



General Description:

Using HUAJING's proprietary trench design and advanced Field Stop (FS) technology, offering superior conduction and switching performances. RoHS Compliant.

V _{CE(S)}	600	V
I _C	15	A
V _{CE(sat)}	1.55	V

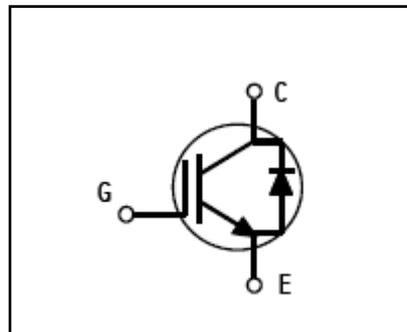
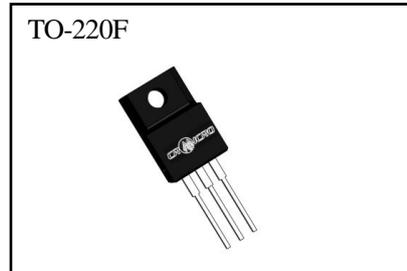
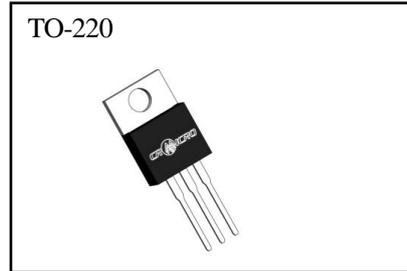
Features:

- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage:

V_{CE(sat)}, TYP=1.55V @I_C=15A, V_{GE}=15V;

Applications:

- Motor control
- UPS, PFC



Package Parameters

Type	Package	Marking	Packing
CRG15T60A94S	TO-220F	G15T60A94S	Tube
CRG15T60A84S	TO-220	G15T60A84S	Tube

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Rating		Units
		TO-220	TO-220F	
V_{CES}	Collector-Emitter Voltage	600	600	V
V_{GES}	Gate- Emitter Voltage	± 20	± 20	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	30	30 ^{al}	A
	Collector Current @ $T_C = 100^\circ\text{C}$	15	15 ^{al}	
I_{CM}^{al}	Pulsed Collector Current @ $T_C = 25^\circ\text{C}$	45	45 ^{al}	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	20	20 ^{al}	A
	Diode Continuous Forward Current @ $T_C = 25^\circ\text{C}$	10	10 ^{al}	A
I_{FM}	Diode Maximum Forward Current	40	40 ^{al}	A
P_D	Power Dissipation @ $T_C = 25^\circ\text{C}$	78	20	W
T_J	Operating Junction	-40~150	-40~150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55~150	-55~150	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	270	270	$^\circ\text{C}$

al: Repetitive rating; pulse width limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	TO-220	TO-220F	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	1.6	6.0	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	2.8	6.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5		$^\circ\text{C}/\text{W}$

Electrical Characteristics of the IGBT ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	SPEC			Units
			Min.	Typ.	Max.	
OFF Characteristics						
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_{CE}=250\mu\text{A}$	600	--	--	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=600V$	--	--	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						
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=15A, V_{GE}=15V$	--	1.55	2.4	V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=250\mu\text{A}, V_{CE}=V_{GE}$	4.0	5.5	7.0	V
Pulse width $t_p \leq 300\mu\text{s}, \delta \leq 2\%$						
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1\text{MHz}$	--	1313	--	pF
C_{oes}	Output Capacitance		--	44	--	
C_{res}	Reverse Transfer Capacitance		--	15	--	

Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=15A,$ $R_g=10\Omega, V_{GE}=15V,$ Inductive Load $T_J=25^\circ C$	--	31.3	--	ns
t_r	Rise Time		--	25.9	--	
$t_{d(off)}$	Turn-Off Delay Time		--	119.3	--	
t_f	Fall Time		--	60.2	--	
E_{on}	Turn-On Switching Loss		--	0.5	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.2	--	
E_{ts}	Total Switching Loss		--	0.7	--	
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=15A,$ $R_g=10\Omega, V_{GE}=15V,$ Inductive Load $T_J=150^\circ C$	--	31.0	--	ns
t_r	Rise Time		--	26.7	--	
$t_{d(off)}$	Turn-Off Delay Time		--	136.3	--	
t_f	Fall Time		--	77.8	--	
E_{on}	Turn-On Switching Loss		--	0.5	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.3	--	
E_{ts}	Total Switching Loss		--	0.8	--	
Q_g	栅极电荷总量	$V_{CE}=480V, I_C=15A,$ $V_{GE}=15V$	--	54	--	nC
Q_{ge}	栅极发射极电荷		--	10.7	--	
Q_{gc}	栅极集电极电荷		--	27.7	--	
Electrical Characteristics of the DIODE ($T_C=25^\circ C$ unless otherwise specified):						
V_F	Diode Forward Voltage	$I_F=8.0A$	--	1.6	2.3	V
t_{rr}	Reverse Recovery Time	$I_F=7.5A$ $di/dt=100A/\mu S$	--	57.6	--	ns
I_{rrm}	Reverse Recovery Current		--	3	--	A
Q_{rr}	Reverse Recovery Charge		--	86.8	--	nC

Typical Performance Characteristics

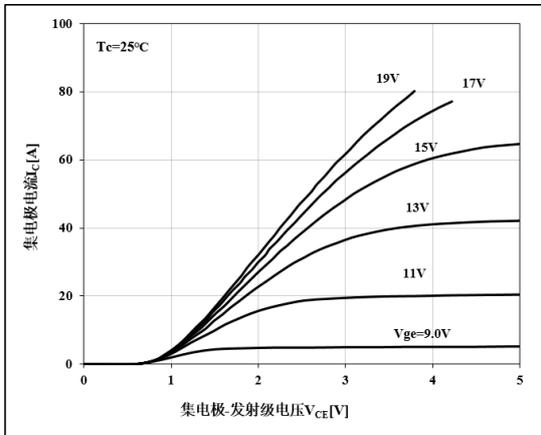


Figure 1. Output Characteristics

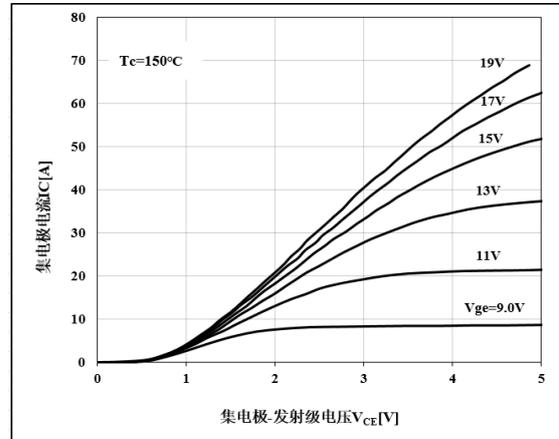


Figure 2. Output Characteristics

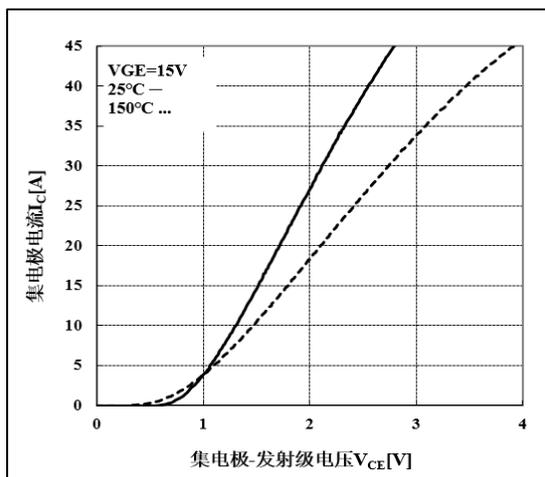


Figure 3. Saturation Voltage Characteristics

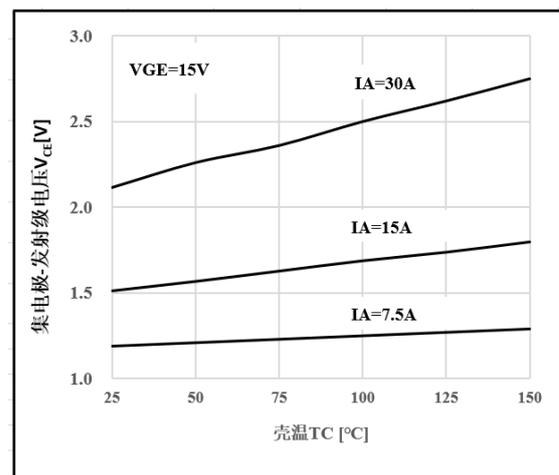


Figure 4. Saturation Voltage -Tc Characteristics

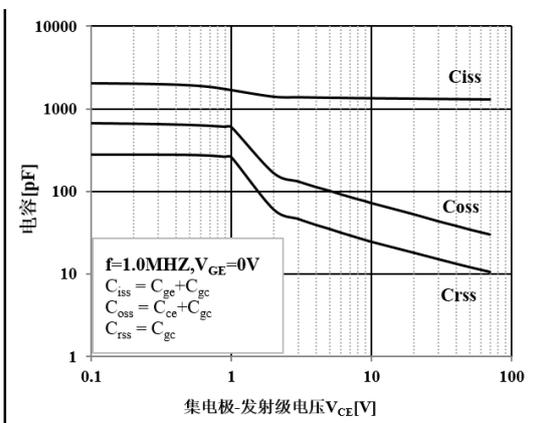


Figure 5. Capacitance Characteristics

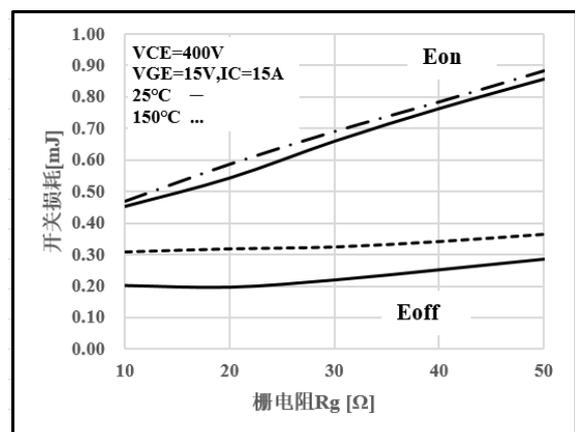


Figure 6. Switching Loss-R_G Characteristics

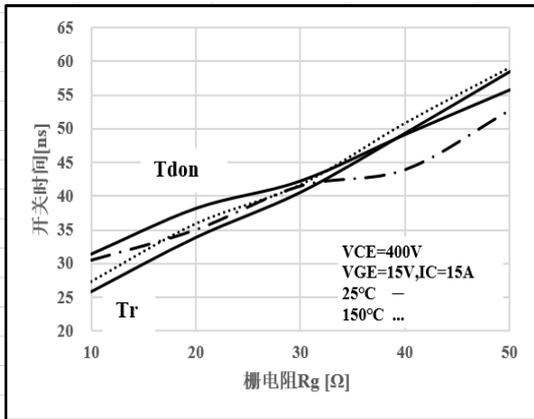


Figure 7. Switching Time- R_g Characteristics

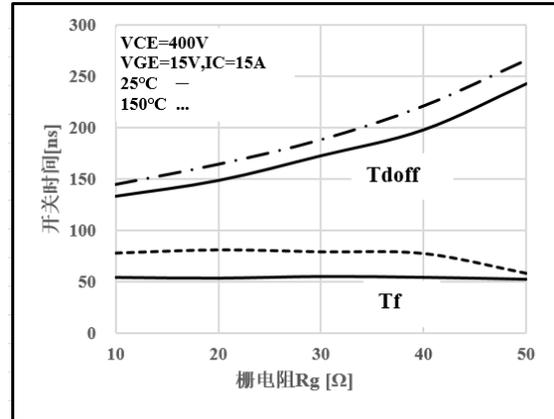


Figure 8. Switching Time- R_g Characteristics

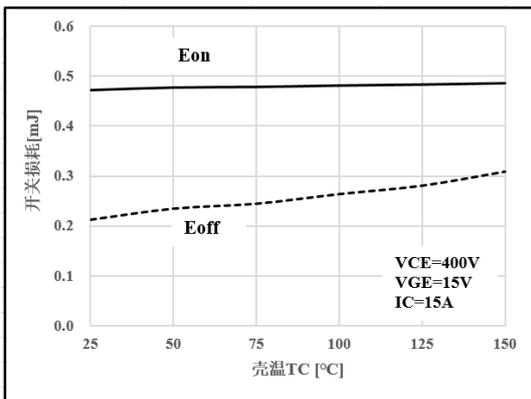


Figure 9. Switching Loss- R_g Characteristics

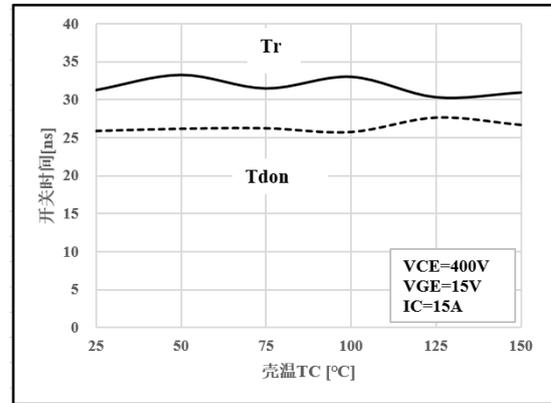


Figure 10. Switching Time- T_c Characteristics

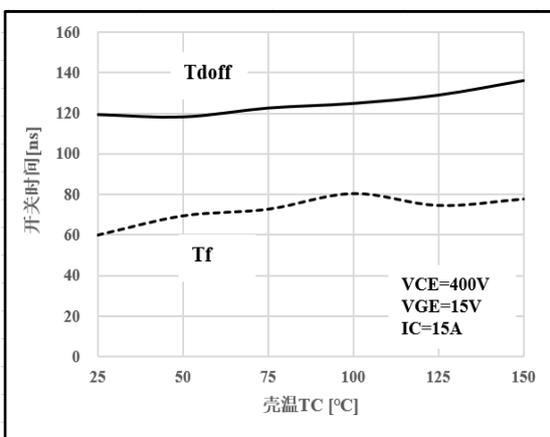


Figure 11. Switching Time- T_c Characteristics

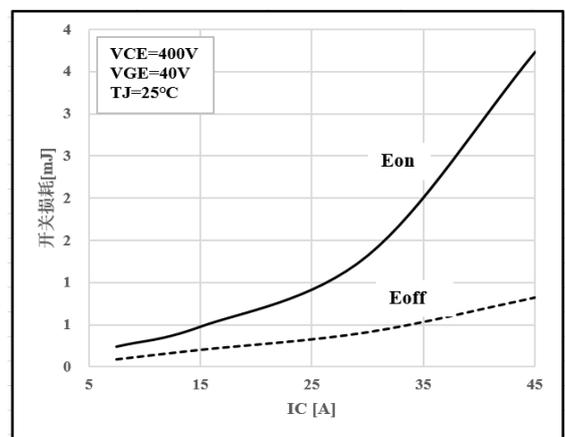


Figure 12. Switching Loss- I_c Characteristics

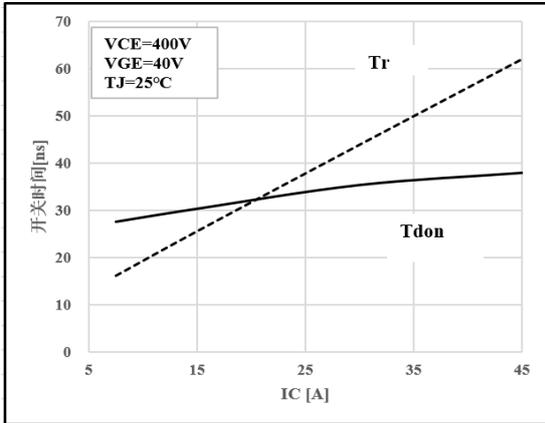


Figure 13. Switching Time-Ic Characteristics

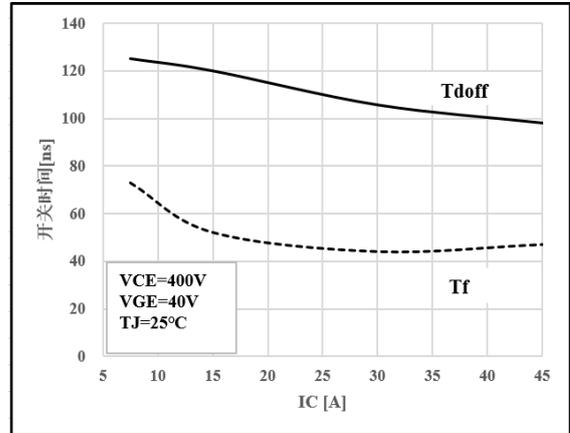


Figure 14. Switching Time-Ic Characteristics

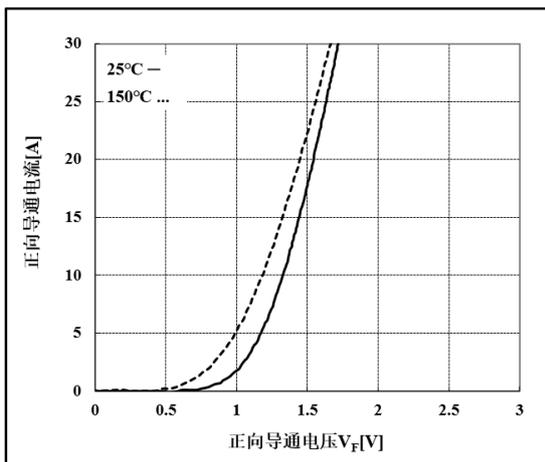


Figure 15. Diode Forward Characteristics

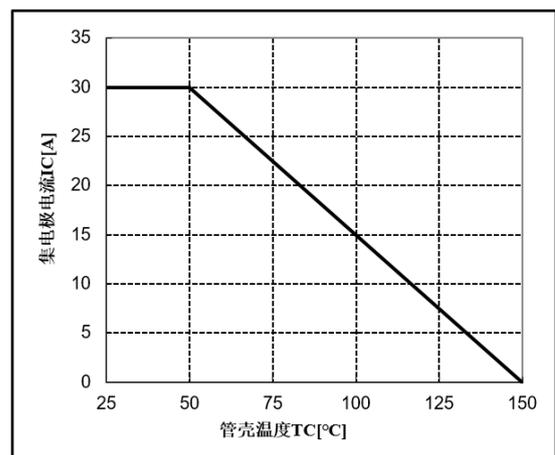


Figure 16. Collector Current -Tc Characteristics

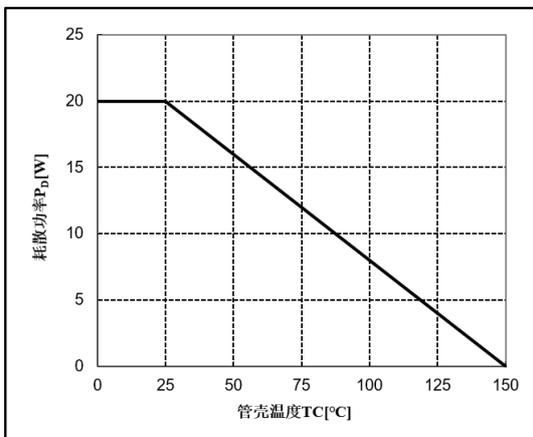


Figure 17. Power Dissipation -Tc Characteristics (TO-220F)

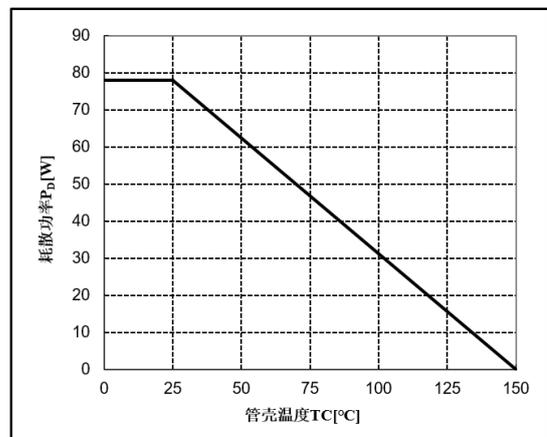


Figure 18. Power Dissipation -Tc Characteristics (TO-220AB)

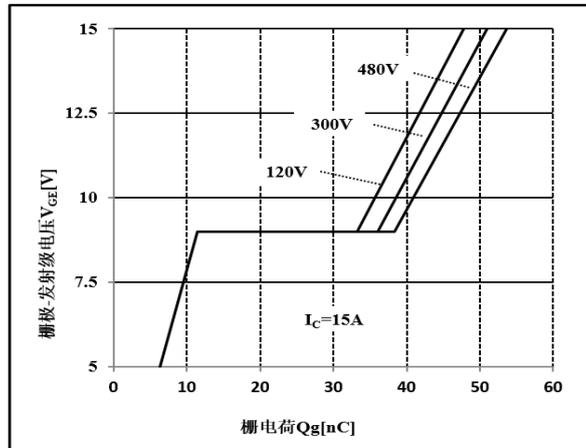


Figure 19. Gage Charge Characteristics

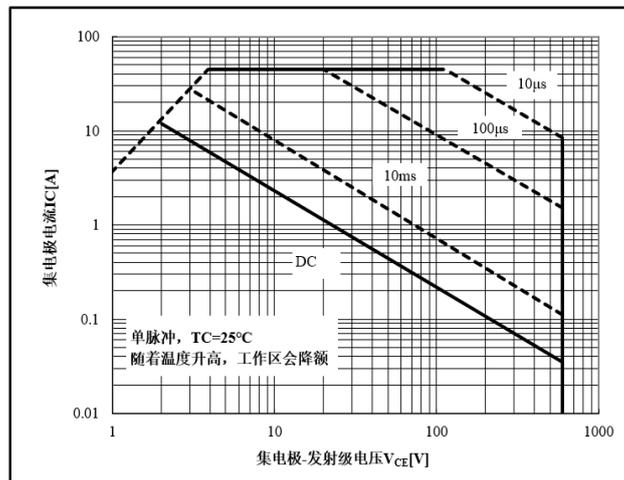


Figure 20. TO-220F Forward Bias Safe Operating Area

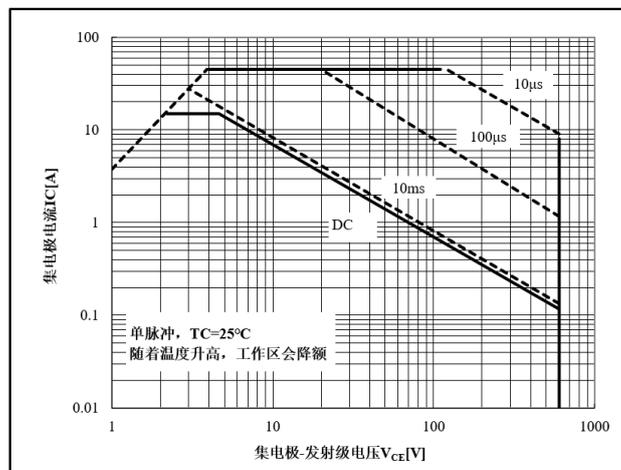


Figure 21. TO-220 Forward Bias Safe Operating Area

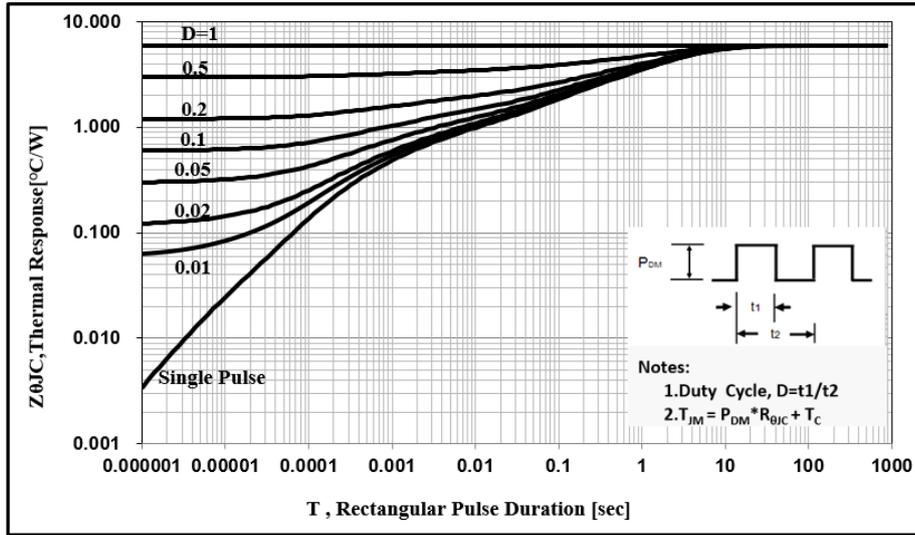


Figure 22.IGBT Transient Thermal Impedance(TO-220F)

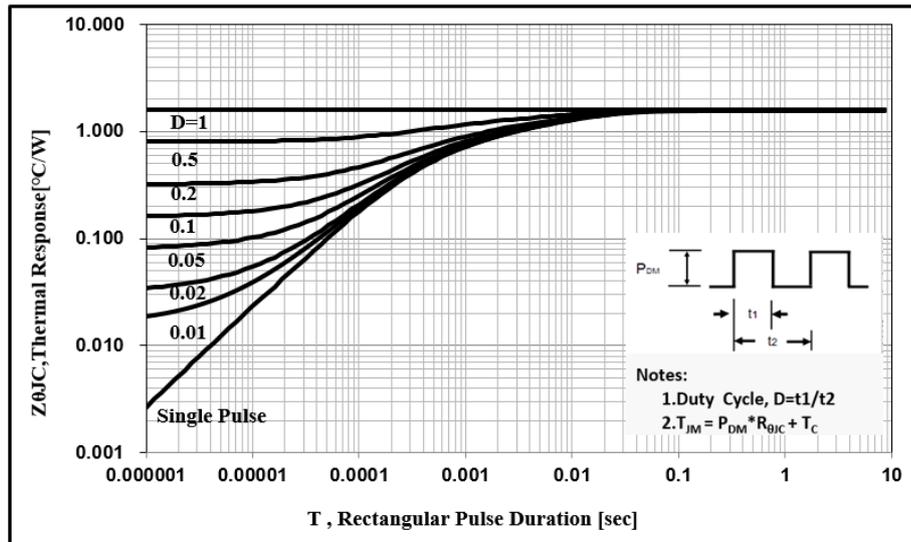
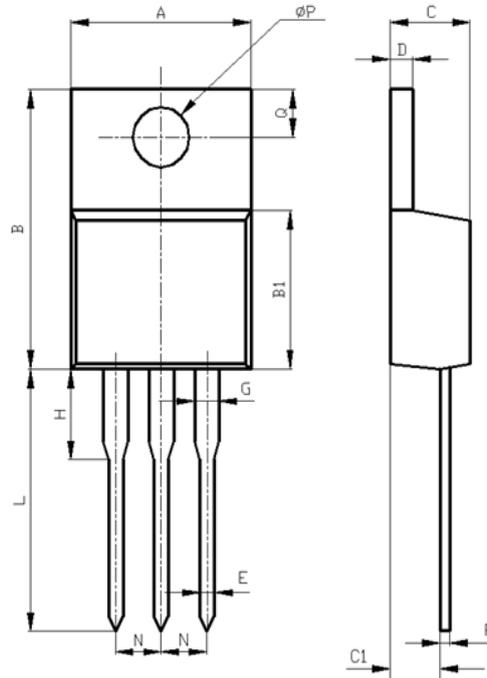
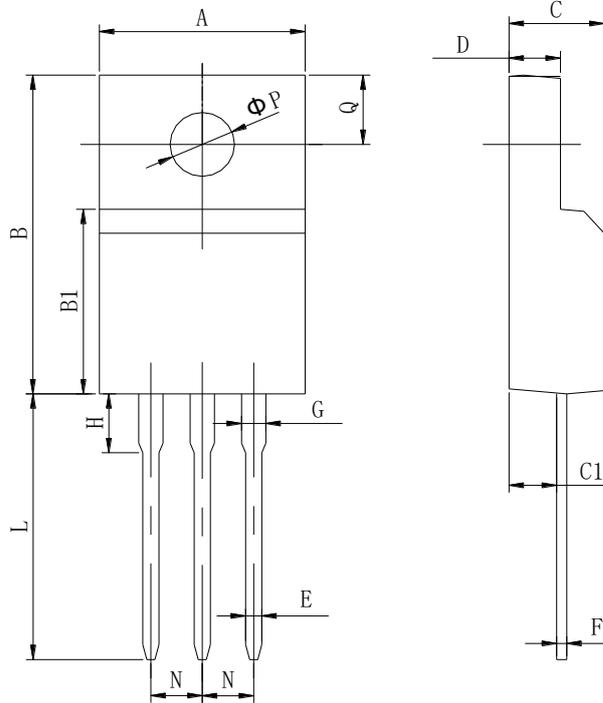


Figure 23.IGBT Transient Thermal Impedance (TO-220)

Package Information: CRG15T60A83L (TO-220)


Items	Values (mm)	
	MIN	MAX
A	9.60	10.6
B	15.0	16.0
B1	8.90	9.50
C	4.30	4.80
C1	2.30	3.10
D	1.20	1.40
E	0.70	0.90
F	0.30	0.60
G	1.17	1.37
H	2.70	3.80
L	12.6	14.8
N	2.34	2.74
Q	2.40	3.00
ϕP	3.50	3.90

TO-220 Package

Package Information: CRG15T60A93L (TO-220F)


Items	Values(mm)	
	MIN	MAX
A	9.60	10.4
B	15.4	16.2
B1	8.90	9.50
C	4.30	4.90
C1	2.10	3.00
D	2.40	3.00
E	0.60	1.00
F	0.30	0.60
G	1.12	1.42
H	3.40	3.80
L	12.0	14.0
N	2.34	2.74
Q	3.15	3.55
ϕP	2.90	3.30

TO-220F 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.

WUXI CHINA RESOURCES HUAJING MICROELECTRONICS CO., LTD.

Add: No.14 Liangxi RD. Wuxi, Jiangsu, China **Mail:** 214061 <https://www.crmicro.com>
Tel: 0510-85807228 **Fax:** 0510-85800864

Marketing Part: **Post:** 214061 **Tel / Fax:** 0510-85807228-3663/5508
0510-85800360 (Fax)

Application and Service: **Post:** 214061 **Tel / Fax:** 0510-85807228-3399 / 2227