



## Description

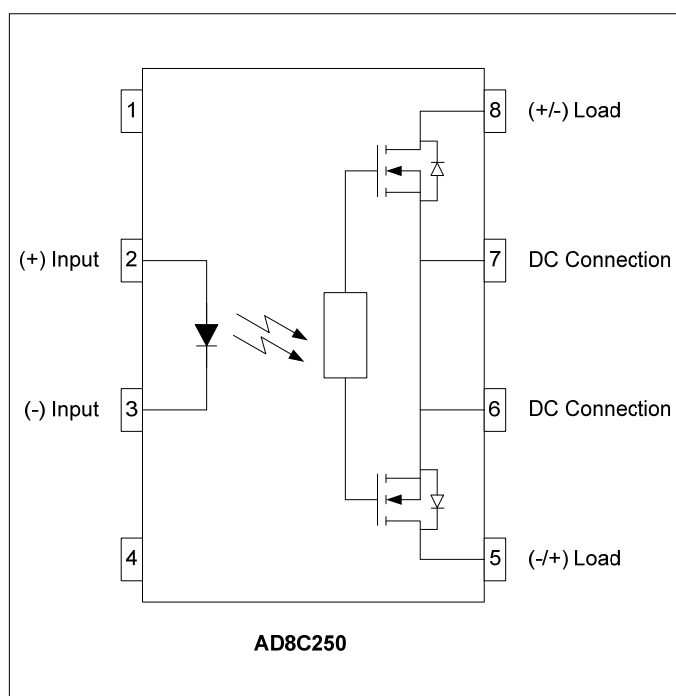
The AD8C250 is a bi-directional, single-pole, single-throw, normally open multipurpose solid-state relay. It is designed to replace electromechanical and reed relays in special applications that call for very fast switching rates. The relay consists of an integrated circuit that drives two special source-to-source 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



## Features

- Fast Switching Speeds (50 $\mu$ S TYP)
- Low Leakage Current (10nA TYP)
- Low Input Control Current (2.5mA TYP)
- High Frequency Switching
- High Isolation Voltage (2.5kV<sub>RMS</sub>, 3.75kV<sub>RMS</sub> -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

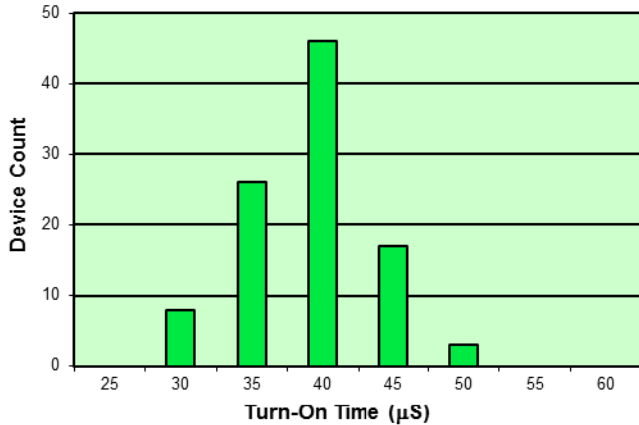
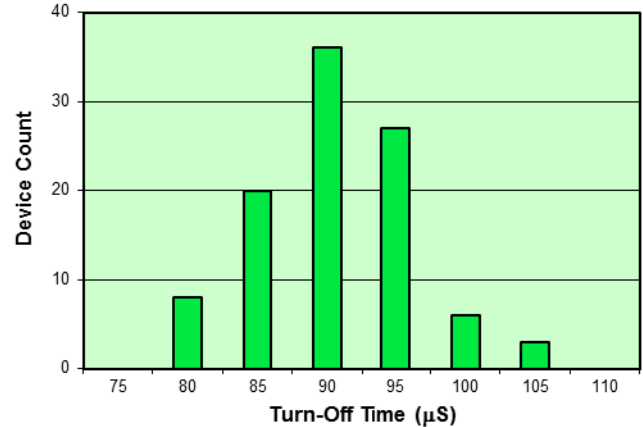
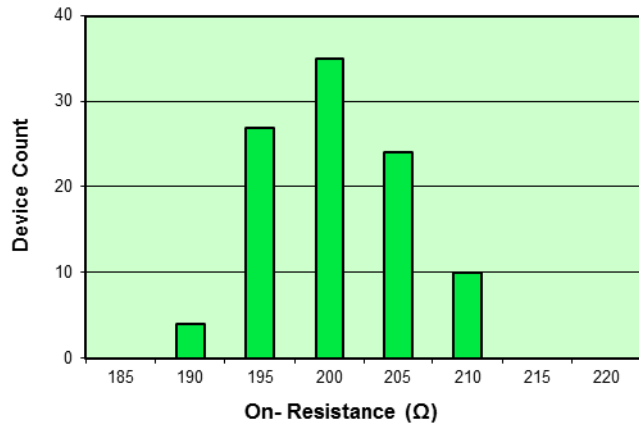
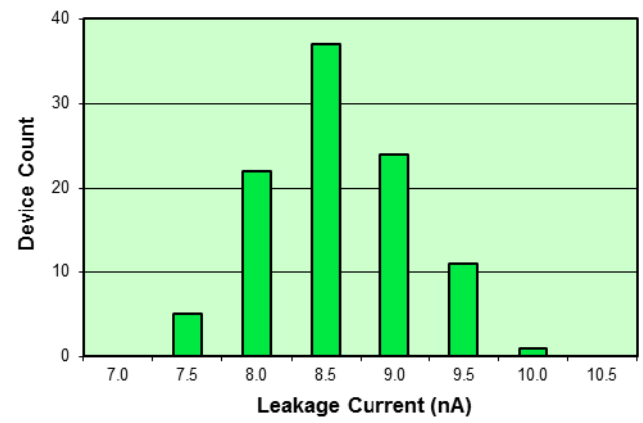
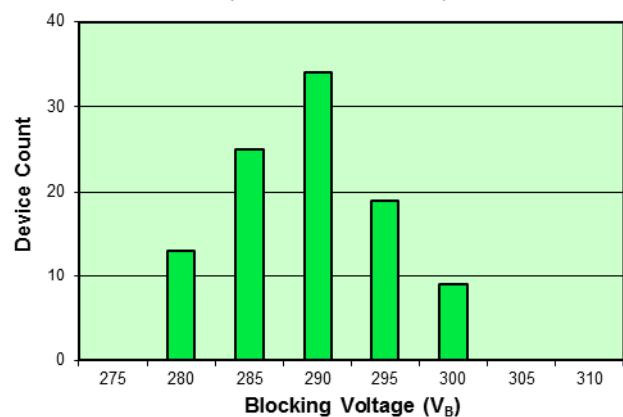
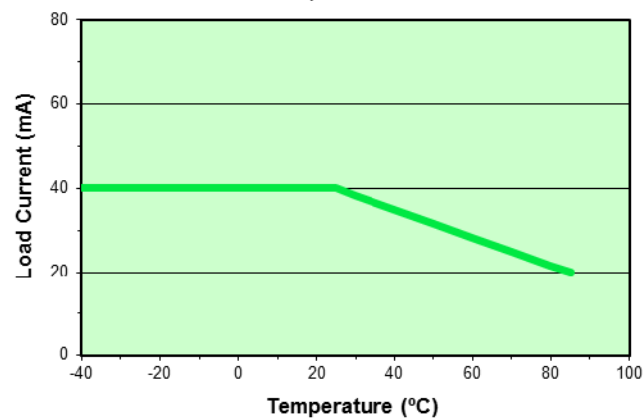
## Ordering Information

Part Number	Description
AD8C250	8 pin DIP, (50/Tube)
AD8C250-H	3.75kV <sub>RMS</sub> Viso, 8 pin DIP, (50/Tube)
AD8C250-S	8 pin SMD, (50/Tube)
AD8C250-HS	3.75kV <sub>RMS</sub> , 8 pin SMD, (50/Tube)
AD8C250-STR	8 pin SMD, Tape and Reel (1000/Reel)
AD8C250-HSTR	3.75kV <sub>RMS</sub> , 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,  $T_A = 25^\circ\text{C}$  (unless otherwise specified)**

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
<b>Input Specifications</b>						
LED Forward Voltage	$V_F$	-	1.2	1.5	V	$I_F = 10\text{mA}$
LED Reverse Voltage	$BV_R$	6	-	-	V	$I_R = 10\mu\text{A}$
Turn-On Current	$I_F$	-	2.5	5	mA	$I_O = 40\text{mA}$
Turn-Off Current	$I_{\text{FOFF}}$	-	0.5	-	mA	$I_O = 40\text{mA}$
<b>Output Specifications</b>						
Blocking Voltage	$V_B$	250	-	-	V	$I_F=0\text{mA}, I_O=1\mu\text{A}$
Continuous Load Current	$I_O$	-	-	40	mA	$I_F=5\text{mA}$
On Resistance	$R_{\text{ON}}$	-	225	300	$\Omega$	$I_F=5\text{mA}, I_O=40\text{mA}$
Leakage Current	$I_{\text{leak}}$	-	10	100	nA	$V_O=250\text{V}$
Output Capacitance	$C_{\text{OUT}}$	-	1.5	-	pF	$I_F=0\text{mA}, V_O=25\text{V } f=1.0\text{MHz}$
Offset Voltage	$V_{\text{OFFSET}}$	-	-	0.2	mV	$I_F=5\text{mA}$
<b>Coupled Specifications</b>						
Turn-On Time	$T_{\text{ON}}$	-	50	500	$\mu\text{S}$	$I_F=5\text{mA}, I_O=40\text{mA}$
Turn-Off Time	$T_{\text{OFF}}$	-	100	500	$\mu\text{S}$	$I_F=0\text{mA}, I_O=40\text{mA}$
Coupled Capacitance	$C_{\text{COUPLED}}$	-	3	-	pF	
Contact Transient Ratio	-	2,000	7,000	0	V/ $\mu\text{S}$	$dV = 50\text{V}$
<b>Isolation Specifications</b>						
Isolation Voltage	$V_{\text{ISO}}$	2,500	-	-	$V_{\text{RMS}}$	$\text{RH} \leq 50\%, t=1\text{min}$
-H Option	$V_{\text{ISO}}$	3,750	-	-	$V_{\text{RMS}}$	$\text{RH} \leq 50\%, t=1\text{min}$
Input-Output Resistance	$R_{\text{I-O}}$	-	$10^{12}$	-	$\Omega$	$V_{\text{I-O}} = 500V_{\text{DC}}$

**AD8C250 Performance & Characteristics Plots,  $T_A = 25^\circ\text{C}$  (unless otherwise specified)**
**Figure 1: Typical Turn-On Time Distribution**  
(N = 100,  $T_A = 25^\circ\text{C}$ )

**Figure 2: Typical Turn-Off Time Distribution**  
(N = 100,  $T_A = 25^\circ\text{C}$ )

**Figure 3: Typical On-Resistance Distribution**  
(N = 100,  $T_A = 25^\circ\text{C}$ )

**Figure 4: Typical Output Leakage Current Distribution**  
(N = 100,  $T_A = 25^\circ\text{C}$ )

**Figure 5: Typical Blocking Voltage Distribution**  
(N = 100,  $T_A = 25^\circ\text{C}$ )

**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 250°C:

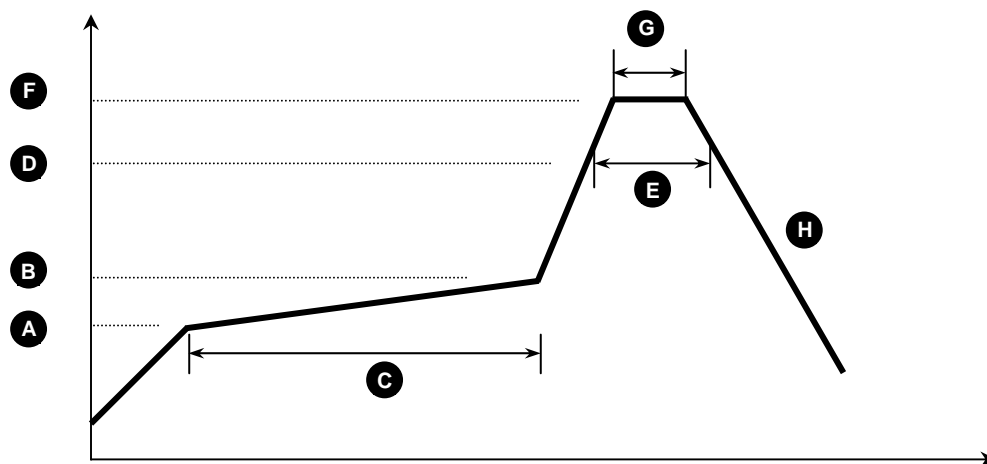


Figure 1

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

### (2) Wave Solder:

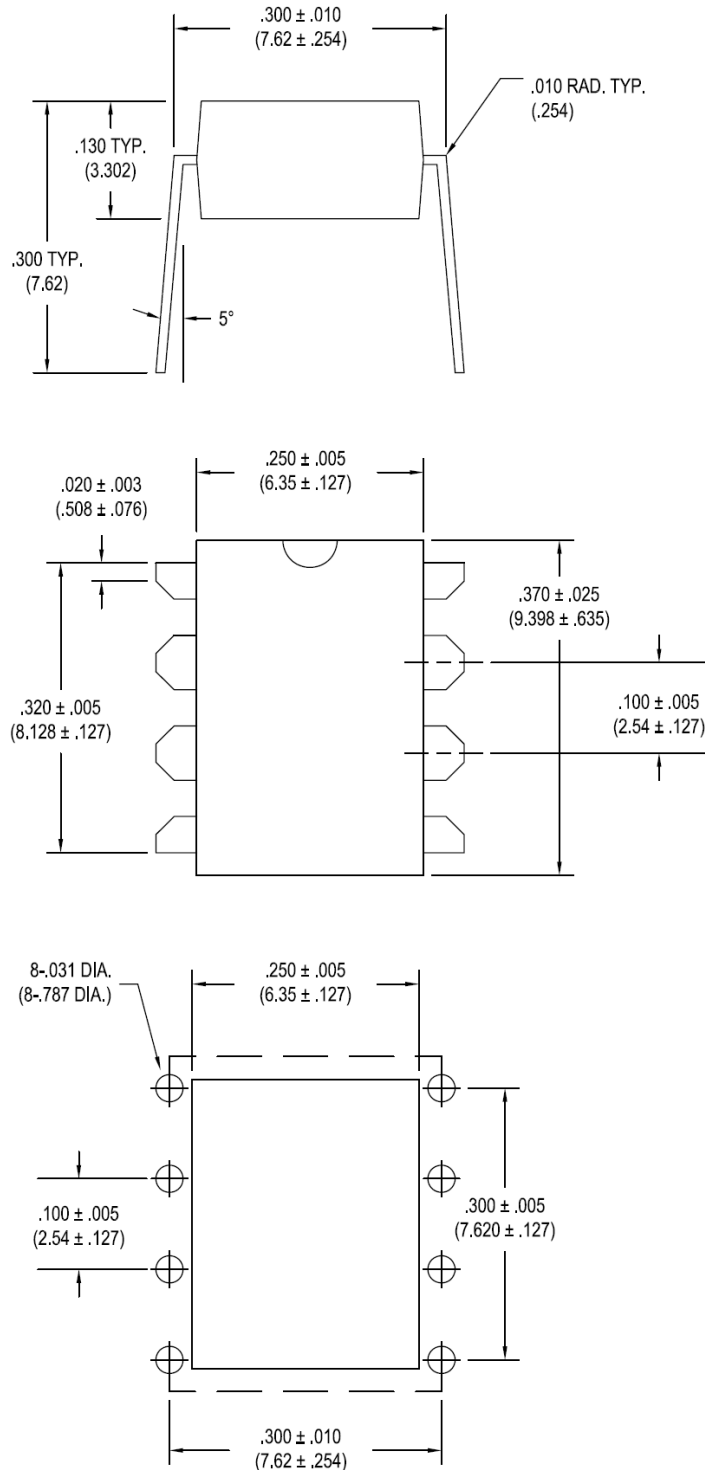
Maximum Temperature: 260°C (at terminal)  
Maximum Time: 10s  
Pre-heating: 100 - 150°C (30 - 90s)  
Single Occurrence

### (3) Hand Solder:

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

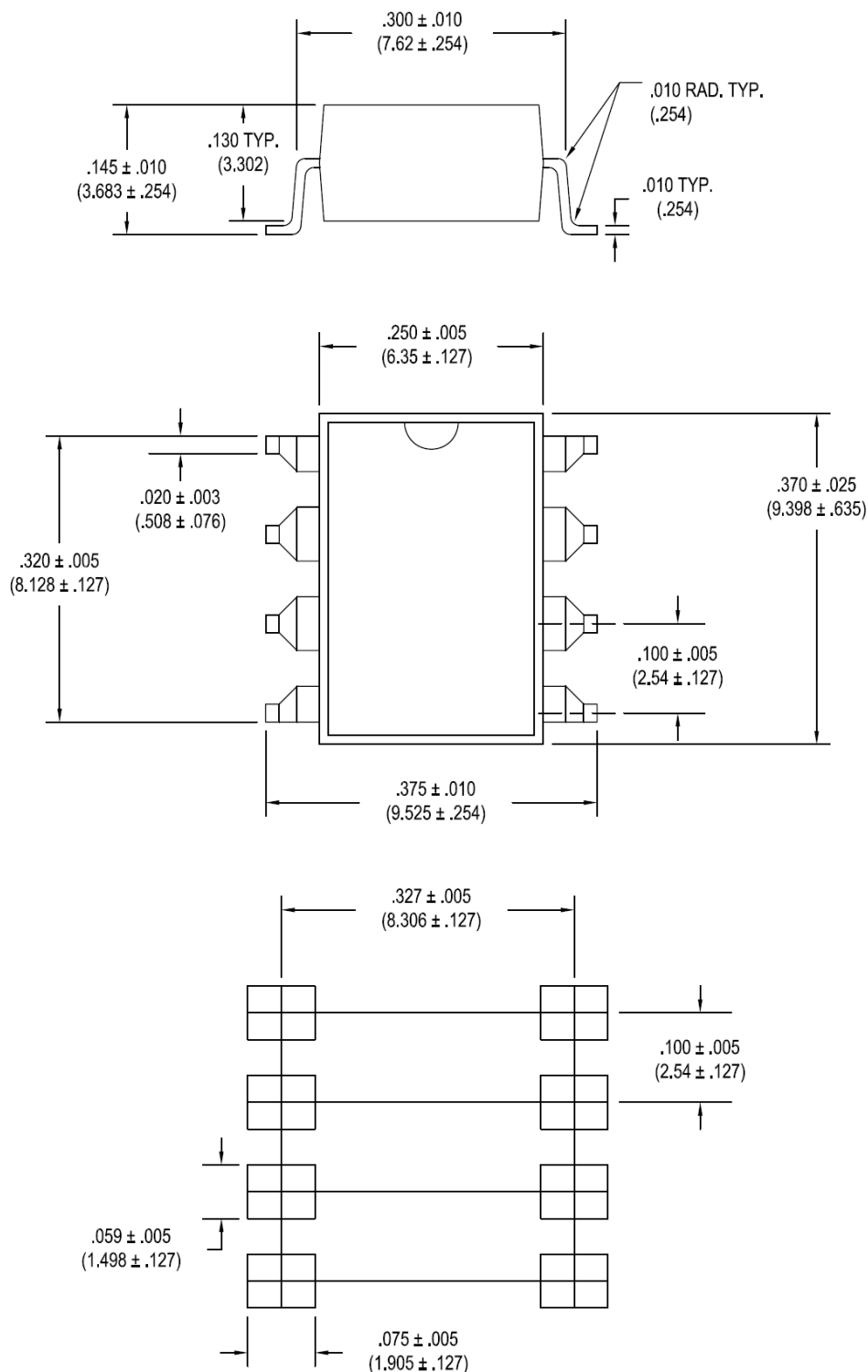
**AD8C250 Package Dimensions**

8 PIN DIP Package

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


**AD8C250 Package Dimensions**

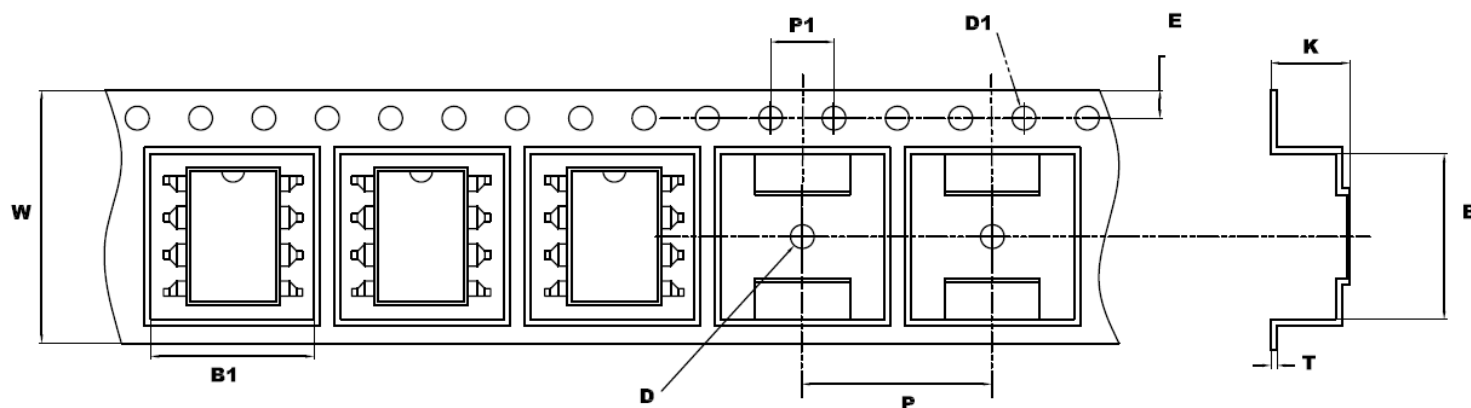
8 PIN SMD Surface Mount Package (-S)

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


**AD8C250 Package Dimensions**

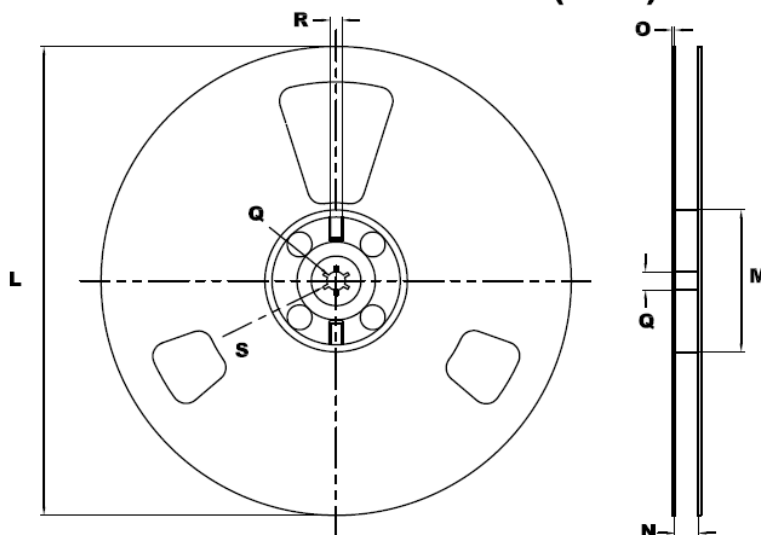
8 PIN SMD Tape &amp; Reel (-STR)

**Note:** All dimensions in millimeters

**Outline and Dimension (Tape)**


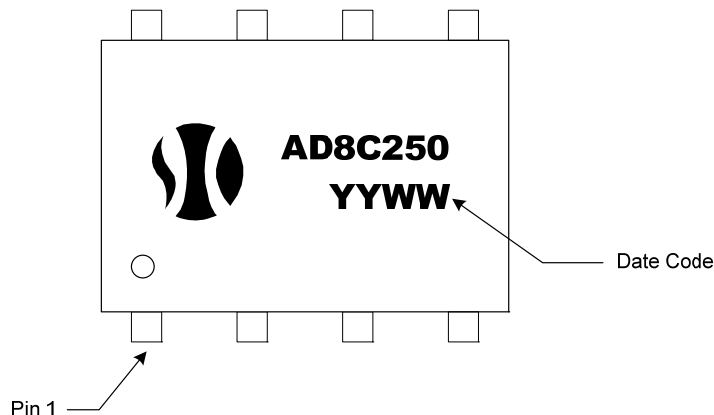
Direction of Feed

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

**Outline and Dimensions (Reel)**

**Packaging: 1,000 pcs / reel**

L	M	N	O	Q	R	S
330.00	100.00	16.40 $\pm 0.2$	2.00 $\pm 0.1$	13.00 $\pm 0.2$	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

## DISCLAIMER

Solid State Optronics (SSO) makes no warranties or representations with regards to the completeness and accuracy of this document. SSO reserves the right to make changes to product description, specifications at any time without further notices.

SSO shall not assume any liability arising out of the application or use of any product or circuit described herein. Neither circuit patent licenses nor indemnity are expressed or implied.

Except as specified in SSO's Standard Terms & Conditions, SSO disclaims liability for consequential or other damage, and we make no other warranty, expressed or implied, including merchantability and fitness for particular use.

## LIFE SUPPORT POLICY

SSO does not authorize use of its devices in life support applications wherein failure or malfunction of a device may lead to personal injury or death. Users of SSO devices in life support applications assume all risks of such use and agree to indemnify SSO against any and all damages resulting from such use. Life support devices are defined as devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when used properly in accordance with instructions for use can be reasonably expected to result in significant injury to the user, or (d) a critical component of a life support device or system whose failure can be reasonably expected to cause failure of the life support device or system, or to affect its safety or effectiveness.