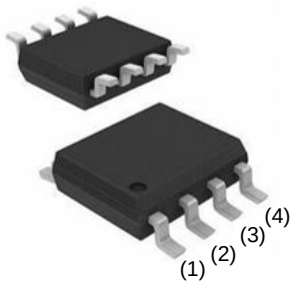
# WPM9435A

Http://www.sh-willsemi.com

**Single P-Channel, -30V, -6.3A, Power MOSFET**

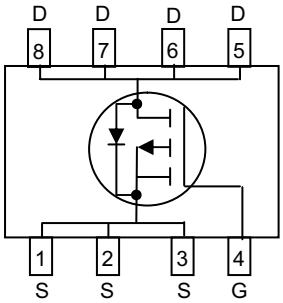
| $V_{DS}$ (V) | Typical $R_{DS(on)}$ (mΩ) |
|---|---|
| -30 | 33 @ $V_{GS}$=-10V |
| | 43 @ $V_{GS}$=-4.5V |




**SOP-8L**

## Descriptions

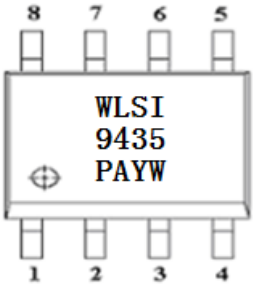
The WPM9435A is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM9435A is Pb-free.




**Pin configuration (Top view)**

## Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage




9435 = Device Code
PA = Special Code
YW = Year&Week

**Marking**

## Applications

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

## Order information

| Device | Package | Shipping |
|---|---|---|
| WPM9435A-8/TR | SOP-8L | 4000/Tape&Reel |

## Absolute Maximum ratings

| Parameter | | Symbol | 10 s | Steady State | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -30 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | | |
| Continuous Drain Current [a d] | $T_A$=25°C | $I_D$ | -6.3 | -5.0 | A |
| | $T_A$=70°C | | -5.1 | -4.0 | |
| Maximum Power Dissipation [a d] | $T_A$=25°C | $P_D$ | 2.7 | 1.7 | W |
| | $T_A$=70°C | | 1.7 | 1.1 | |
| Continuous Drain Current [b d] | $T_A$=25°C | $I_D$ | -5.5 | -4.4 | A |
| | $T_A$=70°C | | -4.4 | -3.5 | |
| Maximum Power Dissipation [b d] | $T_A$=25°C | $P_D$ | 2.1 | 1.3 | W |
| | $T_A$=70°C | | 1.3 | 0.8 | |
| Pulsed Drain Current [c] | | $I_{DM}$ | -25 | | 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 | 46 | °C/W |
| | Steady State | | 60 | 75 | |
| Junction-to-Ambient Thermal Resistance [b] | t ≤ 10 s | $R_{\theta JA}$ | 45 | 60 | |
| | Steady State | | 80 | 95 | |
| Junction-to-Case Thermal Resistance | Steady State | $R_{\theta JC}$ | 16 | 25 | |

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

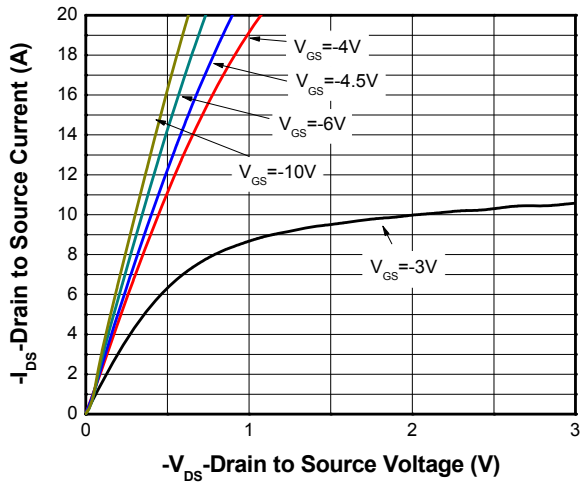
c Repetitive rating, pulse width limited by junction temperature, $t_p$=10μs, Duty Cycle=1%

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

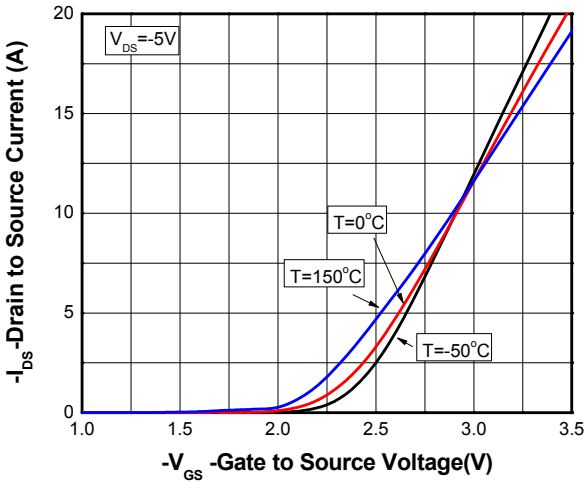
## Electronics Characteristics (Ta=25°C, unless otherwise noted)

| 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, $V_{GS}$ = ±20V | | | ±100 | nA |
| **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, $I_D$ = -4.4A | | 33 | 45 | mΩ |
| | | $V_{GS}$ = -4.5V, $I_D$ = -3.0A | | 43 | 66 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = -5 V, $I_D$ = -5A | | 6 | 16 | S |
| **CHARGES, CAPACITANCES AND GATE RESISTANCE** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1.0MHz, $V_{DS}$ = -15 V | | 1120 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 115 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 74 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = -10 V, $V_{DS}$ = -15 V, $I_D$ =-5 A | | 18.2 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 2 | | |
| Gate-to-Source Charge | $Q_{GS}$ | | | 3.1 | | |
| Gate-to-Drain Charge | $Q_{GD}$ | | | 2.7 | | |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | td(ON) | $V_{GS}$ = -10 V, $V_{DS}$ =-15 V, $I_D$=-4.3A, $R_G$=6Ω | | 20 | | ns |
| Rise Time | tr | | | 10 | | |
| Turn-Off Delay Time | td(OFF) | | | 48 | | |
| Fall Time | tf | | | 10 | | |
| **BODY DIODE CHARACTERISTICS** | | | | | | |
| Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = -2.5A | | -0.8 | -1.5 | V |

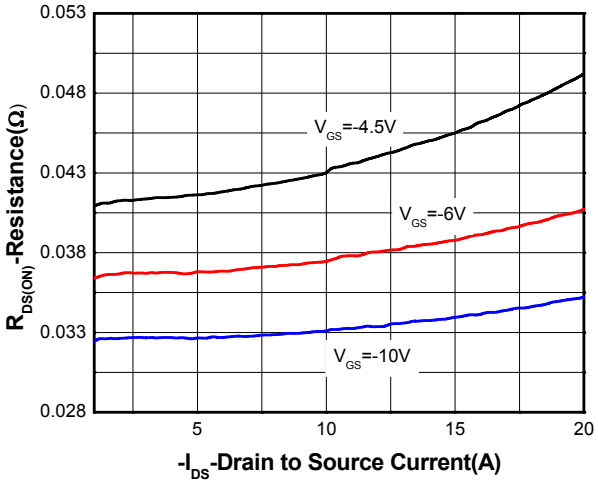
## Typical Characteristics (Ta=25°C, unless otherwise noted)



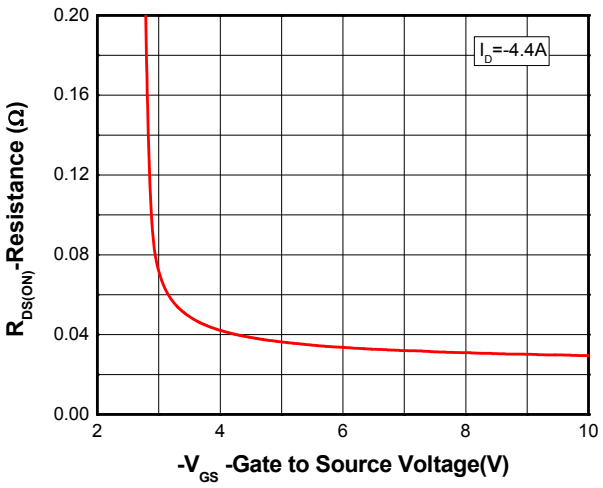

Output characteristics



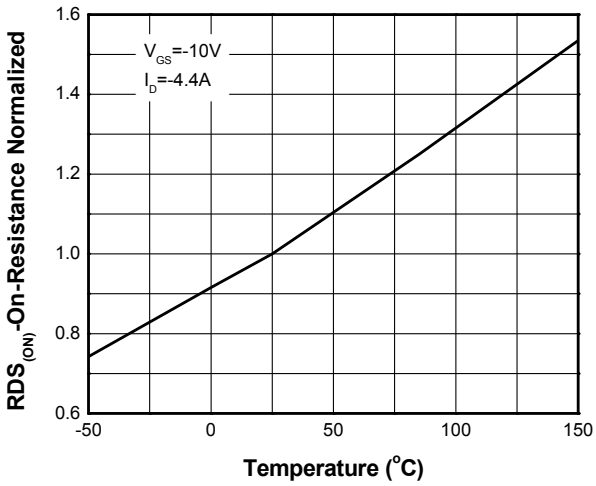

Transfer characteristics



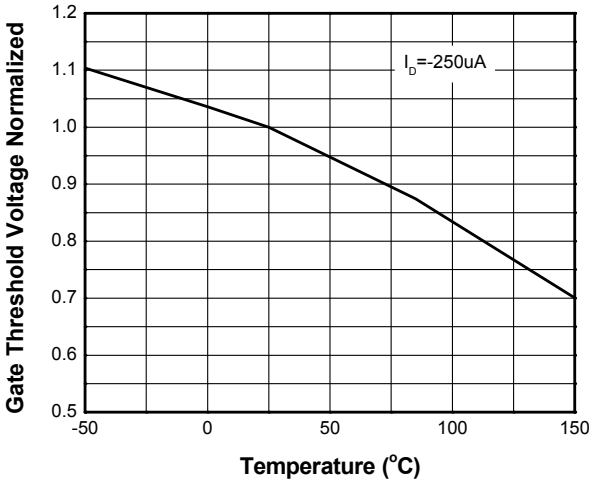

On-Resistance vs. Drain current



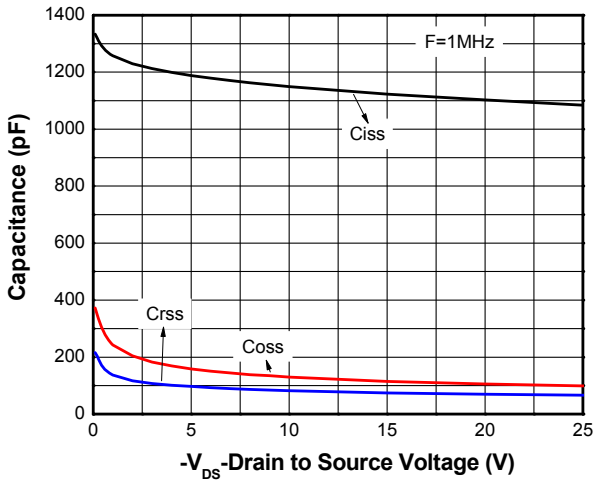

On-Resistance vs. Gate-to-source voltage



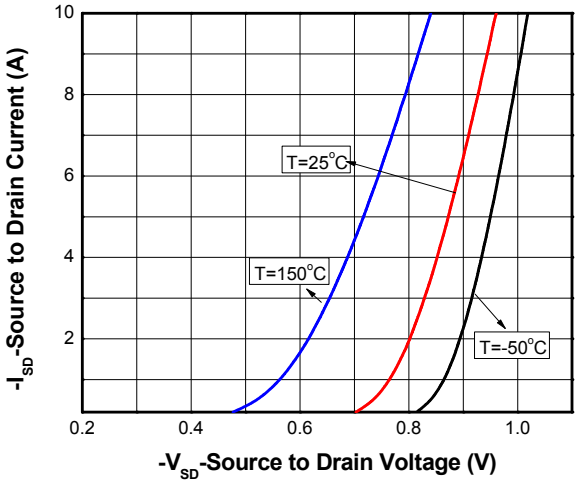

On-Resistance vs. Junction temperature



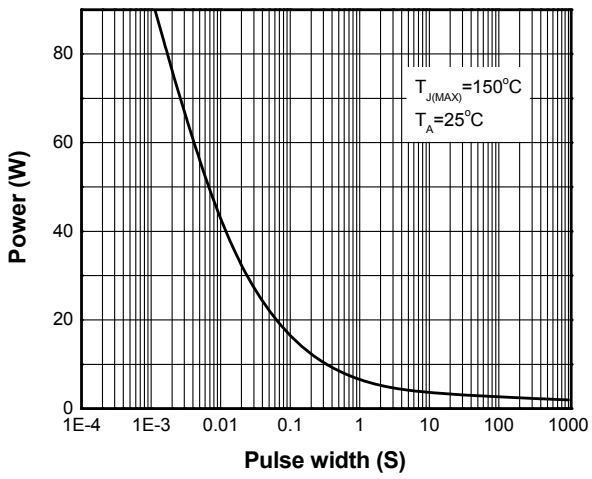

Threshold voltage vs. Temperature



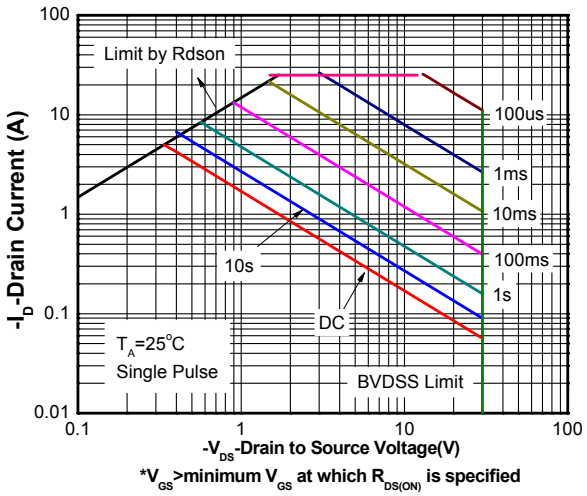

Capacitance



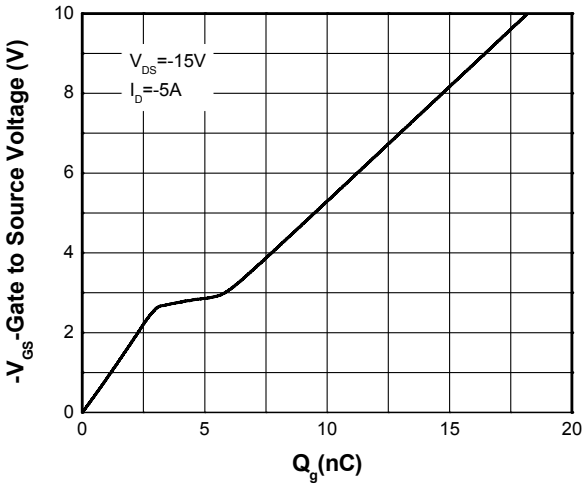

Body diode forward voltage




Single pulse power

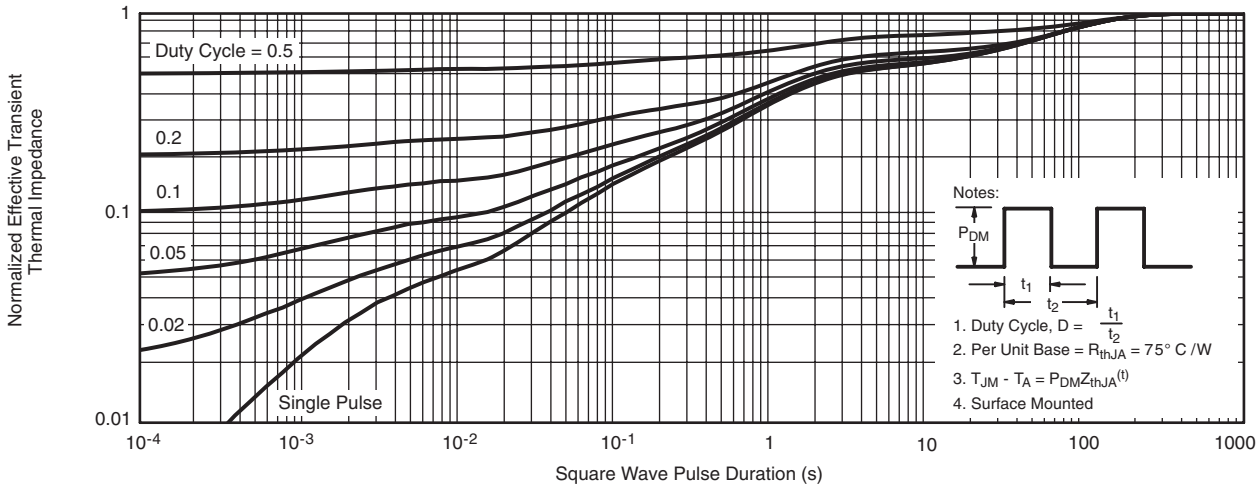



Safe operating power




Gate Charge Characteristics

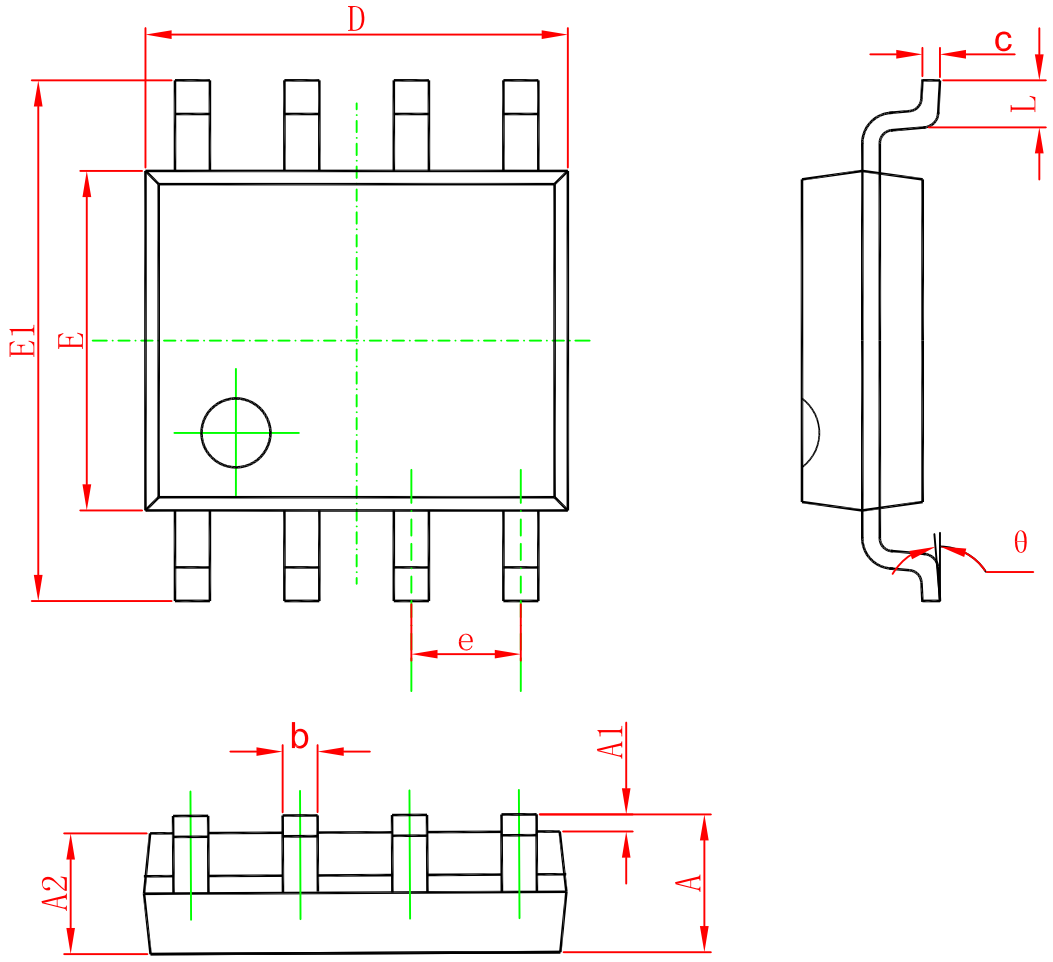
**Transient thermal response (Junction-to-Ambient)**




**Transient thermal response (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 | 0.175 | 0.250 |
| A2 | 1.350 | 1.450 | 1.550 |
| b | 0.330 | 0.420 | 0.510 |
| c | 0.170 | 0.210 | 0.250 |
| D | 4.700 | 4.900 | 5.100 |
| E | 3.800 | 3.900 | 4.000 |
| E1 | 5.800 | 6.000 | 6.200 |
| e | 1.270(BSC) | | |
| L | 0.400 | 0.835 | 1.270 |
| θ | 0° | | 8° |