SOLID STATE OPTRONICS



AD2C211-L

1 Form A, Current Limiting
400V / 25Ω
MOSFET Output Solid State Relay

Description

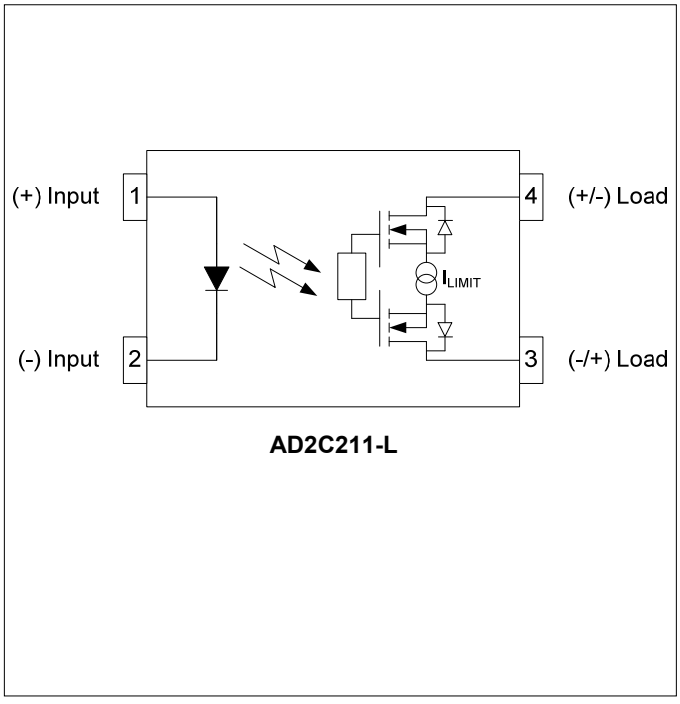
The AD2C211-L is a bi-directional, single-pole, single-throw, normally open solid-state relay. It provides a load current of 150mA, a high blocking voltage of 400V, and current limiting circuitry in a compact 4 pin DIP package. Current limiting circuitry provides a level of protection against increased load currents or transient current spikes by active current reduction across the device, thereby protecting itself and downstream components.

The AD2C211-L comes standard in a compact 4 pin DIP package making it ideal for high-density board applications.

Applications

- Reed Relay Replacement
- Meter Reading Systems
- Data Acquisition
- Medical Equipment
- Battery Monitoring
- Safety Systems

Schematic Diagram



AD2C211-L

Features

- High Isolation Voltage (up to 5kV$_{RMS}$)
- Low Input Control Current (3mA TYP)
- 25Ω Maximum On Resistance
- 150mA Maximum Continuous Load Current
- Active Current Limiting Protection
- Long Life / High Reliability
- RoHS / Pb-Free / REACH Compliant

Agency Approvals

UL / C-UL:	File # E201932
VDE:	File # 40035191 (EN 60747-5-2)

Absolute Maximum Ratings

The values indicated are absolute stress ratings. Functional operation of the device is not implied at these or any conditions in excess of those defined in electrical characteristics section of this document. Exposure to absolute Maximum Ratings may cause permanent damage to the device and may adversely affect reliability.

Storage Temperature	-55 to +125°C
Operating Temperature	-40 to +85°C
Continuous Input Current	50mA
Transient Input Current	500mA
Reverse Input Control Voltage	5V
Input Power Dissipation	40mW
Output Power Dissipation	500mW
Solder Temperature – Wave (10sec)	260°C
Solder Temperature – IR Reflow (10sec)	260°C

Ordering Information

Part Number	Description
AD2C211-L	4 pin DIP, (100/Tube)
AD2C211-LH	5kV$_{RMS}$ Viso, 4 pin DIP, (100/Tube)
AD2C211-LS	4 pin SMD, (100/Tube)
AD2C211-LHS	5kV$_{RMS}$, 4 pin SMD, (100/Tube)
AD2C211-LSTR	4 pin SMD, Tape and Reel (2000/Reel)
AD2C211-LHSTR	5kV$_{RMS}$, 4 pin SMD, Tape and Reel (2000/Reel)

NOTE: Suffixes listed above are not included in marking on device for part number identification

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Electrical Characteristics, T_A = 25°C (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Input Specifications						
LED Forward Voltage	V_F	-	1.2	1.5	V	I_F = 10mA
LED Reverse Voltage	BV_R	5	-	-	V	I_R = 10µA
Input Reverse Current	I_R	-	-	10	µA	V_R = 5V
Turn-On Current	I_F	-	3	5	mA	V_O = 20V, I_O = 150mA (within 10mS)
Turn-Off Current	$I_{F(OFF)}$	-	0.5	-	mA	I_O = 150mA
Output Specifications						
Blocking Voltage	V_B	400	-	-	V	I_O=1µA
Continuous Load Current	I_O	-	-	150	mA	I_F=5mA
Current Limit	I_{LIMIT}	180	300	-	mA	I_F=5mA
On Resistance	R_{ON}	-	18	25	Ω	I_F=5mA, I_O=150mA
Leakage Current	I_{Oleak}	-	0.2	1	µA	I_F=0mA, V_O=400V
Output Capacitance	C_{OUT}	-	20	-	pF	V_O=25V, f=1.0MHz
Offset Voltage	V_{OFFSET}	-	-	0.2	mV	I_F=5mA
Coupled Specifications						
Turn-On Time	T_{ON}	-	2	5	mS	I_F=5mA, I_O=150mA
Turn-Off Time	T_{OFF}	-	0.05	1	mS	I_F=0mA, I_O=150mA
Coupled Capacitance	$C_{COUPLED}$	-	3	-	pF	
Contact Transient Ratio	-	2,000	7,000	0	V/µS	dV = 50V
Isolation Specifications						
Isolation Voltage	V_{ISO}	3750	-	-	V_{RMS}	RH ≤ 50%, t=1min
(-H Option)		5000	-	-		
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	V_{I-O} = 500V_{DC}

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AD2C211-L Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

Figure 1: *Typical Turn-On Time Distribution*
(N = 100, T_a = 25ºC)

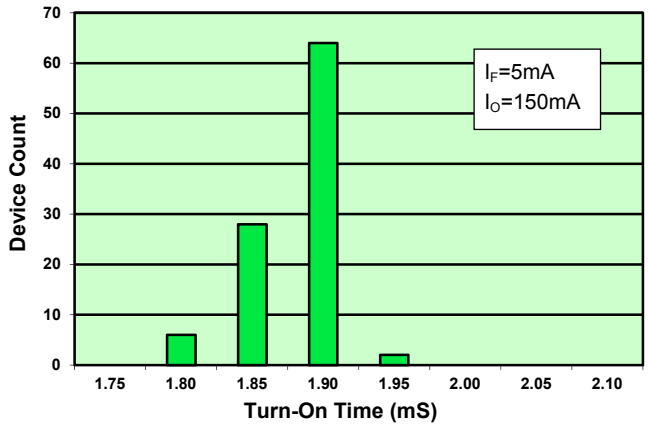


Figure 2: *Typical Turn-Off Time Distribution*
(N = 100, T_a = 25ºC)

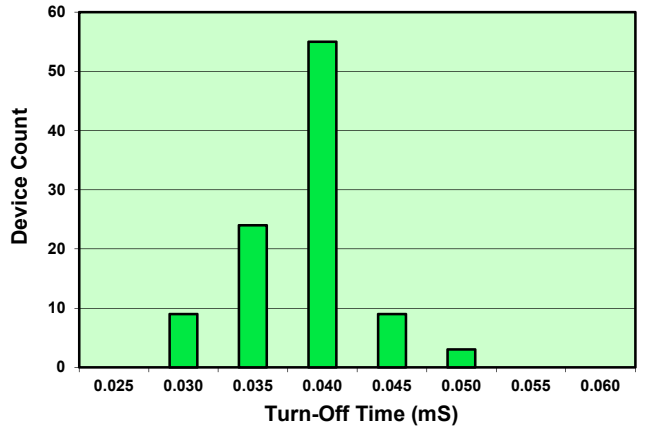


Figure 3: *Typical On-Resistance Distribution*
(N = 100, T_a = 25ºC)

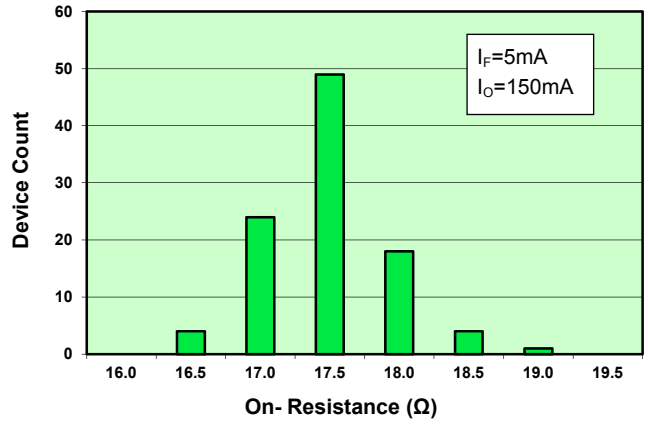


Figure 4: *Typical Output Leakage Current Distribution* (N = 100, T_a = 25ºC)

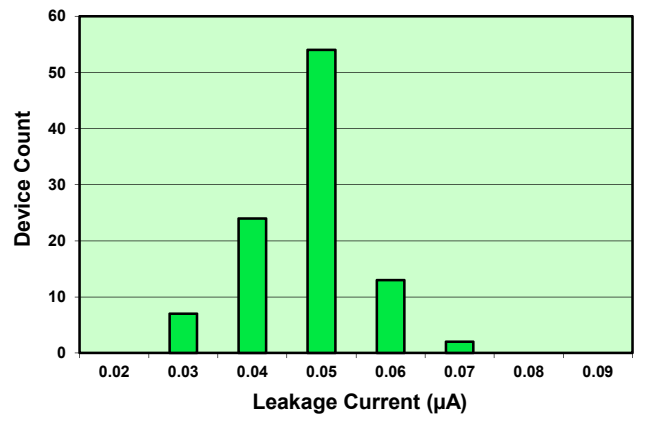


Figure 5: *Typical Blocking Voltage Distribution*
(N = 100, Ta = 25ºC)

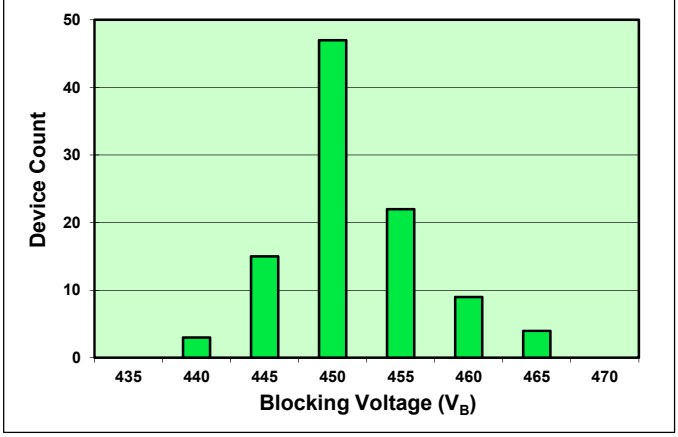
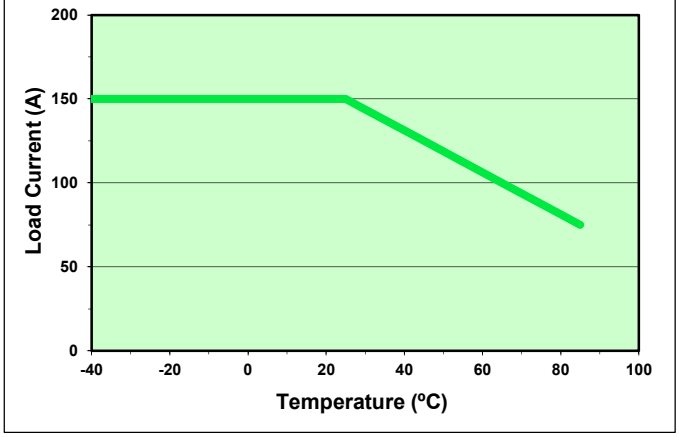


Figure 6: *Maximum Load Current vs. Temperature*



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AD2C211-L Solder Temperature Profile Recommendations

(1) *Infrared Reflow:*

Refer to the following figure as an example of an optimal temperature profile for single occurrence infrared reflow. Soldering process should not exceed temperature or time limits expressed herein. Surface temperature of device package should not exceed 250ºC:

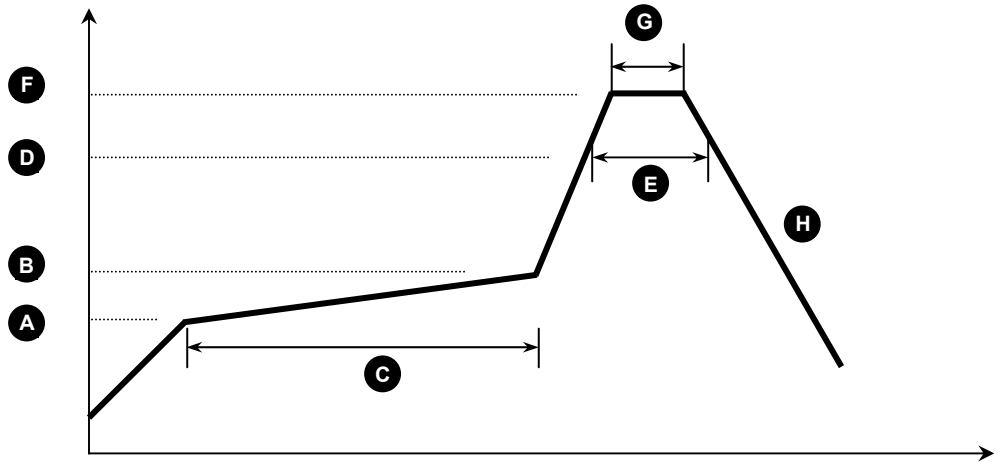


Figure 1

Process Step	Description	Parameter
A	Preheat Start Temperature (ºC)	150ºC
B	Preheat Finish Temperature (ºC)	180ºC
C	Preheat Time (s)	90 - 120s
D	Melting Temperature (ºC)	230ºC
E	Time above Melting Temperature (s)	30s
F	Peak Temperature, at Terminal (ºC)	260ºC
G	Dwell Time at Peak Temperature (s)	10s
H	Cool-down (ºC/s)	<6ºC/s

(2) *Wave Solder:*

Maximum Temperature:	260ºC (at terminal)
Maximum Time:	10s
Pre-heating:	100 - 150ºC (30 - 90s)
Single Occurrence	

(3) *Hand Solder:*

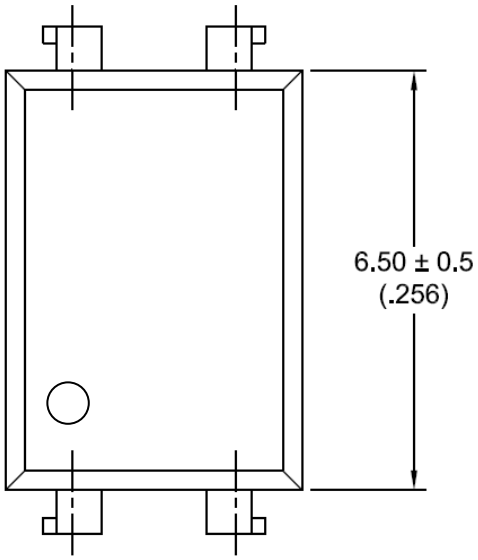
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

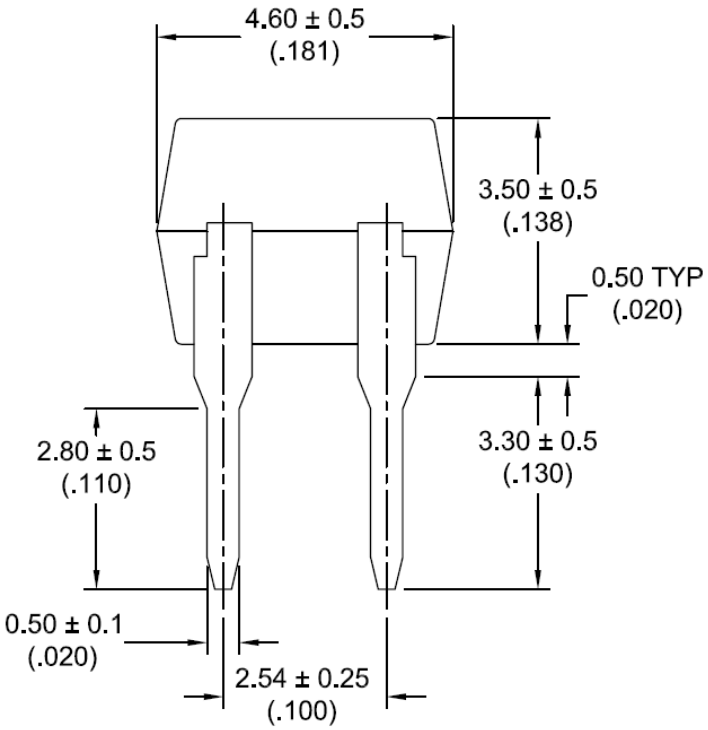
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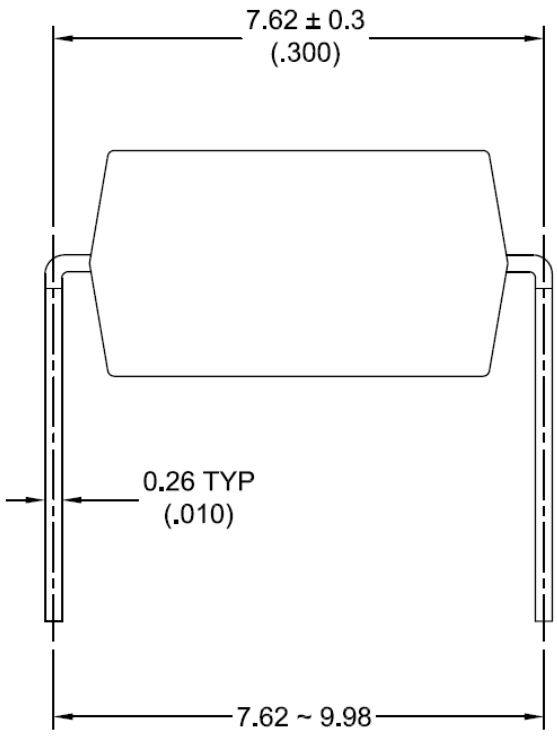
AD2C211-L Package Dimensions

4 PIN DIP Package

Note: *All dimensions in millimeters with inches [“] in parenthesis ()*



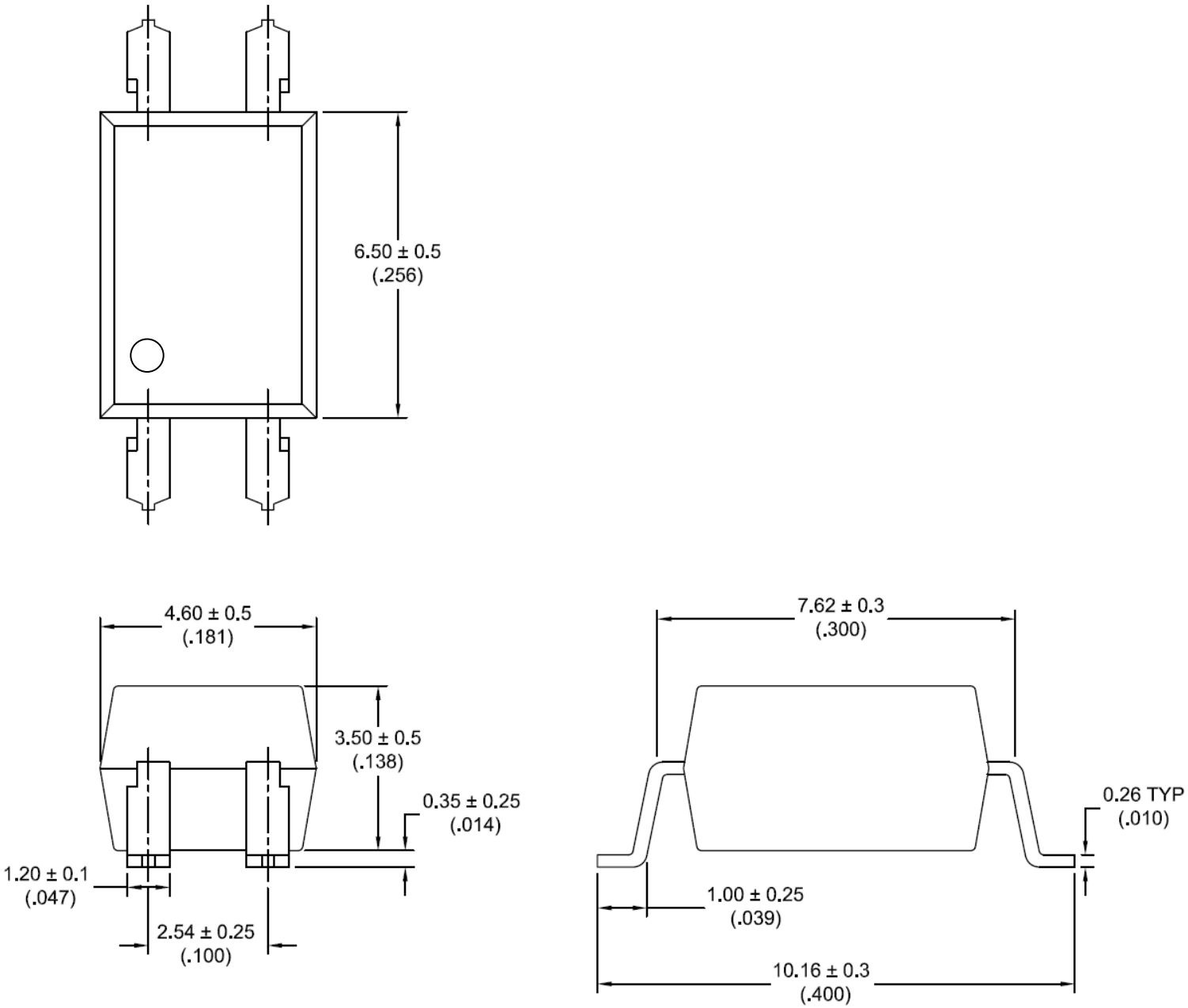




AD2C211-L Package Dimensions

4 PIN SMD Surface Mount Package (-S)

Note: *All dimensions in millimeters with inches [“] in parenthesis ()*

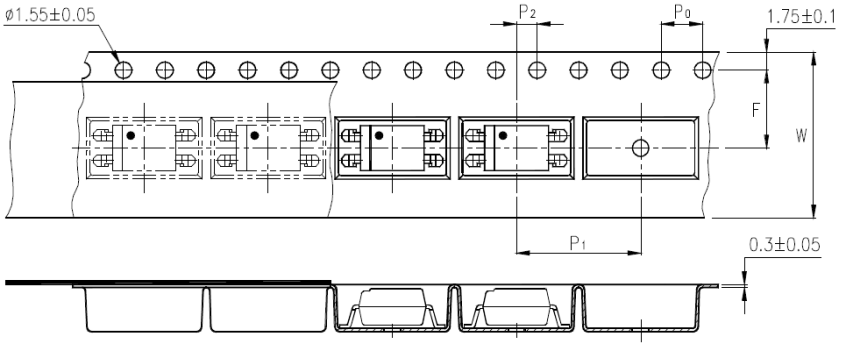


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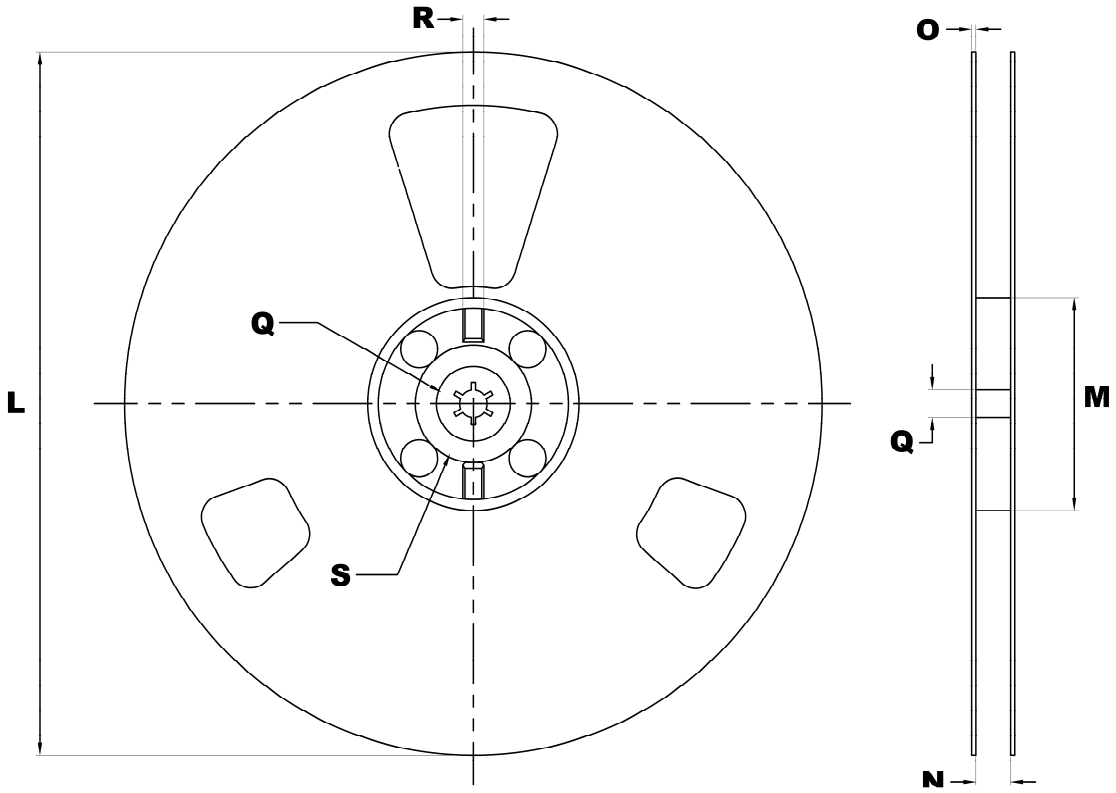
AD2C211-L Package Dimensions

4 PIN SMD Tape & Reel (-STR)

Note: *All dimensions in millimeters*



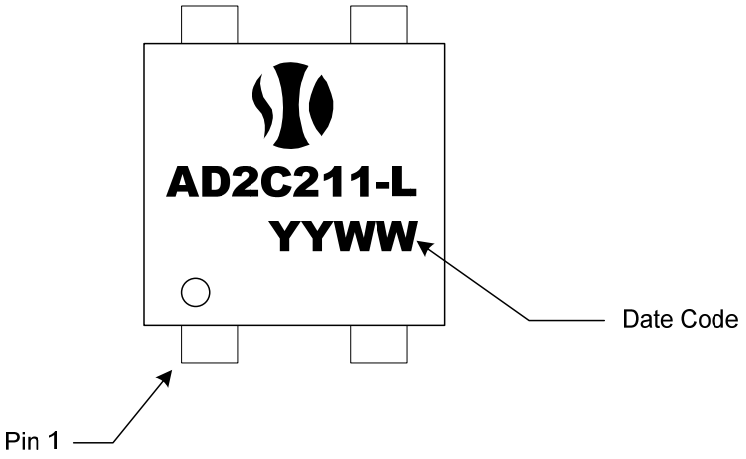
F	P0	P1	P2	W
7.5±0.1	4.0±0.1	12.0±0.1	2.0±0.1	16.0±0.3



L	M	N	O	Q	R	S
330±2	101.6±1	16.4+0.2	2.0±0.2	R13±0.5	1.50±0.5	R10±1

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AD2C211-L Package Marking



AD2C211-L Package Weights

Device	Single Unit	Full Tube (100pcs)	Full Pouch (10 tubes)	Full Reel (2000pcs)
AD2C211-L(H)	0.23	39	400	-
AD2C211-L(H)S	0.22	38	390	-
AD2C211-L(H)STR	0.22	-	-	920

Note: *All weights above are in GRAMS, and include packaging materials where applicable*

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