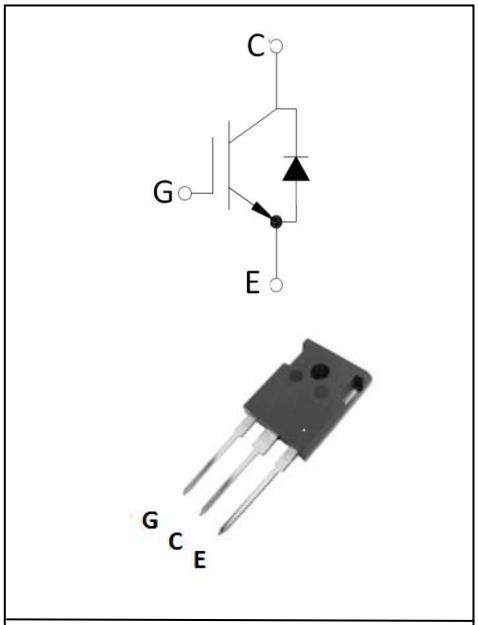
Silicon Field Stop(FS) Trench IGBT

Description

The THG75T65FBK is use advanced field stop(FS) trench technology. The 650V FS Trench IGBT offers superior conduction and switching performances.



THUNDER TO-247H

General Features

- High Speed Switching & Low Power Loss
- Low saturation voltage: $V_{CE(sat)}$ = 1.7V @ I_C = 75A
- Low EMI
- Maximum junction temperature 175°C

Application

- Solar Converters
- Welding Converters
- UPS
- PFC
- PV Inverter

Absolute Maximum Ratings @ Tc=25°C (unless otherwise specified)

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current	150	A
	Collector Current @Tc=100°C	75	A
I_{CM}	Pulsed Collector Current	300	A
I_F	Diode Continuous Forward Current @Tc=100°C	40	A
I_{FM}	Diode Maximum Forward Current	160	A
P_D	Total Dissipation at @Tc = 25°C	438	W
	Total Dissipation at @Tc = 100°C	219	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	°C
T_L	Max Temperature For Soldering	260	°C
T_{SC}	Short circuit data VGE=15V, VCC ≤ 360V, Tvj=150°C	5	us

Electrical Characteristics @ Tc=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
Static Characteristics							
V_{CES}	Collector-Emitter Voltage	V_{GE}=0V, I_{CE}=250μA		650	—	—	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C=75A	T_j = 25°C	—	1.70	2.00	V
			T_j = 175°C	—	1.90	—	V
$V_{GE(th)}$	Gated Threshold Voltage	V_{CE}= V_{GE}, I_C=0.5mA		4.5	5.5	6.5	V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE} =650V		—	—	20	uA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	V_{GE} = +20V, V_{CE} = 0V		—	—	200	nA
$I_{GES(R)}$	Gate to Emitter Reverse Leakage	V_{GE} = -20V, V_{CE} = 0V		—	—	-200	nA
Dynamic Characteristics							
C_{ies}	Input Capacitance	V_{GE} =0V, V_{CE}=25V, f=1.0MHZ		—	7350	—	pF
C_{oes}	Output Capacitance			—	277	—	pF
C_{res}	Reverse Transfer Capacitance			—	158	—	pF
Q_g	Total Gate Charge	V_{CE}=480V,I_C=40A,V_{GE}=15V		—	312	—	nC
Q_{ge}				—	68	—	
Q_{gc}				—	129	—	
Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=400V,I_C=40A V_{GE}=15V,R_G=10 Ω		—	25	—	nS
t_r	Rise Time			—	21	—	
$t_{d(off)}$	Turn-off Delay Time			—	170	—	
t_f	Fall Time			—	22	—	

Electrical Characteristics of the Diode @T_C= 25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_F	Diode Continuous Forward Current	T_C = 100°C	40	—	—	A
I_{FM}	Diode Maximum Forward Current	T_C = 100°C	200	—	—	A
V_F	Diode Forward Voltage	I_F = 40A	—	1.75	2.15	V
t_{rr}	Reverse Recovery Time	T_J=25°C, I_F=40A di/dt=200A/us	—	280	—	nS
Q_{rr}	Reverse Recovery Charge		—	9.1	—	nC
*Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2%						

Thermal Characteristic

Symbol	Paramter	Typ	MAX	Units
$R_{\theta JC}$	Themal Resistance,Junction to case for IGBT	--	0.36	°C/W
$R_{\theta JC}$	Themal Resistance,Junction to case for Diode	--	0.48	°C/W
$R_{\theta JA}$	Themal Resistance,Junction to Ambient	--	40	°C/W

Typical Performance Characteristics

Figure 1 Output Characteristics

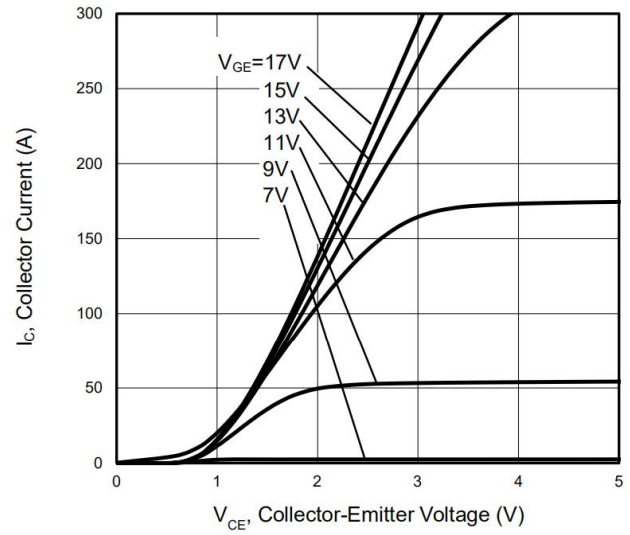


Figure 2 Transfer Characteristics

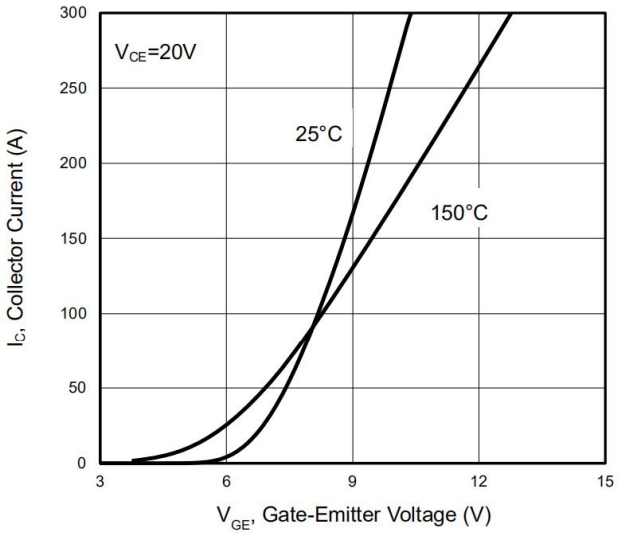


Figure 3 $V_{CE(sat)}$ vs. Temperature

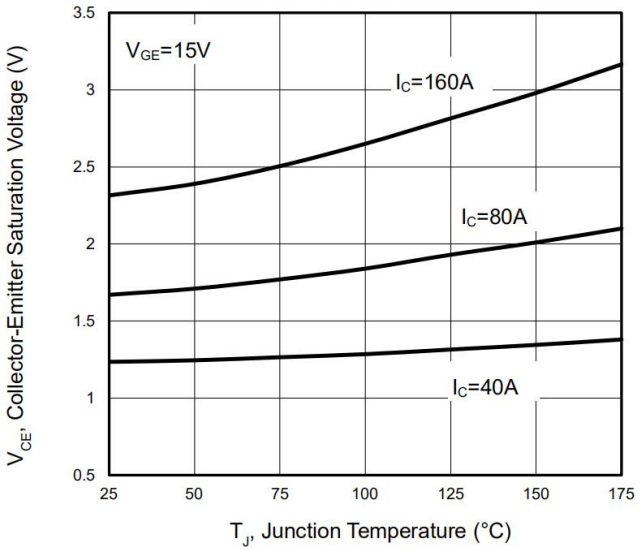


Figure 4 Saturation Voltage vs. V_{GE}

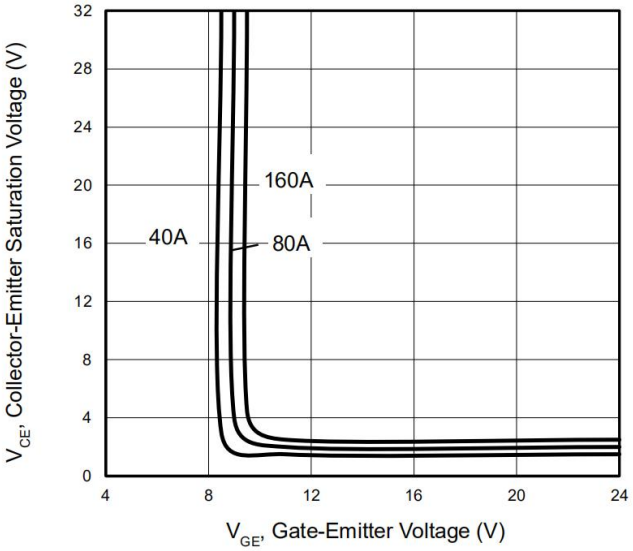


Figure 5 Capacitance Characteristics

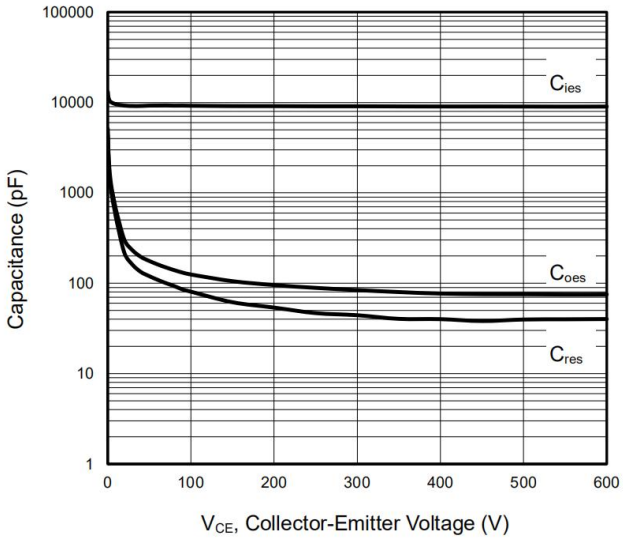


Figure 6 Gate Charge Wave Form

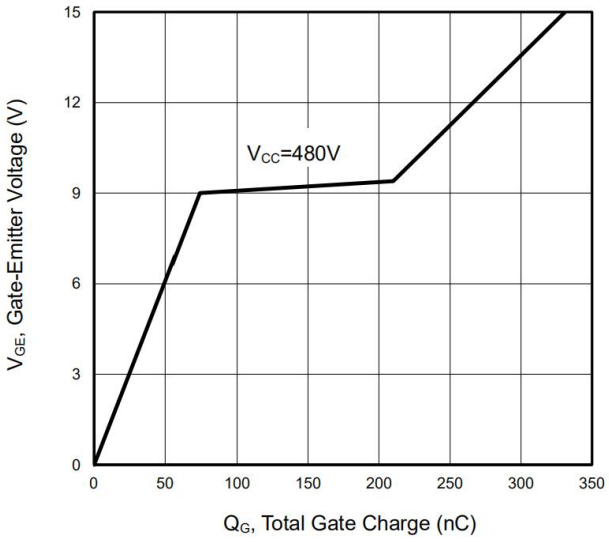


Figure 7 Forward Characteristics

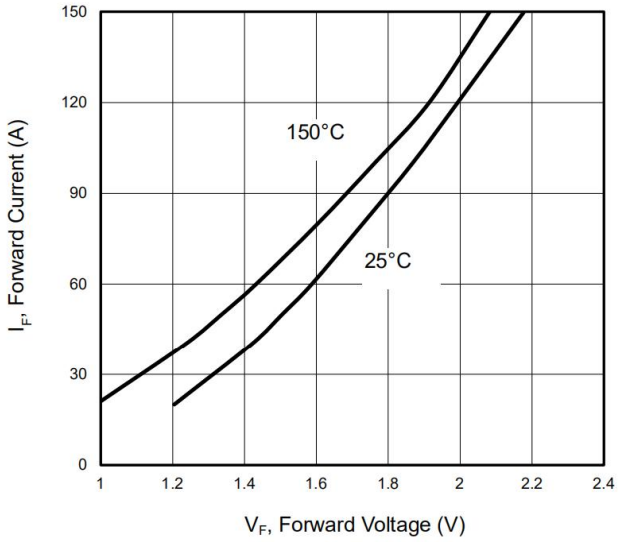


Figure 8 V_F vs. Temperature

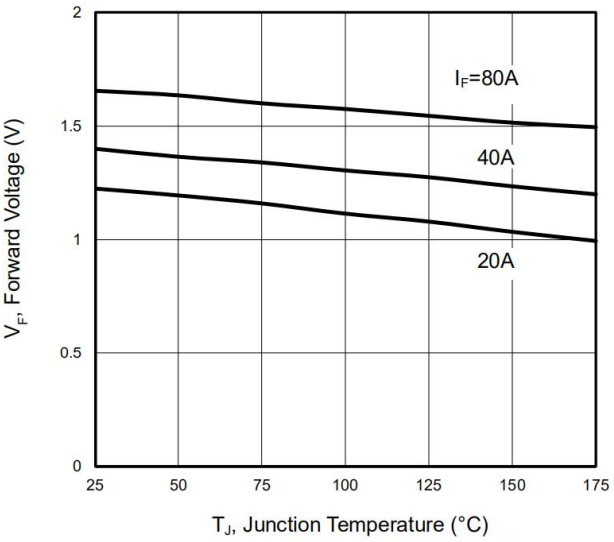


Figure 9 $V_{GE(th)}$ vs. Temperature

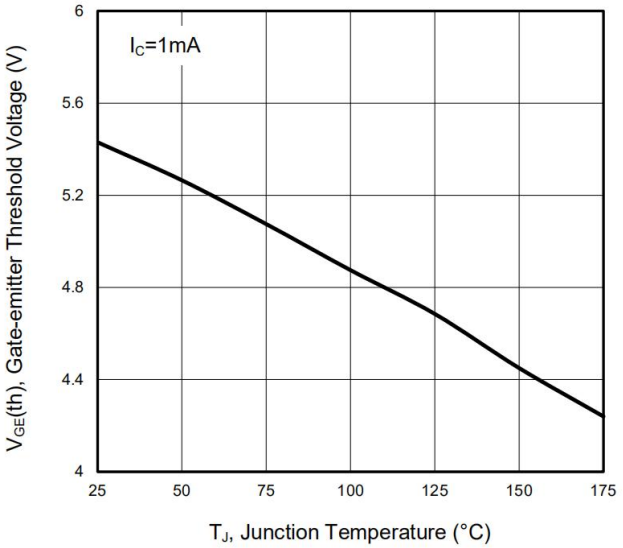


Figure 10 $V_{CE(sat)}$ vs. Collector Current

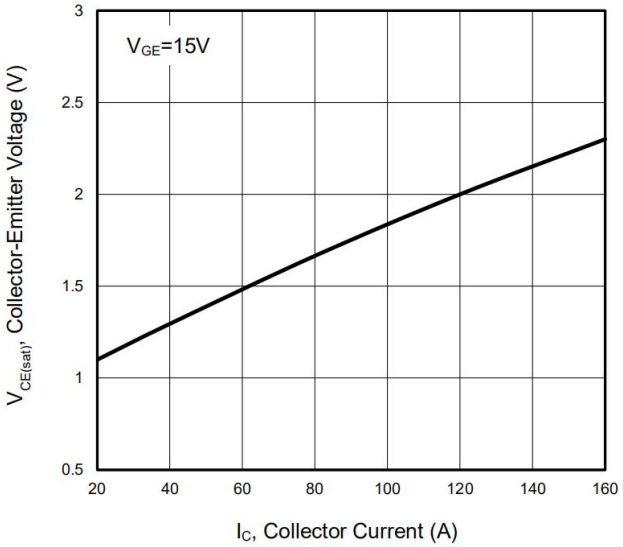


Figure 11 P_{tot} vs. Case Temperature

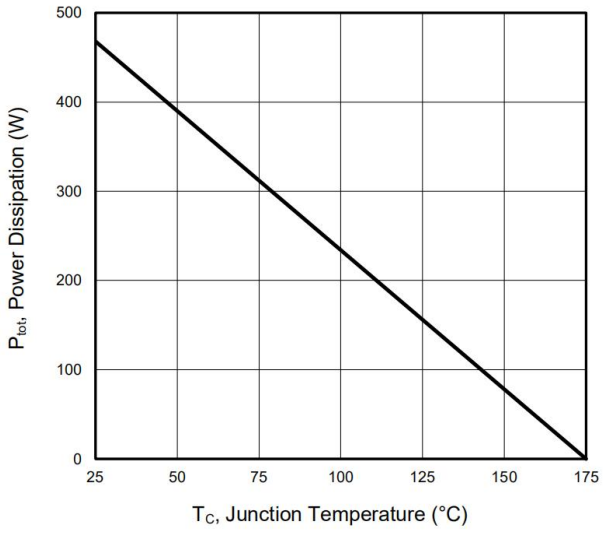


Figure 12 Forward Bias Safe Operating Area

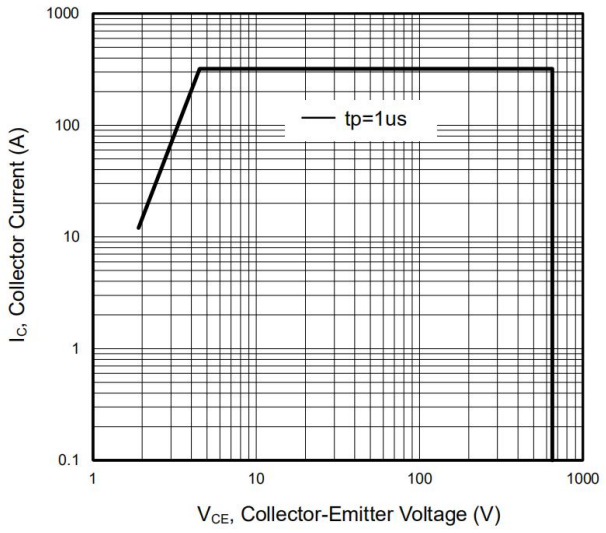


Figure 13 Switching Loss vs. R_G

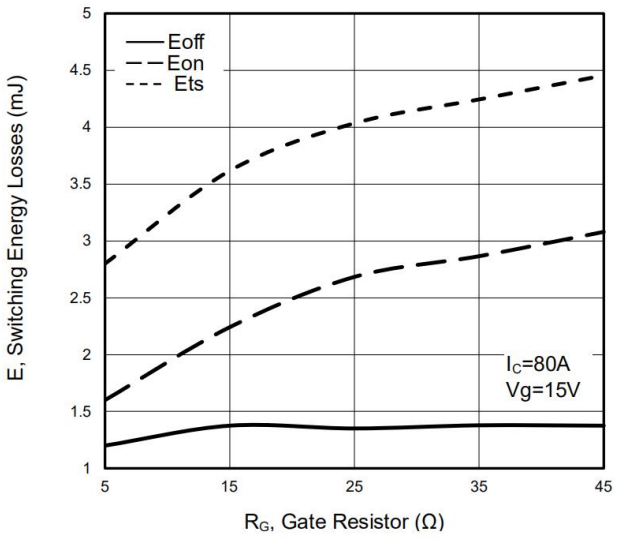


Figure 14 Switching Loss vs. Collector Current

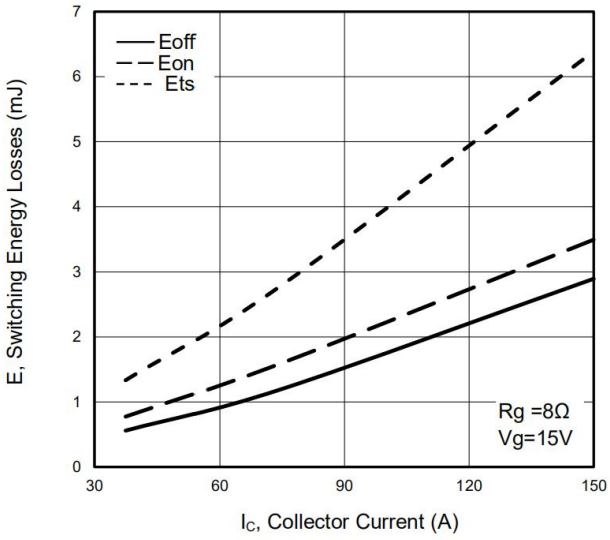


Figure 15 Switching Energy vs. Temperature

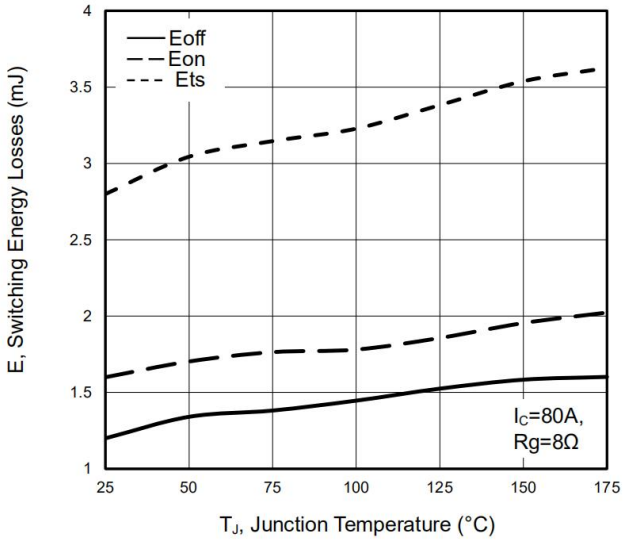


Figure 16 Switching Loss vs. Collector Current

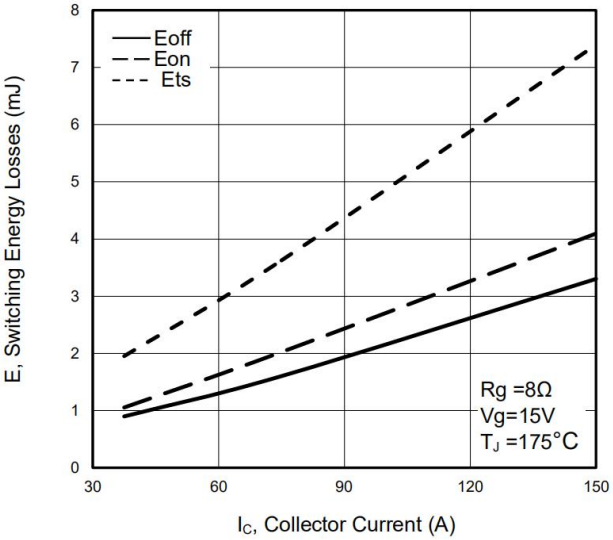


Figure 17 V_{CES} vs. Case Temperature

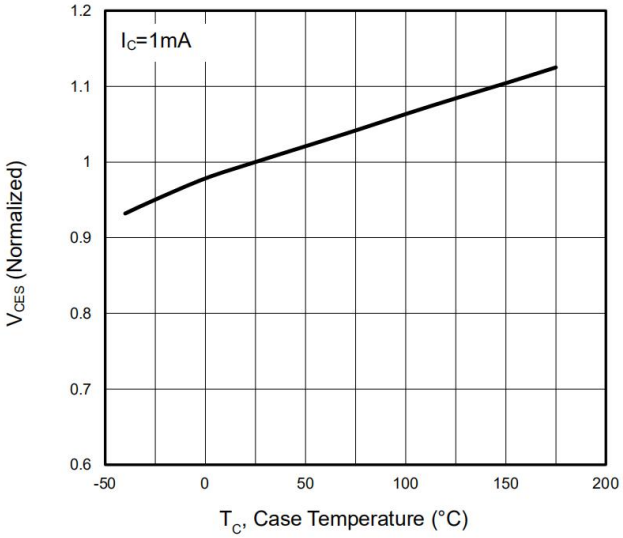


Figure 18 I_C vs. Temperature

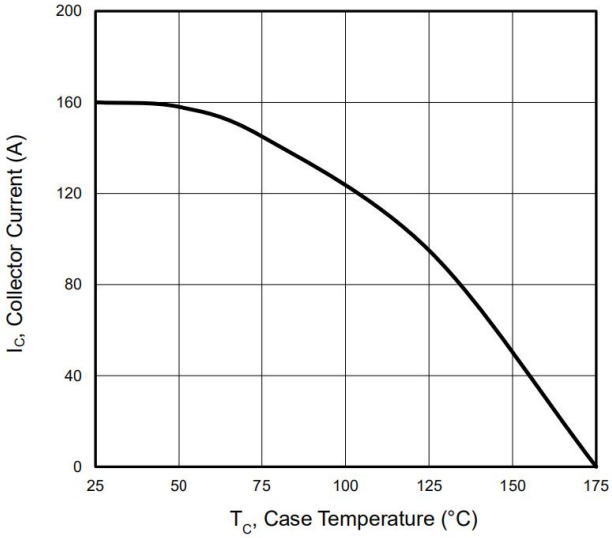


Figure 19 Switching Time vs. I_C

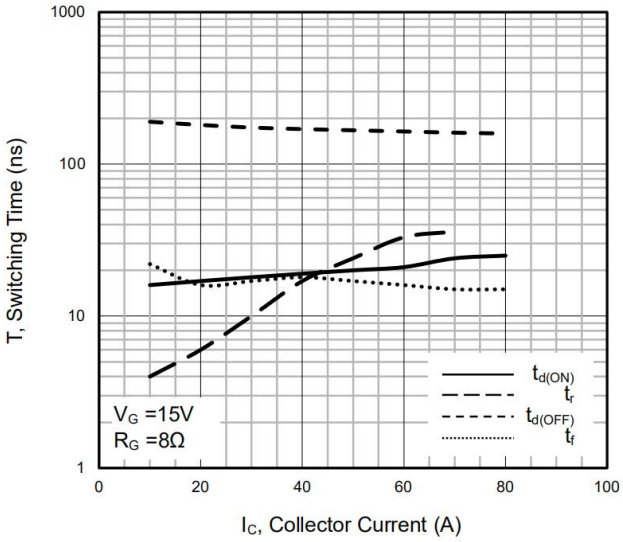


Figure 20 Switching Time vs. R_G

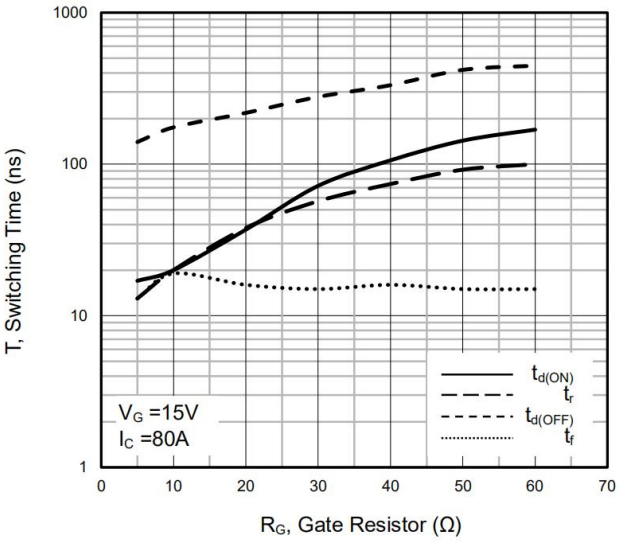


Figure 21 Switching Time vs. IC

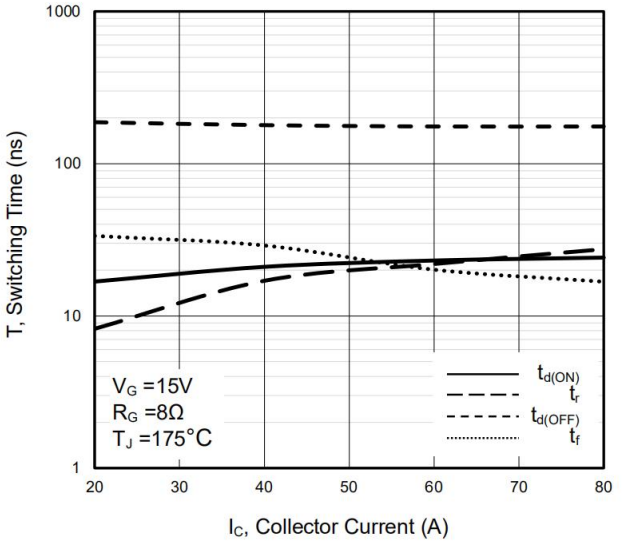
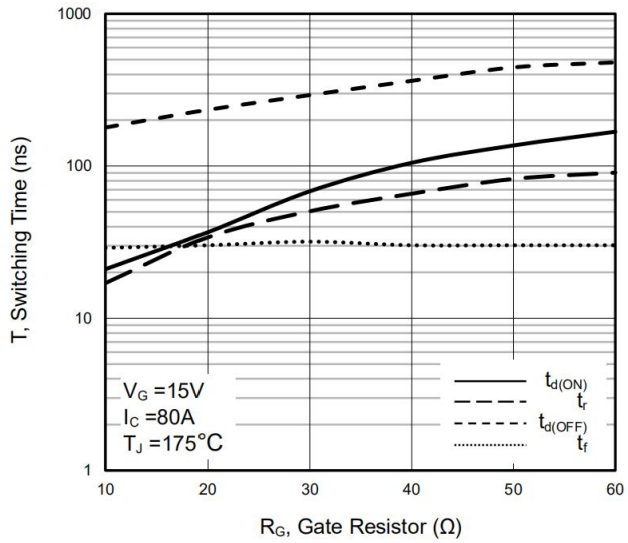
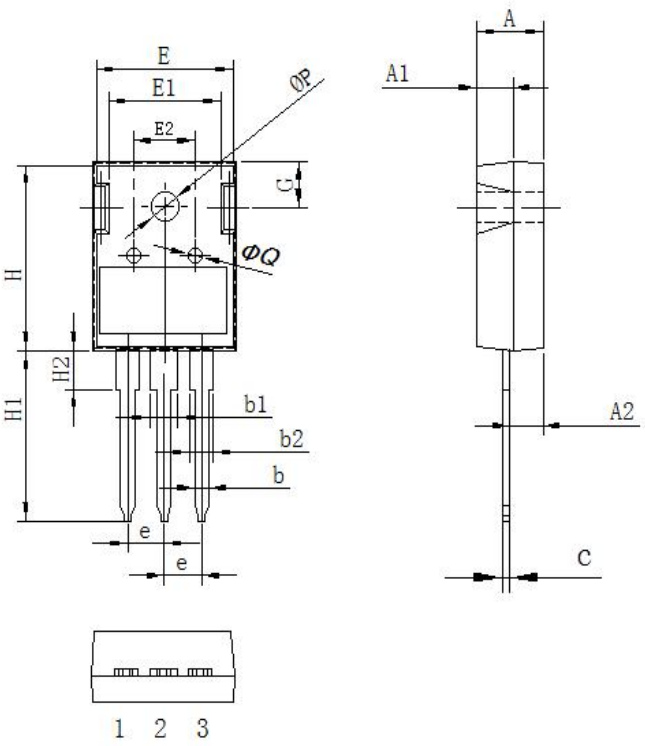


Figure 22 Switching Time vs. R_G



Package Information

TO-247H PACKAGE



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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