

# Insulated Gate Bi-Polar Transistor

## Type T0500ND25E

### Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
$V_{CES}$	Collector – emitter voltage	2500	V
$V_{DC\ link}$	Permanent DC voltage for 100 FIT failure rate.	1250	V
$V_{GES}$	Peak gate – emitter voltage	$\pm 20$	V

	RATINGS	MAXIMUM LIMITS	UNITS
$I_{C(DC)}$	DC collector current, IGBT	500	A
$I_{CRM}$	Repetitive peak collector current, $t_p=1ms$ , IGBT	1000	A
$I_{ECO}$	Maximum reverse emitter current, $t_p=100\mu s$ , (note 2 & 3)	500	A
$P_{MAX}$	Maximum power dissipation, IGBT (Note 2)	2.58	kW
$T_j$	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 850nH.

## Characteristics

### IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS	
V <sub>CE(sat)</sub>	Collector – emitter saturation voltage	-	2.4	2.7	I <sub>C</sub> = 500A, V <sub>GE</sub> = 15V, T <sub>J</sub> = 25°C	V	
		-	3.05	3.35	I <sub>C</sub> = 500A, V <sub>GE</sub> = 15V	V	
V <sub>T0</sub>	Threshold voltage	-	-	1.39	Current range: 167A– 500A	V	
r <sub>T</sub>	Slope resistance	-	-	3.92		mΩ	
V <sub>GE(TH)</sub>	Gate threshold voltage	-	5.8	-	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 45mA	V	
I <sub>CES</sub>	Collector – emitter cut-off current	-	5	15	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	mA	
I <sub>GES</sub>	Gate leakage current	-	-	±10	V <sub>GE</sub> = ±20V	μA	
C <sub>ies</sub>	Input capacitance	-	68	-	V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 100kHz, T <sub>J</sub> =25°C	nF	
t <sub>d(on)</sub>	Turn-on delay time	-	0.9	-	I <sub>C</sub> = 500A, V <sub>CE</sub> = 1250V, di/dt = 1000A/μs V <sub>GE</sub> = ±15V, L <sub>S</sub> = 850nH R <sub>g(ON)</sub> = 5.6Ω, R <sub>g(OFF)</sub> = 12Ω, C <sub>GE</sub> = 15nF Freewheel diode type E0800QC25C at T <sub>J</sub> = 125°C	μs	
t <sub>r(V)</sub>	Rise time	-	2	-		μs	
Q <sub>g(on)</sub>	Turn-on gate charge	-	5	-		μC	
E <sub>on</sub>	Turn-on energy	-	0.65	-		J	
t <sub>d(off)</sub>	Turn-off delay time	-	1.1	-		μs	
t <sub>f(I)</sub>	Fall time	-	2.6	-		μs	
Q <sub>g(off)</sub>	Turn-off gate charge	-	3	-		μC	
E <sub>off</sub>	Turn-off energy	-	0.87	-		J	
I <sub>sc</sub>	Short circuit current	-	2150	-		V <sub>GE</sub> = +15V, V <sub>CC</sub> = 1250V, V <sub>CEmax</sub> ≤ V <sub>CES</sub> , t <sub>p</sub> ≤ 10μs	A

### Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R <sub>thJK</sub>	Thermal resistance junction to sink, IGBT	-	-	38.6	Double side cooled	K/kW
		-	-	60	Collector side cooled	K/kW
		-	-	108	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

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

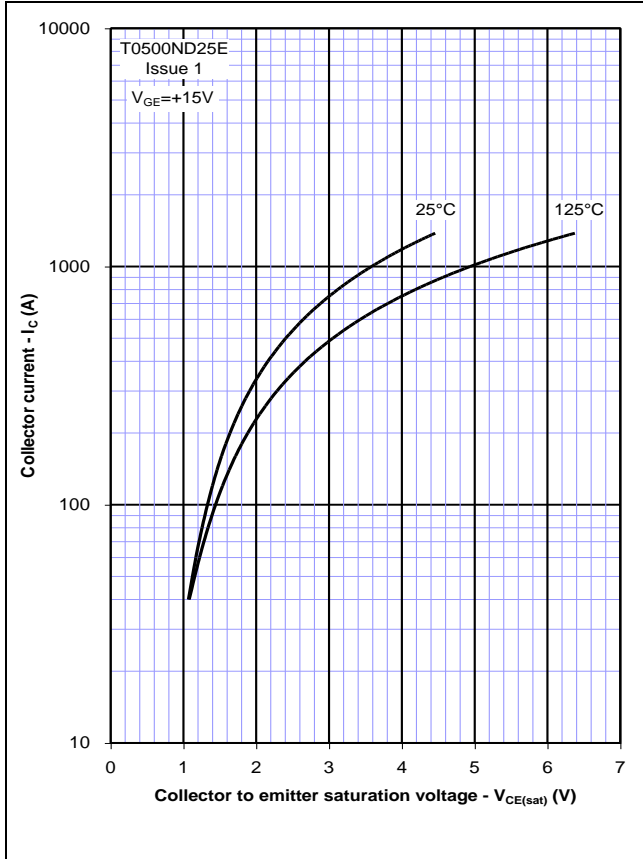


Figure 2 – Typical output characteristic

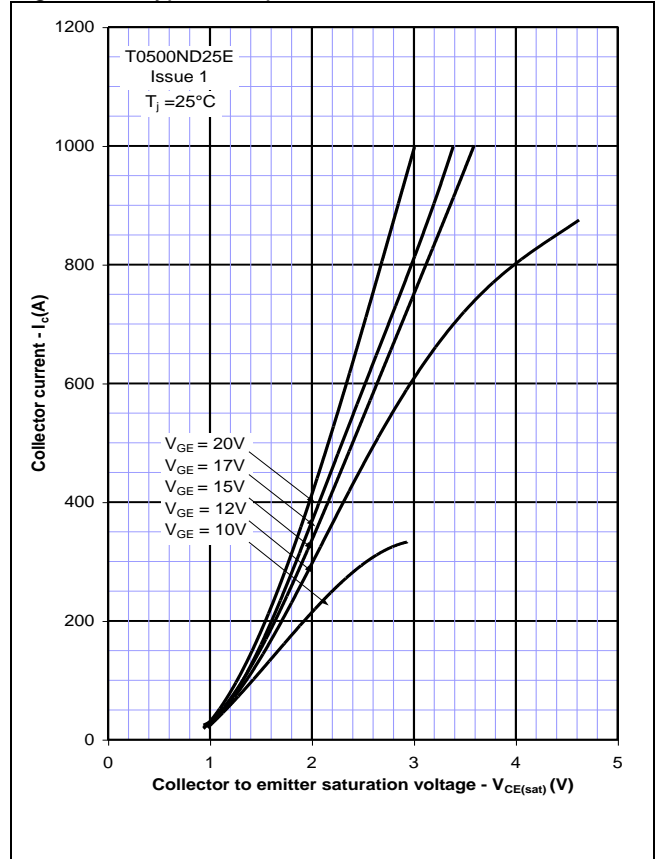


Figure 3 – Typical output characteristic

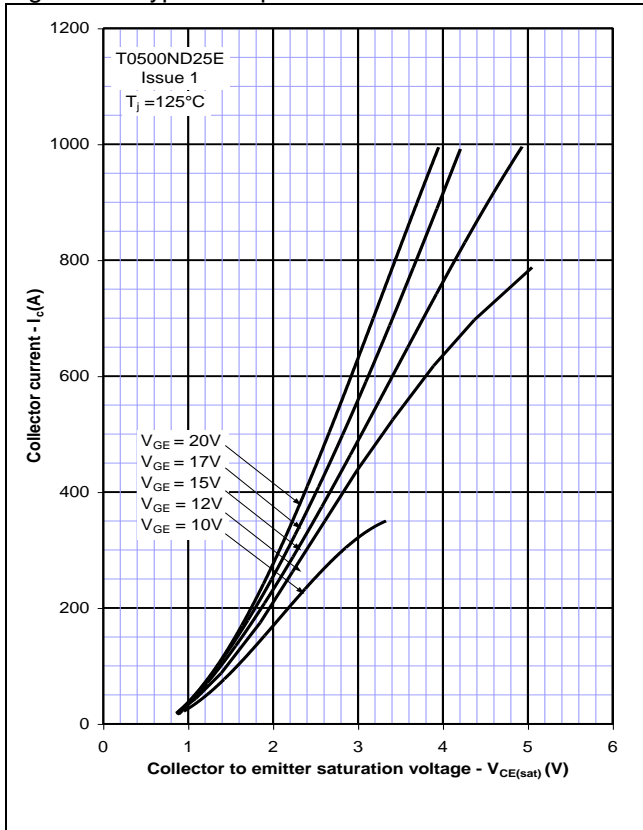


Figure 4 – Typical turn-on delay time vs gate resistance

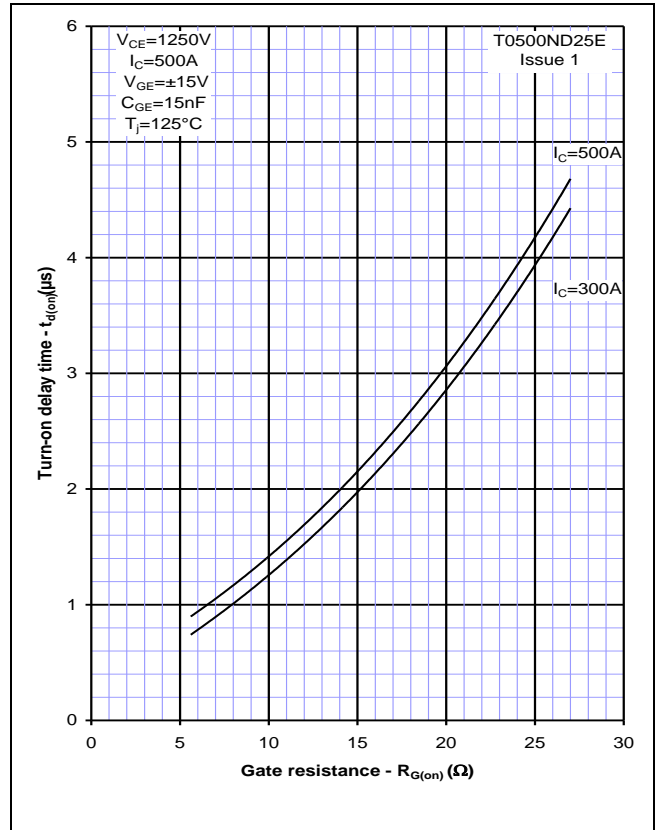


Figure 5 – Typical turn-off delay time vs. gate resistance

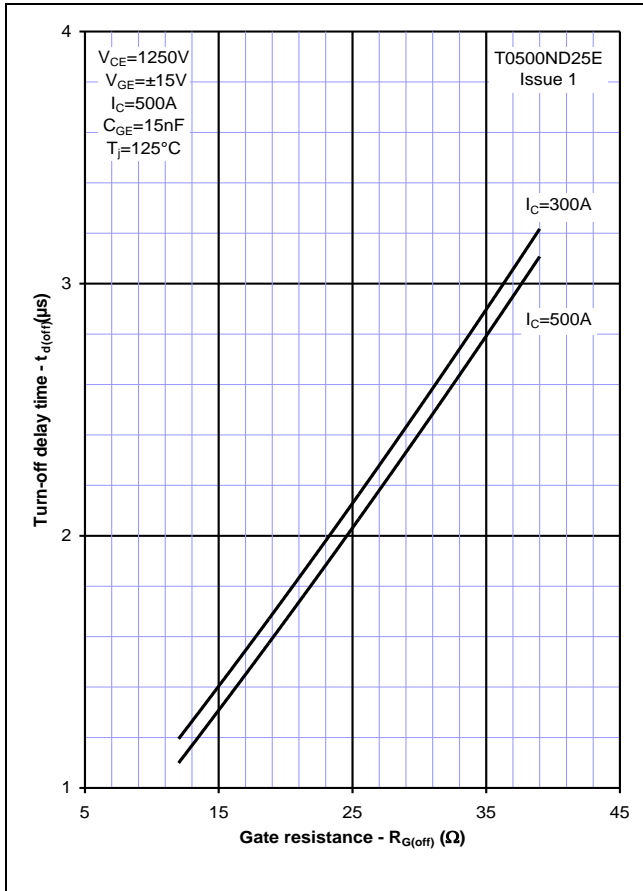


Figure 6 – Typical turn-on energy vs. collector current

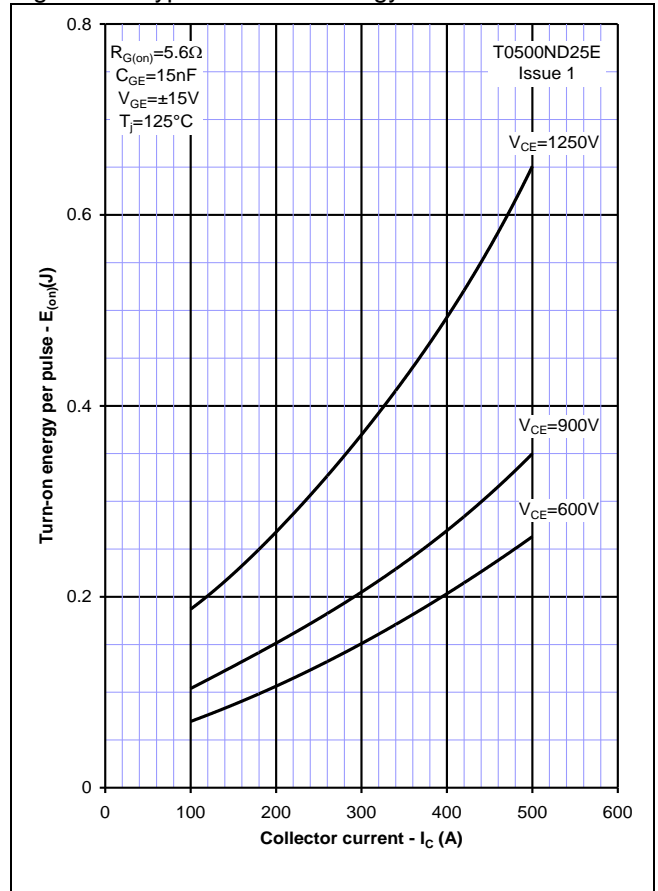


Figure 7 – Typical turn-on energy vs. di/dt

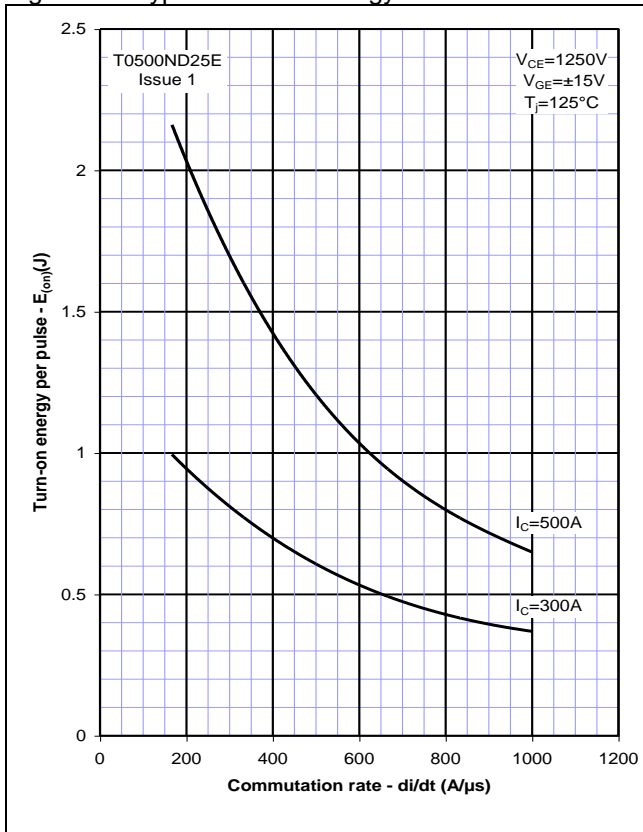


Figure 8 – Typical turn-off energy vs. collector current

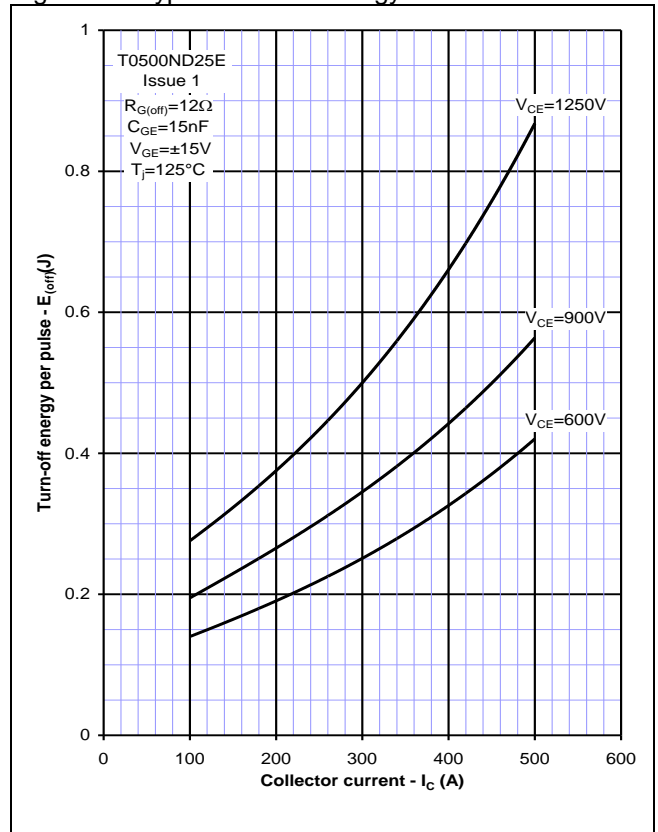


Figure 9 – Turn-off energy vs voltage

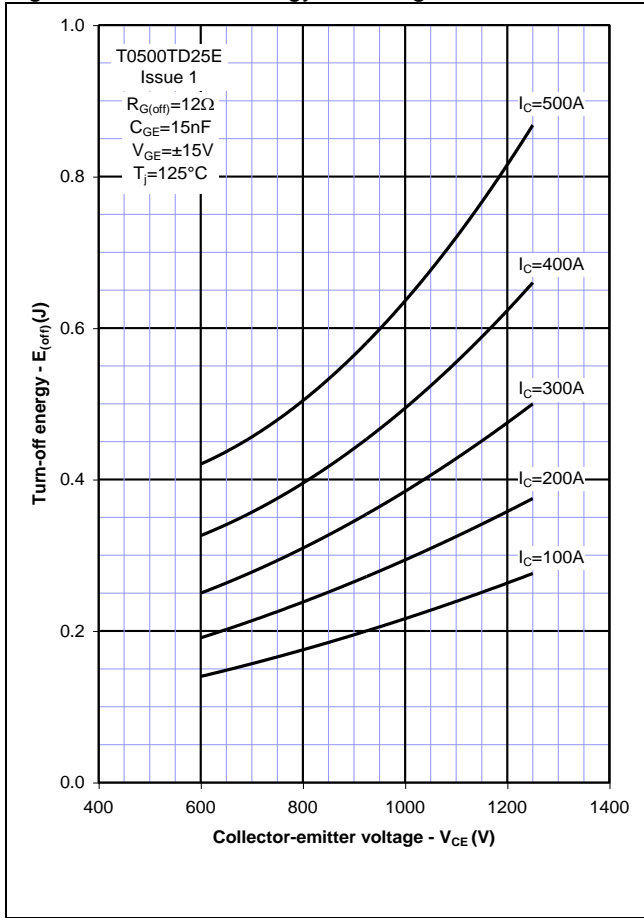


Figure 10 – Safe operating area

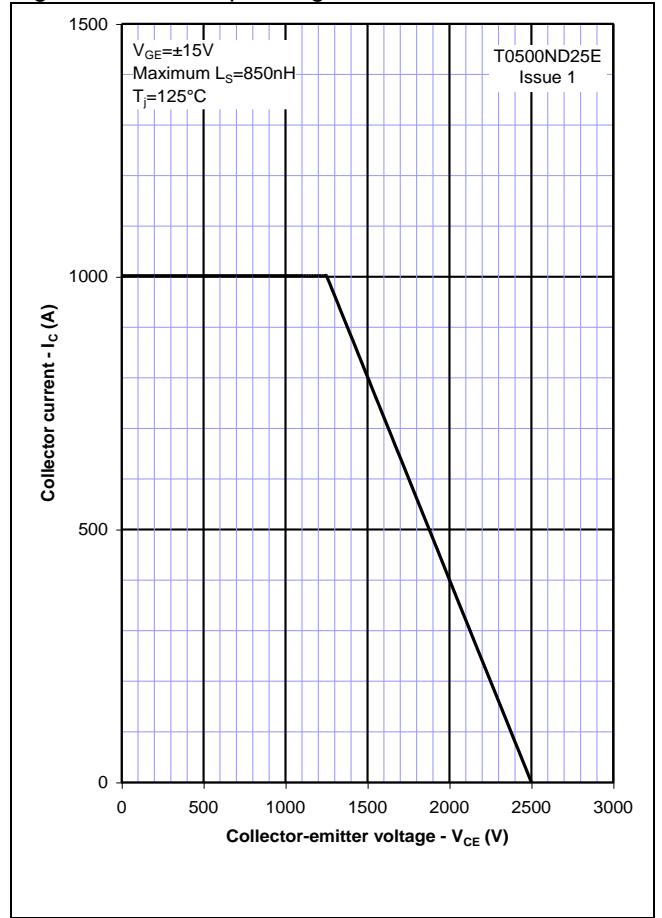
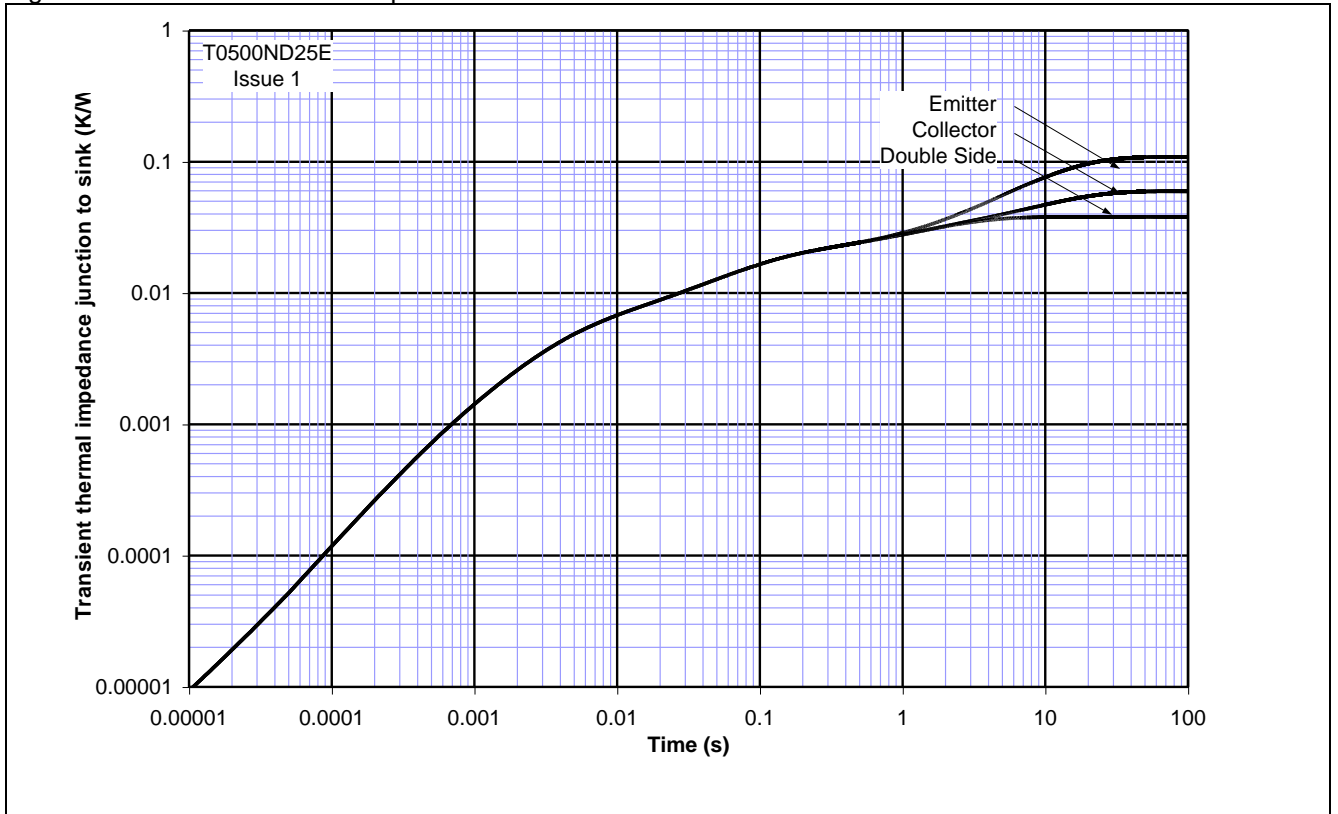
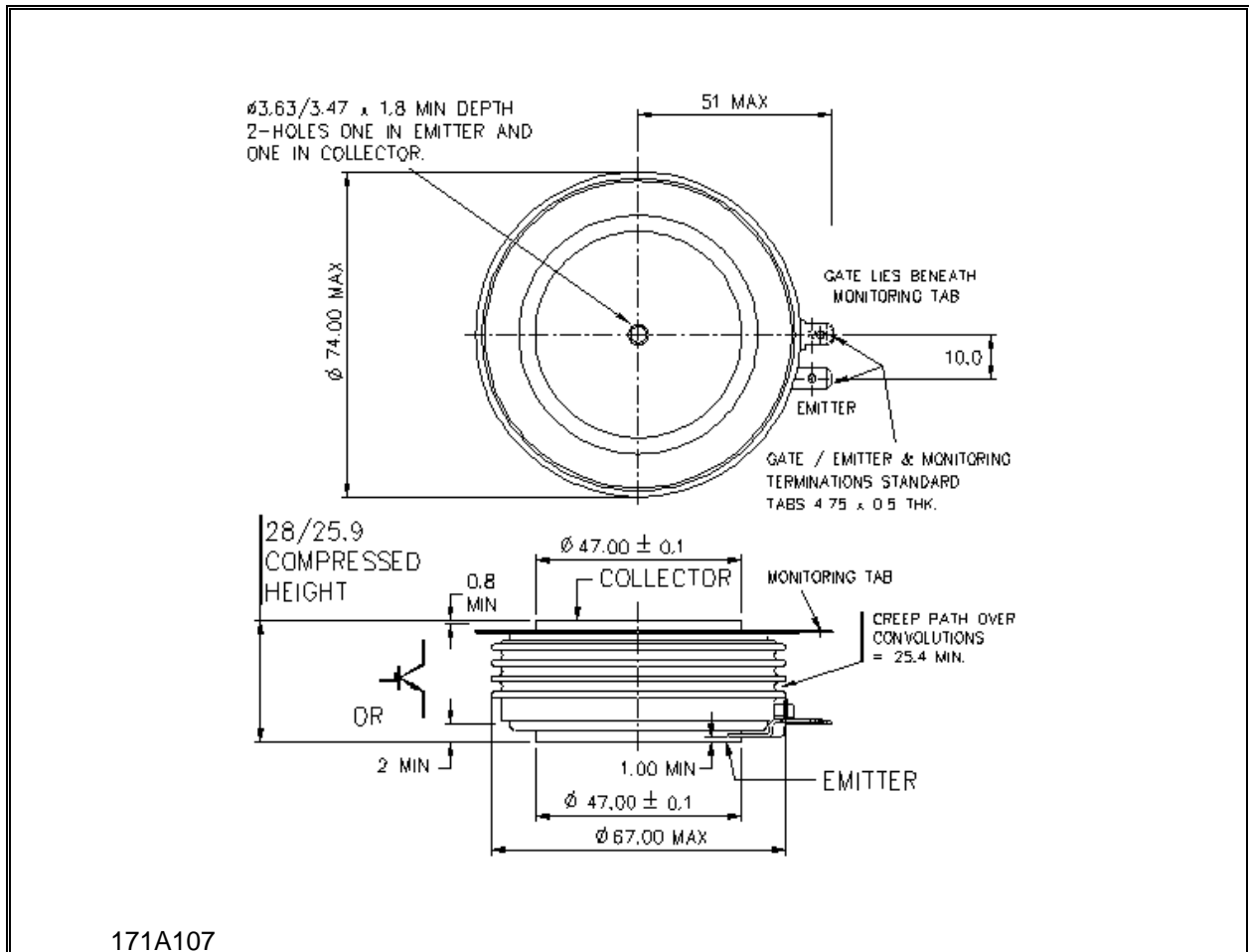


Figure 11 – Transient thermal impedance



**Outline Drawing & Ordering Information**



171A107

**ORDERING INFORMATION**

(Please quote 10 digit code as below)

<b>T0500</b>	<b>ND</b>	<b>25</b>	<b>E</b>
Fixed type Code	Fixed Outline Code	Voltage Grade V <sub>CES</sub> /100 25	Fixed format code

Typical order code: T0500ND25E (V<sub>CES</sub> = 2500V)

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