TM50P02AD

P -Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

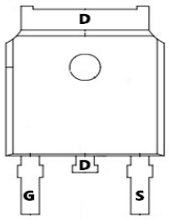
General Features

V_{DS} =-20V I_D =-48A

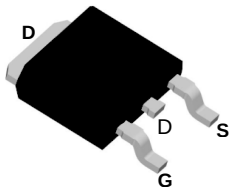
$R_{DS(ON)}$=16mΩ (typ.)@V_{GS}=-4.5V

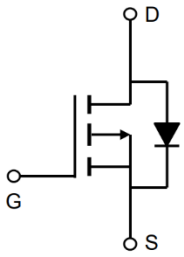
100% UIS Tested
100% R_g Tested

Green Product



D:TO-252-3L





Marking: 50P02A

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

Symbol	Parameter		Rating	Unit
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		±12	
I_D [a]	Continuous Drain Current (V_{GS}=-4.5V)	T_A=25°C	-48	A
		T_A=70°C	-30	
I_{DM} [a]	Pulsed Drain Current (V_{GS}=-4.5V)		-244	
I_S [a]	Diode Continuous Forward Current		-10	
T_J	Maximum Junction Temperature		150	°C
I_{AS} [d]	Avalanche Current, Single pulse	L=0.5mH	-12	A
E_{AS} [d]	Avalanche Energy, Single pulse	L=0.5mH	36	mJ
T_{STG}	Storage Temperature Range		-55 to 150	°C
				W
P_D [c]	Maximum Power Dissipation	T_C=25°C	31.25	
		T_C=100°C	12.5	
$R_{\theta JA}$ [a,b]	Thermal Resistance-Junction to Ambient	t ≤ 10s	40	°C/W
		Steady State	80	
$R_{\theta JC}$ [c]	Thermal Resistance-Junction to Case		4	°C/W

Note * : Package limited.

a : Surface Mounted on 1in^2 pad area, t ≤ 10sec.

b : Maximum under Steady State conditions is 75 °C/W.

e c : The power dissipation P_D is based on $T_{J(MAX)}$ = 150°C, and it is useful for reducing junction-to-case thermal resistance ($R_{\theta JC}$) when additional heat sink is used.

d : UIS tested and pulse width limited by maximum junction temperature 150oC (initial temperature Tj=25oC)

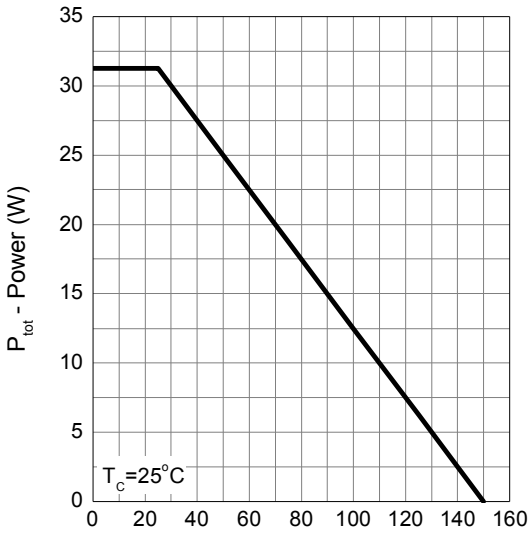
Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

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}=-16V, 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	-0.7	-1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12V, V_{DS}=0V	-	-	±10	μA
$R_{DS(ON)}$ [e]	Drain-Source On-state Resistance	V_{GS}=-4.5V, I_{DS}=-11A	-	16	19	mΩ
		V_{GS}=-2.5V, I_{DS}=-6A	-	20	23	
Diode Characteristics						
V_{SD} [e]	Diode Forward Voltage	I_{SD}=-1A, V_{GS}=0V	-	-0.7	-1	V
t_{rr} [f]	Reverse Recovery Time	I_{SD}=-11A, dI_{SD}/dt=100A/μs	-	63	-	ns
Q_{rr} [f]	Reverse Recovery Charge		-	54	-	nC
Dynamic Characteristics [f]						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-10V, Frequency=1.0MHz	-	1220	-	pF
C_{oss}	Output Capacitance		-	320	-	
C_{rss}	Reverse Transfer Capacitance		-	290	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-10V, R_L=10Ω, I_{DS}=-1A, V_{GEN}=-4.5V, R_G=6Ω	-	9	-	ns
t_r	Turn-on Rise Time		-	13	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	26	-	
t_f	Turn-off Fall Time		-	167	-	
Gate Charge Characteristics [f]						
Q_g	Total Gate Charge	V_{DS}=-10V, V_{GS}=-4.5V, I_{DS}=-11A	-	25	-	nC
Q_{gs}	Gate-Source Charge		-	1.6	-	
Q_{gd}	Gate-Drain Charge		-	11	-	

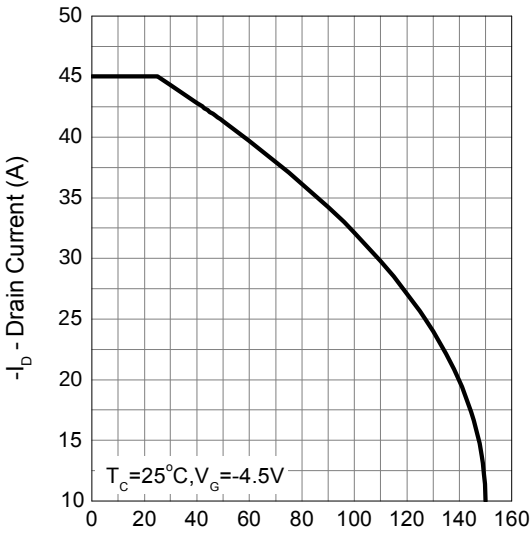
Note e：Pulse test; pulse width≤300μs, duty cycle≤2%.
Note f：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

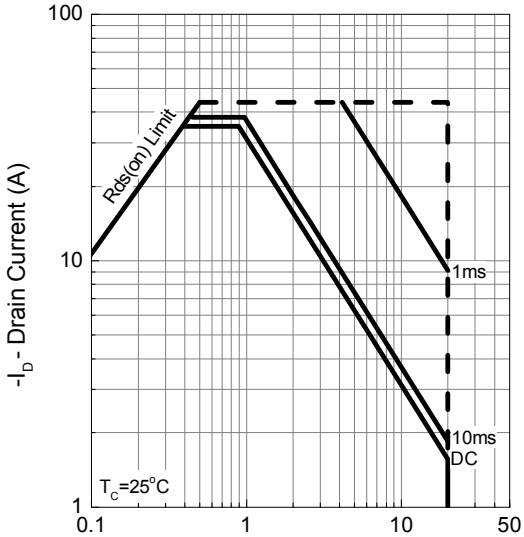
Power Dissipation



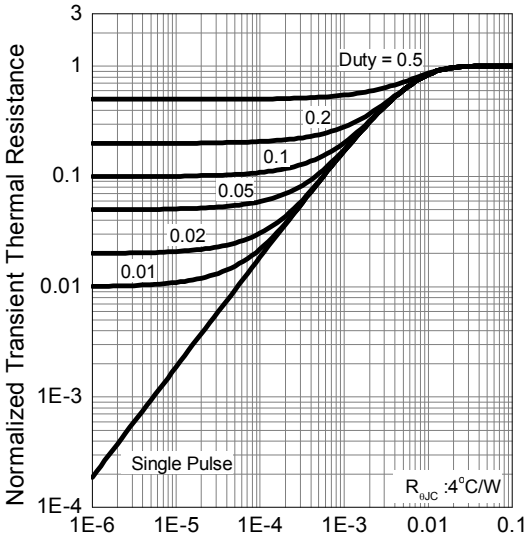
Drain Current



Safe Operation Area



Thermal Transient Impedance



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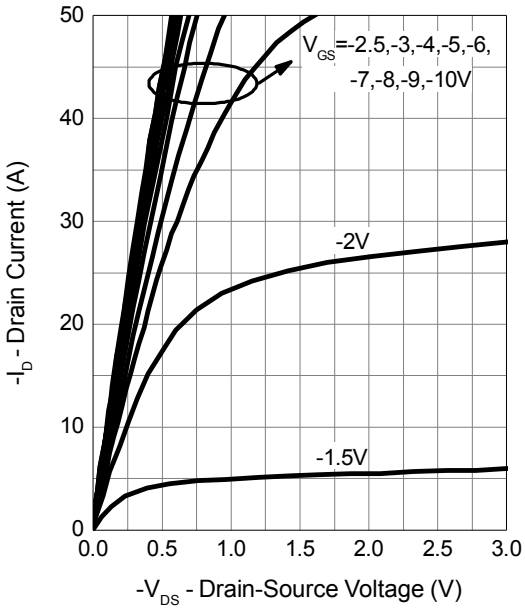
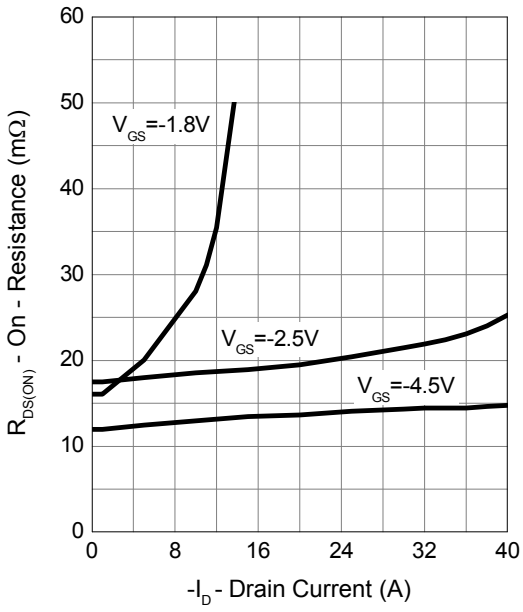
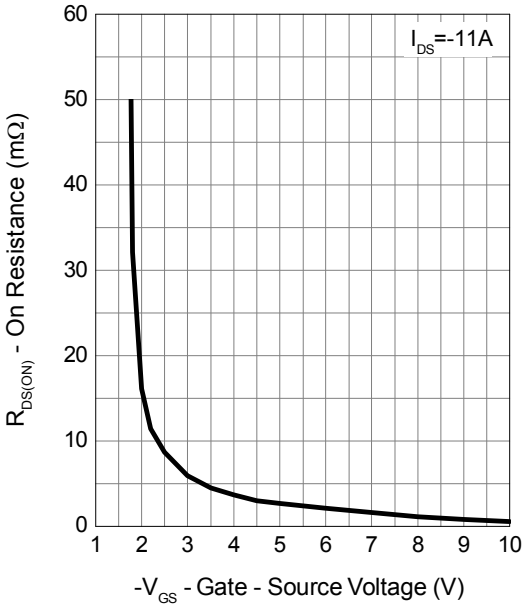
Output Characteristics



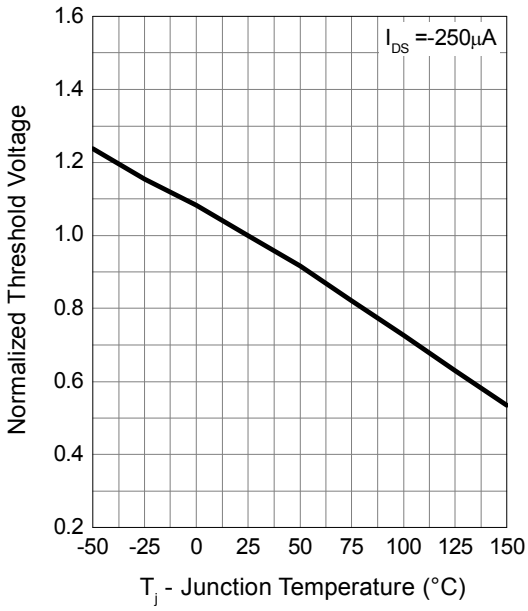
Drain-Source On Resistance



Gate-Source On Resistance



Gate Threshold Voltage



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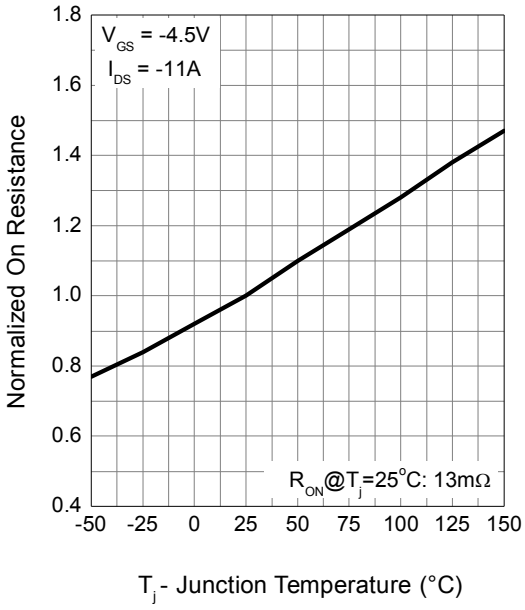
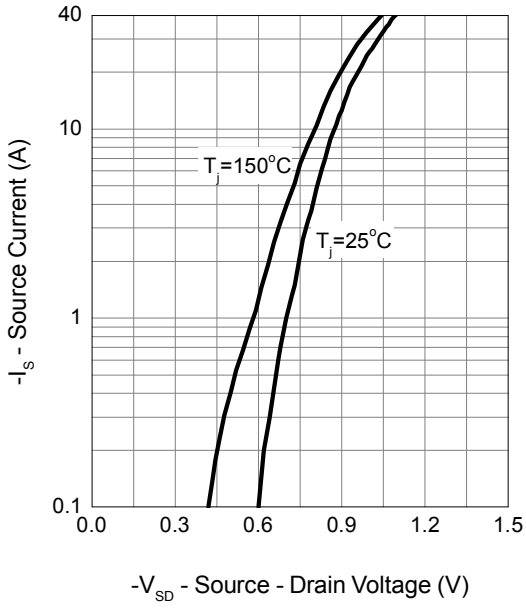
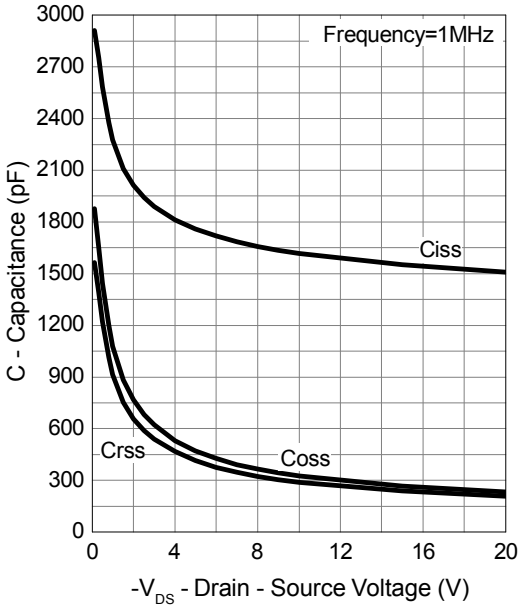
Drain-Source On Resistance



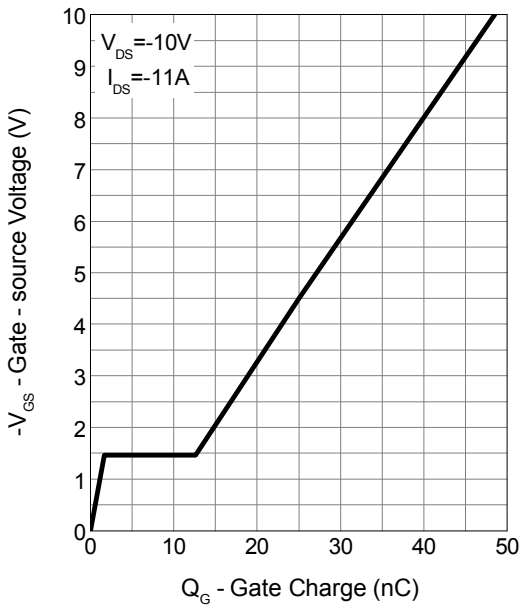
Source-Drain Diode Forward



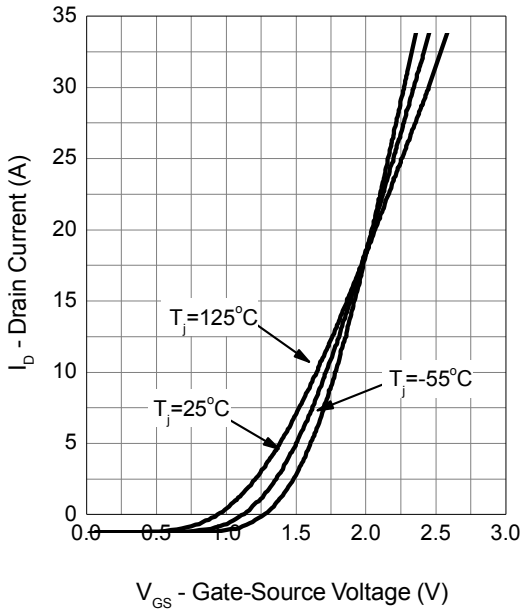
Capacitance



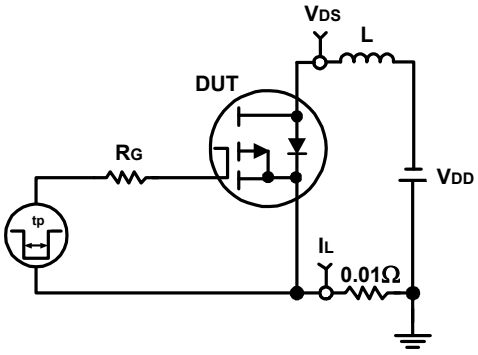
Gate Charge

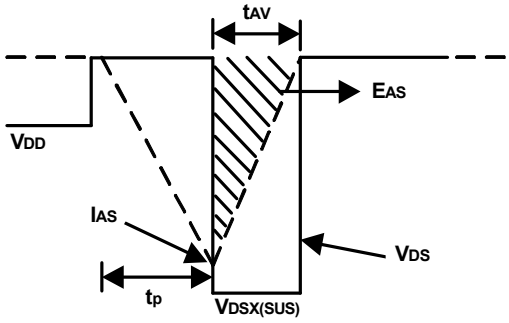


Transfer Characteristics

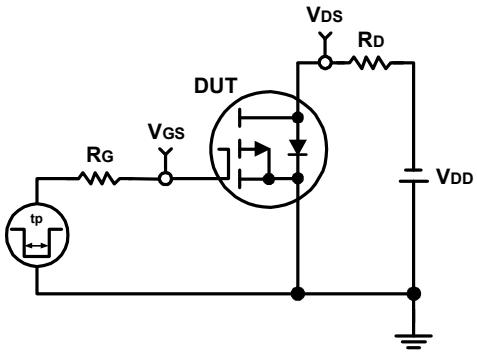


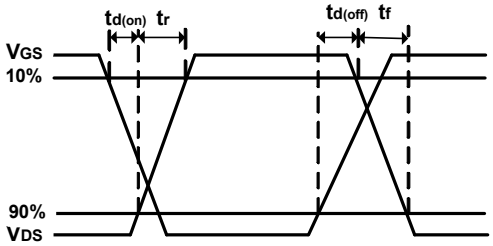
Avalanche Test Circuit and Waveforms



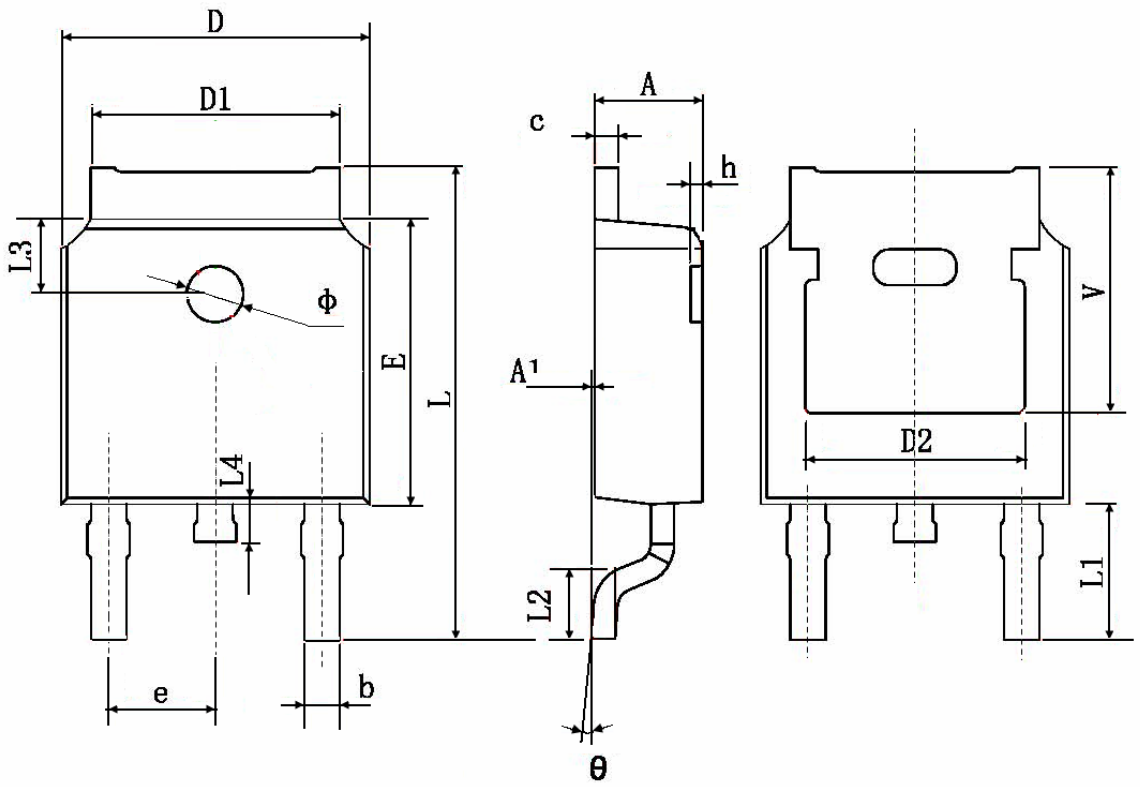


Switching Time Test Circuit and Waveforms





Package Mechanical Data: 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.	