SOLID STATE OPTRONICS



AD2C211

1 Form A
400V / 20Ω
MOSFET Output Solid State Relay

Description

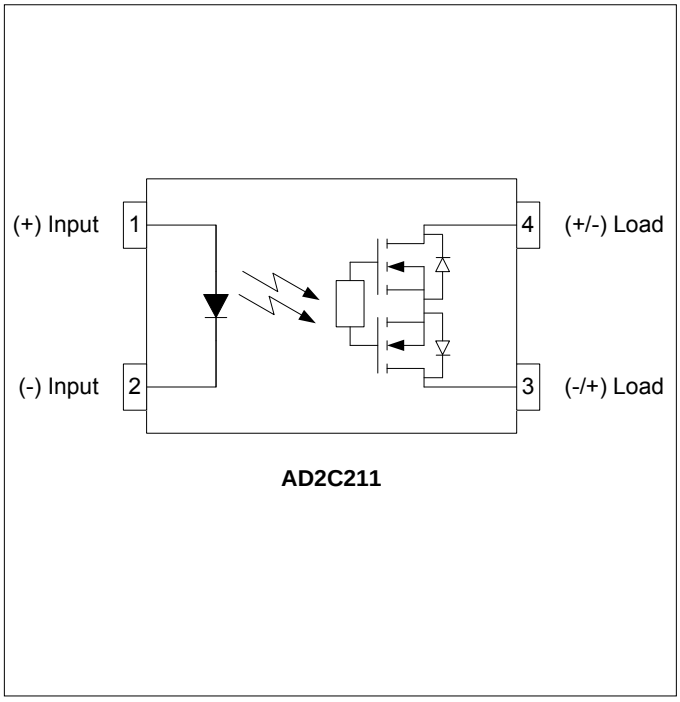
The AD2C211 is a bi-directional, single-pole, single-throw, normally open multipurpose solid-state relay. It is designed to replace electromechanical relays in general purpose switching applications. The relay consists of an IR LED optically coupled to an IC that drives two rugged source-to-source enhancement type DMOS transistors. The devices comes with up to 5kV input to output isolation.

The AD2C211 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

Features

- Compact 4DIP/SMD Package
- High Isolation Voltage (up to 5kV$_{RMS}$)
- Low Input Control Current (2.5mA TYP)
- 17Ω Typical On Resistance
- 150mA Maximum Continuous Load Current
- 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	4 pin DIP, (100/Tube)
AD2C211-H	5kV$_{RMS}$ Viso, 4 pin DIP, (100/Tube)
AD2C211-S	4 pin SMD, (100/Tube)
AD2C211-HS	5kV$_{RMS}$, 8 pin SMD, (100/Tube)
AD2C211-STR	4 pin SMD, Tape and Reel (2000/Reel)
AD2C211-HSTR	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	-	2.5	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
On Resistance	R_{ON}	-	17	20	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 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

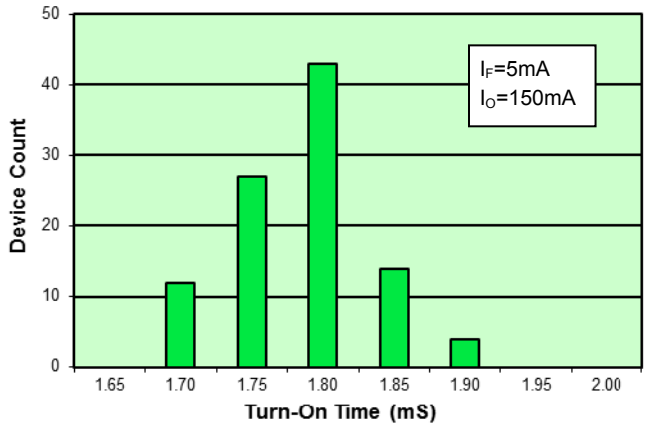


Figure 2: *Typical Turn-Off Time Distribution* (N = 100, T_a = 25ºC)

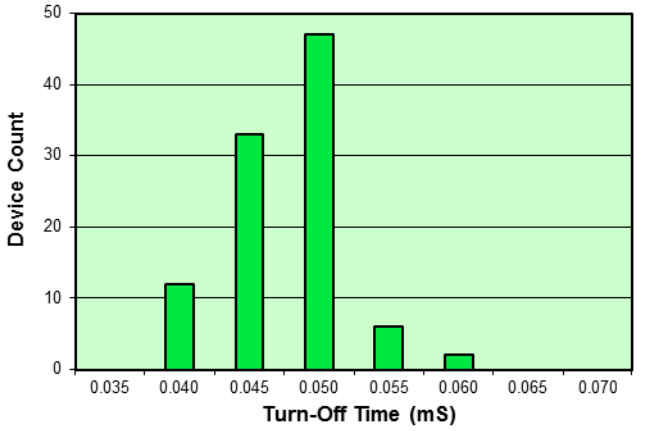


Figure 3: *Typical On-Resistance Distribution* (N = 100, T_a = 25ºC)

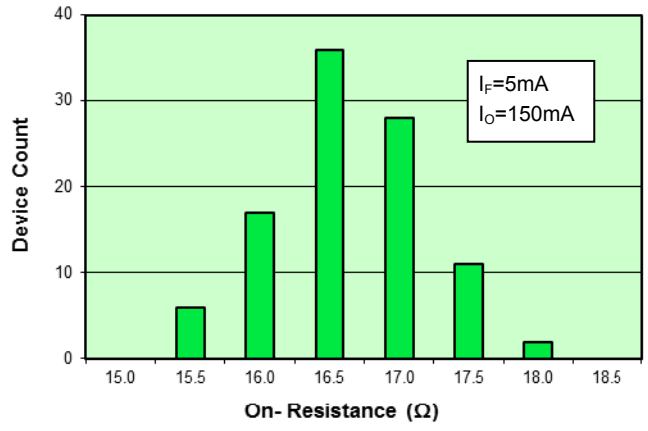


Figure 4: *Typical Output Leakage Current Distribution* (N = 100, T_a = 25ºC)

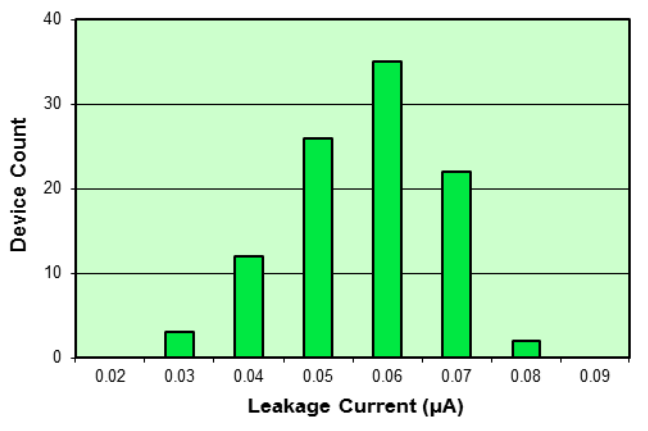


Figure 5: *Typical Blocking Voltage Distribution* (N = 100, Ta = 25ºC)

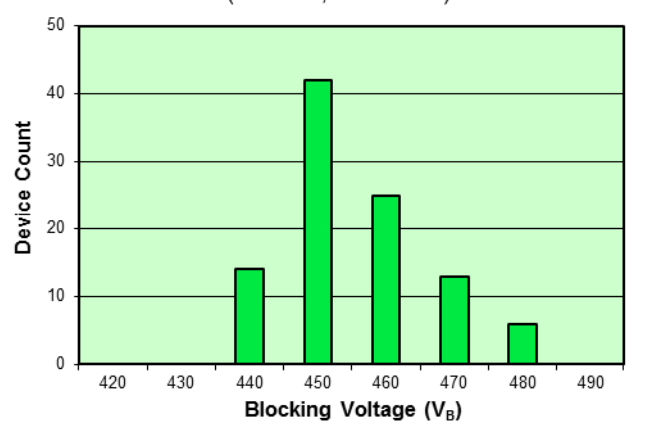
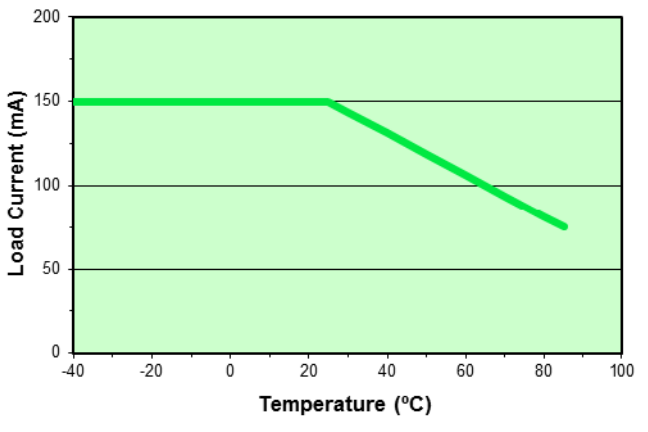


Figure 6: *Maximum Load Current vs. Temperature*



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AD2C211 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:

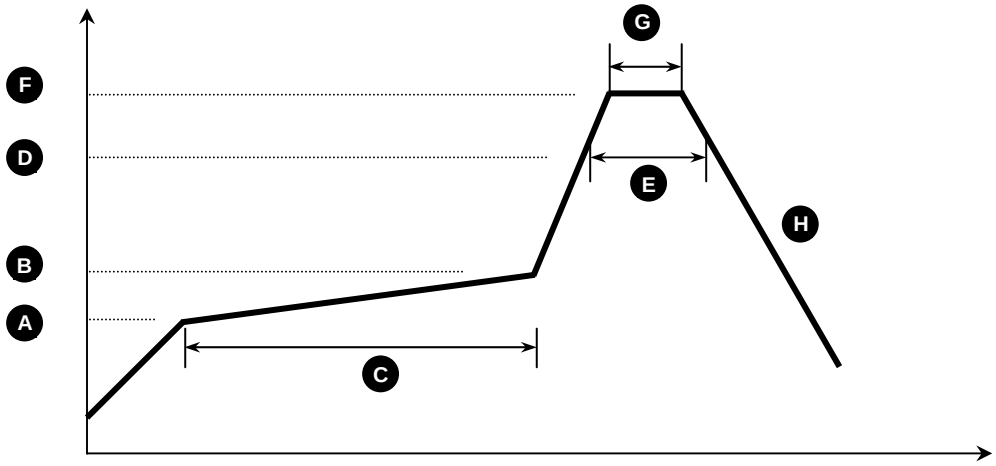


Figure 1

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:*

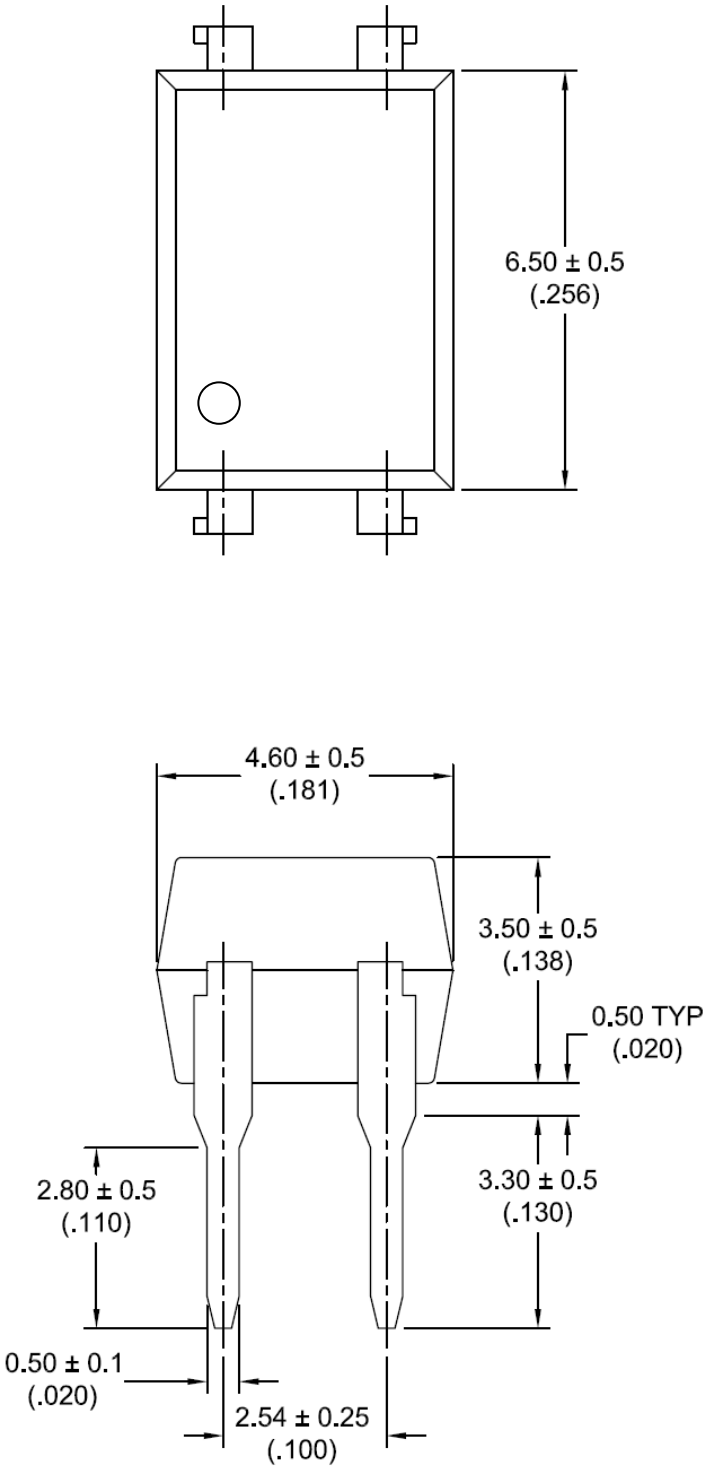
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

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AD2C211 Package Dimensions

4 PIN DIP Package

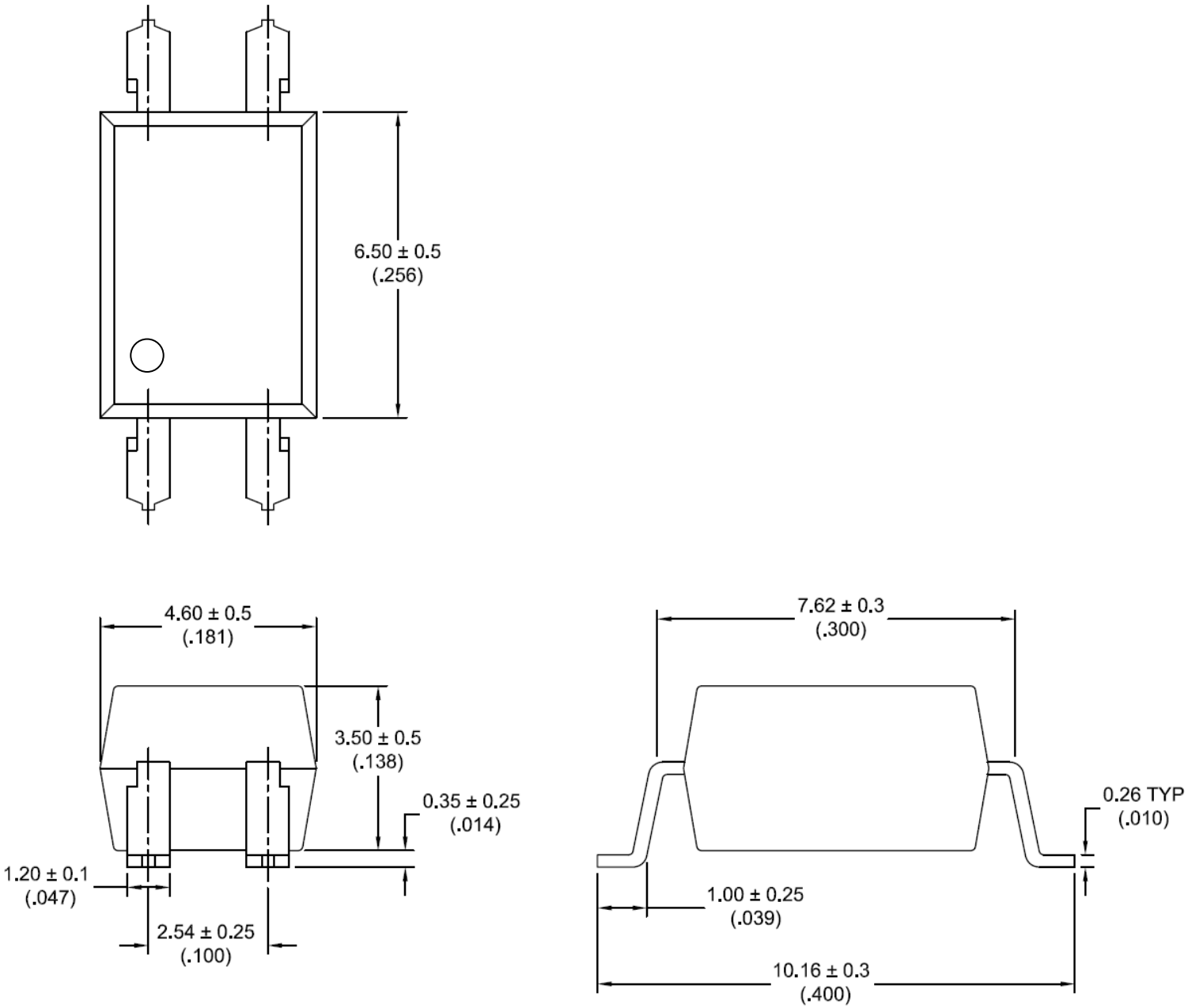
Note: *All dimensions in millimeters with inches [“] in parenthesis ()*



AD2C211 Package Dimensions

4 PIN SMD Surface Mount Package (-S)

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

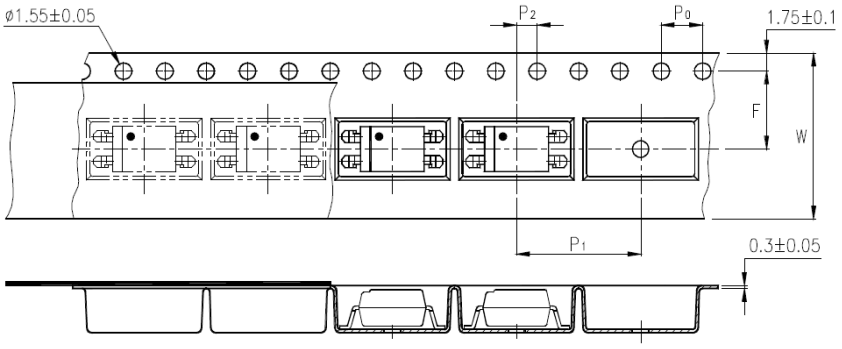


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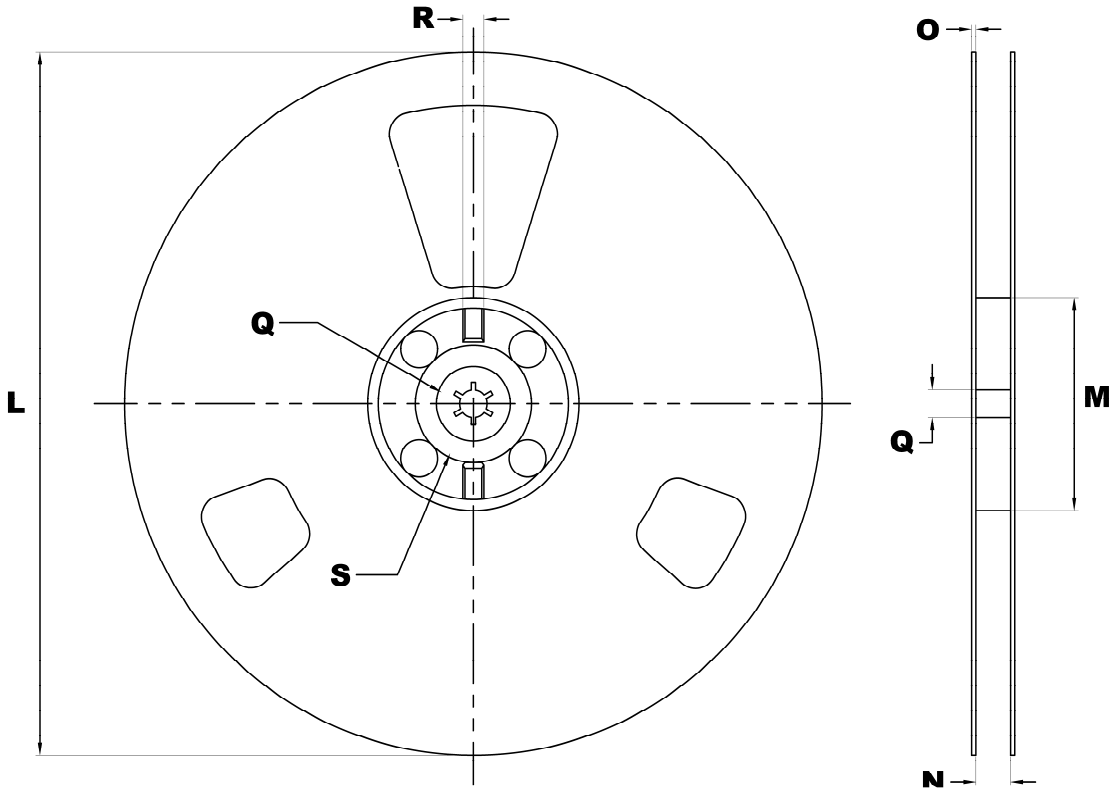
AD2C211 Package Dimensions

4 PIN SMD Tape & Reel (-STR)

Note: *All dimensions in millimeters*

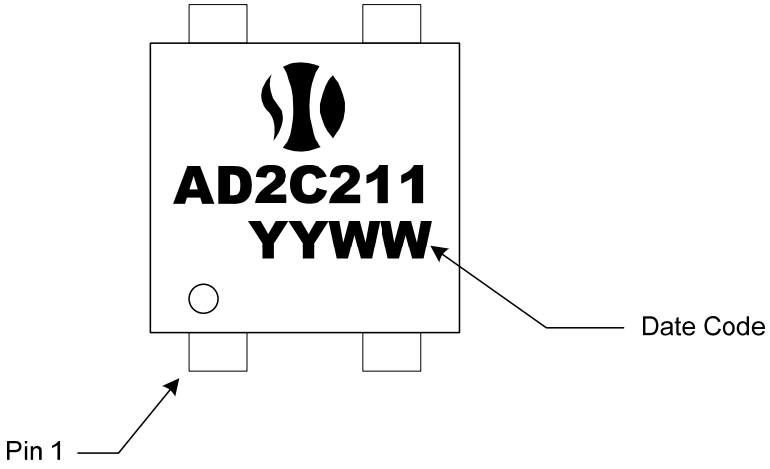


F	P0	P1	P2	W
7.5±0.1	4.0±0.1	12.0±0.1	2.0±0.1	16.0±0.3



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

AD2C211 Package Marking



AD2C211 Package Weights

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

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

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