

BreezeNet

Functional Description and Block Diagram Description

AP-10D, AP-10 Access Point;
SA-10D, SA-10 Station Adapter
and
WB-10D, WB-10 Wireless Bridge.

1. Functional Description.

These devices are designed to operate under IEEE 802.11 standard (Frequency Hopping Spread Spectrum).

The hardware of the AP-10, AP-10D, SA-10, SA-10D, WB-10, WB-10D is identical. All products have integrated antennas implemented in two ways: “D” models have non-standard interface for connection with antennas, non”D” models have a fixed integral antennas which require disassembly of the unit in order to be removed. A list of utilized antennas is supplied.

2. Block Description.

The device includes 3 main parts:

RF part.

Baseband part

Digital part

The device consists of a single board that includes the following sections:

1. A Radio Transceiver that transmits and receives the radio signals.
2. A Modem that handles the modulation/demodulation tasks.
3. A Controller that handles the protocol and the ethernet port.

The block diagram of device is shown in Fig.1.

Digital Part

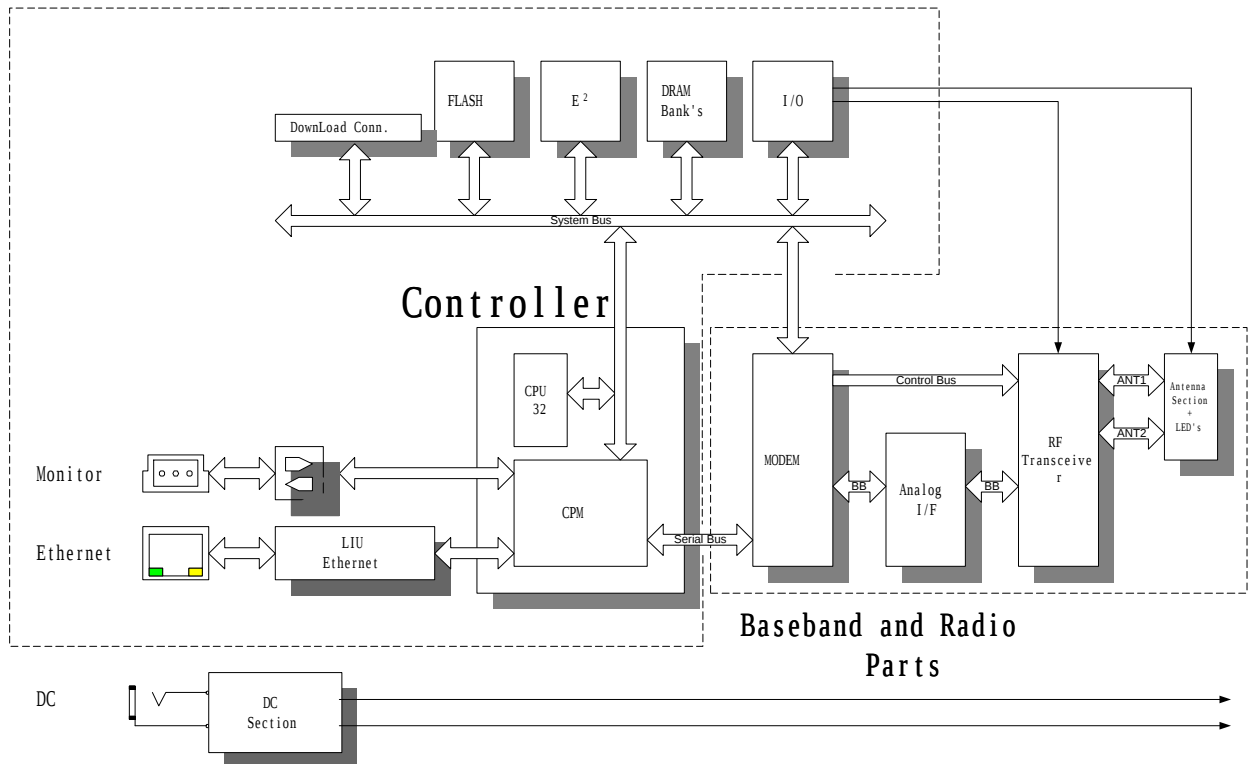


Fig.1. Block Diagram of Device.

3. Block Diagram of RF Part.

3.1 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.

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

3.2 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 463 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 operating at 40 MHz. After division by 2 its signal is used as reference for all 3 VCO's.

All 3 synthesizers are frequency locked by use of PLL.

3.3 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 upconverted 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.

3.4 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 23 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 0.5 MHz bandwidth.

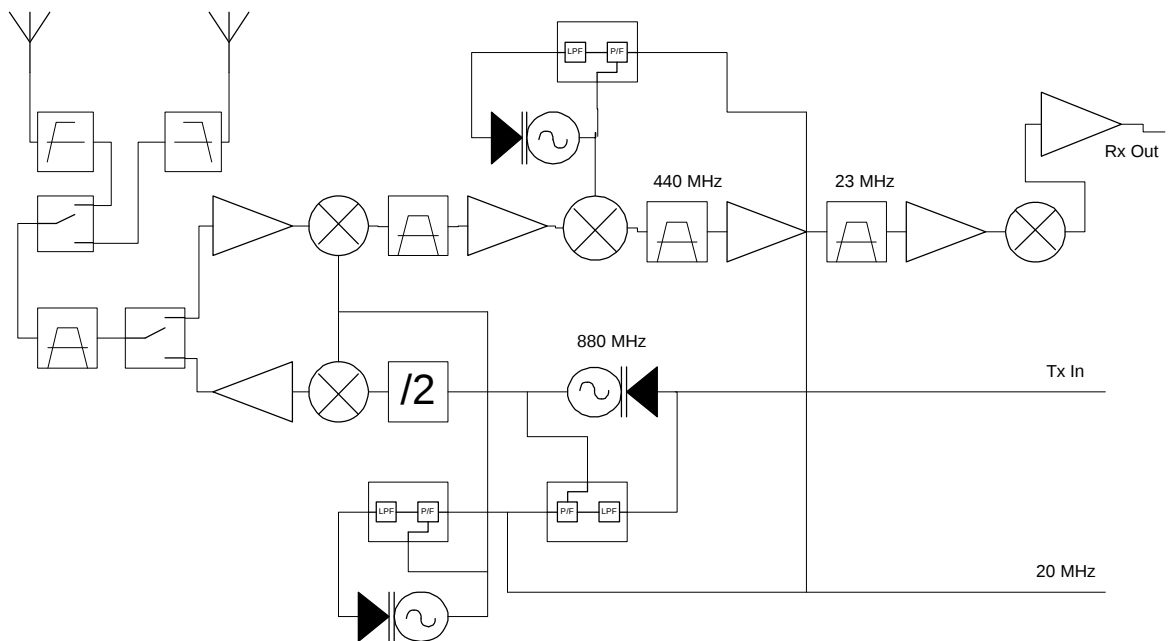


Fig.2. Radio Part Block Diagram

4. Block Diagram of Baseband Part.

Baseband Part consists of Modem and Analog interface for Radio (see Fig.1).

The Modem chip (BOORI) is the system master clock distributor (see Fig.3). It is running from 40MHz Crystal Oscillator Circuit (+/- 10ppm tolerance and +/- 4ppm stability). R_CLK1 default frequency is 4MHz which is division by 2.5 and 4 from the 40MHz clock.

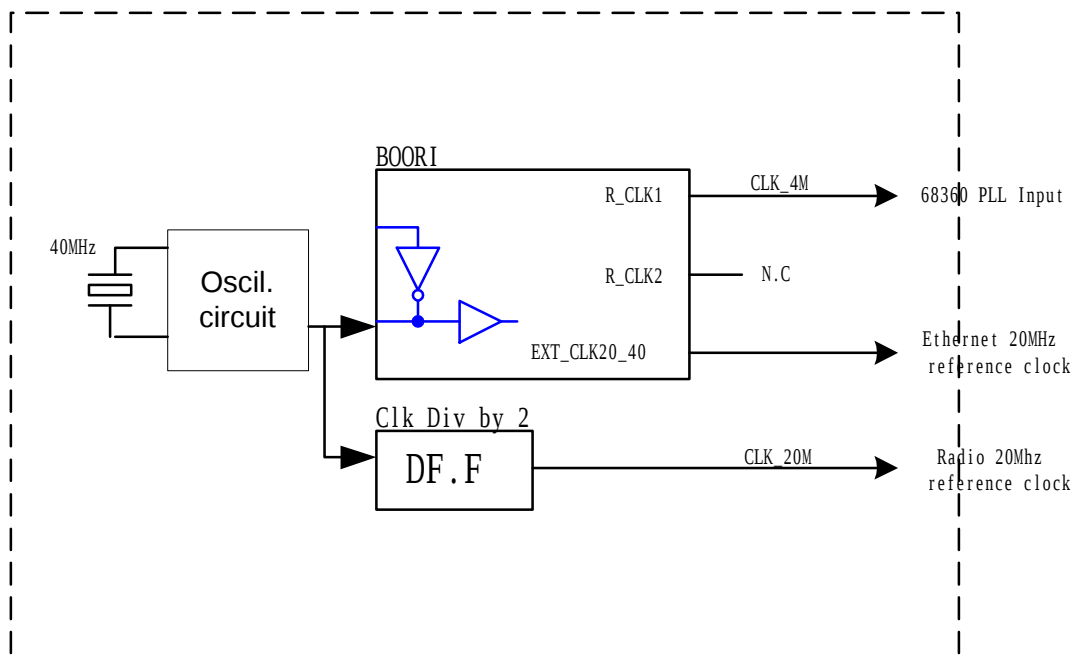


Fig.3. Clock Distribution

5. Block Diagram of Digital Part.

The Digital Part consist of (see Fig.1):

CPU

31Mhz MC68EN360 controller (QUICC);

Memory

16/32Mbit 16 bits bus width sector erase Flash with 64kB uniform sectors;
Additional 64kB E²PROM;

DRAM banks;

48 bits MAC address serial ROM (BreezeCom customized special registry);

I/O Ports

24 bits off-QUICC Input/Output ports;

8 SMD miniature DIP switches and 8 hard jumpers for software and hardware configurations and versions.

Monitor Ports

3 wires miniature connector

2 on-PCB test pads (optionally, for BOORI debugging)

RS232 Transceiver

Ethernet (see Fig.4)

1 10BaseT port;

Motorola compatible Ethernet transceiver;

10BaseT Analog interface for 1 port.

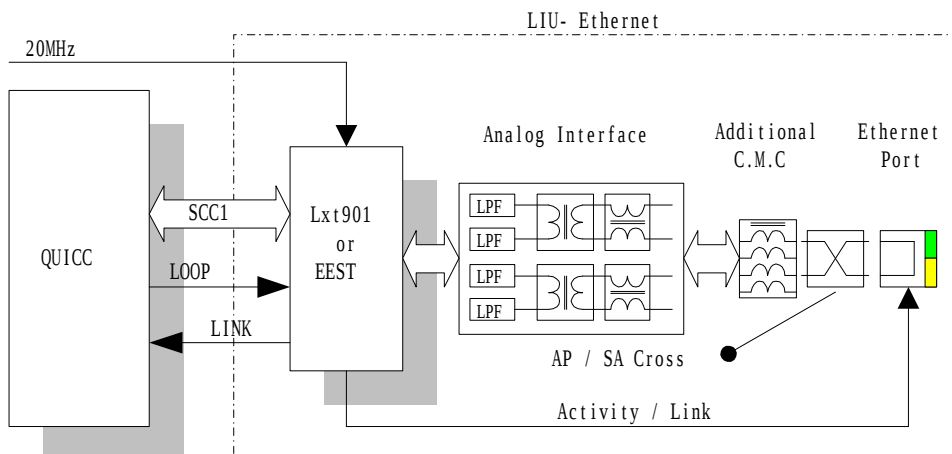


Fig.4. Ethernet Interface Block Diagram

BreezeNet

Functional Description and Block Diagram Description

SA-40D, SA-40 Four Port Adapter

1. Functional Description.

These devices are designed to operate under IEEE 802.11 standard (Frequency Hopping Spread Spectrum).

The hardware of the SA-40, SA-40D is identical. All products have integrated antennas implemented in two ways: "D" models have non-standard interface for connection with antennas, non"D" models have a fixed integral antennas which require disassembly of the unit in order to be removed. A list of utilized antennas is supplied.

The SA-40(D) is based on the hardware and software of the SA-10(D). RF and Baseband parts of SA-40(D) and SA-10(D) are identical, however digital part of SA-40(D) has some additional hardware options for 4 ports Ethernet. The software of SA-40(D) is identical to SA-10.

2. Block Description.

The device includes 3 main parts:

- RF part.
- Baseband part
- Digital part

The device consists of a single board that includes the following sections:

1. A Radio Transceiver that transmits and receives the radio signals.
4. A Modem that handles the modulation/demodulation tasks.
5. A Controller that handles the protocol and the ethernet port.

The block diagram of device is shown in Fig.1.

Digital Part

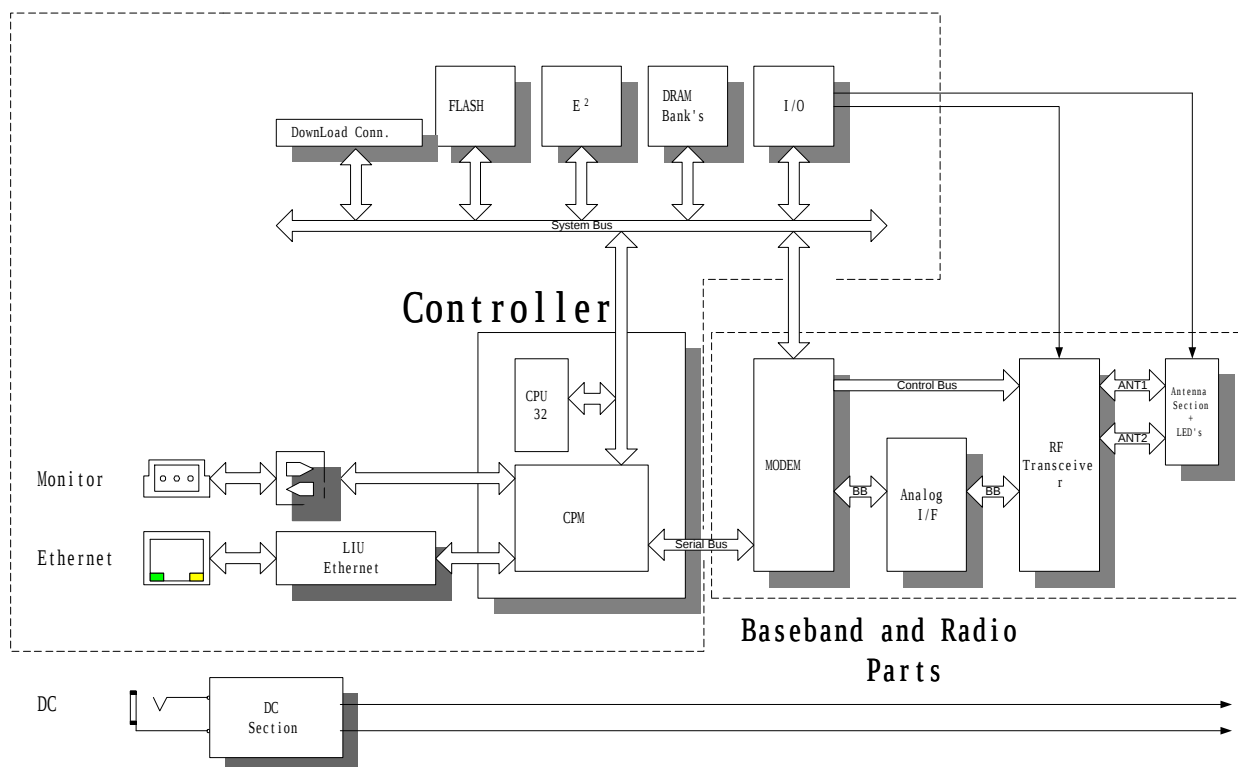


Fig.1. Block Diagram of Device.

3. Block Diagram of RF Part.

3.1 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.

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

3.2 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 463 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 operating at 40 MHz. After division by 2 its signal is used as reference for all 3 VCO's.

All 3 synthesizers are frequency locked by use of PLL.

3.3 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 upconverted 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.

3.4 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 23 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 0.5 MHz bandwidth.

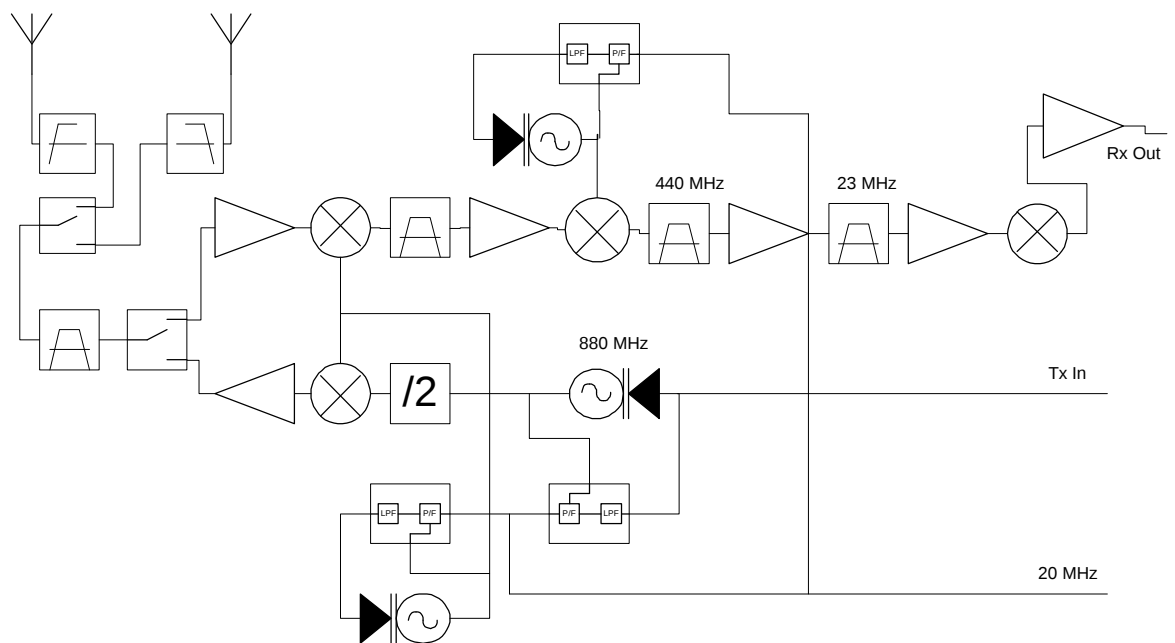


Fig.2. Radio Part Block Diagram

4. Block Diagram of Baseband Part.

Baseband Part consists of Modem and Analog interface for Radio (see Fig.1).

The Modem chip (BOORI) is the system master clock distributor (see Fig.3). It is running from 40MHz Crystal Oscillator Circuit (+/- 10ppm tolerance and +/- 4ppm stability). R_CLK1 default frequency is 4MHz which is division by 2.5 and 4 from the 40MHz clock.

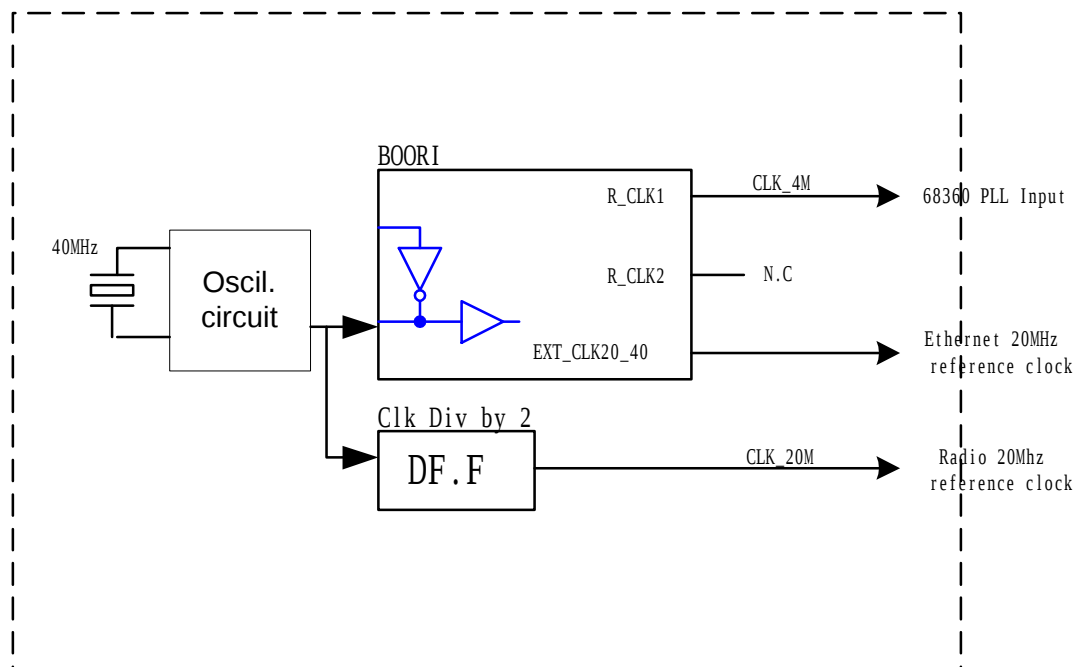


Fig.3. Clock Distribution

5. Block Diagram of Digital Part.

The Digital Part consist of (see Fig.1):

CPU

31Mhz MC68EN360 controller (QUICC);

Memory

16/32Mbit 16 bits bus width sector erase Flash with 64kB uniform sectors;

Additional 64kB E²PROM;

DRAM banks;

BreezeCOM

48 bits MAC address serial ROM (BreezeCom customized special registry);

I/O Ports

24 bits off-QUICC Input/Output ports;

8 SMD miniature DIP switches and 8 hard jumpers for software and hardware configurations and versions.

Monitor Ports

3 wires miniature connector

2 on-PCB test pads(optionally, for BOORI debugging)

RS232 Transceiver

Ethernet (see Fig.4)

4(SA40) 10BaseT ports

Motorola compatible Ethernet transceiver

10BaseT Analog interface for 4 ports

AUI using for multiport configuration

SCC1 of QUICC

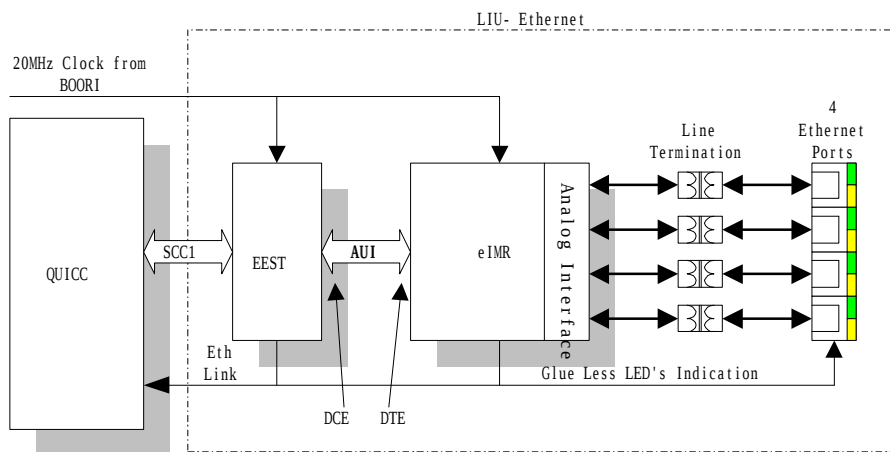


Fig.4. Ethernet Interface Block Diagram



Dipole Antenna for ISM Band

AND-C-107

V3.00

Features

- Compact Size
- High Efficiency
- Low VSWR
- Ground Plane Independent
- Rugged/Durable
- Flexible

Description

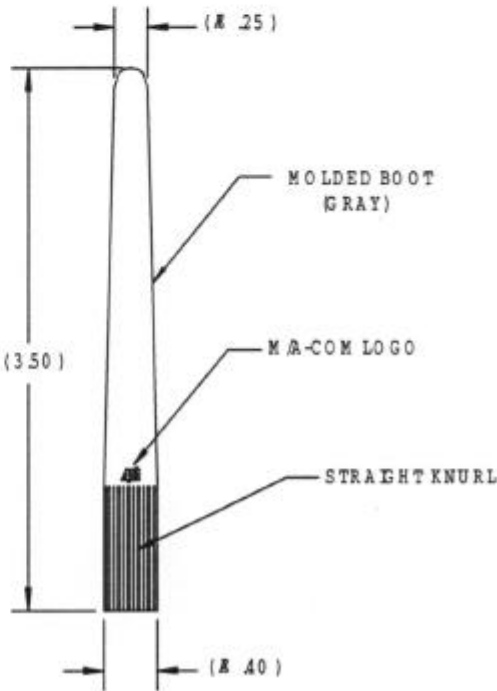
The AND-C-107 collinear dipole is vertically polarized and omnidirectional in azimuth. The unit is flexible to permit bending without damage. The compact design is optimized for high efficiency and easily adapted to custom applications.

This antenna can be used for a variety of ISM applications including wireless LANs and inventory control scanners.



Specifications

Frequency Range	2400-2485 MHz
Peak Gain	1.9 dBi
Polarization	Vertical
Nominal Impedance	50 Ohms
VSWR	2.0:1 Max
R.F. Power Handling	1 W Avg. Max 3 W Peak Max
Weight	1.0 ounce Max
Flex Life	5,000 cycles $\pm 45^\circ$

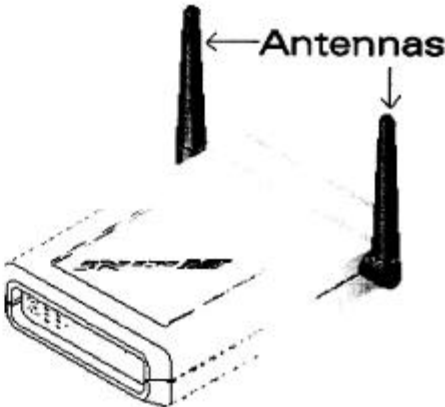


2 dBi OMNI-DIRECTIONAL INTEGRAL ANTENNAS

Description

These dipole omnidirectional antennas are designed for use with BreezeNET product lines. They are supplied with the standard AP-10, SA-10 and SA-40 units.

Two separate antennas provide space diversity to reduce fading due to multipath propagation.



Antennas		General	
Gain	2dBi	Length	79mm
Frequency Range	2.4 - 2.5 GHz	Connector Case	ABS
Impedance	50 Ohms	Antenna Case	ELVAX 50
VSWR	2:1 Max	Operating Temperature Range	-20°C - 65°C
Polarization	Vertical		
	Right angle		
Connector	MCX male		

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	



Order (800) 323-9122

email: sales@maxrad.com

Fax (630)372-80

2.4 GHz ISM Miniature Magnetic Mount Antennas

The MAXRAD Mini-Mag antennas are our most cost-effective, easy to install mobile antenna solution. Featuring integrated low-loss, high performance cable and a compact low profile design, this antenna is easy to transport and install. The Mini-Mag antennas are available with a wide variety of connector options.

General Specifications

Maximum Power:	16 Watts
Antenna Type:	Dipole array
Radiator Type:	.062" diameter, stainless steel, black chrome finish
Base:	Machined polymer
Bushing:	Black chrome triple-plated brass
Nominal Impedance:	50 Ohms
Connector Options:	

- BNC (part #BN)
- Mini-UHF (part #PL)
- Female SMA (part #FSMA)
- Male SMA (part #MSMA)
- TNC (part #C)
- N (part #N)
- Female SMA, reverse threaded (part #FSMART)
- Male SMA, reverse threaded (part #MSMART)
- FME (part #FFME)



BMMG24005

Electrical Specifications

2.4 GHz ISM - Miniature Magnetic Mount Antennas

Model #	Frequency Range	VSWR	Gain	Coaxial Cable
BMMG24000*	2.400-2.484 GHz	< 1.5:1 across the 2.4 GHz ISM band	Unity	6' LMR100A
BMMG24000ML195*	2.400-2.484 GHz	< 1.5:1 across the 2.4 GHz ISM band	Unity	12' LMR195
BMMG24003*	2.400-2.484 GHz	< 1.5:1 across the 2.4 GHz ISM band	3 dBi	6' LMR100A
BMMG24003ML195*	2.400-2.484 GHz	< 1.5:1 across the 2.4 GHz ISM band	3 dBi	12' LMR195
BMMG24005*	2.400-2.484 GHz	< 1.5:1 across the 2.4 GHz ISM band	5 dBi	6' LMR100A
BMMG24005ML195*	2.400-2.484 GHz	< 1.5:1 across the 2.4 GHz ISM band	5 dBi	12' LMR195

*Please specify connector options when ordering. Add \$2.00 for the "N" connector.

Mechanical Specifications

2.4 GHz ISM - Miniature Magnetic Mount Antennas

Model #	Rod/Coil Type	Height	List Price w/ TNC Connector
BMMG24000*	Straight	1 3/4 inches	\$60.97
BMMG24000ML195*	Straight	1 3/4 inches	\$65.97
BMMG24003*	Collinear/Open	5 inches	\$70.52
BMMG24003ML195*	Collinear/Open	5 inches	\$75.52
BMMG24005*	Trilinear/Open	9 inches	\$88.48
BMMG24005ML195*	Trilinear/Open	9 inches	\$93.48

*Please specify connector option when ordering. Add \$2.00 for the "N" connector.

8.5 dBi DIRECTIONAL ANTENNA

Description

This medium gain antenna is designed for use with the BreezeNET and BreezeLINK product lines. It has a wide beamwidth (75 degrees) and is intended for indoor installations with larger distances between locations, or areas with a relatively obstructed propagation path. It is also suitable for locally situated outdoor applications.



Antennas		General	
Gain	8.5dBi	Size	101 x 95 x 32mm
Frequency Range	2.300 -2.500 GHz	Weight	4 x 3,75 x 1.25in
3 db beamwidth (horizontal)	75°	Housing	100g (0.22 lb)
3 db beamwidth (vertical)	60°	Operating temperature range	ASA
Impedance	50 Ohms		-40°C to +80°C
VSWR	1.5:1		
Polarization	Vertical		
Front to Back Ratio	15dB		

12 dBi DIRECTIONAL ANTENNA SET

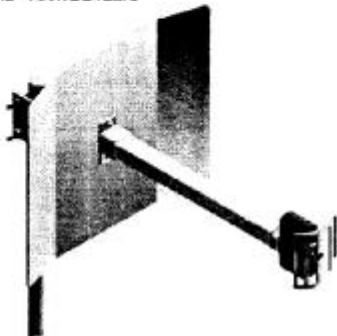
Basic Set - 2 Tx and 1 Rx Antennas - ANT/BS12A/5L
Minimum Basic Set - 1 Tx and 1 Rx Antenna - ANT/BS12B/5

Description

This medium gain antenna is designed for use with the BreezeNET and BreezeLINK product line.

It has a relatively wide beam width (22 degrees), and is intended for both indoor and outdoor installations with medium distances between sites.

A wall mount arm with a dual-joint arm mounting attachment supporting up to 3 antennas is available.



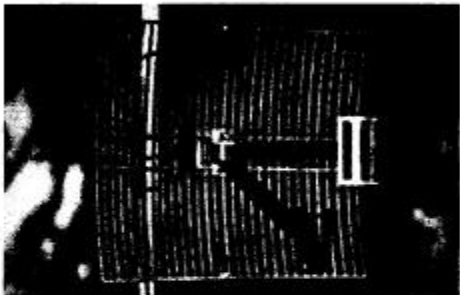
Three 12 dBi antennas on dual-joint arm.

Antenna		General	
Gain	12 dBi	Size	152 x 152 x 381mm
Frequency Range	2150 - 2700 MHz	Weight	6 x 6x 15in
Beamwidth	22°	Mounting	0.77 Kg (1.7 lb)
		Reflector	1" - 2" O.D. Mast 25.4 - 50.8 mm
		Cable	Aluminum
Type	LMR-400		
Impedance	50 Ohms		
Attenuation	0.6 dB/m @ 2.4 GHz		
Length	2 feet		
Connector	N-type		

18 dBi DIRECTIONAL ANTENNA

Description

This high gain antenna is designed for use with the BreezeNET and BreezeLINK product lines. It is supplied with a 2 foot integral cable. The 14 degree narrow beamwidth increases sensitivity to alignment inaccuracy, while it decreases the fading due to multipath propagation. Intended for outdoor installations with large distances between sites, the antennas can be mounted on a mast with a tripodal base or fastened with guy wires.

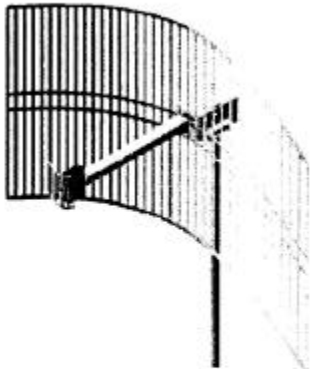


Antennas		General	
Reflector	Cast Magnesium	Size	406 x 508 x 381mm
Gain	18dBi		16 x 20 x 15 in
Frequency Range	2150 - 2700 MHz	Weight	1.22 Kg (2.7 lb.)
Beamwidth	14°	Cable	
VSWR	2:1 Max	Type	LMR-400
Polarization	Vertical or Horizontal	Impedance	50 Ohms
Cross Polarity Rejection	23dB Minimum	Attenuation	0.6 dB/m @ 2.4 GHz
Front to Back Ratio	23dB Minimum	Length	2 feet
		Connector	N- type

24 dBi DIRECTIONAL ANTENNA

Description

This high gain antenna is designed for use with the BreezeNET and BreezeLINK product lines. It has a narrow beamwidth of 7.5 degrees which increases sensitivity to alignment inaccuracy, but decreases fading due to multipath propagation. It is intended for outdoor installations with large distances between sites. The antennas can be mounted on a mast with a tripodal base or fastened with guy wires.



Antennas		General	
Reflector	Cast Magnesium	Size	610 x 915 x 381mm
Gain	24dBi		124 x 36 x 15 in
Frequency Range	2150 - 2700 MHz	Weight	2.22 Kg (4.9 lb.)
Beamwidth	7.5°	Cable	
Impedance @ Output	50 Ohms	Type	LMR-400
VSWR	1.4:1 Max	Impedance	50 Ohms
Polarization	Vertical or Horizontal	Attenuation	0.6 dB/m @ 2.4 GHz
Cross Polarity Rejection	26dB Minimum	Length	2 feet
Front to Back Ratio	31dB Minimum	Connector	N- type

BreezeCOM

Table B-1, Hopping Sequence Set 1

index	0	3	6	9	12	15	18	21	24	27	30	33	36
1	2	5	8	11	14	17	20	23	26	29	32	35	38
2	25	28	31	34	37	40	43	46	49	52	55	58	61
3	64	67	70	73	76	79	3	6	9	12	15	18	21
4	10	13	16	19	22	25	28	31	34	37	40	43	46
5	45	48	51	54	57	60	63	66	69	72	75	78	2
6	18	21	24	27	30	33	36	39	42	45	48	51	54
7	73	76	79	3	6	9	12	15	18	21	24	27	30
8	49	52	55	58	61	64	67	70	73	76	79	3	6
9	21	24	27	30	33	36	39	42	45	48	51	54	57
10	63	66	69	72	75	78	2	5	8	11	14	17	20
11	78	2	5	8	11	14	17	20	23	26	29	32	35
12	31	34	37	40	43	46	49	52	55	58	61	64	67
13	61	64	67	70	73	76	79	3	6	9	12	15	18
14	24	27	30	33	36	39	42	45	48	51	54	57	60
15	54	57	60	63	66	69	72	75	78	2	5	8	11
16	65	68	71	74	77	80	4	7	10	13	16	19	22
17	28	31	34	37	40	43	46	49	52	55	58	61	64
18	79	3	6	9	12	15	18	21	24	27	30	33	36
19	33	36	39	42	45	48	51	54	57	60	63	66	69
20	4	7	10	13	16	19	22	25	28	31	34	37	40
21	20	23	26	29	32	35	38	41	44	47	50	53	56
22	13	16	19	22	25	28	31	34	37	40	43	46	49
23	38	41	44	47	50	53	56	59	62	65	68	71	74
24	74	77	80	4	7	10	13	16	19	22	25	28	31
25	56	59	62	65	68	71	74	77	80	4	7	10	13
26	71	74	77	80	4	7	10	13	16	19	22	25	28
27	23	26	29	32	35	38	41	44	47	50	53	56	59
28	5	8	11	14	17	20	23	26	29	32	35	38	41
29	39	42	45	48	51	54	57	60	63	66	69	72	75
30	12	15	18	21	24	27	30	33	36	39	42	45	48
31	36	39	42	45	48	51	54	57	60	63	66	69	72
32	68	71	74	77	80	4	7	10	13	16	19	22	25
33	9	12	15	18	21	24	27	30	33	36	39	42	45
34	70	73	76	79	3	6	9	12	15	18	21	24	27
35	77	80	4	7	10	13	16	19	22	25	28	31	34
36	6	9	12	15	18	21	24	27	30	33	36	39	42
37	62	65	68	71	74	77	80	4	7	10	13	16	19
38	29	32	35	38	41	44	47	50	53	56	59	62	65
39	14	17	20	23	26	29	32	35	38	41	44	47	50

BreezeCOM

index	0	3	6	9	12	15	18	21	24	27	30	33	36
40	27	30	33	36	39	42	45	48	51	54	57	60	63
41	16	19	22	25	28	31	34	37	40	43	46	49	52
42	59	62	65	68	71	74	77	80	4	7	10	13	16
43	43	46	49	52	55	58	61	64	67	70	73	76	79
44	76	79	3	6	9	12	15	18	21	24	27	30	33
45	34	37	40	43	46	49	52	55	58	61	64	67	70
46	72	75	78	2	5	8	11	14	17	20	23	26	29
47	11	14	17	20	23	26	29	32	35	38	41	44	47
48	60	63	66	69	72	75	78	2	5	8	11	14	17
49	80	4	7	10	13	16	19	22	25	28	31	34	37
50	47	50	53	56	59	62	65	68	71	74	77	80	4
51	22	25	28	31	34	37	40	43	46	49	52	55	58
52	75	78	2	5	8	11	14	17	20	23	26	29	32
53	66	69	72	75	78	2	5	8	11	14	17	20	23
54	41	44	47	50	53	56	59	62	65	68	71	74	77
55	15	18	21	24	27	30	33	36	39	42	45	48	51
56	35	38	41	44	47	50	53	56	59	62	65	68	71
57	67	70	73	76	79	3	6	9	12	15	18	21	24
58	52	55	58	61	64	67	70	73	76	79	3	6	9
59	58	61	64	67	70	73	76	79	3	6	9	12	15
60	44	47	50	53	56	59	62	65	68	71	74	77	80
61	50	53	56	59	62	65	68	71	74	77	80	4	7
62	17	20	23	26	29	32	35	38	41	44	47	50	53
63	7	10	13	16	19	22	25	28	31	34	37	40	43
64	19	22	25	28	31	34	37	40	43	46	49	52	55
65	8	11	14	17	20	23	26	29	32	35	38	41	44
66	69	72	75	78	2	5	8	11	14	17	20	23	26
67	51	54	57	60	63	66	69	72	75	78	2	5	8
68	42	45	48	51	54	57	60	63	66	69	72	75	78
69	3	6	9	12	15	18	21	24	27	30	33	36	39
70	30	33	36	39	42	45	48	51	54	57	60	63	66
71	57	60	63	66	69	72	75	78	2	5	8	11	14
72	37	40	43	46	49	52	55	58	61	64	67	70	73
73	55	58	61	64	67	70	73	76	79	3	6	9	12
74	26	29	32	35	38	41	44	47	50	53	56	59	62
75	46	49	52	55	58	61	64	67	70	73	76	79	3
76	53	56	59	62	65	68	71	74	77	80	4	7	10
77	40	43	46	49	52	55	58	61	64	67	70	73	76
78	32	35	38	41	44	47	50	53	56	59	62	65	68
79	48	51	54	57	60	63	66	69	72	75	78	2	5

BreezeCOM

index	39	42	45	48	51	54	57	60	63	66	69	72	75
1	41	44	47	50	53	56	59	62	65	68	71	74	77
2	64	67	70	73	76	79	3	6	9	12	15	18	21
3	24	27	30	33	36	39	42	45	48	51	54	57	60
4	49	52	55	58	61	64	67	70	73	76	79	3	6
5	5	8	11	14	17	20	23	26	29	32	35	38	41
6	57	60	63	66	69	72	75	78	2	5	8	11	14
7	33	36	39	42	45	48	51	54	57	60	63	66	69
8	9	12	15	18	21	24	27	30	33	36	39	42	45
9	60	63	66	69	72	75	78	2	5	8	11	14	17
10	23	26	29	32	35	38	41	44	47	50	53	56	59
11	38	41	44	47	50	53	56	59	62	65	68	71	74
12	70	73	76	79	3	6	9	12	15	18	21	24	27
13	21	24	27	30	33	36	39	42	45	48	51	54	57
14	63	66	69	72	75	78	2	5	8	11	14	17	20
15	14	17	20	23	26	29	32	35	38	41	44	47	50
16	25	28	31	34	37	40	43	46	49	52	55	58	61
17	67	70	73	76	79	3	6	9	12	15	18	21	24
18	39	42	45	48	51	54	57	60	63	66	69	72	75
19	72	75	78	2	5	8	11	14	17	20	23	26	29
20	43	46	49	52	55	58	61	64	67	70	73	76	79
21	59	62	65	68	71	74	77	80	4	7	10	13	16
22	52	55	58	61	64	67	70	73	76	79	3	6	9
23	77	80	4	7	10	13	16	19	22	25	28	31	34
24	34	37	40	43	46	49	52	55	58	61	64	67	70
25	16	19	22	25	28	31	34	37	40	43	46	49	52
26	31	34	37	40	43	46	49	52	55	58	61	64	67
27	62	65	68	71	74	77	80	4	7	10	13	16	19
28	44	47	50	53	56	59	62	65	68	71	74	77	80
29	78	2	5	8	11	14	17	20	23	26	29	32	35
30	51	54	57	60	63	66	69	72	75	78	2	5	8
31	75	78	2	5	8	11	14	17	20	23	26	29	32
32	28	31	34	37	40	43	46	49	52	55	58	61	64
33	48	51	54	57	60	63	66	69	72	75	78	2	5
34	30	33	36	39	42	45	48	51	54	57	60	63	66
35	37	40	43	46	49	52	55	58	61	64	67	70	73
36	45	48	51	54	57	60	63	66	69	72	75	78	2
37	22	25	28	31	34	37	40	43	46	49	52	55	58
38	68	71	74	77	80	4	7	10	13	16	19	22	25
39	53	56	59	62	65	68	71	74	77	80	4	7	10

BreezeCOM

index	39	42	45	48	51	54	57	60	63	66	69	72	75
40	66	69	72	75	78	2	5	8	11	14	17	20	23
41	55	58	61	64	67	70	73	76	79	3	6	9	12
42	19	22	25	28	31	34	37	40	43	46	49	52	55
43	3	6	9	12	15	18	21	24	27	30	33	36	39
44	36	39	42	45	48	51	54	57	60	63	66	69	72
45	73	76	79	3	6	9	12	15	18	21	24	27	30
46	32	35	38	41	44	47	50	53	56	59	62	65	68
47	50	53	56	59	62	65	68	71	74	77	80	4	7
48	20	23	26	29	32	35	38	41	44	47	50	53	56
49	40	43	46	49	52	55	58	61	64	67	70	73	76
50	7	10	13	16	19	22	25	28	31	34	37	40	43
51	61	64	67	70	73	76	79	3	6	9	12	15	18
52	35	38	41	44	47	50	53	56	59	62	65	68	71
53	26	29	32	35	38	41	44	47	50	53	56	59	62
54	80	4	7	10	13	16	19	22	25	28	31	34	37
55	54	57	60	63	66	69	72	75	78	2	5	8	11
56	74	77	80	4	7	10	13	16	19	22	25	28	31
57	27	30	33	36	39	42	45	48	51	54	57	60	63
58	12	15	18	21	24	27	30	33	36	39	42	45	48
59	18	21	24	27	30	33	36	39	42	45	48	51	54
60	4	7	10	13	16	19	22	25	28	31	34	37	40
61	10	13	16	19	22	25	28	31	34	37	40	43	46
62	56	59	62	65	68	71	74	77	80	4	7	10	13
63	46	49	52	55	58	61	64	67	70	73	76	79	3
64	58	61	64	67	70	73	76	79	3	6	9	12	15
65	47	50	53	56	59	62	65	68	71	74	77	80	4
66	29	32	35	38	41	44	47	50	53	56	59	62	65
67	11	14	17	20	23	26	29	32	35	38	41	44	47
68	2	5	8	11	14	17	20	23	26	29	32	35	38
69	42	45	48	51	54	57	60	63	66	69	72	75	78
70	69	72	75	78	2	5	8	11	14	17	20	23	26
71	17	20	23	26	29	32	35	38	41	44	47	50	53
72	76	79	3	6	9	12	15	18	21	24	27	30	33
73	15	18	21	24	27	30	33	36	39	42	45	48	51
74	65	68	71	74	77	80	4	7	10	13	16	19	22
75	6	9	12	15	18	21	24	27	30	33	36	39	42
76	13	16	19	22	25	28	31	34	37	40	43	46	49
77	79	3	6	9	12	15	18	21	24	27	30	33	36
78	71	74	77	80	4	7	10	13	16	19	22	25	28
79	8	11	14	17	20	23	26	29	32	35	38	41	44