Silicon Diffused Darlington Power Transistor BUV90F

GENERAL DESCRIPTION

High-voltage, monolithic npn power Darlington transistor in a SOT199 envelope intended for use in car ignition systems, DC and AC motor controls, solenoid drivers, etc.

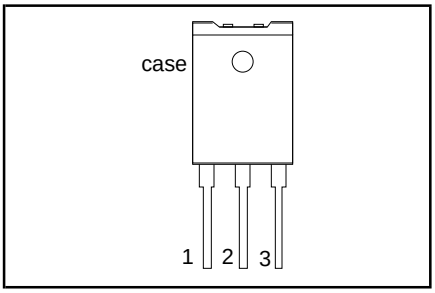
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	V_{BE} = 0 V	-	650	V
V_{CEO}	Collector-emitter voltage (open base)		-	400	V
I_C	Collector current (DC)		-	12	A
I_{CM}	Collector current peak value		-	30	A
P_{tot}	Total power dissipation	$T_{hs} \leq 25$ ˚C	-	34	W
V_{CEsat}	Collector-emitter saturation voltage	I_C = 5 A; I_B = 0.05 A	-	1.5	V
V_{CEsat}	Collector-emitter saturation voltage	I_C = 10 A; I_B = 0.3 A	-	2	V
I_{Csat}	Collector saturation current		10		A
t_f	Fall time	I_C = 5 A; $I_{B(on)}$ = 50 mA	0.7	-	µs
t_f	Fall time	I_C = 10 A; $I_{B(on)}$ = 300 mA	1	-	µs

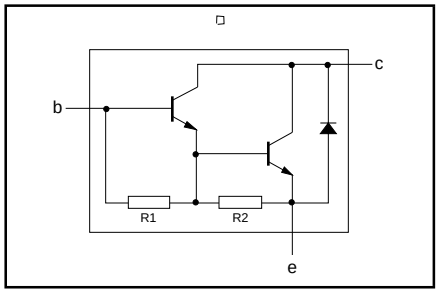
PINNING - SOT199

PIN	DESCRIPTION
1	base
2	collector
3	emitter
case	isolated

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	-	650	V
V_{CEO}	Collector-emitter voltage (open base)		-	400	V
$E_{(BR)}$	Turn-off breakdown energy with inductive load	I_C = 10 A; $I_{B(on)}$ = 0.3 A; L_C = 8 mH	-	400	mJ
I_C	Collector current (DC)		-	12	A
I_{CM}	Collector current peak value		-	30	A
I_B	Base current (DC)		-	4	A
I_{BM}	Base current peak value		-	6	A
P_{tot}	Total power dissipation	$T_{hs} \leq$ 25 ˚C	-	34	W
T_{stg}	Storage temperature		-65	150	˚C
T_j	Junction temperature		-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j\text{-}hs}$	Junction to heatsink	without heatsink compound	-	3.7	K/W
$R_{th\ j\text{-}hs}$	Junction to heatsink	with heatsink compound	-	2.8	K/W

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}	Collector cut-off current [1]	V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$	-	-	1.0	mA
I_{CES}		V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$; T_j = 125 ˚C	-	-	3.0	mA
I_{EBO}	Emitter cut-off current	V_{EB} = 6 V; I_C = 0 A	-	-	20	mA
R1	Base-emitter resistor - driver transistor.		-	500	-	Ω
R2	Base-emitter resistor - output transistor.		-	500	-	Ω
V_F	Diode forward voltage	I_F = 8 A; I_B = 0 A	-	-	3	V
$V_{CEOsust}$	Collector-emitter sustaining voltage	I_B = 0 A; I_C = 100 mA; L = 25 mH	400	-	-	V
V_{CEsat}	Saturation voltages	I_C = 5 A; I_B = 0.05 A	-	-	1.5	V
V_{BEsat}			-	-	2.0	V
V_{CEsat}		I_C = 6 A; I_B = 0.1 A;	-	-	1.5	V
V_{BEsat}		T_{hs} = 150 ˚C	-	-	2.0	V
V_{CEsat}		I_C = 10 A; I_B = 0.3 A	-	-	2.0	V
V_{BEsat}			-	-	2.5	V

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
	Switching times inductive load					
t_f	Turn-off fall time	I_C = 5 A; $I_{B(on)}$ = 50 mA	-	0.7	-	µs
t_f	Turn-off fall time	I_C = 10 A; $I_{B(on)}$ = 300 mA	-	1	-	µs

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

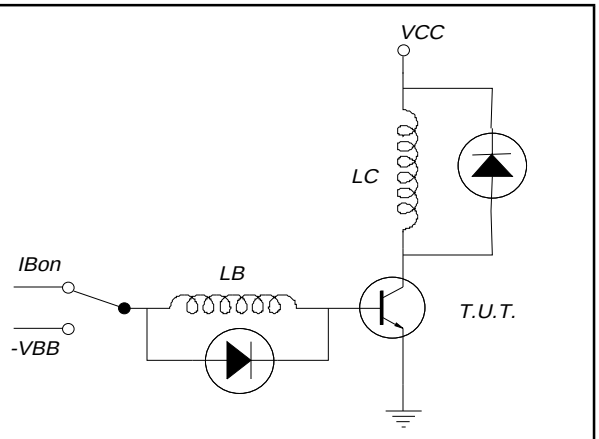


Fig.1. Test circuit inductive load.
V_{CC} = 300 V; -V_{BE} = 5 V; L_C = 200 uH; L_B = 1 uH

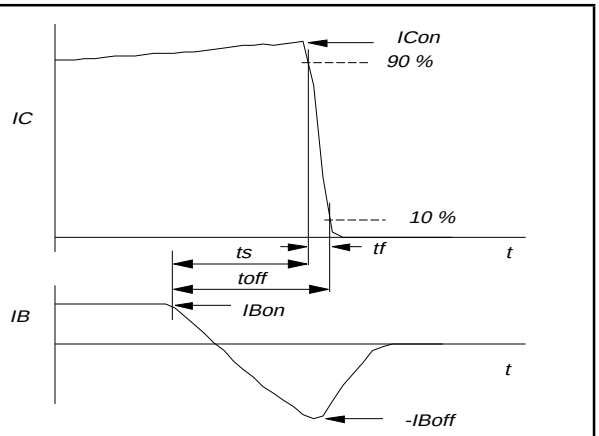


Fig.2. Switching times waveforms with inductive load.

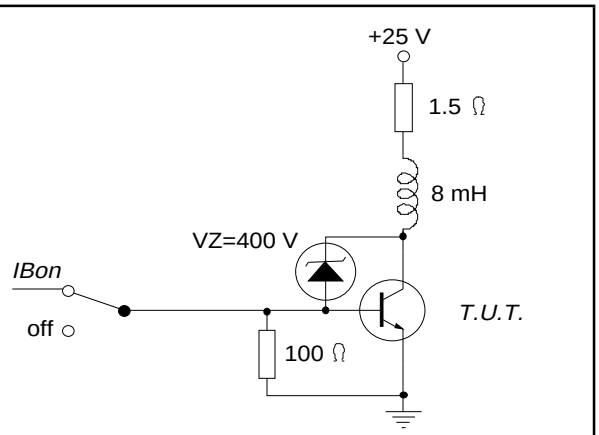


Fig.3. Breakdown energy test circuit.

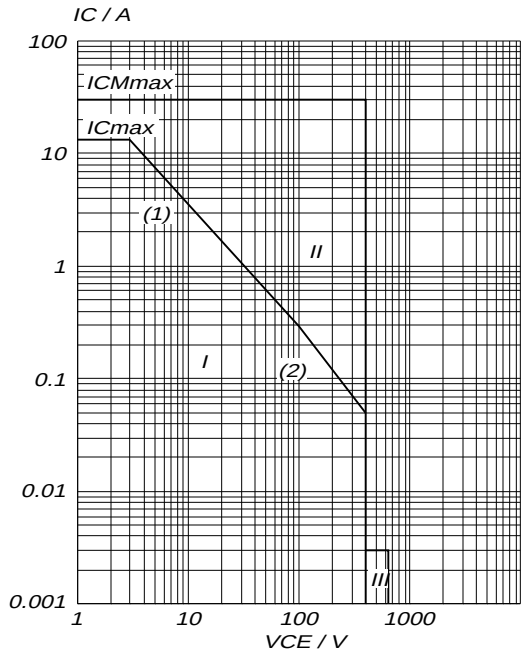


Fig.4. Forward bias safe operating area. T_{hs} = 25 ˚C

I	*Region of permissible DC operation.*
II	*Extension for repetitive pulse operation.*
III	*Repetitive pulse operation is permissible in this region provided V_{BE} < 0 and t_p < 5 ms.*
(1)	*$P_{tot\ max}$ line.*
(2)	*Second breakdown limits (independent of temperature.*
NB:	*Mounted without heatsink compound and 30 ± 5 newton force on the centre of the envelope.*

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

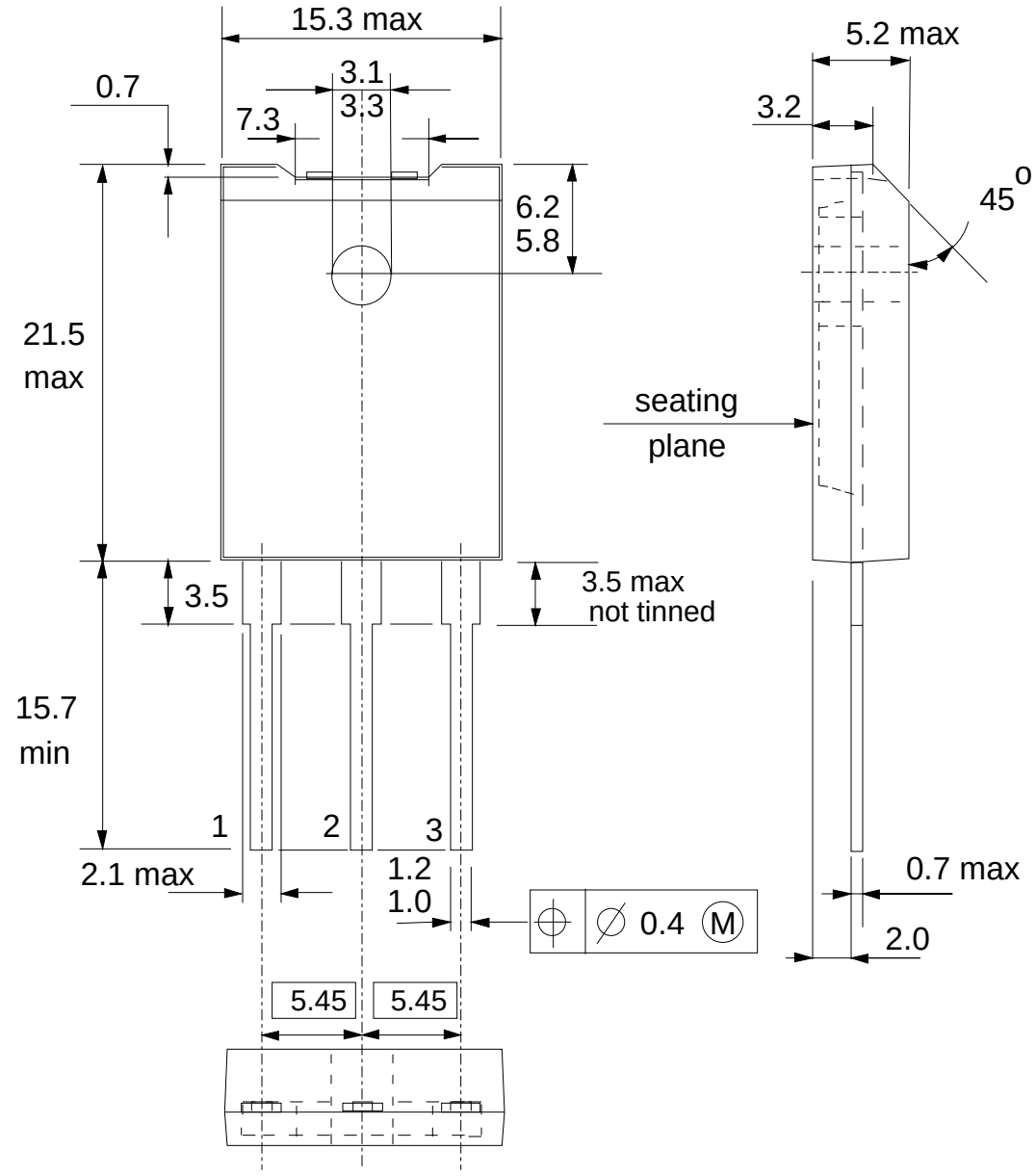


Fig.5. SOT199; The seating plane is electrically isolated from all terminals.

Notes

1. Accessories supplied on request: refer to mounting instructions for F-pack envelopes.

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

These products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.