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Application Note - Cross-Plexing

AS1119

144 LED Cross-Plexing Driver with 320mA Charge-Pump

www.austriamicrosystems.com/AS1119

1. General Description

This document describes how to build up a large LED Matrix with the AS1119. The device is using cross-plexing to control 144 LED's with only 18 pins.

2. Cross Plexing Theorem

The cross-plexing theorem is using the fact that a LED has a forward and backward direction. A LED will only glow if there is a current flowing in forward direction. A parallel LED in backward direction will block the current flow. This effect is used in a cross-plexed matrix of LED's.

In Figure 1 a LED Matrix with 6 single LED's is shown. The sources can switch between high ("1), low ("0") or not connected ("highZ"). As example we switch Source1 to "1" and Source2 to "0", LED1 is on. To put LED5 on we put Source3 to "1" and Source1 to "0". With this switching scheme of the sources it's possible to control 6 LED's with only 3 lines.

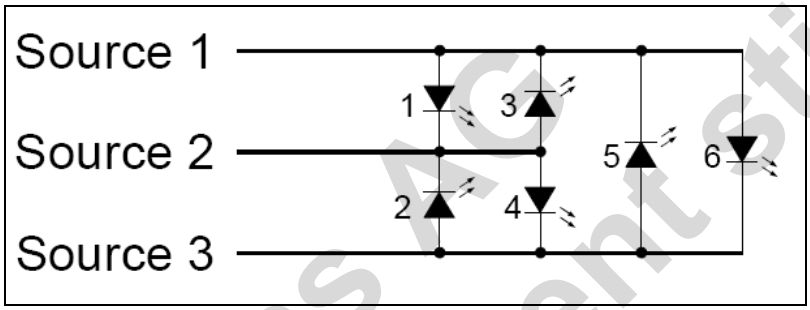


Figure 1: Simple cross-plexed LED Matrix with 6 LED's

Figure 2 gives an example of a LED Matrix with 30 LED's by using only 6 Sources. To build up such a Matrix you have to connect the cathodes of 5 LED's to one Source and the anodes of these LED's to the other sources. Applying this to 6 sources you end up with a 5x6 Matrix as shown in Figure 2.

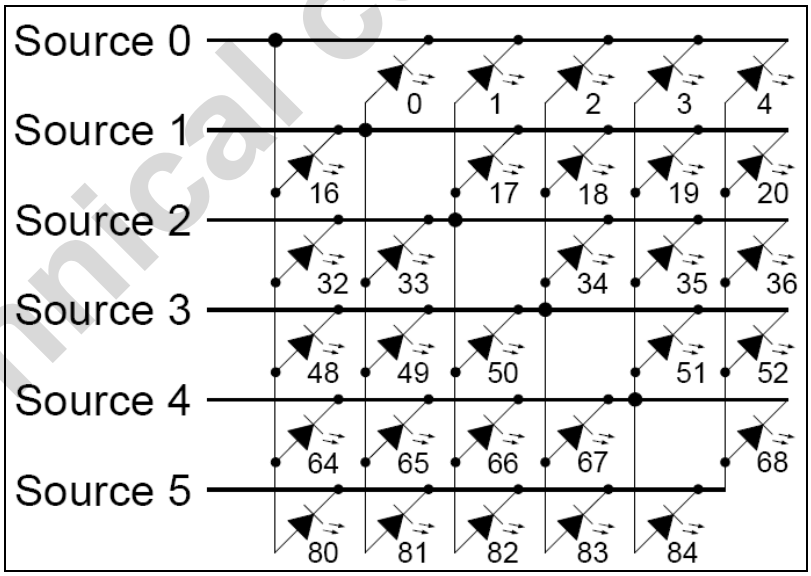
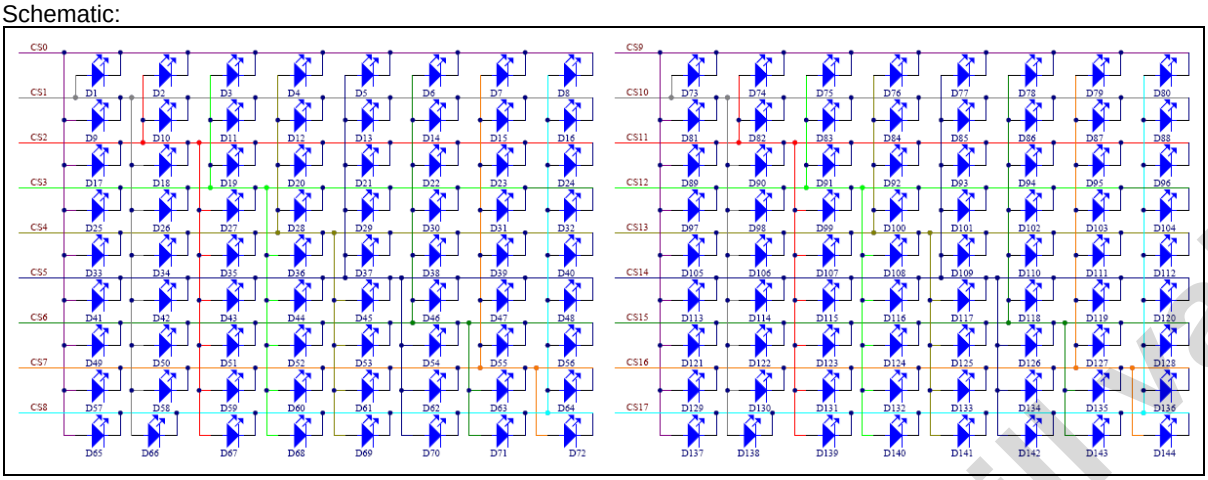


Figure 2: Cross-plexed LED Matrix with 30 LED's

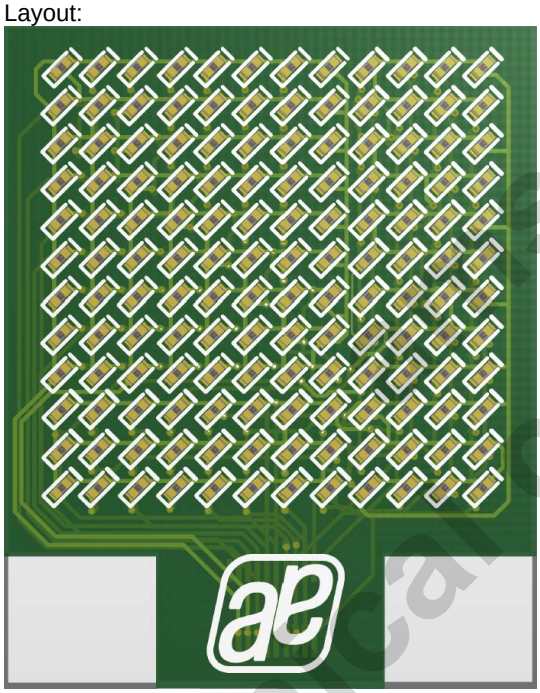
3. Example with 2 Matrix configuration of the AS1119

The following example shows a big LED Matrix with 144 single color LED's.

Schematic:



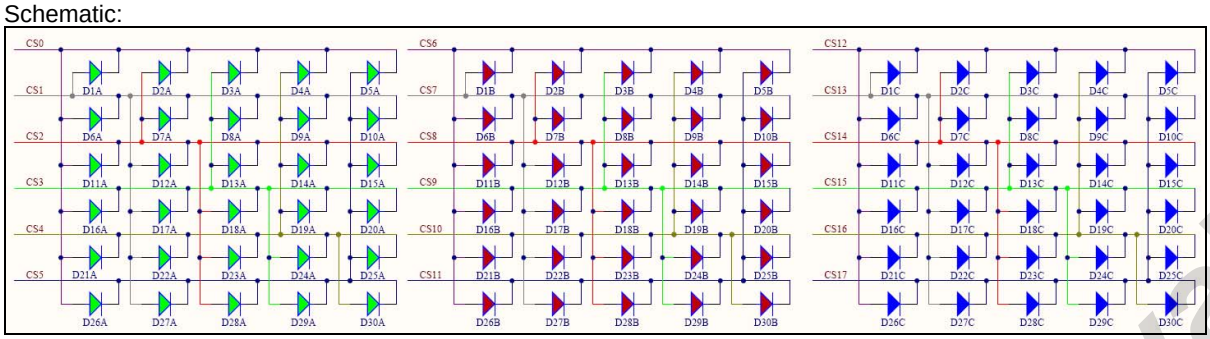
Layout:



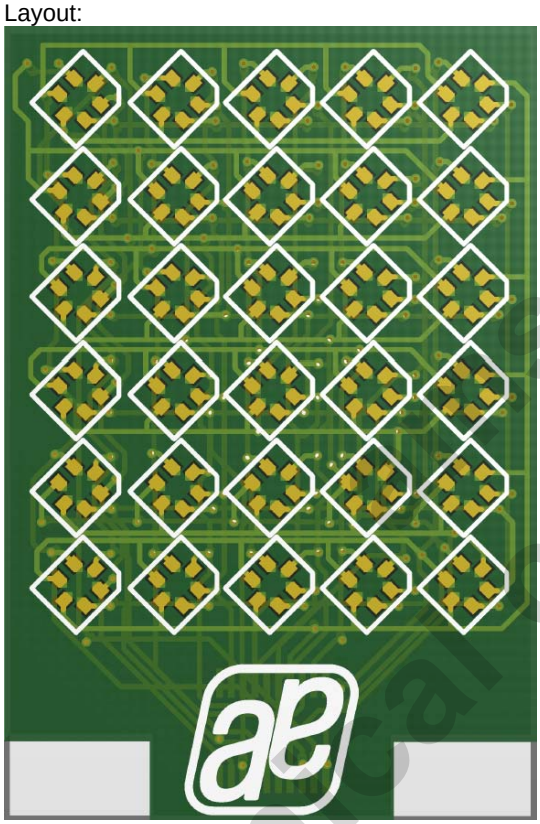
4. Example with 3 Matrix configuration of the AS1119

The following example shows a LED Matrix with 30 RGB color LED's.

Schematic:



Layout:



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