
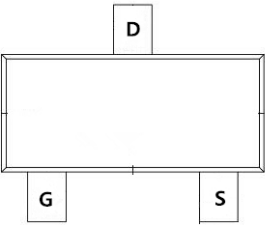


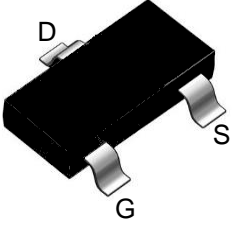
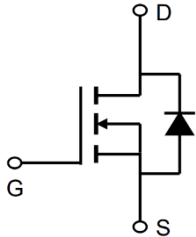
TM2302CI

N-Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>Product Summary</p> <p>$V_{DS} = 20V$ $I_D = 4.0A$</p> <p>$R_{DS(ON)} = 35\ m\Omega$ (Typ.) @ $V_{GS} = 4.5V$</p> <p>100% UIS Tested 100% R_g Tested</p> 
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I: SOT-23

Marking: A2SHB OR 04N02

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	4.0	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	1.45	A
I_{DM}	Pulsed Drain Current ²	10	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ³	1.05	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 ¹	---	112	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	---	$^\circ C/W$



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Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	20	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 20 V, V _{GS} = 0 V	--	--	1	μA
		V _{DS} = 16V, T _C = 125°C	--	--	10	μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 10V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -10 V, V _{DS} = 0 V	--	--	-100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	0.45	0.7	1.1	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 4.5 V, I _D = 3.5A	--	35	55	mΩ
		V _{GS} = 2.5 V, I _D = 2.0A	-	55	70	

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 10V, V _{GS} = 0 V, f = 1.0 MHz	--	180	-	pF
C _{oss}	Output Capacitance		--	37	-	pF
C _{rss}	Reverse Transfer Capacitance		--	34	-	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{GS} =5 V, V _{DS} =10V, I _D =3A, R _G = 6 Ω ,R _L = 2.7 Ω	--	4.5	--	ns
t _r	Turn-On Rise Time		--	31	--	ns
t _{d(off)}	Turn-Off Delay Time		--	12	--	ns
t _f	Turn-Off Fall Time		--	4.0	--	ns
Q _g	Total Gate Charge	V _{DS} = 10 V, I _D = 3A, V _{GS} = 5V	--	6.23	--	nC
Q _{gs}	Gate-Source Charge		--	6	--	nC
Q _{gd}	Gate-Drain Charge		--	0.5	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current	--	--	3.5	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	10.5	A
V _{SD}	Drain to Source Diode Forward Voltage, V _{GS} = 0V, I _{SD} = 3.5A, T _J = 25°C	--	--	1.2	V

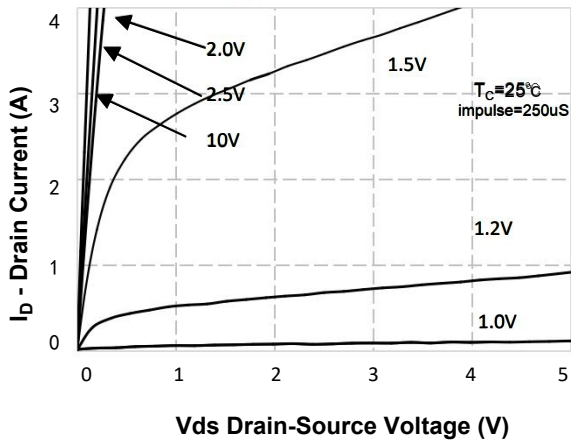
Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Device mounted on FR-4 PCB, 1inch x 0.85inch x 0.062 inch
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%

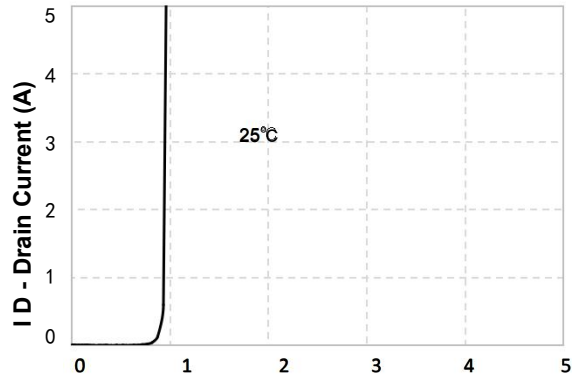


Typical Performance Characteristics

N- Channel Typical Characteristics



Vds Drain-Source Voltage (V)
 Figure 1. On-Region Characteristics



Vgs Gate-Source Voltage (V)
 Figure 2. Transfer Characteristics

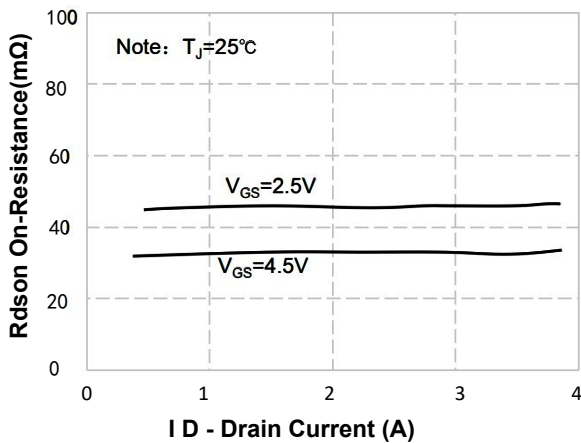


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

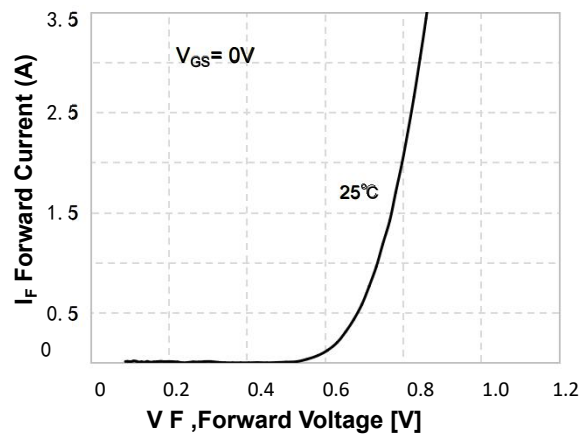


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

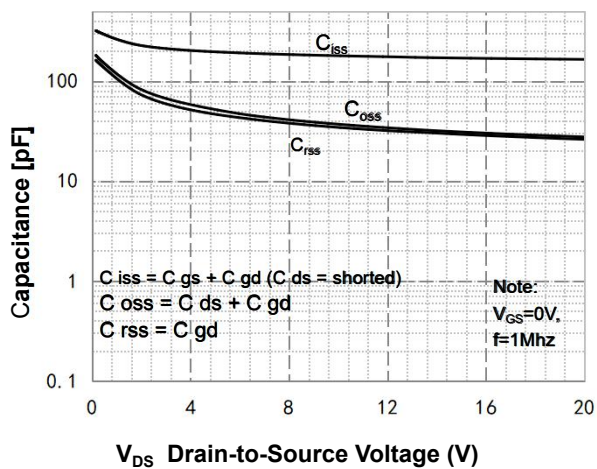


Figure 5. Capacitance Characteristics

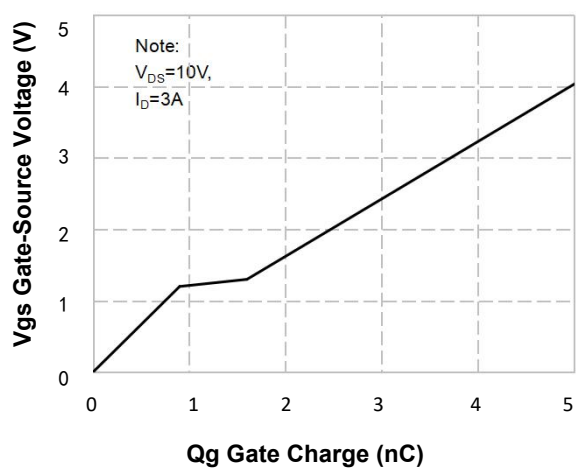


Figure 6. Gate Charge Characteristics



TM2302CI

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N- Channel Typical Characteristics (Continued)

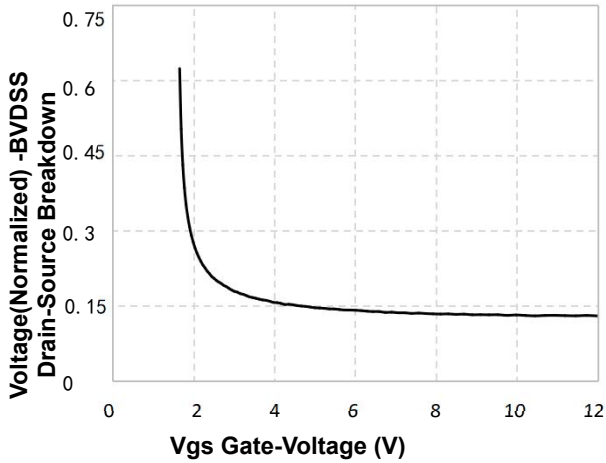


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

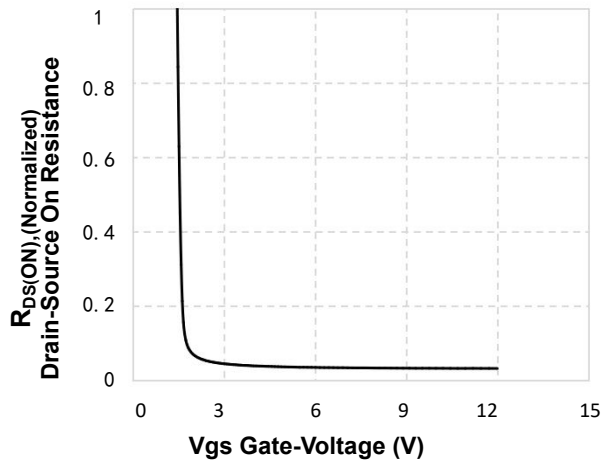


Figure 8. On-Resistance Variation vs Gate Voltage

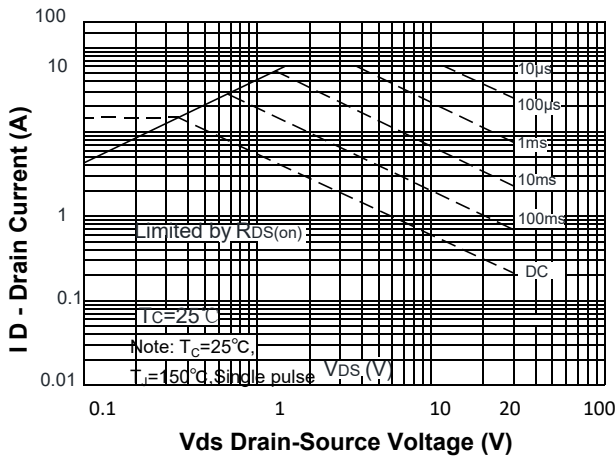


Figure 9. Maximum Safe Operating Area

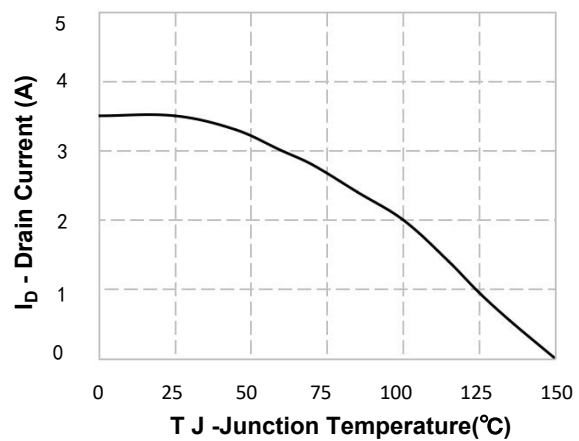


Figure 10. Maximum PContinuous Drain Current vs Case Temperature

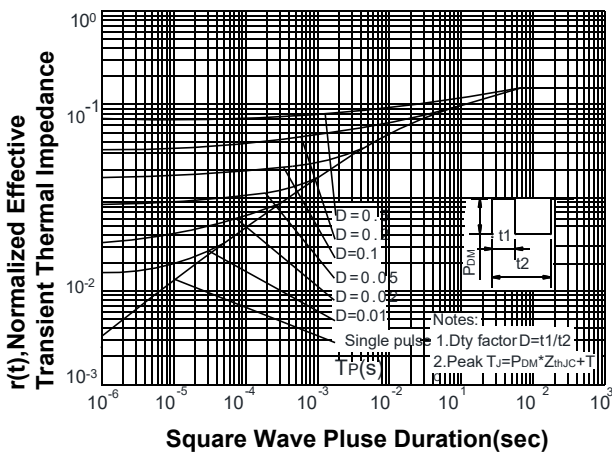
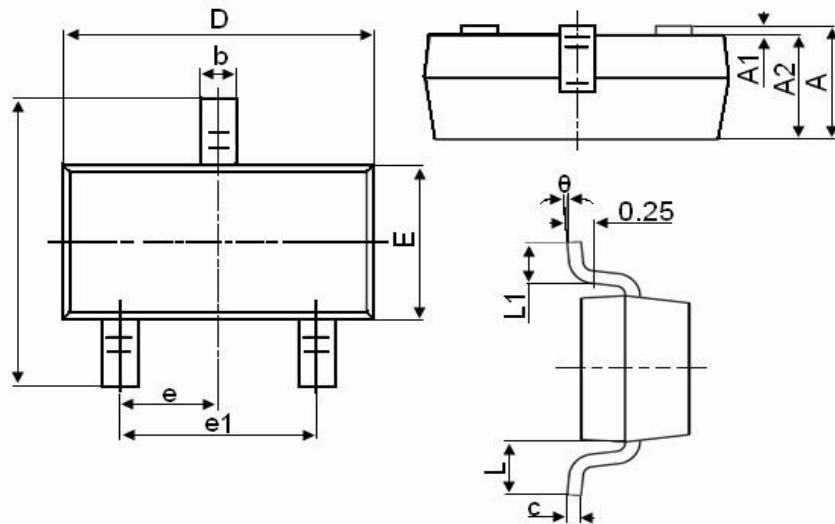


Figure 11. Transient Thermal Response Curve

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°