DATA SHEET

BLV2042
UHF power transistor

Product specification
Supersedes data of 1996 Feb 09

1997 Jul 11

Philips
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UHF power transistor BLV2042

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input matching to achieve high power gain and easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in base stations in the 1800 to 1990 MHz frequency range.

DESCRIPTION

NPN silicon planar epitaxial power transistor in an 8-lead SOT409B SMD package with ceramic cap.
All leads are isolated from the mounting base.

PINNING - SOT409B

PIN	DESCRIPTION
1, 4, 5, 8	emitter
2, 3	base
6, 7	collector

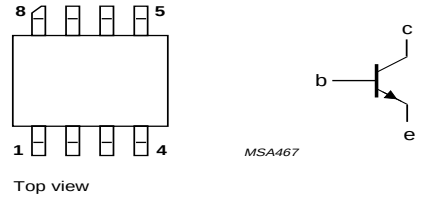


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1950	26	4	≥11	≥40	–
CW, class-AB	1990	26	4	≥11	≥40	–
2-tone, class-AB	f_1 = 1950; f_2 = 1950.1	26	4 (PEP)	typ. 14	typ. 35	typ. –30

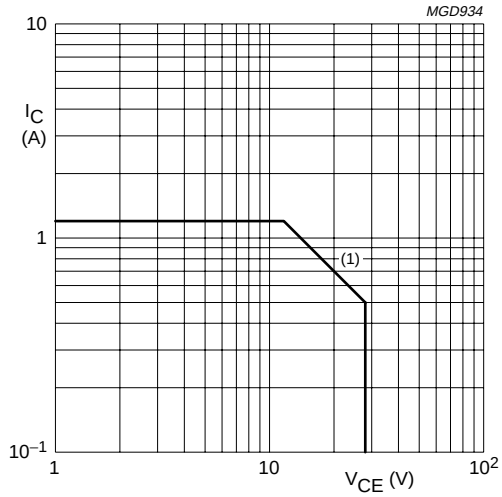
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	4	V
I_C	collector current (DC)		–	1.2	A
$I_{C(AV)}$	collector current (average)		–	1.2	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; note 1	–	17	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

Note

1. Transistor with metallized ground plane mounted on a printed-circuit board, see *"Mounting and soldering recommendations in the General part of handbook SC19a"*.



(1) T_s = 60 °C.

Fig.2 DC SOAR.

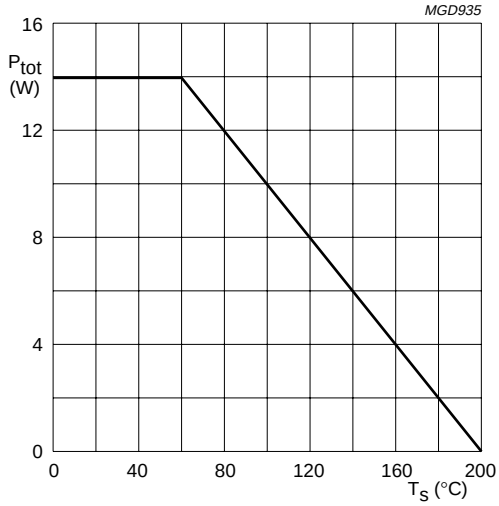


Fig.3 Total power dissipation as a function of the soldering point temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 17 W; T_{mb} = 25 °C; note 1	10	K/W

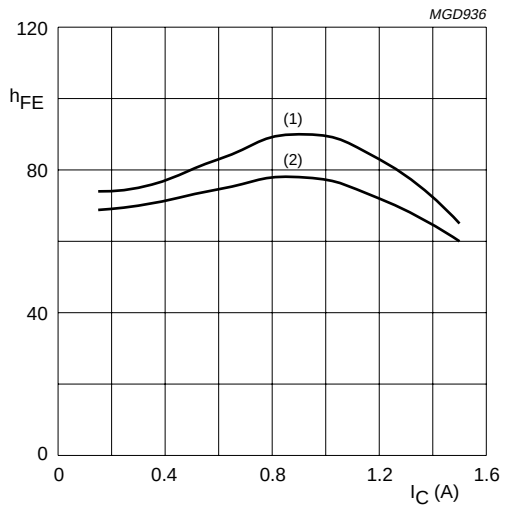
Note

1. Transistor with metallized ground plane mounted on a printed-circuit board, see *"Mounting and soldering recommendations in the General part of handbook SC19a"*.

CHARACTERISTICS

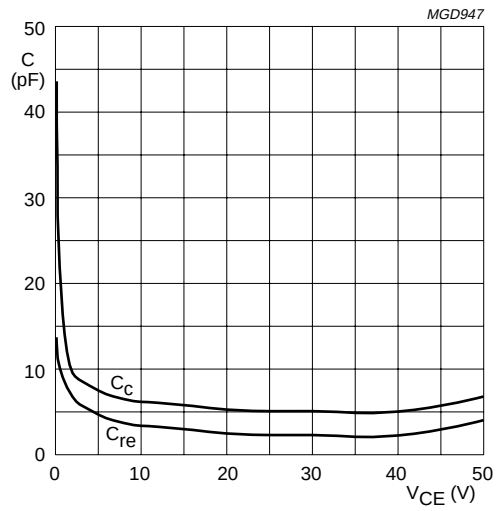
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	4	–	–	V
I_{CES}	collector leakage current	V_{CE} = 26 V; V_{BE} = 0	–	–	1.3	mA
h_{FE}	DC current gain	V_{CE} = 26 V; I_C = 600 mA	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz	–	6	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	2.5	–	pF



(1) V_{CE} = 26 V; t_p = 500 μs; δ = < 1 %.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



f = 1 MHz.

Fig.5 Capacitance as a function of collector-emitter voltage; typical values.

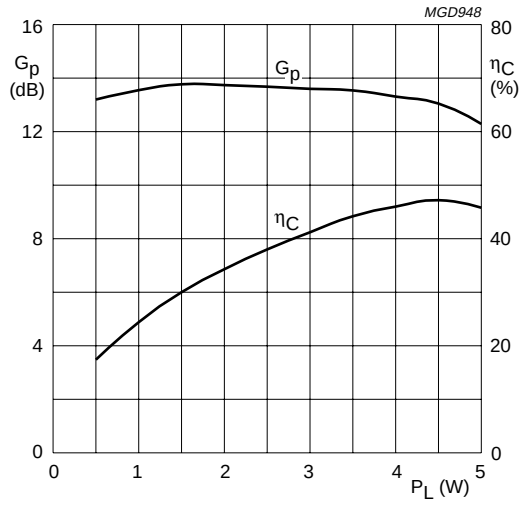
APPLICATION INFORMATION

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1950	26	15	4	≥11 typ. 13	≥40 typ. 45	–
CW, class-AB	1990	26	15	4	≥11	≥40	–
2-tone, class-AB	f_1 = 1950; f_2 = 1950.1	26	15	4 (PEP)	typ. 14	typ. 35	typ. –30

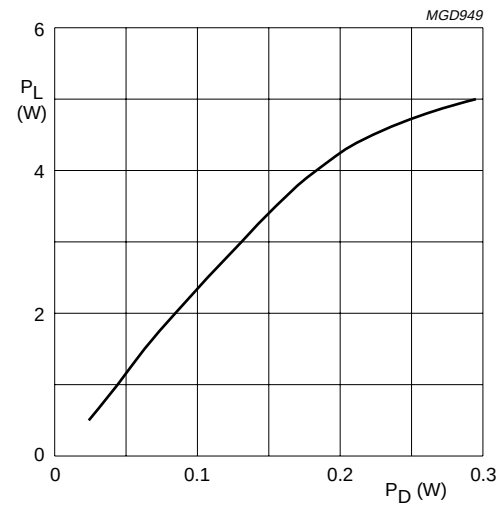
Ruggedness in class-AB operation

The BLV2042 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases under the following conditions: f = 1950 MHz; V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.



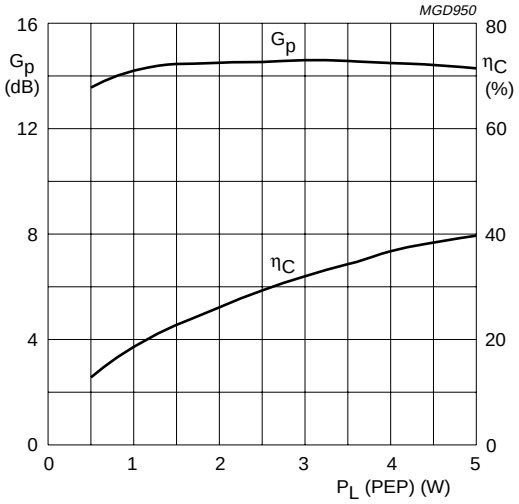
CW, class-AB; V_{CE} = 26 V; I_{CQ} = 15 mA; f = 1950 MHz; T_{mb} = 25 °C.

Fig.6 Power gain and collector efficiency as functions of load power; typical values.



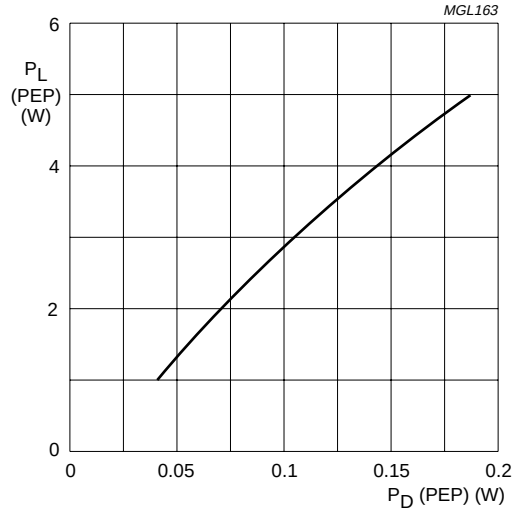
CW, class-AB; V_{CE} = 26 V; I_{CQ} = 15 mA; f = 1950 MHz; T_{mb} = 25 °C.

Fig.7 Load power as a function of drive power; typical values.



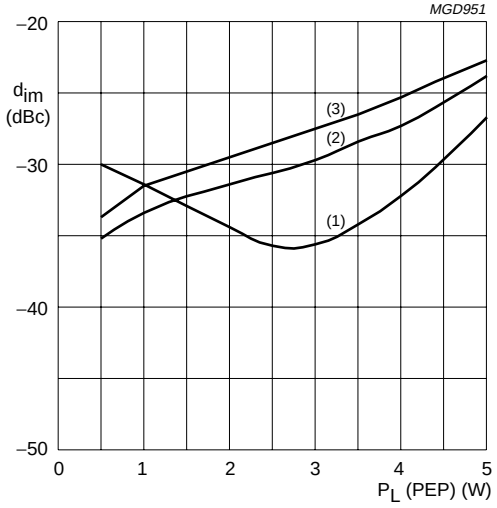
V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 1950 MHz; f_2 = 1950.1 MHz.

Fig.8 Power gain and collector efficiency as functions of peak envelope load power; typical values.



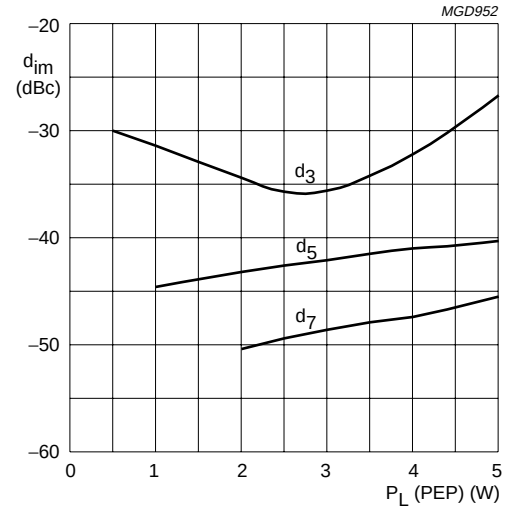
V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 1950 MHz; f_2 = 1950.1 MHz.

Fig.9 Peak envelope load power as a function of peak envelope drive power; typical values.



V_{CE} = 26 V; f_1 = 1950 MHz; f_2 = 1950.1 MHz.
(1) I_{CQ} = 15 mA. (2) I_{CQ} = 40 mA. (3) I_{CQ} = 60 mA.

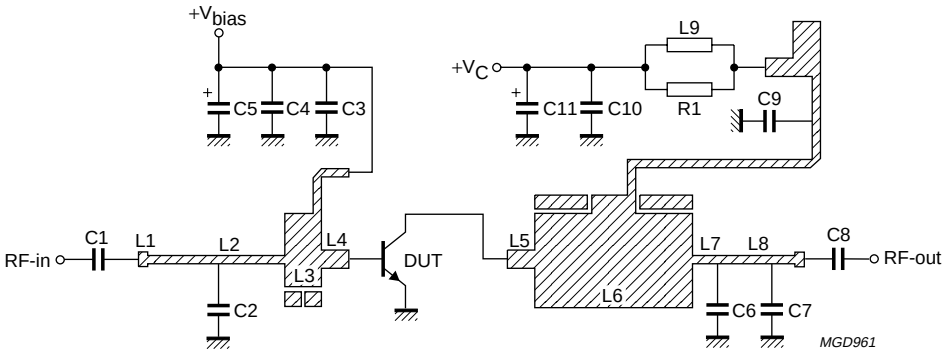
Fig.10 Third order intermodulation distortion as a function of peak envelope load power; typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 1950 MHz; f_2 = 1950.1 MHz.

Fig.11 Intermodulation distortion as a function of peak envelope load power; typical values.

Test circuit information



f = 1950 MHz.

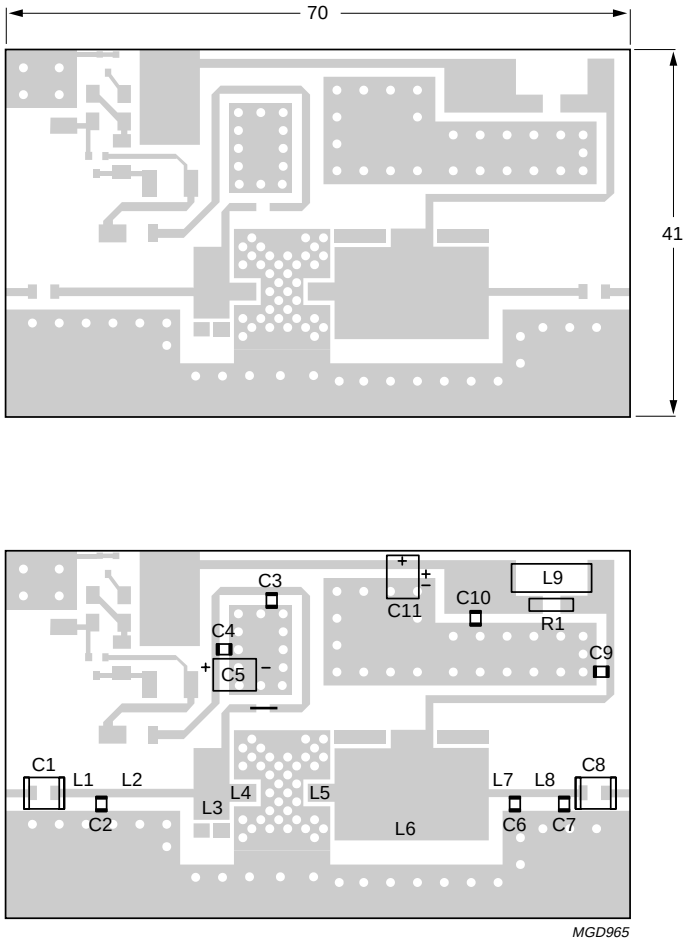
Fig.12 Class-AB test circuit.

List of components (see Figs 12 and 13)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C9	multilayer ceramic chip capacitor; note 1	100 pF		
C2, C6	multilayer ceramic chip capacitor; note 2	3 pF		
C3, C8	multilayer ceramic chip capacitor; note 2	27 pF		
C4, C10	multilayer ceramic chip capacitor	100 nF		2222 581 16641
C5, C11	tantalum SMD capacitor	47 μF; 35 V		
C7	multilayer ceramic chip capacitor; note 2	1.2 pF		
L1	stripline; note 3	50 Ω	length 9.9 mm width 0.91 mm	
L2	stripline; note 3	50 Ω	length 6.66 mm width 0.91 mm	
L3	stripline; note 3	10 Ω	length 4 mm width 8 mm	
L4	stripline; note 3	31 Ω	length 3 mm width 2 mm	
L5	stripline; note 3	31 Ω	length 3 mm width 2 mm	
L6	stripline; note 3	8.3 Ω	length 17.25 mm width 10.3 mm	
L7	stripline; note 3	50 Ω	length 2.42 mm width 0.91 mm	
L8	stripline; note 3	50 Ω	length 6.14 mm width 0.91 mm	
L9	grade 4S2 ferroxcube chip-bead			4330 030 36301
R1	metal film resistor	100 Ω; 0.4 W		
DUT	transistor	BLV2042		

Notes

1. American Technical Ceramics type 100B or capacitor of the same quality.
2. American Technical Ceramics type 100A or capacitor of the same quality.
3. The striplines are on a double copper-clad printed-circuit board with epoxy fibreglass dielectric (ε_r = 6.15); thickness 0.64 mm.

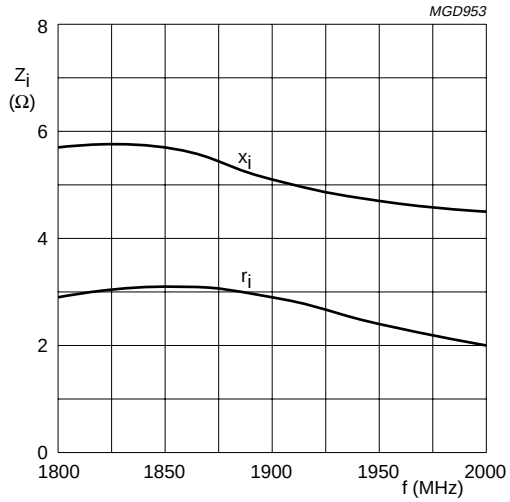


Dimensions in mm.

f = 1950 MHz.

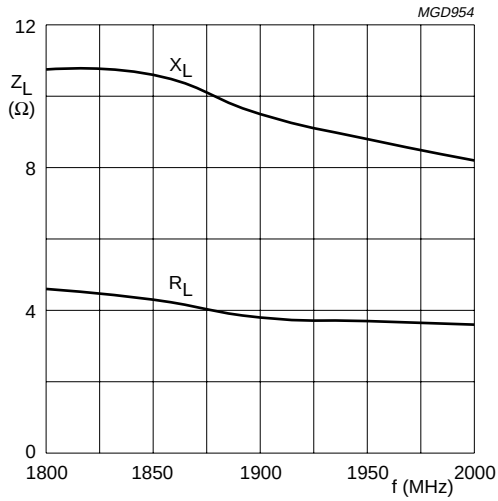
The components are situated on one side of the copper-clad epoxy fibreglass board, the other side is not etched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.13 Component layout for class-AB test circuit.



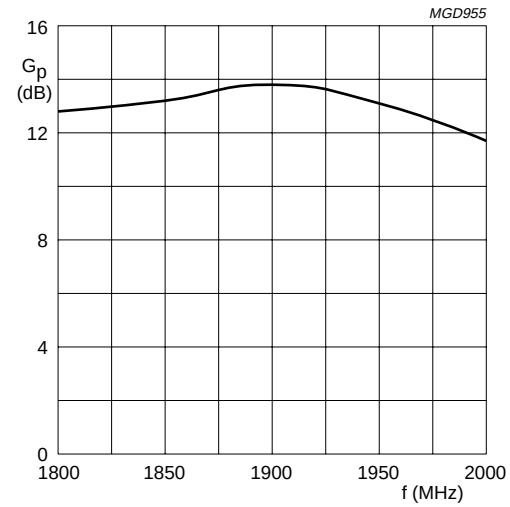
V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.

Fig.14 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.

Fig.15 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.

Fig.16 Power gain as a function of frequency; typical values.

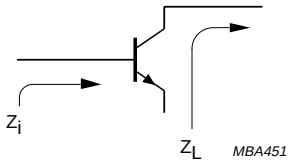


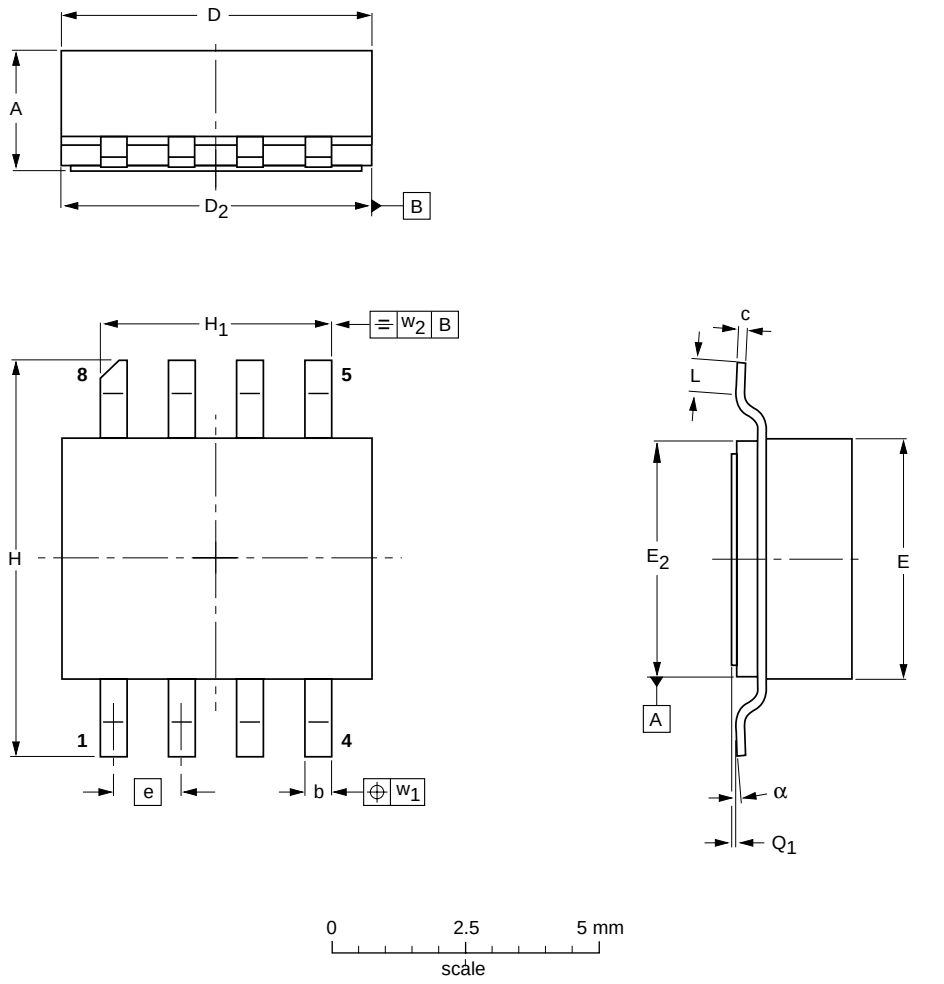
Fig.17 Definition of transistor impedance.

MOUNTING RECOMMENDATIONS

Heat from the device is transferred via the leads and the metallized underside. For optimum heat transfer it is recommended that the transistor be mounted on a grounded metallized area on the component side of the printed-circuit board. This metallized area should contain a large number of metallized, solder-filled through-holes. The non-component side of the printed-circuit board forms a ground plane. When the printed-circuit board is mounted on the heatsink using heatsink compound, a thermal resistance from mounting base to heatsink of 0.9 K/W can be attained.

PACKAGE OUTLINE

Ceramic surface mounted package; 8 leads **SOT409B**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_2	E	E_2	e	H	H_1	L	Q_1	w_1	w_2	α
mm	2.36 2.06	0.58 0.43	0.15 0.10	5.94 5.03	5.16 5.00	4.93 4.01	4.14 3.99	1.27	7.47 7.26	4.39 4.24	0.84 0.69	0.10 0.00	0.25	0.25	2° 0°
inches	0.093 0.081	0.023 0.017	0.006 0.004	0.234 0.198	0.203 0.197	0.194 0.158	0.163 0.157	0.050	0.294 0.286	0.173 0.167	0.033 0.027	0.004 0.000	0.010	0.010	2° 0°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT409B						98-01-27

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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SUNSTAR 商斯达实业集团是集研发、生产、工程、销售、代理经销 、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一,是一家专业代理和分銷世界各大品牌 IC 芯片和電子元器件的连锁经营綜合性国际公司，专业经营进口、国产名厂名牌电子元件，型号、种类齐全。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商,已在全国范围内建成强大统一的供货和代理分销网络。 我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA 软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。商斯达实业公司拥有庞大的资料库，有数位毕业于著名高校——有中国电子工业摇篮之称的西安电子科技大学（西军电）并长期从事国防尖端科技研究的高级工程师为您精挑细选、量身订做各种高科技电子元器件，并解决各种技术问题。

微波光电部专业代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波 CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件： 晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子元器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适 配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

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