DFI300HF07DF1

650V/300A Half Bridge IGBT Module

Description

The DFI300HF07DF1 offer ultrafast switching speed for high frequency application.

Features

- 650V300 A, VCE (sat)(typ.) = 1.8V
- Lower losses and higher energy
- Excellent short circuit ruggedness
- 62mm half bridge module

Applications

- Welder
- Inverter
- Solar
- Inductive heating
- UPS EPS

Circuit diagram

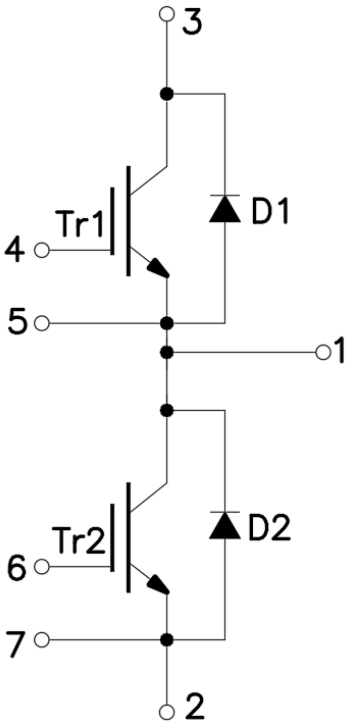

Figure 1. Out drawing & circuit diagram for DFI300HF07DF1

Pin Configuration and Marking Information

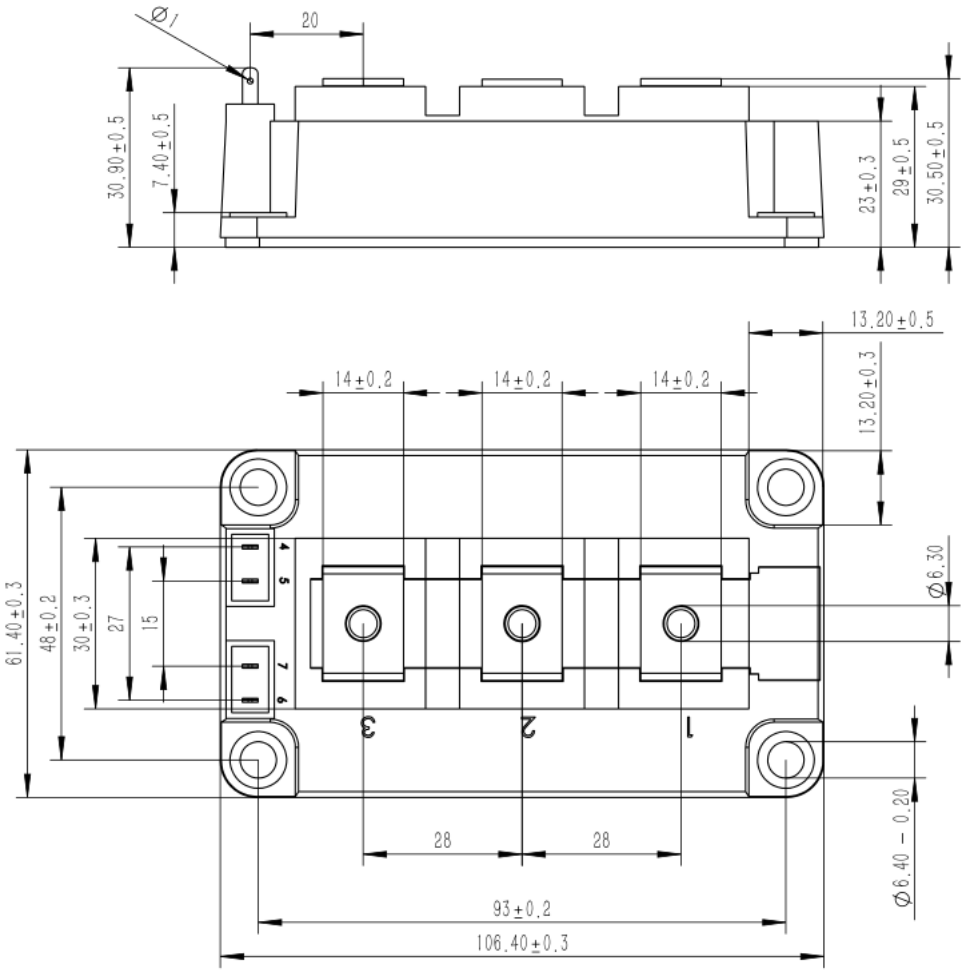

Figure 2. Pin configuration

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	650	V
V_{GES}	Gate-Emitter Voltage	C-E Short	±30V	V
I_C	DC Continuous Collector Current	T_C =100°C	300	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	600	A
P_C	Maximum Power Dissipation	T_C =25°C, T_j =150°C(IGBT)	1136	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	-	650	V
I_F	Diode forward Current	T_C=100°C	300	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	600	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 =300A, V_{GE} =15V	T_j =25°C	-	1.8	2.00	V
			T_j =125°C	-	2.10	-	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		-	2.0	-	uC
R_{Gint}	Internal gate resistor	f=1M, Vpp=1V	T_j =25°C	-	3.1	-	Ω
C_{ies}	Input Capacitance	V_{CE} =25V, V_{GE} =0V, f =1MHz	T_j =25°C	-	12.4	-	nF
C_{oes}	Output Capacitance			-	2.2	-	nF
C_{res}	Reverse transfer Capacitance			-	0.78	-	nF
I_{CES}	Collector- Emitter Cut off Current	V_{CE} =600V, 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} =400V, I_C = 300A, V_{GE} =+15V/-15V, R_G =3Ω, Inductive load	T_j =25°C	-	144	-	ns
			T_j =125°C	-	148	-	
t_r	Rise time		T_j =25°C	-	56	-	ns
			T_j =125°C	-	65	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	196	-	ns
			T_j =125°C	-	204	-	

t_f	Fall time	V_{CC} =400V I_C = 300A V_{GE} =+15V/-15V R_G =3Ω Inductive load	T_j =25°C	-	48	-	ns
			T_j=125°C	-	64	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	3.08	-	mJ
			T_j =125°C	-	5.56	-	
E_{off}	Turn-off power dissipation		T_j =25°C	-	6.4	-	mJ
			T_j =125°C	-	7.06	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-		0.11	°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 =300A, V_{GE} =0V	T_j =25°C	-	1. 45	-	V
			T_j =125°C	-	1. 25	-	
t_{rr}	Reverse recovery time	V_{rr} =300V, I_F =300A di/dt=3200A/μs	T_j =25°C	-	87	-	ns
			T_j =125°C	-	147	-	
I_{rr}	Peak reverse recovery Current		T_j =25°C	-	157	-	A
			T_j =125°C	-	222	-	
Q_{rr}	Recovered charge		T_j=25°C	-	8.0	-	uC
			T_j =125°C	-	19.0	-	
E_{rr}	Reverse recovered energy		T_j =25°C	-	2.2	-	mJ
			T_j =125°C	-	4.9	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)			-		0.25	°C/W

Test Conditions

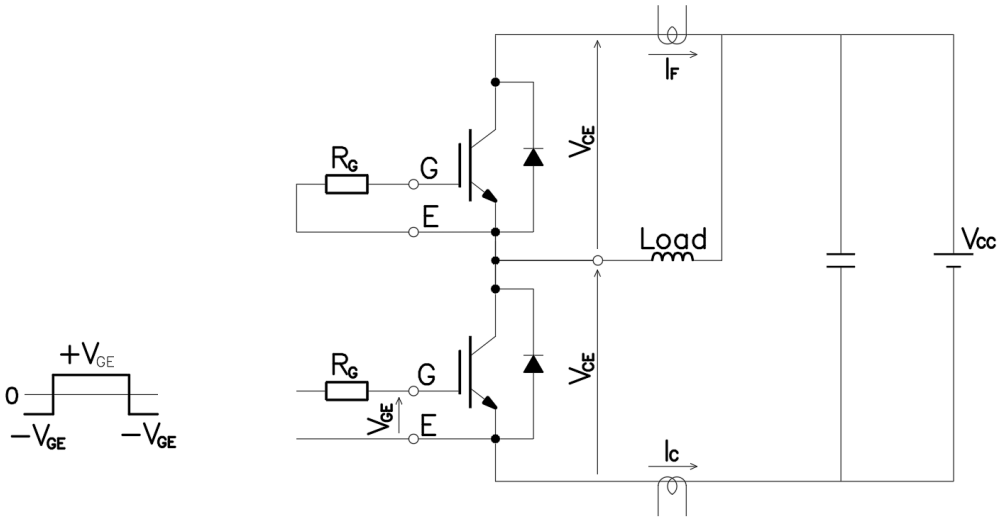

Figure 3. Switching time measure circuit

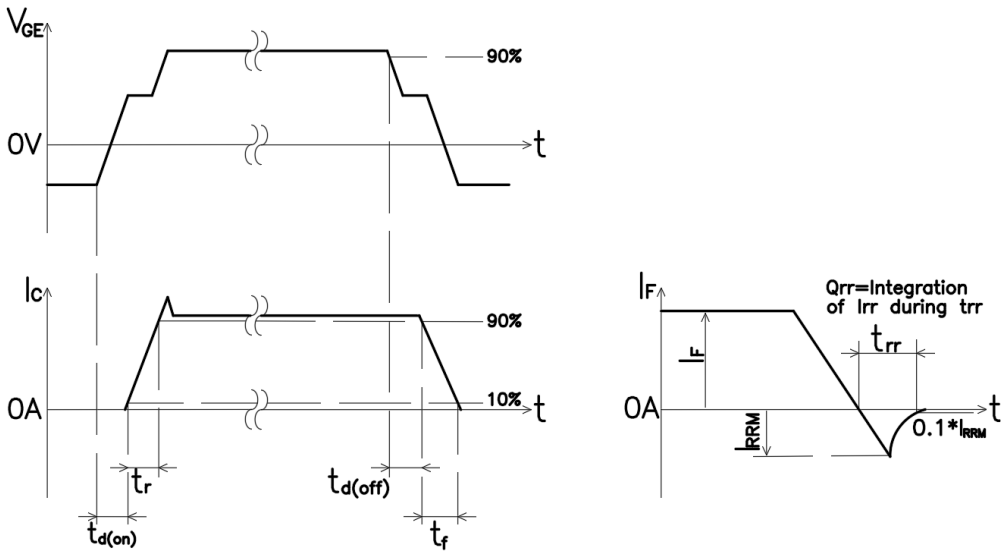

Figure 4. Switching time definition

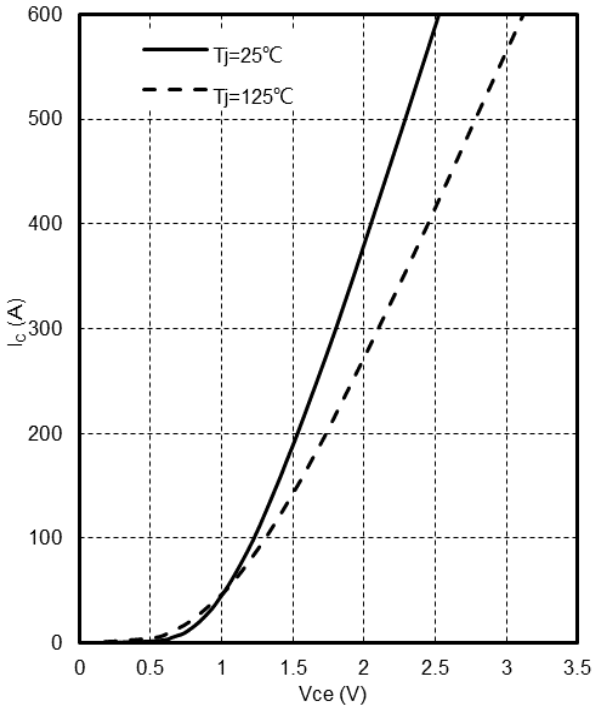

Figure 5. Ic vs V_{CE}
V_{GE} =15V

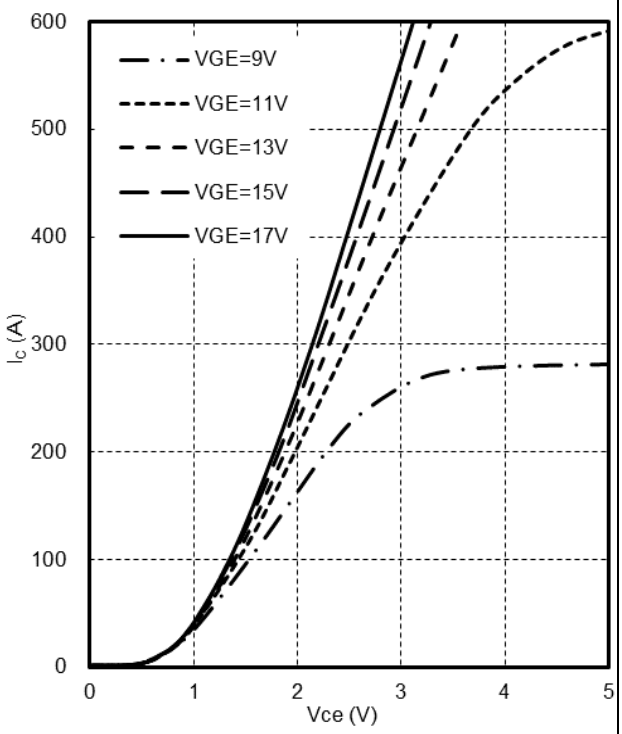

Figure 6. Ic vs V_{CE}
T_j =125°C

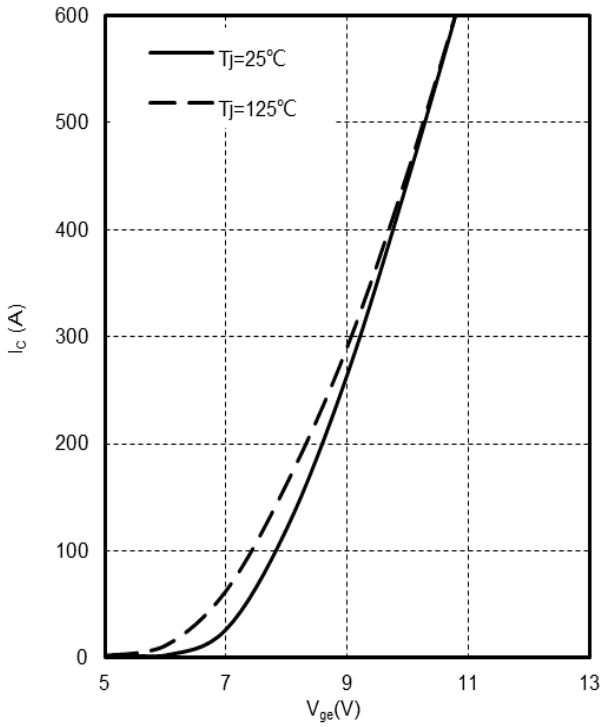

Figure 7. Ic vs V_{GE}
V_{CE} =20V

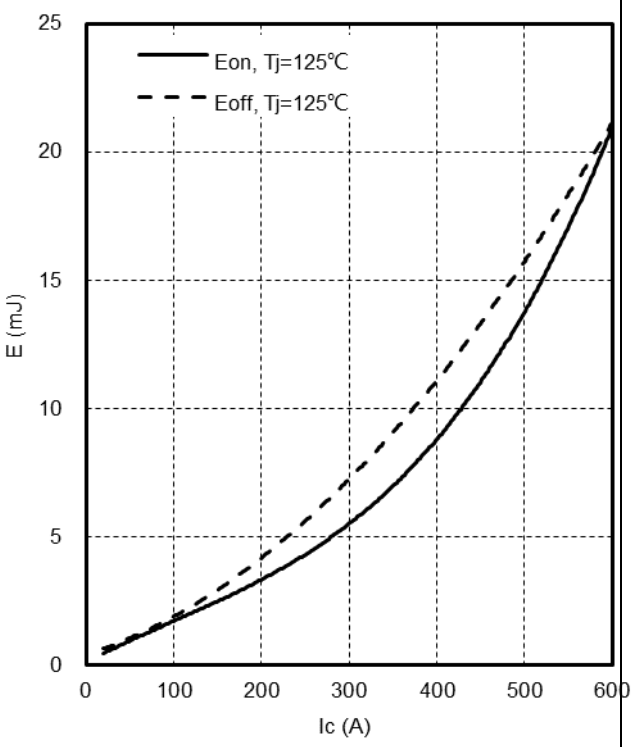

Figure8. E_{on}, E_{off} vs Ic(Typ)
V_{CC}=300V, V_{GE} =+15V/-15V, R_G =3Ω

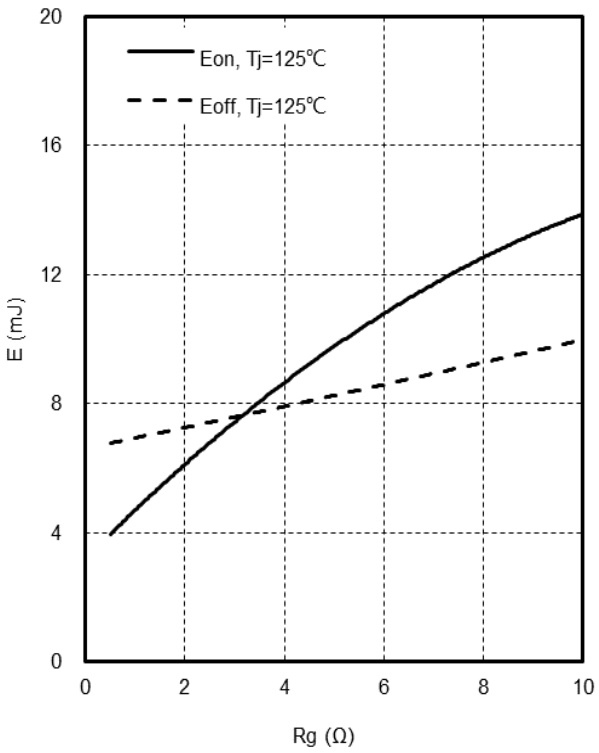

Figure 9. E_{on}, E_{off} vs R_g(Typ)
V_{CC} =300V, V_{GE} =+15V/-15V, I_C =300A

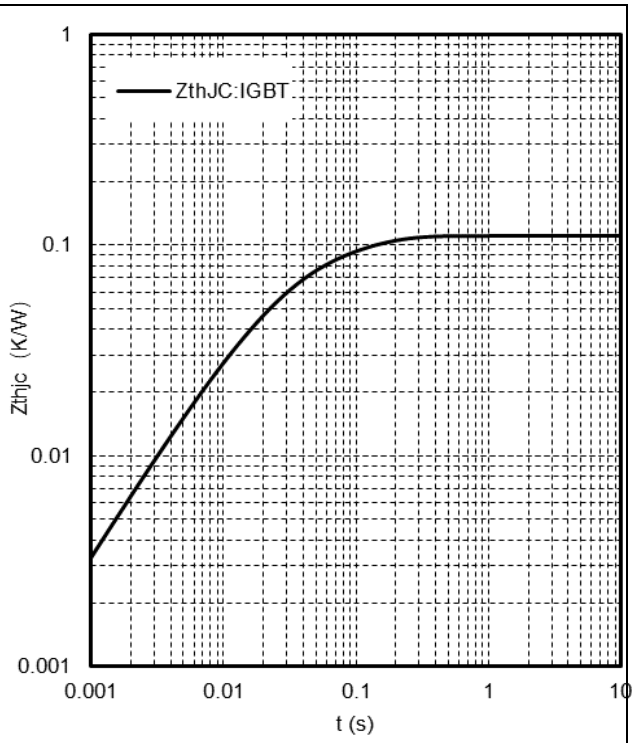

Figure 10. Transient thermal impedance IGBT , Zthjc=f(t)

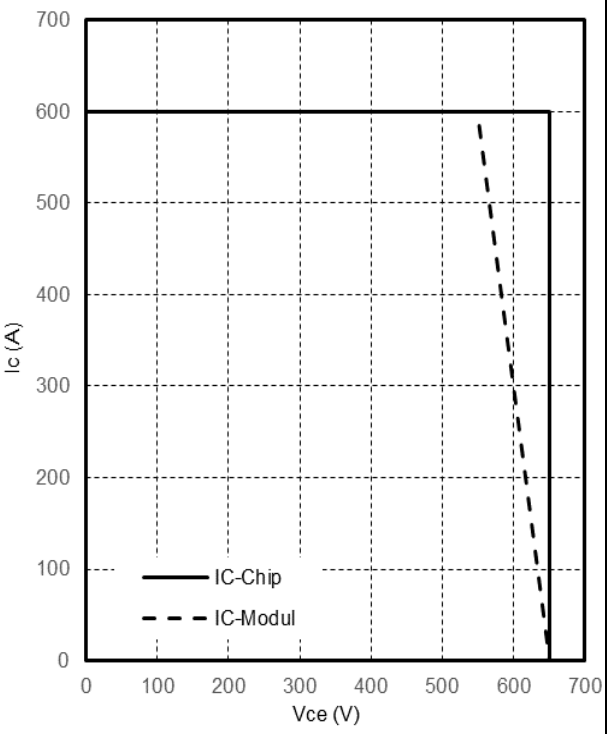

Figure 11. Reverse bias safe operating area IGBT, I_C=f(V_{CE}),V_{GE}=±15V,R_{Goff}=3Ω， Tvj=125℃

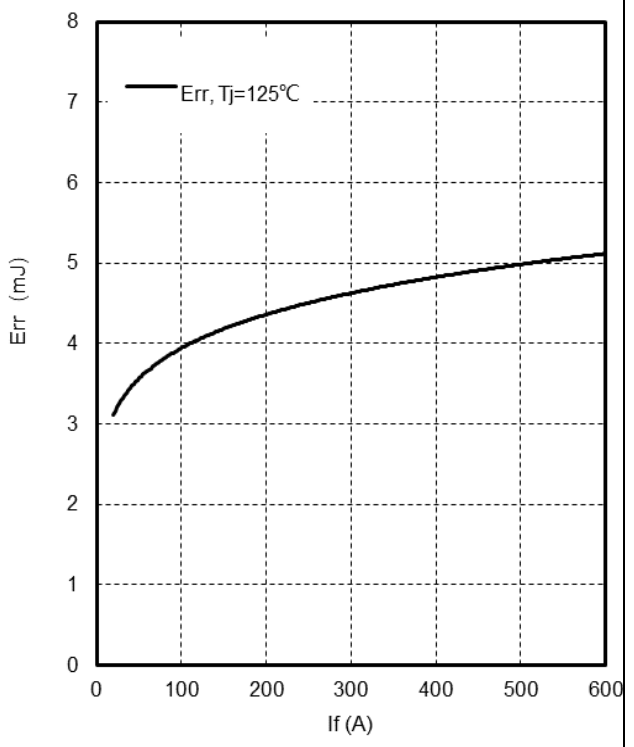

Figure 12. E_{rr} vs I_F(Typ)
V_{CC} =300V, V_{GE} =+15V/-15V, R_G =3Ω

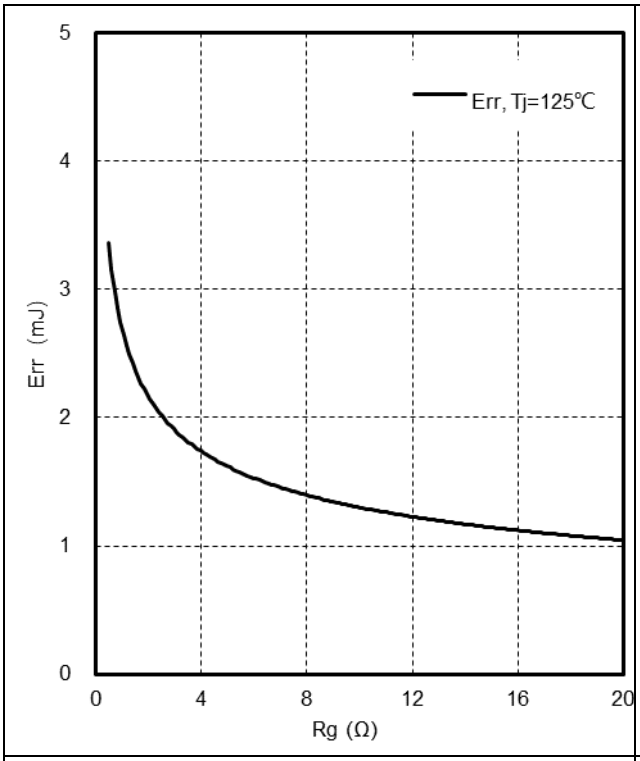

Figure 13. Err vs R_G(Typ)
V_{CC} =300V, V_{GE} =+15V/-15V, I_F =300A

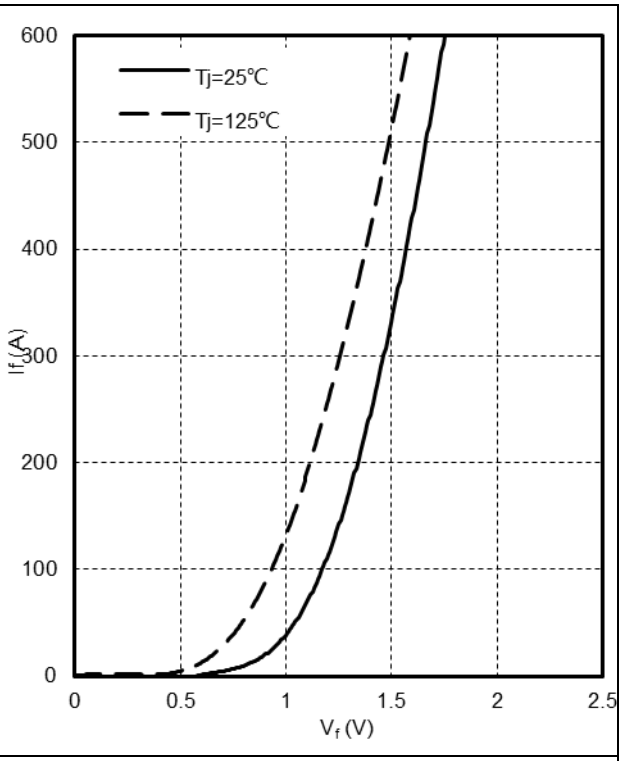

Figure 14. Forward characteristic of Diode ，
I_F=f(V_F)

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