



# RF Exposure Antenna Summary

Network Systems Organization

FCC ID: **H9PLA2400** WLAN PC Card, 1 Mbps, CR-1, Hi Power

Output Power: 500 mW

Class II Permissive Change

Duty Cycle Factor: -9.0 dB

## Mobile Antennas

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	MPE (cm)	TR Status	Device Type
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## Portable Antennas

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	EIRP (mW)	TR Status	Device Type
01.	7546 Trilogy	10-38649-02	F-Element	0.0	0.31	26.68	58.6	Tested	Hand Held
02.	2740 BFA	703624-1	F-Element	0.0	0.07	26.92	61.9	Tested	Hand Held
03.	Vocollect MMCX		Printed	0.0	0.25	26.74	59.5	Tested	Body Worn
04.	7200 Trilogy	10-35477-01	F-Element	0.0	0.13	26.86	61.1	Tested	Hand Held
05.	Toko	50-21900-022	Puck	0.0	0.00	26.99	62.9	Tested	Hand Held
06.	Oniel S24-1	50-21900-023	Slot	0.0	0.39	26.60	57.6	Withdrawn	Body Worn
07.	1740 BFA	703549-1	F-Element	0.0	0.07	26.92	61.9	See # 2	Hand Held
08.	Amity XPn	703611	Slot	0.0	0.58	26.41	55.1	Withdrawn	Hand Held

Antenna Gain listed without cable

**7546 Antenna**

The 7546 antenna is 0 dBi omni-directional in azimuth plane. It is mounted internally 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.

<i>Location</i>	Hand Held Device
<i>Pattern</i>	Omni
<i>Type</i>	F-Element
<i>Gain</i>	0 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	MXYH75
<i>Symbol P/N</i>	10-38649-02

**“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 the user’s body.”**

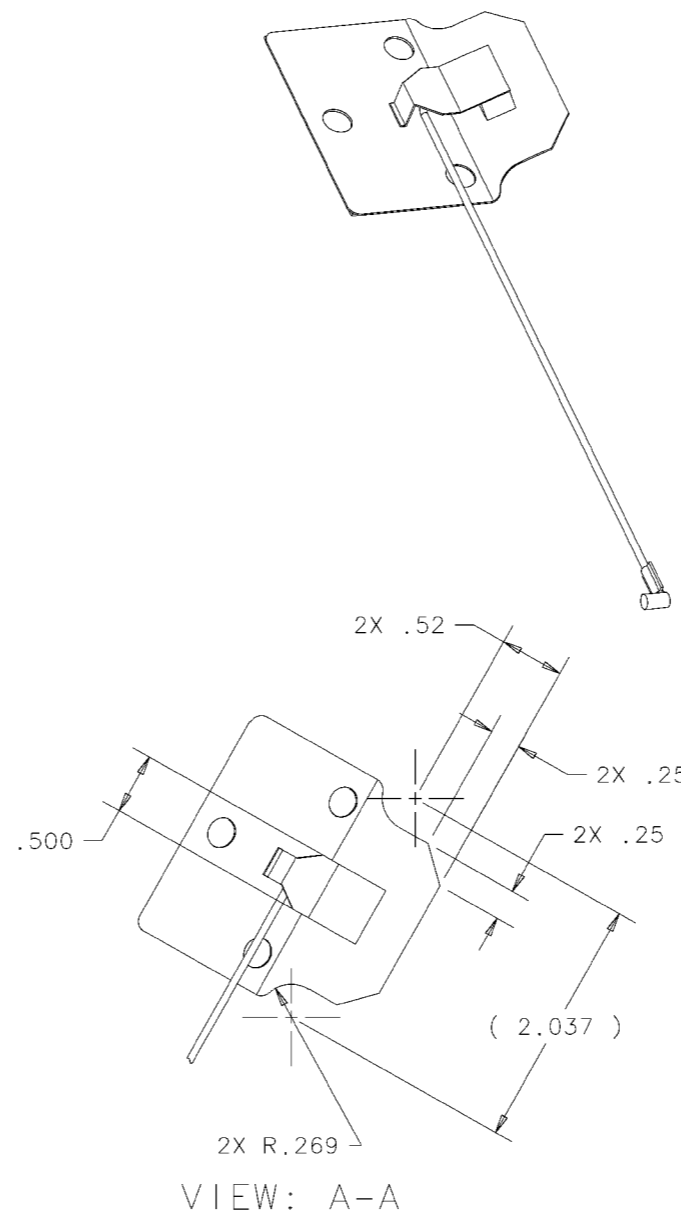
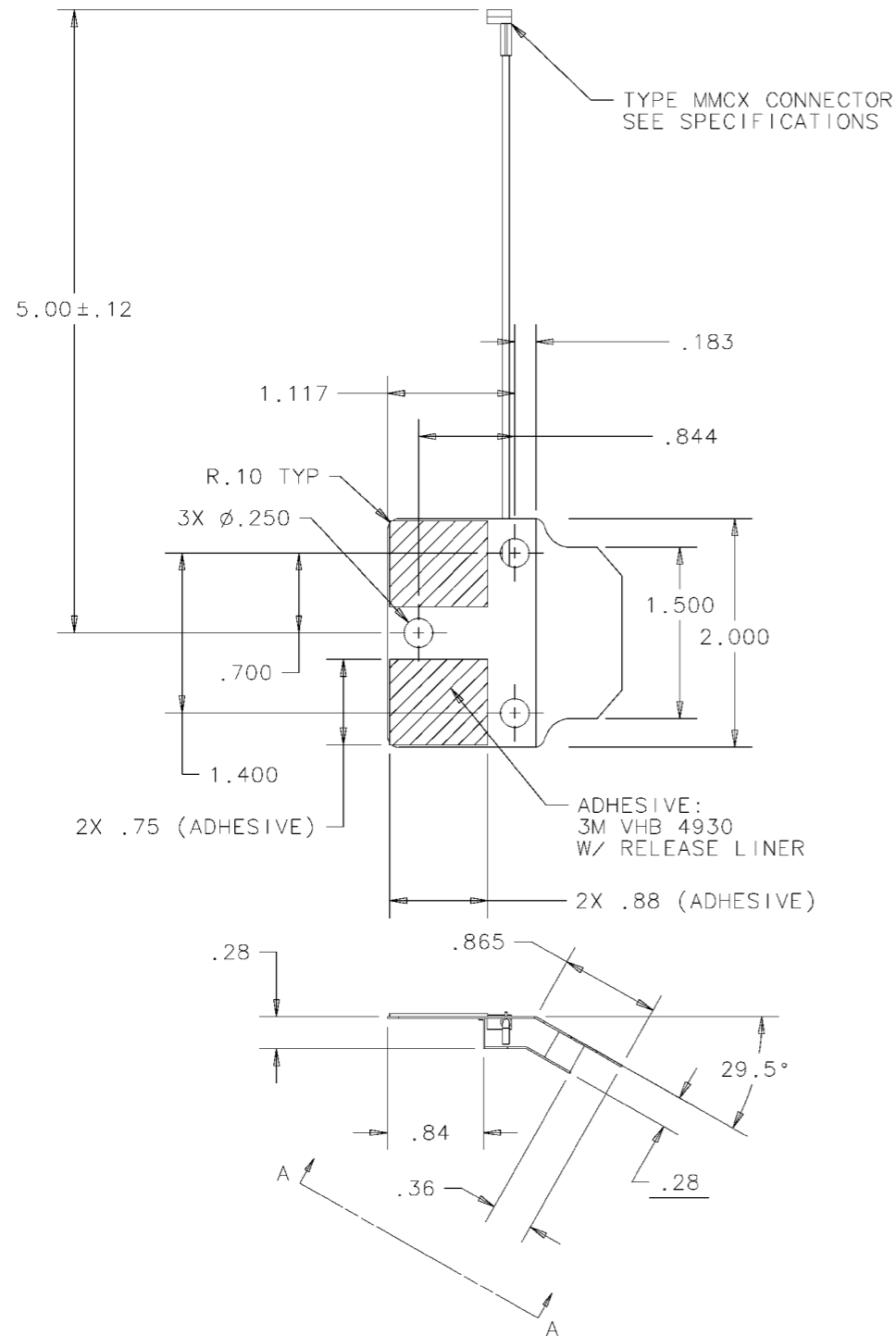


Antenna Installed in Device



Terminal Use Photo

REVISIONS							
REV.	ZONE	△	DESCRIPTION	E.C.	BY	APVD.	DATE
A			RELEASED PER EDR #53455		MB		01/10/00



### SPECIFICATIONS

FREQUENCY: 2.4-2.485 GHZ  
 VSWR: 2.0:1 MAX  
 GAIN: 0dBi NOMINAL  
 POLARIZATION: LINEAR  
 CABLE: RG178  
 CONNECTOR: TYPE MMCX, 50-22100-029

NOTES: UNLESS OTHERWISE SPECIFIED

- MATERIAL: CRS 1008, .015 ± .001THK
- FINISH: BRIGHT TIN PLATE PER MIL-T-10727A, TYPE1, ELECTRO DEPOSITED .00010-.00025 INCHES. FINISH SHALL BE UNIFORM AND EXHIBIT NO EVIDENCE OF CORROSION OR OXIDATION WHEN VIEWED WITH THE UNAIDED EYE, EDGE PLATING ON CUT OR SHEARED SURFACES IS NOT REQUIRED.
- TOLERANCES: .XX ± .03  
.XXX ± .010  
ANGLES ± 1°
- PACKAGE IAW SYMBOL PACKAGING SPECIFICATION 40-04100-013
- BREAK AND DEBUR ALL SHARP EDGES .005 MAX PRIOR TO PLATING

ITEM	QTY.	PART NO.	DESCRIPTION	REMARKS/REF. SYMBOL																																								
<table border="1"> <tr> <td rowspan="4" style="font-size: small;">           THE DWG. &amp; SPECIFICATION CONTAINED HEREON ARE PROPRIETARY AND MUST NOT BE USED, COPIED, REPRODUCED NOR ITS CONTENTS COMMUNICATED TO OTHERS EXCEPT IN ACCORDANCE WITH WRITTEN INSTRUCTIONS RECEIVED FROM SYMBOL TECHNOLOGIES INC.         </td> <td colspan="2">DIMENSIONS ARE IN INCHES</td> <td>APPROVALS</td> <td>DATE</td> <td rowspan="4" style="text-align: center;"> <b>SYMBOL TECHNOLOGIES INC.</b>            Bohemia, New York   <b>ANTENNA: 2.4 GHz TYPE F</b> </td> </tr> <tr> <td colspan="2">UNLESS OTHERWISE SPECIFIED</td> <td>DRAWN M. BUNYON</td> <td>01/10/00</td> </tr> <tr> <td>.XX</td> <td>+/-</td> <td>+/- .01</td> <td>CHECKED M. SAVONA</td> <td>01/10/00</td> </tr> <tr> <td>.XXX</td> <td>+/-</td> <td>+/- .005</td> <td>ENGINEER C. THELEMANN</td> <td>01/10/00</td> </tr> <tr> <td colspan="2">ANGLES ± 1° FRACTIONS ± 1/64</td> <td>MFG. ENG.</td> <td colspan="2"></td> </tr> <tr> <td colspan="2">MATERIAL:</td> <td>PRODUCT</td> <td colspan="2"></td> </tr> <tr> <td colspan="2">FINISH:</td> <td>QUALITY</td> <td colspan="2"></td> </tr> <tr> <td colspan="2"></td> <td>ANALYST L. DOBKOWSKI</td> <td>01/10/00</td> <td></td> </tr> </table>					THE DWG. & SPECIFICATION CONTAINED HEREON ARE PROPRIETARY AND MUST NOT BE USED, COPIED, REPRODUCED NOR ITS CONTENTS COMMUNICATED TO OTHERS EXCEPT IN ACCORDANCE WITH WRITTEN INSTRUCTIONS RECEIVED FROM SYMBOL TECHNOLOGIES INC.	DIMENSIONS ARE IN INCHES		APPROVALS	DATE	<b>SYMBOL TECHNOLOGIES INC.</b> Bohemia, New York  <b>ANTENNA: 2.4 GHz TYPE F</b>	UNLESS OTHERWISE SPECIFIED		DRAWN M. BUNYON	01/10/00	.XX	+/-	+/- .01	CHECKED M. SAVONA	01/10/00	.XXX	+/-	+/- .005	ENGINEER C. THELEMANN	01/10/00	ANGLES ± 1° FRACTIONS ± 1/64		MFG. ENG.			MATERIAL:		PRODUCT			FINISH:		QUALITY					ANALYST L. DOBKOWSKI	01/10/00	
THE DWG. & SPECIFICATION CONTAINED HEREON ARE PROPRIETARY AND MUST NOT BE USED, COPIED, REPRODUCED NOR ITS CONTENTS COMMUNICATED TO OTHERS EXCEPT IN ACCORDANCE WITH WRITTEN INSTRUCTIONS RECEIVED FROM SYMBOL TECHNOLOGIES INC.	DIMENSIONS ARE IN INCHES		APPROVALS	DATE		<b>SYMBOL TECHNOLOGIES INC.</b> Bohemia, New York  <b>ANTENNA: 2.4 GHz TYPE F</b>																																						
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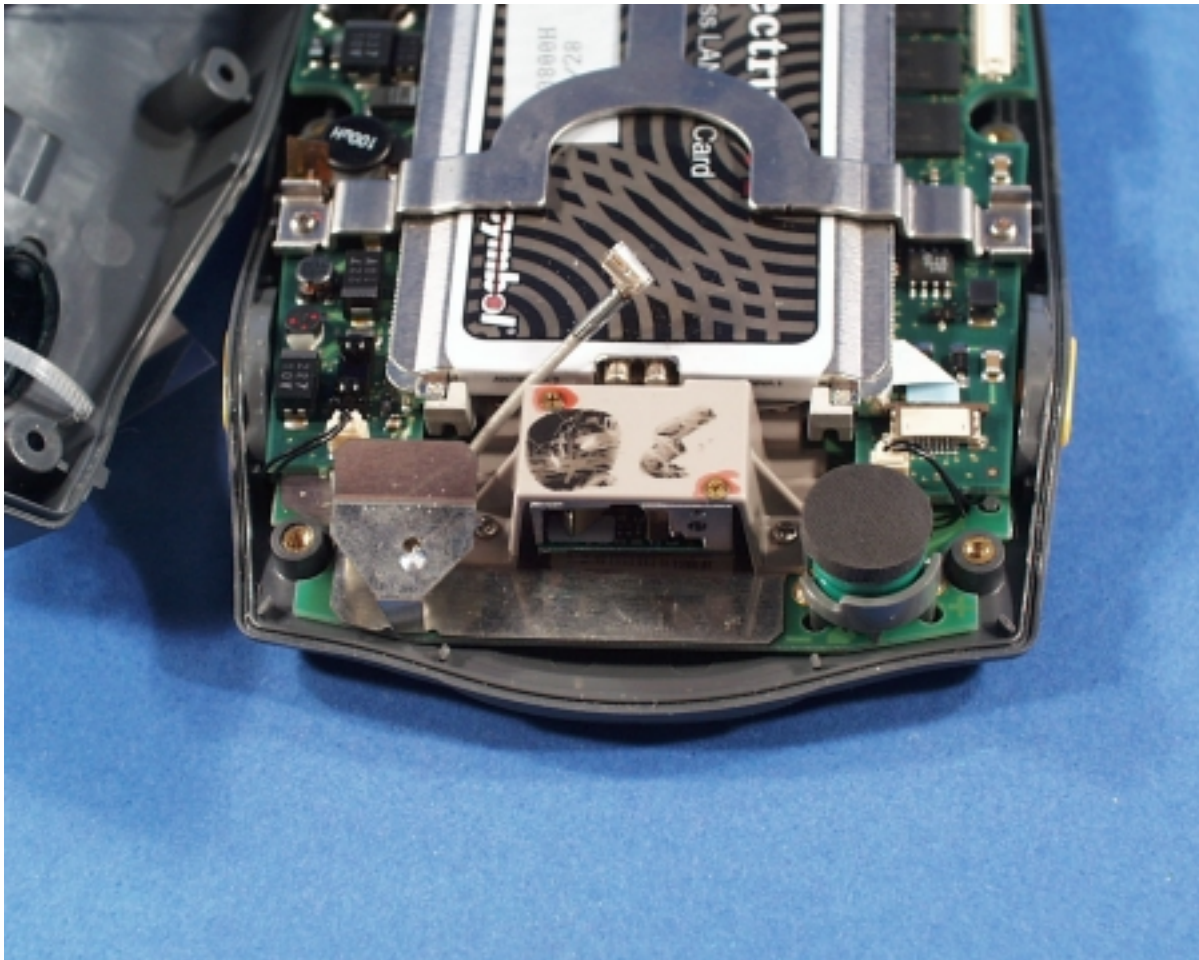
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C	10-38649-02	A
SCALE: 1:1	SOLID MODEL	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
SHEET 1 OF 1		

**2740 Antenna**

The 2740 antenna is 0 dBi omni-directional in azimuth plane. It is mounted internally 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.

<i>Location</i>	Hand Held Device
<i>Pattern</i>	Omni
<i>Type</i>	F-Element
<i>Gain</i>	0 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	MXYPH75
<i>Symbol P/N</i>	703624-1

**“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 the user’s body.”**



Antenna Installed in Device

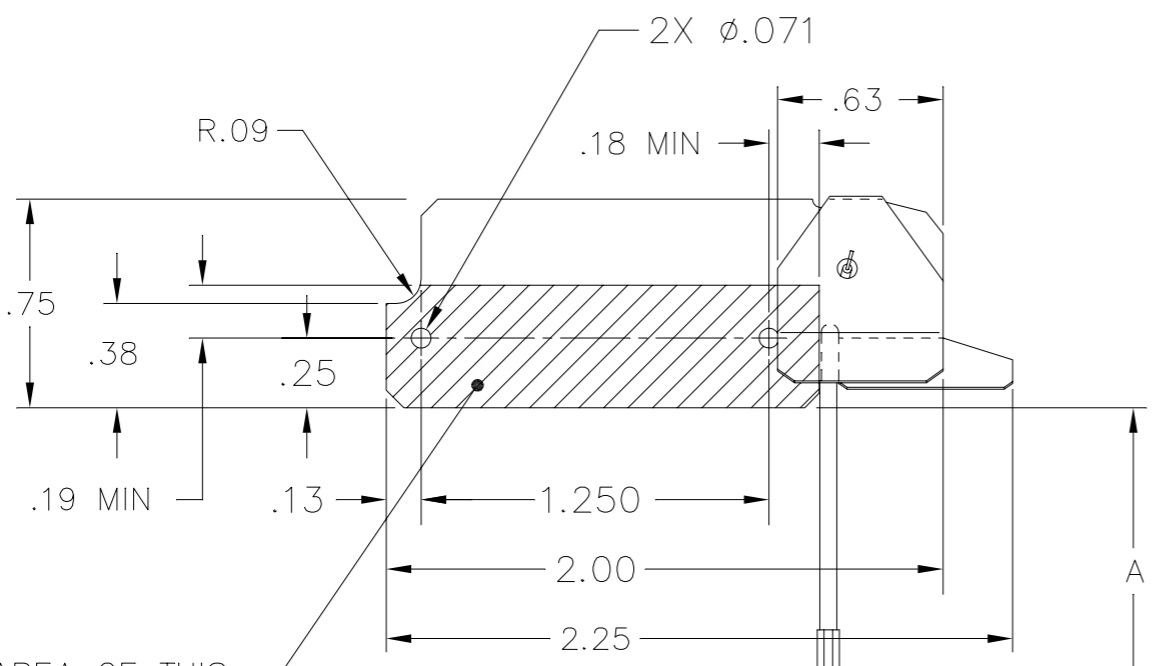




Terminal Use Photo

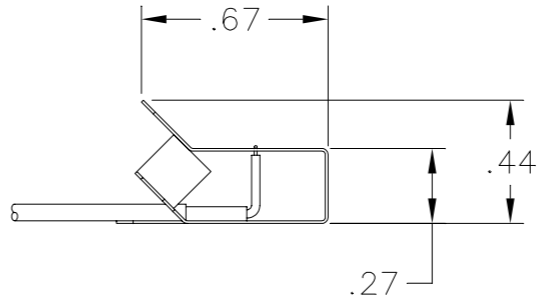
TECOM PROPRIETARY:  
 INFORMATION CONTAINED HEREIN SHALL NOT BE DISCLOSED TO  
 A THIRD PARTY WITHOUT WRITTEN PERMISSION FROM TECOM.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



SHADED AREA OF THIS SURFACE TO BE FREE OF SOLDER

CONNECTOR,



### SPECIFICATIONS

FREQUENCY: \_\_\_\_\_ 2.4-2.485 GHZ  
 VSWR: \_\_\_\_\_ 2.0:1 MAX  
 GAIN: \_\_\_\_\_ 0dBi NOMINAL  
 POLARIZATION: \_\_\_\_\_ LINEAR

- 4. SHARP CORNERS & EDGES .005 MAX.
- 3. FINISH SHALL BE UNIFORM AND EXHIBIT NO EVIDENCE OF CORROSION OR OXIDATION WHEN VIEWED WITH THE UNAIDED EYE. EDGE PLATING ON CUT OR SHEARED SURFACES IS NOT REQUIRED.

-2	MMCX MALE RT ANGLE	1.85±.12	-
-1	MURATA TYPE BFA	1.16±.12	-
DASH NO	CONNECTOR	A	REV

- 2. ALTERNATE:  
 MATERIAL: CRS 1008, .010 THK.  
 FINISH: BRIGHT TIN PLATE PER MIL-T-10727A, TYPE 1, ELECTRO DEPOSITED .00010-.00025 IN.
- 1. MATERIAL: ELECTROLYTIC TIN PLATED STEEL SHEET, .010 THK.

PMIC	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES: .XX ± .03 .XXX ± .010 ANGLES ± 0°30' MACHINED SURFACE ROUGHNESS 125 ✓ REMOVE BURRS, SHARP EDGES R.005-.015 MACHINED FILLETS R.005-.015 DIMENSIONS ARE AFTER PLATING. MACHINED DIA'S ON COMMON CENTERLINE CONCENTRIC WITHIN .005 TIR. INTERPRET PER ANSI Y14.5M-1982.		CONTRACT NUMBER	
			CONTRACTOR	
			DRAWN BY J. LOWE	DATE 12/1/99
			CHECKER	MFG ENGR
			QA	ENGR
			PRGM MGR	ENGR
HOLE TOLERANCES:				
.040 - .128	+ .003 - .001	.515 - .750	+ .008 - .001	
.136 - .228	+ .004 - .001	.765 - 1.000	+ .010 - .002	
.234 - .500	+ .006 - .001	1.031 UP	+ .015 - .002	
MATL ENGR		APPROVAL		

TECOM INDUSTRIES INC.  
 9324 TOPANGA CYN BLVD CHATSWORTH, CA. 91311  
**TECOM** TECHNICAL EXCELLENCE COMMITTED TO QUALITY

ANTENNA,  
2.4 GHZ

SIZE C	CAGE CODE 52791	DWG NO 703624
SCALE 2/1	UNIT WT (703595)	SHEET 1 OF 1

NOTES : UNLESS OTHERWISE SPECIFIED



## Talkman Open – 2.4 GHz Symbol Radio Information

### Vocollect Antenna Specifications

Type: Dipole  
Gain: 2 dBi  
Polarization: Circular  
Physical description: Implemented on flat and rigid printed circuit board, internally mounted, parallel to the belt mounting loop.  
Min distance from skin: 2.1 inches (1.70 inches to inside to belt loop plus 0.40 inches of padded belt)

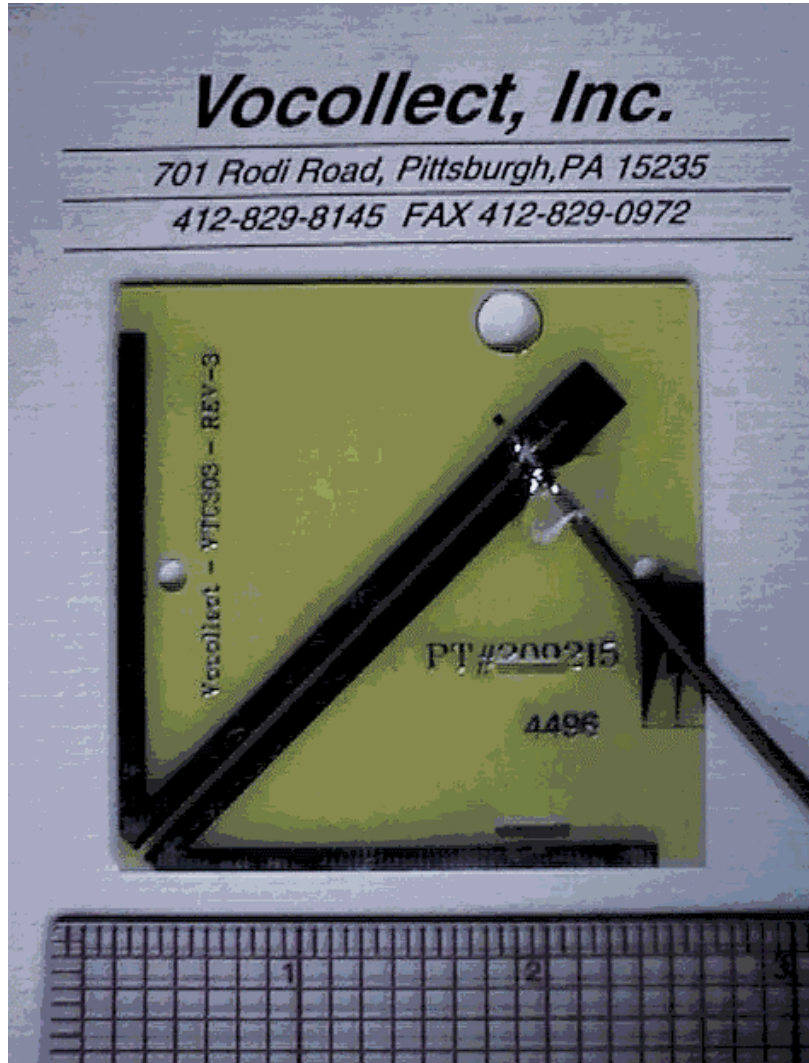
**Table 1: Bill of Materials- Talkman Open – Symbol Radio and Antenna**

Item	Qty	Vocollect Part #	Vendor Part #	Supplier	Description
1	1	656022		Austin Antenna	ANTENNA PCB
2	1	606012	90174601	Huber-Suhner	CABLE ASSY, ANTENNA



Voccollect, Inc.

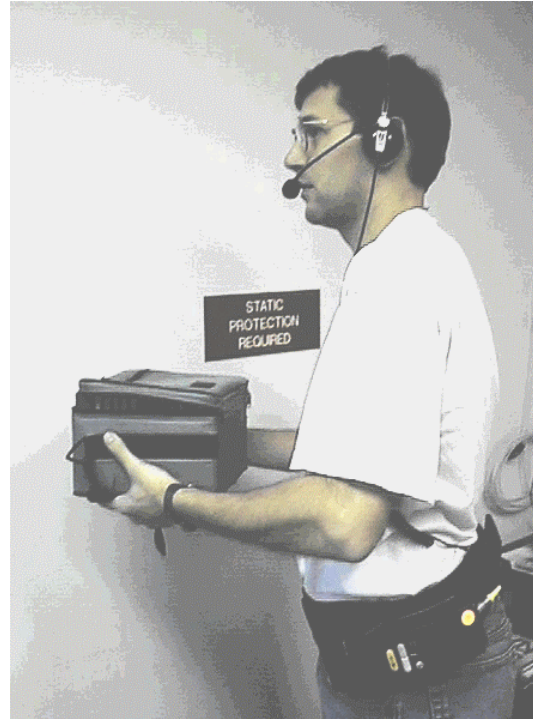
**Image 1: 2.4 GHz Antenna PC Board**



**IMAGE 2: Beltworn Terminal - Drawing**

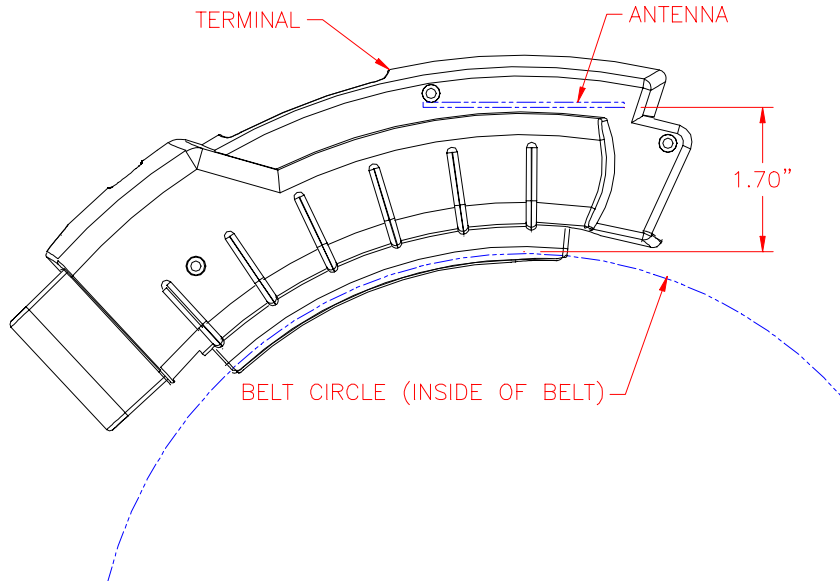


**IMAGE 3: Beltworn Terminal**



**IMAGE 4: Drawing of Antenna Placement Inside Unit.**

The antenna is mounted in the plane parallel to the belt loop and waist, 1.70 inches away from the belt loop used to connect the terminal to the padded mounting belt. Including the belt thickness, the radio is at least 2.1 inches distant from the skin.



**IMAGE 5: The unit mounts on a padded belt ½” thick.**

The unit is connected to the belt by a secondary strap secured to the belt. The full width of the main padded belt remains between the terminal and user's body.

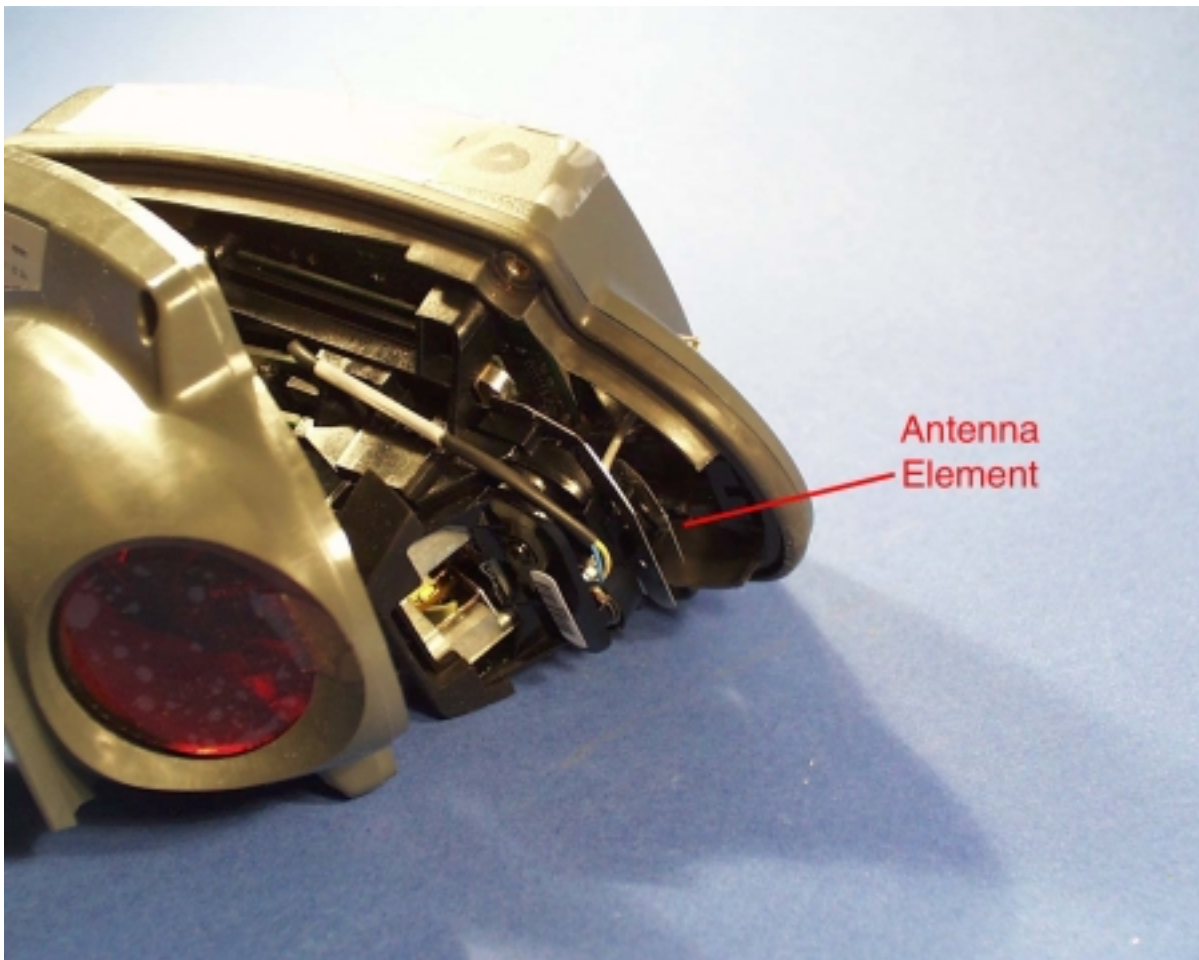


**7240 Antenna**

The 7240 antenna is 0 dBi omni-directional in azimuth plane. It is mounted internally 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.

<i>Location</i>	Hand Held Device
<i>Pattern</i>	Omni
<i>Type</i>	F-Element
<i>Gain</i>	0 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	MXYP75
<i>Symbol P/N</i>	10-35477-01

**“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 the user’s body.”**

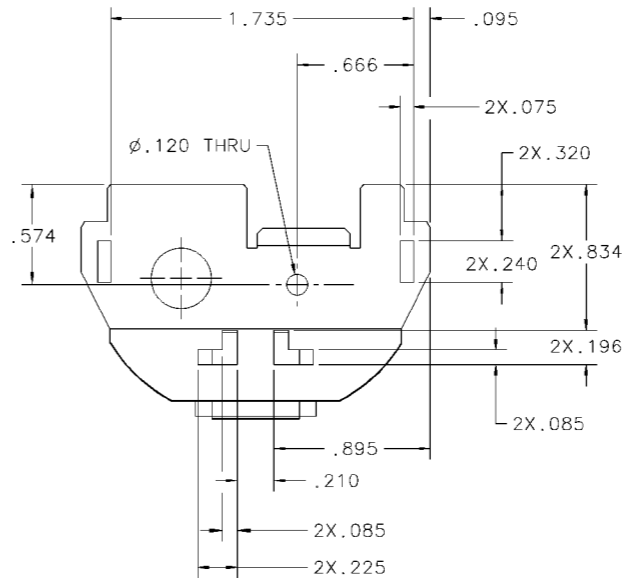
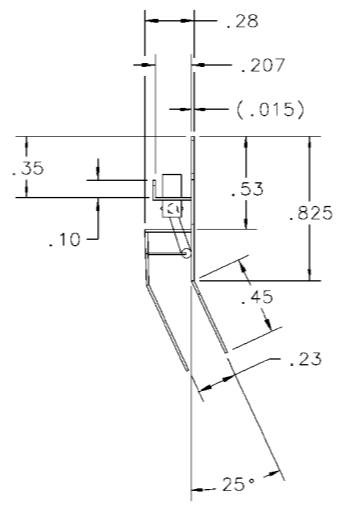
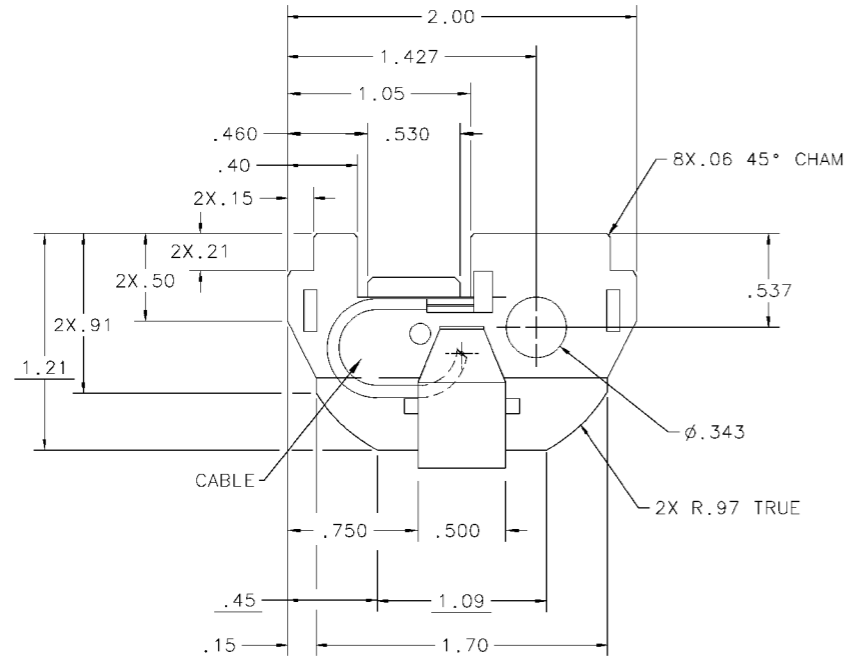


Antenna Installed in Device



Terminal Use Photo

REVISIONS						
REV	ZONE	APPROVALS	DESCRIPTION	E.C.	BY	DATE
1			INITIAL RELEASE PER PPD# 51859		JKW	11-03-99
2			REVISED PER PPD #52781 1) REVISED PER TECOM'S DWG		MB	12/8/99
3			REVISED PER PPD #53240 1) DIM .45 WAS .42 2) ADDED NOTE 5		MB	12/29/99



**SPECIFICATIONS**

- NOTES: UNLESS OTHERWISE SPECIFIED:
- MATERIAL: CRS 1008, .015 THK, SHARP CORNERS AND EDGES .005 MAX. ALTERNATE: ELECTROLYTIC TIN.
  - FINISH: BRIGHT TIN PLATE PER MIL-T-10727A, TYPE 1, ELECTRO DEPOSITED .00010-.00025 IN. FINISH SHALL BE UNIFORM EXHIBIT NO EVIDENCE OF CORROSION OR OXIDATION WHEN VIEWED WITH THE UNAIDED EYE. EDGE PLATING ON CUT OR SHEARED SURFACES IS NOT REQUIRED.
  - PACKAGE ITEMS IN ACCORDANCE WITH STI GENERAL PACKAGING SPEC #50-04100-013.
  - WORKMANSHIP PER STI STANDARD SS-03800-57.
  - ALL UNDERLINED DIMENSIONS ARE OUT OF SCALE AND ARE NOT REFLECTED IN THE 3-D DATA BASE

FREQUENCY: 2.4-2.485 GHz  
 VSWR: 2.0:1  
 GAIN: 0dbi NOMINAL  
 POLARIZATION: LINEAR  
 CABLE: RG178  
 CONNECTOR: 50-22100-029 (MMCX)

ITEM	QTY	PART NO.	DESCRIPTION	REMARKS/REF. SYMBOL
PARTS LIST				
		DIMENSIONS ARE IN UNLESS OTHERWISE SPECIFIED		APPROVALS DRAWN JKW 11-03-99 CHECKED M.SAVONA 11-03-99 ENGINEER J.CONNELLY 11-03-99 MFG. ENG.
		MATERIAL: SEE NOTE 1 FINISH: SEE NOTE 2		PRODUCT QUALITY ANALYST L.DOBKOWSKI 12-29-99
		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.		SYMBOL TECHNOLOGIES INC. Bohemia, New York ANTENNA: 2.4GHZ, 1 1/2MBPS, PDT7200
		NEXT ASSY: PDT 7200 USED ON: DO NOT SCALE DRAWING		SIZE D DWG. NO. 10-35477-01 SCALE: 2:1 SOLID MODEL <input checked="" type="checkbox"/>
				REV 3 SHEET 1 of 1



**Toko Antenna**

The Toko antenna is 0 dBi omni-directional in azimuth plane. It is mounted as a through hole device directly on the printed circuit board of a hand held device. 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 Bullitin 65, Supplement C.

<i>Location</i>	Hand Held Device
<i>Pattern</i>	Omni
<i>Type</i>	Dielectric Puck
<i>Gain</i>	0 dBi
<i>Physical</i>	2.5" x 2.5" x 0.75"
<i>Cable</i>	none
<i>Symbol P/N</i>	50-21900-022

**“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 the user’s body.”**







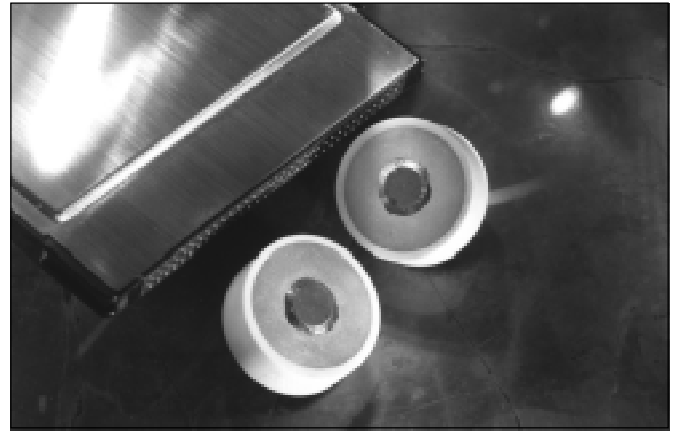
## ANTENNA ELEMENT FOR 2.4 GHz

### DESCRIPTION

The DAC Series is a miniature dielectric antenna element for 2.4 GHz wireless LAN systems. This antenna has vertical polarization characteristics. TOKO's proprietary ceramic dielectric material provides excellent stability and sensitivity. It is mountable in Type II extended PCMCIA cards.

### FEATURES

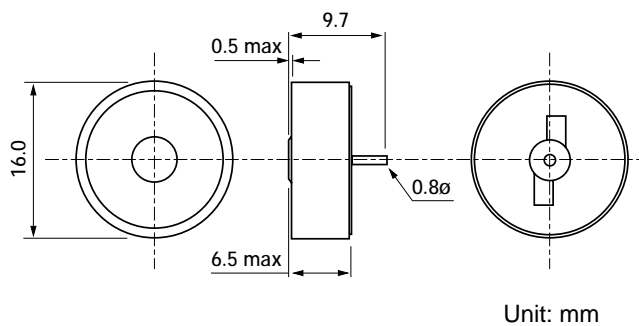
- Vertical Polarization reception
- Low profile (6.5mm max)
- Omni-directional in azimuth
- Low interference design
- Central feeding point terminal
- Wide bandwidth
- Light weight



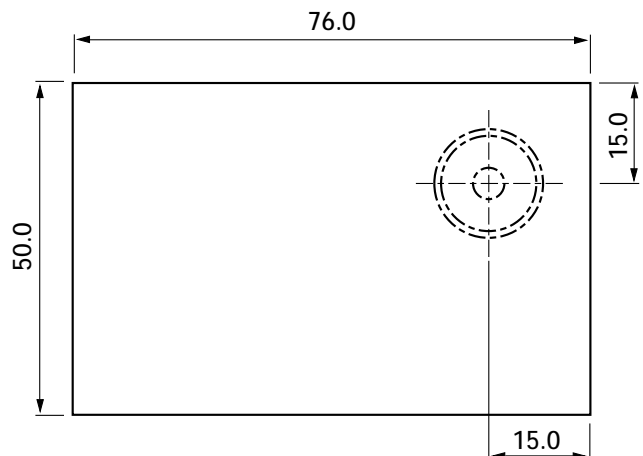
### SPECIFICATIONS

Part Number	DAC2450CT1
Center Frequency	2450 MHz
Receiving Bandwidth	±50 MHz min.
Impedance	50Ω
Peak Gain	2.15 dBi (0dBi typ.) max.
Operating Temperature	-10 ~ +60° C
Storage Temperature	-20 ~ +85° C
Weight	4g

### DIMENSIONS DAC SERIES

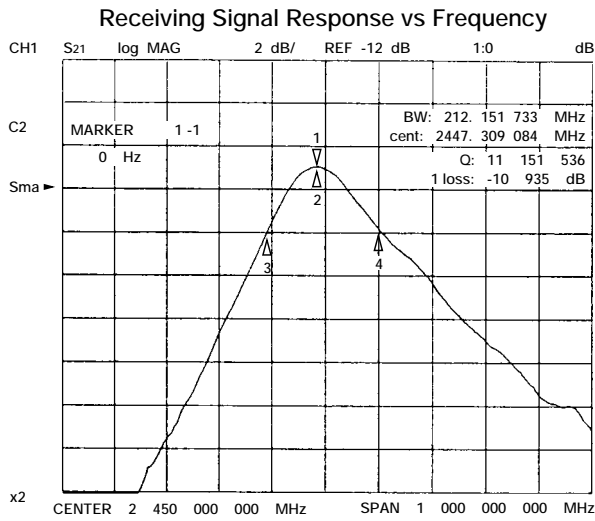


### Mounted with Ground Plane

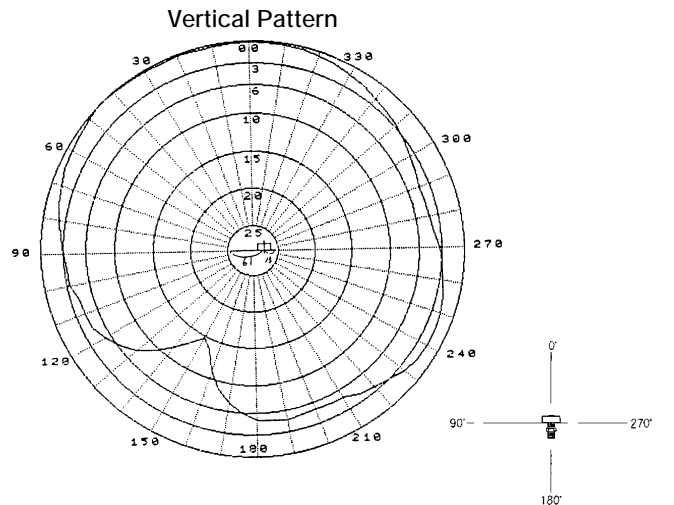
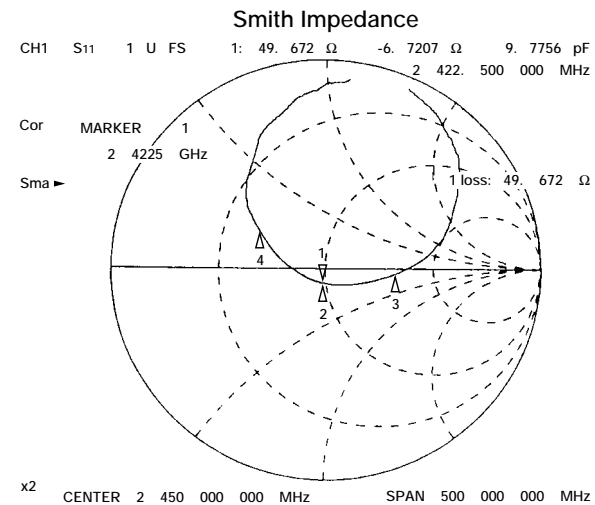
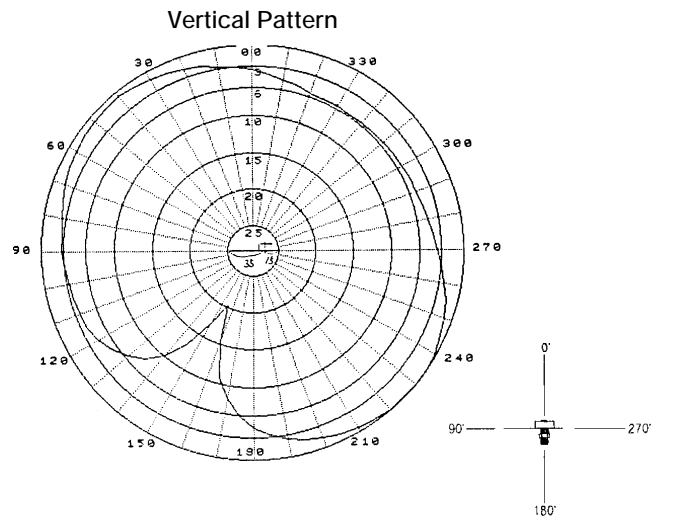
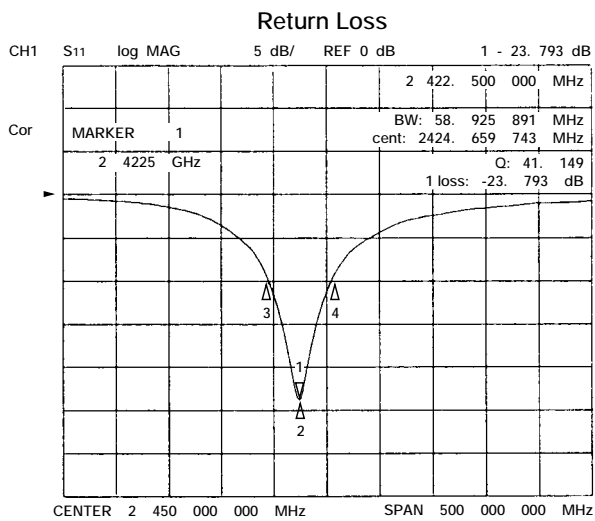
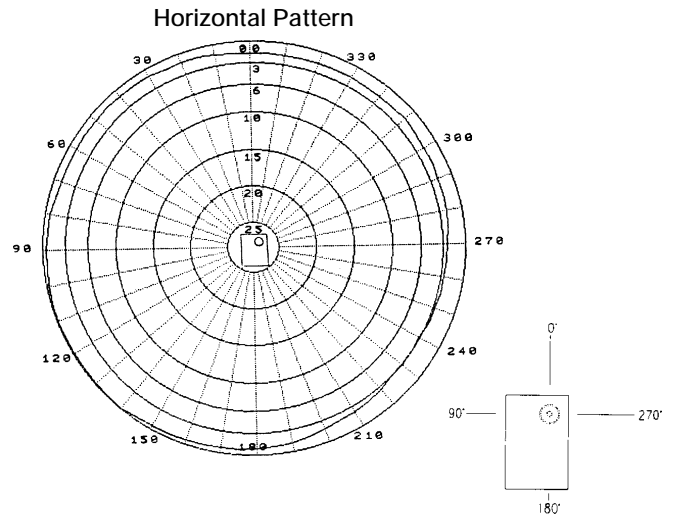


# DAC Series

## TYPICAL CHARACTERISTICS

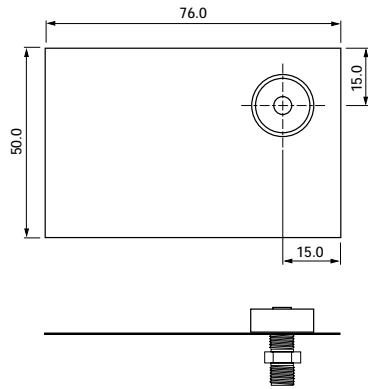


## DIRECTIVITY CHART



## INTERFERENCE COMPARISON OF DAC VS. PLANAR INVERTED F ANTENNA

DAC Set-up



Planar F Inverted Set-up

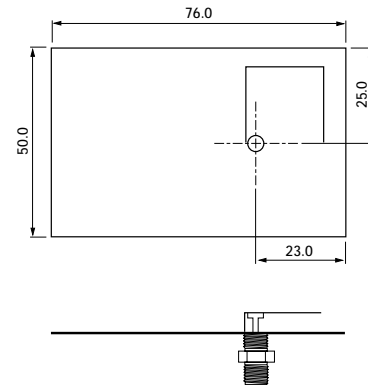


Fig.1

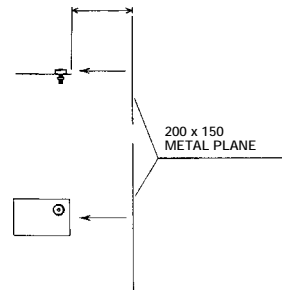
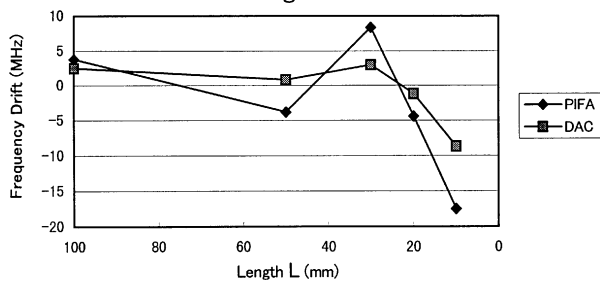


Fig.2

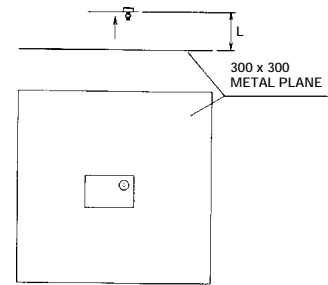
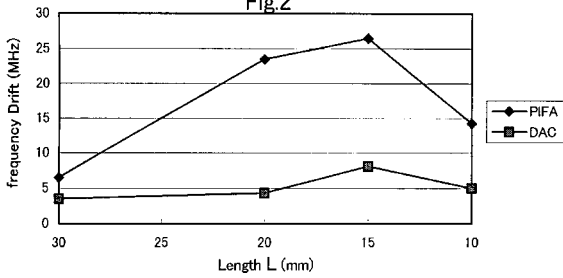


Fig.3

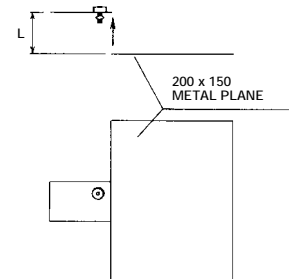
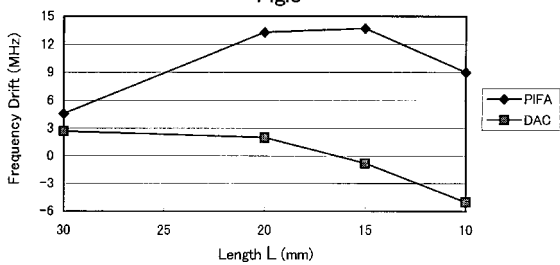
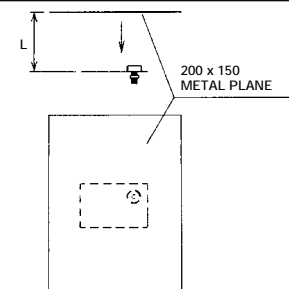
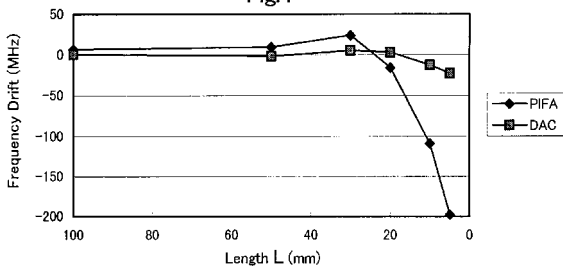


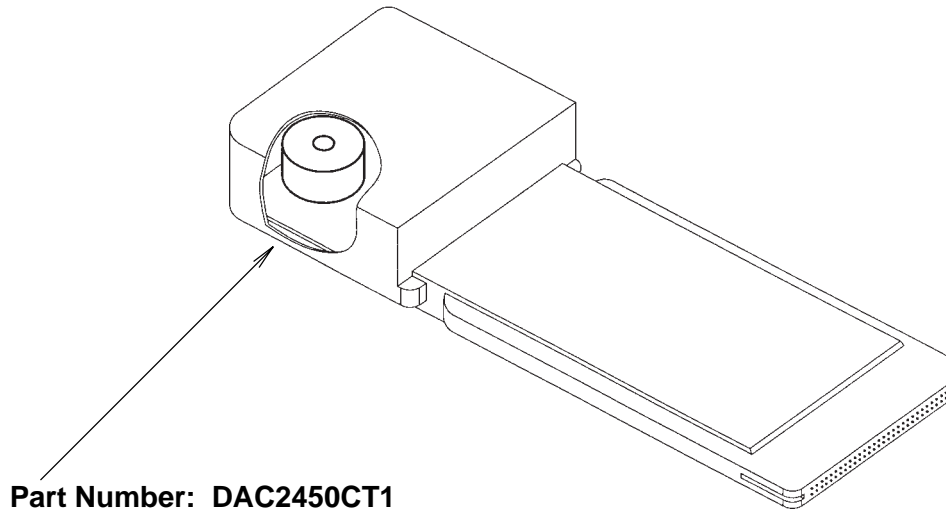
Fig.4



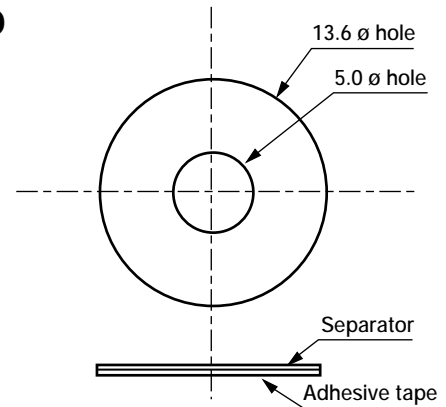
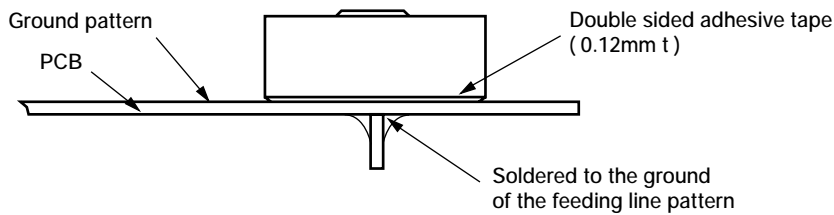
# DAC Series

## TYPICAL APPLICATION

### MOUNTED IN PCMCIA TYPE II EXTENDED CARD



## TYPICAL MOUNTING TO PRINTED CIRCUIT BOARD



#### Notes:

- Fix the antenna element on PCB using double sided adhesive tape of 0.12mm thickness. (Recommend No. 5015 : NITTO DENKO CORP.)
- Solder the antenna terminal pin on the bottom side of PCB to the ground of the feeding line pattern.
- The terminal pin should be separated from the ground pattern.

Unit: mm

Material: Nitto N5015

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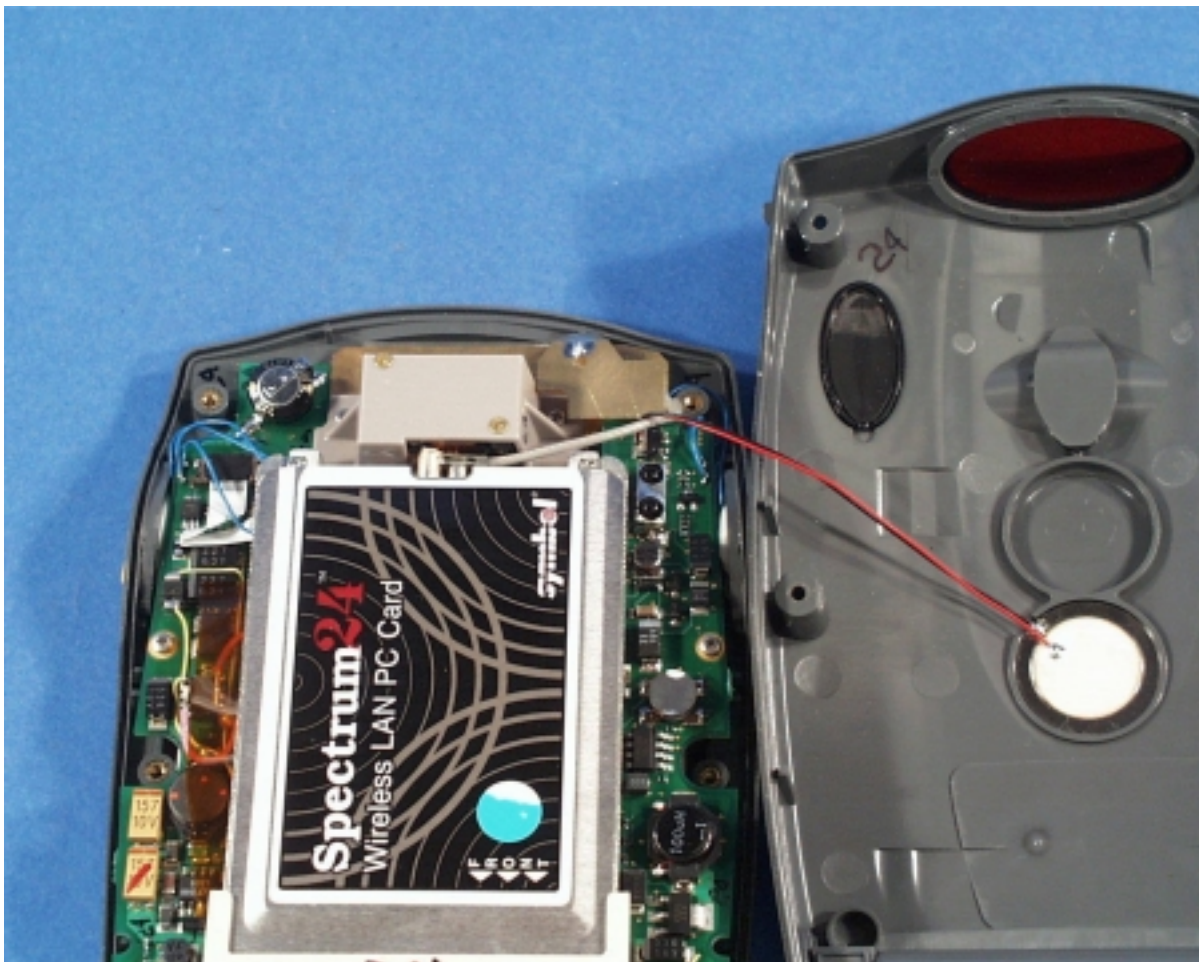


## 1740 Antenna

The 1740 antenna is 0 dBi omni-directional in azimuth plane. It is mounted internally 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.

<i>Location</i>	Hand Held Device
<i>Pattern</i>	Omni
<i>Type</i>	F-Element
<i>Gain</i>	0 dBi
<i>Physical</i>	See attached dwg
<i>Cable</i>	MXYH75
<i>Symbol P/N</i>	703549-1

**“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 the user’s body.”**



Antenna Installed in Device



Terminal Use Photo

