

Description

The DFI150HF12DE1 offer ultrafast switching speed for high frequency application.



Features

- 1200V150 A, $V_{CE(sat)}(typ.) = 2.30V$
- Lower losses
- SPT (Soft Punch Through) technology
- Excellent short-circuit capability
- 34mm halfbridge module

Applications

- Welding
- Motor drive
- Inductive heating
- Power supply
- UPS / EPS

Circuit diagram

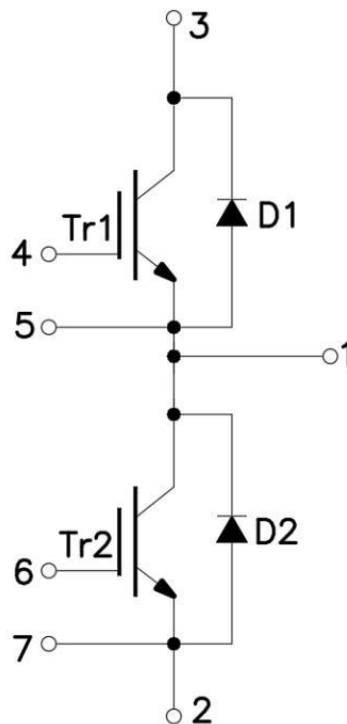


Figure 1. Out drawing & circuit diagram for DFI150HF12DE1

Pin Configuration and Marking Information

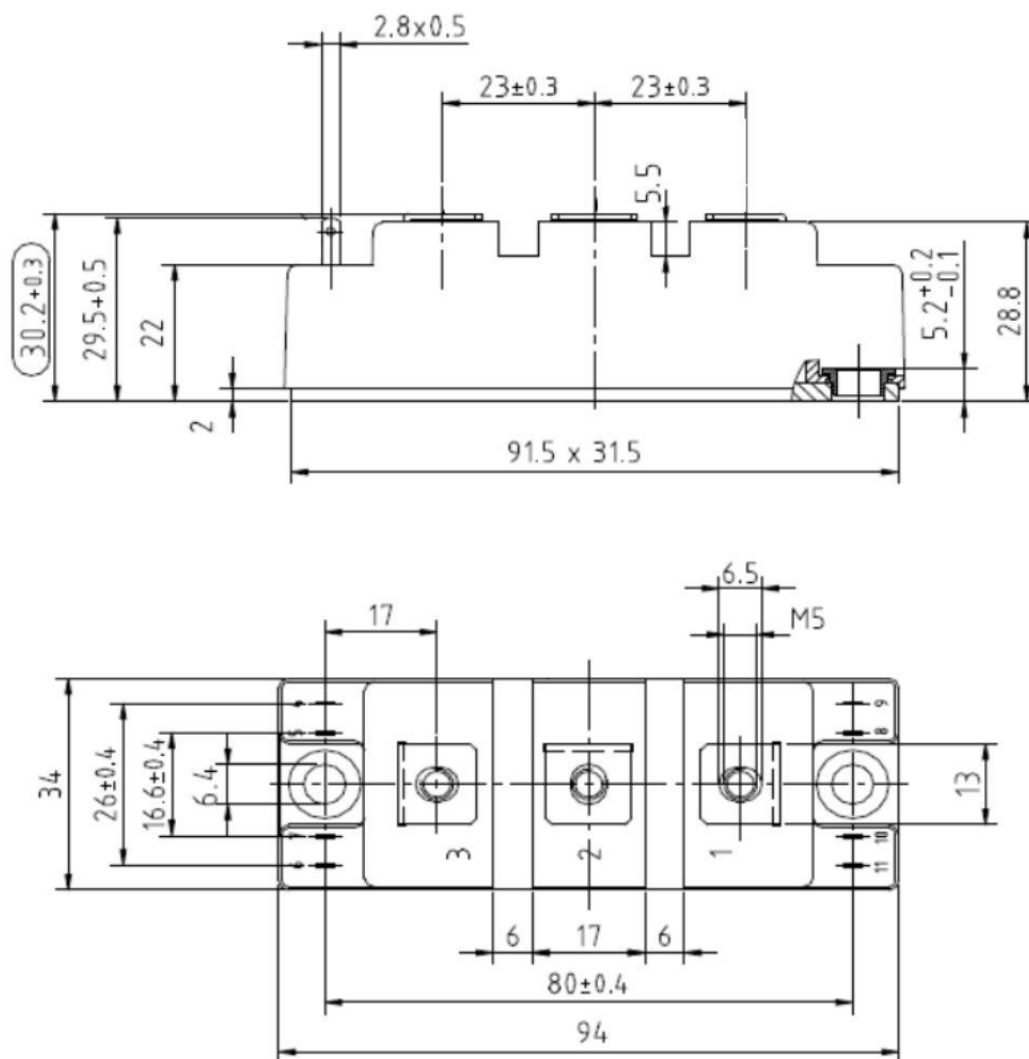


Figure 2. Pin configuration

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	mm
		21	
Clearance	terminal to heatsink terminal to terminal	23.6	mm
		10	
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	$T_C=100^{\circ}\text{C}$	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)	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	-	1200	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	$I_C=150\text{A}$ $V_{GE}=15\text{V}$	$T_j=25^{\circ}\text{C}$	-	2.30	2.50	V
			$T_j=125^{\circ}\text{C}$	-	2.70	-	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 $+15\text{V}$		-	1140	-	nC

R _{Gint}	Internal gate resistor	f=1M, V _{pp} =1V	T _j =25°C	-	2.5	-	Ω	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V f=1MHz	T _j =25°C	-	10.8	-	nF	
C _{oes}	Output Capacitance			-	1.65	-	nF	
C _{res}	Reverse transfer Capacitance			-	0.94	-	nF	
I _{CES}	Collector- Emitter Cut off Current	V _{CE} =1200V, V _{GE} =0V	T _j =25°C	-	-	1	mA	
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = ±30V, V _{CE} =0V	T _j =25°C	-	-	200	nA	
t _{d(on)}	Turn-on delay time	V _{CC} = 600V I _C = 150A R _G = 4.7Ω V _{GE} = ±15V	T _j =25°C	-	35	-	ns	
			T _j =125°C	-	40	-		
t _r	Rise time		T _j =25°C	-	55	-	ns	
			T _j =125°C	-	60	-		
t _{d(off)}	Turn-off delay time		Inductive Load	T _j =25°C	-	340	-	ns
				T _j =125°C	-	370	-	

tf	Fall time	VCC = 600V IC = 150A RG = 4.7Ω VGE = ±15V Inductive Load	Tj=25°C	-	90	-	ns
			Tj=125°C	-	120	-	
Eon	Turn-on power dissipation		Tj=25°C	-	6.30	-	mJ
			Tj=125°C	-	8.00	-	
Eoff	Turn-off power dissipation		Tj=25°C	-	4.10	-	mJ
			Tj=125°C	-	7.20	-	
Rth(j-c)	Thermal Resistance, Junction to Case (IGBT)			-		0.25	°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	-	1.90	2.2	V	
			T _j =125°C	-	1.90	-		
t _{rr}	Diode Reverse Recovery Time	I _F =150A, di/dt= 2600A/μs, V _R =600V, V _{GE} = -15V	T _j =25°C		150		nS	
			T _j =125°C		200			
I _{rr}	Peak reverse recovery Current		T _j =25°C	-	165	-	A	
			T _j =125°C	-	190	-		
Q _{rr}	Recovered charge		T _j =25°C	-	14.50	-	uC	
			T _j =125°C	-	21.00	-		
E _{rr}	Reverse recovered energy		T _j =25°C	-	4.5	-	mJ	
			T _j =125°C	-	7.3	-		
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode)			-		0.38	°C/W	

Preliminary datasheet _Ver.A EN

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Test Conditions

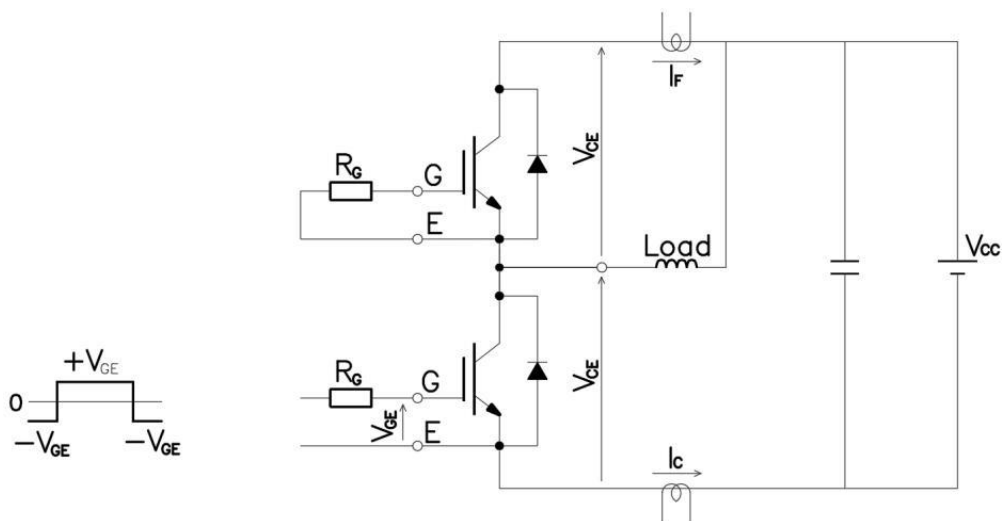


Figure 3. Switching time measure circuit

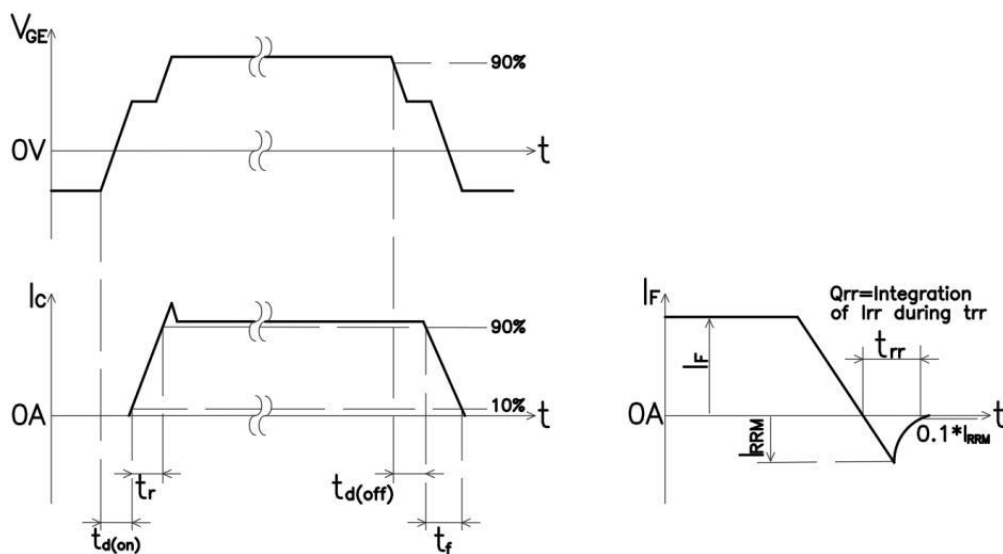


Figure 4. Switching time definition

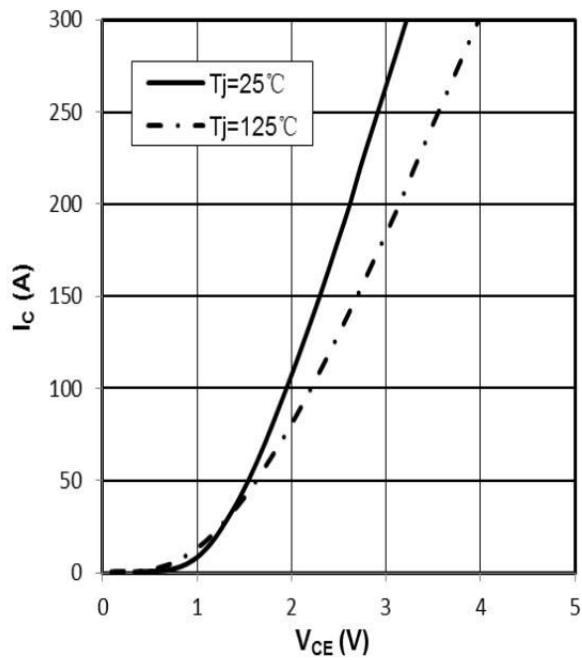


Figure 5. I_c vs V_{CE}
 $V_{GE} = 15\text{V}$

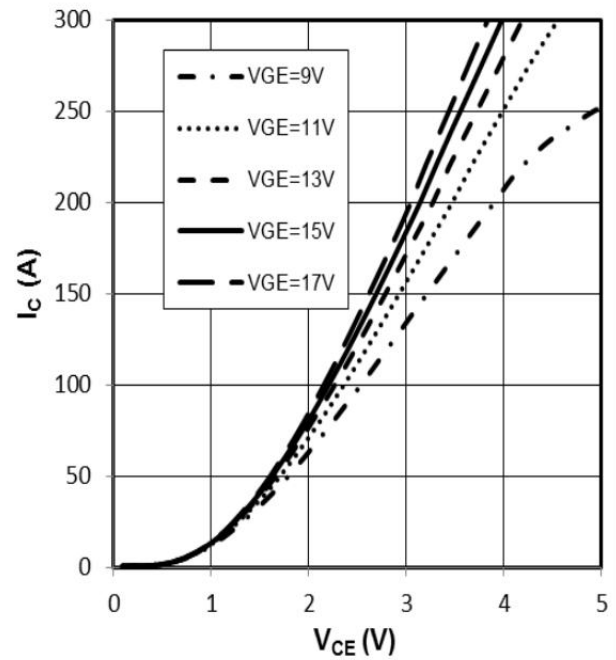


Figure 6. I_c vs V_{CE}
 $T_j = 125^\circ\text{C}$

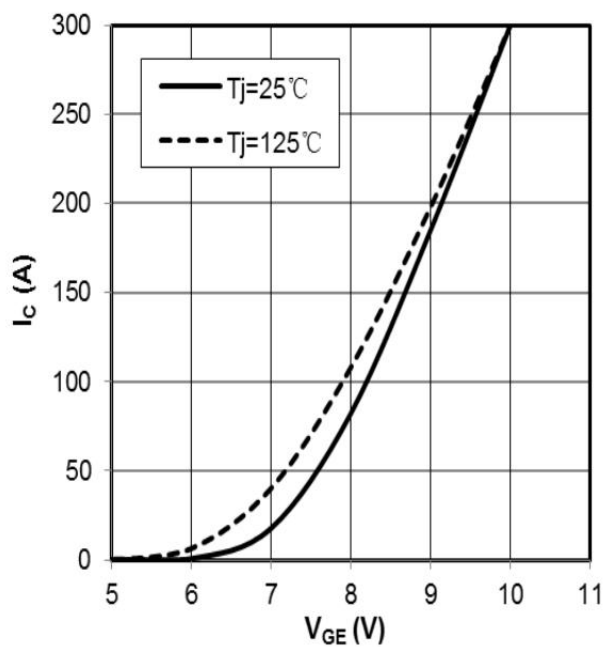


Figure 7. I_c vs V_{GE}
 $V_{CE} = 20\text{V}$

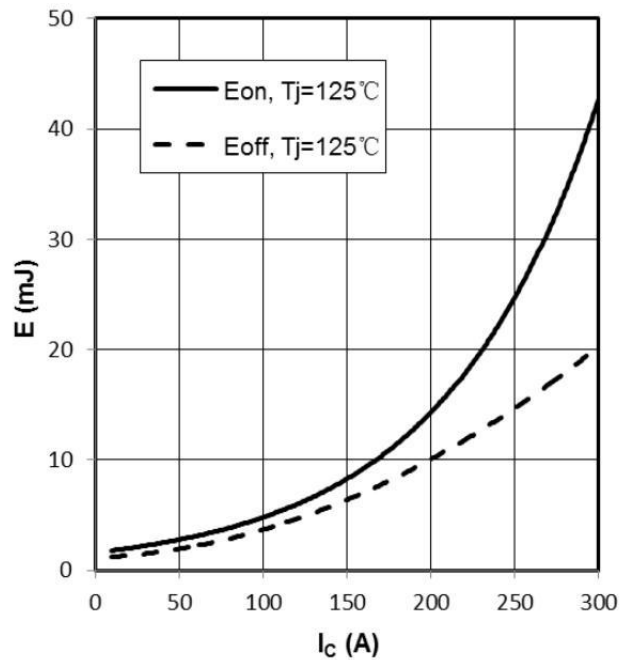


Figure 8. E_{on} , E_{off} vs I_c (Typ)
 $V_{CC} = 600\text{V}$, $V_{GE} = +15\text{V}/-15\text{V}$, $R_G = 4.7\Omega$

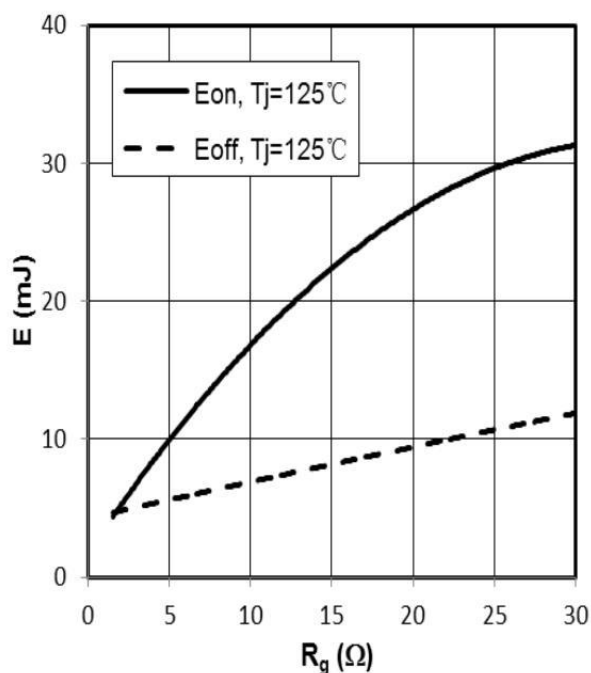


Figure 9. E_{on} , E_{off} vs R_g (Typ)
 $V_{CC}=600\text{V}$, $V_{GE}=+15\text{V}/-15\text{V}$, $I_C=150\text{A}$

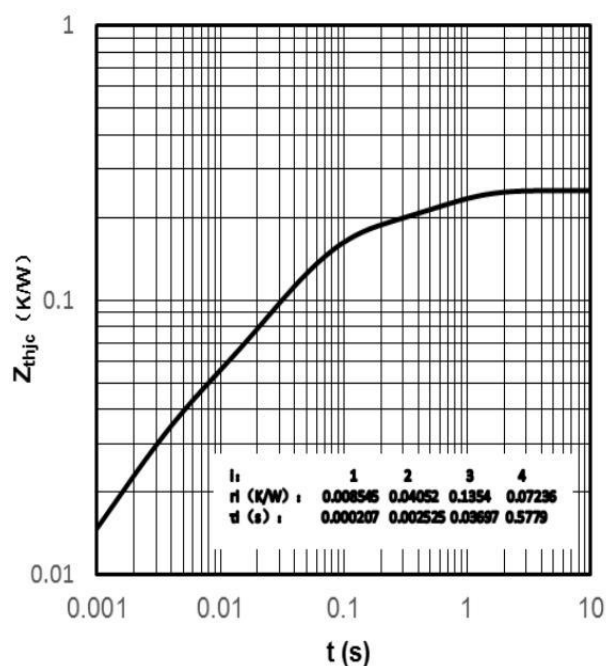


Figure 10. Transient thermal impedance IGBT ,
 $Z_{thjc}=f(t)$

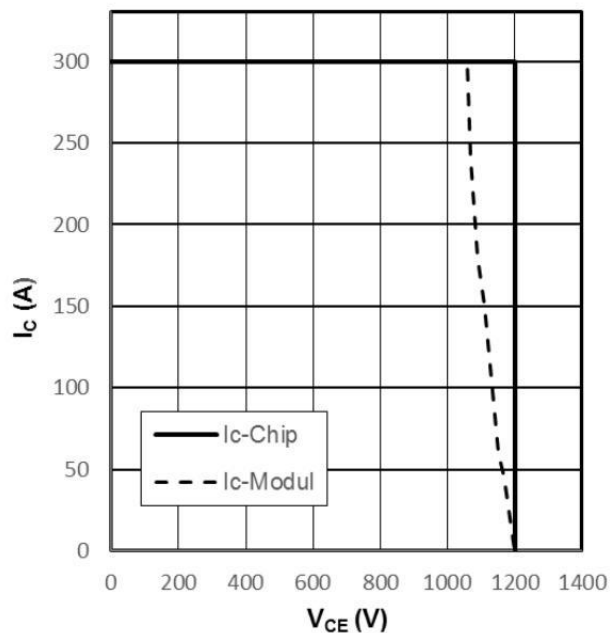


Figure 11. Reverse bias safe operating area IGBT,
 $I_C=f(V_{CE})$, $V_{GE}=\pm 15\text{V}$, $R_{Goff}=4.7\Omega$, $T_{vj}=125^\circ\text{C}$

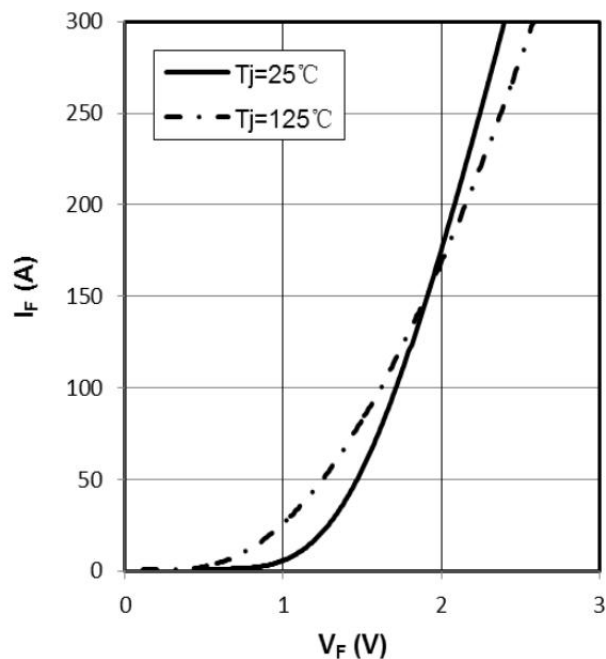


Figure 12. Forward characteristic of Diode ,
 $I_F=f(V_F)$

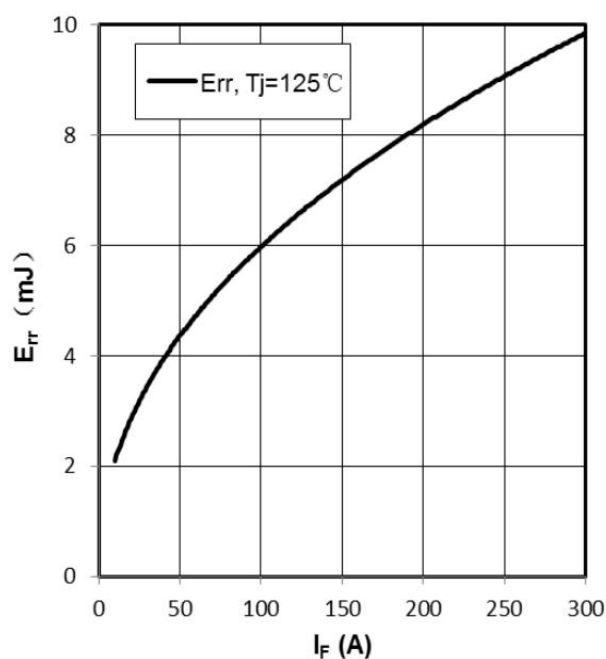


Figure 13. Switching losses Diode,
 $E_{rr}=f(I_F)$ $R_{\theta JA}=4.70^\circ\text{C/W}$ $V_{GE}=600\text{V}$

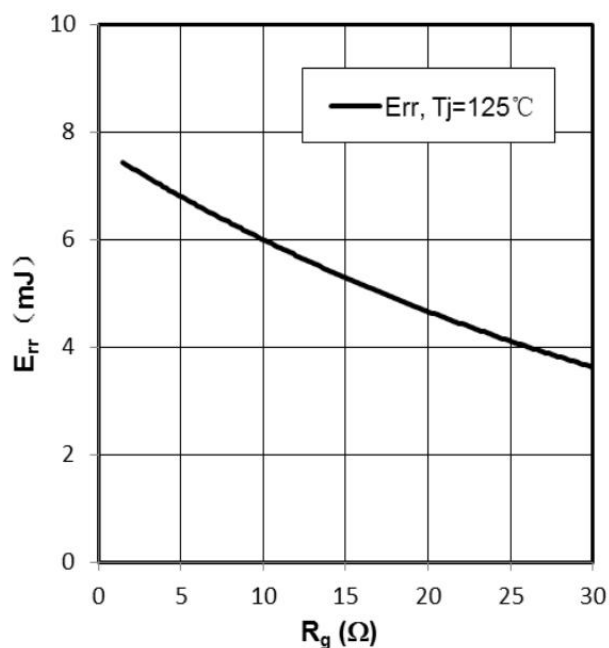


Figure 14. Switching losses Diode,
 $E_{rr}=f(R_g)$ $I_F=150\text{A}$ $V_{GE}=600\text{V}$

IMPORTANT NOTICE:

This product data sheet describes the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively under the terms and conditions of the supply agreement. There will be no guarantee or of any kind for the product and its characteristics.

The data contained in this document is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the product's suitability for the intended application and the completeness of the product data concerning such application.

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