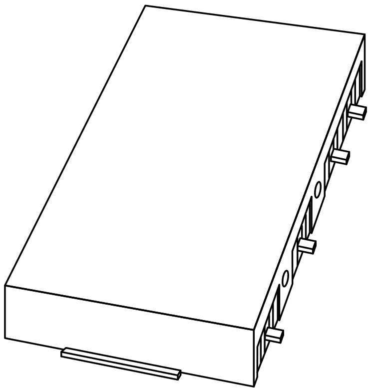
DATA SHEET



BGY240S
UHF amplifier module

Product specification
Supersedes data of 1998 Nov 05

1999 Aug 23

Philips
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FEATURES

- 3.5 V nominal supply voltage
- 3 W output power
- Easy output power control by DC voltage.

APPLICATIONS

- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (GSM systems) in the 890 to 915 MHz frequency range.

DESCRIPTION

The BGY240S is a three-stage UHF amplifier module in a SOT388C package. The module consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT388C

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

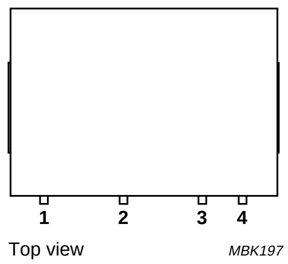


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_S (V)	V_C (V)	P_L (W)	G_p (dB)	η (%)	Z_S, Z_L (Ω)
Pulsed; δ = 1 : 8	890 to 915	3.5	≤2.2	≥3 typ. 3.5	≥35	typ. 47	50

LIMITING VALUES

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

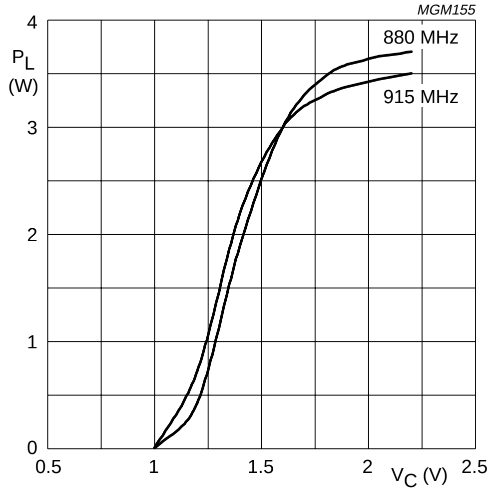
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	DC supply voltage	V_C < 0.2 V; no RF	–	7	V
		V_C ≥ 0.2 V	–	5	V
V_C	DC control voltage		–	3	V
P_D	input drive power		–	5	mW
P_L	load power		–	3.8	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

CHARACTERISTICS

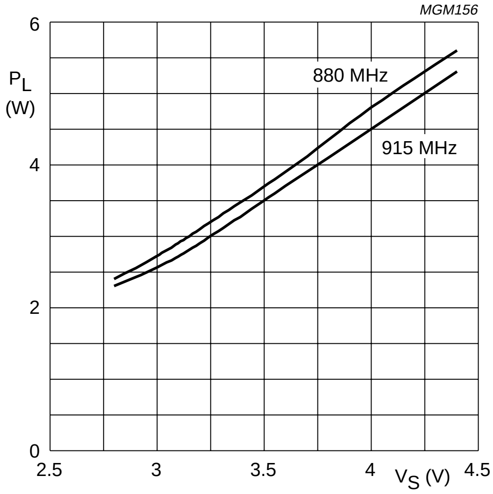
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 3.5$ V; $V_C \leq 2.2$ V; f = 890 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_Q	leakage current	$V_C = 0.2$ V	–	–	10	µA
I_{CM}	peak control current	adjust V_C for $P_L = 2.5$ W	–	–	3	mA
P_L	load power	$V_C = 2.2$ V	3	3.5	–	W
G_p	power gain	adjust V_C for $P_L = 2.5$ W	35	–	–	dB
η	efficiency	adjust V_C for $P_L = 2.5$ W	–	44	–	%
H_2	second harmonic	adjust V_C for $P_L = 2.5$ W	–	–	–35	dBc
H_3	third harmonic	adjust V_C for $P_L = 2.5$ W	–	–	–33	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 2.5$ W	–	1.8 : 1	3 : 1	
	stability	$V_S = 3$ to 5 V; $P_D = -2$ to +5 dBm; $V_C = 0$ to 2.2 V; $P_L \leq 3$ W; VSWR ≤ 12 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.2$ V	–	–45	–36	dBm
P_n	noise power	$P_L = 2.5$ W; bandwidth = 30 kHz; 10 MHz above transmission band	–	–82	–80	dBm
	AM/PM conversion	$P_D = -2$ to +5 dBm; $P_L = 6$ to 34 dBm	–	–	3	deg/dB
	AM/AM conversion	P_D with 3% AM; f = 100 kHz; $P_L = 6$ to 34 dBm	–	–	12	%
t_r	carrier rise time	$P_L = 6$ to 34 dBm; time to settle within –0.5 dB of final P_L	–	1.5	2	µs
t_f	carrier fall time	$P_L = 6$ to 34 dBm; time to settle within –0.5 dB of final P_L	–	1.5	2	µs
	ruggedness	$V_S = 5$ V; adjust V_C for $P_L = 3$ W; VSWR ≤ 12 : 1 through all phases	no degradation			



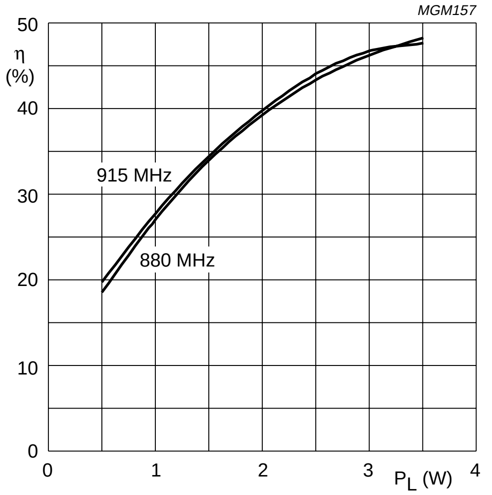
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

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



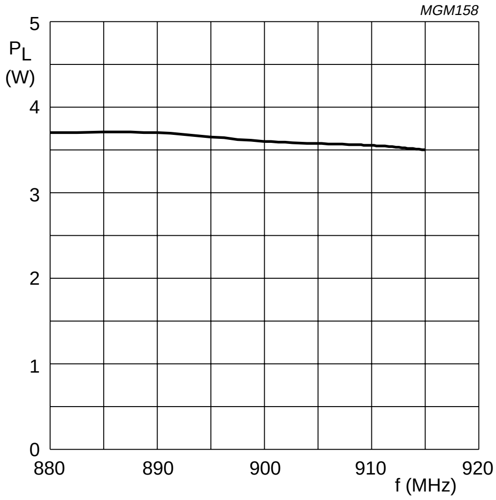
$Z_S = Z_L = 50\ \Omega$; $V_C = 2.2$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.3 Load power as a function of supply voltage; typical values.



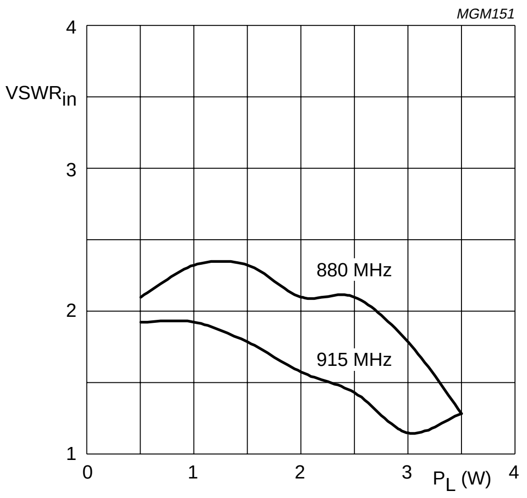
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

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



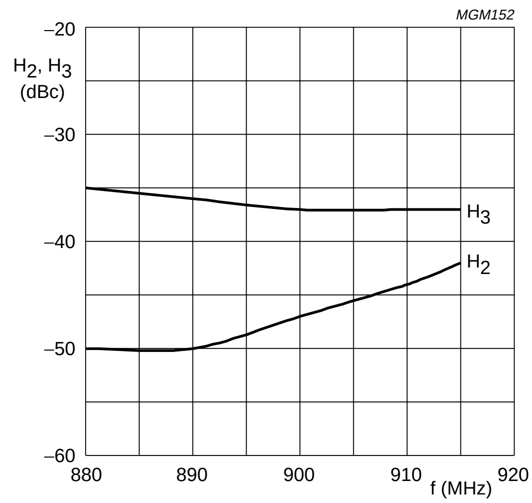
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW; $V_C = 2.2$ V;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.5 Load power as a function of frequency; typical values.



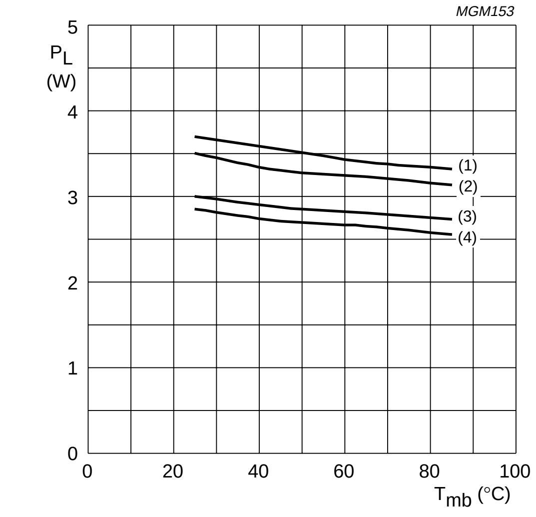
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

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



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW; $P_L = 2.5$ W;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.7 Harmonics as a function of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 2.2$ V; $\delta = 1:8$; $t_p = 575$ µs.

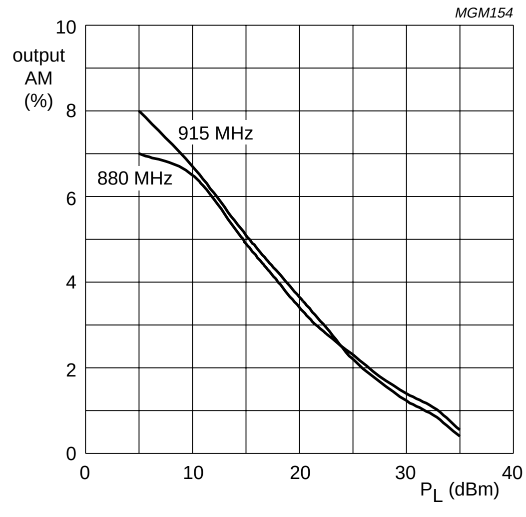
(1) $V_S = 3.5$ V; f = 880 MHz.

(2) $V_S = 3.5$ V; f = 915 MHz.

(3) $V_S = 3.1$ V; f = 880 MHz.

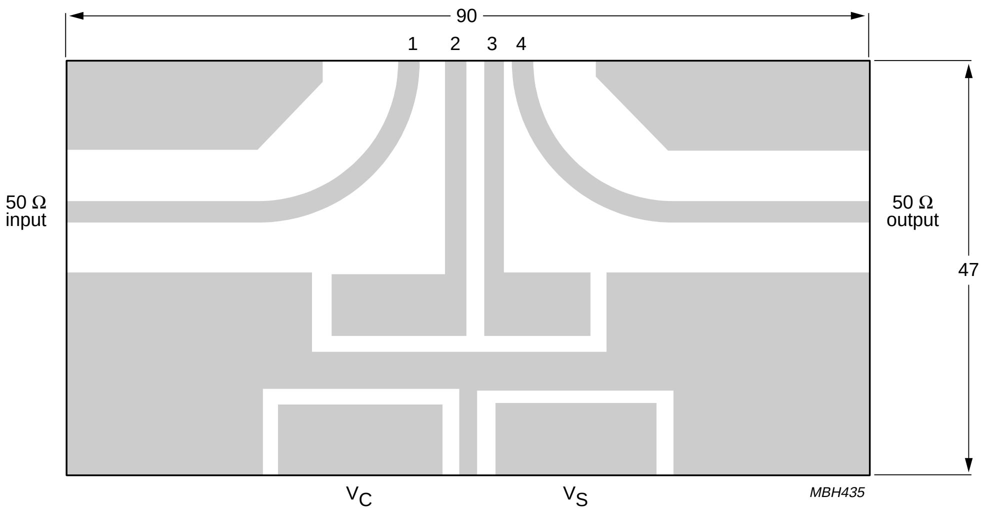
(4) $V_S = 3.1$ V; f = 915 MHz.

Fig.8 Load power as a function of mounting base temperature; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW; $T_{mb} = 25$ °C;
$\Delta f = 100$ kHz; input amplitude modulation = 3%; $\delta = 1:8$; $t_p = 575$ µs.

Fig.9 Output amplitude modulation as a function of load power; typical values.



Dimensions in mm.

Fig.10 Printed-circuit board test fixture.

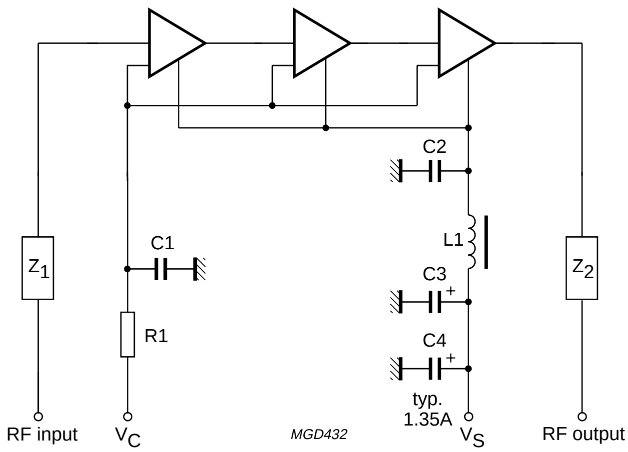


Fig.11 Test circuit.

List of components (see Fig.11)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor	680 pF		2222 851 11681
C3	tantalum capacitor	2.2 μF; 35 V		
C4	electrolytic capacitor	47 μF; 40 V		2222 030 37479
L1	Grade 4S2 Ferroxcube bead			4330 030 36300
Z_1, Z_2	stripline; note 1	50 Ω	width 2.33 mm	
R1	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.

SOLDERING

The indicated temperatures are those at the solder interfaces.

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

Solder dots or solder prints must be large enough to wet the contact areas.

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 is permitted.

Hand soldering must be avoided because the soldering iron tip can exceed the maximum permitted temperature of 250 °C and damage the module.

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.

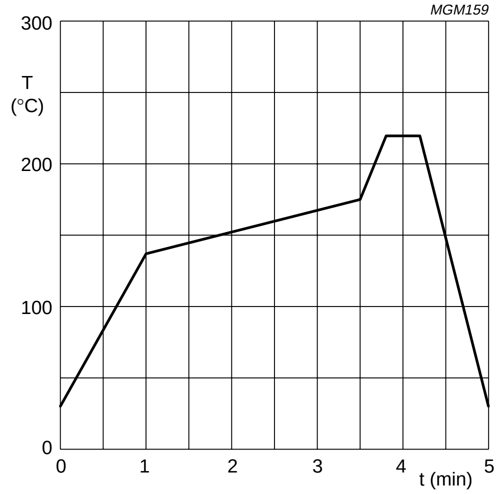


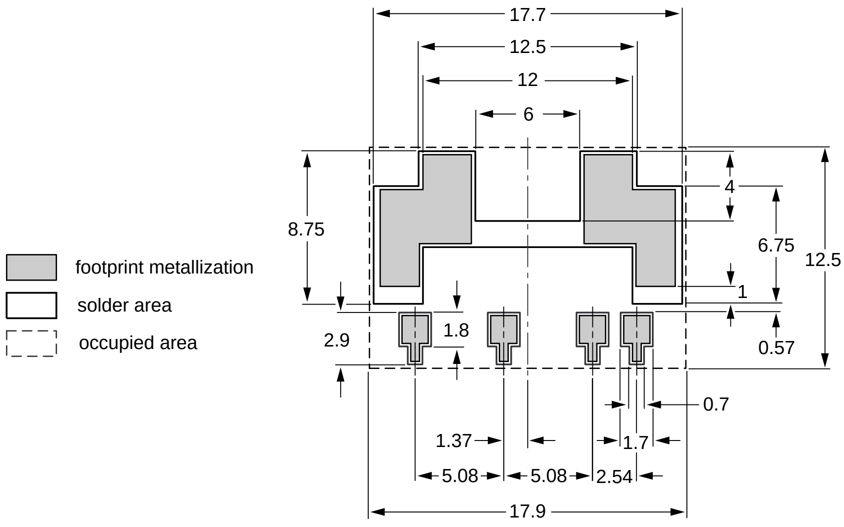
Fig.12 Recommended reflow temperature profile.

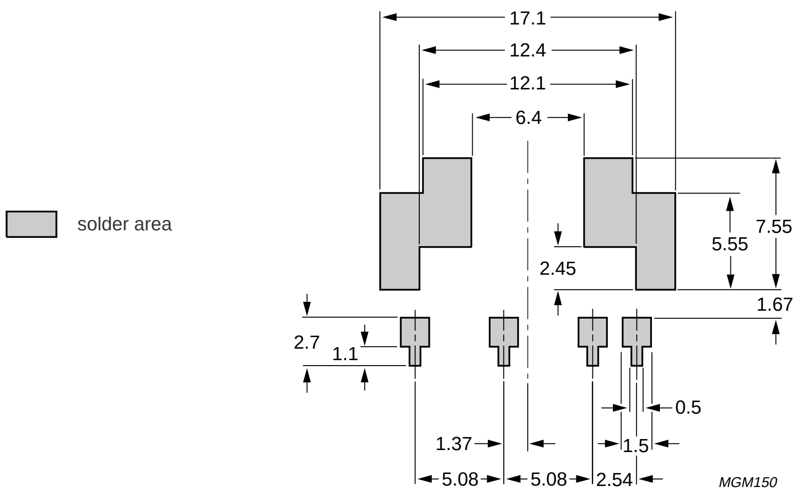
Cleaning

The following fluids may be used for cleaning:

- Alcohol
- Bio-Act (Terpene Hydrocarbon)
- Acetone.

Ultrasonic cleaning should not be used since this can cause serious damage to the product.



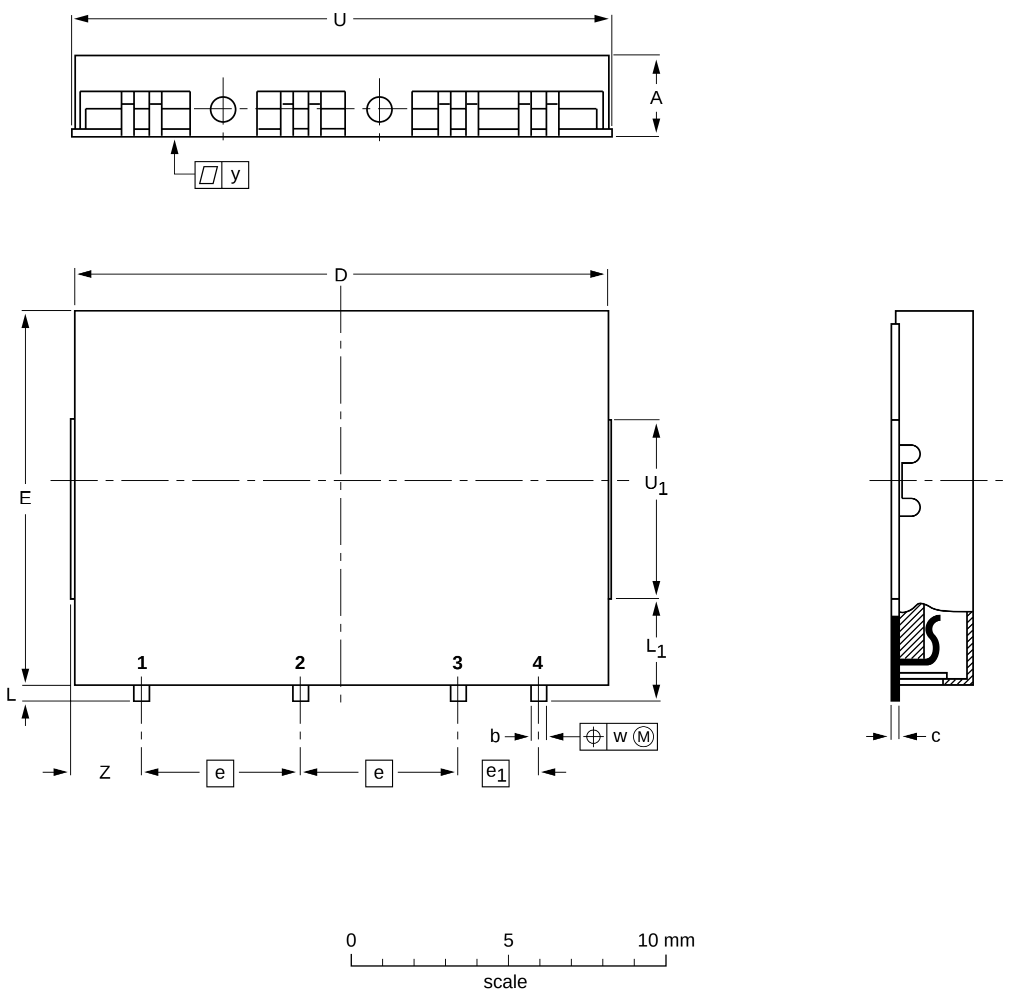


Dimensions in mm.

Fig.13 Footprint SOT388C.

PACKAGE OUTLINE

Rectangular single-ended surface-mount package; metal cap; 4 in-line leads **SOT388C**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	e	e_1	E	L	L_1	U	U_1	w	y	Z
mm	2.7 2.3	0.56 0.46	0.30 0.20	17.1 16.7	5.08	2.54	12.2 11.8	0.7 0.3	3.4 3.0	17.3 16.9	6.0 5.6	0.25	0.15	2.3 1.9

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT388C						99-02-06

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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Printed in The Netherlands 125002/07/pp12 Date of release: 1999 Aug 23 Document order number: 9397 750 06262

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