



# 65V N-Channel MOSFETs

### General Description

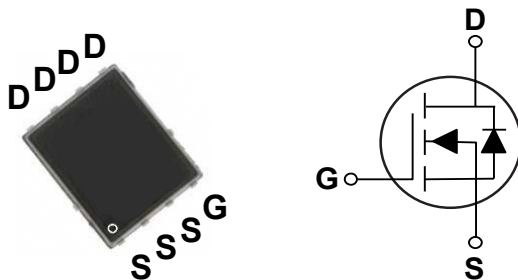
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> | I <sub>D</sub> |
|-------------------|---------------------|----------------|
| 65 V              | 2.8 mΩ              | 130 A          |

### Features

- R<sub>DS(ON)</sub> ≤ 2.8mΩ@V<sub>GS</sub>=10V
- Improved dv/dt Capability
- Fast Switching
- Green Device Available

PPAK5X6 Pin Configuration



### Applications

- Networking
- Load Switch
- LED Applications
- Quick Charger

### Absolute Maximum Ratings T<sub>A</sub>=25°C unless otherwise noted

| Symbol           | Parameter  | Rating               | Units |
|------------------|--|----------------------|-------|
| V <sub>DS</sub>  | Drain-Source Voltage                               | 65                   | V     |
| V <sub>GS</sub>  | Gate-Source Voltage                                | +20 / -12            | V     |
| I <sub>D</sub>   | Drain Current – Continuous (T <sub>C</sub> =25°C)  | 130                  | A     |
|                  | Drain Current – Continuous (T <sub>C</sub> =100°C) | 82                   | A     |
| I <sub>DM</sub>  | Drain Current – Pulsed (NOTE 1)                    | 520                  | A     |
| EAS              | Single Pulse Avalanche Energy (NOTE 2)             | 245                  | mJ    |
| IAS              | Single Pulse Avalanche Current (NOTE 2)            | 70                   | A     |
| P <sub>D</sub>   | Power Dissipation (T <sub>C</sub> =25°C)           | 142                  | W     |
| T <sub>J</sub>   | Operating Junction Temperature Range               | -55 to 150           | °C    |
| T <sub>STG</sub> | Storage Temperature Range                          | -55 to 150           | °C    |
| Marking Code     |  | NG2P8 ,<br>DC6974X-5 |       |

### Thermal Characteristics

| Symbol           | Parameter                              | Rating | Unit |
|------------------|--|--------|------|
| R <sub>θJA</sub> | Thermal Resistance Junction to Ambient | 62     | °C/W |
| R <sub>θJC</sub> | Thermal Resistance Junction to Case    | 0.88   | °C/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 | 65   | ---  | ---  | V    |
| I <sub>DSS</sub>  | Drain-Source Leakage Current   | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V  | ---  | ---  | 1    | uA   |
| I <sub>GSS</sub>  | Gate-Source Leakage Current    | V <sub>GS</sub> =20V, V <sub>DS</sub> =0V  | ---  | ---  | 100  | nA   |

On Characteristics

| Symbol              | Parameter                         | Conditions   | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|--|------|------|------|------|
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                | ---  | ---  | 2.8  | mΩ   |
|                     |                                   | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A               | ---  | ---  | 5.4  |      |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA | 1.0  | ---  | 2.5  | V    |
| g <sub>fs</sub>     | Forward Transconductance          | V <sub>DS</sub> =10V, I <sub>D</sub> =5A                 | ---  | 11   | ---  | S    |

Dynamic and switching Characteristics

| Symbol              | Parameter                    | Conditions   | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|--|------|------|------|------|
| Q <sub>g</sub>      | Total Gate Charge            | V <sub>DS</sub> =48V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A<br>(NOTE 3 · 4)                    | ---  | 59   | ---  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge           |  | ---  | 10.4 | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge            |  | ---  | 19.6 | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time           | V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω,<br>I <sub>D</sub> =1A (NOTE 3 · 4) | ---  | 22   | ---  | nS   |
| T <sub>r</sub>      | Rise Time                    |  | ---  | 14   | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time          |  | ---  | 40   | ---  |      |
| T <sub>f</sub>      | Fall Time                    |  | ---  | 20   | ---  |      |
| C <sub>iss</sub>    | Input Capacitance            | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz  | ---  | 4780 | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance           |  | ---  | 1365 | ---  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance |  | ---  | 51   | ---  |      |
| R <sub>g</sub>      | Gate Resistance              | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz   | ---  | 1.8  | ---  | Ω    |

Drain-Source Diode Characteristics and 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 | ---  | ---  | 130  | A    |
| I <sub>SM</sub> | Pulsed Source Current     |   | ---  | ---  | 260  | A    |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V, I <sub>S</sub> =1A           | ---  | ---  | 1    | V    |

NOTES :

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>=70A, 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.



Characteristics Curves

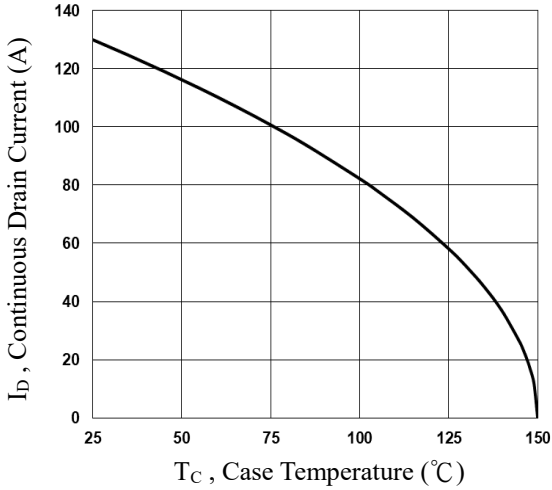


Fig.1 Continuous Drain Current vs.  $T_c$

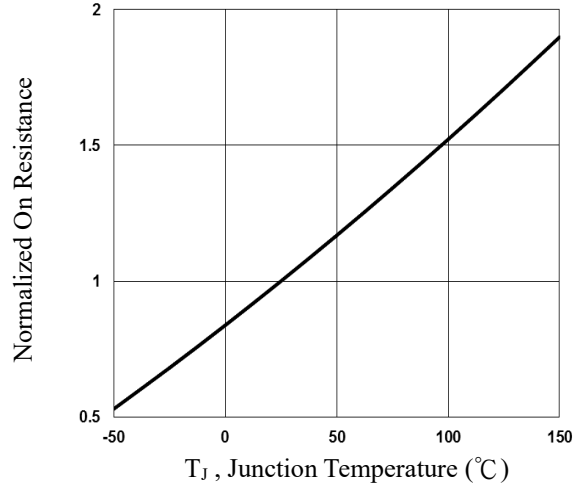


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

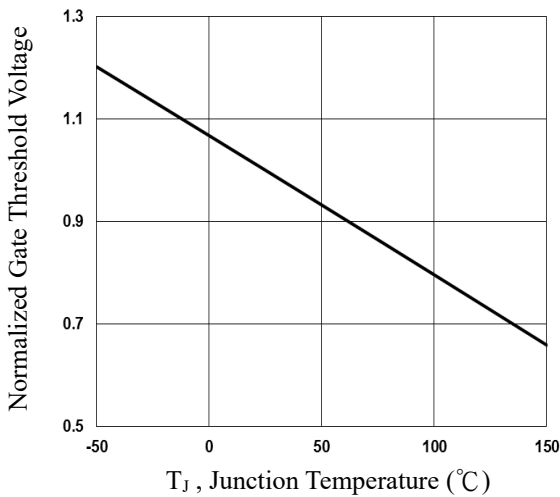


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

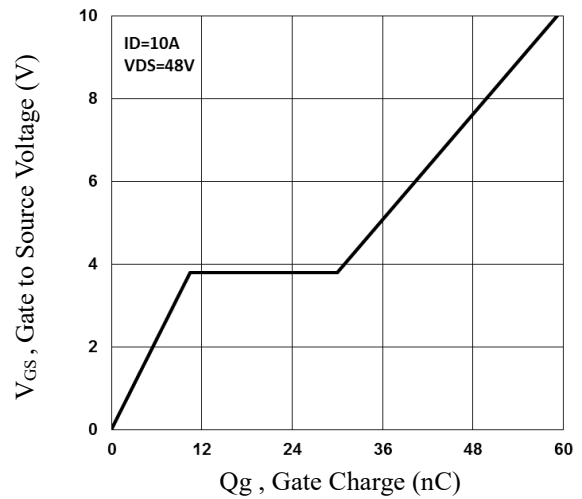


Fig.4 Gate Charge Characteristics

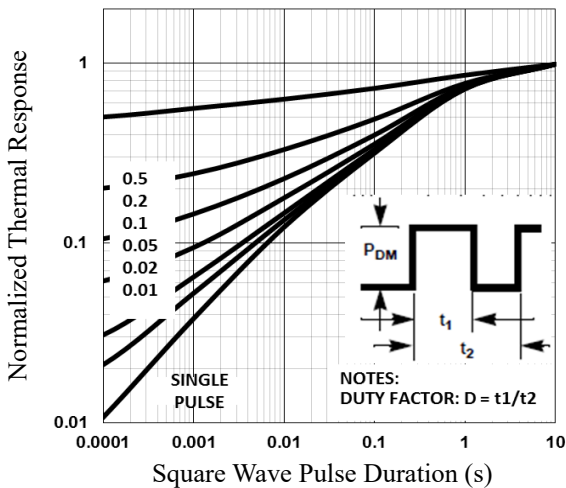


Fig.5 Normalized Transient Impedance

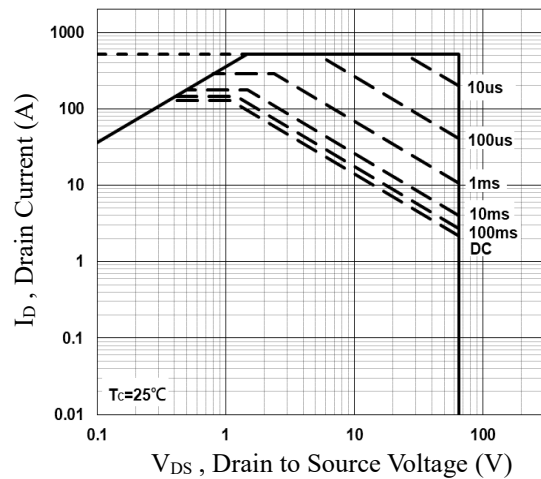


Fig.6 Maximum Safe Operation Area



Characteristics Curves

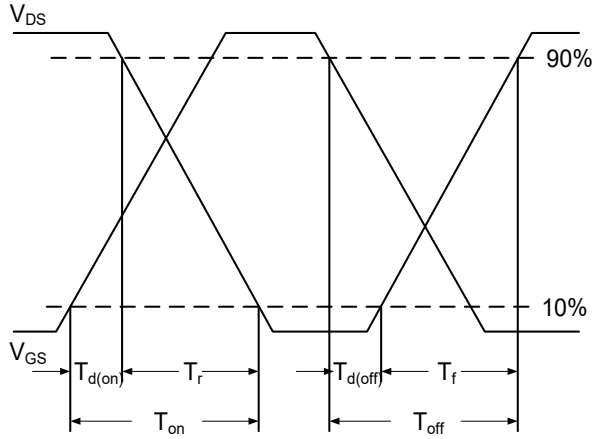


Fig.7 Switching Time Waveform

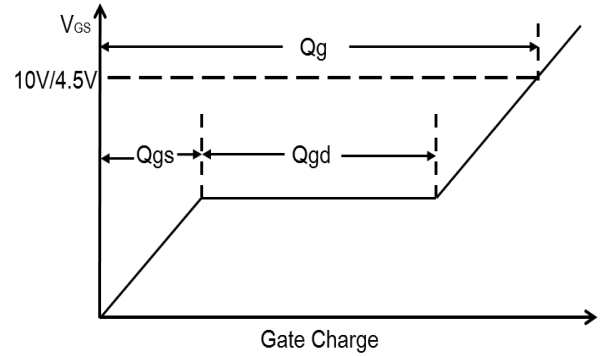
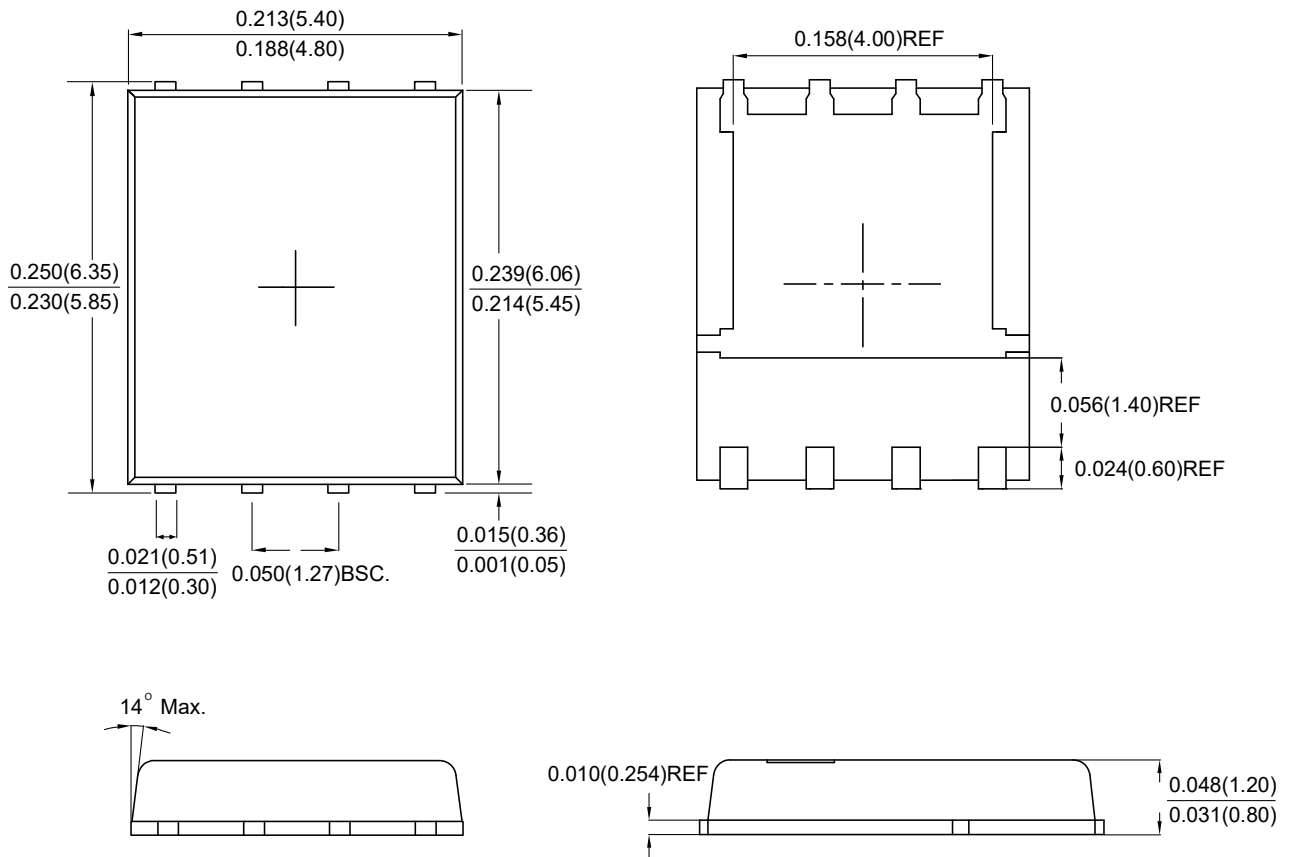


Fig.8 Gate Charge Waveform

Package Outline Dimensions



PPAK5X6

Dimensions in inches and (millimeters)



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