

# TSM60N750

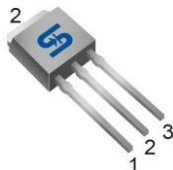
600V, 6A, 0.75Ω

N-Channel Power MOSFET

TO-252  
(DPAK)



TO-251  
(IPAK)



**Pin Definition:**

1. Gate
2. Drain
3. Source

**Key Parameter Performance**

| Parameter          | Value | Unit |
|--------------------|-------|------|
| $V_{DS}$           | 600   | V    |
| $R_{DS(on)}$ (max) | 0.75  | Ω    |
| $Q_g$              | 10.8  | nC   |

**Features**

- Super-Junction technology
- High performance due to small figure-of-merit
- High ruggedness performance
- High commutation performance

**Application**

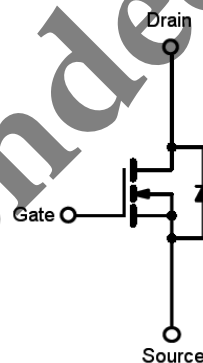
- Power Supply.
- Lighting

**Ordering Information**

| Part No.        | Package | Packing            |
|-----------------|---------|--------------------|
| TSM60N750CH C5G | TO-251  | 75pcs / Tube       |
| TSM60N750CP 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**



N-Channel MOSFET

**Absolute Maximum Ratings** ( $T_A=25^{\circ}C$  unless otherwise noted)

| Parameter   | Symbol         | Limit        | Unit |
|---|----------------|--------------|------|
|   |                | IPAK/DPAK    |      |
| Drain-Source Voltage                                | $V_{DS}$       | 600          | V    |
| Gate-Source Voltage                                 | $V_{GS}$       | ±30          | V    |
| Continuous Drain Current <sup>(Note 1)</sup>        | $I_D$          | 6            | A    |
| $T_C = 25^{\circ}C$                                 |                |              |      |
| Pulsed Drain Current <sup>(Note 2)</sup>            | $I_{DM}$       | 18           | A    |
| Total Power Dissipation @ $T_C=25^{\circ}C$         | $P_{DTOT}$     | 62.5         | W    |
| Single Pulsed Avalanche Energy <sup>(Note 3)</sup>  | $E_{AS}$       | 90           | mJ   |
| Single Pulsed Avalanche Current <sup>(Note 3)</sup> | $I_{AS}$       | 1.9          | A    |
| Operating Junction and Storage Temperature Range    | $T_J, T_{STG}$ | - 55 to +150 | °C   |

## Thermal Performance

| Parameter                              | Symbol          | Limit     | Unit |
|--|-----------------|-----------|------|
|  |                 | IPAK/DPAK |      |
| Junction to Case Thermal Resistance    | $R_{\theta JC}$ | 2         | °C/W |
| Junction to Ambient Thermal Resistance | $R_{\theta JA}$ | 62        | °C/W |

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

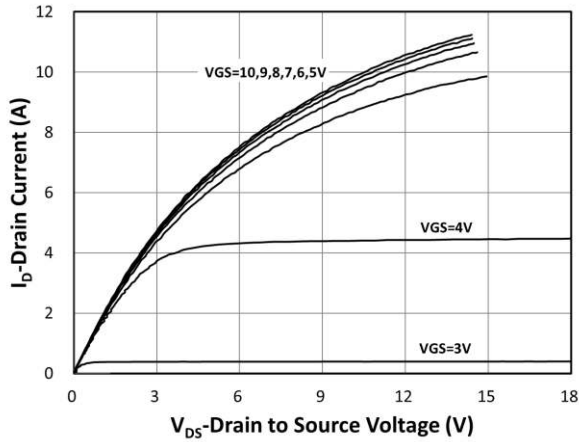
| Parameter                          | Conditions   | Symbol       | Min | Typ  | Max  | Unit |
|------------------------------------|--|--------------|-----|------|------|------|
| <b>Static</b> (Note 4)             |  |              |     |      |      |      |
| Drain-Source Breakdown Voltage     | $V_{GS} = 0V, I_D = 250\mu A$  | $BV_{DSS}$   | 600 | --   | --   | V    |
| Gate Threshold Voltage             | $V_{DS} = V_{GS}, I_D = 250\mu A$                                      | $V_{GS(TH)}$ | 2   | 3    | 4    | V    |
| Gate Body Leakage                  | $V_{GS} = \pm 30V, V_{DS} = 0V$  | $I_{GSS}$    | --  | --   | ±100 | nA   |
| Zero Gate Voltage Drain Current    | $V_{DS} = 600V, V_{GS} = 0V$   | $I_{DSS}$    | --  | --   | 1    | μA   |
| Drain-Source On-State Resistance   | $V_{GS} = 10V, I_D = 3A$   | $R_{DS(ON)}$ | --  | 0.53 | 0.75 | Ω    |
| <b>Dynamic</b> (Note 5)            |  |              |     |      |      |      |
| Total Gate Charge                  | $V_{DS} = 380V, I_D = 6A,$<br>$V_{GS} = 10V$                           | $Q_g$        | --  | 10.8 | --   | nC   |
| Gate-Source Charge                 |  | $Q_{gs}$     | --  | 2.7  | --   |      |
| Gate-Drain Charge                  |  | $Q_{gd}$     | --  | 3.7  | --   |      |
| Input Capacitance                  | $V_{DS} = 100V, V_{GS} = 0V,$<br>$f = 1.0MHz$                          | $C_{iss}$    | --  | 554  | --   | pF   |
| Output Capacitance                 |  | $C_{oss}$    | --  | 46   | --   |      |
| Gate Resistance                    | $f=1MHz, \text{open drain}$  | $R_g$        | --  | 2.7  | --   | Ω    |
| <b>Switching</b> (Note 6)          |  |              |     |      |      |      |
| Turn-On Delay Time                 | $V_{DD} = 380V,$<br>$R_{GEN} = 25\Omega,$<br>$I_D = 6A, V_{GS} = 10V,$ | $t_{d(on)}$  | --  | 17.3 | --   | ns   |
| Turn-On Rise Time                  |  | $t_r$        | --  | 22   | --   |      |
| Turn-Off Delay Time                |  | $t_{d(off)}$ | --  | 28   | --   |      |
| Turn-Off Fall Time                 |  | $t_f$        | --  | 22   | --   |      |
| <b>Source-Drain Diode</b> (Note 4) |  |              |     |      |      |      |
| Forward On Voltage                 | $I_S=6A, V_{GS}=0V$  | $V_{SD}$     | --  | --   | 1.4  | V    |
| Reverse Recovery Time              | $V_R=200V, I_S=3A$<br>$di_f/dt=100A/\mu s$                             | $t_{rr}$     | --  | 182  | --   | ns   |
| Reverse Recovery Charge            |  | $Q_{rr}$     | --  | 1.3  | --   | μC   |

### Notes:

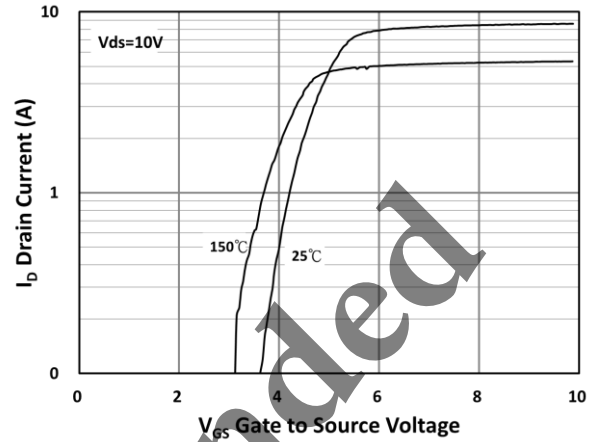
- Current limited by package
- Pulse width limited by the maximum junction temperature
- $L=50mH, I_{AS}=1.9A, V_{DD}=50V, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$
- Pulse test:  $PW \leq 300\mu s, \text{duty cycle} \leq 2\%$
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

## Electrical Characteristics Curves

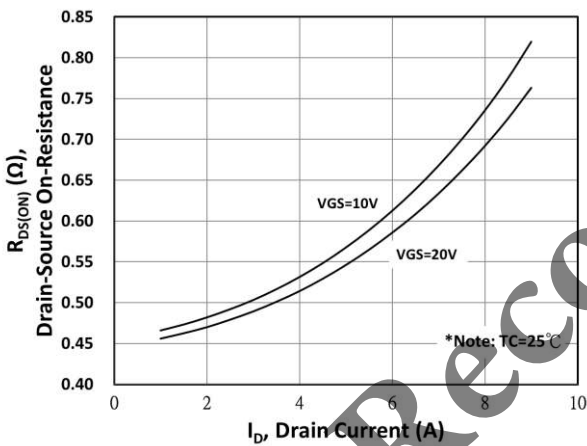
**Output Characteristics**



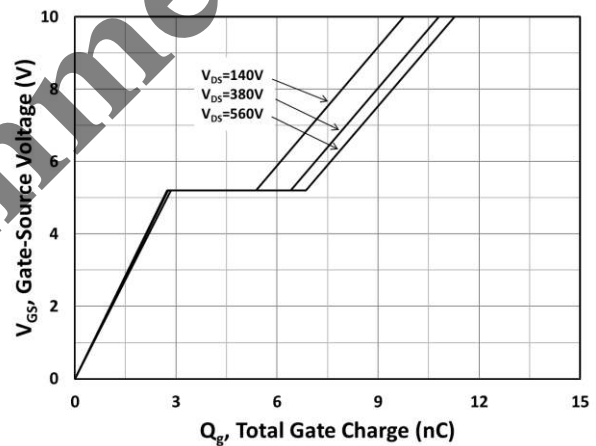
**Transfer Characteristics**



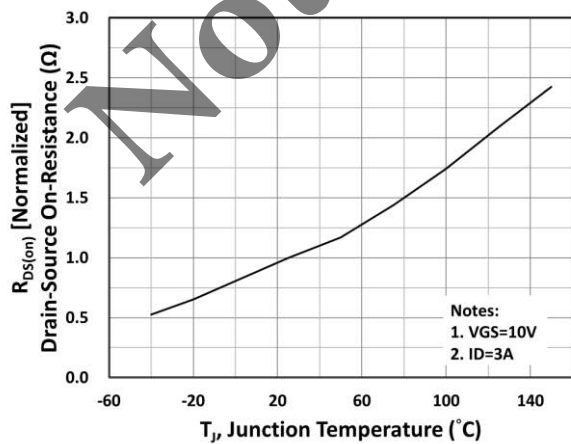
**On-Resistance vs. Drain Current**



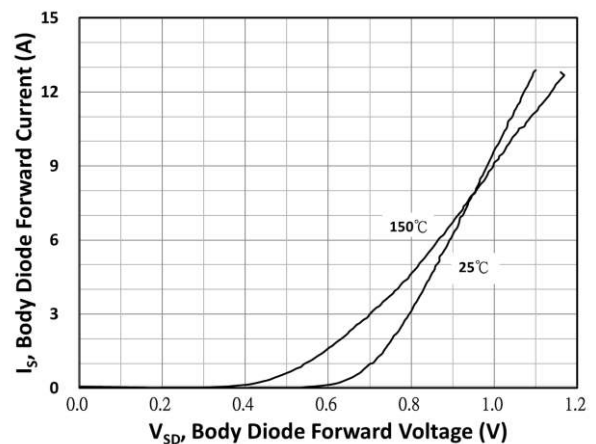
**Gate-Source Voltage vs. Gate Charge**



**On-Resistance vs. Junction Temperature**

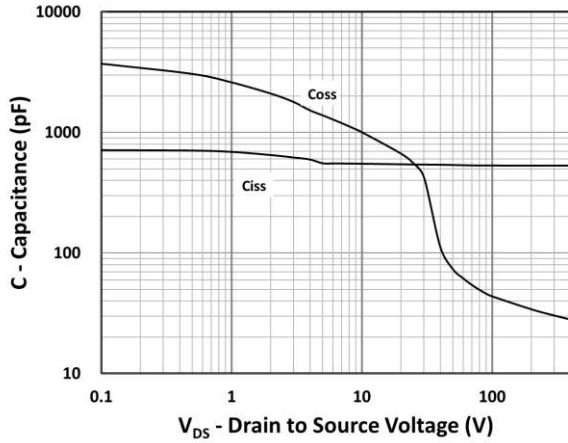


**Source-Drain Diode Forward Current vs. Voltage**

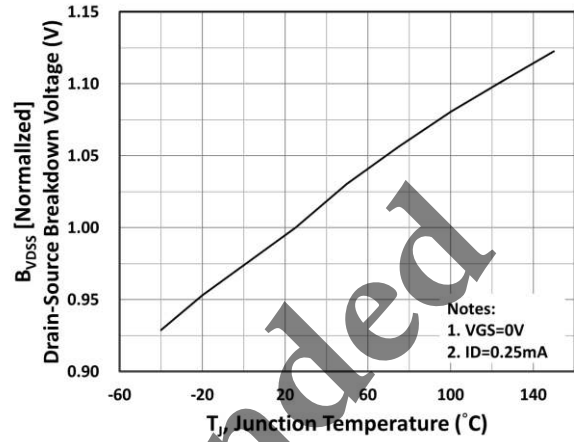


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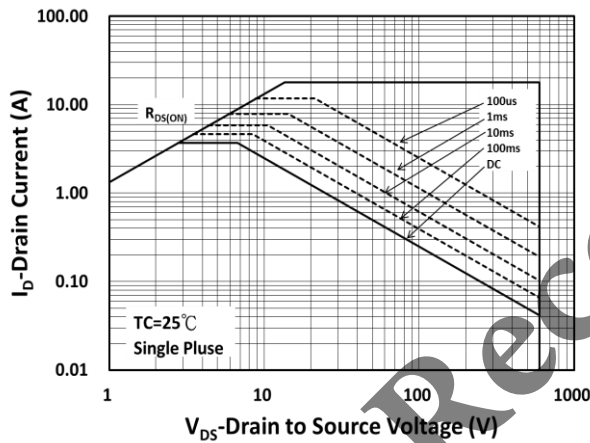
**Capacitance vs. Drain-Source Voltage**



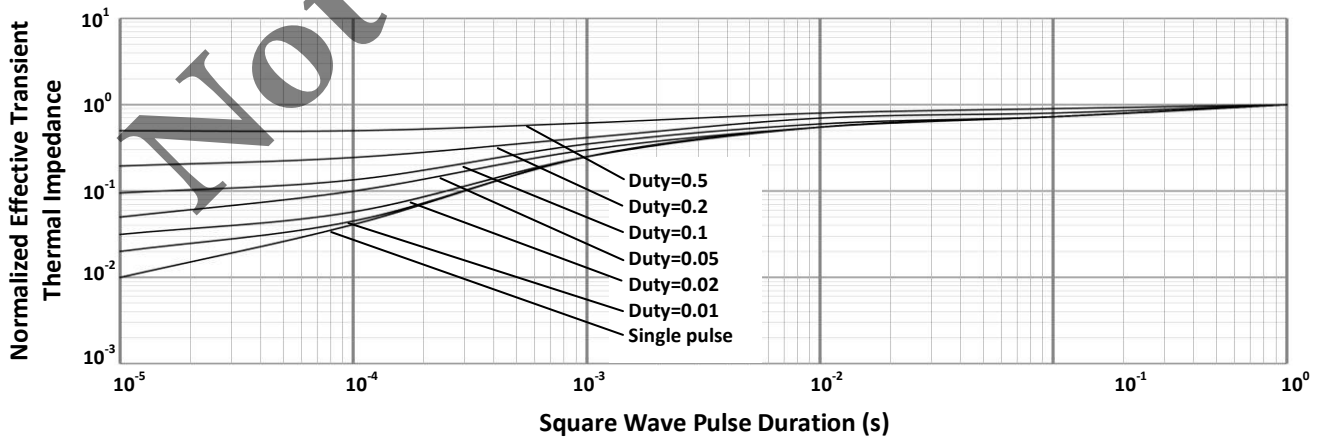
**BV<sub>DSS</sub> vs. Junction Temperature**



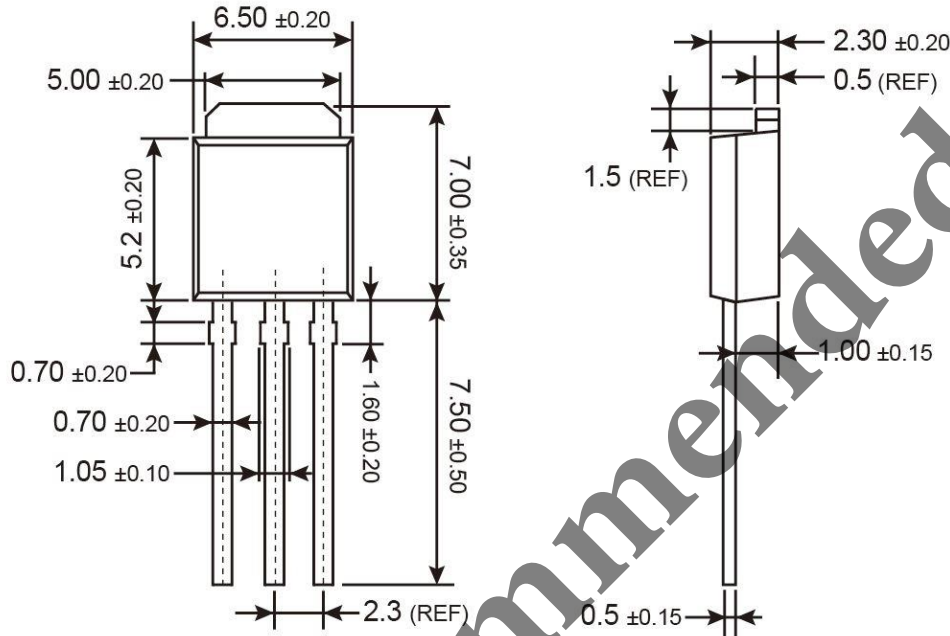
**Maximum Safe Operating Area (DPAK/IPAK)**



**Normalized Thermal Transient Impedance, Junction-to-Case (DPAK/IPAK)**

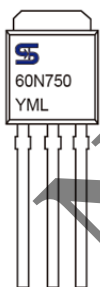


**TO-251 (IPAK) Mechanical Drawing**



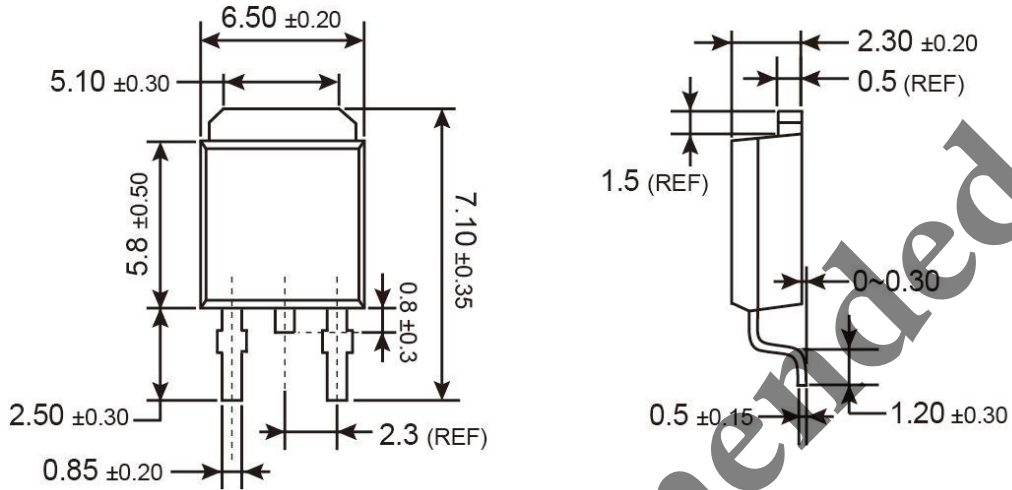
Unit: Millimeters

**Marking Diagram**



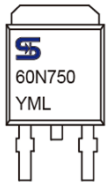
- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

**TO-252 (DPAK) Mechanical Drawing**



Unit: Millimeters

**Marking Diagram**



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Not Recommended

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