EMC Test Report

Project Number: 3374150

Report Number: 3374150EMC04 **Revision Level:** 2

Client: MedicAlgorithmics

Equipment Under Test: Mobile Computer with WCDMA/GSM/WiFi/BT

Model Number: PocketECG III

Applicable Standards: FCC Part 15 Subpart C, § 15.407
RSS-210, Issue 8, December 2010
ANSI C63.10: 2009

Report issued on: 30OCT2014

Test Result: Compliant

Tested by: _____
Brian Forster, EMC Engineer

Reviewed by: _____
David Schramm, EMC Manager

Remarks:
This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Table of Contents

1 Summary of Test Results

Test Description	Test Specification	Test Result
Occupied Bandwidth	15.407	Reported
Maximum Conducted Power Output	15.407 (a)(1)	Compliant
Peak Power Spectral Density	15.407 (a)(1),(5)	Compliant
Peak Excursion	15.407 (a)(6)	Compliant
Frequency Stability	15.407 (g)	Compliant
Undesirable Emissions	15.407 (b)(1),(2),(3)	Compliant
Radiated Spurious Emissions	15.407(b)	Compliant
DFS Requirements	15.407	Separately reported

1.1 *Modifications Required for Compliance*

None

2 General Information

2.1 *Client Information*

Name:	Medicalgorithmics S.A.
Address:	Al. Jerozolimskie 81
City, State, Zip, Country:	02-001 Warsaw Poland

2.1 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country:	Suwanee, GA 30024, USA
Accrediting Body:	A2LA
Type of lab:	Testing Laboratory
Certificate Number:	3212.01

2.2 *General Information of EUT*

Marketing Name:	PocketECG
Model:	PocketECG III
Serial Number:	P3TR13-00002A(Radiated)
Hardware Version:	R904
Software Version	10.001-6.000-8287
FCC ID:	
Frequency Range:	5150 to 5250 MHz
Modulation type:	OFDM, DSSS BPSK, QPSK, 16 QAM, 64 QAM
Channel spacing:	20 MHz
Antenna:	Integral
Rated Voltage:	3.8 VDC Internal Battery
Sample Received Date:	10 DEC 2013
Dates of testing:	16 JAN – 01 APR 2014

Operating Modes and Conditions

Modulations used: For fundamental and spurious measurements, the EUT was configured to operate continuously with Wi-Fi modulation enabled.

As specified in Section 5.10.5 of ANSI C63.10:2009:

- The software allowed configuration and operation on all available unlicensed wireless device channels.
- The software allowed configuration and operation using all available modulations and data rates
- The software allowed configuration and operation on all available power out levels

2.3 *EUT Connection Block Diagram*

2.4 *System Configurations*

Device reference	Manufacturer	Description	Model Number	Serial Number
A	MedicAlgorithmics	EUT	PocketECG III	P3TR13 -00xxxxx(Conducted Measurements) P3TR13-00020A(Conducted Measurements) P3TR13-00002A(Radiated Measurements) P3TR13-00004A(Radiated Measurements)

3 Occupied Bandwidth

3.1 *Test Result*

Test Description	Basic Standards	Test Result
26 dB bandwidth	15.407(1) (2)(3)	Reference Only

3.2 *Test Method*

The procedures from ANSI C63.10 (2009) clause 6.9 were used to determine the 26 dB bandwidth.

3.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.4 °C
Relative Humidity: 47.8 %

3.4 *Test Equipment*

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU 8	R&S	B085759	21 JUN 2014

Note: The calibration period equipment is 1 year.

3.5 *Test Setup Photographs*

Test setup photographs are located in a separate exhibit.

3.6 *Test Data*

Protocol	Channel	Data Rate	BW (MHz)
802.11a	36	6	24.16
802.11a	36	36	23.99
802.11a	36	54	24.60
802.11a	48	6	23.97
802.11a	48	36	23.02
802.11a	48	54	23.26

4 Conducted Output Power

4.1 *Test Result*

Test Description	Test Specification	Test Result
Conducted Output Power	15.407 a(1)	Compliant

4.2 *Test Method*

The test data was measured using a spectrum analyzer with RMS Detector in Channel Power Measurement Mode and a resolution bandwidth of 1 MHz, according to KDB 789033 SA-1.

Limit

The limit is as follows:
B is defined as the 26 dB Bandwidth for all calculations below.

For the band 5.15-5.25 GHz the lesser of 50 mW or 4+10LogB dBm
For the band 5.25-5.35 and 5.47-5.725 GHz, the lesser of 250 mW or 11+10LogB dBm

(3) Test Site
SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.1 °C
Relative Humidity:	35.8 %

4.3 *Test Equipment*

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU 8	R&S	B085759	21 JUN 2014

Note: The calibration period equipment is 1 year.

4.4 *Test Setup Photographs*

Test setup photographs are located in a separate exhibit.

4.5 *Test Data*

Mode	Freq (MHz)	Channel	802.11a UNII Conducted Power (dBm)							
			Data rate (Mbps)							
			6	9	12	18	24	36	48	54
802.11a	5180	36	**9.89**	9.72	9.74	9.74	9.74	9.75	9.75	9.73
802.11a	5200	40	9.58	9.65	9.62	9.68	9.57	9.61	9.60	9.57
802.11a	5220	44	9.68	9.74	9.68	9.65	9.67	9.72	9.69	9.64
802.11a	5240	48	9.65	9.73	9.68	9.77	9.77	9.71	9.68	9.74

Mode	Freq (MHz)	Channel	802.11n, 20 MHz BW, 5GHz 400ns GI, Conducted Power (dBm)							
			Data rate (Mbps)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n	5180	36	**8.45**	8.41	8.36	8.40	8.40	8.44	8.38	7.65
802.11n	5200	40	8.30	8.23	8.26	8.22	8.28	8.28	8.21	7.55
802.11n	5220	44	8.39	8.30	8.24	8.29	8.25	8.25	8.26	7.63
802.11n	5240*	48	8.36	8.31	8.35	8.29	8.28	8.28	8.26	7.59

5 Undesirable Emissions

5.1 *Test Result*

Test Description	Test Specification	Test Result
Spurious Emissions	15.407(b)	Compliant

5.2 *Test Method*

The test data was measured using a spectrum analyzer with

- Peak detector, max hold
- Resolution bandwidth of 100 kHz(30 - 1000 MHz) and 1 MHz(1-40 GHz)
- Video bandwidth at least 3x RBW
- Frequency range: 30 MHz to 40 GHz

- The limit is -27dBm/MHz or 68.2 dBuV/m @3m (or 71.7 dBuV/m @2m).
- 30 – 1000 MHz: Peak emissions were compared to the 15.209 QP limits at 3m.
- 1 – 18 GHz: Peak measurements were compared to the 15.209 Average limits at 2 meters with none exceeding the restricted band limits.

5.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.1 °C
Relative Humidity: 37.8 %

5.4 *Test Equipment*

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU40	ROHDE & SCHWARZ	B079629	7-Oct-2014
ANTENNA, BILOG	JB6	SUNOL	B079689	22-Aug-2014
RF CABLE - 12000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079714	6-Aug-2014
RF CABLE - 7000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079716	16-Sep-2014
DRG HORN (MEDIUM)	3117	ETS-LINDGREN	B079699	25-Mar-2014
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079822	29-Oct-2014
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079823	29-Oct-2014
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	29-Oct-2014
Preamplifier	TSPR 18	ROHDE & SCHWARZ	B094463	13-Feb-2015
DRG HORN (SMALL)	3116B	ETS-LINDGREN	B079695	31-Oct-2014
DRG HORN (SMALL)	3116B	ETS-LINDGREN	B079697	13-Mar-2014

Note: The calibration period equipment is 1 year.

5.5 *Test Setup Photographs*

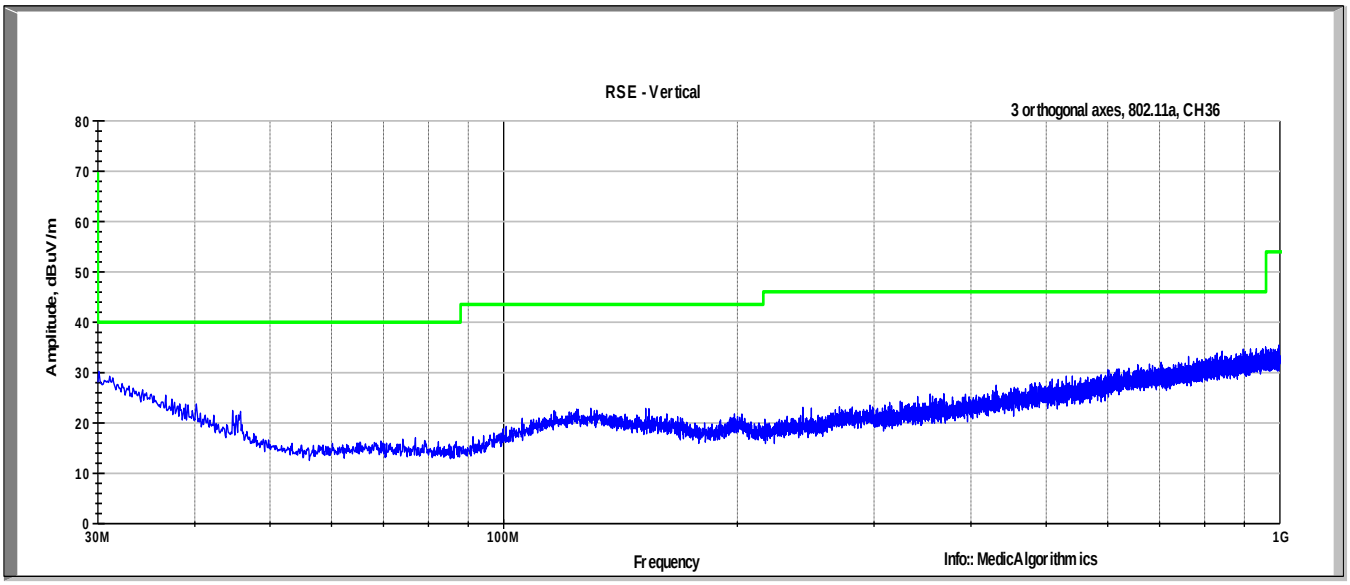
Test setup photographs are located in a separate exhibit.

5.6 *Test Data*

Note: No Peak emissions detected within 10 dB of the 15.209 QP/Avg Limits in any mode.

30 MHz to 1000MHz

CH 36 6MB/s
Vertical



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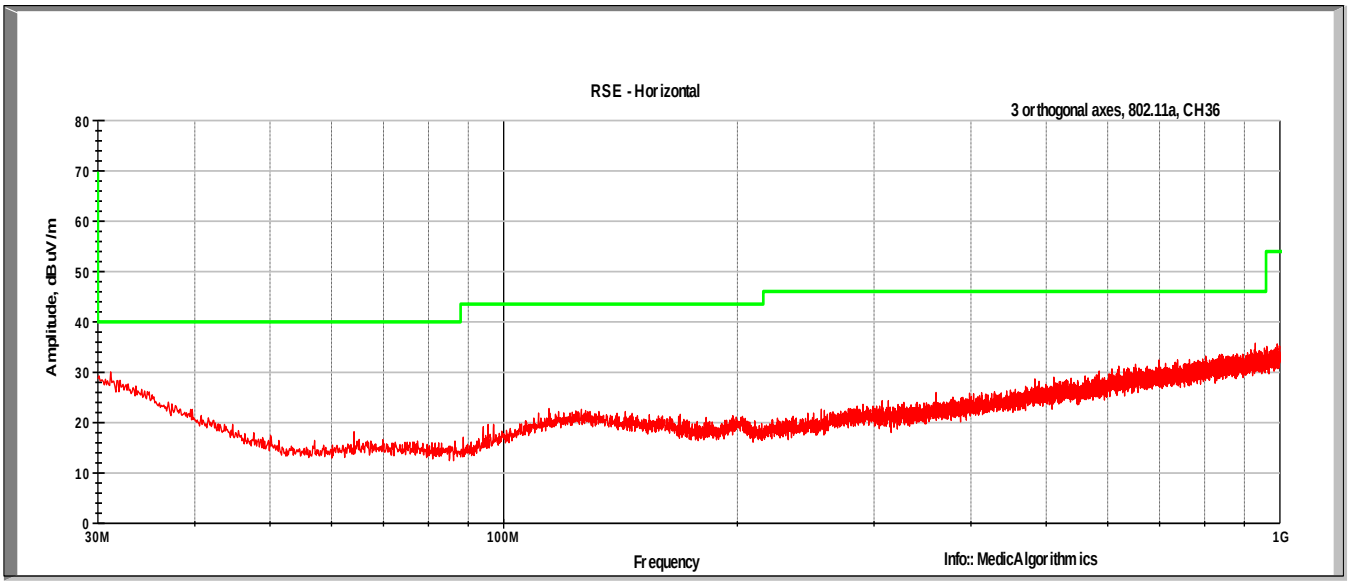
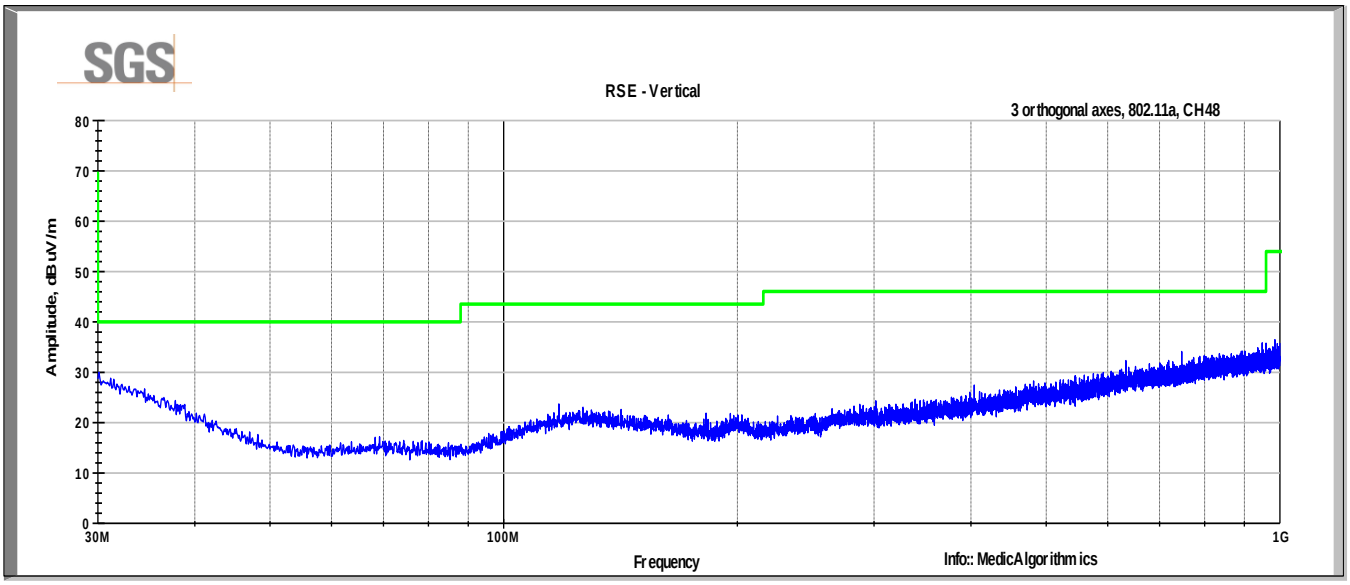


CH 48 6MB/s
Vertical



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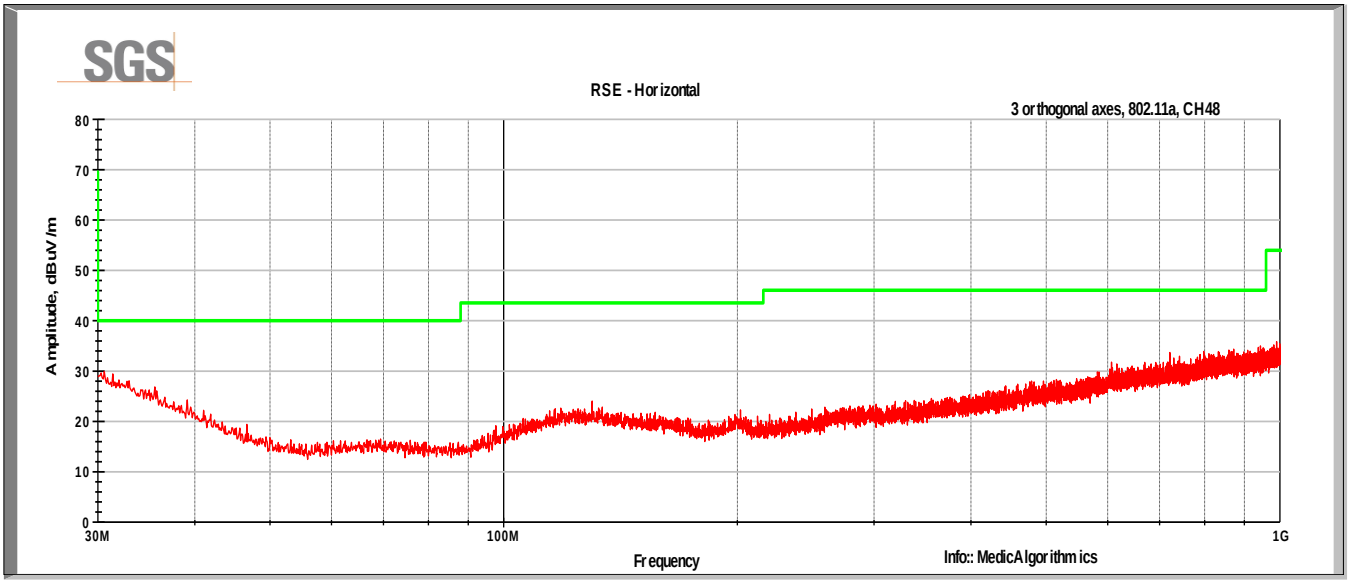
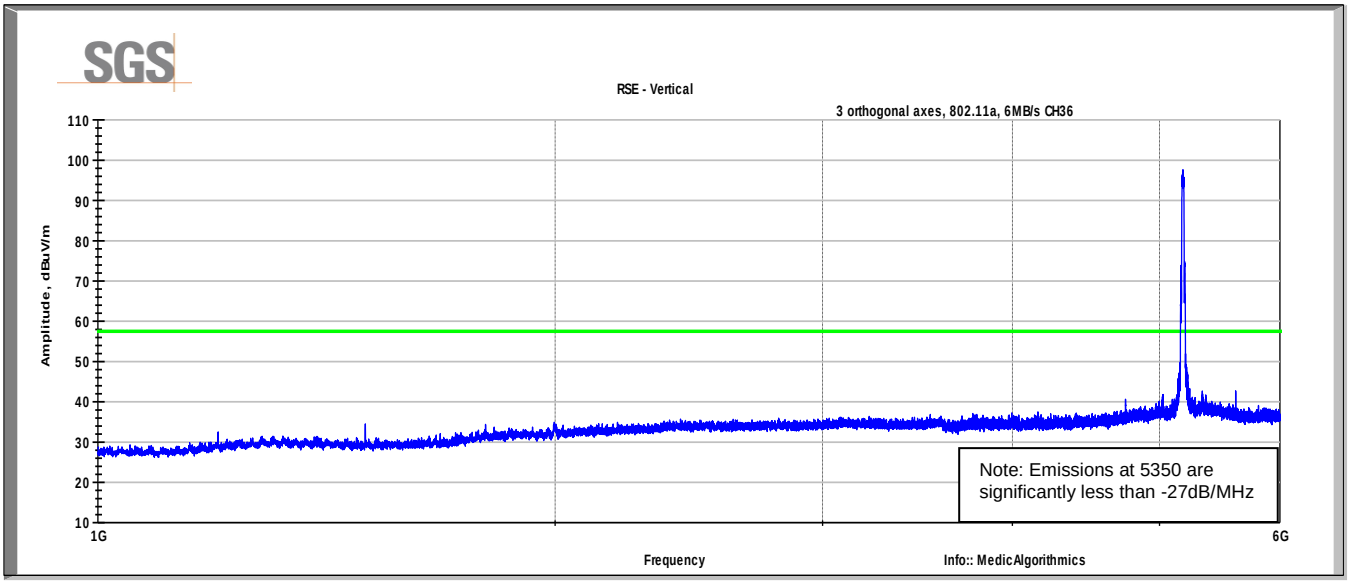
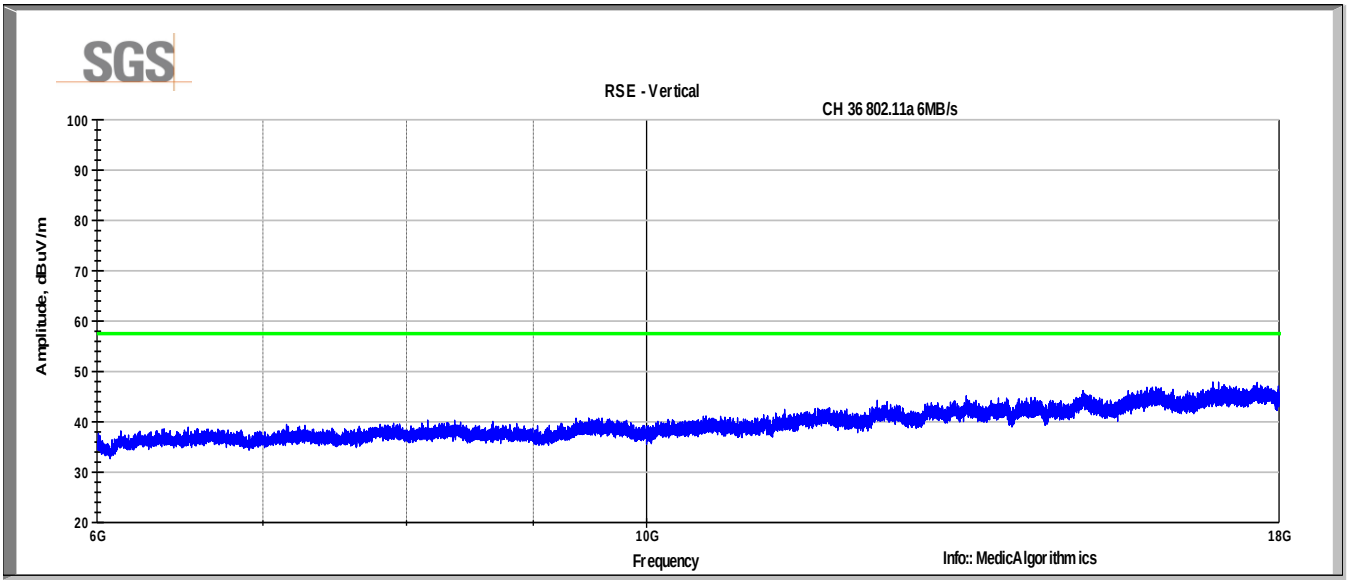


1-18GHz
All Testing performed at 2 meter test distance
802.11a
CH36 6MB
Vertical
1-6 GHz



6-18 GHz



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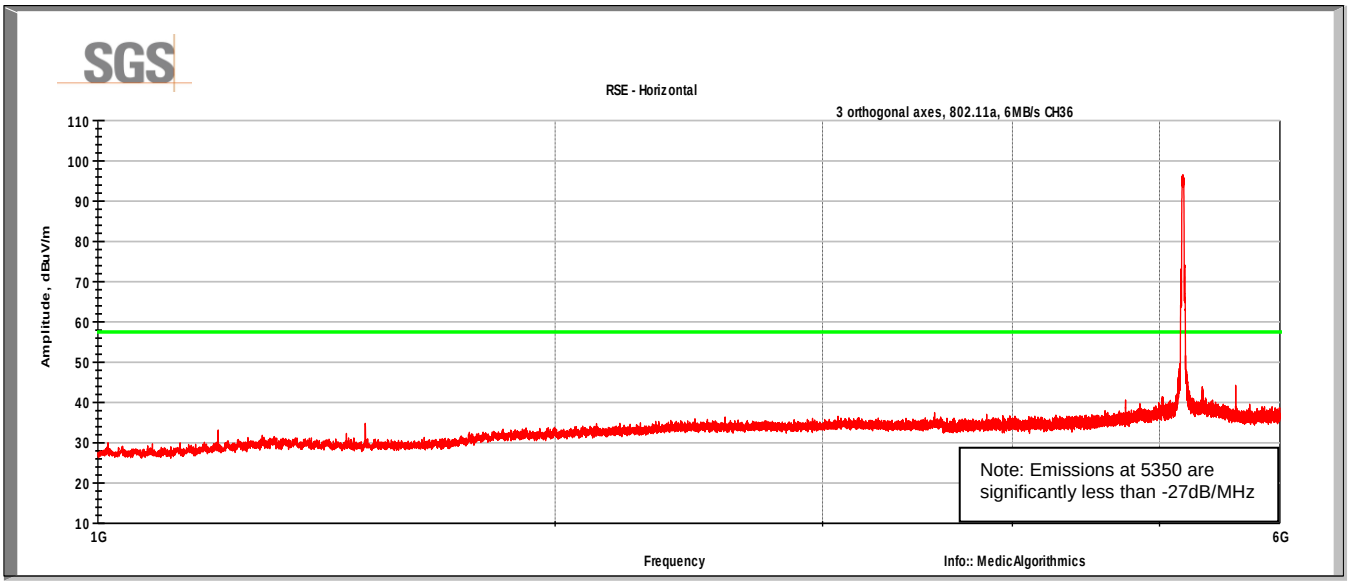
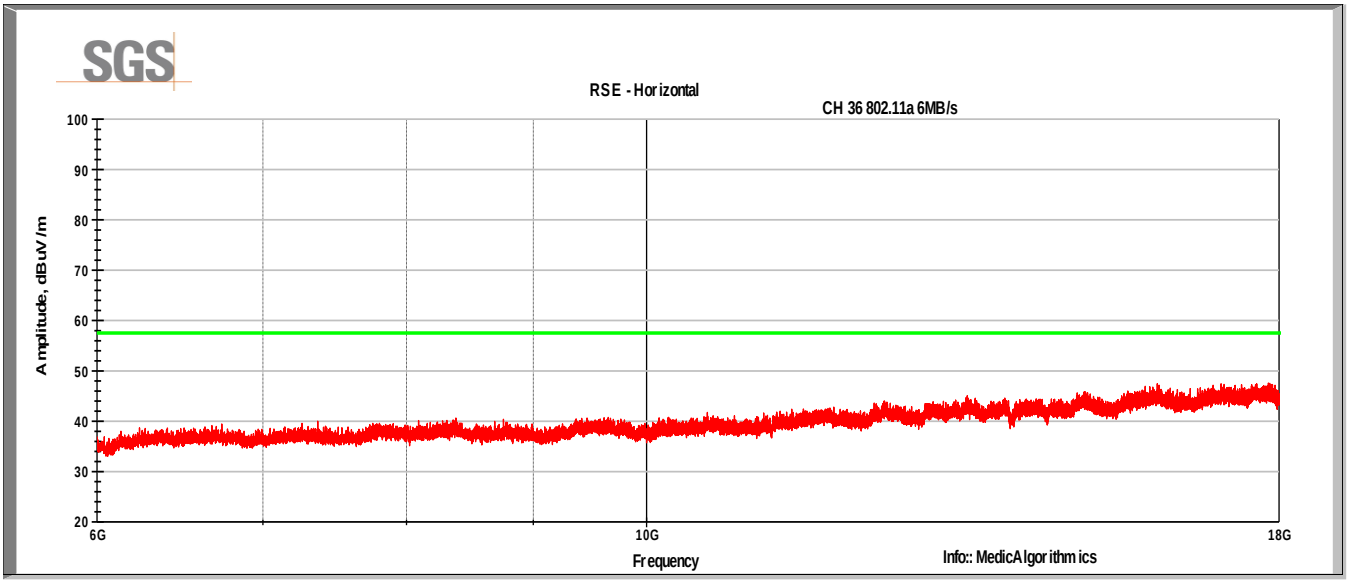
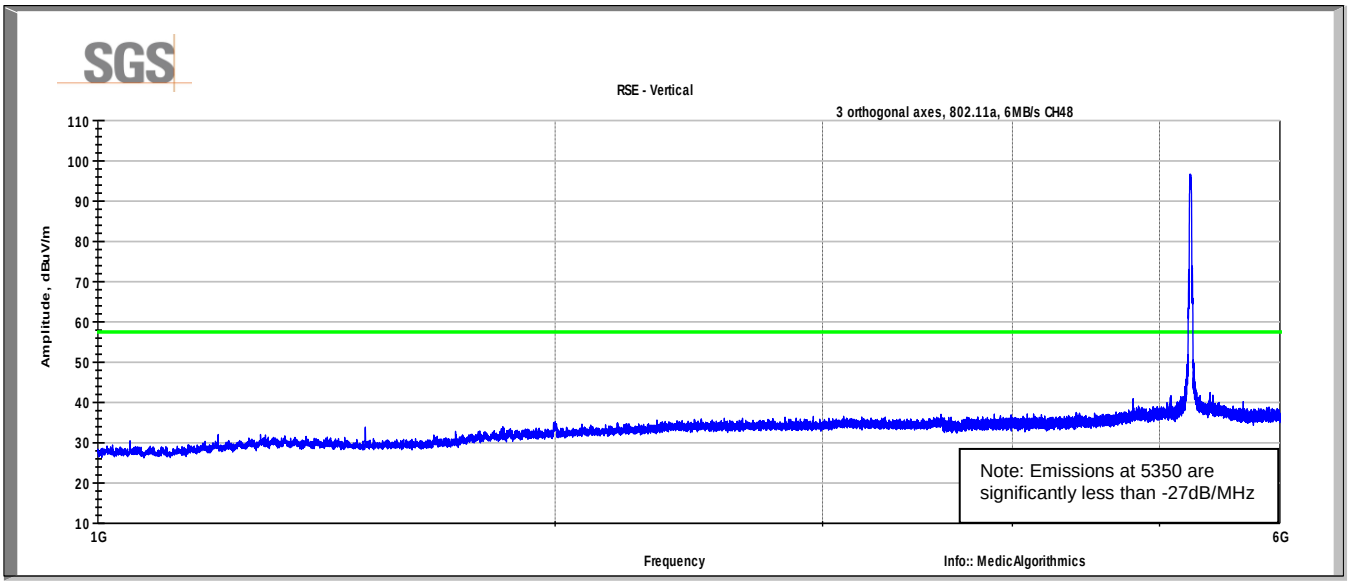
1-6 GHz



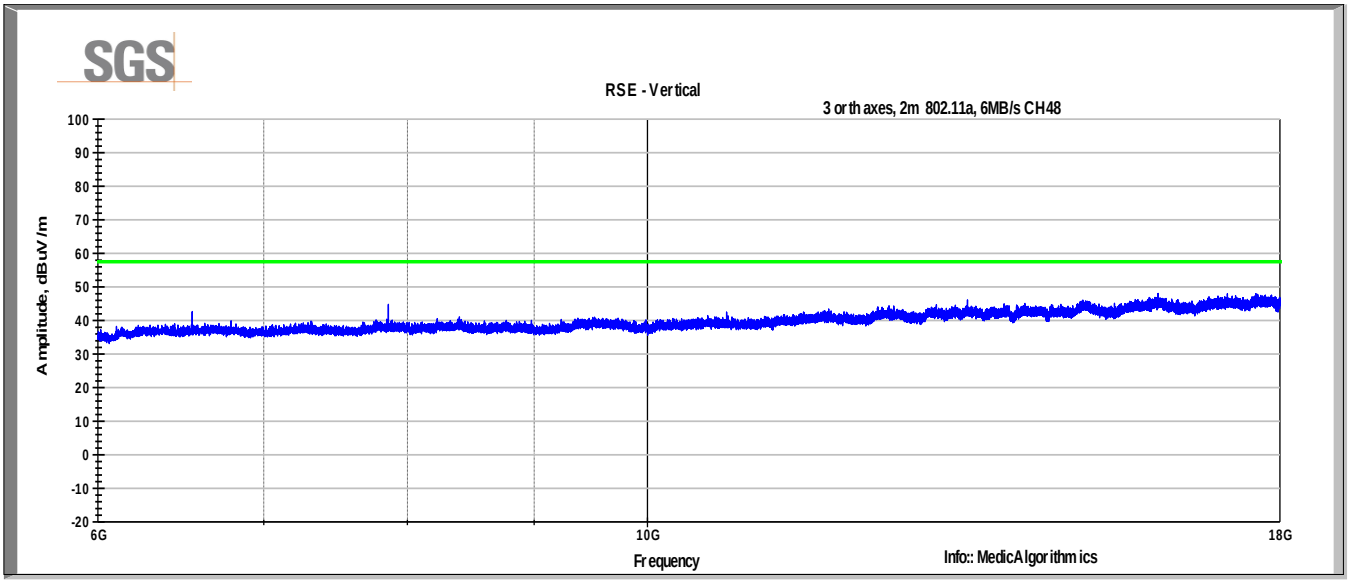
6-18 GHz



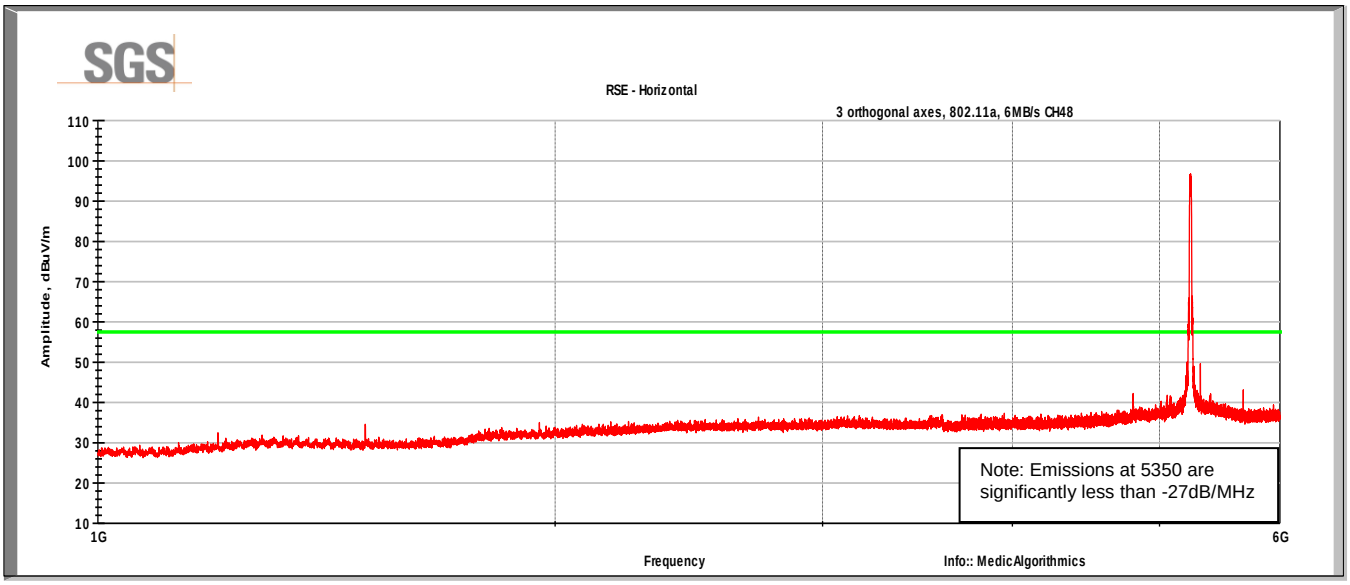
CH48 6MB
Vertical
1-6 GHz



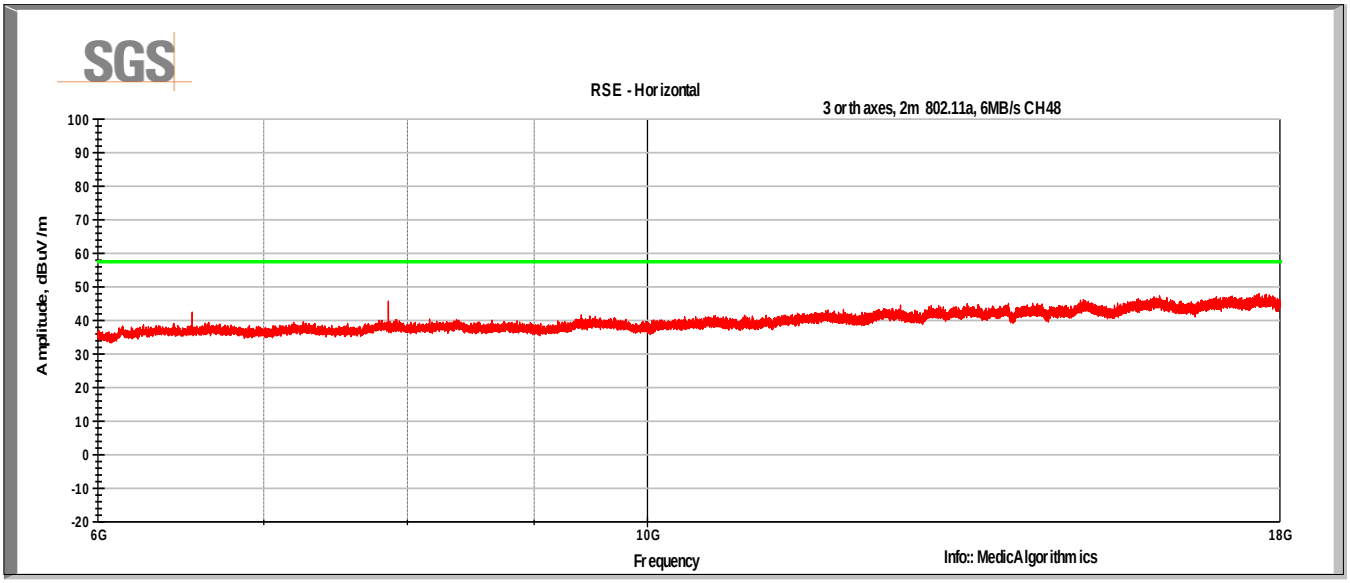
6-18 GHz



Horizontal
1-6 GHz



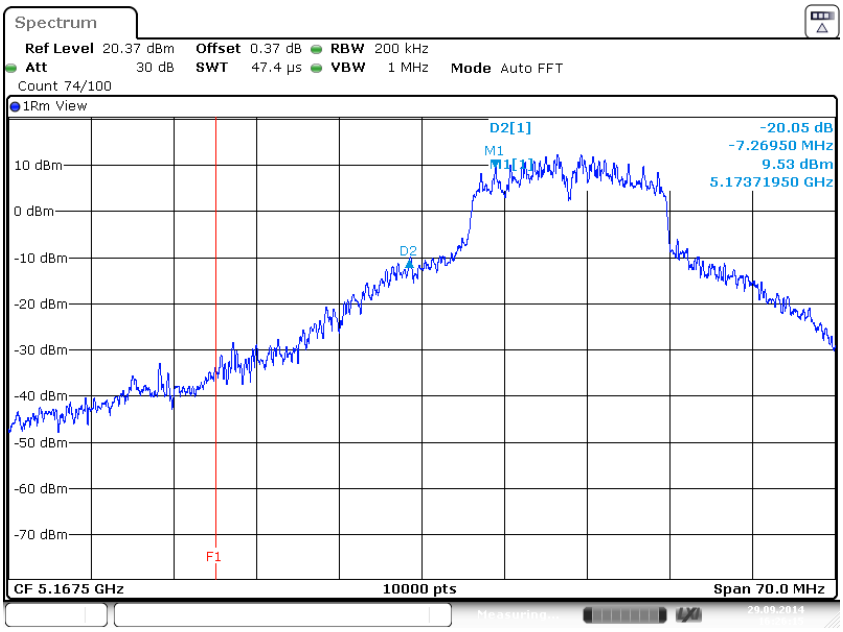
6-18 GHz



Band Edges

Channel	Protocol	Center Frequency (MHz)	20 dB down frequency (MHz)	limit (MHz)	margin (MHz)
36	n	5180	5166.45	5150	16.45
48	n	5240	5249.03	5250	-0.97

CH 36



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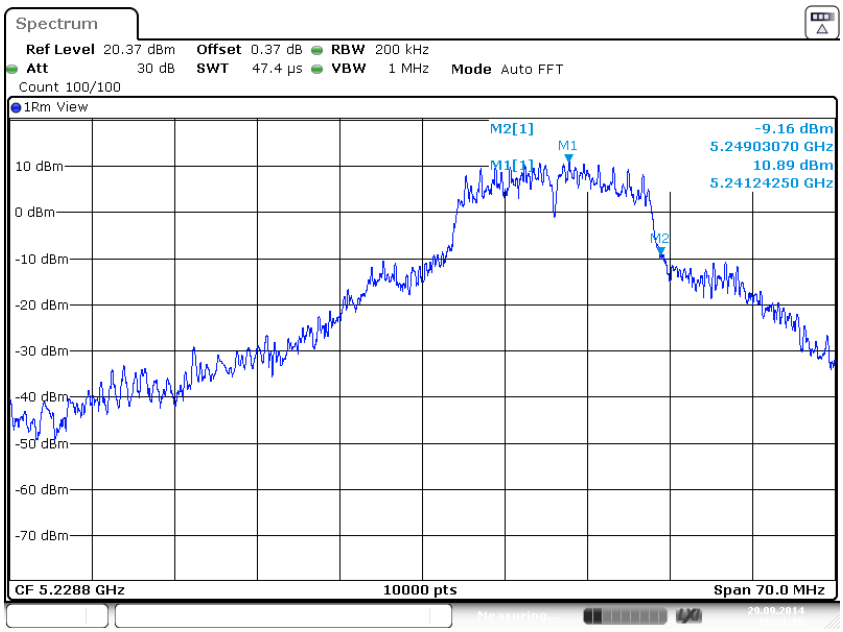
CH 48



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6 Power Spectral Density / Peak Excursion

6.1 *Test Result*

Test Description	Test Specification	Test Result
Power Spectral Density	15.407(1)(2)(5)	Compliant
Peak Excursion	15.407 (6)	Compliant

6.2 *Test Method*

Spectral Density

Reference: 6.11.1.2.2 Method 2 - peak measurement.

a) Connect the EUT antenna port to the input of a spectrum analyzer via an appropriately-sized attenuator
b) Set the spectrum analyzer detector for SAMPLE
c) Set the spectrum analyzer for POWER AVERAGING
d) Set RBW = 1 MHz
e) Set VBW > 1 MHz (3 MHz is recommended)
f) Set SWEEP TIME = 1 ms, or the minimum time necessary to keep the spectrum analyzer in calibrated measurement mode
g) Set SPAN > emission bandwidth (> 20 MHz)
h) Set the AVERAGING to 100 sweeps
i) Use PEAK SEARCH on spectrum analyzer to find maximum level on the display
j) Record result as PPSD

The limits in any 1 MHz band are as follows:

Frequency Band (MHz)	Limit (dBm)
5150 - 5250	4

Peak Excursion

The EUT was connected to a spectrum analyzer and made to transmit continuously. The Spectrum Analyzer was configured with the same Bandwidth, Sweep and Span settings as for the Output power measurement. One trace was set with an RMS detector and trace averaging as prescribed in KDB789033 and trace averaged over 100 sweeps, simultaneously a second trace was recorded with Peak detector and MaxHold settings enabled. A marker was used on each trace to locate the highest emission, the difference between each maximum was calculated and reported as the Peak Excursion and compared to the limit.

Limit : “The ratio of the peak excursion of the modulation envelope to the maximum conducted power shall not exceed 13dB across any 1 MHz bandwidth…”

6.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.4 °C
Relative Humidity: 47.8 %

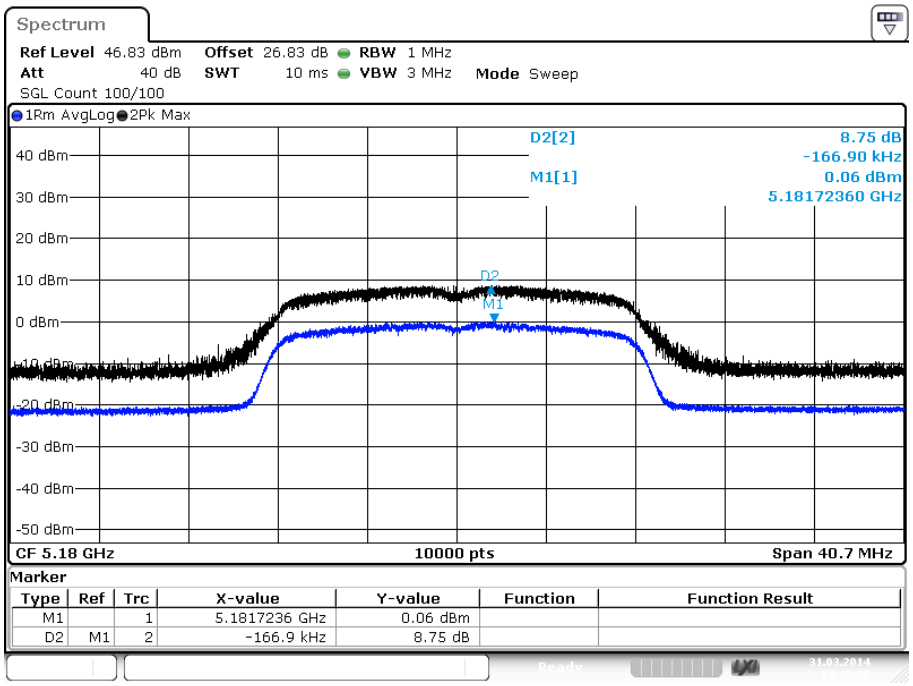
6.4 *Test Equipment*

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	FSV	R&S	B085749	28 AUG 2014

Note: The calibration period equipment is 1 year.

6.5 *Test Data*

Channel No.	Data Rate Mbps	Modulation	PPSD dBm/MHz	Limit dBm/MHz	Margin dB	Peak Excursion dB	Limit dB	Margin dB
36	6	BPSK	0.06	4	-3.94	8.75	13	-4.25
36	12	QPSK	0.15	4	-3.85	8.66	13	-4.34
36	36	16-QAM	0.35	4	-3.65	8.63	13	-4.37
36	54	64-QAM	-0.01	4	-4.01	8.78	13	-4.22
48	6	BPSK	-0.14	4	-4.14	9.18	13	-3.82
48	12	QPSK	-0.41	4	-4.41	8.79	13	-4.21
48	36	16-QAM	-0.34	4	-4.34	9.2	13	-3.8
48	54	64-QAM	-0.12	4	-4.12	8.72	13	-4.28



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7 Frequency Stability

7.1 *Test Result*

Test Description	Test Specification	Test Result
Frequency Stability	15.407(g)	Compliant

Requirement:

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual. The following data is as tested by the Wifi/BT module manufacturer to the module's maximum environmental conditions.

			Supply Voltage (V)		
			3.00	3.60	4.80
Temp	Channel	Nominal Frequency (MHz)	Measured Frequency (Hz)	Measured Frequency (Hz)	Measured Frequency (Hz)
-40°C	36	5180.0	5180013165	5180013365	5180013155
+23°C	36	5180.0	5180009465	5180009890	5180010355
+85°C	36	5180.0	5180011400	5180014950	5180020650

8 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	20JUN2014
1	Updated test procedures for PSD, included limit correction for distance calculations, corrected typographical errors in page 10 table. Included authorized band-edges.	01OCT2014
2	Removed data for deactivated channels.	30OCT2014