# Alfa-MOS Technology

# AFP7415WS

## 60V P-Channel Enhancement Mode MOSFET

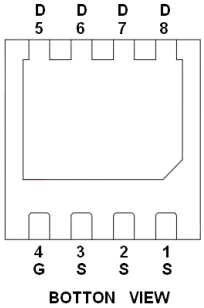
### General Description

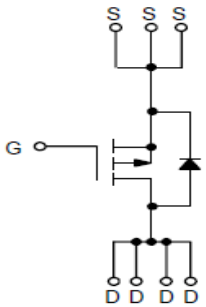
AFP7415WS, P-Channel enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent $R_{DS(ON)}$, low gate charge.
These devices are particularly suited for low voltage power management, such as smart phone and notebook computer and other battery powered circuits, and low in-line power loss are needed in commercial industrial surface mount applications.

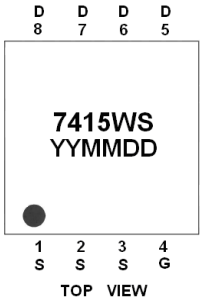
### Features

- $I_D$=-7A,$R_{DS(ON)}$= 56mΩ@$V_{GS}$= -10V
- $I_D$=-7A,$R_{DS(ON)}$= 66mΩ@$V_{GS}$= -4.5V
- Super high density cell design for extremely low $R_{DS\ (ON)}$
- Exceptional on-resistance and maximum DC current capability
- DFN3X3-8L package design

### Pin Description ( DFN3X3-8L )




### Application

- Load Switches
- Half-Bridge Motor Drives
- High Voltage Non-Synchronous Buck Converters

### Pin Define

| Pin | Symbol | Description |
|---|---|---|
| 1~3 | S | Source |
| 4 | G | Gate |
| 5~8 | D | Drain |

### Ordering Information

| Part Ordering No. | Part Marking | Package | Unit | Quantity |
|---|---|---|---|---|
| AFP7415WSFN338RG | 7415WS | DFN3X3-8L | Tape & Reel | 5000 EA |

※ YY year code
※ MM month code
※ DD date code
※ AFP7415WSFN338RG : 13”Tape & Reel ; Pb- Free ; Halogen –Free

## Absolute Maximum Ratings

($T_A$=25℃ Unless otherwise noted)

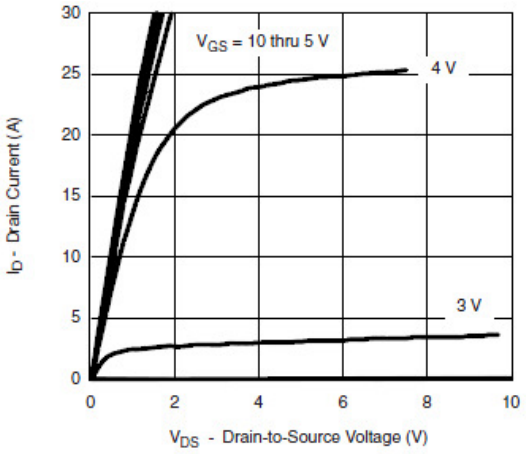
| Parameter | | | Symbol | Value | | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -60 | | V |
| Gate –Source Voltage | | | $V_{GSS}$ | ±20 | | V |
| Continuous Drain Current($T_J$=150℃) | | $T_A$=25℃ | $I_D$ | -14 | | A |
| | | $T_A$=70℃ | | -10 | | |
| Pulsed Drain Current | | | $I_{DM}$ | -45 | | A |
| Continuous Source Current(Diode Conduction) | | | $I_S$ | -3 | | A |
| Power Dissipation | $T_C$=25℃ | $T_C$=70℃ | $P_D$ | 28 | 15 | W |
| | $T_A$=25℃ | $T_A$=70℃ | | 3.2 | 2.0 | |
| Operating Junction Temperature | | | $T_J$ | 150 | | ℃ |
| Storage Temperature Range | | | $T_{STG}$ | -55/150 | | ℃ |
| Thermal Resistance Junction-to-Case (Drain) | | | $R_{\theta JC}$ | 5 | | ℃/W |
| Thermal Resistance-Junction to Ambient | | | $R_{\theta JA}$ | 40 | | |

## Electrical Characteristics

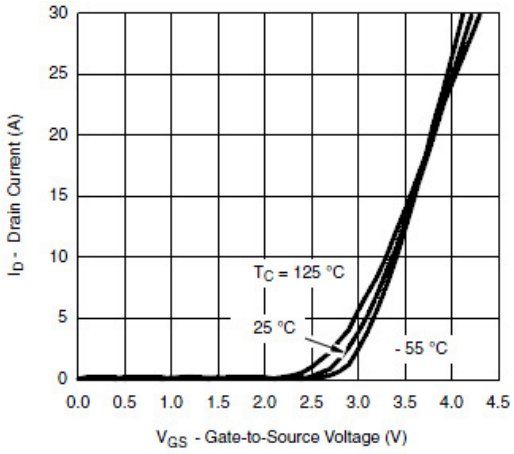
($T_A$=25℃ Unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V,$I_D$= -250uA | -60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$= -250uA | -1.0 | | -2.5 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{DS}$=0V,$V_{GS}$= ±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$= -48V,$V_{GS}$=0V | | | -1 | uA |
| | | $V_{DS}$= -48V,$V_{GS}$=0V $T_J$=85℃ | | | -20 | |
| On-State Drain Current | $I_{D(on)}$ | $V_{DS}$≧ -5V,$V_{GS}$= -10V | -20 | | | A |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = -10V,$I_D$=-7A | | 46 | 56 | mΩ |
| | | $V_{GS}$ = -4.5V,$I_D$=-7A | | 56 | 66 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$= -15V,$I_D$= -3.2A | | 12 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$= -3A,$V_{GS}$=0V | | -0.8 | -1.3 | V |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-30V,$V_{GS}$=-10V $I_D$= -10.0A | | 25 | 40 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 8 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-25V,$V_{GS}$=0V f=1MHz | | 1200 | 2000 | pF |
| Output Capacitance | $C_{oss}$ | | | 140 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 90 | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD}$=-30V,$R_L$=3.0Ω $I_D$≡-18A,$V_{GEN}$=-10V $R_G$=2.5Ω | | 10 | 20 | ns |
| | $t_r$ | | | 10 | 20 | |
| Turn-Off Time | $t_{d(off)}$ | | | 45 | 80 | |
| | $t_f$ | | | 25 | 40 | |

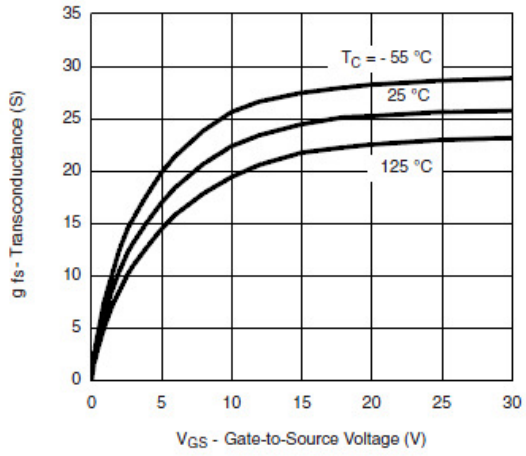
## Typical Characteristics



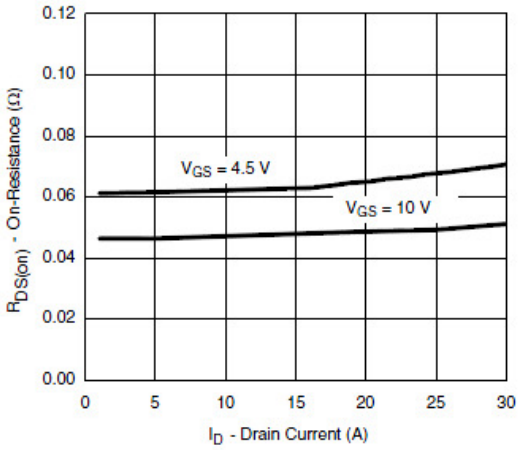

**Output Characteristics**



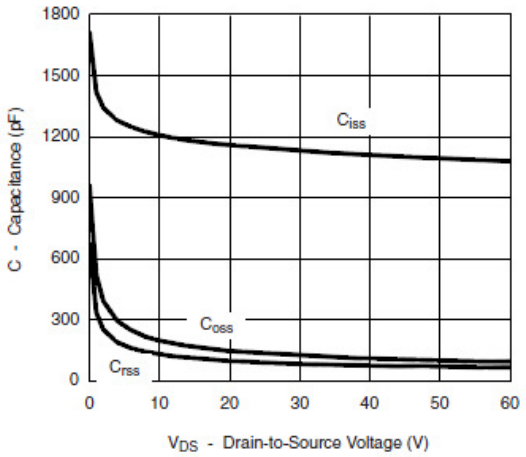

**Transfer Characteristics**



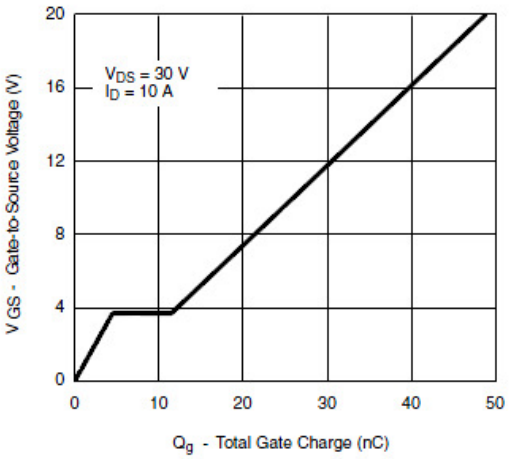

**Transconductance**




**On-Resistance vs. Drain Current**

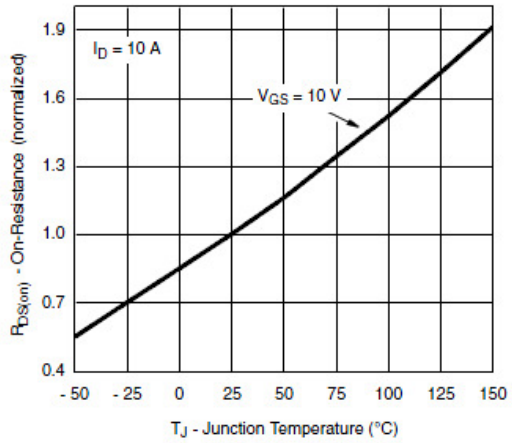



**Capacitance**

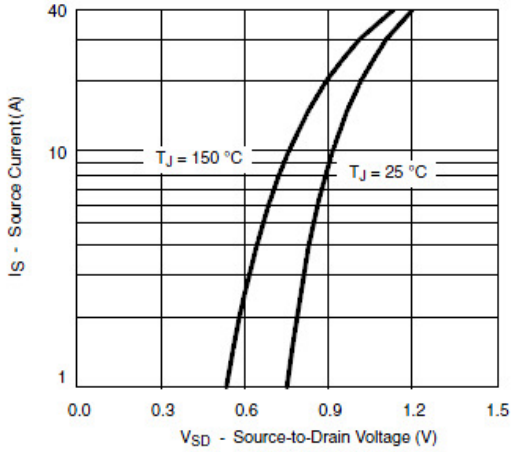



**Gate Charge**

## Typical Characteristics

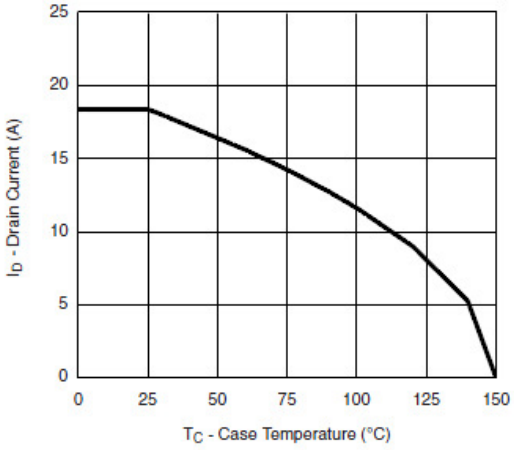



**On-Resistance vs. Junction Temperature**

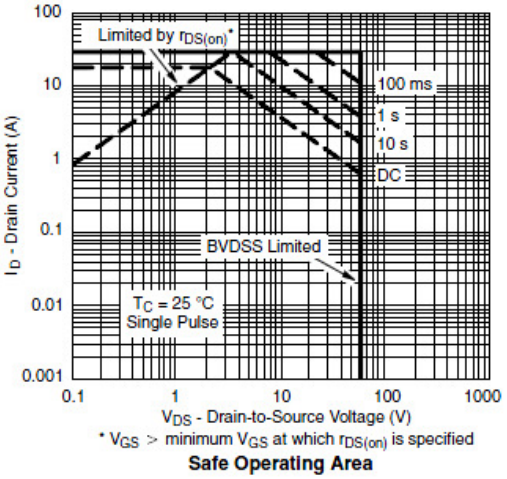



**Source-Drain Diode Forward Voltage**

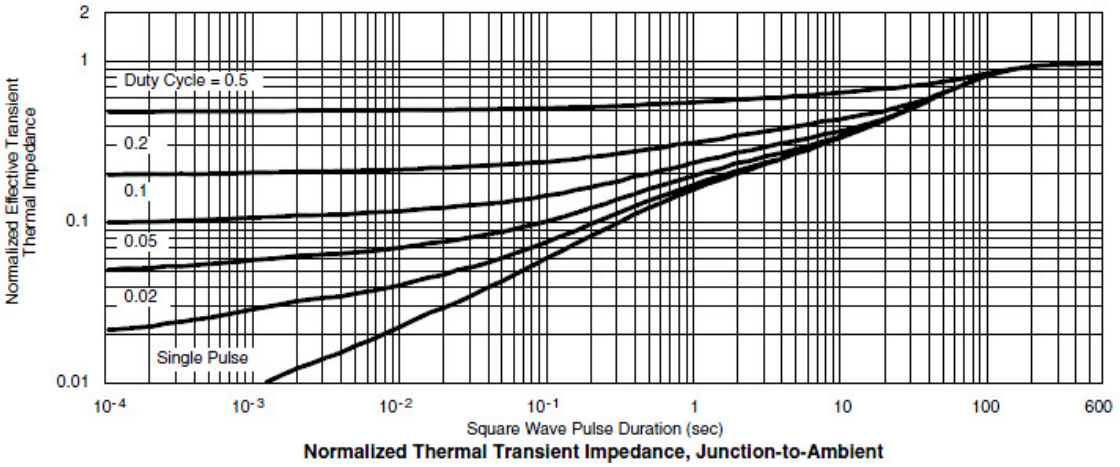
## THERMAL RATINGS




**Maximum Drain Current vs. Case Temperature**



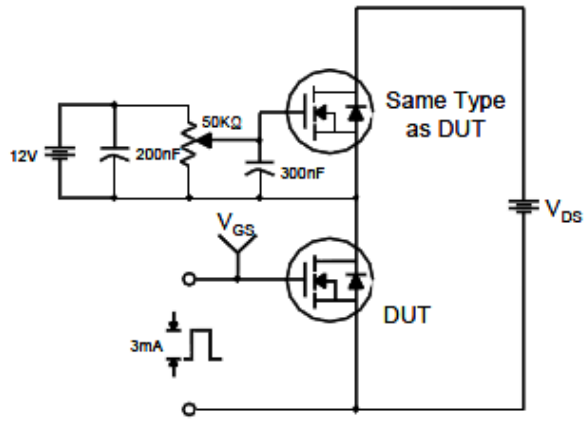

**Safe Operating Area**

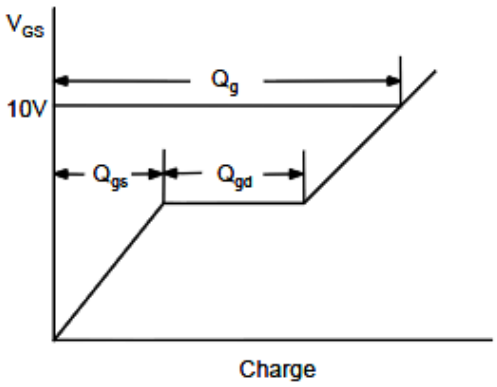



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

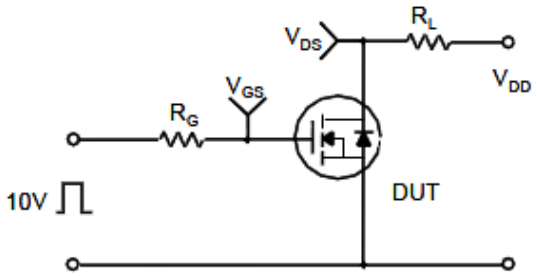
## Typical Characteristics

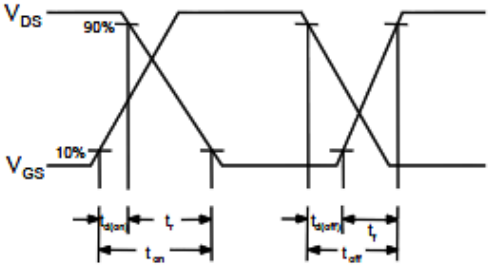
Gate Charge Test Circuit & Waveform



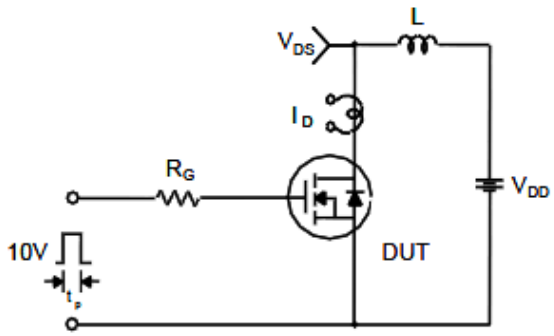




Resistive Switching Test Circuit & Waveforms

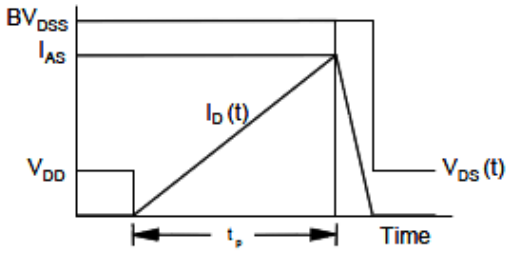


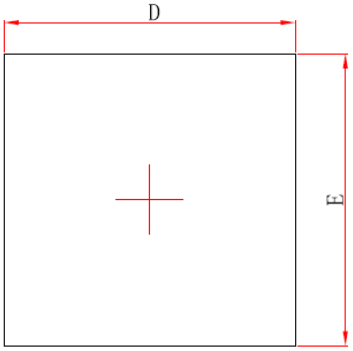

Unclamped Inductive Switching Test Circuit & Waveforms



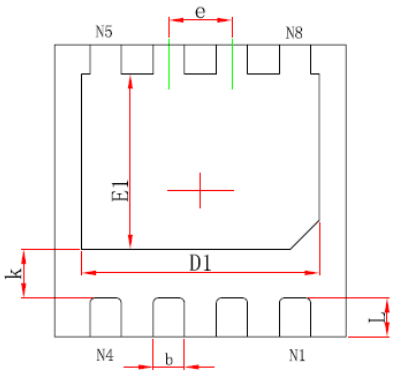

$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



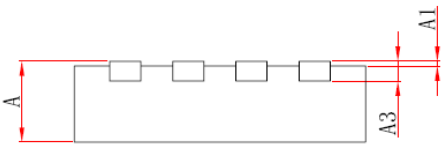
## Package Information ( DFN3X3-8L )




Top View




Bottom View




Side View

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.800 | 0.900 | 0.031 | 0.035 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A3 | 0.203REF. | | 0.008REF. | |
| D | 2.924 | 3.076 | 0.115 | 0.121 |
| E | 2.924 | 3.076 | 0.115 | 0.121 |
| D1 | 2.350 | 2.550 | 0.093 | 0.100 |
| E1 | 1.700 | 1.900 | 0.067 | 0.075 |
| k | 0.450 | 0.550 | 0.018 | 0.022 |
| b | 0.270 | 0.370 | 0.011 | 0.015 |
| e | 0.650TYP. | | 0.026TYP. | |
| L | 0.324 | 0.476 | 0.013 | 0.019 |


2F, No.80, Sec.1, Cheng Kung Rd., Nan Kang Dist., Taipei City 115, Taiwan (R.O.C.)
Tel : 886 2) 2651 3928
Fax : 886 2) 2786 8483
©http://www.alfa-mos.com