

# 250MHz, Triple and Single RGB Multiplexer with Amplifiers

## 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<sup>®</sup>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.

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## TYPICAL APPLICATION



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



# LT1675/LT1675-1

## ABSOLUTE MAXIMUM RATINGS (Note 1)

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

## PACKAGE/ORDER INFORMATION

| <p>MS8 PACKAGE<br/>8-LEAD PLASTIC MSOP<br/><math>T_{JMAX} = 150^{\circ}C, \theta_{JA} = 250^{\circ}C/W</math></p> |                  | <p>S8 PACKAGE<br/>8-LEAD PLASTIC SO<br/><math>T_{JMAX} = 150^{\circ}C, \theta_{JA} = 150^{\circ}C/W</math></p> |                 | <p>GN PACKAGE<br/>16-LEAD PLASTIC SSOP NARROW<br/><math>T_{JMAX} = 150^{\circ}C, \theta_{JA} = 120^{\circ}C/W</math></p> |                 |
|---|------------------|--|-----------------|--|-----------------|
| ORDER PART NUMBER   | MS8 PART MARKING | ORDER PART NUMBER  | S8 PART MARKING | ORDER PART NUMBER  | GN PART MARKING |
| LT1675CMS8-1  | LTX              | LT1675CS8-1  | 16751           | LT1675CGN  | 1675            |

**Order Options** Tape and Reel: Add #TR

Lead Free: Add #PBF, Lead Free Tape and Reel: Add #TRPBF, Lead Free Part Marking: <http://www.linear.com/leadfree/>

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  $T_A = 25^\circ\text{C}$ .  $V_S = \pm 5\text{V}$ ,  $R_L = \infty$ ,  $V_{IN} = 0\text{V}$  LT1675 (Pins 1, 2, 3, 6, 7, 8), LT1675-1 (Pins 1, 3),  $\text{ENABLE} = 0\text{V}$ , unless otherwise specified.

| PARAMETER                 | CONDITIONS  |  | MIN  | TYP  | MAX | UNITS            |               |
|---------------------------|---|--|------|------|-----|------------------|---------------|
| Output Offset Voltage     | Any Input Selected  | ●  |      | 20   | 50  | mV               |               |
| Output Offset Matching    | Between Outputs R1 to R2, G1 to G2, B1 to B2                    | ●  |      | 5    | 20  | mV               |               |
| Input Current             | Any Input Selected  | ●  |      | -12  | -30 | $\mu\text{A}$    |               |
| Input Resistance          | $V_{IN} = \pm 1\text{V}$  | ●  | 100  | 700  |     | $\text{k}\Omega$ |               |
| PSRR                      | $V_S = \pm 2.6\text{V}$ to $\pm 6\text{V}$ , Measured at Output | ●  | 38   | 50   |     | dB               |               |
| DC Gain Error 0V to 1V    | $V_{IN} = 1\text{V}$ , $R_L = \infty$                           | ●  |      | 3    | 6   | %                |               |
|                           | $V_{IN} = 1\text{V}$ , $R_L = 150\Omega$                        | ●  |      | 4    | 8   | %                |               |
|                           | $V_{IN} = 1\text{V}$ , $R_L = 75\Omega$                         |  |      | 5    | 10  | %                |               |
| DC Gain Error 0V to -1V   | $V_{IN} = -1\text{V}$ , $R_L = \infty$                          | ●  |      | 3    | 6   | %                |               |
|                           | $V_{IN} = -1\text{V}$ , $R_L = 150\Omega$                       | ●  |      | 4    | 8   | %                |               |
|                           | $V_{IN} = -1\text{V}$ , $R_L = 75\Omega$                        |  |      | 8    | 20  | %                |               |
| Output Voltage            | $V_{IN} = 2\text{V}$ , $R_L = \infty$                           | ●  | 3.1  | 3.4  |     | V                |               |
|                           | $V_{IN} = 2\text{V}$ , $R_L = 150\Omega$                        | ●  | 2.7  | 3.0  |     | V                |               |
|                           | $V_{IN} = 2\text{V}$ , $R_L = 75\Omega$                         | ●  | 2.4  | 2.8  |     | V                |               |
|                           | $V_{IN} = -2\text{V}$ , $R_L = \infty$                          | ●  | -3.1 | -3.3 |     | V                |               |
|                           | $V_{IN} = -2\text{V}$ , $R_L = 150\Omega$                       | ●  | -2.6 | -3.0 |     | V                |               |
|                           | $V_{IN} = -2\text{V}$ , $R_L = 75\Omega$                        | ●  | -2.3 | -2.6 |     | V                |               |
| Disabled Output Impedance | $\overline{\text{ENABLE}}$ Open                                 | ●  | 1.1  | 1.5  | 2.0 | $\text{k}\Omega$ |               |
| Maximum Output Current    | $V_{IN} = \pm 1\text{V}$ , $V_O = 0\text{V}$                    | ●  | 50   | 70   |     | mA               |               |
| Supply Current            | LT1675  | $\overline{\text{ENABLE}} = 0\text{V}$   | ●    | 25   | 33  | 42               | mA            |
|                           |   | $\overline{\text{ENABLE}} = 4.7\text{V}$ | ●    |      | 1   | 100              | $\mu\text{A}$ |
| ENABLE Pin Current        | LT1675-1  | $\overline{\text{ENABLE}} = 0\text{V}$   | ●    | 8    | 11  | 14               | mA            |
|                           |   | $\overline{\text{ENABLE}} = 4.7\text{V}$ | ●    |      | 0.3 | 33               | $\mu\text{A}$ |
| ENABLE Pin Current        | LT1675  | $\overline{\text{ENABLE}} = 0\text{V}$   | ●    |      | 450 | 600              | $\mu\text{A}$ |
|                           | LT1675-1  | $\overline{\text{ENABLE}} = 0\text{V}$   | ●    |      | 150 | 200              | $\mu\text{A}$ |
| SELECT Pin Current        | LT1675  | SELECT = 0V                              | ●    |      | 90  | 180              | $\mu\text{A}$ |
|                           | LT1675-1  | SELECT = 0V                              | ●    |      | 30  | 60               | $\mu\text{A}$ |
| SELECT Low                | SELECT (See Truth Table)  |  | ●    |      | 0.8 | V                |               |
| SELECT High               | SELECT (See Truth Table)  |  | ●    | 2    |     | V                |               |

# LT1675/LT1675-1

## 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),  $\overline{\text{ENABLE}} = 0\text{V}$ , unless otherwise specified.

| PARAMETER                                  | CONDITIONS   | MIN | TYP          | MAX | UNITS             |
|--|--|-----|--------------|-----|-------------------|
| Slew Rate                                  | $V_{OUT} = 5V_{P-P}$   |     | 1100         |     | V/ $\mu\text{s}$  |
| Full Power Bandwidth (Note 5)              | $V_{OUT} = 6V_{P-P}$   |     | 58           |     | MHz               |
| Small-Signal -3dB Bandwidth                | Less Than 1dB Peaking  |     | 250          |     | MHz               |
| Gain Flatness                              | Less Than 0.1dB  |     | 70           |     | MHz               |
| Gain Matching                              | R to G to B<br>R1 to R2, G1 to G2, B1 to B2, LT1675-1 $V_{IN1}$ to $V_{IN2}$ |     | 0.10<br>0.01 |     | dB<br>dB          |
| Channel-to-Channel Select Time             | R1 = 0V, R2 = 1V   |     |              |     |                   |
| Delay Time                                 | Measured from Time SELECT Pin Crosses Logic Threshold                        |     | 5.0          |     | ns                |
| Switching Time                             | Time for $V_{OUT}$ to Go from 0V to 1V                                       |     | 2.5          |     | ns                |
| Enable Time                                |  |     | 10           |     | ns                |
| Disable Time                               |  |     | 100          |     | ns                |
| Input Pin Capacitance                      |  |     | 2            |     | pF                |
| SELECT Pin Capacitance                     | LT1675   |     | 2.2          |     | pF                |
|  | LT1675-1   |     | 1.5          |     | pF                |
| $\overline{\text{ENABLE}}$ Pin Capacitance | LT1675   |     | 2.1          |     | pF                |
|  | LT1675-1   |     | 1.5          |     | pF                |
| Output Pin Capacitance (Disabled)          | $\overline{\text{ENABLE}}$ Open  |     | 4.4          |     | pF                |
| Small-Signal Rise Time                     | $V_{IN} = 300\text{mV}_{P-P}$ , $R_L = 100\Omega$                            |     | 1.85         |     | ns                |
| Propagation Delay                          | $V_{IN} = 300\text{mV}_{P-P}$ , $R_L = 100\Omega$                            |     | 3            |     | ns                |
| Overshoot                                  | $V_{IN} = 300\text{mV}_{P-P}$ , $R_L = 100\Omega$                            |     | 10           |     | %                 |
| On-Channel to Off-Channel Crosstalk        | Measured at 10MHz  |     | 60           |     | dB                |
| Chip Disable Crosstalk                     | Measured at 10MHz, $\overline{\text{ENABLE}}$ Open                           |     | 90           |     | dB                |
| Channel Select Output Transient            | Measured Between Back Termination and Load                                   |     | 50           |     | $\text{mV}_{P-P}$ |
| Differential Gain (Note 6)                 |  |     | 0.07         |     | %                 |
| Differential Phase (Note 6)                |  |     | 0.05         |     | DEG               |

**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  $0^\circ\text{C}$  to  $70^\circ\text{C}$  and are designed, characterized and expected to meet these extended temperature limits, but are not tested at  $-40^\circ\text{C}$  and  $85^\circ\text{C}$ . 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:

$$\text{LT1675CGN: } T_J = T_A + (P_D)(120^\circ\text{C/W})$$

$$\text{LT1675CMS8-1: } T_J = T_A + (P_D)(250^\circ\text{C/W})$$

$$\text{LT1675CS8-1: } T_J = T_A + (P_D)(150^\circ\text{C/W})$$

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

$$\text{FPBW} = \text{SR}/2\pi V_{PEAK}$$

**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  $0.1^\circ$ . Nine identical MUXs were cascaded giving an effective resolution of 0.011% and  $0.011^\circ$ .

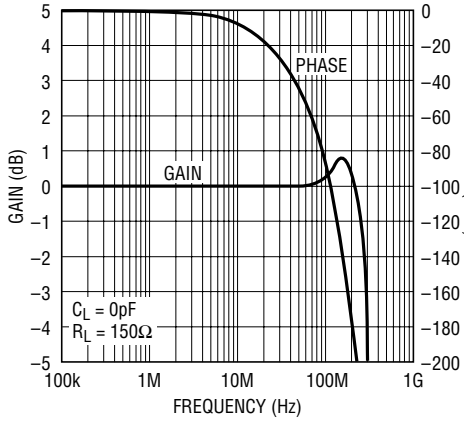
### Truth Table

| SELECT | $\overline{\text{ENABLE}}$ | LT1675  |           |          | LT1675-1 |
|--------|----------------------------|---------|-----------|----------|----------|
|        |                            | RED OUT | GREEN OUT | BLUE OUT | VOUT     |
| 1      | 0                          | RED 1   | GREEN 1   | BLUE 1   | VIN1     |
| 0      | 0                          | RED 2   | GREEN 2   | BLUE 2   | VIN2     |
| X      | 1                          | OFF     | OFF       | OFF      | OFF      |

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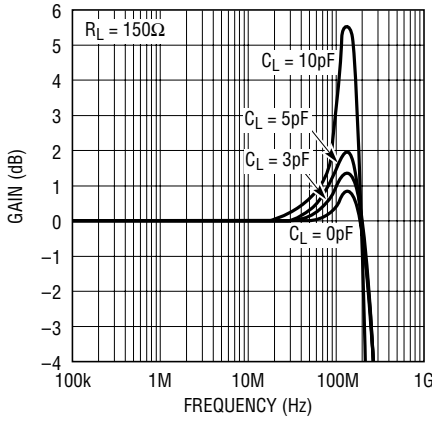
# TYPICAL PERFORMANCE CHARACTERISTICS

**Gain and Phase vs Frequency**



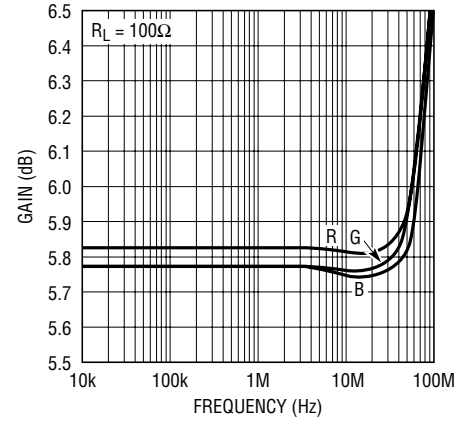
1675 G01

**Frequency Response with Capacitive Loads**



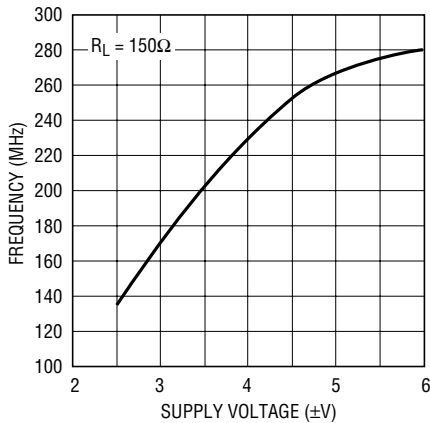
1675 G02

**Gain vs Frequency**



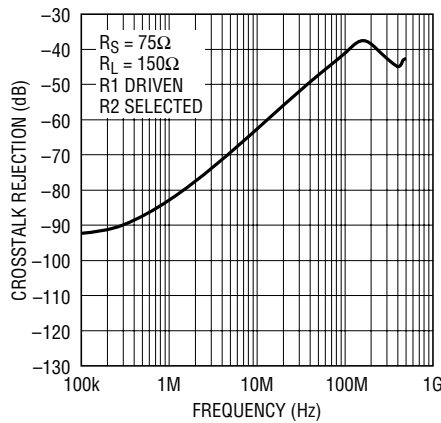
1675 G03

**-3dB Bandwidth vs Supply Voltage**



1675 G04

**Crosstalk Rejection vs Frequency**



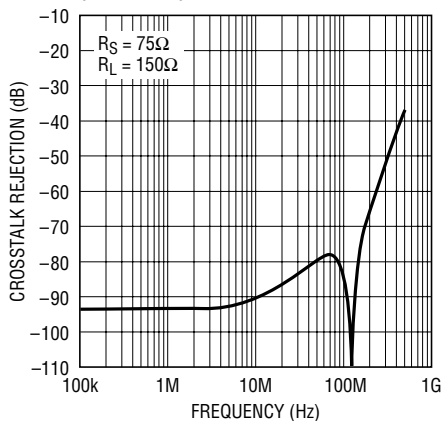
1675 G05

**Crosstalk Rejection vs Frequency**



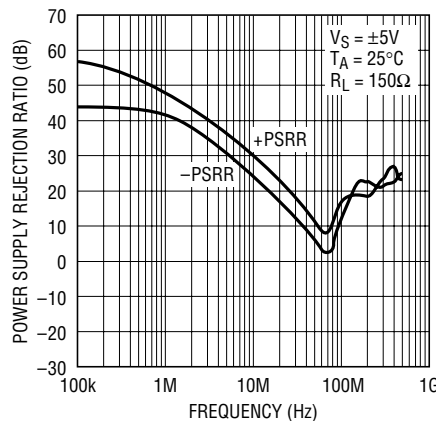
1675 G23

**Crosstalk Rejection vs Frequency (Disabled)**



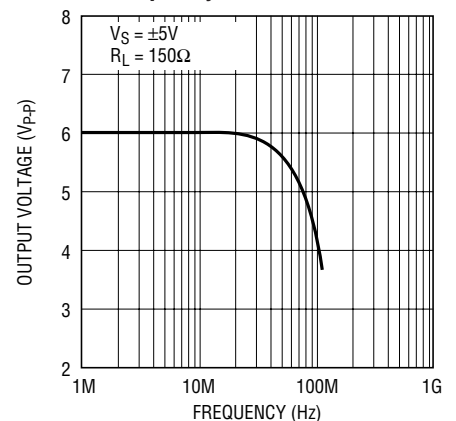
1675 G06

**Power Supply Rejection Ratio vs Frequency**



1675 G07

**Undistorted Output Swing vs Frequency**



1675 G08

# TYPICAL PERFORMANCE CHARACTERISTICS

**Output Impedance vs Frequency**



1675 G09

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



LTXXXX 1675 G10

**Input Bias Current vs Input Voltage**



1675 G12

**Output Short-Circuit Current vs Temperature**



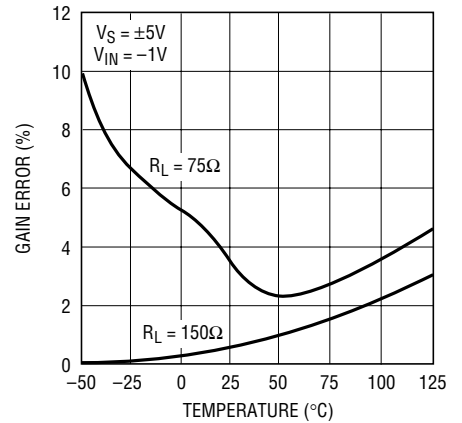
1675 G13

**Positive DC Gain Error vs Temperature**



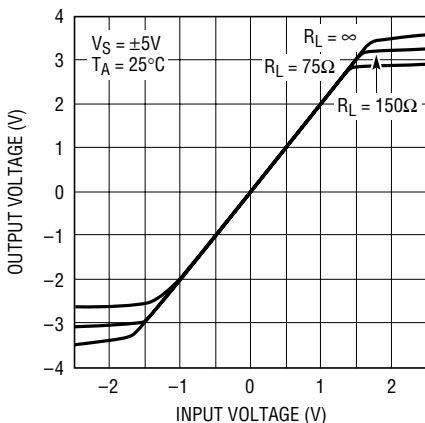
1675 G14

**Negative DC Gain Error vs Temperature**



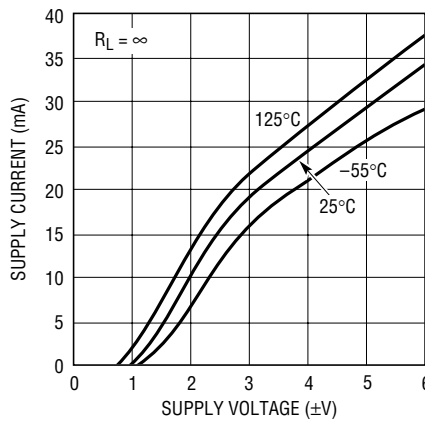
1675 G15

**Output Voltage vs Input Voltage**



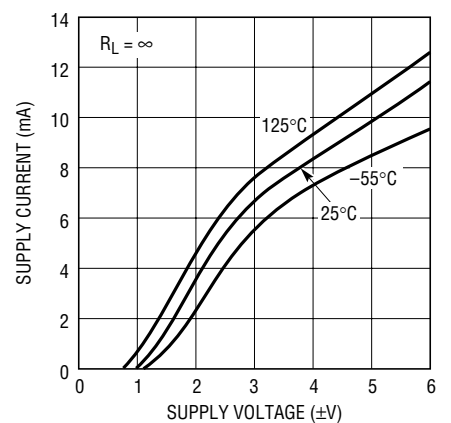
1675 G16

**Supply Current vs Supply Voltage**



1675 G11

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

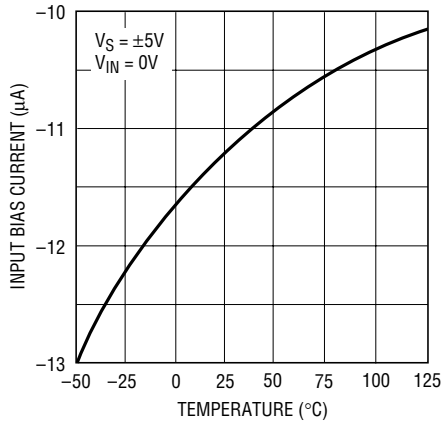


1675 G24

16751fb

# TYPICAL PERFORMANCE CHARACTERISTICS

**Input Bias Current vs Temperature**



1675 G17

**Output Offset Voltage vs Temperature**



1675 G18

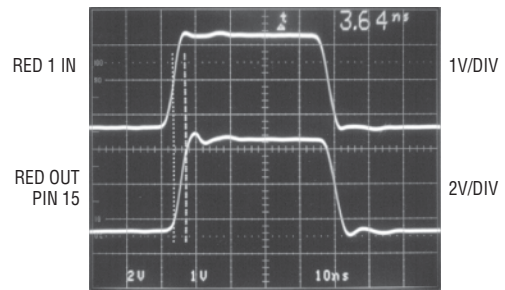
**Toggling RED 2 to RED 1**



RED 1 = 0V  
RED 2 = UNCORRELATED SINEWAVE  
RL = 150Ω, 10pF SCOPE PROBE

1675 G19

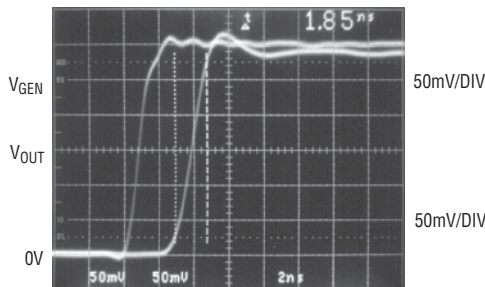
**Slew Rate**



MEASURED AT PIN 15  
RL = 150Ω, 10pF SCOPE PROBE  
SR = 1100V/μs

1675 G20

**Small-Signal Rise Time**



RL = 100Ω  
MEASURED WITH FET PROBES

1675 G21

**Enable and Disable**



ENABLE AND DISABLE OF UNCORRELATED SINEWAVE  
RL = 150Ω

1675 G22



## 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,  $V_{OUT\ RED}$  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,  $V_{OUT\ GREEN}$  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,  $V_{OUT\ BLUE}$  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,  $V_{OUT\ RED}$  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,  $V_{OUT\ GREEN}$  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,  $V_{OUT\ BLUE}$  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 1 $\mu$ A.

### LT1675-1

**$V_{IN1}$  (Pin 1):** The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin,  $V_{OUT}$  will clip. The input must be terminated.

**GND (Pin 2):** Signal Ground. Connect to ground plane.

**$V_{IN2}$  (Pin 3):** The 1V video input signal to be switched is applied to this pin. If 2V is applied to this pin,  $V_{OUT}$  will clip. The input must be terminated.

**$V^-$  (Pin 4):** Connect this pin to  $-5V$  and bypass with good tantalum capacitor (4.7 $\mu$ F). The pin may also require a 0.1 $\mu$ F or 0.01 $\mu$ F depending on layout.

**SELECT (Pin 5):** Use this pin to select  $V_{IN1}$  or  $V_{IN2}$ . Use this pin for fast toggling. HIGH Selects  $V_{IN1}$ .

**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 (4.7 $\mu$ F). The pin may also require a 0.1 $\mu$ F or 0.01 $\mu$ F depending on layout.

**$V_{OUT\ BLUE}$  (Pin 13):** Blue Output. It is twice BLUE 1 or BLUE 2 depending on which channel is selected by Pin 10.  $V_{OUT\ BLUE}$  drives 50 $\Omega$  or 75 $\Omega$  double-terminated cables. Do not add capacitance to this pin.

**$V_{OUT\ GREEN}$  (Pin 14):** Green Output. It is twice GREEN 1 or GREEN 2 depending on which channel is selected by Pin 10.  $V_{OUT\ GREEN}$  drives 50 $\Omega$  or 75 $\Omega$  double-terminated cables. Do not add capacitance to this pin.

**$V_{OUT\ RED}$  (Pin 15):** Red Output. It is twice RED 1 or RED 2 depending on which channel is selected by Pin 10.  $V_{OUT\ RED}$  drives 50 $\Omega$  or 75 $\Omega$  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 (4.7 $\mu$ F). The pin may also require a 0.1 $\mu$ F or 0.01 $\mu$ F depending on layout.

**$V_{OUT}$  (Pin 6):** It is twice  $V_{IN1}$  or  $V_{IN2}$  depending on which channel is selected by Pin 5.  $V_{OUT}$  drives 50 $\Omega$  or 75 $\Omega$  double-terminated cables. Do not add capacitance to this pin.

**ENABLE (Pin 7):** 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 0.3 $\mu$ A.

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



## APPLICATIONS INFORMATION

### Power Supplies

The LT1675 will function with supply voltages below  $\pm 2V$  (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  $\pm 4V$  to  $\pm 6V$ . The LT1675 is designed to operate on  $\pm 5V$ , and at no time should the supplies exceed  $\pm 6V$ . The power supplies should be bypassed with quality tantalum capacitors. It may be necessary to add a  $0.01\mu F$  or  $0.1\mu F$  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  $50\Omega$  or  $75\Omega$  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



Figure 2. Response to Capacitive Loads

## APPLICATIONS INFORMATION

### 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 50mV<sub>p-p</sub> 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:

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

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.

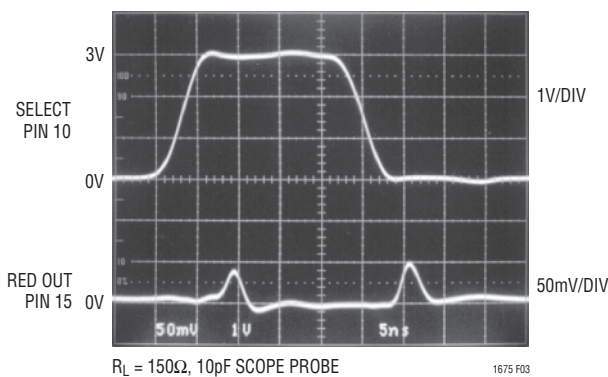


Figure 3. Input-Referred Switching Transient

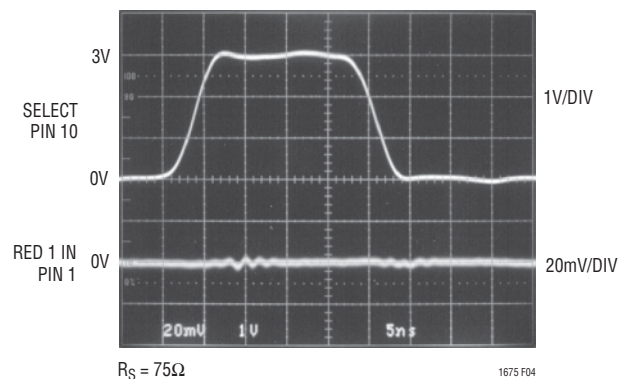


Figure 4. Switching Transient at RED 1 (Pin 1)

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

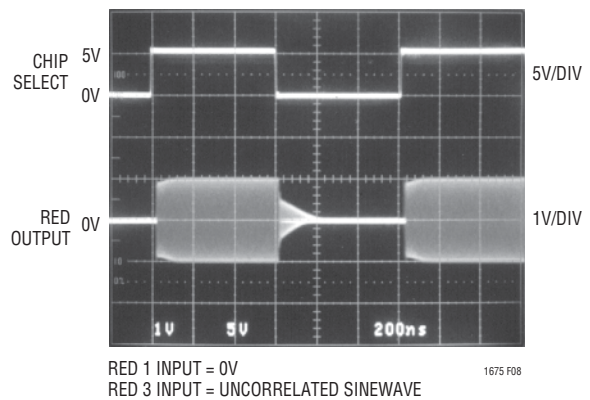
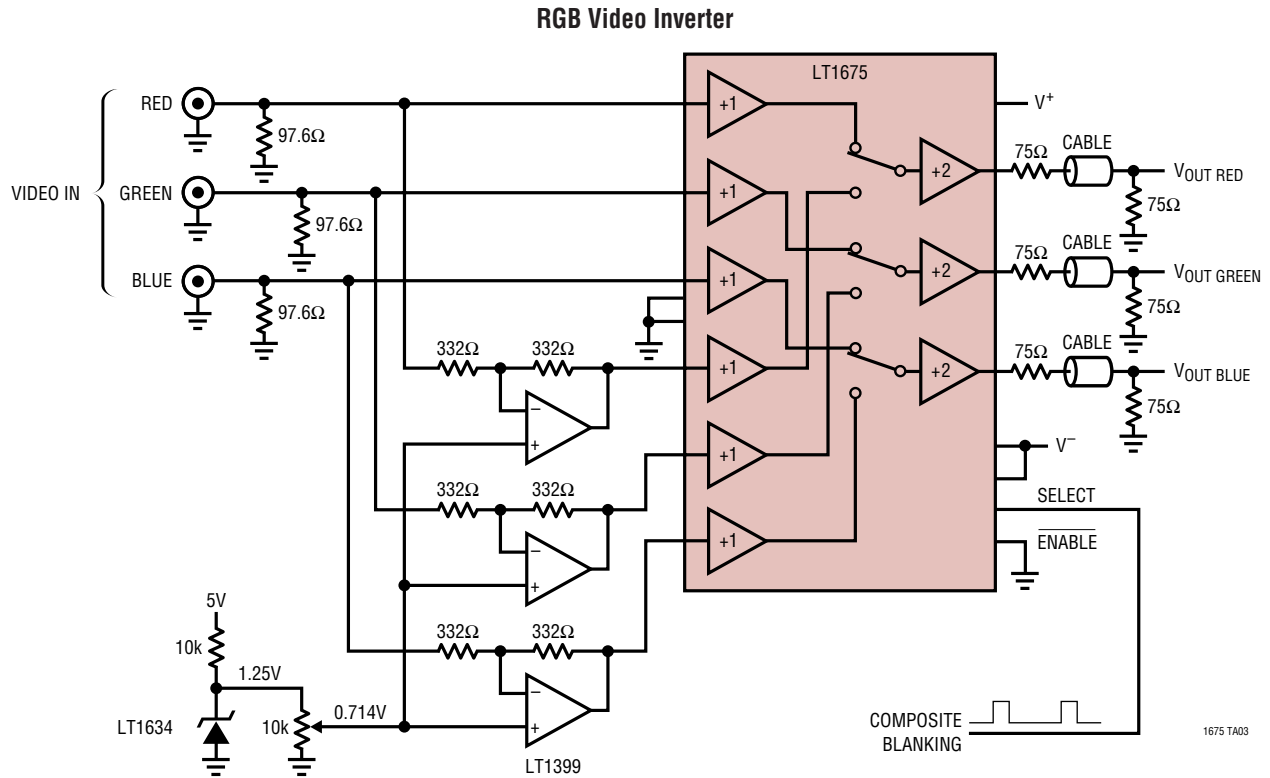


Figure 8. 4-Input Router Toggling

TYPICAL APPLICATIONS

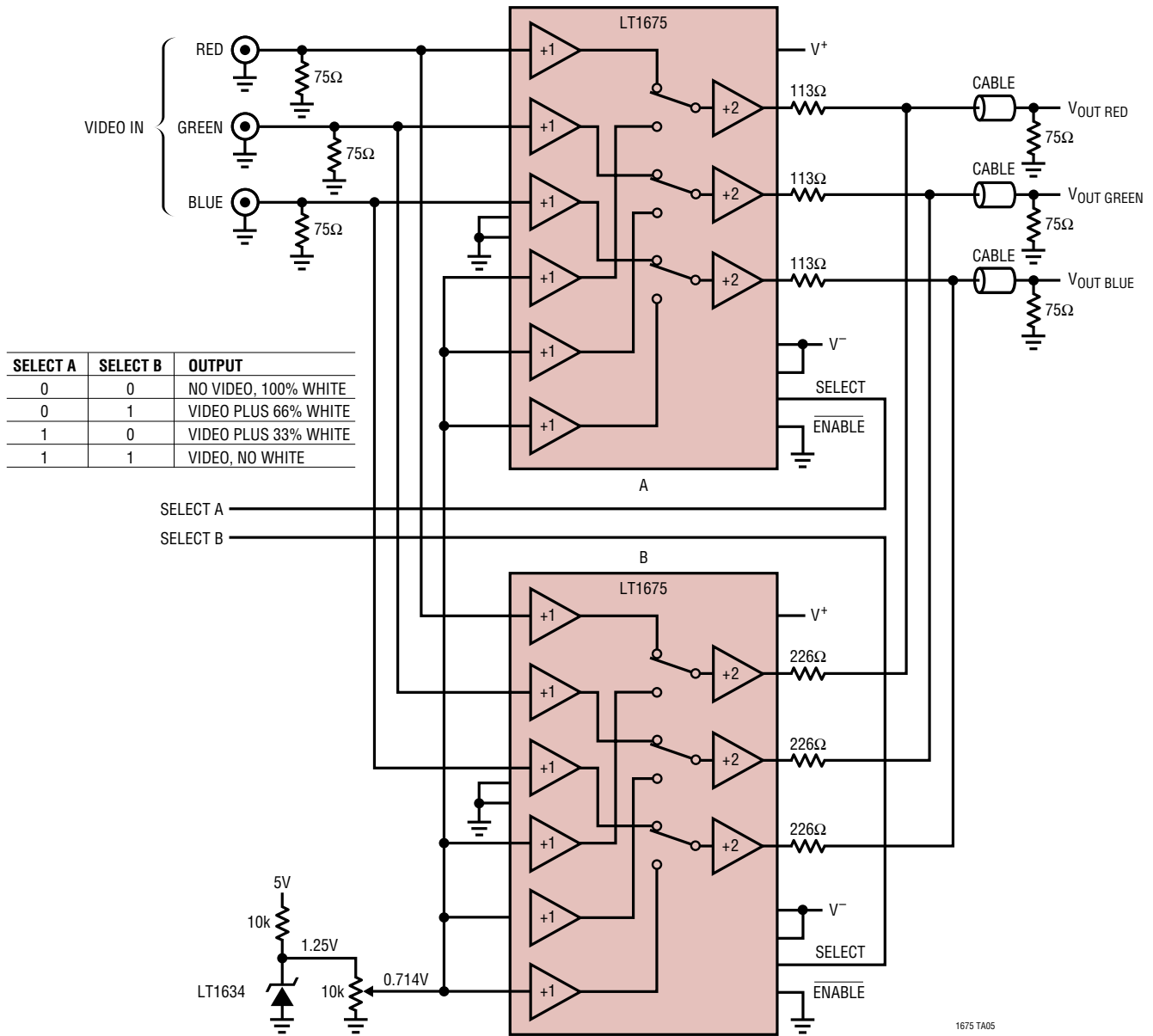


This circuit is useful for viewing photographic negatives on video. A single channel can be used for composite or monochrome video. The inverting amplifier stages are only switched in during active video so the blanking, sync

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.

# TYPICAL APPLICATIONS

Logo or “Bug” Inserter

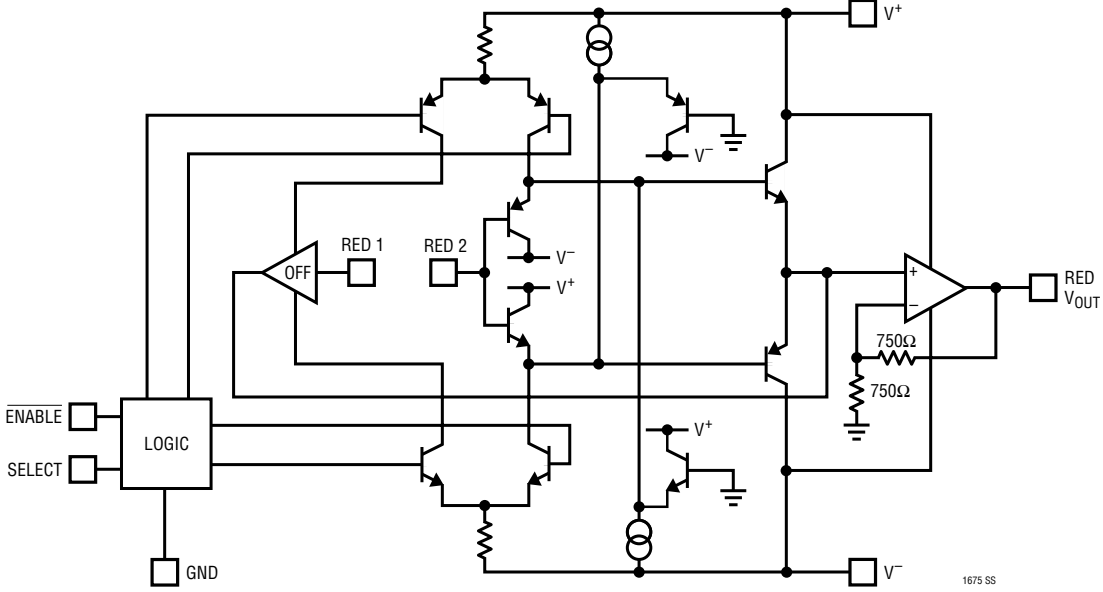


This circuit highlights a section of the picture under control of a synchronous key signal. It can be used for adding the logo (also called a “bug”) you see in the bottom corner of commercial television pictures or any sort of overlay signal, such as a crosshair or a reticule. The key signal has 2 bits 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.

1675 TA05

**SIMPLIFIED SCHEMATIC** (LT1675-1, LT1675 One Channel)

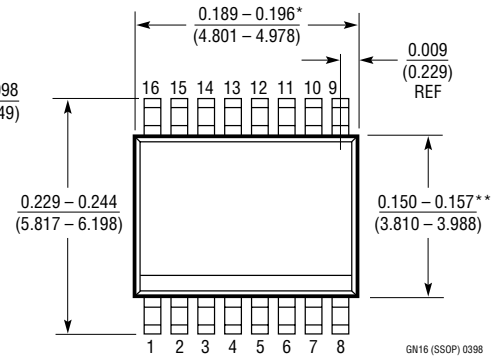


1675 SS

**PACKAGE DESCRIPTION**

Dimensions in inches (millimeters) unless otherwise noted.

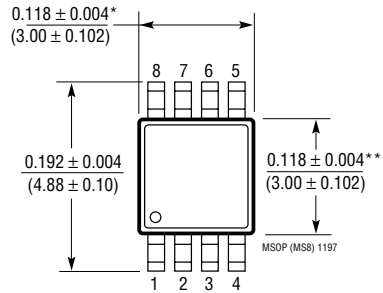
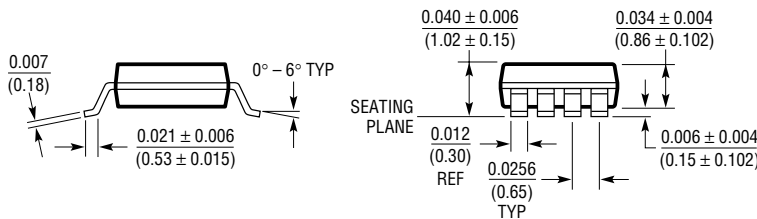
**GN Package**  
**16-Lead Plastic SSOP (Narrow 0.150)**  
 (LTC DWG # 05-08-1641)



\* 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

GN16 (SSOP) 0398

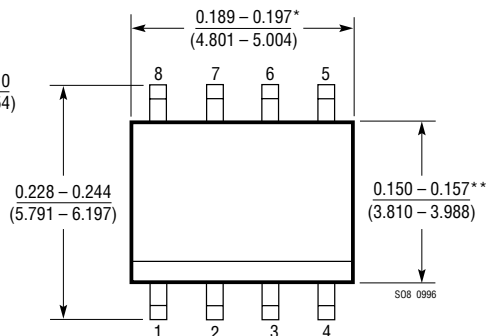
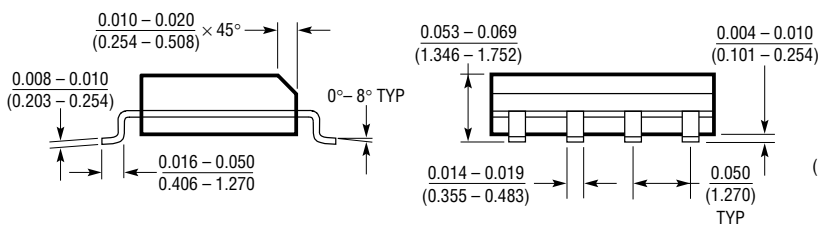
**MS8 Package**  
**8-Lead Plastic MSOP**  
 (LTC DWG # 05-08-1660)



\* 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

MSOP (MS8) 1197

**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

S08 0996