



Tentative Data

Insulated Gate Bi-Polar Transistor

Type T1500EC33E

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{CES}	Collector – emitter voltage	3300	V
$V_{DC\ link}$	Permanent DC voltage for 100 FIT failure rate.	1800	V
V_{GES}	Peak gate – emitter voltage	±20	V

	RATINGS	MAXIMUM LIMITS	UNITS
I_C	Continuous 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)	3000	A
P_{MAX}	Maximum power dissipation, IGBT (note 2)	9.6	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 $T_j = 125^\circ C$.
- 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	-	2.57	2.97	I _C = 1500A, V _{GE} = 15V, T _j = 25°C	V
		-	3.40	3.80	I _C = 1500A, V _{GE} = 15V	V
V ₀	Threshold voltage	-	-	1.79	Current range: 500A – 1500A	V
r _s	Slope resistance	-	-	1.34		mΩ
V _{GE(TH)}	Gate threshold voltage	-	5.3	-	V _{CE} = V _{GE} , I _C = 125mA	V
I _{CES}	Collector – emitter cut-off current	-	13	40	V _{CE} = V _{CES} , V _{GE} = 0V	mA
I _{GES}	Gate leakage current	-	-	±15	V _{GE} = ±20V	μA
C _{ies}	Input capacitance	-	200	-	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz	nF
t _{d(on)}	Turn-on delay time	-	1.7	-	I _C = 1500A, V _{CE} = 1800V, di/dt = 2700A/μs	μs
t _{r(V)}	Rise time	-	1.6	-		μs
Q _{g(on)}	Turn-on gate charge	-	25	-	V _{GE} = ±15V, L _s = 320μH	μC
E _{on}	Turn-on energy	-	3.9	-	R _{G(ON)} = 1.5Ω, R _{G(OFF)} = 10Ω, C _{GE} = TBC	J
t _{d(off)}	Turn-off delay time	-	5.3	-	Freewheel diode type E1500MC33E at T _j = 125°C	μs
t _{f(I)}	Fall time	-	1.5	-		μs
Q _{g(off)}	Turn-off gate charge	-	20	-	(Notes 3, 4 & 5)	μC
E _{off}	Turn-off energy	-	4.1	-		J
I _{sc}	Short circuit current	-	4500	-	V _{GE} = +15V, V _{CC} = 1800V, 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	-	-	10.4	Double side cooled	K/kW
		-	-	17	Collector side cooled	K/kW
		-	-	26.9	Emitter side cooled	K/kW
F	Mounting force	25	-	35	Note 2	kN
W _t	Weight	-	1.2	-		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}.

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

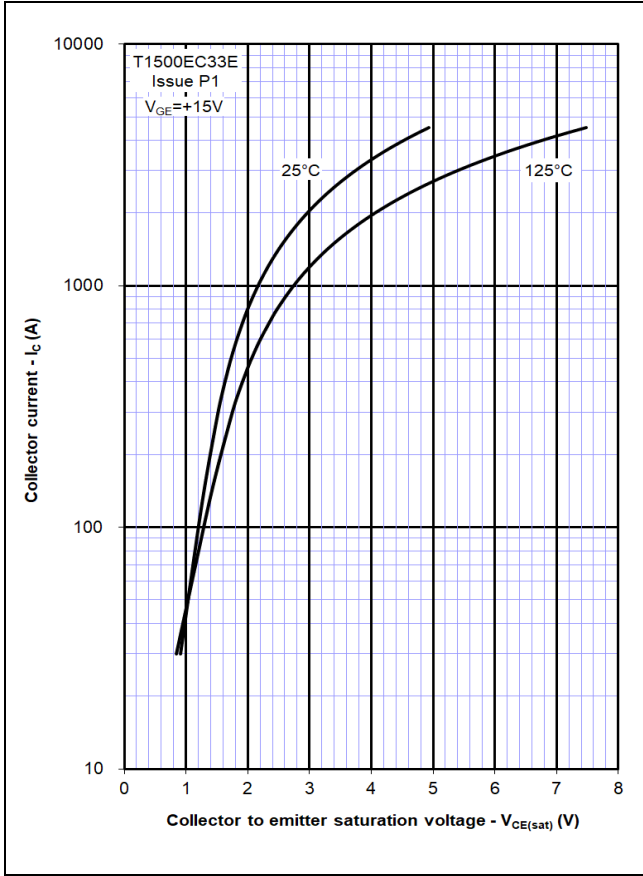


Figure 2 – Typical output characteristic

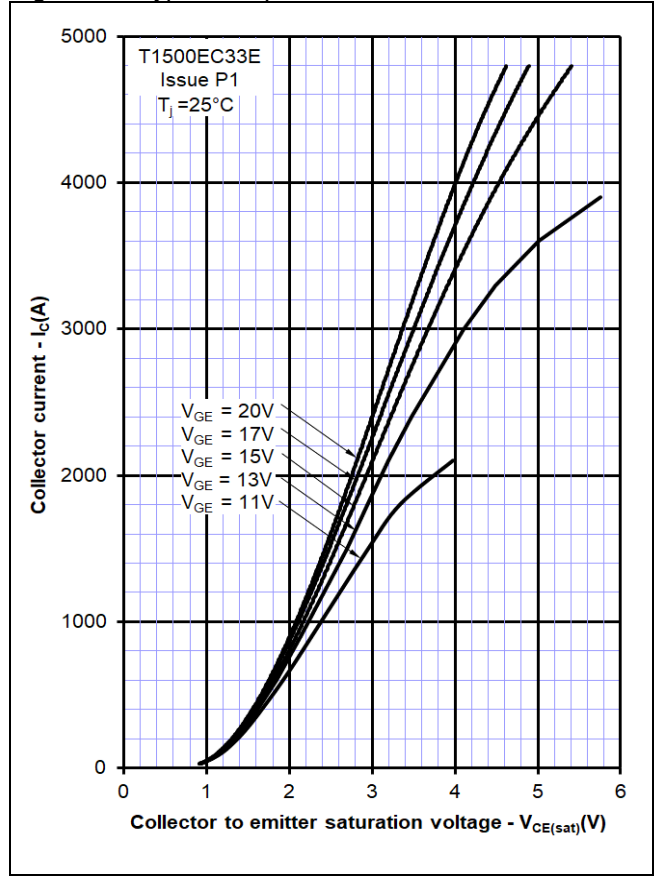


Figure 3 – Typical output characteristic

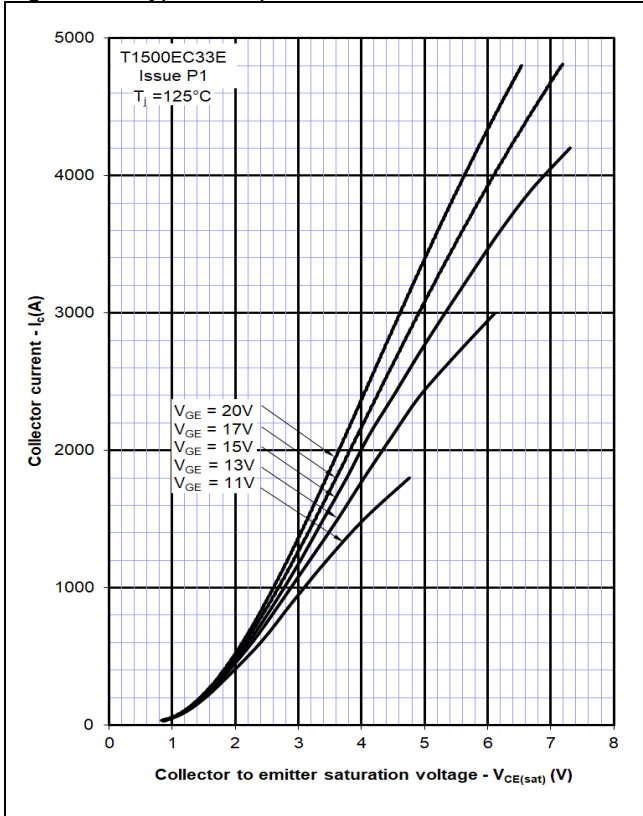


Figure 4 – Typical turn-on delay time vs gate resistance

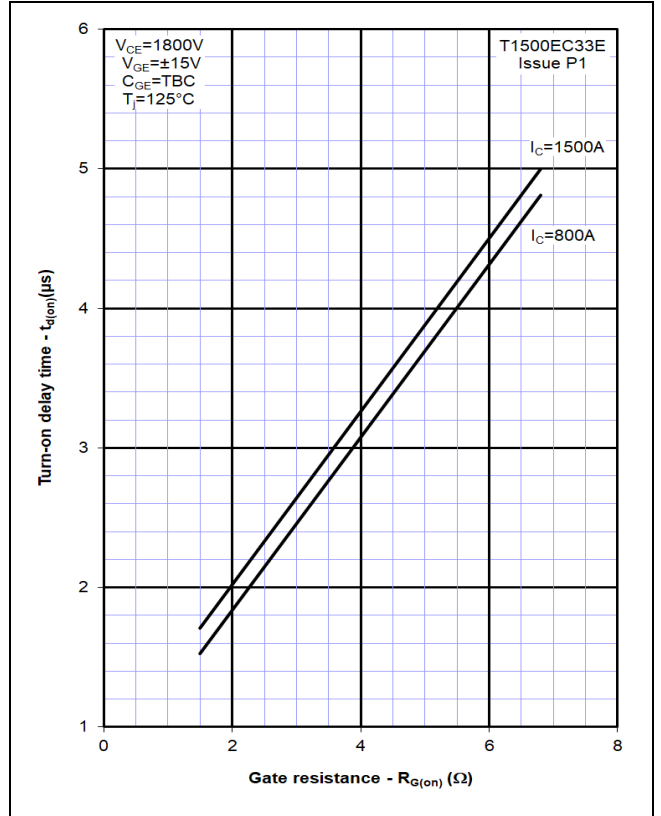


Figure 5 – Typical turn-off delay time vs. gate resistance

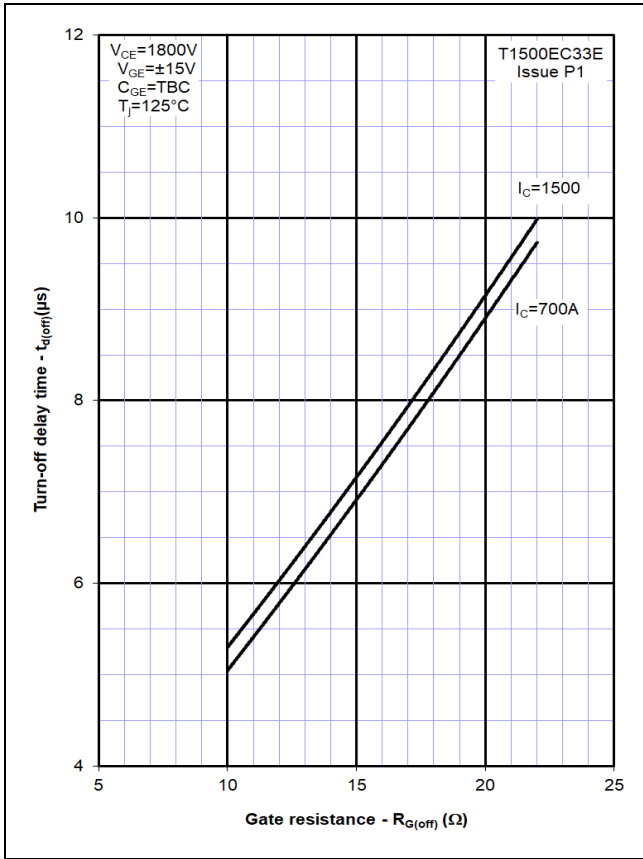


Figure 6 – Typical turn-on energy vs. collector current

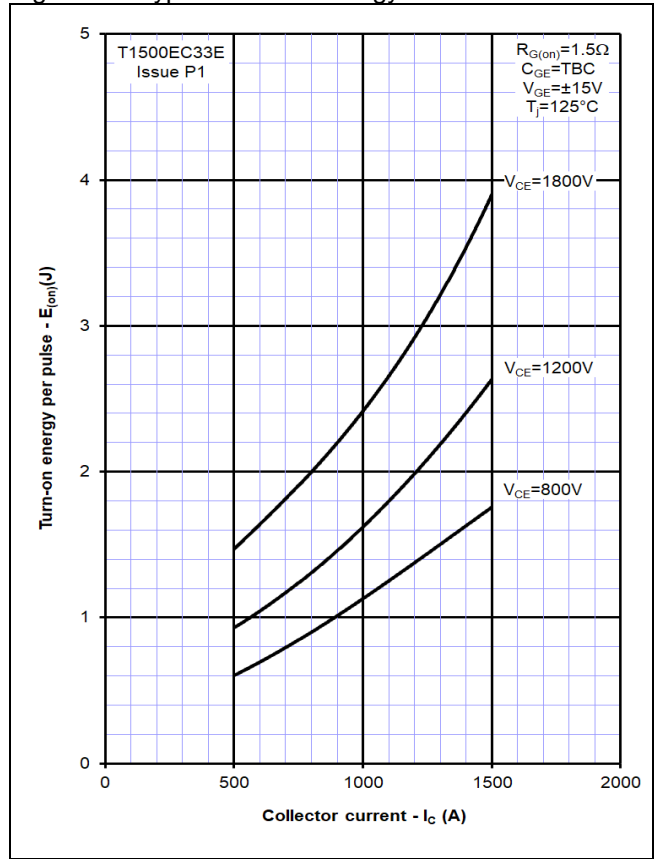


Figure 7 – Typical turn-on energy vs. di/dt

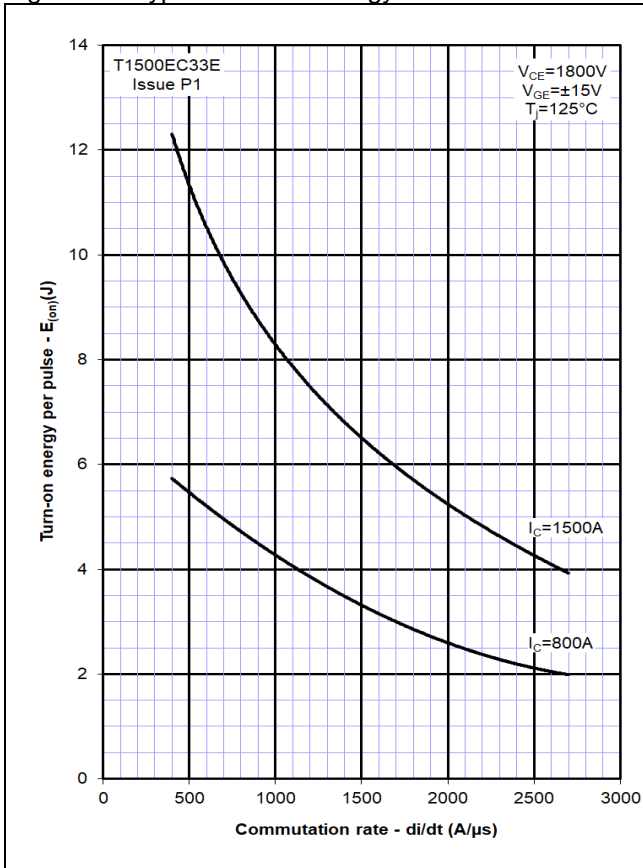


Figure 8 – Typical turn-off energy vs. collector current

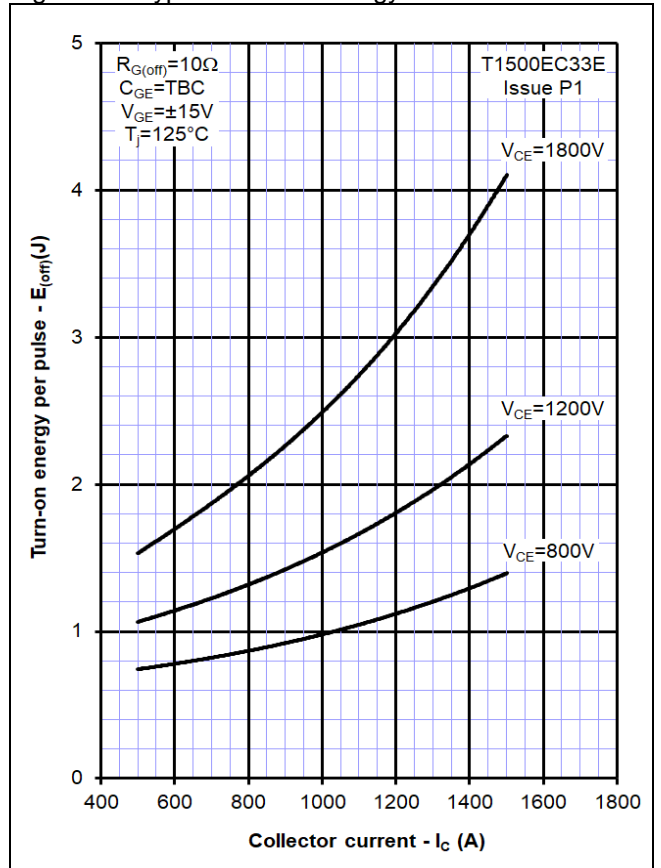


Figure 9 – Turn-off energy vs voltage

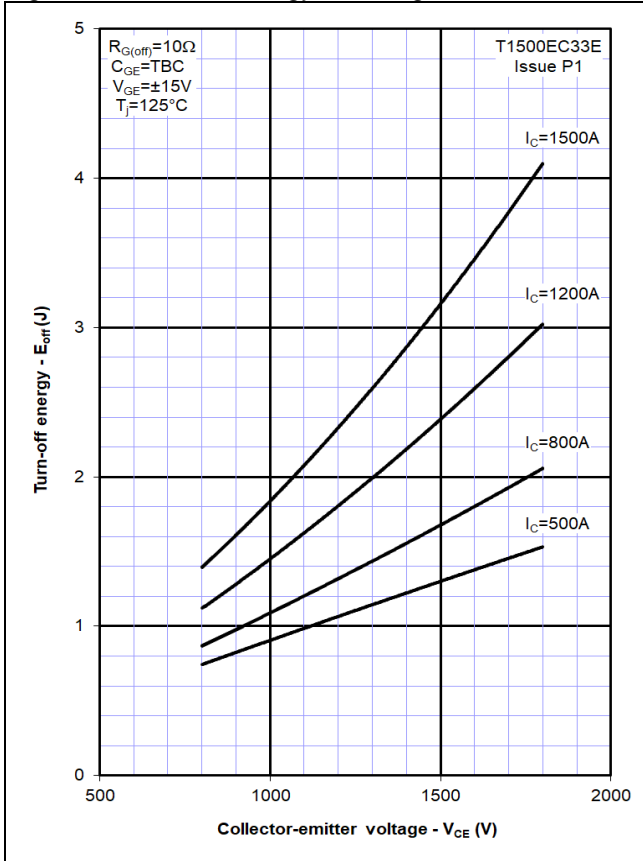


Figure 10 – Safe operating area

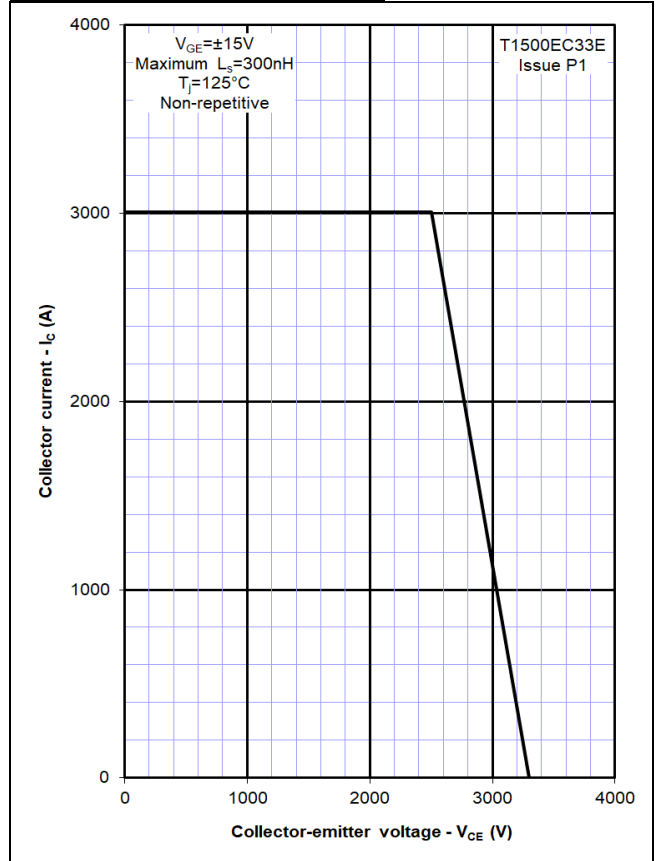
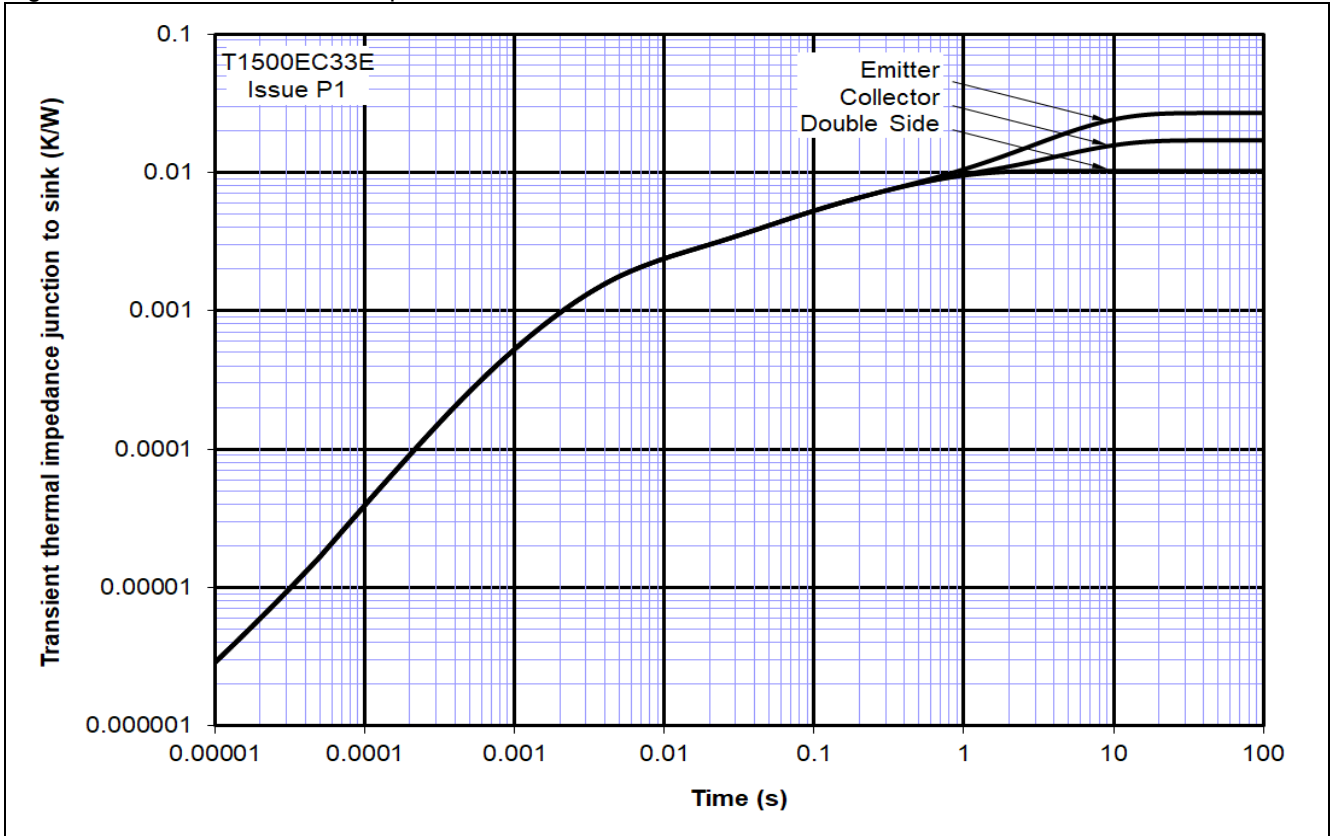
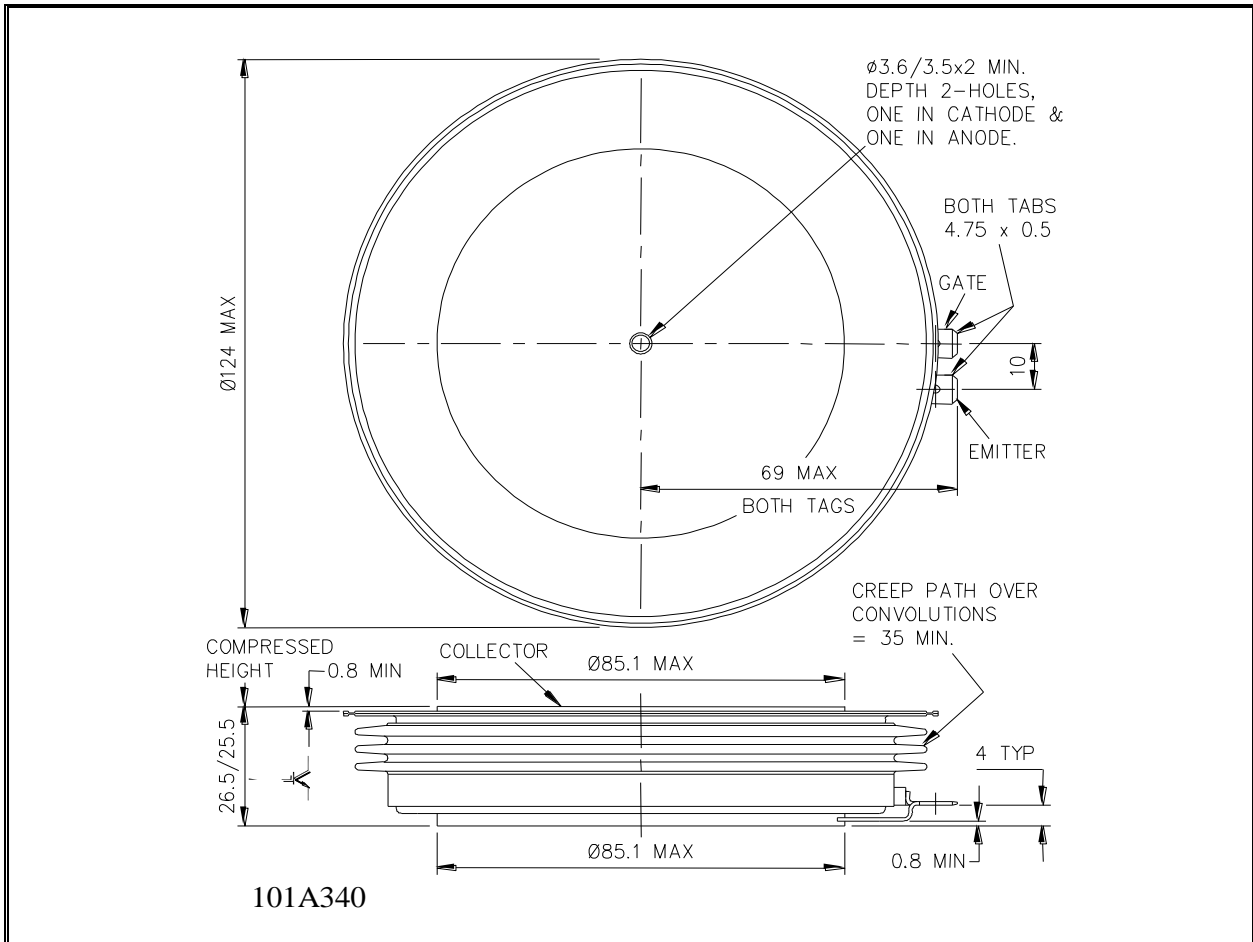


Figure 11 – Transient thermal impedance



Outline Drawing & Ordering Information



ORDERING INFORMATION

(Please quote 10 digit code as below)

T1500	EC	33	E
Fixed type Code	Fixed Outline Code	Voltage Grade $V_{CES}/100$ 33	Fixed format code

 Typical order code: T1500EC33E ($V_{CES} = 3300V$)

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



IXYS
 A Littelfuse Technology

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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