

Features IGBT Module (2 in one-package), 100A

1. High frequency operation
2. Low losses and soft switching
3. Isolated baseplate for easy heat sinking
4. Discrete super-fast recovery free-wheel diode
5. Small temperature dependence of the turn-off switching loss

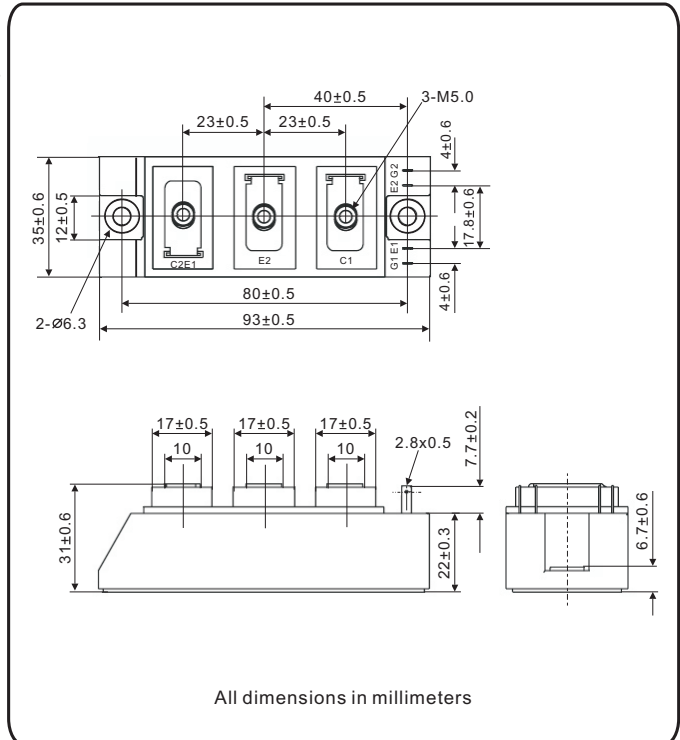
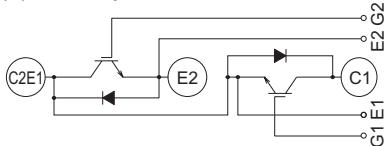
Typical Applications

- AC Motor Control
- DC Motor Control
- UPS
- Welding Power Supplies
- Inverter
- Electronic welders at f_{SW} up to 20kHz

Ordering code

NSGM	100	GB	xx	A
(1)	(2)	(3)	(4)	(5)

- (1) For IGBT module
- (2) Maximum average forward current, A
- (3) 2 in one-package
- (4) Voltage code, V (code x 10 = V_{RRM})
- (5) Case style



Electrical Characteristics

Absolute maximum ratings, $T_j=25^\circ\text{C}$ unless otherwise specified

Parameter	Condition	Max. Value	Unit	
I_C	Collector current	$T_C=80^\circ\text{C}$	100	A
I_{CM}	Peak collector current	$T_C=25^\circ\text{C}$	200	A
P_c	Maximum collector dissipation	$T_C=25^\circ\text{C}, T_j \leq 150^\circ\text{C}$	800	W
V_{CES}	Collector-emitter voltage	G-E Short	1200	V
V_{GES}	Gate-emitter voltage	C-E Short	± 20	V
V_{iso}	Isolation voltage	Main terminal to baseplate, AC 1 min	3000	V
T_j	Junction temperature		-40 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature		-40 to 125	$^\circ\text{C}$
T	Mounting torque, M5 main terminal		2.5 to 5	N.m
	Mounting torque, M6 mounting		3 to 5	
W_t	Approximate weight		200	g

Static electrical characteristics, $T_j=25^\circ\text{C}$ unless otherwise specified

Parameter	Condition	Min.	Typ.	Max.	Unit
I_{CES}	Collector-cutoff current			1.0	mA
I_{GES}	Gate leakage current			200	μA
$V_{GE(th)}$	Gate-emitter threshold voltage	5	6.2	7	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_C=100\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$	1.8		V
		$I_C=100\text{A}, V_{GE}=15\text{V}, T_j=125^\circ\text{C}$	2		
Q_G	Total gate charge		1050		nC
V_{EC}	Emitter-collector voltage			2.2	V

Dynamic electrical characteristics , $T_j=25^\circ\text{C}$ unless otherwise specified

Parameter		Condition	Min.	Typ.	Max.	Unit
C_{ies}	Input capacitance	$V_{GE}=0V, V_{CE}=25V$ $f=1\text{MHz}$			10	nF
C_{oes}	Output capacitance				0.8	
C_{res}	Reverse transfer capacitance				0.5	
$t_{d(on)}$	Turn-on delay time , Resistive	$V_{CC}=600V, I_C=100A$ $V_{GE1}=V_{GE2}=15V, R_G=3\Omega$			250	ns
t_r	Rise time , Load				350	
$t_{d(off)}$	Turn-off delay time , Switching				300	
t_f	Fall time , Times				350	
t_{rr}	Diode reverse recovery time	$I_E=100A, d_iE/dt=-150A/\mu s$			210	ns
Q_{rr}	Diode reverse recovery charge	$I_E=100A, d_iE/dt=-150A/\mu s$		0.93		μC

Thermal and mechanical characteristics , $T_j=25^\circ\text{C}$ unless otherwise specified

Parameter		Condition	Min.	Typ.	Max.	Unit
$R_{th(j-c)}$	Thermal resistance , junction to case	Per IGBT			0.18	$^\circ\text{C/W}$
		Per FWDi			0.5	
$R_{th(c-f)}$	Contact thermal resistance	Per module , thermal grease applied			0.065	$^\circ\text{C/W}$

Fig.1 Power dissipation , $P_{tot}=f(T_c)$
Parameter: $T_j < 150^\circ\text{C}$

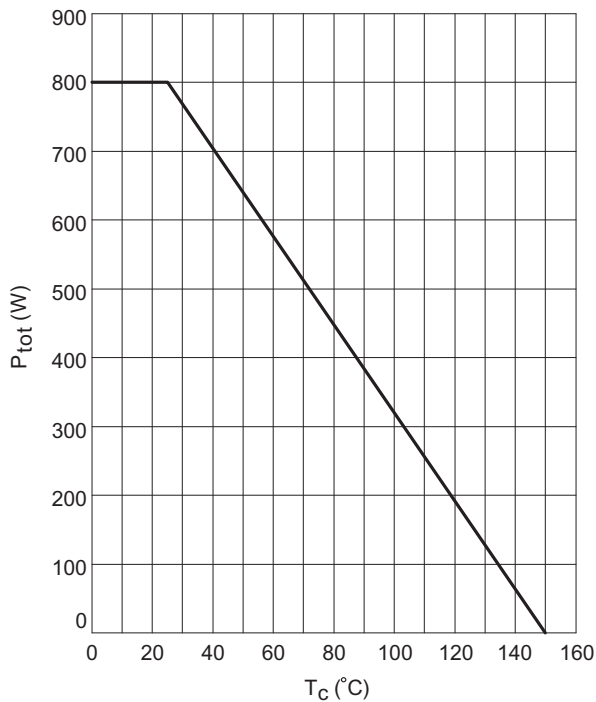


Fig.2 Safe operating area , $I_C=f(V_{CE})$
Parameter: $D=0, T_c=25^\circ\text{C}, T_j \leq 150^\circ\text{C}$

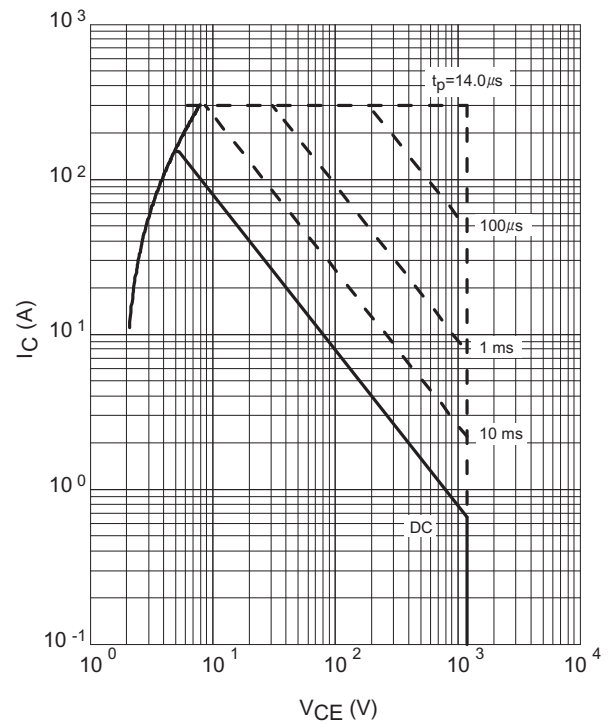


Fig.3 Collector current, $I_C=f(T_C)$
Parameter: $V_{GE} \geq 15V, T_j \leq 150^\circ C$

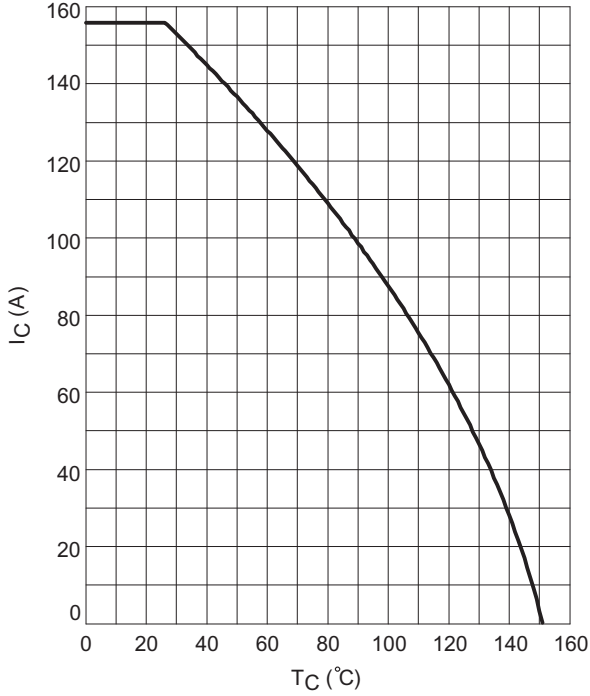


Fig.4 Transient thermal impedance IGBT, $Z_{thJC}=f(t_p)$
Parameter: $D=t_p/T$

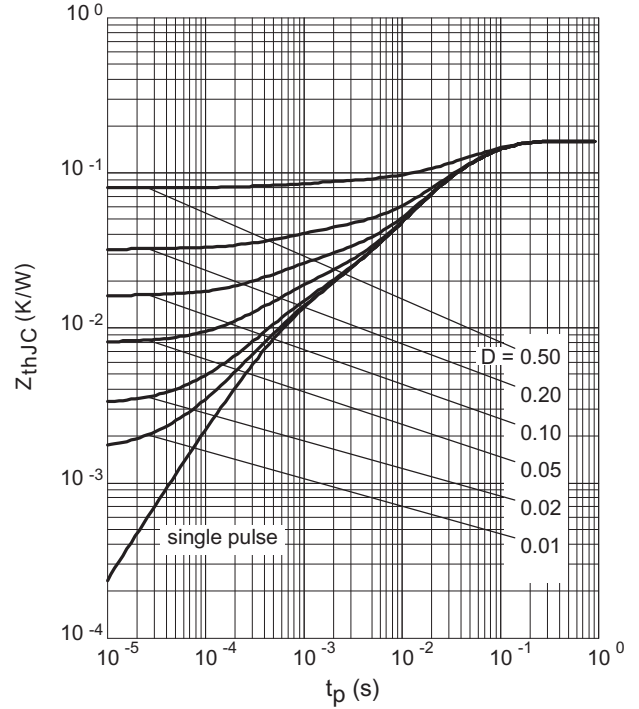


Fig.5 Typ. output characteristics, $I_C=f(V_{CE})$
Parameter: $t_p=80\mu s, T_j=25^\circ C$

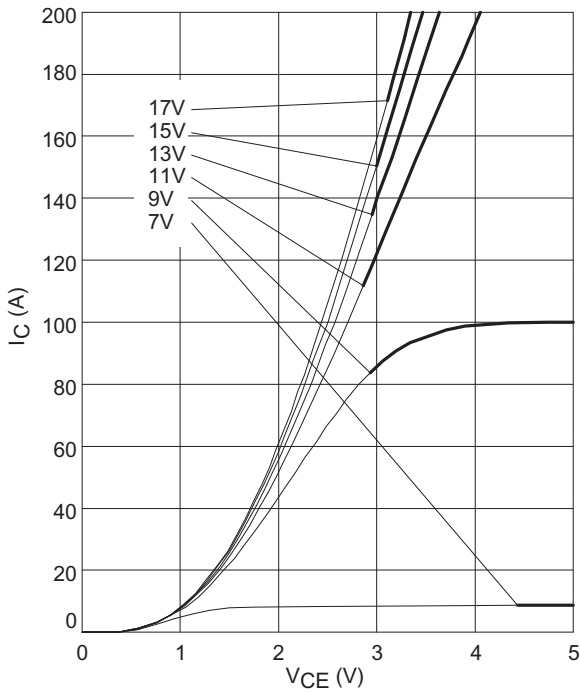


Fig.6 Typ. output characteristics, $I_C=f(V_{CE})$
Parameter: $t_p=80\mu s, T_j=25^\circ C$

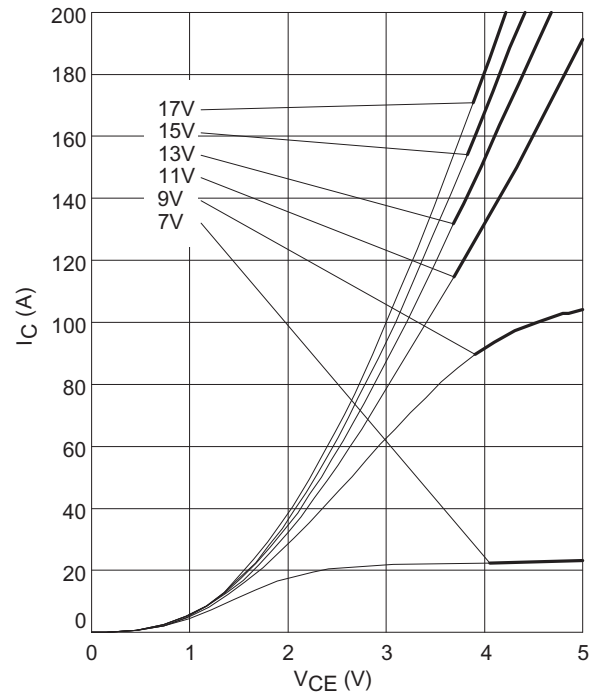


Fig.7 Typ. transfer characteristics , $I_C=f(V_{GE})$
Parameter: $t_p=80\mu s$, $V_{CE}=20V$

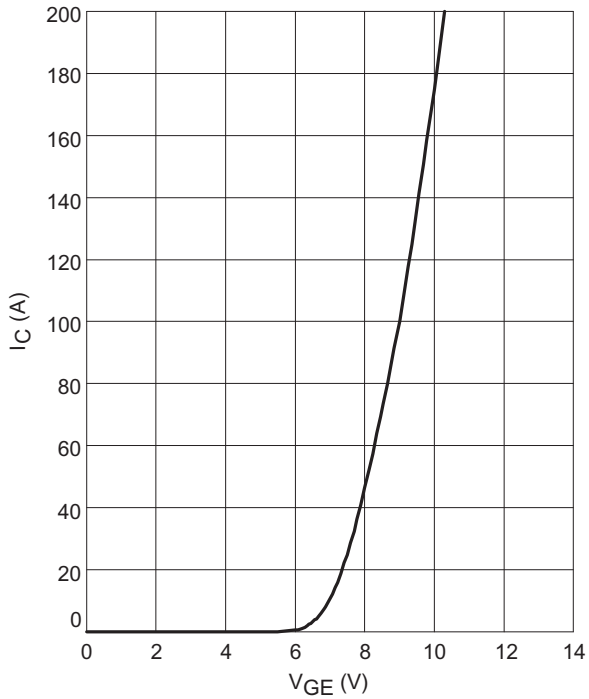


Fig.8 Typ. gate charge , $V_{GE}=f(Q_{Gate})$
Parameter: $I_{Cpuls}=100A$

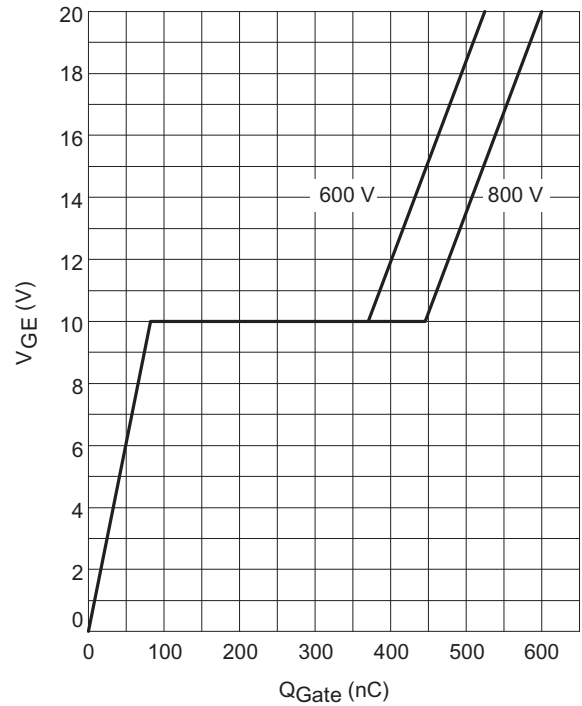


Fig. 9 Typ. Capacitances , $C=f(V_{CE})$
Parameter: $V_{GE}=0V$, $f=1MHz$

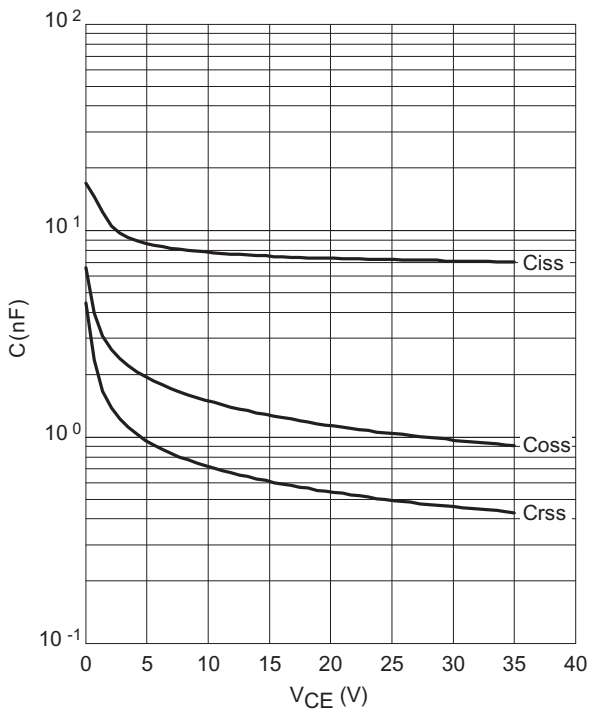


Fig.10 Reverse biased safe operating area , $I_{Cpuls}=f(V_{CE})$,
 $T_j=150^\circ C$, Parameter: $V_{GE}=15V$

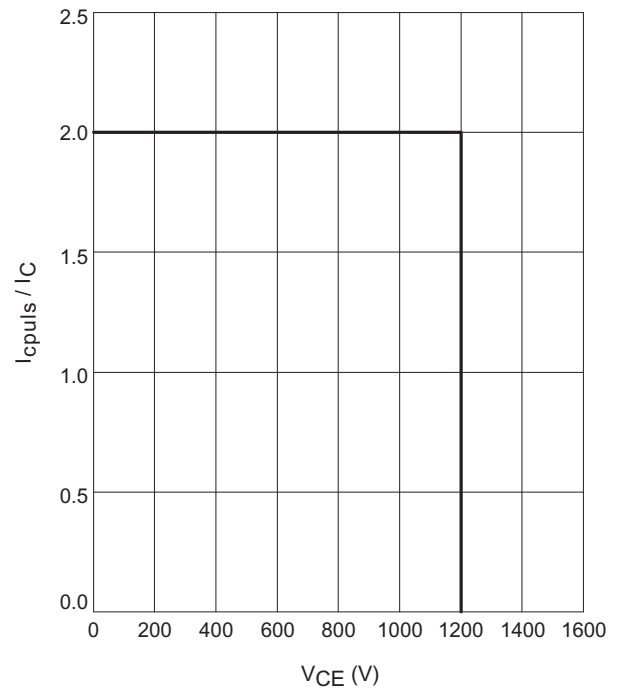


Fig.11 Short circuit safe operating area, $I_{Csc}=f(V_{CE})$, $T_j=150^\circ\text{C}$
 Parameter: $V_{GE}=\pm 15\text{V}$, $t_{SC}\leq 10\mu\text{s}$, $L\leq 25\text{nH}$

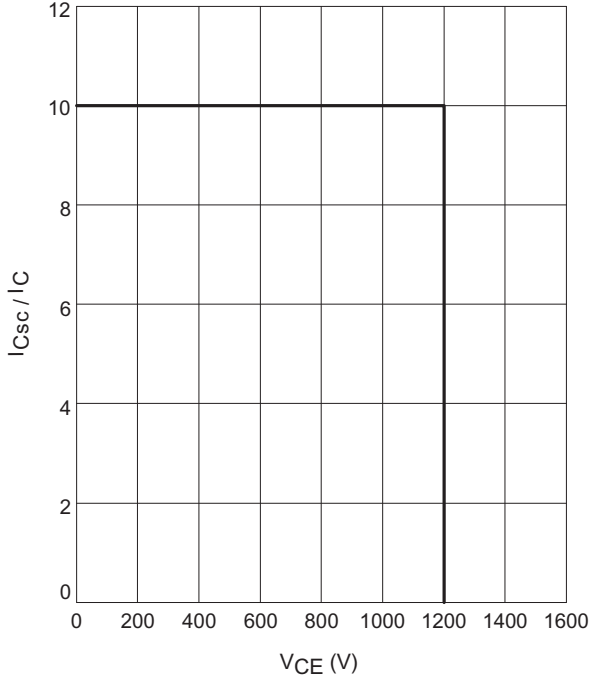


Fig.12 Typ. switching time, $I=f(I_C)$, inductive load, $T_j=125^\circ\text{C}$
 Parameter: $V_{CE}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=6.8\Omega$

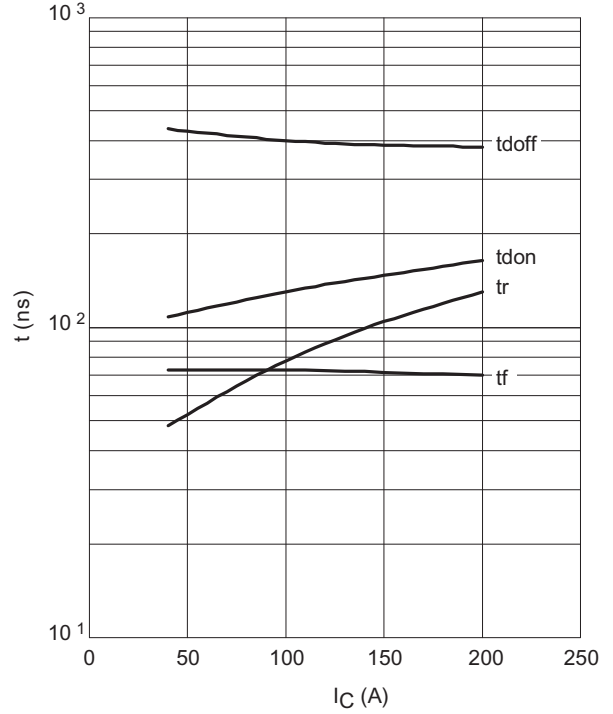


Fig.13 Typ. Switching time, $t=f(R_G)$, inductive load, $T_j=125^\circ\text{C}$
 Parameter: $V_{CE}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $I_C=100\text{A}$

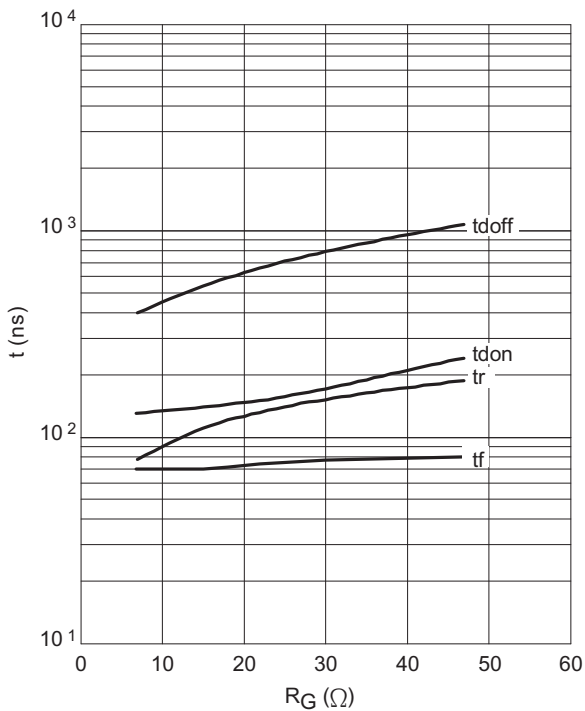


Fig.14 Typ. switching losses, $E=f(I_C)$, Inductive load, $T_j=125^\circ\text{C}$
 Parameter: $V_{CE}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=6.8\Omega$

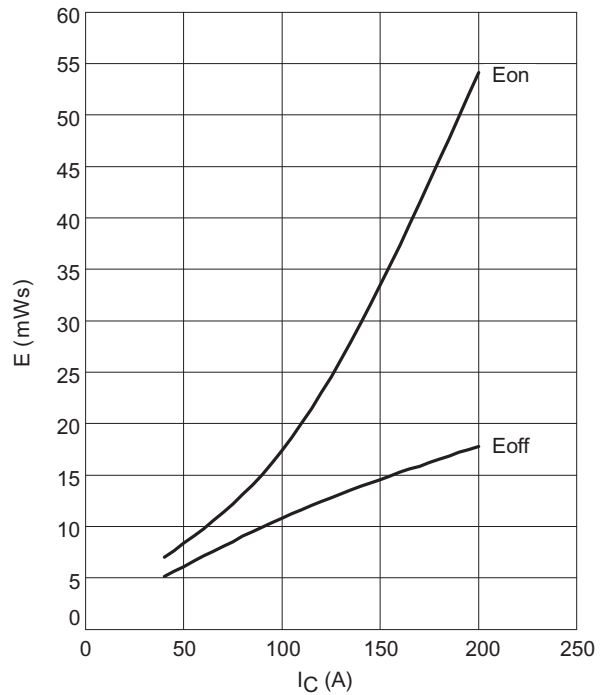


Fig.15 Typ. switching losses , $E=f(R_G)$, inductive load , $T_j=125^\circ\text{C}$
 Parameter: $V_{GE}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $I_C=100\text{A}$

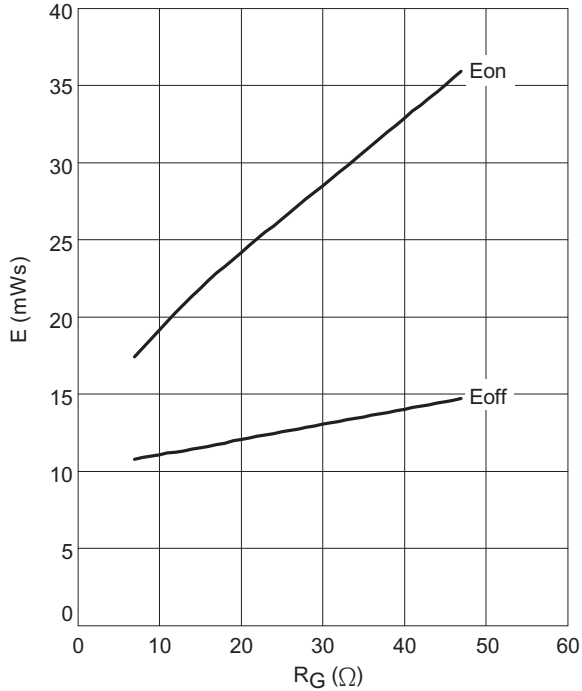


Fig.16 Forward characteristics of fast recovery reverse diode , $I_F=f(V_F)$, Parameter: T_j

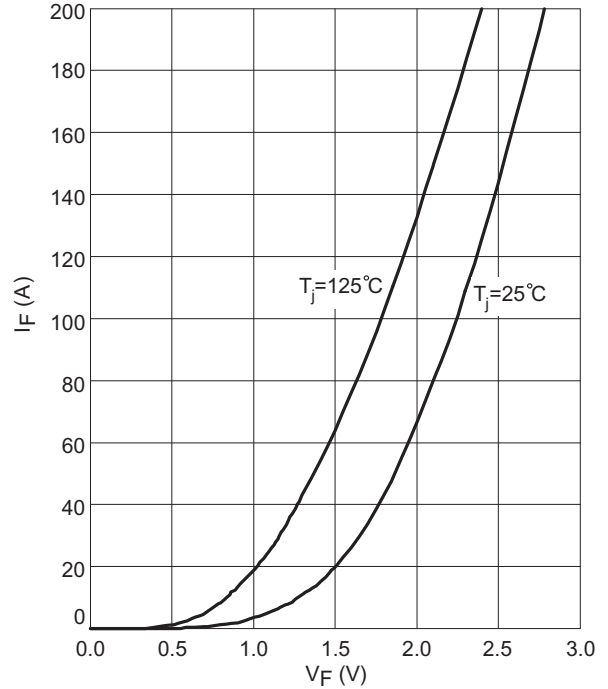


Fig.17 Transient thermal impedance Diode , $Z_{thJC}=f(t_p)$
 Parameter: $D=t_p / T$

