

SiGe-Power Amplifier for GSM 900 (Flipchip Version)

Description

The TST0922 is a monolithic integrated power amplifier IC in flipchip technology. The device is manufactured using TEMIC Semiconductors' Silicon-Germanium (SiGe) technology and has been designed for use in GSM 900 MHz mobile phones.

With a single supply voltage of 3 V and a neglectable



leakage current in power-down mode the TST0922 needs few external components and no high-side switch transistor which reduces system cost.

Features

34.5 dBm output power

Power Added Efficiency (PAE) 50 %

Single-supply operation at 3 V
no negative voltage necessary

Current consumption in power-down mode $\leq 10 \mu\text{A}$

No external power-supply switch required

Power-ramp control

Simple output matching for maximum flexibility

Flipchip package

Block Diagram

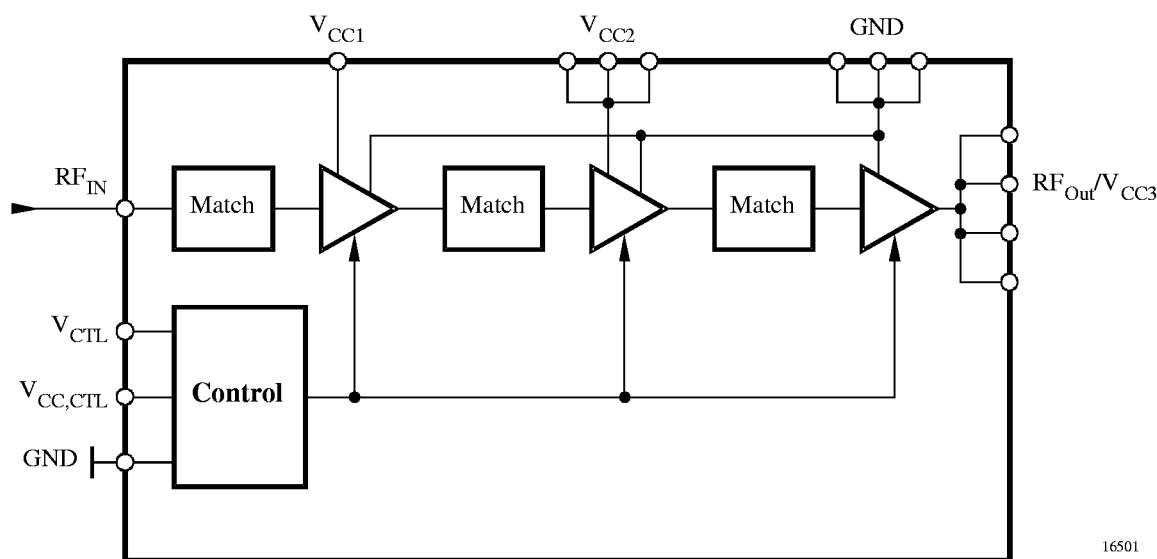


Figure 1. Block diagram

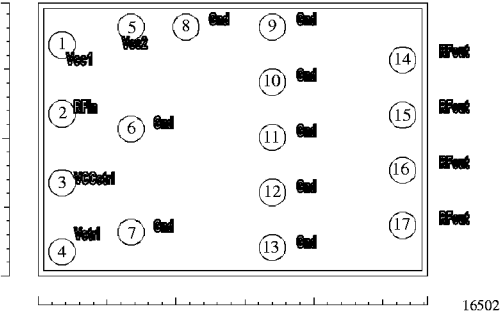
Ordering Information

Extended Type Number	Package	Remarks
TST0922-M	Flipchip	

Pin Description

Pad	Symbol	Function
1	Vcc1	Supply voltage 1
2	RFin	RF input
3	VCCctrl	Supply voltage for control
4	VCTL	Control input
5	Vcc2	Supply voltage 2
6–13	GND	Ground
14–17	RFout/ Vcc3	RF output/ supply voltage 3

Pinning



Dimensions-scale division = 100 μm
Figure 2. Pinning

Absolute Maximum Ratings

All voltages are referred to GND

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC}			5.0	V
Input power	P _{in}			13	dBm
Gain control voltage	V _{CTL}	0		2.2	V
Duty cycle for operation				25	%
Burst duration	T _{burst}			1.2	ms
Junction temperature	T _j			+150	°C
Storage temperature	T _{stg}	−40		+150	°C

Thermal Resistance

Parameters	Symbol	Value	Unit
		tbd	

Operating Range

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC1} V _{CC2} V _{CC3} V _{CC,CTL}	2.4	3.5	4.5	V
Ambient temperature	T _{amb}	− 25		+ 85	°C
Input frequency	f _{in}		900		MHz

Electrical Characteristics

Test conditions: $V_{CC} = V_{CC1}, \dots, V_{CC3}, V_{CC}, C_{TL} = +3.5 \text{ V}$, $T_{amb} = +25^\circ\text{C}$ (see application circuit)

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Power Supply						
Supply voltage		V_{CC}	2.4	3.5	4.5	V
Current consumption	Active mode $P_{out} = 34.5 \text{ dBm}$, $PAE = 50\%$	I		1.70		A
Current consumption (leakage current)	Power-down mode $V_{CTL} \leq 0.2 \text{ V}$	I			10	μA
RF Input						
Frequency range		f_{in}	880	900	915	MHz
Input impedance *		Z_i		50		Ω
Input power		P_{in}		3	12	dBm
Input VSWR *	$P_{in} = 0 \text{ to } 12 \text{ dBm}$, $P_{out} = 34.5 \text{ dBm}$				2 : 1	
RF Output						
Output impedance *		Z_o		50		Ω
Output power: normal conditions	$V_{CC} = 3.5 \text{ V}$, $T_{amb} = +25^\circ\text{C}$ $P_{in} = 3 \text{ dBm}$, $R_L = R_G = 50 \Omega$	P_{out}	34.4	34.8		dBm
extreme conditions	$V_{CC} = 2.7 \text{ V}$, $T_{amb} = +85^\circ\text{C}$ $P_{in} = 3 \text{ dBm}$, $R_L = R_G = 50 \Omega$	P_{out}	32.0	33.0		dBm
Minimum output power	$V_{CTL} = 0.3 \text{ V}$			-20		dBm
Power added efficiency	$V_{CC} = 3 \text{ V}$, $P_{out} = 28 \text{ dBm}$ $V_{CC} = 3 \text{ V}$, $P_{out} = 30 \text{ dBm}$ $V_{CC} = 3 \text{ V}$, $P_{out} = 33.5 \text{ dBm}$	PAE	25 35 50			%
Stability	$T_{amb} = -25 \text{ to } +85^\circ\text{C}$, no spurious $\geq -60 \text{ dBc}$				10 : 1	
Load mismatch (stable, no change)	$P_{out} = 34.5 \text{ dBm}$, all phases, no damage	VSWR			10 : 1	
Second harmonic distortion		2fo			-35	dBc
Third harmonic distortion		3fo			-35	dBc

* With external matching, see application circuit

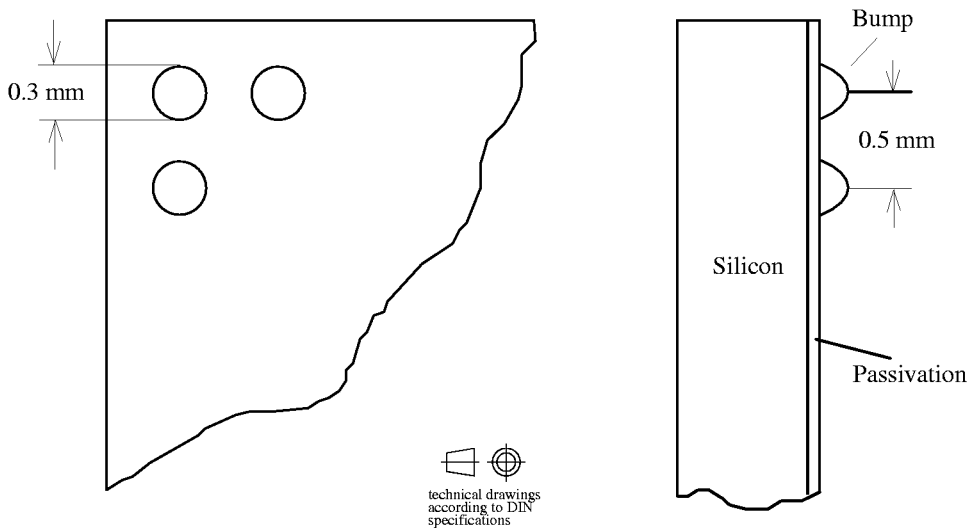
Electrical Characteristics (continued)

Test conditions: $V_{CC} = V_{CC1}, \dots, V_{CC3}, V_{CC}, CTL = + 3.5 \text{ V}$, $T_{amb} = + 25^{\circ}\text{C}$ (see application circuit)

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Noise power	$P_{out} = 34 \text{ dBm}$, $RBW = 100 \text{ kHz}$ $f = 925 \text{ to } 935 \text{ MHz}$ $f \geq 935 \text{ MHz}$			-73 -85	-70 -82	dBm dBm
Rise and fall time		t_r, t_f			0.5	μs
Isolation between input and output	$P_{in} = 0 \text{ to } 10 \text{ dBm}$, $V_{CTL} \leq 0.2 \text{ V}$ (power down)		50			dB
Power Control						
Control-curve slope	$P_{out} \geq 25\text{dBm}$				150	dB/V
Power-control range	$V_{ctrl} = 0.3\text{ to } 2.0 \text{ V}$		50			dB
Control-voltage range		V_{CTL}	0.3		2.0	V
Control current	$P_{in} = 0 \text{ to } 10 \text{ dBm}$, $V_{CTL} = 0 \text{ to } 2.0 \text{ V}$	I_{CTL}			200	μA

Package Information

Flipchip



16526

Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC Semiconductor 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.

TEMIC Semiconductor 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.

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

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use TEMIC Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify TEMIC Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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