美浦森半导体
M s e m i t e k

MSF30GS065DA1
Trench IGBT with Field Stop technology

Features

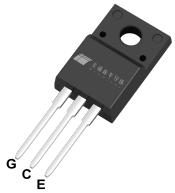
- Advanced Trenchstop technology
- Low conduction loss
- High current capability
- Fast Switching
- Short Circuit Rated
- Pb-free lead plating
- Halogen free

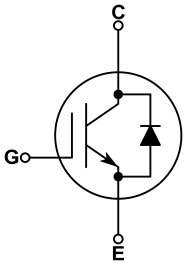
Key Performance

- V_{CE} = 650V, I_C = 30A
- V_{CEsat} = 1.56V @ T_{vj} = 25°C
- t_{SC} = 5μs @ $V_{CE} \leq$ 400V
- Maximum Junction Temperature − T_{vj} = 175°C

Typical Applications

- Motor drivers
- Uninterrupted Power Supply
- Intervers





Package pin definition

- Pin G - gate
- Pin C - collector
- Pin E - emitter

Absolute maximum ratings

Symbol	Parameter	MSF30GS065DA1	Units
V_{CE}	Collector-emitter voltage, $T_{vj} \geq$ 25°C	650	V
I_C	DC collector current [2] - T_C = 25°C	60 [1]	A
	- T_C = 100°C	30 [1]	
I_{CM}	Pulsed collector current [3]	90	A
I_F	Diode forward current [2]	30	A
I_{FM}	Diode pulsed current [3]	90	A
V_{GE}	Gate-emitter voltage	±30	V
t_{SC}	Short circuit withstand time [4]	5	μs
P_D	Power dissipation, T_C=25°C	70	W
T_{vj},T_{STG}	Operating and storage temperature range	-55 to +175	°C
T_L	Maximum lead temperature for soldering purposes,1/8" from case for 5 seconds	260	°C

Notes:
1. Limit by maximum junction temperature.
2. Value limited by bond wire.
3. Repetitive rating: pulse width limited by maximum junction temperature.
4. t_{SC} conditions: T_C=25°C, V_{GE}=15V, $V_{CE} \leq$ 400V .

Ordering Information

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
MSF30GS065DA1	MSF30GS065DA1	TO-220F	Tube	1000	5000

Thermal characteristics

Symbol	Parameter	MSF30GS065DA1	Units
$R_{\theta JC}$	Thermal Resistance,Junction to Case, for IGBT	1.97	°C/W
$R_{\theta JC}$	Thermal Resistance,Junction to Case, for Diode	2.97	°C/W
$R_{\theta JA}$	Thermal Resistance,Junction to ambient	40	°C/W

All electrical characteristics, at T_{vj}=25°C unless otherwise specified.

Static characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{(BR)CES}$	Collector-emitter breakdown voltage	V_{GE}=0V, I_C=250μA	650	-	-	V
$V_{(GE)th}$	Gate-emitter threshold voltage	V_{CE}=V_{GE}, I_C=1mA	5.0	6.0	7.0	V
V_{CEsat}	Collector-emitter saturation voltage	V_{GE}=15V, I_C=30A	-	1.56	1.72	V
V_F	Diode forward voltage	V_{GE}=0V, I_F=30A	-	1.72	-	V
I_{CES}	Zero gate voltage collector current	V_{CE}=650V, V_{GE}=0V	-	-	5	μA
I_{GES}	Gate-emitter leakage current	V_{CE}=0V, V_{GE}=±30V	-	-	±200	nA

Dynamic characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{ies}	Input capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz	-	1510	-	pF
C_{oes}	Output capacitance		-	58	-	
C_{res}	Reverse transfer capacitance		-	10.0	-	
R_G	Internal gate resistance	f = 1MHz, open collector	-	2.4	-	Ω
Q_g	Total Gate charge	V_{CE}=520V, I_C=30A V_{GE}=0 to 15V	-	70	-	nC
Q_{ge}	Gate to emitter charge		-	13	-	
Q_{gc}	Gate to collector charge		-	35	-	

Switching characteristics, Inductive Load (at T_{vj} = 25°C)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-on delay time	V_{CE}=400V, V_{GE}=0/15V, I_C=30A, $R_{Gon/off}$=20Ω	-	46	-	ns
t_r	Rise time		-	32	-	
$t_{d(off)}$	Turn-off delay time		-	191	-	
t_f	Fall time		-	12	-	
E_{on}	Turn-on energy		-	0.65	-	mJ
E_{off}	Turn-off energy		-	0.52	-	
E_{ts}	Total switching energy		-	1.17	-	

Switching characteristics, Inductive Load (at T_{vj} = 175°C)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-on delay time	V_{CE}=400V, V_{GE}=0/15V, I_C=30A, $R_{Gon/off}$=20Ω	-	42	-	ns
t_r	Rise time		-	31	-	
$t_{d(off)}$	Turn-off delay time		-	226	-	
t_f	Fall time		-	35	-	
E_{on}	Turn-on energy		-	0.72	-	mJ
E_{off}	Turn-off energy		-	0.73	-	
E_{ts}	Total switching energy		-	1.45	-	

Diode switching characteristics, Inductive Load (at T_{vj} = 25°C)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{rr}	Reverse recovery time	V_R=400V, I_F=15A, $R_{G(on)}$=20Ω	-	73	-	ns
Q_{rr}	Reverse recovery charge		-	0.43	-	μC
I_{rrm}	Peak reverse recovery current		-	11.9	-	A
t_{rr}	Reverse recovery time	V_R=400V, I_F=30A, $R_{G(on)}$=20Ω	-	103	-	ns
Q_{rr}	Reverse recovery charge		-	0.65	-	μC
I_{rrm}	Peak reverse recovery current		-	11.0	-	A

Diode switching characteristics, Inductive Load (at T_{vj} = 175°C)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{rr}	Reverse recovery time	V_R=400V, I_F=15A, $R_{G(on)}$=20Ω	-	132	-	ns
Q_{rr}	Reverse recovery charge		-	1.39	-	μC
I_{rrm}	Peak reverse recovery current		-	20.3	-	A
t_{rr}	Reverse recovery time	V_R=400V, I_F=30A, $R_{G(on)}$=20Ω	-	185	-	ns
Q_{rr}	Reverse recovery charge		-	1.96	-	μC
I_{rrm}	Peak reverse recovery current		-	21.2	-	A

Notes:
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Electrical characteristics diagrams

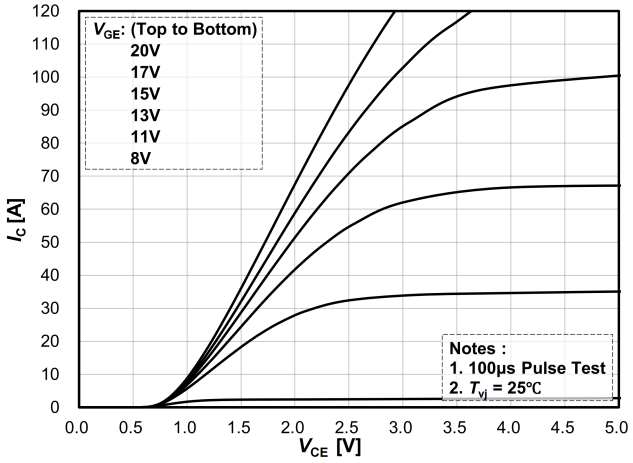


Figure 1. **Typical output characteristic(25℃)**

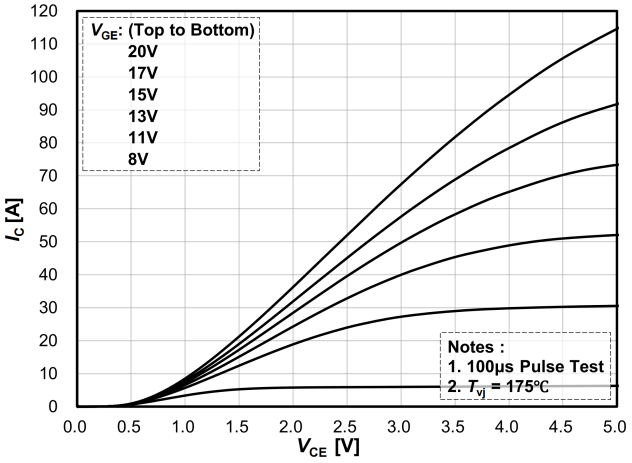


Figure 2. **Typical output characteristic(175℃)**

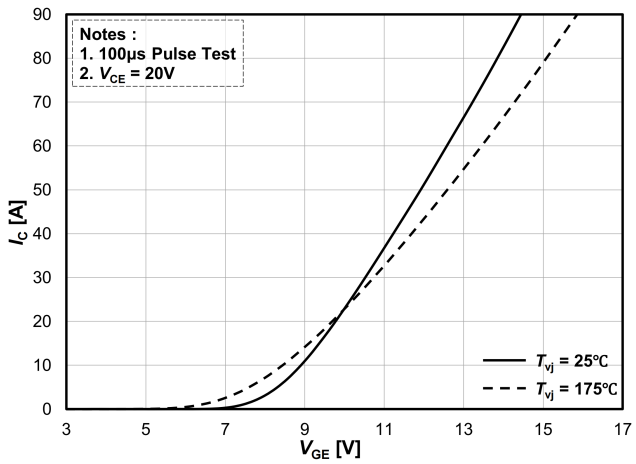


Figure 3. **Typical transfer characteristic**

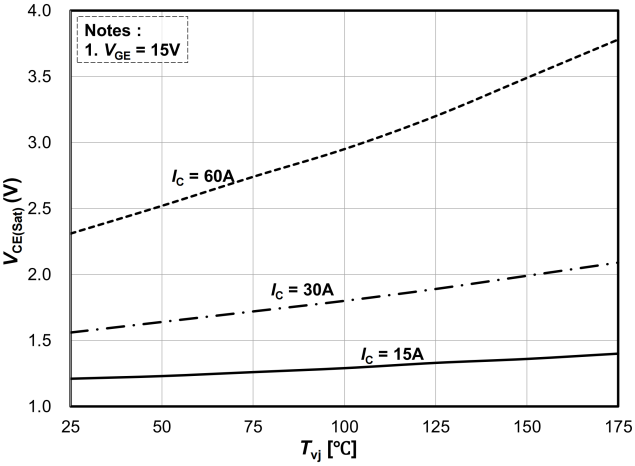


Figure 4. **Typical collector-emitter saturation voltage as a function of junction temperature**

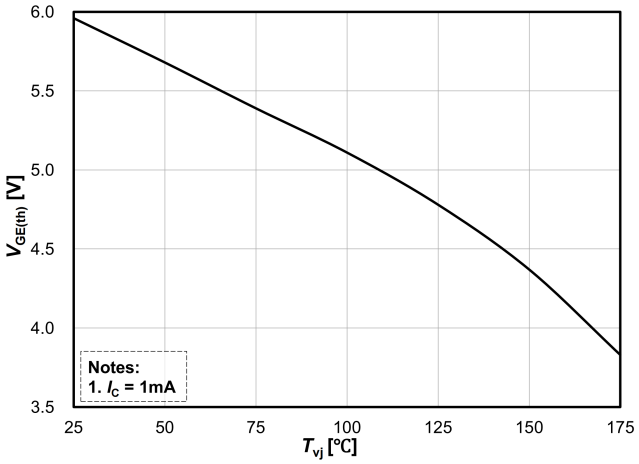


Figure 5. **Gate-emitter threshold voltage as a function of junction temperature**

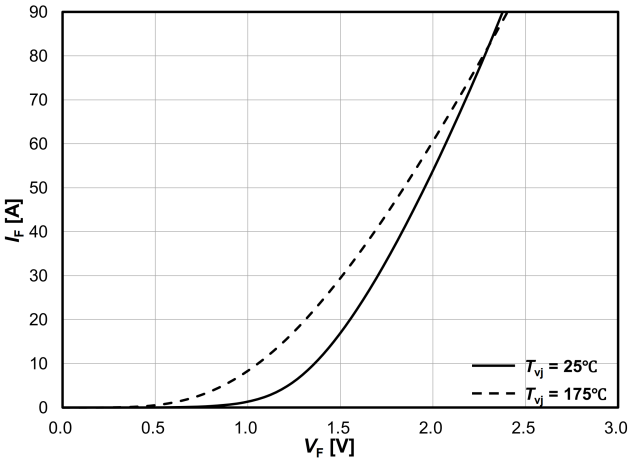


Figure 6. **Typical diode forward current as a function of forward voltage**

Electrical characteristics diagrams (Continued)

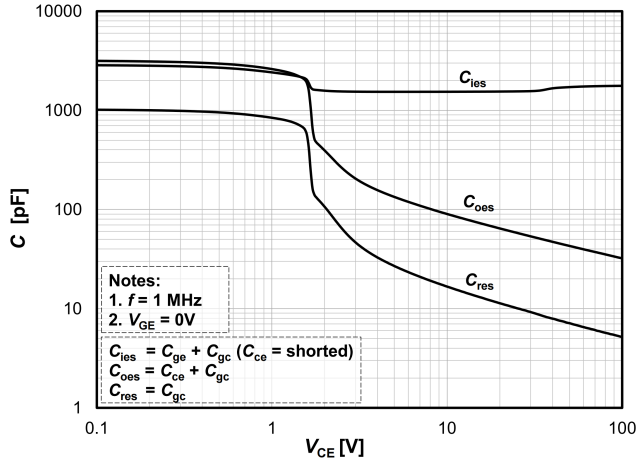


Figure 7. **Typical capacitance as a function of collector-emitter voltage**

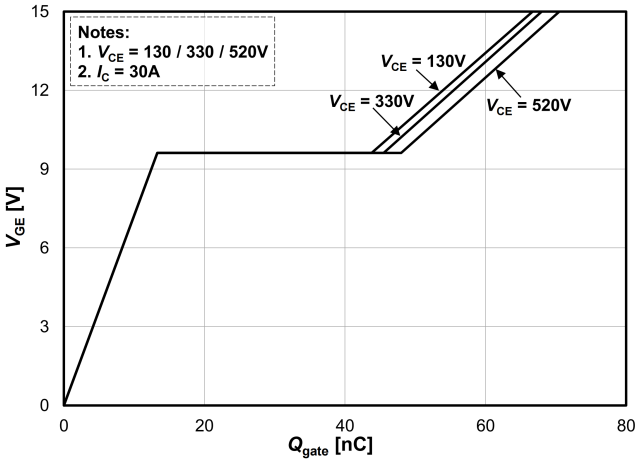


Figure 8. **Typical gate charge**

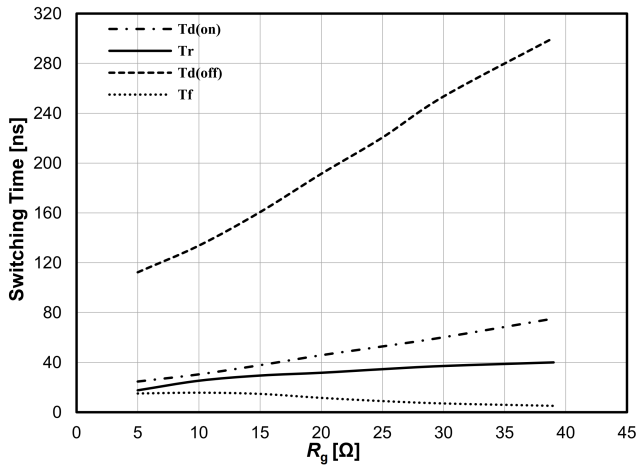


Figure 9. **Typical switching times as a function of gate resistance**

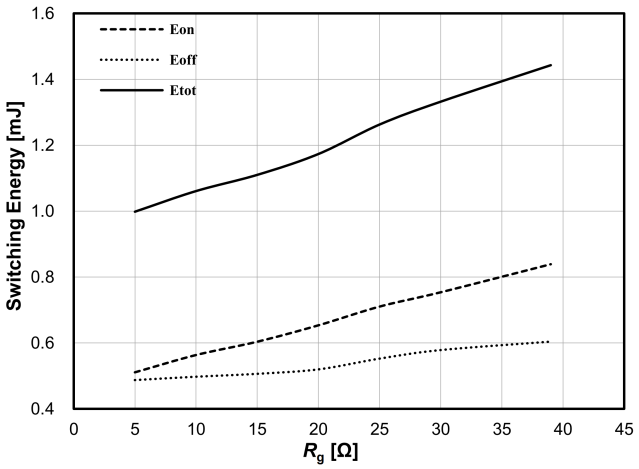


Figure 10. **Typical switching energy losses as a function of gate resistance**

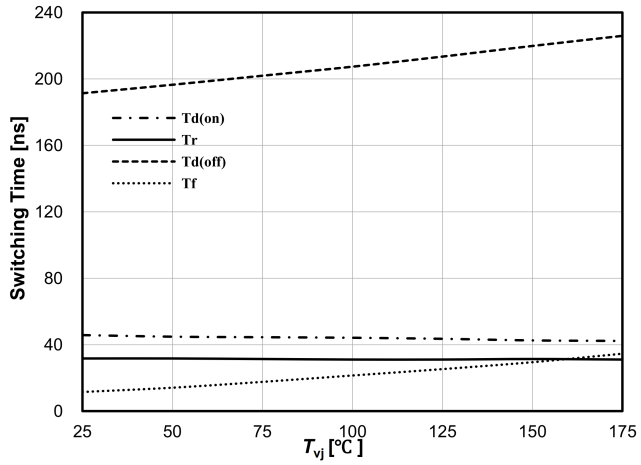


Figure 11. **Typical switching times as a function of junction temperature**

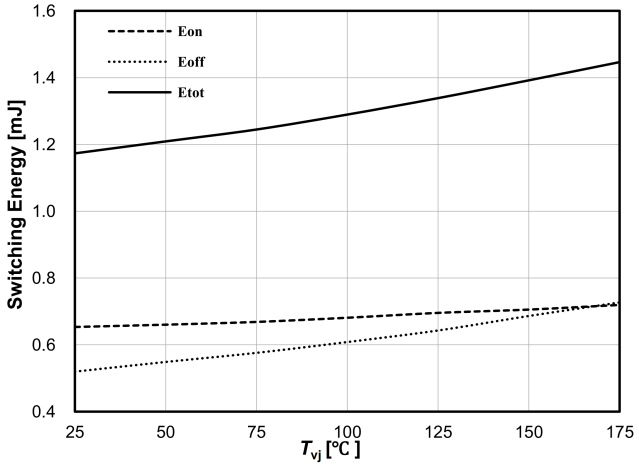


Figure 12. **Typical switching energy losses as a function of junction temperature**

Electrical characteristics diagrams (Continued)

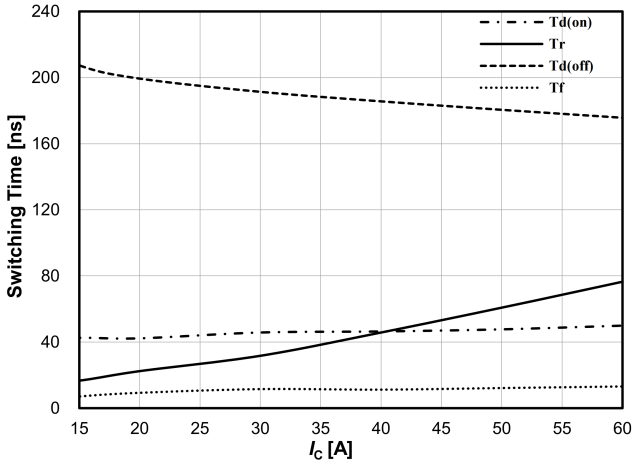


Figure 13. **Typical switching times as a function of collector current**

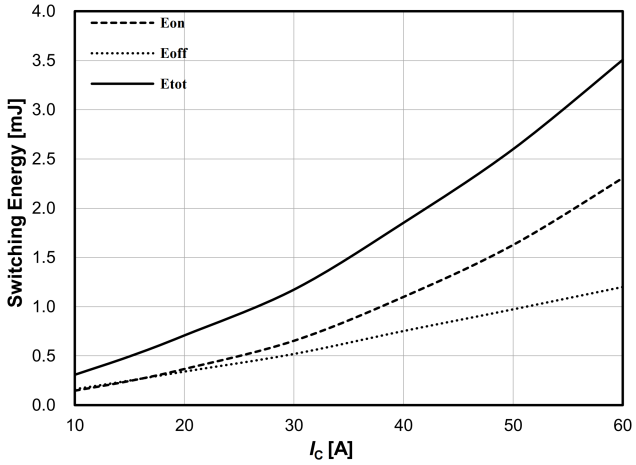


Figure 14. **Typical switching energy losses as a function of collector current**

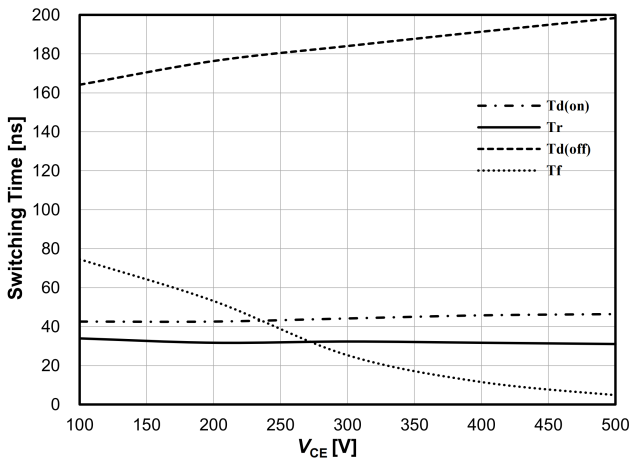


Figure 15. **Typical switching times as a function of collector emitter voltage**

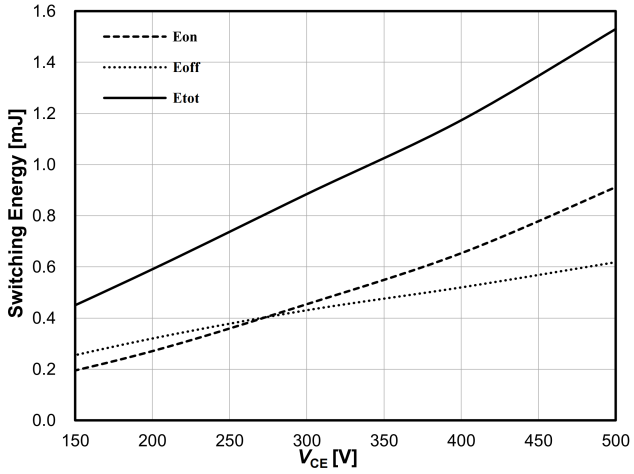


Figure 16. **Typical switching energy losses as a function of collector emitter voltage**

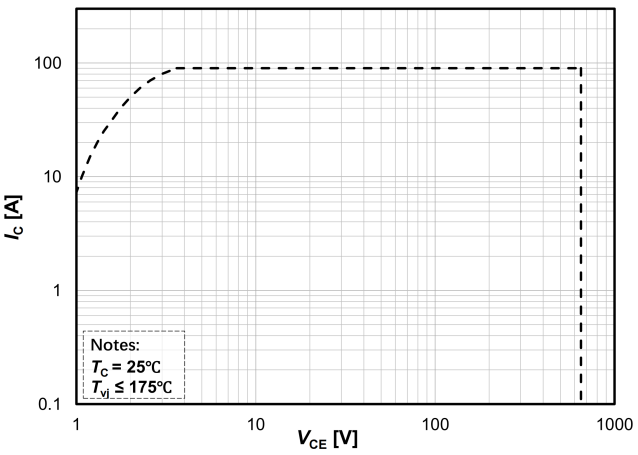


Figure 17. **Reverse bias safe operating area**

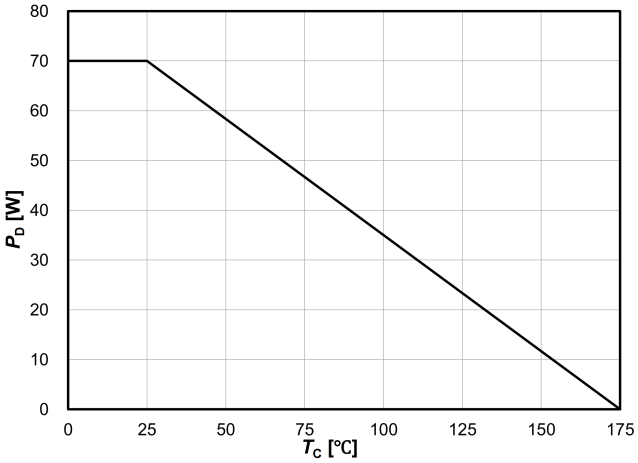


Figure 18. **Power dissipation as a function of case temperature**

Electrical characteristics diagrams (Continued)

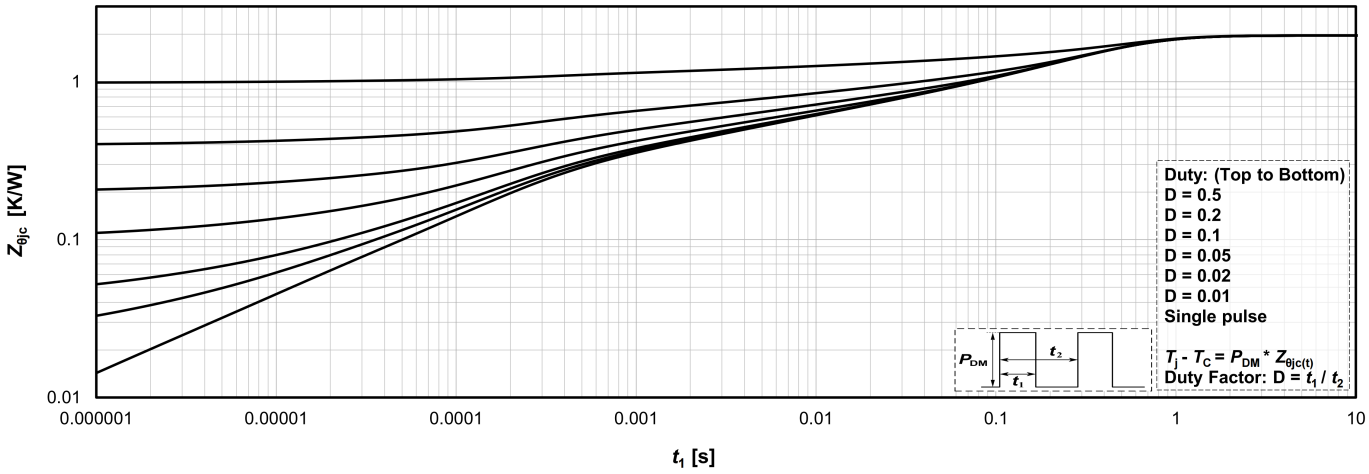
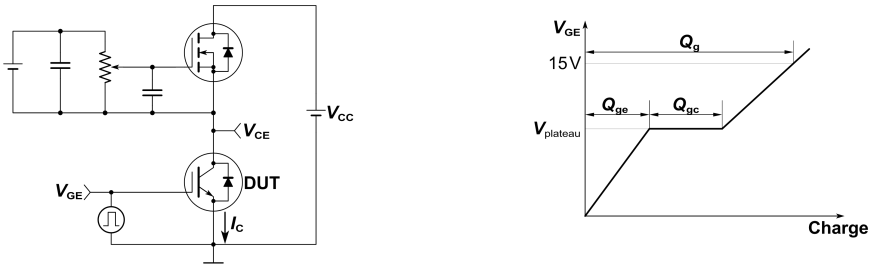
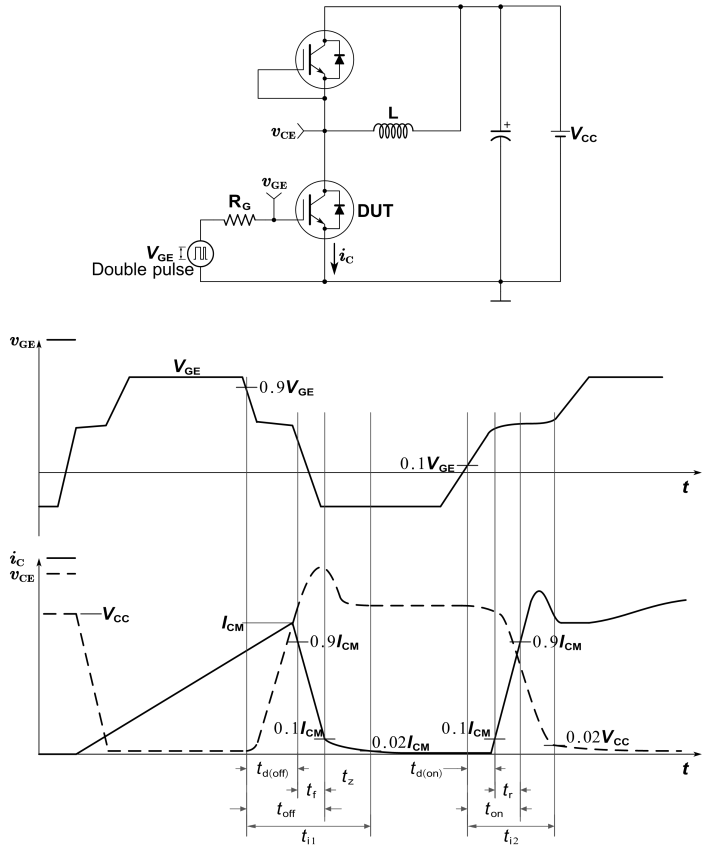


Figure 19. **IGBT transient thermal impedance**

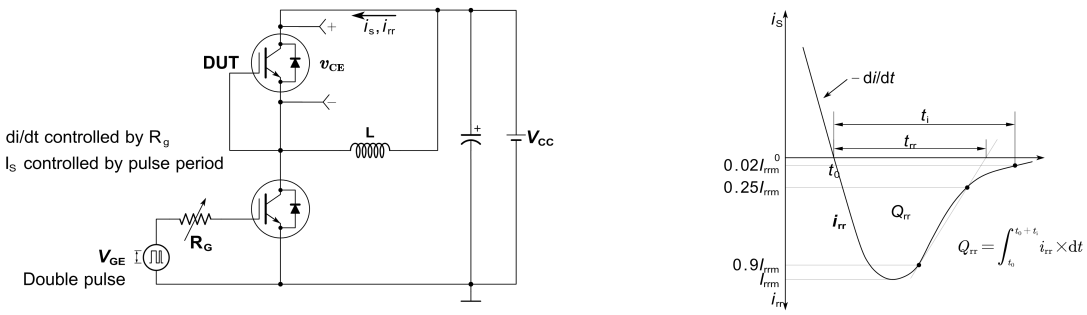
Test Circuits and Waveforms



Gate charge test circuit & waveform



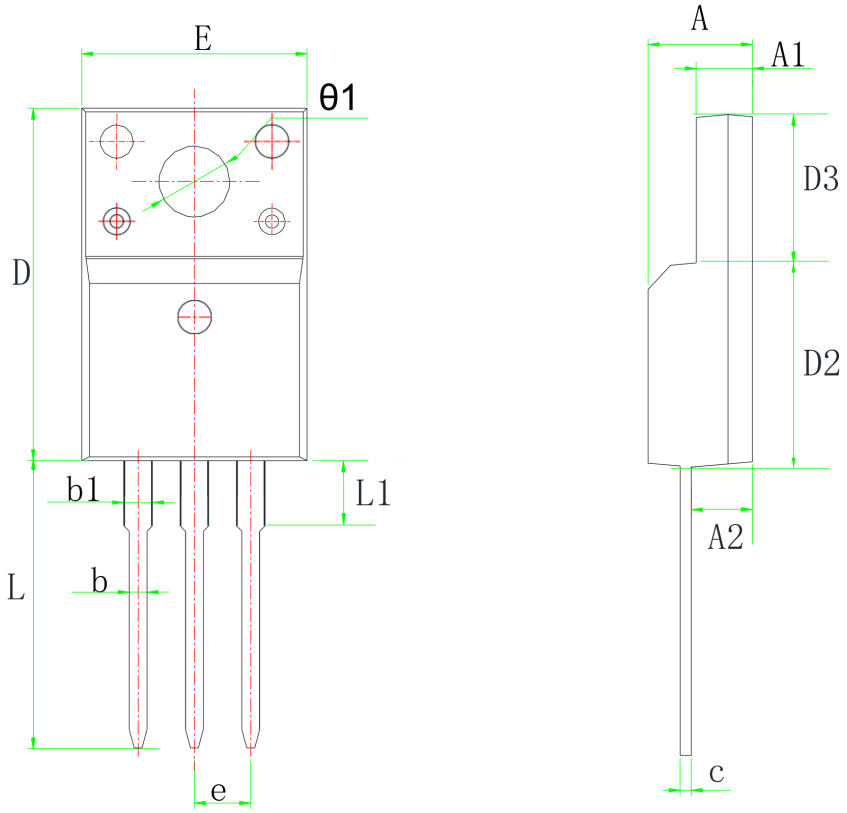
Switching times for inductive load test circuit & waveform



Diode characteristics test circuit & waveform

Package Outlines

TO-220F OUTLINE



SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	4.5	4.7	4.9	E	9.96	10.16	10.36
A1	2.24	2.54	2.84	D	15.37	15.87	16.50
A2	2.56	2.76	2.96	D2	8.97	9.17	9.37
e	2.54			L	12.68	12.98	13.28
b	0.6	0.8	1.0	L1	3.03	3.23	3.43
b1	1.1	1.3	1.6	θ1	2.98	3.18	3.38
c	0.4	0.5	0.65	D3	6.38	6.68	6.98

NAME	TO-220F OUTLINE	UNIT	mm	DESIGNED	sn	THIRD ANGLE SYSTEM
DWGNO		PAGE	1 OF 1	CHECKED		
VERSION	Ver2.0	ISSUE DATE		APPROVED		

Revision: 2026-03-19, Rev. 1.2

Previous Revision		
Revision	**Date**	**Subjects (major changes since last revision)**
1.2	2026-03-19	adjusted the Power dissipation as a function of case temperature.
1.1	2026-02-28	adjusted the Power dissipation as a function of case temperature.
1.0	2025-12-12	Release of final version.

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