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TSM060N03ECP

30V N-Channel Power MOSFET



Pin Definition:
 1. Gate
 2. Drain
 3. Source

Key Parameter Performance

| Parameter | Value | Unit |
|--------------------|-----------------|------|
| V_{DS} | 30 | V |
| $R_{DS(on)}$ (max) | $V_{GS} = 10V$ | 6 |
| | $V_{GS} = 4.5V$ | 9 |
| Q_g | 11.1 | nC |

Features

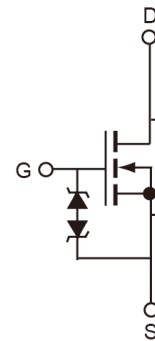
- Fast switching
- G-S ESD Protection Diode Embedded

Ordering Information

| Part No. | Package | Packing |
|------------------|---------|--------------------|
| TSM060N03ECP 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 with ESD protection

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

| Parameter | Symbol | Limit | Unit |
|--|-----------|-------------------------------|------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current | I_D | $T_C=25^\circ C$ | 70 |
| | | $T_C=100^\circ C$ | 44 |
| Pulsed Drain Current ^(Note 1) | I_{DM} | 280 | A |
| Single Pulse Avalanche Energy ^(Note 2) | E_{AS} | 88 | mJ |
| Single Pulse Avalanche Current ^(Note 2) | I_{AS} | 42 | A |
| Total Power Dissipation | P_D | @ $T_C=25^\circ C$ | 54 |
| | | Derate above $T_C=25^\circ C$ | 0.43 |
| Operating Junction Temperature | T_J | 150 | $^\circ C$ |
| Storage Temperature Range | T_{STG} | -55 to +150 | $^\circ C$ |

Thermal Performance

| Parameter | Symbol | Limit | Unit |
|--|-----------------|-------|--------------|
| Thermal Resistance - Junction to Case | $R_{\theta JC}$ | 2.3 | $^\circ C/W$ |
| Thermal Resistance - Junction to Ambient | $R_{\theta JA}$ | 62 | $^\circ C/W$ |

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

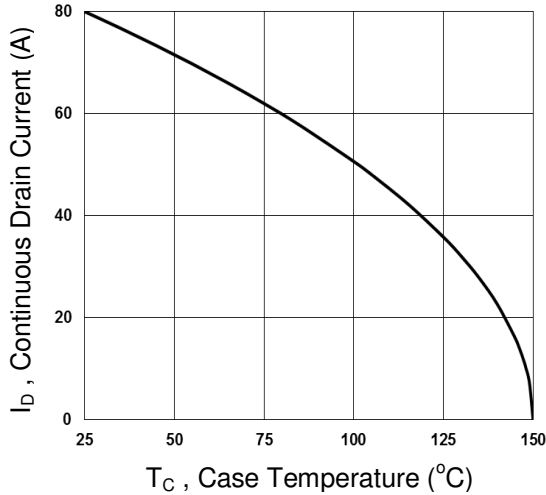
| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|--|--|--------------|-----|------|----------|------------|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu A$ | BV_{DSS} | 30 | -- | -- | V |
| Drain-Source On-State Resistance | $V_{GS} = 10V, I_D = 20A$ | $R_{DS(ON)}$ | -- | 4.8 | 6 | m Ω |
| | $V_{GS} = 4.5V, I_D = 10A$ | | -- | 6.5 | 9 | |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | $V_{GS(TH)}$ | 1 | 1.6 | 2.5 | V |
| Zero Gate Voltage Drain Current | $V_{DS} = 30V, V_{GS} = 0V$ | I_{DSS} | -- | -- | 1 | μA |
| | $V_{DS} = 24V, T_J = 125^\circ\text{C}$ | | -- | -- | 10 | |
| Gate Body Leakage | $V_{GS} = \pm 20V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 10 | μA |
| Forward Transconductance | $V_{DS} = 10V, I_D = 10A$ | g_{fs} | -- | 12.5 | -- | S |
| Dynamic | | | | | | |
| Total Gate Charge ^(Note 3,4) | $V_{DS} = 15V, I_D = 20A,$ $V_{GS} = 4.5V$ | Q_g | -- | 11.1 | -- | nC |
| Gate-Source Charge ^(Note 3,4) | | Q_{gs} | -- | 1.85 | -- | |
| Gate-Drain Charge ^(Note 3,4) | | Q_{gd} | -- | 6.8 | -- | |
| Input Capacitance | $V_{DS} = 25V, V_{GS} = 0V,$ $f = 1\text{MHz}$ | C_{iss} | -- | 1210 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 190 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 100 | -- | |
| Gate Resistance | $V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$ | R_g | -- | 2.5 | -- | Ω |
| Switching | | | | | | |
| Turn-On Delay Time ^(Note 3,4) | $V_{DD}=15V, V_{GS}=10V,$ $R_G=3.3\Omega, I_D=-15A$ | $t_{d(on)}$ | -- | 7.5 | -- | ns |
| Turn-On Rise Time ^(Note 3,4) | | t_r | -- | 14.5 | -- | |
| Turn-Off Delay Time ^(Note 3,4) | | $t_{d(off)}$ | -- | 35.2 | -- | |
| Turn-Off Fall Time ^(Note 3,4) | | t_f | -- | 9.6 | -- | |
| Source-Drain Diode Ratings and Characteristic | | | | | | |
| Continuous Drain-Source Diode | $V_G=V_D=0V$ | I_S | -- | -- | 70 | A |
| Pulse Drain-Source Diode | Force Current | I_{SM} | -- | -- | 280 | A |
| Diode-Source Forward Voltage | $V_{GS} = 0V, I_S = 1A$ | V_{SD} | -- | -- | 1 | V |

Note:

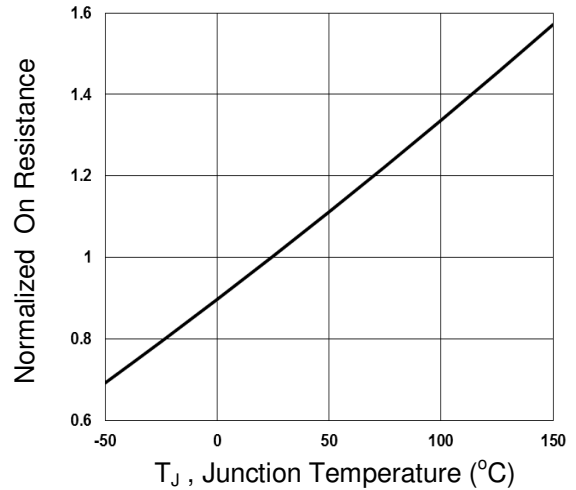
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=42A., R_G=25\Omega,$ Starting $T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width $\leq 300\mu s,$ duty cycle $\leq 2\%$
4. Essentially independent of operating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

Electrical Characteristics Curve

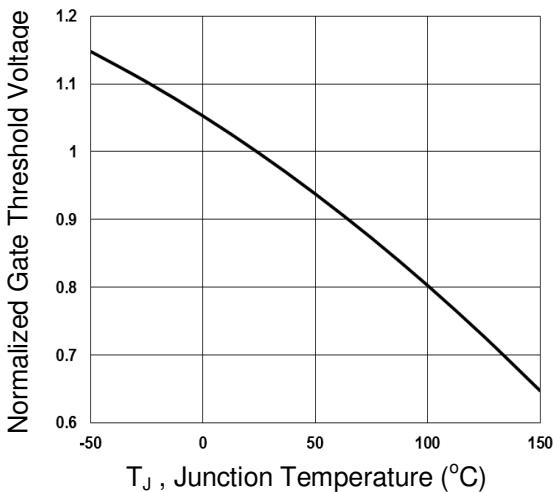
Continuous Drain Current vs. T_C



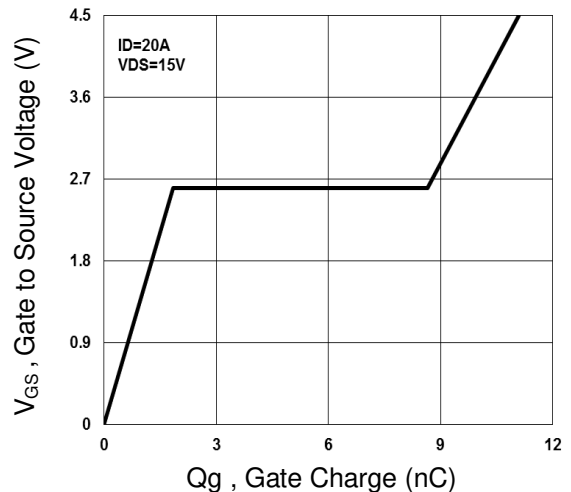
Normalized R_{DS(on)} vs. T_J



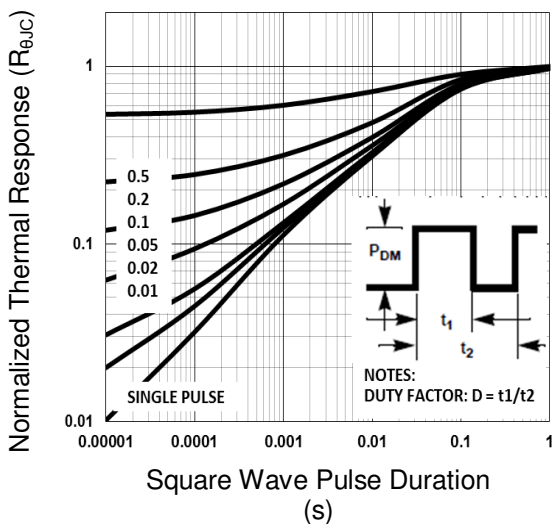
Normalized V_{th} vs. T_J



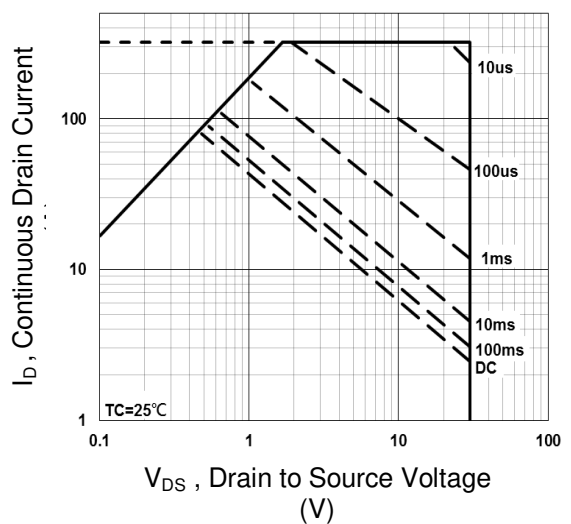
Gate Charge Waveform



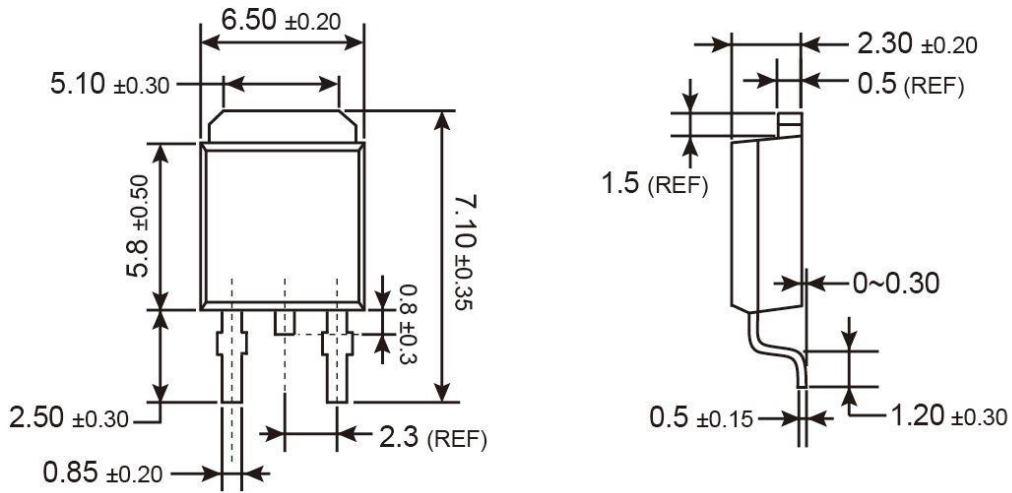
Normalized Transient Impedance



Maximum Safe Operation Area

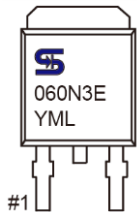


TO-252 Mechanical Drawing



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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