

### General Description

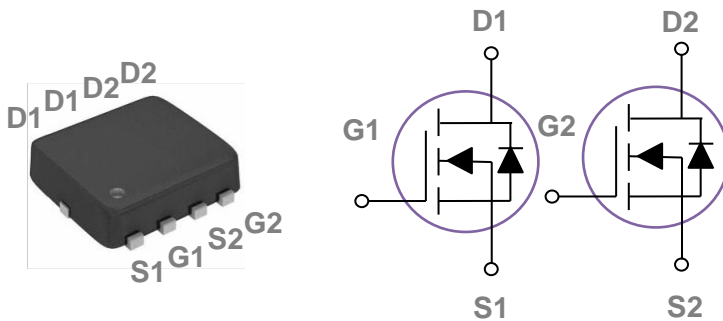
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

|       |       |     |
|-------|-------|-----|
| BVDSS | RDSON | ID  |
| 30V   | 13mΩ  | 35A |

### Features

- 30V,35A,  $R_{DS(ON)} = 13m\Omega$  @  $V_{GS} = 10V$
- Improved  $dv/dt$  capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

### PPAK3X3 Dual Pin Configuration



### Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2<sup>nd</sup> SR

### Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

| Symbol    | Parameter  | Rating     | Units               |
|-----------|--|------------|---------------------|
| $V_{DS}$  | Drain-Source Voltage                                   | 30         | V                   |
| $V_{GS}$  | Gate-Source Voltage                                    | $\pm 20$   | V                   |
| $I_D$     | Drain Current – Continuous ( $T_c=25^\circ\text{C}$ )  | 35         | A                   |
|           | Drain Current – Continuous ( $T_c=100^\circ\text{C}$ ) | 22         | A                   |
| $I_{DM}$  | Drain Current – Pulsed <sup>1</sup>                    | 140        | A                   |
| EAS       | Single Pulse Avalanche Energy <sup>2</sup>             | 13         | mJ                  |
| IAS       | Single Pulse Avalanche Current <sup>2</sup>            | 16         | A                   |
| $P_D$     | Power Dissipation ( $T_c=25^\circ\text{C}$ )           | 27         | W                   |
|           | Power Dissipation – Derate above $25^\circ\text{C}$    | 0.22       | W/ $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature Range                              | -55 to 150 | $^\circ\text{C}$    |
| $T_J$     | Operating Junction Temperature Range                   | -55 to 150 | $^\circ\text{C}$    |

### Thermal Characteristics

| Symbol          | Parameter                              | Typ. | Max. | Unit                      |
|-----------------|--|------|------|---------------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | ---  | 62   | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case    | ---  | 4.6  | $^\circ\text{C}/\text{W}$ |

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

| Symbol                              | Parameter                                 | Conditions   | Min. | Typ. | Max. | Unit |
|-------------------------------------|---|--|------|------|------|------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage            | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                       | 30   | ---  | ---  | V    |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient | Reference to 25°C, I <sub>D</sub> =1mA                           | ---  | 0.04 | ---  | V/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current              | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C  | ---  | ---  | 1    | uA   |
|                                     |   | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C | ---  | ---  | 10   | uA   |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current               | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                       | ---  | ---  | ±100 | nA   |

**On Characteristics**

|                      |  |  |     |     |     |       |
|----------------------|--|--|-----|-----|-----|-------|
| R <sub>DS(ON)</sub>  | Static Drain-Source On-Resistance <sup>3</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =10A                | --- | 10  | 13  | mΩ    |
|                      |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                | --- | 14  | 18  | mΩ    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA | 1.2 | 1.8 | 2.5 | V     |
| ΔV <sub>GS(th)</sub> | V <sub>GS(th)</sub> Temperature Coefficient    |  | --- | -4  | --- | mV/°C |
| g <sub>fs</sub>      | Forward Transconductance                       | V <sub>DS</sub> =10V, I <sub>D</sub> =3A                 | --- | 6   | --- | S     |

**Dynamic and switching Characteristics**

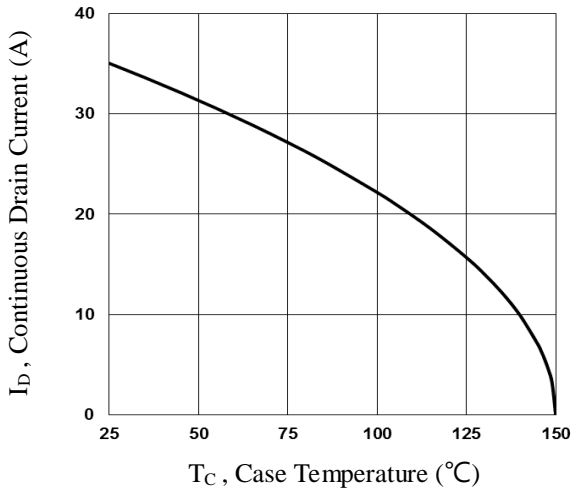
|                     |                                    |  |     |     |     |    |
|---------------------|------------------------------------|--|-----|-----|-----|----|
| Q <sub>g</sub>      | Total Gate Charge <sup>3,4</sup>   | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                      | --- | 7.4 | 12  | nC |
| Q <sub>gs</sub>     | Gate-Source Charge <sup>3,4</sup>  |  | --- | 2.3 | 5   |    |
| Q <sub>gd</sub>     | Gate-Drain Charge <sup>3,4</sup>   |  | --- | 3   | 6   |    |
| T <sub>d(on)</sub>  | Turn-On Delay Time <sup>3,4</sup>  | V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω<br>I <sub>D</sub> =1A | --- | 3.8 | 7   | ns |
| T <sub>r</sub>      | Rise Time <sup>3,4</sup>           |  | --- | 10  | 19  |    |
| T <sub>d(off)</sub> | Turn-Off Delay Time <sup>3,4</sup> |  | --- | 22  | 42  |    |
| T <sub>f</sub>      | Fall Time <sup>3,4</sup>           |  | --- | 6.6 | 13  |    |
| C <sub>iss</sub>    | Input Capacitance                  | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz                                    | --- | 620 | 900 | pF |
| C <sub>oss</sub>    | Output Capacitance                 |  | --- | 85  | 125 |    |
| C <sub>riss</sub>   | Reverse Transfer Capacitance       |  | --- | 60  | 90  |    |
| R <sub>g</sub>      | Gate resistance                    | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                     | --- | 2.8 | 5.6 | Ω  |

**Drain-Source Diode Characteristics and Maximum Ratings**

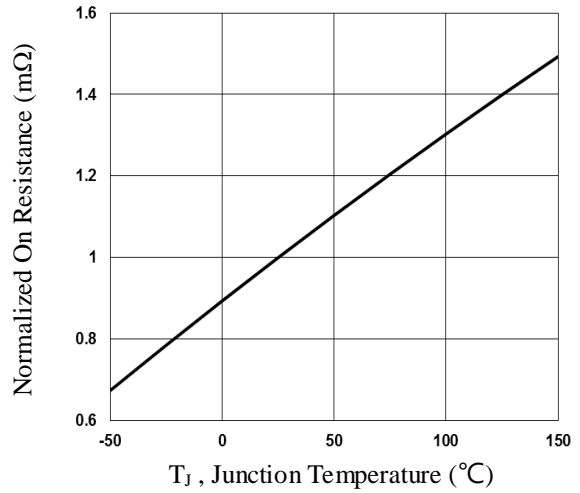
| Symbol          | Parameter                          | Conditions  | Min. | Typ. | Max. | Unit |
|-----------------|------------------------------------|---|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current          | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current             | ---  | ---  | 35   | A    |
| I <sub>SM</sub> | Pulsed Source Current <sup>3</sup> |   | ---  | ---  | 70   | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>3</sup> | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C | ---  | ---  | 1    | V    |

Note :

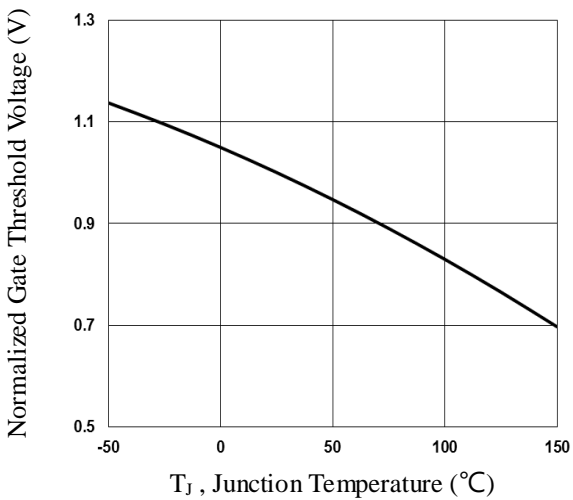
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=16A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



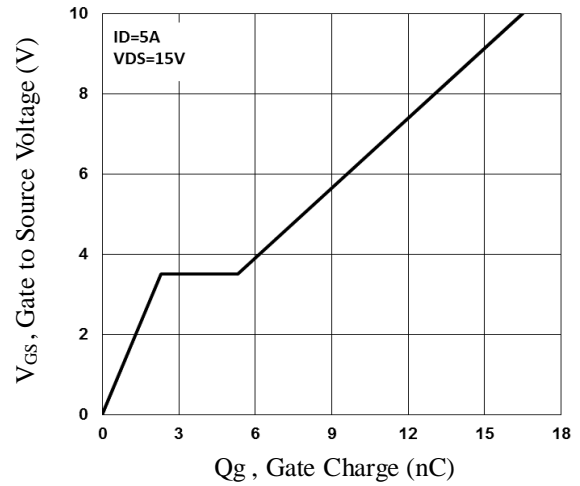
**Fig.1 Continuous Drain Current vs. T<sub>c</sub>**



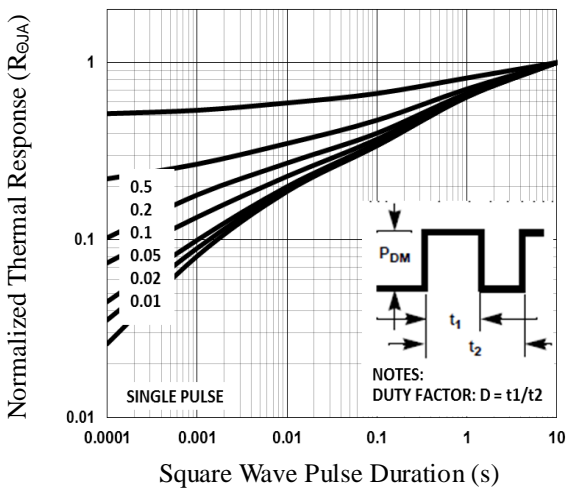
**Fig.2 Normalized R<sub>DSon</sub> vs. T<sub>j</sub>**



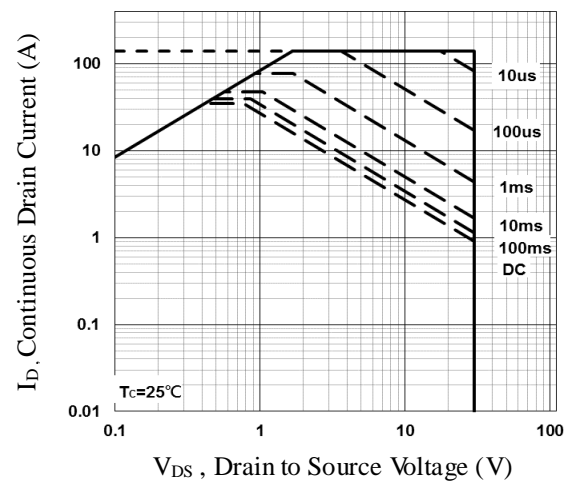
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>j</sub>**



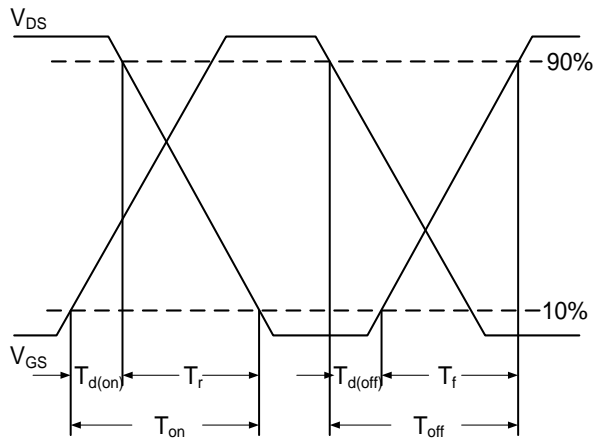
**Fig.4 Gate Charge Waveform**



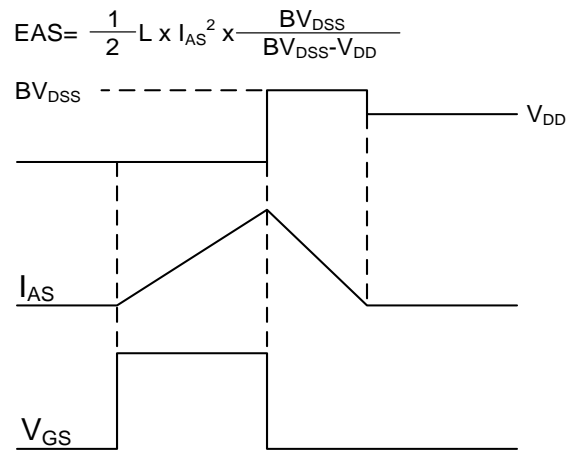
**Fig.5 Normalized Transient Response**



**Fig.6 Maximum Safe Operation Area**

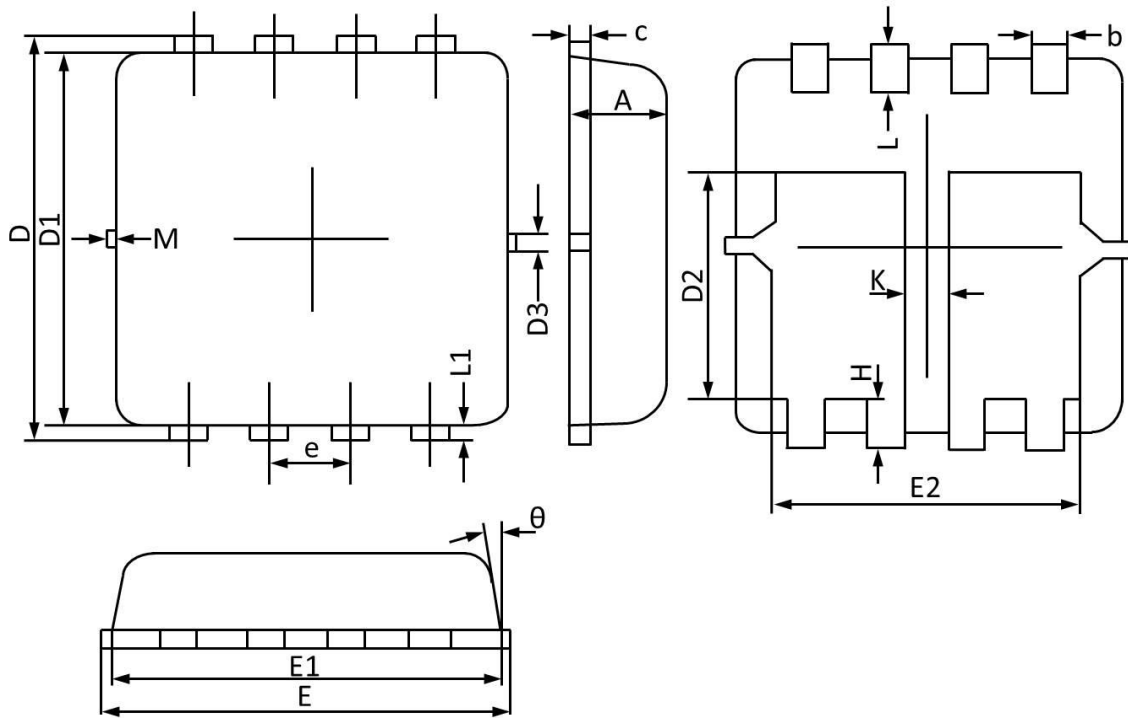


**Fig.7 Switching Time Waveform**



**Fig.8 EAS Waveform**

**PPAK3X3 Dual PACKAGE INFORMATION**



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 0.700                     | 0.800 | 0.028                | 0.031 |
| b        | 0.250                     | 0.350 | 0.010                | 0.013 |
| c        | 0.100                     | 0.250 | 0.004                | 0.009 |
| D        | 3.250                     | 3.450 | 0.128                | 0.135 |
| D1       | 3.000                     | 3.200 | 0.119                | 0.125 |
| D2       | 1.780                     | 1.980 | 0.070                | 0.077 |
| D3       | 0.130 REF                 |       | 0.005 REF            |       |
| E        | 3.200                     | 3.400 | 0.126                | 0.133 |
| E1       | 3.000                     | 3.200 | 0.119                | 0.125 |
| E2       | 2.390                     | 2.590 | 0.094                | 0.102 |
| e        | 0.650 BSC                 |       | 0.026 BSC            |       |
| H        | 0.300                     | 0.500 | 0.011                | 0.019 |
| L        | 0.300                     | 0.500 | 0.011                | 0.019 |
| L1       | 0.130 REF                 |       | 0.005 REF            |       |
| K        | 0.300 REF                 |       | 0.012 REF            |       |
| $\theta$ | 0°                        | 12°   | 0°                   | 12°   |
| M        | 0.150 REF                 |       | 0.006 REF            |       |