

## 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	$\pm 20$	V

	RATINGS	MAXIMUM LIMITS	UNITS
$I_{C(DC)}$	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, $t_p=100\mu s$ , (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  $T_j = 125^\circ C$
- 2)  $T_{sink} = 25^\circ C$ , double side cooled
- 3) The use of an anti-parallel diode is recommended

## Characteristics

### IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS	
$V_{CE(sat)}$	Collector – emitter saturation voltage	-	2.8	3.2	$I_C = 2400A, V_{GE} = 15V, T_j = 25^\circ C$	V	
		-	3.6	4.0	$I_C = 2400A, V_{GE} = 15V$	V	
$V_{T0}$	Threshold voltage	-	-	1.49	Current range: 800 – 2400A	V	
$r_T$	Slope resistance	-	-	1.05		m $\Omega$	
$V_{GE(TH)}$	Gate threshold voltage	-	5.3	-	$V_{CE} = V_{GE}, I_C = 250mA$	V	
$I_{CES}$	Collector – emitter cut-off current	-	25	100	$V_{CE} = V_{CES}, V_{GE} = 0V$	mA	
$I_{GES}$	Gate leakage current	-	-	$\pm 30$	$V_{GE} = \pm 20V$	$\mu A$	
$C_{ies}$	Input capacitance	-	400	-	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$	nF	
$t_{d(on)}$	Turn-on delay time	-	1.7	-	$I_C = 2400A, V_{CE} = 2800V$ $V_{GE} = \pm 15V, L_S = 200nH$ $R_{g(ON)} = 2.2\Omega, R_{g(OFF)} = 2.2\Omega, C_{GE} = 267nF$ Freewheel diode type E2400TC45C at $T_j = 125^\circ C$ . (Notes 3, 4 & 5)	$\mu s$	
$t_r(l)$	Rise time	-	3.8	-		$\mu s$	
$Q_{g(on)}$	Turn-on gate charge	-	17	-		$\mu C$	
$E_{on}$	Turn-on energy	-	15	-		J	
$t_{d(off)}$	Turn-off delay time	-	6	-		$\mu s$	
$t_f$	Fall time	-	1.9	-		$\mu s$	
$Q_{g(off)}$	Turn-off gate charge	-	18	-		$\mu C$	
$E_{off}$	Turn-off energy	-	14	-		J	
$I_{SC}$	Short circuit current	-	9500	-		$V_{GE} = +15V, V_{CC} = 2800V, V_{CEmax} \leq V_{CES}, t_p \leq 10\mu s$	A

### Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$R_{thJK}$	Thermal resistance junction to sink, IGBT	-	-	5.2	Double side cooled	K/kW
		-	-	8.5	Collector side cooled	K/kW
		-	-	13.5	Emitter side cooled	K/kW
F	Mounting force	55	-	65	Note 2	kN
$W_t$	Weight	-	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 $\mu s$  from 10% rising  $I_C$ .
- 5)  $E_{off}$  integration time 15 $\mu s$  from 90% falling  $V_{GE}$ .

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

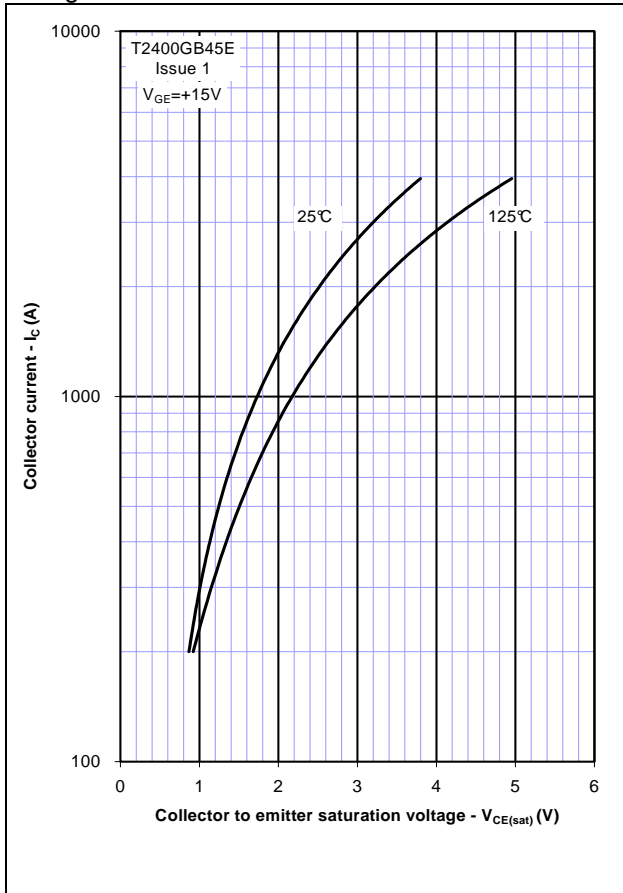


Figure 2 – Typical output characteristic

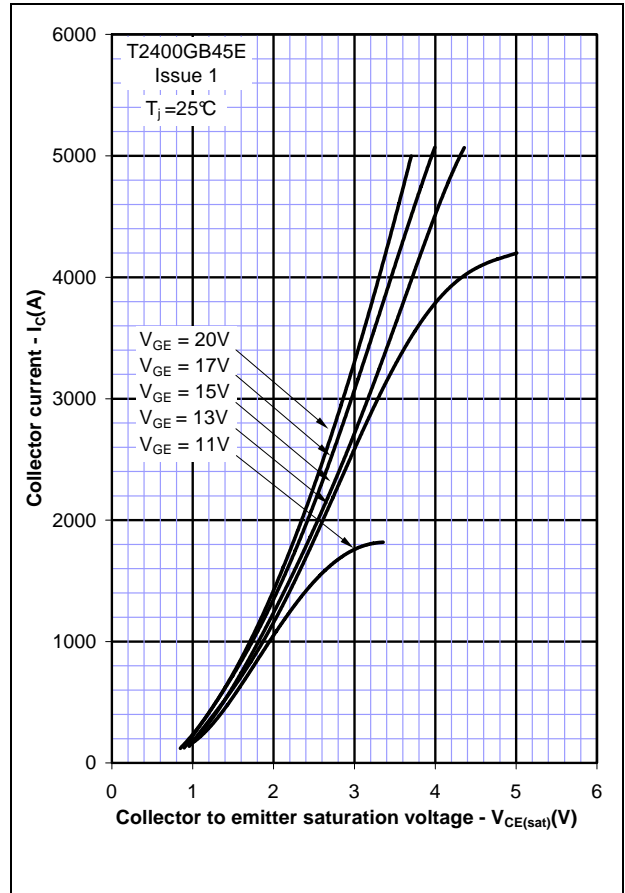


Figure 3 – Typical output characteristic

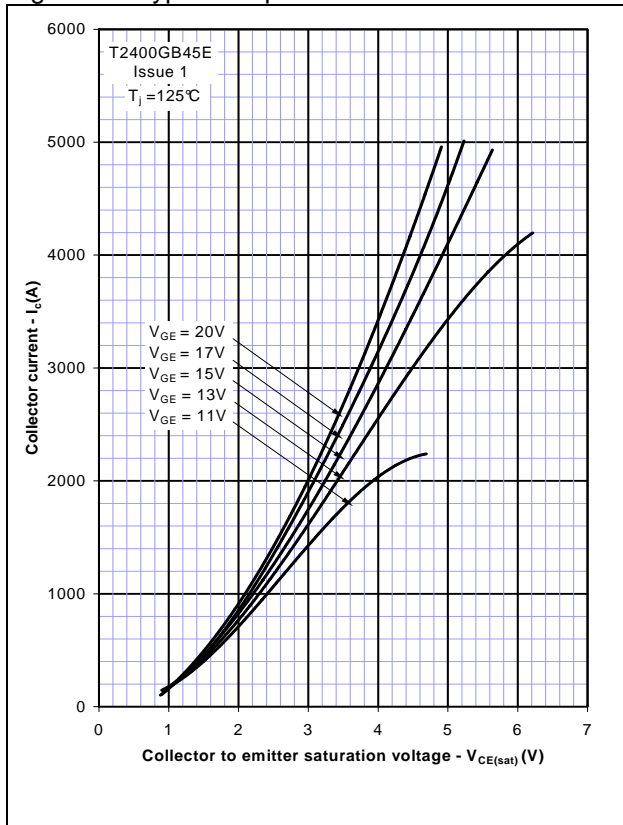


Figure 4 – Typical turn-on delay time vs gate resistance

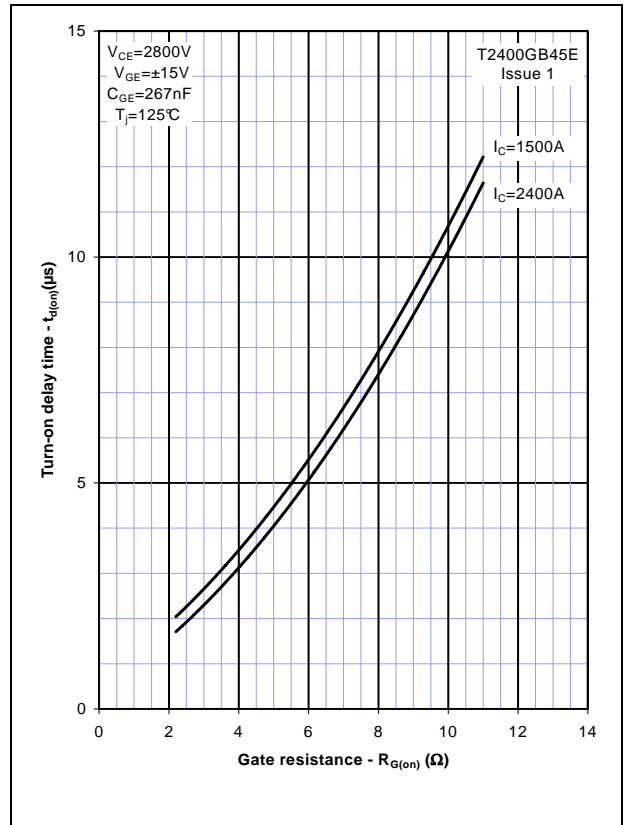


Figure 5 – Typical turn-off delay time vs. gate resistance

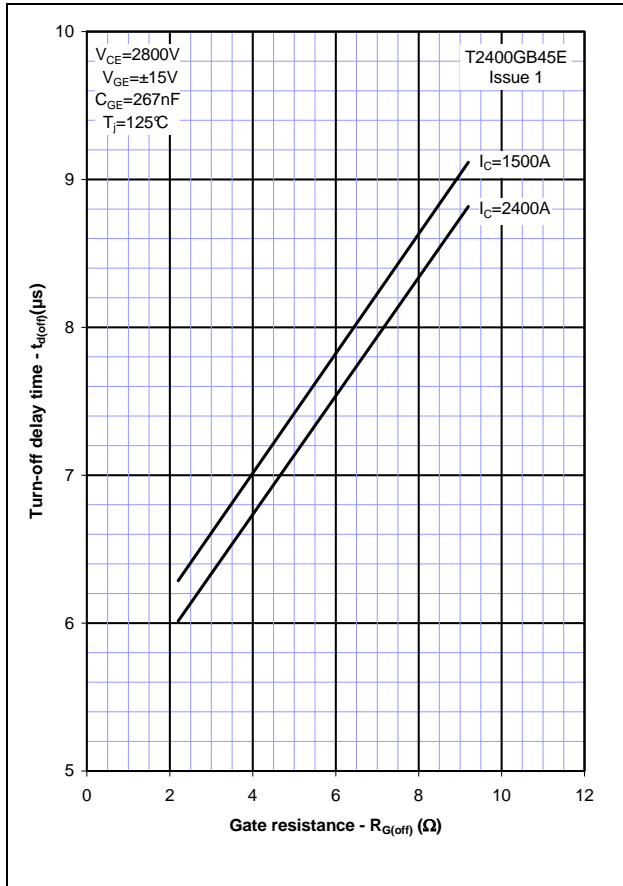


Figure 6 – Typical turn-on energy vs. collector current

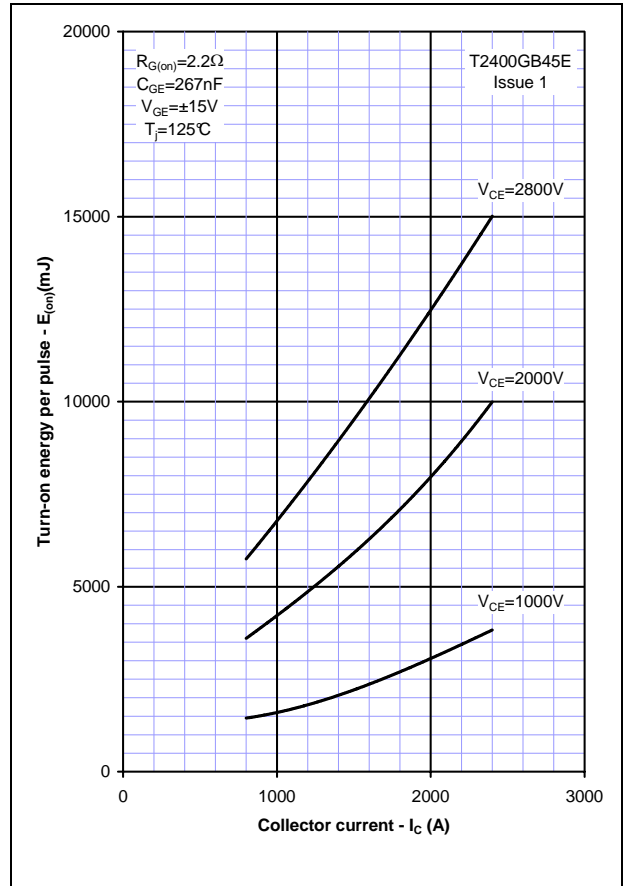


Figure 7 – Typical turn-on energy vs. di/dt

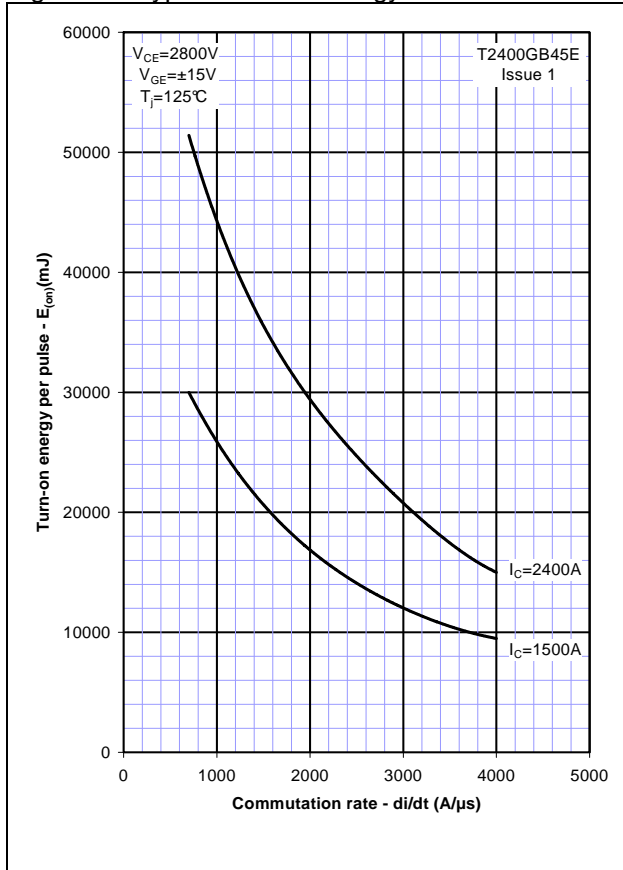


Figure 8 – Typical turn-off energy vs. collector current

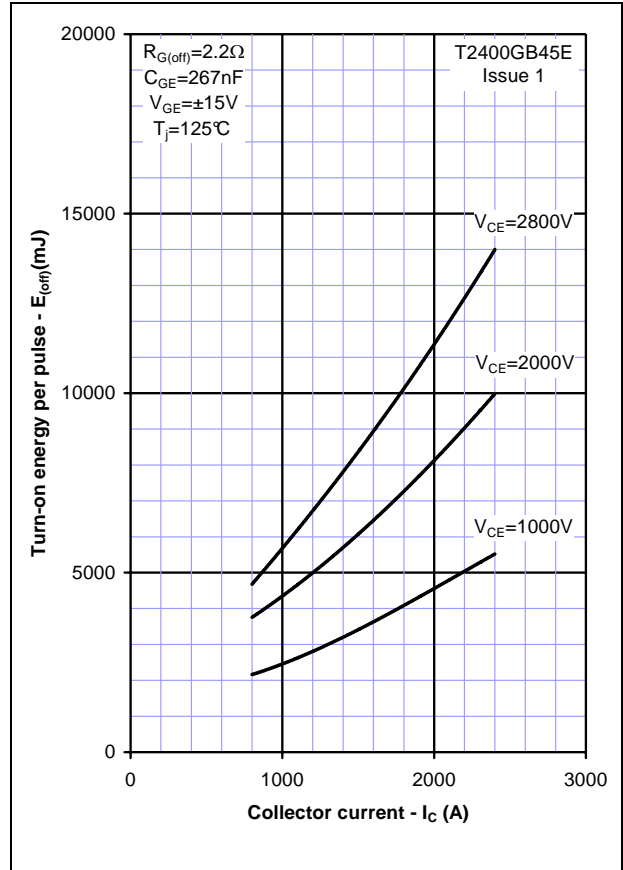


Figure 9 – Turn-off energy vs voltage

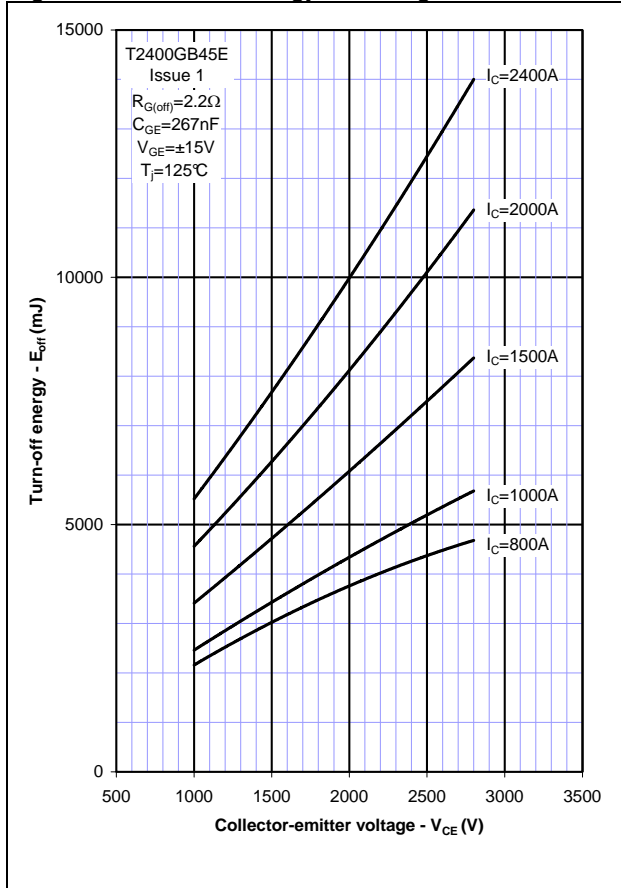


Figure 10 – Safe operating area

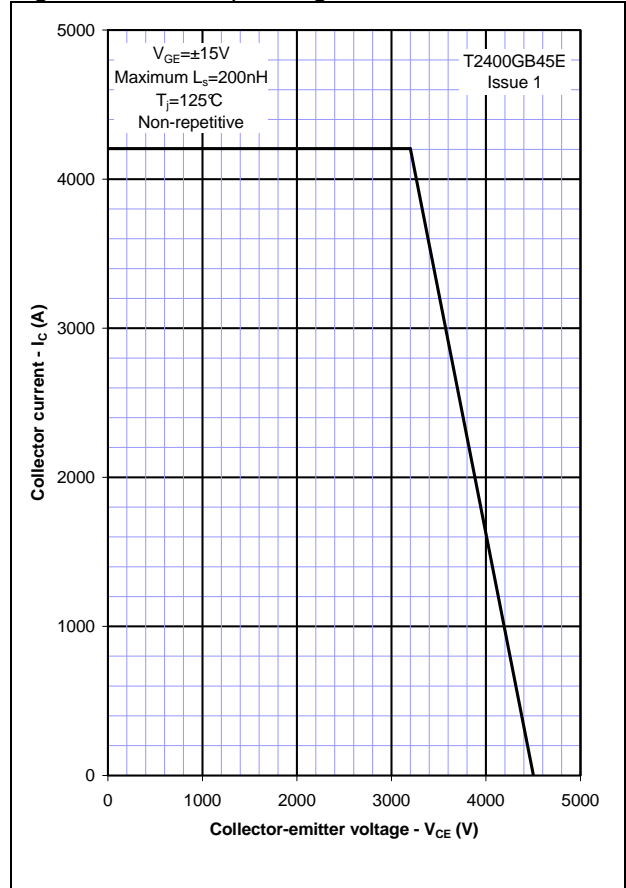
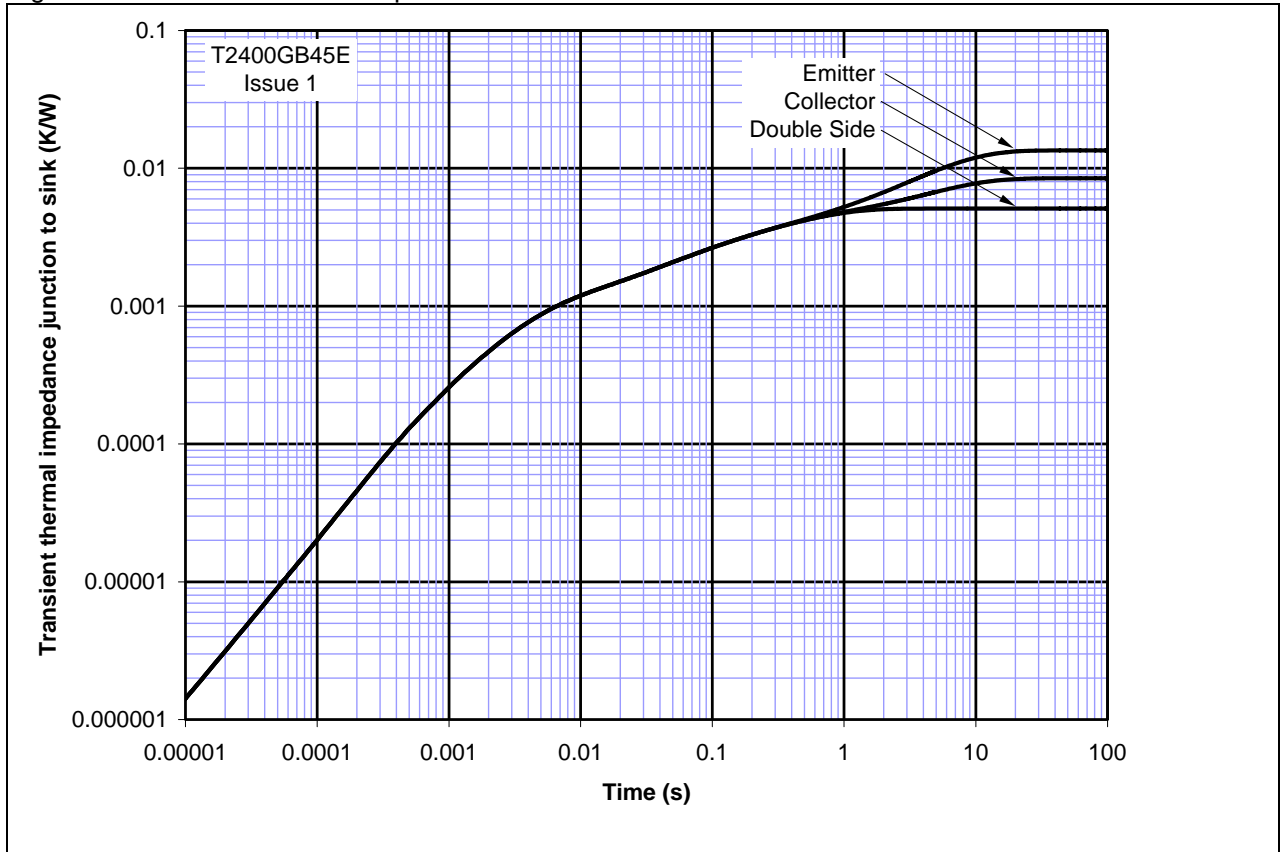
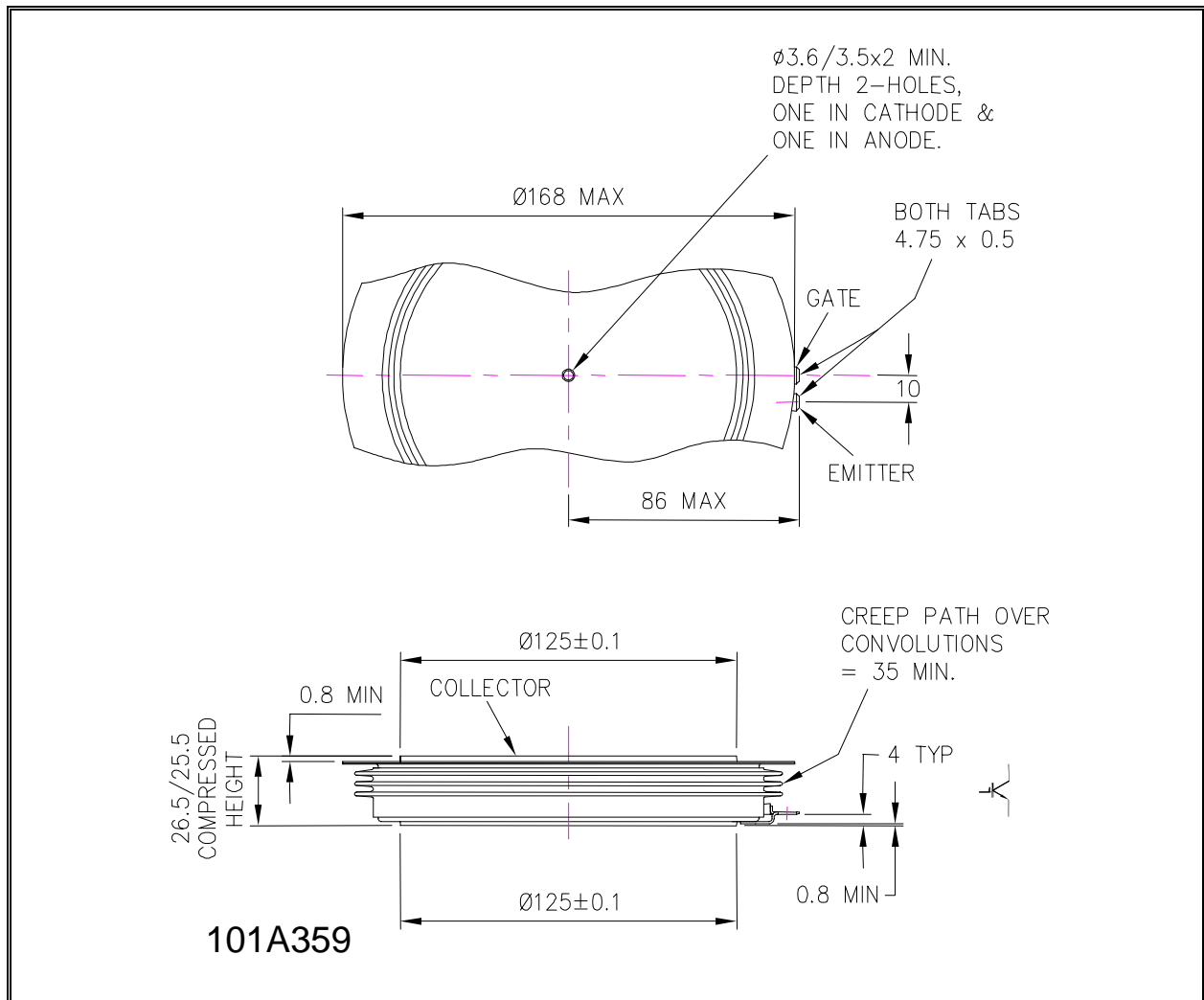


Figure 11 – Transient thermal impedance



**Outline Drawing & Ordering Information**



ORDERING INFORMATION			
(Please quote 10 digit code as below)			
<b>T2400</b>	<b>GB</b>	<b>45</b>	<b>E</b>
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](mailto:marcom@ixys.de)



**Westcode Semiconductors Ltd**  
 Langley Park Way, Langley Park,  
 Chippenham, Wiltshire, SN15 1GE.  
 Tel: +44 (0)1249 444524  
 Fax: +44 (0)1249 659448  
 E-mail: [WSL.sales@westcode.com](mailto:WSL.sales@westcode.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](mailto:sales@ixys.net)

[www.westcode.com](http://www.westcode.com)

[www.ixys.com](http://www.ixys.com)

**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](mailto:service@ixyslongbeach.com)

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