



RF Solutions for Commercial Aerospace



freescale.com/RF

RF Performance

Freescale has developed an advanced portfolio of RF power solutions for use in avionics systems, L-Band radars and S-Band radars. Our latest-generation Airfast products for commercial aerospace pack more RF power in less space, reducing size and weight, and have better reliability and integration — all of which help improve air traffic control and next-generation aircraft-to-aircraft communications.

Leveraging LDMOS

LDMOS transistors provide higher thermal capabilities, gain and ruggedness than bipolar solutions. LDMOS enables more cost-effective systems than gallium nitride (GaN) while delivering similar performance in L-Band. As an example, the AFV121KH RF power transistor has more than 1 kW of power across the full DME 960 –1215 MHz band.

New Level of Integration

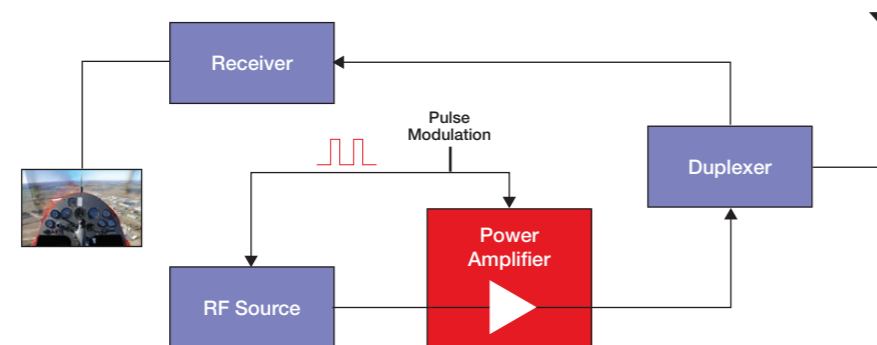
The avionics industry's first RF power integrated circuit for 1090 MHz, AFIC10275N, integrates two amplification stages.

The device also embeds RF sensing and temperature sensing capabilities, reducing the need for external components. This device is designed to work specifically with TCAS systems, ADS-B transponders and Mode S ELM interrogators.

Worldwide Industry Leader

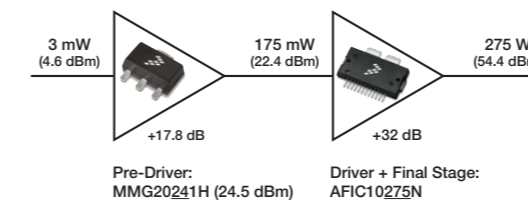
Freescale's RF power transistor products enable the majority of the world's cellular voice and data traffic every day, in the harshest environments on earth, making Freescale the world's largest and most-deployed supplier of RF power technology.

Typical Block Diagram

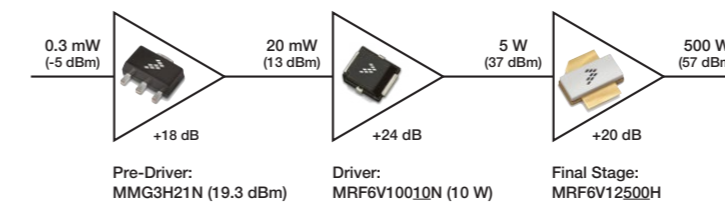


Recommended Solutions for Transponders and Secondary Radars

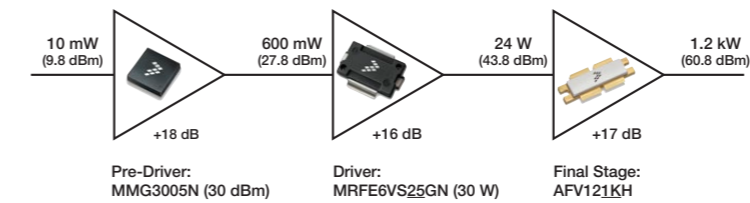
Lineup for 250 W transponder (1090 MHz)



Lineup for 500 W transponder (1090 MHz) or DME (960-1215 MHz)



Lineup for 1 kW secondary radar (1030 MHz) or DME (960-1215 MHz)

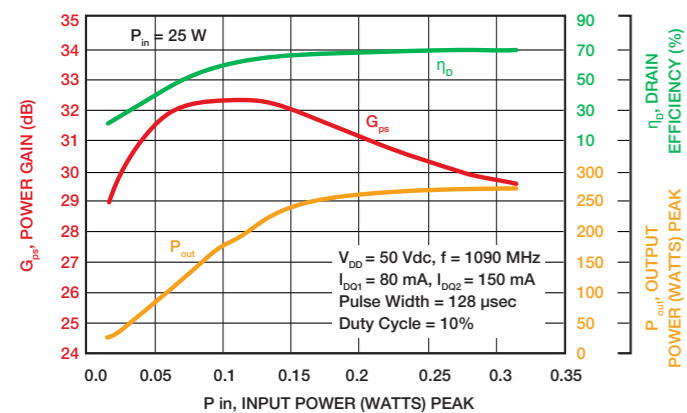
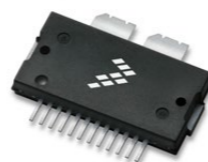


Featured Product: AFIC10275N: 250 W, 978-1090 MHz

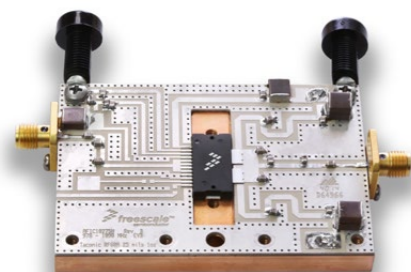
AFIC10275N is a dual-stage integrated circuit with integrated sensors enabling much smaller and lighter power amplifiers for avionics transponders

1090 MHz performance @ $V_{DD} = 50$ Vdc, Pulse 128 μ sec, 10% Duty Cycle

| Frequency (MHz) | Output Power (W) | Gain (dB) | 2nd Stage Drain Efficiency (%) |
|-----------------|------------------|-----------|--------------------------------|
| 1090 | 250 | 30.1 | 60.6 |



Power Gain, Drain Efficiency and Output Power versus Input Power



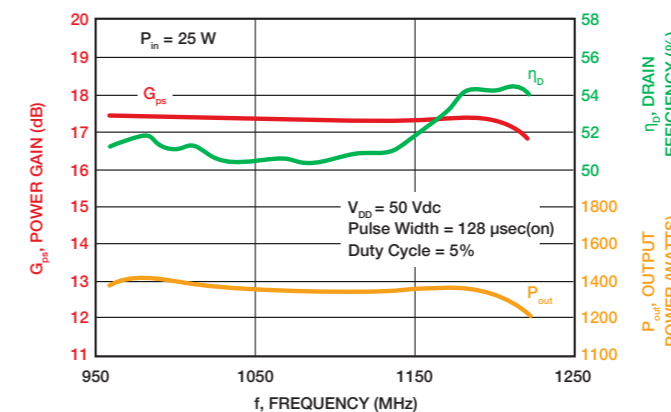
Size: 1.97" x 2.76" (5.0 cm x 7.0 cm)

Featured Product: AFV121KH: > 1 kW Pulse @ 960-1215 MHz

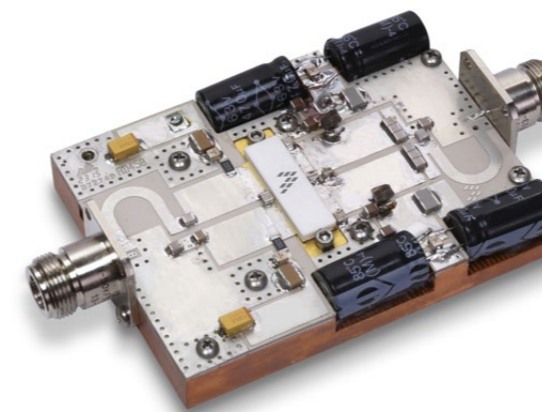
AFV121KH high power device for air traffic control – higher power enables reduction of the number of transistors per system, reducing size and cost.

Typical wideband performance: $V_{DD} = 50$ Vdc, $P_{in} = 25$ W, Pulse 128 μ sec, 5% Duty Cycle

| Frequency (MHz) | Output Power (W) | Gain (dB) | Drain Efficiency (%) |
|-----------------|------------------|-----------|----------------------|
| 960 | 1285 | 17.1 | 50 |
| 1030 | 1320 | 17.2 | 51 |
| 1090 | 1350 | 17.3 | 51 |
| 1215 | 1235 | 17.0 | 55 |



Power Gain, Drain Efficiency and Output Power versus Frequency



Size: 3" x 4" (7.6 cm x 10.2 cm)



Recommended Products

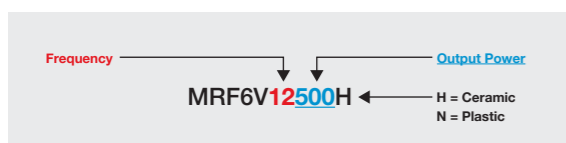
| RF Power LDMOS Transistors | | | | | | | Available Reference Circuits | | | | | | |
|----------------------------|----------|---------------------------|---------------------|--|------|---------------------------------|------------------------------|---------------------|----------------------------|-----------|----------|-----------------------------|-------------------------------|
| Product | P1dB (W) | Freq. (MHz) | V _{DD} (V) | Package Options | VSWR | Warranted Minimum Longevity (1) | Board Freq. (MHz) | Typical Application | P _{out} (W) Pulse | Gain (dB) | Eff. (%) | Size | Suggested Driver |
| AFV121KH NEW* | 1000 | 960–1215 I/O matched | 50 | NI-1230H-4S NI-1230S-4S NI-1230GS-4L | 20:1 | 2030 | 960–1215 | DME | 1200 | 17 | 51 | 3 × 4" (7.6 × 10.2 cm) | MRFE6VS25GN |
| MRF6V12500H | 500 | 960–1215 I/O matched | 50 | NI-780H-2L NI-780S-2L | 10:1 | 2024 | 1030 | ADS-B | 500 | 20 | 62 | 3 × 5" (7.6 × 12.7 cm) | MRF6V10010N or MRFE6VS25GN |
| | | | | | | | 960–1215 | ADS-B or DME | 500 | 18.5 | 57 | 3 × 5" (7.6 × 12.7 cm) | |
| | | | | | | | 960–1215 | ADS-B or DME | 500 | 17.5 | 55 | 2.2 × 3.2" (5.6 × 8.1 cm) | |
| MRF6V12250H | 275 | 960–1215 I/O matched | 50 | NI-780H-2L NI-780S-2L | 10:1 | 2024 | 1030 | ADS-B | 275 | 20.5 | 66 | 3 × 5" (7.6 × 12.7 cm) | MRF6V10010N or MRFE6VS25GN |
| | | | | | | | 960–1215 | ADS-B or DME | 250 | 19.5 | 59 | 3 × 5" (7.6 × 12.7 cm) | |
| | | | | | | | 960–1215 | ADS-B or DME | 250 | 18.5 | 54 | 2 × 3" (5.1 × 7.6 cm) | |
| AFIC10275N NEW | 250 | 978–1090 input matched | 50 | TO-270WB-14 TO-270WBG-14 | 10:1 | 2030 | 978-1090 | ADS-B | 250 | 30 | 61 | 1.97 × 2.76" (5.0 × 7.0 cm) | MMG20241H |
| MRF6V14300H | 330 | 1200–1400 I/O matched | 50 | NI-780H-2L NI-780S-2L | 5:1 | 2023 | 1200–1400 | L-Band Radar | 330 | 17.5 | 60 | 4 × 6" (10.2 × 15 cm) | MRFE6VS25GN |
| MRF8P29300H | 320 | 2700–2900 I/O matched | 30 | NI-1230H-4S NI-1230S-4S | 10:1 | 2026 | 2900 | S-Band Radar | 320 | 13 | 50 | 4 × 5" (10.2 × 13 cm) | A2I25D025N |
| | | | | | | | 2700–2900 | S-Band Radar | 320 | 13 | 49 | 2 × 3" (5.1 × 7.6 cm) | |
| MRF6V3090N | 90 | 470–1215 input matched | 50 | TO-270WB-4 TO-272WB-4 | 10:1 | 2024 | 960–1215 | Wideband DME Driver | 90 | 18 | 45 | 2 × 3" (5.1 × 7.6 cm) | MMG3006N |
| MRF6VS25L MRF6VS25N/GN | 25 | 1.8–2000 unmatched | 50 | NI-360H-2L TO-270-2 TO-270G-2 | 65:1 | 2027 | 960–1215 | Wideband DME Driver | 30 | 16 | 45 | 2 × 3" (5.1 × 7.6 cm) | MMG3005N |
| MRF6V10010N | 10 | 960–1400 I/O matched | 50 | PLD-1.5 | — | — | 1090 | Narrowband Driver | 10 | 24 | 70 | 2 × 3" (5.1 × 7.6 cm) | MMG3H21N |

1. Freescale warrants the manufacturing availability of this product until the year indicated. After indicated year, the product will continue to be available until demand falls (Freescale Product Longevity Program).

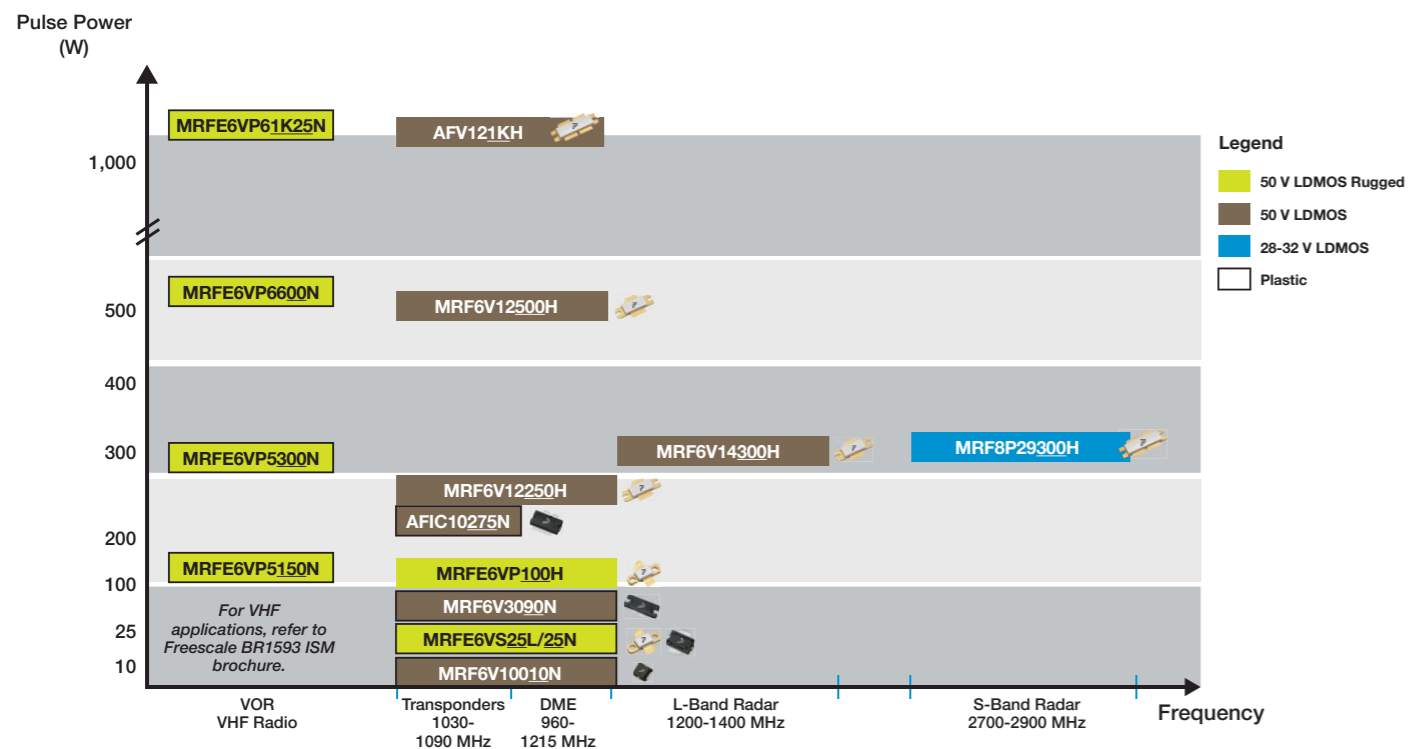
For VHF applications, refer to Freescale BR1593 ISM brochure.

* Preliminary

For additional information and orderable part numbers, refer to Freescale's RF Product selector guide: www.freescale.com/RFselectorguide

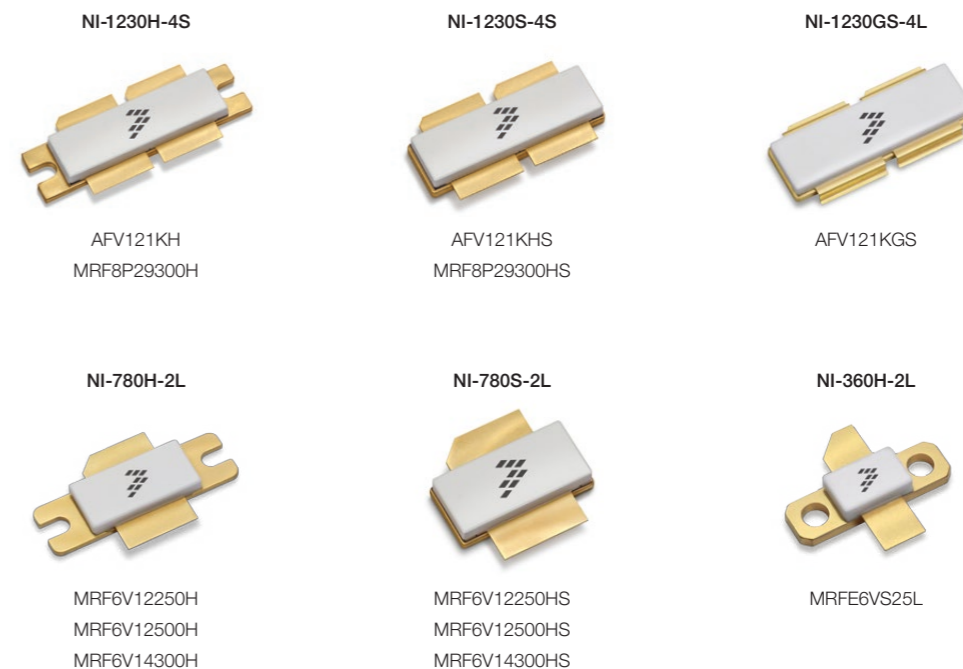


RF Power Commercial Aerospace Portfolio



RF Power Commercial Aerospace Packages

Air Cavity Ceramic



Over-Molded Plastic



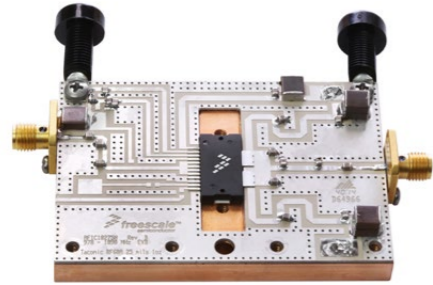
Not to scale



Reference Circuit Boards

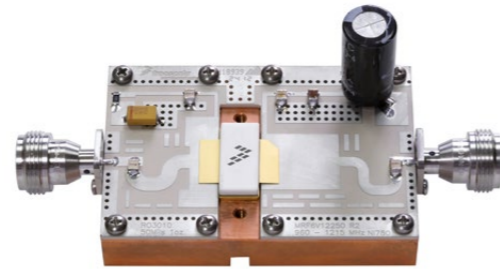
Notes

AFIC10275N 978-1090 MHz



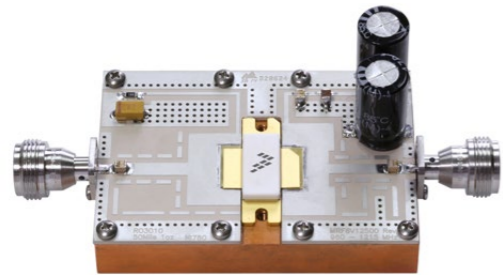
1.97" x 2.76" (5.0 cm x 7.0 cm)

MRF6V12250H 960-1215 MHz



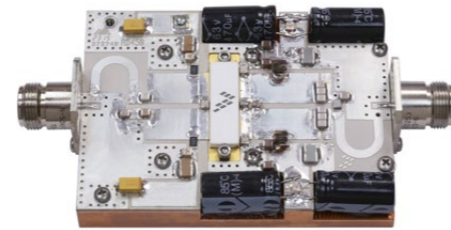
2" x 3" (5.1 cm x 7.6 cm)

MRF6V12500H 960-1215 MHz



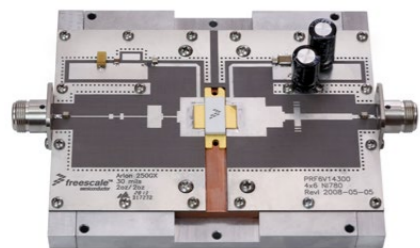
2.2" x 3.2" (5.6 cm x 8.1 cm)

AFV121KH 960-1215 MHz



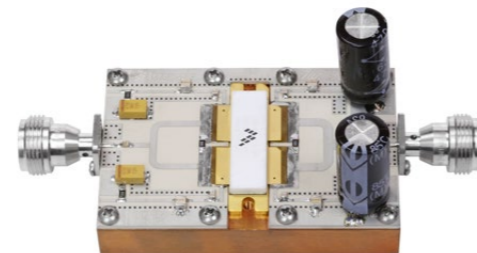
3" x 4" (7.6 cm x 10.2 cm)

MRF6V14300H 1200-1400 MHz



4" x 6" (10.2 cm x 15 cm)

MRF8P29300H 2700-2900 MHz



2" x 3" (5.1 cm x 7.6 cm)





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