

General Description

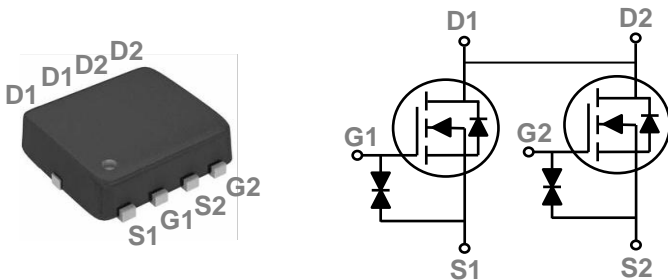
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|------|
| BVDSS | RDSON | ID |
| 20V | 14mΩ | 8.6A |

Features

- 20V,8.6A, $R_{DS(ON)} = 14m\Omega$ @ $V_{GS} = 4.5V$
- Improved dv/dt capability
- ESD Protection Diode Embedded
- 100% EAS Guaranteed
- Green Device Available

PPAK3x3 Dual NEP Pin Configuration



Applications

- POL Applications
- SMPS 2nd SR
- Li-Battery Protection

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

| Symbol | Parameter | Rating | Units |
|-----------|---|------------|---------------|
| V_{DS} | Drain-Source Voltage | 20 | V |
| V_{GS} | Gate-Source Voltage | ± 10 | V |
| I_D | Drain Current – Continuous ($T_A=25^\circ C$) | 8.6 | A |
| | Drain Current – Continuous ($T_A=70^\circ C$) | 6.8 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 34.4 | A |
| P_D | Power Dissipation ($T_c=25^\circ C$) | 1.67 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 0.014 | 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 | --- | 75 | $^\circ C/W$ |

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 | 20 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.02 | --- | V/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =20V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =16V, V _{GS} =0V, T _J =125°C | --- | --- | 10 | uA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±10V, V _{DS} =0V | --- | --- | ±10 | uA |

On Characteristics

| | | | | | | |
|----------------------|---|--|-----|------|------|-------|
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =4.5V, I _D =5A | 8.5 | 11 | 14 | mΩ |
| | | V _{GS} =4.2V, I _D =5A | 8.5 | 11.2 | 14.2 | mΩ |
| | | V _{GS} =3.7V, I _D =4A | 8.5 | 11.5 | 14.5 | mΩ |
| | | V _{GS} =3.0V, I _D =4A | 9 | 12 | 15.2 | mΩ |
| | | V _{GS} =2.5V, I _D =3A | 9.5 | 12.5 | 16 | mΩ |
| | | V _{GS} =1.8V, I _D =2A | 11 | 15.5 | 20 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 0.3 | 0.6 | 1 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 2 | --- | mV/°C |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _S =5A | --- | 13 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|-------------------------------------|--|-----|------|------|----|
| Q _g | Total Gate Charge ^{2, 3} | V _{DS} =10V, V _{GS} =4.5V, I _D =5A | --- | 16.9 | 26 | nC |
| Q _{gs} | Gate-Source Charge ^{2, 3} | | --- | 1.1 | 3 | |
| Q _{gd} | Gate-Drain Charge ^{2, 3} | | --- | 4 | 7 | |
| T _{d(on)} | Turn-On Delay Time ^{2, 3} | V _{DD} =10V, V _{GS} =4.5V, R _G =25Ω I _D =1A | --- | 6.8 | 13 | ns |
| T _r | Rise Time ^{2, 3} | | --- | 20 | 38 | |
| T _{d(off)} | Turn-Off Delay Time ^{2, 3} | | --- | 41.8 | 79 | |
| T _f | Fall Time ^{2, 3} | | --- | 13.2 | 25 | |
| C _{iss} | Input Capacitance | V _{DS} =10V, V _{GS} =0V, F=1MHz | --- | 1020 | 1480 | pF |
| C _{oss} | Output Capacitance | | --- | 160 | 240 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 110 | 160 | |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 2 | 4 | 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 | --- | --- | 8.6 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 17.2 | 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. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

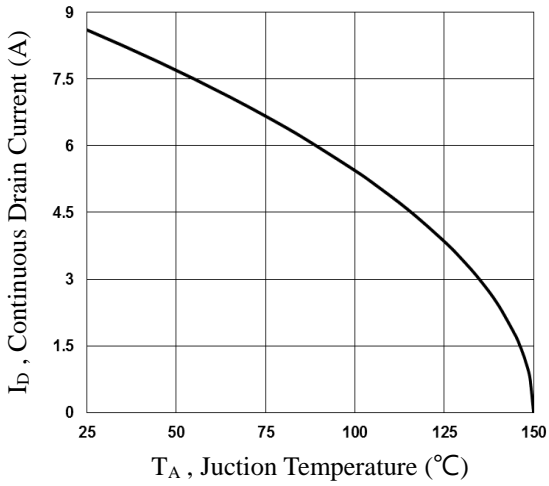


Fig.1 Continuous Drain Current vs. T_c

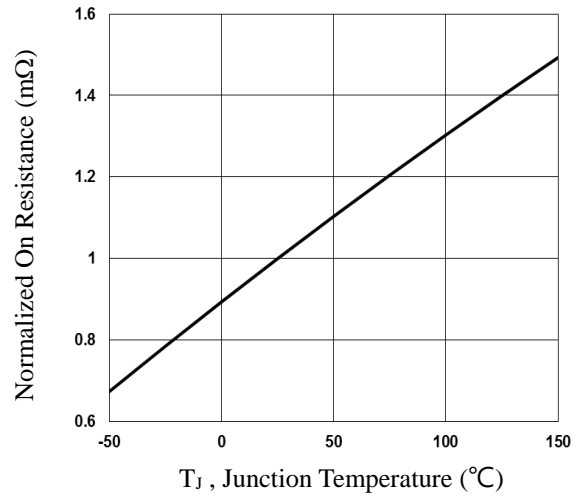


Fig.2 Normalized R_{DS(on)} vs. T_J

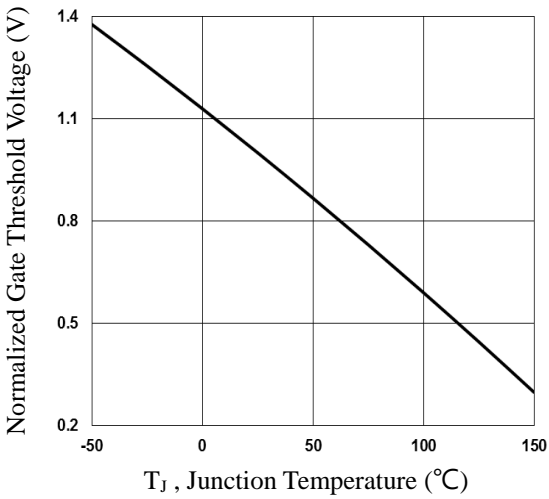


Fig.3 Normalized V_{th} vs. T_J

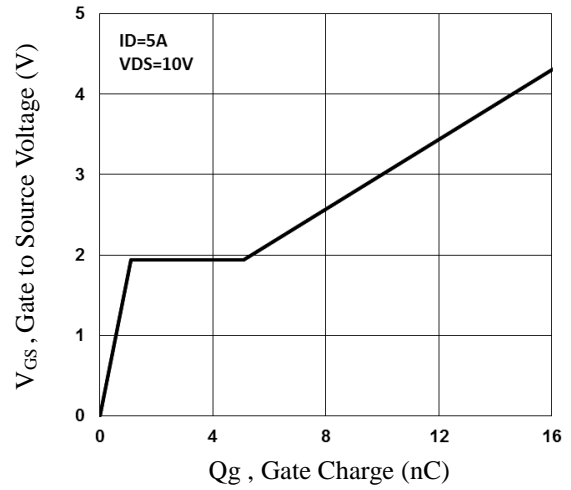


Fig.4 Gate Charge Waveform

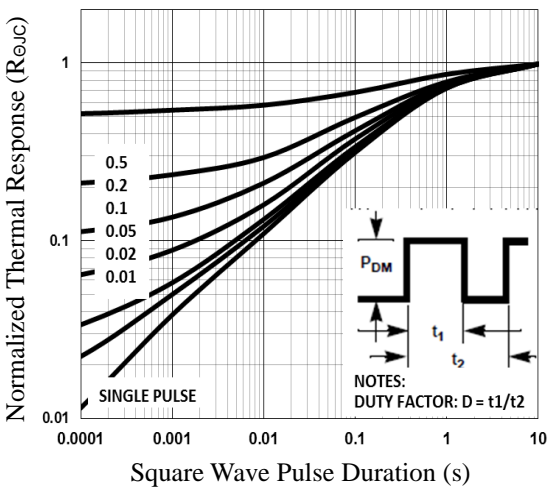


Fig.5 Normalized Transient Response

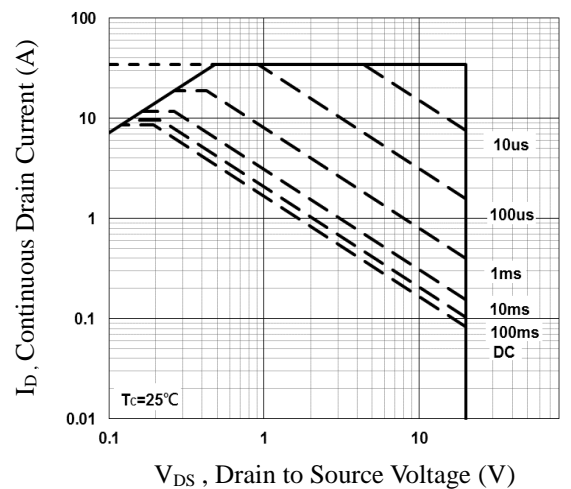


Fig.6 Maximum Safe Operation Area

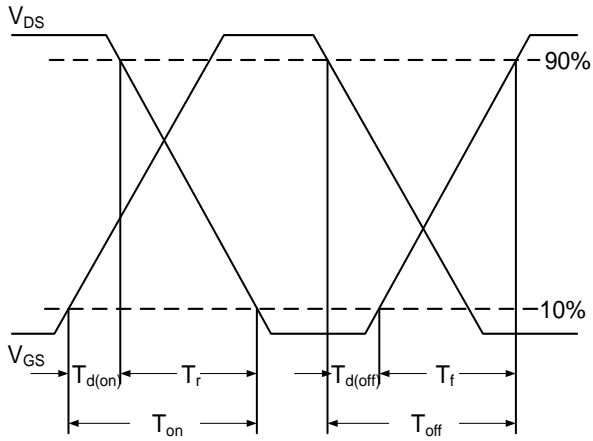


Fig.7 Switching Time Waveform

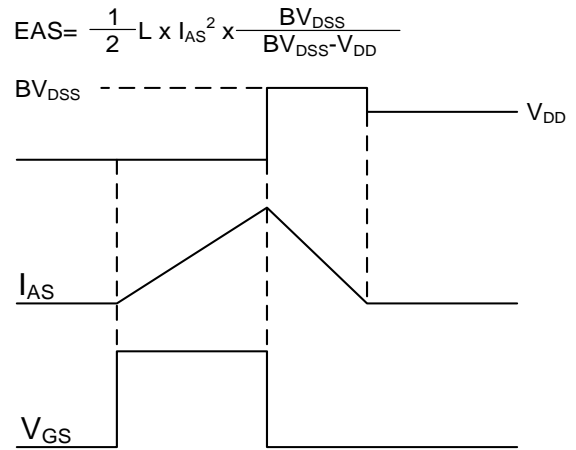
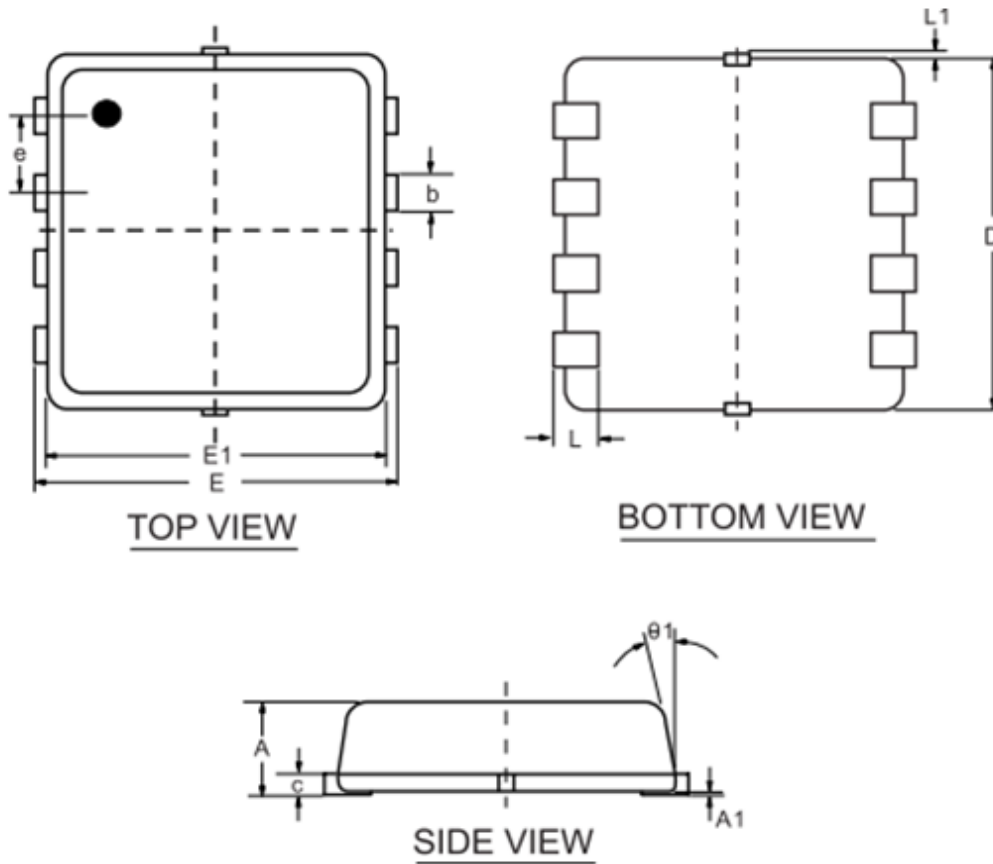


Fig.8 EAS Waveform

PPAK3x3 Dual NEP PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | |
|------------|---------------------------|-------|-------|
| | Min | Typ | Max |
| A | 0.700 | 0.800 | 0.900 |
| A1 | 0.000 | --- | 0.050 |
| b | 0.250 | 0.300 | 0.350 |
| c | 0.080 | 0.152 | 0.250 |
| D | 2.800 | 2.900 | 3.000 |
| E | 2.700 | 2.800 | 2.900 |
| E1 | 2.200 | 2.300 | 2.400 |
| e | 0.65BSC | | |
| L | 0.200 | 0.375 | 0.450 |
| L1 | 0.00 | --- | 0.10 |
| $\theta 1$ | 0° | 10° | 12° |