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just great reliability.

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# RF-2000E/EW Repeater

Microwave Repeater Systems

## Applications

- Low-cost, highly reliable 2 GHz microwave through repeater for extending range of or clearing obstructed microwave radio paths.
- Excellent performance with analog, digital, or video microwave radios; channel capacity to 1200 FDM, 1 DS3, 45 Mb/s PCM, 34 Mb/s PCM.
- Compatible with any manufacturer's 2 GHz radio terminal.
- Solar power compatible -- economical in thin routes and remote locations.

## Features

- Two RF output power level available: +24/+28 dBm analog, +18/+22 dBm digital.
- Power consumption only 2.2 amperes at 12 Vdc for regular-power duplex operation.
- Solar powered, ac powered, or powered by primary cells.
- Compact and lightweight -- ideally suited for remote sites that do not have access roads or commercial power.
- Environmentally protected aluminum, weathertight, lockable cabinet. No extra environmental shelter required in most installation. Suitable for use at unimproved sites anywhere in the world -- Alaska to Saudi Arabia.
- Internally protected duplex, frequency diversity, and three-way or "Y junction" configurations available.
- Only one active element per channel, the internally redundant linear amplifier.
- AGC/ALC provided to correct input fades and reduce overload.
- Maximum gain can be field-adjusted for easy fine-tuning.
- In the case of single duplex configuration, amplifiers can be replaced without disrupting service.
- RMAS-110 Alarm system (optional) can remotely monitor repeater.
- Equipped with directional couplers for in-service RF output power measurements.
- No frequency conversion -- received signal is filtered, amplified, and re-radiated.
- Very reliable, greater than 85,000 hours MTBF for duplex.
- Available as a self-contained RF repeater for use with customer-furnished antenna and power equipment or as a complete package including repeater, antenna, solar electric panels, battery charger, and batteries.

## RF-2000E/EW Repeater

### Technical Summary

#### General

Duplex (1+0)	Output Power Options*	
	Power Level 1	Power Level 2 (HP)
Frequency Range	1.7 to 2.3 GHz	1.7 to 2.3 GHz
Nominal Gain	45 dB (15 dB AGC/ALC)	45 dB (15 dB AGC/ALC)
Maximum Gain	60 dB ( 0 dB AGC/ALC)	60 dB ( 0 dB AGC/ALC)
AGC/ALC (Nominal Gain = 45 dB)	15 dB down fade, 5 dB up fade	15 dB down fade, 5 dB up fade
Noise Figure	7 dB	7 dB
3rd Order Intercept	+34 dBm	+38 dBm

\* 1 Refer to Gain-Power-Noise Figure Table (p5-6) for individual power and configuration options

2 For those repeaters configured with different power levels at different frequency channels, please refer to the appropriate specifications.

#### Antenna Connections

Impedance	50 ohms
Return Loss	20 dB min.
Antenna Ports (Panel)	Type N(f) Coax.
Jumper Supplied	Type N(m) to N(m)
Cable Type (Typical)	7/8 inch Air or Foam filled Coaxial Cable with N(f) connector

#### Frequency Plan

	RF-2000E	RF-2000EW
Channel Bandwidth	20 MHz, 1 dB	30 MHz, 1 dB
T-R Spacing	50 MHz, min.	80 MHz, min.
T-T Spacing (1+1) on common feeders	28 MHz, min.	42 MHz, min.

#### Channel Response

	RF-2000E	RF-2000EW
Amplitude Ripple	1 dB, fo $\pm 5$ MHz	1 dB, fo $\pm 10$ MHz
Group Delay (Equalized)	Not Available	5 nSec p-p., fo $\pm 10$ MHz
Group Delay (Non-Equalized)	0.3 nSec/(MHz) <sup>2</sup>	Not Available

## RF-2000E/EW Repeater

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### Power Requirements

Nominal Voltage	+13.5 Vdc
Voltage Range	+11 to +16 Vdc
Polarity	Negative Ground

### Current:

RF-2000E-01 /EW-11,-14	Duplex	2.0A
RF-2000E-02 /EW-12,-15	Duplex, FD	4.0A
RF-2000E-03 /EW-13,-16	One-Way	1.0A
RF-2000E-21 /EW-31,-34	Duplex, One Direction High Power	2.4A
RF-2000E-22 /EW-32,-35	Duplex, FD, One Direction High Power	4.8A
RF-2000E-41 /EW-51,-54	Duplex, High Power	2.8A
RF-2000E-42 /EW-52,-55	Duplex, Two Direction High Power	5.6A
RF-2000E-43 /EW-53,-56	One-Way, High Power	1.4A

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### Environmental Conditions

Ambient Temperature	-40 °C to +60 °C
Relative Humidity	90% (housing internal) 100% (housing external)
Altitude	15000 ft (5000 m)

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### Reliability (Single channel duplex)

MTBF	85,000 hours
MTTR	30 minutes

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### Dimensions:

Housing	Weather Tight Aluminum	
Height	27 in (690 mm)	
Width, including vent hoods	27.5 in (699 mm)	
Depth	11.2 in (285 mm)	
Weight		
	RF-2000E-01, -21, -41 /EW-11,-14,-31,-34,-51,-54	50 Pounds (23 kg)
	RF-2000E-02, -22, -42 /EW-12,-15,-32,-35,-52,-55	85 Pounds (39 kg)
	RF-2000E-03, -43 /EW-13,-16,-53,-56	40 Pounds (18 kg)

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### Specifications:

RF-2000EW-11,-12,-13,-31,-32,-51,-52,-53 covers a frequency range of 1.7~2.1GHz.

RF-2000EW-14,-15,-16,-34,-35,-54,-55,-56 covers a frequency range of 1.9~2.3GHz.

All specifications with a frequency range of 1.7~2.1GHz apply to the frequency range of 1.9~2.3GHz.

## RF-2000E/EW Repeater

### Gain - Power - Noise Figure Table

RF-2000E-XX

FOR FM/FSK/MSK\*

RF-2000E OPTION	FREQUENCY CHANNEL	LINEAR GAIN MIN. dB	AGC/ALC ON *		NOISE FIGURE dB
			POWER INPUT dBm	POWER OUTPUT dBm	
RF-2000E-01	F1, F2	60.0	-21.0	+24.0	7.0
RF-2000E-02	F1, F4	58.7	-22.3	+22.7	7.0
	F2, F3	58.7	-21.0	+24.0	8.3
RF-2000E-03	F1	60.3	-21.0	+24.0	6.7
RF-2000E-21	F1	60.0	-21.0	+24.0	7.0
	F2	60.0	-17.0	+28.0	7.0
RF-2000E-22	F1	58.7	-18.3	+26.7	7.0
	F2	58.7	-21.0	+24.0	8.3
	F3	58.7	-17.0	+28.0	8.3
	F4	58.7	-22.3	+22.7	7.0
RF-2000E-41	F1, F2	60.0	-17.0	+28.0	7.0
RF-2000E-42	F1, F4	58.7	-18.3	+26.7	7.0
	F2, F3	58.7	-17.0	+28.0	8.3
RF-2000E-03	F1	60.3	-17.0	+28.0	6.7

\*For Other Modulation, Please Refer to the Following Table:

MODULATION	POWER BACKOFF dB
FM/FSK/MSK	0
4PSK	-2
16QAM	-6
QPR3/9QPRS	-5
QPR7/49QPRS	-6
QPR9	-7

Peninsula Engineering Solutions, inc. may change performance specifications where necessary to meet industry requirement.

## RF-2000E/EW Repeater

### Gain - Power - Noise Figure Table

RF-2000EW-XX

FOR FM/FSK/MSK\*

RF-2000EW OPTION	FREQUENCY CHANNEL	LINEAR GAIN MIN. dB	AGC/ALC ON *		NOISE FIGURE dB
			POWER INPUT dBm	POWER OUTPUT dBm	
RF-2000EW-11 -14	F1, F2	58.5	-21.0	+24.0	8.5
RF-2000EW-12 -15	F1, F4	57.2	-22.3	+22.7	8.5
	F2, F3	57.2	-21.0	+24.0	9.8
RF-2000EW-13 -16	F1	58.8	-21.0	+24.0	8.2
RF-2000EW-31 -34	F1	58.5	-21.0	+24.0	8.5
	F2	58.5	-17.0	+28.0	8.5
RF-2000EW-32 -35	F1	57.2	-18.3	+26.7	8.5
	F2	57.2	-21.0	+24.0	9.8
	F3	57.2	-17.0	+28.0	9.8
	F4	57.2	-22.3	+22.7	8.5
RF-2000EW-51 -54	F1, F2	58.5	-17.0	+28.0	8.5
RF-2000EW-52 -55	F1, F4	57.2	-18.3	+26.7	8.5
	F2, F3	57.2	-17.0	+28.0	9.8
RF-2000EW-53 -56	F1	58.8	-17.0	+28.0	8.2

\*For Other Modulation, Please Refer to the Following Table:

MODULATION	POWER BACKOFF dB
FM/FSK/MSK	0
4PSK	-2
16QAM	-6
QPR3/9QPRS	-5
QPR7/49QPRS	-6
QPR9	-7

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