



Airfast Expansion Announcement

New Additions to the Airfast Family of RF Products



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June 2012



A Global Leader of Embedded Processing Solutions

Two Core Product Groups

- Automotive, Industrial & Multi-Market Solutions
 - Microcontrollers
 - Sensors
 - Analog
- Networking and Multimedia Solutions
 - Communications Processors
 - Applications Processors
 - RF Power

Four Primary Markets

- Automotive
- Industrial
- Networking
- Consumer



Platform-Level Solutions

50+ Year Legacy
5,500+ Engineers

6,000+ Patent Families
18,000+ Customers



Market's Broadest Portfolio for Network Infrastructure



QorIQ Communications Processors

The Smarter Approach to Multicore

1 in embedded processors for wired and wireless networking¹

High-performance processors, built on Power Architecture[®] technology with leading embedded interconnects and accelerators, supported by leading VortiQa software

QorIQ Advanced Multi-processing (AMP) series enables new levels of performance



QorIQ Qonverge Platform Solutions

New Dimension of Wireless Processing

#2 supplier of programmable DSPs²

Market leader in base station SoC architecture

QorIQ Qonverge base station SoC families with a common architecture that spans small to large cells

Heterogeneous, multicore implementation of MPU, DSP and powerful accelerators for L1, L2 and transport



Airfast RF Power Solutions

Fast Forward to the Future

1 in high power RF transistors³

Broad portfolio ranging from general purpose amplifiers, linear amplifiers, and signal control products to feature-rich low noise amplifiers and high performance RFICs

Airfast RF products offer industry-leading performance and silicon efficiency (700 – 2700 MHz)

Widest range of RF technologies for ideal performance: LDMOS, GaAs and GaN

Sources: 1. Gartner, Mar 2012, Market Share: Semiconductor Applications, Worldwide, 2011
 2. Strategy Analytics, April 2012
 3. ABI Research, LDMOS Power Semiconductors, December, 2011

we Pioneer RF Innovation

With our extensive, market-leading portfolio of innovative RF solutions, Freescale redefined the future of RF technology. And now, our next-generation RF power solutions continue to break new ground with industry-leading performance



Leading Innovation with **Airfast RF Power Solutions**

Airfast RF portfolio demonstrates Freescale's strong RF market leadership and continued innovation by offering the industry's widest bandwidth products and delivering significant improvements in efficiency and power density

Expanding the **Market's Most Trusted RF Portfolio**

Freescale continues to strengthen its position in industrial, scientific, medical, broadcast, aerospace and land mobile radio markets with products that meet or exceed stringent demands of each application. The rugged E series differentiates Freescale and helps customers achieve higher levels of reliability, performance and cost savings.

Growing our **GaAs MMIC Solutions**

Freescale is driving the evolution of small cell base stations with a lineup of RF GaAs MMICs designed for cellular base station equipment which include two-stage linear amplifiers and low noise amplifiers that offer big performance in a small footprint



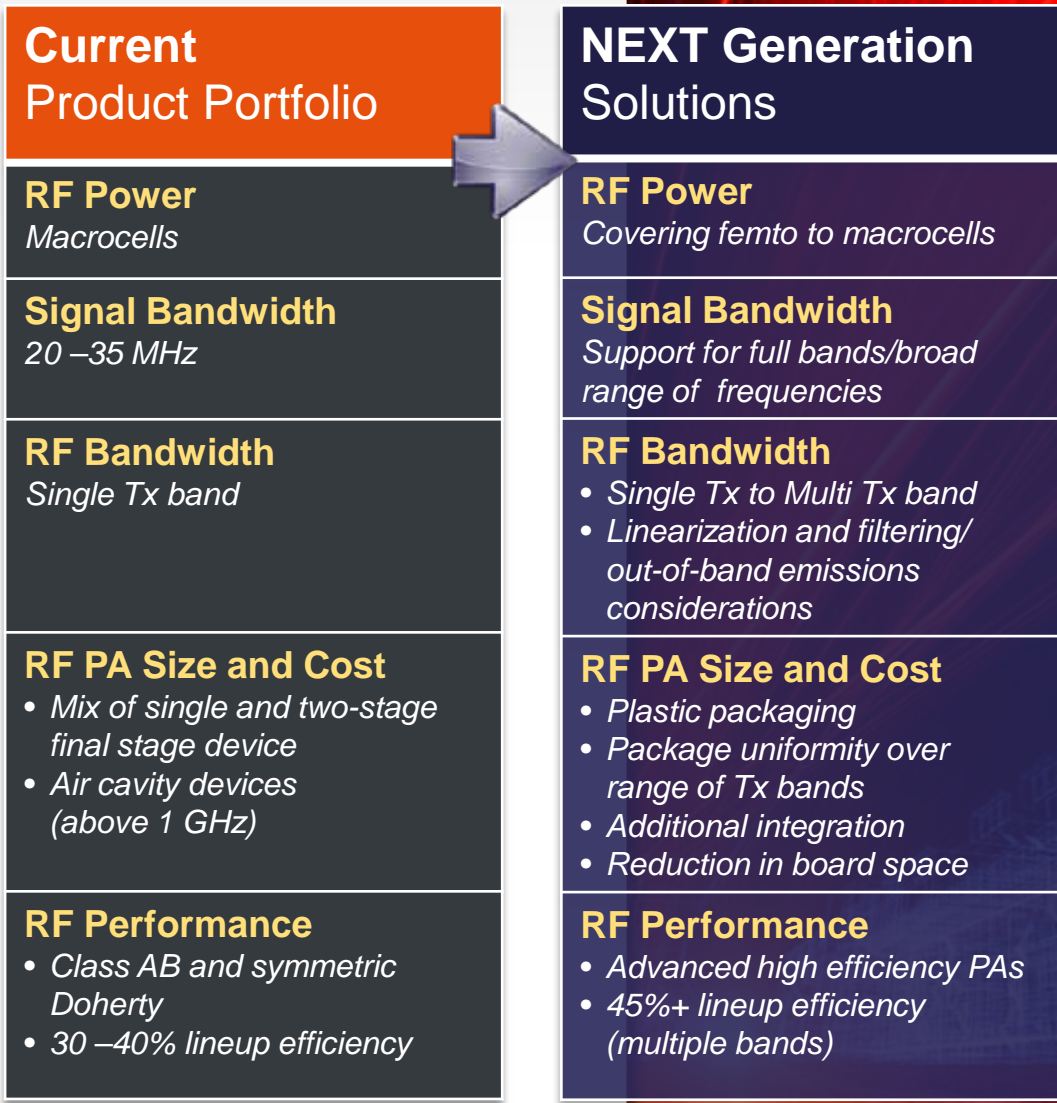
Trends: Power Market

Customers Facing...

- Skyrocketing data rates
- Multiple wireless standards
- Increasing network complexity
- Stringent power requirements
- Worldwide rise in IP traffic


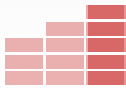
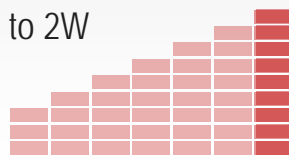
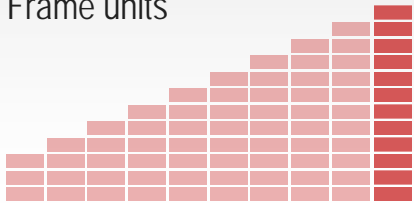
Mobile Broadband for Evolving Cellular Market

- Enable increased capacity requirements on cellular networks
- Support for 4G data rates and beyond
- Reduced energy consumption
- Shrinking equipment footprint
- Reduced time-to-market for new designs





Increasing Radio Complexity: Throughout PA Chain

Radio Access Technology Proliferation	X	Frequency Band Proliferation	X	Transmit Power Level Proliferation	X	Node Type Proliferation
7x		25x		7x		5x
Standards		Spectrum		Cell Size		Hardware Form Factor
<ul style="list-style-type: none"> GSM / EDGE, CDMA, WCDMA/HSPA, WiMAX, TD-SCDMA, LTE, LTE Advanced Expansion of modulation formats over last 10 years. Consolidation with multi-standard radios 		<ul style="list-style-type: none"> FDD: 2100, 1900, 1800, 850, 2600, 950, 1500, 750, 800 MHz TDD: 1900, 2000, 2500, 2300 MHz Unlicensed: 2.4 & 5 GHz Consolidation with multi-band radios 		<p>Macro Cells</p> <ul style="list-style-type: none"> Up to 100 – 120W Avg. <p>Micro/Metro Cells</p> <ul style="list-style-type: none"> Up to 10W Avg. <p>Small Cells:</p> <ul style="list-style-type: none"> 20 mW to 2W 		<ul style="list-style-type: none"> Diversity (MIMO) Remote radio heads Active antenna systems Antenna embedded radio Frame units 

Challenges:

- Relentless cost pressure as cost per MB decreases
- Unprecedented number of product variants stressing supply chain
- Unprecedented product complexity and diversity stressing design resources



Airfast Goals

RF Power Solutions: Fast Forward to the Future

Develop innovative RF solutions that meet and exceed market needs for performance, bandwidth and cost efficiency.

Airfast Delivers Multi-Generational Performance Improvements

- 5 points higher drain efficiency over prior generation
- 25% higher power density
- Significantly improved linearity
- Industry leading instantaneous bandwidth, up to 150 MHz
- Second generation over-molded plastic packaging: most technically advanced and cost-effective packages available for high power RF transistors

Beyond components - System Level Solutions

- DPD validated reference circuit designs for the full PA lineup to shorten customer's development time and cost



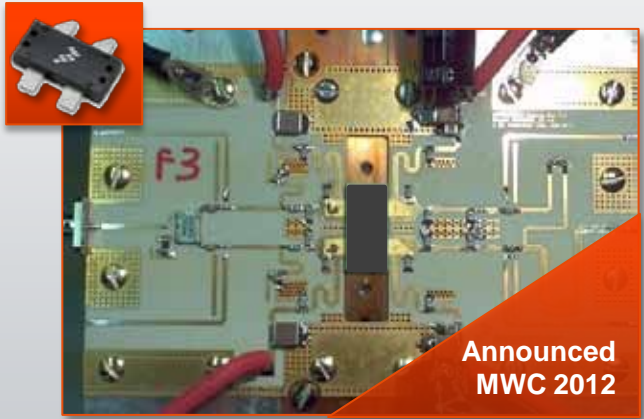
Airtast RF Power Solutions – Announced February 2012

Resetting Industry Benchmarks



2.6 GHz: AFT26HW050GS Doherty

- 15.5 dB gain [**+2 dB relative to HV8**]
- 48% drain efficiency [**+8 pts relative to HV8**]
- Video bandwidth >130 MHz
- *Optimal 2.6 GHz LDMOS performance*



1.0 GHz: AFT09VP350N Doherty

- 57 dBm peak power [**+2 dB relative to HV8 in OM-780**]
- 19 dB gain, 49% drain efficiency
- First cellular 48V product
- *Leading peak power in small package outline*

IMS News Four New Airfast Products for Cellular

Continuing to expand the market's most innovative RF power portfolio

Industry-leading power density, signal bandwidth, linear-efficiency and gain in small form factor with cost-effective configurations

- **AFT09S282N**: Highest peak power in OMNI over-molded plastic package in its class
- **AFT18S230S**: Symmetric Doherty with 45% efficiency
- **AFT21S230S**: Video bandwidth up to 100 MHz
- **AFT18HW355S**: In-package Doherty with efficiency that rivals GaN-based solutions
- **MMDS25254H**: Complementary module enables real time adjustment of phase and amplitude for optimal Doherty performance



AFT09S282N



280 W Rated Power

Airfast RF Power Solutions 28V LDMOS

- Designed for cellular operation from 720 MHz to 960 MHz
- Housed in OMNI-2 cost-effective package
- Highest power in over-molded plastic package

AFT09S282N Doherty Performance

- Measured in a two transistor symmetric Doherty
- 920-960 MHz performance in Doherty test fixture:
 - § Peak power: 700W (58.5 dBm)
 - § At average power of 140W
 - § Gain: 18 dB
 - § Drain Efficiency: 48%
 - § ACPR: -30 dBc

Highest peak power in OMNI over-molded plastic package in its class.

Availability:

- Samples: Now
- Product launch: Sept '12

AFT18S230S



230 W Rated Power

Enables symmetric Doherty PAs with 45% efficiency

Availability:

- Samples: Now
- Product launch: July '12

Airfast RF Power Solutions 28V LDMOS

- Designed for cellular operation from 1805 MHz to 1880 MHz
- Meets strenuous linearity demands of multicarrier GSM
- Ideal for use in symmetric and asymmetric Doherty applications
- Housed in NI-780S-6 package

AFT18S230S Doherty Performance

- Measured in a two transistor symmetric Doherty
- 1805-1880 MHz performance in Doherty test fixture:
 - Peak power: 500W (57 dBm)
 - At an average power of 80W
 - § Gain: 17 dB
 - § Drain Efficiency: 45%
- Supports 35 MHz linearized signal BW for multicarrier GSM

NXP 18HW355S Key Product Features

AFT18HW355S



350 W Rated Power

In-package asymmetric Doherty with efficiency that rivals GaN-based solutions

Availability:

- Samples: Now
- Product launch: July '12

Airfast RF Power Solutions 28V LDMOS

- Designed for cellular operation from 1805 MHz-1880 MHz and 1930-1995 MHz
- Meets strenuous linearity demands of multicarrier GSM
- Compact footprint of an in-package Doherty device
- Housed in NI-1230S-4 package

AFT18HW355S Doherty Performance

- Measured in a single transistor
- 1805-1880 MHz performance in Doherty test fixture:
 - Peak power: 400W (56 dBm)
 - VBW resonance: 150 MHz
 - At an average power of 63W
 - § Gain: 15.3 dB
 - § Drain Efficiency: 48%
- Supports 35 MHz linearized signal BW for multicarrier GSM

NXP AFT21S230S Key Product Features

AFT21S230S



230 W Rated Power

Expanded video bandwidth up to 100 MHz

Availability:

- Samples: Now
- Product launch: Aug '12

Airfast RF Power Solutions 28V LDMOS

- Designed for cellular operation from 2110 MHz to 2170 MHz
- Ideal for use in symmetric and asymmetric Doherty applications
- Housed in NI-780S-6 package

AFT21S230S Doherty Performance

- Measured in a two transistor symmetric Doherty
- 2110-2170 MHz performance in Doherty test fixture:
 - Peak power: 500 W (57 dBm)
 - At an average power of 80 W (49 dBm)
 - § Gain: 15.5 dB
 - § Drain Efficiency: 45%
 - § Supports 35 MHz linearized signal BW

NXP MMDS25254H Key Product Features



Advanced Doherty Alignment Module

- Production yield improvement and tighter parametric distributions
- Enables significant Doherty bandwidth improvement
- Optimized performance over the entire cellular frequency band
- Improved DPD correction with tighter performance distributions
- Increased system efficiency (across entire frequency band)
- Enables consistent asymmetric Doherty with different transistors (works with symmetric Doherty as well)

MMDS25254H Features

- Manufactured in cost-effective industry standard QFN 6x6 mm package
- Digital control of amplitude and phase
- Constant 90 degree phase offset between port 2 and port 3 versus frequency (500 MHz BW)
- Excellent over temperature amplitude and phase performance
- Digital adjustment precision and excellent repeatability

GaAs MMIC Doherty Alignment
Module for 2400-2700 MHz PAs

Availability:
• Samples: Now

