Silicon Diffused Power Transistor BU2515DX

GENERAL DESCRIPTION

New generation, high-voltage, high-speed switching npn transistor with an integrated damper diode in a full plastic envelope intended for use in horizontal deflection circuits of pc monitors.

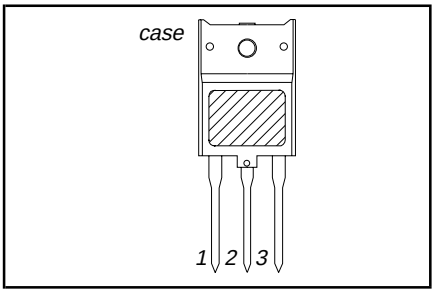
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	V_{BE} = 0 V	-	1500	V
V_{CEO}	Collector-emitter voltage (open base)		-	800	V
I_C	Collector current (DC)		-	9	A
I_{CM}	Collector current peak value		-	20	A
P_{tot}	Total power dissipation	$T_{hs} \leq 25$ ˚C	-	45	W
V_{CEsat}	Collector-emitter saturation voltage	I_C = 4.5 A; I_B = 0.9 A	-	5.0	V
I_{Csat}	Collector saturation current	f = 56 kHz	4.5	-	A
V_F	Diode forward voltage	I_F = 4.5 A	-	2.2	V
t_f	Fall time	I_{Csat} = 4.5 A; f = 56 kHz	0.2	0.4	µs

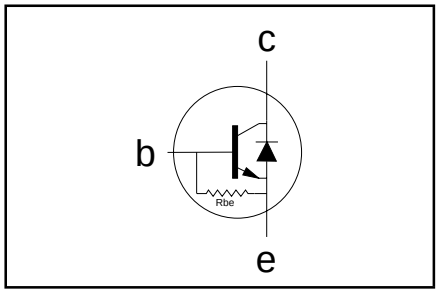
PINNING - SOT399

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	-	1500	V
V_{CEO}	Collector-emitter voltage (open base)		-	800	V
I_C	Collector current (DC)		-	9	A
I_{CM}	Collector current peak value		-	20	A
I_B	Base current (DC)		-	5	A
I_{BM}	Base current peak value		-	7.5	A
$-I_{B(AV)}$	Reverse base current	average over any 20 ms period	-	125	mA
$-I_{BM}$	Reverse base current peak value [1]		-	6	A
P_{tot}	Total power dissipation	$T_{hs} \leq 25$ ˚C	-	45	W
T_{stg}	Storage temperature		-55	150	˚C
T_j	Junction temperature		-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j\text{-}hs}$	Junction to heatsink	with heatsink compound	-	2.8	K/W
$R_{th\ j\text{-}a}$	Junction to ambient	in free air	35	-	K/W

1 Turn-off current.

ISOLATION LIMITING VALUE & CHARACTERISTIC

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 [2]	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	-	-	2.0	mA
I_{EBO}	Emitter cut-off current	V_{EB} = 6 V; I_C = 0 A	-	130	-	mA
BV_{EBO}	Emitter-base breakdown voltage	I_B = 600 mA	7.5	13.5	-	V
$V_{CEOsust}$	Collector-emitter sustaining voltage	I_B = 0 A; I_C = 100 mA; L = 25 mH	800	-	-	V
R_{be}	Base-emitter resistance	V_{EB} = 6 V	-	46	-	Ω
V_{CEsat}	Collector-emitter saturation voltage	I_C = 4.5 A; I_B = 0.9 A	-	-	5.0	V
V_{BEsat}	Base-emitter saturation voltage	I_C = 4.5 A; I_B = 0.9 A	-	-	1.0	V
h_{FE}	DC current gain	I_C = 1.0 A; V_{CE} = 5 V	-	13	-	
h_{FE}		I_C = 4.5 A; V_{CE} = 5 V	5	8	10.2	
V_F	Diode forward voltage	I_F = 4.5 A	-	-	2.2	V

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
	Switching times (56 kHz line deflection circuit)	I_{Csat} = 4.5 A; L_C = 250 µH; C_{fb} = 4 nF; $I_{B(end)}$ = 0.65 A; L_B = 1.5 µH; $-V_{BB}$ = -4 V; $-I_{BM}$ = 2.7 A			
t_s	Turn-off storage time		2.2	3.0	µs
t_f	Turn-off fall time		0.2	0.4	µs
V_{fr}	Anti-parallel diode forward recovery voltage	I_F = 4.5 A; dI_F/dt = 50 A/µs	17	-	V
t_{fr}	Anti-parallel diode forward recovery time	V_F = 5 V	360	-	ns

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

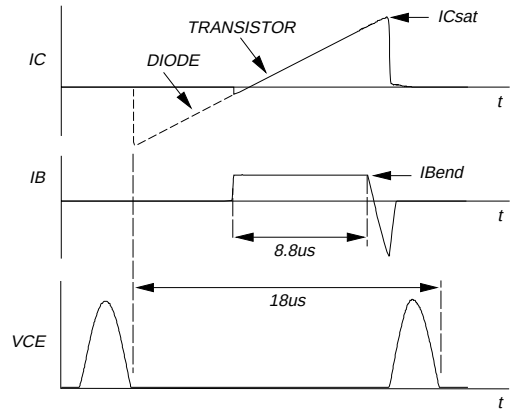


Fig.1. Switching times waveforms.

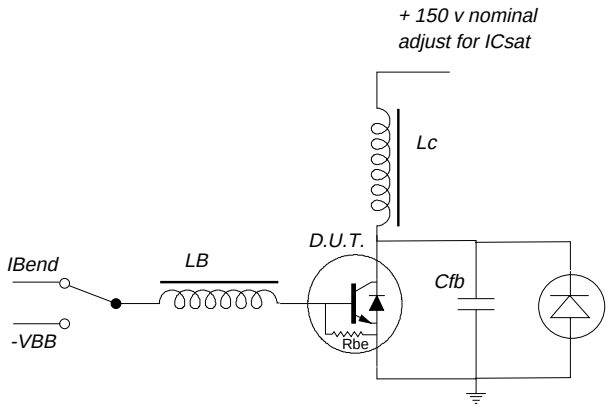


Fig.4. Switching times test circuit.

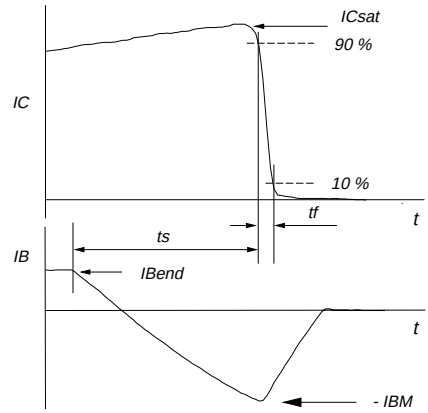


Fig.2. Switching times definitions.

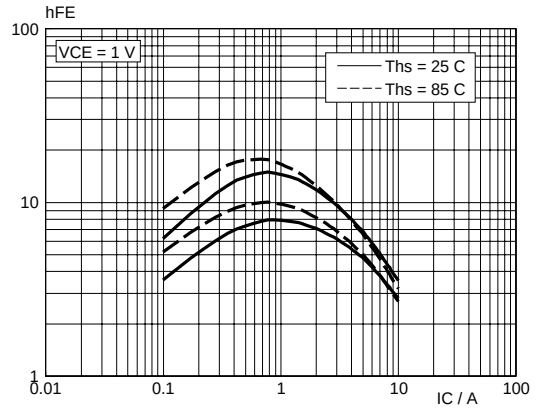


Fig.5. High and low DC current gain. $h_{FE} = f(I_C)$ $V_{CE} = 1$ V

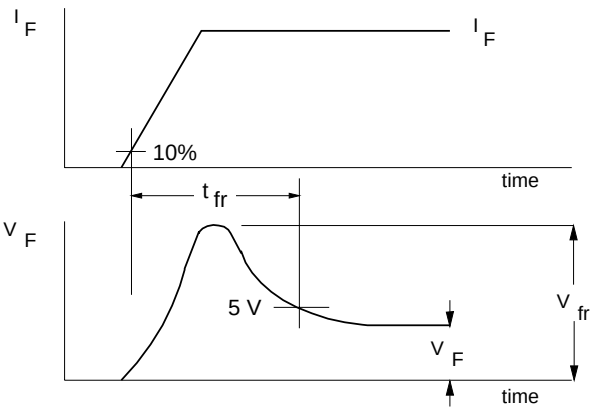


Fig.3. Definition of anti-parallel diode V_{fr} and t_{fr}.

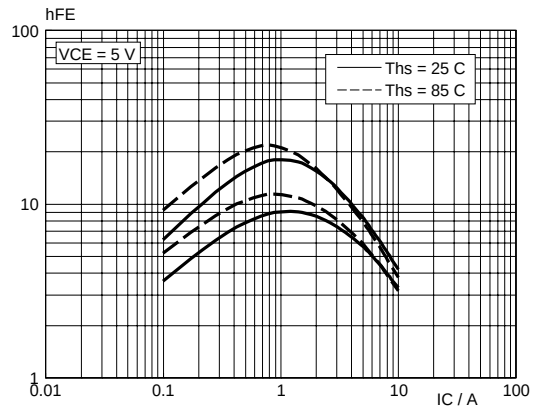


Fig.6. High and low DC current gain. $h_{FE} = f(I_C)$ $V_{CE} = 5$ V

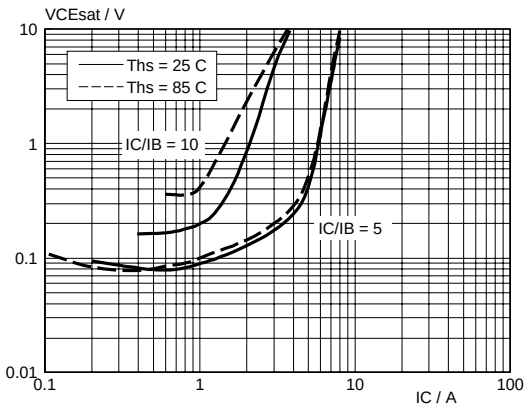


Fig.7. Typical collector-emitter saturation voltage.
$V_{CE}sat = f(I_C)$; parameter I_C/I_B

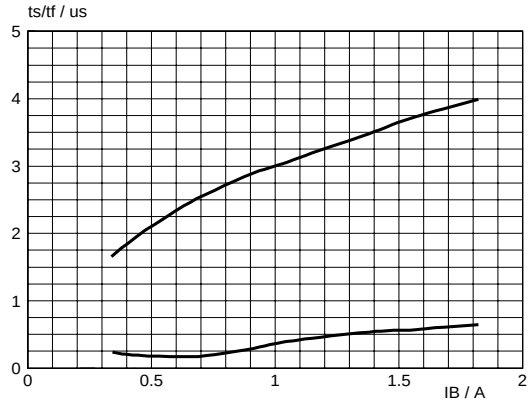


Fig.10. Typical collector storage and fall time.
$ts = f(I_B)$; $tf = f(I_B)$; $I_C = 4.5$ A; $T_j = 85^{\circ}C$; $f = 56$ kHz

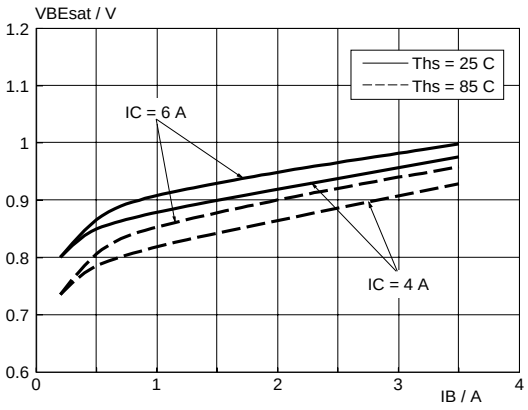


Fig.8. Typical base-emitter saturation voltage.
$V_{BE}sat = f(I_B)$; parameter I_C

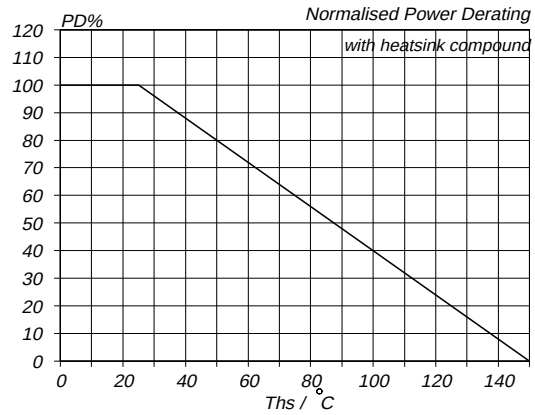


Fig.11. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\ 25^{\circ}C} = f(T_{mb})$

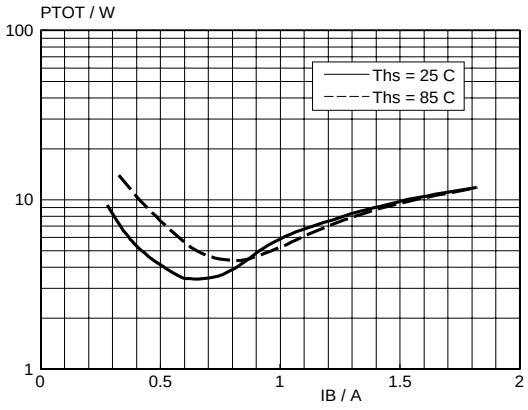


Fig.9. Typical losses.
$P_{TOT} = f(I_B)$; $I_C = 4.5$ A; $f = 56$ kHz

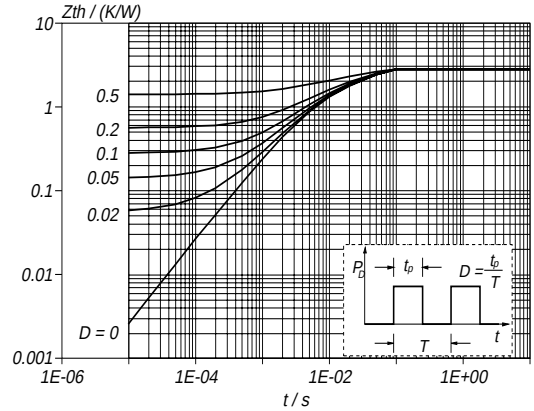


Fig.12. Transient thermal impedance.
$Z_{th\ j\text{-}hs} = f(t)$; parameter $D = t_p/T$

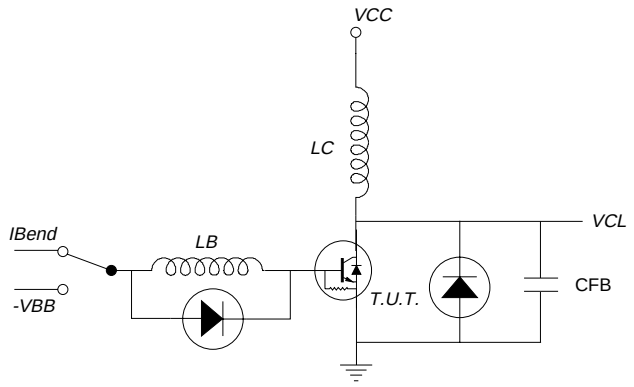


Fig.13. Test Circuit RBSOA. V_{CC} = 150 V; $-V_{BB}$ = 1 - 5 V; L_C = 1.5 mH; V_{CL} = 1450 V; L_B = 0.3 - 2 µH; C_{FB} = 0.5 - 8 nF; $I_{B(end)}$ = 0.65 - 1.3 A

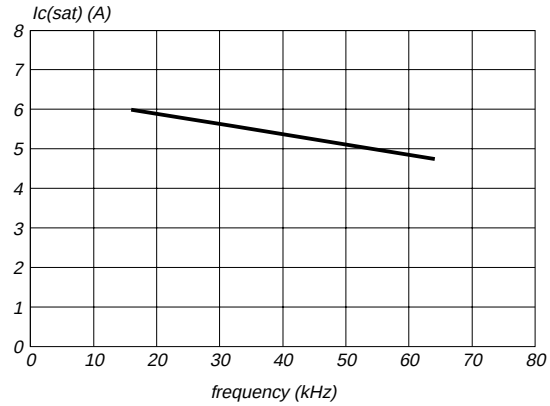


Fig.15. I_{Csat} during normal running vs. frequency of operation for optimum performance

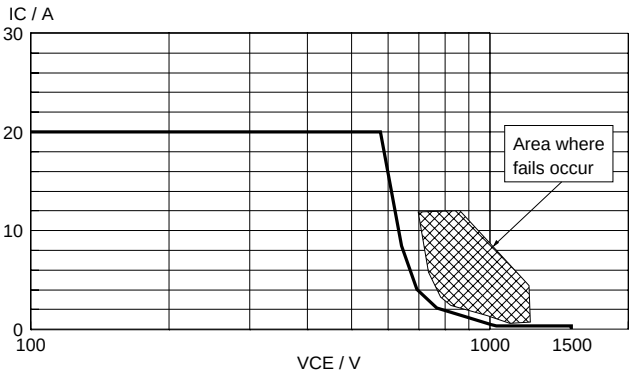


Fig.14. Reverse bias safe operating area. $T_j \leq T_{jmax}$

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.88 g

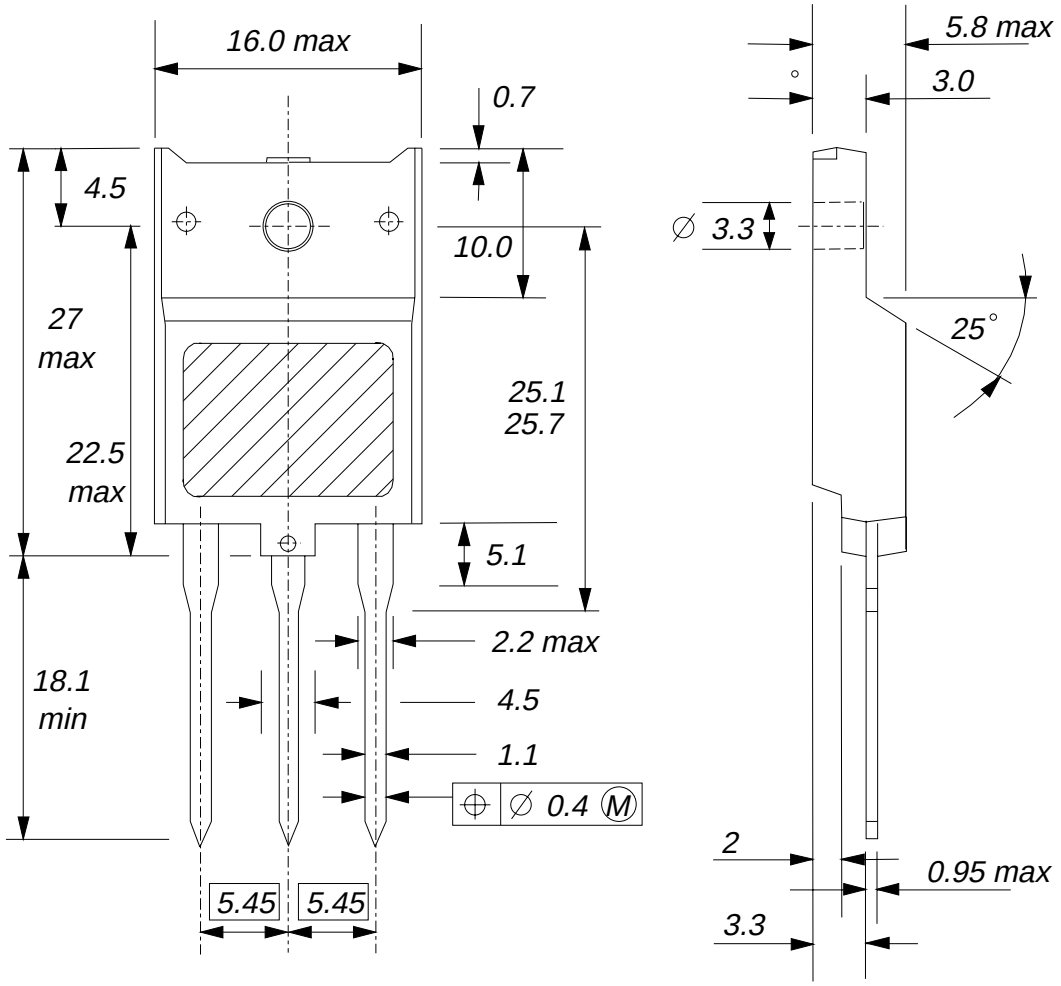


Fig.16. SOT399; The seating plane is electrically isolated from all terminals.

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