

**AQ24COM-01 Series**

24 V Bidirectional 250 W TVS Diode Array Discrete, General Purpose ESD Protection

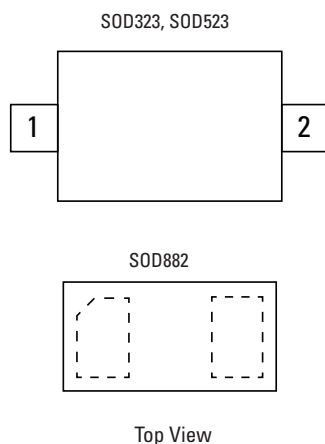
**PRELIMINARY & CONFIDENTIAL**

Littelfuse, Inc. has characterized initial samples of this device and is currently conducting reliability testing. Parts numbers and specifications are subject to change until Confidential and proprietary.

**Description**

The AQ24COM-01 series bidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment.

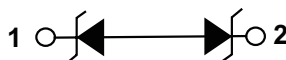
The AQ24COM-01 series TVS can safely absorb repetitive ESD strikes of  $\pm 30$  kV (contact and air discharge as defined in IEC 61000-4-2) without any performance degradation. In addition, it can safely dissipate a 5 A 8/20  $\mu$ s surge event as defined in IEC 61000-4-5, 2<sup>nd</sup> edition.

**Pinout****Features**

- ESD, IEC 61000-4-2,  $\pm 30$  kV contact/air
- ESD, ISO 10605, 330 pF 330  $\Omega$ ,  $\pm 30$  kV contact/air
- EFT, IEC 61000-4-4, 40 A (5/50 ns)
- Maximum surge tolerance, IEC 61000-4-5 2<sup>nd</sup> edition, 5 A (8/20  $\mu$ s)
- Halogen free, lead free and RoHS compliant
- Moisture sensitivity level (MSL-1)
- AEC-Q101 qualified and PPAP capable

**Applications**

- Automotive Applications
- ADAS Control Units
- Body Control Units
- CAN/LIN Bus
- Electronic Control Units
- Factory Automation
- Lighting Control (DALI)
- PowerTrain Control Units

**Functional Block Diagram****Life Support Note:**

Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

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### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$P_{PK}$	Peak Pulse Power ( $t_p = 8/20 \mu s$ )	250	W
$I_{PP}$	Peak Current ( $t_p = 8/20 \mu s$ )	5.0	A
$T_{OP}$	Operating Temperature	-40 to 150	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

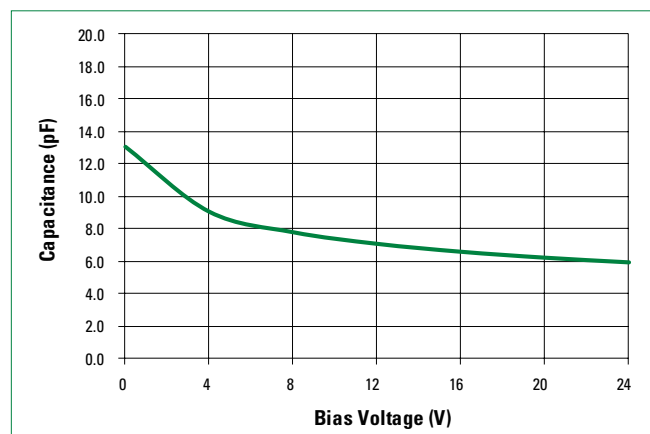
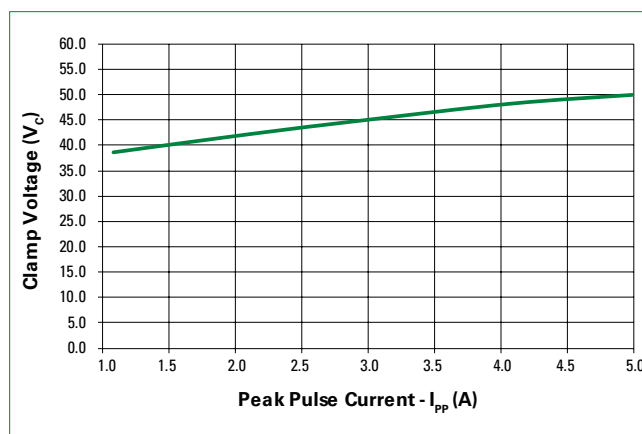
**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

### Electrical Characteristics ( $T_{OP} = 25 \text{ }^\circ\text{C}$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				24	V
Breakdown Voltage	$V_{BR}$	$I_R = 1 \text{ mA}$ , I/O to GND	26		33	V
Reverse Leakage Current	$I_{LEAK}$	$V_R = 24 \text{ V}$ , I/O to GND		1	50	nA
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP} = 1 \text{ A}$ , $t_p = 8/20 \mu s$ , I/O to GND		38.5		V
		$I_{PP} = 5 \text{ A}$ , $t_p = 8/20 \mu s$ , I/O to GND		50		
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100 \text{ ns}$ , I/O to GND		0.42		$\Omega$
ESD Withstand Voltage <sup>1,3</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact discharge)	$\pm 30$			kV
		IEC 61000-4-2 (Air discharge)	$\pm 30$			kV
		ISO10605 (Contact discharge)	$\pm 30$			kV
		ISO10605 (Air discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias = 0 V, $f = 1 \text{ MHz}$ ; I/O to GND		13		pF

Notes:

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 0.2 ns rise time, and average window  $t_1 = 70 \text{ ns}$  to  $t_2 = 90 \text{ ns}$ .
- Device stressed with ten non-repetitive ESD pulses.

**Capacitance vs. Reverse Bias****Clamping Voltage vs  $I_{PP}$** 

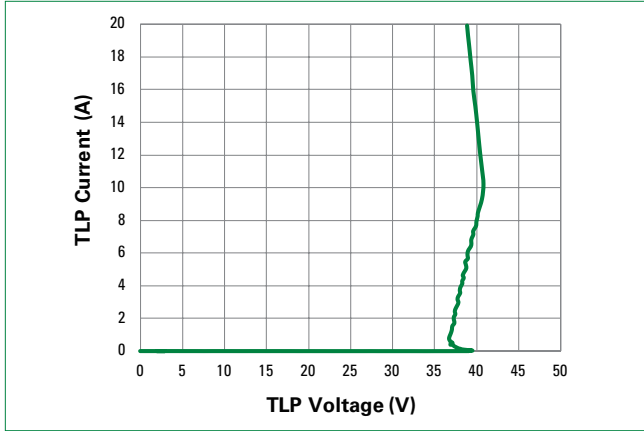
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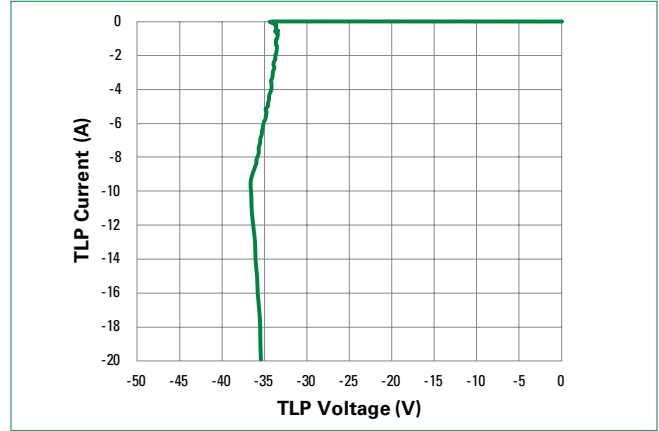
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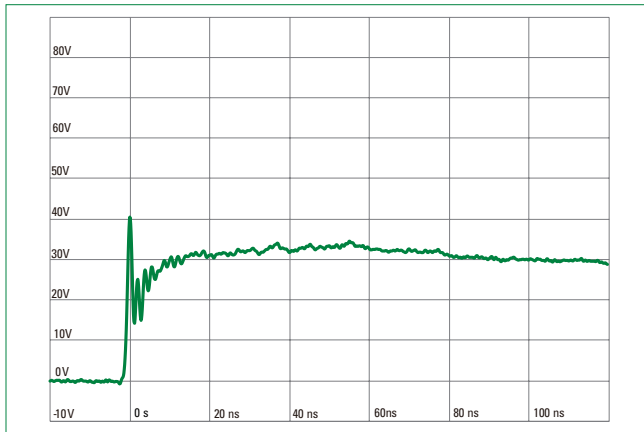
**Positive Transmission Line Pulsing (TLP) Plot**



**Negative Transmission Line Pulsing (TLP) Plot**



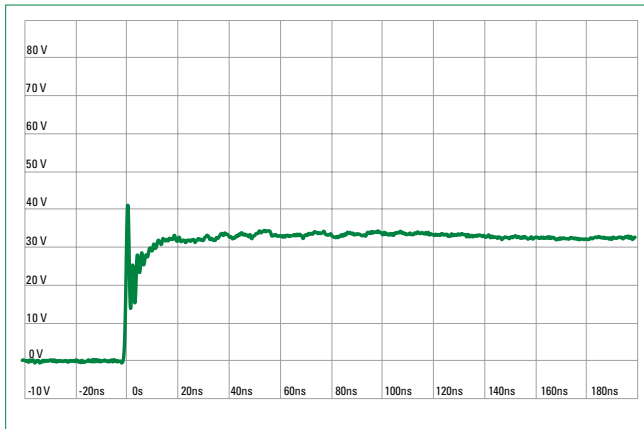
**IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage**



**IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**



**ISO10605 Contact Discharge Plot at +8 kV**



**ISO10605 Contact Discharge Plot at -8 kV**



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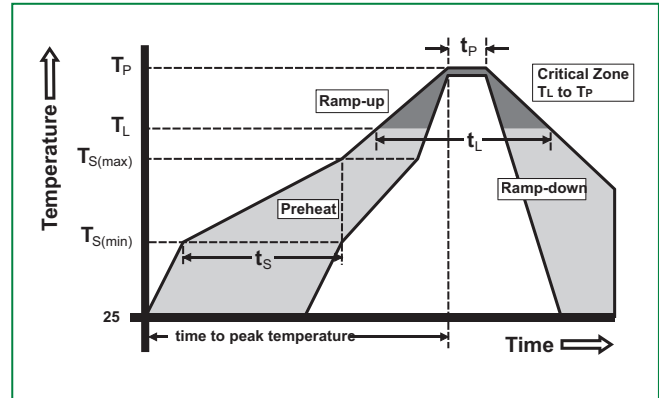
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### Soldering Parameters

<b>Reflow condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature min ( $T_{s(min)}$ )	150 °C
	- Temperature max ( $T_{s(max)}$ )	200 °C
	- Time (min to max) ( $t_s$ )	60 – 120 secs
<b>Average ramp up rate (Liquidus) temp (<math>T_L</math>) to peak</b>		3 °C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up rate</b>		3 °C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217 °C
	- Temperature ( $t_L$ )	60 – 150 seconds
<b>Peak temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak temperature (<math>t_p</math>)</b>		30 seconds
<b>Ramp-down rate</b>		6 °C/second max
<b>Time 25°C to peak temperature (<math>T_p</math>)</b>		8 minutes max
<b>Do not exceed</b>		260 °C



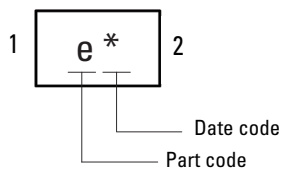
### Ordering Information

Part number	Package	Min. order qty.
AQ24COM-01ETG	SOD882	10,000
AQ24COM-01FTG	SOD323	3,000
AQ24COM-01LTG	SOD523	5,000

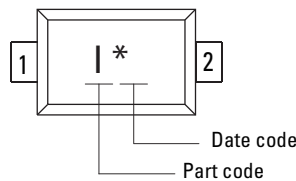
### Product Characteristics

<b>Lead plating</b>	Matte tin
<b>Lead material</b>	Copper alloy
<b>Body material</b>	Molded compound
<b>Flammability</b>	UL recognized compound meeting flammability rating V-0

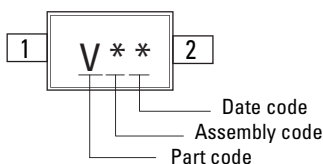
### Part Marking System



AQ24COM-01ETG

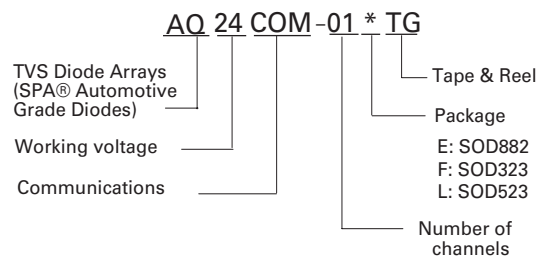


AQ24COM-01LTG



AQ24COM-01FTG

### Part Numbering System

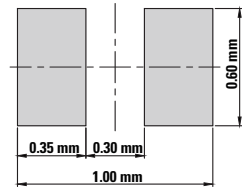
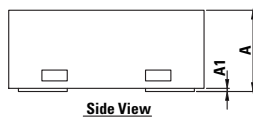
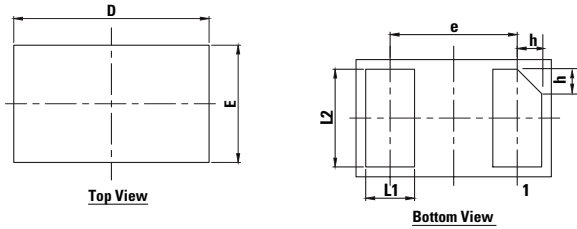


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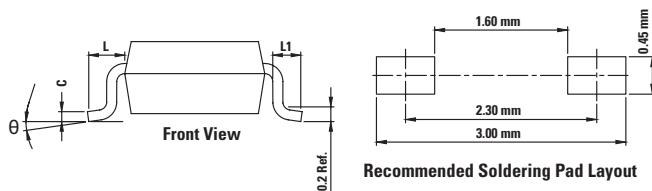
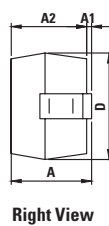
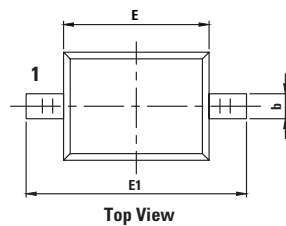
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**Package Dimensions — SOD882**

Recommended Soldering Pad Layout

Symbol	SOD882					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.40	0.50	0.55	0.016	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
L1	0.20	0.25	0.30	0.008	0.010	0.012
L2	0.45	0.50	0.55	0.018	0.020	0.022
D	0.95	1.00	1.05	0.037	0.039	0.041
E	0.55	0.60	0.65	0.022	0.024	0.026
e	0.65 BSC			0.026 BSC		
h	0.07	0.12	0.17	0.003	0.005	0.007

**Package Dimensions — SOD323**

Recommended Soldering Pad Layout

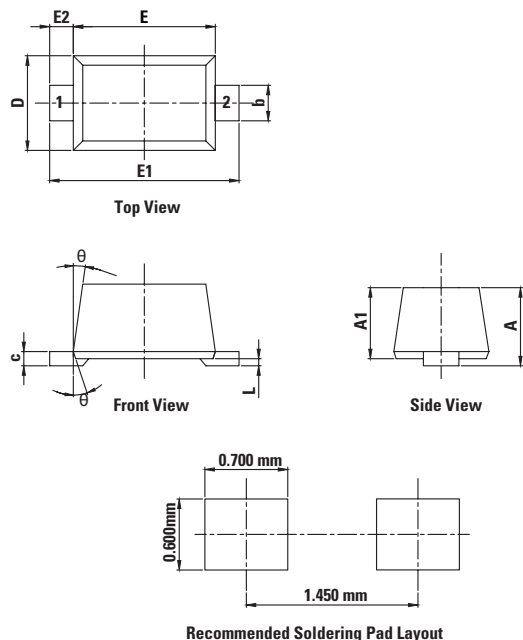
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0.000	0.004
A2	0.80	0.90	0.031	0.035
b	0.25	0.35	0.010	0.014
c	0.08	0.15	0.003	0.006
D	1.20	1.40	0.047	0.055
E	1.60	1.80	0.063	0.071
E1	2.50	2.75	0.098	0.108
L1	0.25	0.40	0.010	0.016
L	0.475 Ref		0.019 Ref	
θ	0°	8°	7°	8°

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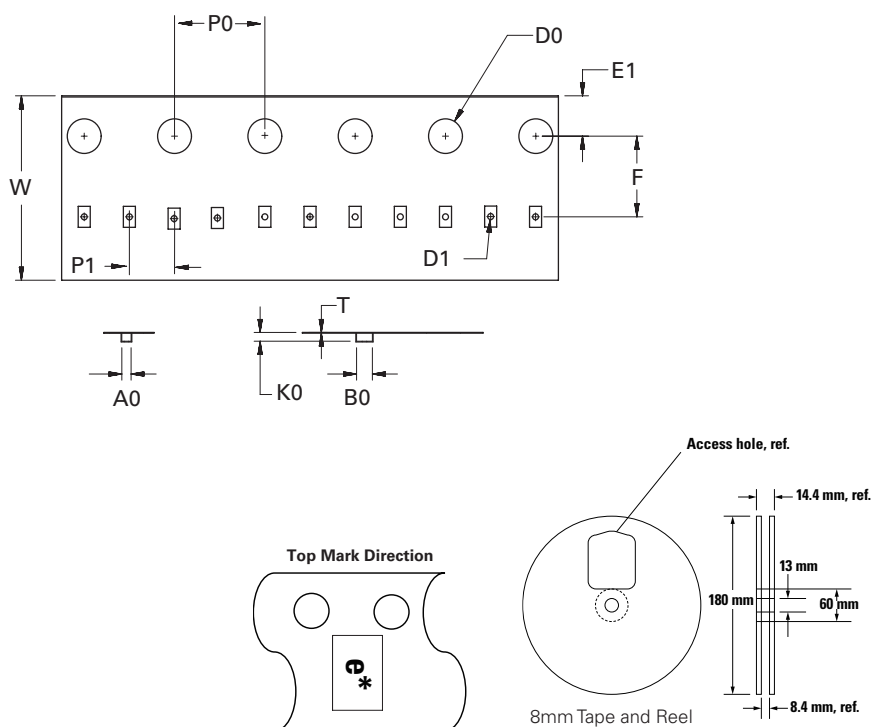
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**Package Dimensions — SOD523**

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.51	0.77	0.020	0.030
A1	0.50	0.70	0.020	0.028
b	0.25	0.35	0.010	0.014
c	0.08	0.15	0.003	0.006
D	0.70	0.90	0.028	0.035
E	1.10	1.30	0.043	0.051
E1	1.50	1.70	0.059	0.067
E2	0.20 Ref		0.001 Ref	
L	0.01	0.07	0.000	0.003
θ	7° Ref		7° Ref	

**Embossed Carrier Tape & Reel Specification — SOD882**

Symbol	Millimeters
A0	0.70+/-0.045
B0	1.10+/-0.045
D0	1.55+0.05
D1	0.40+/-0.05
E1	1.75+/-0.10
F	3.50+/-0.05
K0	0.65+/-0.045
P0	4.00+/-0.10
P1	2.00+/-0.10
T	0.20+/-0.05
W	8.00+0.30/-0.10

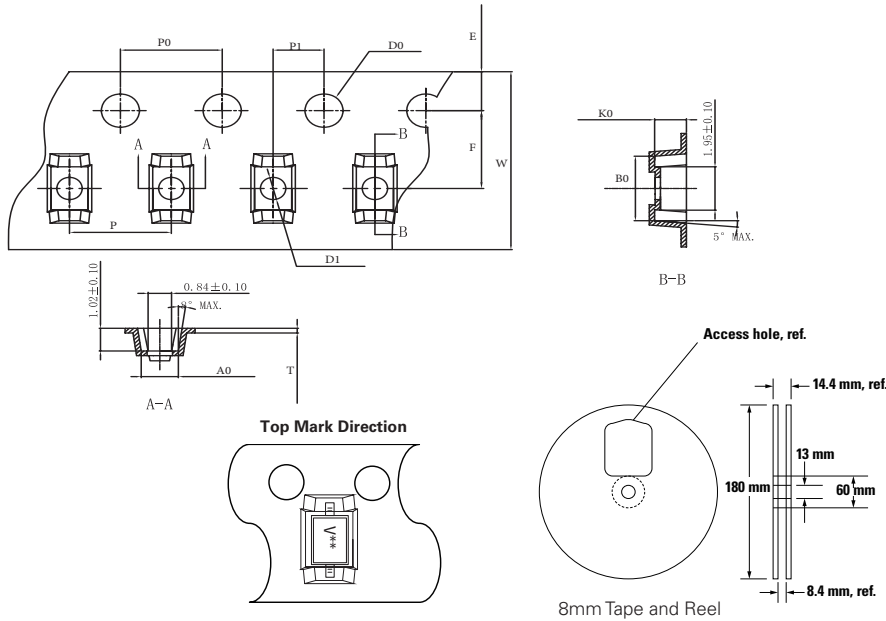
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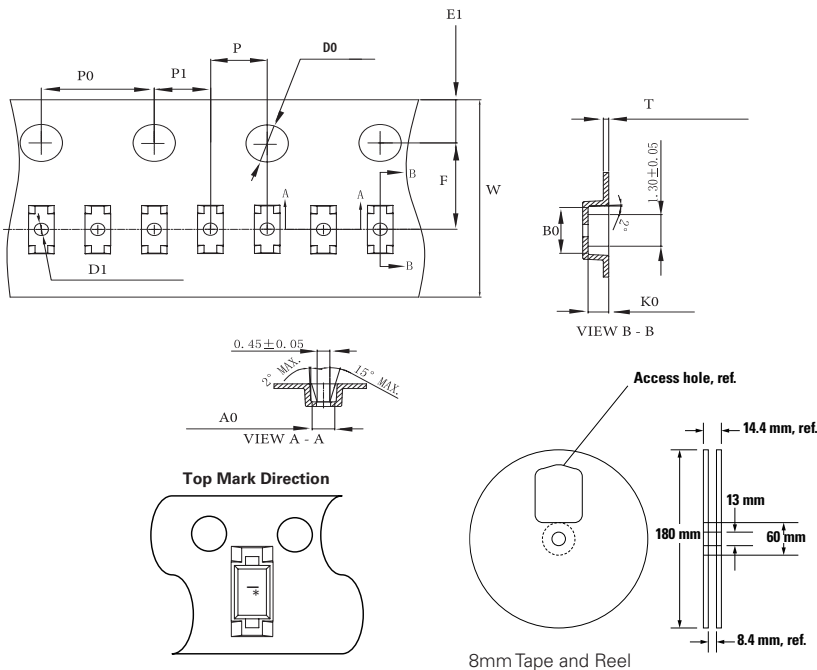
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### Embossed Carrier Tape & Reel Specification — SOD323



Symbol	Millimeters
A0	1.36 min/1.62 max
B0	2.85 min/3.40 max
W	8.0+0.3/-0.10
D0	1.40 min/1.60 max
D1	∅0.95 min/∅1.25 max
E	1.75+/-0.10
F	3.50+/-0.10
P0	4.00+/-0.10
P	4.00+/-0.10
P1	2.00+/-0.10
K0	1.15 min/1.45 max
T	0.254+/-0.02

### Embossed Carrier Tape & Reel Specification — SOD523



Symbol	Millimeters
A0	0.85 min/1.01 max
B0	1.91+/-0.08
W	8.0+0.3/-0.10
D0	1.50+0.10
D1	∅0.25 min/∅0.60 max
E1	1.75+/-0.10
F	3.50+/-0.10
P0	4.00+/-0.10
P	2.00+/-0.05
P1	2.00+/-0.05
K0	0.68 min/0.78 max
T	0.20+/-0.03

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