2300-2700 MHz High Linearity SiGe Active Transmit Mixer

Description

The T0787 is a high linearity active mixer which is manufactured using Atmel Wireless & Microcontrollers' advanced Silicon-Germanium technology. This mixer features a frequency range of 2300 to 2700 MHz. It operates from a single 5 V supply and provides 9 dB of conversion gain while requiring only 0 dBm input to the integrated LO driver. An IF amplifier is also included.

The T0787 incorporates internal matching on each RF, IF and LO port to enhance ease of use and to reduce the external components required. The IF and LO inputs can be driven differentially or single ended.

Electrostatic sensitive device.
Observe precautions for handling.

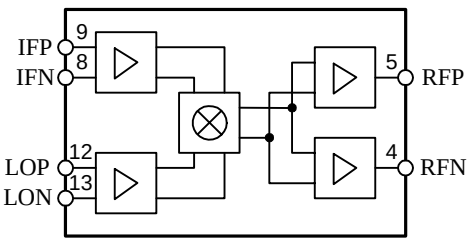
Features

- Active mixer with conversion gain
- No necessary external LO driver
- Low LO drive level required
- IF and LO ports may be driven single-ended
- Single 5 V supply voltage
- Broadband resistive 50 Ω impedances on all three ports

Applications

- Digital communication systems
- 2300-2700 MHz transceivers for base stations

Block Diagram



Ordering Information

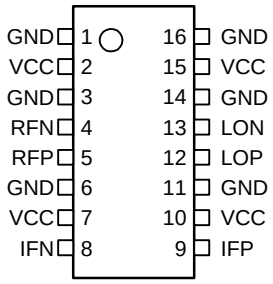
Extended Type Number	Package	Remarks
T0787	SSOP16	

Preliminary Information

Pin Description

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

Pinning



Absolute Maximum Ratings

All voltages are referred to GND.

Parameters	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}		5.0	6.0	V
LO input	LON, LOP			10	dBm
IF input	IFN, IFP			15	dBm
Operating temperature	T_{OP}	-40		+85	ºC
Storage temperature	T_{stg}	-65		+150	ºC

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	R_{thJA}	tbd	K/W

Electrical Characteristics

Test conditions: V_{cc} = +5 V, T_{amb} = +25°C
IF input: –20 dBm @ 200 MHz
LO Input: 0 dBm @ 1760 MHz

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
AC Performance						
Frequency range		f	2300		2700	MHz
IF frequency range		f_{IF}	10	200	300	MHz
Output IP3	IF1 = IF2 = –20 dBm/tone	IP3		15		dBm
Output P1dB				3		dBm
Conversion gain				9		dB
SSB noise figure				9		dB
RF return loss				14		dB
LO return loss				14		dB
IF return loss				14		dB
LO drive			–3	0	3	dBm
Isolation performance						
Leakage (LO-RF)				–30		dBm
Leakage (LO-IF)				–30		dBm
Miscellaneous						
Supply voltage		V_{CC}	4.75	5	5.25	V
Supply current		I_{CC}		190		mA

Typical Device Performance

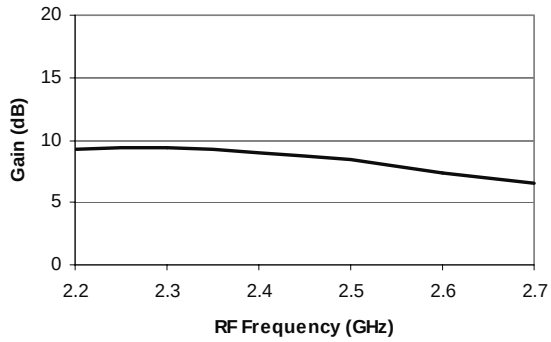


Figure 1. Conversion Gain
V_{CC} = 5.0 V, RF = 92.45 GHz, IF = 200 MHz

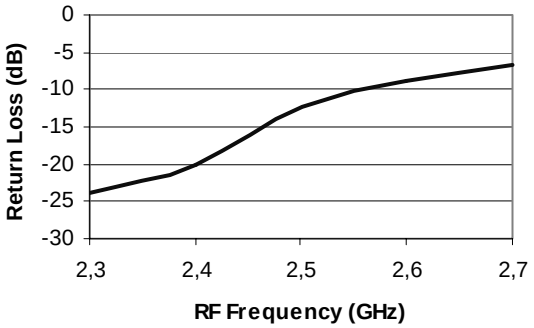


Figure 2. Return Loss at RF Input
V_{CC} = 5.0 V

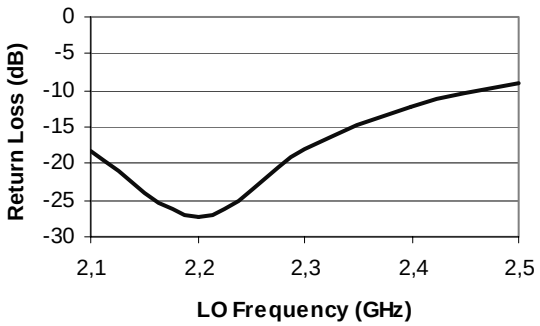


Figure 3. Return Loss at LO Input
V_{CC} = 5.0 V

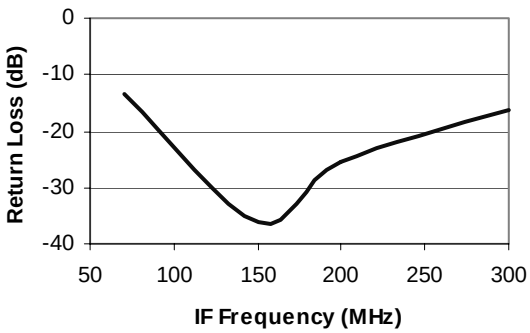
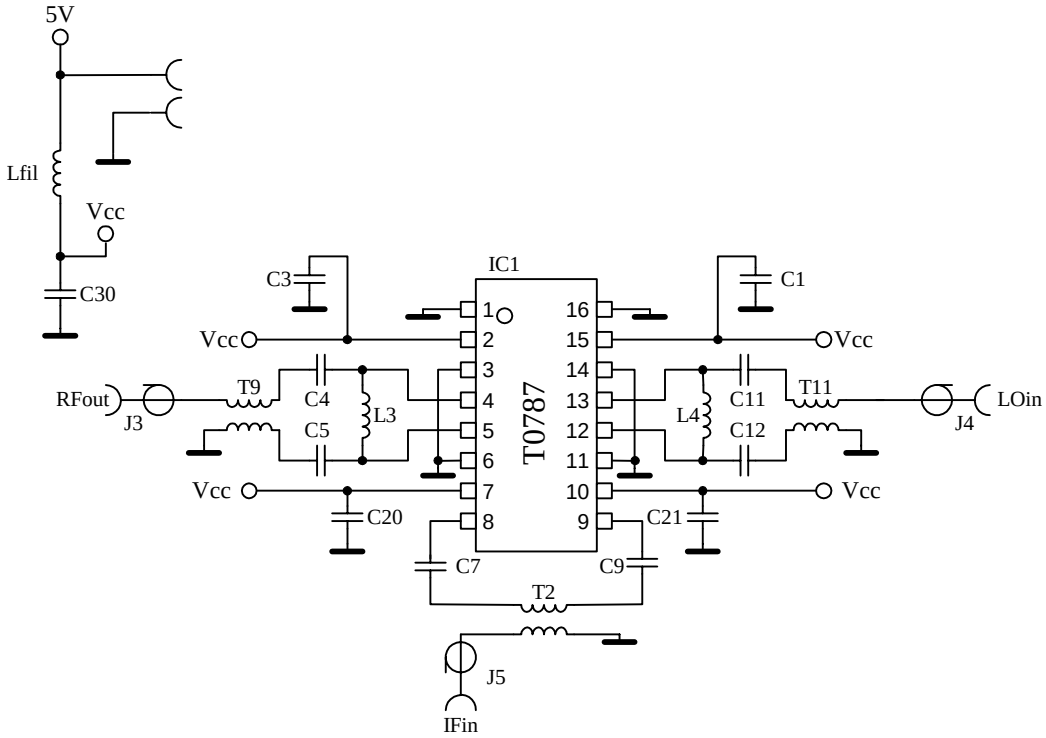


Figure 4. Return Loss at IF Input
V_{CC} = 5.0 V

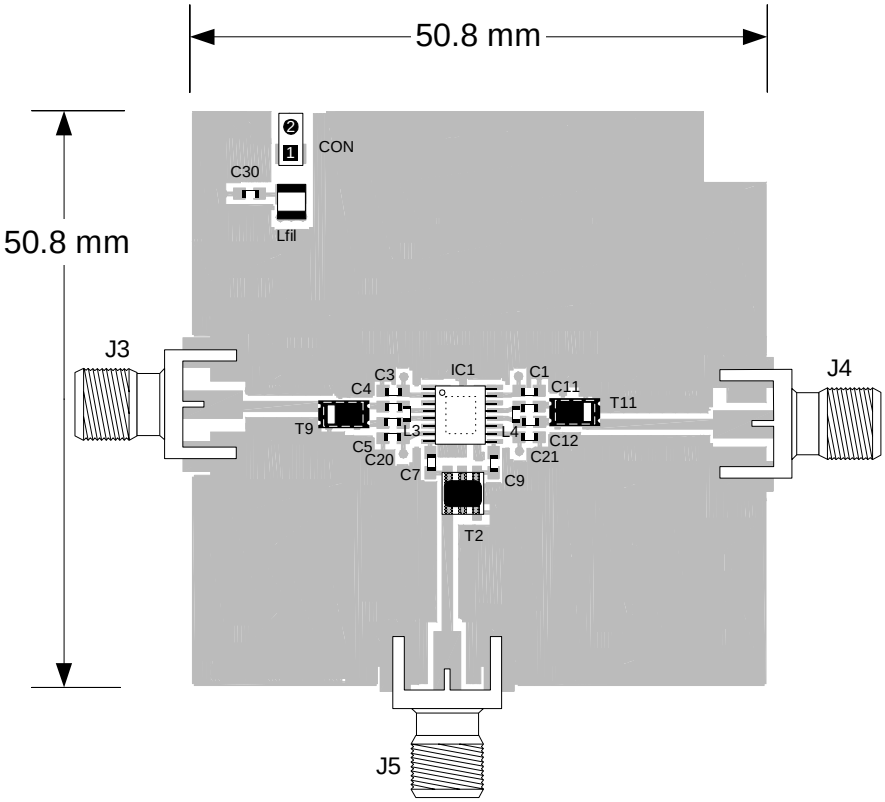
Demo Test Board Schematic



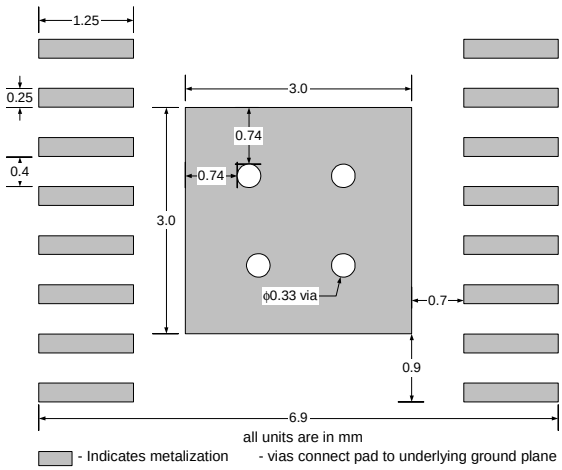
Bill of Material

Component Designator	Value	Vendor	Part Number	Description
IC1		Atmel Wireless & Microcontrollers	T0787	SiGe transmit 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
C1, C3, C20, C21, C30	5.6 pF			Capacitor, 0603 footprint
C7, C9	100 pF			Capacitor, 0603 footprint
C4, C5	1.5 pF			Capacitor, 0603 footprint
C11, C12	2.2 pF			Capacitor, 0603 footprint
L3, L4	12 nH	TOKO	LL1608-FS12NJ	Inductor, 0603 footprint, high Q series

Demo Test Board (Fully Assembled PCB)

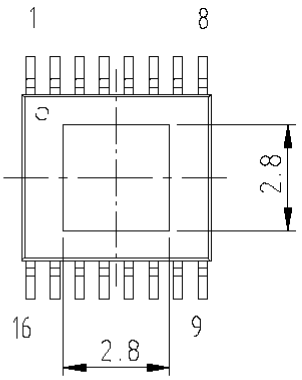


Recommended Package Footprint

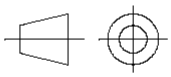


Remark: Heatslug must be soldered to GND

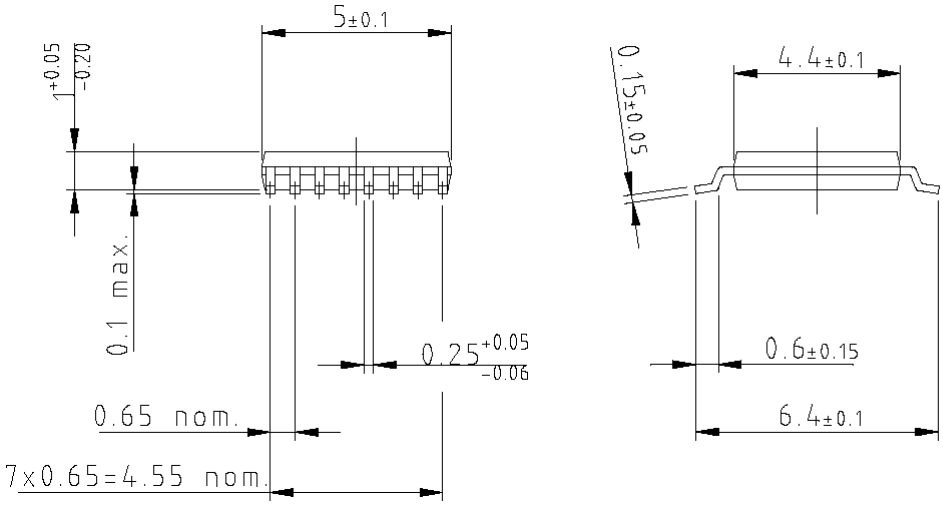
Package Information SSOP16



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



technical drawings
according to DIN
specifications



Ozone Depleting Substances Policy Statement

lt 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 systerns with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

lt 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 improvernents 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 1 and 11 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.

Data sheets can also be retrieved from the Internet: http://www.atmel-wm.com

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