

Measurement of MPE

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

According to **OET BULLETIN 56 Fourth Edition/August 1999**,
Equation for Predicting RF Fields:

$$S = \frac{P G}{4 R^2} = \frac{38.99 \times 1.694}{4 (20)^2} = 13.14 \times 10^{-3} \text{ mW/cm}^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

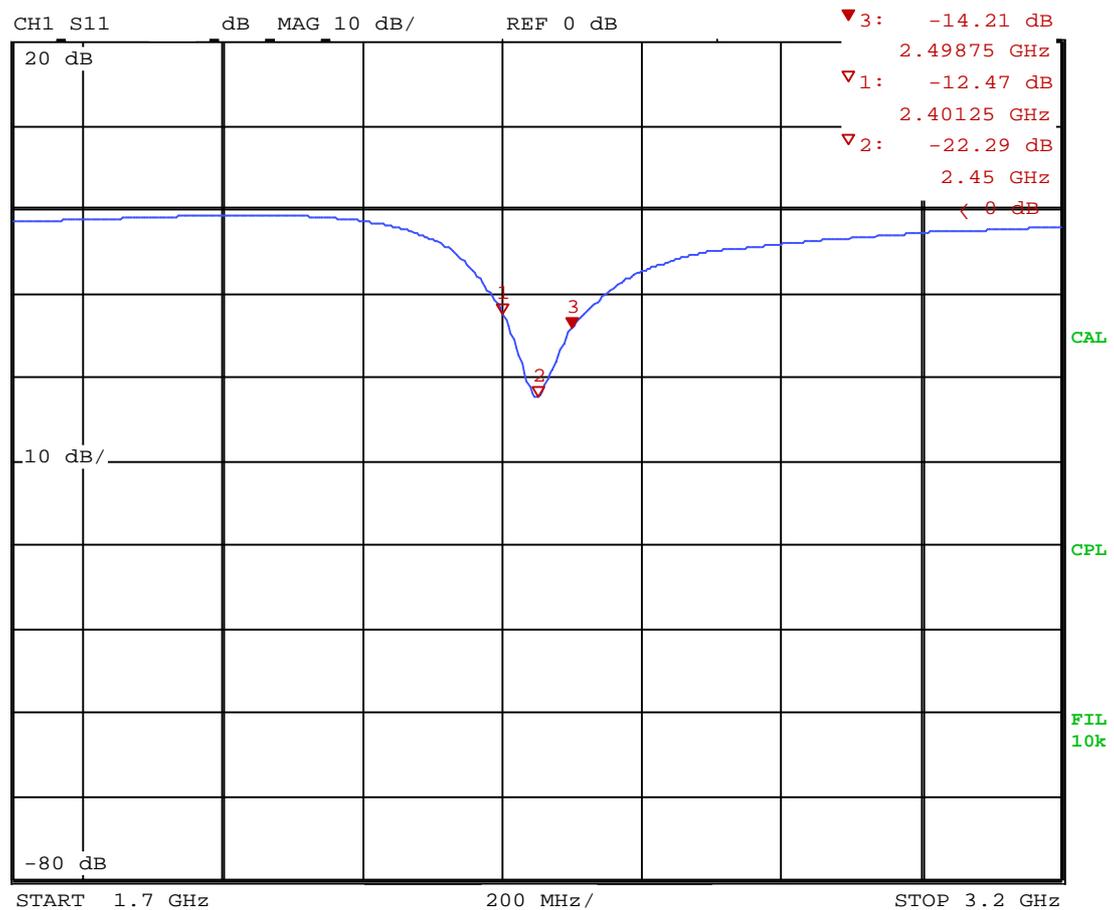
The Numeric gain G of antenna with a gain specified in dB is determined by:

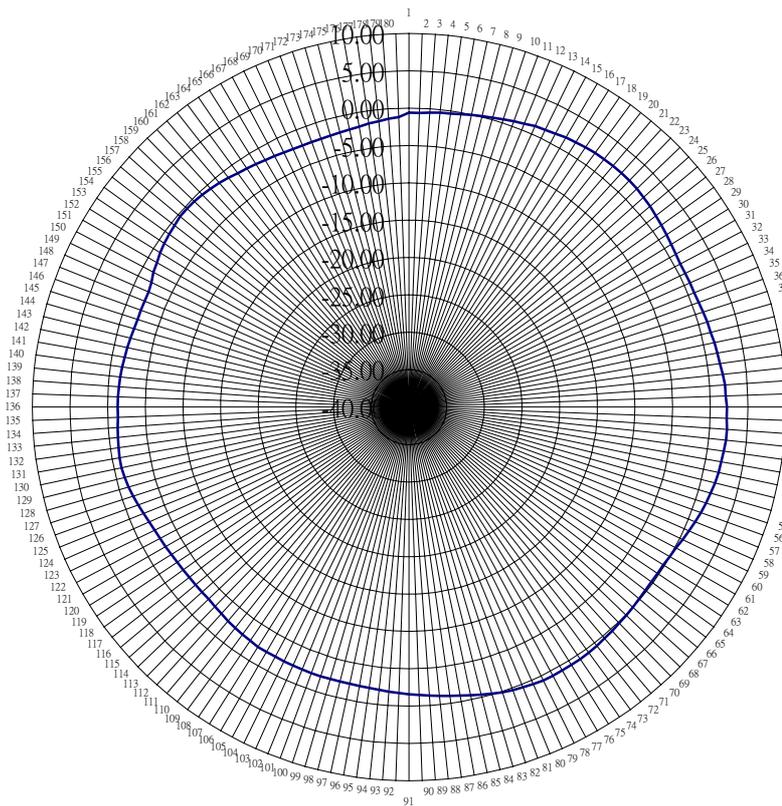
$$G = \text{Log}^{-1} (\text{dB antenna gain}/10)$$

$$G = \text{Log}^{-1} (2.29/10) = 1.694$$

PCMCIA Card dipole antenna :

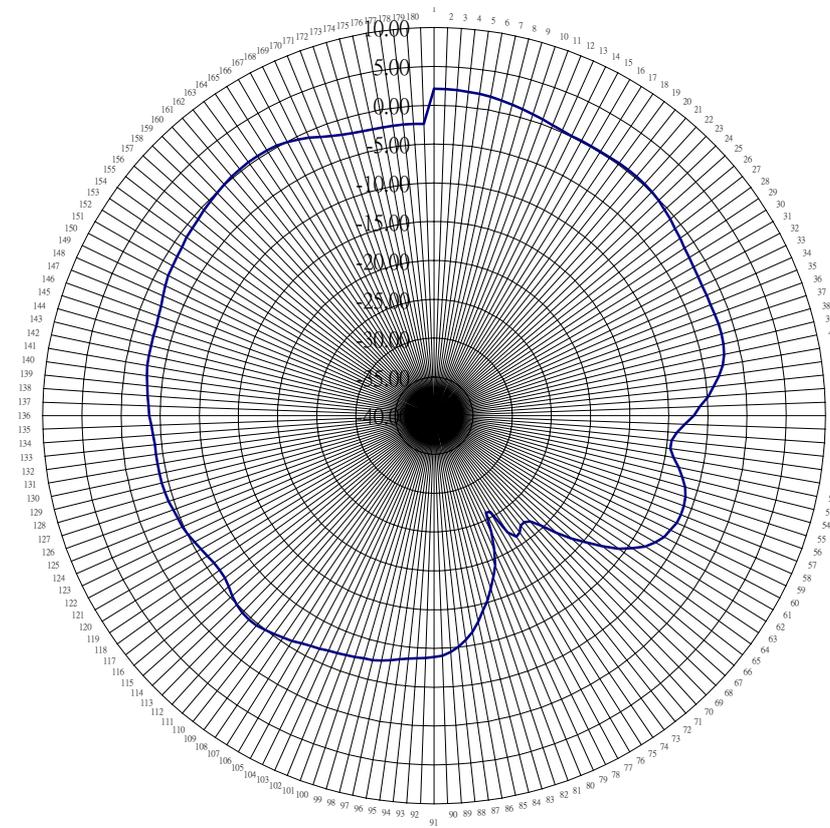
Frequency (MHz)	H-plane	E-plane	S11 return loss (dB)
	Max (dBi)	Max (dBi)	
2400	2.29	2.09	12.47
2450	1.29	0.91	22.29
2500	0.36	0.38	14.21





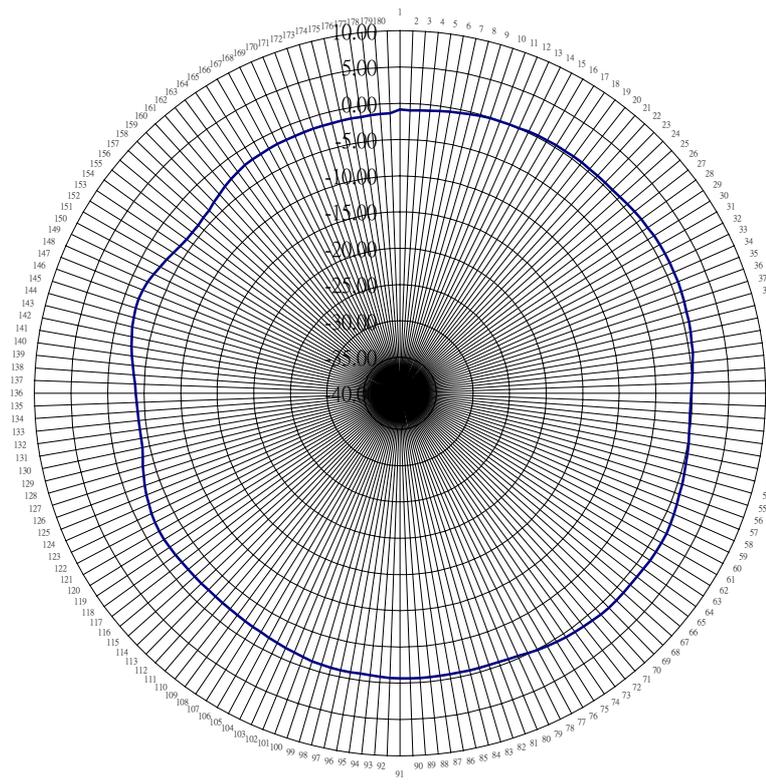
ANTENNA

TEST DATE:2001/10/24
 TEST FREQUENCY:2400MHz
 TEST POLARIZATION:VERTICAL
 (H-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:BUNNY
 MAX GAIN :2.29dBi
 MIN GAIN :-3.04dBi
 AVE GAIN :-0.51dBi



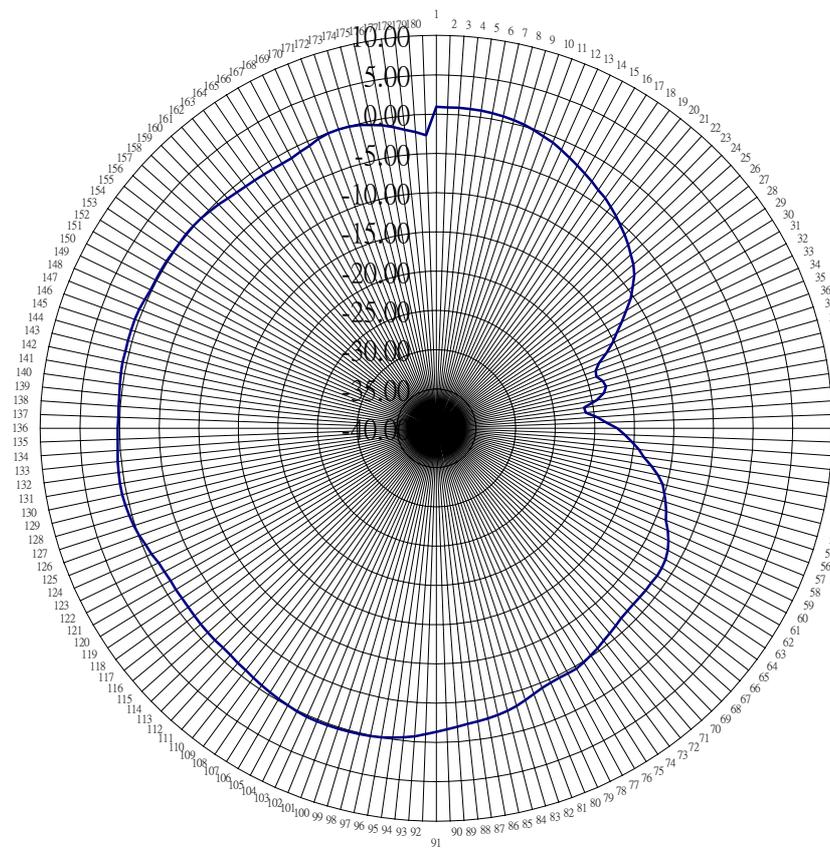
ANTENNA

TEST DATE:2001/10/24
 TEST FREQUENCY:2400MHz
 TEST POLARIZATION:HORIZONTAL
 (E-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:BUNNY
 MAX GAIN :2.09dBi
 MIN GAIN :-25.87dBi
 AVE GAIN :-5.36dBi



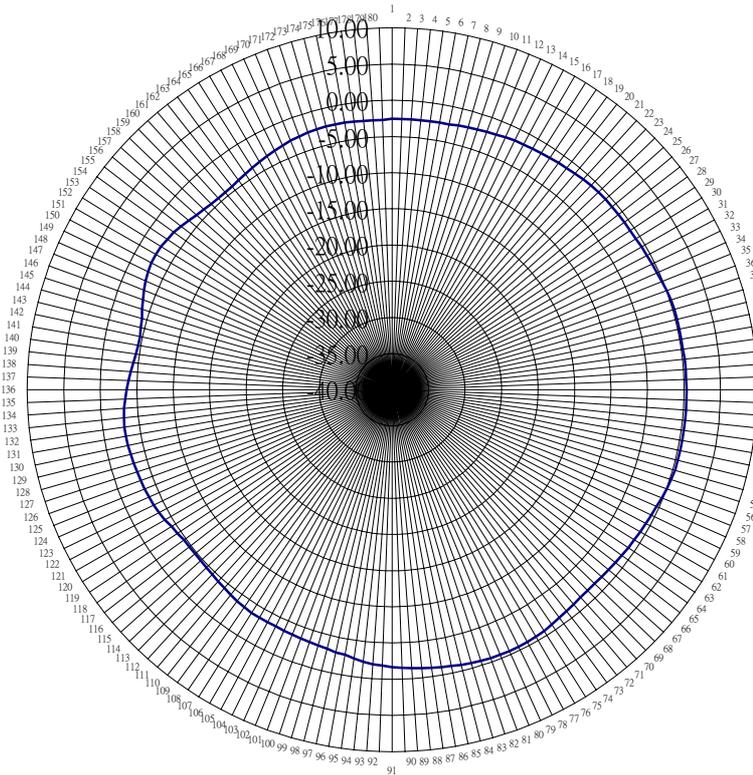
ANTENNA

TEST DATE:2001/10/24
 TEST FREQUENCY:2450MHz
 TEST POLARIZATION:VERTICAL
 (H-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:BUNNY
 MAX GAIN :1.29dBi
 MIN GAIN :-4.09dBi
 AVE GAIN :-1.03dBi



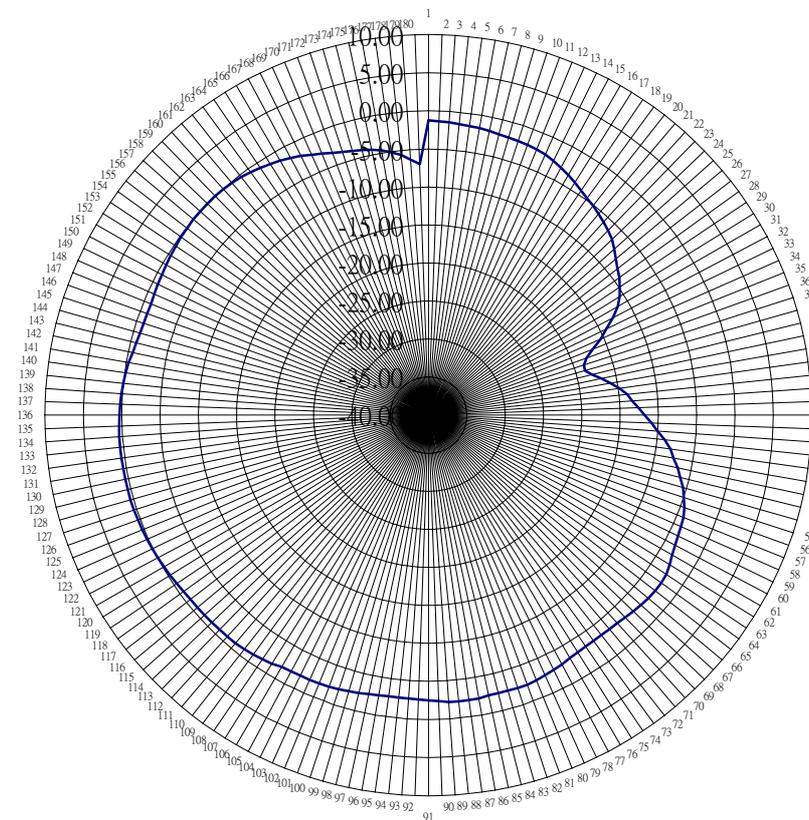
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TEST DATE:2001/10/24
 TEST FREQUENCY:2450MHz
 TEST POLARIZATION:HORIZONTAL
 (E-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:BUNNY
 MAX GAIN :0.91dBi
 MIN GAIN :-21.15dBi
 AVE GAIN:-3.94dBi



ANTENNA

TEST DATE:2001/10/24
 TEST FREQUENCY:2500MHZ
 TEST POLARIZATION:VERTICAL
 (H-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:BUNNY
 MAX GAIN :0.36dBi
 MIN GAIN : -4.75dBi
 AVE GAIN : -2.18dBi

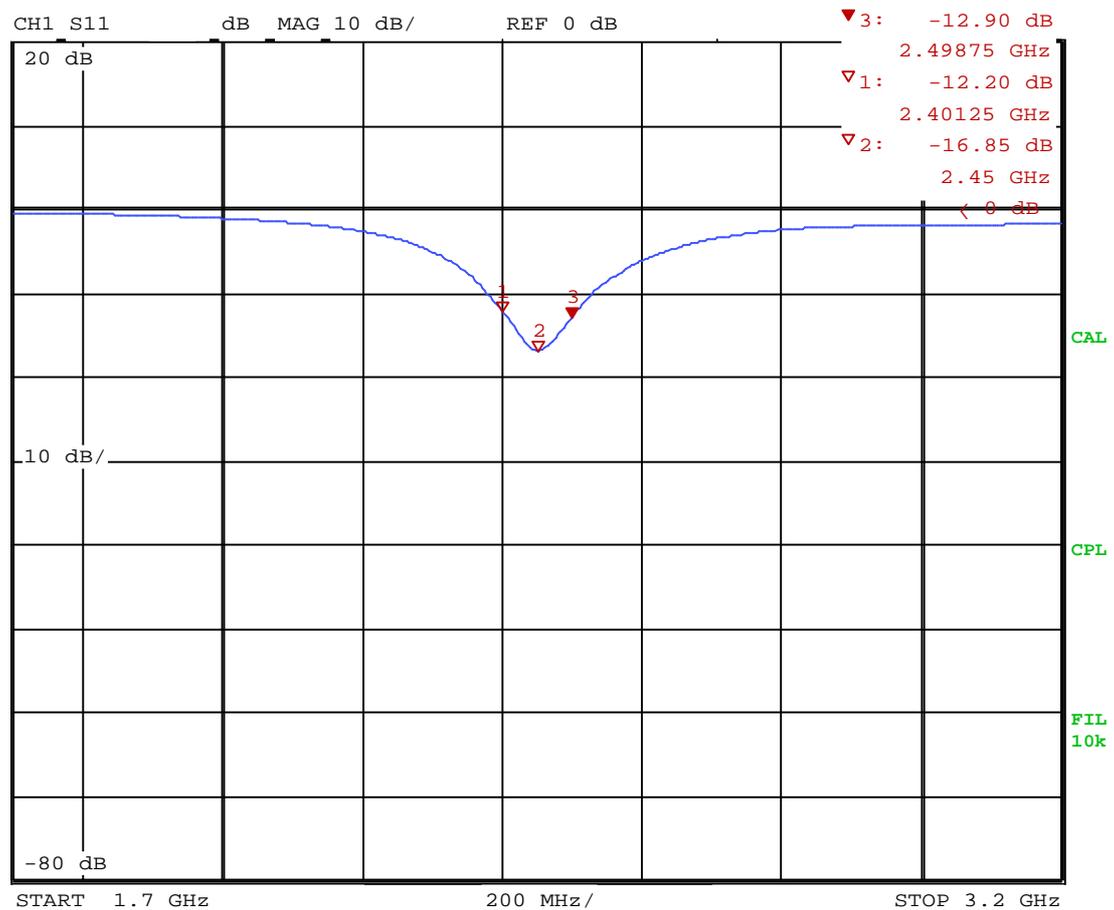


ANTENNA

TEST DATE:200110/24
 TEST FREQUENCY:2500MHZ
 TEST POLARIZATION:HORIZONTAL
 (E-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:BUNNY
 MAX GAIN :0.38dBi
 MIN GAIN : -18.74dBi
 AVE GAIN: -3.66dBi

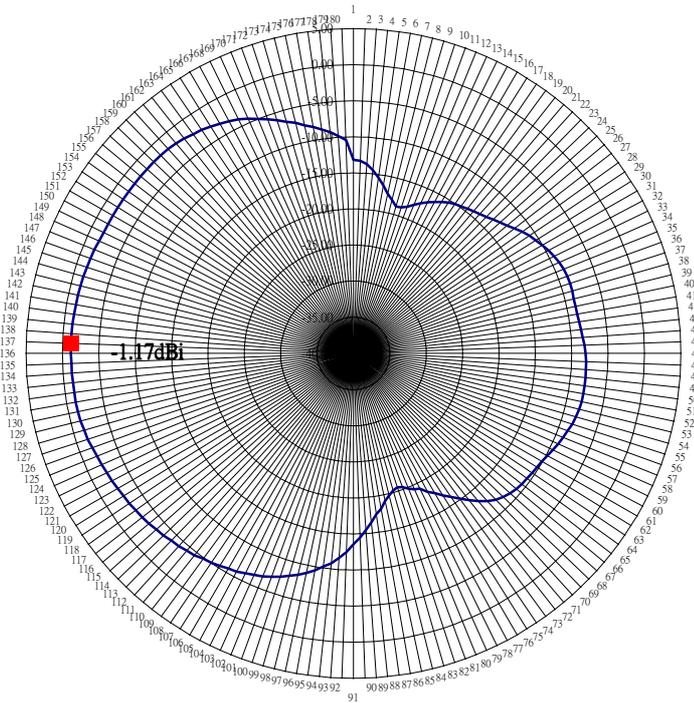
PCMCIA Card inverted-F antenna :

Frequency (MHz)	H-plane	E-plane	S11 return loss (dB)
	Max (dBi)	Max (dBi)	
2400	-1.17	0.22	12.20
2450	-0.61	0.68	16.85
2500	-1.63	-0.13	12.90



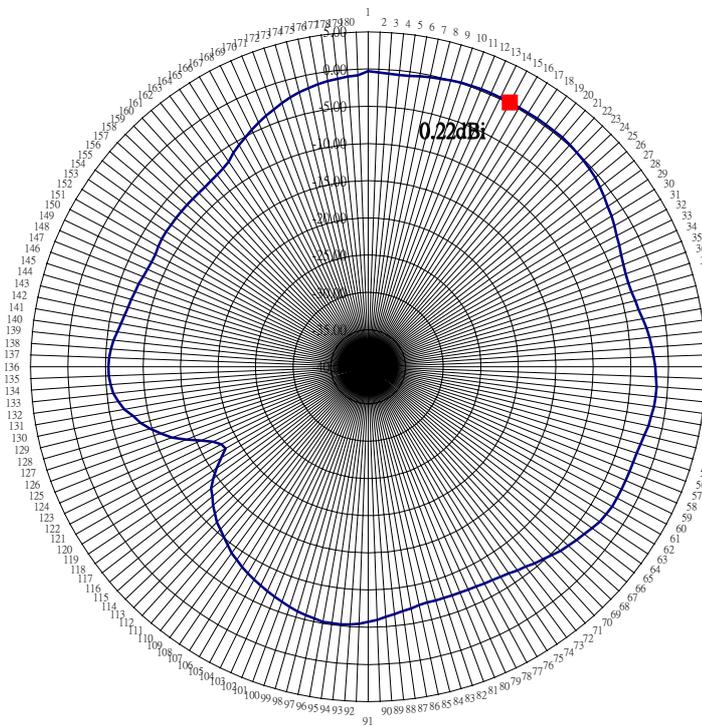
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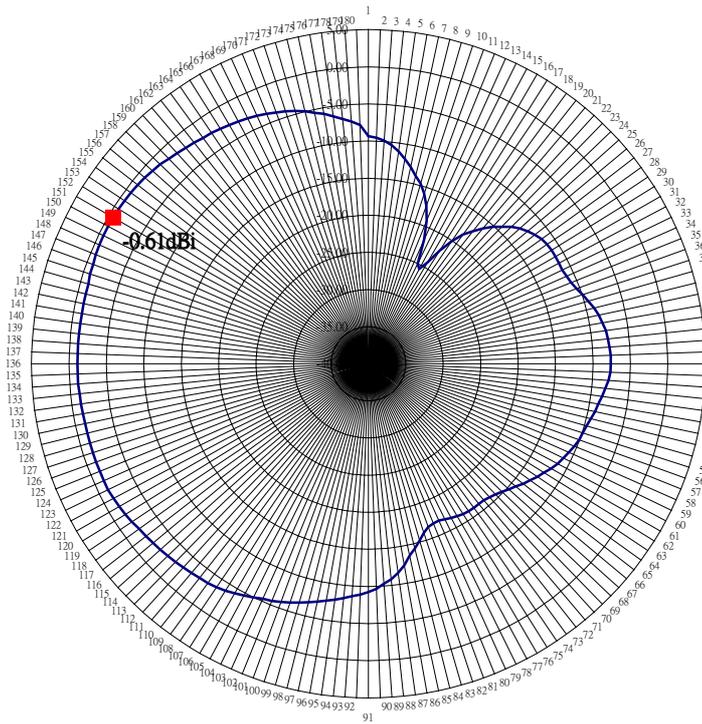


TEST DATE:2001/10/08
TEST FREQUENCY:2400MHZ
TEST POLARIZATION:VERTICAL
(H-PLANE)
TEST ANTENNA: HORN ANTENNA
TEST STEP DEGREE: 2 DEGREE
TEST CHAMBER: RF CHAMBER
TEST PERSONNEL:JAMES
MAX GAIN : -1.17dBi
MIN GAIN :-20.52dBi
AVE GAIN : -8.57dBi

ANTENNA

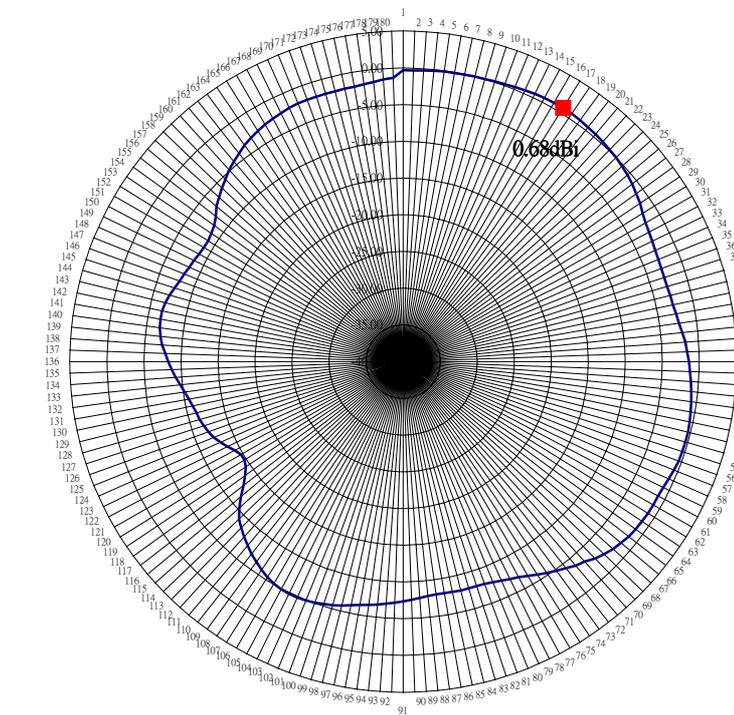


TEST DATE:2001/10/08
TEST FREQUENCY:2400MHZ
TEST POLARIZATION:HORIZONTAL
(E-PLANE)
TEST ANTENNA: HORN ANTENNA
TEST STEP DEGREE: 2 DEGREE
TEST CHAMBER: RF CHAMBER
TEST PERSONNEL:JAMES
MAX GAIN : 0.22dBi
MIN GAIN :-18.06dBi
AVE GAIN : -5.19dBi



ANTENNA

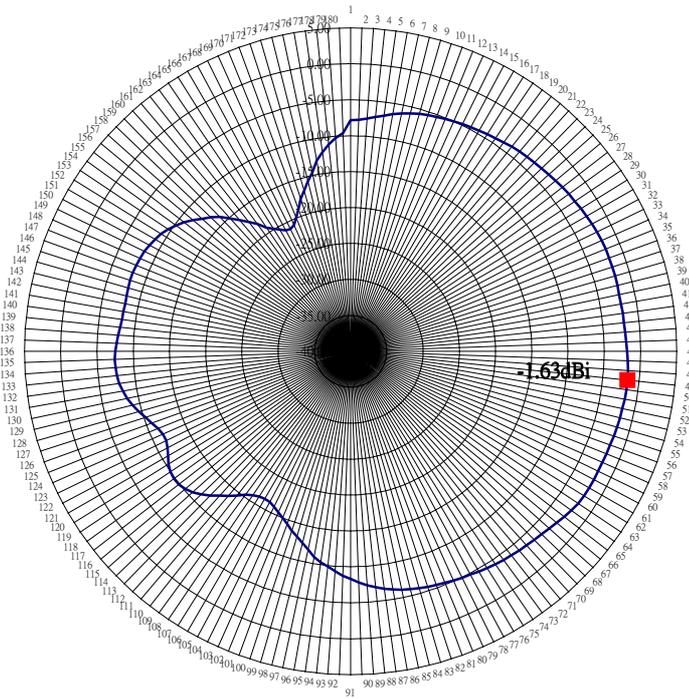
TEST DATE:2001/10/08
 TEST FREQUENCY:2450MHZ
 TEST POLARIZATION:VERTICAL
 (H-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:JAMES
 MAX GAIN : -0.61dBi
 MIN GAIN :-25.58dBi
 AVE GAIN : -8.09dBi



ANTENNA

TEST DATE:2001/10/08
 TEST FREQUENCY:2450MHZ
 TEST POLARIZATION:HORIZONTAL
 (E-PLANE)
 TEST ANTENNA: HORN ANTENNA
 TEST STEP DEGREE: 2 DEGREE
 TEST CHAMBER: RF CHAMBER
 TEST PERSONNEL:JAMES
 MAX GAIN : 0.68dBi
 MIN GAIN :-14.78dBi
 AVE GAIN : -4.70dBi

ANTENNA



TEST DATE:2001/10/08

TEST FREQUENCY:2500MHz

TEST POLARIZATION:VERTICAL
(H-PLANE)

TEST ANTENNA: HORN ANTENNA

TEST STEP DEGREE: 2 DEGREE

TEST CHAMBER: RF CHAMBER

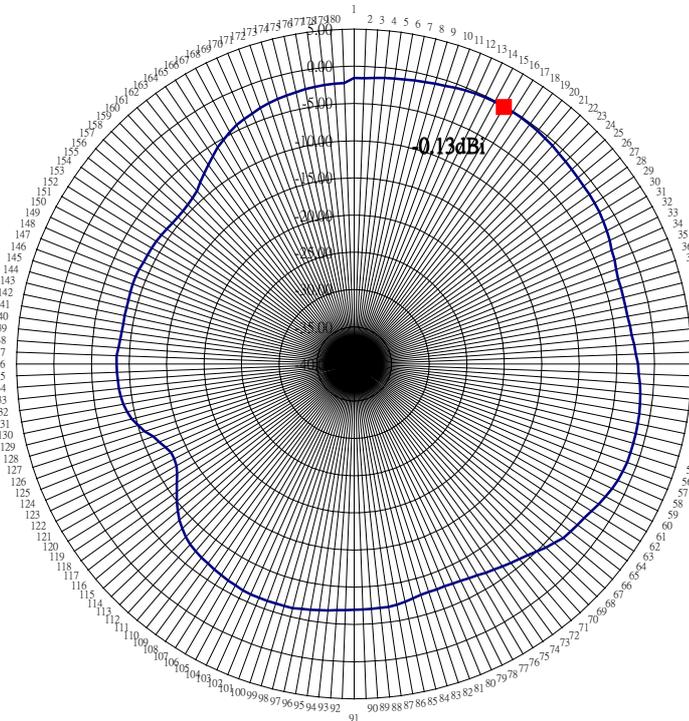
TEST PERSONNEL:JAMES

MAX GAIN : -1.63dBi

MIN GAIN :-21.08dBi

AVE GAIN : -7.96dBi

ANTENNA



TEST DATE:2001/10/08

TEST FREQUENCY:2500MHz

TEST POLARIZATION:HORIZONTAL
(E-PLANE)

TEST ANTENNA: HORN ANTENNA

TEST STEP DEGREE: 2 DEGREE

TEST CHAMBER: RF CHAMBER

TEST PERSONNEL:JAMES

MAX GAIN : -0.13dBi

MIN GAIN :-12.88dBi

AVE GAIN : -5.31dBi