# WPM3021

**Single P-Channel, -30V, -11.5A, Power MOSFET** **Http://www.sh-willsemi.com**

| $V_{DS}$ (V) | Typical $R_{DS(on)}$ (mΩ) |
|---|---|
| -30 | 11@ $V_{GS}$=-10V |
| | 15@$V_{GS}$=-5V |

## Descriptions

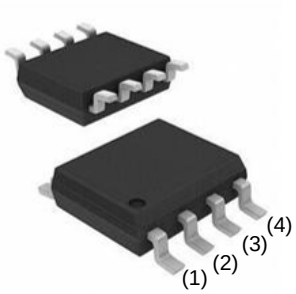
The WPM3021 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM3021 is Pb-free.

## Features

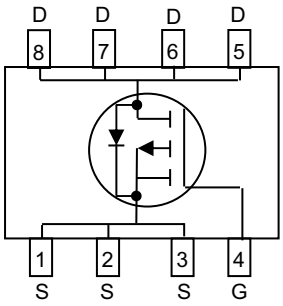
- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package SOP-8L

## Applications

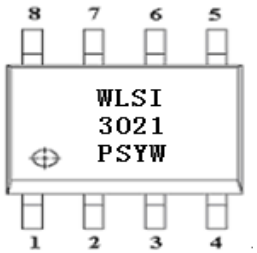
- DC/DC converters
- Power supply converters circuit
- Load/Power Switching for portable device




**SOP-8L**




**Pin configuration (Top view)**




PS =DeviceCode
Y =Year
W = Week(A~z)

**Marking**

## Order information

| Device | Package | Shipping |
|---|---|---|
| WPM3021-8/TR | SOP-8L | 2500/Tape&Reel |

## Absolute Maximum ratings

| Parameter | | Symbol | 10 s | Steady State | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -30 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±25 | | |
| Continuous Drain Current [a d] | $T_A$=25°C | $I_D$ | -11.5 | -8.8 | A |
| | $T_A$=70°C | | -9.4 | -7.0 | |
| Maximum Power Dissipation [a d] | $T_A$=25°C | $P_D$ | 3.0 | 1.7 | W |
| | $T_A$=70°C | | 1.9 | 1.1 | |
| Continuous Drain Current [b d] | $T_A$=25°C | $I_D$ | -8.4 | -6.8 | A |
| | $T_A$=70°C | | -6.7 | -5.4 | |
| Maximum Power Dissipation [b d] | $T_A$=25°C | $P_D$ | 1.5 | 1.0 | W |
| | $T_A$=70°C | | 1.0 | 0.6 | |
| Pulsed Drain Current [c] | | $I_{DM}$ | -47 | | A |
| Operating Junction Temperature | | $T_J$ | -55 to 150 | | °C |
| Lead Temperature | | $T_L$ | 260 | | °C |
| Storage Temperature Range | | $T_{stg}$ | -55 to 150 | | °C |

## Thermal resistance ratings

| Single Operation | | | | | |
|---|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Typical** | **Maximum** | **Unit** |
| Junction-to-Ambient Thermal Resistance [a] | t ≤ 10 s | $R_{\theta JA}$ | 32 | 42 | °C/W |
| | Steady State | | 59 | 75 | |
| Junction-to-Ambient Thermal Resistance [b] | t ≤ 10 s | $R_{\theta JA}$ | 59 | 81 | |
| | Steady State | | 95 | 125 | |
| Junction-to-Case Thermal Resistance | Steady State | $R_{\theta JC}$ | 35 | 45 | |

a Surface mounted on FR4 Board using 1 square inch pad size, 2oz copper

b Surface mounted on FR4 board using minimum pad size, 2oz copper

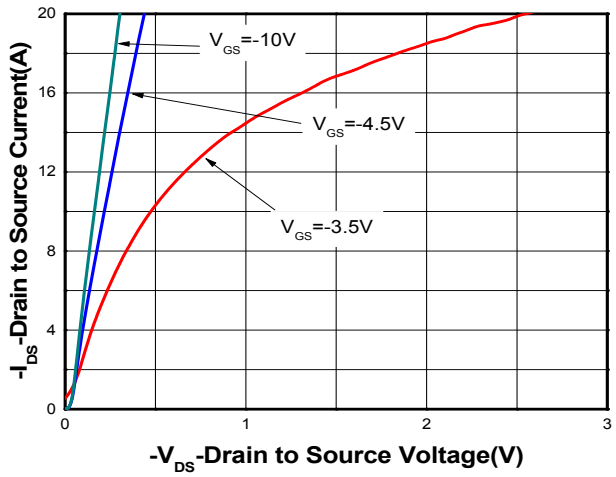
c Repetitive rating, pulse width limited by junction temperature, $t_p$=10μs, Duty Cycle=1%

d Repetitive rating, pulse width limited by junction temperature $T_J$=150°C.

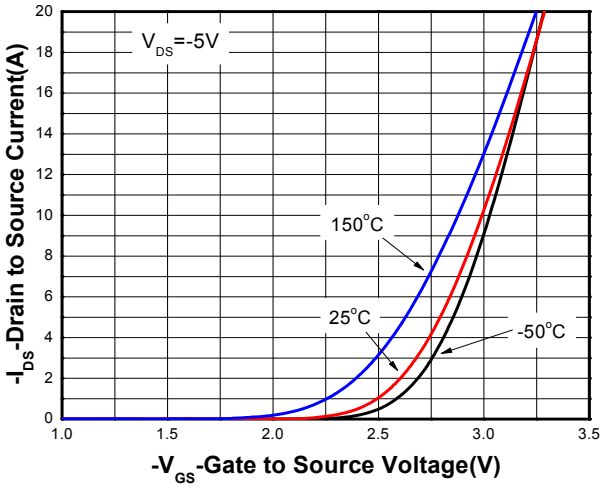
## Electronics Characteristics (Ta=25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-to-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = -250uA | -30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ =-24V, $V_{GS}$ = 0V | | | -1 | uA |
| Gate-to-source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±25V | | | ±1 | uA |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = -250uA | -1.0 | -1.8 | -3.0 | V |
| Drain-to-source On-resistance | $R_{DS(on)}$ | $V_{GS}$ = -10V, $I_D$ = -10A | | 11 | 15 | mΩ |
| | | $V_{GS}$ =-5V, $I_D$ = -7A | | 15 | 20 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = -5 V, $I_D$ = -8A | | 7 | 16 | S |
| **CHARGES, CAPACITANCES AND GATE RESISTANCE** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1.0MHz, $V_{DS}$ = -15 V | | 2800 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 435 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 330 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = -10 V, $V_{DS}$ = -15 V, $I_D$ =-10 A | | 39 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 6 | | |
| Gate-to-Source Charge | $Q_{GS}$ | | | 8 | | |
| Gate-to-Drain Charge | $Q_{GD}$ | | | 7 | | |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | td(ON) | $V_{GS}$ = -10 V, $V_{DS}$ =-15 V, $I_D$=-5A, $R_G$=6Ω | | 19 | | ns |
| Rise Time | tr | | | 12 | | |
| Turn-Off Delay Time | td(OFF) | | | 110 | | |
| Fall Time | tf | | | 32 | | |
| **BODY DIODE CHARACTERISTICS** | | | | | | |
| Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = -1A | -0.5 | -0.8 | -1.2 | V |

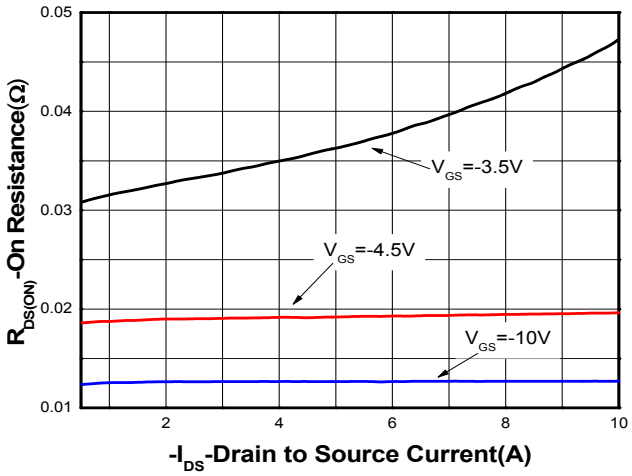
## Typical Characteristics (Ta=25°C, unless otherwise noted)



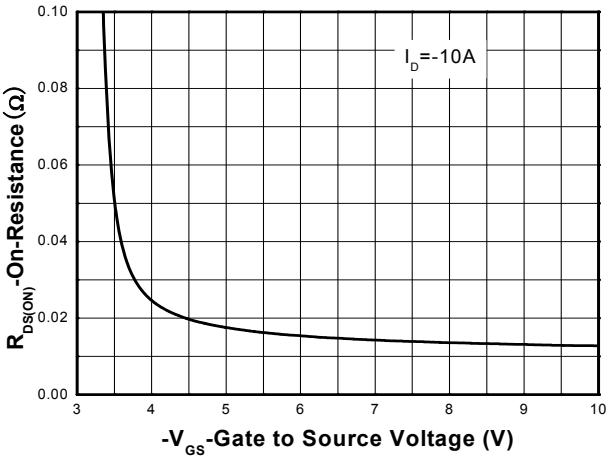

Output characteristics



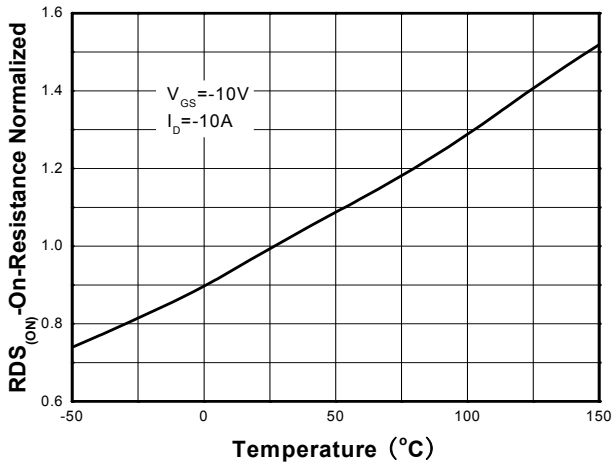

Transfer characteristics



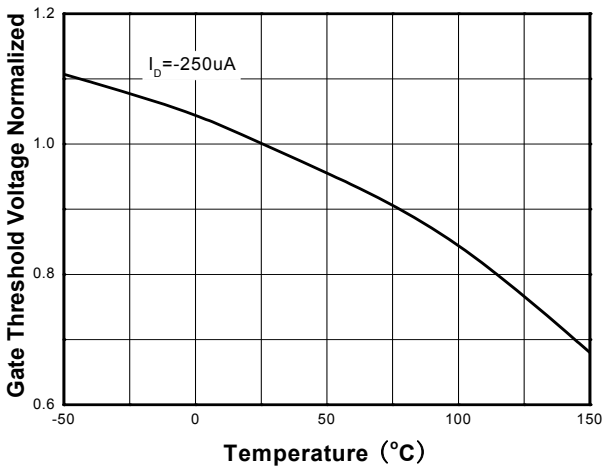

On-Resistance vs. Drain current



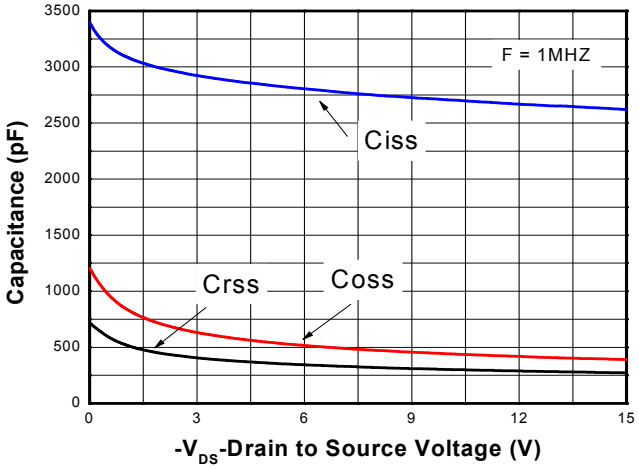

On-Resistance vs. Gate-to-source voltage



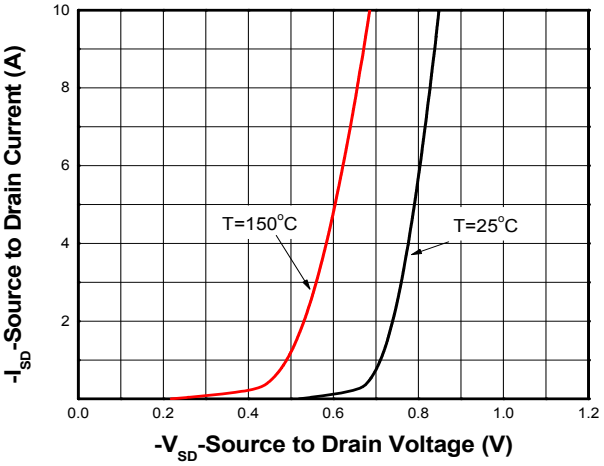

On-Resistance vs. Junction temperature



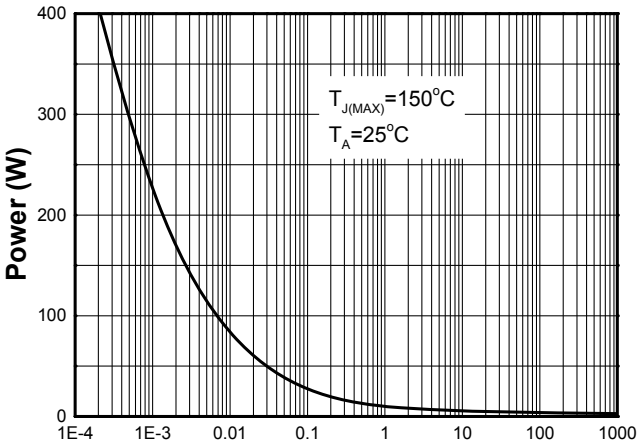

Threshold voltage vs. Temperature



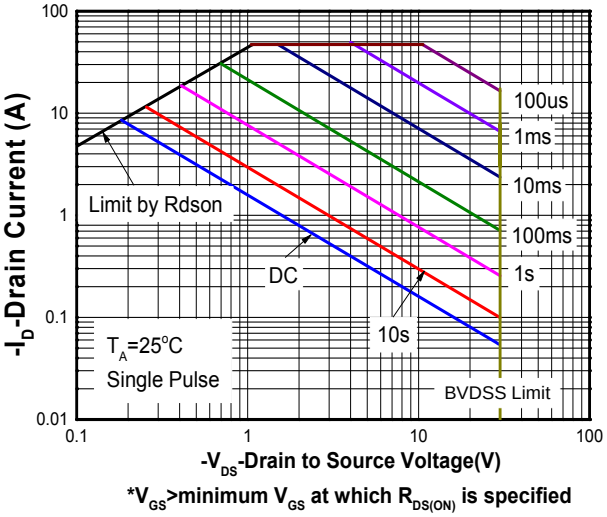

**Capacitance**




**Body diode forward voltage**

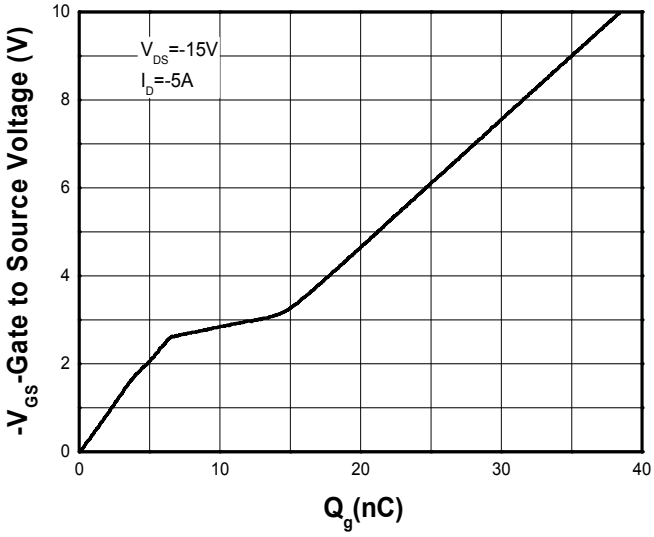



**Single pulse power**

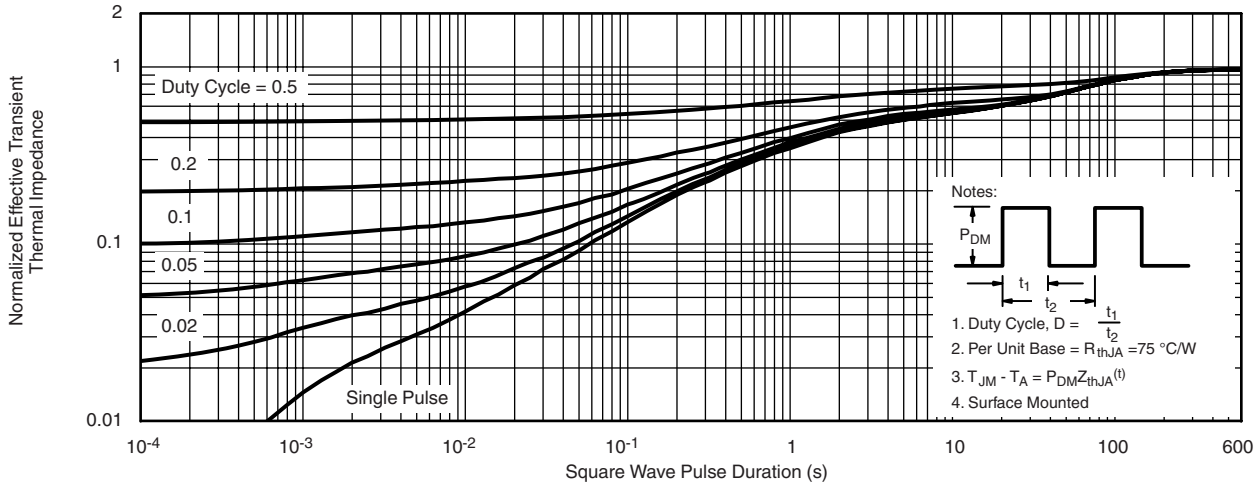



*$V_{GS}$>minimum $V_{GS}$ at which $R_{DS(ON)}$ is specified

**Safe operating power**



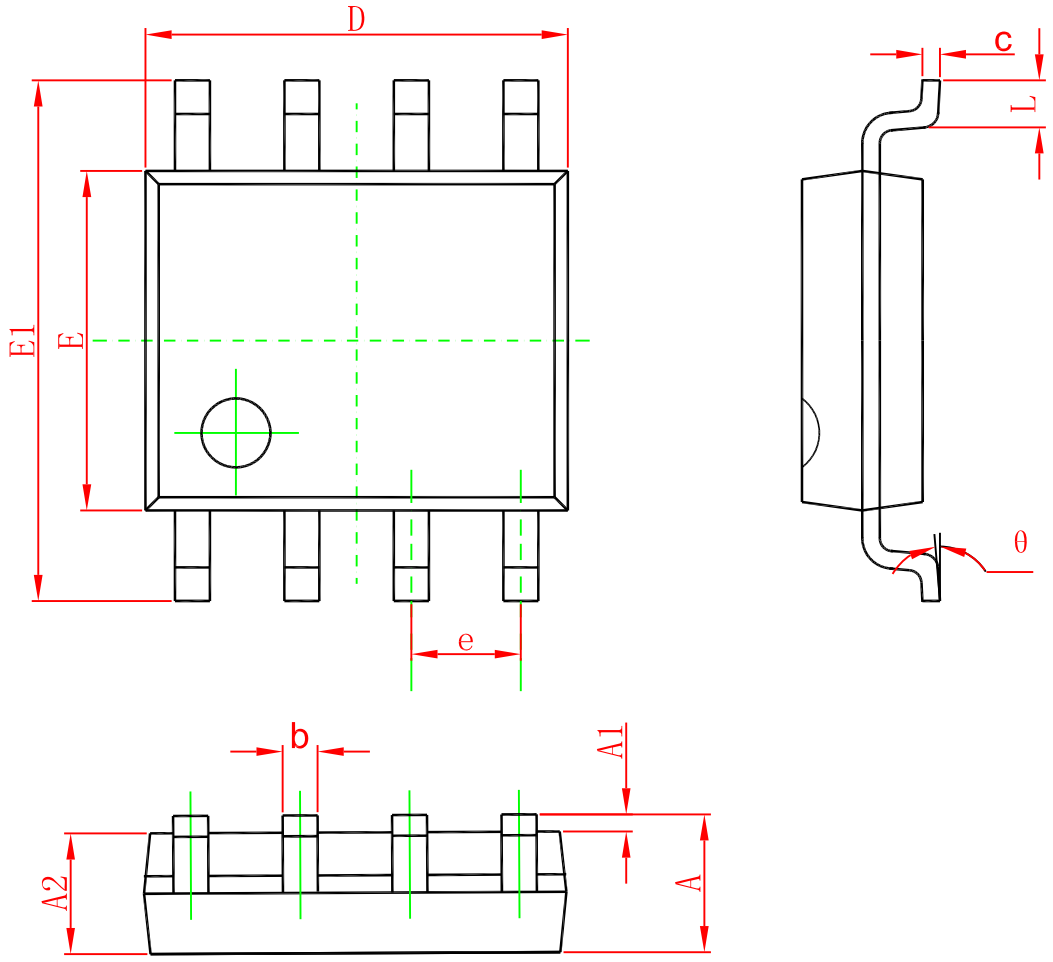

**Gate Charge Characteristics**




**Normalized Thermal Transient Impedance, Junction-to-Ambient**

## Package outline dimensions

### SOP-8L




| Symbol | Dimensions in millimeter | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 1.350 | 1.550 | 1.750 |
| A1 | 0.100 | 0.150 | 0.250 |
| A2 | 1.250 | 1.400 | 1.650 |
| b | 0.380 | - | 0.510 |
| c | 0.170 | - | 0.250 |
| D | 4.800 | 4.900 | 5.000 |
| E | 3.800 | 3.900 | 4.000 |
| E1 | 5.800 | 6.000 | 6.200 |
| e | 1.270(BSC) | | |
| L | 0.450 | 0.600 | 0.800 |
| θ | 0° | - | 8° |