SOLID STATE OPTRONICS



# AD6C742

1 Form B
60V / 1Ω
MOSFET Output Solid State Relay

## Description

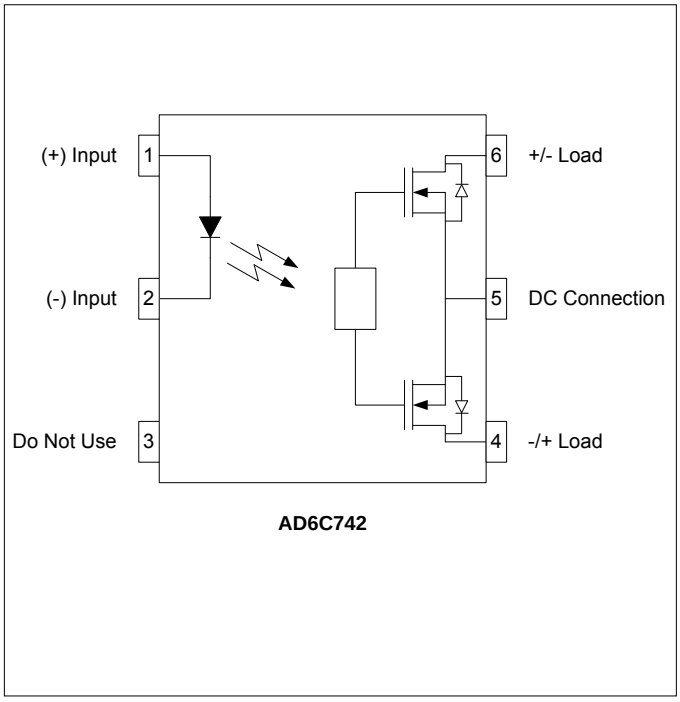
The AD6C742 is a bi-directional, single-pole, single-throw, normally closed multipurpose relay. It is designed to replace electro-mechanical relays in general purpose switching applications. The relay consists of an integrated circuit that drives two rugged drain-to-drain depletion type DMOS transistors - optically coupled to a light emitting diode. The AD6C742 has an extremely low on resistance (500mΩ TYP) and high load current capability (800mA), giving the device unparalleled performance for a normally closed relay.

The AD6C742 comes standard in a compact 6 pin DIP package making it ideal for high-density board applications.

## Applications

- Reed Relay Replacement
- Security Systems
- Meter Reading Equipment
- Data Acquisition
- Battery Monitoring
- Multiplexers

## Schematic Diagram




**AD6C742**

## Features

- Compact 6 pin DIP/SMD Package
- High Input-to-Output Isolation (up to $5V_{RMS}$)
- Low Input Control Current (2.5mA TYP)
- 800mA Maximum Continuous Load Current
- Low On Resistance (500mΩ TYP)
- 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 | 800mW |
| Solder Temperature – Wave (10sec) | 260°C |
| Solder Temperature – IR Reflow (10sec) | 260°C |

## Ordering Information

| Part Number | Description |
|---|---|
| AD6C742 | 6 pin DIP, (50/Tube) |
| AD6C742-H | $5kV_{RMS}$ $V_{ISO}$, 6 pin DIP, (50/Tube) |
| AD6C742-S | 6 pin SMD, (50/Tube) |
| AD6C742-HS | $5kV_{RMS}$, 6 pin SMD, (50/Tube) |
| AD6C742-STR | 6 pin SMD, Tape and Reel (1000/Reel) |
| AD6C742-HSTR | $5kV_{RMS}$, 6 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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AD6C742 H/S/TR
Rev 2.00 (11/25/2013)
001745

**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 |
| Turn-On Current | $I_F$ | - | 0.5 | - | mA | $I_O$=800mA |
| Turn-Off Current | $I_{FOFF}$ | - | 2.5 | 5 | mA | $I_O$=800mA |
| **Output Specifications** | | | | | | |
| Blocking Voltage | $V_B$ | 60 | - | - | V | $I_F$=5mA, $I_O$=1μA |
| Continuous Load Current | $I_O$ | - | - | 800 | mA | $I_F$=0mA |
| On Resistance | $R_{ON}$ | - | 0.5 | 1 | Ω | $I_F$=0mA, $I_O$=800mA |
| Leakage Current | $I_{Oleak}$ | - | 0.1 | 1 | μA | $I_F$=5mA, $V_O$=60V |
| Output Capacitance | $C_{OUT}$ | - | 80 | - | 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 | 2 | mS | $I_F$=0mA, $I_O$=800mA |
| Turn-Off Time | $T_{OFF}$ | - | 2 | 5 | mS | $I_F$=5mA, $I_O$=800mA |
| 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 | $V_{I-O}$ = 500$V_{DC}$ |

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## AD6C742 Performance & Characteristics Plots, $T_A$ = 25°C (unless otherwise specified)

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

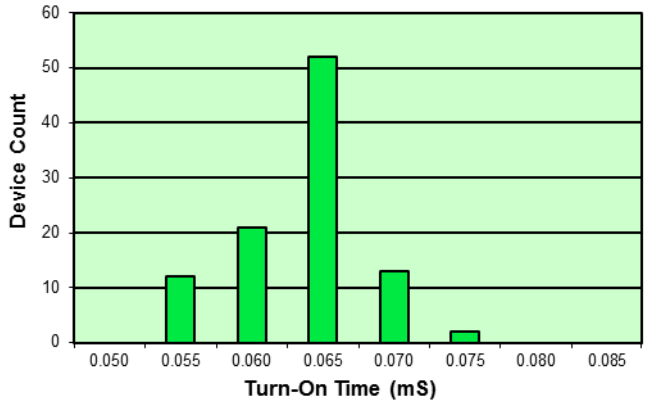



**Figure 2:** *Typical Turn-Off Time Distribution*
(N = 100, $T_a$ = 25ºC)

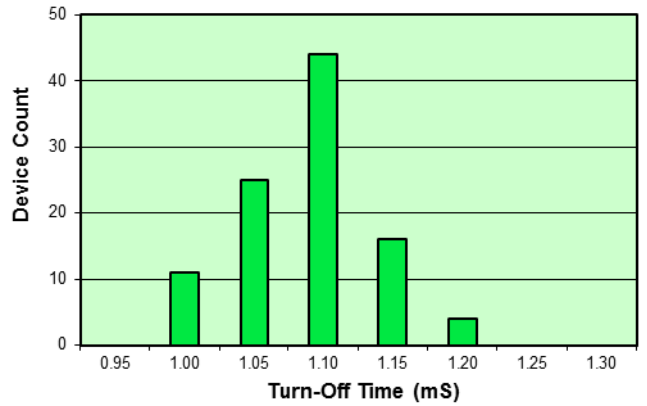



**Figure 3:** *Typical On-Resistance Distribution*
(N = 100, $T_a$ = 25ºC)

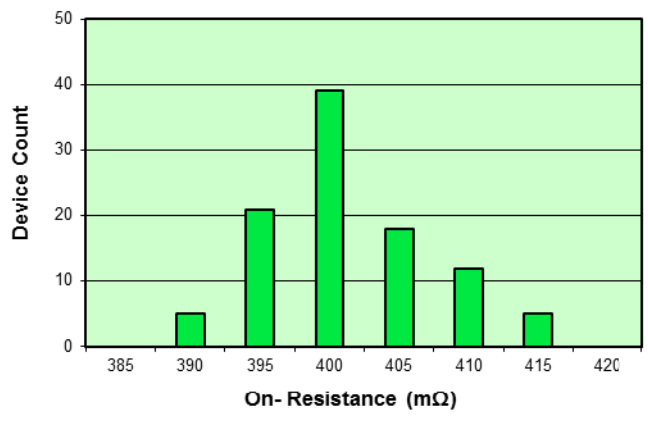



**Figure 4:** *Typical Output Leakage Current Distribution* (N = 100, $T_a$ = 25ºC)

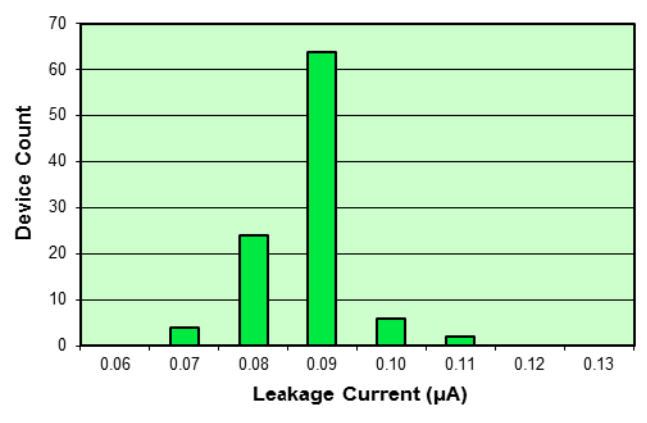



**Figure 5:** *Typical Blocking Voltage Distribution*
(N = 100, Ta = 25ºC)

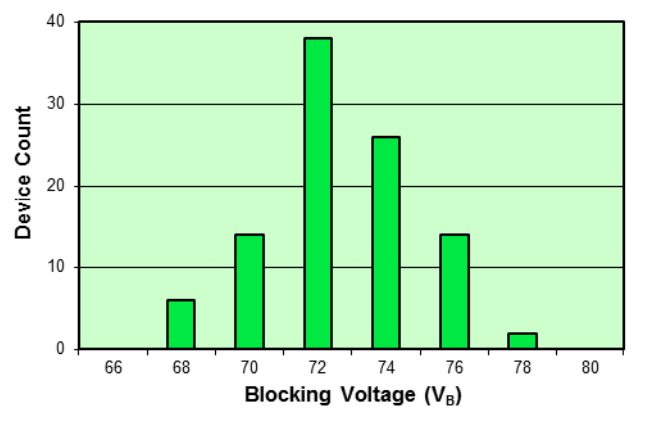
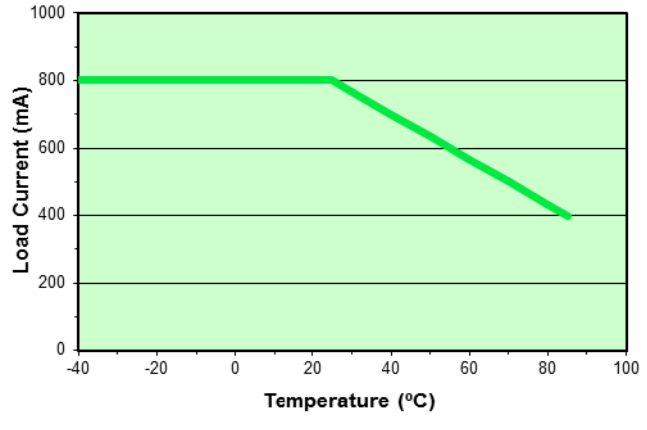



**Figure 6:** *Maximum Load Current vs. Temperature*




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## AD6C742 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:

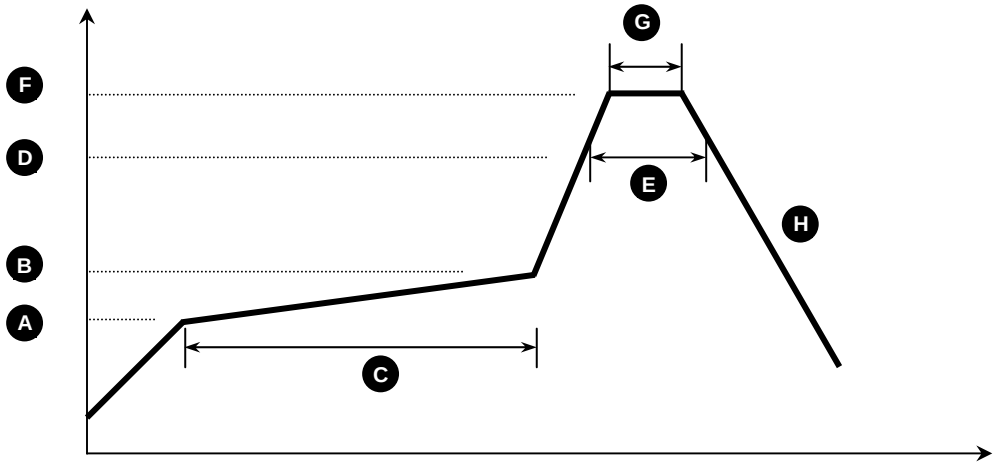



*Figure 1*

| 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:*

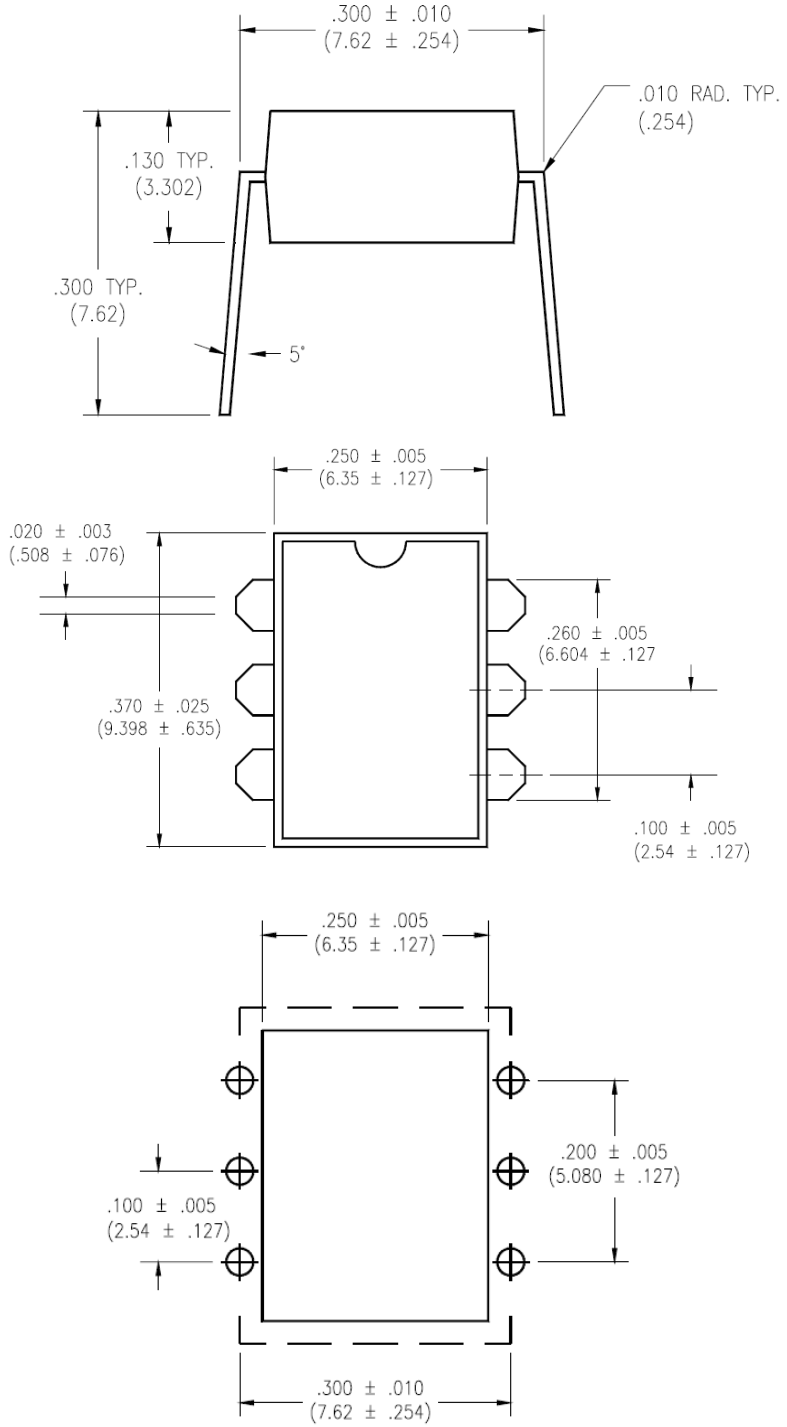
| | |
|---|---|
| Maximum Temperature: | 350ºC (at tip of soldering iron) |
| Maximum Time: | 3s |
| Single Occurrence | |

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## AD6C742 Package Dimensions

*6 PIN DIP Package*

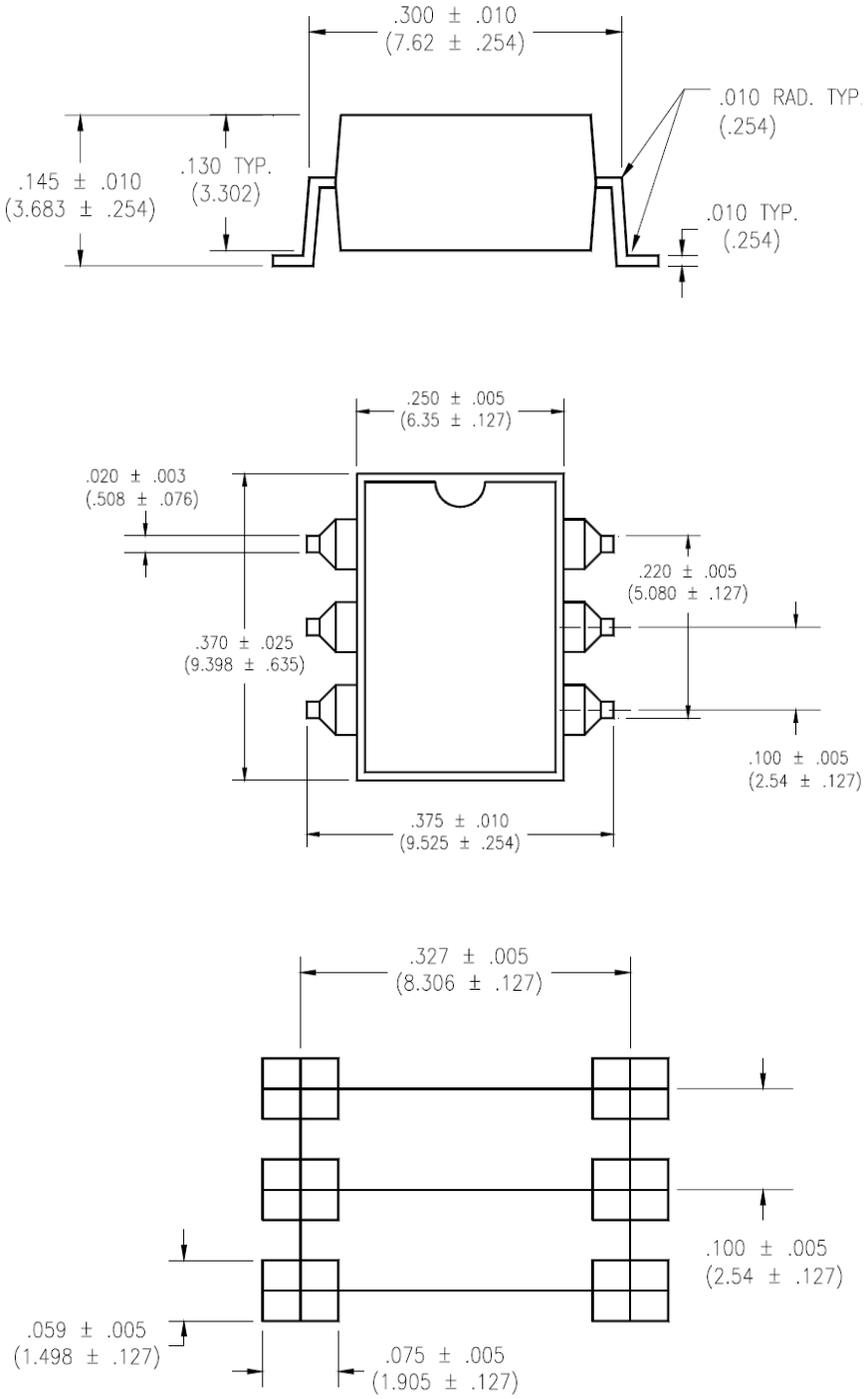
***Note:*** *All dimensions in inches ["] with millimeters in parenthesis ()*



## AD6C742 Package Dimensions

*6 PIN SMD Surface Mount Package (-S)*

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

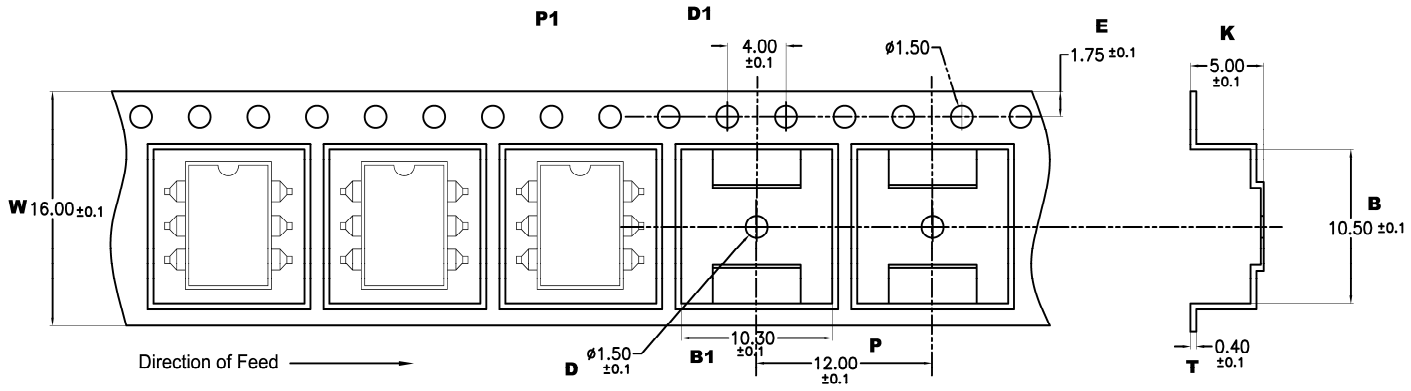


## AD6C742 Package Dimensions

*6 PIN SMD Tape & Reel (-STR)*

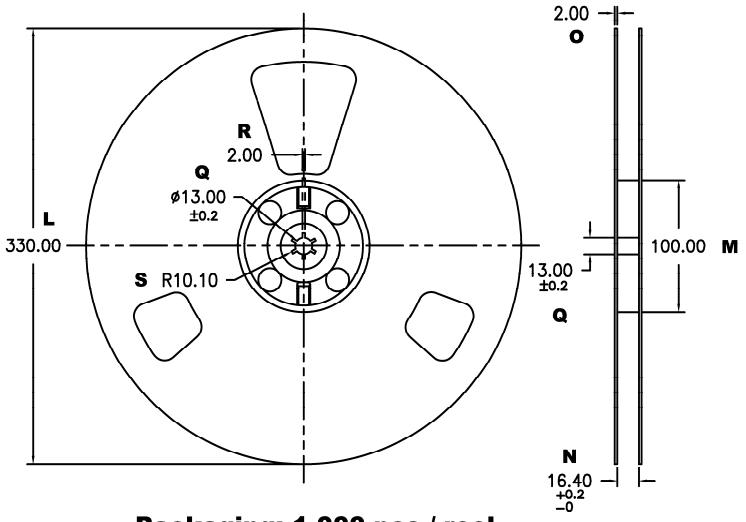
***Note:*** *All dimensions in millimeters*

### 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 |

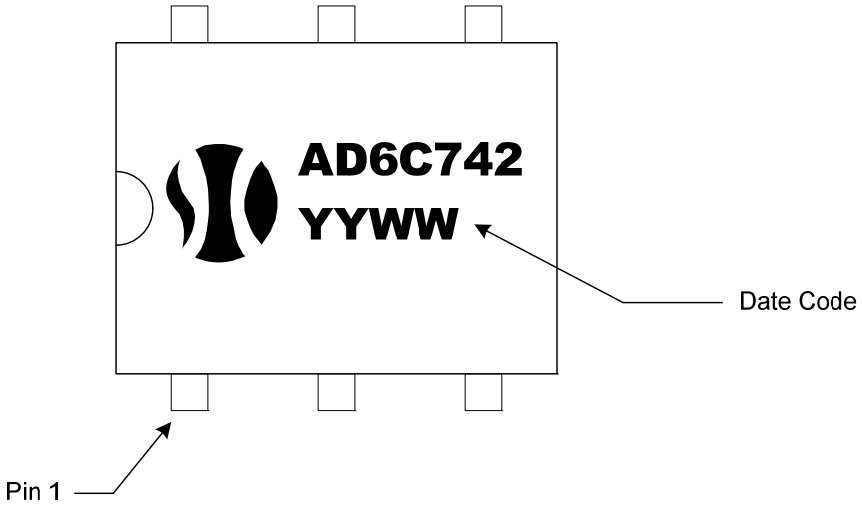
### Outline and Dimensions (Reel)




**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 |

## AD6C742 Package Marking




## AD6C742 Package Weights

| Device | Single Unit | Full Tube (50pcs) | Full Pouch (10 tubes) | Full Reel (1000pcs) |
|---|---|---|---|---|
| AD6C742-(H) | 0.45 | 48 | 490 | - |
| AD6C742-(H)S | 0.44 | 46 | 470 | - |
| AD6C742-(H)STR | 0.44 | - | - | 884 |

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

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