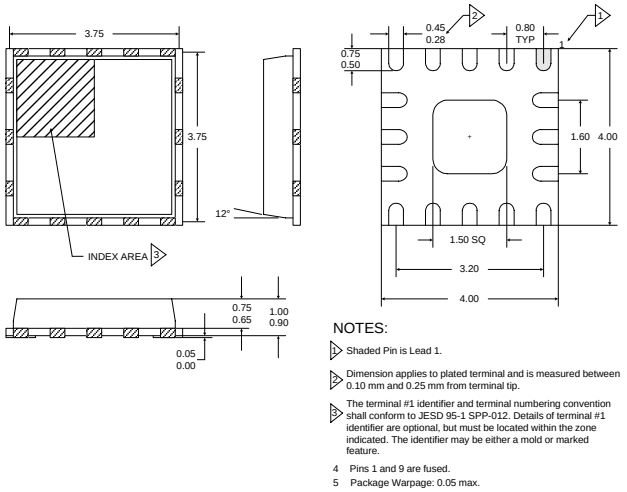
Typical Applications

- TDMA/CDMA/FM Driver Amplifier
- Low Noise Transmit Driver Amplifier
- General Purpose Amplification
- Commercial and Consumer Systems

Product Description

The RF2352 is a low noise driver amplifier for 900MHz CDMA/AMPS applications. The device is designed for operation from 2.7V to 3.6V, and features selectable high and low gain modes. In high gain mode, the device will provide about 19dB of gain, and the linearity and current drain are set with an external resistor, allowing the designer to select the optimum performance for a given application. In the low gain, or "bypass" mode, the gain is controlled by an external attenuator network, and the device draws essentially no current. The part is fabricated using a high performance silicon BiCMOS process, and is packaged in a 4mmx4mm, 16-pin, leadless chip carrier.



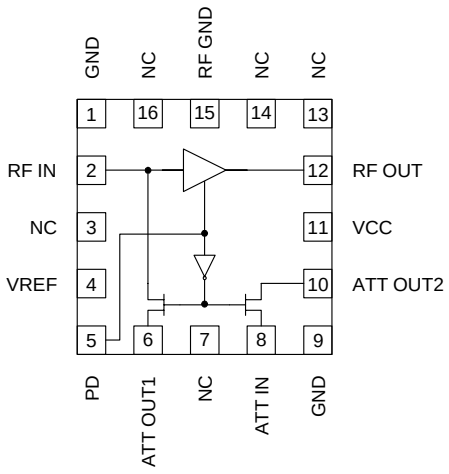
NOTES:

1. Shaded Pin is Lead 1.
2. Dimension applies to plated terminal and is measured between 0.10 mm and 0.25 mm from terminal tip.
3. The terminal #1 identifier and terminal numbering convention shall conform to JESD 95-1 SPP-012. Details of terminal #1 identifier are optional, but must be located within the zone indicated. The identifier may be either a mold or marked feature.
4. Pins 1 and 9 are fused.
5. Package Warpage: 0.05 max.

Package Style: LCC, 16-Pin, 4x4

Optimum Technology Matching® Applied

- ☐ Si BJT
- ☑ Si Bi-CMOS
- ☐ GaAs HBT
- ☐ SiGe HBT
- ☐ GaAs MESFET
- ☐ Si CMOS



Functional Block Diagram

Features

- Low Noise and High Intercept Point
- Power Down Control
- Gain Control
- Single 2.7V to 3.6V Power Supply
- Extremely Small MLF16 Package

Ordering Information

RF2352	3V CDMA Driver Amplifier
RF2352 PCBA	Fully Assembled Evaluation Board

RF Micro Devices, Inc.
7628 Thorndike Road
Greensboro, NC 27409, USA

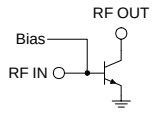
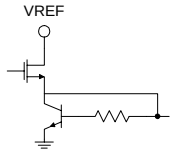
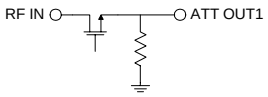
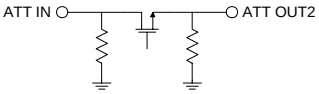
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

Absolute Maximum Ratings

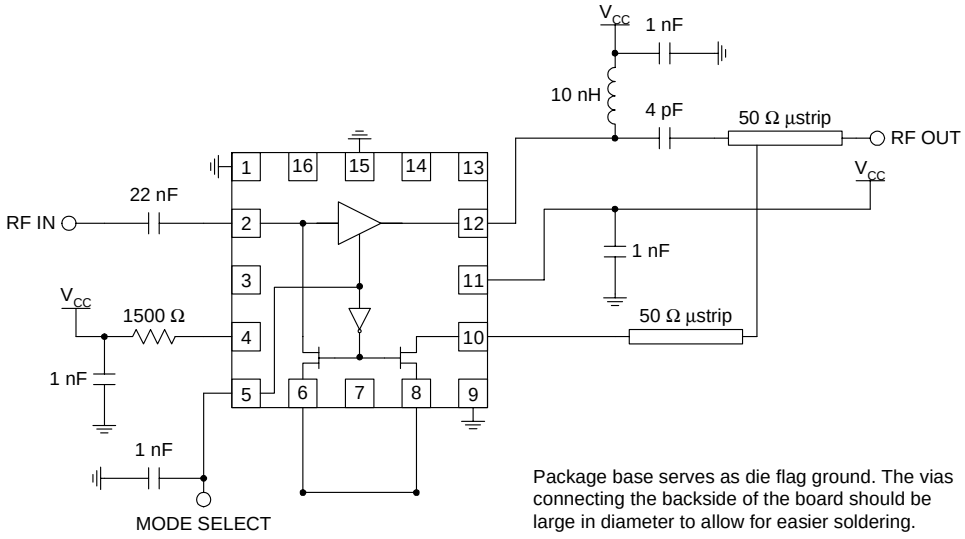
Parameter	Rating	Unit
Supply Voltage	-0.5 to +4.5	V_{DC}
Input RF Level	0	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					V_{CC}=3.0V, T=25°C, External Matching Components Required.
High Gain Mode					V_{PD}=2.8V, P_{OUT}=+4dBm, I_{CC}=15mA
Gain	18	20	22	dB	At 824MHz
Noise Figure		1.9	2.9	dB	
Input VSWR		1.3	1.5		
Output VSWR		1.6	1.8		
Adjacent Channel Power Rejection (ACPR1)	57	60		dBc	900kHz offset
Alternate Channel Power Rejection (ACPR2)	78	80		dBc	1.98MHz offset
Gain	17	19	21	dB	At 874MHz
Noise Figure		2.0	3.0	dB	
Input VSWR		1.6	1.8		
Output VSWR		1.5	1.7		
Adjacent Channel Power Rejection (ACPR1)	58	60		dBc	900kHz offset
Alternate Channel Power Rejection (ACPR2)	76	77		dBc	1.98MHz offset
Gain	16.5	18.5	20.5	dB	At 925MHz
Noise Figure		2.2	3.2	dB	
Input VSWR		1.8	2.0		
Output VSWR		1.4	1.6		
Adjacent Channel Power Rejection (ACPR1)	57	60		dBc	900kHz offset
Alternate Channel Power Rejection (ACPR2)	76	77		dBc	1.98MHz offset
Bypass (Low Gain) Mode					V_{PD}=0V, Pins 6 and 8 shorted.
Gain		-4.2		dB	At 824MHz
Noise Figure		4.2		dB	
Input VSWR		1.2	1.4		
Output VSWR		1.4	1.6		
Gain		-3.7		dB	At 874MHz
Noise Figure		3.7		dB	
Input VSWR		1.4	1.6		
Output VSWR		1.3	1.5		
Gain		-4.7		dB	At 925MHz
Noise Figure		4.7		dB	
Input VSWR		1.5	1.7		
Output VSWR		1.4	1.6		
Power Supply					
Power Supply Range (V_{CC})	2.7	3.0	3.6	V	
Current Drain (I_{CC})		15.0		mA	V_{PD}=2.8V (High Gain Mode)
Current Drain (I_{CC})			10	µA	V_{PD}=0V (Bypass Mode)

Pin	Function	Description	Interface Schematic
1	GND	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
2	RF IN	RF input pin. It is DC-coupled and looks like 50Ω from 824MHz to 925MHz.	
3	NC	Not connected.	
4	VREF	Provides the bias voltage for controlling the RF amplifier current drain. This pin is typically connected through a resistor to an external regulated power supply. It may be connected to the same power supply as the VCC pin. However, if more bias control is desired, it may be connected to a separate supply. With a series external resistor of 1500Ω and power supply of 3V applied, the amplifier current drain should be around 14mA. By increasing the resistor, the amplifier current drain may be dropped. Conversely, by decreasing the resistor, the amplifier current may be increased to a maximum of 30mA.	
5	PD	Power down function. When 0V to 0.5V is applied, the device is in Bypass Mode: the amplifier is shut off and the MOSFET switches are activated. There is no DC current dissipation in this state. When 1.5V to 3V is applied, the device is switched to High Gain Mode: the amplifier is activated and the MOSFET switches are opened. This is the normal operating mode.	
6	ATT OUT1	Output of the first MOSFET switch. DC-coupled. When the PD pin is grounded (Bypass Mode), the MOSFET switches are shorted, sending any signals at the RF IN pin through the first MOSFET and off the chip. In cases where minimum RF attenuation is desired, this pin should be shorted with 50Ω microstrip to the ATT IN pin. This setup will yield approximately 4dB of insertion loss. If more attenuation is desired, a resistive pad between the ATT OUT1 and ATT IN pins can be added to the PC board.	
7	NC	Not connected.	
8	ATT IN	Input to the second MOSFET switch. DC-coupled. When the PD pin is grounded (Bypass Mode), the MOSFET switches are shorted. See the ATT OUT1 pin description for setup options.	
9	GND	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
10	ATT OUT2	Output of the second MOSFET switch. DC-coupled. When the PD pin is grounded (Bypass Mode), the MOSFET switches are shorted. This pin should be shorted with 50Ω microstrip to the amplifier load.	
11	VCC	Provides the power supply to the logic circuitry on the IC.	
12	RF OUT	Amplifier output pin. An open collector output that needs VCC applied to it through an inductor. Typically, a shunt inductor, series capacitor matching network is used to provide a 50Ω output match.	
13	NC	Not connected.	
14	NC	Not connected.	
15	RF GND	Amplifier ground. For best performance, keep traces physically short and connect immediately to ground plane.	
16	NC	Not connected.	
Pkg Base	GND	Ground connection for die flag. The backside of the package should be soldered to a top side ground pad which is connected to the ground plane with multiple vias.	

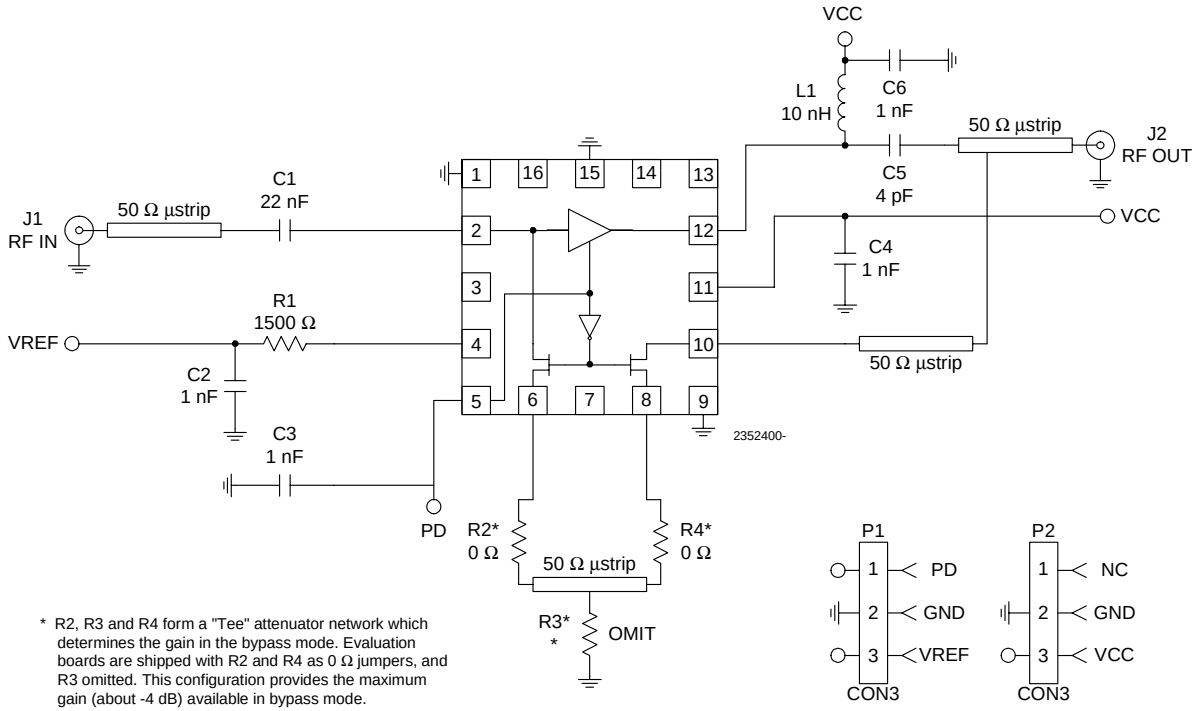
Application Schematic



Package base serves as die flag ground. The vias connecting the backside of the board should be large in diameter to allow for easier soldering.

Evaluation Board Schematic

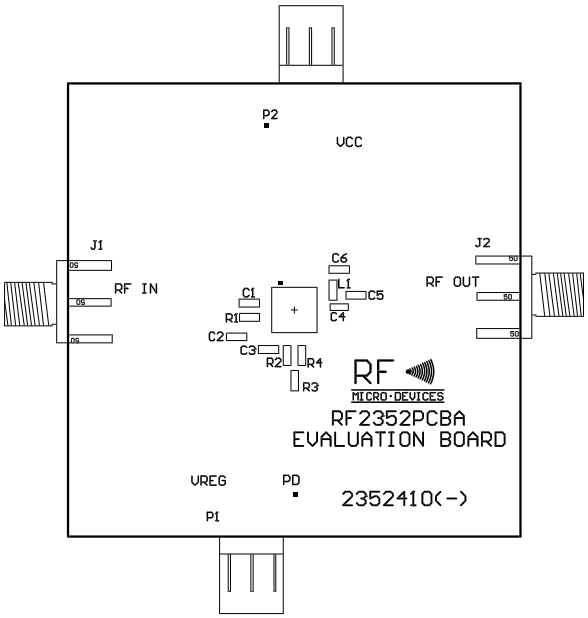
(Download Bill of Materials from www.rfmd.com.)

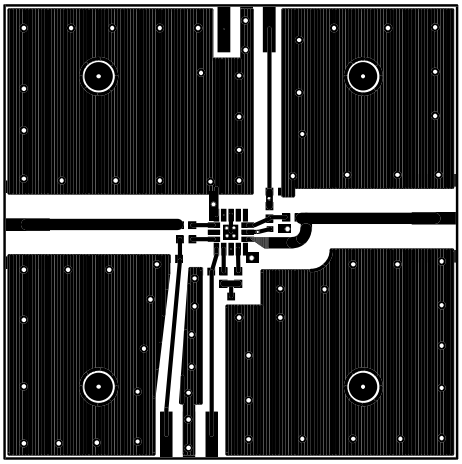


* R2, R3 and R4 form a "Tee" attenuator network which determines the gain in the bypass mode. Evaluation boards are shipped with R2 and R4 as 0 Ω jumpers, and R3 omitted. This configuration provides the maximum gain (about -4 dB) available in bypass mode.

Package base serves as die flag ground. The vias connecting the backside of the board should be large in diameter to allow for easier soldering.

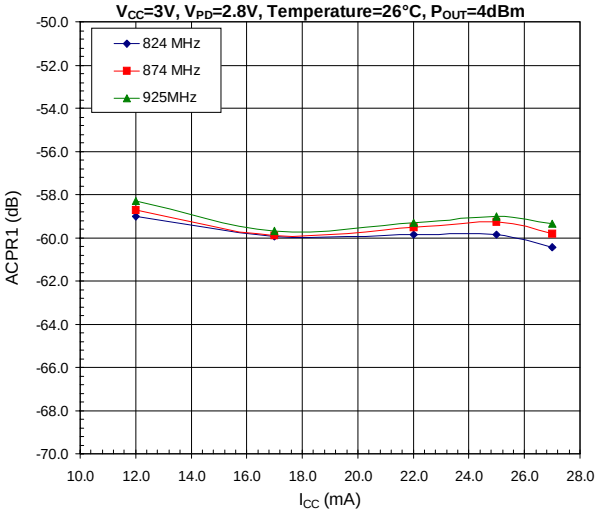
Evaluation Board Layout
Board Size 2.0" x 2.0"
Board Thickness 0.031"; Board Material FR-4





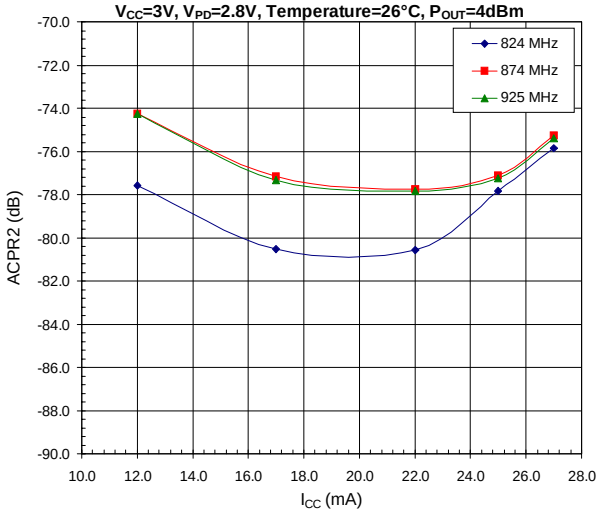
ACPR1 versus I_{CC}

V_{CC}=3V, V_{PD}=2.8V, Temperature=26°C, P_{OUT}=4dBm



ACPR2 versus I_{CC}

V_{CC}=3V, V_{PD}=2.8V, Temperature=26°C, P_{OUT}=4dBm



Gain versus V_{CC}

I_{CC}=15mA, V_{PD}=2.8V, Temperature=25°C, POUT=4dBm