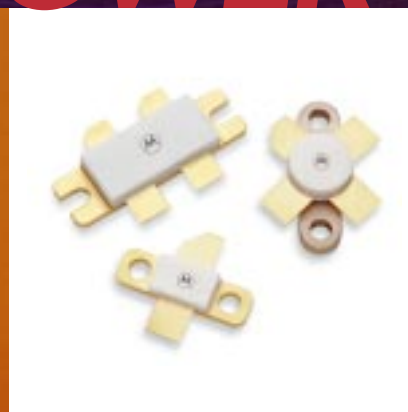




**RF POWER**

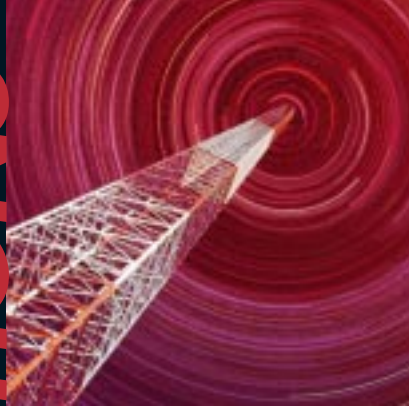
**SOLUTIONS**



 **Digital DNA™**  
from Motorola

05161-3 PRINTED IN USA 12/99 IRONWOOD LITHO 990755 7,000 LITRF

 **MOTOROLA**  
Semiconductor Products Sector



THIS BROCHURE CONTAINS SEMICONDUCTOR SOLUTIONS FOR RF POWER MARKETS. MOTOROLA PROVIDES A NUMBER OF LINEUP SOLUTIONS FOR RF POWER TRANSMITTERS. THE SYSTEM SOLUTION LINEUPS IN THIS BROCHURE DEMONSTRATE DEVICE CAPABILITY AND ARE INTENDED AS GUIDELINES IN THE SELECTION OF

DEVICES FOR GENERAL APPLICATIONS. THESE SYSTEM SOLUTIONS ARE APPLICABLE TO WORLDWIDE WIRELESS STANDARDS TARGETING BROADCAST, INDUSTRIAL, AVIONICS, AND INMARSAT MARKETS.

### MOTOROLA OFFERS:

- RF Power and Microwave products that exhibit excellent RF performance with typical parametrics that remain consistent over time and high volumes.
- Tradition of being a leader in RF Power product design capability with the manufacturing expertise and technologies to serve the market needs for more than the last 30 years.
- High volume, six sigma quality manufacturing capability for complex, high performance RF Power devices.
- Industry standard RF Power device portfolio utilizing the breadth of RF technologies – bipolar, TMOS and the exciting RF LDMOS structure.
- Complete lineup solutions for major RF transmitter applications in Broadcast, Industrial, Avionics, and Inmarsat markets.
- Technical support to aid customers in the design and application of RF Power products by providing information available through our Data Book (DL110/D), Selector Guide (SG46/D), CD-ROM (CD301/D), and the Internet (<http://motorola.com/sps/rf/>).



## LDMOS TECHNOLOGY AND DEVELOPMENT

**MOTOROLA'S RF LDMOS TECHNOLOGY** has become the technology of choice in new products. Motorola's RF LDMOS technology is used in making high power, high frequency RF amplifier designs simpler, easier, and more cost effective, thus enabling our customers to compete in today's competitive wireless markets. Advantages of Motorola's RF LDMOS transistors include:

**Higher gain** – Less overall system cost due to fewer stages. The LDMOS products have a built-in P+ sinker that connects the source through the back side of the die. This back side contact eliminates the need for beryllium oxide (BeO) insulating layers in the package. P+ sinkers also reduce the common source impedance that allows for 3 to 5 dB higher gains from an LDMOS product when compared to a bipolar device.

**Higher efficiency** – Lower operating costs due to less power consumption.

**Simplicity of use** – Easier design due to ease of matching and bias circuitry.

**Simpler bias circuitry** – Because LDMOS FETs have no gate current the Class AB bias circuit can be as simple as a resistor voltage divider network. Temperature compensation can be achieved with the addition of a thermistor or a few diodes in one of the network legs.

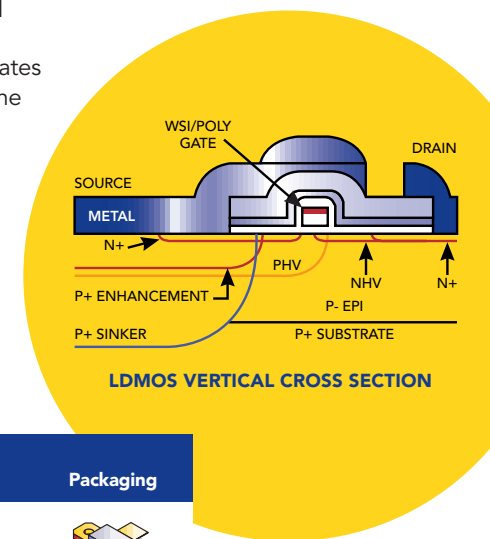
**Better thermal properties** – No BeO isolation is needed in the package because die has a backside source contact requiring no isolation, resulting in lower thermal resistance and better RF grounding.

**Better thermal stability** – LDMOS FETs are immune to thermal runaway due to the negative drain current temperature coefficient. At high temperatures, the parts turn themselves off rather than burn up.

**Single voltage supply and enhancement mode** – Biasing with no sequencing requirement simplifies the DC and thermal controls of the device.

**Soft compression points** – Although the devices are output power rated at their typical -30 dBc, 1 dB compression point, LDMOS parts typically have a 50% higher saturated output-power capability. This high  $P_{sat}$  feature allows for reduced clipping of the power peaks when used with today's digital modulation techniques.

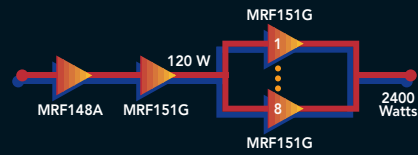
**Improved linearity** – Motorola LDMOS products have a built-in Faraday shield structure that helps to isolate the gate contacts from the drain fingers, thus reducing the  $C_{rss}$  value and improving stability. This improved isolation also creates improved linearity. Under the right Class AB bias conditions, the Motorola LDMOS products are capable of more than -40 dBc from the -3 dB back-off point on down through a 30 dB dynamic range.



Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)	IMD	Packaging
MRF373	470-860 MHz	28 Volts	60 Watts	14.7 dB	56%	—	
MRF373S	470-860 MHz	28 Volts	60 Watts	14.7 dB	56%	—	
*MRF372 <sup>1</sup>	470-860 MHz	28 Volts	180 Watts (PEP)	14 dB	35%	-30 dBc	
MRF374	470-860 MHz	28 Volts	100 Watts (PEP)	13.5 dB	36%	-31 dBc	
*MRF376 <sup>1</sup>	470-860 MHz	50 Volts	240 Watts	14 dB	55%	-30 dBc	

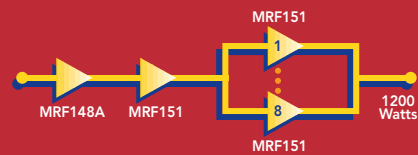
<sup>\*</sup>Device under development.  
<sup>1</sup>Internally matched.

# BROADCAST RF POWER MOSFETS



## 55–88 MHz, 50 V, 2400 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	175 MHz	50 Volts	30 Watts	15 dB	50%
MRF151G	175 MHz	50 Volts	300 Watts	16 dB	55%



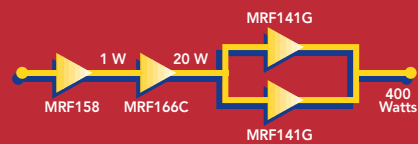
## 88–108 MHz, 50 V, 1200 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	175 MHz	50 Volts	30 Watts	15 dB	50%
MRF151	175 MHz	50 Volts	150 Watts	13 dB	45%



## 88–150 MHz, 28 V, 200 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF158	500 MHz	28 Volts	2 Watts	17.5 dB	52%
MRF136	150 MHz	28 Volts	15 Watts	16 dB	60%
MRF141G	175 MHz	28 Volts	300 Watts	13 dB	55%



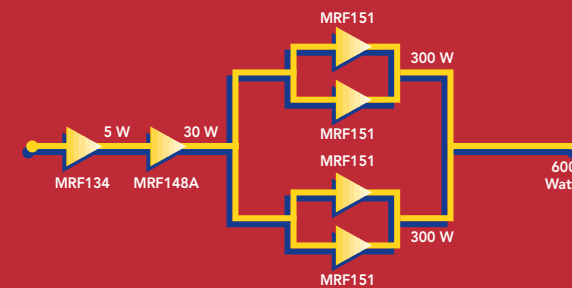
## 88–150 MHz, 28 V, 400 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF158	500 MHz	28 Volts	2 Watts	17.5 dB	52%
MRF166C	500 MHz	28 Volts	20 Watts	16 dB	55%
MRF141G	175 MHz	28 Volts	300 Watts	13 dB	55%



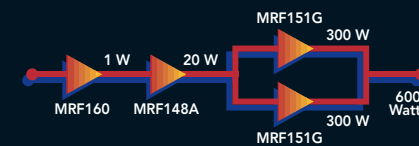
## 5–225 MHz, 50 V, 300 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	175 MHz	50 Volts	30 Watts	15 dB	50%
MRF151G	175 MHz	50 Volts	300 Watts	16 dB	55%



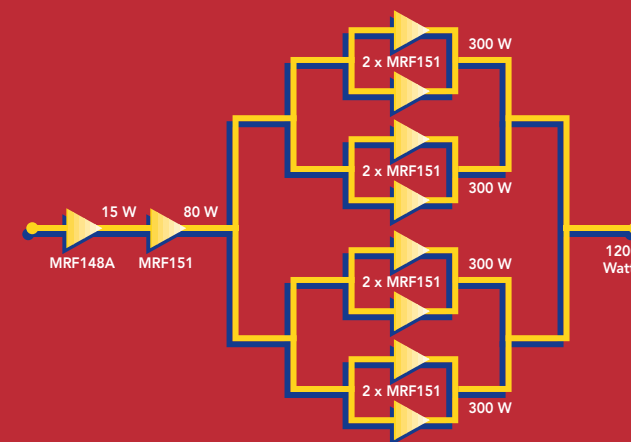
## 5–225 MHz, 50 V, 600 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF134	150 MHz	28 Volts	5 Watts	14 dB	55%
MRF148A	175 MHz	50 Volts	30 Watts	15 dB	50%
MRF151	175 MHz	50 Volts	150 Watts	13 dB	45%



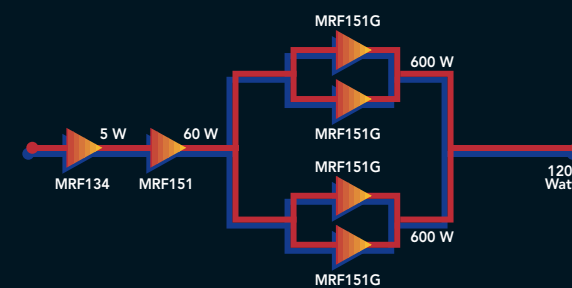
## 5–255 MHz, 50 V, 600 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF160	500 MHz	28 Volts	4 Watts	17 dB	55%
*MRF148A	175 MHz	50 Volts	30 Watts	15 dB	50%
MRF151G	175 MHz	50 Volts	300 Watts	16 dB	55%



## 5–225 MHz, 50 V, 1200 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	30 MHz	50 Volts	30 Watts (PEP)	18 dB	40%
MRF151	175 MHz	50 Volts	150 Watts	13 dB	45%



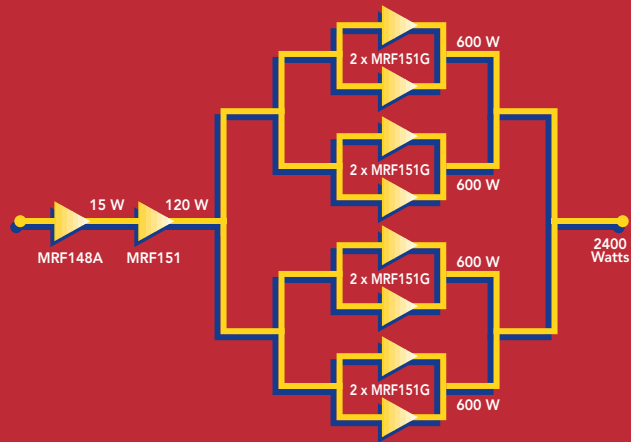
## 5–225 MHz, 50 V, 1200 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF134	150 MHz	28 Volts	5 Watts	14 dB	55%
MRF151	175 MHz	50 Volts	150 Watts	13 dB	45%
MRF151G	175 MHz	50 Volts	300 Watts	16 dB	55%

\*Typical performance @ 30 MHz, 50 Volts, 30 Watts (PEP): 18 dB, 40%

\*Typical performance

# BROADCAST RF POWER MOSFETs



## 5-225 MHz, 50 V, 2400 WATTS

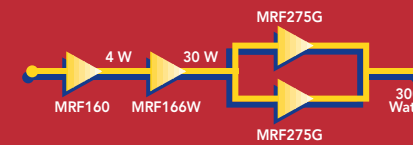
Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	30 MHz	50 Volts	30 Watts (PEP)	18 dB	40%
MRF151	175 MHz	50 Volts	150 Watts	13 dB	45%
MRF151G	175 MHz	50 Volts	300 Watts	16 dB	55%

\*Typical performance



## 30-500 MHz, 28 V, 150 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF160	500 MHz	28 Volts	4 Watts	17 dB	55%
MRF166C	500 MHz	28 Volts	20 Watts	16 dB	55%
MRF275G	500 MHz	28 Volts	150 Watts	11.2 dB	55%



## 30-500 MHz, 28 V, 300 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF160	500 MHz	28 Volts	4 Watts	17 dB	55%
MRF166W	500 MHz	28 Volts	40 Watts	16 dB	55%
MRF275G	500 MHz	28 Volts	150 Watts	11.2 dB	55%



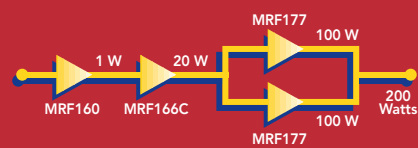
## 30-400 MHz, 28 V, 100 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF158	500 MHz	28 Volts	2 Watts	17.5 dB	52%
MRF166C	500 MHz	28 Volts	20 Watts	16 dB	55%
MRF177	400 MHz	28 Volts	100 Watts	12 dB	60%



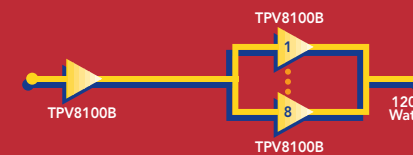
## 225-500 MHz, 28 V, 300 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF158	500 MHz	28 Volts	2 Watts	17.5 dB	52%
MRF166C	500 MHz	28 Volts	20 Watts	16 dB	55%
MRF166W	500 MHz	28 Volts	40 Watts	16 dB	55%
MRF275G	500 MHz	28 Volts	150 Watts	11.2 dB	55%



## 30-400 MHz, 28 V, 200 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF160	500 MHz	28 Volts	4 Watts	17 dB	55%
MRF166C	500 MHz	28 Volts	20 Watts	16 dB	55%
MRF177	400 MHz	28 Volts	100 Watts	12 dB	60%



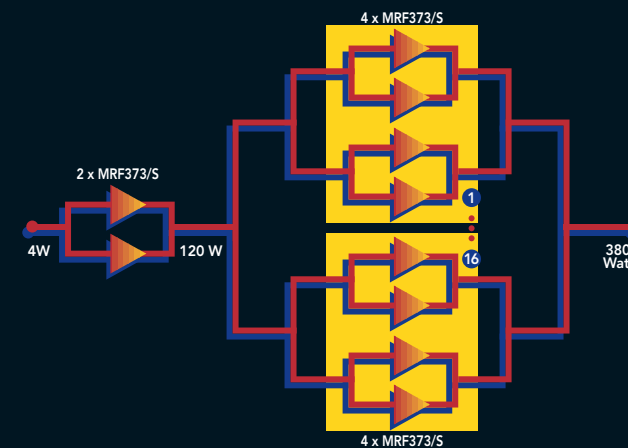
## 470-860 MHz, 28 V, 1200 WATTS, ANALOG

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
TPV8100B	860 MHz	28 Volts	150 Watts	10 dB	58%



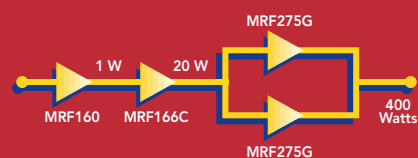
## 30-400 MHz, 28 V, 200 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF158	500 MHz	28 Volts	2 Watts	17.5 dB	52%
MRF166C	500 MHz	28 Volts	20 Watts	16 dB	55%
MRF275G	500 MHz	28 Volts	150 Watts	11.2 dB	55%



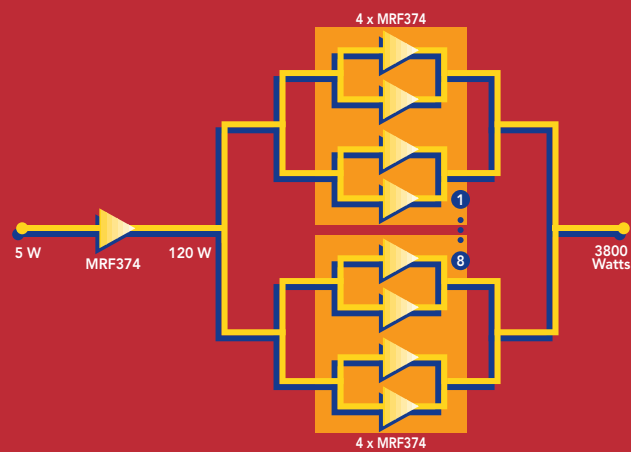
## 470-860 MHz, 28 V, 3800 WATTS, DIGITAL TV

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF373/S	860 MHz	28 Volts	60 Watts	14.7 dB	56%



## 30-225 MHz, 28 V, 400 WATTS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF160	500 MHz	28 Volts	4 Watts	17 dB	55%
MRF166C	500 MHz	28 Volts	20 Watts	16 dB	55%
MRF275G	500 MHz	28 Volts	150 Watts	11.2 dB	55%



**470–860 MHz, 28 V, 3800 WATTS, DIGITAL TV**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)	IMD
MRF374	860 MHz	28 Volts	100 Watts (PEP)	13.5 dB	36%	-31 dBc



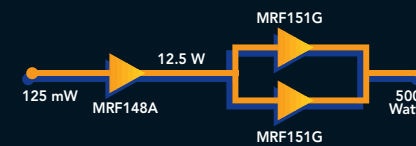
**10–30 MHz, 50 V, 150 WATTS (CW)**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF151	175 MHz	50 Volts	150 Watts	13 dB	45%



**10–30 MHz, 50 V, 300 WATTS (CW)**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	30 MHz	50 Volts	30 Watts (PEP)	18 dB	40%
MRF151G	175 MHz	50 Volts	300 Watts	16 dB	55%



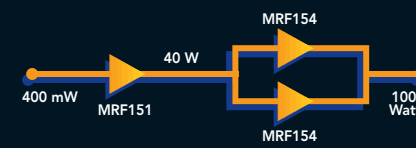
**10–30 MHz, 50 V, 500 WATTS (CW)**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	30 MHz	50 Volts	30 Watts (PEP)	18 dB	40%
MRF151G	175 MHz	50 Volts	300 Watts	16 dB	55%



**10–30 MHz, 50 V, 600 WATTS (CW)**

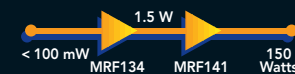
Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
*MRF148A	30 MHz	50 Volts	30 Watts (PEP)	18 dB	40%
MRF154	30 MHz	50 Volts	600 Watts	17 dB	50%



**10–30 MHz, 50 V, 1000 WATTS (CW)**

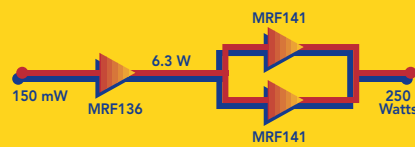
Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF151	175 MHz	50 Volts	150 Watts	13 dB	45%
MRF154	30 MHz	50 Volts	600 Watts	17 dB	50%

**MEDICAL/INDUSTRIAL RF POWER MOSFETS**



**10–30 MHz, 28 V, 150 WATTS (CW)**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF134	150 MHz	28 Volts	5 Watts	14 dB	55%
MRF141	175 MHz	28 Volts	150 Watts	10 dB	55%



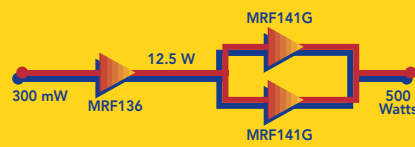
**10–30 MHz, 28 V, 250 WATTS (CW)**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF136	150 MHz	28 Volts	15 Watts	16 dB	60%
MRF141	175 MHz	28 Volts	150 Watts	10 dB	55%



**10–30 MHz, 28 V, 300 WATTS (CW)**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF136	150 MHz	28 Volts	15 Watts	16 dB	60%
MRF141G	175 MHz	28 Volts	300 Watts	13 dB	55%



**10–30 MHz, 28 V, 500 WATTS (CW)**

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF136	150 MHz	28 Volts	15 Watts	16 dB	60%
MRF141G	175 MHz	28 Volts	300 Watts	13 dB	55%

\*Typical performance

# AVIONICS RF MICROWAVE TRANSISTORS

# INMARSAT SATELLITE UPLINK



## 950-1215 MHz MODE S

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)
MRF10005	1090 MHz	28 Volts	5 Watts	10 dB
MRF10031	1090 MHz	36 Volts	30 Watts	9.5 dB
MRF10350	1090 MHz	50 Volts	350 Watts	9 dB



## 1600-1640 MHz, 28 V, 30 WATTS, INMARSAT

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)	Efficiency (Typ.)
MRF16030	1600-1640 MHz	28 Volts	30 Watts	7.7 dB	45%



## 950-1215 MHz EXTENDED MODE S

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)
MRF10005	1090 MHz	28 Volts	5 Watts	10 dB
MRF10031	1090 MHz	36 Volts	30 Watts	9.5 dB
MRF10150	1090 MHz	50 Volts	150 Watts	10 dB
MRF10502	1090 MHz	50 Volts	500 Watts	9 dB



## 950-1215 MHz DME

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)
MRF10005	1090 MHz	28 Volts	5 Watts	10 dB
MRF10031	1090 MHz	36 Volts	30 Watts	12 dB
MRF10150	1090 MHz	50 Volts	150 Watts	10 dB
MRF10502	1090 MHz	50 Volts	500 Watts	9 dB



## 950-1215 MHz TCAS

Device	Frequency	Operating Voltage	Output Power	Gain (Typ.)
MRF10005	1090 MHz	28 Volts	5 Watts	10 dB
MRF10031	1090 MHz	36 Volts	30 Watts	12 dB
MRF10150	1090 MHz	50 Volts	150 Watts	10 dB
MRF10502	1090 MHz	50 Volts	500 Watts	9 dB

## INFO AND SUPPORT

Contact your nearest Motorola sales office or reach us at:  
<http://motorola.com/sps/rf/>

## HOW TO REACH US:

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
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
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