

Single P-Channel, -20V, -0.73A, Power MOSFET

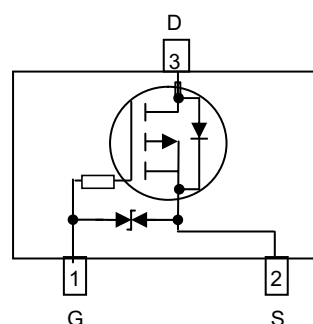
| V _{DS} (V) | R _{ds(on)} (Ω) |
|---------------------|---------------------------------|
| -20 | 0.480@ V _{GS} = - 4.5V |
| | 0.620@ V _{GS} = - 2.5V |
| | 0.780@ V _{GS} = - 1.8V |



SOT-523

Descriptions

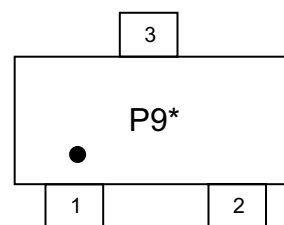
The WPM2019 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS (ON)} with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM2019 is Pb-free.



Pin configuration (Top view)

Features

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



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

Marking

Applications

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

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 ^a | $T_A=25^{\circ}\text{C}$ | I_D | -0.73 | -0.62 | A |
| | $T_A=70^{\circ}\text{C}$ | | -0.58 | -0.50 | |
| Maximum Power Dissipation ^a | $T_A=25^{\circ}\text{C}$ | P_D | 0.38 | 0.28 | W |
| | $T_A=70^{\circ}\text{C}$ | | 0.24 | 0.18 | |
| Continuous Drain Current ^b | $T_A=25^{\circ}\text{C}$ | I_D | -0.61 | -0.55 | A |
| | $T_A=70^{\circ}\text{C}$ | | -0.49 | -0.44 | |
| Maximum Power Dissipation ^b | $T_A=25^{\circ}\text{C}$ | P_D | 0.27 | 0.22 | W |
| | $T_A=70^{\circ}\text{C}$ | | 0.17 | 0.14 | |
| Pulsed Drain Current ^c | | I_{DM} | -1.2 | | A |
| Operating Junction Temperature | | T_J | 150 | | $^{\circ}\text{C}$ |
| Lead Temperature | | T_L | 260 | | $^{\circ}\text{C}$ |
| Storage Temperature Range | | T_{stg} | -55 to 150 | | $^{\circ}\text{C}$ |

Thermal resistance ratings

| Parameter | | Symbol | Typical | Maximum | Unit |
|---|-----------------------|-----------------|---------|---------|-----------------------------|
| Junction-to-Ambient Thermal Resistance ^a | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 285 | 325 | $^{\circ}\text{C}/\text{W}$ |
| | Steady State | | 355 | 440 | |
| Junction-to-Ambient Thermal Resistance ^b | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 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

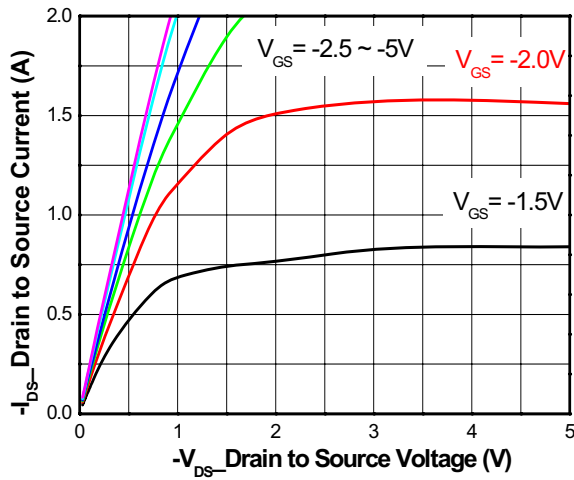
c Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

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

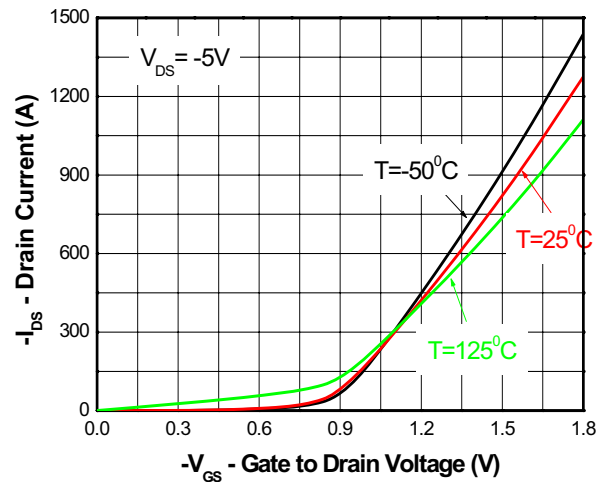
Electronics Characteristics (Ta=25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--|--------------|--|-------|-------|-------|---------------|
| OFF CHARACTERISTICS | | | | | | |
| 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 | μA |
| Gate-to-source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$ | | | -5 | μA |
| ON CHARACTERISTICS | | | | | | |
| 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 Ω |
| | | $V_{GS} = -2.5\text{ V}, I_D = -0.35\text{ A}$ | | 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 |
| CHARGES, CAPACITANCES AND GATE RESISTANCE | | | | | | |
| 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 | | |
| SWITCHING CHARACTERISTICS | | | | | | |
| 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 | | |
| BODY DIODE CHARACTERISTICS | | | | | | |
| Forward Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = -0.15\text{ A}$ | -0.50 | -0.65 | -1.50 | V |

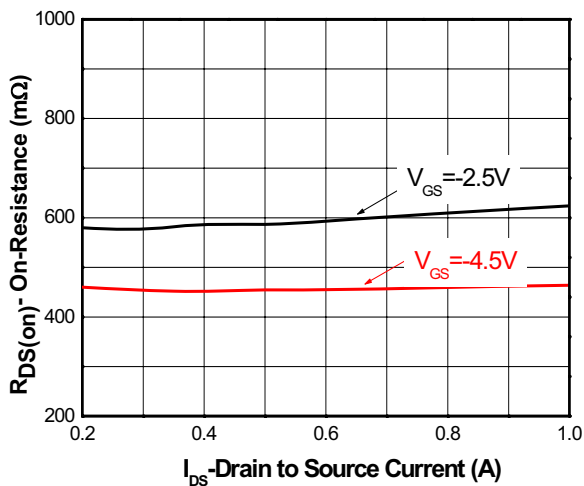
Typical Characteristics (Ta=25°C, unless otherwise noted)



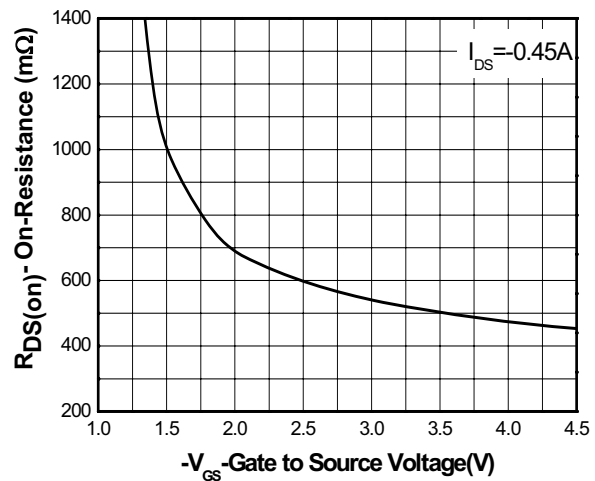
Output characteristics



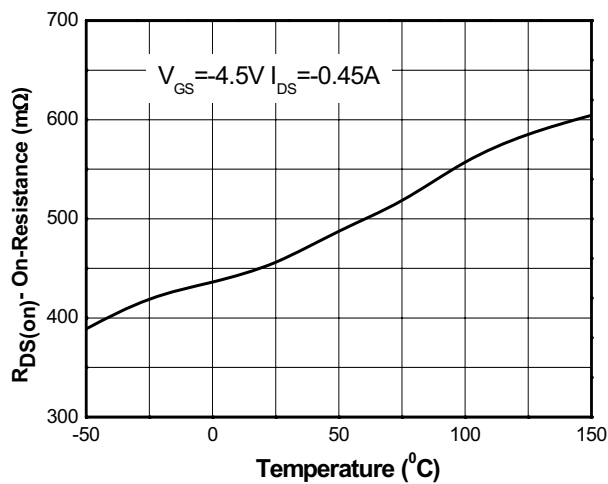
Transfer characteristics



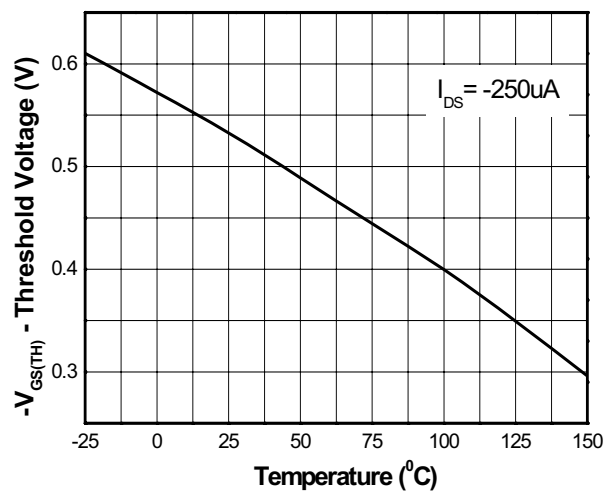
On-Resistance vs. Drain current



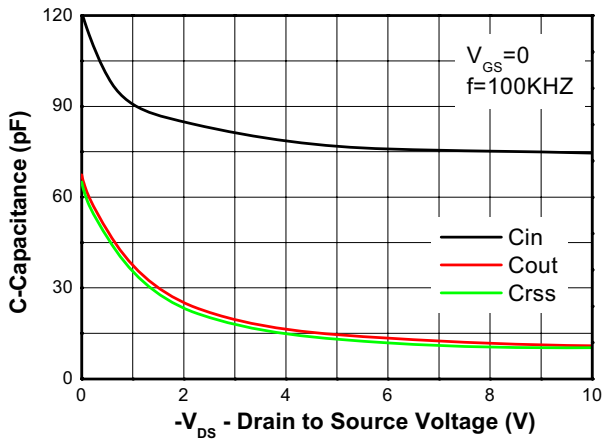
On-Resistance vs. Gate-to-Source voltage



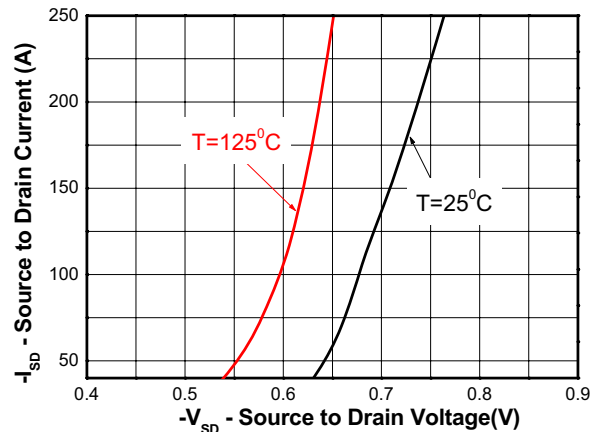
On-Resistance vs. Junction temperature



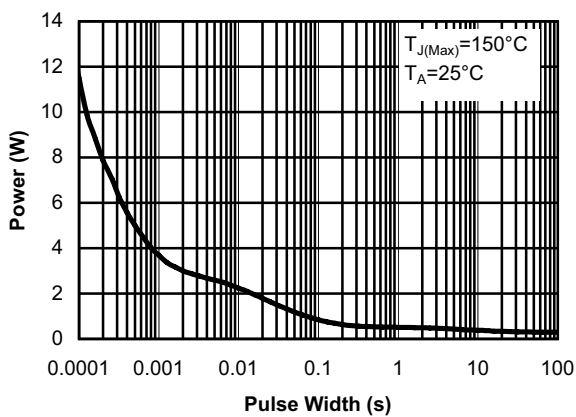
Threshold voltage vs. Temperature



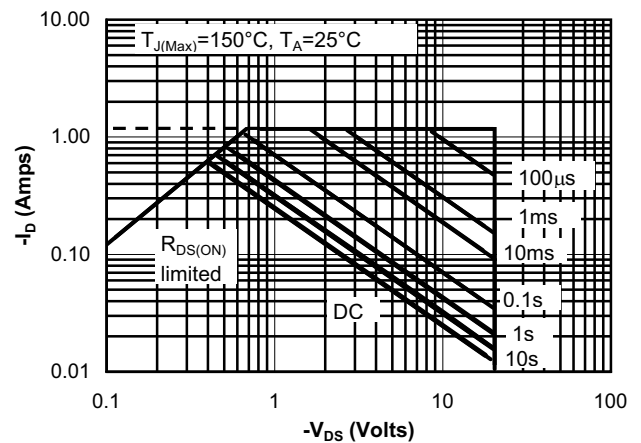
Capacitance



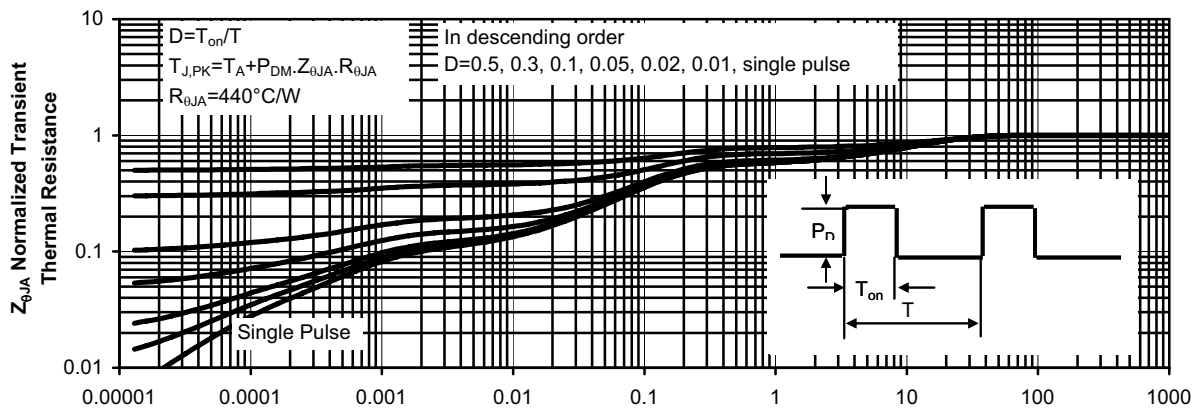
Body diode forward voltage



Single pulse power



Safe operating power

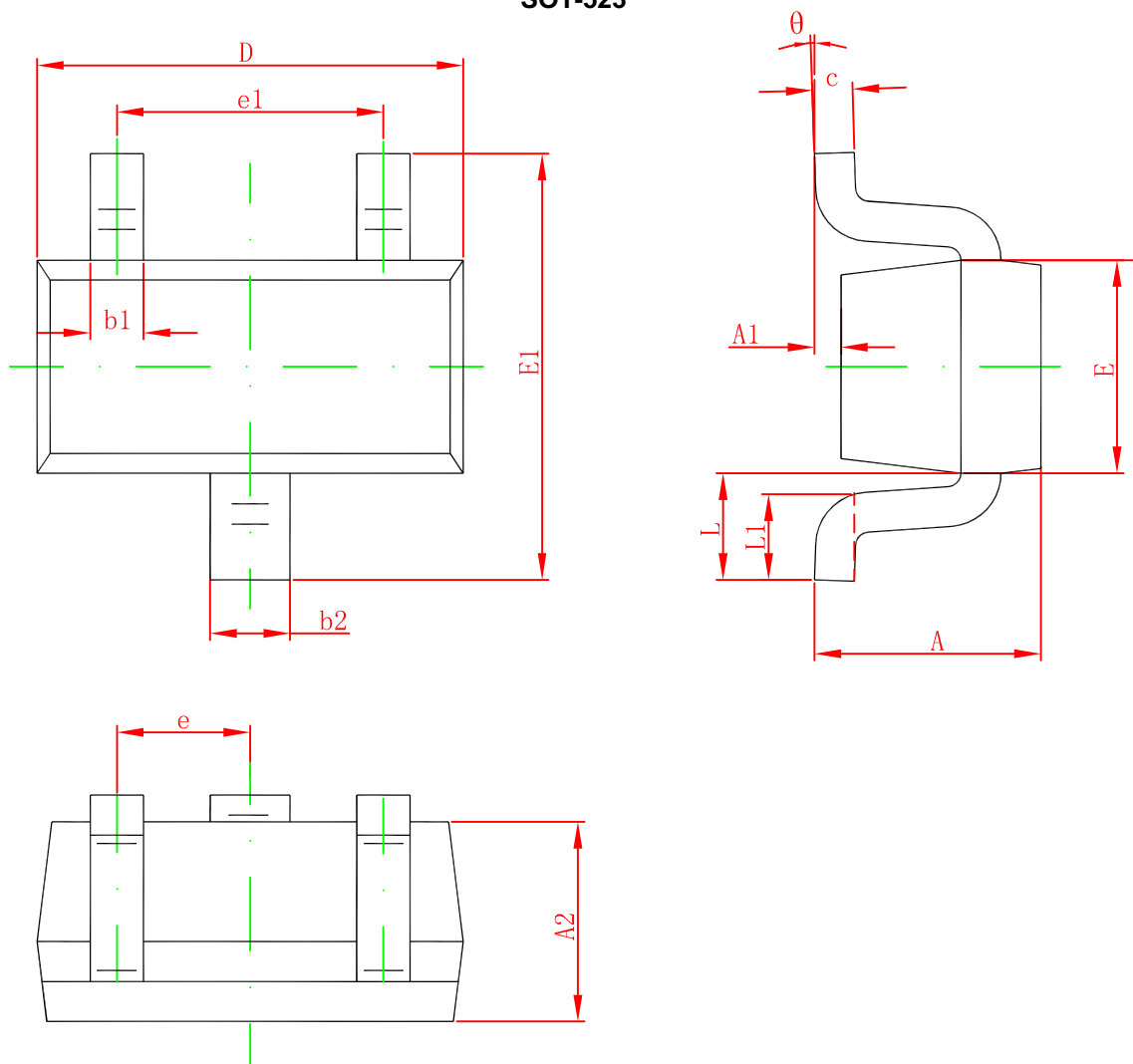


Transient thermal response (Junction-to-Ambient)

Package outline dimensions

WPM2019

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° |