

THG45N120FBKH

1200V 45A Fieldstop Planar IGBT

Advanced field-stop planar technology for low conduction loss, fast switching performance and rugged operation in high-power conversion systems.



Package view and circuit symbol

General Features

- 1200 V breakdown voltage
- $V_{CE(sat)}$, typ. = 2.5 V @ $I_C = 45$ A
- Field-stop planar technology with positive temperature coefficient
- High-speed switching with low power loss
- 10 μ s short-circuit withstand capability
- 175 °C maximum junction temperature

Applications

- Solar Converters
- Welding Converters
- UPS

Key Performance Parameters

Parameter	Value	Unit
V_{CES} , min @ $T_J = 25$ °C	1200	V
T_J , maximum junction temperature	175	°C
I_C @ $T_C = 100$ °C	45	A
$I_{C,pulse}$ @ $T_C = 25$ °C, $t_p = 10$ μ s	135	A
$V_{CE(sat)}$, typ. @ $V_{GE} = 15$ V	2.5	V
Q_g , typ.	128	nC



Marking Information

Product Name	Package	Marking
THG45N120FBKH	TO-247H	THG45N120FBKH

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Maximum Ratings (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Collector-to-Emitter Voltage		V _{CE}	1200	V
Gate-to-Emitter Voltage		V _{GE}	±30	V
Collector Current	T _C =25°C	I _C	90	A
	T _C =100°C		45	
Pulsed Collector Current	T _C =25°C tp limited by Tvjmax	I _{CM}	135	A
Diode Forward Current	T _C =25°C	I _F	40	
	T _C =100°C		20	
Pulsed Diode Forward Current	T _C =25°C tp limited by Tvjmax	I _{FM}	60	
Short Circuit Withstand Time V _{GE} = 15 V, V _{CC} = 800 V, T _C = 25°C		T _{SC}	10	μs
Power Dissipation	T _C =25°C	P _D	625	W
	T _C =100°C		326	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 To +175	°C
Lead Temperature for Soldering Purposes		T _L	270	

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case for IGBT	R _{thJC}	0.23	°C/W
Thermal Resistance, Junction-to-Case for FRD	R _{thJC}	1	
Thermal Resistance, Junction-to-Ambient	R _{thJA}	62.5	

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

Parameter	Symbol	Test Condition		Value			Unit
				min.	typ.	max.	
Collector-to-Emitter Breakdown Voltage	B _V CEs	V _{GE} =0V, I _C =250μA		1200	-	-	V
Zero Gate Voltage Collector Current	I _C ES	V _{GE} =0V, V _{CE} =V _{CES}		-	-	40	μA
Gate-to-Emitter leakage Current	I _G ES	V _{GE} =±30V, V _{CE} =0V		-	-	±300	nA
Gate-to-Emitter Threshold Voltage	V _{GE(th)}	V _{GE} =V _{CES} , I _C =1mA	T _J =25°C	5.2	-	6.6	V
			T _J =150°C	-	4.3	-	
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =45A	T _J =25°C	-	2.5	3	V
			T _J =150°C	-	2.8	-	
Input Capacitance	C _I ES	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		-	3000	-	pF
Output Capacitance	C _O ES			-	220	-	
Reverse Transfer Capacitance	C _R ES			-	73	-	
Total Gate Charge	Q _g	V _{CE} = 600 V, V _{GE} = 15 V, I _C = 45 A		-	128	-	nC
Gate-emitter charge	Q _{ge}				39		
Gate-collector charge	Q _{gc}				68		
Turn-On Delay Time	td(on)	V _{CE} = 600 V V _{GE} = -5/15 V I _C = 45 A R _G = 27 Ω T _J = 25°C		-	81	-	ns
Turn-Off Delay Time	td(off)			-	380	-	
Rise time	tr			-	26	-	
Fall time	tf			-	180	-	
Turn-On Switching Loss	Eon					-	7.8
Turn-Off Switching Loss	Eoff			-	1.8	-	
Turn-On Delay Time	td(on)	V _{CE} = 600 V V _{GE} = -5/15 V I _C = 45 A R _G = 27 Ω T _J = 150°C		-	94	-	ns
Turn-Off Delay Time	td(off)			-	220	-	
Rise time	tr			-	28	-	
Fall time	tf			-	213	-	
Turn-On Switching Loss	Eon					-	7.4
Turn-Off Switching Loss	Eoff			-	2.5	-	

Diode Characteristics

Parameter	Symbol	Test Condition		Value			Unit
				min.	typ.	max.	
Diode Forward Voltage	V_F	$I_F = 22.5\text{ A}$	$T_J = 25^\circ\text{C}$	-	3.2	4.6	V
			$T_J = 150^\circ\text{C}$	-	2.4	-	
Reverse Recovery Time	t_{rr}	$V_R = 600\text{ V}, I_F = 45\text{ A},$ $dI_F/dt = 800\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$		-	33	-	ns
Reverse Recovery Charge	Q_{rr}			-	400	-	nC
Reverse Recovery Energy	E_{rec}			-	0.03	-	mJ
Peak Reverse Recovery Current	I_{RRM}			-	18	-	A
Reverse Recovery Time	t_{rr}	$V_R = 600\text{ V}, I_F = 45\text{ A},$ $dI_F/dt = 800\text{ A}/\mu\text{s}$ $T_J = 150^\circ\text{C}$			53		ns
Reverse Recovery Charge	Q_{rr}				1000		nC
Reverse Recovery Energy	E_{rec}				0.08		mJ
Peak Reverse Recovery Current	I_{RRM}				25		A

Typical Performance Characteristics

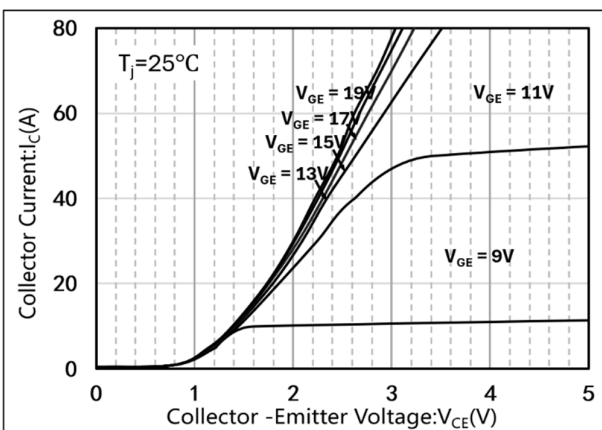


Fig 1. Typical output characteristic

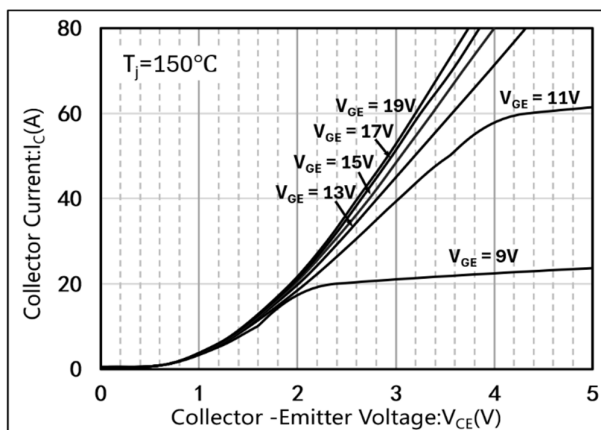


Fig 2. Typical output characteristic

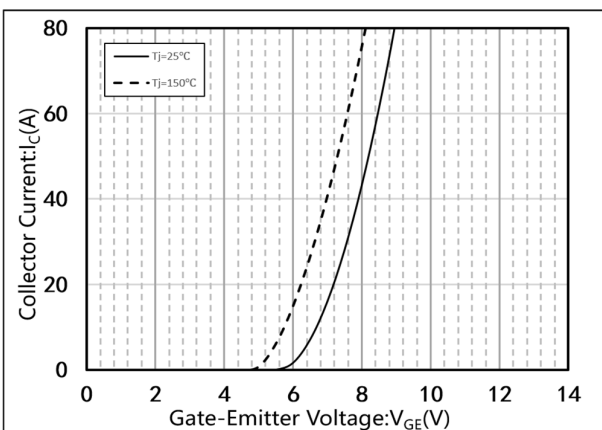


Fig 3. Typical transfer characteristic

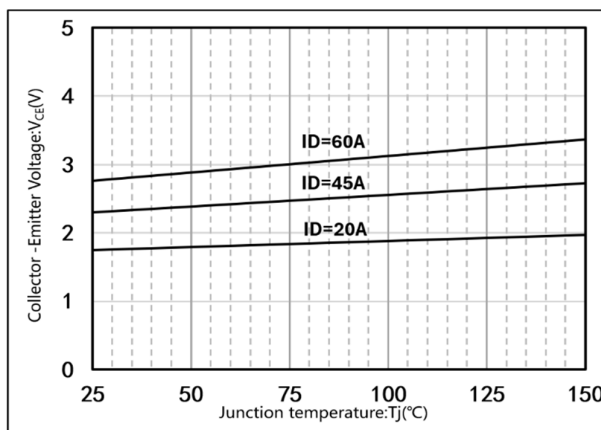


Fig 4. Typical collector-emitter saturation voltage as a function of junction temperature

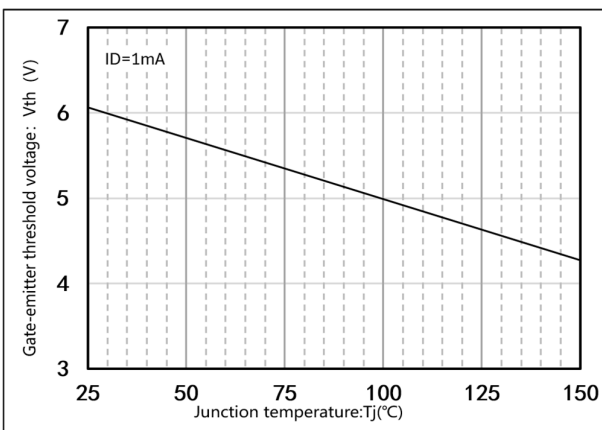


Fig 5. Gate-emitter threshold voltage as a function of junction temperature

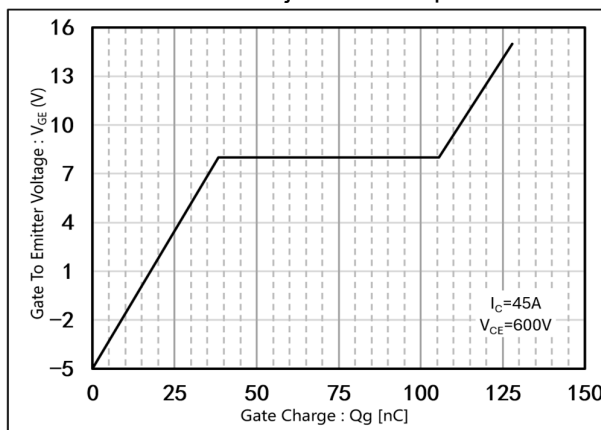


Fig 6. Typical gate charge

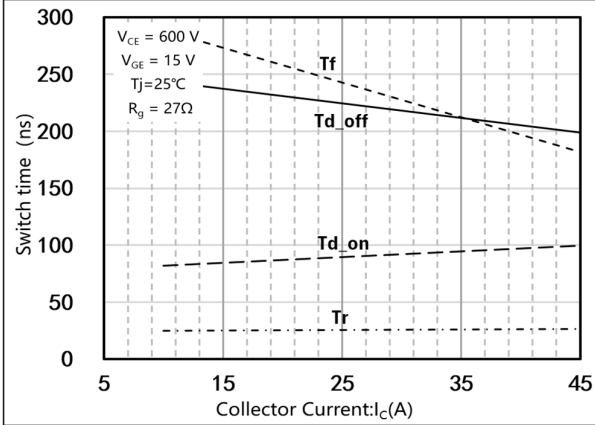


Fig 7. Typical switching times as a function of collector current

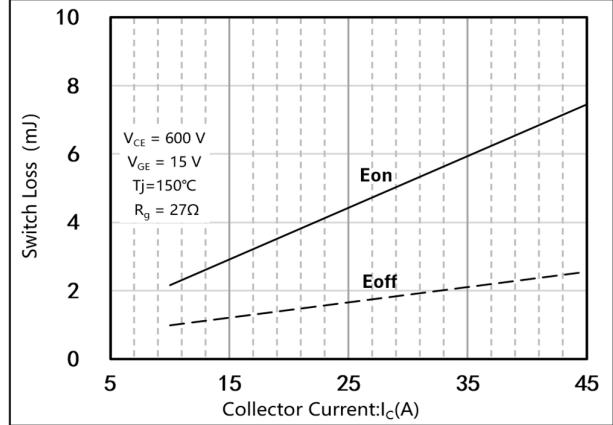


Fig 8. Typical switching energy losses as a function of collector current

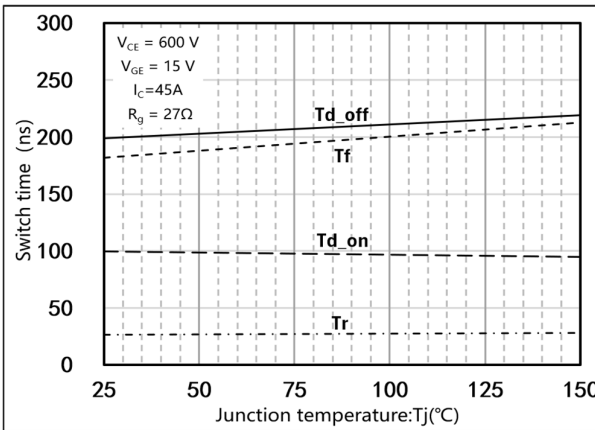


Fig 9. Typical switching times as a function of junction temperature

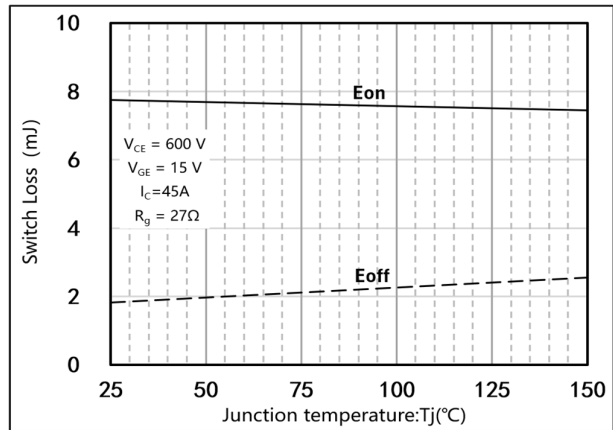


Fig 10. Typical switching energy losses as a function of junction temperature

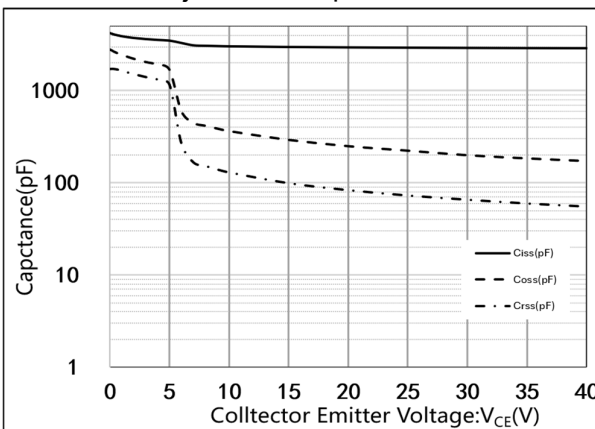


Fig 11. Typical capacitance as a function of collector-emitter voltage

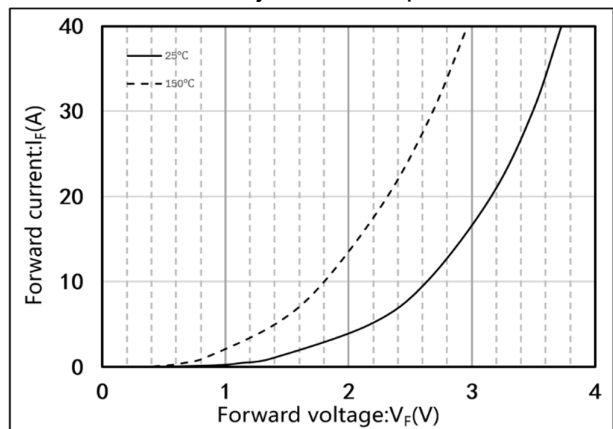


Fig 12. Typical diode forward current as a function of forward voltage

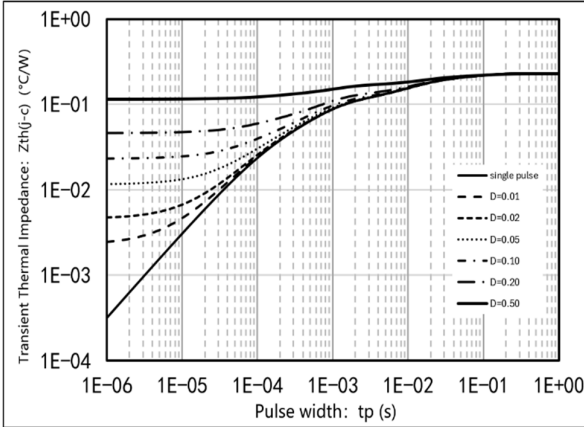


Fig 13. IGBT transient thermal impedance

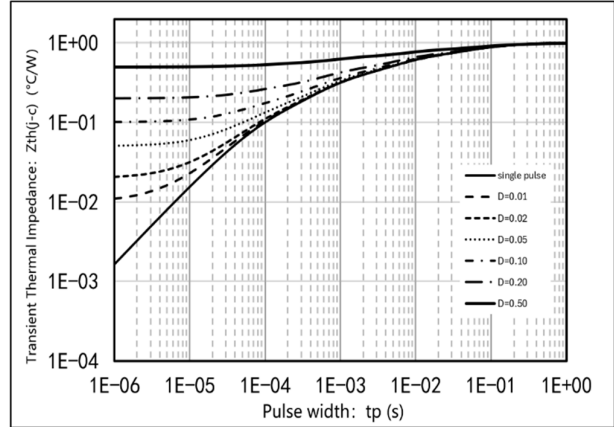
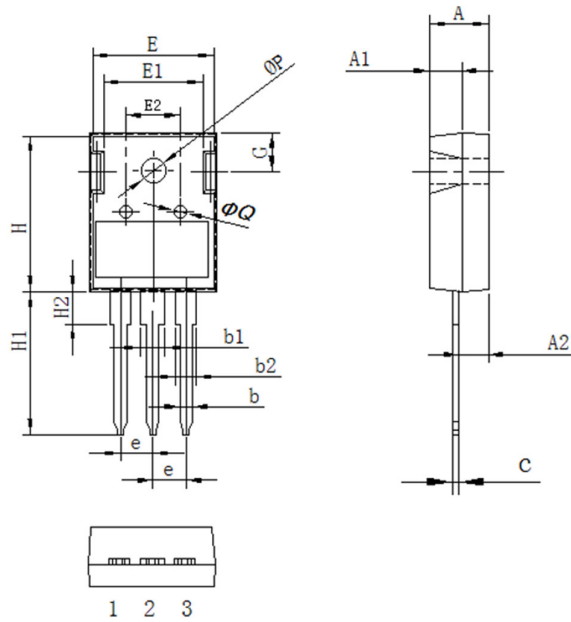


Fig 14. Diode transient thermal impedance

Package Information

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

Notice

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-Headquarters

WuXi Thunder Microelectronics Incorporated Limited

Building E1-9, No.200 LingHu Road, XinWu district,WuXi,China 214135

Tel:+86-510-85160109 Fax:+86-510-85160109