

# RF Solutions for Commercial Aerospace



# RF Performance

Freescal 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

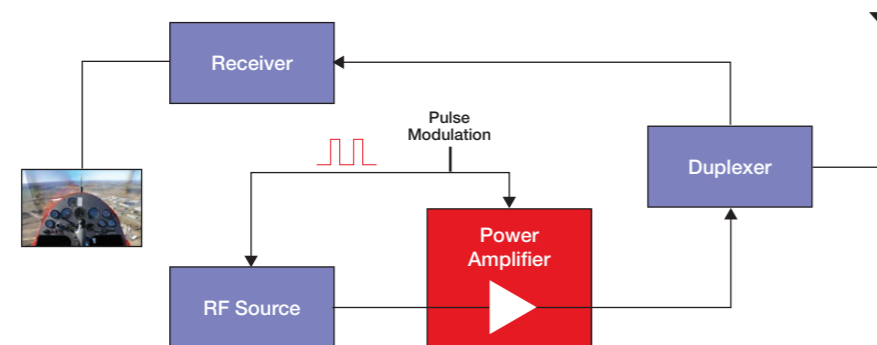
The avionics industry's first RF power integrated circuit for 1090 MHz, AFIC10275N, integrates two amplification stages.

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

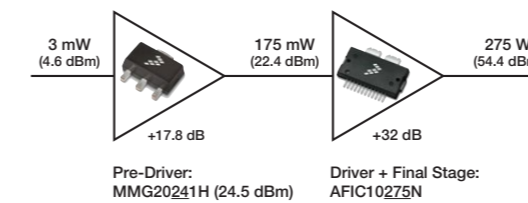
Freescal's RF power transistor products enable the majority of the world's cellular voice and data traffic every day, in the harshest environments on earth, making Freescal the world's largest and most-deployed supplier of RF power technology.

## Typical Block Diagram

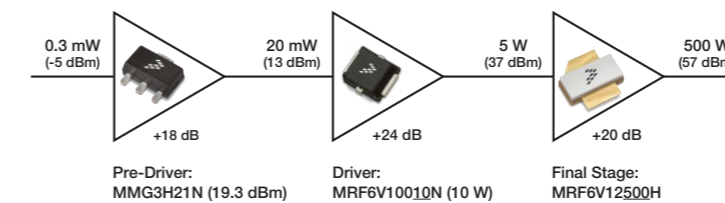


## Recommended Solutions for Transponders and Secondary Radars

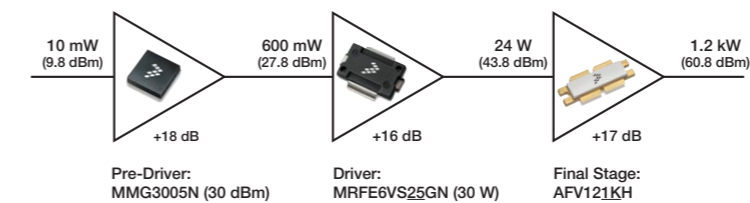
### Lineup for 250 W transponder (1090 MHz)



### 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)

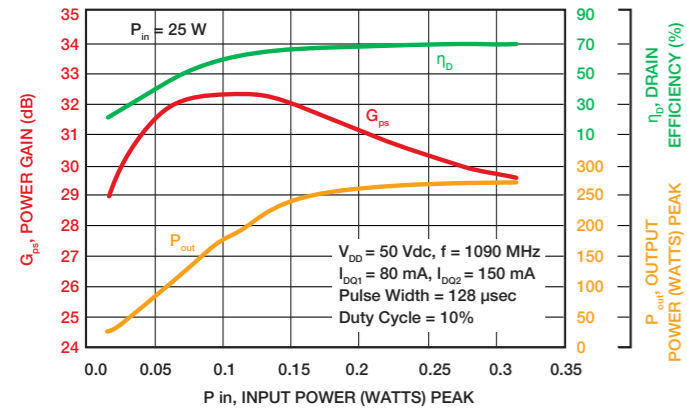


### Featured Product: AFIC10275N: 250 W, 978-1090 MHz

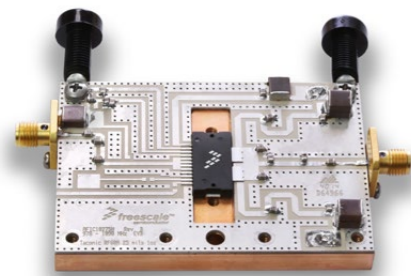
AFIC10275N is a dual-stage integrated circuit with integrated sensors enabling much smaller and lighter power amplifiers for avionics transponders

1090 MHz performance @  $V_{DD} = 50$  Vdc, Pulse 128  $\mu$ 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



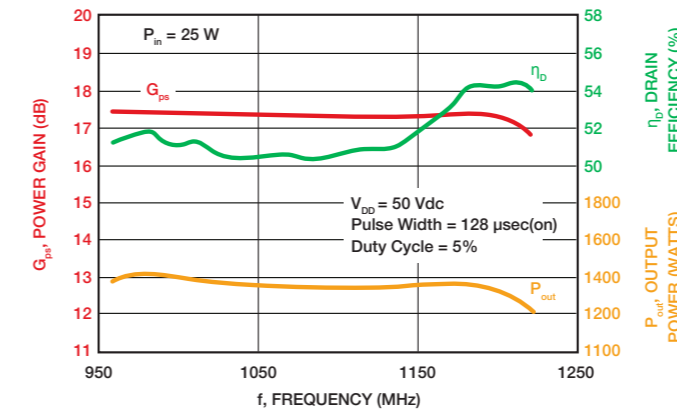
Size: 1.97" x 2.76" (5.0 cm x 7.0 cm)

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

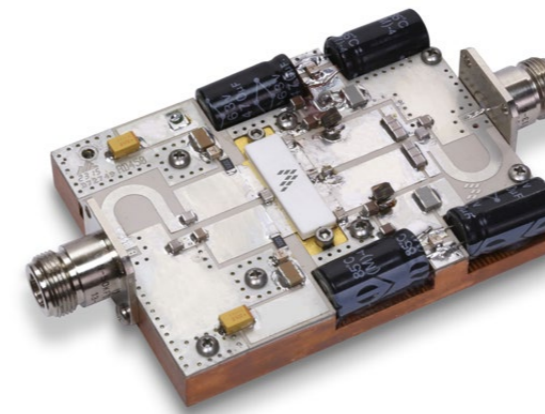
AFV121KH high power device for air traffic control – higher power enables reduction of the number of transistors per system, reducing size and cost.

Typical wideband performance:  $V_{DD} = 50$  Vdc, P<sub>in</sub> = 25 W, Pulse 128  $\mu$ 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

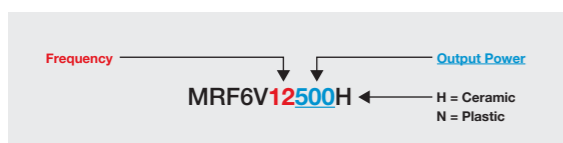
RF Power LDMOS Transistors							Available Reference Circuits						
Product	P1dB (W)	Freq. (MHz)	V <sub>DD</sub> (V)	Package Options	VSWR	Warranted Minimum Longevity (1)	Board Freq. (MHz)	Typical Application	P <sub>out</sub> (W) Pulse	Gain (dB)	Eff. (%)	Size	Suggested Driver
AFV121KH <b>NEW*</b>	1000	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 <b>NEW</b>	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).

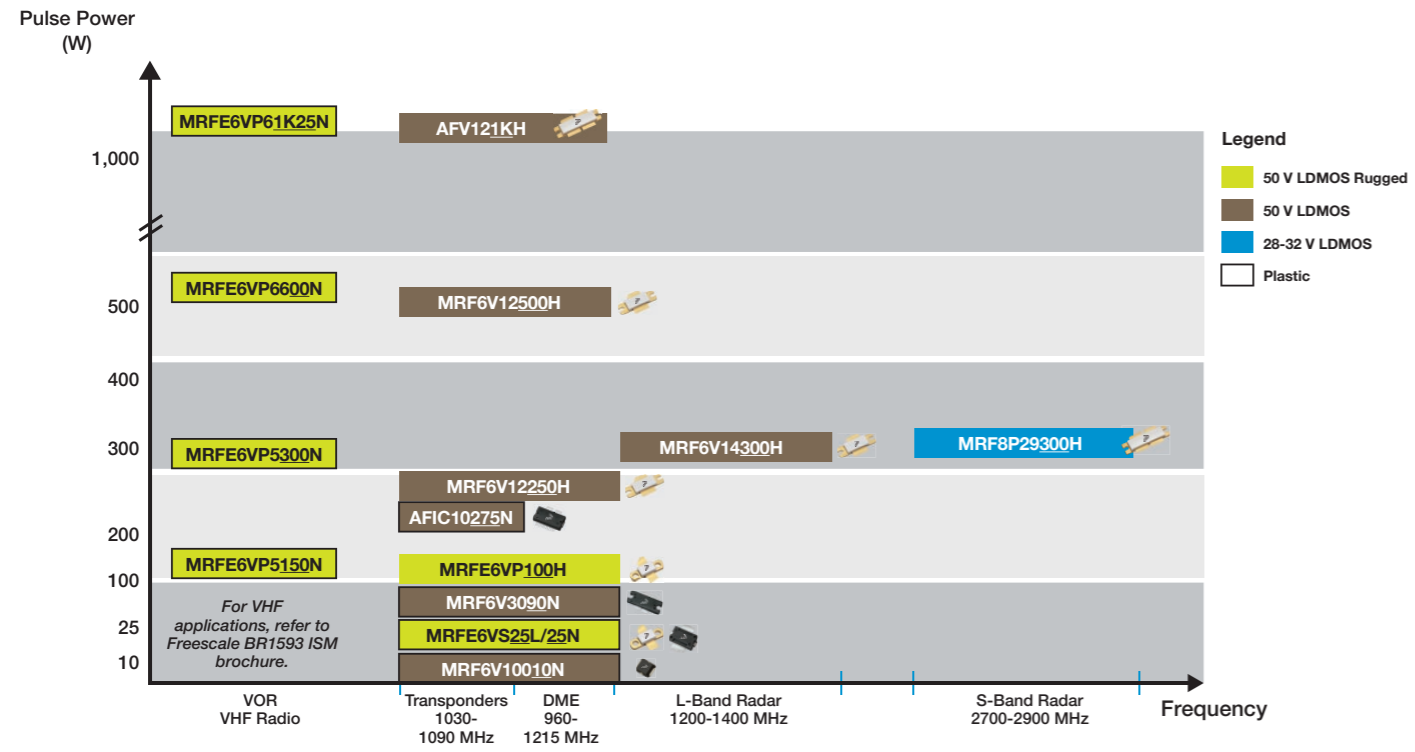
For VHF applications, refer to Freescale BR1593 ISM brochure.

\* Preliminary

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

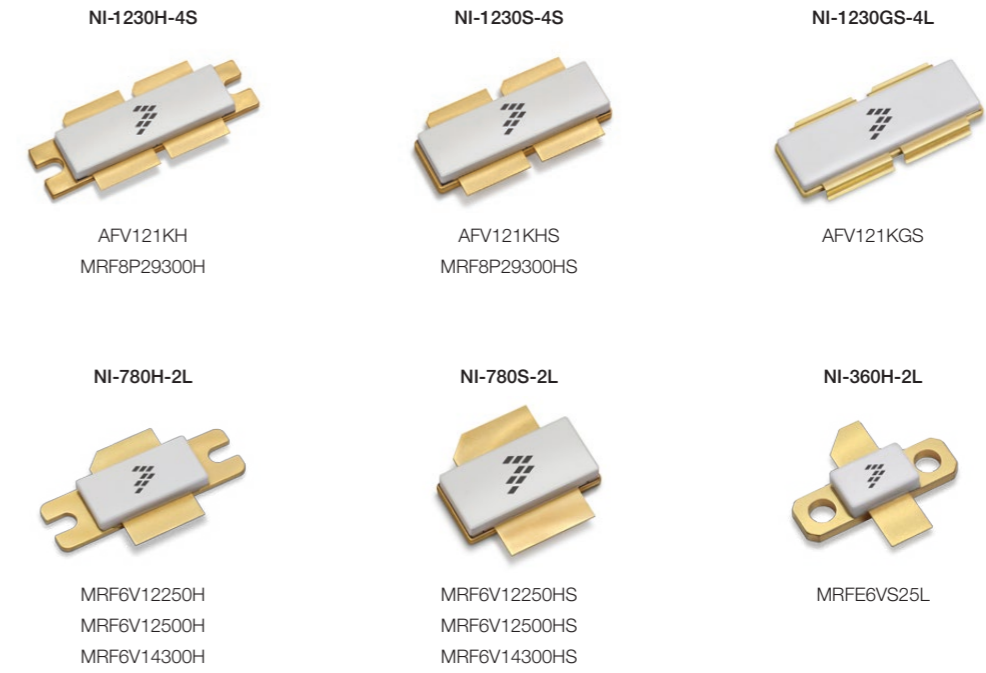


### RF Power Commercial Aerospace Portfolio



### RF Power Commercial Aerospace Packages

#### Air Cavity Ceramic



#### Over-Molded Plastic



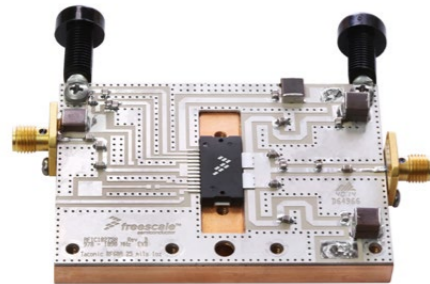
Not to scale



Reference Circuit Boards

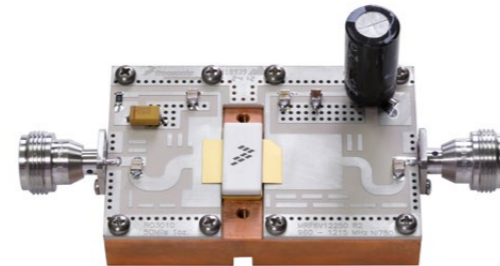
Notes

AFIC10275N 978-1090 MHz



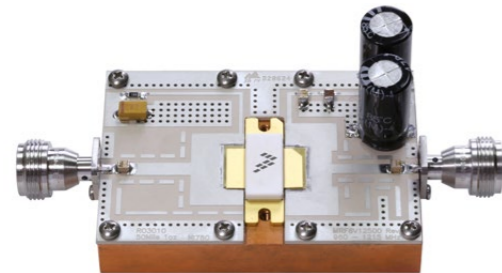
1.97" x 2.76" (5.0 cm x 7.0 cm)

MRF6V12250H 960-1215 MHz



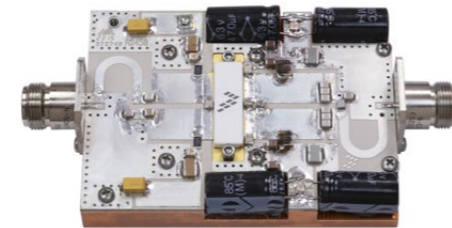
2" x 3" (5.1 cm x 7.6 cm)

MRF6V12500H 960-1215 MHz



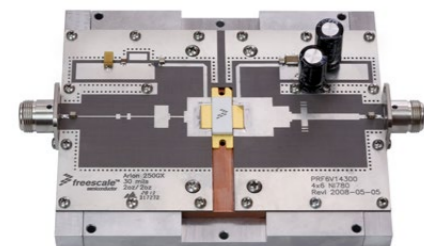
2.2" x 3.2" (5.6 cm x 8.1 cm)

AFV121KH 960-1215 MHz



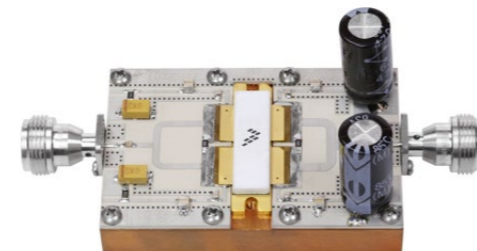
3" x 4" (7.6 cm x 10.2 cm)

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)





For more information, visit [freescale.com/RF](http://freescale.com/RF)

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