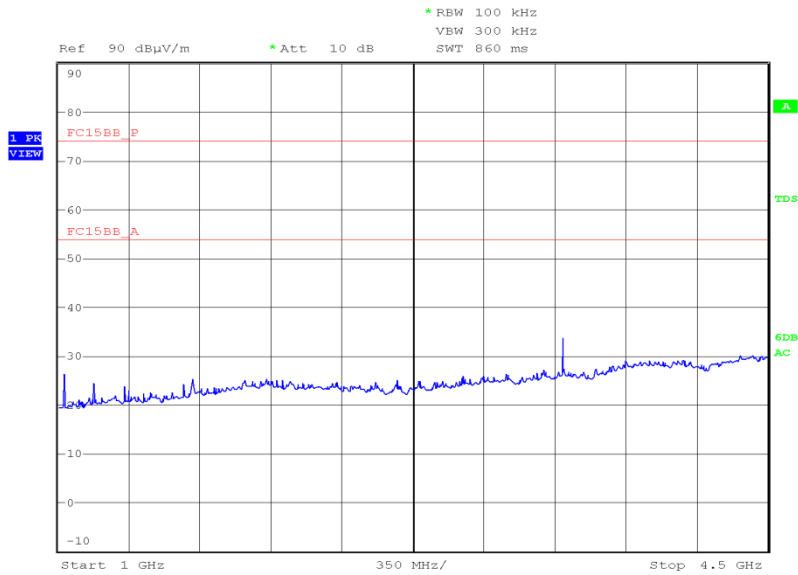


Frequency (MHz)	QP Level (dBμV/m)	QP Level (μV/m)	QP Limit (dBμV/m)	QP Limit (μV/m)	QP Margin (dBμV/m)	QP Margin (μV/m)	Angle (Deg)	Height (m)	Polarity
30.048	30.1	32.0	40.0	100	-9.9	68.0	260	1.51	Vertical
31.369	29.6	30.2	40.0	100	-10.4	69.8	0	1.00	Vertical
32.267	29.3	29.2	40.0	100	-10.7	70.8	329	1.00	Vertical
35.640	27.7	24.3	40.0	100	-12.3	75.7	217	1.00	Vertical
588.798	35.1	56.9	46.0	200	-10.9	143.1	183	1.00	Vertical
756.069	32.5	42.2	46.0	200	-13.5	157.8	0	1.00	Vertical
883.198	35.7	61.0	46.0	200	-10.3	139.0	259	1.00	Horizontal



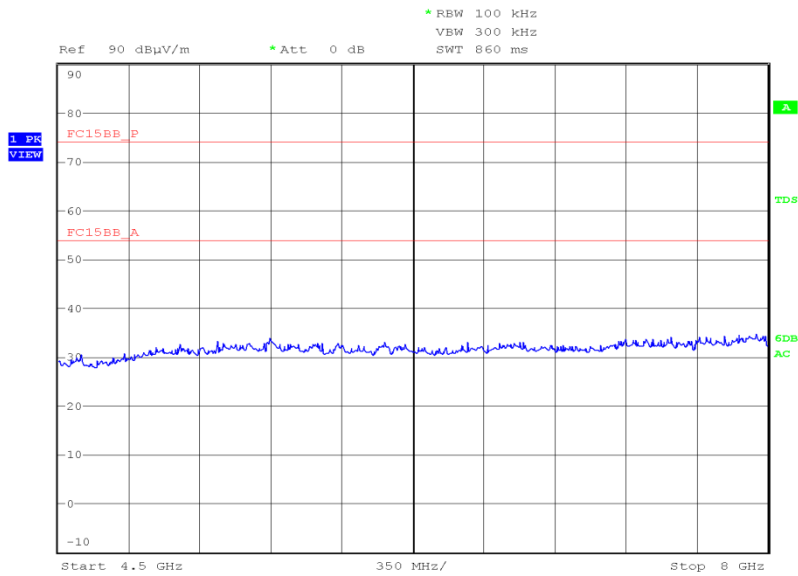
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1 GHz to 4.5 GHz



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4.5 GHz to 8 GHz

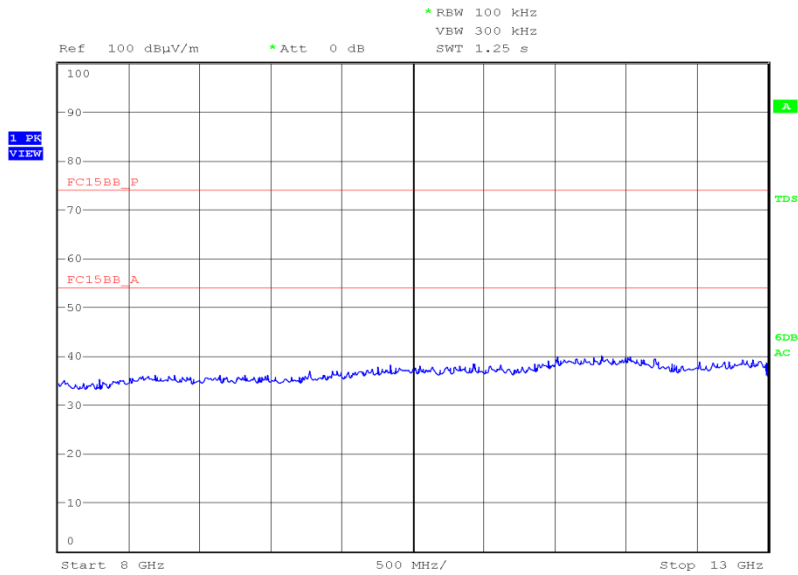


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8 GHz to 13 GHz



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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 – AC Line Conducted Emissions					
LISN (1 Phase)	Chase	MN 2050	336	12	23-Mar-2012
Screened Room (5)	Rainford	Rainford	1545	36	3-Feb-2014
Transient Limiter	Hewlett Packard	11947A	2378	12	22-Jun-2012
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	19-Sep-2011
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
Section 2.2 - Radiated Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Nov-2011
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Pre-Amplifier	Phase One	PS04-0086	1533	12	15-Sep-2011
Screened Room (5)	Rainford	Rainford	1545	36	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Compliance 5 Emissions	Schaffner	C5e Software V.5.00.00	3275	-	N/A - Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	19-Sep-2011
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	12	26-Aug-2012
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
Low Noise Amplifier	Wright Technologies	APS04-0085	3969	12	8-Jul-2012

TU – Traceability Unscheduled



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3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Radiated Emissions	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB
AC Line Conducted Emissions	± 3.2 dB



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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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