

Provisional Data

## Insulated Gate Bi-Polar Transistor Type T1800GA45A

### 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 (Note 2)	1808	A
$I_{CRM}$	Repetitive peak collector current, $t_p=1ms$ , IGBT	3000	A
$I_{F(DC)}$	Continuous DC forward current, Diode (note 2 & 4)	1471	A
$I_{FRM}$	Repetitive peak forward current, $t_p=1ms$ , Diode	3000	A
$P_{MAX}$	Maximum power dissipation, IGBT (note 3)	20	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 4)	3000	A/ $\mu s$
$T_j$	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)  $T_{sink} = 55^{\circ}C$ , double side cooled.
- 3)  $T_{sink} = 25^{\circ}C$ , double side cooled.
- 4) Maximum commutation loop inductance  $1\mu H$ .

**Characteristics**

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V <sub>CE(sat)</sub>	Collector – emitter saturation voltage	-	3.6	3.9	I <sub>C</sub> = 1800A, V <sub>GE</sub> = 15V, T <sub>J</sub> = 25°C	V
		-	4.7	5.0	I <sub>C</sub> = 1800A, V <sub>GE</sub> = 15V	V
V <sub>T0</sub>	Threshold voltage	-	-	2.66	Current range: 600 - 1800A	V
r <sub>T</sub>	Slope resistance	-	-	1.31		mΩ
V <sub>GE(TH)</sub>	Gate threshold voltage	4.0	4.7	5.1	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 200mA	V
I <sub>CES</sub>	Collector – emitter cut-off current	-	20	40	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	mA
I <sub>GES</sub>	Gate leakage current	-	-	±250	V <sub>GE</sub> = ±20V	μA
C <sub>ies</sub>	Input capacitance	-	300	-	V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz	nF
t <sub>d(on)</sub>	Turn-on delay time	-	2.0	-	I <sub>C</sub> = 1800A, V <sub>CE</sub> = 0.5V <sub>CES</sub> , V <sub>GE</sub> = ±15V,	μs
t <sub>r(l)</sub>	Rise time	-	4	-		μs
Q <sub>g(on)</sub>	Turn-on gate charge	-	-	120	R <sub>g(ON)</sub> = 2Ω, R <sub>g(OFF)</sub> = 1.5Ω,	μC
E <sub>on</sub>	Turn-on energy	-	5.6	-		J
t <sub>d(off)</sub>	Turn-off delay time	-	2.5	-	R <sub>g(ON)</sub> = 2Ω, R <sub>g(OFF)</sub> = 1.5Ω,	μs
t <sub>f</sub>	Fall time	-	2.2	-		μs
Q <sub>g(off)</sub>	Turn-off gate charge	-	-	140		μC
E <sub>off</sub>	Turn-off energy	-	5.2	-		J

Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V <sub>F</sub>	Forward voltage	-	3.1	3.4	I <sub>F</sub> = 1800A, T <sub>J</sub> = 25°C	V
		-	3.6	3.9	I <sub>F</sub> = 1800A	V
V <sub>T0</sub>	Threshold voltage	-	-	1.27	Current range 600 - 1800A	V
r <sub>T</sub>	Slope resistance	-	-	1.48		mΩ
I <sub>rm</sub>	Peak reverse recovery current	-	2320	-	I <sub>F</sub> = 1800A, V <sub>GE</sub> = ±15V, di/dt=2500A/μs	A
Q <sub>rr</sub>	Recovered charge	-	2720	-		μC
t <sub>rr</sub>	Reverse recovery time, 50% chord	-	1.7	-		μs
E <sub>r</sub>	Reverse recovery energy	-	3.2	-		J

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R <sub>thJK</sub>	Thermal resistance junction to sink, IGBT	-	-	7.7	Double side cooled	K/kW
		-	-	13	Collector side cooled	K/kW
		-	-	19	Emitter side cooled	K/kW
R <sub>thJK</sub>	Thermal resistance junction to sink, Diode	-	-	13.8	Double side cooled	K/kW
		-	-	21	Cathode side cooled	K/kW
		-	-	40	Anode side cooled	K/kW
F	Mounting force	50	55	60	Note 2	kN
W <sub>t</sub>	Weight	-	2	-		kg

Notes:-

- 1) Unless otherwise indicated T<sub>J</sub>=125°C.
- 2) For other clamp forces, please consult factory

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

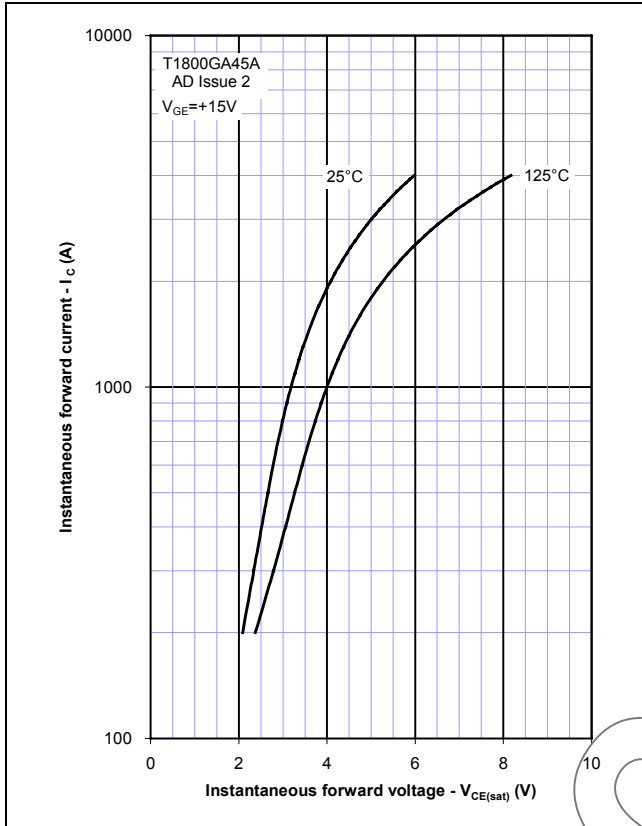


Figure 2 – Typical output characteristic

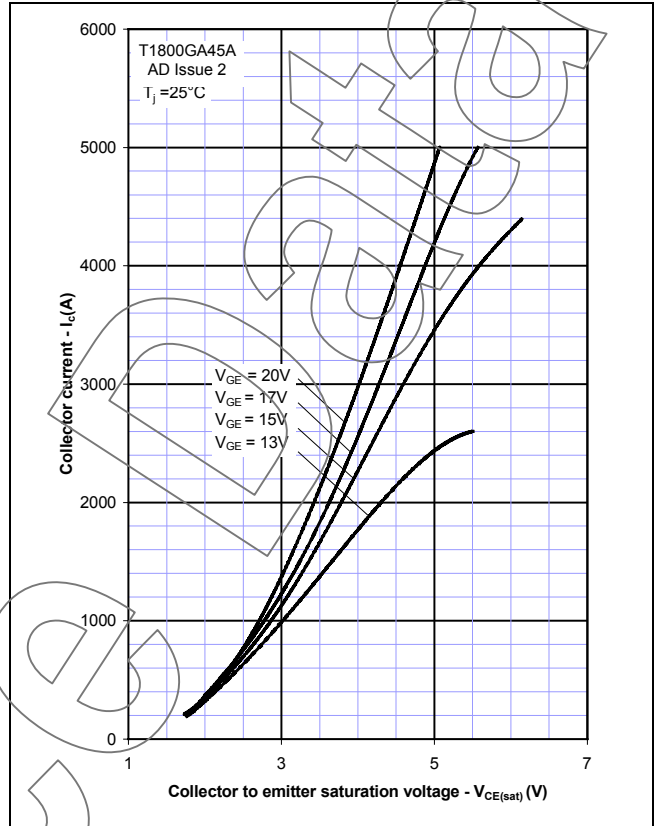


Figure 3 – Typical output characteristic

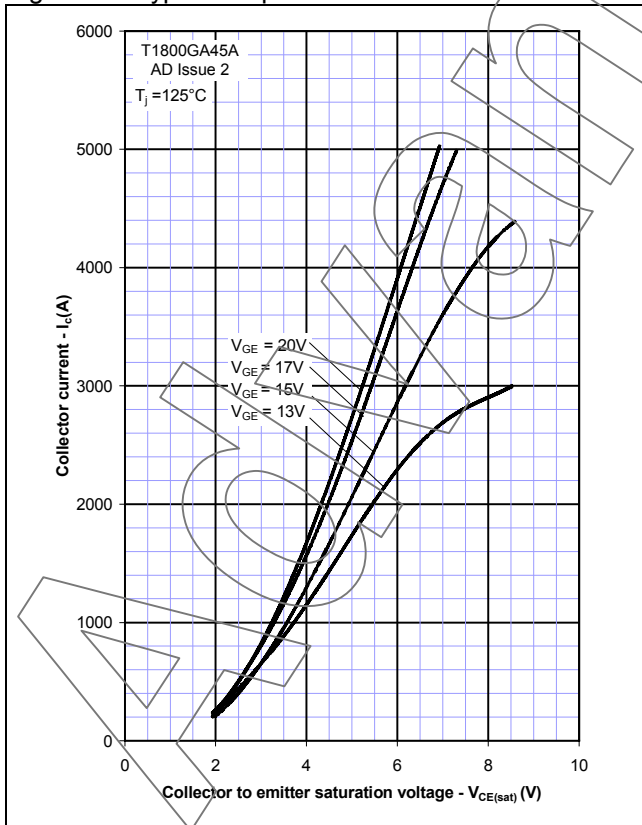


Figure 4 – Typical turn-on gate charge

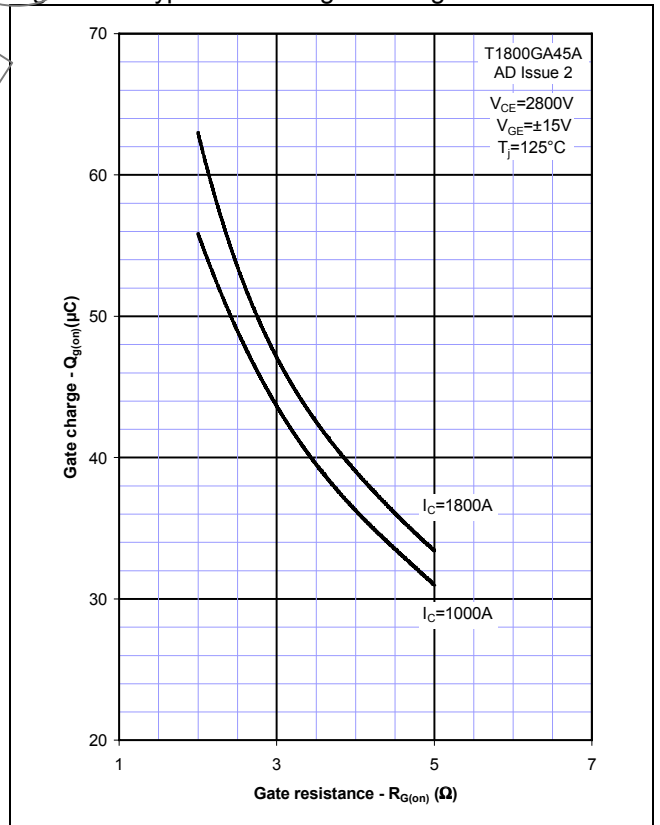


Figure 5 – Typical turn-off gate charge

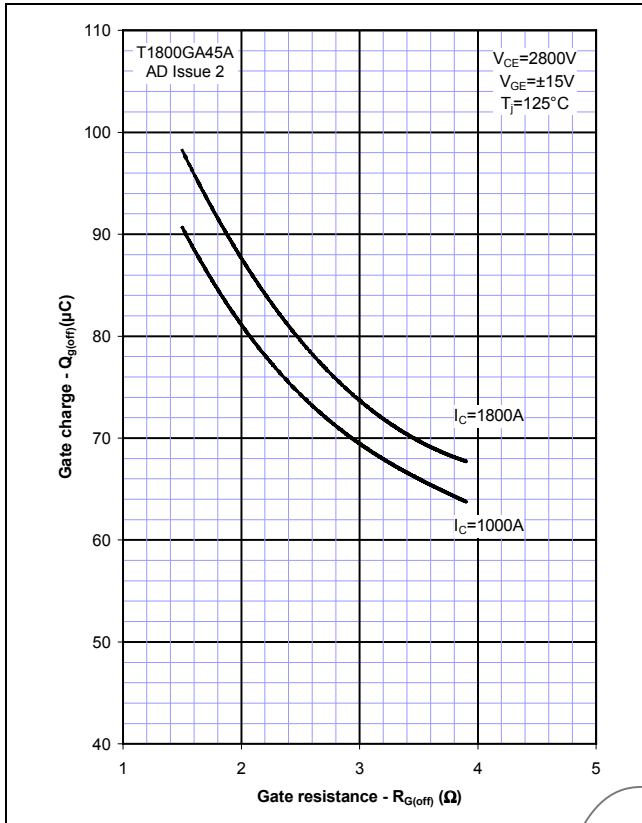


Figure 6 – Typical turn-on delay time vs gate resistance

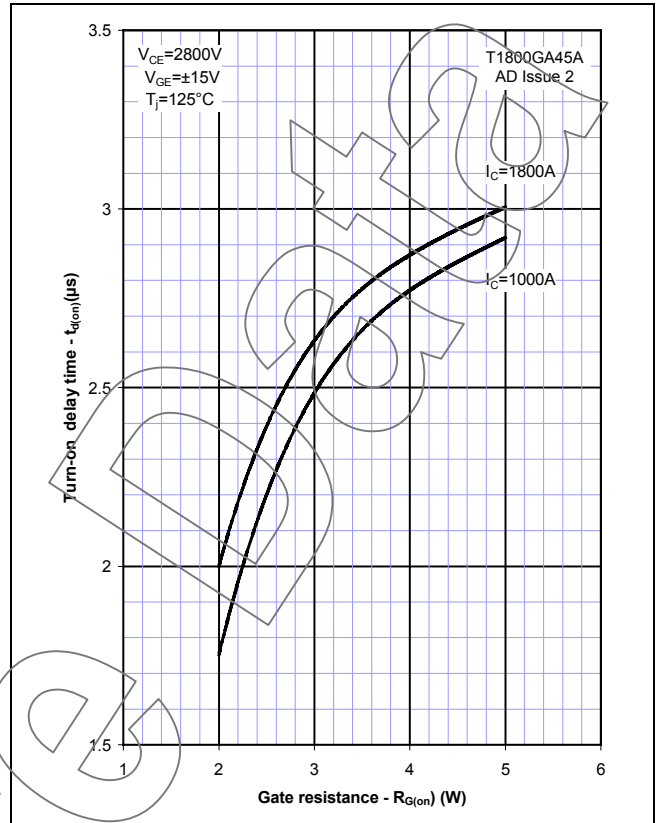


Figure 7 – Typical turn-off delay time vs. gate resistance

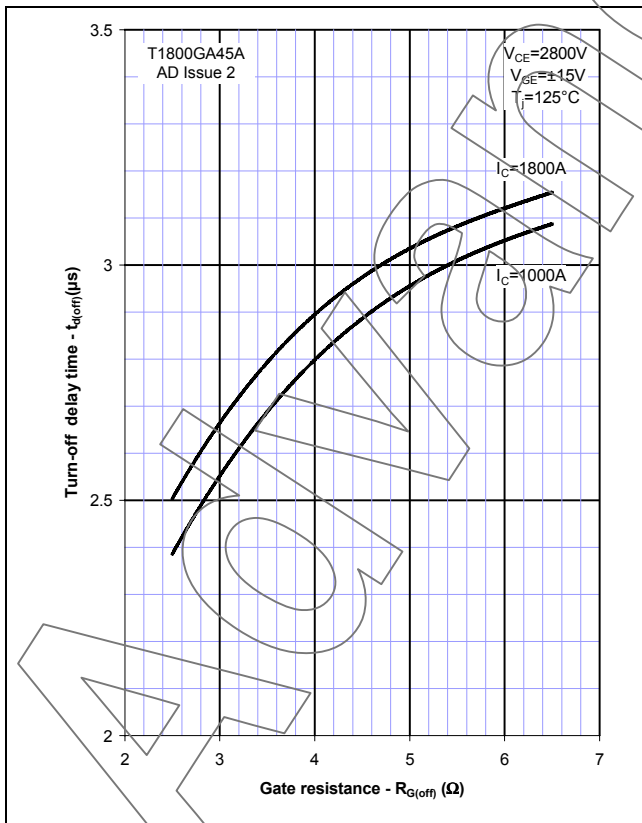


Figure 8 – Typical turn-on energy vs. collector current

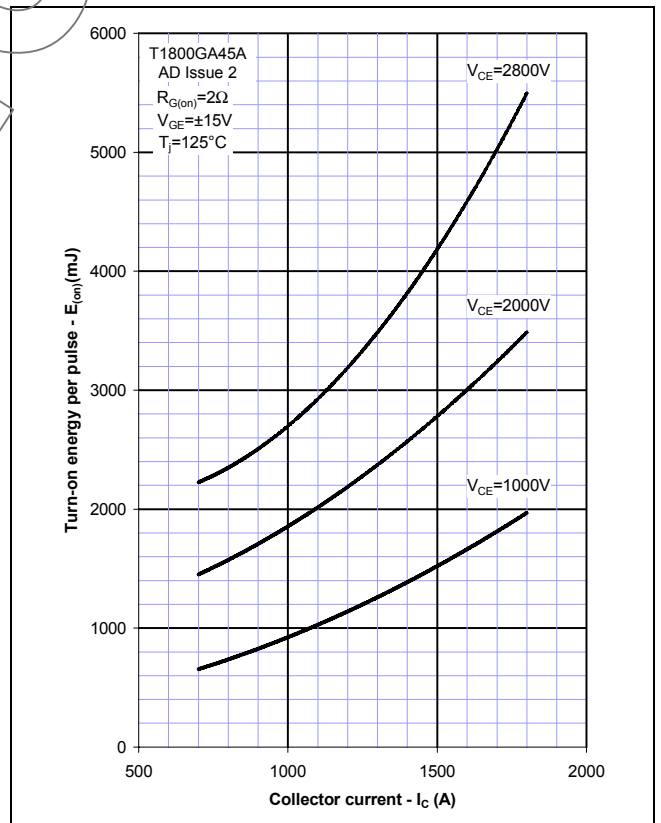


Figure 9 – Typical turn-on energy vs. di/dt

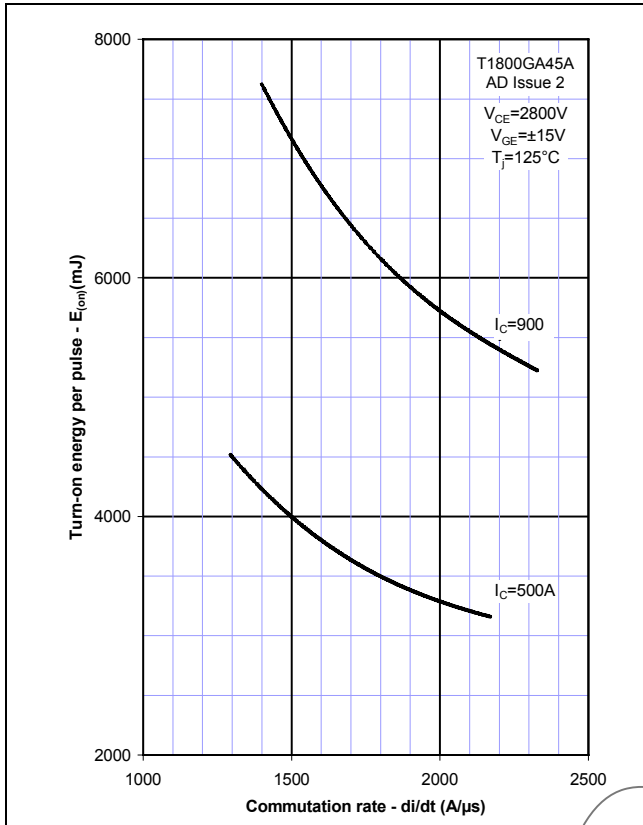


Figure 10 – Typical turn-off energy vs. collector current

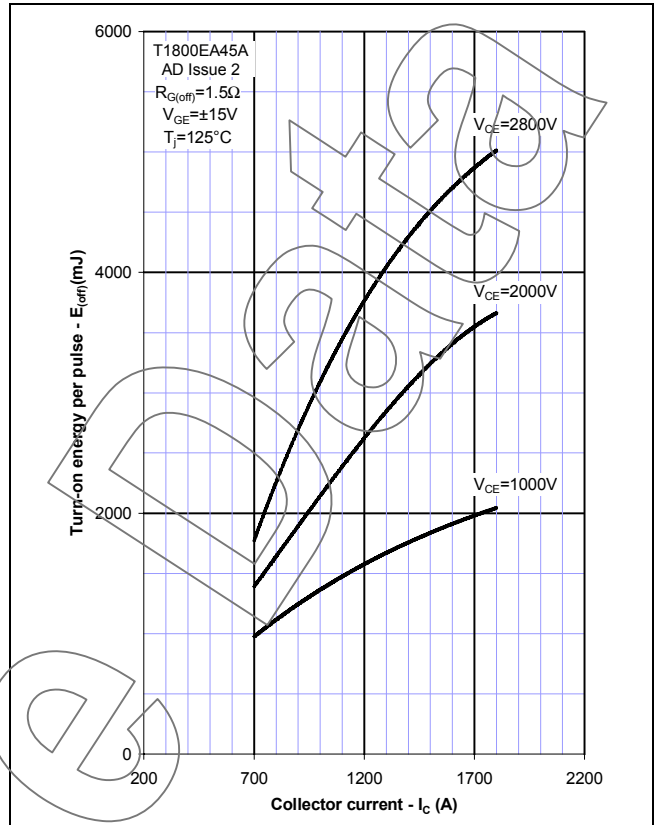


Figure 11 – Turn-off energy vs voltage

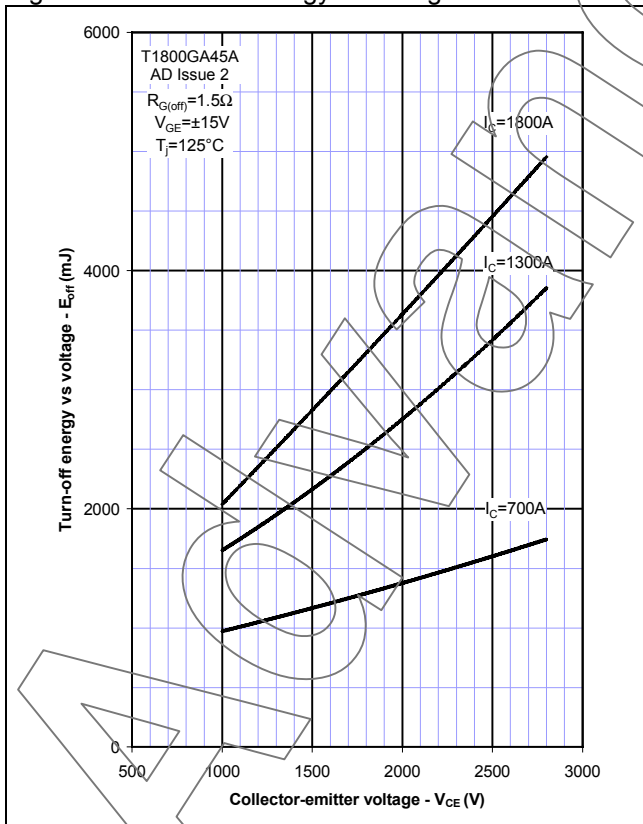


Figure 12 – Safe operating area

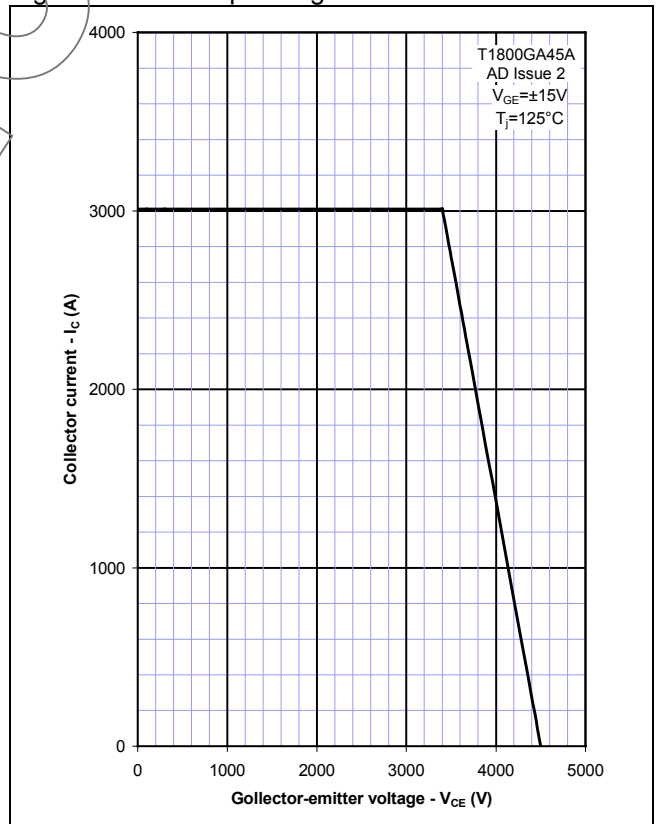


Figure 13 – Typical diode forward characteristic

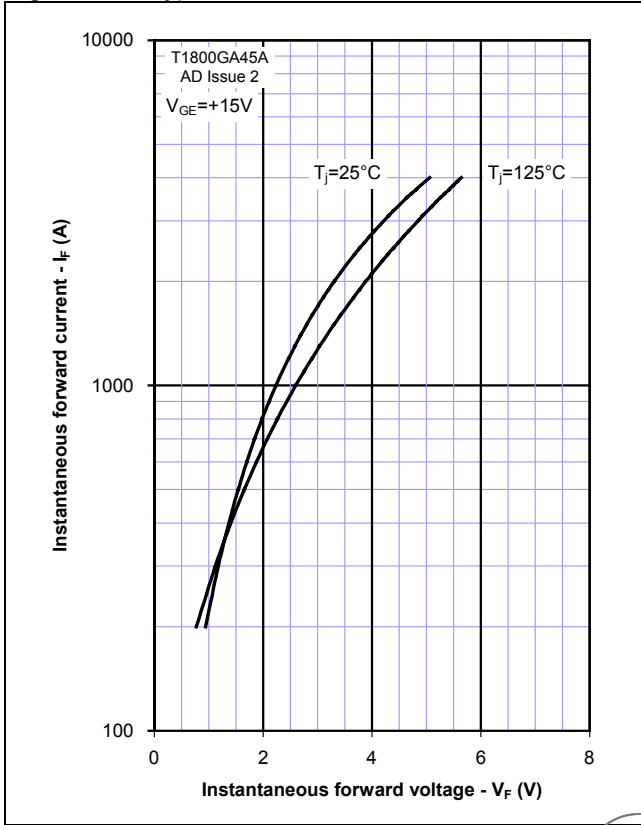


Figure 14 – Typical recovered charge

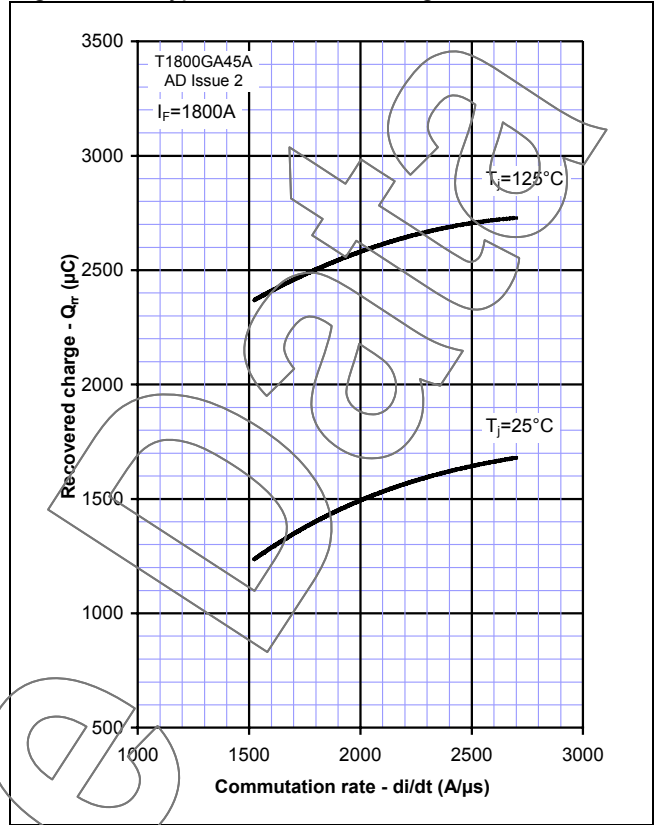


Figure 15 – Typical reverse recovery current

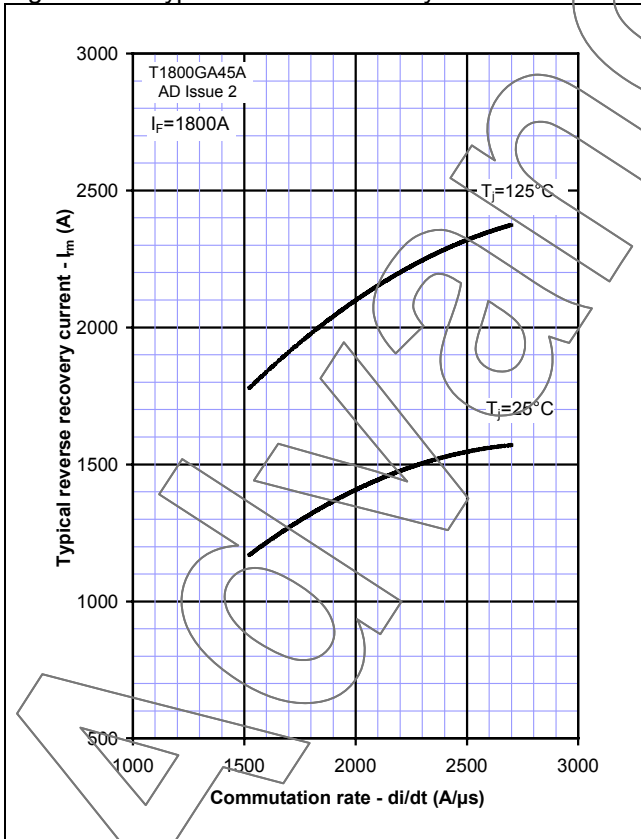


Figure 16 – Typical reverse recovery time

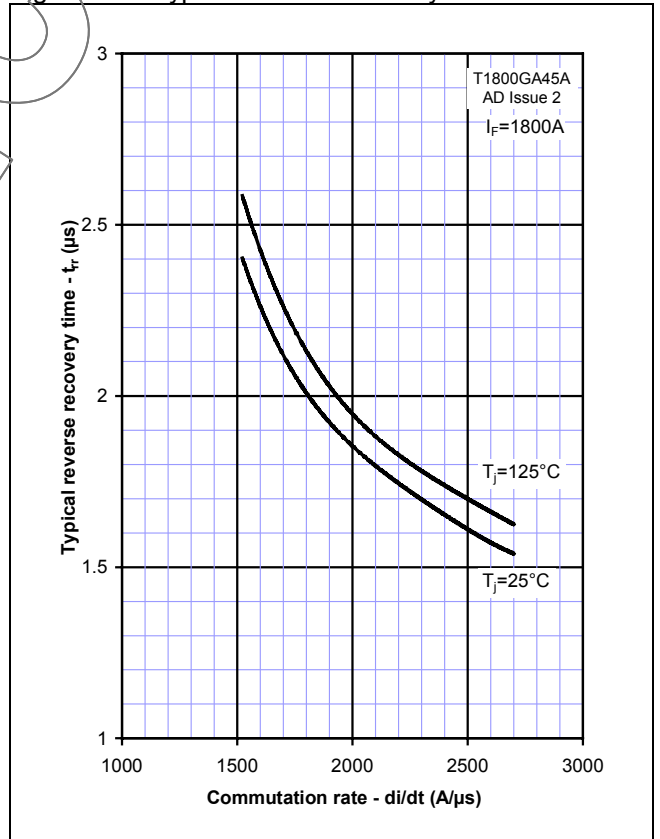


Figure 17 – Transient thermal impedance (IGBT)

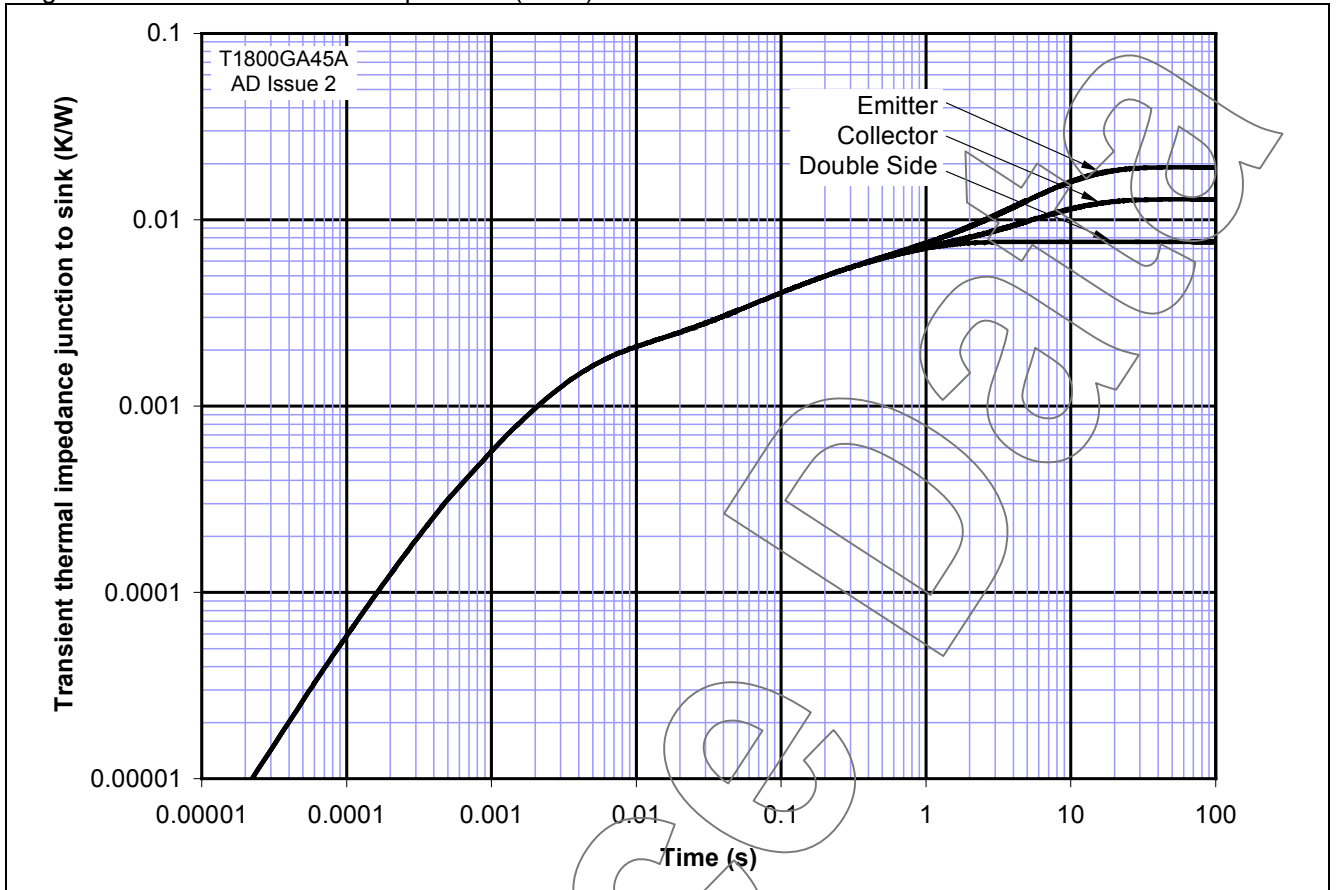
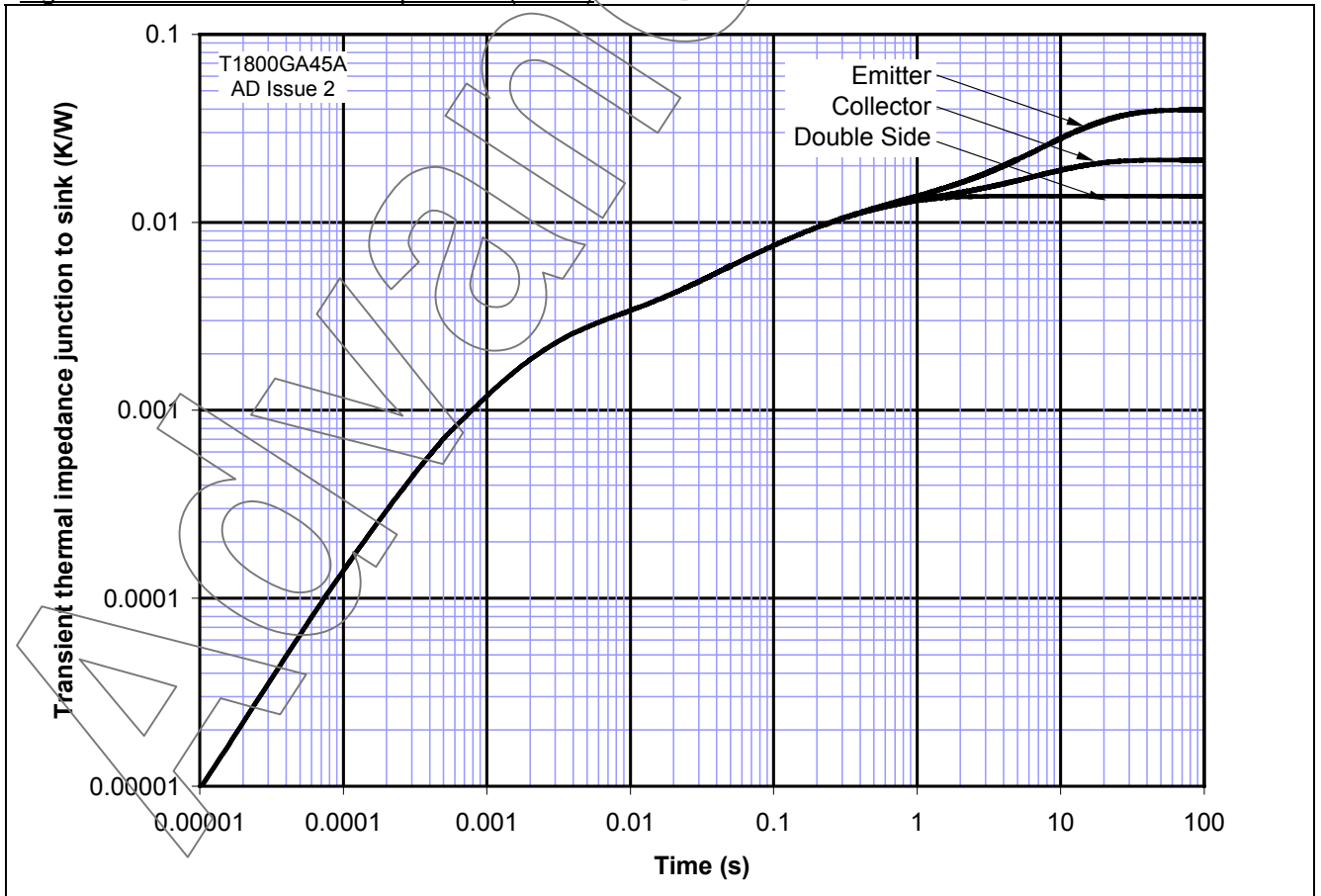
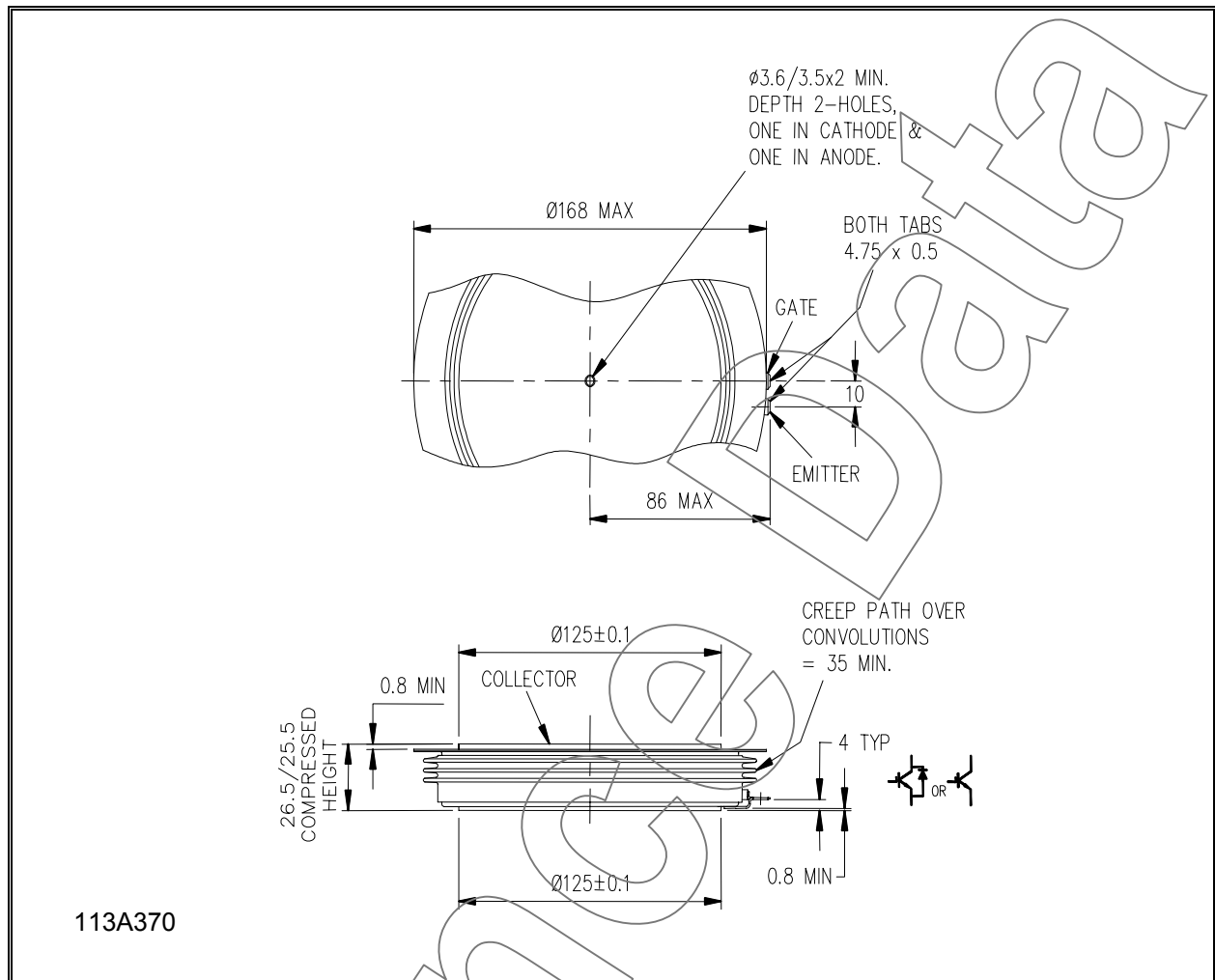


Figure 18 – Transient thermal impedance (Diode)



**Outline Drawing & Ordering Information**



ORDERING INFORMATION			
(Please quote 10 digit code as below)			
<b>T1800</b>	<b>GA</b>	<b>45</b>	<b>A</b>
Fixed type Code	Fixed Outline Code	Voltage Grade 4500	Fixed format code

Typical order code: T1800GA45A ( $V_{CES} = 4500V$ )

**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**  
 An IXYS Company

**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**  
 3540 Bassett Street  
 Santa Clara CA 95054 USA  
 Tel: +1 (408) 982 0700  
 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)

**Westcode Semiconductors Inc**  
 3270 Cherry Avenue  
 Long Beach CA 90807 USA  
 Tel: +1 (562) 595 6971  
 Fax: +1 (562) 595 8182  
 E-mail: [WSI.sales@westcode.com](mailto:WSI.sales@westcode.com)

The information contained herein is confidential and is protected by Copyright. The information may not be used or disclosed except with the written permission of and in the manner permitted by the proprietors Westcode Semiconductors Ltd. © Westcode Semiconductors Ltd.

In the interest of product improvement, Westcode reserves the right to change specifications at any time without prior notice.

Devices with a suffix code (2-letter or letter/digit/letter combination) added to their generic code are not necessarily subject to the conditions and limits contained in this report.