

HCG200HF120A21

1200V/200A Half Bridge IGBT Module

Description

The HCG200HF120A21 offer ultrafast switching speed for high frequency application.

Features

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



Applications

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

Circuit diagram

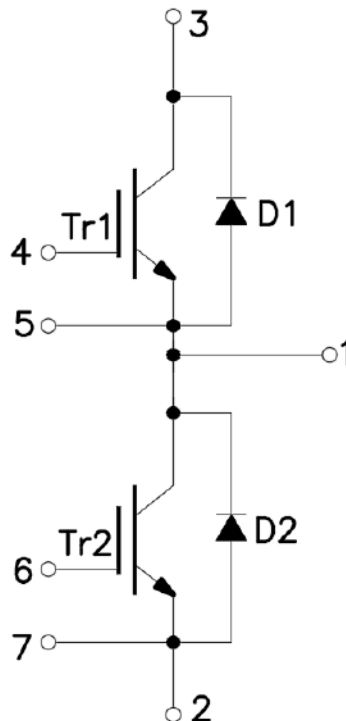


Figure 1. Out drawing & circuit diagram for HCG200HF120A21

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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	$T_C=100^\circ\text{C}$	200	A
I_{CM}	Pulse Collector Current	$t_p=1\text{ms}$, Note1	400	A
P_C	Maximum Power Dissipation	$T_C=25^\circ\text{C}$, $T_j=150^\circ\text{C}$ (IGBT)	860	W
T_j	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	$T_C=100^\circ\text{C}$	200	A
I_{FRM}	Repetitive peak forward Current	$t_p=1\text{ms}$, Note1	400	A
T_j	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		
$V_{CE(sat)}$ (Chip)	Collector-Emitter Saturation Voltage	$I_C=200\text{A}$ $V_{GE}=15\text{V}$	$T_j=25^\circ\text{C}$	-	3.00	3.20	V
			$T_j=125^\circ\text{C}$	-	3.60	-	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	$V_{GE} = -15\text{V to } +15\text{V}$	-	1.74	-	μC	
R_{Gint}	Internal gate resistor	$f=1\text{M}$, $V_{pp}=1\text{V}$	$T_j=25^\circ\text{C}$	-	2.5	-	\square
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$ $f=1\text{MHz}$	$T_j=25^\circ\text{C}$	-	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	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	5	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = 30\text{V}$, $V_{CE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	400	nA
$t_{d(on)}$	Turn-on delay time		$T_j=25^\circ\text{C}$	-	90	-	ns
			$T_j=125^\circ\text{C}$	-	95	-	
t_r	Rise time		$T_j=25^\circ\text{C}$	-	85	-	ns
			$T_j=125^\circ\text{C}$	-	90	-	
$t_{d(off)}$	Turn-off delay time		$T_j=25^\circ\text{C}$	-	670	-	ns
			$T_j=125^\circ\text{C}$	-	725	-	

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t_f	Fall time	$V_{CC}=600V$	$T_j=25^{\circ}C$	-	110	-	ns
			$T_j=125^{\circ}C$	-	130	-	
E_{on}	Turn-on power dissipation	$I_C=200A$ $V_{GE}=+15V/-15V$	$T_j=25^{\circ}C$	-	8.5	-	mJ
			$T_j=125^{\circ}C$	-	10.5	-	
E_{off}	Turn-off power dissipation	$R_G=4.7\Omega$ Inductive load	$T_j=25^{\circ}C$	-	11.0	-	mJ
			$T_j=125^{\circ}C$	-	14.0	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)		-	-	-	0.145	$^{\circ}C/W$

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	$I_F=200A, V_{GE}=0V$	$T_j=25^{\circ}C$	-	1.9	2.2	V
			$T_j=125^{\circ}C$	-	1.9	-	
t_{rr}	Reverse recovery time	$V_{rr}=600V, I_F=200A$	$T_j=25^{\circ}C$	-	160	-	ns
			$T_j=125^{\circ}C$	-	220	-	
I_{rr}	Peak reverse recovery Current	$di/dt=2600A/\mu s$	$T_j=25^{\circ}C$	-	170	-	A
			$T_j=125^{\circ}C$	-	210	-	
Q_{rr}	Recovered charge	$di/dt=2600A/\mu s$	$T_j=25^{\circ}C$	-	16.50	-	nC
			$T_j=125^{\circ}C$	-	26.50	-	
E_{rr}	Reverse recovered energy	$di/dt=2600A/\mu s$	$T_j=25^{\circ}C$	-	5.50	-	mJ
			$T_j=125^{\circ}C$	-	9.00	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)		-	-	-	0.157	$^{\circ}C/W$

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Test Conditions

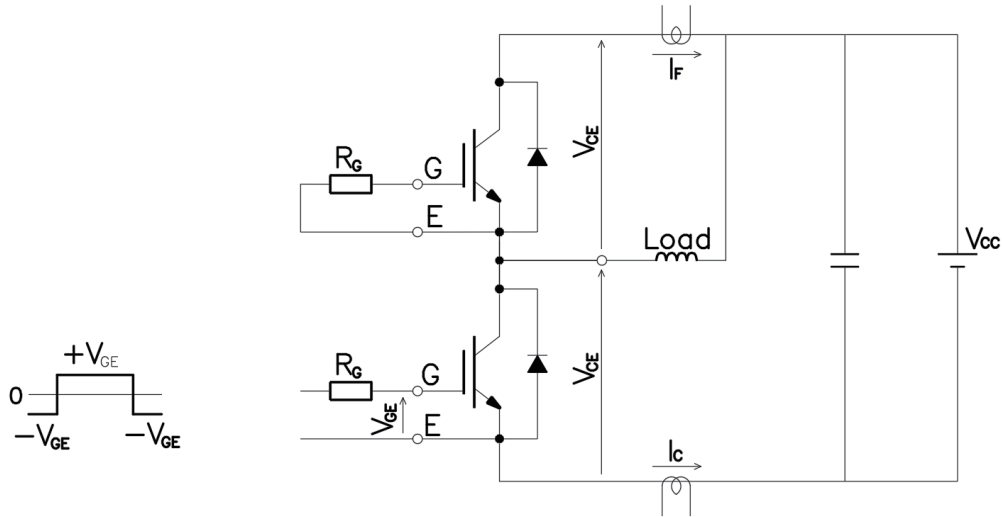


Figure 3. Switching time measure circuit

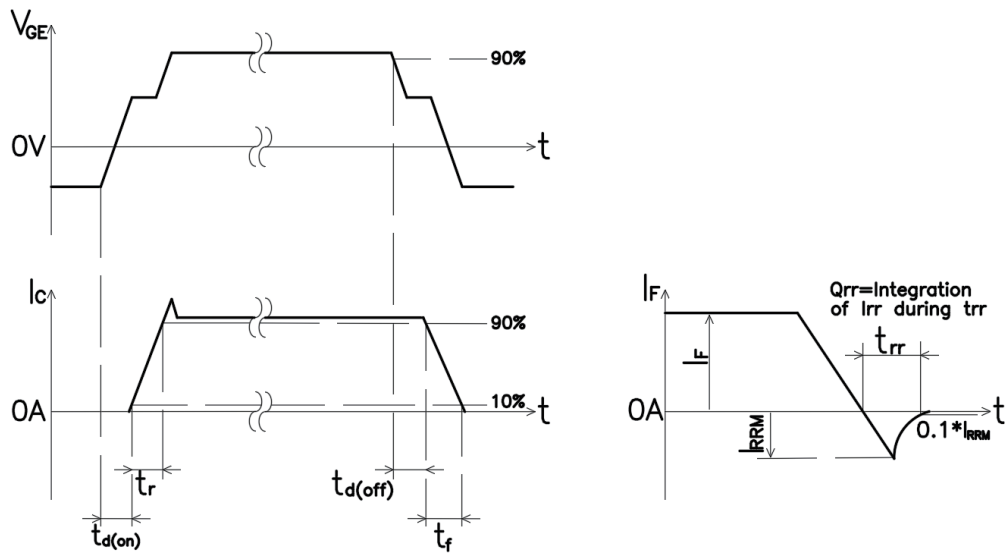


Figure 4. Switching time definition

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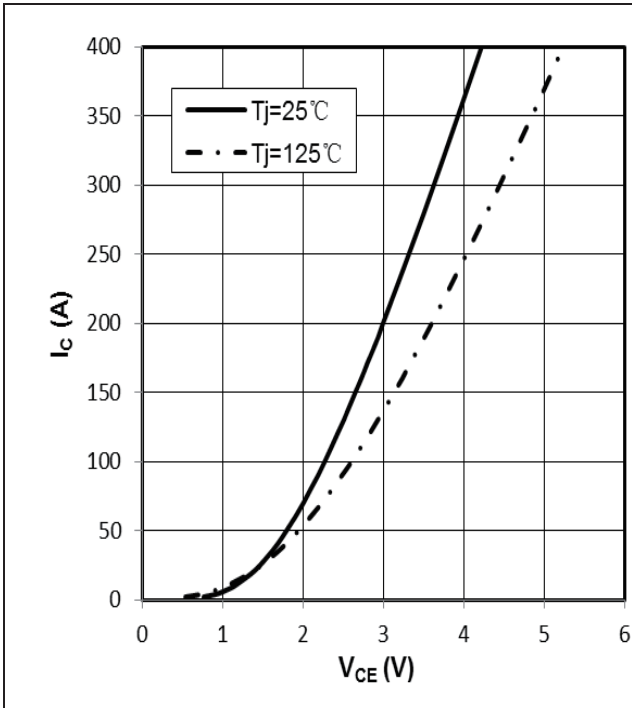


Figure 5. I_c vs V_{CE}
 $V_{GE}=15\text{V}$

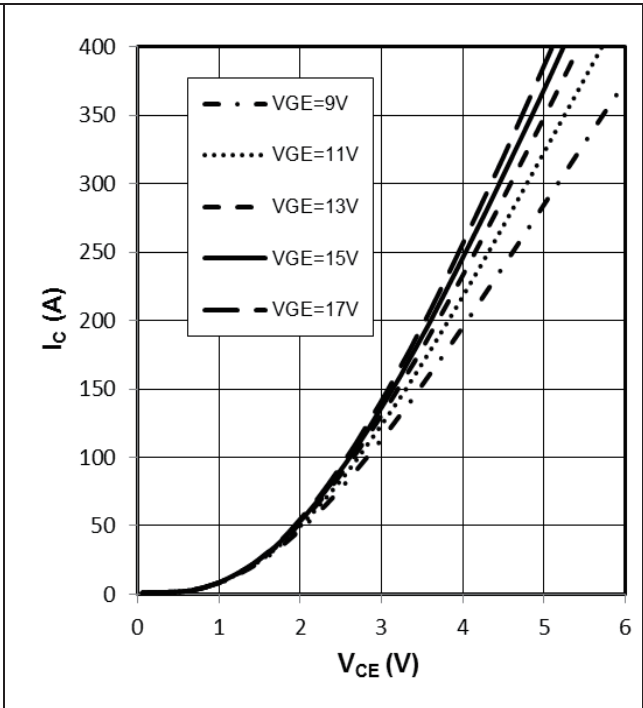


Figure 6. I_c vs V_{CE}
 $T_j=125^\circ\text{C}$

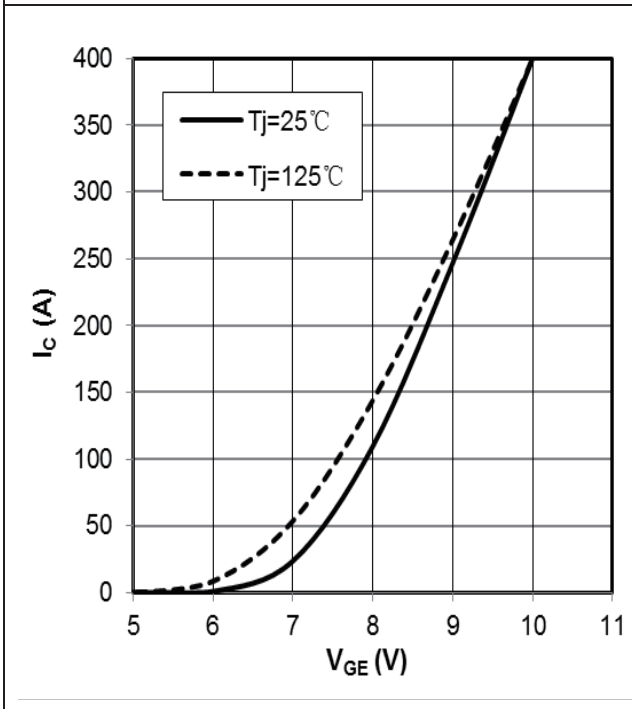


Figure 7. I_c vs V_{GE}
 $V_{CE}=20\text{V}$

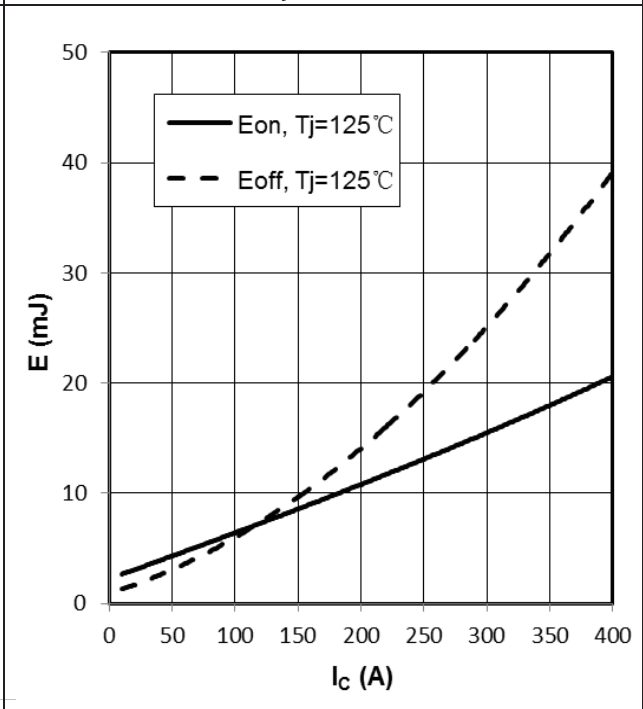


Figure 8. E_{on} , E_{off} vs I_c (Typ)
 $V_{CC}=600\text{V}$, $V_{GE}=+15\text{V}/-15\text{V}$, $R_G=4.7\Omega$

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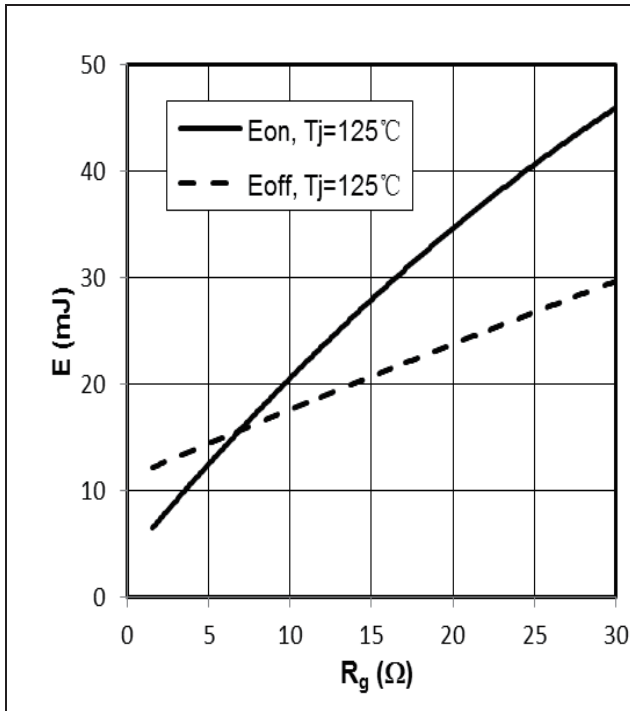


Figure 9. E_{on} , E_{off} vs R_g (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-15V$, $I_C=200A$

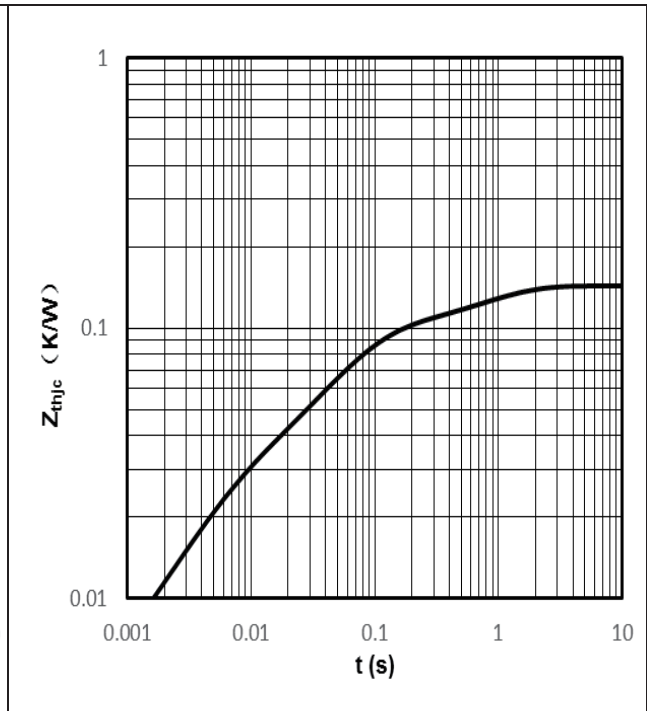


Figure 10. Transient thermal impedance IGBT ,
 $Z_{thjc}=f(t)$

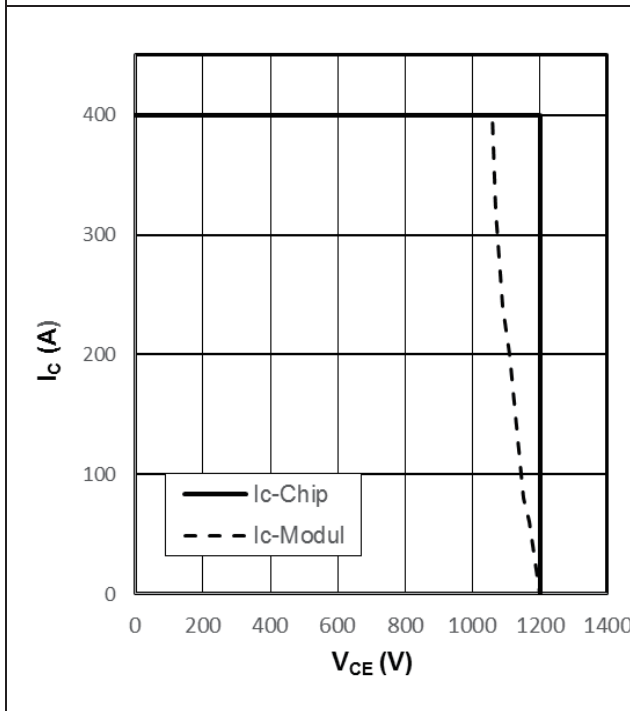


Figure 11. Reverse bias safe operating area IGBT,
 $I_C=f(V_{CE})$, $V_{GE}=\pm 15V$, $R_{Goff}=4.7\Omega$, $T_{vj}=125^\circ C$

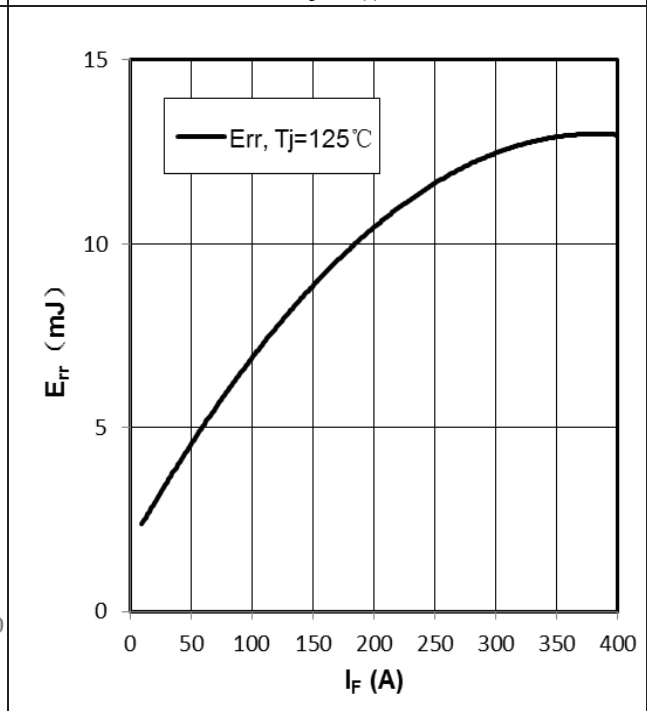


Figure 12. E_{rr} vs I_F (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-15V$, $R_G=4.7\Omega$

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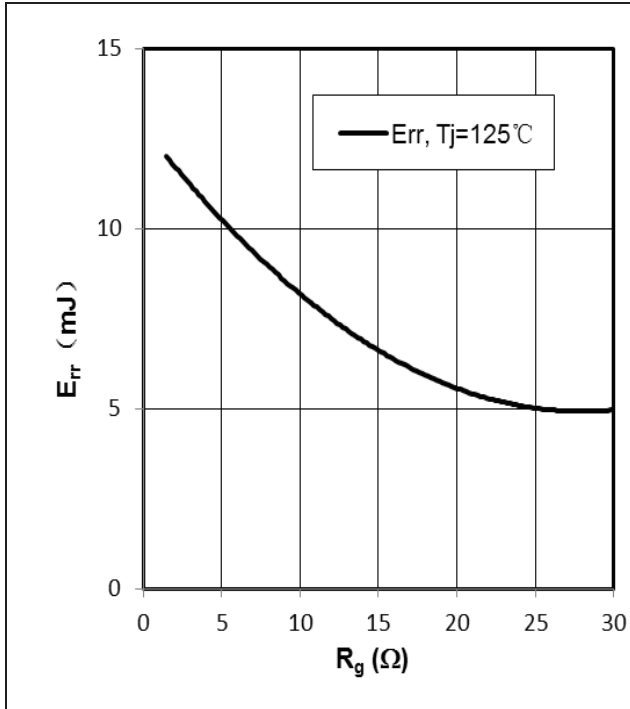


Figure 13. Err vs R_G(Typ)
 $V_{CC}=600V, V_{GE}=+15V/-15V, I_F=200A$

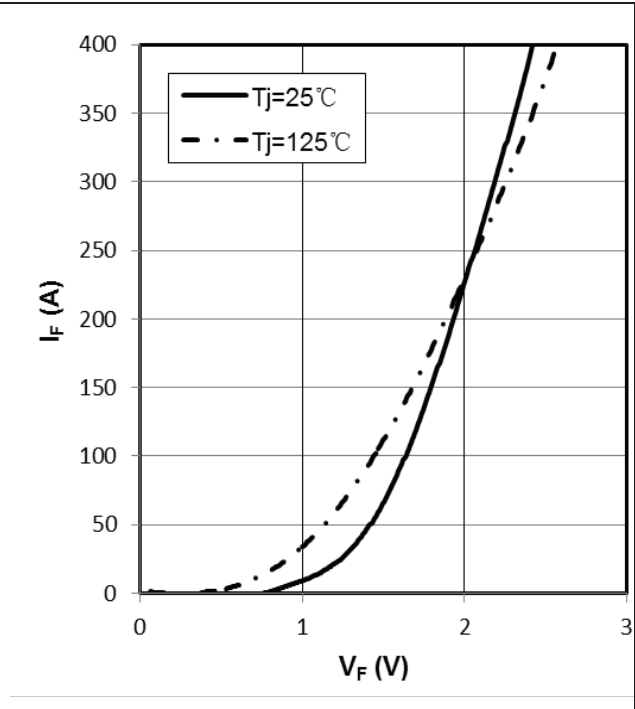


Figure 14. Forward characteristic of Diode ,
 $I_F=f(V_F)$

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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@hiitio.com) for further information on the product, technology, delivery terms, conditions and prices. □

Revision History

Document Version	Description of Changes
RevX.0.1	Released

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