

## **BIPOLAR DIGITAL INTEGRATED CIRCUIT**

# $\mu$ PB1512TU

## 13 GHz INPUT DIVIDE BY 8 PRESCALER IC FOR SATELLITE COMMUNICATIONS

#### **DESCRIPTION**

The  $\mu$ PB1512TU is a silicon germanium (SiGe) monolithic integrated circuit designed as a divide by 8 prescaler IC for satellite communications and point-to-point/multi-point radios.

The package is 8-pin lead-less minimold suitable for surface mount.

This IC is manufactured using our 50 GHz fmax UHS2 (Ultra High Speed Process) SiGe bipolar process.

#### **FEATURES**

• Operating frequency : fin = 5 to 13 GHz

Low current consumption : Icc = 48 mA @ Vcc = 5.0 V
 High-density surface mounting : 8-pin lead-less minimold
 Supply voltage : Vcc = 4.5 to 5.5 V

• Division ratio : 8

#### **APPLICATIONS**

· Point-to-point/Multi-point radios

VSAT radios

#### **ORDERING INFORMATION**

Part Number	Order Number	Package	Markin g	Supplying Form
μPB1512TU-E2	μPB1512TU-E2-A	8-pin lead-less minimold (Pb-Free) Note	1512	<ul> <li>8 mm wide embossed taping</li> <li>Pin 5, 6, 7, 8 indicates pull-out direction of tape</li> <li>Qty 5 kpcs/reel</li> </ul>

**Note** With regards to terminal solder (the solder contains lead) plated products (conventionally plated), contact your nearby sales office.

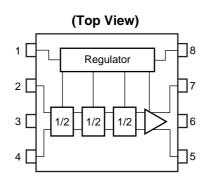
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order:  $\mu$ PB1512TU

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

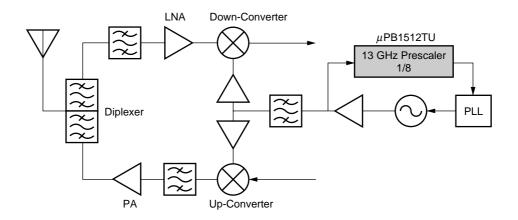
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#### INTERNAL BLOCK DIAGRAM AND PIN CONNECTIONS



Pin No.	Pin Name
1	Vcc1
2	IN
3	GND
4	ĪN
5	OUT
6	GND
7	OUT
8	Vcc2

#### SYSTEM APPLICATION EXAMPLE



## PIN EXPLANATION

Pin No.	Pin Name	Applied Voltage (V)	Function and Applications
1	Vcc1	5	Power supply pin.
			This pin must be equipped with bypass capacitor (example : 100 pF and 10 nF) to minimize ground impedance.
2	IN	-	Signal input pin.
			This pin should be coupled to signal source with capasitor (example : 100 pF) for DC cut.
3	GND	0	Ground pin.
			Ground pattern on the board should be formed as widely as possible to minimize ground impedance.
4	ĪN	-	Signal input bypass pin.
			This pin must be equipped with bypass capacitor (example : 100 pF) to minimize ground impedance.
5	OUT	-	Divided frequency output pin.
			This pin shoud be coupled to load device with capasitor (example : 100 pF) for DC cut.
6	GND	0	Ground pin.
			Ground pattern on the board should be formed as widely as possible to minimize ground impedance.
7	OUT	-	Divided frequency output pin.
			This pin should be coupled to load device with capasitor (example : 100 pF) for DC cut.
8	Vcc2	5	Power supply pin.
			This pin must be equipped with bypass capacitor (example : 100 pF and 10 nF) to minimize ground impedance.

#### **ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Test Conditions	Ratings	Unit
Supply Voltage	Vcc	T <sub>A</sub> = +25°C	6	V
Total Power Dissipation	Po	$T_A = +85^{\circ}C$ Note	867	mW
Thermal Resistance (junction to ground paddle)	R <sub>th(j-c)</sub>	T <sub>A</sub> = +85°C <b>Note</b>	75	°C/W
Operating Ambient Temperature	TA		-40 to +85	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

**Note** Mounted on  $33 \times 21 \times 0.4$  mm polyimide PCB, with copper patterning on both sides.

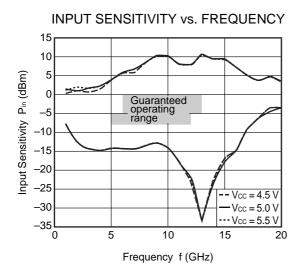
## RECOMMENDED OPERATING RANGE

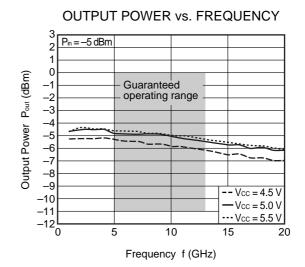
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	Vcc	4.5	5.0	5.5	V
Operating Ambient Temperature	TA	-40	+25	+85	°C

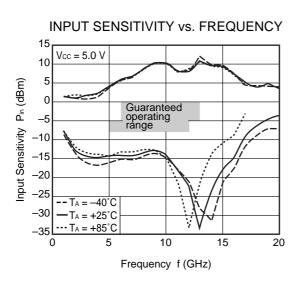
## ELECTRICAL CHARACTERISTICS (Vcc = 4.5 to 5.5 V, $T_A = -40$ to +85°C, $Z_S = Z_L = 50 \Omega$ )

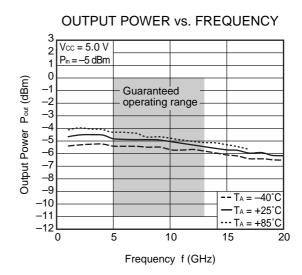
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	lcc	No Signals	I	48	75	mA
Input Sensitivity	Pin1	fin = 5 to 6 GHz	-8	-	-5	dBm
	Pin2	fin = 6 to 12 GHz	-8	-	0	dBm
	Pin3	fin = 12 to 13 GHz	-5	-	0	dBm
Output Power	Pout	$f_{in} = 5 \text{ to } 13 \text{ GHz}, \text{ single ended},$ $P_{in} = -5 \text{ dBm}$	-11	-4.0	2	dBm

#### TYPICAL CHARACTERISTICS (TA = +25°C, unless otherwise specified)

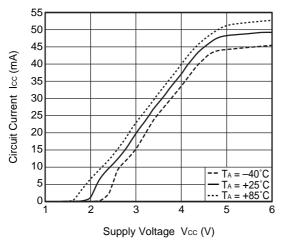








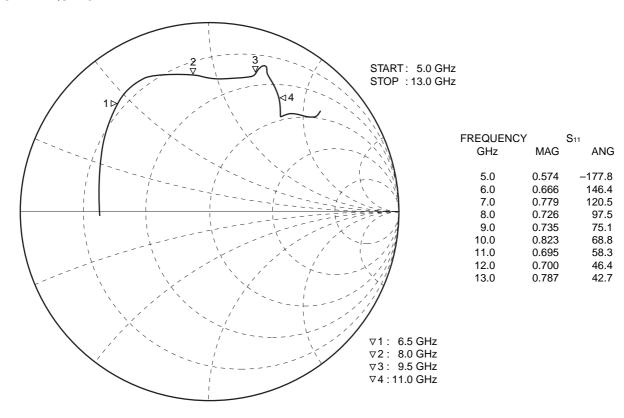
### ★ CIRCUIT CURRENT vs. SUPPLY VOLTAGE



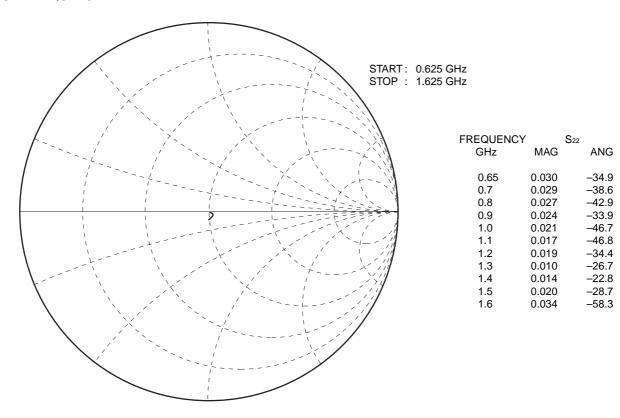
Remark The graphs indicate nominal characteristics.

#### **★** S-PARAMETERS (TA = +25°C, Vcc = 5.0 V)

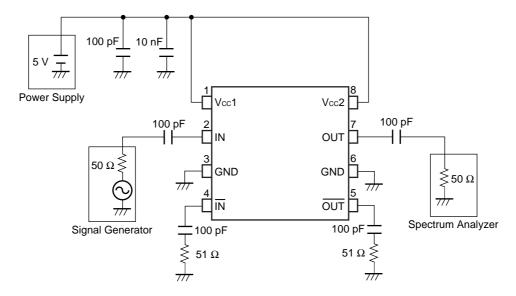
#### S<sub>11</sub>-FREQUENCY



#### S<sub>22</sub>-FREQUENCY

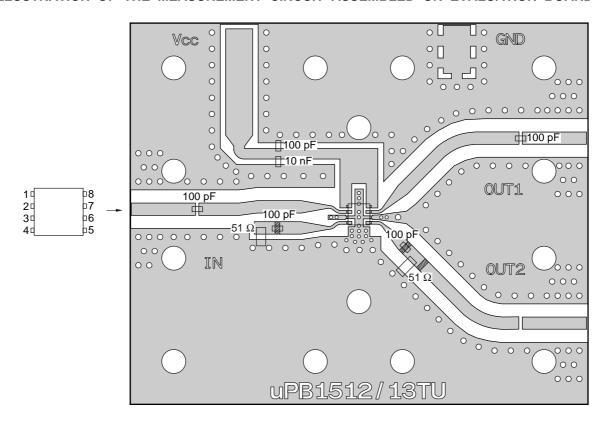


## **MEASUREMENT CIRCUIT**



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

#### ILLUSTRATION OF THE MEASUREMENT CIRCUIT ASSEMBLED ON EVALUATION BOARD



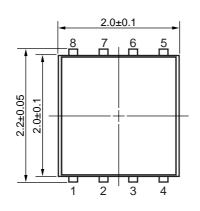
**Remarks 1.**  $33 \times 21 \times 0.4$  mm double-sided copper-clad polyimide PCB

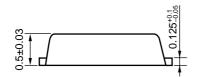
- 2. Back side: GND pattern
- 3. Solder plated on pattern
- 4. represents cutout
- 5. oO: Through holes

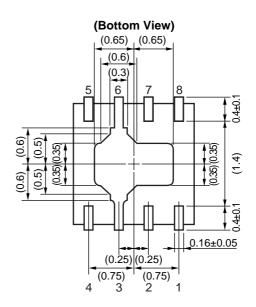
## **PACKAGE DIMENSIONS**

## 8-PIN LEAD-LESS MINIMOLD (UNIT: mm)

## (Top View)







#### NOTES ON CORRECT USE

- (1) Observe precautions for handling because of electro-static sensitive devices.
- (2) Form a ground pattern as widely as possible to minimize ground impedance (to prevent undesired oscillation).
- (3) Keep the track length of the ground terminals as short as possible.
- (4) Bypass capacitance must be attached to Vcc line.
- (5) Exposed heatsink at bottom on package must be soldered to PCB RF/DC ground.

#### RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

Soldering Method	Soldering Conditions		Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) Time at peak temperature Time at temperature of 220°C or higher Preheating time at 120 to 180°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 60 seconds or less : 120±30 seconds : 3 times : 0.2%(Wt.) or below	IR260
Wave Soldering	Peak temperature (molten solder temperature) Time at peak temperature Preheating temperature (package surface temperature) Maximum number of flow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less	WS260
Partial Heating	Peak temperature (terminal temperature) Soldering time (per side of device) Maximum chlorine content of rosin flux (% mass)	: 350°C or below : 3 seconds or less : 0.2%(Wt.) or below	HS350

Caution Do not use different soldering methods together (except for partial heating).

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Cadmium	< 100 PPM	Not Detected		
Hexavalent Chromium	< 1000 PPM	Not Detected		
PBB	< 1000 PPM	Not Detected		
PBDE	< 1000 PPM	Not Detected		

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