



**FCC Test Data for ITC Report# 20031028-01-FC15
per 47CFR15, Subpart C for Intentional Radiators**

on
**2.4 GHz DSS Cordless Telephone
(Digital Spread Spectrum Technology)
FCC ID: DXACL2200**

For the
**CL1200, CL2200 and CL2400
Series Telephone**

Judgement
Complies as tested

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Lab Code 200172-0

EN45001 Accredited Compliance Laboratory (RES-GmbH)
Registration number: TTI-P-G 159/98-00 (RES-GmbH)

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General Information (cont.)

Accuracy of Test Data

The test results contained in this report accurately represent the emissions generated by the sample equipment under test. ITC as an independent testing laboratory declares that the equipment, as tested, complies with the functional requirements of:

1. FCC standard 47CFR §15.247.

Tests Performed on Base and Handset Units:

RF Requirements:

- MAXIMUM EIRP OF FUNDAMENTAL per 47 CFR §15.247 (b)
- MAXIMUM PEAK POWER per FCC 47 CFR Part §15.247 (b)



Gurjit Khosa
Technical Author



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Project Engineer

General Information (cont.)

Declaration/Disclaimer

ITC Engineering Services, Inc. reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. ITC Engineering Services, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from ITC Engineering Services, Inc. issued reports.

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ITC Engineering Services, Inc. is:

Accepted by the Federal Communications Commission (FCC) for FCC Methods, CISPR Methods and AUSTEL Technical Standards (Ref: NVLAP Lab Code 200172-0)

Approved by the Industry Canada for Telecom Testing

Certified by Rockford Engineering Services GmbH for EMC Testing according to the European EMC Directive 89/336/EEC per EN45001

Certified by Reg. TP for EMC Testing according to the European EMC Directive 89/336/EEC per EN45001 for RES GmbH (DAR-Registration number: TTI-P-G 159/98-00)

Certified by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI) for EMC testing, in accordance with the Regulations for Voluntary Control Measures, Article 8, Registration Numbers - Site 1: C-1582 and R-1497.

General Information (cont.)

Test Equipment (EUT)

The Equipment Under Test, Teledex Model CL2210, also referred to herein as the EUT, is a two-line 2.4 GHz digital cordless phone.

Test Methodology

The electromagnetic interference tests, which this report describes, were performed by an independent electromagnetic compatibility consultant, ITC Engineering Services, Inc., in accordance with the FCC test procedure ANSI C63.4 (1992).

Test Facility

The open area test site, the conducted measurement facility, and the test equipment used to collect the emissions data is located in Sunol, California, and is fully described in site attenuation report. The approved site attenuation description is on file at the Federal Communications Commission.

Table 1: Measurement Uncertainty

150kHz to 30MHz:		
Combined standard uncertainty uc(y)	± 1.68 dB	Normal
Expanded uncertainty U	± 3.36 dB	Normal (k = 2)
30MHz to 1GHz:		
Combined standard uncertainty uc(y)	± 3.24 dB	Normal
Expanded uncertainty U	± 6.48 dB	Normal (k = 2)
1GHz to 18GHz:		
Combined standard uncertainty uc(y)	± 2.48 dB	Normal
Expanded uncertainty U	± 4.96 dB	Normal (k = 2)
Above 18GHz:		
Radiated emission up to 26 GHz	± 3 dB	
Radiated emission up to 40 GHz	± 3 dB	
Radiated emission up to 75 GHz	± 3 dB	

PART 3 : RF MEASUREMENTS

Test Setup Configurations

Teledex's Model CL2210, or the EUT, was set up on a wooden table, 80cm above the ground reference plane in an anechoic chamber and in an open field. It was powered and tested in normal continuous mode.

Table 2: Test Equipment – RF Measurements

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Date
Preamplifier	Hewlett-Packard	8449B	3008A00101	N/A
Preselector	Hewlett-Packard	85685A	2620A00265	12-11-2004
Biconical Antenna	EMCO	3104	9111-4463	01-16-2004
I.p. Ant (200 -1000MHz)	EMCO	3146	2261	01-22-2004
Quasi Peak Adapter	Hewlett-Packard	85650A	2521A00737	12-11-2004
Spectrum Analyzer	Hewlett-Packard	8566B	2618A02909	12-11-2004
Spectrum Analyzer Display	Hewlett-Packard			12-11-2004
Horn. Ant (Below 18GHz)	EMCO	3115	8812-3050	01-19-2004
Spectrum Analyzer	Hewlett-Packard	8569A	2128A00270	04-23-2004

Table 3: Data Table Legend and Field Strength Calculation

Detector mode: Peak (P) or Quasi-Peak (QP) or Average (A)

	Polarization	Antenna	Freq Range (in MHz)
VB	Vertical	EMCO 3104/sn 9111-4463 Biconical	30 – 200
HB	Horizontal	EMCO 3104/sn 9111-4463 Biconical	30 – 200
VL	Vertical	EMCO 3146/sn. 2261 Log Periodic	200 – 1000
HL	Horizontal	EMCO 3146/sn. 2261 Log Periodic	200 – 1000
VH	Vertical	EMC 3115/sn. 4663 Horn	Below 18000
HH	Horizontal	EMC 3115/sn. 4663 Horn	Below 18000
VH1	Vertical	EMC 3115/sn. 8812-3050 Horn	Below 18000
HH1	Horizontal	EMC 3115/sn. 8812-3050 Horn	Below 18000

The margin is calculated as follows:

Margin = Corrected Amplitude - Limit; where Corrected Amplitude = Amplitude + Cable Loss + Antenna Factor.

MAXIMUM OUTPUT POWER OF FUNDAMENTAL per 47 CFR 15.247(b)

Maximum Power Measurement (HandSet Unit)

The EUT was set up on a wooden non-conductive tabletop, 80 cm above the ground plane on an Open Area Test Site (OATS) at 3 meters. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-1992. The EUT running in continuous mode, was rotated 360 degrees azimuth and was also rotated in its x-y-z axis positions. The search antenna was varied 1 to 4m and rotated in its horizontal and vertical polarities while operating the spectrum analyzer in fixed tuned mode to determine the precise amplitude of the emission. This EUT signal was captured in "max hold" mode to trace "A" on the analyzer and recorded as the RF measured Peak Power. The EUT was then replaced by a signal generator which sent out an unmodulated signal which was captured to trace "B". The output frequency of the signal in trace "B" was made equal to the center of the frequency range occupied by the EUT signal in trace "A". The reading on the signal generator meter display was recorded as the EIRP level.

Site Used – Maximum Power Measurement of Fundamental (HandSet Unit)

- ☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
- ☒ Test Site 1 - 3m Open Field Radiated Site
- ☐ Test Site 1 - 10m Open Field Radiated Site
- ☐ Test Site 2 - Environmental Lab
- ☐ EMC Lab 1 - Test Laboratory
- ☐ Semi-Anechoic Absorber Lined Shielded Room
- ☐ Other: _____

Administrative Details – Maximum Power Measurement of Fundamental (HandSet Unit)

Test Date(s):	November 11, 2003
Test Engineer(s):	Bande Adepou

Environmental Conditions – Maximum Power Measurement of Fundamental (HandSet Unit)

Temperature	17.2°C
Humidity	54%

Spectrum Analyzer Configuration (during swept frequency scans) – Maximum Power Measurement

Center Frequency See Applicable Plot Below
 Span 10.00 MHz
 Sweep Speed Manual
 RES Bandwidth..... 1000 kHz
 Video Bandwidth..... 1000 kHz
 Quasi Peak Adapter Mode Bypass
 Quasi Peak Adapter Bandwidth..... Disabled
 Average Detector..... Disabled

Table 4: Test Equipment – Maximum Power Tests (HandSet Unit)

Equipment Description	Manufacturer	Model Name	Serial Number	Cal Due Date
Spectrum Analyzer	Hewlett-Packard	8565E	2618A02909	02/18/2003
Pre-amplifier	Hewlett-Packard	8449B	3008A00101	02/25/2003
Pre-amplifier	Hewlett-Packard	8447F	2805A02491	12/15/2003
Antenna Cable	Hewlett-Packard (OPTK45)	RG8/u	-	
Antenna Cable (high freq)	Specialty Cable Corp.	M17/60-RG142	-	
Horn Antenna	EMCO	3115	8812-3050	01/15/2004
Horn Antenna	EMCO	3115	4663	12/18/2003

MAXIMUM OUTPUT POWER OF FUNDAMENTAL (cont.)

Test Data – Maximum Power of Fundamental (HandSet Unit @ 2404.8MHz)

The measurement plot below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

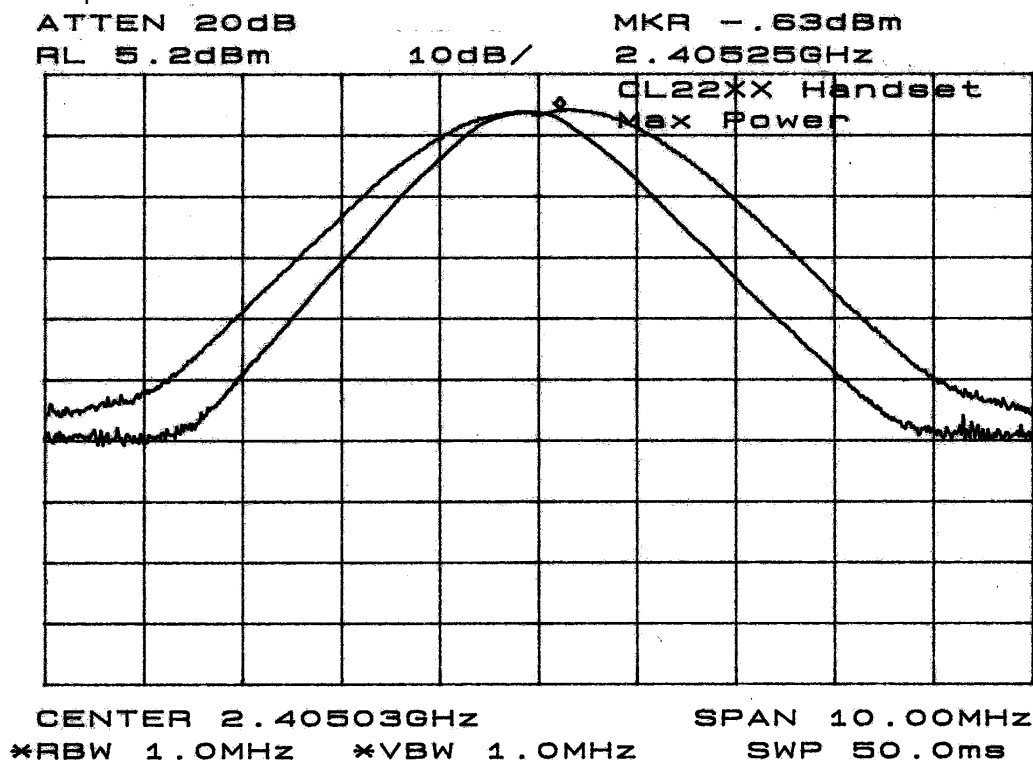


Table 5: Maximum EIRP Test Data – 2404.8MHz HandSet Signal Generator Measurement @ 3 meters

SIG-GEN		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB	dB	dBm	m	-	MODE
2404.8MHz	6.50	30.1	4.83	24.17	17.26	0.80	VH1	P

Test-Data Summary – HandSet Unit @ 2404.8MHz:

Center Frequency = 2404.8 MHz

Measured EIRP Level = 17.26dBm

Table 6: Maximum Power Test Data – 2404.8MHz HandSet Analyzer Measurement @ 3 meters

INDICATED		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB	dB	dBm	m	-	MODE
2404.8MHz	-0.63	30.7	9.84	24.17	15.74	1.2	VH	P

Test-Data Summary – HandSet Unit @ 2404.8MHz:

Center Frequency = 2404.8 MHz

Measured Peak Power = 15.74dBm

MAXIMUM OUTPUT POWER OF FUNDAMENTAL (cont.)

Peak Power Calculation (HandSet Unit @ 2404.8MHz):

Limit (15.247b1) = 30dBm (1 watt)

$$P = (Ed)^2 / (30xG)$$

$$\begin{aligned} E &= 15.74 \text{ dBm} &= 1.37\text{V/m} \\ G &= 5.53 \\ d &= 3 \text{ meters} \end{aligned}$$

$$P = (1.37x3)^2 / (30x5.53) = 102\text{mW}$$

Note: "E" is the measured maximum field strength in V/m.
 "G" is the numeric gain of the transmitting antenna over an isotropic radiator.
 "d" is the distance from which the field strength was measured in meters.
 "P" is the power in watts

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Test Data – Maximum Power of Fundamental (HandSet Unit @ 2439MHz)

The measurement plot below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

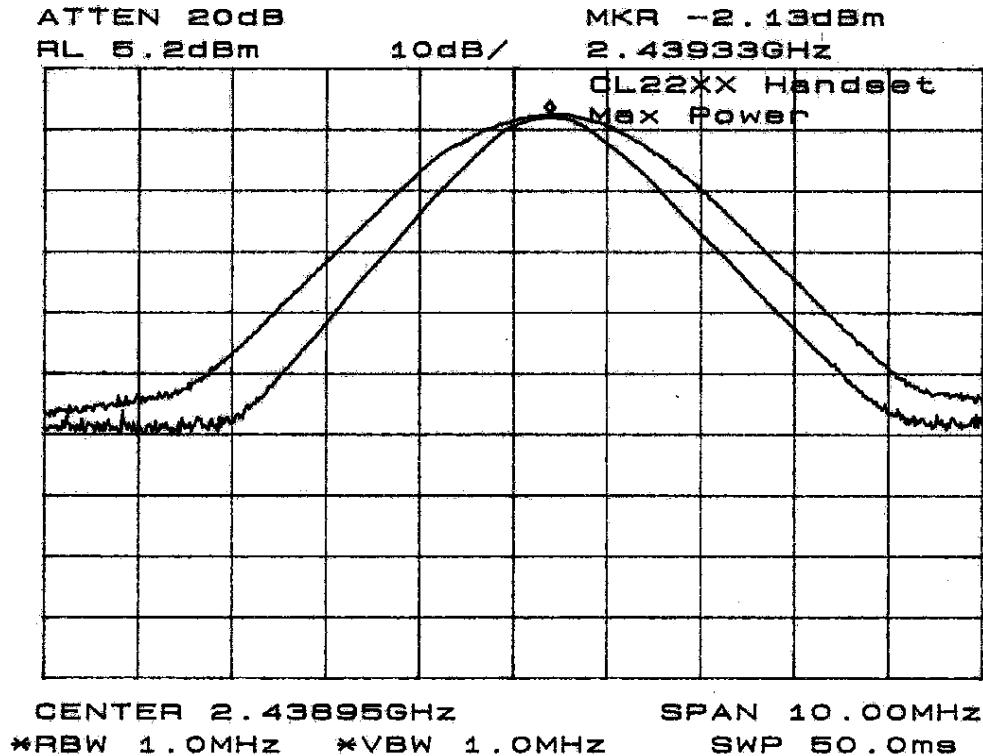


Table 7: Maximum EIRP Test Data – 2439MHz Signal Generator HandSet Measurement @ 3 meters

SIG-GEN		CORRECTION			CORR	ANT ORIENTATION		Limit		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	AMPL	MARG	DET
MHz	dBm	dB	dB	dB	dBm	m	-	dBm	dB	MODE
2439MHz	4.95	30.	4.83	24.33	15.55	1.2	VH1	30	-14.45	P

Test-Data Summary – HandSet Unit @ 2439MHz:

Center Frequency = 2439 MHz
Measured EIRP Level = 15.55dBm

Table 8: Maximum Power Test Data – 2439MHz Signal Generator HandSet Measurement @ 3 meters

INDICATED		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB	dB	dBm	m	-	MODE
2439MHz	-2.13	30.7	9.84	24.33	14.08	1.2	VH	P

Test-Data Summary – HandSet Unit @ 2439MHz:

Center Frequency = 2439 MHz
Measured Peak Power = 14.08dBm

MAXIMUM OUTPUT POWER OF FUNDAMENTAL (cont.)

Peak Power Calculation (HandSet Unit @ 2439MHz):

Limit (15.247b1) = 30dBm (1 watt)

$$P = (Exd)^2 / (30xG)$$

$$E = 14.08 \text{ dBm} = 1.13 \text{ V/m}$$

$$G = 5.53$$

$$d = 3 \text{ meters}$$

$$P = (1.13x3)^2 / (30x5.53) = 69 \text{ mW}$$

Note: "E" is the measured maximum field strength in V/m.
 "G" is the numeric gain of the transmitting antenna over an isotropic radiator.
 "d" is the distance from which the field strength was measured in meters.
 "P" is the power in watts

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Test Data – Maximum Power of Fundamental (HandSet Unit @ 2475MHz)

The measurement plot below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

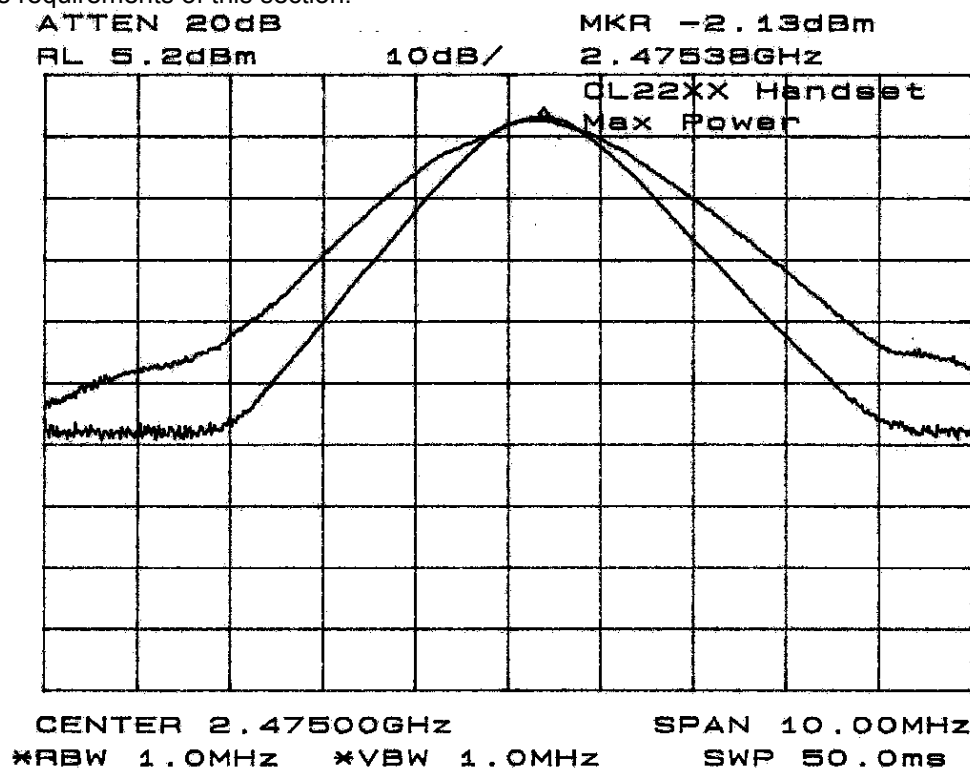


Table 9: Maximum EIRP Test Data – 2475MHz Signal Generator HandSet Measurement @ 3 meters

SIG-GEN		CORRECTION			CORR	ANT ORIENTATION		Limit		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	AMPL	MARG	DET
MHz	dBm	dB	dB	dB	dBm	m	-	dBm	dB	MODE
2475MHz	4.50	30.1	5.67	24.50	15.77	1.2	VH1	30	-14.23	P

Test-Data Summary – HandSet Unit @ 2475MHz:

Center Frequency = 2475 MHz

Measured EIRP Level = 15.77dBm

Table 10: Maximum Power Test Data – 2475MHz Signal Generator HandSet Measurement @ 3 meters

INDICATED		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB	dB	dBm	m	-	MODE
2475MHz	-2.13	30.7	9.84	24.50	13.91	1.2	VH	P

Test-Data Summary – HandSet Unit @ 2475MHz:

Center Frequency = 2475 MHz

Measured Peak Level = 15.71dBm

MAXIMUM OUTPUT POWER OF FUNDAMENTAL (cont.)

Peak Power Calculation (HandSet Unit @ 2475MHz):

Limit (15.247b1) = 30dBm (1 watt)

$$P = (Exd)^2 / (30xG)$$

$$E = 13.91 \text{ dBm} = 1.11 \text{ V/m}$$

$$G = 5.53$$

$$d = 3 \text{ meters}$$

$$P = (1.11x3)^2 / (30x5.53) = 67 \text{ mW}$$

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Test Data – Maximum Power of Fundamental (Base Unit)

Maximum Power Measurement

The EUT was set up on a wooden non-conductive tabletop, 80 cm above the ground plane on an Open Area Test Site (OATS) at 3 meters. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-1992. The EUT running in continuous mode, was rotated 360 degrees azimuth and was also rotated in its x-y-z axis positions. The search antenna was varied 1 to 4m and rotated in its horizontal and vertical polarities while operating the spectrum analyzer in fixed tuned mode to determine the precise amplitude of the emission. This EUT signal was captured in “max hold” mode to trace “A” on the analyzer and recorded as the RF measured Peak Power. The EUT was then replaced by a signal generator which sent out an unmodulated signal which was captured to trace “B”. The output frequency of the signal in trace “B” was made equal to the center of the frequency range occupied by the EUT signal in trace “A”. The reading on the signal generator meter display was recorded as the EIRP level.

Site Used – Maximum Power Measurement of Fundamental (Base Unit)

- ☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
☒ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☐ Semi-Anechoic Absorber Lined Shielded Room
☐ Other: _____

Administrative Details – Maximum Power Measurement of Fundamental (Base Unit)

Test Date(s):	November 14, 2003
Test Engineer(s):	Bande Adepou

Environmental Conditions – Maximum Power Measurement of Fundamental (Base Unit)

Temperature	15.6°C
Humidity	69%

Spectrum Analyzer Configuration (during swept frequency scans) – Maximum Power Measurement

Center Frequency See Applicable Plot Below
 Span 10.00 MHz
 Sweep Speed Manual
 RES Bandwidth..... 1000 kHz
 Video Bandwidth..... 1000 kHz
 Quasi Peak Adapter Mode Bypass
 Quasi peak Adapter Bandwidth Disabled
 Average Detector..... Disabled

Table 11: Test Equipment – Maximum Power Tests (Base Unit)

Equipment Description	Manufacturer	Model Name	Serial Number	Cal Due Date
Spectrum Analyzer	Hewlett-Packard	8565E	2618A02909	02/18/2003
Pre-amplifier	Hewlett-Packard	8449B	3008A00101	02/25/2003
Pre-amplifier	Hewlett-Packard	8447F	2805A02491	12/15/2003
Antenna Cable	Hewlett-Packard (OPTK45)	RG8/u	-	
Antenna Cable (high freq)	Specialty Cable Corp.	M17/60-RG142	-	
Horn Antenna	EMCO	3115	8812-3050	01/15/2003

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Test Data – Maximum Power of Fundamental (Base Unit @ 2410.13MHz)

The measurement plot below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

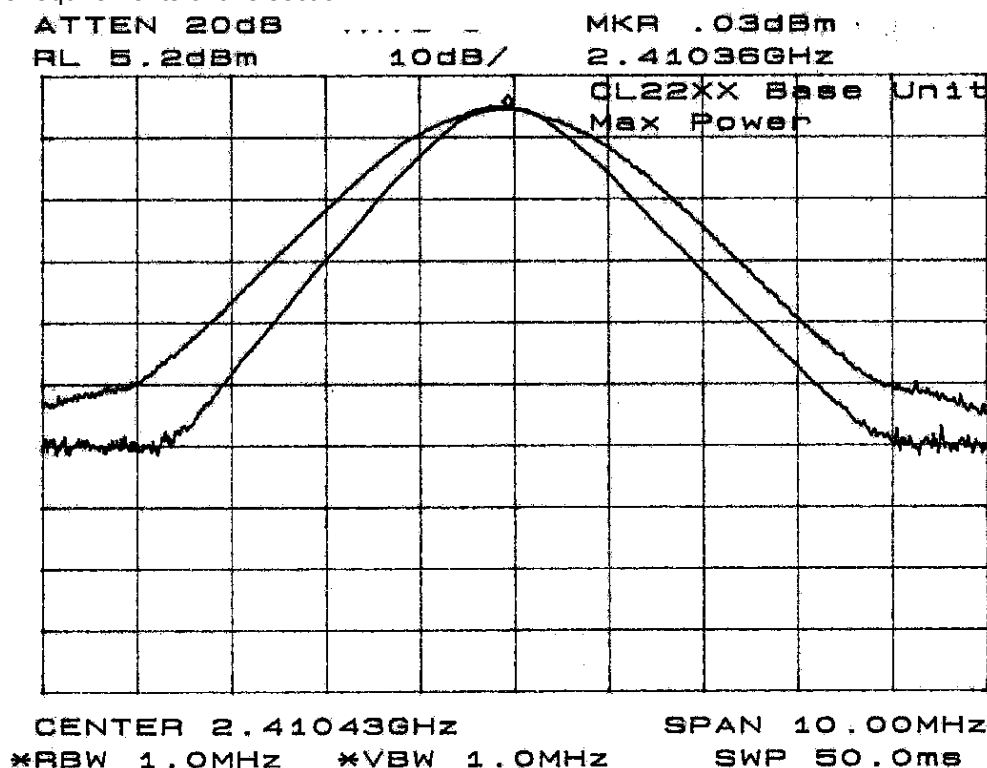


Table 12: Maximum EIRP Test Data – 2410.13MHz Signal Generator Base Unit Measurement @ 3 meters

SIG-GEN		CORRECTION			CORR	ANT ORIENTATION		Limit		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	AMPL	MARG	DET
MHz	dBm	dB	dB	dB	dB/m	m	-	dBm	dB	MODE
2410.13MHz	8.80	30.1	5.00	24.33	19.57	1.2	VH1	30	-10.43	P

Test-Data Summary – Base Unit @ 2410.13MHz:

Center Frequency = 2410.13 MHz
 Measured Peak Level = 19.57dBm

Table 13: Maximum Power Test Data – 2410.13MHz Signal Generator Base Unit Measurement @ 3 meters

INDICATED		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CABLE	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB		dBm	m	-	MODE
2410.13MHz	0.03	30.7	9.84	24.17	16.24	1.2	VH	P

Test-Data Summary – Base Unit @ 2410.13MHz:

Center Frequency = 2410.13 MHz
 Measured Peak Level = 16.40dBm

MAXIMUM OUTPUT POWER OF FUNDAMENTAL (cont.)

Peak Power Calculation (Base Unit @ 2410.13MHz):

Limit (15.247b1) = 30dBm (1 watt)

$$P = (Exd)^2 / (30xG)$$

$$E = 16.40 \text{ dBm} = 1.48 \text{ V/m}$$

$$G = 5.53$$

$$d = 3 \text{ meters}$$

$$P = (1.48x3)^2 / (30x5.53) = 119 \text{ mW}$$

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Test Data – Maximum Power of Fundamental (Base Unit @ 2439MHz)

The measurement plot below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

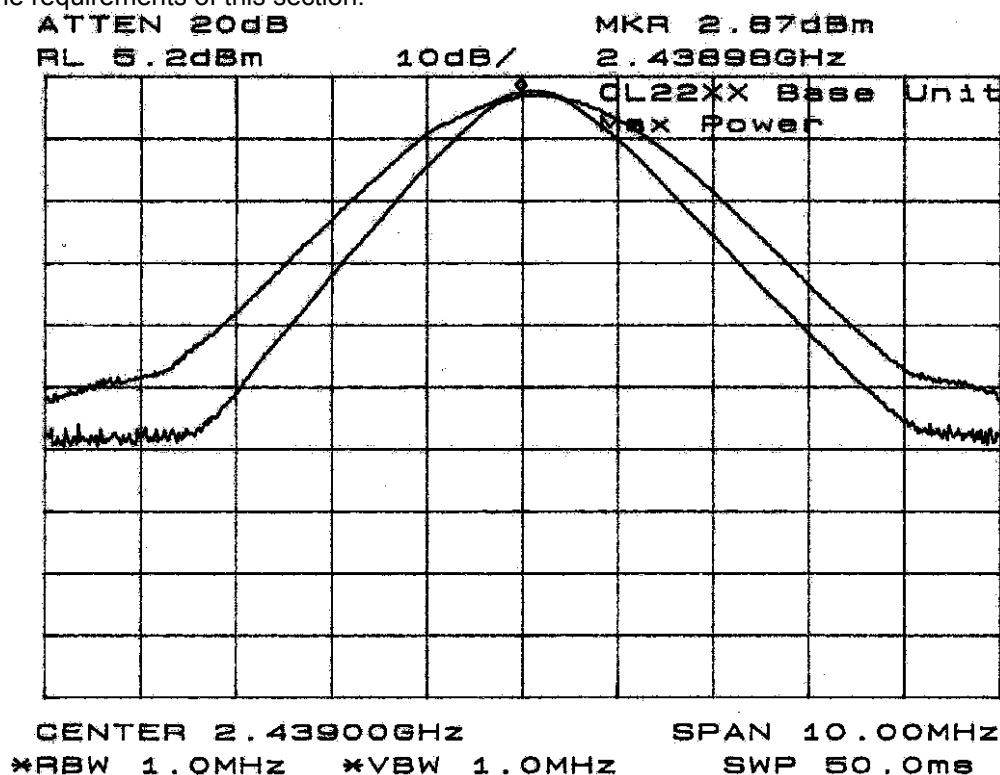


Table 14: Maximum EIRP Test Data – 2439MHz Signal Generator Base Unit Measurement @ 3 meters

SIG-GEN		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB	dB	dBm	m	-	MODE
2439MHz	10.5	30.1	5.67	24.33	21.94	0.80	VH	P

Test-Data Summary – Base Unit @ 2439 MHz:

Center Frequency = 2439 MHz

Measured Peak Level = 21.94dBm

Table 15: Maximum Power Test Data – 2439MHz Signal Generator Base Unit Measurement @ 3 meters

INDICATED		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CABLE	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB		dBm	m	-	MODE
2439MHz	2.87	30.7	9.84	24.33	19.08	1.2	VH	P

Test-Data Summary – Base Unit @ 2439 MHz:

Center Frequency = 2439 MHz

Measured Peak Level = 19.08dBm

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Peak Power Calculation (Base Unit @ 2439MHz):

Limit (15.247b1) = 30dBm (1 watt)

$$P = (Exd)^2 / (30xG)$$

$$E = 19.08 \text{ dBm} = 2\text{V/m}$$

$$G = 5.53$$

$$d = 3 \text{ meters}$$

$$P = (2x3)^2 / (30x5.53) = 217\text{mW}$$

Note: "E" is the measured maximum field strength in V/m.
 "G" is the numeric gain of the transmitting antenna over an isotropic radiator.
 "d" is the distance from which the field strength was measured in meters.
 "P" is the power in watts

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Test Data – Maximum Power of Fundamental (Base Unit @ 2475MHz)

The measurement plot below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

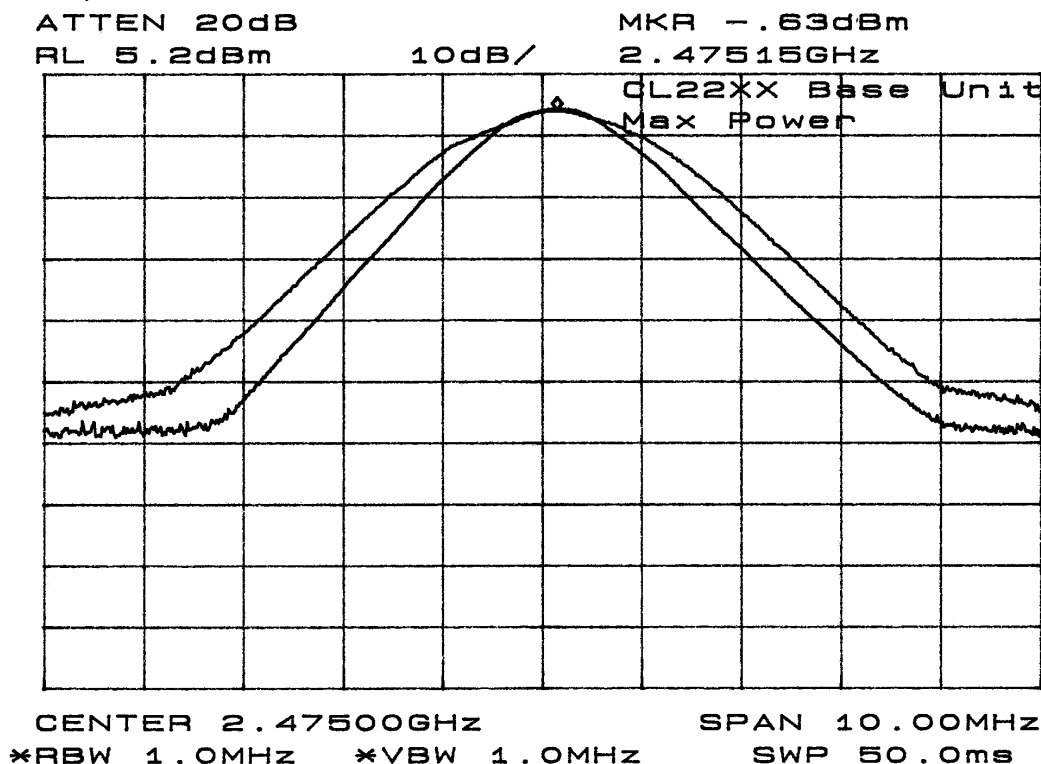


Table 16: Maximum EIRP Test Data – 2475MHz Signal Generator Base Unit Measurement @ 3 meters

SIG-GEN		CORRECTION			CORR	ANT ORIENTATION		Limit		
FREQ	AMPL	ANT	CAB	PreAMP	AMPL	HT	POL	AMPL	MARG	DET
MHz	dBm	dB	dB	dB	dBm	m	-	dBm	dB	MODE
2475MHz	7.00	30.7	9.84	24.50	18.27	1.2	VH	30	-11.13	P

Test-Data Summary – Base Unit @ 2475 MHz:

Center Frequency = 2475 MHz
Measred Peak Level: = 18.27dBm

Table 17: Maximum Power Test Data – 2475MHz Signal Generator Base Unit Measurement @ 3 meters

INDICATED		CORRECTION			CORR	ANT ORIENTATION		
FREQ	AMPL	ANT	CABLE	PreAMP	AMPL	HT	POL	DET
MHz	dBm	dB	dB		dBm	m	-	MODE
2475MHz	-0.63	30.7	9.84	24.33	15.58	1.2	VH	P

Test-Data Summary – Base Unit @ 2475 MHz:

Center Frequency = 2475 MHz
Measred Peak Level: = 15.58dBm

MAXIMUM PEAK OUTPUT POWER OF FUNDAMENTAL (cont.)

Peak Power Calculation (Base Unit @ 2475MHz):

Limit (15.247b1) = 30dBm (1 watt)

$$P = (Ed)^2 / (30xG)$$

$$E = 15.58 \text{ dBm} = 1.34 \text{ V/m}$$

$$G = 5.53$$

$$d = 3 \text{ meters}$$

$$P = (1.34x3)^2 / (30x5.53) = 97 \text{ mW}$$

Note: "E" is the measured maximum field strength in V/m.
 "G" is the numeric gain of the transmitting antenna over an isotropic radiator.
 "d" is the distance from which the field strength was measured in meters.
 "P" is the power in watts