SAT1600

AC Input
60V
Quad Pole Optocoupler

Description

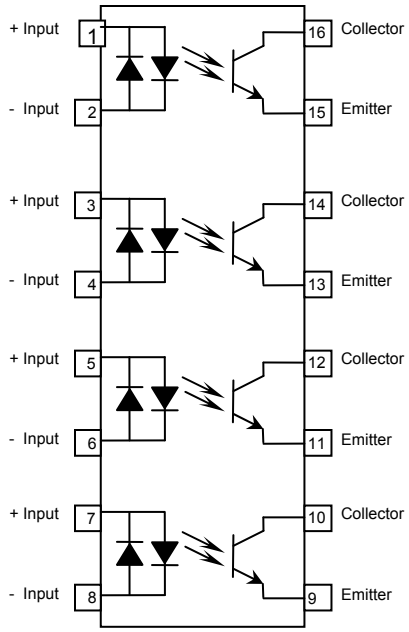
The SAT1600 consists of four phototransistors optically coupled to individual light emitting diodes. Optical coupling between two input IR LEDs and a single output phototransistor allows for high isolation levels while maintaining low-level AC signal control capability. The SAT1600 provides an optically isolated method of controlling many interface applications such as telecommunications, industrial control and instrumentation circuitry.

The SAT1600 comes standard in a 16 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



SAT1600

Features

- V_{CEO} = 70V
- 16 pin DIP/SMD package
- Low input power consumption
- High stability
- CTR Range 20 – 300%
- 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 +100°C
Continuous Input Current	50mA
Transient Input Current	500mA
Reverse Input Control Voltage	5V
Input Power Dissipation	40mW[1]
Total Power Dissipation	200mW[1]
Solder Temperature – Wave (10sec)	260°C
Solder Temperature – IR Reflow (10sec)	260°C

[1] Per Channel

Ordering Information

Part Number	Description
SAT1600	16 pin DIP, (25/Tube)
SAT1600-H	0.40" (10.16mm) Lead Spacing (VDE0884)
SAT1600-S	16 pin SMD, (25/Tube)

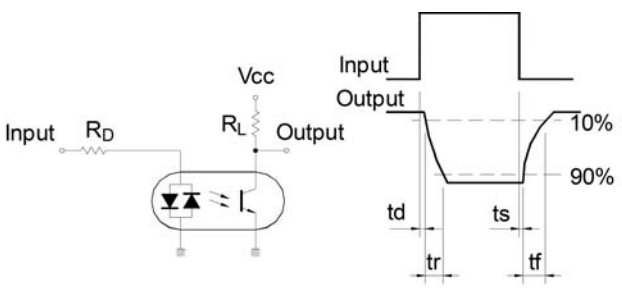
NOTE: Suffixes listed above are not included in marking on device for part number identification

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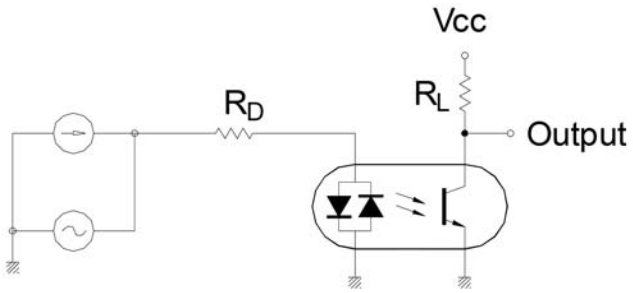
Electrical Characteristics, T_A = 25°C (unless otherwise specified). Specifications for each individual pole.

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	5	-	-	V	I_R = 10µA
Terminal Capacitance	C_t	-	30	250	pF	V=0, f=1KHz
Reverse Current	I_R	-	-	10	µA	V_R=4V
Output Specifications						
Collector-Emitter Voltage	V_{CEO}	60	-	-	V	I_C=10µA
Emitter-Collector Voltage	V_{COE}	6	-	-	V	I_E=10µA
Collector Dark Current	I_{CEO}	-	-	0.1	µA	V_{CE}=20V
Floating Capacitance	C_f	-	0.6	1.0	pF	V=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	18	µS	I_C=±2mA, V_{CC}=2V, R_L=100Ω
Fall Time	T_F	-	3	18	µS	I_C=±2mA, V_{CC}=2V, R_L=100Ω
Current Transfer Ratio	CTR	20	-	300	%	I_F=±1mA, 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*



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SAT1600 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

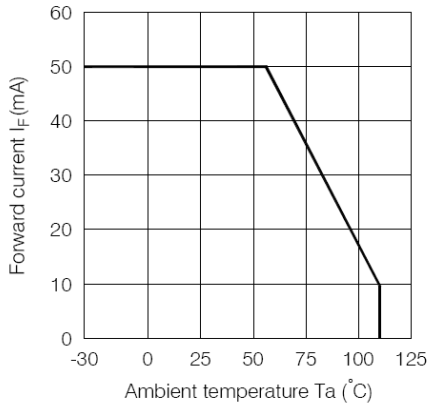


Figure 2: *Collector-Emitter Saturation Voltage ($V_{CE(SAT)}$) vs. Forward Current (I_F)*

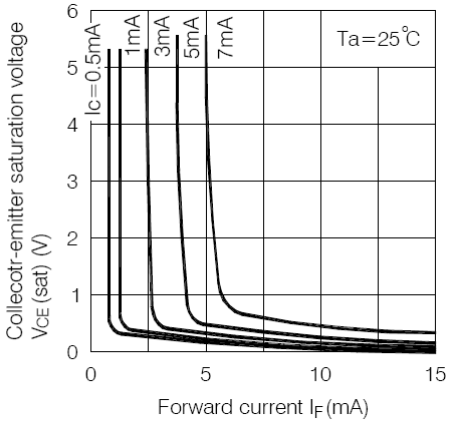


Figure 3: *Collector Power Dissipation (P_C) vs. Temperature (°C)*

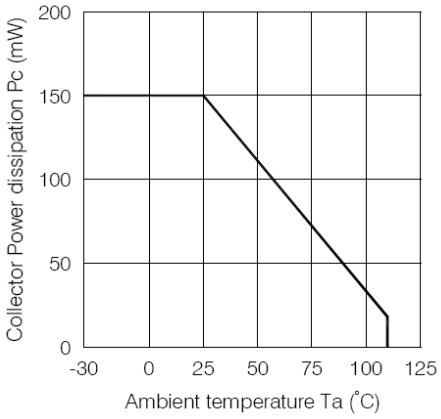


Figure 4: *Current Transfer Ratio (CTR) vs. Forward Current (I_F)*

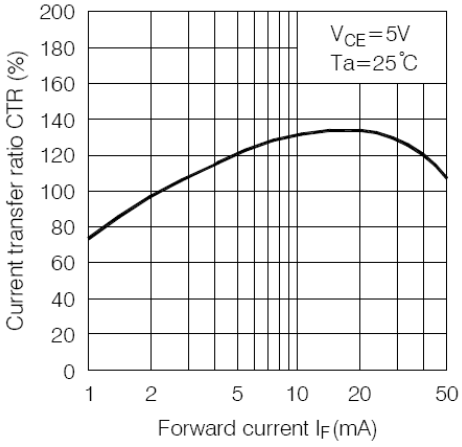


Figure 5: *Forward Current (I_F) vs. Forward Voltage (V_F)*

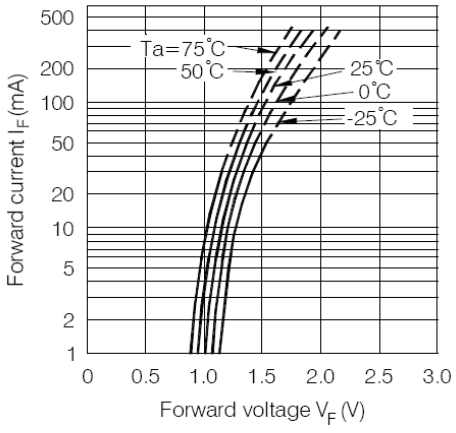
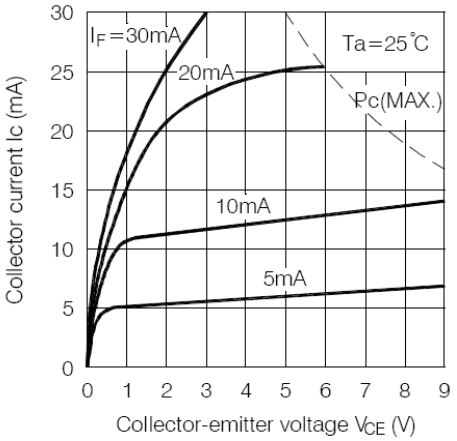


Figure 6: *Collector Current (I_C) vs. Collector-Emitter Voltage (V_{CE})*



SAT1600 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

Figure 7: *Response Times vs. Load Resistance (R_L)*

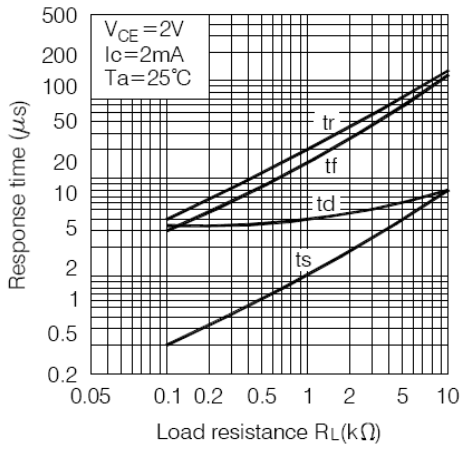


Figure 8: *Frequency Response Characteristics*

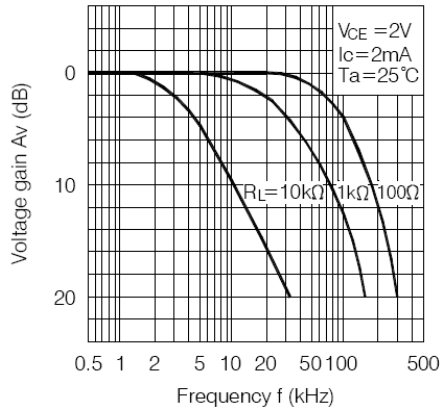


Figure 9: *Collector-Emitter Saturation Voltage ($V_{CE(SAT)}$) vs. Temperature (°C)*

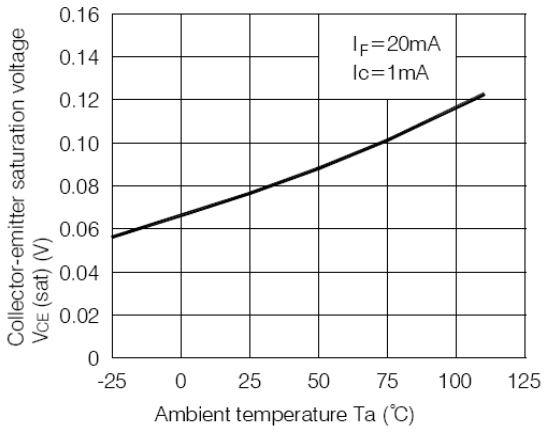


Figure 10: *Relative CTR (%) vs. Temperature (°C)*

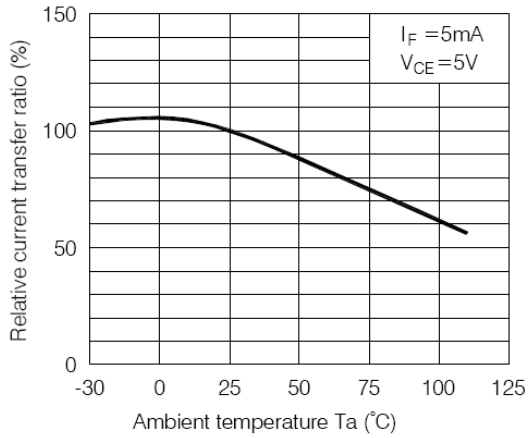
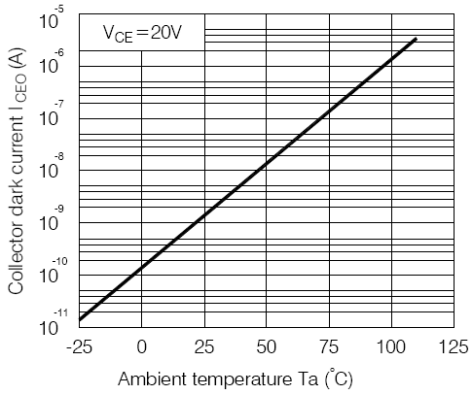


Figure 11: *Collector Dark Current (I_{CEO}) vs. Temperature (°C)*

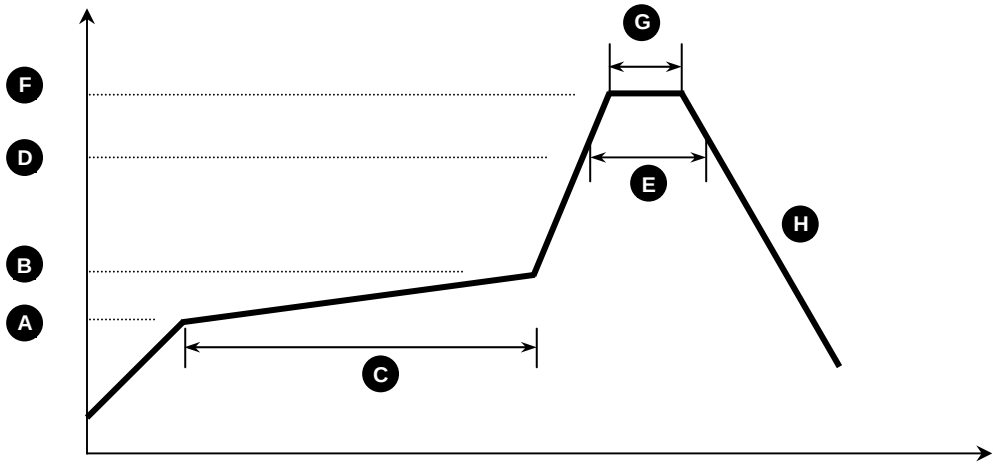


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SAT1600 Solder Reflow Temperature Profile Recommendations

(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:*

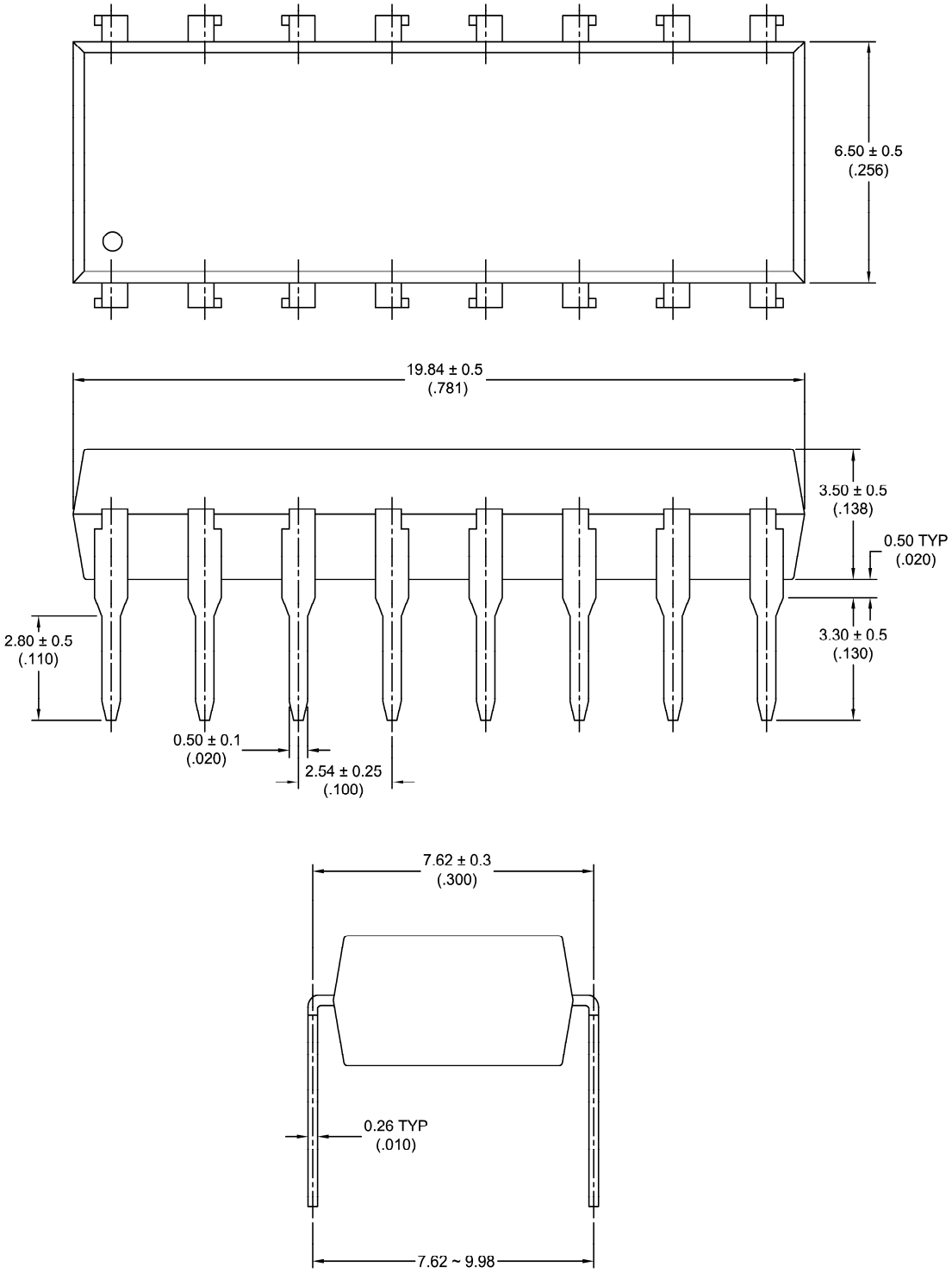
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

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SAT1600 Package Dimensions

16 PIN DIP Package

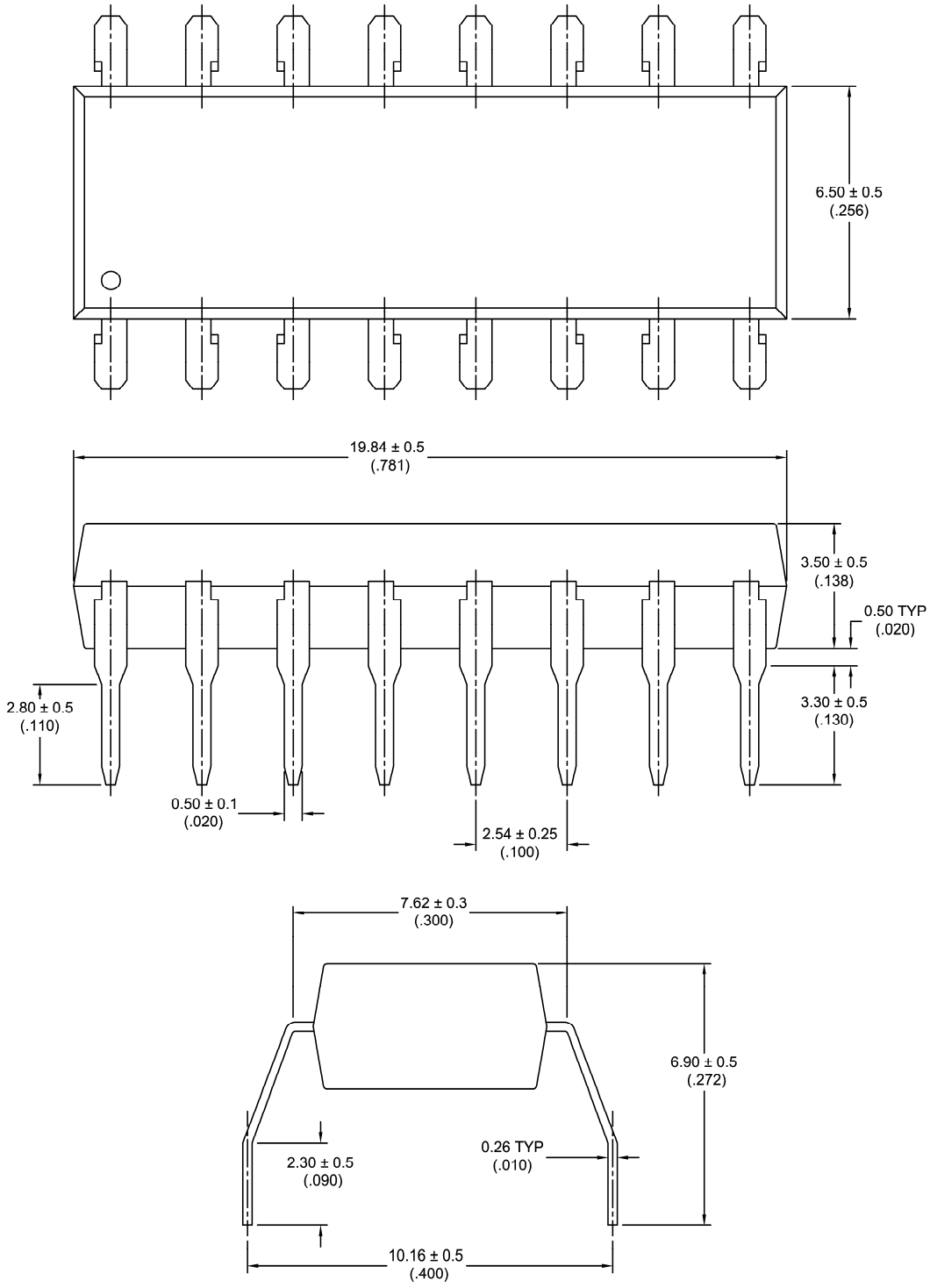
Note: *All dimensions in millimeters [mm] with inches in parenthesis ()*



SAT1600 Package Dimensions

16 PIN WIDE Lead Space Package (-H)

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

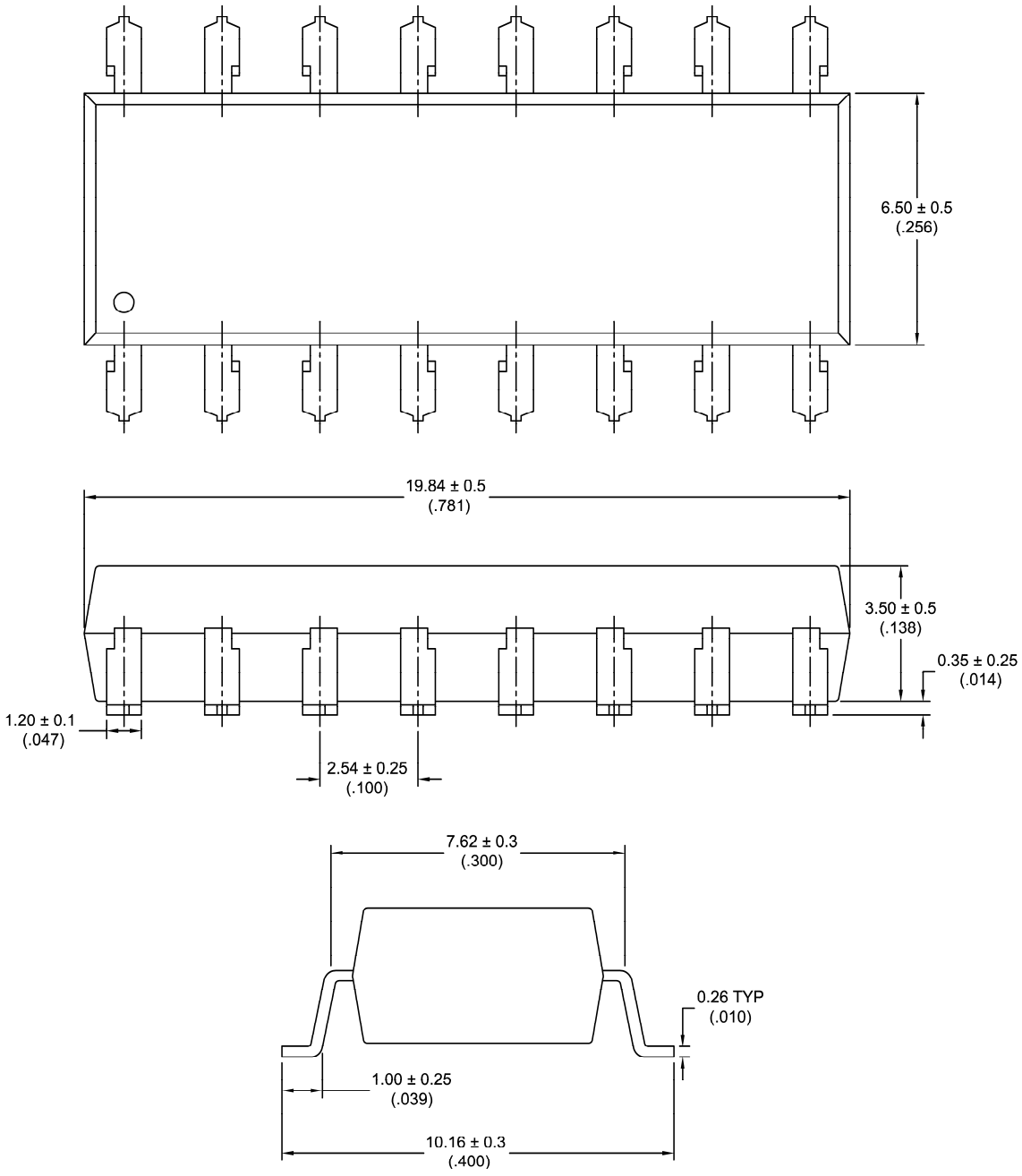


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SAT1600 Package Dimensions

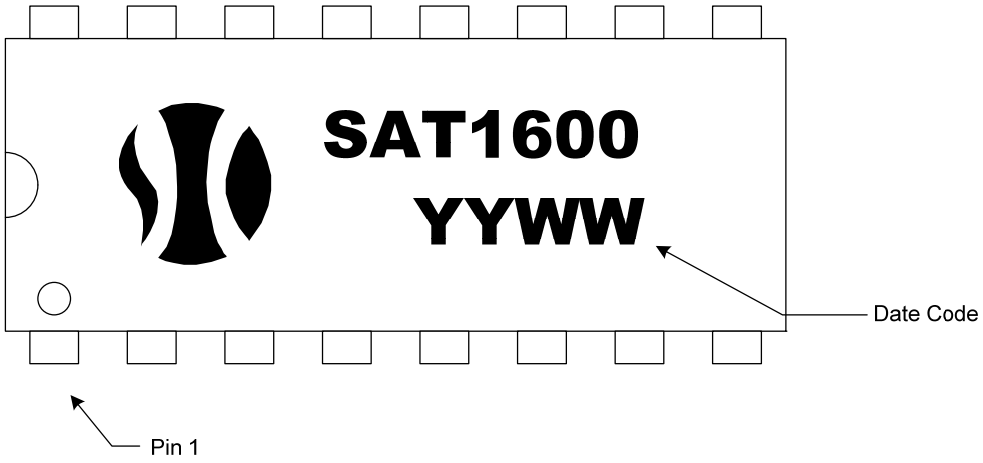
16 PIN SMD Surface Mount Package (-S)

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



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SAT1600 Package Marking



SAT1600 Package Weights

Device	Single Unit	Full Tube (25pcs)	Full Pouch (10 tubes)
SAT1600	0.91	36	380
SAT1600-H	0.93	37	380
SAT1600-S	0.89	36	380

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

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