

Prospective Data

## Insulated Gate Bi-Polar Transistor Type T0800EB45G

### 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	800	A
$I_{CRM}$	Repetitive peak collector current, $t_p=1ms$ , IGBT	1600	A
$I_{F(DC)}$	Continuous DC forward current, Diode	800	A
$I_{FRM}$	Repetitive peak forward current, $t_p=1ms$ , Diode	1600	A
$I_{FSM}$	Peak non-repetitive surge $t_p=10ms$ , $V_{RM}=60\%V_{RRM}$ , Diode (Note 4)	16.5	kA
$I_{FSM2}$	Peak non-repetitive surge $t_p=10ms$ , $V_{RM}\leq 10V$ , Diode (Note 4)	18.2	kA
$P_{MAX}$	Maximum power dissipation, IGBT (Note 2)	6.6	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 3)	2000	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)  $T_{sink} = 25^{\circ}C$ , double side cooled.
- 3) Maximum commutation loop inductance 150nH.
- 4) Half-sinewave,  $125^{\circ}C$   $T_j$  initial.

## Characteristics

### IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V <sub>CE(sat)</sub>	Collector – emitter saturation voltage	-	2.8	3.2	I <sub>C</sub> = 800A, V <sub>GE</sub> = 15V, T <sub>j</sub> = 25°C	V
		-	3.6	4.1	I <sub>C</sub> = 800A, V <sub>GE</sub> = 15V	V
V <sub>T0</sub>	Threshold voltage	-	-	1.76	Current range: 267 – 800A	V
r <sub>T</sub>	Slope resistance	-	-	2.93		mΩ
V <sub>GE(TH)</sub>	Gate threshold voltage	-	5.3	-	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 85mA	V
I <sub>CES</sub>	Collector – emitter cut-off current	-	13	45	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	-	140	-	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> = 800A, V <sub>CE</sub> = 2800V, di/dt = 1800A/μs	μs
t <sub>r(V)</sub>	Rise time	-	3.0	-		μs
Q <sub>g(on)</sub>	Turn-on gate charge	-	5	-	V <sub>GE</sub> = ±15V, L <sub>s</sub> = 160nH	μC
E <sub>on</sub>	Turn-on energy	-	4.1	-	R <sub>g(ON)</sub> = 10Ω, R <sub>g(OFF)</sub> = 8.2Ω, C <sub>GE</sub> = 68nF	J
t <sub>d(off)</sub>	Turn-off delay time	-	1.6	-	Integral diode used as freewheel diode (Note 3 & 4)	μs
t <sub>f(I)</sub>	Fall time	-	2.1	-		μs
Q <sub>g(off)</sub>	Turn-off gate charge	-	10	-		μC
E <sub>off</sub>	Turn-off energy	-	4.5	-		J
I <sub>SC</sub>	Short circuit current	-	3150	-	V <sub>GE</sub> = ±15V, V <sub>CO</sub> = 2800V, V <sub>CEmax</sub> ≤ V <sub>CES</sub> , t <sub>p</sub> ≤ 10μs	A

### Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V <sub>F</sub>	Forward voltage	-	3.15	3.45	I <sub>F</sub> = 800A, T <sub>j</sub> = 25°C	V
		-	3.5	3.8	I <sub>F</sub> = 800A	V
V <sub>To</sub>	Threshold voltage	-	-	2.08	Current range 267-800A	V
r <sub>T</sub>	Slope resistance	-	-	2.15		mΩ
I <sub>rm</sub>	Peak reverse recovery current	-	700	-	I <sub>F</sub> = 800A, V <sub>GE</sub> = ±15V, di/dt = 1800A/μs	A
Q <sub>rr</sub>	Recovered charge	-	1400	-		μC
t <sub>rr</sub>	Reverse recovery time, 50% chord	-	2.3	-		μs
E <sub>r</sub>	Reverse recovery energy	-	2.4	-		J

## Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$R_{thJK}$	Thermal resistance junction to sink, IGBT	-	-	15	Double side cooled	K/kW
		-	-	24.6	Collector side cooled	K/kW
		-	-	37.5	Emitter side cooled	K/kW
$R_{thJK}$	Thermal resistance junction to sink, Diode	-	-	22.3	Double side cooled	K/kW
		-	-	35.1	Cathode side cooled	K/kW
		-	-	66.8	Anode side cooled	K/kW
F	Mounting force	25	-	35	Note 2	kN
$W_t$	Weight	-	1.2	-		kg

## Notes:-

- 1) Unless otherwise indicated  $T_j=125^{\circ}\text{C}$ .
- 2) Consult application note 2008AN01 for detailed mounting requirements
- 3)  $C_{GE}$  is additional gate – emitter capacitance added to output of gate drive
- 4) Figures 6 to 9 are obtained using integral diode as freewheeling diode

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

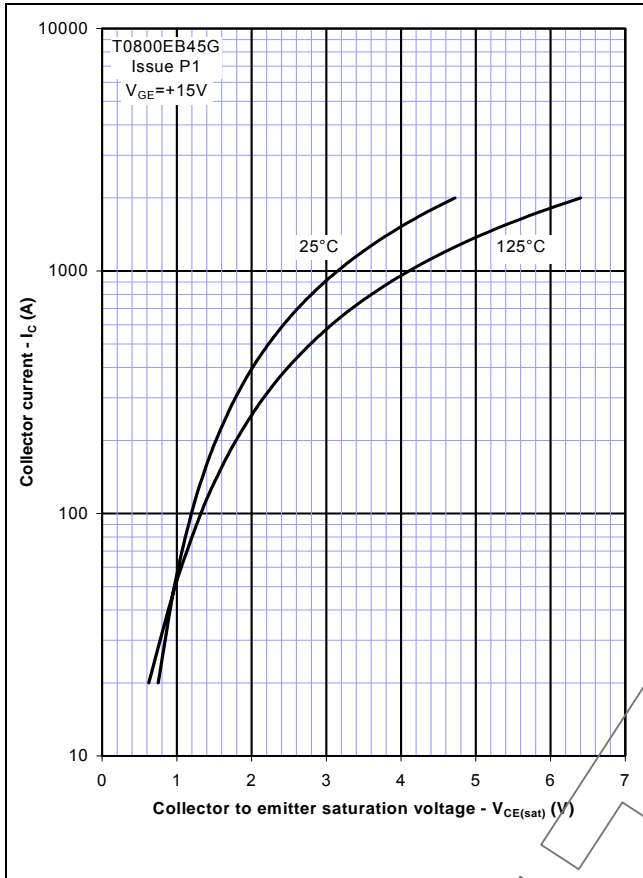


Figure 2 – Typical output characteristic

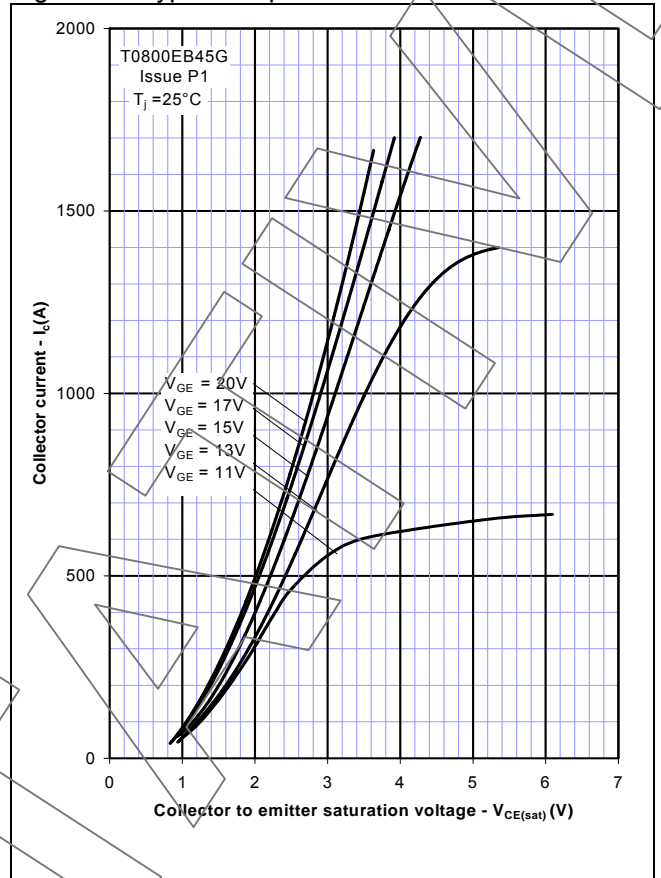


Figure 3 – Typical output characteristic

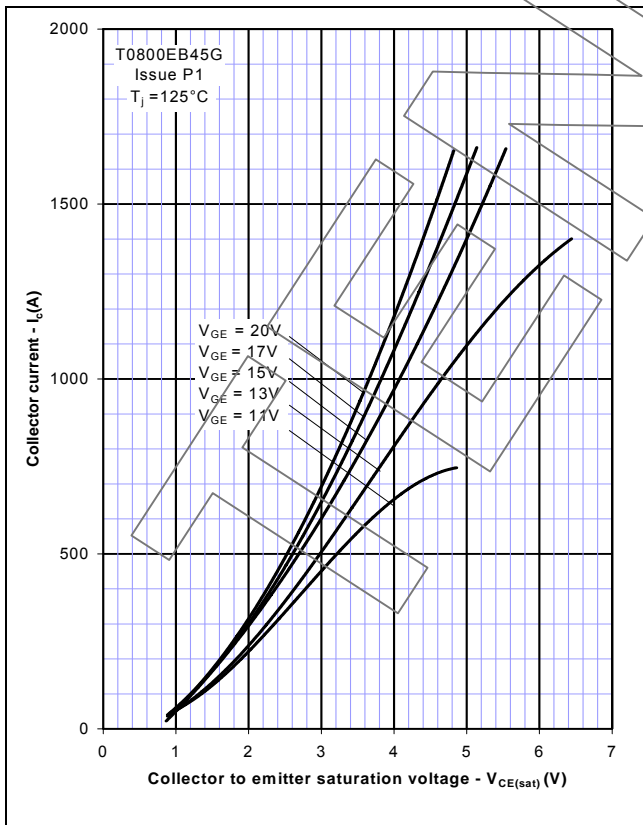


Figure 4 – Typical diode forward characteristic

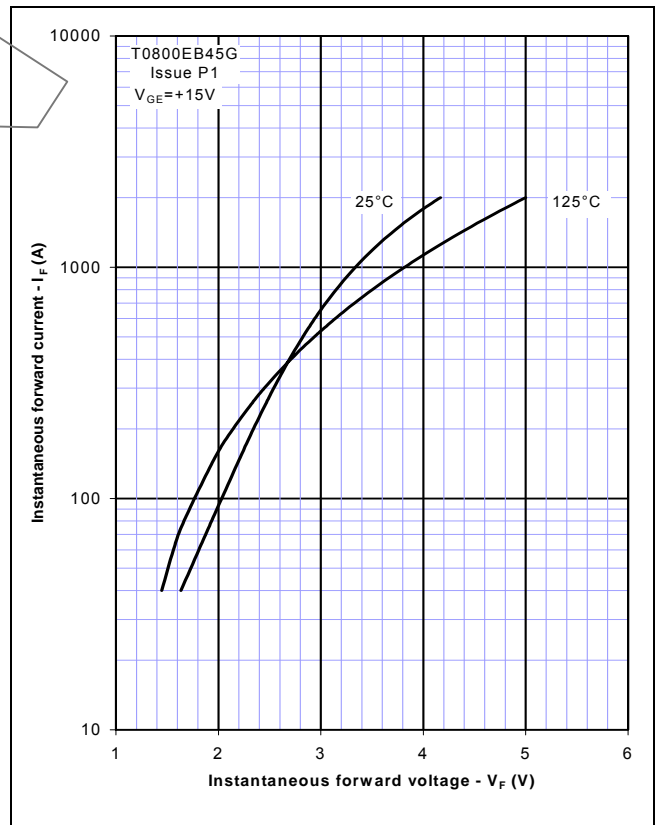


Figure 5 – Transient thermal impedance (IGBT)

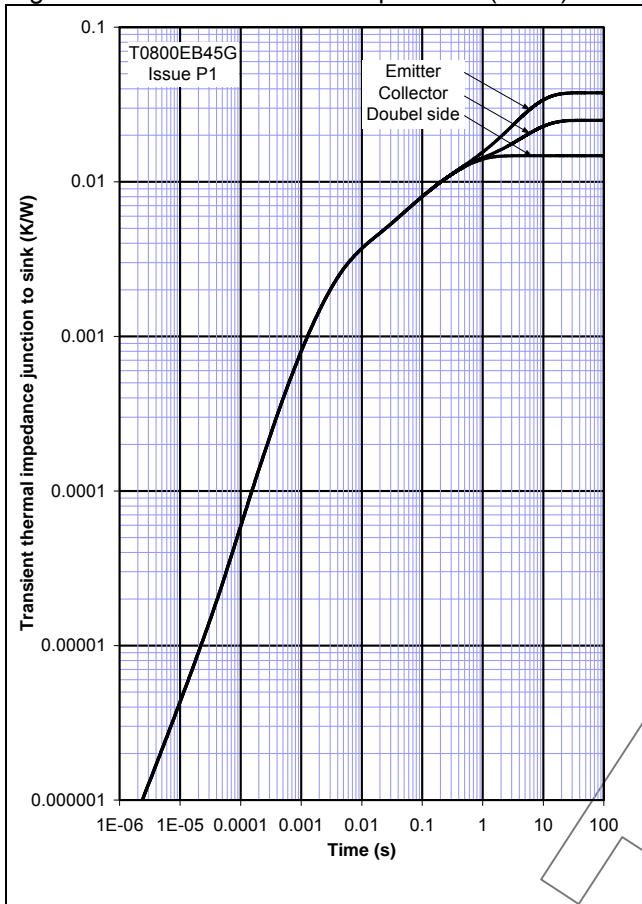
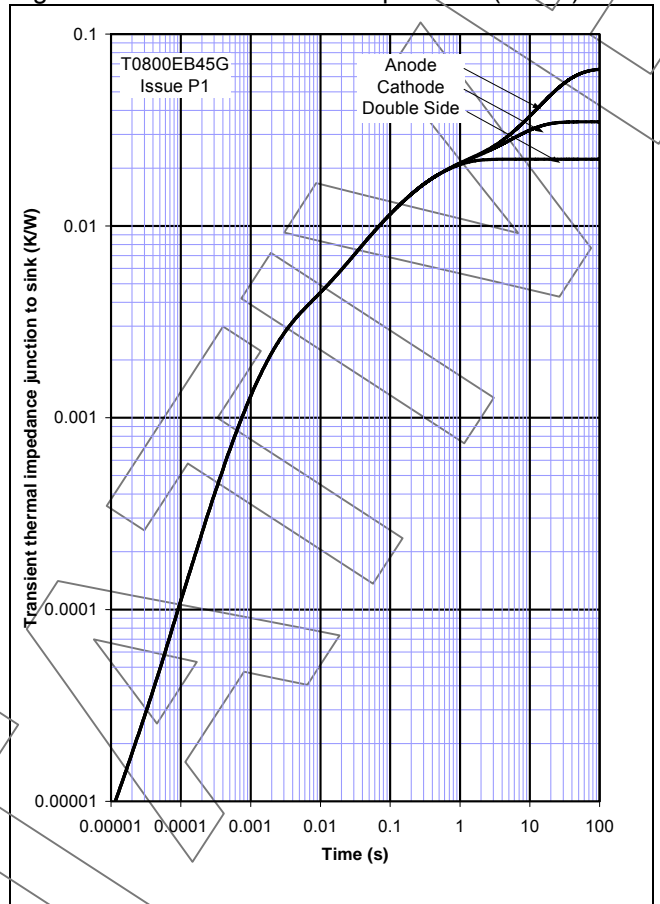
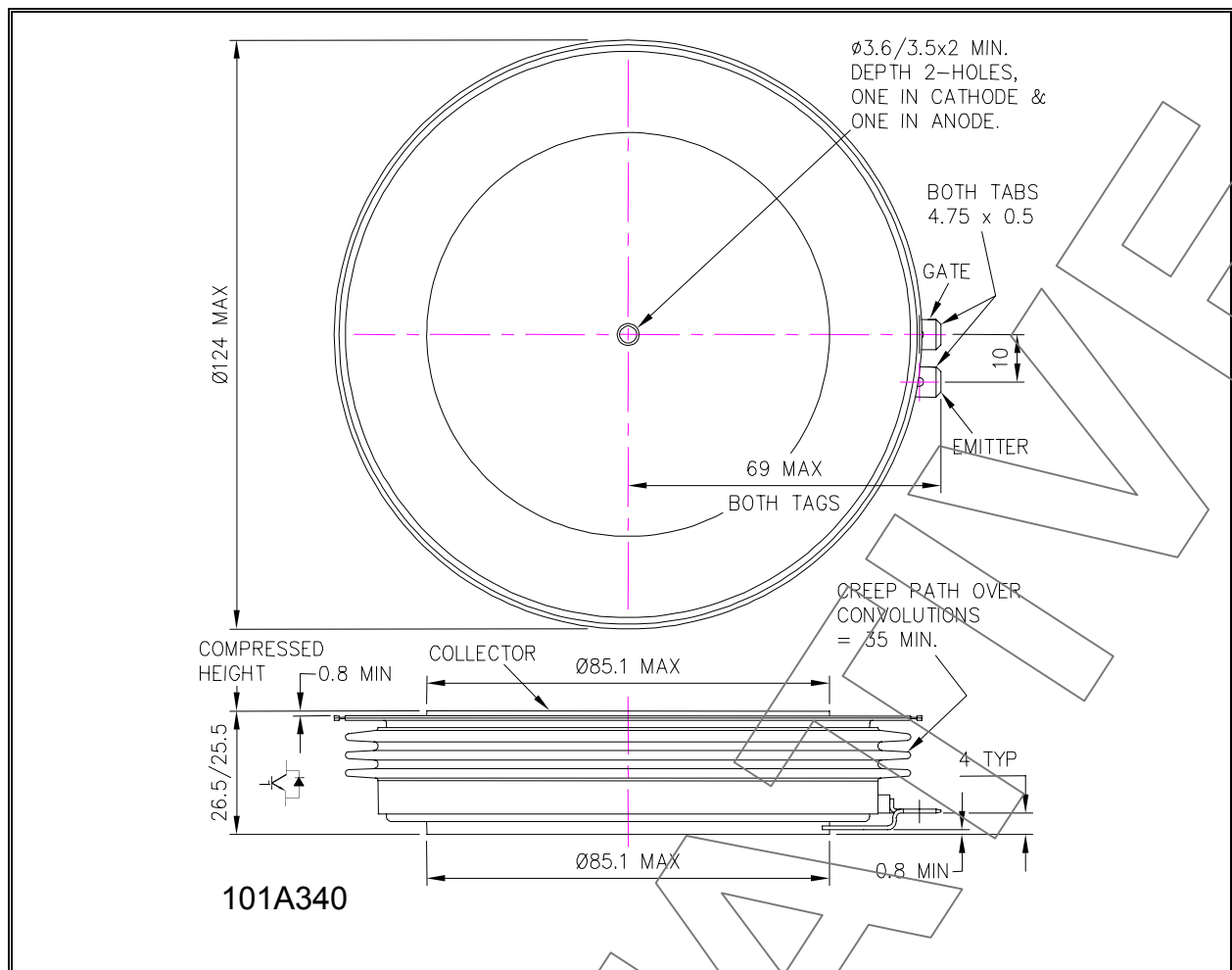


Figure 6 – Transient thermal impedance (Diode)



**Outline Drawing & Ordering Information**



**ORDERING INFORMATION**

(Please quote 10 digit code as below)

<b>T0800</b>	<b>EB</b>	<b>45</b>	<b>G</b>
Fixed type Code	Fixed Outline Code	Voltage Grade $V_{CES}/100$ 45	Fixed format code

Typical order code: T0800EB45G ( $V_{CES} = 4500V$ )

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