



SK04N65B_SK04N65B-T1

650V N-Channel Power MOSFET

Features

- RoHS Compliant
- $R_{DS(ON),max}=2.8\Omega@V_{GS}=10V$
- Low gate charge minimize switching loss
- Fast recovery body diode

Applications

- Adaptor
- Charger
- SMPS Standby Power

Ordering Information

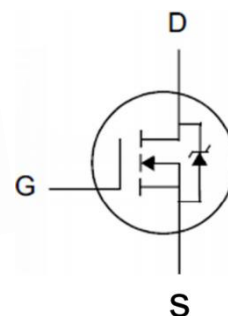
$BV_{DSS}, T_A=25^{\circ}C$	$R_{DS(ON),max}@10V$	$I_D, T_C=25^{\circ}C$
650V	2.8Ω	4.0A



TO-251



TO-252



Type	Marking	Package
SK04N65B	04N65B	TO-252
SK04N65B-T1	04N65B	TO-251

Maximum Ratings($T_C=25^{\circ}C$, unless otherwise noted.)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current-Continuous	I_D	4.0	A
Drain Current-Pulsed@ $V_{GS}=10V$	I_{DM}	16	A
Single Pulse Avalanche Energy	E_{AS}	250	mJ
Power Dissipation	P_D	86	W
Derating Factor above $25^{\circ}C$		0.68	W/ $^{\circ}C$
Junction and Storage Temperature Range	T_J, T_{STG}	$-55\sim+150$	$^{\circ}C$
Soldering Temperature Distance of 1.6mm from case for 10 seconds	T_L	300	$^{\circ}C$

Caution: Stresses greater than those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	75	$^{\circ}C/W$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.45	$^{\circ}C/W$



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Electrical Characteristics($T_J=25^{\circ}\text{C}$, unless otherwise noted.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V,I _D =250μA	650			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V,V _{GS} =0V			1	μA
		V _{DS} =520V,V _{GS} =0V,T _J =125°C			100	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V,V _{DS} =0V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2.0		4.0	V
Drain-Source on Resistance	R _{DS(on)}	V _{GS} =10V,I _D =2.0A		2.5	2.8	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		450		pF
Output Capacitance	C _{oss}			50		
Reverse Transfer Capacitance	C _{rss}			6.0		
Total Gate Charge	Q _g	V _{DS} =325V, V _{GS} =0 to 10V, I _D =4A		8.5		nC
Gate Source Charge	Q _{gs}			2.8		
Gate Drain Charge	Q _{gd}			2.5		
Switching Characteristics						
Turn-on Delay Time	t _{d(ON)}	V _{GS} =10V, I _D =4A, V _{DD} =325V, R _G =4.7Ω		9.0		ns
Rise Timer	t _r			7.0		
Turn-Off Delay Time	t _{d(OFF)}			22		
Fall Timer	t _f			9.0		
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V,I _S =4A			1.5	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V,I _F =4A, di/dt=100A/μs		235		ns
Reverse Recovery Charge	Q _{rr}			750		nC



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Typical Characteristics

Figure 1. Maximum Transient Thermal Impedance

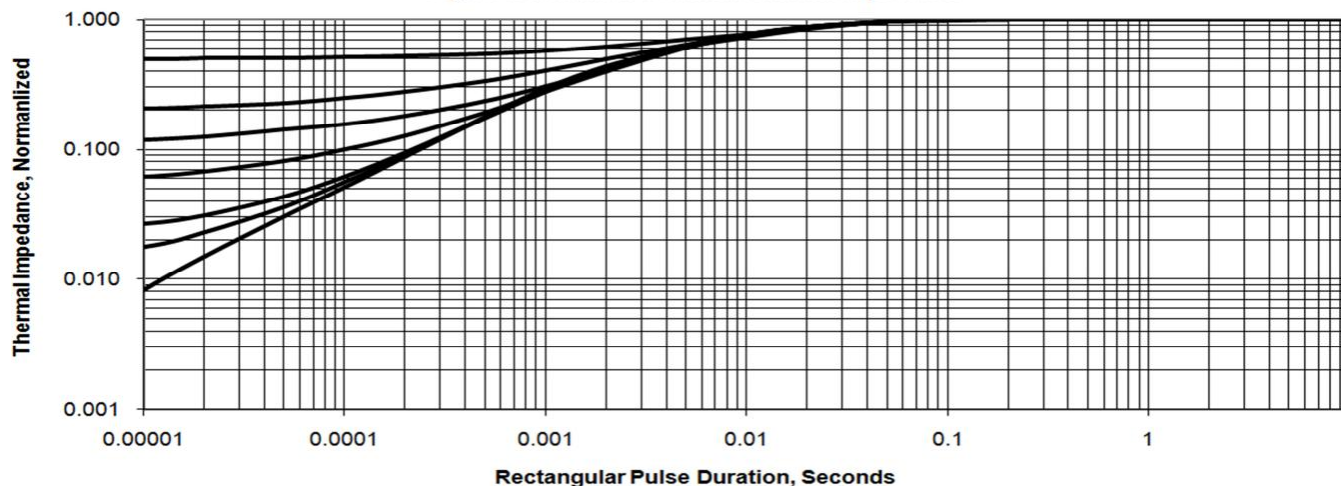


Figure 2. Maximum Power Dissipation vs Case Temperature

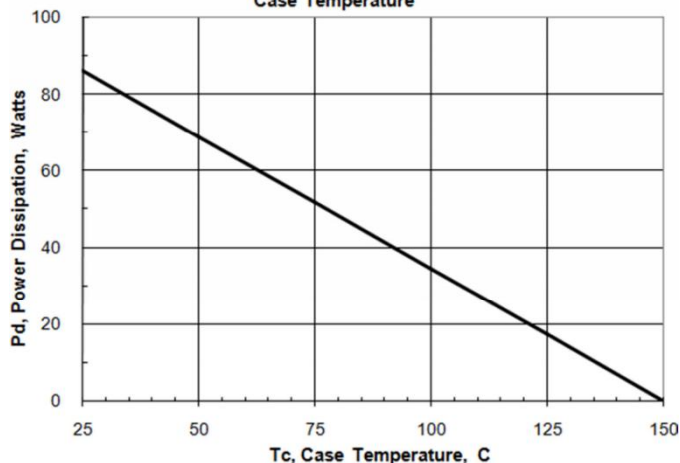


Figure 3. Maximum Continuous Drain Current vs Case Temperature

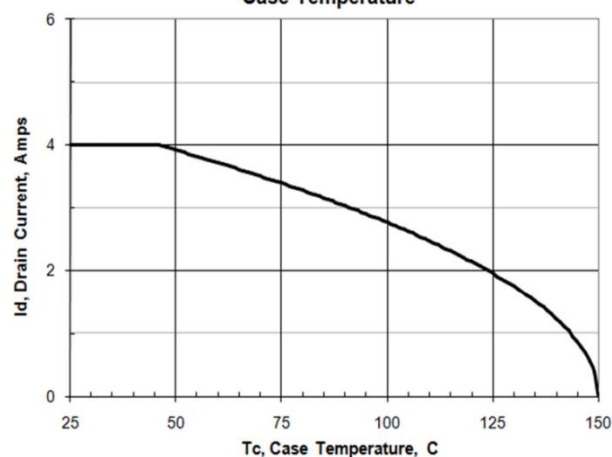


Figure 4. Typical Output Characteristics

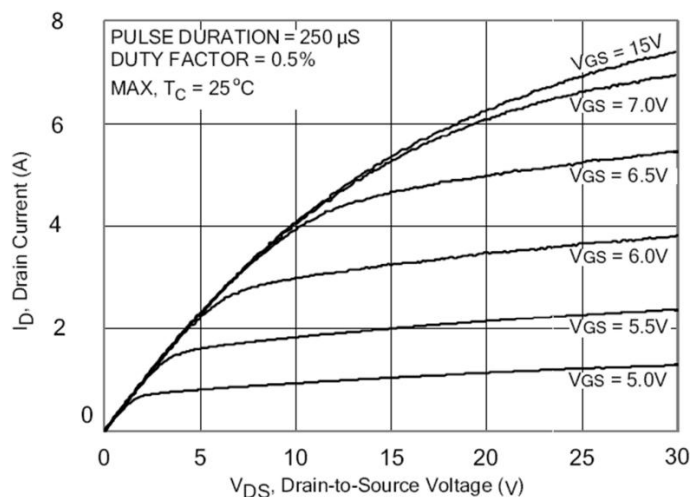
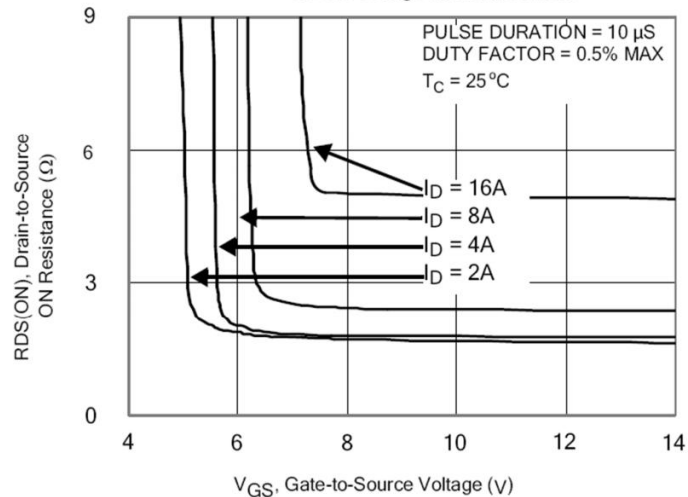


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current





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Figure 6. Maximum Peak Current Capability

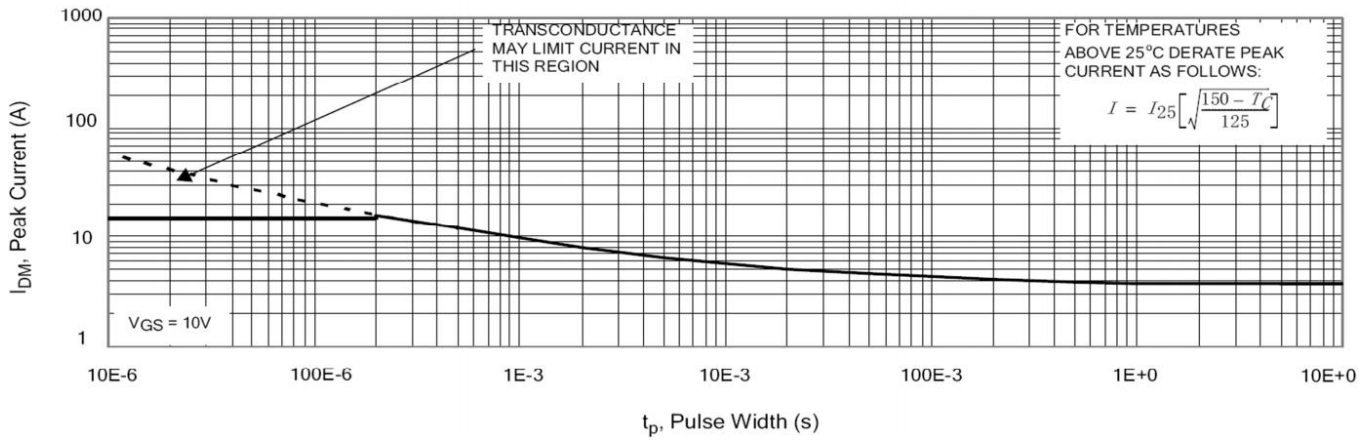


Figure 7. Typical Transfer Characteristics

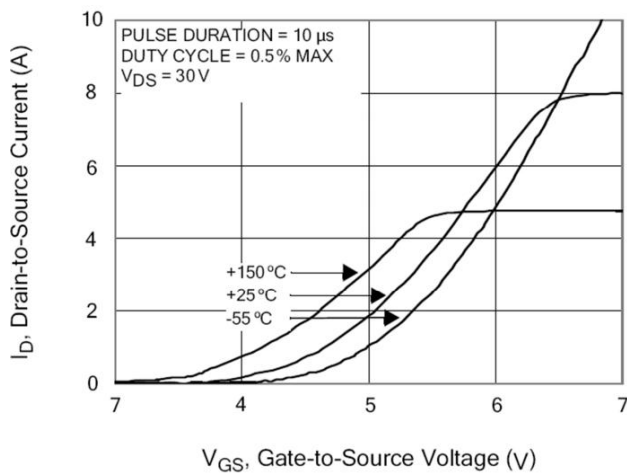


Figure 8. Unclamped Inductive Switching Capability

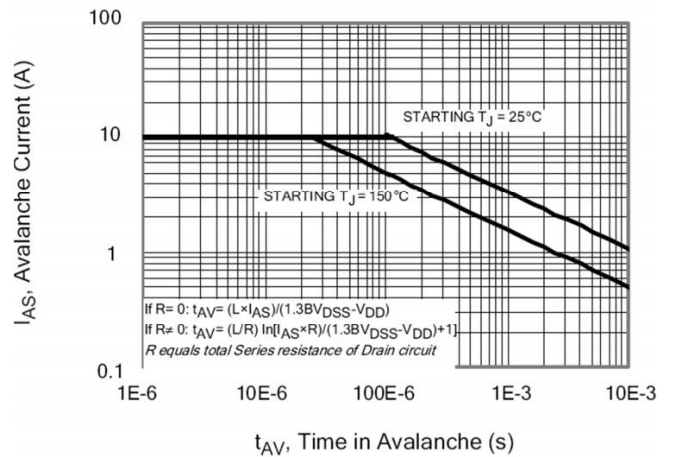


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

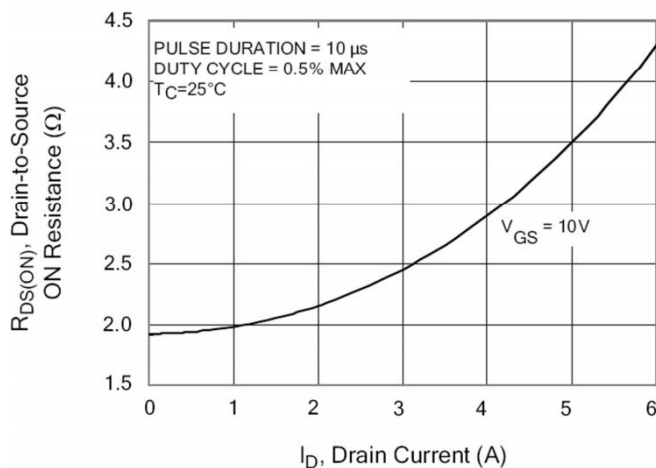
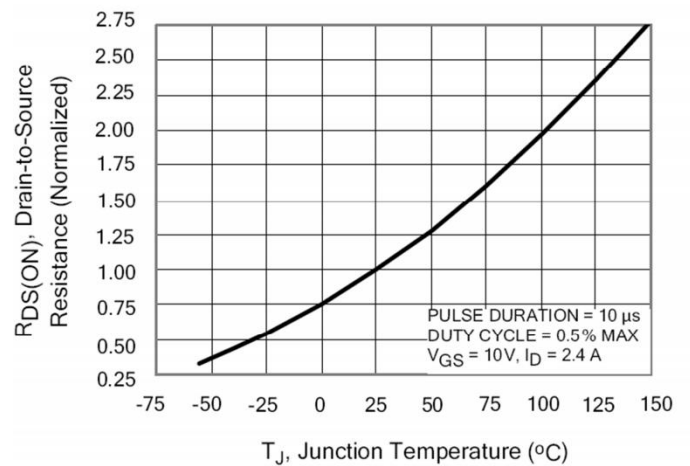


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature





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Figure 11. Typical Breakdown Voltage vs Junction Temperature

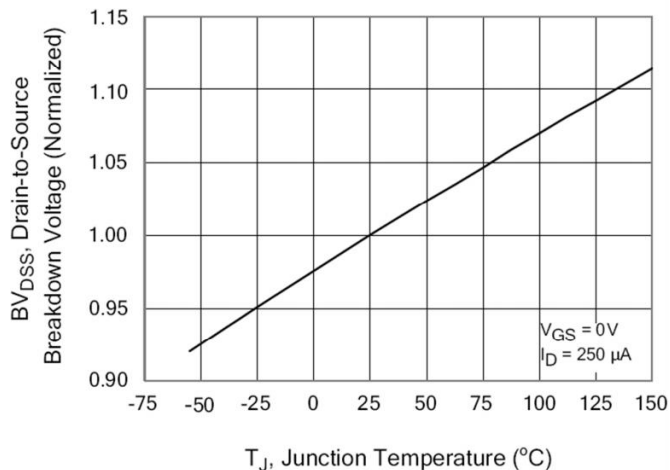


Figure 12. Typical Threshold Voltage vs Junction Temperature

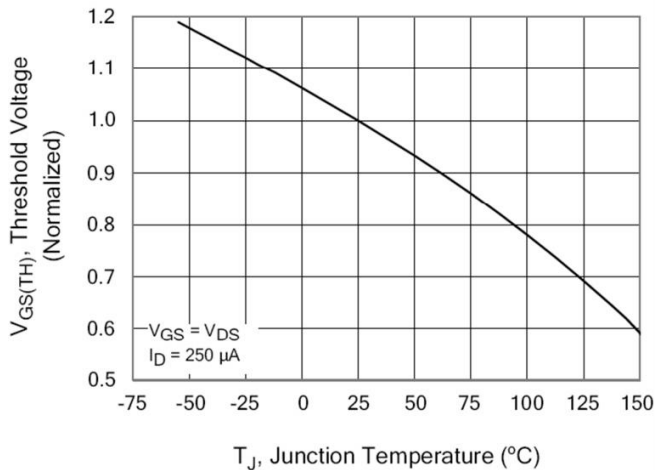


Figure 13. Maximum Safe Operating Area

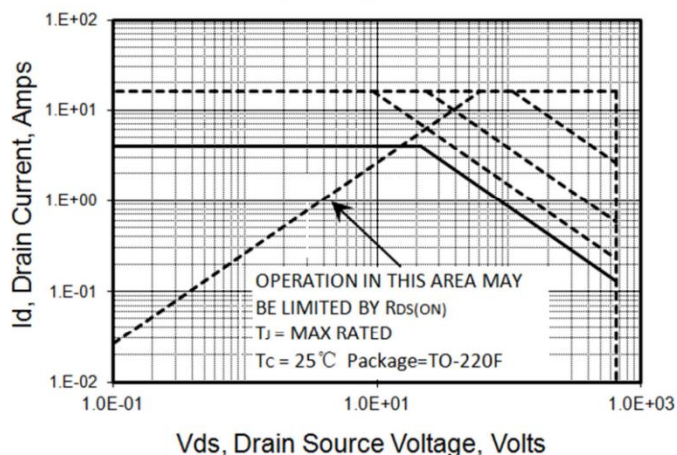


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

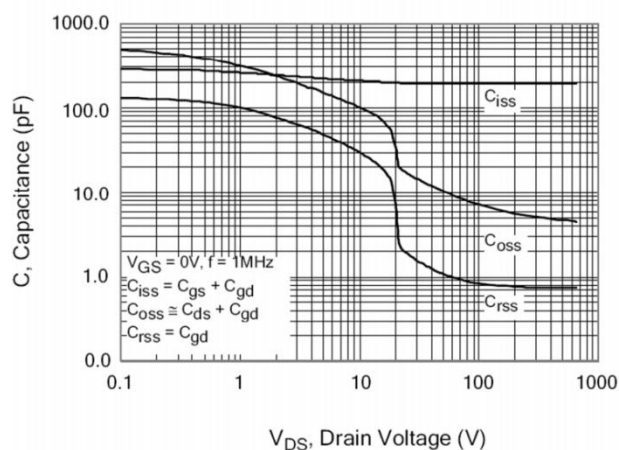


Figure 15. Typical Gate Charge

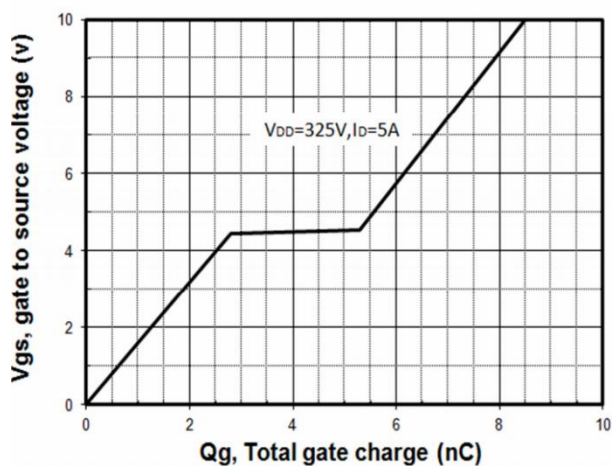
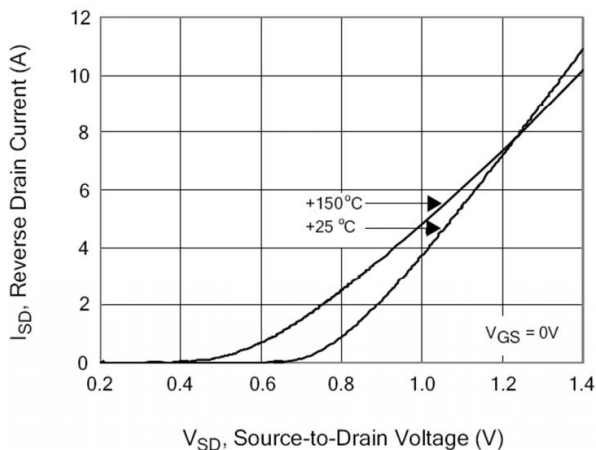


Figure 16. Typical Body Diode Transfer Characteristics





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Test Circuits and Waveforms

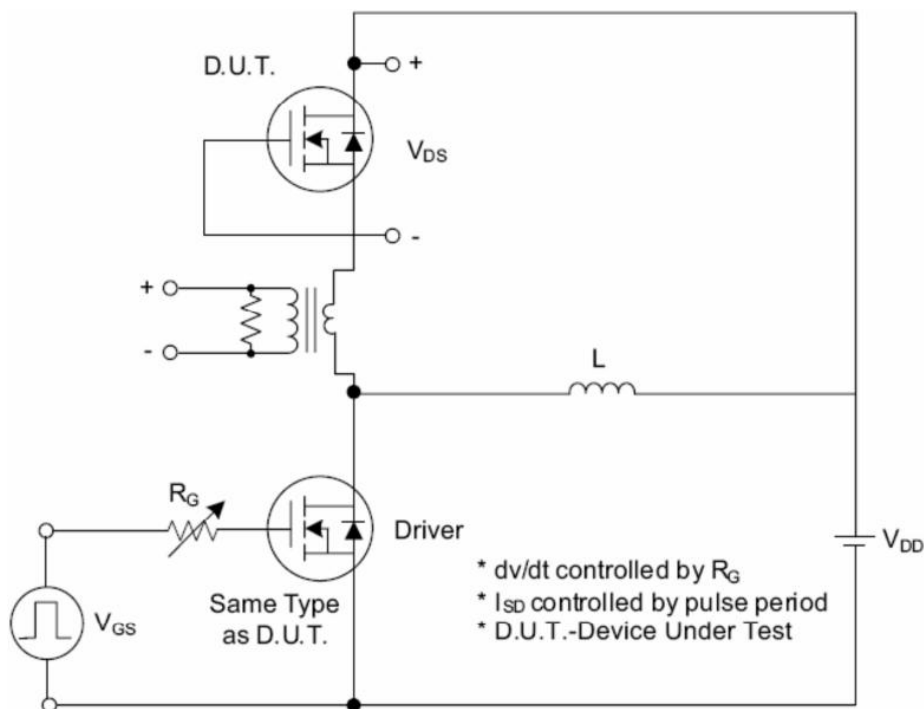


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

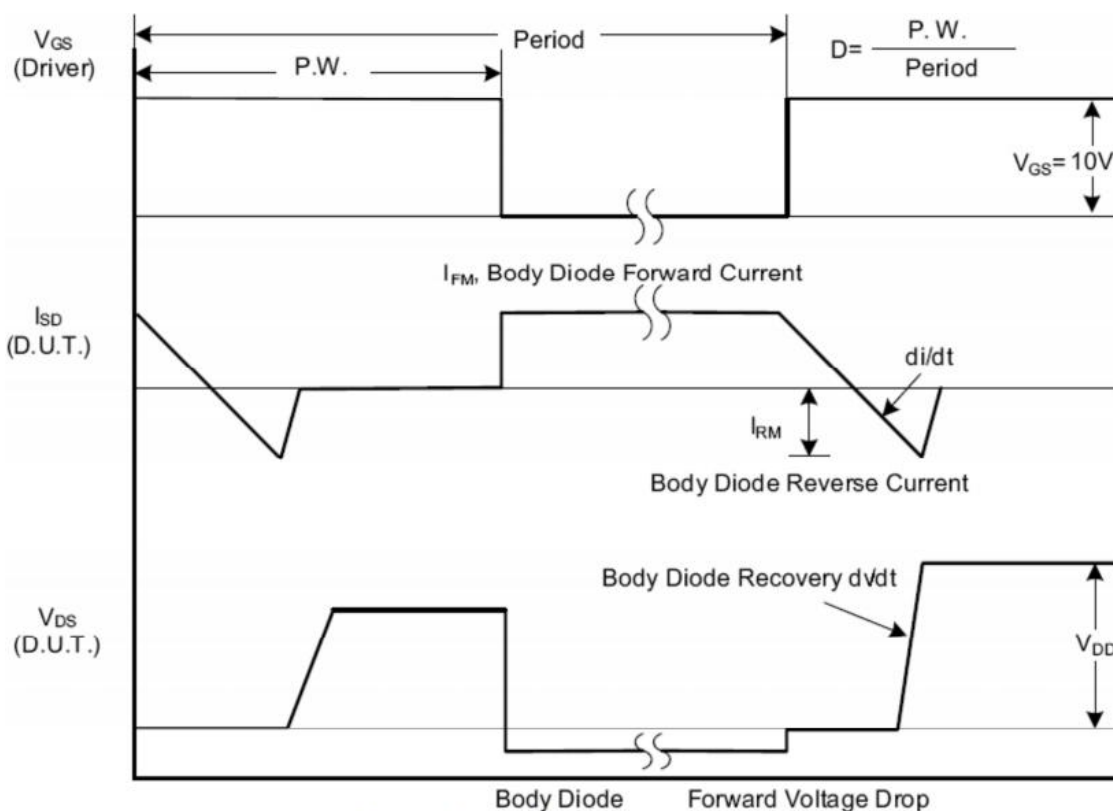


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms



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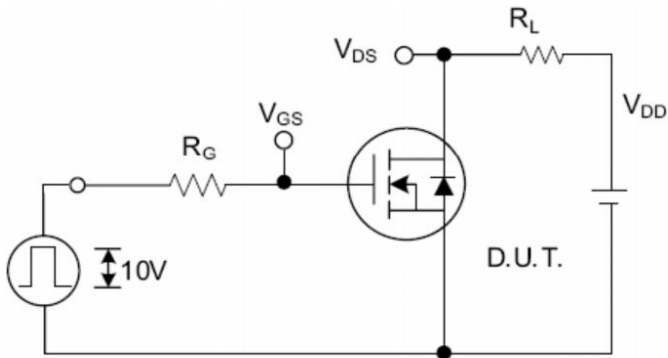


Fig. 2.1 Switching Test Circuit

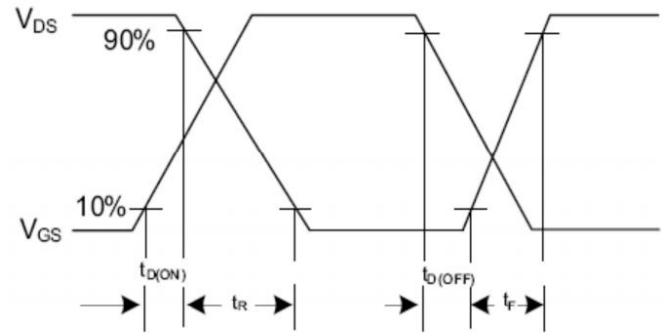


Fig. 2.2 Switching Waveforms

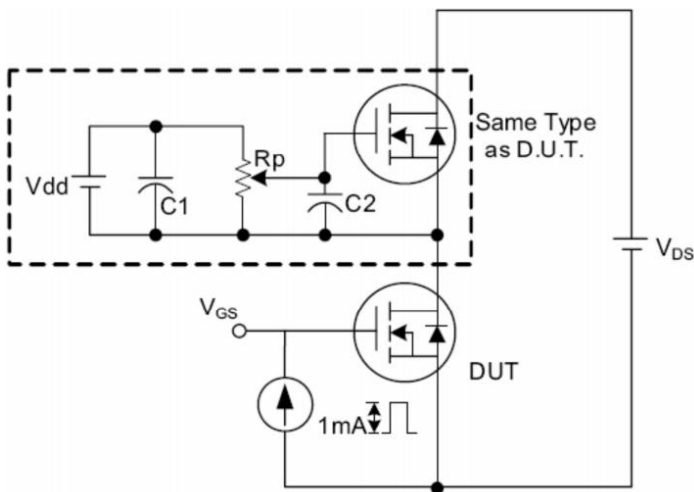


Fig. 3.1 Gate Charge Test Circuit

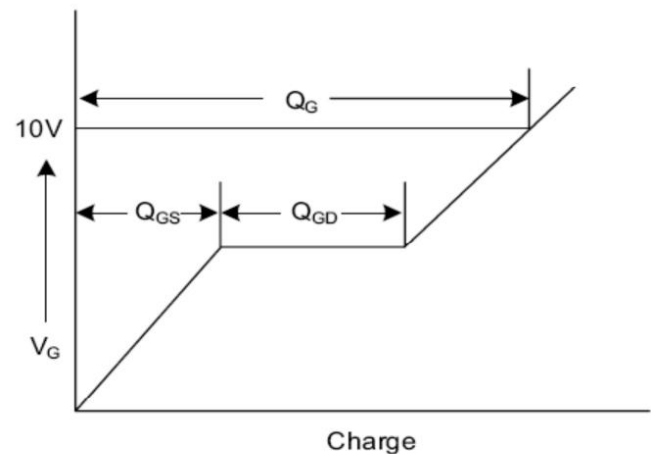


Fig. 3.2 Gate Charge Waveform

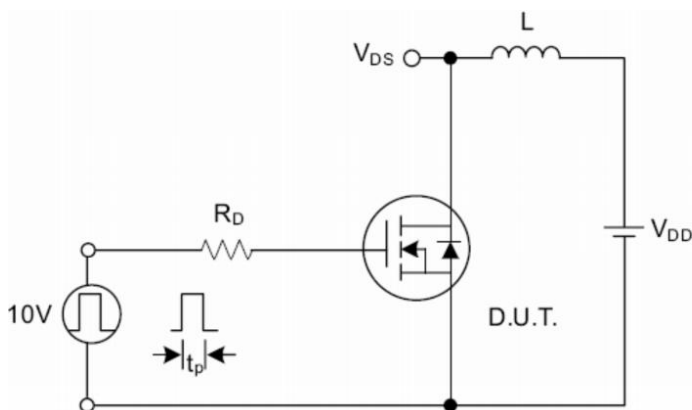


Fig. 4.1 Unclamped Inductive Switching Test Circuit

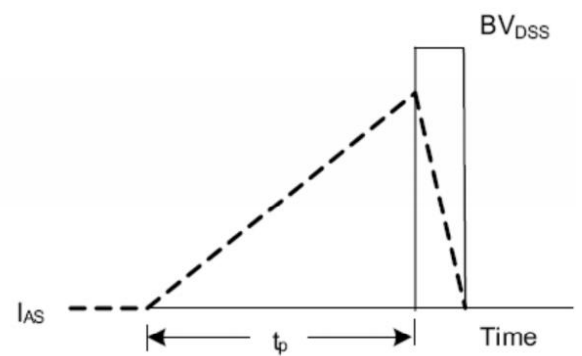


Fig. 4.2 Unclamped Inductive Switching Waveforms

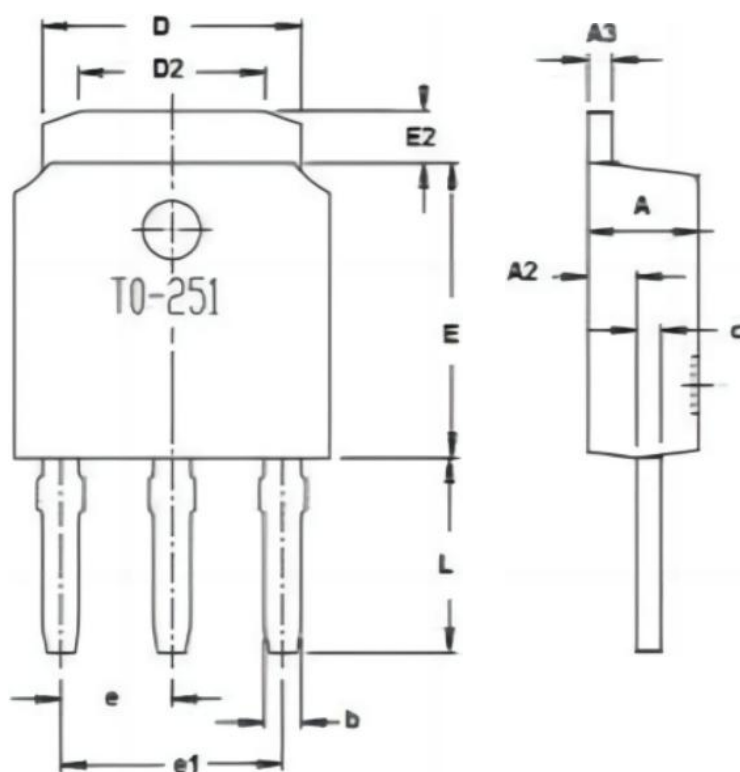


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Package Information

TO-251

Dimensions in mm



Symbol	Dimensions In Millimeter	
	Min	Max
A	2.1	2.5
A2	0.9	1.1
A3	0.5 TYP	
b	0.74	0.86
c	0.9	1.1
D	5.33	5.53
D2	3.65	4.05
E	6.0	6.2
E2	0.91	1.36
e	2.3 TYP	
e1	4.6 TYP	
L	3.7	4.3

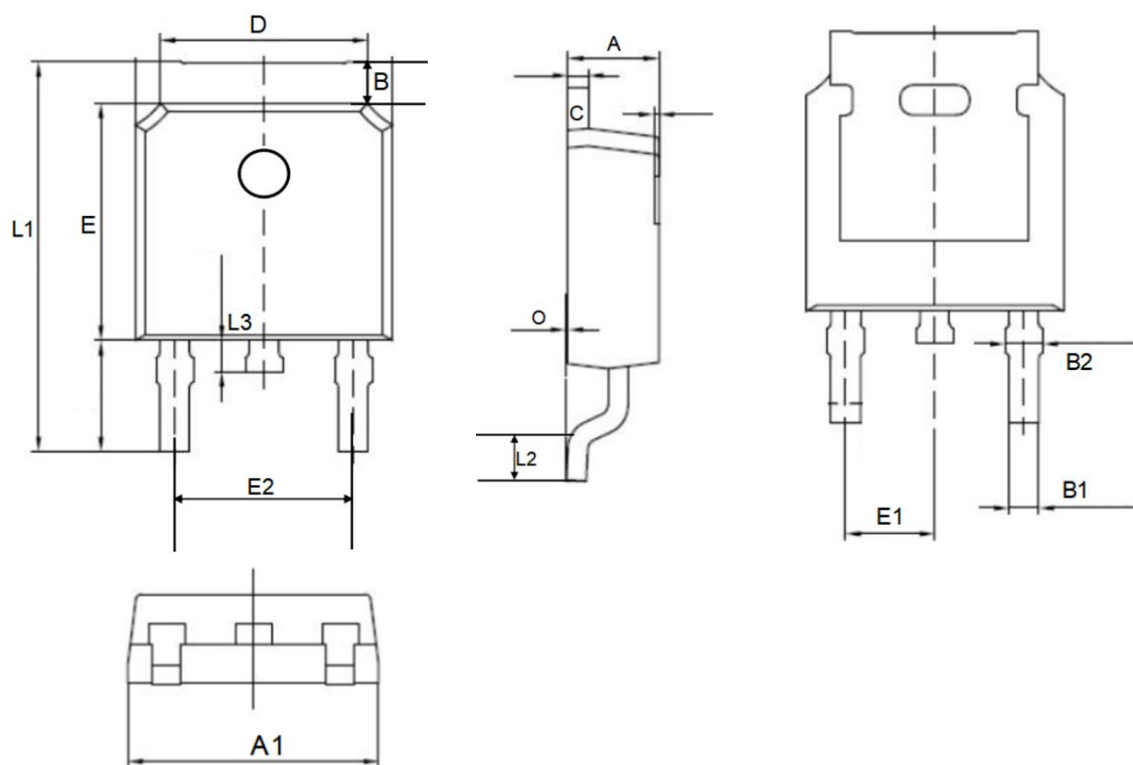


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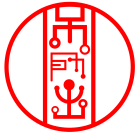
Package Information

TO-252

Dimensions in mm



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.10	2.50	E	5.80	6.40
A1	6.30	6.90	E1	2.10	2.50
B	0.95	1.55	E2	4.30	4.80
B1	0.60	0.87	L1	9.00	11.0
B2	0.67	0.96	L2	1.30	1.70
C	0.40	0.62	L3	0.70	0.95
D	5.10	5.80	O	0.00	0.15



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