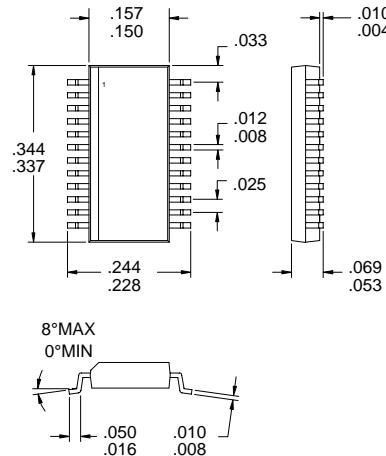


Typical Applications

- Single or Dual Channel LO Source
- FM/FSK Transmitter
- Wireless Data Transmitters
- 433MHz, 868MHz or 915MHz ISM Band Systems
- Wireless Security Systems

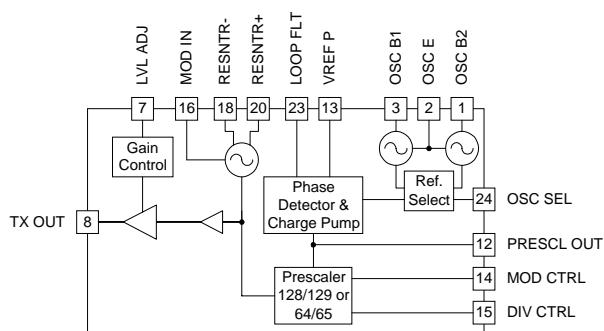
Product Description

The RF2512 is a monolithic integrated circuit intended for use as a low-cost Frequency Synthesizer and Transmitter. The device is provided in a 24 pin SSOP package and is designed to provide a phased locked frequency source for use in local oscillator or transmitter applications. The chip can be used in FM or FSK applications in the U.S. 915MHz ISM band and European 433MHz or 868MHz ISM band. The integrated VCO, dual modulus/dual divide (128/129 or 64/65) pre-scaler, and reference oscillator require only the addition of an external crystal to provide a complete phase-locked oscillator. A second reference oscillator is available to support two channel applications.



Optimum Technology Matching® Applied

Si BJT GaAs HBT GaAs MESFET
 Si Bi-CMOS



Functional Block Diagram

Package Style: SSOP-24

Features

- Fully Integrated PLL Circuit
- 15mW Output Power at 433MHz
- 2.7V to 5.0V Supply Voltage
- Low Current and Power Down Capability
- 300MHz to 1000MHz Frequency Range
- Narrowband and Wideband FM

Ordering Information

RF2512	VHF/UHF Transmitter
RF2512 PCBA-L	Fully Assembled Evaluation Board, 433MHz
RF2512 PCBA-M	Fully Assembled Evaluation Board, 868MHz
RF2512 PCBA-H	Fully Assembled Evaluation Board, 915MHz

RF Micro Devices, Inc.
7625 Thorndike Road
Greensboro, NC 27409, USA

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

Absolute Maximum Ratings

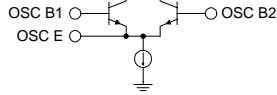
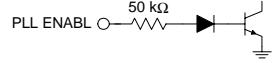
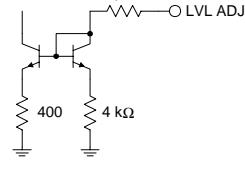
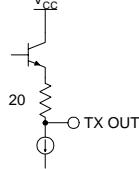
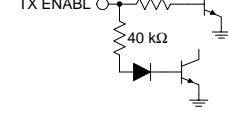
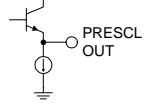
Parameter	Rating	Unit
Supply Voltage	-0.5 to +5.5	V _{DC}
Power Down Voltage (V _{PD})	-0.5 to V _{CC}	V
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

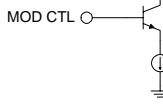
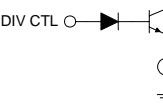
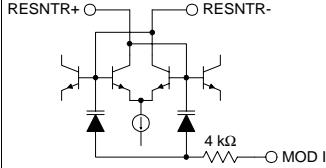
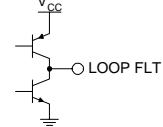


Caution! ESD sensitive device.

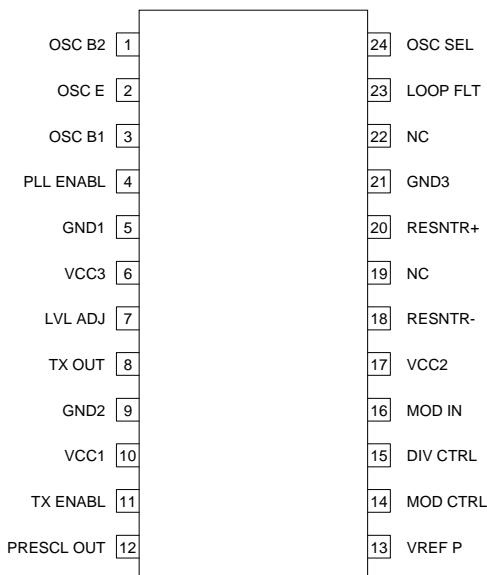
RF Micro Devices believes the furnished information is correct and accurate at the time of this printing. However, RF Micro Devices reserves the right to make changes to its products without notice. RF Micro Devices does not assume responsibility for the use of the described product(s).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					T=25 °C, V _{CC} =3.6V, Freq=915MHz
Frequency Range		300 to 1000		MHz	
Modulation		FM/FSK			
Modulation Frequency			2	MHz	
Maximum FM Deviation	200			kHz	Dependent upon Supply Voltage
PLL and Prescaler					
Prescaler Divide Ratio		64/65 or 128/129			
PLL Lock TIme		4/PLL BW		ms	
PLL Phase Noise		-80		dBc/Hz	The PLL lock time, from power up, is set externally by the bandwidth of the loop filter.
		-100		dBc/Hz	10kHz Offset, 10kHz loop bandwidth
Reference Frequency	TBD		17	MHz	100kHz Offset, 10kHz loop bandwidth
Max Crystal R _S			100	Ω	
Charge Pump Current	-40		+40	μA	
Transmit Section					
Maximum Power Level	+7	+12		dBm	Freq=433MHz
		+6		dBm	Freq=915MHz
Power Control Range	15	10		dB	
Power Control Sensitivity		50		dB/V	
Antenna Port Impedance		TBD		Ω	TX ENABL="1"
Antenna Port Impedance				Ω	TX ENABL="0"
Antenna Port VSWR			1.5:1	Ω	TX Mode
Modulation Input Impedance	4	-23		kΩ	
Harmonics				dBc	Compliant to Part 15.249 and I-ETS 300 220
Spurious				dBc	
Power Down Control					
Logic Controls "ON"	2.0			V	Voltage supplied to the input; device is "ON"
Logic Controls "OFF"	25		1.0	V	Voltage supplied to the input; device is "OFF"
Control Input Impedance				kΩ	
Turn On Time		5+4/PLL		ms	From Change in OSC SEL,7.075MHz XTAL
Turn Off Time		BW		ms	From Change in OSC SEL,7.075MHz XTAL
Power Supply					
Voltage		3.6		V	Specifications
		2.7 to 5.0		V	Operating limits
Current Consumption		28		mA	TX Mode, LVL ADJ=3.6V
		10		mA	TX Mode, LVL ADJ=0V
		8		mA	PLL Only

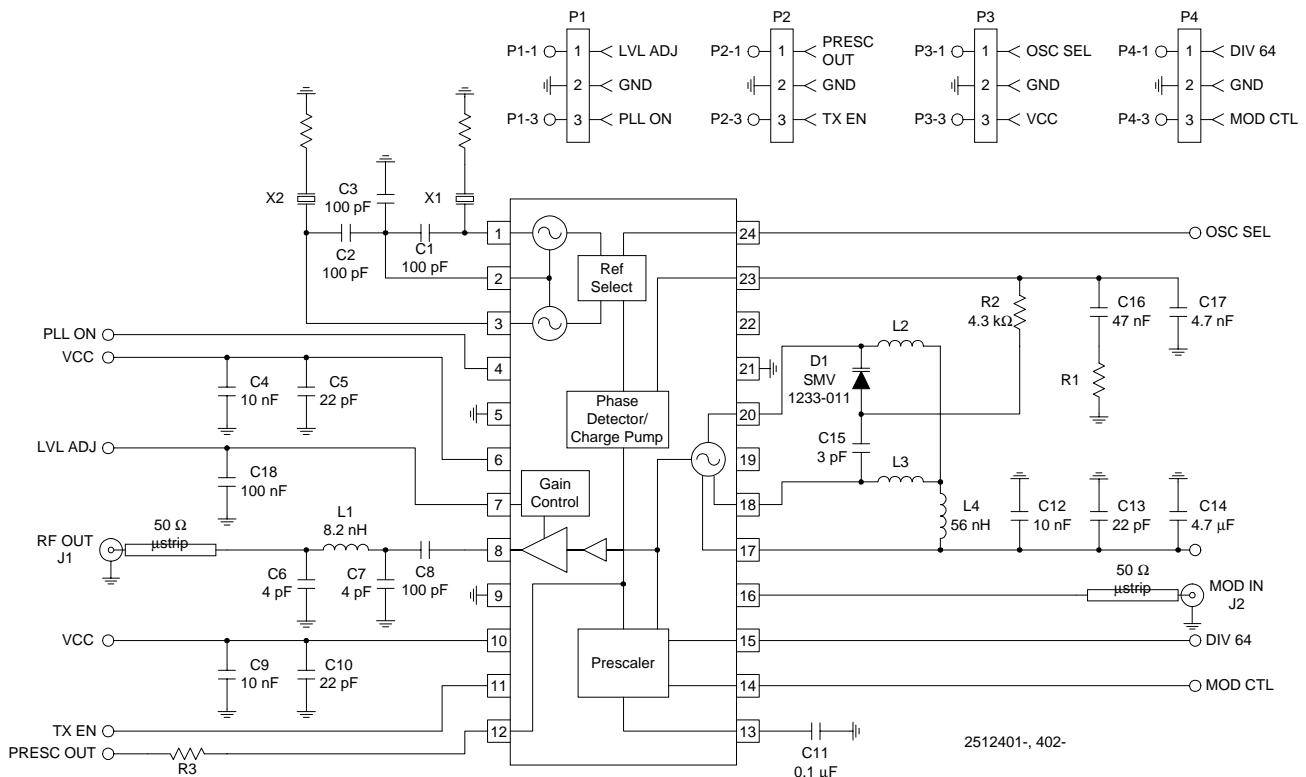
Pin	Function	Description	Interface Schematic
1	OSC B2	This pin is connected directly to the reference oscillator transistor base. The intended reference oscillator configuration is a modified Colpitts. An appropriate capacitor as chosen by the customer should be connected between pin 1 and pin 2.	
2	OSC E	This pin is connected directly to the emitter of the reference oscillator transistor. An appropriate capacitor as chosen by the customer should be connected from this pin to ground.	See pin 1.
3	OSC B1	This pin is connected directly to the reference oscillator transistor base. The intended reference oscillator configuration is a modified Colpitts. An appropriate capacitor as chosen by the customer should be connected between pin 3 and pin 2.	See pin 1.
4	PLL ENABL	This pin is used to power up or down the VCO and PLL. A logic high (PLL ENABL>2.0V) powers up the VCO and PLL electronics. A logic low (PLL ENABL<1.0V) powers down the PLL and VCO.	
5	GND1	Ground connection for the PA buffer amp. Keep traces physically short and connect immediately to ground plane for best performance.	
6	VCC3	This pin is used to supply DC bias to the transmitter PA. A RF bypass capacitor should be connected directly to this pin and returned to ground. A 100pF capacitor is recommended for 915MHz applications. A 220pF capacitor is recommended for 433MHz applications.	
7	LVL ADJ	This pin is used to vary the transmitter output power. An output level adjustment range greater than 12dB is provided through analog voltage control of this pin. DC current of the transmitter power amp is also reduced with output power. This pin MUST be low when the transmitter is disabled.	
8	TX OUT	RF output pin for the transmitter electronics. TX OUT output impedance is a low impedance when the transmitter is enabled. TX OUT is a high impedance when the transmitter is disabled.	
9	GND2	Ground connection for the Tx PA functions. Keep traces physically short and connect immediately to ground plane for best performance.	
10	VCC1	This pin is used to supply DC bias to the PA buffer amp. A RF bypass capacitor should be connected directly to this pin and returned to ground. A 100pF capacitor is recommended for 915MHz applications. A 220pF capacitor is recommended for 433MHz applications.	
11	TX ENABL	Enables the transmitter circuits. TX ENABL>2.0V powers up all transmitter functions. TX ENABL<1.0V turns off all transmitter functions except the PLL functions.	
12	PRESCL OUT	Dual-modulus/Dual-divide prescaler output. The output can be interfaced to an external PLL IC for additional flexibility in frequency programming.	
13	VREF P	Bias voltage reference pin for bypassing the prescaler and phase detector. The bypass capacitor should be of appropriate size to provide filtering of the reference crystal frequency and be connected directly to this pin.	

14	MOD CTRL	This pin is used to select the prescaler modulus. A logic "high" selects 64 or 128 for the prescaler divisor. A logic "low" selects 65 or 129 for the prescaler divisor.	
15	DIV CTRL	This pin is used to select the desired prescaler divisor. A logic "high" selects the 64/65 divisor. A logic low selects the 128/129 divisor.	
16	MOD IN	FM analog or digital modulation can be imparted to the VCO through this pin. The VCO varies in accordance to the voltage level presented to this pin. To set the deviation to a desired level, a voltage divider referenced to Vcc is the recommended. Because the modulation varactors are part of the resonator tank, the deviation is slightly dependent upon the components used in the external tank.	See pin 18.
17	VCC2	This pin is used to supply DC bias to the VCO, prescaler, and PLL.	
18	RESNTR-	The RESNTR pins are used to supply DC voltage to the VCO, as well as to tune the center frequency of the VCO. Equal value inductors should be connected to this pin and pin 20.	
19	NC	Not internally connected.	
20	RESNTR+	See pin 18.	See pin 18.
21	GND3	GND is the ground shared on chip by the VCO, prescaler, and PLL electronics. Keep traces physically short and connect immediately to ground plane for best performance.	
22	NC	Not internally connected.	
23	LOOP FLT	Output of the charge pump. An RC network from this pin to ground is used to establish the PLL bandwidth.	
24	OSC SEL	A logic high (OSC SEL>2.0V) applied to this pin powers on reference oscillator 2 and powers down reference oscillator 1. A logic low (OSC SEL<1.0V) applied to this pin powers on reference oscillator 1 and powers down reference oscillator 2.	

Pin Out



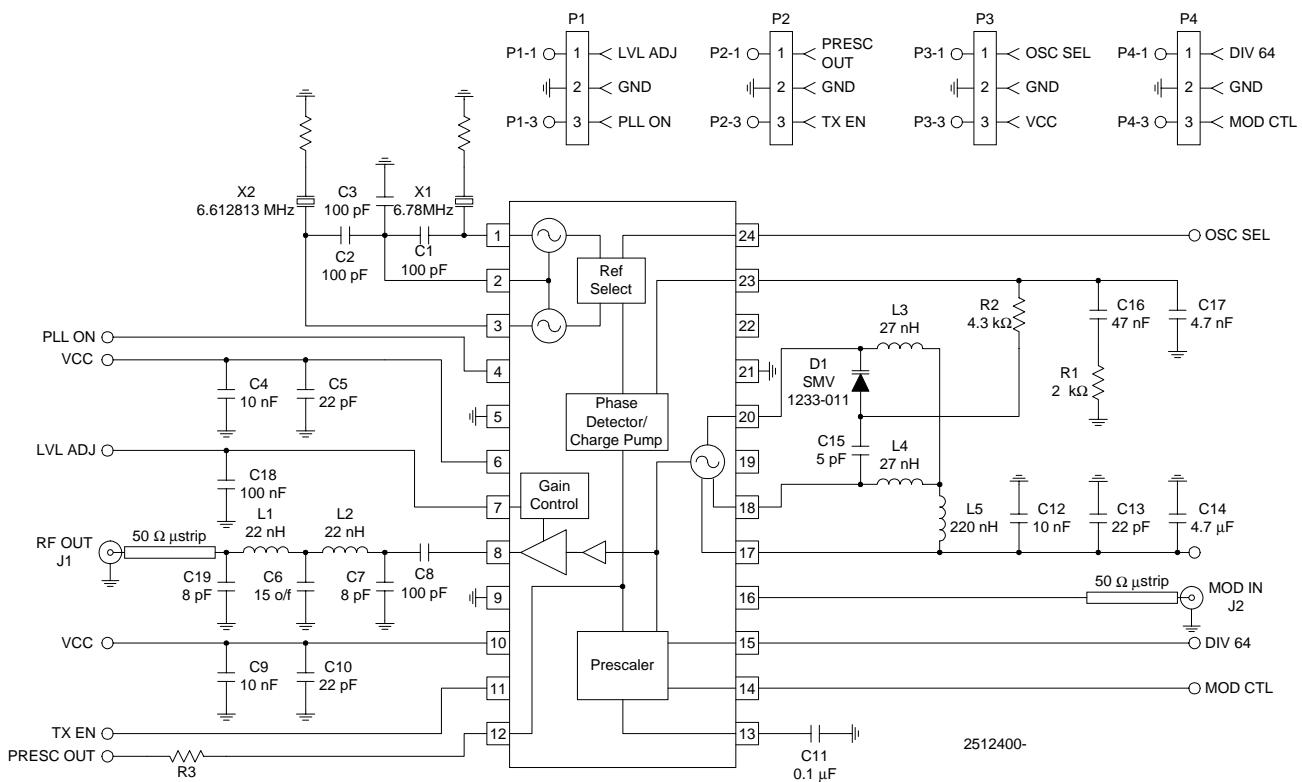
Evaluation Board Schematic H (915MHz) and M (868MHz) boards



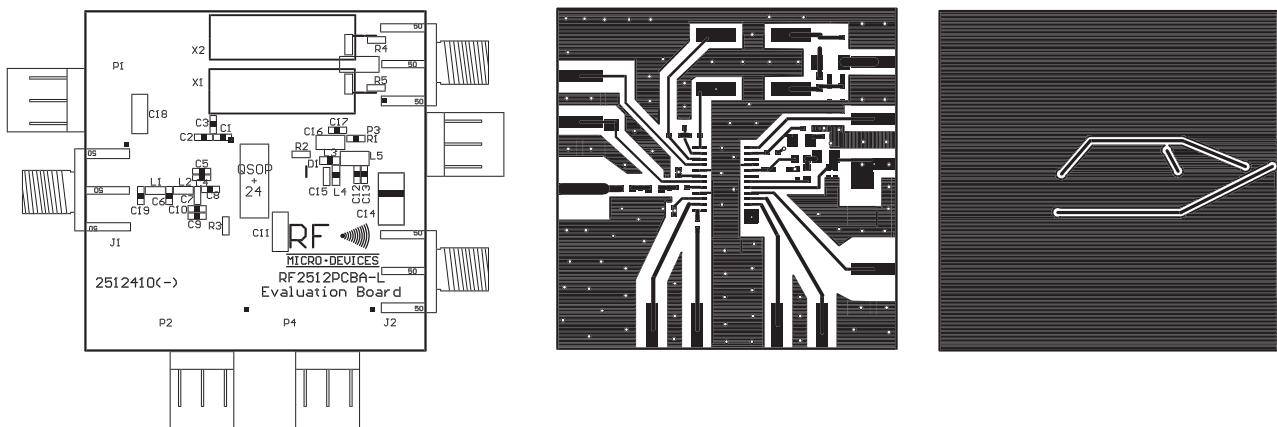
Board	X1 (MHz)	X2 (MHz)	R1 (kΩ)	L2 (nH)	L3 (nH)
M (868MHz)	13.57734	13.41015	1.2	6.8	6.8
H (915MHz)	7.07549	7.15909	2.2	4.7	4.7

Evaluation Board Schematic L (433MHz) board

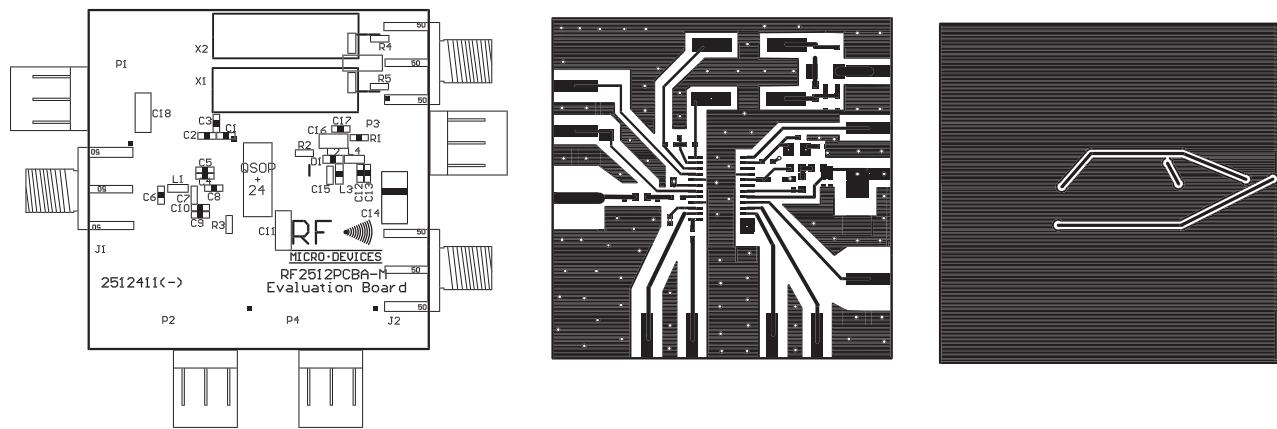
(Download Bill of Materials from www.rfmd.com.)



Evaluation Board Layout 433MHz Board Size 1.5" x 1.5"



Evaluation Board Layout 868MHz Board Size 1.5" x 1.5"



Evaluation Board Layout 915MHz Board Size 1.5" x 1.5"

