

# TSM7P06CP

## 60V P-Channel Power MOSFET

TO-252



### Pin Definition:

1. Gate
2. Drain
3. Source

### Key Parameter Performance

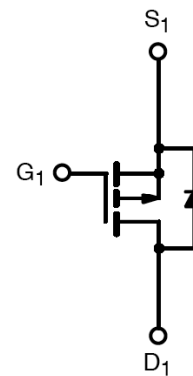
| Parameter          | Value            | Unit |
|--------------------|------------------|------|
| $V_{DS}$           | -60              | V    |
| $R_{DS(on)}$ (max) | $V_{GS} = -10V$  | 180  |
|                    | $V_{GS} = -4.5V$ | 220  |
| $Q_g$              | 8.2              | nC   |

### Ordering Information

| Part No.      | Package | Packing            |
|---------------|---------|--------------------|
| TSM7P06CP ROG | TO-252  | 2.5kpcs / 13" Reel |

**Note:** "G" denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

### Block Diagram



P-Channel MOSFET

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                          | Symbol    | Limit                     | Unit             |
|----------------------------------------------------|-----------|---------------------------|------------------|
| Drain-Source Voltage                               | $V_{DS}$  | -60                       | V                |
| Gate-Source Voltage                                | $V_{GS}$  | $\pm 20$                  | V                |
| Continuous Drain Current                           | $I_D$     | $T_C = 25^\circ\text{C}$  | -7               |
|                                                    |           | $T_C = 100^\circ\text{C}$ | -4.4             |
| Pulsed Drain Current <sup>(Note 1)</sup>           | $I_{DM}$  | -28                       | A                |
| Single Pulse Avalanche Energy <sup>(Note 2)</sup>  | $E_{AS}$  | 32                        | mJ               |
| Single Pulse Avalanche Current <sup>(Note 1)</sup> | $I_{AS}$  | -8                        | A                |
| Power Dissipation @ $T_C = 25^\circ\text{C}$       | $P_D$     | 15.6                      | W                |
| Operating Junction Temperature                     | $T_J$     | 150                       | $^\circ\text{C}$ |
| Storage Temperature Range                          | $T_{STG}$ | -50 to +150               | $^\circ\text{C}$ |

### Thermal Performance

| Parameter                                | Symbol          | Limit | Unit               |
|------------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance - Junction to Case    | $R_{\theta JC}$ | 8     | $^\circ\text{C/W}$ |
| Thermal Resistance - Junction to Ambient | $R_{\theta JA}$ | 62    |                    |

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

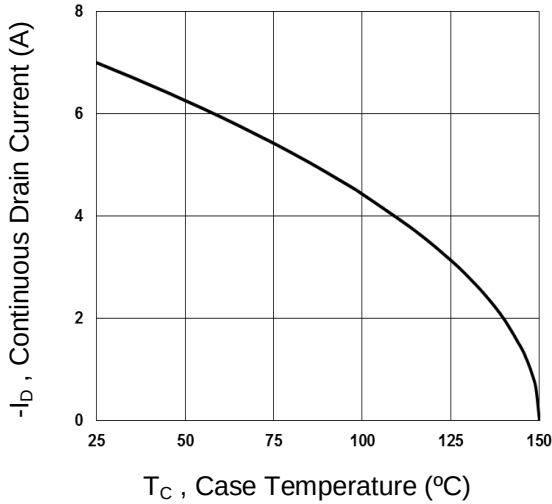
| Parameter                                             | Conditions                                       | Symbol       | Min  | Typ  | Max  | Unit |
|-------------------------------------------------------|--------------------------------------------------|--------------|------|------|------|------|
| Static                                                |                                                  |              |      |      |      |      |
| Drain-Source Breakdown Voltage                        | $V_{GS} = 0V, I_D = -250\mu A$                   | $BV_{DSS}$   | -60  | --   | --   | V    |
| Drain-Source On-State Resistance                      | $V_{GS} = -10V, I_D = -3A$                       | $R_{DS(ON)}$ | --   | 153  | 180  | mΩ   |
|                                                       | $V_{GS} = -4.5V, I_D = -1.5A$                    |              | --   | 198  | 220  |      |
| 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                       | $V_{DS} = -60V, V_{GS} = 0V$                     | $I_{DSS}$    | --   | --   | -1   | μA   |
|                                                       | $V_{DS} = -48V, V_{GS} = 0V, T_C = 125^{\circ}C$ |              | --   | --   | -10  |      |
| Gate Body Leakage                                     | $V_{GS} = \pm 20V, V_{DS} = 0V$                  | $I_{GSS}$    | --   | --   | ±100 | nA   |
| Forward Transconductance <sup>(Note 3)</sup>          | $V_{DS} = -10V, I_D = -2A$                       | $g_{fs}$     | --   | 3    | --   | S    |
| Dynamic                                               |                                                  |              |      |      |      |      |
| Total Gate Charge <sup>(Note 3,4)</sup>               | $V_{DS} = -30V, I_D = -3A, V_{GS} = -10V$        | $Q_g$        | --   | 8.2  | --   | nC   |
| Gate-Source Charge <sup>(Note 3,4)</sup>              |                                                  | $Q_{gs}$     | --   | 1.8  | --   |      |
| Gate-Drain Charge <sup>(Note 3,4)</sup>               |                                                  | $Q_{gd}$     | --   | 1.5  | --   |      |
| Input Capacitance                                     | $V_{DS} = -30V, V_{GS} = 0V, f = 1.0MHz$         | $C_{iss}$    | --   | 425  | --   | pF   |
| Output Capacitance                                    |                                                  | $C_{oss}$    | --   | 35   | --   |      |
| Reverse Transfer Capacitance                          |                                                  | $C_{rss}$    | --   | 20   | --   |      |
| Switching                                             |                                                  |              |      |      |      |      |
| Turn-On Delay Time <sup>(Note 3,4)</sup>              | $V_{DD} = -30V, I_D = -1A, R_{GEN} = 6\Omega$    | $t_{d(on)}$  | --   | 5.2  | --   | ns   |
| Turn-On Rise Time <sup>(Note 3,4)</sup>               |                                                  | $t_r$        | --   | 19   | --   |      |
| Turn-Off Delay Time <sup>(Note 3,4)</sup>             |                                                  | $t_{d(off)}$ | --   | 35   | --   |      |
| Turn-Off Fall Time <sup>(Note 3,4)</sup>              |                                                  | $t_f$        | --   | 10.6 | --   |      |
| Source-Drain Diode Ratings and Characteristic         |                                                  |              |      |      |      |      |
| Maximum Continuous Drain-Source Diode Forward Current | Integral reverse diode in the MOSFET             | $I_S$        | --   | --   | -7   | A    |
| Maximum Pulse Drain-Source Diode Forward Current      |                                                  | $I_{SM}$     | --   | --   | -28  | A    |
| Diode-Source Forward Voltage                          | $V_{GS} = 0V, I_S = -1A$                         | $V_{SD}$     | --   | --   | -1   | V    |

**Note:**

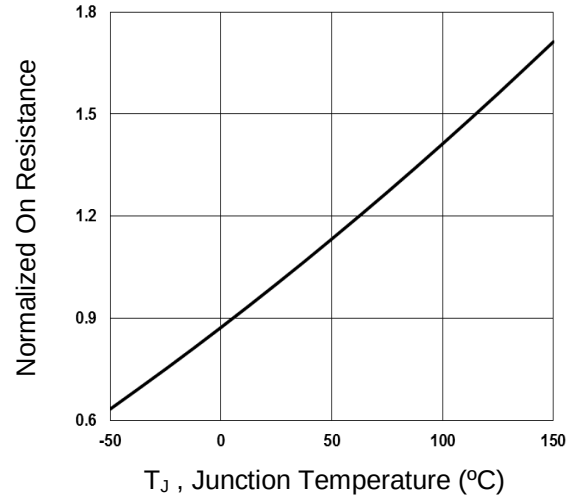
- Pulse width limited by safe operating area
- $L=1\text{mH}, I_{AS}=-8A, V_{DD}=-25V, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
- Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$
- Switching time is essentially independent of operating temperature.

### Electrical Characteristics Curve

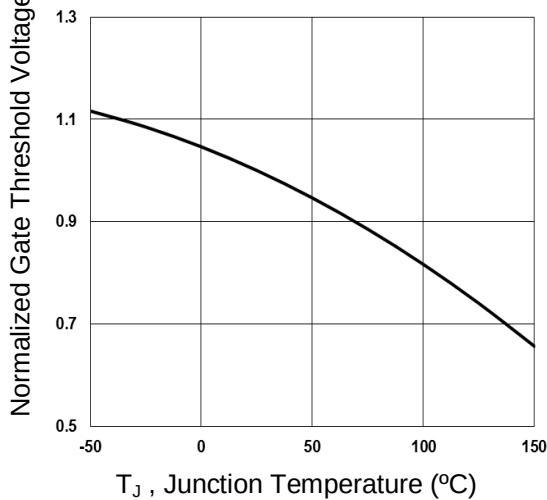
**Continuous Drain Current vs.  $T_C$**



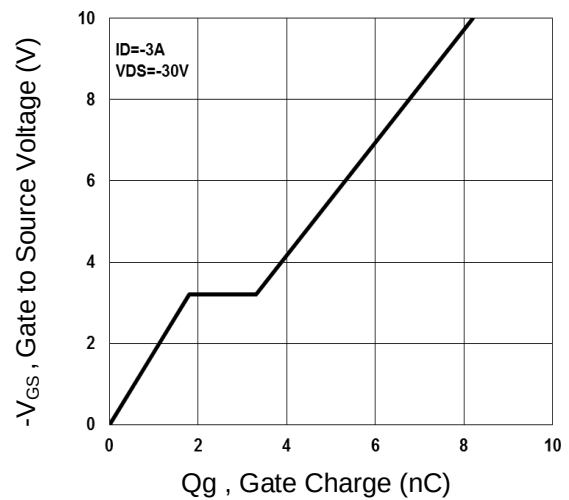
**Normalized  $R_{DS(on)}$  vs.  $T_J$**



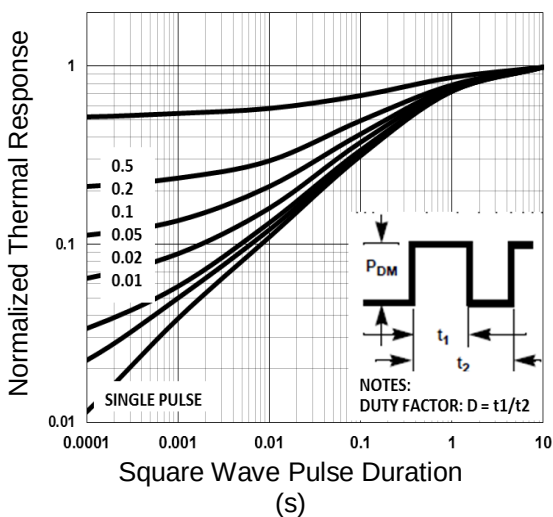
**Normalized  $V_{th}$  vs.  $T_J$**



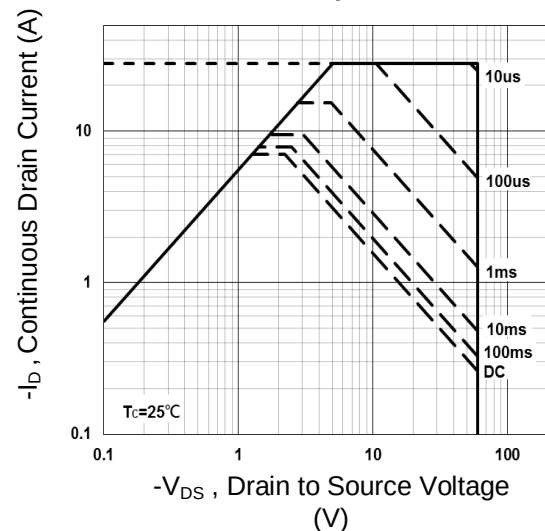
**Gate Charge Waveform**



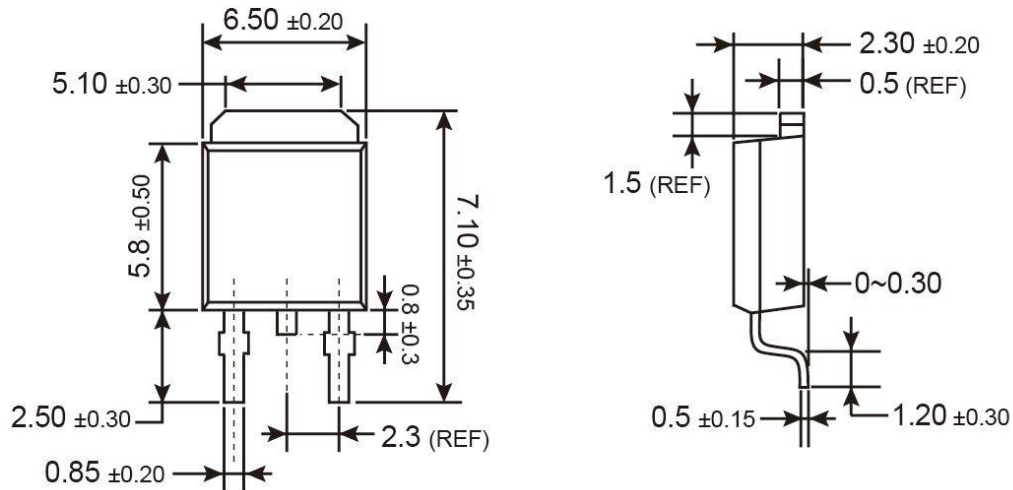
**Normalized Transient Impedance**



**Maximum Safe Operation Area**

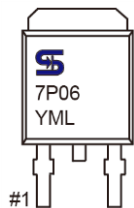


### TO-252 Mechanical Drawing



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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