

General Description

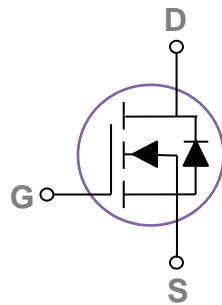
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|------|
| BVDSS | RDSON | ID |
| 60V | 4.6mΩ | 100A |

Features

- 60V, 100A, $R_{DS(ON)} = 4.6m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

PPAK5X6 Pin Configuration



Applications

- PowerTools
- Load Switch
- LED applications
- Motor Drive Applications

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

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------|
| V_{DS} | Drain-Source Voltage | 60 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ C$) | 100 | A |
| | Drain Current – Continuous ($T_c=100^\circ C$) | 63 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 400 | A |
| EAS | Single Pulse Avalanche Energy ² | 450 | mJ |
| IAS | Single Pulse Avalanche Current ² | 95 | A |
| P_D | Power Dissipation ($T_c=25^\circ C$) | 142 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 1.14 | W/ $^\circ C$ |
| T_{STG} | Storage Temperature Range | -50 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -50 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 | --- | 0.88 | $^\circ C/W$ |

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 =250μA | 60 | --- | --- | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =60V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | μA |
| | | V _{DS} =48V, 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 =20A | --- | 3.8 | 4.6 | mΩ |
| | | V _{GS} =4.5V, I _D =10A | --- | 4.2 | 5.5 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250μA | 1 | 1.6 | 2.5 | V |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _D =3A | --- | 25 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|------------------------------------|--|-----|------|-------|----|
| Q _g | Total Gate Charge ^{3,4} | V _{DS} =30V, V _{GS} =4.5V, I _D =10A | --- | 58.2 | 116 | nC |
| Q _{gs} | Gate-Source Charge ^{3,4} | | --- | 16.2 | 32 | |
| Q _{gd} | Gate-Drain Charge ^{3,4} | | --- | 23.4 | 46 | |
| T _{d(on)} | Turn-On Delay Time ^{3,4} | V _{DD} =30V, V _{GS} =10V, R _G =6Ω I _D =1A | --- | 19.2 | 40 | ns |
| T _r | Rise Time ^{3,4} | | --- | 56.3 | 120 | |
| T _{d(off)} | Turn-Off Delay Time ^{3,4} | | --- | 90.8 | 200 | |
| T _f | Fall Time ^{3,4} | | --- | 21.6 | 40 | |
| C _{iss} | Input Capacitance | V _{DS} =25V, V _{GS} =0V, F=1MHz | --- | 6805 | 10000 | pF |
| C _{oss} | Output Capacitance | | --- | 445 | 680 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 195 | 280 | |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 1.3 | 2.6 | 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 | --- | --- | 100 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 200 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=95A., Starting T_J=25°C
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

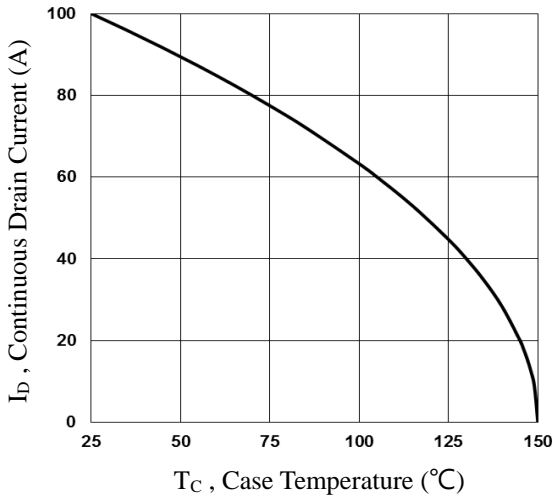


Fig.1 Continuous Drain Current vs. T_C

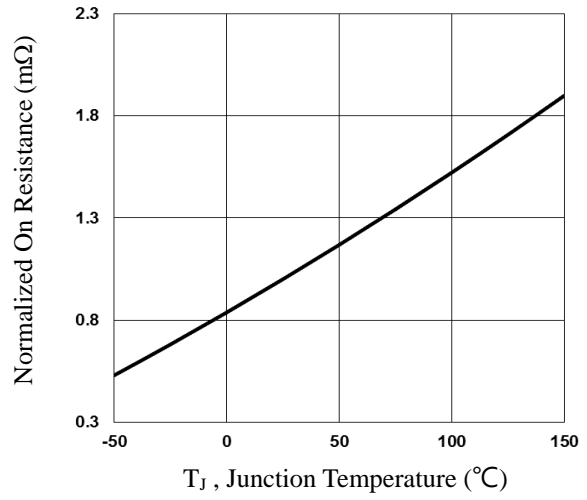


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

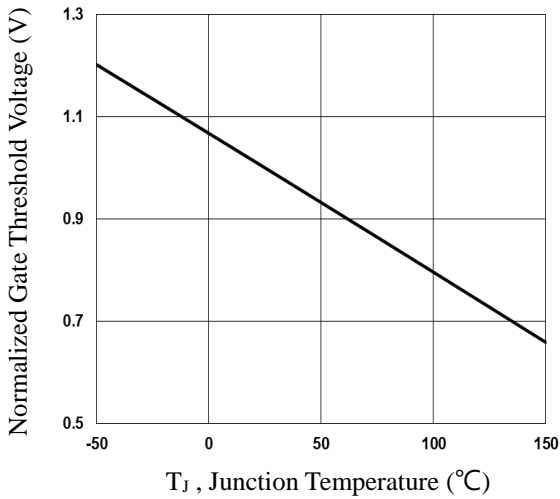


Fig.3 Normalized V_{th} vs. T_J

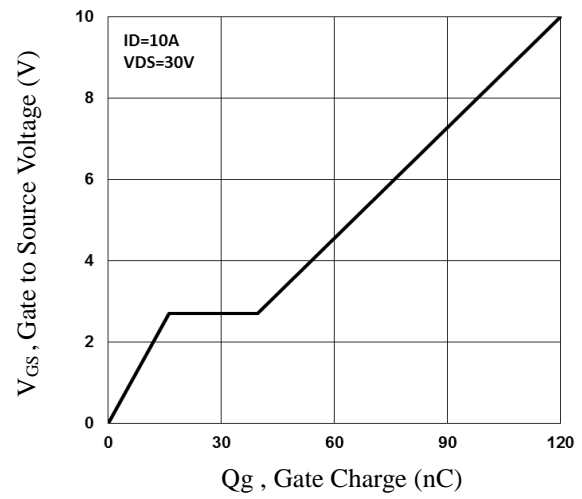


Fig.4 Gate Charge Characteristics

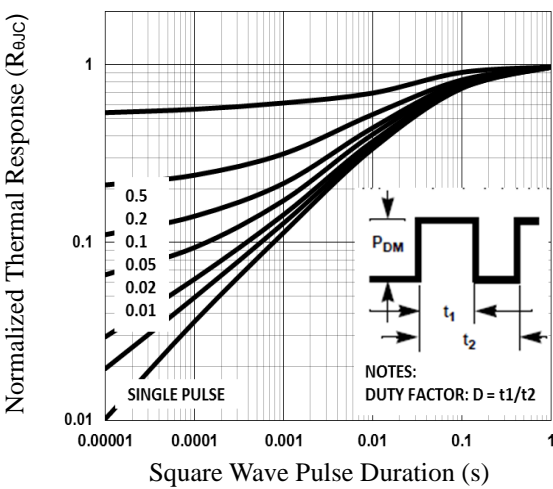


Fig.5 Normalized Transient Impedance

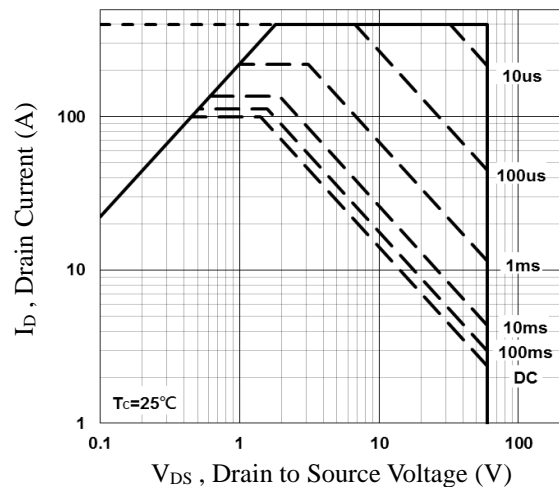


Fig.6 Maximum Safe Operation Area

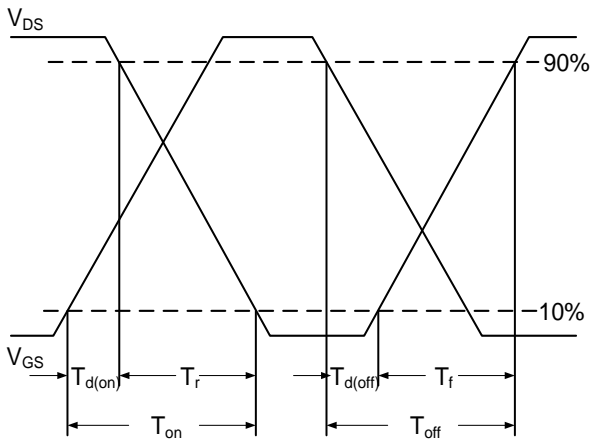


Fig.7 Switching Time Waveform

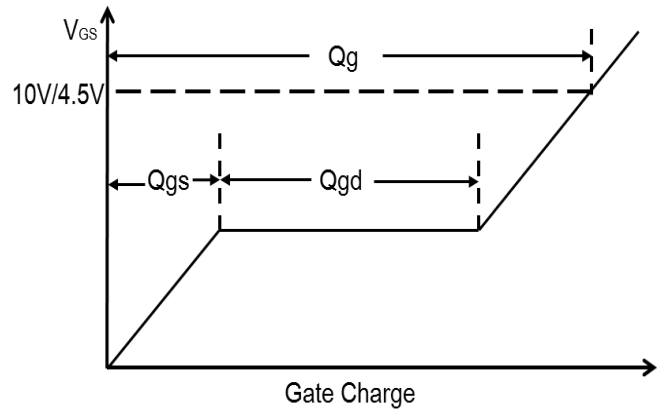
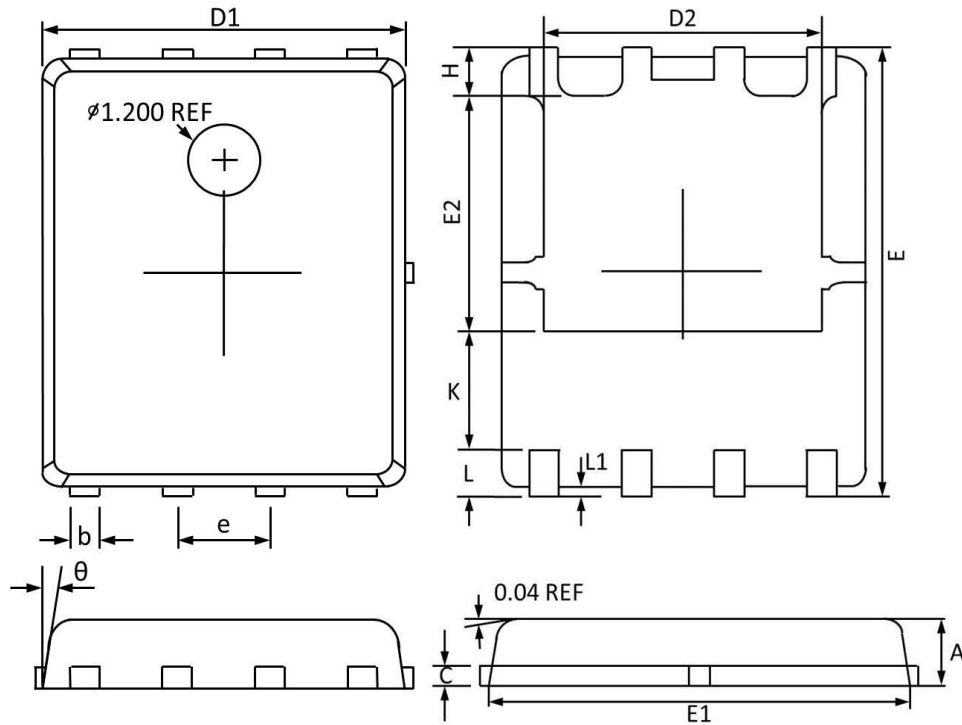


Fig.8 Gate Charge Waveform

PPAK5x6 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | MAX | MIN | MAX | MIN |
| A | 1.100 | 0.800 | 0.043 | 0.031 |
| b | 0.510 | 0.330 | 0.020 | 0.013 |
| C | 0.300 | 0.200 | 0.012 | 0.008 |
| D1 | 5.100 | 4.800 | 0.201 | 0.189 |
| D2 | 4.100 | 3.610 | 0.161 | 0.142 |
| E | 6.200 | 5.900 | 0.244 | 0.232 |
| E1 | 5.900 | 5.700 | 0.232 | 0.224 |
| E2 | 3.780 | 3.350 | 0.149 | 0.132 |
| e | 1.27BSC | | 0.05BSC | |
| H | 0.700 | 0.410 | 0.028 | 0.016 |
| K | 1.500 | 1.100 | 0.059 | 0.043 |
| L | 0.710 | 0.510 | 0.028 | 0.020 |
| L1 | 0.200 | 0.060 | 0.008 | 0.002 |
| θ | 12° | 0° | 12° | 0° |