Application Note

BGS67A
Application Note

AN10201

Philips Semiconductors

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Abstract

The BGS67A is a high dynamic range hybrid amplifier designed for applications as a reverse amplifier in two-way CATV systems.

Revision history

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Author(s)
Gai van Straten

Philips Semiconductors
Gerstweg 2, Nijmegen
The Netherlands

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Summary

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Contents

1. PRODUCT DESCRIPTION

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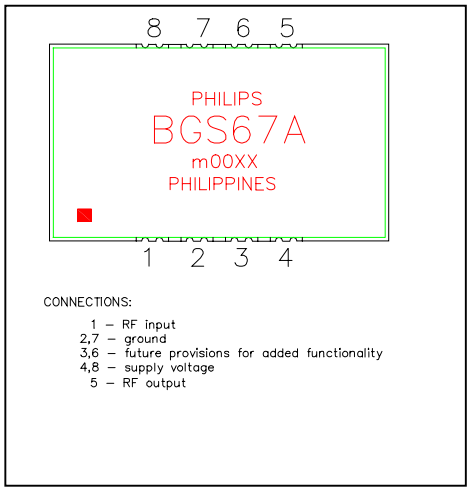
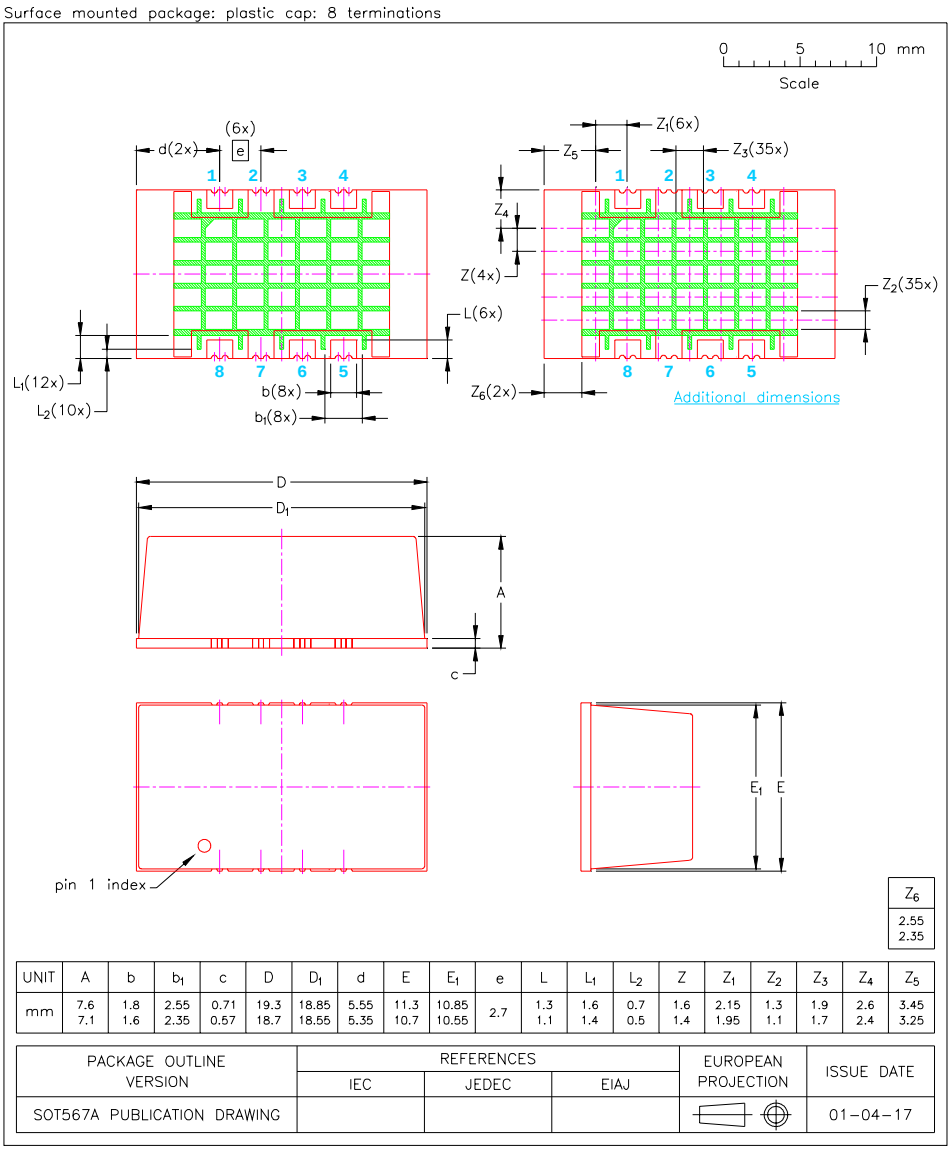
2. PACKAGE DESCRIPTION

The leadless reverse amplifier, BGS67A, makes use of castellations for outside connections. The bottom of the substrate incorporates AgPt metallization with a maximum dimension of 14mm. to prevent substrate cracks due to differences in thermal coefficient between the substrate itself and the PCB on which the module will be soldered into. A solder resist mesh has been applied for consistent distribution of solder layer and to prevent excessive solder flow which can cause shorts between the ground and the other connections.

Figure 1 shows the connection configuration of the BGS67A.



3. PACKAGE OUTLINE



Z6
2.55 2.35

UNIT	A	b	b_1	c	D	D_1	d	E	E_1	e	L	L_1	L_2	Z	Z_1	Z_2	Z_3	Z_4	Z_5
mm	7.6 7.1	1.8 1.6	2.55 2.35	0.71 0.57	19.3 18.7	18.85 18.55	5.55 5.35	11.3 10.7	10.85 10.55	2.7	1.3 1.1	1.6 1.4	0.7 0.5	1.6 1.4	2.15 1.95	1.3 1.1	1.9 1.7	2.6 2.4	3.45 3.25

PACKAGE OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT567A PUBLICATION DRAWING					01-04-17

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4. ELECTRICAL DESCRIPTION

BGS67A is a 25-dB reverse amplifier for use in 2-way CATV systems operating in a frequency range of 5 to 65 MHz. In order to reduce the dissipation, the module uses a supply of +12V and has a typical current of 80 mA.

Table 1a and 1b show a summary of the electrical performance of the module.

Table 1a S-parameters

	Gain @10MHz	Gain @ 65MHz	Slope 5-65 MHz	Flatness 5-65 MHz	Worst Case Input Return Losses	Worst Case Output Return Losses
Maximum	25.50 dB	25.60 dB	-0.05 dB	0.05 dB	-26 dB	-21 dB
Average	25.50 dB	25.52 dB	-0.07 dB	0.03 dB	-28 dB	-22 dB
Minimum	25.50 dB	25.50 dB	-0.10 dB	0.02 dB	-31 dB	-25 dB

Table 1b: Distortion and Noise Figure

	CTB	Xmod	D2	NF @ 5MHz	NF @ 65MHz
Maximum	-63.40 dB	-53.90 dB	-71.60 dB	2.36 dB	2.35 mA
Average	-65.50 dB	-56.12 dB	-75.05 dB	2.32 dB	2.31 mA
Minimum	-66.00 dB	-56.60 dB	-78.40 dB	2.27 dB	2.26 mA

Note: The following test conditions were used for measuring distortion.

CTB: 4 channels flat; Vo = 50 dBmV; measured at 25 MHz

XMOD: 4 channels flat; Vo = 50 dBmV; measured at 25 MHz

D2: measured at $f_P + f_Q = 50$ MHz

$f_P = 19$ MHz; $V_P = 50$ dBmV

$f_Q = 31$ MHz; $V_Q = 50$ dBmV

5. THERMAL MOUNTING CONSIDERATIONS

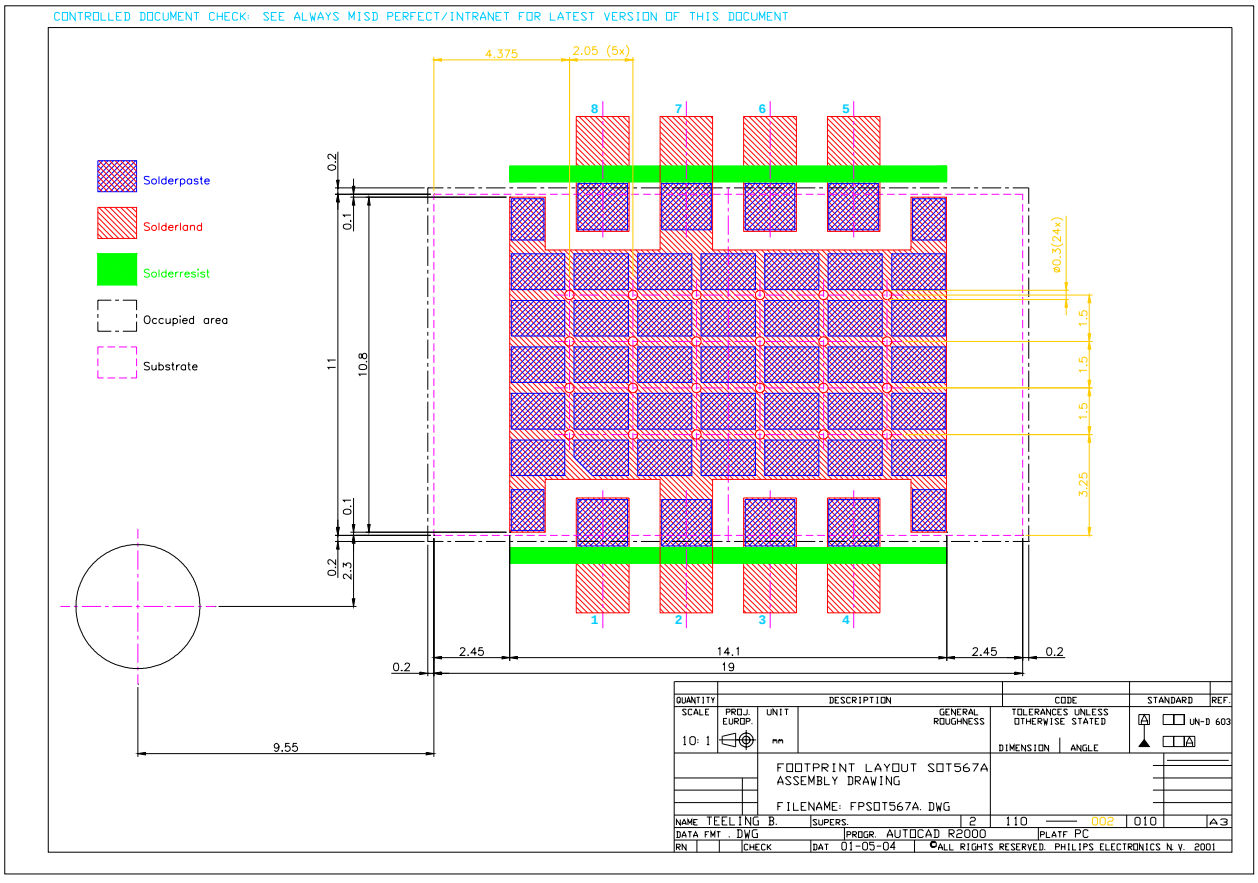
Assuming a maximum allowed Tmb of 85 ºC at a cabinet temperature of 60 ºC, the temperature rise will become critical at 1W dissipation when no proper attention is paid to the size and thermal design of the PCB. Simulations showed that a significant amount of thermal vias in the footprint should be used (10% copper) on a PCB of 10 x 10 centimeters with a copper plating on the back of at least 35 µm to maintain a Tmb <85 ºC at Tair =60 ºC. When PCB is directly attached to a heatsink, any board size will suffice as long as thermal vias are included.

6. SOT567A SOLDERING RECOMMENDATIONS

Materials

Stencil print solder pastes:	Sn(62)Pb(36)Ag(2) and Sn(63)Pb(37) (weight percentage)
Printed board:	FR4 or Rogers 4003, 1.5mm or 0.8 mm thick, 10x10 centimeters, with metallized vias (10% Cu), at least 35 µm Cu backplating
Solder land finish:	Ni/Au
Solder land:	No grid
Component metallization:	No grid
Stencil thickness:	120µm to 150µm, metal
Reflow profile:	nominal (according to CE-3 technology)
Reflow environment:	air

7. SOT567A FOOTPRINT



8. AUTOMATED PRODUCTION HANDLING

Process indication:

Reflow soldering of the SOT567A consists of:

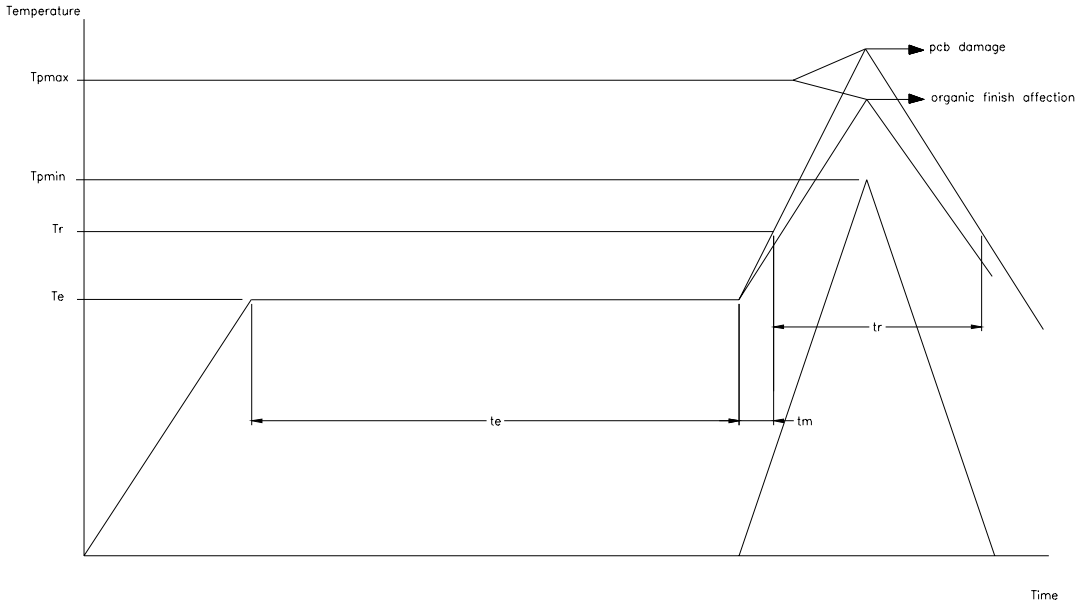
· solder paste printing

· component mounting

· reflow soldering

Solder paste printing for SOT567A modules should be done according to CE-3 technology. Cleaning of the bottom side of the stencil is not required for less than 26 boards. Component mounting within an accuracy of 150 µm is sufficient for the modules. The placement force must be at least 250 grams. The modules must be soldered according CE-3 specifications for reflow soldering. An inert atmosphere (e.g. nitrogen) is not required.

9. SOT567A REFLOW SOLDERING PROFILE



Max. temperature gradient: 10 degC/s

Te=160 degC
Tr=180 degC
Tpmin=205 degC
Tpmax=240 degC in case of organic finish in air atm. and soldering the first side of a double sided pcb.
Tpmax=260 degC in other cases

te=60 s (if possible, else 5 minutes)
tr=70 s
tm=2–30 s

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10. FLUX CLEANING RECOMMENDATION

Tests have shown that product performance is not affected after ultrasonic flux cleaning. However, it is recommended that cleaning be done by spraying and not by immersion due to the fact that the product is not hermetically sealed.

To prevent the need for flux cleaning, it is recommended that solder with no-clean flux be used for attaching the product into the application board.

11. REWORK AND MANUAL HANDLING

Rework needs to be done at relatively low temperatures, since the product uses a thermoplastic cap which starts its melting trajectory above 260°C. Philips cannot guarantee the product's functionality after rework.

De-soldering:

Using hot air gun at maximum of 280°C air temperature. If no recovery of the module is needed higher temperatures up to 300°C are allowed.
Procedure:

a. Hold PCB board level

b. Preheat PCB board at 150°C

c. Do not apply mechanical forces during de-soldering until step e.

d. Maximum de-soldering temperature is 5 seconds at 250°C

e. Take out product by lifting it at the substrate edges

f. Remove as much as possible the solder left on the PCB.

Re-soldering:

Using hot air gun at maximum of 280°C air temperature. To avoid too much solder, do not use solder wire. Also the use of a soldering iron is not recommended.

Procedure:

a. Hold PCB board level

b. Dispense small amount of Sn(62)Pb(36)Ag(2) or Sn(63)Pb(37) solder.
c. Place product on PCB board

d. Do not apply mechanical forces during soldering

e. Preheat PCB board at 150°C

f. Maximum soldering temperature is 5 seconds at 250°C