

Description

The DFI200HF12DF1 offer ultrafast switching speed for high frequency application.



Features

- 1200V200 A, $V_{CE(sat)}(typ.) = 3.0V$
- Ultrafast switching speed
- Excellent short circuit ruggedness
- 62mm half bridge module

Applications

- Welder
- Inverter
- Power supply
- Inductive heating
- UPS EPS

Circuit diagram

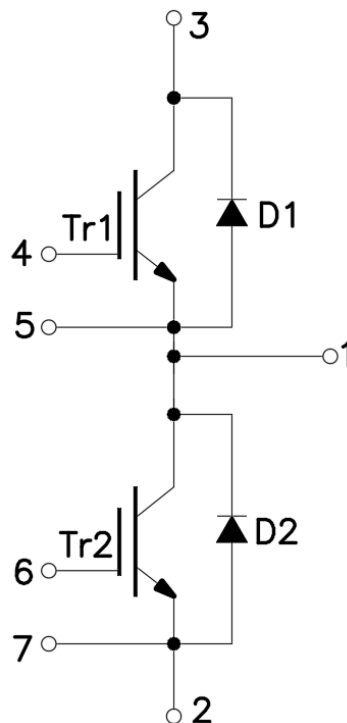


Figure 1. Out drawing & circuit diagram for DFI200HF12DF1

Pin Configuration and Marking Information

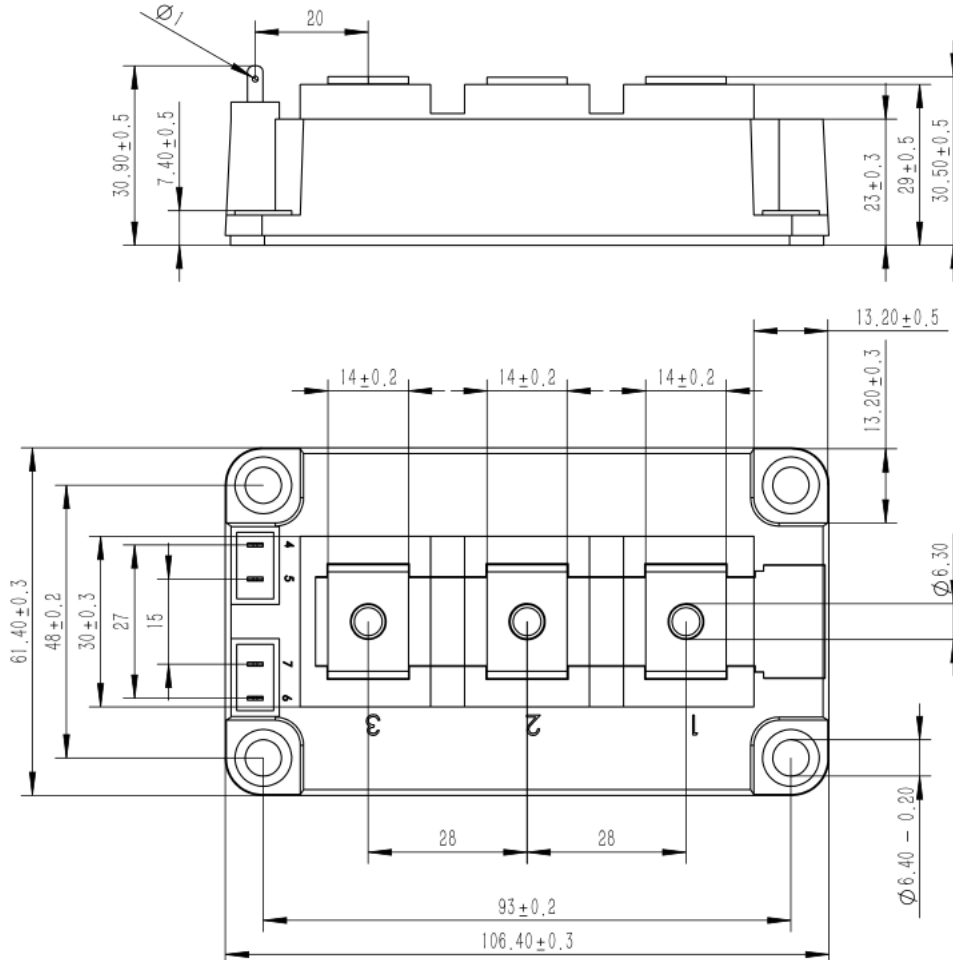


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t = 1min	2.5	KV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	47 26	mm
Clearance	terminal to heatsink terminal to terminal	29 14	mm
CTI	-	>200	-
Module lead resistance, terminals – chip	T _C = 25°C	0.8	mΩ
Mounting torque for module mounting	M6	3 to 6	Nm
Weight	-	315	g

Maximum Ratings (IGBT, $T_j=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	G-E Short	1200	V
V_{GES}	Gate-Emitter Voltage	C-E Short	$\pm 30\text{V}$	V
I_C	DC Continuous Collector Current	$T_C=100^\circ\text{C}$	200	A
I_{CM}	Pulse Collector Current	$t_p=1\text{ms}$, Note1	400	A
P_C	Maximum Power Dissipation	$T_C=25^\circ\text{C}$, $T_j=150^\circ\text{C}$ (IGBT)	860	W
T_j	junction temperature	-	-40 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^\circ\text{C}$

Note1: Pulse width limited by maximum junction temperature

Maximum Ratings (Freewheeling diode, $T_j=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{RRM}	Peak Repetitive Revers Voltage	-	1200	V
I_F	Diode forward Current	$T_C=100^\circ\text{C}$	200	A
I_{FRM}	Repetitive peak forward Current	$t_p=1\text{ms}$, Note1	400	A
T_j	junction temperature	-	-40 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^\circ\text{C}$

Note1: Pulse width limited by maximum junction temperature

IGBT Electrical characteristics ($T_j=25^\circ\text{C}$ unless otherwise specified, chip)

Symbol	Item	Condition	Value			Unit	
			Min.	Typ.	Max		
$V_{CE(sat)}$ (Chip)	Collector-Emitter Saturation Voltage	$I_C=200\text{A}$ $V_{GE}=15\text{V}$	$T_j=25^\circ\text{C}$	-	3.00	3.20	V
			$T_j=125^\circ\text{C}$	-	3.60	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$	4.5	-	5.7	V	
Q_G	Gate charge	$V_{GE} = -15\text{V to } +15\text{V}$	-	1.74	-	μC	
R_{Gint}	Internal gate resistor	$f=1\text{M}$, $V_{pp}=1\text{V}$	$T_j=25^\circ\text{C}$	-	2.5	-	Ω
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$ $f=1\text{MHz}$	$T_j=25^\circ\text{C}$	-	17.5	-	nF
C_{oes}	Output Capacitance			-	2.4	-	nF
C_{res}	Reverse transfer Capacitance			-	1.4	-	nF
I_{CES}	Collector- Emitter Cut off Current	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	5	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = 30\text{V}$, $V_{CE} = 0\text{V}$	$T_j=25^\circ\text{C}$	-	-	400	nA
$t_{d(on)}$	Turn-on delay time		$T_j=25^\circ\text{C}$	-	90	-	ns
			$T_j=125^\circ\text{C}$	-	95	-	
t_r	Rise time		$T_j=25^\circ\text{C}$	-	85	-	ns
			$T_j=125^\circ\text{C}$	-	90	-	
$t_{d(off)}$	Turn-off delay time		$T_j=25^\circ\text{C}$	-	670	-	ns
			$T_j=125^\circ\text{C}$	-	725	-	

t _f	Fall time	V _{CC} = 600V	T _j = 25°C	-	110	-	ns
			T _j = 125°C	-	130	-	
E _{on}	Turn-on power dissipation	I _C = 200A V _{GE} = +15V/-15V	T _j = 25°C	-	8.5	-	mJ
			T _j = 125°C	-	10.5	-	
E _{off}	Turn-off power dissipation	R _G = 4.7Ω Inductive load	T _j = 25°C	-	11.0	-	mJ
			T _j = 125°C	-	14.0	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT)		-	-	-	0.145	°C/W

Freewheeling Diode Electrical characteristics (T_j = 25°C unless otherwise specified, chip)

Symbol	Item	Condition	Value			Unit	
			Min.	Typ.	Max		
V _F	Diode Forward Voltage	I _F = 200A, V _{GE} = 0V	T _j = 25°C	-	1.9	2.2	V
			T _j = 125°C	-	1.9	-	
t _{rr}	Reverse recovery time	V _{rr} = 600V, I _F = 200A di/dt = 2600A/μs	T _j = 25°C	-	160	-	ns
			T _j = 125°C	-	220	-	
I _{rr}	Peak reverse recovery Current	V _{rr} = 600V, I _F = 200A di/dt = 2600A/μs	T _j = 25°C	-	170	-	A
			T _j = 125°C	-	210	-	
Q _{rr}	Recovered charge	V _{rr} = 600V, I _F = 200A di/dt = 2600A/μs	T _j = 25°C	-	16.50	-	nC
			T _j = 125°C	-	26.50	-	
E _{rr}	Reverse recovered energy	V _{rr} = 600V, I _F = 200A di/dt = 2600A/μs	T _j = 25°C	-	5.50	-	mJ
			T _j = 125°C	-	9.00	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode)		-	-	-	0.157	°C/W

Test Conditions

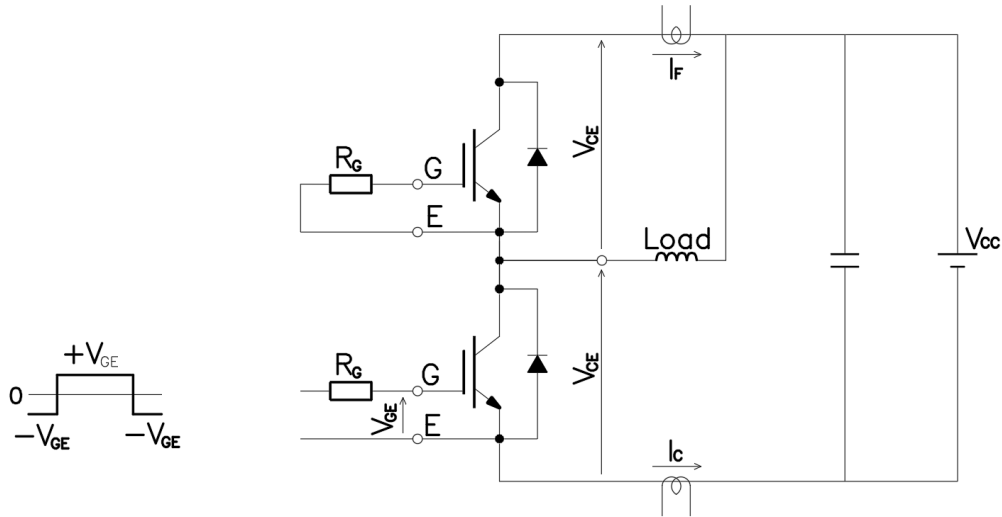


Figure 3. Switching time measure circuit

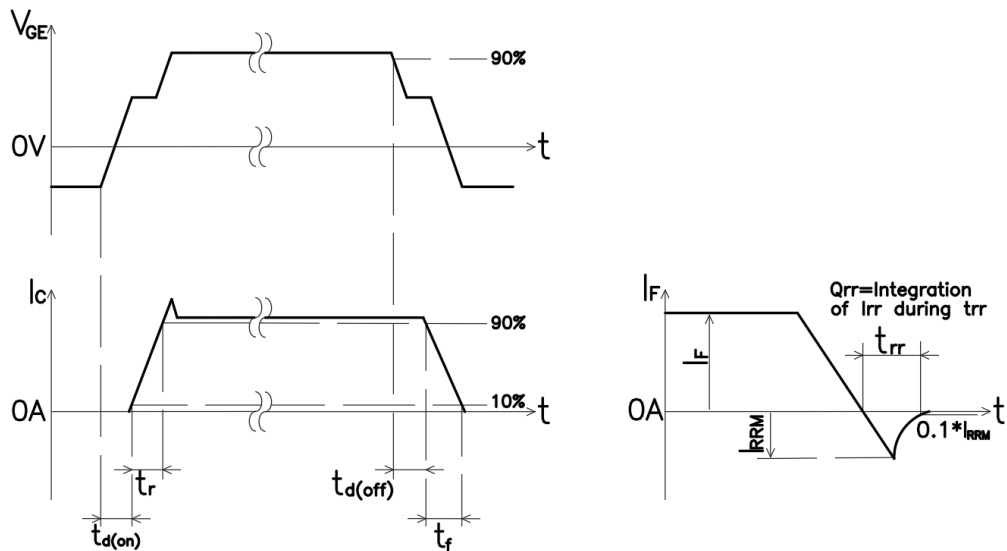


Figure 4. Switching time definition

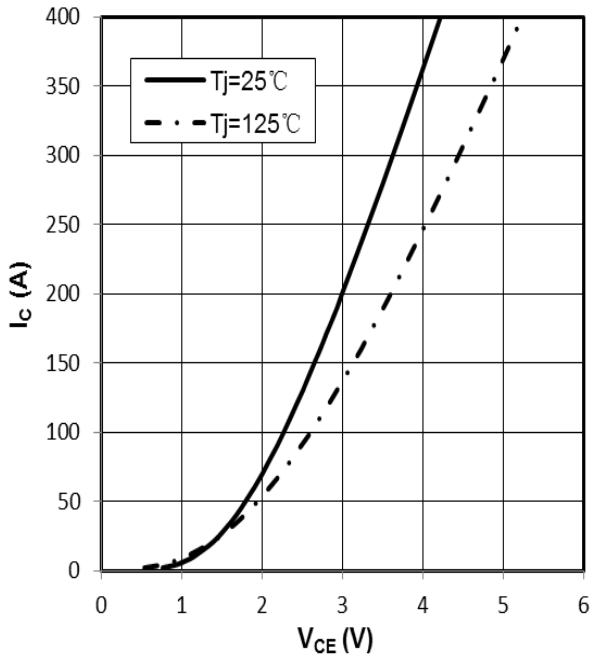


Figure 5. I_c vs V_{CE}
 $V_{GE} = 15\text{V}$

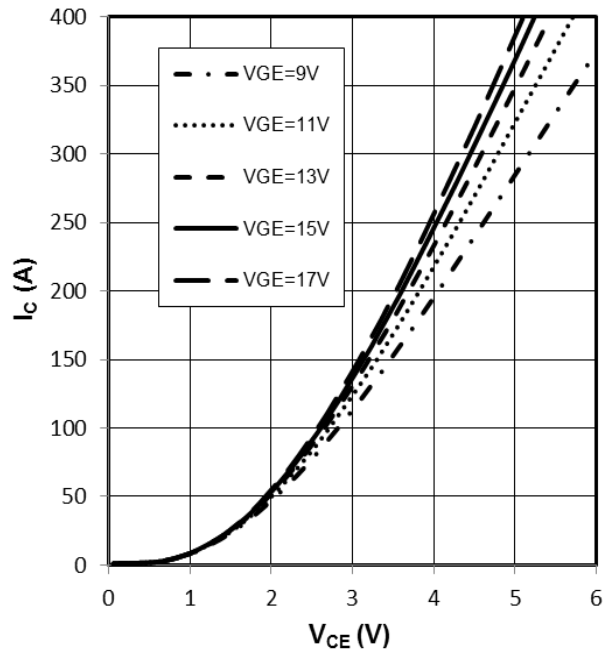


Figure 6. I_c vs V_{CE}
 $T_j = 125^\circ\text{C}$

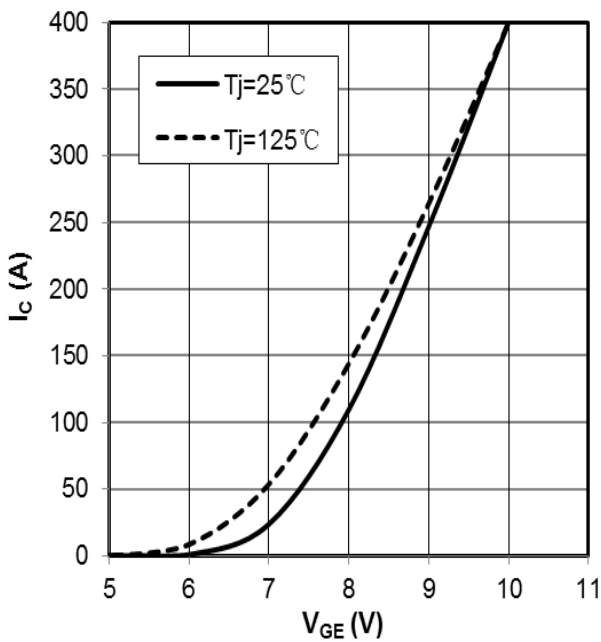


Figure 7. I_c vs V_{GE}
 $V_{CE} = 20\text{V}$

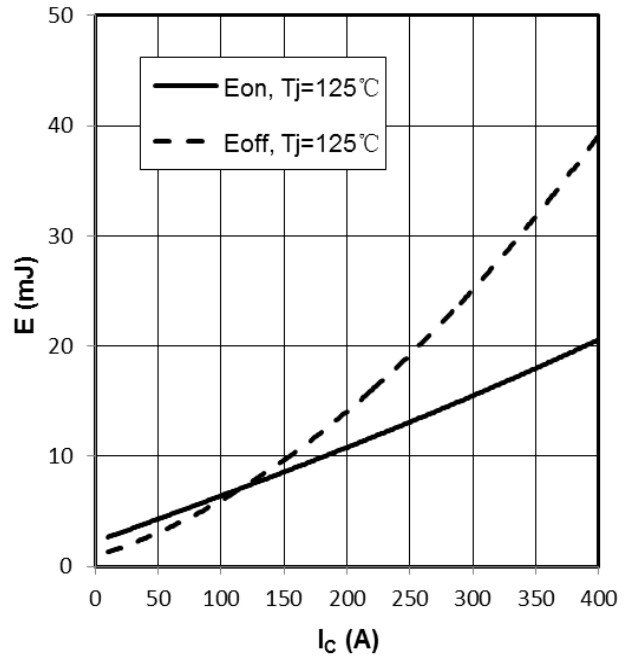


Figure 8. E_{on} , E_{off} vs I_c (Typ)
 $V_{CC} = 600\text{V}$, $V_{GE} = +15\text{V}/-15\text{V}$, $R_G = 4.7\Omega$

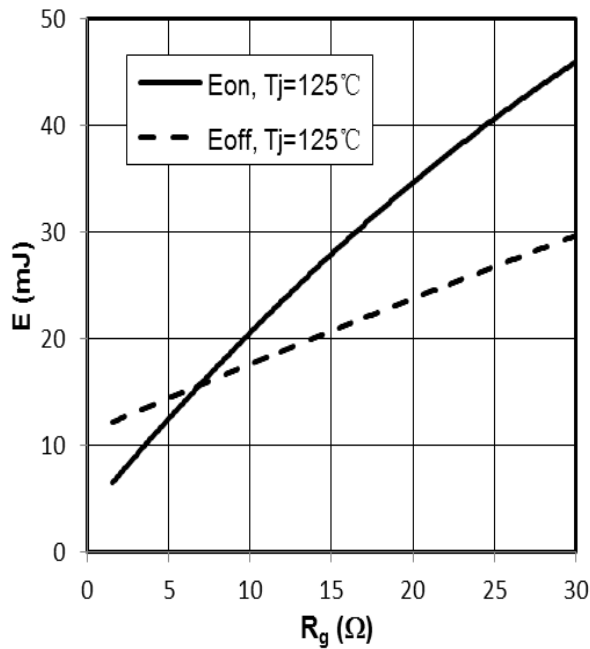


Figure 9. E_{on} , E_{off} vs R_g (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-15V$, $I_C=200A$

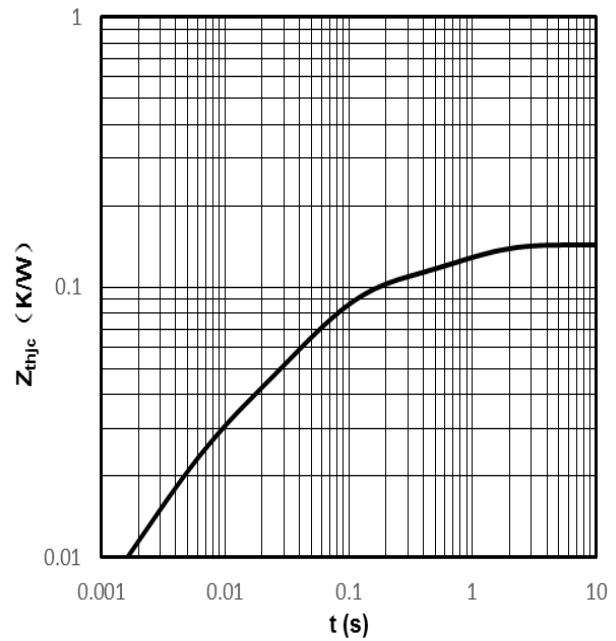


Figure 10. Transient thermal impedance IGBT,
 $Z_{thjc}=f(t)$

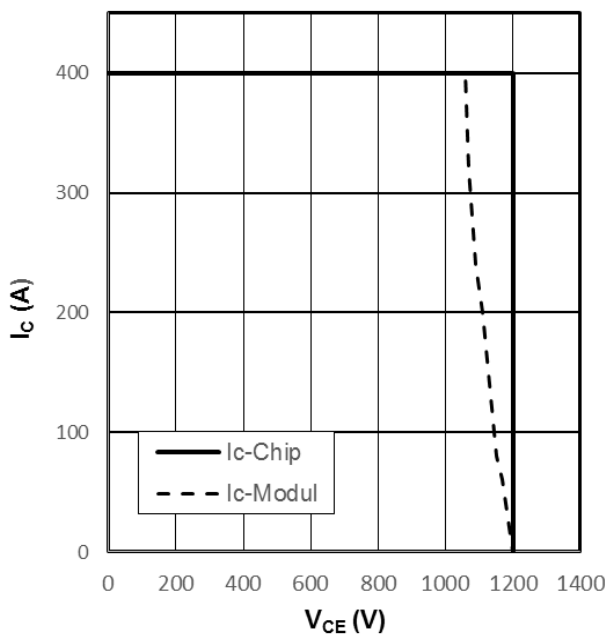


Figure 11. Reverse bias safe operating area IGBT,
 $I_C=f(V_{CE})$, $V_{GE}=\pm 15V$, $R_{GoFF}=4.7\Omega$, $T_{vj}=125^\circ C$

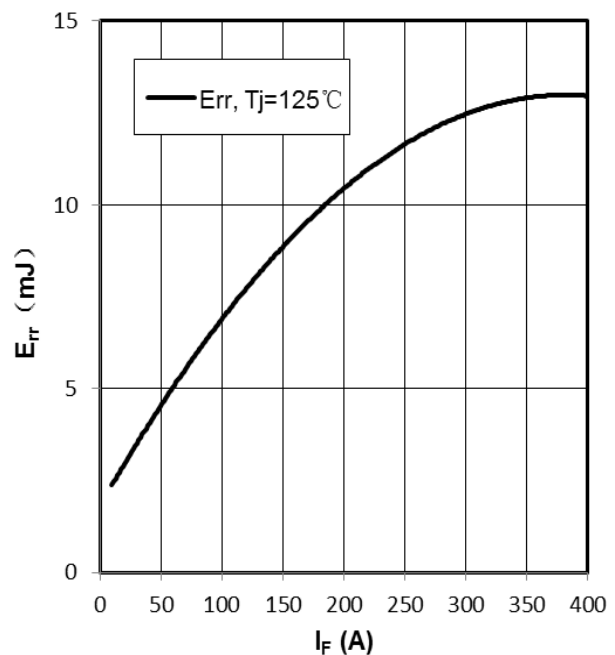


Figure 12. E_{rr} vs I_F (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-15V$, $R_G=4.7\Omega$

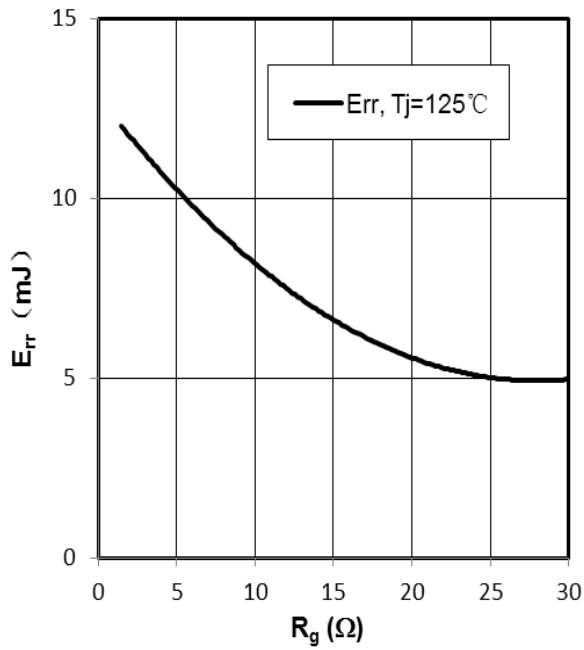


Figure 13. Err vs R_G(Typ)
 $V_{CC}=600V, V_{GE}=+15V/-15V, I_F=200A$

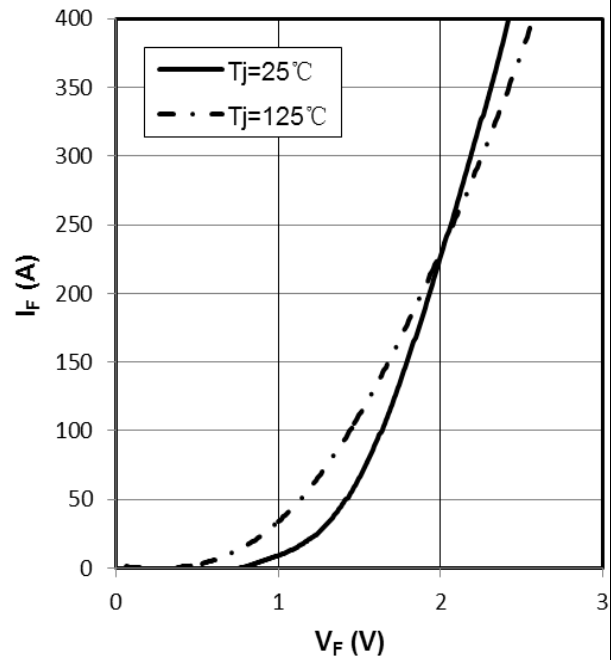


Figure 14. Forward characteristic of Diode ,
 $I_F=f(V_F)$

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