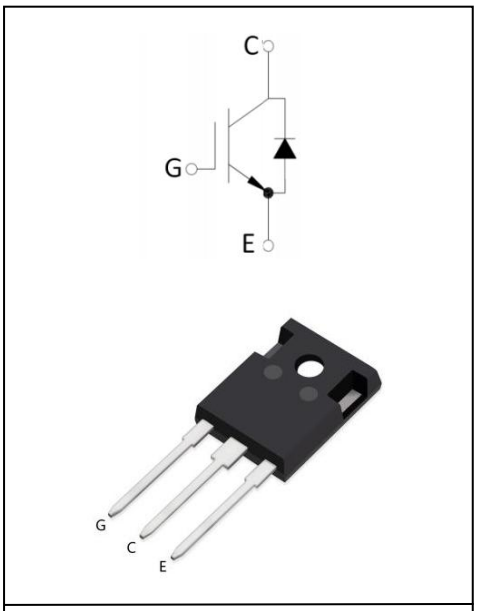
Thunder High Power Products

Silicon Field Stop(FS) Trench IGBT

Description

The THG75T65FQK is use advanced field stop(FS) trench technology. The 650V FS Trench IGBT offers superior conduction and switching performances.



THUNDER TO-247

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	Unit
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	75	A
I_{FM}	Diode Maximum Forward Current	300	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	—	1.90	2.4	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		—	7907	—	pF
C_{oes}	Output Capacitance			—	298	—	pF
C_{res}	Reverse Transfer Capacitance			—	110	—	pF
Q_g	Total Gate Charge	V_{CE}=400V,I_C=75A,V_{GE}=15V		—	312	—	nC
Q_{ge}	Gate to Emitter Charge			—	68	—	
Q_{gc}	Gate to Collector Charge			—	129	—	
Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=400V,I_C=75A V_{GE}=15V,R_G=10Ω		—	187	—	nS
t_r	Rise Time			—	171	—	
$t_{d(off)}$	Turn-off Delay Time			—	364	—	
t_f	Fall Time			—	118	—	
E_{on}	Turn-on Energy			—	9	—	mJ
E_{off}	Turn-off Energy			—	1.7	—	
E_{tot}	Total Switching Energy			—	10.7	—	

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	75	—	—	A
I_{FM}	Diode Maximum Forward Current		300	—	—	A
V_F	Diode Forward Voltage	I_F = 75A	—	1.5	2.3	V
t_{rr}	Reverse Recovery Time	T_J=25°C, I_F=75A di/dt=200A/us	—	41	—	nS
Q_{rr}	Reverse Recovery Charge		—	0.6	—	nC
*Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2%						

Thermal Characteristic

Symbol	Paramter	Typ	Max	Unit
$R_{\theta JC}$	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

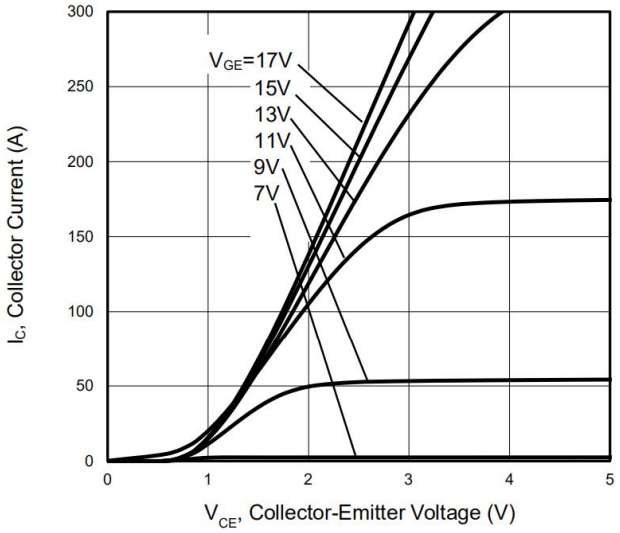


Figure 2 Transfer Characteristics

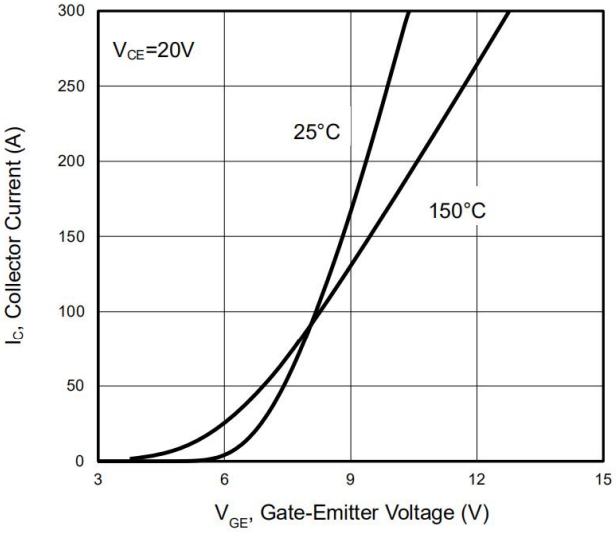


Figure 3 $V_{CE(sat)}$ vs. Temperature

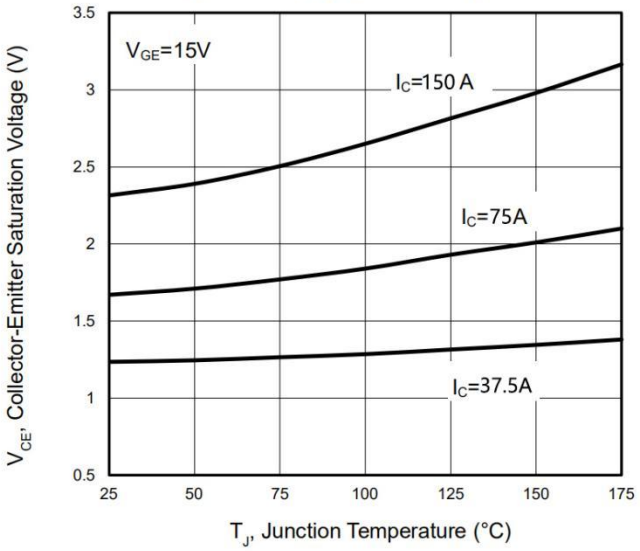


Figure 4 Saturation Voltage vs. V_{GE}

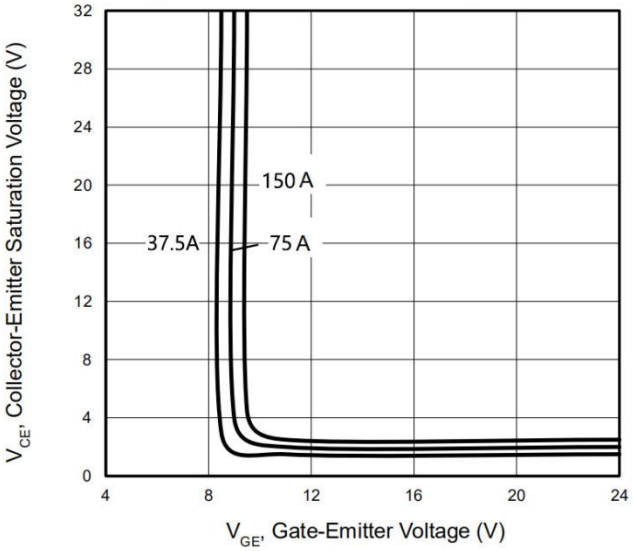


Figure 5 Capacitance Characteristics

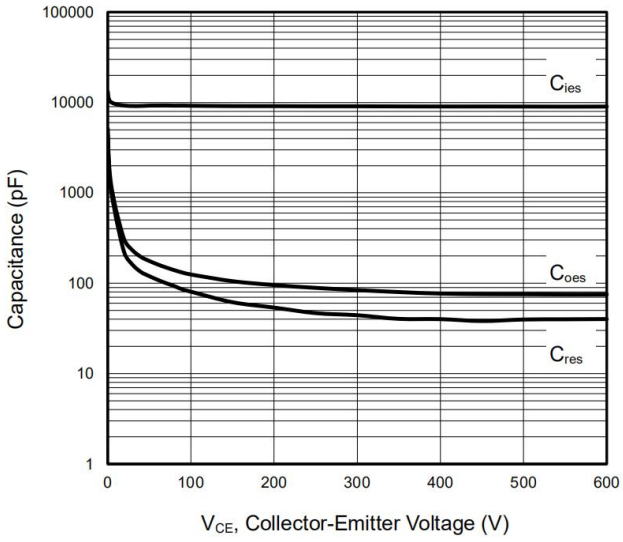


Figure 6 Gate Charge Wave Form

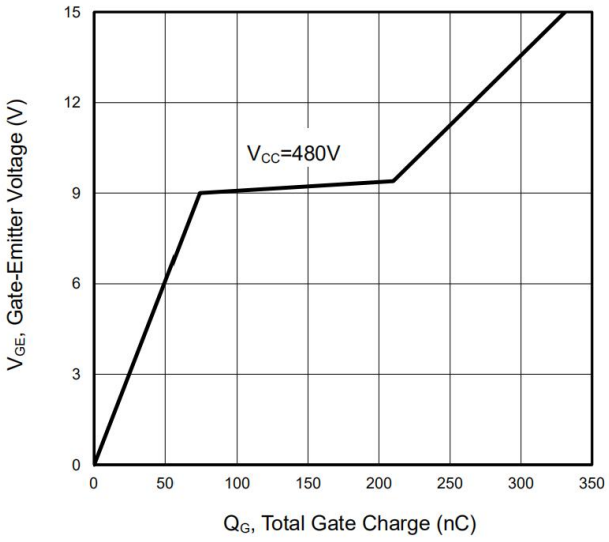


Figure 7 Forward Characteristics

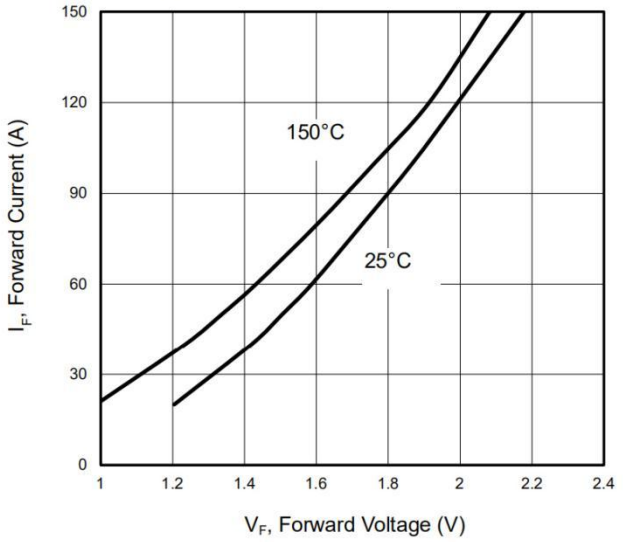


Figure 8 V_F vs. Temperature

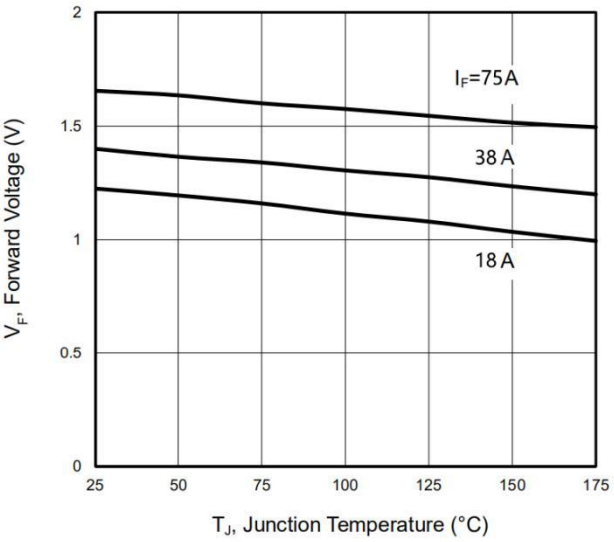


Figure 9 $V_{GE(th)}$ vs. Temperature

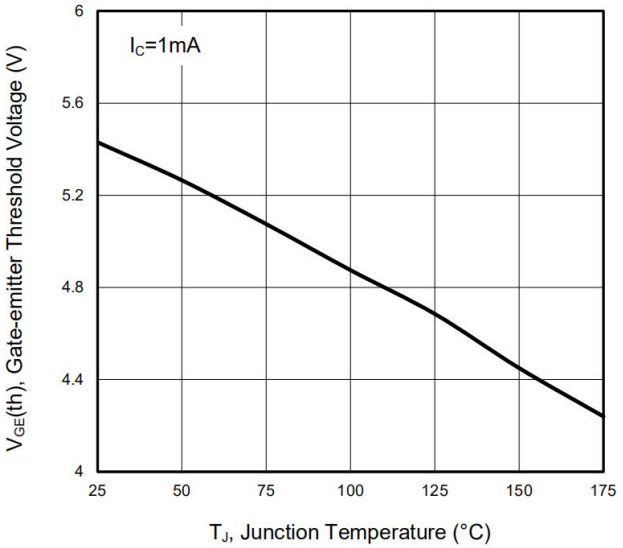


Figure 10 $V_{CE(sat)}$ vs. Collector Current

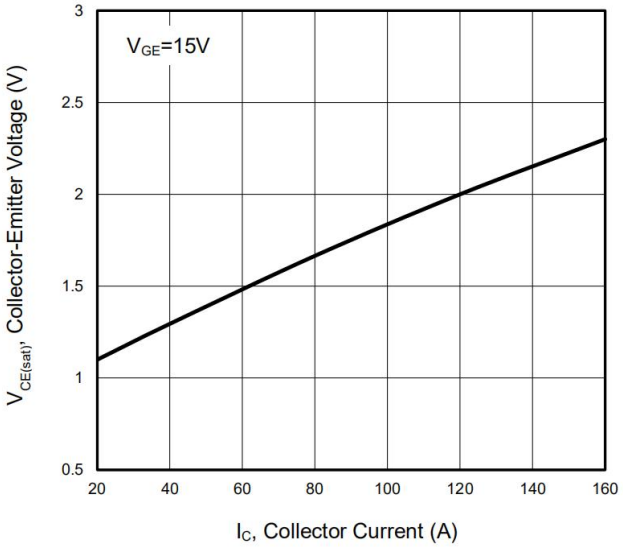


Figure 11 P_{tot} vs. Case Temperature

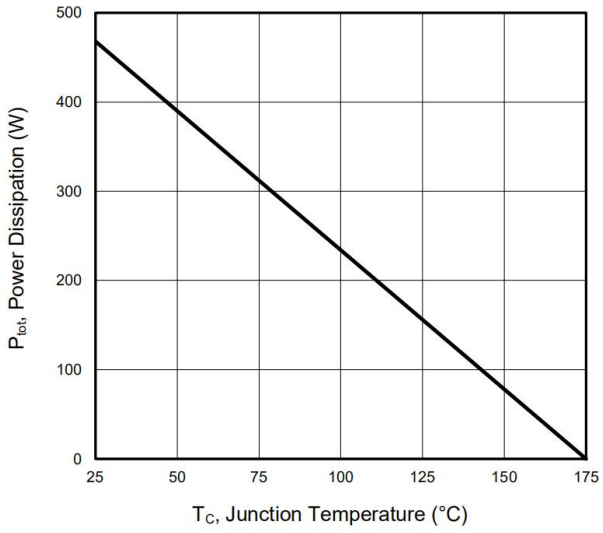


Figure 12 Forward Bias Safe Operating Area

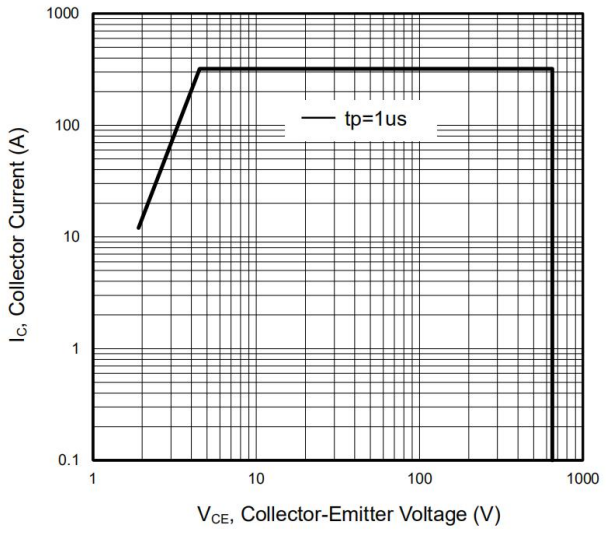


Figure 13 Switching Loss vs. R_G

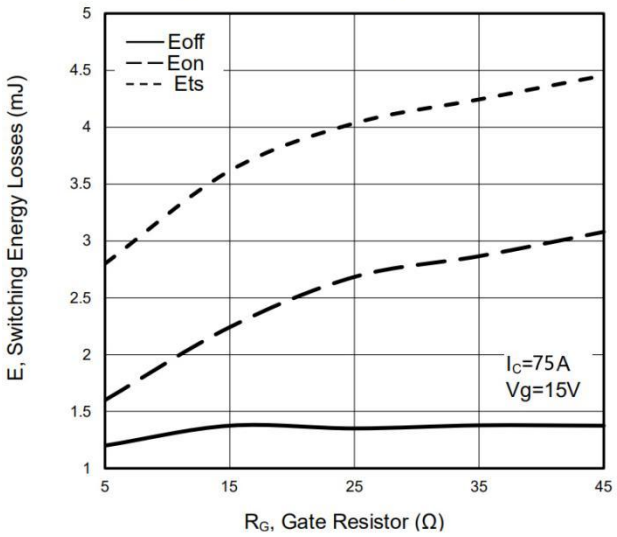


Figure 14 Switching Loss vs. Collector Current

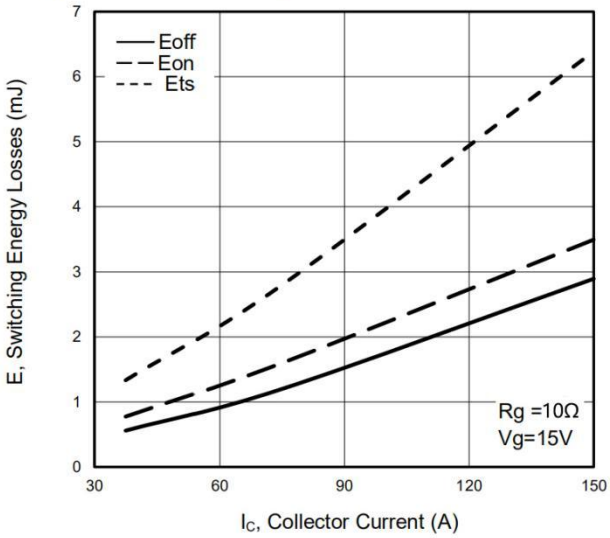


Figure 15 Switching Energy vs. Temperature

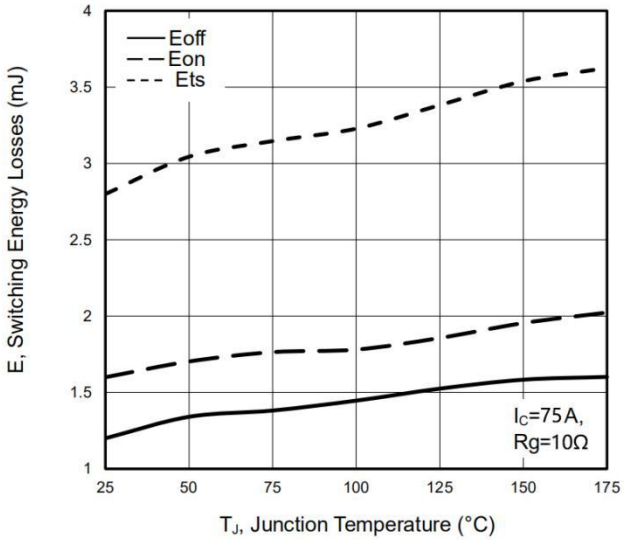


Figure 16 Switching Loss vs. Collector Current

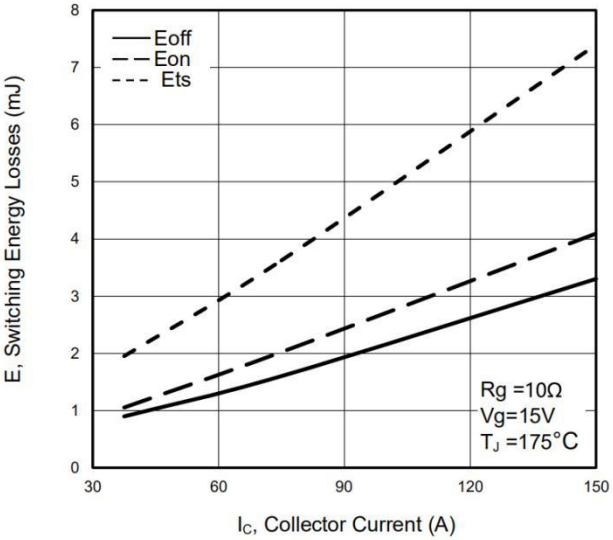


Figure 17 V_{CES} vs. Case Temperature

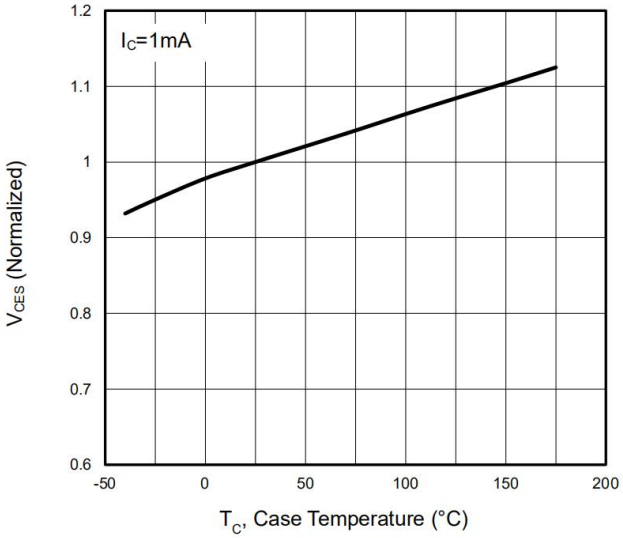


Figure 18 I_C vs. Temperature

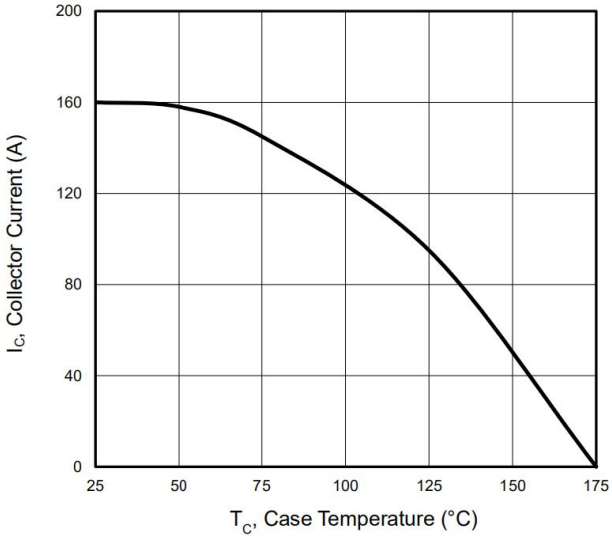


Figure 19 Switching Time vs. I_C

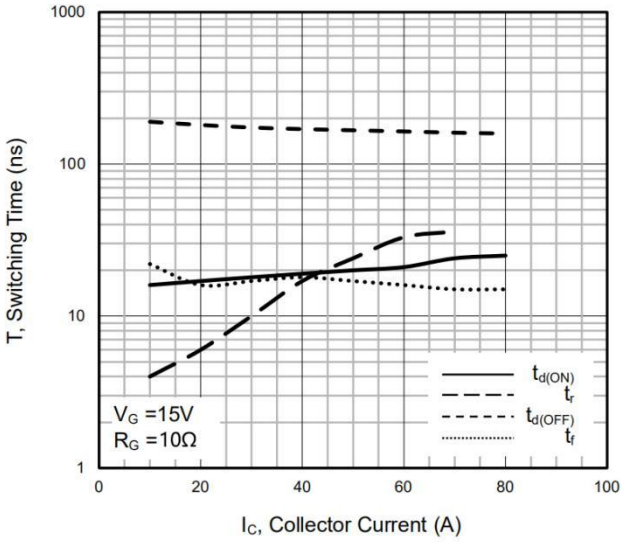


Figure 20 Switching Time vs. R_G

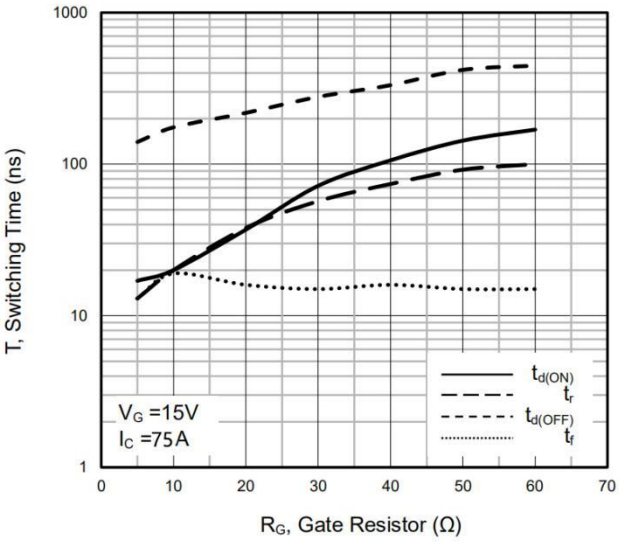


Figure 21 Switching Time vs. IC

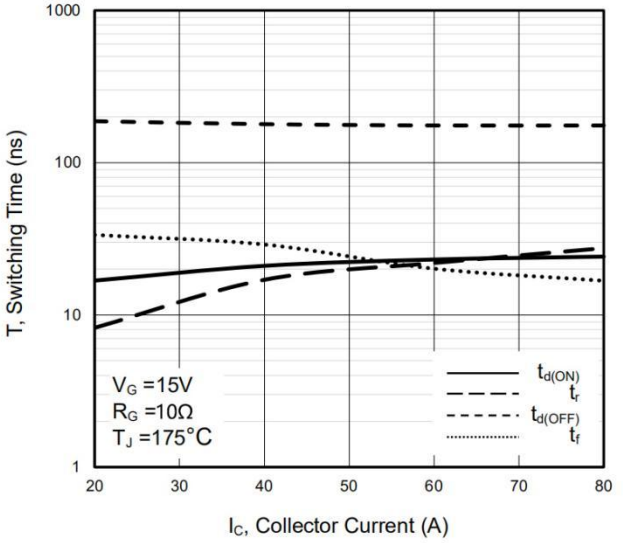
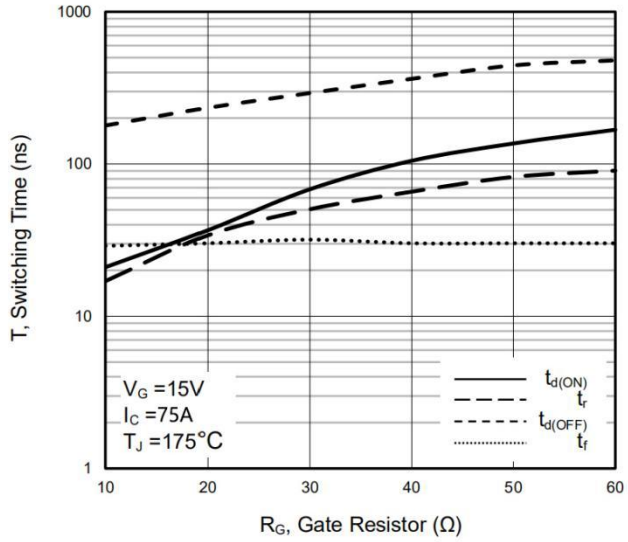
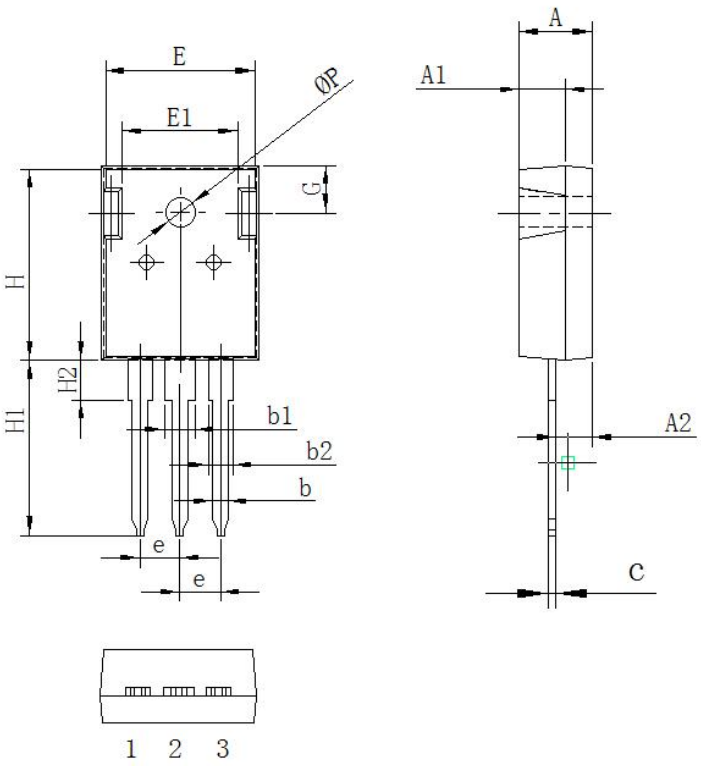


Figure 22 Switching Time vs. R_G



Package Information

TO-247 PACKAGE



基本尺寸

Symbol	单位 mm		
	Min	Nom	Max
A	4.8	5.00	5.20
A1	3.3	3.5	3.7
A2	2.20	2.40	2.60
b	1.00	1.2	1.40
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c	0.50	0.60	0.70
e	5.25	5.45	5.65
E	15.2	15.7	16.2
E1	10.2	10.7	11.2
H	20.8	21	21.2
H1	19.5	20.0	20.5
H2	4.00	4.20	4.40
G	5.60	5.80	6.00
ΦP	3.50	3.70	3.90

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