



Tentative Data

# Insulated Gate Bi-Polar Transistor

## Type T0285NC33E

### Absolute Maximum Ratings

	<b>VOLTAGE RATINGS</b>	<b>MAXIMUM LIMITS</b>	<b>UNITS</b>
V <sub>CES</sub>	Collector – emitter voltage	3300	V
V <sub>DC link</sub>	Permanent DC voltage for 100 FIT failure rate.	1800	V
V <sub>GES</sub>	Peak gate – emitter voltage	±20	V

	<b>RATINGS</b>	<b>MAXIMUM LIMITS</b>	<b>UNITS</b>
I <sub>C</sub>	Continuous DC collector current, IGBT	285	A
I <sub>CRM</sub>	Repetitive peak collector current, t <sub>p</sub> =1ms, IGBT	570	A
I <sub>ECO</sub>	Maximum reverse emitter current, t <sub>p</sub> =100µs, (note 2 & 3)	285	A
P <sub>MAX</sub>	Maximum power dissipation, IGBT (note 2)	1.85	kW
T <sub>j op</sub>	Operating temperature range	-40 to +125	°C
T <sub>stg</sub>	Storage temperature range	-40 to +125	°C

Notes: -

- 1) Unless otherwise indicated T<sub>j</sub> = 125°C.
- 2) T<sub>sink</sub> = 25°C, double side cooled.
- 3) Maximum commutation loop inductance 1.5µH.

## Characteristics

### IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V <sub>CE(sat)</sub>	Collector – emitter saturation voltage	-	2.57	2.97	I <sub>C</sub> = 285A, V <sub>GE</sub> = 15V, T <sub>j</sub> = 25°C	V
		-	3.40	3.80	I <sub>C</sub> = 285A, V <sub>GE</sub> = 15V	V
V <sub>T0</sub>	Threshold voltage	-	-	1.77	Current range: 95A – 285A	V
r <sub>T</sub>	Slope resistance	-	-	7.11		mΩ
V <sub>GE(TH)</sub>	Gate threshold voltage	-	5.3	-	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 25mA	V
I <sub>CES</sub>	Collector – emitter cut-off current	-	2.5	8	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	mA
I <sub>GES</sub>	Gate leakage current	-	-	±7	V <sub>GE</sub> = ±20V	μA
C <sub>ies</sub>	Input capacitance	-	40	-	V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz	nF
t <sub>d(on)</sub>	Turn-on delay time	-	1.5	-	I <sub>C</sub> = 285A, V <sub>CE</sub> = 1800V, di/dt = 600A/μs V <sub>GE</sub> = ±15V, L <sub>S</sub> = 1.5μH R <sub>G(ON)</sub> = 7.5Ω, R <sub>G(OFF)</sub> = 51Ω, C <sub>GE</sub> = 120nF Freewheel diode type TBC at T <sub>j</sub> = 125°C (Notes 3, 4 & 5)	μs
t <sub>r(V)</sub>	Rise time	-	1.9	-		μs
Q <sub>g(on)</sub>	Turn-on gate charge	-	5.5	-		μC
E <sub>on</sub>	Turn-on energy	-	0.73	-		J
t <sub>d(off)</sub>	Turn-off delay time	-	4.6	-		μs
t <sub>f(I)</sub>	Fall time	-	1.1	-		μs
Q <sub>g(off)</sub>	Turn-off gate charge	-	4	-		μC
E <sub>off</sub>	Turn-off energy	-	0.75	-		J
I <sub>sc</sub>	Short circuit current	-	1100	-		V <sub>GE</sub> = +15V, V <sub>CC</sub> = 1800V, V <sub>CEmax</sub> ≤ V <sub>CES</sub> , t <sub>p</sub> ≤ 10μs

### Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R <sub>thJK</sub>	Thermal resistance junction to sink, IGBT	-	-	54.6	Double side cooled	K/kW
		-	-	89	Collector side cooled	K/kW
		-	-	140	Emitter side cooled	K/kW
F	Mounting force	8	-	12	Note 2	kN
W <sub>t</sub>	Weight	-	0.5	-		kg

#### Notes:-

- 1) Unless otherwise indicated T<sub>j</sub> = 125°C.
- 2) Consult application note 2008AN01 for detailed mounting requirements.
- 3) C<sub>GE</sub> is additional gate - emitter capacitance added to output of gate drive circuit.
- 4) E<sub>on</sub> integration time 15μs from 10% rising I<sub>G</sub>.
- 5) E<sub>off</sub> integration time 15μs from 90% falling V<sub>GE</sub>.

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

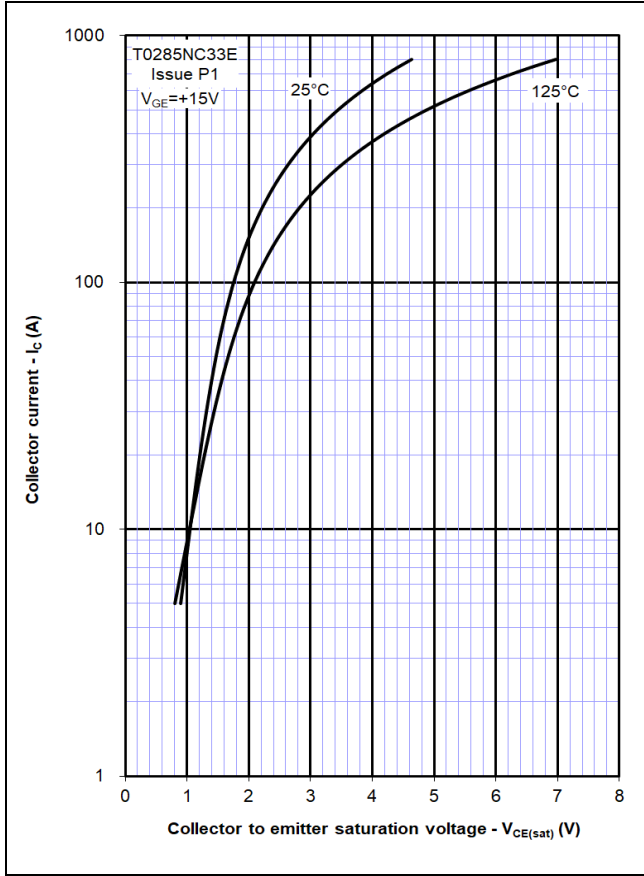


Figure 2 – Typical output characteristic

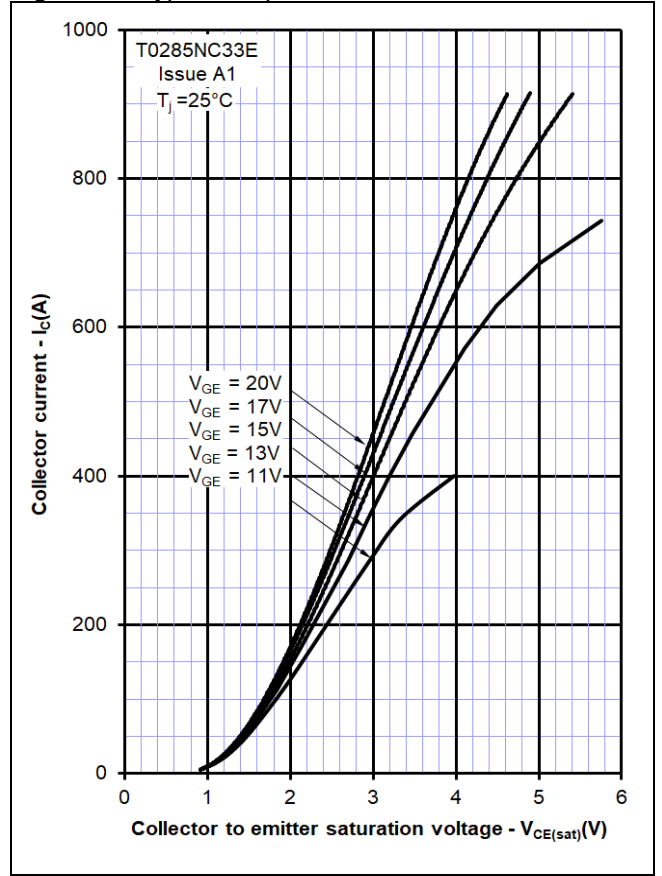


Figure 3 – Typical output characteristic

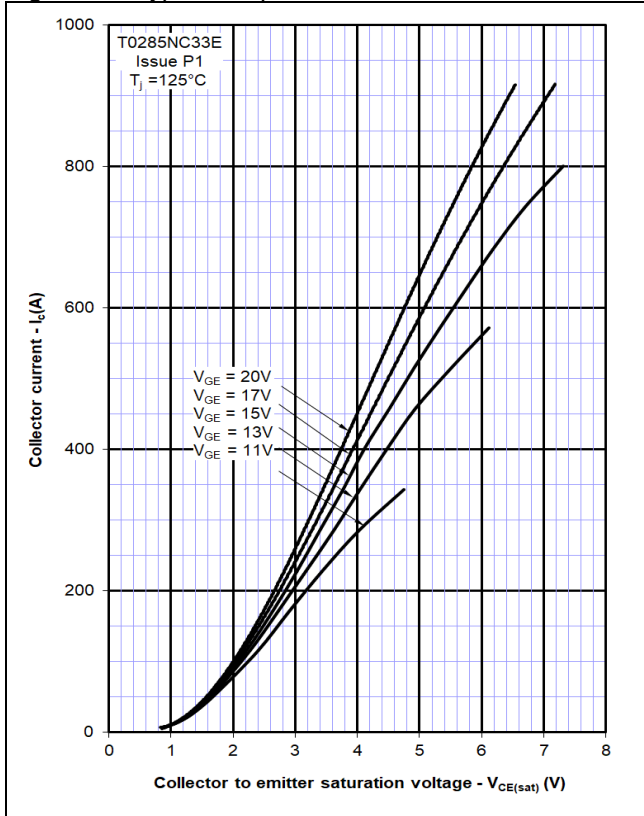


Figure 4 – Typical turn-on delay time vs gate resistance

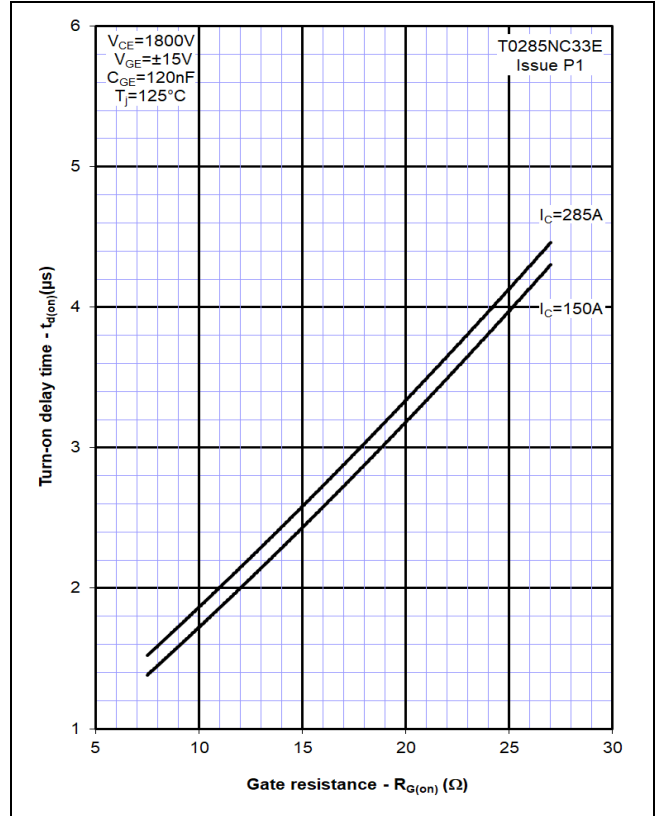


Figure 5 – Typical turn-off delay time vs. gate resistance

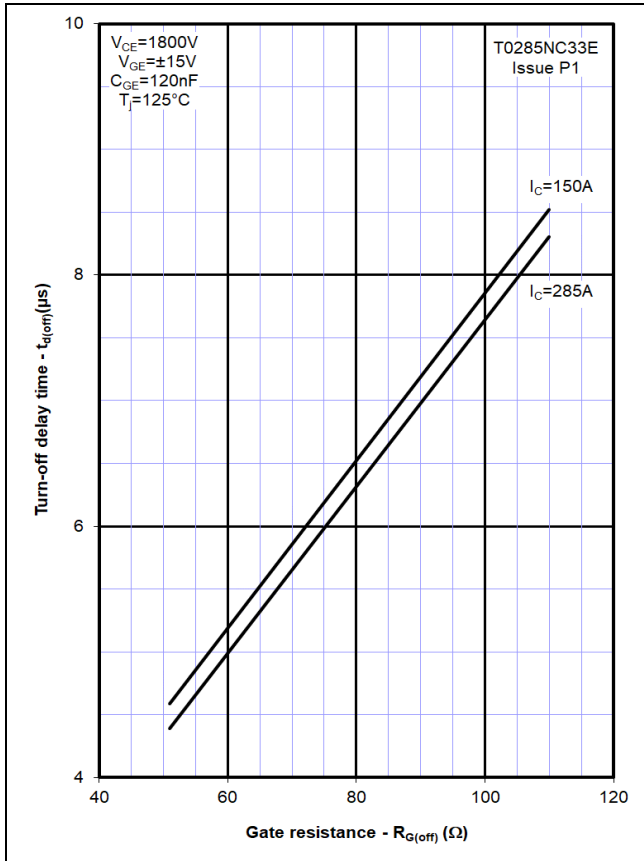


Figure 6 – Typical turn-on energy vs. collector current

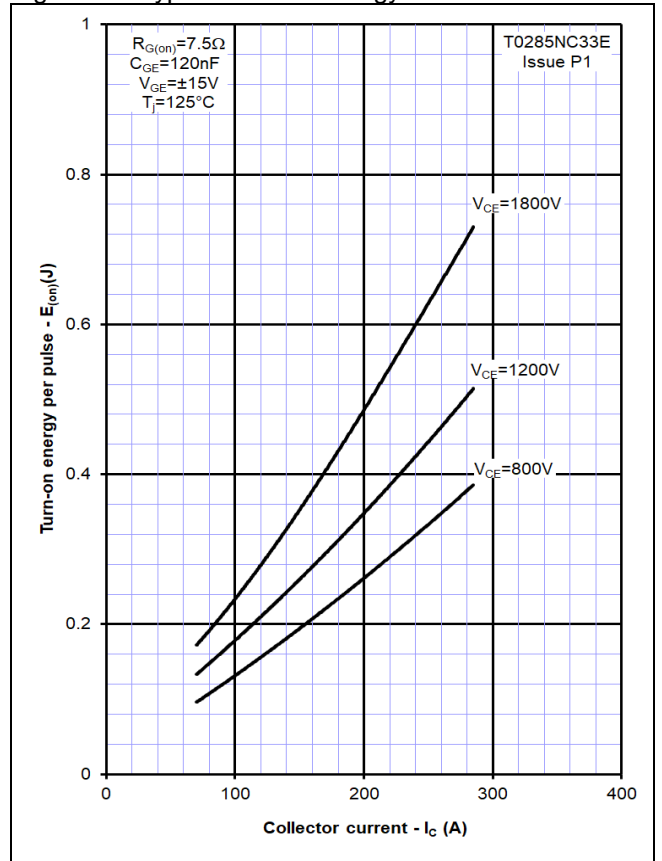


Figure 7 – Typical turn-on energy vs. di/dt

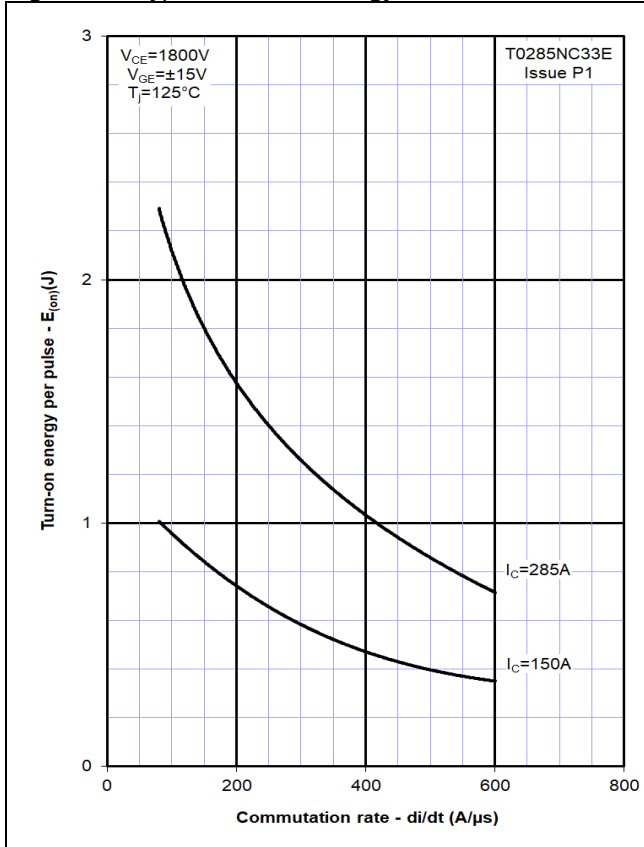


Figure 8 – Typical turn-off energy vs. collector current

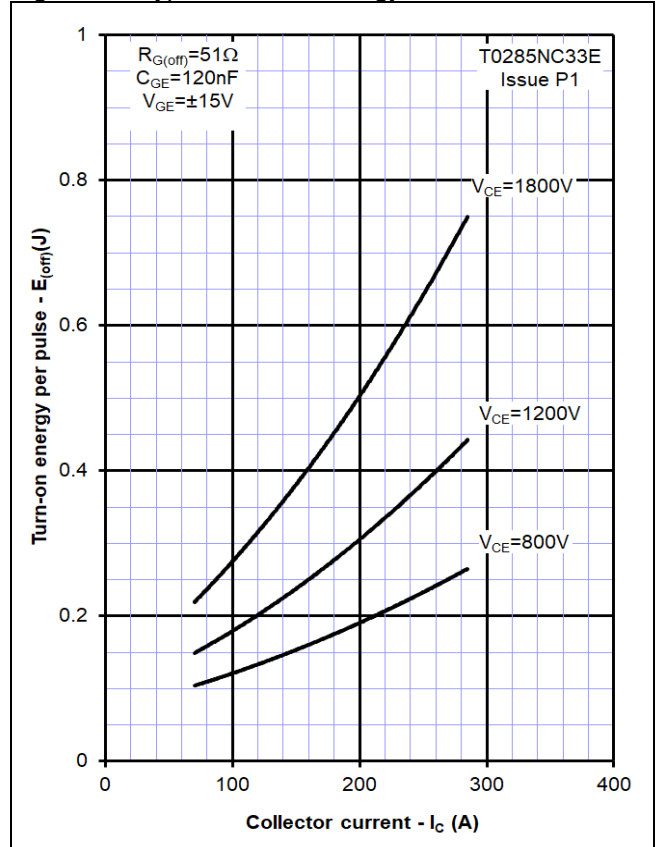


Figure 9 – Turn-off energy vs voltage

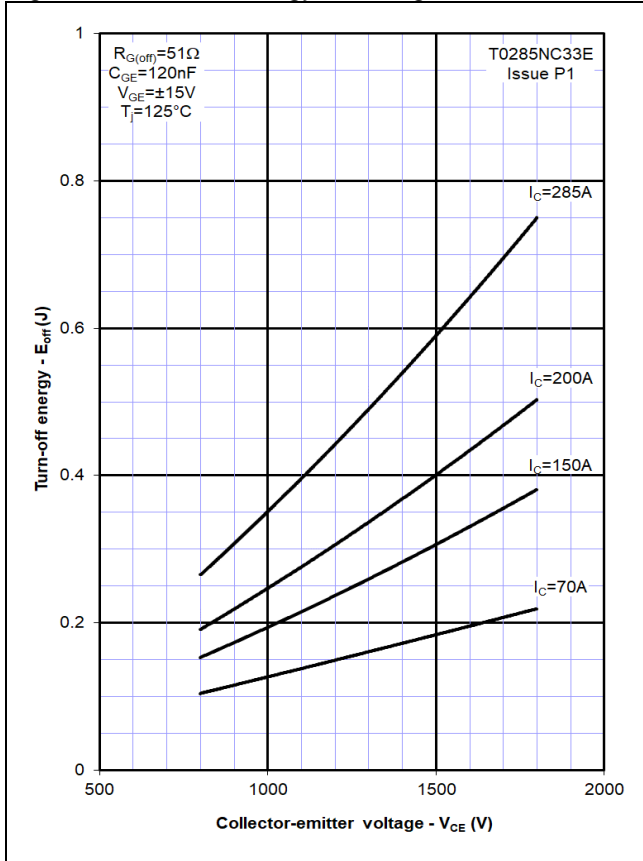


Figure 10 – Safe operating area

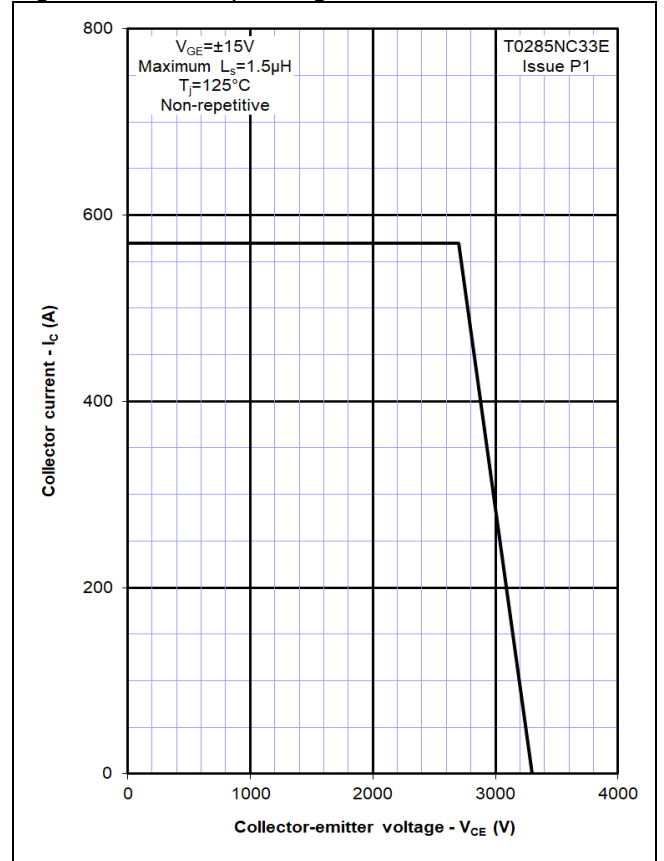
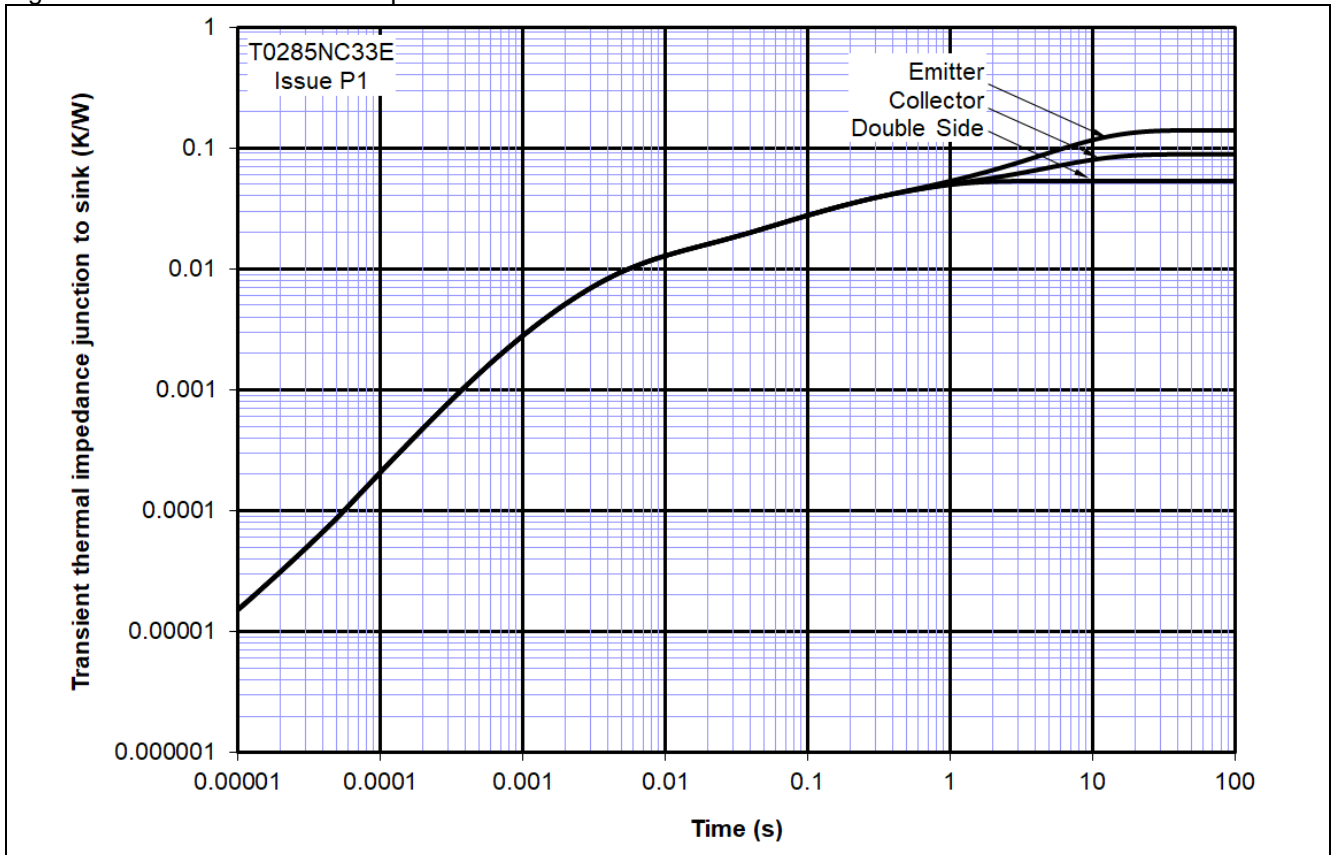
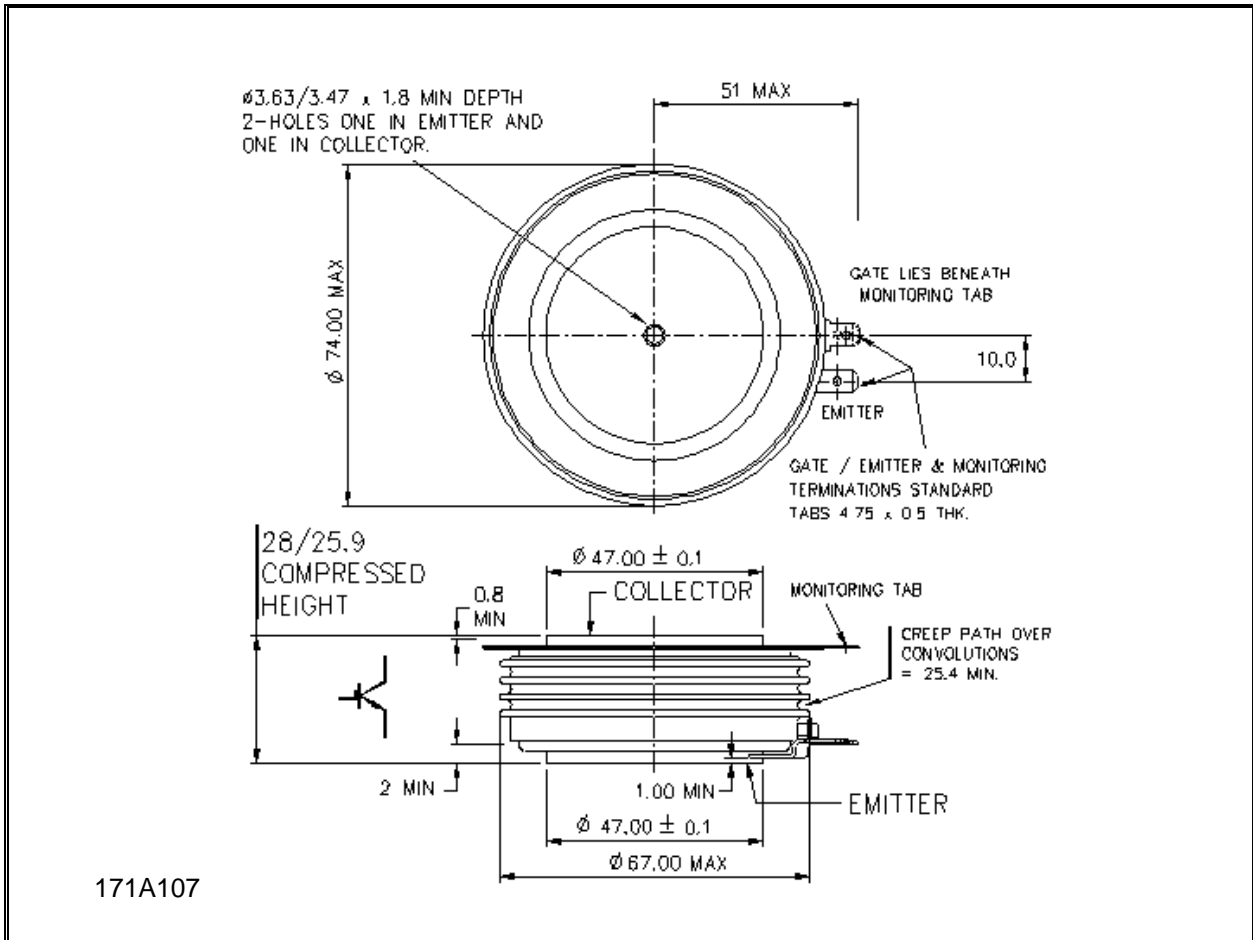


Figure 11 – Transient thermal impedance



## Outline Drawing & Ordering Information



### ORDERING INFORMATION

(Please quote 10 digit code as below)

T0285	NC	33	E
Fixed type Code	Fixed Outline Code	Voltage Grade V <sub>CES</sub> /100 33	Fixed format code

 Typical order code: T0285NC33E (V<sub>CES</sub> = 3300V)

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