

Nemko Test Report: 3L0018RUS1

Applicant: SyChip, Inc.
1700 Alma Drive
Suite 240
Plano, TX 75075

**Equipment Under Test:
(E.U.T.)** WLAN6060SD

In Accordance With: **FCC Part 15, Subpart C, 15.247**
Direct Sequence Spread Spectrum Transmitters

Tested By: Nemko Dallas Inc.
802 N. Kealy
7-3136

Authorized By: 
Tom Tidwell, Frontline Manager

Date: 11 February 2003

Total Number of Pages: 40

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EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)**Section 1. Summary of Test Results**

Manufacturer: SyChip, Inc.

Model No.: WLAN6060SD

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 Direct Sequence Spread Spectrum devices. Radiated tests were conducted in accordance with ANSI C63.4-1992. 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. NONE
See " Summary of Test Data".

**NVLAP LAB CODE: 100426-0**

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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
Powerline Conducted Emissions	15.207(a)	Mask	Complies
Minimum 6 dB Bandwidth	15.247(a)(2)	>500 kHz	Complies
Maximum Peak Power Output	15.247(b)(1)	<1 Watt	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	-20 dBc/100kHz	Complies
Spurious Emissions (Restricted Bands)	15.247(c)	< 74 dBuV/m Peak < 54 dBuV/m Avg	Complies
Peak Power Spectral Density	15.247(d)	+8 dBm/3kHz	Complies

Footnotes:

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

General Equipment Information

Frequency Band: 2412 to 2462 MHz

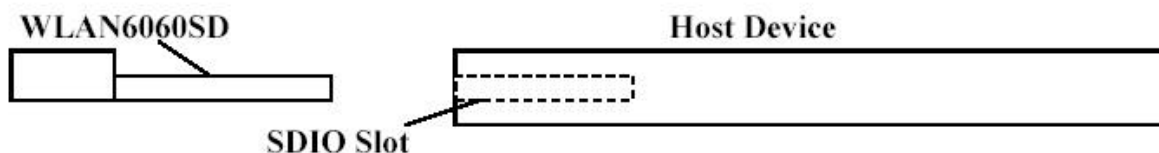
Channel Spacing: 4.5 MHz

User Frequency Adjustment: Software controlled

Theory of Operation

WLAN6060SD Card from SyChip Inc is a Secure Digital Card form factor Wireless LAN NIC(Network Interface Card) incorporating the popular wireless Ethernet standard 802.11b. It uses Direct Sequence Spread Spectrum (DSSS) Wireless LAN technology to provide bandwidths of up to 11Mbps at ranges of up to 400 feet. This card enables next generation Pocket PC/PDAs, and Ultra-thin notebook computers to access the internet, email, corporate networks and transfer streaming video or audio, images or large files from a WLAN-enabled environment. It allows an extension of the corporate resources by enabling the mobile workforce and telecommuters. The card is ideal for vertical markets such as manufacturing floors, car rentals, retail spaces, hospitals etc. In the consumer market, this WLAN card is ideal for users of next generation Palms, Pocket PCs, printers and scanners. Additionally, the card gives users the ability to work whilst away from the office by connecting to the rapidly expanding public hotspot infrastructure. Such venues as coffee shops, airports, shopping malls, hotels, etc are offering this capability based on the IEEE802.11b standard. For mobile applications, battery life is extended through the use of enhanced power saving features, which reduce the current drain whilst in standby mode (the card is in this state for the majority of the time as it awaits data destined for it).

System Diagram



Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: David Light	DATE: 2/3/2003

Test Results: Complies.

Measurement Data: See attached plots.

Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT: WLAN6060SDPROJECT NO.: 3L0018RUS1

Test Data – Powerline Conducted Emissions



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Conducted Emissions			
Powerline Voltage Measurement			
Complete	<u>X</u>	Job # : <u>3L0018R</u>	Test # : <u>CE1</u>
Preliminary	<u> </u>	Page <u>1</u>	of <u>2</u>
Client Name : <u>SYCHIP</u>			
EUT Name : <u>WIRELESS LAN CARD</u>			
EUT Config. : <u>#REF!</u>			
Specification :			
Transducer # :	<u>1258</u>	Temp. (deg. C) :	<u>22</u>
HP Filter # :	<u>704</u>	Humidity (%) :	<u>30</u>
Cable 1 # :	<u>1266</u>	EUT Voltage :	<u>115</u>
Cable 2 # :	<u> </u>	EUT Frequency :	<u>60</u>
Detector 1 # :	<u>1036</u>	Peak Bandwidth:	<u>10kHz</u>
Detector 2 # :	<u> </u>	QP Bandwidth	<u>10kHz</u>
Limiter # :	<u>674</u>	Avg. Bandwidth	<u>10kHz</u>
Reference :		Date :	<u>2/3/2003</u>
		Time :	<u>2:00</u>
		Staff :	<u>LIGHT</u>
		Location :	<u>LAB 4</u>
		Photo ID:	<u>NA</u>

Ref	Lvl	Marker 1 [T1]	RBW	10 kHz	RF Att	0 dB
97	dBμV	53.38 dBμV	VBW	10 kHz		
		150.0000000 kHz	SWT	760 ms	Unit	dBμV

Start 150 kHz 2.985 MHz Stop 30 MHz

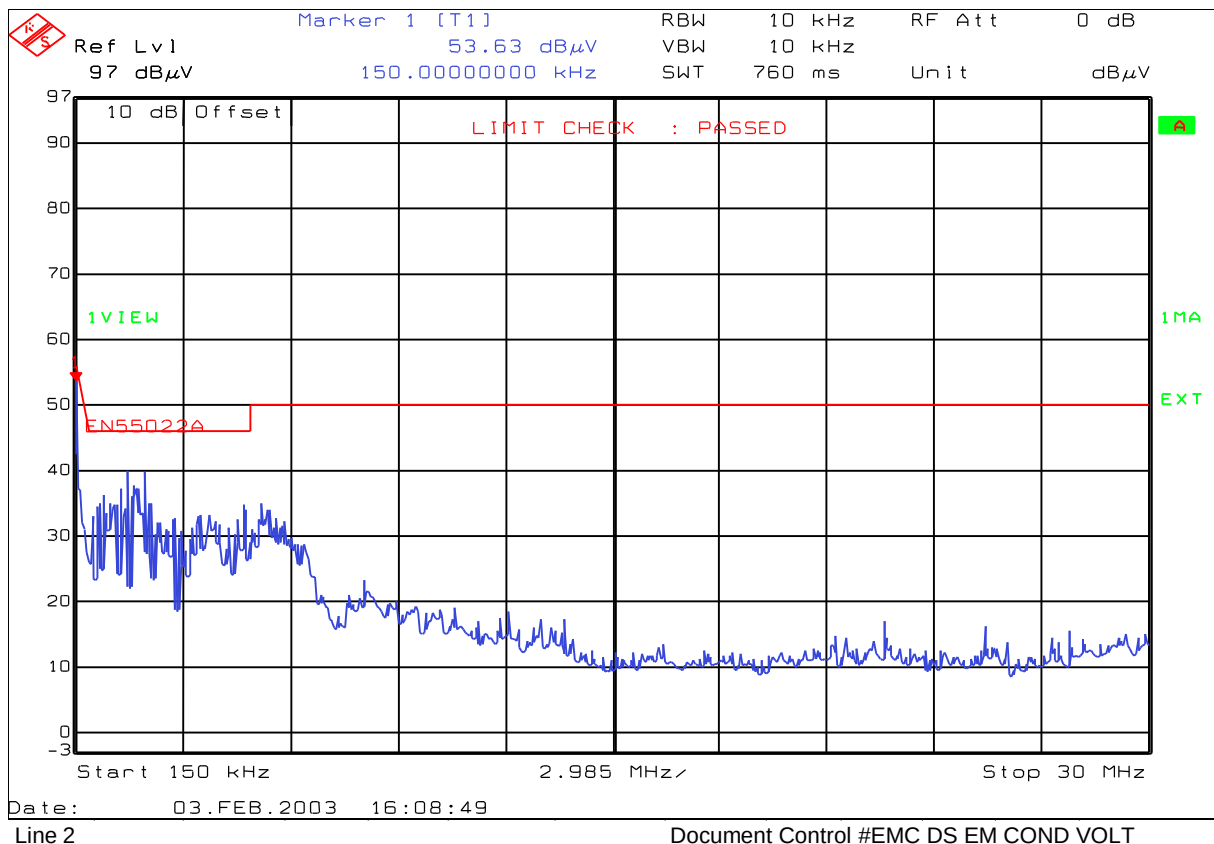
Date: 03.FEB.2003 16:07:29

Line 1 Document Control #EMC DS EM COND VOLT

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Complete	<u>X</u>	Job # :	<u>3L0018R</u>	Test # :	<u>CE1</u>
Preliminary	<u> </u>	Page	<u>2</u>	of	<u>2</u>
Client Name :	<u>SYCHIP</u>				
EUT Name :	<u>WIRELESS LAN CARD</u>				
EUT Model # :	<u>#REF!</u>				
EUT Part # :	<u>#REF!</u>				
EUT Serial # :	<u>#REF!</u>				
EUT Config. :	<u>#REF!</u>				
Specification :	Reference :				



Photos – Powerline Conducted Emissions

Front



Side



Section 4. Minimum 6 dB Bandwidth

NAME OF TEST: Minimum 6 dB Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: David Light	DATE: 2/3/2003

Test Results: Complies.

Measurement Data: See attached plots

Equipment Used: 1464-1083-1478

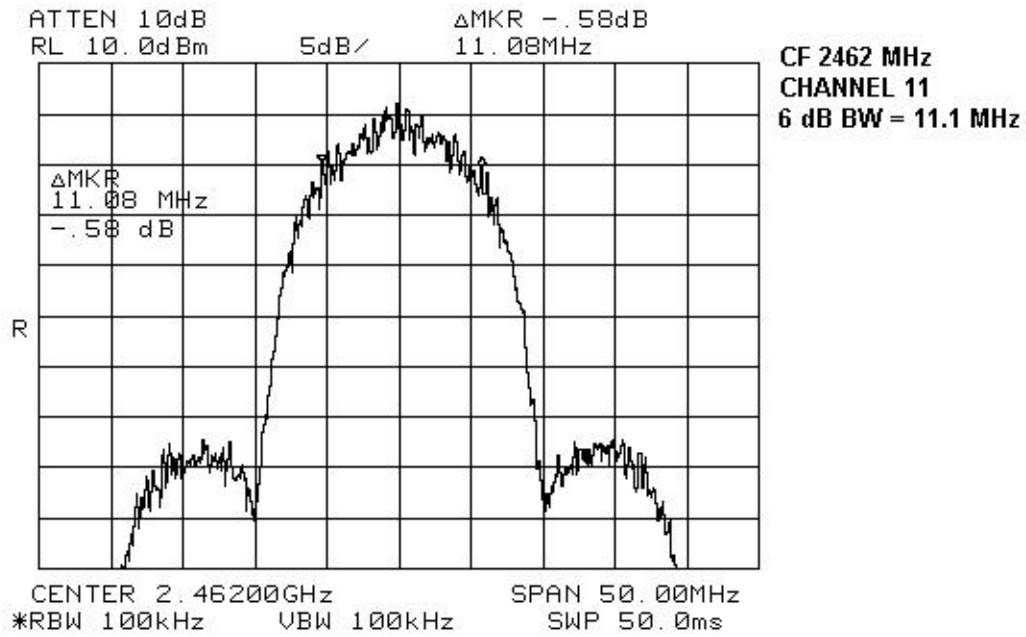
Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 30 %

EQUIPMENT: [WLAN6060SD](#)

PROJECT NO.: [3L0018RUS1](#)



EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)**Section 5. Maximum Peak Output Power**

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(1)
TESTED BY: David Light	DATE: 2/3/2003

Test Results: Complies.**Measurement Data:**

Frequency (MHz)	Type	Output at Antenna Terminal (dBm)	Gain (dBi)	E.I.R.P. (dBm)
2412	Integral	14.5	3	17.5
2437	Integral	14.9	3	17.9
2462	Integral	15.0	3	18.0
Peak power output (EIRP): 63 mW				

Note – The device was tested at +/- 15% supply voltage to host with no effect to output power.

Equipment Used: 1029-1030-1478Measurement Uncertainty: +/- 0.7 dB

Temperature: 22 °C

Relative Humidity: 30 %

Section 6. RF Exposure

NAME OF TEST: RF Exposure	PARA. NO.: 15.247(b)(4)
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Test Results: See Separate SAR report.

Measurement Data:

See separate report for Body worn SAR.

Section 7. Spurious Emissions (conducted)

NAME OF TEST: Spurious Emissions (conducted)	PARA. NO.: 15.247(c)
TESTED BY: David Light	DATE: 2/3/2003

Test Results: Complies.

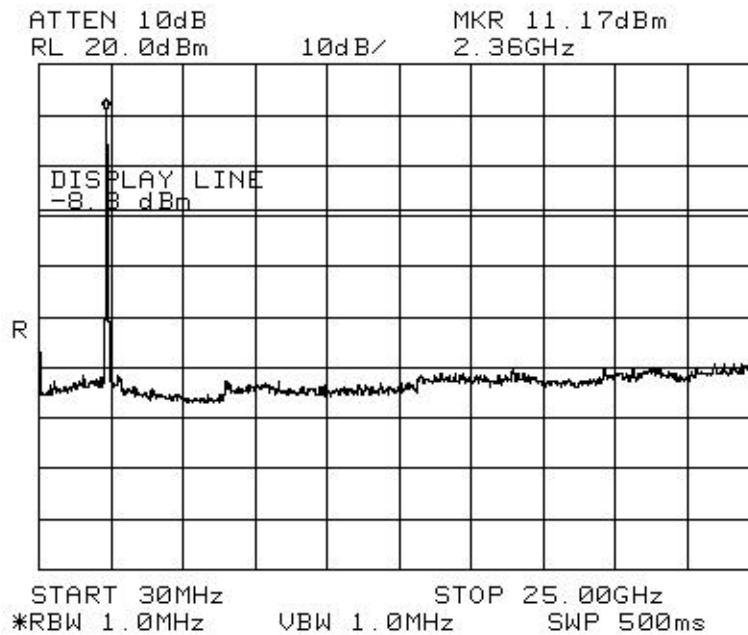
Measurement Data: See attached plots.

Equipment Used: 1464-1083-1478

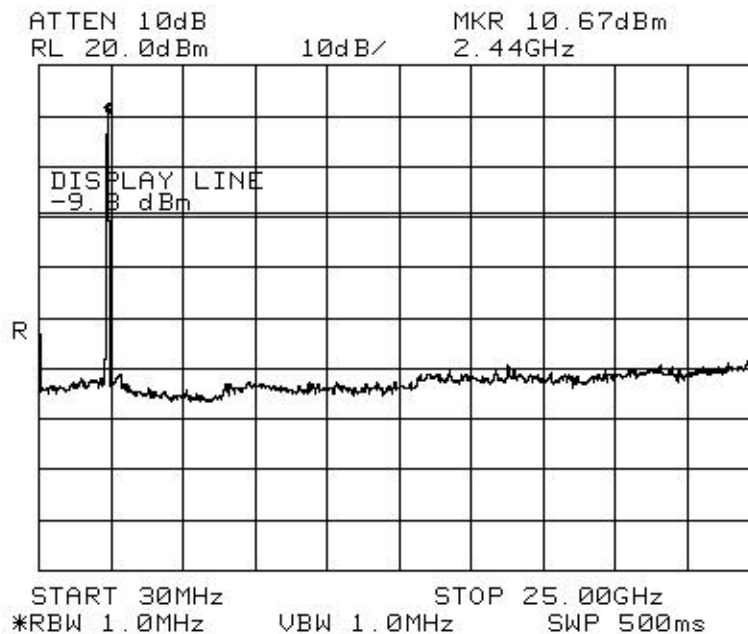
Measurement Uncertainty: +/- 0.7 dB

Temperature: 22 °C

Relative Humidity: 30 %

EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)**Test Plots-Spurious Emissions at Antenna Terminal**

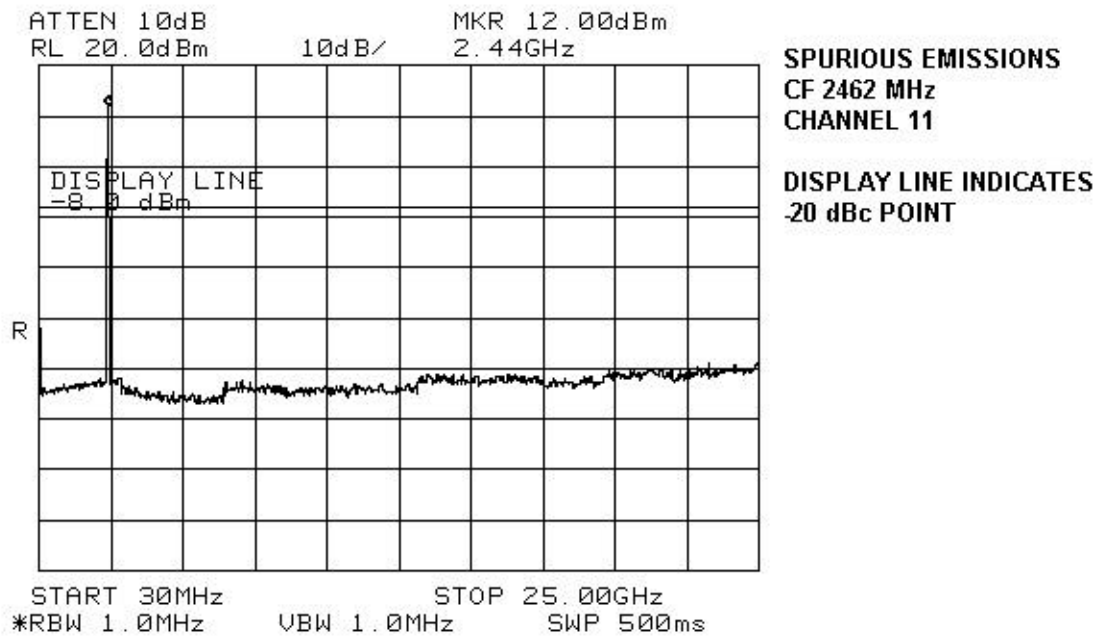
CF 2412 MHz
CHANNEL 1
DISPLAY LINE INDICATES
-20 dBc POINT



CF 2437 MHz
CHANNEL 6
DISPLAY LINE INDICATES
-20 dBc POINT

EQUIPMENT: [WLAN6060SD](#)

PROJECT NO.: [3L0018RUS1](#)



Section 8. Spurious Emissions (radiated)

NAME OF TEST: Spurious Emissions (radiated)	PARA. NO.: 15.247 (c)
TESTED BY: David Light	DATE: 2/3/2003

Test Results: Complies.

Measurement Data: See attached table.

Duty Cycle Calculation:

Duty Cycle correction factor(dB) = $20 \log (rf_{ON} \text{ in ms}/100\text{ms})$

No duty cycle.

Note – The device was tested on three axis’.

EQUIPMENT: **WLAN6060SD**PROJECT NO.: **3L0018RUS1**

Test Data – Radiated Emissions



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Radiated Emissions

Page 1 of 2
 Job No.: 3L0018R Date: 2/3/2003
 Specification: 15.247 Temperature(°C): 22
 Tested By: David Light Relative Humidity(%) 30
 E.U.T.: 802.11B DEVICE
 Configuration: TX FULL POWER
 Sample Number: 1
 Location: AC 3 RBW: 1 MHz
 Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna: 1304 Directional Coupler: #N/A
 Pre-Amp: 1016 Cable #1: 1484
 Filter: 1482 Cable #2: 1485
 Receiver: 1464 Cable #3: #N/A
 Attenuator #1: #N/A Cable #4: #N/A
 Attenuator #2: #N/A Mixer: #N/A

Measurement
 Uncertainty: +/- 3.7 dB

Frequenc (GHz)	Mete Readin (dBuV)	Antenn Facto (dB)	Cabl Loss (dB)	Pre- Gain	Correcte Readin (dBuV/m)	Limi (dBuV/m)	Delt (dB)	Commen
								Channel 11
2.4835	33.	28.	3.1	0.0	65.	74	-9.0	Horizontal-
2.4835	21.	28.	3.1	0.0	52.	54	-1.2	Horizontal-
4.924	45.	33.	4.3	32.	51.	54	-2.7	Horizontal-
7.386	42.	36.	5.3	32.	51.	54	-2.2	Horizontal-
12.31	44.	39.	7.3	35.	56.	74	-17.6	Horizontal-
12.31	32.	39.	7.3	35.	44.	54	-9.4	Horizontal-
2.4835	34.	28.	3.1	0.0	65.	74	-8.5	Vertical-Peak
2.4835	21.	28.	3.1	0.0	52.	54	-1.2	Vertical-Average
4.9240	46.	33.	4.3	32.	51.	54	-2.2	Vertical-Peak
7.386	42.	36.	5.3	32.	51.	54	-2.6	Vertical-Peak
12.31	45.	39.	7.3	35.	57.	74	-16.7	Vertical-Peak
12.31	33	39.	7.3	35.	45.	54	-8.9	Vertical-Average
Notes:								

EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)

Test Data – Radiated Emissions



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Radiated Spurious Emissions								
Page 1 of		Continuation Page						
Job No.:		Date: 2/3/2003						
Specification: CFR 47, Part 15		Temperature(°C): 22						
Tested By: #N/A		Relative Humidity(%) 30						
E.U.T.:		802.11B DEVICE						
Configuration:		TX FULL POWER						
Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
								Channel 6
4.874	44.83	33.9	4.3	32.7	50.3	54	-3.7	Vertical-Peak
7.311	42.17	36.3	5.3	32.5	51.3	54	-2.7	Vertical-Peak
12.185	44.13	39.9	7.3	35.1	56.2	74	-17.8	Vertical-Peak
12.185	33.0	39.9	7.3	35.1	45.1	54	-8.9	Vertical-Average
4.874	43	33.9	4.3	32.7	48.5	54	-5.5	Horizontal-Peak
7.311	41.5	36.3	5.3	32.5	50.6	54	-3.4	Horizontal-Peak
12.185	43.83	39.9	7.3	35.1	55.9	74	-18.1	Horizontal-Peak
12.185	31.8	39.9	7.3	35.1	43.9	54	-10.1	Horizontal-Average
								Channel 1
4.824	44.17	33.9	4.3	32.7	49.7	54	-4.3	Horizontal-Peak
12.060	43.8	36.3	5.3	32.5	52.9	54	-1.1	Horizontal-Peak
14.472	42.33	39.9	7.3	35.1	54.4	74	-19.6	Horizontal-Peak
14.472	31.5	39.9	7.3	35.1	43.6	54	-10.4	Horizontal-Average
4.824	46.17	33.9	4.3	32.7	51.7	54	-2.3	Vertical-Peak
12.060	43.2	36.3	5.3	32.5	52.3	54	-1.7	Vertical-Peak
14.472	42	39.9	7.3	35.1	54.1	74	-19.9	Vertical-Peak
14.472	31.5	39.9	7.3	35.1	43.6	54	-10.4	Vertical-Average
Notes:	Scanned 30 MHz to 25 GHz							

If PEAK measurement met the AVERAGE limit, then an AVERAGE measurement was not taken.

Radiated Photographs



Section 9. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(d)
TESTED BY: David Light	DATE: 2/3/2003

Test Results: Complies.

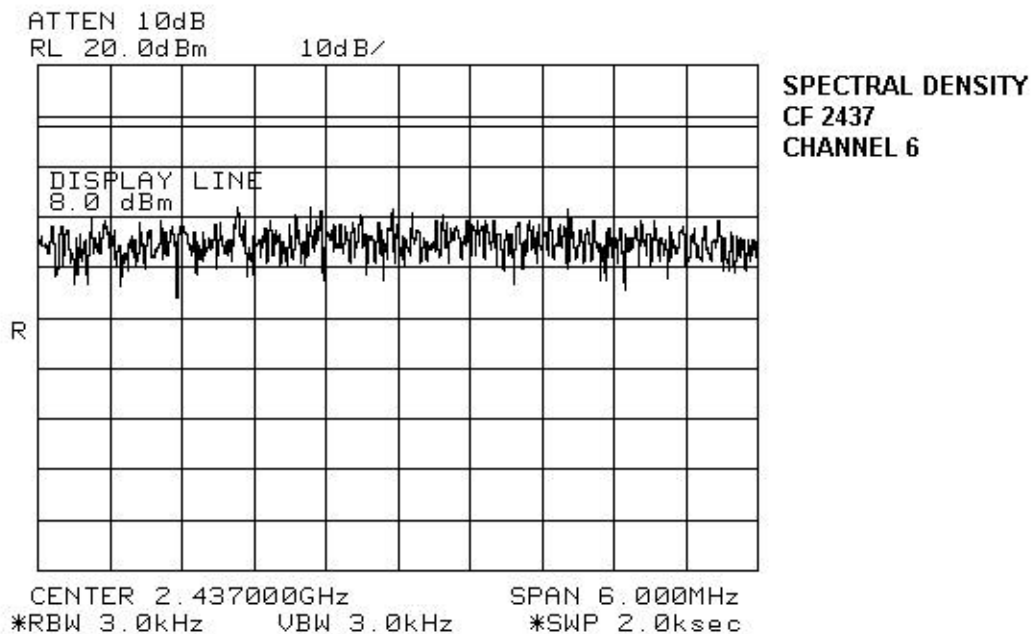
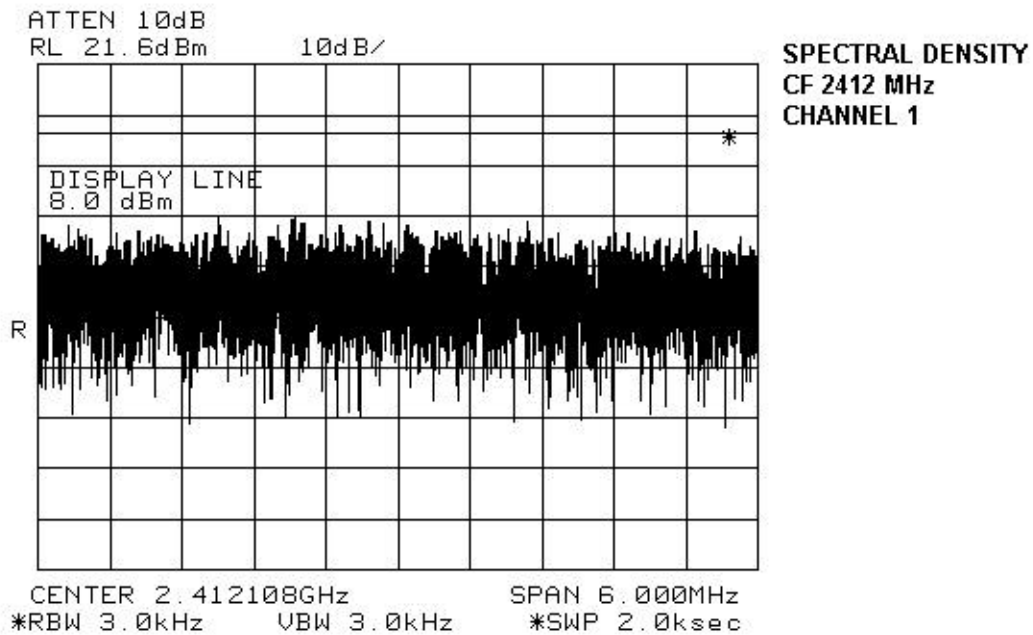
Measurement Data: See attached plots.

Equipment Used: 1464-1083-1478

Measurement Uncertainty: +/- 0.7 dB

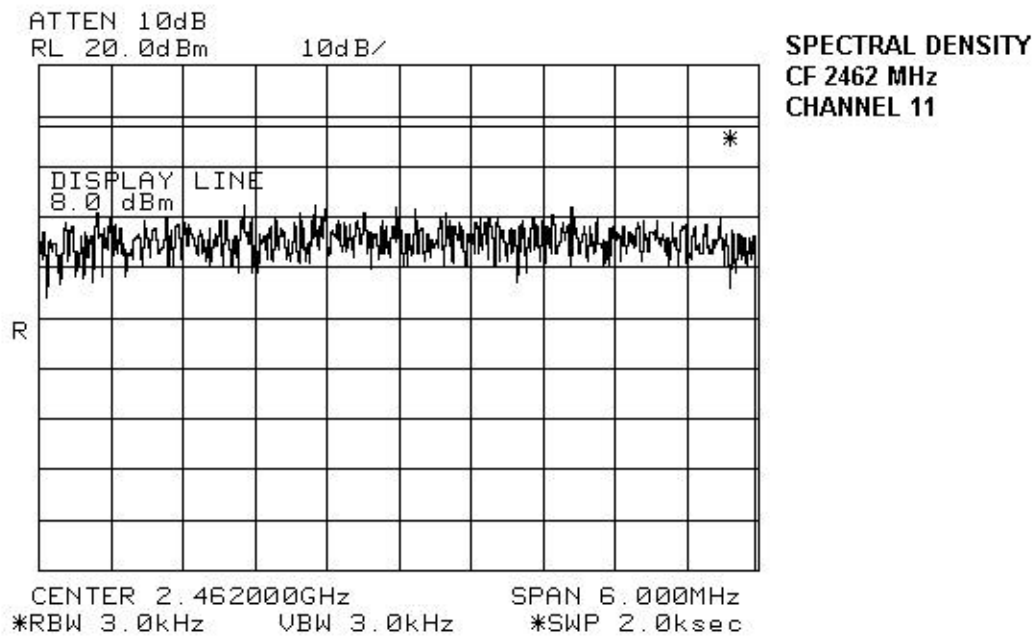
Temperature: 22 °C

Relative Humidity: 30 %

EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)**Test Plots – Spectral Density**

EQUIPMENT: [WLAN6060SD](#)

PROJECT NO.: [3L0018RUS1](#)



EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)**Section 10. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A
1083	Cable 2m	Astrolab 32027-2-29094-72TC	N/A
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159
1266	CABLE, 10m	KTL RG223	N/A
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006
674	LIMITER	HP 11947A	3107A02200
704	FILTER, HIGH PASS, 5 KHz	SOLAR 7930-5.0	933126
1258	LISN .15mhz-30mhz	EMCO 0	1305
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151
1482	Band Pass Filter	K & L 11SH10-4000/T12000-0/0	2
1029	PEAK POWER METER	HP 8900D	3303U0012
1030	PEAK POWER SENSOR	HP 84811A	2539A03573

ANNEX A - TEST DETAILS

EQUIPMENT: [WLAN6060SD](#)

PROJECT NO.: [3L0018RUS1](#)

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
---	----------------------

Minimum Standard:

The R.F. that is conducted back onto the AC power line on any frequency within the band 0.45 to 30 MHz shall not exceed 250 μ V (48 dB μ V) across 50 ohms.

Nemko Dallas

FCC PART 15, SUBPART C
DIRECT SEQUENCE SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: [WLAN6060SD](#)

PROJECT NO.: [3L0018RUS1](#)

NAME OF TEST: Minimum 6 dB bandwidth	PARA. NO.: 15.247(a)(2)
--------------------------------------	-------------------------

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

EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)

NAME OF TEST: Maximum Peak Output Power

PARA. NO.: 15.247(b)(1)

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.

Calculation Of EIRP For Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

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: [WLAN6060SD](#)

PROJECT NO.: [3L0018RUS1](#)

NAME OF TEST: RF Exposure	PARA. NO.: 15.247(b)(4)
---------------------------	-------------------------

Minimum Standard:

Systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines stipulated in 1.1307(b)(1) of CFR 47.

EQUIPMENT: WLAN6060SD

PROJECT NO.: 3L0018RUS1

NAME OF TEST: Spurious Emissions(conducted)

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 (mV/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: **WLAN6060SD**PROJECT NO.: **3L0018RUS1**

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 (mV/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

EQUIPMENT: [WLAN6060SD](#)PROJECT NO.: [3L0018RUS1](#)

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

NAME OF TEST: Processing Gain

PARA. NO.: 15.247(e)

Minimum Standard: The processing gain shall be at least 10 dB.

Method Of Measurement: The CW jamming margin method was used to determine the processing gain. A CW signal generator is stepped across the passband of the receiver in 50 kHz increments. At each point the signal generator level required to obtain the recommended bit error rate is recorded. The jammer to signal ratio (J/S) is then calculated. The worst 20% of the J/S points is discarded. The lowest remaining J/S ratio is used to calculate the processing gain.

Calculation Of Processing Gain:

The processing gain was determined by measuring the jamming margin of the E.U.T. and using the following formula:

$$\text{Jamming Margin} = G_p - (S/N)_{\text{out}} - L_{\text{sys}}$$

For a receiver using non-coherent detection the value $(S/N)_{\text{out}}$ is calculated using the formula:

$P_e = (1/2)\text{EXP}\{-E/2N_o\}$ where P_e is the probability of error (minimum Bit Error Rate required for proper operation).

E/N_o is $(S/N)_{\text{out}}$

for example, for a bit error rate of 10^{-4} a S/N ratio of 12.3 dB is required.

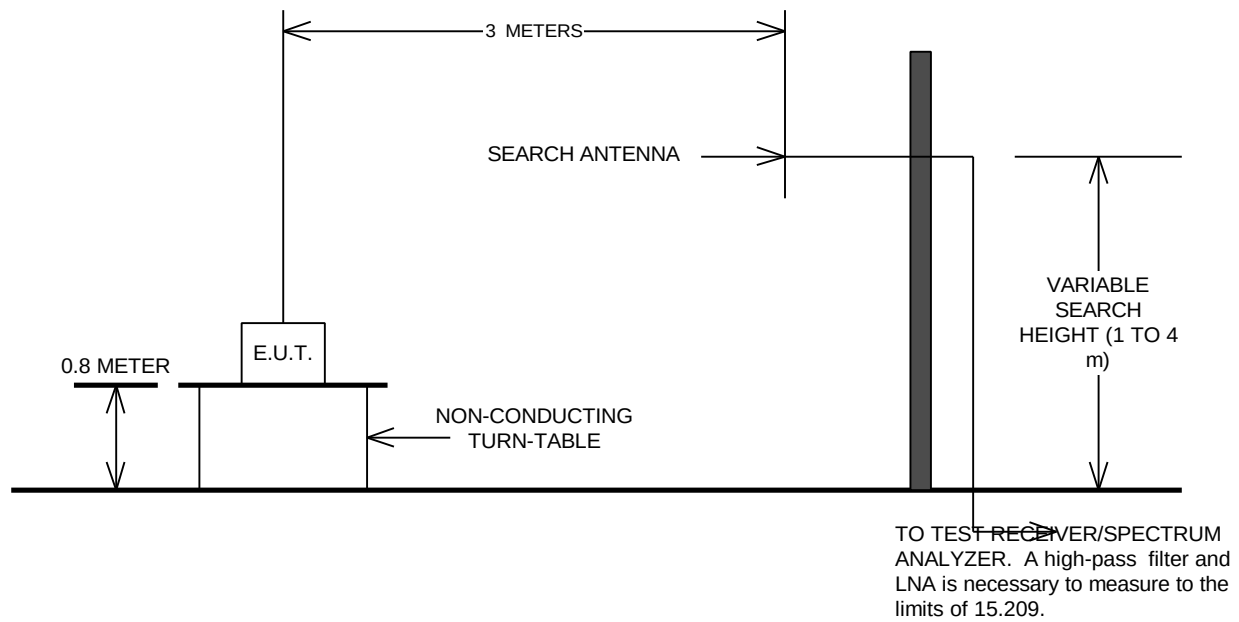
L_{sys} (system losses) is assumed to be 2 dB.

$$\text{Therefore } G_p = M_j + (S/N)_{\text{out}} + L_{\text{sys}}$$

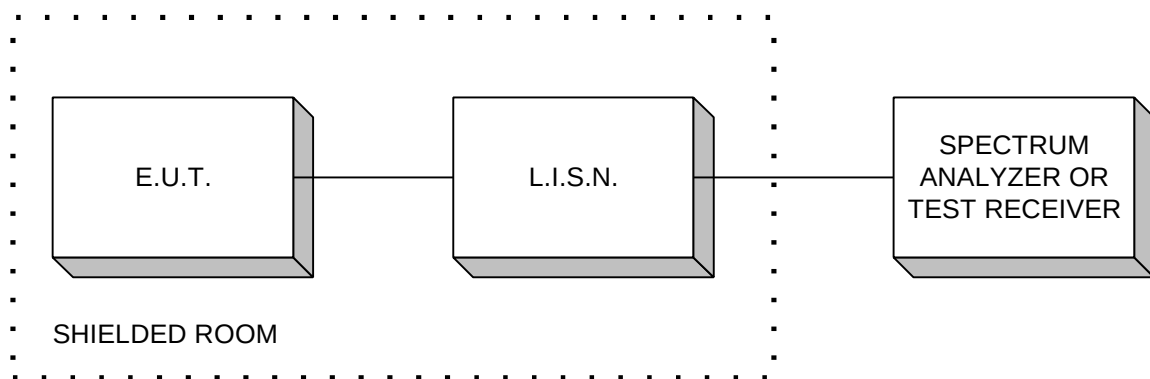
Measurement performed at a channel in the center of the operating band of the EUT.

ANNEX B - TEST DIAGRAMS

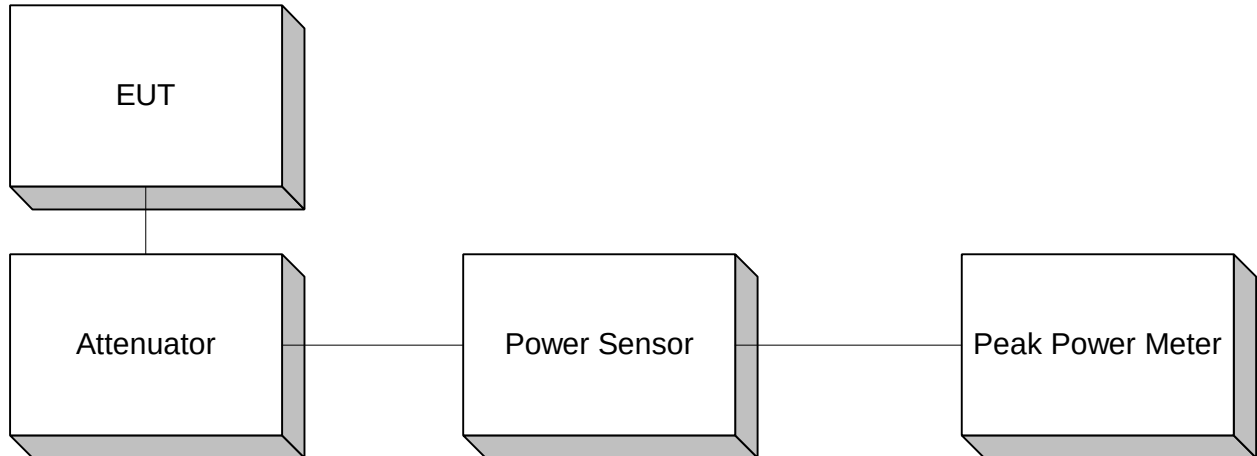
Test Site For Radiated Emissions



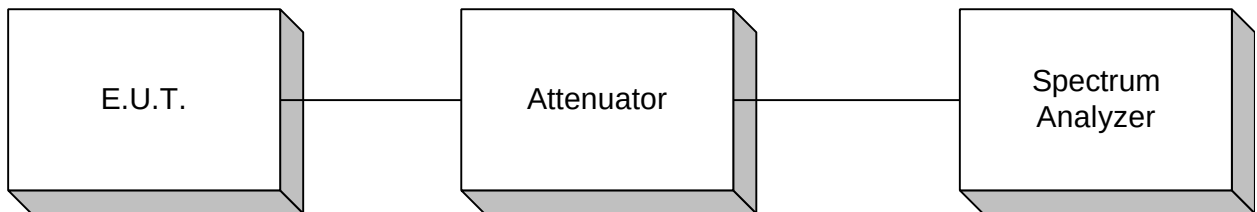
Conducted Emissions

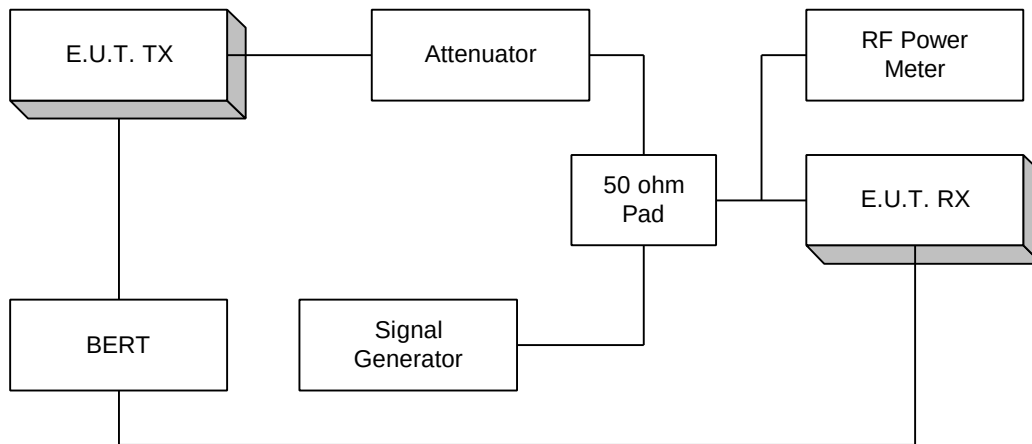


Peak Power At Antenna Terminals



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



Processing Gain

NOTE: This is a typical setup. The setup may vary slightly since many devices have BER test functions built into the device.