

## Features

- Active Mixer with Conversion Gain
- No External LO Driver Necessary
- Low LO Drive Level Required
- RF and LO Ports May Be Driven Single-ended
- Single 5-V Supply Voltage
- High LO-RF Isolation
- Broadband Resistive 50- $\Omega$  Impedances on All Three Ports
- Small SSO16 Package

## Applications

- Digital Communication Systems
- 2200 MHz to 2700 MHz Transceivers for Base Stations

Electrostatic sensitive device.  
Observe precautions for handling.

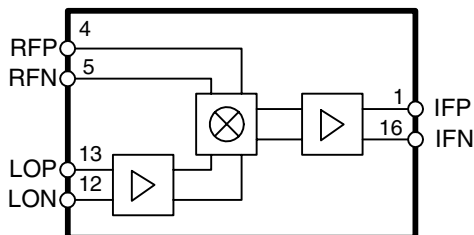


## Description

The T0782 is a high-linearity active mixer which is manufactured using Atmel's advanced Silicon-Germanium technology. This mixer features a frequency range of 2200 MHz to 2700 MHz. It operates from a single 5-V supply and provides 10 dB of conversion gain while requiring only 0 dBm input to the integrated LO driver. An IF amplifier is also included.

The T0782 incorporates internal matching on each RF, IF and LO port to enhance ease of use and to reduce the external components required. The RF and LO inputs can be driven differentially or single-ended.

Figure 1. Block Diagram



# 2200-2700 MHz High Linearity SiGe Active Receive Mixer

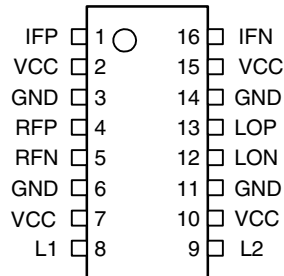
## T0782

## Preliminary



## Pin Configuration

Figure 2. Pinning SSOP16



## Pin Description

Pin	Symbol	Function
1	IFP	IF positive output
2	VCC	5-V power supply
3	GND	Ground
4	RFP	RF positive input
5	RFN	RF negative input
6	GND	Ground
7	VCC	5-V power supply
8	L1	External inductor terminal
9	L2	External inductor terminal
10	VCC	5-V power supply
11	GND	Ground
12	LON	Local oscillator, negative input
13	LOP	Local oscillator, positive input
14	GND	Ground
15	VCC	5-V power supply
16	IFN	IF negative output

## Absolute Maximum Ratings

All voltages are referred to GND

Parameters	Symbol	Value	Unit
Supply voltage	$V_{CC}$	5 to 6.0	V
LO input	$LO_P, LO_N$	10	dBm
IF input	$RF_P, RF_N$	15	dBm
Operating temperature	$T_{OP}$	-40 to +85	°C
Storage temperature	$T_{stg}$	-40 to +150	°C

## Thermal Resistance

Parameter	Symbol	Value	Unit
Junction ambient	$R_{thJA}$	TBD	K/W

## Electrical Characteristics

Test conditions:  $V_{cc} = +5\text{ V}$ ,  $T_{amb} = +25^\circ\text{C}$

RF input:  $-20\text{ dBm}$  at  $2450\text{ MHz}$

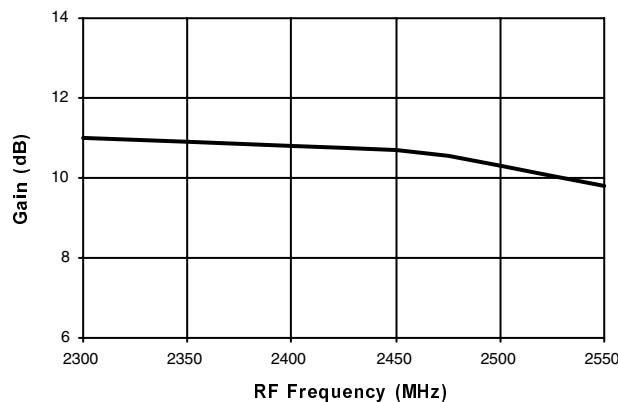
LO output:  $0\text{ dBm}$  at  $2250\text{ MHz}$

No.	Parameters	Test Conditions / Pins	Pin	Symbol	Min.	Typ.	Max.	Unit	Type *
<b>AC Performance</b>									
	Frequency range			f	2200		2700	MHz	
	IF frequency range			$F_{IF}$	10	200	300	MHz	
	Output IP3	RF1 = RF2 = $-17\text{ dBm/tone}$		IP3		15.5		dBm	
	Output P1dB					4.5		dBm	
	Conversion gain					10.5		dB	
	SSB noise figure					15.5		dB	
	RF return loss					14		dB	
	LO return loss					14		dB	
	IF return loss					14		dB	
	LO drive				-3	0	+3	dBm	
<b>Isolation Performance</b>									
	Leakage (LO-RF)					-30		dBm	
	Leakage (LO-IF)					-30		dBm	
<b>Miscellaneous</b>									
	Supply voltage			$V_{CC}$	4.75	5	5.25	V	
	Supply current			$I_{CC}$		150		mA	

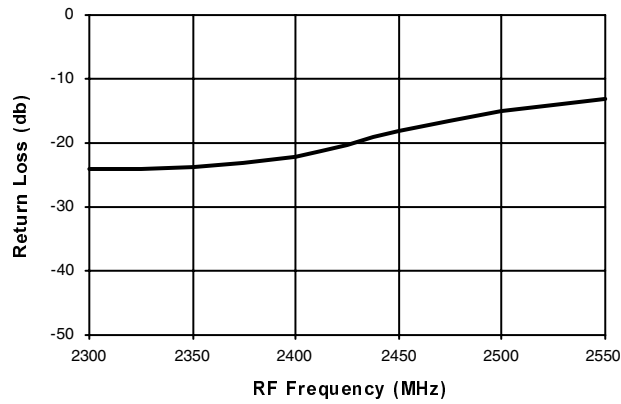
\*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

## Typical Device Performance

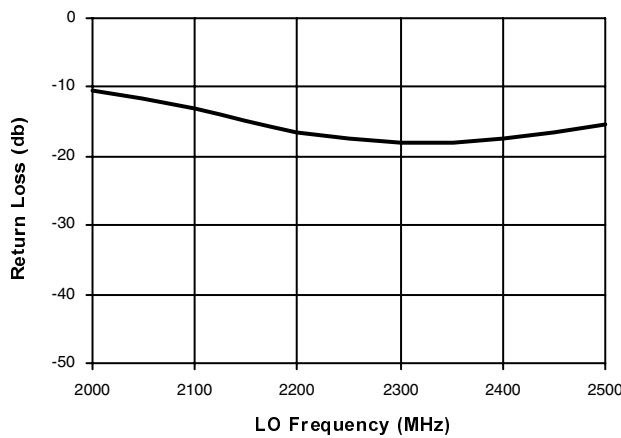
**Figure 3.** Conversion Gain versus RF Frequency,  $V_{CC} = 5.0\text{ V}$ , LO =  $0\text{ dBm}$ ,  $RF_{IN} = -20\text{ dBm}$ , IF =  $200\text{ MHz}$



**Figure 4.** Return Loss versus RF Frequency,  $V_{CC} = 5.0\text{ V}$



**Figure 5.** Return Loss at LO Input,  $V_{CC} = 5.0\text{ V}$



**Figure 6.** Return Loss versus IF Frequency,  $V_{CC} = 5.0\text{ V}$

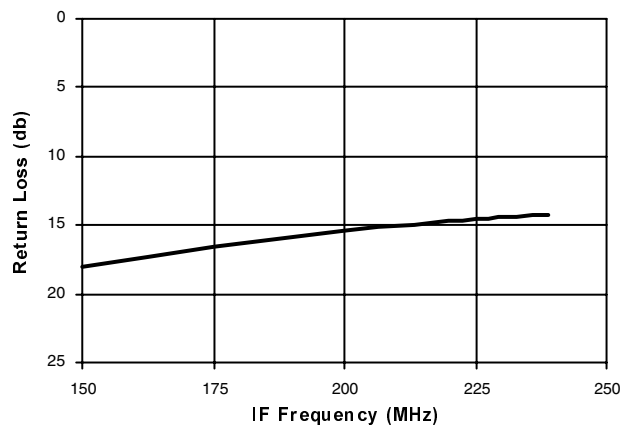
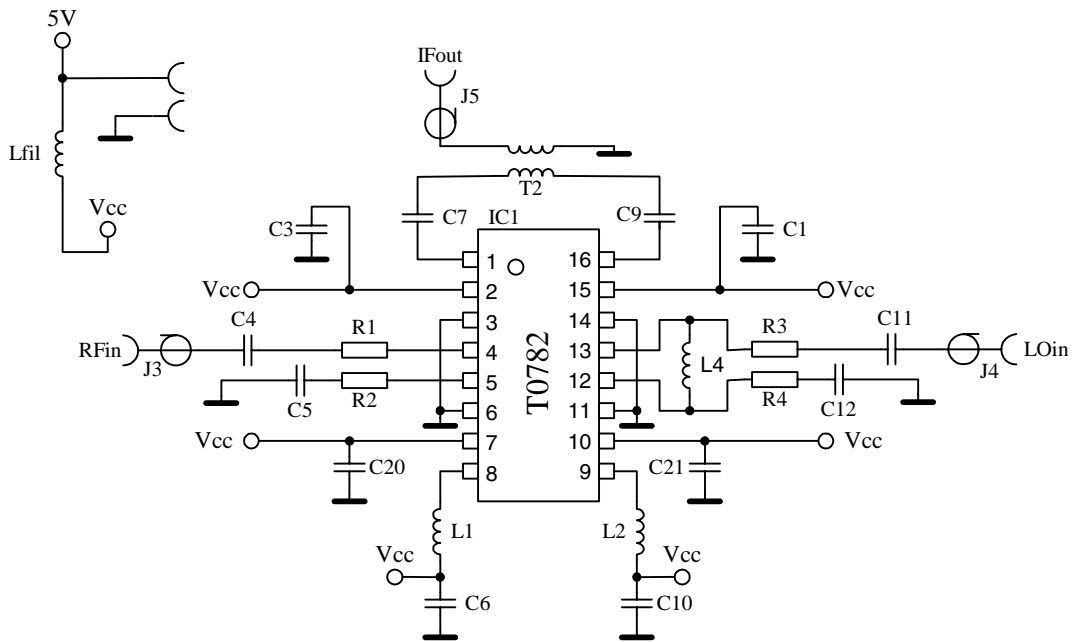


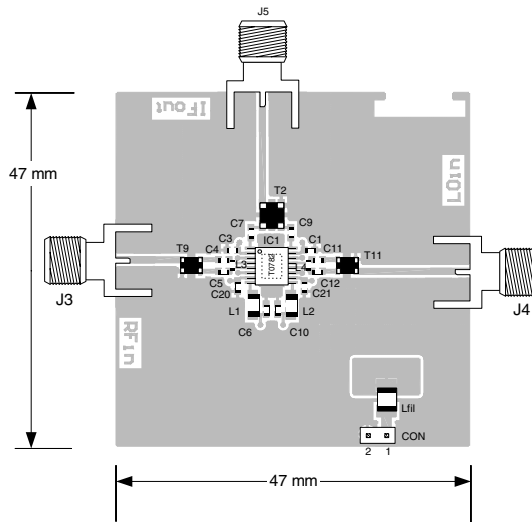
Figure 7. Demo Test Board Schematic



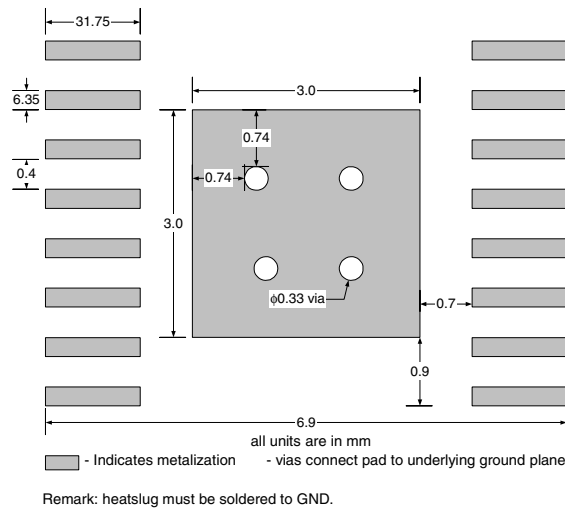
Bill of Material

Component Designator	Value	Vendor	Part Number	Description
IC1		Atmel	T0782	SiGe receiver mixer
J3, J4, J5		Johnson Components	142-0701-851	SMA connector, end launch with tab, for 0.062 inch thick board
T2	1:1	Mini-circuits	TC1-1	IF transformer
Lfil	1 $\mu$ H			Inductor, 1210 footprint, minimum 200 mA rating
L1, L2	100 nH	TOKO	LL1608-FSR10J	Inductor, 0603 footprint, high Q series
C1, C3, C20, C21	5.6 pF			Capacitor, 0603 footprint
C6, C10	100 pF			Capacitor, 0603 footprint
C7, C9	120 pF			Capacitor, 0603 footprint
C4, C5	1.2 pF			Capacitor, 0603 footprint
C11, C12	1.5 pF			Capacitor, 0603 footprint
R1, R2, R3, R4	0 $\Omega$			Resistor, 0603 footprint
L4	27 nH			Inductor, 0603 footprint

**Figure 8.** Demo Test Board (Fully Assembled PCB)



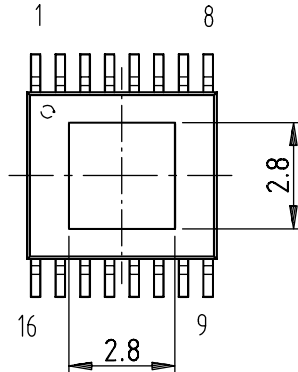
**Figure 9.** Recommended Package Footprint



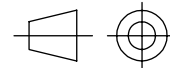
### Ordering Information

Extended Type Number	Package	Remarks
T0782	SSOP16	

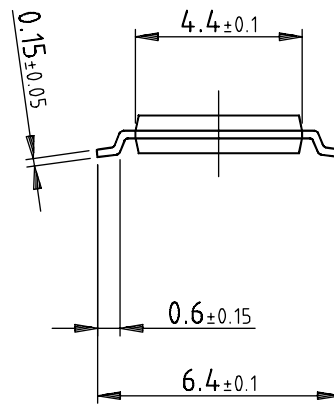
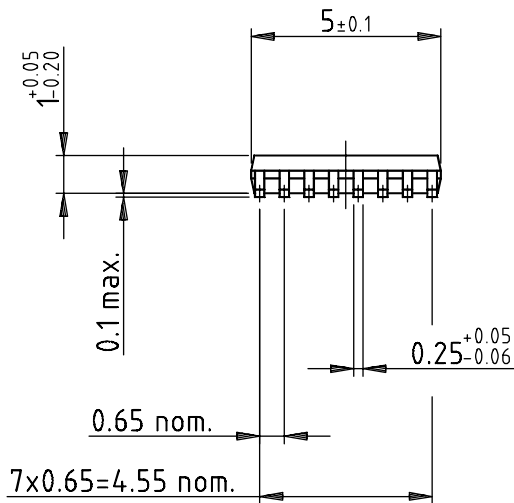
### Package Information



Package: SSOP16  
 ( acc. JEDEC SMALL OUTLINE No. MO-153 )  
 Dimensions in mm



technical drawings  
 according to DIN  
 specifications



Drawing-No.: 6.543-5079.01-4  
 Issue: 1; 10.07.01



## Atmel Headquarters

### **Corporate Headquarters**

2325 Orchard Parkway  
San Jose, CA 95131  
TEL 1(408) 441-0311  
FAX 1(408) 487-2600

### **Europe**

Atmel Sarl  
Route des Arsenaux 41  
Casa Postale 80  
CH-1705 Fribourg  
Switzerland  
TEL (41) 26-426-5555  
FAX (41) 26-426-5500

### **Asia**

Atmel Asia, Ltd.  
Room 1219  
Chinachem Golden Plaza  
77 Mody Road Tsimhatsui  
East Kowloon  
Hong Kong  
TEL (852) 2721-9778  
FAX (852) 2722-1369

### **Japan**

Atmel Japan K.K.  
9F, Tonetsu Shinkawa Bldg.  
1-24-8 Shinkawa  
Chuo-ku, Tokyo 104-0033  
Japan  
TEL (81) 3-3523-3551  
FAX (81) 3-3523-7581

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TEL 1(719) 576-3300  
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### **e-mail**

[literature@atmel.com](mailto:literature@atmel.com)

### **Web Site**

<http://www.atmel.com>

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