

General Description

The AOZ7200CI is a 600V AlphaZBL™ product that controls the external N-channel MOSFET to replace a diode when used in AC/DC diode-bridge application. The AOZ7200CI can help to reduce power consumption and heat dissipation.

In diode-bridge application, the AOZ7200CI senses the voltage drop and reduces the forward conduction loss to the minimum value. When the forward current is reversed, the AOZ7200CI turns off the external switch and suffers the reverse voltage. In AC/DC application, the AOZ7200CI is self-powered system without extra voltage supply.

The AOZ7200CI is available in a SOT23-5 package and is rated over a -40°C to +125°C ambient temperature range.

Features

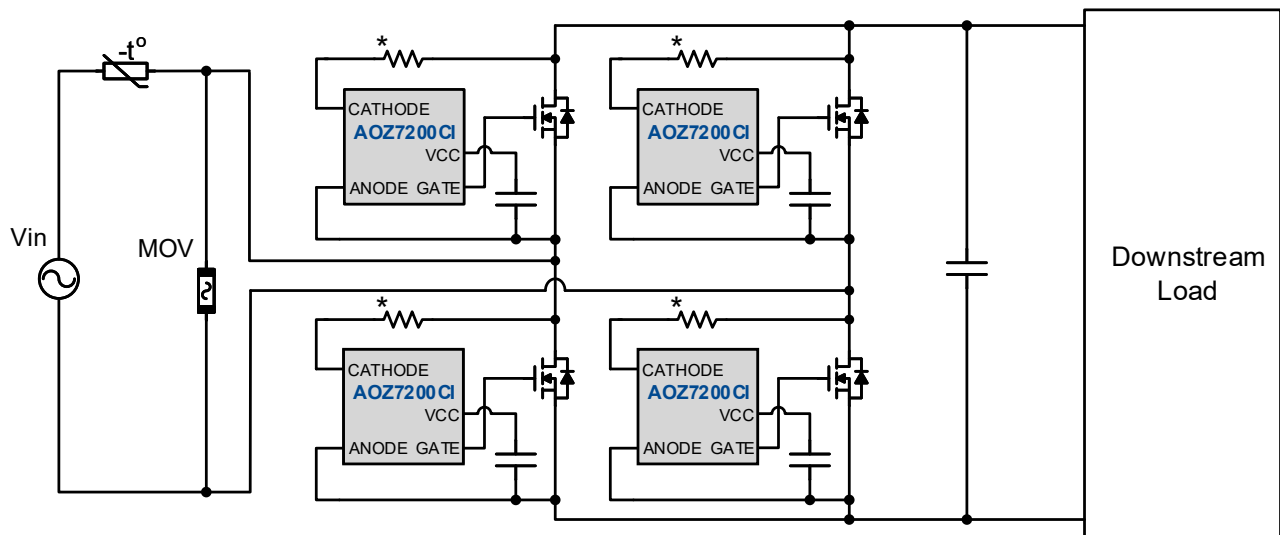
- Replaces a power diode in HV bridge rectifier
- Self-powered in AC system
- Low reverse threshold 1mV
- Low quiescent current 5uA

Applications

- AC/DC
- HV bridge rectifier application



Typical Applications



* For detailed information, please refer to the Application Note.

Figure 1. Typical Application Circuit

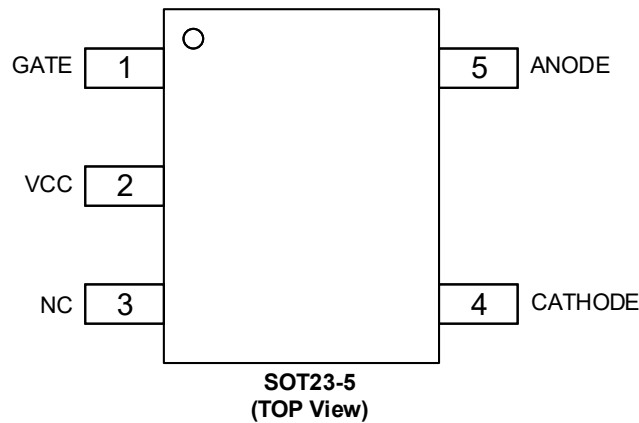
Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ7200CI	-40°C to +125°C	SOT23A-5L	Green Product



AOS Green Products use reduced levels of Halogens, and are also RoHS compliant. Please visit www.aosmd.com/media/AOSGreenPolicy.pdf for additional information.

Pin Configuration



Pin Description

Pin Number	Pin Name	Pin Function
1	GATE	N-MOSFET gate driver output
2	VCC	Power source for controller
3	NC	No Connection
4	CATHODE	Externally connected to the drain of N-MOSFET
5	ANODE	Externally connected to the source of N-MOSFET; reference ground of controller

Absolute Maximum Ratings

Exceeding the Absolute Maximum Ratings may damage the device.

Parameter	Rating
V _{CC} to ANODE	-0.3V to 24V
CATHODE to ANODE, DC	-1V to 600V
CATHODE to ANODE, Negative Transient ⁽¹⁾	-5V
GATE to ANODE	-0.3V to (V _{CC} +0.3V)
Junction Temperature (T _J)	+150°C
Storage Temperature (T _S)	-65 °C to +150°C
ESD Rating ⁽²⁾	1 kV

Note:

1. Peak voltage can be applied for 1ms pulse width, duty cycle 50% max, for 300k cycles.
2. Devices are inherently ESD sensitive, handling precautions are required.
Human body model rating: 1.5kΩ in series with 100pF.

Recommended Operating Ratings

The device is not guaranteed to operate beyond the Recommended Operating Ratings

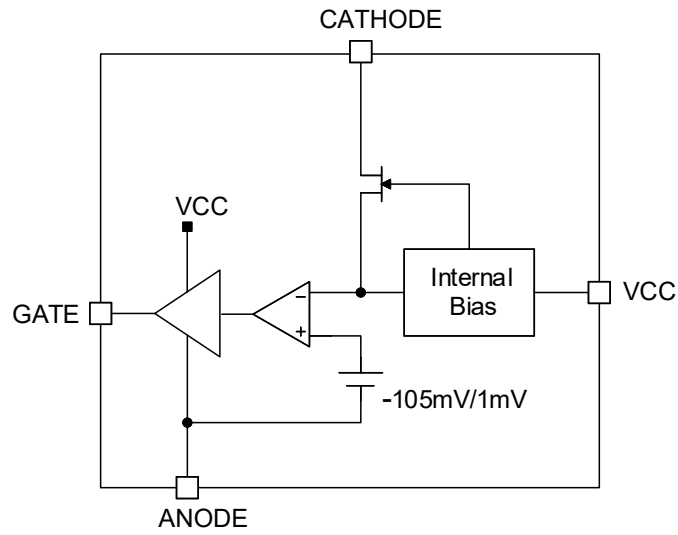
Parameter	Rating
Supply Voltage (V _{CC})	18V
Ambient Temperature (T _A)	-40°C to +125°C
Package Thermal Resistance SOT23-5(θ _{JA})	191°C/W

Electrical Characteristics

T_A = 25°C, V_{CC} = 16V, V_{ANODE} = 0V, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{RRM}	Repetitive peak reverse voltage	I _{CATHODE} =250μA	600	810	900	V
V _{CC_UP}	V _{CC} UVLO rising	V _{CA} =-0.2V, V _{CC} rising	13.5	15.2	17	V
V _{CC_UVLO}	V _{CC} UVLO falling	V _{CA} =-0.2V, V _{CC} falling	11	12.9	14	V
I _{Charge}	Charging for V _{CC}	V _{CA} =30V, V _{CC} =10V	1	1.25	1.5	mA
I _{OP}	V _{CC} operation current at on-state	V _{CA} =-0.2V	10	12	25	μA
I _Q	V _{CC} quiescent current at off-state	V _{CA} =0.2V	3	5	8	μA
V _{CA_ON}	Switch turn-on threshold	V _{CA} falling	-80	-105	-140	mV
V _{CA_OFF}	Switch turn-off threshold	V _{CA} rising	0.1	1	1.9	mV
R _{GATE_source}	Gate pull-high resistance	I _G =10mA		18	23	Ω
R _{GATE_sink}	Gate pull-low resistance	I _G =10mA		5.5	11	Ω

Functioning Block Diagram



Typical Performance Characteristics

$T_A = 25^\circ\text{C}$, $V_{\text{ANODE}} = 0\text{ V}$, $V_{\text{CC}} = 16\text{ V}$ unless otherwise specified.

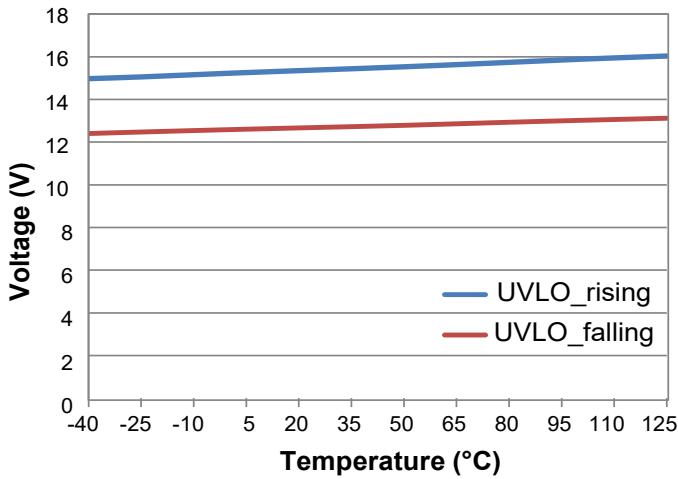


Figure 2. UVLO vs. Temperature

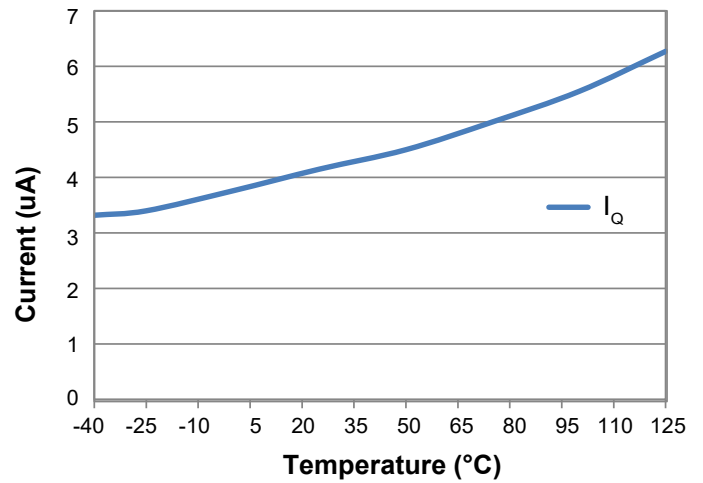


Figure 3. Quiescent Current vs. Temperature

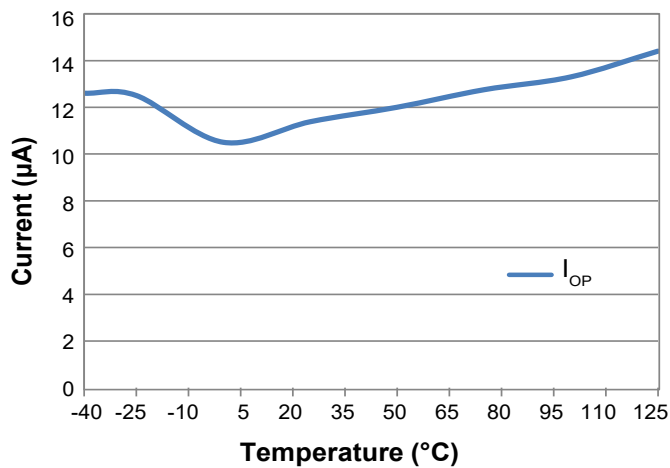


Figure 4. Operation Current vs. Temperature

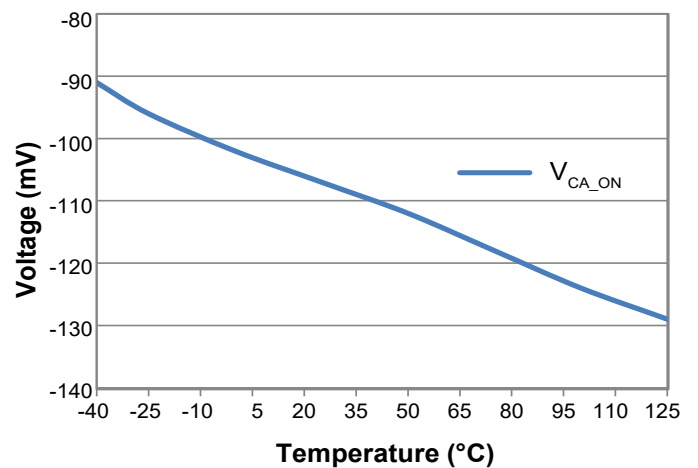


Figure 5. $V_{\text{CA_ON}}$ vs. Temperature

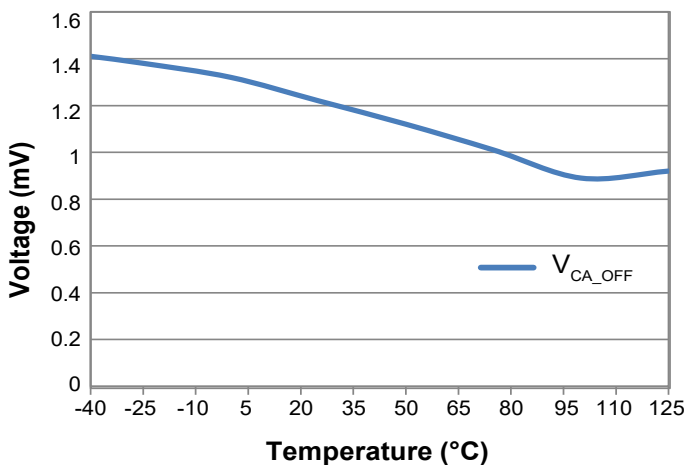


Figure 6. $V_{\text{CA_OFF}}$ vs. Temperature

Detailed Description

The AOZ7200 with a low-voltage capacitor can drive the N-MOSFET to replace each diode in high-voltage bridge rectifier application. In normal operation, after V_{CC} is charged to UVLO rising level, AOZ7200CI senses the voltage between CATHODE and ANODE. If this voltage is less than -105mV , the GATE turns on the external N-MOSFET and the conduction loss is reduced. When the N-MOSFET is on, controller keeps monitoring the voltage between CATHODE and ANODE. If this voltage is larger than 1mV , the controller turns off the N-MOSFET.

There is a high voltage depletion MOSFET that could help to charge the V_{CC} capacitor. In normal operation, the charging procedure happens at lower voltage drop and it helps to reduce the quiescent power. The value of V_{CC} capacitor is recommended not smaller than $1\mu\text{F}/25\text{V}$ for typical application.

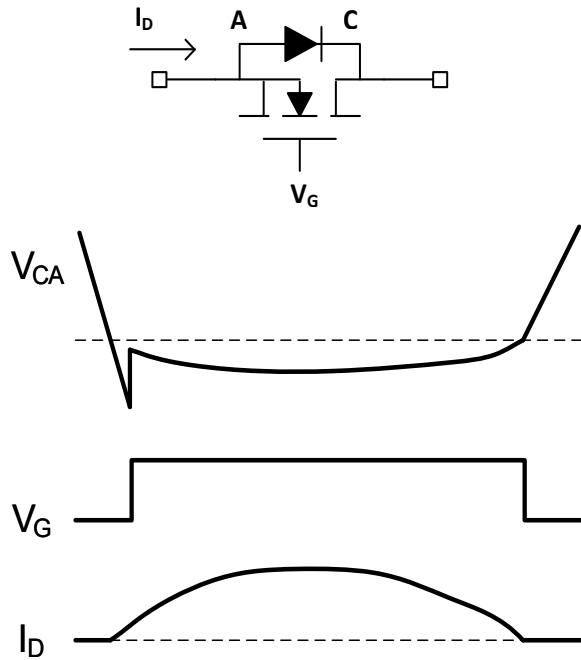


Figure 7. V_{CA} vs. Switch Gate

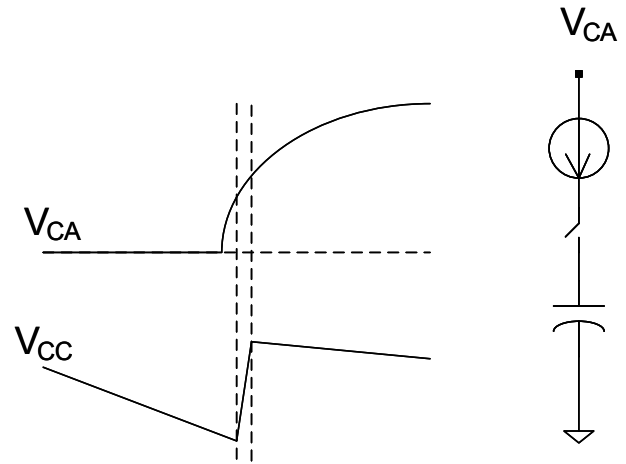
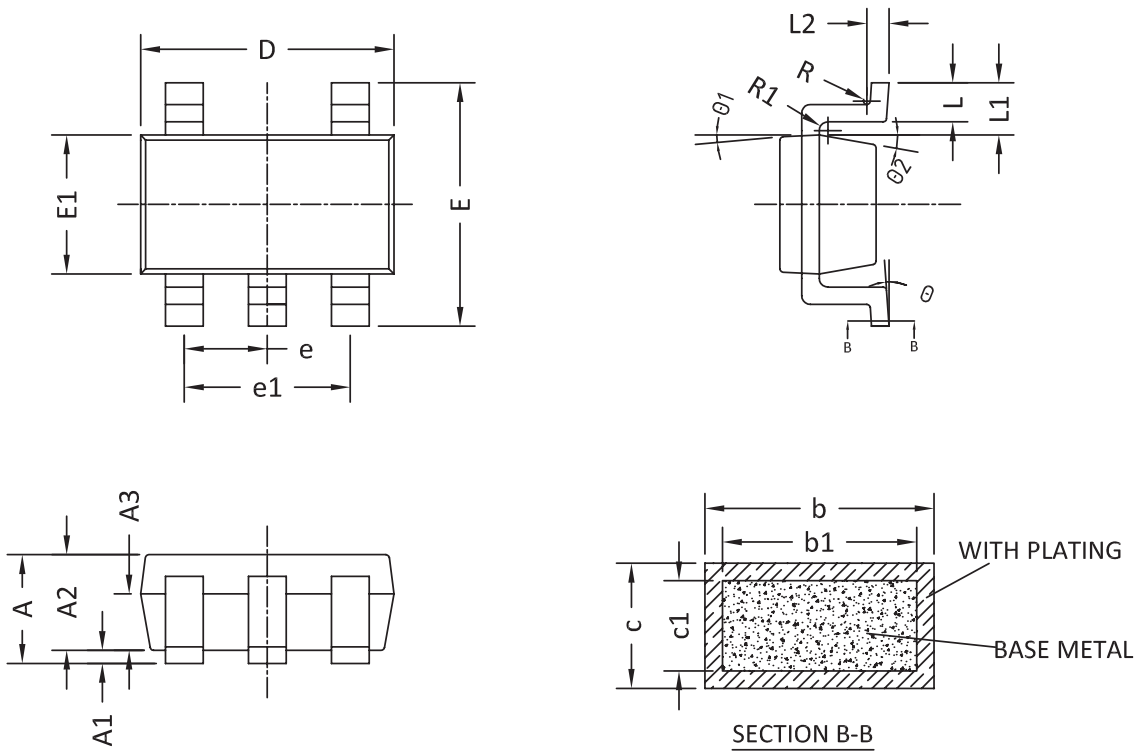
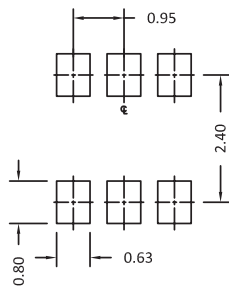


Figure 8. Charging V_{CC}

Package Dimensions, SOT23A-5L



RECOMMENDED LAND PATTERN



UNIT: mm

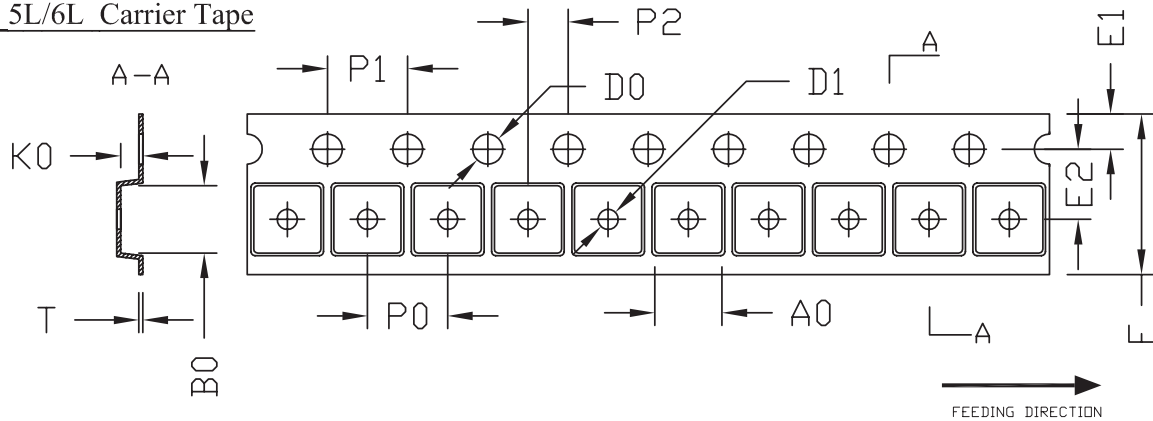
SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.25	----	----	0.049
A1	0.00	---	0.15	0.000	----	0.006
A2	1.00	1.10	1.20	0.039	0.043	0.047
A3	0.60	0.65	0.70	0.024	0.026	0.028
b	0.36	---	0.50	0.014	----	0.020
b1	0.36	0.38	0.45	0.014	0.015	0.018
c	0.14	---	0.20	0.006	----	0.008
c1	0.14	0.15	0.16	0.006	0.006	0.006
D	2.826	2.926	3.026	0.111	0.115	0.119
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.526	1.626	1.726	0.060	0.064	0.068
e	0.90	0.95	1.00	0.035	0.037	0.039
e1	1.80	1.90	2.00	0.071	0.075	0.079
L	0.35	0.45	0.60	0.014	0.018	0.024
L1	0.59REF			0.023REF		
L2	0.25BSC			0.010BSC		
R	0.05	---	---	0.002	----	----
R1	0.05	---	0.20	0.002	----	0.008
theta	0°	---	8°	0°	----	8°
theta1	3°	5°	7°	3°	5°	7°
theta2	6°	---	14°	6°	----	14°

NOTE

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 5 MILS EACH.
2. DIMENSION "L" IS MEASURED IN GAUGE PLANE.
3. TOLERANCE ±0.100 mm(4 mil) UNLESS OTHERWISE SPECIFIED.
4. FOLLOWED FROM JEDEC MO-178C & MO-193C.
5. CONTROLLING DIMENSIONS IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

Tape and Reel Dimensions, SOT23A-5L

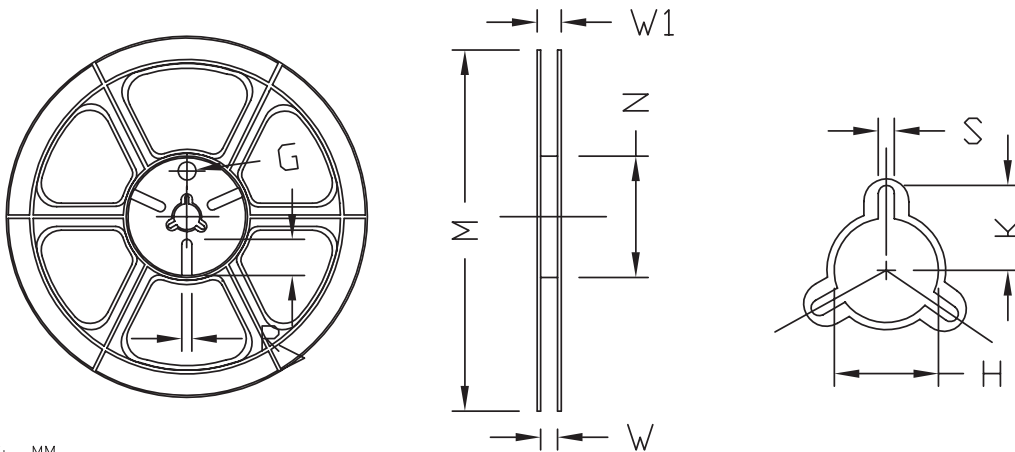
SOT23 5L/6L Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SOT23_5L&6L	3.15 ±0.10	3.20 ±0.10	1.40 ±0.10	1.50 ±0.05	1.00 +0.10 -0.00	8.00 ±0.30	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.23 ±0.03

SOT23 5L/6L REEL



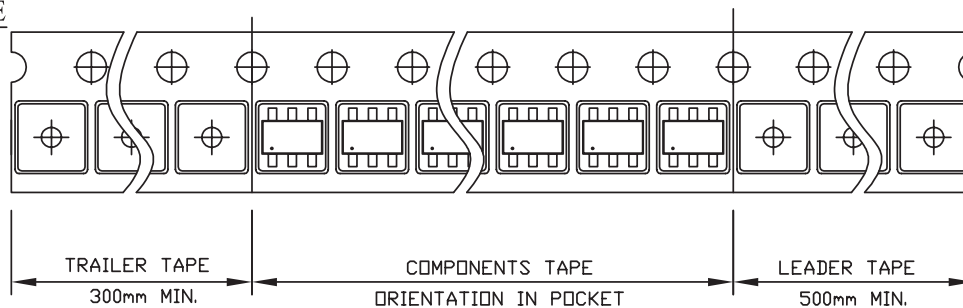
UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
8 mm	φ178	φ178.00 ±1.00	φ54.00 ±0.50	9.00 ±0.30	11.40 ±1.00	φ13.00 +0.50 -0.20	10.60	2.00 ±0.50	φ9.00	5.00	18.00

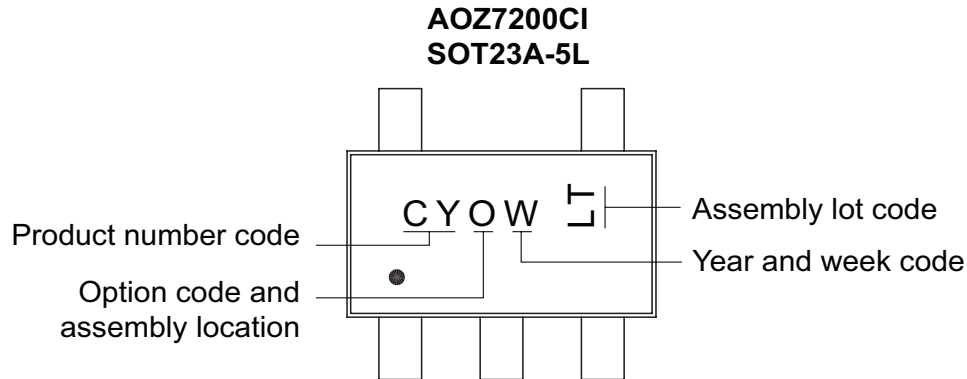
SOT23 5L/6L TAPE

Leader / Trailer
& Orientation

Unit Per Reel:
3000pcs



Part Marking



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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.