Report On

FCC and Industry Canada Testing of the
Cobham Tactical Communications DC1600 HD Module & SOLO 7
In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 90 and
Industry Canada RSS-210 and RSS-GEN

COMMERCIAL-IN-CONFIDENCE

FCC ID: XRF SOL7HDNTX

Document 75926941 Report 02 Issue 1 November 2014

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

REPORT ON

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November 2014

PREPARED FOR

Cobham Tactical Communications
The Cobham Centre
Parkway
Fusion 2 Solent Business Park
Fareham
Hampshire
PO15 7AB

PREPARED BY

Natalie Bennett
Senior Administrator, Project Support

APPROVED BY

Ryan Henley
Authorised Signatory

DATED 07 November 2014

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 2, FCC CFR 47 Part 90 and Industry Canada RSS-210 and RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler M Russell

Product Service

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Product Service

SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Cobham Tactical Communications DC1600 HD Module & SOLO 7
In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 90
and Industry Canada RSS-210 and RSS-GEN

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC and Industry Canada Testing of the Cobham Tactical Communications DC1600 HD Module & SOLO 7 to the requirements of FCC CFR 47 Part 2, FCC CFR 47 Part 90 and Industry Canada RSS-210 and RSS-GEN.

Objective	To perform Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Cobham Tactical Communications
Model Number(s)	SOLO7
Serial Number(s)	SOLO7HDNTX-198270
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2 (2013) FCC CFR 47 Part 90 (2013) Industry Canada RSS-210 (Issue 11, 2011) Industry Canada RSS-GEN (Issue 3, 2010)
Incoming Release Date	Declaration of Build Status 20 September 2014
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	PO-033163-1 05 September 2014
Start of Test	9 June 2014
Finish of Test	9 July 2014
Name of Engineer(s)	G Lawler M Russell
Related Document(s)	ANSI C63.4 (2014)

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 90 and Industry Canada RSS-210 and RSS-GEN is shown below.

Section	Spec Clause				Test Description	Result	Comments/Base Standard
	Pt 2	Pt 90	RSS-210	RSS-GEN			
QPSK - 2.5 MHz Bandwidth							
2.1	2.1046	90.205 (o)	A8.4(4)	4.8	Power and Antenna Height Limits / Transmitter Output Power and e.i.r.p. Requirements	Pass	
2.2	2.1047	90.207	-	-	Type of Emissions	-	Customer Declaration
2.3	2.1047 (d)	-	-	-	Modulation Characteristics	-	Customer Declaration
2.4	2.1049	90.209	-	-	Bandwidth Limitations	Pass	
2.5	2.1051	90.210 (b)(1)(2)(3)	A8.5	4.9	Emission Mask/Transmitter Unwanted Emissions	Pass	
2.6	2.1055	90.213	-	4.7	Frequency Stability	Pass	
2.7	-	-	A8.2	4.6.2	6 dB Bandwidth	Pass	
2.8	-	-	A8.2(b)	-	Power Spectral Density	Pass	

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	SOLO7 HD Nano Transmitter 1.98-2.70GHz		
MANUFACTURER	Cobham Tactical Communications and Surveillance		
TYPE	COFDM Transmitter		
PART NUMBER	SOL7HDNTX-198270		
SERIAL NUMBER	030119		
HARDWARE VERSION	V4.0		
SOFTWARE VERSION	SN V1.2		
TRANSMITTER OPERATING RANGE	1.98GHz to 2.70GHz		
RECEIVER OPERATING RANGE	N/A		
COUNTRY OF ORIGIN	United Kingdom		
INTERMEDIATE FREQUENCIES	N/A		
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	2M5G2D and 2M50D7F		
MODULATION TYPES: (i.e. GMSK, QPSK)	COFDM Radio 2.4GHz 16QAM / QPSK		
HIGHEST INTERNALLY GENERATED FREQUENCY	2.7GHz		
OUTPUT POWER (W or dBm)	100mW		
FCC ID	XRF SOL7HDNTX		
INDUSTRY CANADA ID			
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The Nano Transmitter is a COFDM digital video transmitter; it can operate in a variety of transmission bandwidths, with the user trading image quality for range. It can transmit images in a non-line of sight environment up to 1km depending on mode and frequency, its encased in a lightweight weatherproof aluminium chassis suitable for body-worn applications.		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	N/A		
MANUFACTURER			
TYPE			
PART NUMBER			
VOLTAGE			
COUNTRY OF ORIGIN			
MODULES (if applicable)			
MANUFACTURING DESCRIPTION	SOLO7 HD Nano Transmitter 1.98-2.70GHz		
MANUFACTURER	Cobham Tactical Communications and Surveillance		
TYPE	D1600		
POWER	100mW		
FCC ID	XRF SOL7HDNTX		
COUNTRY OF ORIGIN	United Kingdom		
INDUSTRY CANADA ID			
EMISSION DESIGNATOR	2M5G2D and 2M50D7F		
DHSS/FHSS/COMBINED OR OTHER			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	N/A		
MANUFACTURER			
TYPE			
PART NUMBER			
SERIAL NUMBER			
COUNTRY OF ORIGIN			

Page 1 of 1

COMMERCIAL-IN-CONFIDENCE

Signature

Date 20/9/2014

Declaration of Build Status Serial Number

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Cobham Tactical Communications DC1600 HD Module & SOLO 7. 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 12.0 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: SOLO7HDNTX-198270			
0	As supplied by manufacturer.	N/A	N/A
1	High Linearity setting was activated in the test software to improve the level of the shoulders of the transmission for compliance with Emission mask B of FCC 90.210.	M Russell	09/06/2014
2	The EUT was returned to the manufacturer in order for the RF output power to be re-calibrated as previous measurements were higher than expected. The reduction was 2 dB (Approx).	Cobham	11/06/2014

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Product Service

SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
Cobham Tactical Communications DC1600 HD Module & SOLO 7
In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 90
and Industry Canada RSS-210 and RSS-GEN

Product Service

2.1 POWER AND ANTENNA HEIGHT LIMITS / TRANSMITTER OUTPUT POWER AND E.I.R.P. REQUIREMENTS

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 90, Clause 90.205 (o)
Industry Canada RSS-210 , Clause A8.4(4)
Industry Canada RSS-GEN, Clause 4.8

2.1.2 Equipment Under Test and Modification State

SOLO7 S/N: SOLO7HDNTX-198270 - Modification State 2

2.1.3 Date of Test

11 June 2014 & 1 July 2014

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 test was applied in accordance with the test method requirements of FCC CFR 47 Part 90.205 (d) and RSS-210 Issue 8 Q8.4(4).

Conducted

The EUT was configured to transmit on maximum power on the bottom, middle and top channels configured with QPSK modulation and 2.5 MHz Bandwidth which was declared as the worst case configuration by the manufacturer. The EUT was connected to a wideband power meter via cable and attenuator. The path loss was measured using a network analyser and entered as an offset in the power meter including the manufacturers declared maximum antenna gain. The peak power was recorded as per the table below.

Radiated

The EUT was configured to transmit on maximum power on the bottom, middle and top channels configured with QPSK modulation and 2.5 MHz Bandwidth which was declared as the worst case configuration by the manufacturer.
To ascertain the azimuth angle and measuring antenna polarization that yields the highest level, each measurement was investigated by continuous azimuth 360° rotation and also repeated with the measuring antenna in both vertical and horizontal polarizations. For each final measurement, the respective azimuth angle and measuring antenna polarization which yielded the highest level was used during a measuring antenna elevation search from 1 m to 4 m.
Each final measurement frequency was then measured with the azimuth angle, measuring antenna height and polarization that yielded the highest level. The peak and average power was recorded as per the table below.

Product Service

2.1.6 Environmental Conditions

Ambient Temperature	20.0 - 23.9°C
Relative Humidity	40.0 - 45.0%

2.1.7 Test Results

12.0 V DC Supply

Conducted

2452.50 MHz

Peak Power (dBm)	Peak Power (W)
29.27	0.933

2466.75 MHz

Peak Power (dBm)	Peak Power (W)
29.13	0.818

2481.00 MHz

Peak Power (dBm)	Peak Power (W)
29.23	0.838

Radiated

2452.50 MHz

Peak Power (dBm)	Average Power (dBm)	Peak Power (W)	Average Power (W)
32.26	30.12	1.683	1.028

2466.75 MHz

Peak Power (dBm)	Average Power (dBm)	Peak Power (W)	Average Power (W)
31.57	29.43	1.435	0.877

2481.00 MHz

Peak Power (dBm)	Average Power (dBm)	Peak Power (W)	Average Power (W)
31.42	29.28	1.387	0.847

Limit

For FCC, the maximum transmitter power allowed is 5 Watts.

For IC, the maximum peak conducted output power shall not exceed 1 W. The radiated shall not exceed 4 Watts.

2.2 TYPE OF EMISSIONS

2.2.1 Specification Reference

FCC CFR 47 Part 2 Clause 2.1047
FCC CFR 47 Part 90, Clause 90.207

2.2.2 Equipment Under Test

SOLO7

2.2.3 Test Results

Customer Description

The EUT operates with a measured channel bandwidth of 2.3 MHz and has a declared authorised bandwidth of 2.5 MHz. The EUT can operate with QPSK modulation. Therefore, the type of emission can be classified as follows:

QPSK: 2M5G2D

The measurements in the Bandwidth Limitations sections shows compliance with the emission designators described above.

2.3 MODULATION CHARACTERISTICS

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047 (d)

2.3.2 Equipment Under Test

SOLO7

2.3.3 Test Results

Customer Description

Orthogonal frequency-division multiplexing (OFDM) – essentially identical to Coded OFDM (COFDM) – is a scheme utilised as a digital multi-carrier modulation method. A large number of closely-spaced orthogonal sub-carriers are used to carry data. The data is divided into several parallel data streams or channels, one for each sub-carrier. Each sub-carrier is modulated with a conventional modulation scheme, such as Quadrature Phase Shift Keying (QPSK) or Quadrature Amplitude Modulation (QAM) at a low symbol rate, maintaining total data rates similar to conventional single-carrier modulation schemes in the same bandwidth. Phase-shift keying (PSK) is a digital modulation scheme that conveys data by modulating the phase of the carrier wave. Quadrature phase-shift keying (QPSK) uses four points on the constellation diagram, equispaced around a circle. With four phases, QPSK can encode two bits per symbol.

Limit Clause

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

2.4 BANDWIDTH LIMITATIONS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 90, Clause 90.209

2.4.2 Equipment Under Test and Modification State

SOLO7 S/N: SOLO7HDNTX-198270 - Modification State 0

2.4.3 Date of Test

6 June 2014

2.4.4 Test Equipment Used

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

2.4.5 Test Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 90.209 (b).

The EUT was transmitting at maximum power, with QPSK modulation and 2.5 MHz nominated bandwidth which was declared by the manufacturer as the worst case for testing. The EUT was connected to a spectrum analyser via a cable and attenuator, the RBW of the spectrum analyser was set to at least 1% of the emission bandwidth and a video bandwidth of 3 times RBW, the occupied bandwidth measurement function of the analyser was used and the 99% bandwidth recorded.

The plots on the following pages show the resultant display from the Spectrum Analyser.

2.4.6 Environmental Conditions

Ambient Temperature	23.9°C
Relative Humidity	40.0%

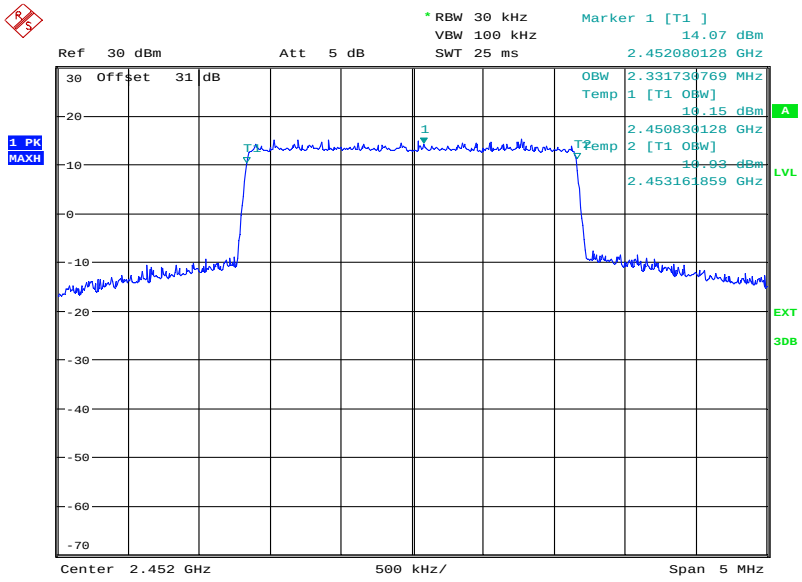
Product Service

2.4.7 Test Results

12.0 V DC Supply

Frequency	Occupied Bandwidth (kHz)
2452.50 MHz	2331.731
2466.75 MHz	2331.731
2481.00 MHz	2331.731

2452.50 MHz



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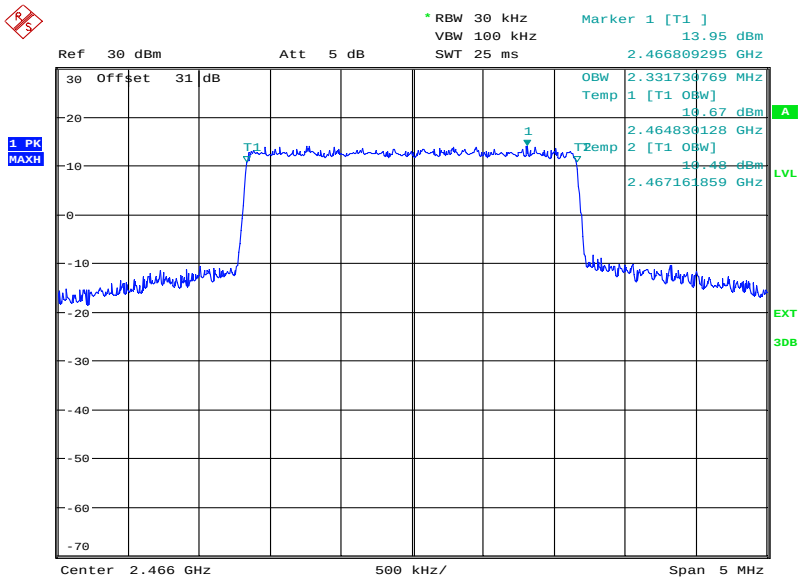
2466.75 MHz



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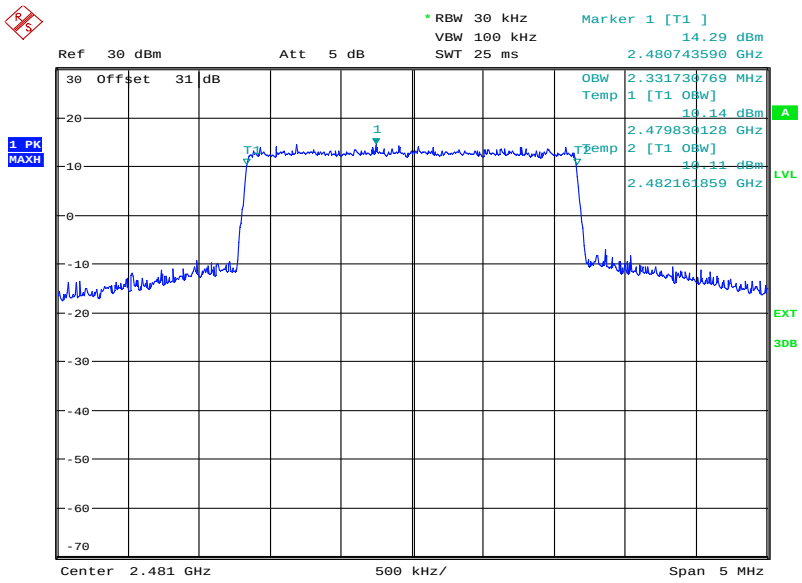
2481.00 MHz



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Limit

The maximum authorised signal channel bandwidth of emission is corresponding to the type of emission specified.

2.5 EMISSION MASK/TRANSMITTER UNWANTED EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 90, Clause 90.210 (b)(1)(2)(3)
Industry Canada RSS-210, Clause A8.5
Industry Canada RSS-GEN, Clause 4.9

2.5.2 Equipment Under Test and Modification State

SOLO7 S/N: SOLO7HDNTX-198270 - Modification State 1

2.5.3 Date of Test

1 June 2014, 2 June 2014, 10 June 2014

2.5.4 Test Equipment Used

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

2.5.5 Test Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 90.210 (d), Part 2.1049 (c).

For emissions less than 6.25 MHz removed from the edge of the authorized bandwidth measurements were performed using a conducted method as detailed below:

The EUT was connected to a spectrum analyser via a cable and attenuator. The EUT was transmitting at maximum power, for bottom, middle and top channels. The EUT was modulated with QPSK modulation with a bandwidth of 2.5 MHz which was declared as the worst case configuration by the manufacturer. The path loss between the EUT and analyser was calibrated using a network analyser and entered in to the spectrum analyser as a reference level offset. The spectrum analyser was configured with an RMS detector and average trace. The RBW of the analyser was configured to 10 kHz to show the true shape of the fundamental and to correct for the reduced power as the bandwidth of the emission is greater than 10 kHz an additional offset was added on top of the path loss which was entered as a reference level offset on the spectrum analyser. This correction factor was 10 log (2331/10) = 23.7 dB.

For emissions greater than 6.25 MHz removed from the edge of the authorized bandwidth, measurements were performed using both conducted and radiated methods as follows:

Product Service

Conducted

A network analyser was used to measure the path loss and the worst case was entered as a reference level offset in to the spectrum analyser. The EUT was connected to a spectrum analyser via an attenuator, filter and cable. Between 9 kHz and 4GHz the EUT was connected to the spectrum analyser via a cable and attenuator. Between 4 GHz and 18 GHz a 4 GHz high pass filter was used, between 18 GHz and 25 GHz the EUT was connected to the spectrum analyser via a cable and waveguide. The EUT was set to operate at maximum power with QPSK modulation and a bandwidth of 2.5 MHz which was declared as the worst case configuration by the manufacturer. The spectrum analyser was configured with an RBW of 1 MHz as the frequency of the fundamental is greater than 1GHz. The trace set to max hold using a peak detector.

For Industry Canada the measurements were repeated for the spectrum ranges above, however, a 100 kHz bandwidth was used and the limit was -20 dB relative to the power of the fundamental as measured using a 100 kHz RBW on the spectrum analyser. This limit was significantly higher than the limit of -13 dBm for FCC. Therefore, these plots are not shown.

Radiated

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

To ascertain the azimuth and measuring antenna polarization that yields the highest peak emission level, each final measurement frequency was investigated by continuous azimuth emissions searching with the measuring antenna in both vertical and horizontal polarizations. For each final measurement frequency, the respective peak emission azimuth and measuring antenna polarization was used during a measuring antenna elevation search from 1 m to 4 m. Each final measurement frequency was then measured with the EUT azimuth, measuring antenna height and polarization that yielded the greatest peak emission level.

The EUT was set to operate at maximum power with QPSK modulation and a bandwidth of 2.5 MHz which was declared as the worst case configuration by the manufacturer.

The measurements were performed at a 3m distance unless otherwise stated.

For any emissions found the EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gain and cable loss.

Field Strength Measurements

Final measurement points over the frequency range of 30 MHz to 1 GHz were measured using a quasi-peak detector. Final measurement points over the frequency range of 1 GHz and 25 GHz were measured using peak and average methods. Peak measurements were made using a peak detector with 1 MHz resolution and video bandwidths. Average measurements were made using a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

2.5.6 Environmental Conditions

Ambient Temperature	21.1 - 23.9°C
Relative Humidity	40.0 - 46.0%

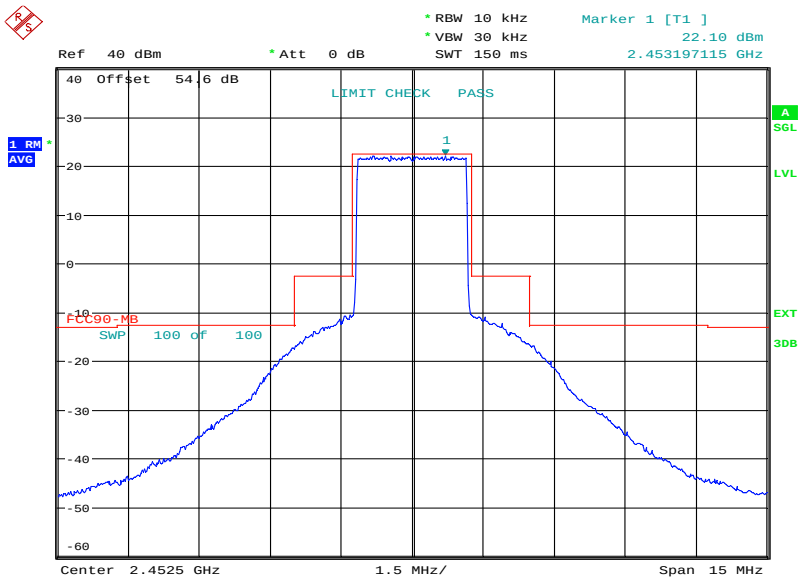
Product Service

2.5.7 Test Results

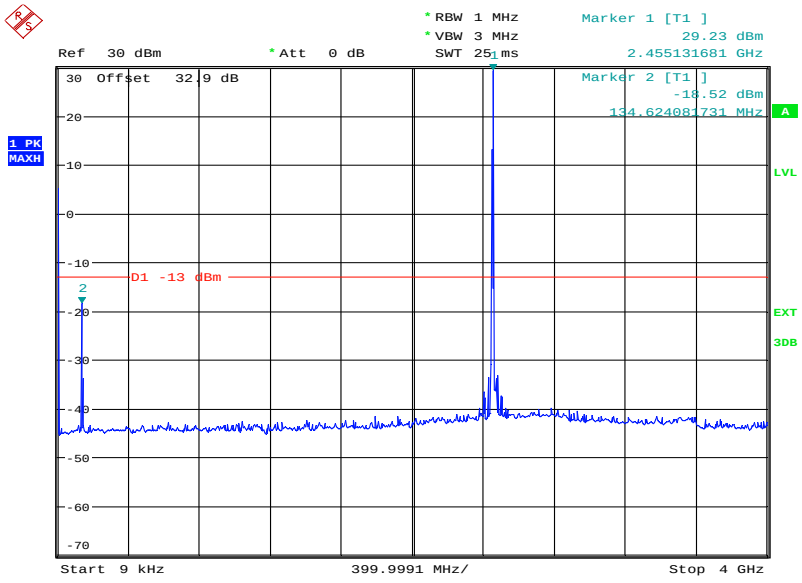
12.0 V DC Supply

Conducted

2452.50 MHz

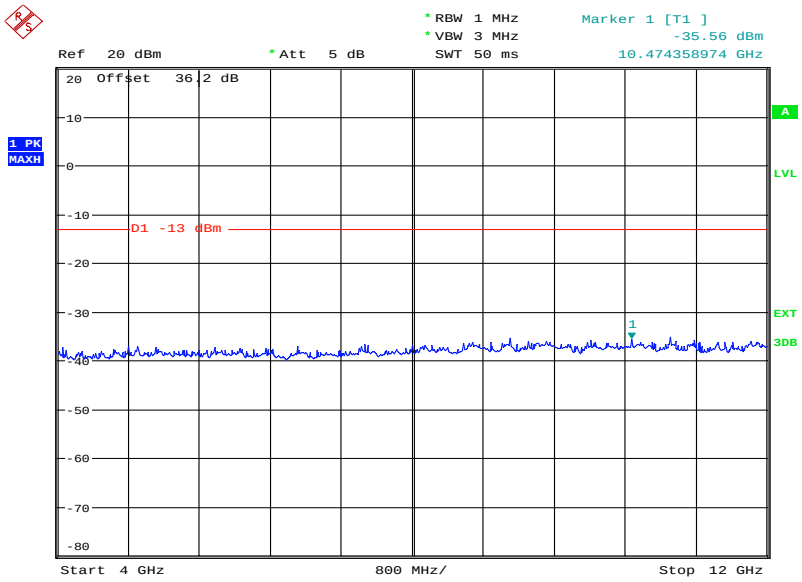


9 kHz to 4 GHz



Product Service

4 GHz to 12 GHz



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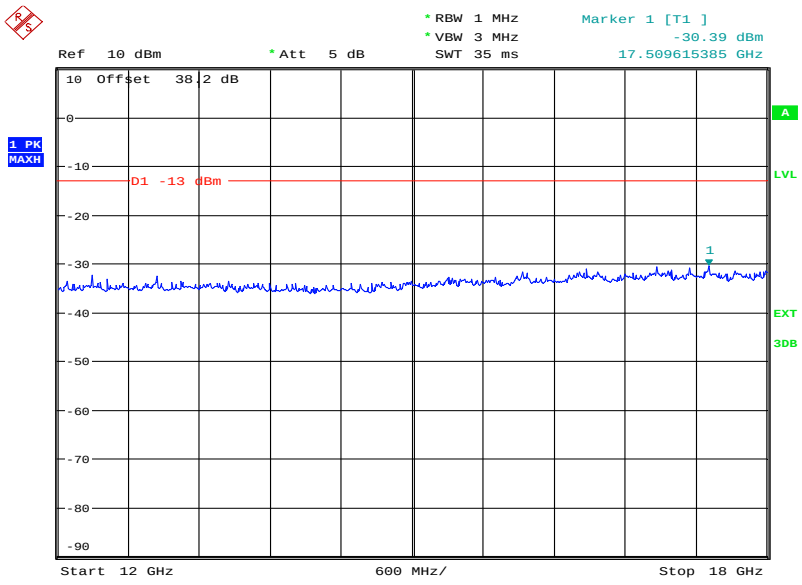
12 GHz to 18 GHz



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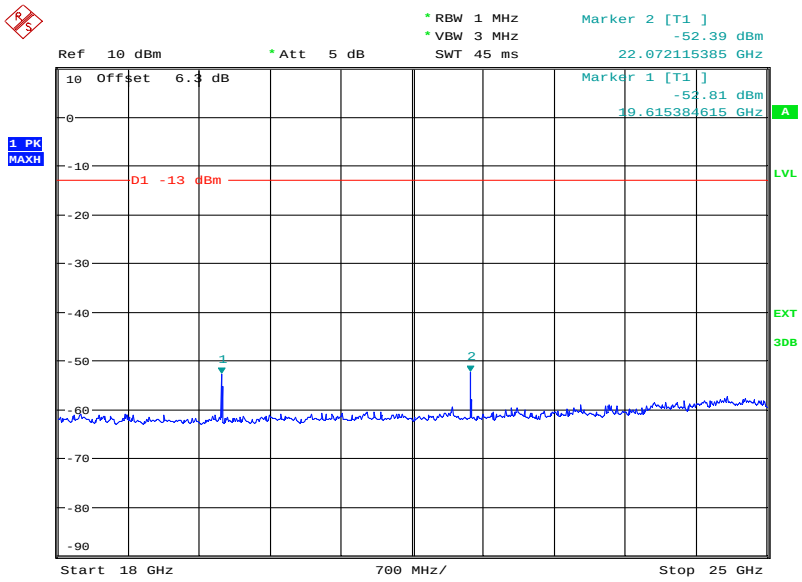
Product Service

18 GHz to 25 GHz



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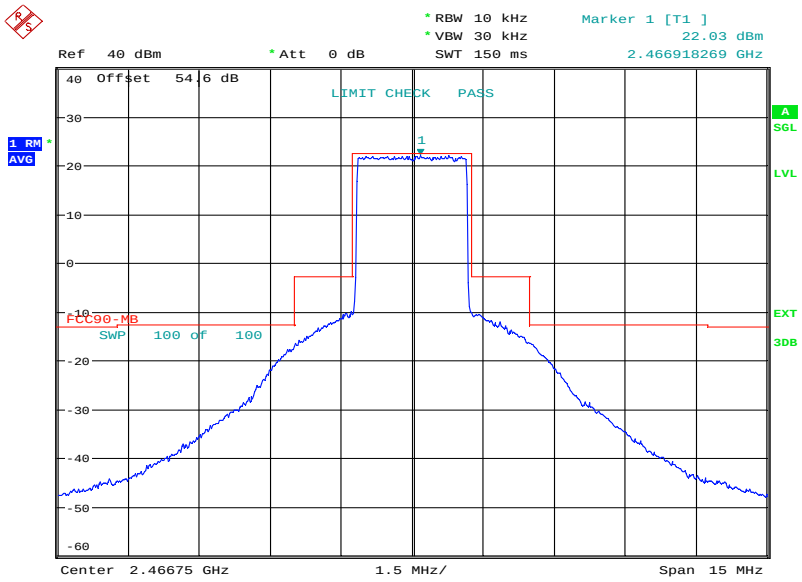
Product Service

2466.75 MHz



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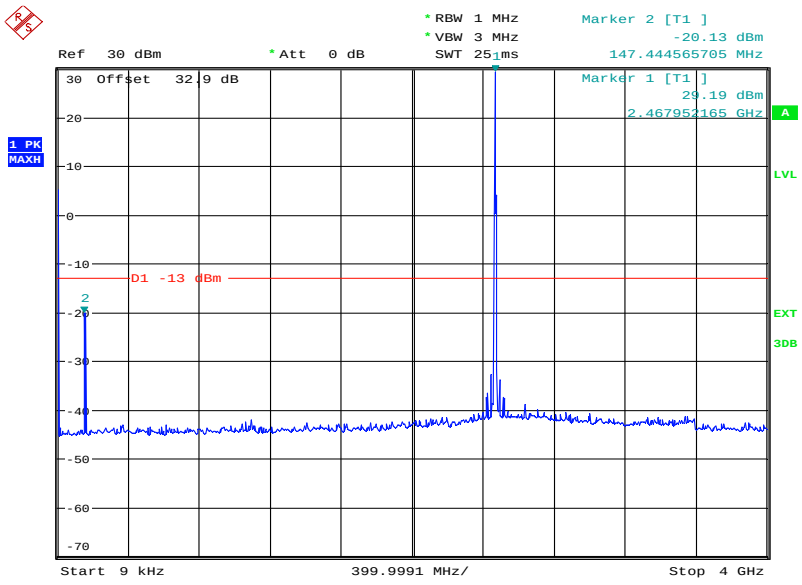
9 kHz to 4 GHz



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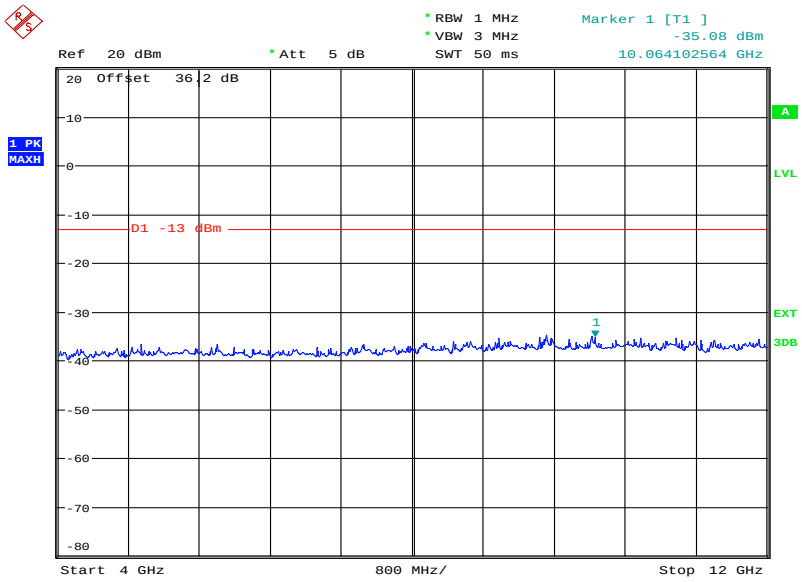
Product Service

4 GHz to 12 GHz



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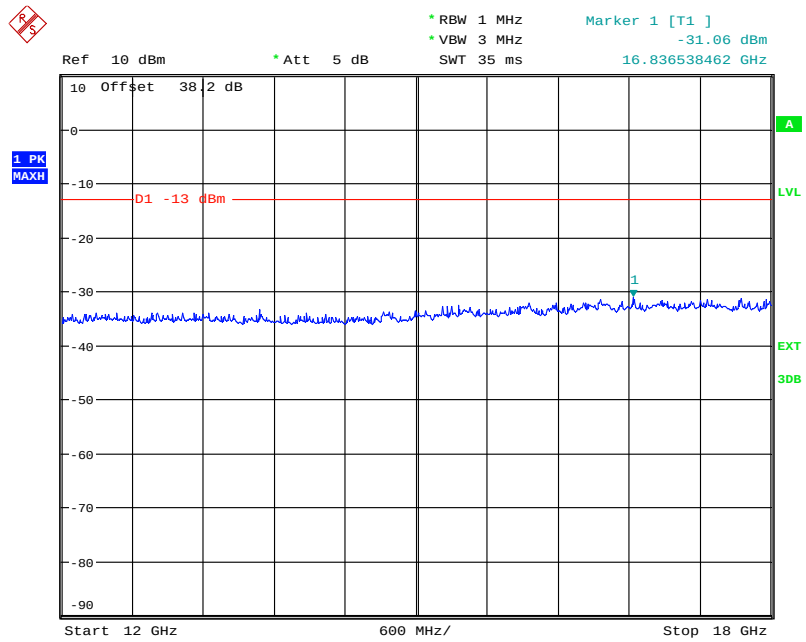
12 GHz to 18 GHz



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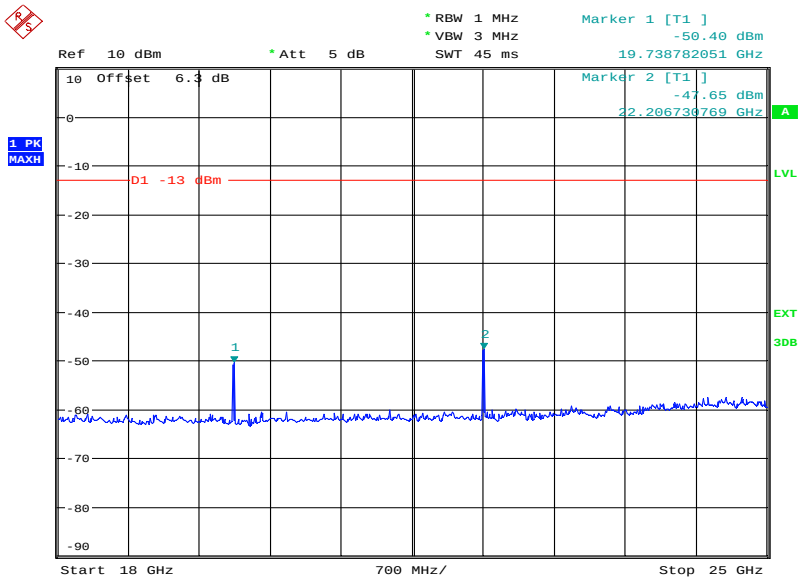
Product Service

18 GHz to 25 GHz



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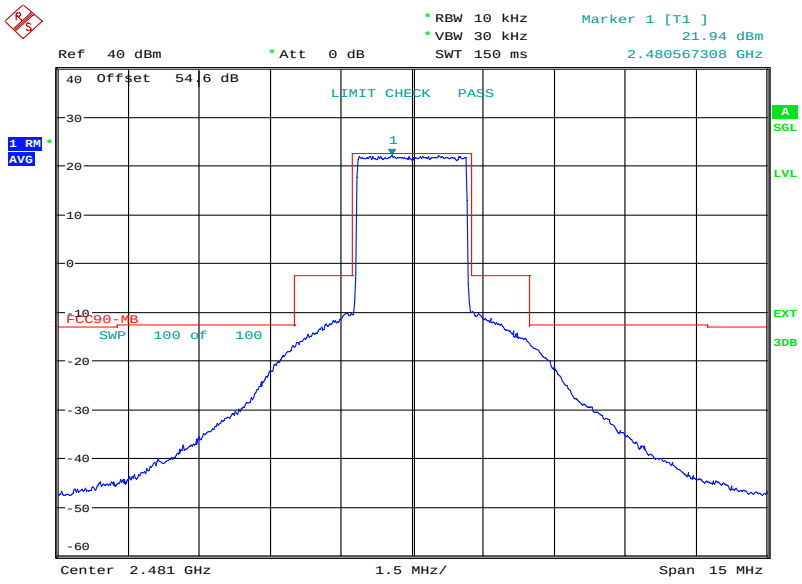
Product Service

2481.00 MHz



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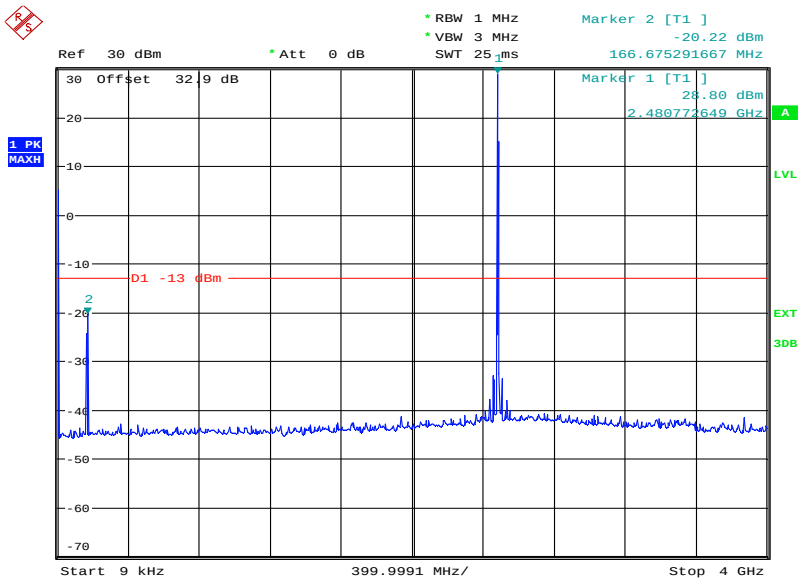
9 kHz to 4 GHz



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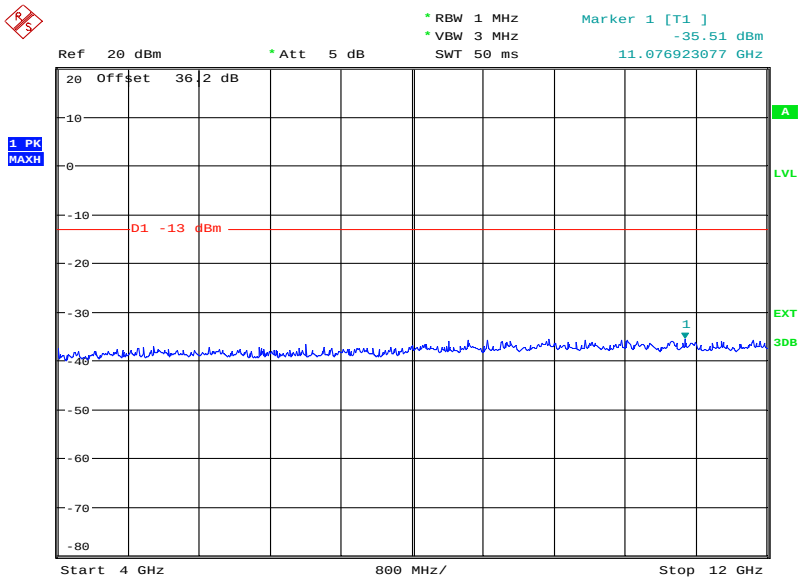
Product Service

4 GHz to 12 GHz



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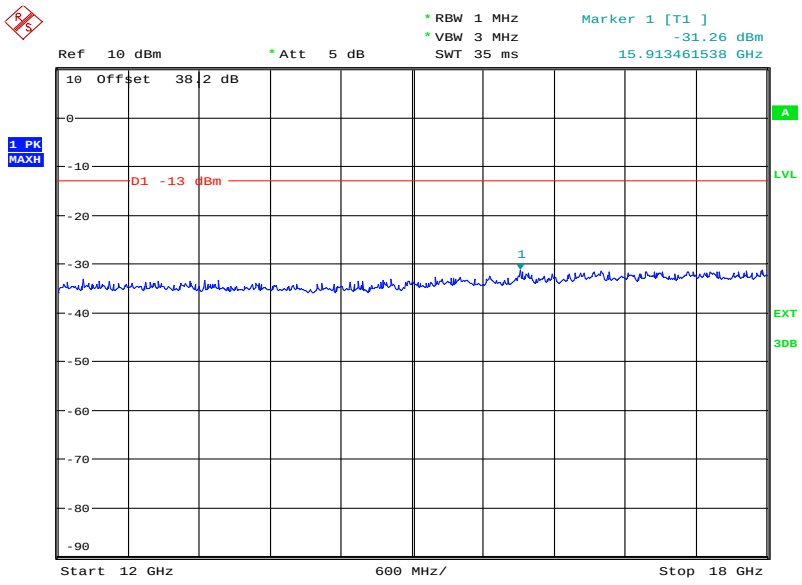
12 GHz to 18 GHz



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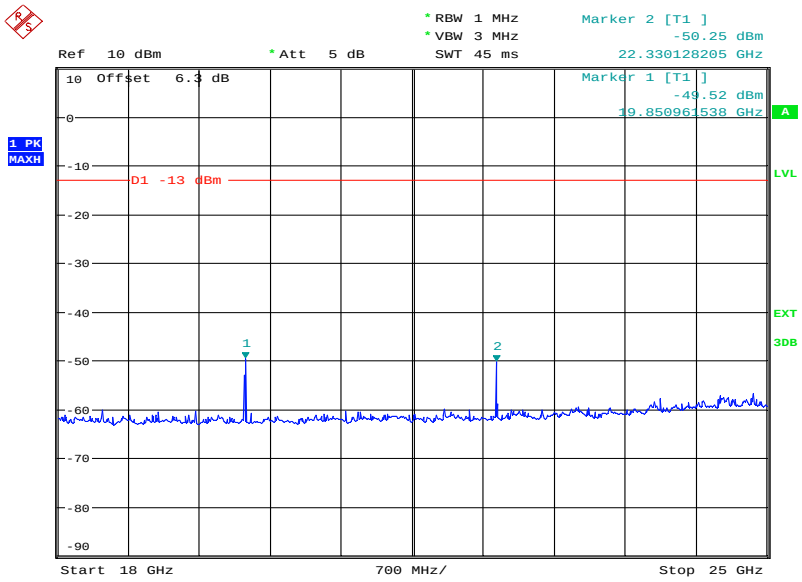
Product Service

18 GHz to 25 GHz



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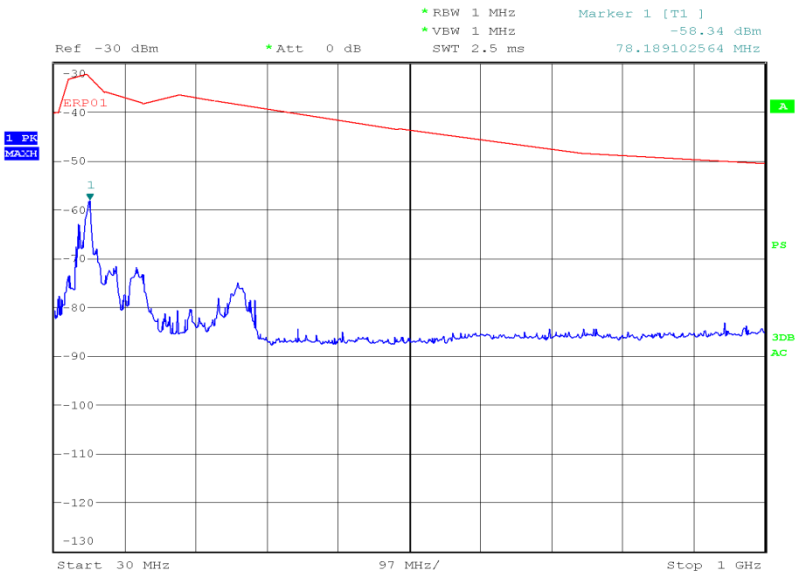
Radiated

2452.50 MHz

30 MHz to 1 GHz



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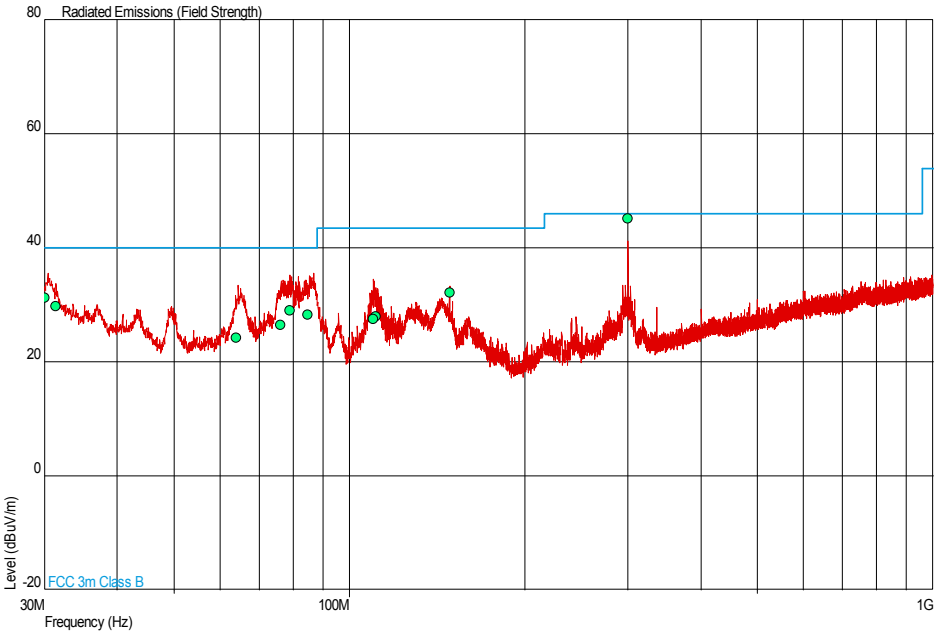
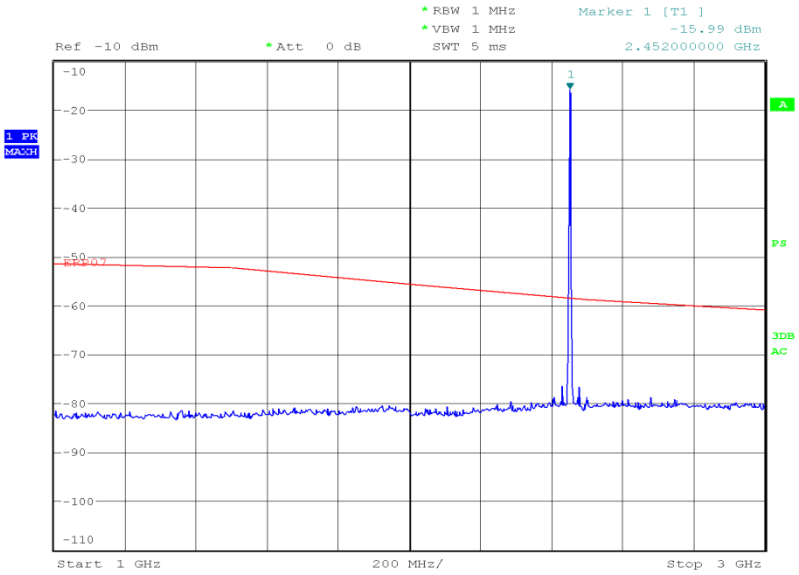


Frequency (MHz)	QP Level (dBuV/m)	QP Level (uV/m)	QP Limit (dBuV/m)	QP Limit (uV/m)	QP Margin (dBuV/m)	QP Margin (uV/m)	Angle (Deg)	Height (m)	Polarity
30.026	31.2	36.3	40.0	100	-8.8	-63.7	357	1.03	Vertical
31.438	29.7	30.5	40.0	100	-10.3	-69.5	259	1.00	Vertical
63.984	24.2	16.2	40.0	100	-15.8	-83.8	260	1.00	Vertical
76.169	26.5	21.1	40.0	100	-13.5	-78.9	171	1.00	Vertical
79.018	29.1	28.5	40.0	100	-10.9	-71.5	254	1.00	Vertical
84.704	28.3	26.0	40.0	100	-11.7	-74.0	286	1.00	Vertical
109.991	27.6	24.0	43.5	150	-15.9	-126.0	17	1.00	Vertical
111.010	27.9	24.8	43.5	150	-15.6	-125.2	0	1.00	Vertical
148.508	32.2	40.7	43.5	150	-11.3	-109.3	211	1.00	Vertical
300.077	45.1	179.9	46.0	200	-0.9	-20.1	0	1.00	Horizontal

Product Service

1 GHz to 3 GHz



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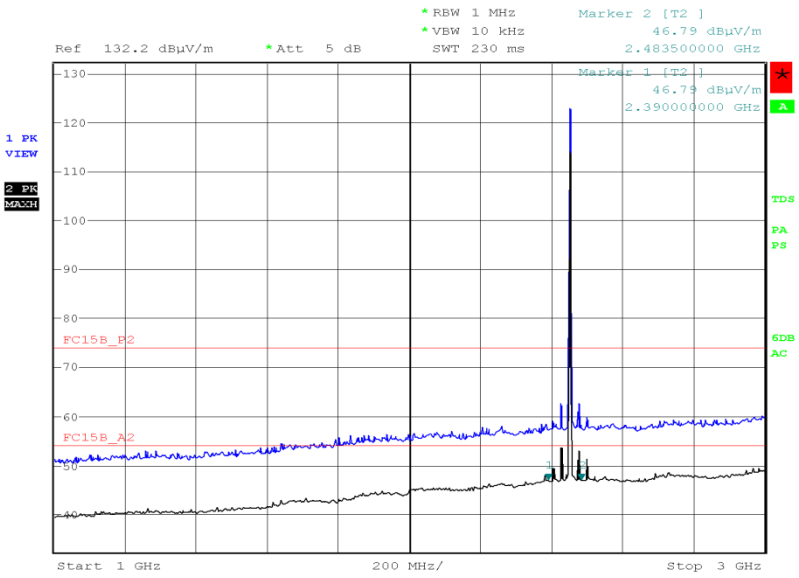

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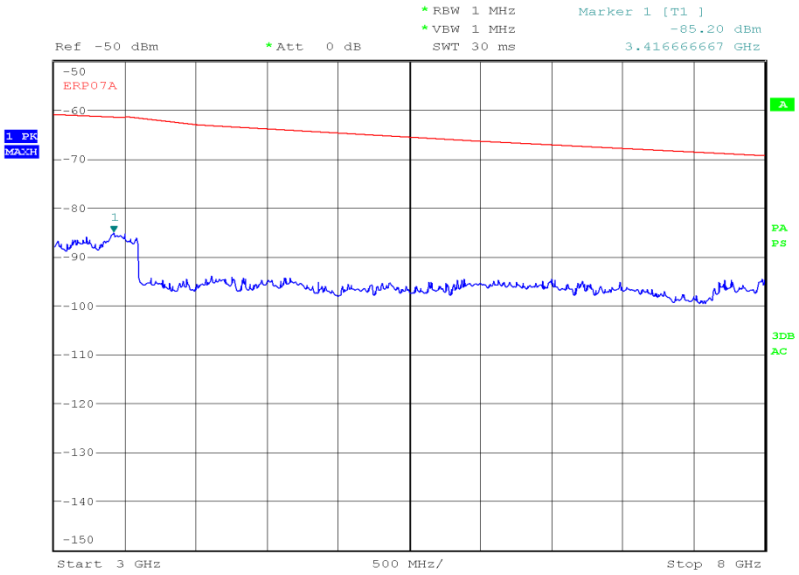
Product Service

3 GHz to 8 GHz



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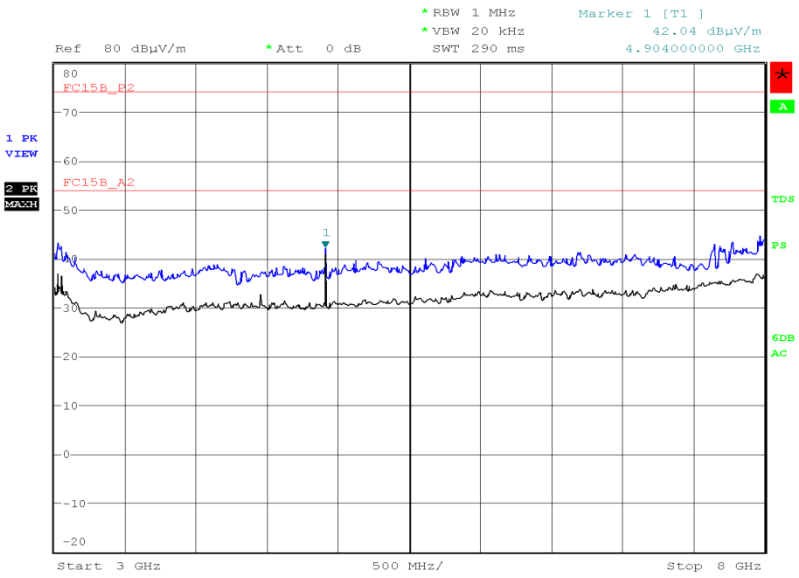
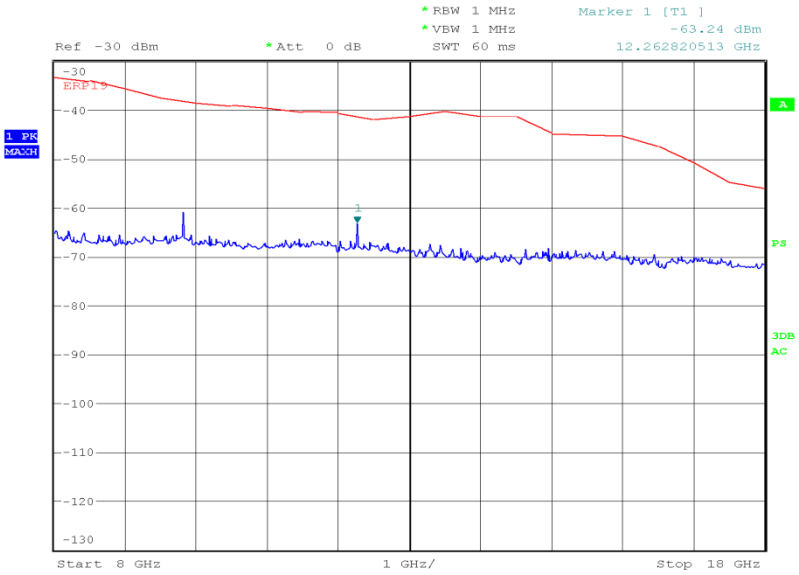


Date: 2.JUL.2014 18:21:21

8 GHz to 18 GHz



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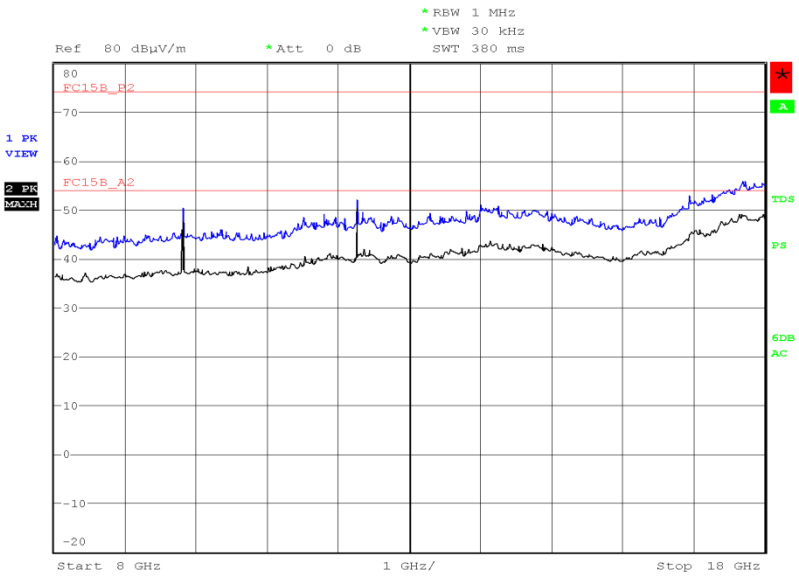

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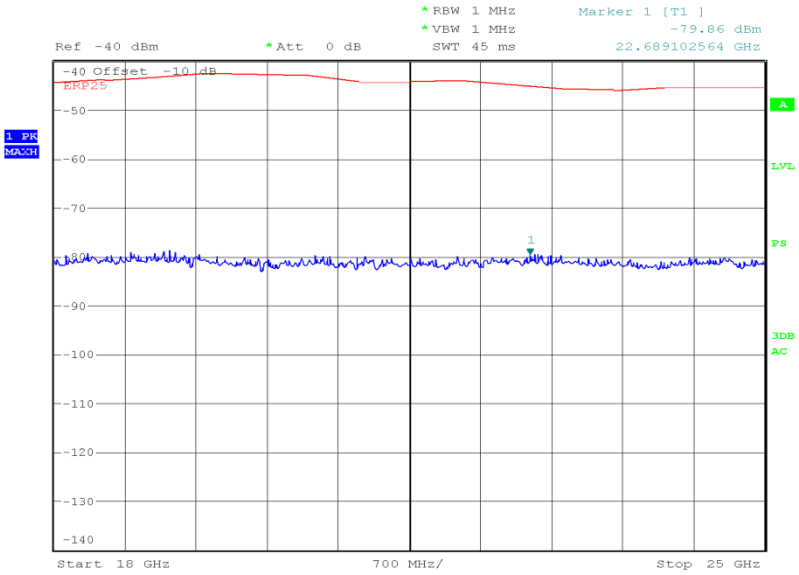
Product Service

18 GHz to 25 GHz



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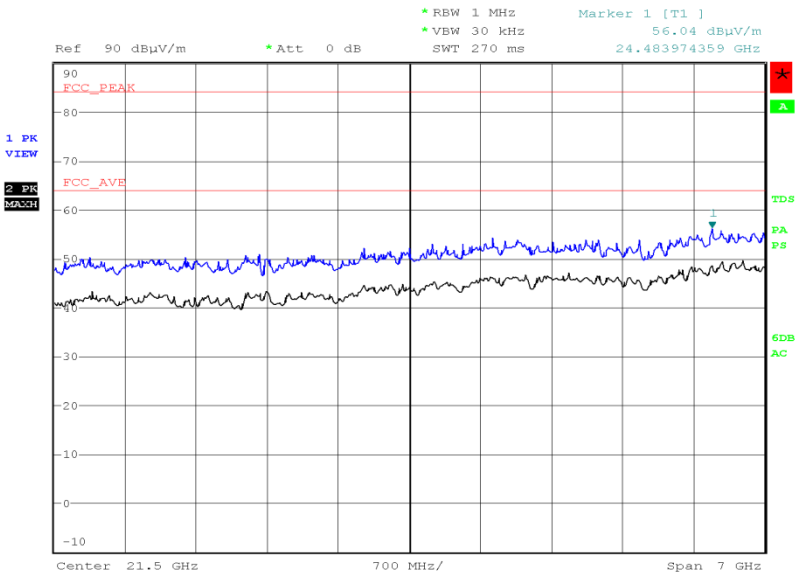
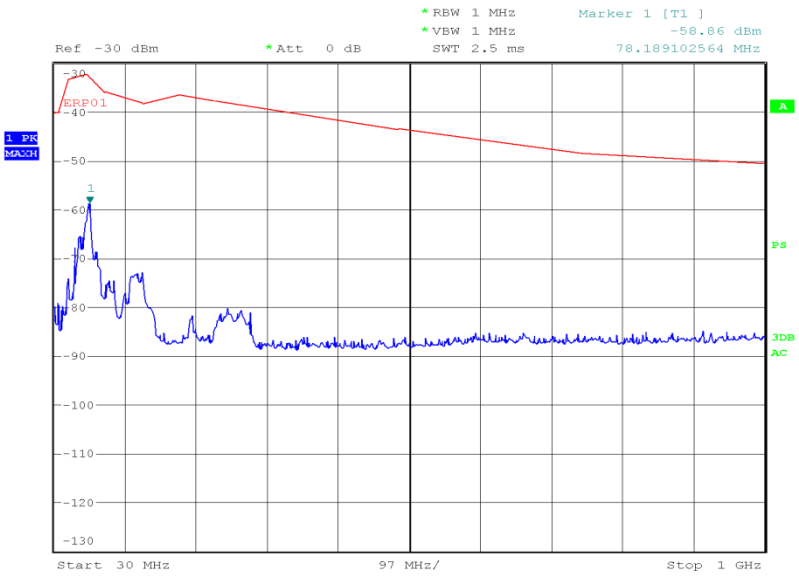


Date: 2.JUL.2014 21:02:19

Product Service

2466.75 MHz

30 MHz to 1 GHz



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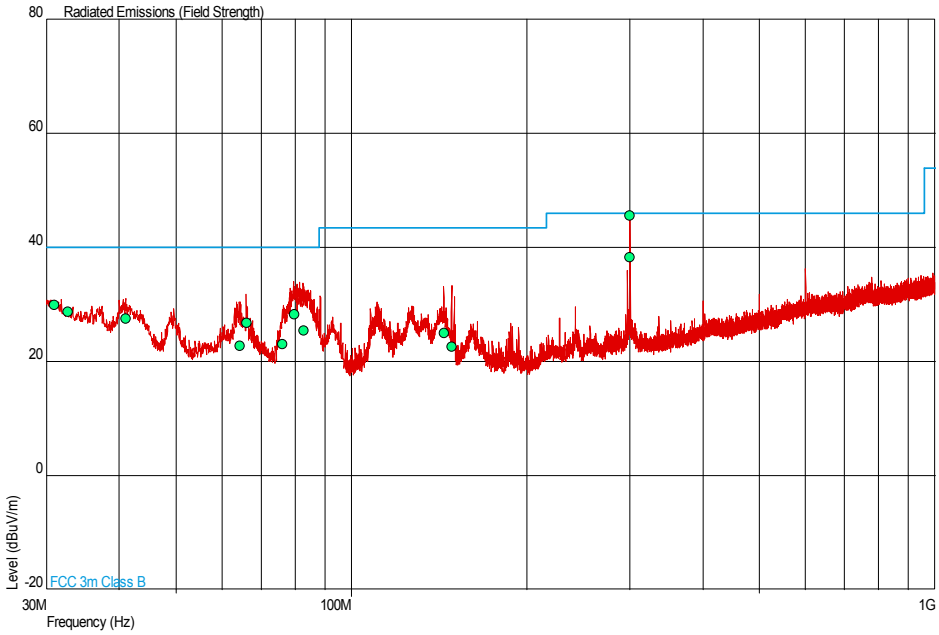
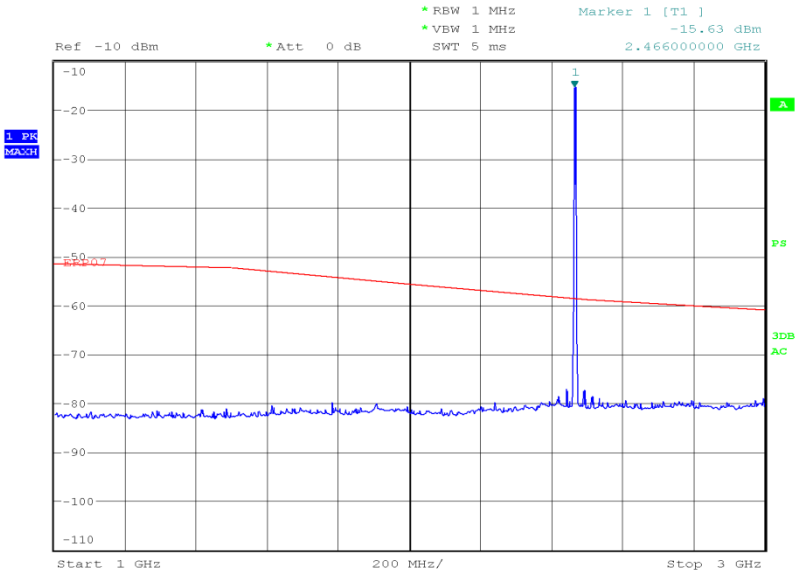


Frequency (MHz)	QP Level (dBuV/m)	QP Level (uV/m)	QP Limit (dBuV/m)	QP Limit (uV/m)	QP Margin (dBuV/m)	QP Margin (uV/m)	Angle (Deg)	Height (m)	Polarity
30.951	29.9	31.3	40.0	100	-10.1	-68.7	8	1.00	Vertical
32.698	28.8	27.5	40.0	100	-11.2	-72.5	25	1.00	Vertical
41.110	27.5	23.7	40.0	100	-12.5	-76.3	62	1.12	Vertical
64.324	22.8	13.8	40.0	100	-17.2	-86.2	101	1.00	Vertical
66.162	26.8	21.9	40.0	100	-13.2	-78.1	68	1.00	Vertical
76.193	23.0	14.1	40.0	100	-17.0	-85.9	332	1.00	Vertical
79.877	28.2	25.7	40.0	100	-11.8	-74.3	184	1.73	Vertical
82.915	25.5	18.8	40.0	100	-14.5	-81.2	82	1.00	Vertical
144.184	25.0	17.8	43.5	150	-18.5	-132.2	306	1.30	Vertical
148.470	22.6	13.5	43.5	150	-20.9	-136.5	223	1.00	Vertical
300.057	38.2	81.3	46.0	200	-7.8	-118.7	0	1.00	Horizontal
300.090	45.5	188.4	46.0	200	-0.5	-11.6	286	1.20	Vertical

Product Service

1 GHz to 3 GHz



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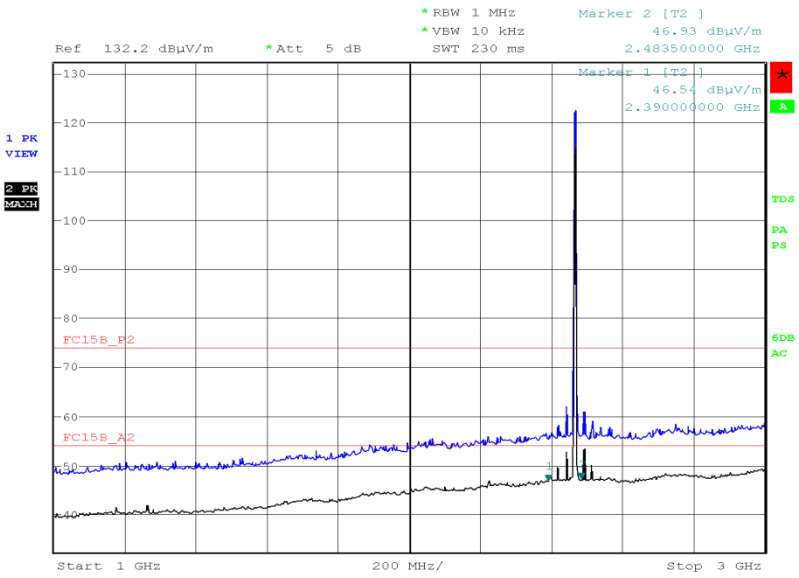

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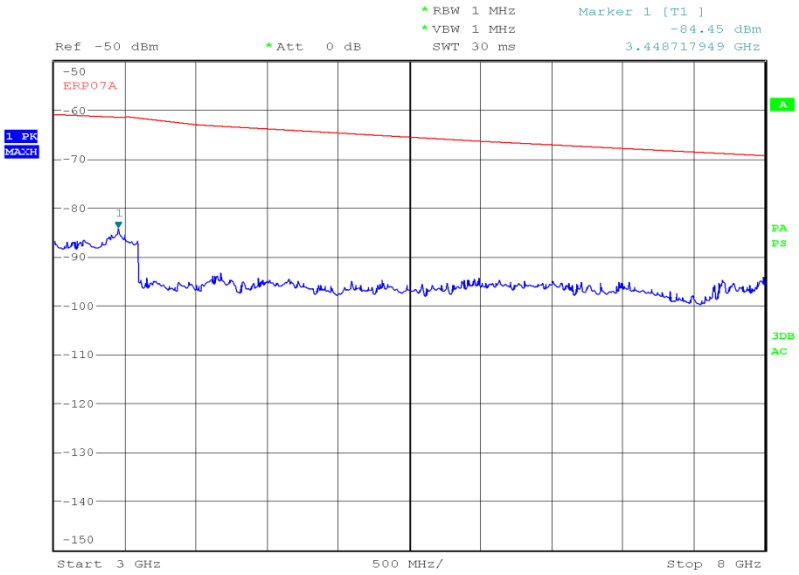
Product Service

3 GHz to 8 GHz



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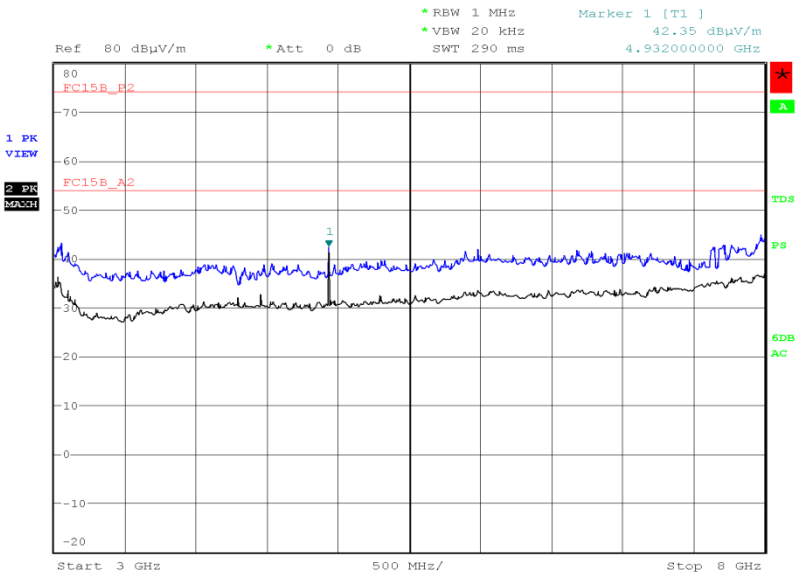
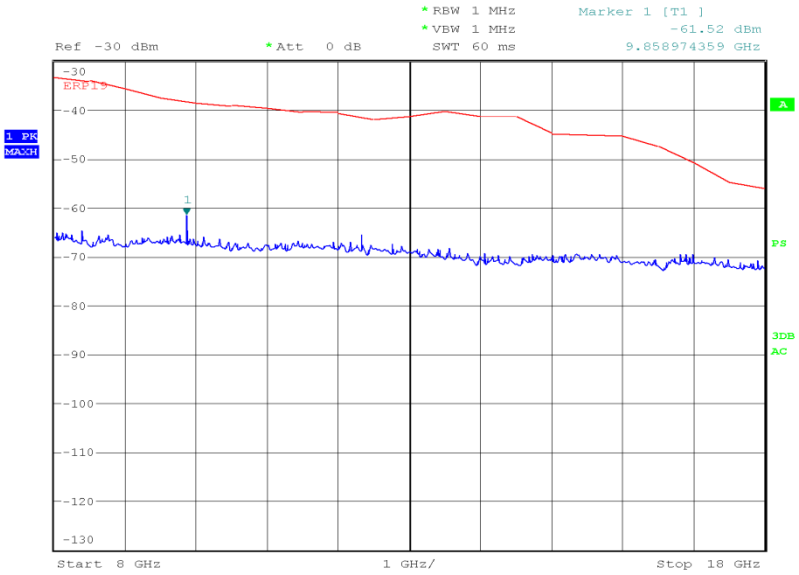


Date: 2.JUL.2014 18:29:00

Product Service

8 GHz to 18 GHz



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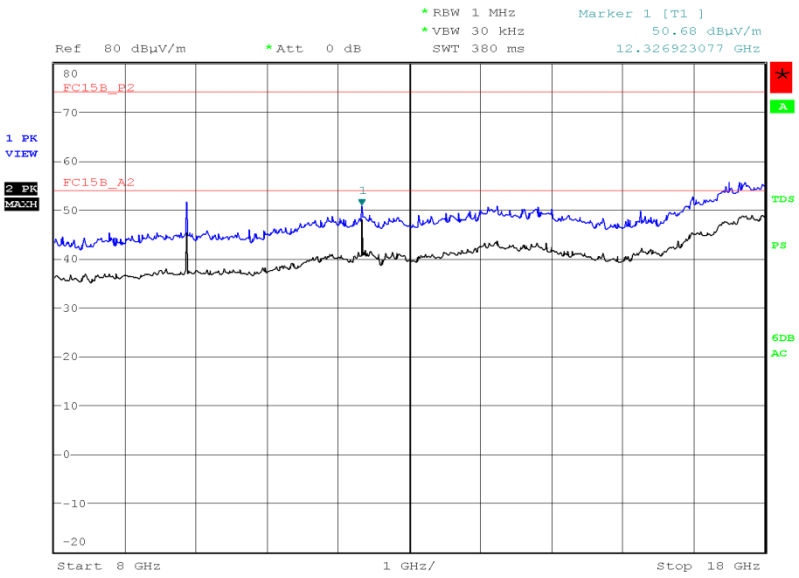
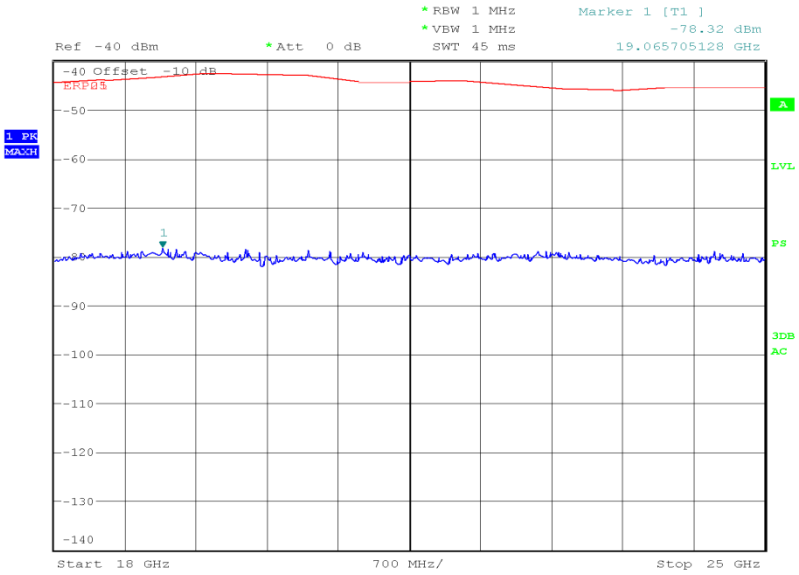


Date: 1.JUL.2014 22:34:44

Product Service

18 GHz to 25 GHz



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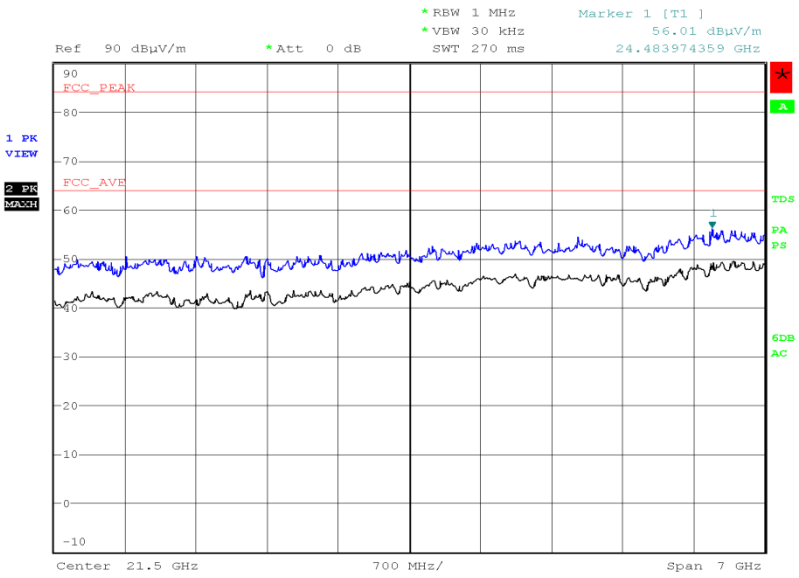
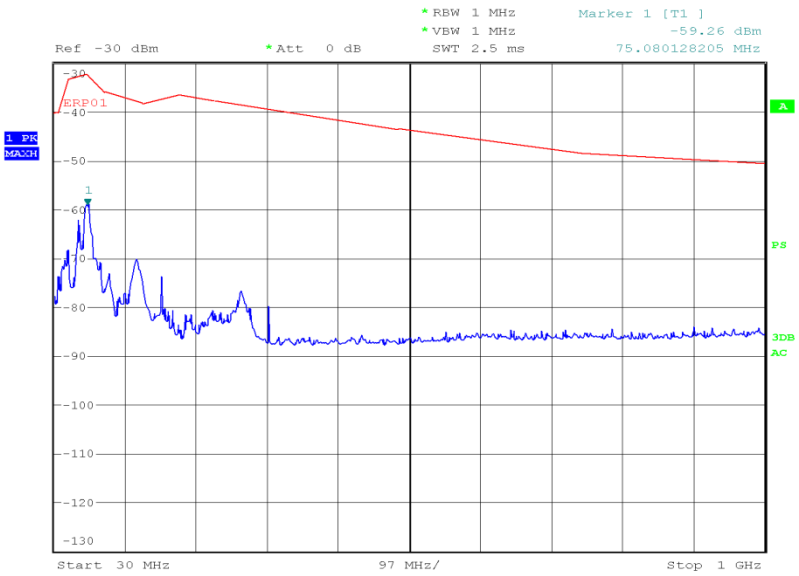


Date: 2.JUL.2014 20:59:39

Product Service

2481.00 MHz

30 MHz to 1 GHz



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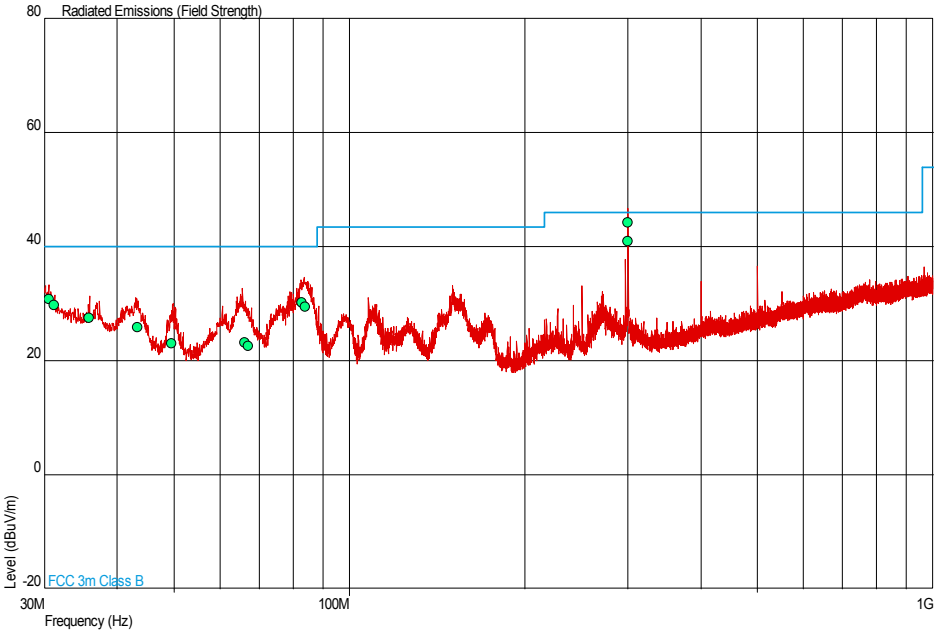
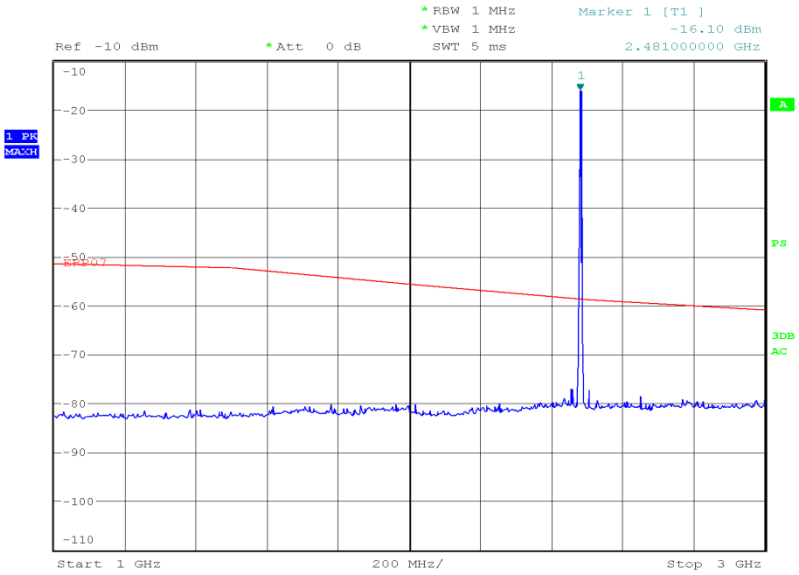


Frequency (MHz)	QP Level (dBuV/m)	QP Level (uV/m)	QP Limit (dBuV/m)	QP Limit (uV/m)	QP Margin (dBuV/m)	QP Margin (uV/m)	Angle (Deg)	Height (m)	Polarity
30.538	30.9	35.1	40.0	100	-9.1	-64.9	271	1.00	Vertical
31.135	29.7	30.5	40.0	100	-10.3	-69.5	167	1.00	Vertical
35.738	27.5	23.7	40.0	100	-12.5	-76.3	234	1.00	Vertical
43.286	25.9	19.7	40.0	100	-14.1	-80.3	340	1.00	Vertical
49.618	23.1	14.3	40.0	100	-16.9	-85.7	144	1.00	Vertical
66.089	23.3	14.6	40.0	100	-16.7	-85.4	142	1.00	Vertical
66.969	22.6	13.5	40.0	100	-17.4	-86.5	360	3.15	Vertical
82.959	30.3	32.7	40.0	100	-9.7	-67.3	276	1.65	Vertical
84.031	29.5	29.9	40.0	100	-10.5	-70.1	184	1.65	Vertical
300.070	44.2	162.2	46.0	200	-1.8	-37.8	356	1.20	Horizontal
300.079	41.0	112.2	46.0	200	-5.0	-87.8	141	1.00	Vertical

Product Service

1 GHz to 3 GHz



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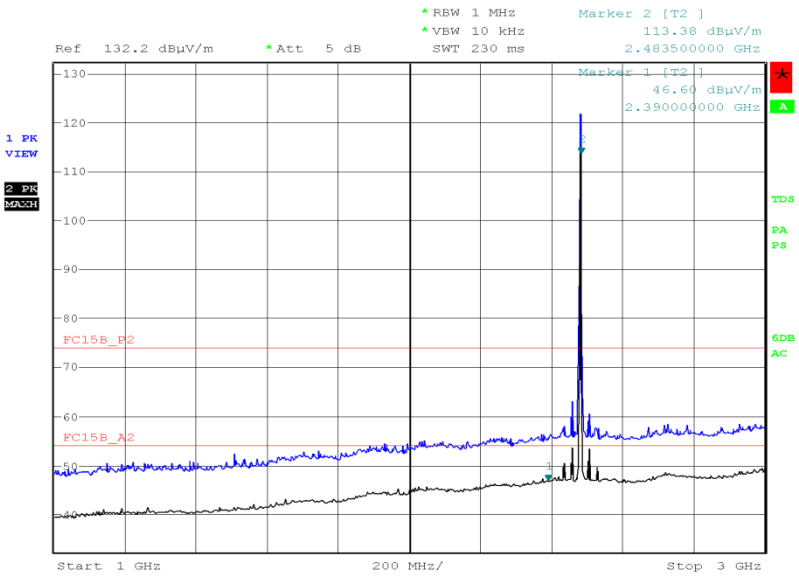
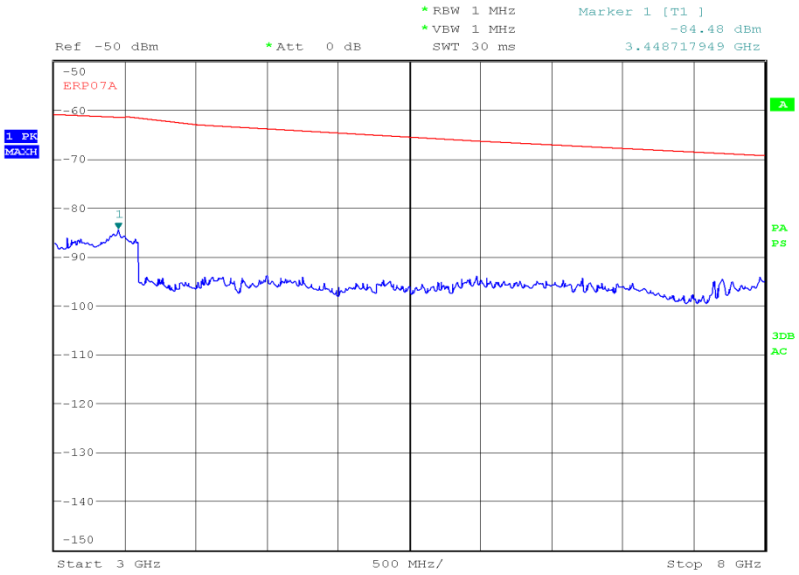


Date: 1.JUL.2014 20:19:08

Product Service

3 GHz to 8 GHz



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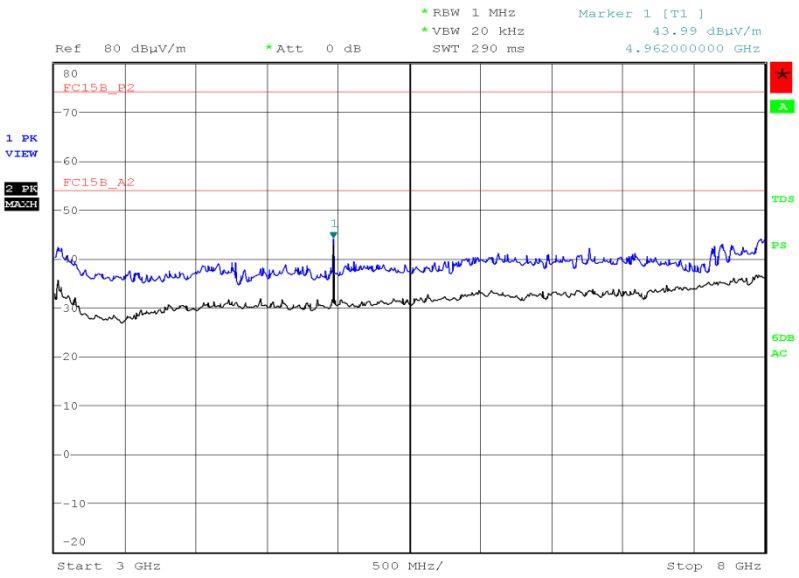
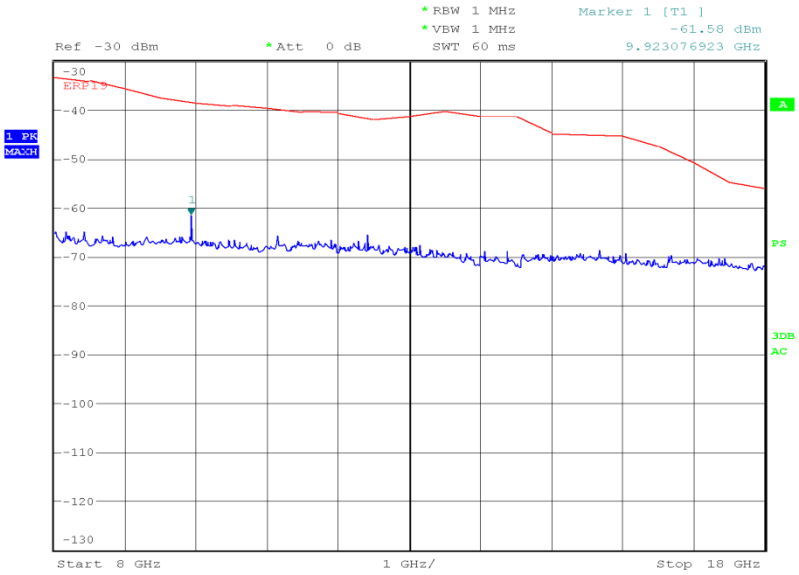


Date: 2.JUL.2014 18:32:38

Product Service

8 GHz to 18 GHz



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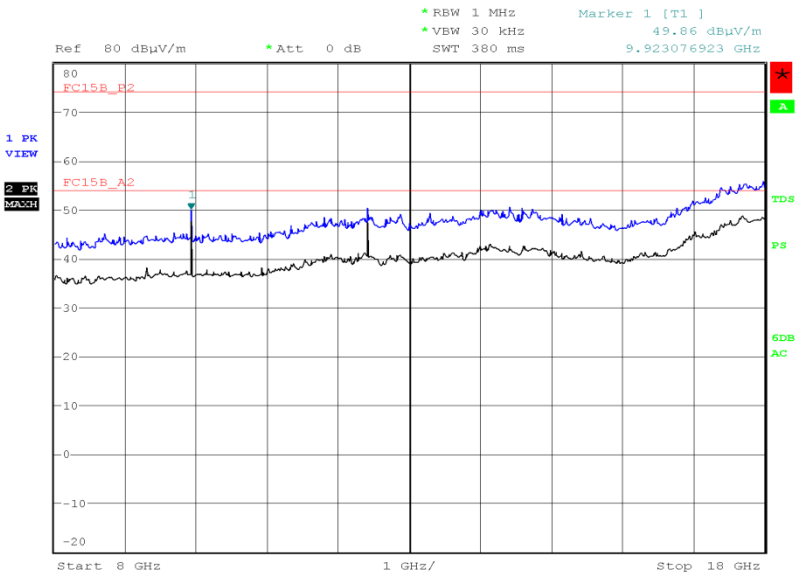

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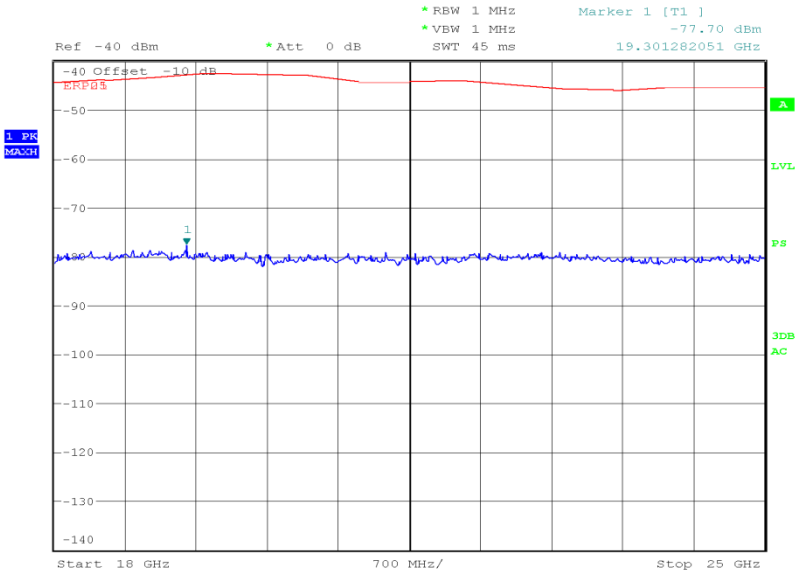
Product Service

18 GHz to 25 GHz



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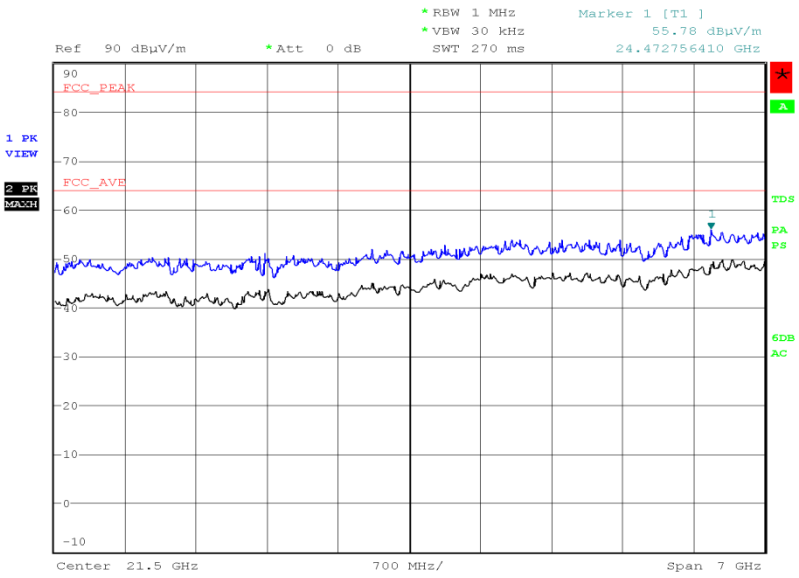


Date: 2.JUL.2014 21:07:38

Product Service

Limit

FCC: Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the un-modulated carrier power (P) as follows:
(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Industry Canada: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB.

2.6 FREQUENCY STABILITY

2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 90, Clause 90.213
Industry Canada RSS-GEN, Clause 4.7

2.6.2 Equipment Under Test and Modification State

SOLO7 S/N: SOLO7HDNTX-198270 - Modification State 2

2.6.3 Date of Test

11 June 2014

2.6.4 Test Equipment Used

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

2.6.5 Test Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 90.213 and FCC CFR 47 Part 2.1055 (a) (1), (d) (1).

The EUT was set to transmit on maximum power with an un-modulated carrier on bottom, middle and top channels. The EUT was connected to a frequency counter using an external 10 MHz frequency reference. The difference between the frequency of the fundamental and the frequency of the assigned channel in accordance with the manufactures documentation was recorded. In accordance with 2.1055, the temperature was varied from -30°C to +50° in 10° steps and a variation of voltage extremes was performed at +20°C.

2.6.6 Environmental Conditions

Ambient Temperature	22.3°C
Relative Humidity	46.2%

Product Service

2.6.7 Test Results

Other than Hand Carried Battery Equipment

Temperature Interval	Supply Voltage	Frequency Error (ppm)
		2466.75 MHz
-30°C	12.0 V DC	-2.08
-20°C	12.0 V DC	-2.05
-10°C	12.0 V DC	-2.49
0°C	12.0 V DC	-1.62
+10°C	12.0 V DC	-1.64
+20°C	12.0 V DC	-1.29
	5.9 V DC	-1.94
	16 V DC	-1.63
-30°C	12.0 V DC	-1.46
+40°C	12.0 V DC	-2.05
+50°C	12.0 V DC	-1.91

Limit

No limit specified.

2.7 6 dB BANDWIDTH

2.7.1 Specification Reference

Industry Canada RSS-210, Clause A8.2
Industry Canada RSS-GEN, Clause 4.6.2

2.7.2 Equipment Under Test and Modification State

SOLO7 S/N: SOLO7HDNTX-198270 - Modification State 0

2.7.3 Date of Test

6 June 2014

2.7.4 Test Equipment Used

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

2.7.5 Test Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 90.209 (b).

The EUT was transmitting at maximum power, with QPSK modulation and 2.5 MHz nominated bandwidth which was declared by the manufacturer as the worst case for testing. The EUT was connected to a spectrum analyser via a cable and attenuator, the RBW of the spectrum analyser was set to30 kHz and a VBW of 100 kHz. The peak value was recorded and the markers were adjusted to the -6 dB points of the fundamental, the delta value between these two markers were recorded as the 6 dB bandwidth.

The plots on the following pages show the resultant display from the Spectrum Analyser.

2.7.6 Environmental Conditions

Ambient Temperature	23.9°C
Relative Humidity	40.0%

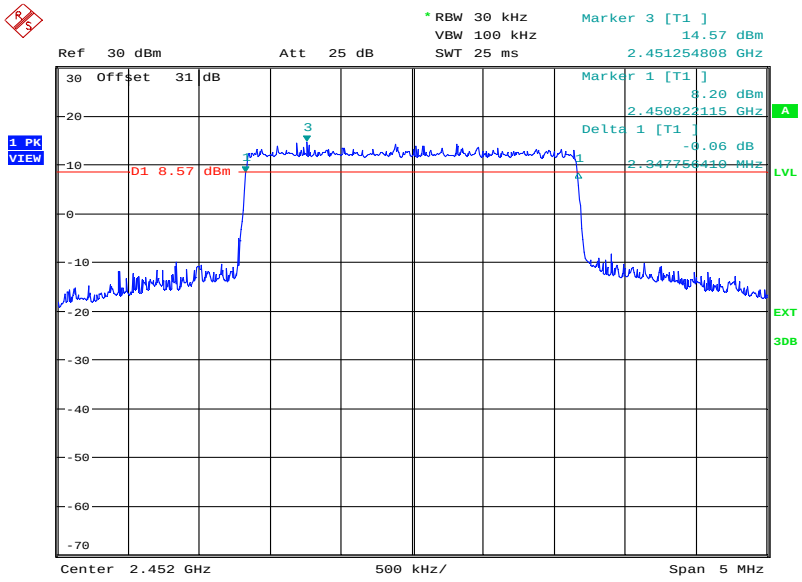
Product Service

2.7.7 Test Results

12.0 V DC Supply

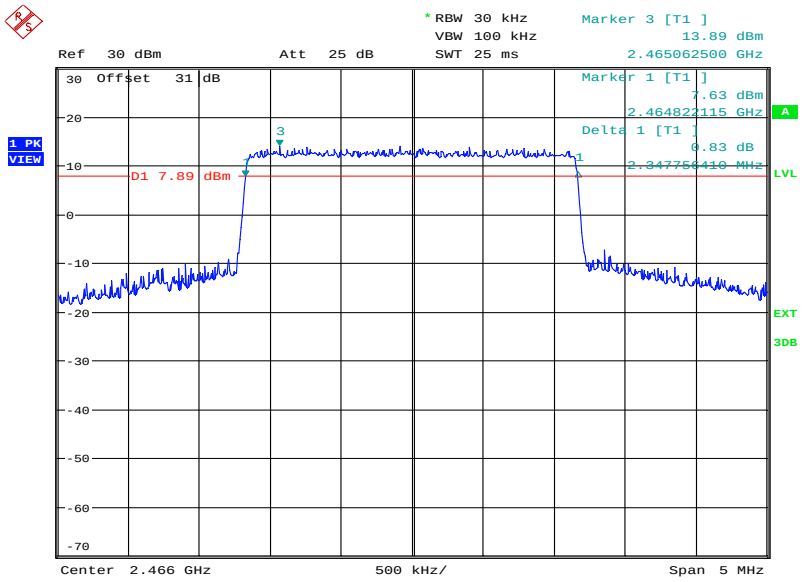
Frequency	6 dB Bandwidth (kHz)
2452.50 MHz	3247.7564
2466.75 MHz	3247.7564
2481.00 MHz	3481.2883

2452.50 MHz



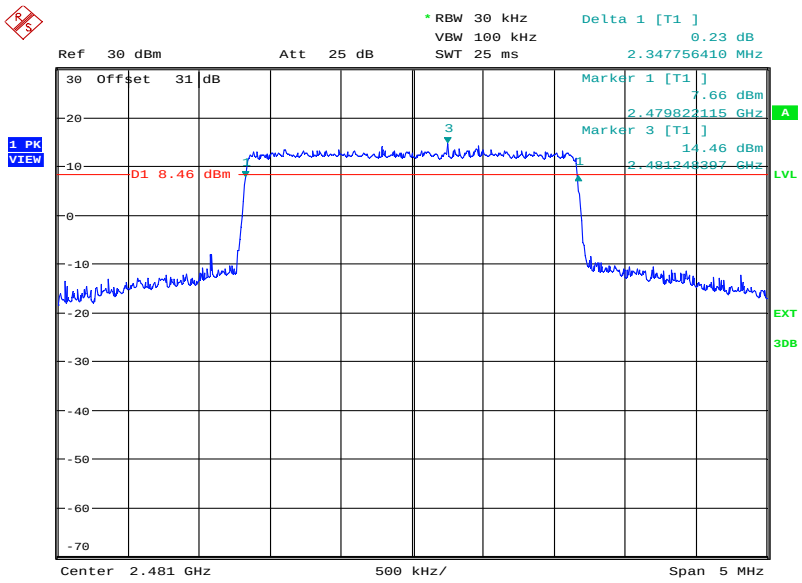
Date: 6.JUN.2014 10:51:42

2466.75 MHz



Date: 6.JUN.2014 11:34:18

2481.00 MHz



Date: 6.JUN.2014 11:36:10

Limit

≥ 500 kHz

2.8 POWER SPECTRAL DENSITY

2.8.1 Specification Reference

Industry Canada RSS-210, Clause A8.2(b)

2.8.2 Equipment Under Test and Modification State

SOLO7 S/N: SOLO7HDNTX-198270 - Modification State 0

2.8.3 Date of Test

9 June 2014

2.8.4 Test Equipment Used

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

2.8.5 Test Procedure

The test was applied in accordance with the test method requirements of Industry Canada RSS-210 A8.2(b).

The EUT was connected to a spectrum analyser via a cable and attenuator. The EUT was transmitting at maximum power, for bottom, middle and top channels using QPSK modulation and 2.5 MHz nominated bandwidth which was declared by the manufacturer as the worst case for testing. The path loss was measured between the EUT and the spectrum analyser and entered as a reference level offset. The trace was set to max hold and using a peak detector the maximum response was established with the spectrum analyser RBW at 3 kHz and VBW at 10 kHz, the power spectral density in a 3 kHz bandwidth was measured.

2.8.6 Environmental Conditions

Ambient Temperature	23.9°C
Relative Humidity	40.0%

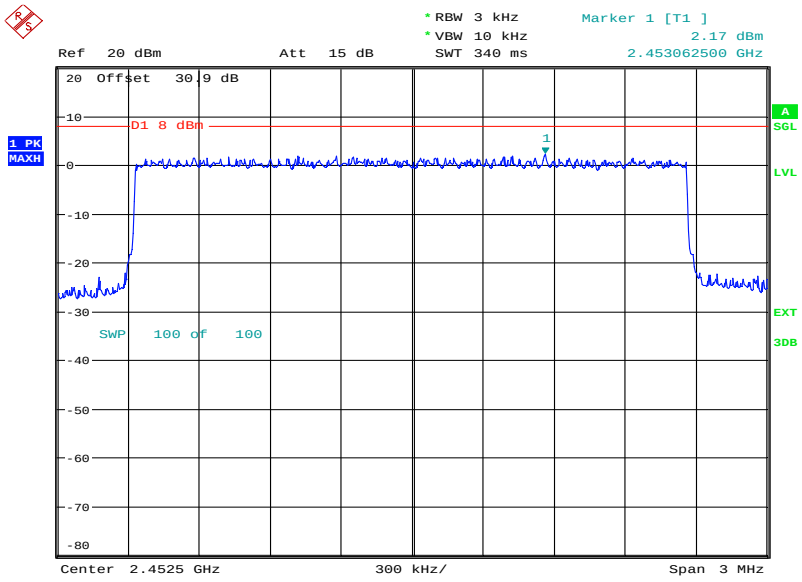
Product Service

2.8.7 Test Results

12.0 V DC Supply

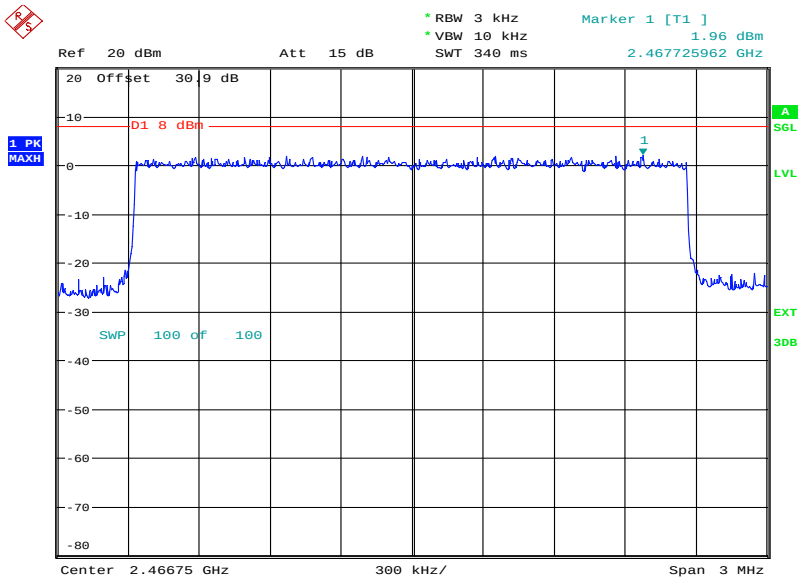
Frequency	Power Spectral Density in 3 kHz Bands (dBm)
2452.50 MHz	2.17
2466.75 MHz	1.96
2481.00 MHz	2.32

2452.50 MHz



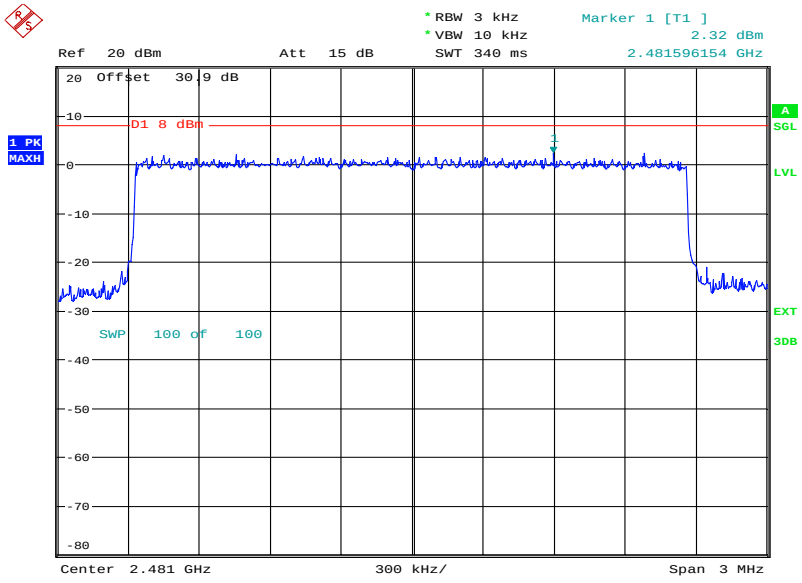
Product Service

2466.75 MHz



Date: 9.JUN.2014 14:28:46

2481.00 MHz



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Limit Clause

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

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 - Power and Antenna Height Limits / Transmitter Output Power and e.i.r.p. Requirements					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	2-May-2015
Pre-Amplifier	Phase One	PS04-0086	1533	12	19-Dec-2014
Screened Room (5)	Rainford	Rainford	1545	24	10-Jan-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	10-Jun-2015
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Section 2.4 - Bandwidth Limitations					
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Multimeter	Iso-tech	IDM101	2419	12	9-Oct-2014
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	12-Dec-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014
Section 2.5 - Emission Mask/Transmitter Unwanted Emissions					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	26-Nov-2015
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	2-May-2015
Pre-Amplifier	Phase One	PS04-0086	1533	12	19-Dec-2014
Pre-Amplifier	Phase One	PSO4-0087	1534	12	30-Sep-2014
Screened Room (5)	Rainford	Rainford	1545	24	10-Jan-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	10-Jun-2015
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	10-Sep-2014
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
1 Metre K Type Cable	Rhophase	KPS-1501A-1000-KPS	4106	12	5-Nov-2014
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	1-Oct-2014
Suspended Subtrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4411	12	21-Mar-2015
Section 2.6 - Frequency Stability					
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
Digital Temperature Indicator + T/C	Fluke	51	412	12	12-Feb-2015
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Multimeter	Iso-tech	IDM101	2419	12	9-Oct-2014
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	12-Dec-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.7 - 6 dB Bandwidth					
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Multimeter	Iso-tech	IDM101	2419	12	9-Oct-2014
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	12-Dec-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014
Section 2.8 - Power Spectral Density					
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Multimeter	Iso-tech	IDM101	2419	12	9-Oct-2014
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	12-Dec-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

Product Service

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Power and Antenna Height Limits / Transmitter Output Power and e.i.r.p. Requirements	Radiated: ± 5.1 dB Conducted: ± 0.70 dB
Frequency Stability	± 42.47 Hz
Emission Mask/Transmitter Unwanted Emissions	Radiated: 30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 25 GHz: ± 6.3 dB Conducted: ± 3.454 dB
Type of Emissions	-
Bandwidth Limitations	± 47.56 kHz
6 dB Bandwidth	± 47.56 kHz
Power Spectral Density	± 3.0 dB
Modulation Characteristics	-

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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).