DATA SHEET

BUX84; BUX85
Silicon diffused power transistors

Product specification
Supersedes data of February 1996
File under Discrete Semiconductors, SC06

1997 Aug 13

Philips
Semiconductors

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Silicon diffused power transistors BUX84; BUX85

DESCRIPTION

High-voltage, high-speed, glass-passivated NPN power transistor in a TO-220AB package.

APPLICATIONS

- Converters
- Inverters
- Switching regulators
- Motor control systems
- Switching applications.

PINNING

PIN	DESCRIPTION
1	base
2	collector; connected to mounting base
3	emitter

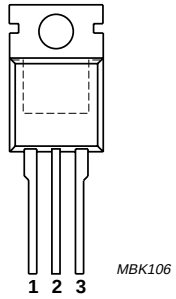


Fig.1 Simplified outline (TO-220AB) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0			
	BUX84		–	800	V
	BUX85		–	1000	V
V_{CEO}	collector-emitter voltage	open base			
	BUX84		–	400	V
	BUX85		–	450	V
V_{CEsat}	collector-emitter saturation voltage	I_C = 1 A; I_B = 200 mA; see Fig.7	–	1	V
I_C	collector current (DC)	see Figs 4 and 5	–	2	A
I_{CM}	collector current (peak value)	see Figs 4 and 5	–	3	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C; see Fig.8	–	40	W
t_f	fall time	resistive load; see Fig.11	0.4	–	µs

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	2.5	K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient in free air	70	K/W

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0			
	BUX84		–	800	V
	BUX85		–	1000	V
V_{CEO}	collector-emitter voltage	open base			
	BUX84		–	400	V
	BUX85		–	450	V
I_C	collector current (DC)	see Figs 4 and 5	–	2	A
I_{CM}	collector current (peak value)	t_p = 2 ms; see Figs 4 and 5	–	3	A
I_B	base current (DC)		–	0.75	A
I_{BM}	base current (peak value)		–	1	A
I_{BM}	base current (reversed; peak value)	turn-off current	–	–1	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C; see Fig.8	–	40	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CEOsust}$	collector-emitter sustaining voltage	I_C = 100 mA; I_{Boff} = 0; L = 25 mH; see Figs 2 and 3				
	BUX84		400	–	–	V
	BUX85		450	–	–	V
V_{CEsat}	collector-emitter saturation voltage	I_C = 0.3 A; I_B = 30 mA; see Fig.7	–	–	0.8	V
		I_C = 1 A; I_B = 200 mA; see Fig.7	–	–	1	V
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 200 mA; see Fig.9	–	–	1.1	V
I_{CES}	collector-emitter cut-off current	$V_{CEM} = V_{CEMSmax}$; V_{BE} = 0; note 1	–	–	200	µA
		$V_{CEM} = V_{CEMSmax}$; V_{BE} = 0; T_j = 125 °C; note 1	–	–	1.5	mA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 5 A; see Fig.10	15	–	–	
		V_{CE} = 5 V; I_C = 100 mA; see Fig.10	20	50	100	
f_T	transition frequency	V_{CE} = 10 V; I_C = 200 mA; f = 1 MHz	–	20	–	MHz

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Switching times in horizontal deflection circuit (see Fig.11)						
t_{on}	turn-on time	I_{Con} = 1 A; I_{Bon} = 200 mA; I_{Boff} = −400 mA; V_{CC} = 250 V	–	0.2	0.5	µs
t_f	fall time	I_{Con} = 1 A; I_{Bon} = 200 mA; I_{Boff} = −400 mA; V_{CC} = 250 V	–	0.4	–	µs
		I_{Con} = 1 A; I_{Bon} = 200 mA; I_{Boff} = −400 mA; V_{CC} = 250 V; T_{mb} = 95 °C	–	–	1.4	µs
t_s	storage time	I_{Con} = 1 A; I_{Bon} = 200 mA; I_{Boff} = −400 mA; V_{CC} = 250 V	–	2	3.5	µs

Note

1. Measured with a half-sinewave voltage (curve tracer).

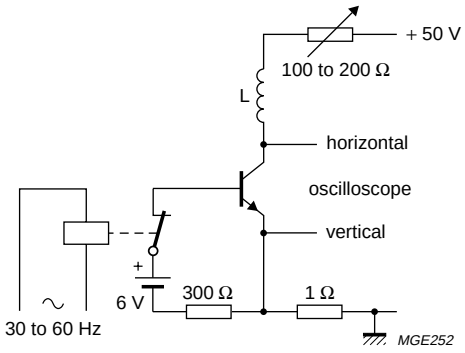


Fig.2 Test circuit for collector-emitter sustaining voltage.

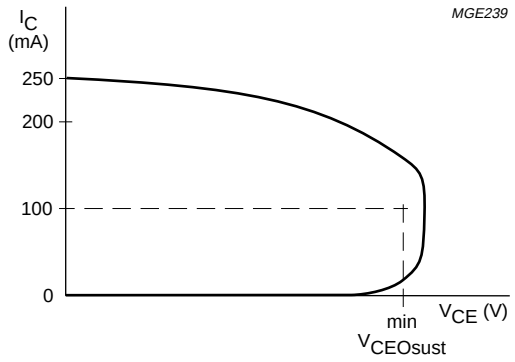
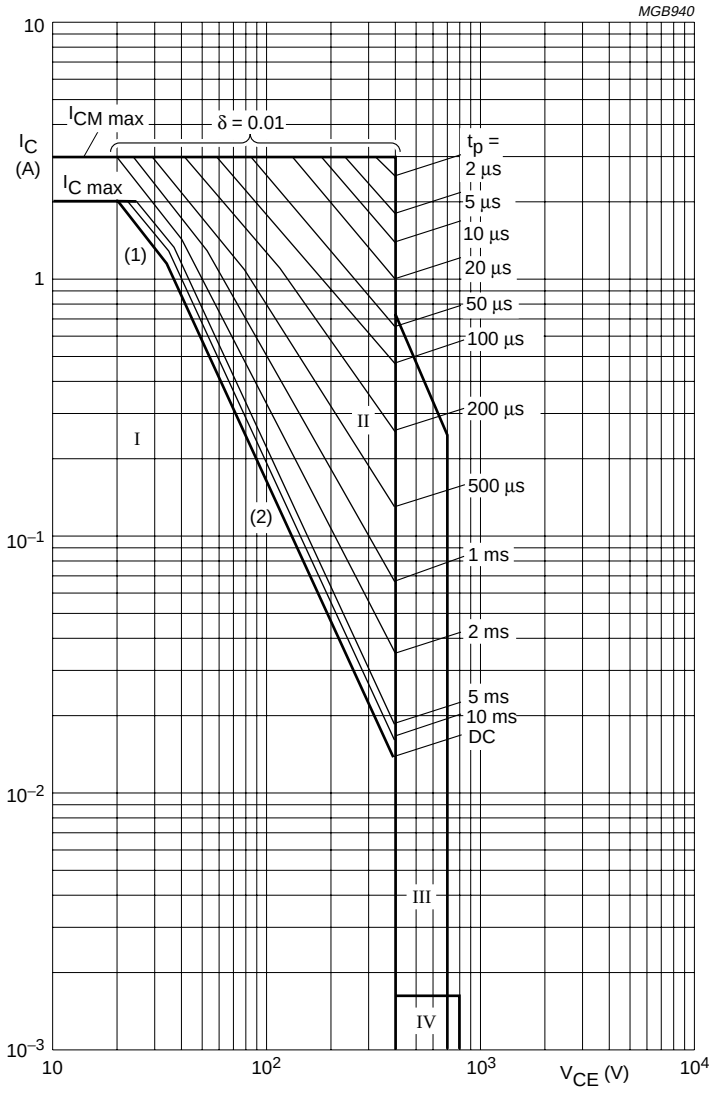


Fig.3 Oscilloscope display for collector-emitter sustaining voltage.



BUX84.

$T_{mb} \leq 50$ °C.

I - Region of permissible DC operation.

II - Permissible extension for repetitive pulse operation.

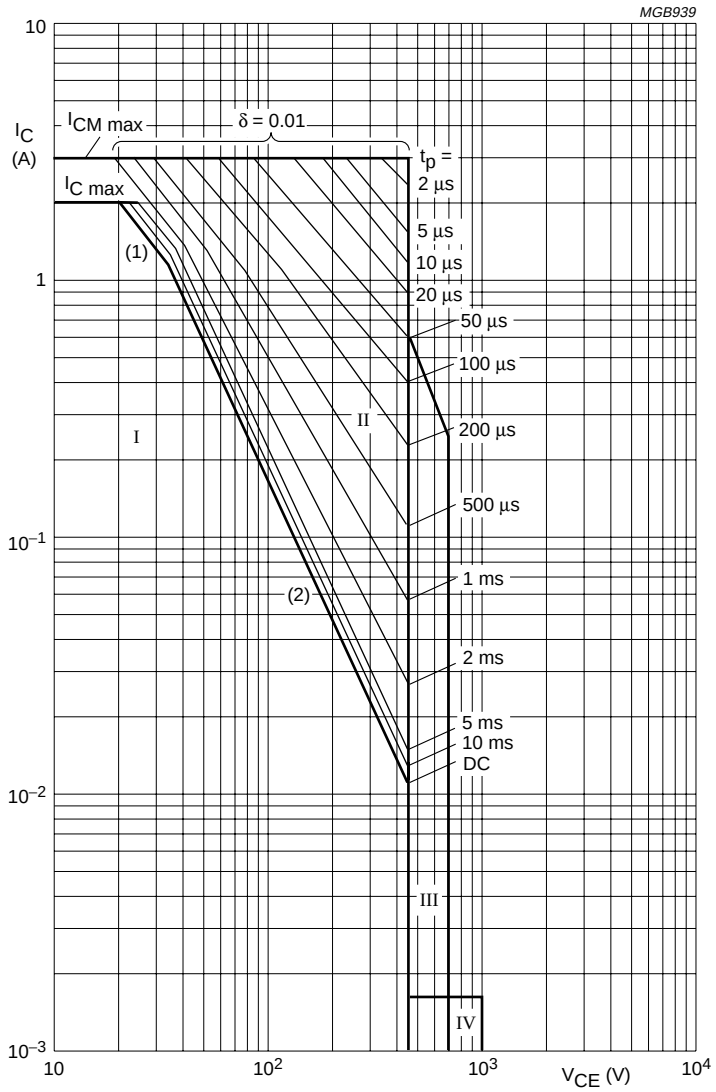
III - Area of permissible operation during turn-on in single transistor converters, provided $R_{BE} \leq 100\ \Omega$ and $t_p \leq 0.6$ µs.

IV - Repetitive pulse operation in this region is permissible provided $V_{BE} \leq 0$ and $t_p \leq 2$ ms.

(1) $P_{tot\ max}$ and $P_{tot\ peak\ max}$ lines.

(2) Second breakdown limits.

Fig.4 Forward bias SOAR.



BUX85.

$T_{mb} \leq 50$ °C.

I - Region of permissible DC operation.

II - Permissible extension for repetitive pulse operation.

III - Area of permissible operation during turn-on in single transistor converters, provided $R_{BE} \leq 100\ \Omega$ and $t_p \leq 0.6$ µs.

IV - Repetitive pulse operation in this region is permissible provided $V_{BE} \leq 0$ and $t_p \leq 2$ ms.

(1) $P_{tot\ max}$ and $P_{tot\ peak\ max}$ lines.

(2) Second breakdown limits.

Fig.5 Forward bias SOAR.

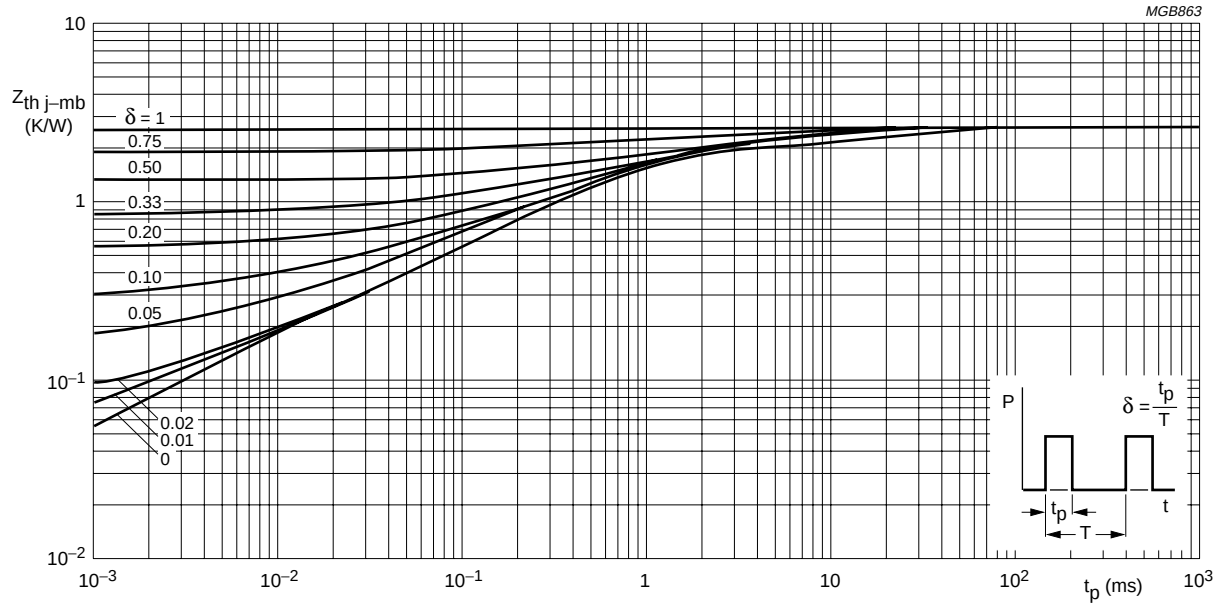
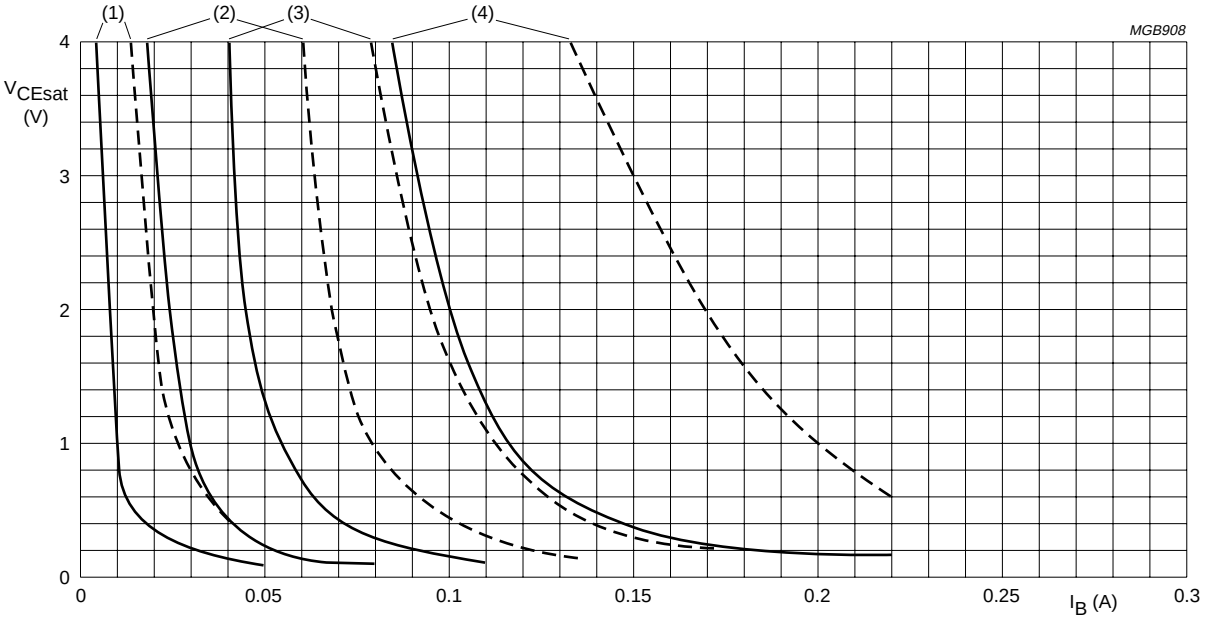


Fig.6 Transient thermal impedance.



(1) I_C = 0.3 A. (2) I_C = 0.5 A. (3) I_C = 0.7 A. (4) I_C = 1 A. T_j = 25 °C; solid line: typical values; dotted line: maximum values.

Fig.7 Collector-emitter saturation voltage as a function of base current; typical values.

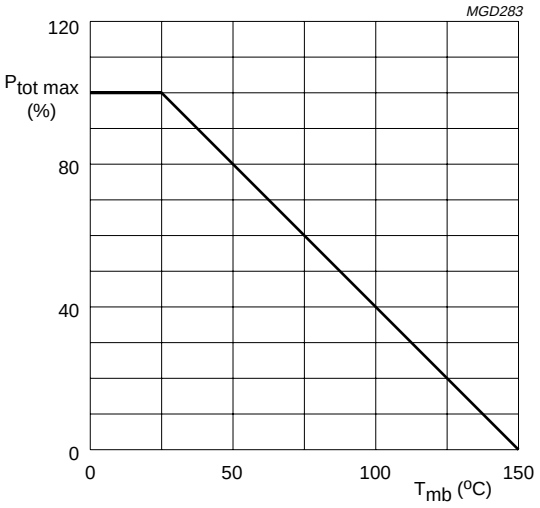
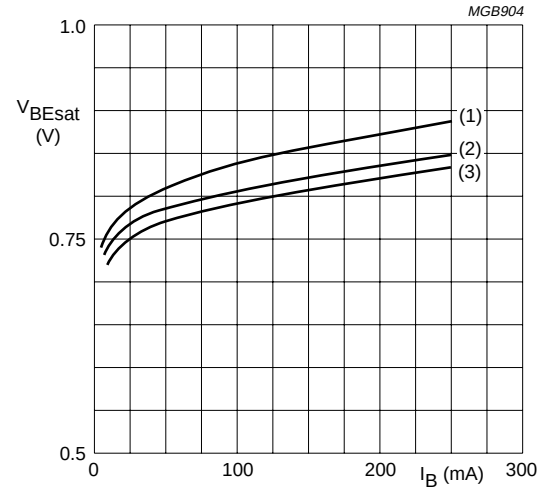


Fig.8 Power derating curve.



T_j = 25 °C.
(1) I_C = 1 A.
(2) I_C = 0.5 A.
(3) I_C = 0.3 A.

Fig.9 Base-emitter saturation voltage as a function of emitter current; typical values.

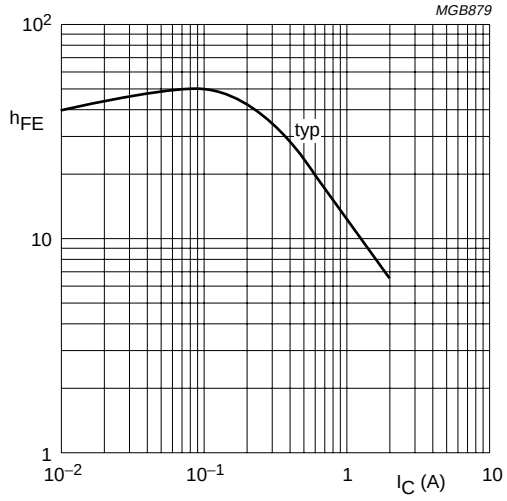


Fig.10 DC current gain; typical values.

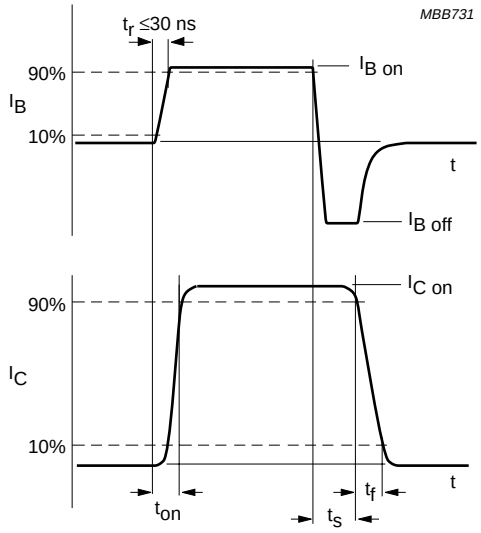
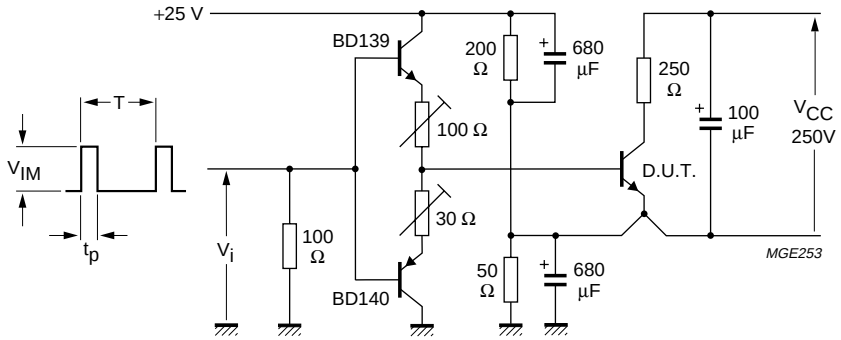


Fig.11 Switching time waveforms with resistive load.

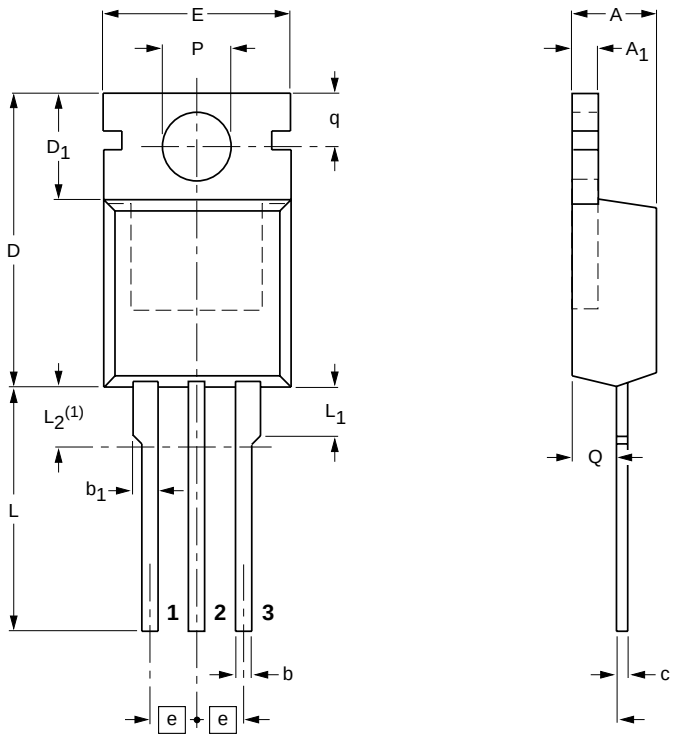


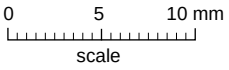
t_p = 20 µs; T = 2 ms; V_{IM} = 15 V.

Fig.12 Test circuit resistive load.

PACKAGE OUTLINE

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **SOT78**





DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	c	D	D_1	E	e	L	L_1	$L_2^{(1)}$ max.	P	q	Q
mm	4.5 4.1	1.39 1.27	0.9 0.7	1.3 1.0	0.7 0.4	15.8 15.2	6.4 5.9	10.3 9.7	2.54	15.0 13.5	3.30 2.79	3.0	3.8 3.6	3.0 2.7	2.6 2.2

Note

1. Terminals in this zone are not tinned.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT78		TO-220AB				97-06-11

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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