

THGM600N120L2BH

1200V 600A Half-Bridge IGBT Module

Field-stop IGBT technology with optimized freewheeling diodes for low conduction loss, fast switching and rugged operation in high-power conversion systems.



Package view

General Features

- 1200 V, 600A 4 in 1 Half-Bridge
- Field-stop planar technology
- 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
- Servo Drives
- Welding Converters
- UPS
- Industrial Motor Drives

Key Performance Parameters

Parameter	Value	Unit
V_{CES} , min @ $T_J = 25\text{ }^{\circ}\text{C}$	1200	V
T_J , maximum junction temperature	175	$^{\circ}\text{C}$
I_C @ $T_C = 100\text{ }^{\circ}\text{C}$	600	A
$I_{C,pulse}$ @ $T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ }\mu\text{s}$	1200	A
$V_{CE(sat)}$, typ. @ $V_{GE} = 15\text{ V}$	2.35	V
Q_g , typ.	4200	nC



Marking Information

Product Name	Package	Marking
THGM600N120L2BH	62mm	THGM600N120L2BH

Circuit Symbol

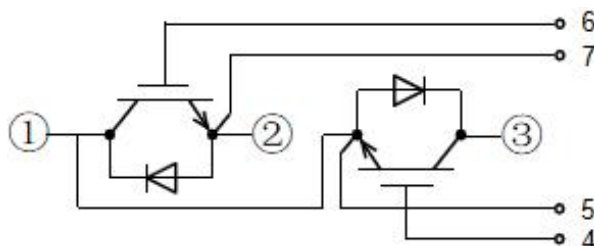


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Module Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Value	Unit
Isolation Voltage	RMS, $f=50\text{HZ}$, $t=1\text{min}$	V_{iso}	2500	V
Material of Module Baseplate		-	Cu	-
Material of module Internal Isolation		-	Al_2O_3	-
Creepage Distance	Terminal to terminal	d_{Creep}	23	mm
	Terminal to base		28	
Clearance Distance	Terminal to terminal	d_{Clear}	11	
	Terminal to base		22	
Comparative Tracking Index		CTI	>200	-
Mounting torque to main terminals		M_T	2~4	Nm
Mounting torque to heat sink		M_H	3~6	
Max Stray Inductance		L_{CE}	20	nH
Dimensions		L*W*H	106*61*30	mm
Weight of Module		G	316	g

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	900	A
	T _C =100°C		600	
Pulsed Collector Current	T _C =25°C tp limited by Tvjmax	I _{CM}	1200	A
Diode Forward Current	T _C =25°C	I _F	900	A
	T _C =100°C		600	
Pulsed Diode Forward Current	T _C =25°C tp limited by Tvjmax	I _{FM}	1200	
Short Circuit Withstand Time V _{GE} = 15 V, V _{CC} = 600 V, T _C = 25°C		T _{SC}	10	μs
Power Dissipation	T _C =25°C	P _D	3190	W
	T _C =100°C		1063	
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}	0.047	°C/W
Thermal Resistance, Junction-to-Case for FRD	R _{thJC}	0.093	

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 _{CE} , I _C =4mA	T _J =25°C	4.8	-	6.6	V
			T _J =150°C	-	4	-	
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =300A	T _J =25°C	-	2.35	2.8	V
			T _J =150°C	-	3.1	-	
Input Capacitance	C _I ES	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		-	13.7	-	nF
Output Capacitance	C _O ES			-	4.4	-	
Reverse Transfer Capacitance	C _R ES			-	1.3	-	
Total Gate Charge	Q _g	V _{CE} = 600 V, V _{GE} = -5/15 V, I _C = 600 A		-	4200	-	nC
Gate-emitter charge	Q _{ge}				1640		
Gate-collector charge	Q _{gc}				1400		
Turn-On Delay Time	td(on)	V _{CE} = 600 V V _{GE} = -5/15 V I _C = 600 A R _G = 10 Ω		-	250	-	ns
Turn-Off Delay Time	td(off)			-	1400	-	
Rise time	tr			-	70	-	
Fall time	tf			-	85	-	
Turn-On Switching Loss	E _{on}			T _J = 25°C		-	21
Turn-Off Switching Loss	E _{off}	-	78			-	
Turn-On Delay Time	td(on)	V _{CE} = 600 V V _{GE} = -5/15 V I _C = 600 A R _G = 10 Ω		-	240	-	ns
Turn-Off Delay Time	td(off)			-	1460	-	
Rise time	tr			-	80	-	
Fall time	tf			-	80	-	
Turn-On Switching Loss	E _{on}			T _J = 150°C		-	43
Turn-Off Switching Loss	E _{off}	-	86			-	

Diode Characteristics

Parameter	Symbol	Test Condition		Value			Unit
				min.	typ.	max.	
Diode Forward Voltage	V_F	$I_F = 600\text{ A}$	$T_J = 25^\circ\text{C}$	-	1.9	2.3	V
			$T_J = 150^\circ\text{C}$	-	1.65	-	
Reverse Recovery Time	t_{rr}	$V_R = 600\text{ V}, I_F = 600\text{ A},$ $T_J = 25^\circ\text{C}$		-	400	-	ns
Reverse Recovery Charge	Q_{rr}			-	42	-	μC
Reverse Recovery Energy	E_{rec}			-	16	-	mJ
Peak Reverse Recovery Current	I_{RRM}			-	400	-	A
Reverse Recovery Time	t_{rr}	$V_R = 600\text{ V}, I_F = 600\text{ A},$ $T_J = 150^\circ\text{C}$		-	1300	-	ns
Reverse Recovery Charge	Q_{rr}			-	95	-	μC
Reverse Recovery Energy	E_{rec}			-	40	-	mJ
Peak Reverse Recovery Current	I_{RRM}			-	590	-	A

Typical Performance Characteristics

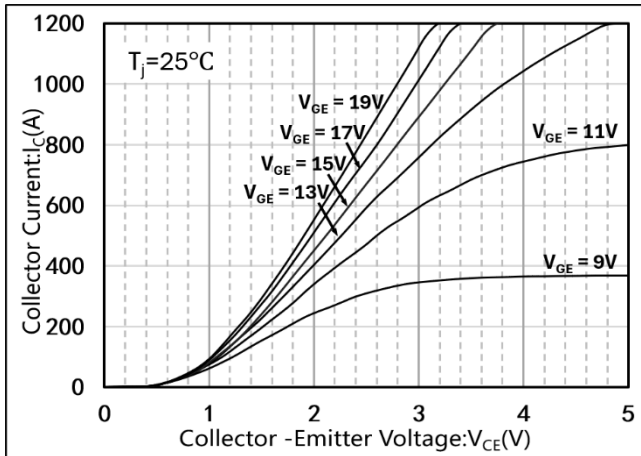


Fig 1. Typical output characteristic

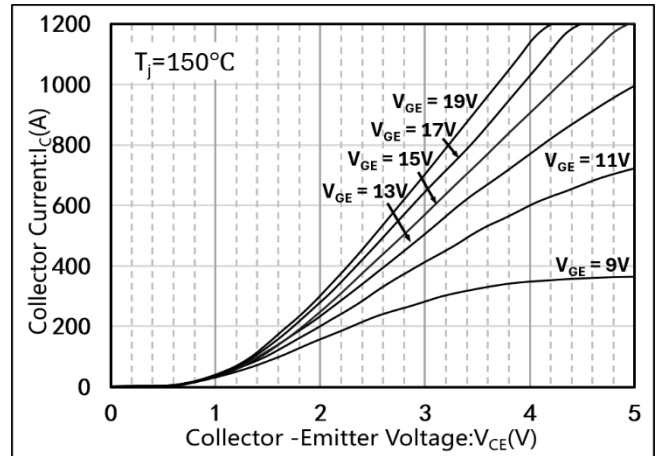


Fig 2. Typical output characteristic

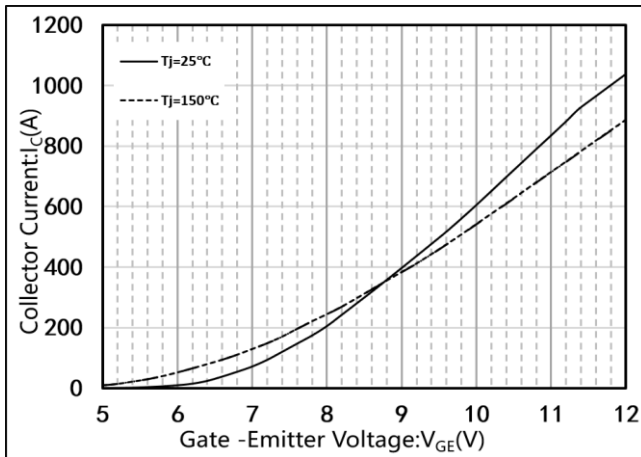


Fig 3. Typical transfer characteristic

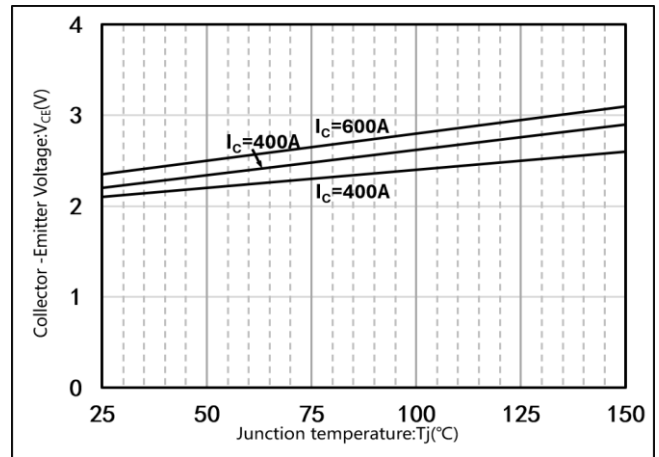


Fig 4. Typical collector-emitter saturation voltage as a function of junction temperature

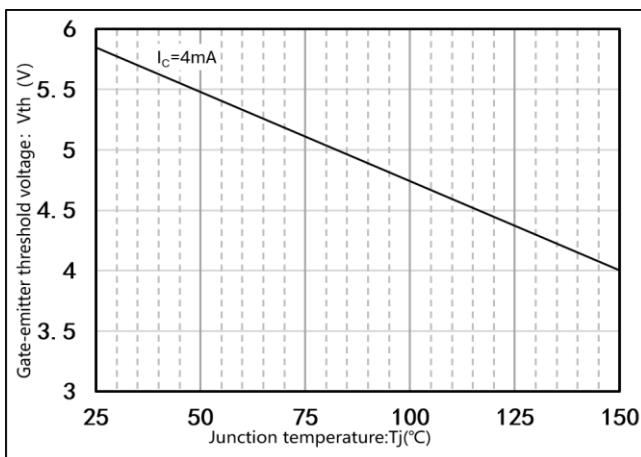


Fig 5. Gate-emitter threshold voltage as a function of junction temperature

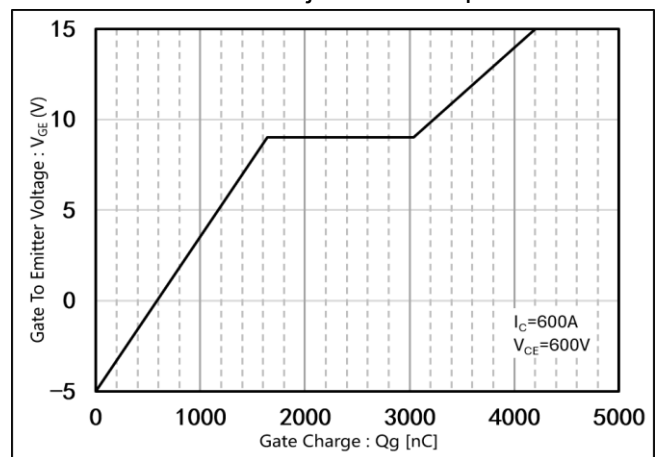


Fig 6. Typical gate charge

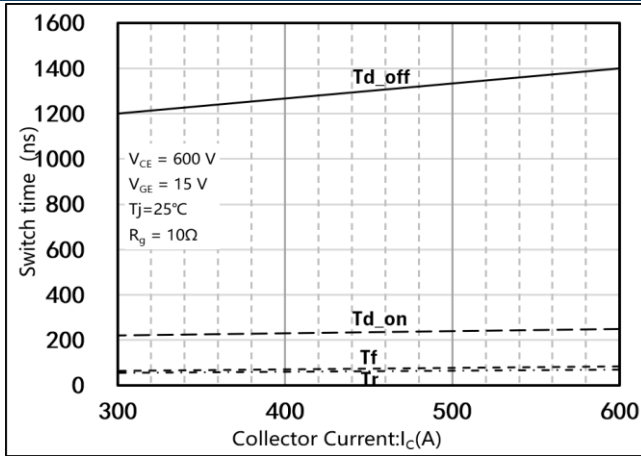


Fig 7. Typical switching times as a function of collector current

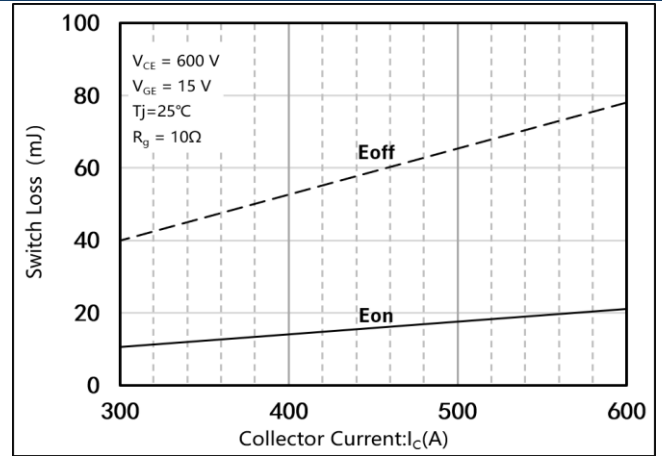


Fig 8. Typical switching energy losses as a function of collector current

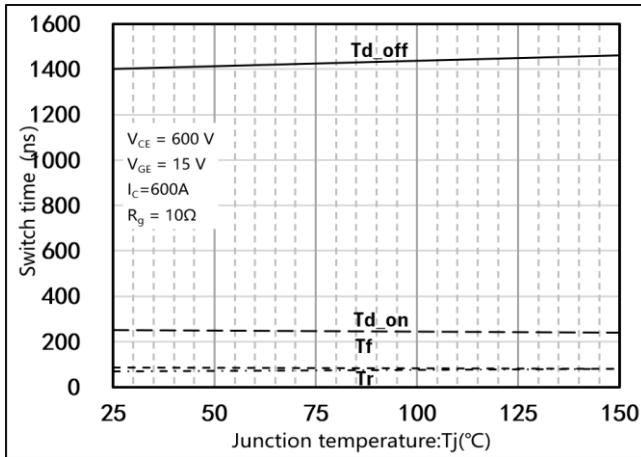


Fig 9. Typical switching times as a function of junction temperature

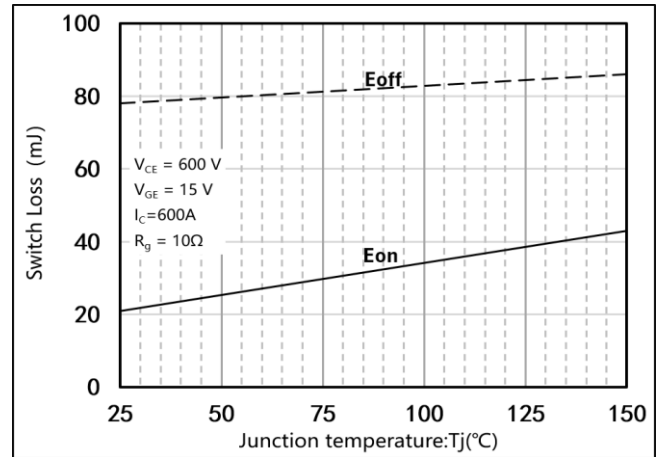


Fig 10. Typical switching energy losses as a function of junction temperature

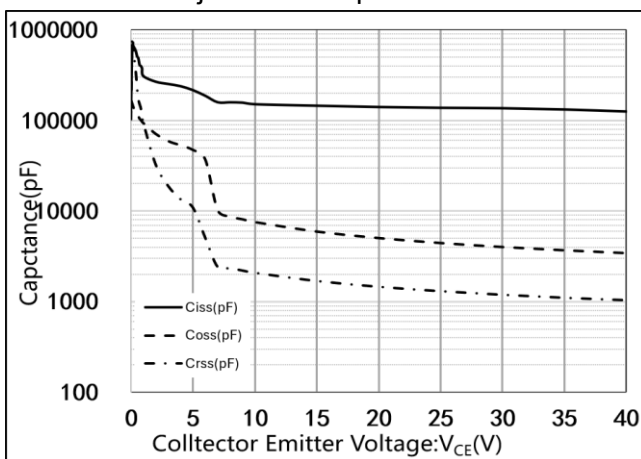


Fig 11. Typical capacitance as a function of collector-emitter voltage

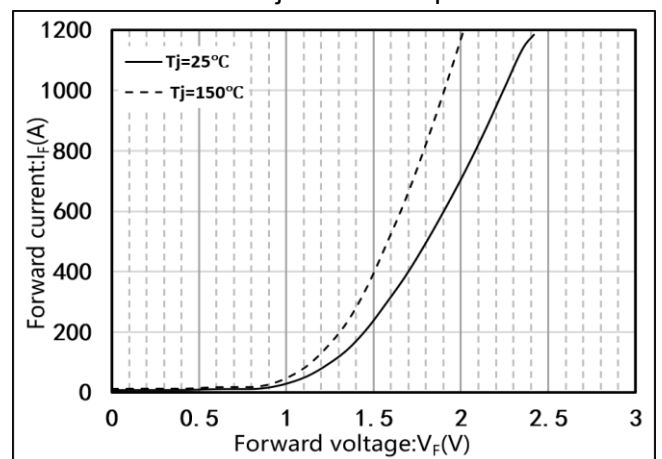


Fig 12. Typical diode forward current as a function of forward voltage

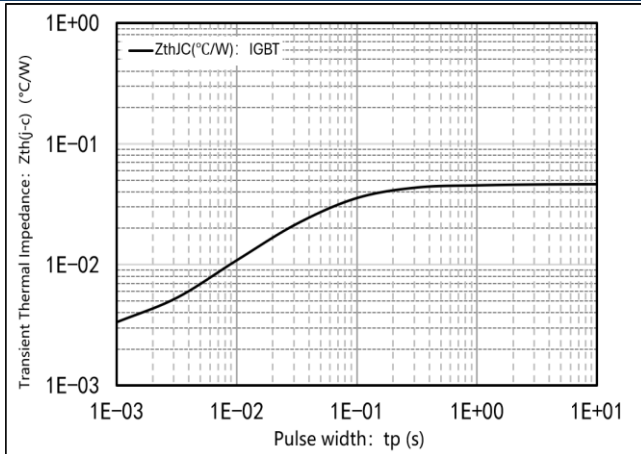


Fig 13. IGBT transient thermal impedance

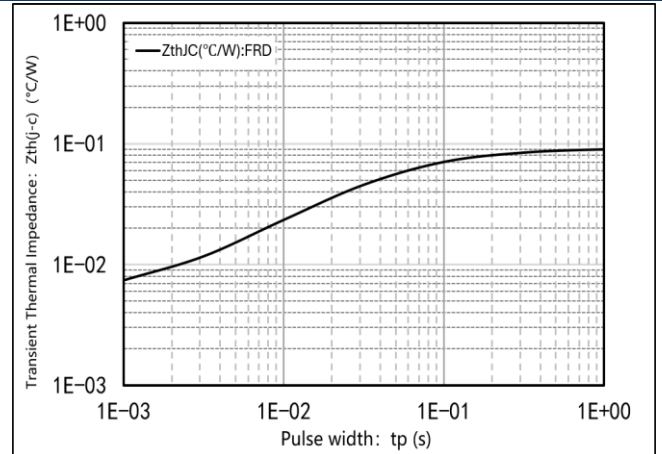
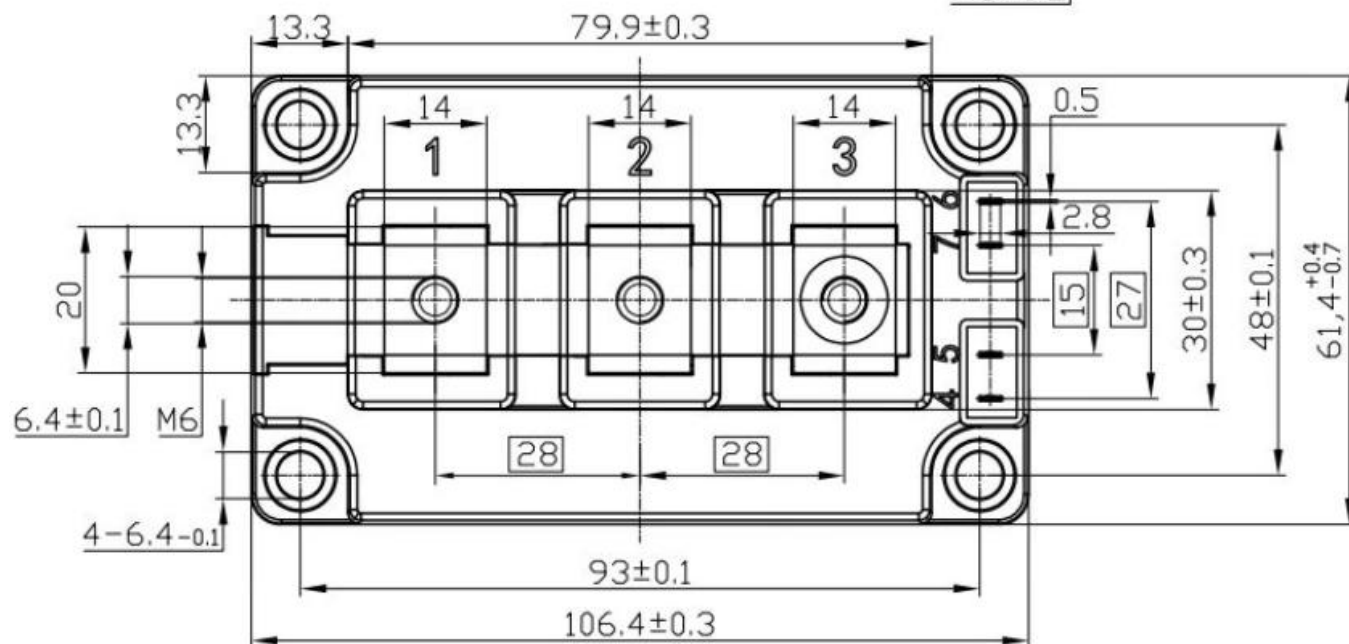


Fig 14. Diode transient thermal impedance

Package Information



Notice

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