

General Description

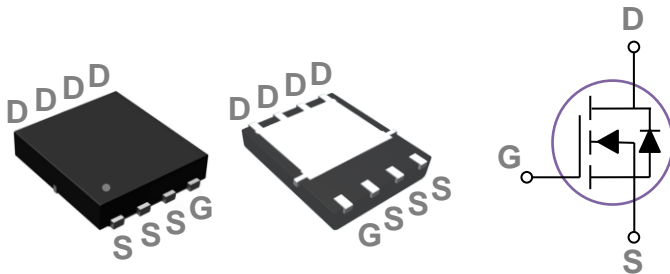
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| 30V | 4.2mΩ | 90A |

Features

- 30V,90A, $R_{DS(ON)} = 4.2m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

PPAK5X6 Pin Configuration



Applications

- Motor Drive
- Power Tools
- LED Lighting

Absolute Maximum Ratings $T_c=25^\circ C$ 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 ($T_c=25^\circ C$) | 90 | A |
| | Drain Current – Continuous ($T_c=100^\circ C$) | 58 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 360 | A |
| EAS | Single Pulse Avalanche Energy ² | 115 | mJ |
| IAS | Single Pulse Avalanche Current ² | 48 | A |
| P_D | Power Dissipation ($T_c=25^\circ C$) | 74 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 0.59 | 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 | --- | 1.7 | $^\circ C/W$ |

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 =250uA | 30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.03 | --- | V/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =30V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =24V, V _{GS} =0V, T _J =125°C | --- | --- | 10 | uA |
| 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 =15A | --- | 3.5 | 4.2 | mΩ |
| | | V _{GS} =4.5V, I _D =10A | --- | 4.8 | 6.2 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.2 | 1.6 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -4.17 | --- | mV/°C |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _D =3A | --- | 20 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|-------------------------------------|---|--|------|------|----|
| Q _g | Total Gate Charge ^{3, 4} | V _{DS} =15V, V _{GS} =10V, I _D =45A | --- | 34.8 | 52 | nC |
| Q _{gs} | Gate-Source Charge ^{3, 4} | | --- | 4.4 | 6.6 | |
| Q _{gd} | Gate-Drain Charge ^{3, 4} | | --- | 8.4 | 13 | |
| T _{d(on)} | Turn-On Delay Time ^{3, 4} | V _{DD} =15V, V _{GS} =10V, R _G =6Ω I _D =45A | --- | 9.7 | 20 | ns |
| T _r | Rise Time ^{3, 4} | | --- | 15.8 | 31 | |
| T _{d(off)} | Turn-Off Delay Time ^{3, 4} | | --- | 37.4 | 75 | |
| T _f | Fall Time ^{3, 4} | | --- | 12 | 24 | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, F=1MHz | --- | 1910 | 2870 | pF |
| C _{oss} | Output Capacitance | | --- | 300 | 450 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 230 | 350 | |
| R _g | Gate resistance | | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 1.5 | |

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 | --- | --- | 90 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 180 | 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 | --- | 120 | --- | ns |
| Q _{rr} | Reverse Recovery Charge | di/dt=100A/μs, T _J =25°C | --- | 160 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=48A., 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.

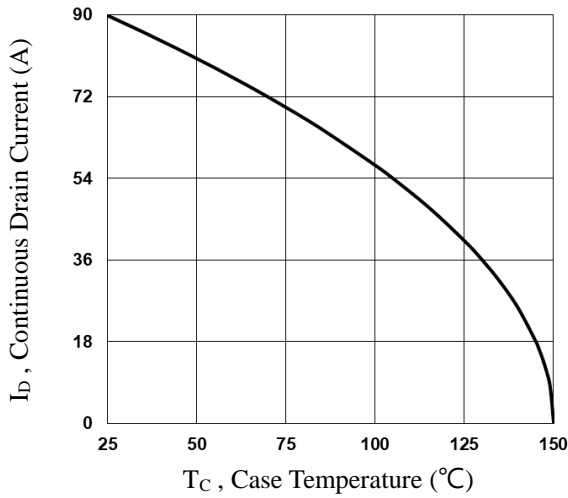


Fig.1 Continuous Drain Current vs. TC

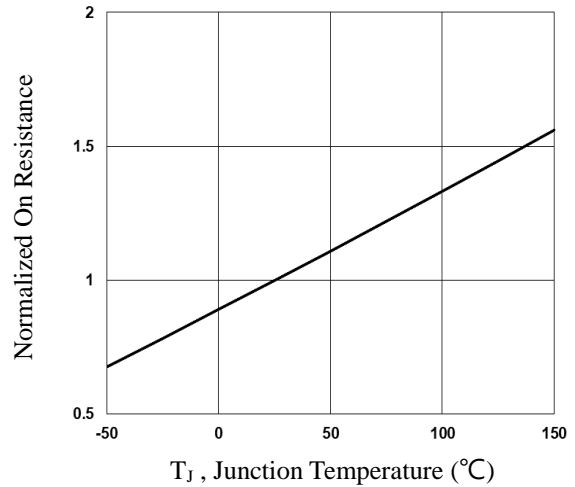


Fig.2 Normalized RDSON vs. TJ

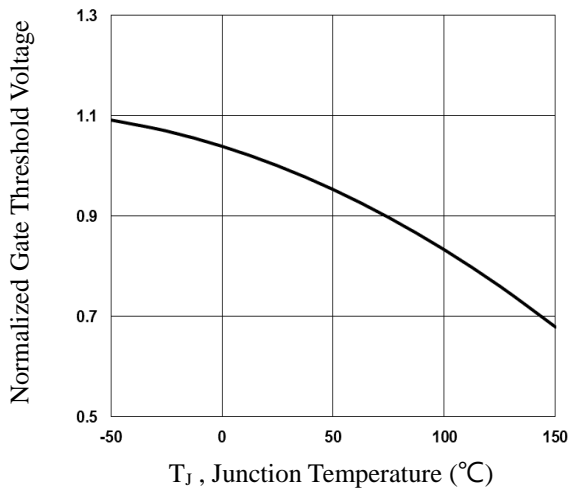


Fig.3 Normalized V_{th} vs. T_J

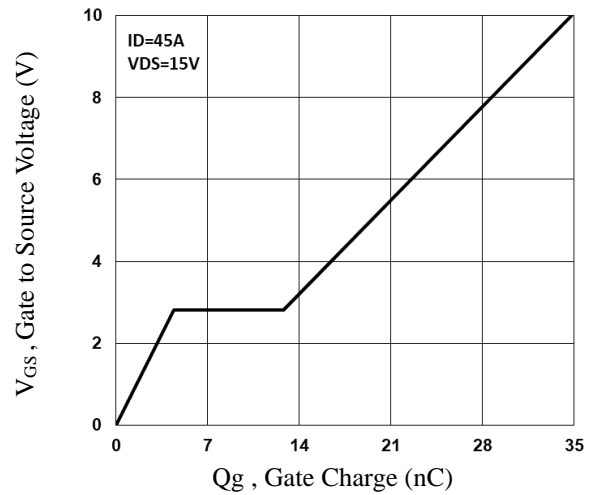


Fig.4 Gate Charge Characteristics

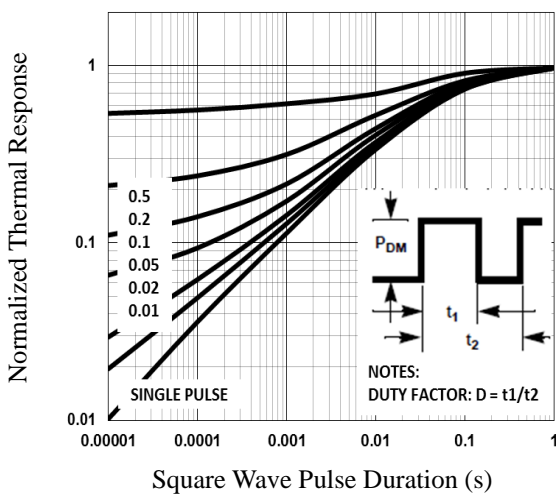


Fig.5 Normalized Transient Impedance

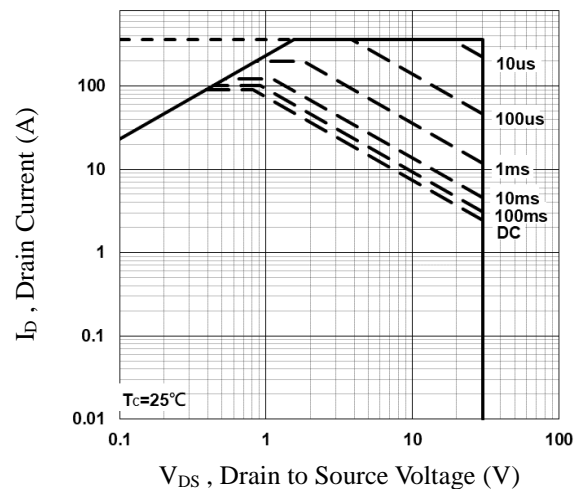


Fig.6 Maximum Safe Operation Area

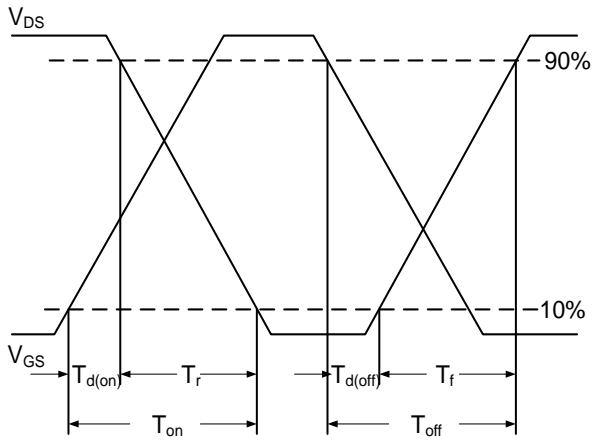


Fig.7 Switching Time Waveform

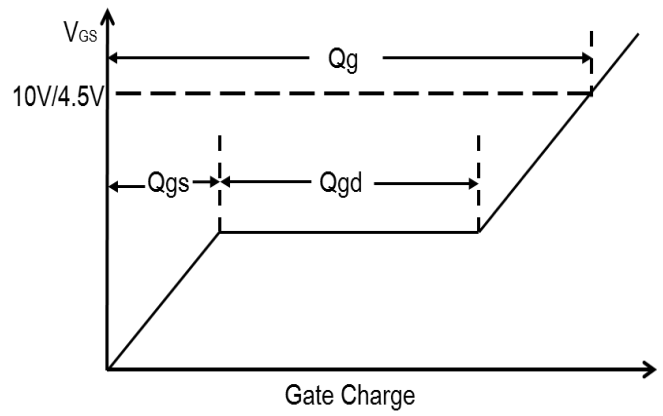


Fig.8 Gate Charge Waveform

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 |
| θ | 12° | 0° | 12° | 0° |