

Silicon Field Stop(FS) Trench IGBT

Description

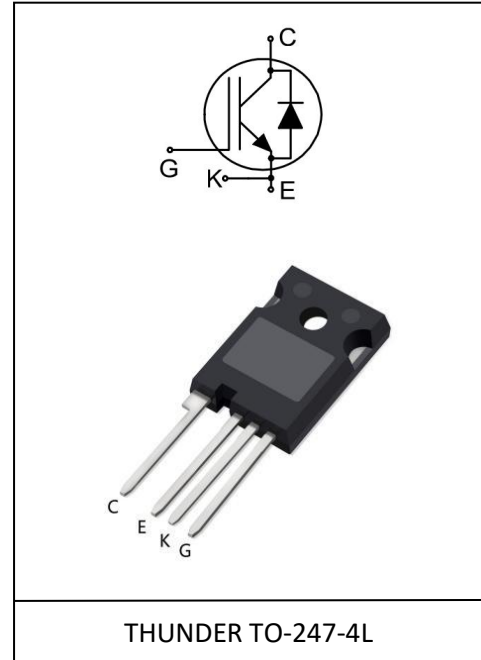
The THG75T65FQK4 is use advanced field stop(FS) trench technology. The 650V FS Trench IGBT offers superior conduction and switching performances.

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 @ T_c=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} =400V, I _C =75A, 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 =75A V _{GE} =15V, R _G =10Ω		—	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	75	—	—	A
I _{FM}	Diode Maximum Forward Current		300	—	—	A
V _F	Diode Forward Voltage	I _F = 75A	—	1.75	2.15	V
t _{rr}	Reverse Recovery Time	T _J =25°C, I _F =75A	—	280	—	nS
Q _{rr}	Reverse Recovery Charge	di/dt=200A/us	—	9.1	—	nC
*Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%						

Thermal Characteristic

Symbol	Paramter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.36	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	0.48	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^{\circ}\text{C}/\text{W}$

Typical Performance Characteristics

Figure 1 Output Characteristics

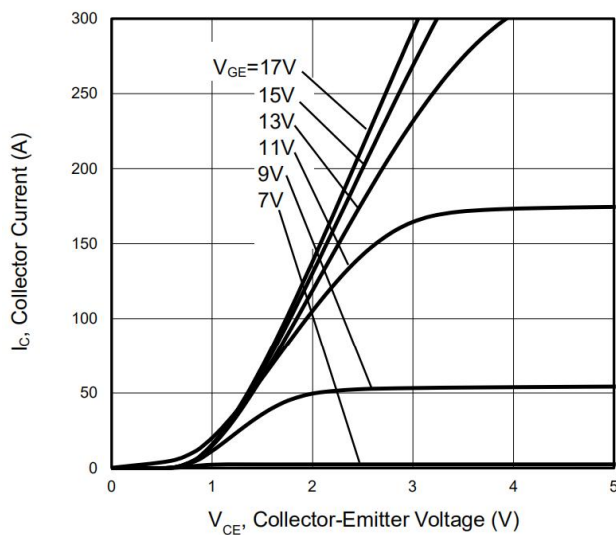


Figure 2 Transfer Characteristics

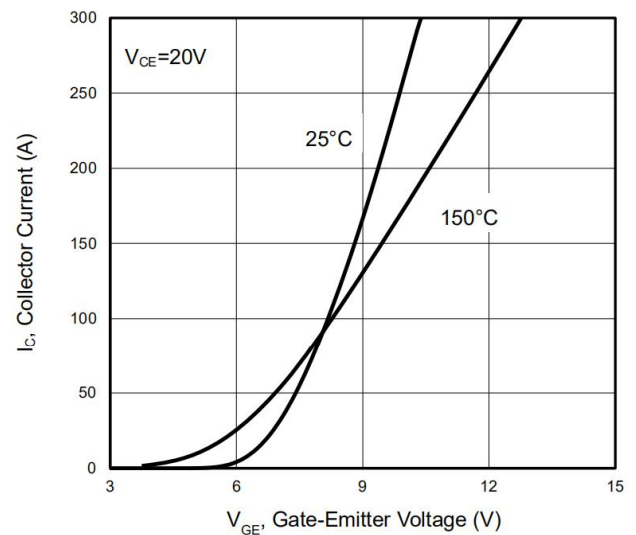


Figure 3 $V_{CE(sat)}$ vs. Temperature

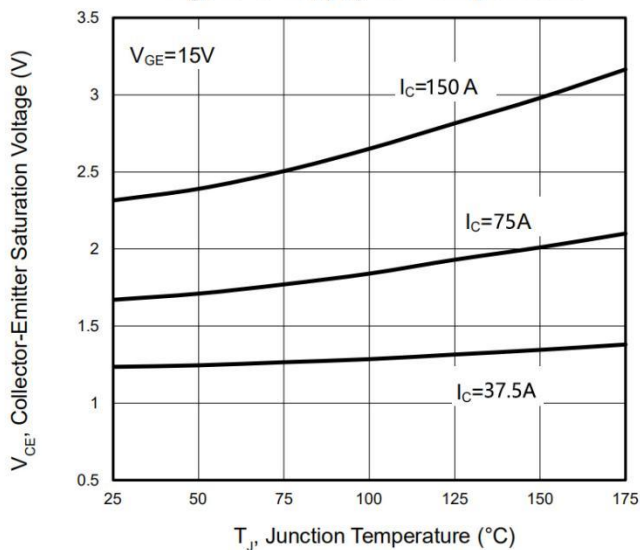


Figure 4 Saturation Voltage vs. V_{GE}

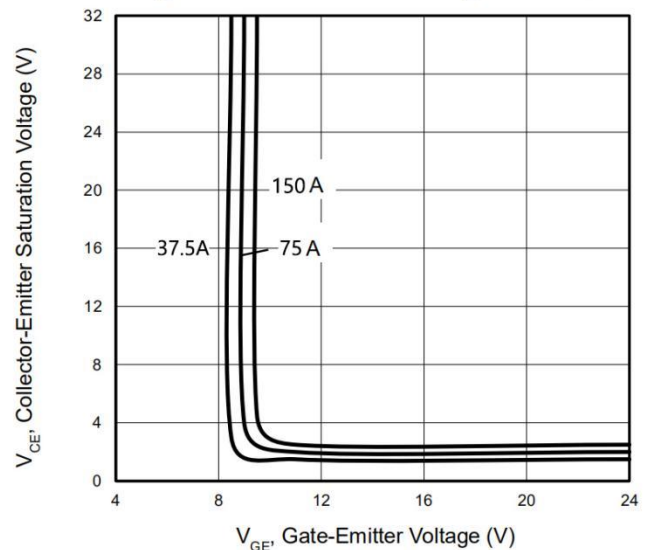


Figure 5 Capacitance Characteristics

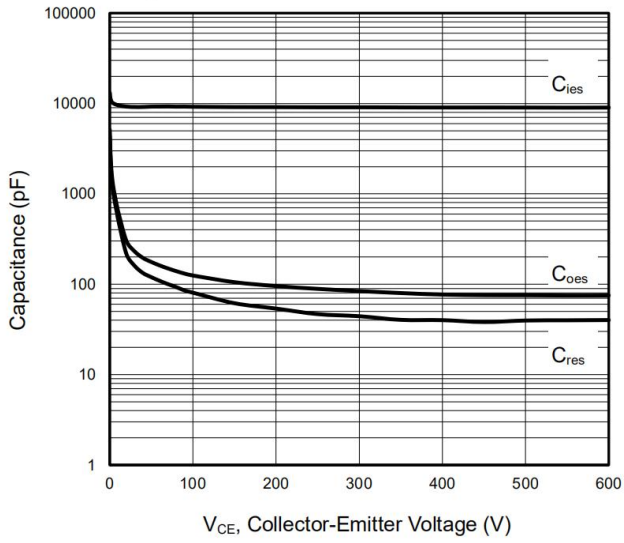


Figure 6 Gate Charge Wave Form

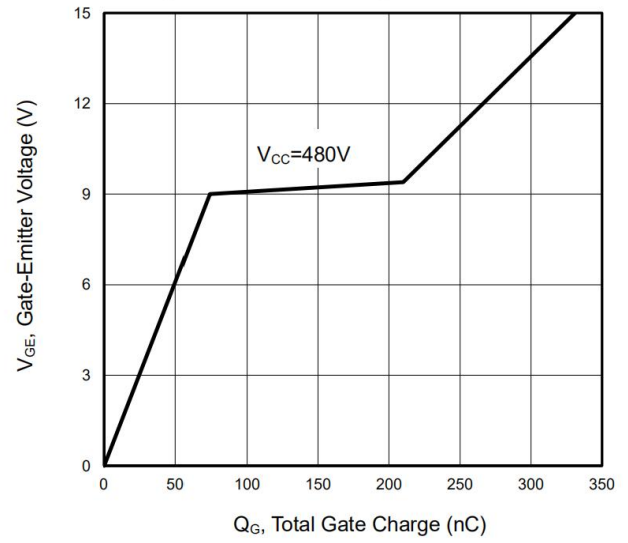


Figure 7 Forward Characteristics

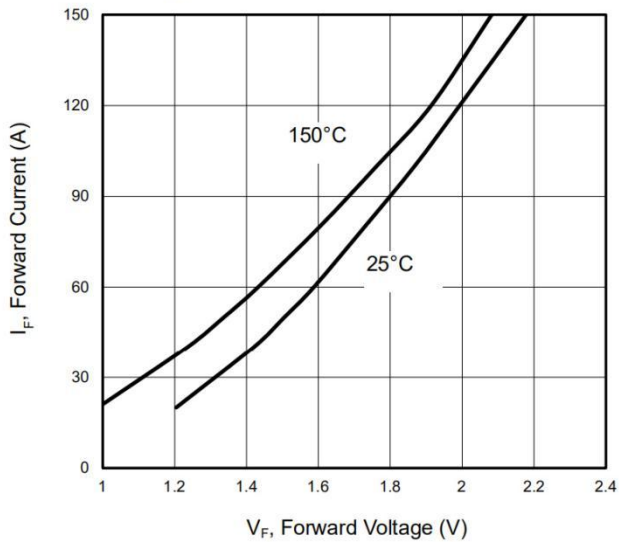


Figure 8 V_F vs. Temperature

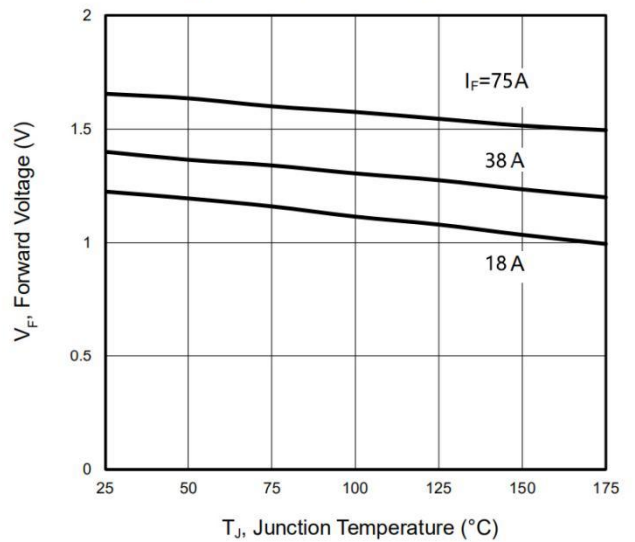


Figure 9 $V_{GE(th)}$ vs. Temperature

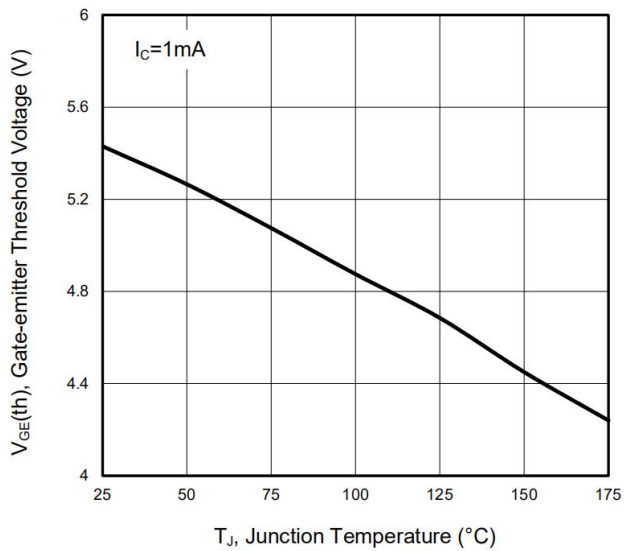


Figure 10 $V_{CE(sat)}$ vs. Collector Current

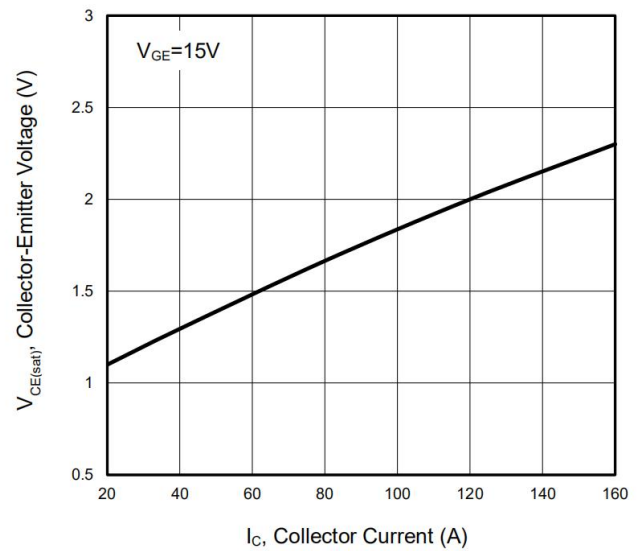


Figure 11 P_{tot} vs. Case Temperature

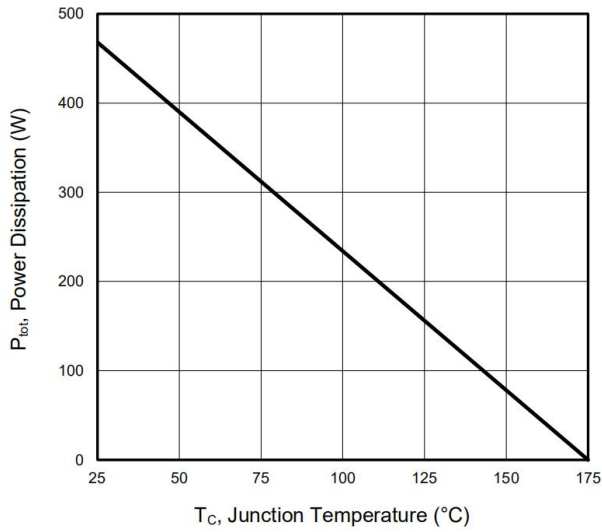


Figure 12 Forward Bias Safe Operating Area

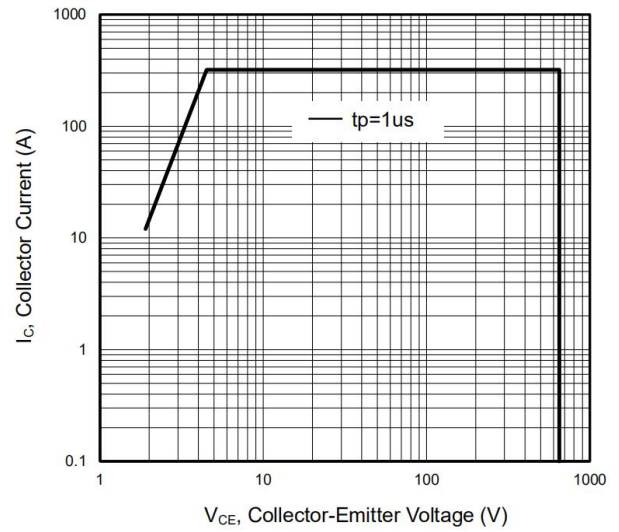


Figure 13 Switching Loss vs. R_G

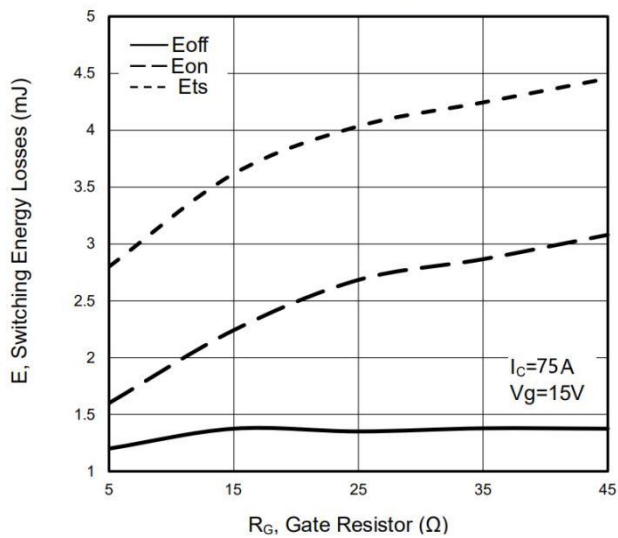


Figure 14 Switching Loss vs. Collector Current

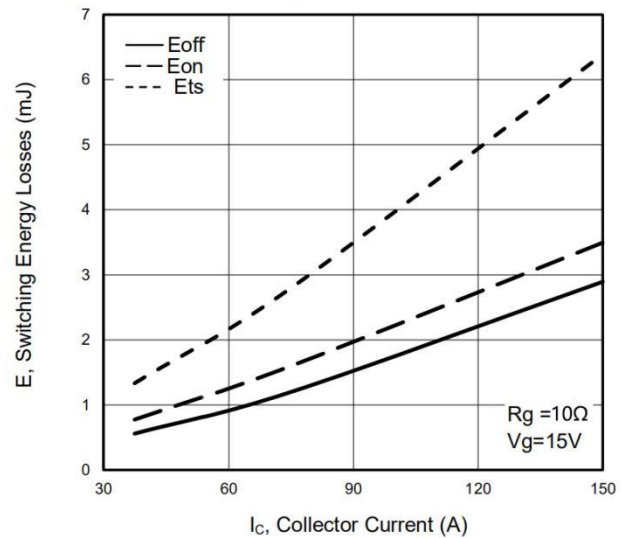


Figure 15 Switching Energy vs. Temperature

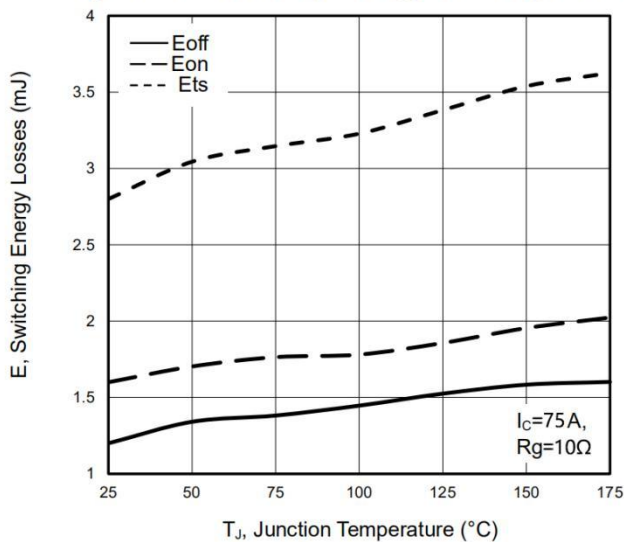


Figure 16 Switching Loss vs. Collector Current

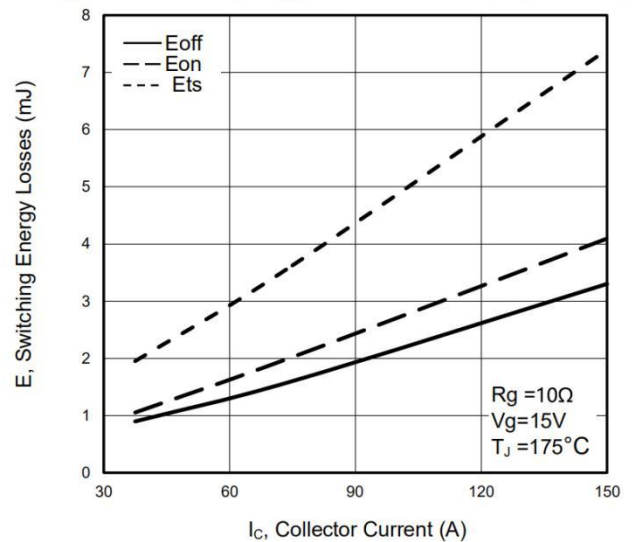


Figure 17 V_{CES} vs. Case Temperature

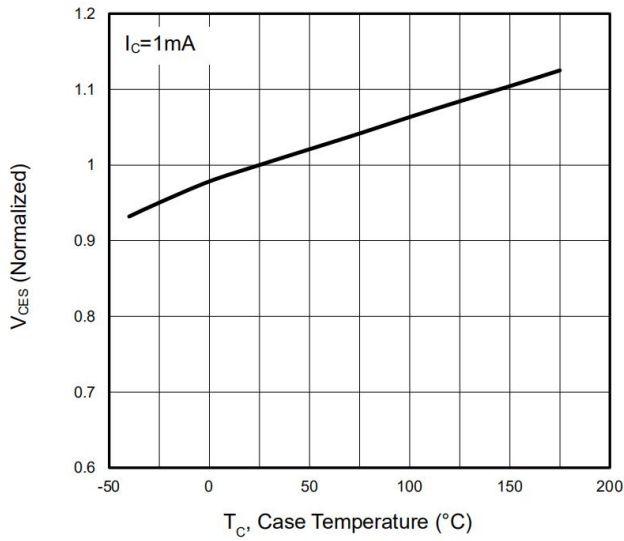


Figure 18 I_C vs. Temperature

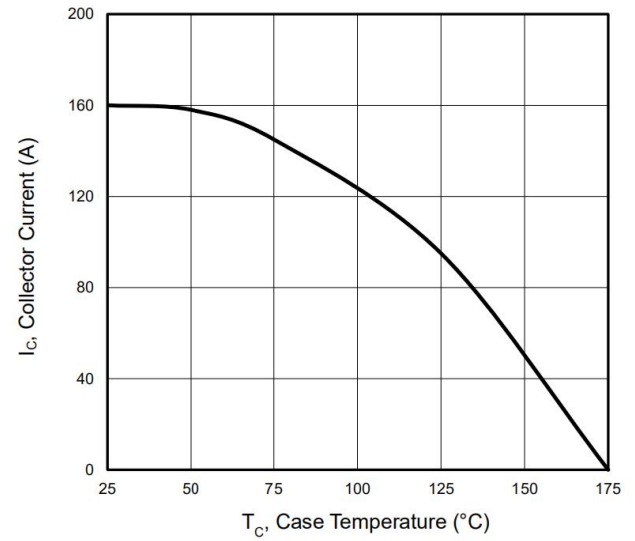


Figure 19 Switching Time vs. I_C

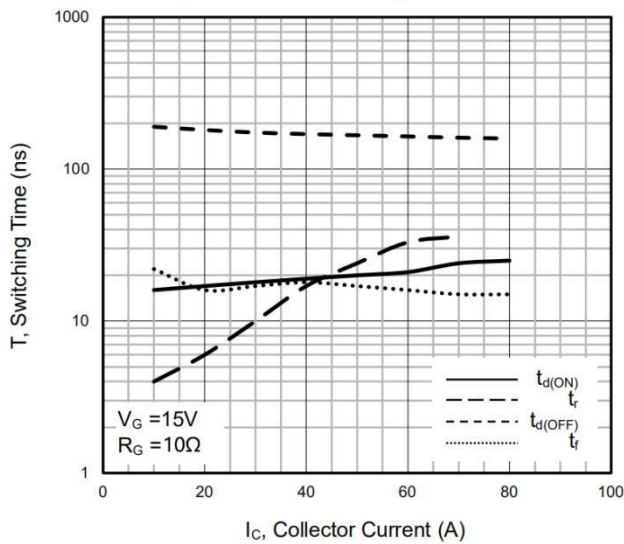


Figure 20 Switching Time vs. R_G

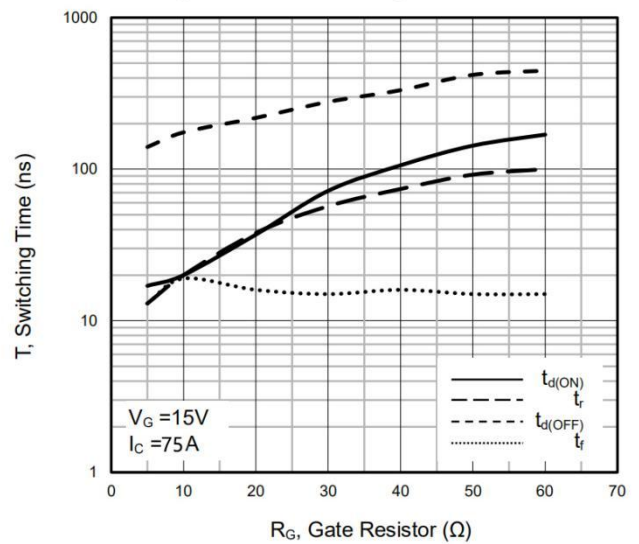


Figure 21 Switching Time vs. I_C

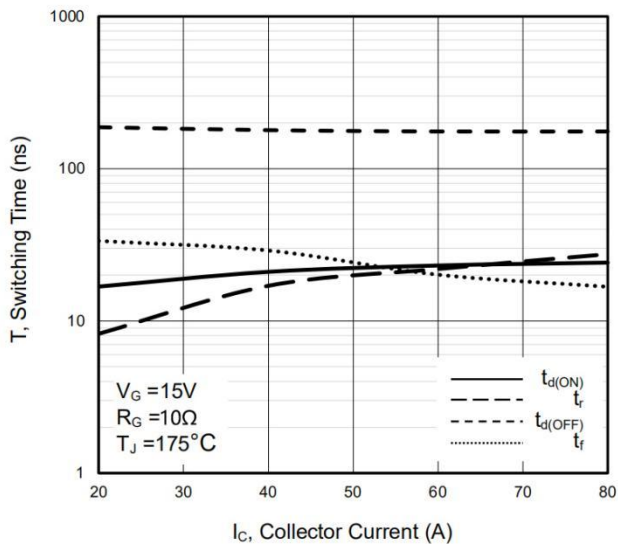
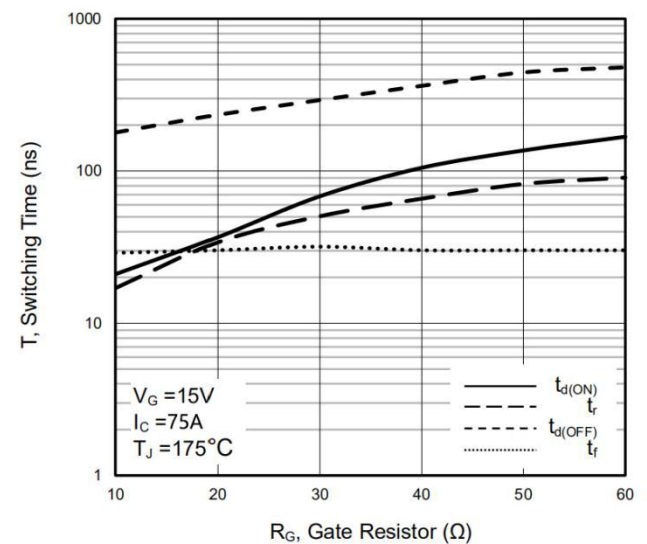
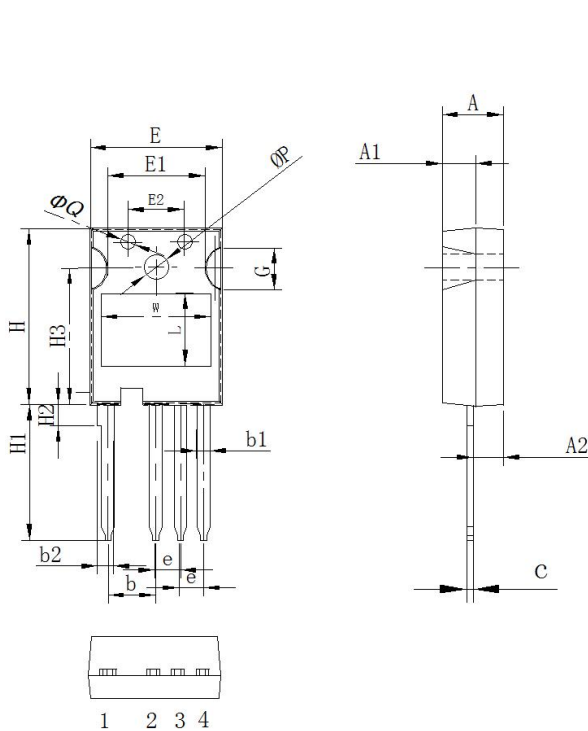


Figure 22 Switching Time vs. R_G



Package Information

TO-247-4L PACKAGE



基本尺寸

Symbol	单位 mm		
	Min	Nom	Max
A	4.8	5.00	5.20
A1	2.8	3.0	3.2
A2	2.20	2.40	2.60
b	4.85	5.05	5.25
b1	1.15	1.25	1.35
b2	2.30	2.50	2.70
c	0.50	0.60	0.70
e	2.35	2.55	2.75
E	15.5	15.7	15.9
E1	10.5	10.7	10.9
E2	7.4	7.6	7.8
G	4.8	5.0	5.2
H	22.4	22.6	22.8
H1	17.5	18.0	18.5
H2	2.42	2.62	2.82
H3	16.17	16.37	16.57
ΦP	3.40	3.60	3.8
ΦQ	2.3	2.5	2.7
W	11.8	12	12.2
L	8.3	8.5	8.7

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