LINEAR TECHNOLOGY

DESIGN NOTES

Tiny RGB Video Multiplexer Switches Pixels at 100MHz

Design Note 205

Frank Cox and John Wright

Introduction

The LT®1675, a new 3-channel, 2-input 250MHz video multiplexer, is designed for pixel switching, video graphics and RGB routing. The complete circuit squeezes into a 16-lead SSOP package and uses only 0.25in^2 of PC board area (Figure 1). The LT1675 features a fixed gain of 2 for driving double-terminated cables. By incorporating internal feedback resistors, the circuit simplifies PC board layout and boosts performance by eliminating stray capacitance. A single channel 2:1 MUX, the LT1675-1 is available in the small MSOP package. Table 1 summarizes the major performance specifications of this new multiplexer, and Figure 2 shows a typical application: switching between two RGB sources.

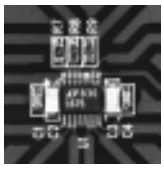


Figure 1. Board Photo Actual Size

Table 1. LT1675 Performance, $V_S = \pm 5V$

PARAMETER	CONDITIONS	TYPICAL VALUES
–3dB Bandwidth	$R_L = 150\Omega$	250MHz
0.1dB Gain Flatness	$R_L = 150\Omega$	70MHz
Crosstalk	Between Active Channels at 10MHz	–60dB
Slew Rate	$R_L = 150\Omega$	1100V/µs
Differential Gain	$R_L = 150\Omega$	0.07%
Differential Phase	$R_L = 150\Omega$	0.05°
Channel Select Time	$R_L = 150\Omega$, $V_{IN} = 1V$	2.5ns
Enable Time	$R_L = 150\Omega$	10ns
Output Voltage Swing	$R_L = 150\Omega$	±3V
Output Offset Voltage		20mV
Supply Current	All Three Channels Active	30mA
Supply Current Disabled		1µA

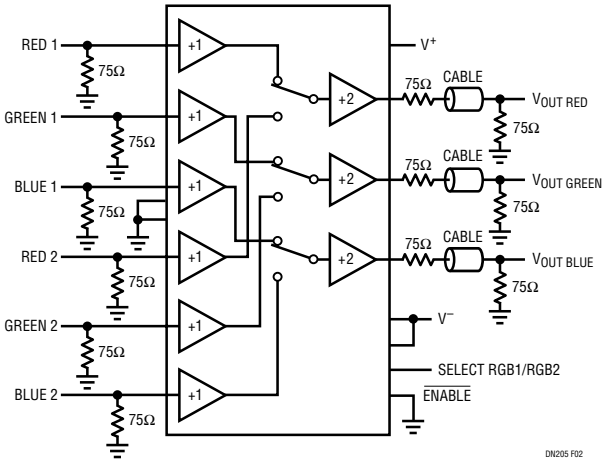


Figure 2. LT1675 Typical Application: Switching Between Two RGB Sources and Driving Three Cables

Expanding Inputs Does Not Increase Power Dissipation

In video-routing applications, where the ultimate in speed is not mandatory as it is in pixel switching, it is possible to expand the number of MUX inputs by shorting the LT1675 outputs together and switching between the two LT1675s with the $\overline{\text{ENABLE}}$ pins. This technique, shown in Figure 3, does not increase the power dissipation because LT1675s draw virtually zero current when disabled.

Add Your Own Logo

The circuit of Figure 4 highlights a section of picture under control of a synchronous key signal. The technique is used for adding the logo you see in the bottom corner of commercial television pictures or any type of overlay signal, such as a crosshair or a reticule. The key signal has two bits of control, so there can be four levels of highlighting: unmodified video, video plus 33% white, video plus 66% white and 100% white. Two LT1675s are configured as a 2-bit DAC, and resistors on the output set the relative bit weights. The output of the LT1675, labeled B, is one-half the weight of the A device. To properly

match the 75Ω video cable, the output resistors are selected so the parallel combination of the two is 75Ω. The output will never exceed peak white, which is 0.714V for this NTSC-related RGB video. The reference white signal is adjusted to a lower level than peak white to make the effect less intrusive.

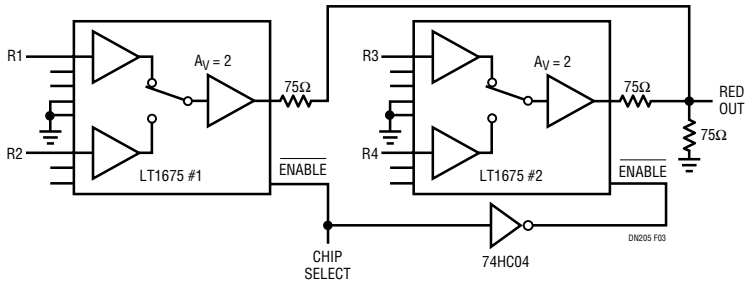
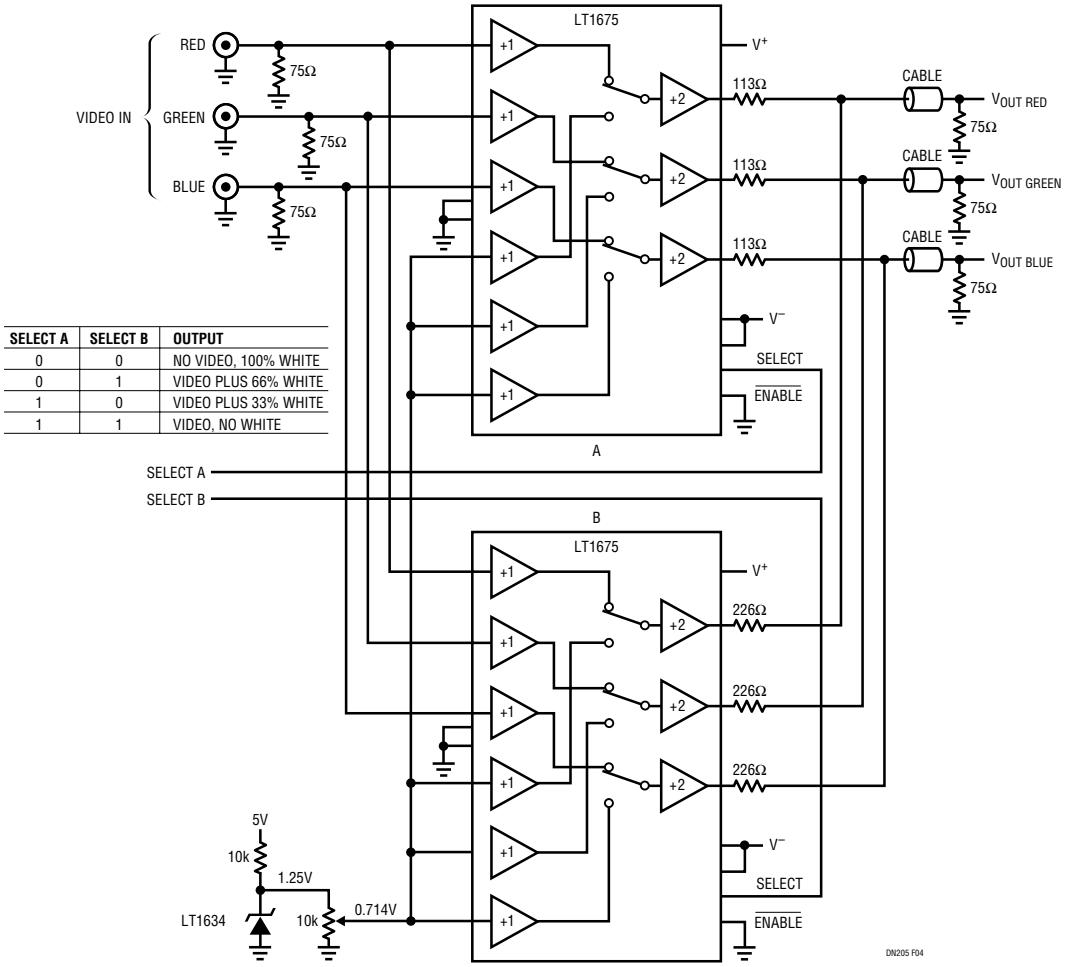


Figure 3. Two LT1675s Make a 4-Input RGB Router



SELECT A	SELECT B	OUTPUT
0	0	NO VIDEO, 100% WHITE
0	1	VIDEO PLUS 66% WHITE
1	0	VIDEO PLUS 33% WHITE
1	1	VIDEO, NO WHITE

Figure 4. Logo Inserter

Data Sheet Download

http://www.linear-tech.com/go/dn1675

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Linear Technology Corporation
1630 McCarthy Blvd., Milpitas, CA 95035-7417
(408)432-1900 • FAX: (408) 434-0507 • www.linear-tech.com

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