

TM2302DI

N-Channel Enhancement Mosfet

**General Description**

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

**Applications**

- Load switch
- PWM

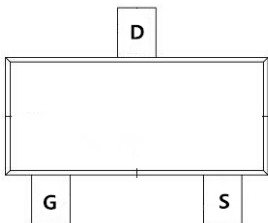
**Product Summary**

$V_{DS} = 20V$   $I_D = 3.0A$

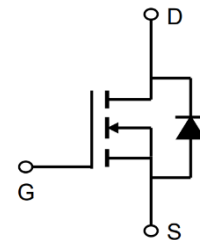
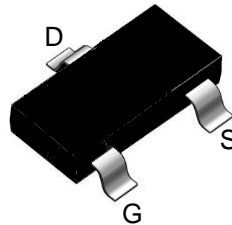
$R_{DS(ON)} = 43\text{ m}\Omega$  (Typ.) @  $V_{GS} = 4.5V$

100% UIS Tested

100%  $R_g$  Tested



I:SOT-23



Marking: A2SHB OR 03N02

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	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, $V_{GS} @ 10V^1$	1.16	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	9	A
$P_D @ T_A = 25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	0.85	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	162	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	---	$^\circ\text{C/W}$



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**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	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	0.7	1.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	$V_{GS}=4.5V, I_D=3A$	-	43	62	m $\Omega$
		$V_{GS}=2.5V, I_D=2A$	-	62	86	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=10V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	184	-	pF
$C_{oss}$	Output Capacitance		-	38	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	28	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=10V, I_D=3A,$ $V_{GS}=4.5V$	-	2.7	-	nC
$Q_{gs}$	Gate-Source Charge		-	0.4	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	0.5	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=10V, I_D=3A,$ $R_{GEN}=3\Omega, V_{GS}=4.5V$	-	8	-	ns
$t_r$	Turn-on Rise Time		-	27	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	26	-	ns
$t_f$	Turn-off Fall Time		-	33	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	3	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	12	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=3A$	-	-	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

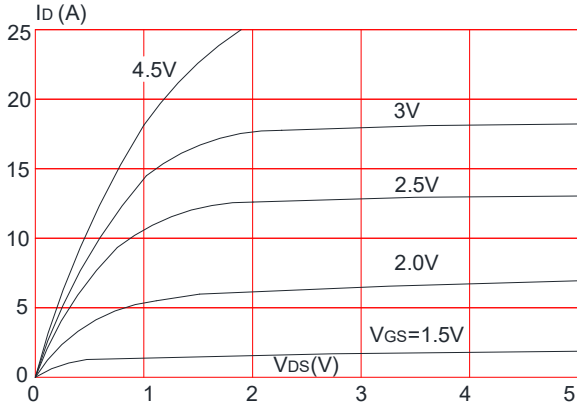


Figure 2: Typical Transfer Characteristics

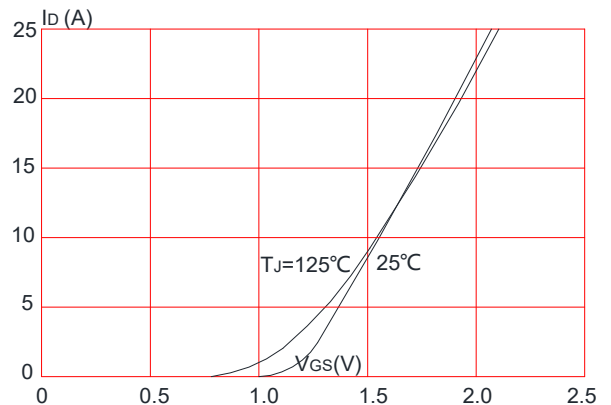


Figure 3: On-resistance vs. Drain Current

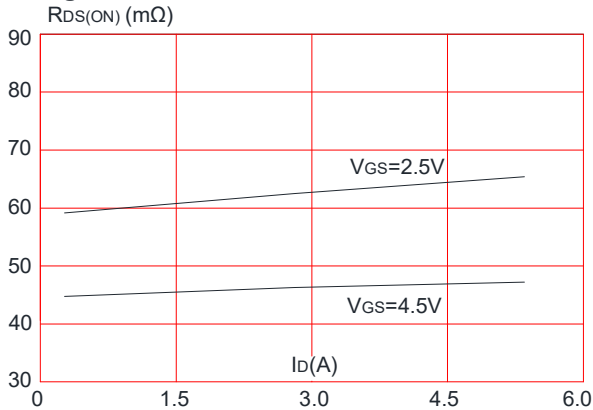


Figure 4: Body Diode Characteristics

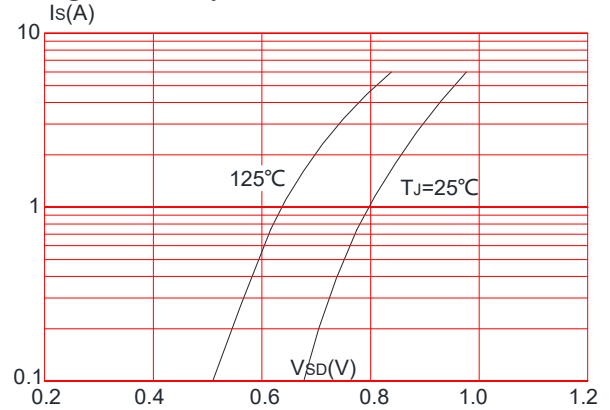


Figure 5: Gate Charge Characteristics

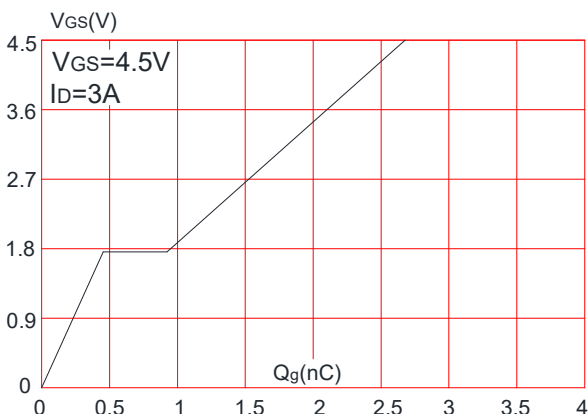
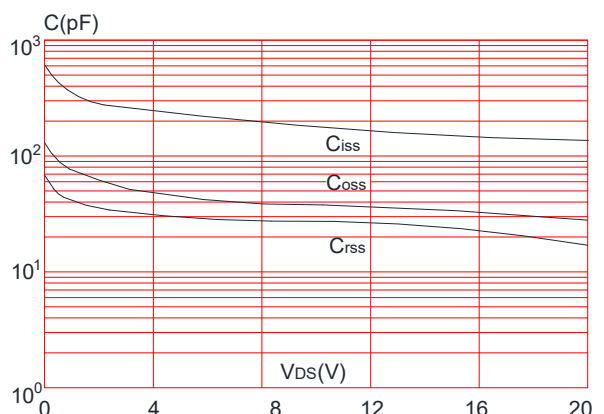


Figure 6: Capacitance Characteristics





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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

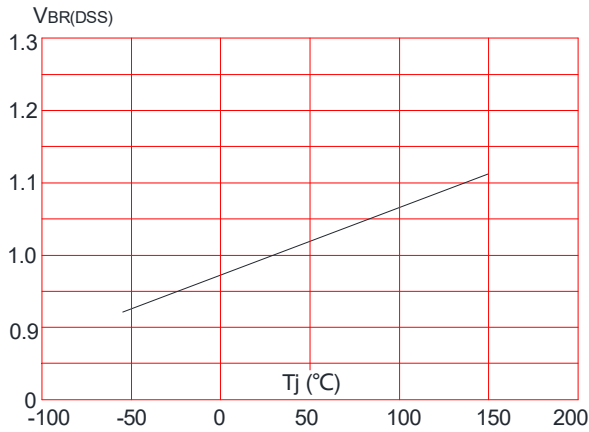


Figure 8: Normalized on Resistance vs. Junction Temperature

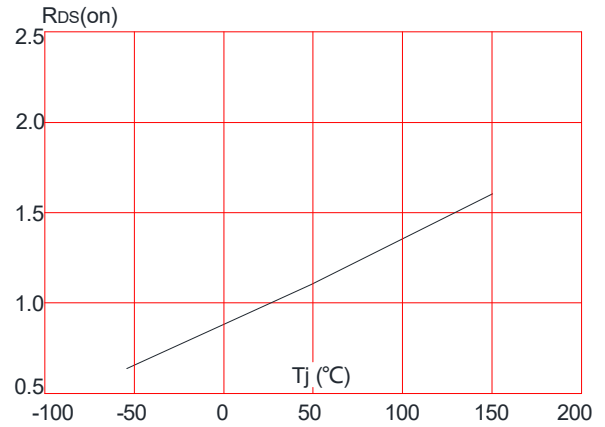


Figure 9: Maximum Safe Operating Area

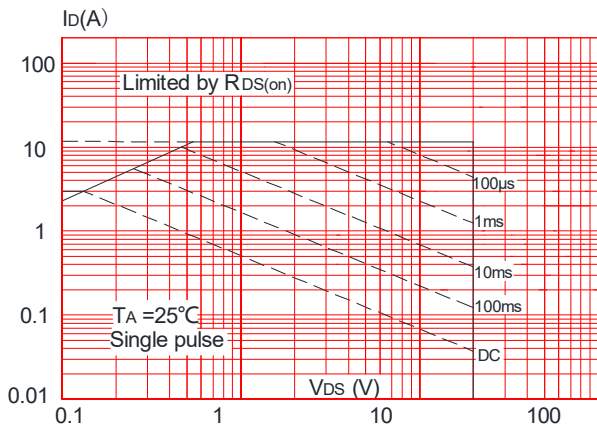


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

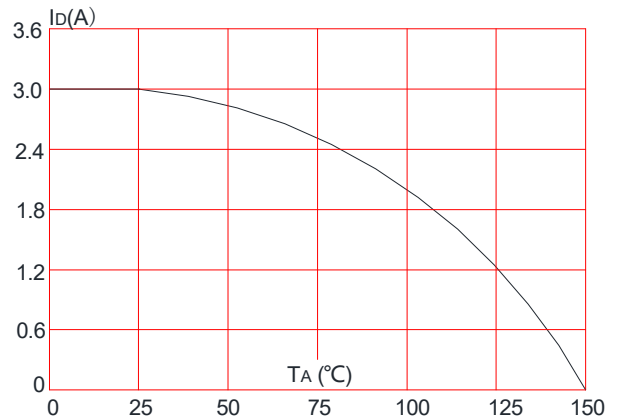
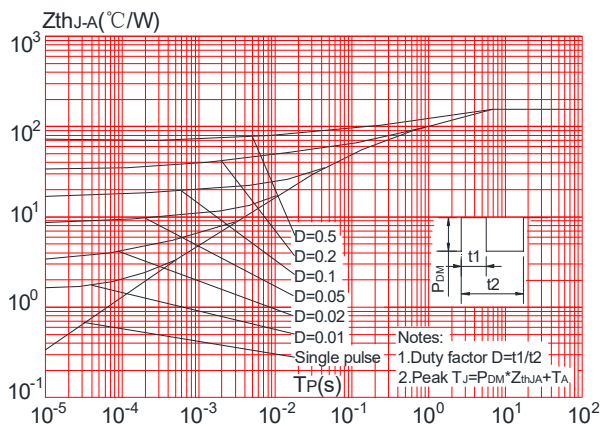
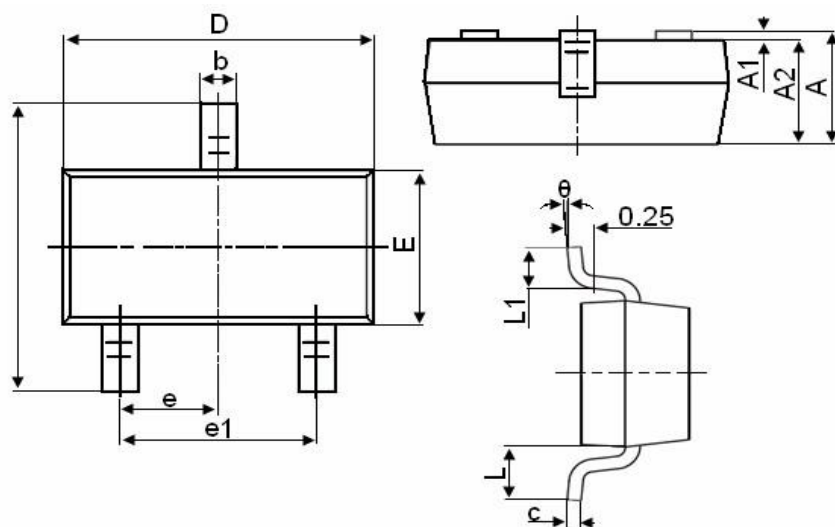


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## 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
θ	0°	8°

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