



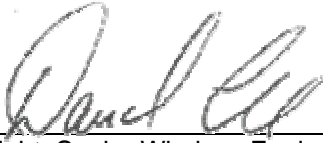
Nemko Test Report: 4078RUS1


Applicant: Stemco LP
300 Industrial Blvd.
Longview, Tx 75062
USA

**Equipment Under Test:
(E.U.T.)** 8200001

In Accordance With: **FCC Part 15, Subpart C, 15.247**
Digital Transmission System Transmitter

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

TESTED BY: 
David Light, Senior Wireless Engineer **DATE:** 08 October 2007

APPROVED BY: 
DATE: 10 October, 2007

Number of Pages: 25

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EQUIPMENT: 8200001

Section 1. Summary of Test Results

Manufacturer: Stemco LP

Model No.: 8200001

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 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.



New Submission



Production Unit



Class II Permissive Change



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".



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Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a)	NA
Minimum 6 dB Bandwidth	15.247(a)(2)	Complies
Maximum Peak Power Output	15.247(b)(3)	Complies
Spurious Emissions (Antenna Conducted)	15.247(d)	Not tested
Spurious Emissions (Restricted Bands)	15.247(d)/15.209(a)	Complies
Peak Power Spectral Density	15.247(e)	Complies

Footnotes:

The device does not have an external antenna connector.

The device is powered via USB interface.

EQUIPMENT: 8200001

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

General Equipment Information

Frequency Band (MHz):	902-928	2400-2483.5	5725-5850
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Operating Frequency of Test Sample: 2403 to 2479 MHz

User Frequency Adjustment: Software controlled

EQUIPMENT: 8200001

Section 3. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: David Light	DATE: 08 October

Test Results: Complies.

Measurement Data: See 6 dB BW plot

Measured 6 dB bandwidth:

880 KHZ

Measured 20 dB bandwidth:

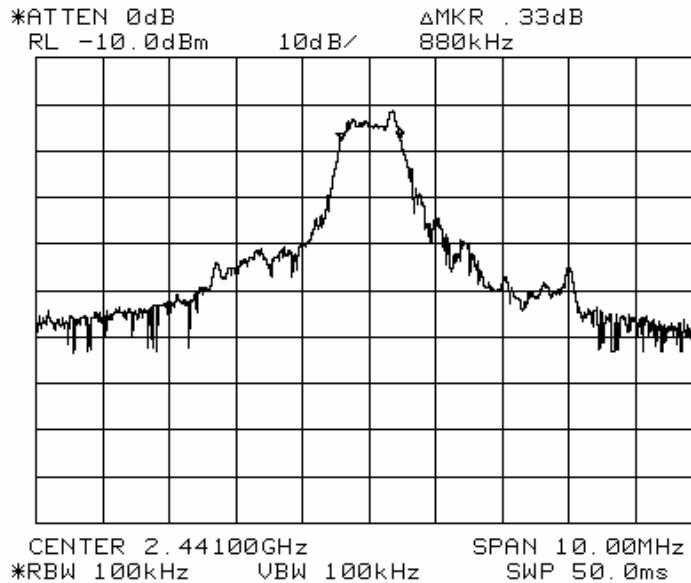
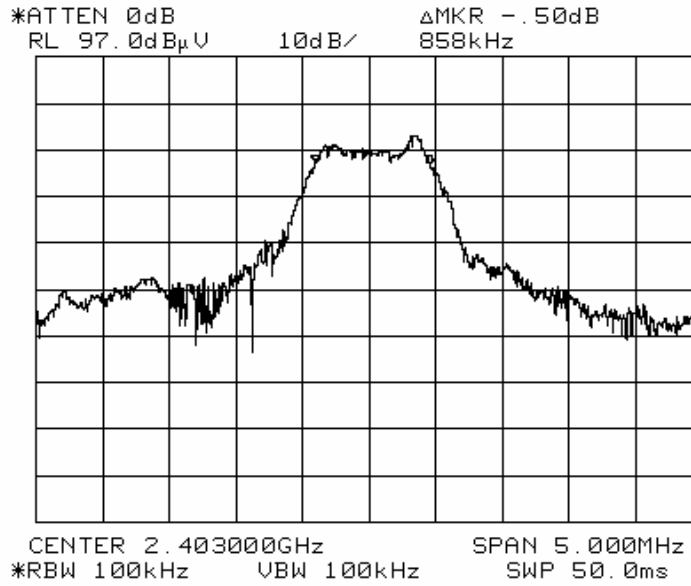
1.47 MHZ

Test Conditions: 22 %RH
45 °C

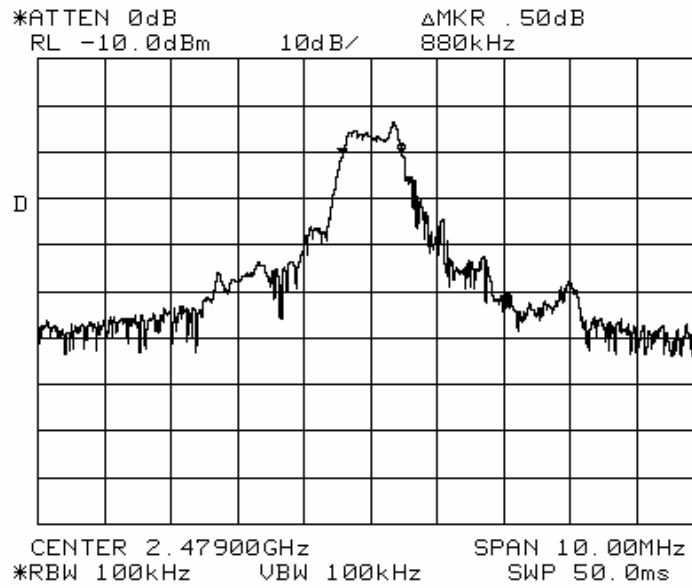
Measurement Uncertainty: +/-1x10⁻⁷ ppm

Test Equipment Used: 993-1464-1484-1485

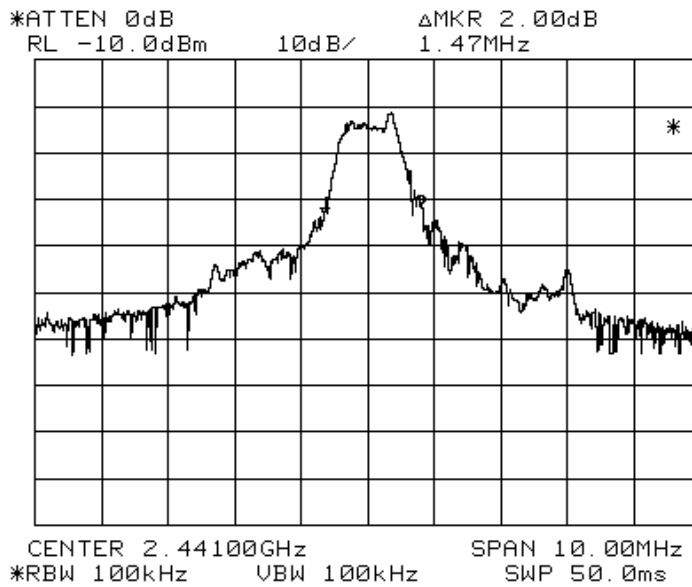
Test Data – Occupied Bandwidth



Test Data – Occupied Bandwidth



20 dB Bandwidth for IC



Section 4. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(3)
TESTED BY: David Light	DATE: 08 October 2007

Test Results: Complies.

Measurement Data:

Frequency (MHz)	Measured Power (dBm)	Measured Power (mW)	Antenna Gain (dBi)	Calculated Conducted Power (mW)
2403	-8.6	0.138	3	0.069
2441	-7.0	0.200	3	0.100
2479	-5.4	0.288	3	0.144

Test Conditions: 22 %RH
45 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1484-1485-993

- 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 a fresh battery per 15.31(e).
- The device was tested on three channels per 15.31(l).
- This test was performed radiated.

EQUIPMENT: 8200001

Section 5. Spurious Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.247 (d)
TESTED BY: David Light	DATE: 08 October 2007

Test Results: Complies.

Measurement Data: See attached.

Test Conditions: 22 %RH
45 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1484-1485-993-759-760-1016-791

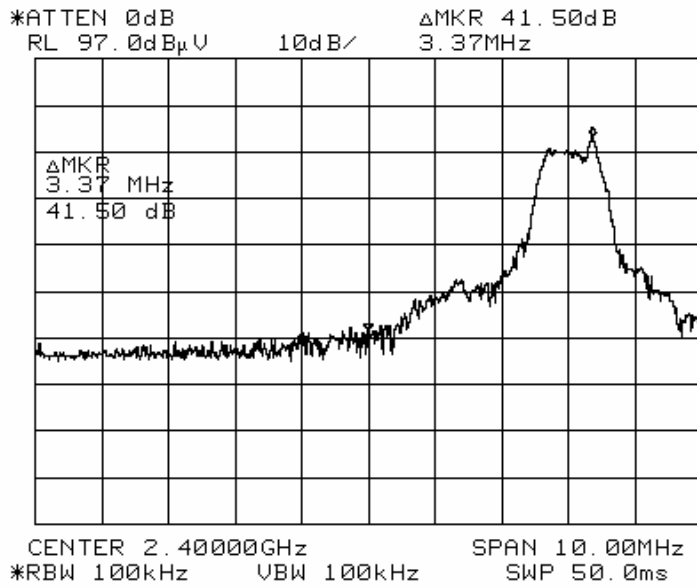
Notes:

- 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

EQUIPMENT: 8200001

Lower Band Edge Emissions



Radiated Emissions

Freq MHz	Rdng dBµV	Cable dB	Cable dB	Horn Duty dB	Pre-A dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
Low Channel										
4806.00 Peak	63.3	+1.0	+3.2	+33.1 +0.0	-32.5	+0.0	68.1	74.0	-5.9	Horiz
4806.00 Average	63.3	+1.0	+3.2	+33.1 -47.9	-32.5	+0.0	20.2	54.0	-33.8	Horiz
7209.00 Peak	47.8	+1.2	+3.9	+35.8 +0.0	-32.1	+0.0	56.6	74.0	-17.4	Horiz
7209.00 Average	47.8	+1.2	+3.9	+35.8 -47.9	-32.1	+0.0	8.7	54.0	-45.3	Horiz
4806.00 Peak	48.2	+1.0	+3.2	+33.1 +0.0	-32.5	+0.0	53.0	54.0	-1.0	Vert
Mid Channel										
4882.00 Peak	57.2	+1.0	+3.3	+33.4 +0.0	-32.6	+0.0	62.3	74.0	-11.7	Vert
4882.00 Average	57.2	+1.0	+3.3	+33.4 -47.9	-32.6	+0.0	14.4	54.0	-39.6	Vert
4881.70 Peak	68.2	+1.0	+3.3	+33.4 +0.0	-32.6	+0.0	73.3	74.0	-0.7	Horiz
4881.70 Average	68.2	+1.0	+3.3	+33.4 -47.9	-32.6	+0.0	25.4	54.0	-28.6	Horiz
7322.70 Peak	45.5	+1.2	+4.0	+35.8 +0.0	-32.3	+0.0	54.2	74.0	-19.8	Horiz
7322.70 Average	45.5	+1.2	+4.0	+35.8 -47.9	-32.3	+0.0	6.3	54.0	-47.7	Horiz
High Channel										
2483.50 Peak	64.5	+0.8	+2.3	+29.0 +0.0	-32.8	+0.0	63.8	74.0	-10.2	Horiz
2483.50 Average	64.5	+0.8	+2.3	+29.0 -47.9	-32.8	+0.0	15.9	54.0	-38.1	Horiz
4958.00 Peak	66.8	+1.0	+3.3	+33.7 +0.0	-32.6	+0.0	72.2	74.0	-1.8	Horiz
4958.00 Average	66.8	+1.0	+3.3	+33.7 -47.9	-32.6	+0.0	24.3	54.0	-29.7	Horiz
7437.00 Peak	41.2	+1.2	+4.1	+35.9 +0.0	-32.5	+0.0	49.9	54.0	-4.1	Horiz
2483.50 Peak	63.7	+0.8	+2.3	+29.0 +0.0	-32.8	+0.0	63.0	74.0	-11.0	Vert
2483.50 Average	63.7	+0.8	+2.3	+29.0 -47.9	-32.8	+0.0	15.1	54.0	-38.9	Vert
4958.00 Peak	56.2	+1.0	+3.3	+33.7 +0.0	-32.6	+0.0	61.6	74.0	-12.4	Vert
4958.00 Average	56.2	+1.0	+3.3	+33.7 -47.9	-32.6	+0.0	13.7	54.0	-40.3	Vert

EQUIPMENT: 8200001

Section 6. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(e)
TESTED BY: David Light	DATE: 08 October

Test Results: Complies.

Measurement Data: See attached data..

Frequency (MHz)	Measured Power (dBm)	Antenna Gain (dBi)	Calculated Spectral Density (dBm)
2403	-23.1	3	-26.1
2441	-21.9	3	-24.9
2479	-20.2	3	-23.2

Test Conditions: 22 %RH
45 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1484-1485-993

EQUIPMENT: 8200001

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/24/07	01/24/09
1484	Cable	Storm PR90-010-072	N/A	05/02/07	05/01/08
1485	Cable	Storm PR90-010-216	N/A	05/02/07	05/01/08
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/01/07	04/30/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/01/07	04/30/08
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/31/09
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	03/30/07	03/29/08
760	Antenna biconical	Electro Metrics MFC-25	477	01/19/07	01/19/08

ANNEX A - TEST DETAILS

Nemko USA, Inc.

FCC PART 15, SUBPART C
Digital Transmission Systems
Test Report No.: 4078RUS1

EQUIPMENT: 8200001

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
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Minimum Standard: The minimum 6 dB bandwidth shall be at least 500 kHz

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

EQUIPMENT: 8200001

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

EQUIPMENT: 8200001

NAME OF TEST: Spurious Emissions(conducted)	PARA. NO.: 15.247(d)
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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 (µV/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

EQUIPMENT: 8200001

NAME OF TEST: Radiated Spurious Emissions	PARA. NO.: 15.247(c)
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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)
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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 \leq 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.

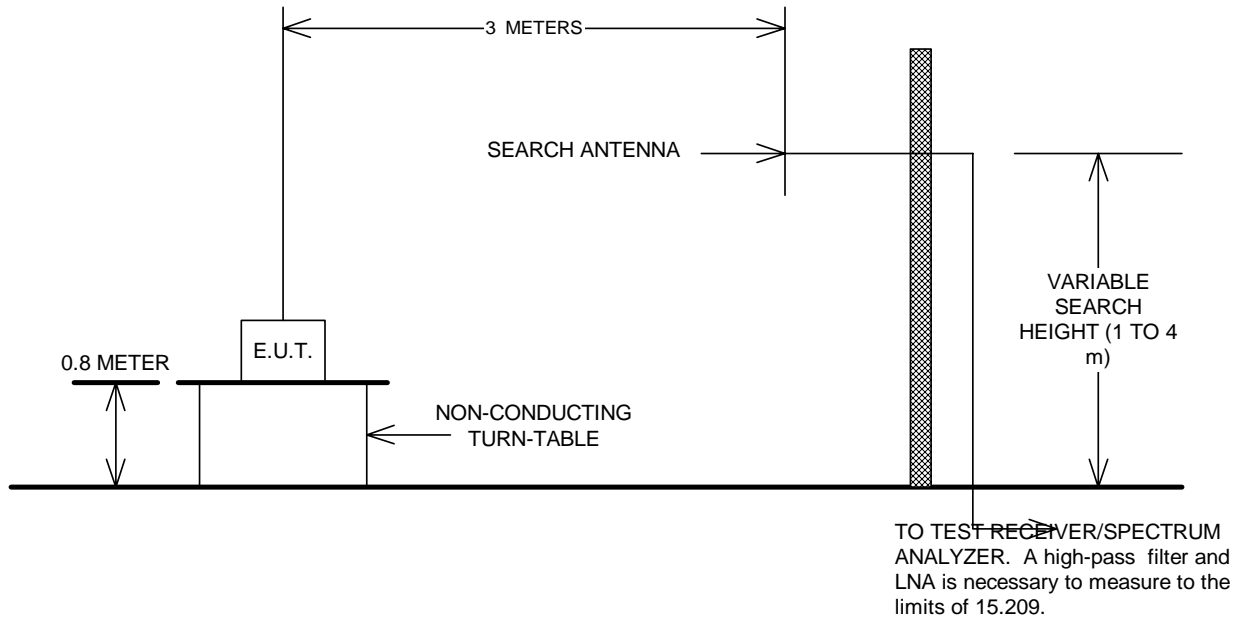
Number of channels tested:

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

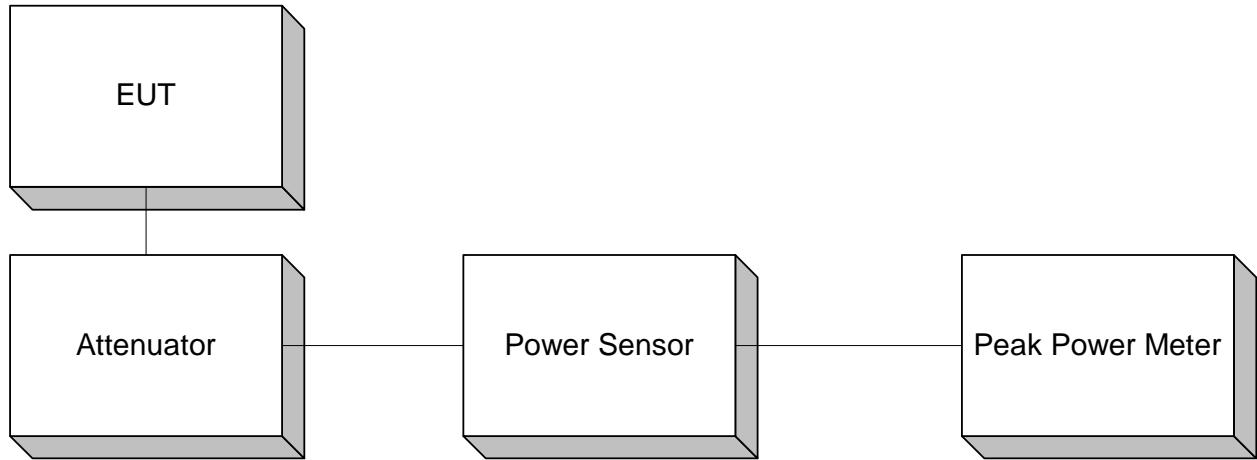
ANNEX B - TEST DIAGRAMS

EQUIPMENT: 8200001

Test Site For Radiated 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)**

