LMH6572 トリプル2:1高速ビデオ・マルチプレクサ

1 特長

- 350MHz、250mV、-3dB帯域幅
- 290MHz、2V_{PP}、-3dB帯域幅
- チャネルのスイッチング時間: 10ns
- 5MHzにおいてチャネル間分離90dB
- 0.02%、0.02°の差動ゲイン、位相
- ゲイン・フラットネス: 140MHzまで0.1dB
- スルー・レート: 1400V/µs
- 広い電源電圧範囲:
  6V (±3V)～12V (±6V)
- 10MHzにおいて-78dB HD2
- 10MHzにおいて-75dB HD3

2 アプリケーション

- RGBビデオ・ルータ
- 複数入力のビデオ・モニタ
- フォルト・トレラントのデータ・スイッチ

3 概要

LMH6572は高性能のアナログ・マルチプレクサで、プロフェッショナル・グレードのビデオや、他の高忠実度、高帯域幅のアナログ・アプリケーション用に最適化されています。LMH6572は、2V_{PP}の出力信号レベルで290MHzの帯域幅を提供します。140MHzの0.1dB帯域幅と、1500V/µsのスルー・レートから、この製品は高解像度テレビ(HDTV)および高解像度のマルチメディア・ビデオ・アプリケーションに適しています。

LMH6572は、コンポジット・ビデオ・アプリケーションをサポートし、NTSCおよびPALビデオ信号で0.02%および0.02°の差動ゲイン誤差と位相誤差を実現し、単一のバック終端の75Ω負荷を駆動します。LM6572は80mAのリニア出力電流を供給し、複数のビデオ負荷アプリケーションを駆動できます。

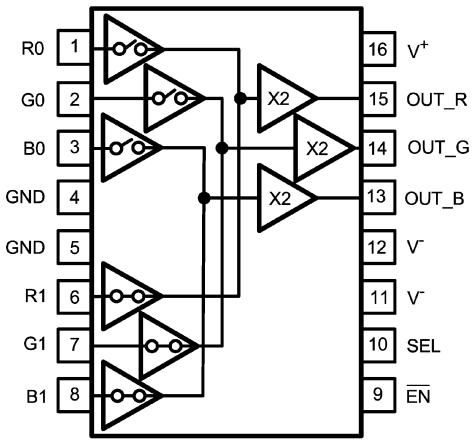
LMH6572の内部ゲインは2V/V (+6dBv)で、バック終端の伝送ラインを1V/V (0dBv)の実質ゲインで駆動します。

LMH6572はSSOPパッケージで供給されます。

製品情報(1)

型番	パッケージ	本体サイズ(公称)
LMH6572	SSOP (16)	4.90mm×3.90mm

(1) 利用可能なすべてのパッケージについては、このデータシートの末尾にある注文情報を参照してください。



目次

4 改訂履歴

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

Revision F (May 2013) から **Revision G** に変更 **Page**

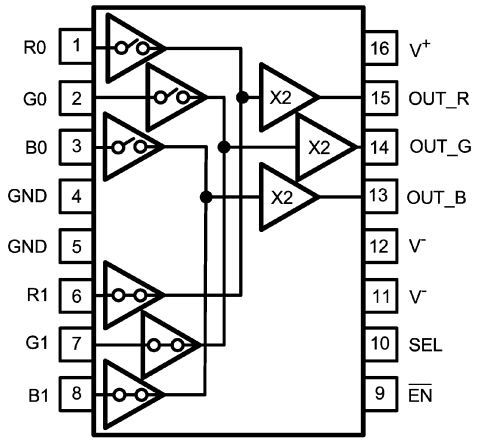
- プレビュー版のウォーターマーク 削除 ... 1
- 「*製品情報*」表、「*ピン構成および機能*」セクション、「*ESD定格*」表、「*機能説明*」セクション、「*電源に関する推奨事項*」セクション、「*レイアウト*」セクション、「*デバイスおよびドキュメントのサポート*」セクション、「*メカニカル、パッケージ、および注文情報*」セクション 追加 ... 1
- Deleted bolding from Electrical Characteristics specifications, added temperature range to test conditions for clarification 5
- Changed *Overview* title from *General Information* ... 11
- Changed *Layout Considerations* title to *Layout Guidelines* ... 16

Revision E (April 2013) から **Revision F** に変更 **Page**

- Changed layout of National Semiconductor Data Sheet to TI format ... 16

5 Pin Configuration and Functions

DBQ Package
16-Pin SSOP
Top View



Truth Table

SEL	$\overline{EN}$	OUT
0	0	CH 1
1	0	CH 0
X	1	Disable

6 Specifications

6.1 Absolute Maximum Ratings

see (1)(2)

	MIN	MAX	UNIT
Supply Voltage ($V^+ - V^-$)		13.2	V
I_{OUT} (3)		130	mA
Input Voltage Range		±(V_S)	V
Maximum Junction Temperature (4)		+150	°C
Storage temperature, T_{stg}	–65	+150	°C

(1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured. For ensured specifications, see the Electrical Characteristics tables.
(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.
(3) The maximum output current (I_{OUT}) is determined by the device power dissipation limitations. See the *Power Dissipation* section for more details. A short circuit condition should be limited to 5 seconds or less.
(4) Human Body Model, 1.5 kΩ in series with 100 pF. Machine Model 0 Ω in series with 200 pF.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 (1)	±2000	V
		Machine model (MM)	±200	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

see (1)

		MIN	NOM	MAX	UNIT
	Operating Temperature	–40		85	°C
	Supply Voltage Range	6		12	V

(1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured. For ensured specifications, see the Electrical Characteristics tables.

6.4 Thermal Information

THERMAL METRIC (1)		LMH6572 DBQ (SSOP) 16 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	125	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	36	°C/W

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report.

6.5 ±5V Electrical Characteristics

V_S = ±5 V and R_L = 100 Ω, (unless otherwise noted)

PARAMETER		TEST CONDITIONS(1)	MIN	TYP	MAX	UNIT
FREQUENCY DOMAIN PERFORMANCE						
SSBW	–3 dB Bandwidth	V_{OUT} = 0.25 V_{PP}		350		MHz
LSBW	–3 dB Bandwidth(2)	V_{OUT} = 2 V_{PP}	250	290		MHz
.1 dBBW	0.1 dB Bandwidth	V_{OUT} = 0.25 V_{PP}		140		MHz
DG	Differential Gain	R_L = 150 Ω, f = 4.43 MHz		0.02%		
DP	Differential Phase	R_L = 150 Ω, f = 4.43 MHz		0.02		deg
TIME DOMAIN RESPONSE						
TRS	Channel to Channel Switching Time	Logic Transition to 90% Output		10		ns
	Enable and Disable Times	Logic Transition to 90% or 10% Output		11		ns
TRL	Rise and Fall Time	2-V Step		1.5		ns
TSS	Settling Time to 0.05%	2-V Step		17		ns
OS	Overshoot	4-V Step		5%		
SR	Slew Rate(2)	4-V Step	1200	1400		V/µs
DISTORTION						
HD2	2nd Harmonic Distortion	2 V_{PP} , 10 MHz		−78		dBc
HD3	3rd Harmonic Distortion	2 V_{PP} , 10 MHz		−75		dBc
IMD	3rd Order Intermodulation Products	10 MHz, Two tones 2 V_{PP} at Output		−80		dBc
EQUIVALENT INPUT NOISE						
VN	Voltage	>1 MHz, Input Referred		5		nV/√Hz
ICN	Current	>1 MHz, Input Referred		5		pA/√Hz
STATIC, DC PERFORMANCE						
GAIN	Voltage Gain			2.0		V/V
	Gain Error(3)	No load, with respect to nominal gain of 2.00 V/V		±0.3%	±0.5%	
		No load, with respect to nominal gain of 2.00 V/V, T_A = –40°C to +85°C		±0.3%	±0.7%	
	Gain Error	R_L = 50 Ω, with respect to nominal gain of 2.00 V/V		0.3%		
VIO	Output Offset Voltage(3)	V_{IN} = 0 V		1	±14	mV
		V_{IN} = 0 V, T_A = –40°C to +85°C		1	±17.5	
DVIO	Average Drift			27		µV/°C
IBN	Input Bias Current(3)(4)	V_{IN} = 0 V		−1.4	±5.0	µA
		V_{IN} = 0 V, T_A = –40°C to +85°C		−1.4	±5.6	
DIBN	Average Drift			7		nA/°C
PSRR	Power Supply Rejection Ratio(3)	DC, Input referred	50	54		dB
		DC, Input referred, T_A = –40°C to +85°C	48	54		
ICC	Supply Current(3)	No load	20	23	25	mA
		No load, T_A = –40°C to +85°C	20	23	28.5	
	Supply Current Disabled(3)	No load		2.0	2.2	mA
		No load, T_A = –40°C to +85°C		2.0	2.3	
VIH	Logic High Threshold(3)	Select and Enable Pins	2.0			V

(1) Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that $T_J = T_A$. No specification of parametric performance is indicated in the electrical tables under conditions of internal self heating where $T_J > T_A$. See the *Power Dissipation* section for information on temperature de-rating of this device. Minimum and maximum ratings are based on product testing, characterization and simulation. Individual parameters are tested as noted.
(2) Parameters ensured by design.
(3) Parameters ensured by electrical testing at 25° C.
(4) Positive Value is current into device.

±5V Electrical Characteristics (continued)

V_S = ±5 V and R_L = 100 Ω, (unless otherwise noted)

PARAMETER		TEST CONDITIONS(1)	MIN	TYP	MAX	UNIT
VIL	Logic Low Threshold(3)	Select and Enable Pins			0.8	V
IiL	Logic Pin Input Current Low(4)	Logic Input = 0 V		−1	±5.0	µA
		Logic Input = 0 V, T_A = –40°C to +85°C		−1	±15	
IiH	Logic Pin Input Current High(4)	Logic Input = 2.0 V	112	150	200	µA
		Logic Input = 2.0 V, T_A = –40°C to +85°C	100	150	210	
MISCELLANEOUS PERFORMANCE						
RF	Internal Feedback and Gain Set Resistor Values		650	800	940	Ω
		T_A = –40°C to +85°C	620	800	1010	
RODIS	Disabled Output Resistance	Internal Feedback and Gain Set Resistors in Series to Ground	1.3	1.6	1.88	kΩ
RIN+	Input Resistance			100		kΩ
CIN	Input Capacitance			0.9		pF
ROUT	Output Resistance			0.26		Ω
VO	Output Voltage Range	No Load	±3.83	±3.9		V
		No Load, T_A = –40°C to +85°C	±3.80	±3.9		
VOL		R_L = 100 Ω	±3.52	±3.53		V
		R_L = 100 Ω, T_A = –40°C to +85°C	±3.5	±3.53		
CMIR	Input Voltage Range		±2	±2.5		V
IO	Linear Output Current(3)(4)	V_{IN} = 0 V	+70	±80		mA
		V_{IN} = 0 V, T_A = –40°C to +85°C	40	±80		
ISC	Short Circuit Current(5)	V_{IN} = ±2 V, Output Shorted to Ground		±230		mA
XTLK	Channel to Channel Crosstalk	V_{IN} = 2 V_{PP} at 5 MHz		-90		dBc
XTLK	Channel to Channel Crosstalk	V_{IN} = 2 V_{PP} at 100 MHz		-54		dBc
XTLK	All Hostile Crosstalk	In A, C, Out B, V_{IN} = 2 V_{PP} at 5 MHz		-95		dBc

(5) The maximum output current (I_{OUT}) is determined by the device power dissipation limitations. See the *Power Dissipation* section for more details. A short circuit condition should be limited to 5 seconds or less.

6.6 ±3.3V Electrical Characteristics

V_S = ±3.3 V, R_L = 100 Ω (unless otherwise noted)

PARAMETER		TEST CONDITIONS (1)	MIN	TYP	MAX	UNIT
FREQUENCY DOMAIN PERFORMANCE						
SSBW	−3 dB Bandwidth	V_{OUT} = 0.25 V_{PP}		360		MHz
LSBW	−3 dB Bandwidth	V_{OUT} = 2.0 V_{PP}		270		MHz
0.1 dBBW	0.1 dB Bandwidth	V_{OUT} = 0.5 V_{PP}		80		MHz
GFP	Peaking	DC to 200 MHz		0.3		dB
DG	Differential Gain	R_L = 150 Ω, f = 4.43 MHz		0.02%		
DP	Differential Phase	R_L = 150 Ω, f = 4.43 MHz		0.03		deg
TIME DOMAIN RESPONSE						
TRL	Rise and Fall Time	2-V Step		2.0		ns
TSS	Settling Time to 0.05%	2-V Step		15		ns
OS	Overshoot	2-V Step		5%		
SR	Slew Rate	2-V Step		1000		V/µs
DISTORTION						
HD2	2nd Harmonic Distortion	2 V_{PP}, 10 MHz		−70		dBc
HD3	3rd Harmonic Distortion	2 V_{PP}, 10 MHz		−74		dBc
IMD	3rd Order Intermodulation Products	10 MHz, Two tones 2 V_{PP} at Output		-79		dBc
STATIC, DC PERFORMANCE						
GAIN	Voltage Gain			2.0		V/V
VIO	Output Offset Voltage	V_{IN} = 0 V		1		mV
DVIO	Average Drift			36		µV/°C
IBN	Input Bias Current (2)	V_{IN} = 0 V		2		µA
DIBN	Average Drift			24		nA/°C
PSRR	Power Supply Rejection Ratio	DC, Input Referred		54		dB
ICC	Supply Current	R_L = ∞		20		mA
VIH	Logic High Threshold	Select and Enable Pins			1.3	V
VIL	Logic Low Threshold	Select and Enable Pins	0.4			V
MISCELLANEOUS PERFORMANCE						
RIN+	Input Resistance			100		kΩ
CIN	Input Capacitance			0.9		pF
ROUT	Output Resistance			0.27		Ω
VO	Output Voltage Range	No Load		±2.5		V
VOL		R_L = 100 Ω		±2.2		V
CMIR	Input Voltage Range			±1.2		V
IO	Linear Output Current	V_{IN} = 0V		±60		mA
ISC	Short Circuit Current	V_{IN} = ±1V, Output Shorted to Ground		±150		mA
XTLK	Channel to Channel Crosstalk	5 MHz		-90		dBc

(1) Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that $T_J = T_A$. No specification of parametric performance is indicated in the electrical tables under conditions of internal self heating where $T_J > T_A$. See the *Power Dissipation* section for information on temperature de-rating of this device. Minimum and maximum ratings are based on product testing, characterization and simulation. Individual parameters are tested as noted.

(2) Positive Value is current into device.

6.7 Typical Characteristics

V_S = ±5 V and R_L = 100 Ω (unless otherwise noted)

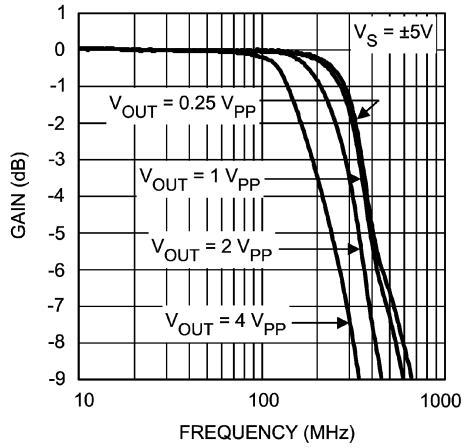


Figure 1. Frequency Response vs V_{OUT}

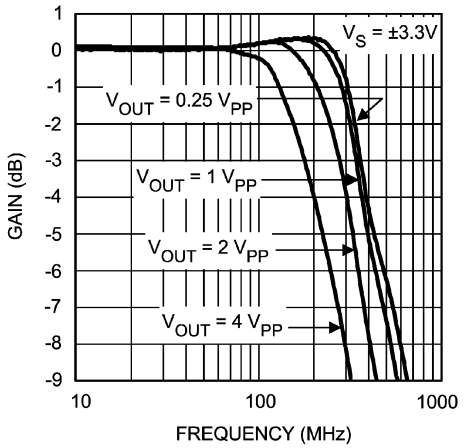


Figure 2. Frequency Response vs V_{OUT}

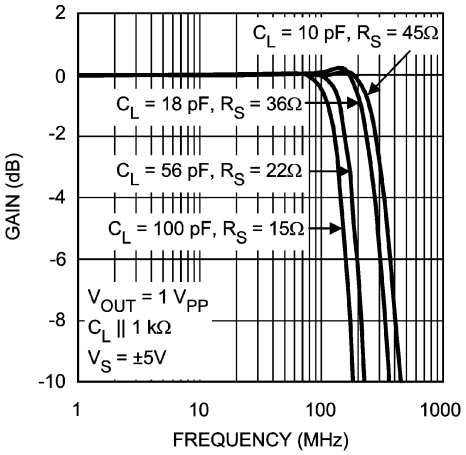


Figure 3. Frequency Response vs Capacitive Load

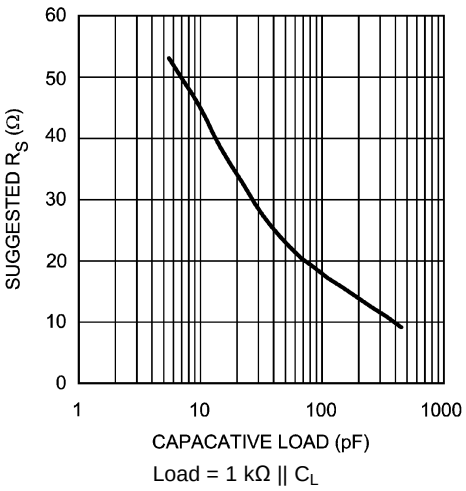


Figure 4. Suggested R_S vs Capacitive Load

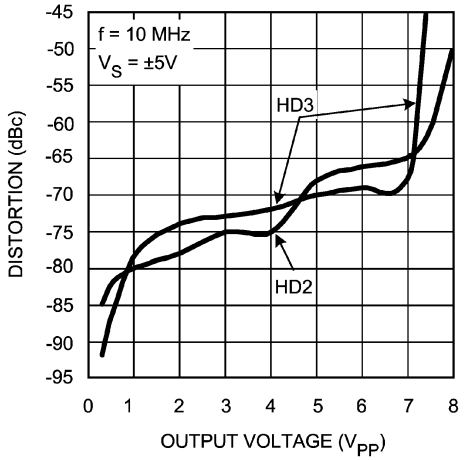


Figure 5. Harmonic Distortion vs Output Voltage

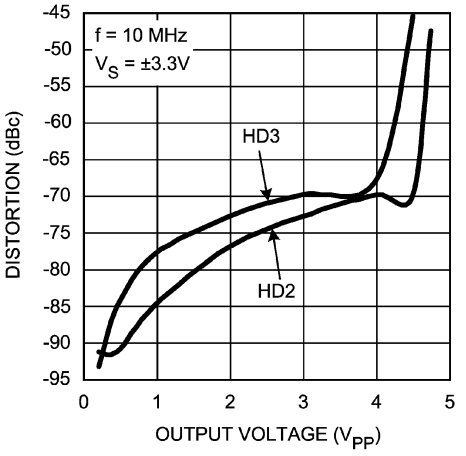


Figure 6. Harmonic Distortion vs Output Voltage

Typical Characteristics (continued)

V_S = ±5 V and R_L = 100 Ω (unless otherwise noted)

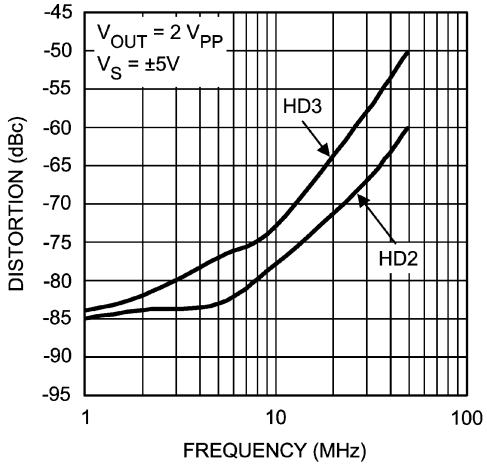


Figure 7. Harmonic Distortion vs Frequency

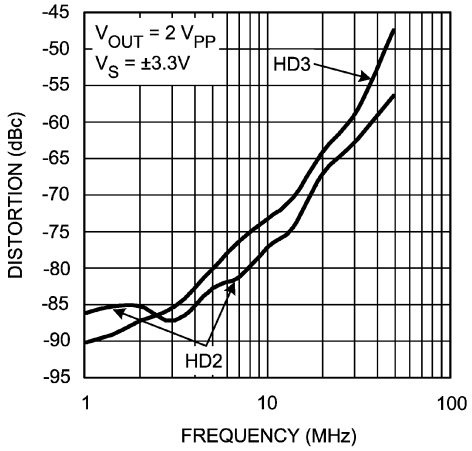


Figure 8. Harmonic Distortion vs Frequency

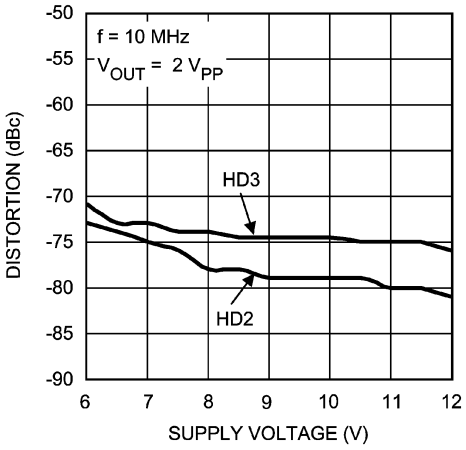


Figure 9. Harmonic Distortion vs Supply Voltage

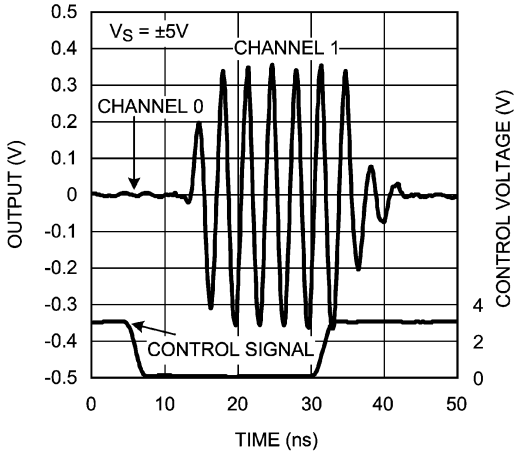


Figure 10. Channel Switching Time

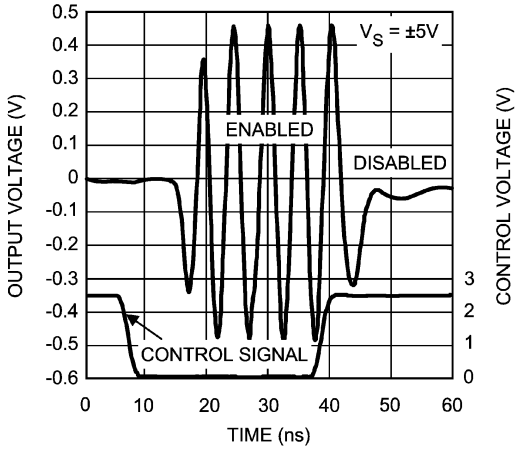


Figure 11. Disable Time

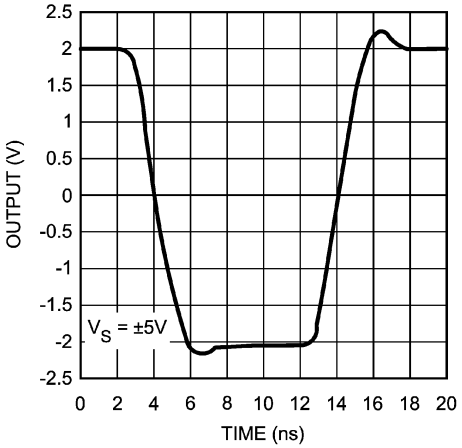


Figure 12. Pulse Response

Typical Characteristics (continued)

V_S = ±5 V and R_L = 100 Ω (unless otherwise noted)

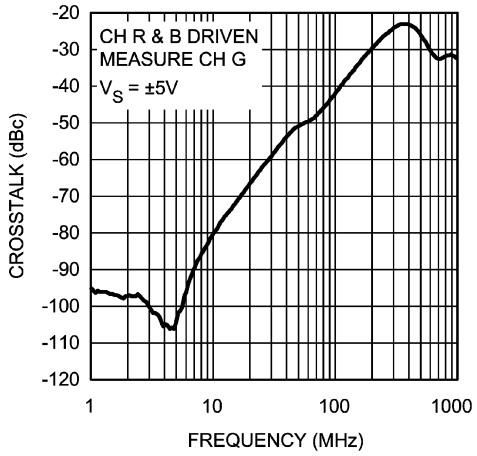


Figure 13. Crosstalk

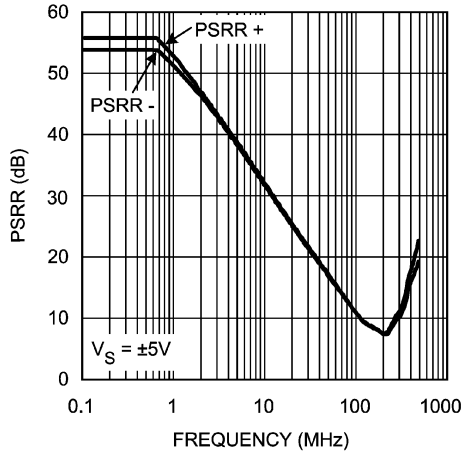


Figure 14. PSRR

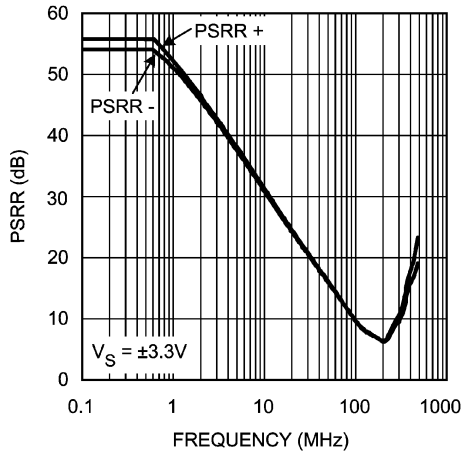


Figure 15. PSRR

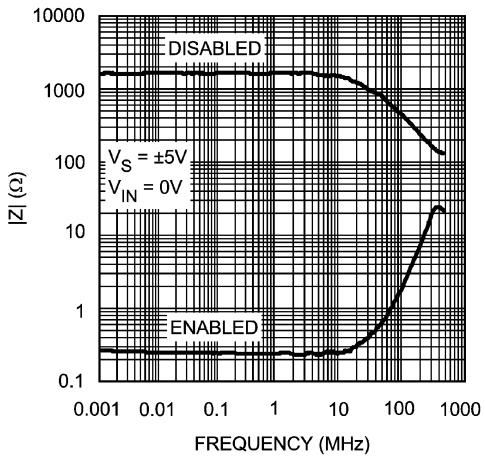


Figure 16. Closed-Loop Output Impedance

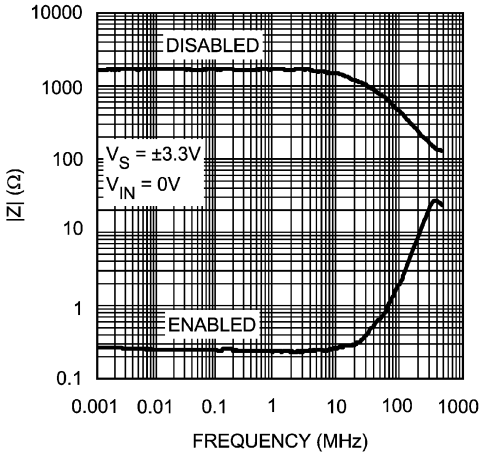


Figure 17. Closed-Loop Output Impedance

7 Detailed Description

7.1 Overview

The LMH6572 is a high-speed triple 2:1 analog multiplexer, optimized for very high speed and low distortion. With a fixed gain of 2 and excellent AC performance, the LMH6572 is ideally suited for switching high resolution, presentation grade video signals. The LMH6572 has no internal ground reference. Single or split supply configurations are both possible. The LMH6572 features very high speed channel switching and disable times. When disabled the LMH6572 output is high impedance, making multiplexer expansion possible by combining multiple devices.

7.2 Feature Description

7.2.1 Single Supply Operation

The LMH6572 uses mid-supply referenced circuits for the select and disable pins. In order to use the LMH6572 in single supply configuration, it is necessary to use a circuit similar to Figure 19. In this configuration the logical inputs are compatible with high breakdown open collector TTL, or open drain CMOS logic. In addition, the default logic state is reversed since there is a pull-up resistor on those pins. Single supply operation also requires the input to be biased to within the common mode input range of roughly ±2V from the mid-supply point.

7.2.2 Video Performance

The LMH6572 has been designed to provide excellent performance with production quality video signals in a wide variety of formats such as HDTV and High Resolution VGA. Best performance will be obtained with back-terminated loads. The back termination reduces reflections from the transmission line and effectively masks transmission line and other parasitic capacitances from the amplifier output stage. Figure 18 shows a typical configuration for driving a 75-Ω cable. The output buffer is configured for a gain of 2, so using back terminated loads will give a net gain of 1.

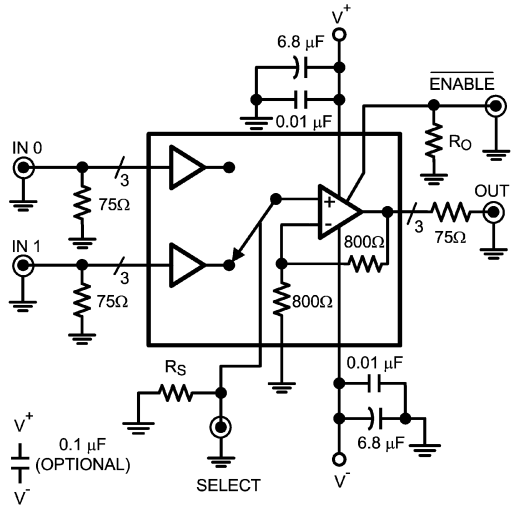


Figure 18. Typical Application

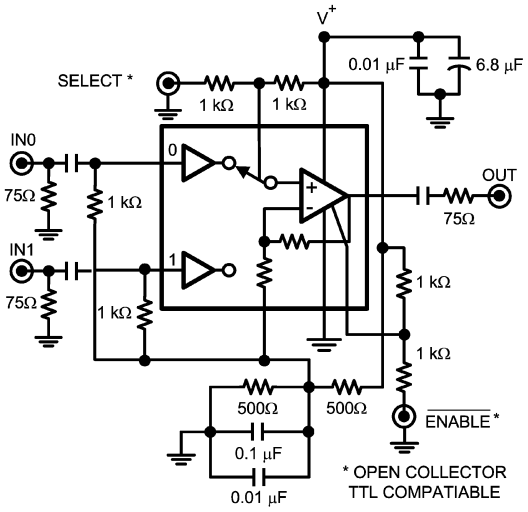


Figure 19. Single Supply Application

7.2.3 Gain Accuracy

The gain accuracy of the LMH6572 is accurate to ±0.5% (0.3% typical) and stable over temperature. The internal gain setting resistors, RF and RG, match very well; however, over process and temperature their absolute value will change.

Feature Description (continued)

7.2.4 Expanding the Multiplexer

It is possible to build higher density multiplexers by paralleling several LMH6572s. Figure 20 shows a 4:1 RGB MUX using two LMH6572s:

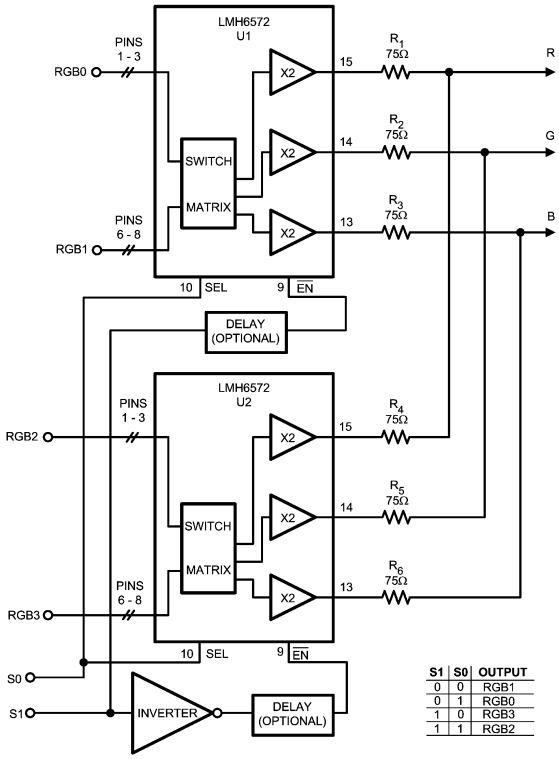


Figure 20. RGB MUX Using Two LMH6572's

If it is important in the end application to make sure that no two inputs are presented to the output at the same time, an optional delay block can be added prior to the $\overline{\text{ENABLE}}$(EN) pin of each device, as shown. Figure 21 shows one possible approach to this delay circuit. The delay circuit shown will delay $\overline{\text{ENABLE}}$'s H to L transitions (R_1 and C_1 decay) but will not delay its L to H transition.

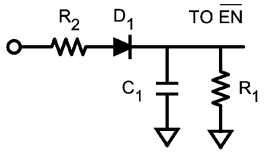


Figure 21. Delay Circuit Implementation

R_2 should be kept small compared to R_1 in order to not reduce the $\overline{\text{ENABLE}}$ voltage and to produce little or no delay to the $\overline{\text{ENABLE}}$ L to H transition.

With the $\overline{\text{ENABLE}}$ pin putting the output stage into a high impedance state, several LMH6572's can be tied together to form a larger input MUX. However, there is a slight loading effect on the active output caused by the off-channel feedback and gain set resistors, as shown in Figure 21. Figure 22 is assuming there are four LMH6572 devices tied together to form a triple 8:1 MUX. With the internal resistors valued at approximately 800Ω, the gain error is about -0.57 dB, or about −6%.

Feature Description (continued)

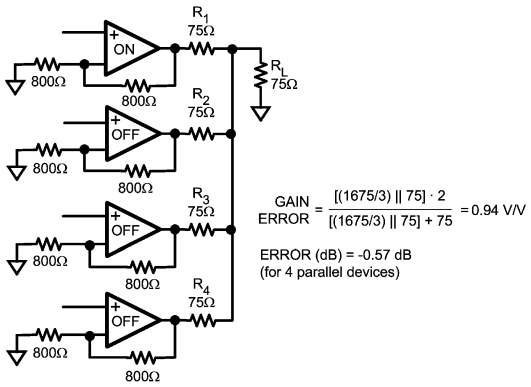


Figure 22. Multiplexer Input Expansion by Combining Outputs

An alternate approach would be to tie the outputs directly together and let all devices share a common back termination resistor in order to alleviate the gain error issue above.

The drawback in this case is the increased capacitive load presented to the output of each LMH6572 due to the offstate capacitance of the LMH6572.

Feature Description (continued)

7.2.5 Other Applications

The LMH6572 may be utilized in systems that involve a single RGB channel as well whenever there is a need to switch between different “flavors” of a single RGB input.

Here are some examples:

1. RGB positive polarity, negative polarity switch
2. RGB full resolution, high-pass filter switch

In each of these applications, the same RGB input occupies one set of inputs to the LMH6572 and the other “flavor” would be tied to the other input set.

7.2.5.1 Driving Capacitive Loads

Capacitive output loading applications will benefit from the use of a series output resistor. Figure 23 shows the use of a series output resistor, R_{OUT}, to stabilize the amplifier output under capacitive loading. Capacitive loads of 5 to 120 pF are the most critical, causing ringing, frequency response peaking and possible oscillation. Figure 24 gives a recommended value for selecting a series output resistor for mitigating capacitive loads. The values suggested in the charts are selected for .5 dB or less of peaking in the frequency response. This gives a good compromise between settling time and bandwidth. For applications where maximum frequency response is needed and some peaking is tolerable, the value of R_{OUT} can be reduced slightly from the recommended values.

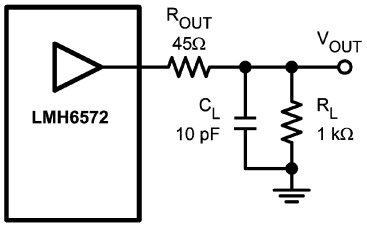


Figure 23. Decoupling Capacitive Loads

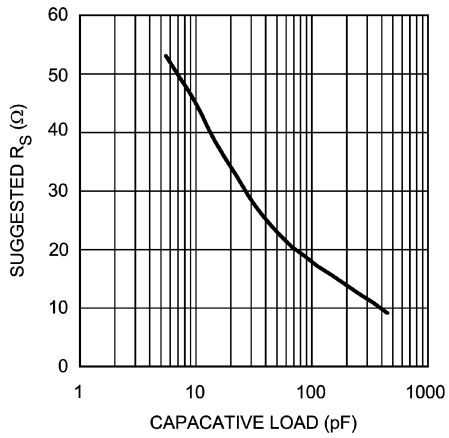


Figure 24. Recommended R_{OUT} vs Capacitive Load

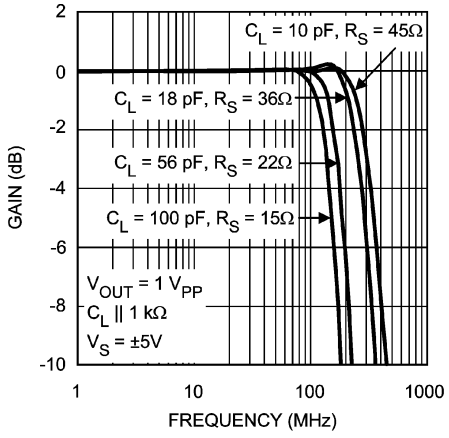


Figure 25. Frequency Response vs Capacitive Load

8 Power Supply Recommendations

8.1 Power Dissipation

The LMH6572 is optimized for maximum speed and performance in the small form factor of the standard SSOP package. To achieve its high level of performance, the LMH6572 consumes 23 mA of quiescent current, which cannot be neglected when considering the total package power dissipation limit. To ensure maximum output drive and highest performance, thermal shutdown is not provided. Therefore, it is of utmost importance to make sure that the T_{JMAX} is never exceeded due to the overall power dissipation.

Follow these steps to determine the Maximum power dissipation for the LMH6572:

1. Calculate the quiescent (no-load) power:

$P_{AMP} = I_{CC}* (V_S)$

where

- $V_S = V^+ - V^-$ (1)

2. Calculate the RMS power dissipated in the output stage:

P_D (rms) = rms $[(V_S - V_{OUT}) * I_{OUT}]$

where

- V_{OUT} and I_{OUT} are the voltage across and the current through the external load
- V_S is the total supply voltage (2)

3. Calculate the total RMS power:

$P_T = P_{AMP} + P_D$ (3)

The maximum power that the LMH6572 package can dissipate at a given temperature can be derived with the following equation:

$P_{MAX} = (150°C – T_{AMB})/ \theta_{JA}$

where

- T_{AMB} = Ambient temperature (°C)
- θ_{JA} = Thermal resistance, from junction to ambient, for a given package (°C/W)
- For the SSOP package θ_{JA} is 125 °C/W (4)

8.2 ESD Protection

The LMH6572 is protected against electrostatic discharge (ESD) on all pins. The LMH6572 will survive 2000V Human Body model and 200V Machine model events. Under normal operation the ESD diodes have no effect on circuit performance. There are occasions, however, when the ESD diodes will be evident. If the LMH6572 is driven by a large signal while the device is powered down the ESD diodes will conduct. The current that flows through the ESD diodes will either exit the chip through the supply pins or will flow through the device, hence it is possible to power up a chip with a large signal applied to the input pins. Shorting the power pins to each other will prevent the chip from being powered up through the input.

9 Layout

9.1 Layout Guidelines

Whenever questions about layout arise, use the LMH730151 evaluation board as a guide. To reduce parasitic capacitances, ground and power planes should be removed near the input and output pins. For long signal paths controlled impedance lines should be used, along with impedance matching elements at both ends. Bypass capacitors should be placed as close to the device as possible. Bypass capacitors from each rail to ground are applied in pairs. The larger electrolytic bypass capacitors can be located farther from the device; however, the smaller ceramic capacitors should be placed as close to the device as possible. In Figure 18 and Figure 19, the capacitor between V^+ and V^- is optional, but is recommended for best second harmonic distortion. Another way to enhance performance is to use pairs of 0.01 μF and 0.1 μF ceramic capacitors for each supply bypass.

9.1.1 Evaluation Boards

Texas Instruments provides the following evaluation boards as a guide for high frequency layout and as an aid in device testing and characterization. Many of the datasheet plots were measured with these boards.

DEVICE	PACKAGE	EVALUATION BOARD PART NUMBER
LMH6572	SSOP	LMH730151

An evaluation board can be shipped when a device sample request is placed with Texas Instruments.

10 デバイスおよびドキュメントのサポート

10.1 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、ti.comのデバイス製品フォルダを開いてください。右上の隅にある「*通知を受け取る*」をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取れます。変更の詳細については、修正されたドキュメントに含まれている改訂履歴をご覧ください。

10.2 コミュニティ・リソース

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™オンライン・コミュニティ ***TIのE2E（Engineer-to-Engineer）コミュニティ。*****エンジニア間の共同作業を促進するために開設されたものです。e2e.ti.comでは、他のエンジニアに質問し、知識を共有し、アイディアを検討して、問題解決に役立てることができます。**

設計サポート ***TIの設計サポート*** **役に立つE2Eフォーラムや、設計サポート・ツールをすばやく見つけることができます。技術サポート用の連絡先情報も参照できます。**

10.3 商標

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

10.4 静電気放電に関する注意事項

すべての集積回路は、適切なESD保護方法を用いて、取扱いと保存を行うようにして下さい。

静電気放電はわずかな性能の低下から完全なデバイスの故障に至るまで、様々な損傷を与えます。高精度の集積回路は、損傷に対して敏感であり、極めてわずかなパラメータの変化により、デバイスに規定された仕様に適合しなくなる場合があります。

10.5 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

11 メカニカル、パッケージ、および注文情報

以降のページには、メカニカル、パッケージ、および注文に関する情報が記載されています。この情報は、そのデバイスについて利用可能な最新のデータです。このデータは予告なく変更されることがあり、ドキュメントが改訂される場合もあります。本データシートのブラウザ版を使用されている場合は、画面左側の説明をご覧ください。

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
LMH6572MQ/NOPB	Active	Production	SSOP (DBQ) | 16	95 | TUBE	Yes	Call TI | Sn	Level-1-260C-UNLIM	-40 to 85	LH65 72MQ
LMH6572MQ/NOPB.A	Active	Production	SSOP (DBQ) | 16	95 | TUBE	Yes	Call TI	Level-1-260C-UNLIM	-40 to 85	LH65 72MQ
LMH6572MQX/NOPB	Active	Production	SSOP (DBQ) | 16	2500 | LARGE T&R	Yes	Call TI | Sn	Level-1-260C-UNLIM	-40 to 85	LH65 72MQ
LMH6572MQX/NOPB.A	Active	Production	SSOP (DBQ) | 16	2500 | LARGE T&R	Yes	Call TI	Level-1-260C-UNLIM	-40 to 85	LH65 72MQ

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

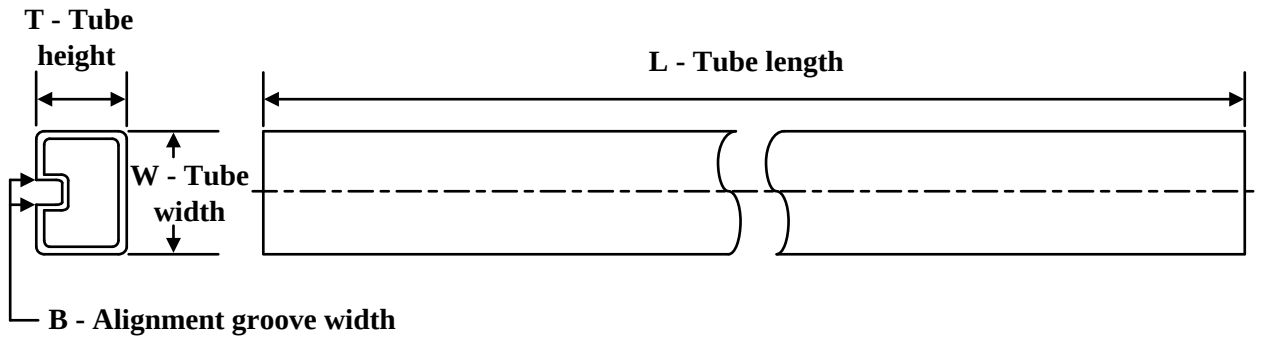
(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

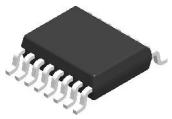
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
LMH6572MQ/NOPB	DBQ	SSOP	16	95	495	8	4064	3.05
LMH6572MQ/NOPB.A	DBQ	SSOP	16	95	495	8	4064	3.05

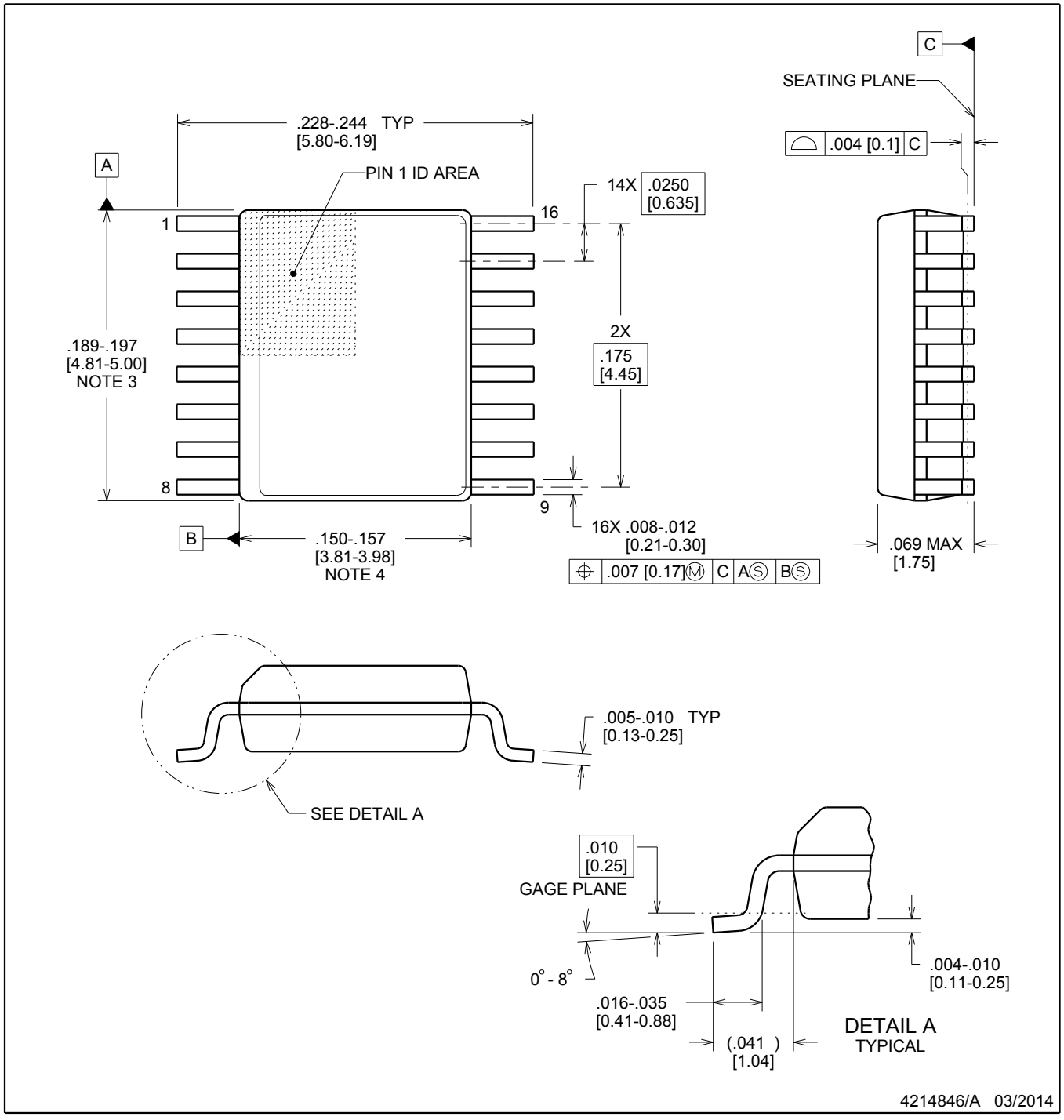


PACKAGE OUTLINE

DBQ0016A

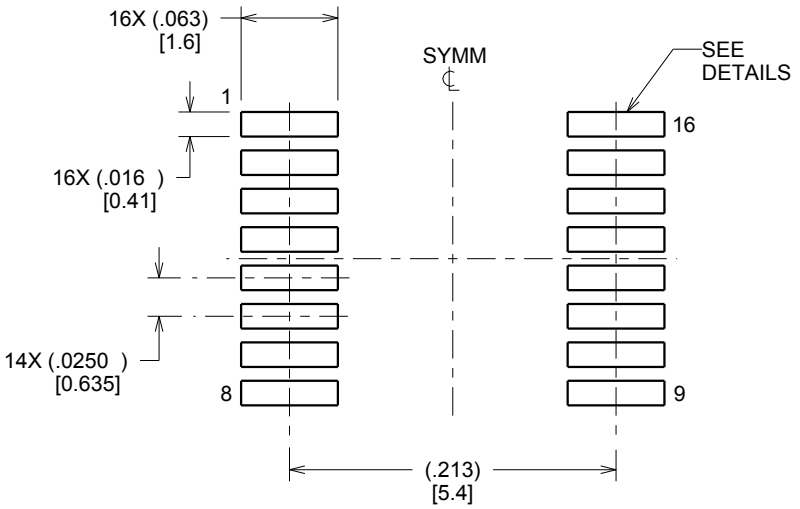
SSOP - 1.75 mm max height

SHRINK SMALL-OUTLINE PACKAGE

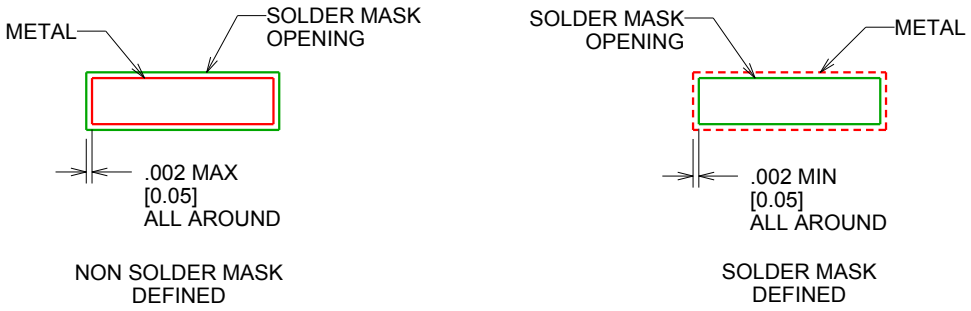


NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 inch, per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MO-137, variation AB.



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4214846/A 03/2014

NOTES: (continued)

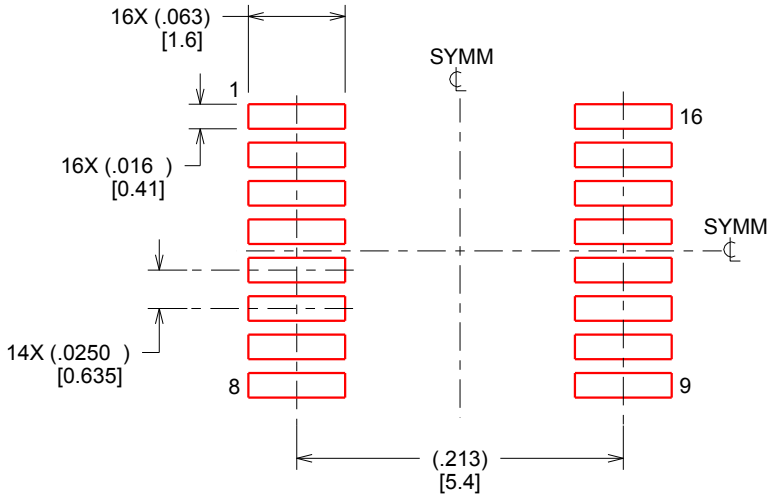
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DBQ0016A

SSOP - 1.75 mm max height

SHRINK SMALL-OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.127 MM] THICK STENCIL
SCALE:8X

4214846/A 03/2014

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

重要なお知らせと免責事項

TI は、技術データと信頼性データ (データシートを含みます)、設計リソース (リファレンス デザインを含みます)、アプリケーションや設計に関する各種アドバイス、Web ツール、安全性情報、その他のリソースを、欠陥が存在する可能性のある「現状のまま」提供しており、商品性および特定目的に対する適合性の黙示保証、第三者の知的財産権の非侵害保証を含むいかなる保証も、明示的または黙示的にかかわらず拒否します。

これらのリソースは、TI 製品を使用する設計の経験を積んだ開発者への提供を意図したものです。(1) お客様のアプリケーションに適した TI 製品の選定、(2) お客様のアプリケーションの設計、検証、試験、(3) お客様のアプリケーションに該当する各種規格や、その他のあらゆる安全性、セキュリティ、規制、または他の要件への確実な適合に関する責任を、お客様のみが単独で負うものとします。

上記の各種リソースは、予告なく変更される可能性があります。これらのリソースは、リソースで説明されている TI 製品を使用するアプリケーションの開発の目的でのみ、TI はその使用をお客様に許諾します。これらのリソースに関して、他の目的で複製することや掲載することは禁止されています。TI や第三者の知的財産権のライセンスが付与されている訳ではありません。お客様は、これらのリソースを自身で使用した結果発生するあらゆる申し立て、損害、費用、損失、責任について、TI およびその代理人を完全に補償するものとし、TI は一切の責任を拒否します。

TI の製品は、TI の販売条件 、 TI の総合的な品質ガイドライン 、 ti.com または TI 製品などに関連して提供される他の適用条件に従い提供されます。TI がこれらのリソースを提供することは、適用される TI の保証または他の保証の放棄の拡大や変更を意味するものではありません。 TI がカスタム、またはカスタマー仕様として明示的に指定していない限り、TI の製品は標準的なカタログに掲載される汎用機器です。

お客様がいかなる追加条項または代替条項を提案する場合も、TI はそれらに異議を唱え、拒否します。

最終更新日：2025 年 10 月