



### Product Summary

|               |                 |       |
|---------------|-----------------|-------|
| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
| -60V          | 24mΩ@-10V       | -20A  |

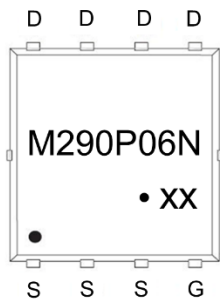
### Feature

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

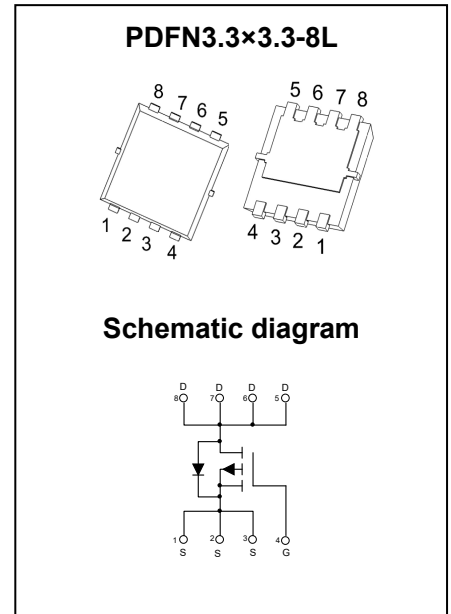
### Application

- Power Switching Application

### MARKING:



M290P06N = Device Code  
 XX = Date Code  
 Solid Dot = Green Indicator



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

| Parameter  | Symbol          | Value     | Unit                      |
|--|-----------------|-----------|---------------------------|
| Drain - Source Voltage                                   | $V_{DS}$        | -60       | V                         |
| Gate - Source Voltage                                    | $V_{GS}$        | $\pm 20$  | V                         |
| Continuous Drain Current <sup>1</sup>                    | $I_D$           | -20       | A                         |
| Continuous Drain Current <sup>6</sup>                    | $I_D$           | -14       | A                         |
| Pulsed Drain Current <sup>2</sup>                        | $I_{DM}$        | -80       | A                         |
| Single Pulsed Avalanche Current <sup>3</sup>             | $I_{AS}$        | -27       | A                         |
| Single Pulsed Avalanche Energy <sup>3</sup>              | $E_{AS}$        | 180       | mJ                        |
| Power Dissipation <sup>5</sup>                           | $P_D$           | 24        | W                         |
| Power Dissipation <sup>6</sup>                           | $P_D$           | 2.1       | W                         |
| Thermal Resistance from Junction to Ambient <sup>6</sup> | $R_{\theta JA}$ | 60        | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance from Junction to Case                 | $R_{\theta JC}$ | 5.2       | $^\circ\text{C}/\text{W}$ |
| Junction Temperature                                     | $T_J$           | 150       | $^\circ\text{C}$          |
| Storage Temperature                                      | $T_{STG}$       | -55~ +150 | $^\circ\text{C}$          |

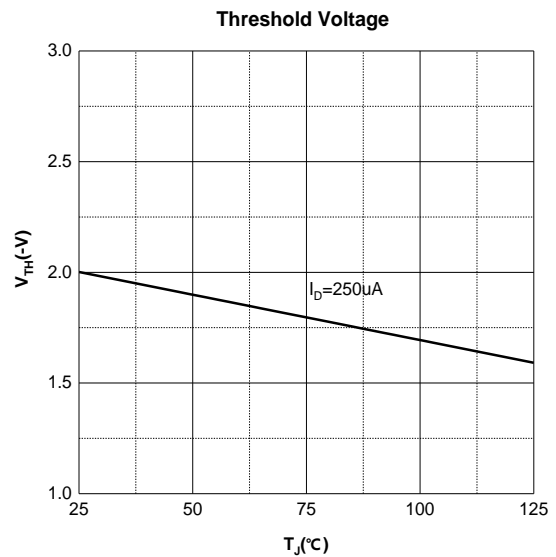
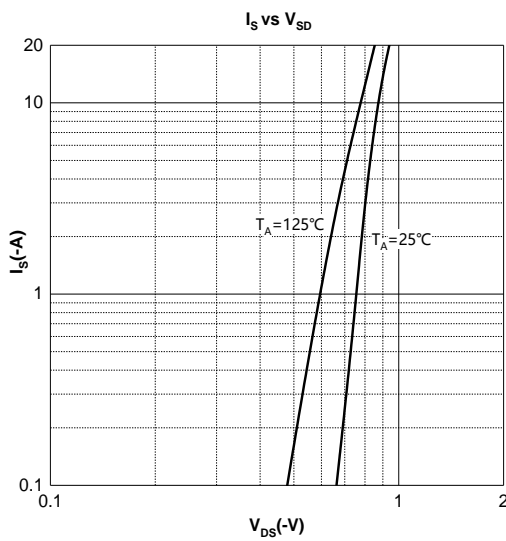
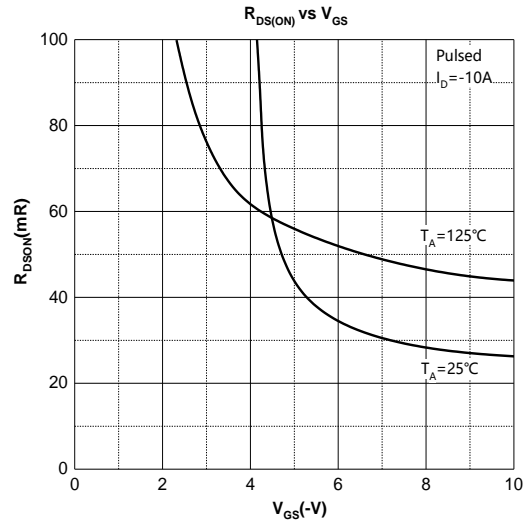
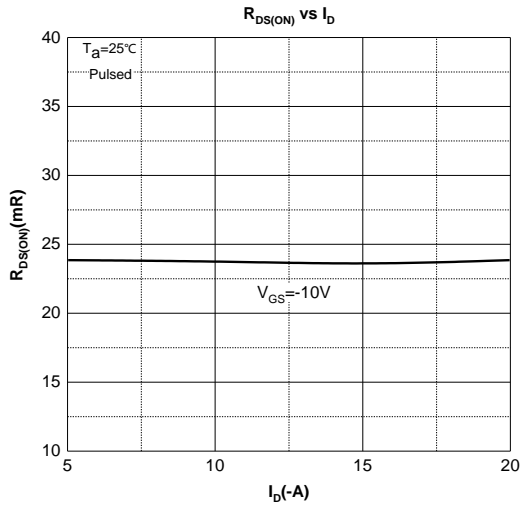
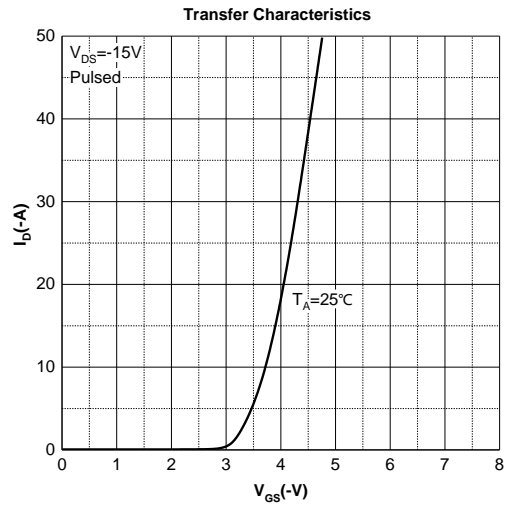
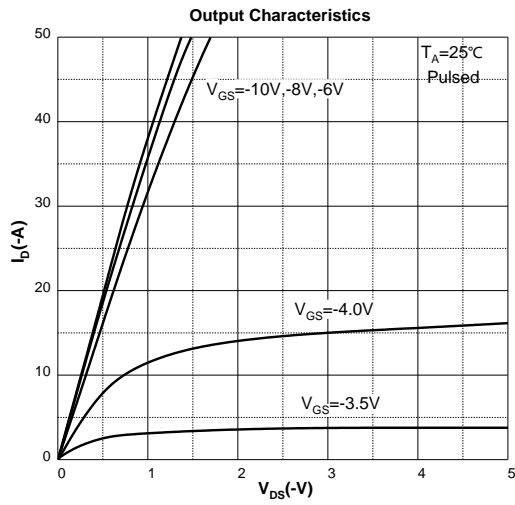
## MOSFET ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

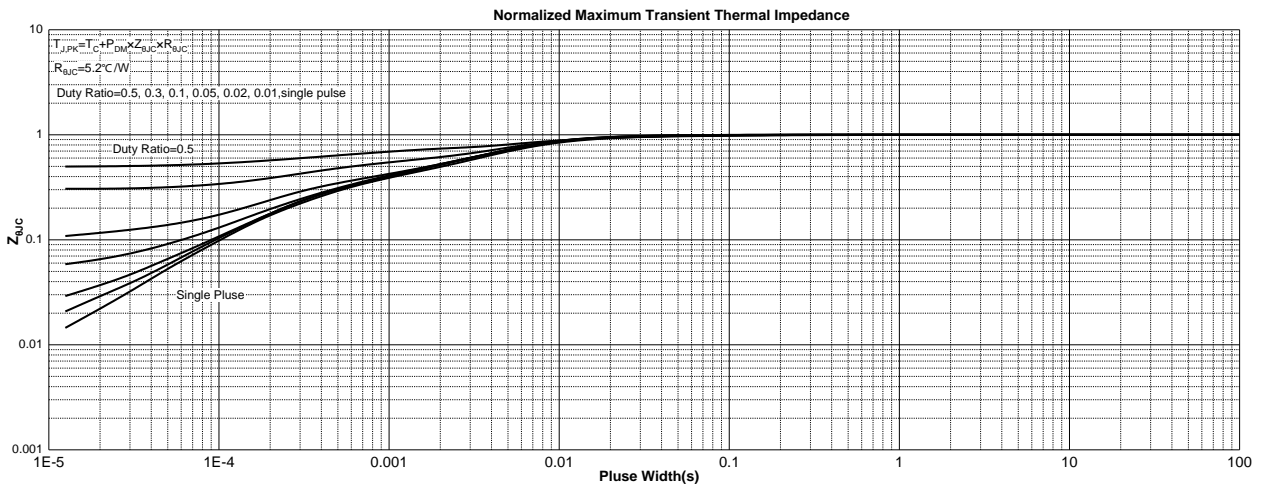
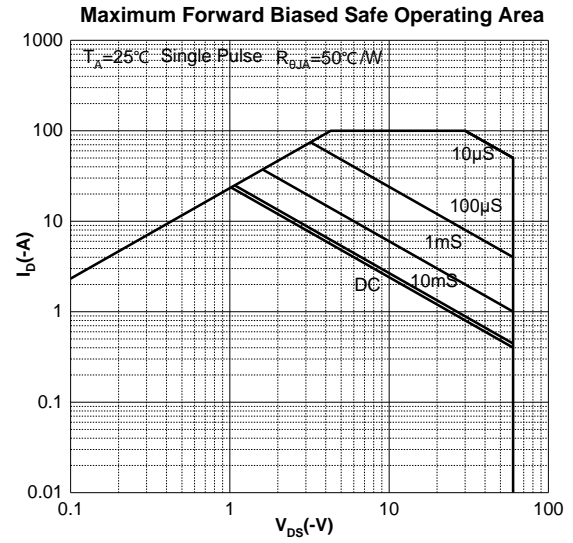
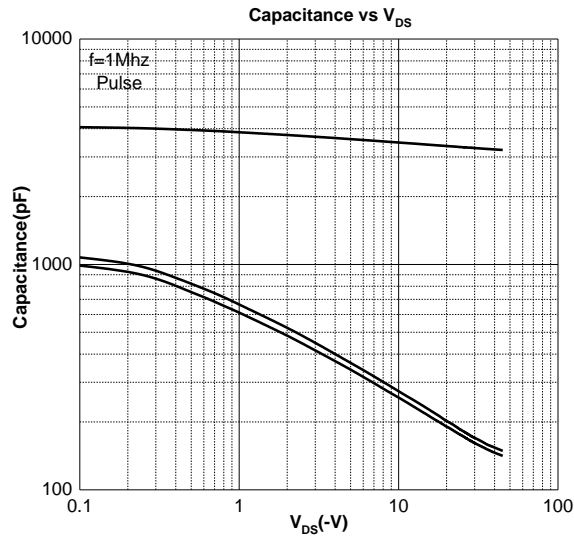
| Parameter                                   | Symbol        | Test Condition   | Min  | Type | Max       | Unit       |
|---|---------------|--|------|------|-----------|------------|
| <b>Off Characteristics</b>                  |               |  |      |      |           |            |
| Drain - Source Breakdown Voltage            | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$                                   | -60  |      |           | V          |
| Zero Gate Voltage Drain Current             | $I_{DSS}$     | $V_{DS} = -48V, V_{GS} = 0V$                                     |      |      | -1        | $\mu A$    |
| Gate - Body Leakage Current                 | $I_{GSS}$     | $V_{GS} = \pm 20V, V_{DS} = 0V$                                  |      |      | $\pm 100$ | nA         |
| <b>On Characteristics<sup>4</sup></b>       |               |  |      |      |           |            |
| Gate Threshold Voltage                      | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -250\mu A$                               | -1.0 | -2.0 | -3.0      | V          |
| Drain-source On-resistance                  | $R_{DS(on)}$  | $V_{GS} = -10V, I_D = -5A$                                       |      | 24   | 29        | m $\Omega$ |
| Forward Transconductance                    | $g_{FS}$      | $V_{DS} = -10V, I_D = -8A$                                       |      | 16   |           | S          |
| <b>Dynamic Characteristics</b>              |               |  |      |      |           |            |
| Input Capacitance                           | $C_{iss}$     | $V_{DS} = -30V, V_{GS} = 0V, f = 1MHz$                           |      | 3285 |           | pF         |
| Output Capacitance                          | $C_{oss}$     |  |      | 170  |           |            |
| Reverse Transfer Capacitance                | $C_{rss}$     |  |      | 161  |           |            |
| Gate Resistance                             | $R_g$         | $V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$                             |      | 5    |           | $\Omega$   |
| <b>Switching Characteristics</b>            |               |  |      |      |           |            |
| Total Gate Charge                           | $Q_g$         | $V_{DS} = -30V, V_{GS} = -10V, I_D = -10A$                       |      | 48   |           | nC         |
| Gate-source Charge                          | $Q_{gs}$      |  |      | 14   |           |            |
| Gate-drain Charge                           | $Q_{gd}$      |  |      | 18   |           |            |
| Turn-on Delay Time                          | $t_{d(on)}$   | $V_{DD} = -30V, V_{GS} = -10V, R_L = 3\Omega$<br>$R_G = 3\Omega$ |      | 17.5 |           | ns         |
| Turn-on Rise Time                           | $t_r$         |  |      | 24   |           |            |
| Turn-off Delay Time                         | $t_{d(off)}$  |  |      | 35   |           |            |
| Turn-off Fall Time                          | $t_f$         |  |      | 40   |           |            |
| <b>Source - Drain Diode Characteristics</b> |               |  |      |      |           |            |
| Diode Forward Voltage <sup>4</sup>          | $V_{SD}$      | $V_{GS} = 0V, I_S = -10A$  |      |      | -1.2      | V          |

Notes :

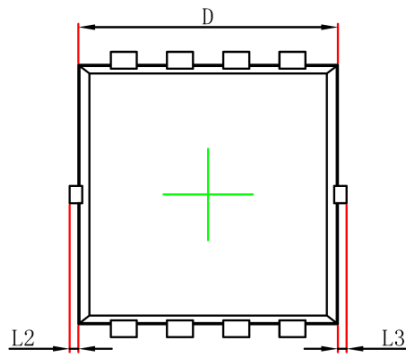
- 1.The maximum current rating is limited by package.And device mounted on a large heatsink
- 2.Pulse Test : Pulse Width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$ .
- 3.EAS condition:  $V_{DD} = -15V, V_{GS} = -10V, L = 0.5mH, R_G = 25\Omega$  Starting  $T_J = 25^\circ\text{C}$ .
- 4.Pulse Test : Pulse 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  $1in^2$  FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .

**Typical Characteristics**

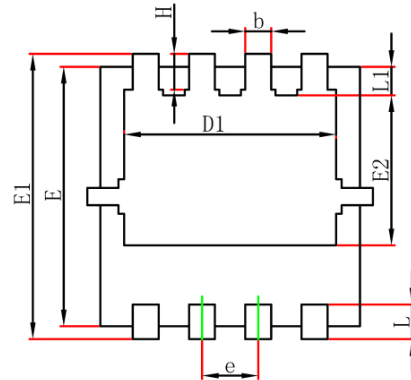




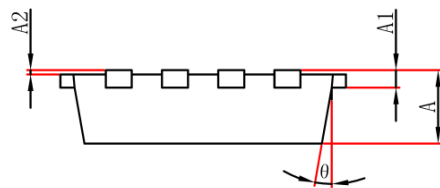
## PDFN3.3×3.3-8L Package Information



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°   |