



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 Ω impedances on all three ports

Applications

- Infrastructure digital communication systems
- 1700-2000 MHz transceivers for base stations

Electrostatic sensitive device.

Observe precautions for handling.



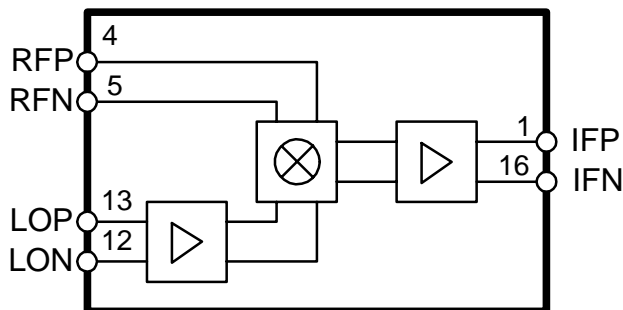
Description

The T0781 is a high linearity active mixer which is manufactured using Atmels advanced Silicon-Germanium technology. This mixer features a frequency range of 1700 - 2000 MHz. It operates from a single 5 V supply and provides 11 dB of conversion gain while requiring only 0 dBm input to the integrated LO driver. An IF amplifier is also included.

The T0781 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.

Block Diagram

Figure 1.



1700 - 2000 MHz High Linearity SiGe Active Receiver Mixer

T0781

Rev. A2, 04-Dec-01

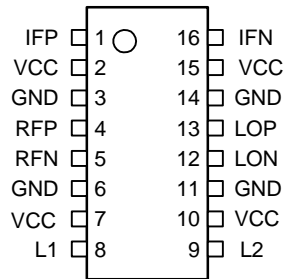


Ordering Information

Extended Type Number	Package	Remarks
T0781	TSSOP16	

Pin Configuration

Figure 2.



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 osc., negative input
13	LOP	Local osc., 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.

Parameter	Symbol	Value	Unit
Supply voltage	V_{CC}	5.5	V
LO input	LOP, LON	10	dBm
IF input	RFP, RFN	15	V
Operating temperature	T_{OP}	-40 to +85	°C
Storage temperature	T_{stg}	-65 to +150	°C

Note: The part may not survive all maximums applied simultaneously

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: -40 dB @ 1880 MHz, LO input: 0 dBm @ 1680 MHz

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
1	AC Performance								
1.1	Frequency range		4, 5	f	1700		2000	MHz	B
1.2	IF frequency range		1, 16	F_{IF}	10	200	300	MHz	B
1.3	Input IP3	RF1 = RF2 = -17 dBm/tone	4, 5	IIP3		17		dBm	D
1.4	Input P1dB		4, 5	P1dB		4		dBm	D
1.5	Conversion gain		1, 16	G		11		dB	A
1.6	SSB noise figure		1, 16	NF_{SSB}		14		dB	D
1.7	RF return loss		4, 5	RL_{RF}		14		dB	D
1.8	LO return loss		12, 13	RL_{LO}		14		dB	D
1.9	IF return loss		1, 16	RL_{IF}		14		dB	D
1.10	LO drive		12, 13	P_{LO}	-3	0	3	dBm	D
2	Isolation performance								
1.12	Leakage (LO-RF)		12, 13	A_{LO-RF}		-60		dBm	D
1.13	Leakage (LO-IF)		12, 13	A_{LO-IF}		-30		dBm	D
3	Miscellaneous								
3.1	Supply voltage		2, 7, 10, 15	V_{CC}	4.75	5	5.25	V	A
3.2	Supply current		2, 7, 10, 15	I_{CC}		150		mA	A

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

Typical Device Performance

Figure 3. Return loss at LO input, $V_{CC} = 5.0\text{ V}$

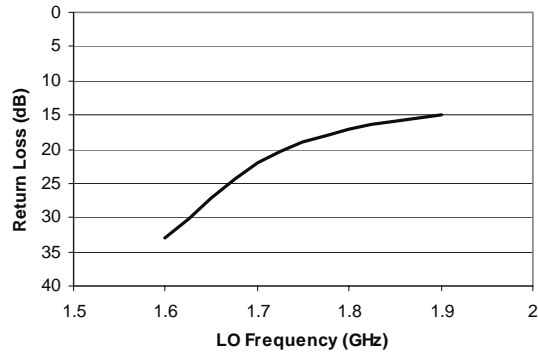


Figure 4. Return loss at IF output, $V_{CC} = 5.0\text{ V}$

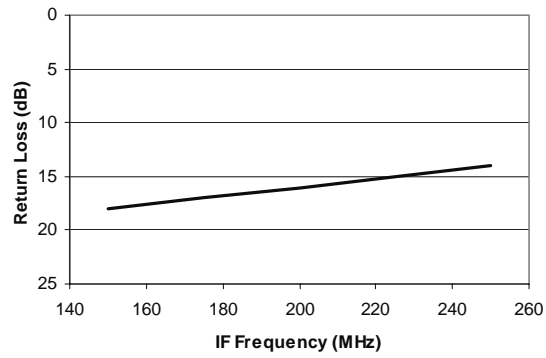


Figure 5. Conversion gain, $V_{CC} = 5.0\text{ V}$, $LO = 0\text{ dBm}$, $RF_{IN} = -20\text{ dBm}$, $IF = 200\text{ MHz}$

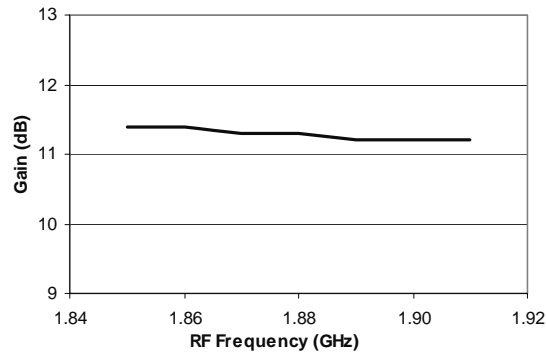
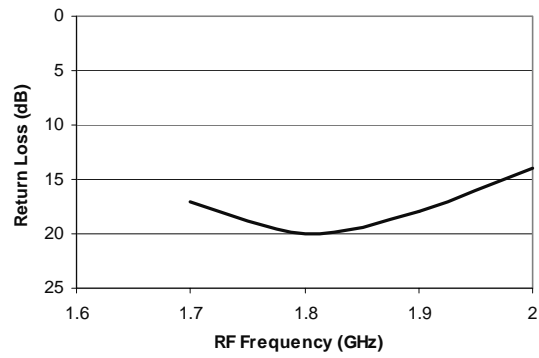
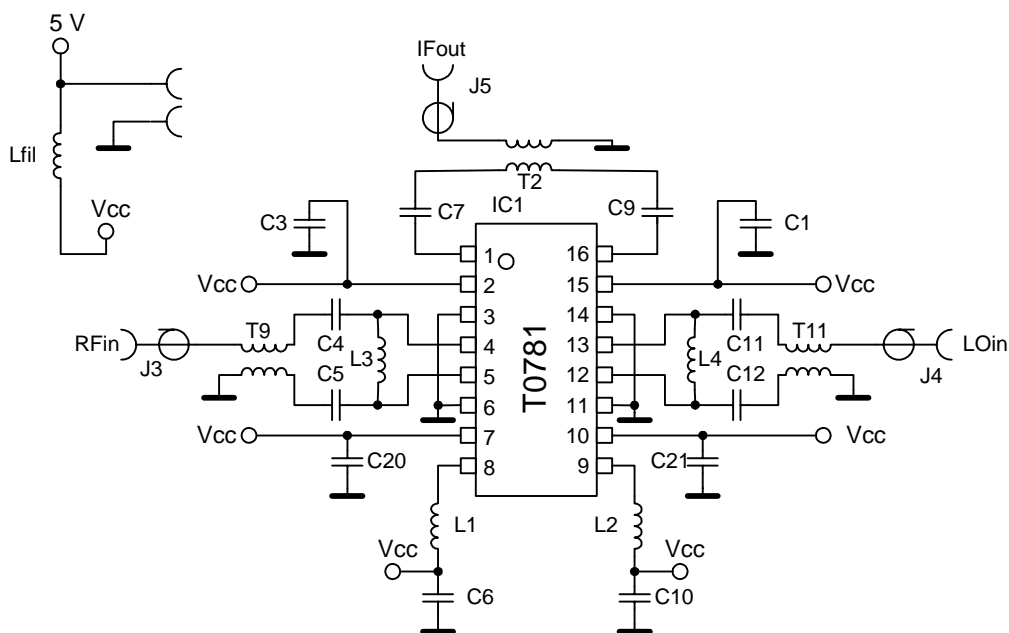


Figure 6. Return loss at RF input, $V_{CC} = 5.0\text{ V}$



Demo Test Board Schematic

Figure 7.

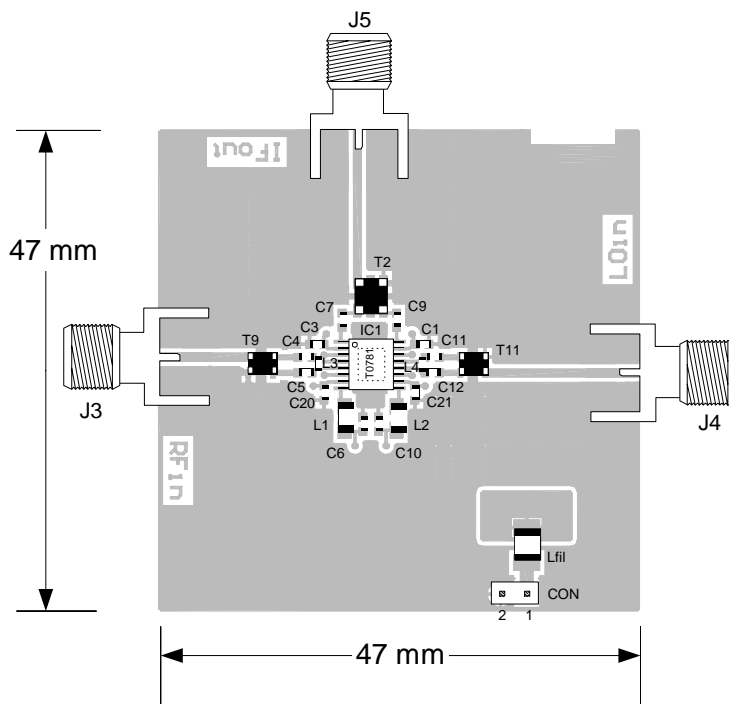


Bill of Materials

Component Designator	Value	Vendor	Part Number	Description
IC1		Atmel	T0781	SiGe receiver mixer
J3, J4, J5		Johnson Components	142-0701-851	SMA connector, end launch with tab, for .062 inch thick board
T9, T11	1:1	Panasonic	EHF-FD1619	RF transformer
T2	1:1	Mini-Circuits	TC1-1	IF transformer
Lfil	1 μH			Inductor, 1210 footprint, min. 200 mA rating
L1, L2	100 nH	TOKO	LL1608-FSR10J	Inductor, 0603 footprint, high Q series
L3	18 nH	TOKO	LL1608-FS18NJ	Inductor, 0603 footprint, high Q series
C1, C3, C20, C21	6.8 pF			Capacitor, 0603 footprint
C6, C10	100 pF			Capacitor, 0603 footprint
C7, C9	120 pF			Capacitor, 0603 footprint
C4, C5	2.2 pF			Capacitor, 0603 footprint
C11, C12	3.3 pF			Capacitor, 0603 footprint

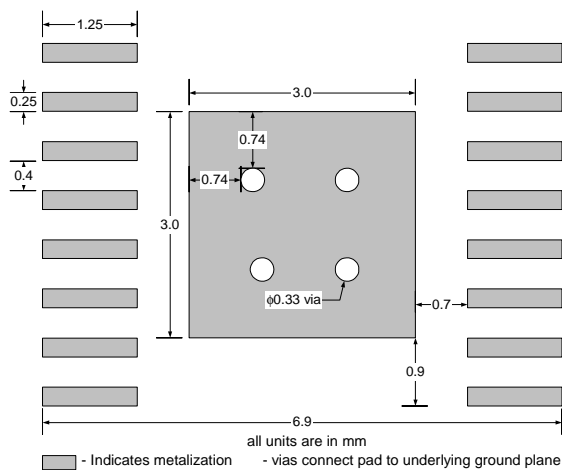
Demo Test Board (Fully Asembled PCB)

Figure 8.



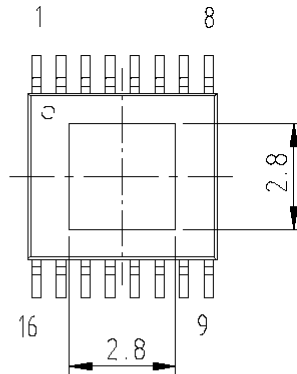
Recommended Package Footprint

Figure 9.

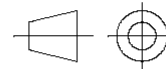


Remark: Heatslug must be soldered to GND

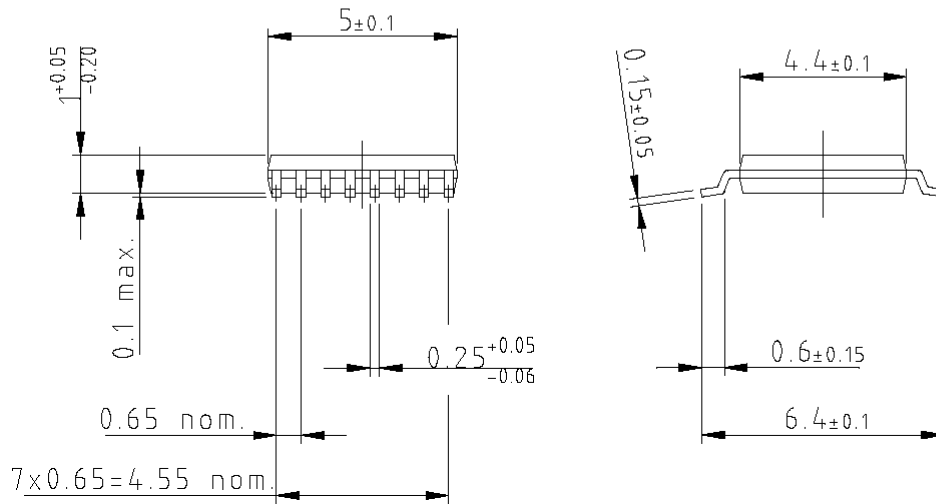
Package Information



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



technical drawings
according to DIN
specifications



Ozone Depleting Substances Policy Statement

It is the policy of **Atmel Germany GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Atmel Germany GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Atmel Germany GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.





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