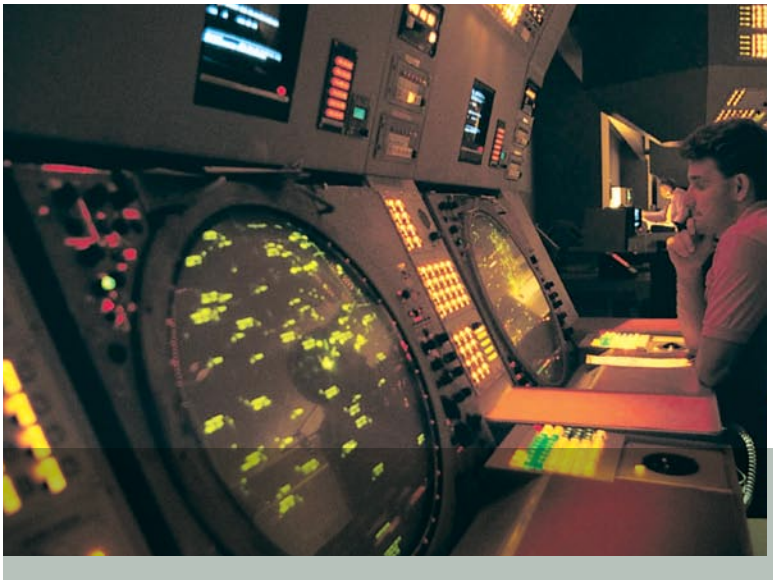
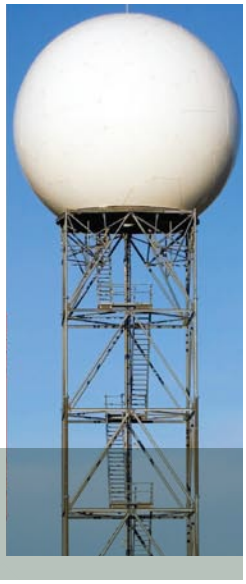




Commercial Aerospace Solutions

RF power transistors for higher performance

Building on a legacy of innovation in the RF power transistor market space, Freescale offers a comprehensive portfolio of high power transistors for aerospace applications.

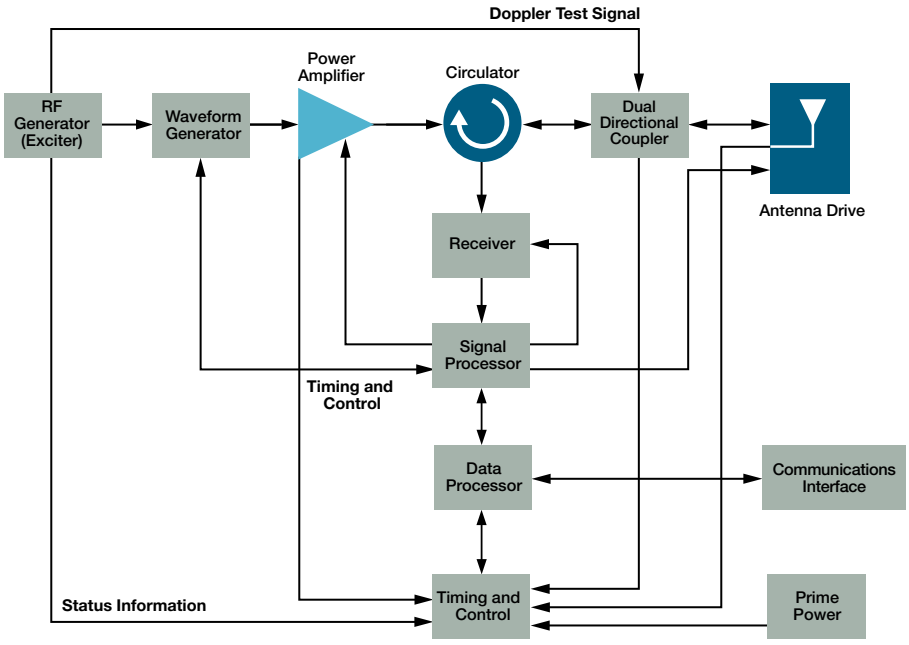
Freescale is the first to offer a robust portfolio to the commercial aerospace market that includes 50V LDMOS devices up to 1 kW of output power and 32V LDMOS devices up to 3500 MHz. Freescale's proven LDMOS technology brings enhancements to aerospace designs with higher gain, lower thermal resistance and higher efficiency for applications ranging from the HF to S-bands.

Freescale's continued technology advancements provide cost-effective, reliable, field-proven solutions for the commercial aerospace market.

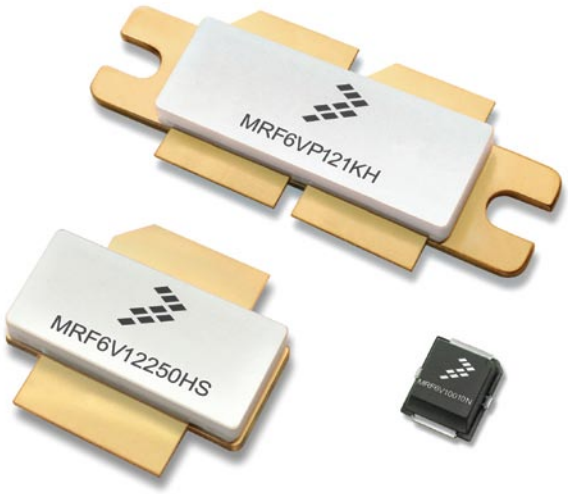
Application Examples

- Weather Radar
- Air Traffic Management
- Distance Measuring Equipment (DME)

General Radar Block Diagram



freescale semiconductor

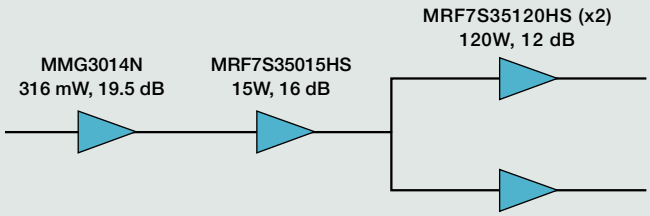


Freescale Competitive Advantages

- Highest gain figures in the industry—up to 25.5 dB
- Highest efficiency in the industry—up to 71% (Class AB at P1dB)
- High efficiency combined with low thermal resistance:
  - Reduces system cooling requirements
  - Lowers junction temperature, increasing MTTF
- Comprehensive LDMOS solutions from HF to S-band
- 50V LDMOS lineups from HF to L-band
- Cost-effective, over-molded plastic packaging options
- Backed by Freescale's secure volume manufacturing capability
- Proven reliability, quality and consistency
- Integrated ESD protection
- World-class, global applications and design support
- RoHS compliant
- Field-proven high-voltage LDMOS process

230W, 3500 MHz Weather Radar Lineup

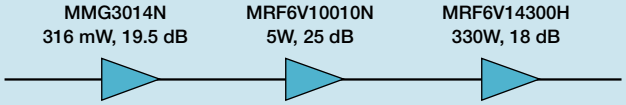
47.3 dB of Gain in Three Stages



- Cost effective
- Compact design
- LDMOS performance at S-band frequencies
- 2:1 combining losses (0.2 dB)

330W, 1400 MHz, Air Traffic Radar Lineup

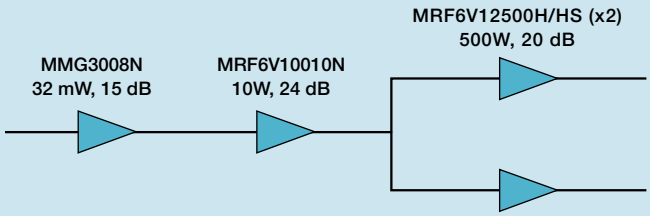
62.5 dB of Gain in Three Stages



- Cost effective
- Small, low cost, over-molded plastic driver and pre-driver
- Compact design

950W, 1030 MHz Air Traffic Radar Lineup

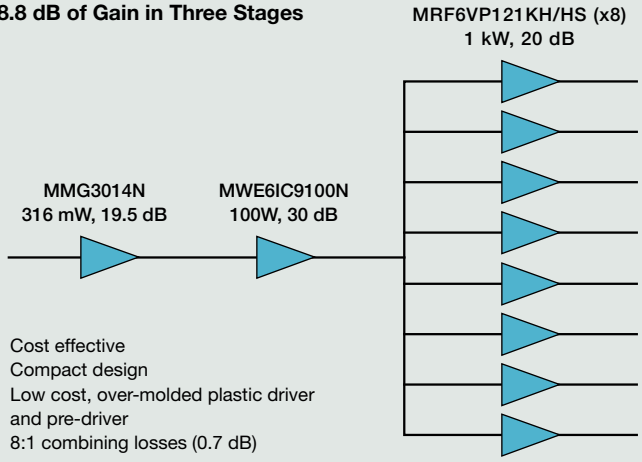
58.8 dB of Gain in Three Stages



- Cost effective
- Compact design
- Low cost, over-molded plastic driver and pre-driver
- 2:1 combining losses (0.2 dB)

6.8 kW, 1030 MHz Air Traffic Radar Lineup

68.8 dB of Gain in Three Stages



- Cost effective
- Compact design
- Low cost, over-molded plastic driver and pre-driver
- 8:1 combining losses (0.7 dB)

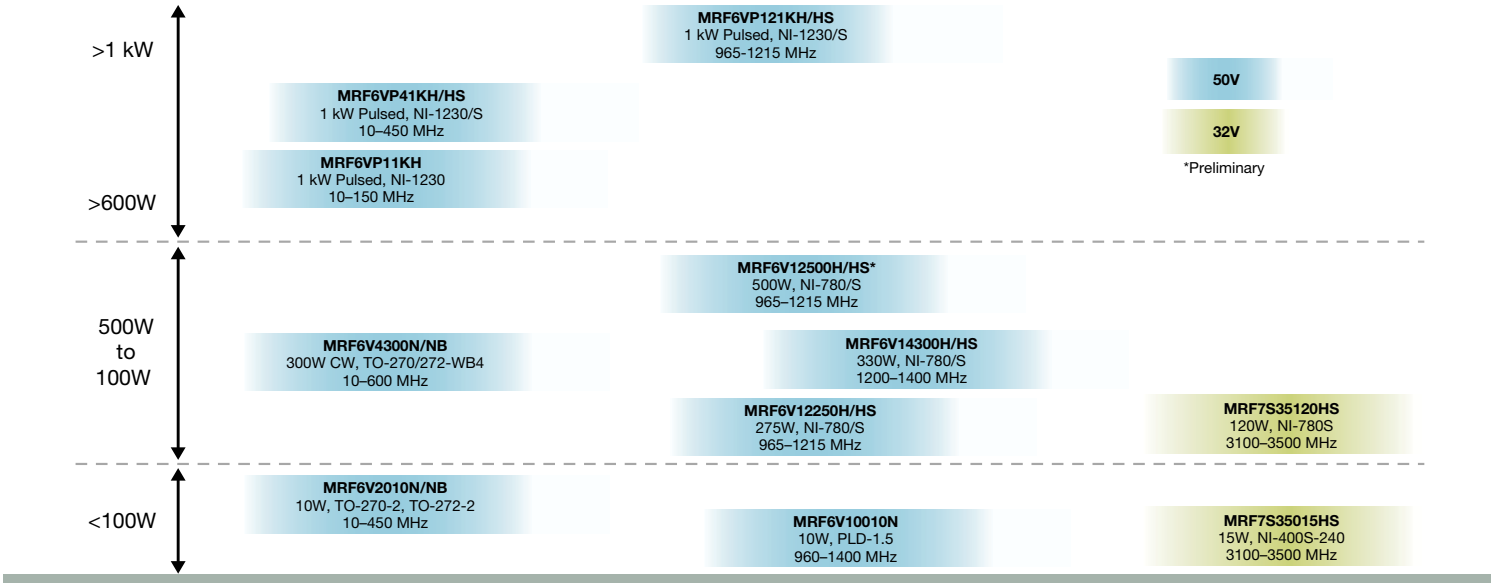
Performance Table for UHF/L-Band Aerospace—50 Volt Devices

Part Number	Voltage (V)	Operating Frequency (MHz)	Rated Power (W)	Technology	Package	θ_{JC} °C/W	Typical Gain (dB)	Typical Efficiency (%)	Reference Designs (MHz)
HF/VHF/UHF									
MRF6V2010N/NB	50	10–450	10 CW	VHV6	Over-Molded	3[2]	23.9	62	27, 64, 130, 220, 450
MRF6V4300N/NB	50	10–600	300 CW	VHV6	Over-Molded	0.24[2]	25.5	60	450
MRF6VP11KH	50	10–150	1000[1]	VHV6	Air Cavity	0.03[3]	26	71	30 CW, 81 CW, 100 CW, 130
MRF6VP41KH/HS	50	10–450	1000[1]	VHV6	Air Cavity	0.03[4]	20	64	352 CW, 450, 500
L-Band									
MRF6V10010N	50	960–1400	10[1]	VHV6	Over-Molded	1.6[5]	25	69	1090
MRF6V12250H/HS	50	965–1215	275[1]	VHV6	Air Cavity	0.08[6]	20.3	65.5	965–1215, 1030
MRF6V14300H/HS	50	1200–1400	330[1]	VHV6	Air Cavity	0.13[7]	18	60.5	1200–1400
MRF6V12500H/HS*	50	965–1215	500[1]	VHV6	Air Cavity	-	19	60	1030
MRF6VP121KH/HS	50	965–1215	1000[1]	VHV6	Air Cavity	0.02[8]	20	56	785, 1030, 1090

Performance Table for S-Band Aerospace—32 Volt Devices

Part Number	Voltage (V)	Operating Frequency (MHz)	Rated Power (W)	Technology	Package	θ_{JC} °C/W	Typical Gain (dB)	Typical Efficiency (%)	Reference Designs (MHz)
S-Band									
MRF7S35015HS	32	3100–3500	15[1]	HV7	Air Cavity	0.6[9]	16	41	3500
MRF7S35120HS	32	3100–3500	120[1]	HV7	Air Cavity	0.11[10]	12	40	3500

RF Power Aerospace Portfolio



*Preliminary

(1) Peak power

(2) Thermal resistance is determined under specified RF operating conditions: 220 MHz @ CW rated power. MRF6V4300N: 450 MHz @ CW rated power

(3) Preliminary thermal resistance is determined under specified RF operating conditions: 130 MHz @ 1000 W peak, 100 µsec pulse width, 20% duty cycle

(4) Preliminary thermal resistance is determined under specified RF operating conditions: 450 MHz @ 1000 W peak, 100 µsec pulse width, 20% duty cycle

(5) Preliminary thermal resistance is determined under specified RF operating conditions: 1090 MHz @ 10 W peak, 100 µsec pulse width, 20% duty cycle

(6) Preliminary thermal resistance is determined under specified RF operating conditions: 1030 MHz @ 275 W peak, 128 µsec pulse width, 10% duty cycle

(7) Preliminary thermal resistance is determined under specified RF operating conditions: 1400 MHz @ 330 W peak, 300 µsec pulse width, 12% duty cycle

(8) Preliminary thermal resistance is determined under specified RF operating conditions: 1030 MHz @ 1000 W peak, 128 µsec pulse width, 10% duty cycle

(9) Preliminary thermal resistance is determined under specified RF operating conditions: 3500 MHz @ 15 W peak, 100 µsec pulse width, 20% duty cycle

(10) Preliminary thermal resistance is determined under specified RF operating conditions: 3500 MHz @ 120 W peak, 100 µsec pulse width, 20% duty cycle

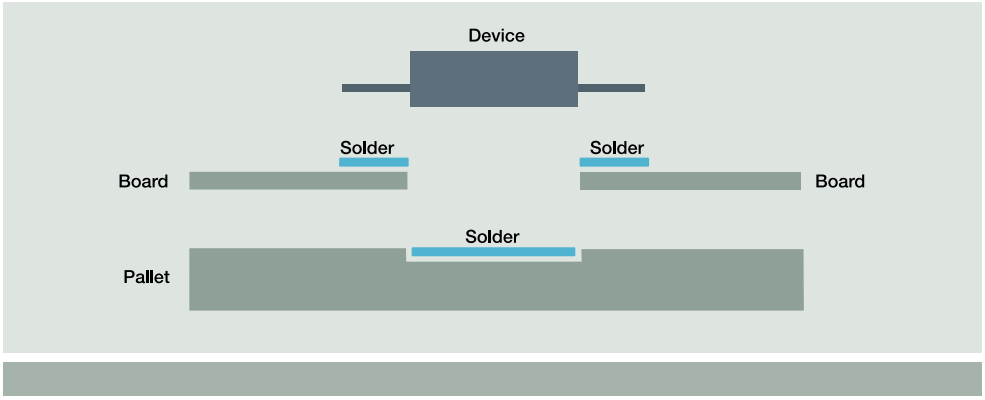
Industry Leading Packaging

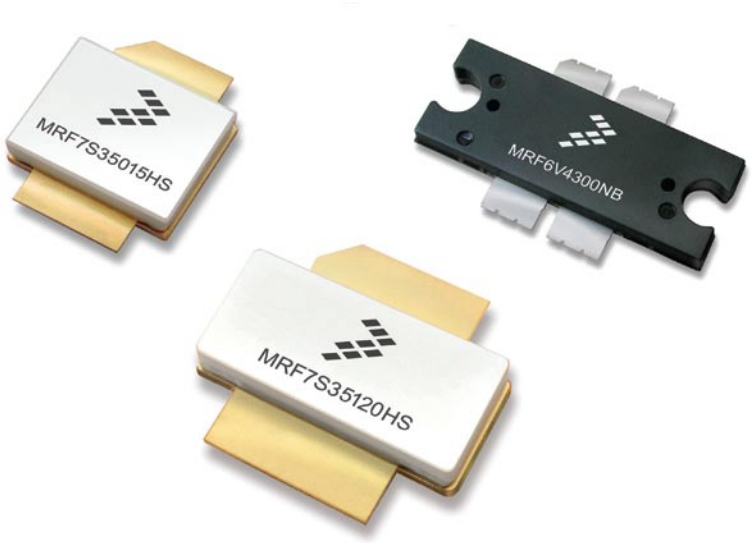
With over 80 million RF power devices delivered in over-molded plastic packaging, Freescale has established a proven reliability track record. Thermally optimized, these packages demonstrate an industry-leading junction-to-case thermal resistance with 0.24°C/W for a single-ended part rated at 300 Watts. These RoHS compliant packages are also available in both solder reflow and bolt down versions.

Why Freescale?

- RF performance leadership
- Package design
  - Freescale JEDEC-registered TO series is the only over-molded plastic package series specifically designed for high power RF applications
  - Bolt down and solder reflow options
  - Multiple mounting configurations
  - 200°C TJ
- Manufacturing
  - Internal dedicated RF power plastic manufacturing line
  - Over 80 million RF power plastic packages shipped with no known package related failures
  - Automated high volume assembly and test
  - Multiple manufacturing locations
- Materials
  - RoHS compliant
- Over-molded plastic
  - Solderable backmetal die attach = 20 percent better thermal results over epoxy
  - Package with a larger heatsink contact area for optimum thermal performance
- Conventional ceramic packaging
  - Lower thermal resistance flange material
  - Higher on-package impedance matching
  - Higher power > 1 kW
  - Low Au solderable finish

RF Over-Molded Plastic Solder Reflow Process





Learn More: For current information about Freescale RF solutions, please visit: **www.freescale.com/rfpower**.

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