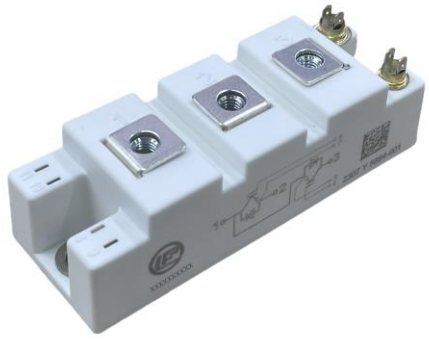
DFI150HF12DE1

1200V/150A Half Bridge IGBT Module

Description

The DFI150HF12DE1 offer ultrafast switching speed for high frequency application.



Features

- 1200V150 A, VCE (sat)(typ.) = 2.30V
- Lower losses
- SPT（Soft Punch Through）technology
- Excellent short-circuit capability
- 34mm half bridge module

Applications

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

Circuit diagram

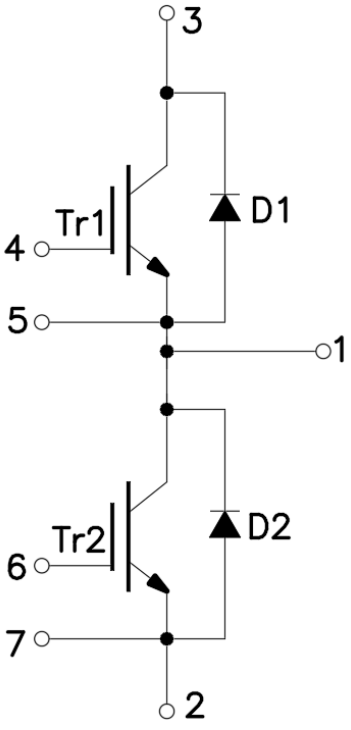


Figure 1. Out drawing & circuit diagram for DFI150HF12DE1

Pin Configuration and Marking Information

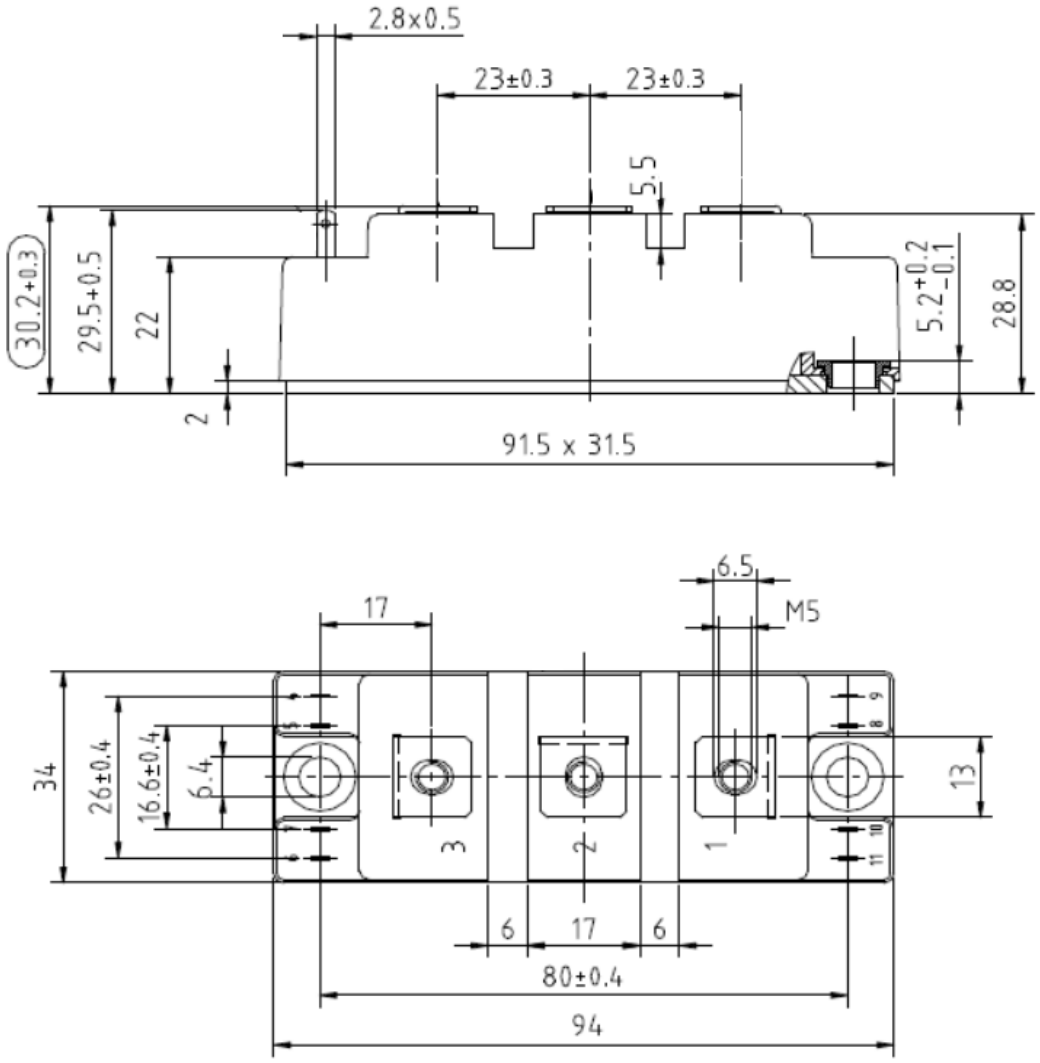


Figure 2. Pin configuration

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 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°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	±30V	V
I_C	DC Continuous Collector Current	T_C =100°C	150	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	300	A
P_C	Maximum Power Dissipation	T_C =25°C, T_j =150°C(IGBT)	500	W
T_{jop}	junction temperature	-	-40 to 150	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

Maximum Ratings (Freewheeling diode, T_j =25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{RRM}	Peak Repetitive Revers Voltage	-	1200	V
I_F	Diode forward Current	- Tc =100°C	150	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	300	A
T_{jop}	junction temperature	-	-40 to 150	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

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

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C =150A, V_{GE} =15V	T_j =25°C	-	2.30	2.50	V
			T_j =125°C	-	2.70	-	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		-	1140	-	nC
R_{Gint}	Internal gate resistor	f=1M, Vpp=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, Inductive Load	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		T_j =25°C	-	340	-	ns
			T_j =125°C	-	370	-	

t_f	Fall time	V_{CC} = 600V I_C = 150A R_G = 4.7Ω V_{GE} = ±15V Inductive Load	T_j =25°C	-	90	-	ns
			T_j=125°C	-	120	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	6.30	-	mJ
			T_j =125°C	-	8.00	-	
E_{off}	Turn-off power dissipation		T_j =25°C	-	4.10	-	mJ
			T_j =125°C	-	7.20	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-		0.25	°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 =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

Test Conditions

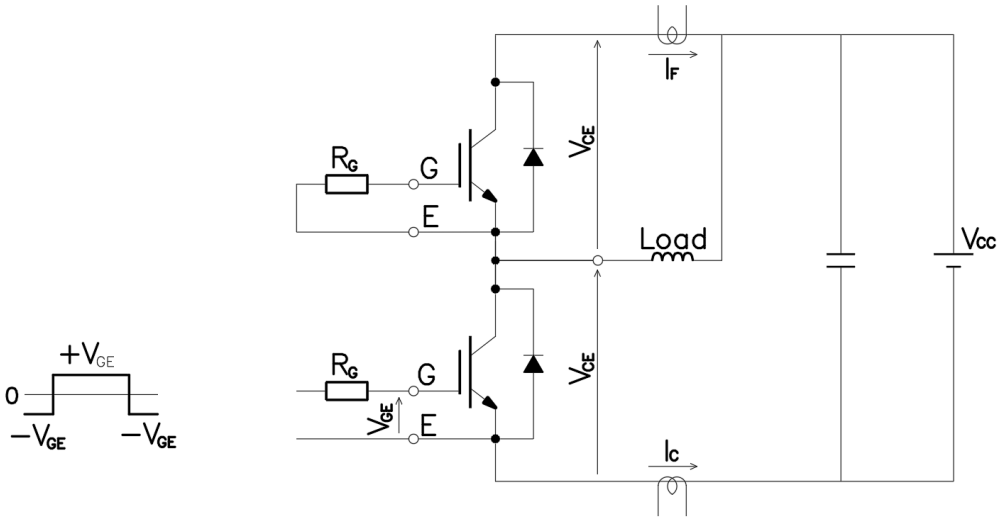


Figure 3. Switching time measure circuit

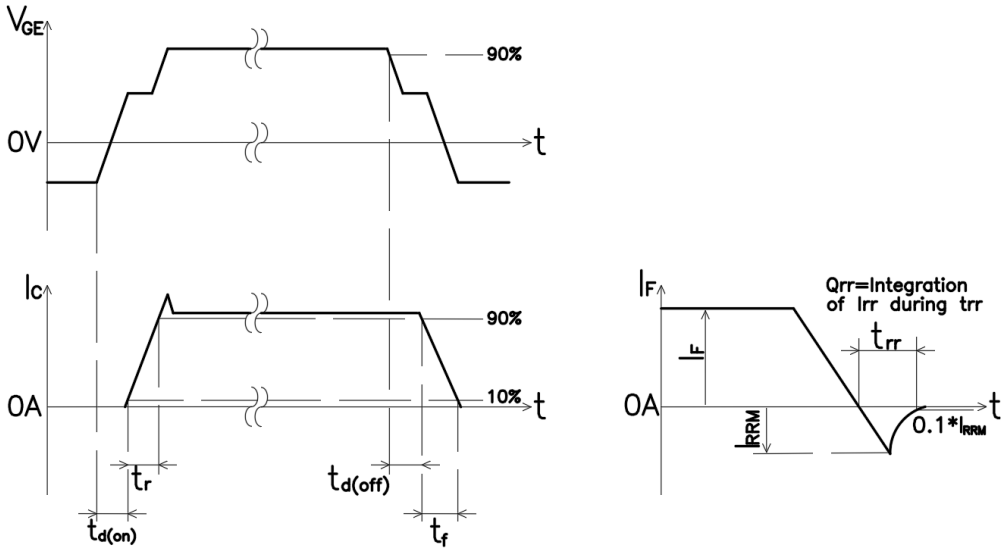


Figure 4. Switching time definition

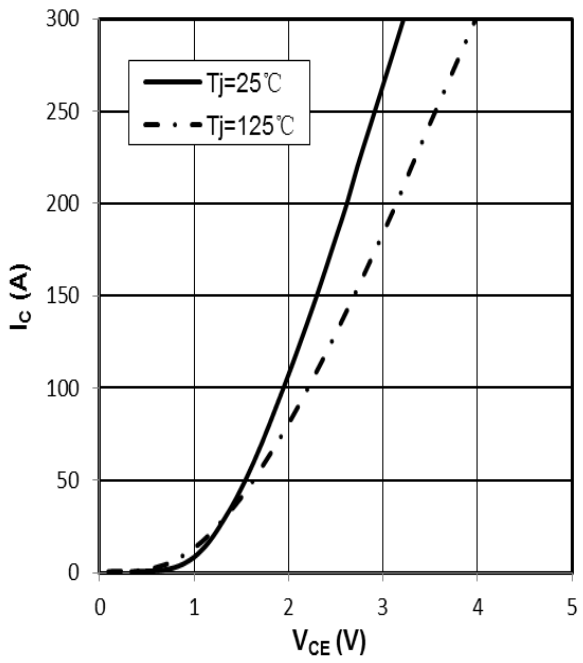


Figure 5. Ic vs V_{CE}
V_{GE} =15V

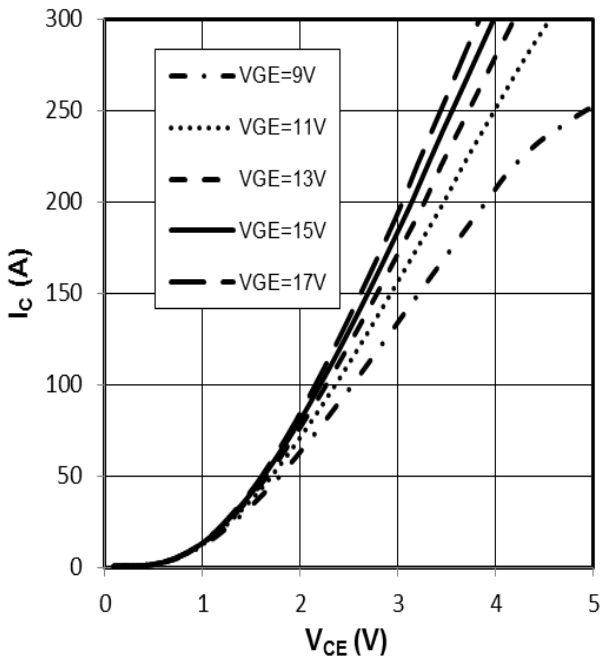


Figure 6. Ic vs V_{CE}
T_j =125°C

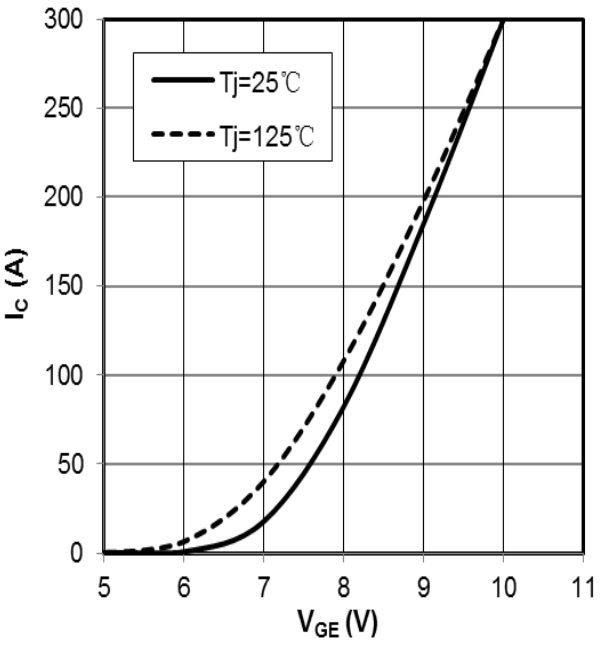


Figure 7. Ic vs V_{GE}
V_{CE} =20V

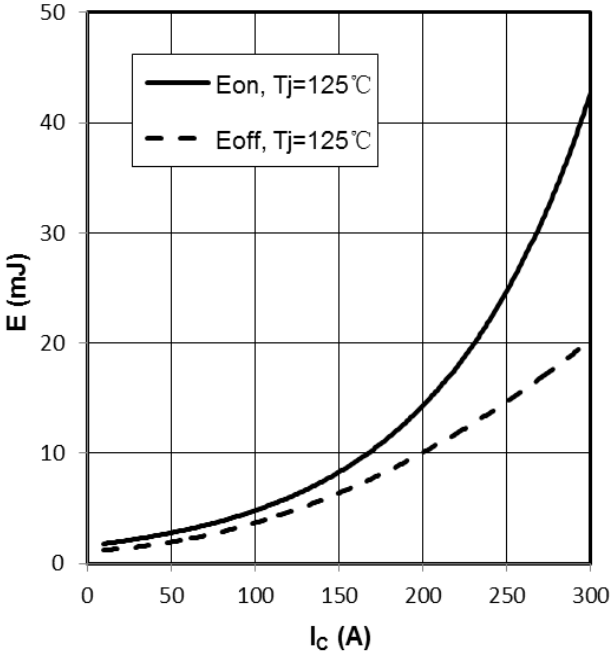


Figure8. E_{on}, E_{off} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-15V, R_G =4.7Ω

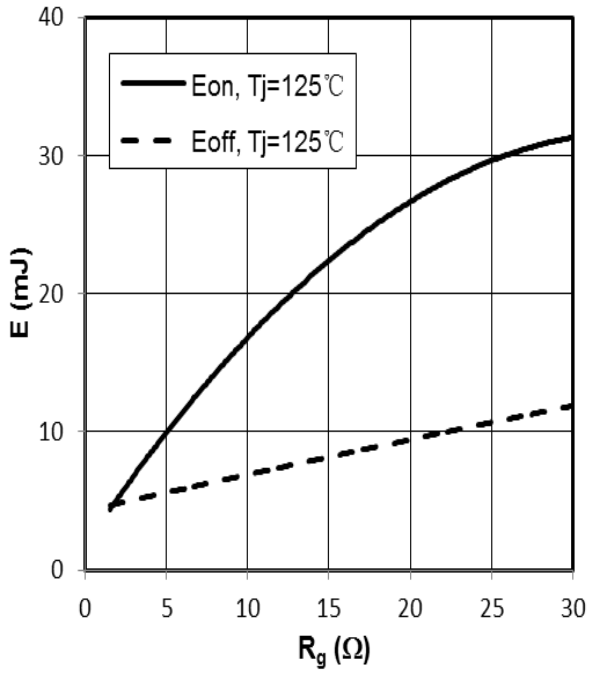


Figure 9. E_{on}, E_{off} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-15V, I_C =150A

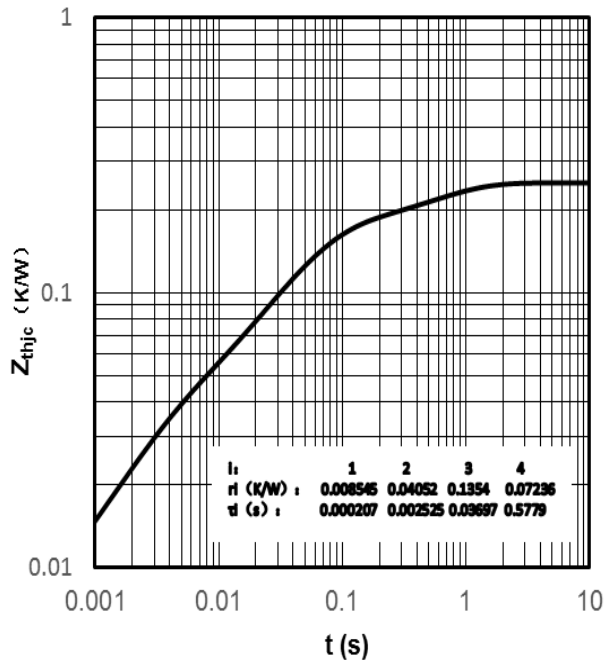


Figure 10. Transient thermal impedance IGBT , Zthjc=f(t)

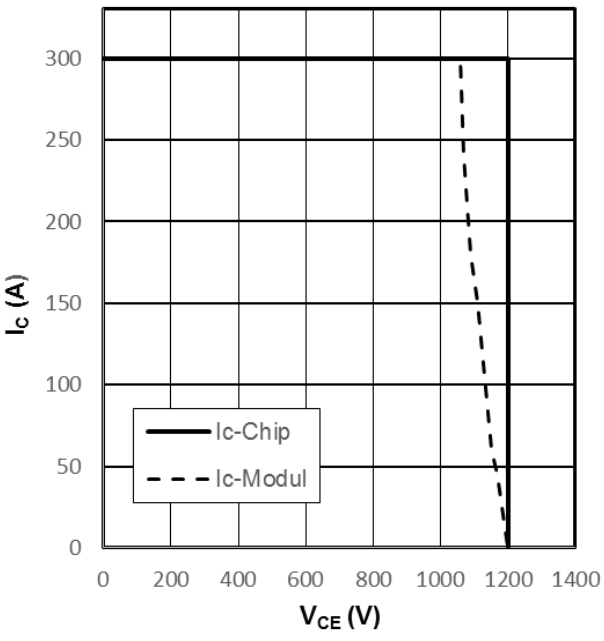


Figure 11. Reverse bias safe operating area IGBT, $I_C=f(V_{CE})$,V_{GE}=±15V,R_{Goff}=4.7Ω， Tvj=125℃

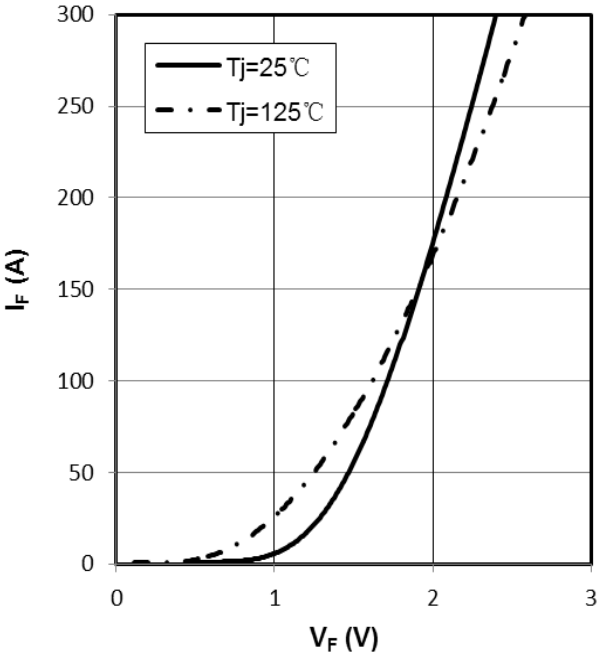


Figure 12. Forward characteristic of Diode ， $I_F=f(V_F)$

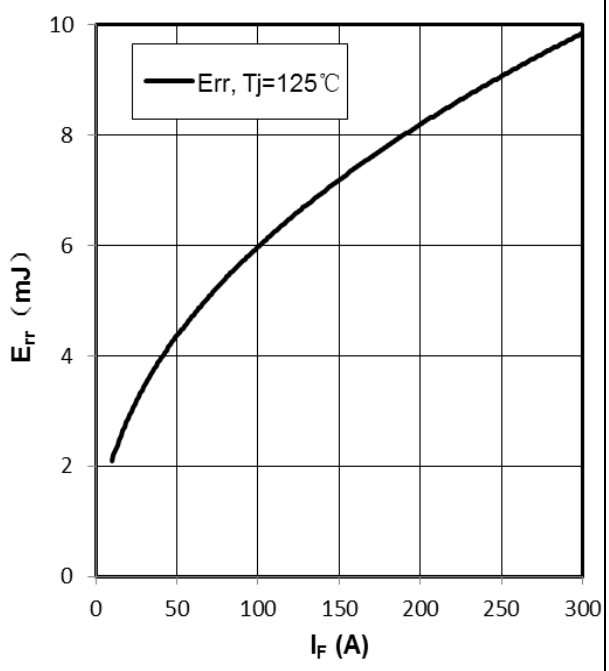


Figure 13. Switching losses Diode, $E_{rr}=f(I_F)$,,$R_{Gon}=4.7\Omega$,$V_{CE}=600V$

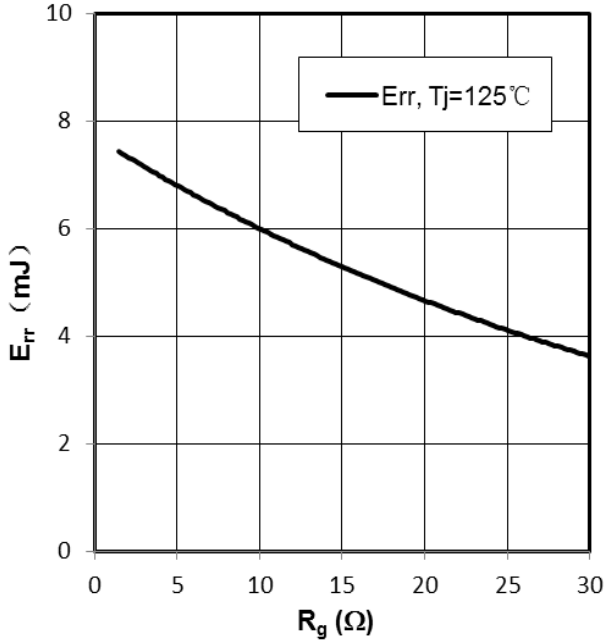


Figure 14. Switching losses Diode, $E_{rr}=f(R_G)$,$I_F=150A$,$V_{CE}=600V$

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.

Due to technical requirements, our product may contain dangerous substances. For information on the types in question, please contact the sales staff responsible for you.

Changes to this product data sheet are reserved.

Please contact the sales staff (Sales@leapers-power.com) for further information on the product, technology, delivery terms, conditions and prices.