SOLID STATE OPTRONICS

AD8C250

1 Form A
250V / 300 Ω
High Speed MOSFET Output Solid State Relay

Description

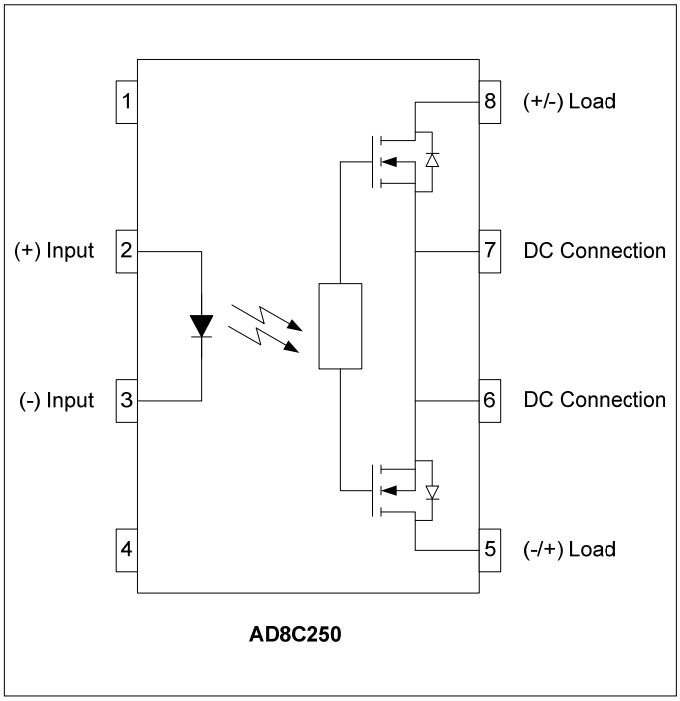
The AD8C250 is a bi-directional, single-pole, single-throw, normally open multipurpose solid-state relay. It is designed to replace electromechanical and reed relays in special applications that call for very fast switching rates. The relay consists of an integrated circuit that drives two special source-to-source enhancement type DMOS transistors with extremely low output capacitance and leakage current. The IC is optically coupled to a light emitting diode which controls its switching. The design of the circuit makes it ideal for switching high frequency signals.

The AD8C250 comes standard in a miniature 8 pin DIP package making it ideal for high-density board applications.

Applications

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

Schematic Diagram



AD8C250

Features

- Fast Switching Speeds (50μS TYP)
- Low Leakage Current (10nA TYP)
- Low Input Control Current (2.5mA TYP)
- High Frequency Switching
- 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
AD8C250	8 pin DIP, (50/Tube)
AD8C250-H	3.75kV$_{RMS}$ Viso, 8 pin DIP, (50/Tube)
AD8C250-S	8 pin SMD, (50/Tube)
AD8C250-HS	3.75kV$_{RMS}$, 8 pin SMD, (50/Tube)
AD8C250-STR	8 pin SMD, Tape and Reel (1000/Reel)
AD8C250-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

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	-	2.5	5	mA	I_O = 40mA
Turn-Off Current	I_{FOFF}	-	0.5	-	mA	I_O = 40mA
Output Specifications						
Blocking Voltage	V_B	250	-	-	V	I_F=0mA, I_O=1µA
Continuous Load Current	I_O	-	-	40	mA	I_F=5mA
On Resistance	R_{ON}	-	225	300	Ω	I_F=5mA, I_O=40mA
Leakage Current	I_{Oleak}	-	10	100	nA	V_O=250V
Output Capacitance	C_{OUT}	-	1.5	-	pF	I_F=0mA, V_O=25V f=1.0MHz
Offset Voltage	V_{OFFSET}	-	-	0.2	mV	I_F=5mA
Coupled Specifications						
Turn-On Time	T_{ON}	-	50	500	µS	I_F=5mA, I_O=40mA
Turn-Off Time	T_{OFF}	-	100	500	µS	I_F=0mA, I_O=40mA
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}

AD8C250 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

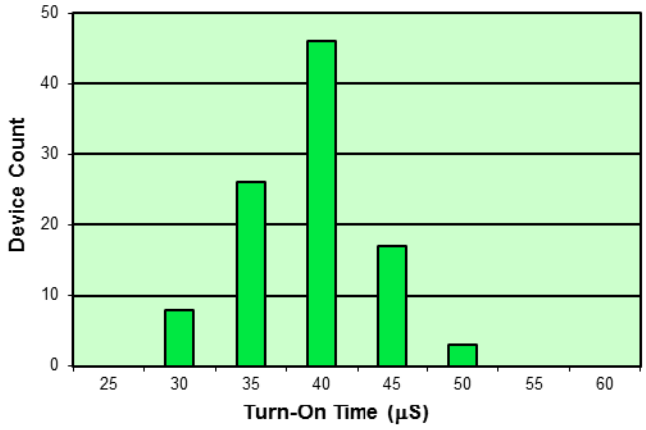


Figure 2: *Typical Turn-Off Time Distribution*
(N = 100, T_a = 25ºC)

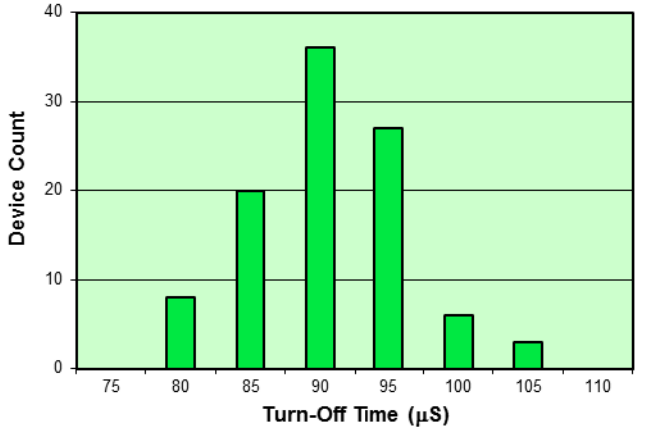


Figure 3: *Typical On-Resistance Distribution*
(N = 100, T_a = 25ºC)

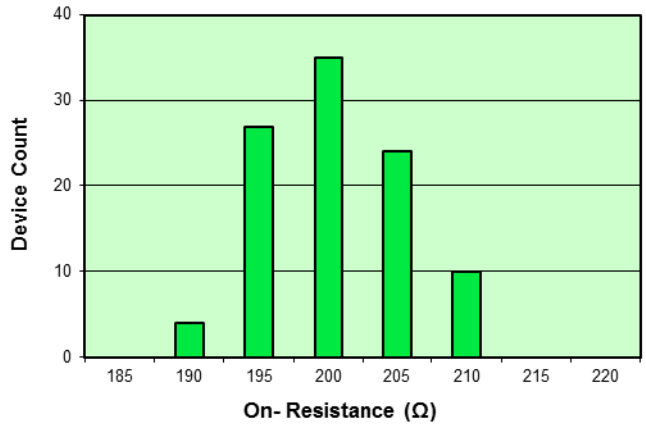


Figure 4: *Typical Output Leakage Current Distribution* (N = 100, T_a = 25ºC)

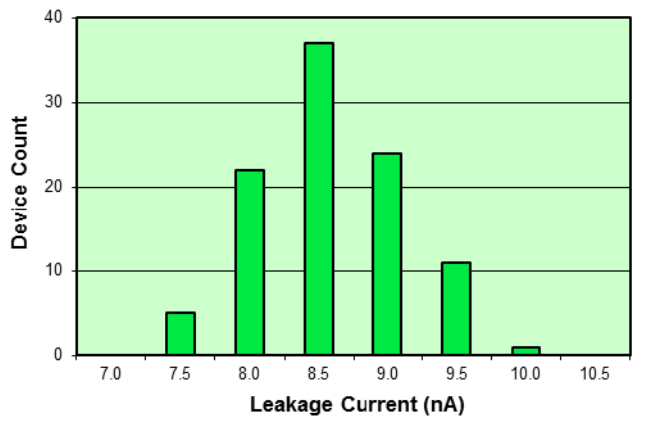


Figure 5: *Typical Blocking Voltage Distribution*
(N = 100, Ta = 25ºC)

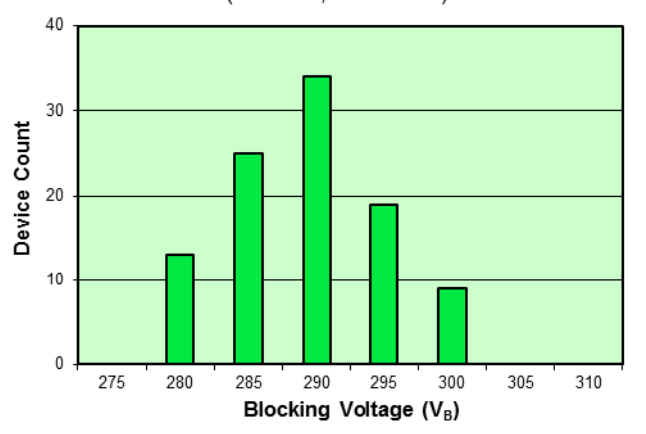
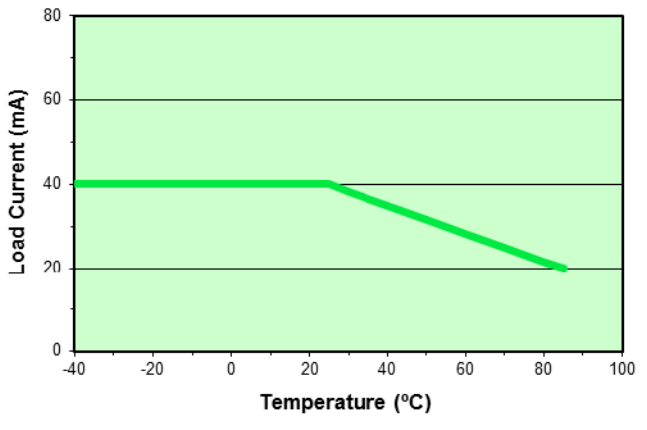


Figure 6: *Maximum Load Current vs. Temperature*



AD8C250 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:

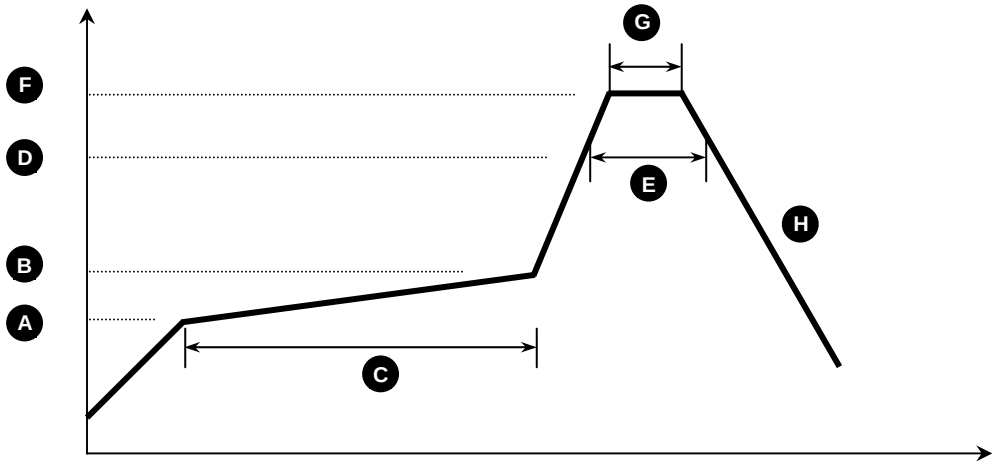


Figure 1

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	

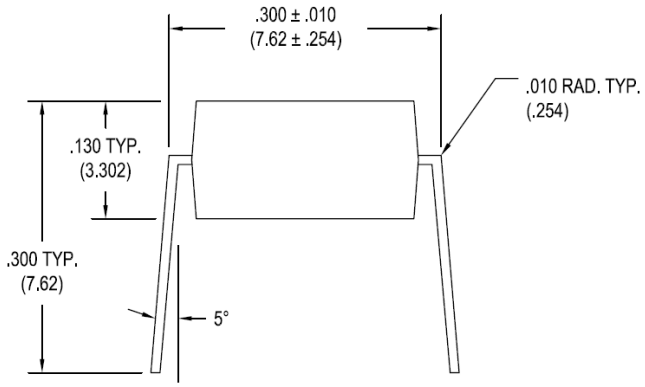
(3) *Hand Solder:*

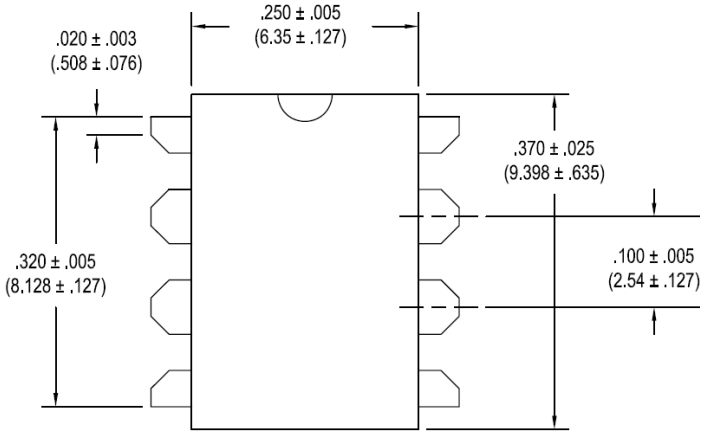
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

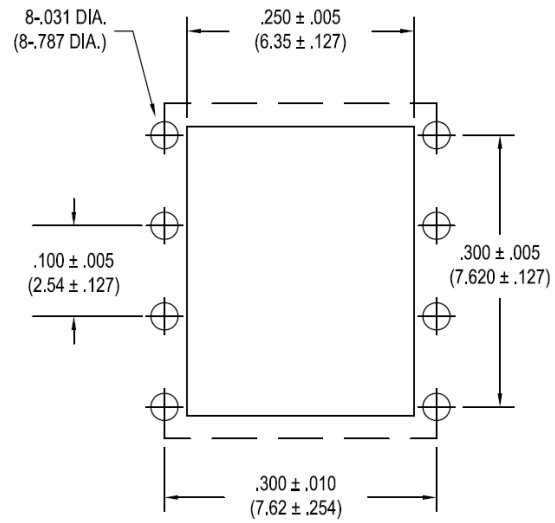
AD8C250 Package Dimensions

8 PIN DIP Package

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



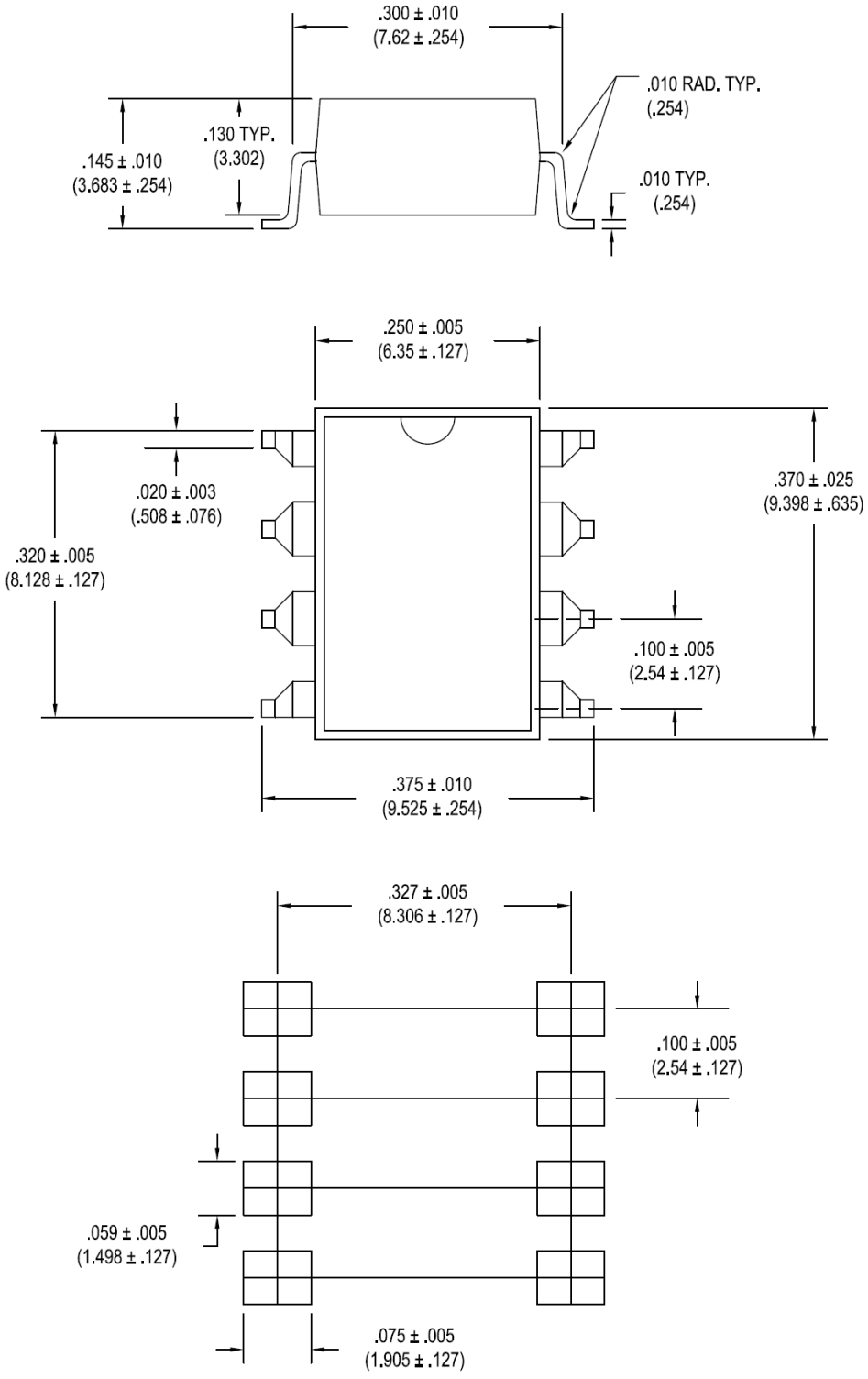




AD8C250 Package Dimensions

8 PIN SMD Surface Mount Package (-S)

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

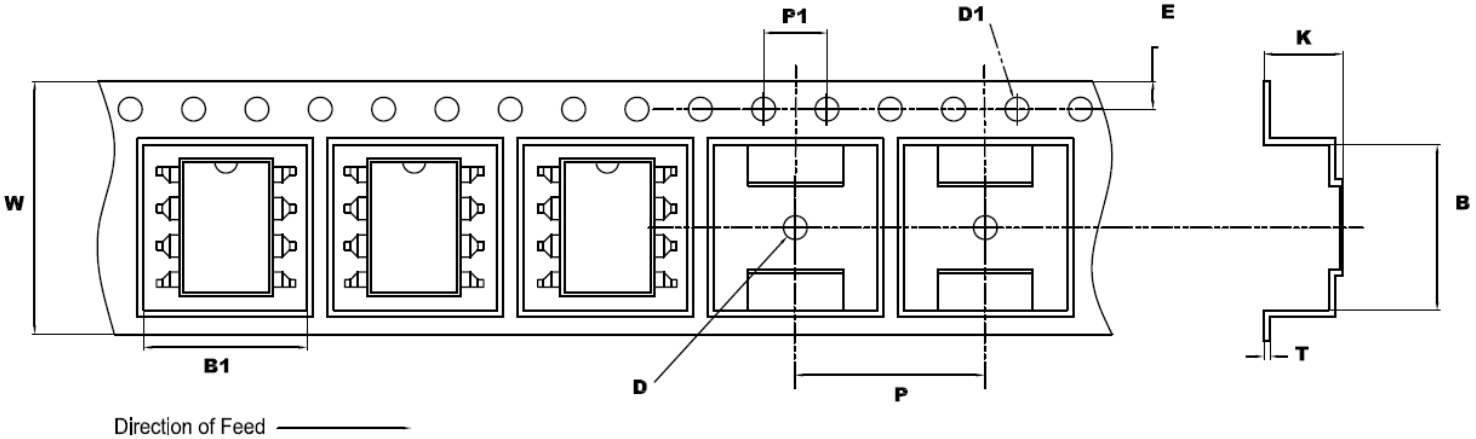


AD8C250 Package Dimensions

8 PIN SMD Tape & Reel (-STR)

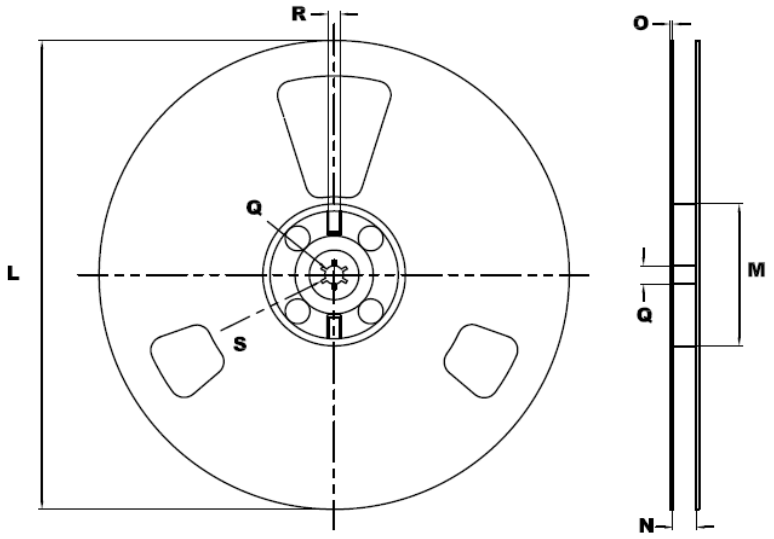
Note: *All dimensions in millimeters*

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

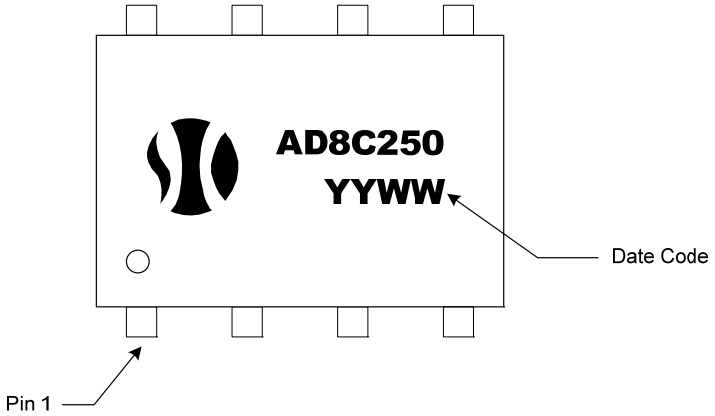
Outline and Dimensions (Reel)



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

AD8C250 Package Marking



AD8C250 Package Weights

Device	Single Unit	Full Tube (50pcs)	Full Pouch (10 tubes)	Full Reel (1000pcs)
AD8C250	0.48	48	490	-
AD8C250-S	0.46	46	470	-
AD8C250-STR	0.46	-	-	884

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