

N-Channel Power MOSFET

60V, 11A, 90mΩ

FEATURES

- 100% UIS and Rg tested
- Logic-level gate drive
- Fast switching
- RoHS Compliant
- Halogen-Free according to IEC 61249-2-21

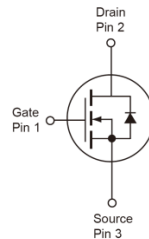
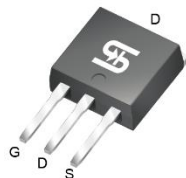
APPLICATIONS

- DC-DC Converters
- Solenoid and Motor Drivers

| PRODUCT SUMMARY | | | |
|--------------------|-----------------|------|----|
| PARAMETER | VALUE | UNIT | |
| V_{DS} | 60 | V | |
| $R_{DS(on)}$ (max) | $V_{GS} = 10V$ | 90 | mΩ |
| | $V_{GS} = 4.5V$ | 100 | |
| Q_g | $V_{GS} = 10V$ | 9.5 | nC |



TO-251S (IPAK SL)



| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | |
|---|--------------------------|---------------------------|------------------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | V_{DS} | 60 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current (Note 1) | I_D | $T_C = 25^\circ\text{C}$ | 11 |
| | | $T_C = 100^\circ\text{C}$ | 7 |
| Pulsed Drain Current (Note 2) | I_{DM} | 44 | A |
| Single Pulse Avalanche Current (Note 3) | I_{AS} | 7 | A |
| Single Pulse Avalanche Energy (Note 3) | E_{AS} | 25 | mJ |
| Total Power Dissipation | $T_C = 25^\circ\text{C}$ | P_D | 25 |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | - 55 to +150 | $^\circ\text{C}$ |

| THERMAL RESISTANCE | | | |
|--|-----------------|---------|--------------------|
| PARAMETER | SYMBOL | MAXIMUM | UNIT |
| Thermal Resistance – Junction to Case | $R_{\theta JC}$ | 5 | $^\circ\text{C/W}$ |
| Thermal Resistance – Junction to Ambient | $R_{\theta JA}$ | 62 | $^\circ\text{C/W}$ |

Note: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design

| ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | |
|--|---|--------------|-----|-------|-----------|---------------|
| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNIT |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ | BV_{DSS} | 60 | -- | -- | V |
| Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250\mu\text{A}$ | $V_{GS(TH)}$ | 1.2 | 1.8 | 2.5 | V |
| Gate-Source Leakage Current | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ | I_{GSS} | -- | -- | ± 100 | nA |
| Drain-Source Leakage Current | $V_{GS} = 0\text{V}, V_{DS} = 60\text{V}$ | I_{DSS} | -- | -- | 1 | μA |
| | $V_{GS} = 0\text{V}, V_{DS} = 48\text{V}$ $T_J = 125^\circ\text{C}$ | | -- | -- | 10 | |
| Drain-Source On-State Resistance (Note 4) | $V_{GS} = 10\text{V}, I_D = 6\text{A}$ | $R_{DS(on)}$ | -- | 76 | 90 | m Ω |
| | $V_{GS} = 4.5\text{V}, I_D = 3\text{A}$ | | -- | 87 | 100 | |
| Forward Transconductance (Note 4) | $V_{DS} = 10\text{V}, I_D = 3\text{A}$ | g_{fs} | -- | 4 | -- | S |
| Dynamic | | | | | | |
| Total Gate Charge | $V_{GS} = 10\text{V}, V_{DS} = 48\text{V},$ $I_D = 6\text{A}$ | Q_g | -- | 9.5 | -- | nC |
| Gate-Source Charge | | Q_{gs} | -- | 2 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 1.4 | -- | |
| Input Capacitance | $V_{GS} = 0\text{V}, V_{DS} = 30\text{V},$ $f = 1.0\text{MHz}$ | C_{iss} | -- | 553.4 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 34.4 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 27 | -- | |
| Gate Resistance | $f = 1.0\text{MHz}$ | R_g | -- | 2 | -- | Ω |
| Switching (Note 5) | | | | | | |
| Turn-On Delay Time | $V_{GS} = 10\text{V}, V_{DS} = 30\text{V},$ $I_D = 1\text{A}, R_G = 3.3\Omega$ | $t_{d(on)}$ | -- | 6.7 | -- | ns |
| Rise Time | | t_r | -- | 2.8 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 17.1 | -- | |
| Fall Time | | t_f | -- | 1.8 | -- | |
| Source-Drain Diode | | | | | | |
| Diode Forward Voltage (Note 4) | $V_{GS} = 0\text{V}, I_S = 1\text{A}$ | V_{SD} | -- | -- | 1.2 | V |
| Reverse Recovery Time | $I_S = 2\text{A}, V_{GS} = 30\text{V}$ $di/dt = 100\text{A}/\mu\text{s}$ | t_{rr} | -- | 12.5 | -- | ns |
| Reverse Recovery Charge | | Q_{rr} | -- | 7.7 | -- | nC |

Notes:

- Limited by maximum junction temperature.
- Repetitive Rating : Pulsed width limited by maximum junction temperature.
- $L = 1\text{mH}, V_{GS} = 10\text{V}, R_G = 25\Omega$, 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.

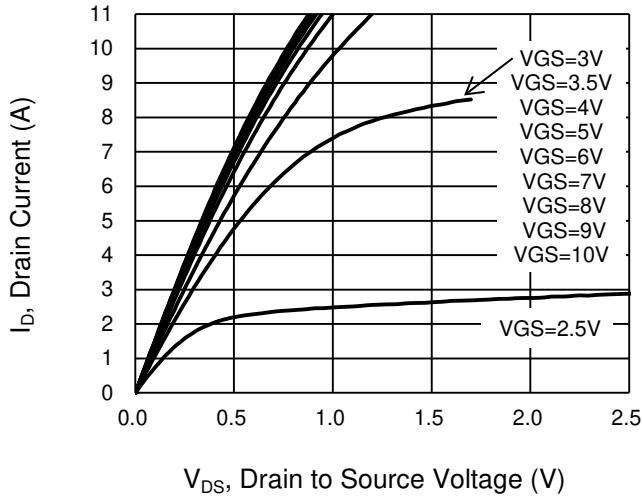
ORDERING INFORMATION

| ORDERING CODE | PACKAGE | PACKING |
|-----------------|---------|--------------|
| TSM900N06CH X0G | TO-251S | 75pcs / Tube |

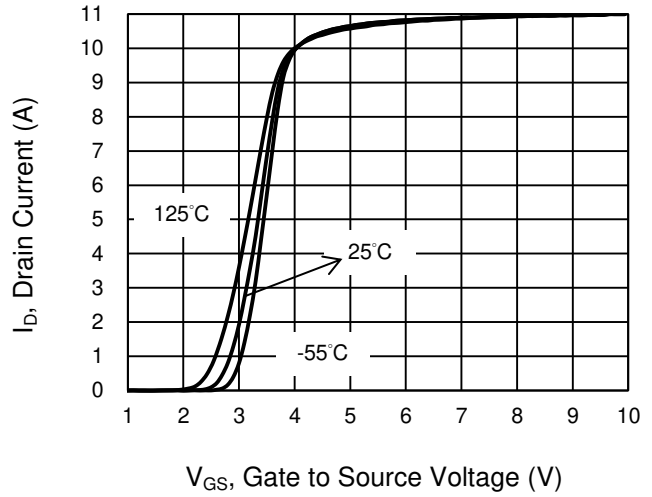
CHARACTERISTICS CURVES

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

Output Characteristics



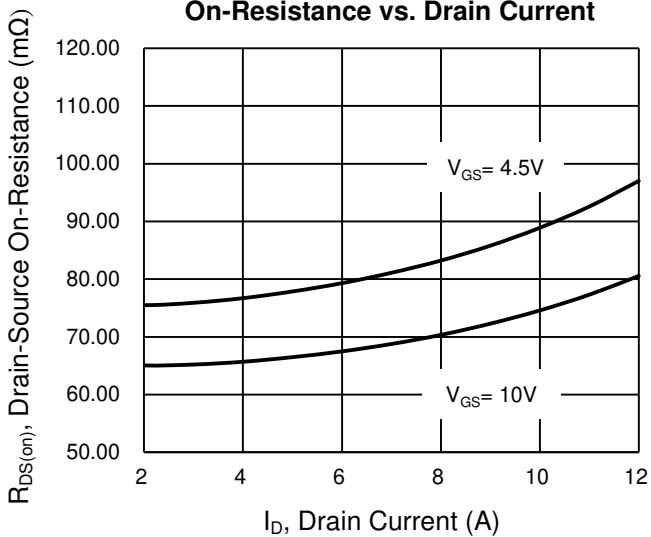
Transfer Characteristics



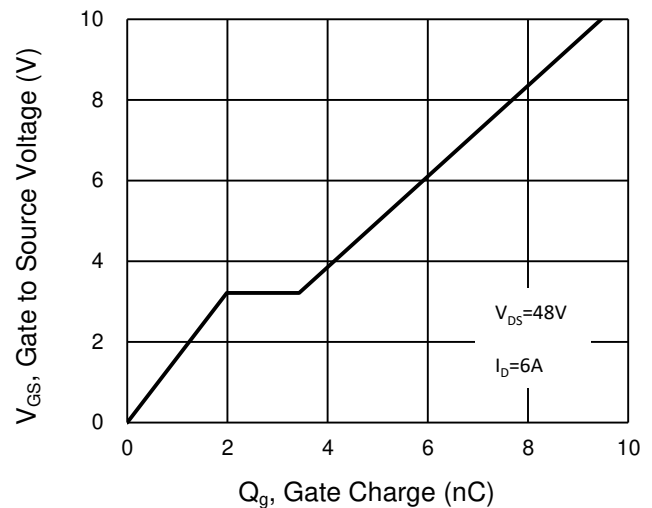
V_{DS} , Drain to Source Voltage (V)

V_{GS} , Gate to Source Voltage (V)

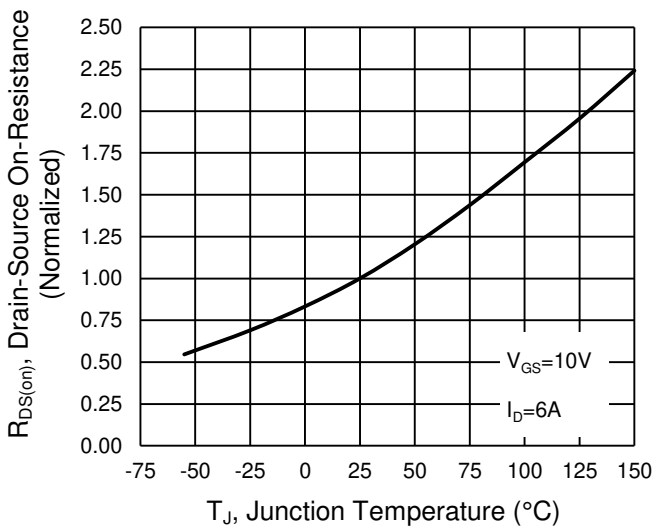
On-Resistance vs. Drain Current



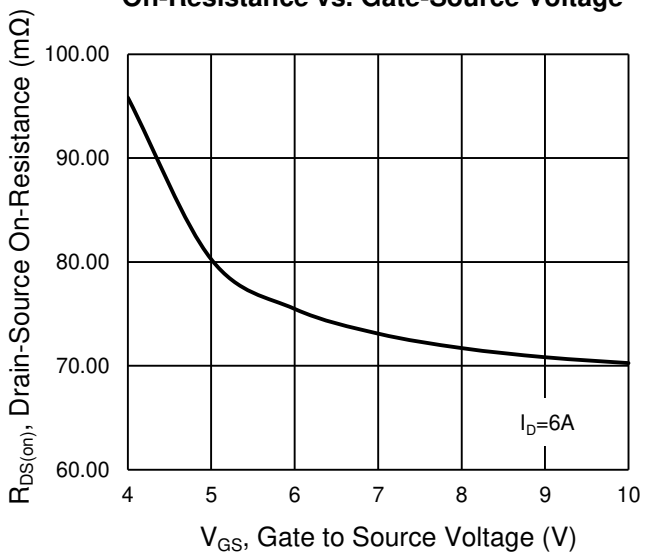
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature

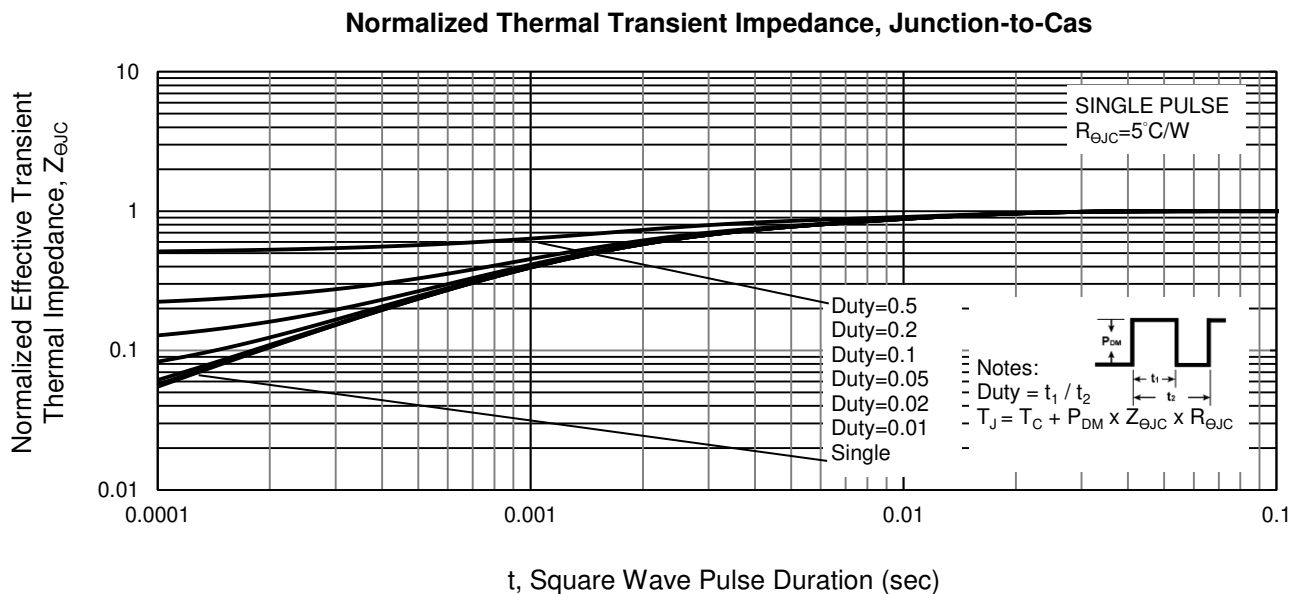
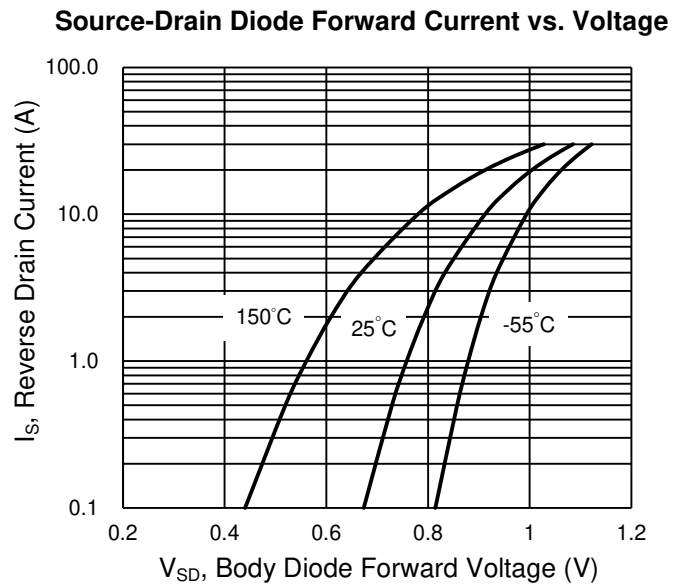
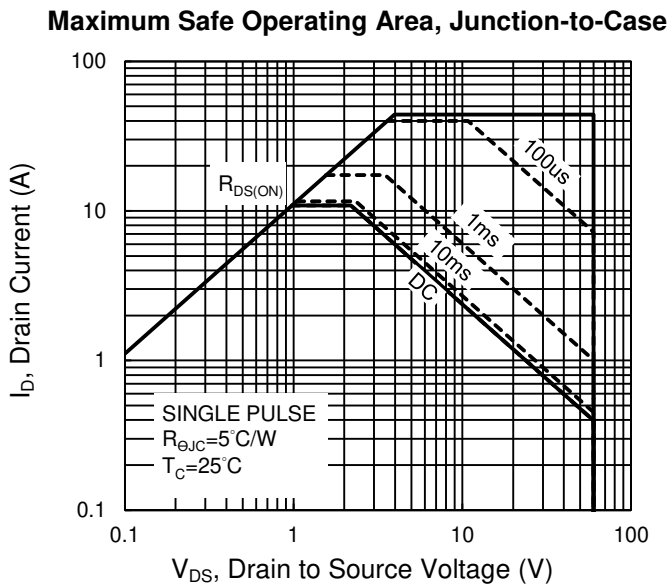
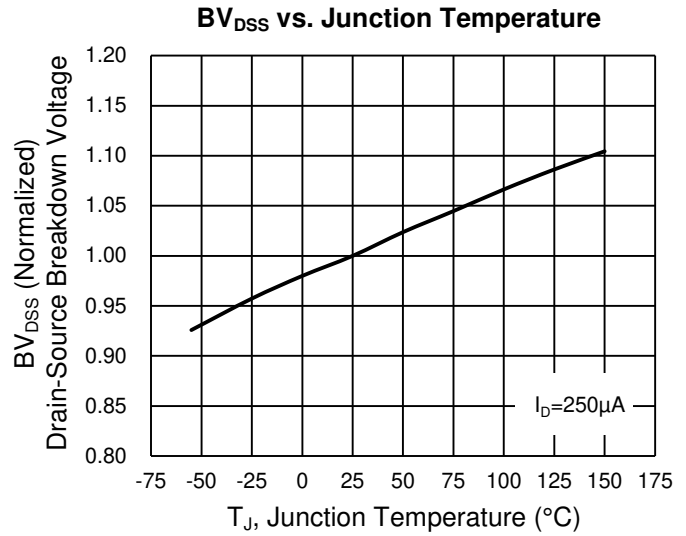
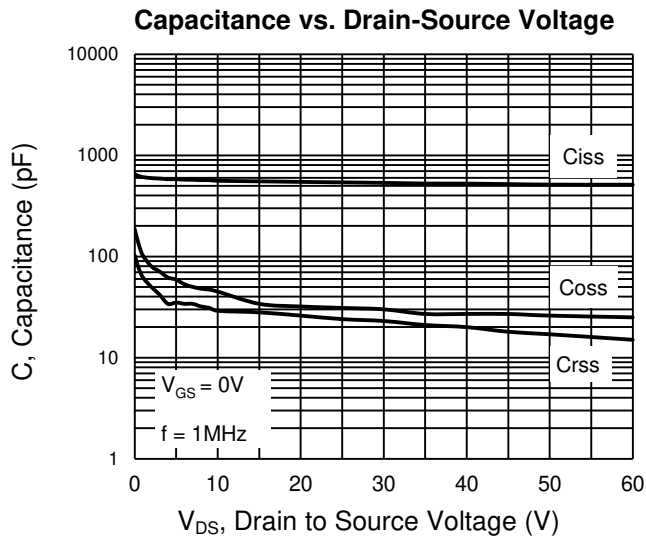


On-Resistance vs. Gate-Source Voltage



CHARACTERISTICS CURVES

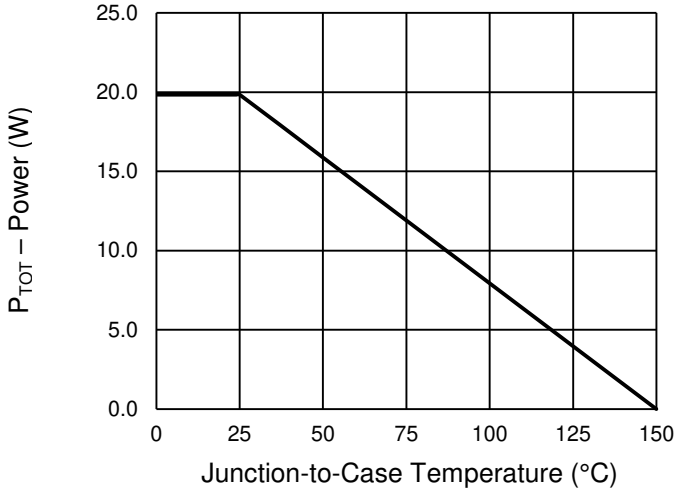
($T_A = 25^\circ\text{C}$ unless otherwise noted)



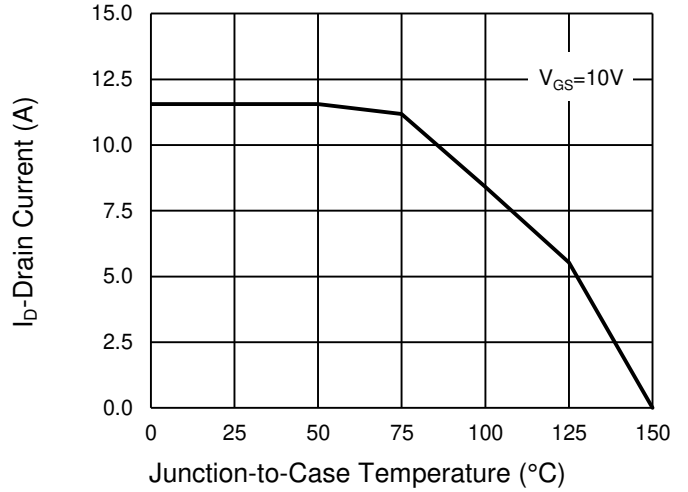
CHARACTERISTICS CURVES

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

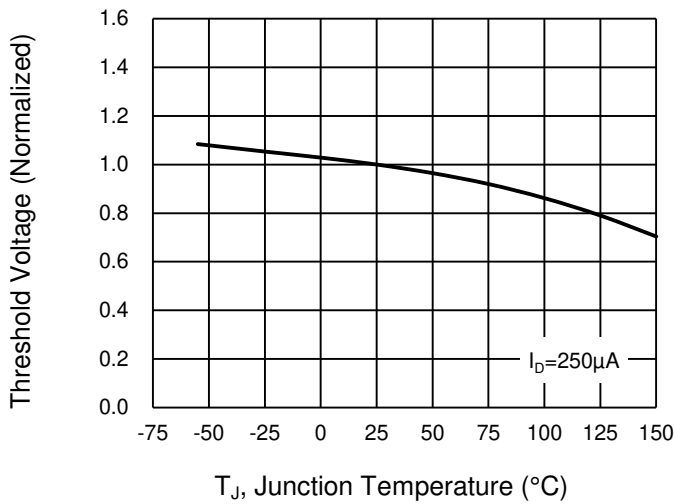
Power Dissipation



Drain Current

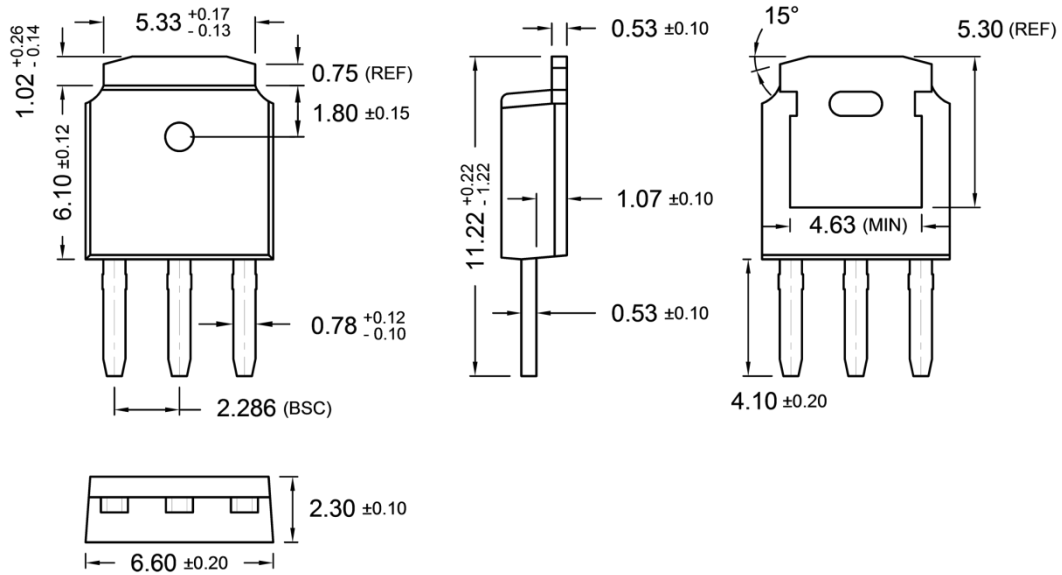


Normalized gate threshold voltage vs Temperature

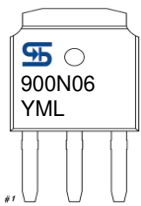


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-251S (IPAK SL)



MARKING DIAGRAM



- Y** = Year Code
- M** = Month Code
 - 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 (1~9, A~Z)

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