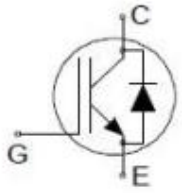
迈诺斯科技

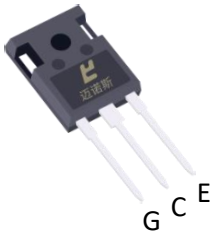
MLG60T65FBK

Description

MLG60T65FBK is obtained by advanced Trench Field Stop (T-FS) technology which is characteristic with low $V_{CE(sat)}$, optimized switching performance and low gate charge Q_g. The IGBT is suitable device for Photovoltaic, UPS and high switching frequency applications.



Schematic diagram



TO-247

General Features

① 650V Breakdown Voltage
② Fast Switching
③ Low V_{CE}(sat),typ=1.6V@I_C=60A and T_C=25℃
④ Positive temperature coefficient
⑤ Fast recovery anti-parallel diode
⑥ RoHS product

APPLICATIONS

① Photovoltaic converters
② UPS
③ Boost

ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
MLG60T65FBK-F	TO-247	MLG60T65FBK	Tube

ABSOLUTE RATINGS

Symbol	Parameter	Values	Units
V_{CES}	Collector-Emitter Voltage	650	V
I_C	Collector Current @TC=25°C	120	A
	Collector Current @TC=100°C	60	A
I_{CM}	Pulsed Collector Current, tp limited by T_{Jmax}	240	A
I_F	Diode Continuous Forward Current @TC=25°C	60	A
	Diode Continuous Forward Current @TC=100 °C	30	A
I_{FM}	Diode Maximum Forward Current, limited by T_{Jmax}	120	A
V_{GES}	Gate-Emitter Voltage	±30	V
t_{SC}	Short circuit withstand time VGE=15V, VCC≤400V, Allowed number of short circuits<1000,Times between short circuits: ≥ 1.0s,TJ ≤ 175°C	10.0	μs
P_D	Power Dissipation @TC=25°C	375	W
T_{Jmax}, T_{stg}	Operating Junction and Storage Temperature Range	175, –55 to 175	℃
T_L	Maximum Temperature for Soldering	260	℃

Thermal characteristics

Symbol	Parameter	Values	Units
$R_{\theta JC}$	Junction-to-Case (IGBT)	0.4	℃/W
$R_{\theta JC}$	Junction-to-Case (Diode)	0.75	℃/W
$R_{\theta JA}$	Junction-to-Ambient	40	℃/W

Electrical Characteristics（at TC = 25°C, unless otherwise specified）

Static Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
V_{CES}	Collector-Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 250μA	650	--	--	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15V,I_C = 60A T_J=25℃ T_J=125℃ T_J=175℃	 -- -- --	 1.60 1.95 2.10	 2.00 -- --	V
$V_{GE(TH)}$	Gate Threshold Voltage	V_{CE} = V_{GE} ,I_C = 1mA	4.7	5.5	6.2	V
V_F	Diode Forward Voltage	I_F=30A,T_J=25℃ T_J=125℃ T_J=175℃	 -- --	 1.90 1.55 1.40	 2.60 -- --	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE} = 650V, V_{GE} = 0V	--	--	25	μA
$I_{GES(F)}$	Gate-Emitter Forward Leakage Current	V_{GE} = +30V	--	--	200	nA
$I_{GES(R)}$	Gate-Emitter Reverse Leakage Current	V_{GE} = -30V	--	--	-200	nA
Pulse width tp≤300μs, δ≤2%						

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GE} =0V V_{CE} =25V f =1.0MHz	--	3146	--	pF
C_{oss}	Output Capacitance		--	121	--	
C_{rss}	Reverse Transfer Capacitance		--	31	--	
Q_G	Gate charge	V_{CC}=520V I_{CE}=20A V_{GE} =15V	--	118	--	nC
Q_{GE}	Gate-emitter charge		--	46	--	
Q_{GC}	Gate-collector charge		--	33	--	
$I_{C(SC)}$	Short circuit collector current Max.1000 short circuits, Times between short circuits:	V_{GE} =15.0V,V_{CC}≤400V， t_{SC}≤10us， T_J≤175℃	--	250	--	A

IGBT Switching Characteristics, at TJ=25℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-on Delay Time	I_C =60A V_{CE} = 400V V_{GE} = 15V R_G =5Ω T_J=25°C Inductive Load	--	40	--	ns
t_r	Rise Time		--	47	--	
$t_{d(off)}$	Turn-Off Delay Time		--	123	--	
t_f	Fall Time		--	90	--	
E_{on}	Turn-On Switching Loss		--	1.2	--	mJ
E_{off}	Turn-Off Switching Loss		--	1.5	--	
E_{ts}	Total Switching Loss		--	2.7	--	

IGBT Switching Characteristics, at TJ=175℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-on Delay Time	I_C =60A V_{CE} = 400V V_{GE} = 15V R_G =5Ω T_J=175°C Inductive Load	--	35	--	ns
t_r	Rise Time		--	44	--	
$t_{d(off)}$	Turn-Off Delay Time		--	139	--	
t_f	Fall Time		--	154	--	
E_{on}	Turn-On Switching Loss		--	1.26	--	mJ
E_{off}	Turn-Off Switching Loss		--	2.30	--	
E_{ts}	Total Switching Loss		--	3.56	--	

Diode Characteristics, at TJ=25℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
T_{rr}	Reverse Recovery Time	I_F=30A, di/dt=200A/μs, T_J=25°C	--	52	--	ns
Q_{rr}	Reverse Recovery Charge		--	62	--	nC
I_{rrm}	Reverse Recovery Current		--	3.07	--	A
T_{rr}	Reverse Recovery Time	I_F=60A, di/dt=200A/μs, T_J=25°C	--	69	--	ns
Q_{rr}	Reverse Recovery Charge		--	76	--	nC
I_{rrm}	Reverse Recovery Current		--	3.64	--	A

Diode Characteristics, at TJ=175℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
T_{rr}	Reverse Recovery Time	I_F=30A, di/dt=200A/μs, T_J=175°C	--	154	--	ns
Q_{rr}	Reverse Recovery Charge		--	655	--	nC
I_{rrm}	Reverse Recovery Current		--	7.72	--	A
T_{rr}	Reverse Recovery Time	I_F=60A, di/dt=200A/μs, T_J=175°C	--	175	--	ns
Q_{rr}	Reverse Recovery Charge		--	670	--	nC
I_{rrm}	Reverse Recovery Current		--	7.96	--	A

Characteristics Curves

Figure 1. Forward Bias Safe Operating Area for TO-247

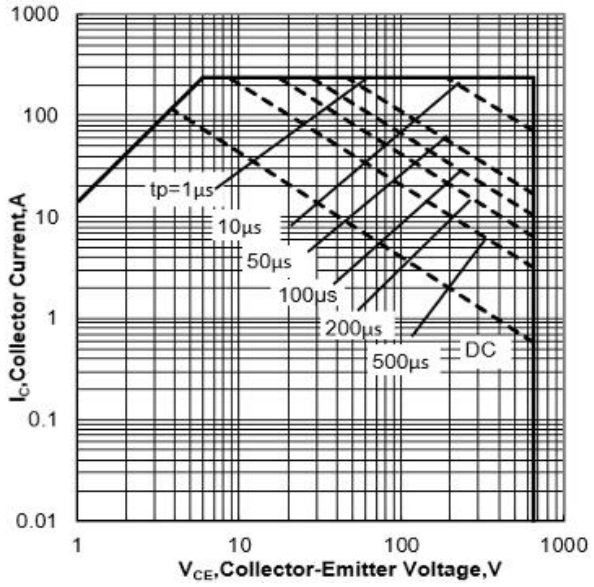


Figure 2. Power Dissipation vs Case Temperature for TO-247

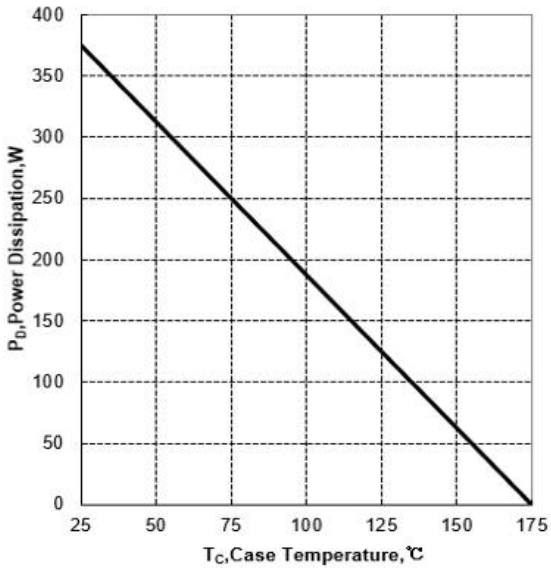


Figure 3. Collector Current vs Case Temperature

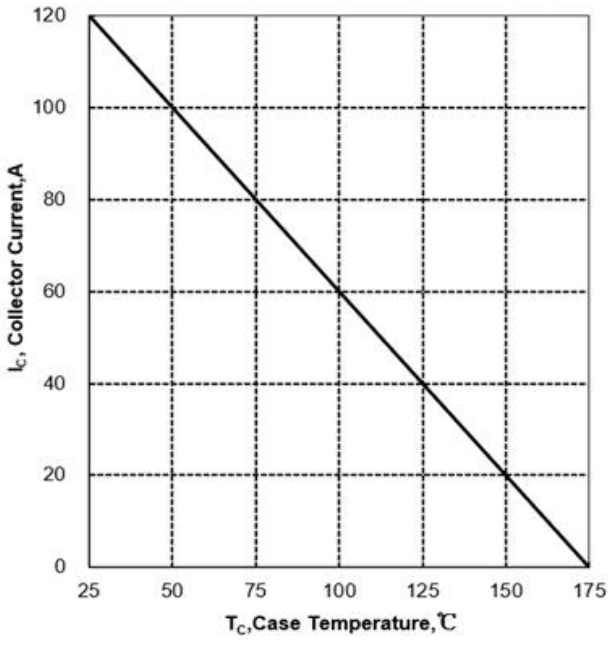


Figure 4.Typical Transfer Characteristics

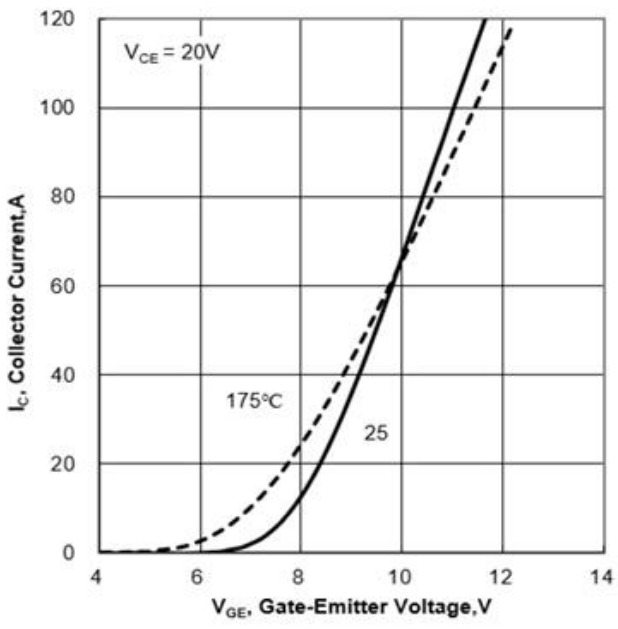


Figure 5. Typical Output Characteristics (TJ=25℃)

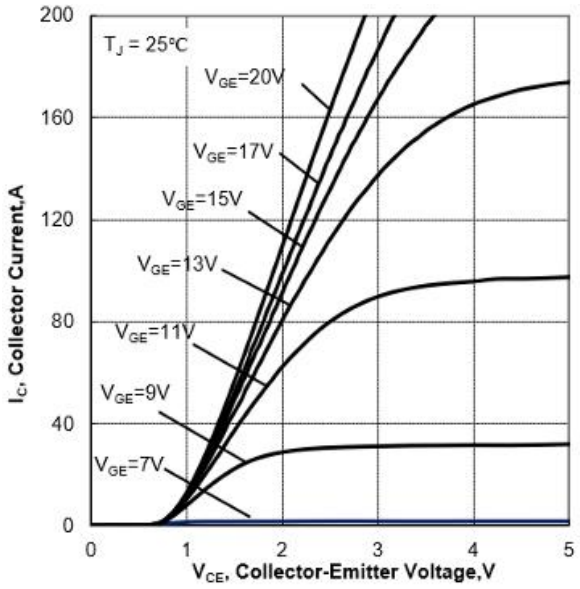


Figure 6. Typical Output Characteristics (TJ=175℃)

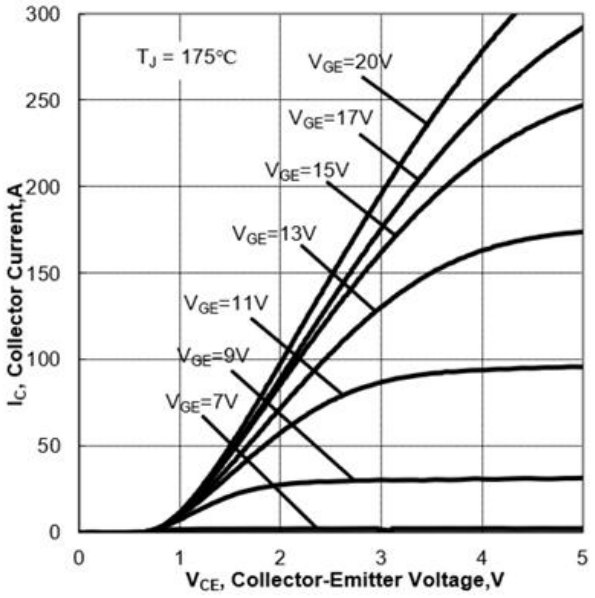


Figure 7. Typical Collector-Emitter Saturation Voltage vs Junction Temperature

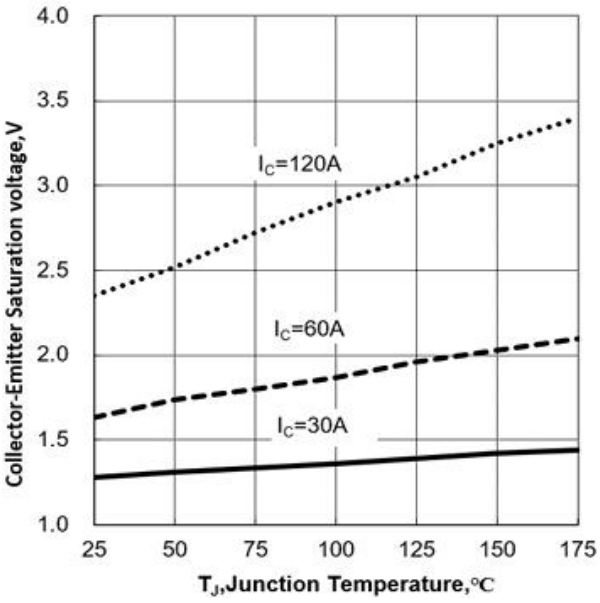


Figure 8. Typical Gate-Emitter Threshold Voltage vs Junction Temperature

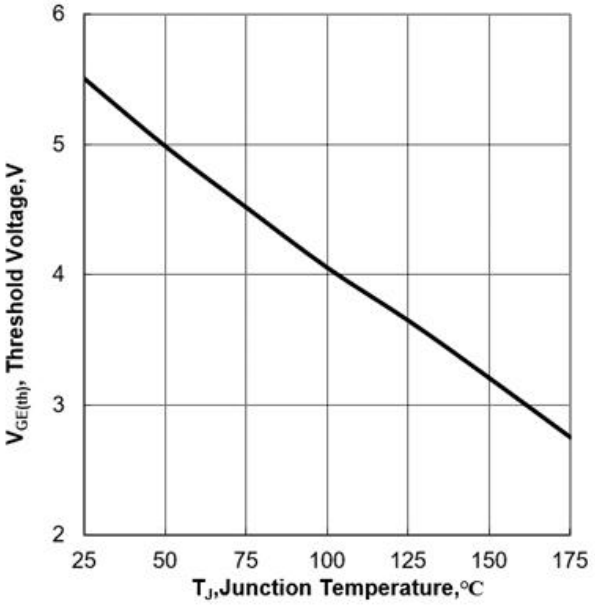


Figure 9. Typical Switching Times vs Gate Resistor (TJ=25℃, VCE=400V, VGE=15/0V, IC=60A)

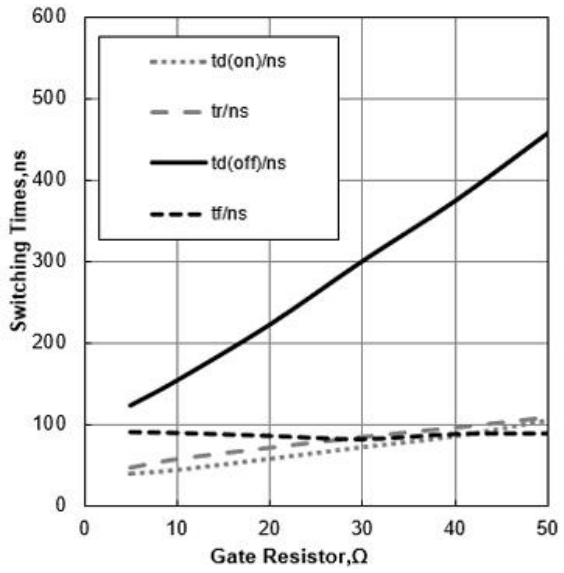


Figure 10. Typical Switching Energy vs Gate Resistor (TJ=25℃, VCE=400V, VGE=15/0V, IC=60A)

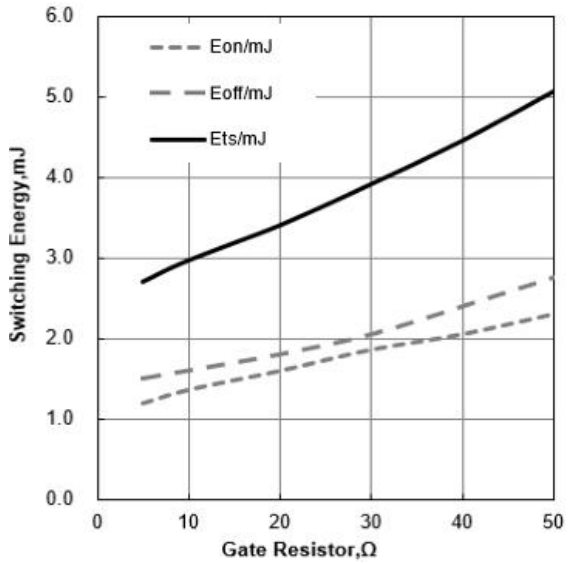


Figure 11. Typical Switching Times vs Junction Temperature (VCE=400V, VGE=15/0V, Ic=60A)

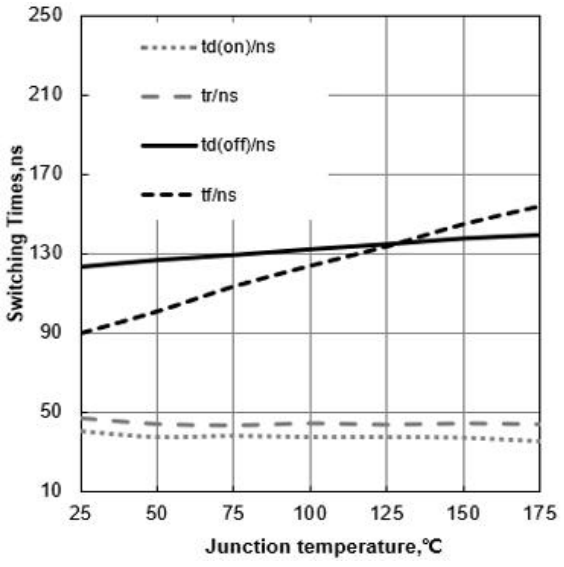


Figure 12. Typical Switching Energy vs Junction Temperature (VCE=400V, VGE=15/0V, Ic=60A)

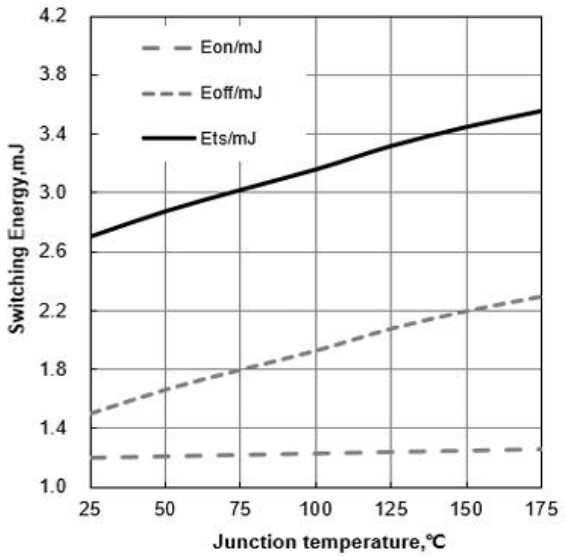


Figure 13. Typical Switching Times vs Collector Current (TJ=25℃,VCE=400V, VGE=15/0V)

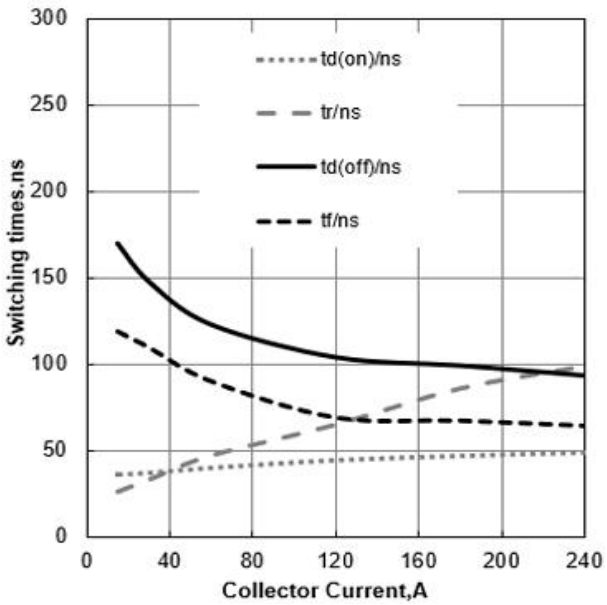


Figure 14. Typical Switching Energy vs Collector Current (TJ=25℃, VCE=400V, VGE=15/0V)

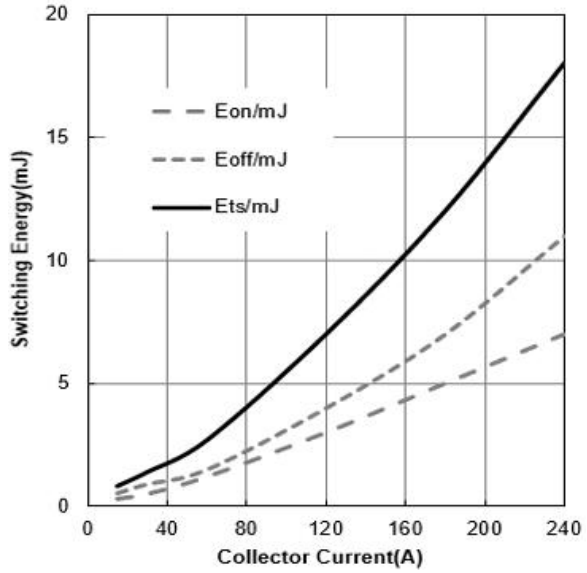


Figure 15. Typical Switching Times vs VCE (TJ=25℃,VGE=15/0V, IC=60A)

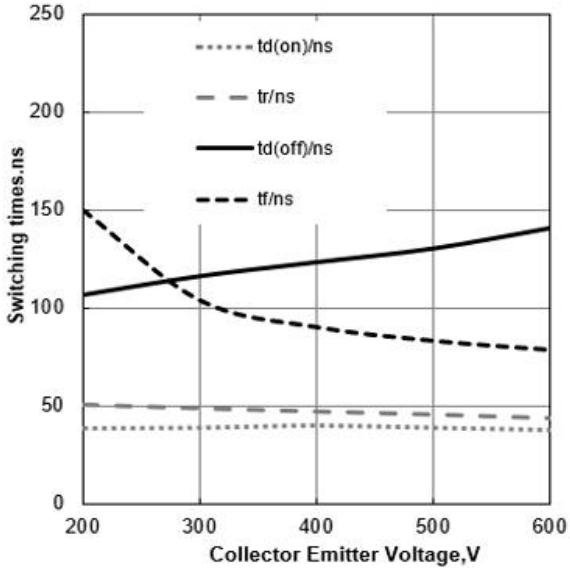


Figure 16. Typical Switching Energy vs VCE (TJ=25℃,VGE=15/0V, IC=60A)

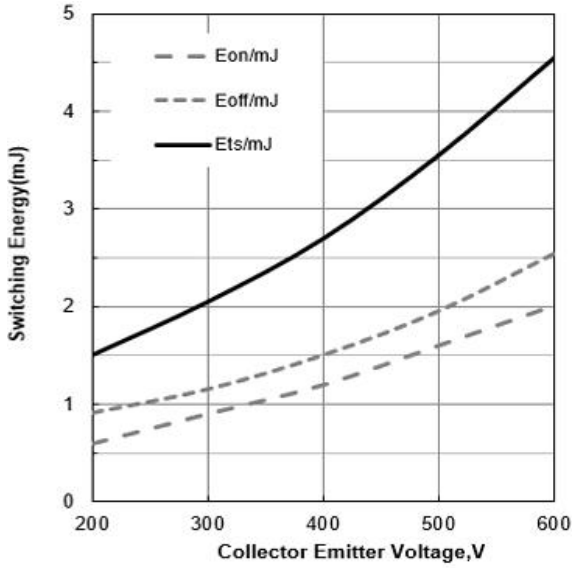


Figure 17. Typical Gate Charge

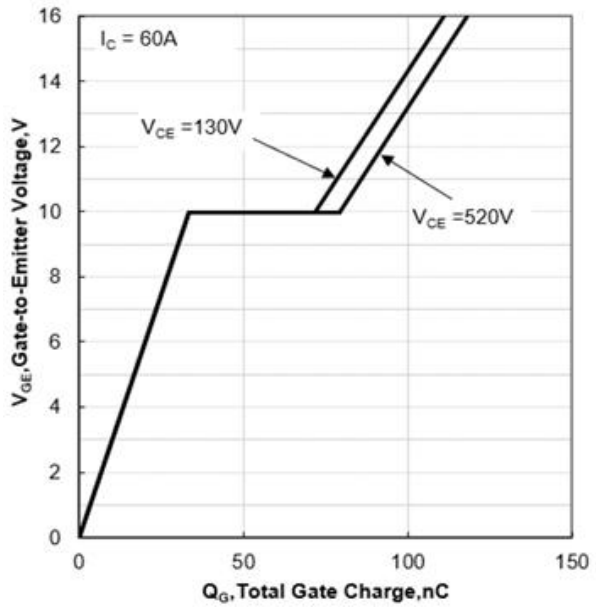


Figure 18. Typical Capacitance vs Collector- Emitter Voltage

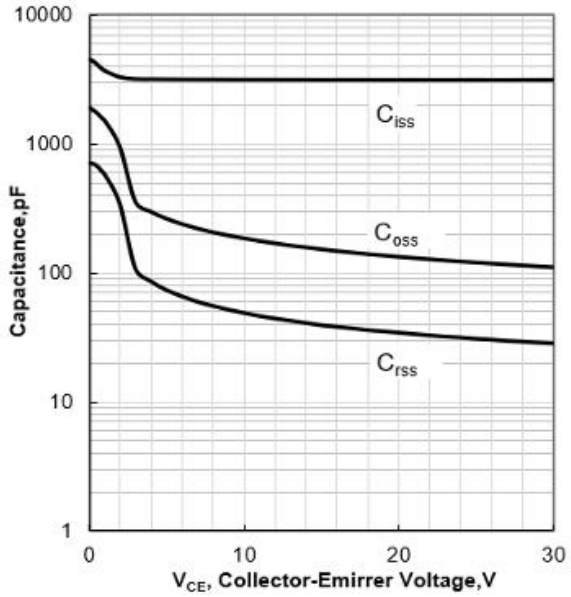


Figure 19. IGBT Transient Thermal Impedance vs Pulse Width(TO-247)

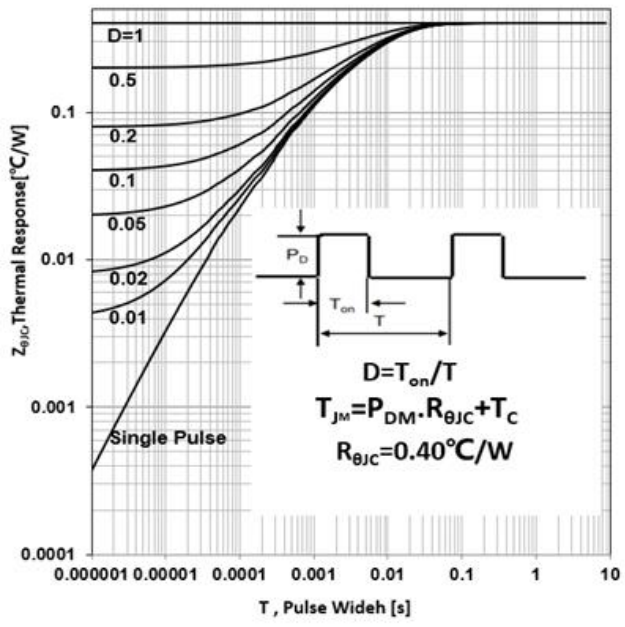


Figure 20. Diode Transient Thermal Impedance vs Pulse Width(TO-247)

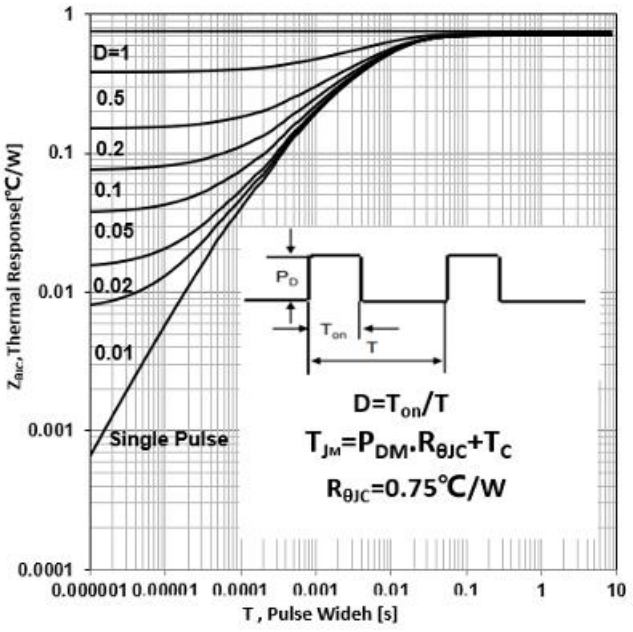
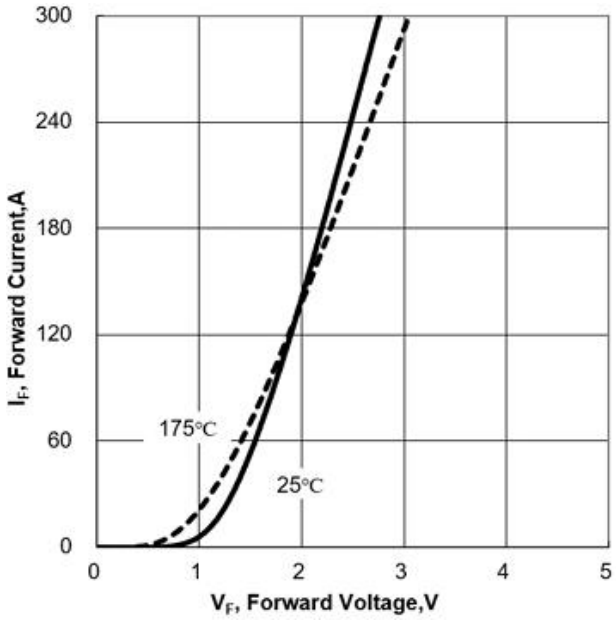


Figure 21. Typical Diode Forward Current vs Forward Voltage



Test Circuit and Waveform

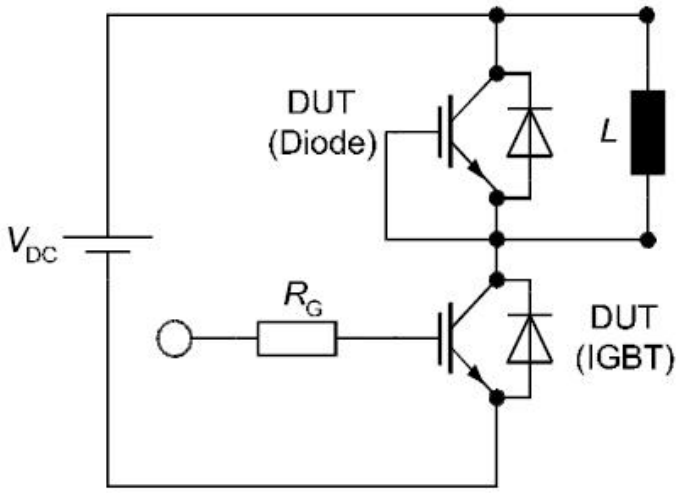
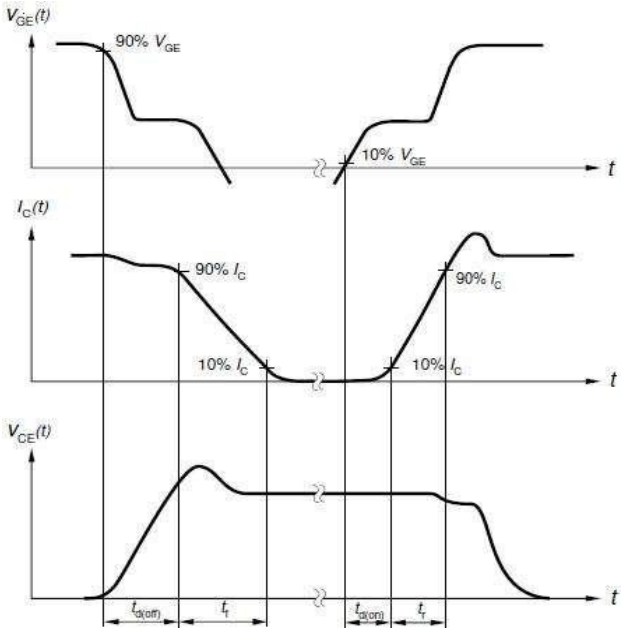
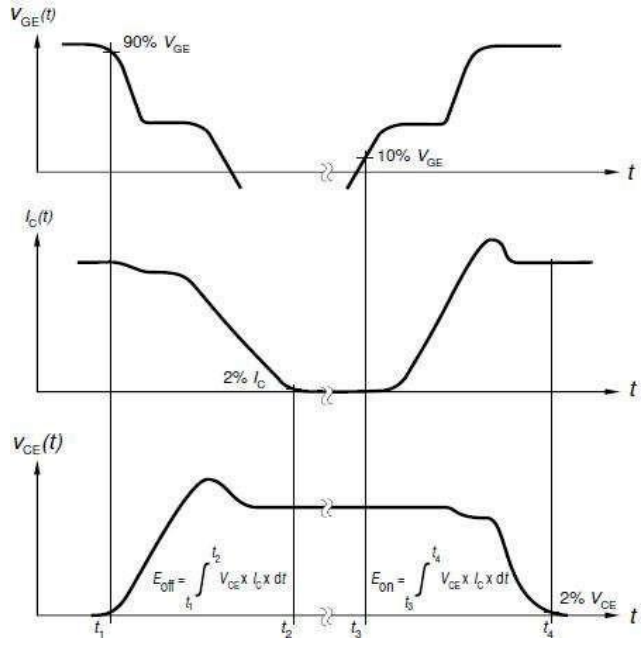
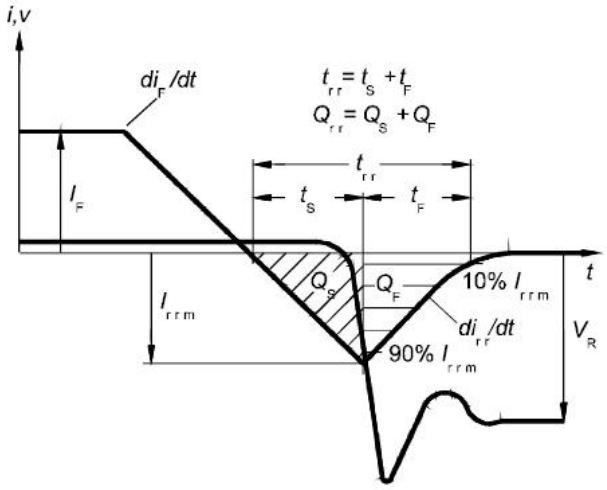
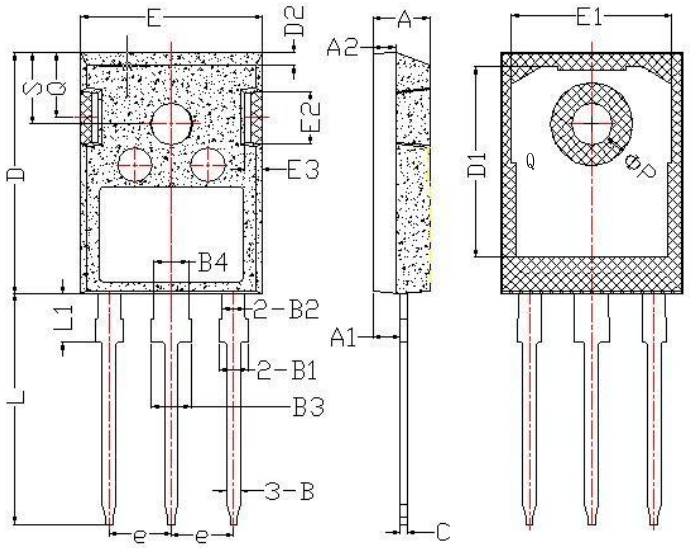
Figure 22. Inductive Switching Test Circuit	Figure 23. Definition of switching times
	

Figure 24. Definition of switching losses	Figure 25. Definition of diode switching characteristics
	

Package Description



Items	Values（mm）	
	MIN	MAX
A	4.90	5.16
A1	2.27	2.53
A2	1.85	2.11
B	1.07	1.33
B1	1.90	2.41
B2	1.75	2.15
B3	2.87	3.38
B4	2.87	3.13
C	0.55	0.68
D	20.82	21.10
D1	16.25	17.65
D2	1.05	1.35
E	15.70	16.03
E1	13.10	14.15
E2	3.68	5.10
E3	1.68	2.60
e	5.44	
L	19.80	20.31
L1	4.17	4.47
ΦP	3.50	3.70
Q	5.49	6.00
S	6.04	6.30

TO-247 Package

NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. IGBT is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change without prior notice.

CONTACT:

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