SOLID STATE OPTRONICS



AD4C312

Dual 1 Form B
400V / 15 Ω
MOSFET Output Solid State Relay

Description

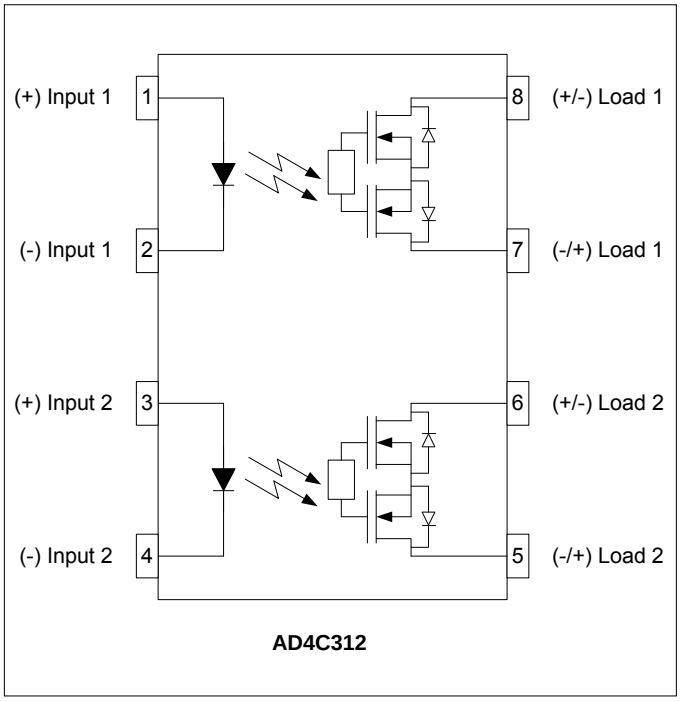
The AD4C312 is composed of two distinct 1 Form B (normally closed) relays in one compact 8 pin DIP package. Each relay consists of an AlGaAs LED optically coupled to a Photo Diode Array, driving a pair of rugged source-to-source depletion type DMOS transistors. The output MOS transistors are protected with free-wheeling diodes that can handle up to 5A of inrush current, making the relay ideal for switching lamps and highly inductive loads.

The AD4C312 comes standard in a miniature 8 pin DIP package making it ideal for high-density board applications.

Applications

- Meter Reading Systems
- Multiplexers
- Data Acquisition
- Medical Equipment
- Battery Monitoring
- Home / Safety Security Systems

Schematic Diagram



AD4C312

Features

- Low Input Control Current (2.5mA TYP)
- 180mA Maximum Continuous Load Current
- Low On Resistance (12Ω TYP – Both Poles)
- High Isolation Voltage (2.5kV$_{RMS}$, 3.75kV$_{RMS}$ -H Option)
- 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	6V
Input Power Dissipation	40mW
Output Power Dissipation	800mW
Solder Temperature – Wave (10sec)	260°C
Solder Temperature – IR Reflow (10sec)	260°C

Ordering Information

Part Number	Description
AD4C312	8 pin DIP, (50/Tube)
AD4C312-H	3.75kV$_{RMS}$ Viso, 8 pin DIP, (50/Tube)
AD4C312-S	8 pin SMD, (50/Tube)
AD4C312-HS	3.75kV$_{RMS}$, 8 pin SMD, (50/Tube)
AD4C312-STR	8 pin SMD, Tape and Reel (1000/Reel)
AD4C312-HSTR	3.75kV$_{RMS}$, 8 pin SMD, Tape and Reel (1000/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	6	-	-	V	I_R = 10µA
Turn-On Current	I_F	-	0.5	-	mA	I_O = 180mA
Turn-Off Current	I_{FOFF}	-	2.5	5	mA	I_O = 180mA
Output Specifications						
Blocking Voltage	V_B	400	-	-	V	I_F=5mA, I_O=1µA
Continuous Load Current	I_O	-	-	180	mA	I_F=0mA
On Resistance	R_{ON}	-	12	15	Ω	I_F=0mA, I_O=180mA
Leakage Current	I_{Oleak}	-	0.2	1	µA	V_O=25V, f=1.0MHz
Output Capacitance	C_{OUT}	-	40	-	pF	I_F=5mA, f=1.0MHz
Offset Voltage	V_{OFFSET}	-	-	0.2	mV	I_F=0mA
Coupled Specifications						
Turn-On Time	T_{ON}	-	0.1	1	mS	I_F=0mA, I_O=180mA
Turn-Off Time	T_{OFF}	-	1	3	mS	I_F=5mA, I_O=180mA
Coupled Capacitance	$C_{COUPLED}$	-	3	-	pF	
Contact Transient Ratio	-	2,000	7,000	0	V/µS	dV = 50V
Isolation Specifications						
Isolation Voltage	V_{ISO}	2,500	-	-	V_{RMS}	RH ≤ 50%, t=1min
-H Option	V_{ISO}	3,750	-	-	V_{RMS}	RH ≤ 50%, t=1min
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	V_{I-O} = 500V_{DC}

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AD4C312 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

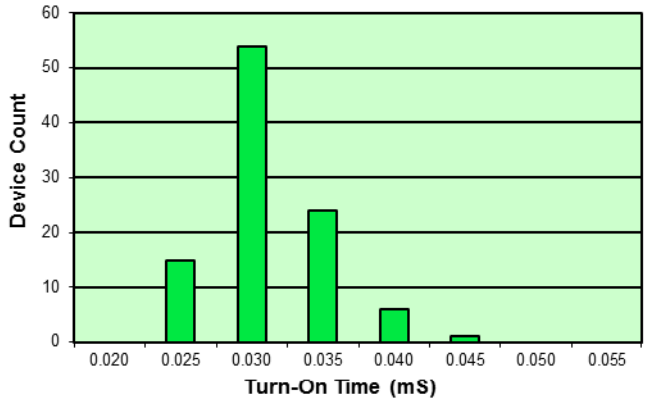


Figure 2: *Typical Turn-Off Time Distribution* (N = 100, T_a = 25ºC)

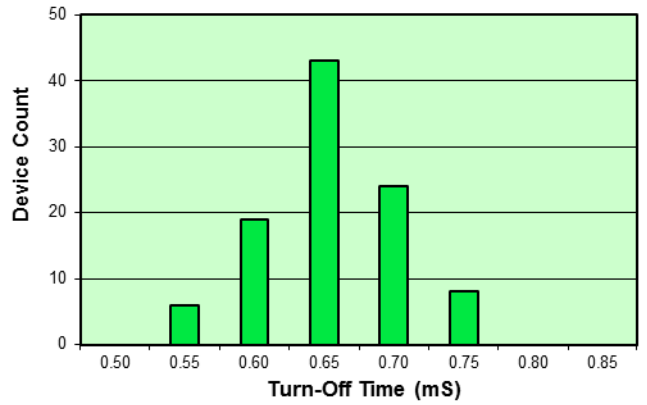


Figure 3: *Typical On-Resistance Distribution* (N = 100, T_a = 25ºC)

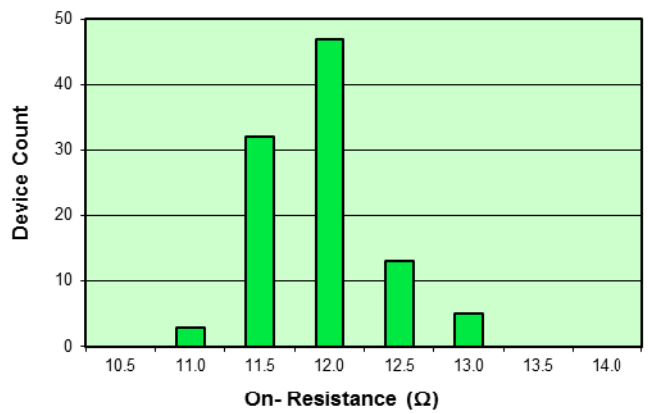


Figure 4: *Typical Output Leakage Current Distribution* (N = 100, T_a = 25ºC)

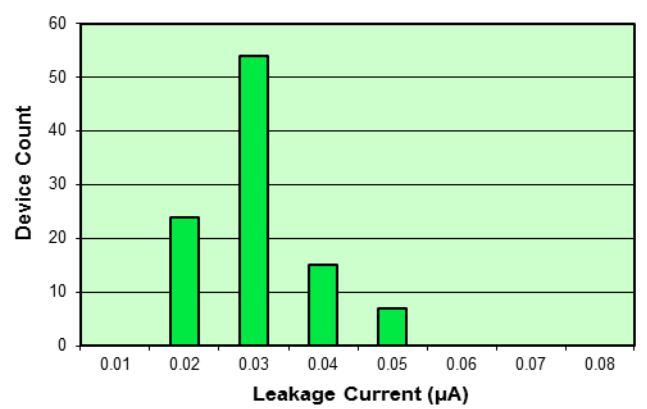


Figure 5: *Typical Blocking Voltage Distribution* (N = 100, Ta = 25ºC)

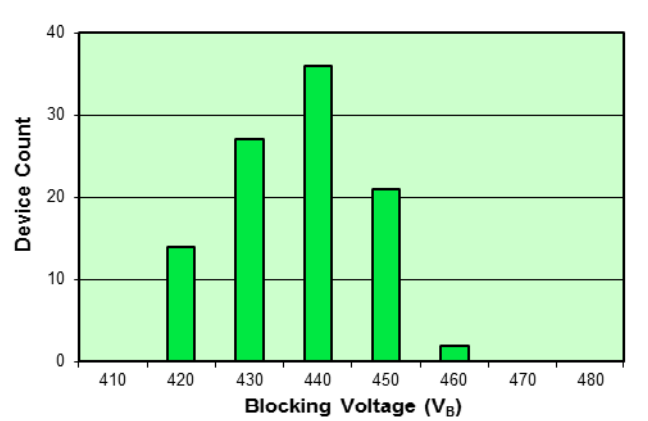
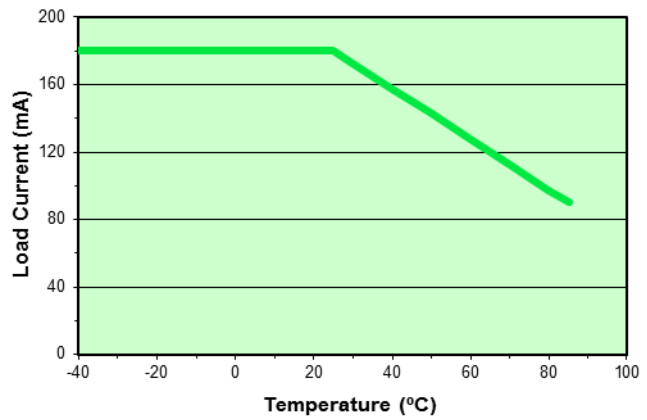


Figure 6: *Maximum Load Current vs. Temperature*



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AD4C312 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:

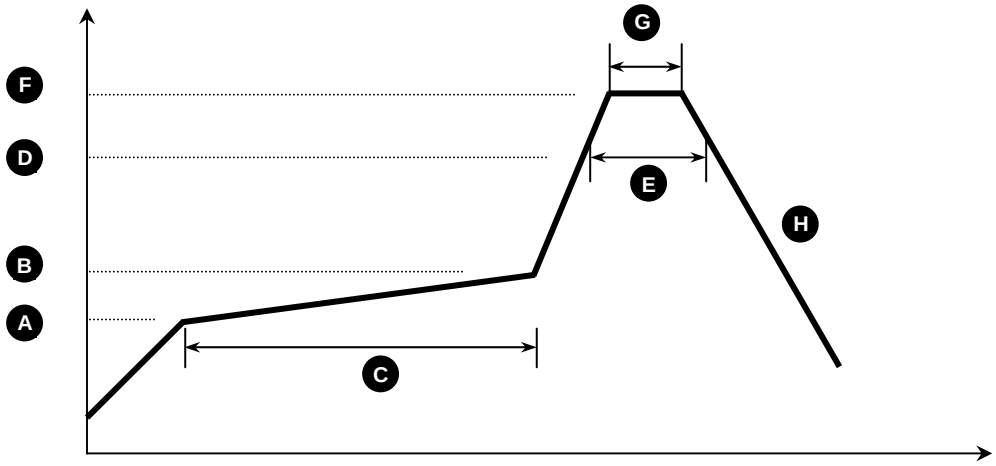


Figure 1

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:*

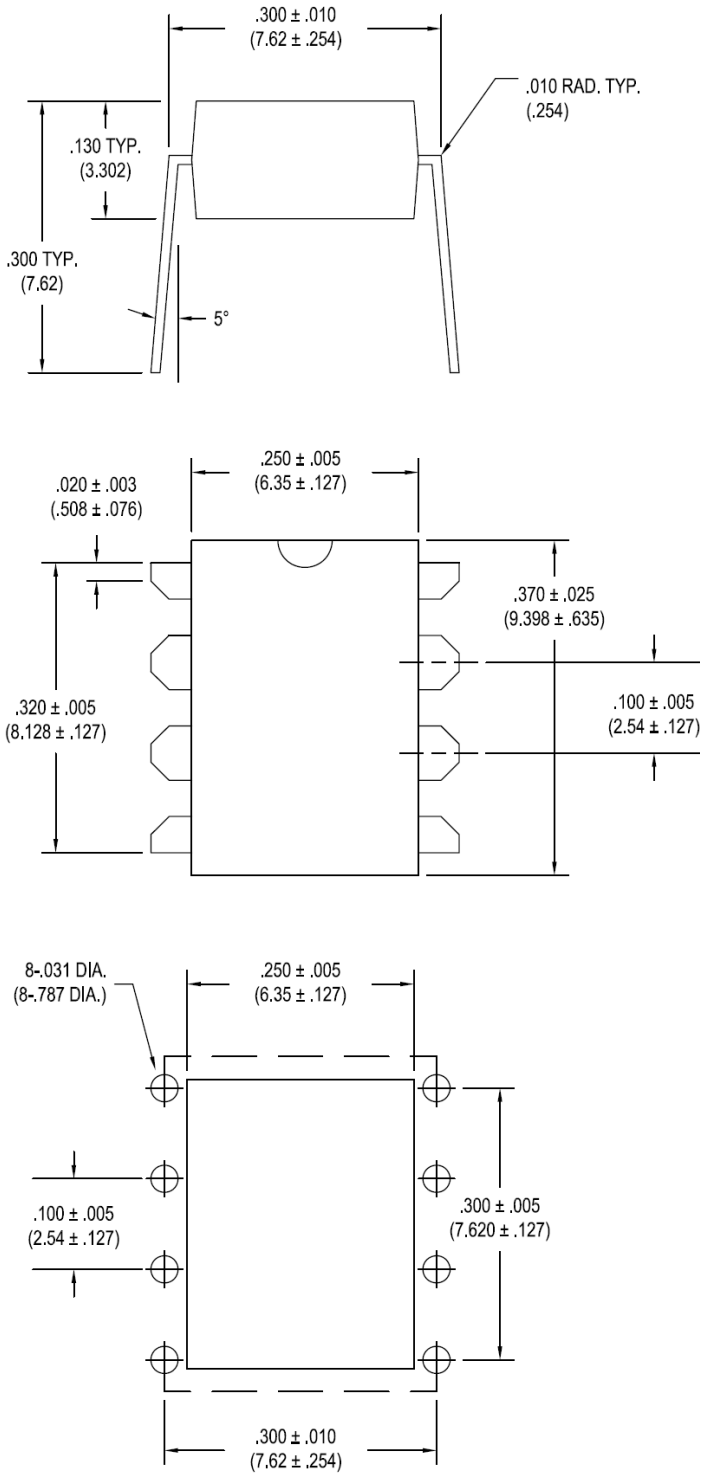
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

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AD4C312 Package Dimensions

8 PIN DIP Package

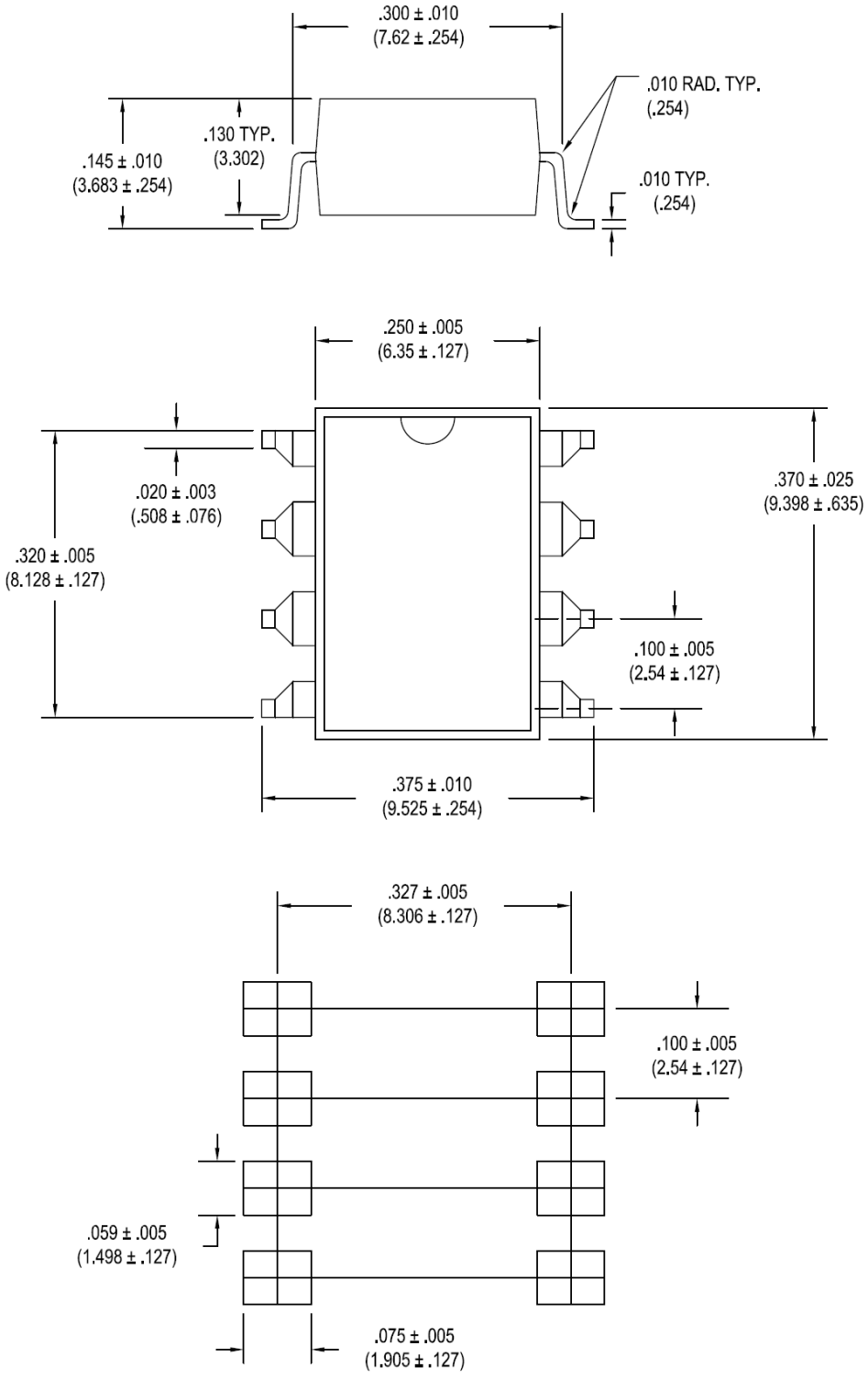
Note: *All dimensions in inches ["] with millimeters in parenthesis ()*



AD4C312 Package Dimensions

8 PIN SMD Surface Mount Package (-S)

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

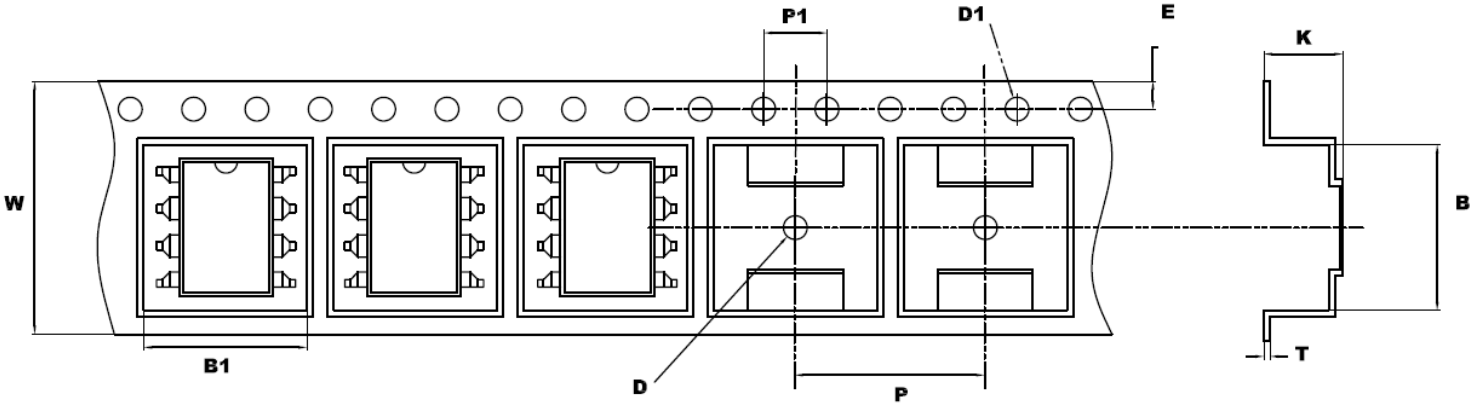


AD4C312 Package Dimensions

8 PIN SMD Tape & Reel (-STR)

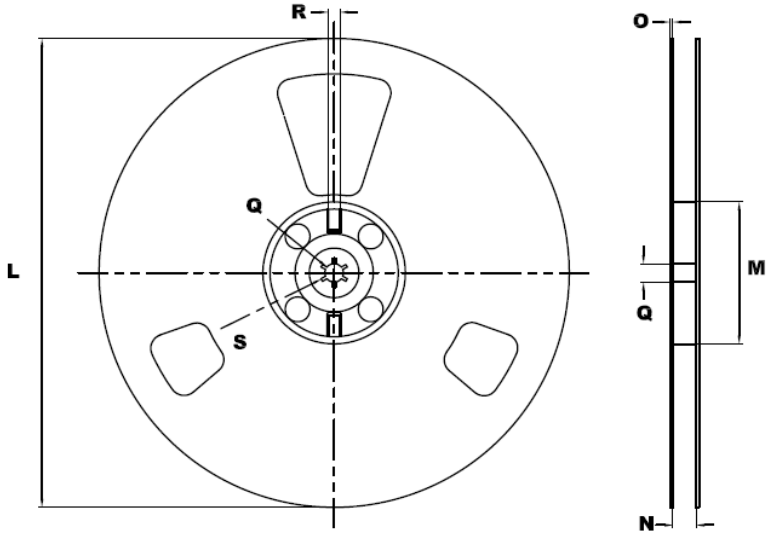
Note: *All dimensions in millimeters*

Outline and Dimension (Tape)



W	B	B1	P	P1	K	E	T	D	D1
16.00 ±0.1	10.50 ±0.1	10.30 ±0.1	12.00 ±0.1	4.00 ±0.1	5.00 ±0.1	1.75 ±0.1	0.40 ±0.1	1.50 ±0.1	1.50 ±0.1

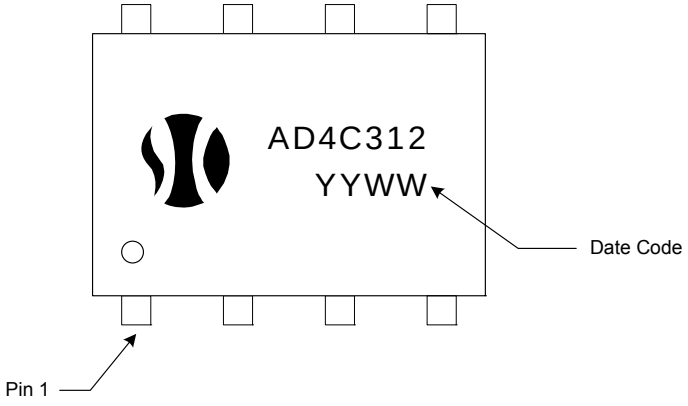
Outline and Dimensions (Reel)



Packaging: 1,000 pcs / reel

L	M	N	O	Q	R	S
330.00	100.00	16.40 +0.2	2.00 ±0.1	13.00 ±0.2	2.00	10.00

AD4C312 Package Marking



AD4C312 Package Weights

Device	Single Unit	Full Tube (50pcs)	Full Pouch (10 tubes)	Full Reel (1000pcs)
AD4C312	0.48	48	490	-
AD4C312-S	0.46	46	470	-
AD4C312-STR	0.46	-	-	884

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

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