WESTCODE

An IXYS Company

Date:- 30 Oct, 2008

Data Sheet Issue:- 1

Provisional Data

Insulated Gate Bi-Polar Transistor

Type T0900EB45A

Advance Data

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	±20	V

	RATINGS	MAXIMUM LIMITS	UNITS
$I_{C(DC)}$	Continuous DC collector current, IGBT	900	A
I_{CRM}	Repetitive peak collector current, t_p=1ms, IGBT	1800	A
$I_{F(DC)}$	Continuous DC forward current, Diode	900	A
I_{FRM}	Repetitive peak forward current, t_p=1ms, Diode	1800	A
I_{FSM}	Peak non-repetitive surge t_p=10ms, V_{RM}=60%V_{RRM}, Diode (Note 4)	14.2	kA
I_{FSM2}	Peak non-repetitive surge t_p=10ms, V_{RM}≤10V, Diode (Note 4)	15.6	kA
P_{MAX}	Maximum power dissipation, IGBT (Note 2)	7.1	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 3)	2500	A/µs
T_j	Operating temperature range.	-40 to +125	°C
T_{stg}	Storage temperature range.	-40 to +125	°C

Notes: -
1) Unless otherwise indicated T_j = 125ºC.
2) T_{sink} = 25°C, double side cooled.
3) Maximum commutation loop inductance 250nH.
4) Half-sinewave, 125°C T_j initial.

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$V_{CE(sat)}$	Collector – emitter saturation voltage	-	3.05	3.40	I_C = 900A, V_{GE} = 15V, T_j = 25°C	V
		-	3.80	4.20	I_C = 900A, V_{GE} = 15V	V
V_{T0}	Threshold voltage	-	-	1.73	Current range: 400 – 1200A	V
r_T	Slope resistance	-	-	2.68		mΩ
$V_{GE(TH)}$	Gate threshold voltage	-	5.3	-	V_{CE} = V_{GE}, I_C = 90mA	V
I_{CES}	Collector – emitter cut-off current		10	30	V_{CE} = V_{CES}, V_{GE} = 0V	mA
I_{GES}	Gate leakage current	-	-	±10	V_{GE} = ±20V	µA
C_{ies}	Input capacitance	-	150	-	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	nF
$t_{d(on)}$	Turn-on delay time	-	2.2	-		µs
t_r(I)	Rise time	-	3.4	-	I_C =900A, V_{CE} =2800V,	µs
$Q_{g(on)}$	Turn-on gate charge	-	5	-	V_{GE} = ±15V, L_s=250nH	µC
E_{on}	Turn-on energy	-	4.3	-	$R_{g(ON)}$= 6.6Ω, $R_{g(OFF)}$=5.0Ω, C_{GE}=100nF	J
$t_{d(off)}$	Turn-off delay time	-	1.9	-	Integral diode used as freewheel diode	µs
t_f	Fall time	-	2.4	-	(Note 3)	µs
$Q_{g(off)}$	Turn-off gate charge	-	10	-		µC
E_{off}	Turn-off energy	-	3.6	-		J
$t_{d(on)}$	Turn-on delay time	-	2.4	-		µs
t_r(I)	Rise time	-	3.2	-		µs
$Q_{g(on)}$	Turn-on gate charge	-	5	-	I_C =900A, V_{CE} = 2800V,	µC
E_{on}	Turn-on energy	-	3.8	-	V_{GE} = ±15V, L_s=250nH	J
$t_{d(off)}$	Turn-off delay time	-	1.9	-	$R_{g(ON)}$= 6.6Ω, $R_{g(OFF)}$=5.0Ω, C_{GE}=100nF	µs
t_f	Fall time	-	2.4	-	Free wheel diode type E900NC450	µs
$Q_{g(off)}$	Turn-off gate charge	-	10	-	(Note 3)	µC
E_{off}	Turn-off energy	-	3.6	-		J
I_{SC}	Short circuit current	-	3400	-	V_{GE}=+15V, V_{CC}=2800V, V_{CEmax}≤V_{CES}, t_p≤10µs	A

Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V_F	Forward voltage	-	3.4	3.7	I_F = 900A, T_j =25°C	V
		-	3.9	4.2	I_F = 900A	V
V_{To}	Threshold voltage	-	-	2.43	Current range 400-1200A	V
r_T	Slope resistance	-	-	1.86		mΩ
I_{rm}	Peak reverse recovery current	-	610	-	I_F = 900A, V_{GE} = ±15V, di/dt=2000A/µs	A
Q_{rr}	Recovered charge	-	920	-		µC
t_{rr}	Reverse recovery time, 50% chord	-	2.3	-		µs
E_r	Reverse recovery energy	-	0.9	-		J

Advance Data

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R_{thJK}	Thermal resistance junction to sink, IGBT	-	-	14	Double side cooled	K/kW
		-	-	23	Collector side cooled	K/kW
		-	-	35	Emitter side cooled	K/kW
R_{thJK}	Thermal resistance junction to sink, Diode	-	-	26	Double side cooled	K/kW
		-	-	41	Cathode side cooled	K/kW
		-	-	78	Anode 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°C.
2) Consult application note 2008AN01 for detailed mounting requirements
3) C_{GE} is additional gate – emitter capacitance added to output of gate drive

Advance Data

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

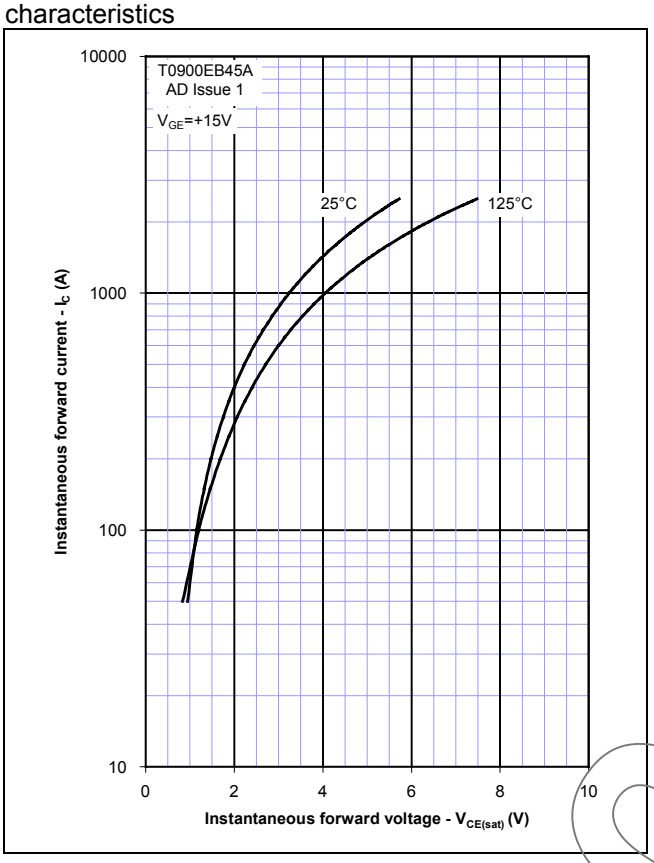


Figure 2 – Typical output characteristic

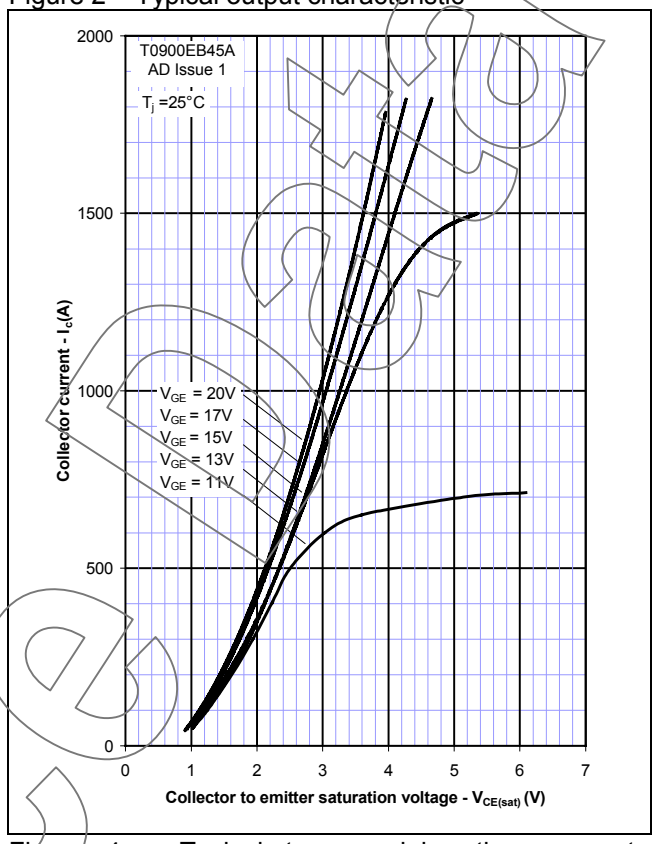


Figure 3 – Typical output characteristic

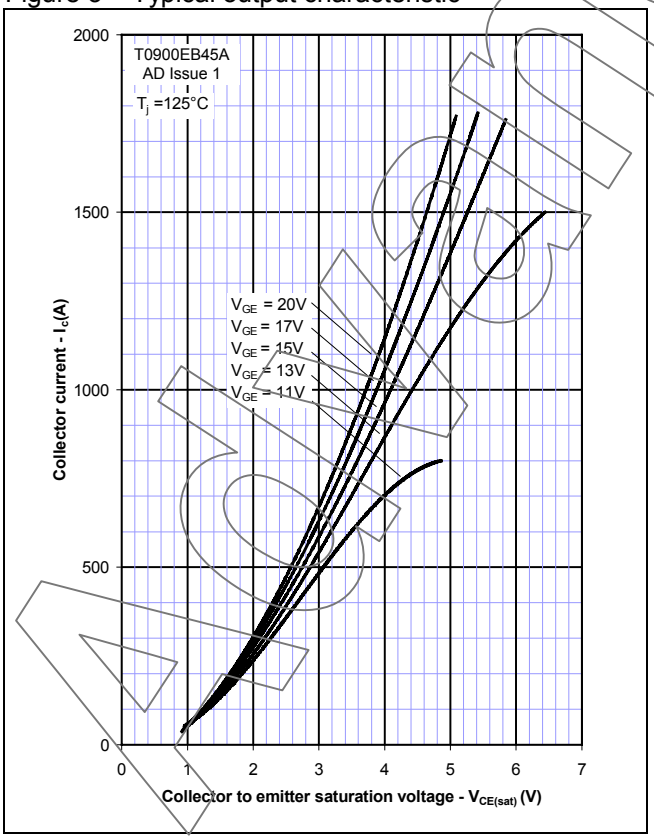


Figure 4 – Typical turn-on delay time vs gate resistance

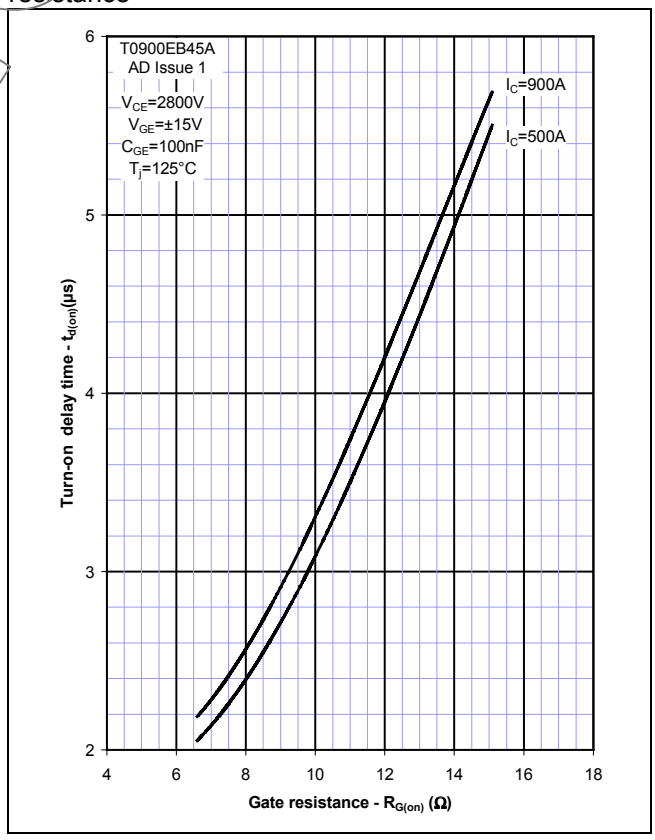


Figure 5 – Typical turn-off delay time vs. gate resistance

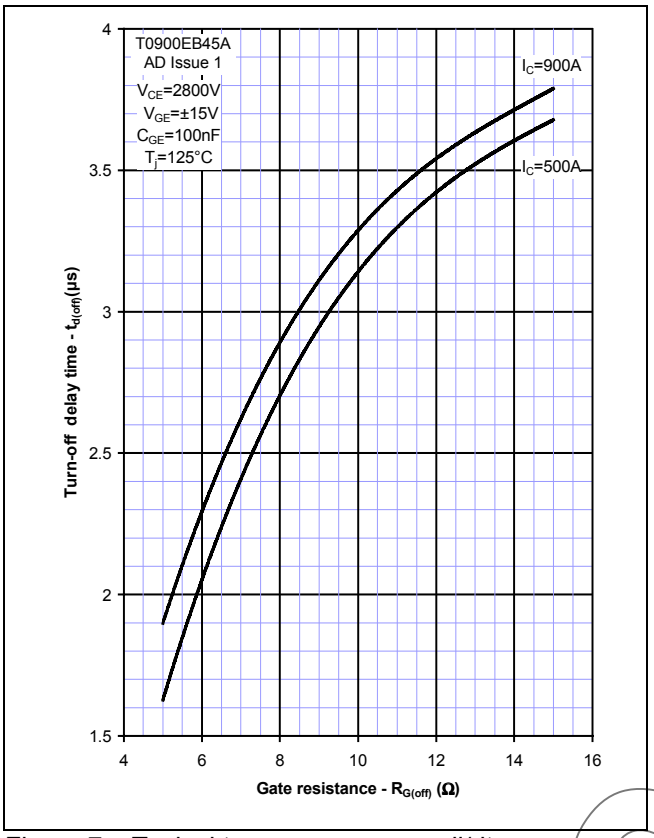


Figure 6 – Typical turn-on energy vs. collector current

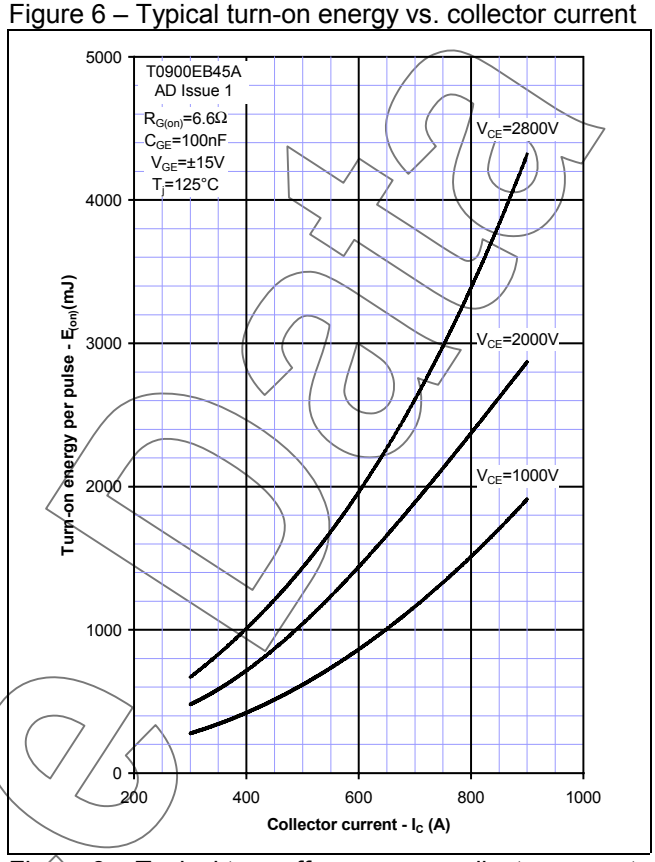


Figure 7 – Typical turn-on energy vs. di/dt

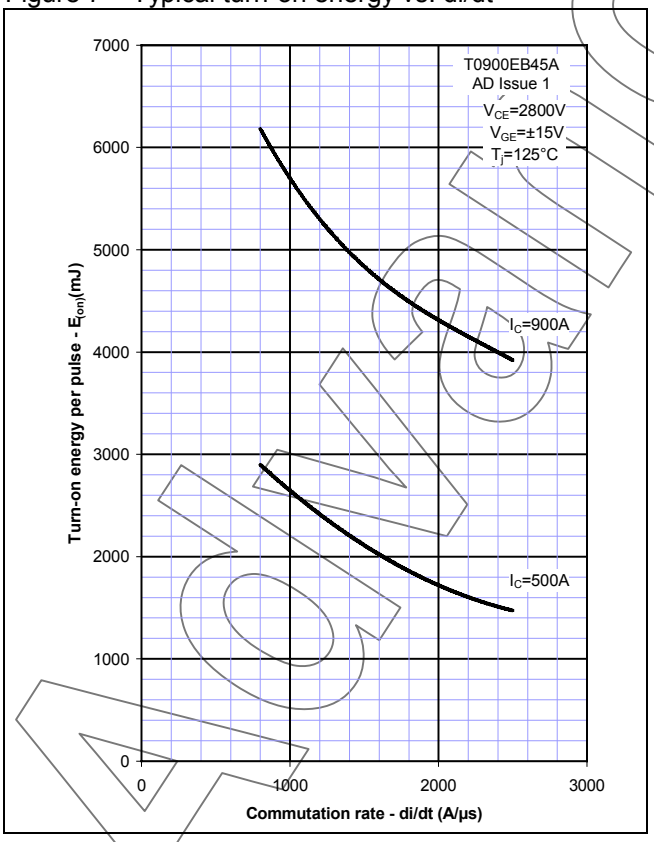
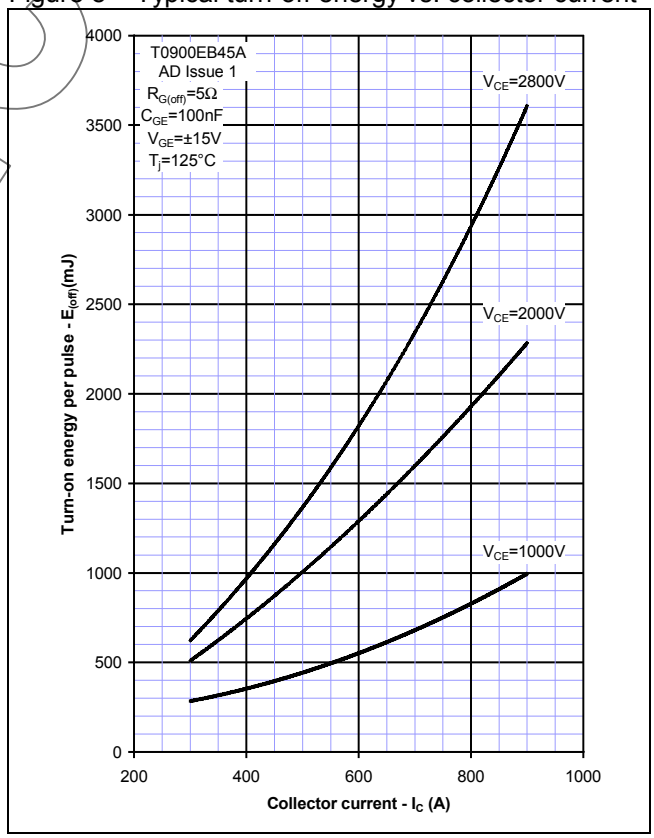


Figure 8 – Typical turn-off energy vs. collector current



Archive

Figure 9 – Turn-off energy vs voltage

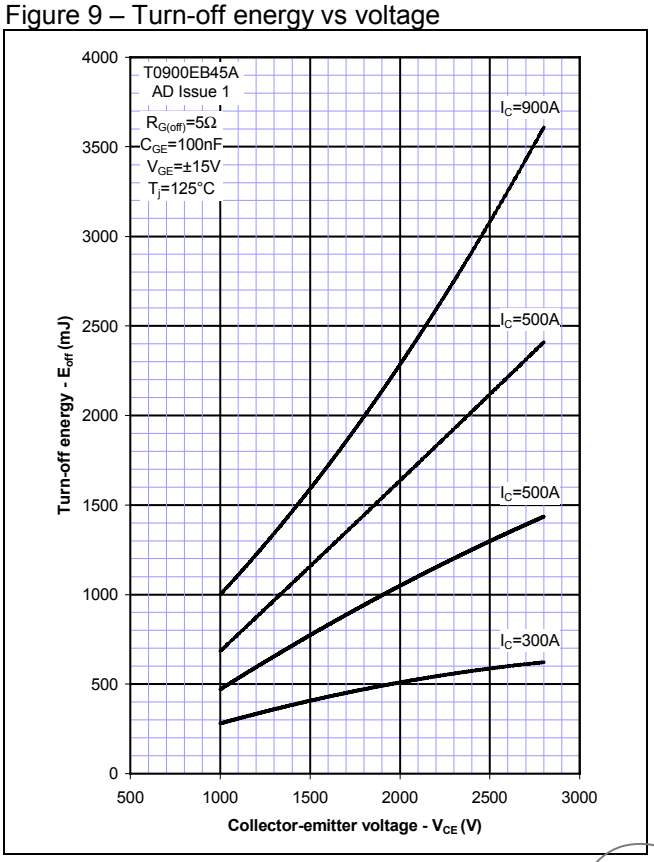


Figure 10 – Safe operating area

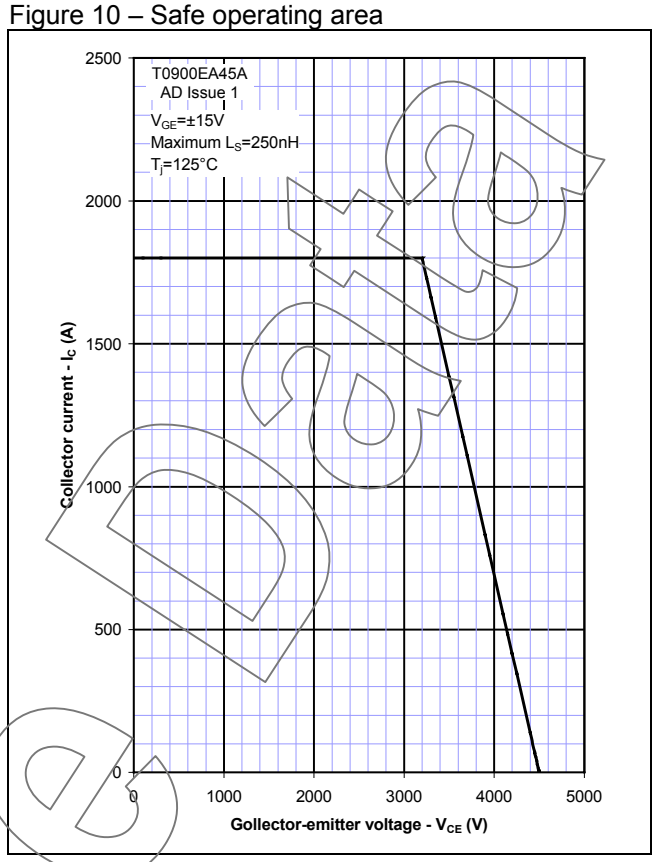


Figure 11 – Typical diode forward characteristic

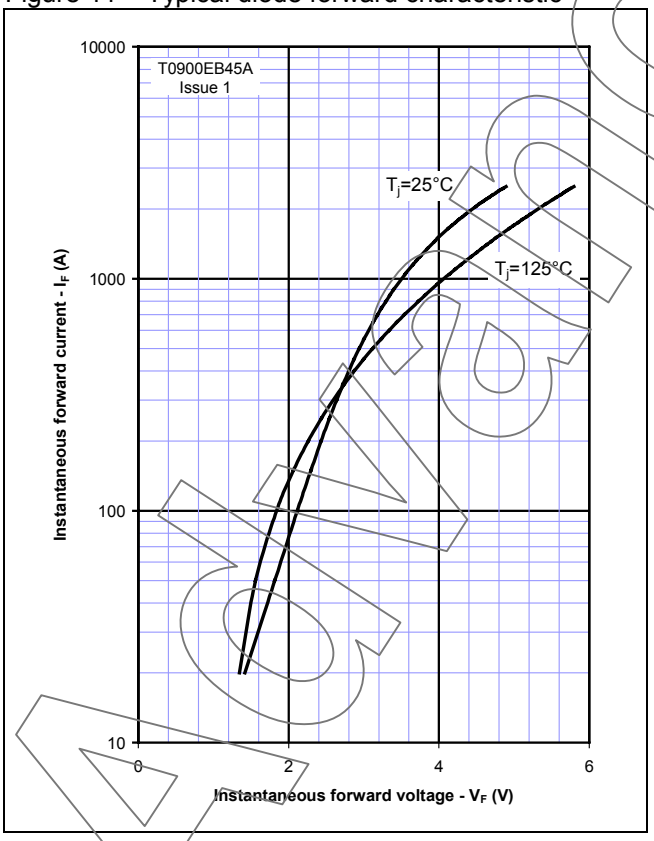
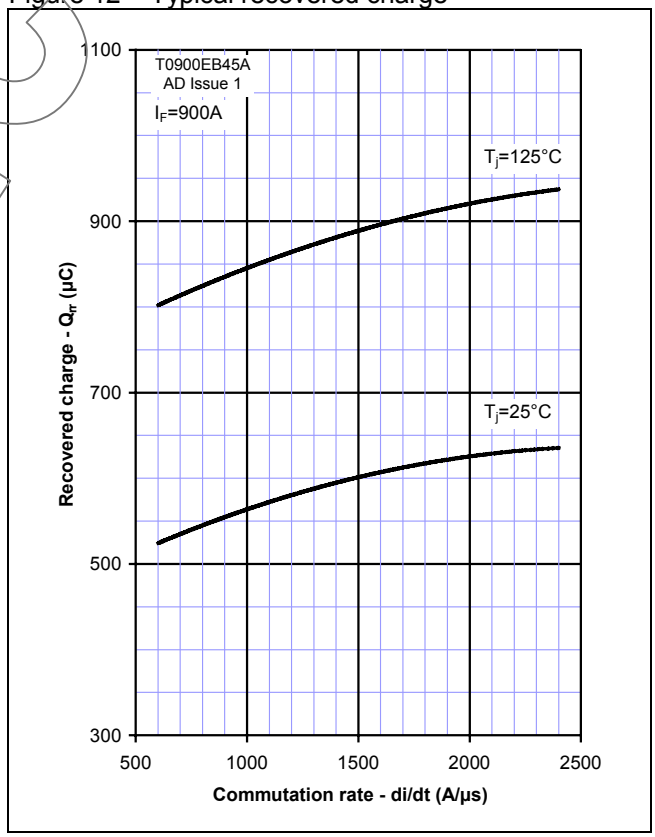


Figure 12 – Typical recovered charge



Advance Data

Figure 13 – Typical reverse recovery current

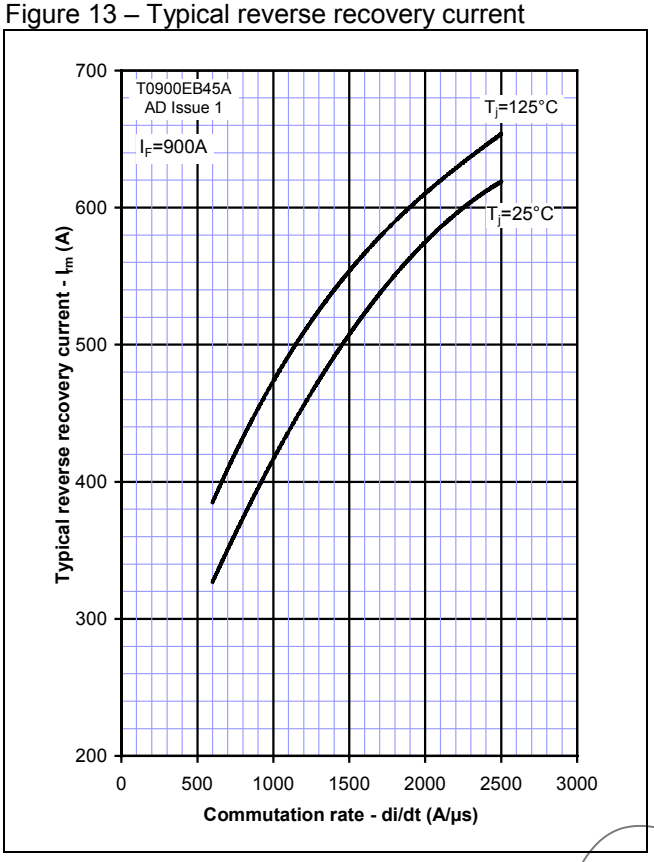


Figure 14 – Typical reverse recovery time

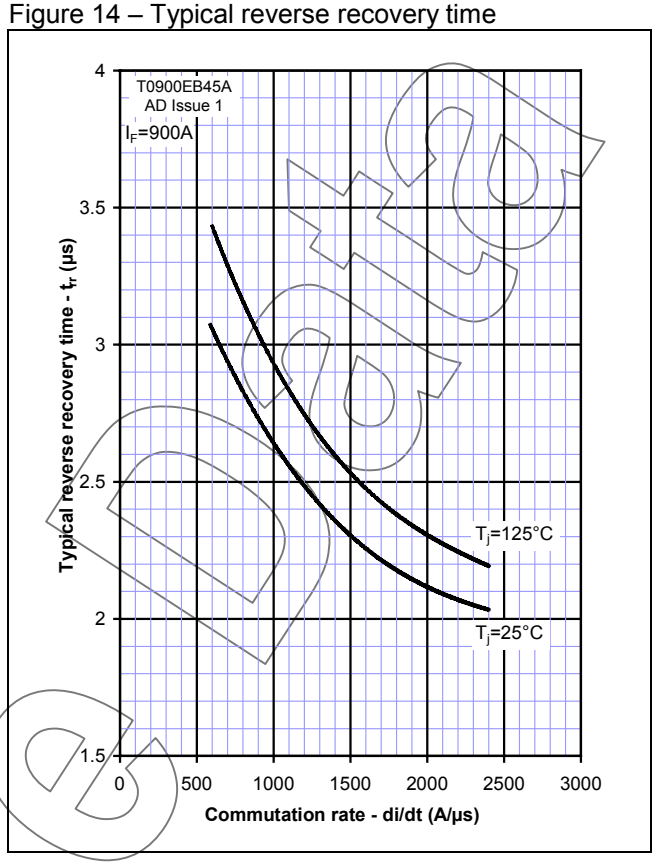


Figure 15 – Transient thermal impedance (IGBT)

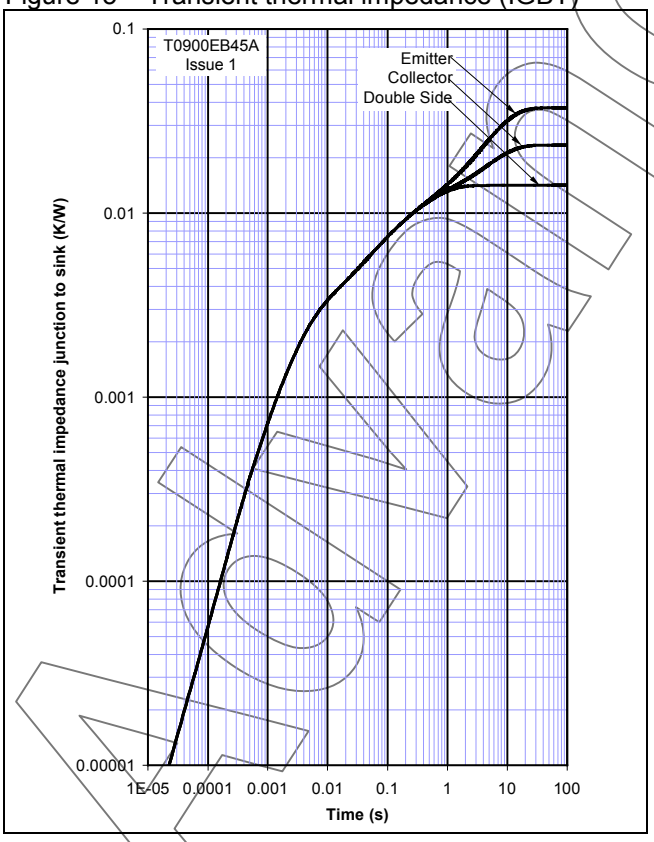
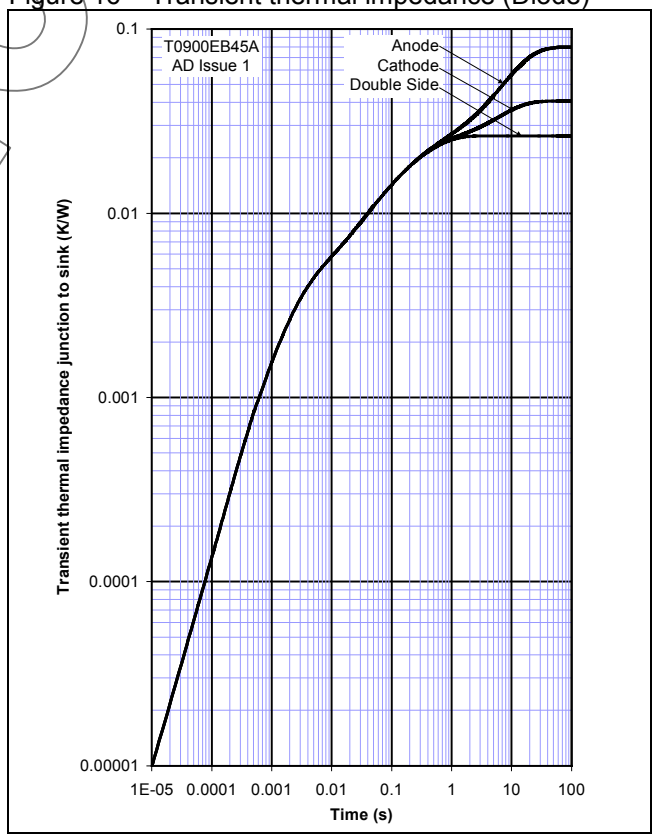
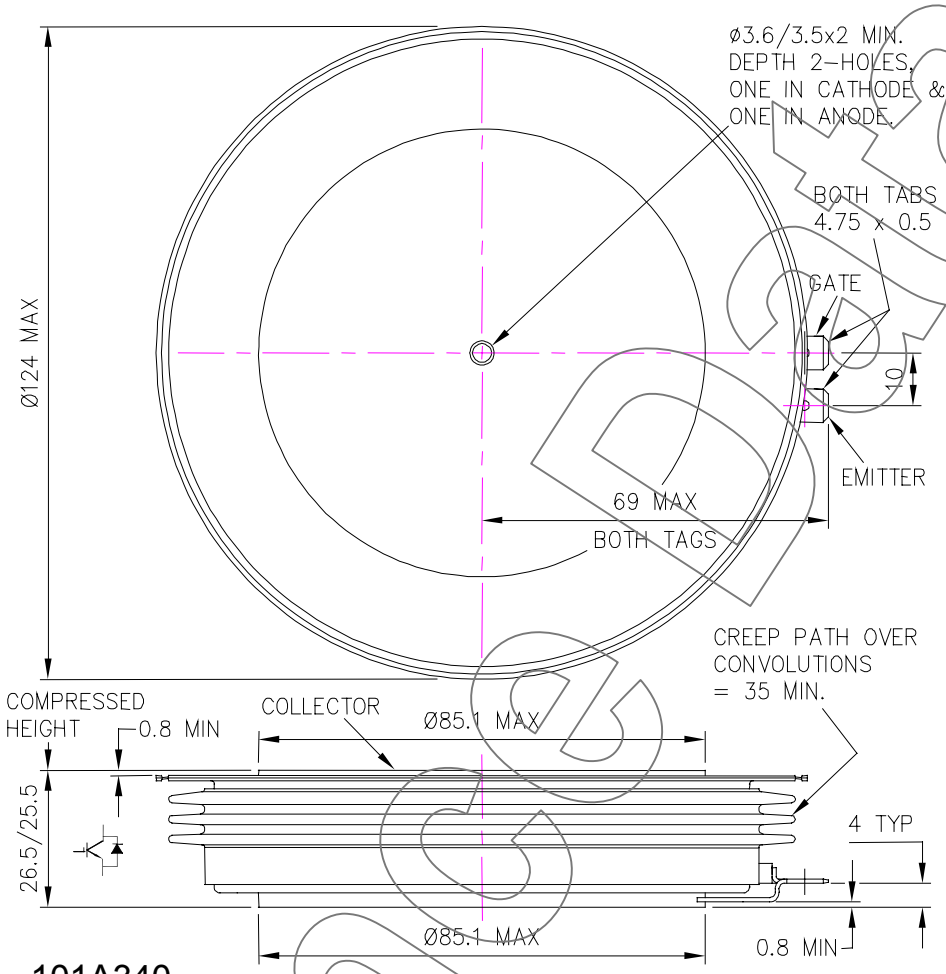


Figure 16 – Transient thermal impedance (Diode)



Advance Information

Outline Drawing & Ordering Information



ORDERING INFORMATION		(Please quote 10 digit code as below)	
T0900	**EB**	**45**	**A**
Fixed type Code	Fixed Outline Code	Voltage Grade 4500	Fixed format code

Typical order code: T0900EB45A (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

IXYS Corporation
1590 Buckeye Drive
Milpitas CA 95035-7418
Tel: +1 (408) 457 9000
Fax: +1 (408) 496 0670
E-mail: sales@ixys.net

WESTCODE
An IXYS Company

www.westcode.com

www.ixys.net

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

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

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.