

# ZVP4525Z

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## 250V P-CHANNEL ENHANCEMENT MODE MOSFET

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### SUMMARY

$V_{(BR)DSS} = -250V$ ;  $R_{DS(ON)} = 14\Omega$ ;  $I_D = -205mA$

### DESCRIPTION

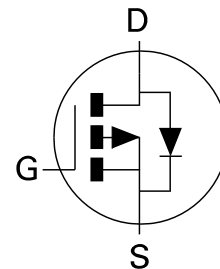
This 250V enhancement mode P-channel MOSFET provides users with a competitive specification offering efficient power handling capability, high impedance and is free from thermal runaway and thermally induced secondary breakdown. Applications benefiting from this device include a variety of Telecom and general high voltage switching circuits.



SOT223 and SOT23-6 versions are also available.

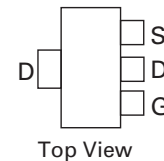
### FEATURES

- High voltage
- Low on-resistance
- Fast switching speed
- Low gate drive
- Low threshold
- Complementary N-channel Type ZVN4525Z
- SOT89 package



### APPLICATIONS

- Earth Recall and dialling switches
- Electronic hook switches
- High Voltage Power MOSFET Drivers
- Telecom call routers
- Solid state relays



### ORDERING INFORMATION

| DEVICE     | REEL SIZE (inches) | TAPE WIDTH (mm) | QUANTITY PER REEL |
|------------|--------------------|-----------------|-------------------|
| ZVP4525ZTA | 7                  | 12mm embossed   | 1000 units        |
| ZVP4525ZTC | 13                 | 12mm embossed   | 4000 units        |

### DEVICE MARKING

- P52

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## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                                                                                   | SYMBOL                            | LIMIT        | UNIT       |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------|------------|
| Drain-Source Voltage                                                                                                        | V <sub>DSS</sub>                  | 250          | V          |
| Gate Source Voltage                                                                                                         | V <sub>GS</sub>                   | ±40          | V          |
| Continuous Drain Current (V <sub>GS</sub> =10V; T <sub>A</sub> =25°C)(a)<br>(V <sub>GS</sub> =10V; T <sub>A</sub> =70°C)(a) | I <sub>D</sub><br>I <sub>D</sub>  | -205<br>-164 | mA<br>mA   |
| Pulsed Drain Current (c)                                                                                                    | I <sub>DM</sub>                   | -1           | A          |
| Continuous Source Current (Body Diode)                                                                                      | I <sub>S</sub>                    | -0.75        | A          |
| Pulsed Source Current (Body Diode)                                                                                          | I <sub>SM</sub>                   | -1           | A          |
| Power Dissipation at T <sub>A</sub> =25°C (a)<br>Linear Derating Factor                                                     | P <sub>D</sub>                    | 1.2<br>9.6   | W<br>mW/°C |
| Operating and Storage Temperature Range                                                                                     | T <sub>j</sub> ; T <sub>stg</sub> | -55 to +150  | °C         |

## THERMAL RESISTANCE

| PARAMETER               | SYMBOL           | VALUE | UNIT |
|-------------------------|------------------|-------|------|
| Junction to Ambient (a) | R <sub>θJA</sub> | 103   | °C/W |
| Junction to Ambient (b) | R <sub>θJA</sub> | 50    | °C/W |

### NOTES

(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

(b) For a device surface mounted on FR4 PCB measured at t ≤ 5 secs.

(c) Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

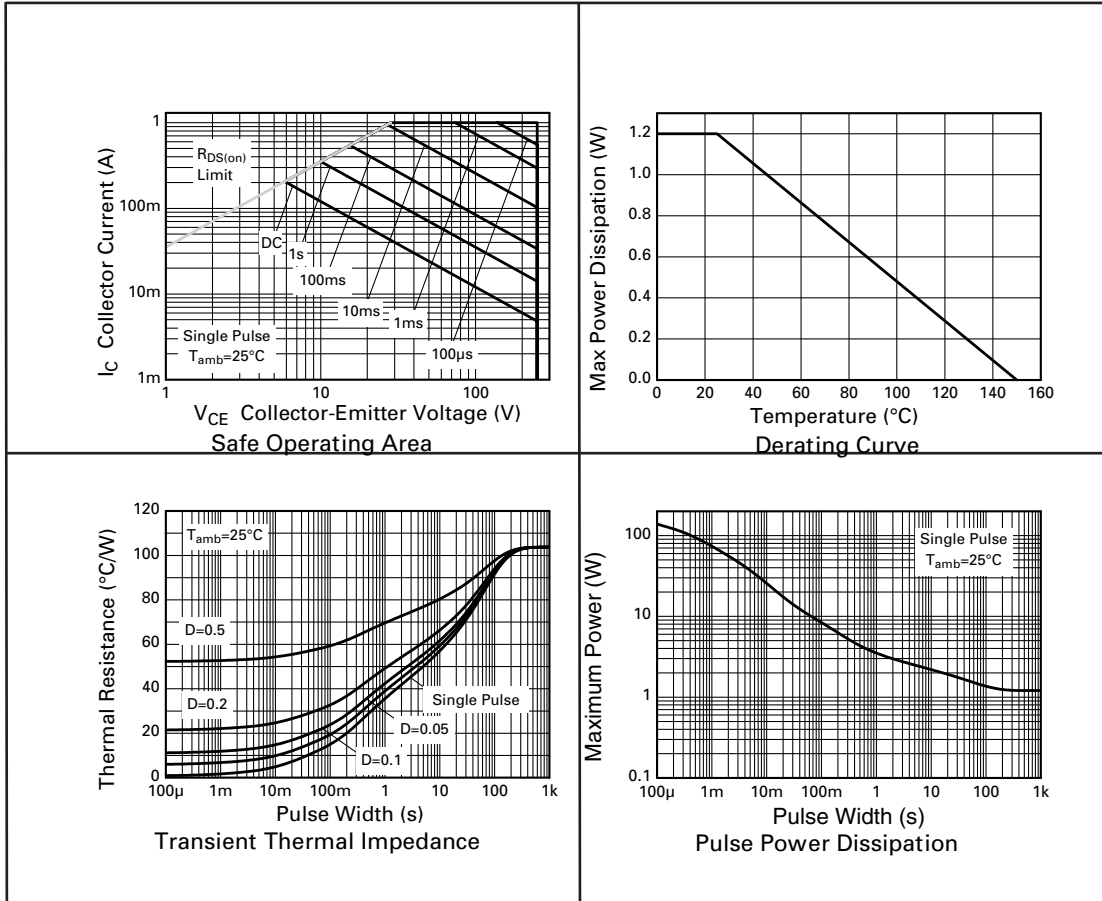
### NB High Voltage Applications

For high voltage applications, the appropriate industry sector guidelines should be considered with regard to voltage spacing between conductors.



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## CHARACTERISTICS



# ZVP4525Z

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| PARAMETER                                   | SYMBOL        | MIN. | TYP.     | MAX.      | UNIT                 | CONDITIONS.                                                                                                            |
|---------------------------------------------|---------------|------|----------|-----------|----------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>STATIC</b>                               |               |      |          |           |                      |                                                                                                                        |
| Drain-Source Breakdown Voltage              | $V_{(BR)DSS}$ | -250 | -285     |           | V                    | $I_D = -1\text{mA}$ , $V_{GS} = 0\text{V}$                                                                             |
| Zero Gate Voltage Drain Current             | $I_{DSS}$     |      | -30      | -500      | nA                   | $V_{DS} = -250\text{V}$ , $V_{GS} = 0\text{V}$                                                                         |
| Gate-Body Leakage                           | $I_{GSS}$     |      | $\pm 1$  | $\pm 100$ | nA                   | $V_{GS} = \pm 40\text{V}$ , $V_{DS} = 0\text{V}$                                                                       |
| Gate-Source Threshold Voltage               | $V_{GS(th)}$  | -0.8 | -1.5     | -2.0      | V                    | $I_D = -1\text{mA}$ , $V_{DS} = V_{GS}$                                                                                |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$  |      | 10<br>13 | 14<br>18  | $\Omega$<br>$\Omega$ | $V_{GS} = -10\text{V}$ ,<br>$I_D = -200\text{mA}$<br>$V_{GS} = -3.5\text{V}$ ,<br>$I_D = -100\text{mA}$                |
| Forward Transconductance (3)                | $g_{fs}$      | 80   | 200      |           | mS                   | $V_{DS} = -10\text{V}$ , $I_D = -0.15\text{A}$                                                                         |
| <b>DYNAMIC (3)</b>                          |               |      |          |           |                      |                                                                                                                        |
| Input Capacitance                           | $C_{iss}$     |      | 73       |           | pF                   | $V_{DS} = -25\text{V}$ , $V_{GS} = 0\text{V}$ ,<br>$f = 1\text{MHz}$                                                   |
| Output Capacitance                          | $C_{oss}$     |      | 12.8     |           | pF                   |                                                                                                                        |
| Reverse Transfer Capacitance                | $C_{rss}$     |      | 3.91     |           | pF                   |                                                                                                                        |
| <b>SWITCHING(2) (3)</b>                     |               |      |          |           |                      |                                                                                                                        |
| Turn-On Delay Time                          | $t_{d(on)}$   |      | 1.53     |           | ns                   | $V_{DD} = -30\text{V}$ , $I_D = -200\text{mA}$<br>$R_G = 50\Omega$ , $V_{GS} = -10\text{V}$<br>(refer to test circuit) |
| Rise Time                                   | $t_r$         |      | 3.78     |           | ns                   |                                                                                                                        |
| Turn-Off Delay Time                         | $t_{d(off)}$  |      | 17.5     |           | ns                   |                                                                                                                        |
| Fall Time                                   | $t_f$         |      | 7.85     |           | ns                   |                                                                                                                        |
| Total Gate Charge                           | $Q_g$         |      | 2.45     | 3.45      | nC                   | $V_{DS} = -25\text{V}$ , $V_{GS} = -10\text{V}$ ,<br>$I_D = -200\text{mA}$ (refer to test circuit)                     |
| Gate-Source Charge                          | $Q_{gs}$      |      | 0.22     | 0.31      | nC                   |                                                                                                                        |
| Gate Drain Charge                           | $Q_{gd}$      |      | 0.45     | 0.63      | nC                   |                                                                                                                        |
| <b>SOURCE-DRAIN DIODE</b>                   |               |      |          |           |                      |                                                                                                                        |
| Diode Forward Voltage (1)                   | $V_{SD}$      |      |          | 0.97      | V                    | $T_j = 25^{\circ}\text{C}$ , $I_S = -200\text{mA}$ ,<br>$V_{GS} = 0\text{V}$                                           |
| Reverse Recovery Time (3)                   | $t_{rr}$      |      | 205      | 290       | ns                   | $T_j = 25^{\circ}\text{C}$ , $I_F = -200\text{mA}$ ,<br>$di/dt = 100\text{A}/\mu\text{s}$                              |
| Reverse Recovery Charge (3)                 | $Q_{rr}$      |      | 21       | 29        | nC                   |                                                                                                                        |

(1) Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$  .

(2) Switching characteristics are independent of operating junction temperature.

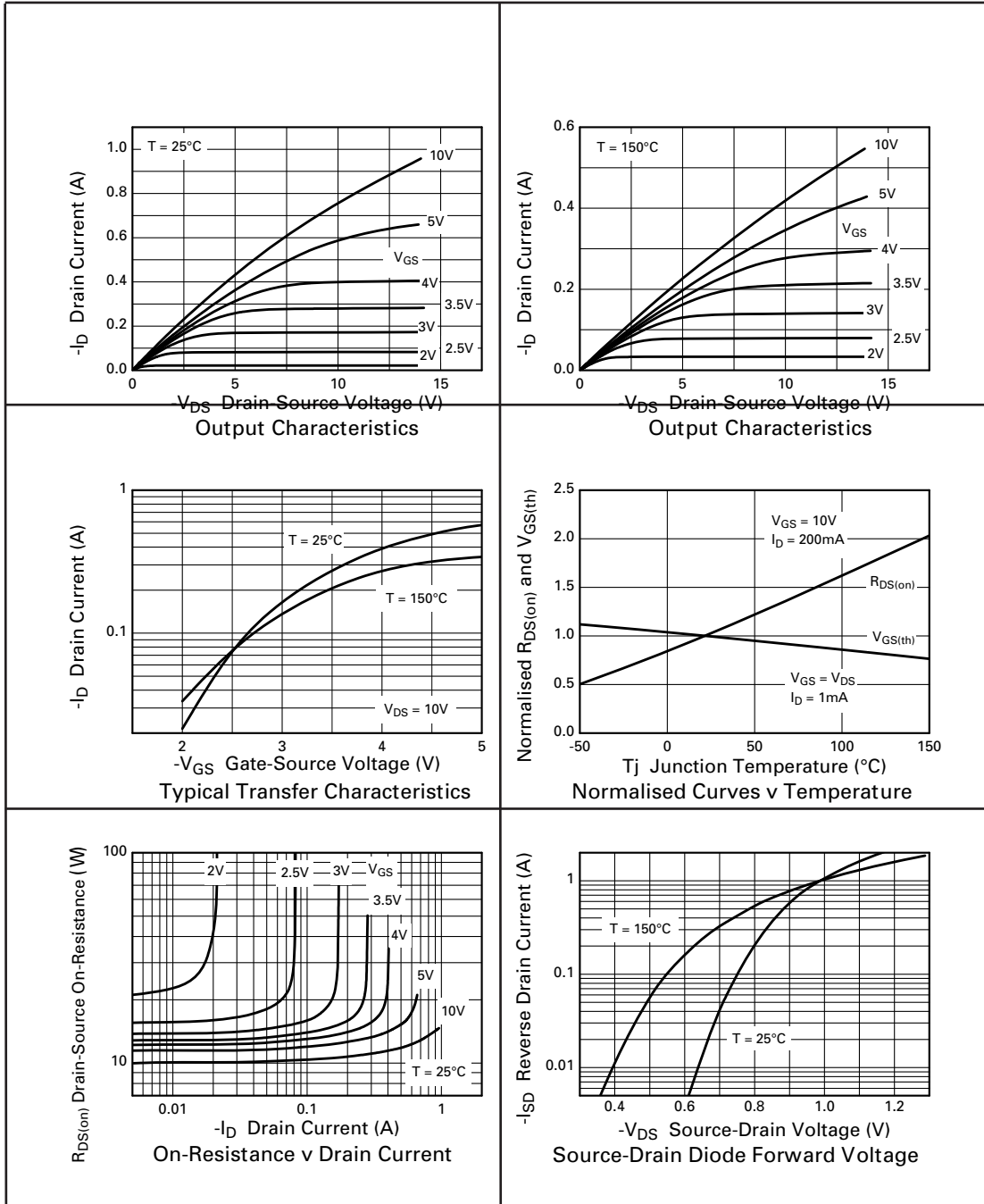
(3) For design aid only, not subject to production testing.



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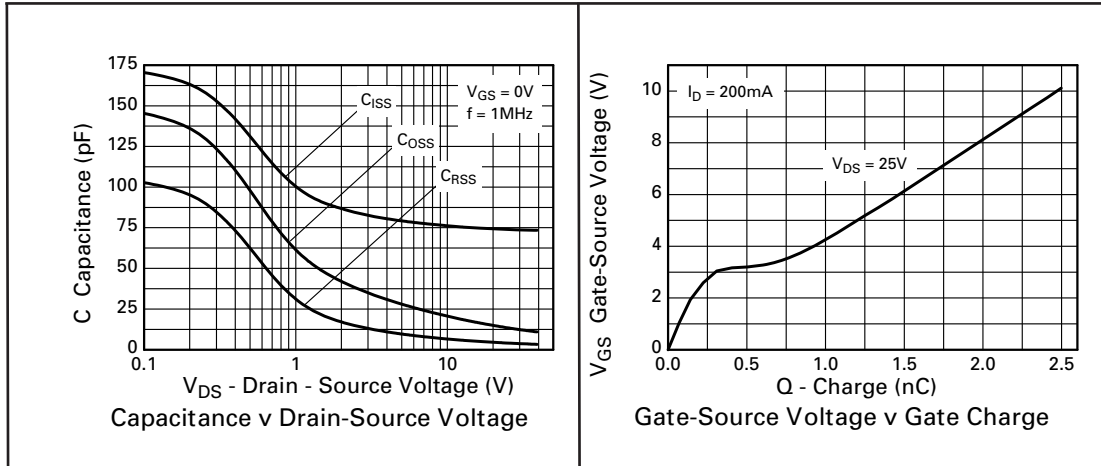
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## TYPICAL CHARACTERISTICS

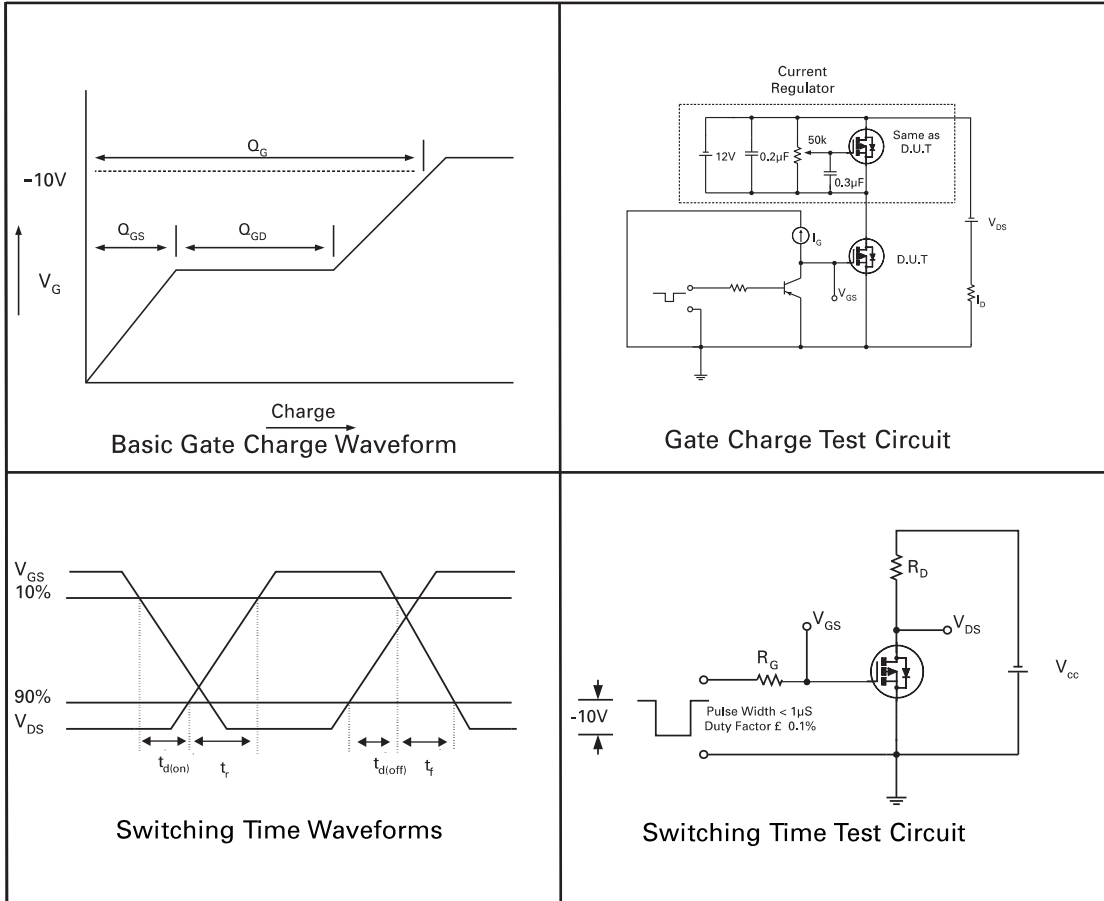


# ZVP4525Z

## CHARACTERISTICS



TEST CIRCUITS



# ZVP4525Z

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"Preview"Future device intended for production at some point. Samples may be available

"Active"Product status recommended for new designs

"Last time buy (LTB)"Device will be discontinued and last time buy period and delivery is in effect

"Not recommended for new designs"Device is still in production to support existing designs and production

"Obsolete"Production has been discontinued

Datasheet status key:

"Draft version" This term denotes a very early datasheet version and contains highly provisional information, which may change in any manner without notice.

"Provisional version" This term denotes a pre-release datasheet. It provides a clear indication of anticipated performance. However, changes to the test conditions and specifications may occur, at any time and without notice.

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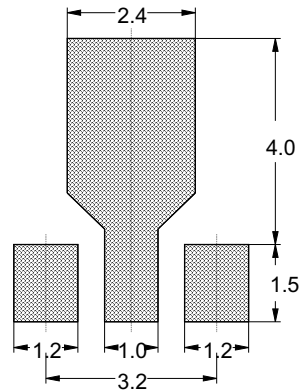


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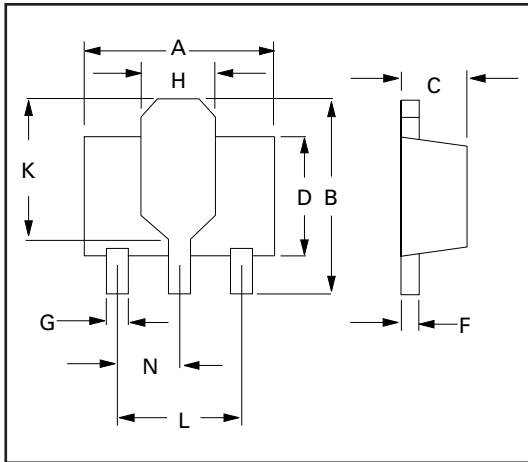
## PACKAGE DIMENSIONS

| DIM | Millimetres |      | Inches |       |
|-----|-------------|------|--------|-------|
|     | Min         | Max  | Min    | Max   |
| A   | 4.40        | 4.60 | 0.173  | 0.181 |
| B   | 3.75        | 4.25 | 0.150  | 0.167 |
| C   | 1.40        | 1.60 | 0.550  | 0.630 |
| D   | -           | 2.60 | -      | 0.102 |
| F   | 0.28        | 0.45 | 0.011  | 0.018 |
| G   | 0.38        | 0.55 | 0.015  | 0.022 |
| H   | 1.50        | 1.80 | 0.060  | 0.072 |
| K   | 2.60        | 2.85 | 0.102  | 0.112 |
| L   | 2.90        | 3.10 | 0.114  | 0.122 |
| N   | 1.40        | 1.60 | 0.055  | 0.063 |

## PAD LAYOUT DETAILS



SOT89 pattern.  
Minimum Pad Size (dimensions in mm)



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