

Low Power Window Detector

CN305

General Description

The CN305 is a single adjustable window detector with separate under/overvoltage outputs. It consists of 2 comparators and a voltage reference, and is specially designed for monitoring single or multi lithium-ion (Li+) cells, multi-cell alkaline, NiCd, NiMH and multi-cell lead acid batteries. The comparators' threshold accuracy is $\pm 2\%$, and offers 7.5% hysteresis which eliminates the output chatter sometimes associated with battery voltage monitors, usually due to input voltage noise or battery terminal voltage recovery after load removal. The CN305 has 2 inputs that can be configured by the external resistor divider. When the voltage at OVIN rises above the rising overvoltage threshold, $\overline{OV}$ goes low. When the voltage at UVIN falls below the falling under voltage threshold, $\overline{UV}$ is driven to low. The device has a low quiescent current of 11 μA typical, and offers open-drain outputs. The device is available in 6 pin SOT23 package.

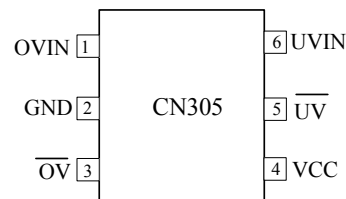
Applications

- Battery-powered Systems
- Multi-cell Batteries Monitoring
- Window Detector
- DSPs, Microcontrollers Applications
- Cell Phones and PDAs

Features

- Two low power high accuracy comparators
- Precise Threshold: $\pm 2\%$
- 7.5% Hysteresis to Eliminate the Output Chatter
- Open-Drain Outputs
- 11 μA Supply Current @VCC=3.7V
- Power Supply Transient Immunity
- Operating Temperature Range
-40°C to +85°C
- Available in SOT23-6
- Lead-free, Rohs-compliant and Halogen-free

Pin Assignment



Typical Application Circuit

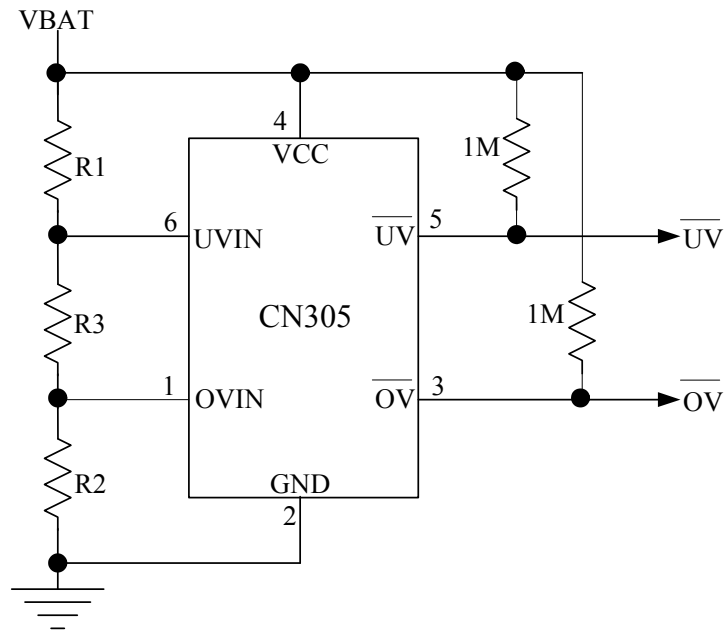


Figure 1 Dual-Outputs Window Detector

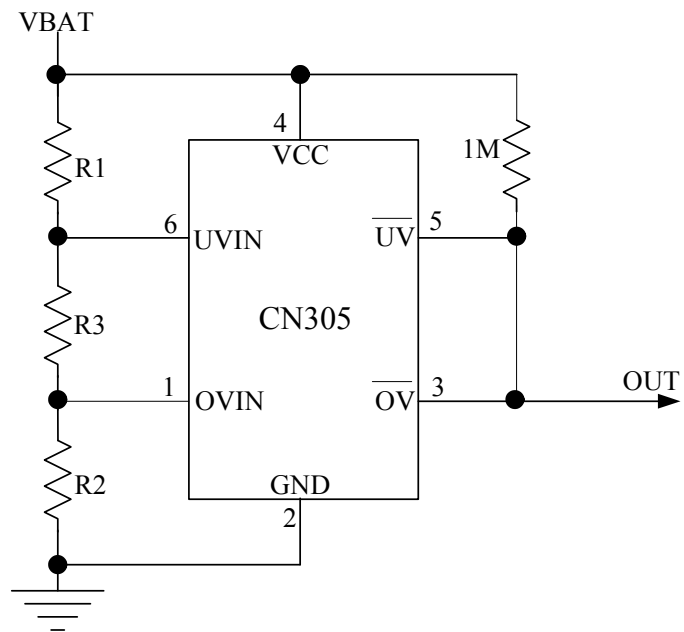


Figure 2 Single-Output Window Detector

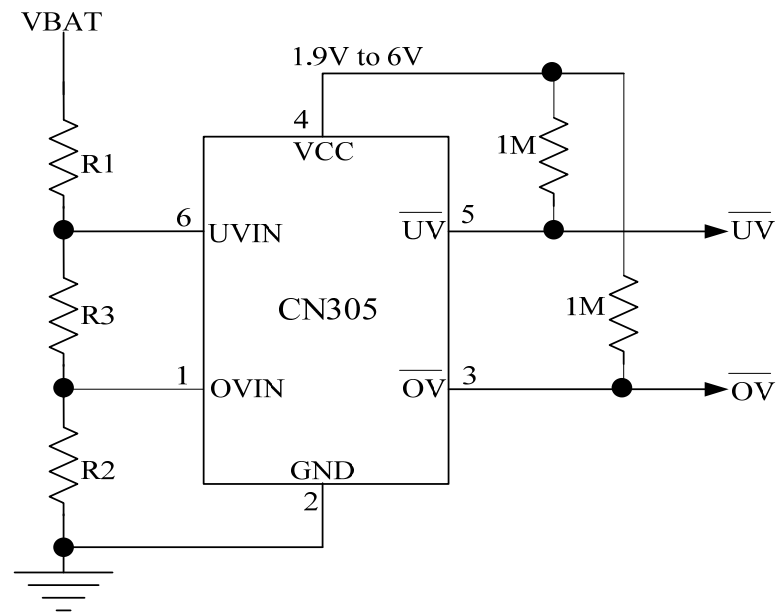


Figure 3 Monitor the Voltage Higher Than 6V

Ordering Information:

Part No.	Package	Shipping	Operating Temperature Range
CN305	SOT23-6	Tape and Reel, 3000/Reel	-40°C to 85°C

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Block Diagram

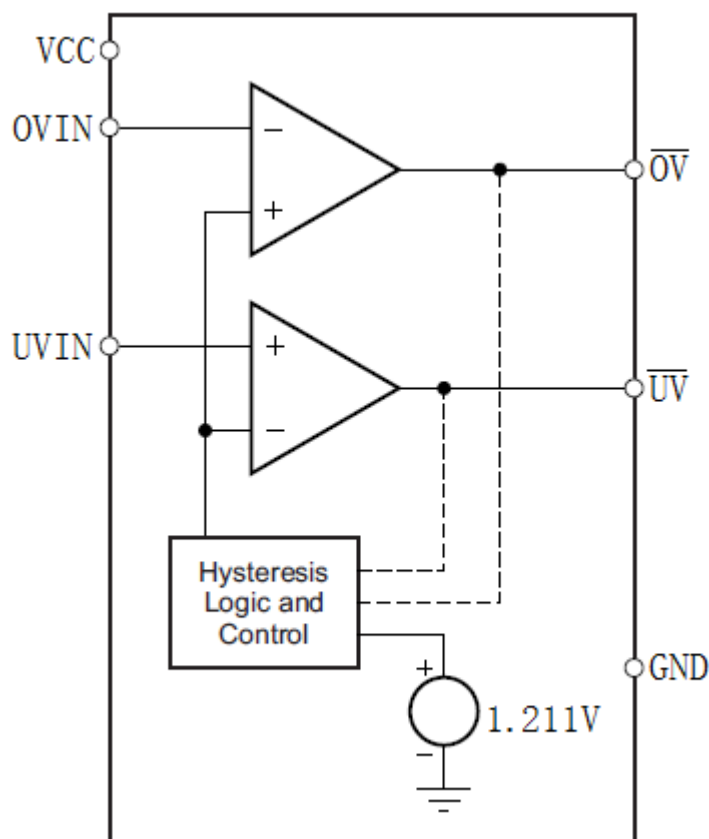


Figure 4 Block Diagram

Pin Description

Pin No.	Symbol	Description
1	OVIN	Overvoltage Input. Generally OVIN pin should be tied to an external resistor divider to sense the voltage being monitored.
2	GND	Negative Terminal of Power Supply(Ground)
3	$\overline{OV}$	Overvoltage Detect Output. Open-Drain output. When the voltage at OVIN pin rises above the rising overvoltage threshold, $\overline{OV}$ becomes low; When the voltage at OVIN pin falls below the falling overvoltage threshold, $\overline{OV}$ becomes high.
4	VCC	Positive Terminal of Power Supply. This pin is the power supply to internal circuit.
5	$\overline{UV}$	Undervoltage Detect Output. Open-Drain output. When the voltage at UVIN pin falls below the falling undervoltage threshold, $\overline{UV}$ becomes low; When the voltage at UVIN pin rises above the rising undervoltage threshold, $\overline{UV}$ becomes high.
6	UVIN	Undervoltage Detect Input. Generally UVIN pin should be tied to an external resistor divider to sense the voltage being monitored.

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ABSOLUTE MAXIMUM RATINGS

Terminal Voltage (With respect to GND)	Thermal Resistance.....300°C/W
VCC,OVIN,UVIN.....-0.3V to +6.5V	Operating Temperature.....-40 to +85°C
$\overline{UV}$, $\overline{OV}$-0.3V to VCC	Storage Temperature.....-65 to +150°C
Input/Output Current	Lead Temperature (soldering, 10s)+260°C
All Pins.....20mA	

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

(VCC = 3V, T_A = - 40°C to 85°C, Typical values are at T_A = 25°C, unless otherwise noted.)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Voltage Range	VCC		1.9		6	V
Operating Current	I _{VCC}	VCC = 1.9V	5	10	15	uA
		VCC = 3.0V	6	11	16	
		VCC = 5.0V	7	12	17	
OVIN Rising Threshold	V _{OVTH+}	OVIN voltage rises	1.187	1.211	1.235	V
OVIN Falling Threshold	V _{OVTH-}	OVIN voltage falls	1.09	1.12	1.15	
UVIN Rising Threshold	V _{RTH2}	UVIN voltage rises	1.187	1.211	1.235	
UVIN Falling Threshold	V _{FTH2}	UVIN voltage falls	1.09	1.12	1.15	
OVIN Leakage Current	I _{IN1}		- 100	0	100	nA
UVIN Leakage Current	I _{IN2}		- 100	0	100	nA
OVIN to $\overline{OV}$ Delay	t _{PD1}	30mV Overdrive		15		us
UVIN to $\overline{UV}$ Delay	t _{PD2}	30mV Overdrive		15		us
$\overline{OV}$ and $\overline{UV}$ Low Voltage	V _{OL}	VCC = 2V, I _{SINK} = 1.5mA			0.3	V
		VCC = 3V, I _{SINK} = 3.2mA			0.3	
		VCC = 5V, I _{SINK} = 6mA			0.3	
$\overline{OV}$ and $\overline{UV}$ High Voltage	V _{OH}	VCC = 2V, I _{SOURCE} =1.5mA	VCC - 0.4			V
		VCC = 3V, I _{SOURCE} = 3mA	VCC - 0.4			
		VCC = 5V, V _{LBI} = 1.5V I _{SOURCE} = 5mA	VCC - 0.4			
Startup Delay			2.5			ms

Note: During power-up, VCC must exceed 1.9V for the startup delay time before the output is in the correct state.

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Detailed Description

The CN305 is a single adjustable window detector with separate under/overvoltage outputs. It consists of 2 comparators, a voltage reference and hysteresis control circuit, and is specially designed for monitoring single or multi lithium-ion (Li+) cells, multi-cell alkaline, NiCd, NiMH and multi-cell lead acid batteries. The CN305 comparators' threshold accuracy is $\pm 2\%$, and offers 7.5% hysteresis which eliminates the output chatter sometimes associated with battery voltage monitors, usually due to input voltage noise or battery terminal voltage recovery after load removal. The CN305 has 2 inputs that can be configured by the external resistor divider. When the voltage at OVIN rises above the rising overvoltage threshold (V_{OVTH+}), $\overline{OV}$ goes low; When the voltage at OVIN falls below the falling overvoltage threshold (V_{OVTH-}), $\overline{OV}$ becomes high. When the voltage at UVIN rises above the rising under voltage threshold (V_{UVTH+}), $\overline{UV}$ is driven to high. When the voltage at UVIN falls below the falling under voltage threshold (V_{UVTH-}), $\overline{UV}$ is driven to low. The operation of the device can be best understood by referring to figure 5.

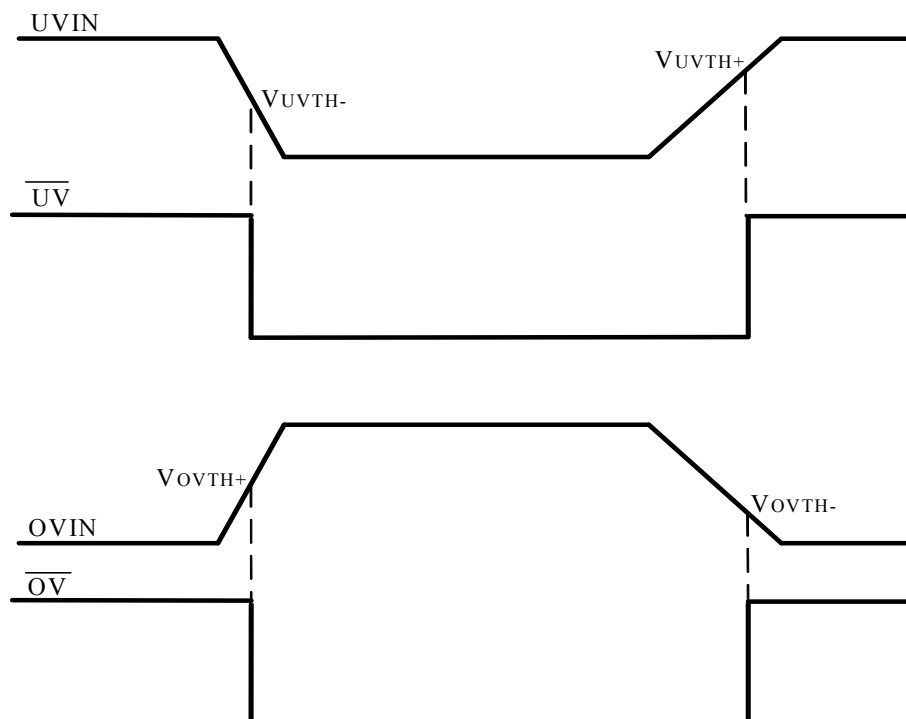


Figure 5 Timing waveform

Applications Information

Resistor Divider Selection

Choosing the proper external resistors is a balance between accuracy and current consumption. There is a leakage current into OVIN(UVIN), and the current travels through the resistor divider, which introduces error. If extremely high resistor values are used, this current introduces significant error. With extremely low resistor value, this error becomes negligible, but the resistor divider draws more current from the monitored power supply.

For the application circuit shown in Figure 1, $\overline{OV}$ and $\overline{UV}$'s trip points are shown in Figure 6:

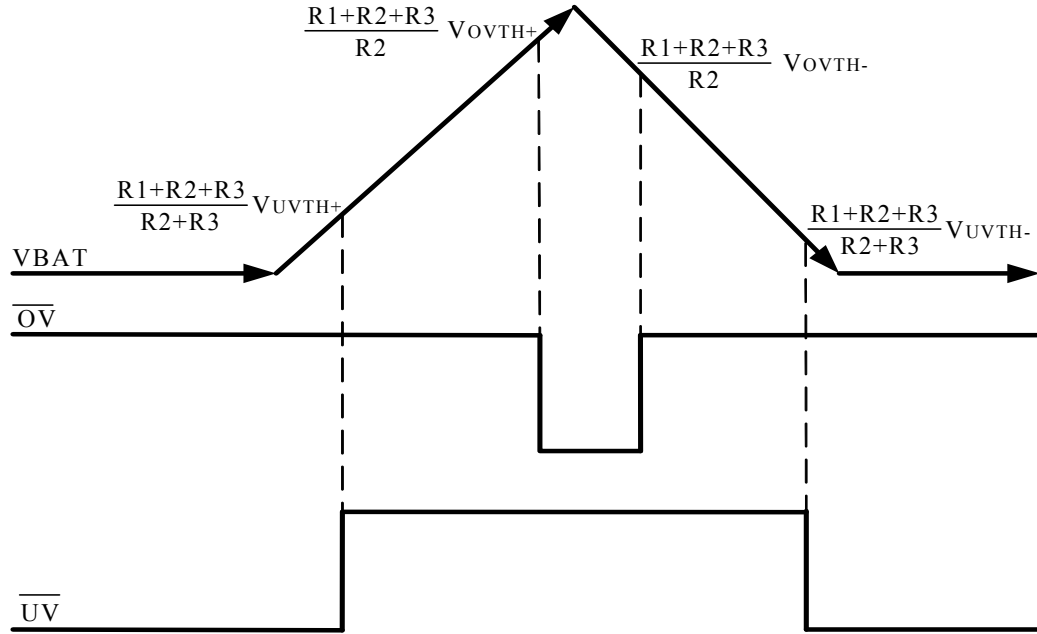


Figure 6 Trip Points for the Circuit Shown in Figure 1

For the application circuit shown in Figure 2, OUT's trip points are shown in Figure 7:

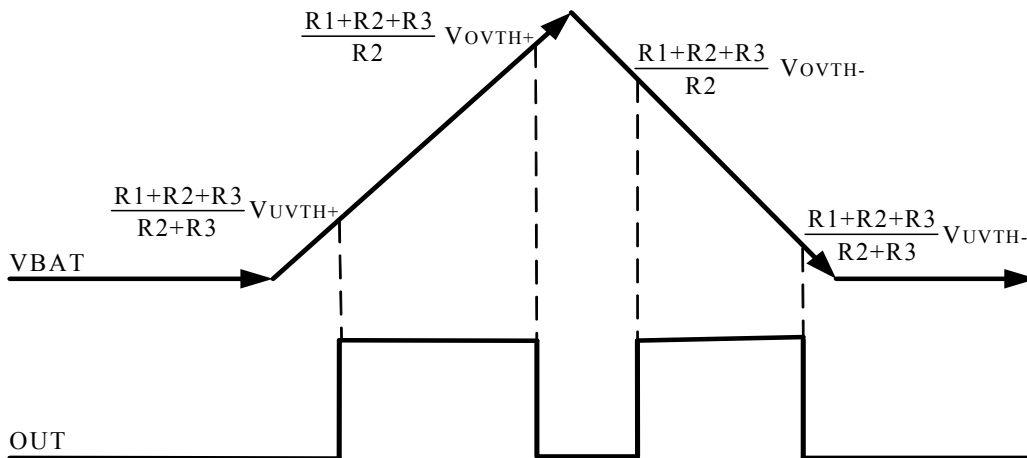


Figure 7 OUT Trip Points for the Circuit Shown in Figure 2

Adding External Capacitance to Enhance Noise Immunity

If monitoring voltages in a noisy environment, add a bypass capacitor of 0.1μF from battery terminal to GND as close as possible to the device. For systems with large transients, additional capacitance may be required. A small capacitor (<1nF) from OVIN and UVIN pin to GND may provide additional noise immunity.

Choose the Power Supply for CN305

If the monitored voltage is less than 6V, or there is a power supply from 1.9V to 6V in the system, then CN305 can be powered by one of the 2 power supplies. If there is glitch, ripple, etc at the power supply, a

low-pass RC filter may be used as shown in Figure 8.

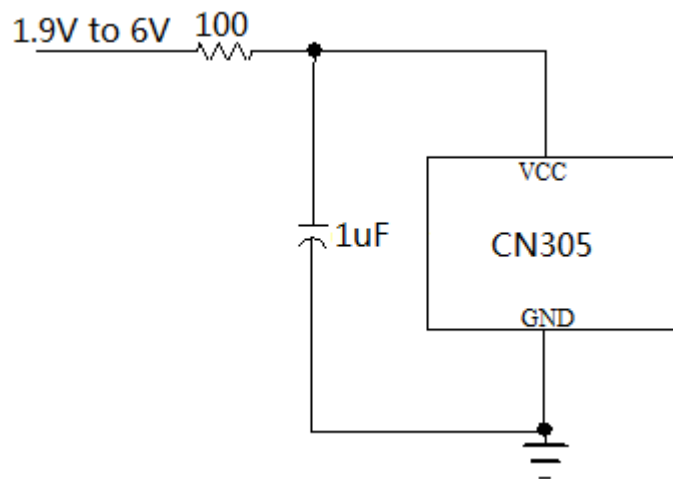


Figure 8 An RC Filter For CN305

If the monitored voltage is higher than 6V, and there is not a power supply from 1.9V to 6V, the circuit in Figure 9 can be used to generate the power supply for CN305. In Figure 9, resistor R4 and R5 are used to generate a voltage between 2.7V to 6V. R4 and R5 should be chosen in such a way that R4 and R5 can not load the battery too much. A 1uF capacitor can be chosen for C1.

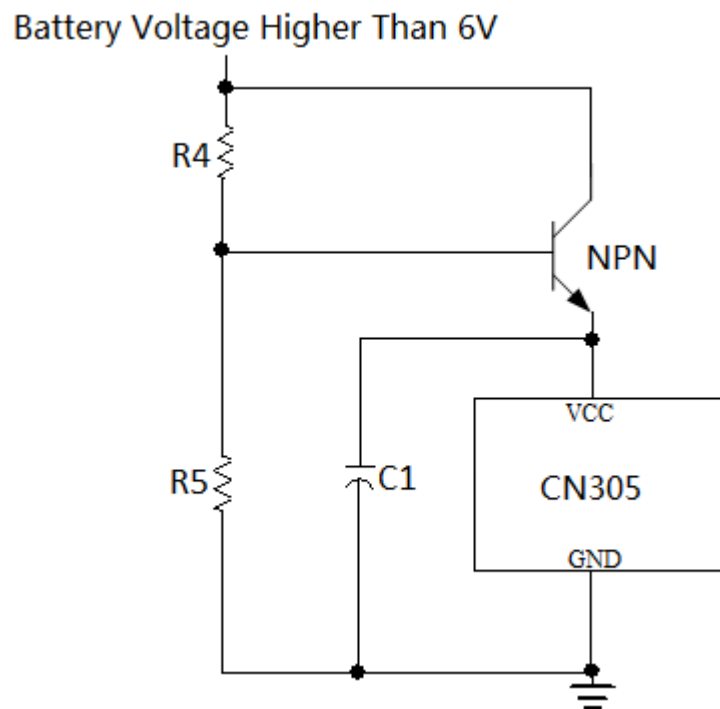
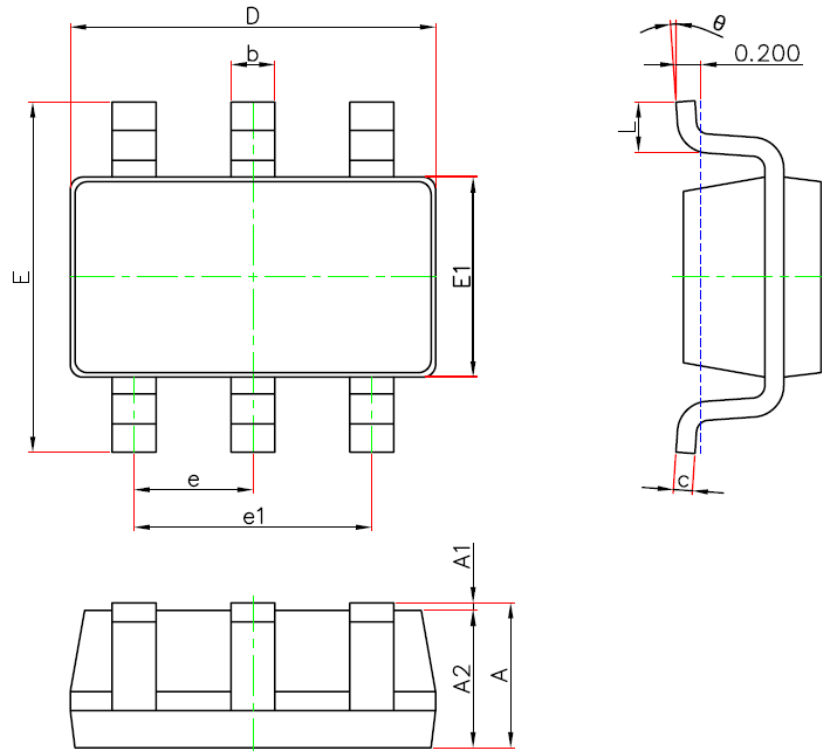


Figure 9 Power CN305 from a Resistor Divider

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Package Information

SOT-23-6L(12R) PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Consonance does not assume any responsibility for use of any circuitry described. Consonance reserves the right to change the circuitry and specifications without notice at any time.