



# FCC Certification Report for the **H9PLA4121** WLAN PC Card

## EXHIBIT 12

### **RF EXPOSURE INFO**

Note: All effort has been made to correlate the Antenna Summary tables with the Antenna descriptions and data sheets. Where there is a conflict the Antenna Summary table takes precedence. The Antenna Summary table breaks out the gain of the antenna and the cable loss associated with the entire antenna/cable assembly. Some of the data sheets have gains listed that do not take cable loss into account. The Antenna Summary table does.



## RF Exposure Antenna Summary

### Network Systems Organization

FCC ID: **H9PLA4121**

WLAN PC Card, 11 Mbps, T2

Output Power: 150 mW

Original Equip.

Duty Cycle Factor: 0.0 dB

### Mobile Antennas

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	MPE (cm)	TR Status	Device Type
01.	Parapolic Grid	ML-2499-PGA1-0	Dish	24.0	14.49	7.27	10.3	Tested	Mobile
02.	Pipe Bomb 11"x4'	50-11901-048P	Dipole Array	5.2	1.00	20.76	5.6	Tested	Mobile
02.1	Pipe Bomb 11"x15'	50-11901-180P	Dipole Array	5.2	3.75	18.01	4.1	See # 2	Mobile
03.	Patch	ML-2499-PTA1-0	Patch	6.5	1.50	20.26	6.1	Tested	Mobile
04.	Panel	ML-2499-PNA1-0	Panel	11.0	3.48	18.28	8.2	Tested	Mobile
08.	Pipe Bomb 25"x20'	50-11902-240S	Dipole Array	7.0	5.00	16.76	4.3	Tested	Mobile
08.1	Pipe Bomb 25"x30'	50-11902-360S	Dipole Array	7.0	7.49	14.27	3.3	See # 8	Mobile
09.	Ceiling Panel	ML-2499-SD24-0	Plane	3.3	1.50	20.26	4.3	Tested	Mobile
10.	Trilogy AP	21-20667-01	Dipole	2.0	0.20	21.56	4.3	Tested	Mobile
15.	Amtrak Omni	50-21900-027	Dipole	3.0	0.00	21.76	4.9	See # 10	Mobile
16.	Rubber DuckTNC-RP	50-21900-029	Dipole	1.0	0.00	21.76	3.9	See # 10	Mobile
16.1	Rubber Duck	50-21900-007	Dipole	1.0	0.00	21.76	3.9	See # 10	Mobile
17.	PC04	50-11903-0115	Dipole	2.0	0.28	21.48	4.2	See # 10	Mobile
17.1	PC14	50-11903-0355	Dipole	2.0	0.86	20.90	3.9	See # 10	Mobile
20.	Mag Dipole	ML-2499-MGA1-	Dipole	2.0	3.00	18.76	3.1	See # 10	Vehicle Mount
21.	Trilogy PCI, 72"	25-20728-01	Dipole	2.0	3.53	18.23	2.9	See # 10	Mobile
32.	Corner Patch	ML-2499-DLA1-0	Patch	7.5	1.50	20.26	6.9	See # 3	Mobile
33.	Plane	50-21900-008	Plane	0.0	1.00	20.76	3.1	See # 9	Mobile

Antenna Gain listed without cable

TR Status refers to whether the antenna was tested. If not refer to the directed antenna test data

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FCC ID: **H9PLA4121**

WLAN PC Card, 11 Mbps, T2

Output Power: 150 mW

Original Equip.

Duty Cycle Factor: 0.0 dB

### Portable Antennas

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	EIRP (mW)	TR Status	Device Type
05.	IEC	24- 20776- 02	Patch	0.0	0.00	21.76	150.0	Tested	Laptop
06.	4140	50-11900-001	Whip	-2.0	0.00	21.76	94.6	Tested	Hand Held
07.	HS Dipole	50-21900-030	Dipole	2.0	0.55	21.21	209.5	Tested	Hand Held
12.	Toko	50-21900-022	Puck	0.0	0.00	21.76	150.0	Tested	Hand Held
13.	6846D	10-41003-01	Slot	0.0	0.37	21.39	137.8	Tested	Hand Held
14.	End Cap "C"	10-20511-01	F-Element	0.0	0.00	21.76	150.0	Tested	Laptop
18.	4342	50-21900-033	Dipole	1.2	0.15	21.61	191.0	See # 10	Hand Held
19.	DASH 3000	50-21900-036	Dipole	2.2	0.62	21.14	216.0	See # 10	Hand Held
22.	Novas	50-21900-034	F-Element	0.0	0.43	21.33	135.9	See # 14	Hand Held
23.	1742	703549-2	F-Element	0.0	0.11	21.65	146.1	See # 14	Hand Held
24.	2742	703624-2	F-Element	0.0	0.13	21.63	145.6	See # 14	Hand Held
25.	7242	10-35477-01	F-Element	0.0	0.13	21.63	145.6	See # 14	Hand Held
26.	Criticare BFA	50-21900-021	F-Element	0.0	0.20	21.56	143.3	See # 14	Hand Held
27.	7546D	10-40948-01	F-Element	0.0	0.22	21.54	142.7	See # 14	Hand Held
28.	7546	10-38649-02	F-Element	0.0	0.31	21.45	139.7	See # 14	Hand Held
29.	6846	10-32290-02	F-Element	0.0	0.34	21.42	138.7	See # 14	Hand Held
30.	2042	10-17577-03	F-Element	0.0	0.06	21.70	147.9	See # 14	Hand Held
31.	6146	10-35305-02	F-Element	0.0	0.12	21.64	145.9	See # 14	Hand Held
35.	XP	50-21900-024	Slot	0.0	0.58	21.19	131.4	See # 13	Hand Held

### Body Worn Antennas

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	EIRP (mW)	TR Status	Device Type
11.	Vocollect MMCX	50-21900-025	Dipole	2.0	0.25	21.51	224.5	Tested + SAR	Body worn
34.	Oniel MMCX	50-21900-031	Slot	0.0	0.37	21.39	137.8	See # 13	Body worn

Antenna Gain listed without cable

TR Status refers to whether the antenna was tested. If not refer to the directed antenna test data

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## Parabolic Grid Antenna

The **Parabolic Grid** antenna assembly is 9.5 dBi high gain directional dish with a 7° beam width in azimuth plane. It is used for point to point connections across a large corporate campus.

It is mounted on a outdoor mast. The **Parabolic Grid** is always installed with a minimum amount of cable as shown in the attached block diagram. It is always farther than 20 cm from a person's body. It is used with mobile devices.

<i>Location</i>	Outdoor Mast
<i>Pattern</i>	7° Beam
<i>Type</i>	Dish
<i>Max Gain</i>	9.5 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	See attached dwg
<i>Symbol P/N</i>	ML-2499-PGA1-00
<i>MPE Distance</i>	See summary table

The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C when ever the device configuration could reduce the MPE distance to be less than 20 cm.

**“Important Note: To comply with FCC RF exposure requirements, no one may remain within 20 cm of the antenna for extended periods of time.”**



Antenna Photograph

# Wireless Antennas

For World-Wide Applications

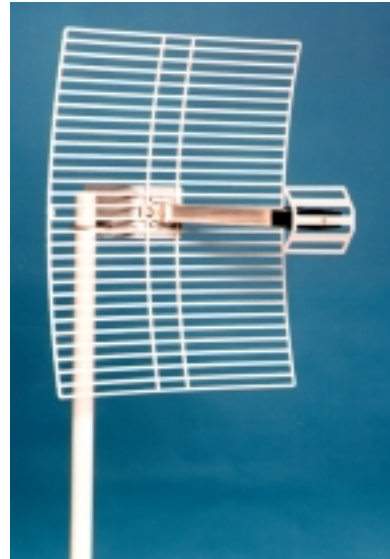
WLAN/ISM  
2.4 - 2.5 GHz\*



**MODEL  
26T-2400\***



**MODEL  
18T-2400\***



\*U.S. Patent 5,191,350

## FEATURES

- Die-cast 18/26 manufacturing processes
- Magnesium Alloy is superior to anodized aluminum and weighs 33% less
- Low wind loading
- Manufactured with nonferrous materials; magnesium alloy, stainless steel and aluminum
- Compact packaging
- No mechanical adaptors required to mount the feed
- Five Year Limited Warranty

## BENEFITS

- Consistent high performance from every antenna
- Lightest weight and most durable grid antennas
- Operational in most all weather environments
- No rust!
- Saves on shipping costs
- One feed fits both antennas
- Guaranteed reliability

**CONIFER<sup>II</sup>**  
WIRELESS TELECOMMUNICATION TECHNOLOGY

1400 N Roosevelt, Burlington, IA 52601  
Phone 800-843-5419 (U.S.), 319-752-3607 (Int'l)  
Fax 319-753-5508, email <conifer@conifercorp.com>



\*Contact factory for other frequency options.

## PERFORMANCE SPECIFICATIONS\*

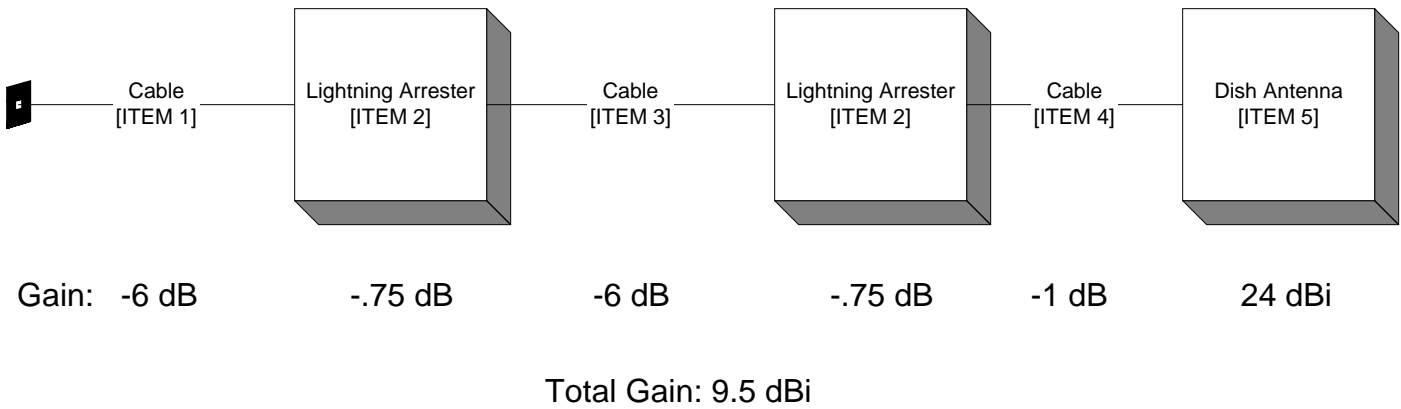
	MODEL 18T-2400	MODEL 26T-2400
Input Frequency	2400 - 2500 MHz	2400 - 2500 MHz
Gain	18 dBi	24 dBi
-3 dB Beam Width	14°	7.5°
Front to Back Ratio	>23 dB	>31 dB
Polarity	Dual	Dual
Cross Polarity Rejection	>23 dB	>26 dB
VSWR (Maximum)	1.4:1 @ 2400-2500 MHz	1.4:1 @ 2400-2500 MHz
Impedance @ Output	50 OHMS	50 OHMS
Connector "N" Type**	Male	Male
Coaxial Pigtail - RG8**	24 inches	24 inches
Input Power	50 Watts	50 Watts
Windloading		
@ 100 MPH	39.4 lbs.	97.0 lbs.
@ 140 MPH	77.9 lbs.	199.5 lbs.
Elevation Adjustment	60° in 10° Increments	60° in 10° Increments
Size	16 x 20 x 15 inches (40.64 x 50.80 x 38.10 cm)	23.5 x 39.25 x 15 inches (60.95 x 91.44 x 38.10 cm)
Weight	2.7 lbs. (1.22 Kg)	5.4 lbs. (2.43 Kg)
Reflector Material	Cast Magnesium Alloy	Cast Magnesium Alloy
Mounting Hardware	Stainless Steel	Stainless Steel
Mounting	1" - 2" O.D. Mast (2.54 - 5.08 cm)	1" - 2" O.D. Mast (2.54 - 5.08 cm)

\*Specifications subject to change without notice.

\*\*Contact factory for other options.

**MANUFACTURED IN BURLINGTON, IOWA**

© CONIFER 8/99



Item #	Part #	Description	Quantity
1		Cable, RG-58 (Belden 8219) , BNC-RP-Plug to N-Male	20 ft.
2		Lightning Suppressor, Conifer II (2.4-2.5 GHz) N-Female to N-Female	2
3		Cable, RG-8 (Belden 8237) N-Male to N-Male	30 ft.
4		Cable, RG-8 (Belden 8237), N-Male to pigtail	3 ft.
5	26T-2400	ANT:Dish, 2440 - 2500 MHz, 24 dBi. LPV,N-MALE	1
6			
7			
8			

Symbol Technologies, Inc., Network Systems Organization			
ANT KIT:S24, DISH, 9.5 DBI, LP, CBL 50FT, BNCRP			
	MAY 2, 2000	ML-2499-PGA1-00	REV 1
NOT TO SCALE		SHEET	1 OF 1

**Pipe Bomb 11" Antenna**

The **Pipe Bomb 11"** antenna is 4.2 dBi omnidirectional in azimuth plane. The **Pipe Bomb 11"** uses a reverse polarity BNC connector. It is mounted on the ceiling or on a wall near the ceiling. In its use it would be farther than 20 cm from a person's body. It is used with mobile devices. It is available with either a 4' or 15' cable.

The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C whenever the device configuration could reduce the MPE distance to be less than 20 cm.

<i>Location</i>	Near ceiling
<i>Pattern</i>	Omni
<i>Type</i>	Dipole Array
<i>Max Gain</i>	4.2 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	4, 15 ft (Plenum-rated)
<i>Symbol P/N</i>	ML-2499-HPA1-00 ML-2499-HPA2-00
<i>MPE Distance</i>	See summary table

**“Important Note: To comply with FCC RF exposure requirements, no one may remain within 20 cm of the antenna for extended periods of time.”**



Antenna Photograph





Mounting Configuration

# REVISIONS

REV	DESCRIPTION	DATE	APPVL
A	DOCUMENT RELEASED PER EDR# 16847	1/2/95	TS
B	CHANGE DIM. PER MFGR. & UPDATE FAMILY DWG PER EC#E6375	4/14/00	D. Potts

## General Notes:

THE FOLLOWING STI SPECIFICATIONS APPLY:

50-04100-013: **Specification: Supplier Packaging and Labeling Requirements**

**symbol**

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APPROVAL	NAME	DATE	COMPONENT SPECIFICATION	
DRAWN	S. VanNoy	12/15/95	<b>TITLE:</b> <b>ANT:OMNI ASSY, 2.4-2.5GHz , 3dBd</b> <b>W/CBL, W/REV BNC, OPTIONAL PLENUM</b> <b>DOC. NO. 50-11901-XXX</b>	
CHECKED	T. SMURA	2/1/95		
ENG.	T. HOFBAUER	1/18/96		
OPERATIONS	S. SPITERI	1/15/96		
				REV B
			SHEET 1 of 5	

## OMNIDIRECTIONAL ANTENNA ASSEMBLY

### Features:

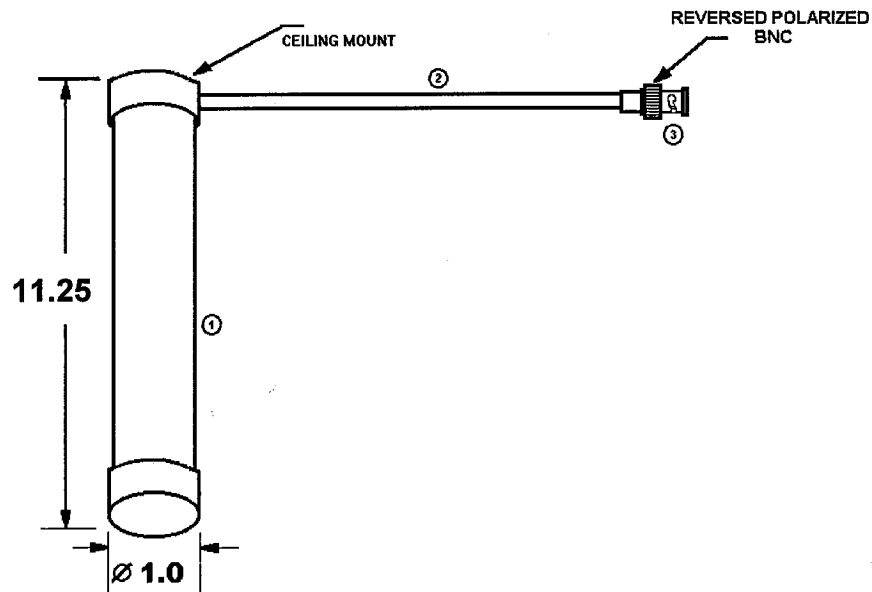
- Weatherproof designs with UltraLink pigtail
- DC grounded
- Plated copper laminated radiator

Enclosure Material:	Ultraviolet-stabilized Polycarbonate
Mount Style:	Ceiling
Performance:	Omnidirectional
Frequency:	2.4 - 2.5 GHz
Gain:	3 dBd
Bandwidth (1.5:1):	100 MHz
-3dB bmwidth:	38 E-Plane <sup>0</sup>
Weight:	.31 lb.
W/sur Area:	0.08 ft <sup>2</sup>
W/survival:	125 mph
Power:	50W
Operating Temperature:	-30°C - 70°C

### Note:

Common Specifications: VSWR - 1.2: nominal; Connector Type -N-female; Element material - printed circuit

## OUTLINE DRAWING



DRAWING NOT TO SCALE

<b>TABULATION:</b>	50-11901-XXX	XXX = Cable Length in Inches
<b>OPTIONS:</b>	Plenum Rating <sup>1</sup>	Add "P" to Part Number (Rating applies to Cable not Antenna)
	Color	Add single character for color e.g. Y = Yellow, without color is white.
	Private Label	Add "S" for private label.
<b>EXAMPLE:</b>	50-11901-048P	048 = 48 Inches or 4 FT., P = with Plenum Rating

Note:  
1. Modified Steiner Tunnel Flame Test (UL-910). Plenum is a closed area, such as between drop ceiling and true ceiling. With rating coax can be run in plenum without conduit.

ITEM	PART#	QTY	DESCRIPTION
1	S2403BH	1	CUSHCRAFT/Signals Omnidirectional Antenna
2	N/A	1	Coaxial Cable (RG58)
3	50-12100-093	1	Reversed Polarized Female BNC Connector

Dimensions are in inches unless otherwise noted

SYMBOL TECHNOLOGIES, INC.

DOCUMENT No.50-11901-XXX

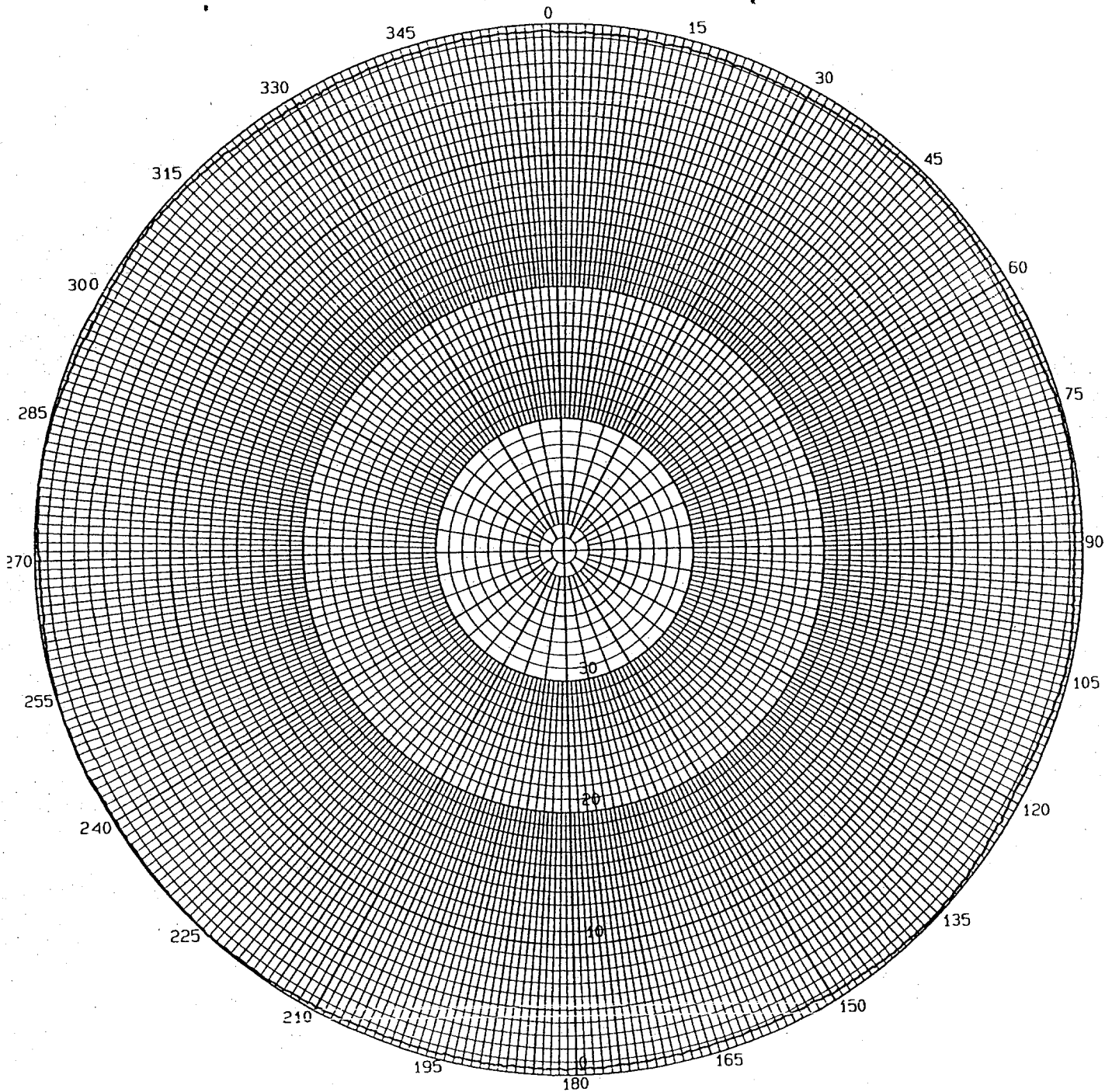
REV B

SHEET 3 of 5

**Typical Radiation Pattern**

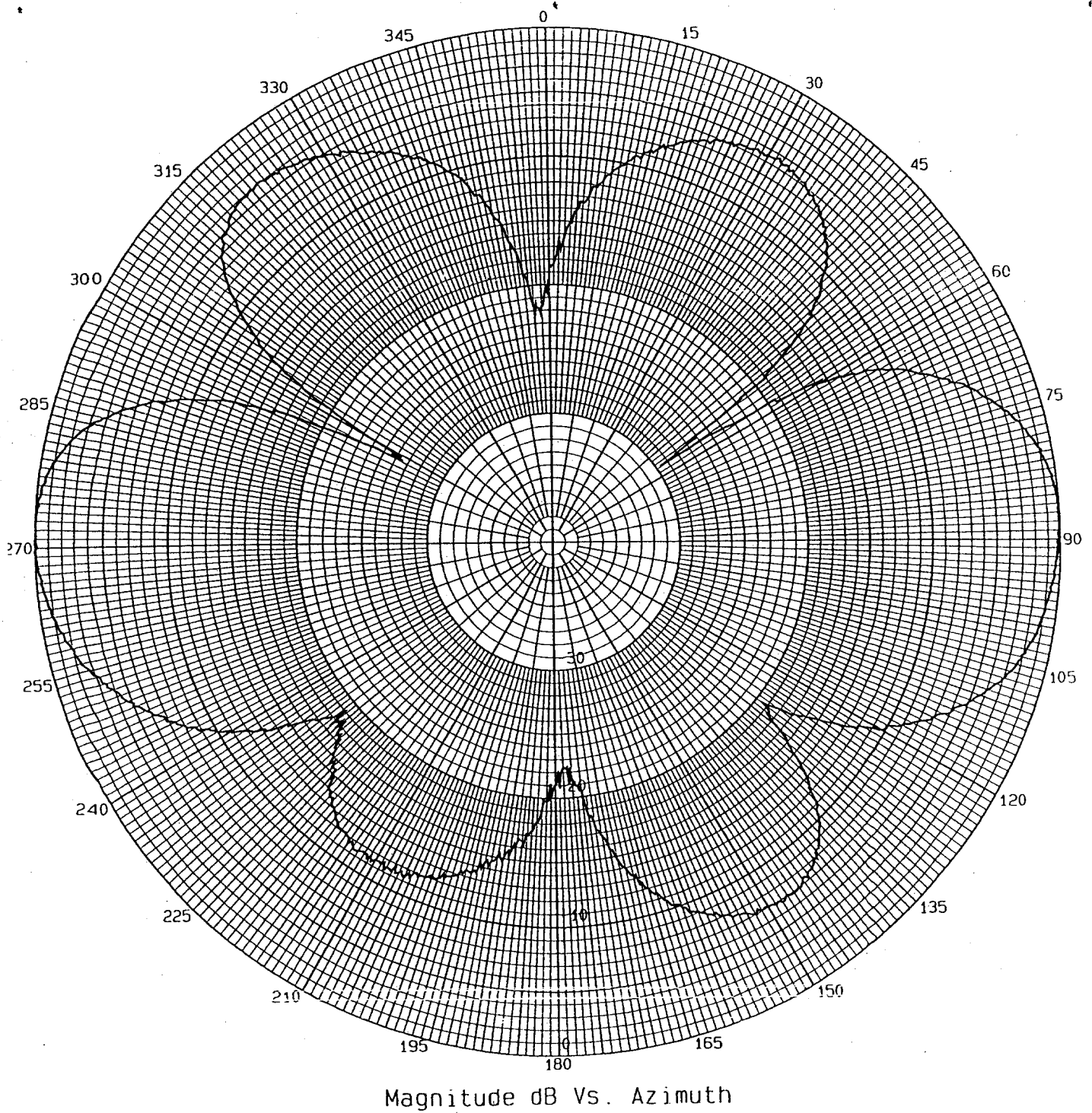
**Freq: 2.45 GHz**

**Polarization: H-Plane**



Magnitude dB Vs. Azimuth

**Typical Radiation Pattern**  
**Freq: 2.45 GHz**  
**Polarization: E-Plane**



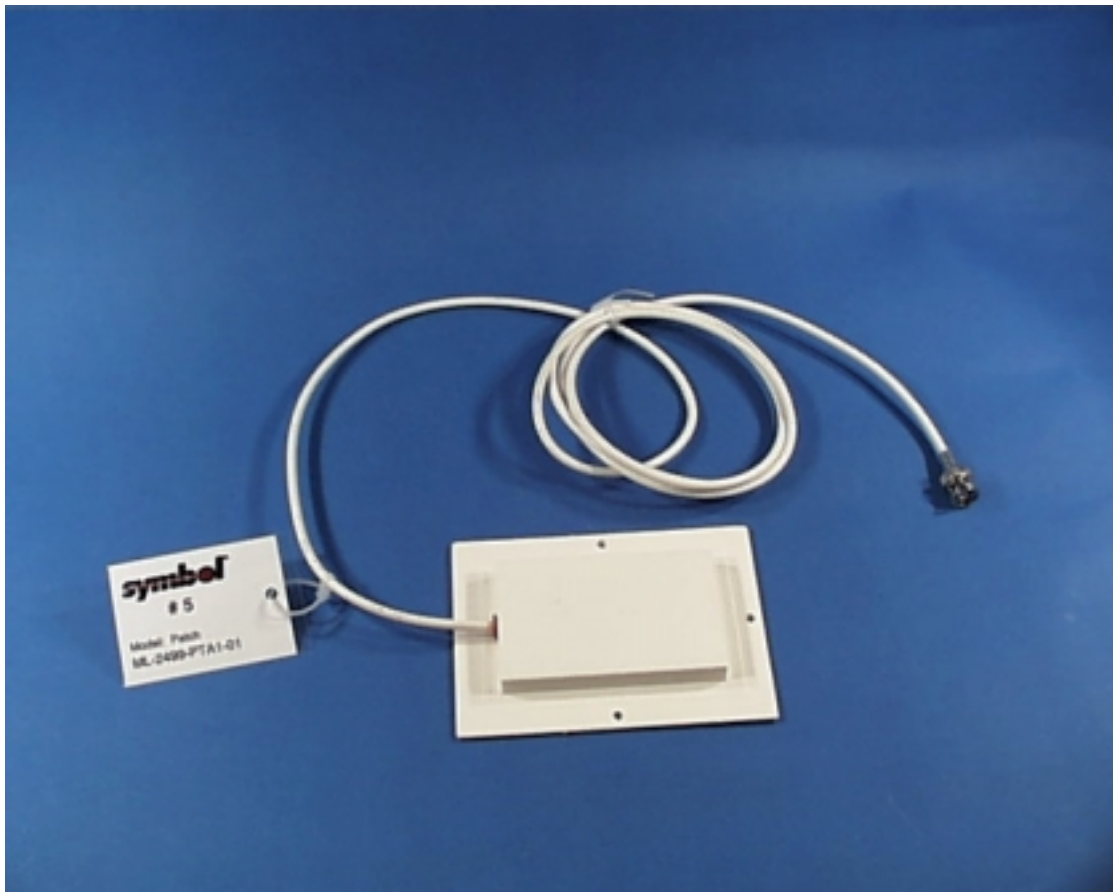
## Patch Antenna

The **Patch** antenna is 5 dBi 70° directional in azimuth plane. The **Patch** uses a reverse polarity BNC connector. It is mounted on a wall near the ceiling. In its use it would be farther than 20 cm from a person's body. It is used with mobile devices.

The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C when ever the device configuration could reduce the MPE distance to be less than 20 cm.

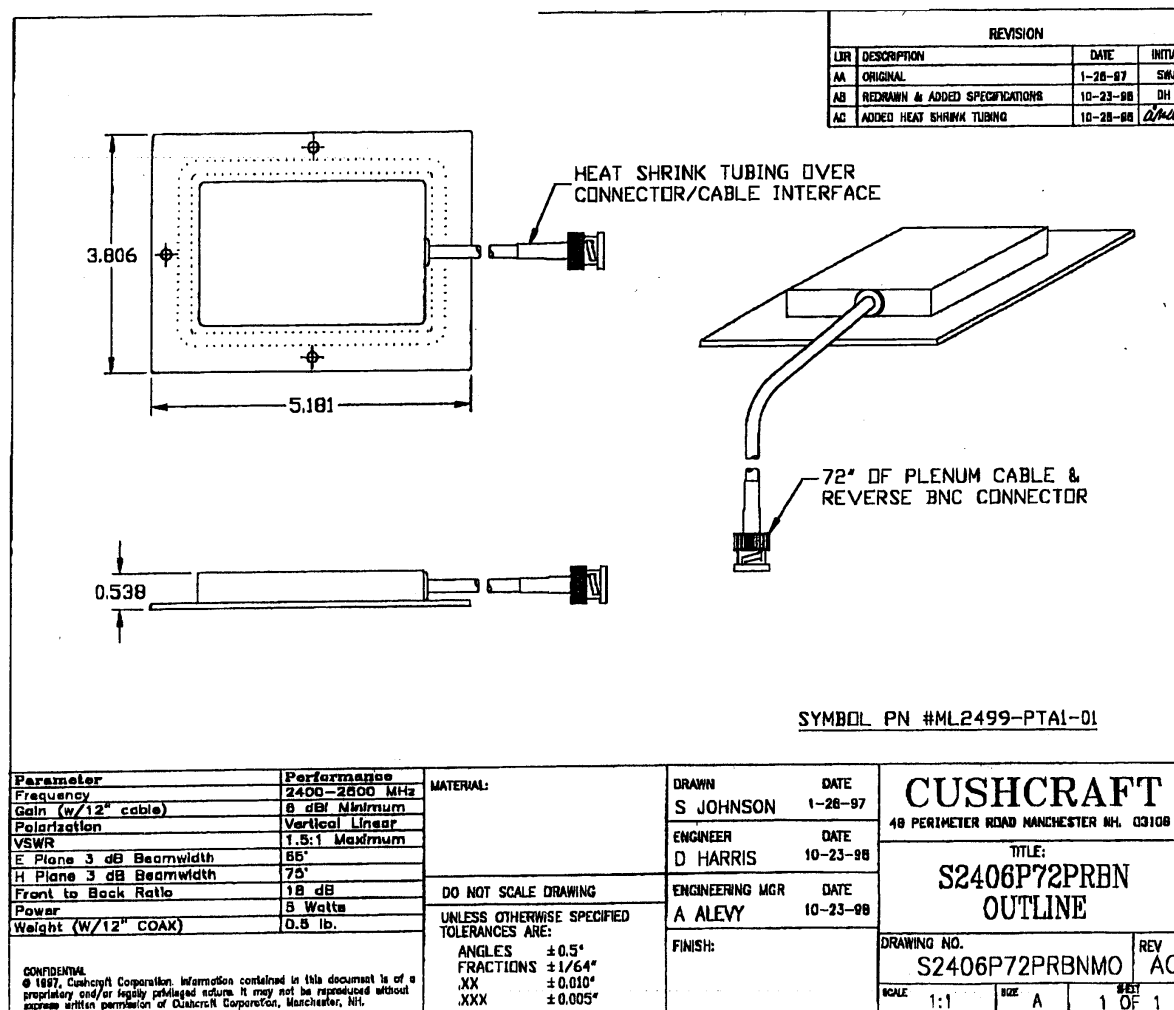
<i>Location</i>	Vertical Surface
<i>Pattern</i>	Directional 70° beam
<i>Type</i>	Patch
<i>Max Gain</i>	5 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	6 ft (Plenum-rated)
<i>Symbol P/N</i>	ML-2499-PTA1-00
<i>MPE Distance</i>	See summary table

**“Important Note: To comply with FCC RF exposure requirements, no one may remain within 20 cm of the antenna for extended periods of time.”**



Antenna Photograph

.A	RELEASE PER EDR # 20049	03/18/97
.B	ADD TUBING PER EC# D4429	01/27/99



2. SYMBOL PART NUMBER: **ML-2499-PTA1-01**

1. PART TO BE PACKAGED IN ACCORDANCE WITH  
STI SPECIFICATION 50-04100-013

UNLESS OTHERWISE SPECIFIED:

THIRD PARTY PRODUCT  
CUSHCRAFT

SYMBOL TECHNOLOGIES  
PART NO. ML-2499-PTA1-01  
ANTENNA,VA: PATCH, 2.4, 6 DBI, 6 FT:  
REV .B  
PAGE 1 OF 2



## Patches for both 902, 2400 and 5800 Linear and Circular Polarization

Patch antennas lend themselves well to many data collection applications. They are flat and unobtrusive in most environments. Their patterns are much like a short Yagi. Patches are available in either linear or circular polarity. The choice of polarity and the convenient shape of the patch makes it the right choice for many applications. Patches are most commonly wall mounted. Occasionally ceiling mounted patches are the right answer. We can also design patches so that they may be an integral part of the enclosure for data transceivers.

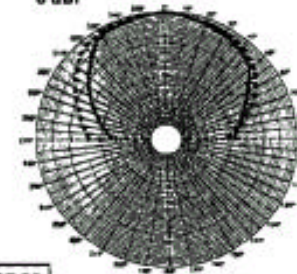


PATCHES

Model	S2406PL
Type	Patch
Polarity	Linear
Frequency, MHz	2400-2500
Gain	6 dBi
Front to Back, dB	16
Bandwidth 1.5:1, MHz	100
-3 dB beamwidth	
E-Plane, degrees	65
H-Plane, degrees	75
Connector Type	N-female
Enclosure Material	ABS plastic
Dimensions, in	5 x 5 x 7/16
	(12.7 x 12.7 x 1.1)
Weight, oz.(g)	6 (224)
Mount Style	Optional

S2406PL

6 dBi



H-Plane  
E-Plane

SYMBOL TECHNOLOGIES  
PART NO. ML-2499-PTA1-01  
ANTENNA,VA: PATCH, 2.4, 6 DBI, 6 FT REV .B  
PAGE 2 OF 2

## Panel Antenna

The **Panel** is a 7.5 dBi antenna with a 44° beamwidth in azimuth plane. The **Panel** uses a reverse polarity BNC connector. It is mounted on a vertical surface. In its use it would be mounted on a wall near a ceiling farther than 20 cm from a person's body. It is used with mobile devices.

The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C when ever the device configuration could reduce the MPE distance to be less than 20 cm.

<i>Location</i>	Vertical Surface
<i>Pattern</i>	Directional
<i>Type</i>	Panel
<i>Max Gain</i>	7.5 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	20 ft (Plenum-rated)
<i>Symbol P/N</i>	ML-2499-PNA1-01
<i>MPE Distance</i>	See summary table

**“Important Note: To comply with FCC RF exposure requirements, no one may remain within 20 cm of the antenna for an extended period of time.”**

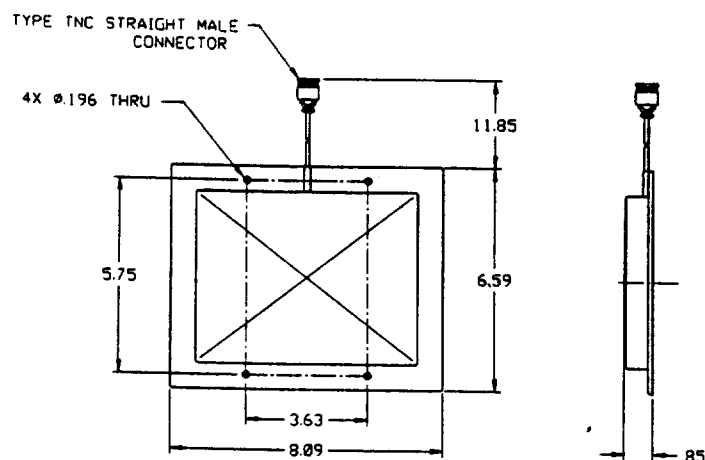


Antenna Photograph

## 2.4 GHz ANTENNAS



### Type 505021 HIGH-GAIN CP PANEL



#### SPECIFICATIONS

Frequency:	2.4 To 2.485 GHz
VSWR:	2:1 Max.
Gain:	+11 dBic
3 dB Beamwidth:	±22° (Typ) E-Plane ±18° (Typ) H-Plane
Side Lobe Level:	≥ dB E-Plane ≥15 dB H-Plane
Front/Back:	≥20 dB
Polarization:	RHCP (LHCP)



# RELEASED

PART IS PACKAGED ACCORDING TO STI SPECIFICATION :50-04100-013  
3rd Party PRODUCT

SYMBOL TECHNOLOGIES  
PART NO. ML-2499-PNA1-01  
ANTENNA: PANEL, 2.4, 7 DBI, 20 FT  
REV .A  
PAGE 1 OF 2

**I. CONSTRUCTION****DIAMETER**

Center Conductor: Solid Bare Copper  
Dielectric: Gas Injected Foam Polyethylene  
Shield: Bonded Aluminum-Polyester-Aluminum Tape  
36 GA Tinned Copper Braid(90%k)  
Jacket: Black Low Smoke Low Toxicity FR Polyethylene

.044"  
.116"  
.121"  
.144"  
.195"

**II. ENVIRONMENTAL AND MECHANICAL PROPERTIES**

Weight: 34 lbs per 1000 feet  
Operating Temperature: -40°C to +85°C  
Minimum Bend Radius: 1/2"  
Flame Resistance: Passes IEEE-383

**III. ELECTRICAL PROPERTIES**

Impedance: 50 ohms  
Capacitance: 24.5 pF per foot  
Velocity: 83%  
Attenuation @ (typical)

30 MHz:	1.8 dB per 100 feet
50 MHz:	2.4 dB per 100 feet
150 MHz:	4.1 dB per 100 feet
220 MHz:	5.0 dB per 100 feet
450 MHz:	7.2 dB per 100 feet
900 MHz:	10.4 dB per 100 feet
1500 MHz:	13.5 dB per 100 feet
2000 MHz:	15.7 dB per 100 feet

**IV. NOTES**

1) All tests performed in accordance with MIL-C-17(current issue).

**ORIGINAL**

PART IS PACKAGED ACCORDING TO STI SPECIFICATION :50-04100-013  
3rd Party PRODUCT

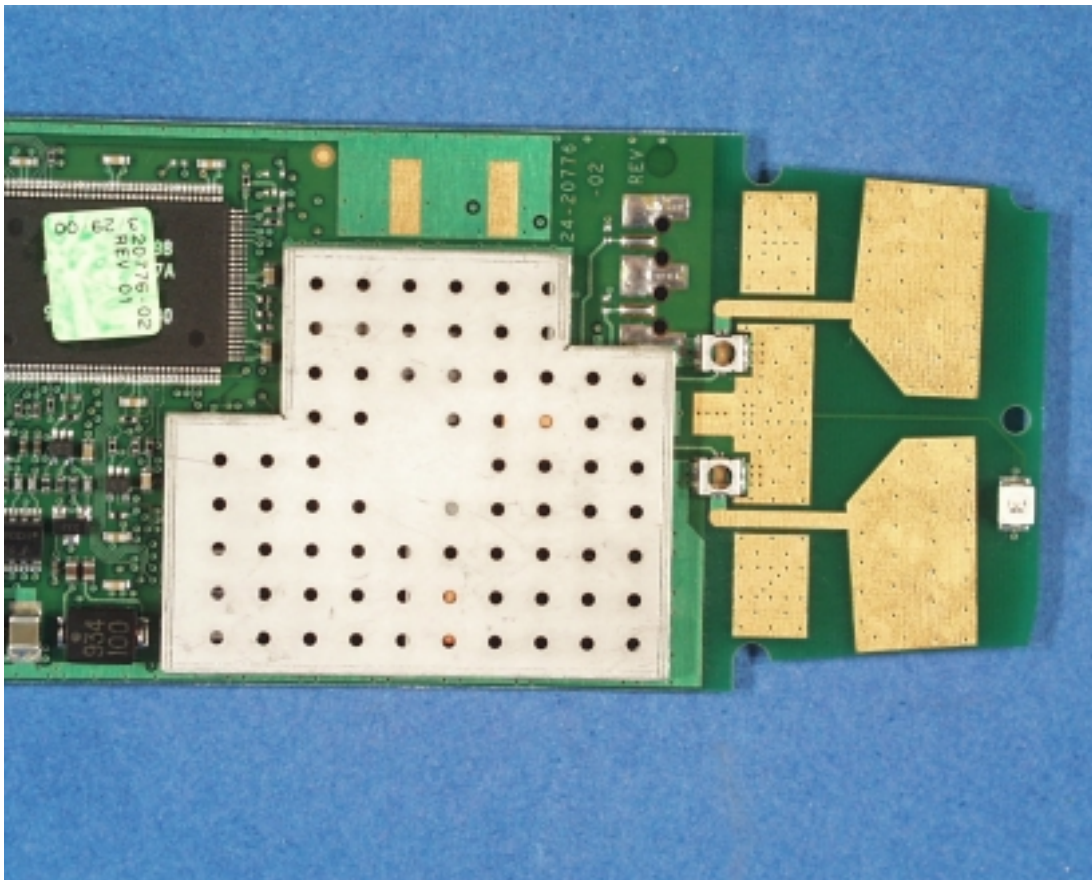
SYMBOL TECHNOLOGIES  
PART NO. ML-2499-PNA1-01  
ANTENNA: PANEL, 2.4, 7 DBI, 20 FT  
REV A  
PAGE 2 OF 2

**IEC Antenna**

The **IEC** antenna is 0 dBi omni-directional in azimuth plane. It is printed on a extended version of the PCB as shown in the attached photo. There are two patches for spatial diversity. The **IEC** does not use a connector. In its use it could be within 20 cm of a persons hand but more than 20 cm from the users body. It is used in portable devices. The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C for EIRP greater than 200 mW.

<i>Location</i>	Laptop PC
<i>Pattern</i>	Omni
<i>Type</i>	Patch
<i>Gain</i>	0 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	none
<i>Symbol P/N</i>	24- 20776- 02
<i>EIRP</i>	See Summary Tbl

**“Important Note: To comply with FCC RF exposure requirements, this portable device is approved for operation near a user’s hand when there is 20 cm or more between the antenna and everyone’s body.”**



Antenna Internal Photo





Antenna External Photo



Antenna Use Photo

## 4140 Antenna

The **4140** antenna is -2 dBi omni-directional in azimuth plane. It is mounted externally on the top end of the terminal as shown in the attached photo. In its use it would be within 20 cm of a persons hand but more than 20 cm from the users body. It is used in portable devices. The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C. for EIRP greater than 200 mW.

<i>Location</i>	Hand Held Device
<i>Pattern</i>	Omni
<i>Type</i>	Whip
<i>Max Gain</i>	-2 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	MXYP75
<i>Symbol P/N</i>	50-11900-001

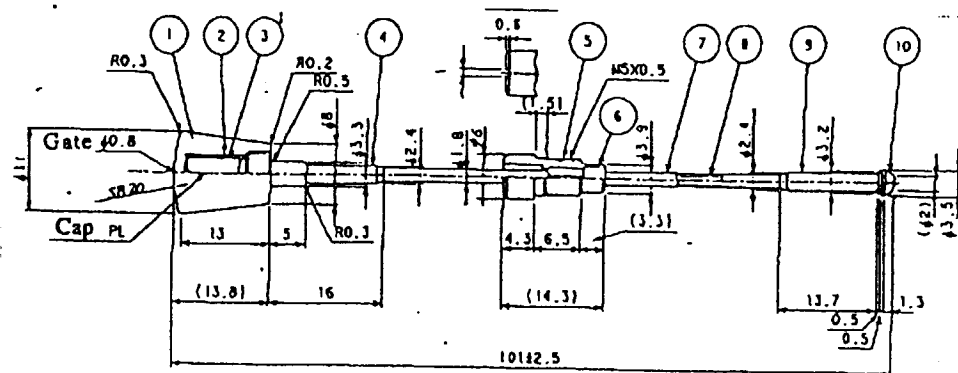
**“Important Note: To comply with FCC RF exposure requirements, this hand-held device is approved for operation in a user’s hand when there is 20 cm or more between the antenna and everyone’s body.”**



Antenna / Terminal Use Photo

REVISIONS						
REV	No.	DESCRIPTION	E.C.	BY	APVD.	DATE
A		RELEASE PER EDR#11613		MJ		9/2/94
B		CHG PRINT TO ENGLISH	D7090	MJ		2/21/95

No.	Parts Name	Qty	Material	Remarks	No.	Parts Name	Qty	Material	Remarks
6	Inner Spring	1	Brass	Ni Coat	1	Cap	1	AES	-Pantone Black C -Matte TH-107
7	Tube	1	Urethane CB	Black	2	Coil Element	1	SUS	
8	Element	1	Ni-Ti		3		1	POM	
9	Stopper	1	Brass	Ni Coat	4	Sleeve	1	Brass	Black Chrome Coat
10	Insulator	1	POM		5	Metal	1	Brass	Black Chrome Coat



RELEASED

		THE DRAWING & SPECIFICATION CONTAINED HEREIN ARE PROPRIETARY AND MUST NOT BE USED, COPIED, REPRODUCED, OR OTHERWISE DEALT WITH NOR ITS CONTENTS COMMUNICATED TO OTHERS EXCEPT IN ACCORDANCE WITH WRITTEN INSTRUCTIONS RECEIVED FROM SYMBOL TECHNOLOGIES INC.
	4400	
NEXT ASSY	USED ON	
		DO NOT SCALE DRAWING

DIMENSIONS ARE IN			APPROVALS		DATE	SYMBOL TECHNOLOGIES INC. Bohemia, New York		
UNLESS OTHERWISE SPECIFIED			DRAWN	M H JONES	5/12/94			
	MM	INCH	CHECKED		5/13/94	ANTENNA, LIBERTY		
.XX	+/-	+/- .01	ENGINEER					
.XXX	+/-	+/- .005	MFG. ENG.			SIZE B DWG. NO. 50-11900-001 REV B		
ANGLES ± 1° FRACTIONS ± 1/64			PRODUCT					
MATERIAL:			QUALITY			SCALE: NONE SOLID MODEL YES NO SHEET 1 OF 1		
FINISH:								



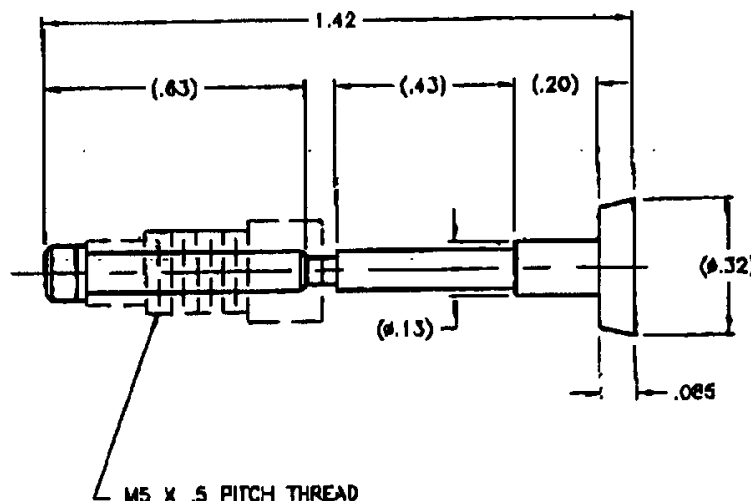
DESCRIPTION OF HOLES		
UNLESS OTHERWISE SPECIFIED, HOLE TOLERANCES ARE AS SHOWN IN HOLE TOLERANCE TABLE		
SYM	DESCRIPTION	QTY

THIS DRAWING REPRESENTS UNLESS NOTED
--

REVISIONS			DATE	APPROVED
REV	DESCRIPTION	ISSUED		
A				

NOTICE: THIS IS A CAD DRAWING  
IF CHANGES ARE REQUIRED,  
THIS DRAWING SHOULD NOT BE  
RELEASED UNTIL THE CAD DATA  
BASE HAS BEEN UPDATED.

*ORIGINAL*



#### NOTES:

##### 1. ELECTRICAL

FREQUENCY - 2.4 / 2.5 GHz  
IMPEDANCE - 50 ohms  
VSWR - 2.0:1 MAX.  
POLARIZATION - LINEAR  
GAIN - 0 dBi

##### 2. MECHANICAL:

STRUCTURE - SPRING WIRE  
FINISH - BLACK  
& BLACK PLASTIC  
TUBES

##### 3. ANTENNA SUPPLIED BY CUSTOMER FOR MODIFICATION.

ITEM #	QTY	PART NUMBER
211	1	50-11900-001

INTERPRET DWG IAW DOD-STD-100C

SEE SEPARATE PARTS LIST

HOLE TOLERANCE TABLE				UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			CNSL. NO.		ALL Systems Inc.	
				TOLERANCES			DATE BY		DR10-2 2.4GHz WHIP (DATA RELAY ANTENNA)	
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**HS Dipole Antenna**

The **HS Dipole** antenna is 1.5 dBi omnidirectional in azimuth plane. It is mounted internally on the top end of the terminal as shown in the attached photo. The **HS Dipole** is available with either a Murata Erie BFA or MMCX connector. In its use it would be within 20 cm of a person's hand but more than 20 cm from the user's body. It is used in portable devices. The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C for EIRP greater than 200 mW.

<i>Location</i>	Hand Held Device
<i>Pattern</i>	Omni
<i>Type</i>	Dipole
<i>Max Gain</i>	1.5 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	MXYP75, RG-178
<i>Symbol P/N</i>	50-21900-030

**“Important Note: To comply with FCC RF exposure requirements, this hand-held device is approved for operation in a user’s hand when there is 20 cm or more between the antenna and anyone’s body.”**



Terminal Use Photo



# SUHNER

## DIPOLE ANTENNA 2.45 GHZ

### FOR WIRELESS COMMUNICATION

Type No. 9090.16.0001

*mmcx  
adapter*



#### Technical Data

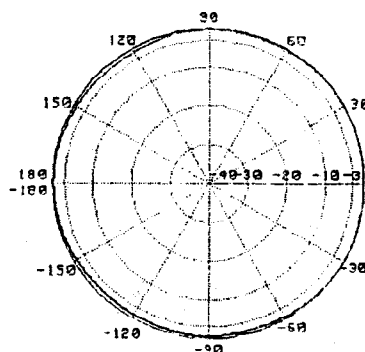
##### Electrical properties

Frequency range	2.4 – 2.5 GHz
Impedance	50 $\Omega$
VSWR	$\leq 2.0$
Polarisation	vertical
Gain	1.8 dBi
Pattern	Omni
Permitted power on entrance	1 W (CW) at 25 °C
Standard connector	right angle MCX-male

##### Mechanical properties

Length	79 mm
Connector case	ABS
Antenna case	ELVAX 550
Color	Pantone cool grey 11c
Operating temperature range	- 20 °C to + 65 °C

#### Radiation Pattern



horizontal



**HUBER+SUHNER AG**

Radio Transmission  
Department

CH-9100 Herisau

☎ 071 53 41 11

FAX 071 53 45 90

Tr 88 27 29

Data Sheet 02.95/Edition 1, 231GHA/st

While the information has been carefully compiled to the best of our knowledge, nothing is intended as representation or warranty on our part and no statement herein shall be construed as recommendation to infringe existing patents.

**Pipe Bomb 25" Antenna**

The **Pipe Bomb 25"** antenna is 2 dBi omnidirectional in azimuth plane. The **Pipe Bomb 25"** uses a reverse polarity BNC connector. It is mounted on the ceiling of warehouses. In its use it would be farther than 20 cm from a person's body. It is used with mobile devices. It is available with either a 20' or 30' cable.

The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C when ever the device configuration could reduce the MPE distance to be less than 20 cm.

<i>Location</i>	Near ceiling
<i>Pattern</i>	Omni
<i>Type</i>	Dipole Array
<i>Max Gain</i>	2, -.5 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	20, 30 ft (Plenum-rated)
<i>Symbol P/N</i>	ML-2499-WHA1-00 ML-2499-WHA2-00
<i>MPE Distance</i>	See summary table

**“Important Note: To comply with FCC RF exposure requirements, no one may remain within 20 cm of the antenna for extended periods of time.”**



Antenna Photograph

[illegible]

**General Notes:**

THE FOLLOWING STI SPECIFICATIONS APPLY:

50-04100-013: **Specification for Supplier Packaging and Labeling Requirements**

**ORIGINAL**

# ORIGINAL

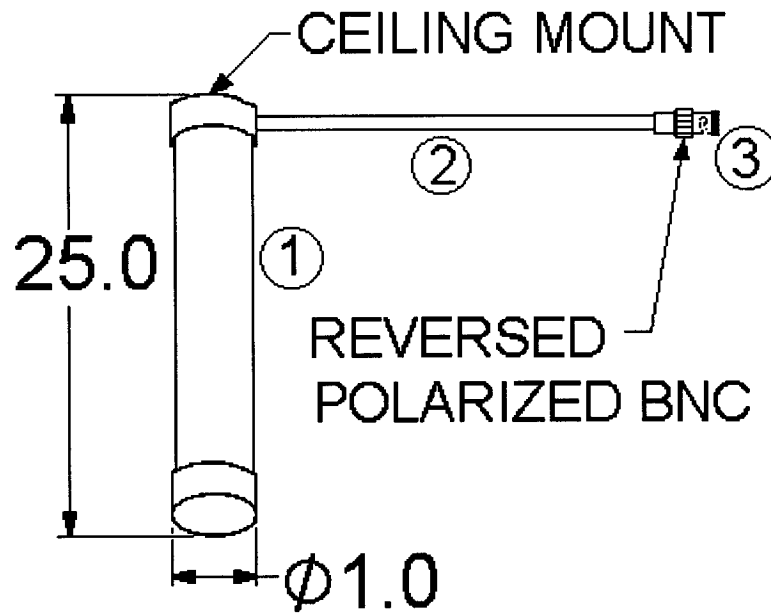
® This document and specification contained herein must not be used, copied, reproduced, or otherwise dealt with nor its contents communicated to others except in accordance with written instructions received from Symbol Technologies, Inc.

APPROVAL	NAME	DATE	COMPONENT SPECIFICATION	
DRAWN	M. TORINESE <i>MT</i>	11/19/99	<b>ANT:OMNI, 2.4-2.5GHz,7dBi,W/CBL, W/REV BNC,OPTIONAL PLENUM</b>	
CHECKED	D. PETRY <i>D. Petry</i>	11/19/99		
ENG.	S. LOCKHEAD	11/19/99		
CEG	T. SMURA <i>[Signature]</i>	11/22/99	DOC. NO. 50-11902-XXX	REV A
			SHEET 1 of 5	

**OMNIDIRECTIONAL ANTENNA ASSEMBLY**

Enclosure Material:	Ultraviolet-stabilized Polycarbonate
Mount Style:	Ceiling
Performance:	Omnidirectional
Frequency:	2.4 - 2.5 GHz
Gain:	7 dBi
Bandwidth (1.5:1):	100 MHz
-3dB bmwidth:	65 E-Plane <sup>o</sup>
Weight:	1.1 lb. Max
W/sur Area:	.122 ft <sup>2</sup>
W/survival:	45 mph
Power:	50W
Operating Temperature:	-30°C - 70°C

Note:  
Common Specifications: VSWR - 1.5:1 nominal; Connector Type -N-female; Element material - printed circuit



DRAWING NOT TO SCALE

<b>TABULATION:</b>	50-11902-XXX	XXX = Cable Length in Inches
<b>OPTIONS:</b>	Plenum Rating <sup>1</sup>	Add "P" to Part Number (Rating applies to Cable not Antenna)
	Color	Add single character for color, e.g. Y = Yellow, Without color is white
	Private Label	Add "S" for private label.
<b>EXAMPLE:</b>	50-11902-048P	048 = 48 Inches or 4 FT., P = with Plenum Rating

**Note:**

1. Modified Steiner Tunnel Flame Test (UL-910). Plenum is a closed area, such as between drop ceiling and true ceiling. With rating coax can be run in plenum without conduit.

ITEM	PART#	QTY	DESCRIPTION
1	S2406BH	1	CUSHCRAFT/Signals Omnidirectional Antenna
2	N/A	1	Coaxial Cable (RG58)
3	50-12100-093	1	Reversed Polarized Female BNC Connector

Dimensions are in inches unless otherwise noted

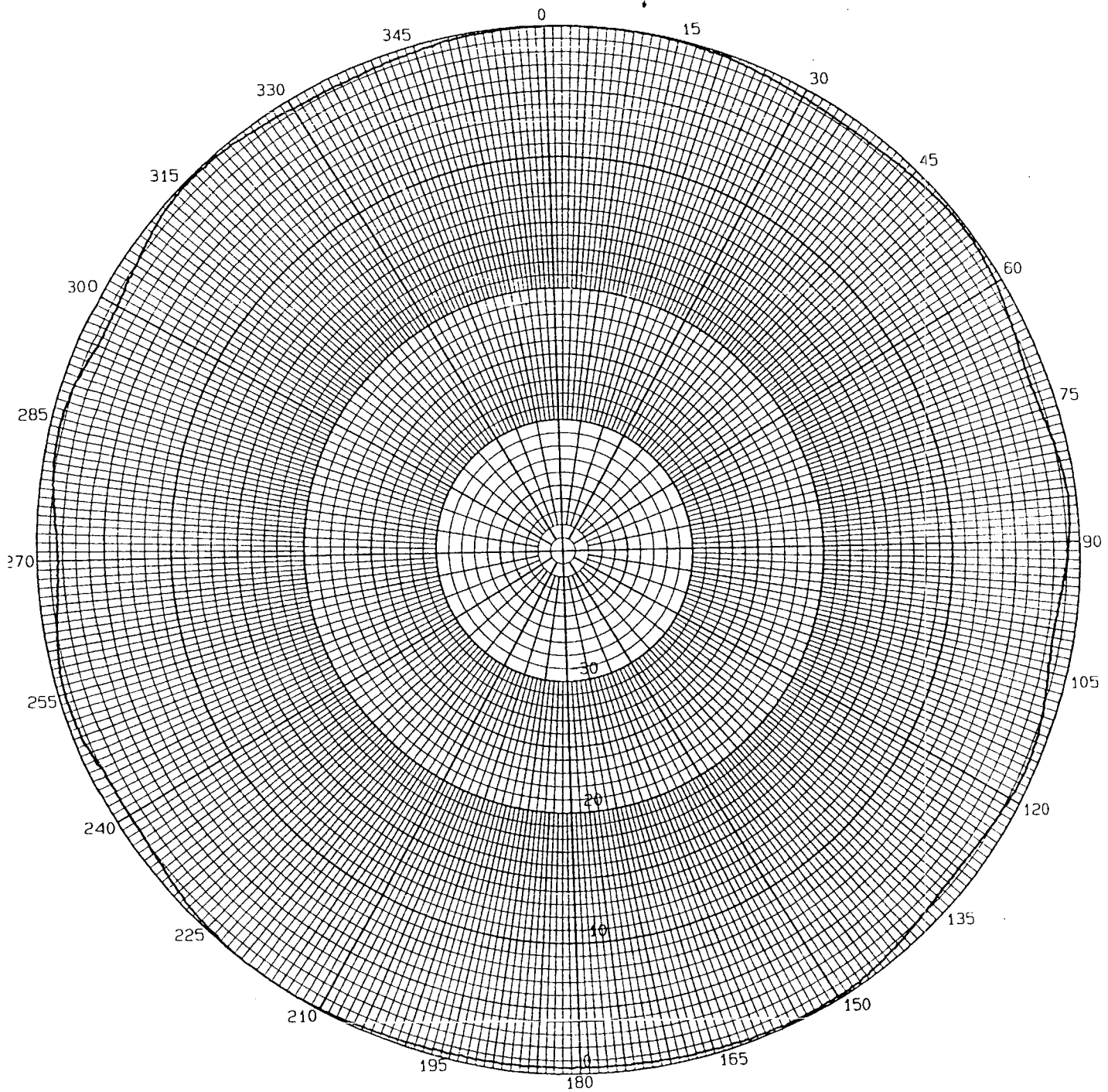
SYMBOL TECHNOLOGIES, INC.

DOCUMENT No.50-11902-XXX

REV A

SHEET 3 of 5

**Typical Radiation Pattern**  
**Freq: 2.45 GHz**  
**Polarization: H- Plane**

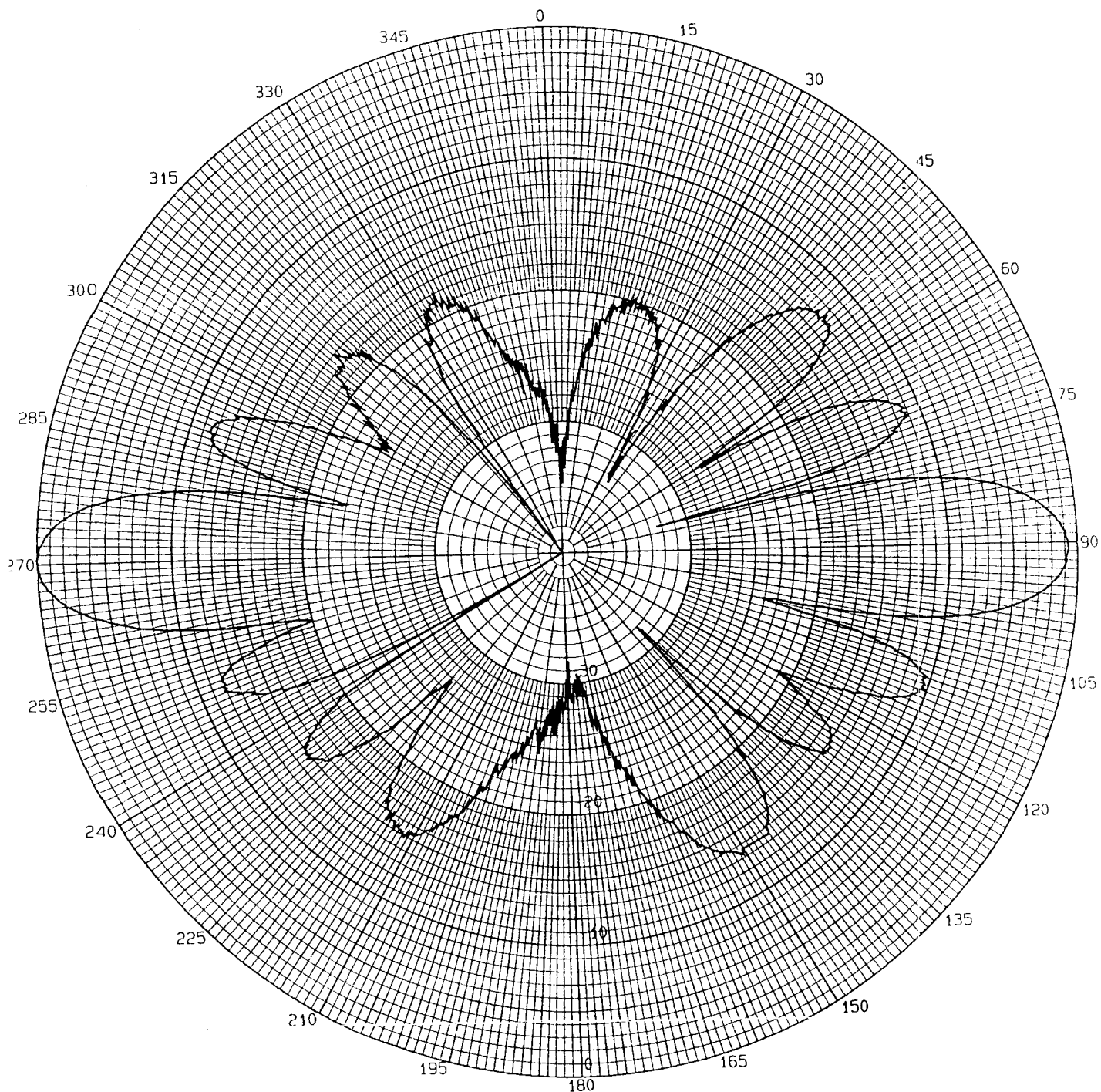


Magnitude dB Vs. Azimuth

Data: \_\_\_\_\_



**Typical Radiation Pattern**  
**Freq: 2.45 GHz**  
**Polarization: E- Plane**



Magnitude dB Vs. Azimuth

Data: \_\_\_\_\_

## Ceiling Panel Antenna

The **Ceiling Panel** antenna is 1.8 dBi omnidirectional in azimuth plane. The **Plane** uses a reverse polarity BNC connector. It is mounted on a horizontal surface. In its use it would be mounted on a ceiling farther than 20 cm from a person's body. It is used with mobile devices.

The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C whenever the device configuration could reduce the MPE distance to be less than 20 cm.

<i>Location</i>	Horizontal Surface
<i>Pattern</i>	Omni
<i>Type</i>	Plane
<i>Max Gain</i>	1.8 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	6 ft (Plenum-rated)
<i>Symbol P/N</i>	ML-2499-SD24-00
<i>MPE Distance</i>	See summary table

**“Important Note: To comply with FCC RF exposure requirements, no one may remain within 20 cm of the antenna for extended periods of time.”**



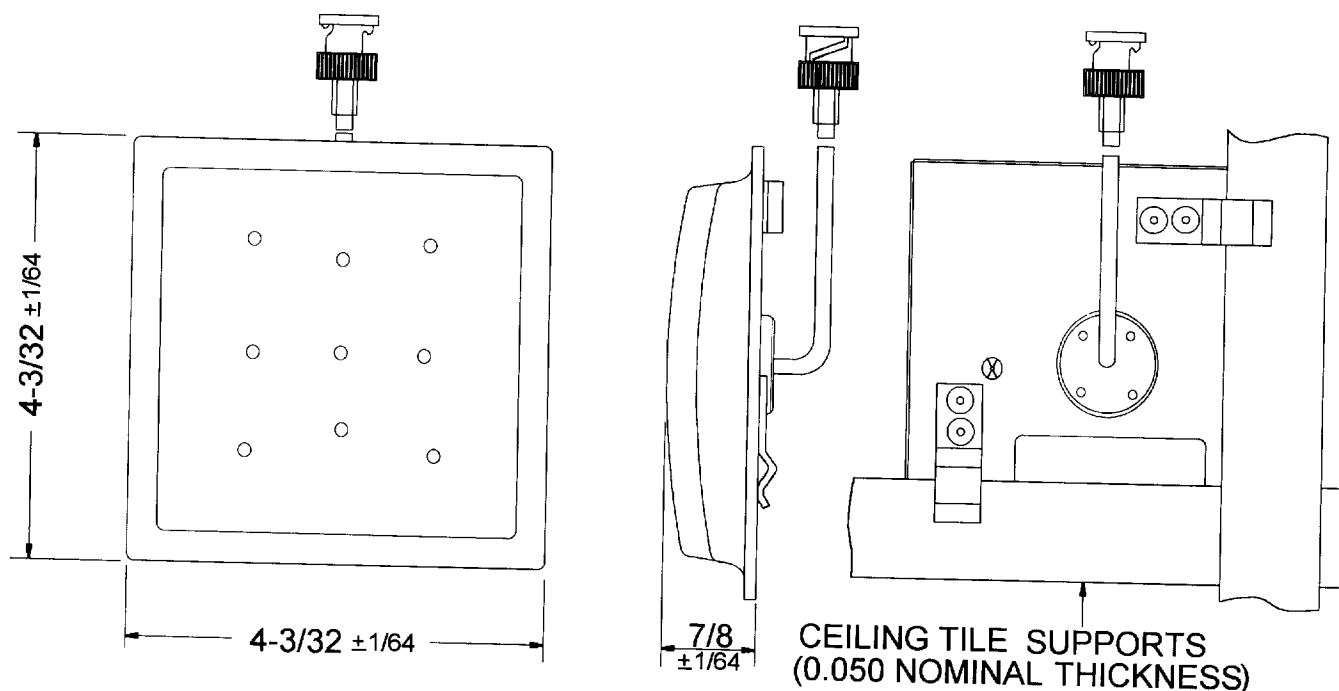
Antenna Photograph



Ceiling Configuration



## DIMENSIONS



**DRAWING NOT TO SCALE**

## SPECIFICATION

### PARAMETER

Frequency  
Gain  
Polarization  
VSWR  
Azimuth Plane Beamwidth  
Elevation Plane 3 dB Beamwidth  
Cable Type  
Cable Length  
RF Connector  
Power  
Antenna Weight (excluding cable)

### PERFORMANCE

2400 – 2500MHz  
1.8 dBi  
Vertical Linear  
1.5:1 Nominal (2.0:1 Max.)  
Omnidirectional  
45° (Peak at 53°)  
Plenum rated RG-58  
72 in.  
Reverse BNC  
10 Watts  
3.2 oz.

Dimensions are in inches unless otherwise noted.

**Trilogy AP**

The Trilogy AP antenna is two sleeved dipole antennas for spatial diversity mounted in an integrated molded housing that mounts to the 11 Mbps series of Access Points. The gain is less than 2 dBi in all planes. The antenna assembly flips up or down to accommodate the access point mounting method of either a horizontal

<i>Location</i>	Table Top, Wall Mount
<i>Pattern</i>	Omni
<i>Type</i>	Spatial Diverse Dipoles
<i>Max Gain</i>	2 dBi
<i>Physical</i>	See attached dwg.
<i>Cable</i>	4.5" min
<i>Symbol P/N</i>	21-20667-XX

or vertical surface. The antenna can swivel to maintain its vertical orientation. This antenna can also be mounted in a plastic base with a longer cable for use with a Spectrum 24 PCI computer card. The antenna will, in this usage clearly will be more than 20 cm from the user and so, be classified as a mobile antenna.

The following RF exposure information is included in a prominent place in the device's user manual to inform the user of safety issues as required by OET Bulletin 65, Supplement C when ever the device configuration could reduce the MPE distance to be less than 20 cm.

**“Important Note: To comply with FCC RF exposure requirements, no one may remain within 20 cm of the antenna for extended periods of time.”**

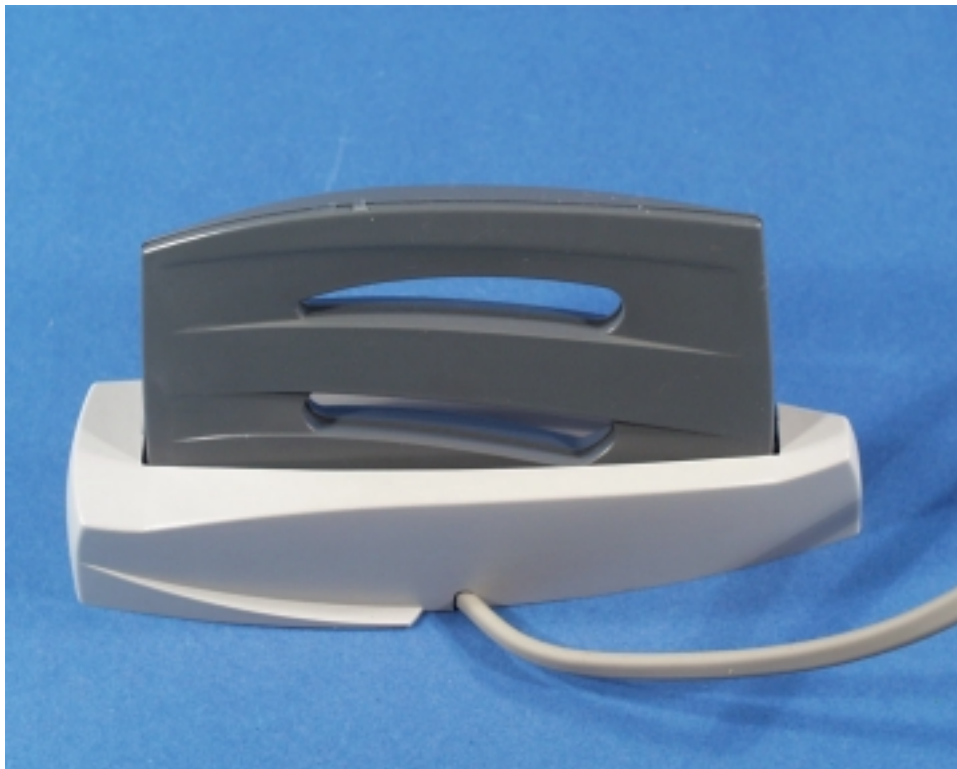


Antenna Installed in Flip up holder





Access point table top configuration



Remote bracket holder.

8

7

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REVISIONS			
REV.	DESCRIPTION	E.C.	DATE
1	ENGINEERING DRAWING		8-23-99
2	4.52 WAS 4.19		8-27-99
3	CHANGED DIRECTION OF CONNECTORS	21437	9-22-99
4	ADDED -03 COLOR	21585	11-99
A	RELEASE FOR PRODUCTION	21680	
B	ADDED NOTES TO SHOW BEND IN ANTENNAS	D4762	

D

D

C

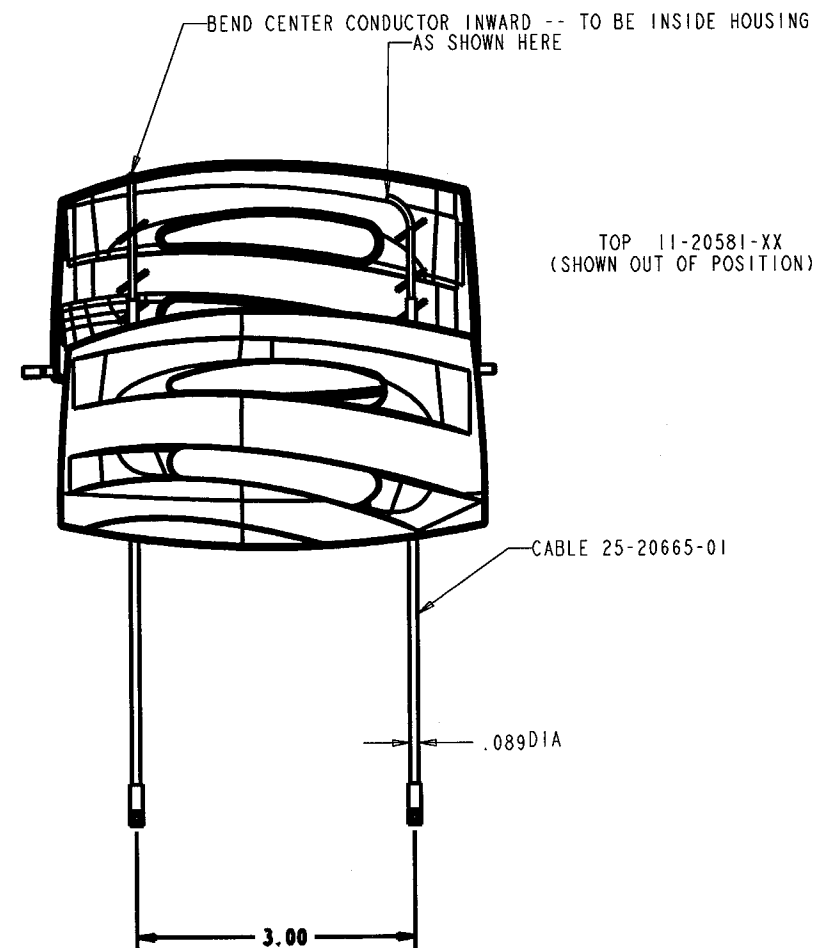
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B

B

A

A

TOP 11-20581-XX  
(SHOWN OUT OF POSITION)

CABLE 25-20665-01

.089 DIA

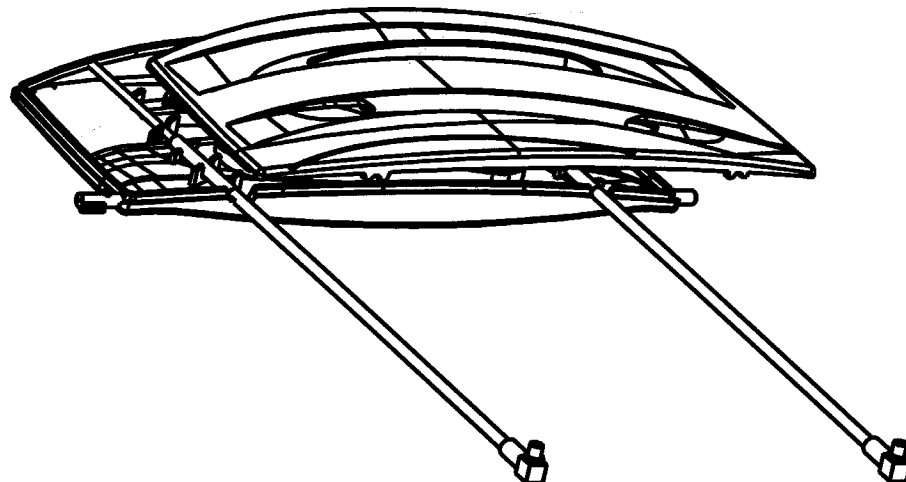
3.00

MMCX CONNECTORS POINTED TOWARD ANTENNA TOP



4.52

BOTTOM 11-20582-XX



SCALE 1.500

## TABULATION BLOCK

DASH NO.	CUSTOMER/COLOR
-01	SYMBOL/ DARK GREY
-02	3COM/ COOL GREY
-03	3COM/ LIGHT GREY

SYMBOL TECHNOLOGIES	
SAN JOSE, CALIFORNIA	
ANTENNA ASSEMBLY, DUAL PORT VISUAL AID	
D 21-20667-XX	
SCALE: NONE	

SYMBOL TECHNOLOGIES	
SAN JOSE, CALIFORNIA	
ANTENNA ASSEMBLY, DUAL PORT VISUAL AID	
D 21-20667-XX	
SCALE: NONE	





