WESTCODE

An IXYS Company

Date:- 20 Sep, 2006

Data Sheet Issue:- 4

Insulated Gate Bi-Polar Transistor

Type T0900EA45A

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 (Note 3)	1212	A
I_{CRM}	Repetitive peak collector current, t_p=1ms, IGBT	1500	A
$I_{F(DC)}$	Continuous DC forward current, Diode (note 2 & 4)	1004	A
I_{FRM}	Repetitive peak forward current, t_p=1ms, Diode	1500	A
P_{MAX}	Maximum power dissipation, IGBT (note 3)	7.1	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 4)	2000	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} = 55°C, double side cooled.
3) T_{sink} = 25°C, double side cooled.
4) Maximum commutation loop inductance 1µH.

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$V_{CE(sat)}$	Collector – emitter saturation voltage	-	3.5	3.8	I_C = 900A, V_{GE} = 15V, T_j = 25°C	V
		-	4.7	5.0	I_C = 900A, V_{GE} = 15V	V
V_{T0}	Threshold voltage	-	-	2.40	Current range: 300 – 900A	V
r_T	Slope resistance	-	-	2.88		mΩ
$V_{GE(TH)}$	Gate threshold voltage	4.0	5.6	6.0	V_{CE} = V_{GE}, I_C = 200mA	V
I_{CES}	Collector – emitter cut-off current		20	35	V_{CE} = V_{CES}, V_{GE} = 0V	mA
I_{GES}	Gate leakage current	-	-	±150	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	-	1.6	-		µs
$t_r(I)$	Rise time	-	2.3	-		µs
$Q_{g(on)}$	Turn-on gate charge	-	-	60	I_C =900A, V_{CE} = 0.5V_{CES},	µC
E_{on}	Turn-on energy	-	2.8	-	V_{GE} = ±15V,	J
$t_{d(off)}$	Turn-off delay time	-	1.2	-	$R_{g(ON)}$= 4Ω,	µs
t_f	Fall time	-	1.2	-	$R_{g(OFF)}$=2.5Ω,	µs
$Q_{g(off)}$	Turn-off gate charge	-	-	100		µC
E_{off}	Turn-off energy	-	2.6	-		J

Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V_F	Forward voltage	-	3.1	3.4	I_F = 900A, T_j =25°C	V
		-	3.6	3.9	I_F = 900A	V
V_{To}	Threshold voltage	-	-	1.63	Current range 300-900A	V
r_T	Slope resistance	-	-	2.19		mΩ
I_{rm}	Peak reverse recovery current	-	1800	-	I_F = 900A, V_{GE} = ±15V, di/dt=1500A/µs	A
Q_{rr}	Recovered charge	-	800	-		µC
t_{rr}	Reverse recovery time, 50% chord	-	0.71	-		µs
E_r	Reverse recovery energy	-	1.4	-		J

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	30	35	Note 2	kN
W_t	Weight	-	1.2	-		kg

Notes:-
1) Unless otherwise indicated T_j=125°C.
2) For other clamp forces, please consult factory

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

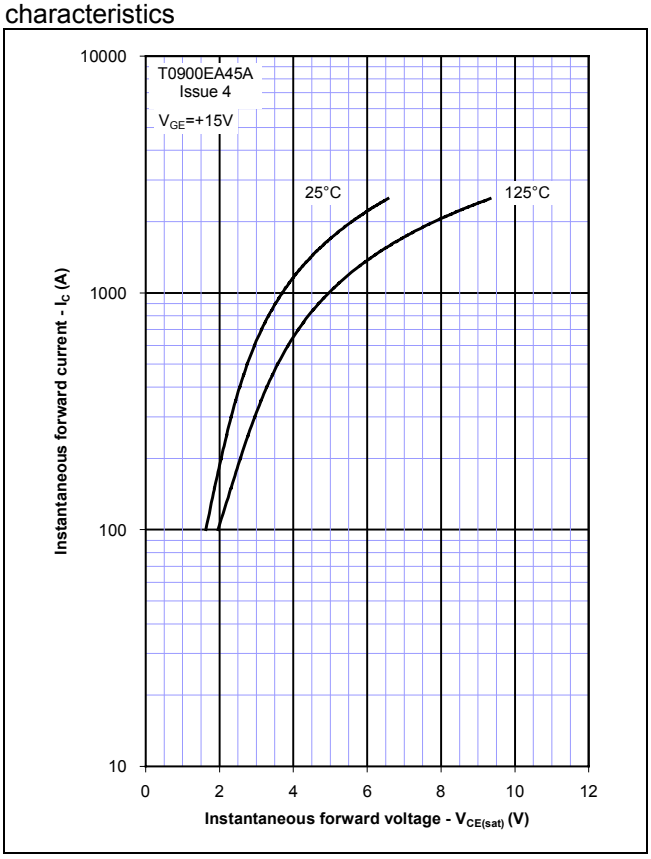


Figure 2 – Typical output characteristic

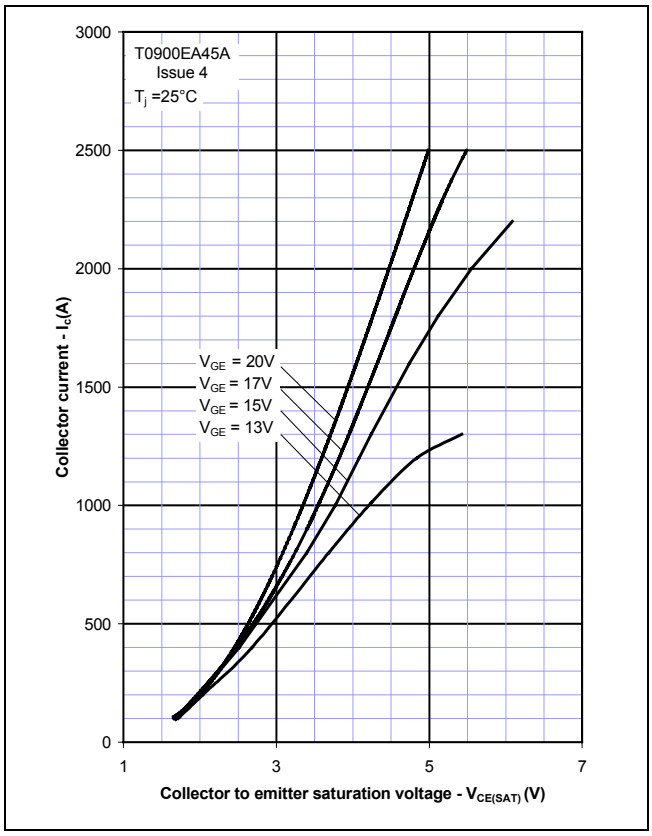


Figure 3 – Typical output characteristic

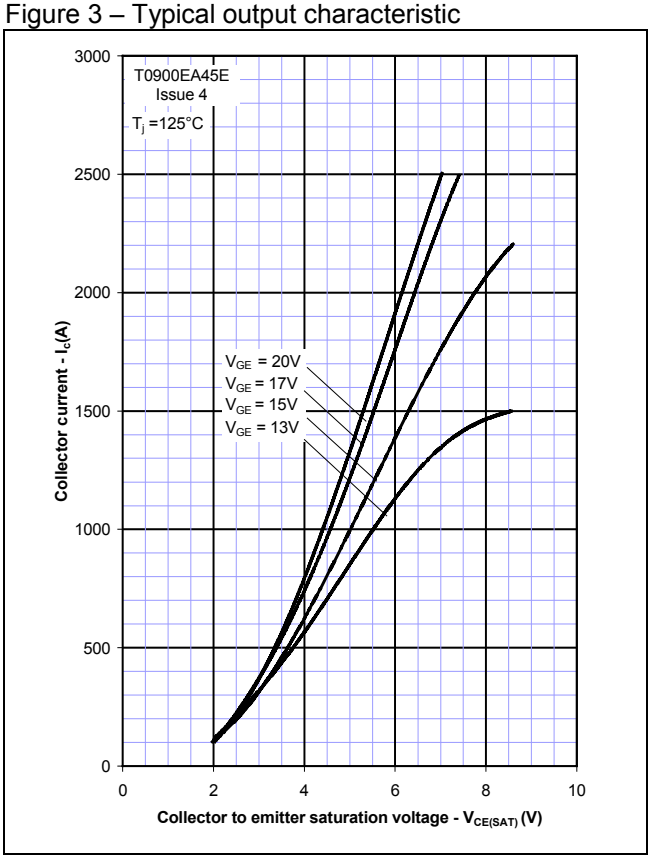


Figure 4 – Typical turn-on gate charge

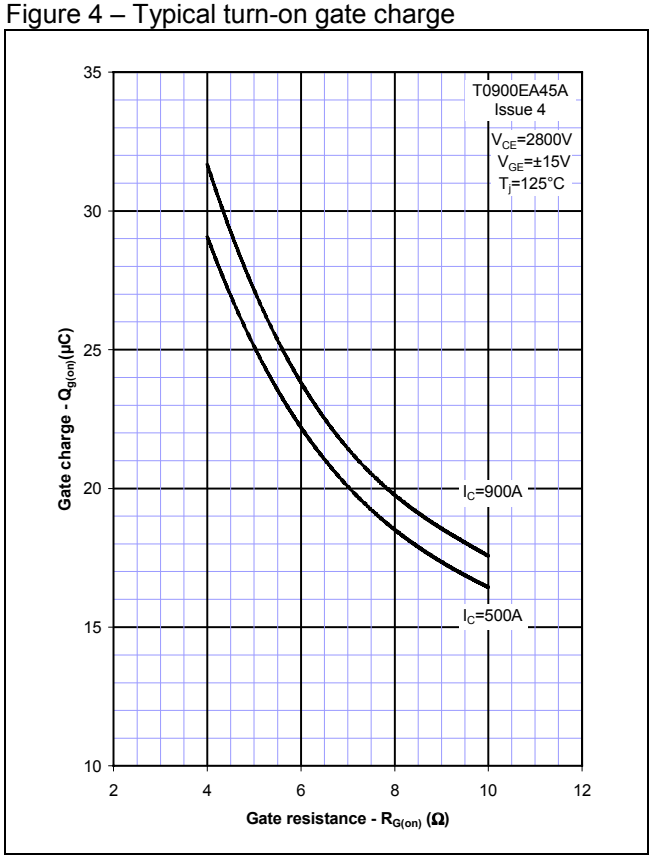


Figure 5 – Typical turn-off gate charge

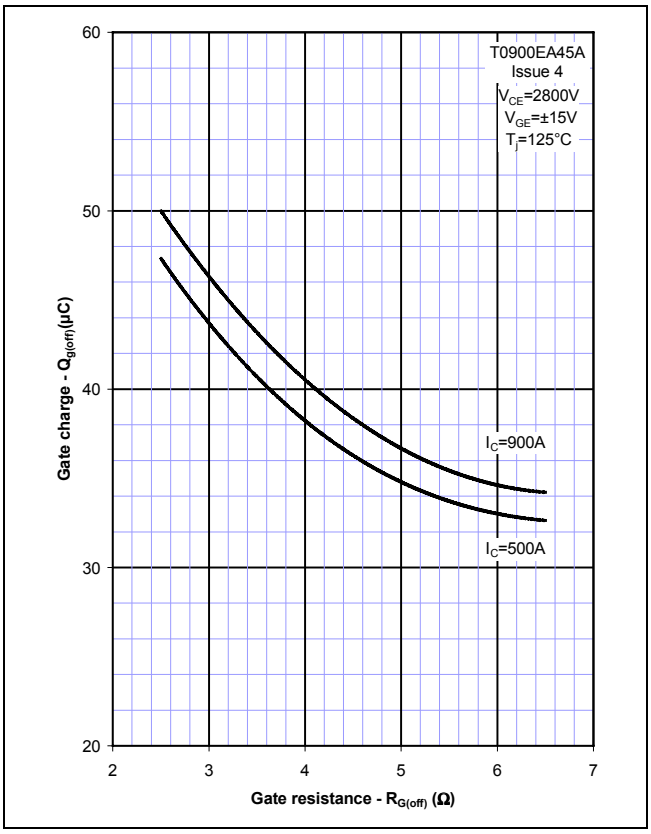


Figure 6 – Typical turn-on delay time vs gate resistance

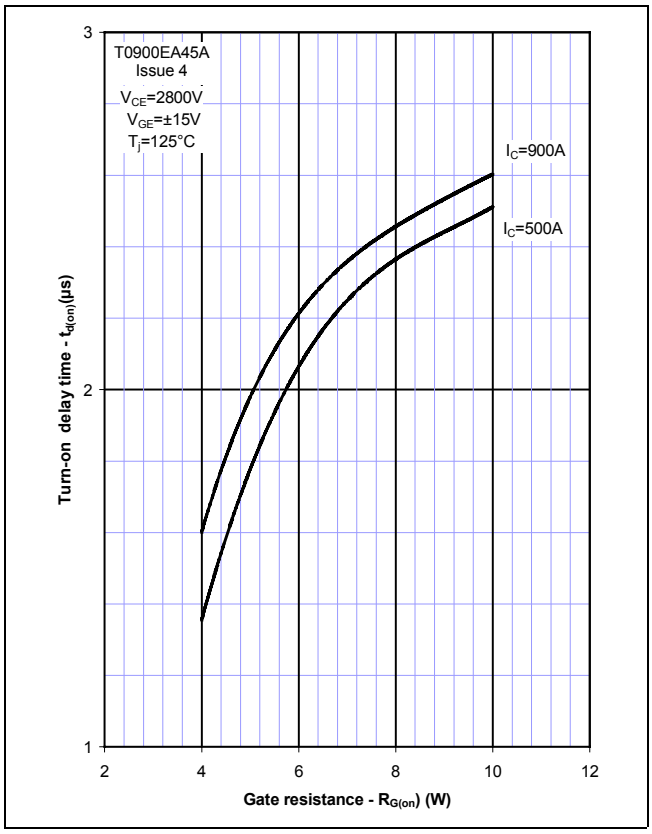


Figure 7 – Typical turn-off delay time vs. gate resistance

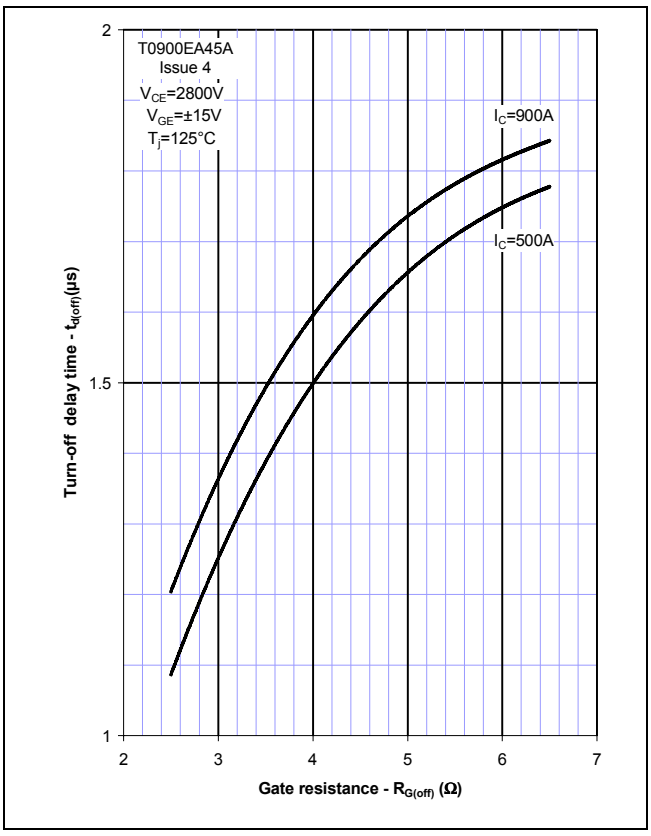


Figure 8 – Typical turn-on energy vs. collector current

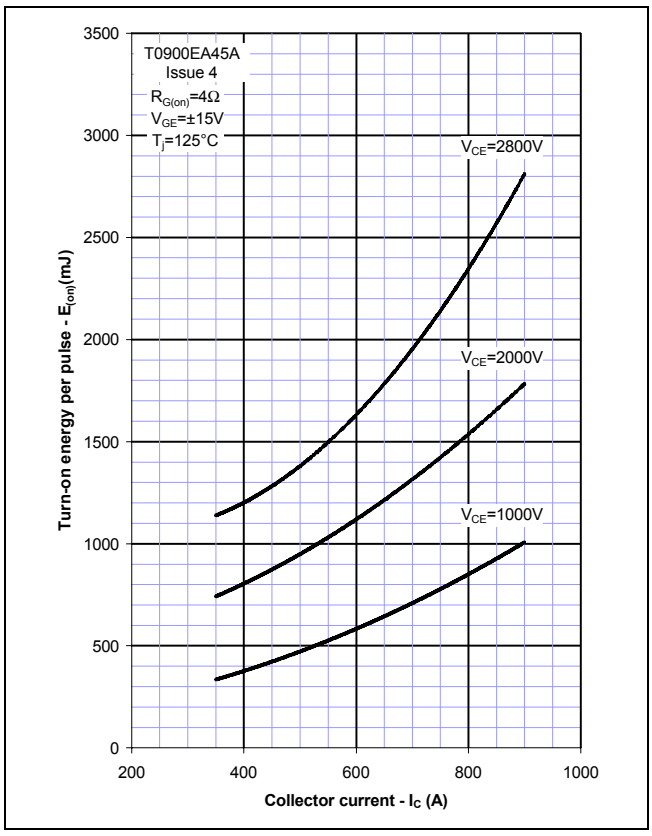


Figure 9 – Typical turn-on energy vs. di/dt

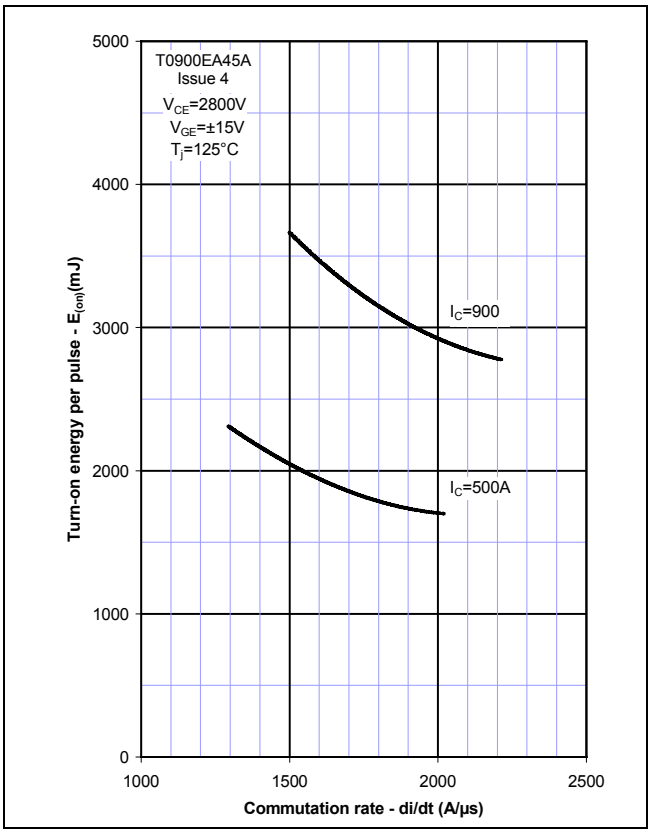


Figure 10 – Typical turn-off energy vs. collector current

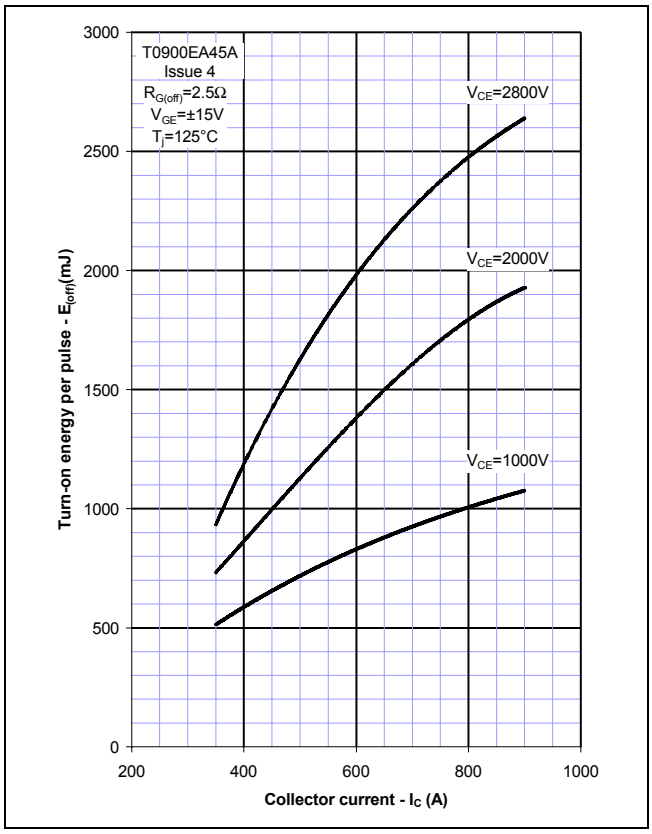


Figure 11 – Turn-off energy vs voltage

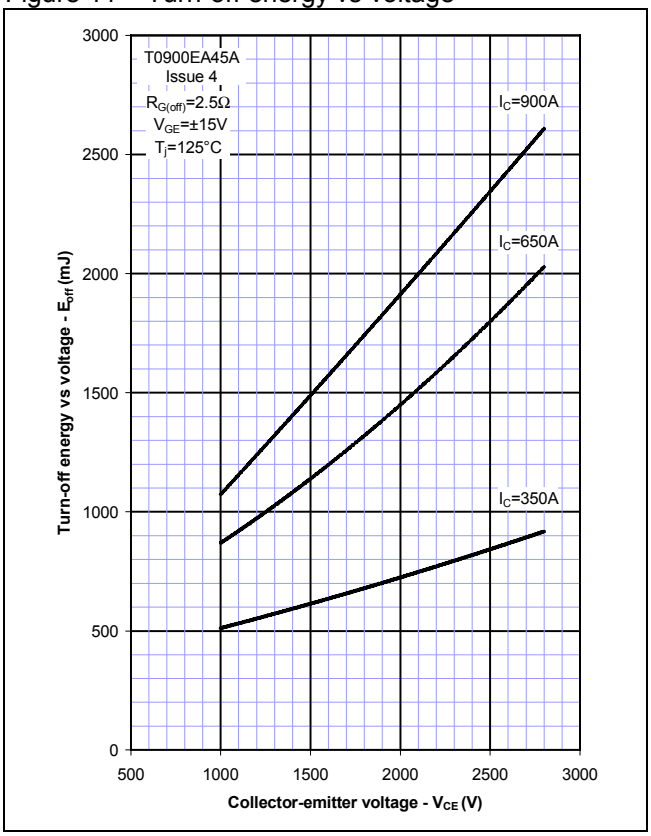


Figure 12 – Safe operating area

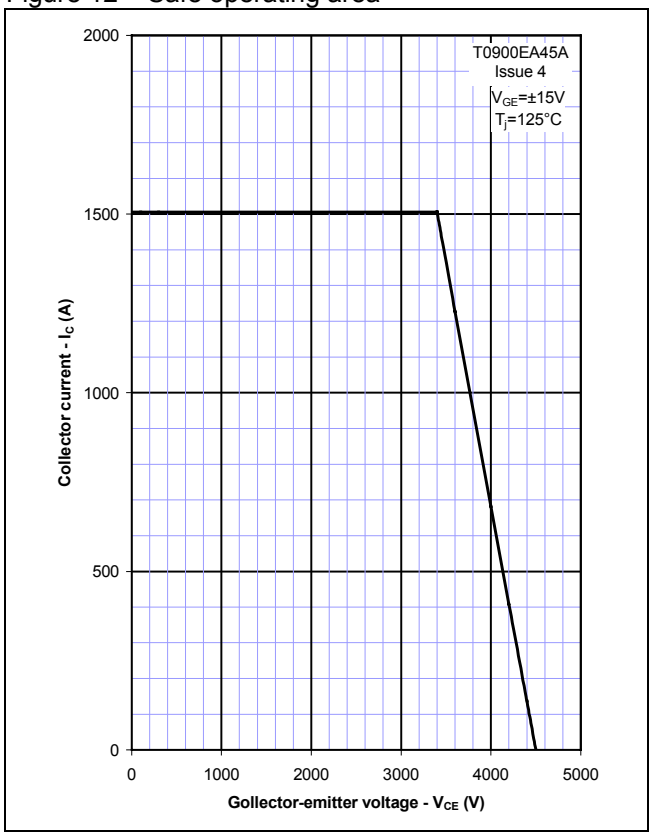


Figure 13 – Typical diode forward characteristic

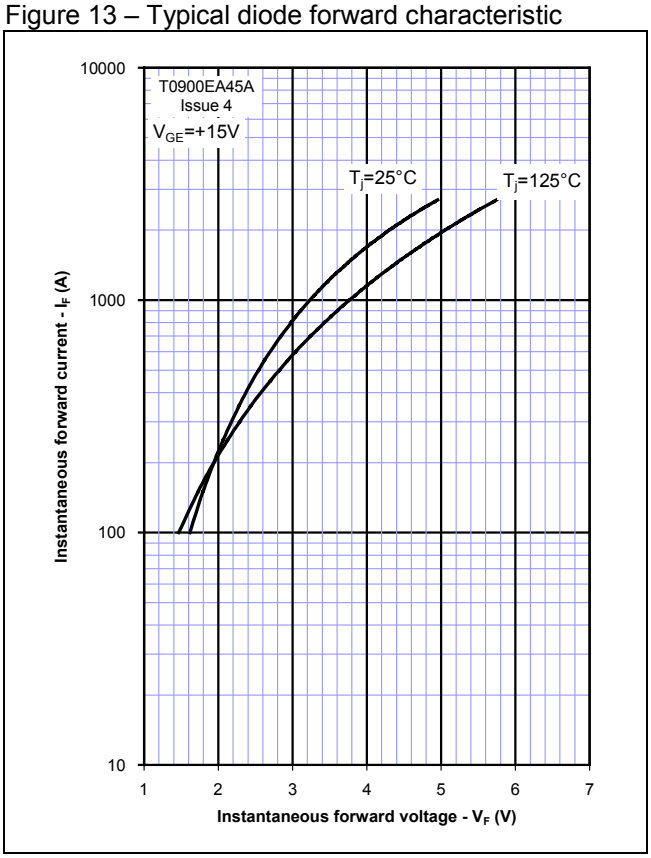


Figure 14 – Typical recovered charge

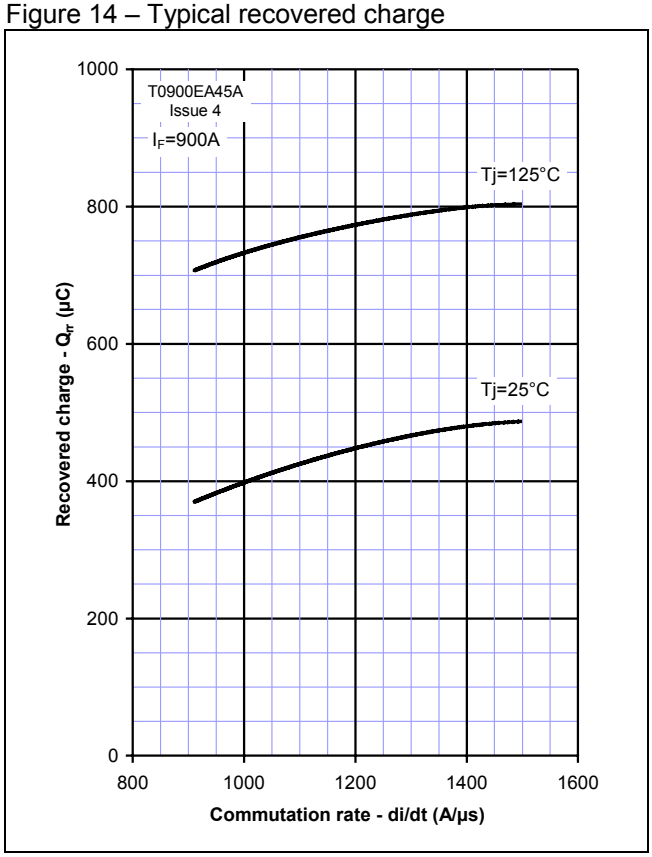


Figure 15 – Typical reverse recovery current

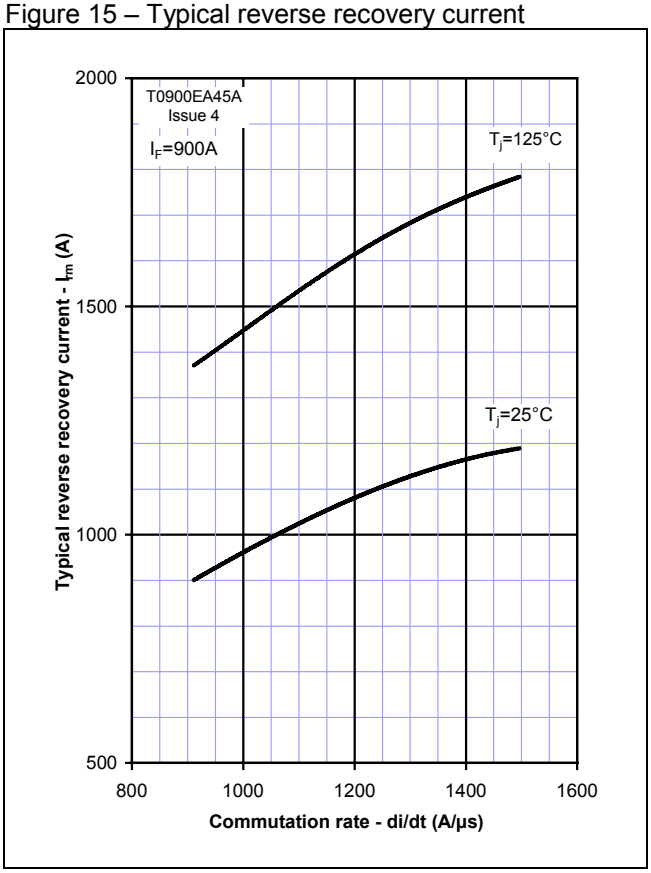


Figure 16 – Typical reverse recovery time

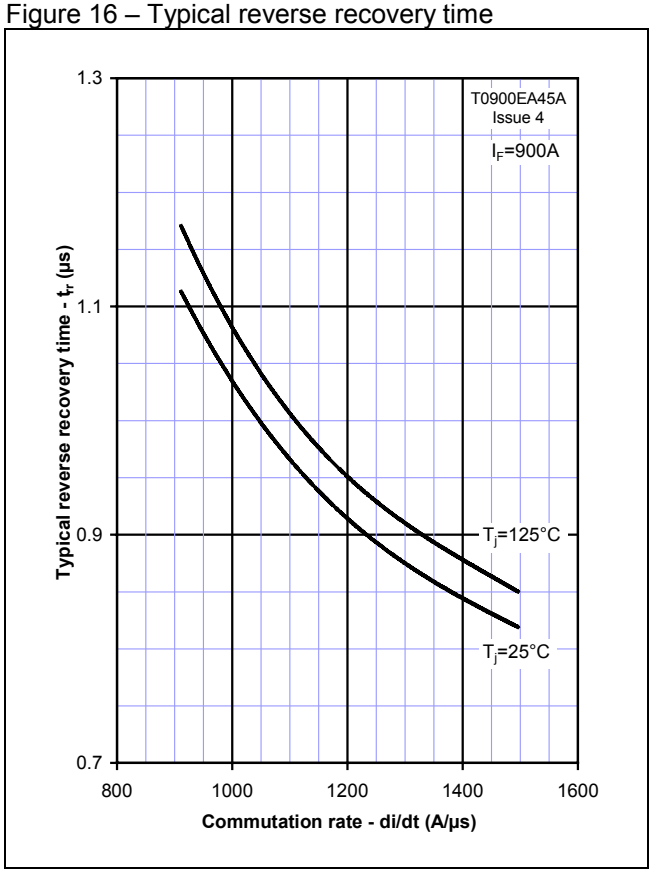


Figure 17 – Transient thermal impedance (IGBT)

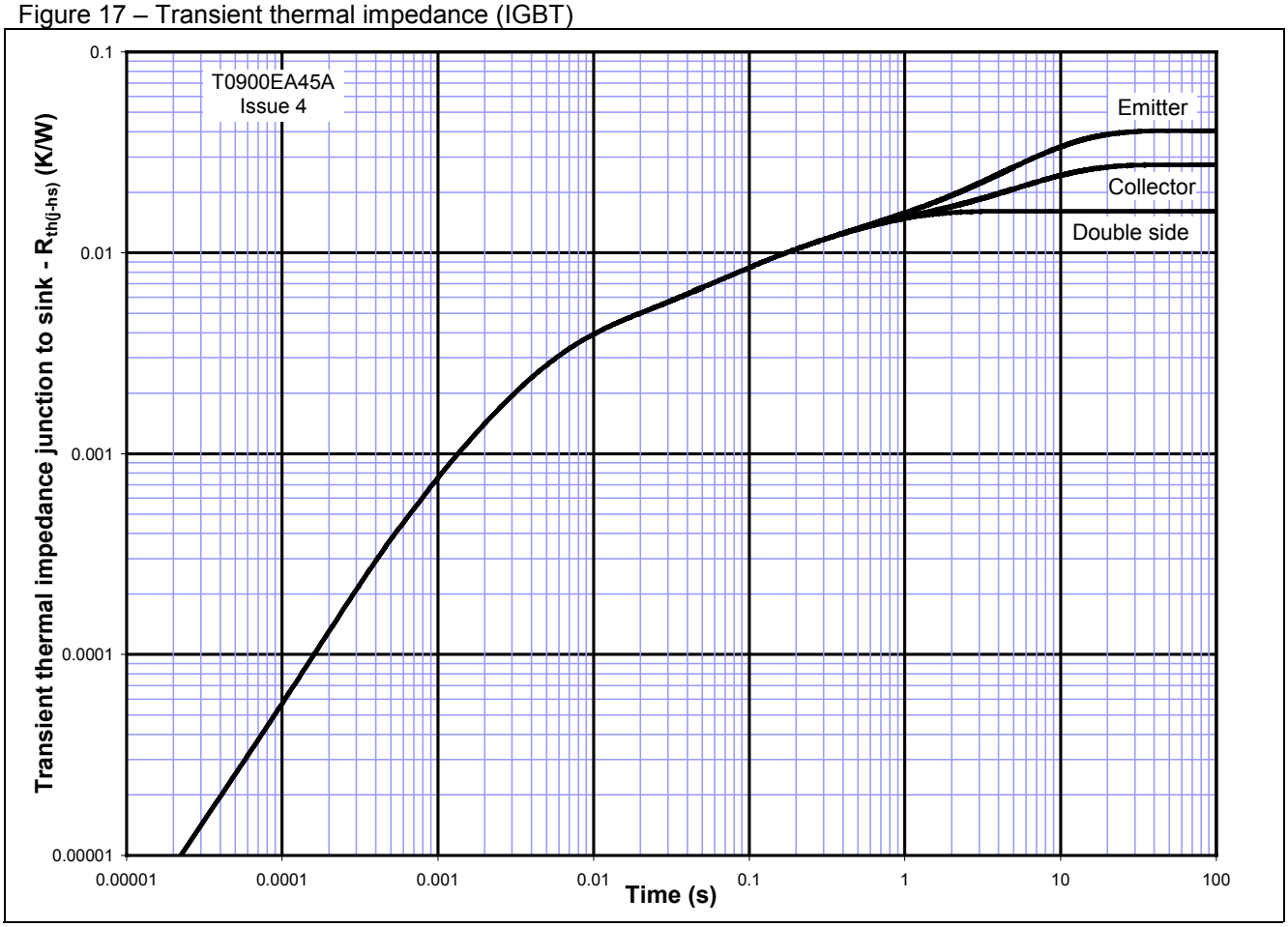
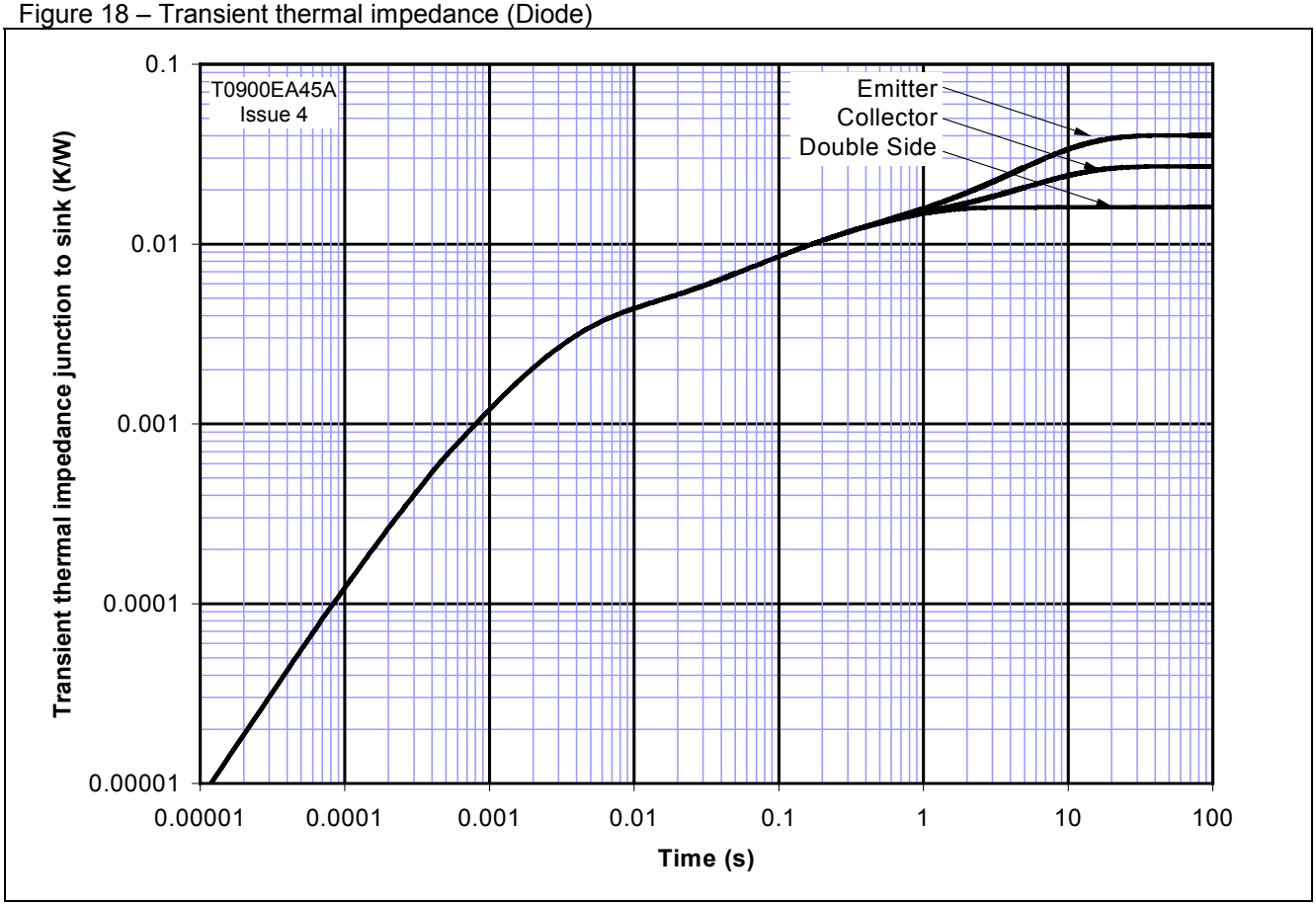
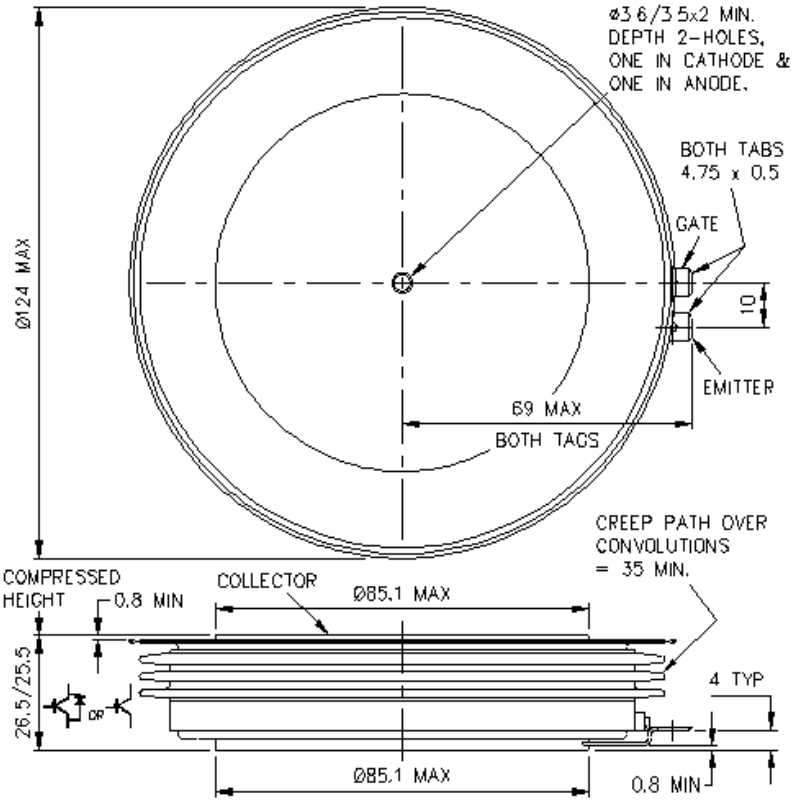


Figure 18 – Transient thermal impedance (Diode)



Outline Drawing & Ordering Information



101A340

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

Typical order code: T0900EA45A (V_{CES} = 4500V)

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