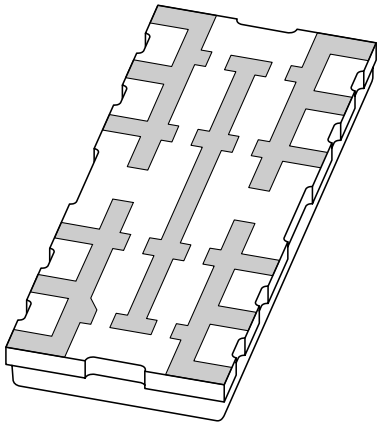
DATA SHEET



BGY282
dual band UHF amplifier module for GSM900 and GSM1800

Preliminary specification

2001 Dec 04

Philips Semiconductors

PHILIPS

dual band UHF amplifier module for GSM900 and GSM1800 BGY282

FEATURES

- Dual band GSM amplifier
- 3.5 V nominal supply voltage
- 33 dBm output power for GSM1800
- 35 dBm output power for GSM900
- Easy output power control by DC voltage
- Internal input and output matching
- Easy band selection by DC voltage
- Suited for GPRS class 12 (duty cycle 4 : 8).

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 BGY282 is a power amplifier module in a SOT632A surface mounted ceramic package with a plastic cap. The module consists of two separated line-ups, one for GSM900 and one for GSM1800 with internal power control, input and output matching.

PINNING - SOT632A

PIN	DESCRIPTION
1	RF input 1 (GSM900)
2	V_{APC}
3, 6, 9, 12	Ground
4	V_{S1} (GSM900)
5	RF output 1 (GSM900)
7	RF output 2 (GSM1800)
8	V_{S2} (GSM1800)
10	V_{band}
11	RF input 2 (GSM1800)

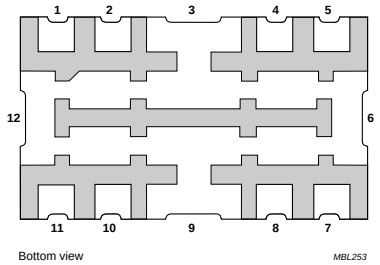


Fig.1 Simplified outline

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_S (V)	V_{APC} (V)	P_L (dBm)	η (%)	Z_S, Z_L (Ω)
Pulsed; δ = 1 : 8	880 to 915	3.5	≤2.2	typ. 35	50	50
	1710 to 1785	3.5	≤2.2	typ. 33	45	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{S1}, V_{S2}	DC supply voltage	V_{APC} = 0; RF_{IN} = off	–	7	V
		V_{APC} > 0.5 V; RF_{IN} = on	–	5.5	V
V_{APC}	DC control voltage		–	3	V
P_{D1}, P_{D2}	input drive power		–	10	dBm
P_{L1}	load power 1 (GSM900)		–	36	dBm
P_{L1}	load power 1 (GSM900)	δ = 4 : 8; $VSWR_{out}$ > 2 : 1	–	35	dBm
P_{L2}	load power 2 (GSM1800)		–	35	dBm
P_{L2}	load power 2 (GSM1800)	δ = 4 : 8; $VSWR_{out}$ > 2 : 1	–	34	dBm
P_{S1}	total power from supply during pulse (GSM900)	δ = 4 : 8	–	7.5	W
P_{S2}	total power from supply during pulse (GSM1800)	δ = 4 : 8	–	4.5	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+90	°C

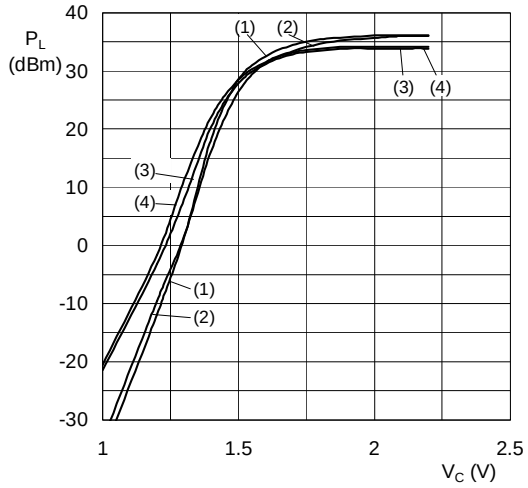
Note: P_L is forward power, measured in a coupler.

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_{D1,2} = 0$ dBm; $V_{S1} = V_{S2} = 3.5$ V; $V_{APC} \leq 2.2$ V; $T_{mb} = 25\ °C$; $t_p = 575\ \mu s$; $\delta = 1 : 8$; f = 880 to 915 MHz (GSM900); f = 1710 to 1785 MHz (GSM1800); measured on demoboard of fig 7; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{band}	band switch voltage	GSM1800 selected	0	–	0.7	V
		GSM900 selected	1.7	–	5.5	V
I_{band}	band switch current		–	–	30	µA
I_L	leakage current	$V_{APC} = 0.2$ V; $P_{D1,2} = 0$ mW	–	–	10	µA
I_{CM1}, I_{CM2}	peak control current		–	–	2	mA
P_{D1}	input drive power (GSM900)		–3	–	4	dBm
P_{D2}	input drive power (GSM1800)		–3	2	5	dBm
P_{L1}	load power GSM900	$V_{APC} = 2.2$ V	34.7	35	–	dBm
		$V_{APC} = 2.2$ V; $V_{S1} = 3.1$ V	34.2	34.5	–	dBm
P_{L2}	load power GSM1800	$V_{APC} = 2.2$ V	32.3	33	–	dBm
		$V_{APC} = 2.2$ V; $V_{S1} = 3.1$ V	31.7	32.3	–	dBm
η_1	efficiency GSM900	$V_{APC} = 2$ V	43	50	–	%
η_2	efficiency GSM1800	$V_{APC} = 2$ V	38	45	–	%
H_2, H_3	harmonics GSM900	$P_{L1} = 34.7$ dBm	–	–	–38	dBc
	harmonics GSM1800	$P_{L2} = 32.3$ dBm	–	–	–35	dBc
$VSWR_{in}$	input VSWR of active device	$V_{S1,2} = 3.1$ to 4.4 V; $P_{D1,2} = 0$ dBm; $P_{L1} = 5$ to 34.7 dBm; $P_{L2} = 0$ to 32.3 dBm	–		3 : 1	
	input VSWR of inactive device	$V_{S1,2} = 3.1$ to 5.15 V; $V_{APC} \leq 0.5$ V	–		8 : 1	
	stability	$V_{S1,2} = 3$ to 5 V; $P_{D1} = 0$ to 3 dBm; $P_{D2} = 0$ to 5 dBm; $P_{L1} = <35$ dBm; $P_{L2} = <33$ dBm; VSWR = 6 : 1 through all phases	–	–	–60	dBc
		$V_{S1,2} = 3.1$ to 4.2 V; $P_{D1} = 0$ to 3 dBm; $P_{D2} = 0$ to 5 dBm; $P_{L1} = <34$ dBm; $P_{L2} = <32$ dBm; VSWR = 6 : 1 through all phases; $\delta = 4 : 8$	–	–	–60	dBc
	isolation	$V_{APC} = 0.5$ V; $P_{D1} = 3$ dBm; $P_{D2} = 5$ dBm	–	–	–36	dBm
	second harmonic isolation from GSM900 into GSM1800	$P_{L1} = 34.7$ dBm	–	–	–20	dBm
	maximum control slope	-5 dBm $< P_{L1,2} < P_{L\ max}$	120	–	200	dB/V
t_r	carrier rise time	$P_{L1} = 5$ to 34 dBm; $P_{L2} = 0$ to 32 dBm; time to settle within –0.5 dB of final P_L	–	1.5	2	µs
t_f	carrier fall time	$P_{L1} = 5$ to 34 dBm; $P_{L2} = 0$ to 32 dBm; time to settle within –0.5 dB of final P_L	–	1.5	2	µs

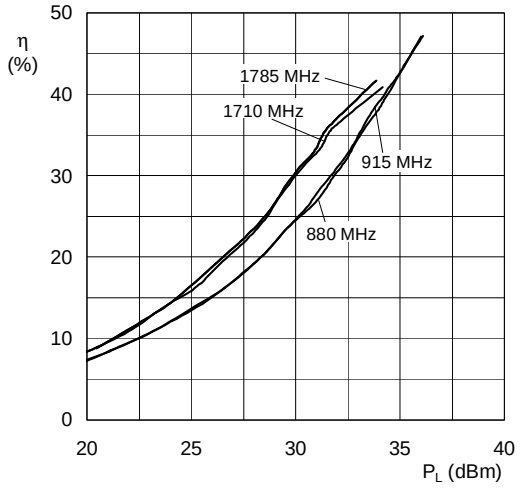
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
P_n	noise power GSM900	$P_{L1} \leq 34$ dBm; bandwidth = 100 kHz; f = 925 MHz	–	–	–71	dBm
		$P_{L1} \leq 34$ dBm; bandwidth = 100 kHz; f = 935 MHz	–	–	–80	dBm
	noise power GSM1800	$P_{L2} \leq 32$ dBm; bandwidth = 100 kHz; f = 1805 MHz	–	–	–76	dBm
	AM/PM conversion	$P_{D1,2}$ = –0.5 to 0.5 dBm; P_{L1} = 5 to 34 dBm; P_{L2} = 0 to 32 dBm; $P_{L1,2}$ = constant during measurement	–	–	6	deg/dB
	AM/AM conversion	$P_{D1,2}$ = 4 %; f = 100 kHz; P_{L1} = 5 to 34.7 dBm; P_{L2} = 0 to 32.3 dBm	–	–	30	%
CG	conversion gain GSM900	P_{D1} = 0 dBm @ 915 MHz; P_{L1} = 34 dBm; P_{i1} = –50 dBm @ 905 MHz; CG = $P_{925} - P_{i1}$	–	25	–	dB
CG	conversion gain GSM1800	P_{D2} = 0 dBm @ 1785 MHz; P_{L2} = 32 dBm; P_{i2} = –50 dBm @ 1765 MHz; CG = $P_{1805} - P_{i2}$	–	25	–	dB
	3 dB control bandwidth GSM900, GSM1800	P_{L1} = 5 to 34 dBm; P_{L2} = 0 to 32 dBm	0.5	–	–	MHz
	power drop 4 slot burst GSM900, GSM1800	V_{APC} = 2.2 V; difference P_L with δ = 1 : 8 and δ = 4 : 8	–	–	0.4	dB
	ruggedness	$V_{S1,2}$ = 5 V; P_{D1} = 0 to 3 dBm; P_{D2} = 0 to 5 dBm; P_{L1} = <35 dBm; P_{L2} = <33 dBm; VSWR ≤6 : 1 through all phases	no degradation			
		$V_{S1,2}$ = 4.2 V; P_{D1} = 0 to 3 dBm; P_{D2} = 0 to 5 dBm; P_{L1} = <35 dBm; P_{L2} = <33 dBm; VSWR ≤10 : 1 through all phases	no degradation			
		$V_{S1,2}$ = 4.2 V; P_{D1} = 0 to 3 dBm; P_{D2} = 0 to 5 dBm P_{L1} = <34 dBm; P_{L2} = <32 dBm; VSWR ≤6 : 1 through all phases; δ = 4 : 8	no degradation			



(1) = 880 MHz (3) = 1710 MHz
(2) = 915 MHz (4) = 1785 MHz

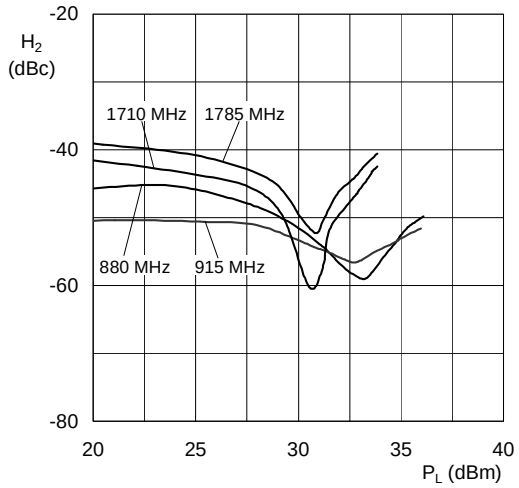
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

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



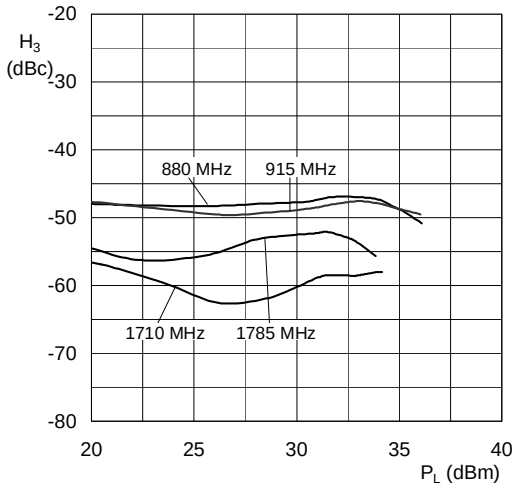
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

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



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

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



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 0$ dBm;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

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

APPLICATION INFORMATION

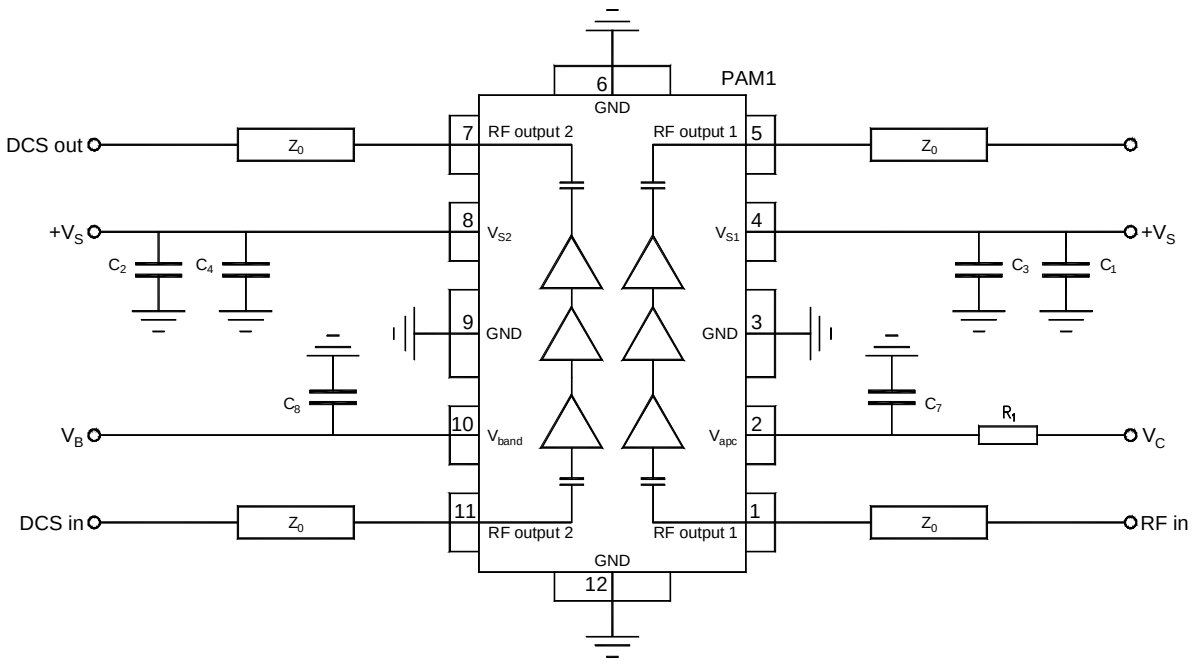


Fig.6 Test circuit.

List of components

QUANTITY	LOCATION	VALUE / TYPE	DESCRIPTION	REMARK	SUPPLIER
1			PCB		Roland Haefele
1	PAM1	BGY282	Power amplifier module		
4			Jack assembly end launch SMA connector	Type no. 142-0701-881	Johnson Components
1	C1	100 µF / 35 V	Electrol. capacitor	Type no. ECEV1VA101P	Matsushita
1	C2	100 µF / 35 V	Electrol. capacitor	Type no. ECEV1VA101P	Matsushita
1	C3	100 nF	0805 size SMD capacitor		
1	C4	100 nF	0805 size SMD capacitor		
1	C7	680 pF	0603 size SMD capacitor		
1	C8	100 pF	0603 size SMD capacitor		
1	R1	100 Ohms / 0.1 W	0805 size SMD resistor		
4	Z0	50 Ω	stripline; note 1	width 1.4 mm	

Note

1. The striplines are on a double etched printed circuit board (ε_r = 4.6); thickness 0.8 mm

TOP VIEW

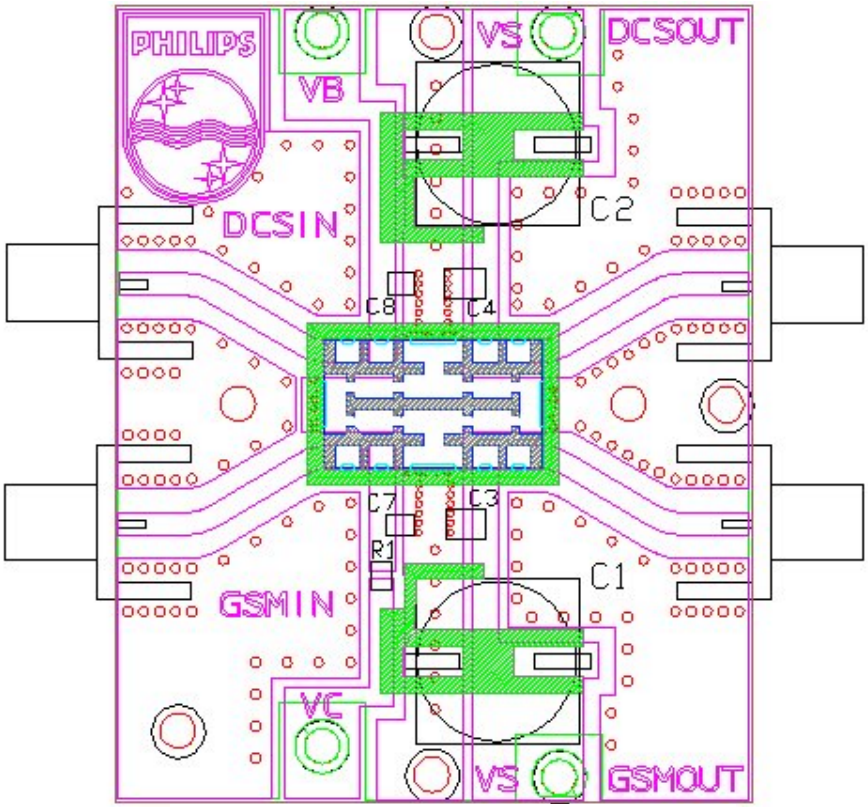


Fig.7 PCB test circuit.

SOLDERING

The indicated temperatures are those at the solder interfaces.

Advised solder types are types with a liquidus less or equal to 210 °C.

Soldering can be carried out using a conveyor oven, a hot air oven, an infrared oven or a combination of these ovens. A double reflow process can be used.

Hand soldering is not recommended because of the nature of the contacts.

The maximum allowed temperature is 250 °C for a maximum of 5 seconds.

The maximum ramp-up is 10 °C per second.

The maximum cool-down is 5 °C per second.

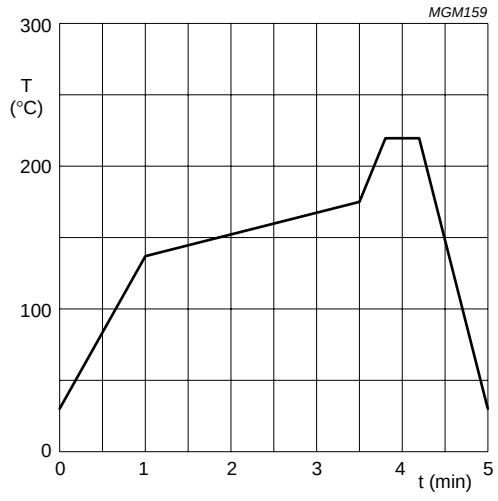


Fig.8 Recommended reflow temperature profile.

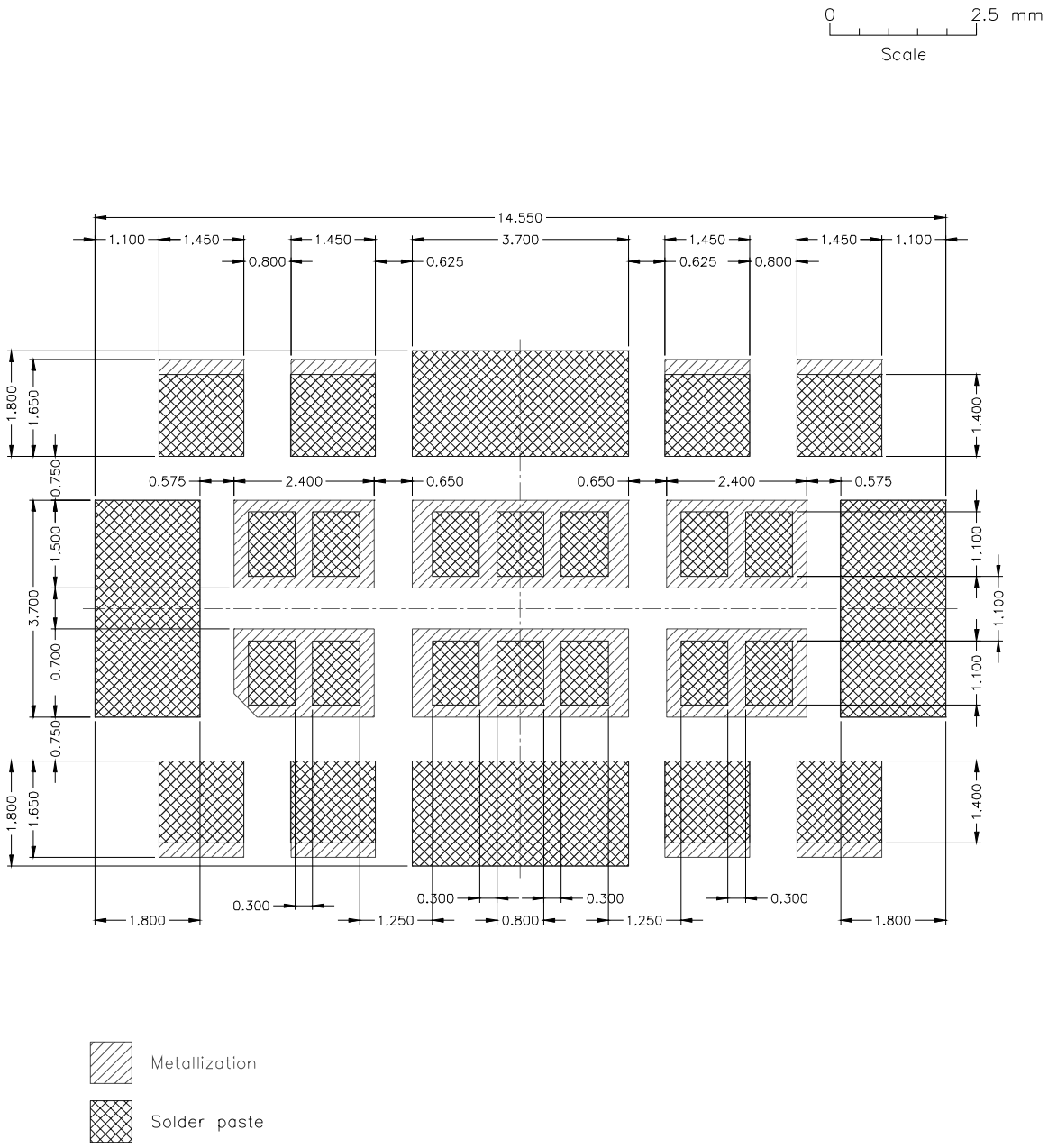
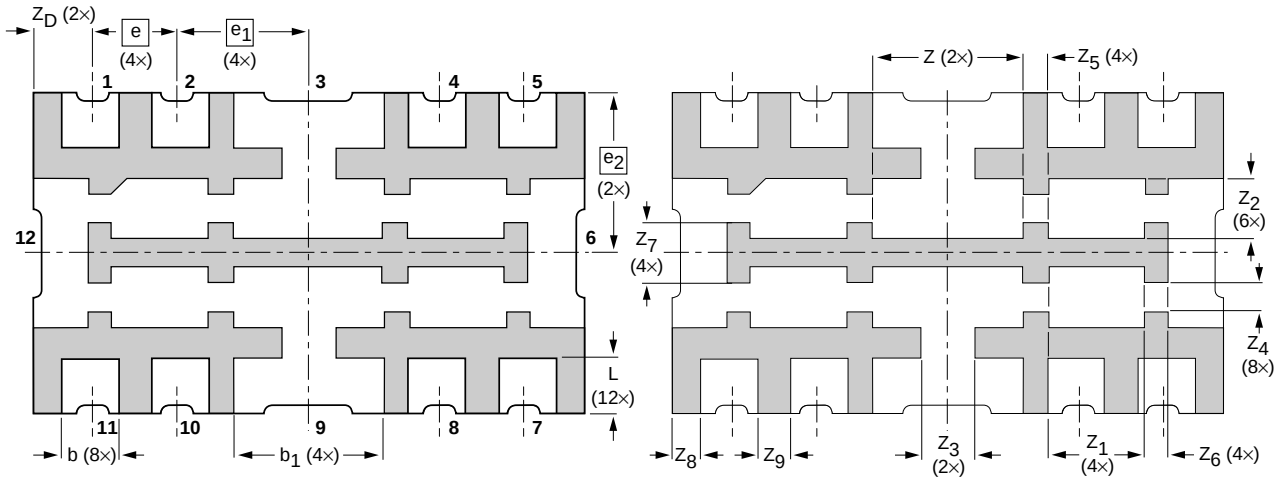


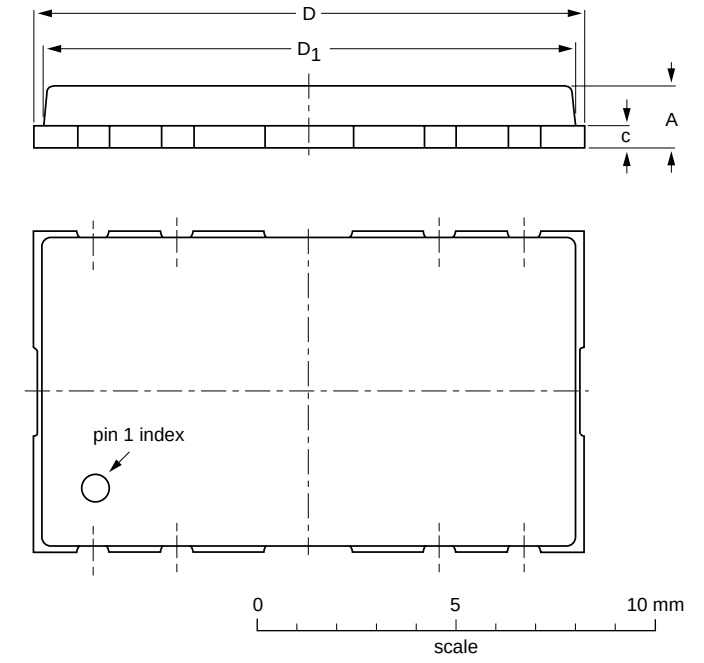
Fig.9 Soldering footprint for SOT632A.

PACKAGE OUTLINE

Leadless surface mounted package; plastic cap; 12 terminations **SOT632A**



Dimensions of terminations Dimensions of solderresist



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	D_1	E	E_1	e	e_1	e_2	L	Z	Z_D	Z_1	Z_2	Z_3	Z_4	Z_5	Z_6	Z_7	Z_8	Z_9
mm	1.8 1.4	1.5 1.4	3.75 3.65	0.61 0.49	14.05 13.45	13.35 13.05	8.3 7.7	7.85 7.55	2.1	3.275	4.0	1.45 1.35	3.75 3.65	1.55 1.45	2.45 2.35	1.55 1.45	1.35 1.25	0.75 0.65	0.7 0.6	0.625 0.525	1.55 1.45	0.75 0.65	0.85 0.75

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT632A						~~01-09-26~~ 01-11-20

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DATA SHEET STATUS[1]	PRODUCT STATUS[2]	DEFINITIONS
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SCA73

Printed in The Netherlands budgetnum/printrun/ed/pp12 Date of release: 2001 Dec 04 Document order number: 9397 750 09163

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