

BreezeAccess

Functional Description and Block Diagram

AU-O/A-2.4-110

SU-O/A-1D-2.4-110

SU-O/A-4D-2.4-110

SU-O/A-8D-2.4-110

SU-O/A-16D-2.4-110

SU-O/A-BD-2.4-110

SU-O/A-1D1V-2.4-110

SU-O/A-4D1V-2.4-110

SU-O/A-8D1V-2.4-110

SU-O/A-16D1V-2.4-110

SU-O/A-BD1V-2.4-110

1. Functional Description.

The BreezeAccess products are designed to operate under IEEE 802.11 standard.

Each product is divided to indoor unit and outdoor unit, as shown in Fig. 1.

These units are connected together using four-pair CATEGORY 5 PATCH cable for outdoor use.

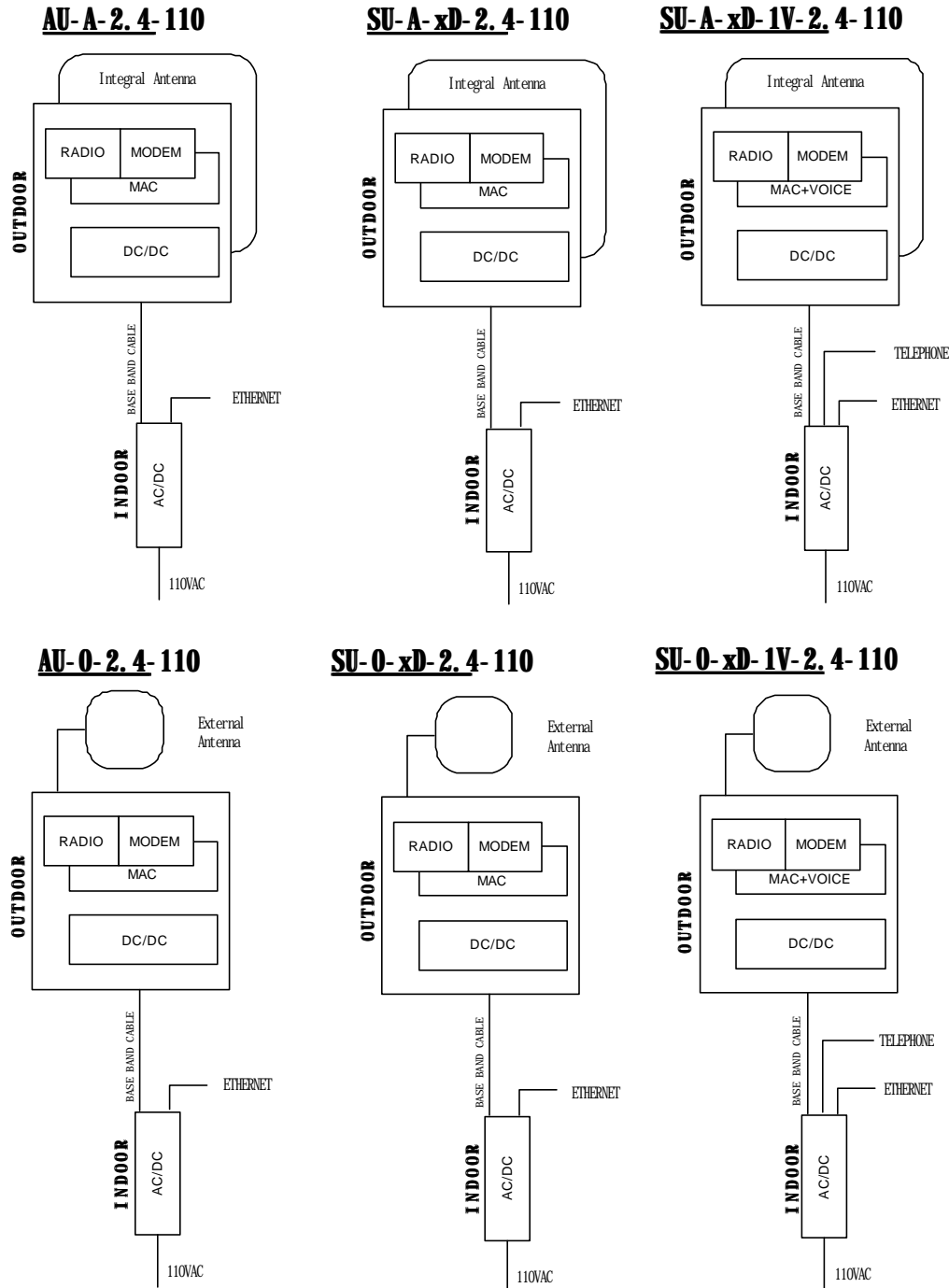


Fig. 1 BreezeAccess Products

1.1. *Outdoor Unit*

AU-A-2.4-110, SU-A-2.4-xD1V-110 and SU-A-2.4-xD-110 outdoor units are integrated with 16dBi antenna.

The AU-O-2.4-110 and SU-O-xD/1V-2.4-110 outdoor units doesn't include integral antenna.

The hardware of the outdoor unit in the AU-O/A-2.4-110, SU-O/A-2.4xD-110 is identical.

SU-O/A-xD1V has in addition voice port..

All products have the same RADIO.

The outdoor unit includes 4 main blocks:

- RF block.
- Base Band block.
- Digital block.
- DC/DC and protection block

The outdoor unit consists of three boards:

1. MAC Board, which contains the CPU that runs the protocol and the Ethernet port.
In the case of SU-O/A-xD1V-110 this board includes telephone interface as well.
2. PHY Board, which contains the physical layer (Modem and RF areas) designed to run under IEEE 802.11.
3. Protection board, which contains DC/DC and protection circuits.

“xD” stands for 1D, 4D, 8D, 16D or BD, which are software internal modes of operation

1.2. *Indoor Unit*

The indoor unit of AU-O-2.4-110 and SU-O/A-2.4-xD-110 are identical. They include outdoor unit connector, mains input connector and network Ethernet connector.

The indoor unit of the SU-O/A-xD/1V-2.4-110 includes a Telephone connector as well as all other connectors.

The indoor unit consist from AC/DC 110/56V transformer and protection circuit.

1.3. *Antennas*

The following products: AU-A-2.4-110, SU-A-xD-2.4-110, SU-A-xD-2.4-110, have integral antenna, 16dBi.

The following products: AU-O-2.4-110, SU-O-xD-2.4-110, SU-O-xD-2.4-110, have external antenna's:

- TIL-TEK-TA2304-2 sectoral 16dBi
- TIL-TEK TA2308 directional 17dBi
- SUHNER PLANAR ANTENNA planar 16.5 dBi
- ANAD OMNI ANTENNA 16dBi

2. Block Diagram

2.1. *RF Block.*

2.1.1. The RF part has 2 main functions:

1. Modulate and transmit analog data.
2. Receive and demodulate the RF signals and forward these signals to the Baseband processor in analog form.

2.1.2. Oscillators.

There are three RF oscillators on the RF board:

1. Tx VCO (Modulator) which continuously operates at 880 MHz, and in transmit mode is divided by two.
2. Rx VCO, serves as LO for the second conversion, Operates at 452 MHz.
3. Hopping synthesizer, Operate in the frequency range of 1962 MHz to 2040 MHz, Step size is 1 MHz.

There is also a Reference Oscillator that operates at 16 MHz, Used as reference for all 3 VCO's. All 3 synthesizers are frequency locked by use of PLL.

2.1.3. Transmit Path.

The transmit path consists of a modulator operating at twice the IF frequency, Hopping VCO, Up converter, PA and Diversity switch.

In transmit mode the divider is operated and thus enabling the division of the modulator by 2. This signal is unconverted by mixing it with the hopping signal that operates as LO. The mixed signal that is now in the 2.4 GHz band is filtered and fed to the PA, filtered again and through the diversity switch feeds the antenna.

The modulating signal is a 2, 4 or 8 levels analog signal.

2.1.4. Receive Path.

The received signal is received in any of the antennas, selected by the diversity switch, filtered and transferred to the LNA, filtered again and down converted by mixing the received signal with the hopping synthesizer. The product has a 440 MHz IF where the signal is filtered and down converted to 12 MHz where it is demodulated into baseband signal. The baseband signal is filtered and transferred to the baseband processor. The output signal is a 2, 4, or 8 levels analog signal with 1 MHz bandwidth.

The block diagram of the radio is shown in Fig. 2.

2.2. *Modem Block.*

The modem consists of 3 main areas:

1. The DSP processor running at 64 MHz, based on internal PLL referenced by the 2 MHz clock derived from the 16 MHz produced by the radio.
2. DSP hardware support running at 8 MHz.
3. Analog part consists of D/A running at 4 MHz, an A/D running at 1 and 2 MHz and a second A/D running at 250 kHz clock.

The block diagram of the modem is shown in Fig. 3.

2.3. Mac Board:

The CPU board (MAC) contains 4 main blocks for the data option and additional block for the voice option:

1. CPU RISK processor running at 25 MHz 32 bits, using 4Mhz crystal oscillator. The CPU interfaces with DRAM banks, FLASH memory, NVRAM and serial ROM.
2. MAC Hardware support that is a state machine implemented by an EPLD running in 0.5 MHz rate.
3. Ethernet PHY, operated by a 20 MHz crystal oscillator.
4. MAC-PHY Interface using a serial bus running at 5 MHz burst mode and a 8 bit parallel bus running at the CPU rate.
5. Voice interface, using SLIC CODEC and DSP which running with 40Mhz, using 4Mhz crystal oscillator. This block includes DC up converter. The block diagram of the voice interface is shown in Fig. 4b.

The block diagram of the CPU is shown in Fig. 4a.

2.4. Indoor Unit:

The indoor unit includes two main blocks:

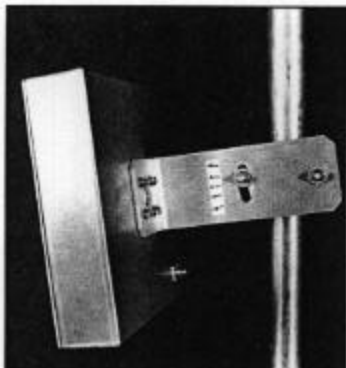
1. AC to DC transformer and rectifier diodes.
2. Protection circuits.

The indoor unit is shown on Fig. 5.



TIL-TEK

**TA-2308
DIRECTIONAL ANTENNA**

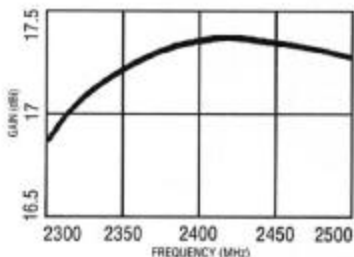


The TA-2308 panel antenna consists of a broadband dipole array on a printed circuit board, enclosed in an aluminum cavity with a plastic front cover. It was designed specifically for point-to-multipoint rural radio applications. The antenna may be mounted for either vertical or horizontal polarization and can be tilted up or down. The antenna elements are at DC ground to aid in lightning protection.

ELECTRICAL SPECIFICATIONS

Frequency Range: 2300 - 2500 MHz
Gain: 17.0 dBi nominal (see graph below)
VSWR: 1.5:1 maximum
Polarization: Vertical / Horizontal
Power Rating: 25 watts
H-Plane Beamwidth (-3 dB): 22 degrees
E-Plane Beamwidth (-3 dB): 22 degrees
Cross-Polarization Discrimination: 20 dB minimum
Impedance: 50 ohms nominal
Termination: Type N female

GAIN vs. FREQUENCY



MECHANICAL SPECIFICATIONS

Length: 12.6 in. (320 mm)
Width: 11.8 in. (300 mm)
Depth: 3.0 in. (76 mm)
Weight Including Clamp: 7 lb. (3.2 kg)
Rated Wind Velocity: 125 mph (200 km/hr)
Horizontal Thrust at Rated Wind: 58 lb. (26 kg)
Mounting: Mounts to a 0.75 - 3.0 in. O.D. (19 - 76 mm) pipe using the TMC-105 clamp supplied

MATERIALS

Radiating Elements: Tin plated copper on PCB
Radome: White ASA, UV stabilized
Reflector: Irridited aluminum
Clamp: Hot dip galvanized steel

TIL-TEK ANTENNAS INC.

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Data subject to change without notice. Printed in Canada, September 1996.

Form 1120

SUHNER® PLANAR ANTENNA FOR WIRELESS COMMUNICATION

SPA 2400/85/17/0/V

Technical Data

Electrical Properties	
Frequency range	2300 - 2500 MHz
Impedance	50 Ω
VSWR	1.5
Polarization	linear, vertical
Gain	16.5 dBi
3 dB beamwidth horizontal	85°
3 dB beamwidth vertical	6°
Downtilt	0°
Front to back ratio	25 dB
Permitted power on entrance	100 W (CW) at 25 °C

Mechanical Properties	
Dimensions	1220 x 85 x 35 mm (48.03" x 3.35" x 1.38")
Weight	2.1 kg (lbs.)
Housing material	Aluminium anodized
Radome material	ASA
Radome color	RAL 7035 (light-grey)
Operating temperature range	- 40° C to + 80° C
Storage temperature range	- 40° C to + 80° C
Windload	75 N at 160km/h (100mph)

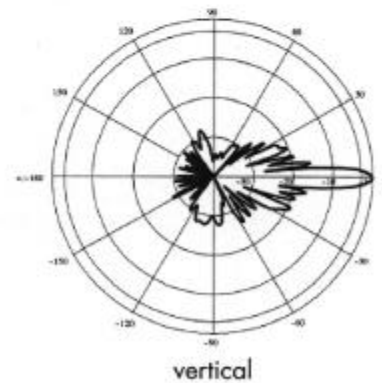
Available Types	
1324.17.0005	N female

Mounting Hardware	
9091.99.0076	downtilt bracket
Mast and wall mounting material (2 metal bands) included, mast diameter 45-90 mm (1.77" - 3.54")	

100 ~~150~~ \$600
 1000 ~ \$500
 1-10 \$650



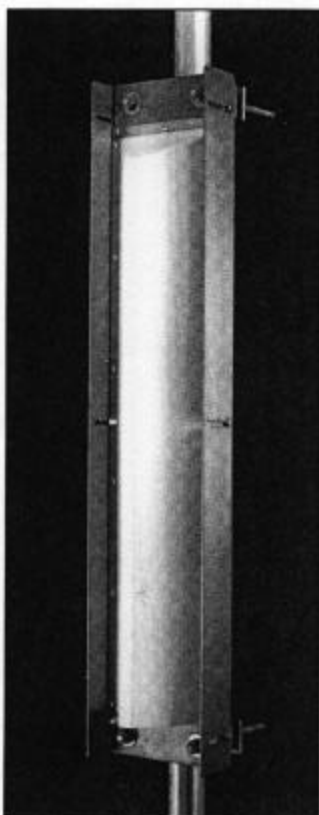
Radiation Pattern





TIL-TEK

TA-2304-2
ADJUSTABLE SECTORAL ANTENNA



The TA-2304-2 is a vertically polarized sectoral antenna. It can be ordered with three different kinds of side panels, depending on the horizontal beamwidth required: fixed at 45 degrees, fixed at 180 degrees or field adjustable to 60, 90, 120 or 160 degrees. Radiating elements are protected by a weatherproof radome for operation under severe weather conditions (icing, salt air, acid rain, etc.) and are at DC ground for lightning protection.

ELECTRICAL SPECIFICATIONS

Frequency Range: 2300 - 2500 MHz
Gain: 18.5 dBi for 45 degree sector; 17.5 dBi for 60 degree sector;
15.5 dBi for 90 degree sector; 14.5 dBi for 120 degree sector;
13.0 dBi for 160 degree sector; 12.5 dBi for 180 degree sector
VSWR: 1.5:1 maximum
Polarization: Vertical
Power Rating: 25 watts
H-Plane Beamwidth (-3 dB): Fixed at 45 degrees; fixed at 180 degrees;
or field adjustable to 60, 90, 120 or 160 degrees
(nominal mid-band values)
E-Plane Beamwidth (-3 dB): 7.2 degrees
Cross-Polarization Discrimination: 20 dB minimum
Impedance: 50 ohms nominal
Termination: Type N female (7/16 jack optional)

MECHANICAL SPECIFICATIONS

Length: 40 in. (1016 mm)
Width: 4.9 in. (124 mm)
Depth: 4.6 in. (117 mm)
Weight Including Clamps: 8 lb. (3.6 kg)
Rated Wind Velocity: 125 mph (200 km/hr)
Horizontal Thrust at Rated Wind: 86 lb. (39 kg)
Mounting: Mounts to a 0.75 - 3.0 O.D. (19 - 76 mm) pipe using the TMC-101 clamps supplied (TMC-105 clamps optional)

MATERIALS

Radiating Elements: Tin plated
copper on PCB
Radome: Gray ASA, UV stabilized
Reflector: Iridited aluminum
Clamps: Hot dip galvanized steel

TIL-TEK ANTENNAS INC.

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Form 1141-1



WLL Subscriber Antenna

ANAD-158W-A-6-SM
ANAD-159W-A-6-SM
ANAD-160W-A-6-SM

V3.00

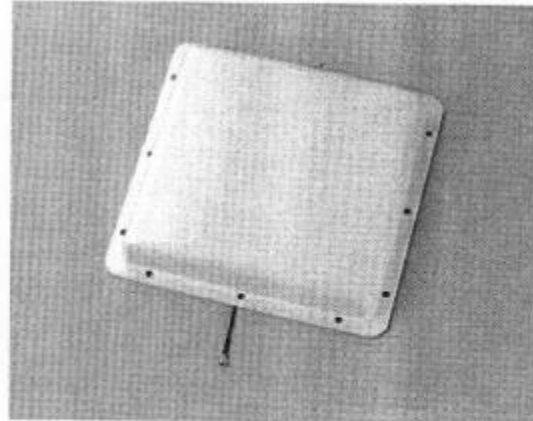
Features

- Low profile
- Single piece circuit board construction
- Multiple gain and beamwidth options available
- Color and finish options available
- Available in 3 frequency bands

Description

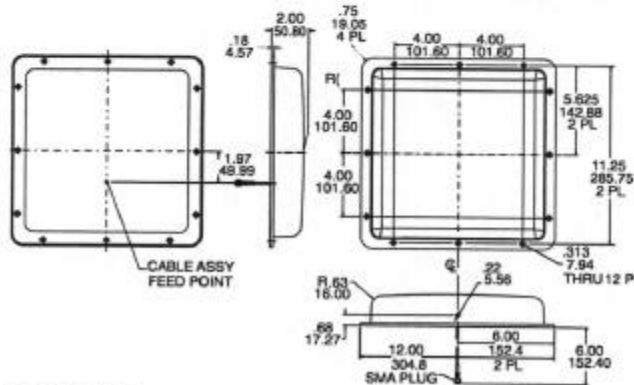
M/A-COM's WLL subscriber antenna belongs to our family of Planar Array antennas. With our patented technology and automated production process, we can quickly and cost effectively derive antennas that fit your requirements.

Our WLL antennas are assembled with an innovative backplane which becomes a shielded enclosure to house RF and/or digital electronics. The antenna element alone may also be purchased for integration into your housing.



Specifications

Part Number	Frequency	Gain	Beamwidth Azimuth (3 dB)	Beamwidth Elevation (3 dB)	VSWR	Dimensions
ANAD-158W-A-6-SM	1850 – 1990 MHz	14 dB	30° nominal	28° nominal	1.5:1/1.6:1 typical	12" x 12" x 2"
ANAD-159W-A-6-SM	2300 – 2500 MHz	16 dB	28° nominal	27° nominal	1.5:1/1.6:1 typical	12" x 12" x 2"
ANAD-160W-A-6-SM	3400 – 3700 MHz	18 dB	23° nominal	17° nominal	1.5:1/1.6:1 typical	12" x 12" x 2"



Note: Dimensions given in inches over millimeters.

BreezeCOM

BreezeCOM Integral Antenna

Attachment (B) REV 1
(Stand Alone Antenna)

1. Description:

This document specifies the electrical, mechanical & environmental characteristics of directional antenna MT-10016.

2. Applicable Documents

2.1. Mechanical interface control drawing (see attached) RD40638900C

3. Electrical Characteristics

3.1 Frequency Range:	2.4 GHz - 2.48 GHz	
3.2 Gain:	16 dBi 15-5	(min)
3.3 3 dB Beamwidth:	Azimuth 20°	(nom)
	Elevation 20°	(nom)
3.4 VSWR:	1.5 : 1	(max)
3.5 Polarization:	Linear	
3.6 Power:	2 Watt	
3.7 Input Impedance:	50 Ohms	
3.8 Front to Back	26 db	

4. Mechanical Characteristics

4.1 Input Connector:	SMA, male, terminating 20 cm cable	
4.2 Dimensions:	See drawing RD40638900C	
4.3 Weight:	1.5 Kg	(max)
4.4 Radome:	Plastic, white polycarbonate	
4.5 Base Plate:	Aluminum	

5. Environmental Characteristics

5.1 Temperature:	Operating: - 40 °C to + 71 °C
5.2 Vibration:	ETS 300 019-1-4 (Feb 92), Class 4.1 Sweep rate = 0.1 Octave/min; 10 cycles
5.3 Shock:	ETS 300 019-2-2, Table 7
5.4 Wind Load:	Operating: 150 Km/hr. Survival: 250 Km/hr.
5.5 Humidity:	0 to 100 % Relative Humidity
5.6 Ice Loading:	1" radial
5.7 Solar Radiation:	< 1,120 w/m ²
5.8 Salt Fog:	MIL-STD-810E, Method 509.3 for 200 hours
5.9 Service Life:	> 20 years
5.10 Lightning Protection:	DC Grounded

6. Regulatory Compliance:

DE/TM - 4060 -Antennas for PMP radio systems in frequency bands 1-3 GHz, TS2

ETS 300 019-1-4, A1 (June 1997) - Environmental

ETS 300 019-2-2 (May 1994) - Environmental (Transportation)

UL 50

BreezeCOM

6 dBi OMNI-DIRECTIONAL ANTENNA

Description

This omnidirectional antenna is designed for use with BreezeNET product lines. It can be used with the AP-10, SA-10, WB-10 and SA-40 units for indoor applications where a higher gain and larger coverage area are required. The antenna is also suitable for outdoor applications in point-to-multipoint communication environments.



Antennas		General	
Gain	6dBi	Dimensions	38 x 18mm
Frequency Range	2400 - 2500 MHz	Weight	100g
Impedance	50 Ohms	Operating Temperature Range	-30°C to +70°C
VSWR	1.5:1 Max		
Polarization	Vertical		
Cable			
Type	RG - 58		
Impedance	50 Ohms		
Attenuation	0.2 dB		
Length	4 ft.		
Connector	N-type		

