

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 40V           | 5.7mΩ@10V       | 40A   |
|               | 9.7mΩ@10V       |       |

### Feature

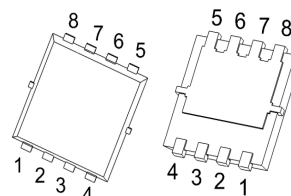
- Trench Technology Power MOSFET
- Low  $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

### Application

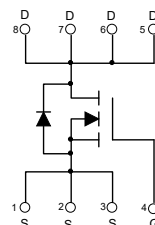
- Power Switching Application
- DC/DC Converter

### Marking

#### PDFN3.3X3.3-8L



#### Schematic diagram



| Part Number  | Package        | Marking  | Packing     | Reel Size | Tape Width | Qty     |
|--------------|----------------|----------|-------------|-----------|------------|---------|
| GPM054N04LNA | PDFN3.3X3.3-8L | M054N04L | Reel & Tape | 330mm     | 12mm       | 5000pcs |

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Parameter                                                |                           | Symbol          | Value     | Unit               |
|----------------------------------------------------------|---------------------------|-----------------|-----------|--------------------|
| Drain - Source Voltage                                   |                           | $V_{DS}$        | 40        | V                  |
| Gate - Source Voltage                                    |                           | $V_{GS}$        | ±20       | V                  |
| Continuous Drain Current <sup>1</sup>                    | $T_C = 25^\circ\text{C}$  | $I_D$           | 40        | A                  |
|                                                          | $T_C = 100^\circ\text{C}$ | $I_D$           | 26        | A                  |
| Pulsed Drain Current <sup>2</sup>                        |                           | $I_{DM}$        | 160       | A                  |
| Single Pulsed Avalanche Current <sup>3</sup>             |                           | $I_{AS}$        | 17        | A                  |
| Single Pulsed Avalanche Energy <sup>3</sup>              |                           | $E_{AS}$        | 72        | mJ                 |
| Power Dissipation <sup>5</sup>                           |                           | $P_D$           | 114       | W                  |
| $T_C = 25^\circ\text{C}$                                 |                           |                 |           |                    |
| Thermal Resistance from Junction to Ambient <sup>6</sup> |                           | $R_{\theta JA}$ | 45        | $^\circ\text{C/W}$ |
| Thermal Resistance from Junction to Case                 |                           | $R_{\theta JC}$ | 1.1       | $^\circ\text{C/W}$ |
| Junction Temperature                                     |                           | $T_J$           | 150       | $^\circ\text{C}$   |
| Storage Temperature                                      |                           | $T_{STG}$       | -55~ +150 | $^\circ\text{C}$   |

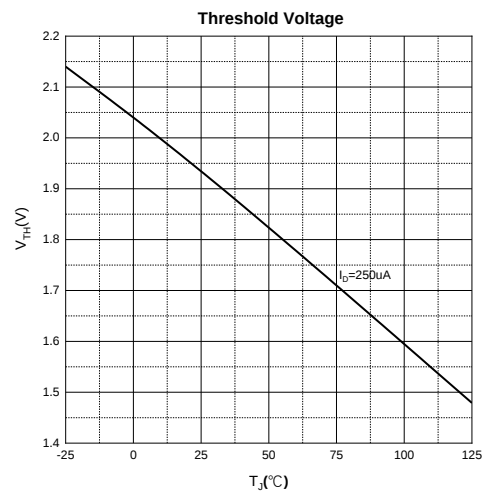
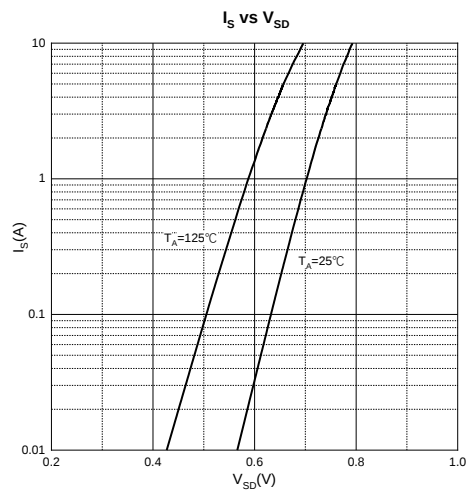
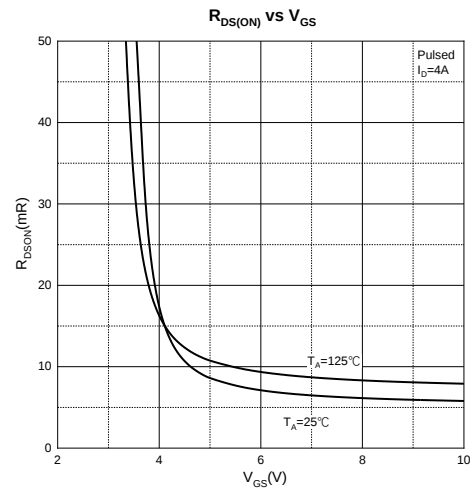
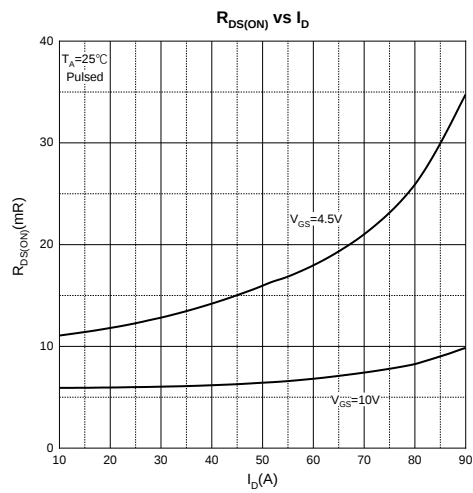
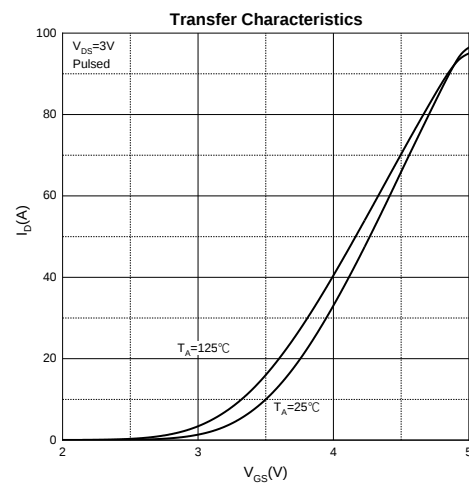
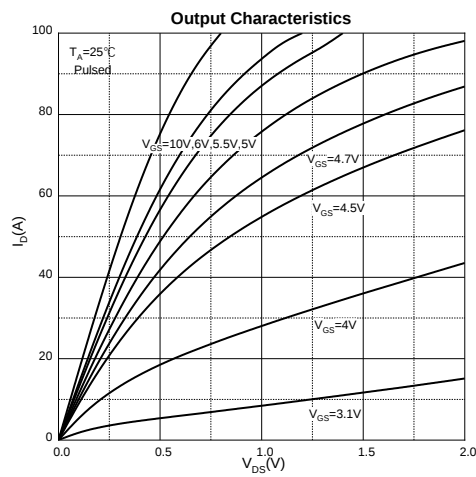
**MOSFET ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)**

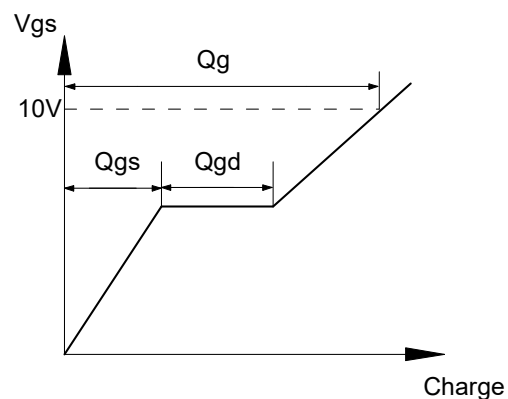
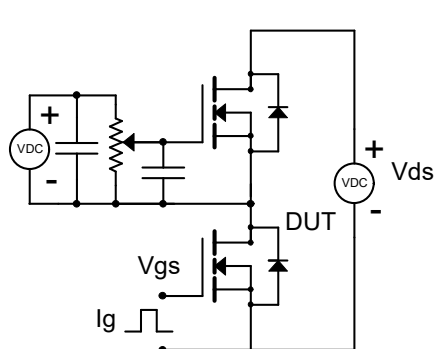
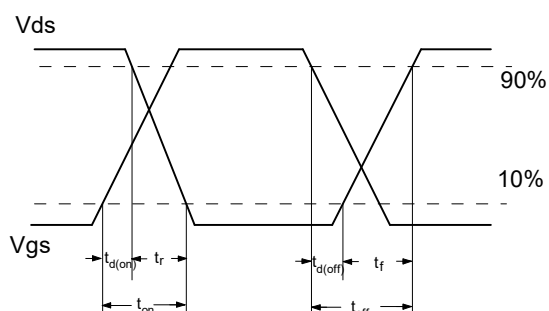
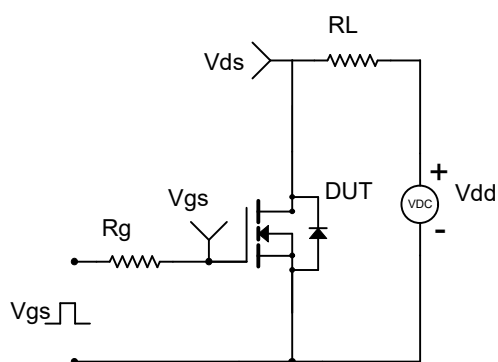
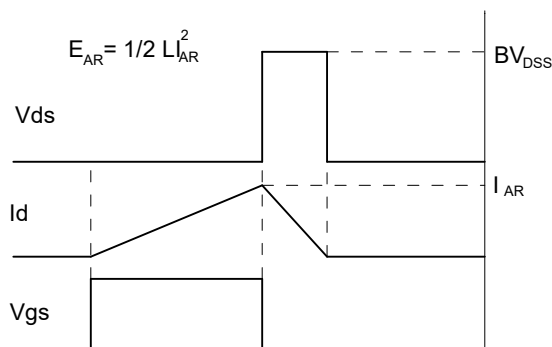
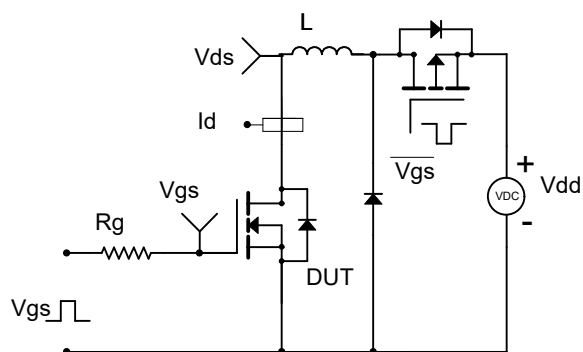
| Parameter                            | Symbol               | Test Condition                                                                             | Min | Type | Max  | Unit |
|--------------------------------------|----------------------|--------------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                  |                      |                                                                                            |     |      |      |      |
| Drain - Source Breakdown Voltage     | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                               | 40  |      |      | V    |
| Zero Gate Voltage Drain Current      | I <sub>DSS</sub>     | V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V                                                |     |      | 1    | μA   |
| Gate - Body Leakage Current          | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                               |     |      | ±100 | nA   |
| On Characteristics <sup>4</sup>      |                      |                                                                                            |     |      |      |      |
| Gate Threshold Voltage               | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                 | 1   | 1.9  | 3    | V    |
| Drain-Source On-Resistance           | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 4A                                                 |     | 5.7  | 7.5  | mΩ   |
|                                      |                      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4A                                                |     | 9.7  | 13   |      |
| Dynamic Characteristics              |                      |                                                                                            |     |      |      |      |
| Input Capacitance                    | C <sub>iss</sub>     | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1MHz                                      |     | 1717 |      | pF   |
| Output Capacitance                   | C <sub>oss</sub>     |                                                                                            |     | 174  |      |      |
| Reverse Transfer Capacitance         | C <sub>rss</sub>     |                                                                                            |     | 141  |      |      |
| Gate Resistance                      | R <sub>g</sub>       | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                       |     | 2.7  |      | Ω    |
| Switching Characteristics            |                      |                                                                                            |     |      |      |      |
| Total Gate Charge                    | Q <sub>g</sub>       | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 4A                          |     | 36.1 |      | nC   |
| Gate-Source Charge                   | Q <sub>gs</sub>      |                                                                                            |     | 5.2  |      |      |
| Gate-Drain Charge                    | Q <sub>gd</sub>      |                                                                                            |     | 8.8  |      |      |
| Turn-On Delay Time                   | t <sub>d(on)</sub>   | V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A,<br>R <sub>G</sub> = 3Ω |     | 10   |      | ns   |
| Turn-On Rise Time                    | t <sub>r</sub>       |                                                                                            |     | 30   |      |      |
| Turn-Off Delay Time                  | t <sub>d(off)</sub>  |                                                                                            |     | 40   |      |      |
| Turn-Off Fall Time                   | t <sub>f</sub>       |                                                                                            |     | 5    |      |      |
| Source - Drain Diode Characteristics |                      |                                                                                            |     |      |      |      |
| Diode Forward Voltage <sup>4</sup>   | V <sub>SD</sub>      | V <sub>GS</sub> = 0V, I <sub>S</sub> = 4A                                                  |     |      | 1.2  | V    |

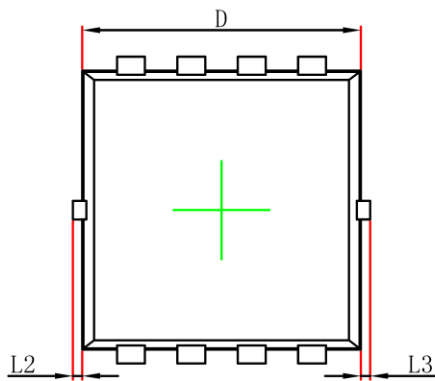
Notes :

- 1.The maximum current rating is limited by package.And device mounted on a large heatsink
- 2.Pulse Test : Pulse Width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$ .
- 3.EAS condition:  $V_{DD} = 20V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$  Starting  $T_J = 25^\circ\text{C}$ .
- 4.Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- 5.The power dissipation  $P_D$  is limited by  $T_{J(MAX)} = 150^\circ\text{C}$ .And device mounted on a large heatsink
- 6.Device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .

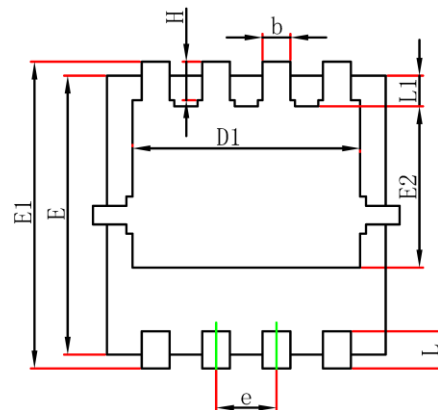
## Typical Characteristics



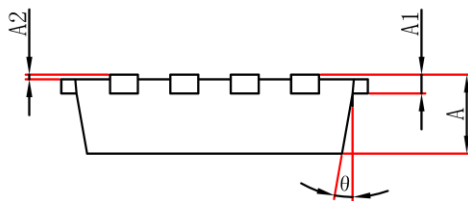
**Gate Charge Test Circuit & Waveform**

**Resistive Switching Test Circuit & Waveform**

**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**


**PDFN3.3X3.3-8L Package Information**


Top View  
[顶视图]



Bottom View  
[背视图]



Side View  
[侧视图]

| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.700                     | 0.900 | 0.028                | 0.035 |
| A1     | 0.152REF                  |       | 0.006REF             |       |
| A2     | 0.000                     | 0.050 | 0.000                | 0.002 |
| D      | 2.900                     | 3.200 | 0.114                | 0.126 |
| D1     | 2.300                     | 2.600 | 0.091                | 0.102 |
| E      | 2.900                     | 3.200 | 0.114                | 0.126 |
| E1     | 3.150                     | 3.450 | 0.124                | 0.136 |
| E2     | 1.535                     | 1.935 | 0.060                | 0.076 |
| b      | 0.200                     | 0.400 | 0.008                | 0.016 |
| e      | 0.550                     | 0.750 | 0.022                | 0.030 |
| L      | 0.300                     | 0.500 | 0.012                | 0.020 |
| L1     | 0.180                     | 0.480 | 0.007                | 0.019 |
| L2     | 0.000                     | 0.100 | 0.000                | 0.004 |
| L3     | 0.000                     | 0.100 | 0.000                | 0.004 |
| H      | 0.315                     | 0.515 | 0.012                | 0.020 |
| θ      | 0°                        | 12°   | 0°                   | 12°   |

**Attention:**

- GreenPower Electronics reserves the right to improve product design function and reliability without notice.
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