**FEATURES**

- **100MHz Pixel Switching**
- **–3dB Bandwidth: 250MHz**
- **Channel Switching Time: 2.5ns**
- **Expandable to Larger Arrays**
- **Drives Cables Directly**
- **High Slew Rate: 1100V/µs**
- **Low Switching Transient: 50mV**
- **Shutdown Supply Current: 100µA**
- **Output Short-Circuit Protected**
- **Available in Small 16-Pin SSOP Package**

**APPLICATIONS**

- **RGB Switching**
- **Workstation Graphics**
- **Pixel Switching**
- **Coaxial Cable Drivers**
- **High Speed Signal Processing**

**DESCRIPTION**

The LT®1675 is a high speed RGB multiplexer designed for pixel switching and fast workstation graphics. Included on chip are three SPDT switches and three current feedback amplifiers. The current feedback amplifiers drive double-terminated 50Ω or 75Ω cables and are configured for a fixed gain of 2, eliminating six external gain setting resistors. The SPDT switches are designed to be break-before-make to minimize unwanted signals coupling to the input.

The LT1675-1 is a single version with two inputs, a single output and is ideal for a single channel application such as video sync.

The key to the LT1675 fast switching speed is Linear Technology’s proprietary high speed bipolar process. This MUX can toggle between sources in excess of 100MHz, has a slew rate over 1000V/µs and has a –3dB bandwidth of 250MHz. Power supply requirements are ±4V to ±6V and power dissipation is only 300mW on ±5V, or 100mW for the LT1675-1. The expandable feature uses the disable pin to reduce the power dissipation to near 0mW in the off parts.

Unlike competitive solutions that are in bulky high pin count packages, the LT1675 is in a 16-lead narrow body SSOP. This small footprint, the size of an SO-8, results in a very clean high performance solution. The LT1675-1 is available in the tiny MSOP and the SO-8.

**TYPICAL APPLICATION**

![High Speed RGB MUX Diagram](image)

**Clocking Between 2 DC Levels at 100MHz**

![Waveform Graph](image)
LT1675/LT1675-1

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

Supply Voltage .................................................... ±6.3V
Inputs, ENABLE and SELECT, Current ................ ±20mA
Output Short-Circuit Duration (Note 2)........Continuous
Specified Temperature Range ......................... 0°C to 70°C
Operating Temperature Range (Note 3) .. –40°C to 85°C
Storage Temperature Range ...................... –65°C to 150°C
Junction Temperature (Note 4) ......................... 150°C
Lead Temperature (Soldering, 10 sec) ............... 300°C

**PACKAGE/ORDER INFORMATION**

<table>
<thead>
<tr>
<th>ORDER PART NUMBER</th>
<th>MS8 PART MARKING</th>
<th>ORDER PART NUMBER</th>
<th>S8 PART MARKING</th>
<th>ORDER PART NUMBER</th>
<th>GN PART MARKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT1675CMS8-1</td>
<td>LTGX</td>
<td>LT1675CS8-1</td>
<td>16751</td>
<td>LT1675CGN</td>
<td>1675</td>
</tr>
</tbody>
</table>

*Order Options*  
Tape and Reel: Add #TR  

Consult LTC Marketing for parts specified with wider operating temperature ranges.
## ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the specified temperature range, otherwise specifications are at $T_A = 25^\circ C$, $V_S = \pm 5V$, $R_L = \infty$, $V_{IN} = 0V$ LT1675 (Pins 1, 2, 3, 6, 7, 8), LT1675-1 (Pins 1, 3), ENABLE = 0V, unless otherwise specified.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Offset Voltage</td>
<td>Any Input Selected</td>
<td>●</td>
<td>20</td>
<td>50</td>
<td>mV</td>
</tr>
<tr>
<td>Output Offset Matching</td>
<td>Between Outputs R1 to R2, G1 to G2, B1 to B2</td>
<td>●</td>
<td>5</td>
<td>20</td>
<td>mV</td>
</tr>
<tr>
<td>Input Current</td>
<td>Any Input Selected</td>
<td>●</td>
<td>–12</td>
<td>–30</td>
<td>µA</td>
</tr>
<tr>
<td>Input Resistance</td>
<td>$V_{IN} = \pm 1V$</td>
<td>●</td>
<td>100</td>
<td>700</td>
<td>kΩ</td>
</tr>
<tr>
<td>PSRR</td>
<td>$V_S = \pm 2.6V$ to $\pm 6V$, Measured at Output</td>
<td>●</td>
<td>38</td>
<td>50</td>
<td>dB</td>
</tr>
<tr>
<td>DC Gain Error 0V to 1V</td>
<td>$V_{IN} = 1V$, $R_L = \infty$</td>
<td>●</td>
<td>3</td>
<td>6</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = 1V$, $R_L = 150\Omega$</td>
<td>●</td>
<td>4</td>
<td>8</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = 1V$, $R_L = 75\Omega$</td>
<td>●</td>
<td>5</td>
<td>10</td>
<td>%</td>
</tr>
<tr>
<td>DC Gain Error 0V to –1V</td>
<td>$V_{IN} = –1V$, $R_L = \infty$</td>
<td>●</td>
<td>3</td>
<td>6</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = –1V$, $R_L = 150\Omega$</td>
<td>●</td>
<td>4</td>
<td>8</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = –1V$, $R_L = 75\Omega$</td>
<td>●</td>
<td>8</td>
<td>20</td>
<td>%</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>$V_{IN} = 2V$, $R_L = \infty$</td>
<td>●</td>
<td>3.1</td>
<td>3.4</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = 2V$, $R_L = 150\Omega$</td>
<td>●</td>
<td>2.7</td>
<td>3.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = 2V$, $R_L = 75\Omega$</td>
<td>●</td>
<td>2.4</td>
<td>2.8</td>
<td>V</td>
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<tr>
<td></td>
<td>$V_{IN} = –2V$, $R_L = \infty$</td>
<td>●</td>
<td>–3.1</td>
<td>–3.3</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = –2V$, $R_L = 150\Omega$</td>
<td>●</td>
<td>–2.6</td>
<td>–3.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{IN} = –2V$, $R_L = 75\Omega$</td>
<td>●</td>
<td>–2.3</td>
<td>–2.6</td>
<td>V</td>
</tr>
<tr>
<td>Disabled Output Impedance</td>
<td>ENABLE Open</td>
<td>●</td>
<td>1.1</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Maximum Output Current</td>
<td>$V_{IN} = \pm 1V$, $V_O = 0V$</td>
<td>●</td>
<td>50</td>
<td>70</td>
<td>mA</td>
</tr>
<tr>
<td>Supply Current</td>
<td>LT1675 $ENABLE = 0V$</td>
<td>●</td>
<td>25</td>
<td>33</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>LT1675 $ENABLE = 4.7V$</td>
<td>●</td>
<td>1</td>
<td>100</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td>LT1675-1 $ENABLE = 0V$</td>
<td>●</td>
<td>8</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>LT1675-1 $ENABLE = 4.7V$</td>
<td>●</td>
<td>0.3</td>
<td>33</td>
<td>µA</td>
</tr>
<tr>
<td>ENABLE Pin Current</td>
<td>LT1675 $ENABLE = 0V$</td>
<td>●</td>
<td>450</td>
<td>600</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td>LT1675-1 $ENABLE = 0V$</td>
<td>●</td>
<td>150</td>
<td>200</td>
<td>µA</td>
</tr>
<tr>
<td>SELECT Pin Current</td>
<td>LT1675 $SELECT = 0V$</td>
<td>●</td>
<td>90</td>
<td>180</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td>LT1675-1 $SELECT = 0V$</td>
<td>●</td>
<td>30</td>
<td>60</td>
<td>µA</td>
</tr>
<tr>
<td>SELECT Low</td>
<td>$SELECT$ (See Truth Table)</td>
<td>●</td>
<td>0.8</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>SELECT High</td>
<td>$SELECT$ (See Truth Table)</td>
<td>●</td>
<td>2</td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>
AC CHARACTERISTICS \( T_A = 25^\circ\text{C}, V_S = \pm 5\text{V}, R_L = 150\Omega, V_{IN} = 0\text{V} \) LT1675 (Pins 1, 2, 3, 6, 7, 8), LT1675-1 (Pins 1, 3), ENABLE = 0V, unless otherwise specified.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slew Rate</td>
<td>( V_{OUT} = 5\text{VP-P} )</td>
<td>1100</td>
<td></td>
<td></td>
<td>( \text{V/\mu s} )</td>
</tr>
<tr>
<td>Full Power Bandwidth (Note 5)</td>
<td>( V_{OUT} = 6\text{VP-P} )</td>
<td>58</td>
<td></td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>Small-Signal –3dB Bandwidth</td>
<td>Less Than 1dB Peaking</td>
<td>250</td>
<td></td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td>Less Than 0.1dB</td>
<td>70</td>
<td></td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>Gain Matching</td>
<td>R to G to B</td>
<td>0.10</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>R1 to R2, G1 to G2, B1 to B2, LT1675-1</td>
<td>0.01</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Channel-to-Channel Select Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Delay Time</td>
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<tr>
<td>Switching Time</td>
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<tr>
<td>Enable Time</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>ns</td>
</tr>
<tr>
<td>Disable Time</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>ns</td>
</tr>
<tr>
<td>Input Pin Capacitance</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>pF</td>
</tr>
<tr>
<td>SELECT Pin Capacitance</td>
<td>LT1675</td>
<td>2.2</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td>LT1675-1</td>
<td>1.5</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>ENABLE Pin Capacitance</td>
<td>LT1675</td>
<td>2.1</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td>LT1675-1</td>
<td>1.5</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Output Pin Capacitance (Disabled)</td>
<td>ENABLE Open</td>
<td>4.4</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Small-Signal Rise Time</td>
<td>( V_{IN} = 300\text{mVP-P}, R_L = 100\Omega )</td>
<td>1.85</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Propagation Delay</td>
<td>( V_{IN} = 300\text{mVP-P}, R_L = 100\Omega )</td>
<td>3</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Overshoot</td>
<td>( V_{IN} = 300\text{mVP-P}, R_L = 100\Omega )</td>
<td>10</td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>On-Channel to Off-Channel Crosstalk</td>
<td>Measured at 10MHz</td>
<td>60</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Chip Disable Crosstalk</td>
<td>Measured at 10MHz, ENABLE Open</td>
<td>90</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Channel Select Output Transient</td>
<td>Measured Between Back Termination and Load</td>
<td>50</td>
<td></td>
<td></td>
<td>mVP-P</td>
</tr>
<tr>
<td>Differential Gain (Note 6)</td>
<td></td>
<td>0.07</td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Differential Phase (Note 6)</td>
<td></td>
<td>0.05</td>
<td></td>
<td></td>
<td>DEG</td>
</tr>
</tbody>
</table>

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

**Note 2:** May require a heat sink.

**Note 3:** The LT1675/LT1675-1 are guaranteed to meet specified performance from 0°C to 70°C and are designed, characterized and expected to meet these extended temperature limits, but are not tested at –40°C and 85°C. Guaranteed I grade parts are available; consult factory.

**Note 4:** \( T_J \) is calculated from the ambient temperature \( T_A \) and power dissipation \( P_D \) according to the following formula:

\[
T_J = T_A + (P_D)(120^\circ\text{C/W})
\]

\[
T_J = T_A + (P_D)(250^\circ\text{C/W})
\]

\[
T_J = T_A + (P_D)(150^\circ\text{C/W})
\]

**Note 5:** Full power bandwidth is calculated from the slew rate measurement:

\[
\text{FPBW} = \frac{\text{SR}}{2\pi V_{PEAK}}
\]

**Note 6:** Differential Gain and Phase are measured using a Tektronix TSG120 YC/NTSC signal generator and a Tektronix 1780R Video Measurement Set. The resolution of this equipment is 0.1% and 0.1°. Nine identical MUXs were cascaded giving an effective resolution of 0.011% and 0.011°.

**Truth Table**

<table>
<thead>
<tr>
<th>SELECT</th>
<th>ENABLE</th>
<th>RED OUT</th>
<th>GREEN OUT</th>
<th>BLUE OUT</th>
<th>VOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>RED 1</td>
<td>GREEN 1</td>
<td>BLUE 1</td>
<td>VIN1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>RED 2</td>
<td>GREEN 2</td>
<td>BLUE 2</td>
<td>VIN2</td>
</tr>
<tr>
<td>X</td>
<td>1</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

LT1675CGN: \( T_J = T_A + (P_D)(120^\circ\text{C/W}) \)
LT1675CMS8-1: \( T_J = T_A + (P_D)(250^\circ\text{C/W}) \)
LT1675SC8-1: \( T_J = T_A + (P_D)(150^\circ\text{C/W}) \)
**TYPICAL PERFORMANCE CHARACTERISTICS**

**Output Impedance vs Frequency**

- Frequency (Hz): 100k, 1M, 10M, 1G
- Output Impedance (Ω): 100k, 1M, 10M, 1G

**2nd and 3rd Harmonic Distortion vs Frequency**

- Frequency (MHz): 1, 10, 100

**Input Bias Current vs Input Voltage**

- Input Voltage (V): –2, 0, 2
- Input Bias Current (µA): 1, 5, 10, 15

**Output Short-Circuit Current vs Temperature**

- Temperature (°C): –50, 0, 25, 75, 125
- Output Short-Circuit Current (mA): 100, 105, 110, 115, 120

**Positive DC Gain Error vs Temperature**

- Temperature (°C): –50, 0, 25, 75, 125
- Positive DC Gain Error (%): 0, 1, 2, 3, 4

**Negative DC Gain Error vs Temperature**

- Temperature (°C): –50, 0, 25, 75, 125
- Negative DC Gain Error (%): 0, 1, 2, 3, 4

**Output Voltage vs Input Voltage**

- Input Voltage (V): –2, –1, 0, 1, 2
- Output Voltage (V): –4, –3, –2, –1, 0, 1, 2

**Supply Current vs Supply Voltage**

- Supply Voltage (±V): 0, 1, 2, 3, 4, 5, 6
- Supply Current (mA): 0, 2, 4, 6, 8, 10, 12

**LT1675-1 Supply Current vs Supply Voltage**

- Supply Voltage (±V): 0, 1, 2, 3, 4, 5, 6
- Supply Current (mA): 0, 2, 4, 6, 8, 10, 12

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**LT1675/LT1675-1**

Downloaded from Arrow.com.
TYPICAL PERFORMANCE CHARACTERISTICS

**Input Bias Current vs Temperature**

- $V_S = \pm 5V$
- $V_{IN} = 0V$

**Output Offset Voltage vs Temperature**

- $V_S = \pm 5V$

**Toggling RED 2 to RED 1**

- RED 1 = 0V
- RED 2 = UNCORRELATED SINEWAVE
- $R_L = 150\Omega$, 10pF SCOPE PROBE

**Small-Signal Rise Time**

- $R_L = 100\Omega$
- MEASURED WITH FET PROBES

**Slew Rate**

- MEASURED AT PIN 15
- $R_L = 150\Omega$, 10pF SCOPE PROBE
- SR = 1100V/µs

**Enable and Disable**

- ENABLE AND DISABLE OF UNCORRELATED SINEWAVE
- $R_L = 150\Omega$
PIN FUNCTIONS

LT1675

RED 1 (Pin 1): Red 1 Input. The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin, VOUT RED will clip. The input must be terminated.

GREEN 1 (Pin 2): Green 1 Input. The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin, VOUT GREEN will clip. The input must be terminated.

BLUE 1 (Pin 3): Blue 1 Input. The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin, VOUT BLUE will clip. The input must be terminated.

GND (Pins 4, 5): Signal Ground. Connect to ground plane.

RED 2 (Pin 6): Red 2 Input. The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin, VOUT RED will clip. The input must be terminated.

GREEN 2 (Pin 7): Green 2 Input. The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin, VOUT GREEN will clip. The input must be terminated.

BLUE 2 (Pin 8): Blue 2 Input. The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin, VOUT BLUE will clip. The input must be terminated.

ENABLE (Pin 9): Chip Enable. Ground this pin for normal operation. Take this pin to within 300mV of V+, or open to shut down the part. This pin is also used for router applications. When the part is disabled, the supply current is 1µA.

V+ (Pin 8): Connect this pin to 5V and bypass with a good tantalum capacitor (4.7µF). The pin may also require a 0.1µF or 0.01µF depending on layout.

VOUT (Pin 6): It is twice VIN1 or VIN2 depending on which channel is selected by Pin 5. VOUT drives 50Ω or 75Ω double-terminated cables. Do not add capacitance to this pin.

SELECT (Pin 10): Channel Select. Use this pin to select between RGB1 inputs and RGB2 inputs. Use this pin for fast toggling. HIGH Selects RGB1.

V− (Pins 11, 12): Negative Power Supply. Connect these pins to −5V and bypass with a good tantalum capacitor (4.7µF). Do not add capacitance to this pin.

VOUT BLUE (Pin13): Blue Output. It is twice BLUE 1 or BLUE 2 depending on which channel is selected by Pin 10. VOUT BLUE drives 50Ω or 75Ω double-terminated cables. Do not add capacitance to this pin.

VOUT GREEN (Pin14): Green Output. It is twice GREEN 1 or GREEN 2 depending on which channel is selected by Pin 10. VOUT GREEN drives 50Ω or 75Ω double-terminated cables. Do not add capacitance to this pin.

VOUT RED (Pin15): Red Output. It is twice RED 1 or RED 2 depending on which channel is selected by Pin 10. VOUT RED drives 50Ω or 75Ω double-terminated cables. Do not add capacitance to this pin.

V+ (Pin 16): Positive Power Supply. Connect this pin to 5V and bypass with a good tantalum capacitor (4.7µF). The pin may also require a 0.1µF or 0.01µF depending on layout.
**APPLICATIONS INFORMATION**

**Power Supplies**

The LT1675 will function with supply voltages below ±2V (4V total), however, to ensure a full 1V_P-P video signal (2V_P-P at the output pins), the power supply voltage should be between ±4V to ±6V. The LT1675 is designed to operate on ±5V, and at no time should the supplies exceed ±6V. The power supplies should be bypassed with quality tantalum capacitors. It may be necessary to add a 0.01µF or 0.1µF in parallel with the tantalum capacitors if there is excessive ringing on the output waveform. Even though the LT1675 is well behaved, bypass capacitors should be placed as close to the LT1675 as possible.

**Smallest Package and PC Board Space**

The LT1675 has the internal gain set for +2V/V or 6dB, because it is designed to drive a double-terminated 50Ω or 75Ω cable that has an inherent 6dB loss. There are several advantages to setting the gain internally. This topology eliminates six gain set resistors, reduces the pin count of the package and eliminates stray capacitance on the sensitive feedback node. The LT1675 fits into the small SSOP package, and these advantages lead to the smallest PC board footprint with enhanced performance. The LT1675-1 eliminates two gain set resistors and is available in the tiny MSOP package and the cost-effective SO-8 package.

**Fast Switching**

The key to the LT1675 fast switching speed is Linear Technology’s proprietary high speed bipolar process. Internal switches can change state in less than 1ns, but the output of the MUX switches in about 2.5ns, as shown in Figure 1. The additional delay is due to the finite bandwidth and the slew rate of the current feedback amplifier that drives the cable.

For minimum ringing, it is important to minimize the load capacitance on the output of the part. This is normally not a problem in a controlled impedance environment, but stray PC board capacitance and scope probe capacitance can degrade the pulse fidelity. Figure 2 shows the response of the output to various capacitive loads measured with a 10pF scope probe.

![Figure 1. Toggling at 25MHz](image1)

![Figure 2. Response to Capacitive Loads](image2)
Switching Transients

This MUX includes fast current steering break-before-make SPDT switches that minimize switching glitches. The switching transients of Figure 3 are input-referred (measured between 75Ω back termination and the 75Ω load). The glitch is only 50mVp-p and the duration is just 5ns. This transient is small and fast enough to not be visible on quality graphics terminals. Additionally, the break-before-make SPDT switch is open before the alternate channel is connected. This means there is no input feedthrough during switching. Figure 4 shows the amount of alternate channel that is coupled at the input.

Expanding Inputs

In video routing applications where the ultimate 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 with the ENABLE pins. The internal gain set resistors have a nominal value of 750Ω and cause a 1500Ω shunt across the 75Ω cable termination. Figure 5 shows schematically the effect of expanding the number of inputs. The effect of this loading is to cause a gain error that can be calculated by the following formula:

\[
\text{Gain Error (dB)} = 6\text{dB} + 20\log \left( \frac{\frac{1575\Omega}{n-1}}{75 + \frac{1575\Omega}{n-1}} \right) \\
\]

where \( n \) is total number of LT1675s. For example, using ten LT1675s (20 Red, 20 Green and 20 Blue) the Gain Error is only –1.7dB per channel.

Figure 6 shows a 4-input RGB router. The response from RED 1 Input to Red Output is shown in Figure 7 for a 25MHz square wave with Chip Select = 0V. In this case the Gain Error is –0.23dB. Toggling with Chip Select between IC #1 and IC #2 is shown in Figure 8. In this case RED 1 Input is connected to 0V and RED 3 Input is connected to an uncorrelated sinewave.
APPLICATIONS INFORMATION

Figure 5. Off Channels Load the Cable Termination with 1575Ω Each

Figure 6. Two LT1675s Build a 4-Input RGB Router

Figure 7. 4-Input Router Response

Figure 8. 4-Input Router Toggling
This circuit is useful for viewing photographic negatives on video. A single channel can be used for composite or monochrome video. The inverting amplifier stages are only switched in during active video so the blanking, sync and color burst (if present) are not disturbed. To prevent video from swinging negative, a voltage offset equal to the peak video signal is added to the inverted signal.
This circuit highlights a section of the picture under control of a synchronous key signal. It can be used for adding the logo (also called a “bug”) you see in the bottom corner of commercial television pictures or any sort of overlay signal, such as a crosshair or a reticule. The key signal has 2 bits of control so there can be four levels of highlighting: unmodified video, video plus 33% white, video plus 66% white and 100% white. The two LT1675s are configured as a 2-bit DAC. The resistors on the outputs set the relative bit weights. The output of the LT1675 labeled B in the schematic 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 75 ohms. The output will never exceed peak white, which is 0.714V for this NTSC-related RGB video. The reference white signal is adjustable to lower than peak white to make the effect less intrusive, if desired.
PACKAGE DESCRIPTION

Dimensions in inches (millimeters) unless otherwise noted.

GN Package
16-Lead Plastic SSOP (Narrow 0.150)
(LTC DWG # 05-08-1641)

* DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE
** DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

MS8 Package
8-Lead Plastic MSOP
(LTC DWG # 05-08-1660)

* DIMENSION DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE
** DIMENSION DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS. INTERLEAD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE

S8 Package
8-Lead Plastic Small Outline (Narrow 0.150)
(LTC DWG # 05-08-1610)

* DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE
** DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

Information furnished by Linear Technology Corporation is believed to be accurate and reliable. However, no responsibility is assumed for its use. Linear Technology Corporation makes no representation that the interconnection of its circuits as described herein will not infringe on existing patent rights.
**TYPICAL APPLICATION**

**NTSC-Related Color Bar Generator**

An RGB color bar test pattern is easily generated by dividing down a suitable clock. To form a stable pattern, the clock must be synchronous with the horizontal scan rate. Four times subcarrier, or 14.318MHz, is a readily available frequency, which when divided by 91, gives 157.343KHz. Dividing this signal by two, four and eight, gives the blue, red and green signals, respectively. This timing gives eight bars including white and black that fill the 52.6μs active video time. The digital signals are run through a 74ACT04 inverter because the CMOS output swings rail-to-rail. The inverter output is scaled to make video (0.714V peak, for NTSC-related RGB). The LT1675 drives the cable and adds sync to the RGB signals by switching in –0.286V. If no sync is required, this voltage can be set to zero and composite blanking can be used to drive the select pin of the LT1675 in order to provide a more precise blanking level.

**RELATED PARTS**

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT6555</td>
<td>650 MHz RGB Multiplexing Amplifier</td>
<td>2200V/μs Slew Rate, 2:1 Input MUX</td>
</tr>
<tr>
<td>LT1203/LT1205</td>
<td>150MHz Video MUX</td>
<td>2-Input and 4-Input, 90dB Channel Separation, Wide Supply Range</td>
</tr>
<tr>
<td>LT1204</td>
<td>4-Input Video MUX with 75MHz Current Feedback Amp</td>
<td>Drives Cables, Adjustable Gain, 90dB Channel Separation</td>
</tr>
<tr>
<td>LT1260</td>
<td>Low Cost Dual and Triple 130MHz Current Feedback Amp with Shutdown</td>
<td>Drives Cables, Wide Supply Range, 0µA Shutdown Current</td>
</tr>
<tr>
<td>LT1398/LT1399</td>
<td>Low Cost Dual and Triple 300MHz Current Feedback Amp with Shutdown</td>
<td>Performance Upgrade for the LT1259/LT1260</td>
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