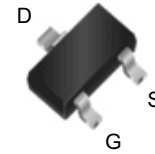


**WPM2019**
**Single P-Channel, -20V, -0.73A, Power MOSFET**
[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

$V_{DS}$ (V)	$R_{ds(on)}$ ( $\Omega$ )
-20	0.480@ $V_{GS} = -4.5V$
	0.620@ $V_{GS} = -2.5V$
	0.780@ $V_{GS} = -1.8V$


**SOT-523**
**Descriptions**

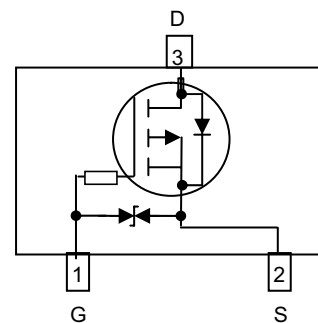
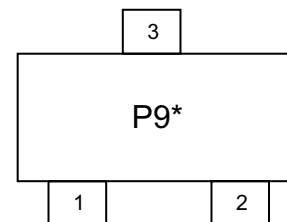
The WPM2019 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM2019 is Pb-free and Halogen-free.

**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package SOT-523

**Applications**

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging


**Pin configuration (Top view)**


P9 =Device Code  
\* = Month(A~Z)

**Marking**
**Order information**

Device	Package	Shipping
WPM2019-3/TR	SOT-523	3000/Reel&Tape

**Absolute Maximum ratings**

Parameter		Symbol	10 S	Steady State	Unit
Drain-Source Voltage		$V_{DS}$	-20		V
Gate-Source Voltage		$V_{GS}$	±5		
Continuous Drain Current <sup>a</sup>	$T_A=25^{\circ}\text{C}$	$I_D$	-0.73	-0.62	A
	$T_A=70^{\circ}\text{C}$		-0.58	-0.50	
Maximum Power Dissipation <sup>a</sup>	$T_A=25^{\circ}\text{C}$	$P_D$	0.38	0.28	W
	$T_A=70^{\circ}\text{C}$		0.24	0.18	
Continuous Drain Current <sup>b</sup>	$T_A=25^{\circ}\text{C}$	$I_D$	-0.61	-0.55	A
	$T_A=70^{\circ}\text{C}$		-0.49	-0.44	
Maximum Power Dissipation <sup>b</sup>	$T_A=25^{\circ}\text{C}$	$P_D$	0.27	0.22	W
	$T_A=70^{\circ}\text{C}$		0.17	0.14	
Pulsed Drain Current <sup>c</sup>		$I_{DM}$	-1.2		A
Operating Junction Temperature		$T_J$	150		°C
Lead Temperature		$T_L$	260		°C
Storage Temperature Range		$T_{stg}$	-55 to 150		°C

**Thermal resistance ratings**

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	285	325	°C/W
	Steady State		355	440	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	395	460	
	Steady State		465	560	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	280	320	

a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

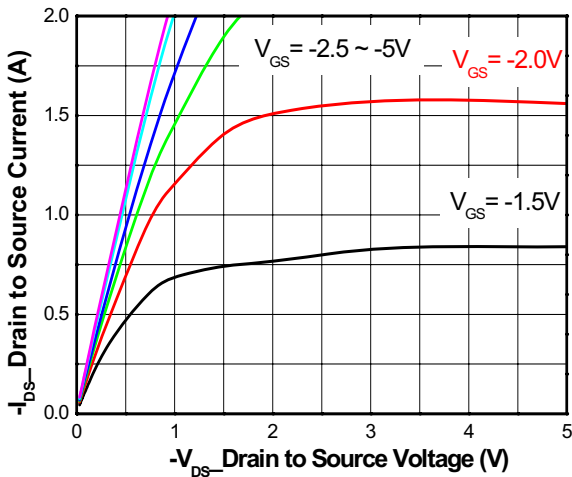
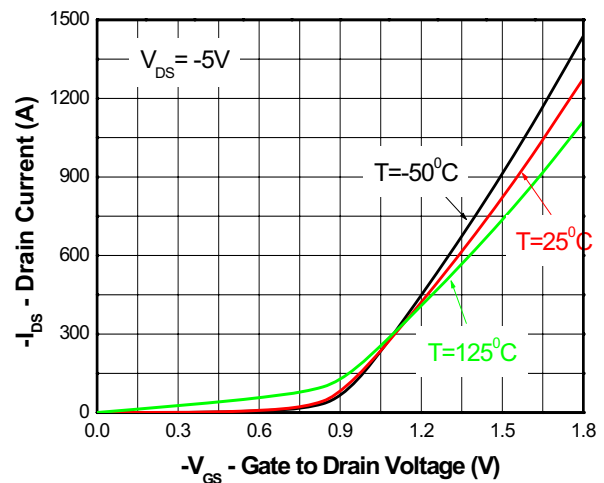
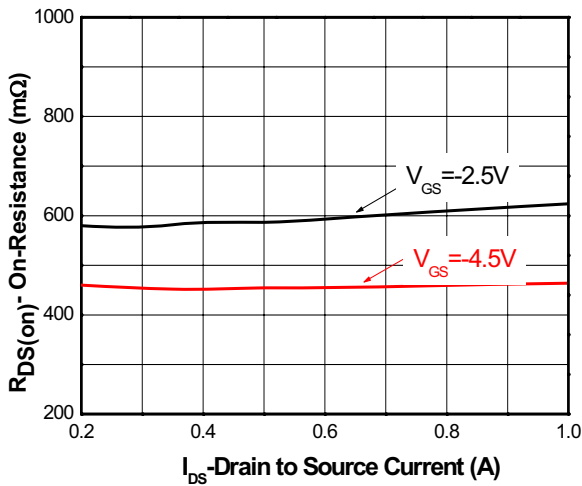
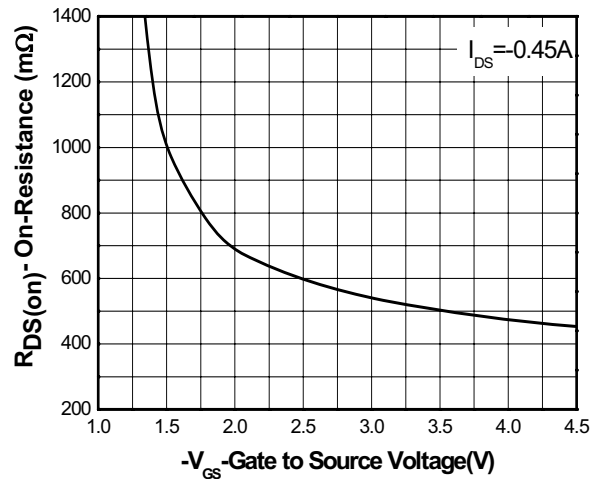
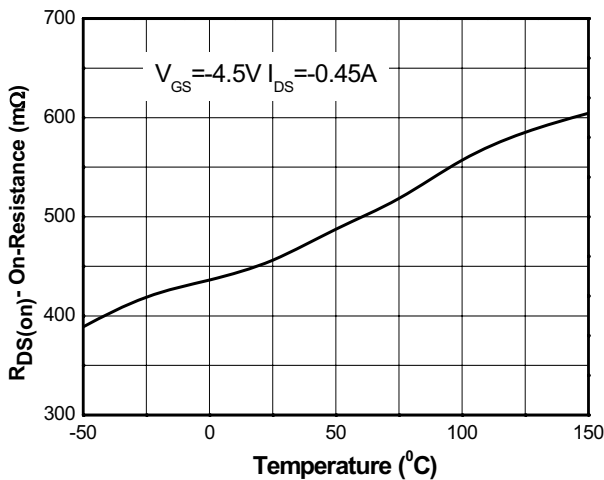
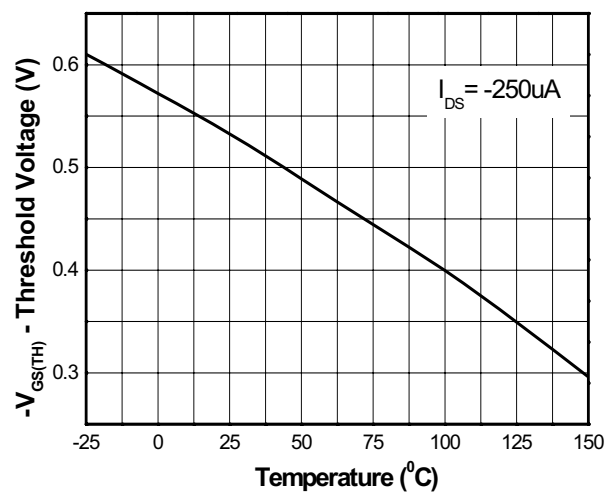
b Surface mounted on FR4 board using minimum pad size, 1oz copper

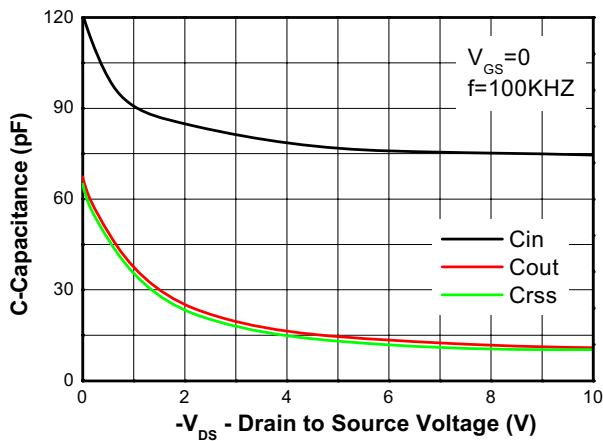
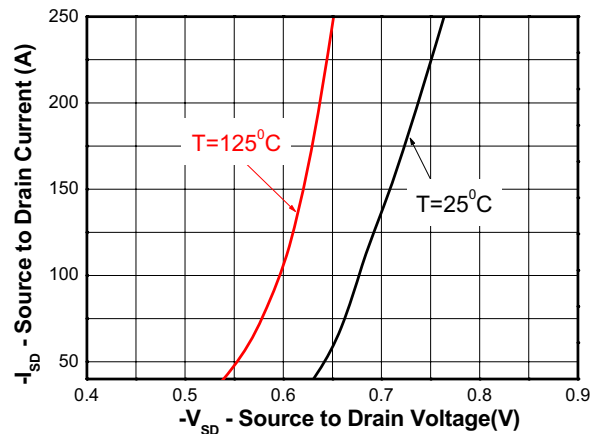
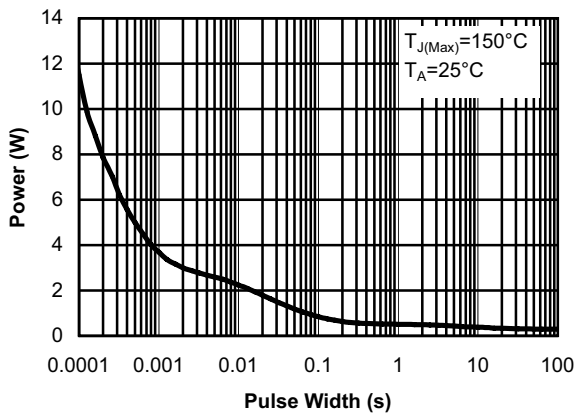
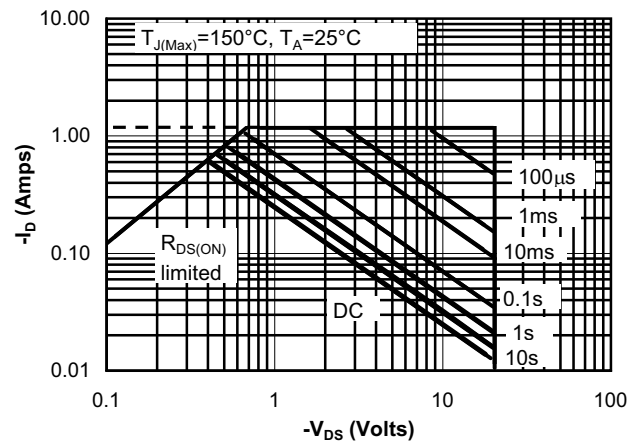
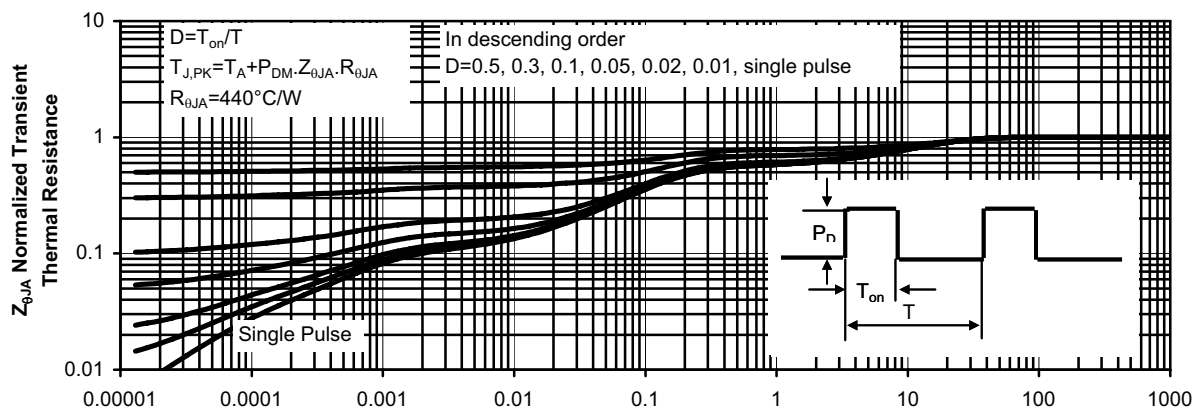
c Repetitive rating, pulse width limited by junction temperature,  $t_p=10\mu\text{s}$ , Duty Cycle=1%

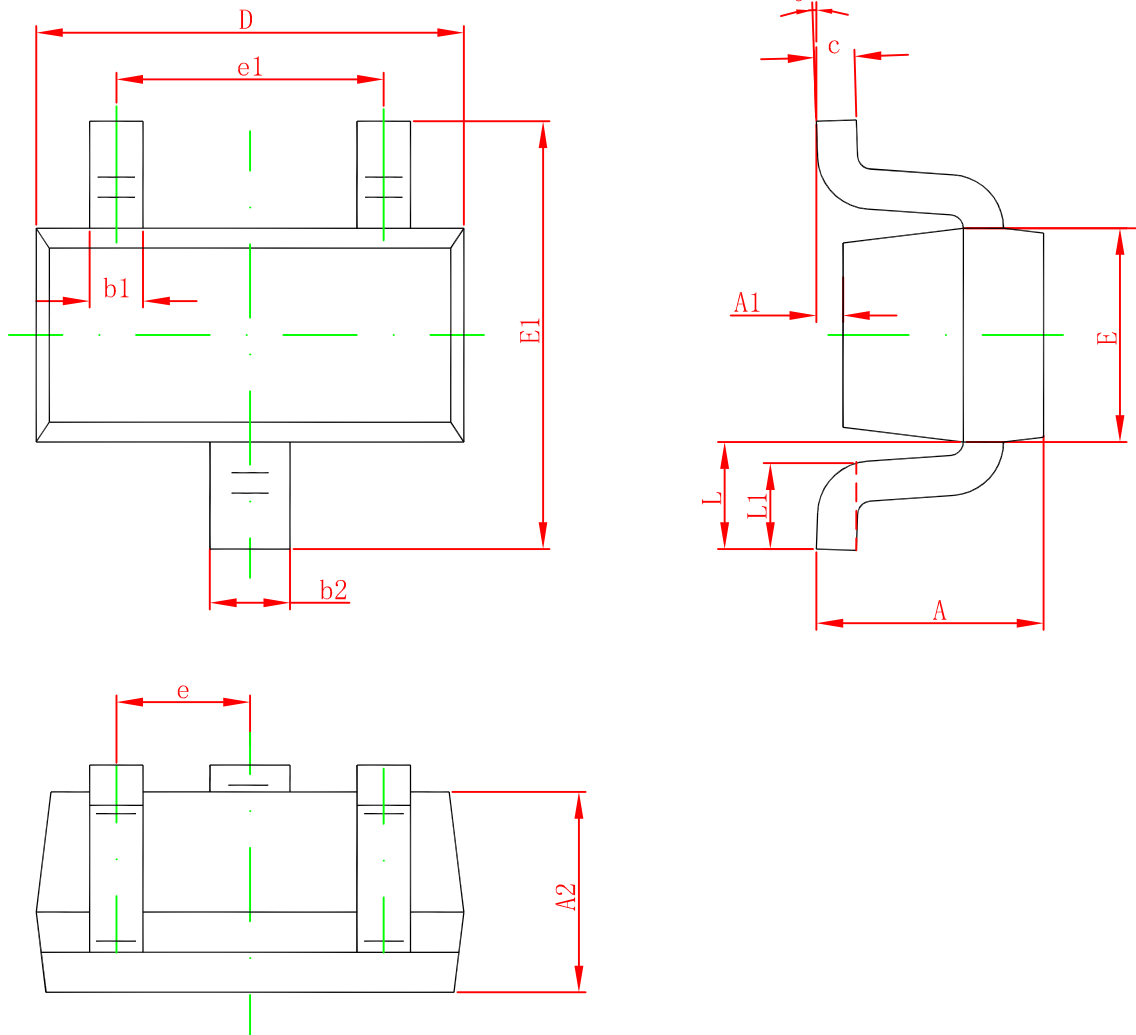
d Repetitive rating, pulse width limited by junction temperature  $T_J=150^{\circ}\text{C}$ .

**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			-5	$\mu\text{A}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-0.40	-0.65	-0.90	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -0.45\text{ A}$		480	810	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -0.35\text{ A}$		620	1050	
		$V_{GS} = -1.8\text{ V}, I_D = -0.25\text{ A}$		780	1300	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5\text{ V}, I_D = -0.45\text{ A}$		1.25		S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 100\text{ KHz}, V_{DS} = -10\text{ V}$		74.5		pF
Output Capacitance	$C_{OSS}$			10.8		
Reverse Transfer Capacitance	$C_{RSS}$			10.2		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V}, I_D = -0.45\text{ A}$		1.8		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.12		
Gate-to-Source Charge	$Q_{GS}$			0.18		
Gate-to-Drain Charge	$Q_{GD}$			0.74		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_d(ON)$	$V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V}, I_D = -0.45\text{ A}, R_G = 6\ \Omega$		45		ns
Rise Time	$t_r$			140		
Turn-Off Delay Time	$t_d(OFF)$			1500		
Fall Time	$t_f$			2100		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -0.15\text{ A}$	-0.50	-0.65	-1.50	V

**Typical Characteristics (Ta=25°C, unless otherwise noted)**

**Output characteristics**

**Transfer characteristics**

**On-Resistance vs. Drain current**

**On-Resistance vs. Gate-to-Source voltage**

**On-Resistance vs. Junction temperature**

**Threshold voltage vs. Temperature**


**Capacitance**

**Body diode forward voltage**

**Single pulse power**

**Safe operating power**

**Transient thermal response (Junction-to-Ambient)**

**Package outline dimensions**
**SOT-523**


Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.700	0.800	0.900
A1	0.000	0.050	0.100
A2	0.700	0.750	0.800
b1	0.150	0.200	0.250
b2	0.250	0.300	0.350
c	0.100	0.150	0.200
D	1.500	1.600	1.700
E	0.700	0.800	0.900
E1	1.450	1.600	1.750
e	0.500TYP		
e1	0.900	1.000	1.100
L	0.400REF		
L1	0.260		0.460
θ	0°		8°