Freescale introduces breakthrough ultra-wideband RF power GaN on SiC transistors in advanced plastic packages

Announcing: MMRF5011N and MMRF5015N

May 2015
Freescale RF Military Overview

• Freescale RF is **#1 in RF power***
  • Strong presence in ISM, mobile radio, broadcast and avionics
  • June 2013: Freescale RF announced new focus supporting U.S. defense industry

Freescale RF Military Value Proposition

• Products and Technology
  - Leveraging **20 years of innovation** in RF power
  - Highest performing RF portfolio

• Support
  - U.S. LDMOS fabrication and dedicated internal manufacturing
  - Freescale product longevity program (10 or 15 years)
  - Dedicated U.S.-based applications and systems engineering support

• Compliance
  - ITAR compliant, secure technical data handling

*Source: ABI Report, Sep 2014
Part Overview

Product Performance:
• Output power: 10 W CW
• Supply voltage: 28 V
• Frequency of operation: up to 3000 MHz
• 10 W CW wideband circuit performance: 200-2600 MHz
  - Gain : 10 dB Min
  - Drain Efficiency: 40% Min

Description:
10 W CW RF power transistor driver designed for wideband amplifiers with frequencies up to 3000 MHz. The high gain, ruggedness and wideband performance of this device make it ideal for large-signal, common-source amplifier applications for linear and compressed amplifier circuits.

Features:
• Advanced GaN on SiC, offering high power density
• Suitable for octave and decade bandwidth wideband amplifiers
• Input matched for extended wideband performance
• High ruggedness, > 20:1 VSWR
• 200-2600 MHz wideband reference circuit
MMRF5011N – Featured Device

Applications
• Wideband and narrowband amplifiers
• Ideal for multi-octave communication applications
• Professional and military radios
• Radar, jammers and electronic warfare
• General purpose wideband amplifiers

Competitive Advantages
• OM-270-8 plastic packaging, industry leading thermal resistance
• Ultra wideband 200-2600 MHz performance
  • 10 dB min gain and 40% min efficiency
• Low thermal resistance, due to die attached technology and packaging
• Device included in Freescale’s Product Longevity Program for 15 years
• Able to replace multiple RF amplifiers with one wideband PA
• Application circuit support
• Dedicated RF military team
MMRF5015N – Device Details

Part Overview

Product Performance:
- Output power: 125 W CW
- Supply voltage: 50 V
- Frequency of operation: up to 2700 MHz
- 100 W CW wideband circuit performance: 200-2500 MHz
  - Gain: 12 dB Min
  - Drain Efficiency: 40% Min

Description:
This 125 W CW RF power transistor is designed for wideband operation up to 2700 MHz. The high gain, ruggedness and wideband performance of this device make it ideal for large-signal, common-source amplifier applications for linear and compressed amplifier circuits. Industry leading thermal resistance.

Features:
- Advanced GaN on SiC, offering high power density
- Suitable for octave and decade bandwidth wideband amplifiers
- Input matched for extended wideband performance
- High ruggedness, > 20:1 VSWR
- Low Thermal Resistance
- 200-2500 MHz wideband reference circuit
Applications
• Wideband and narrowband amplifiers
• Ideal for multi-octave communication applications
• Professional and military radios
• Radar, jammers and electronic warfare
• General purpose wideband amplifiers

Competitive Advantages
• Industry leading wideband 200-2500 MHz performance
  • 12 dB min gain and 40% min efficiency
• Low thermal resistance, due to die attached technology and packaging
• 125 watts CW capable
• Device will be on the Freescale 15 year Product Longevity Program
• Able to replace multiple RF amplifiers with one wideband PA
• Application circuit support
• Dedicated RF Military team
• Availability: sampling now. In production Q3 2015. (orderable part MMRF5015NR5)
MMRF5015N
125 W GaN
Power Drive Up

Power Drive up @ f=2500 MHz
Pulse Width=200us, Duty Cycle=20%, Vdd=50V, Idq=350mA

Gain (dB)

Output Power (dBm)

Efficiency (%)

Output Power (dBm)
MMRF5015N
200-2500 MHz Circuit
100 W CW Performance

Design Goals Met
► 100 W CW
► 200-2500 MHz
► 12 dB min gain
► 40% min eff

MMRF5015N 100W GaN CW Performance
VDD = 50 V, IDQ=350 mA
MMRF5015N
1300-1900 MHz Circuit
Pulsed Performance

VDD = 50 V
IDQ = 350 mA,
Pulse Width = 500 usec
50% Duty Factor.
More Information

From the Product Summary Pages

- Data sheets
- Simulation models – ADS and AWR
- MTTF calculators
- S-parameters
  - MMRF5011N
  - MMRF5015N

From www.freescale.com/RFpower

- Product Selector Guide
- Parametric search
- App notes – > 30 available
- White papers & webinars
- Freescale Product Longevity Program

On the web

- Blogs & Twitter – @RFLeonard
- YouTube.com/Freescale
- RF Engineering Tools App for Android & iOS
- On eTailers & Freescale Approved Distributors