



Silicon FS Trench IGBT



CRG30T60AK3HD

General Description:

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

V_{CES}	600	V
I_C	30	A
P_{tot} (T_C=25°C)	156	W
V_{CE(sat)}	1.75	V

Features:

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

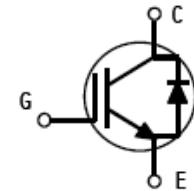
V_{CE(sat)},TYP=1.75V @I_C=30A,V_{GE}=15V;

TO-247



Applications

- Welding
- Solar Inverter
- UPS



Package Parameters

Type	Marking	Package	Packing
CRG30T60AK3HD	G30T60AK3HD	TO-247	Tube



CRG30T60AK3HD

**Absolute Maximum Ratings (T_C= 25°C unless otherwise specified):**

Symbol	Parameter	Rating	Units
V _{CES}	Collector-Emitter Voltage	600	V
V _{GES}	Gate- Emitter Voltage	±20	V
I _C	Collector Current @T _C = 25 °C	60	A
	Collector Current @T _C = 100 °C	30	
I _{CM} ^{a1}	Pulsed Collector Current @T _C =25°C	90	A
I _F	Diode Continuous Forward Current @T _C = 100 °C	30	A
	Diode Continuous Forward Current @T _C = 25 °C	60	A
I _{FM}	Diode Maximum Forward Current	90	A
P _D	Power Dissipation @ T _C = 25 °C	156	W
	Power Dissipation @T _C = 100 °C	62.5	
T _J	Operating Junction	-40~150	°C
T _{stg}	Storage Temperature Range	-55~150	°C
T _L	Wave Soldering Temperature for 10 sec	260±5	°C

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Thermal Resistance, Junction to case for IGBT	--	0.8	°C/W
R _{θJC}	Thermal Resistance, Junction to case for Diode	--	1.2	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	--	43	°C/W

Electrical Characteristics of the IGBT (T_C= 25°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} =250uA	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 =30A ,V _{GE} =15V	--	1.75	2.4	V
V _{GE(th)}	Gate Threshold Voltage	I _C =1mA ,V _{CE} =V _{GE}	3.5	5.4	7.0	V
Pulse width tp≤300 μs,δ≤2%						
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V,V _{GE} =0V f=1MHz	--	4286	--	pF
C _{oes}	Output Capacitance		--	102	--	
C _{res}	Reverse Transfer Capacitance		--	68	--	



CRG30T60AK3HD

**Switching Characteristics**

$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=30A, R_g=10\Omega, V_{GE}=15V, \text{Inductive Load}, T_J=25^\circ C$	--	65	--	ns
t_r	Rise Time		--	48	--	
$t_{d(off)}$	Turn-Off Delay Time		--	192	--	
t_f	Fall Time		--	37.5	--	
E_{on}	Turn-On Switching Loss	$V_{CE}=400V, IC=30A, R_g=10\Omega, V_{GE}=15V, \text{Inductive Load}, T_J=150^\circ C$	--	1.23	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.46	--	
E_{ts}	Total Switching Loss		--	1.69	--	
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, IC=30A, R_g=10\Omega, V_{GE}=15V, \text{Inductive Load}, T_J=150^\circ C$	--	59	--	ns
t_r	Rise Time		--	49	--	
$t_{d(off)}$	Turn-Off Delay Time		--	211	--	
t_f	Fall Time		--	35.5	--	
E_{on}	Turn-On Switching Loss	$V_{CE}=400V, I_C=30A, V_{GE}=15V$	--	1.28	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.53	--	
E_{ts}	Total Switching Loss		--	1.81	--	
Q_g	Total Gate Charge	$V_{CE}=400V, I_C=30A, V_{GE}=15V$	--	162	--	nC
Q_{ge}	Gate to Emitter Charge		--	33.5	--	
Q_{gc}	Gate to Collector Charge		--	73.2	--	

Electrical Characteristics of the DIODE ($T_C = 25^\circ C$ unless otherwise specified):

V_F	Diode Forward Voltage	$I_F=30A$	--	1.4	2.0	V
t_{rr}	Reverse Recovery Time	$I_F=30A$ $di/dt=200A/\mu s$	--	80	--	ns
I_{rrm}	Reverse Recovery Current		--	6	--	A
Q_{rr}	Reverse Recovery Charge		--	240	--	nC

Typical Performance Characteristics

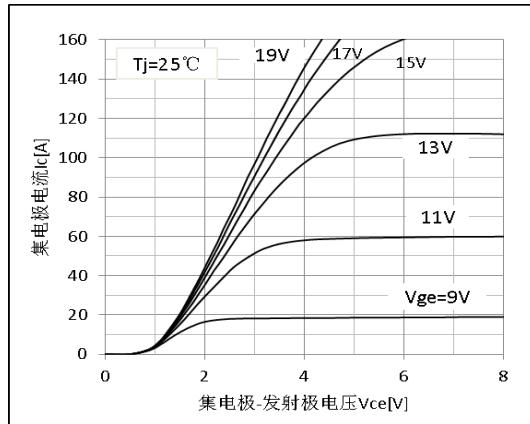


Figure 1.Output Characteristics

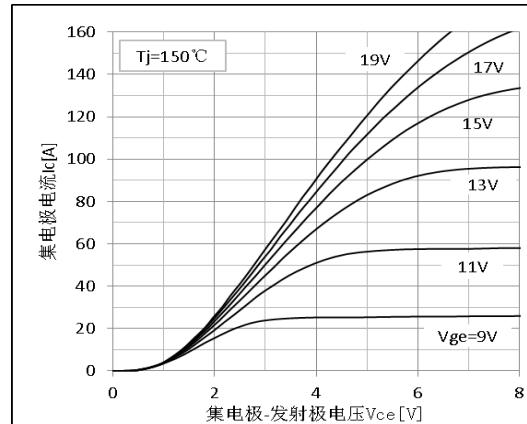


Figure 2.Output Characteristics

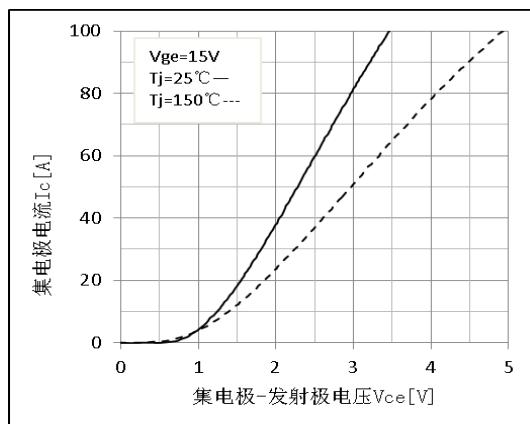


Figure 3.Saturation Voltage Characteristics

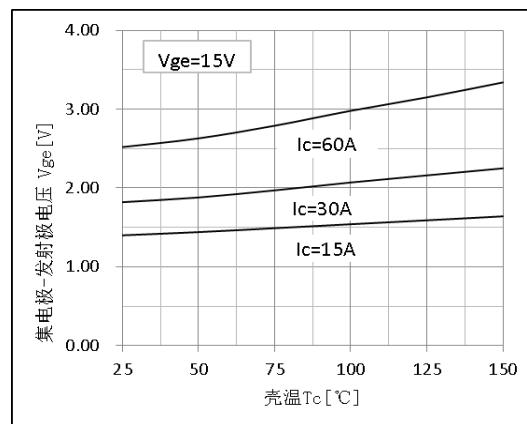


Figure 4.Saturation Voltage - T_c Characteristics

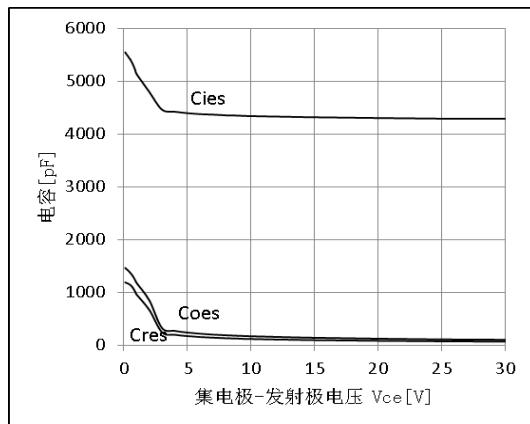


Figure 5.Capacitance Characteristics

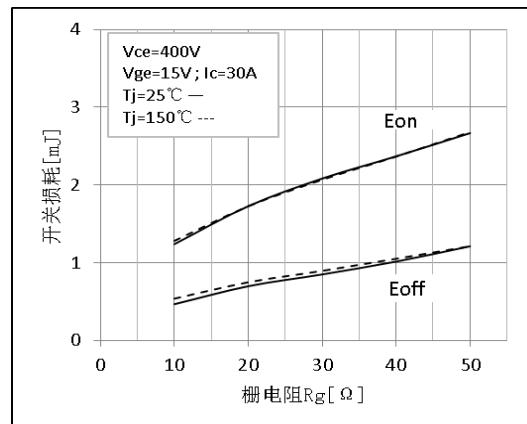


Figure 6.Switching Loss- R_g Characteristics

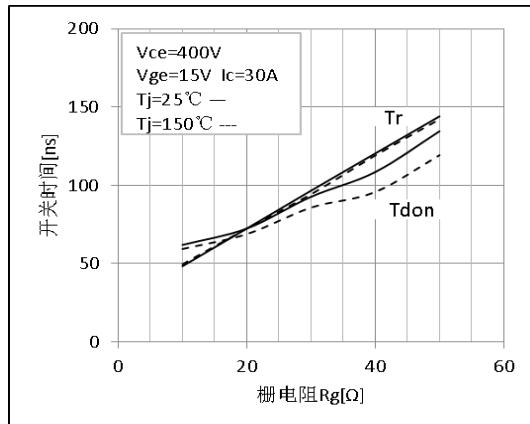


Figure 7.Switching Time- R_g Characteristics

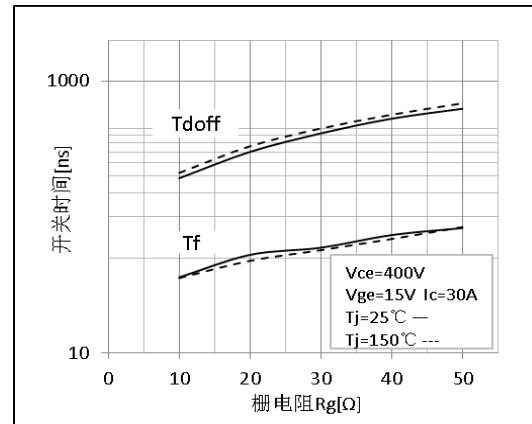


Figure 8.Switching Time- R_g Characteristics

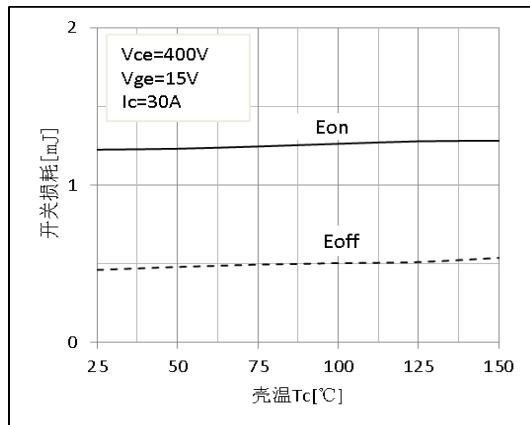


Figure 9.Switching Loss-Tc Characteristics

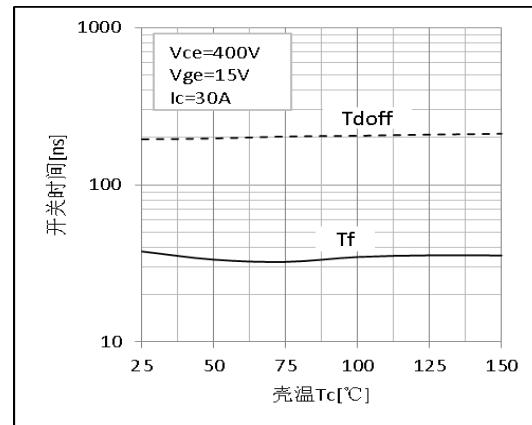


Figure 10.Turn-Off Time-Tc Characteristics

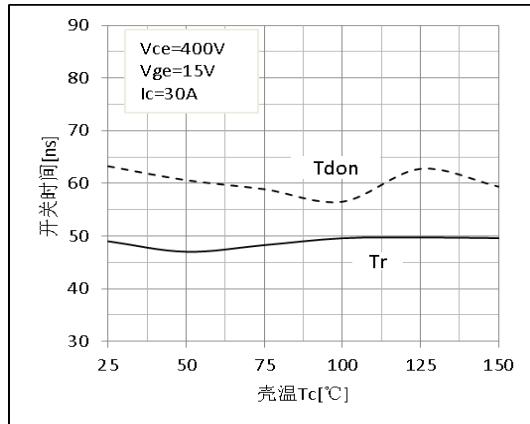


Figure 11.Turn-On Time-Tc Characteristics

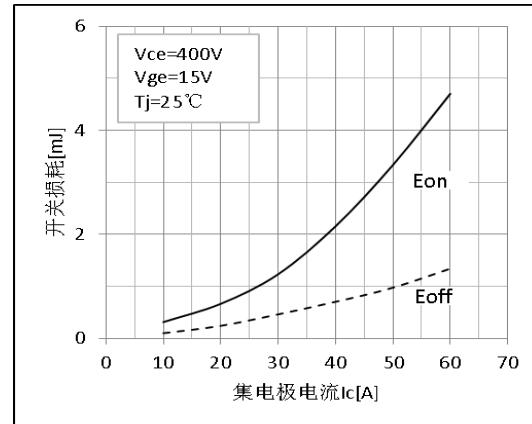


Figure 12.Switching Loss- I_c Characteristics

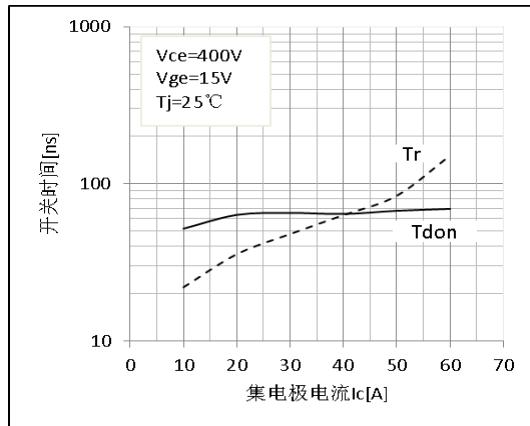


Figure 13.Switching Loss-Ic Characteristics

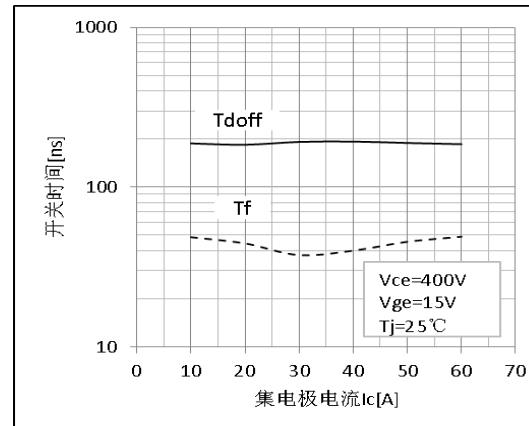


Figure 14. Turn-Off Time-Ic Characteristics

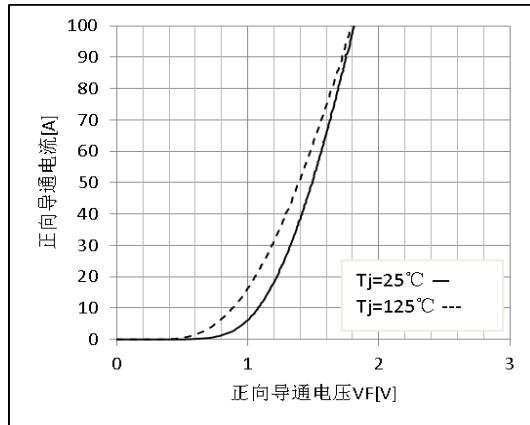


Figure 15.Diode Forward Characteristics

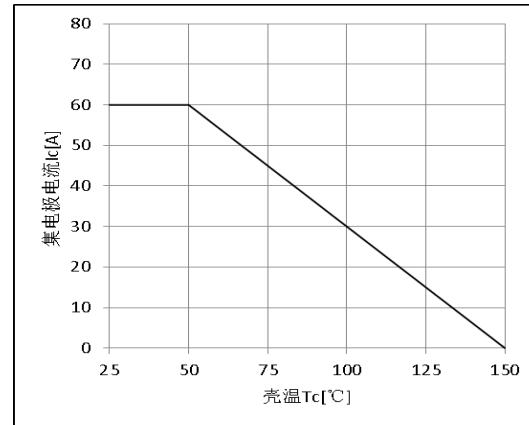


Figure 16. Collector Current-Tc Characteristics

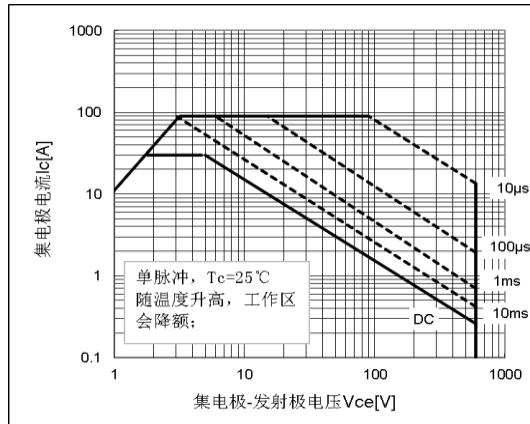


Figure 17.Forward Bias Safe Operating Area

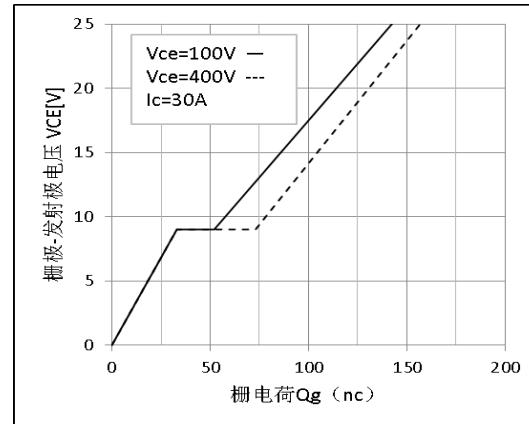


Figure 18.Gage Charge Characteristics

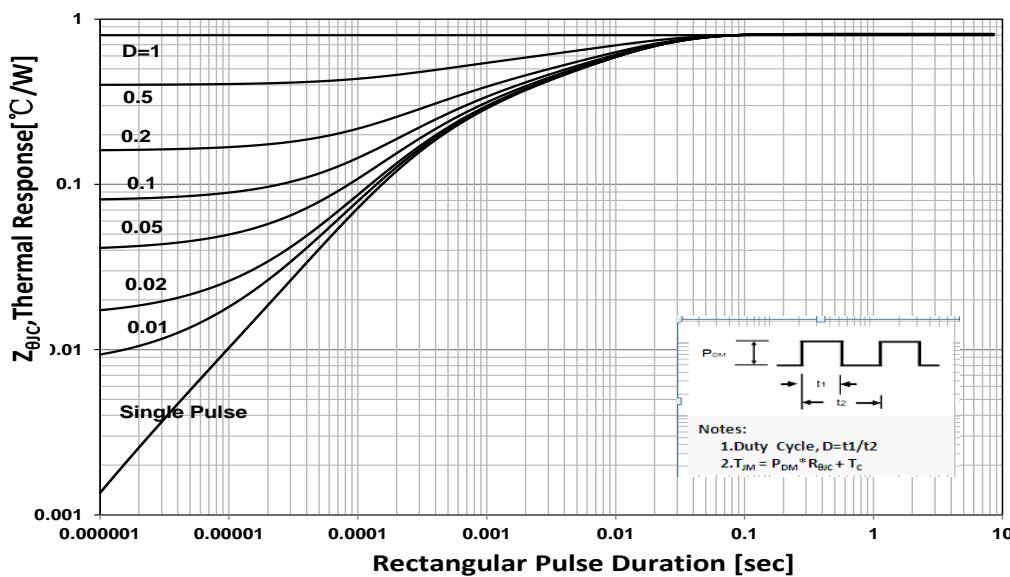
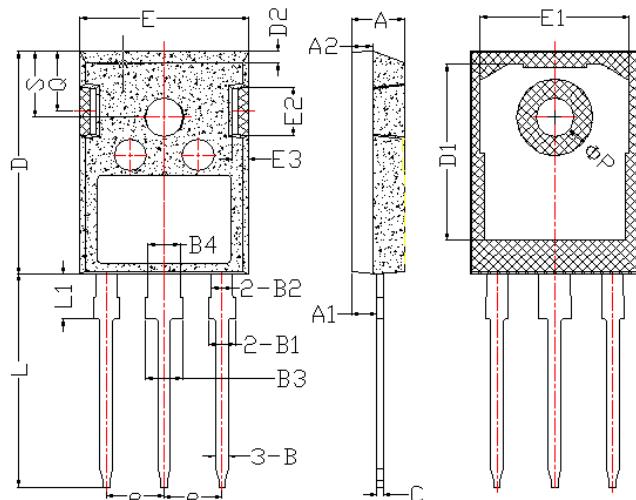


Figure 19.IGBT Transient Thermal Impedance

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



The name and content of poisonous and harmful material in products

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