

**20V P-Channel Enhancement-Mode MOSFET**

$V_{DS} = -20V$

$R_{DS(ON)}, V_{GS}@-4.5V, I_{DS}@-2.8A = 100\ m\Omega$

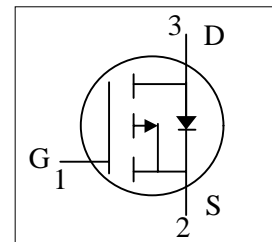
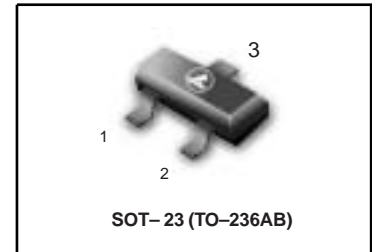
$R_{DS(ON)}, V_{GS}@-2.5V, I_{DS}@-2.0A = 150\ m\Omega$

**Features**

- Advanced trench process technology
- High Density Cell Design For Ultra Low On-Resistance
- Fully Characterized Avalanche Voltage and Current
- Improved Shoot-Through FOM

- ▼ Simple Drive Requirement
- ▼ Small Package Outline
- ▼ Surface Mount Device
- ▼ Pb-Free package is available

LP2301LT1G



**Maximum Ratings and Thermal Characteristics** ( $T_A = 25^\circ C$  unless otherwise noted)

| Parameter   | Symbol         | Limit              | Unit         |   |
|---|----------------|--------------------|--------------|---|
| Drain-Source Voltage                                    | $V_{DS}$       | -20                | V            |   |
| Gate-Source Voltage                                     | $V_{GS}$       | $\pm 8$            |              |   |
| Continuous Drain Current                                | $I_D$          | -2.3               | A            |   |
| Pulsed Drain Current 1)                                 | $I_{DM}$       | -8                 |              |   |
| Maximum Power Dissipation                               | $P_D$          | $T_A = 25^\circ C$ | 0.9          | W |
|   |                | $T_A = 75^\circ C$ | 0.57         |   |
| Operating Junction and Storage Temperature Range        | $T_J, T_{stg}$ | -55 to 150         | $^\circ C$   |   |
| Junction-to-Case Thermal Resistance                     | $R_{qJC}$      |                    | $^\circ C/W$ |   |
| Junction-to-Ambient Thermal Resistance (PCB mounted) 2) | $R_{qJA}$      | 140                |              |   |

Note: 1. Repetitive Rating; Pulse width limited by the Maximum junction temperature

2. 1-in<sup>2</sup> 2oz Cu PCB board

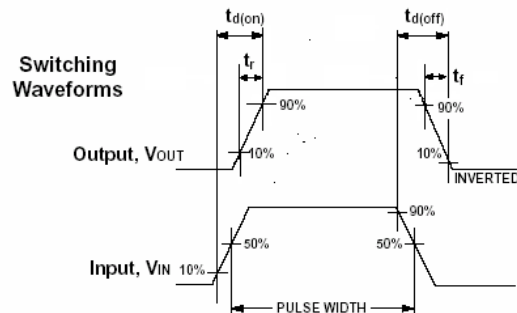
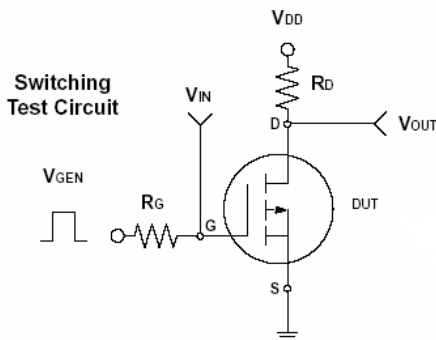
3. Guaranteed by design; not subject to production testing

## LP2301LT1G

### ELECTRICAL CHARACTERISTICS

| Parameter                        | Symbol       | Test Condition   | Min   | Typ    | Max       | Unit      |
|----------------------------------|--------------|--|-------|--------|-----------|-----------|
| <b>Static</b>                    |              |  |       |        |           |           |
| Drain-Source Breakdown Voltage   | $BV_{DSS}$   | $V_{GS} = 0V, I_D = -250\mu A$   | -20   | -      | -         | V         |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS} = -4.5V, I_D = -2.8A$  |       | 69     | 100       | $m\Omega$ |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS} = -2.5V, I_D = -2.0A$  |       | 83     | 150       | $m\Omega$ |
| Gate Threshold Voltage           | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu A$   | -0.45 |        | -0.95     | V         |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | $V_{DS} = -9.6V, V_{GS} = 0V$  |       |        | -1        | $\mu A$   |
| Gate Body Leakage                | $I_{GSS}$    | $V_{GS} = \pm 8V, V_{DS} = 0V$   |       |        | $\pm 100$ | nA        |
| Gate Resistance                  | $R_g$        |  |       |        |           | $\Omega$  |
| Forward Transconductance         | $g_{fs}$     | $V_{DS} = -5V, I_D = -4.0A$  |       | 6.5    |           | S         |
| <b>Dynamic <sup>3)</sup></b>     |              |  |       |        |           |           |
| Total Gate Charge                | $Q_g$        | $V_{DS} = -6V, I_D = -2.8A$<br>$V_{GS} = -4.5V$                                  |       | 15.23  |           | nC        |
| Gate-Source Charge               | $Q_{gs}$     |  |       | 5.49   |           |           |
| Gate-Drain Charge                | $Q_{gd}$     |  |       | 2.74   |           |           |
| Turn-On Delay Time               | $t_{d(on)}$  | $V_{DD} = -6V, R_L = 6\Omega$<br>$I_D = -1A, V_{GEN} = -4.5V$<br>$R_G = 6\Omega$ |       | 17.28  |           | ns        |
| Turn-On Rise Time                | $t_r$        |  |       | 3.73   |           |           |
| Turn-Off Delay Time              | $t_{d(off)}$ |  |       | 36.05  |           |           |
| Turn-Off Fall Time               | $t_f$        |  |       | 6.19   |           |           |
| Input Capacitance                | $C_{iss}$    | $V_{DS} = -6V, V_{GS} = 0V$<br>$f = 1.0\text{ MHz}$                              |       | 882.51 |           | pF        |
| Output Capacitance               | $C_{oss}$    |  |       | 145.54 |           |           |
| Reverse Transfer Capacitance     | $C_{rss}$    |  |       | 97.26  |           |           |
| <b>Source-Drain Diode</b>        |              |  |       |        |           |           |
| Max. Diode Forward Current       | $I_S$        |  |       |        | -2.4      | A         |
| Diode Forward Voltage            | $V_{SD}$     | $I_S = -0.75A, V_{GS} = 0V$  |       | -0.8   | -1.2      | V         |

Note: Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$

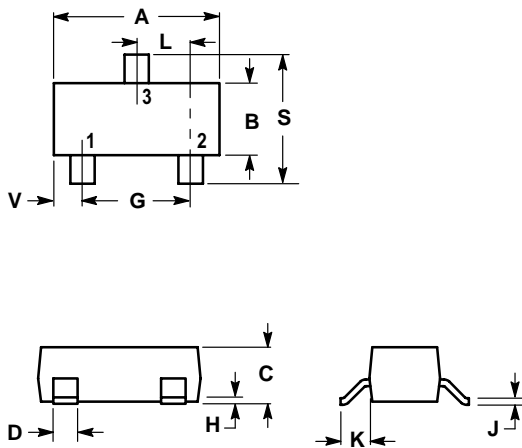


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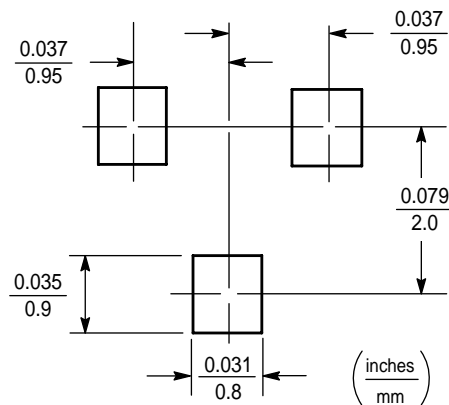
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NOTES:

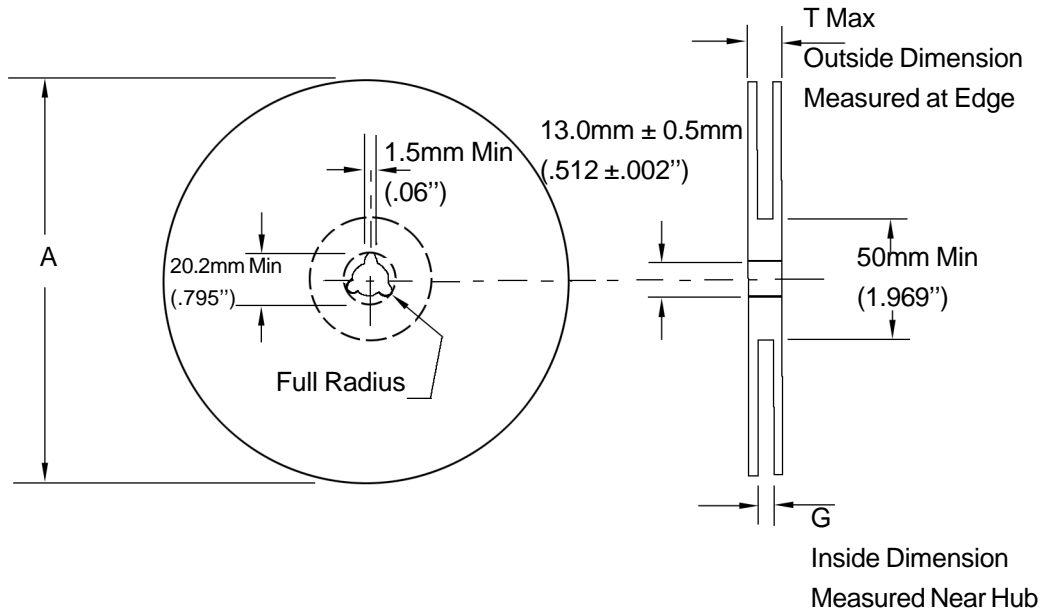
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M,1982
2. CONTROLLING DIMENSION: INCH.



| DIM | INCHES |        | MILLIMETERS |       |
|-----|--------|--------|-------------|-------|
|     | MIN    | MAX    | MIN         | MAX   |
| A   | 0.1102 | 0.1197 | 2.80        | 3.04  |
| B   | 0.0472 | 0.0551 | 1.20        | 1.40  |
| C   | 0.0350 | 0.0440 | 0.89        | 1.11  |
| D   | 0.0150 | 0.0200 | 0.37        | 0.50  |
| G   | 0.0701 | 0.0807 | 1.78        | 2.04  |
| H   | 0.0005 | 0.0040 | 0.013       | 0.100 |
| J   | 0.0034 | 0.0070 | 0.085       | 0.177 |
| K   | 0.0140 | 0.0285 | 0.35        | 0.69  |
| L   | 0.0350 | 0.0401 | 0.89        | 1.02  |
| S   | 0.0830 | 0.1039 | 2.10        | 2.64  |
| V   | 0.0177 | 0.0236 | 0.45        | 0.60  |



## EMBOSSED TAPE AND REEL DATA FOR DISCRETES



| Size | A Max              | G  | T Max            |
|------|--------------------|--|------------------|
| 8 mm | 330mm<br>(12.992") | 8.4mm+1.5mm, -0.0<br>(.33"+.059", -0.00) | 14.4mm<br>(.56") |

### Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

### Storage Conditions

Temperature: 5 to 40 Deg.C (20 to 30 Deg. C is preferred)  
 Humidity: 30 to 80 RH (40 to 60 is preferred )  
 Recommended Period: One year after manufacturing  
 (This recommended period is for the soldering condition only. The characteristics and reliabilities of the products are not restricted to this limitation)

## Shipment Specification

