



Insulated Gate Bi-Polar Transistor Type T2400GB45E

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V _{CES}	Collector – emitter voltage	4500	V
V _{DC 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 =1ms, IGBT	4800	A
I _{ECO}	Maximum reverse emitter current, t _p =100µs, (note 2 & 3)	2400	A
P _{MAX}	Maximum power dissipation, IGBT (note 2)	19	kW
T _{j op}	Operating temperature range	-40 to +125	°C
T _{stg}	Storage temperature range	-40 to +125	°C

Notes: -

- 1) Unless otherwise indicated T_j = 125°C.
- 2) T_{sink} = 25°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°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		mΩ
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} = ±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/μs V _{GE} = ±15V, L _S = 200nH	μs
t _{r(V)}	Rise time	-	3.6	-		μs
Q _{g(on)}	Turn-on gate charge	-	18	-	R _{G(ON)} = 2.2Ω, R _{G(OFF)} = 8.2Ω, C _{GE} = 267nF Freewheel diode type E2400EC45E at T _j = 125°C.	μC
E _{on}	Turn-on energy	-	14	-		J
t _{d(off)}	Turn-off delay time	-	5.1	-	(Notes 3, 4 & 5)	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} ≤ V _{CES} , t _p ≤ 10μs	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°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 15μs from 10% rising I_G.
- 5) E_{off} integration time 15μs from 90% falling V_{GE}.
- 6) Freewheeling diode changed from E2400TC45C to E2400EC45E.

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

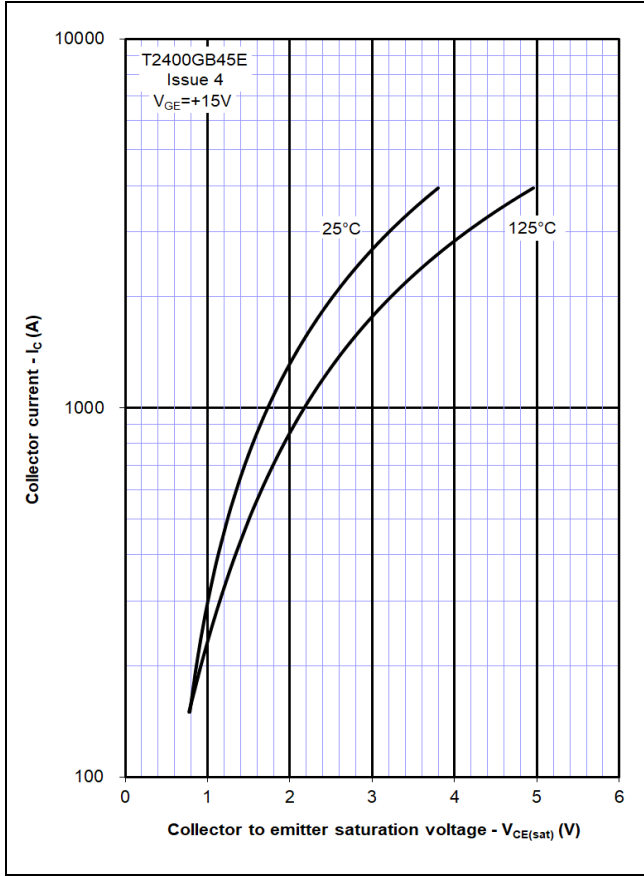


Figure 2 – Typical output characteristic

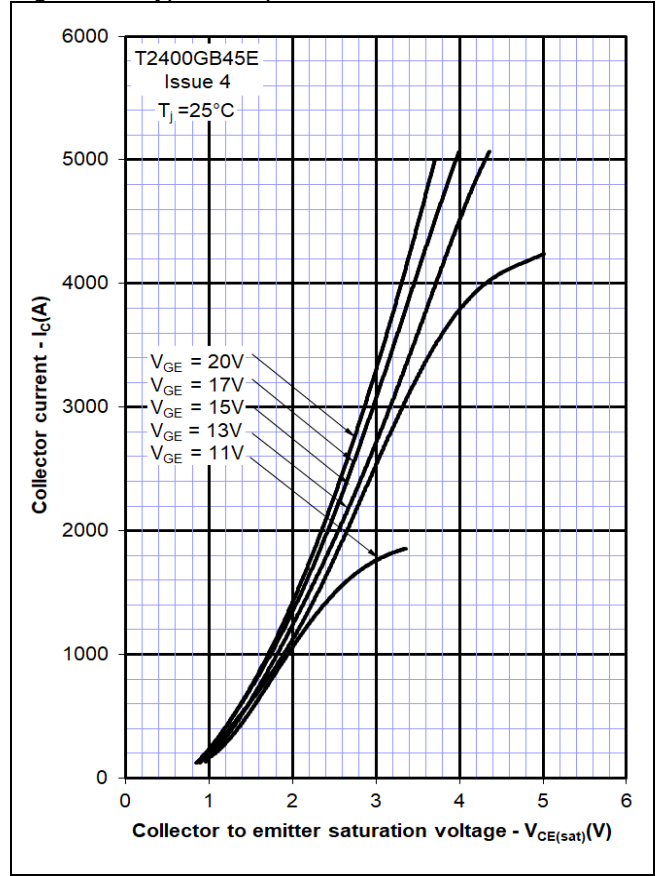


Figure 3 – Typical output characteristic

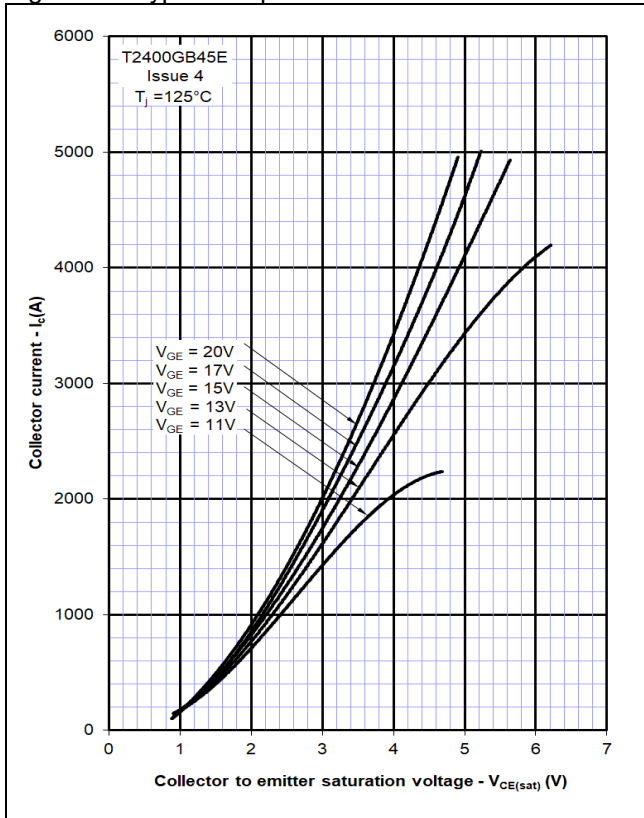


Figure 4 – Typical turn-on delay time vs gate resistance

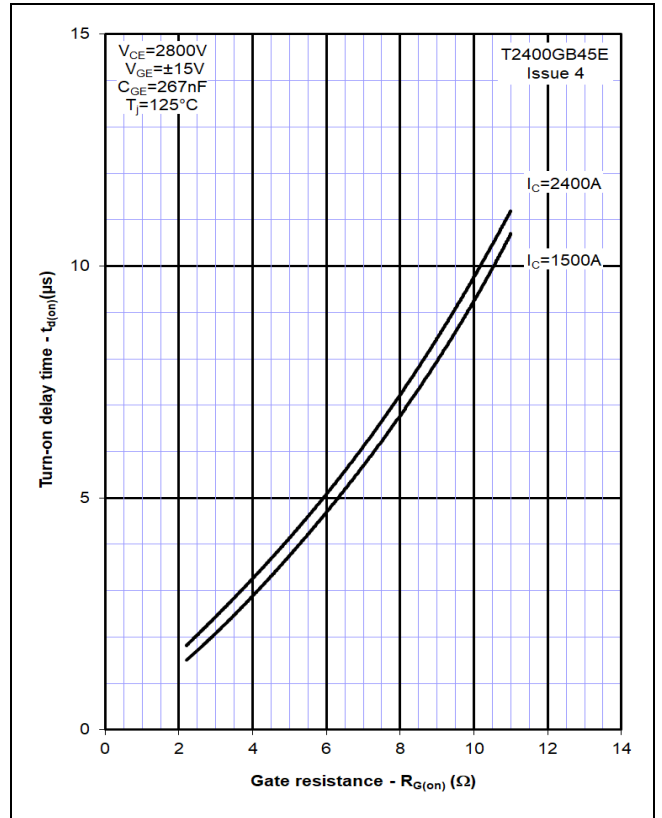


Figure 5 – Typical turn-off delay time vs. gate resistance

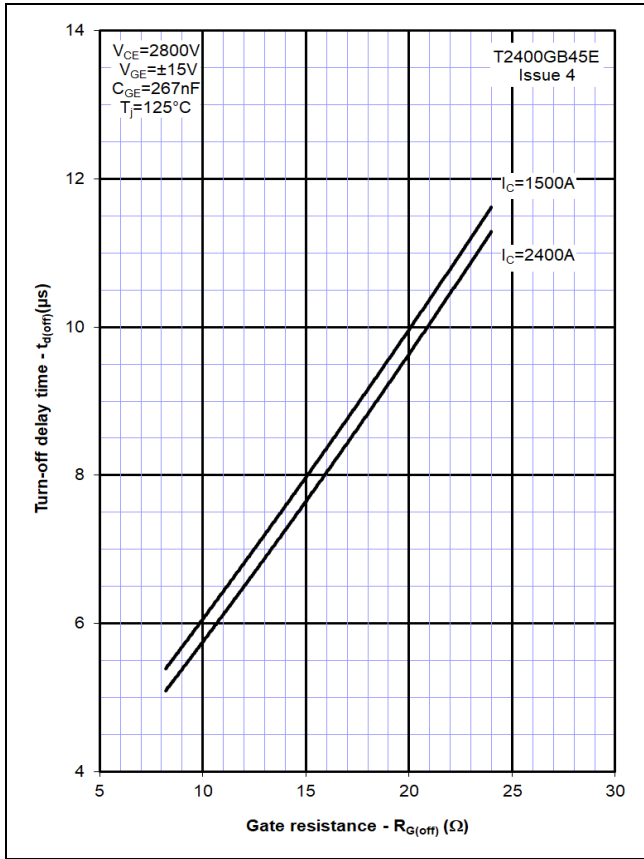


Figure 6 – Typical turn-on energy vs. collector current

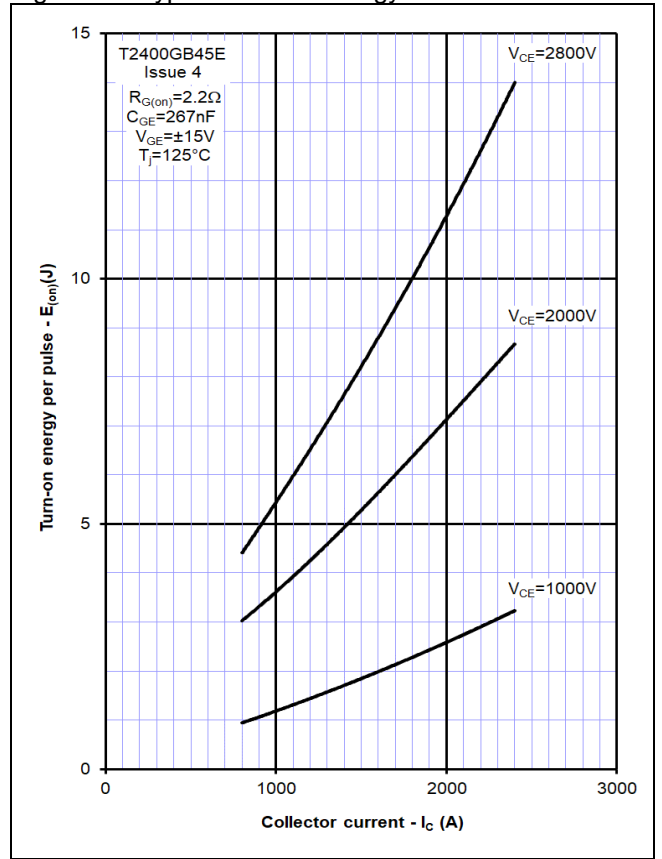


Figure 7 – Typical turn-on energy vs. di/dt

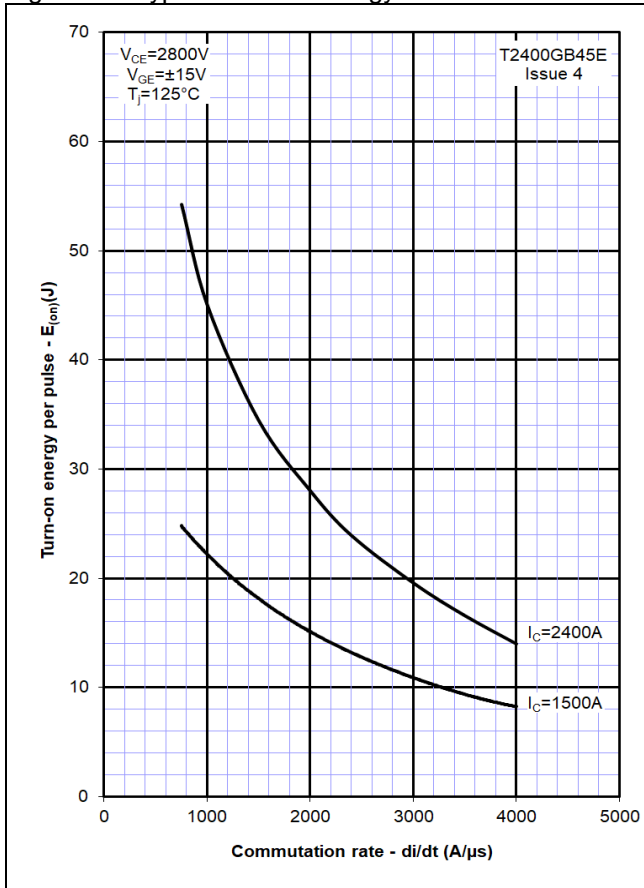


Figure 8 – Typical turn-off energy vs. collector current

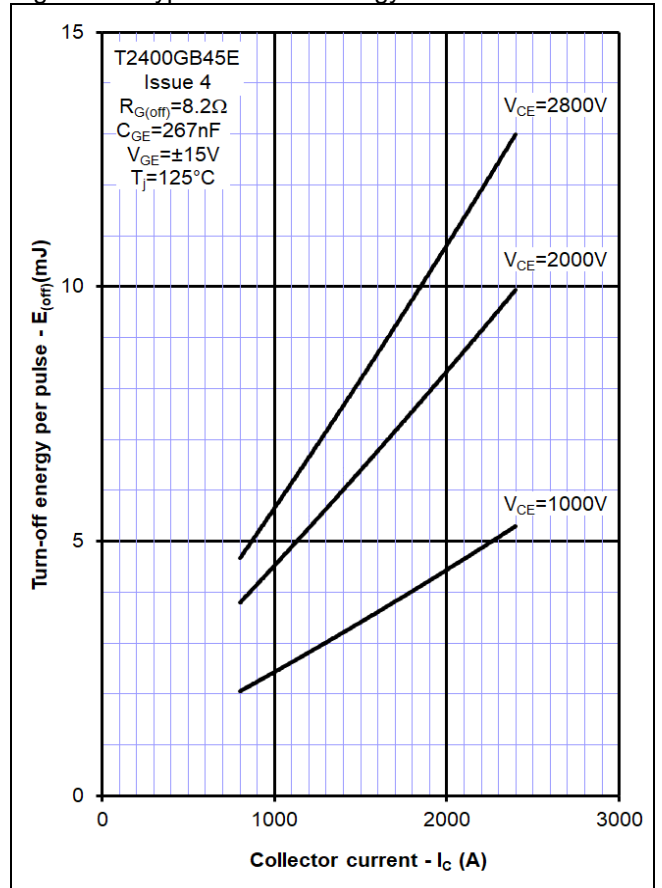


Figure 9 – Turn-off energy vs voltage

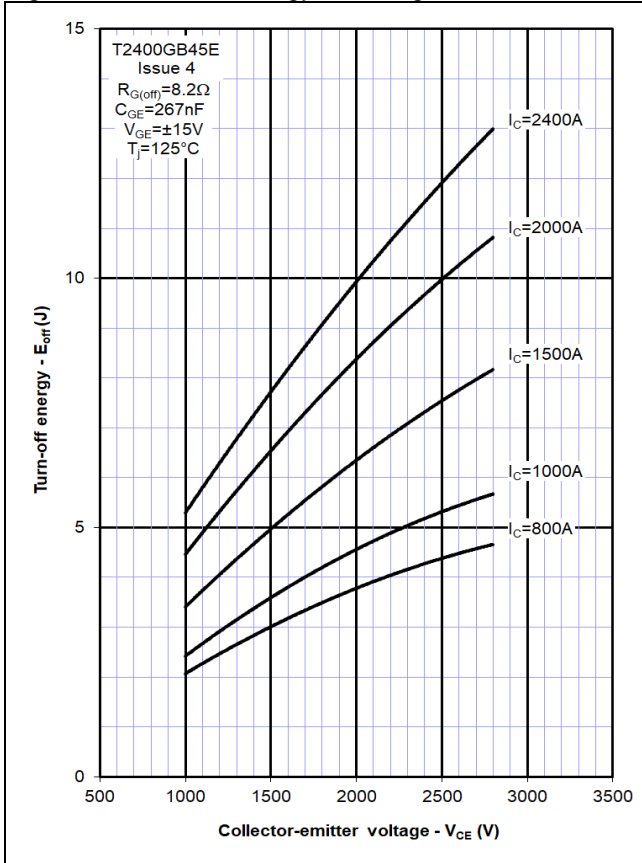


Figure 10 – Safe operating area

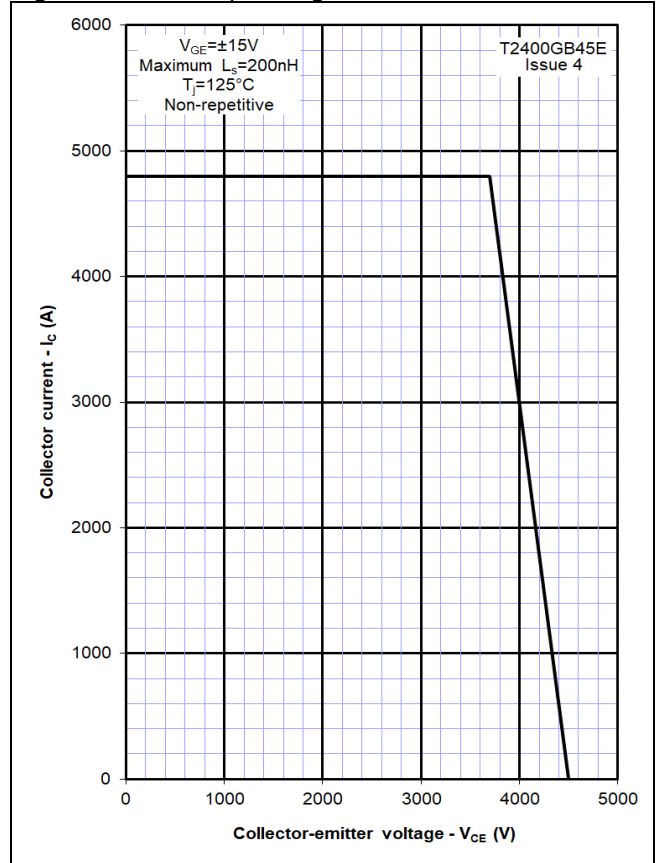
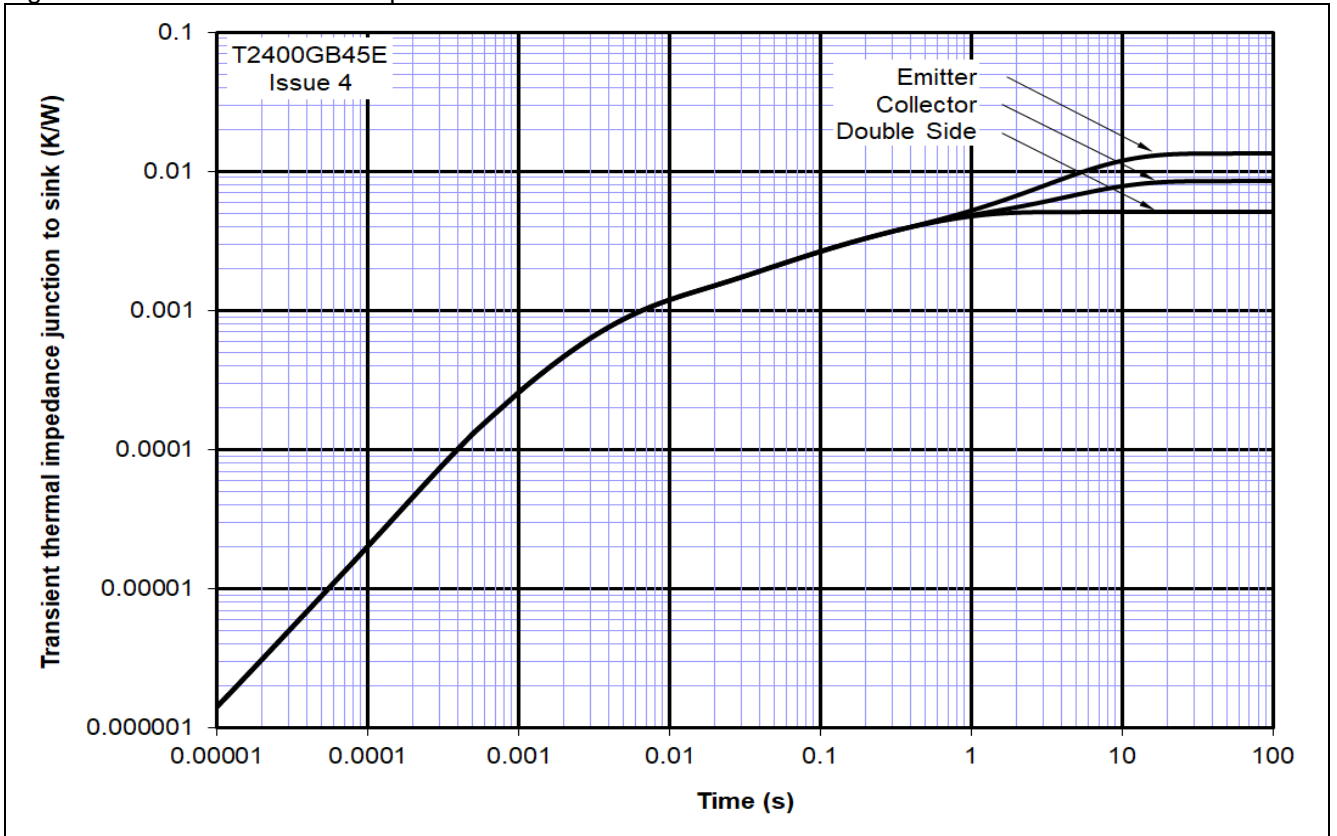
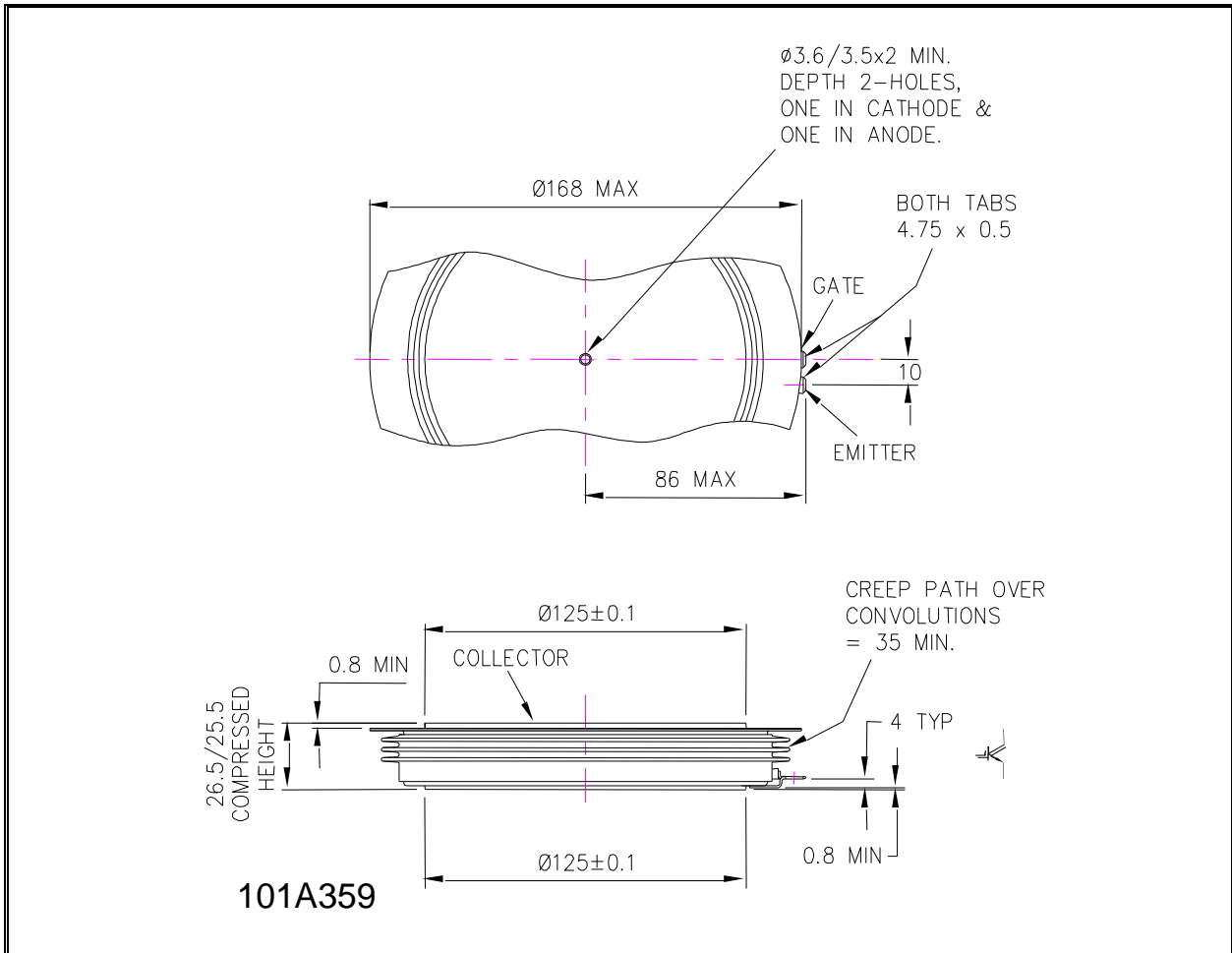


Figure 11 – Transient thermal impedance



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 ($V_{CES} = 4500V$)

IXYS Semiconductor GmbH
 Edisonstraße 15
 D-68623 Lampertheim
 Tel: +49 6206 503-0
 Fax: +49 6206 503-627
 E-mail: marcom@ixys.de



IXYS UK Westcode Ltd
 Langley Park Way, Langley Park,
 Chippenham, Wiltshire, SN15 1GE.
 Tel: +44 (0)1249 444524
 E-mail: sales@ixysuk.com

IXYS Corporation
 1590 Buckeye Drive
 Milpitas CA 95035-7418
 Tel: +1 (408) 457 9000
 Fax: +1 (408) 496 0670
 E-mail: sales@ixys.net

www.littelfuse.com
www.ixysuk.com
www.ixys.net

IXYS Long Beach
 IXYS Long Beach, Inc
 2500 Mira Mar Ave, Long Beach
 CA 90815
 Tel: +1 (562) 296 6584
 Fax: +1 (562) 296 6585
 E-mail: service@ixyslongbeach.com

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