

**Product Summary**

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$    | $I_D$ |
|---------------|--------------------|-------|
| 150V          | 3.9m $\Omega$ @10V | 200A  |

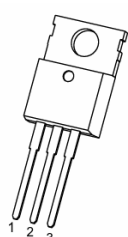
**Feature**

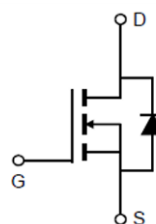
- Split Gate Trench Technology
- Low  $R_{DS(on)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

**Application**

- Power Switching Application
- Motor Driving
- Power Management

**TO-220-3L-C**

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1. GATE
  2. DRAIN
  3. SOURCE

**Schematic diagram**

**Package Marking and Ordering Information**

| Part Number  | Package     | Marking  | Packing | Reel Size | Tape Width | Qty   |
|--------------|-------------|----------|---------|-----------|------------|-------|
| GPT039N15NTB | TO-220-3L-C | T039N15N | Tube    | -         | -          | 50pcs |

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

| Parameter                                                |                             | Symbol          | Value     | Unit                 |
|----------------------------------------------------------|-----------------------------|-----------------|-----------|----------------------|
| Drain-Source Voltage                                     |                             | $V_{DS}$        | 150       | V                    |
| Gate-Source Voltage                                      |                             | $V_{GS}$        | $\pm 20$  | V                    |
| Continuous Drain Current <sup>1</sup>                    | $T_C = 25^{\circ}\text{C}$  | $I_D$           | 200       | A                    |
|                                                          | $T_C = 100^{\circ}\text{C}$ |                 | 126       |                      |
| Pulsed Drain Current <sup>2</sup>                        |                             | $I_{DM}$        | 800       | A                    |
| Single Pulsed Avalanche Current <sup>3</sup>             |                             | $I_{AS}$        | 77        | A                    |
| Single Pulsed Avalanche Energy <sup>3</sup>              |                             | $E_{AS}$        | 1482      | mJ                   |
| Power Dissipation <sup>5</sup>                           | $T_C = 25^{\circ}\text{C}$  | $P_D$           | 250       | W                    |
| Thermal Resistance from Junction to Ambient <sup>6</sup> |                             | $R_{\theta JA}$ | 69        | $^{\circ}\text{C/W}$ |
| Thermal Resistance from Junction to Case                 |                             | $R_{\theta JC}$ | 0.5       | $^{\circ}\text{C/W}$ |
| Operating Junction and Storage Temperature Range         |                             | $T_J, T_{STG}$  | -55~ +150 | $^{\circ}\text{C}$   |

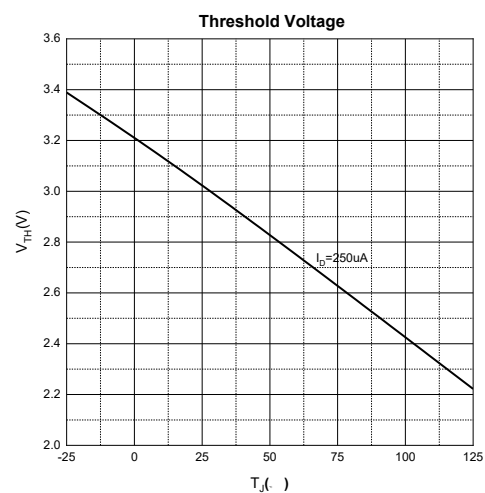
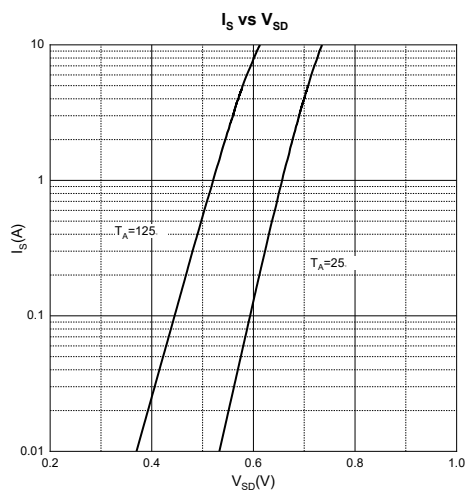
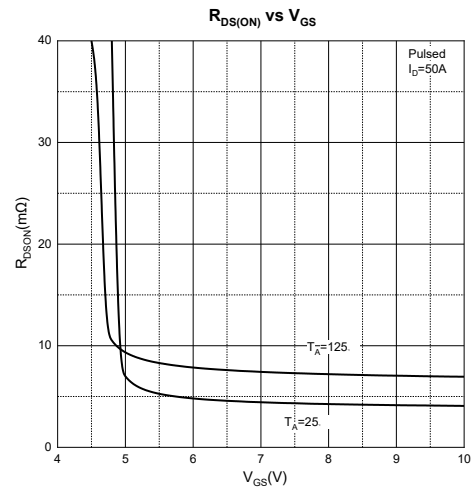
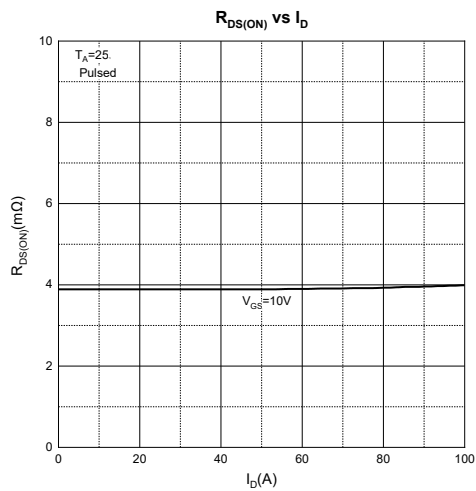
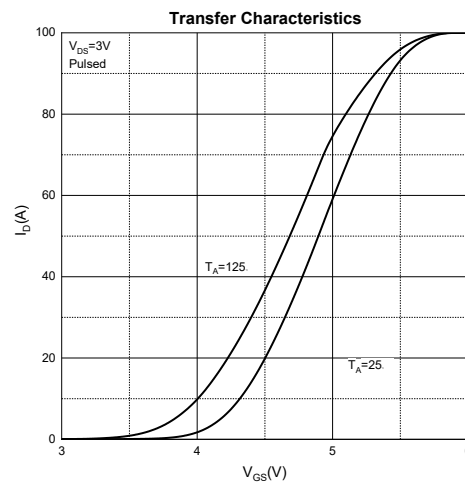
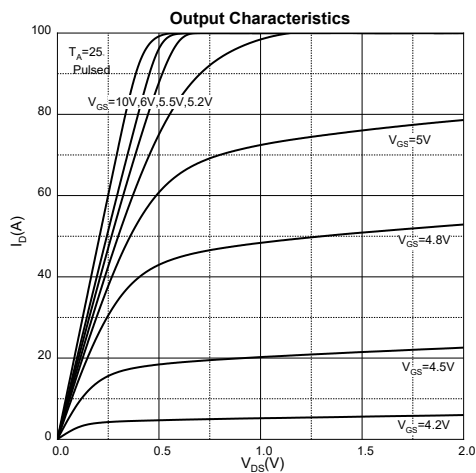
**MOSFET ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)**

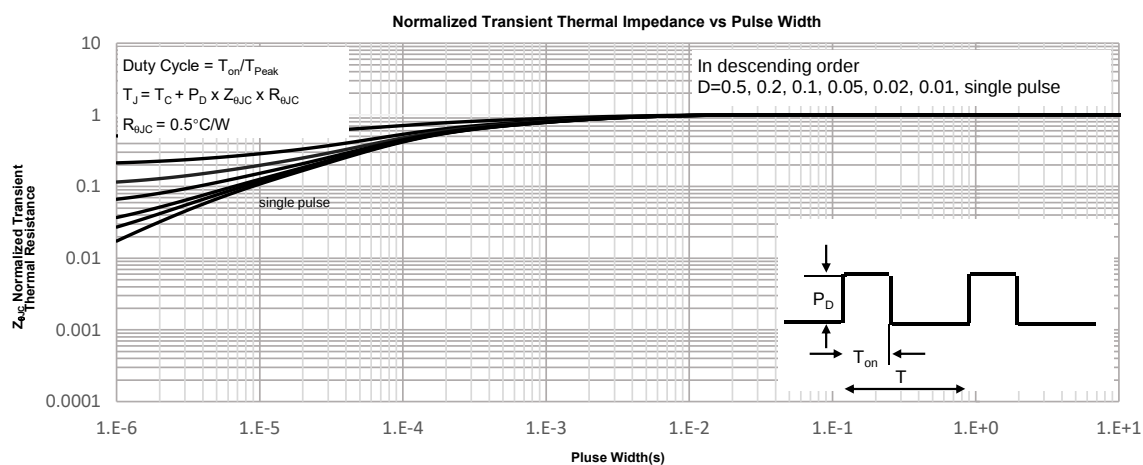
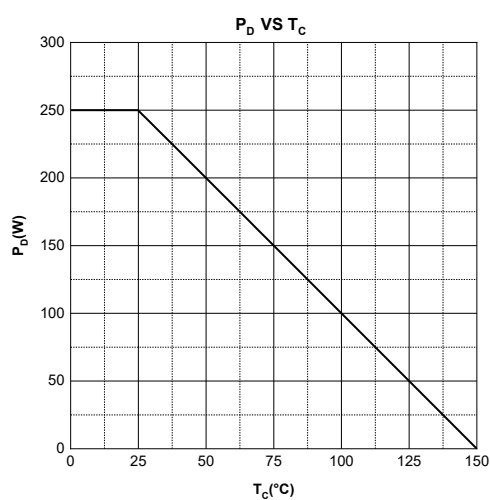
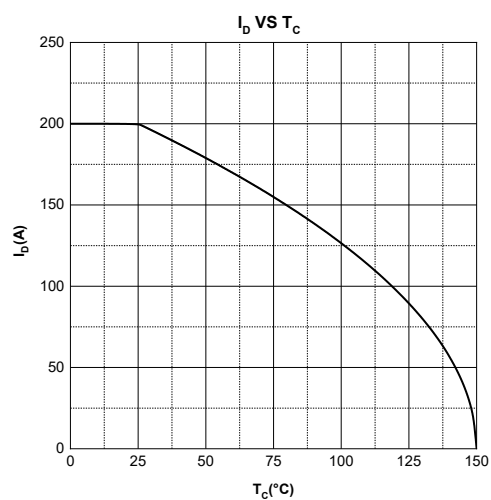
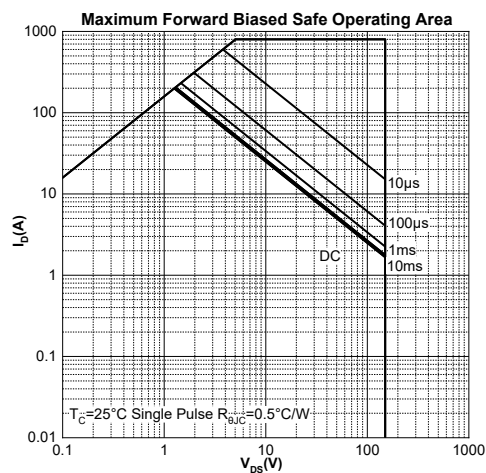
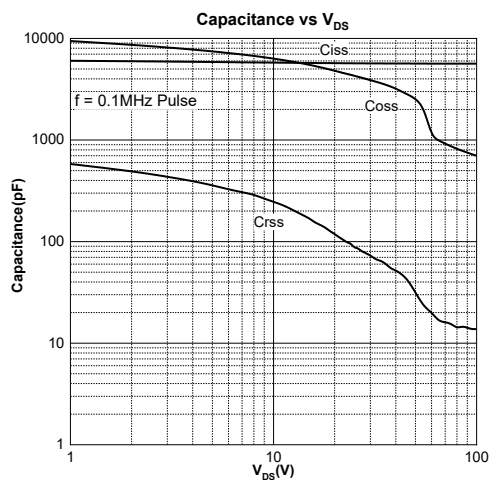
| Parameter                                     | Symbol               | Test Condition                                                                             | Min | Type | Max  | Unit |
|-----------------------------------------------|----------------------|--------------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                           |                      |                                                                                            |     |      |      |      |
| Drain-Source Breakdown Voltage                | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                               | 150 |      |      | V    |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>     | V <sub>DS</sub> = 150V, 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                                 | 2   | 3    | 4    | V    |
| Drain-Source On-Resistance                    | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 50A                                                |     | 3.9  | 5.0  | mΩ   |
| Dynamic Characteristics                       |                      |                                                                                            |     |      |      |      |
| Input Capacitance                             | C <sub>iss</sub>     | V <sub>DS</sub> = 75V, V <sub>GS</sub> = 0V, f = 0.1MHz                                    |     | 5687 |      | pF   |
| Output Capacitance                            | C <sub>oss</sub>     |                                                                                            |     | 875  |      |      |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>     |                                                                                            |     | 20   |      |      |
| Gate Resistance                               | R <sub>g</sub>       | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                       |     | 3.5  |      | Ω    |
| Switching Characteristics                     |                      |                                                                                            |     |      |      |      |
| Total Gate Charge                             | Q <sub>g</sub>       | V <sub>DS</sub> = 75V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                         |     | 81   |      | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>      |                                                                                            |     | 26   |      |      |
| Gate-Drain Charge                             | Q <sub>gd</sub>      |                                                                                            |     | 16   |      |      |
| Gate Plateau Voltage                          | V <sub>plateau</sub> |                                                                                            |     | 4.7  |      | V    |
| Turn-On Delay Time                            | t <sub>d(on)</sub>   | V <sub>DD</sub> = 75V, V <sub>GS</sub> = 10V, R <sub>G</sub> = 3Ω,<br>I <sub>D</sub> = 20A |     | 29   |      | ns   |
| Turn-On Rise Time                             | t <sub>r</sub>       |                                                                                            |     | 41   |      |      |
| Turn-Off Delay Time                           | t <sub>d(off)</sub>  |                                                                                            |     | 78   |      |      |
| Turn-Off Fall Time                            | t <sub>f</sub>       |                                                                                            |     | 31   |      |      |
| Source-Drain Diode Characteristics            |                      |                                                                                            |     |      |      |      |
| Diode Forward Voltage <sup>4</sup>            | V <sub>SD</sub>      | V <sub>GS</sub> = 0V, I <sub>S</sub> = 50A                                                 |     |      | 1.2  | V    |
| Diode Continuous Forward Current <sup>1</sup> | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                                      |     |      | 200  | A    |
| Diode Reverse Recovery Time                   | t <sub>rr</sub>      | I <sub>F</sub> = 50A, dI/dt = 100A/μs                                                      |     | 120  |      | ns   |
| Diode Reverse Recovery Charge                 | Q <sub>rr</sub>      |                                                                                            |     | 490  |      | nC   |

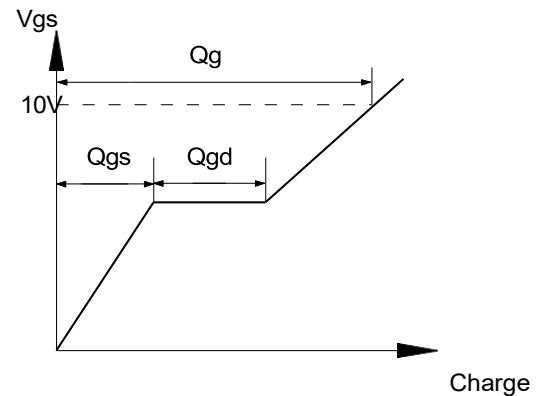
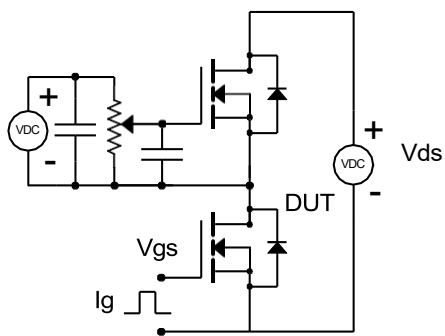
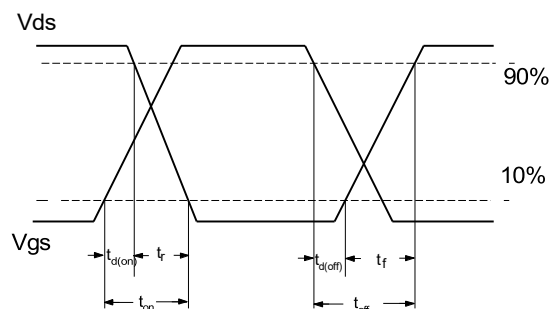
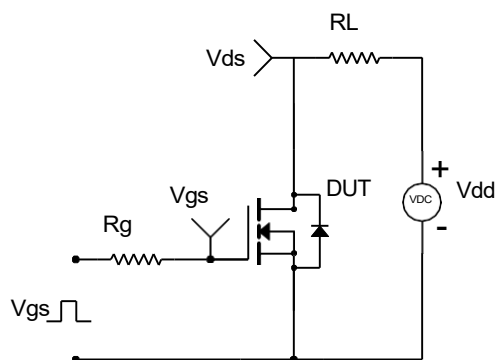
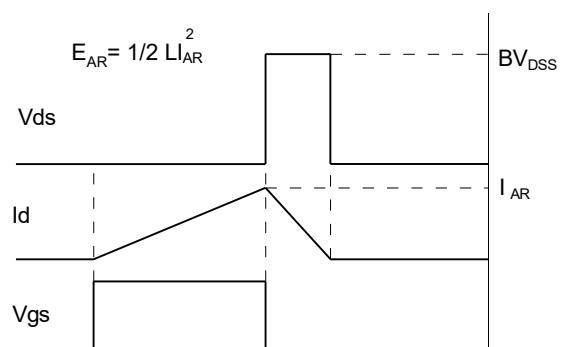
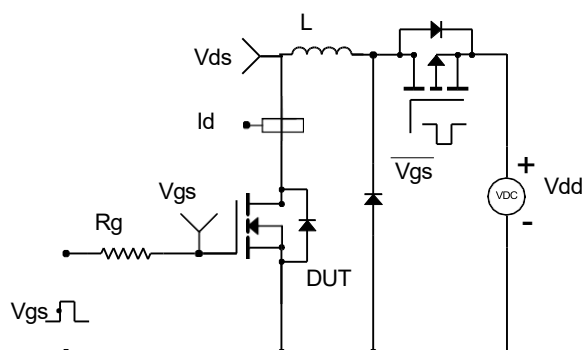
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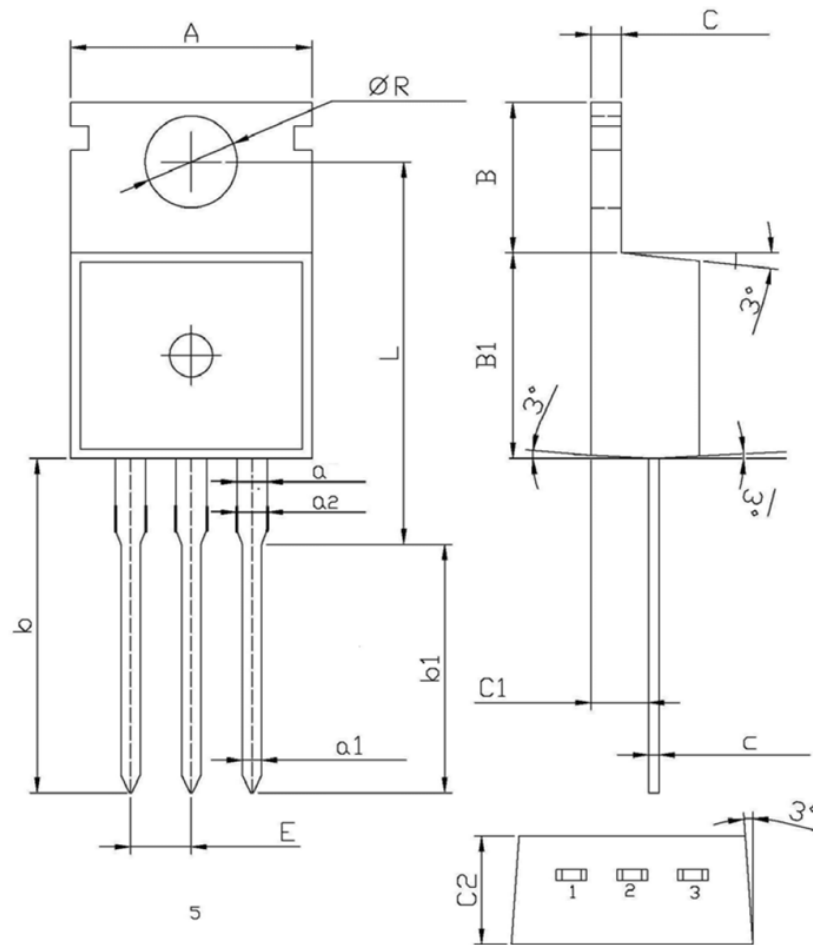
- 1.The maximum current rating is limited by package. And device mounted on a large heatsink.
- 2.Pulse Test: Pulse Width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$ .
- 3.EAS condition:  $V_{DD} = 100V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$  Starting  $T_J = 25^\circ\text{C}$ .
- 4.Pulse Test: Pulse 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





**Test Circuit**
**Gate Charge Test Circuit & Waveform**

**Resistive Switching Test Circuit & Waveform**

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


**TO-220-3L-C Package Information**


| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 9.800                     | 10.200 | 0.386                | 0.402 |
| R      | 3.560                     | 3.640  | 0.140                | 0.143 |
| L      | 15.700                    | 16.100 | 0.618                | 0.634 |
| b      | 12.600                    | 13.600 | 0.496                | 0.535 |
| b1     | 9.600                     | 10.600 | 0.378                | 0.417 |
| a      | 1.220                     | 1.320  | 0.048                | 0.052 |
| E      | 2.340                     | 2.740  | 0.092                | 0.108 |
| a2     | 1.250                     | 1.620  | 0.049                | 0.064 |
| C      | 1.200                     | 1.400  | 0.047                | 0.055 |
| B      | 5.900                     | 6.700  | 0.232                | 0.264 |
| B1     | 9.000                     | 9.400  | 0.354                | 0.370 |
| C1     | 2.200                     | 2.600  | 0.087                | 0.102 |
| a1     | 0.700                     | 0.900  | 0.028                | 0.035 |
| c      | 0.400                     | 0.600  | 0.016                | 0.024 |
| C2     | 4.300                     | 4.700  | 0.169                | 0.185 |

**Attention:**

- GreenPower Electronics reserves the right to improve product design function and reliability without notice.
- Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.
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