
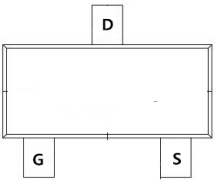




**TM05P03MI**

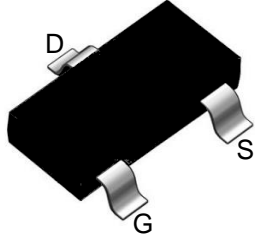
**P-Channel Enhancement Mosfet**

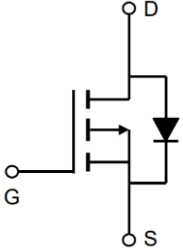
<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = -30V</math> <math>I_D = -4.8A</math></p> <p><math>R_{DS(ON)} = 38m\Omega (Typ.) @ V_{GS} = -10V</math></p>  <p>100% UIS Tested                  100% <math>R_g</math> Tested</p> <div style="text-align: right;">  </div>
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Marking: A19T OR X1

MI:SOT-23-3L





**Absolute Maximum Ratings ( $T_c=25^\circ C$  unless otherwise noted)**

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-30	V
VGS	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current	-4.8	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current	-3.2	A
IDM	Pulsed Drain Current <sup>2</sup>	-25	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>3</sup>	1.4	W
$P_D @ T_A = 70^\circ C$	Total Power Dissipation <sup>3</sup>	0.9	W
TSTG	Storage Temperature Range	- 55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	- 55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	125	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10s$ )	85	$^\circ C/W$



## TM05P03MI

## P-Channel Enhancement Mosfet

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	-32	---	V
$\Delta BVDSS/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	---	-0.014	---	$V/^\circ\text{C}$
RDS(ON)	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-3A$	---	38	45	m $\Omega$
		$V_{GS}=-4.5V, I_D=-3A$	---	46	56	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.5	-1.0	-1.4	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2.6	---	mV/ $^\circ\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu\text{A}$
		$V_{DS}=-24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	-5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	$\pm 100$	nA
gfs	Forward Transconductance	$V_{DS}=-5V, I_D=-3A$	---	5.6	---	S
Qg	Total Gate Charge (-4.5V)	$V_{DS}=-15V, V_{GS}=-4.5V, I_D=-3A$	---	11.9	---	nC
Qgs	Gate-Source Charge		---	1.8	---	
Qgd	Gate-Drain Charge		---	3	---	
Td(on)	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-4.5V, R_G=3.3\Omega, I_D=-3A$	---	6.6	---	ns
T <sub>r</sub>	Rise Time		---	27.8	---	
Td(off)	Turn-Off Delay Time		---	46.2	---	
T <sub>f</sub>	Fall Time		---	20.6	---	
Ciss	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	290	---	pF
Coss	Output Capacitance		---	73	---	
Crss	Reverse Transfer Capacitance		---	71	---	
IS	Continuous Source Current <sup>1,4</sup>	$V_G=V_D=0V$ , Force Current	---	---	-4.8	A
VSD	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1.2	V

## Note :

- 1.The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\cong 300\mu\text{s}$  , duty cycle  $\cong 2\%$
- 3.The power dissipation is limited by  $150^\circ\text{C}$  junction temperature
- 4.The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.



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Typical Characteristics

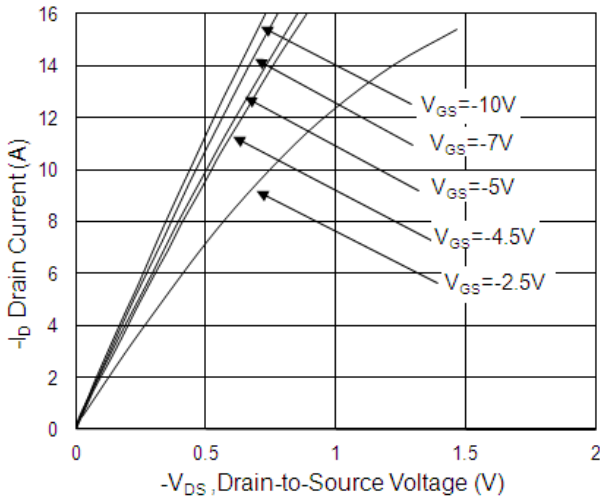


Fig.1 Typical Output Characteristics

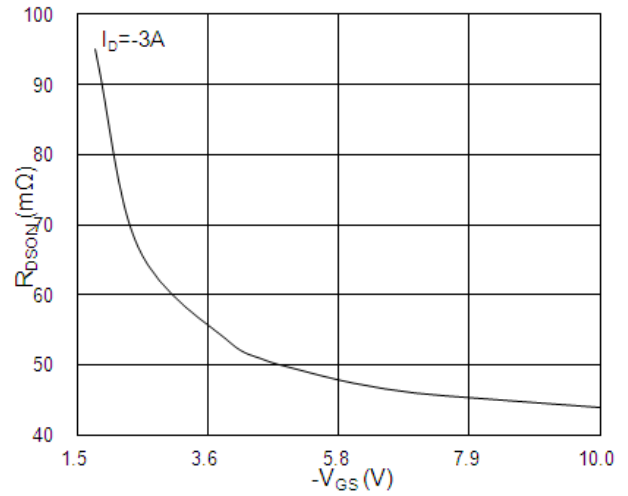


Fig.2 On-Resistance vs. G-S Voltage

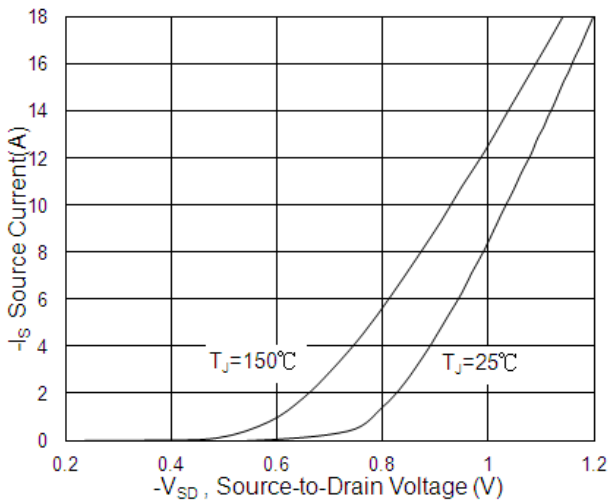


Fig.3 Forward Characteristics Of Reverse

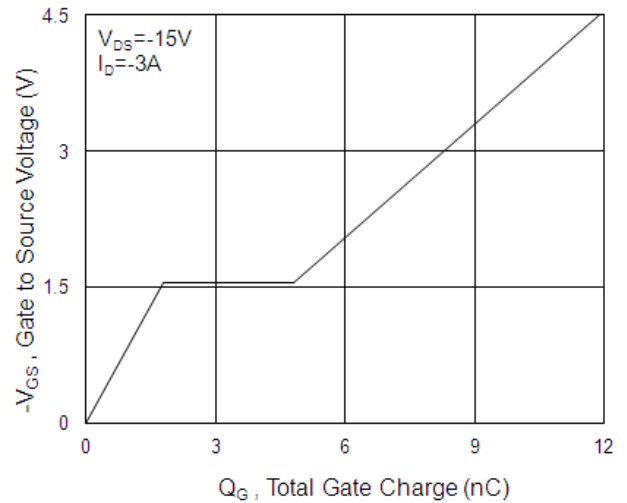


Fig.4 Gate-Charge Characteristics

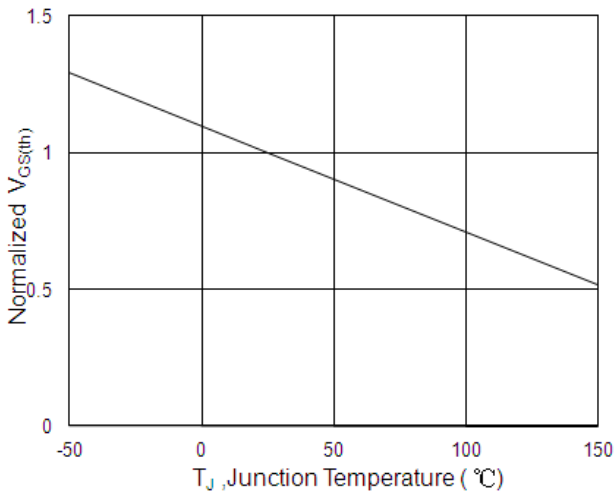


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

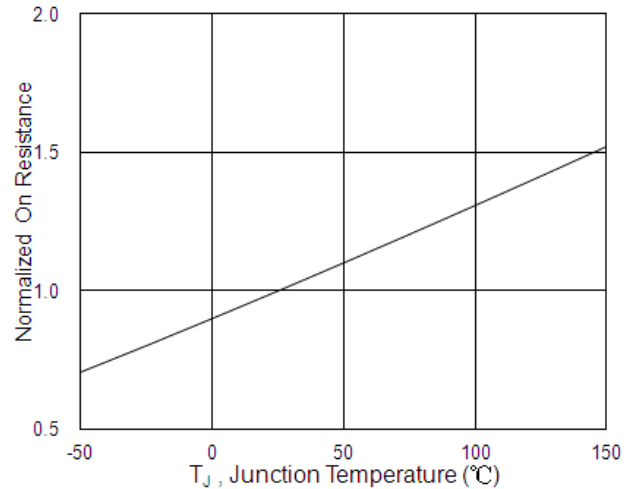


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$



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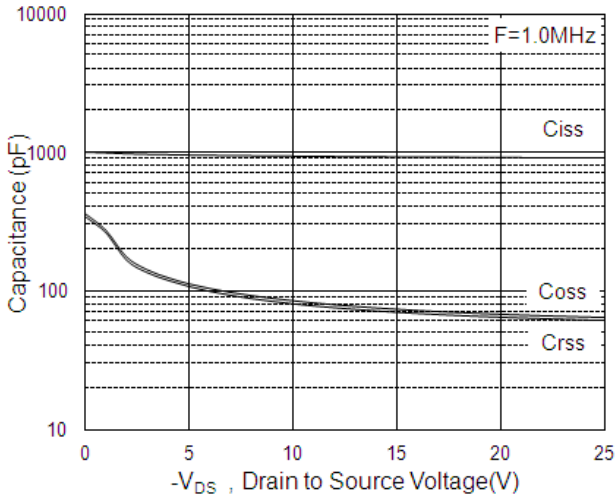


Fig.7 Capacitance

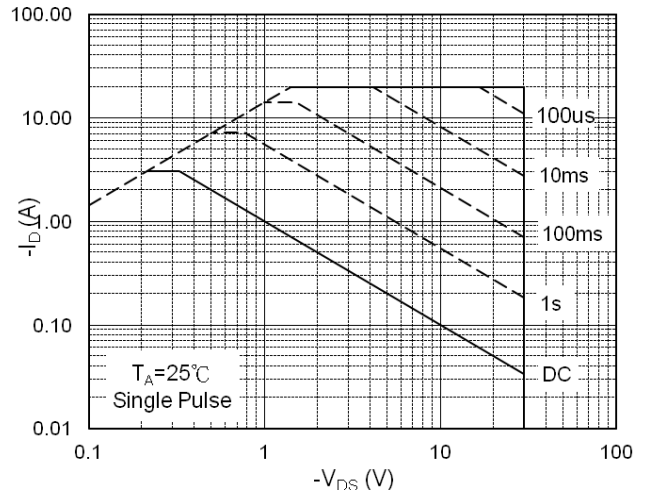


Fig.8 Safe Operating Area

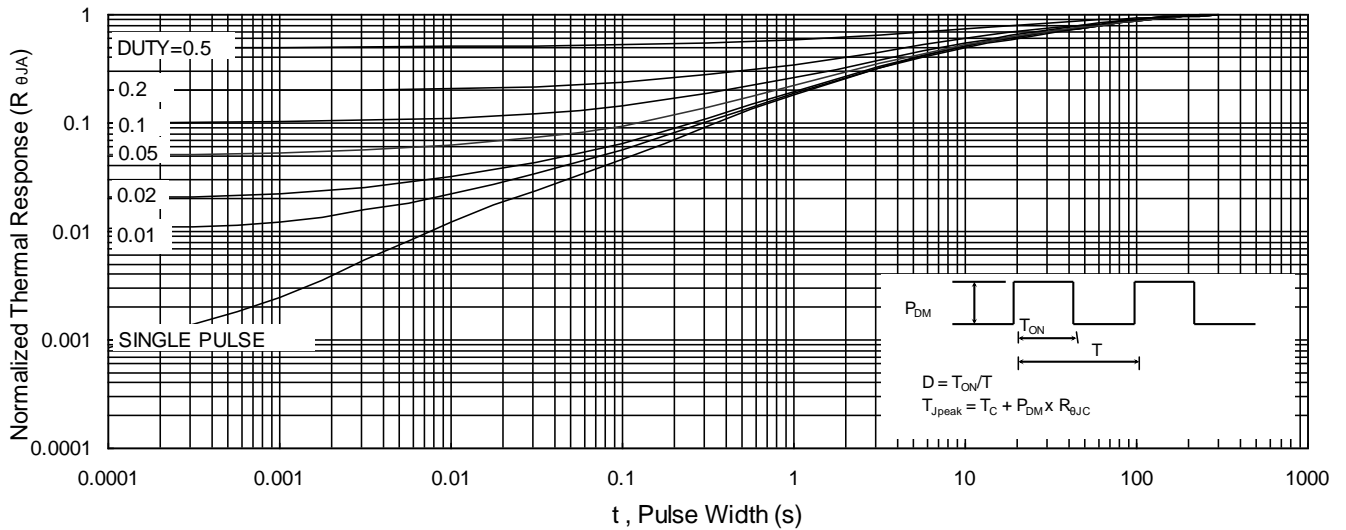


Fig.9 Normalized Maximum Transient Thermal Impedance

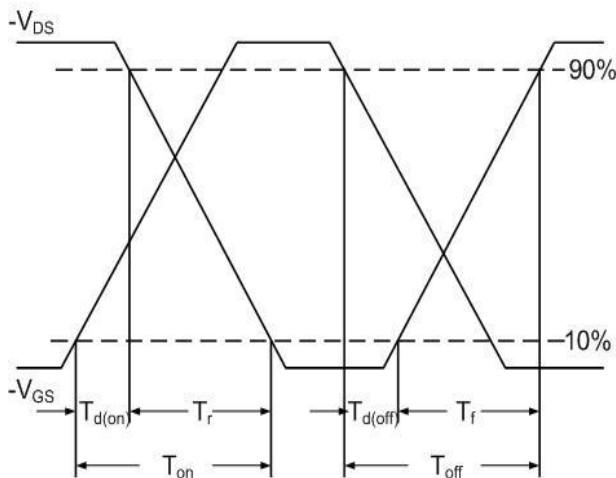


Fig.10 Switching Time Waveform

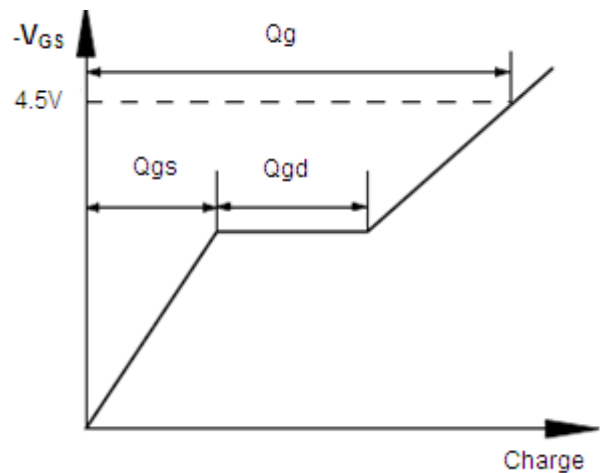
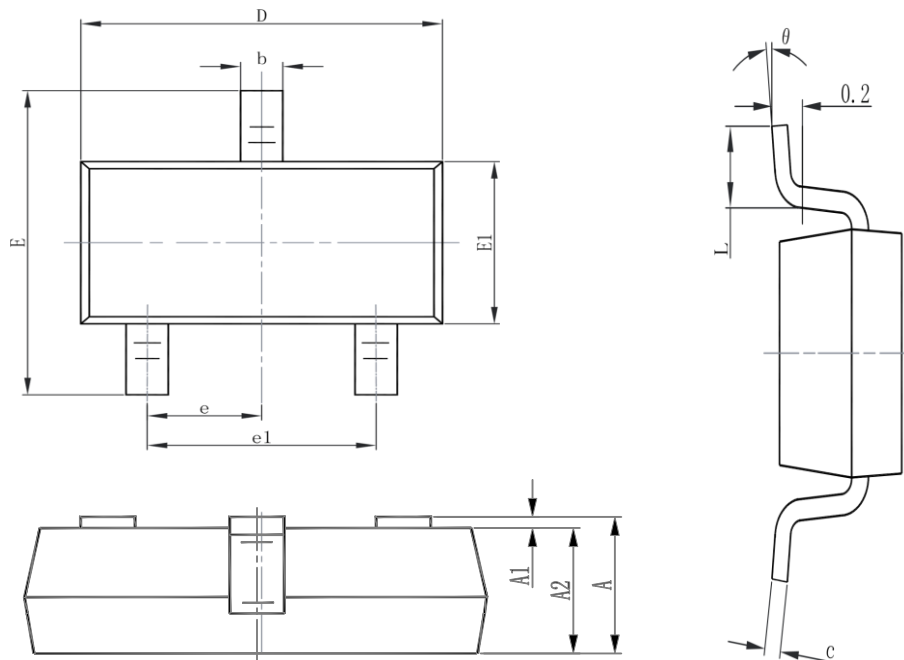


Fig.11 Gate Charge Waveform

# Package Mechanical Data:SOT-23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°