

**TM04N03I**

**N-Channel Enhancement Mosfet**

**General Description**

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

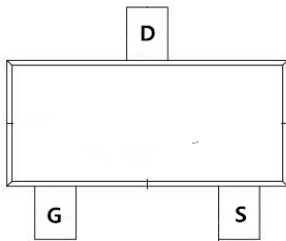
**Applications**

- Load switch
- PWM

**General Features**

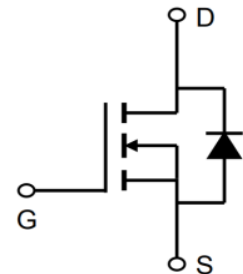
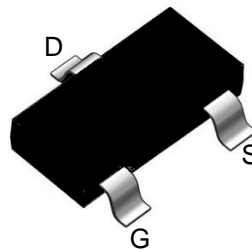
$V_{DS} = 30V$   $I_D = 3.8A$   
 $R_{DS(ON)} = 44m\Omega @ V_{GS}=10V$

100% UIS Tested  
 100%  $R_g$  Tested



Marking:A6

I:SOT-23



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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	3.8	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	2.6	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	16.4	A
$P_D @ T_A=25^\circ C$	Total Power Dissipation <sup>3</sup>	1	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	125	$^\circ C / W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	80	$^\circ C / W$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	2.0	3.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	$V_{GS}=10V, I_D=4A$		44	59	m $\Omega$
		$V_{GS}=4.5V, I_D=3A$	-	60	65	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$	-	233	-	pF
$C_{oss}$	Output Capacitance		-	44	-	pF
$C_{rSS}$	Reverse Transfer Capacitance		-	33	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=2A,$ $V_{GS}=10V$	-	3	-	nC
$Q_{gs}$	Gate-Source Charge		-	0.5	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	0.8	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=15V,$ $I_D=4A, R_{GEN}=3\Omega,$ $V_{GS}=10V$	-	4	-	ns
$t_r$	Turn-on Rise Time		-	2.1	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	15	-	ns
$t_f$	Turn-off Fall Time		-	3.2	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	3.8	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=4A$	-	-	1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

## Typical Performance Characteristics

Figure 1: Output Characteristics

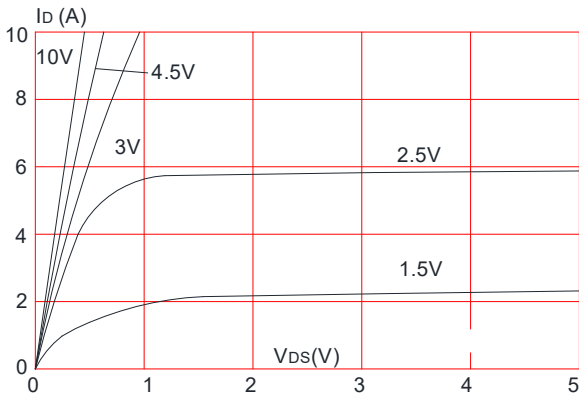


Figure 2: Typical Transfer Characteristics

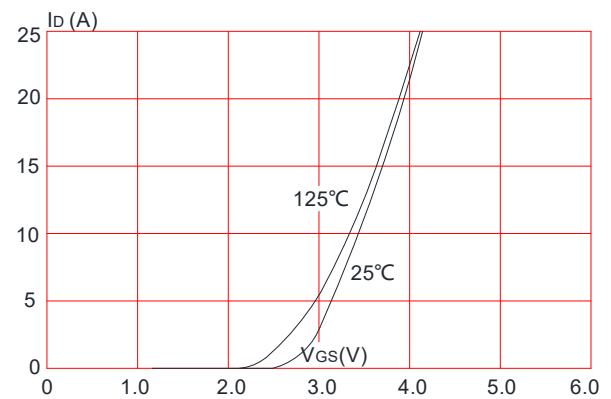


Figure 3: On-resistance vs. Drain Current

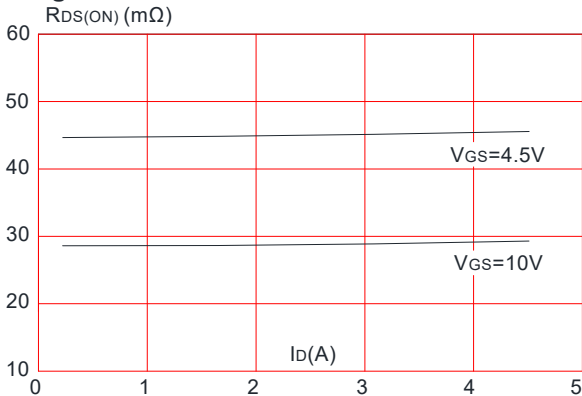


Figure 4: Body Diode Characteristics

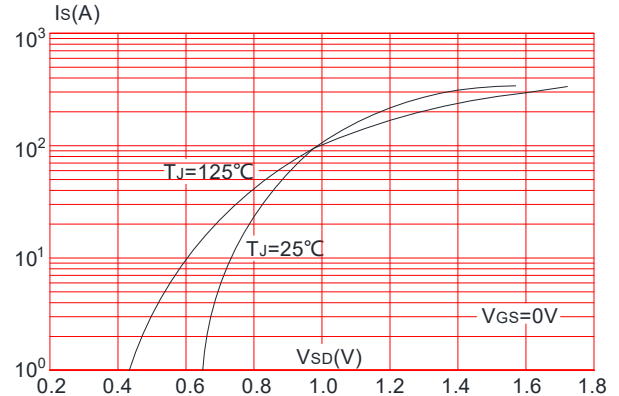


Figure 5: Gate Charge Characteristics

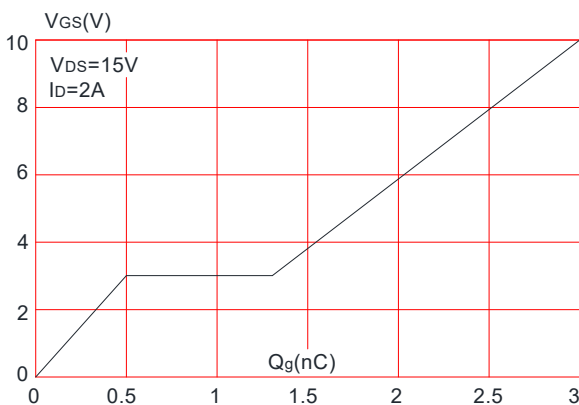
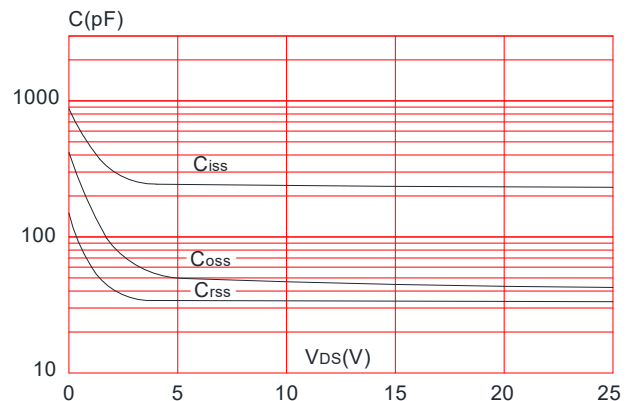


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

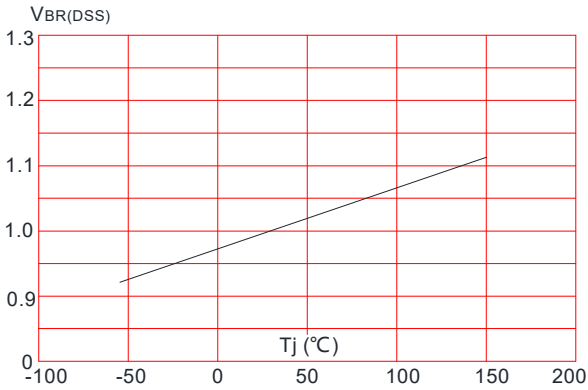


Figure 9: Maximum Safe Operating Area

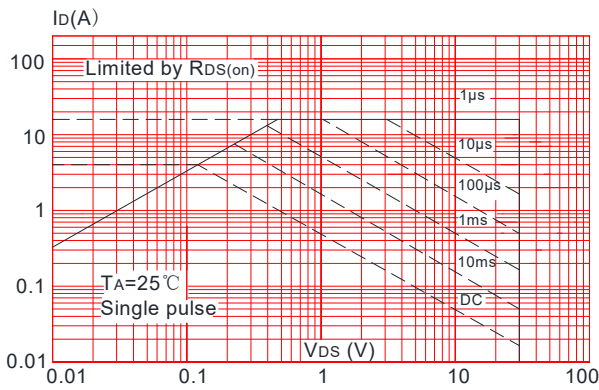


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

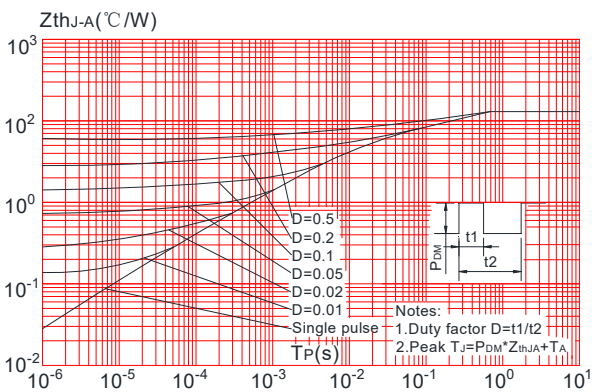


Figure 8: Normalized on Resistance vs. Junction Temperature

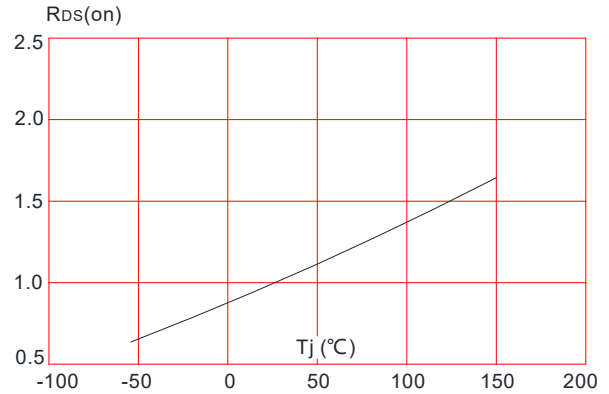
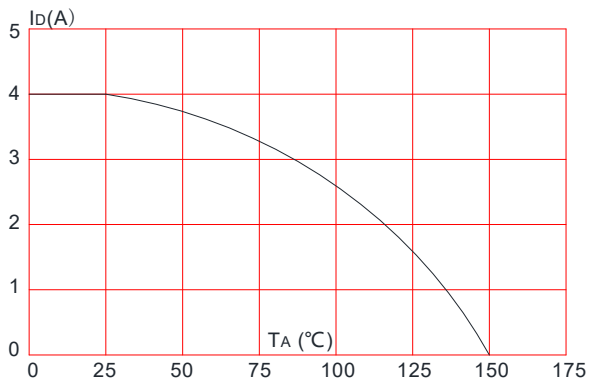
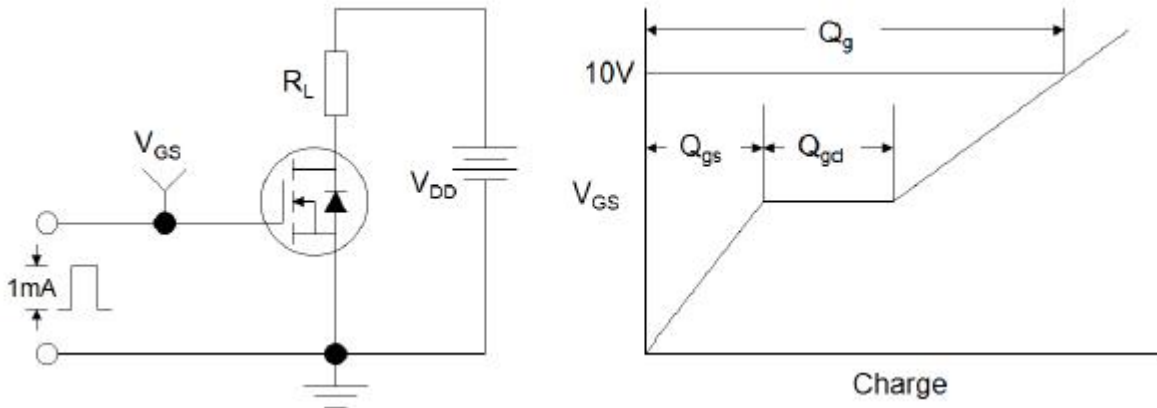


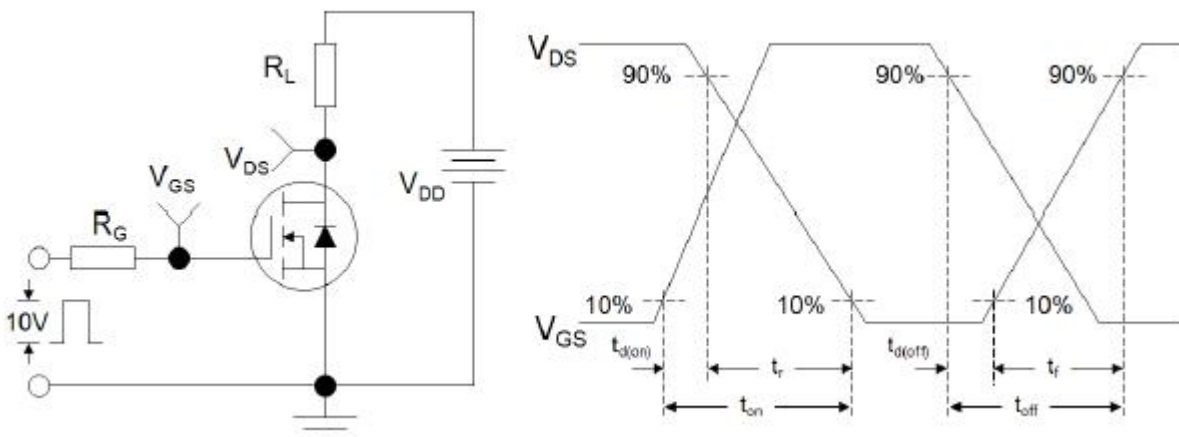
Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature



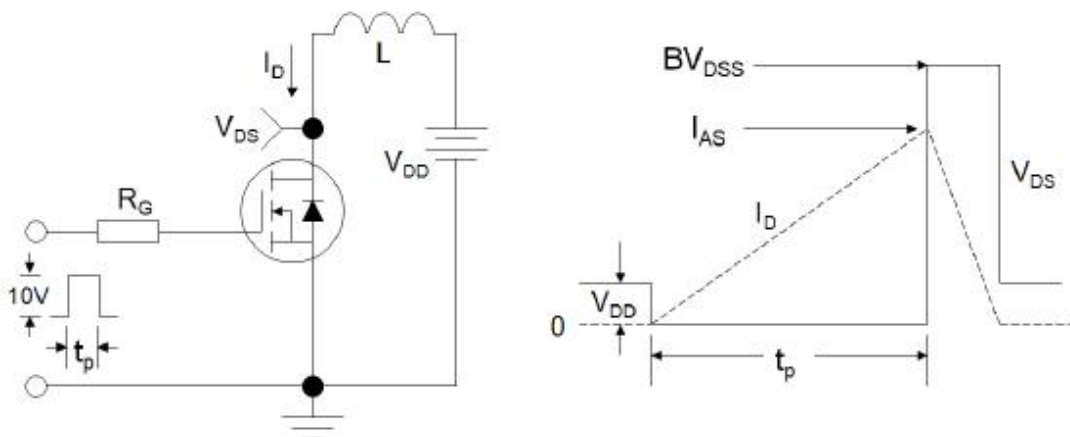
**Test Circuit**



**Figure1:Gate Charge Test Circuit & Waveform**

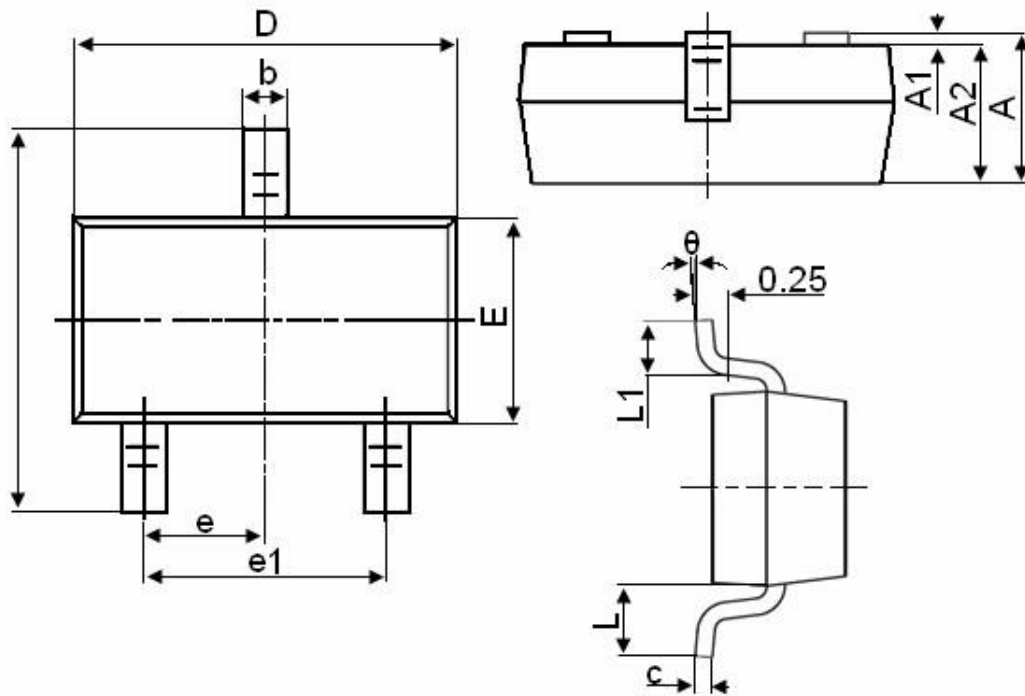


**Figure 2: Resistive Switching Test Circuit & Waveforms**



**Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms**

### Package Information: 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°