Silicon FS Trench IGBT

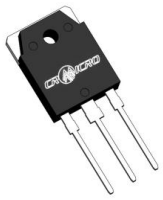
CRG15T120BNR3S

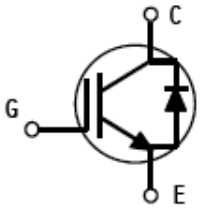
General Description：

Using CRM's proprietary trench design, advanced FS(field stop) technology and integrated with Free Wheeling Diode, the 1200V Trench FS IGBT offers superior conduction and switching performances, high avalanche ruggedness.

V_{CES}	1200	V
I_C	15	A
P_{tot} (T_C=25℃)	156	W
$V_{CE(SAT)}$	1.95	V

TO-3P（N）





Features：

- Trench FS Technology, Positive temperature coefficient
- Low saturation voltage: $V_{CE(sat)}$, typ =1.95V
  @ I_C =15A
- Extremely enhanced avalanche capability

Applications：

Power switch circuit of induction cooker(IH).

Ordering Information:

Part Number	Package	Marking	Delivery mode
CRG15T120BNR3S	TO-3P(N)	G15T120BNR3S	Tube

Absolute Maximum Ratings

（T_j= 25℃ unless otherwise specified）:

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate- Emitter Voltage	±20	V
I_C	Collector Current@T_C = 25 ℃	30	A
	Collector Current @T_C = 100 ℃	15	A
I_{CM}[a1]	Pulsed Collector Current@T_C = 25 ℃	45	A
I_F	Diode Continuous Forward Current @T_C = 100 ℃	15	A
I_{FM}	Diode Maximum Forward Current@T_C = 25 ℃	45	A
P_D	Power Dissipation @ T_C = 25℃	156	W
	Power Dissipation @T_C = 100 ℃	62	W
T_J， T_{stg}	Operating Junction and Storage Temperature Range	150，-55 to +150	℃

T_L	Maximum Temperature for Soldering	270	℃

[a1]: Repetitive rating; pulse width limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	0.55	0.8	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	35	40	℃/W

Electrical Characteristics of the IGBT（T_j= 25℃ unless otherwise specified）:

OFF Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}=0V,I_{CE}=1mA	1200	--	--	V
I_{CES}	Collector-Emitter Leakage Current	V_{GE} =0V,V_{CE}=V_{CES}	--	--	1.0	mA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	V_{GE} =+20V	--	--	+250	nA
$I_{GES(R)}$	Gate to Source Reverse Leakage	V_{GE} =-20V	--	--	-250	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=15A,V_{GE}=15V	--	1.95	2.5	V
V_{FM}	Diode Forward Voltage	I_F=15A	--	2.7	3.2	V
$V_{GE(TH)}$	Gate Threshold Voltage	I_C=250uA,V_{CE}=V_{GE}	4.5	5.8	7.5	V
Pulse width tp≤300μs,δ≤2%						

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{ies}	Input Capacitance	V_{CE}=25V，V_{GE}=0V f=1MHz	--	1513	--	pF
C_{oes}	Output Capacitance		--	35	--	
C_{res}	Reverse Transfer Capacitance		--	25	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	T_j= 25℃ V_{CE}=600V,I_C=15A V_{GE}=0/15V, R_g=10Ω Inductive Load	--	14	--	ns
tr	Rise Time		--	32	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	107	--	
t_f	Fall Time		--	131	--	
Eon	Turn-On Switching Loss		--	0.43	--	mJ
Eoff	Turn-Off Switching Loss		--	0.7	--	

Ets	Total Switching Loss		--	1.13	--	
Q_g	Total Gate Charge	V_{CE}=960V,I_C=15A V_{GE}=15V	--	81.5	--	nC
Q_{ge}	Gate to Emitter Charge		--	7.5	--	
Q_{gc}	Gate to Collector Charge		--	51.5	--	

Characteristics Cure

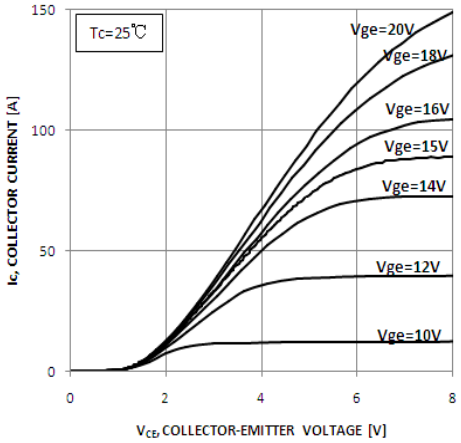


Figure 1. Typical Output Characteristics

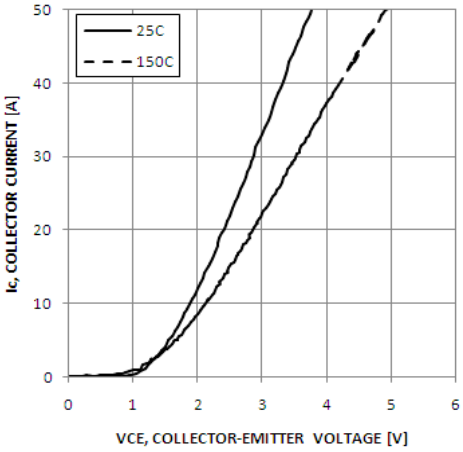


Figure 2. Typical Output Characteristics

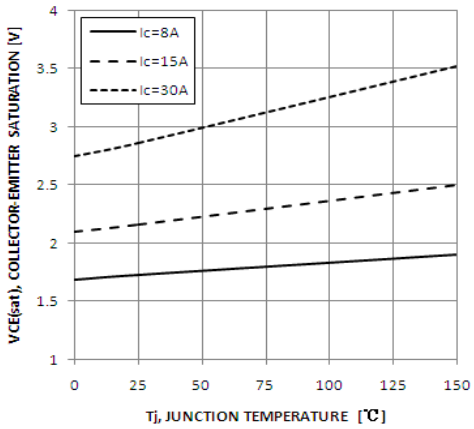


Figure 3. Typical Saturation Voltage vs.Junction Temperature

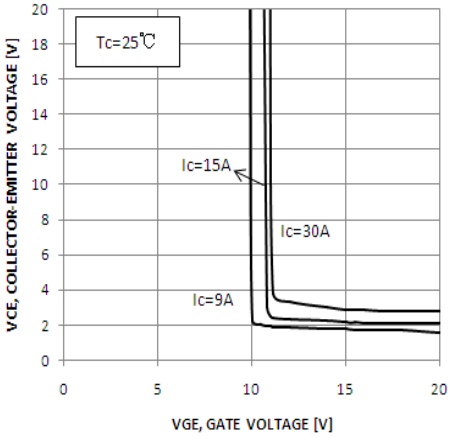


Figure 4. Typical Saturation Voltage vs. Gate- Emitter Voltage

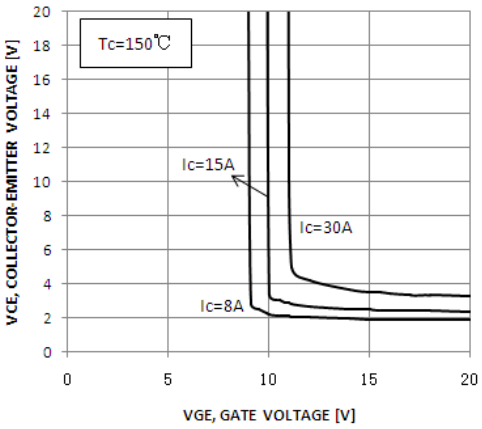


Figure 5. Typical Saturation Voltage vs. Gate-Emitter Voltage

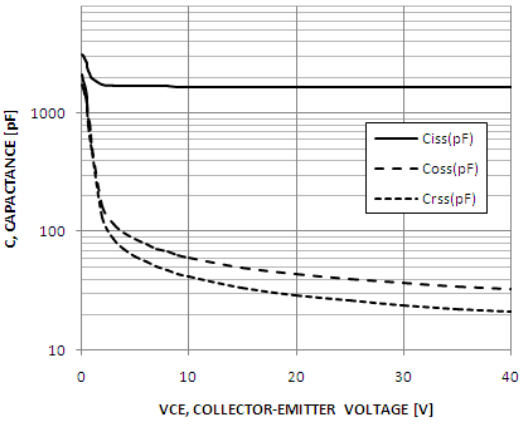


Figure 6. Typical Capacitance Characteristics

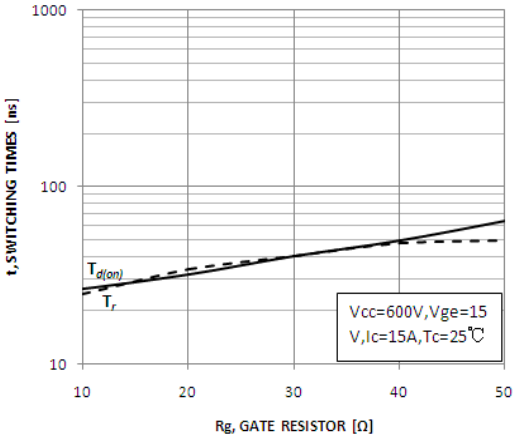


Figure 7. Typical Turn-On Characteristics vs. Gate Resistance

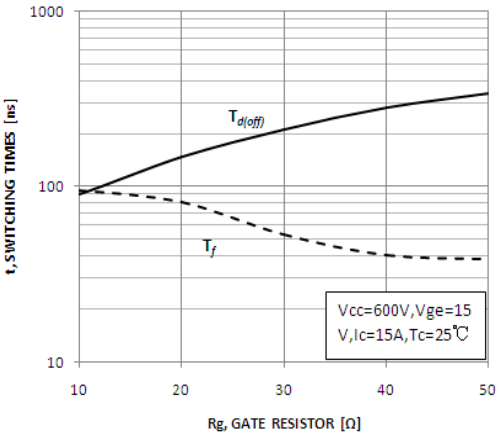


Figure 8. Typical Turn-Off Characteristics vs.Gate

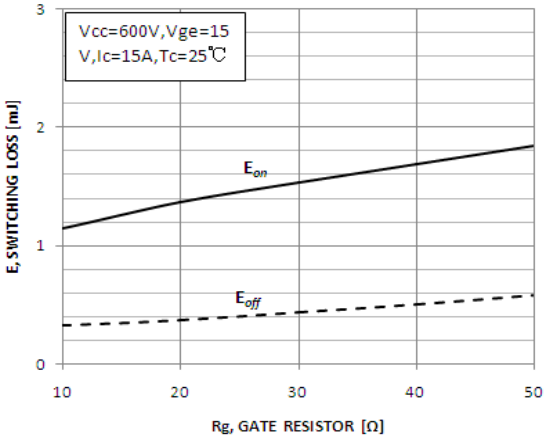


Figure 9. Typical Switching Losses vs. Gate Resistance

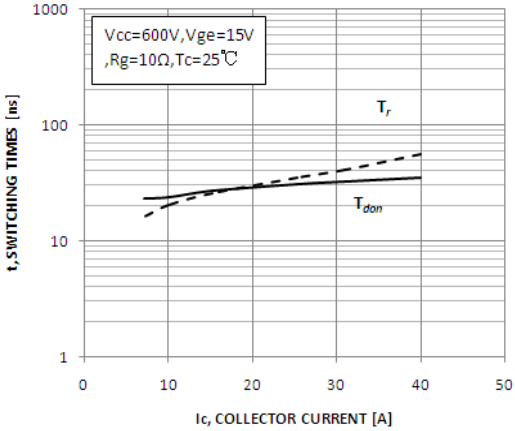


Figure 10. Typical Turn-On Characteristics vs. Collector Current

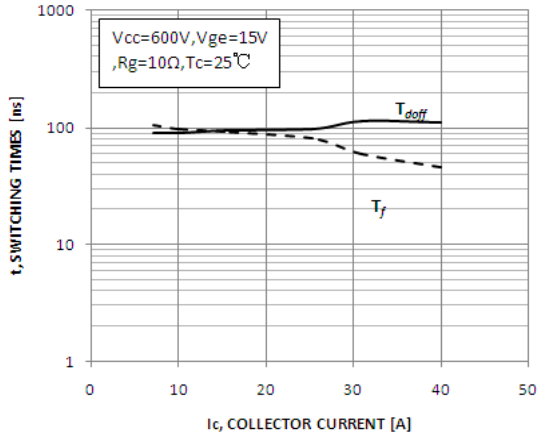


Figure 11. Typical Turn-Off Characteristicsvs. Collector Current

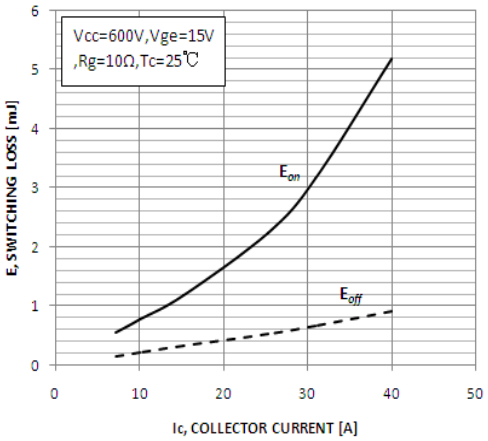


Figure 12. Typical Switching Losses vs. Collector Current

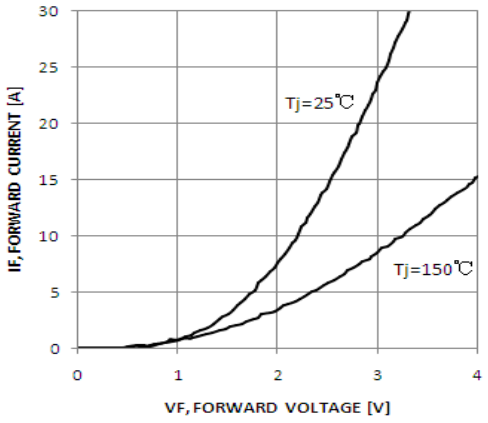


Figure 13. Typical Diode Forward Characteristics

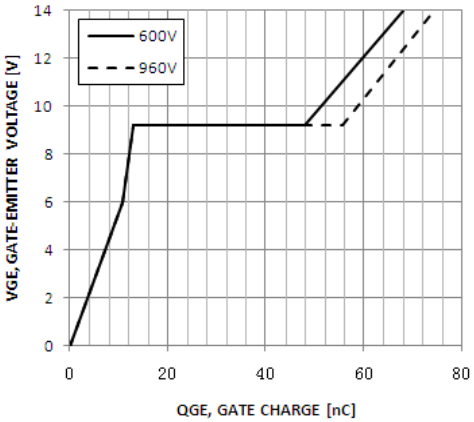


Figure 14. Typical Gate Charge

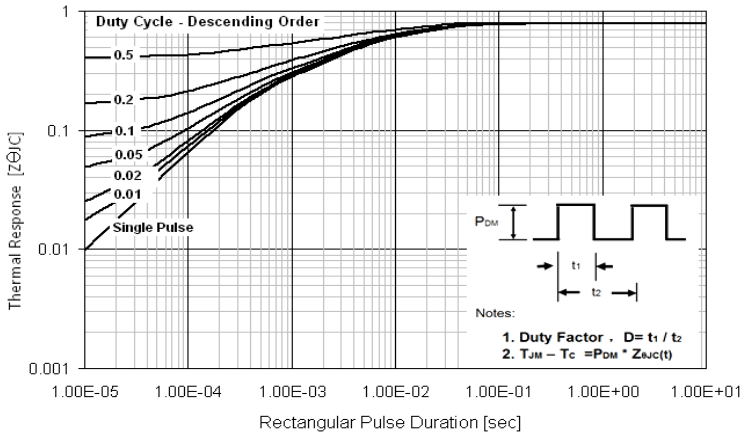
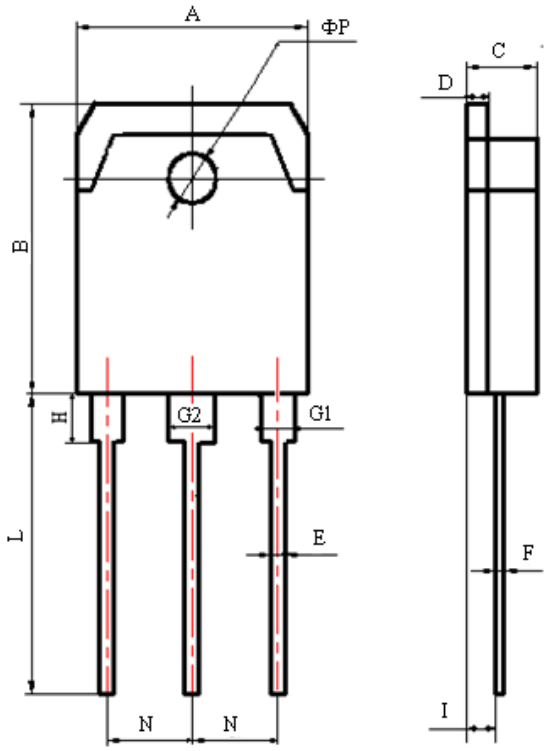


Figure 15. Transient Thermal Impedance of IGBT

Package Information



Items	Values(mm)	
	MIN	MAX
A	15.00	16.00
B	19.20	20.60
C	4.60	5.00
D	1.40	1.60
E	0.90	1.10
F	0.50	0.70
G1	2.00	2.20
G2	3.00	3.20
H	3.00	3.70
I	1.20	1.70
	2.70	2.90
L*	19.00	21.00
N	5.25	5.65
ϕP	3.10	3.30

*：adjustable

TO-3P(N) Package

The name and content of poisonous and harmful material in products

Part's Name	Hazardous Substance									
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE	DIBP	DEHP	DBP	BBP
Limit	⩽ 0.1%	⩽ 0.1%	⩽ 0.01%	⩽0.1%	⩽0.1%	⩽0.1%	⩽0.1%	⩽0.1%	⩽0.1%	⩽0.1%
Lead Frame	○	○	○	○	○	○	○	○	○	○
Molding	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○	○	○	○	○
Solder	×	○	○	○	○	○	○	○	○	○
Note	○: Means the hazardous material is under the criterion of 2011/65/EU. ×: Means the hazardous material exceeds the criterion of 2011/65/EU. The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup's RoHS.									

Warnings

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. It is suggested to be used under 80 percent of the maximum ratings of the device.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. IGBTs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. This publication is made by Huajing Microelectronics and subject to regular change without notice.

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