

# Single P-channel MOSFET

ELM65103A-S

<http://www.elm-tech.com>

## ■ General description

ELM65103A-S uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate resistance.

## ■ Features

- $V_{ds} = -30V$
- $I_d = -4.5A$  ( $V_{gs} = -10V$ )
- $R_{ds(on)} = 41m\Omega$  ( $V_{gs} = -10V$ )
- $R_{ds(on)} = 60m\Omega$  ( $V_{gs} = -4.5V$ )

## ■ Maximum absolute ratings

$T_a = 25^\circ C$ . Unless otherwise noted.

| Parameter                              | Symbol         | Limit              | Unit       | Note |   |
|--|----------------|--------------------|------------|------|---|
| Drain-source voltage                   | $V_{ds}$       | -30                | V          |      |   |
| Gate-source voltage                    | $V_{gs}$       | $\pm 20$           | V          |      |   |
| Continuous drain current               | $I_d$          | $T_a = 25^\circ C$ | -4.5       | A    |   |
|  |                | $T_a = 70^\circ C$ | -3.5       | A    |   |
| Pulsed drain current                   | $I_{dm}$       | -20                | A          | 1, 2 |   |
| Power dissipation                      | $P_d$          | $T_c = 25^\circ C$ | 1.38       | W    | 3 |
|  |                | $T_c = 75^\circ C$ | 0.83       | W    | 3 |
| Junction and storage temperature range | $T_j, T_{stg}$ | -55 to +150        | $^\circ C$ |      |   |

NOTE : 1. Pulse width limited by maximum junction temperature.

2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

3. Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board.

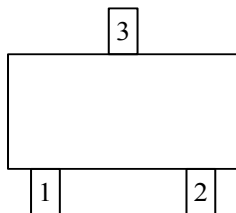
## ■ Thermal characteristics

| Parameter                               | Symbol          | Typ. | Max. | Unit         | Note |
|---|-----------------|------|------|--------------|------|
| Thermal resistance, junction-to-ambient | $R_{\theta ja}$ | -    | 90   | $^\circ C/W$ |      |

NOTE : Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board; 270 $^\circ C/W$  when mounted on minimum copper pad.

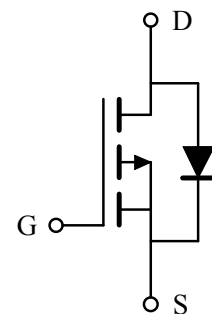
## ■ Pin configuration

SOT-23(TOP VIEW)



| Pin No. | Pin name |
|---------|----------|
| 1       | GATE     |
| 2       | SOURCE   |
| 3       | DRAIN    |

## ■ Circuit



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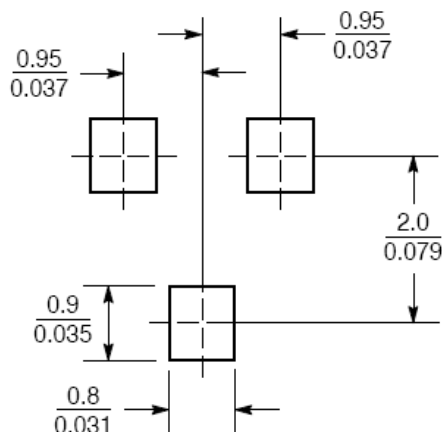
## ■Electrical characteristics

Ta=25°C. Unless otherwise noted.

| Parameter                            | Symbol  | Condition                            | Min. | Typ. | Max. | Unit |
|--------------------------------------|---------|--------------------------------------|------|------|------|------|
| <b>STATIC PARAMETERS</b>             |         |                                      |      |      |      |      |
| Drain-source breakdown voltage       | BVdss   | Id=-250μA, Vgs=0V                    | -30  | -    | -    | V    |
| Zero gate voltage drain current      | Idss    | Vds=-24V, Vgs=0V                     | -    | -    | -1   | μA   |
|                                      |         | Vds=-24V, Vgs=0V (Ta=125°C)          | -    | -    | -10  |      |
| Gate-body leakage current            | Igss    | Vds=0V, Vgs=±20V                     | -    | -    | ±100 | nA   |
| Gate threshold voltage               | Vgs(th) | Vds=Vgs, Id=-250μA                   | -1.2 | 1.8  | -2.2 | V    |
| Static drain-source on-resistance *  | Rds(on) | Vgs=-10V, Id=-4.5A                   | -    | 41   | 50   | mΩ   |
|                                      |         | Vgs=-4.5V, Id=-3.5A                  | -    | 60   | 70   |      |
| Forward transconductance *           | Gfs     | Vds=-10V, Id=-4.5A                   | -    | 4.3  | -    | S    |
| Max. body-diode continuous current * | Is      |                                      |      |      | -4.5 | A    |
| Pulsed body-diode current *          | Ism     |                                      | -    | -    | -18  | A    |
| Diode forward voltage *              | Vsd     | Is=-1A, Vgs=0V                       | -    | -    | -1.2 | V    |
| <b>DYNAMIC PARAMETERS</b>            |         |                                      |      |      |      |      |
| Input capacitance                    | Ciss    |                                      | -    | 885  | -    | pF   |
| Output capacitance                   | Coss    | Vgs=0V, Vds=-10V, f=1MHz             | -    | 86   | -    | pF   |
| Reverse transfer capacitance         | Crss    |                                      | -    | 81   | -    | pF   |
| <b>SWITCHING PARAMETERS</b>          |         |                                      |      |      |      |      |
| Total gate charge *                  | Qg      | Vgs=-10V, Vds=-15V<br>Id=-4.5A       | -    | 15   | -    | nC   |
| Gate-source charge *                 | Qgs     |                                      | -    | 3    | -    | nC   |
| Gate-drain charge *                  | Qgd     |                                      | -    | 7    | -    | nC   |
| Turn-on delay time *                 | td(on)  | Vgs=-10V, Vds=-15V<br>Id=-1A, Rd=15Ω | -    | 8    | -    | ns   |
| Turn-on rise time *                  | tr      |                                      | -    | 12   | -    | ns   |
| Turn-off delay time *                | td(off) | Rgen=6Ω                              | -    | 30   | -    | ns   |
| Turn-off fall time *                 | tf      |                                      | -    | 23   | -    | ns   |
| Body diode reverse recovery time *   | trr     | If=-4.5A, dIf/dt=100A/μs             | -    | 32.0 | -    | ns   |
| Body diode reverse recovery charge * | Qrr     |                                      | -    | 13.5 | -    | nC   |

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

## ■Reference land pattern

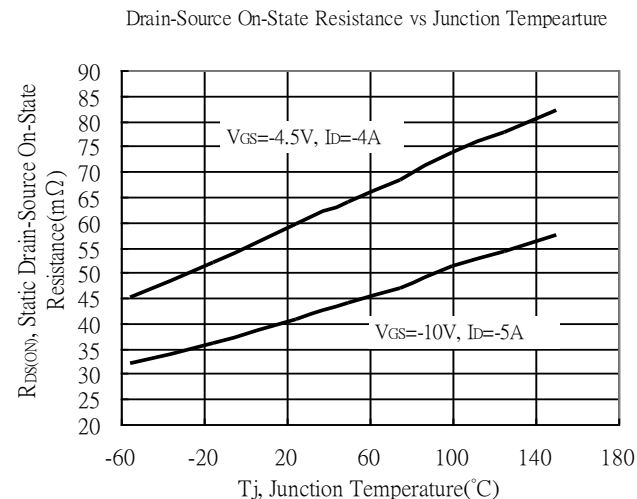
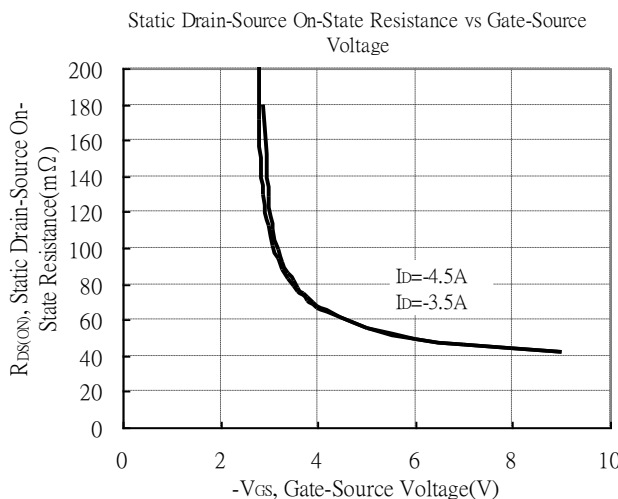
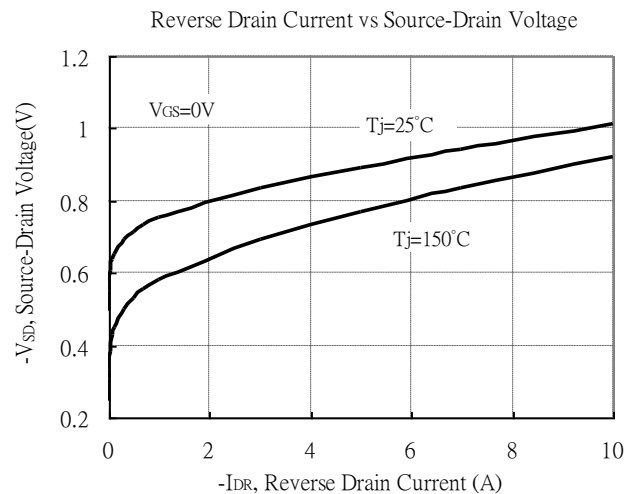
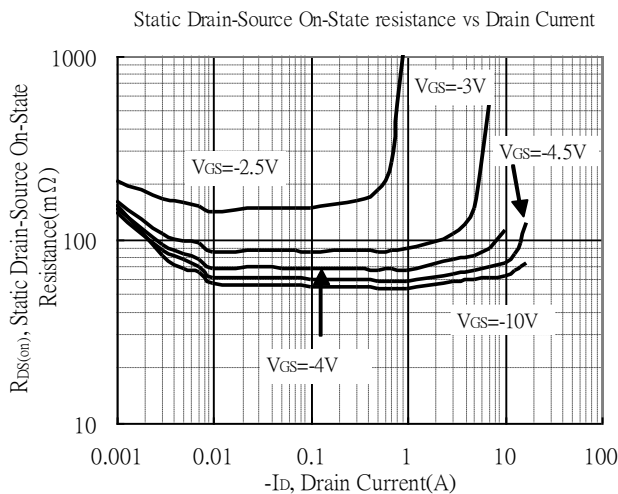
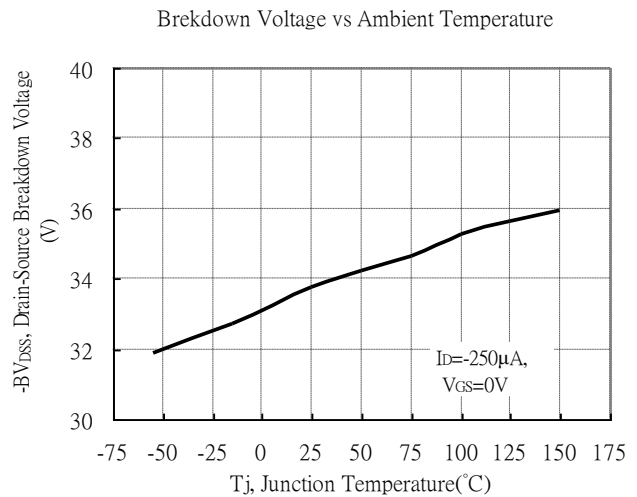
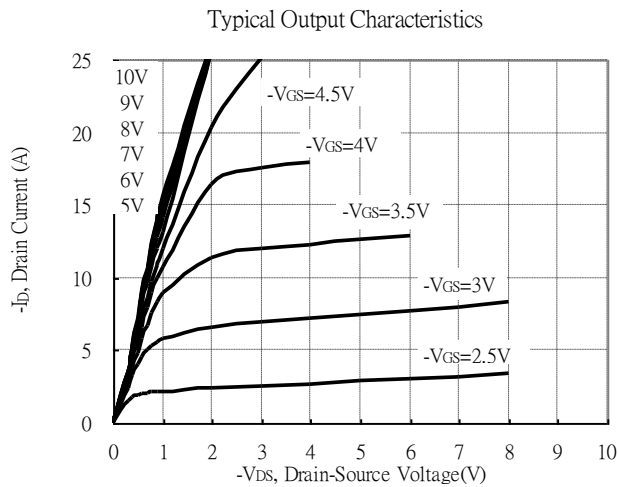


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## Typical electrical and thermal characteristics

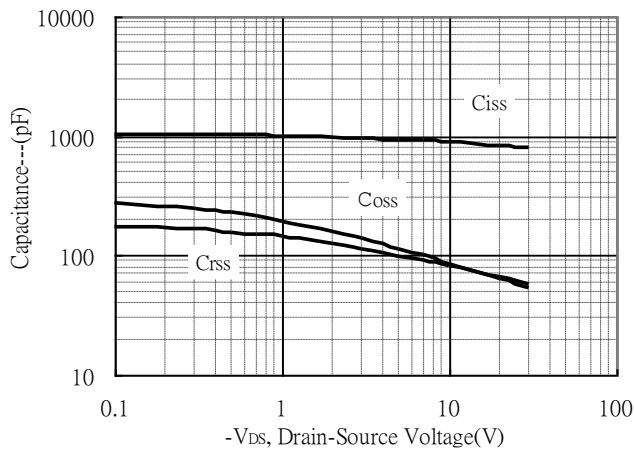


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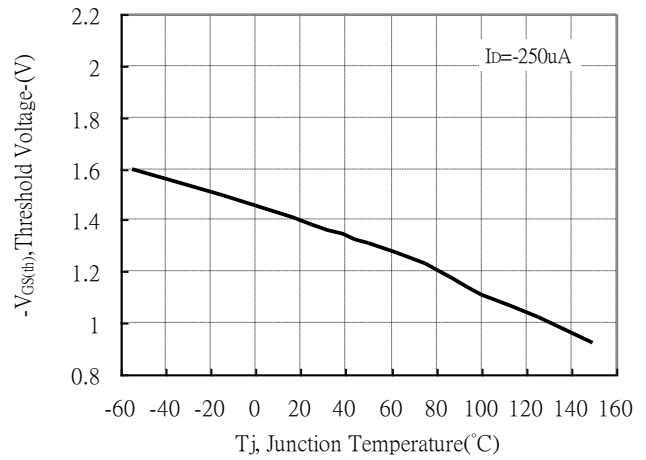
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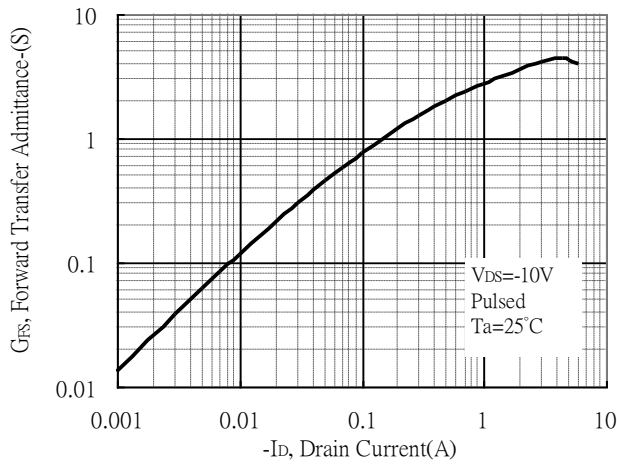
Capacitance vs Drain-to-Source Voltage



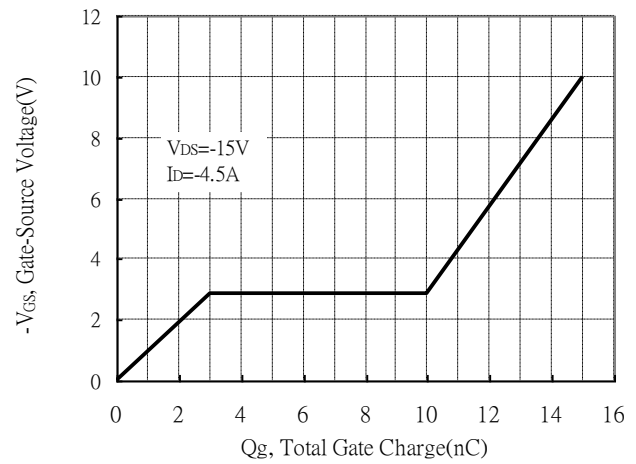
Threshold Voltage vs Junction Temperature



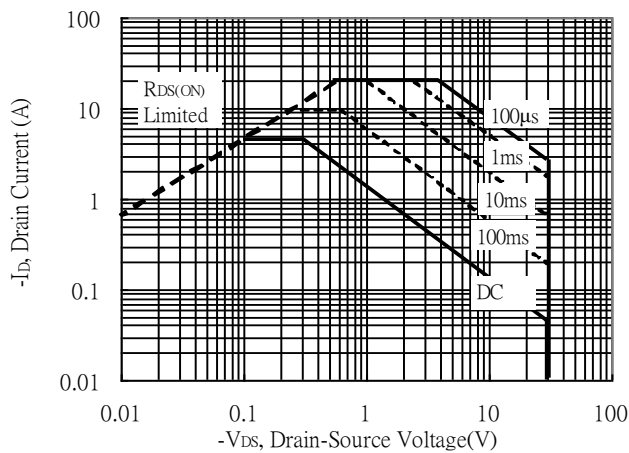
Forward Transfer Admittance vs Drain Current



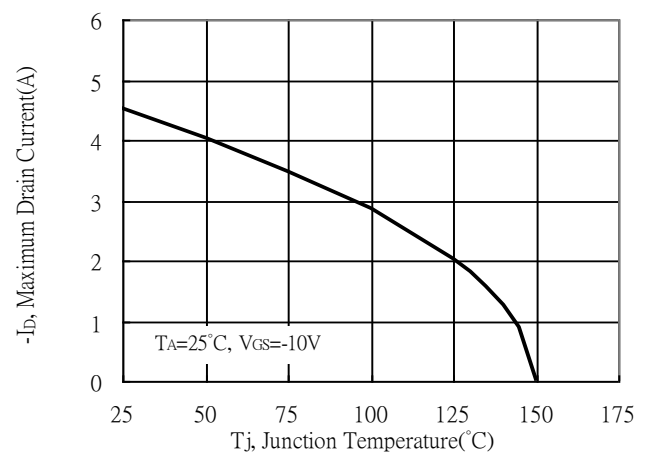
Gate Charge Characteristics



Maximum Safe Operating Area



Maximum Drain Current vs Junction Temperature

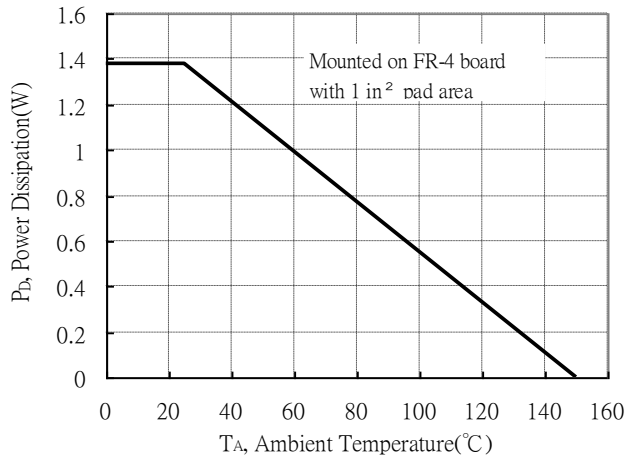


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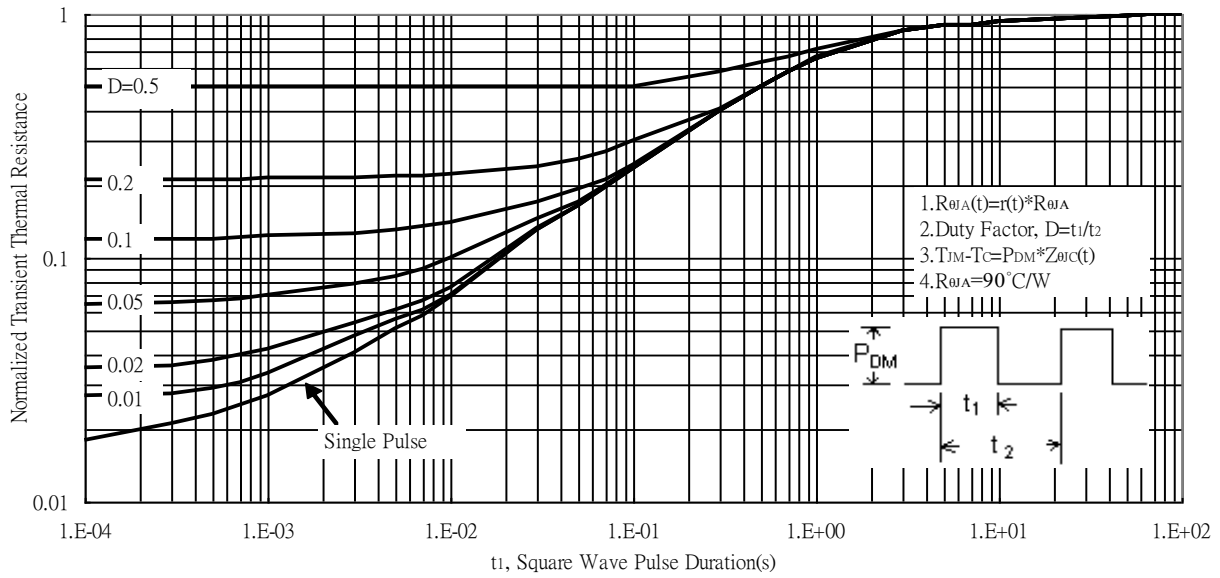
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Power Derating Curve



Transient Thermal Response Curves

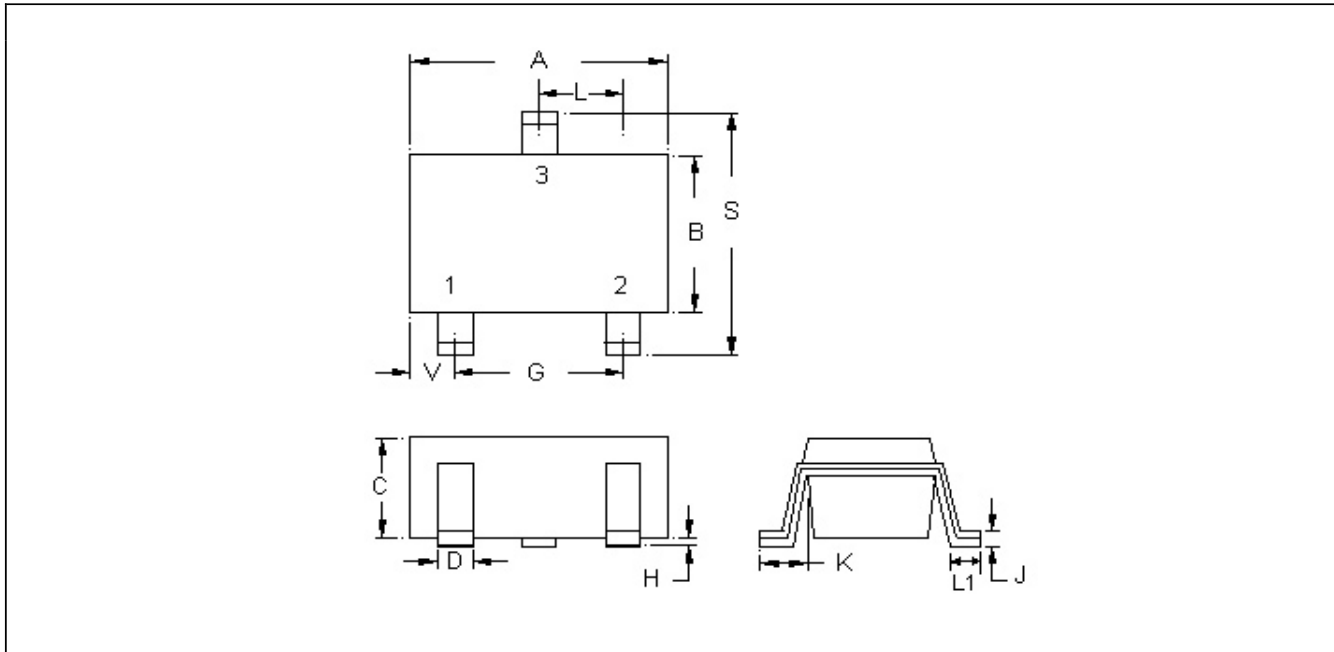


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## ■SOT-23 dimension



| DIM | Inches |        | Millimeters |      | DIM | Inches |        | Millimeters |      |
|-----|--------|--------|-------------|------|-----|--------|--------|-------------|------|
|     | Min.   | Max.   | Min.        | Max. |     | Min.   | Max.   | Min.        | Max. |
| A   | 0.1102 | 0.1204 | 2.80        | 3.04 | J   | 0.0032 | 0.0079 | 0.08        | 0.20 |
| B   | 0.0472 | 0.0669 | 1.20        | 1.70 | K   | 0.0118 | 0.0266 | 0.30        | 0.67 |
| C   | 0.0335 | 0.0512 | 0.89        | 1.30 | L   | 0.0335 | 0.0453 | 0.85        | 1.15 |
| D   | 0.0118 | 0.0197 | 0.30        | 0.50 | S   | 0.0830 | 0.1161 | 2.10        | 2.95 |
| G   | 0.0669 | 0.0910 | 1.70        | 2.30 | V   | 0.0098 | 0.0256 | 0.25        | 0.65 |
| H   | 0.0000 | 0.0040 | 0.00        | 0.10 | L1  | 0.0118 | 0.0197 | 0.30        | 0.50 |

Notes: 1. Controlling dimension: millimeters.

2. Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

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### Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

