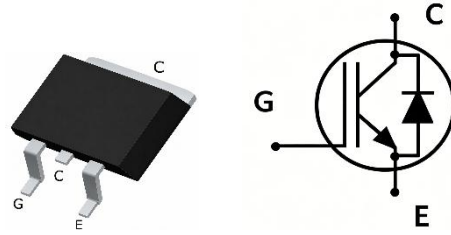


THG6N65FQN

650V 6A 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

- 650 V breakdown voltage
- $V_{CE(sat)}$, typ. = 1.68 V @ $V_{GE}=15V$, $I_C = 6$ 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	650	V
T_J , maximum junction temperature	175	°C
I_C @ $T_C = 100$ °C	6	A
$I_{C,pulse}$ @ $T_C = 25$ °C, $t_p = 10$ μ s	18	A
$V_{CE(sat)}$, typ. @ $V_{GE} = 15$ V	1.68	V
Q_g , typ.	9.1	nC



Marking Information

Product Name	Package	Marking
THG6N65FQN	TO-263	THG6N65FQN

Table of contents

Key Performance Parameters	1
Marking Information	1
Maximum Ratings	3
Diode Forward Current	3
Electrical Characteristics.....	4
Diode Characteristics.....	5
Typical Performance Characteristics	6
Package Information	9
Notice.....	10

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

Parameter		Symbol	Value	Unit
Collector-to-Emitter Voltage		V _{CE}	650	V
Gate-to-Emitter Voltage		V _{GE}	±30	V
Collector Current	T _C =25°C	I _C	12	A
	T _C =100°C		6	
Pulsed Collector Current	T _C =25°C tp limited by Tvjmax	I _{CM}	18	A
Diode Forward Current	T _C =25°C	I _F	12	
	T _C =100°C		6	
Pulsed Diode Forward Current	T _C =25°C tp limited by Tvjmax	I _{FM}	18	
Short Circuit Withstand Time V _{GE} = 15 V, V _{CC} = 400 V, T _C = 25°C		T _{SC}	10	μs
Power Dissipation	T _C =25°C	P _D	88	W
	T _C =100°C		30	
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	Max Value	Unit
Thermal Resistance, Junction-to-Case for IGBT	R _{thJC}	1.7	°C/W
Thermal Resistance, Junction-to-Case for FRD	R _{thJC}	3.8	
Thermal Resistance, Junction-to-Ambient	R _{thJA}	100	

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		650	-	-	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 =1mA	T _J =25°C	5	-	6	V
			T _J =150°C	-	4.5	-	
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =6A	T _J =25°C	-	1.68	2	V
			T _J =150°C	-	1.9	-	
Input Capacitance	C _I ES	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		-	226	-	pF
Output Capacitance	C _O ES			-	37	-	
Reverse Transfer Capacitance	C _R ES			-	6	-	
Total Gate Charge	Q _g	V _{CE} =400 V, V _{GE} = 15 V, I _C = 6 A		-	9.1	-	nC
Gate-emitter charge	Q _{ge}				2.3		
Gate-collector charge	Q _{gc}				4.5		
Turn-On Delay Time	td(on)	V _{CE} = 400 V V _{GE} = -5/15 V I _C = 6 A R _G = 27 Ω		-	25	-	ns
Turn-Off Delay Time	td(off)			-	40	-	
Rise time	tr			-	10	-	
Fall time	tf			-	30	-	
Turn-On Switching Loss	E _{on}			T _J = 25°C		-	0.82
Turn-Off Switching Loss	E _{off}	-	0.26			-	
Turn-On Delay Time	td(on)	V _{CE} = 400 V V _{GE} = -5/15 V I _C = 6 A R _G = 27 Ω		-	30	-	ns
Turn-Off Delay Time	td(off)			-	43	-	
Rise time	tr			-	14	-	
Fall time	tf			-	45	-	
Turn-On Switching Loss	E _{on}			T _J = 150°C		-	1.2
Turn-Off Switching Loss	E _{off}	-	0.4			-	

Diode Characteristics

Parameter	Symbol	Test Condition		Value			Unit
				min.	typ.	max.	
Diode Forward Voltage	V_F	$I_F = 6\text{ A}$	$T_J = 25^\circ\text{C}$	-	1.4	1.6	V
			$T_J = 150^\circ\text{C}$	-	1.25	-	
Reverse Recovery Time	t_{rr}	$V_R = 400\text{ V}, I_F = 6\text{ A},$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$		-	40	-	ns
Reverse Recovery Charge	Q_{rr}			-	80	-	nC
Reverse Recovery Energy	E_{rec}			-	0.01	-	mJ
Peak Reverse Recovery Current	I_{RRM}			-	3.6	-	A
Reverse Recovery Time	t_{rr}	$V_R = 400\text{ V}, I_F = 6\text{ A},$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 150^\circ\text{C}$			65		ns
Reverse Recovery Charge	Q_{rr}				170		nC
Reverse Recovery Energy	E_{rec}				0.02		mJ
Peak Reverse Recovery Current	I_{RRM}				6.5		A

Typical Performance Characteristics

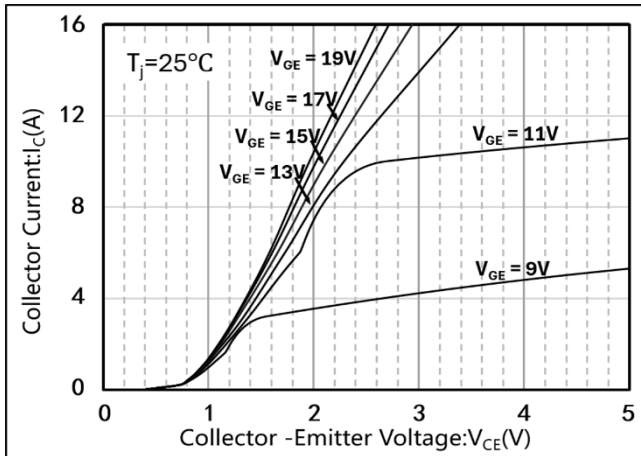


Fig 1. Typical output characteristic

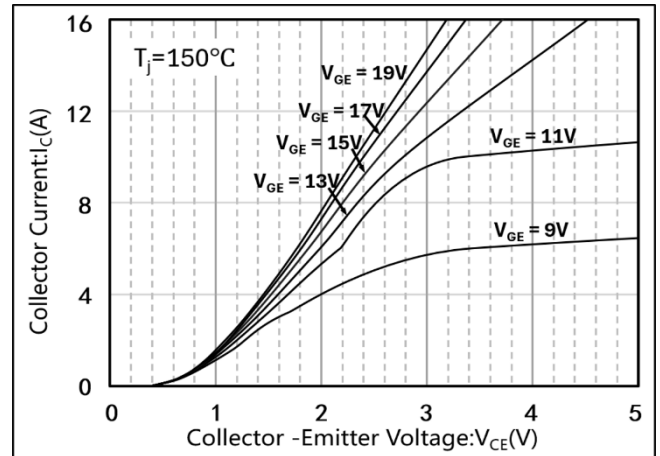


Fig 2. Typical output characteristic

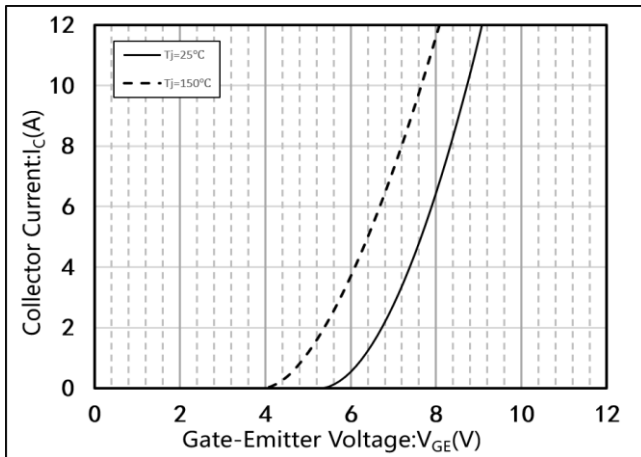


Fig 3. Typical transfer characteristic

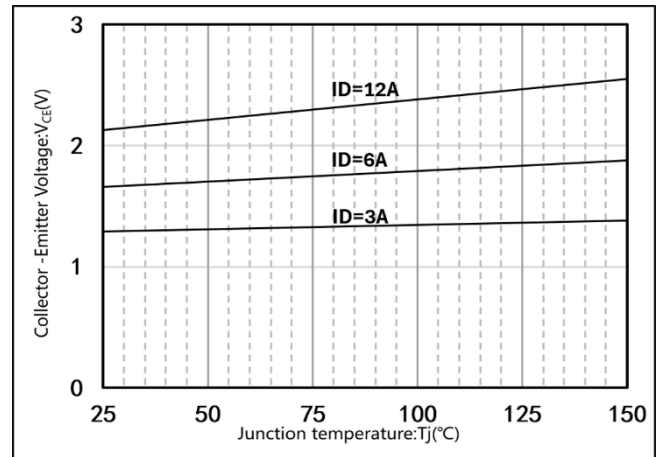


Fig 4. Typical collector-emitter saturation voltage as a function of junction temperature

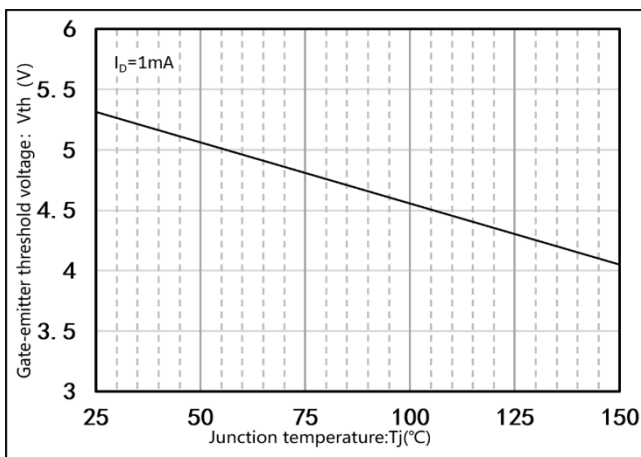


Fig 5. Gate-emitter threshold voltage as a function of junction temperature

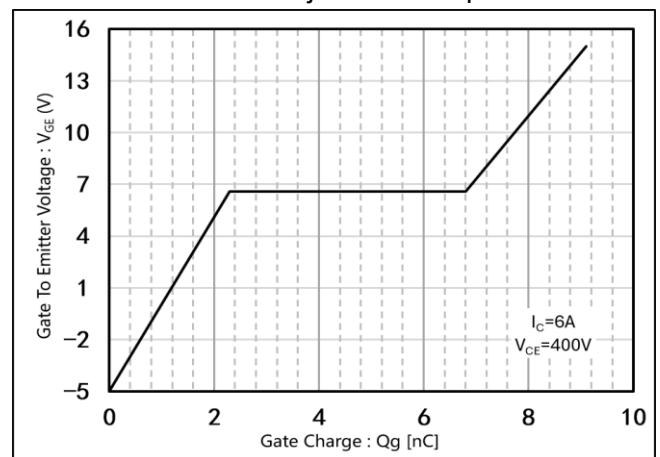


Fig 6. Typical gate charge

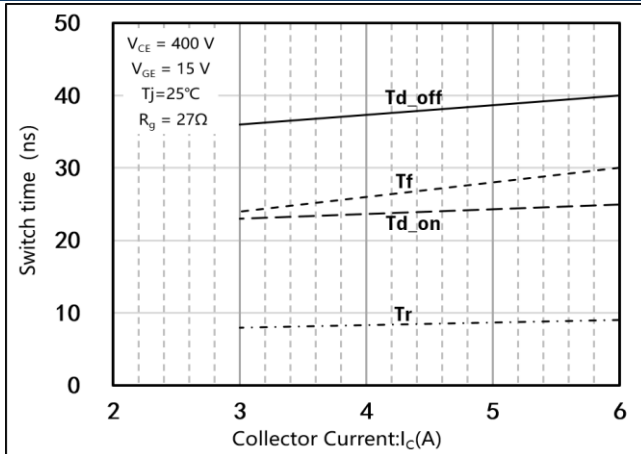


Fig 7. Typical switching times as a function of collector current

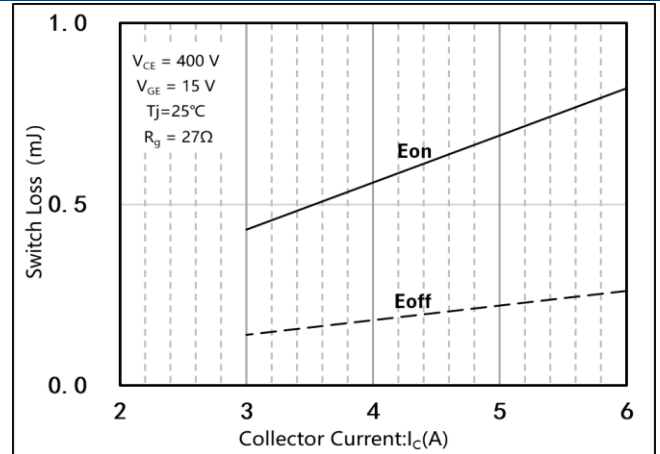


Fig 8. Typical switching energy losses as a function of collector current

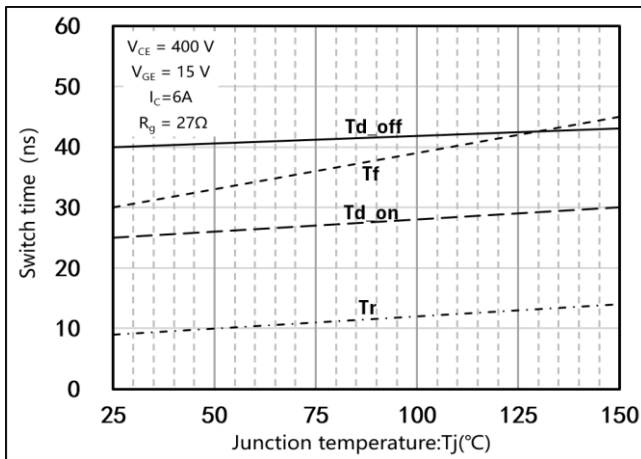


Fig 9. Typical switching times as a function of junction temperature

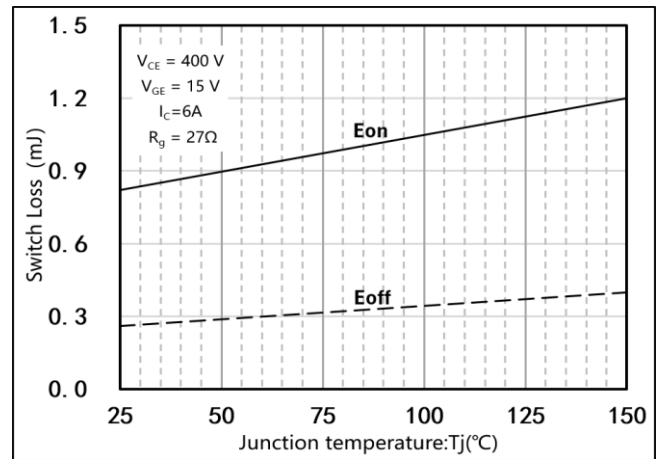


Fig 10. Typical switching energy losses as a function of junction temperature

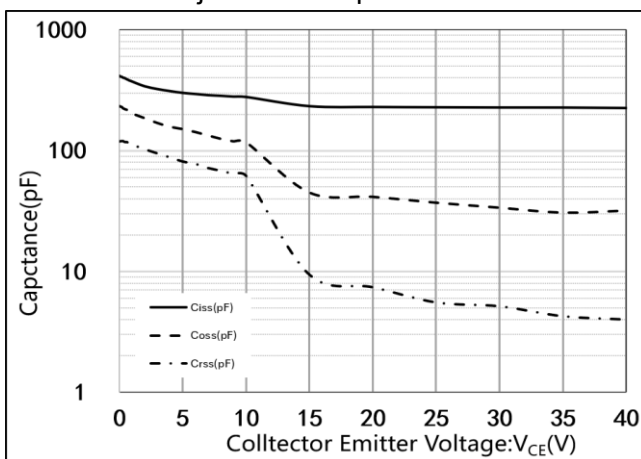


Fig 11. Typical capacitance as a function of collector-emitter voltage

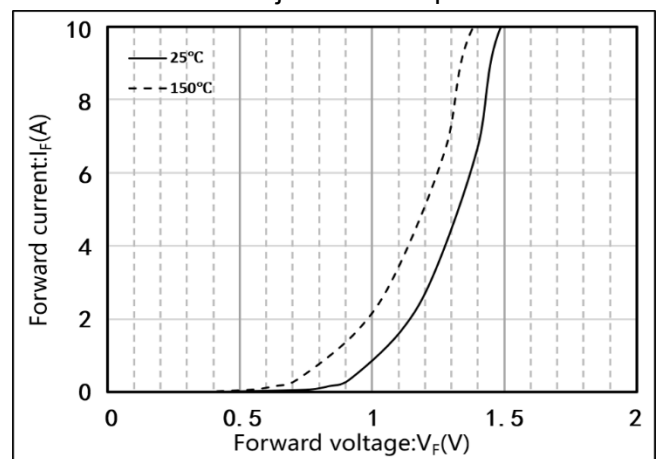


Fig 12. Typical diode forward current as a function of forward voltage

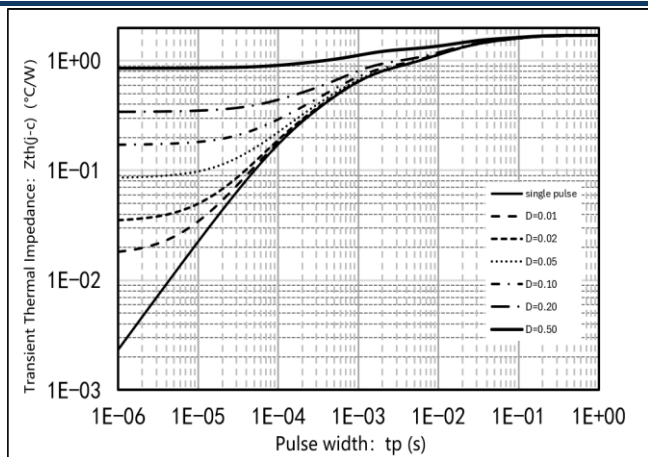


Fig 13. IGBT transient thermal impedance

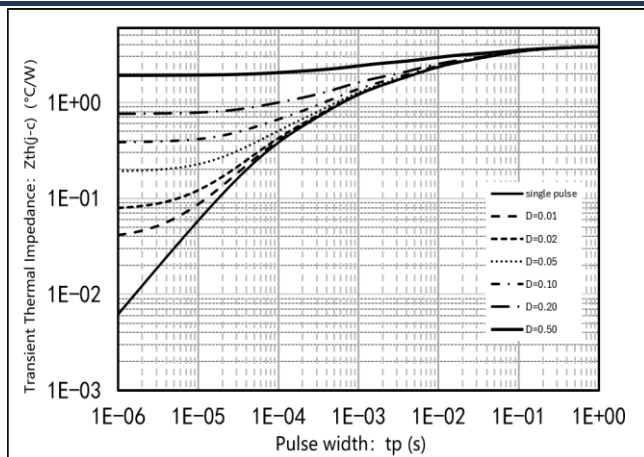
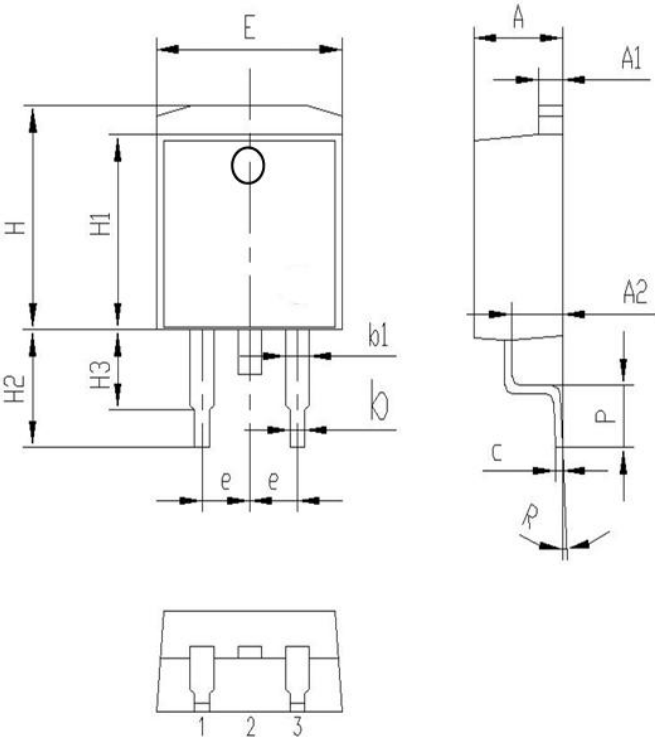


Fig 14. Diode transient thermal impedance

Package Information

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.40	4.6	4.80
A1	1.17	1.27	1.37
A2	2.40	2.6	2.80
b	0.60	0.8	1.00
b1	1.05	1.25	1.45
c	0.28	0.38	0.48
e	2.34	2.54	2.74
E	9.9	10.1	10.3
H	9.90	10.1	10.3
H1	8.50	8.7	8.90
H2	4.80	5.00	5.20
H3	2.60	2.8	3.00
R	0°	3°	6°
P	2.40	2.70	3.00

Notice

Thunder Microelectronics Incorporated Limited reserves the right to make changes without further notice to any products or specifications herein. When use the product, be sure to obtain the latest specification.

Thunder Microelectronics Incorporated Limited does not assume any liability arising out of the application or any product described herein. When using Thunder Microelectronics Incorporated Limited products in your equipment, you are requested to take adequate safety measures to prevent the equipment from causing a physical injury ,fire or other problem if any of the products become faulty.

-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