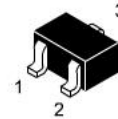


WPM2301

Single P-Channel, -20 V, -2A, Power Mosfet

Description

The WPM2301 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion applications. Standard Product WPM2301 is Pb-free.

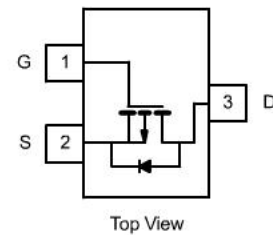

SOT 23

Features

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
-20 V	90 m Ω @ -4.5 V	-2 A
	120 m Ω @ -2.5 V	

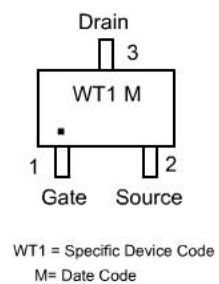
Application

- Li-Ion Battery Charging
- High Side DC-DC Conversion Circuits
- High Side Drive for Small Brushless DC Motors
- Power Management in Portable, Battery Powered Products

P-Channel MOSFET


Absolute Maximum Ratings (TA=25°C unless otherwise specified)

Parameter	Symbol	Value	Units
V_{DS}	Drain-Source voltage	-20	V
V_{GS}	Gate-Source Voltage	±8	V
I_D	Continuous Drain Current ^A	Steady-State TA=25°C	-1.75
		Steady-State TA=70°C	-1.4
		t ≤ 5s TA=25°C	-2.0
I_{DM}	Pulse Drain Current ^A	10	A
P_D	Power Dissipation ^B	TA=25°C	0.7
		TA=70°C	0.45
T_J	Operating Junction Temperature Range	-55~150	°C
T_{stg}	Storage Temperature Range		



Order information

Part Number	Package	Shipping
WPM2301-3/TR	SOT23	3000Tape&Reel

Electrical Characteristics

OFF

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Voltage	$I_D = -250\mu A, V_{GS} = 0V$	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16V, V_{GS} = 0V$			-1	μA
					-5	μA
I_{GSS}	Gate-body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 8V$			± 100	nA

ON

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.5	-0.7	-0.9	V
$R_{DS(on)}$	Static Drain-Source On resistance	$V_{GS} = -4.5V, I_D = -2.2A$		90	105	m Ω
		$V_{GS} = -2.5V, I_D = -1.7A$		120	140	m Ω
		$V_{GS} = -1.8V, I_D = -1.5A$		170	200	m Ω

Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
g_{FS}	Transconductance	$V_{DS} = -10V, I_D = -1.7A$	4	6		S
C_{iss}	Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V, f = 1MHz$		200	300	pF
C_{oss}	Output Capacitance			90	140	pF
C_{rss}	Reverse Transfer Capacitance			40	60	pF
R_g	Gate Resistance	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		12		Ω

Switching

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge	$V_{GS} = -4.5V, I_D = -2.2A, V_{DS} = -10V$		4		nC
Q_{gs}	Gate Source Charge			0.5		nC
Q_{gd}	Gate Drain Charge			1		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -4.5V, V_{DD} = -16V, I_D = -2.2A, R_{GEN} = 2.5\Omega$		8		ns
t_r	Turn-On Rise Time			15		ns
$t_{D(off)}$	Turn-Off Delay Time			35		ns
t_f	Turn-Off Fall Time			25		ns

Source Drain Diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	$I_S = -1A, V_{GS} = 0V$		-0.79	-1	V
I_S	Maximum Body-diode Continuous Current				-2	A
t_{rr}	Body-diode Reverse Recovery Time	$I_S = -2.1A, di/dt = 100A/\mu s$		30		ns
Q_{rr}	Body-diode Reverse Recovery Charge			12		nC

Thermal Characteristic

Symbol	Parameter	Typ.	Max.	Unit.	
R _{θJA}	Junction to Ambient ^A	t ≤ 5μs	115	140	°C/W
		Steady-State	140	175	°C/W
R _{θJL}	Junction to Lead ^C	Steady-State	45	62.5	°C/W

A: Pulse width limited by maximum junction temperature.
 B: Surface Mounted on FR4 Board.

Typical Performance Characteristics

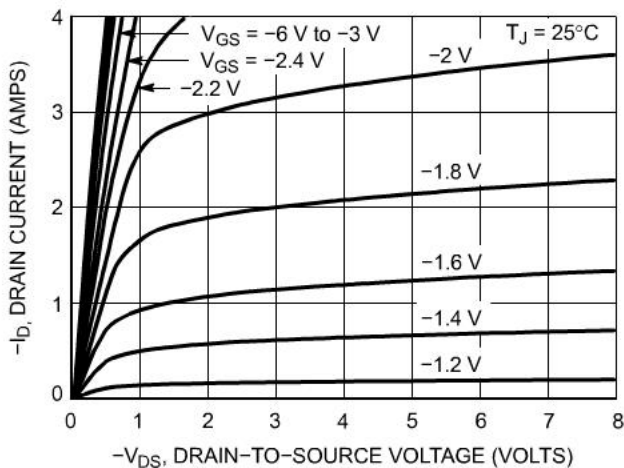


Figure 1. On-Region Characteristics

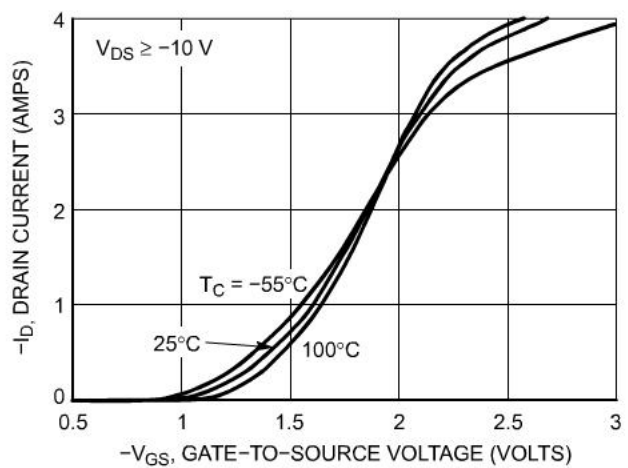


Figure 2. Transfer Characteristics

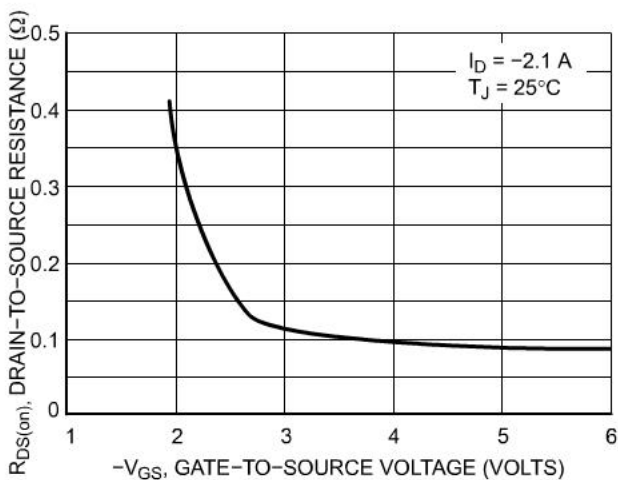


Figure 3. On-Resistance vs. Gate-to-Source Voltage

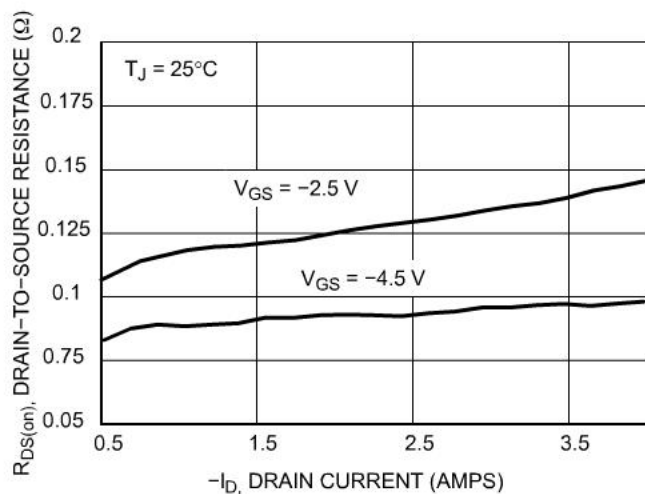


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

Typical Performance Characteristics

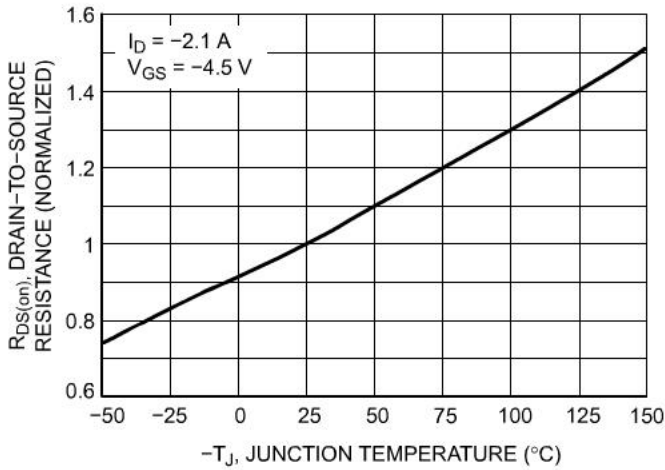


Figure 5. On-Resistance Variation with Temperature

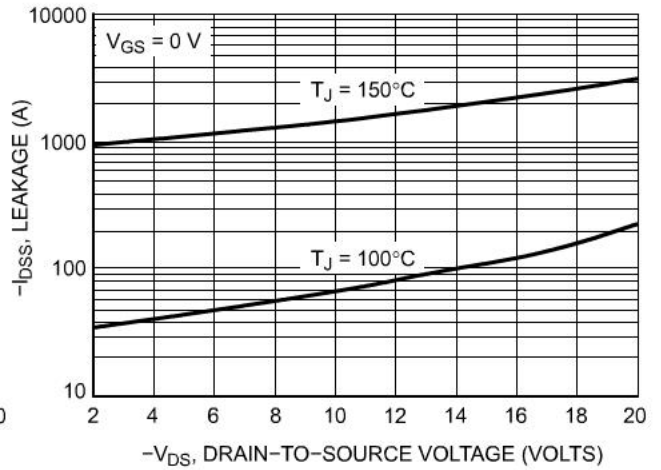


Figure 6. Drain-to-Source Leakage Current vs. Voltage

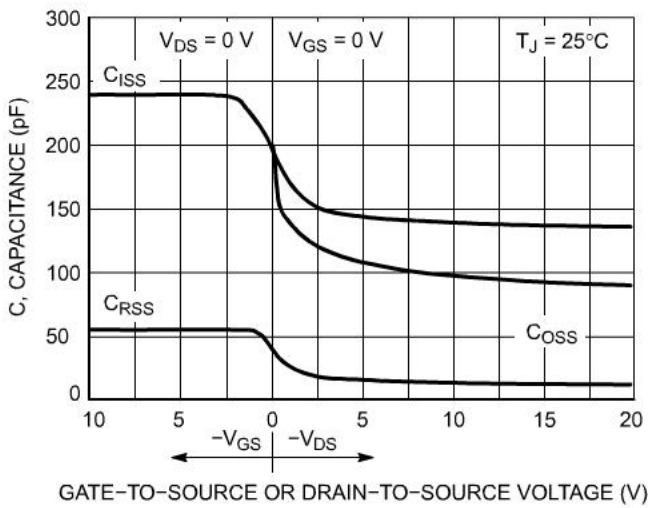


Figure 7. Capacitance Variation

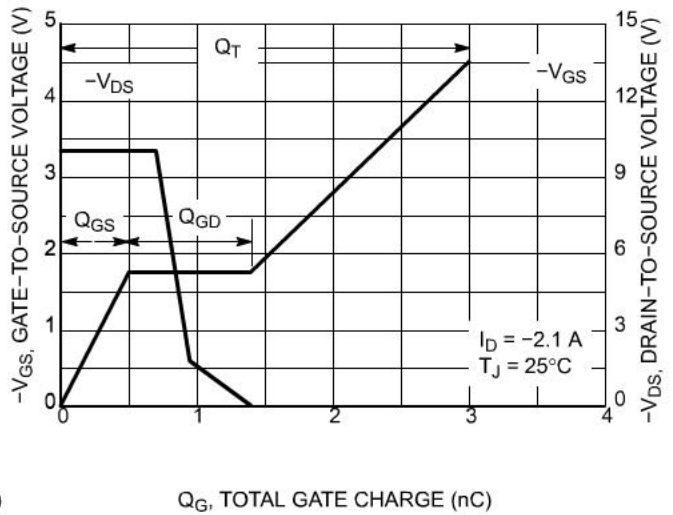


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

Typical Performance Characteristics

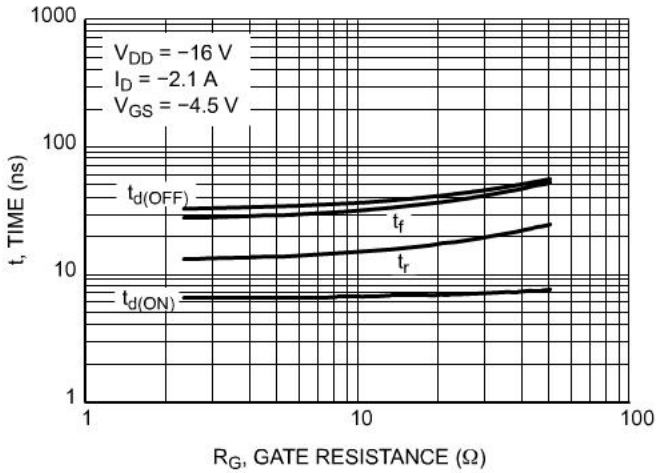


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

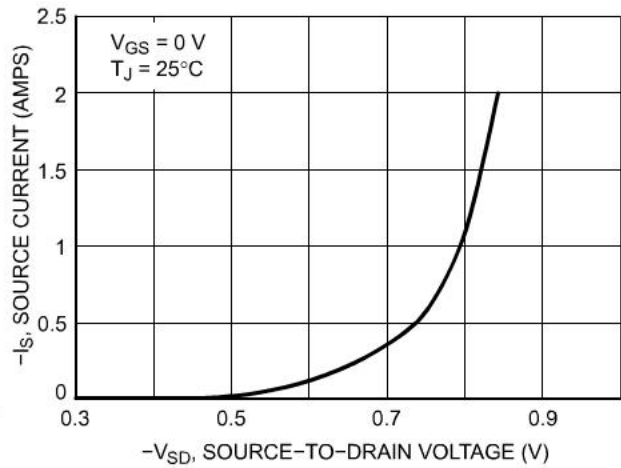


Figure 10. Diode Forward Voltage vs. Current

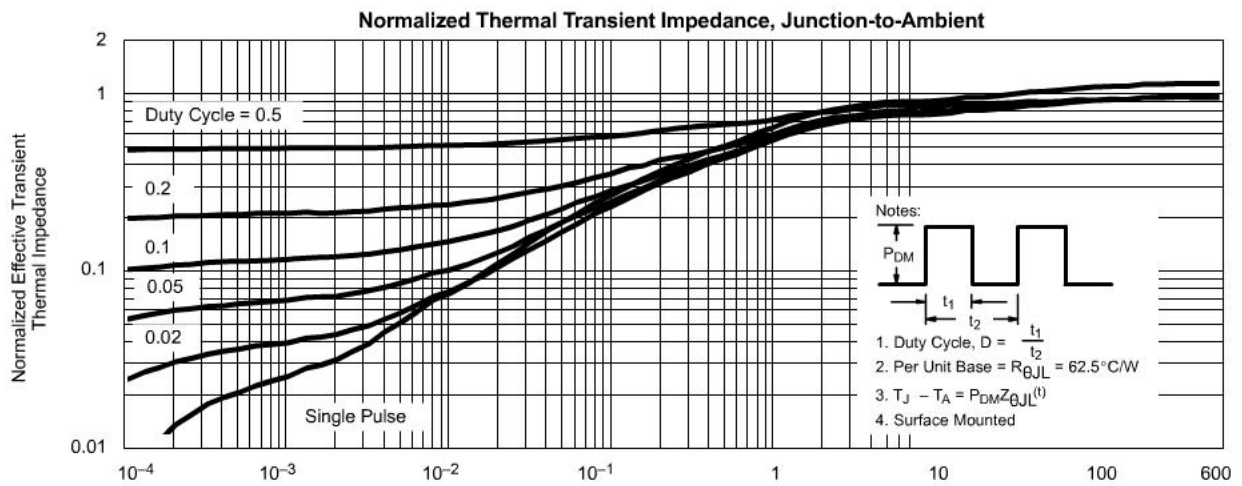
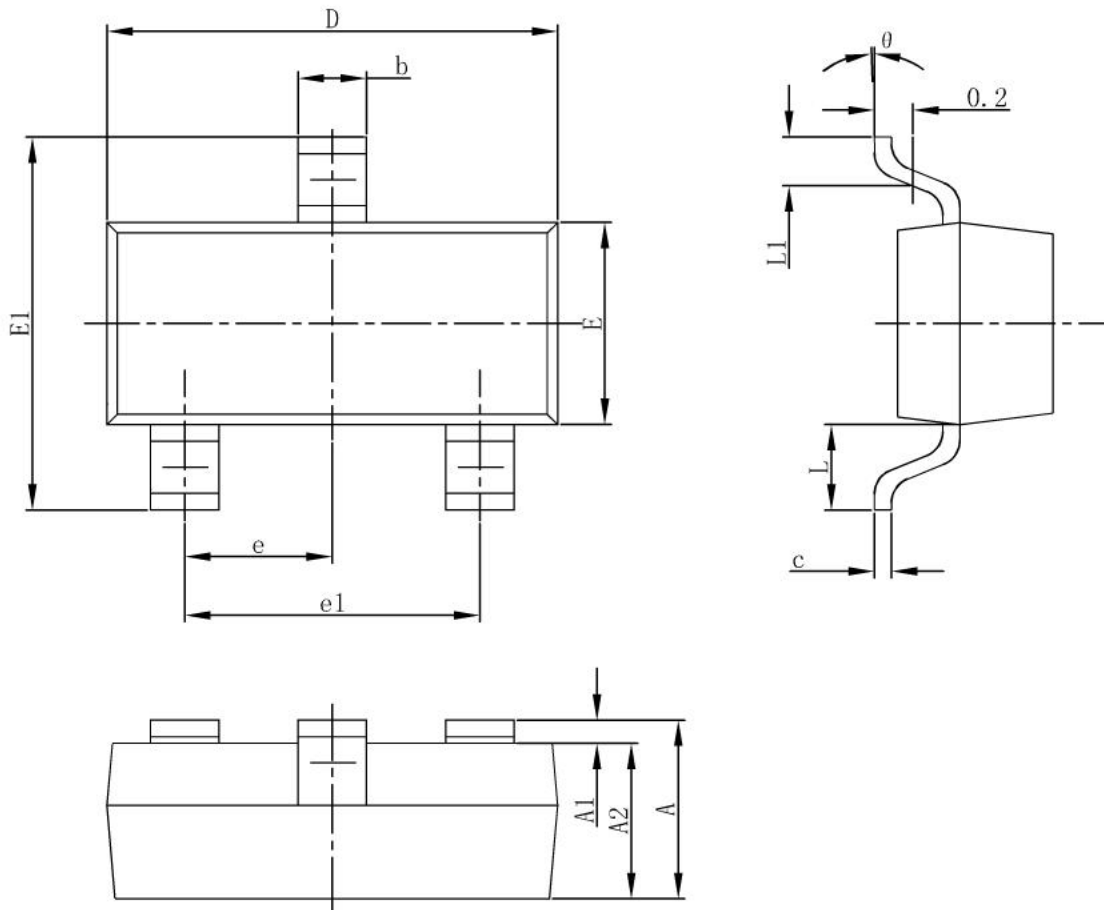


Figure 11. Thermal Response

Packaging Information

SOT23 Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.047
A1	0.000	0.100	0.000	0.004
A2	0.900	1.100	0.035	0.043
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°