

Description

The DFI150HF17DF1 offer lower losses and higher energy for soft switching applications.



Features

- 1700V150 A, $V_{CE(sat)}(typ.) = 2.50V$
- Lower losses and higher energy
- Excellent short-circuit capability
- 62mm half bridge module

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

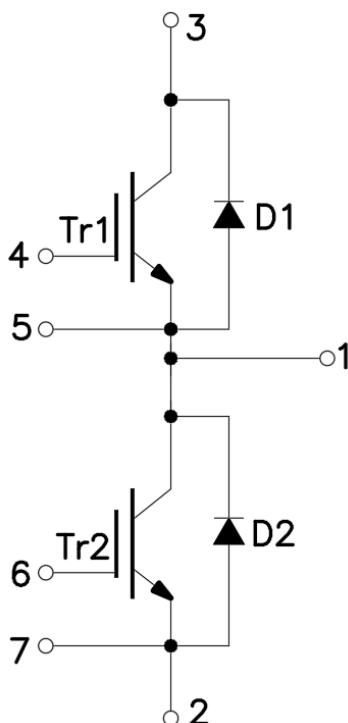


Figure 1. Out drawing & circuit diagram for DFI150HF17DF1

Pin Configuration and Marking Information

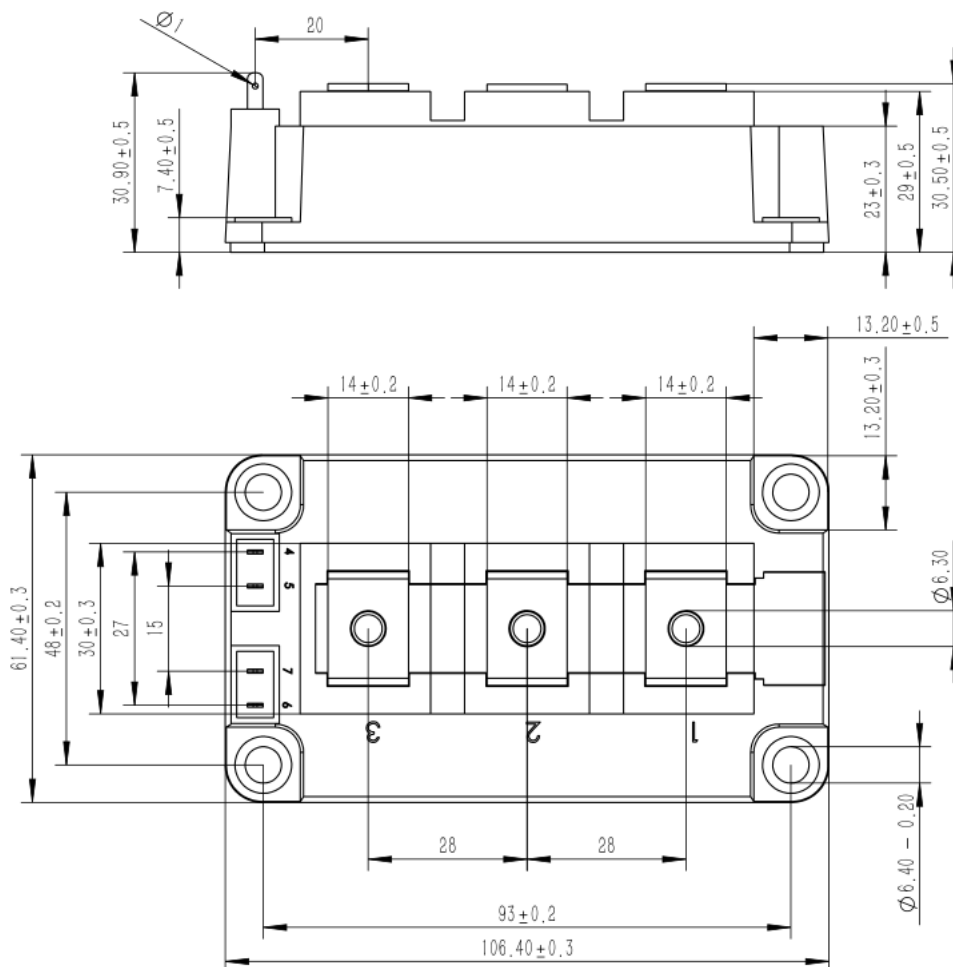


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t = 1min	4.0	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	1700	V
V_{GES}	Gate-Emitter Voltage	C-E Short	$\pm 30\text{V}$	V
I_C	DC Continuous Collector Current	$T_C = 100^\circ\text{C}$	150	A
I_{CM}	Pulse Collector Current	$t_p = 1\text{ms}$, Note1	300	A
P_C	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$, $T_j = 150^\circ\text{C}$ (IGBT)	850	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	- $T_C = 100^\circ\text{C}$	150	A
I_{FRM}	Repetitive peak forward Current	$t_p = 1\text{ms}$, Note1	300	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 =150A	T _j =25°C	-	2.50	2.70	V
		V _{GE} =15V	T _j =125°C	-	2.80	3.0	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		-	1600	-	nC
R _{Gint}	Internal gate resistor	f=1M, V _{pp} =1V	T _j =25°C	-	3	-	Ω
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V	T _j =25°C	-	13	-	nF
C _{oes}	Output Capacitance	f =1MHz		-	1.4.	-	nF
C _{res}	Reverse transfer Capacitance			-	0.9	-	nF
I _{CES}	Collector- Emitter Cut off Current	V _{CE} =1700V, V _{GE} =0V	T _j =25°C	-	-	5	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = ±30V, V _{CE} =0V	T _j =25°C	-	-	400	nA
t _{d(on)}	Turn-on delay time	V _{CC} = 900V I _C = 150A R _G = 5.1Ω V _{GE} = ±15V Inductive Load	T _j =25°C	-	88	-	ns
			T _j =125°C	-	95	-	
t _r	Rise time		T _j =25°C	-	65	-	ns
			T _j =125°C	-	58	-	
t _{d(off)}	Turn-off delay time		T _j =25°C	-	450	-	ns
			T _j =125°C	-	520	-	

t _f	Fall time	V _{CC} = 900V I _C = 150A	T _J =25°C	-	320	-	ns
			T _J =125°C	-	530	-	
E _{on}	Turn-on power dissipation	R _G = 5.1Ω V _{GE} = ±15V	T _J =25°C	-	25	-	mJ
			T _J =125°C	-	30	-	
E _{off}	Turn-off power dissipation	Inductive Load	T _J =25°C	-	30	-	mJ
			T _J =125°C	-	40	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT)			-		0.15	°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 =150A, V _{GE} =0V	T _j =25°C	-	2. 7	3.0	V
			T _j =125°C	-	2. 8	-	
t _{rr}	Diode Reverse Recovery Time	I _F =150A, di/dt= 3300A/μs, V _R =900V, V _{GE} = -15V	T _j =25°C		100		nS
			T _j =125°C		160		
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	-	uC
			T _j =125°C	-	16	-	
E _{rr}	Reverse recovered energy		T _j =25°C	-	5	-	mJ
			T _j =125°C	-	9	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode)			-		0.160	°C/W

Test Conditions

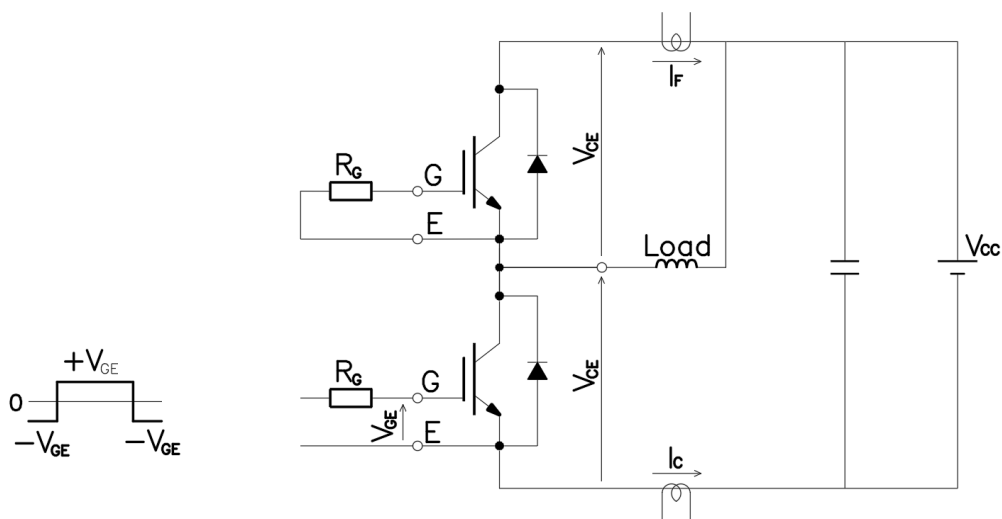


Figure 3. Switching time measure circuit

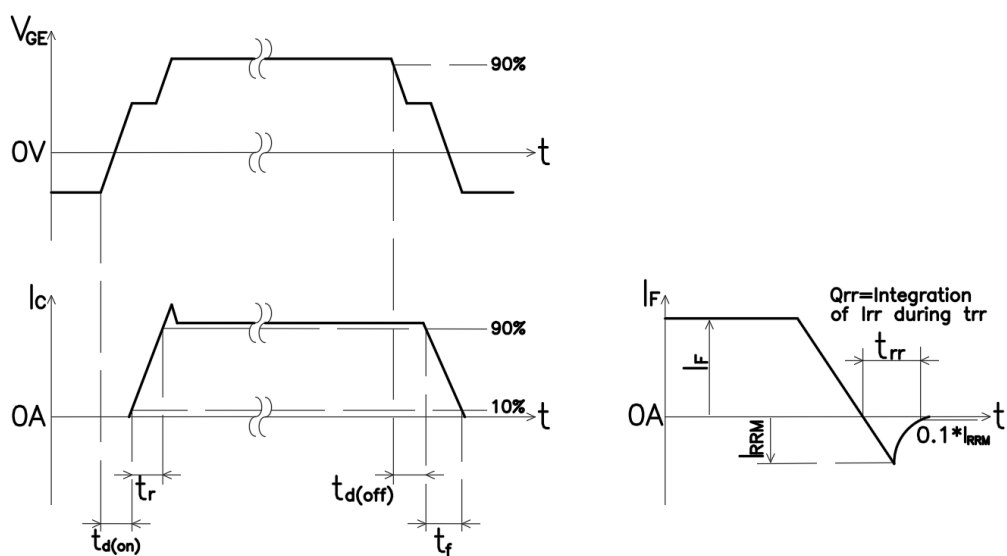


Figure 4. Switching time definition

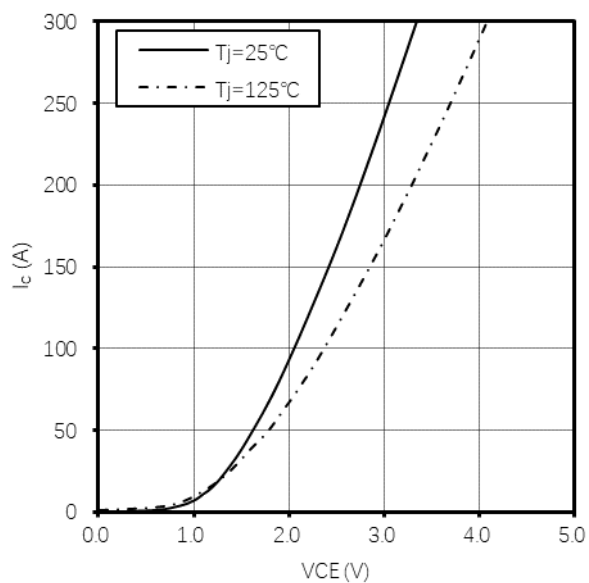


Figure 5. I_c vs V_{CE}
 $V_{GE} = 15\text{V}$

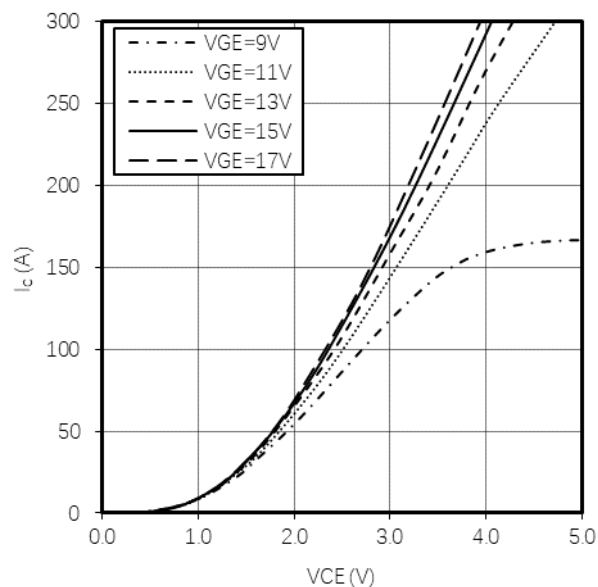


Figure 6. I_c vs V_{CE}
 $T_j = 125^\circ\text{C}$

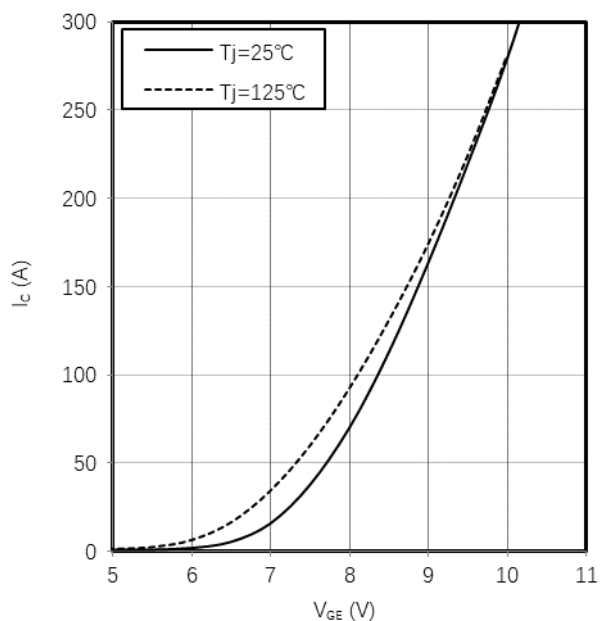


Figure 7. I_c vs V_{GE}
 $V_{CE} = 20\text{V}$

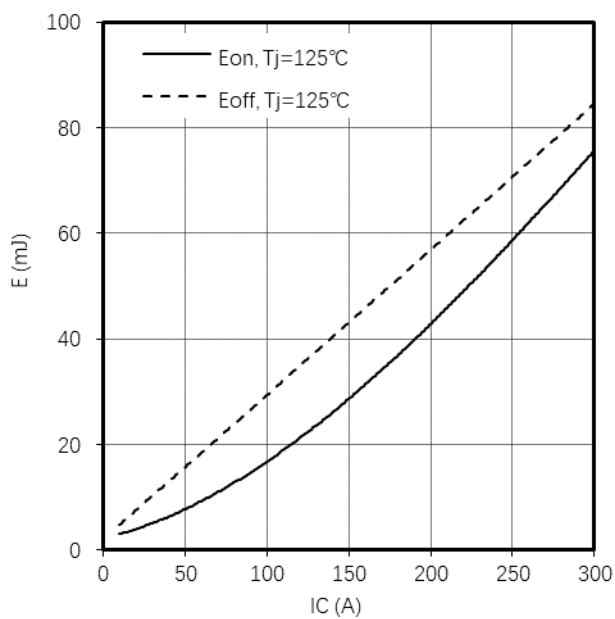


Figure 8. E_{on} , E_{off} vs I_c (Typ)
 $V_{CC} = 900\text{V}$, $V_{GE} = +15\text{V}/-15\text{V}$, $R_G = 5.1\Omega$

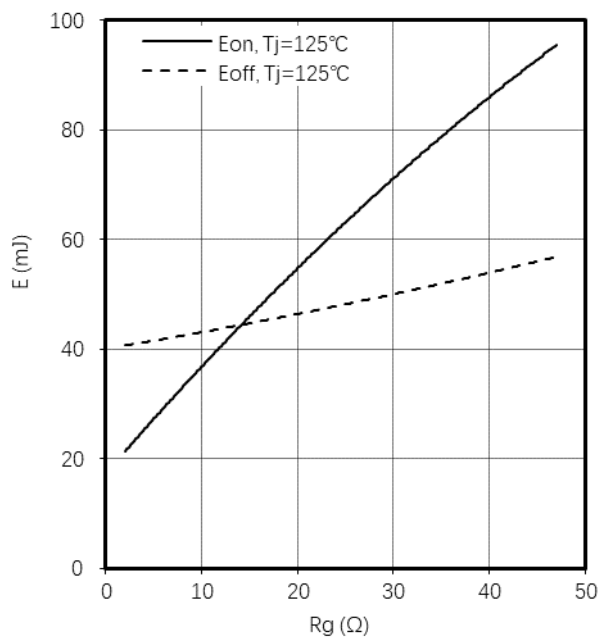


Figure 9. E_{on} , E_{off} vs R_g (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-15V$, $I_C=150A$

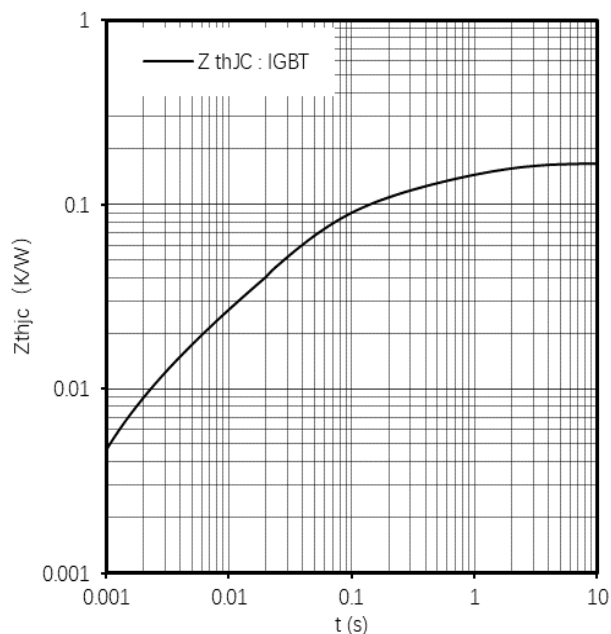


Figure 10. Transient thermal impedance IGBT ,
 $Z_{thjc}=f(t)$

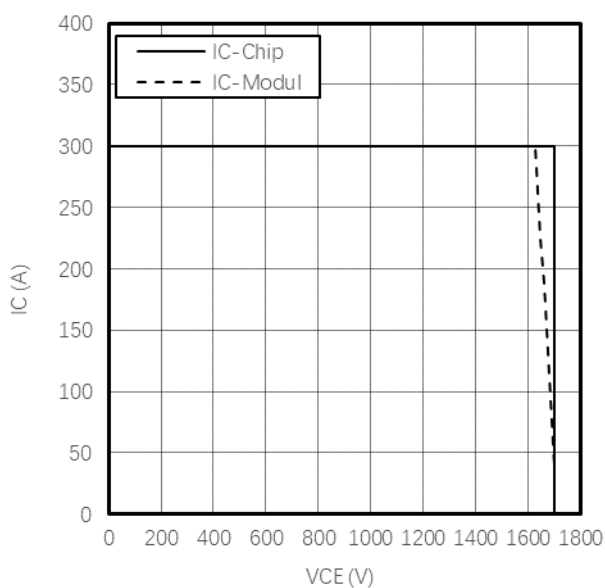


Figure 11. Reverse bias safe operating area IGBT,
 $I_C=f(V_{CE})$, $V_{GE}=\pm 15V$, $R_{Goff}=5.1\Omega$, $T_{vj}=125^\circ C$

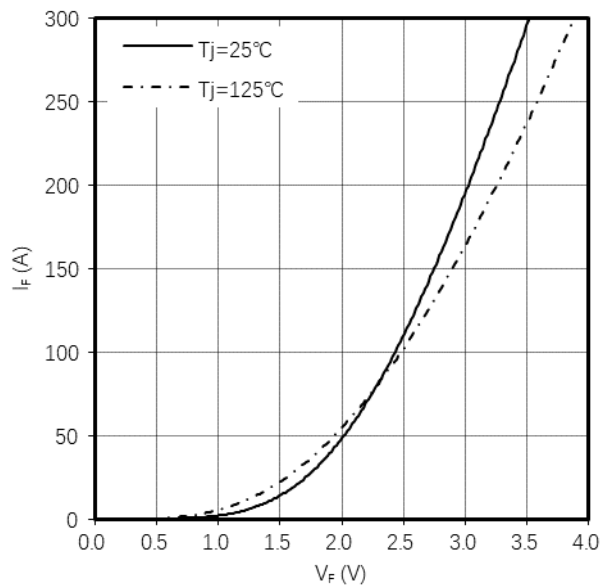


Figure 12. Forward characteristic of Diode ,
 $I_F=f(V_F)$

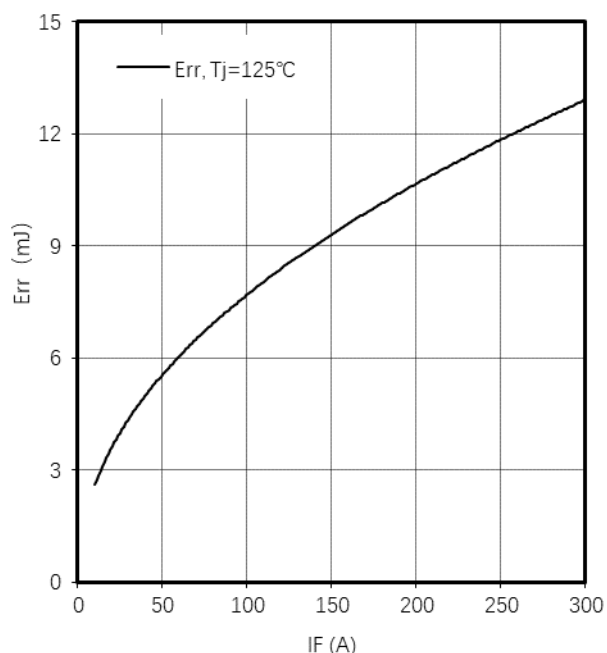


Figure 13. Switching losses Diode,
 $E_{rr}=f(I_F), R_{Gon}=5.1\Omega, V_{CE}=900V$

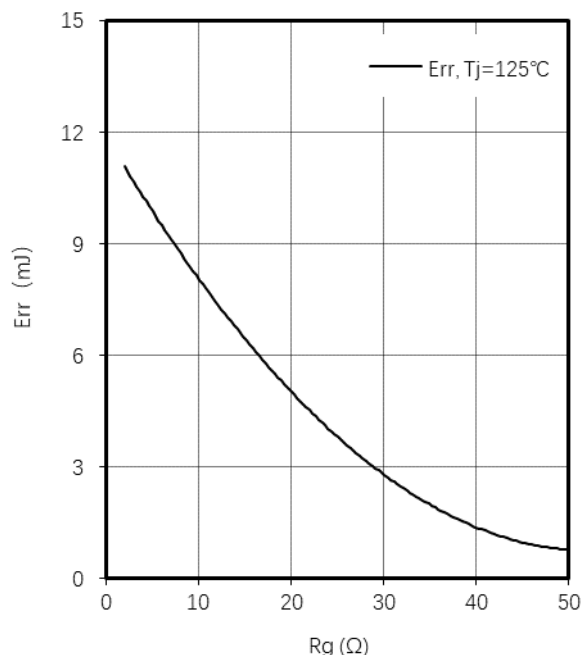


Figure 14. Switching losses Diode,
 $E_{rr}=f(R_G), I_F=150A, V_{CE}=900V$

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