SOLID STATE OPTRONICS

SDT400-R

DC Input
80V
Photo-Transistor Optocoupler

Description

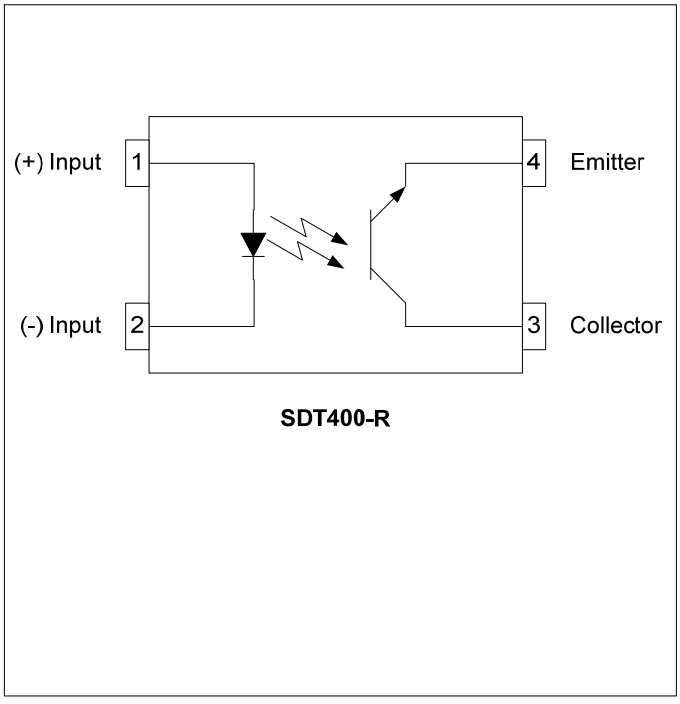
The SDT400-R consists of a phototransistor optically coupled to a light emitting diode. Optical coupling between the input IR LED and output phototransistor allows for high isolation levels while maintaining low-level DC signal control capability. The SDT400-R provides an optically isolated method of controlling many interface applications such as telecommunications, industrial control and instrumentation circuitry.

The SDT400-R comes standard in a miniature 4 pin DIP package.

Applications

- Registers, Copiers, Automatic Vending Machines
- System Appliances, Measuring Instruments
- Computer Terminals, PLCs
- Telecommunication Equipment, Telephones
- Home Appliances
- Digital Logic Inputs
- Microprocessor Inputs
- Switching Power Supplies

Schematic Diagram



SDT400-R

Features

- V_{CEO} = 80V
- Reversed Output (Emitter-Pin4, Collector-Pin3)
- Low input power consumption
- CTR Range 50 – 600% (Binning Available)
- High Isolation Voltage (5000V_{RMS})
- 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	70mW
Total Power Dissipation	200mW
Solder Temperature – Wave (10sec)	260°C
Solder Temperature – IR Reflow (10sec)	260°C

Ordering Information / Lead Form / Packaging

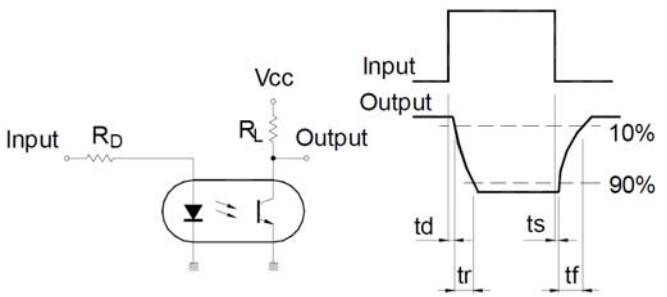
Part Number	Description
SDT400-R	4 pin DIP, (100/Tube)
SDT400-RH	0.40" (10.16mm) Lead Spacing (VDE0884)
SDT400-RS	4 pin SMD, (100/Tube)
SDT400-RSTR	4 pin SMD, Tape and Reel (2000/Reel)

NOTE: For complete product ordering / naming conventions, reference page 10. Suffixes listed above are not included in marking on device for part number identification

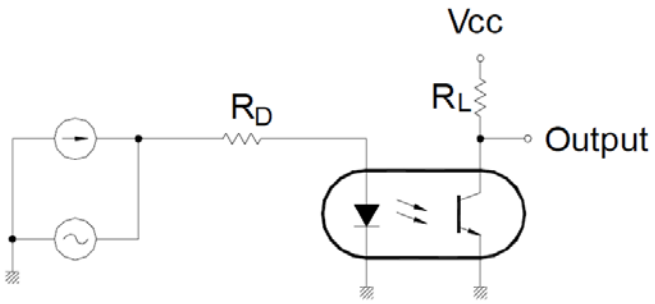
Electrical Characteristics, T_A = 25°C (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Input Specifications						
LED Forward Voltage	V_F	-	1.2	1.4	V	I_F = 20mA
LED Reverse Voltage	BV_R	6	-	-	V	I_R = 10μA
Terminal Capacitance	C_t	-	30	250	pF	V=0, f=1KHz
Input Reverse Current	I_R	-	-	10	μA	V_R=4V
Output Specifications						
Collector-Emitter Voltage	V_{CEO}	80	-	-	V	I_C=100μA
Emitter-Collector Voltage	V_{ECO}	6	-	-	V	I_E=10μA
Collector Dark Current	I_{CEO}	-	-	100	nA	V_{CE}=20V
Collector Current	I_C	2.5	-	30	mA	I_F=5mA, V_{CE}=5V
Floating Capacitance	C_f	-	0.6	1.0	pF	V_{CE}=0, f=1MHz
Cut-Off Frequency	f_C	-	80	-	kHz	V_{CE}=5V, I_C=2mA, R_L=100Ω, -3dB
Saturation Voltage	$V_{CE(sat)}$	-	0.1	0.2	V	I_F=20mA, I_C=1mA
Coupled Specifications						
Rise Time	T_R	-	4	-	μS	I_C=2mA, V_{CC}=2V, R_L=100Ω
Fall Time	T_F	-	3	-	μS	I_C=2mA, V_{CC}=2V, R_L=100Ω
Current Transfer Ratio	CTR	50	-	600	%	I_F=10mA, V_{CE}=5V
CTR Classification (BINNING)						
- C		100	-	400	%	I_F=10mA, V_{CE}=5V
- E		50	-	600	%	I_F=10mA, V_{CE}=5V
Isolation Specifications						
Isolation Voltage	V_{ISO}	5000	-	-	V_{RMS}	RH ≤ 50%, t=1min
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	V_{I-O} = 500V_{DC}

Test Circuit: *Response Time*



Test Circuit: *Frequency Response*



SDT400-R Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

Figure 1: *Forward Current (I_F) vs. Temperature (°C)*

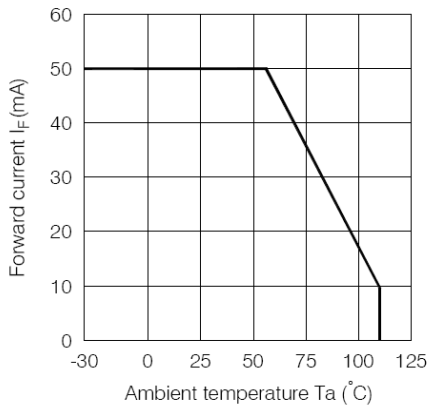


Figure 2: *Collector Power Dissipation (P_C) vs. Temperature (°C)*

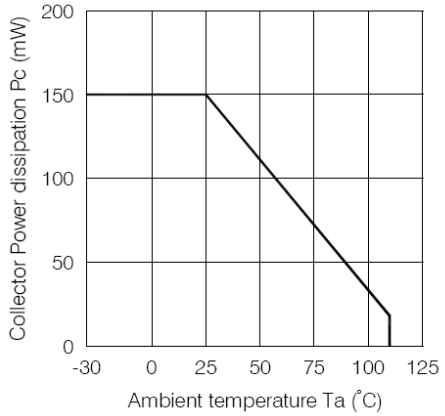


Figure 3: *Collector-Emitter Saturation Voltage ($V_{CE(SAT)}$) vs. Forward Current (I_F)*

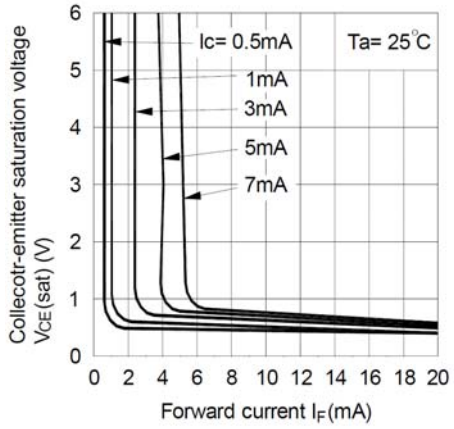


Figure 4: *Forward Current (I_F) vs. Forward Voltage (V_F)*

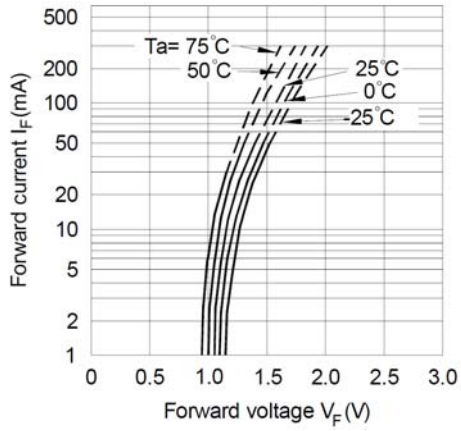


Figure 5: *Collector Current (I_C) vs. Collector-Emitter Voltage (V_{CE})*

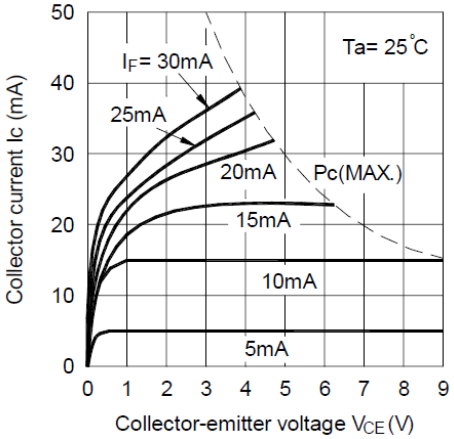
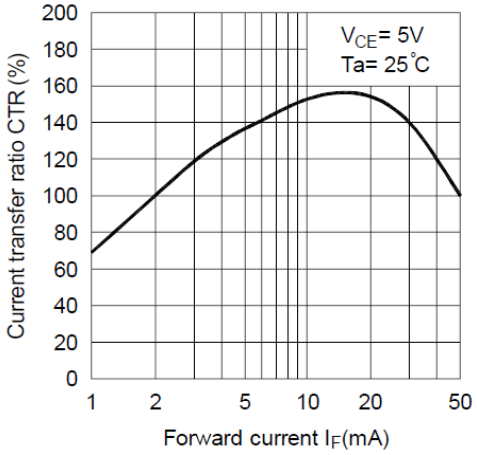


Figure 6: *Current Transfer Ratio (CTR) vs. Forward Current (I_F)*



SDT400-R Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

Figure 7: *Relative CTR (%) vs. Temperature (°C)*

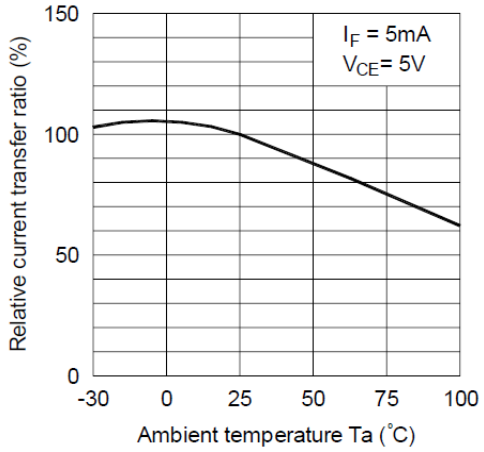


Figure 8: *Collector-Emitter Saturation Voltage ($V_{CE(SAT)}$) vs. Temperature (°C)*

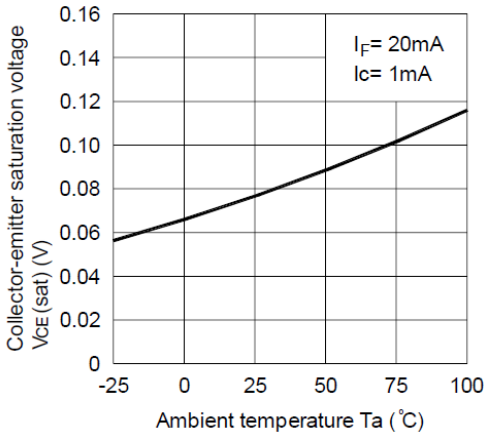


Figure 9: *Collector Dark Current (I_{CEO}) vs. Temperature (°C)*

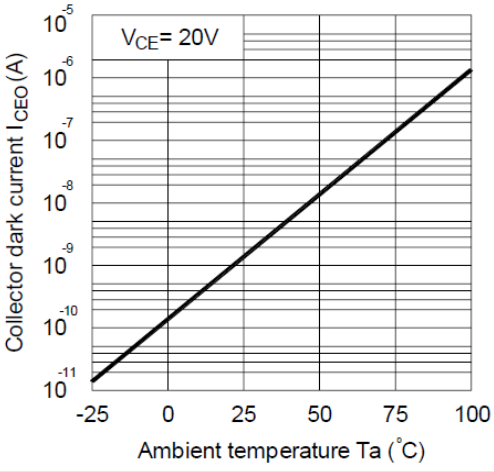


Figure 10: *Response Times vs. Load Resistance (R_L)*

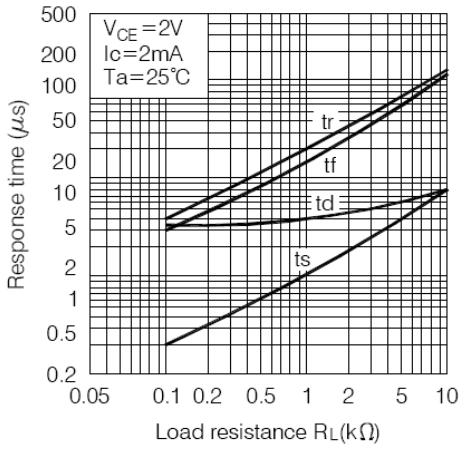
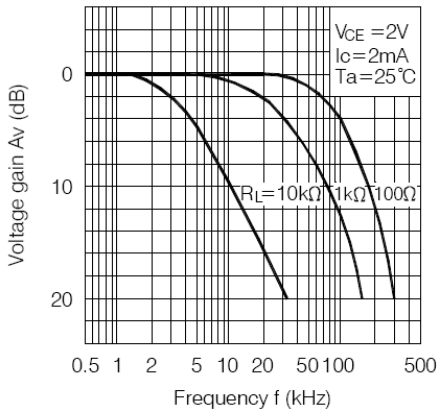


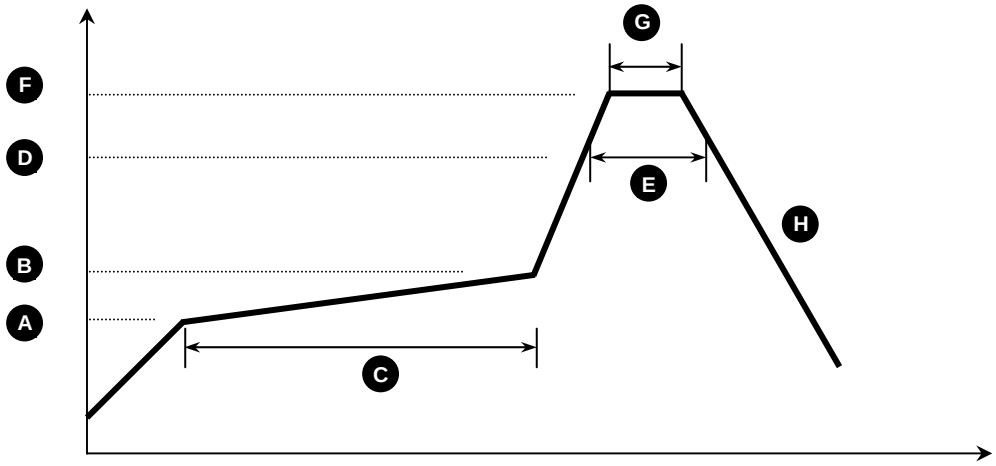
Figure 11: *Frequency Response Characteristics*



SDT400-R Solder Reflow 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:



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	

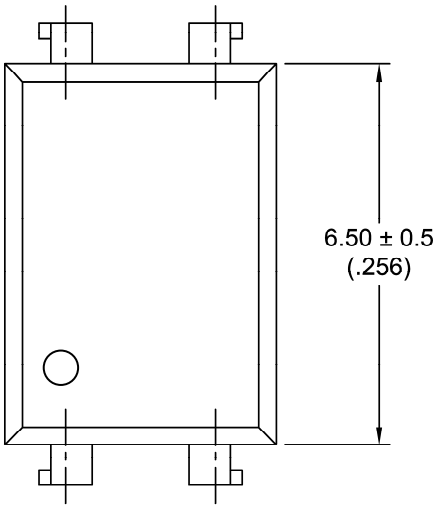
(3) *Hand Solder:*

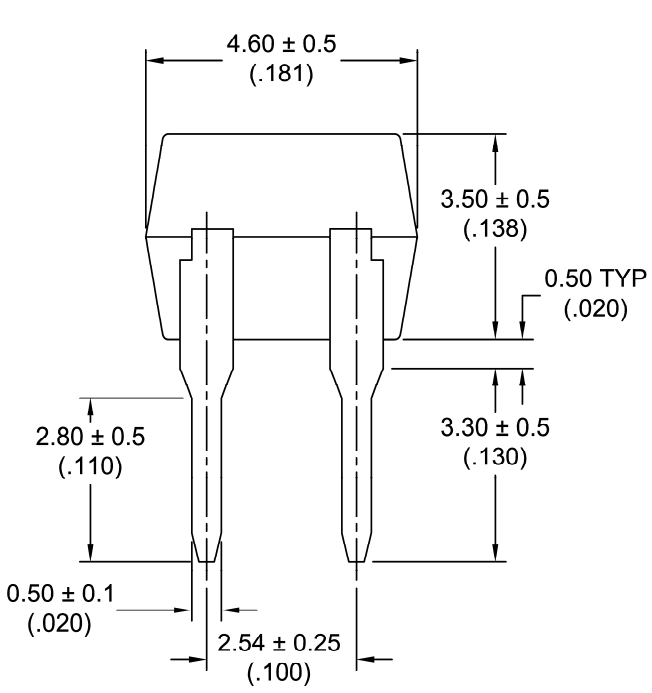
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

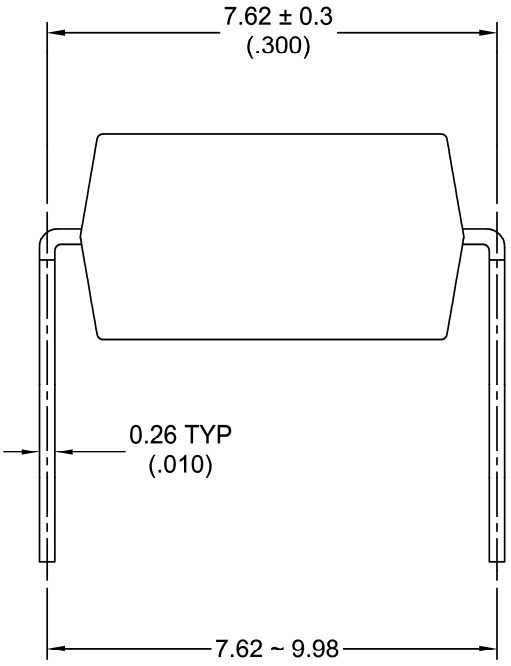
SDT400-R Package Dimensions

4 PIN DIP Package

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



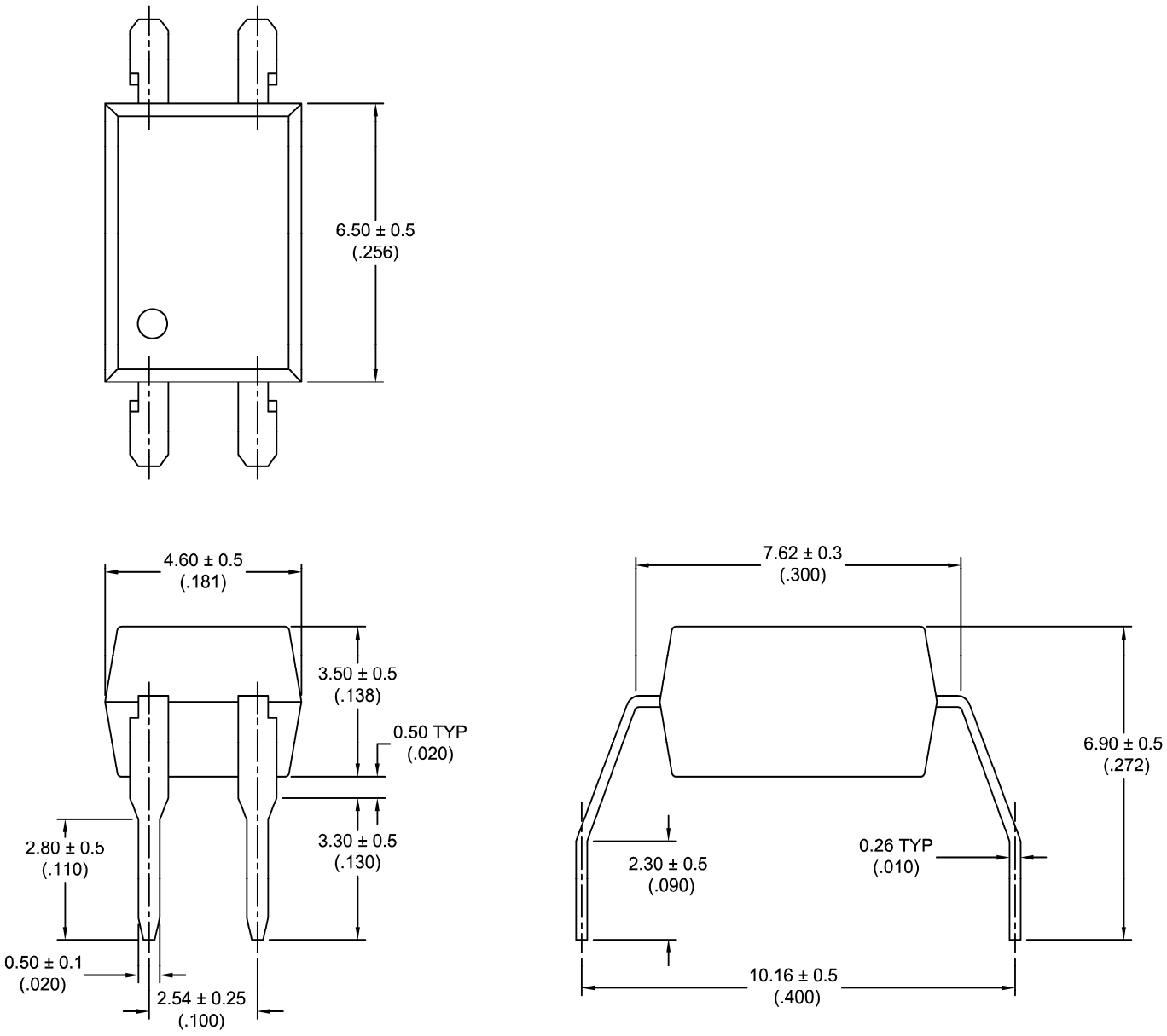




SDT400-R Package Dimensions

4 PIN WIDE Lead Space Package (-H)

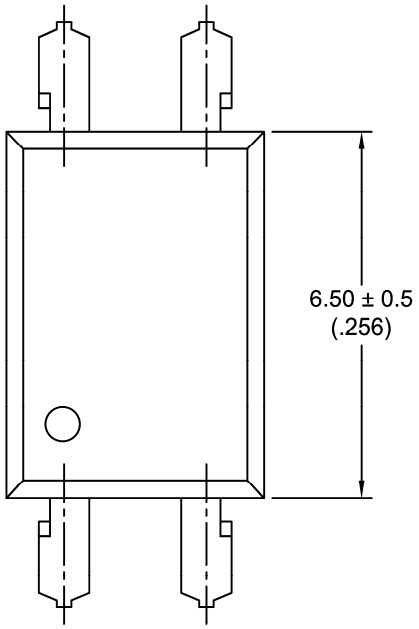
Note: *All dimensions in millimeters [mm] with inches in parenthesis ()*

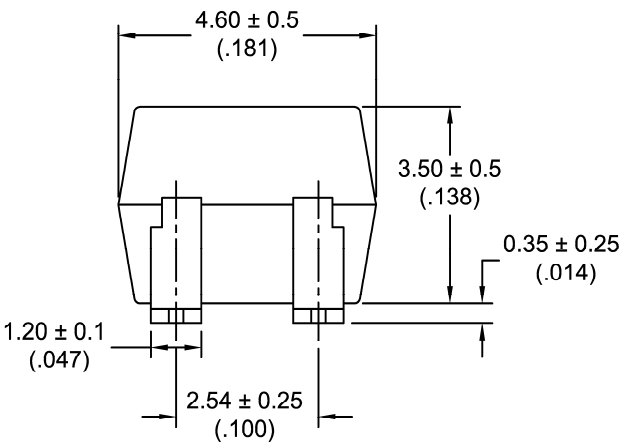


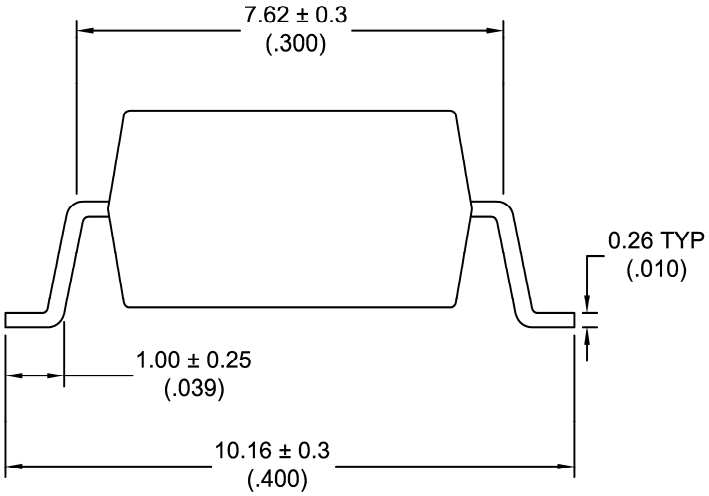
SDT400-R Package Dimensions

4 PIN SMD Surface Mount Package (-S)

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



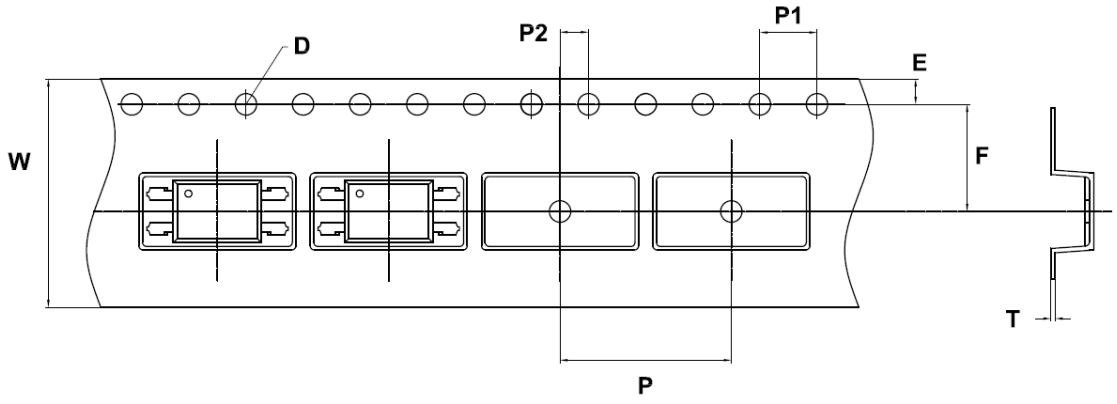




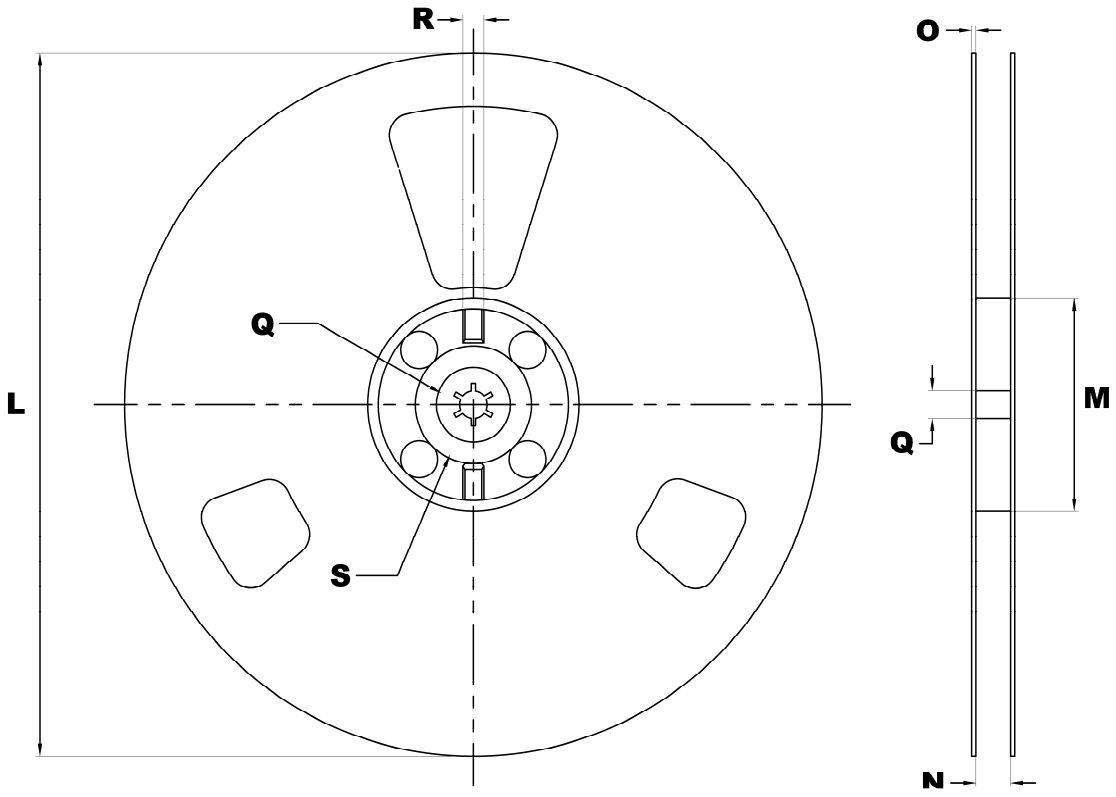
SDT400-R Packaging Specifications

Tape & Reel Specifications (T&R)

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



D	E	F	P	P1	P2	W	T
1.55±0.05	1.75±0.1	7.5±0.1	12.0±0.1	4.0±0.1	2.0±0.1	16.0±0.3	0.3±0.05



L	M	N	O	Q	R	S
330±2	101.6±1	16.4+0.2	2.0±0.2	R13±0.5	1.50±0.5	R10±1

SDT400-R Ordering Information

SDT400 – R X Y Z

CTR Binning

- A	100-400%
- B	100-400%
- C	100-400%
- D	100-400%
- E or Blank	50-600%

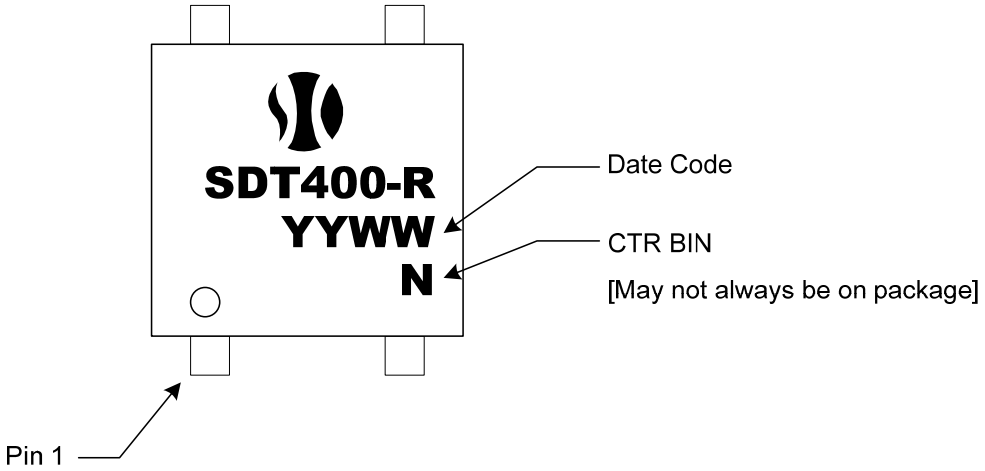
VDE Lead Spacing

- Blank	Standard DIP
- "H"	0.40" Lead Spacing

Packaging / Lead Form

- Blank	Standard DIP
- S	SMD Form
- STR	SMD + Tape & Reel

SDT400-R Package Marking



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.