



Insulated Gate Bi-Polar Transistor

Type T2400GB45E

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{CES}	Collector – emitter voltage	4500	V
$V_{DC \text{ link}}$	Permanent DC voltage for 100 FIT failure rate.	2800	V
V_{GES}	Peak gate – emitter voltage	± 20	V

	RATINGS	MAXIMUM LIMITS	UNITS
I_C	Continuous DC collector current, IGBT	2400	A
I_{CRM}	Repetitive peak collector current, $t_p=1\text{ms}$, IGBT	4800	A
I_{ECO}	Maximum reverse emitter current, $t_p=100\mu\text{s}$, (note 2 & 3)	2400	A
P_{MAX}	Maximum power dissipation, IGBT (note 2)	19	kW
$T_{j \text{ op}}$	Operating temperature range	-40 to +125	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-40 to +125	$^{\circ}\text{C}$

Notes: -

- 1) Unless otherwise indicated $T_j = 125^{\circ}\text{C}$.
- 2) $T_{\text{sink}} = 25^{\circ}\text{C}$, double side cooled.
- 3) Maximum commutation loop inductance 200nH.
- 4) Half-sinewave, 125°C T_j initial.

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$V_{CE(sat)}$	Collector – emitter saturation voltage	-	2.8	3.2	$I_C = 2400A$, $V_{GE} = 15V$, $T_j = 25^\circ C$	V
		-	3.6	4.0	$I_C = 2400A$, $V_{GE} = 15V$	V
V_{T0}	Threshold voltage	-	-	1.49	Current range: 800A – 2400A	V
r_T	Slope resistance	-	-	1.05		m Ω
$V_{GE(TH)}$	Gate threshold voltage	-	5.1	-	$V_{CE} = V_{GE}$, $I_C = 250mA$	V
I_{CES}	Collector – emitter cut-off current	-	45	70	$V_{CE} = V_{CES}$, $V_{GE} = 0V$	mA
I_{GES}	Gate leakage current	-	-	± 30	$V_{GE} = \pm 20V$	μA
C_{ies}	Input capacitance	-	400	-	$V_{CE} = 25V$, $V_{GE} = 0V$, $f = 1MHz$	nF
$t_{d(on)}$	Turn-on delay time	-	1.8	-	$I_C = 2400A$, $V_{CE} = 2800V$, $di/dt = 4000A/\mu s$ $V_{GE} = \pm 15V$, $L_S = 200nH$ $R_{G(ON)} = 2.2\Omega$, $R_{G(OFF)} = 8.2\Omega$, $C_{GE} = 267nF$ Freewheel diode type E2400EC45E at $T_j = 125^\circ C$. (Notes 3, 4 & 5)	μs
$t_r(V)$	Rise time	-	3.6	-		μs
$Q_{g(on)}$	Turn-on gate charge	-	18	-		μC
E_{on}	Turn-on energy	-	14	-		J
$t_{d(off)}$	Turn-off delay time	-	5.1	-		μs
$t_f(I)$	Fall time	-	2.4	-		μs
$Q_{g(off)}$	Turn-off gate charge	-	14	-		μC
E_{off}	Turn-off energy	-	13	-		J
I_{sc}	Short circuit current	-	9500	-	$V_{GE} = +15V$, $V_{CC} = 2800V$, $V_{CEmax} \leq V_{CES}$, $t_p \leq 10\mu s$	A

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R_{thJK}	Thermal resistance junction to sink, IGBT	-	-	5.2	Double side cooled	K/kW
		-	-	8.5	Collector side cooled	K/kW
		-	-	13.5	Emitter side cooled	K/kW
F	Mounting force	50	-	70	Note 2	kN
W_t	Weight	-	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 circuit.
- 4) E_{on} integration time 15 μs from 10% rising I_G .
- 5) E_{off} integration time 15 μs from 90% falling V_{GE} .
- 6) Freewheeling diode changed from E2400TC45C to E2400EC45E.

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

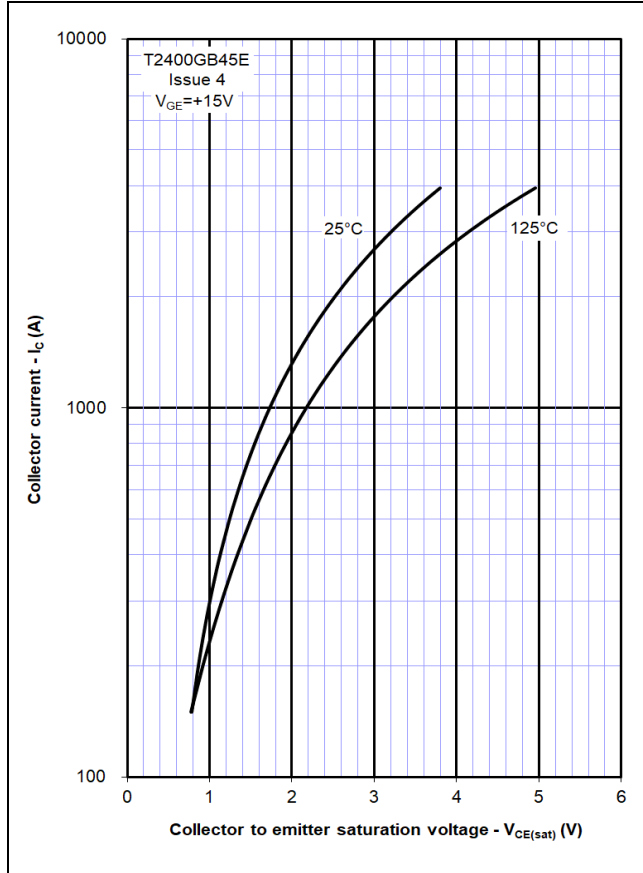


Figure 2 – Typical output characteristic

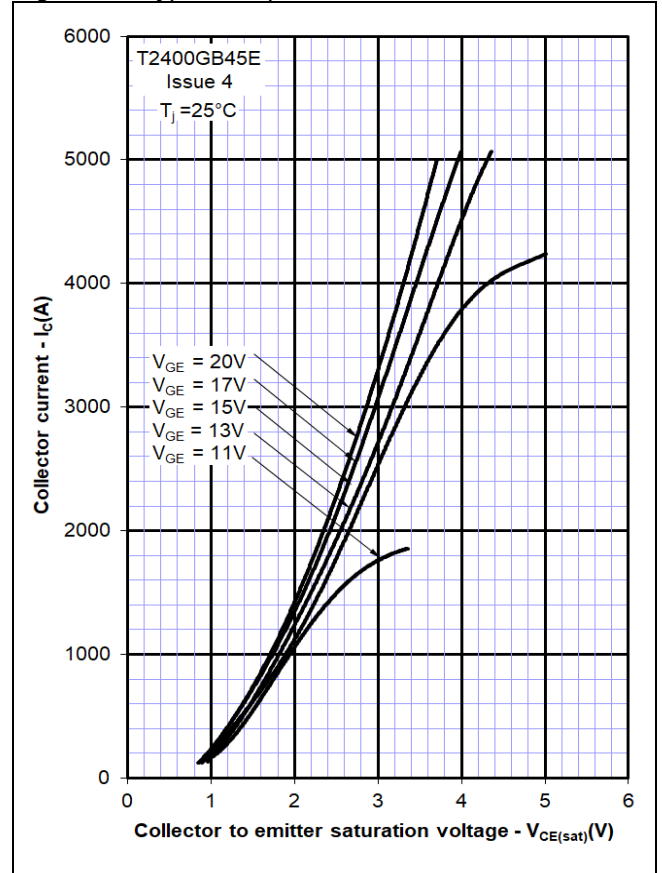


Figure 3 – Typical output characteristic

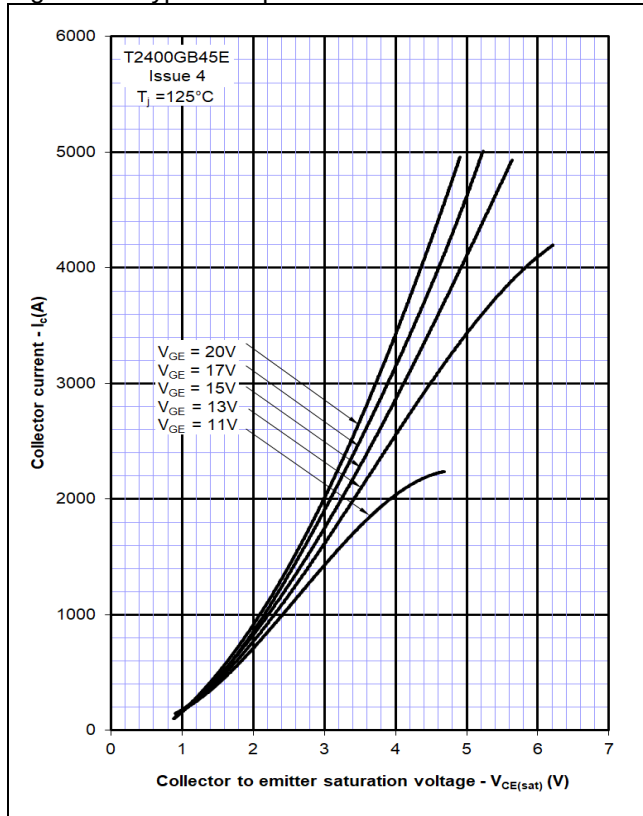


Figure 4 – Typical turn-on delay time vs gate resistance

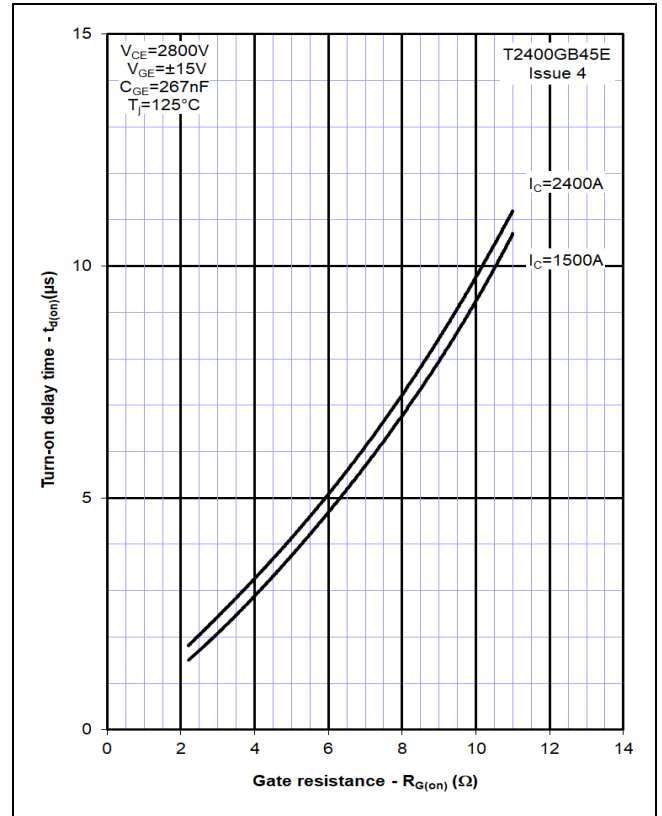


Figure 5 – Typical turn-off delay time vs. gate resistance

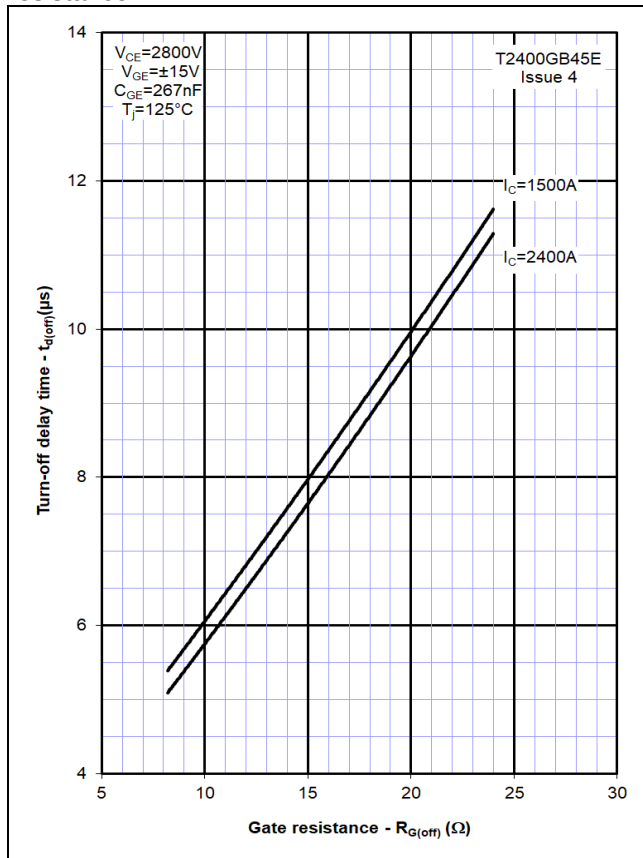


Figure 6 – Typical turn-on energy vs. collector current

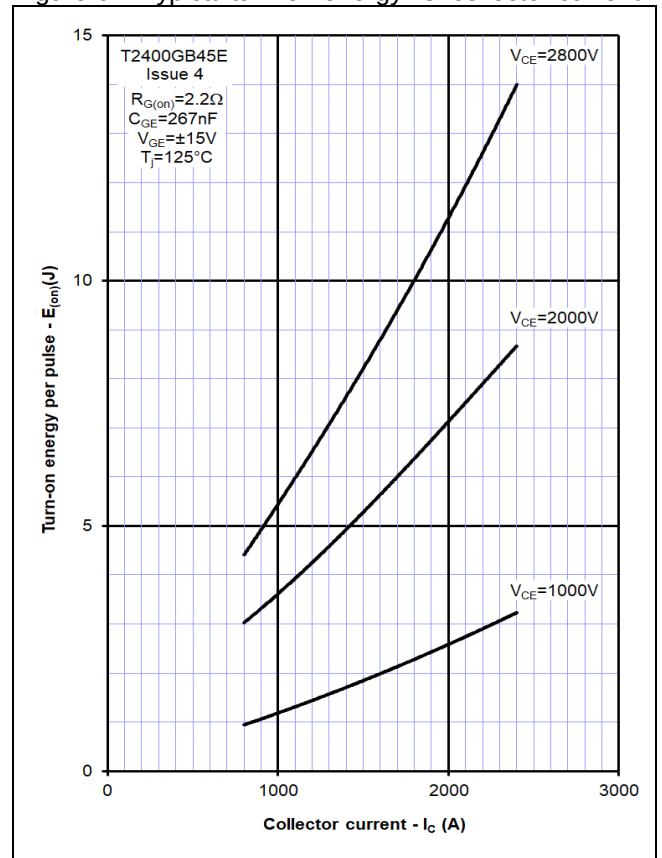


Figure 7 – Typical turn-on energy vs. di/dt

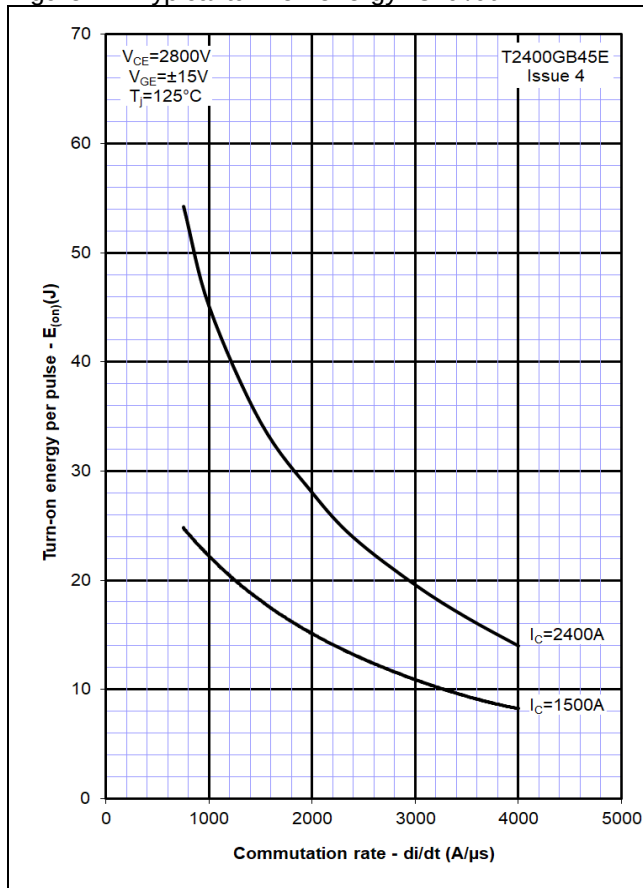


Figure 8 – Typical turn-off energy vs. collector current

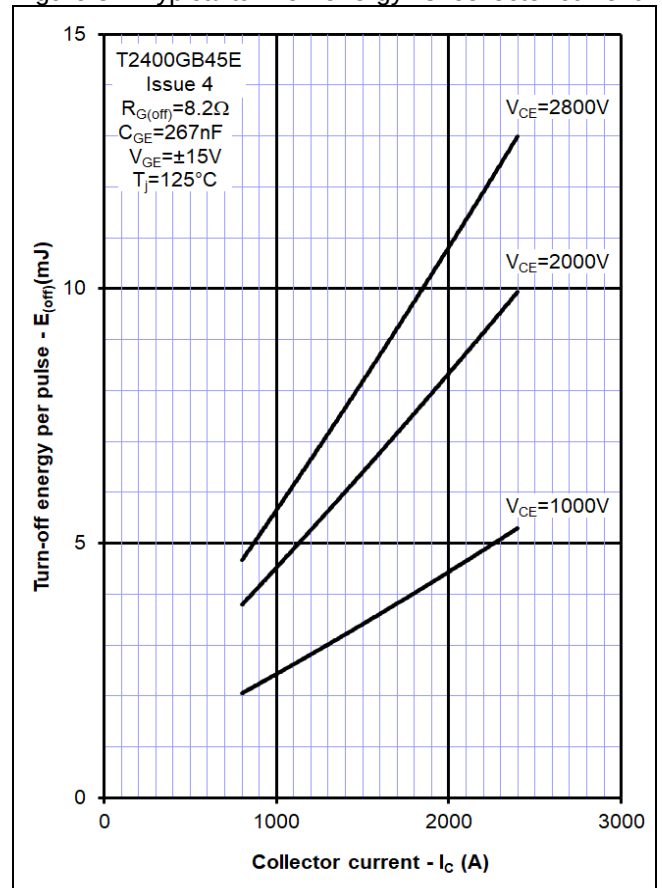


Figure 9 – Turn-off energy vs voltage

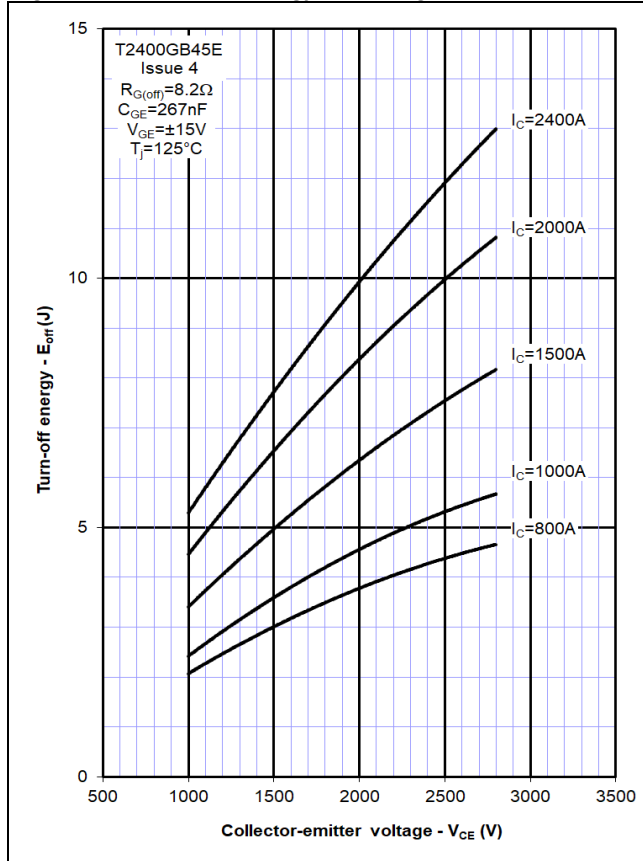


Figure 10 – Safe operating area

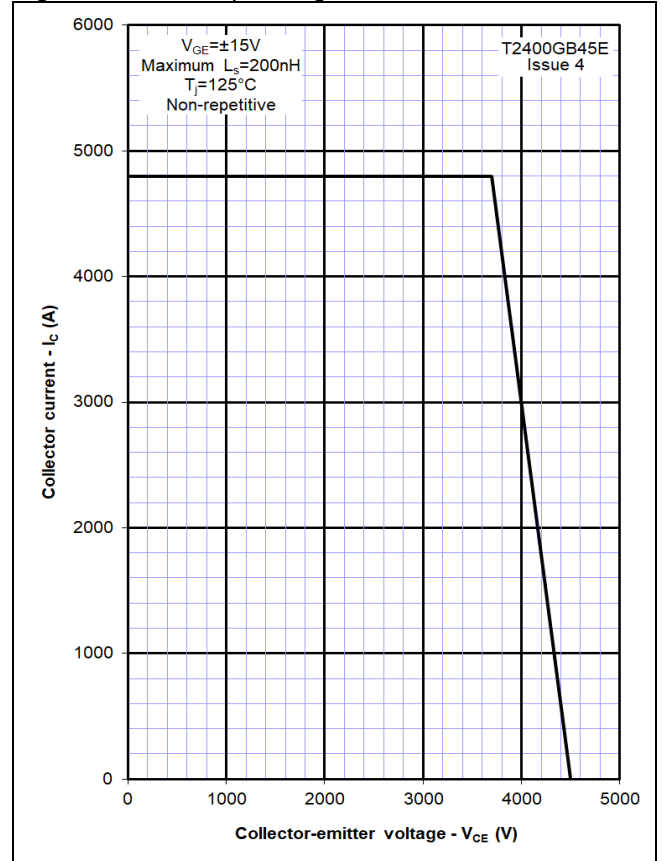
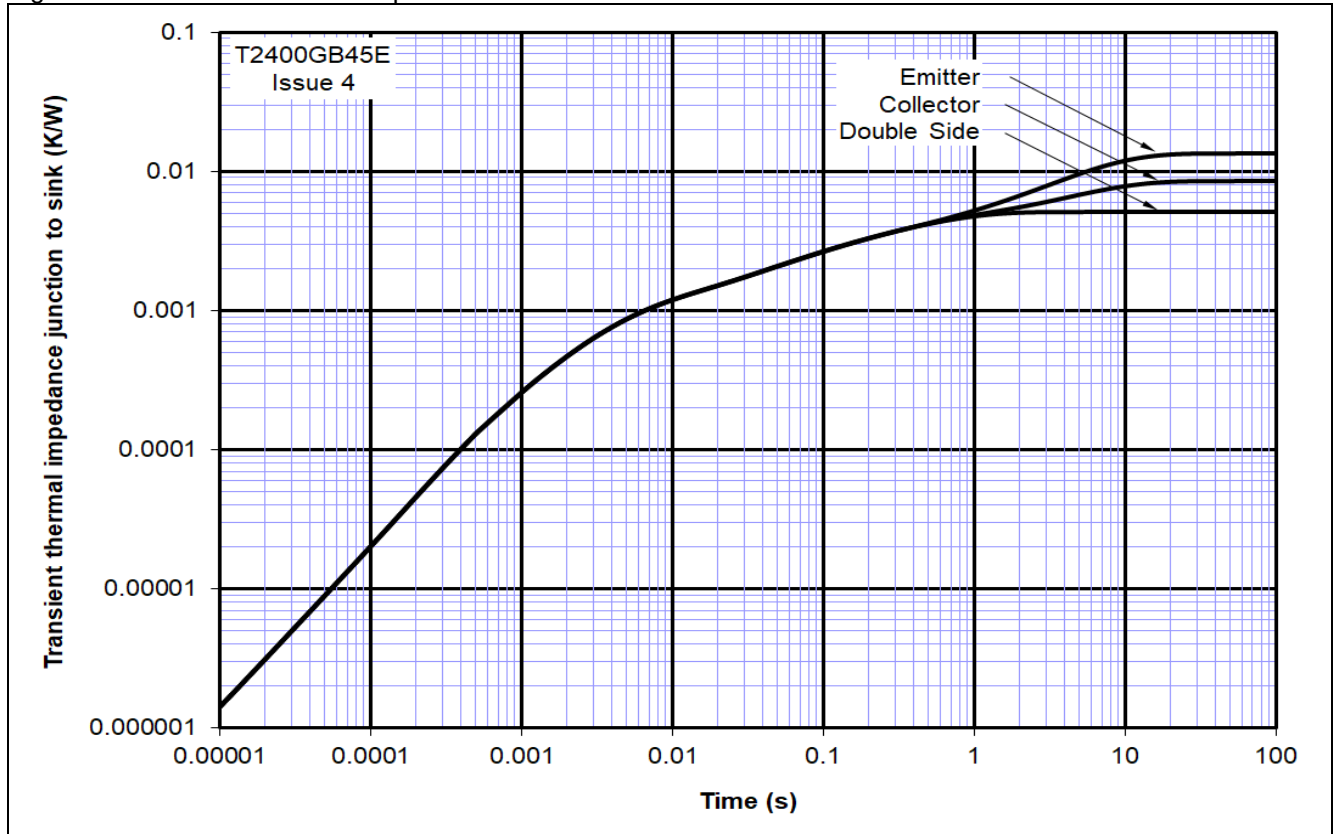
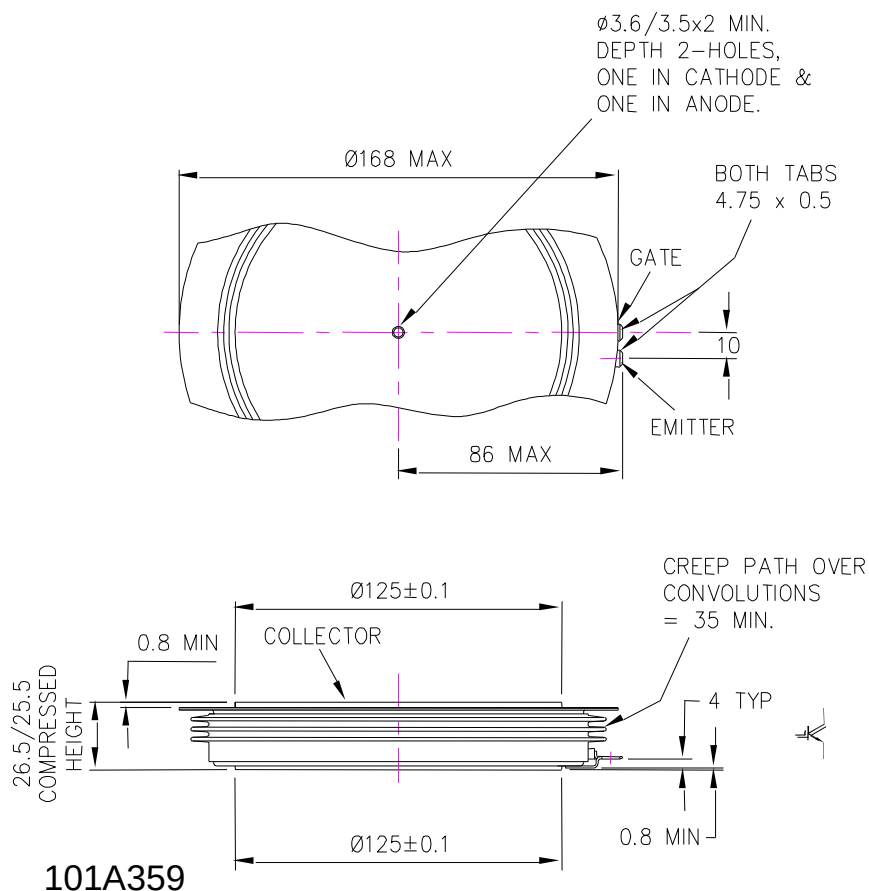


Figure 11 – Transient thermal impedance



Outline Drawing & Ordering Information



ORDERING INFORMATION

(Please quote 10 digit code as below)

T2400	GB	45	E
Fixed type Code	Fixed Outline Code	Voltage Grade $V_{CES}/100$ 45	Fixed format code

 Typical order code: T2400GB45E ($V_{CES} = 4500V$)

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