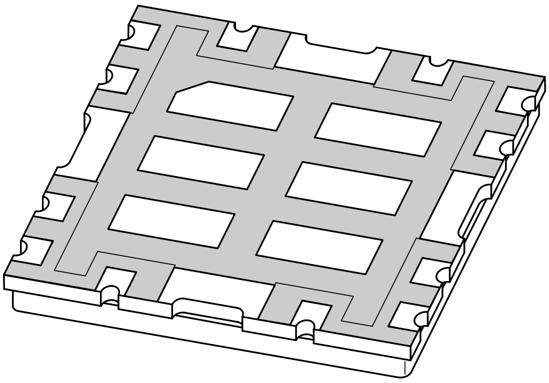
DATA SHEET



BGY280
UHF amplifier module

Preliminary specification 2000 Nov 15

Philips Semiconductors

PHILIPS

FEATURES

- Dual band GSM amplifier
- 3.6 V nominal supply voltage
- 33.5 dBm output power for GSM1800
- 35.5 dBm output power for GSM900
- Easy output power control by DC voltage.
- Internal input and output matching.

APPLICATIONS

- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (GSM systems) in two frequency bands: 880 to 915 MHz and 1710 to 1785 MHz.

DESCRIPTION

The BGY280 is a power amplifier module in a SOT559A leadless package with a plastic cap. The dimensions are 13.75 x 11 x 1.7 mm. The module consists of two separated line-ups. One for GSM900 and one for GSM1800. Internal power control, input and output matching.

PINNING - SOT559A

PIN	DESCRIPTION
1,2,3,6,9,10,11,14	Ground
4	RF output 2 (1800 MHz)
5	V_{S2} (1800 MHz)
7	V_{S1} (900 MHz)
8	RF output 1 (900 MHz)
12	RF input 1 (900 MHz)
13	V_{C1} (900 MHz)
15	V_{C2} (1800 MHz)
16	RF input 2 (1800 MHz)

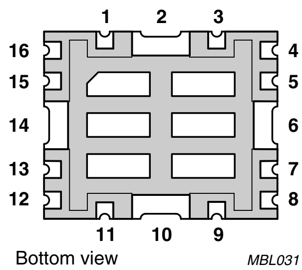


Fig.1 Simplified outline

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_S (V)	V_C (V)	P_L (dBm)	G_p (dB)	η (%)	Z_S, Z_L (Ω)
Pulsed; δ = 2 : 8	880 to 915	3.6	≤2.2	typ. 35.5	typ. 35.5	47	50
	1710 to 1785	3.6	≤2.2	typ. 33.5	typ. 33.5	40	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

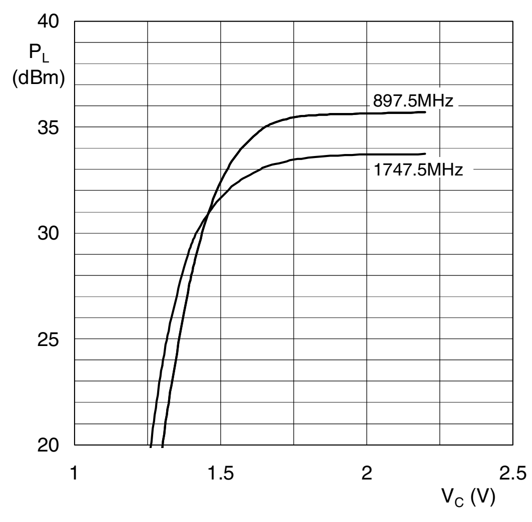
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{S1}, V_{S2}	DC supply voltage	$V_{C1,2}$ = 0; RF_{IN} = off	–	7	V
		$V_{C1,2}$ > 0.5 V; RF_{IN} = on	–	5.5	V
V_{C1}, V_{C2}	DC control voltage		–	3	V
P_{D1}, P_{D2}	input drive power		–	10	mW
P_{L1}	load power 1		–	4	W
P_{L2}	load power 2		–	3	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_{D1,2} = 0$ dBm; $V_{S1} = V_{S2} = 3.6$ V; $V_{C1,2} \leq 2.2$ V; $T_{mb} = 25$ °C; $t_p = 575$ µs; $\delta = 2 : 8$;
f = 880 to 915 MHz (GSM900); f = 1710 to 1785 MHz (GSM1800); unless otherwise specified.

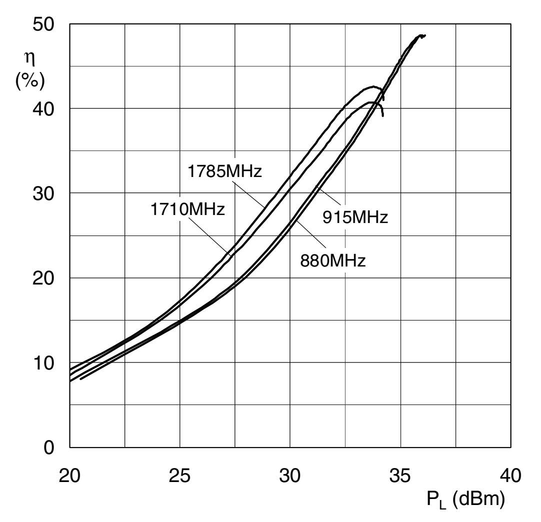
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_L	leakage current	$V_{C1,2} = 0.2$ V	–	–	10	µA
I_{CM1}, I_{CM2}	peak control current		–	–	2	mA
P_{L1}	load power GSM 900	$V_{C1} = 2.2$ V	34.5	35.5	–	dBm
		$V_{C1} = 2.2$ V; $V_{S1} = 3.2$ V; $T_{mb} = 25$ °C	34	35	–	dBm
P_{L2}	load power GSM 1800	$V_{C2} = 2.2$ V	32.5	33.5	–	dBm
		$V_{C2} = 2.2$ V; $V_{S1} = 3.2$ V; $T_{mb} = 25$ °C	32	33	–	dBm
G_{P1}	power gain GSM900	$P_{L1} = 35.5$ dBm	–	35.5	–	dB
G_{P2}	power gain GSM1800	$P_{L2} = 33$ dBm	–	33.5	–	dB
η_1	efficiency GSM900	$P_{L1} = 35$ dBm	40	45	–	%
η_2	efficiency GSM1800	$P_{L2} = 32$ dBm	33	38	–	%
H_2, H_3	harmonics GSM900	$P_{L1} = 34$ dBm	–	–	–40	dBc
	harmonics GSM1800	$P_{L2} = 32$ dBm	–	–	–35	dBc
$VSWR_{in}$	input VSWR of active device	$V_{S1,2} = 3.2$ to 5 V; $P_{L1} = 34$ dBm; $P_{L2} = 32$ dBm	–		3 : 1	
	input VSWR of inactive device	$V_{S1,2} = 3.2$ to 5 V; $V_{C1,2} \leq 0.5$ V	–		8 : 1	
	isolation GSM900	$V_{C1,2} = 0.5$ V; $P_{D1,2} = 3$ dBm	–	–54	–37	dBm
	isolation GSM1800	$V_{C1,2} = 0.5$ V; $P_{D1,2} = 3$ dBm	–	–42	–37	dBm
	second harmonic isolation from GSM900 into GSM1800	$P_{L1} = 35$ dBm	–	–21	–20	dBm
	maximum slope	–5 dBm < $P_{L1,2} < P_{L\ max}$	120	–	200	dB/V
t_r	carrier rise time	$P_{L1} = 6$ to 34 dBm; $P_{L2} = 4$ to 32 dBm; time to settle within –0.5 dB of final P_L	–	1.5	2	µs
t_f	carrier fall time	$P_{L1} = 6$ to 34 dBm; $P_{L2} = 4$ to 32 dBm; time to fall below –37 dBm	–	1.5	2	µs
P_n	noise power GSM900	$P_{L1} \leq 34$ dBm; bandwidth = 100 kHz; f = 925 - 935 MHz; $f_c = 897.5$ MHz	–	–	–71	dBm
		$P_{L1} \leq 34$ dBm; bandwidth = 100 kHz; f = 935 - 960 MHz; $f_c = 897.5$ MHz	–	–82	–80	dBm
	noise power GSM1800	$P_{L2} \leq 32$ dBm; bandwidth = 100 kHz; f = 1805 - 1880 MHz; $f_c = 1747.5$ MHz	–	–80	–73	dBm
	AM/PM conversion	$P_{D1,2} = -0.5$ to 0.5 dBm; $P_{L1,2}$ = constant during measurement for $P_{L1} = 6$ to 34 dBm and $P_{L2} = 4$ to 32 dBm	–	–	6	deg/dB
	AM/AM conversion	$P_{L1} = 6$ to 34 dBm; $P_{L2} = 4$ to 32 dBm; f = 100 kHz; $P_{D1,2} = 5.4$ %	–		25	%

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
	T_X / R_X conversion	P_{L1} = 34 dBm; f = 915 MHz P_{L1} (925 MHz) / P_D (905 MHz) P_{L2} = 32 dBm; f = 1785 MHz P_{L2} (1765 MHz) / P_D (1805 MHz)	–	25	–	dB
	control bandwidth	P_{L1} = 6 to 34 dBm; P_{L2} = 4 to 32 dBm;	1	1.5	–	MHz
	stability	$V_{S1,2}$ = 3.2 to 5 V; V_C = 0 to 2.2 V; $P_{D1,2}$ = 0 to 3 dBm; P_{L1} < 34.8 dBm; P_{L2} < 32.5 dBm; VSWR ≤ 6 : 1 through all phases	–	–	–60	dBc
	ruggedness	$V_{S1,2}$ = 5 V; $P_{D1,2}$ = 0 to 3 dBm; P_{L1} = 34.8 dBm; P_{L2} = 32.5 dBm; VSWR ≤ 6 : 1 through all phases	no degradation			
		$V_{S1,2}$ = 4.2 V; $P_{D1,2}$ = 0 to 3 dBm; P_{L1} = 34.8 dBm; P_{L2} = 32.5 dBm; VSWR ≤ 10 : 1 through all phases	no degradation			



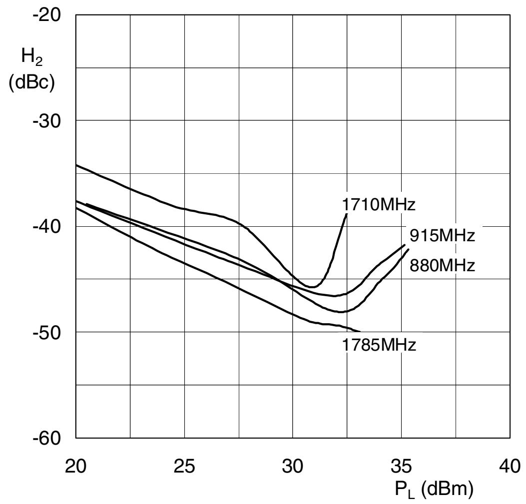
$Z_S = Z_L = 50\ \Omega$; V_S = 3.6 V; P_D = 0 dBm;
T_{mb} = 25 °C; δ = 2 : 8; t_p = 575 µs.

Fig.2 Load power as a function of control voltage; typical values.



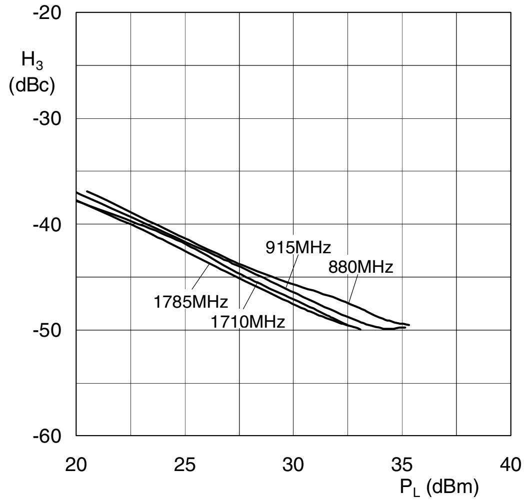
$Z_S = Z_L = 50\ \Omega$; V_S = 3.6 V; P_D = 0 dBm;
T_{mb} = 25 °C; δ = 2 : 8; t_p = 575 µs.

Fig.3 Efficiency as a function of load power; typical values.



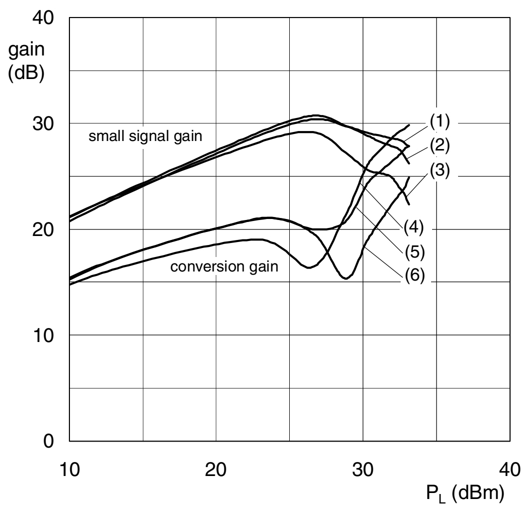
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.6$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $\delta = 2 : 8$; $t_p = 575$ µs.

Fig.4 Second harmonic as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.6$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $\delta = 2 : 8$; $t_p = 575$ µs.

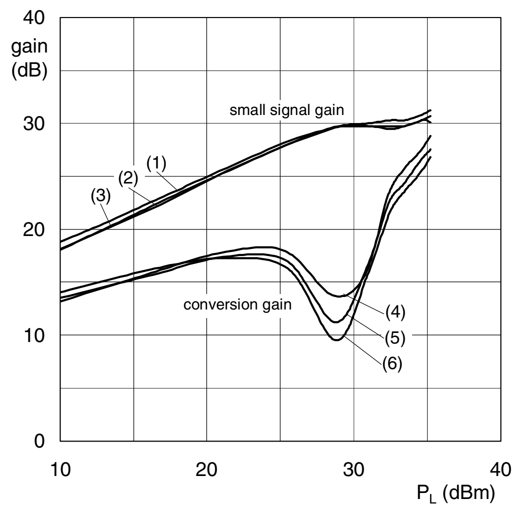
Fig.5 Third harmonic as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 3.6$ V; $T_{mb} = 25$ °C;
$f_c = 1747.5$ MHz; $\delta = 2 : 8$; $t_p = 575$ µs.

(1) f = 1805 MHz	(4) f = 1615 MHz
(2) f = 1842.5 MHz	(5) f = 1625.5 MHz
(3) f = 1880 MHz	(6) f = 1690 MHz

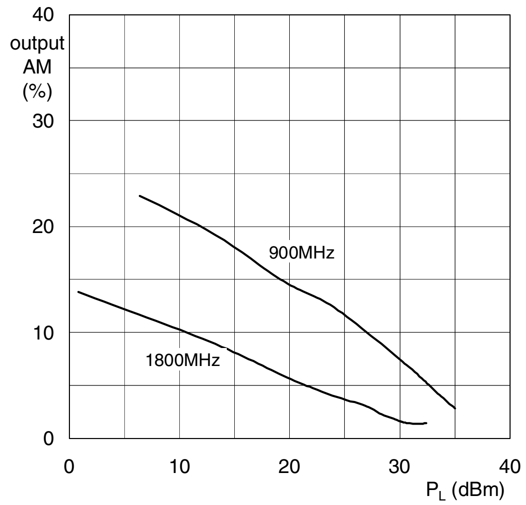
Fig.6 Gain as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.6$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $f_c = 897.5$ MHz; $\delta = 2 : 8$; $t_p = 575$ µs.

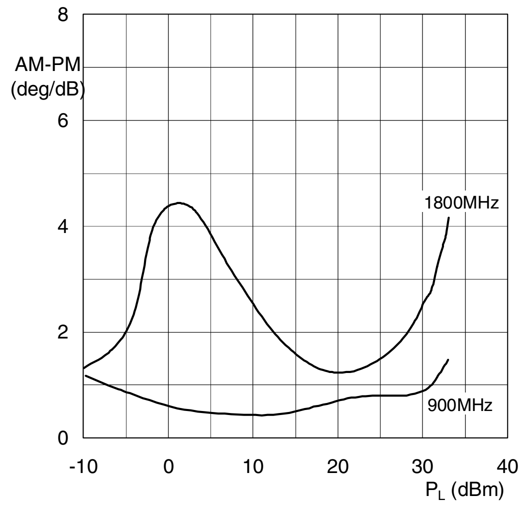
(1) f = 925 MHz	(4) f = 835 MHz
(2) f = 942.5 MHz	(5) f = 852.5 MHz
(3) f = 960 MHz	(6) f = 870 MHz

Fig.7 Gain as a function of load power; typical values.



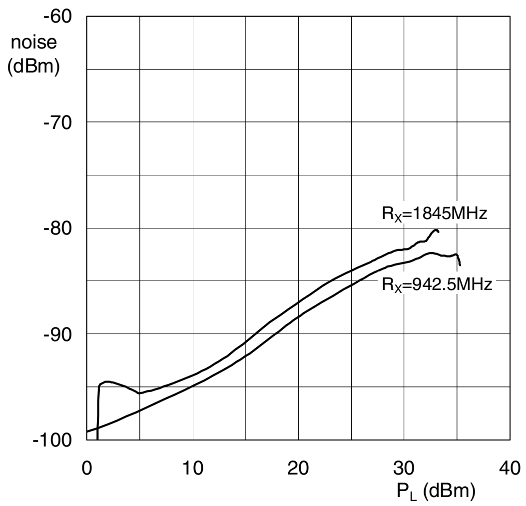
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.6$ V; $P_D = 0$ dBm; $T_{mb} = 25$ °C;
$\Delta f = 100$ kHz; input amplitude modulation = 5.4%; $\delta = 2:8$; $t_p = 575$ µs.

Fig.8 Output amplitude modulation as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.6$ V; $P_D = 0$ dBm; $T_{mb} = 25$ °C;
$\delta = 2:8$; $t_p = 575$ µs.

Fig.9 Output phase at $P_D = +0.5$ dBm, relatively to output phase at $P_D = -0.5$ dBm; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.6$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $\delta = 2:8$; $t_p = 575$ µs.

Fig.10 Noise as a function of load power; typical values.

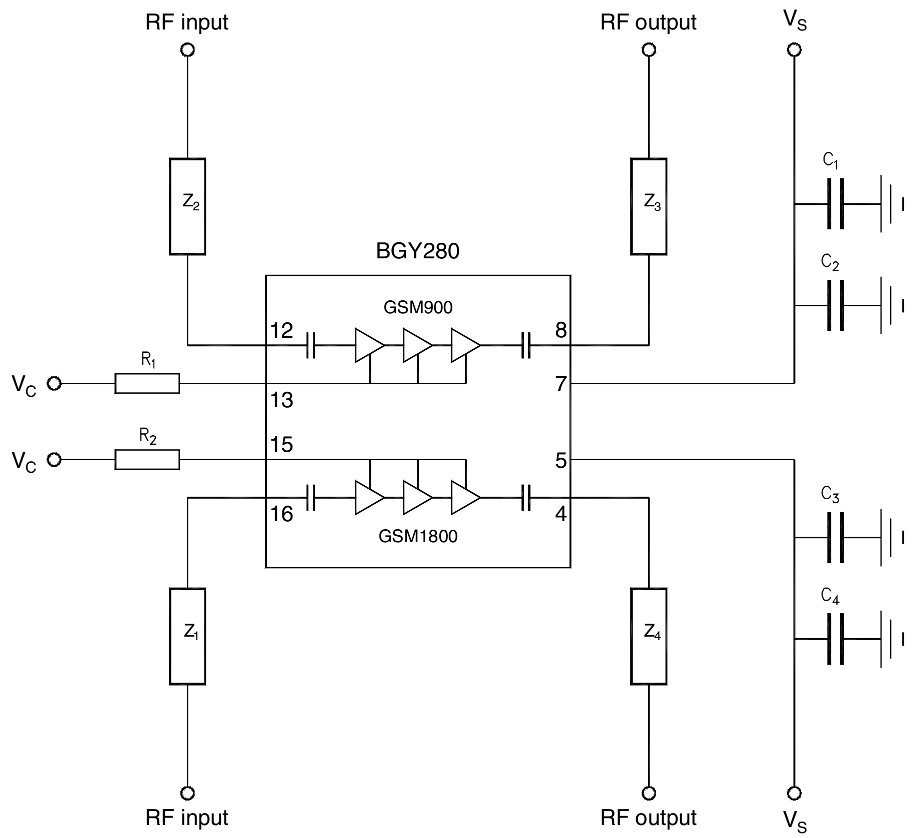


Fig.11 Test circuit

List of components (See Fig 10 and 11)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C_1, C_4	multilayer ceramic chip capacitor	100 μF; 40 V		
C_2, C_3	electrolytic capacitor	100 nF		
Z_1, Z_2, Z_3, Z_4	stripline; note 1	50 Ω	width 2.33 mm	
R1, R_2	metal film resistor	100 Ω; 0.6 W		2322 156 11001

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric (ε_r = 2.2); thickness $^1\!/_{32}$ inch.

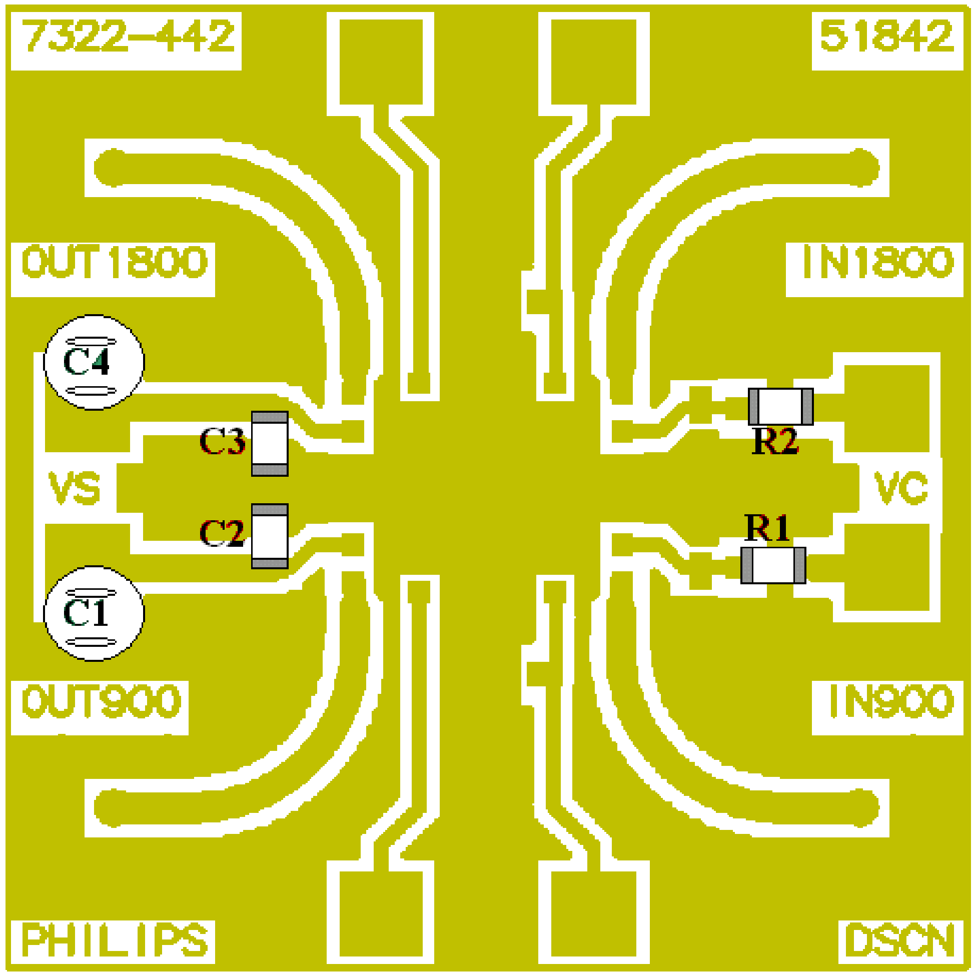
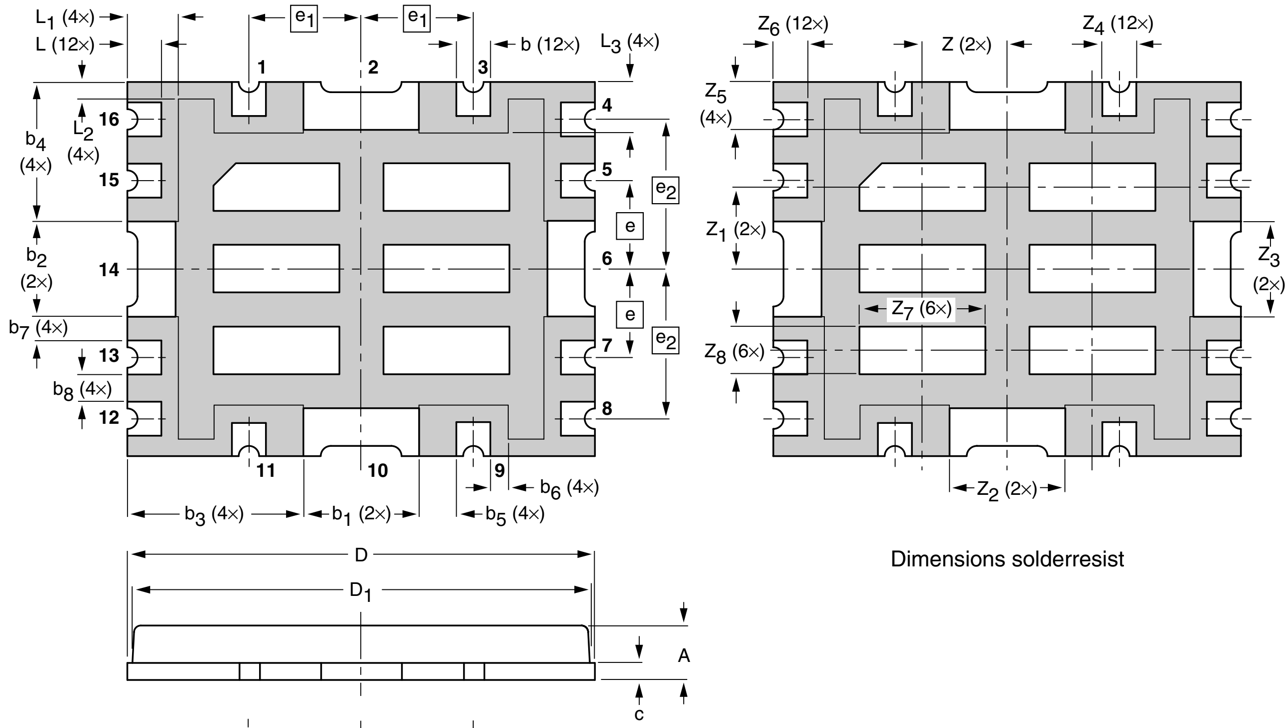
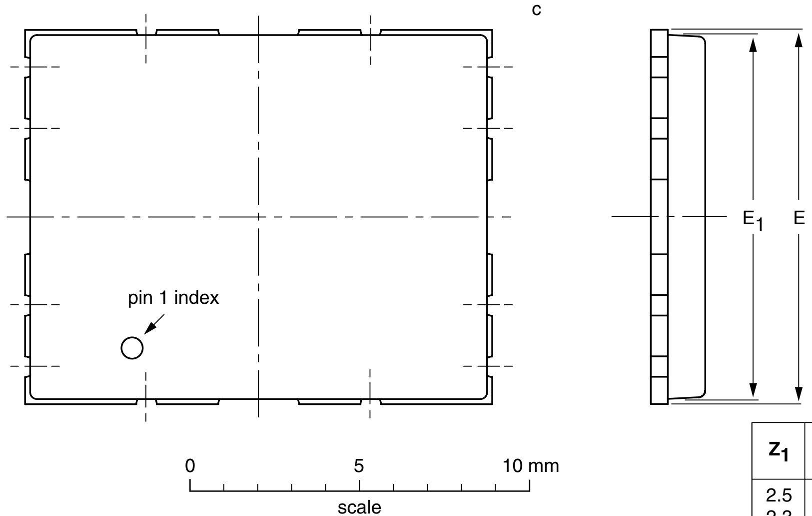


Fig.12 PCB testcircuit

PACKAGE OUTLINE SOT559A

Leadless surface mounted package; plastic cap; 16 terminations **SOT559A**





Z_1	Z_2	Z_3	Z_4	Z_5	Z_6	Z_7	Z_8
2.5 2.3	3.5 3.3	2.9 2.7	1.1 0.9	1.5 1.3	1.1 0.9	3.8 3.6	1.5 1.3

DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	b_2	b_3	b_4	b_5	b_6	b_7	b_8	c	D	D_1	E	E_1	e	e_1	e_2	L	L_1	L_2	L_3	Z
mm	1.9 1.5	1.1 0.9	3.5 3.3	2.9 2.7	5.275 5.075	4.2 4.0	1.2 1.0	0.625 0.425	0.8 0.6	0.9 0.7	0.55 0.45	14.05 13.45	13.6 13.3	11.3 10.7	10.85 10.55	2.6	3.3	4.4	1.1 0.9	1.6 1.4	0.6 0.4	1.6 1.4	2.6 2.4

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT559A						~~00-01-31~~ 00-09-28

DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

Note

1. Please consult the most recently issued data sheet before initiating or completing a design.

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