

60V N-Channel MOSFET



TO-92

5

Pin Definition:

- 1. Source
- 2. Gate
- 3. Drain

PRODUCT SUMMARY

| V _{DS} (V) | $R_{DS(on)}(\Omega)$ | I _D (mA) | | |
|---------------------|----------------------------|---------------------|--|--|
| 60 | 5 @ V _{GS} = 10V | 100 | | |
| | 5.5 @ V _{GS} = 5V | 100 | | |

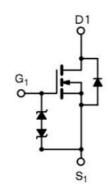
Features

- Low On-Resistance
- ESD Protection
- High Speed Switching
- Low Voltage Drive

Ordering Information

| Part No. | Package | Packing |
|-----------------|---------|--------------|
| TSM2N7000KCT B0 | TO-92 | 1Kpcs / Bulk |
| TSM2N7000KCT A3 | TO-92 | 2Kpcs / Ammo |

Block Diagram



N-Channel MOSFET

Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

| Parameter | | Symbol | Limit | Unit | |
|--|-----------------------------------|------------------|-------------|------|--|
| Drain-Source Voltage | | V_{DS} | 60 | V | |
| Gate-Source Voltage | | V_{GS} | ±20 | V | |
| Drain Current | Continuous @ T _A =25°C | I _D | 300 | mA | |
| | Pulsed | I _{DM} | 700 | | |
| Drain Reverse Current | Continuous @ T _A =25°C | I _{DR} | 300 | mA | |
| | Pulsed | I _{DMR} | 700 | | |
| Maximum Power Dissipation | | P_{D} | 400 | mW | |
| Operating Junction Temperature | | TJ | +150 | °C | |
| Operating Junction and Storage Temperature Range | | T_J, T_STG | -55 to +150 | °C | |

Thermal Performance

| Parameter | Symbol | Limit | Unit |
|--|----------------|-------|------|
| Lead Temperature (1/8" from case) | T_L | 10 | S |
| Junction to Ambient Thermal Resistance (PCB mounted) | $R\Theta_{JA}$ | 357 | °C/W |

Notes:

- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on FR4 Board, t ≤ 5 sec.



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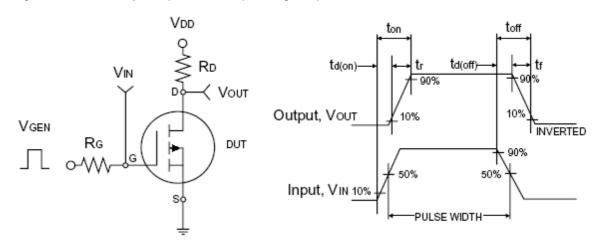


Electrical Specifications (Ta = 25°C, unless otherwise noted)

| Parameter | Conditions | Symbol | Min | Тур | Max | Unit |
|--|---|---------------------|-----|------|-----|------|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 10\mu A$ | BV _{DSS} | 60 | | | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_{D} = 250 \mu A$ | V _{GS(TH)} | 1.0 | | 2.5 | V |
| Gate Body Leakage | $V_{GS} = \pm 20V, V_{DS} = 0V$ | I _{GSS} | | | ±10 | uA |
| Zero Gate Voltage Drain Current | $V_{DS} = 60V, V_{GS} = 0V$ | I _{DSS} | | | 1.0 | uA |
| Danier Courses On Otata Desistance | $V_{GS} = 10V, I_D = 100mA$ | Б | | 3 | 5 | |
| Drain-Source On-State Resistance $V_{GS} = 5V, I_D = 100mA$ $R_{DS(ON)}$ | | 3.6 | 5.5 | Ω | | |
| Forward Transconductance | $V_{DS} = 10V, I_{D} = 200mA$ | g _{fs} | 100 | | | mS |
| Diode Forward Voltage | $I_S = 300 \text{mA}, V_{GS} = 0 \text{V}$ | V _{SD} | | 0.9 | 1.2 | V |
| Dynamic ^b | | | | | | |
| Total Gate Charge | $V_{DS} = 10V, I_D = 250mA,$ $V_{GS} = 4.5V$ | Q_g | | 0.4 | | nC |
| Input Capacitance | $V_{DS} = 25V, V_{GS} = 0V,$ | C _{iss} | | 7.32 | | |
| Output Capacitance | | C _{oss} | | 3.42 | | pF |
| Reverse Transfer Capacitance | f = 1.0MHz | C _{rss} | | 7.63 | | |
| Switching ^c | | | | | | |
| Turn-On Delay Time | $V_{DD} = 30V, R_{G} = 10\Omega$ | t _{d(on)} | | 25 | | C |
| Turn-Off Delay Time | $I_D = 100 \text{mA}, V_{GEN} = 10 \text{V},$ | t _{d(off)} | | 35 | | nS |

Notes:

- a. pulse test: PW ≤300µS, duty cycle ≤2%
 b. For DESIGN AID ONLY, not subject to production testing.
- b. Switching time is essentially independent of operating temperature.



Switching Test Circuit

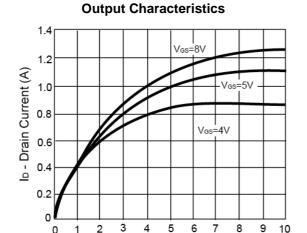
Switchin Waveforms



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Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)



1.4 1.2 lo - Drain Current (A) 1.0 0.8 0.6 0.4 0.2

Transfer Characteristics

On-Resistance vs. Drain Current

4

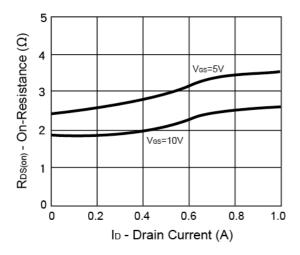
6 7 8

VDS - Drain-to-Source Voltage (V)

10

2

0



Forward Transfer Admittance vs. Drain Current

5

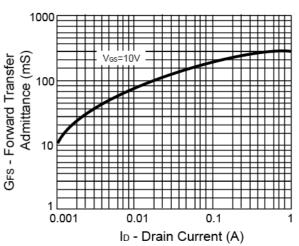
V_{GS} - Gate-to-Source Voltage (V)

6 7 8 9 10

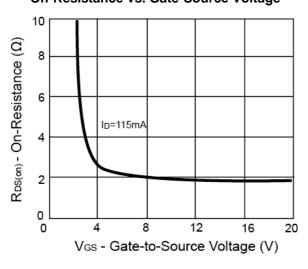
0

0

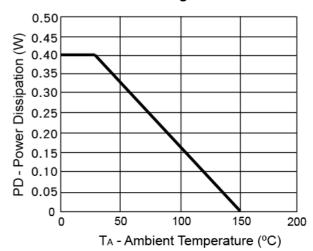
2 3 4



On-Resistance vs. Gate-Source Voltage



Power Derating Curve

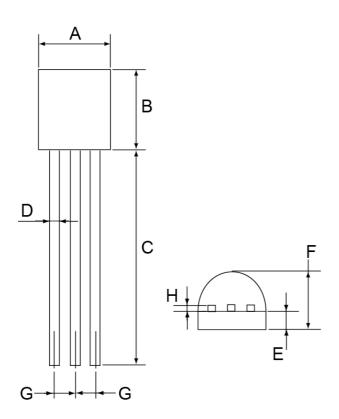








TO-92 Mechanical Drawing



| TO-92 DIMENSION | | | | | |
|-----------------|-------------|------|-------------|-------|--|
| DIM | MILLIMETERS | | INCHES | | |
| | MIN | MAX | MIN | MAX | |
| Α | 4.30 | 4.70 | 0.169 | 0.185 | |
| В | 4.30 | 4.70 | 0.169 | 0.185 | |
| С | 13.53 (typ) | | 0.532 (typ) | | |
| D | 0.39 | 0.49 | 0.015 | 0.019 | |
| Е | 1.18 | 1.28 | 0.046 | 0.050 | |
| F | 3.30 | 3.70 | 0.130 | 0.146 | |
| G | 1.27 | 1.31 | 0.050 | 0.051 | |
| Н | 0.33 | 0.43 | 0.013 | 0.017 | |

Marking Diagram



Y = Year Code

M = Month Code

(A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug,

I=Sep, J=Oct, K=Nov, L=Dec)

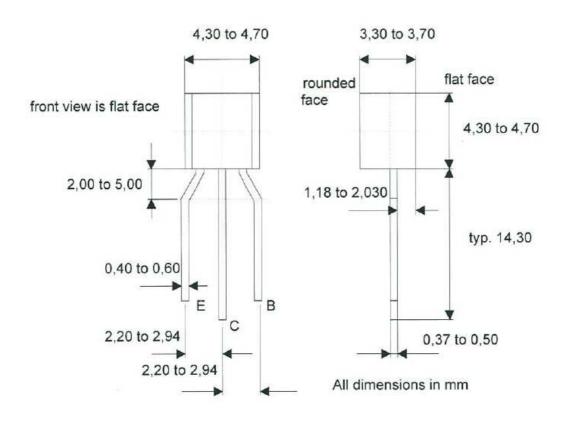
L = Lot Code



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TO-92 Ammo Pack Mechanical Drawing





TSM2N7000K 60V N-Channel MOSFET

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