

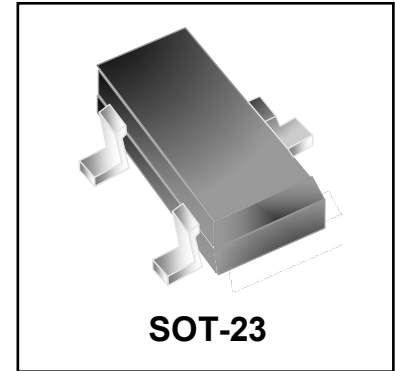
## P-Channel Enhancement MOSFET

### Features

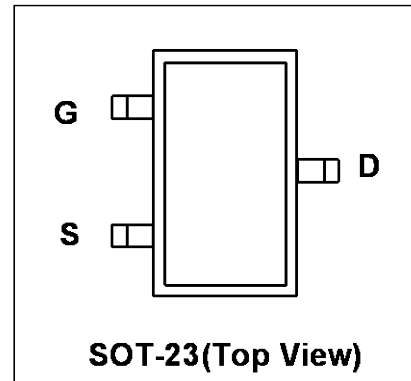
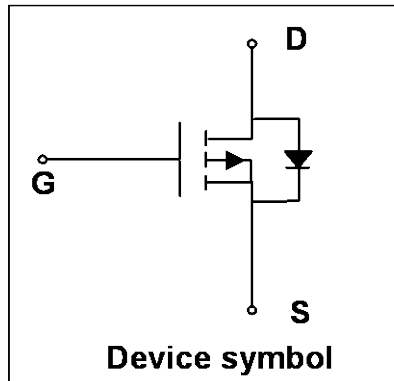
- Way-on Small Signal MOSFETs
- $V_{DS} = -20\text{ V}$ ,  $I_D = -4.1\text{ A}$   
 $R_{DS(on)} < 45\text{ m}\Omega$  @  $V_{GS} = -4.5\text{ V}$   
 $R_{DS(on)} < 57\text{ m}\Omega$  @  $V_{GS} = -2.5\text{ V}$
- Trench LV MOSFET Technology

### Mechanical Characteristics

- SOT-23 Package
- Marking : Making Code
- RoHS Compliant



### Schematic & PIN Configuration



### Absolute Maximum Rating ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current	$I_D$	-4.1	A
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	-13	A
Power Dissipation	$P_D$	1.2	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Ambient <sup>2</sup>	$R_{\theta JA}$	104	$^\circ\text{C/W}$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-20	-	-	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±12V	-	-	±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V	-	-	-1	μA
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-0.3	-0.7	-1	V
Drain-Source on-Resistance <sup>3</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A	-	32	45	mΩ
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -4A	-	41	57	
		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2A	-	55	92	
<b>Dynamic Characteristics<sup>4</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -10V, f= 1.0MHz	-	751	-	pF
Output Capacitance	C <sub>oss</sub>		-	97	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	80	-	
<b>Switching Characteristics<sup>4</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -4A	-	9.3	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	2.2	-	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 2.5Ω, R <sub>GEN</sub> = 3Ω,	-	13	-	ns
Rise time	t <sub>r</sub>		-	9	-	
Turn-off Delay Time	t <sub>d(off)</sub>		-	19	-	
Fall Time	t <sub>f</sub>		-	29	-	
<b>Source-Drain Diode Characteristics</b>						
Body Diode Voltage <sup>3</sup>	V <sub>SD</sub>	I <sub>S</sub> = -1A, V <sub>GS</sub> = 0V	-	-	-1	V
Continuous Source Current	I <sub>S</sub>		-	-	-4.1	A

**Notes:**

1. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
2. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
3. Pulse Test: Pulse width≤300μs, duty cycle≤2%.
4. This value is guaranteed by design hence it is not included in the production test.

### Typical Characteristics

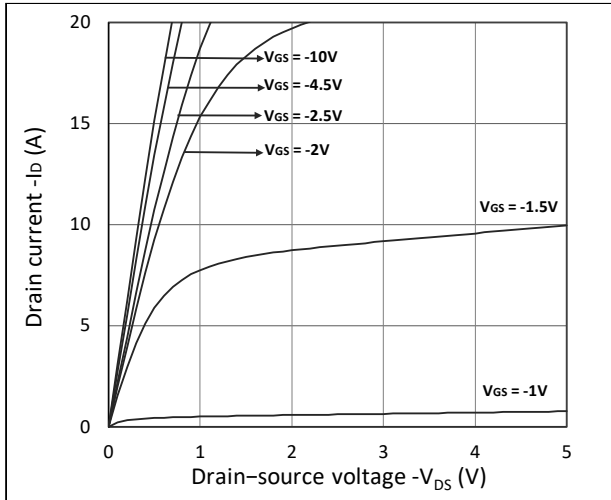


Figure 1. Output Characteristics

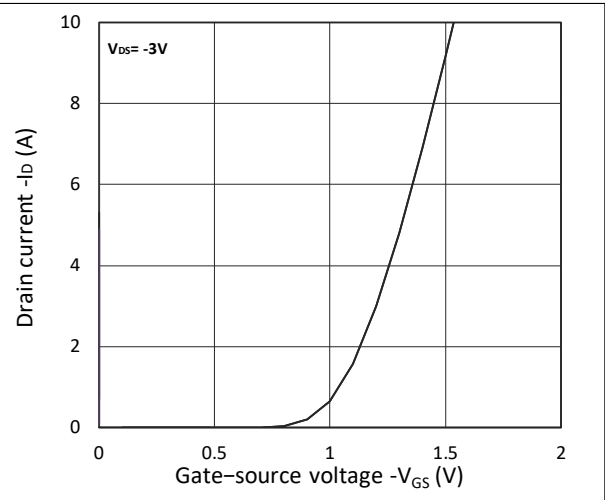


Figure 2. Transfer Characteristics

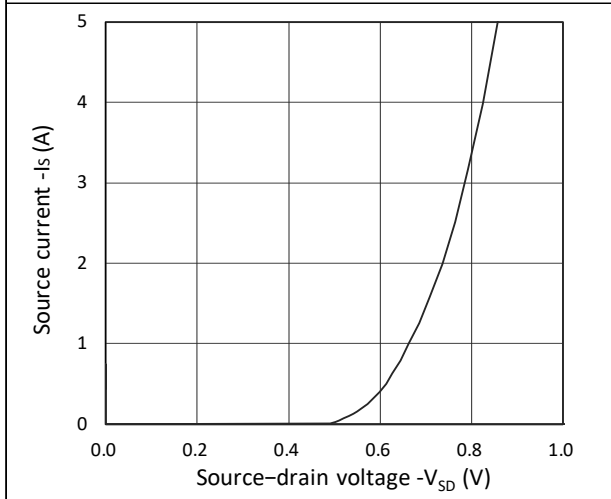


Figure 3. Forward Characteristics of Reverse

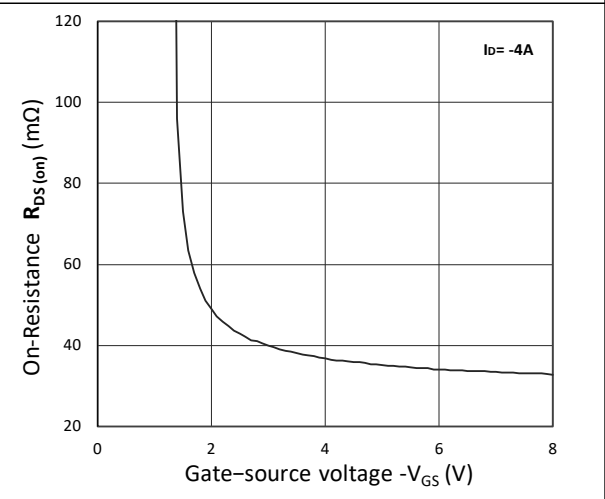


Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$

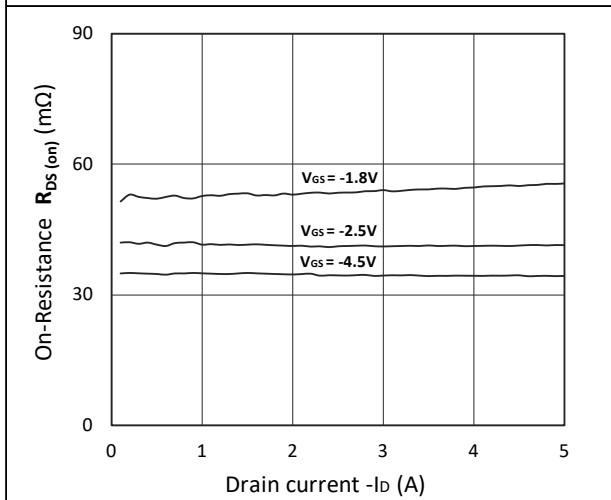


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

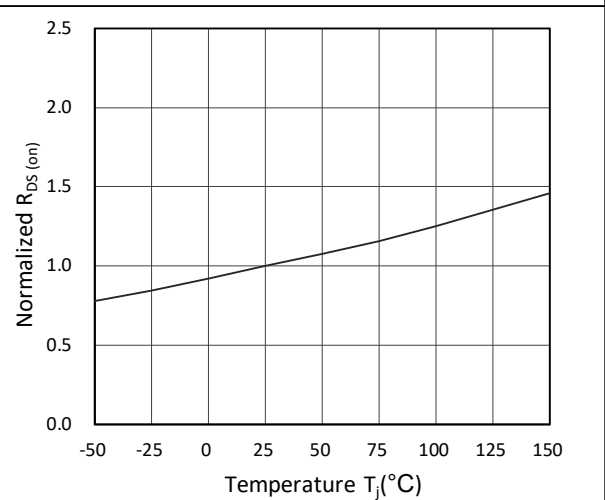


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

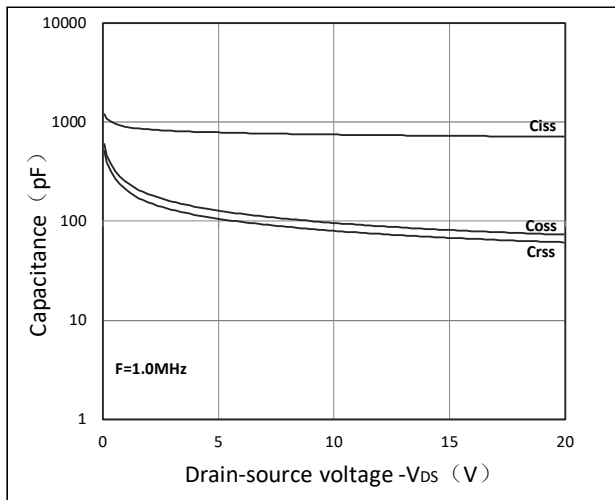


Figure 7. Capacitance Characteristics

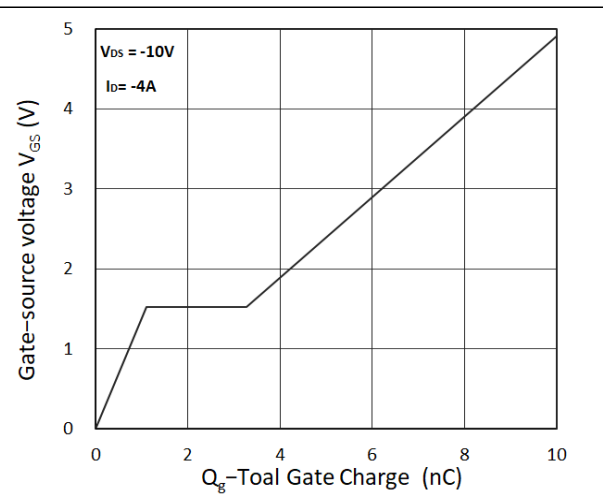


Figure 8. Gate Charge Characteristics

## Outline Drawing – SOT-23

### PACKAGE OUTLINE

**SOT-23**

DIMENSIONS				
SYMBOL	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
b	0.30	0.50	0.012	0.020
c	0.08	0.15	0.003	0.006
D	2.80	3.00	0.110	0.118
E	2.25	2.55	0.089	0.100
E1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.037BSC	
e1	1.80	2.00	0.071	0.079
L	0.55REF		0.022REF	
$\theta$	0°	8°	0°	8°

DIMENSIONS		
DIM	INCHES	MILLIMETERS
M	0.080	2.02
C	0.032	0.80
Z	0.111	2.82
e	0.037 BSC	0.95 BSC
e1	0.075 BSC	1.90 BSC
b	0.032	0.80

**Notes**

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Pin 3 is the cathode (Unidirectional Only).
4. Dimensions are exclusive of mold flash and metal burrs.

### Marking Codes

Part Number	WM02P41M
Marking Code	

### Package Information

Qty: 3k/Reel

### CONTACT INFORMATION

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For additional information, please contact your local Sales Representative.

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Specifications are subject to change without notice.  
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.  
Users should verify actual device performance in their specific applications.