DFI200HF12DF1

1200V/200A Half Bridge IGBT Module

Description

The DFI200HF12DF1 offer ultrafast switching speed for high frequency application.

Features

- 1200V200 A, VCE (sat)(typ.) = 3.0V
- Ultrafast switching speed
- Excellent short circuit ruggedness
- 62mm half bridge module

Applications

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

Circuit diagram

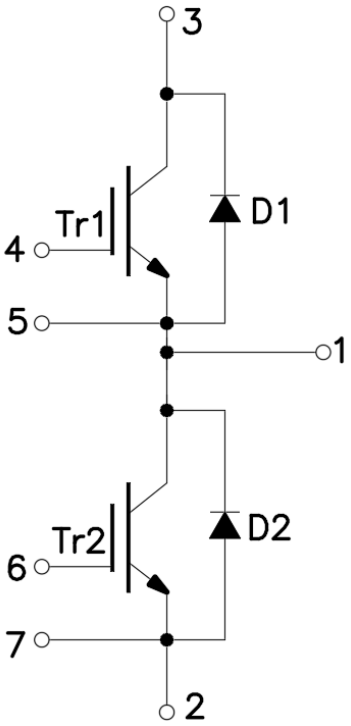

Figure 1. Out drawing & circuit diagram for DFI200HF12DF1

Pin Configuration and Marking Information

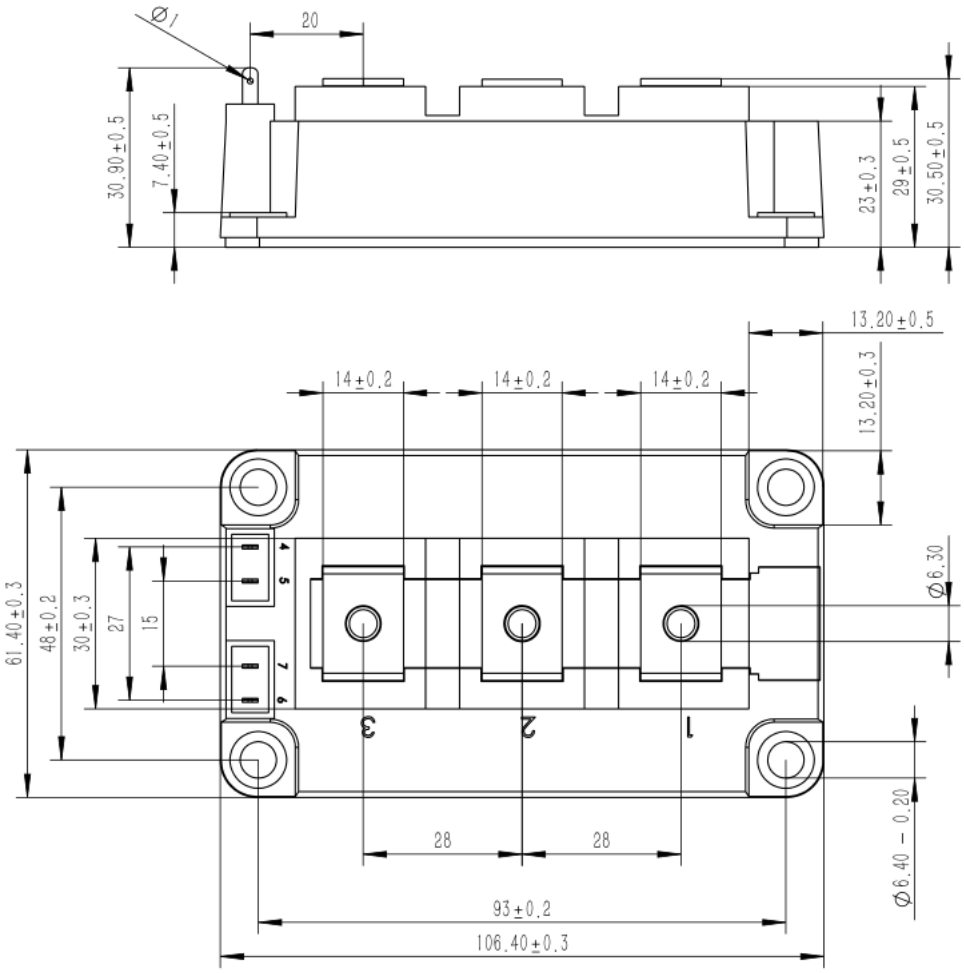

Figure 2. Pin configuration

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	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°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	200	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	400	A
P_C	Maximum Power Dissipation	T_C =25°C, T_j =150°C(IGBT)	860	W
T_j	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	T_C=100°C	200	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	400	A
T_j	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	
$V_{CE(sat)}$ (Chip)	Collector-Emitter Saturation Voltage	I_C =200A, V_{GE} =15V	T_j =25°C	-	3.00	3.20	V
			T_j =125°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		-	1.74	-	uC
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	-	17.5	-	nF
C_{oes}	Output Capacitance			-	2.4	-	nF
C_{res}	Reverse transfer Capacitance			-	1.4	-	nF
I_{CES}	Collector- Emitter Cut off Current	V_{CE} =1200V, 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		T_j =25°C	-	90	-	ns
			T_j =125°C	-	95	-	
t_r	Rise time		T_j =25°C	-	85	-	ns
			T_j =125°C	-	90	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	670	-	ns
			T_j =125°C	-	725	-	

t_f	Fall time	V_{CC} =600V I_C = 200A V_{GE} =+15V/-15V R_G =4.7Ω Inductive load	T_j =25°C	-	110	-	ns
			T_j=125°C	-	130	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	8.5	-	mJ
			T_j =125°C	-	10.5	-	
E_{off}	Turn-off power dissipation		T_j =25°C	-	11.0	-	mJ
			T_j =125°C	-	14.0	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-		0.145	°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 =200A, 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 =200A di/dt=2600A/μs	T_j =25°C	-	160	-	ns
			T_j =125°C	-	220	-	
I_{rr}	Peak reverse recovery Current		T_j =25°C	-	170	-	A
			T_j =125°C	-	210	-	
Q_{rr}	Recovered charge		T_j=25°C	-	16.50	-	nC
			T_j =125°C	-	26.50	-	
E_{rr}	Reverse recovered energy		T_j =25°C	-	5.50	-	mJ
			T_j =125°C	-	9.00	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)			-		0.157	°C/W

Test Conditions

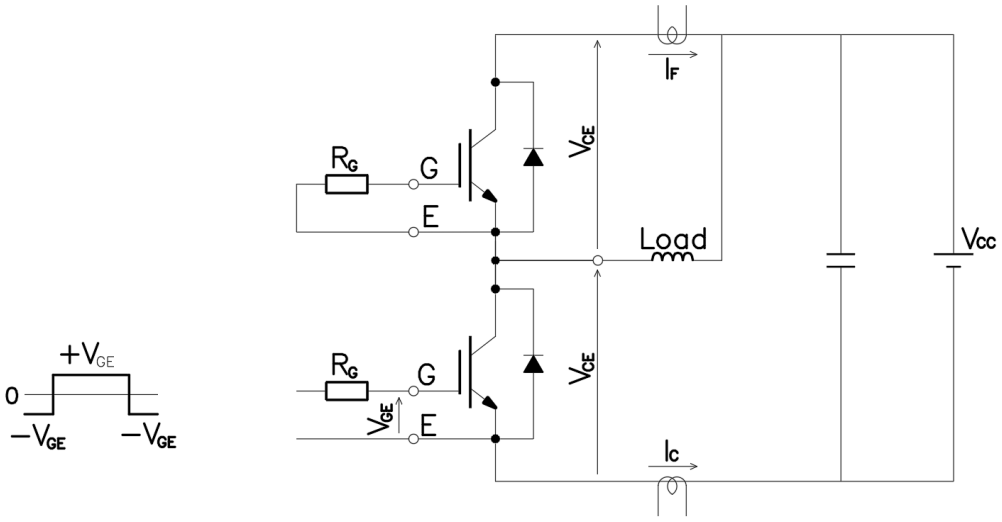

Figure 3. Switching time measure circuit

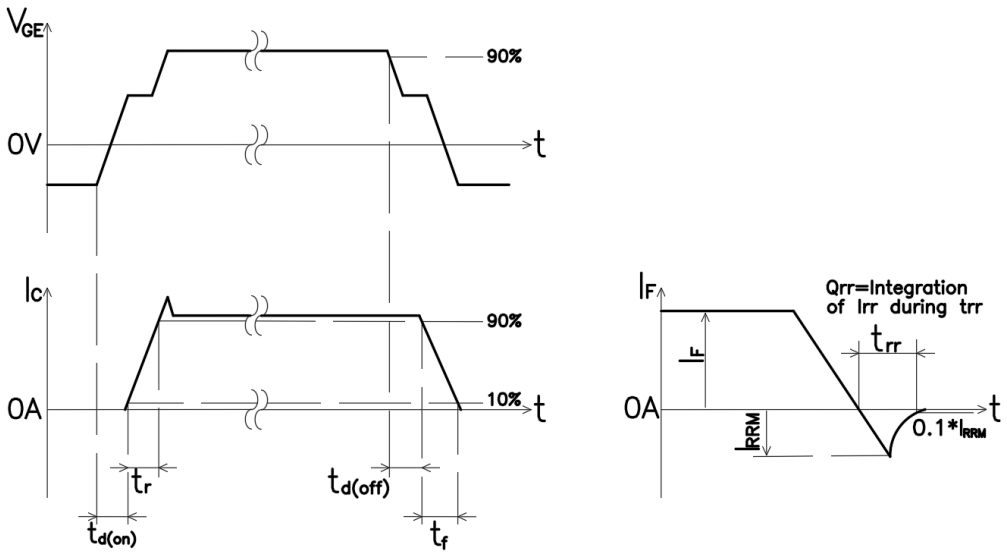

Figure 4. Switching time definition

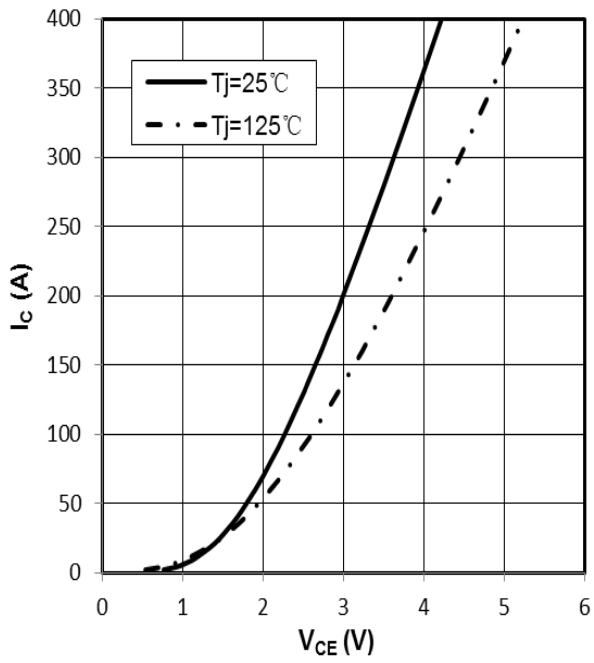

Figure 5. Ic vs V_{CE}
V_{GE} =15V

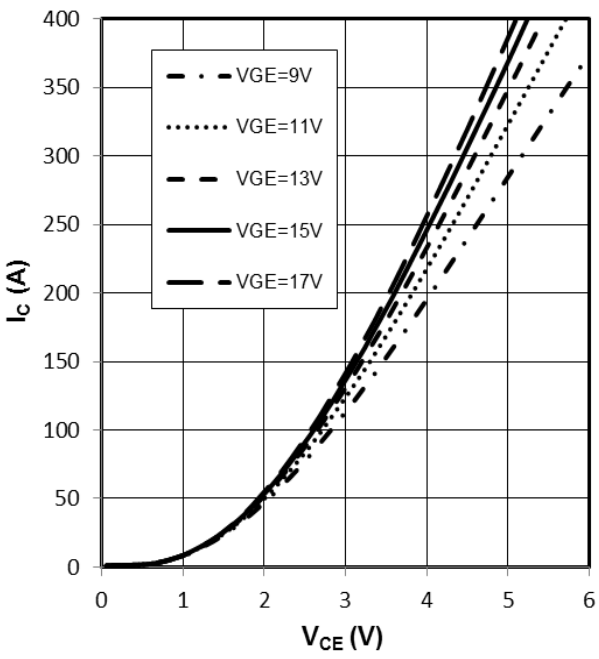

Figure 6. Ic vs V_{CE}
T_j =125°C

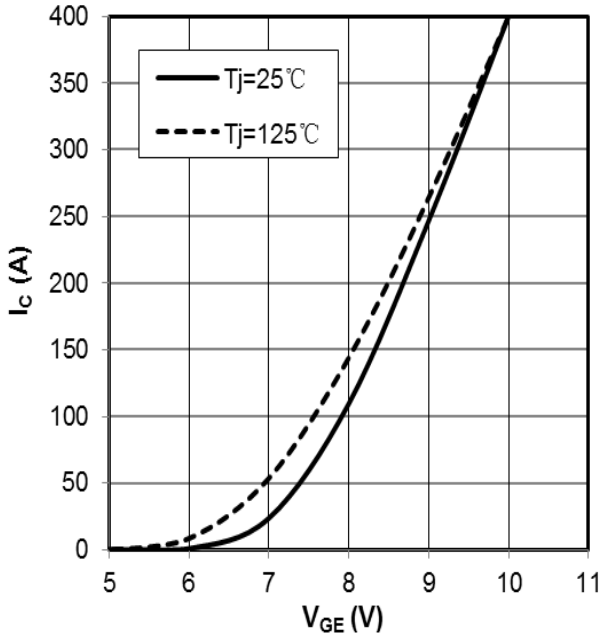

Figure 7. Ic vs V_{GE}
V_{CE} =20V

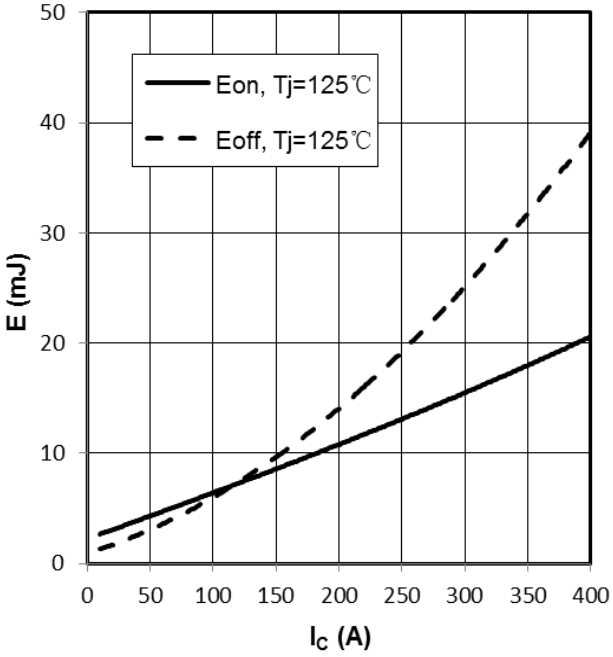

Figure8. E_{on}, E_{off} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-15V, R_G =4.7Ω

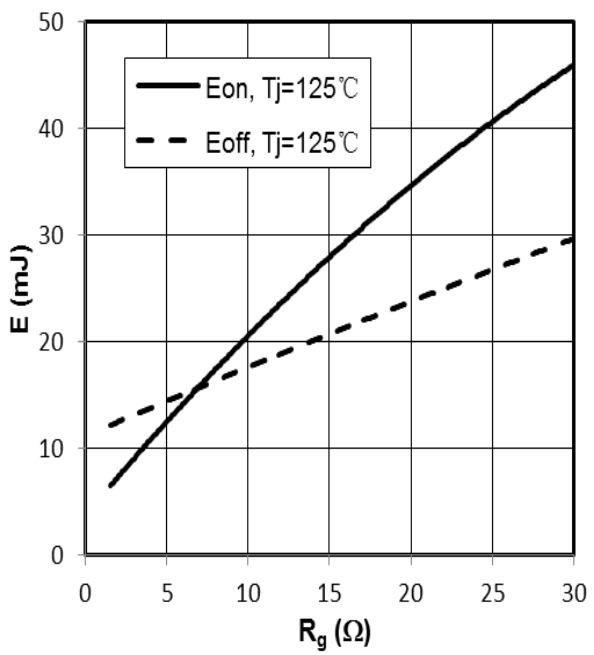

Figure 9. E_{on}, E_{off} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-15V, I_C =200A

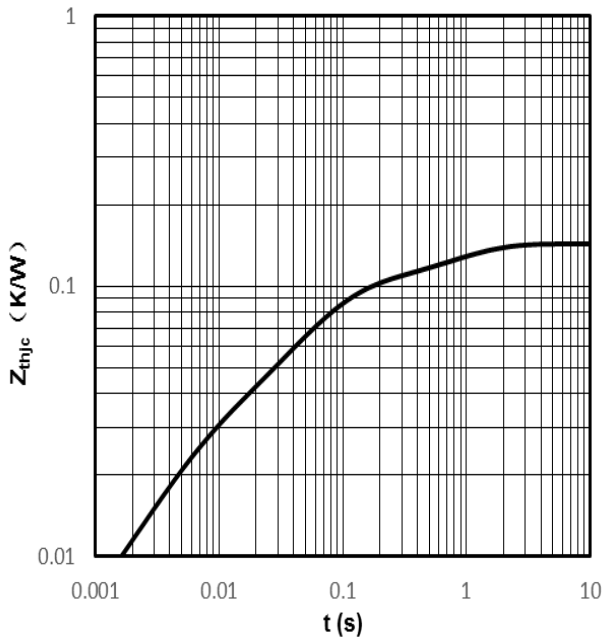

Figure 10. Transient thermal impedance IGBT , Zthjc=f(t)

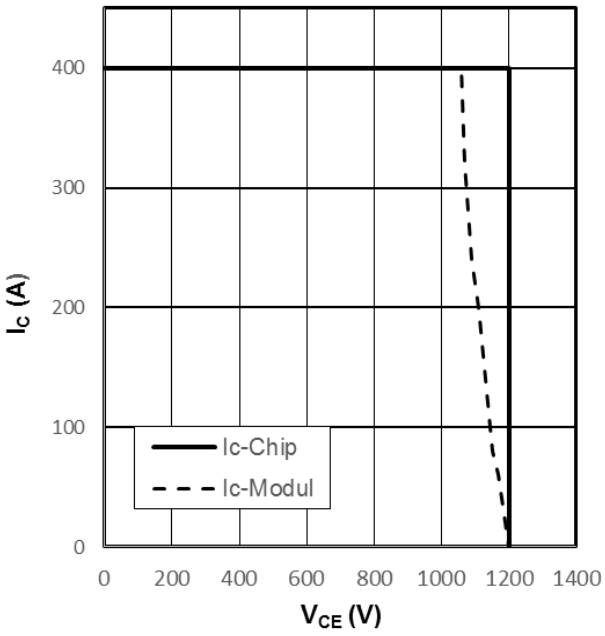

Figure 11. Reverse bias safe operating area IGBT,
I_C=f(V_{CE}),V_{GE}=±15V,R_{Goff}=4.7Ω， Tvj=125℃

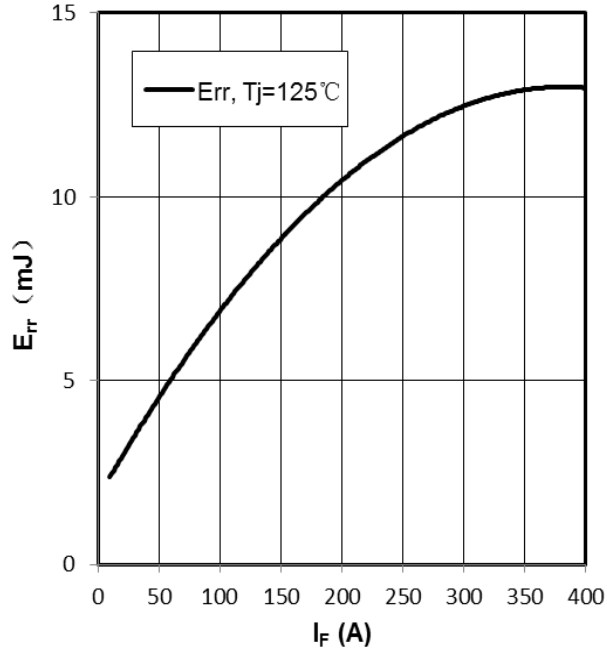

Figure 12. E_{rr} vs I_F(Typ)
V_{CC} =600V, V_{GE} =+15V/-15V, R_G =4.7Ω

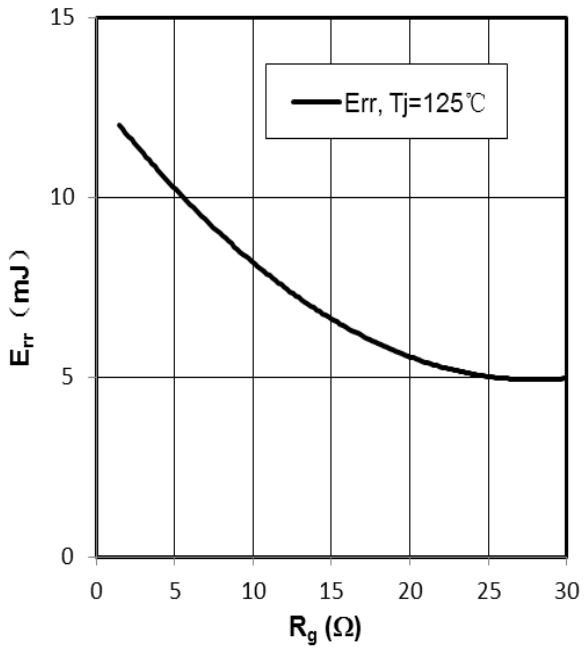

Figure 13. Err vs R_G(Typ)
V_{CC} =600V, V_{GE} =+15V/-15V, I_F =200A

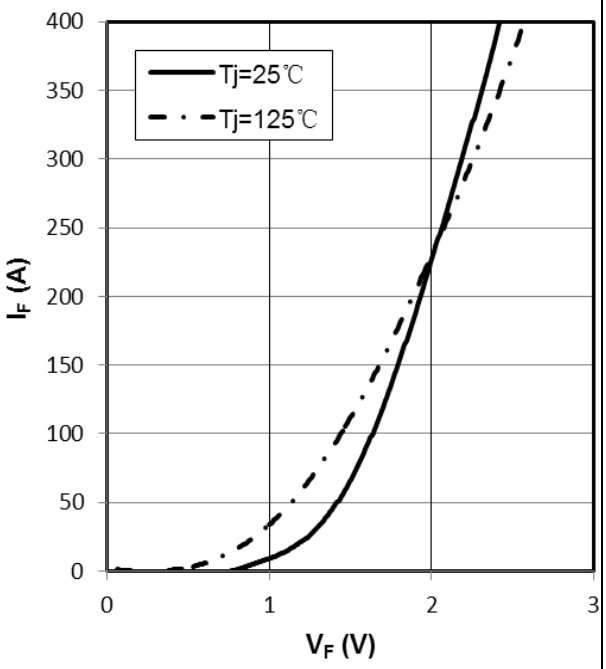

Figure 14. Forward characteristic of Diode ，
$I_F=f(V_F)$

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.