
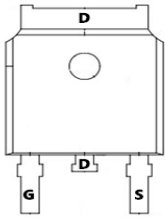
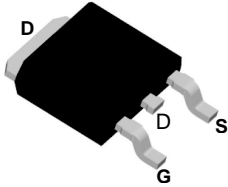
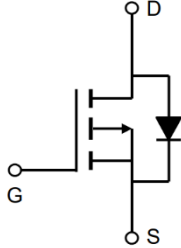


**TM60P06D**

**P -Channel Enhancement Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = -60V</math> <math>I_D = -60A</math></p> <p><math>R_{DS(ON)} = 16m\Omega</math> (typ.) @ <math>V_{GS} = -10V</math></p> <p>100% UIS Tested 100% <math>R_g</math> Tested</p> 
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**D:TO-252-3L**

Marking: 60P06

**Absolute Maximum Ratings (TC=25°C unless otherwise noted)**

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b>				
$V_{DSS}$	Drain-Source Voltage	-60	V	
$V_{GSS}$	Gate-Source Voltage	±20		
$T_J$	Maximum Junction Temperature	150	°C	
$T_{STG}$	Storage Temperature Range	-55 to 150	°C	
$I_S$	Diode Continuous Forward Current	-13	A	
$I_{AS}^a$	Avalanche Current, Single pulse	L=0.5mH	A	
$E_{AS}^a$	Avalanche Energy, Single pulse	L=0.5mH	mJ	
$I_{DP}^b$	Pulse Drain Current Tested	$T_C = 25^\circ C$	A	
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$		-60
		$T_C = 100^\circ C$		-46
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	54	W
		$T_C = 100^\circ C$	21	
$R_{\theta JA}^d$	Thermal Resistance-Junction to Ambient	Steady State	55	°C/W

Note a : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature  $T_J = 25^\circ C$ ).  
 Note b : Pulse width limited by max. junction temperature.  
 Note c : Wire limited.  
 Note d :  $R_{\theta JA}$  steady state  $t = 999s$ .  $R_{\theta JA}$  is measured with the device mounted on 1in2, FR-4 board with 2oz. Copper.



TM60P06D

P -Channel Enhancement Mosfet

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-60	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-48V, V_{GS}=0V$	-	-	1	$\mu A$
		$T_J=85^\circ C$	-	-	-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.0	-1.5	-2.0	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
$R_{DS(ON)}^e$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_{DS}=-20A$	-	16	20	$m\Omega$
		$V_{GS}=-4.5V, I_{DS}=-20A$	-	21	27	$m\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^e$	Diode Forward Voltage	$I_{SD}=-1A, V_{GS}=0V$	-	-0.7	-1	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=-20A, di_{SD}/dt=100A/\mu s$	-	23	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	22	-	nC
<b>Dynamic Characteristics<sup>f</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	-	8	16	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-30V,$ Frequency=1.0MHz	-	2816	-	pF
$C_{oss}$	Output Capacitance		-	142	-	
$C_{rss}$	Reverse Transfer Capacitance		-	85	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-30V, R_L=30\Omega,$ $I_{DS}=-1A, V_{GEN}=-10V,$ $R_G=6\Omega$	-	10	18	ns
$t_r$	Turn-on Rise Time		-	9	16	
$t_{d(OFF)}$	Turn-off Delay Time		-	88	158	
$t_f$	Turn-off Fall Time		-	42	76	
<b>Gate Charge Characteristics<sup>f</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=-30V, V_{GS}=-10V,$ $I_{DS}=-20A$	-	32	45	nC
$Q_{gs}$	Gate-Source Charge		-	3.6	-	
$Q_{gd}$	Gate-Drain Charge		-	8.3	-	

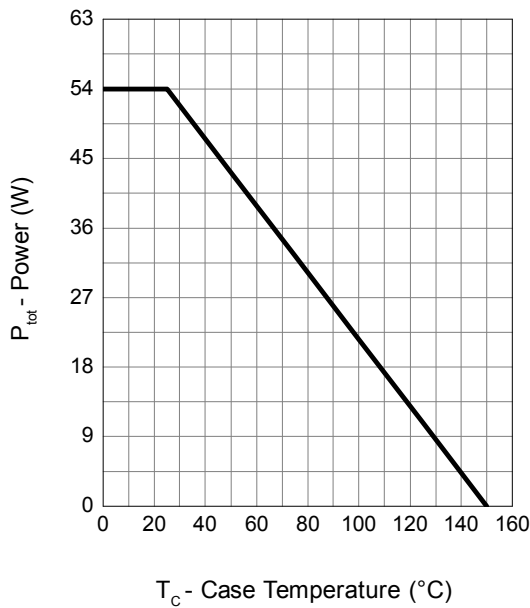
Note e : Pulse test; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

Note f : Guaranteed by design, not subject to production testing.

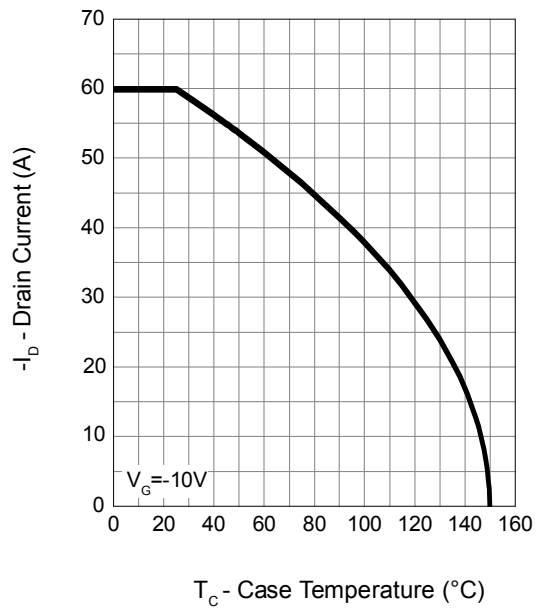


### Typical Operating Characteristics

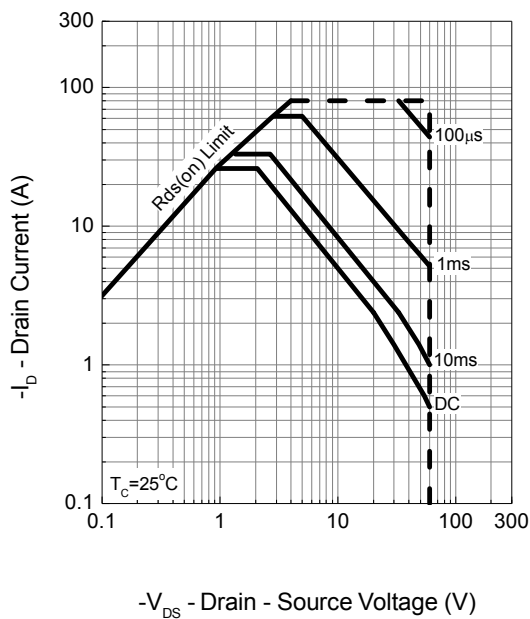
Power Dissipation



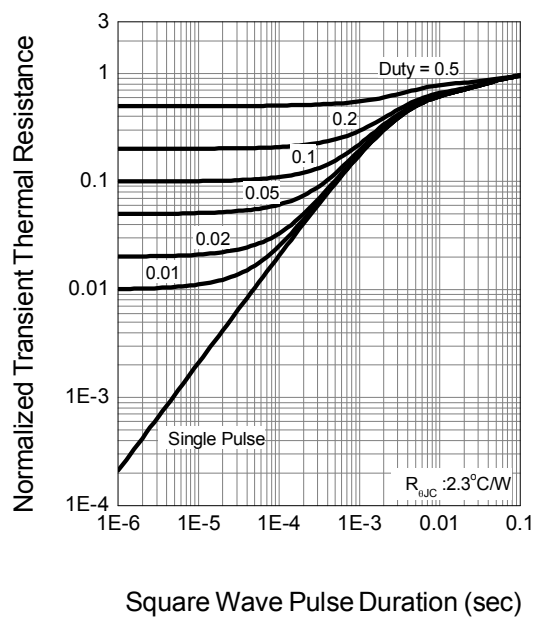
Drain Current



Safe Operation Area



Thermal Transient Impedance

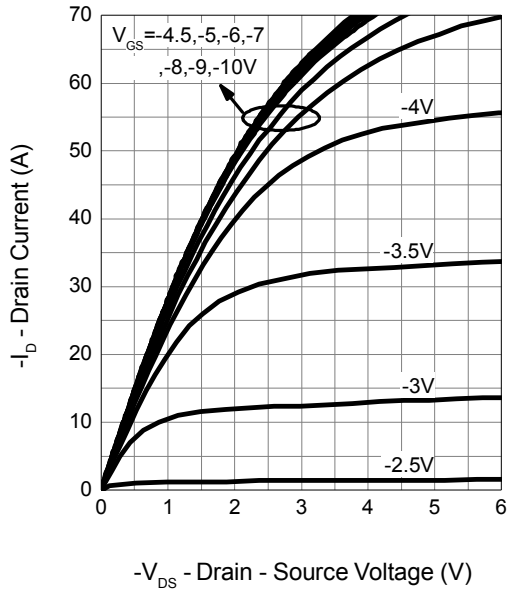




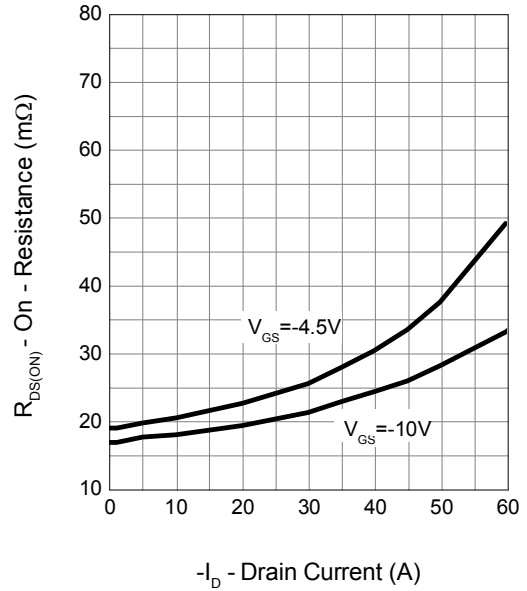
# TM60P06D

# P -Channel Enhancement Mosfet

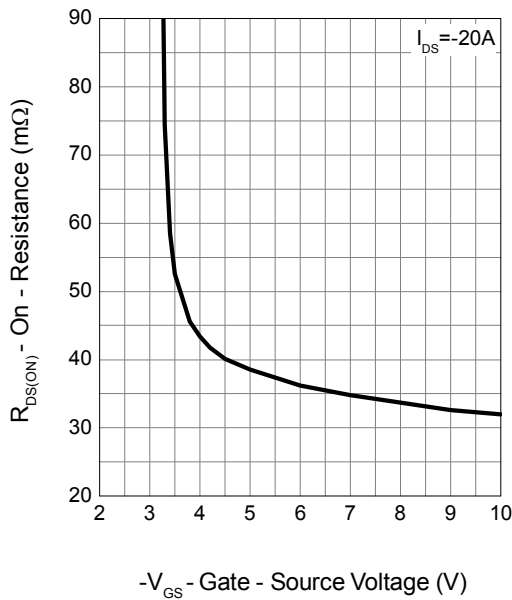
### Output Characteristics



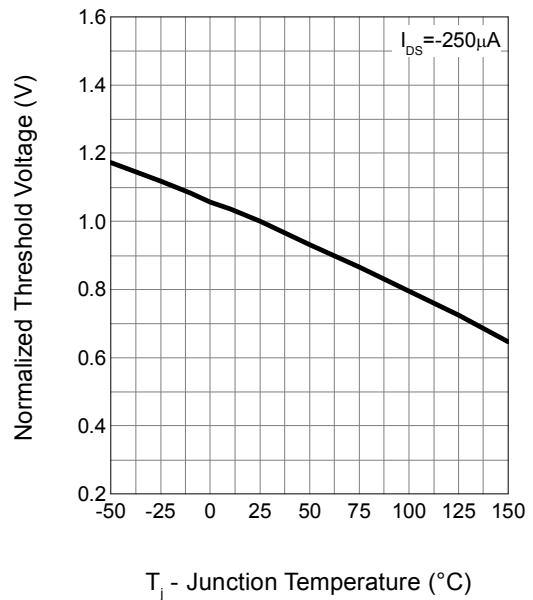
### Drain-Source On Resistance



### Gate-Source On Resistance

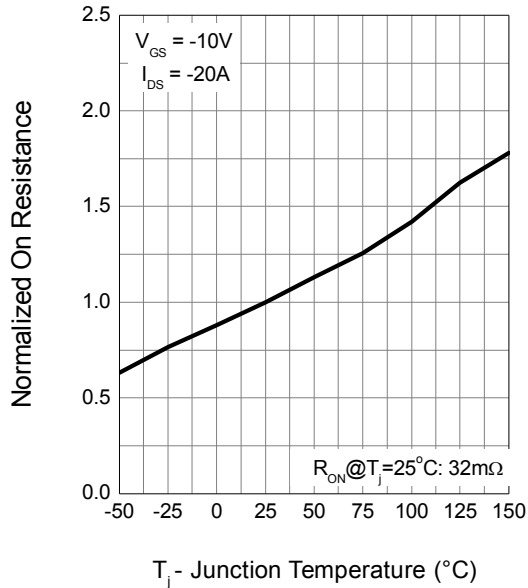


### Gate Threshold Voltage

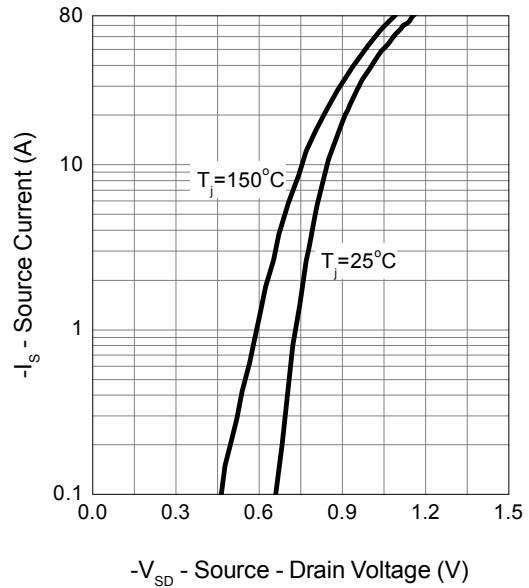




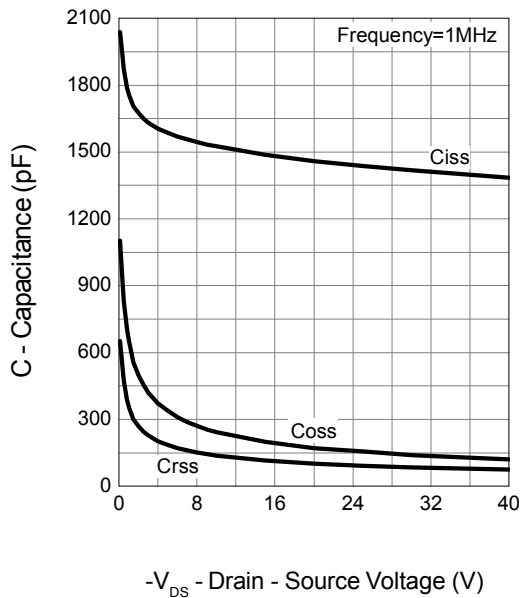
Drain-Source On Resistance



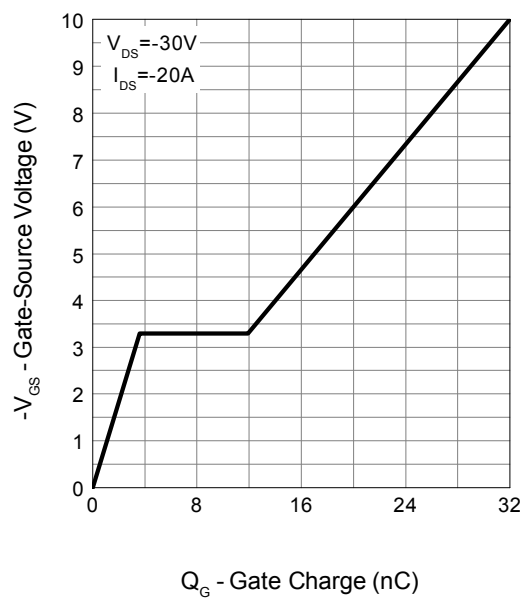
Source-Drain Diode Forward



Capacitance

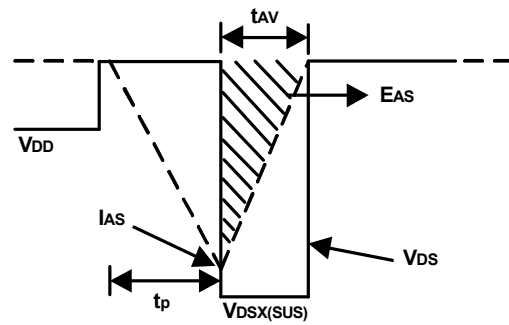
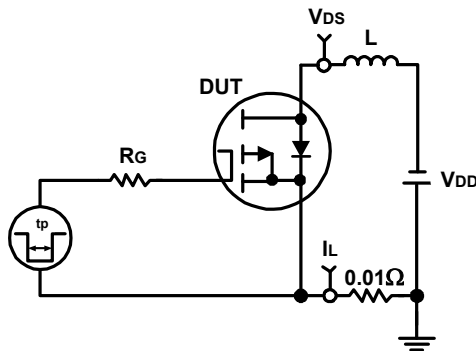


Gate Charge

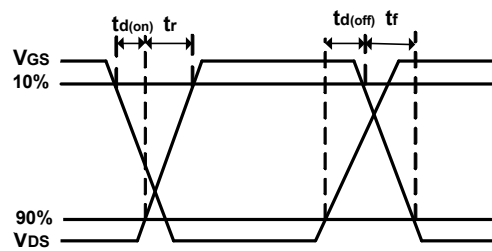
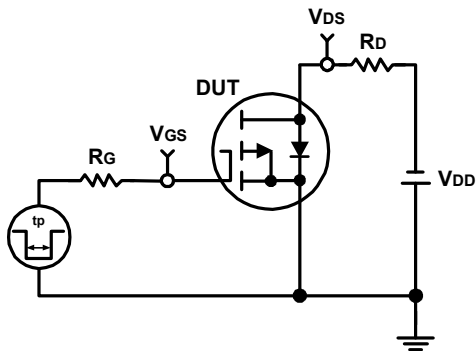




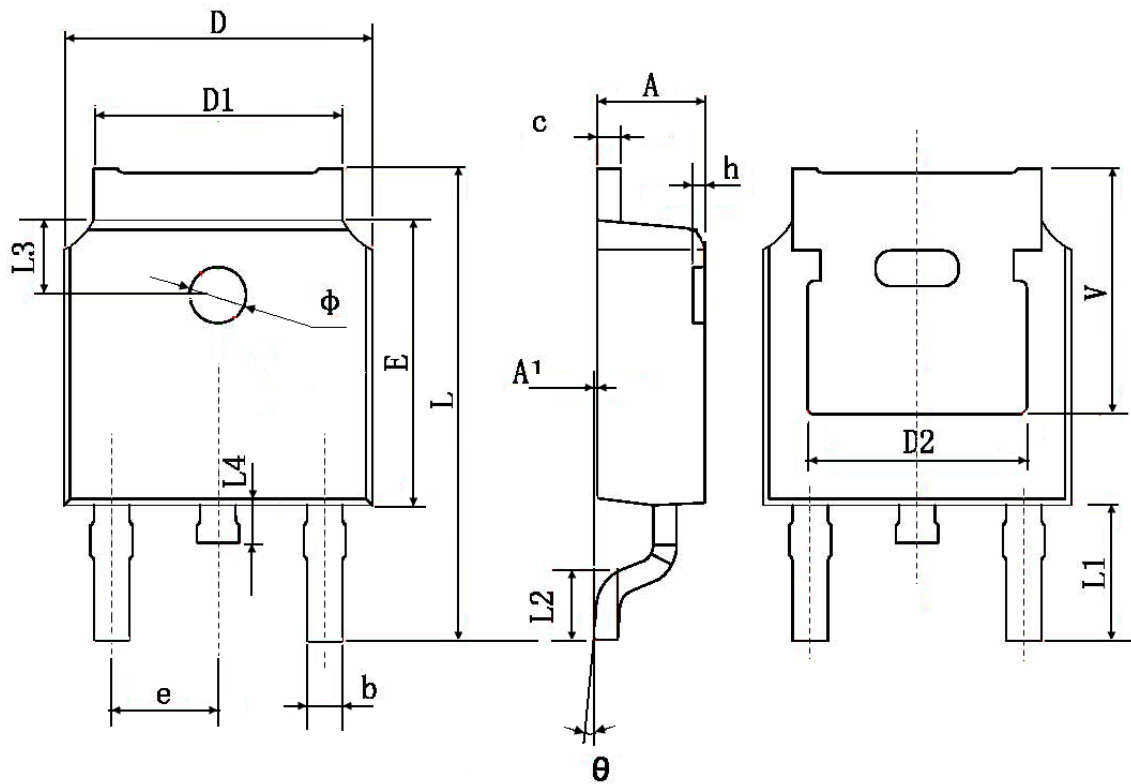
### Avalanche Test Circuit and Waveforms



### 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.	