



Nemko Test Report: 66465RUS1

Applicant: Traxxas
1100 Klein Road
Plano, Texas 75074
USA

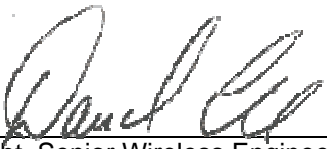
**Equipment Under Test:
(E.U.T.)** SA-09181

FCC Identifier: XVE-SA09181

In Accordance With: **FCC Part 15, Subpart C, 15.247 and
Industry Canada, RSS-210, Issue 7**
Digital Transmission System Transmitter

Tested By: Nemko USA, Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

TESTED BY:



David Light, Senior Wireless Engineer

DATE: 19 November 2010

APPROVED BY:



Tom Tidwell, Telecom Direct

DATE: 29 November 2010

Number of Pages: 34

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Section 1. Summary of Test Results

Manufacturer: Traxxas

Model No.: SA-09181

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 and Industry Canada RSS-210, Issue 7 for Digital Transmission Systems. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC and Industry Canada.

- | | | | |
|-------------------------------------|----------------------------|-------------------------------------|---------------------|
| <input type="checkbox"/> | New Submission | <input checked="" type="checkbox"/> | Production Unit |
| <input checked="" type="checkbox"/> | Class II Permissive Change | <input type="checkbox"/> | Pre-Production Unit |

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".



NVLAP Lab Code 100426-0

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Summary Of Test Data

| NAME OF TEST | PARA. NO. | RESULT |
|---|------------------------------------|------------|
| Powerline Conducted Emissions | 15.207(a) / RSS-Gen 7.2.2 | NA |
| Minimum 6 dB Bandwidth | 15.247(a)(2) / RSS-210 A8.2(a) | Complies |
| Maximum Peak Power Output | 15.247(b)(3) / Rss-210 A8.4(4) | Complies |
| Spurious Emissions (Antenna Conducted) | 15.247(d) / RSS-210 A8.5 | Complies |
| Spurious Emissions (Radiated) | 15.247(d)/15.209(a) / RSS-210 A8.5 | Complies |
| Peak Power Spectral Density | 15.247(e) / RSS-210 A8.2(b) | Complies |
| Receiver Spurious Emissions | RSS-Gen 7.2.3 | Not tested |

Footnotes:

The device is powered by 4 AA batteries.

Limited testing performed. Manufacturer is including two additional options for PAs to original design. Testing was performed on the center channel.

Please refer to original Nemko USA, Inc. (Dallas) test report 37863RUS1, dated 03 November 2009, for additional information.

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Band (MHz): 902-928 2400-2483.5 5725-5850

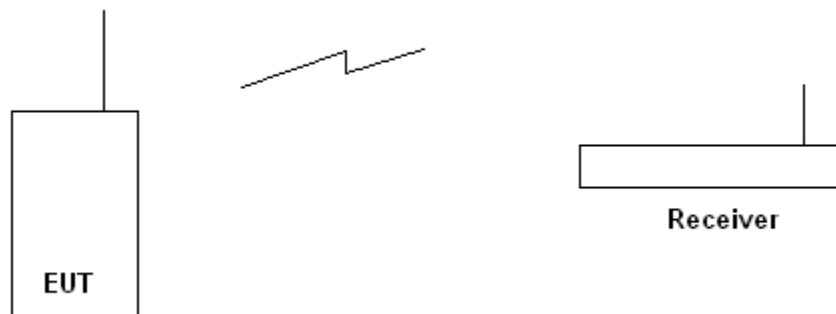
Operating Frequency of Test Sample: 2407 to 2454 MHz

User Frequency Adjustment: Software controlled

Description of EUT

The SA-09181 transceiver is used in Traxxas remote controls for radio controlled toys.

System Diagram



Section 3. Occupied Bandwidth

| | |
|----------------------------------|-----------------------------------|
| NAME OF TEST: Occupied Bandwidth | PARA. NO.: 15.247(a)(2) / A8.2(a) |
| TESTED BY: David Light | DATE: 19 November 2010 |

Test Results: Complies.

Measurement Data: See 6 dB BW plots
Measured 6 dB bandwidth: 982 kHz

Test Conditions: 48 %RH
23 °C

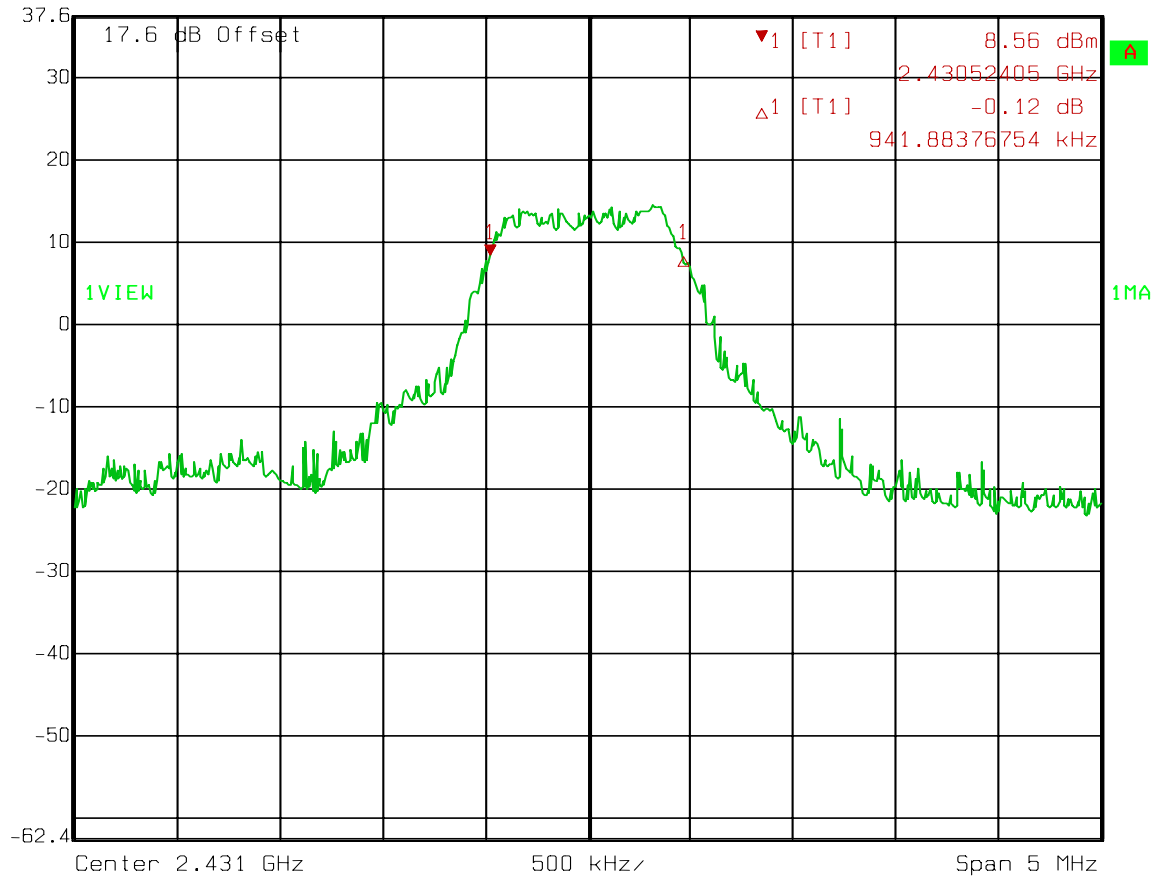
Measurement Uncertainty: +/-1x10⁻⁷ ppm

Test Equipment Used: 1036-1081-1469

Test Data – Occupied Bandwidth

PA SE2564

Ref Lvl 37.6 dBm
Marker 1 [T1] 8.56 dBm
2.43052405 GHz
RBW 100 kHz RF Att 50 dB
VBW 100 kHz
SWT 5 ms Unit dBm



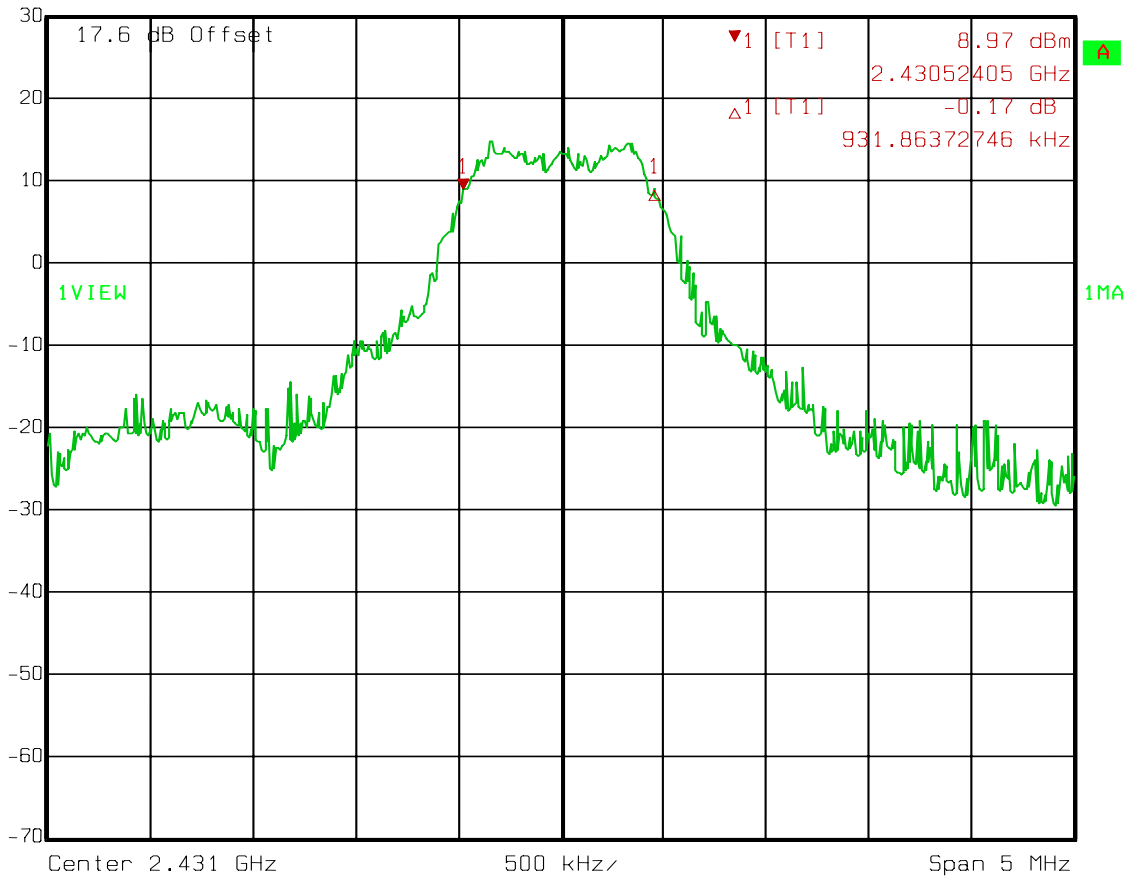
Date: 19.NOV.2010 09:55:03

Test Data – Occupied Bandwidth

PA SE2603L



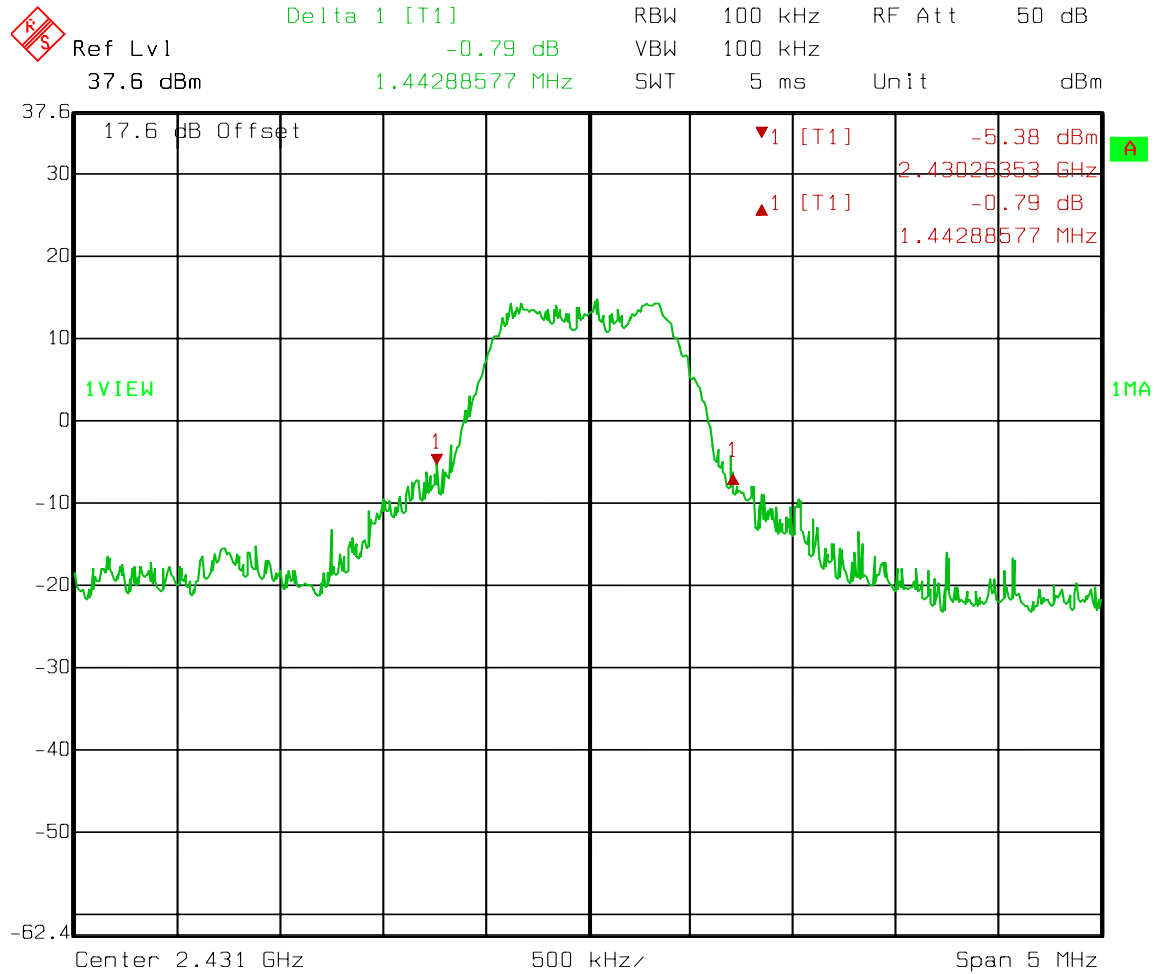
Ref Lvl 30 dBm
Marker 1 [T1] 8.97 dBm
2.43052405 GHz
RBW 100 kHz RF Att 40 dB
VBW 100 kHz
SWT 5 ms Unit dBm



Date: 19.NOV.2010 10:15:01

20 dB Occupied Bandwidth for IC

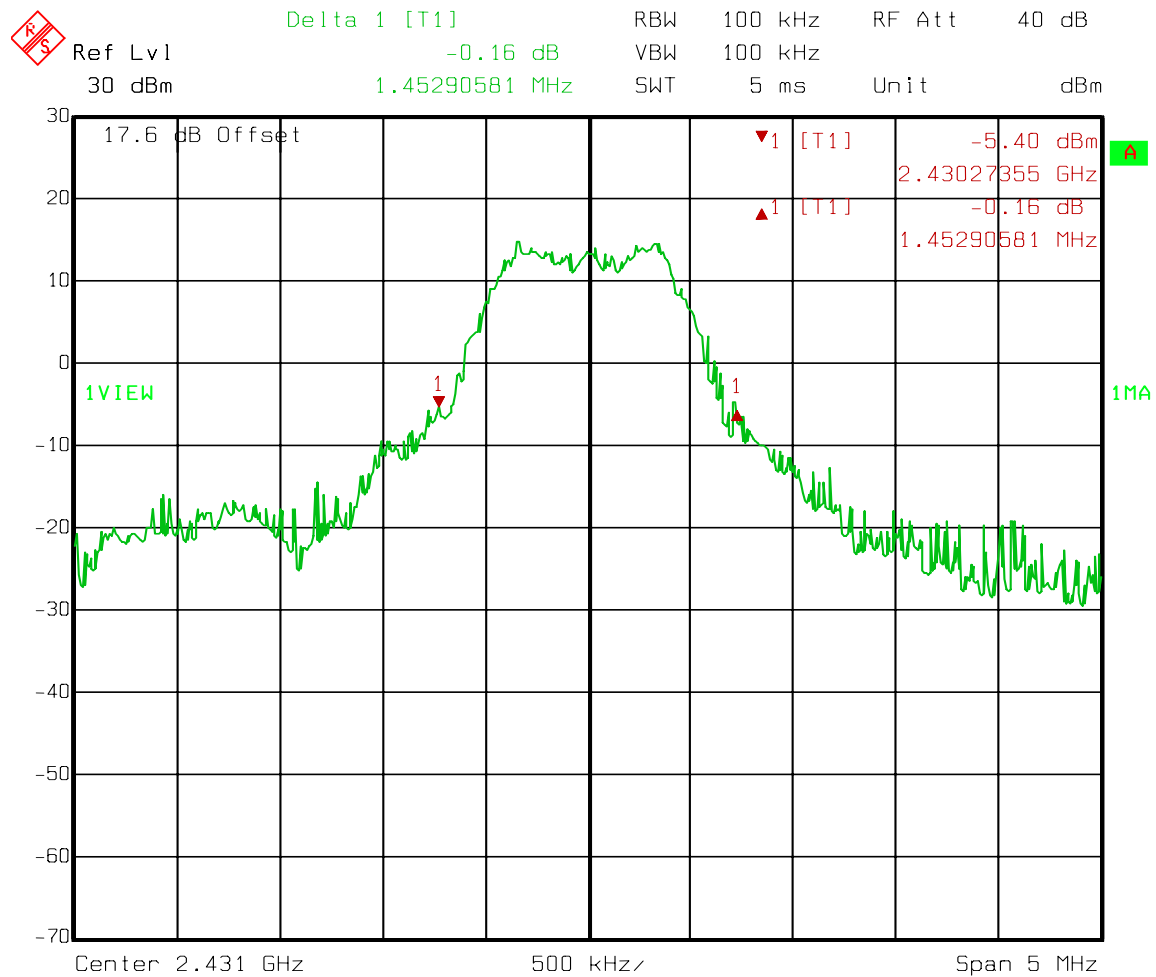
PA SE2564



Date: 19.NOV.2010 09:57:43

20 dB Occupied Bandwidth for IC

PA SE2603L



Date: 19.NOV.2010 10:15:54

Section 4. Maximum Peak Output Power

| | |
|---|-----------------------------------|
| NAME OF TEST: Maximum Peak Output power | PARA. NO.: 15.247(b)(3) / A8.4(4) |
| TESTED BY: David Light | DATE: 19 November 2010 |

Test Results: Complies.

Measurement Data: Refer to attached data

Test Conditions: 48 %RH
23 °C

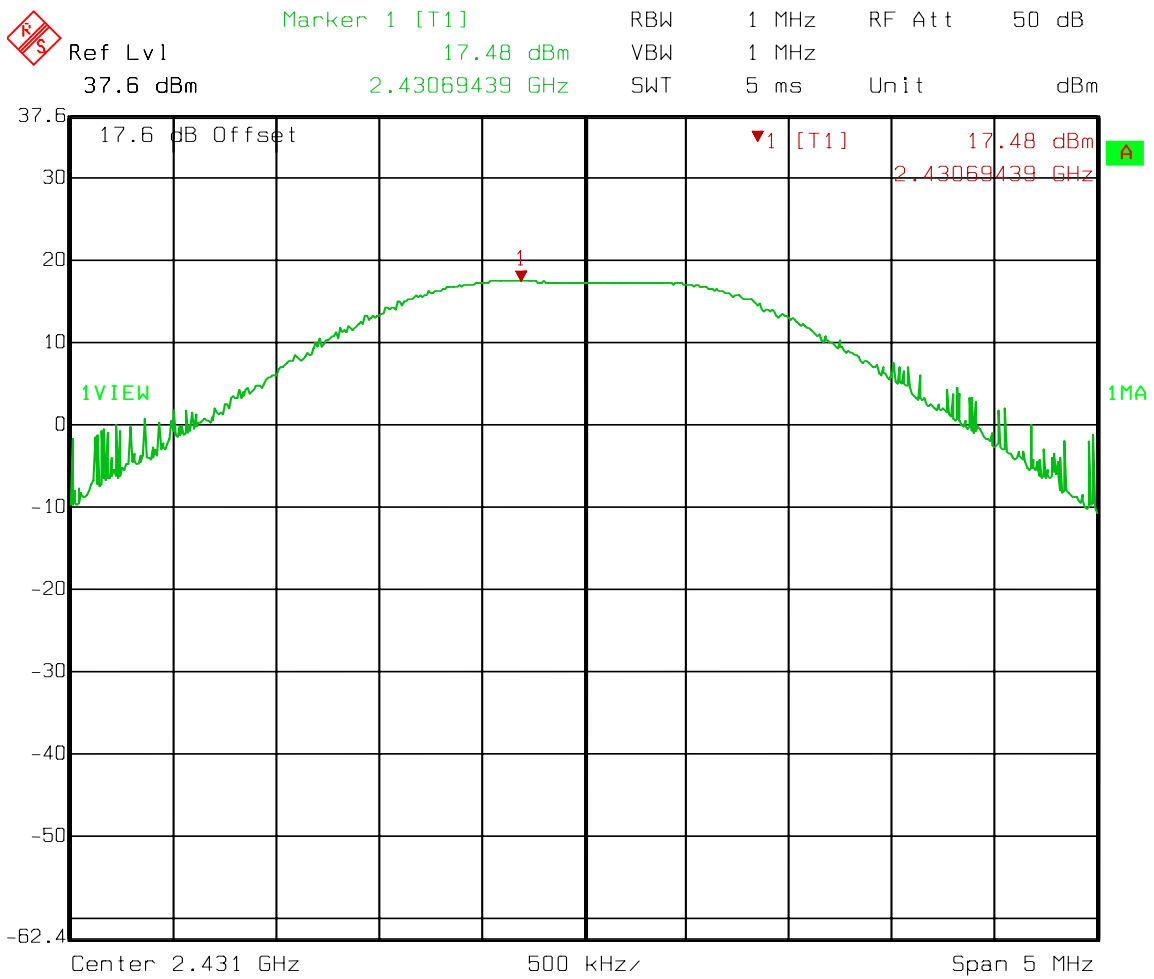
Measurement Uncertainty: +/-1x10⁻⁷ ppm

Test Equipment Used: 1036-1081-1469

- This device was tested at +/- 15% input power per 15.31(e), with no variation in output power.
- For battery powered equipment, the device was tested with fresh batteries per 15.31(e).
- The device was tested on three channels per 15.31(l).
- This test was performed radiated.

Test Data – Peak Power

PA SE2564



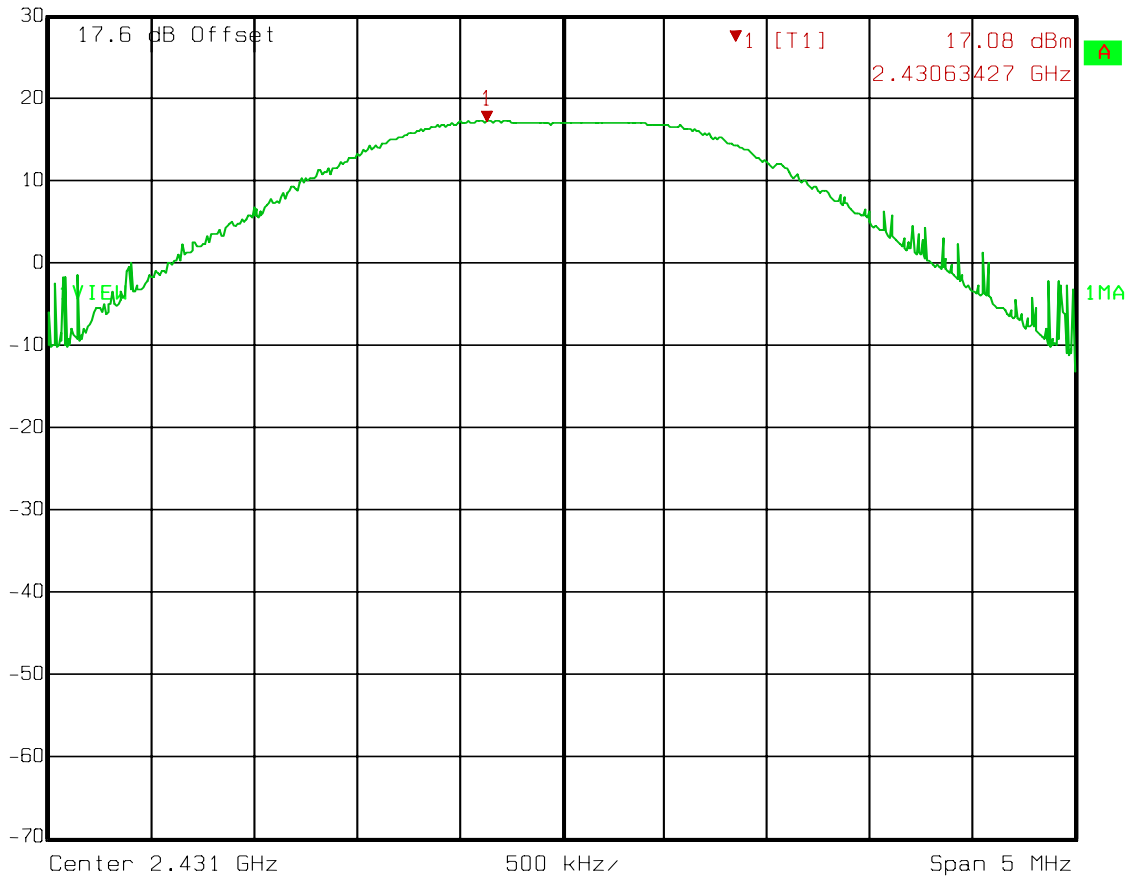
Date: 19.NOV.2010 09:55:45

Test Data – Peak Power

PA SE2603L



Ref Lvl 30 dBm
Marker 1 [T1] 17.08 dBm
2.43063427 GHz
RBW 1 MHz RF Att 40 dB
VBW 1 MHz
SWT 5 ms Unit dBm



Date: 19.NOV.2010 10:13:49

Section 5 Spurious Emissions (Conducted)

| | |
|--|------------------------------|
| NAME OF TEST: Spurious Emissions (Conducted) | PARA. NO.: 15.247 (d) / A8.5 |
| TESTED BY: David Light | DATE: 19 November 2010 |

Test Results: Complies.

Measurement Data: See attached plots.

Test Conditions: 48 %RH
 23 °C

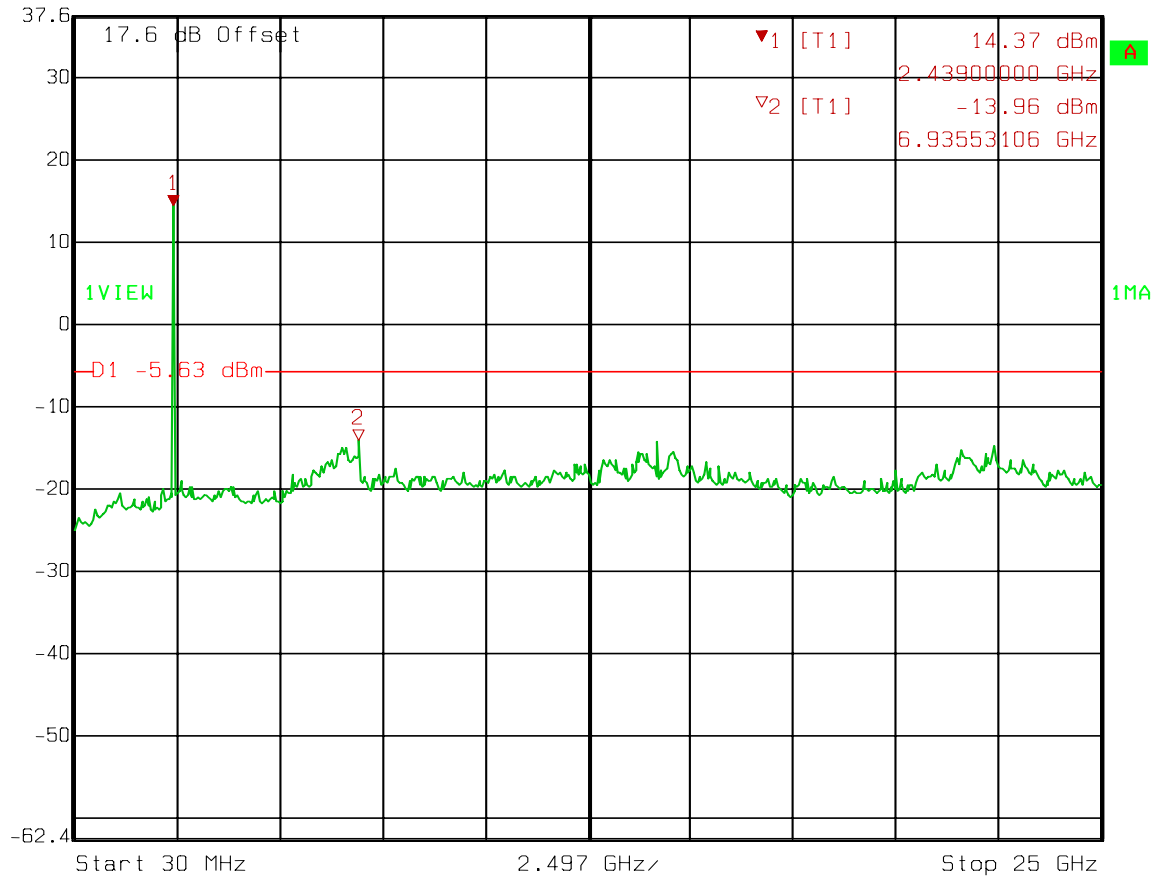
Measurement Uncertainty: +/-1x10⁻⁷ ppm

Test Equipment Used: 1036-1081-1469

Test Data – Spurious Emissions at Antenna Terminals

PA SE2564

Ref Lvl 37.6 dBm Marker 1 [T1] 14.37 dBm RBW 100 kHz RF Att 50 dB
37.6 dBm 2.43900000 GHz VBW 100 kHz
SWT 6.4 s Unit dBm

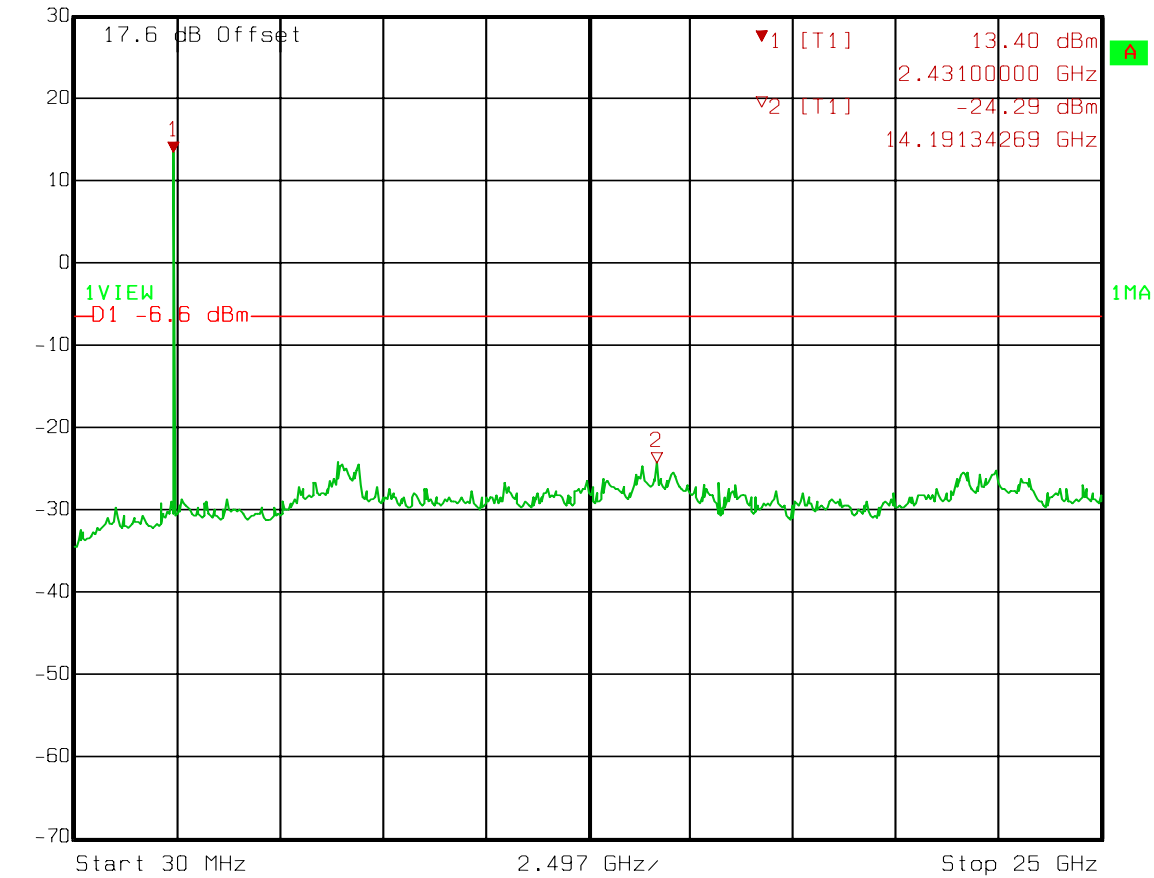


Date: 19.NOV.2010 09:59:47

Test Data – Spurious Emissions at Antenna Terminals

PA SE2603L

Ref Lvl 30 dBm
Marker 1 [T1] 13.40 dBm
2.43100000 GHz
RBW 100 kHz RF Att 40 dB
VBW 100 kHz
SWT 6.4 s Unit dBm



Date: 19.NOV.2010 10:17:15

Section 6. Radiated Emissions

| | |
|----------------------------------|------------------------|
| NAME OF TEST: Radiated Emissions | PARA. NO.: 15.247 (d) |
| TESTED BY: David Light | DATE: 19 November 2010 |

Test Results: Complies.

Measurement Data: See attached table.

Test Conditions: 48 %RH
23 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1480-791-993-1016-1464-1484-1485

Notes:

- For handheld devices, the EUT was tested on three orthogonal axis'
- The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33
- The device was tested on three channels per 15.31(l).
- No emissions were detected within 20 dB of the specification limit therefore none are reported per 15.31(o). Band edge data is presented below.

RBW=VBW=100 kHz below 1000 MHz

RBW=VBW=1 MHz above 1000 MHz

Peak detector

For this test, the radio was tested on the highest channel (2454 MHz)

Radiated Emissions

PA SE2564

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

| # | Freq MHz | Rdng dBµV | Horn Duty dB | | Cable dB | Cable dB | Dist Table | Corr dBµV/m | Spec dBµV/m | Margin dB | Polar Ant |
|---|-------------|--------------|--------------------|--|-------------|-------------|---------------|----------------|----------------|--------------|--------------|
| 1 | 2483.5 | 36.3 | +29.0 +0.0 | | +0.8 | +2.3 | +0.0 | 68.4 | 74.0 | -5.6 | Vert |
| 2 | 2483.5 | 36.3 | +29.0 -22.7 | | +0.8 | +2.3 | +0.0 | 45.7 | 54.0 | -8.3 | Vert |
| 3 | 2483.5 | 33.5 | +29.0 +0.0 | | +0.8 | +2.3 | +0.0 | 65.6 | 74.0 | -8.4 | Horiz |
| 4 | 2483.5 | 33.5 | +29.0 -22.7 | | +0.8 | +2.3 | +0.0 | 42.9 | 54.0 | -11.1 | Horiz |

PA SE2603L

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

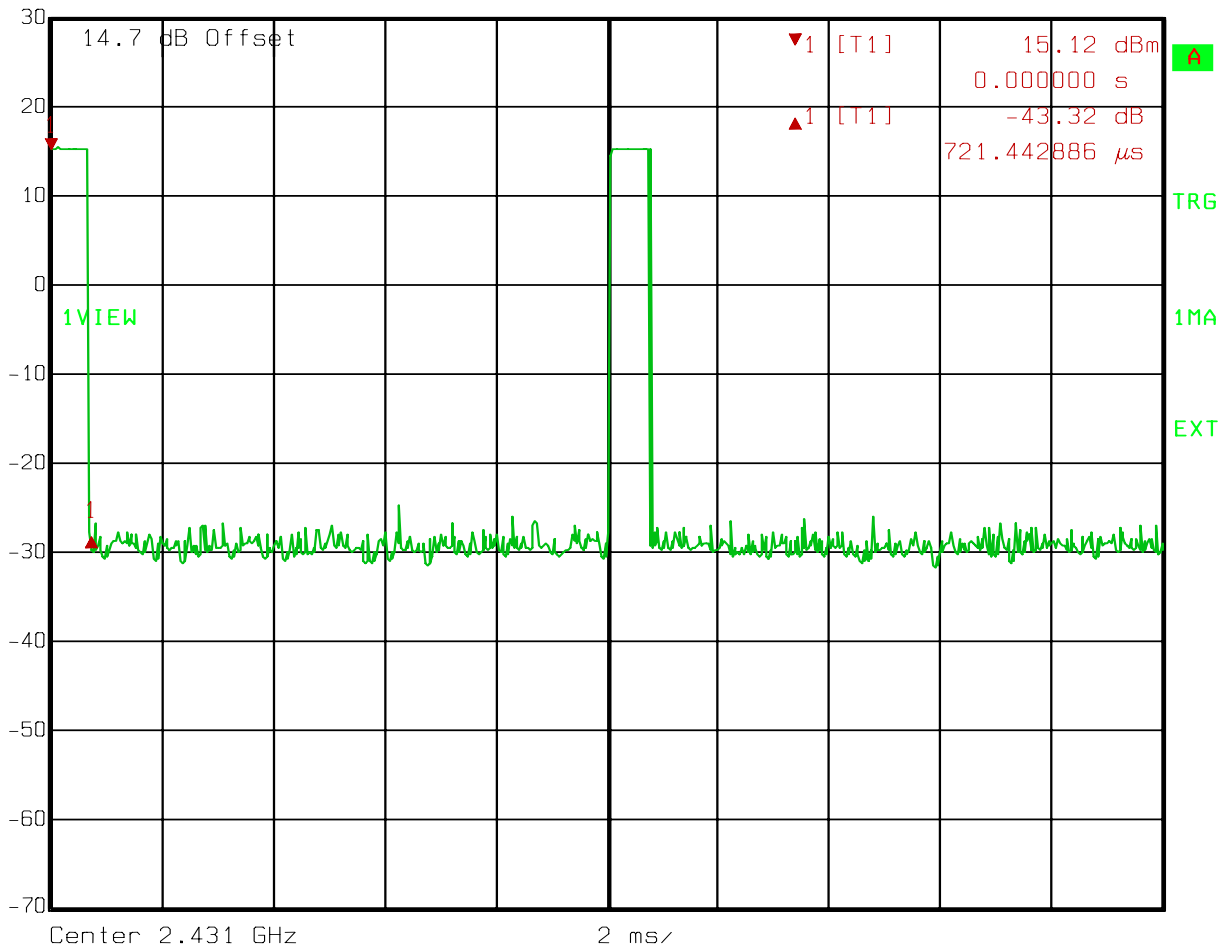
| # | Freq MHz | Rdng dBµV | Horn Duty dB | | Cable dB | Cable dB | Dist Table | Corr dBµV/m | Spec dBµV/m | Margin dB | Polar Ant |
|---|-------------|--------------|--------------------|--|-------------|-------------|---------------|----------------|----------------|--------------|--------------|
| 1 | 2483.5 | 35.2 | +29.0 +0.0 | | +0.8 | +2.3 | +0.0 | 67.3 | 74.0 | -6.7 | Vert |
| 2 | 2483.5 | 35.2 | +29.0 -22.7 | | +0.8 | +2.3 | +0.0 | 44.6 | 54.0 | -9.4 | Vert |
| 3 | 2483.5 | 33.7 | +29.0 +0.0 | | +0.8 | +2.3 | +0.0 | 65.8 | 74.0 | -8.2 | Horiz |
| 4 | 2483.5 | 33.7 | +29.0 -22.7 | | +0.8 | +2.3 | +0.0 | 43.1 | 54.0 | -10.9 | Horiz |

Corrected reading = Rdng + AF + Duty Cycle + Cable Loss

Duty Cycle Calculation



| | | | | | |
|---------|--------------------|-----|-------|--------|-------|
| Ref Lvl | Delta 1 [T1] | RBW | 1 MHz | RF Att | 40 dB |
| 30 dBm | -43.32 dB | VBW | 1 MHz | | |
| | 721.442886 μ s | SWT | 20 ms | Unit | dBm |



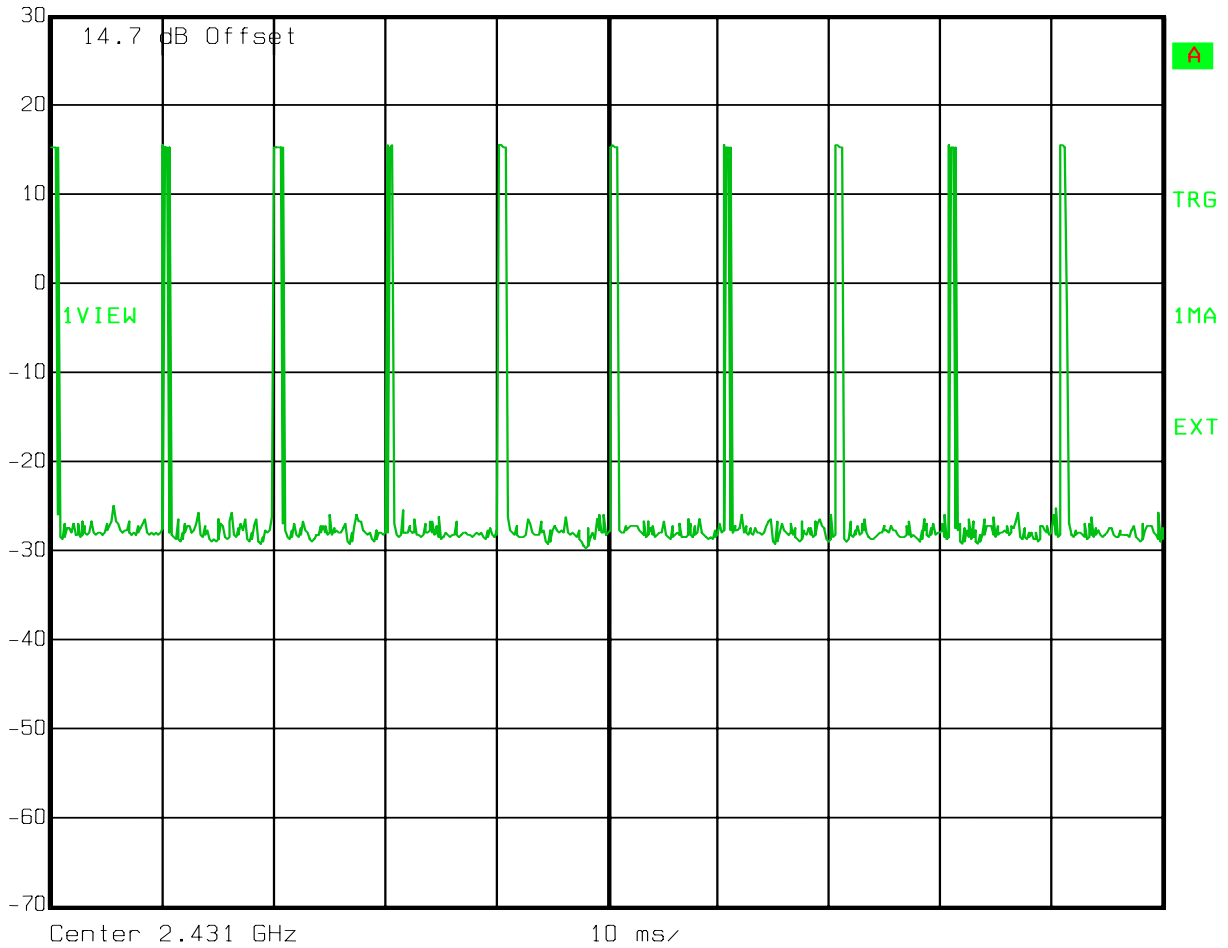
Date: 30.AUG.2010 09:02:45

Duty Cycle Calculation



Ref Lvl
30 dBm

RBW 1 MHz RF Att 40 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 30.AUG.2010 09:03:27

Duty Cycle correction = $20 \log (\text{Ton}/100 \text{ mS})$
 $20 \log (7.214/100) = -22.8 \text{ dB}$

Section 7. Peak Power Spectral Density

| | |
|---|------------------------------|
| NAME OF TEST: Peak Power Spectral Density | PARA. NO.: 15.247(e)/A8.2(b) |
| TESTED BY: David Light | DATE: 19 November 2010 |

Test Results: Complies.

Measurement Data: See attached data.

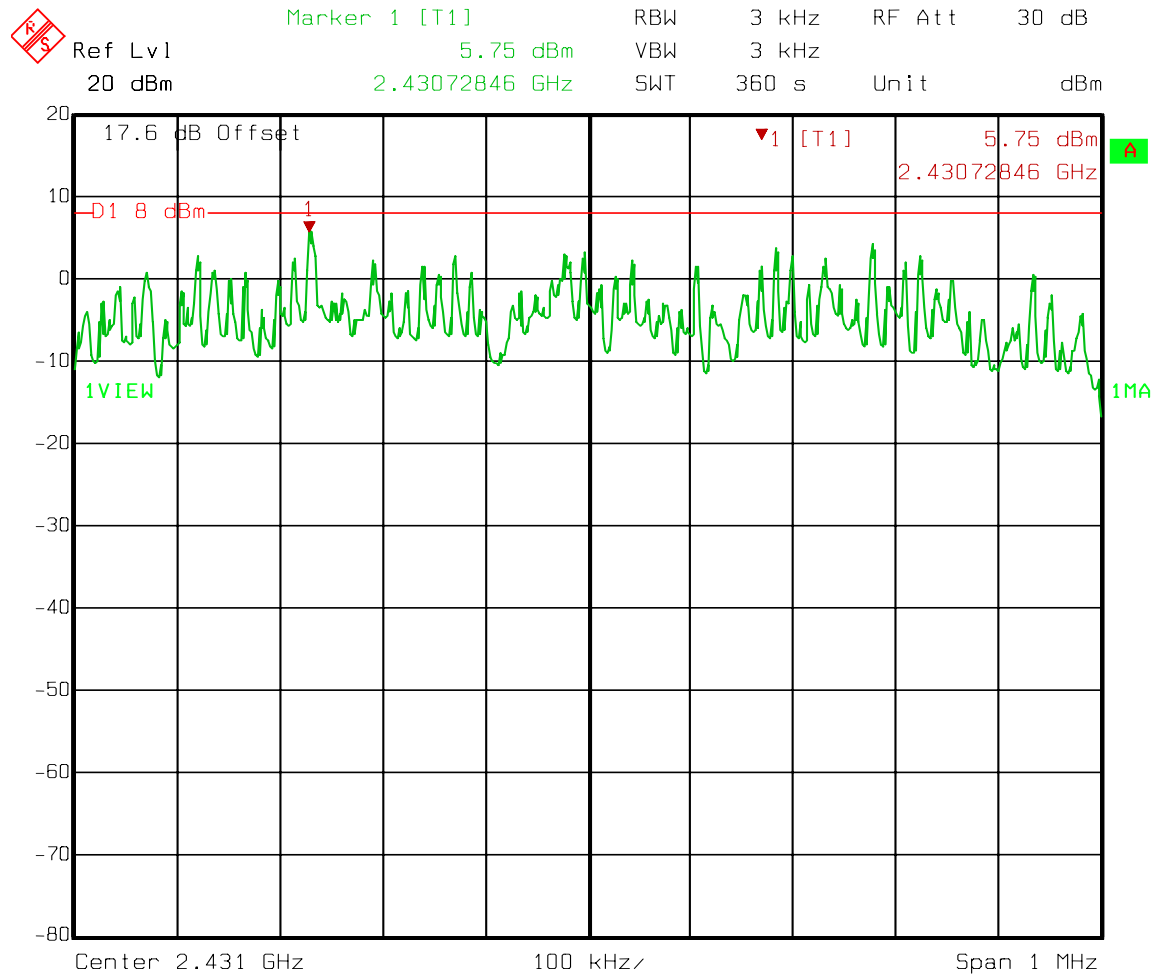
Test Conditions: 48 %RH
23 °C

Measurement Uncertainty: $\pm 1 \times 10^{-7}$ ppm

Test Equipment Used: 1036-1081-1469

Peak Power Spectral Density

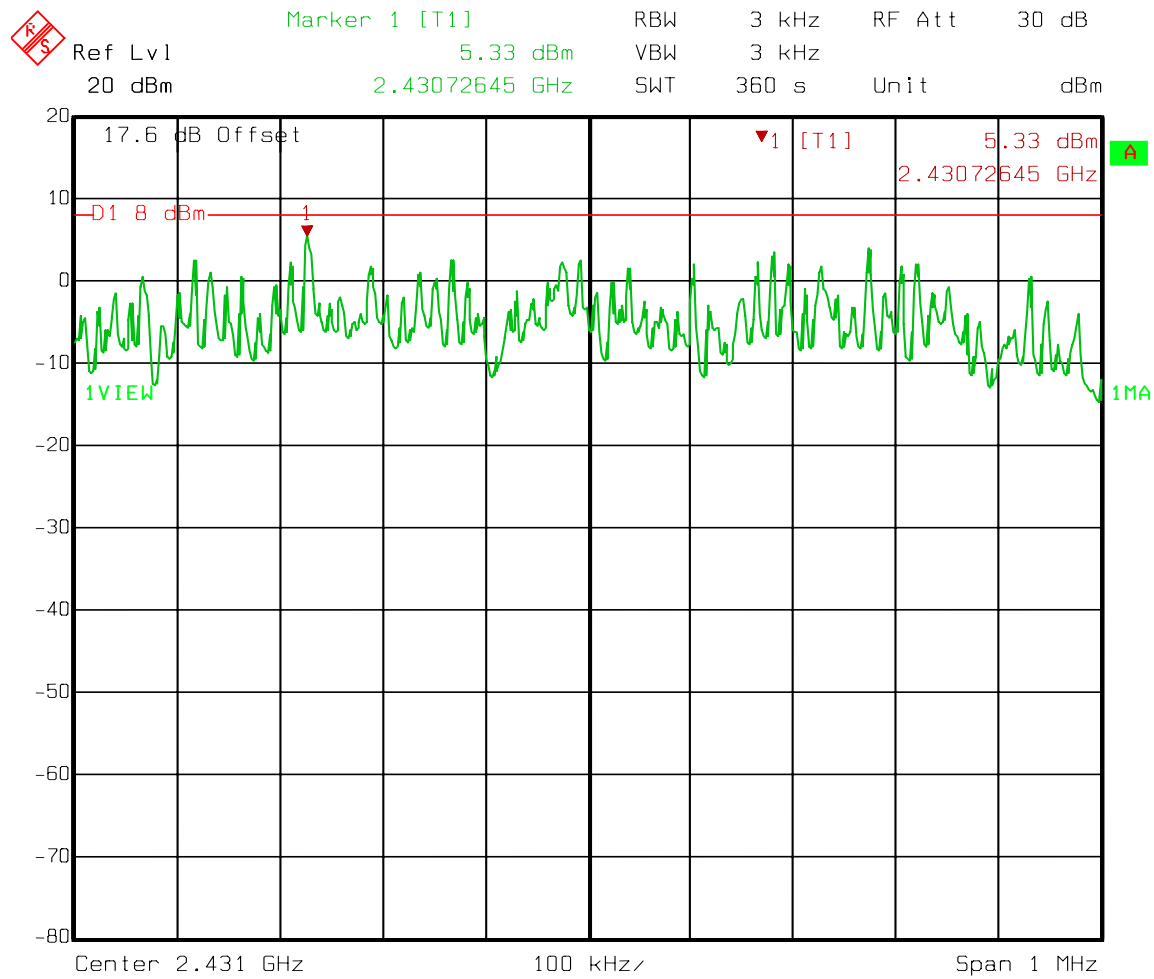
PA SE2564



Date: 19.NOV.2010 10:08:09

Peak Power Spectral Density

PA SE2603L



Date: 19.NOV.2010 10:24:50

Section 8. Test Equipment List

| Asset Tag | Description | Manufacturer | Model | Serial # | Last Cal | Next Cal |
|-----------|----------------------|---------------------|------------------------|------------|---------------|-------------|
| 993 | Antenna, Horn | A.H. Systems | SAS-200/571 | 162 | 09-Sep-2009 | 09-Sep-2011 |
| 1016 | Preamplifier | Hewlett Packard | 8449A | 2749A00159 | 19-Jun-2010 | 19-Jun-2011 |
| 1036 | Spectrum Analyzer | Rohde & Schwartz | FSEK30 | 830844/006 | 19-Jan-2009 | 19-Jan-2011 |
| 1081 | Cable | Astrolab | 32027-2- 29094-72TC | | Verify B4 use | NA |
| 1464 | Spectrum Analyzer | Hewlett Packard | 8563E | 3551A04428 | 27-Feb-2009 | 27-Feb-2011 |
| 1469 | Attenuator | MCL Inc. | BW-S10W2 10db-2WDC | | Verify B4 use | NA |
| 1480 | Antenna, Bilog | Schaffner- Chase | CBL6111C | 2572 | 18-Jan-2010 | 18-Jan-2011 |
| 1484 | Cable | Storm | PR90-010-072 | | 19-Jun-2010 | 19-Jun-2011 |
| 1485 | Cable | Storm | PR90-010-216 | | 19-Jun-2010 | 19-Jun-2011 |
| 791 | PreAmp | Nemko, USA | | | 08-Mar-2010 | 08-Mar-2011 |

ANNEX A - TEST DETAILS

| | |
|----------------------------------|-------------------------|
| NAME OF TEST: Occupied Bandwidth | PARA. NO.: 15.247(a)(2) |
|----------------------------------|-------------------------|

Minimum Standard: The minimum 6 dB bandwidth shall be at least 500 kHz

| | |
|----------------------------------|-------------------------|
| NAME OF TEST: Occupied Bandwidth | PARA. NO.: 15.247(a)(2) |
|----------------------------------|-------------------------|

Minimum Standard: Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW = VBW = 100 kHz.

Span: Sufficient to display 6 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

Number of channels tested:

| Tuning range | Number of channels tested | Channel location in band |
|------------------|---------------------------|--------------------------|
| 1 MHz or less | 1 | middle |
| 1 to 10 MHz | 2 | top and bottom |
| more than 10 MHz | 3 | top, middle, bottom |

| | |
|---|-------------------------|
| NAME OF TEST: Maximum Peak Output Power | PARA. NO.: 15.247(b)(3) |
|---|-------------------------|

Minimum Standard: The maximum peak output power shall not exceed 1 watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Direct Measurement Method For Detachable Antennas:

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

Substitution Antenna Method for Integral Antennas:

The peak field strength of the carrier is measured in a worst-case configuration with a RBW > 5 times the occupied bandwidth of the transmitted waveform. For cases where the RBW of the test instrument is not sufficient, the power is measured using a peak power meter instead of the spectrum analyzer.

The RBW of the spectrum analyzer shall be set to a value greater than the measured 6 dB occupied bandwidth of the E.U.T.

Number of channels tested:

| Tuning range | Number of channels tested | Channel location in band |
|------------------|---------------------------|--------------------------|
| 1 MHz or less | 1 | middle |
| 1 to 10 MHz | 2 | top and bottom |
| more than 10 MHz | 3 | top, middle, bottom |

| | |
|---|----------------------|
| NAME OF TEST: Spurious Emissions(conducted) | PARA. NO.: 15.247(d) |
|---|----------------------|

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

| Frequency (MHz) | Field Strength ($\mu\text{V/m}$ @ 3m) | Field Strength (dB @ 3m) |
|-----------------|--|--------------------------|
| 30 - 88 | 100 | 40.0 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

THE SPECTRUM IS SEARCHED TO THE 10th HARMONIC OF THE HIGHEST FREQUENCY GENERATED IN THE EUT.

Method Of Measurement:

30 MHz - 10th harmonic plot

RBW: 100 kHz

VBW: 300 kHz

Sweep: Auto

Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz

Marker: Peak of fundamental emission

Marker Δ : Peak of highest spurious level below center frequency.

Upper Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz

Marker: Peak of fundamental emission

Marker Δ : Peak of highest spurious level above center frequency.

Number of channels tested:

| Tuning range | Number of channels tested | Channel location in band |
|------------------|---------------------------|--------------------------|
| 1 MHz or less | 1 | middle |
| 1 to 10 MHz | 2 | top and bottom |
| more than 10 MHz | 3 | top, middle, bottom |

| | |
|---|----------------------|
| NAME OF TEST: Radiated Spurious Emissions | PARA. NO.: 15.247(c) |
|---|----------------------|

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

| Frequency (MHz) | Field Strength ($\mu\text{V/m @ 3m}$) | Field Strength (dB @ 3m) |
|-----------------|---|--------------------------|
| 30 - 88 | 100 | 40.0 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

| MHz | MHz | MHz | GHz |
|-------------------|---------------------|---------------|-------------|
| 0.09-0.11 | 16.42-16.423 | 399.9-410 | 4.5-5.25 |
| 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.125-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2655-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | Above 38.6 |
| 13.36-13.41 | 1718 | | |

Number of channels tested:

| Tuning range | Number of channels tested | Channel location in band |
|------------------|---------------------------|--------------------------|
| 1 MHz or less | 1 | middle |
| 1 to 10 MHz | 2 | top and bottom |
| more than 10 MHz | 3 | top, middle, bottom |

| | |
|---|----------------------|
| NAME OF TEST: Transmitter Power Density | PARA. NO.: 15.247(d) |
|---|----------------------|

Minimum Standard: The transmitted power density averaged over any 1 second interval shall not be greater than +8 dBm in any 3 kHz bandwidth.

Method Of Measurement: The spectrum analyzer is set as follows:

- RBW: 3 kHz
- VBW: >3 kHz
- Span: => measured 6 dB bandwidth
- Sweep: Span(kHz)/3 (i.e. for a span of 1.5 MHz the sweep rate is 1500/3 = 500 sec.
- LOG dB/div.: 2 dB

Note: For devices with spectrum line spacing ≤ 3 kHz, the RBW of the analyzer is reduced until the spectral lines are resolved. The measurement data is normalized to 3 kHz by summing the power of all the individual spectral lines within a 3 kHz band in linear power units.

For Devices With Integral Antenna:

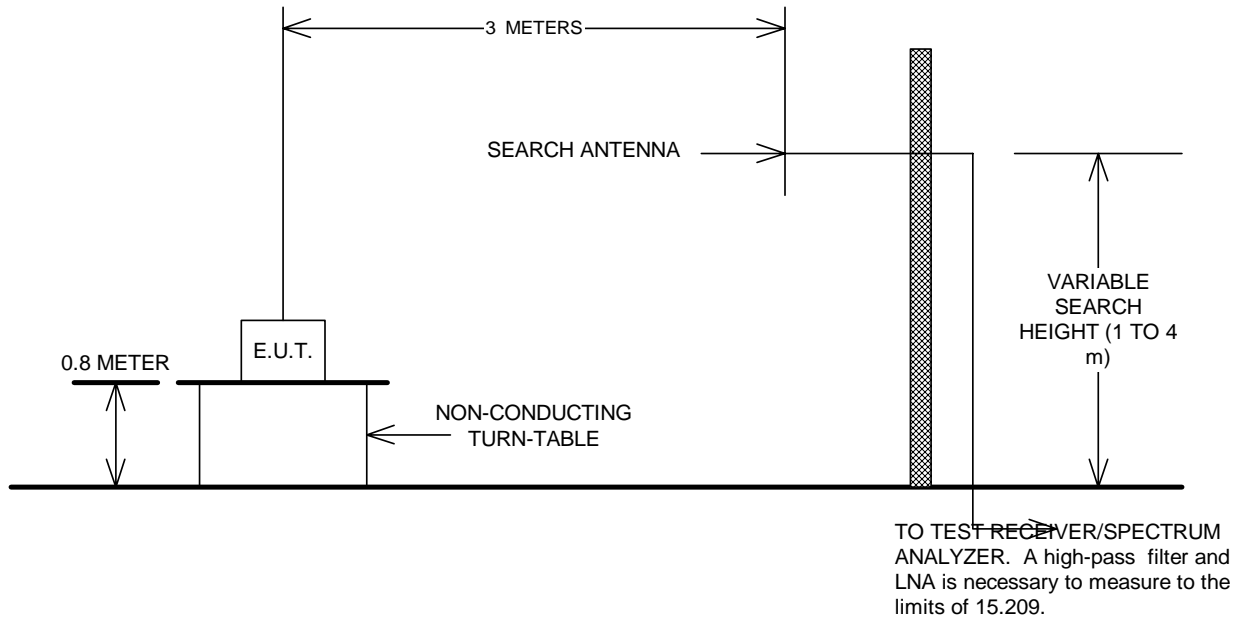
For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent isotropic radiated power using the same method as described for Peak Power output.

Number of channels tested:

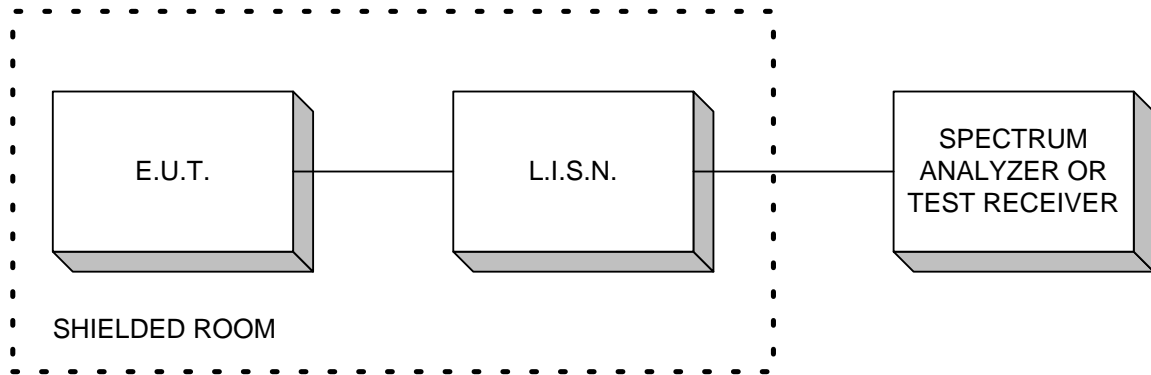
| Tuning Range | Number Of Channels Tested | Channel Location In Band |
|------------------|---------------------------|--------------------------|
| 1 MHz or Less | 1 | Middle |
| 1 to 10 MHz | 2 | Top And Bottom |
| More Than 10 MHz | 3 | Top, Middle, Bottom |

ANNEX B - TEST DIAGRAMS

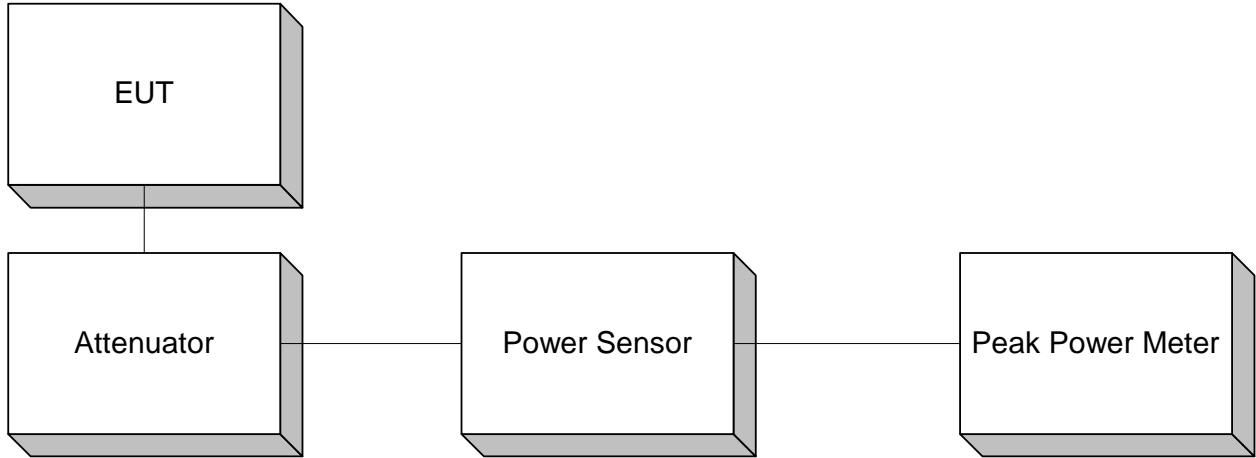
Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals



Note: A spectrum analyzer may be substituted for Peak Power Meter given that the measurement bandwidth is sufficient to capture the 6 dB bandwidth of the transmitter.

**Minimum 6 dB Bandwidth
Peak Power Spectral Density
Spurious Emissions (conducted)**

