# N-Channel Enhancement Mode Power MOSFET

## Description

The PE8390G uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

## General Features

- $V_{DS}$ = 30V, $I_D$ = 90A

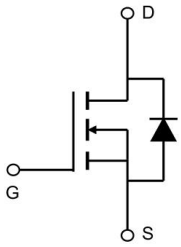
  $R_{DS(ON)}$ < 2.4mΩ @ $V_{GS}$=10V

  $R_{DS(ON)}$ < 3mΩ @ $V_{GS}$=4.5V

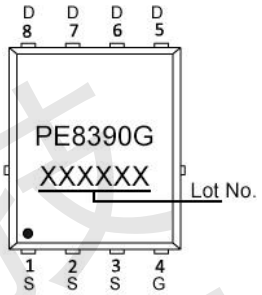
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

## Application

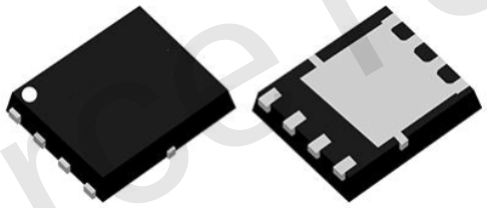
- PWM applications
- Load switch
- Power management
- DC/DC Converter




**Schematic diagram**




**Marking and pin assignment**



**DFN5x6-8L**

## Absolute Maximum Ratings (TC=25℃ unless otherwise noted)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 90 | A |
| Drain Current-Continuous (TC=100℃) | $I_D$ | 67 | A |
| Pulsed Drain Current (Note 1) | $I_{DM}$ | 230 | A |
| Maximum Power Dissipation | $P_D$ | 48 | W |
| Avalanche Current | $I_{AS}$ | 55 | A |
| Avalanche Energy (L=0.5mH) | $E_{AS}$ | 756 | mJ |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance, Junction-to-Case (Note 2) | $R_{\theta JC}$ | 2.6 | ℃/W |

## Electrical Characteristics (TC=25℃ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250μA | 30 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.1 | 1.6 | 2.1 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V,$I_D$=20A | - | 2 | 2.4 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=20A | - | 2.5 | 3 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=10V,$I_D$=10A | - | 45 | - | S |
| **Dynamic Characteristics** (Note 4) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=15V,$V_{GS}$=0V, F=1.0MHz | - | 6100 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 650 | - | pF |
| Reverse Transfer Capacitance (Note 4) | $C_{rss}$ | | - | 530 | - | pF |
| **Switching Characteristics** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=15V,$R_L$=1Ω, $V_{GS}$=10V,$R_G$=3Ω | - | 26 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 24 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 91 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 39 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$I_D$=20A,$V_{GS}$=10V | - | 74 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 21 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 27 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=1A | - | - | 1.2 | V |

## Notes:

**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**4.** Guaranteed by design, not subject to product.

## Typical Electrical and Thermal Characteristics

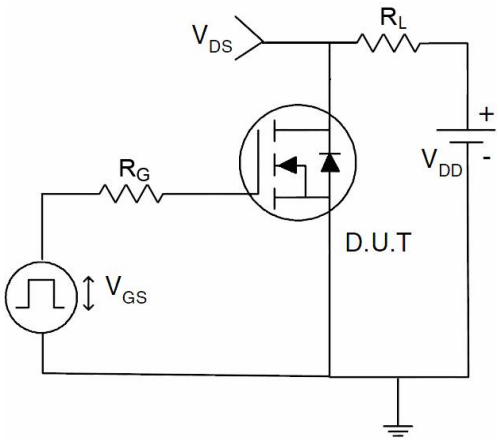



**Figure 1 Switching Test Circuit**

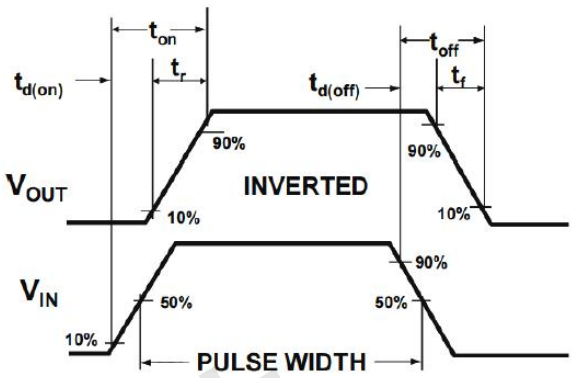



**Figure 2 Switching Waveform**

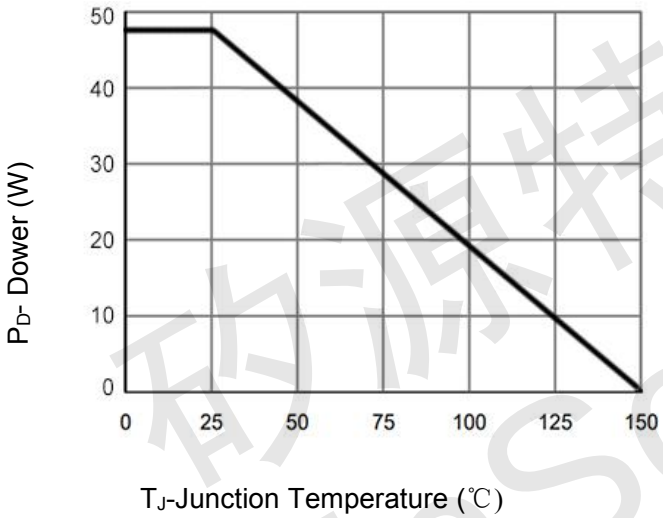



**Figure 3 Power De-rating**

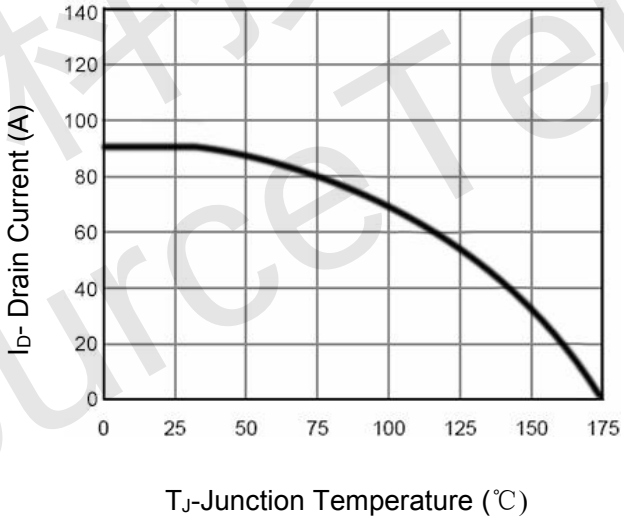



**Figure 4 Drain Current**

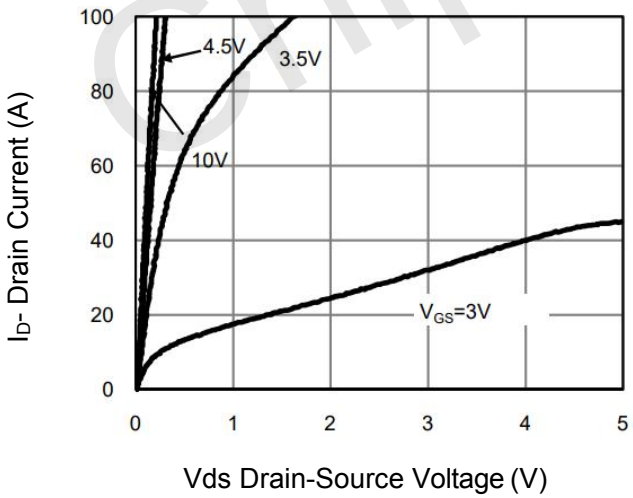



**Figure 5 Output Characteristics**

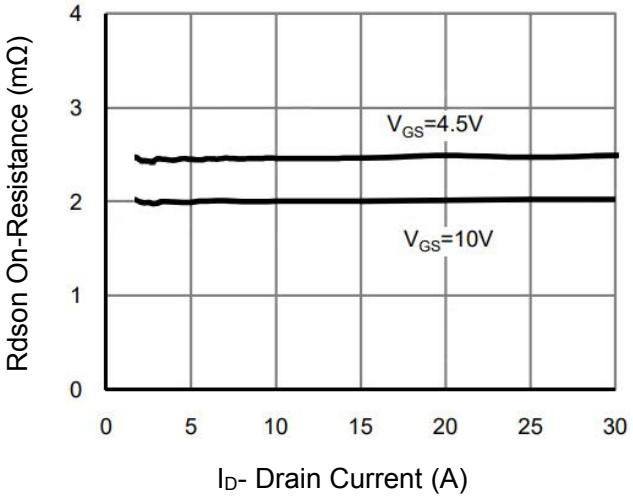



**Figure 6 Rdson vs Drain Current**

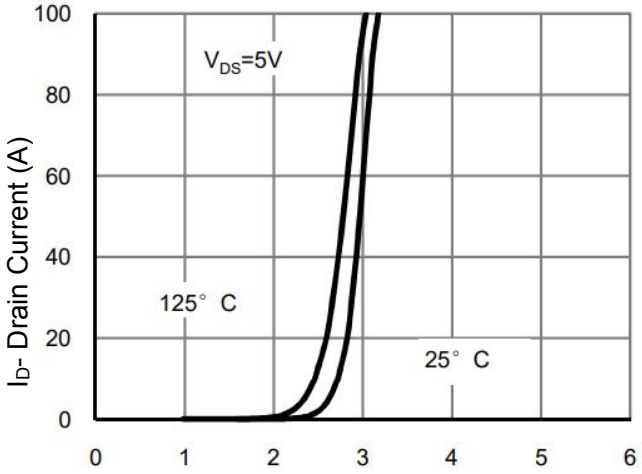



**Figure 7 Transfer Characteristics**

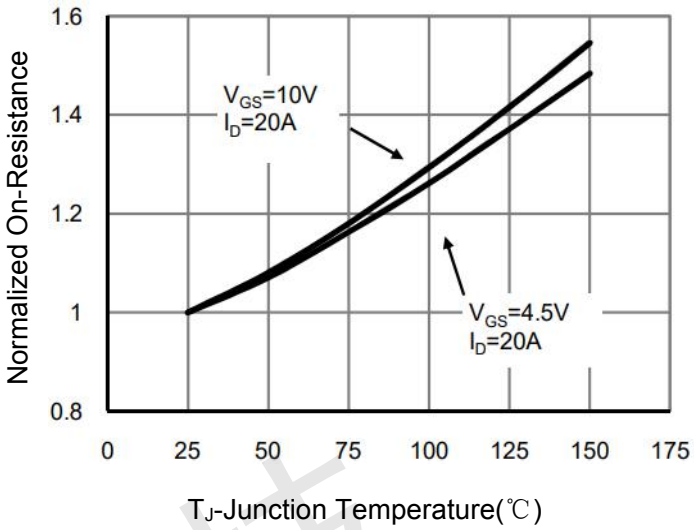



**Figure 8 Rdson vs Junction Temperature**

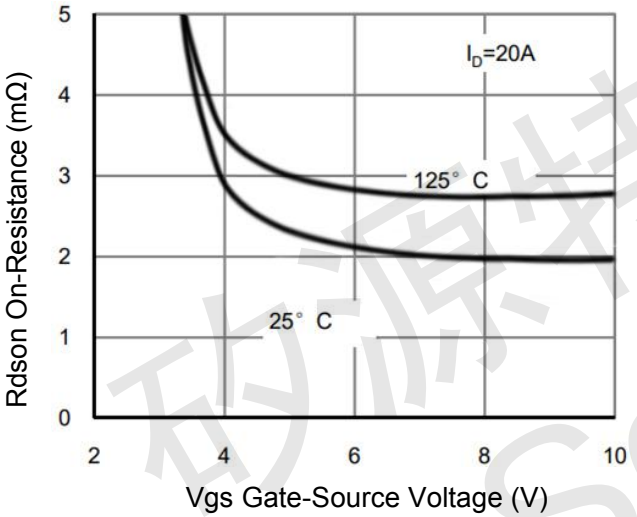



**Figure 9 Rdson vs Vgs**

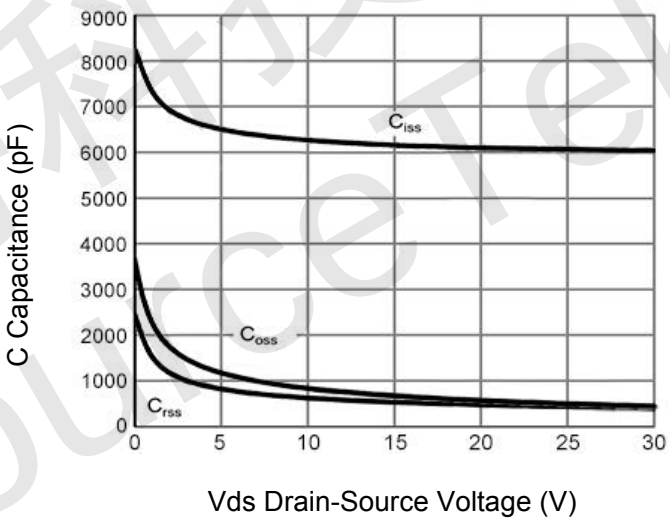



**Figure 10 Capacitance vs Vds**

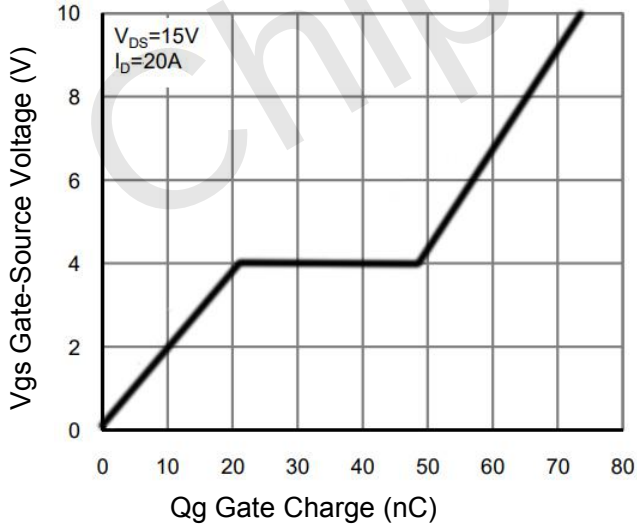



**Figure 11 Gate Charge**

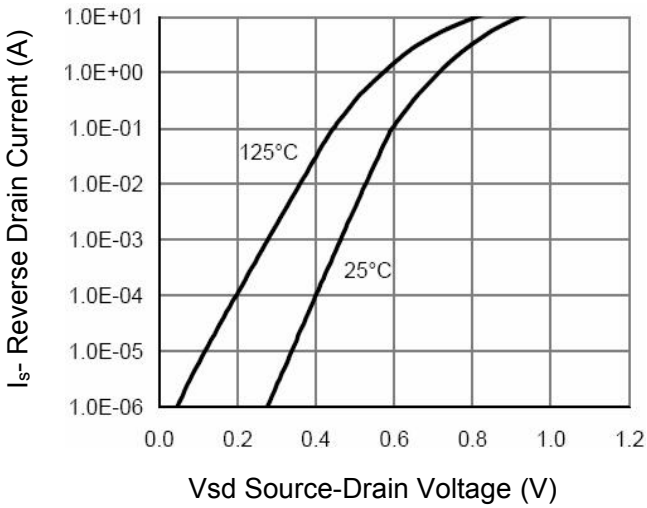



**Figure 12 Source- Drain Diode Forward**

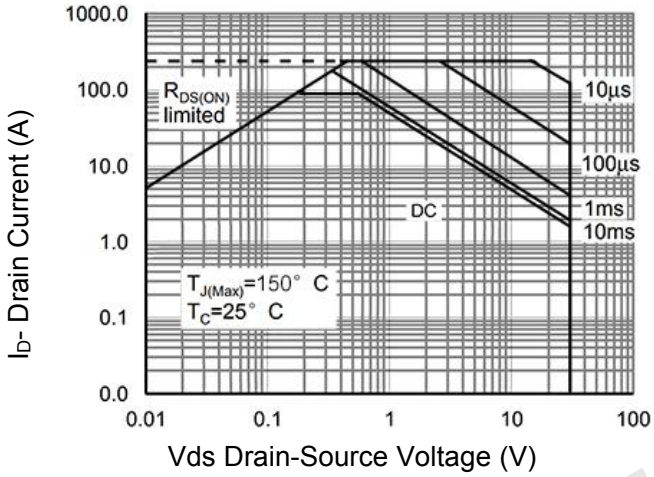



**Figure 13 Safe Operation Area**

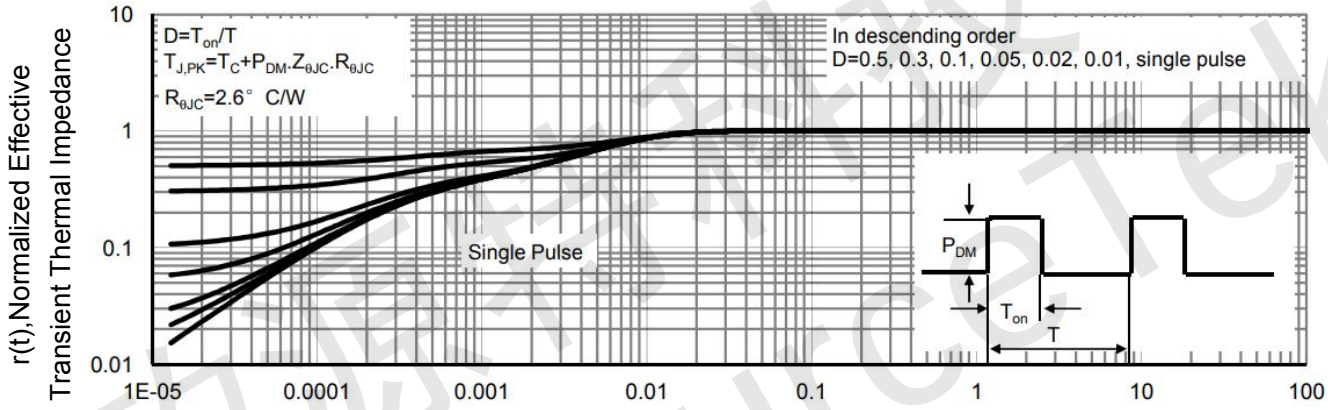
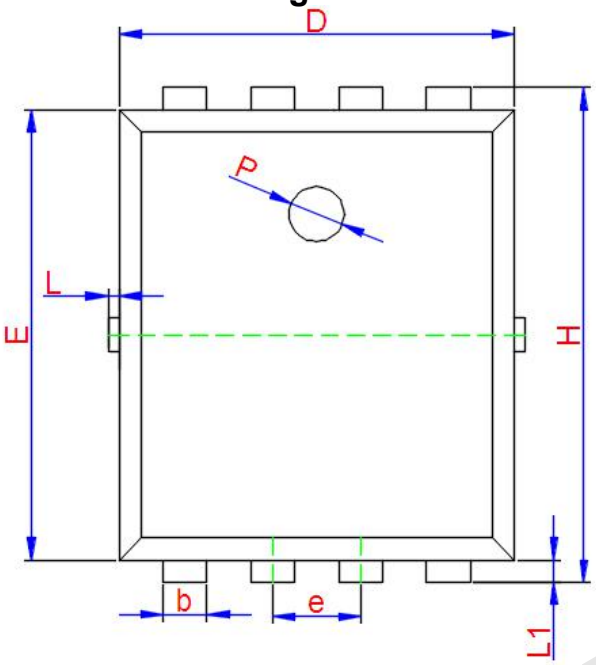
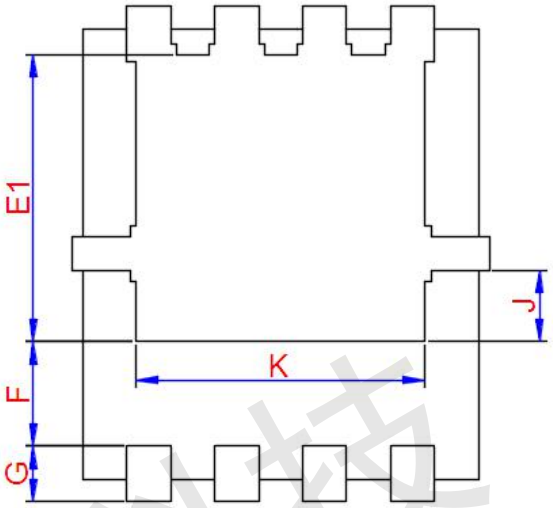
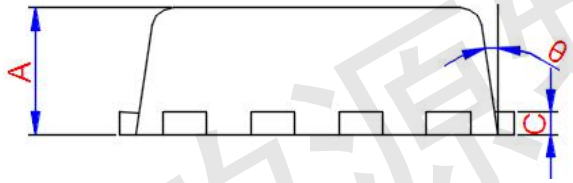



**Figure 14 Normalized Maximum Transient Thermal Impedance**

## DFN5x6-8L Package Information




| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 0.800 | 0.900 | 1.000 |
| b | 0.350 | 0.420 | 0.490 |
| c | | 0.254TYP. | |
| D | 4.900 | 5.000 | 5.100 |
| e | | 1.270TYP. | |
| E | 5.700 | 5.800 | 5.900 |
| E1 | | 3.400TYP. | |
| F | | 1.400TYP. | |
| G | | 0.600TYP. | |
| H | 5.950 | 6.080 | 6.200 |
| J | | 0.950TYP. | |
| K | | 4.000TYP | |
| L | - | - | 0.150 |
| L1 | 0.100 | 0.140 | 0.180 |
| P | | 1.000TYP. | |
| θ | 6° | 10° | 14° |