

***THIS DOCUMENT IS FOR MAINTENANCE
PURPOSES ONLY AND IS NOT
RECOMMENDED FOR NEW DESIGNS***

SL1452

WIDEBAND LINEAR FM DETECTOR FOR SATELLITE TV

With a minimum of external components, the SL1452 forms a complete wideband FM detector suitable for use in satellite TV. The video output and bandwidth may be optimised by adjustment of the working Q of the quadrature coil.

FEATURES

- High Operating Frequency Simplifies Image Filtering
- Negligible Differential Gain and Phase Errors
- Video Bandwidth Suitable for High Definition TV
- High Sensitivity and Wide Dynamic Range
- Wide Operating Frequency Range: 300 to 1000 MHz
- Electrostatic Protection*

* Normal ESD handling precautions should be observed

ORDERING INFORMATION

SL1452 NA DP (8-lead plastic DIL package)

SL1452 NA MP (8-lead miniature plastic DIL package)

ABSOLUTE MAXIMUM RATINGS

Operating temperature range	-10°C to +80°C
Supply voltage, pin 6	7V
Input voltage, pin 7 or 8	2.5V p-p
Storage temperature	-55°C to +150°C
Junction temperature	+175°C

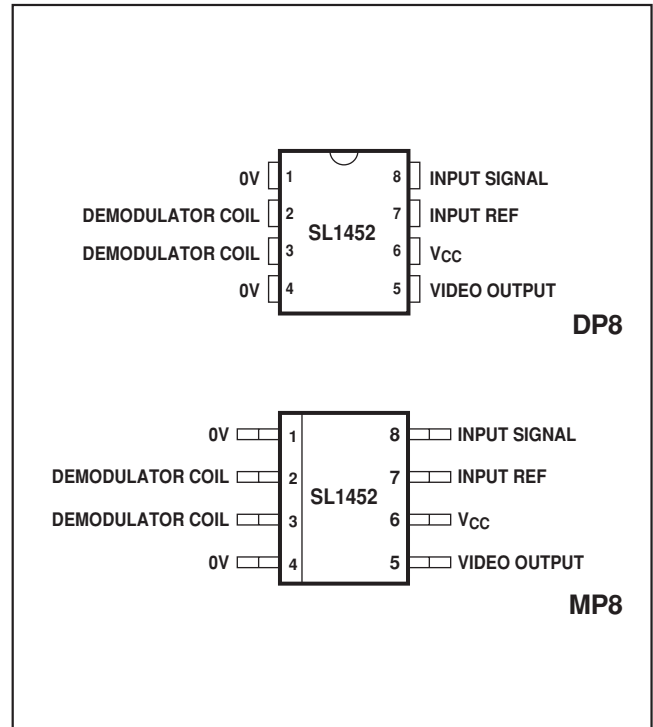


Fig. 1 Pin connections - top view (not to scale)

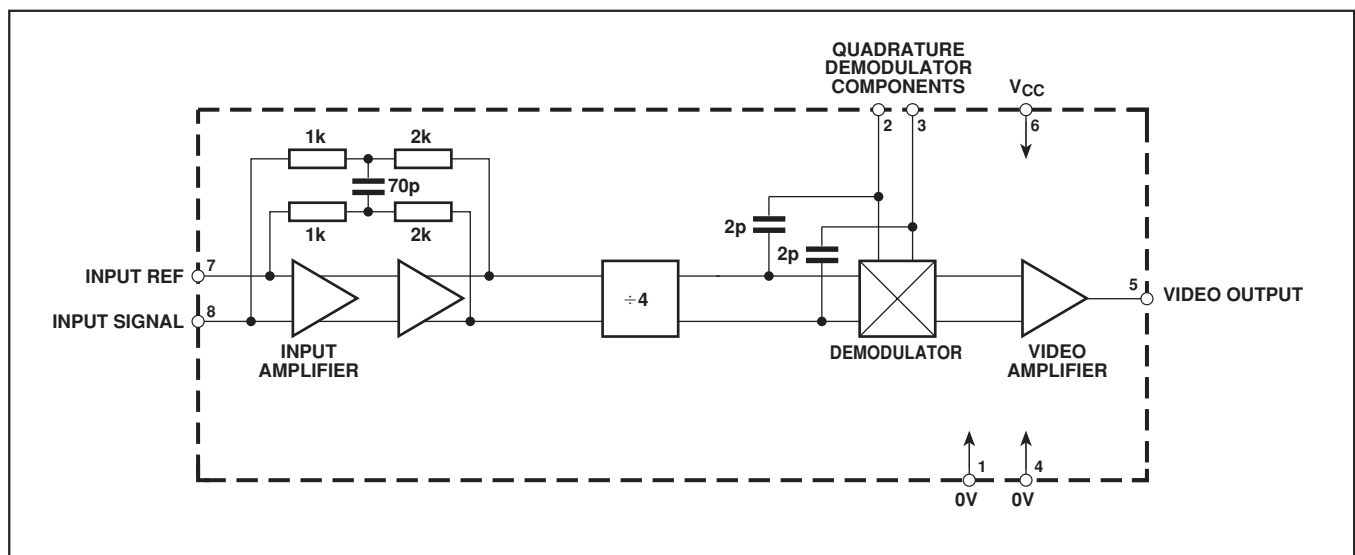


Fig. 2 Block diagram

ELECTRICAL CHARACTERISTICS

These characteristics are guaranteed over the following conditions (unless otherwise stated):

$$T_{AMB} = +25^{\circ}\text{C}, V_{CC} = +4.5\text{V to } +5.5\text{V}, Q = 6, f = 612\text{MHz}$$

Characteristic	Pin	Value			Units	Conditions	
		Min.	Typ.	Max.			
Supply current, I_{CC}	6		40	50	mA	$V_{CC} = 5\text{V}$ $\Delta f = 13.5\text{MHz p-p}$	
Video output voltage	5		0.7		V p-p		
Video bandwidth	5		14		MHz		
Minimum operating frequency	8		300		MHz		
Maximum operating frequency	8		1000		MHz		
Input voltage	8	10		300	mVrms		
Intermodulation	5		-60		dB		
Differential gain	5		$< \pm 1$		%		Product of input modulation: $f = 4.4\text{MHz}$, $\Delta f = 13.5\text{MHz p-p}$ and $f = 6\text{MHz}$, $\Delta f = 2\text{MHz p-p}$ (PAL colour and sound subcarriers). $\Delta f = 13.5\text{MHz p-p}$. Demodulated staircase referred to input staircase before modulation.
Differential phase	5		$< \pm 1$		deg	Demodulated colour bar waveform referred to waveform before modulation.	
Signal-to-noise ratio	5	70			dB	Ratio of output with $\Delta f = 13.5\text{MHz p-p}$ at 1MHz to output rms noise in 10MHz bandwidth with $\Delta f = 0$.	

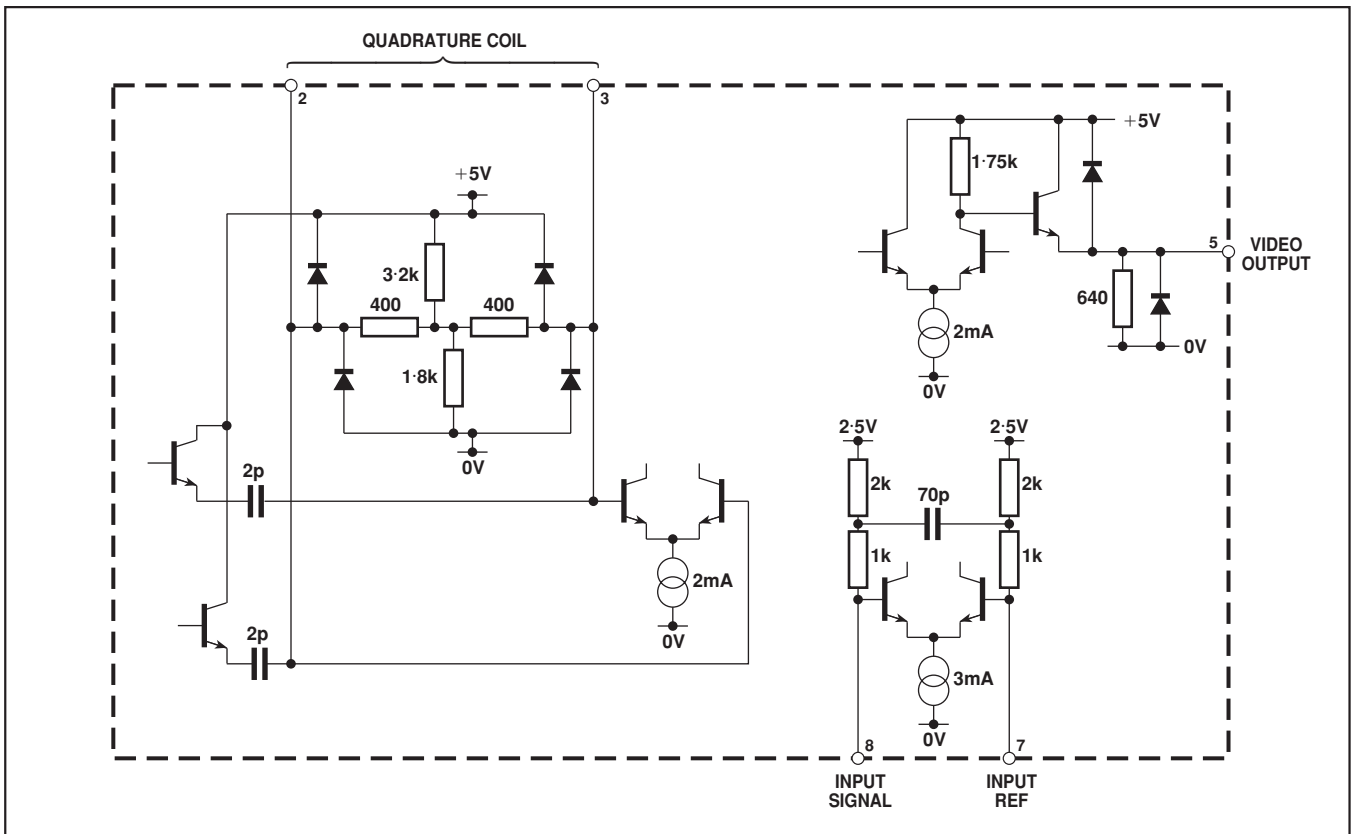


Fig. 3 Input/output interface circuits

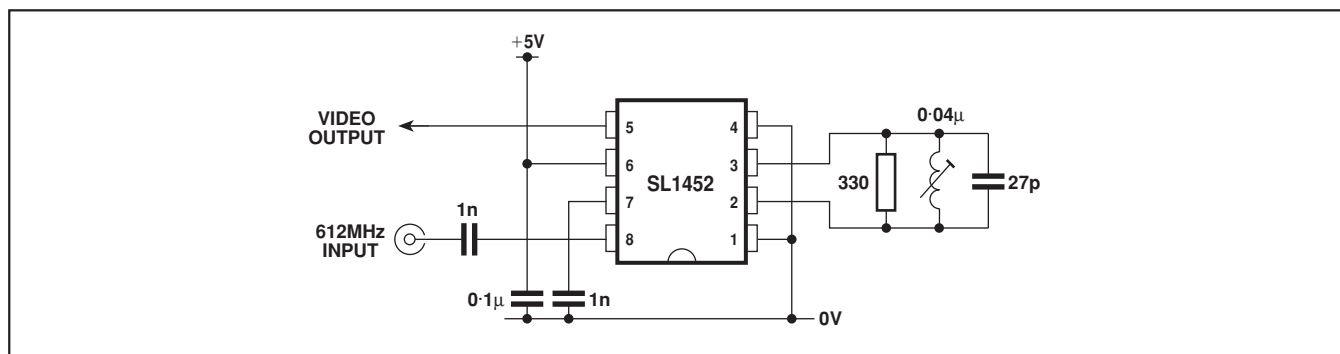


Fig. 4 Typical application

SL1452 QUADRATURE DEMODULATOR

The SL1452 FM demodulator has a simple application with very low external component count. This is demonstrated by the applications circuit diagram Fig. 4, but as with most integrated circuits, particularly those working at high frequencies, some attention to good RF layout techniques and correct component selection will ensure optimum results.

A good layout can usually be ensured by the simple precaution of keeping all components close to the SL1452, maintaining short lead lengths and ensuring a good low impedance ground plane. Double sided board layout enables these objectives to be easily met, but is not essential for satisfactory operation. All coupling and decoupling capacitors should be chosen for low impedance characteristics at high frequencies, multilayer ceramic types usually providing small size and adequate high frequency performance. For the quadrature coil tuning capacitor a fairly stable component should be selected to prevent excessive drift. The power supply decoupling capacitor from pin 6 to ground should be 0.1 μ F minimum but the input coupling and decoupling values can be smaller, about 330pF being adequate.

The only remaining components to be selected are those forming the quadrature circuit on pins 2 and 3 and some care in the determination of values for these is required if maximum performance is to be obtained.

First determine the quadrature circuit operating frequency, which is a quarter of the input frequency on pin 8 due to the two internal $\div 2$ stages (see Fig.2).

Choose suitable values for L and C to resonate at the correct frequency using:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

The value of C should be greater than 15pF to prevent stray capacitance effects introducing errors and distortion of the demodulation curve, but the use of very large capacitances with small inductance values will lower the impedance of the tuned circuit at the required Q value, reducing the drive level to the demodulator and thereby restricting the video output available. In general, for operation in the 400MHz to 600MHz range, an inductance value between 40nH and 60nH is recommended.

Once suitable L and C values have been determined, the working Q for the quadrature circuit should be set, the Q value determining the video output level and bandwidth. Video output is proportional to Q whereas video bandwidth is inversely proportional. The effect of Q variations on video bandwidth and amplitude can be determined from Table 1 and the graphs in Fig. 5.

A value for total damping resistor value to obtain the required Q can be calculated from:

$$R = Q2\pi fL$$

The internal 800 Ω resistance between pins 2 and 3 must be allowed for when calculating R.

Example

Design a quadrature circuit to demodulate a carrier on pin 8 with centre frequency 480 MHz and video bandwidth of 10MHz.

For L = 40nH, $f_{\text{QUAD}} = 120\text{MHz}$,
 C = 43.98pF (nearest preferred value 47pF)
 From Table 1, Q required is approximately 6,
 therefore total R required is:

$$\begin{aligned} R &= Q2\pi fL \\ &= 6 \times 2 \times \pi \times \frac{480 \times 10^6}{4} \times 0.04 \times 10^{-6} \\ &= 181 \text{ ohms} \end{aligned}$$

Allowing for the internal 800 Ω resistance between pins 2 and 3 (see Fig.3), the external resistance required is 234 Ω ; choose 270 Ω .

It should be remembered that the internal 800 Ω resistance is subject to production tolerances and if fairly close control of video bandwidth is required, the L and C ratio may require some adjustment to ensure that the external R is sufficiently low to swamp the effect of internal resistance changes. The value of 270 Ω obtained in the example is low enough to allow adequate control.

In order to overcome the effects of component tolerances, it will usually be necessary to make either the L or C a variable component, the value being adjusted to obtain best linearity.

Q	Bandwidth
10	7.5MHz
6	14MHz
4	23MHz

Table 1

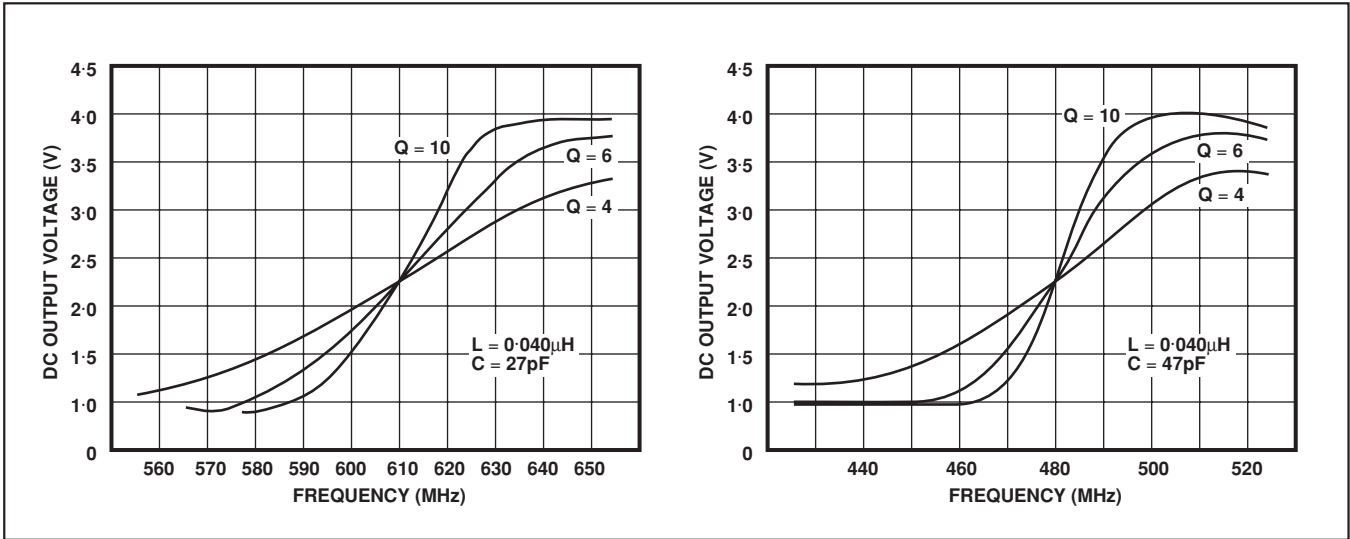
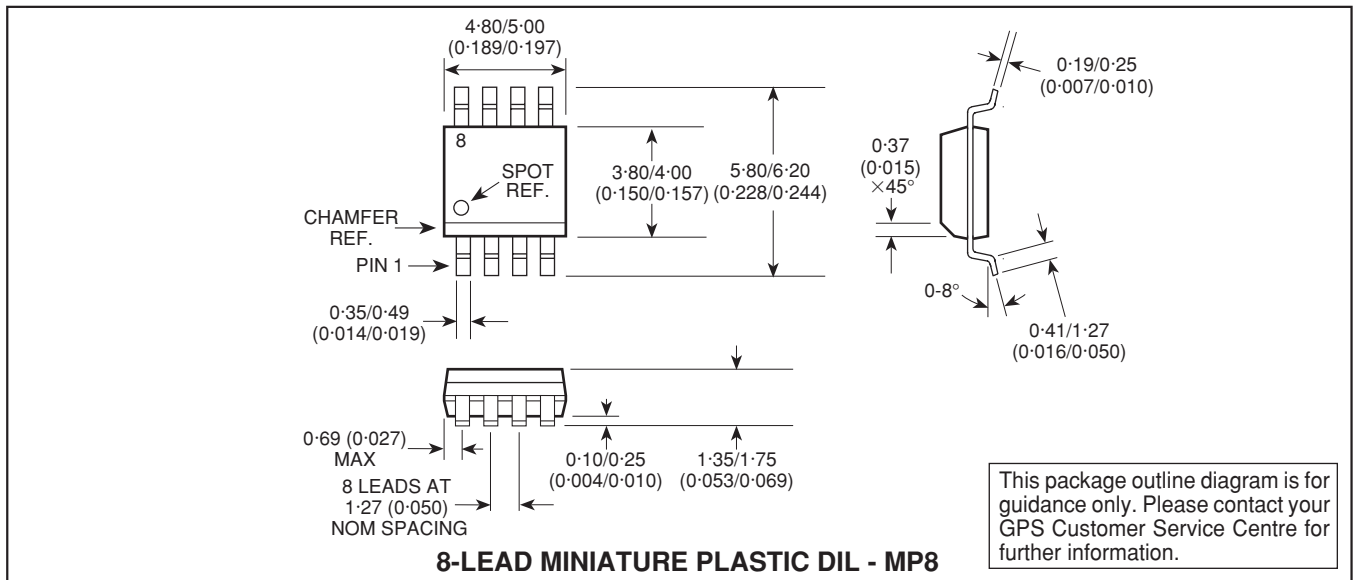
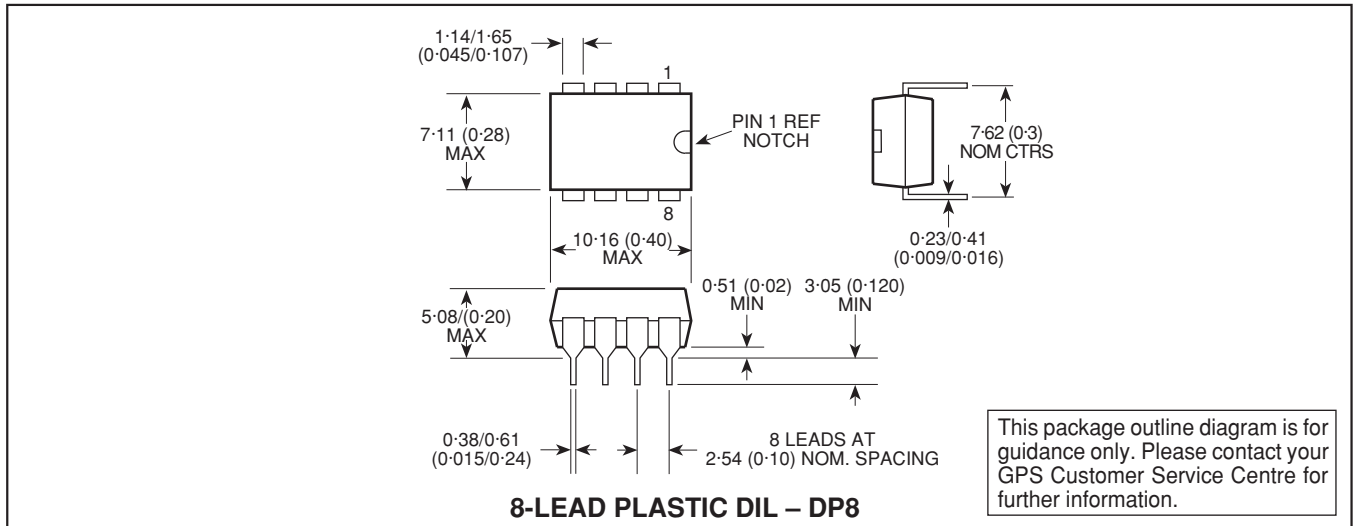


Fig. 5 Output voltage v. input frequency

NOTES

PACKAGE DETAILS

Dimensions are shown thus: mm (in)



HEADQUARTERS OPERATIONS
GEC PLESSEY SEMICONDUCTORS
 Cheney Manor, Swindon,
 Wiltshire SN2 2QW, United Kingdom.
 Tel: (0793) 518000
 Fax: (0793) 518411

GEC PLESSEY SEMICONDUCTORS
 P.O. Box 660017
 1500 Green Hills Road,
 Scotts Valley, CA95067-0017
 United States of America.
 Tel (408) 438 2900
 Fax: (408) 438 5576

CUSTOMER SERVICE CENTRES

- **FRANCE & BENELUX** Les Ulis Cedex Tel: (1) 64 46 23 45 Tx: 602858F
 Fax : (1) 64 46 06 07
 - **GERMANY** Munich Tel: (089) 3609 06-0 Tx: 523980 Fax : (089) 3609 06-55
 - **ITALY** Milan Tel: (02) 66040867 Fax: (02) 66040993
 - **JAPAN** Tokyo Tel: (03) 3296-0281 Fax: (03) 3296-0228
 - **NORTH AMERICA Integrated Circuits and Microwave Products, Scotts Valley, USA**
 Tel: (408) 438 2900 Fax: (408) 438 7023.
Hybrid Products, Farmingdale, USA Tel (516) 293 8686 Fax: (516) 293 0061.
 - **SOUTH EAST ASIA** Singapore Tel: (65) 3827708 Fax: (65) 3828872
 - **SWEDEN** Stockholm Tel: 4687029770 Fax: 4686404736
 - **UK, EIRE, DENMARK, FINLAND & NORWAY**
 Swindon Tel: (0793) 518510 Tx: 444410 Fax : (0793) 518582
- These are supported by Agents and Distributors in major countries world-wide.

© GEC Plessey Semiconductors 1993 Publication No. DS2029 Issue No. 2.1 September 1993

This publication is issued to provide information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. The Company reserves the right to alter without prior knowledge the specification, design or price of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to the Company's conditions of sale, which are available on request.



**For more information about all Zarlink products
visit our Web Site at
www.zarlink.com**

Information relating to products and services furnished herein by Zarlink Semiconductor Inc. trading as Zarlink Semiconductor or its subsidiaries (collectively "Zarlink") is believed to be reliable. However, Zarlink assumes no liability for errors that may appear in this publication, or for liability otherwise arising from the application or use of any such information, product or service or for any infringement of patents or other intellectual property rights owned by third parties which may result from such application or use. Neither the supply of such information or purchase of product or service conveys any license, either express or implied, under patents or other intellectual property rights owned by Zarlink or licensed from third parties by Zarlink, whatsoever. Purchasers of products are also hereby notified that the use of product in certain ways or in combination with Zarlink, or non-Zarlink furnished goods or services may infringe patents or other intellectual property rights owned by Zarlink.

This publication is issued to provide information only and (unless agreed by Zarlink in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. The products, their specifications, services and other information appearing in this publication are subject to change by Zarlink without notice. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. Manufacturing does not necessarily include testing of all functions or parameters. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to Zarlink's conditions of sale which are available on request.

Purchase of Zarlink's I²C components conveys a licence under the Philips I²C Patent rights to use these components in an I²C System, provided that the system conforms to the I²C Standard Specification as defined by Philips.

Zarlink, ZL and the Zarlink Semiconductor logo are trademarks of Zarlink Semiconductor Inc.

Copyright 2003, Zarlink Semiconductor Inc. All Rights Reserved.

TECHNICAL DOCUMENTATION - NOT FOR RESALE
