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Report On

Limited FCC Testing of the
Sharp CDMA SHI14 Dual Band CDMA (800 MHz, BC0 and 1900 MHz,
BC6) Cellular Phone with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15C

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00163

Document 75915808 Report 07 Issue 1

December 2011



Product Service

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COMMERCIAL-IN-CONFIDENCE

REPORT ON

Limited FCC Testing of the
Sharp CDMA SH114 Dual Band CDMA (800 MHz, BC0 and 1900
MHz, BC6) Cellular Phone with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15C

Document 75915808 Report 07 Issue 1

December 2011

PREPARED FOR

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APPROVED BY

Mark Jenkins
Authorised Signatory

DATED

08 December 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 15C. 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

Limited FCC Testing of the
Sharp CDMA SHI14 Dual Band CDMA (800 MHz, BC0 and 1900 MHz, BC6) Cellular Phone
with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15C



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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Limited FCC Testing of the Sharp CDMA SHI14 Dual Band CDMA (800 MHz, BC0 and 1900 MHz, BC6) Cellular Phone with Bluetooth, WLAN, FeliCa and GPS to the requirements of FCC CFR 47 Part 15C.

Objective	To perform Limited 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)	CDMA SHI14
Serial Number(s)	SSHFA002157
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2010)
Incoming Release Date	Application Form 24 October 2011
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	8857 07 November 2011
Start of Test	9 November 2011
Finish of Test	21 November 2011
Name of Engineer(s)	G Lawler
Related Document(s)	ANSI C63.10: 2009



1.2 BRIEF SUMMARY OF RESULTS

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

Section	Spec Clause	Test Description	Result	Comments/Base Standard
802.11(b)				
2.1	15.247 (d)	Spurious and Band Edge Emissions	Pass	
802.11(g)				
2.1	15.247 (d)	Spurious and Band Edge Emissions	Pass	
802.11(n)				
2.1	15.247 (d)	Spurious and Band Edge Emissions	Pass	



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1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	CDMA SHI14
Part Number	
FCC ID (if applicable)	APYHRO00163
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	Dual-Band CDMA(800MHz_BC0, 1900MHz_BC6) Cellular Phone with Bluetooth, W-LAN, FeliCa and GPS receiver.

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	



Product Service

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: 24th, October 2011



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp CDMA SHI14 Dual Band CDMA (800 MHz, BC0 and 1900 MHz, 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.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

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

Limited FCC Testing of the
Sharp CDMA SHI14 Dual Band CDMA (800 MHz, BC0 and 1900 MHz, BC6) Cellular Phone
with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 15C



2.1 SPURIOUS AND BAND EDGE EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.247 (d)

2.1.2 Equipment Under Test and Modification State

CDMA SHI14 S/N: SSHFA002157 - Modification State 0

2.1.3 Date of Test

9 November 2011, 12 November 2011, 14 November 2011 & 21 November 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

For conducted emissions, the EUT was set to operate at maximum power on the worst case data rate. The test was performed on the bottom, middle and top channels. The test was performed from 9 kHz to 25 GHz. Firstly, the power of each fundamental frequency was measured in 100 kHz bandwidth and this was used to shown a -20 dBc limit line on the trace. The measurement path loss in each relevant frequency band was measured and entered as a reference level offset.

For radiated emissions, the test method described above was also used. However, the measurement was performed from 30 MHz to 25 GHz and the path loss is incorporated as a transducer factor and entered into the spectrum analyser.

The band edge measurements were performed in accordance with ANSI C63.10, Clause 6.9.3. The results were analysed to ensure compliance with restricted bands. The EUT was set to the lowest and highest operating frequencies.

2.1.6 Environmental Conditions

Ambient Temperature	19.7 - 21.1°C
Relative Humidity	42.0 - 54.0%



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2.1.7 Test Results

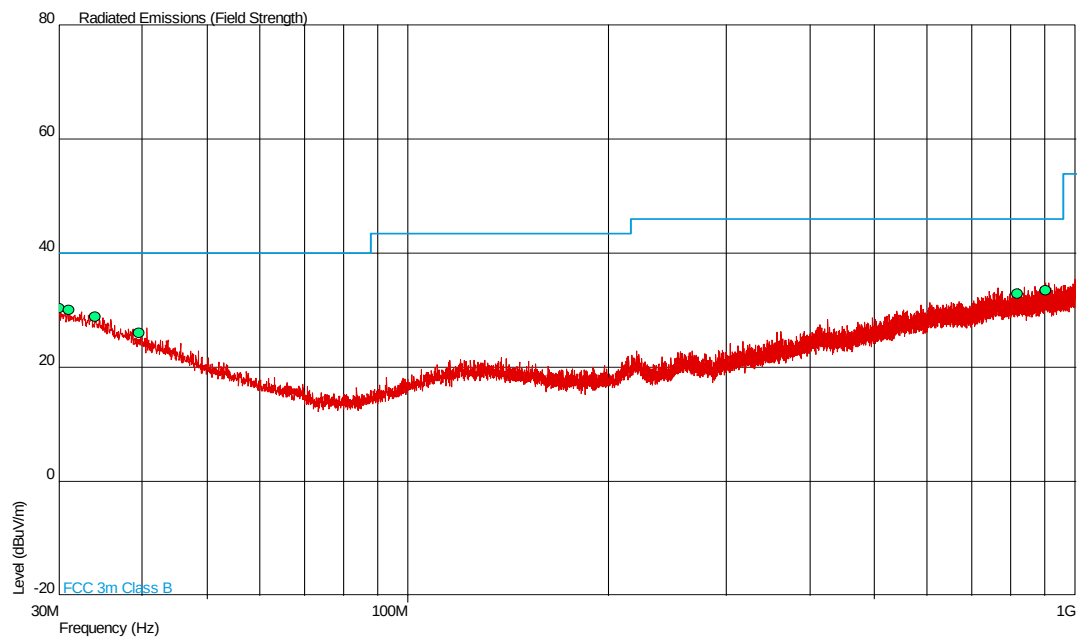
802.11(b)

4.0 V DC Supply

Spurious Radiated Emissions

2412 MHz

30 MHz to 1 GHz

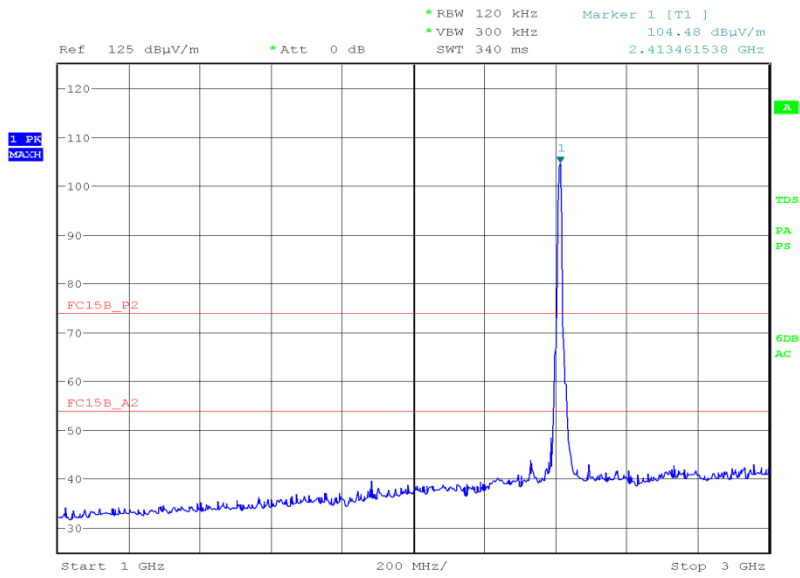


Frequency (MHz)	QP Level (dBμV/m)	QP Level (μV/m)	QP Limit (dBμV/m)	QP Limit (μV/m)	QP Margin (dBμV/m)	QP Margin (μV/m)	Angle (Deg)	Height (m)	Polarity
30.097	30.4	33.1	40.0	100	-9.6	66.9	180	1.00	Vertical
31.116	30.0	31.6	40.0	100	-10.0	68.4	0	1.00	Vertical
34.074	28.8	27.5	40.0	100	-11.2	72.5	180	1.00	Vertical
39.555	26.0	20.0	40.0	200	-14.0	80.0	0	1.00	Vertical
818.125	32.9	44.2	46.0	200	-13.1	155.8	180	1.00	Vertical
901.933	33.6	47.9	46.0	200	-12.4	152.1	0	1.00	Vertical



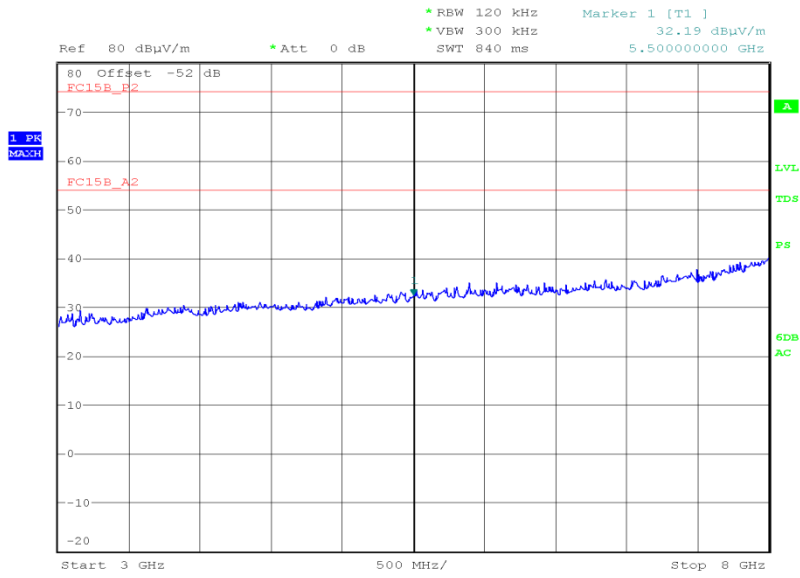
Product Service

1 GHz to 3 GHz



Date: 8.NOV.2011 20:58:23

3 GHz to 8 GHz

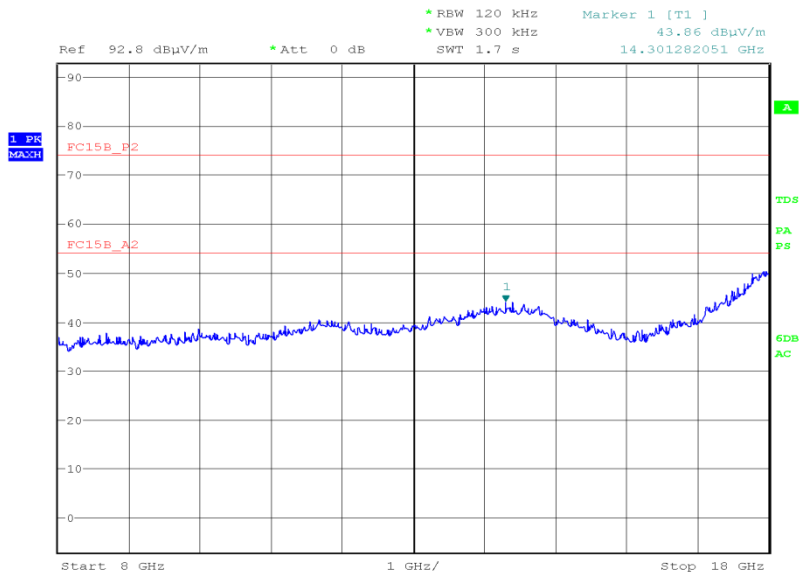


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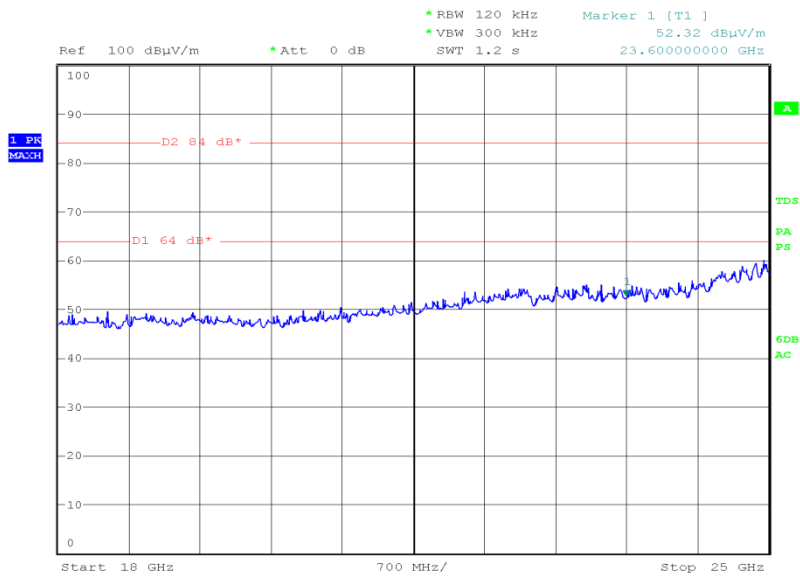
Product Service

8 GHz to 18 GHz



Date: 12.NOV.2011 21:25:32

18 GHz to 25 GHz



Date: 21.NOV.2011 17:06:31

Limit

Peak (dBuV/m)	Average (dBuV/m)
74.0	54.0

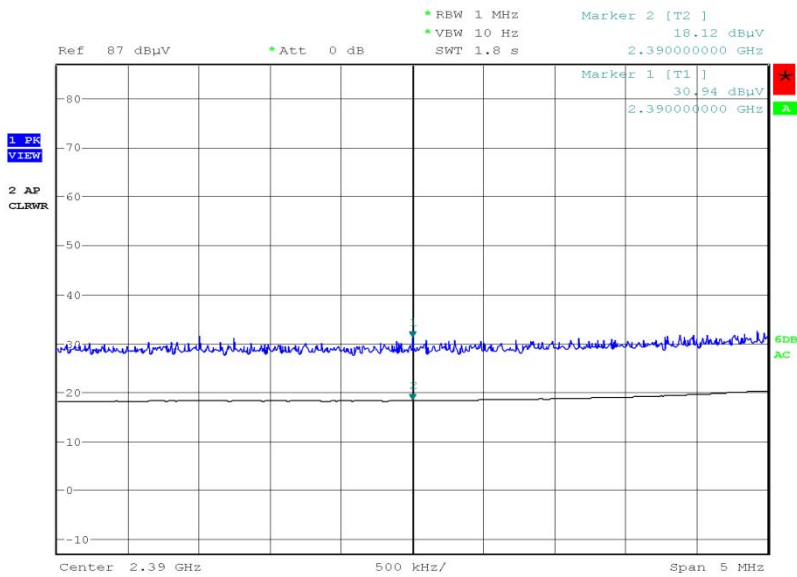


Product Service

Band Edge Emissions

2412 MHz

Polarisation	Final Peak (dBμV/m)	Final Average (dBμV/m)
Horizontal	63.1	50.3



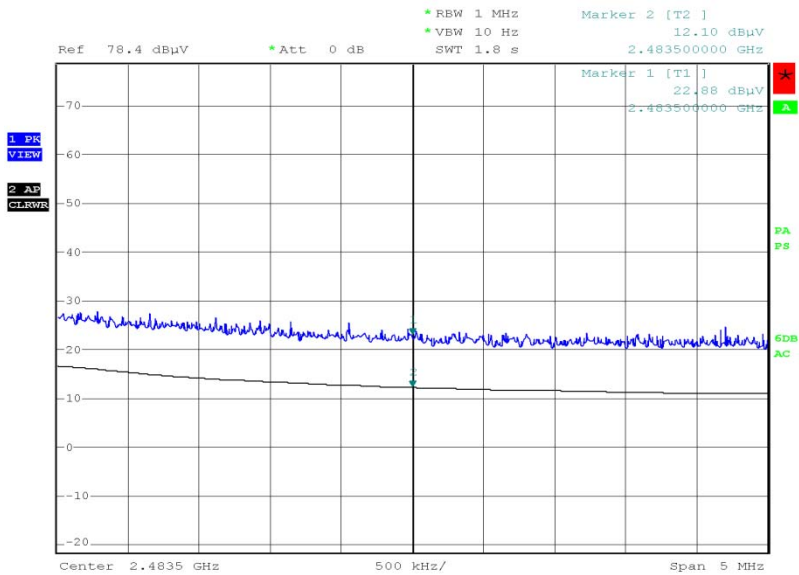
Date: 8.NOV.2011 20:56:51



Product Service

2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	55.2	44.5



Date: 8.NOV.2011 21:14:31

Limit

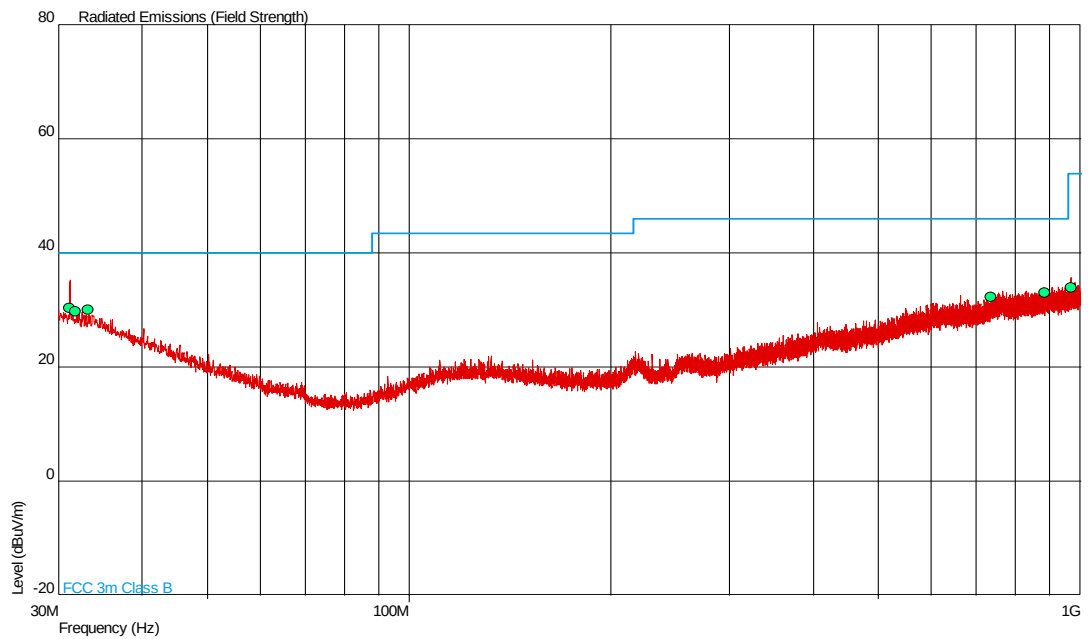
Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0



Product Service

802.11(g)

4.0 V DC Supply

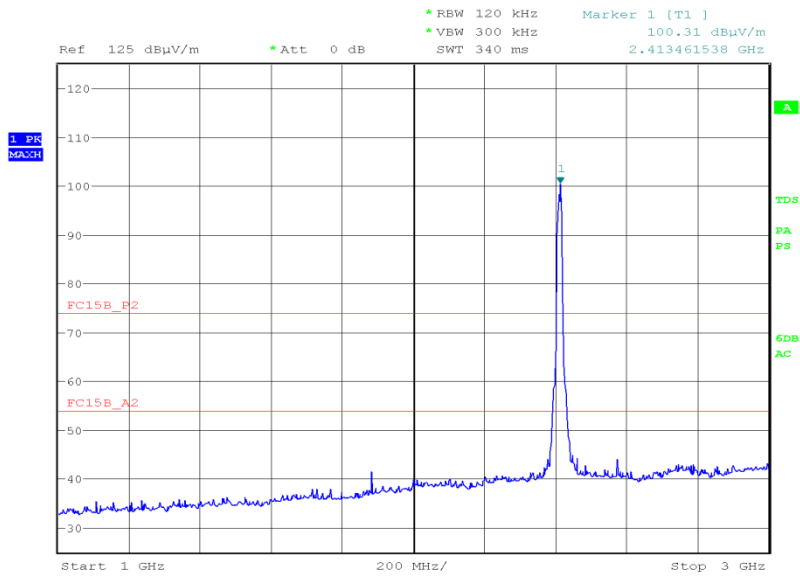
Spurious Radiated Emissions2412 MHz30 MHz to 1 GHz

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
31.180	30.4	33.1	40.0	100	-9.6	66.9	0	0.00	Horizontal
31.770	29.7	30.5	40.0	100	-10.3	69.5	0	0.00	Horizontal
33.250	30.0	31.6	40.0	100	-10.0	68.4	180	1.00	Vertical
734.463	32.3	41.2	46.0	200	-13.7	158.8	180	1.00	Vertical
884.279	33.1	45.2	46.0	200	-12.9	154.8	0	1.00	Horizontal
966.972	33.9	49.5	54.0	500	-20.1	450.5	0	1.00	Vertical



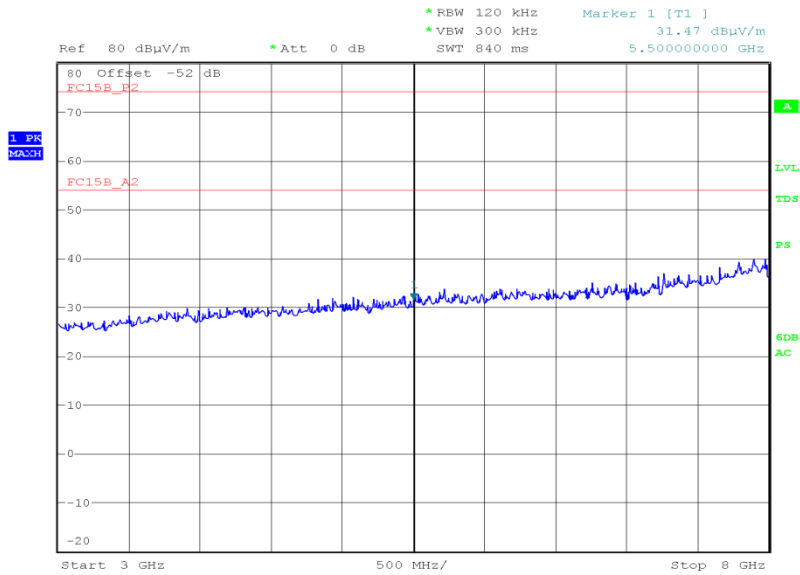
Product Service

1 GHz to 3 GHz



Date: 8.NOV.2011 21:26:23

3 GHz to 8 GHz

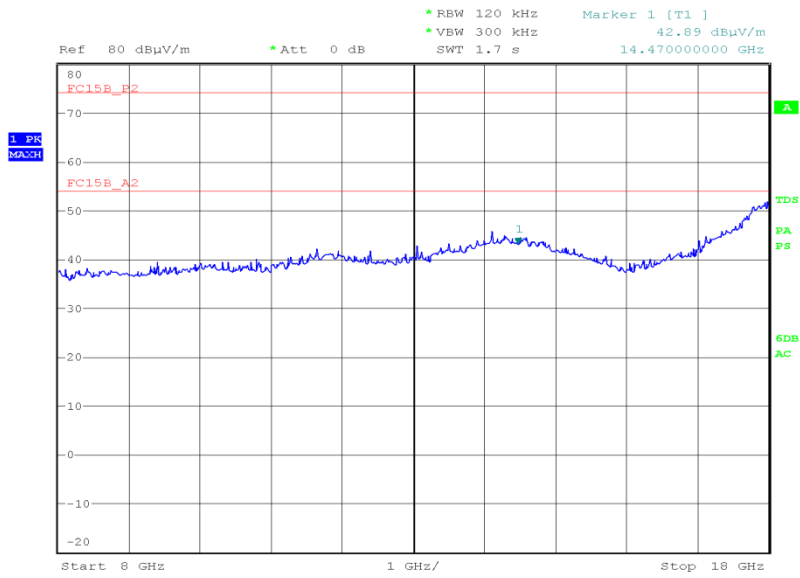


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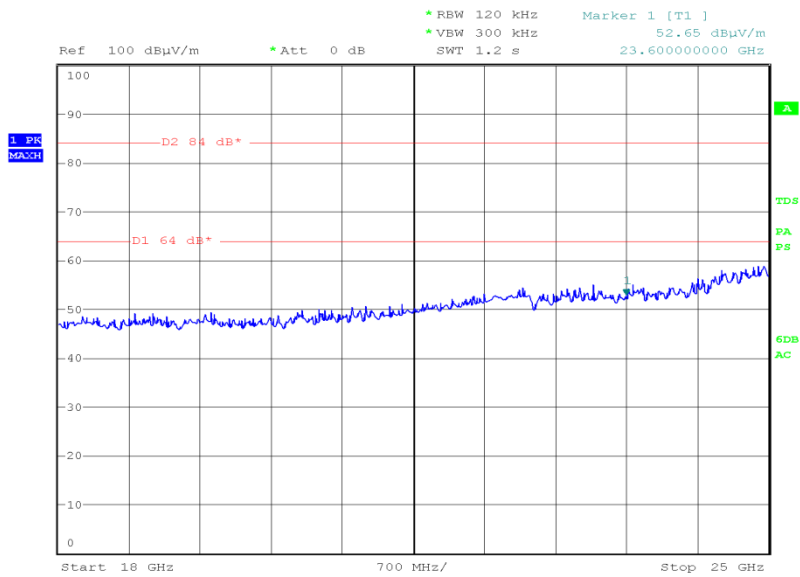
Product Service

8 GHz to 18 GHz



Date: 14.NOV.2011 18:32:42

18 GHz to 25 GHz



Date: 21.NOV.2011 17:47:39

Limit

Peak (dBμV/m)	Average (dBμV/m)
74.0	54.0

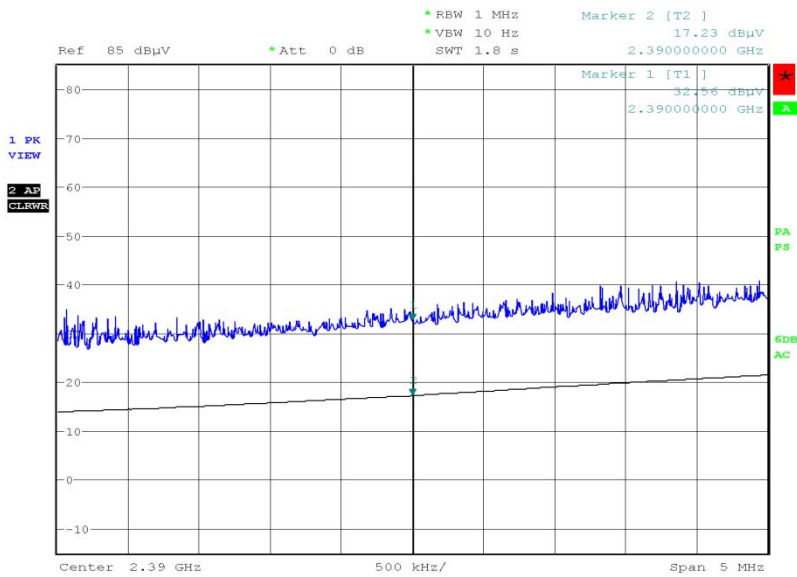


Product Service

Band Edge Emissions

2412 MHz

Polarisation	Final Peak (dBμV/m)	Final Average (dBμV/m)
Horizontal	64.7	49.4



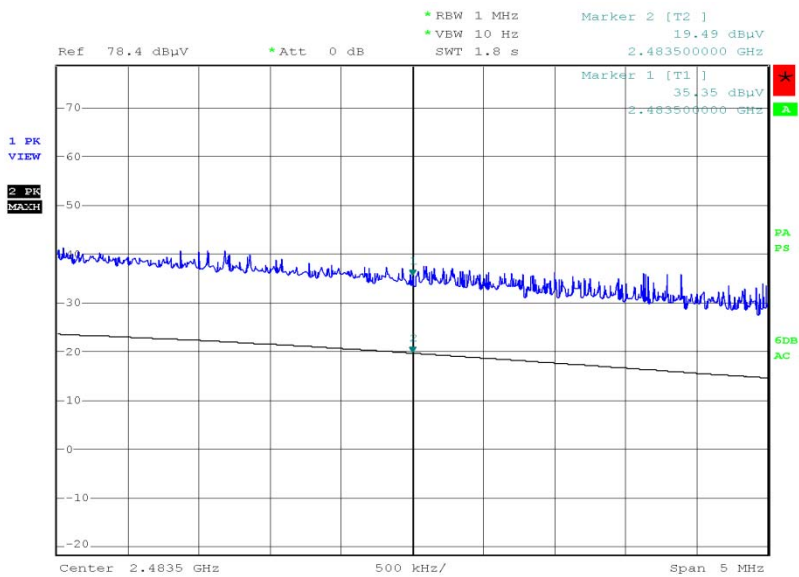
Date: 8.NOV.2011 21:32:23



Product Service

2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	67.7	51.8



Date: 8.NOV.2011 21:53:03

Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0



Product Service

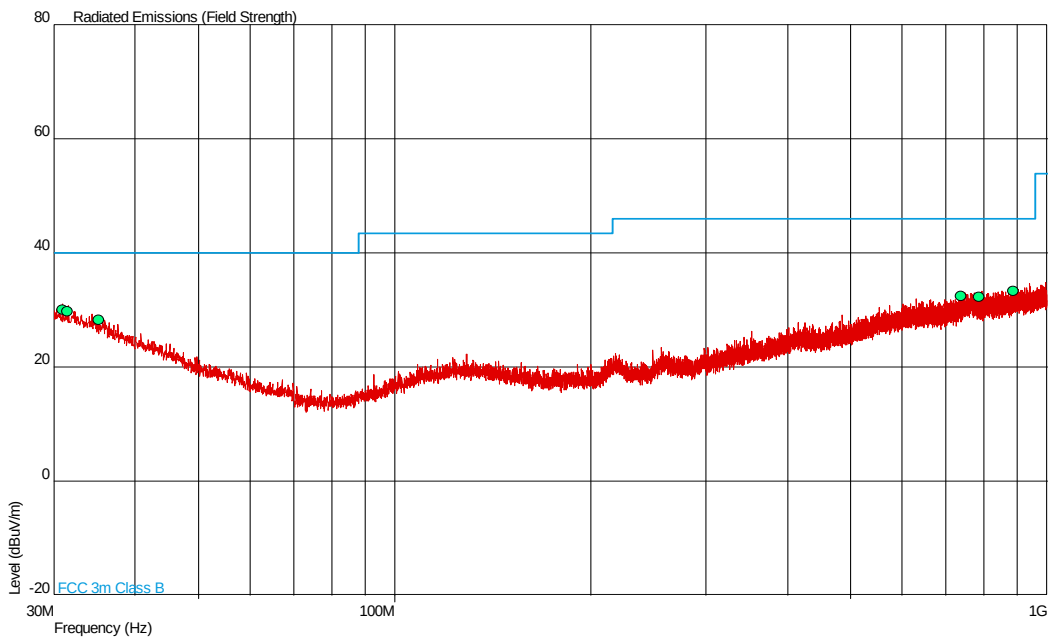
802.11(n)

4.0 V DC Supply

Spurious Radiated Emissions

2412 MHz

30 MHz to 1 GHz

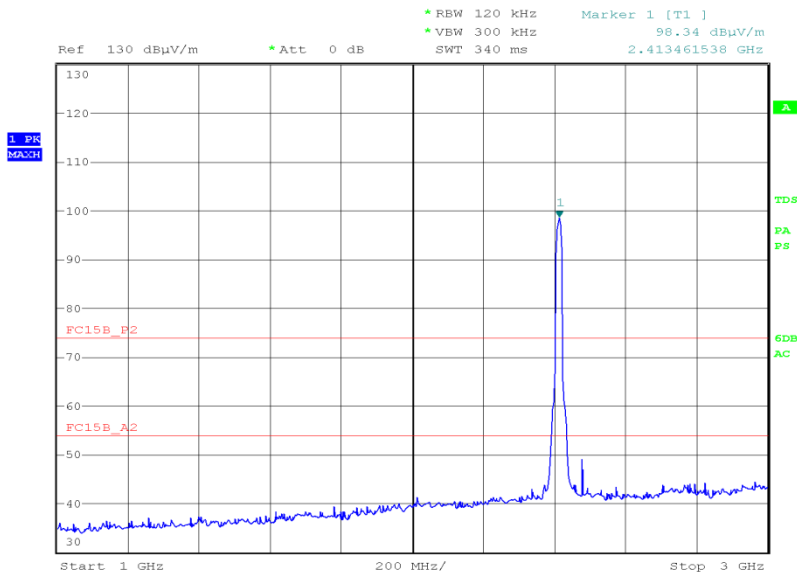


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP Limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (Deg)	Height (m)	Polarity
30.922	30.1	32.0	40.0	100	-9.9	68.0	0	1.00	Vertical
31.455	29.8	30.9	40.0	100	-10.2	69.1	180	1.00	Vertical
35.141	28.3	26.0	40.0	100	-11.7	74.0	180	1.00	Horizontal
737.761	32.5	42.2	46.0	200	-13.5	157.8	0	1.00	Horizontal
785.921	32.4	41.7	46.0	200	-13.6	158.3	180	1.00	Vertical
886.462	33.3	46.2	46.0	200	-12.7	153.8	180	1.00	Horizontal



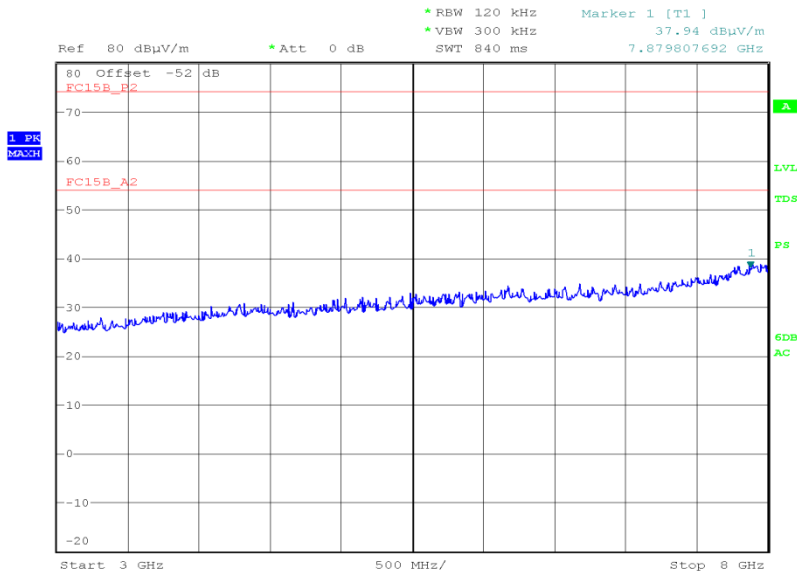
Product Service

1 GHz to 3 GHz



Date: 8.NOV.2011 22:23:43

3 GHz to 8 GHz

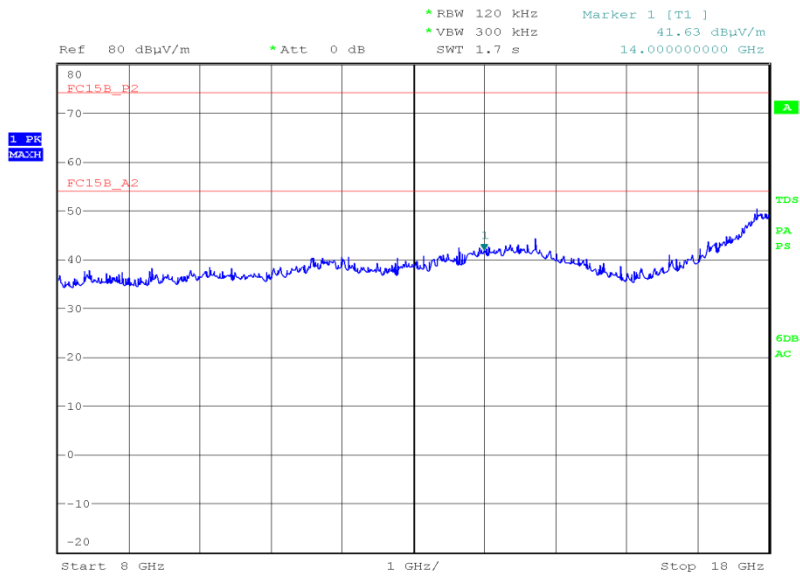


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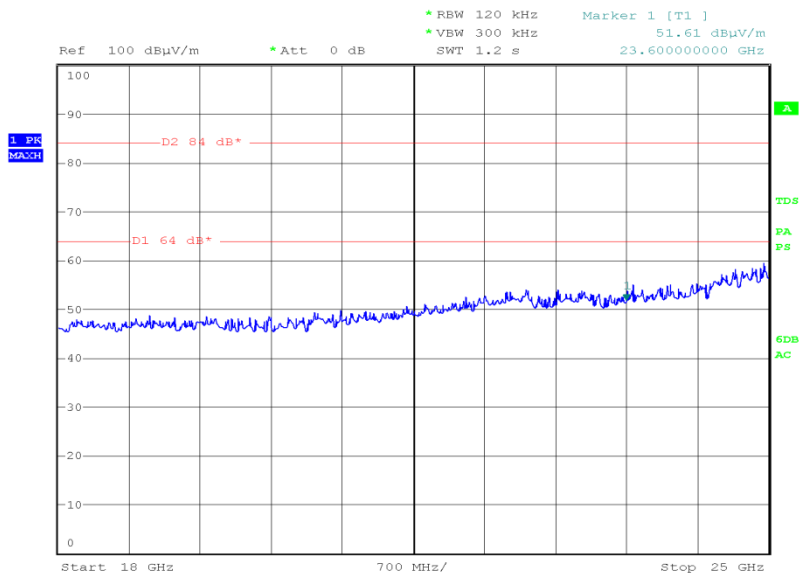
Product Service

8 GHz to 18 GHz



Date: 14.NOV.2011 19:21:09

18 GHz to 25 GHz



Date: 21.NOV.2011 18:14:44

Limit

Peak (dBμV/m)	Average (dBμV/m)
74.0	54.0

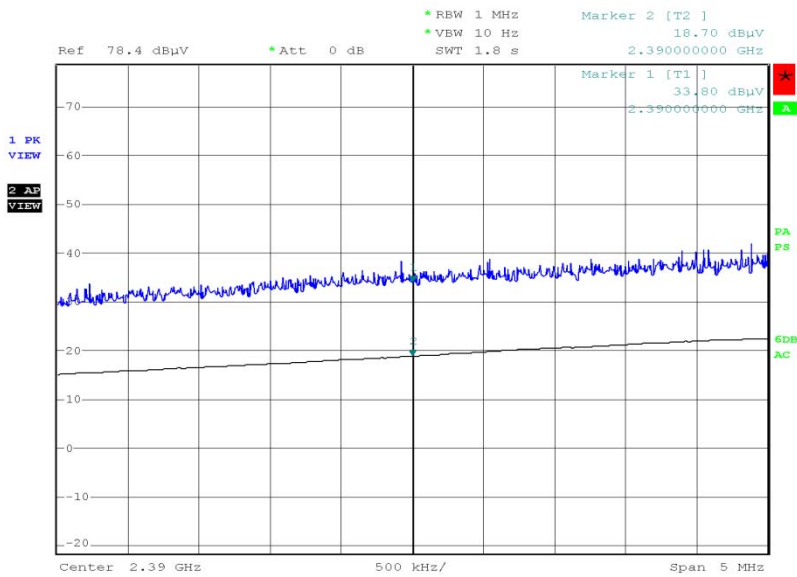


Product Service

Band Edge Emissions

2412 MHz

Polarisation	Final Peak (dBμV/m)	Final Average (dBμV/m)
Horizontal	64.7	49.4



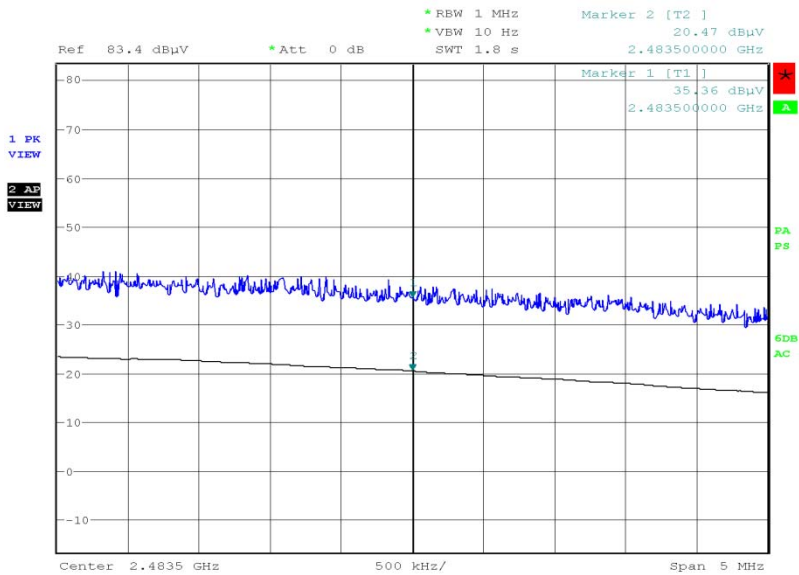
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Product Service

2462 MHz

Polarisation	Final Peak (dBµV/m)	Final Average (dBµV/m)
Horizontal	67.7	51.8



Date: 8.NOV.2011 22:47:27

Limit

Peak (dBµV/m)	Average (dBµV/m)
74.0	54.0



Product Service

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 - Spurious and Band Edge Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Nov-2011
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	2-Aug-2012
Pre-Amplifier	Phase One	PS04-0086	1533	12	20-Sep-2012
Pre-Amplifier	Phase One	PS04-0087	1534	12	26-Sep-2012
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
Antenna (DRG Horn)	ETS-LINDGREN	3115	3125	12	27-Apr-2012
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	12	5-Jul-2012
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	29-Sep-2012
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	14-Apr-2012
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3703	-	TU
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

TU – Traceability Unscheduled



Product Service

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Spurious and Band Edge Emissions	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

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