

General Description

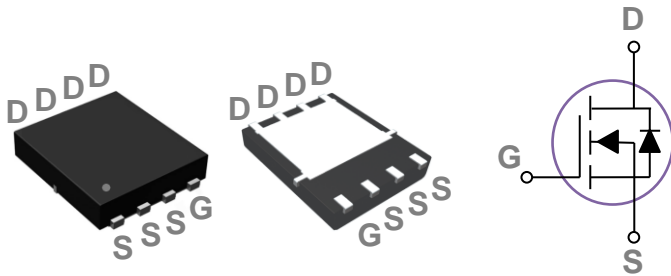
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| 65V | 9.1mΩ | 55A |

Features

- 65V,55A, $R_{DS(ON)} = 9.1m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

PPAK5X6 Pin Configuration



Applications

- Networking
- Load Switch
- LED applications

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

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------|
| V_{DS} | Drain-Source Voltage | 65 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ C$) | 55 | A |
| | Drain Current – Continuous ($T_c=100^\circ C$) | 35 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 220 | A |
| EAS | Single Pulse Avalanche Energy ² | 72 | mJ |
| IAS | Single Pulse Avalanche Current ² | 38 | A |
| P_D | Power Dissipation ($T_c = 25^\circ C$) | 67 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 0.54 | 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 | --- | 1.86 | $^\circ C/W$ |

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------|--------------------------------|---|------|------|-----------|---------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 65 | --- | --- | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=60V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=48V, V_{GS}=0V, T_J=85^\circ\text{C}$ | --- | --- | 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 ^{3, 4} | $V_{GS}=10V, I_D=15A$ | --- | 7.6 | 9.1 | m Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 2 | 3 | 4 | V |
| gfs | Forward Transconductance | $V_{DS}=10V, I_D=3A$ | --- | 8 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|-------------------------------------|--|---------------------------------------|-----|------|----|
| Q_g | Total Gate Charge ^{3, 4} | $V_{DS}=30V, V_{GS}=10V, I_D=30A$ | --- | 19 | 30 | nC |
| Q_{gs} | Gate-Source Charge ^{3, 4} | | --- | 2.9 | 4.5 | |
| Q_{gd} | Gate-Drain Charge ^{3, 4} | | --- | 8.7 | 13 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{3, 4} | $V_{DD}=30V, V_{GS}=10V, R_G=6\Omega$ $I_D=30A$ | --- | 10 | 15 | ns |
| T_r | Rise Time ^{3, 4} | | --- | 14 | 21 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{3, 4} | | --- | 28 | 42 | |
| T_f | Fall Time ^{3, 4} | | --- | 20 | 30 | |
| C_{iss} | Input Capacitance | $V_{DS}=30V, V_{GS}=0V, F=1\text{MHz}$ | --- | 950 | 1450 | pF |
| C_{oss} | Output Capacitance | | --- | 300 | 450 | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 20 | 30 | |
| R_g | Gate resistance | | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | --- | 0.9 | |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|---------------------------|---|------|------|------|------|
| I_S | Continuous Source Current | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | 55 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | 110 | 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 | $V_R=50V, I_S=10A$ | --- | 30 | --- | ns |
| Q_{rr} | Reverse Recovery Charge | $di/dt=100A/\mu s, T_J=25^\circ\text{C}$ | --- | 30 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=38A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

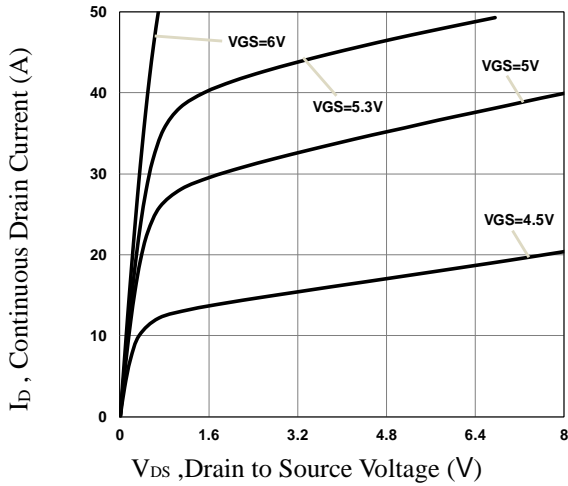


Fig.1 Typical Output Characteristics

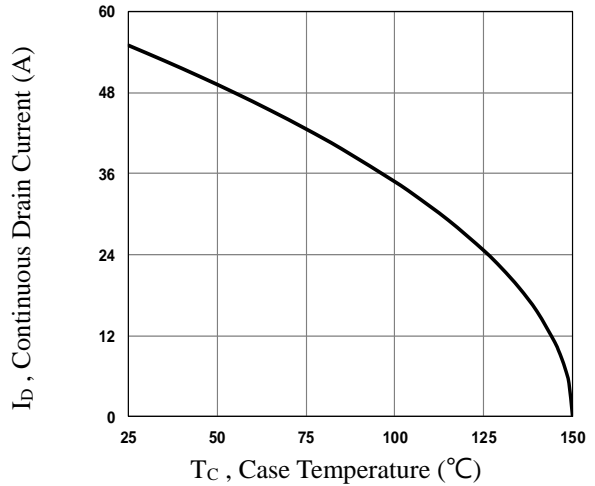


Fig.2 Continuous Drain Current vs. T_C

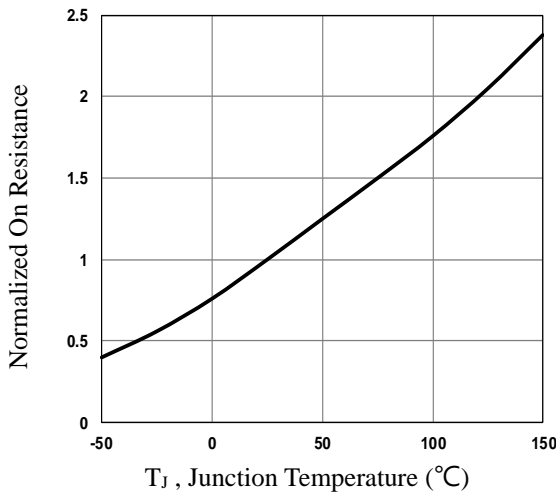


Fig.3 Normalized R_{DS(on)} vs. T_J

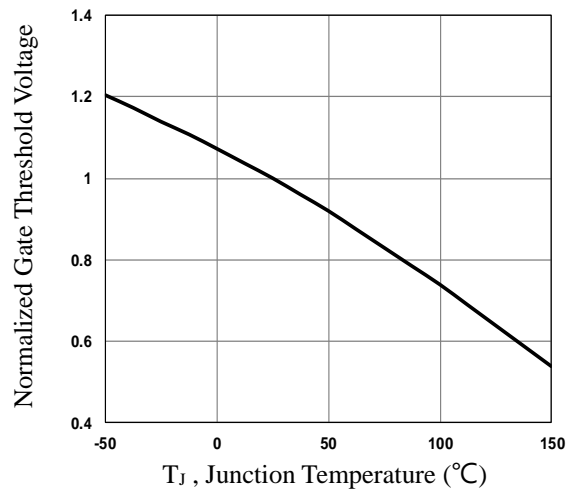


Fig.4 Normalized V_{th} vs. T_J

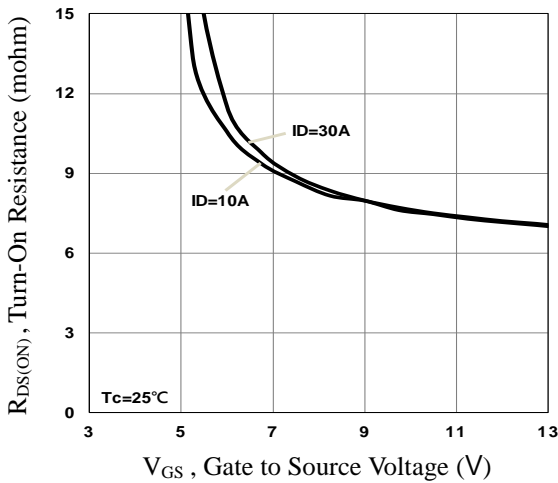


Fig.5 Turn-On Resistance vs. V_{GS}

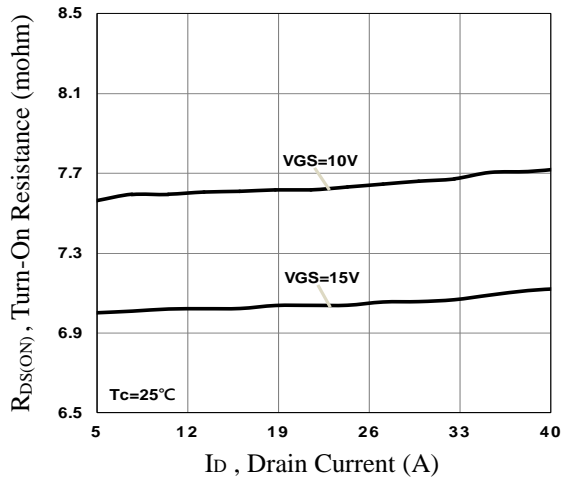


Fig.6 Turn-On Resistance vs. I_D

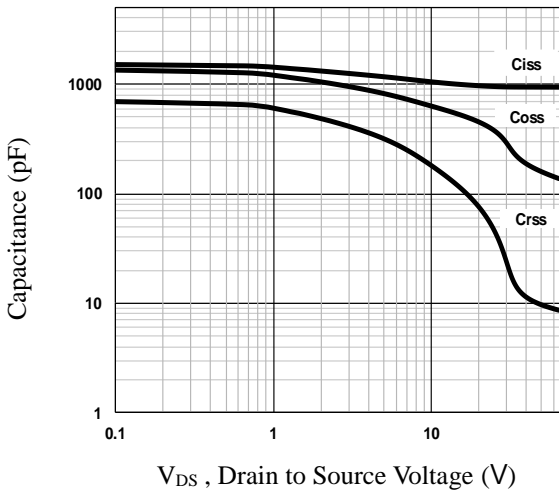


Fig.7 Capacitance Characteristics

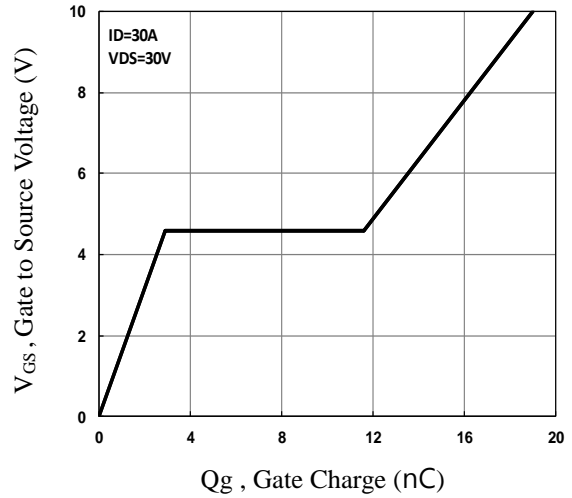


Fig.8 Gate Charge Characteristics

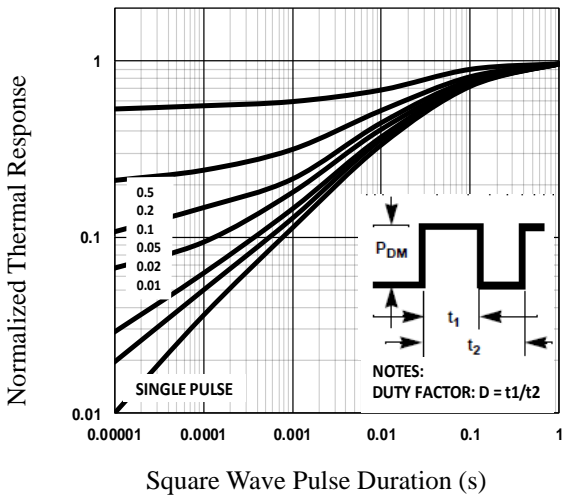


Fig.9 Normalized Transient Impedance

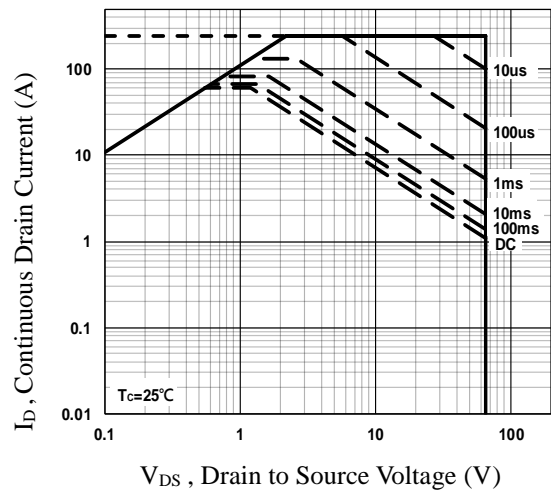


Fig.10 Maximum Safe Operation Area

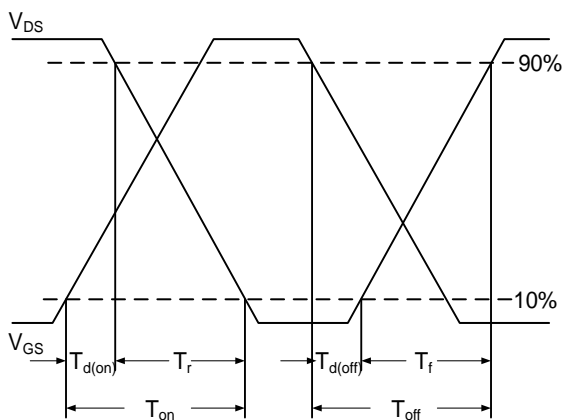


Fig.11 Switching Time Waveform

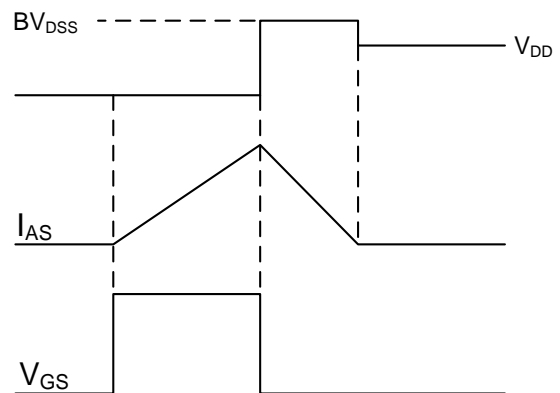


Fig.12 EAS Waveform

PPAK5x6 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | MAX | MIN | MAX | MIN |
| A | 1.200 | 0.850 | 0.047 | 0.031 |
| b | 0.510 | 0.300 | 0.020 | 0.012 |
| C | 0.300 | 0.200 | 0.012 | 0.008 |
| D1 | 5.400 | 4.800 | 0.212 | 0.189 |
| D2 | 4.310 | 3.610 | 0.170 | 0.142 |
| E | 6.300 | 5.850 | 0.248 | 0.230 |
| E1 | 5.960 | 5.450 | 0.235 | 0.215 |
| E2 | 3.920 | 3.300 | 0.154 | 0.130 |
| e | 1.27BSC | | 0.05BSC | |
| H | 0.650 | 0.380 | 0.026 | 0.015 |
| K | --- | 1.100 | --- | 0.043 |
| L | 0.710 | 0.380 | 0.028 | 0.015 |
| L1 | 0.250 | 0.050 | 0.009 | 0.002 |
| theta | 12° | 0° | 12° | 0° |