

BGS22WL10

DPDT (Dual-Pole / Double-Throw) Differential RF Switch

Data Sheet

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Power Management & Multimarket

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Revision History

Previous Version: v1.6, May 27, 2014

| Page | Subjects (major changes since last revision) |
|------|--|
| 9 | Updated Maximum Ratings (Table 3) |
| | |
| | |

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Last Trademarks Update 2010-06-09

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BGS22WL10 DPDT (Dual-Pole / Double-Throw) Differential RF Switch

1 Features

- DPDT (Dual-Pole / Double-Throw) differential RF switch
- Frequency range: 0.1 - 3 GHz
- High signal power up to 30 dBm
- Supply voltage 2.3 - 3.6 V
- Small package size of 1.55 x 1.15 mm²
- No decoupling capacitors required if no DC applied
- RoHS compliant package



2 Product Description

The BGS22WL10 is a DPDT (Dual-Pole / Double Throw) RF switch which combines two differential signals into one differential output or splits one differential signal into two separate differential lines. The parallel paths of the switch are controlled simultaneously through the same signals. The switch is designed to operate in battery powered applications with a supply voltage range of 2.4 - 3.6 V. The highly symmetric design ensures best phase- and amplitude accuracy.

A typical application is to combine two Rx paths in a mobile cellular device after the Rx filters or duplexers into one input to the transceiver IC. The IC can also be used for a wide variety of applications switching balanced signals in a frequency range of 0.1 - 3 GHz. The RF switch is packaged in a standard RoHS compliant TSLP-10-1 package with a small outline of only 1.55 x 1.15 mm².

No decoupling capacitors are required in typical applications as long as no DC is applied to any RF port.

Table 1: Ordering Information

| Type | Package | Marking |
|-----------|-----------|---------|
| BGS22WL10 | TSLP-10-1 | 22W |

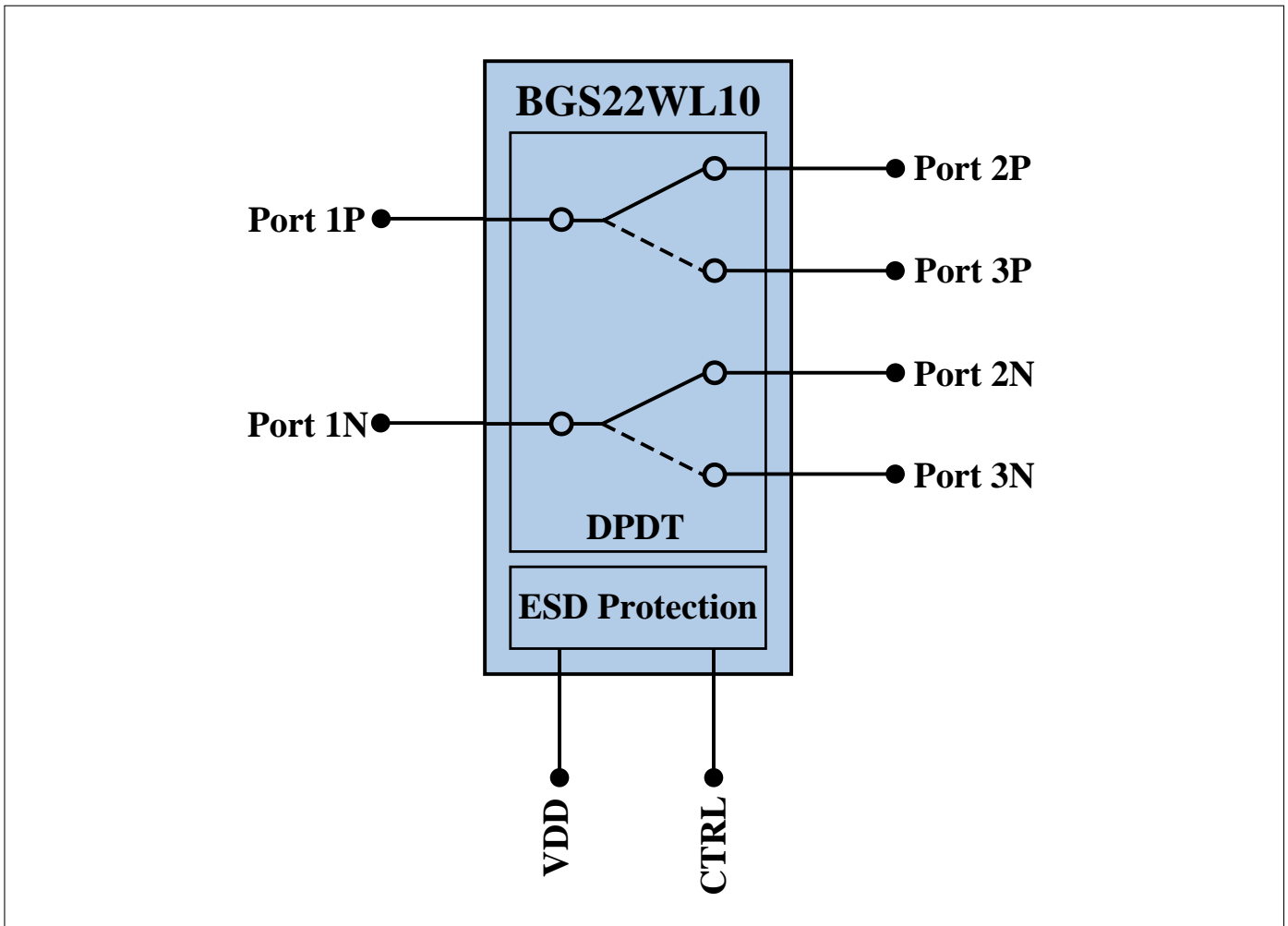


Figure 1: BGS22WL10 block diagram

Table 2: Truth Table

| Pin No. | CTRL |
|------------------|------|
| Port 1 to Port 2 | 0 |
| Port 1 to Port 3 | 1 |

3 Maximum Ratings

Table 3: Maximum Ratings at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|----------------|--------|------|------|------------------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Supply voltage | V_{DD} | -0.5 | – | 5.5 | V | – |
| Control voltage | V_{Ctrl} | -0.3 | – | 3.6 | V | – |
| Storage temperature range | T_{STG} | -55 | – | 150 | $^\circ\text{C}$ | – |
| RF input power | P_{In} | – | – | +32 | dBm | – |
| ESD capability Human Body Model | V_{ESD_HBM} | 1000 | – | – | V | – |
| Junction temperature | T_j | – | – | 125 | $^\circ\text{C}$ | – |
| Thermal resistance junction - soldering point | R_{thJS} | – | – | 43 | K/W | – |

Attention:

Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

4 Operation Ranges

Table 4: Operation Ranges

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------|---------------|--------|------|----------|------------------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Supply Voltage | V_{DD} | 2.3 | – | 3.6 | V | – |
| Control Voltage Low | V_{Ctrl_L} | -0.3 | – | 0.4 | V | – |
| Control Voltage High | V_{Ctrl_H} | 1.2 | – | V_{DD} | V | – |
| RF frequency | f_{RF} | 0.1 | – | – | GHz | – |
| Ambient Temperature | T_A | -40 | 25 | 85 | $^\circ\text{C}$ | – |

Table 5: RF Input Power

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|-------------------------------|----------|--------|------|------|------|-----------------------|
| | | Min. | Typ. | Max. | | |
| RF Input Power (50 Ω) | P_{In} | – | – | 30 | dBm | – |

5 RF Characteristics

Table 6: RF Characteristics:

 Terminating port impedance: $Z_0 = 50 \Omega$

Measurement conditions unless otherwise specified:

 $T_A = 25 \text{ }^\circ\text{C}$, $P_{IN} = 0 \text{ dBm}$, Supply Voltage $V_{DD} = 2.3 - 3.6 \text{ V}$

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|-----------------|--------|------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Insertion Loss - Typical Conditions: $T_A = 25 \text{ }^\circ\text{C}$, $V_{DD} = 3 \text{ V}$ | | | | | | |
| | IL | 0.30 | 0.34 | 0.39 | dB | 824 - 915 MHz |
| | | 0.37 | 0.40 | 0.46 | dB | 1710 - 1910 MHz |
| | | 0.43 | 0.48 | 0.59 | dB | 2170 - 2690 MHz |
| Insertion Loss - Min/Max Conditions: $T_A = -40 \dots +85 \text{ }^\circ\text{C}$, $V_{DD} = 2.3 \dots 3.6 \text{ V}$ | | | | | | |
| | IL | 0.23 | 0.34 | 0.54 | dB | 824 - 915 MHz |
| | | 0.27 | 0.40 | 0.58 | dB | 1710 - 1910 MHz |
| | | 0.31 | 0.48 | 0.75 | dB | 2170 - 2690 MHz |
| Return Loss - Min/Max Conditions: $T_A = -40 \dots +85 \text{ }^\circ\text{C}$, $V_{DD} = 2.3 \dots 3.6 \text{ V}$ | | | | | | |
| | RL | 25 | 27 | 35 | dB | 824 - 915 MHz |
| | | 22 | 26 | 30 | dB | 1710 - 1910 MHz |
| | | 16 | 22 | 25 | dB | 2170 - 2690 MHz |
| Isolation¹ | | | | | | |
| | ISO | 32 | 38 | 44 | dB | 824 - 915 MHz |
| | | 25 | 30 | 37 | dB | 1710 - 1910 MHz |
| | | 22 | 28 | 33 | dB | 2170 - 2690 MHz |
| P0.1 dB Compression Point | | | | | | |
| | $P_{0.1dB}$ | 33 | 34 | 35 | dBm | 1000 MHz |
| Harmonic Generation up to 12.75 GHz | | | | | | |
| Any path | P_{Harm} | 80 | 85 | 95 | dBc | 27 dBm, 50Ω, 25 °C, 25 % duty cycle |
| Intermodulation Distortion in Rx Band | | | | | | |
| IMD2_Low ² | P_{IMD2_L} | -125 | -115 | -105 | dBm | Tx = 15 dBm, Interferer = -15 dBm |
| IMD3 | P_{IMD3} | -125 | -115 | -110 | dBm | Tx = 10 dBm, Interferer = -15 dBm |
| IMD2_High | P_{IMD2_H} | -125 | -115 | -110 | dBm | Tx = 10 dBm, Interferer = -15 dBm |
| Switching Time and Current Consumption | | | | | | |
| RF Rise Time | $t_{10\%-90\%}$ | – | 250 | – | ns | 10% - 90% of RF Signal ($V_{DD} = 3 \text{ V}$) |
| Ctrl to RF Time | $t_{Ctrl-RF}$ | – | 600 | – | ns | 50% of Ctrl Signal to 90% of RF Signal ($V_{DD} = 3 \text{ V}$) |
| Supply Current | I_{DD} | 70 | 120 | 190 | μA | Current at $T_A = 25 \text{ }^\circ\text{C}$ |
| Phase Error | | | | | | |
| Between any two paths | Ph_{Err} | 0.3 | 0.5 | 0.7 | Deg. | 27 dBm, 50Ω, 25 °C, 25 % duty cycle |

Note: All electrical characteristics are measured with all RF ports terminated in 50 Ω.

¹ Isolation values are not dependent on supply voltage and temperature as long as operated in the specified operation range.

² With external shunt inductor.

6 Package Outline and Pin Configuration

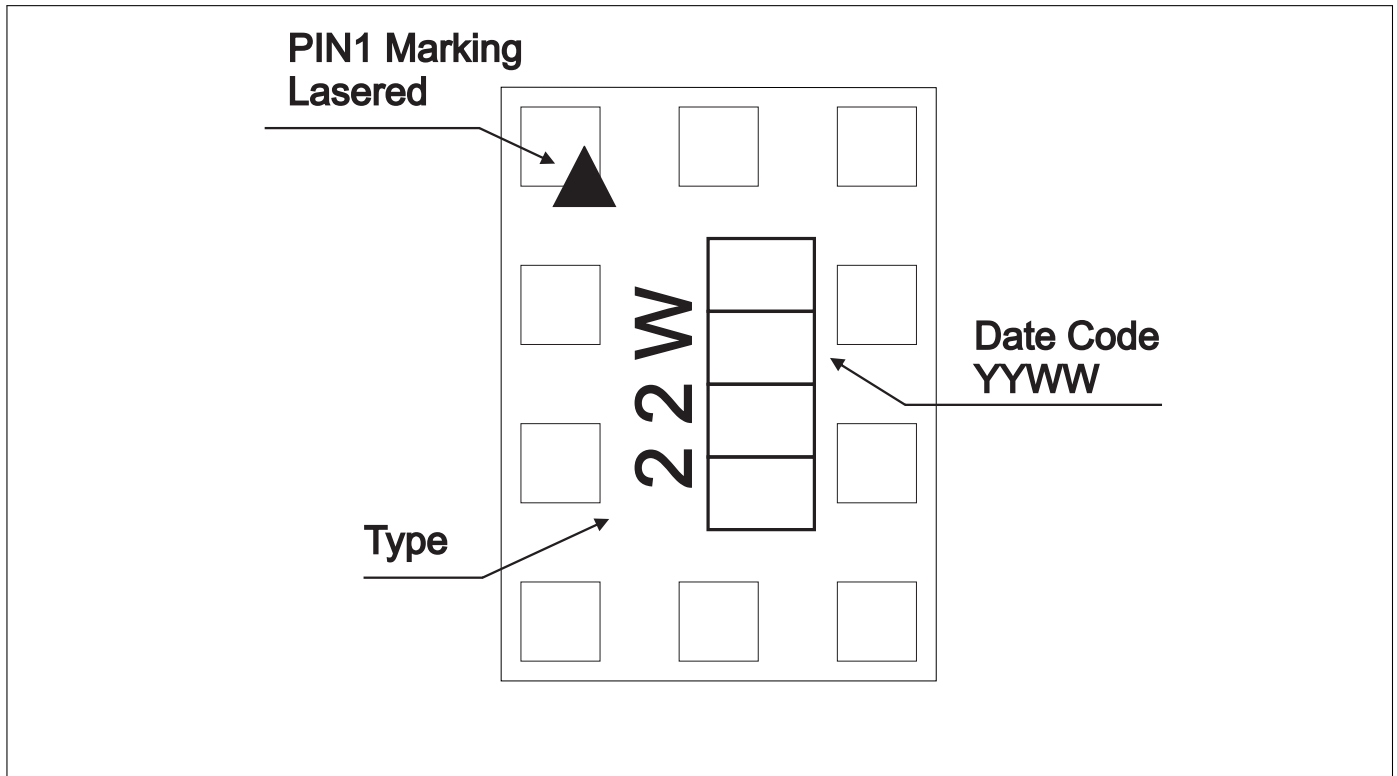


Figure 2: Marking Layout (top view)

Table 7: Pin Configuration

| Pin No. | Name | Pin Type | Buffer Type | Function |
|---------|---------|----------|-------------|---------------------------------|
| 1 | Port 3P | | | Differential Output P of Port 3 |
| 2 | GND | | | Ground Pin |
| 3 | GND | | | Ground Pin |
| 4 | Port 2N | | | Differential Output N of Port 2 |
| 5 | Port 2P | | | Differential Output P of Port 2 |
| 6 | CTRL | | | Control Voltage |
| 7 | Port 1P | | | Differential Input P of Port 1 |
| 8 | Port 1N | | | Differential Input N of Port 1 |
| 9 | VDD | | | Supply Voltage |
| 10 | Port 3N | | | Differential Output N of Port 3 |

Table 8: Mechanical Data

| Parameter | Symbol | Value | Unit |
|---------------------|--------|------------------|-----------------|
| Package X-Dimension | X | 1.55 ± 0.05 | mm |
| Package Y-Dimension | Y | 1.15 ± 0.05 | mm |
| Package Area | A | 1.783 | mm ² |
| Package Height | H | 0.39 +0.01/-0.03 | mm |

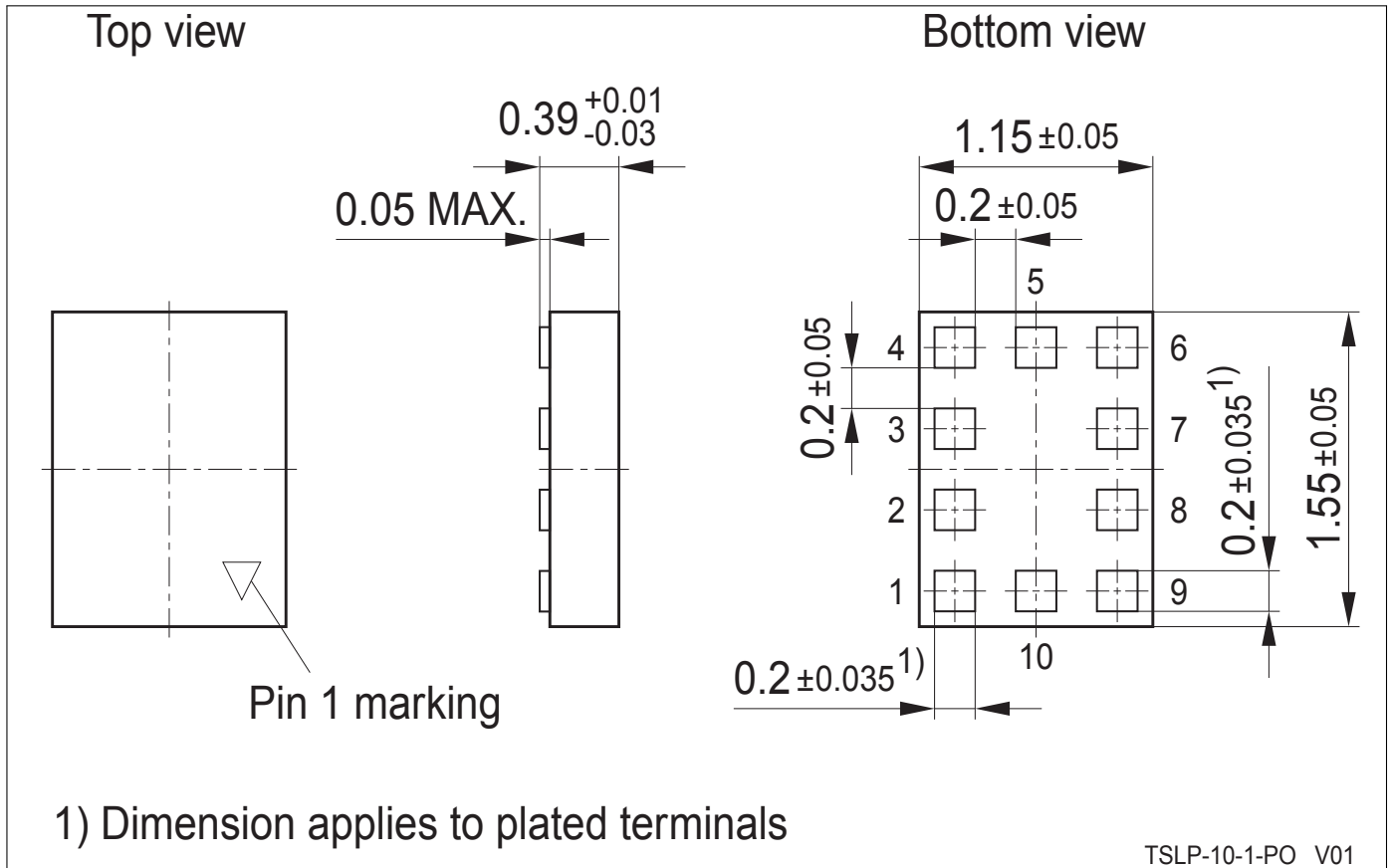


Figure 3: TSLP-10-1 Package Outline (top, side and bottom view)

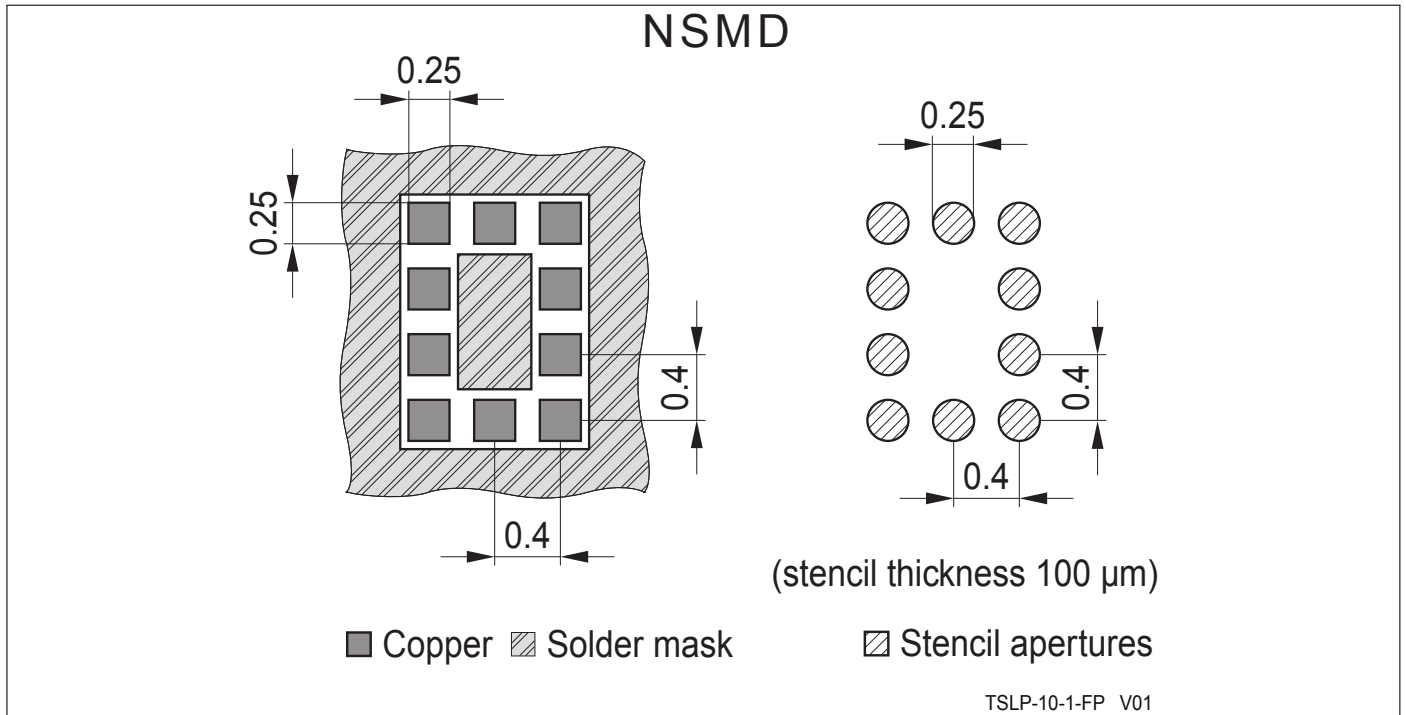


Figure 4: Footprint TSLP-10-1

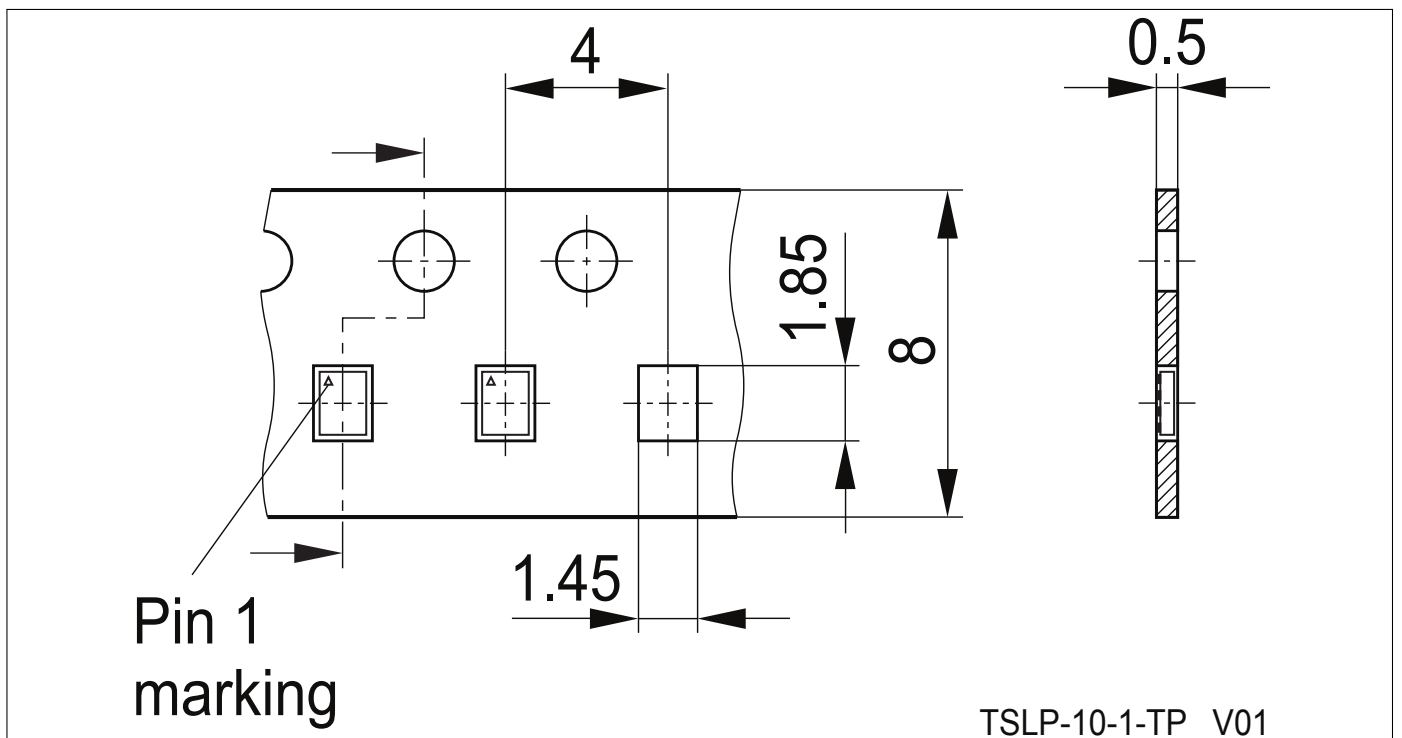


Figure 5: Tape and Reel Dimensions for TSLP-10-1

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