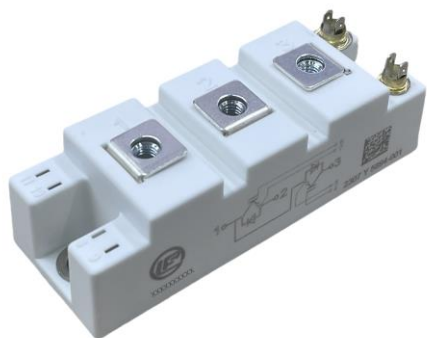


Description

The DFI100HF12DE1 offer ultrafast switching speed for high frequency application.



Features

- 1200V100 A, $V_{CE(sat)}(typ.) = 3.0V$
- Ultrafast switching speed
- Excellent short circuit ruggedness
- 34mm half bridge module

Applications

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

Circuit diagram

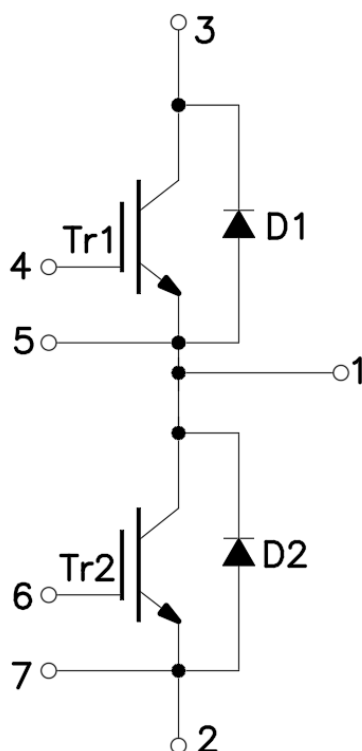


Figure 1. Out drawing & circuit diagram for DFI100HF12DE1

Pin Configuration and Marking Information

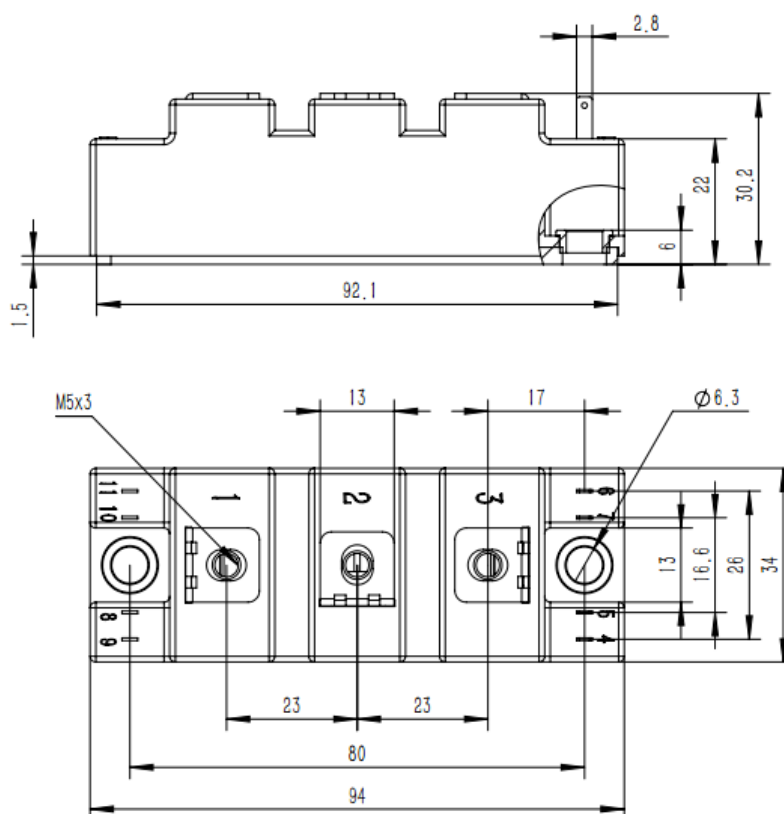


Figure 2. Pin configuration

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	26 21	mm
Clearance	terminal to heatsink terminal to terminal	23.6 10	mm
CTI	-	>200	-
Module lead resistance, terminals – chip	T _C =25°C	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	160	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	$T_C = 100^\circ\text{C}$	100	A
I_{CM}	Pulse Collector Current	$t_p = 1\text{ms}$, Note1	200	A
P_C	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$, $T_j = 150^\circ\text{C}$ (IGBT)	430	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	$T_C = 100^\circ\text{C}$	100	A
I_{FRM}	Repetitive peak forward Current	$t_p = 1\text{ms}$, Note1	200	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	$I_C=100A$	$T_j=25^{\circ}C$	-	3.00	3.20	V
		$V_{GE}=15V$	$T_j=125^{\circ}C$	-	3.60	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	$I_C=1mA, V_{CE}=V_{GE}$		4.5	-	5.7	V
Q_G	Gate charge	$V_{GE}=-15V$ to $+15V$		-	0.87	-	μC
R_{Gint}	Internal gate resistor	$f=1M, V_{pp}=1V$	$T_j=25^{\circ}C$	-	1.9	-	Ω
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V$	$T_j=25^{\circ}C$	-	8.00	-	nF
C_{oes}	Output Capacitance	$f=1MHz$		-	1.35	-	nF
C_{res}	Reverse transfer Capacitance			-	0.81	-	nF
I_{CES}	Collector- Emitter Cut off Current	$V_{CE}=1200V, V_{GE}=0V$	$T_j=25^{\circ}C$	-	-	1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=30V, V_{CE}=0V$	$T_j=25^{\circ}C$	-	-	200	nA
$t_{d(on)}$	Turn-on delay time		$T_j=25^{\circ}C$	-	30	-	ns
			$T_j=125^{\circ}C$	-	35	-	
t_r	Rise time		$T_j=25^{\circ}C$	-	50	-	ns
			$T_j=125^{\circ}C$	-	55	-	
$t_{d(off)}$	Turn-off delay time		$T_j=25^{\circ}C$	-	380	-	ns
			$T_j=125^{\circ}C$	-	390	-	

t _f	Fall time	V _{CC} =600V	T _j =25°C	-	110	-	ns
			T _j =125°C	-	160	-	
E _{on}	Turn-on power dissipation	I _C = 100A V _{GE} =+15V/-15V	T _j =25°C	-	4.6	-	mJ
			T _j =125°C	-	5.7	-	
E _{off}	Turn-off power dissipation	R _G =5.6Ω Inductive load	T _j =25°C	-	3.1	-	mJ
			T _j =125°C	-	5.1	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT)			-		0.29	°C/W

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

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
V _F	Diode Forward Voltage	I _F =100A, 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 =100A di/dt=1600A/μs	T _j =25°C	-	115	-	ns
			T _j =125°C	-	250	-	
I _{rr}	Peak reverse recovery Current		T _j =25°C	-	120	-	A
			T _j =125°C	-	135	-	
Q _{rr}	Recovered charge		T _j =25°C	-	10.0	-	nC
			T _j =125°C	-	15.0	-	
E _{rr}	Reverse recovered energy		T _j =25°C	-	3.7	-	mJ
			T _j =125°C	-	6.2	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode)			-		0.46	°C/W

Test Conditions

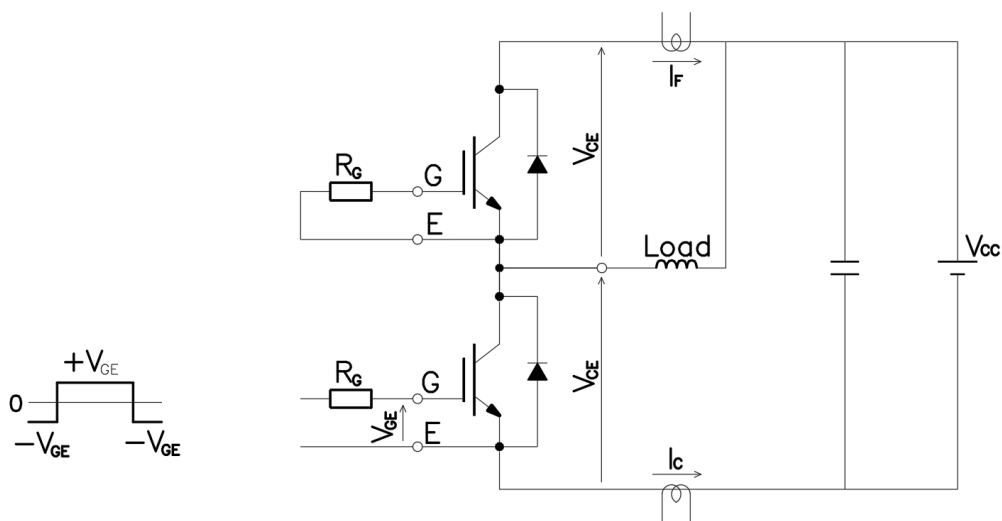


Figure 3. Switching time measure circuit

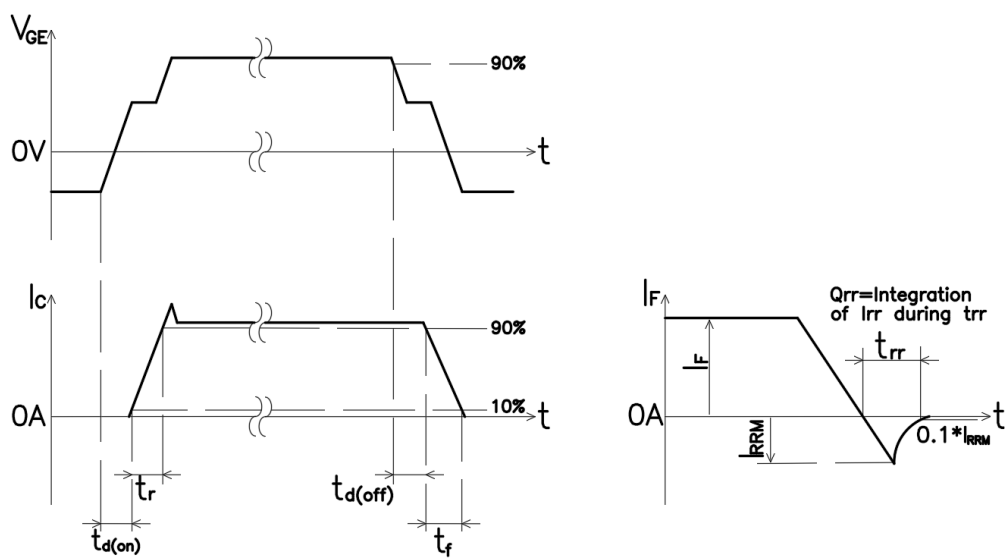


Figure 4. Switching time definition

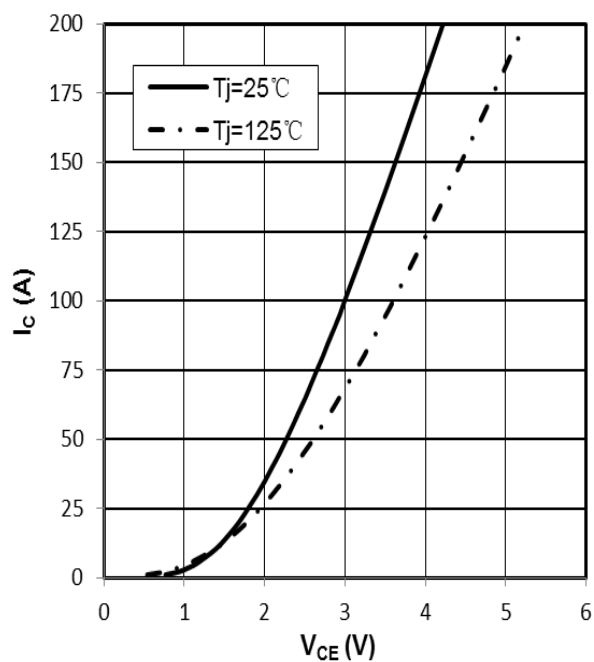


Figure 5. I_c vs V_{CE}
 $V_{GE} = 15\text{V}$

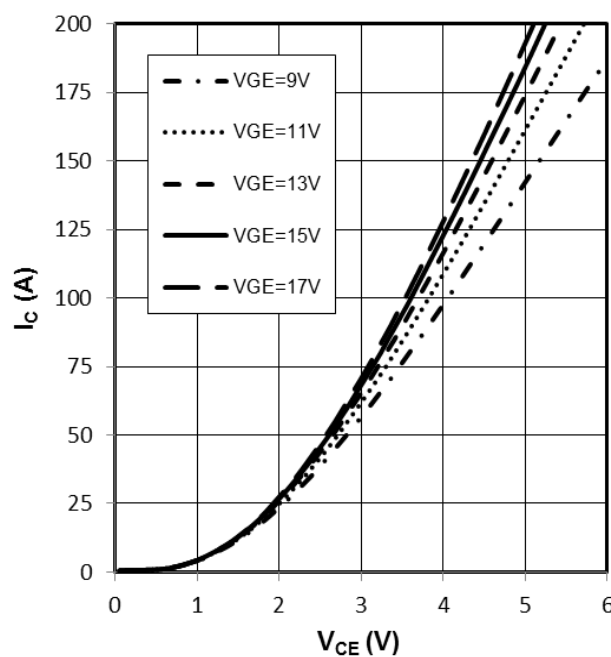


Figure 6. I_c vs V_{CE}
 $T_j = 125^\circ\text{C}$

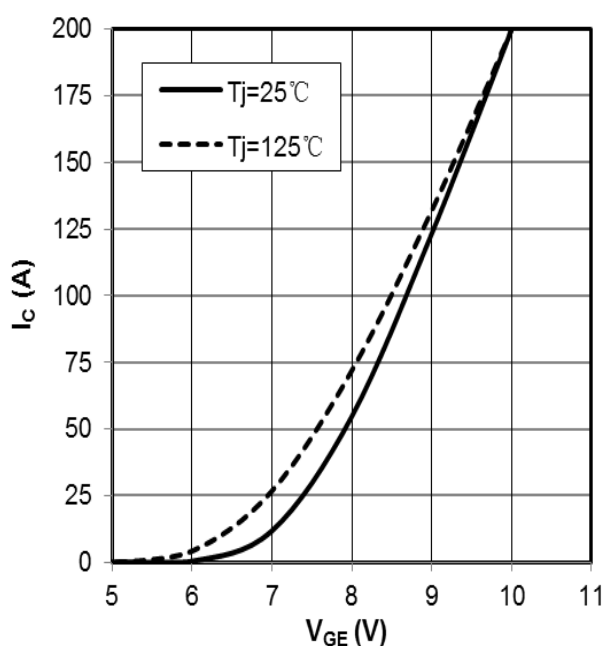


Figure 7. I_c vs V_{GE}
 $V_{CE} = 20\text{V}$

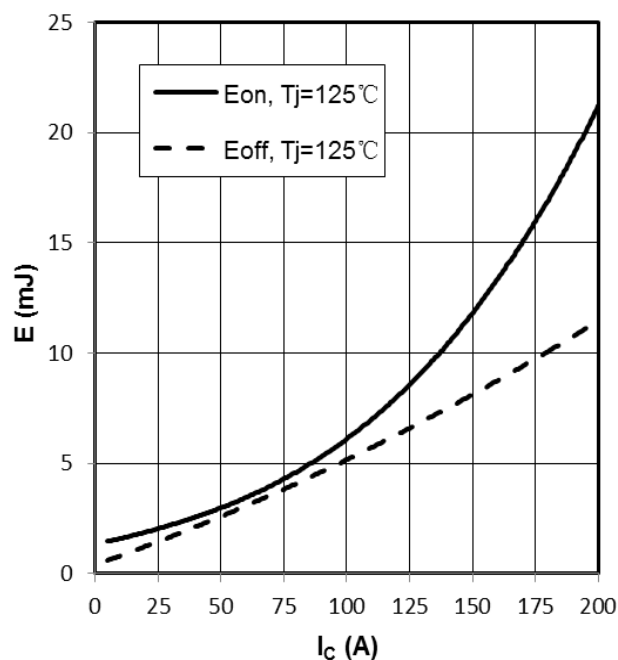


Figure 8. E_{on} , E_{off} vs I_c (Typ)
 $V_{CC} = 600\text{V}$, $V_{GE} = +15\text{V}/-15\text{V}$, $R_G = 5.6\Omega$

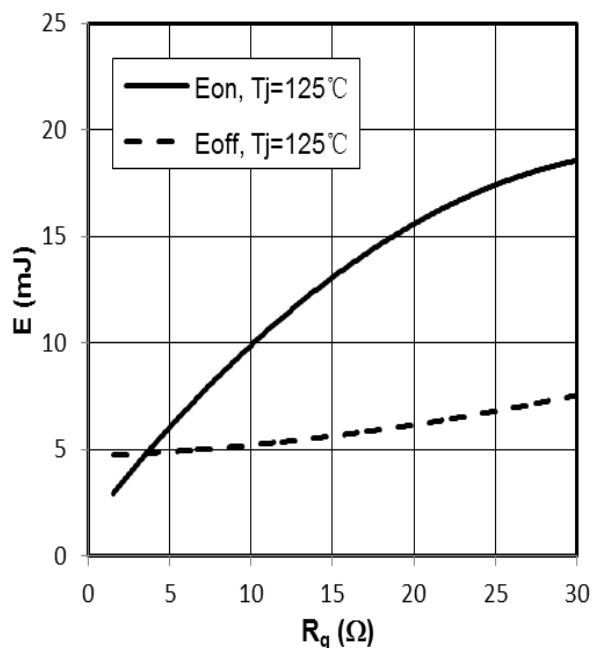


Figure 9. E_{on} , E_{off} vs R_g (Typ)
 $V_{CC}=600\text{V}$, $V_{GE}=+15\text{V}/-15\text{V}$, $I_C=100\text{A}$

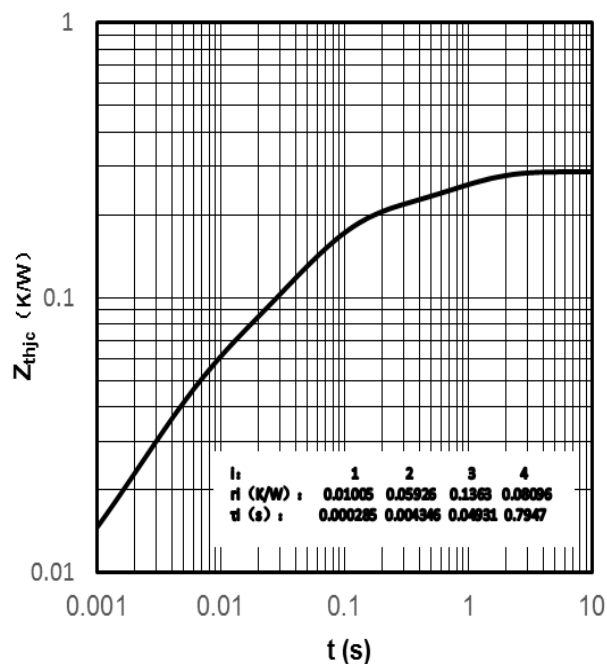


Figure 10. Transient thermal impedance IGBT ,
 $Z_{thjc}=f(t)$

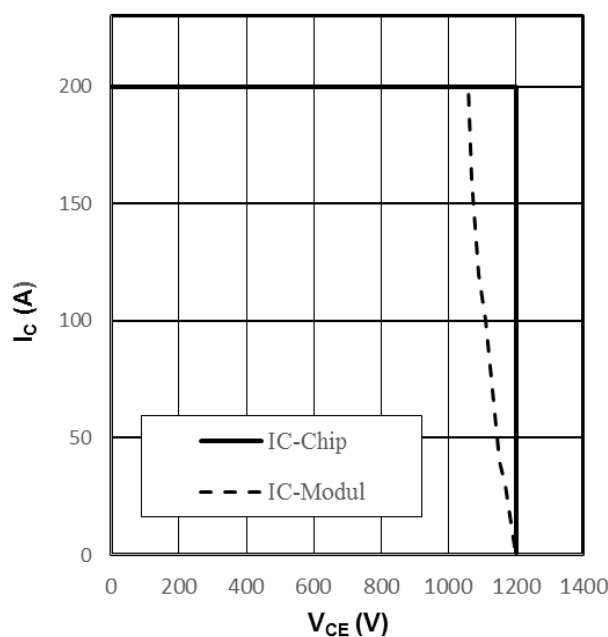


Figure 11. Reverse bias safe operating area IGBT,
 $I_C=f(V_{CE})$, $V_{GE}=\pm 15\text{V}$, $R_{Goff}=5.6\Omega$, $T_{vj}=125^\circ\text{C}$

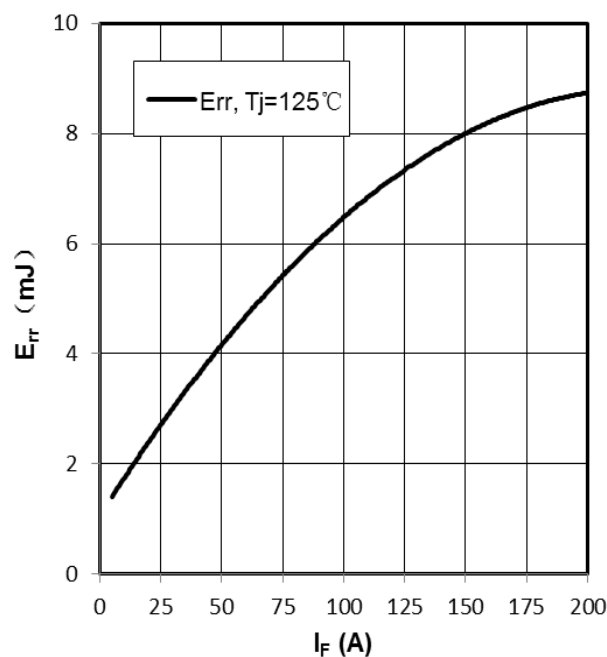


Figure 12. E_{rr} vs I_F (Typ)
 $V_{CC}=600\text{V}$, $V_{GE}=+15\text{V}/-15\text{V}$, $R_G=5.6\Omega$

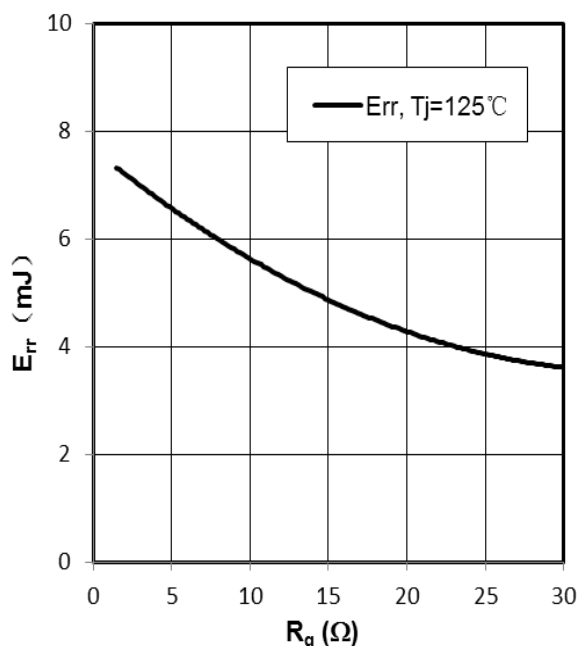


Figure 13. Err vs R_G(Typ)
V_{CC} = 600V, V_{GE} = +15V/-15V, I_F = 100A

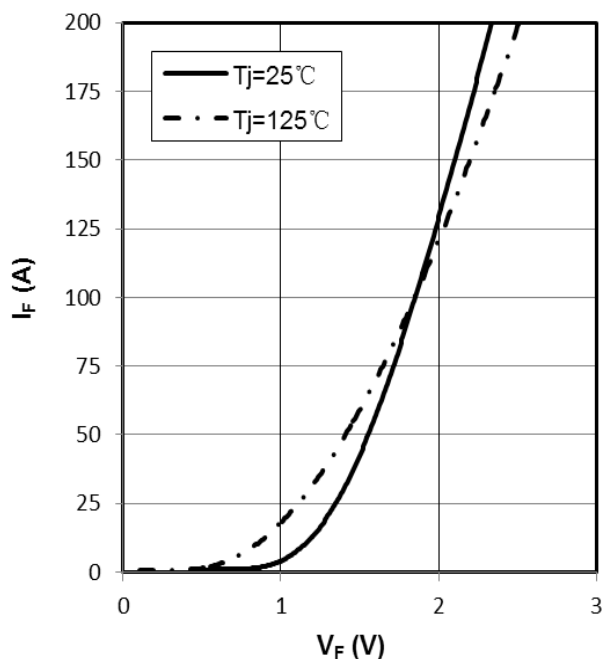


Figure 14. forward characteristic of Diode ,
I_F = f(V_F)

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