



## Features

- Gain control in 20-dB steps
- Very low I/Q amplitude and phase errors
- High input P1dB
- Buffered IF OUT available through baseband output

## Applications

- Infrastructure digital communication systems
- GSM/cellular transceivers
- ISM band transceivers

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Electrostatic sensitive device.  
Observe precautions for handling.

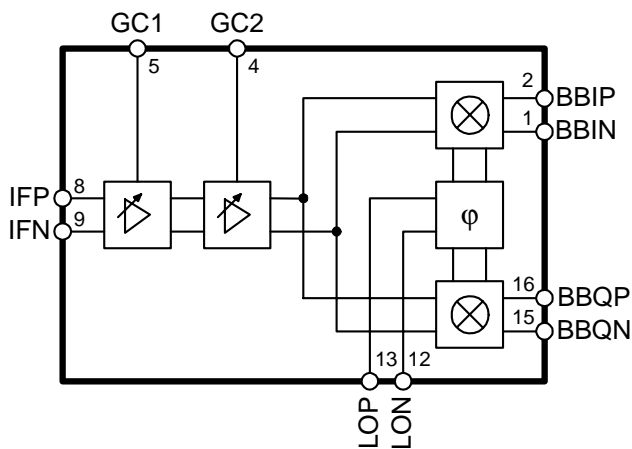


## Description

The T0797 is a multi-purpose demodulator RFIC. The silicon monolithic integrated circuit is designed in Atmel's advanced SiGe technology. This demodulator is capable of both quadrature demodulation or direct IF output. Features include switchable gain control on a frequency range from 65 MHz to 300 MHz. The device performs a very low amplitude as well as phase error and allows high input P1dB. The T0797 targets a variety of system applications for communications including 3G wireless.

## Block Diagram

Figure 1.



# 65 - 300 MHz SiGe IF Receiver / Demodulator

## T0797

Rev. A2, 03-Dec-01



Preliminary Information 1 (10)

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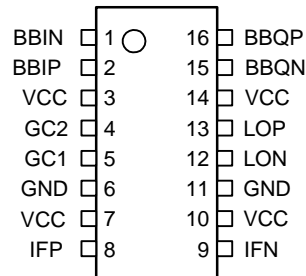
## Ordering Information

Extended Type Number	Package	Remarks
T0797	TSSOP16	

## Pin Configuration

Figure 2.

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## Pin Description

Pin	Symbol	Function
1	BBIN	Baseband I-axis negative output
2	BBIP	Baseband I-axis positive output
3	VCC	5 V power supply
4	GC2	Gain control input, stage 2
5	GC1	Gain control input, stage 1
6	GND	Ground
7	VCC	5 V power supply
8	IFP	IF positive input
9	IFN	IF negative input
10	VCC	5 V power supply
11	GND	Ground
12	LON	Local oscillator, negative input
13	LOP	Local oscillator, positive input
14	VCC	5 V power supply
15	BBQN	Baseband Q-axis negative output
16	BBQP	Baseband Q-axis positive 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	IFN, IFP	10	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

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## Thermal Resistance

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

## Electrical Characteristics

Test conditions:  $V_{CC} = 5\text{ V}$ ,  $T_{amb} = 25^\circ\text{C}$ , LO input: 0 dBm@200 MHz

IF input: @200.1 MHz, GC1 = 0, GC2 = 0; 0 dBm

IF input: @200.1 MHz, GC1 = 1, GC2 = 0; -20 dBm

IF input: @200.1 MHz, GC1 = 1, GC2 = 1; -40 dBm

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>1</b>	<b>IF input (I/Q mixing to baseband)</b>								
1.1	Frequency range		8, 9	f	65	120 - 220	300	MHz	B
1.2	Return loss		8, 9	RL		20		dB	D
1.3	Gain	Gain set = high; GC1 = GC2 = 1	8, 9	G		35		dB	A
1.4	Input P1dB		8, 9	P1dB		-30		dBm	C
1.5	Input IP3		8, 9	IIP3		-20		dBm	B
1.6	Noise figure		8, 9	NF		6		dB	D
1.7	Gain	Gain set = high; GC1 = 1; GC2 = 0	8, 9	G		15		dB	A
1.8	Input P1dB		8, 9	P1dB		-10		dBm	C
1.9	Input IP3		8, 9	IIP3		0		dBm	B
1.10	Noise figure		8, 9	NF	-3	10		dB	D
1.11	Gain	Gain set = high; GC1 = GC2 = 0	8, 9	G		-5		dB	A
1.12	Input P1dB		8, 9	P1dB		10		dBm	C
1.13	Input IP3		8, 9	IIP3		20		dBm	B
1.14	Noise figure		8, 9	NF		30		dB	D

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

## Electrical Characteristics

Test conditions:  $V_{CC} = 5\text{ V}$ ,  $T_{amb} = 25^{\circ}\text{C}$ , LO input: 0 dBm@200 MHz

IF input: @200.1 MHz, GC1 = 0, GC2 = 0; 0 dBm

IF input: @200.1 MHz, GC1 = 1, GC2 = 0; -20 dBm

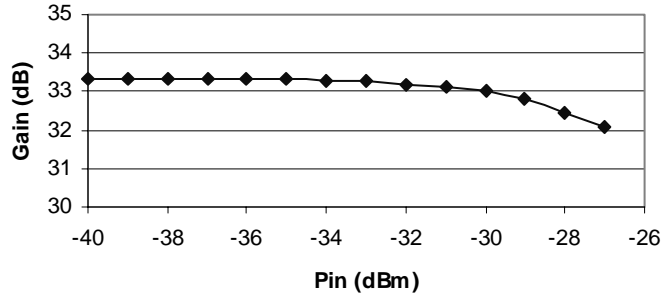
IF input: @200.1 MHz, GC1 = 1, GC2 = 1; -40 dBm

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>2</b>	<b>Stuck Mixer (DC to LO port – gain-controlled amplifier)</b>								
2.1	Frequency range		8, 9	f	65	120 - 220	300	MHz	B
2.2	Return loss		8, 9	RL		20		dB	D
2.3	Gain	Gain set = high; GC1 = GC2 = 1	8, 9	G		40		dB	A
2.4	Input P1dB		8, 9	P1dB		-26		dBm	C
2.5	Input IP3		8, 9	IIP3		-16		dBm	B
2.6	Noise figure		8, 9	NF		6		dB	D
2.7	Gain	Gain set = high; GC1 = 1; GC2 = 0	8, 9	G		20		dB	A
2.8	Input P1dB		8, 9	P1dB		-6		dBm	C
2.9	Input IP3		8, 9	IIP3		4		dBm	B
2.10	Noise figure		8, 9	NF		9		dB	D
2.11	Gain	Gain set = high; GC1 = GC2 = 0	8, 9	G		0		dB	A
2.12	Input P1dB		8, 9	P1dB		14		dBm	C
2.13	Input IP3		8, 9	IIP3		24		dBm	B
2.14	Noise figure		8, 9	NF		30		dB	D
<b>3</b>	<b>I/Q Output</b>								
3.1	I/Q output frequency range		1, 2, 15, 16	$f_{I/Q}$	DC		500	MHz	D
3.2	I/Q output amplitude error		1, 2, 15, 16		-0.2		+0.2	dB	A
3.3	I/Q phase error		1, 2, 15, 16		-2		+2	deg	A
3.4	I/Q output common mode voltage		1, 2, 15, 16			2.5		V	A
3.5	I/Q output differential offset voltage		1, 2, 15, 16	$V_{offset}$			10	mV	A
<b>4</b>	<b>LO input</b>								
4.1	LO input level		12, 13	$P_{LO}$	-3	0	+3	dBm	D
4.2	Return loss		12, 13	$RL_{LO}$		20		dB	D
<b>5</b>	<b>Miscellaneous</b>								
5.1	Supply voltage		3, 7, 10, 14	$V_{CC}$	4.75	5	5.25	V	A
5.2	Supply current		3, 7, 10, 14	$I_{CC}$		180		mA	A

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

Typical Device Performance

Figure 3. Gain vs. pin high-gain state (11)



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Figure 4. Gain vs. pin low-gain state (00)

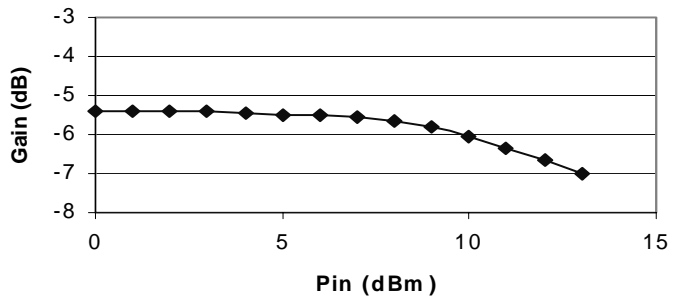
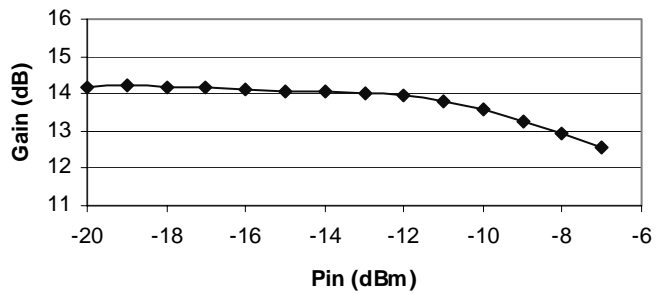
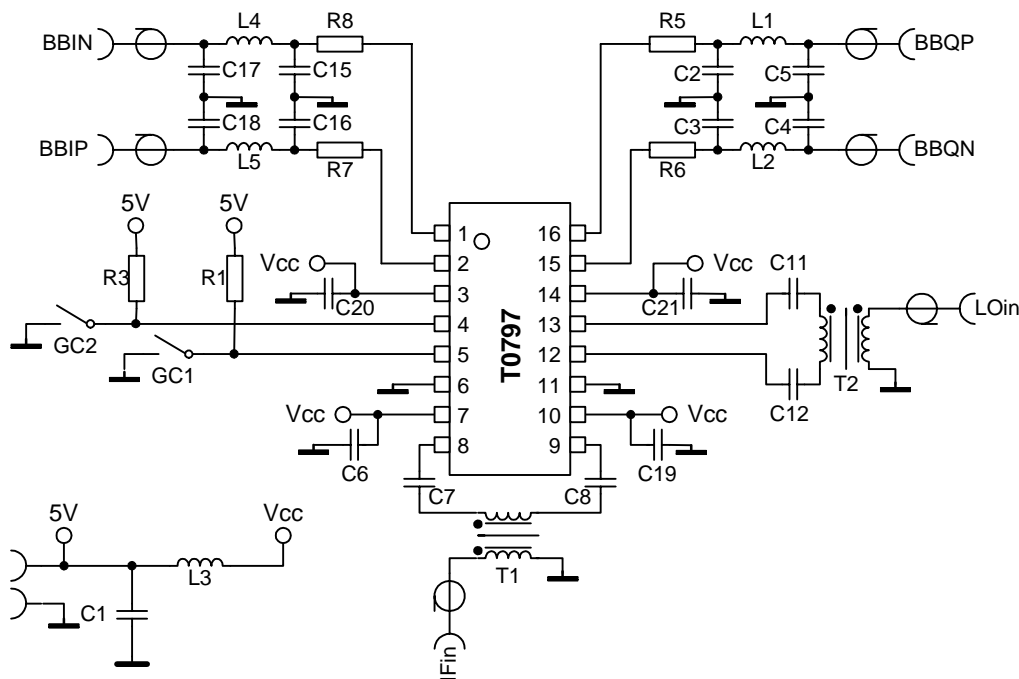


Figure 5. Gain vs. pin medium-gain state (10)



### Demo Test Board Schematic

Figure 6.

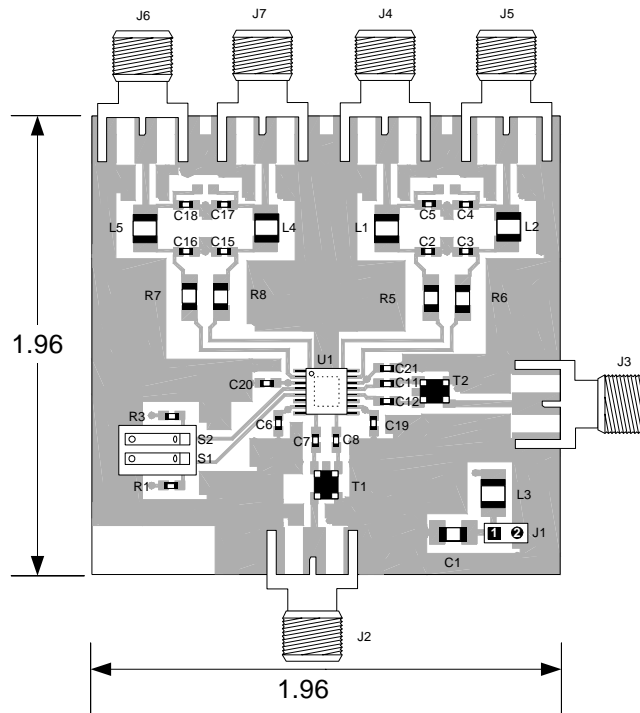


### Bill of Materials

Component Designator	Value	Vendor	Part Number	Description
D1		Atmel	T0797	IF receiver
J2, J3, J4, J5, J6, J7		Johnson Components	142-0701-851	SMA end launch connector
T1, T2		Mini-Circuits	TC1-1	Transformer
C1	1uF			1206 size supply bypass capacitor
R1, R3	1 kohm			0603 size
C6, C19, C20, C21	1nF			0603 size
L1, L2, L3, L4, L5	1uH			1210 size
C7, C8, C11, C12	68pF			0603 size
R5, R6, R7, R8	0 Ohm			1206 size
C2, C3, C4, C5, C15, C16, C17, C18	820pF			0603 size

## Demo Test Board (Fully Asembled PCB)

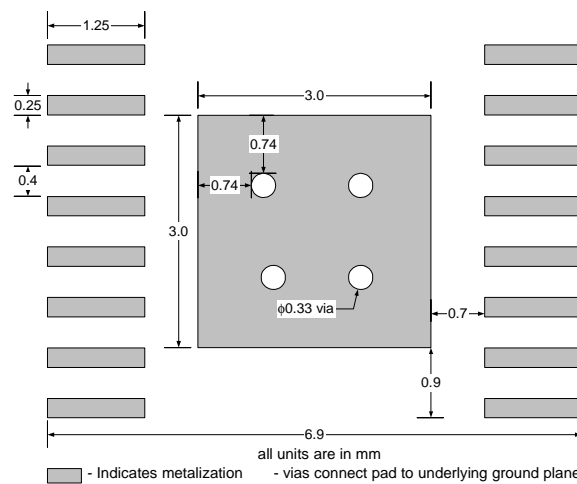
Figure 7.



Note: Dimensions in inches

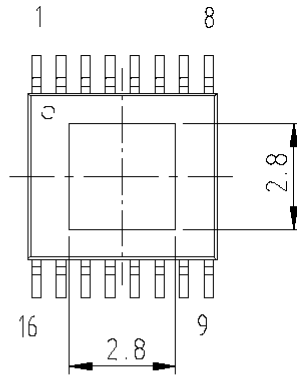
## Recommended Package Footprint

Figure 8.

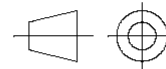


Remark: Heatslug must be soldered to GND

Package Information

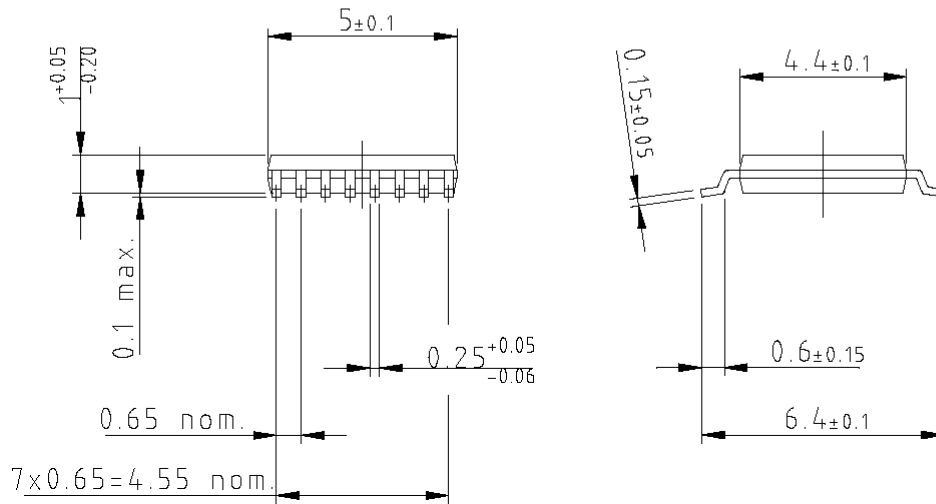


Package: SSOP16  
 ( acc. JEDEC SMALL OUTLINE No. MO-153 )  
 Dimensions in mm



technical drawings  
 according to DIN  
 specifications

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## 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.

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## Atmel Sales Offices

### **France**

3, Avenue du Centre  
78054 St.-Quentin-en-Yvelines  
Cedex  
Tel: +33 1 30 60 70 00  
Fax: +33 1 30 60 71 11

### **Germany**

Erfurter Strasse 31  
85386 Eching  
Tel: +49 89 319 70 0  
Fax: +49 89 319 46 21

Kruppstrasse 6  
45128 Essen  
Tel: +49 201 247 30 0  
Fax: +49 201 247 30 47

Theresienstrasse 2  
74072 Heilbronn  
Tel: +49 7131 67 36 36  
Fax: +49 7131 67 31 63

### **Italy**

Via Grosio, 10/8  
20151 Milano  
Tel: +39 02 38 03 71  
Fax: +39 02 38 03 72 34

### **Spain**

Principe de Vergara, 112  
28002 Madrid  
Tel: +34 91 564 51 81  
Fax: +34 91 562 75 14

### **Sweden**

Kavallerivaegen 24, Rissne  
17402 Sundbyberg  
Tel: +46 8 587 48 800  
Fax: +46 8 587 48 850

### **United Kingdom**

Easthampstead Road  
Bracknell  
Berkshire RG12 1LX  
Tel: +44 1344 707 300  
Fax: +44 1344 427 371

### **USA Western**

2325 Orchard Parkway  
San Jose, California 95131  
Tel: +1 408 441 0311  
Fax: +1 408 436 4200

### **USA Eastern**

1465 Route 31, Fifth floor  
Annandale  
New Jersey 08801  
Tel: +1 908 848 5208  
Fax: +1 908 848 5232

### **Hong Kong**

Room #1219,  
Chinachem Golden Plaza  
77 Mody Road, Tsimhatsui East  
East Kowloon, Hong Kong  
Tel: +852 23 789 789  
Fax: +852 23 755 733

### **Korea**

25-4, Yoido-Dong, Suite 605,  
Singsong Bldg.  
Youngdeungpo-Ku  
150-010 Seoul  
Tel: +822 785 1136  
Fax: +822 785 1137

### **Rep. of Singapore**

Keppel Building #03-00  
25 Tampines Street 92,  
Singapore 528877  
Tel: +65 260 8223  
Fax: +65 787 9819

### **Taiwan, R.O.C.**

8F-2, 266 Sec.1 Wen Hwa 2 Rd.  
Lin Kou Hsiang,  
244 Taipei Hsien  
Tel: +886 2 2609 5581  
Fax: +886 2 2600 2735

### **Japan**

Tonetsushinkawa Bldg.  
1-24-8 Shinkawa Chuo Ku  
Tokyo 104-0033  
Tel: +81 3 3523 3551  
Fax: +81 3 3523 7581

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