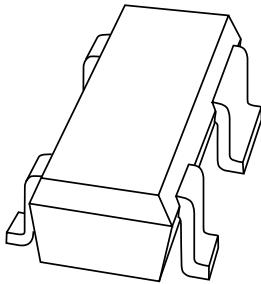


DATA SHEET



BFG21W UHF power transistor

Product specification
Supersedes data of 1997 Nov 21

1998 Jul 06



UHF power transistor

BFG21W

FEATURES

- High power gain
- High efficiency
- 1.9 GHz operating area
- Linear and non-linear operation.

APPLICATIONS

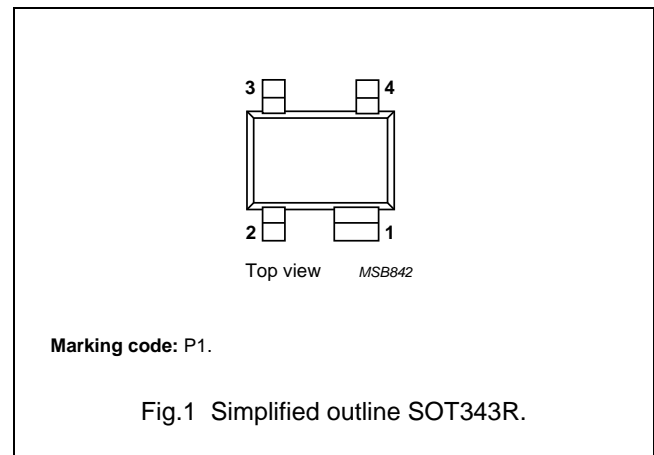
- Common emitter class-AB output stage in hand held radio equipment at 1.9 GHz such as DECT, PHS, etc.
- Driver for DCS1800, 1900.

DESCRIPTION

NPN double polysilicon bipolar power transistor with buried layer for low voltage medium power applications encapsulated in a plastic, 4-pin dual-emitter SOT343R package.

PINNING

PIN	DESCRIPTION
1, 3	emitter
2	base
4	collector



QUICK REFERENCE DATA

RF performance at $T_s \leq 60\text{ }^\circ\text{C}$ in a common emitter test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (dBm)	G_p (dB)	η_c (%)
Pulsed class-AB; $\delta < 1 : 2$; $t_p = 5\text{ ms}$	1.9	3.6	26	≥ 10	typ.55

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LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{CBO}	collector-base voltage	open emitter	–	15	V
V _{CEO}	collector-emitter voltage	open base	–	4.5	V
V _{EBO}	emitter-base voltage	open collector	–	1	V
I _C	collector current (DC)		–	500	mA
P _{tot}	total power dissipation	T _s ≤ 60 °C; note 1	–	600	mW
T _{stg}	storage temperature		–65	+150	°C
T _j	operating junction temperature		–	150	°C

Note

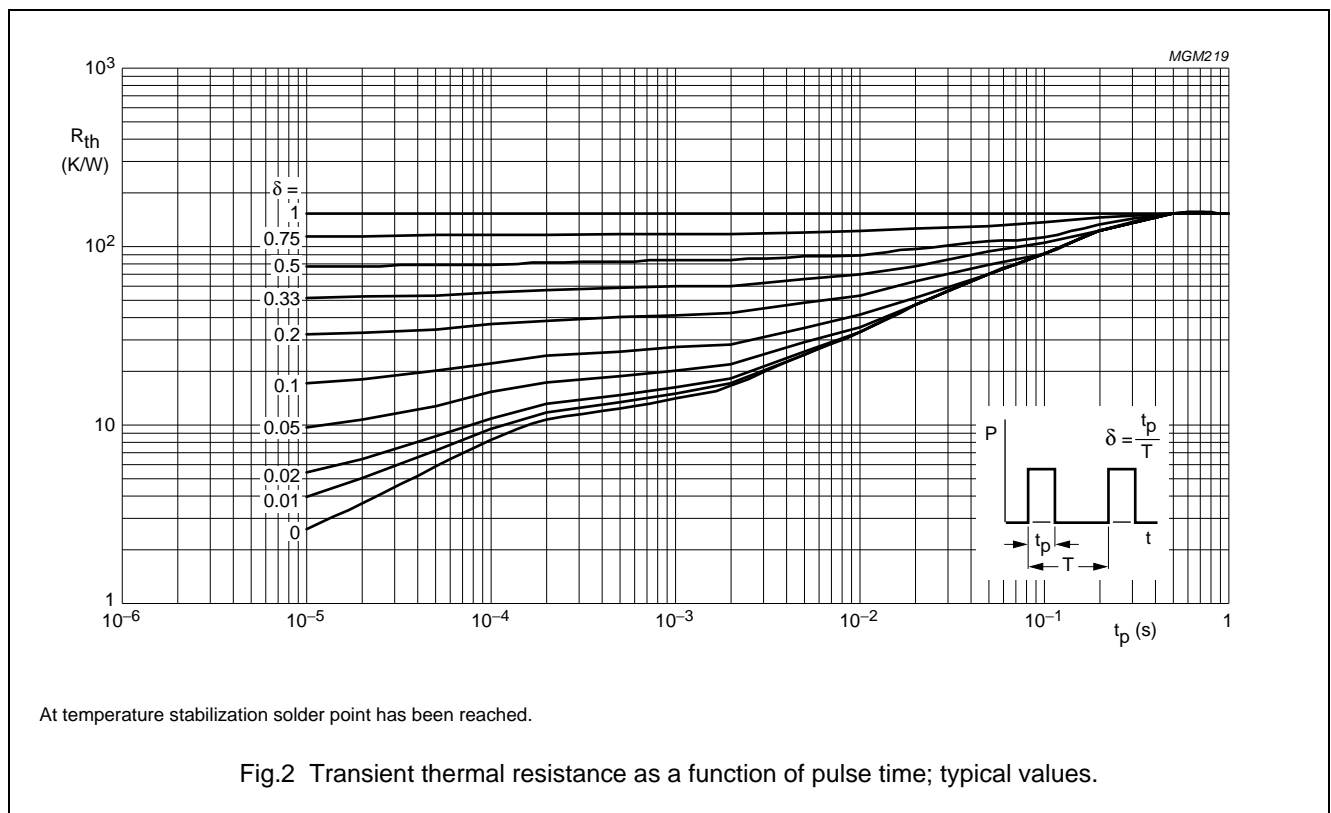
1. T_s is the temperature at the soldering point of the emitter pins.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-s}	thermal resistance from junction to soldering point	T _s ≤ 60 °C; P _{tot} = 600 mW; note 1	150	K/W

Note

1. T_s is the temperature at the soldering point of the emitter pins.



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CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 0.1\text{ mA}$	15	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 10\text{ mA}$	4.5	–	V
$V_{(BR)CER}$	collector-emitter breakdown voltage	$R_{BE} < 1\text{ k}\Omega$, $I_C = 10\text{ mA}$	10	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 0.1\text{ mA}$	1	–	V
I_{CES}	collector leakage current	$V_{CE} = 5\text{ V}$; $V_{BE} = 0$	–	10	μA
h_{FE}	DC current gain	$I_C = 200\text{ mA}$; $V_{CE} = 2\text{ V}$	40	100	
C_c	collector capacitance	$I_E = i_e = 0$; $V_{CB} = 3\text{ V}$; $f = 1\text{ MHz}$	–	3	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CB} = 3.6\text{ V}$; $f = 1\text{ MHz}$	–	1.5	pF
f_T	transition frequency	$I_C = 200\text{ mA}$; $V_{CE} = 3.6\text{ V}$; $f = 700\text{ MHz}$	18	–	GHz

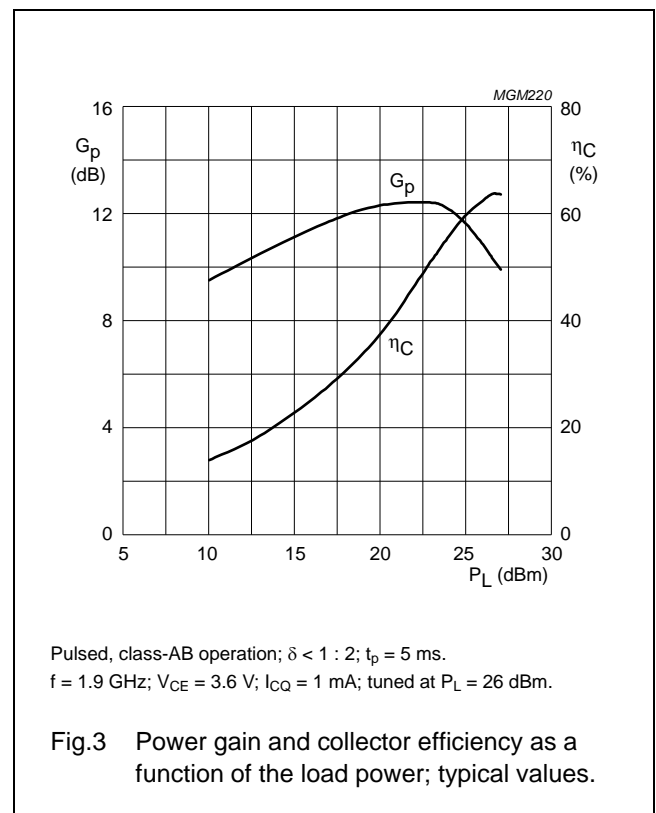
APPLICATION INFORMATION

RF performance at $T_s \leq 60\text{ }^\circ\text{C}$ in a common emitter test circuit (see Figs 4 and 5).

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (dBm)	G_p (dB)	η_C (%)
Pulsed; class-AB; $\delta < 1 : 2$; $t_p = 5\text{ ms}$	1.9	3.6	1	26	≥ 10	typ. 55

Ruggedness in class-AB operation

The transistor is capable of withstanding a load mismatch corresponding to $VSWR = 6 : 1$ through all phases at 26 dBm output power under pulsed conditions: $\delta = 1 : 2$; $t_p = 5\text{ ms}$; $f = 1.9\text{ GHz}$ at $V_{CE} = 4.5\text{ V}$.



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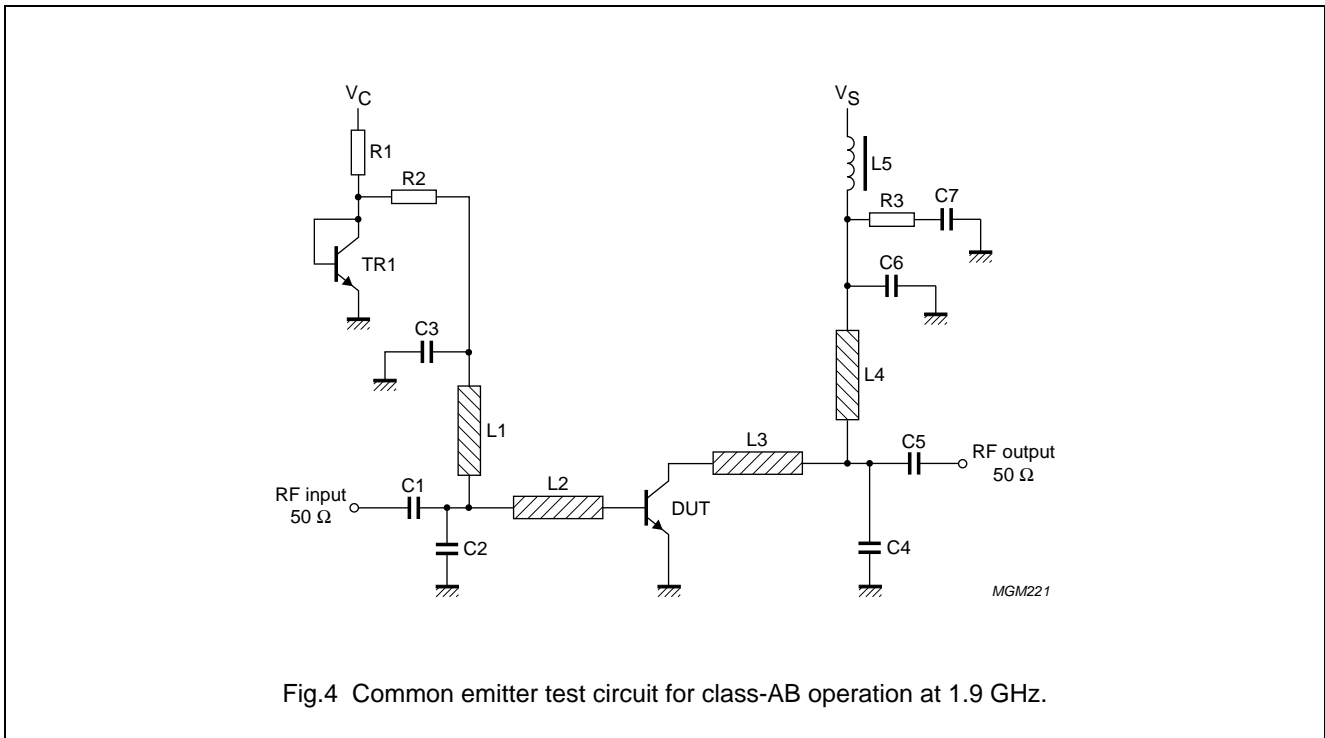


Fig.4 Common emitter test circuit for class-AB operation at 1.9 GHz.

List of components used in test circuit (see Figs 4 and 5)

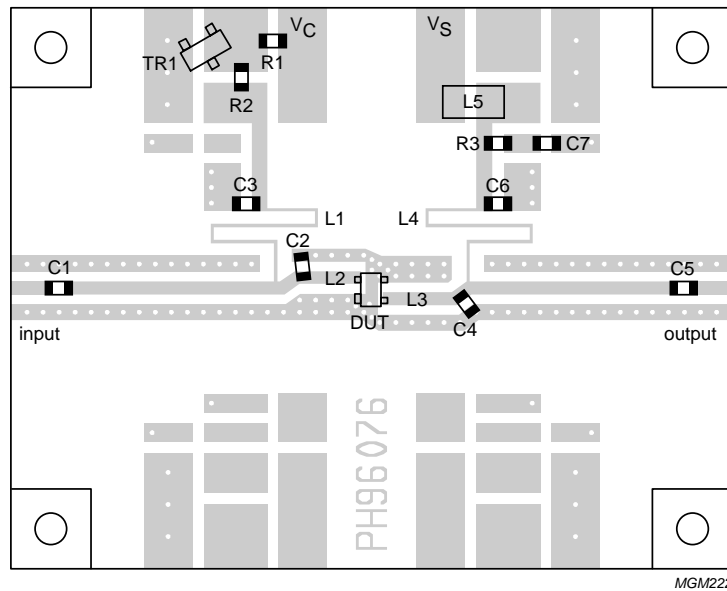
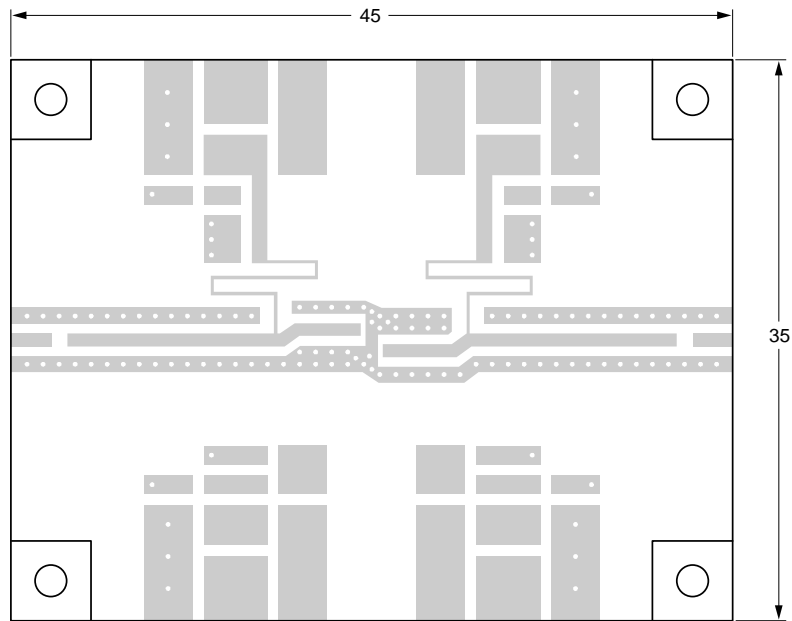
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C5	multilayer ceramic chip capacitor; note 1	24 pF		
C2	multilayer ceramic chip capacitor; note 1	3.3 pF		
C3, C6	multilayer ceramic chip capacitor, note 1	15 pF		
C4	multilayer ceramic chip capacitor; note 1	2.4 pF		
C7	multilayer ceramic chip capacitor; note 1	1 nF		
L1, L4	stripline; note 2	100 Ω	18 × 0.2 mm	
L2	stripline; note 2	50 Ω	3.2 × 0.8 mm	
L3	stripline; note 2	50 Ω	4.6 × 0.8 mm	
L5	Grade 4S2 Ferroxcube chip bead			4330 030 36300
R1	metal film resistor	220 Ω; 0.4 W		
R2, R3	metal film resistor	10 Ω; 0.4 W		
TR1	NPN transistor	BC817		9335 895 20215

Notes

- American Technical Ceramics type 100A or capacitor of same quality.
- The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric ($\epsilon_r = 6.15$, $\tan \delta = 0.0019$); thickness 0.64 mm, copper cladding = 35 μm .

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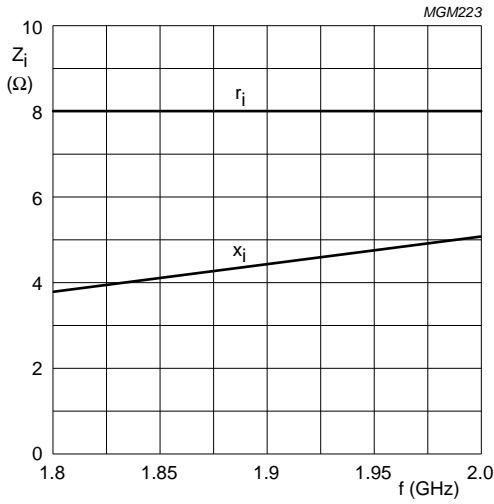
Dimensions in mm.

The components are situated on one side of the copper-clad PTFE fibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.5 Printed-circuit board and component lay-out for 1.9 GHz class-AB test-circuit in Fig.4.

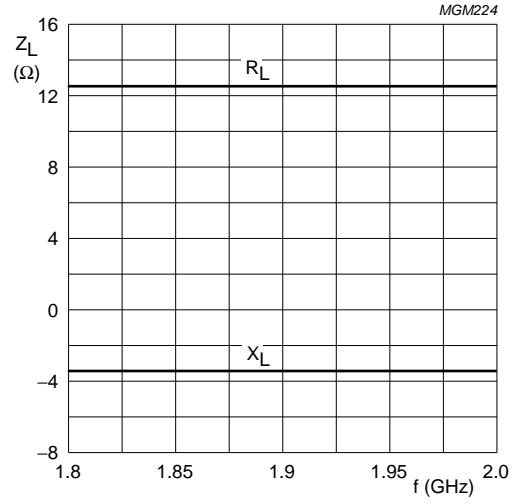
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$V_{CE} = 3.6 \text{ V}$; $I_{CQ} = 1 \text{ mA}$; $P_L = 26 \text{ dBm}$; $T_s \leq 60 \text{ }^\circ\text{C}$.

Fig.6 Input impedance as function of frequency (series components); typical values.



$V_{CE} = 3.6 \text{ V}$; $I_{CQ} = 1 \text{ mA}$; $P_L = 26 \text{ dBm}$; $T_s \leq 60 \text{ }^\circ\text{C}$.

Fig.7 Load impedance as a function of frequency (series components); typical values.

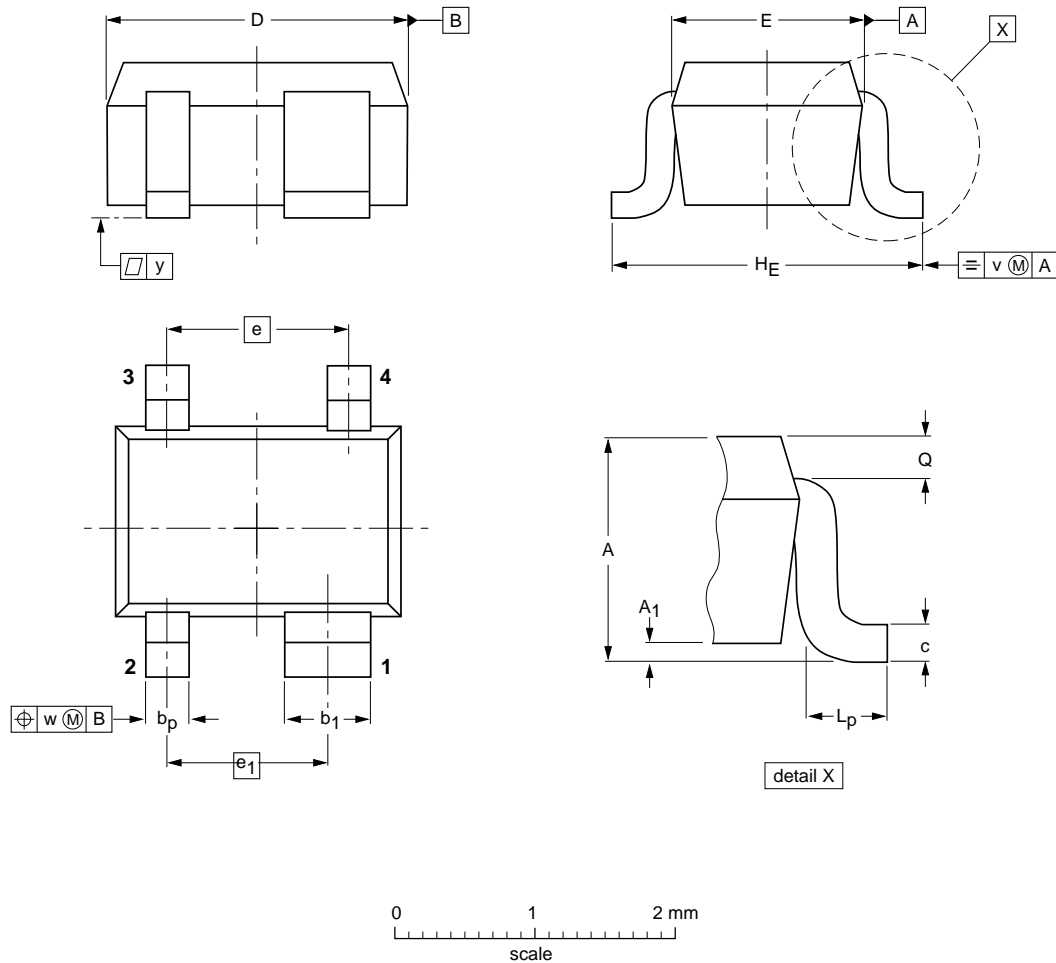
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PACKAGE OUTLINE

Plastic surface-mounted package; reverse pinning; 4 leads

SOT343R



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	b ₁	c	D	E	e	e ₁	H _E	L _p	Q	v	w	y
mm	1.1 0.8	0.1	0.4 0.3	0.7 0.5	0.25 0.10	2.2 1.8	1.35 1.15	1.3	1.15	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT343R						97-05-21 06-03-16

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DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
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Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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