TAIWAN
SEMICONDUCTOR

COMPLIANCE

## Pin Definition:

## Features

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


## Ordering Information

| Part No. | Package | Packing |
| :---: | :---: | :---: |
| TSM2N7000KCT B0G | TO-92 | 1 Kpcs / Bulk |
| TSM2N7000KCT A3G | TO-92 | $2 \mathrm{Kpcs} /$ Ammo |

Note: "G" denotes for Halogen Free


1. Source
2. Gate
3. Drain

PRODUCT SUMMARY

| $\mathbf{V}_{\mathrm{DS}}(\mathbf{V})$ | $\mathbf{R}_{\mathrm{DS} \text { (on) }(\mathbf{\Omega})}$ | $\mathbf{I}_{\mathrm{D}}(\mathbf{m A})$ |
| :---: | :---: | :---: |
| 60 | $5 @ \mathrm{~V}_{\mathrm{GS}}=10 \mathrm{~V}$ | 100 |
|  | $5.5 @ \mathrm{~V}_{\mathrm{GS}}=5 \mathrm{~V}$ | 100 |

## N-Channel MOSFET

| Parameter | Symbol | Limit | Unit |
| :---: | :---: | :---: | :---: |
| Drain-Source Voltage | $V_{\text {DS }}$ | 60 | V |
| Gate-Source Voltage | $\mathrm{V}_{\text {GS }}$ | $\pm 20$ | V |
| Drain Current Continuous @ $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ | $\mathrm{I}_{\mathrm{D}}$ | 300 | mA |
| Pulsed | $\mathrm{I}_{\mathrm{DM}}$ | 700 |  |
| 2 Continuous @ $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ | $\mathrm{I}_{\mathrm{DR}}$ | 300 | mA |
| Drain Reverse Current ${ }^{\text {Pulsed }}$ | $\mathrm{I}_{\text {DMR }}$ | 700 |  |
| Maximum Power Dissipation | $\mathrm{P}_{\mathrm{D}}$ | 400 | mW |
| Operating Junction Temperature | $\mathrm{T}_{J}$ | +150 | ${ }^{\circ} \mathrm{C}$ |
| Operating Junction and Storage Temperature Range | $\mathrm{T}_{\mathrm{J},} \mathrm{T}_{\text {STG }}$ | -55 to +150 | ${ }^{\circ} \mathrm{C}$ |

## Thermal Performance

| Parameter | Symbol | Limit | Unit |
| :--- | :---: | :---: | :---: |
| Lead Temperature (1/8" from case) | $\mathrm{T}_{\mathrm{L}}$ | 10 | S |
| Junction to Ambient Thermal Resistance (PCB mounted) | $\mathrm{R} \Theta_{\mathrm{JA}}$ | 357 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |

## Notes:

a. Pulse width limited by the Maximum junction temperature
b. Surface Mounted on FR4 Board, $\mathrm{t} \leq 5 \mathrm{sec}$.

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Electrical Specifications $\left(\mathrm{Ta}=25^{\circ} \mathrm{C}\right.$, unless otherwise noted)

| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Static |  |  |  |  |  |  |
| Drain-Source Breakdown Voltage | $\mathrm{V}_{\mathrm{GS}}=0 \mathrm{~V}, \mathrm{I}_{\mathrm{D}}=10 \mu \mathrm{~A}$ | $B V_{\text {DSS }}$ | 60 | -- | -- | V |
| Gate Threshold Voltage | $\mathrm{V}_{\mathrm{DS}}=\mathrm{V}_{\mathrm{GS}}, \mathrm{I}_{\mathrm{D}}=250 \mu \mathrm{~A}$ | $\mathrm{V}_{\mathrm{GS}(\mathrm{TH})}$ | 1.0 | -- | 2.5 | V |
| Gate Body Leakage | $\mathrm{V}_{\mathrm{GS}}= \pm 20 \mathrm{~V}, \mathrm{~V}_{\mathrm{DS}}=0 \mathrm{~V}$ | $\mathrm{I}_{\text {GSS }}$ | -- | -- | $\pm 10$ | uA |
| Zero Gate Voltage Drain Current | $\mathrm{V}_{\mathrm{DS}}=60 \mathrm{~V}, \mathrm{~V}_{\mathrm{GS}}=0 \mathrm{~V}$ | $\mathrm{I}_{\text {DSS }}$ | -- |  | 1.0 | uA |
| Drain-Source On-State Resistance | $\mathrm{V}_{\mathrm{GS}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{D}}=100 \mathrm{~mA}$ | $\mathrm{R}_{\mathrm{DS} \text { (ON) }}$ | -- |  | 5 | $\Omega$ |
|  | $\mathrm{V}_{\mathrm{GS}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{D}}=100 \mathrm{~mA}$ |  | -- |  | 5.5 |  |
| Forward Transconductance | $\mathrm{V}_{\mathrm{DS}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{D}}=200 \mathrm{~mA}$ | $\mathrm{g}_{\text {fs }}$ | 100 |  | -- | mS |
| Diode Forward Voltage | $\mathrm{I}_{\mathrm{S}}=300 \mathrm{~mA}, \mathrm{~V}_{\mathrm{GS}}=0 \mathrm{~V}$ | $\mathrm{V}_{\text {SD }}$ |  | 0.9 | 1.2 | V |
| Dynamic ${ }^{\text {b }}$ |  |  |  |  |  |  |
| Total Gate Charge | $\begin{aligned} & \mathrm{V}_{\mathrm{DS}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{D}}=250 \mathrm{~mA}, \\ & \mathrm{~V}_{\mathrm{GS}}=4.5 \mathrm{~V} \end{aligned}$ |  |  | 0.4 | -- | nC |
| Input Capacitance | $\begin{aligned} & V_{\mathrm{DS}}=25 \mathrm{~V}, \mathrm{~V}_{\mathrm{GS}}=0 \mathrm{~V}, \\ & \mathrm{f}=1.0 \mathrm{MHz} \end{aligned}$ | $\mathrm{C}_{\text {iss }}$ | -- | 7.32 | -- | pF |
| Output Capacitance |  | C | -- | 3.42 | -- |  |
| Reverse Transfer Capacitance |  | Crss | -- | 7.63 | -- |  |
| Switching ${ }^{\text {c }}$ |  |  |  |  |  |  |
| Turn-On Delay Time | $\begin{aligned} & V_{D D}=30 \mathrm{~V}, R_{G}=10 \Omega \\ & I_{D}=100 \mathrm{~mA}, V_{G E N}=10 \mathrm{~V}, \end{aligned}$ | $t_{\text {d(on) }}$ | -- | 25 | -- | nS |
| Turn-Off Delay Time |  | $\mathrm{t}_{\mathrm{d}(\mathrm{off})}$ | -- | 35 | -- |  |

## Notes:

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


Switching Test Circuit


Switchin Waveforms

TAIWAN
SEMICONDUCTOR 60V N-Channel MOSFET

Electrical Characteristics Curve ( $\mathrm{Ta}=25^{\circ} \mathrm{C}$, unless otherwise noted)

Output Characteristics


On-Resistance vs. Drain Current


On-Resistance vs. Gate-Source Voltage


Transfer Characteristics


Forward Transfer Admittance vs. Drain Current


Power Derating Curve
 COMPLIANCE

## TO-92 Mechanical Drawing



| TO-92 DIMENSION |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| DIM | MILLIMETERS |  | INCHES |  |
|  | MIN | MAX | MIN | MAX |
| A | 4.30 | 4.70 | 0.169 | 0.185 |
| B | 4.30 | 4.70 | 0.169 | 0.185 |
| C | 13.53 (typ) |  | 0.532 (typ) |  |
| D | 0.39 | 0.49 | 0.015 | 0.019 |
| E | 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 |
| H | 0.33 | 0.43 | 0.013 | 0.017 |

## Marking Diagram


$\mathbf{Y}=$ Year Code
$\mathbf{M}=$ Month Code for Halogen Free Product

| $\mathbf{O}$ | $=$ Jan | $\mathbf{P}$ | $=$ Feb | $\mathbf{Q}=$ Mar | $\mathbf{R}=$ Apr |
| ---: | :--- | :--- | :--- | :--- | :--- |
| $\mathbf{S}$ | $=$ May | $\mathbf{T}$ | $=$ Jun | $\mathbf{U}=$ Jul | $\mathbf{V}=$ Aug |
| $\mathbf{W}$ | $=$ Sep | $\mathbf{X}$ | $=$ Oct | $\mathbf{Y}=$ Nov | $\mathbf{Z}$ |

L = Lot Code COMPLIANCE

## TO-92 Ammo Pack Mechanical Drawing




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