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	150	GB	xx	B
(1)	(2)	(3)	(4)	(5)

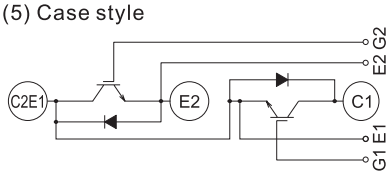
(1) For IGBT module

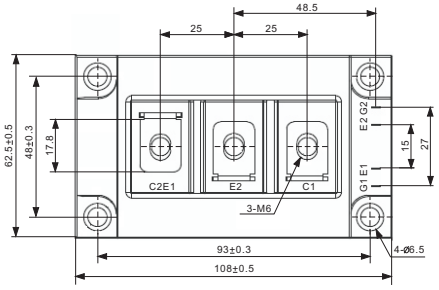
(2) Maximum average forward current , A

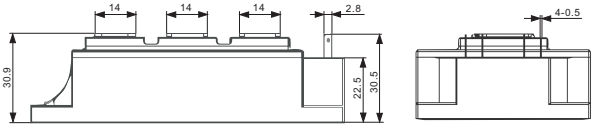
(3) 2 in one-package

(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

Symbol	Parameter	Condition	Max. Value	Unit
I_C	Collector current	T_C=80℃	150	A
I_{CM}	Peak collector current	T_C=25℃	300	A
P_C	Maximum collector dissipation	T_C=25℃ , T_j≤150℃	1250	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 , M6 main terminal		3 to 5	N.m
	Mounting torque , M6 mounting		3 to 5	
W_t	Approximate weight		370	g

Static electrical characteristics , T_j=25℃ unless otherwise specified

Symbol	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}=±20V , V_{CE}=0V , T_J=125℃			200	μA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=6mA , V_{CE}=VGE	5	6.2	7	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C=150A , V_{GE}=15V , T_J=25℃		1.8		V
		I_C=150A , V_{GE}=15V , T_J=125℃		2.25		
Q_G	Total gate charge			1560		nC
V_{EC}	Emitter-collector voltage	I_C=-150A , V_{GE}=15V			2.2	V

Dynamic electrical characteristics , T_j=25℃ unless otherwise specified

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
C_{ies}	Input capacitance	V_{GE}=0V , V_{CE}=25V f=1MHz		16		nF
C_{oes}	Output capacitance			1.2		
C_{res}	Reverse transfer capacitance			0.6		
$t_{d(on)}$	Turn-on delay time , Resistive	V_{CC}=600V , I_C=150A V_{GE1}=V_{GE2}=+15V , R_G=8Ω		160		ns
t_r	Rise time , Load			65		
$t_{d(off)}$	Turn-off delay time , Switching			500		
t_f	Fall time , Times			70		
t_{rr}	Diode reverse recovery time	I_C=-150A , $d_{i/dt}$=-150A/μs			250	ns
Q_{rr}	Diode reverse recovery charge	I_C=-150A , $d_{i/dt}$=-1500A/μs ,T_j=25ºC		5		μC

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

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
$R_{th(j-c)}$	Thermal resistance , junction to case	Per IGBT			0.18	℃/W
		Per FWDi			0.35	
$R_{th(c-f)}$	Contact thermal resistance	Per module , thermal grease applied			0.05	℃/W

Fig.1 Power dissipation

P_{tot} = ƒ (T_C) , parameter: T_j ≤ 150 ºC

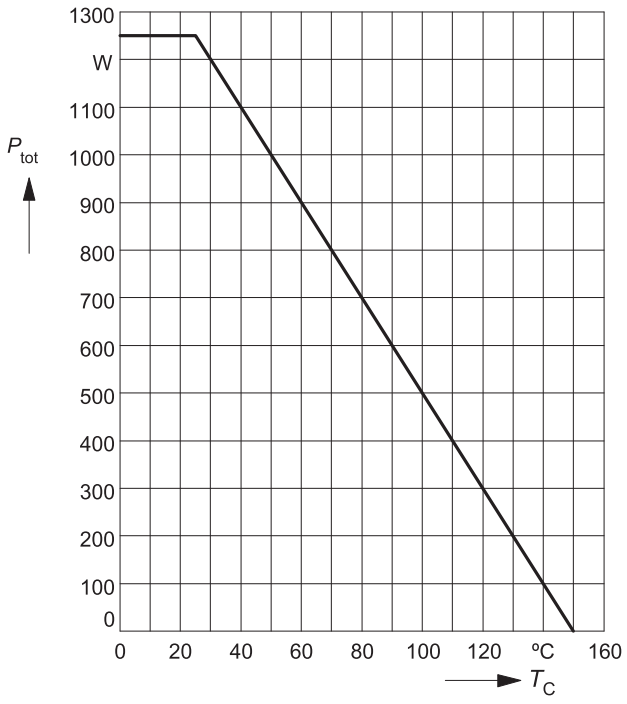


Fig.2 Safe operating area

I_C=ƒ (V_{CE}) , parameter: D = 0 , T_C = 25 ºC , T_j ≤ 150 °C

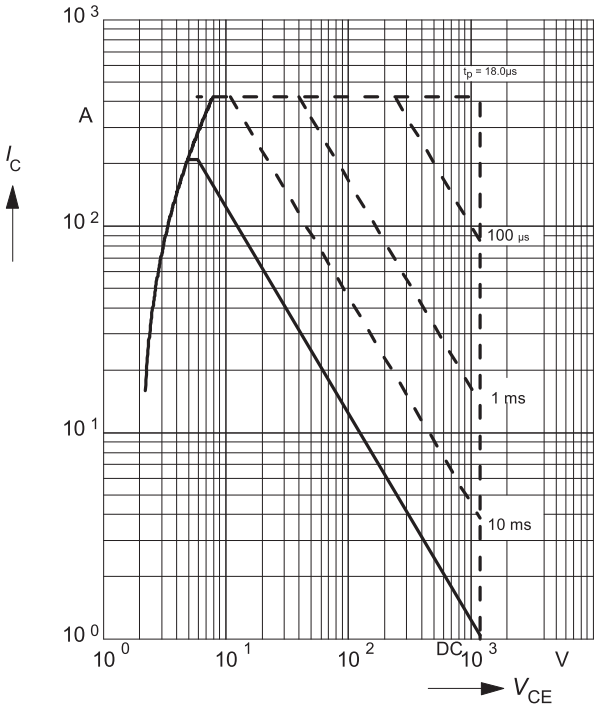


Fig.3 Collector current
$I_C = f(T_C)$,parameter : $V_{GE} \geq 15$ V , $T_j \leq 150$ °C

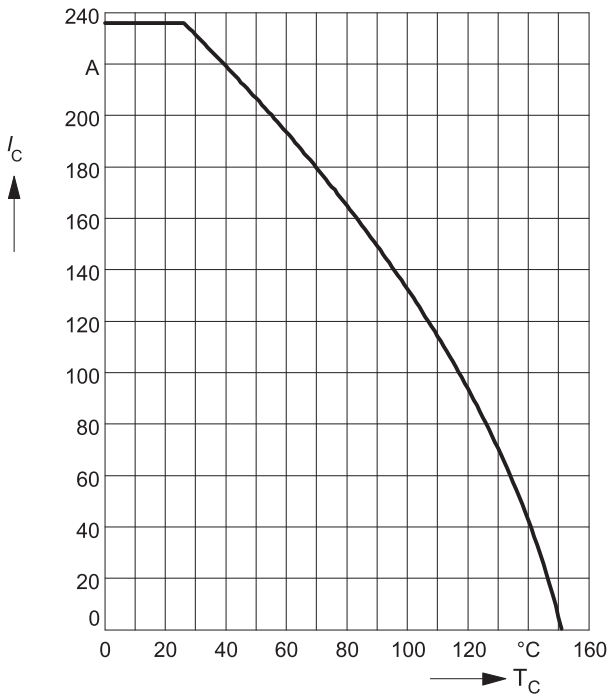


Fig 4.Transient thermal impedance IGBT
$Z_{thJC} = f(t_p)$, parameter : $D = t_p / T$

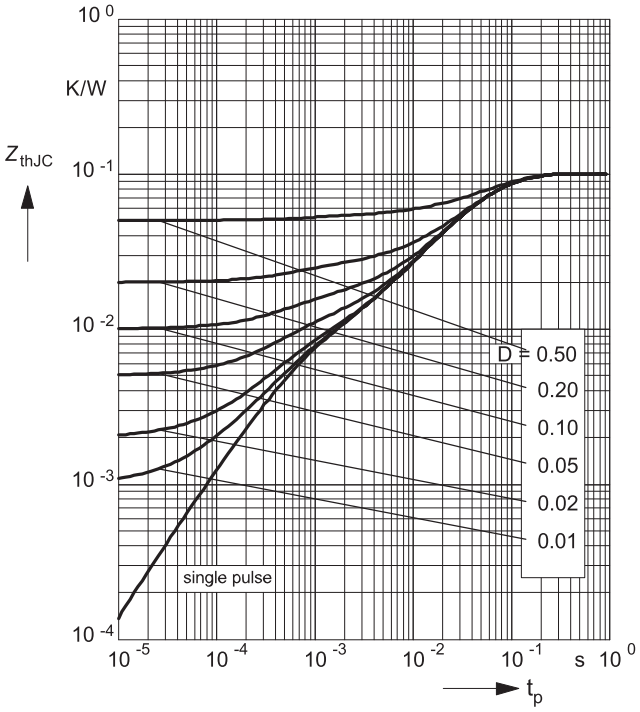


Fig 5. Typ. output characteristics
$I_C = f(V_{CE})$, parameter : $t_p = 80$ µs , $T_j = 25$ °C

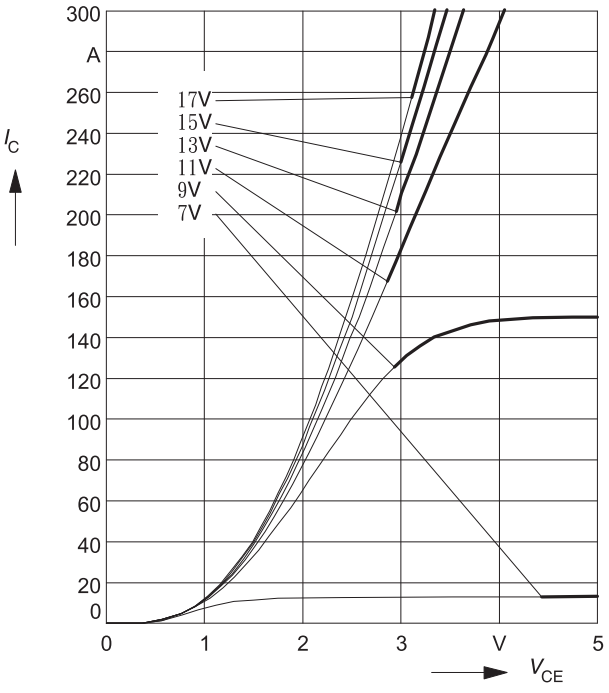


Fig 6. Typ. output characteristics
$I_C = f(V_{CE})$, parameter : $t_p = 80$ µs, $T_j = 125$ °C

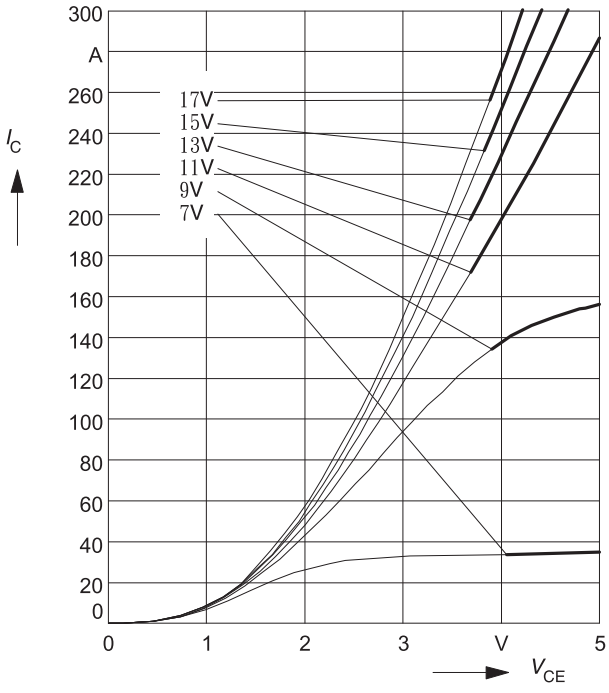


Fig 7. Typ. transfer characteristics

$I_C = f(V_{GE})$, parameter : t_p= 80 µs, V_{CE}= 20 V

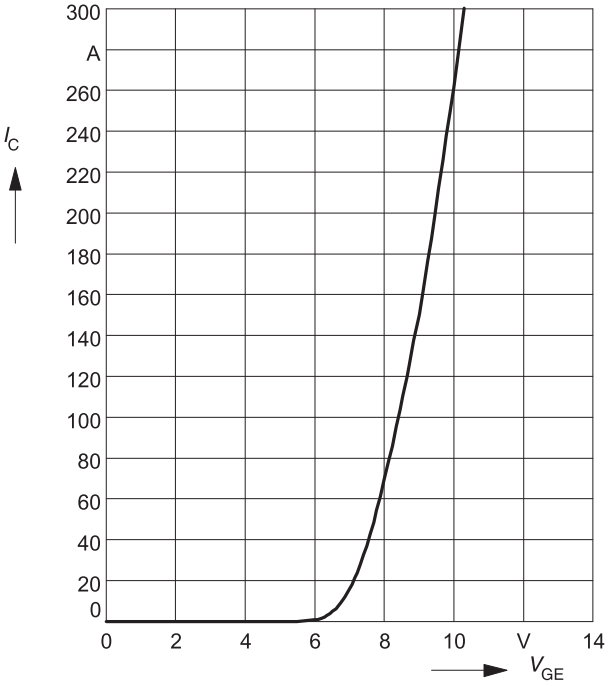


Fig 8. Typ. gate charge

$V_{GE} = f(Q_{Gate})$,parameter : $I_{C\ puls}$ = 150 A

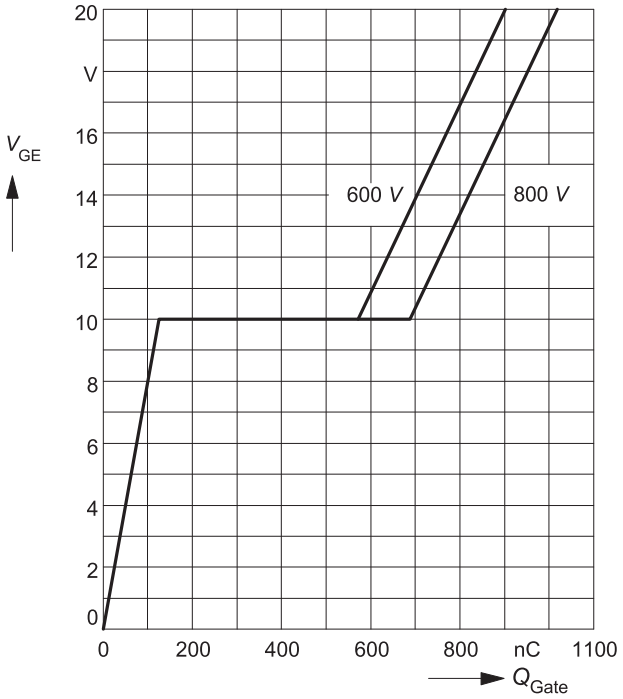


Fig 9. Typ. capacitances

$C = f(V_{CE})$, parameter : V_{GE} = 0 V, f = 1 MHz

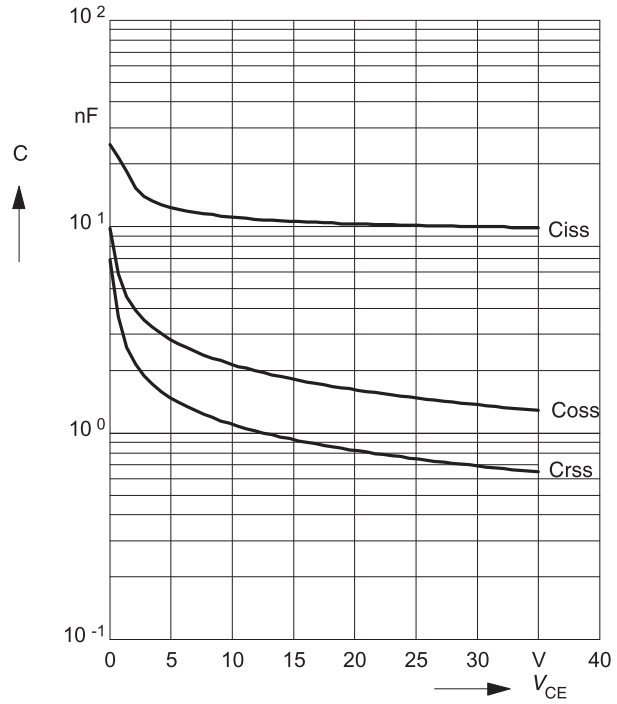


Fig 10. Reverse biased safe operating area

$I_{Cpuls} = f(V_{CE})$, T_j = 150 °C ,parameter : V_{GE} = 15 V

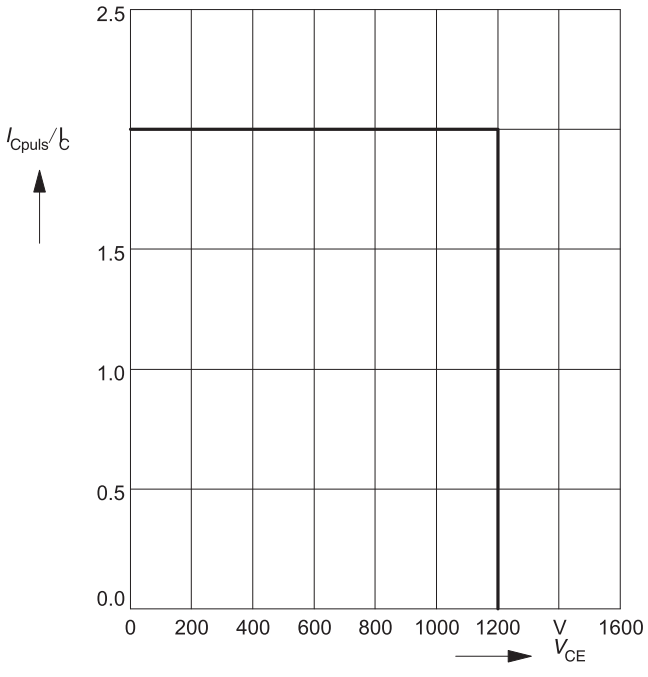


Fig 11. Short circuit safe operating area
$I_{Csc} = f(V_{CE})$, T_j = 150 ºC
parameter : V_{GE} = ±15 V, t_{SC} ≤ 10 µs, L < 25 nH

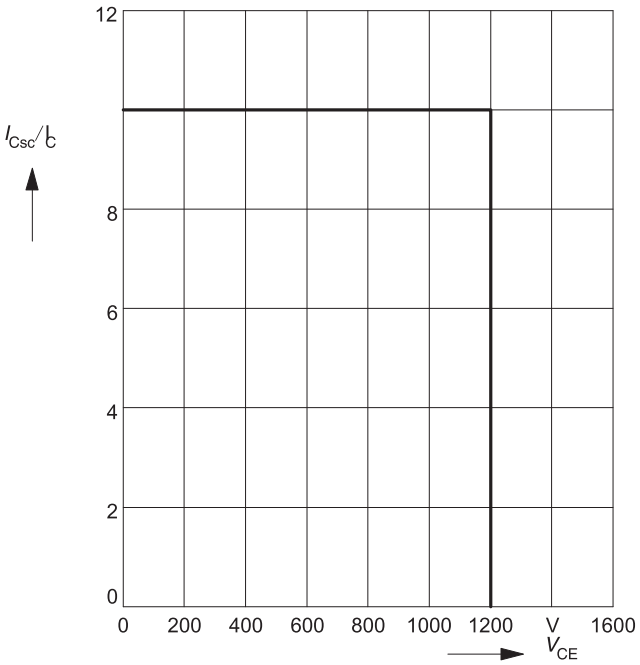


Fig 12. Typ. switching time
$I = f(I_C)$, inductive load , T_j = 125 ºC
par.: V_{CE} = 600 V, V_{GE} = ±15 V, R_G = 5.6 Ω

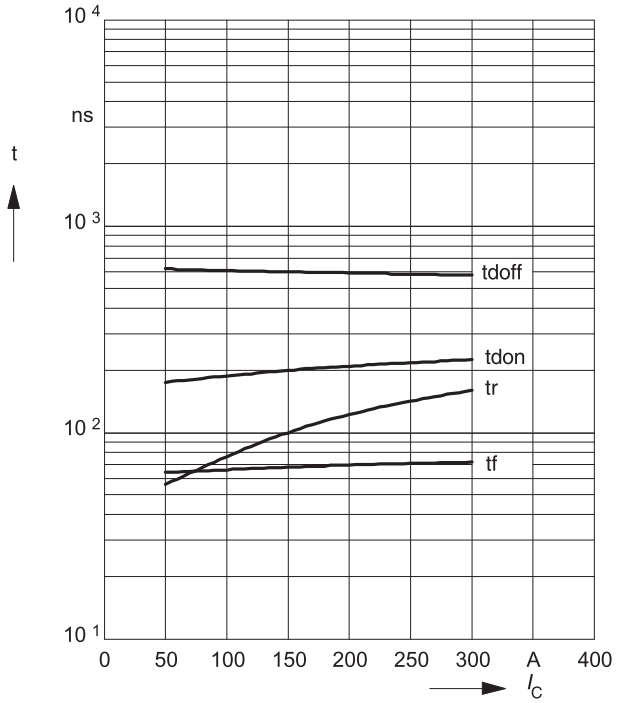


Fig 13. Typ. switching time
$t = f(R_G)$, inductive load , T_j = 125 °C
par.: V_{CE} = 600 V, V_{GE} = ±15 V, I_C = 150 A

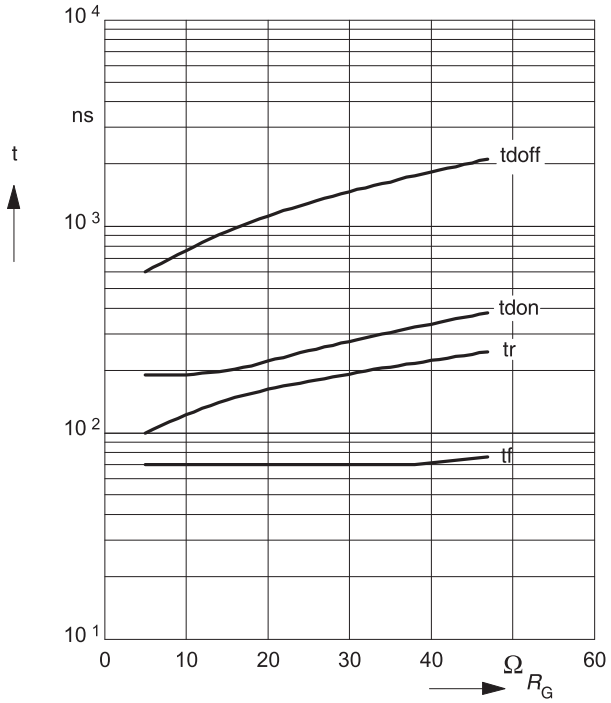


Fig 14. Typ. switching losses
$E = f(I_C)$, inductive load , T_j = 125 °C
par.: V_{CE} = 600 V, V_{GE} = ±15 V, R_G = 5.6 Ω

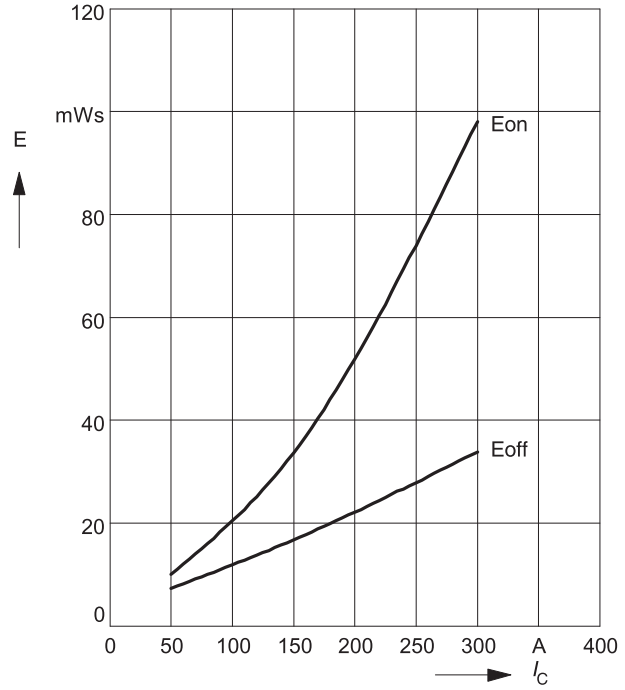


Fig 15. Typ. switching losses
E = ƒ (R_G) , inductive load , T_j = 125 °C
par.: V_{CE} = 600V, V_{GE} = ± 15 V, I_C = 150 A

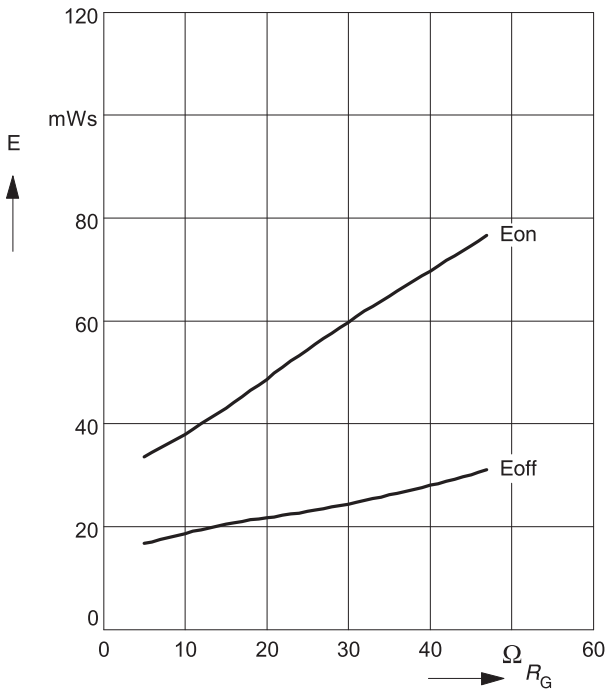


Fig 16. Forward characteristics of fast recovery reverse diode I_F = ƒ (V_F) ,parameter : T_j

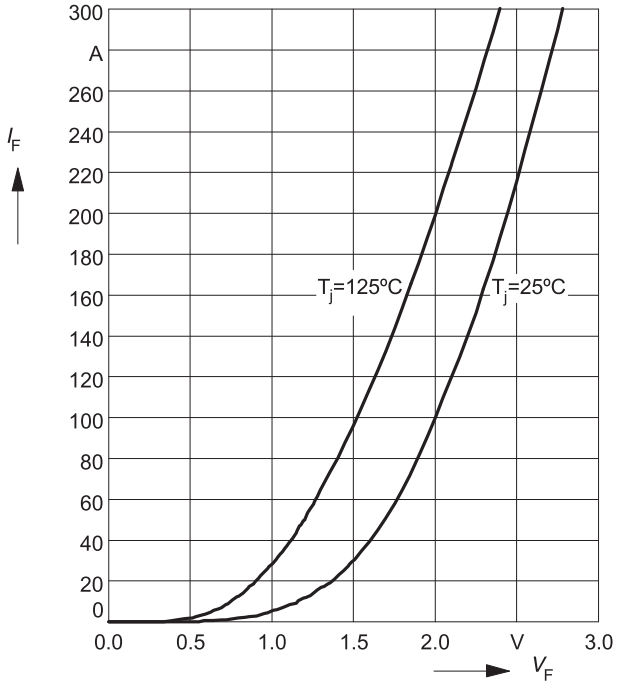


Fig 17. Transient thermal impedance Diode
Z_{thJC} = (t_p) ,parameter : D = t_p / T