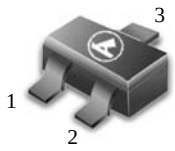
# Small Signal MOSFET
# 115 mA, 60 V
## N–Channel SOT–323

**L2N7002WT1G**
**S-L2N7002WT1G**




SOT– 323 (SC-70)

- We declare that the material of product compliance with RoHS requirements.
- ESD Protected:1000V
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

### ORDERING INFORMATION

| Device | Marking | Shipping |
|---|---|---|
| L2N7002WT1G<br>S-L2N7002WT1G | 6C | 3000 Tape & Reel |
| L2N7002WT3G<br>S-L2N7002WT3G | 6C | 10000 Tape & Reel |

### MAXIMUM RATINGS

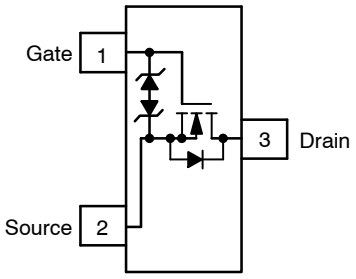
| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain–Source Voltage | $V_{DSS}$ | 60 | Vdc |
| Drain–Gate Voltage ($R_{GS}$ = 1.0 MΩ) | $V_{DGR}$ | 60 | Vdc |
| Drain Current<br>– Continuous $T_C$ = 25°C (Note 1.)<br>$T_C$ = 100°C (Note 1.)<br>– Pulsed (Note 2.) | $I_D$<br>$I_D$<br>$I_{DM}$ | ±115<br>±75<br>±800 | mAdc |
| Gate–Source Voltage<br>– Continuous<br>– Non–repetitive ($t_p \leq 50$ μs) | $V_{GS}$<br>$V_{GSM}$ | ±20<br>±40 | Vdc<br>Vpk |

### THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Total Device Dissipation FR–5 Board<br>(Note 3.) $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 225<br>1.8 | mW<br>mW/°C |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 556 | °C/W |
| Total Device Dissipation<br>Alumina Substrate,(Note 4.) $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 300<br>2.4 | mW<br>mW/°C |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 417 | °C/W |
| Junction and Storage Temperature | $T_J$, $T_{stg}$ | -55 to +150 | °C |

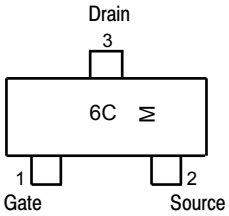
1. The Power Dissipation of the package may result in a lower continuous drain current.
2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
3. FR–5 = 1.0 x 0.75 x 0.062 in.
4. Alumina = 0.4 x 0.3 x 0.025 in 99.5% alumina.

### Simplified Schematic




(Top View)

### MARKING DIAGRAM & PIN ASSIGNMENT




6C = Device Code
M =Month Code

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain–Source Breakdown Voltage ($V_{GS}$ = 0, $I_D$ = 10 μAdc) | | $V_{(BR)DSS}$ | 60 | – | – | Vdc |
| Zero Gate Voltage Drain Current ($V_{GS}$ = 0, $V_{DS}$ = 60 Vdc) | $T_J$ = 25°C<br>$T_J$ = 125°C | $I_{DSS}$ | –<br>– | –<br>– | 1.0<br>500 | μAdc |
| Gate–Body Leakage Current, Forward ($V_{GS}$ = 20 Vdc) | | $I_{GSSF}$ | – | – | 1 | μAdc |
| Gate–Body Leakage Current, Reverse ($V_{GS}$ = – 20 Vdc) | | $I_{GSSR}$ | – | – | -1 | μAdc |
| **ON CHARACTERISTICS** (Note 2.) | | | | | | |
| Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = 250 μAdc) | | $V_{GS(th)}$ | 1.0 | 1.6 | 2.5 | Vdc |
| On–State Drain Current ($V_{DS} \geq 2.0\ V_{DS(on)}$, $V_{GS}$ = 10 Vdc) | | $I_{D(on)}$ | 500 | – | – | mA |
| Static Drain–Source On–State Voltage<br>($V_{GS}$ = 10 Vdc, $I_D$ = 500 mAdc)<br>($V_{GS}$ = 5.0 Vdc, $I_D$ = 50 mAdc) | | $V_{DS(on)}$ | <br>–<br>– | <br>–<br>– | <br>3.75<br>0.375 | Vdc |
| Static Drain–Source On–State Resistance<br>($V_{GS}$ = 10 V, $I_D$ = 500 mAdc)<br><br>($V_{GS}$ = 5.0 Vdc, $I_D$ = 50 mAdc)<br> | <br>$T_C$ = 25°C<br>$T_C$ = 125°C<br>$T_C$ = 25°C<br>$T_C$ = 125°C | $r_{DS(on)}$ | <br>–<br>–<br>–<br>– | <br>1.4<br>–<br>1.8<br>– | <br>7.5<br>13.5<br>7.5<br>13.5 | Ohms |
| Forward Transconductance ($V_{DS} \geq 2.0\ V_{DS(on)}$, $I_D$ = 200 mAdc) | | $g_{FS}$ | 80 | – | – | mmhos |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance ($V_{DS}$ = 25 Vdc, $V_{GS}$ = 0, f = 1.0 MHz) | | $C_{iss}$ | – | 17 | 50 | pF |
| Output Capacitance ($V_{DS}$ = 25 Vdc, $V_{GS}$ = 0, f = 1.0 MHz) | | $C_{oss}$ | – | 10 | 25 | pF |
| Reverse Transfer Capacitance ($V_{DS}$ = 25 Vdc, $V_{GS}$ = 0, f = 1.0 MHz) | | $C_{rss}$ | – | 2.5 | 5.0 | pF |
| **SWITCHING CHARACTERISTICS** (Note 2.) | | | | | | |
| Turn–On Delay Time | ($V_{DD}$ = 25 Vdc , $I_D \cong$ 500 mAdc, $R_G$ = 25 Ω, $R_L$ = 50 Ω, $V_{gen}$ = 10 V) | $t_{d(on)}$ | – | 7 | 20 | ns |
| Turn–Off Delay Time | | $t_{d(off)}$ | – | 11 | 40 | ns |
| **BODY–DRAIN DIODE RATINGS** | | | | | | |
| Diode Forward On–Voltage ($I_S$ = 115 mAdc, $V_{GS}$ = 0 V) | | $V_{SD}$ | – | – | –1.5 | Vdc |
| Source Current Continuous (Body Diode) | | $I_S$ | – | – | –115 | mAdc |
| Source Current Pulsed | | $I_{SM}$ | – | – | –800 | mAdc |

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## TYPICAL ELECTRICAL CHARACTERISTICS

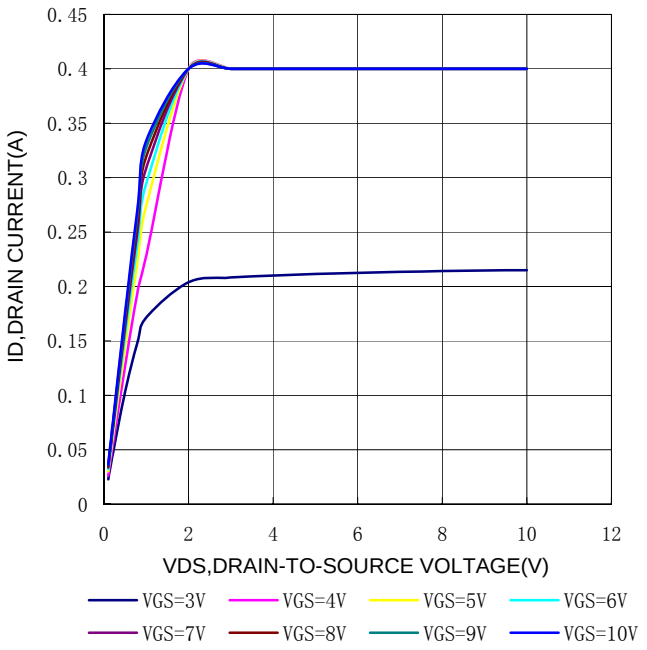



Fig. 1 ON-REGION CHARACTERISTICS

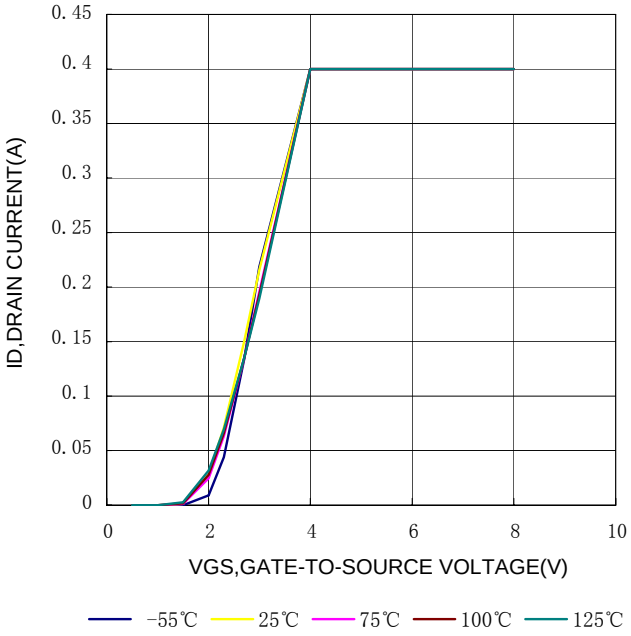



Fig. 2 TRANSFER CHARACTERISTICS

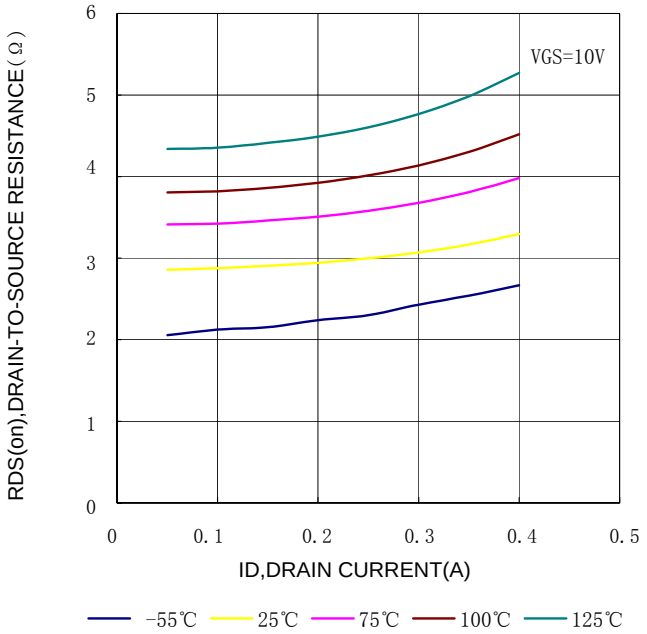



Fig. 3 ON-RESISTANCE VS. DRAIN CURRENT AND TEMPERATURE

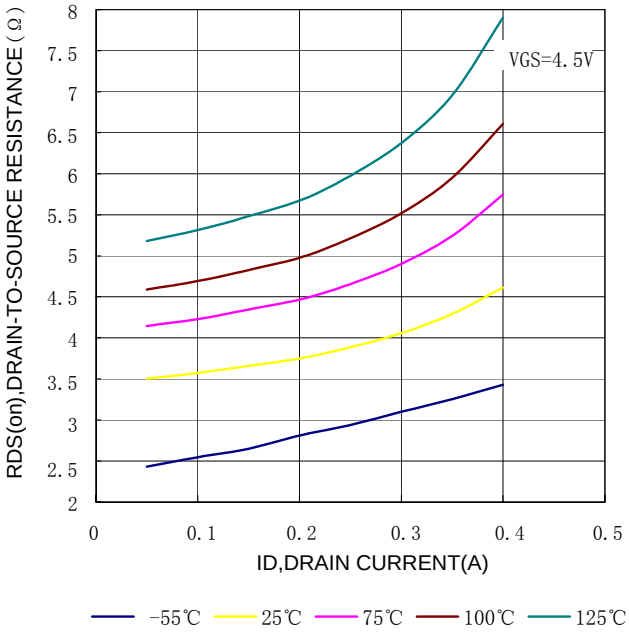



Fig. 4 ON-RESISTANCE VS. DRAIN CURRENT AND TEMPERATURE

## TYPICAL ELECTRICAL CHARACTERISTICS

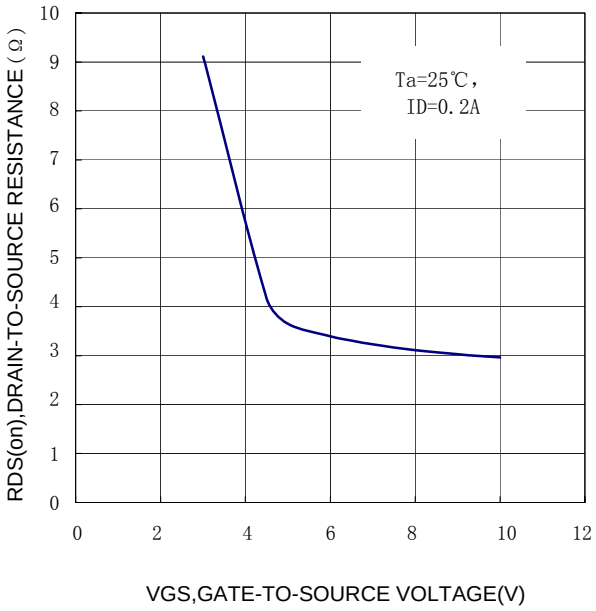



Fig. 5 ON-RESISTANCE VS.GATE-TO-SOURCE VOLTAGE

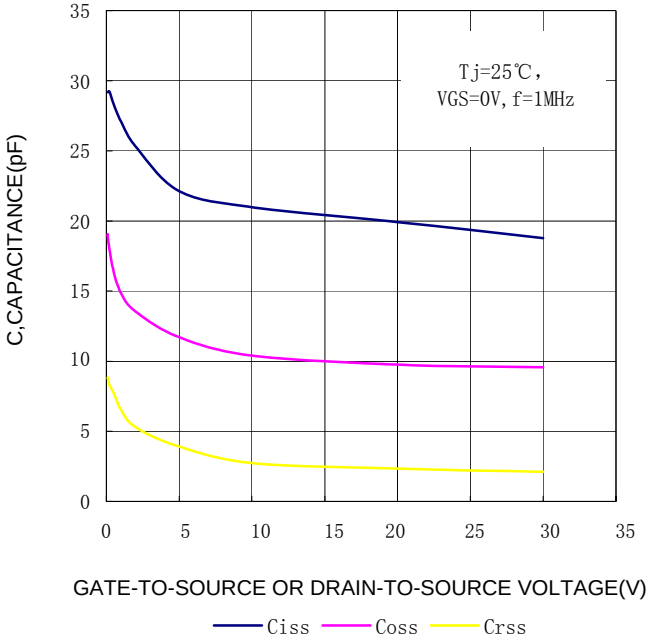



Fig. 6 CAPACITANCE VARIATION

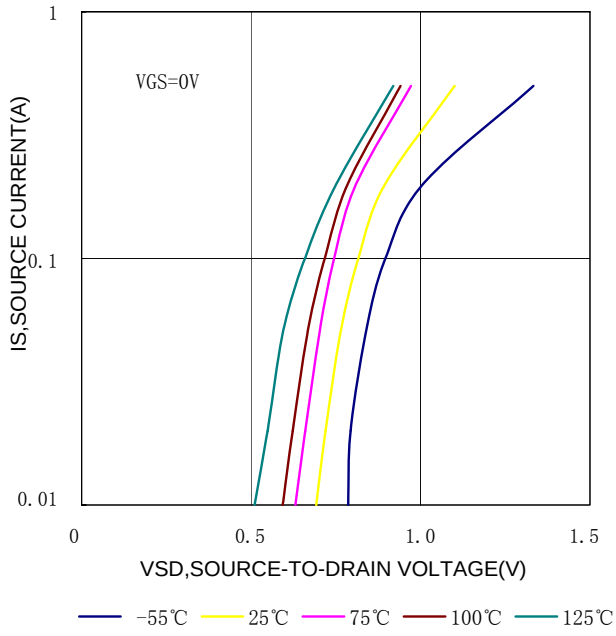



Fig. 7 DIODE FORWARD VOLTAGE VS.CURRENT

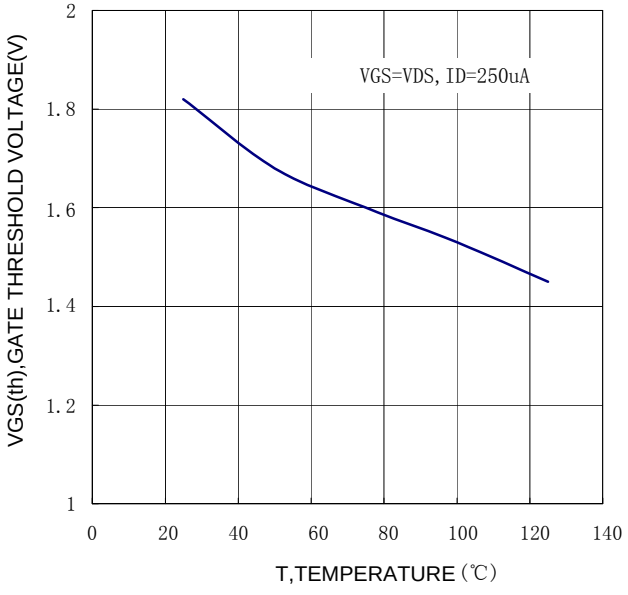



Fig. 8 TEMPERATURE VS.GATE THRESHOLD VOLTAGE

## TYPICAL ELECTRICAL CHARACTERISTICS

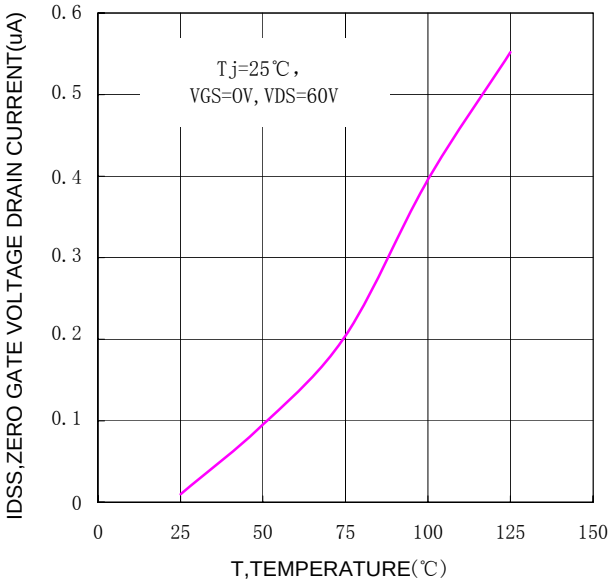
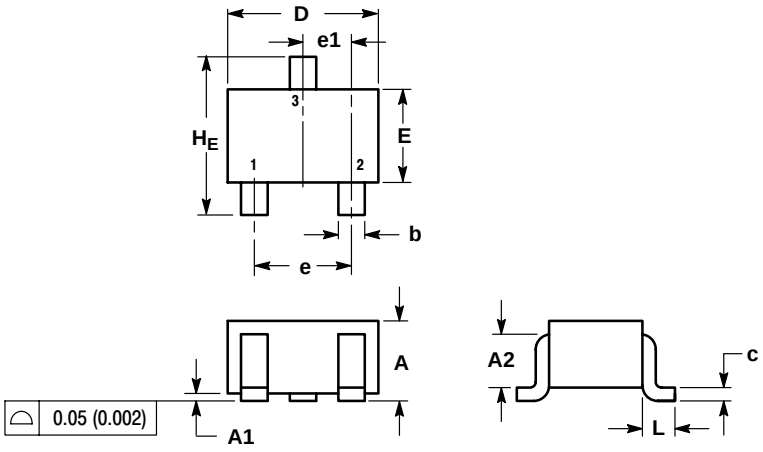



Fig. 9 TEMPERATURE VS.DRAIN CURRENT

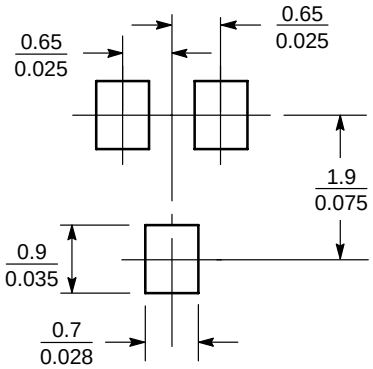
## SC−70 (SOT−323)




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

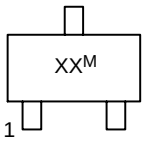
| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | 0.90 | 1.00 | 0.032 | 0.035 | 0.040 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A2 | | 0.7 REF | | | 0.028 REF | |
| b | 0.30 | 0.35 | 0.40 | 0.012 | 0.014 | 0.016 |
| c | 0.10 | 0.18 | 0.25 | 0.004 | 0.007 | 0.010 |
| D | 1.80 | 2.10 | 2.20 | 0.071 | 0.083 | 0.087 |
| E | 1.15 | 1.24 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| e1 | | 0.65 BSC | | | 0.026 BSC | |
| L | | 0.425 REF | | | 0.017 REF | |
| $H_E$ | 2.00 | 2.10 | 2.40 | 0.079 | 0.083 | 0.095 |

### SOLDERING FOOTPRINT*




SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

### GENERIC MARKING DIAGRAM




XX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.