

Silicon Trench & Field Stop(FS) IGBT

Description

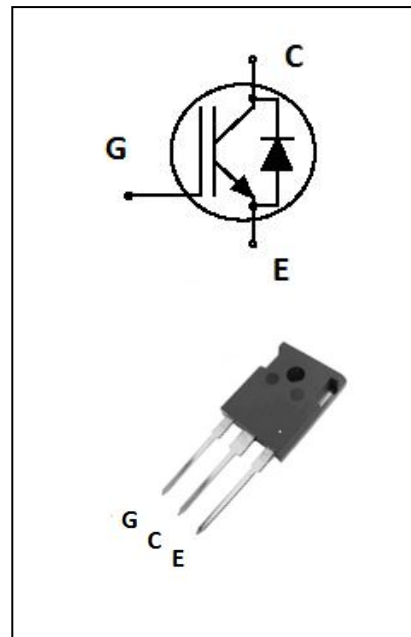
The THG40T120FQK is use advanced trench & field stop(FS) technology. The 1200V Trench & FS IGBT offers superior conduction and switching performances.

General Features

- 1200V Breakdown Voltage
- Low saturation voltage: $V_{CE(sat)}$, typ=1.95V
@ $I_C=40A$ and $T_C=25^{\circ}C$
- FS Planar Technology, Positive temperature coefficient
- High speed switch & Low power loss

Application

- Solar Converters
- Welding Converters
- UPS



Electrical Characteristics @ $T_C=25^{\circ}C$ (unless otherwise specified)

a) Limited Parameters:

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	+/-30	V
I_C	Collector Current	65	A
	Collector Current @ $T_C=100^{\circ}C$	40	A
I_{CM}	Pulsed Collector Current	120	A
I_F	Diode Continuous Forward Current @ $T_C=100^{\circ}C$	40	A
I_{FM}	Diode Maximum Forward Current	100	A
P_D	Total Dissipation at	280	W
	Total Dissipation at @ $T_C=100^{\circ}C$	110	
	Total Dissipation at @ $T_a=25^{\circ}C$	3.125	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	$^{\circ}C$
T_L	Max Temperature For Soldering	265	$^{\circ}C$

b) Electrical Parameters:

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{CES}	Collector-Emitter Voltage	$V_{GE}=0V, I_{CE}=250\mu A$	1200			V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=40A$		1.95	2.5	V
$V_{GE(th)}$	Gated Threshold Voltage	$V_{CE}=V_{GE}, I_C=1mA$	5.1		6.7	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=1200V$			1.0	μA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	$V_{GE}=+30V,$			100	nA
$I_{GES(R)}$	Gate to Emitter Reverse Leakage	$V_{GE}=-30V,$			-100	nA
C_{ies}	Input Capacitance	$V_{GE}=0V,$ $V_{CE}=25V,$ $f=1.0MHz$		2.1		nF
C_{oes}	Output Capacitance			200		pF
C_{res}	Reverse Transfer Capacitance			61		pF
Q_g	Total Gate Charge	$V_{CE}=600V, I_C=40A, V_{GE}=15V$		220		nC

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=600V, I_C=40A$ $V_{GE}=15V, R_G=10\Omega$		60		nS
t_r	Rise Time			140		nS
$t_{d(off)}$	Turn-off Delay Time			320		nS
t_f	Fall Time			251		nS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I _F	Diode Continuous Forward Current	TC=100℃		40		A
I _{FM}	Diode Maximum Forward Current	TC=100℃		200		A
V _F	Diode Forward Voltage	I _F =40A		1.95	2.8	V
t _{rr}	Reverse Recovery Time	T _J =25℃,I _F =40A di/dt=200A/us		95		nS
Q _{rr}	Reverse Recovery Charge			1.1		uC
*Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2%						

Symbol	Parameter	Typ	MAX	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.446	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	1.25	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ C/W$

Typical Performance Characteristics

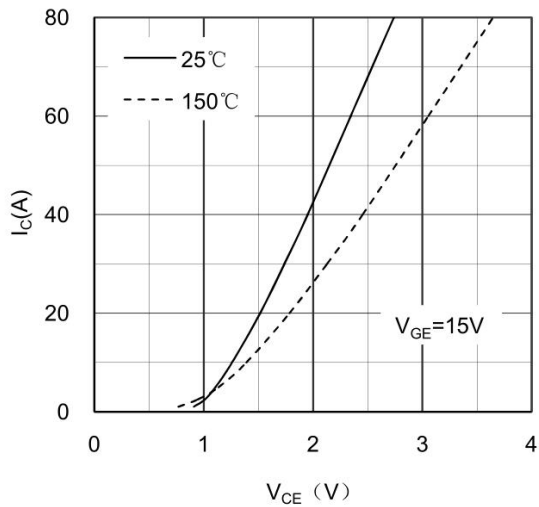


Figure 1. Typical Output Characteristics IGBT

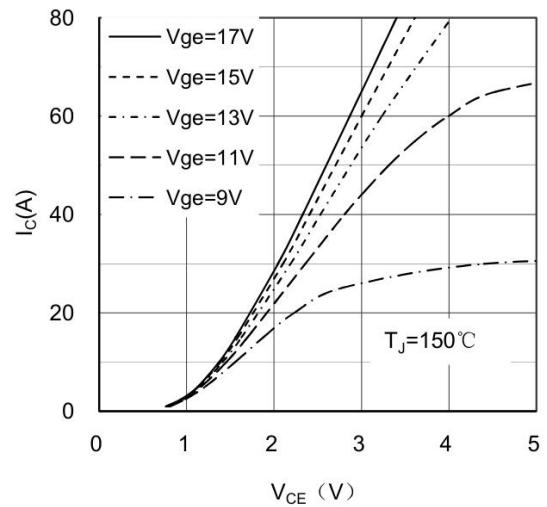


Figure 2. Typical Output Characteristics IGBT

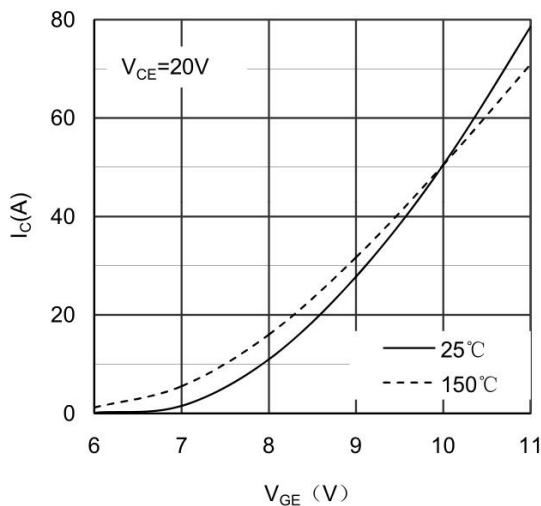


Figure 3. Typical Transfer characteristics IGBT

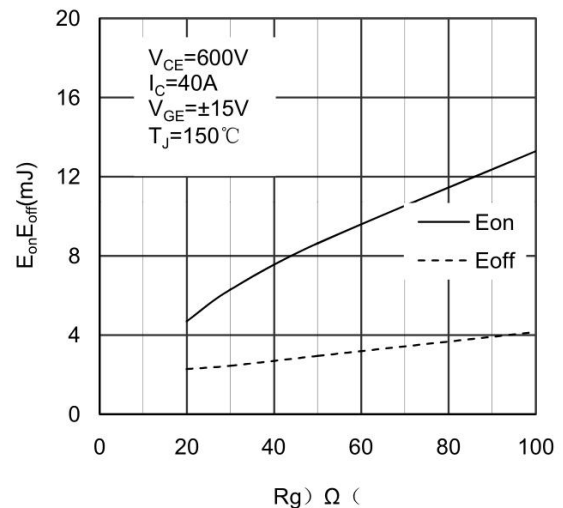


Figure 4. Switching Energy vs Gate Resistor IGBT

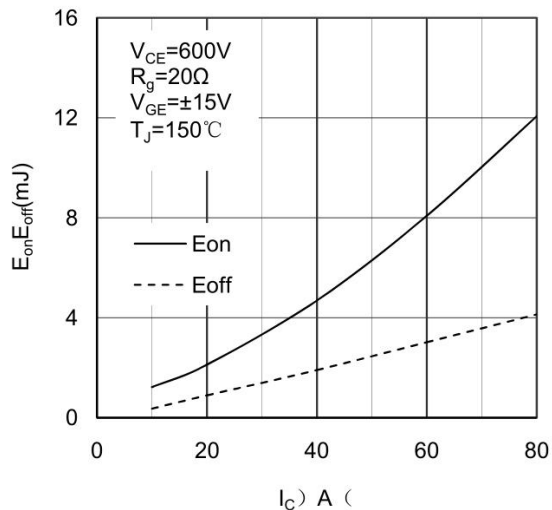


Figure 5. Switching Energy vs Collector Current IGBT

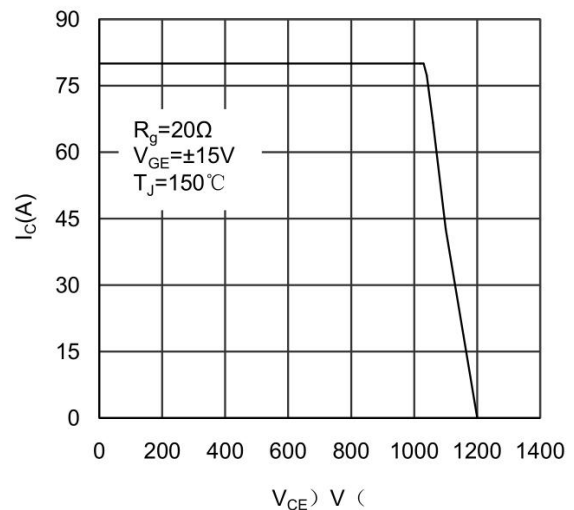


Figure 6. Reverse Biased Safe Operating Area IGBT

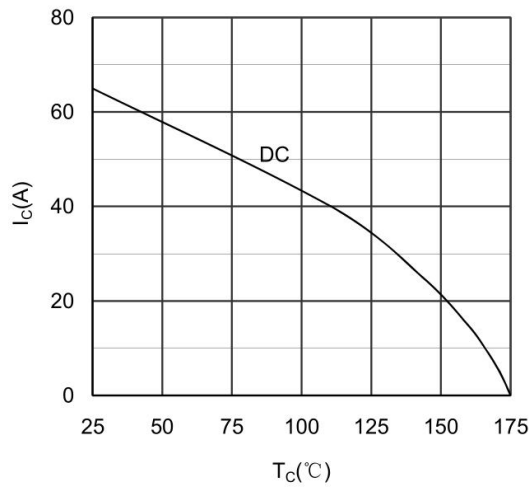


Figure 7. Collector Current vs Case temperature IGBT

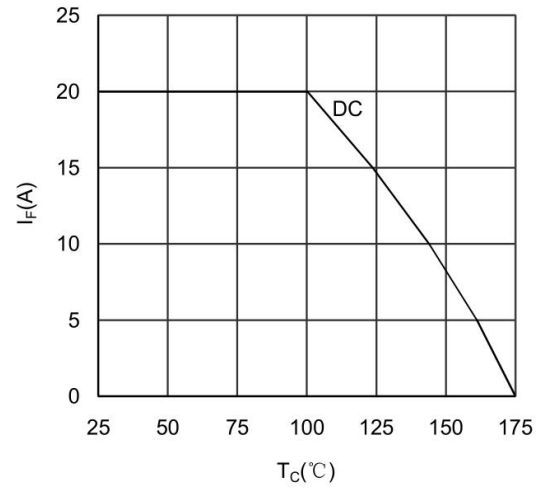


Figure 8. Forward current vs Case temperature Diode

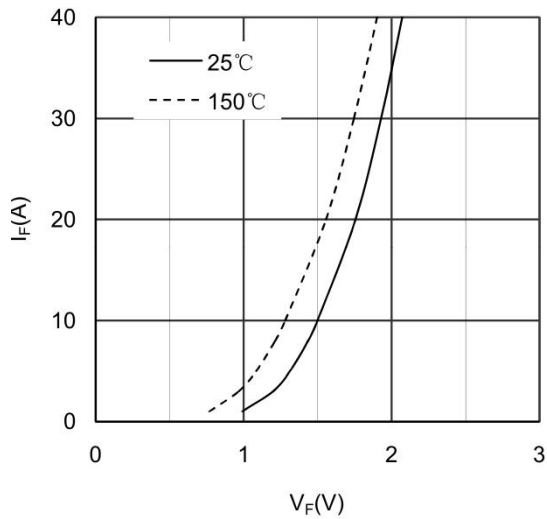


Figure 9. Diode Forward Characteristics Diode

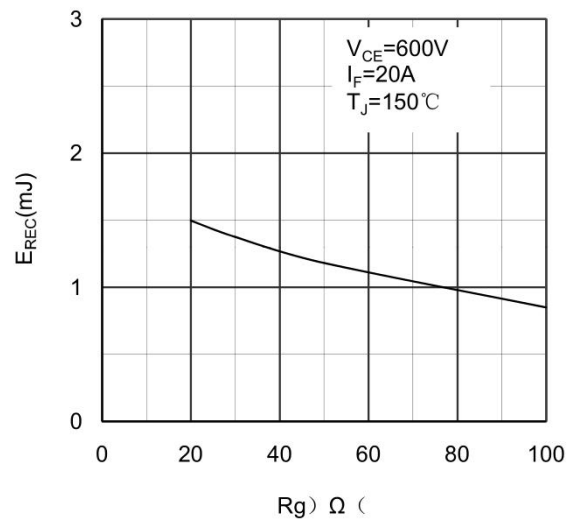


Figure 10. Switching Energy vs Gate Resistor Diode

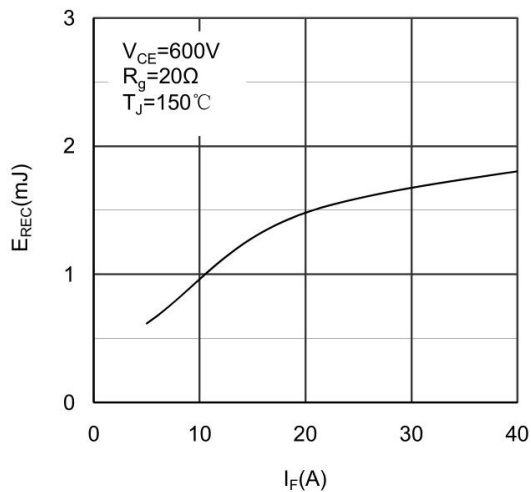


Figure 11. Switching Energy vs Forward Current Diode

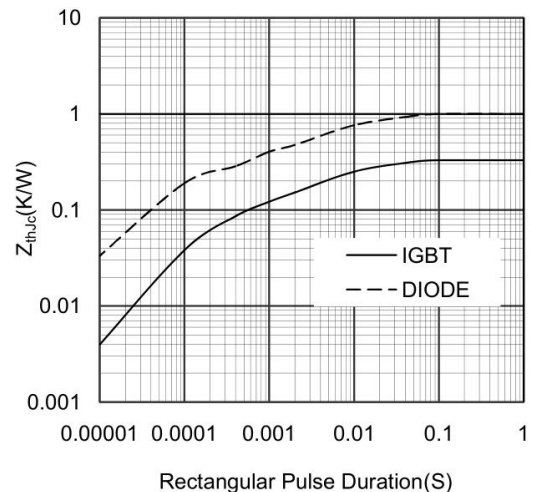
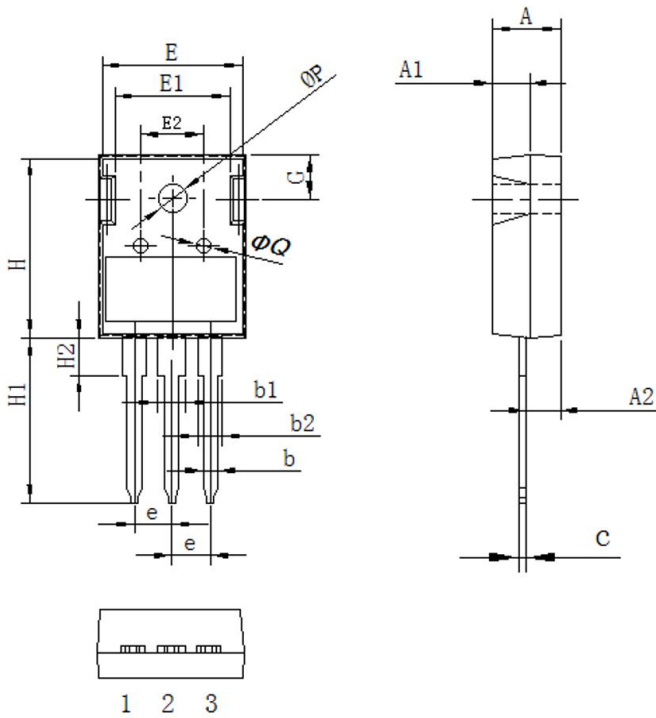


Figure 12. Transient Thermal Impedance of Diode and IGBT

Package Information

TO-247H PACKAGE

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.80	3.00	3.20
A2	2.20	2.40	2.60
b	1.05	1.20	1.35
b1	2.80	3.00	3.20
b2	1.80	2.00	2.20
c	0.50	0.60	0.70
e	5.35	5.45	5.75
E	15.6	15.80	16.0
E1	12.3	12.50	12.7
E2	6.00	6.20	6.40
H	20.5	21.0	21.5
H1	19.0	20.0	21.0
H2	3.00	4.00	5.00
G	5.70	5.90	6.10
ΦP	3.30	3.50	3.50
ΦQ	2.30	2.50	2.70

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