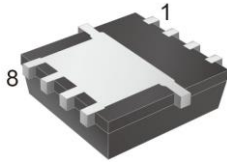


# TSM055N03PQ56

## 30V N-Channel MOSFET

### PDFN56



### Pin Definition:

- |           |          |
|-----------|----------|
| 1. Source | 8. Drain |
| 2. Source | 7. Drain |
| 3. Source | 6. Drain |
| 4. Gate   | 5. Drain |

### Note:

MSL 1 (Moisture Sensitivity Level)  
per J-STD-020

### Key Parameter Performance

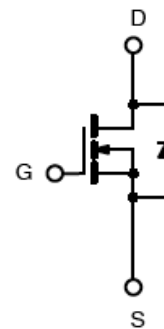
| Parameter          |                 | Value | Unit |
|--------------------|-----------------|-------|------|
| $V_{DS}$           |                 | 30    | V    |
| $R_{DS(on)}$ (max) | $V_{GS} = 10V$  | 5.5   | mΩ   |
|                    | $V_{GS} = 4.5V$ | 8.5   |      |
| $Q_g$              |                 | 11.1  | nC   |

### Ordering Information

| Part No.          | Package | Packing            |
|-------------------|---------|--------------------|
| TSM055N03PQ56 RLG | PDFN56  | 2.5kpcs / 13" Reel |

**Note:** Halogen-free according to IEC 61249-2-21 definition

### Block Diagram



N-Channel MOSFET

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

| Parameter                                         |                       | Symbol           | Limit       | Unit |
|---------------------------------------------------|-----------------------|------------------|-------------|------|
| Drain-Source Voltage                              |                       | $V_{DS}$         | 30          | V    |
| Gate-Source Voltage                               |                       | $V_{GS}$         | ±20         | V    |
| Continuous Drain Current                          | T <sub>C</sub> =25°C  | $I_D$            | 80          | A    |
|                                                   | T <sub>C</sub> =100°C |                  | 51          |      |
| Drain Current-Pulsed <sup>(Note 1)</sup>          |                       | $I_{DM}$         | 320         | A    |
| Single Pulse Avalanche Energy <sup>(Note 2)</sup> |                       | $E_{AS}$         | 88          | mJ   |
| Maximum Power Dissipation @ T <sub>C</sub> = 25°C |                       | $P_D$            | 74          | W    |
| Storage Temperature Range                         |                       | T <sub>STG</sub> | -55 to +150 | °C   |
| Operating Junction Temperature Range              |                       | T <sub>J</sub>   | -55 to +150 | °C   |

### Thermal Performance

| Parameter                                | Symbol          | Limit | Unit |
|------------------------------------------|-----------------|-------|------|
| Thermal Resistance - Junction to Case    | $R_{\theta JC}$ | 1.7   | °C/W |
| Thermal Resistance - Junction to Ambient | $R_{\theta JA}$ | 62    | °C/W |

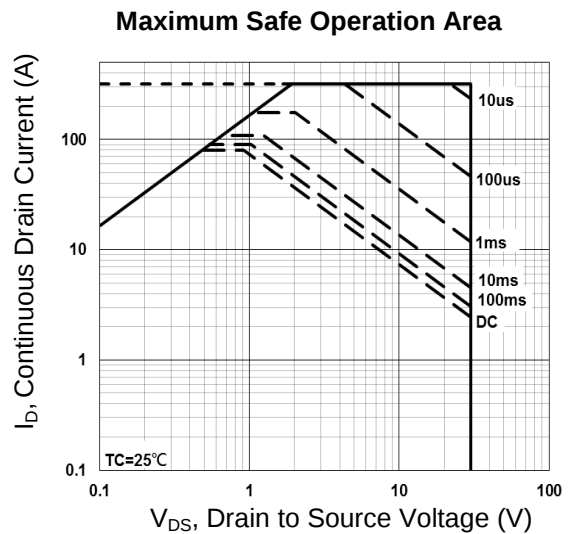
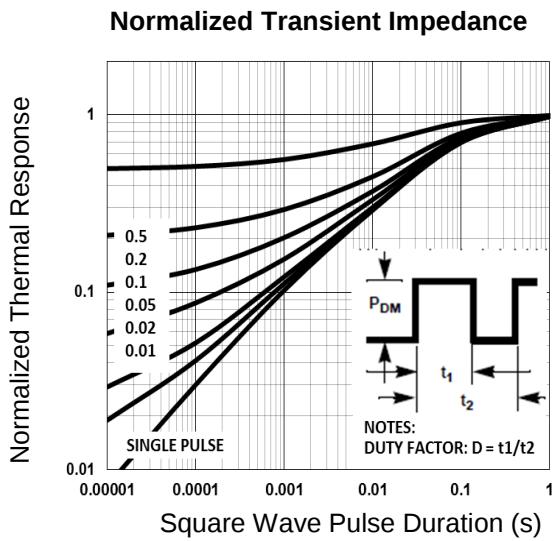
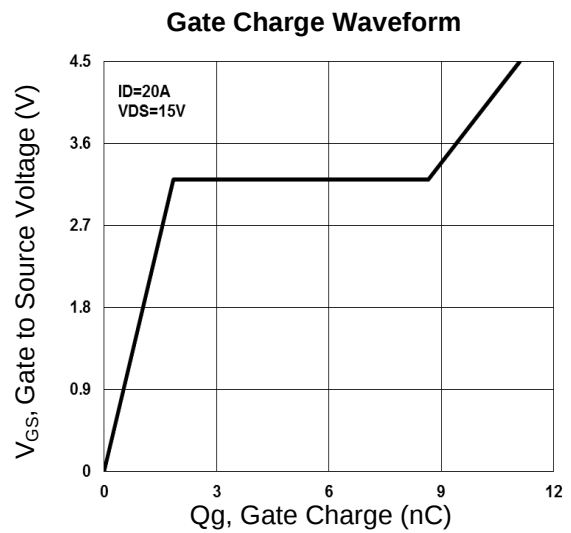
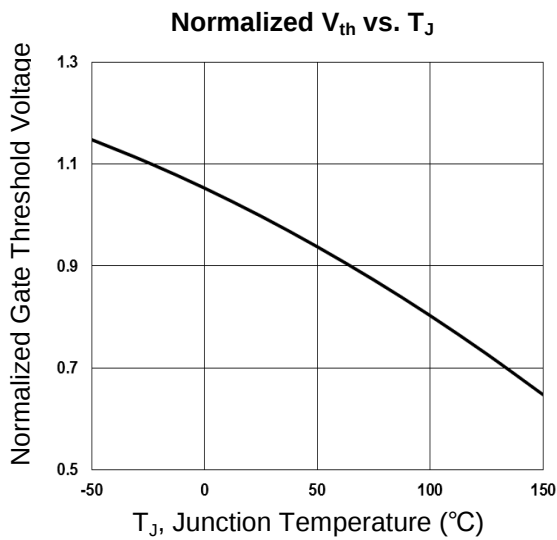
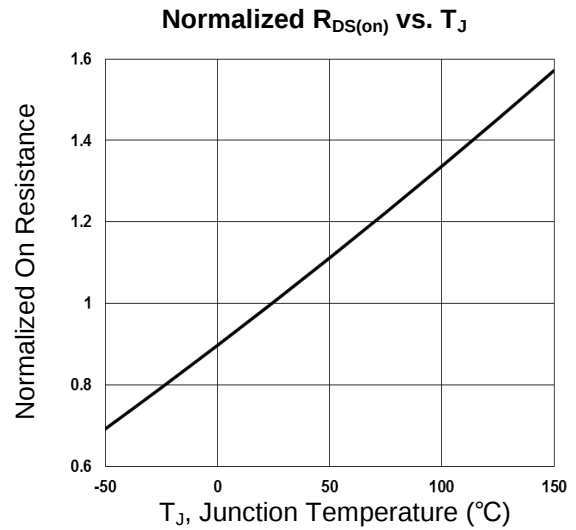
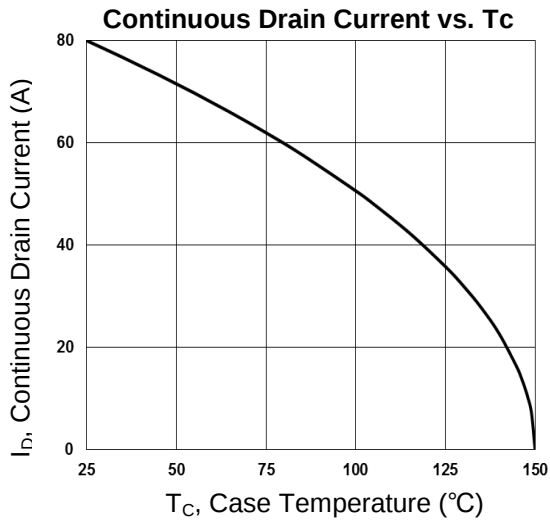
**Electrical Specifications** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

| Parameter                                             | Conditions                                               | Symbol       | Min | Typ  | Max  | Unit |
|-------------------------------------------------------|----------------------------------------------------------|--------------|-----|------|------|------|
| Static                                                |                                                          |              |     |      |      |      |
| Drain-Source Breakdown Voltage                        | $V_{GS} = 0V, I_D = 250\mu A$                            | $BV_{DSS}$   | 30  | --   | --   | V    |
| Drain-Source On-State Resistance                      | $V_{GS} = 10V, I_D = 20A$                                | $R_{DS(ON)}$ | --  | 4.5  | 5.5  | mΩ   |
|                                                       | $V_{GS} = 4.5V, I_D = 10A$                               |              |     | 6.3  | 8.5  |      |
| Gate Threshold Voltage                                | $V_{DS} = V_{GS}, I_D = 250\mu A$                        | $V_{GS(TH)}$ | 1.2 | 1.6  | 2.5  | V    |
| Zero Gate Voltage Drain Current                       | $V_{DS} = 30V, V_{GS} = 0V$                              | $I_{DSS}$    | --  | --   | 1    | μA   |
|                                                       | $V_{DS} = 24V, V_{GS} = 0V, T_J = 125^{\circ}C$          |              | --  | --   | 10   | μA   |
| Gate Body Leakage                                     | $V_{GS} = \pm 20V, V_{DS} = 0V$                          | $I_{GSS}$    | --  | --   | ±100 | nA   |
| Dynamic                                               |                                                          |              |     |      |      |      |
| Total Gate Charge <sup>(Note 3,4)</sup>               | $V_{DS} = 15V, I_D = 20A, V_{GS} = 4.5V$                 | $Q_g$        | --  | 11.1 | --   | nC   |
| Gate-Source Charge <sup>(Note 3,4)</sup>              |                                                          | $Q_{gs}$     | --  | 1.85 | --   |      |
| Gate-Drain Charge <sup>(Note 3,4)</sup>               |                                                          | $Q_{gd}$     | --  | 6.8  | --   |      |
| Input Capacitance                                     | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$                  | $C_{iss}$    | --  | 1160 | --   | pF   |
| Output Capacitance                                    |                                                          | $C_{oss}$    | --  | 200  | --   |      |
| Reverse Transfer Capacitance                          |                                                          | $C_{rss}$    | --  | 180  | --   |      |
| Switching                                             |                                                          |              |     |      |      |      |
| Turn-On Delay Time <sup>(Note 3,4)</sup>              | $V_{GS} = 10V, V_{DS} = 15V, R_G = 3.3\Omega, I_D = 15A$ | $t_{d(on)}$  | --  | 7.5  | --   | ns   |
| Turn-On Rise Time <sup>(Note 3,4)</sup>               |                                                          | $t_r$        | --  | 14.5 | --   |      |
| Turn-Off Delay Time <sup>(Note 3,4)</sup>             |                                                          | $t_{d(off)}$ | --  | 35.2 | --   |      |
| Turn-Off Fall Time <sup>(Note 3,4)</sup>              |                                                          | $t_f$        | --  | 9.6  | --   |      |
| Drain-Source Diode Characteristics and Maximum Rating |                                                          |              |     |      |      |      |
| Maximum Continuous Drain-Source Diode Forward Current | Integral reverse diode in the MOSFET                     | $I_S$        | --  | --   | 80   | A    |
| Maximum Pulse Drain-Source Diode Forward Current      |                                                          | $I_{SM}$     | --  | --   | 320  | A    |
| Drain-Source Diode Forward Voltage                    | $V_{GS} = 0V, I_S = 1A$                                  | $V_{SD}$     | --  | --   | 1    | V    |

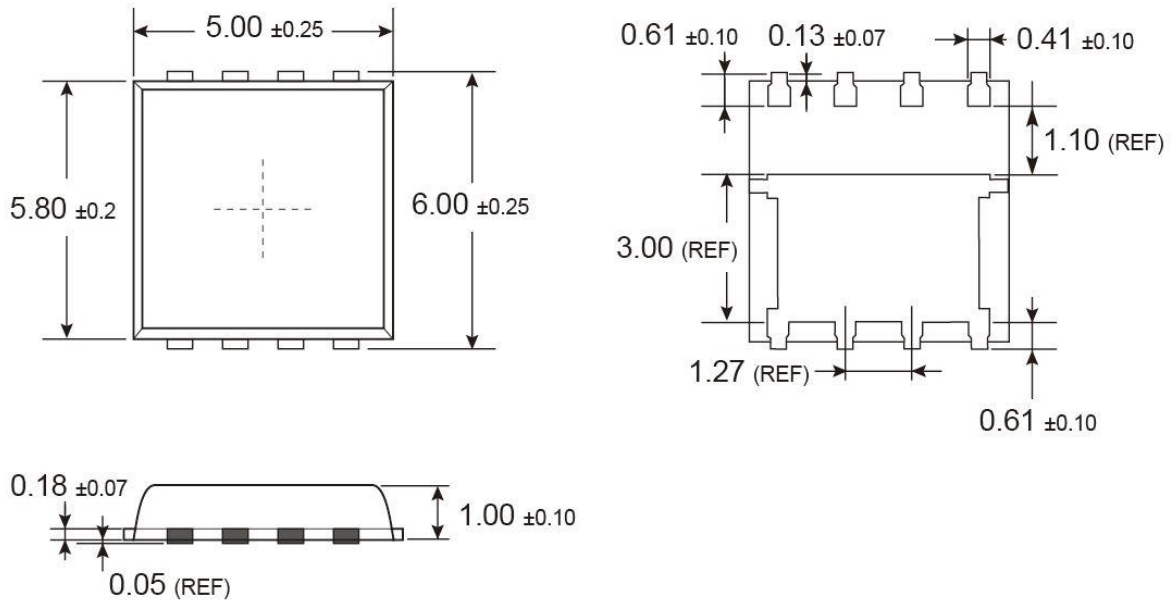
**Notes:**

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD} = 25V, V_{GS} = 10V, L = 0.1\text{mH}, I_{AS} = 42A, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$ .
3. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
4. Essentially independent of operating temperature.

## Electrical Characteristics Curves

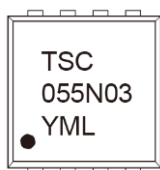


## PDFN56 Mechanical Drawing



Unit: Millimeters

## Marking Diagram



- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

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