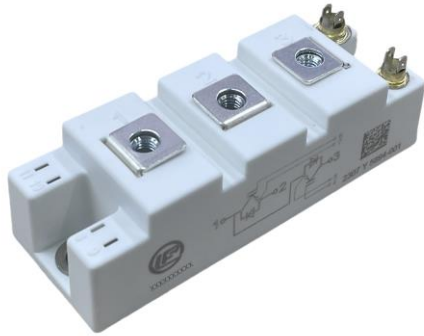


Description

The DFI100HF17DE1 offer lower losses and higher energy for soft switching applications.



Features

- 1700V100 A, $V_{CE(sat)}(typ.) = 2.20V$
- Lower losses and higher energy
- Excellent short-circuit capability
- 34mm half bridge module

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

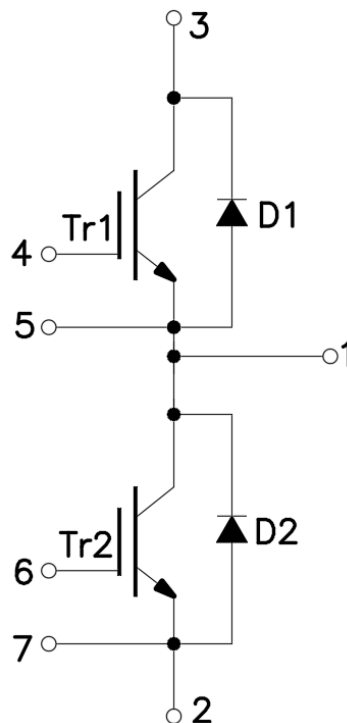


Figure 1. Out drawing & circuit diagram for DFI100HF17DE1

Pin Configuration and Marking Information

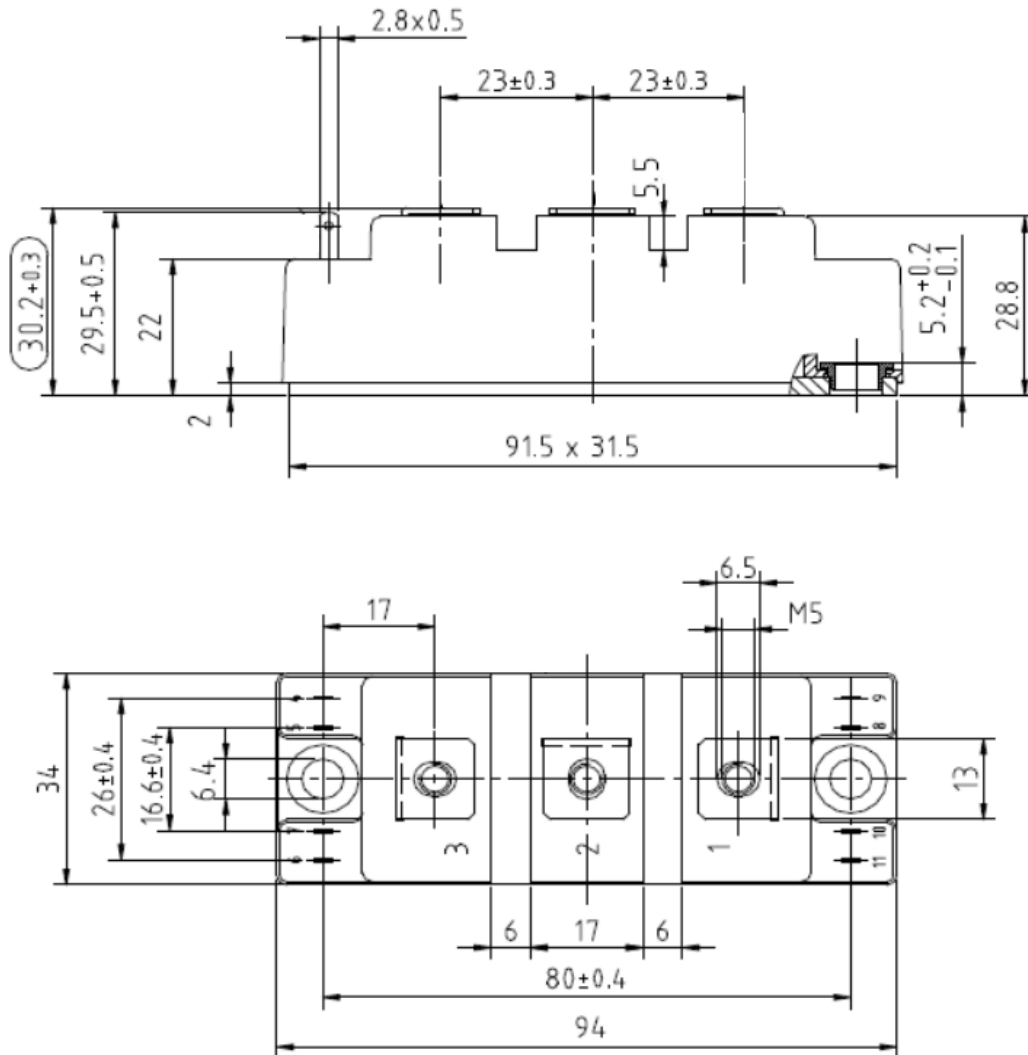


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t = 1 min	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	1700	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)	500	W
T_{jop}	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	-	1700	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_{jop}	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	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=100\text{A}$ $V_{GE}=15\text{V}$	$T_j=25^{\circ}\text{C}$	-	2.20	2.50	V
			$T_j=125^{\circ}\text{C}$	-	2.60	-	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 $+15\text{V}$		-	1000	-	nC
R_{Gint}	Internal gate resistor	$f=1\text{M}$, $V_{pp}=1\text{V}$	$T_j=25^{\circ}\text{C}$	-	5.25	-	Ω
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$ $f=1\text{MHz}$	$T_j=25^{\circ}\text{C}$	-	8.6	-	nF
C_{oes}	Output Capacitance			-	1.29	-	nF
C_{res}	Reverse transfer Capacitance			-	0.8	-	nF
I_{CES}	Collector- Emitter Cut off Current	$V_{CE}=1700\text{V}$, $V_{GE}=0\text{V}$	$T_j=25^{\circ}\text{C}$	-	-	5	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 30\text{V}$, $V_{CE}=0\text{V}$	$T_j=25^{\circ}\text{C}$	-	-	400	nA
$t_{d(on)}$	Turn-on delay time	$V_{CC}=900\text{V}$ $I_C=100\text{A}$ $R_G=5.1\Omega$ $V_{GE}=\pm 15\text{V}$ Inductive Load	$T_j=25^{\circ}\text{C}$	-	180	-	ns
			$T_j=125^{\circ}\text{C}$	-	200	-	
t_r	Rise time		$T_j=25^{\circ}\text{C}$	-	55	-	ns
			$T_j=125^{\circ}\text{C}$	-	50	-	
$t_{d(off)}$	Turn-off delay time	$T_j=25^{\circ}\text{C}$	-	360	-	ns	
		$T_j=125^{\circ}\text{C}$	-	400	-		

t_f	Fall time	$V_{CC} = 900V$ $I_C = 100A$	$T_j = 25^\circ C$	-	440	-	ns
			$T_j = 125^\circ C$	-	660	-	
E_{on}	Turn-on power dissipation	$R_G = 5.1\Omega$ $V_{GE} = \pm 15V$	$T_j = 25^\circ C$	-	15	-	mJ
			$T_j = 125^\circ C$	-	20	-	
E_{off}	Turn-off power dissipation	Inductive Load	$T_j = 25^\circ C$	-	20	-	mJ
			$T_j = 125^\circ C$	-	28	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)		-	-	0.25	-	$^\circ C/W$

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	$I_F = 100A, V_{GE} = 0V$	$T_j = 25^\circ C$	-	3.1	3.3	V
			$T_j = 125^\circ C$	-	3.2	-	
t_{rr}	Diode Reverse Recovery Time		$T_j = 25^\circ C$		90		nS
			$T_j = 125^\circ C$		250		
I_{rr}	Peak reverse recovery Current	$I_F = 100A,$ $di/dt = 2100A/\mu s,$	$T_j = 25^\circ C$	-	75	-	A
			$T_j = 125^\circ C$	-	85	-	
Q_{rr}	Recovered charge	$V_R = 900V,$ $V_{GE} = -15V$	$T_j = 25^\circ C$	-	4	-	uC
			$T_j = 125^\circ C$	-	9	-	
E_{rr}	Reverse recovered energy		$T_j = 25^\circ C$	-	2.4	-	mJ
			$T_j = 125^\circ C$	-	4.7	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)		-	-	0.3	-	$^\circ C/W$

Test Conditions

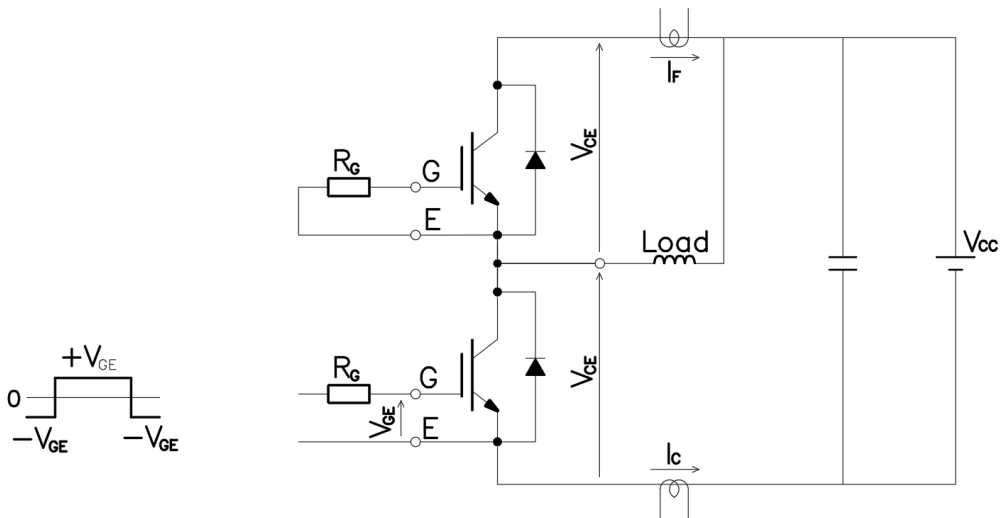


Figure 3. Switching time measure circuit

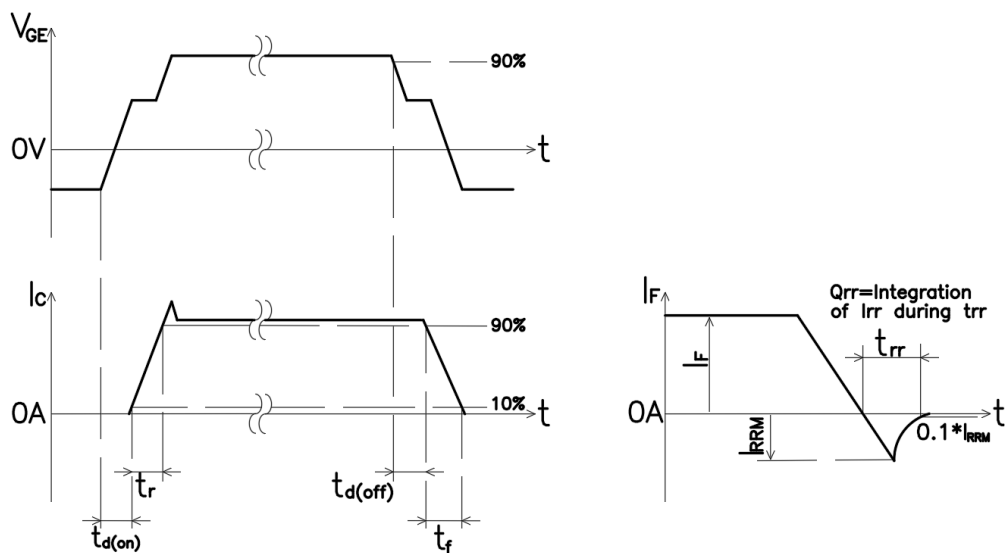


Figure 4. Switching time definition

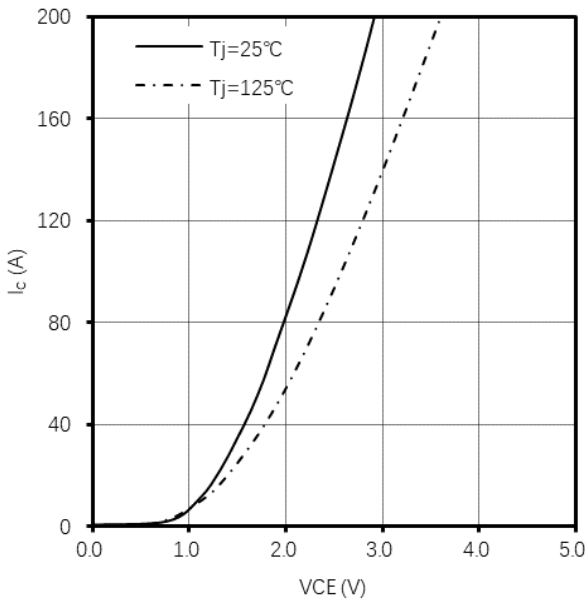


Figure 5. I_c vs V_{CE}
 $V_{GE} = 15\text{V}$

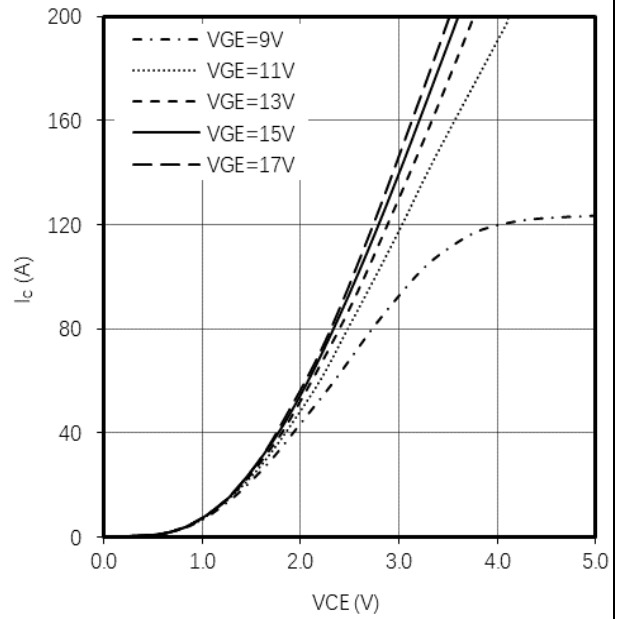


Figure 6. I_c vs V_{CE}
 $T_j = 125^\circ\text{C}$

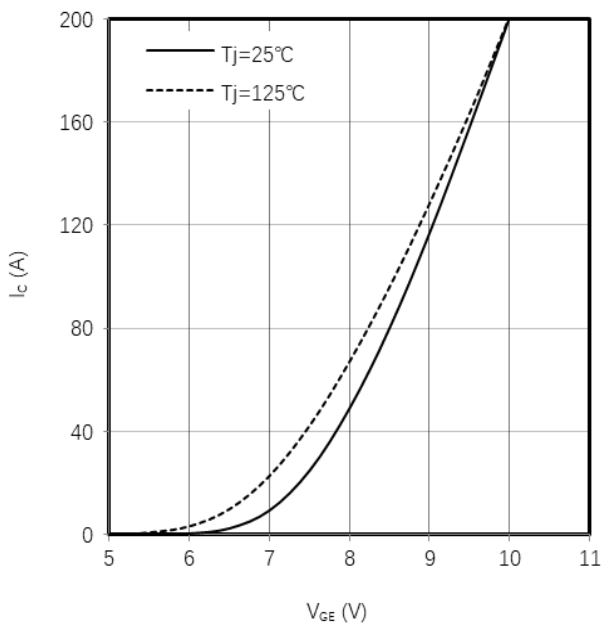


Figure 7. I_c vs V_{GE}
 $V_{CE} = 20\text{V}$

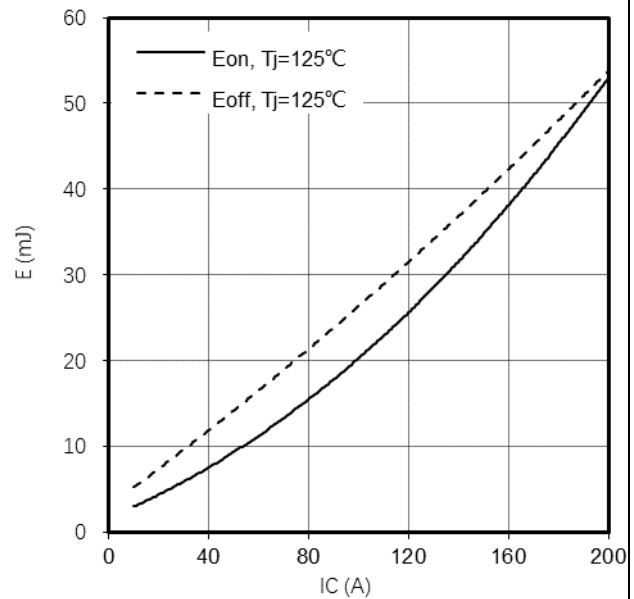


Figure 8. E_{on} , E_{off} vs $I_c(\text{Typ})$
 $V_{CC} = 900\text{V}$, $V_{GE} = +15\text{V}/-15\text{V}$, $R_G = 5.1\Omega$

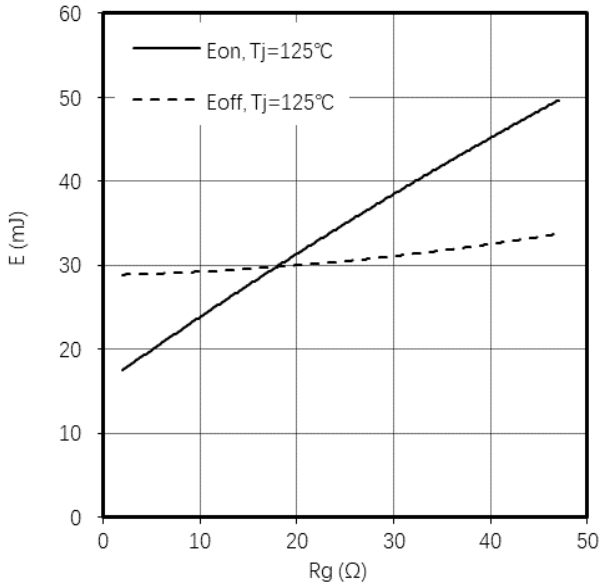


Figure 9. E_{on}, E_{off} vs R_g(Typ)
V_{CC} = 900V, V_{GE} = +15V/-15V, I_C = 100A

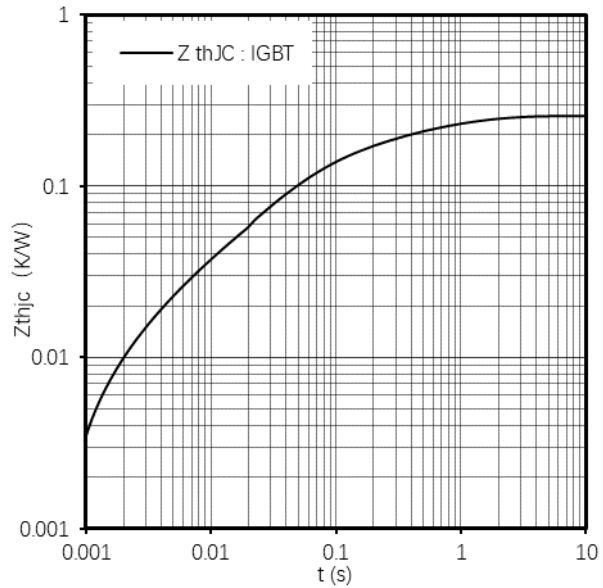


Figure 10. Transient thermal impedance IGBT ,
Z_{thjc} = f(t)

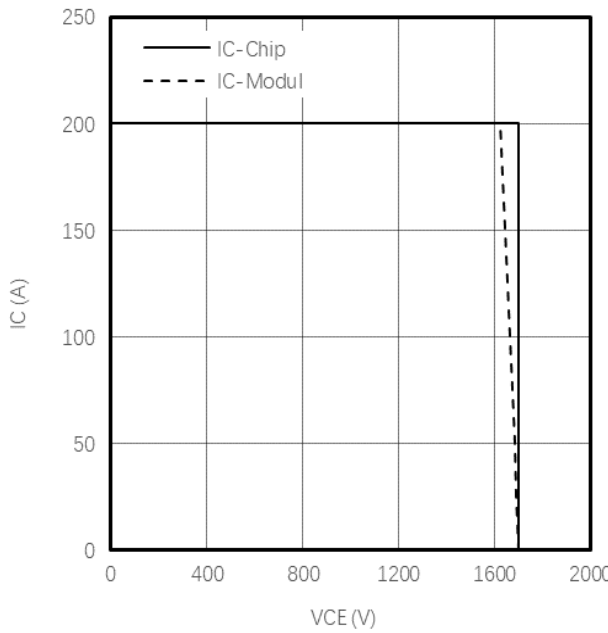


Figure 11. Reverse bias safe operating area IGBT,
I_C = f(V_{CE}), V_{GE} = ±15V, R_{Goff} = 5.1Ω, T_{vj} = 125°C

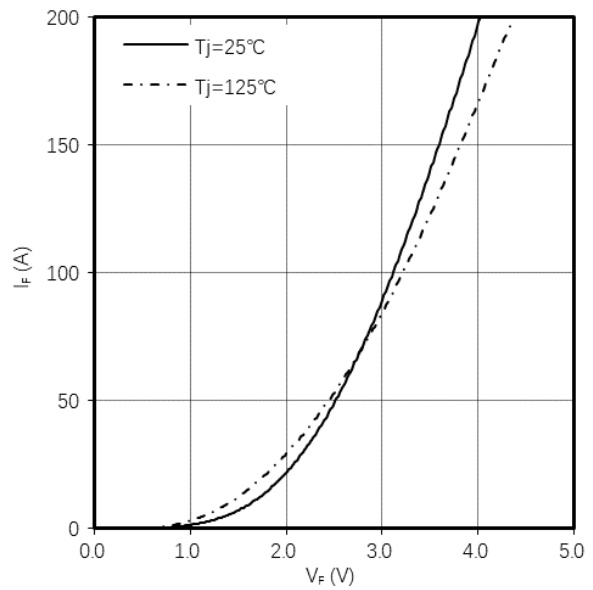


Figure 12. Forward characteristic of Diode ,
I_F = f(V_F)

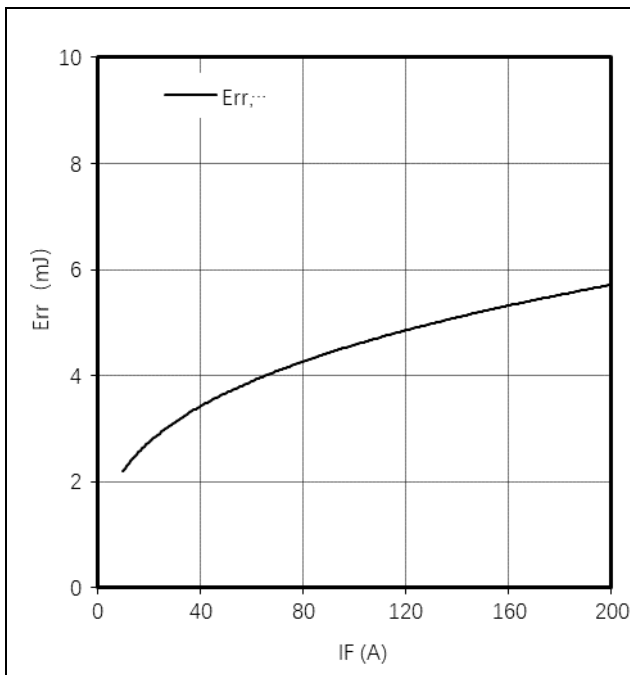


Figure 13. Switching losses Diode,
 $E_{rr}=f(I_F)$, $R_{Gon}=5.1\Omega$, $V_{CE}=900V$

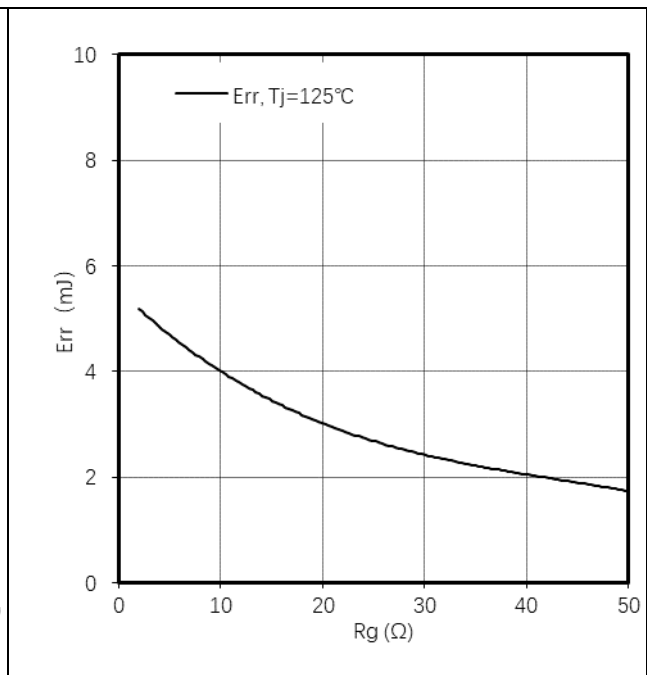


Figure 14. Switching losses Diode,
 $E_{rr}=f(R_G)$, $I_F=100A$, $V_{CE}=900V$

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