

Space Products
For The Next Millennium



narda
microwave-west

an  communications company

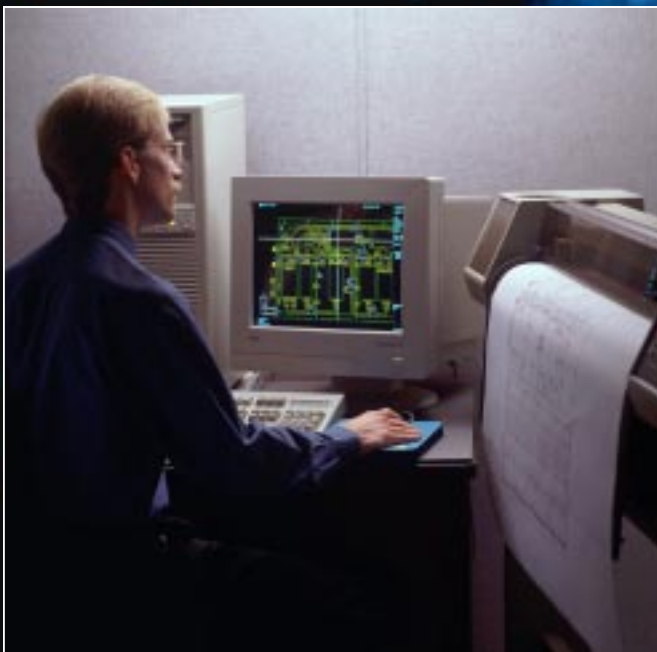
Narda Microwave-West is a leading manufacturer of passive and active microwave components and subsystems with applications on launch vehicles and satellites.

The Company devotes its effort to the development and production of standard and custom "K" Level Microwave Filters, Multiplexers, GaAsFet Amplifiers, Isolators, Circulators and Subsystems, with an emphasis on size, weight, and performance.

Narda Microwave-West employs a highly qualified technical staff with depth and diversity in microwave design technology. This assures a broad capability to solve system interface problems and to develop hardware which will meet the stringent electrical, mechanical, and environmental requirements imposed by launch/satellite applications.

This capability has allowed Narda Microwave-West to participate on various programs such as TIROS N, GPS BLK IIR, Milstar II, Clementine Explorer, Mars Lander, PanAmSat 7 & 8, Apstar, Thaicom, Telstar, Skynet IV, as well as several commercial launch vehicles.

The Company's rapid growth in recent years is the result of a strong customer orientation at all levels of the organization, emphasizing prompt and cost-effective responses to all customer orders, regardless of size. Narda West's reputation for quality is the result of robust designs produced by dedicated, skilled





well-equipped operators, engineers and support personnel, who use stringently controlled processes and exhaustive screening/acceptance test sequences. The Narda West facility is a 57,000 square feet modern administrative and manufacturing plant. Ideally located in Folsom, California, Narda West has easy access to a large, stable, and highly skilled labor force, as well as a very capable network of special process suppliers and support services.

Narda West maintains a Class 100,000 clean room with Class 10,000 laminar flow workstations. State-of-the-art manufacturing, inspection, environmental and electrical test equipment are used to ensure and verify all finished products meet our quality specifications and are fully compliant to the customers' requirements.

Extensive environmental capabilities include random and sine vibration table, temperature cycling and shock chambers, fine and gross leak equipment, and thermal vacuum chambers capable of producing 1×10^{-7} Torr conditions.

Narda Microwave-West has a quality system compliant to MIL-I-45208 and MIL-Q-9858A. The Company also maintains a certified Statistical Process Control (SPC) system to ensure all critical processes remain stable and consistently yield the desired results. ISO 9000 Certification is the current goal.

Narda Microwave-West is an L-3 Communications Company. L-3 Communications is a leading supplier of sophisticated communication systems, microwave components, avionics, and telemetry and instrument products.

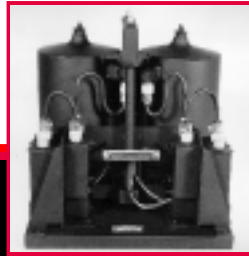


narda microwave-west

an **L3** communications company



Courtesy of Matra Marconi Space

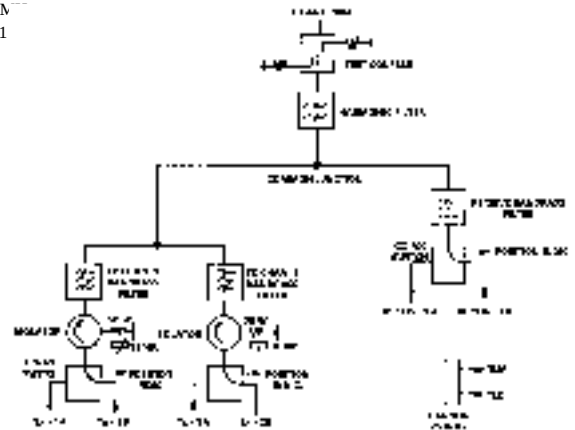


SKYNET IV

UHF Multiplexer Assembly

SPECIFICATIONS

Transmit 1254 MHz
Transmit 2257 MHz
Receive 307-311



GPS BLK IIR

Bandpass Filter (Model L-120-2)

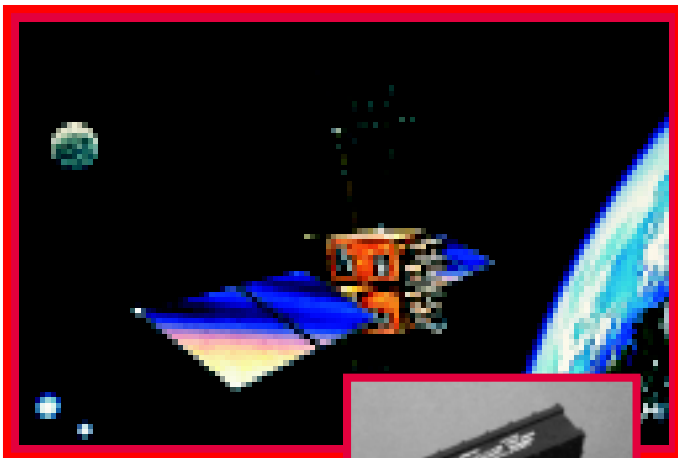
SPECIFICATIONS

Passband 1360 to 1390 MHz
Passband Ins. Loss 0.25 dB @ 1360 MHz
0.5 dB @ 1380 MHz
1.0 dB @ 1390 MHz

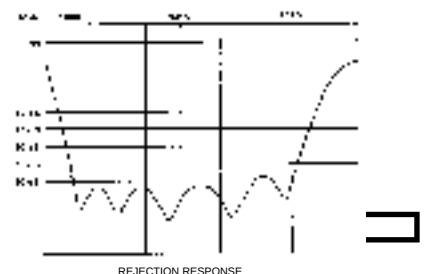
Passband VSWR 1.20:1 max
Passband Group Delay 20 nsec. max.
Stopband 1400 to 1427 MHz
Stopband Attenuation 35 dB @ 1400 MHz
40 dB @ 1401 to 1415 MHz
30 dB @ 1427 MHz

Power Handling: 25 W CW @ 1381 MHz,
Hard Vacuum

Size: 8" x 3.2" x 3"
Weight: 2.0 lbs.
Connectors: TNC Female



Courtesy of Lockheed Martin





Courtesy of TRW

MILSTAR II

Biased Diplexer (Model U-212-3)

SPECIFICATIONS

Passband Frequencies
 Channel T1: 243.7-244.6 MHz
 Channel T2: 250.4-253.1 MHz
 Passband Insertion Loss: 0.80 dB max
 Passband Ripple: 0.10 dB max
 Passband Return Loss: 20.8 dB min.
 Rejections:
 Channel T1 Channel T2
 20 dB min. 10 KHz-234 MHz 30 dB min. 10 KHz-238 MHz
 17 dB min. 249.7-252.1 MHz 17 dB min. 238-244.6 MHz
 55 dB min. 335-400 MHz 25 dB min. 265-335 MHz
 30 dB min. 400-10000 MHz 55 dB min. 235-400 MHz
 30 dB min. 400-10000 MHz
 Power Handling (Hard Vacuum)
 Channel T1: 30 watts cw
 Channel T2: 50 watts cw

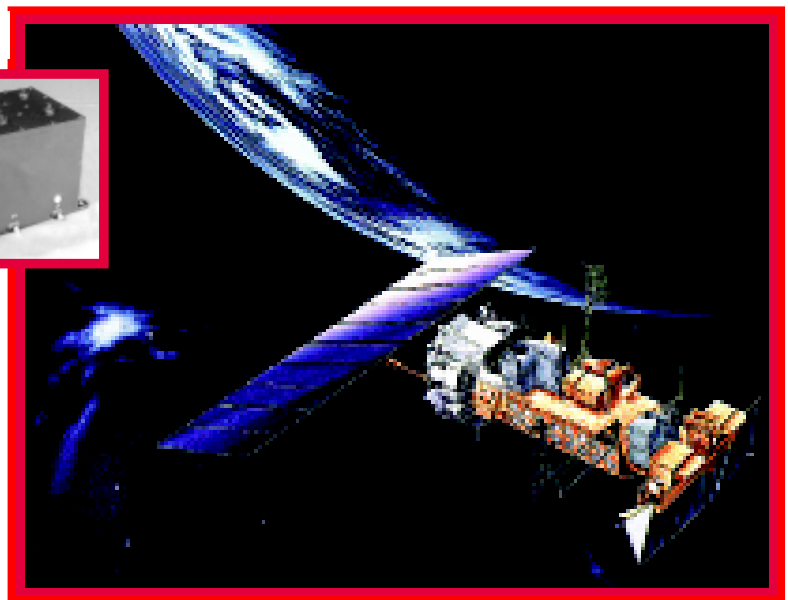
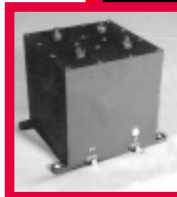
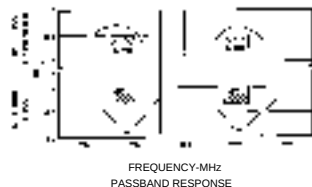
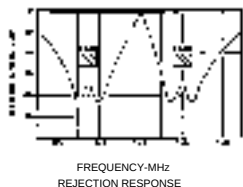
TIROS N

UHF Diplexer (Model U-210-3)

SPECIFICATIONS

Frequency (Fo) 401.65 & 406.05 MHz
 Bandwidth/Channel 1 MHz
 Passband Ins. Loss 0.5 dB max
 Passband VSWR 1.3:1 max
 Isolation 25 dB min
 Size 4.6"H x 4.5"W x 5"L
 Weight 2.5 lbs max.

Isolation 25 dB min
 Size 4.6"H x 4.5"W x 5"L
 Weight 2.5 lbs max.



Courtesy of Lockheed Martin

Bandpass Filter (Model V-139)

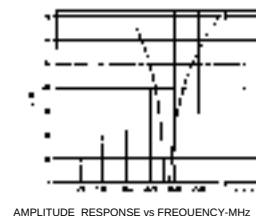
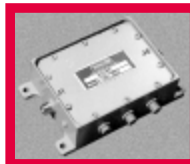
SPECIFICATIONS

ELECTRICAL

Center Frequency 243 MHz
 Insertion Loss ($f \pm 1$ MHz) 0.7 dB Max.
 VSWR 1.25:1 Max.
 Rejection ($f \pm 65$ MHz) 50 dB Min.
 Harmonic Rejection (to 3 GHz) 60 dB Min.

MECHANICAL

Size 3.0"L x 2.2"W x 1.0"H
 Weight 5.40 ounces
 Connectors SMA Female



Lowpass Filter (Model V-140)

SPECIFICATIONS

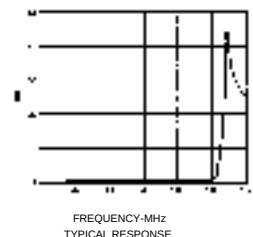
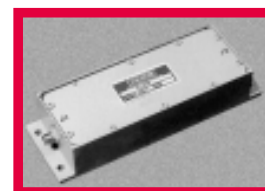
ELECTRICALSPECTYPICAL

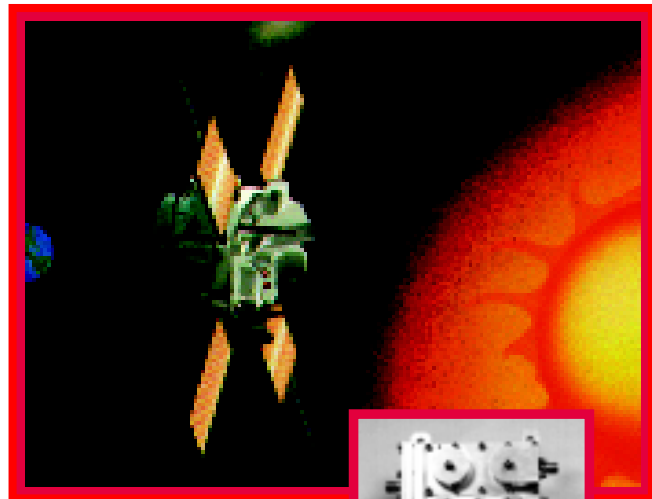
Passband DC to 126 MHz —
 Insertion Loss 0.75 dB Max. 0.5 dB
 VSWR 1.30:1 Max. 1.20:1
 Stopband
 (136-138 MHz) 35 dB Min. 40 dB
 (138-150 MHz) 25 dB Min. 30 dB

MECHANICAL

Size 5.3"L x 1.0"W x 1.0"H
 Weight 5.85 ounces

0"H





Courtesy of NASA

ACE

S-Band Diplexer (Model S-266)

SPECIFICATIONS

PARAMETER Receive Channel Transmit Channel
 Center Frequency 2025 to 2120 MHz 2200 to 2300 MHz
 Bandwidth 10 MHz Min. 10 MHz Min.
 Passband Ins. Loss 0.6 dB Max. 0.4 dB Max.
 Passband VSWR 1.30:1 Max. 1.30:1 Max.
 Rejection & 40 dB Min @ 40 dB Min @
 Spurious 10 to F - 174 MHz & Rx F0 $\pm$ 5 MHz
 $f_0 + 174$ to 8000 MHz
 Time Delay 2.5 nsec. Max. 1.0 nsec. Max. over
 Variation F0 $\pm$ 1.2 MHz passband bandwidth
 Power Handling — 10 Watts Min.

Size 2.75" x 2.65" x 1.5"
 Weight 8 oz. Max.

S-Band Diplexer (Model S-201)

SPECIFICATIONS

ELECTRICAL SPECIFICATION TYPICAL

Frequency Band 2200-2300 MHz Tunable
 Passband Bandwidth 5.0 MHz Min. 13 MHz
 Passband Insertion Loss 0.8 dB Max. 0.60 dB
 Passband VSWR 1.30:1 Max. 1.10:1

Interchannel Isolation**

25 MHz Separation 20 dB Min. 22-24 dB
 30 MHz Separation 25 dB Min. 27-29 dB
 40 MHz Separation 33 dB Min. 35-37 dB
 50 MHz Separation 39 dB Min. 41-43 dB
 60 MHz Separation 44 dB Min. 46-48 dB

Power Handling 40 watts CW/channel 50 Watts

Harmonic Rejection

(thru 3rd harmonic) 60 dB Min. 60 dB to 8.0 GHz

Time Delay Variation $\pm$ 5 nsec. $\pm$ 3 nsec.

Connectors*** TNC Female

ENVIRONMENTAL

Temperature Range -65°F to +200°F

Altitude Unlimited (sealed)

Humidity and Salt Spray 240 hrs. Continuous Cycling

Shock 50 g's (8 millisecond duration)

200 g's (1 millisecond duration)

Acceleration 50 g's

Vibration Sinusoidal 5-14 cps - .5" Double Amplitude

14 - 400 cps - 10 g zero to peak

400 - 2000 cps - 20 g zero to peak

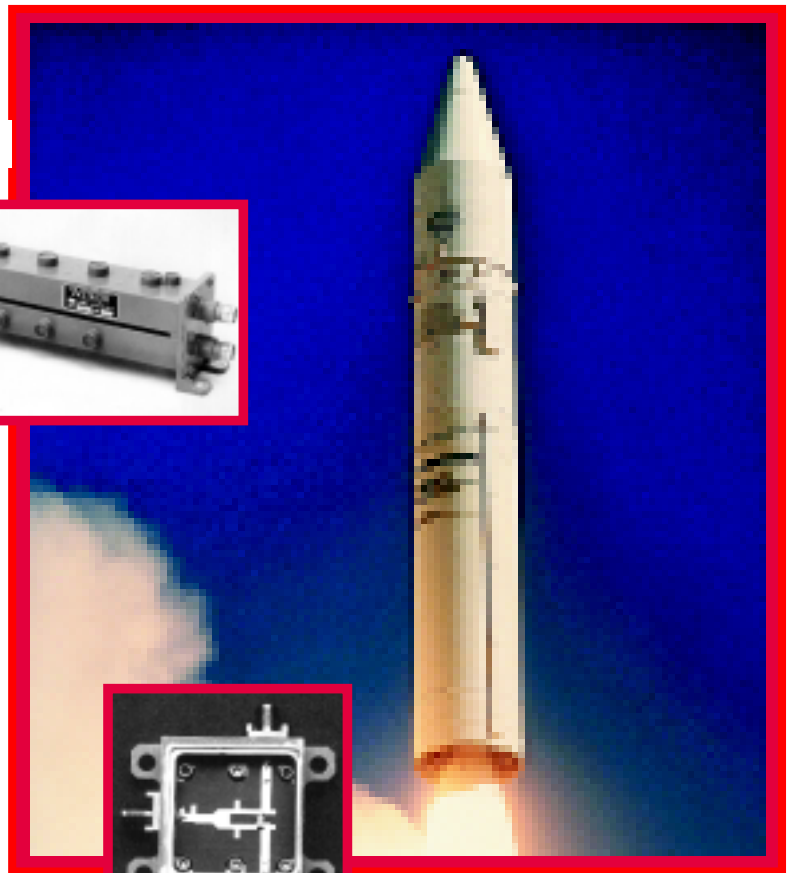
Random 20 - 400 cps - .08g/cps 18.7 grms

400 - 2000 cps - .20g/2/cps 18.7 grms

Electro-Magnetic

Interference (EMI) MIL-I-6

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Courtesy of Lockheed Martin

S-Band Power Divider (Model S-718-1)

SPECIFICATIONS

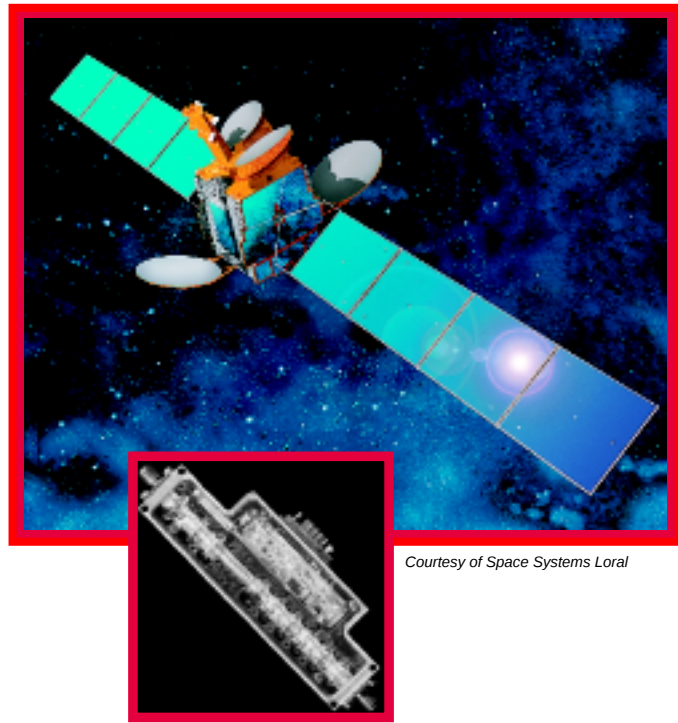
Frequency Range 2200 - 2300 MHz
 VSWR 1.20:1 Max.
 Insertion Loss 0.40 dB Max.
 Amplitude Unbalance $\pm$ 0.20 dB Max.
 Phase Balance $\pm$ 5.0 Degrees
 Isolation 20.0 dB Min.
 Input Power 20 W CW
 Operating Temp. -40°C to +125°
 Weight 2.50 oz.

TELSTAR

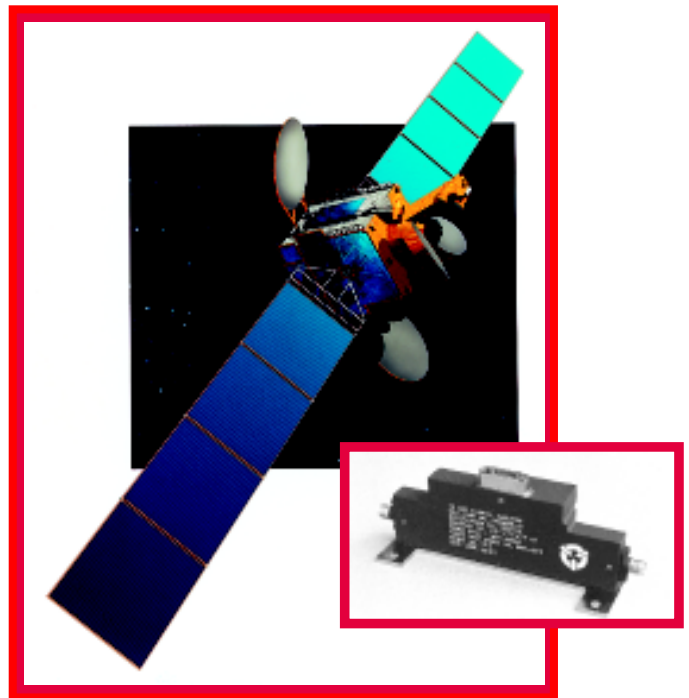
Ku-Band Channel Amplifier (Model NAR4574)

Frequency 11.7 - 12.2 GHz
Commandable
Gain Control 31 dB Min. in 1.0 $\pm$ 0.5 dB Steps
Noise Figure 7 dB @ Max Gain
20 dB @ Min Gain.

Gain 61-65 dB
Total Phase Shift 5 Degrees
Max Output Power +19 dBm
Weight 120 Grams
Size 4.00" x 1.36" x .360"



Courtesy of Space Systems Loral



Courtesy of Space Systems Loral

APSTAR-2R

C-Band Channel Amplifier (Model NAR4572)

Frequency 3.62 - 4.20 GHz
Commandable
Gain Control 36 dB $\pm$ 2 dB in 1.0 dB $\pm$ 0.3 dB steps
Noise Figure 10 dB @ Max Gain
20 dB @ 31 dB GCA

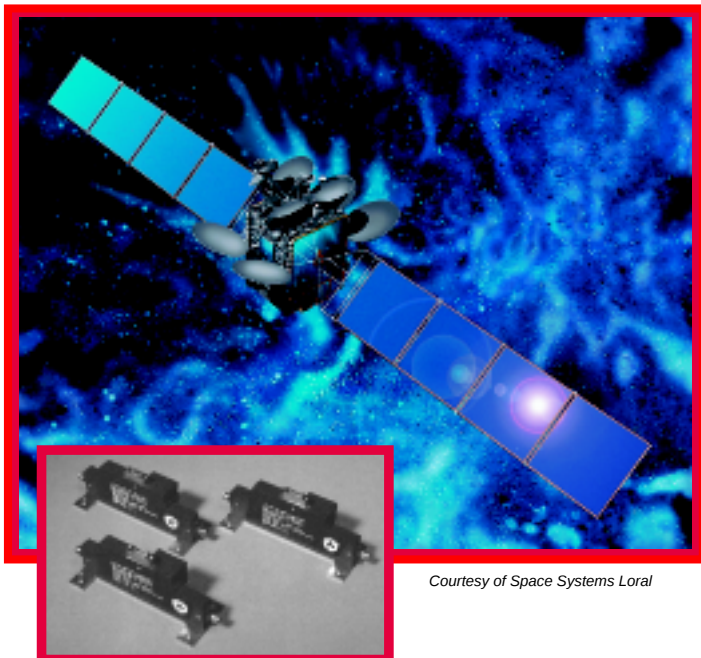
Gain 58 $\pm$ 2 dB
Total Phase Shift 4 Degrees @ +4 dBm Out
Max Output Power +14 dBm
Weight 116 Grams
Size 4.00" x 1.36" x .360"

PANAMSAT

Ku-Band Channel Amplifier (Model NAR4575)

Frequency 12.5 - 12.75 GHz
Commandable
Gain Control 31 dB Min. in 1.0 dB $\pm$ 0.5 dB steps
Noise Figure 7 dB @ Max Gain
20 dB @ 31 dB GCA

Gain 60 $\pm$ 2 dB
Total Phase Shift 3 Degrees @ +4 dBm
5 Degrees @ +6 dBm
Max Output Power +19 dBm
Weight 120 Grams
Size 4.00" x 1.36" x .360"



Courtesy of Space Systems Loral