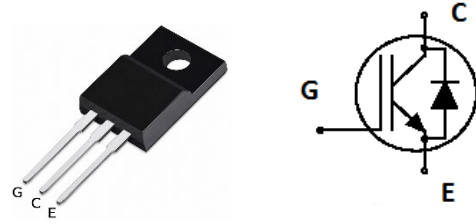


THG15N65FQF

650V 15A 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 @ $I_C = 15$ 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	15	A
$I_{C,pulse}$ @ $T_C = 25$ °C, $t_p = 10$ μ s	45	A
$V_{CE(sat)}$, typ. @ $V_{GE} = 15$ V	1.68	V
Q_g , typ.	25	nC



Marking Information

Product Name	Package	Marking
THG15N65FQF	TO-220F	THG15N65FQF

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Maximum Ratings ($T_J = 25^\circ\text{C}$ 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 _(Silicon limit)	$T_C = 25^\circ\text{C}$	I_C	30	A
	$T_C = 100^\circ\text{C}$		15	
Pulsed Collector Current	$T_C = 25^\circ\text{C}$ tp limited by T_{vjmax}	I_{CM}	45	A
Diode Forward Current _(Silicon limit)	$T_C = 25^\circ\text{C}$	I_F	30	
	$T_C = 100^\circ\text{C}$		15	
Pulsed Diode Forward Current	$T_C = 25^\circ\text{C}$ tp limited by T_{vjmax}	I_{FM}	45	
Short Circuit Withstand Time $V_{GE} = 15\text{ V}$, $V_{CC} = 400\text{ V}$, $T_C = 25^\circ\text{C}$		T_{SC}	10	μs
Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	53	W
	$T_C = 100^\circ\text{C}$		17	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 To +175	$^\circ\text{C}$
Lead Temperature for Soldering Purposes		T_L	270	

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case for IGBT	R_{thJC}	2.8	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case for FRD	R_{thJC}	4.5	
Thermal Resistance, Junction-to-Ambient	R_{thJA}	75	

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 _{GE} S	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℃	5	-	6	V
			T _J =150℃	-	4.0	-	
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =15A	T _J =25℃	-	1.68	2.1	V
			T _J =150℃	-	1.88	-	
Input Capacitance	C _I ES	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		-	545	-	pF
Output Capacitance	C _O ES			-	67	-	
Reverse Transfer Capacitance	C _R ES			-	18	-	
Total Gate Charge	Q _g	V _{CE} =400 V, V _{GE} = 15 V, I _C = 15 A		-	25	-	nC
Gate-emitter charge	Q _{ge}			-	6	-	
Gate-collector charge	Q _{gc}			-	13	-	
Gate Resistance	R _g	V _{GE} =0V, V _{CE} =0V, f=1MHz		-	3.2	-	Ω
Turn-On Delay Time	td(on)	V _{CE} = 400 V V _{GE} = -5/15 V I _C = 15 A R _G = 27 Ω T _J = 25℃		-	34	-	ns
Turn-Off Delay Time	td(off)			-	60	-	
Rise time	tr			-	12	-	
Fall time	tf			-	193	-	
Turn-On Switching Loss	E _{on}			V _{CE} = 400 V V _{GE} = -5/15 V I _C = 15 A R _G = 27 Ω T _J = 150℃		-	1.4
Turn-Off Switching Loss	E _{off}	-	0.36			-	
Turn-On Delay Time	td(on)	-	39			-	ns
Turn-Off Delay Time	td(off)	-	69			-	
Rise time	tr	-	15			-	
Fall time	tf	-	265	-			
Turn-On Switching Loss	E _{on}	T _J = 150℃		-	1.75	-	mJ
Turn-Off Switching Loss	E _{off}			-	0.65	-	

Diode Characteristics

Parameter	Symbol	Test Condition		Value			Unit
				min.	typ.	max.	
Diode Forward Voltage	V_F	$I_F = 15\text{ A}$	$T_J = 25^\circ\text{C}$	-	1.35	1.6	V
			$T_J = 150^\circ\text{C}$	-	1.2	-	
Reverse Recovery Time	t_{rr}	$V_R = 400\text{ V}, I_F = 15\text{ A},$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$		-	33	-	ns
Reverse Recovery Charge	Q_{rr}			-	200	-	nC
Reverse Recovery Energy	E_{rec}			-	0.01	-	mJ
Peak Reverse Recovery Current	I_{RRM}			-	7	-	A
Reverse Recovery Time	t_{rr}	$V_R = 400\text{ V}, I_F = 15\text{ A},$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ $T_J = 150^\circ\text{C}$			55		ns
Reverse Recovery Charge	Q_{rr}				480		nC
Reverse Recovery Energy	E_{rec}				0.03		mJ
Peak Reverse Recovery Current	I_{RRM}				10		A

Typical Performance Characteristics

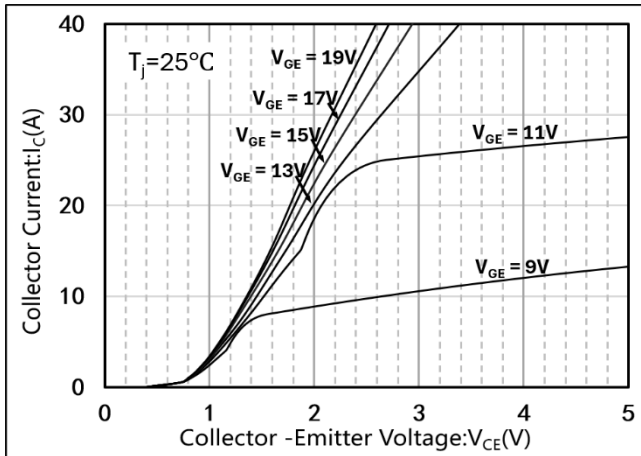


Fig 1. Typical output characteristic

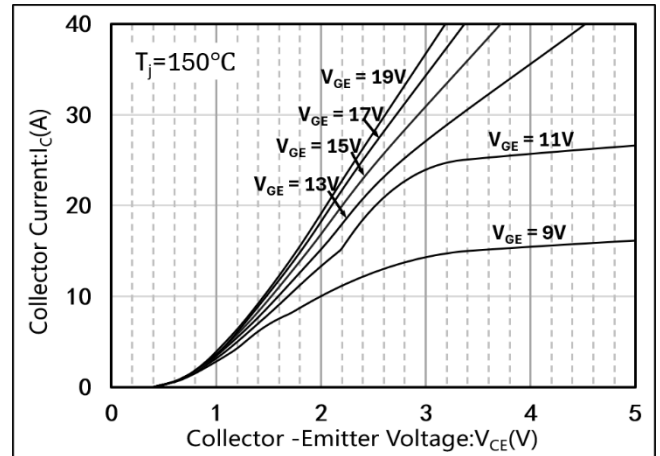


Fig 2. Typical output characteristic

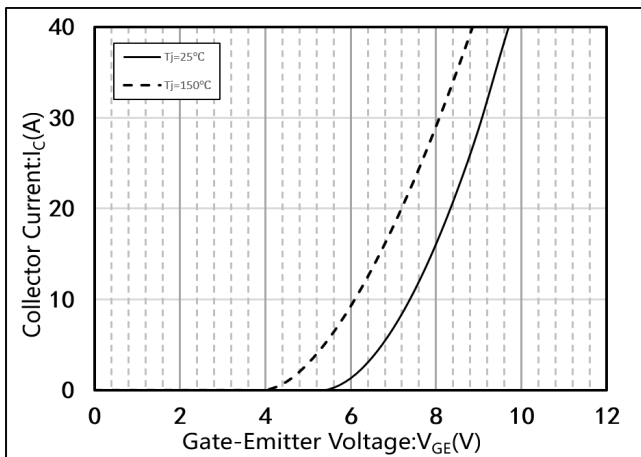


Fig 3. Typical transfer characteristic

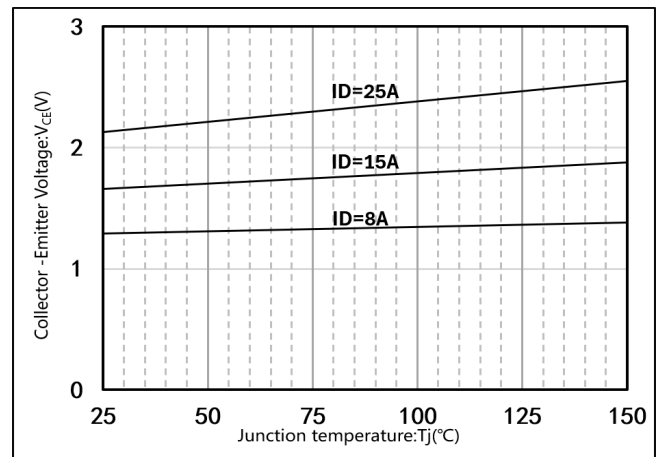


Fig 4. Typical collector-emitter saturation voltage as a function of junction temperature

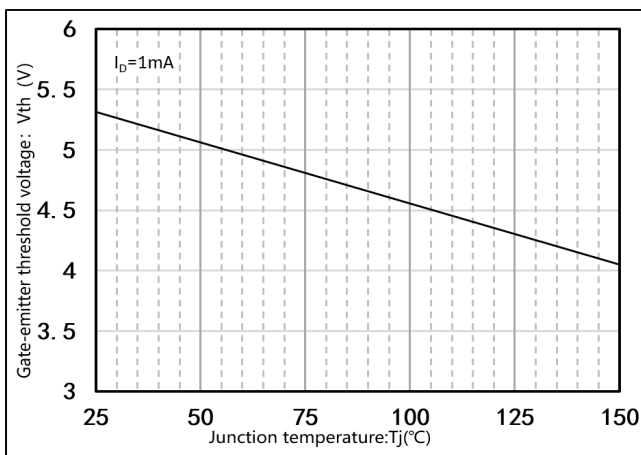


Fig 5. Gate-emitter threshold voltage as a function of junction temperature

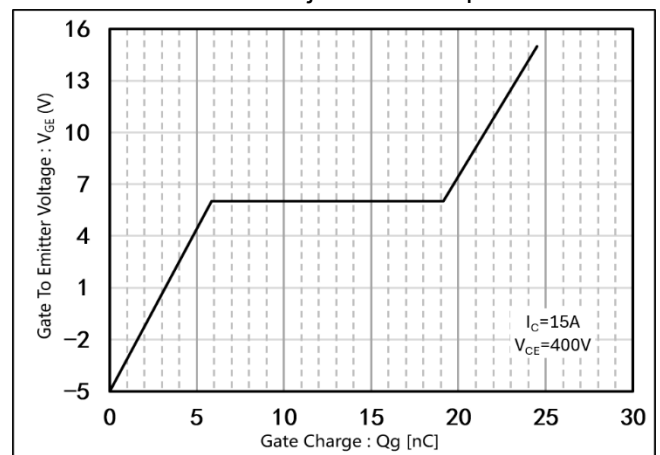


Fig 6. Typical gate charge

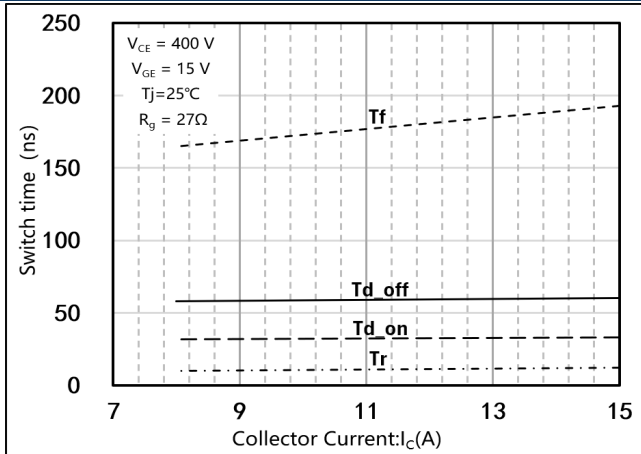


Fig 7. Typical switching times as a function of collector current

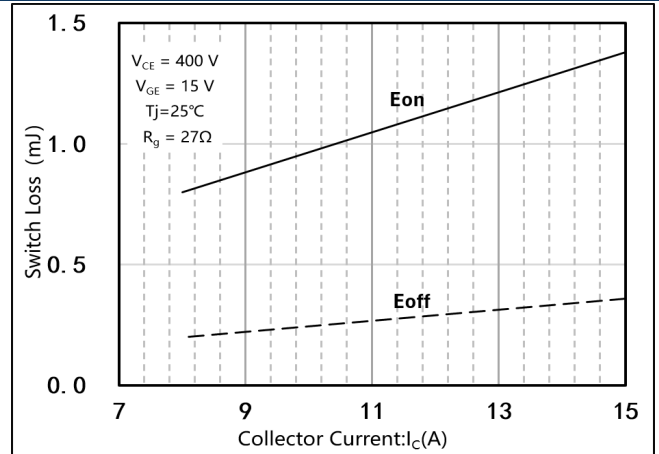


Fig 8. Typical switching energy losses as a function of collector current

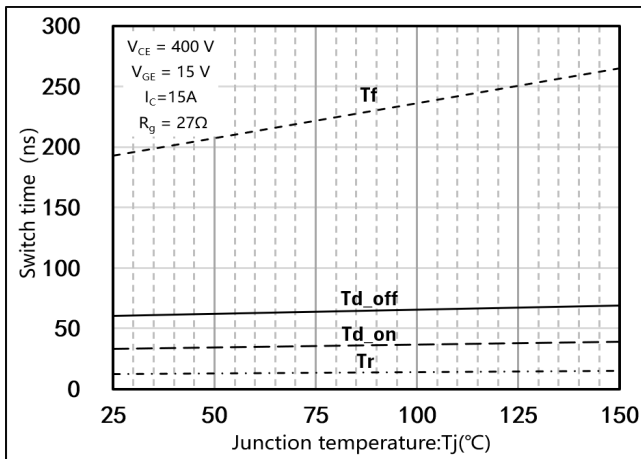


Fig 9. Typical switching times as a function of junction temperature

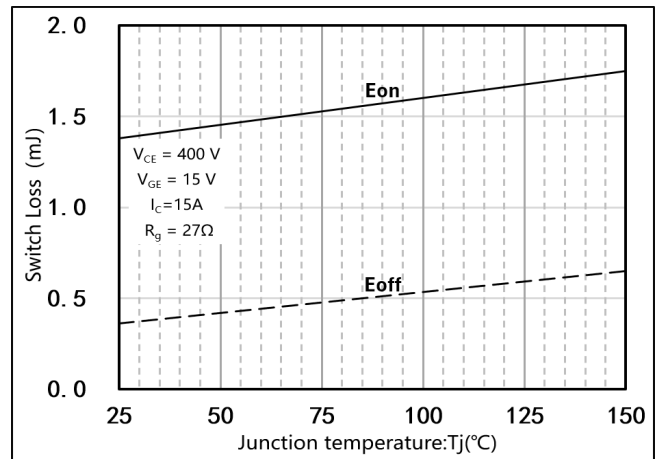


Fig 10. Typical switching energy losses as a function of junction temperature

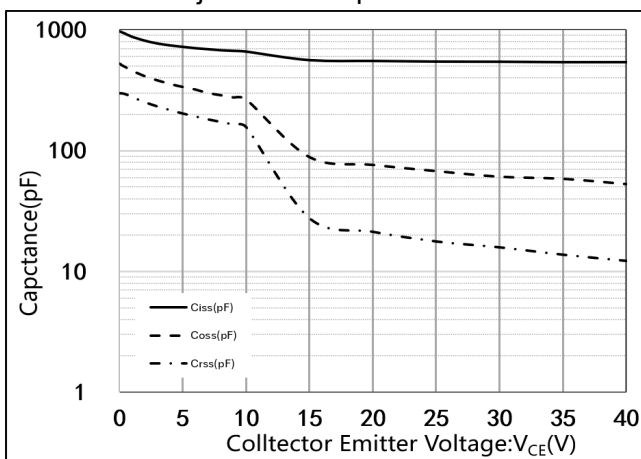


Fig 11. Typical capacitance as a function of collector-emitter voltage

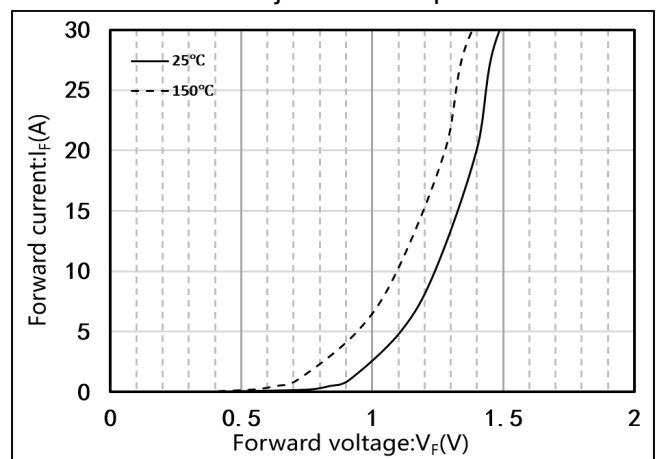


Fig 12. Typical diode forward current as a function of forward voltage

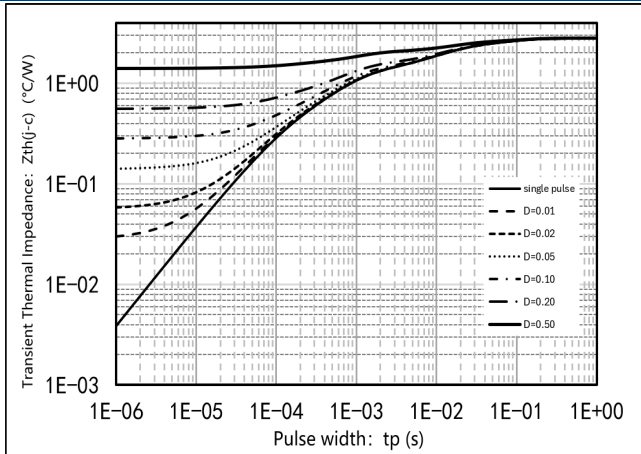


Fig 13. IGBT transient thermal impedance

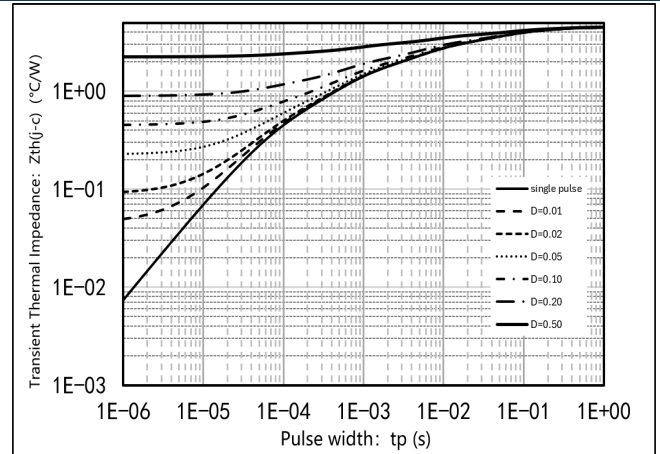
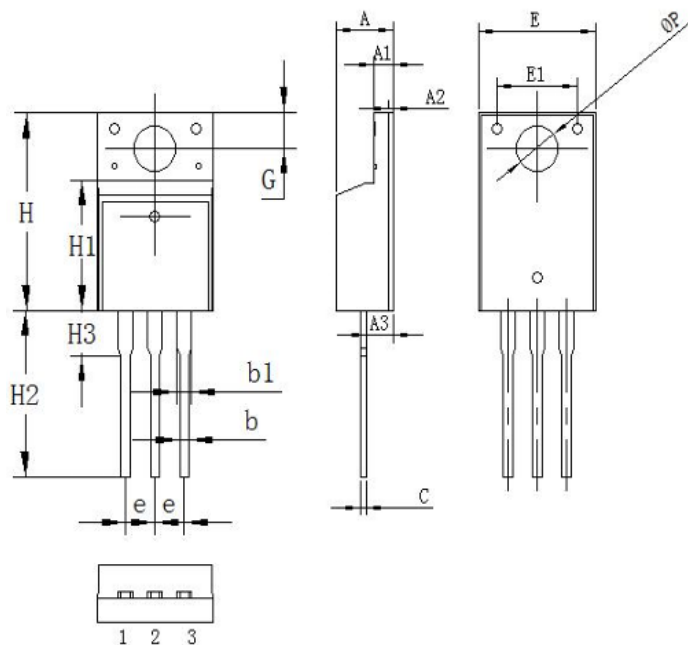


Fig 14. Diode transient thermal impedance

Package Information

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.55	4.75	4.95
A1	2.40	2.60	2.80
A2	0.40	0.60	0.80
A3	2.10	2.30	2.50
b1	1.10	1.30	1.50
b	0.60	0.80	1.00
c	0.42	0.50	0.58
e	2.30	2.50	2.70
E	9.9	10.1	10.3
E1	6.8	7	7.2
H	15.8	16.0	16.2
H1	9.10	9.30	9.50
H2	12.5	13.0	13.5
H3	3.10	3.30	3.50
G	3.00	3.20	3.40
ΦP	3.00	3.20	3.40

Notice

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