TM60N02AD

N-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

General Features

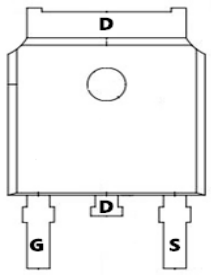
V_{DS} =20V I_D =58A

$R_{DS(ON)}$=4.9mΩ(typ.)@V_{GS}=10V

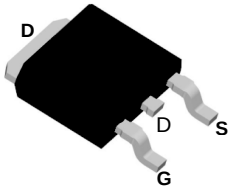
100% UIS Tested

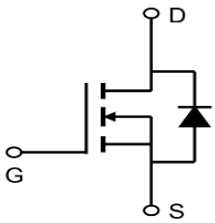
100% R_g Tested

Green Product



D:TO-252-3L





Marking: 60N02

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		±12	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	T_C=25°C	20	A
I_D	Continuous Drain Current	T_C=25°C	60*	A
		T_C=100°C	70	
I_{DM} [a]	Pulse Drain Current Tested	T_C=25°C	260	A
P_D	Maximum Power Dissipation	T_C=25°C	50	W
		T_C=100°C	20	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	2.5	°C/W
I_D	Continuous Drain Current	T_A=25°C	18	A
		T_A=70°C	15	
P_D	Maximum Power Dissipation	T_A=25°C	2.5	W
		T_A=70°C	1.6	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	t ≤ 10s	20	°C/W
		Steady State	50	
I_{AS} [b]	Avalanche Current, Single pulse	L=0.5mH	19	A
E_{AS} [b]	Avalanche Energy, Single pulse	L=0.5mH	212	mJ

Note a：*Current is limited by bond wire.

Note b：UIS tested and pulse width are limited by maximum junction temperature 150°C (initial temperature T_j=25°C).

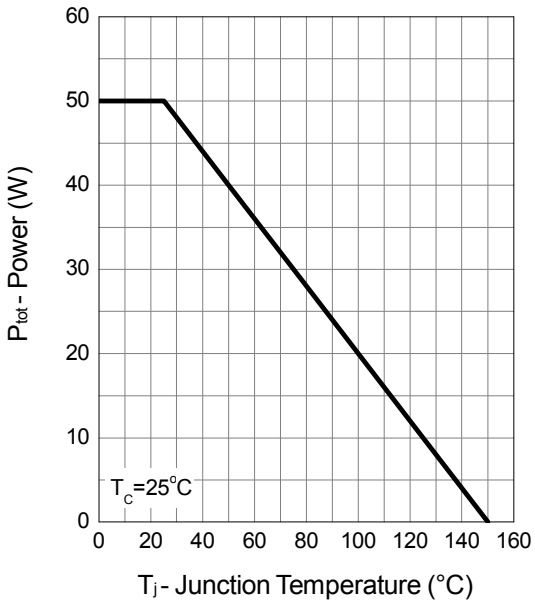
Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	0.5	0.75	1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [c]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=60A	-	5.3	6.4	mΩ
		T_J=125°C	-	3.9	-	
		V_{GS}=4.5V, I_{DS}=60A	-	6.5	9	
		V_{GS}=2.5V, I_{DS}=50A	-	7.8	10	
Diode Characteristics						
V_{SD} [c]	Diode Forward Voltage	I_{SD}=10A, V_{GS}=0V	-	0.7	1.1	V
t_{rr}	Reverse Recovery Time	I_{DS}=20A, dI_{SD}/dt=100A/μs	-	16	-	ns
t_a	Charge Time		-	9.2	-	
t_b	Discharge Time		-	7	-	
Q_{rr}	Reverse Recovery Charge		-	7.5	-	nC
Dynamic Characteristics [d]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	2.5	5	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz	-	2450	-	pF
C_{oss}	Output Capacitance		-	270	-	
C_{rss}	Reverse Transfer Capacitance		-	190	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=15Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	13	-	ns
t_r	Turn-on Rise Time		-	11.6	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	85	-	
t_f	Turn-off Fall Time		-	42	-	
Gate Charge Characteristics [d]						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_{DS}=25A	-	23	-	nC
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_{DS}=25A	-	50	-	
Q_{gth}	Threshold Gate Charge		-	1.25	-	
Q_{gs}	Gate-Source Charge		-	2.8	-	
Q_{gd}	Gate-Drain Charge		-	8.2	-	

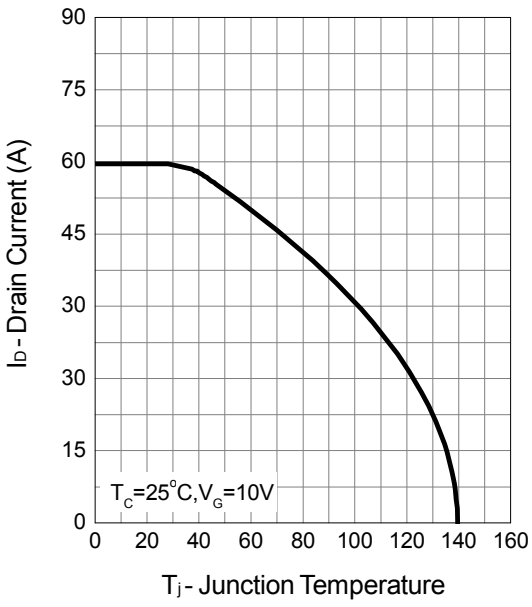
Note c：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note d：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

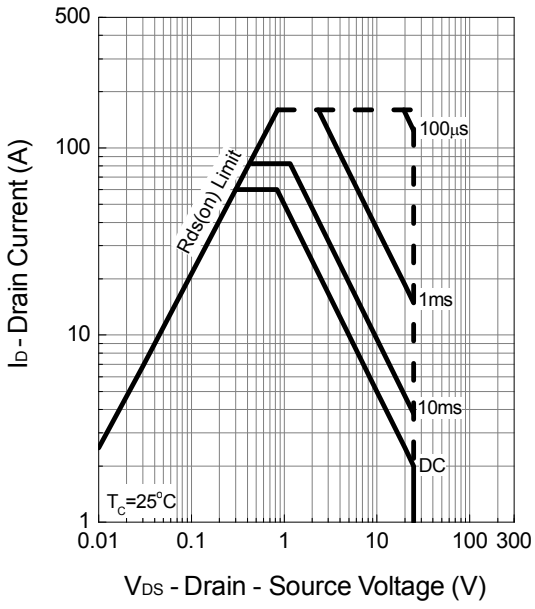
Power Dissipation



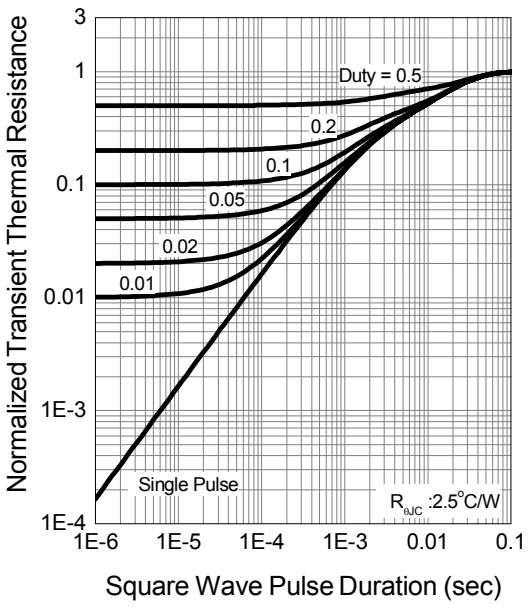
Drain Current



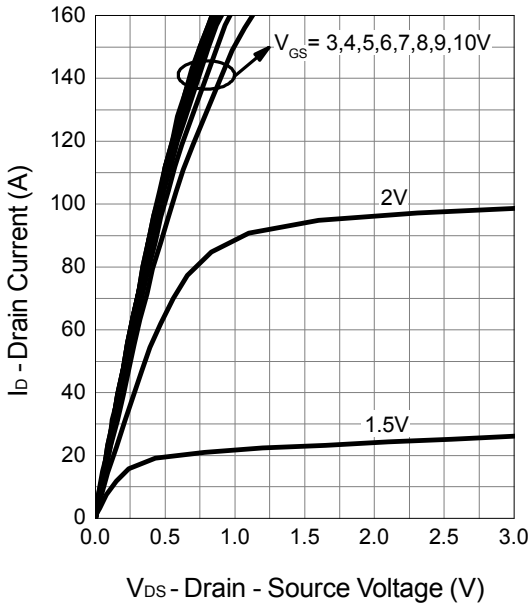
Safe Operation Area



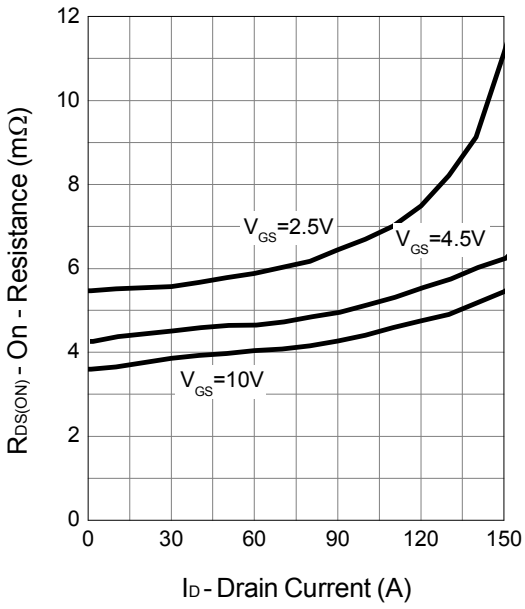
Thermal Transient Impedance



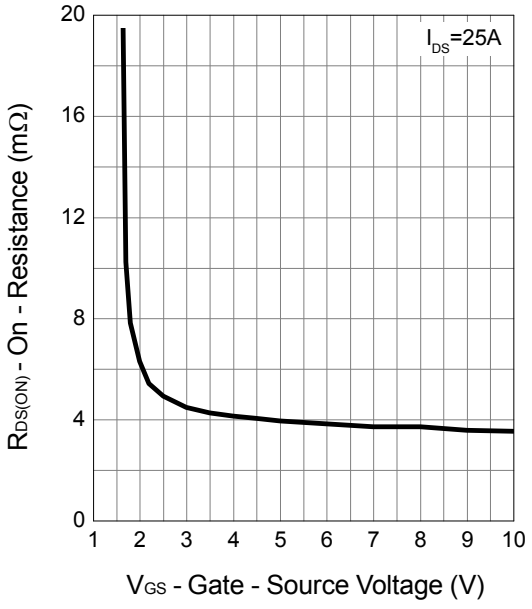
Output Characteristics



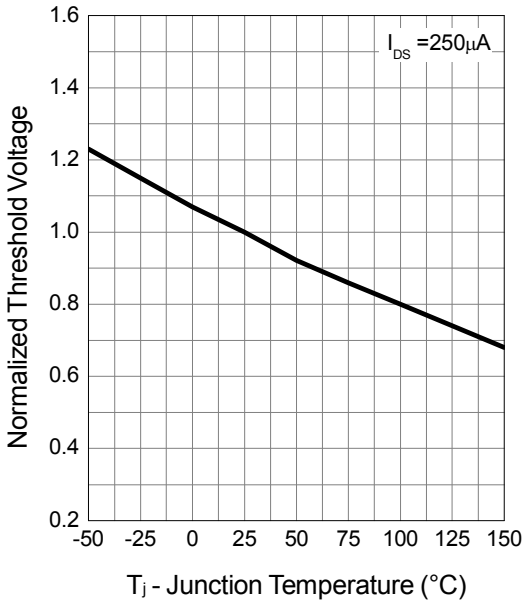
Drain-Source On Resistance



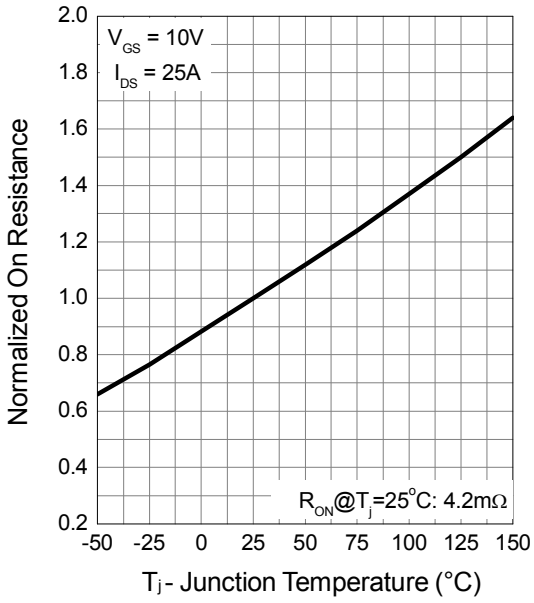
Gate-Source On Resistance



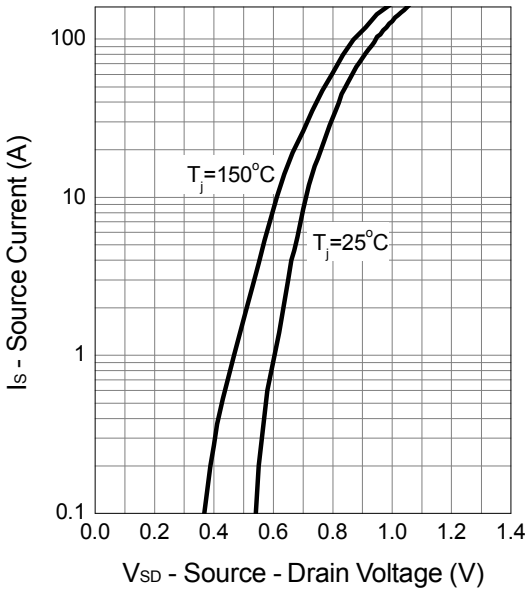
Gate Threshold Voltage



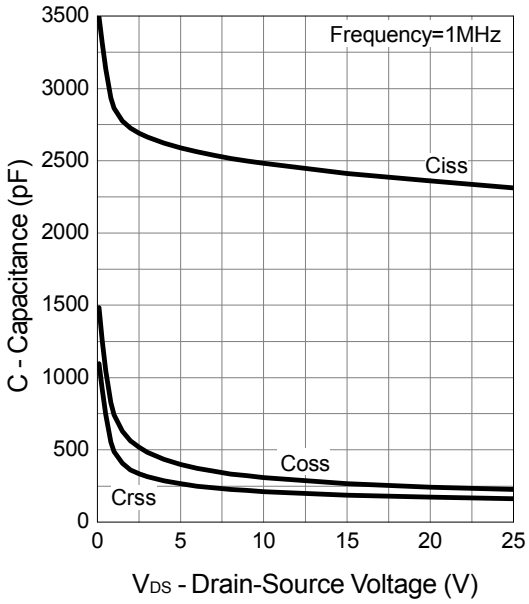
Drain-Source On Resistance



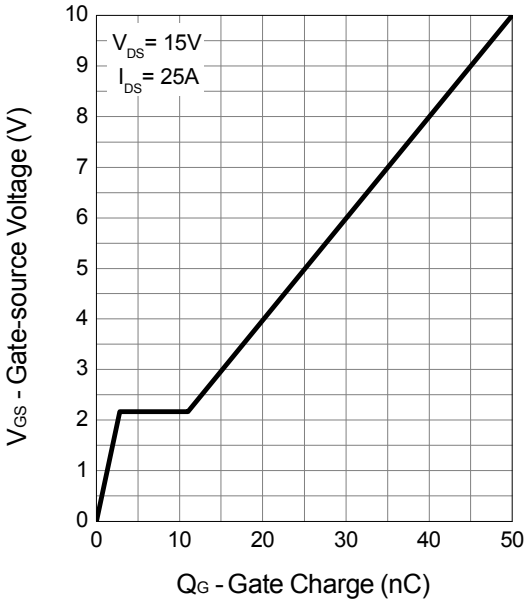
Source-Drain Diode Forward



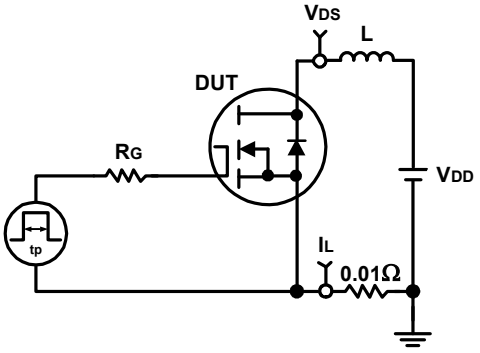
Capacitance

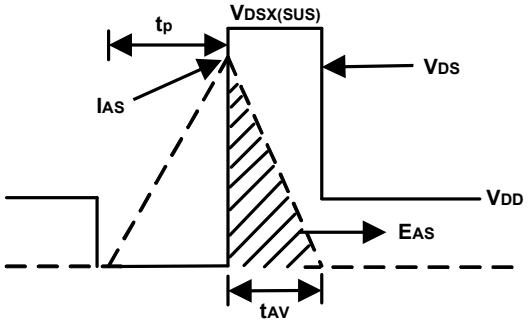


Gate Charge

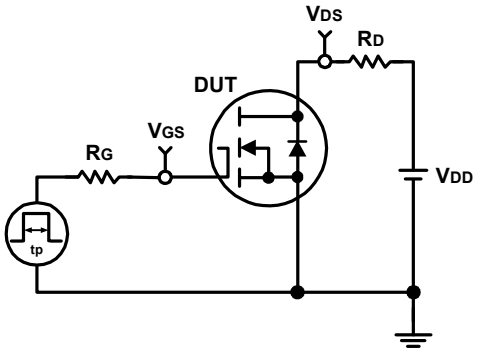


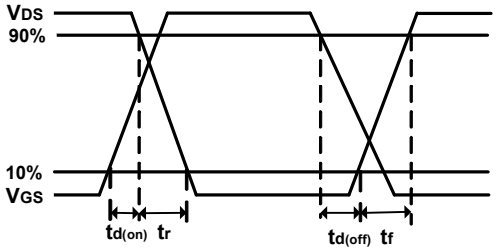
Avalanche Test Circuit and Waveforms



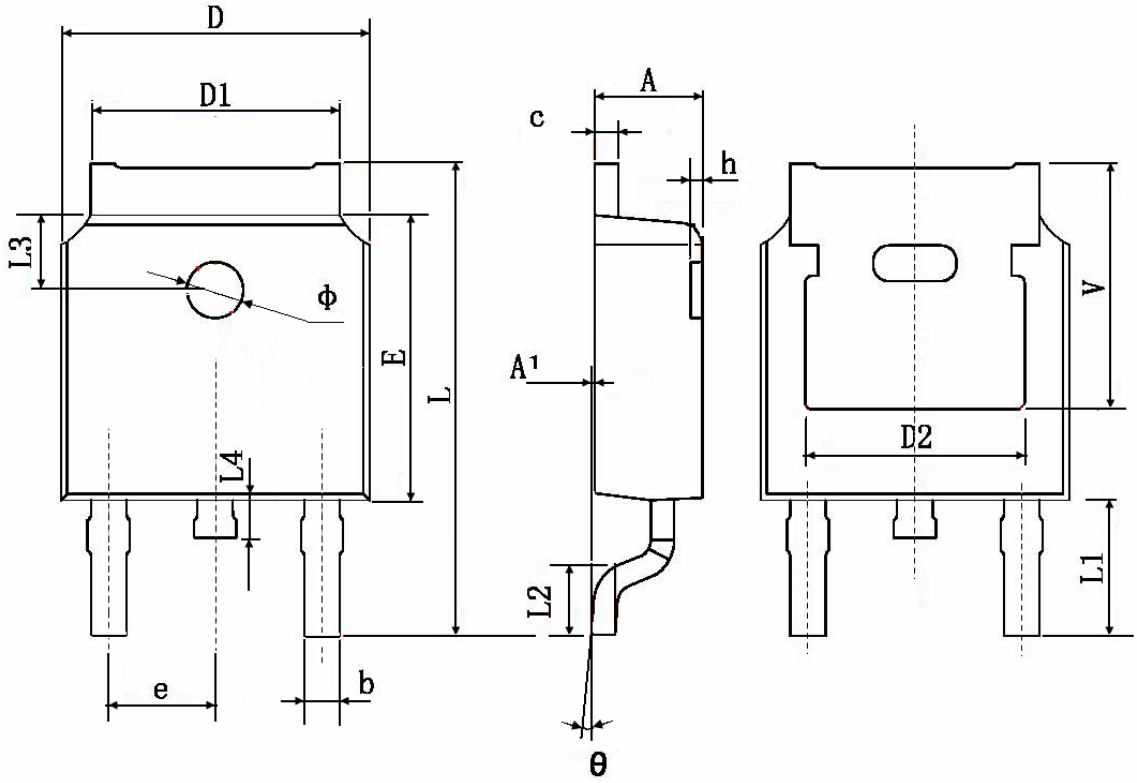


Switching Time Test Circuit and Waveforms





Package Information:TO-252-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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