

General Description

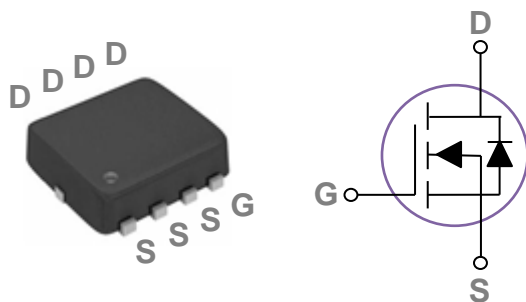
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| 25V | 6mΩ | 50A |

Features

- 25V,50A, $R_{DS(ON)} = 6m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

PPAK3X3 Pin Configuration



Applications

- Networking
- Load Switch
- Notebook

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

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------|
| V_{DS} | Drain-Source Voltage | 25 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ C$) | 50 | A |
| | Drain Current – Continuous ($T_c=100^\circ C$) | 32 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 200 | A |
| EAS | Single Pulse Avalanche Energy ² | 48 | mJ |
| IAS | Single Pulse Avalanche Current ² | 31 | A |
| P_D | Power Dissipation ($T_c=25^\circ C$) | 29 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 0.23 | W/ $^\circ C$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 4.28 | $^\circ C/W$ |

Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)
Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------|--------------------------------|--|------|------|-----------|---------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 25 | --- | --- | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=25V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=20V, V_{GS}=0V, T_J=125^\circ\text{C}$ | --- | --- | 10 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|-------------------------------|-----|-----|-----|-----------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V, I_D=10A$ | --- | 5 | 6 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=6A$ | --- | 7.8 | 10 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.6 | 2.5 | V |
| gfs | Forward Transconductance | $V_{DS}=10V, I_D=3A$ | --- | 17 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|-------------------------------------|--|-----|------|------|----------|
| Q_g | Total Gate Charge ^{3, 4} | $V_{DS}=15V, V_{GS}=10V, I_D=25A$ | --- | 15.4 | 23 | nC |
| Q_{gs} | Gate-Source Charge ^{3, 4} | | --- | 1.8 | 3 | |
| Q_{gd} | Gate-Drain Charge ^{3, 4} | | --- | 4.8 | 8 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{3, 4} | $V_{DD}=15V, V_{GS}=10V, R_G=6\Omega, I_D=25A$ | --- | 5 | 7.5 | ns |
| T_r | Rise Time ^{3, 4} | | --- | 13 | 20 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{3, 4} | | --- | 28 | 42 | |
| T_f | Fall Time ^{3, 4} | | --- | 8 | 12 | |
| C_{iss} | Input Capacitance | $V_{DS}=15V, V_{GS}=0V, F=1\text{MHz}$ | --- | 890 | 1335 | pF |
| C_{oss} | Output Capacitance | | --- | 165 | 248 | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 135 | 203 | |
| R_g | Gate resistance | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | --- | 1.2 | --- | Ω |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|---------------------------|---|------|------|------|---------|
| I_S | Continuous Source Current | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | 50 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | 100 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1 | V |
| t_{rr} | Reverse Recovery Time | $V_{GS}=0V, I_S=10A$ | --- | 590 | --- | ns |
| Q_{rr} | Reverse Recovery Charge | $di/dt=100A/\mu s, T_J=25^\circ\text{C}$ | --- | 1.85 | --- | μC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=31A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

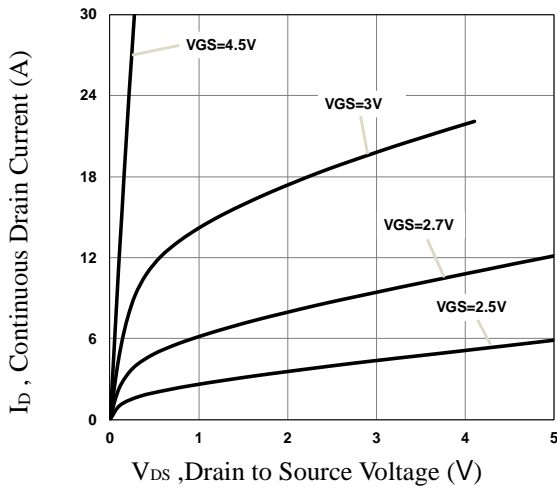


Fig.1 Typical Output Characteristics

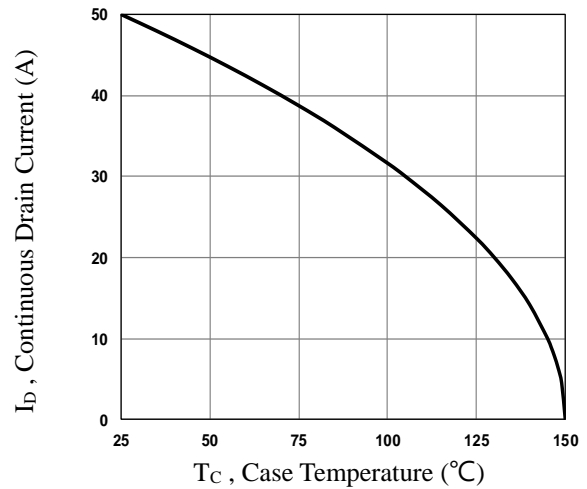


Fig.2 Continuous Drain Current vs. T_c

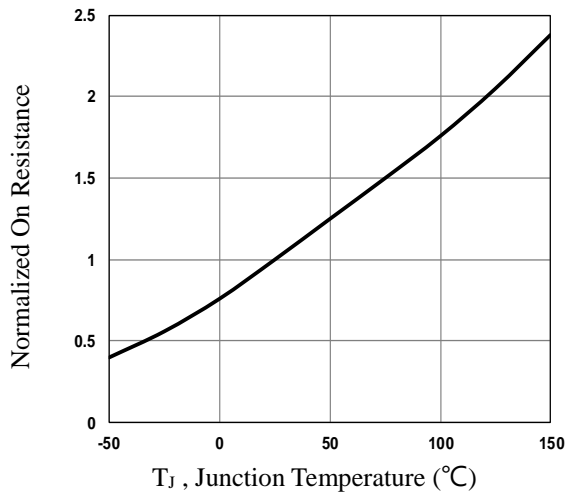


Fig.3 Normalized R_{DS(on)} vs. T_j

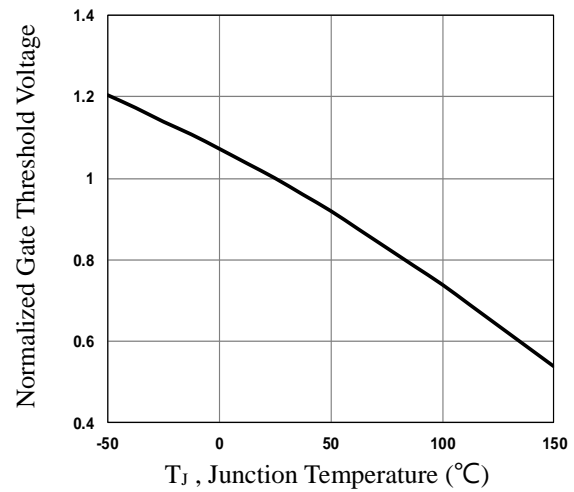


Fig.4 Normalized V_{th} vs. T_j

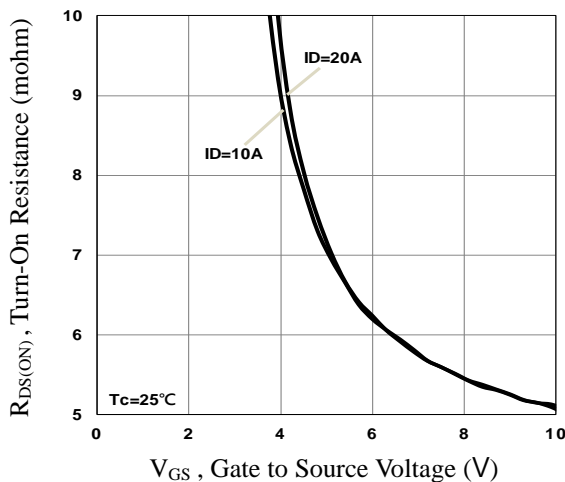


Fig.5 Turn-On Resistance vs. V_{GS}

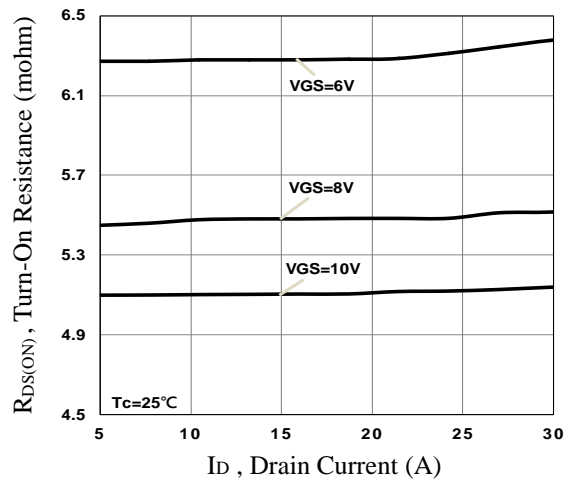


Fig.6 Turn-On Resistance vs. I_D

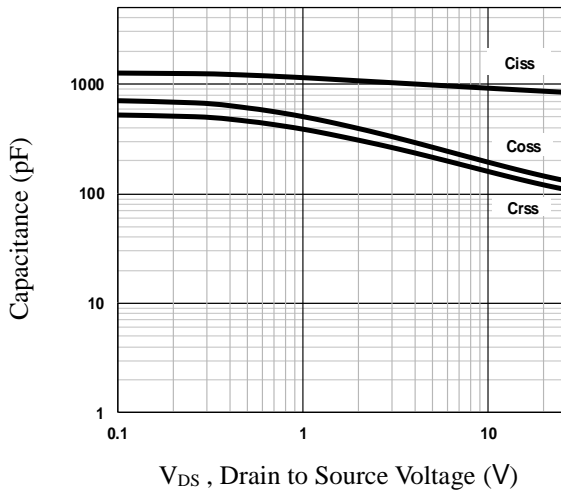


Fig.7 Capacitance Characteristics

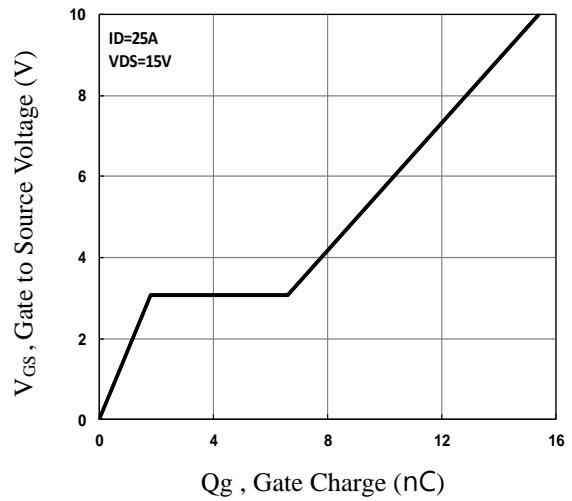


Fig.8 Gate Charge Characteristics

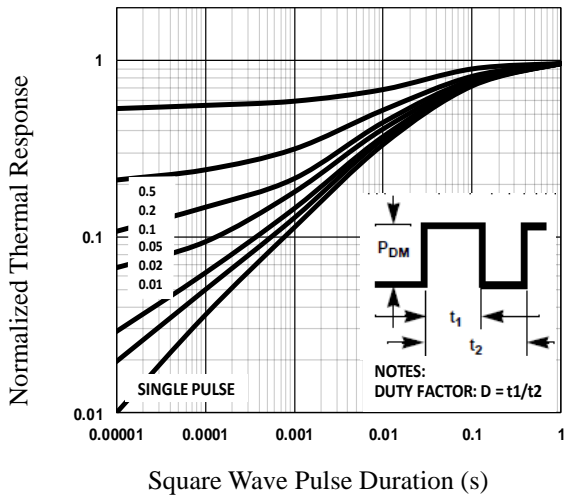


Fig.9 Normalized Transient Impedance

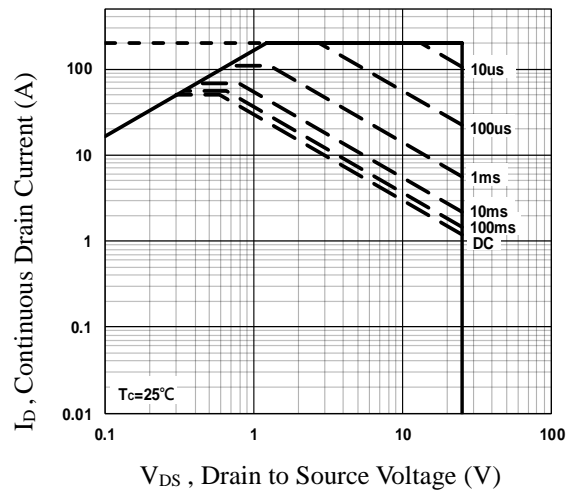


Fig.10 Maximum Safe Operation Area

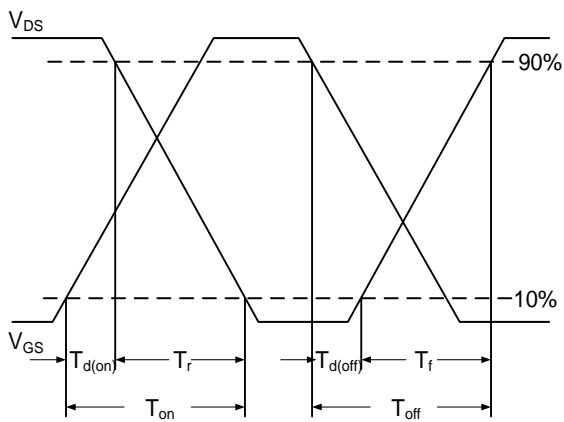


Fig.11 Switching Time Waveform

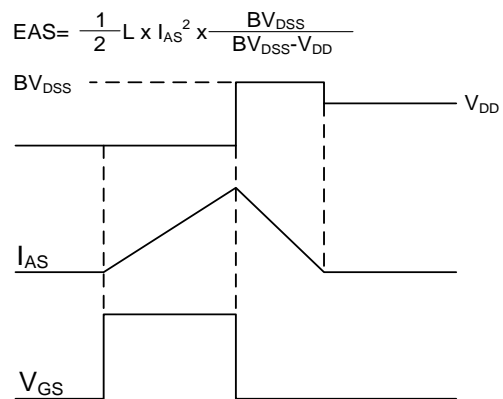
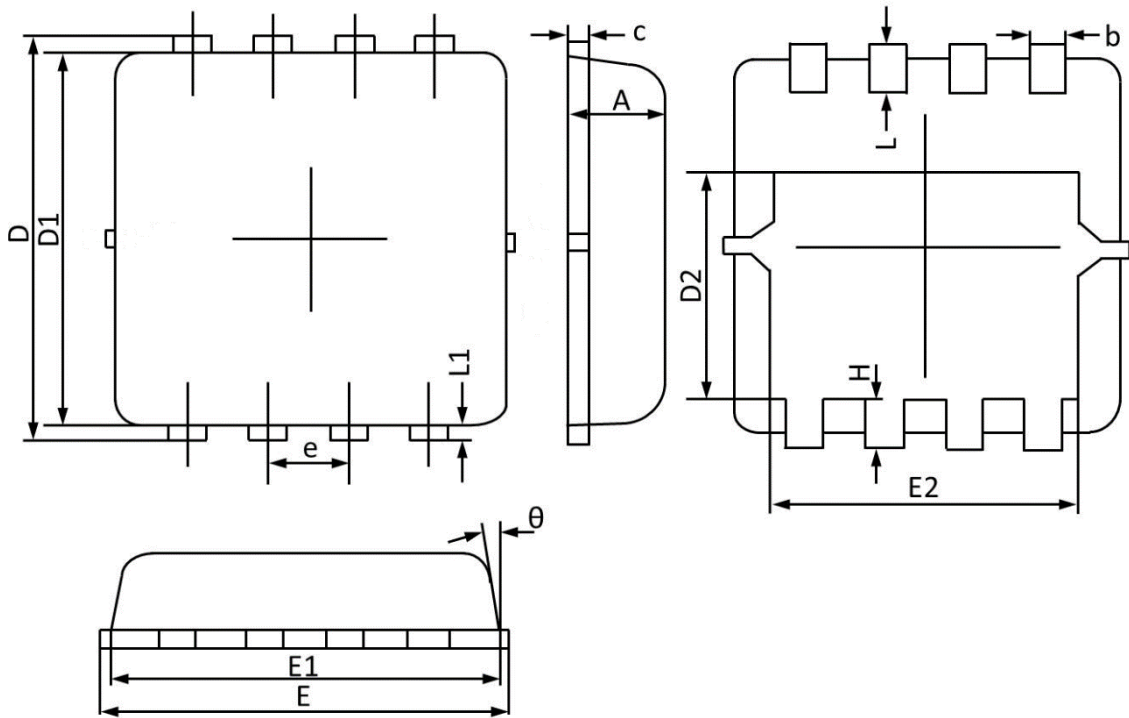


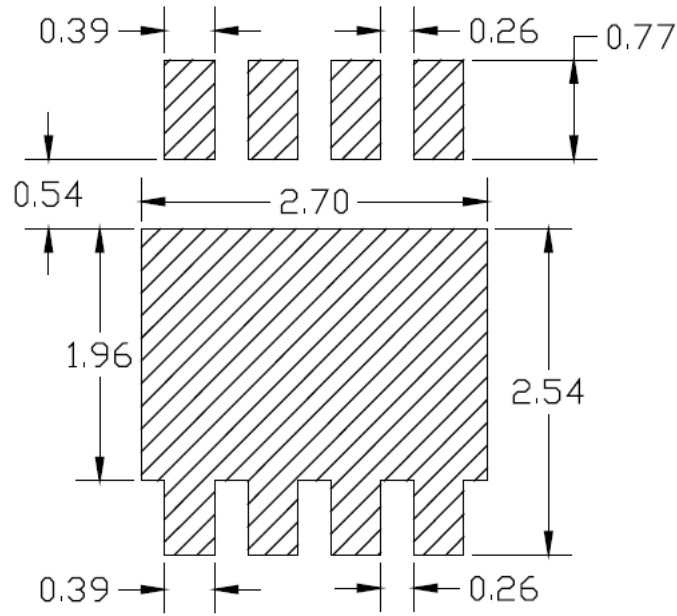
Fig.12 EAS Waveform

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° |

PPAK3X3 RECOMMENDED LAND PATTERN



unit : mm