Silicon Diffused Power Transistor BUW14

GENERAL DESCRIPTION

High-voltage, high-speed, glass passivated npn power transistor in a SOT82 envelope intended for use in converters, inverters, switching regulators, motor control systems and switching applications.

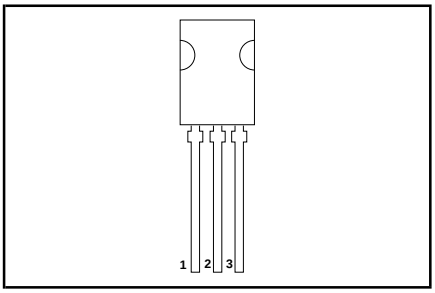
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	V_{BE} = 0 V	-	1000	V
V_{CEO}	Collector-emitter voltage (open base)		-	450	V
I_C	Collector current (DC)		-	0.5	A
I_{CM}	Collector current peak value		-	1	A
P_{tot}	Total power dissipation	$T_{mb} \leq 60$ ˚C	-	20	W
t_f	Fall time		0.4	-	µs

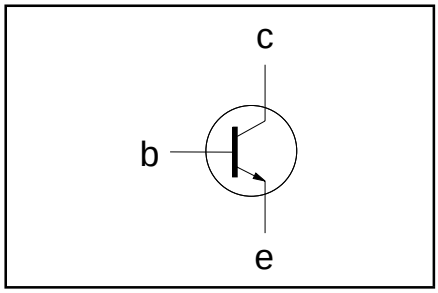
PINNING - SOT82

PIN	DESCRIPTION
1	emitter
2	collector
3	base

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum Rating System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	V_{BE} = 0 V	-	1000	V
V_{CEO}	Collector-emitter voltage (open base)		-	450	V
I_C	Collector current (DC)		-	0.5	A
I_{CM}	Collector current peak value		-	1	A
I_B	Base current (DC)		-	0.2	A
I_{BM}	Base current peak value		-	0.3	A
$-I_{BM}$	Reverse base current peak value [1]		-	0.3	A
P_{tot}	Total power dissipation	$T_{mb} \leq 60$ ˚C	-	20	W
T_{stg}	Storage temperature		-65	150	˚C
T_j	Junction temperature		-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j\text{-}mb}$	Junction to mounting base	-	-	4.5	K/W
$R_{th\ j\text{-}a}$	Junction to ambient	in free air	100	-	K/W

1 Turn-off current.

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}	Collector cut-off current [2]	V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$	-	-	100	µA
I_{CES}		V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$; T_j = 125 ˚C	-	-	1.0	mA
I_{EBO}	Emitter cut-off current	V_{EB} = 5 V; I_C = 0 A	-	-	1.0	mA
$V_{CEOsust}$	Collector-emitter sustaining voltage	I_B = 0 A; I_C = 100 mA; L = 25 mH	450	-	-	V
V_{CEsat}	Collector-emitter saturation voltages	I_C = 0.1 A; I_B = 10 mA	-	-	0.8	V
V_{CEsat}		I_C = 0.2 A; I_B = 20 mA	-		1.0	V
V_{BEsat}	Base-emitter saturation voltage	I_C = 0.2 A; I_B = 20 mA	-		1.0	V
h_{FE}	DC current gain	I_C = 50 mA; V_{CE} = 5 V	-	50	-	
h_{FE}		I_C = 300 mA; V_{CE} = 5 V	25	50	100	

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
f_T	Transition frequency	I_C = 0.2 A; V_{CE} = 10 V; f = 1 MHz	20	-	MHz
	Switching times (resistive load circuit)	I_{Con} = 0.2 A; I_{Bon} = 20 mA; $-I_{Boff}$ = 40 mA; V_{CC} = 250 V			
t_{on}	Turn-on time		0.4	0.7	µs
t_s	Turn-off storage time		3.5	5.0	µs
t_f	Turn-off fall time		0.4	-	µs
t_f	Turn-off fall time	T_{mb} = 95 ˚C	-	1.3	µs

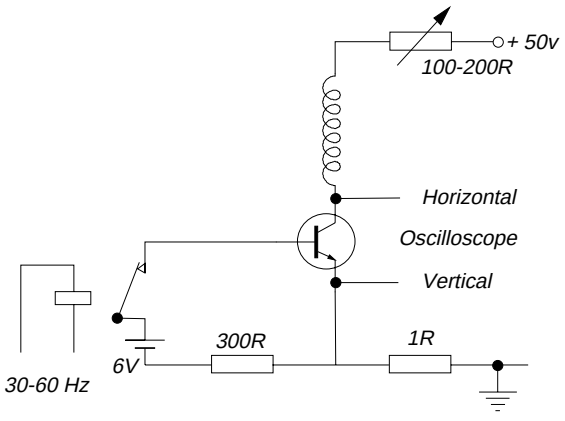


Fig.1. Test circuit for $V_{CEOsust}$.

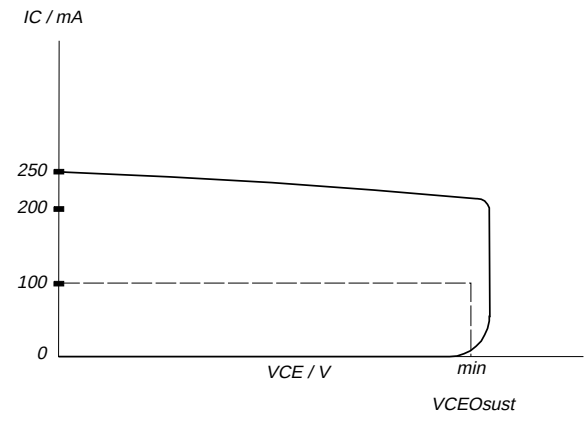


Fig.2. Oscilloscope display for $V_{CEOsust}$.

2 Measured with half sine-wave voltage (curve tracer).

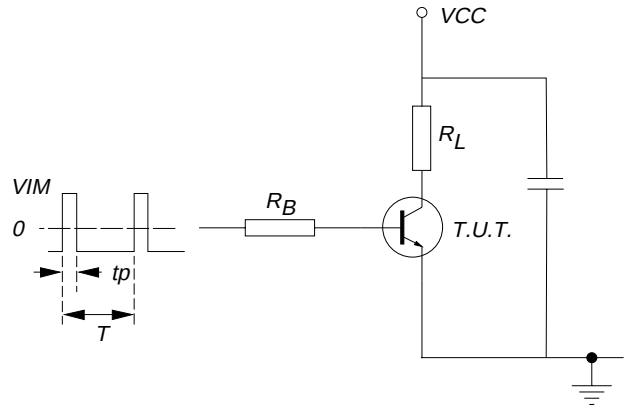


Fig.3. Test circuit resistive load. V_{IM} = -6 to +8 V V_{CC} = 150 V; tp = 20 μs; δ = tp / T = 0.01. R_B and R_L calculated from I_{Con} and I_{Bon} requirements.

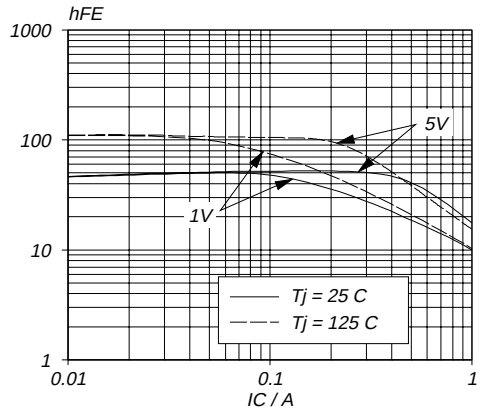


Fig.6. Typical DC current gain. $h_{FE} = f(I_C)$ parameter V_{CE}

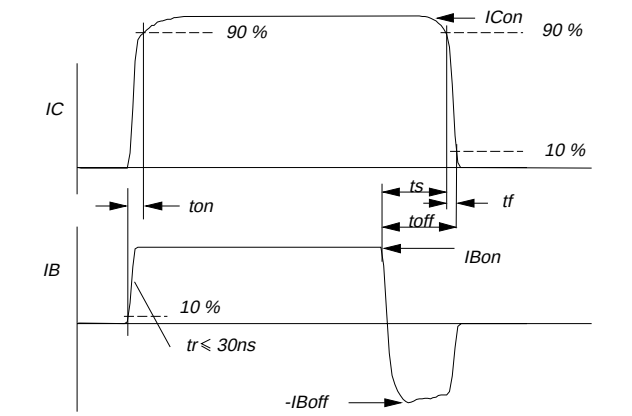


Fig.4. Switching times waveforms with resistive load.

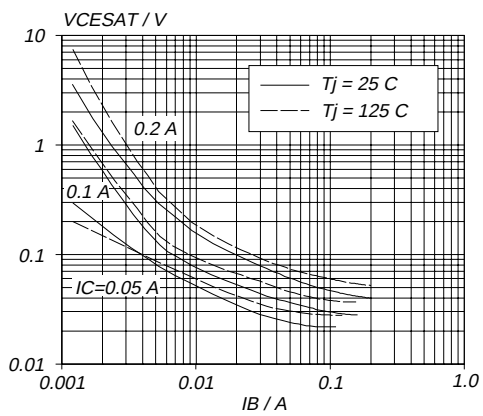


Fig.7. Typical collector-emitter saturation voltage. $V_{CE}sat = f(I_B)$; parameter I_C

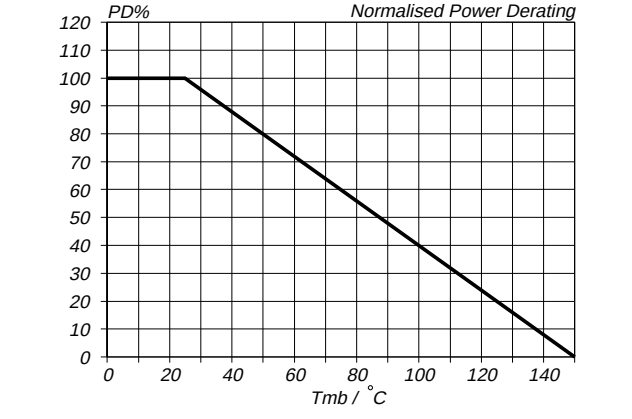


Fig.5. Normalised power dissipation. PD% = 100·P_D/$P_{D\ 25°C}$ = f (T_{mb})

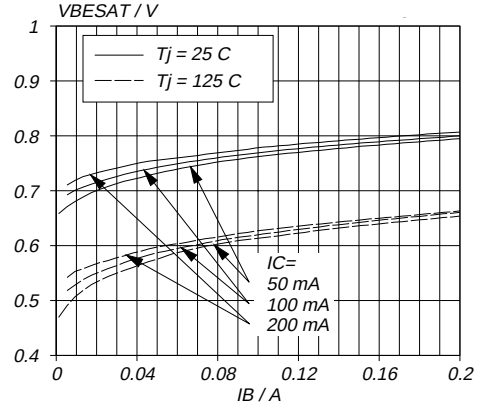


Fig.8. Typical base-emitter saturation voltage. $V_{BE}sat = f(I_B)$; parameter I_C

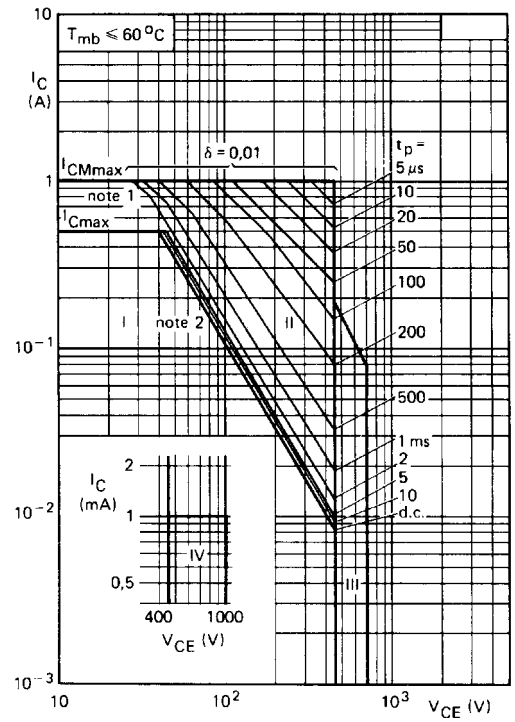


Fig.9. Forward bias safe operating area.
(1) *P_{tot} max line.*
(2) *Second-breakdown limits.*
I *Region of permissible DC operation.*
II *Permissible extension for repetitive pulse operation.*
III *Area of permissible operation during turn-on in single transistor converters, provided $R_{BE} \leq 100\,\Omega$ and tp ≤ 0.6 μs.*
IV *Repetitive pulse operation in this region is permissible provided $V_{BE} \leq 0$ and tp ≤ 2 ms.*

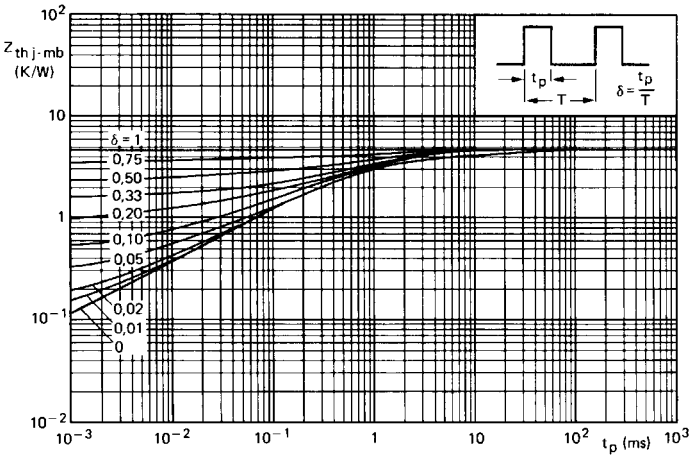
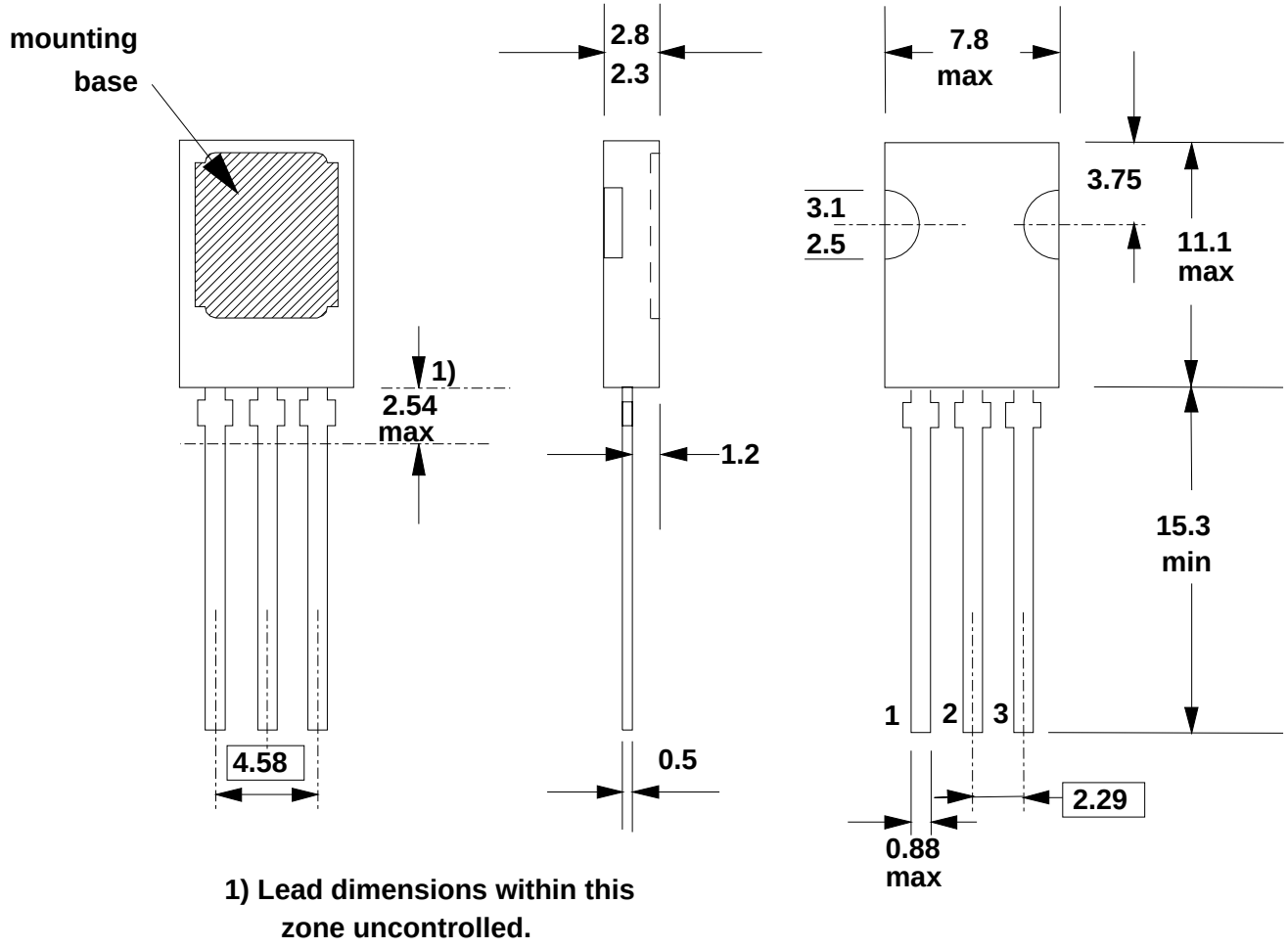


Fig.10. Transient thermal impedance.
$Z_{th\ j\text{-}mb}$ = f(t); parameter δ = duty cycle.

MECHANICAL DATA

Dimensions in mm

Net Mass: 0.8 g



1) Lead dimensions within this zone uncontrolled.

Fig.11. SOT82; pin 2 connected to mounting base.

Notes
1. Refer to mounting instructions for SOT82 envelopes.
2. Epoxy meets UL94 V0 at 1/8".

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 are given 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 this 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.	

LIFE SUPPORT APPLICATIONS

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