SOLID STATE OPTRONICS



AD6C941

1 Form A
60V / 250mΩ
MOSFET Output Solid State Relay

Description

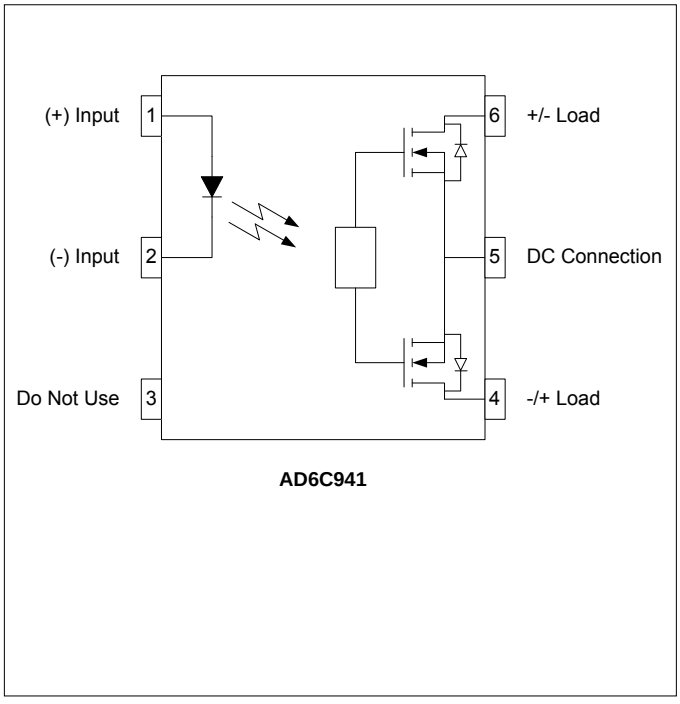
The AD6C941 is a bi-directional, single-pole, single-throw, normally open multipurpose relay. It is designed to replace electro-mechanical relays in general purpose switching applications. The relay consists of an integrated circuit that drives two rugged drain-to-drain enhancement type DMOS transistors - optically coupled to a light emitting diode. The output MOS transistors have extremely low on resistance allowing the relay to high continuous load currents of up to 2.2 amps.

The AD6C941 comes standard in a miniature 6 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



AD6C941

Features

- Low On Resistance (75mΩ TYP)
- Low Input Control Current (1mA TYP)
- High Maximum Continuous Load Current (2.2 Amps)
- High Isolation Voltage (3.75kV$_{RMS}$, 5kV$_{RMS}$ -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	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
AD6C941	6 pin DIP, (50/Tube)
AD6C941-H	5kV$_{RMS}$ V$_{ISO}$, 6 pin DIP, (50/Tube)
AD6C941-S	6 pin SMD, (50/Tube)
AD6C941-HS	5kV$_{RMS}$, 6 pin SMD, (50/Tube)
AD6C941-STR	6 pin SMD, Tape and Reel (1000/Reel)
AD6C941-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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Electrical Characteristics, T_A = 25°C (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Input Specifications						
LED Forward Voltage	V_F	-	1.4	1.8	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	-	1	5	mA	V_O = 20V, I_O = 2.2A, within 20mS
Turn-Off Current	I_{FOFF}	-	0.5	-	mA	-
Output Specifications						
Blocking Voltage	V_B	60	-	-	V	I_O=1µA
Continuous Load Current	I_O	-	-	2.2	A	I_F=5mA
On Resistance	R_{ON}	-	75	250	mΩ	I_F=5mA, I_O=2.2A
Leakage Current	I_{Oleak}	-	0.05	1	µA	I_F=0mA, V_O=60V
Output Capacitance	C_{OUT}	-	25	-	pF	I_F=0mA, f=1.0MHz
Offset Voltage	V_{OFFSET}	-	-	0.2	mV	I_F=5mA
Coupled Specifications						
Turn-On Time	T_{ON}	-	1	5	mS	I_F=5mA, I_O=2.2A
Turn-Off Time	T_{OFF}	-	0.05	0.5	mS	I_F=0mA, I_O=2.2A
Coupled Capacitance	$C_{COUPLED}$	-	3	-	pF	
Contact Transient Ratio	-	2,000	7,000	0	V/µS	dV = 50V
Offset Voltage	V_{OFFSET}	-	-	0.2	mV	I_F=5mA
Isolation Specifications						
Isolation Voltage	V_{ISO}	3,750	-	-	V_{RMS}	RH ≤ 50%, t=1min
-H Option	V_{ISO}	5,000	-	-	V_{RMS}	RH ≤ 50%, t=1min
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	V_{I-O} = 500V_{DC}

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AD6C941 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

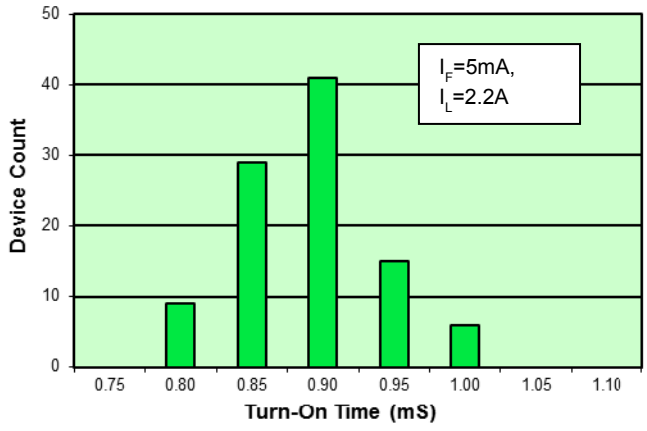


Figure 2: *Typical Turn-Off Time Distribution* (N = 100, T_a = 25ºC)

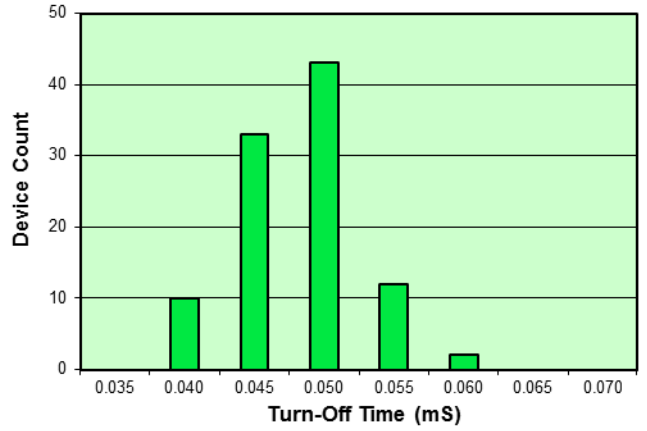


Figure 3: *Typical On-Resistance Distribution* (N = 100, T_a = 25ºC)

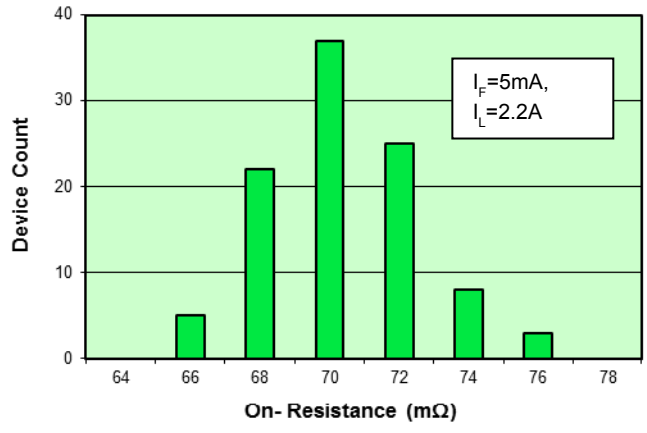


Figure 4: *Typical Output Leakage Current Distribution* (N = 100, T_a = 25ºC)

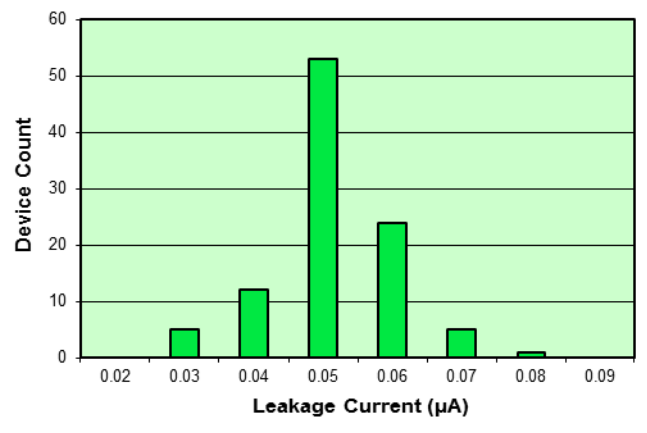


Figure 5: *Typical Blocking Voltage Distribution* (N = 100, Ta = 25ºC)

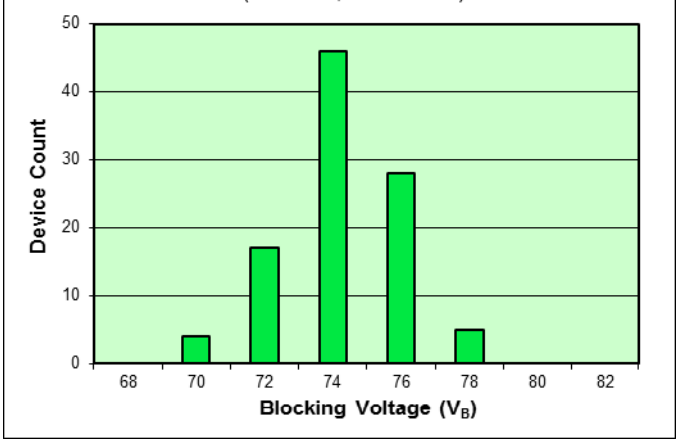
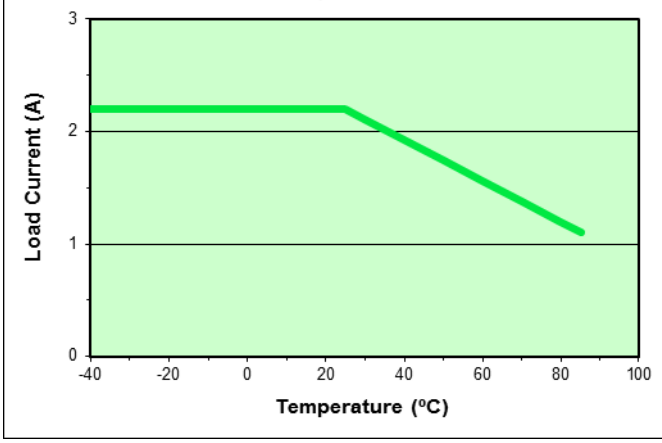


Figure 6: *Maximum Load Current vs. Temperature*



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AD6C941 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:

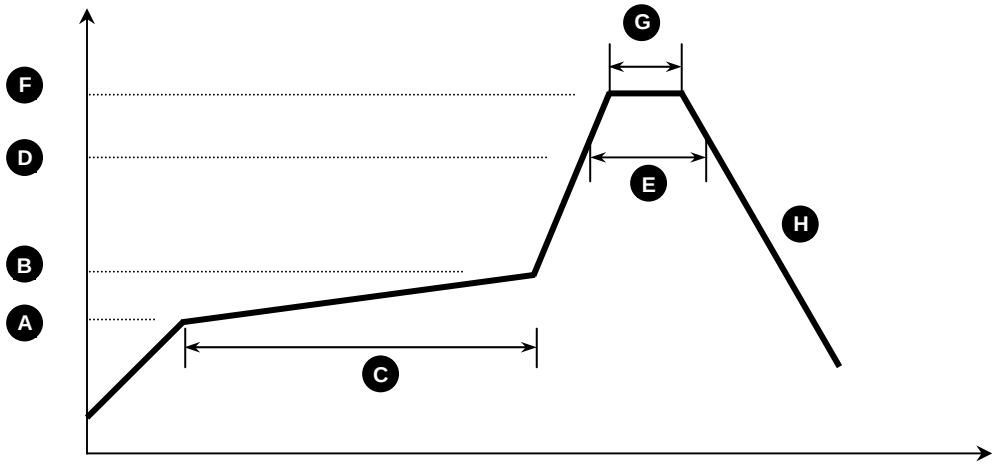


Figure 1

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:*

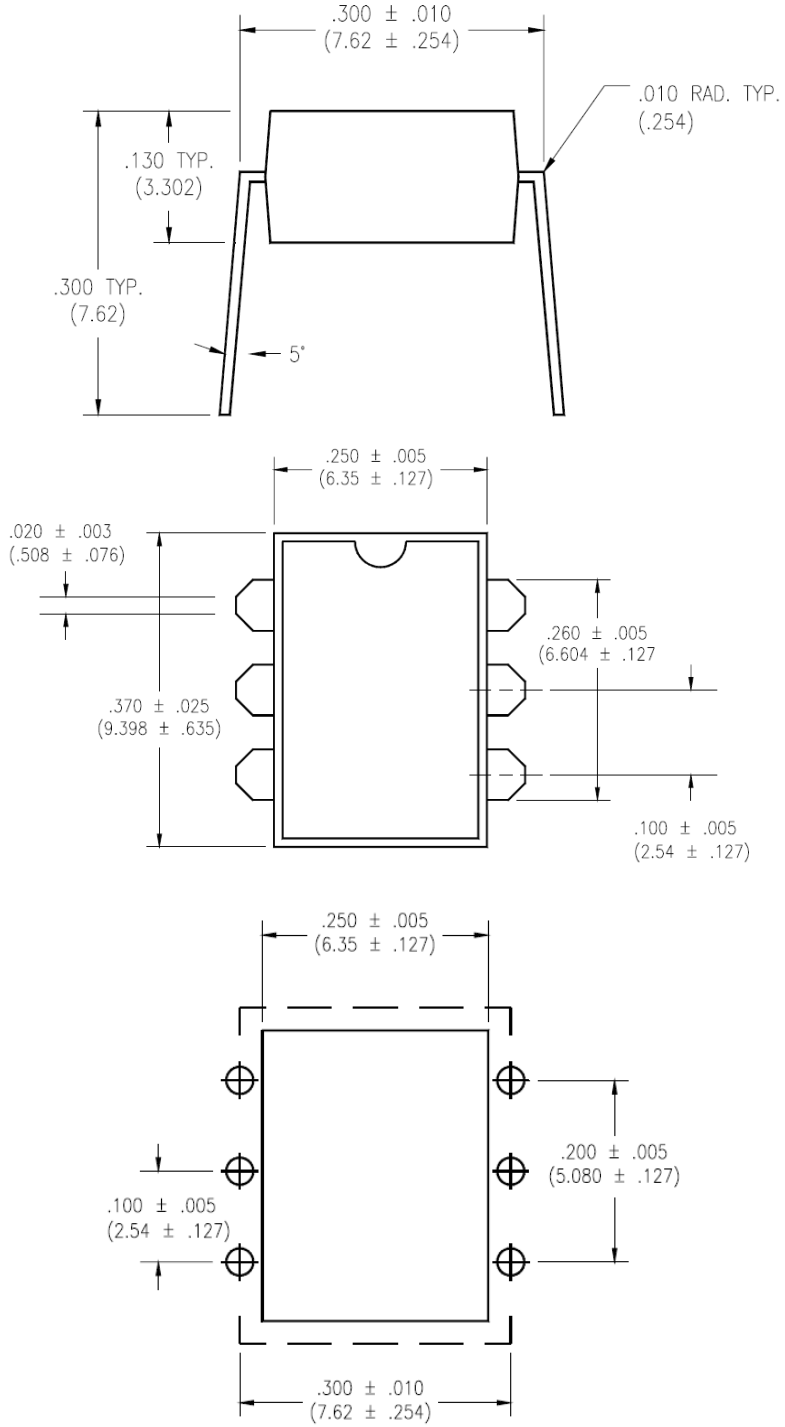
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

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AD6C941 Package Dimensions

6 PIN DIP Package

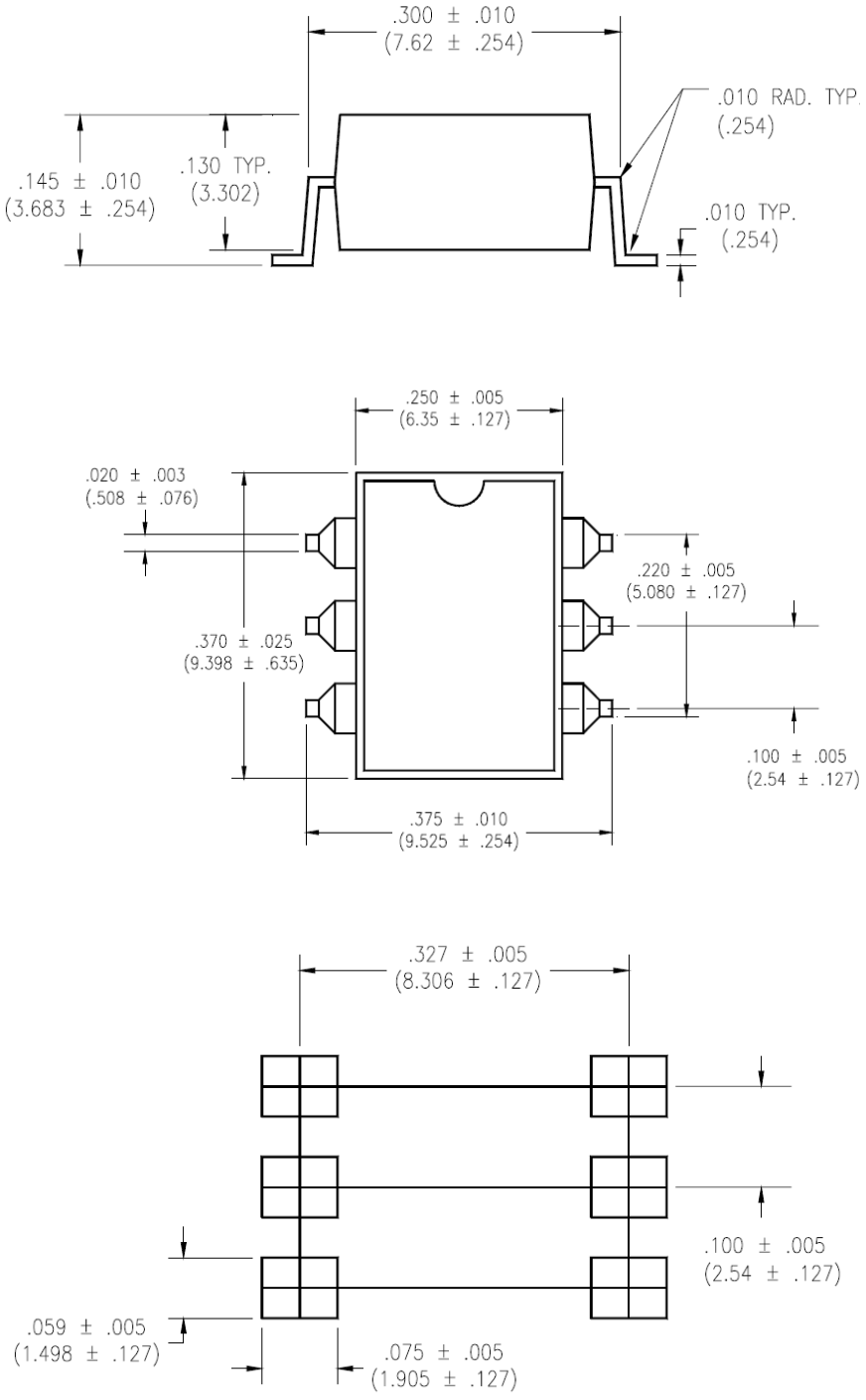
Note: *All dimensions in inches ["] with millimeters in parenthesis ()*



AD6C941 Package Dimensions

6 PIN SMD Surface Mount Package (-S)

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

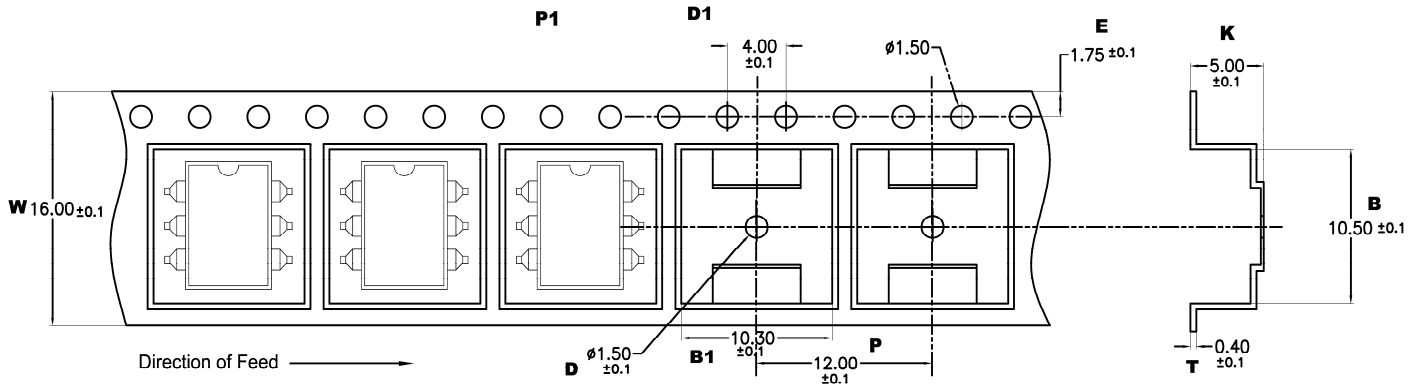


AD6C941 Package Dimensions

6 PIN SMD Tape & Reel (-STR)

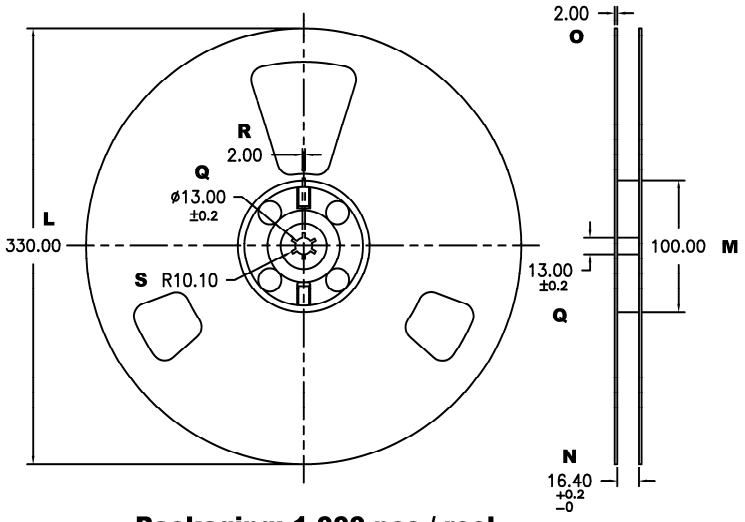
Note: *All dimensions in millimeters*

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

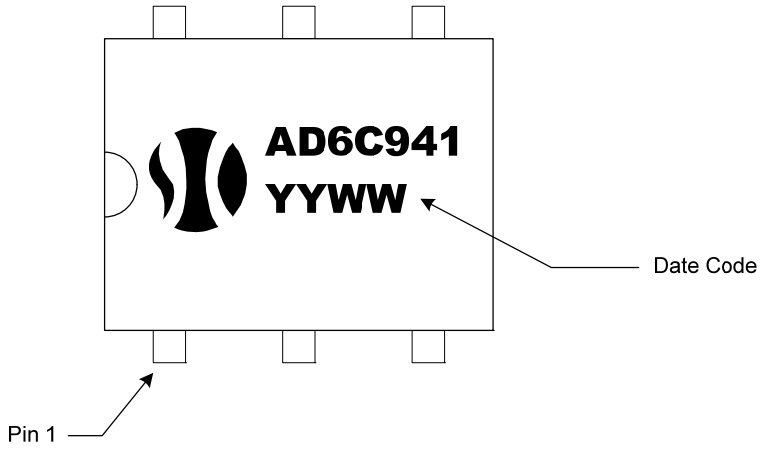
Outline and Dimensions (Reel)



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

AD6C941 Package Marking



AD6C941 Package Weights

Device	Single Unit	Full Tube (50pcs)	Full Pouch (10 tubes)	Full Reel (1000pcs)
AD6C941	0.45	48	490	-
AD6C941-S	0.44	46	470	-
AD6C941-STR	0.44	-	-	884

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

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