


**TM03N06I**

**N-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 = 3A</math>  <math>R_{DS(ON)} = 75 m\Omega @ V_{GS}=10V</math></p> <p>100% UIS Tested              100% <math>R_g</math> Tested</p> 
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I: SOT-23

Marking: 6003 OR S10

Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ unless otherwise noted)			
Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	3.0	A
$I_D @ T_A=70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	1.8	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	9.2	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	1	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	125	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	80	$^\circ\text{C/W}$



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Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	60	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C , I <sub>D</sub> =1mA	---	0.054	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =2A	---	75	85	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =1A	---	85	98	
V <sub>GS(th)</sub>	Gate Threshold Voltage		1.2	1.4	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	---	-4.96	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =48V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =48V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ± 20V , V <sub>DS</sub> =0V	---	---	± 100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V , I <sub>D</sub> =2A	---	13	---	S
Q <sub>g</sub>	Total Gate Charge (4.5V)		---	5	7.0	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =48V , V <sub>GS</sub> =4.5V , I <sub>D</sub> =2A	---	1.68	2.4	
Q <sub>gd</sub>	Gate-Drain Charge		---	1.9	2.7	
T <sub>d(on)</sub>	Turn-On Delay Time		---	1.6	3.2	ns
T <sub>r</sub>	Rise Time	V <sub>DD</sub> =30V , V <sub>GS</sub> =10V , R <sub>G</sub> =3.3 Ω ,	---	7.2	13	
T <sub>d(off)</sub>	Turn-Off Delay Time	I <sub>D</sub> =2A	---	25	50	
T <sub>f</sub>	Fall Time		---	14.4	28.8	
C <sub>iss</sub>	Input Capacitance		---	511	715	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =15V , V <sub>GS</sub> =0V , f=1MHz	---	38	53	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	25	35	
I <sub>S</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	3.0	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,4</sup>		---	---	9.2	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =2A , di/dt=100A/μs , T <sub>J</sub> =25°C	---	9.7	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	5.8	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature.
- 4.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

Typical Characteristics

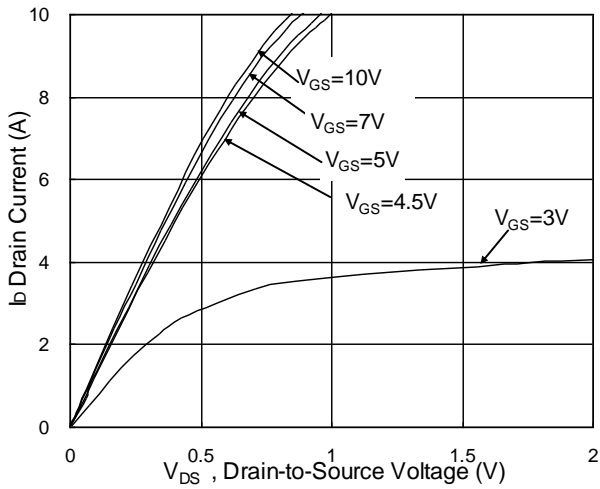


Fig.1 Typical Output Characteristics

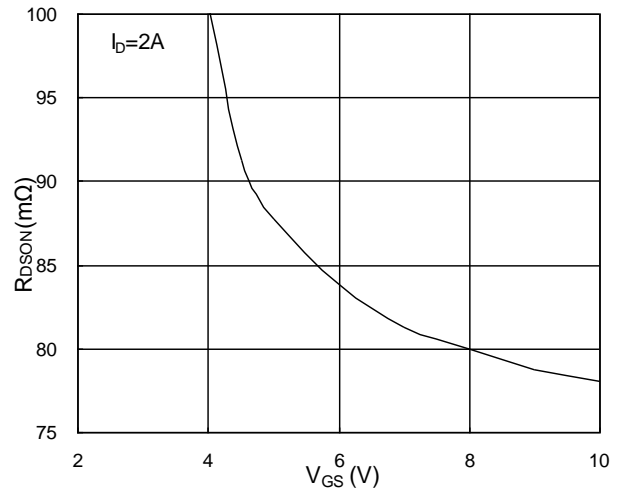


Fig.2 On-Resistance v.s Gate-Source

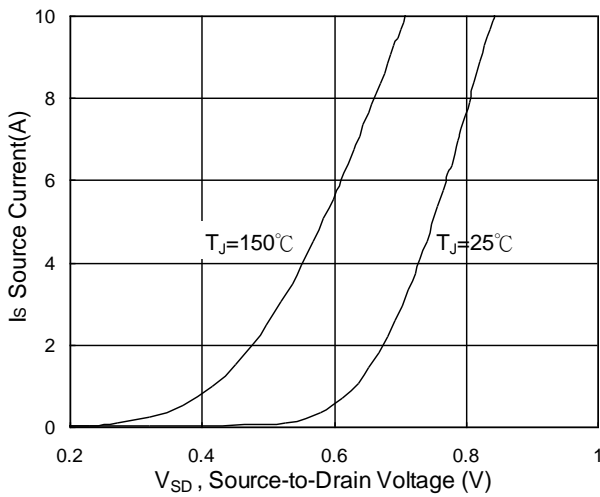


Fig.3 Forward Characteristics of Reverse

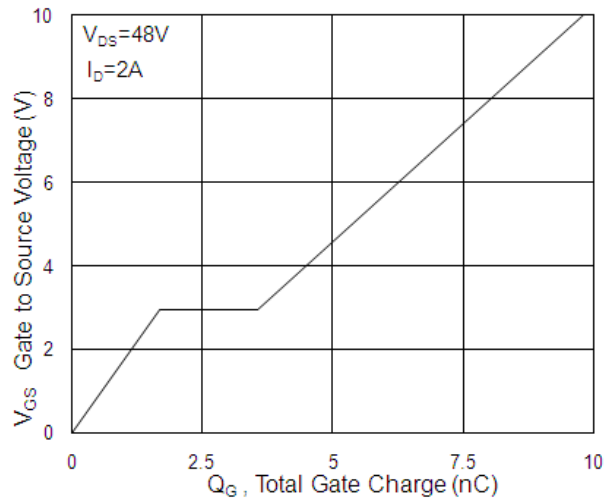
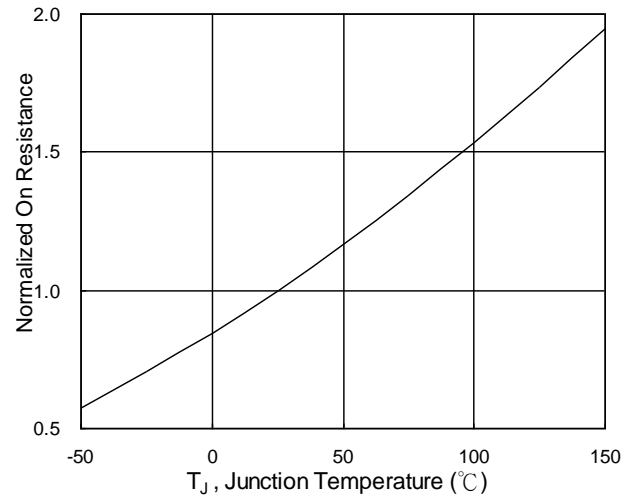
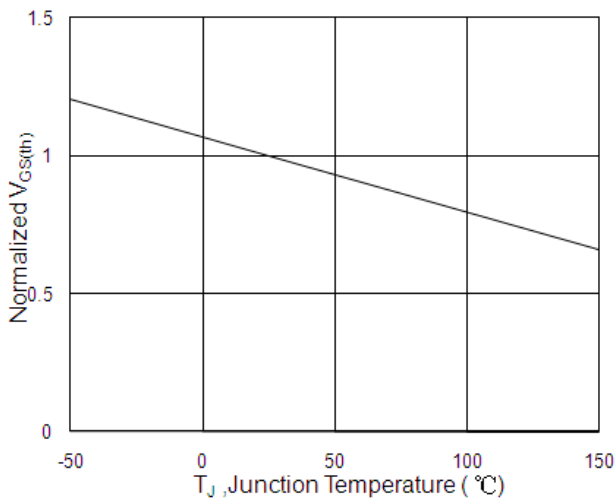


Fig.4 Gate-Charge Characteristics



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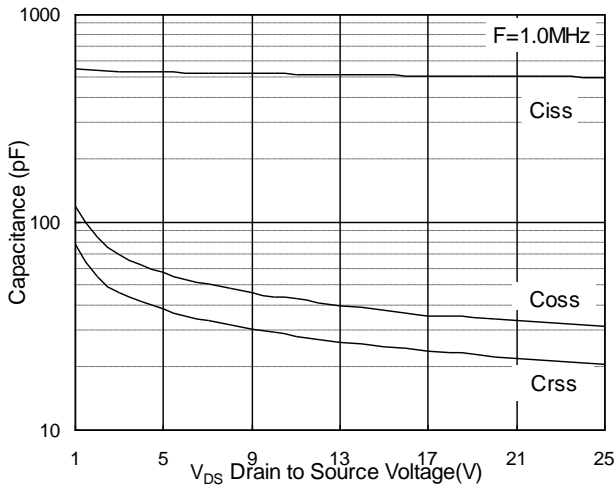


Fig.7 Capacitance

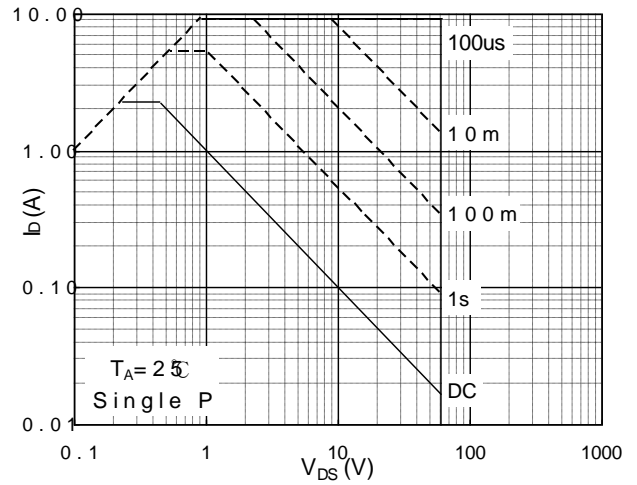


Fig.8 Safe Operating Area

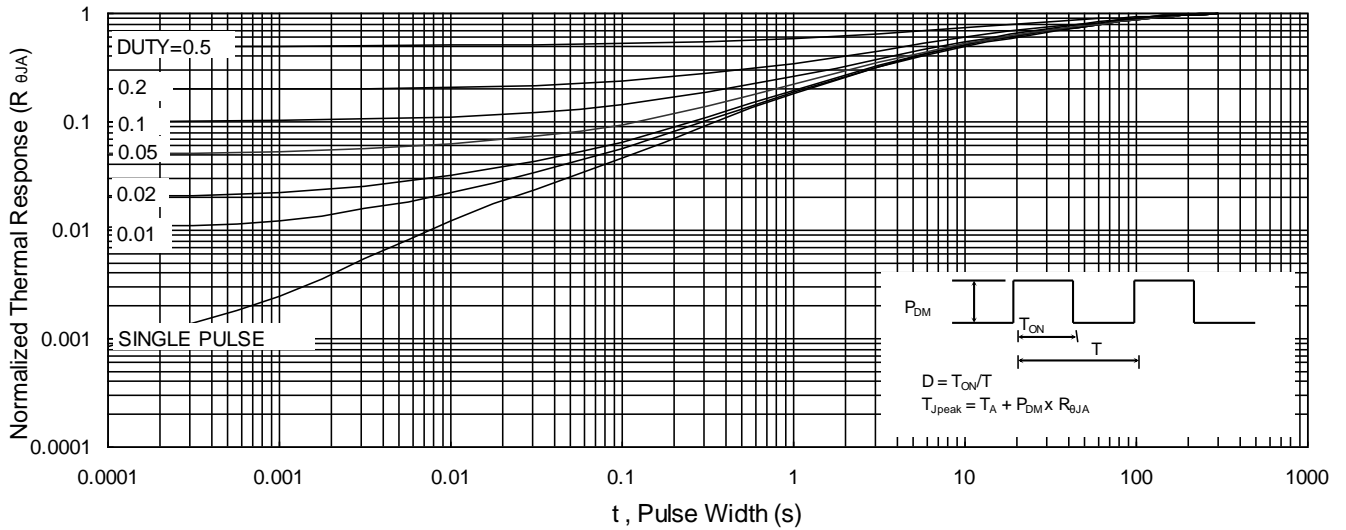
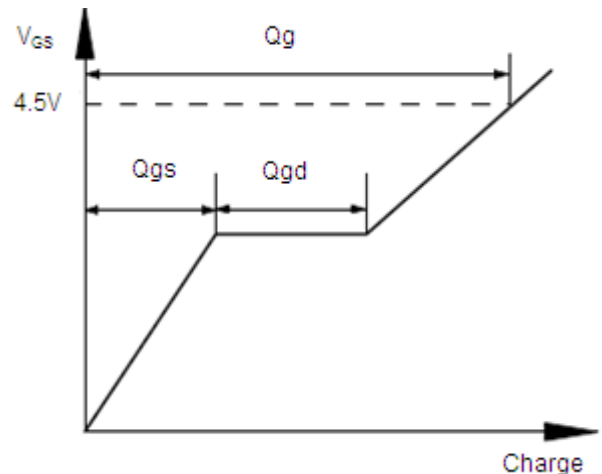
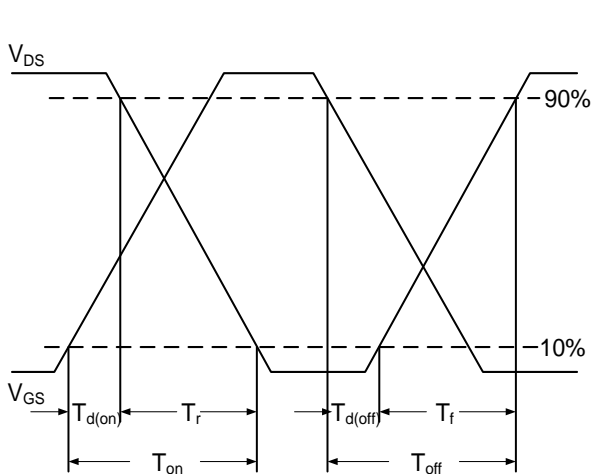
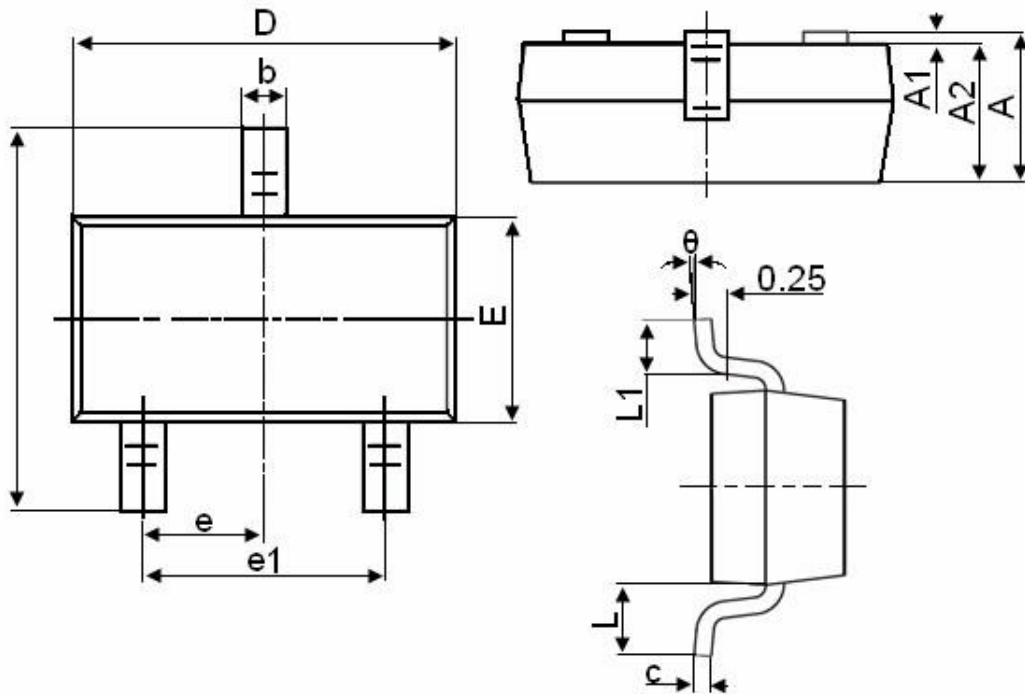


Fig.9 Normalized Maximum Transient Thermal Impedance





## Package Mechanical Data:SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
$\theta$	0°	8°