



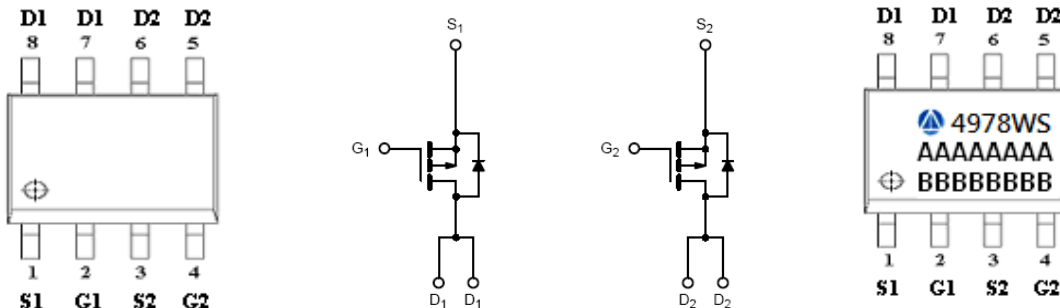
### General Description

AFP4978WS, P-Channel enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent  $R_{DS(ON)}$ , low gate charge. These devices are particularly suited for low voltage power management, and low in-line power loss are needed in commercial industrial surface mount applications.

### Features

- -60V/-6A,  $R_{DS(ON)} = 40m\Omega @ V_{GS} = -10V$
- -60V/-5A,  $R_{DS(ON)} = 48m\Omega @ V_{GS} = -4.5V$
- Super high density cell design for extremely low  $R_{DS(ON)}$
- SOP-8P package design

### Pin Description ( SOP-8P )



### Application

- Backlight Inverter for LCD Display
- Full Bridge DC/DC Converter
- Load Switch
- CCFL Inverter

### Pin Define

| Pin | Symbol | Description |
|-----|--------|-------------|
| 1   | S1     | Source 1    |
| 2   | G1     | Gate 1      |
| 3   | S2     | Source 2    |
| 4   | G2     | Gate 2      |
| 5   | D2     | Drain 2     |
| 6   | D2     | Drain 2     |
| 7   | D1     | Drain 1     |
| 8   | D1     | Drain 1     |

### Ordering Information

| Part Ordering No. | Part Marking | Package | Unit        | Quantity |
|-------------------|--------------|---------|-------------|----------|
| AFP4978WSS8RG     | 4978WS       | SOP-8P  | Tape & Reel | 2500 EA  |

- ※ A Lot code
- ※ B Date code
- ※ AFP4978WSS8RG : 13" Tape & Reel ; Pb- Free ; Halogen -Free



### Absolute Maximum Ratings

(T<sub>A</sub>=25°C Unless otherwise noted)

| Parameter                                       | Symbol           | Typical                      | Unit |
|-------------------------------------------------|------------------|------------------------------|------|
| Drain-Source Voltage                            | V <sub>DSS</sub> | -60                          | V    |
| Gate –Source Voltage                            | V <sub>GSS</sub> | ±20                          | V    |
| Continuous Drain Current(T <sub>J</sub> =150°C) | I <sub>D</sub>   | T <sub>A</sub> =25°C<br>-6.0 | A    |
|                                                 |                  | T <sub>A</sub> =70°C<br>-5.0 |      |
| Pulsed Drain Current                            | I <sub>DM</sub>  | -20                          | A    |
| Continuous Source Current(Diode Conduction)     | I <sub>S</sub>   | -2                           | A    |
| Power Dissipation                               | P <sub>D</sub>   | T <sub>A</sub> =25°C<br>2.8  | W    |
|                                                 |                  | T <sub>A</sub> =70°C<br>1.8  |      |
| Operating Junction Temperature                  | T <sub>J</sub>   | 150                          | °C   |
| Storage Temperature Range                       | T <sub>STG</sub> | -55/150                      | °C   |
| Thermal Resistance-Junction to Ambient          | R <sub>θJA</sub> | 62.5                         | °C/W |

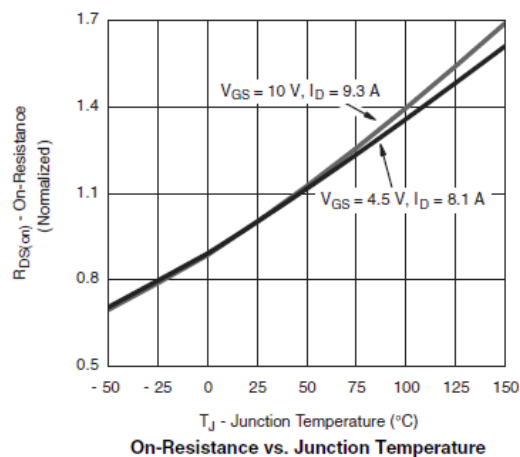
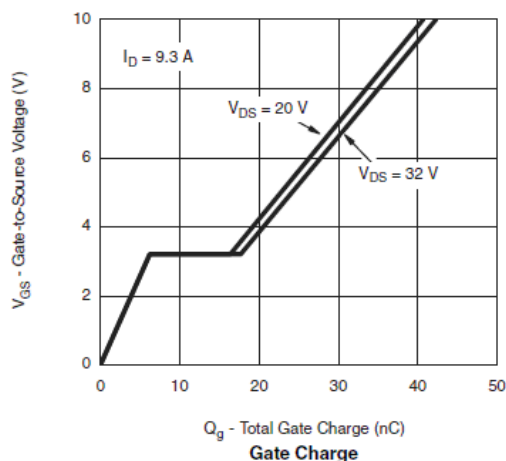
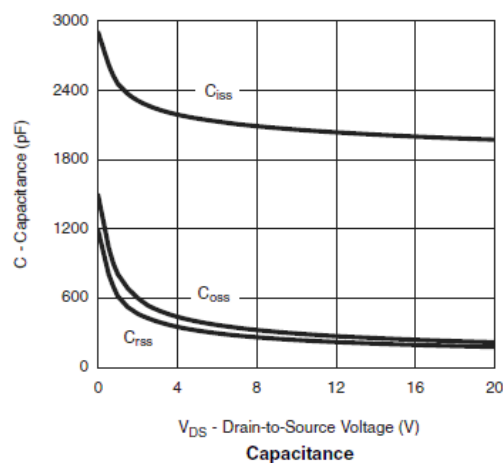
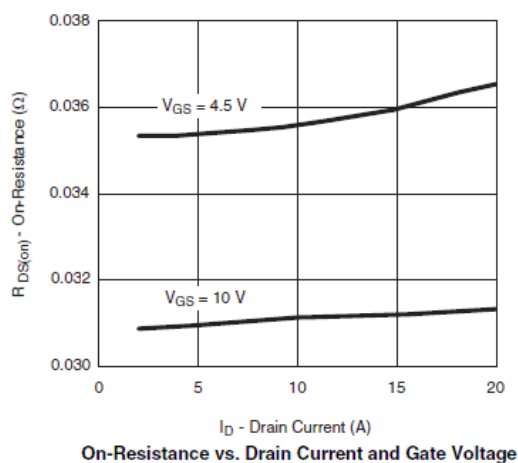
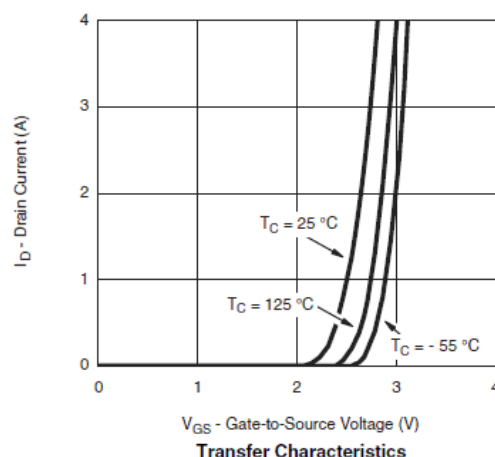
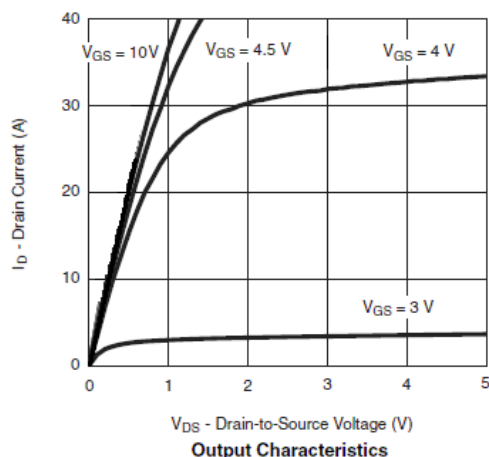
### Electrical Characteristics

(T<sub>A</sub>=25°C Unless otherwise noted)

| Parameter                       | Symbol               | Conditions                                                                                                           | Min. | Typ  | Max. | Unit |
|---------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| <b>Static</b>                   |                      |                                                                                                                      |      |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> = -250uA                                                                         | -60  |      |      | V    |
| Gate Threshold Voltage          | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250uA                                                           | -1.0 |      | -2.0 |      |
| Gate Leakage Current            | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                                                          |      |      | ±100 | nA   |
| Zero Gate Voltage Drain Current | I <sub>DSS</sub>     | V <sub>DS</sub> = -48V, V <sub>GS</sub> =0V                                                                          |      |      | -1   | uA   |
|                                 |                      | V <sub>DS</sub> = -48V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =85°C                                                  |      |      | -20  |      |
| On-State Drain Current          | I <sub>D(on)</sub>   | V <sub>DS</sub> ≥ -5V, V <sub>GS</sub> = -10V                                                                        | -6   |      |      | A    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> = -10V, I <sub>D</sub> =-6A                                                                          |      | 33   | 40   | mΩ   |
|                                 |                      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> =-5A                                                                         |      | 40   | 48   |      |
| Forward Transconductance        | g <sub>FS</sub>      | V <sub>DS</sub> = -15V, I <sub>D</sub> = -6A                                                                         |      | 25   |      | S    |
| Diode Forward Voltage           | V <sub>SD</sub>      | I <sub>S</sub> = -3A, V <sub>GS</sub> =0V                                                                            |      | -0.8 | -1.3 | V    |
| <b>Dynamic</b>                  |                      |                                                                                                                      |      |      |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =-30V, V <sub>GS</sub> =-4.5V<br>I <sub>D</sub> = -6.0A                                              |      | 20   | 38   | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                                                      |      | 8    |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                                                      |      | 10   |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V<br>f=1MHz                                                                 |      | 1900 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                                                      |      | 210  |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                                                      |      | 170  |      |      |
| Turn-On Time                    | t <sub>d(on)</sub>   | V <sub>DD</sub> =-30V, R <sub>L</sub> =5.0Ω<br>I <sub>D</sub> =-6.0A, V <sub>GEN</sub> =-10V<br>R <sub>G</sub> =1.0Ω |      | 10   | 20   | ns   |
|                                 | t <sub>r</sub>       |                                                                                                                      |      | 12   | 25   |      |
| Turn-Off Time                   | t <sub>d(off)</sub>  |                                                                                                                      |      | 30   | 60   |      |
|                                 | t <sub>f</sub>       |                                                                                                                      |      | 10   | 20   |      |

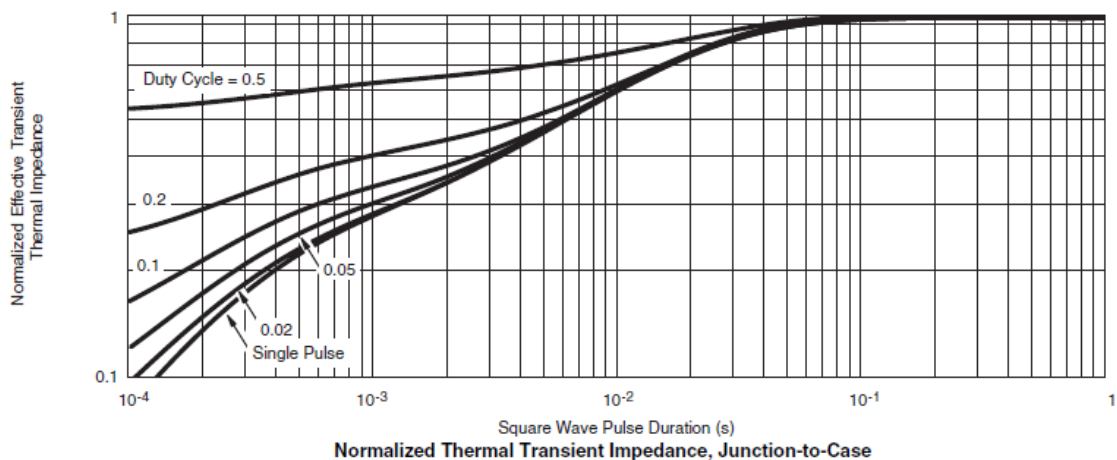
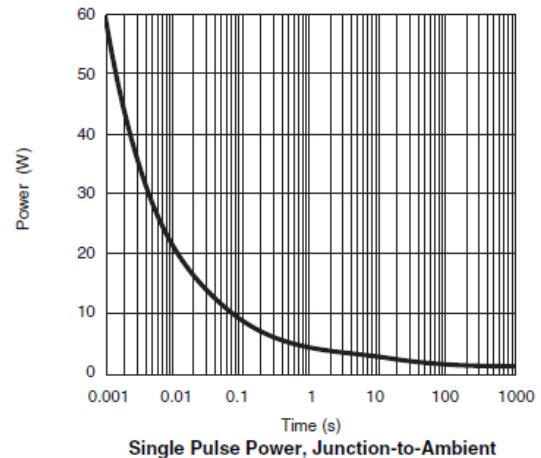
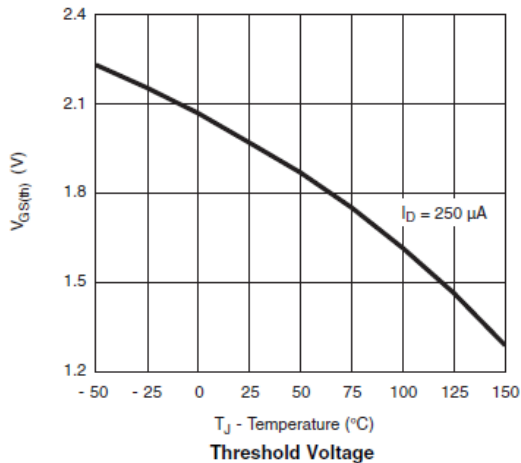
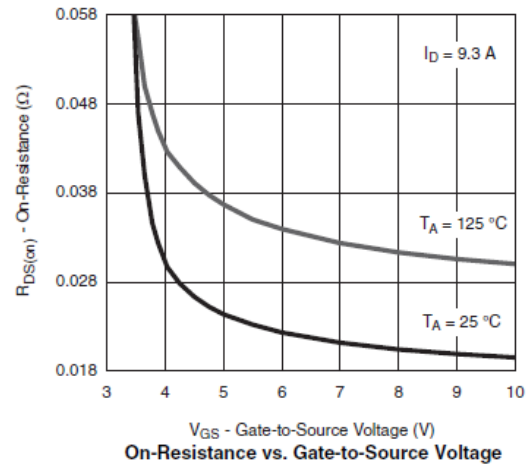
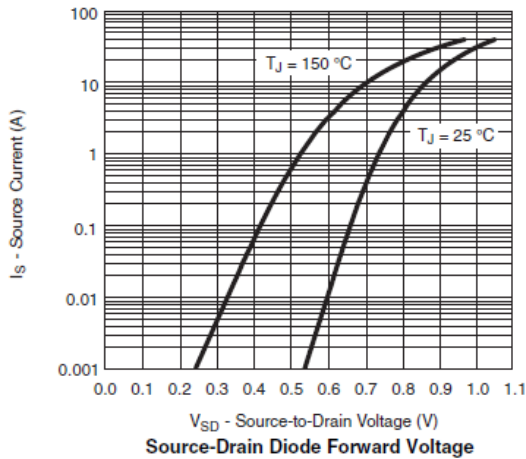


### Typical Characteristics





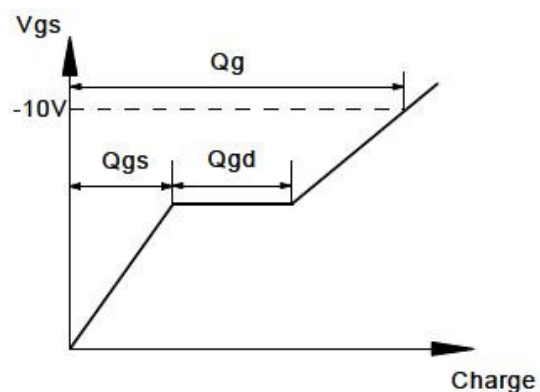
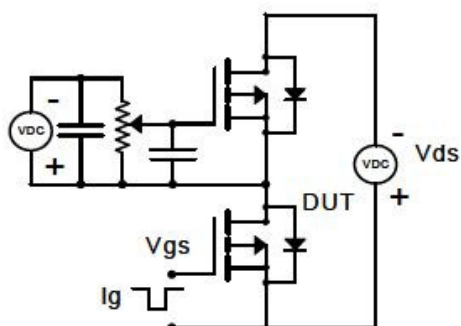
### Typical Characteristics



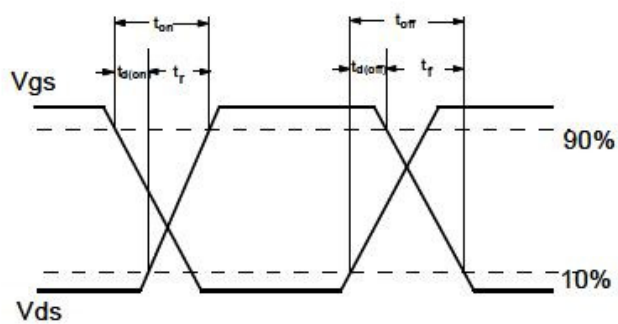
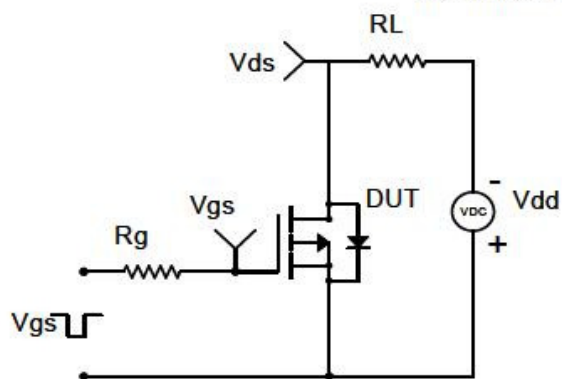


## Typical Characteristics

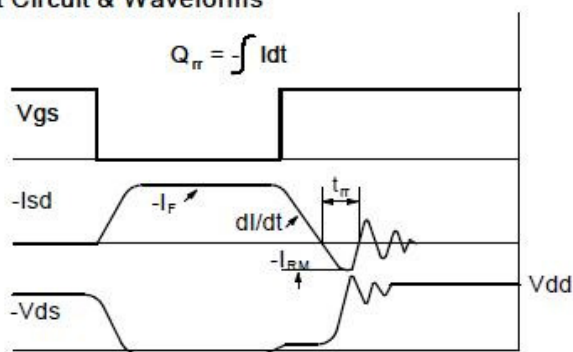
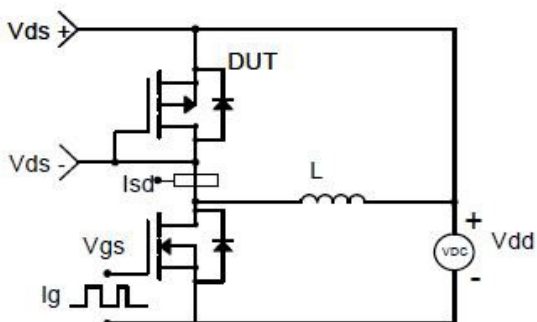
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

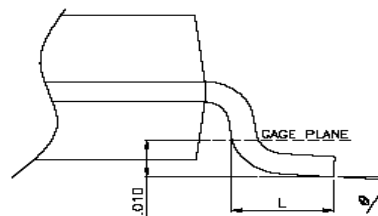
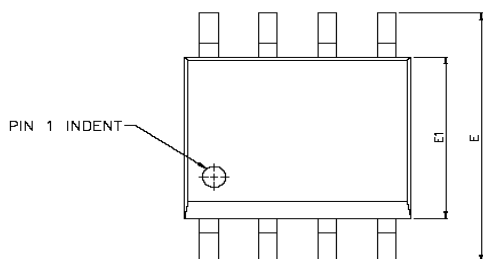


Diode Recovery Test Circuit & Waveforms

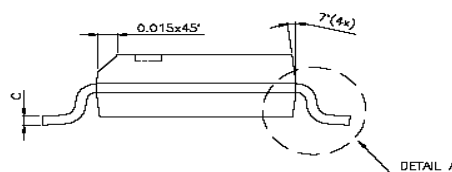
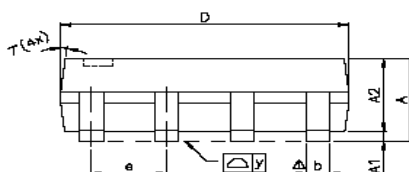




**Package Information (SOP-8P )**



DETAIL A



| SYMBOLS    | DIMENSIONS IN MILLIMETERS |      |       | DIMENSIONS IN INCHES |       |        |
|------------|---------------------------|------|-------|----------------------|-------|--------|
|            | MIN                       | NOM  | MAX   | MIN                  | NOM   | MAX    |
| A          | 1.47                      | 1.60 | 1.73  | 0.058                | 0.063 | 0.068  |
| A1         | 0.10                      | —    | 0.25  | 0.004                | —     | 0.010  |
| A2         | —                         | 1.45 | —     | —                    | 0.057 | —      |
| b          | 0.33                      | 0.41 | 0.51  | 0.013                | 0.016 | 0.020  |
| C          | 0.19                      | 0.20 | 0.25  | 0.0075               | 0.008 | 0.0098 |
| D          | 4.80                      | 4.85 | 4.95  | 0.189                | 0.191 | 0.195  |
| E          | 5.80                      | 6.00 | 6.20  | 0.228                | 0.236 | 0.244  |
| E1         | 3.80                      | 3.90 | 4.00  | 0.150                | 0.154 | 0.157  |
| e          | —                         | 1.27 | —     | —                    | 0.050 | —      |
| L          | 0.38                      | 0.71 | 1.27  | 0.015                | 0.028 | 0.050  |
| $\Delta y$ | —                         | —    | 0.076 | —                    | —     | 0.003  |
| $\theta$   | 0°                        | —    | 8°    | 0°                   | —     | 8°     |

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