Evaluation Board Documentation

TRF8011 and 2 X TRF7003 RF Power Amplifier 4.8 Volts GSM Application

APPLICATION BRIEF: SWRA013

Wireless Communication Business Unit

Digital Signal Processing Solutions
March 1998

TEXAS INSTRUMENTS

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TRF8011 and 2 X TRF7003 RF Power Amplifier 4.8 Volts GSM Application

Abstract

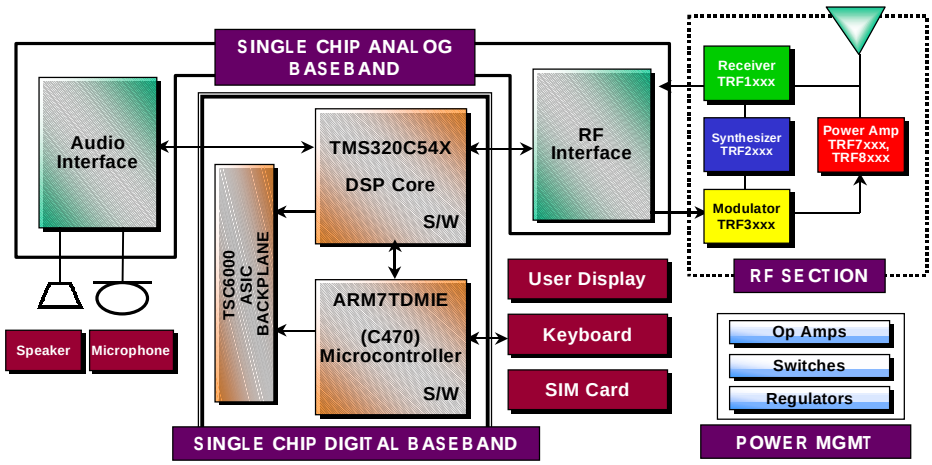
The evaluation board documentation for the TRF8011 RF Transmit Driver and TRF7003 RF power amplifier is primarily for device assessment. Included in this documentation are the following:

- Functional block diagram with terminal functions
- Evaluation board mechanical outline
- Evaluation board schematic for GSM

  The schematic includes a component list describing the resistors, inductors, and capacitors, along with the suppliers and board material specifications.
- Typical RF performance
- Test bench diagram with organized instructions for configuration

Product Support

The TI Advantage Extends Beyond RF to Every Other Major Wireless System Block



Digital Baseband

TI's single-chip Digital Baseband Platform, combines two high-performance core processors – a digital signal processor tailored for digital wireless applications and a microcontroller designed specifically for low-power embedded systems. The customizable platform helps wireless digital telephone manufacturers lower component counts, save board space, reduce power consumption, introduce new features, save development costs and achieve faster time to market, at the same time giving them flexibility and performance to support any standard worldwide.

Analog Baseband

TI analog baseband components provide a Mixed-signal bridge between the real world of analog signals and digital signal processors, the key enabling technology of the digital wireless industry. Using a seamless architecture for wireless communications technology, TI matches its baseband interfaces, radio frequency ICs and power management ICs to digital signal processing engines to create complete DSP Solutions for digital wireless systems.

Power Management

TI provides power management solutions with integration levels designed to meet the needs of a range of wireless applications. From discrete LDOs and voltage supervisors to complete power supplies for the baseband section, TI power management solutions play an important role in increasing wireless battery life, time-to-market and system functionality.

For more information visit the Wireless Communications web site at www.ti.com/sc/docs/wireless/home.htm.

Related Documentation

The following list specifies product names, part numbers, and literature numbers of corresponding TI documentation.

- Data sheet, *TRF8011 900-MHz RF Transmit Driver*, Literature number SLWS056B
- *TRF8011 Production Bulletin*, Literature number SLWT005
- *TRF8011 RF Transmit Driver 4.8 Volt GSM Application*, Literature number SWRA008
- *TRF7003 RF Power Amplifier 4.8 Volt GSM Application,* Literature number SWRA009
- *TRF7003 RF Power MOSFET S-Parameter Board,* Literature number SWRA007
- Data sheet, *MOSFET Power Amplifier,* Literature number SLWS058

World Wide Web

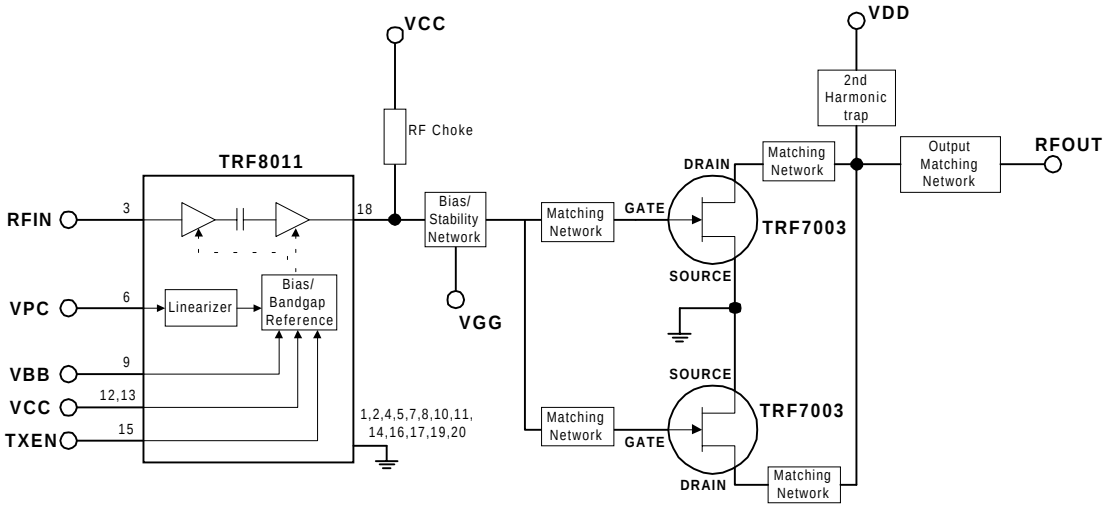
Our World Wide Web site at www.ti.com contains the most up to date product information, revisions, and additions. Users registering with TI&ME can build custom information pages and receive new product updates automatically via email.

Email

For technical issues or clarification on switching products, please send a detailed email to sc-infomaster@ti.com. Questions receive prompt attention and are usually answered within one business day.

Functional Block Diagram

Figure 1. Functional Block Diagram

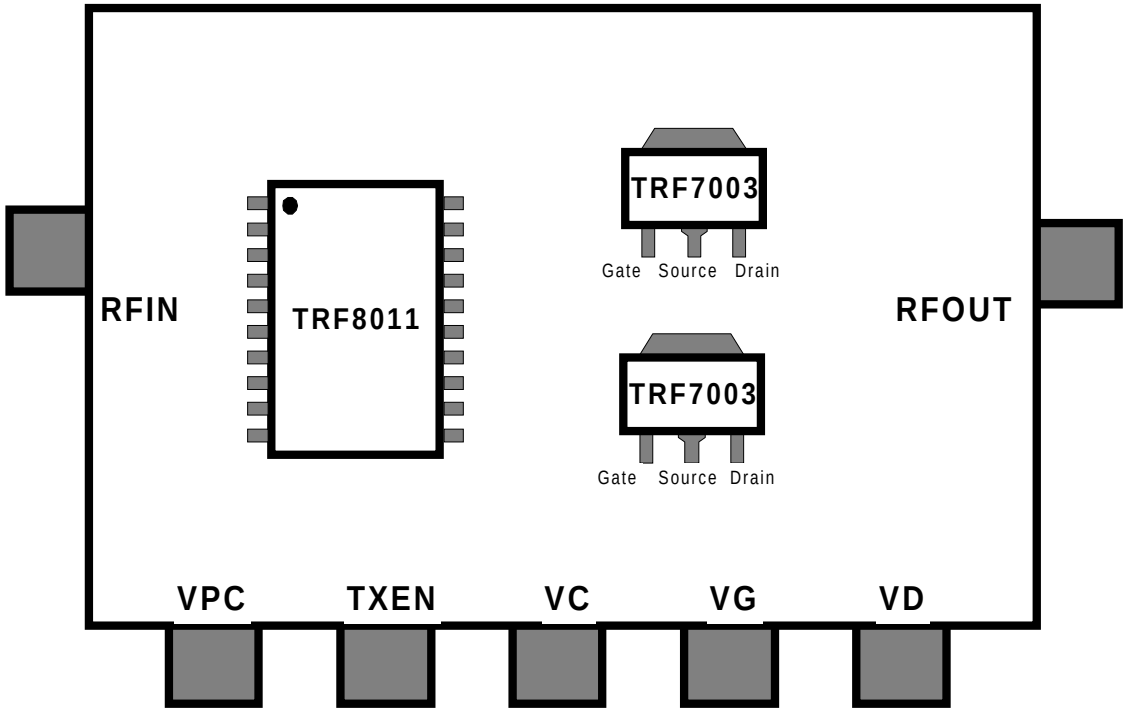


Terminal Functions

CONNECTOR	I/O	DESCRIPTION
RFIN	I	RF Input. Accepts signal from 800MHz to 1000MHz with 5 dBm maximum input power.
RFOUT	O	RF Output.
VPC	I	DC Input for power control signal.
VBB	I	Second stage base bias connection to power supply.
VCC	I	First stage bias connection to power supply.
TXEN	I	Input for transmit enable logic signal.
VDD	I	Drain Voltage Input.
VGG	I	Gate Voltage input.

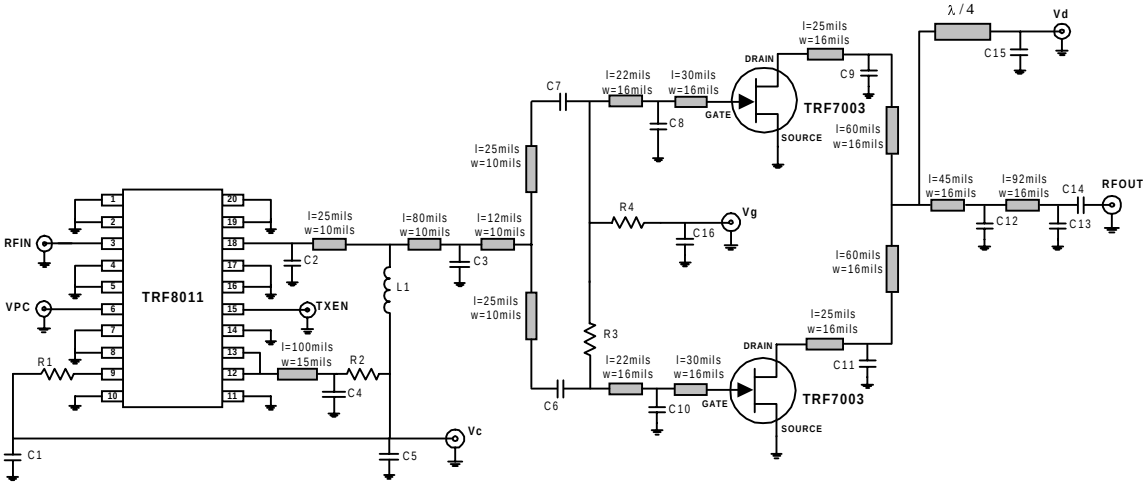
Evaluation Board Mechanical Outline (Top View)

Figure 2. Evaluation Board Mechanical Outline (Top View)



Evaluation Board Schematic

Figure 3. Evaluation Board Schematic for GSM



Component List

Resistor (Ohms)	Inductor (nH)	Capacitor (pF)
R1=75	L1=15	C1=1000
R2=10		C2=4
R3=10		C3=27
R4=1K		C4=1000
		C5=1u
		C6=22
		C7=22
		C8=22
		C9=15
		C10=22
		C11=15
		C12=2
		C13=10
		C14=100
		C15=1u
		C16=1000

Supplier:

- IMS
  RCI-0603 series (resistors)
- Toko
  L61608 series or LL2012 (inductors)
- Murata
  GRM36 series (capacitors)
- THERMALLY
  6390B (heat sink)

Board Material Specifications:

Type FR4 ; ε_r = 4.3 ; h = 12 mils

Typical RF Performance

Forward Isolation

Parameter	Test Conditions	Limits			Units
		Min	Typ	Max	
Output Power, Po	Vds=4.8Vdc; Vg=0Vdc; Vpc=0Vdc; Vtxen=0Vdc; Pin=0dBm		-59		dBm

Output Power / Gain / PAE vs. Pin and VPC

Figure 4. Typical RF performance - Pout/GAIN/PAE vs. Pin

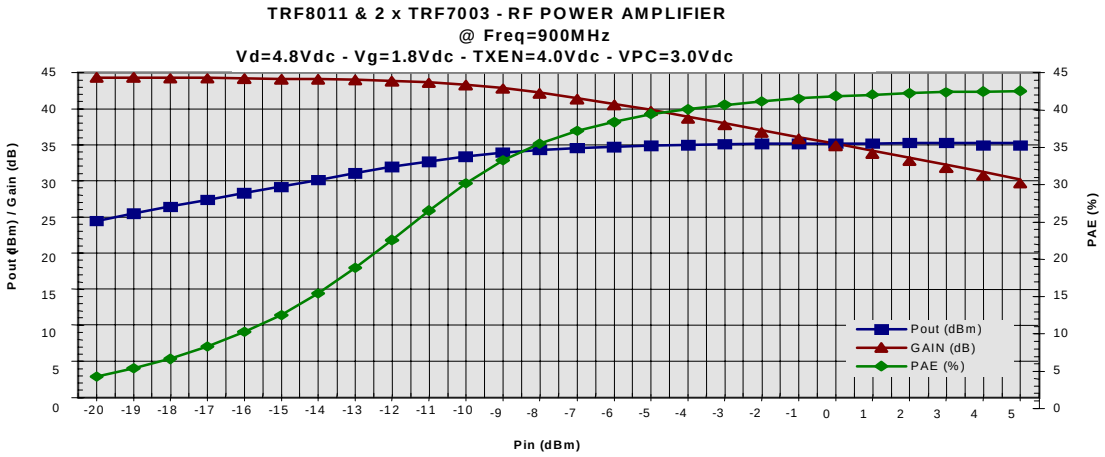
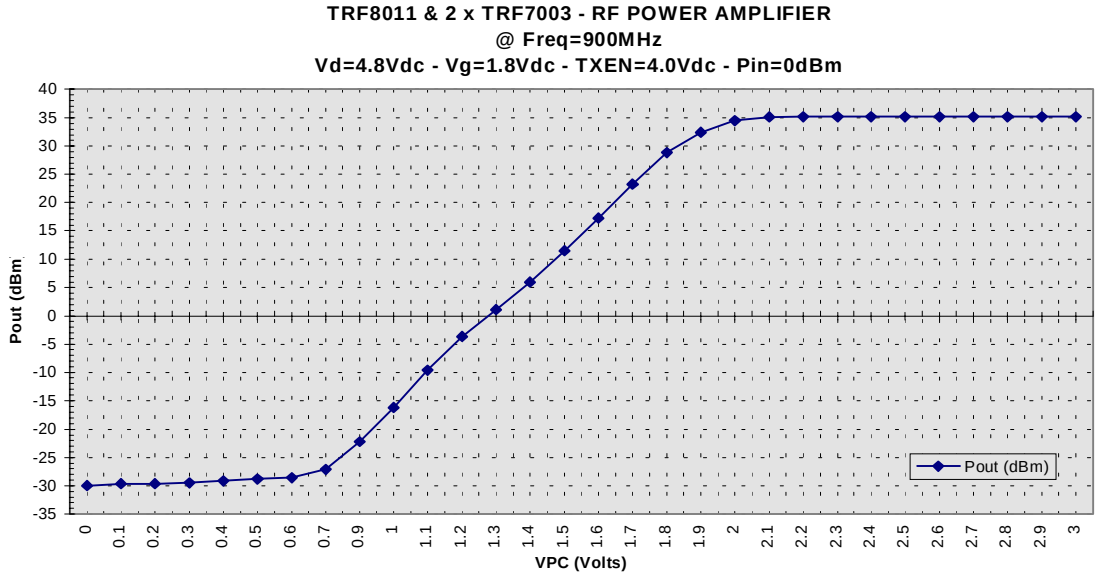
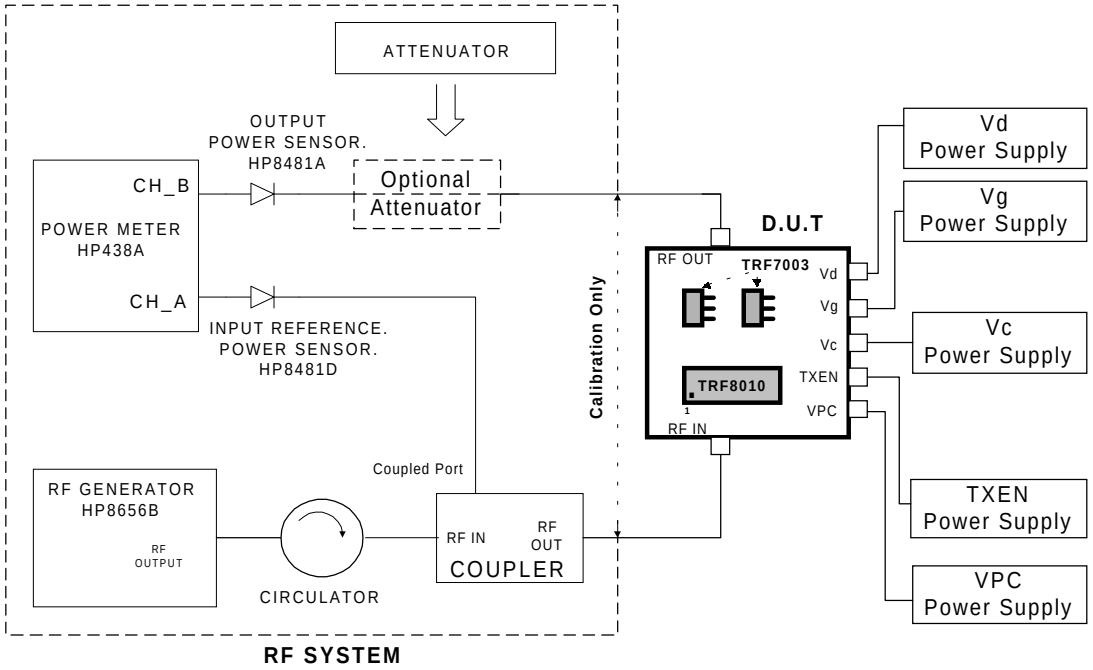


Figure 5. Typical RF performance - Pout vs. Vpc



Test Bench Diagram

Figure 6. Typical Bench Test Setup



1) Configure Test Bench as shown.
2) Calibrate *RF SYSTEM* - less *Device Under Test*.
   a) Zero and calibrate *POWER METER, POWER SENSORS*.
   b) Set RF power and frequency on *RF GENERATOR*.
   c) RF Input Calibration:

      Offset *Channel A* of *POWER METER* by the difference between the reading of *B* and *Channel A*. Verify that *Channel A* reading and *Channel B* reading the same after offsetting.

   d) RF Output Calibration:

      Attach an Attenuator to *OUTPUT POWER SENSOR*. Offset *Channel B* of *POWER* by the difference between the reading of *Channel A* and *Channel B*. Verify *Channel A* reading and *Channel B* reading are the same after offsetting.

3) Device D.C. Power-up
   a) Set *Vd / Vc Power Supply* to 4.8Vdc at the Drain terminal of TRF7003.

b) Set *Vg Power Supply* to 1.8Vdc at the Gate terminal of TRF7003.

c) Adjust *Vg Power Supply* so that Drain Current is about 1.1Amps (without RF).

d) Set *TXEN Power Supply* to [Vcc - 0.8Volts].

e) Set *VPC Power Supply* to

- 3.0Vdc for the Power Test
- 0 to 3.0 Volts for VPC Control Test

NOTE:

Ensure that Vd is always 4.8V during RF test.
Adjustment of *Vd Power Supply* may be required.

Evaluation Board Disclaimer

Please note that the enclosed evaluation boards are experimental Printed Circuit Boards and are therefore only intended for device evaluation.

We would like to draw your attention to the fact that these boards have been processed through one or more of Texas Instruments' external subcontractors which have not been production qualified.

Device parameters measured, using these boards, are not representative of any final data sheet or of a final production version. Texas Instruments does not represent or guarantee that a final version will be made available after device evaluation.

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