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RF-7000E Repeater

Microwave Repeater Systems

Applications

- Low-cost, highly reliable 8-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 2400 FDM, 2016 PCM (3 DS3 or 135 Mb/s) or multiple video.
- Compatible with any manufacturer's 8-GHz radio terminal.
- Solar power compatible -- economical in thin routes and remote locations.

Features

- RF output power up to +28 dBm analog, +26 dBm digital.
- Power consumption only 2.3 amperes at 12 Vdc for regular-power-duplex operation.
- Solar powered, ac powered, or primary cell powered.
- 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.
- In the case of single duplex configuration, amplifiers can be replaced without disrupting service.
- RMAS-120 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.

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Technical Summary

General

Output Power Options*

	Power Level 1	Power Level 2 (HP)
Frequency Range GHz	7.1 to 9 GHz	7.1 to 7.9 GHz
Nominal Gain	40 dB (15 dB AGC/ALC)	40 dB (10 dB AGC/ALC)
Maximum Gain	50 dB (0 dB AGC/ALC)	55 dB (0 dB AGC/ALC)
AGC/ALC (Nominal Gain = 40 dB)	10 dB down fade, 5 dB up fade	15 dB down fade, 5 dB up fade
Noise Figure	8 dB	8 dB
3rd Order Intercept	+34 dBm	+38 dBm

* 1. Refer to Gain-Power-Noise Figure Table (p5) for individual configuration options

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

Antenna Connections

Return Loss	26 dB min.
Antenna Ports	CPR-112G Waveguide
Waveguide Type	WR-112, EW 64, EW 77, WC 166

Frequency Plan

Frequency Range	7700-8500 MHz
Channel Bandwidth	30 MHz, 1 dB
T-R Spacing	80 MHz, min.
T-T Spacing (1+1, 2+1, or 3+1) on common feeders	56 MHz, min.

Channel Response

Amplitude	± 0.5 dB, fo ± 15 MHz
Group Delay (Non-equalized)	0.065 nSec/(MHz) ²
Group Delay (Equalized)	4 nSec p-p ,fo ± 15 MHz

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Power Requirements

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

Current:

One Frequency Channel of Power Level 1 Option		1.15 Amperes max.
One Frequency-Channel of Power Level 2 Option		1.95 Amperes max.
Both Direction Power Level 1 (LP)	RF-7000E-01 Duplex	2.3 A
	RF-7000E-02 Duplex, FD	4.6 A
	RF-7000E-03 One-Way	1.15 A
	RF-7000E-11 Duplex, Delay-Equil	2.3 A
	RF-7000E-12 Duplex, FD, Delay-Equil	4.6 A
	RF-7000E-13 One-Way, Delay-Equil	1.15 A
	RF-7000E-15 (2+1), Delay Equil	6.9 A
	RF-7000E-16 (3+1), Delay-Equil	9.2 A
One Direction Power Level 1 (HP), One Direction Power Level 2 (LP)	RF-7000E-21 Duplex	3.1 A
	RF-7000E-22 Duplex, FD	6.2 A
	RF-7000E-31 Duplex, Delay-Equil	3.1 A
	RF-7000E-32 Duplex, FD, Delay-Equil	6.2 A
	RF-7000E-35 (2+1), Delay-Equil	9.3 A
	RF-7000E-36 (3+1), Delay-Equil	12.4 A
Both Direction Power Level 2 (HP)	RF-7000E-41 Duplex	3.9 A
	RF-7000E-42 One-Way	7.8 A
	RF-7000E-43 Duplex, Delay-Equil	1.95 A
	RF-7000E-51 Duplex, FD, Delay-Equil	3.9 A
	RF-7000E-52 One-Way, Delay-Equil	7.8 A
	RF-7000E-55 (2+1), Delay Equil	11.7 A
	RF-7000E-56 (3+1), Delay-Equil	15.6 A

Environmental Conditions

Housing	Weather Tight Aluminum
Ambient Temperature	-40°C to +60°C
Relative Humidity	90% (housing internal), 100% (housing external)
Altitude	15,000 ft (5000 m)

Reliability (Single channel duplex)

MTBF	85,000 hours
MTTR	30 minutes

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Dimensions:	One to Four Frequency Channels	One to Four Frequency Channels
Height, including feeder manifold	28.5 in (854 mm)	46.5 in (854 mm)
Width, including vent hoods	27.5 in (742 mm)	27.5 in (854 mm)
Depth, including feeder manifold	22.2 in (475 mm)	22.2 in (854 mm)

Weight:	Model	(pound/kg)
	One-Way	40/18
	Duplex	50/23
	Duplex, Freq. Diversity	70/32
	Duplex, 2+1	100/46
	Duplex, 3+1	120/55

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Gain - Power - Noise Figure Table

FOR FM/FSK/MSK*

RF-8000E OPTION	FREQUENCY CHANNEL	LINEAR GAIN MIN. dB	AGC/ALC ON *		NOISE FIGURE dB
			POWER INPUT dBm	POWER OUTPUT dBm	
RF-7000E-01	F1, F2	52.8	-14.6	+25.4	6.6
RF-7000E-02	F1, F4	52.5	-14.9	+25.1	6.6
	F2, F3	52.5	-14.6	+25.4	6.9
RF-7000E-03	F1	53.2	-14.4	+25.6	6.4
RF-7000E-11	F1, F2	50.0	-16.0	+24.0	8.0
RF-7000E-12	F1, F4	49.7	-16.3	+23.7	8.0
	F2, F3	49.7	-16.0	+24.0	8.3
RF-7000E-13	F1	50.4	-15.8	+24.2	7.8
RF-7000E-15	F1, F6	49.4	-16.6	+23.4	8.0
	F2, F6	49.4	-16.0	+24.0	8.6
	F3, F4	49.4	-16.3	+23.7	8.3
RF-7000E-16	F1, F8	49.1	-16.9	+23.1	8.0
	F2, F7	49.1	-16.0	+24.0	8.9
	F3, F6	49.1	-16.6	+23.4	8.3
	F4, F5	49.1	-16.3	+23.7	8.6
RF-7000E-21	F1	52.8	-14.6	+25.4	6.6
	F2	57.8	-10.6	+29.4	6.6
RF-7000E-22	F1	52.5	-14.6	+25.1	6.6
	F2	57.5	-10.9	+29.4	6.9
	F3	52.5	-14.6	+25.4	6.9
	F4	57.5	-10.9	+29.1	6.6
RF-7000E-31	F1	50.0	-16.0	+24.0	8.0
	F2	50.0	-12.0	+28.0	8.0

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RF-8000E OPTION	FREQUENCY CHANNEL	LINEAR GAIN MIN. dB	AGC/ALC ON *		NOISE FIGURE dB
			POWER INPUT dBm	POWER OUTPUT dBm	
RF-7000E-32	F1	49.7	-16.3	+23.7	8.0
	F2	54.7	-12.0	+28.0	8.3
	F3	49.7	-16.0	+24.0	8.3
	F4	54.7	-12.3	+27.7	8.0
RF-7000E-35	F1	49.4	-16.6	+23.4	8.0
	F2	54.4	-12.0	+28.0	8.6
	F3	49.4	-16.3	+23.7	8.3
	F4	54.4	-12.3	+27.7	8.3
	F5	49.4	-16.0	+24.0	8.6
	F6	54.4	-12.6	+27.4	8.0
RF-7000E-36	F1	49.1	-16.9	+23.1	8.0
	F2	54.1	-12.0	+28.0	8.9
	F3	49.1	-16.6	+23.4	8.3
	F4	54.1	-12.3	+27.7	8.6
	F5	49.1	-16.3	+23.7	8.6
	F6	54.1	-12.6	+27.4	8.3
	F7	49.1	-16.0	+24.0	8.9
	F8	54.1	-12.9	+27.1	8.0
RF-7000E-41	F1, F2	57.8	-10.6	+29.4	6.6
RF-7000E-42	F1, F4	57.5	-10.9	+29.1	6.6
	F2, F3	57.5	-10.6	+29.4	6.9
RF-7000E-43	F1	58.2	-10.4	+29.6	6.4
RF-7000E-51	F1, F2	55.0	-12.0	+28.0	8.0
RF-7000E-52	F1, F4	54.7	-12.6	+27.7	8.0
	F2, F3	54.7	-12.0	+28.0	8.3
RF-7000E-53	F1	55.4	-11.8	+28.2	7.8
RF-7000E-55	F1, F6	54.4	-12.6	+27.4	8.0
	F2, F5	54.4	-12.0	+28.0	8.6
	F3, F4	54.4	-12.3	+27.7	8.3
RF-7000E-56	F1, F8	54.1	-12.9	+27.1	8.0
	F2, F7	54.1	-12.0	+28.0	8.9
	F3, F6	54.1	-12.6	+27.4	8.3
	F4, F5	54.1	-12.3	+27.7	8.6

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

MODULATION	POWER BACKOFF
	dB
FM/FSK/MSK	0
4PSK	-2
16QAM	-6
64 QAM	-10
QPR3/9QPRS	-5
QPR7/49QPRS	-6
QPR9	-7

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