

150V N-Channel MOSFETs

General Description

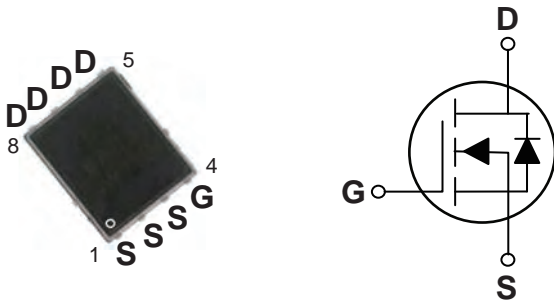
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| 150V | 65mΩ | 15A |

Features

- 150V, 15A, $R_{DS(ON)} = 65m\Omega$ @ $V_{GS} = 10V$
- VGS Guarantee $\pm 25V$
- Improved dv/dt capability
- Fast switching
- 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 | 150 | V |
| V_{GS} | Gate-Source Voltage | ± 25 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ C$) | 15 | A |
| | Drain Current – Continuous ($T_c=100^\circ C$) | 9.5 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 60 | A |
| P_D | Power Dissipation ($T_c=25^\circ C$) | 135 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 1.08 | 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 | --- | 0.92 | $^\circ C/W$ |



FTK30N15DFN56

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 | $V_{GS}=0V, I_D=250\mu A$ | 150 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BV_{DSS} Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | --- | 0.08 | --- | $V/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=120V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=96V, V_{GS}=0V, T_J=125^\circ\text{C}$ | --- | --- | 30 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 25V, V_{DS}=0V$ | --- | --- | ± 100 | nA |

On Characteristics

| | | | | | | |
|---------------------|--|-------------------------------|-----|------|-----|---------------------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ³ | $V_{GS}=10V, I_D=6A$ | --- | 52 | 65 | $m\Omega$ |
| | | $V_{GS}=6V, I_D=4A$ | --- | 65 | 90 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 2 | 3 | 4 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -2.5 | --- | $mV/^\circ\text{C}$ |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|------------------------------------|---|-----|------|------|----------|
| Q_g | Total Gate Charge ^{2,3} | $V_{DS}=30V, V_{GS}=10V, I_D=4A$ | --- | 30 | 45 | nC |
| Q_{gs} | Gate-Source Charge ^{2,3} | | --- | 8.7 | 14 | |
| Q_{gd} | Gate-Drain Charge ^{2,3} | | --- | 8 | 15 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{2,3} | $V_{DD}=30V, V_{GS}=10V, R_G=6\Omega$ $I_D=1A$ | --- | 14.5 | 28 | ns |
| T_r | Rise Time ^{2,3} | | --- | 19.2 | 18 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{2,3} | | --- | 33.6 | 60 | |
| T_f | Fall Time ^{2,3} | | --- | 22.8 | 25 | |
| C_{iss} | Input Capacitance | $V_{DS}=30V, V_{GS}=0V, F=1\text{MHz}$ | --- | 1790 | 3000 | pF |
| C_{oss} | Output Capacitance | | --- | 160 | 300 | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 82 | 160 | |
| R_g | Gate Resistance | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | | 1.4 | 2.8 | 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 | --- | --- | 15 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | 30 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1.2 | V |
| t_{rr} | Reverse Recovery Time ² | $V_{GS}=0V, I_S=1A, di/dt=100A/\mu s$ $T_J=25^\circ\text{C}$ | --- | --- | --- | ns |
| Q_{rr} | Reverse Recovery Charge ² | | --- | --- | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

ELECTRICAL CHARACTERISTICS CURVES

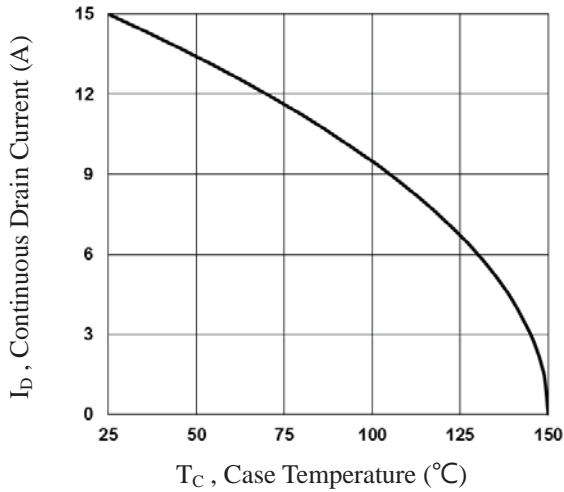


Fig.1 Continuous Drain Current vs. T_C

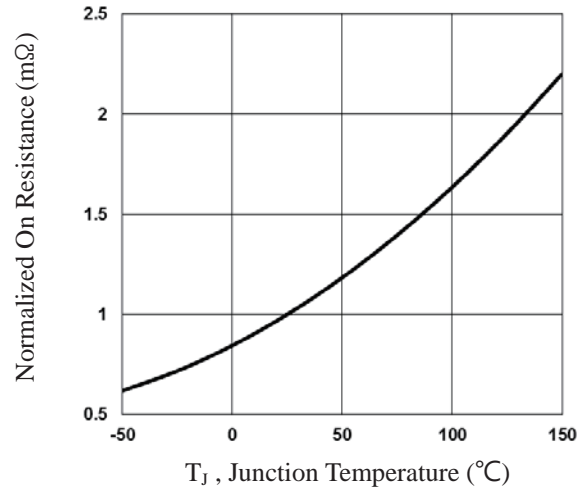


Fig.2 Normalized RDSON vs. T_J

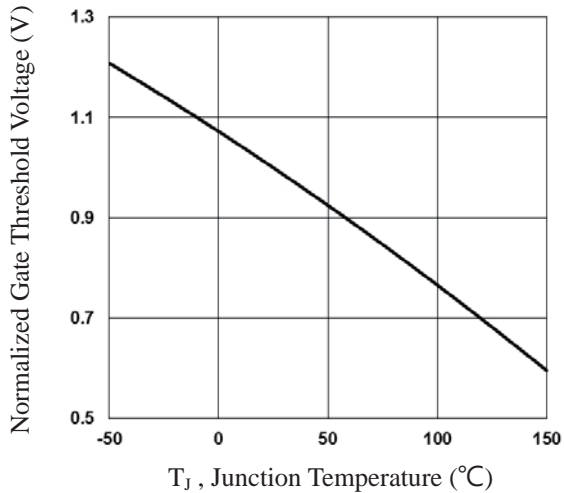


Fig.3 Normalized V_{th} vs. T_J

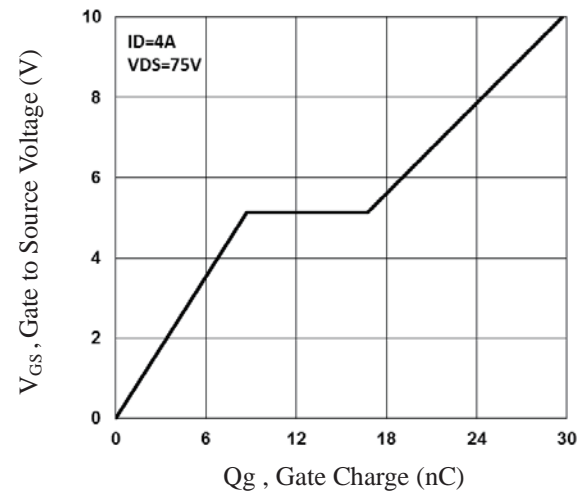


Fig.4 Gate Charge Characteristics

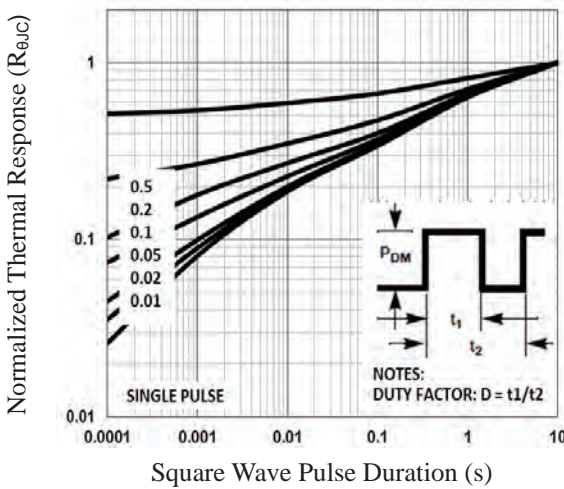


Fig.5 Normalized Transient Impedance

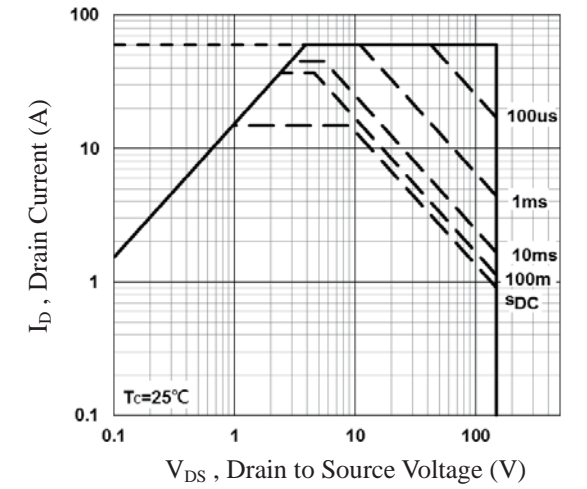


Fig.6 Maximum Safe Operation Area

ELECTRICAL CHARACTERISTICS CURVES (Con.)

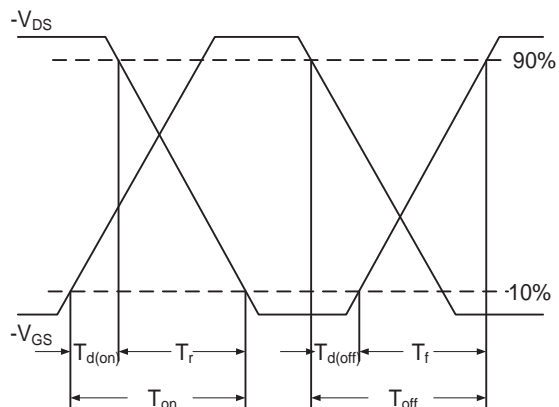


Fig.7 Switching Time Waveform

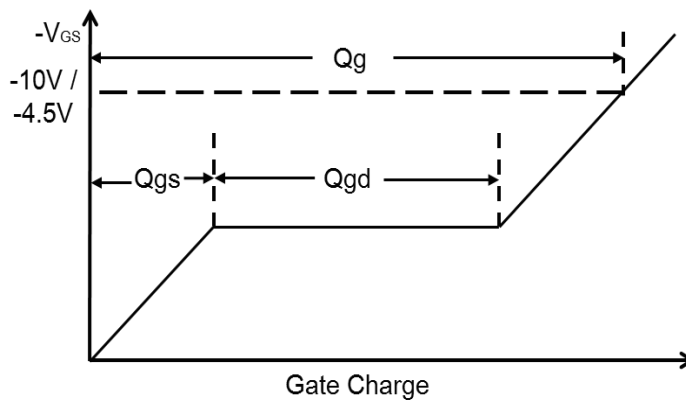
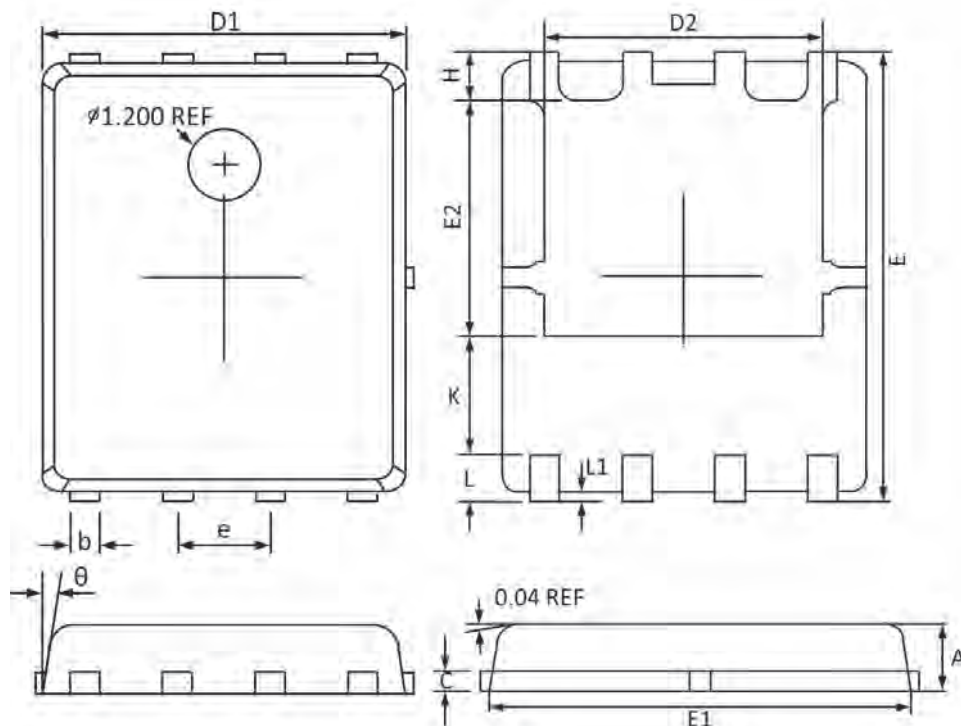


Fig.8 Gate Charge Waveform

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° |