SOLID STATE OPTRONICS



SAT470

AC Input
80V
Photo-Transistor Optocoupler

Description

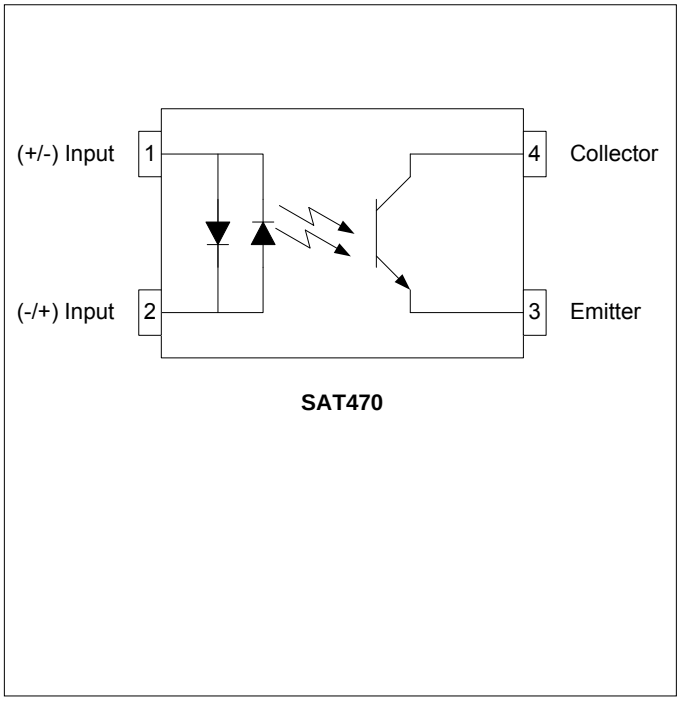
The SAT470 consists of a phototransistor optically coupled to two light emitting diodes. Optical coupling between the input IR LEDs and output phototransistor allows for high isolation levels while maintaining low-level AC or DC signal control capability. The SAT470 provides an optically isolated method of controlling many interface applications such as telecommunications, industrial control and instrumentation circuitry.

The SAT470 comes standard in an ultra-miniature 4 pin SSOP package.

Applications

- Office Automation Equipment
- System Appliances, Measuring Instruments
- Computer Terminals, PLCs
- Telecom / Datacom
- Home Appliances
- Digital Logic Inputs
- Fax / Modems
- Power Supplies

Schematic Diagram



SAT470

Features

- Ultra miniature 4 pin SSOP package
- Low input power consumption
- High stability
- CTR Range 20 – 400%
- High Isolation Voltage (3750V_{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	6V
Input Power Dissipation	40mW
Total Power Dissipation	200mW
Solder Temperature – Wave (10sec)	260°C
Solder Temperature – IR Reflow (10sec)	260°C

Ordering Information

Part Number	Description
SAT470	4 pin SSOP, (170/Tube)
SAT470-TR	4 pin SSOP, Tape and Reel (3000/Reel)

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

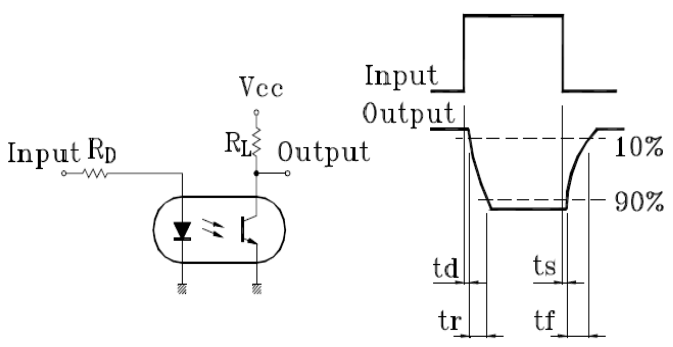
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SAT470 /TR
Rev 2.11 (11/30/2012)
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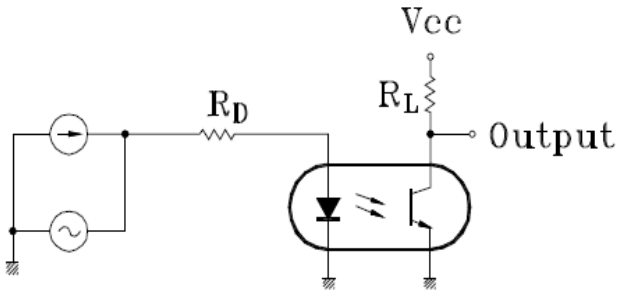
Electrical Characteristics, T_A = 25°C (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Input Specifications						
LED Forward Voltage	V_F	-	1.2	1.4	V	I_F = ±20mA
Terminal Capacitance	C_t	-	60	250	pF	V=0, f=1KHz
Output Specifications						
Collector-Emitter Voltage	V_{CEO}	80	-	-	V	I_C=100µA
Emitter-Collector Voltage	V_{COE}	7	-	-	V	I_E=10µA
Collector Dark Current	I_{CEO}	-	-	100	nA	V_{CE}=50V, I_F=0mA
Floating Capacitance	C_f	-	0.8	1.0	pF	V=0, f=1MHz
Cut-Off Frequency	f_C	-	80	-	kHz	V_{CE}=2V, I_C=20mA, R_L=100Ω, -3dB
Saturation Voltage	$V_{CE(sat)}$	-	0.1	0.4	V	I_F=±20mA, I_C=1mA
Coupled Specifications						
Rise Time	T_R	-	3	-	µS	I_C=±2mA, V_{CC}=2V, R_L=100Ω
Fall Time	T_F	-	4	-	µS	I_C=±2mA, V_{CC}=2V, R_L=100Ω
Current Transfer Ratio	CTR	20	-	400	%	I_F=±1mA, V_{CE}=5V
(-A Binning)	CTR	50	-	250	%	I_F=±1mA, V_{CE}=5V
Isolation Specifications						
Isolation Voltage	V_{ISO}	3,750	-	-	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*



SAT470 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

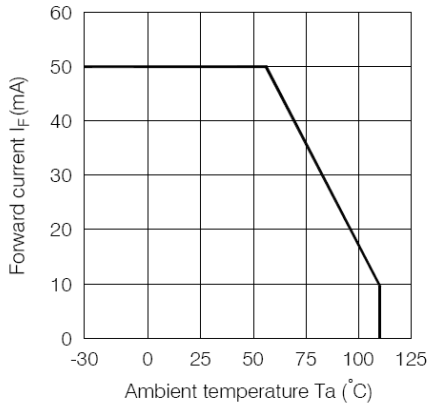


Figure 2: *Collector Power Dissipation (P_C) vs. Temperature (°C)*

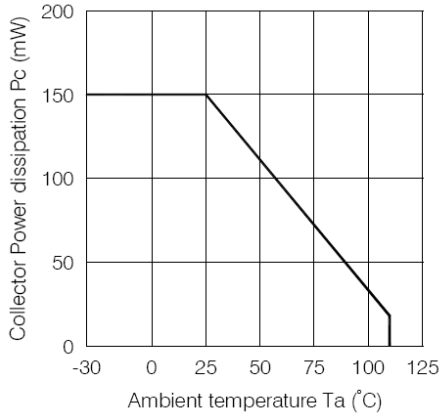


Figure 3: *Collector-Emitter Saturation Voltage ($V_{CE(SAT)}$) vs. Forward Current (I_F)*

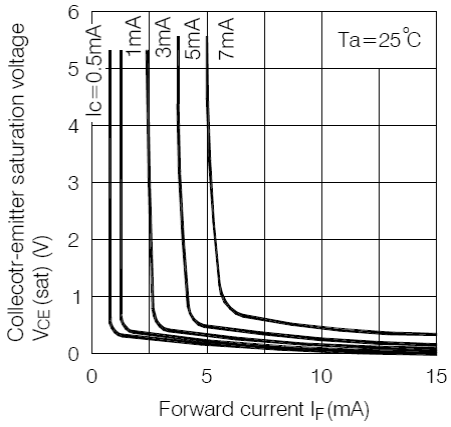


Figure 4: *Forward Current (I_F) vs. Forward Voltage (V_F)*

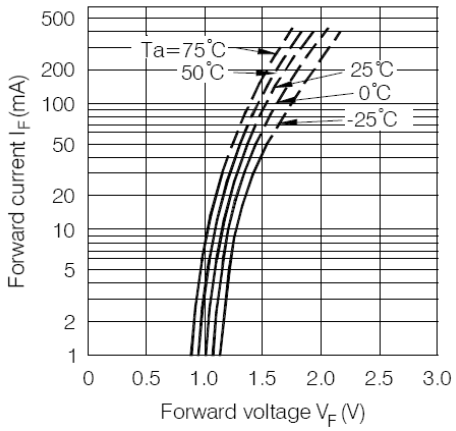


Figure 5: *Collector Current (I_C) vs. Collector-Emitter Voltage (V_{CE})*

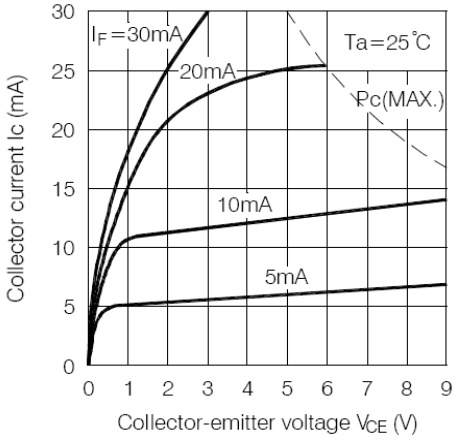
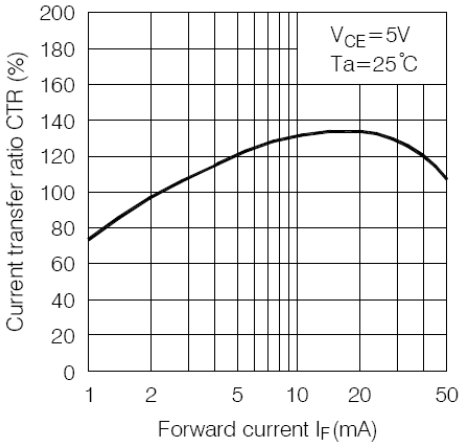


Figure 6: *Current Transfer Ratio (CTR) vs. Forward Current (I_F)*



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SAT470 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

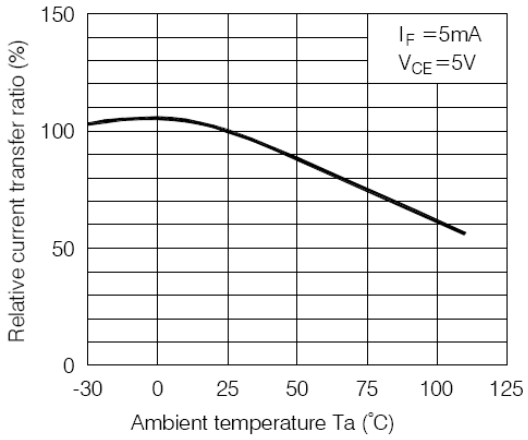


Figure 8: *Collector-Emitter Saturation Voltage ($V_{CE(SAT)}$) vs. Temperature (°C)*

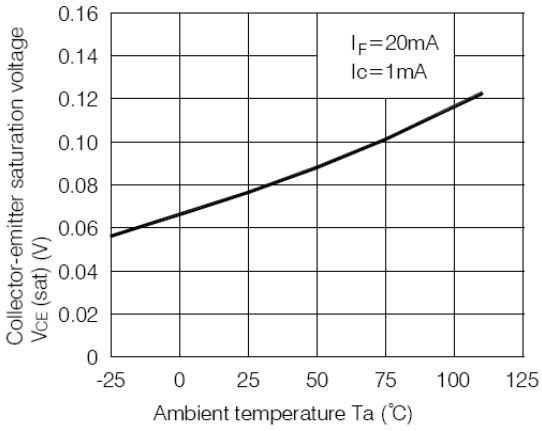


Figure 9: *Collector Dark Current (I_{CEO}) vs. Temperature (°C)*

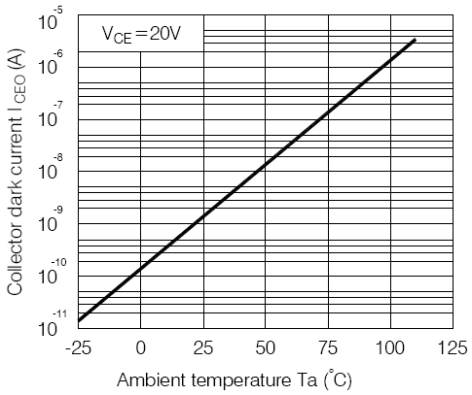


Figure 10: *Response Times vs. Load Resistance (R_L)*

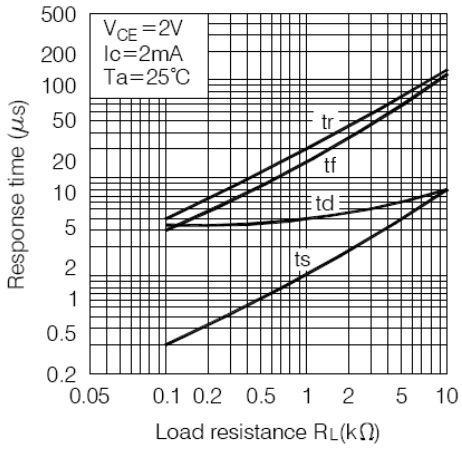
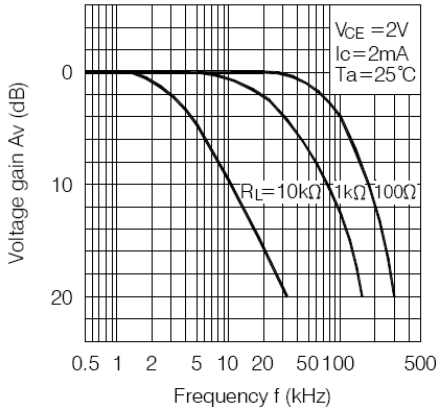


Figure 11: *Frequency Response Characteristics*

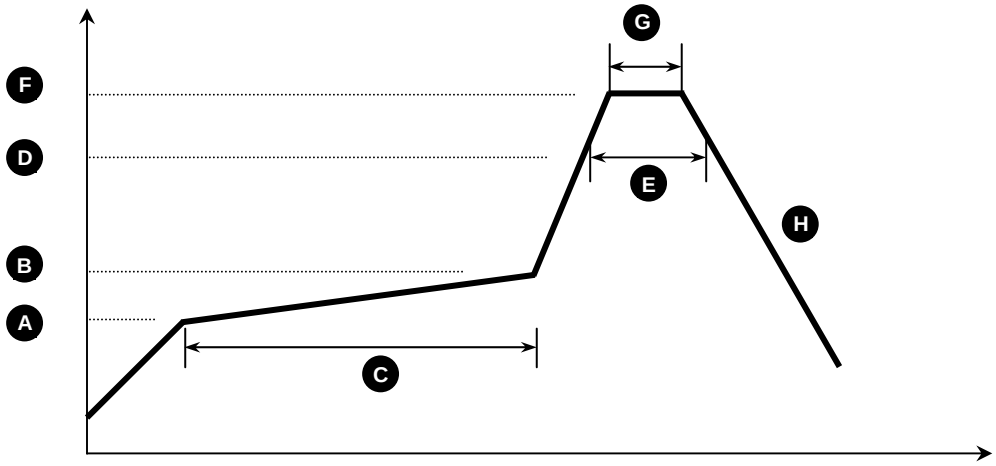


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SAT470 Solder Reflow Temperature Profile Recommendations

(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:*

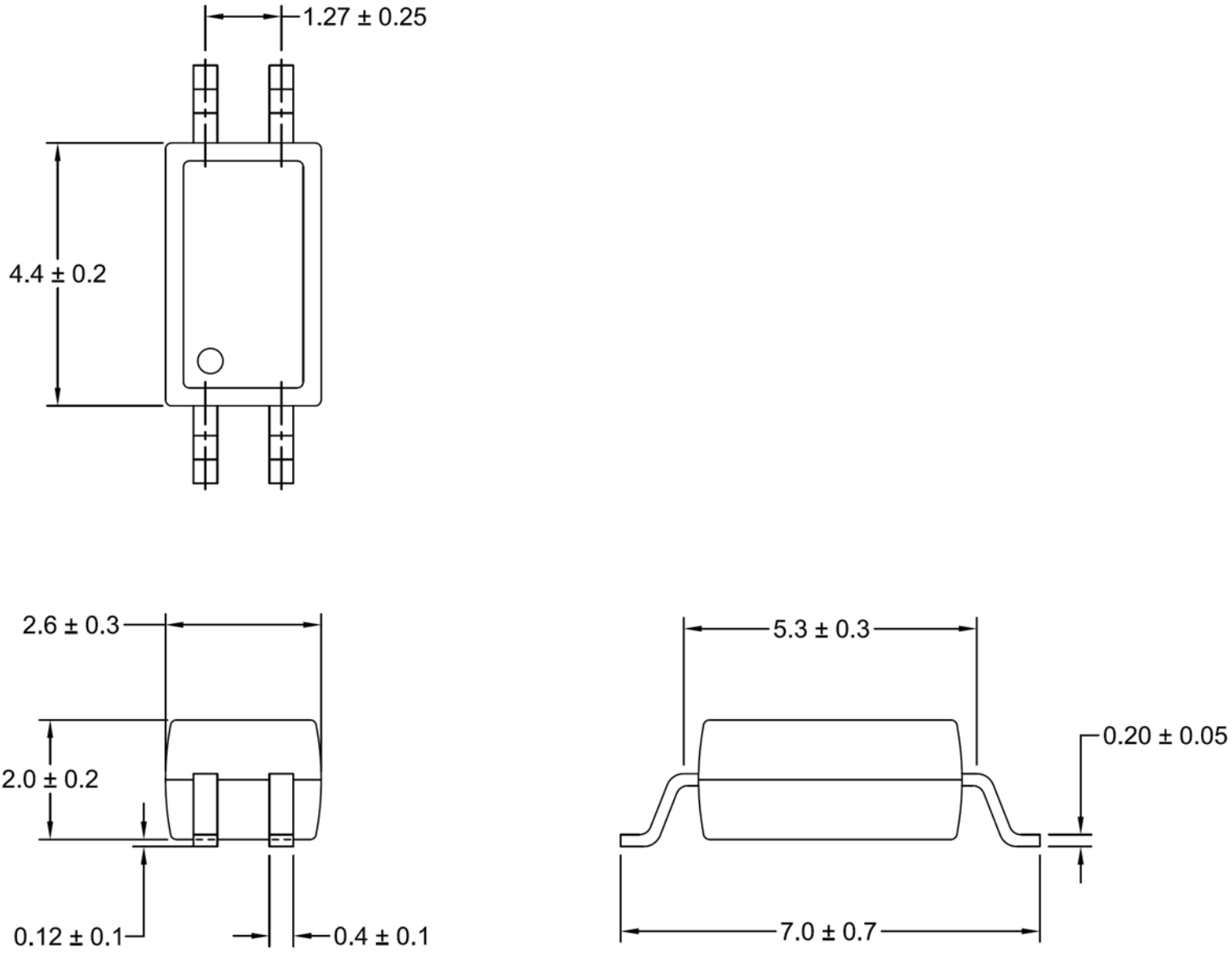
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

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SAT470 Package Dimensions

4 PIN SSOP Package

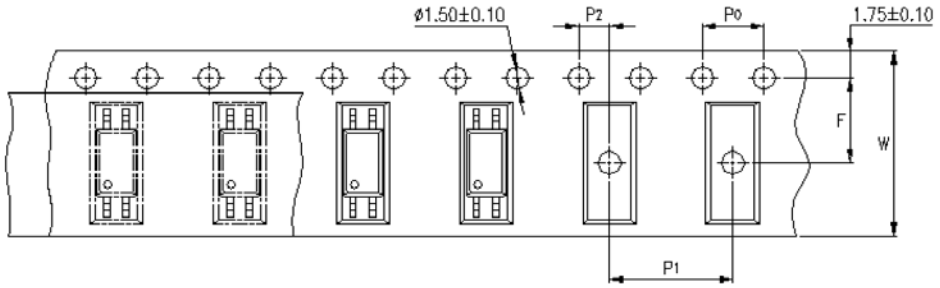
Note: *All dimensions in millimeters [mm]*



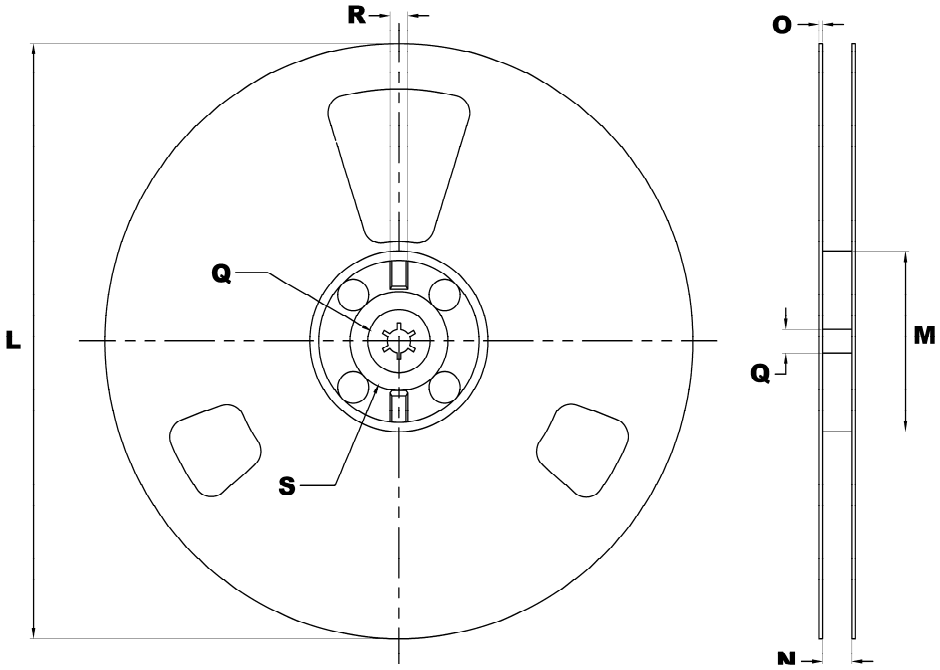
SAT470 Packaging Specifications

Tape & Reel Specifications (T&R)

Note: *All dimensions in millimeters [mm]*



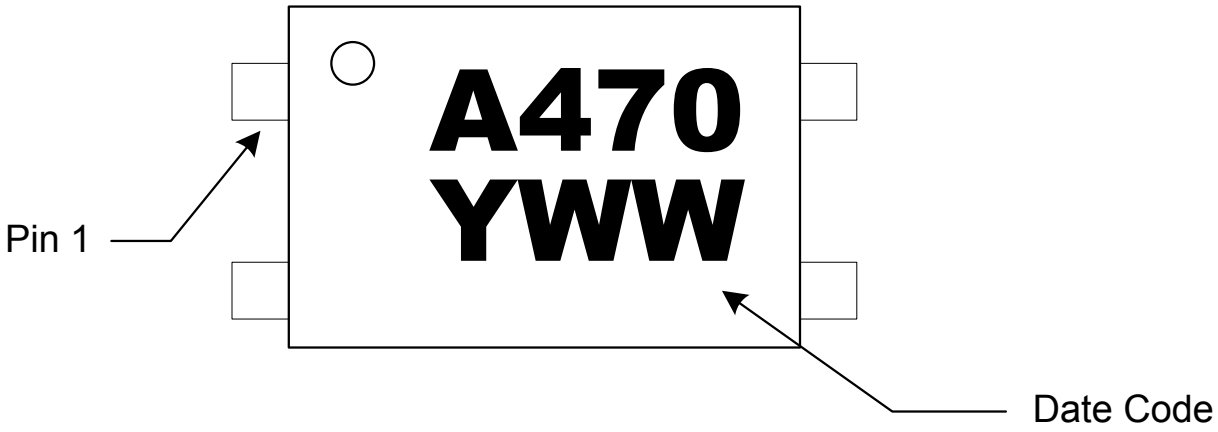
Specification	Symbol	Dimensions, mm (inches)
Tape Width	W	12 ± 0.3 (0.47)
Sprocket Hole Pitch	P0	4 ± 0.1 (0.15)
Compartment Location	F P2	5.5 ± 0.1 (0.217) 2 ± 0.1 (0.079)
Compartment Pitch	P1	12 ± 0.1 (0.472)



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

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SAT470 Package Marking



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