

General Description

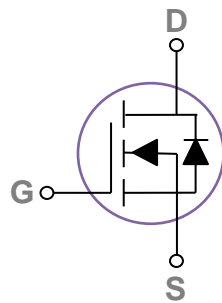
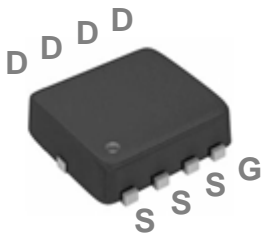
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| 30V | 6.2mΩ | 50A |

Features

- 30V,50A, $R_{DS(ON)} = 6.2m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

PPAK3X3 Pin Configuration



Applications

- Networking
- Load Switch
- Notebook

Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ\text{C}$) | 50 | A |
| | Drain Current – Continuous ($T_c=100^\circ\text{C}$) | 32 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 200 | A |
| EAS | Single Pulse Avalanche Energy ² | 65 | mJ |
| IAS | Single Pulse Avalanche Current ² | 36 | A |
| P_D | Power Dissipation ($T_c=25^\circ\text{C}$) | 33 | W |
| | Power Dissipation – Derate above 25°C | 0.27 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|---------------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 3.74 | $^\circ\text{C}/\text{W}$ |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)
Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------|--------------------------------|--|------|------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250μA | 30 | --- | --- | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =30V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | μA |
| | | V _{DS} =24V, V _{GS} =0V, T _J =125°C | --- | --- | 10 | μA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |

On Characteristics

| | | | | | | |
|---------------------|-----------------------------------|--|-----|-----|-----|----|
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =12A | --- | 5.2 | 6.2 | mΩ |
| | | V _{GS} =4.5V, I _D =10A | --- | 7 | 9 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250μA | 1.2 | 1.6 | 2.5 | V |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _D =1A | --- | 7 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|-------------------------------------|---|-----|------|------|----|
| Q _g | Total Gate Charge ^{3, 4} | V _{DS} =15V, V _{GS} =10V, I _D =25A | --- | 19 | 29 | nC |
| Q _{gs} | Gate-Source Charge ^{3, 4} | | --- | 2.5 | 4 | |
| Q _{gd} | Gate-Drain Charge ^{3, 4} | | --- | 5 | 8 | |
| T _{d(on)} | Turn-On Delay Time ^{3, 4} | V _{DD} =15V, V _{GS} =10V, R _G =6Ω I _D =25A | --- | 4.6 | 7 | ns |
| T _r | Rise Time ^{3, 4} | | --- | 14 | 21 | |
| T _{d(off)} | Turn-Off Delay Time ^{3, 4} | | --- | 27 | 41 | |
| T _f | Fall Time ^{3, 4} | | --- | 7.8 | 12 | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, F=1MHz | --- | 1180 | 1770 | pF |
| C _{oss} | Output Capacitance | | --- | 170 | 260 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 130 | 200 | |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 2 | --- | Ω |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|---|------|------|------|------|
| I _S | Continuous Source Current | V _G =V _D =0V, Force Current | --- | --- | 50 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 100 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1 | V |
| t _{rr} | Reverse Recovery Time | V _R =30V, I _S =10A | --- | 100 | --- | ns |
| Q _{rr} | Reverse Recovery Charge | di/dt=100A/μs, T _J =25°C | --- | 120 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=36A., R_G=25Ω, Starting T_J=25°C.
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

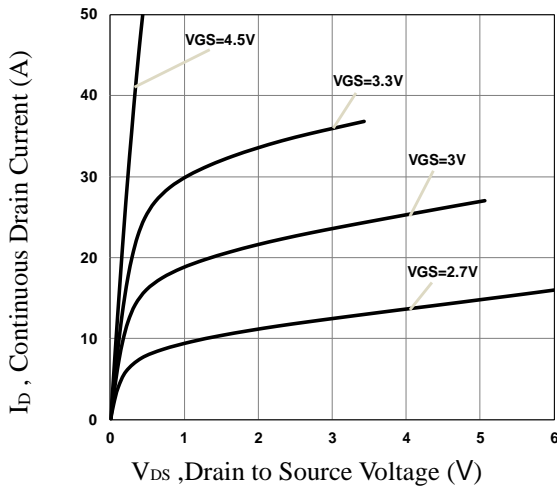


Fig.1 Typical Output Characteristics

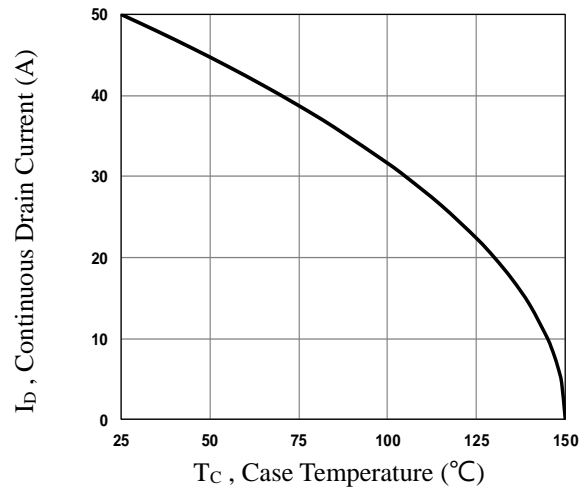


Fig.2 Continuous Drain Current vs. T_c

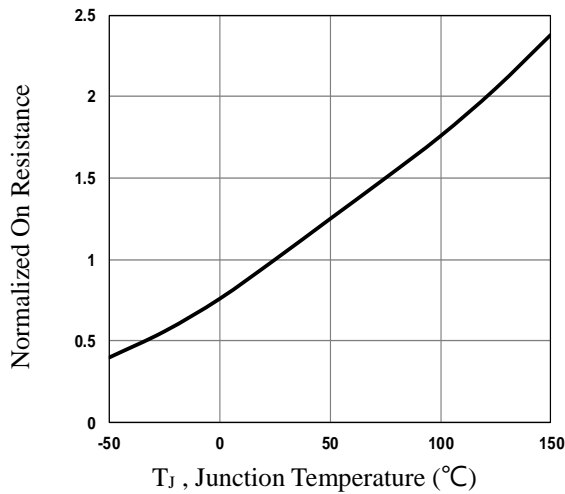


Fig.3 Normalized R_{DS(on)} vs. T_j

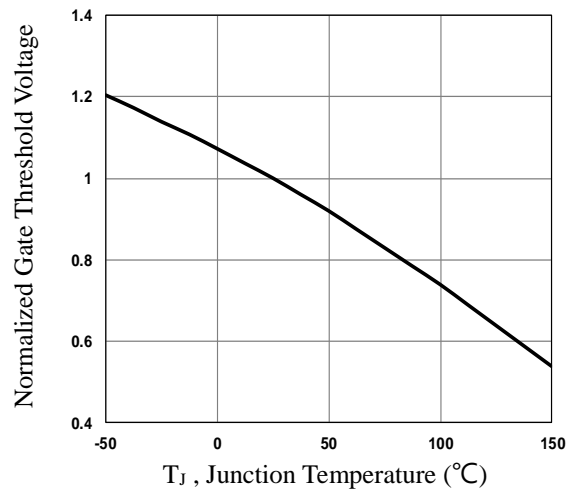


Fig.4 Normalized V_{th} vs. T_j

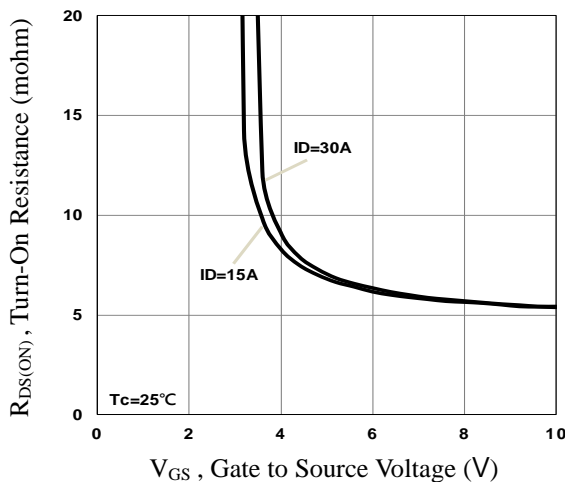


Fig.5 Turn-On Resistance vs. V_{GS}

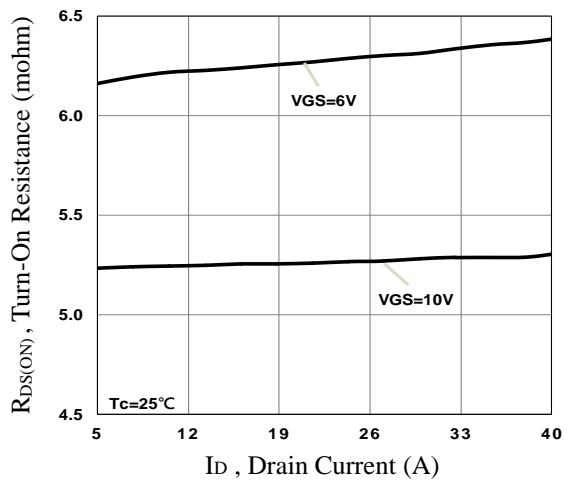


Fig.6 Turn-On Resistance vs. I_D

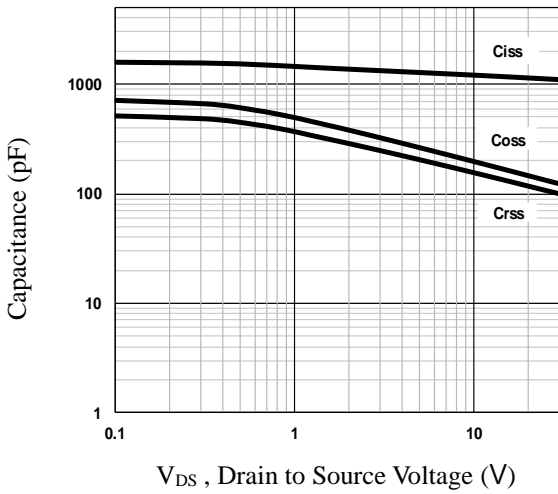


Fig.7 Capacitance Characteristics

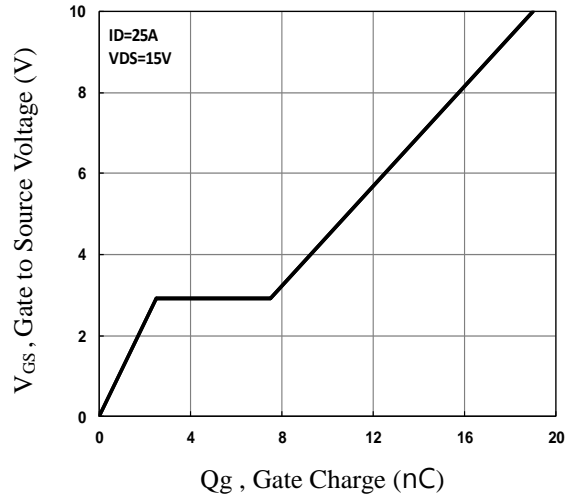


Fig.8 Gate Charge Characteristics

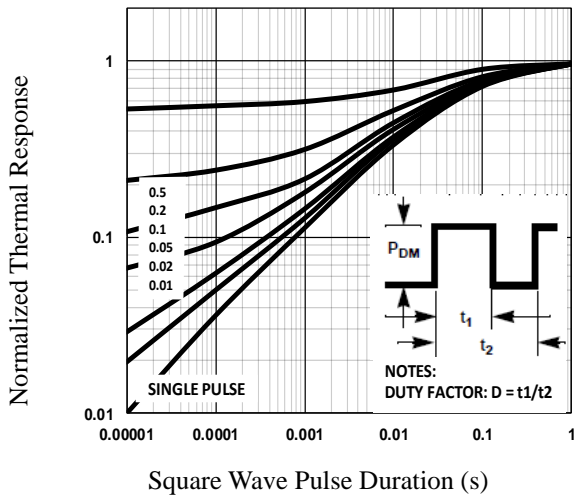


Fig.9 Normalized Transient Impedance

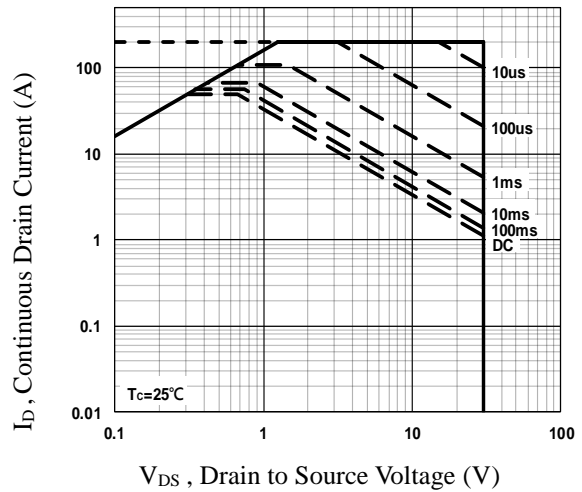


Fig.10 Maximum Safe Operation Area

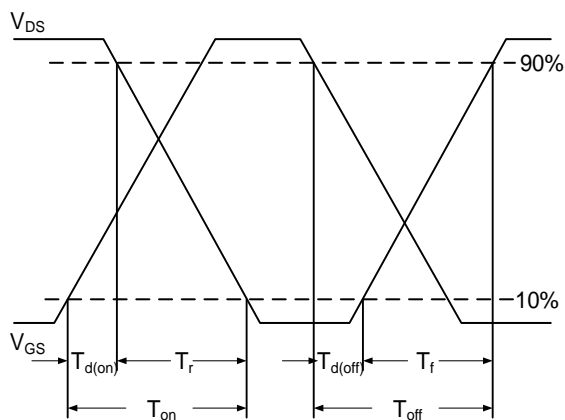


Fig.11 Switching Time Waveform

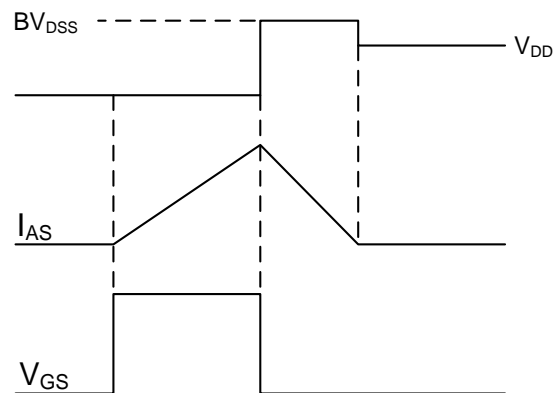


Fig.12 EAS Waveform

PPAK3x3 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | MAX | MIN | MAX | MIN |
| A | 0.900 | 0.700 | 0.035 | 0.028 |
| b | 0.350 | 0.250 | 0.014 | 0.010 |
| c | 0.250 | 0.100 | 0.010 | 0.004 |
| D | 3.500 | 3.050 | 0.138 | 0.120 |
| D1 | 3.200 | 2.900 | 0.126 | 0.114 |
| D2 | 1.950 | 1.350 | 0.077 | 0.053 |
| E | 3.400 | 3.000 | 0.134 | 0.118 |
| E1 | 3.300 | 2.900 | 0.130 | 0.114 |
| E2 | 2.600 | 2.350 | 0.102 | 0.093 |
| e | 0.65BSC | | 0.026BSC | |
| H | 0.750 | 0.300 | 0.030 | 0.012 |
| L | 0.600 | 0.300 | 0.024 | 0.012 |
| L1 | 0.200 | 0.060 | 0.008 | 0.002 |
| θ | 14° | 6° | 14° | 6° |