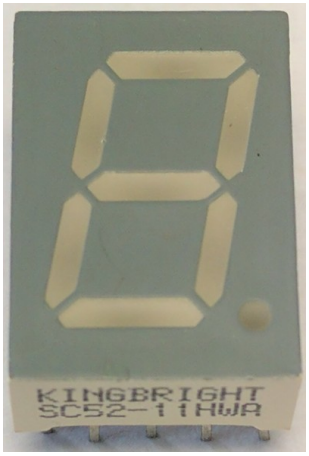
7 Segment Displays

Introduction



The 7 segment display is an arrangement of 7 LEDs and a separate LED for the decimal place.

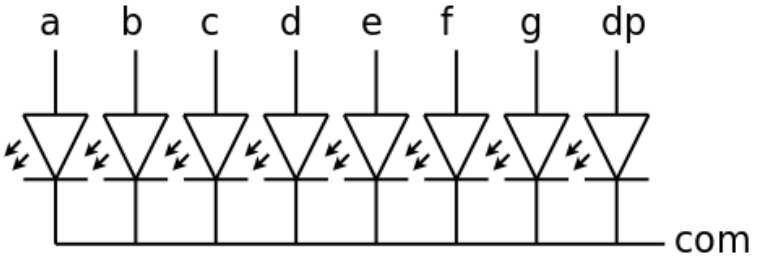
The display can form the digits 0-9 to display decimal numbers and can also form the letters A-F allowing Hexadecimal to be displayed.

7 Segment displays come in different sizes and colours and have different forward bias voltages depending on how many LEDs make up each segment.

The LEDs in a 7 Segment Display usually need a series resistor.

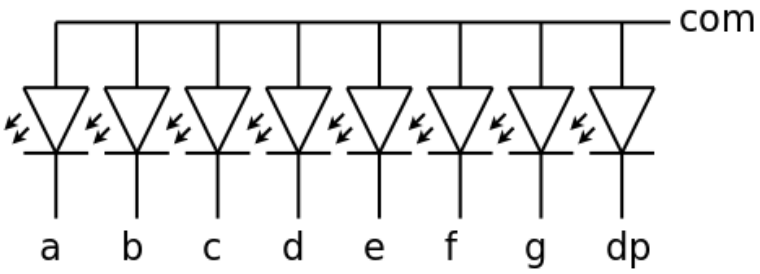
There are two types of display available - common cathode and common anode. The number "SC52" on the 7 segment display shown above means it is a common Cathode display.

Common Cathode and Common Anode Displays



In a 'Common Cathode' 7 Segment Display the cathodes of all eight LEDs are connected to a common pin which is connected to 0 V.

Each separate segment of the display should have its own series resistor. Each segment is made HIGH (connected to positive) to illuminate the display. The display driver must be able to source current to the LEDs.



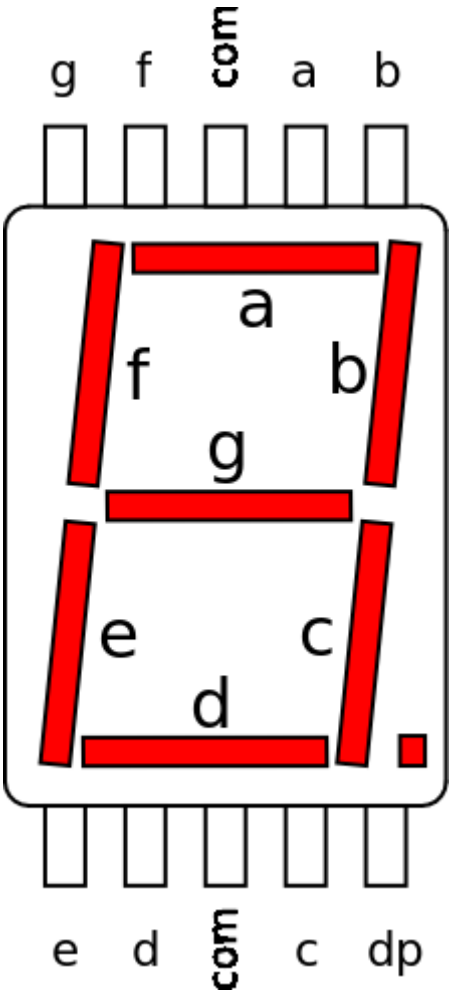
In a 'Common Anode' 7 Segment Display, all eight anodes are connected to a common pin which is connected to the positive supply.

Each segment is connected separately to 0 V (made LOW) using a series resistor to illuminate the display. The display driver must be able to sink current from the LEDs.

Pin Connections

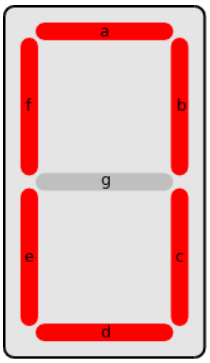
7 Segment Displays are usually used with some form of counter and may need a decoder so that the correct segments are illuminated for each corresponding number, letter or symbol.

The pin layout for common types of 7 Segment displays is shown below.

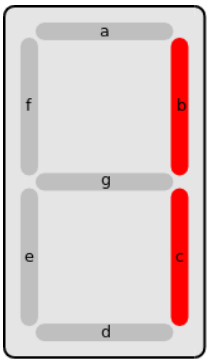


Displaying Numbers

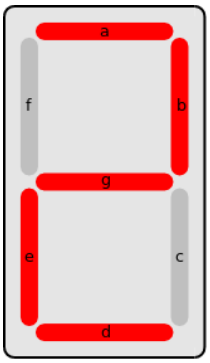
The truth tables show how each number is formed by illuminating the appropriate segments. The 1 is right justified and the 6 and 9 do not have tails.



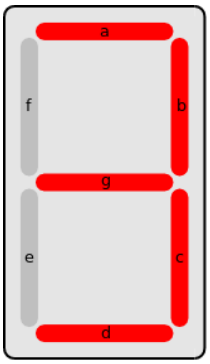
a	1
b	1
c	1
d	1
e	1
f	1
g	0



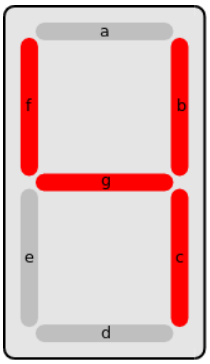
a	0
b	1
c	1
d	0
e	0
f	0
g	0



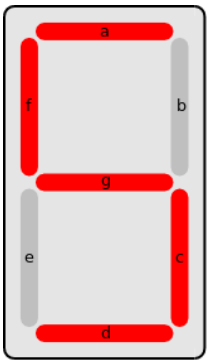
a	1
b	1
c	0
d	1
e	1
f	0
g	1



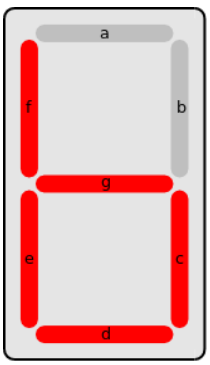
a	1
b	1
c	1
d	1
e	0
f	0
g	1



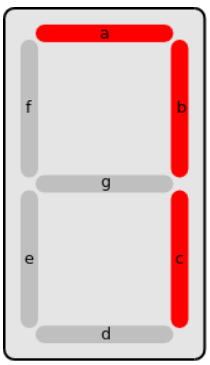
a	0
b	1
c	1
d	0
e	0
f	1
g	1



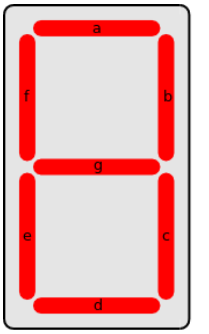
a	1
b	0
c	1
d	1
e	0
f	1
g	1



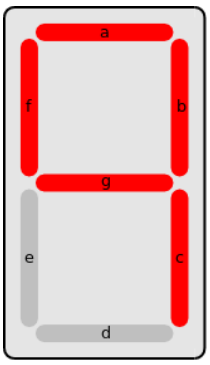
a	0
b	0
c	1
d	1
e	1
f	1
g	1



a	1
b	1
c	1
d	0
e	0
f	0
g	0



a	1
b	1
c	1
d	1
e	1
f	1
g	1



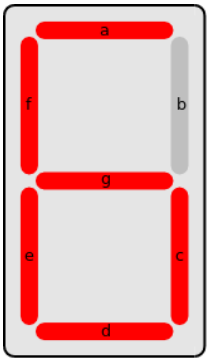
a	1
b	1
c	1
d	0
e	0
f	1
g	1

Displaying Hexadecimal

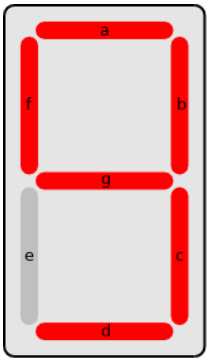
Hexadecimal is a number system that uses the numbers 0 to 9 and the letter A to F to give 16 different values.

Hexadecimal can be displayed on a 7 Segment Display BUT the 6 (and 9 for consistency) must have tails so that the letter "b" can be displayed and distinguished from a "6".

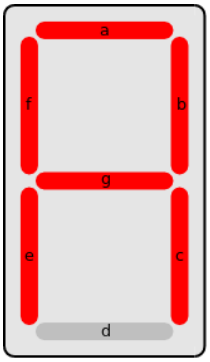
The letters are displayed as A b C d E F.



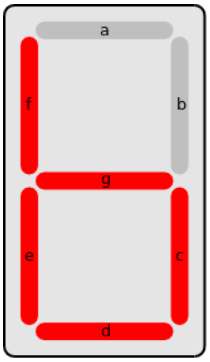
a	1
b	0
c	1
d	1
e	1
f	1
g	1



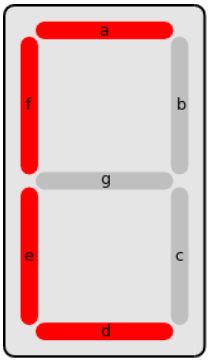
a	1
b	1
c	1
d	1
e	0
f	1
g	1



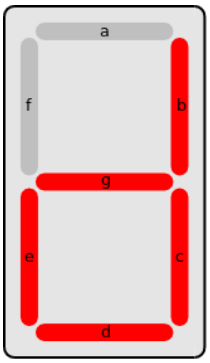
a	1
b	1
c	1
d	0
e	1
f	1
g	1



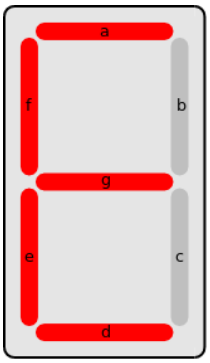
a	0
b	0
c	1
d	1
e	1
f	1
g	1



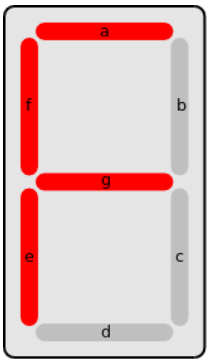
a	1
b	0
c	0
d	1
e	1
f	1
g	0



a	0
b	1
c	1
d	1
e	1
f	0
g	1



a	1
b	0
c	0
d	1
e	1
f	1
g	1



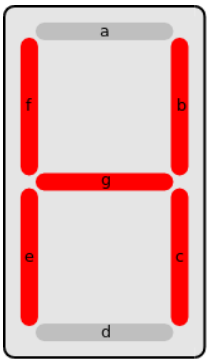
a	1
b	0
c	0
d	0
e	1
f	1
g	1

Displaying Letters

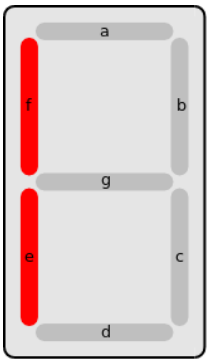
Other letters can be displayed with a 7 Segment Display such as "y" and "n" which is useful for Yes / No (y/n). Some letters are identical to numbers and so have to be used appropriately.

Common letters, in addition to those used for Hexadecimal, can be either upper or lower case.

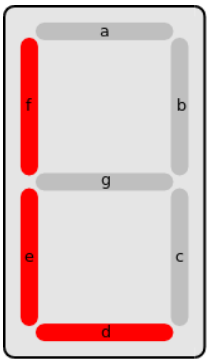
Upper case letters include H, I, L, O, P, S, U



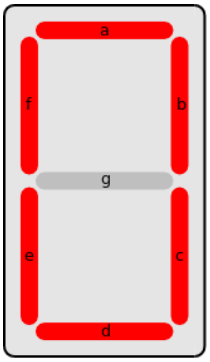
a	0
b	1
c	1
d	0
e	1
f	1
g	1



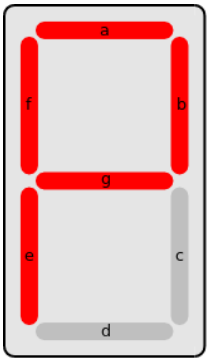
a	0
b	0
c	0
d	0
e	1
f	1
g	0



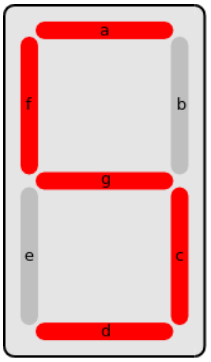
a	0
b	0
c	0
d	1
e	1
f	1
g	0



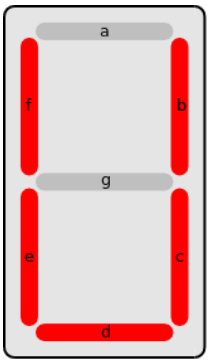
a	1
b	1
c	1
d	1
e	1
f	1
g	0



a	1
b	1
c	0
d	0
e	1
f	1
g	1

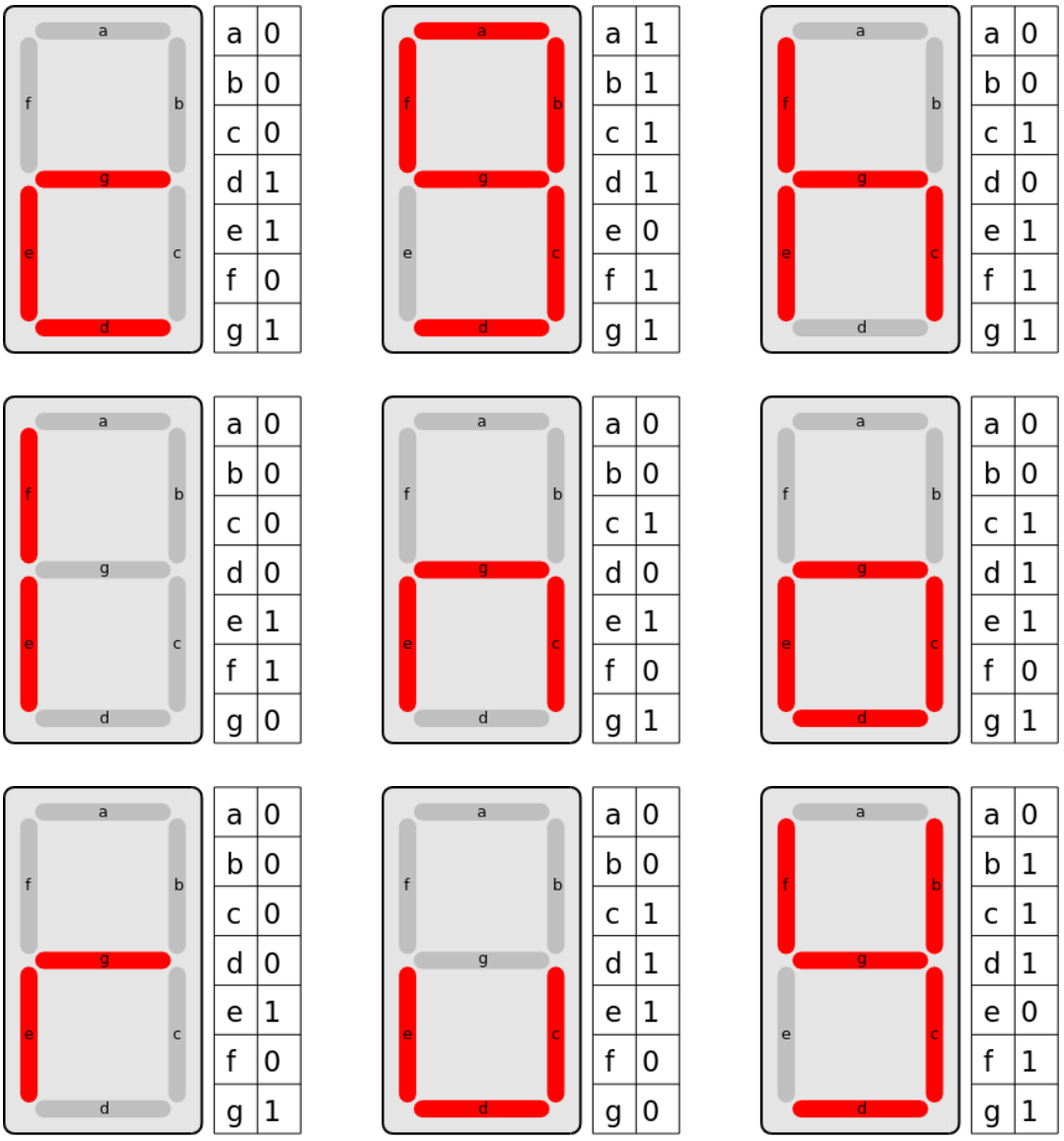


a	1
b	0
c	1
d	1
e	0
f	1
g	1



a	1
b	0
c	1
d	1
e	0
f	1
g	1

Lower case letters include: c, g, h, l, n, o, r, u, y



Website

https://www.electronicsteaching.com/Electronics_Resources/DocumentIndex.html

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