



IXYS
A Littelfuse Technology

Date:- 22 July, 2019

Data Sheet Issue:- P1

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	$^{\circ}C$
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	-	2.57	2.97	$I_C = 1500A, V_{GE} = 15V, T_j = 25^\circ C$	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		m Ω
$V_{GE(TH)}$	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	$V_{GE} = \pm 20V$	μA
C_{ies}	Input capacitance	-	200	-	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$	nF
$t_{d(on)}$	Turn-on delay time	-	1.7	-	$I_C = 1500A, V_{CE} = 1800V, di/dt = 2700A/\mu s$	μs
$t_r(V)$	Rise time	-	1.6	-		μs
$Q_{g(on)}$	Turn-on gate charge	-	25	-	$V_{GE} = \pm 15V, L_s = 320\mu H$	μC
E_{on}	Turn-on energy	-	3.9	-	$R_{G(ON)} = 1.5\Omega, R_{G(OFF)} = 10\Omega, C_{GE} = TBC$	J
$t_{d(off)}$	Turn-off delay time	-	5.3	-	Freewheel diode type E1500MC33E at $T_j = 125^\circ C$ (Notes 3, 4 & 5)	μs
$t_f(I)$	Fall time	-	1.5	-		μs
$Q_{g(off)}$	Turn-off gate charge	-	20	-		μC
E_{off}	Turn-off energy	-	4.1	-		J
I_{sc}	Short circuit current	-	4500	-	$V_{GE} = +15V, V_{CC} = 1800V, V_{CEmax} \leq V_{CES}, t_p \leq 10\mu s$	A

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R_{thJK}	Thermal resistance junction to sink, IGBT	-	-	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 $T_j = 125^\circ C$.
- 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} .

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

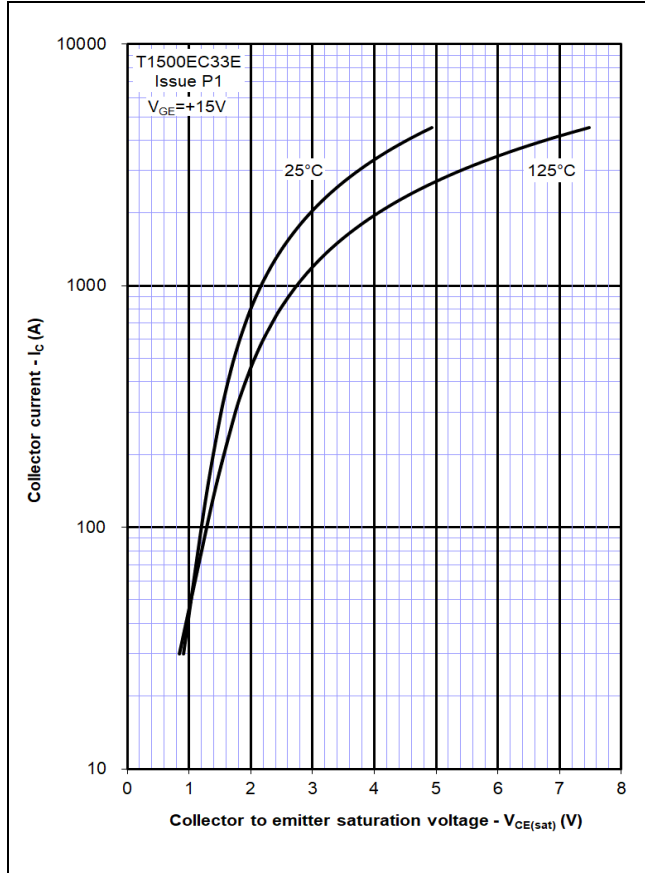


Figure 2 – Typical output characteristic

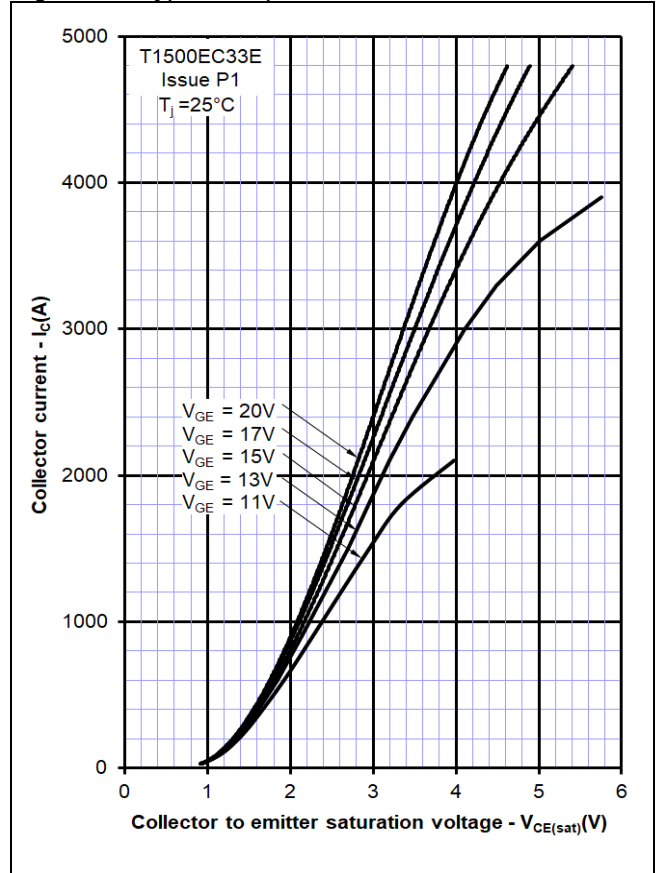


Figure 3 – Typical output characteristic

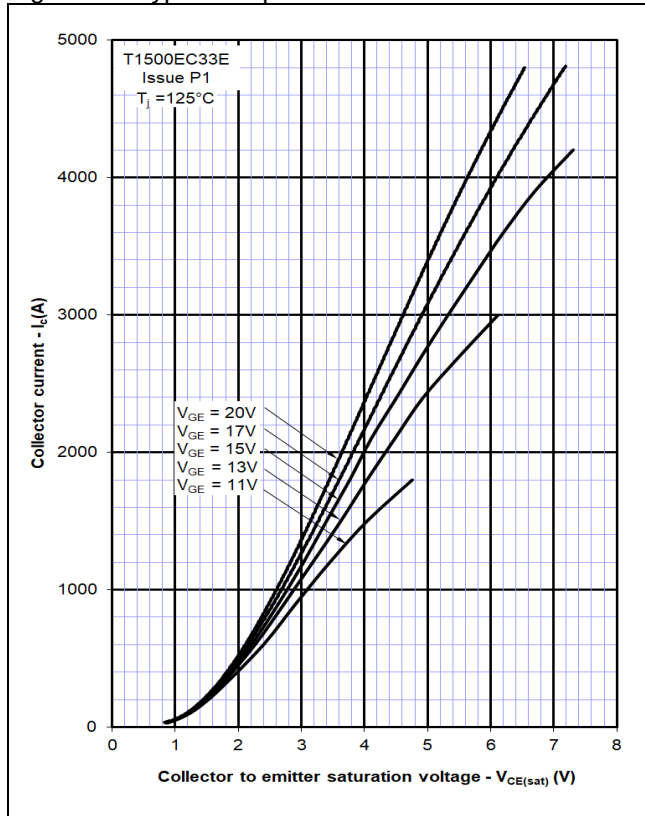


Figure 4 – Typical turn-on delay time vs gate resistance

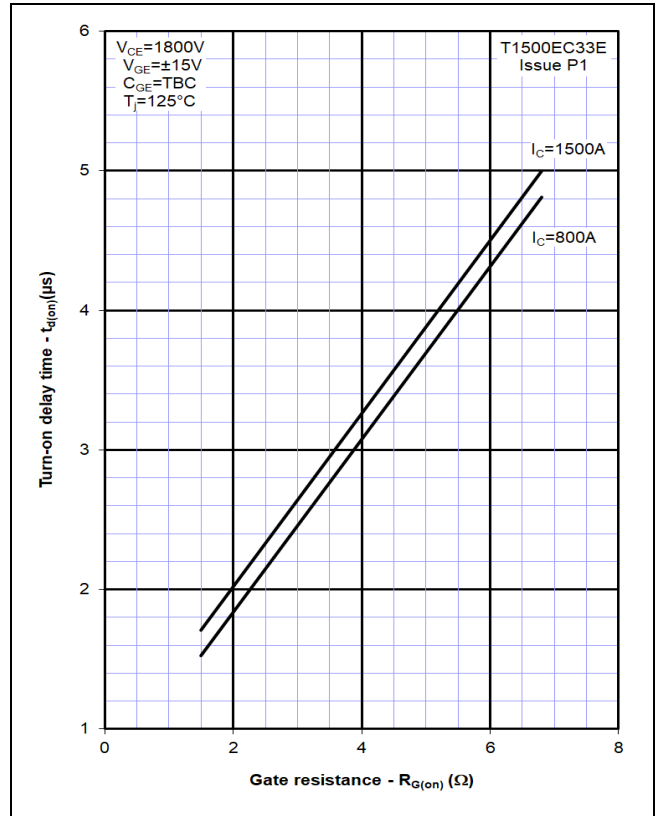


Figure 5 – Typical turn-off delay time vs. gate resistance

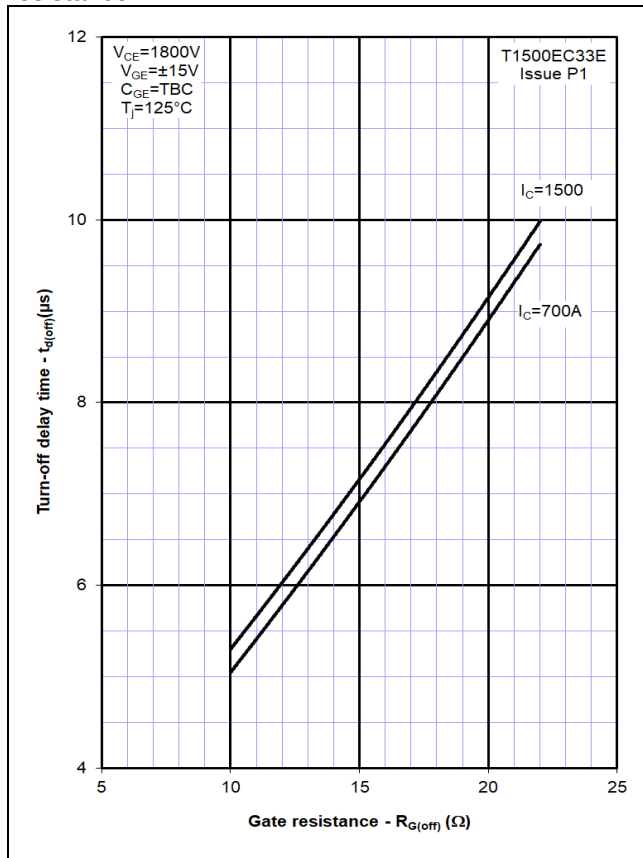


Figure 6 – Typical turn-on energy vs. collector current

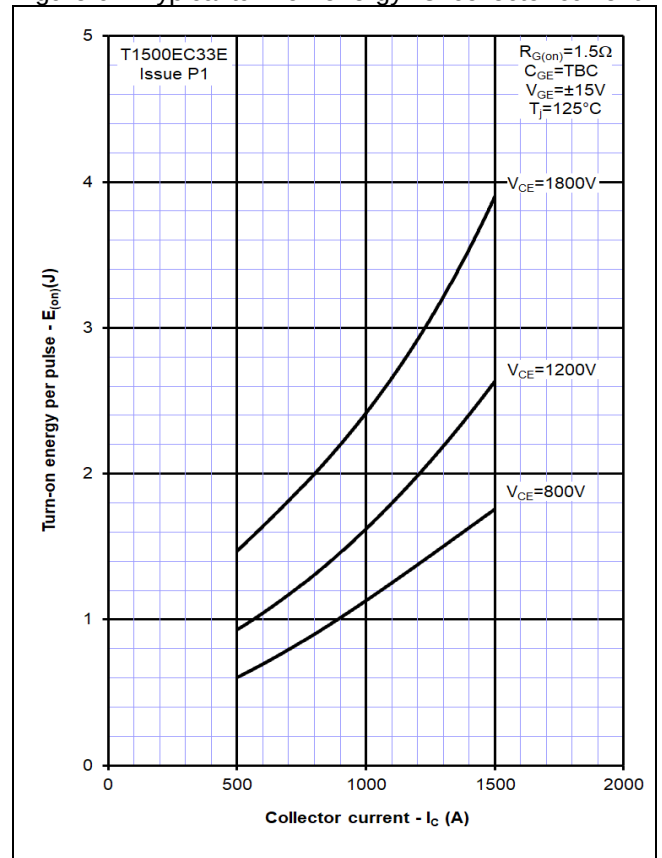


Figure 7 – Typical turn-on energy vs. di/dt

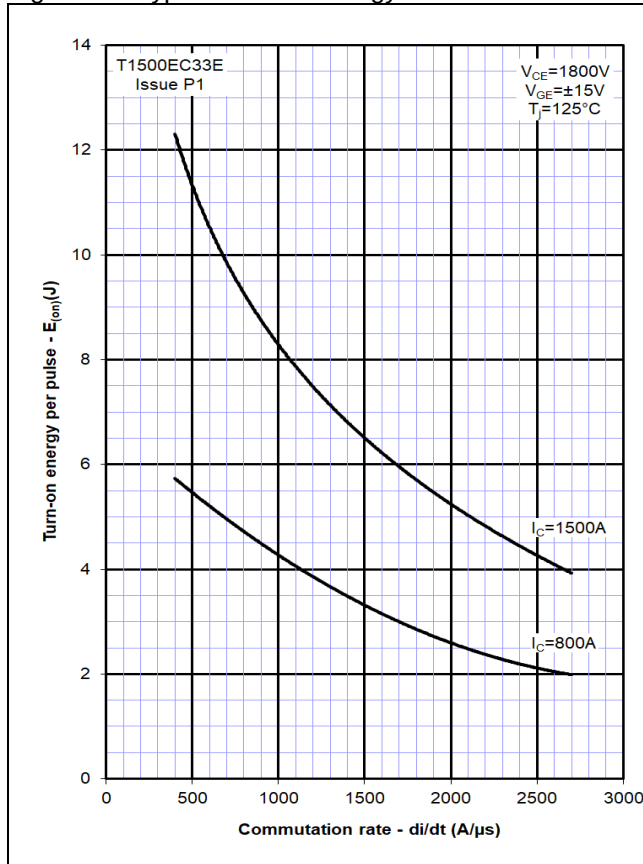


Figure 8 – Typical turn-off energy vs. collector current

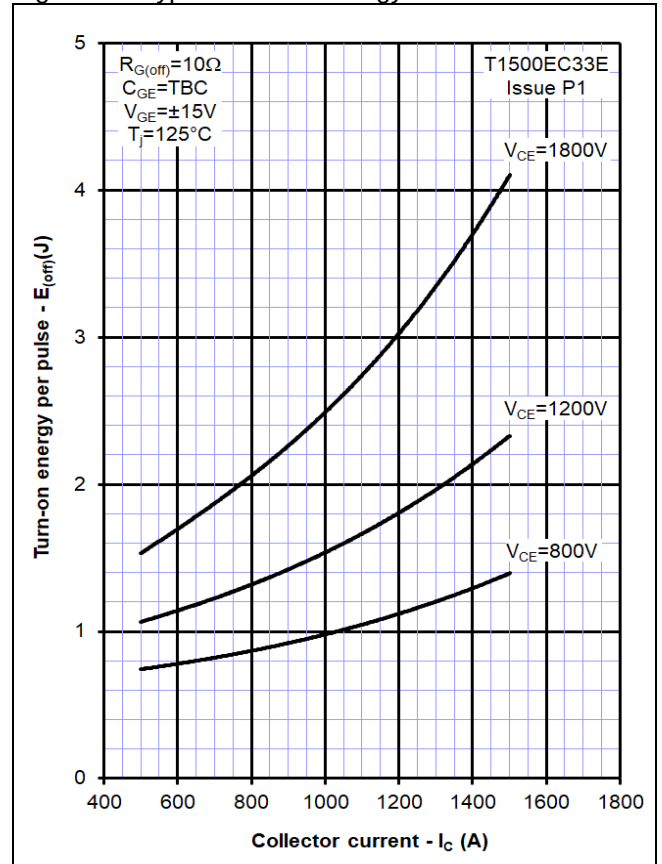


Figure 9 – Turn-off energy vs voltage

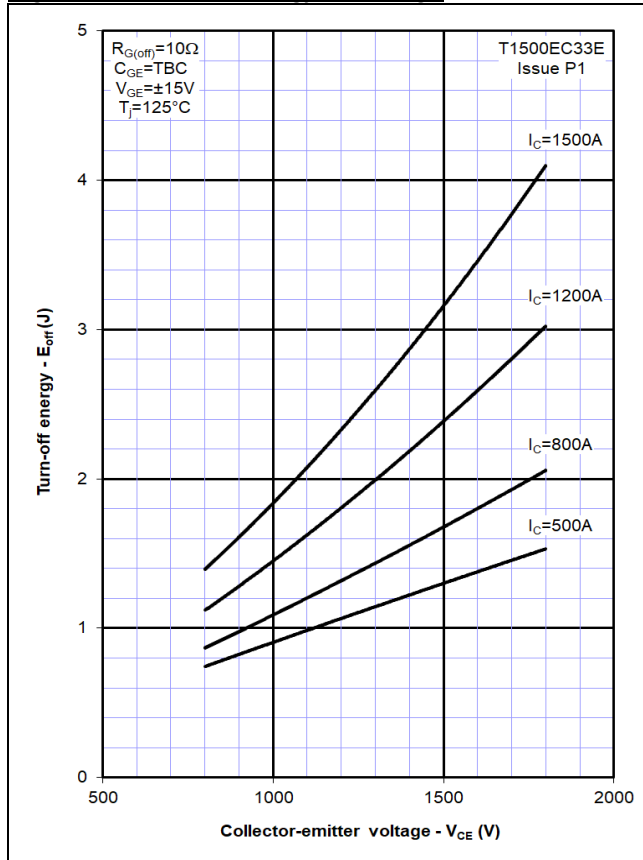


Figure 10 – Safe operating area

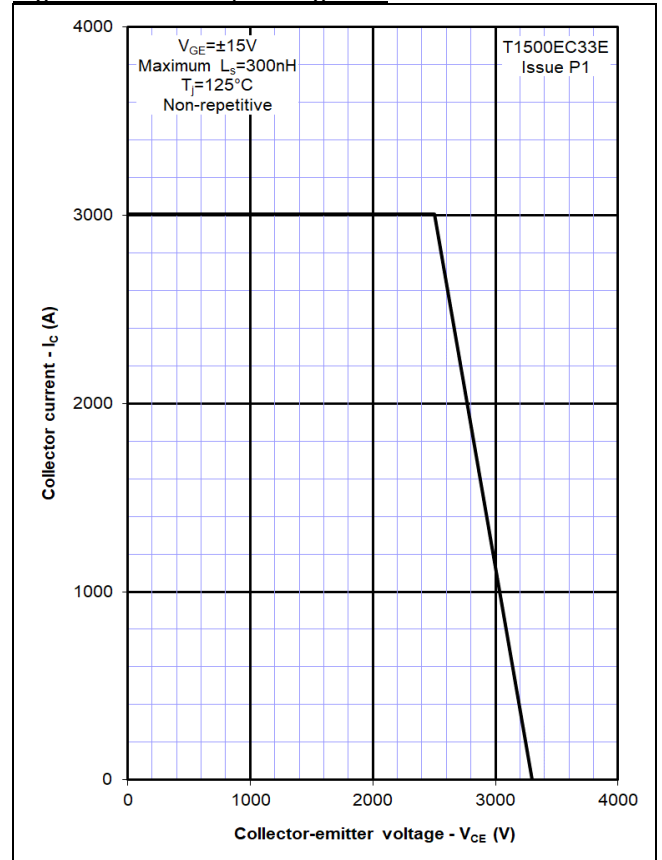
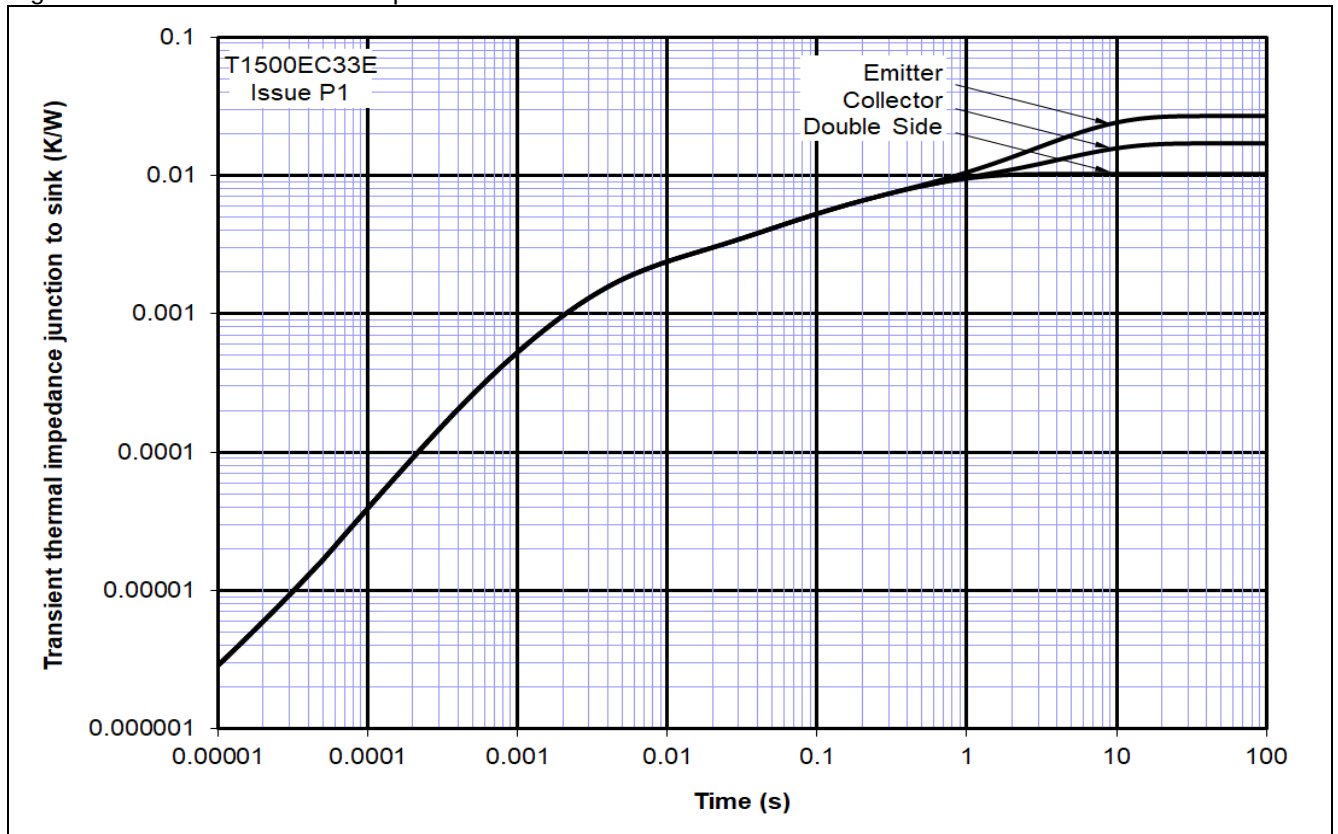
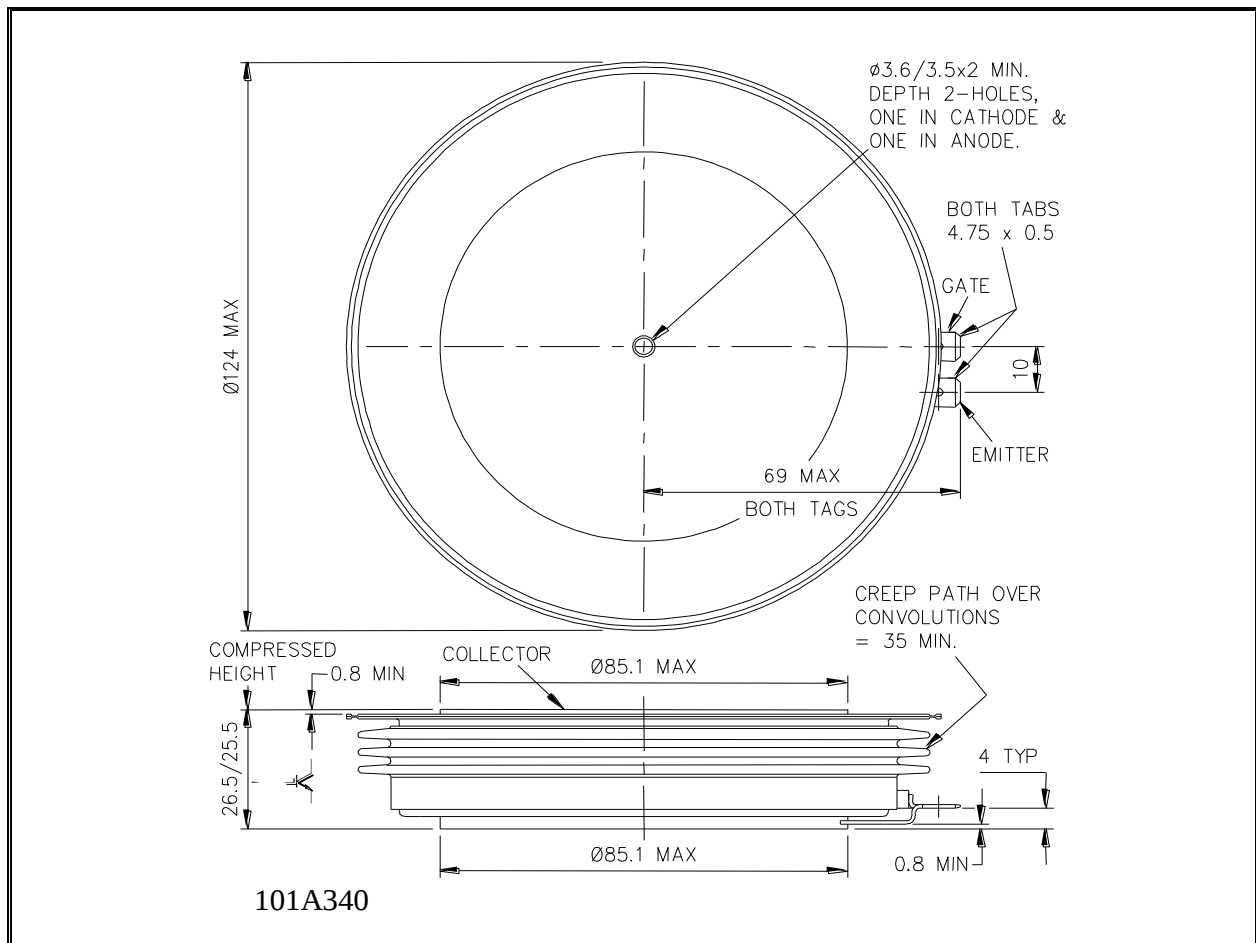


Figure 11 – Transient thermal impedance



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 ($V_{CES} = 3300V$)

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