

**Antenna Spec:**

Antenna size	56.6x24.96mm
Freq range	2.4GHz-2.48GHz
VSWR	2 Max
Gain	0dBi max
Impedance	50ohm
Antenna type	Printed antenna
Polarization	Linear
Max Power	200mW
Operating temp	-20 to +55 deg celcius
Interconnection and cable assembly	MMCX to Hirose UFL connector with 1.13 RF cable
Manufacturer:	Cardo
PN:	509 Edge UCS antenna
Testing LAB	Hermon labs - <a href="https://hermonlabs.com/">https://hermonlabs.com/</a>

**Manufacturer and address:**

Cardo Systems Ltd  
 101 E Park Blvd Suite 600, Plano. TX75074  
 United States

**Antenna testing laboratory:**

Hermon Laboratories Ltd.  
 66 Hatachana St., POB 23

Binyamina 3055001, Israel

Tester:

Stanislav Sugatov Test Engineer EMC & Radio

stanislav.s@hermonlabs.com



Phone: +972 4 628 8001

Antenna Horn:	HL2432
Manufacturer:	EMC Test Systems
Model:	3115
Date of Calibration:	12-July-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

EXA Signal Analyzer:	HL5376
Manufacturer:	Keysight Technologies
Model:	N9010B
Date of Calibration:	8-Jan-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

Cable:	HL5668
Manufacturer:	Huber-Suhner
Model:	SF126EA
Date of Calibration:	22-Jun-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

Antenna Horn:	HL5673
Manufacturer:	Huber-Suhner
Model:	SF126EA
Date of Calibration:	19-May-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

	Name and Title	Date	Signature
<b>Tested by:</b>	Mr. S. Sugatov, test engineer, EMC & Radio	19-Jun-24	
<b>Reviewed by:</b>	Mrs. S. Peysahov Sheynin, certification specialist, EMC & Radio	18-Jul-24	

**2480 MHz vertical poz. X:**

Frequency:	2480	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dBi
0	100.26	3.52	0.00
20	96.42	-0.32	-3.84
40	99.15	2.41	-1.11
60	98.29	1.55	-1.97
80	81.65	-15.09	-18.61
100	99.65	2.91	-0.61
120	99.35	2.61	-0.91
140	99.87	3.13	-0.39
160	97.38	0.64	-2.88
180	94.78	-1.96	-5.48
200	99.14	2.4	-1.12
220	100.15	3.41	-0.11
240	96.81	0.07	-3.45
260	94.15	-2.59	-6.11
280	92.81	-3.93	-7.45
300	99.22	2.48	-1.04
320	98.22	1.48	-2.04
340	100.25	3.51	-0.01
360	100.24	3.5	-0.02
			-3.01

Spectrum Analyzer Data		
Span	10	MHz
RBW	1000	kHz
VBW	3000	kHz
Ref Level	120	dBuV/m
SG	0	dBm
F, MHz	2480	MHz
SA reading	103.87	dBuV/m

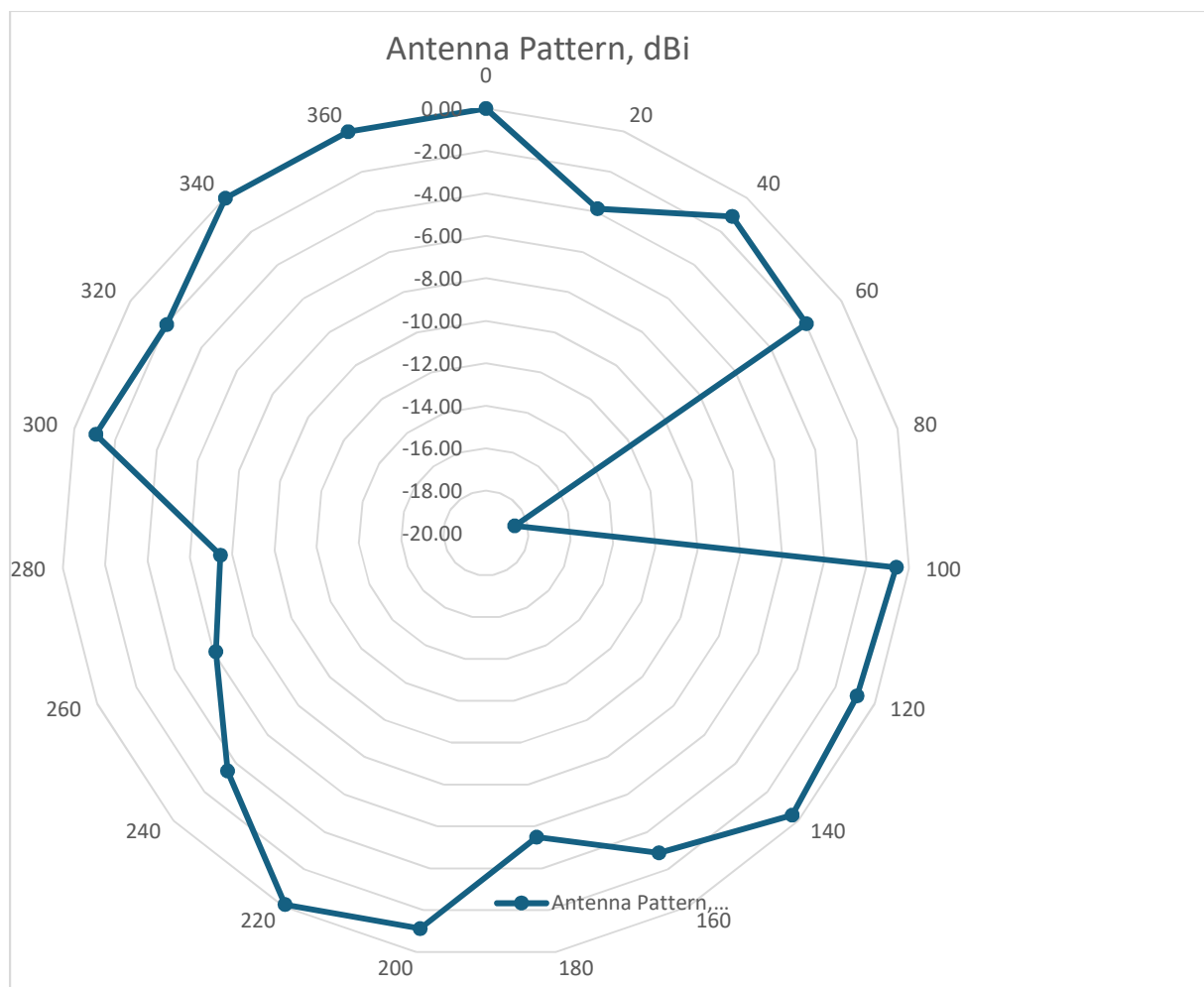
sweep time	20 ms
Substitution	

AG, dBi	10.3	dBi
Cable Loss	3.17	dB
Antenna polarization Vertical		
Antenna Horn HL4474		

-96.74

Gain measurement calculation:

=- (Reference SA reading)+(SA reading of Antenna Power)+(Reference Signal Generator RF Power)+(Reference Antenna gain)-(Reference Antenna cable loss)



**2480 MHz horizontal poz. X**

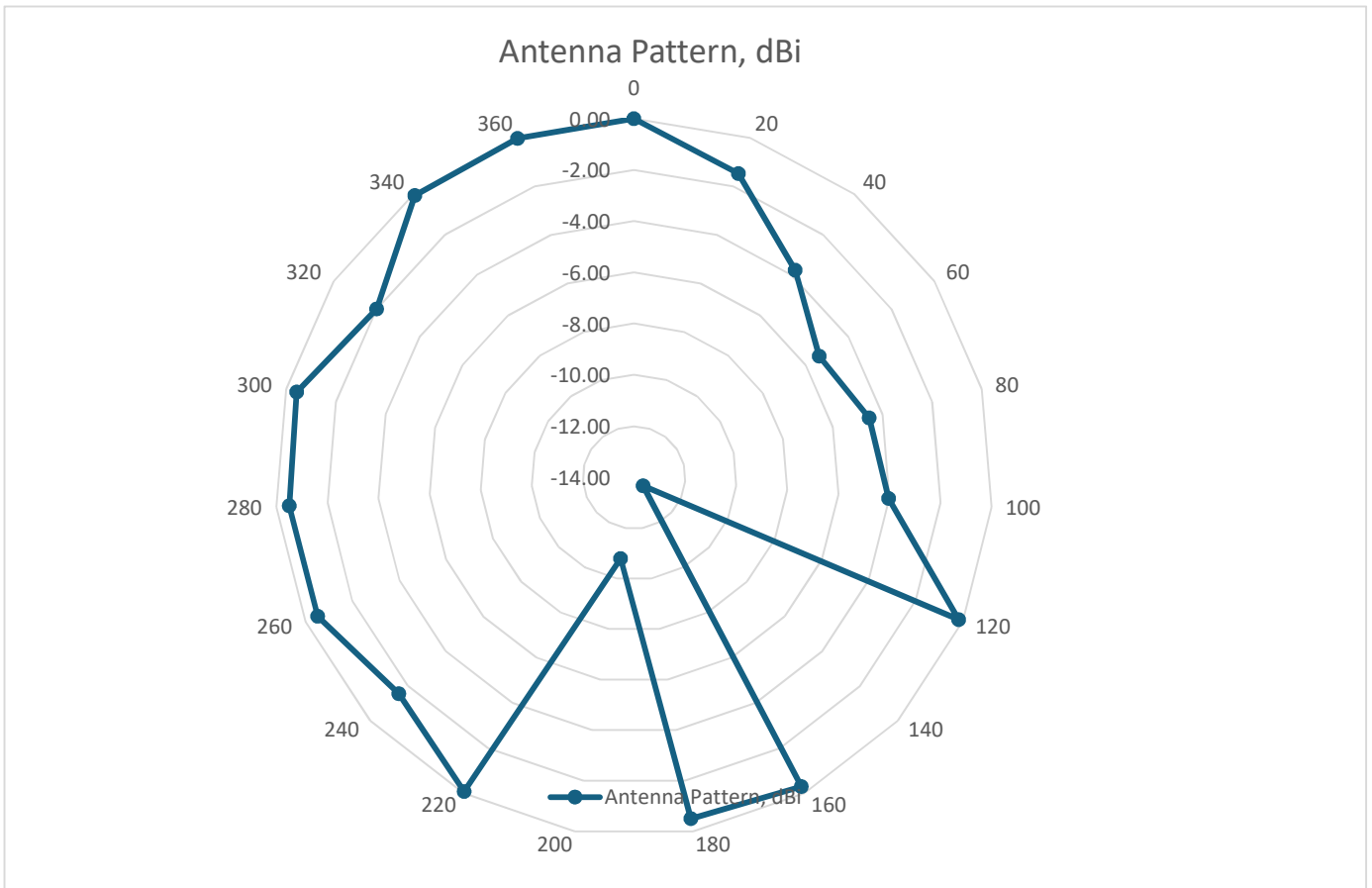
Frequency:	2480	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dBi
0	89.62	-7.12	0.00
20	88.15	-8.59	-1.47
40	85.86	-10.88	-3.76
60	84.26	-12.48	-5.36
80	85.09	-11.65	-4.53
100	85.59	-11.15	-4.03
120	89.45	-7.29	-0.17
140	76.1	-20.64	-13.52
160	89.34	-7.4	-0.28
180	89.12	-7.62	-0.50
200	78.83	-17.91	-10.79
220	89.55	-7.19	-0.07
240	88.09	-8.65	-1.53
260	89.1	-7.64	-0.52
280	89.12	-7.62	-0.50
300	89.2	-7.54	-0.42
320	87.62	-9.12	-2.00
340	89.55	-7.19	-0.07
360	89.6	-7.14	-0.02
			-2.61

Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2480	MHz	
SA reading	103.87	dBuV/m	

AG, dBi	10.3	dBi
Cable Loss	3.17	dB
Antenna polarization Vertical		
Antenna Horn HL 4474		

Gain measurement calculation:

$=-(\text{Reference SA reading})+(\text{SA reading of Antenna Power})+(\text{Reference Signal Generator RF Power})+(\text{Reference Antenna gain})-(\text{Reference Antenna cable loss})$



**2440 MHz horizontal poz.X**

Frequency:	2440	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dBi
0	93.06	-3.36	0.00
20	91.76	-4.66	-1.30
40	89.58	-6.84	-3.48
60	86.75	-9.67	-6.31
80	91.16	-5.26	-1.90
100	83.21	-13.21	-9.85
120	93.01	-3.41	-0.05
140	84.13	-12.29	-8.93
160	92.98	-3.44	-0.08
180	92.98	-3.44	-0.08
200	88.02	-8.4	-5.04
220	93.01	-3.41	-0.05
240	93.04	-3.38	-0.02
260	92.99	-3.43	-0.07
280	92.98	-3.44	-0.08
300	89.53	-6.89	-3.53
320	93.02	-3.4	-0.04
340	92.91	-3.51	-0.15
360	92.46	-3.96	-0.60
			-2.19

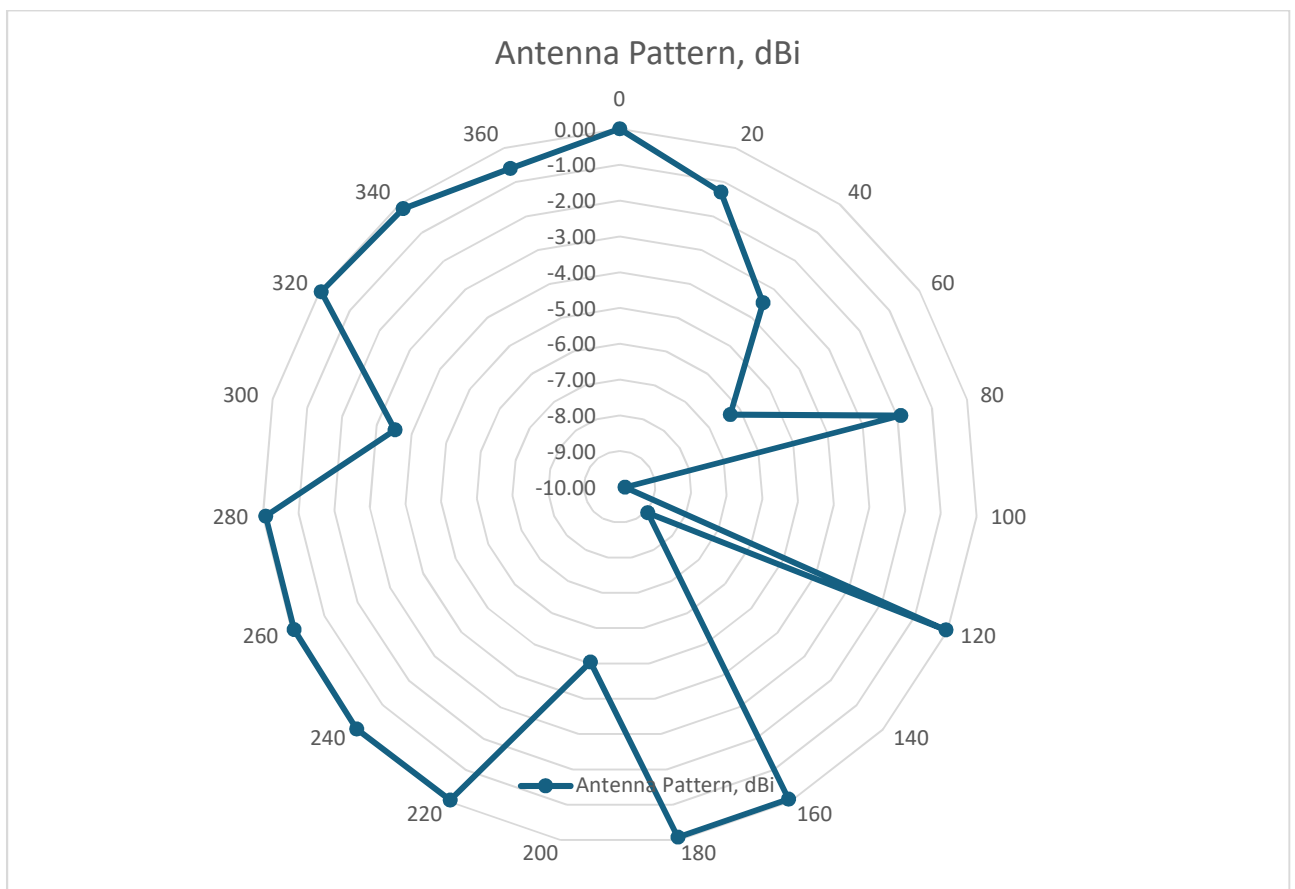
Spectrum Analyzer Data			sweep time	20 ms
Span	10	MHz		
RBW	1000	kHz		
VBW	3000	kHz		
Ref Level	120	dBuV/m		
SG	0	dBm		
F, MHz	2440	MHz		
SA reading	103.5	dBuV/m		
AG, dBi	10.2	dBi		
Cable Loss	3.12	dB		

Antenna polarization Vertical

Antenna Horn HL 4474

Gain measurement calculation:

$$= -(Reference\ SA\ reading) + (SA\ reading\ of\ Antenna\ Power) + (Reference\ Signal\ Generator\ RF\ Power) + (Ref\ Antenna\ gain) - (Reference\ Antenna\ cable\ loss)$$





**2440 MHz vertical poz.X**

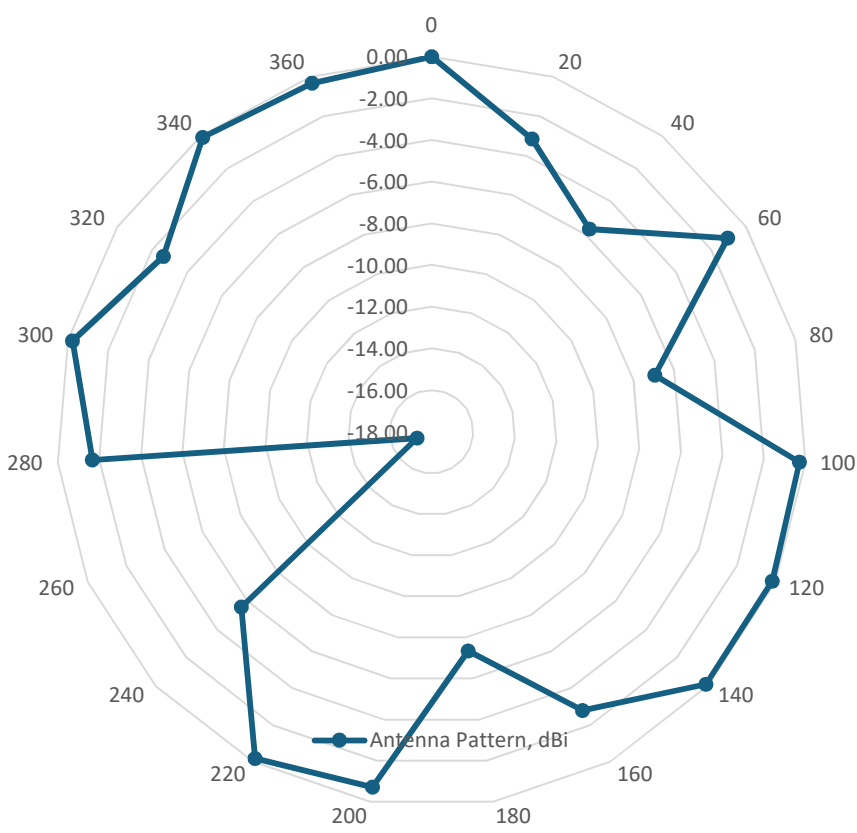
Frequency:	2440	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dBi
0	100.33	3.91	0.00
20	97.18	0.76	-3.15
40	94.66	-1.76	-5.67
60	99.31	2.89	-1.02
80	93.38	-3.04	-6.95
100	100.04	3.62	-0.29
120	100.18	3.76	-0.15
140	100.23	3.81	-0.10
160	97.54	1.12	-2.79
180	92.99	-3.43	-7.34
200	99.62	3.2	-0.71
220	100.15	3.73	-0.18
240	94.75	-1.67	-5.58
260	83.09	-13.33	-17.24
280	98.67	2.25	-1.66
300	100.11	3.69	-0.22
320	97.71	1.29	-2.62
340	100.23	3.81	-0.10
360	100.02	3.6	-0.31
			-2.95

Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2440	MHz	
SA reading	103.5	dBuV/m	
AG, dBi	10.2	dBi	
Cable Loss	3.12	dB	
Antenna polarization Vertical			
Antenna Horn HL 4474			

Gain measurement calculation:

=-(Reference SA reading)+(SA reading of Antenna Power)+(Reference Signal Generator RF Power)+(Reference Antenna gain)-(Reference Antenna cable loss)

Antenna Pattern, dBi



**2402 MHz horizontal poz.X**

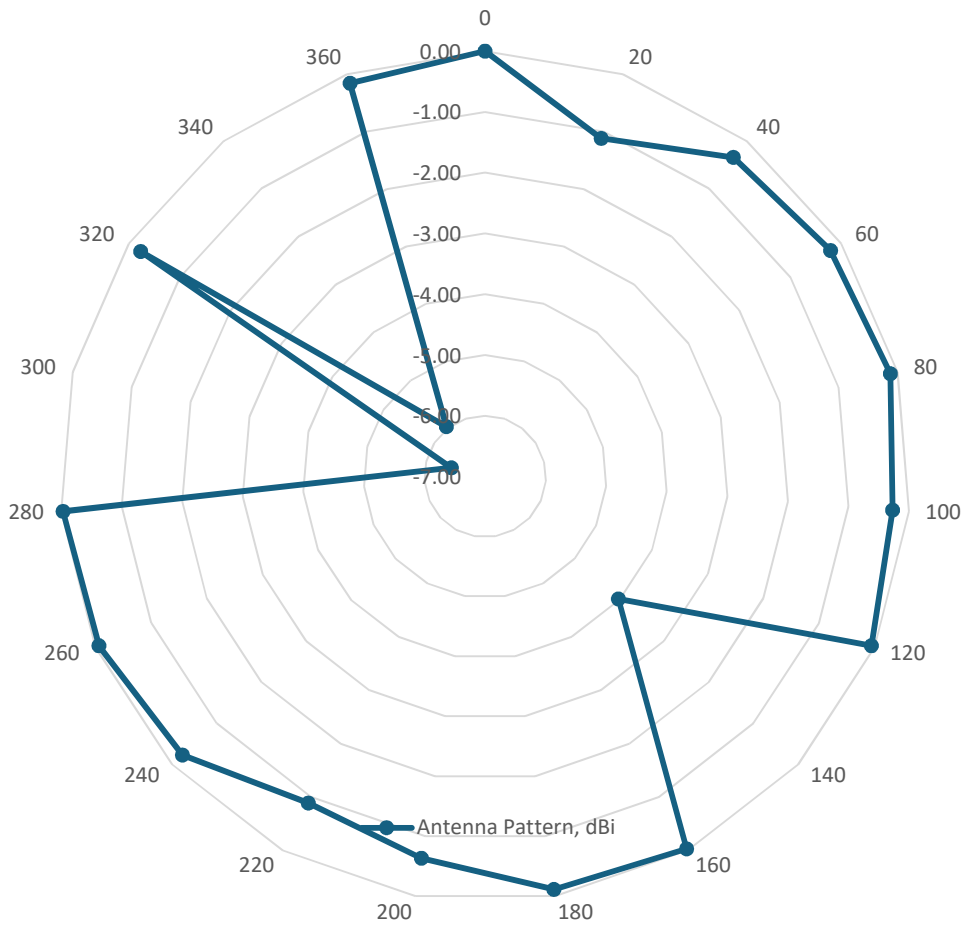
Frequency:	2402	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dBi
0	92.35	-4.04	0.00
20	91.23	-5.16	-1.12
40	92	-4.39	-0.35
60	92.14	-4.25	-0.21
80	92.23	-4.16	-0.12
100	92.08	-4.31	-0.27
120	92.29	-4.1	-0.06
140	88.33	-8.06	-4.02
160	92.32	-4.07	-0.03
180	92.24	-4.15	-0.11
200	91.72	-4.67	-0.63
220	91.46	-4.93	-0.89
240	92.12	-4.27	-0.23
260	92.29	-4.1	-0.06
280	92.32	-4.07	-0.03
300	85.92	-10.47	-6.43
320	92.12	-4.27	-0.23
340	86.39	-10	-5.96
360	92.19	-4.2	-0.16
			-1.10

Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2405	MHz	
SA reading	103.2	dBuV/m	
AG, dBi	9.9	dBi	
Cable Loss	3.09	dB	
Antenna polarization Vertical			
Antenna Horn HL 4474			

Gain measurement calculation:

$$=-(\text{Refernce SA reading})+(\text{SA reading of Antenna Power})+(\text{Refernce Signal Generator RF Power})+(\text{Ref Antenna gain})-(\text{Refernce Antenna cable loss})$$

Antenna Pattern, dBi



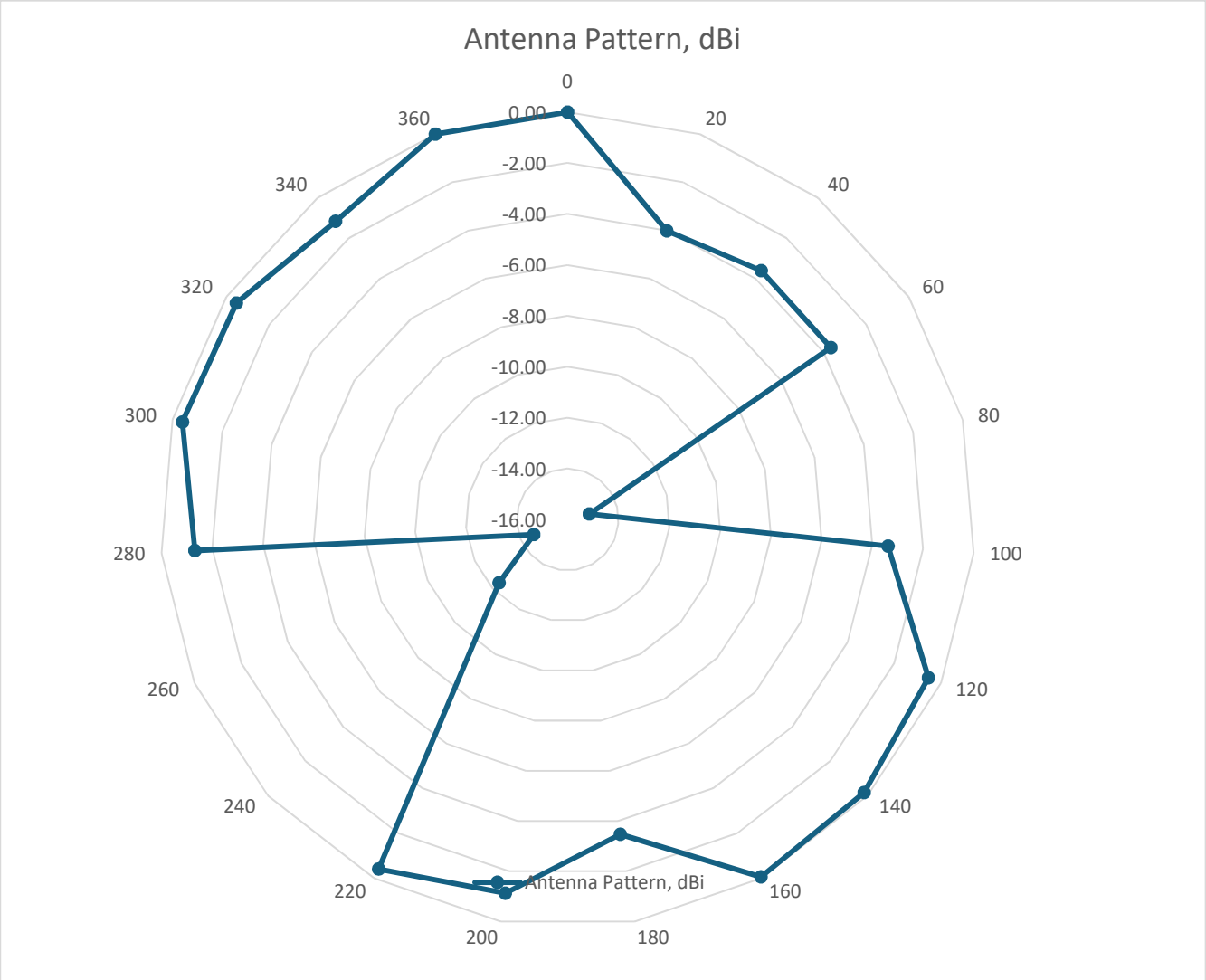
**2402 MHz vertical poz.X**

Frequency:	2402	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dBi
0	101.63	5.24	0.00
20	97.62	1.23	-4.01
40	98.01	1.62	-3.62
60	97.98	1.59	-3.65
80	86.51	-9.88	-15.12
100	98.26	1.87	-3.37
120	101.1	4.71	-0.53
140	101.45	5.06	-0.18
160	101.58	5.19	-0.05
180	98.16	1.77	-3.47
200	100.5	4.11	-1.13
220	101.23	4.84	-0.40
240	89.29	-7.1	-12.34
260	87.09	-9.3	-14.54
280	100.32	3.93	-1.31
300	101.24	4.85	-0.39
320	101.18	4.79	-0.45
340	100.47	4.08	-1.16
360	101.63	5.24	0.00
			-3.46

Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2405	MHz	
SA reading	103.2	dBuV/m	
AG, dBi	9.9	dBi	
Cable Loss	3.09	dB	
Antenna polarization Vertical			
Antenna Horn HL 4474			

Gain measurement calculation:

$$=-(\text{Reference SA reading})+(\text{SA reading of Antenna Power})+(\text{Reference Signal Generator RF Power})+(\text{Ref Antenna gain})-(\text{Reference Antenna cable loss})$$



## Antenna spec

Antenna size	56x5.8mm
Freq range	2.4GHz-2.48GHz
VSWR	2 Max
Gain	2.21dBi max
Impedance	50ohm
Antenna type	SMT chip antenna
Polarization	Linear
Max Power	200mW
Operating temp	-20 to +55 deg celcius
Interconnection and cable assembly	Part of the PCB so no RF cable or Coax connection.
Manufacturer:	Amotech
PN:	AMAN301512ST01
Testing LAB	Hermon labs - <a href="https://hermonlabs.com/">https://hermonlabs.com/</a>

Manufacturer and address	<p style="text-align: center;"><b>AMOTECH Co., Ltd.</b></p> <p style="text-align: center;">5BL-1Lot, 617, Namchon-Dong, Namdong-Gu, Incheon, Korea</p> <p style="text-align: center;"><b><u>Dielectric Chip Antenna</u></b></p> <p style="text-align: center;">P/N : AMAN301512ST01</p>
Antenna testing laboratory	<p style="text-align: center;"><b>Hermon Laboratories Ltd.</b></p> <p>66 Hatachana St., POB 23 <b>Binyamina</b> 3055001, Israel</p> <p><b>Tester:</b> Stanislav Sugatov Test Engineer EMC &amp; Radio <a href="mailto:stanislav.s@hermonlabs.com">stanislav.s@hermonlabs.com</a> Phone: +972 4 628 8001</p>





Antenna Horn:	HL2432
Manufacturer:	EMC Test Systems
Model:	3115
Date of Calibration:	12-July-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

EXA Signal Analyzer:	HL5376
Manufacturer:	Keysight Technologies
Model:	N9010B
Date of Calibration:	8-Jan-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

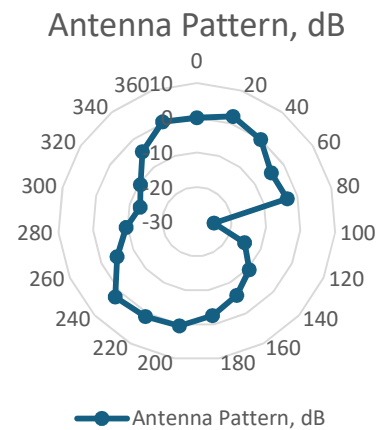
Cable:	HL5668
Manufacturer:	Huber-Suhner
Model:	SF126EA
Date of Calibration:	22-Jun-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

Antenna Horn:	HL5673
Manufacturer:	Huber-Suhner
Model:	SF126EA
Date of Calibration:	19-May-24
Calibration Service Provided:	Hermon Laboratories
Calibration Period:	1 year

	Name and Title	Date	Signature
<b>Tested by:</b>	Mr. S. Sugatov, test engineer, EMC & Radio	19-Jun-24	
<b>Reviewed by:</b>	Mrs. S. Peysahov Sheynin, certification specialist, EMC & Radio	18-Jul-24	

**2480 MHz vertical poz**

V pozition of EUT			
Frequency:	2480	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dB
0	70	-26.74	0.00
20	72.12	-24.62	2.12
40	70	-26.74	0.00
60	65.7	-31.04	-4.30
80	66.87	-29.87	-3.13
100	45	-51.74	-25.00
120	55	-41.74	-15.00
140	60.55	-36.19	-9.45
160	64.15	-32.59	-5.85
180	67.5	-29.24	-2.50
200	70.45	-26.29	0.45
220	71.12	-25.62	1.12
240	72.05	-24.69	2.05
260	65.15	-31.59	-4.85
280	60.43	-36.31	-9.57
300	56.89	-39.85	-13.11
320	59.45	-37.29	-10.55
340	65.55	-31.19	-4.45
360	70.5	-26.24	0.50



Spectrum Analyzer Data			Substitution	
Span	10	MHz		sweep time 20 ms
RBW	1000	kHz		
VBW	3000	kHz		
Ref Level	120	dBuV/m		
SG	0	dBm		
F, MHz	2480	MHz		
SA reading	103.87	dBuV/m		
AG, dBi	10.3	dB		
Cable Loss	3.17	dB		
Antenna polarization Vertical				
Antenna Horn HL 4474				

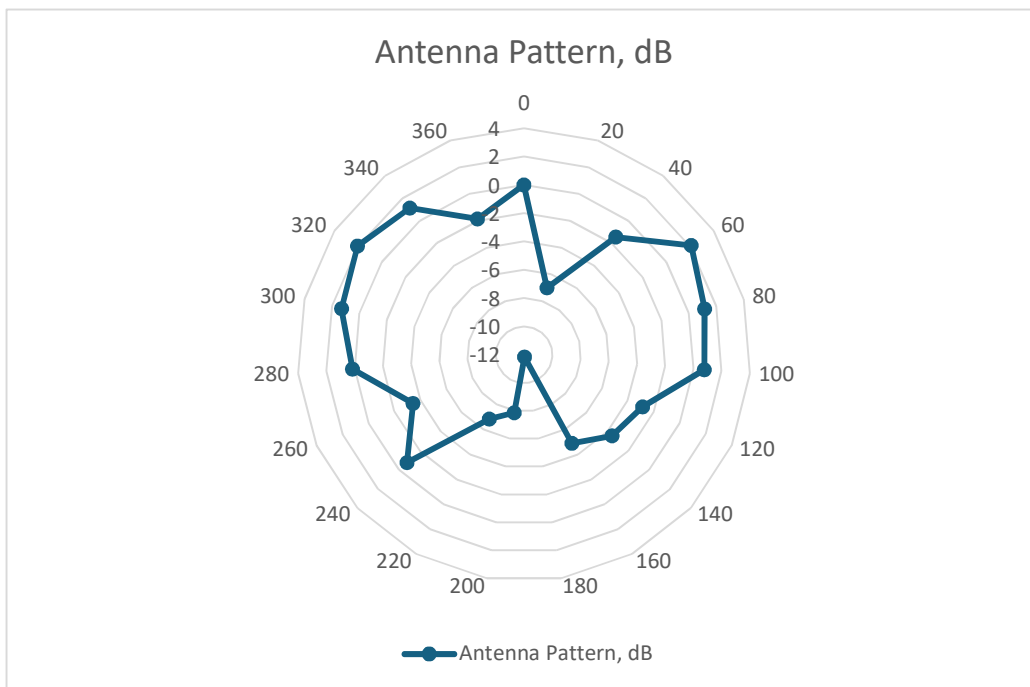
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Gain measurement calculation:

$$(Refernce\ SA\ reading) + (SA\ reading\ of\ Antenna\ Power) + (Refernce\ Signal\ Generator\ RF\ Power) + (Ref\ Antenna\ gain) - (Refernce\ Antenna\ cable\ loss)$$

**2480 MHz Horizontal poz**

H position of EUT			
Frequency:	2480	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dB
0	67	-29.74	0.00
20	60	-36.74	-7.00
40	65.55	-31.19	-1.45
60	69.1	-27.64	2.10
80	68.15	-28.59	1.15
100	67.78	-28.96	0.78
120	64.15	-32.59	-2.85
140	63.45	-33.29	-3.55
160	62.12	-34.62	-4.88
180	55.15	-41.59	-11.85
200	59.15	-37.59	-7.85
220	60.15	-36.59	-6.85
240	66.23	-30.51	-0.77
260	63.56	-33.18	-3.44
280	67.15	-29.59	0.15
300	68.3	-28.44	1.30
320	69.05	-27.69	2.05
340	68.12	-28.62	1.12
360	65.15	-31.59	-1.85



Span	10	MHz	sweep time 20 ms	
RBW	1000	kHz		
VBW	3000	kHz		
Ref Level	120	dBuV/m		
SG	0	dBm		
F, MHz	2480	MHz		
SA reading	103.87	dBuV/m		Substitution
AG, dBi	10.3	dBi		
Cable Loss	3.17	dB		
Antenna polarization Vertical  Antenna Horn HL 4474				

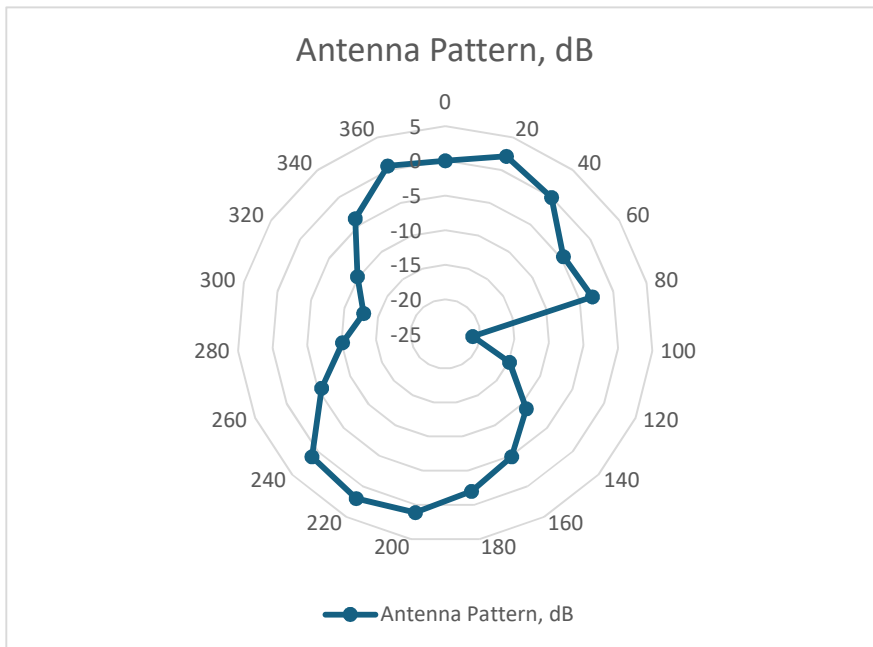
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Gain measurement calculation:

$$= -(\text{Reference SA reading}) + (\text{SA reading of Antenna Power}) + (\text{Reference Signal Generator RF Power}) + (\text{Ref Antenna gain}) - (\text{Reference Antenna cable loss})$$

**2440 MHz vertical poz.Y**

V position of EUT			
Frequency:	2440	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dB
0	70	-26.42	0.00
20	72.12	-24.3	2.12
40	70	-26.42	0.00
60	65.4	-31.02	-4.60
80	66.89	-29.53	-3.11
100	49	-47.42	-21.00
120	55.15	-41.27	-14.85
140	60.89	-35.53	-9.11
160	65.15	-31.27	-4.85
180	68	-28.42	-2.00
200	71.12	-25.3	1.12
220	72	-24.42	2.00
240	71.15	-25.27	1.15
260	64.48	-31.94	-5.52
280	59.89	-36.53	-10.11
300	57.12	-39.3	-12.88
320	60.13	-36.29	-9.87
340	66.11	-30.31	-3.89
360	70.65	-25.77	0.65



Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2440	MHz	
SA reading	103.5	dBuV/m	
AG, dBi	10.2	dBi	
Cable Loss	3.12	dB	
Antenna polarization Vertical  Antenna Horn HL 4474			

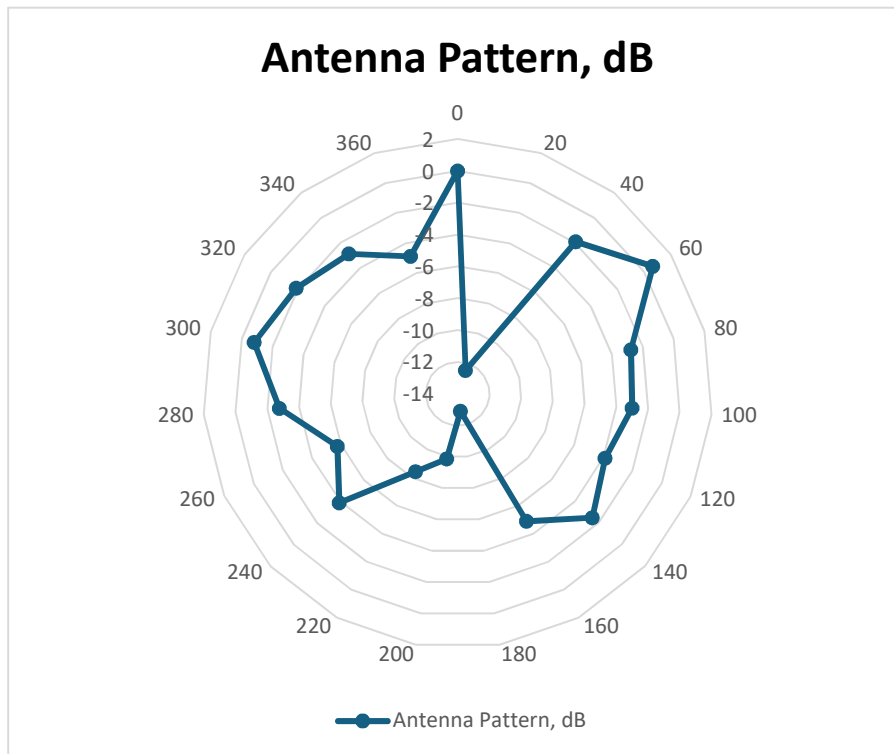
-96.42

Gain measurement calculation:

=-(Reference SA reading)+(SA reading of Antenna Power)+(Reference Signal Generator RF Power)+(Ref Antenna gain)-  
 (Reference Antenna cable loss)

**2440 MHz horizontal poz.Y**

H position of EUT			
Frequency:	2440	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dB
0	67	-29.42	0.00
20	54.55	-41.87	-12.45
40	65.1	-31.32	-1.90
60	67.65	-28.77	0.65
80	64.23	-32.19	-2.77
100	64	-32.42	-3.00
120	63.12	-33.3	-3.88
140	64.5	-31.92	-2.50
160	62.12	-34.3	-4.88
180	54.12	-42.3	-12.88
200	57.15	-39.27	-9.85
220	58.56	-37.86	-8.44
240	63.12	-33.3	-3.88
260	61.25	-35.17	-5.75
280	64.23	-32.19	-2.77
300	66.18	-30.24	-0.82
320	65.12	-31.3	-1.88
340	64.13	-32.29	-2.87
360	62.12	-34.3	-4.88



Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2440	MHz	
SA reading	103.5	dBuV/m	
AG, dBi	10.2	dBi	
Cable Loss	3.12	dB	
Antenna polarization Vertical			
Antenna Horn HL 4474			

-96.42

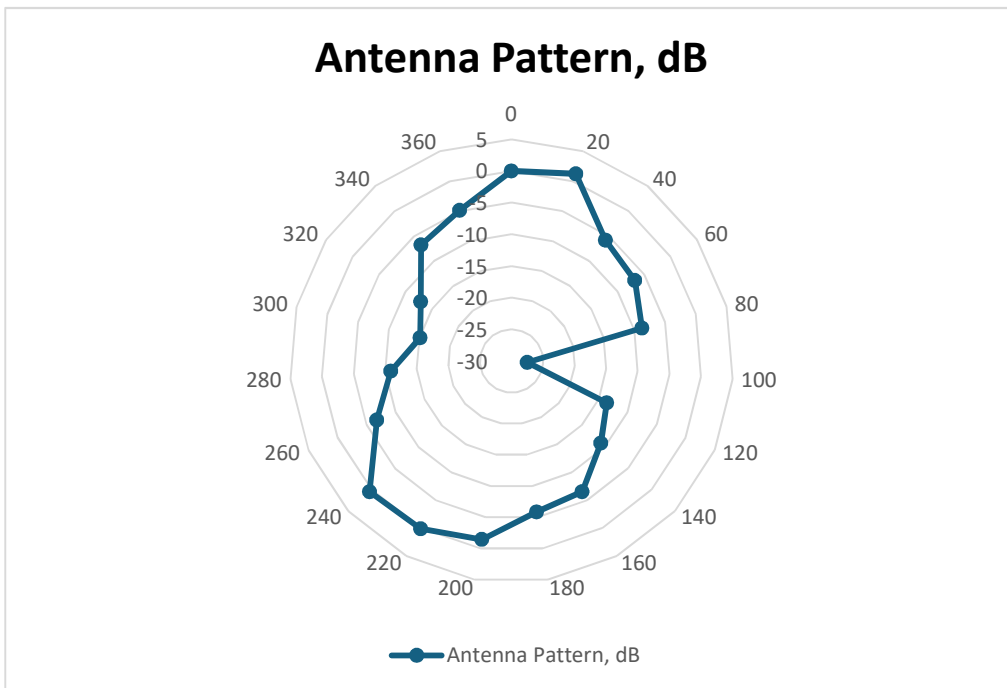
**Gain measurement calculation:**

**=(Refernce SA reading)+(SA reading of Antenna Power)+(Refernce Signal Generator RF Power)+(Ref Antenna gain)-(Refrence Antenna cable loss)**

**2405 MHz vertical poz.Y**



V position of EUT			
Frequency:	2405	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dB
0	70	-26.39	0.00
20	71.26	-25.13	1.26
40	64.15	-32.24	-5.85
60	63.23	-33.16	-6.77
80	61.23	-35.16	-8.77
100	42.5	-53.89	-27.50
120	56.41	-39.98	-13.59
140	59.15	-37.24	-10.85
160	63.45	-32.94	-6.55
180	64.15	-32.24	-5.85
200	68.56	-27.83	-1.44
220	70.12	-26.27	0.12
240	70.45	-25.94	0.45
260	63.23	-33.16	-6.77
280	59.12	-37.27	-10.88
300	54.89	-41.5	-15.11
320	57.12	-39.27	-12.88
340	63.23	-33.16	-6.77
360	65.15	-31.24	-4.85



Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2405	MHz	
SA reading	103.2	dBuV/m	
AG, dBi	9.9	dBi	
Cable Loss	3.09	dB	
Antenna polarization Vertical  Antenna Horn HL 4474			

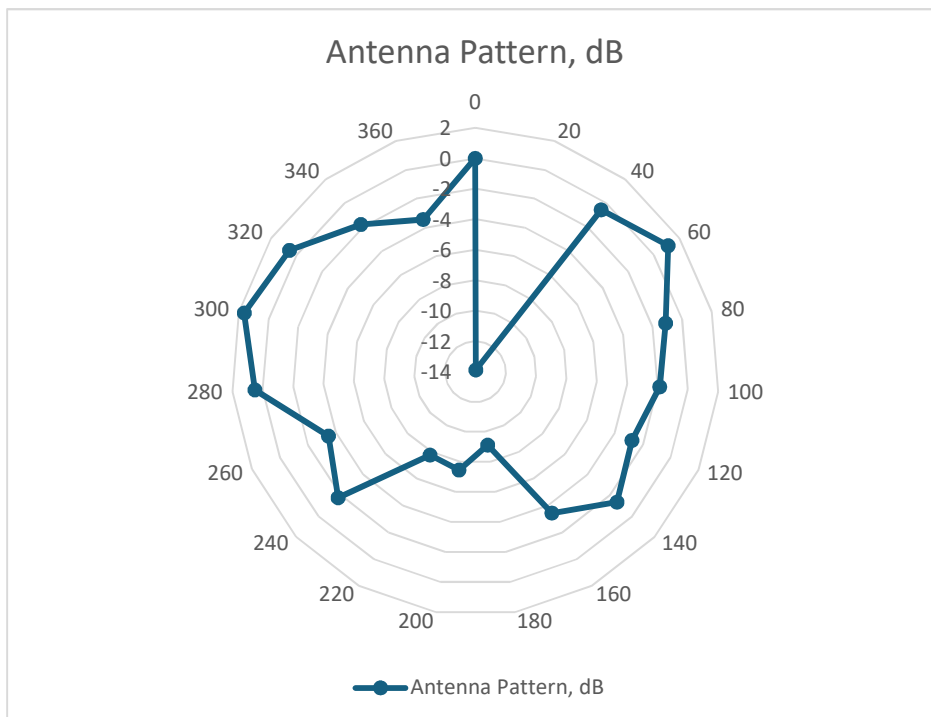
-96.39

Gain measurement calculation:

$$= -(\text{Reference SA reading}) + (\text{SA reading of Antenna Power}) + (\text{Reference Signal Generator RF Power}) + (\text{Ref Antenna gain}) - (\text{Reference Antenna cable loss})$$

**2405 MHz horizontal poz.X**

H position of EUT			
Frequency:	2405	MHz	
Angle (deg)	Spectrum Analyzer reading (dBuV/m)	EIRP, dBm	Antenna Pattern, dB
0	67	-29.39	0.00
20	53.12	-43.27	-13.88
40	66.45	-29.94	-0.55
60	68.12	-28.27	1.12
80	65.89	-30.5	-1.11
100	65.15	-31.24	-1.85
120	64.23	-32.16	-2.77
140	65.65	-30.74	-1.35
160	63.56	-32.83	-3.44
180	57.89	-38.5	-9.11
200	59.56	-36.83	-7.44
220	59.23	-37.16	-7.77
240	65.23	-31.16	-1.77
260	63.53	-32.86	-3.47
280	67.51	-28.88	0.51
300	68.65	-27.74	1.65
320	67.56	-28.83	0.56
340	65.23	-31.16	-1.77
360	63.55	-32.84	-3.45



Spectrum Analyzer Data			sweep time 20 ms  Substitution
Span	10	MHz	
RBW	1000	kHz	
VBW	3000	kHz	
Ref Level	120	dBuV/m	
SG	0	dBm	
F, MHz	2405	MHz	
SA reading	103.2	dBuV/m	
AG, dBi	9.9	dBi	
Cable Loss	3.09	dB	
Antenna polarization Vertical  Antenna Horn HL 4474			

-96.39

**Gain measurement calculation:**

**=(Refernce SA reading)+(SA reading of Antenna Power)+(Refernce Signal Generator RF Power)+(Ref Antenna gain)-(Refrence Antenna cable loss)**