IGBT Module (2 in one-package)

Features

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	75	GB	xx	A
(1)	(2)	(3)	(4)	(5)

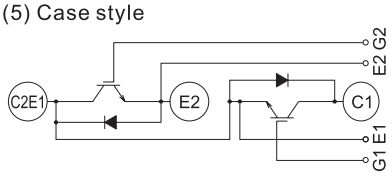
(1) For IGBT module

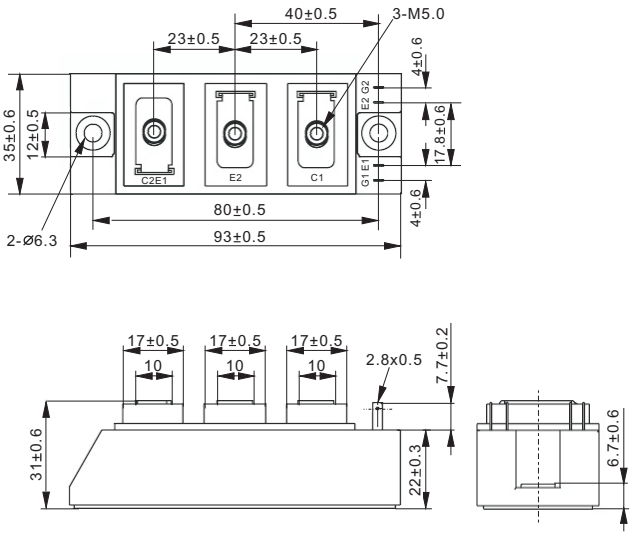
(2) Maximum average forward current , A

(3) 2 in one-package

(4) Voltage code , V (code x 10 = / V_{RRM})

(5) Case style





All dimensions in millimeters

Electrical Characteristics

Absolute maximum ratings , T_j=25℃ unless otherwise specified

Parameter		Condition	Max. Value	Unit
I_C	Collector current	T_c=80℃	75	A
I_{CM}	Peak collector current	T_c=25℃	150	A
P_c	Maximum collector dissipation	T_c=25℃ , T_j≤150℃	600	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	℃
T_{stg}	Storage temperature		-40 to 125	℃
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℃ unless otherwise specified

Parameter		Condition	Min.	Typ.	Max.	Unit
I_{CES}	Collector-cutoff current	V_{CE}=V_{CES} , V_{GE}=0V			1.0	mA
I_{GES}	Gate leakage current	V_{GE}=V_{GES} , V_{CE}=0V			200	μA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=3mA , V_{CE}=10V	5	6.2	7	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C=75A , V_{GE}=15V , T_J=25℃		1.8		V
		I_C=75A , V_{GE}=15V , T_J=125℃		2		
Q_G	Total gate charge	V_{CC}=600V , I_C=75A , V_{GE}=15V		780		nC
V_{EC}	Emitter-collector voltage	I_E=75A , V_{GE}=0V			2.2	V

Dynamic electrical characteristics , T_j=25℃ unless otherwise specified

Parameter		Condition	Min.	Typ.	Max.	Unit
C_{ies}	Input capacitance	V_{GE}=0V , V_{CE}=25V f=1MHz			8	nF
C_{oes}	Output capacitance				0.6	
C_{res}	Reverse transfer capacitance				0.3	
$t_{d(on)}$	Turn-on delay time , Resistive	V_{CC}=600V , I_C=75A V_{GE1}=V_{GE2}=15V , R_G=4.2Ω			150	ns
t_r	Rise time , Load				350	
$t_{d(off)}$	Turn-off delay time , Switching				250	
t_f	Fall time , Times				350	
t_{rr}	Diode reverse recovery time	I_E=75A , $d_{iE/dt}$=-150A/μs			250	ns
Q_{rr}	Diode reverse recovery charge	I_E=75A , $d_{iE/dt}$=-150A/μs		0.56		μC

Thermal and mechanical characterisitics , T_j=25℃ unless otherwise specified

Parameter		Condition	Min.	Typ.	Max.	Unit
$R_{th(j-c)}$	Thermal resistance , junction to case	Per IGBT			0.21	℃/W
		Per FWDi			0.5	
$R_{th(c-f)}$	Contact thermal resistance	Per module , thermal grease applied			0.075	℃/W

Fig.1 Power dissipation , P_{tot}=f (T_c)
Parameter:T_j≤150℃

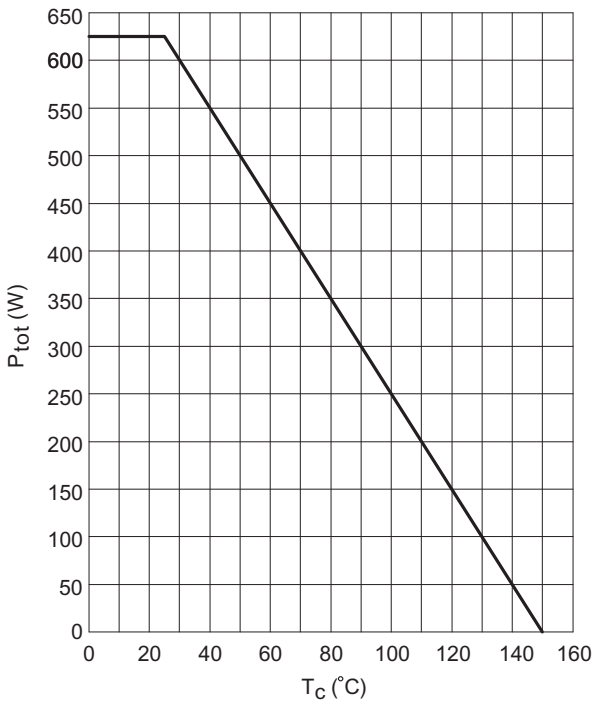


Fig.2 Safe operating area , I_C=f (V_{CE})
Parameter:D=0 , T_c=25℃ , T_j≤150℃

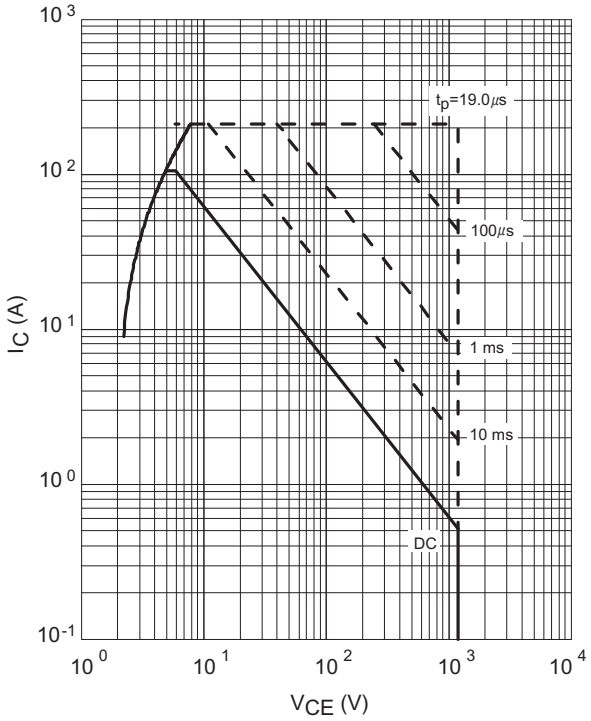


Fig.3 Collector current , $I_C=f(T_c)$
Parameter:$V_{GE}\geq 15V$, $T_j\leq 150℃$

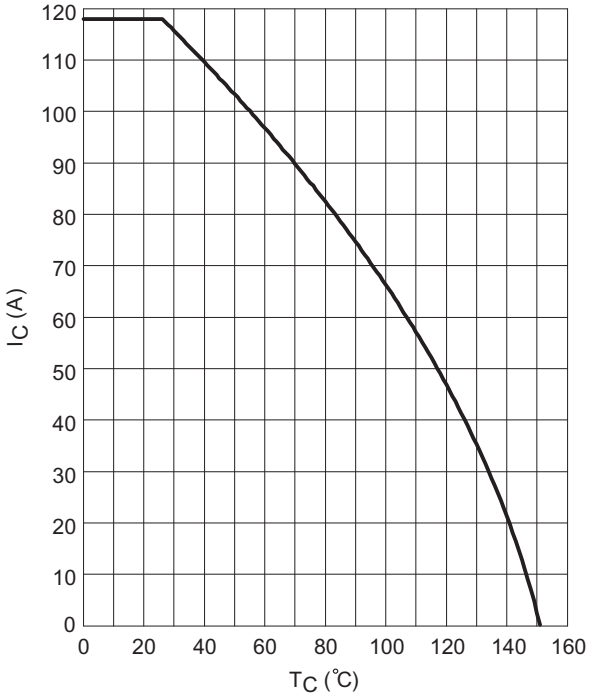


Fig.4 Transient thermal impedance IGBT , $Z_{thJC}=f(t_p)$
Parameter:$D=t_p/T$

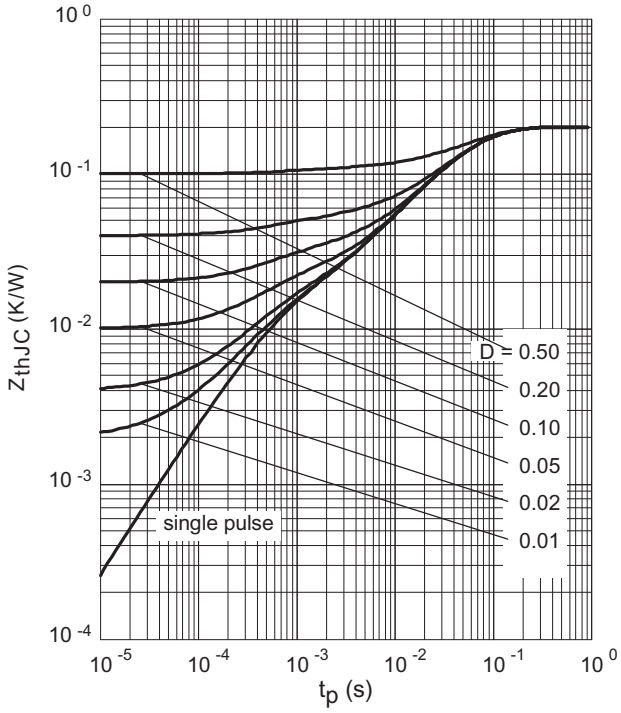


Fig.5 Typ. output characteristics , $I_C=f(V_{CE})$
Parameter:$t_p=80\mu s$, $T_j=25℃$

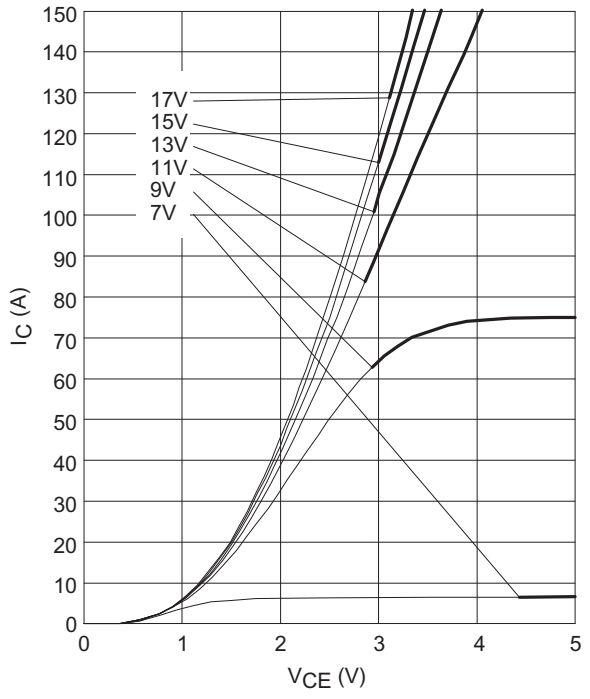


Fig.6 Typ. output characteristics , $I_c=f(V_{CE})$
Parameter:$t_p=80\mu s$, $T_j=25℃$

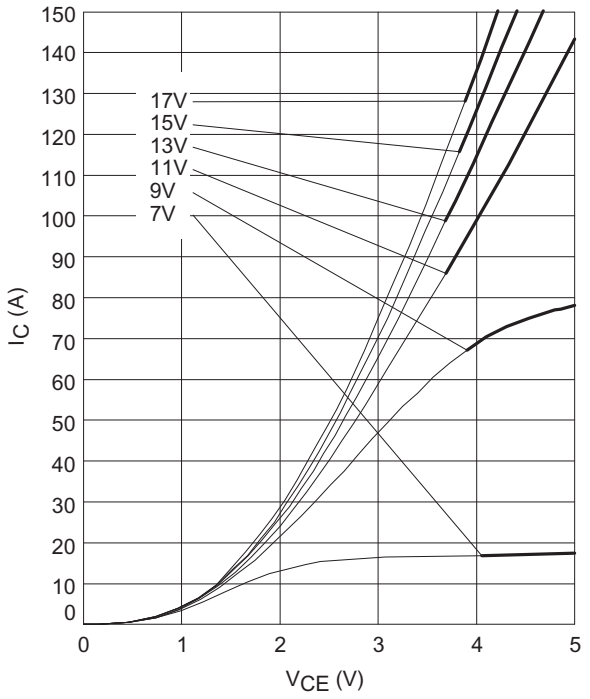


Fig.7 Typ. transfer characteristics , $I_C=f(V_{GE})$
Parameter:$t_p=80\mu s$, $V_{CE}=20V$

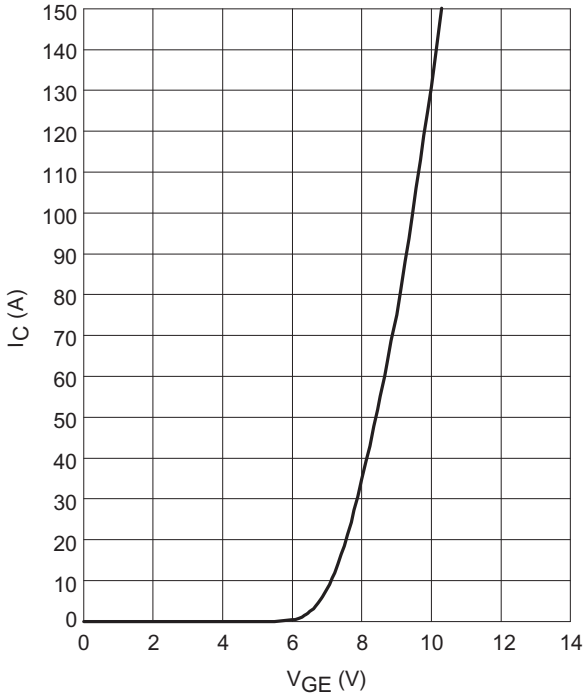


Fig.8 Typ. gate charge , $V_{GE}=f(Q_{Gate})$
Parameter:$I_{Cpuls}=75A$

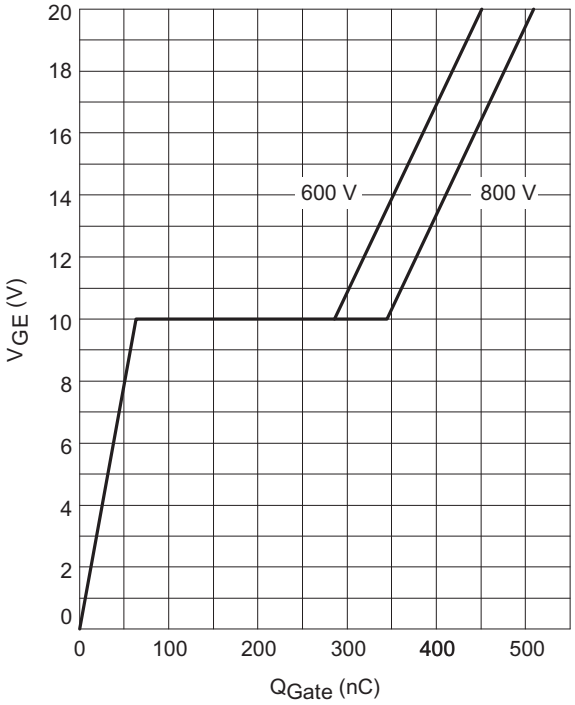


Fig. 9 Typ. Capacitances , $C=f(V_{CE})$
Parameter:$V_{GE}=0$, f=1MHz

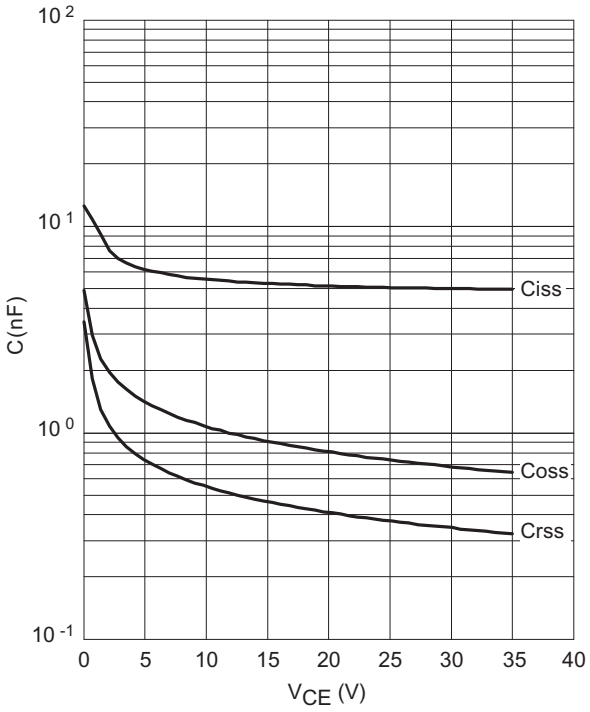


Fig.10 Reverse biased safe operating area ,
$I_{Cplus}=f(V_{CE})$, $T_j=150℃$
Parameter:$V_{GE}=0$, f=1MHz$V_{GE}=15V$

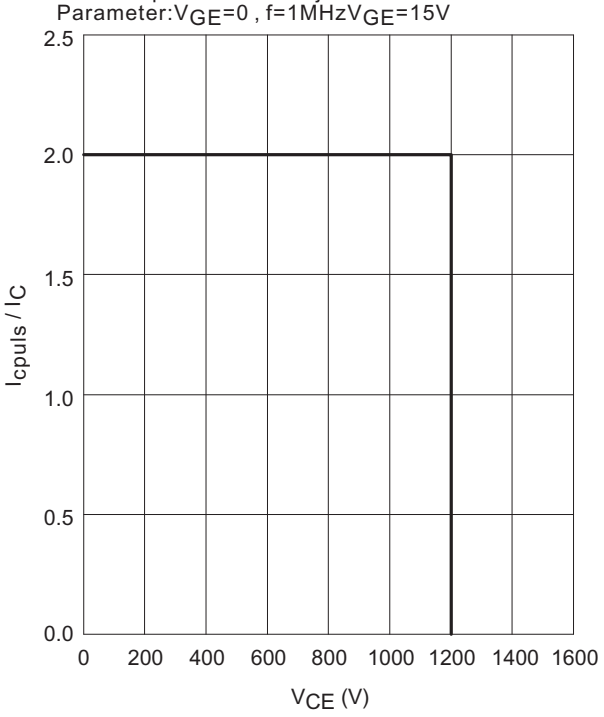


Fig.11 Short circuit safe operating area , I_{Csc}=f (V_{CE}) , T_j=150°C
Parameter:V_{GE}=±15V , t_{SC}≤10μs ,L≤50nH

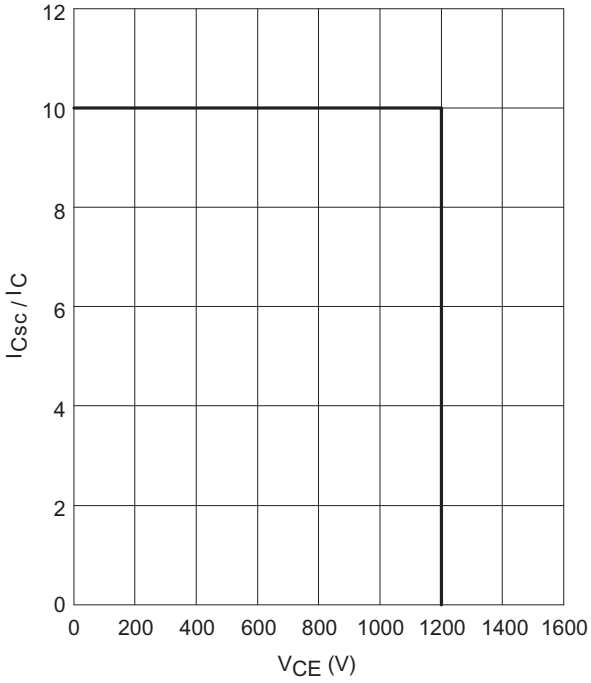


Fig.12 Typ. switching time , I=f I_C , inductive load , T_j=125°C
Parameter:V_{CE}=600V , V_{GE}=±15V , R_G=15Ω

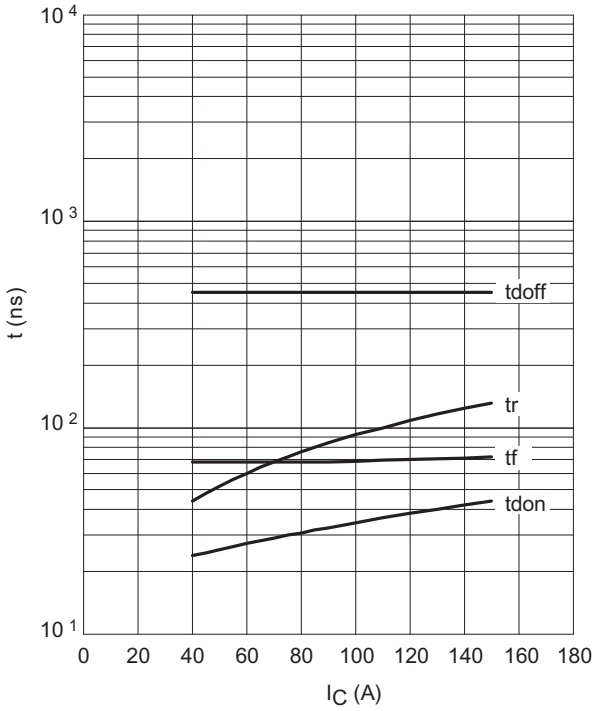


Fig.13 Typ. Switching time , t=f (R_G) , inductive load , T_j=125°C
Parameter:V_{CE}=600V , I_C=75A

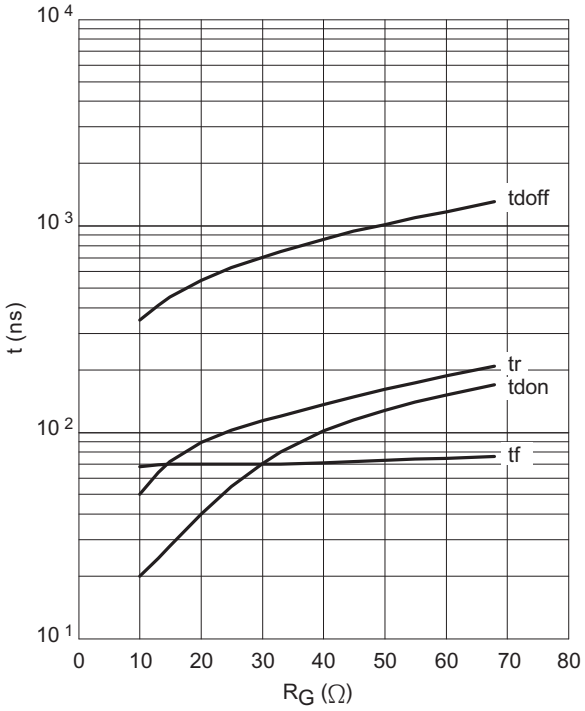


Fig.14 Typ. switching losses , E=f (I_C) , Inductive load , T_j=125°C
Parameter:V_{CE}=600V , V_{GE}=±15V , RG=15Ω

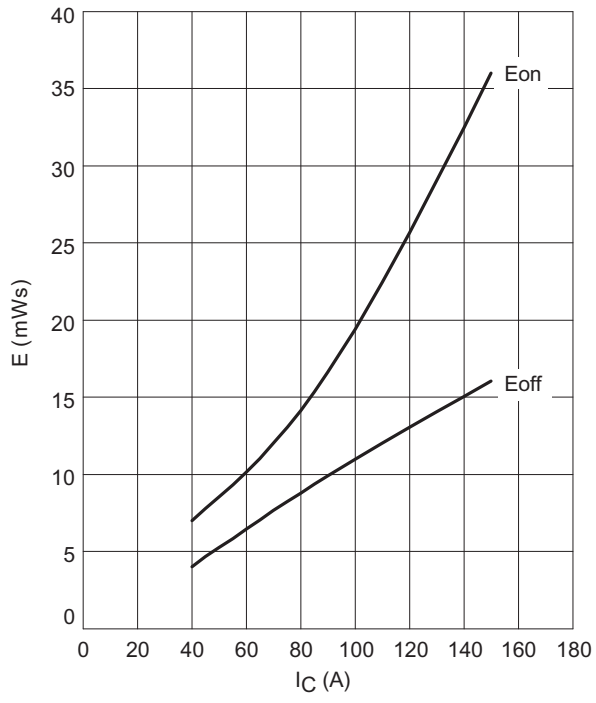


Fig.15 Typ.switching losses , E=f (R_G) , inductive load , T_j=125℃
Parameter:V_{GE}=600V , V_{GE}=±15V , I_C=75A

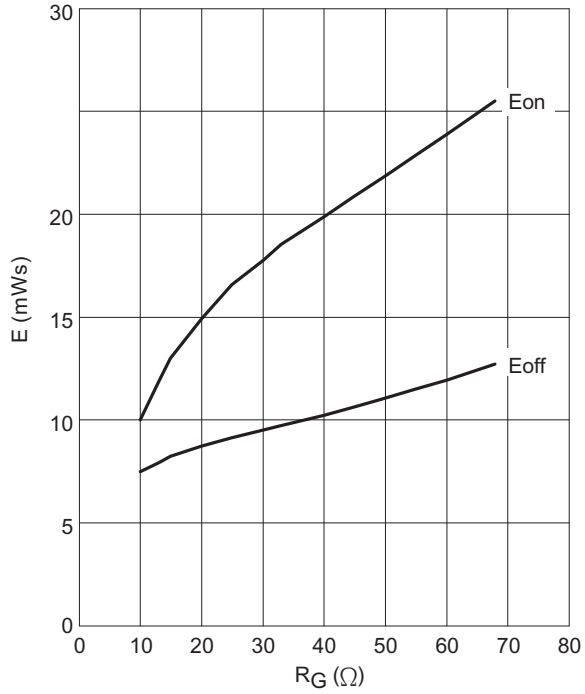


Fig.16 Forward characteristics of fast recovery reverse diode , I_F=f (VF)
Parameter:T_j

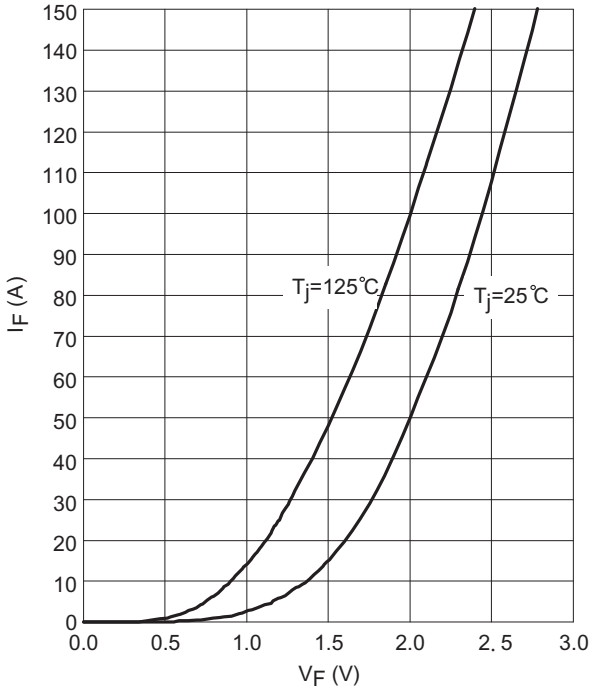


Fig.17 Transient thermal impedance Diode , Z_{thJC}=f (tp)
Parameter:D=t_p / T