



CRG40T120AK3SD

General Description:

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

V _{CES}	1200	V
I _C	40	A
P _{tot} (T _C =25°C)	333	W
V _{CE(sat)}	1.9	V

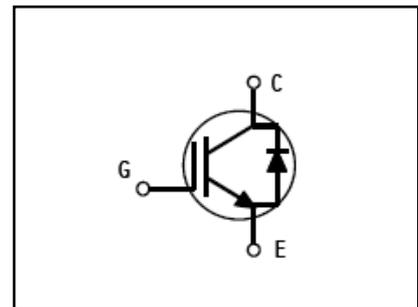
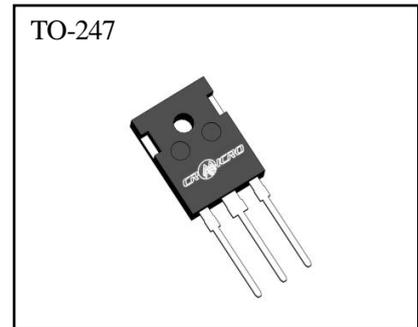
Features:

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

V_{CE(sat)},TYP=1.9V @I_C=40A,V_{GE}=15V;

Applications

- Solar Inverter
- UPS



Package Parameters

Type	Marking	Package	Packing
CRG40T120AK3SD	G40T120AK3SD	TO-247	Tube

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

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate- Emitter Voltage	± 20	V
V_{GES}	Gate- Emitter Voltage ($t_p \leq 10\mu\text{s}, D < 0.01$)	± 30	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	80	A
	Collector Current @ $T_C = 100^\circ\text{C}$	40	
I_{CM}^{a1}	Pulsed Collector Current @ $T_C = 25^\circ\text{C}$	160	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	40	A
I_{FM}	Diode Maximum Forward Current	160	A
P_D	Power Dissipation @ $T_C = 25^\circ\text{C}$	333	W
T_{vjop}^{a2}	Operating Junction temperature range	$-40 \sim 175$	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	$-55 \sim 150$	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	270	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.45	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	0.7	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ\text{C}/\text{W}$

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	$V_{GE}=0V, I_{CE}=250\mu\text{A}$	1200	--	--	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=1200V$	--	--	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	$I_C=40A, V_{GE}=15V$	--	1.9	2.4	V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=250\mu\text{A}, V_{CE}=V_{GE}$	5	6.0	7	V
Pulse width $t_p \leq 300\mu\text{s}, \delta \leq 2\%$						
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1\text{MHz}$	--	6618	--	pF
C_{oes}	Output Capacitance		--	131	--	
C_{res}	Reverse Transfer Capacitance		--	111	--	

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=600V, I_C=40A,$ $R_g=10\Omega, V_{GE}=15V,$ Inductive Load, $T_J=25^\circ C,$	--	77	--	ns	
t_r	Rise Time		--	47.5	--		
$t_{d(off)}$	Turn-Off Delay Time		--	238	--		
t_f	Fall Time		--	47	--		
E_{on}	Turn-On Switching Loss	$V_{CE}=600V, I_C=40A,$ $R_g=10\Omega, V_{GE}=15V,$ Inductive Load, $T_J=150^\circ C$	--	2.8	--	mJ	
E_{off}	Turn-Off Switching Loss		--	1.5	--		
E_{ts}	Total Switching Loss		--	4.3	--		
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=600V, I_C=40A,$ $R_g=10\Omega, V_{GE}=15V,$ Inductive Load, $T_J=150^\circ C$		69		ns	
t_r	Rise Time			50			
$t_{d(off)}$	Turn-Off Delay Time			267			
t_f	Fall Time			105			
E_{on}	Turn-On Switching Loss			2.86			mJ
E_{off}	Turn-Off Switching Loss			2			
E_{ts}	Total Switching Loss		4.86				
Q_g	Total Gate Charge	$V_{CE}=600V, I_C=40A,$ $V_{GE}=15V,$	--	208	--	nC	
Q_{ge}	Gate to Emitter Charge		--	53	--		
Q_{gc}	Gate to Collector Charge		--	88	--		
Electrical Characteristics of the DIODE ($T_C=25^\circ C$ unless otherwise specified):							
V_F	Diode Forward Voltage	$I_F=40A$	--	2.27	2.8	V	
t_{rr}	Reverse Recovery Time	$I_F=40A$ $di/dt=100A/\mu S$	--	88	--	ns	
I_{rrm}	Reverse Recovery Current		--	7.6	--	A	
Q_{rr}	Reverse Recovery Charge		--	326	--	nC	

Notes:

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

a2: Overload condition, it is allowed to operate under the maximum junction temperature $T_{vjop} = 175^\circ C$, the maximum duty cycle is less than 20% (lasting for 60s at most)

Typical Performance Characteristics

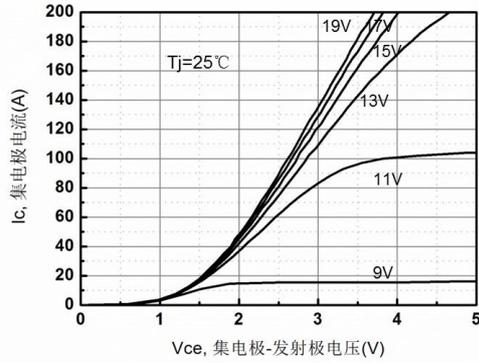


Figure 1. Output Characteristics

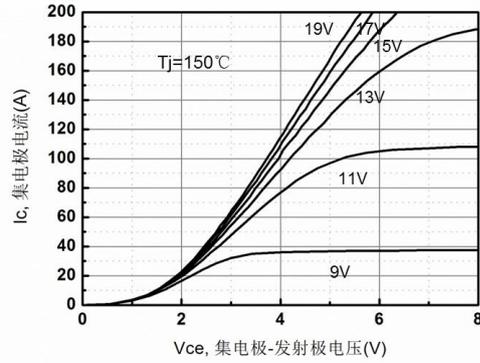


Figure 2. Output Characteristics

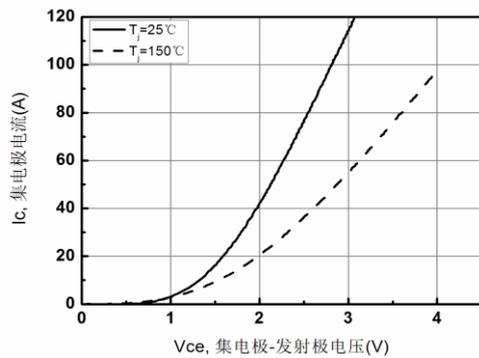


Figure 3. Saturation Voltage Characteristics

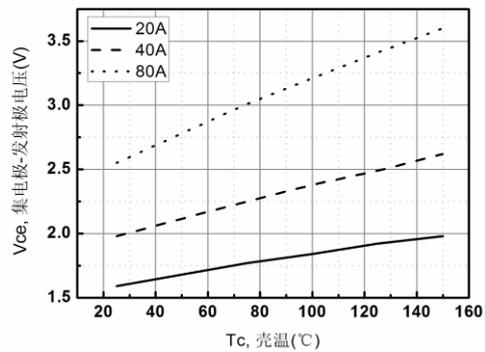


Figure 4. Saturation Voltage - T_c Characteristics

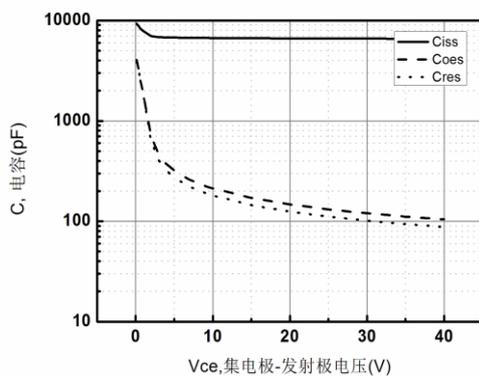


Figure 5. Capacitance Characteristics

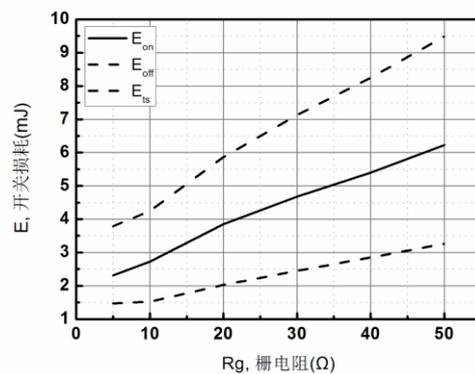


Figure 6. Switching Loss- R_g Characteristics

$V_{CE}=600V, I_C=40A, R_g=10\Omega, V_{BE}=15V$, Inductive Load, $T_a=25^\circ C$

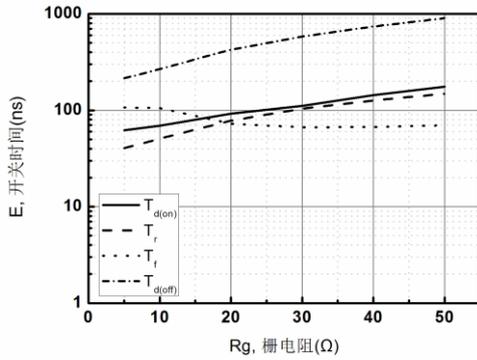


Figure 7. Switching Time- R_g Characteristics

$V_{CE}=600V, I_C=40A, R_g=10\Omega, V_{GE}=15V$, Inductive Load, $T_a=25^\circ C$

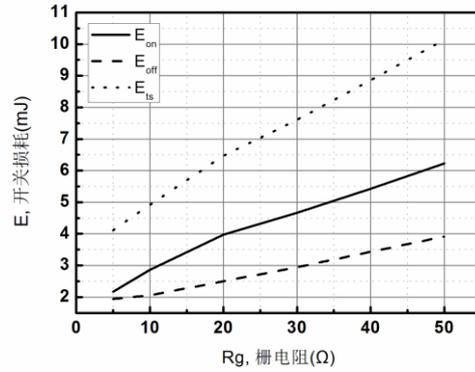


Figure 8. Switching Loss- R_g Characteristics

$V_{CE}=600V, I_C=40A, R_g=10\Omega, V_{GE}=15V$, Inductive Load, $T_a=150^\circ C$

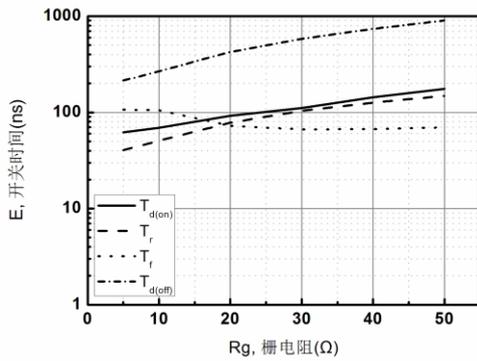


Figure 9. Switching Time- R_g Characteristics

$V_{CE}=600V, I_C=40A, R_g=10\Omega, V_{GE}=15V$, Inductive Load, $T_a=150^\circ C$

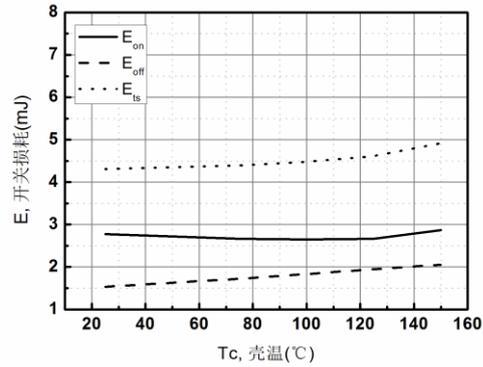


Figure 10. Switching Loss- T_c Characteristics

$V_{CE}=600V, I_C=40A, R_g=10\Omega, V_{GE}=15V$, Inductive Load,

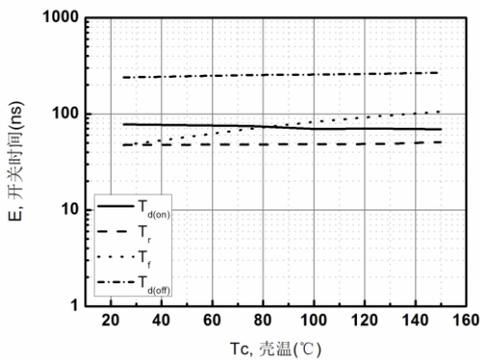


Figure 11. Switching Time- T_c Characteristics

$V_{CE}=600V, I_C=40A, R_g=10\Omega, V_{GE}=15V$, Inductive Load,

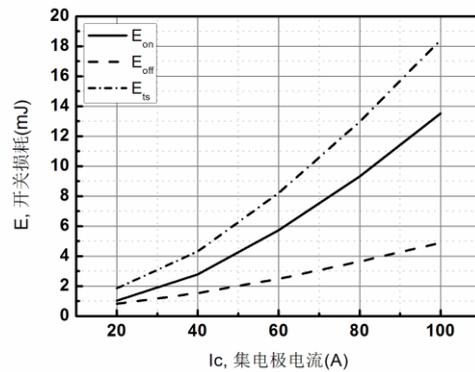


Figure 12. Switching Loss- I_c Characteristics

$V_{CE}=600V, R_g=10\Omega, V_{GE}=15V$, Inductive Load, $T_a=25^\circ C$

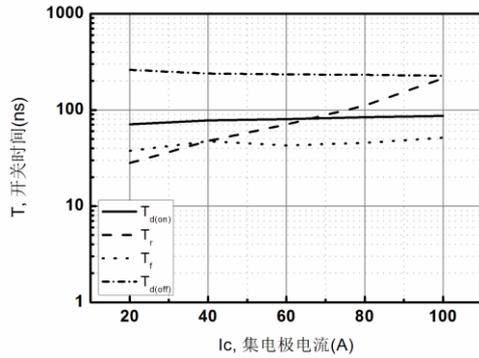


Figure 13. Switching Time-Ic Characteristics

$V_{CE}=600V, R_{\theta}=10\Omega, V_{GE}=15V$, Inductive Load, $T_a=25^\circ C$

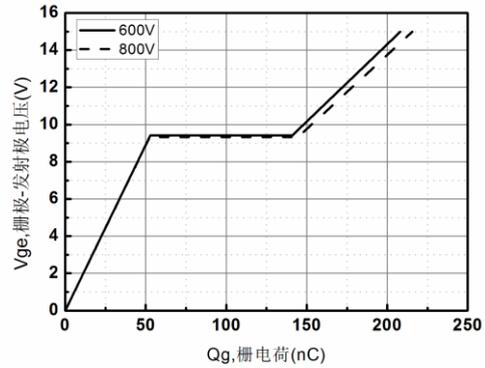


Figure 14. Gage Charge Characteristics

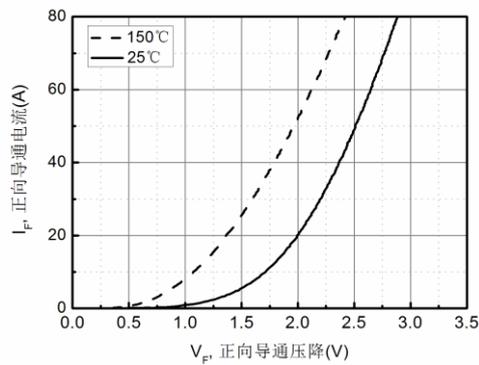


Figure 15. Diode Forward Characteristics

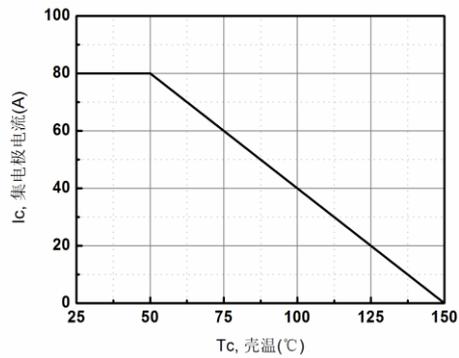


Figure 16. Collector Current-Tc Characteristics

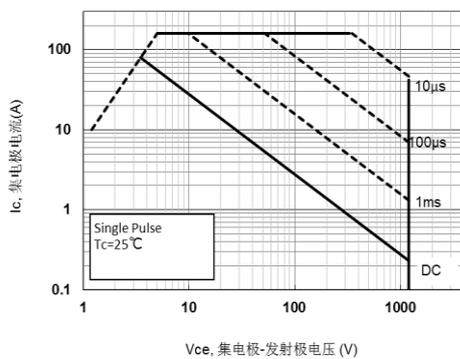


Figure 17. Forward Bias Safe Operating Area

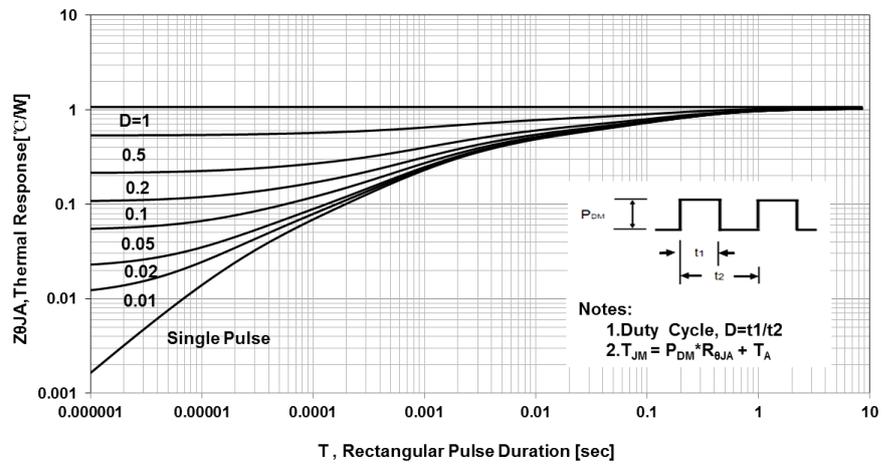
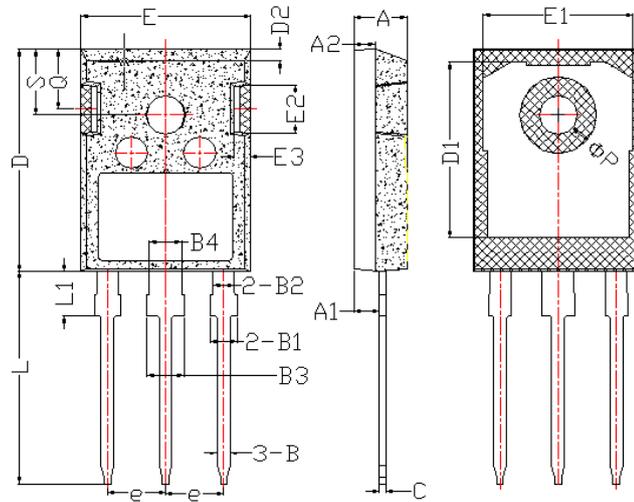


Figure 19.IGBT Transient Thermal Impedance

Package Information


Items	Values (mm)	
	MIN	MAX
A	4.6	5.2
A1	2,2	2.6
B	0.9	1.4
B1	1.75	2.35
B2	1.75	2.15
B3	2.8	3.35
B4	2.8	3.15
C	0.5	0.7
D	20.60	21.30
D1	16	18
E	15.5	16.10
E1	13	14.7
E2	3.80	5.3
E3	0.8	2.60
e	5.2	5.7
L	19	20.5
L1	3.9	4.6
ΦP	3.3	3.70
Q	5.2	6.00
S	5.8	6.6

TO-247 Package

