

# Insulated Gate Bi-Polar Transistor

## Type T1500TB25E

### Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
$V_{CES}$	Collector – emitter voltage	2500	V
$V_{DC\ link}$	Permanent DC voltage for 100 FIT failure rate.	1250	V
$V_{GES}$	Peak gate – emitter voltage	$\pm 20$	V

	RATINGS	MAXIMUM LIMITS	UNITS
$I_{C(DC)}$	DC collector current, IGBT	1500	A
$I_{CRM}$	Repetitive peak collector current, $t_p=1ms$ , IGBT	3000	A
$I_{ECO}$	Maximum reverse emitter current, $t_p=100\mu s$ , (note 2 & 3)	1500	A
$P_{MAX}$	Maximum power dissipation, IGBT (Note 2)	7.8	kW
$T_j$	Operating temperature range.	-40 to +125	$^{\circ}C$
$T_{stg}$	Storage temperature range.	-40 to +125	$^{\circ}C$

Notes: -

- 1) Unless otherwise indicated  $T_j = 125^{\circ}C$ .
- 2)  $T_{sink} = 25^{\circ}C$ , double side cooled.
- 3) Maximum commutation loop inductance 300nH.

## Characteristics

### IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$V_{CE(sat)}$	Collector – emitter saturation voltage	-	2.1	2.4	$I_C = 1500A, V_{GE} = 15V, T_j = 25^\circ C$	V
		-	2.9	3.2	$I_C = 1500A, V_{GE} = 15V$	V
$V_{T0}$	Threshold voltage	-		1.31	Current range: 500A – 1500A	V
$r_T$	Slope resistance	-		1.26		m $\Omega$
$V_{GE(TH)}$	Gate threshold voltage	-	5.8	6.3	$V_{CE} = V_{GE}, I_C = 125mA$	V
$I_{CES}$	Collector – emitter cut-off current	-	15	40	$V_{CE} = V_{CES}, V_{GE} = 0V$	mA
$I_{GES}$	Gate leakage current	-	7	$\pm 25$	$V_{GE} = \pm 20V$	$\mu A$
$C_{ies}$	Input capacitance	-	200	-	$V_{CE} = 25V, V_{GE} = 0V, f = 100kHz, T_j = 25^\circ C$	nF
$t_{d(on)}$	Turn-on delay time	-	0.7	-	$I_C = 1500A, V_{CE} = 1250V, di/dt = 2500A/\mu s$	$\mu s$
$t_r(V)$	Rise time	-	2.8	-		$\mu s$
$Q_{g(on)}$	Turn-on gate charge	-	10	-	$V_{GE} = \pm 15V, L_s = 200nH$	$\mu C$
$E_{on}$	Turn-on energy	-	3.5	-	$R_{g(ON)} = 1.8\Omega, R_{g(OFF)} = 3.6\Omega, C_{GE} = 68nF$	J
$t_{d(off)}$	Turn-off delay time	-	3	-	Freewheel diode type E2250VF25C at $T_j = 125^\circ C$	$\mu s$
$t_f(I)$	Fall time	-	2.8	-		$\mu s$
$Q_{g(off)}$	Turn-off gate charge	-	9	-		$\mu C$
$E_{off}$	Turn-off energy	-	2.6	-		J
$I_{SC}$	Short circuit current	-	4150	-	$V_{GE} = +15V, V_{CC} = 1250V, V_{CEmax} \leq V_{CES}, t_p \leq 10\mu s$	A

### Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$R_{thJK}$	Thermal resistance junction to sink, IGBT	-	-	12.9	Double side cooled	K/kW
		-	-	19.8	Collector side cooled	K/kW
		-	-	37	Emitter side cooled	K/kW
F	Mounting force	15	-	25	Note 2	kN
$W_t$	Weight	-	1.2	-		kg

#### Notes:-

- 1) Unless otherwise indicated  $T_j = 125^\circ C$ .
- 2) Consult application note 2008AN01 for detailed mounting requirements
- 3)  $C_{GE}$  is additional gate – emitter capacitance added to output of gate drive

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

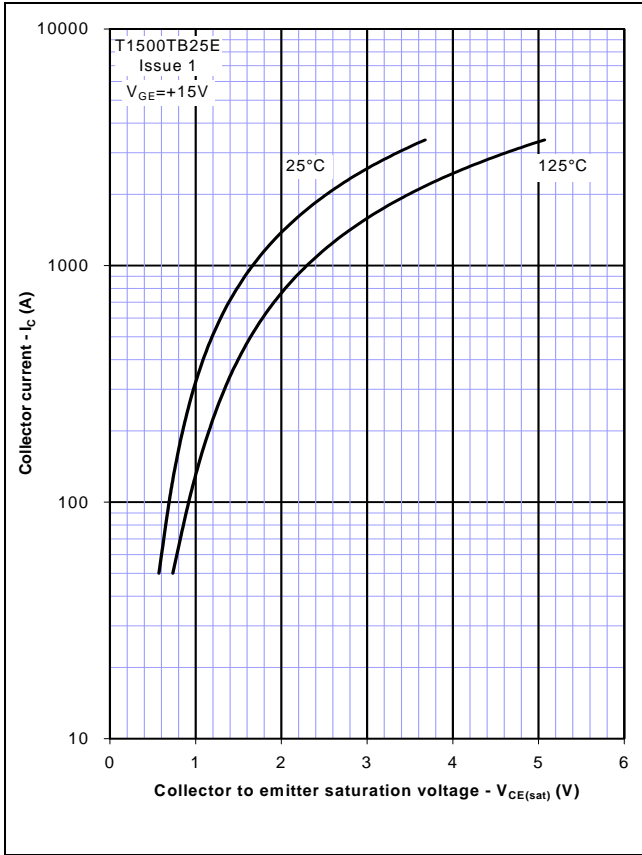


Figure 2 – Typical output characteristic

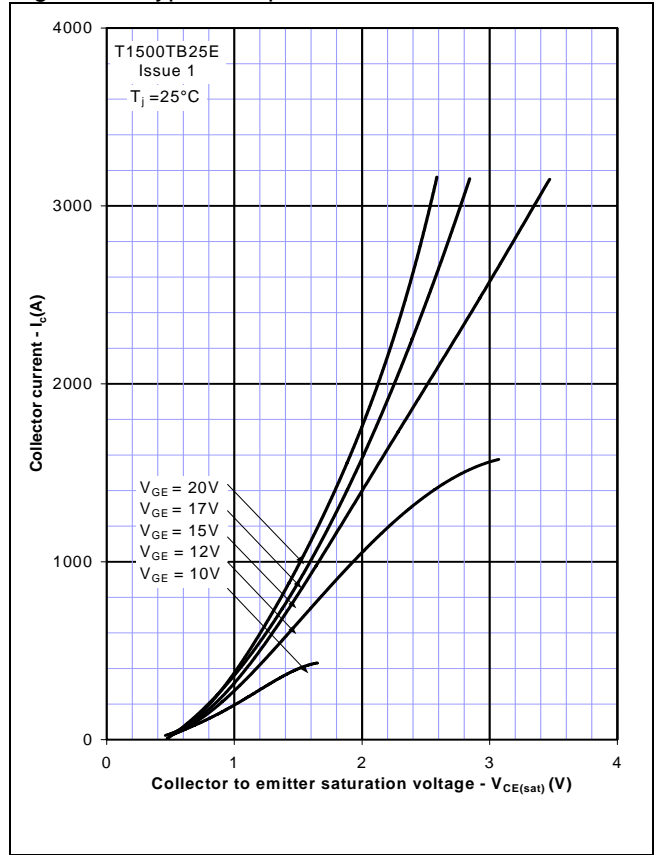


Figure 3 – Typical output characteristic

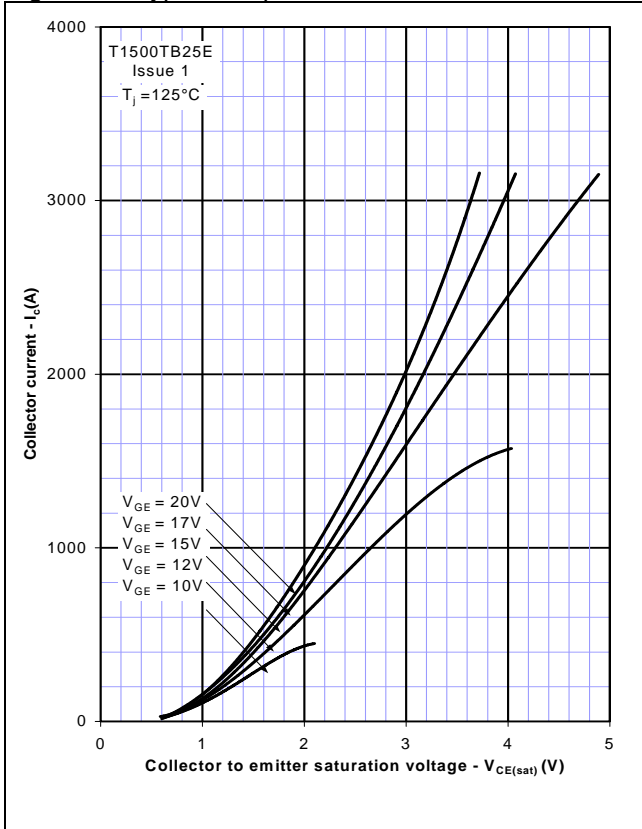


Figure 4 – Typical turn-on delay time vs gate resistance

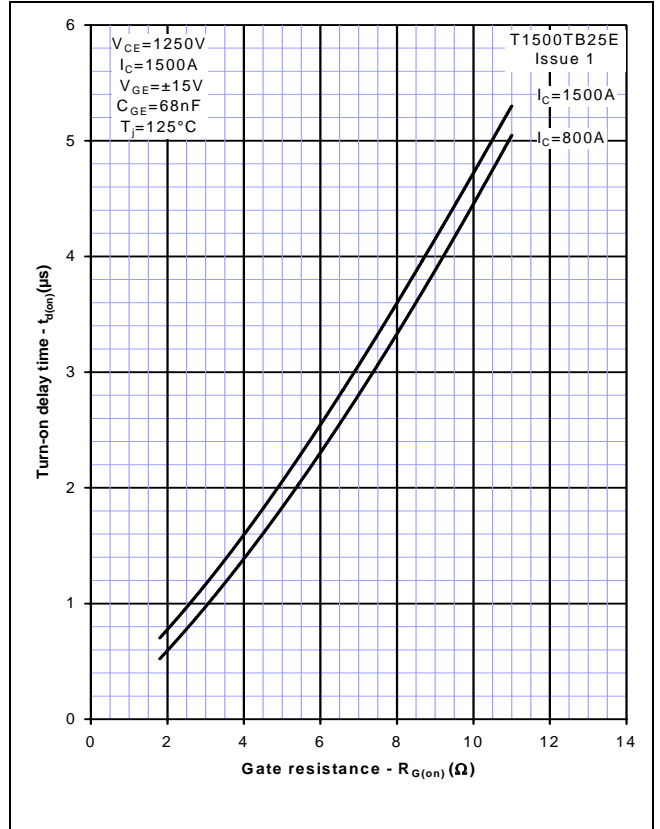


Figure 5 – Typical turn-off delay time vs. gate resistance

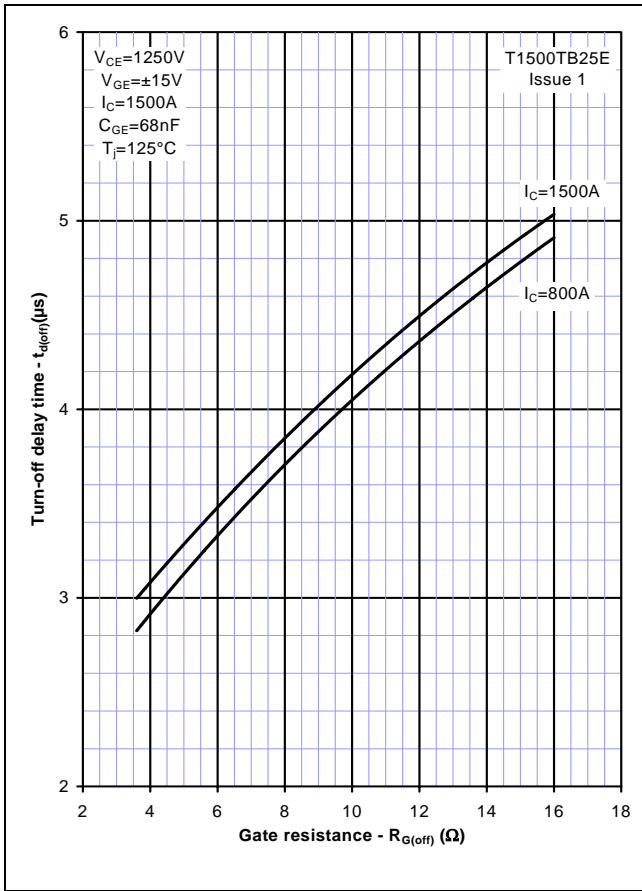


Figure 6 – Typical turn-on energy vs. collector current

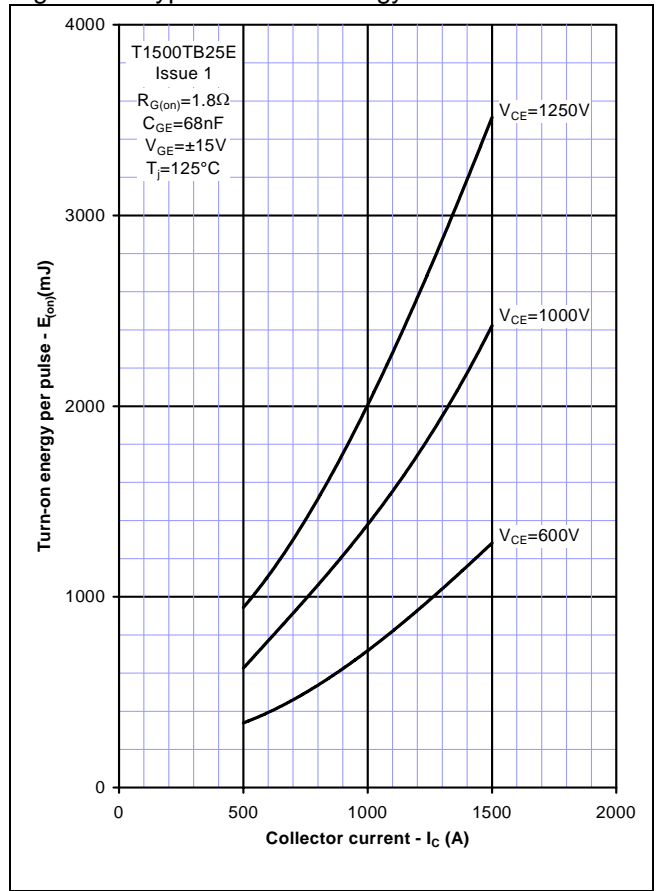


Figure 7 – Typical turn-on energy vs. di/dt

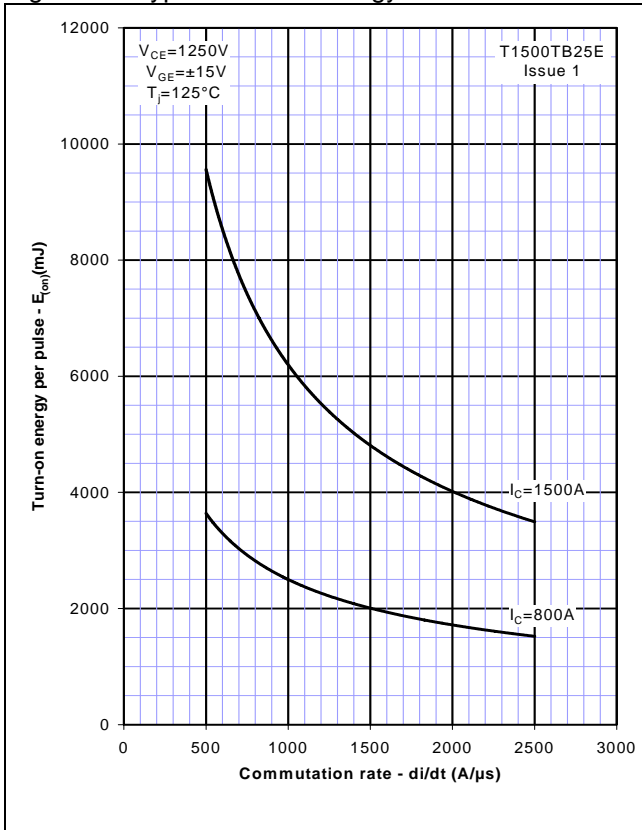


Figure 8 – Typical turn-off energy vs. collector current

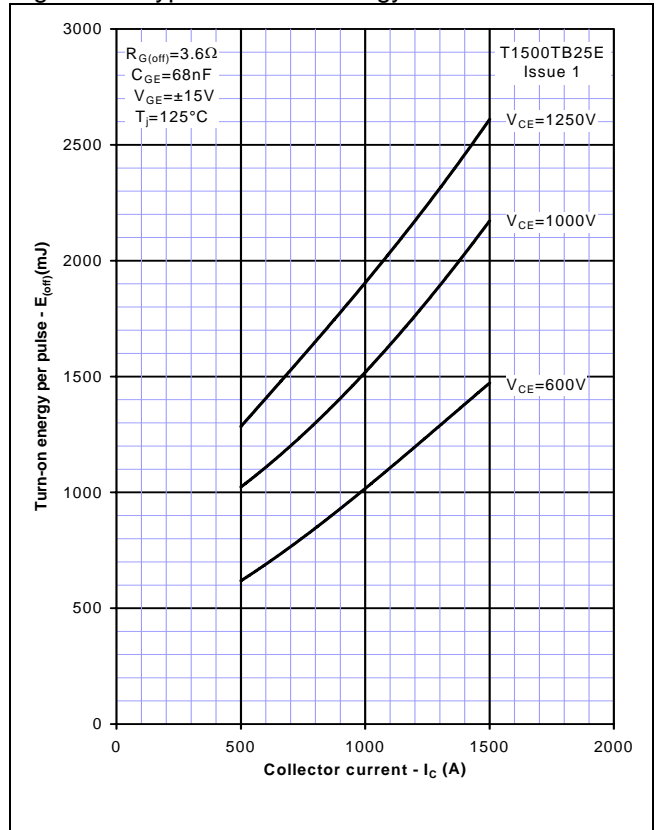


Figure 9 – Turn-off energy vs voltage

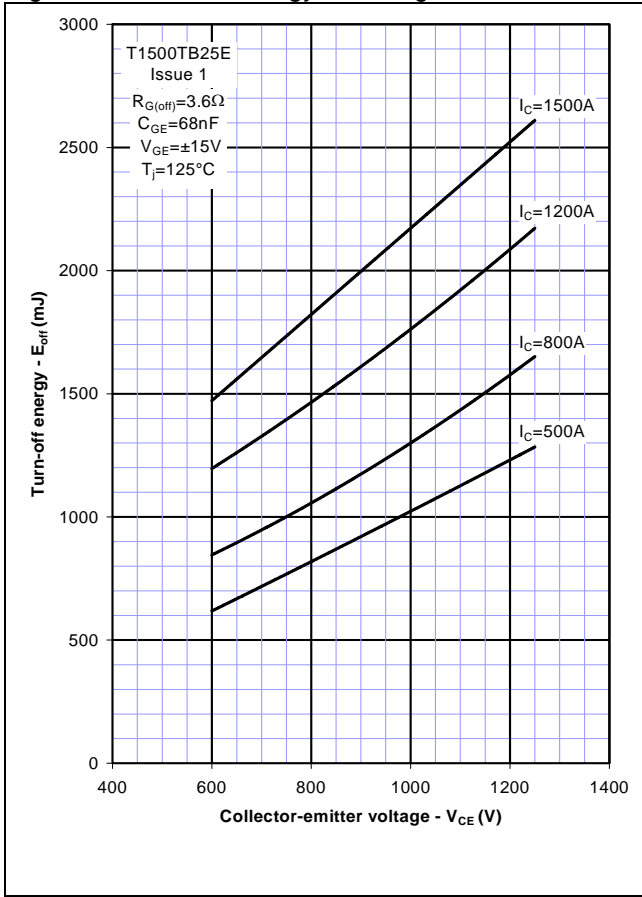


Figure 10 – Safe operating area

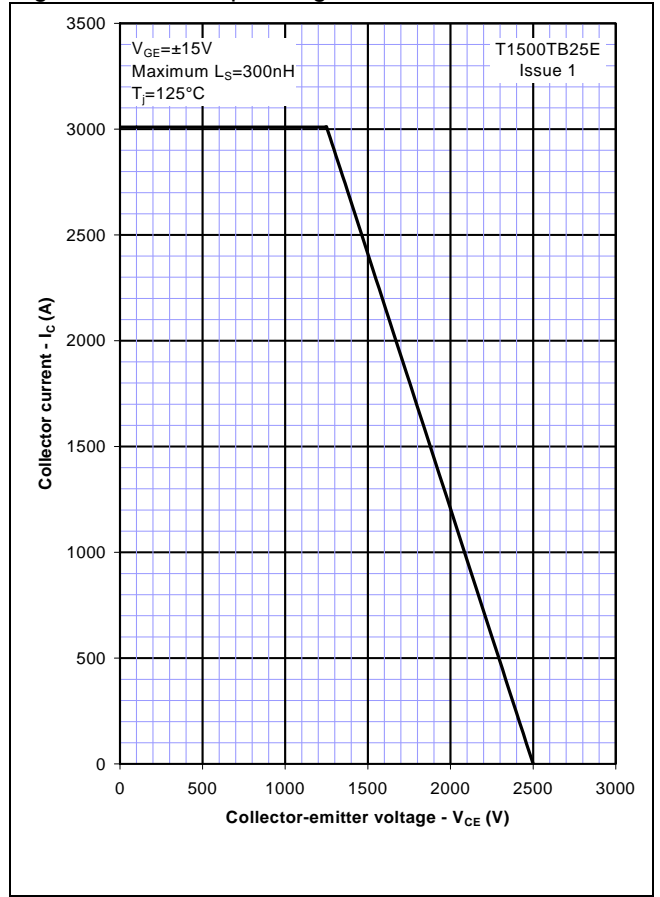
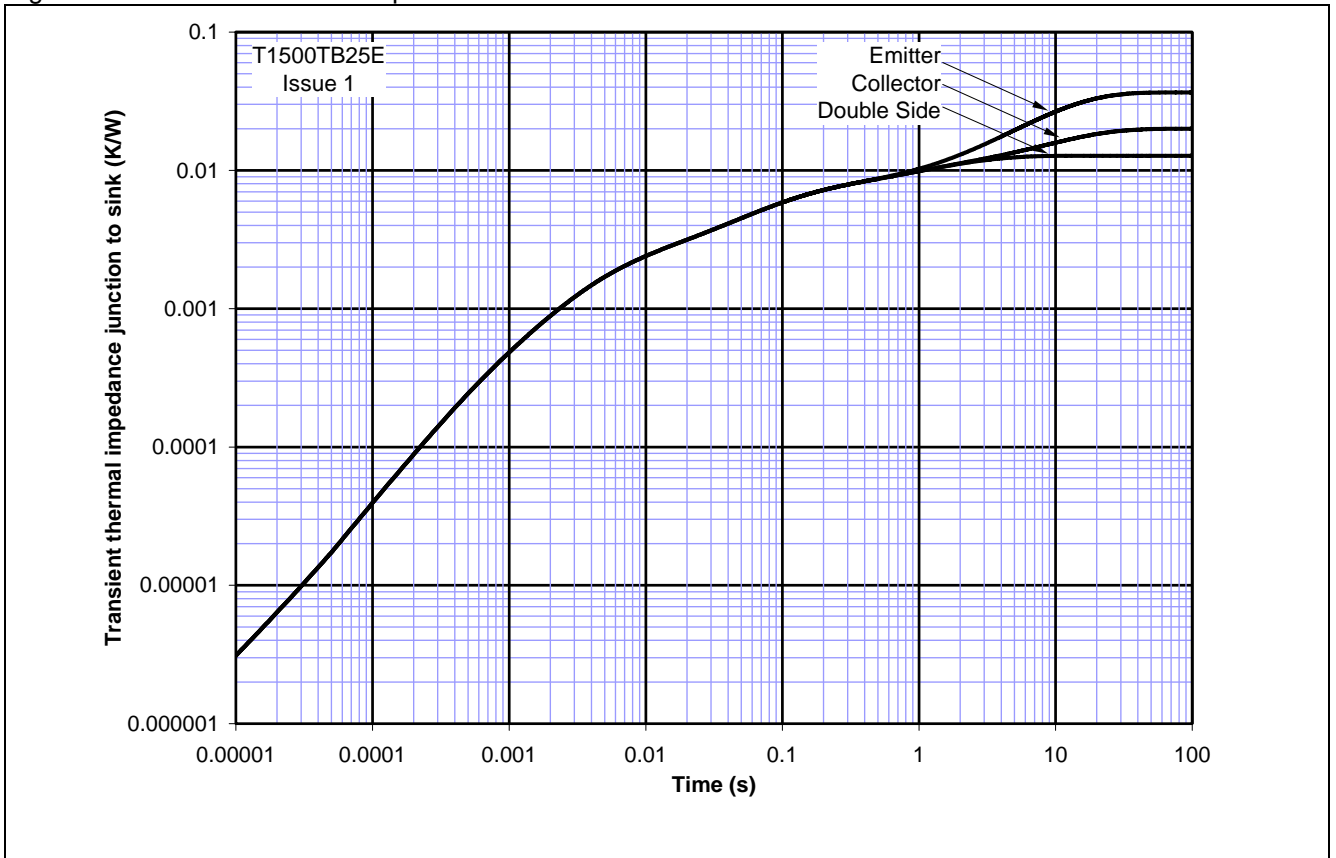
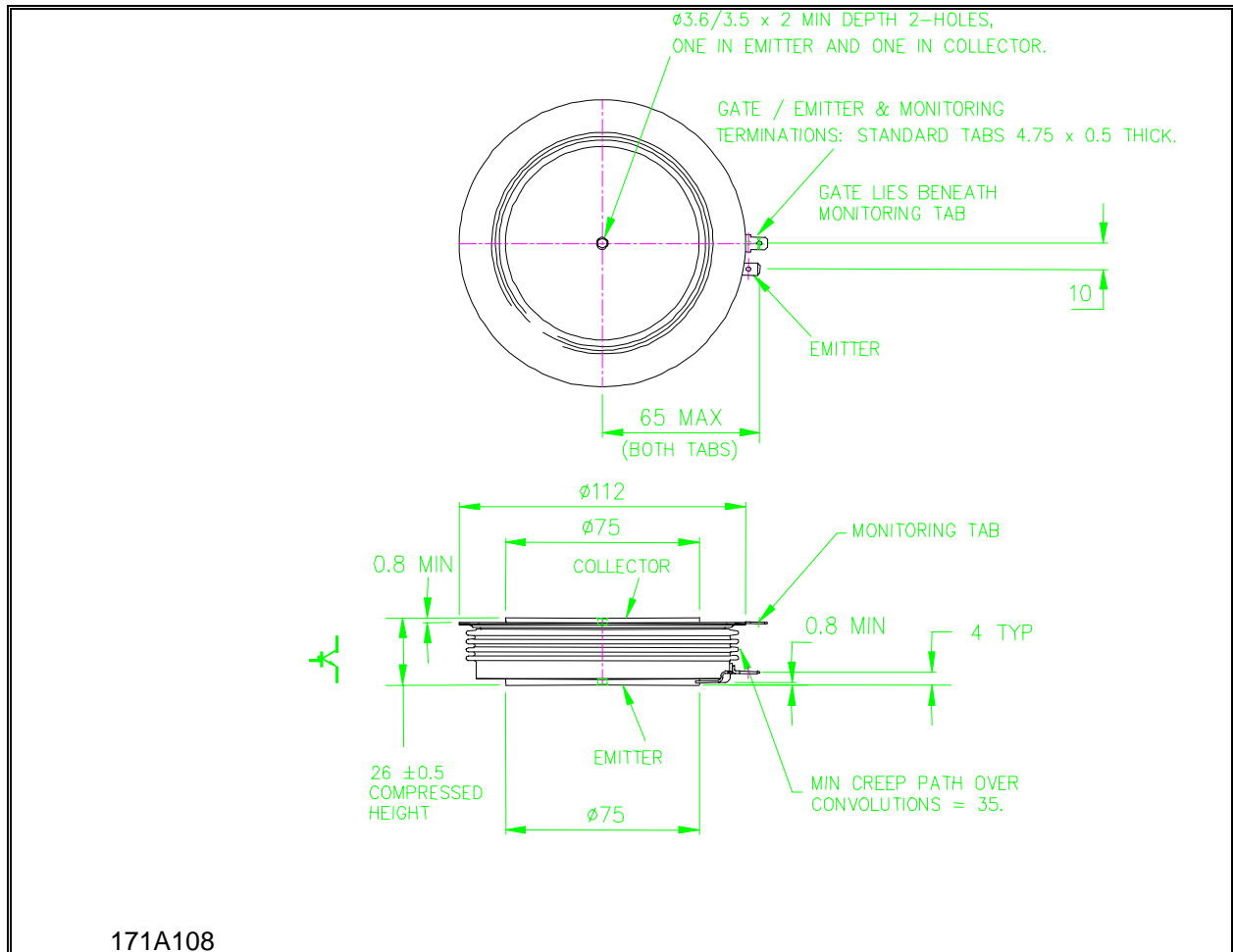


Figure 11 – Transient thermal impedance



**Outline Drawing & Ordering Information**



171A108

**ORDERING INFORMATION**

(Please quote 10 digit code as below)

<b>T1500</b>	<b>TB</b>	<b>25</b>	<b>E</b>
Fixed type Code	Fixed Outline Code	Voltage Grade $V_{CES}/100$ 25	Fixed format code

Typical order code: T1500TB25E ( $V_{CES} = 2500V$ )

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