

March 2006

## Features

- 3.45 V Single Supply Operation
- Low Power Dissipation: 210 mW typ
- Broadband: DC to 6 GHz
- SSB Phase Noise:  $-148$  dBc/Hz @ 10 KHz
- Pout 3 dBm

## Prescaler Modulus

- ZL40804 – Divide by 4

## Applications

- DC to 6 GHz PLL applications
- HyperLan
- LMDS
- Instrumentation
- Satellite Communications
- Fibre Optic Communications; OC48, OC192
- Ultra Low Jitter Clock Systems

### Ordering Information

ZL40804/DCA	8 pin SOIC	Tubes
ZL40804/DCB	8 pin SOIC	Tape and Reel
ZL40804DCE1	8 Pin SOIC*	Trays, Bake & Drypack
ZL40804DCF1	8 Pin SOIC*	Trays, Bake & Drypack

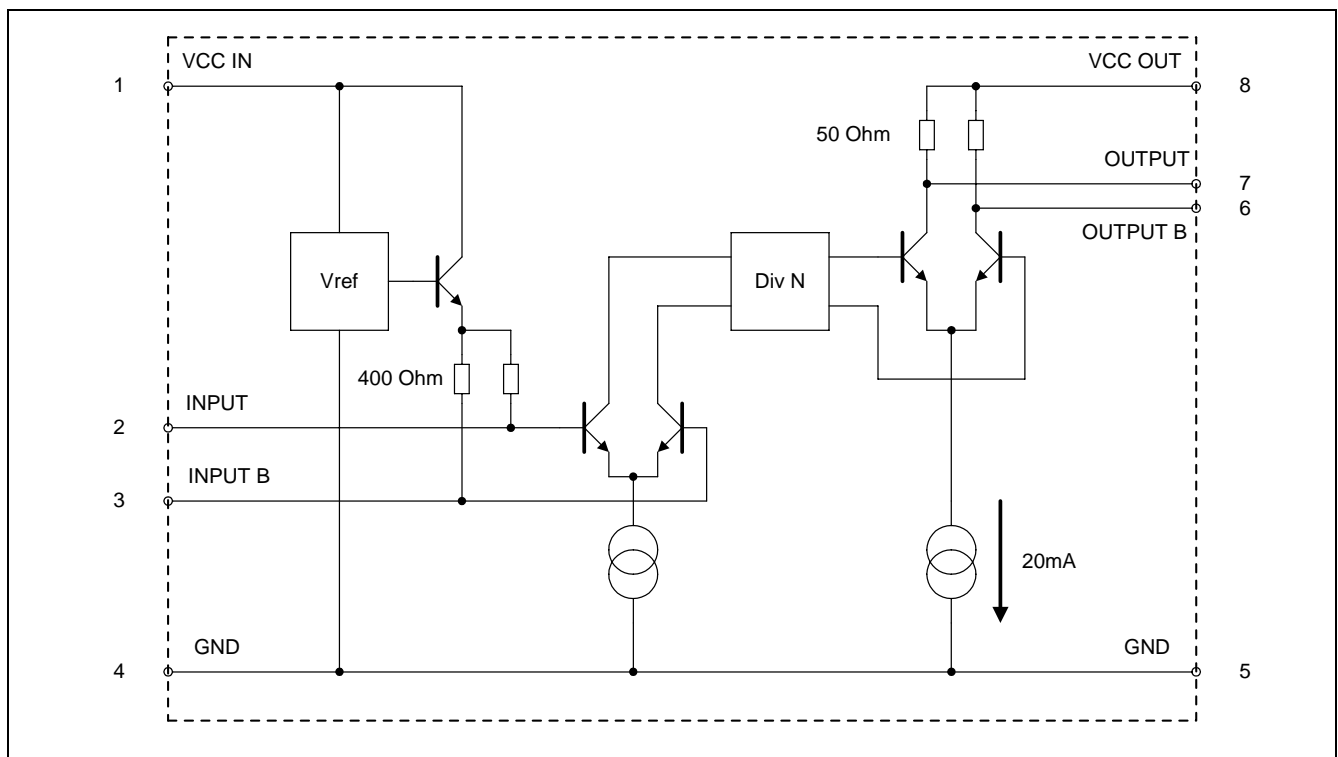
\*Pb Free Matte Tin

 $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ 

## Description

The ZL40804 are Bipolar 3.45 V supply, very low power prescalers for professional applications with a fixed modulus of 4. The ultra low close in (10 KHz offset) SSB phase noise performance is ideal for narrow band communications systems or systems with ultra low jitter budgets such as next generation fibre optic communications. The devices are broadband from DC to 6 GHz.

See Figure 1 and Application Note for RF Prescalers for more details.



**Figure 1 - Functional Block Diagram**

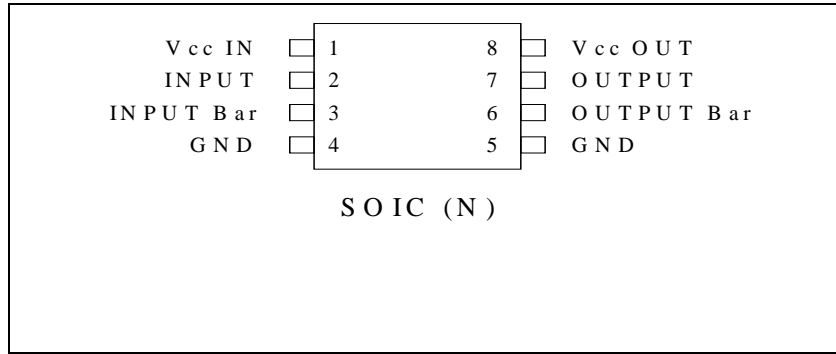


Figure 2 - Pin Connections – Top View

**Application Configuration**

Figure 3 shows a recommended application configuration. This example shows the device set up for single ended operation.

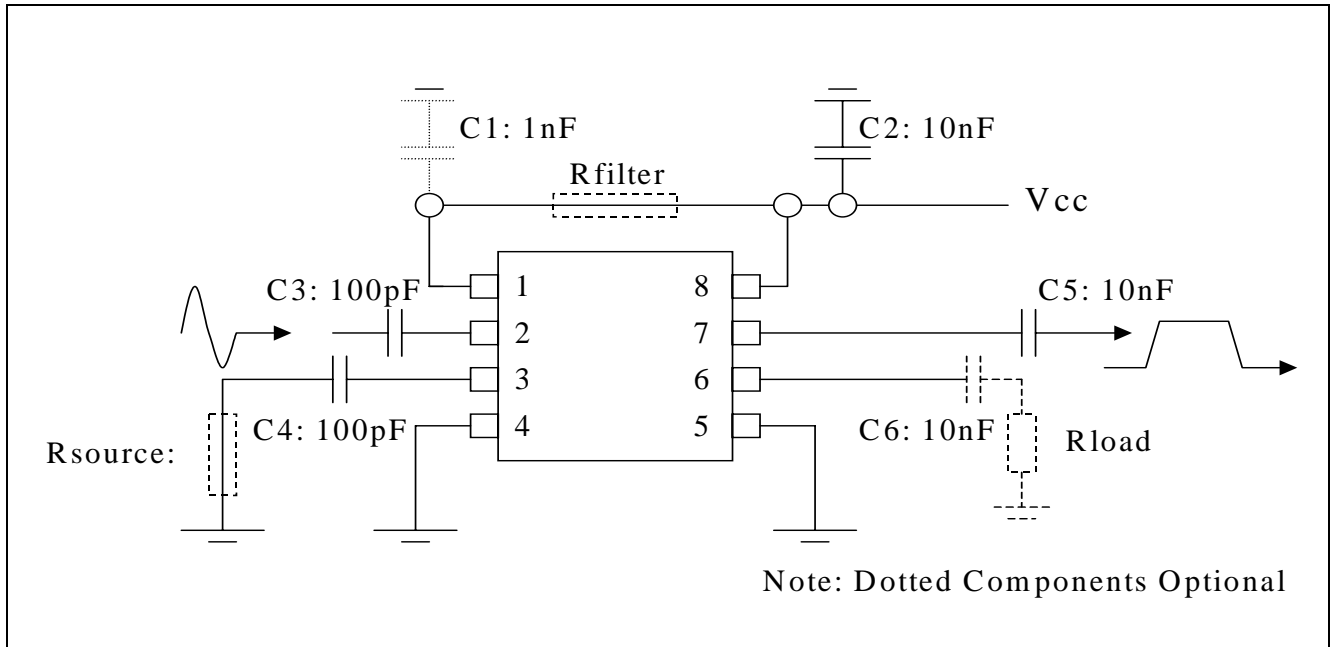


Figure 3 - Recommended Circuit Configuration

This represents the circuit used to complete characterization. The tabulated Electrical performance is guaranteed using this application circuit.

Unpopulated evaluation boards are available, type No. ZLE40008. A fully populated evaluation board is also available, type No. ZLE40804.

## Circuit Options

The application circuit includes some optional components that may be required to improve tolerance of system noise present in the application.

**Dummy R source** may be added to the inverting input to provide a better matched source impedance at the input. This will improve the rejection of common mode noise present within the system.

**Dummy R load** may be added to the inverting output to provide better matched load at the output. This will reduce the radiated EMI at the output and reduce the Output Noise present on the supply rail.

**Rfilter** can be inserted between the Vcc\_In and the Vcc\_out to provide additional filtering to the input Vcc. The input Vcc powers the input bias reference only and can be a sensitive point to system noise. The nominal input current at Vcc\_In is 0.35 mA. An alternative would be to use an inductive choke.

**C1** is additional Supply Filtering and should be added with Rfilter. The IC includes 10pF of on Chip Supply Filtering.

## Input & Output Circuit

Figure 4 shows the equivalent input and output circuit.

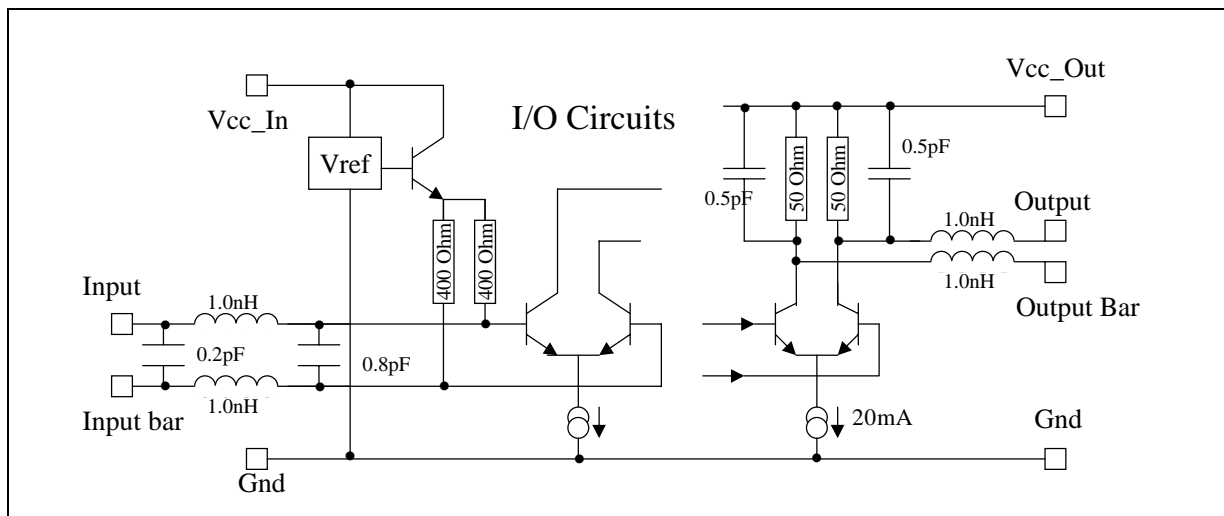


Figure 4 - Input and Output Equivalent Circuit

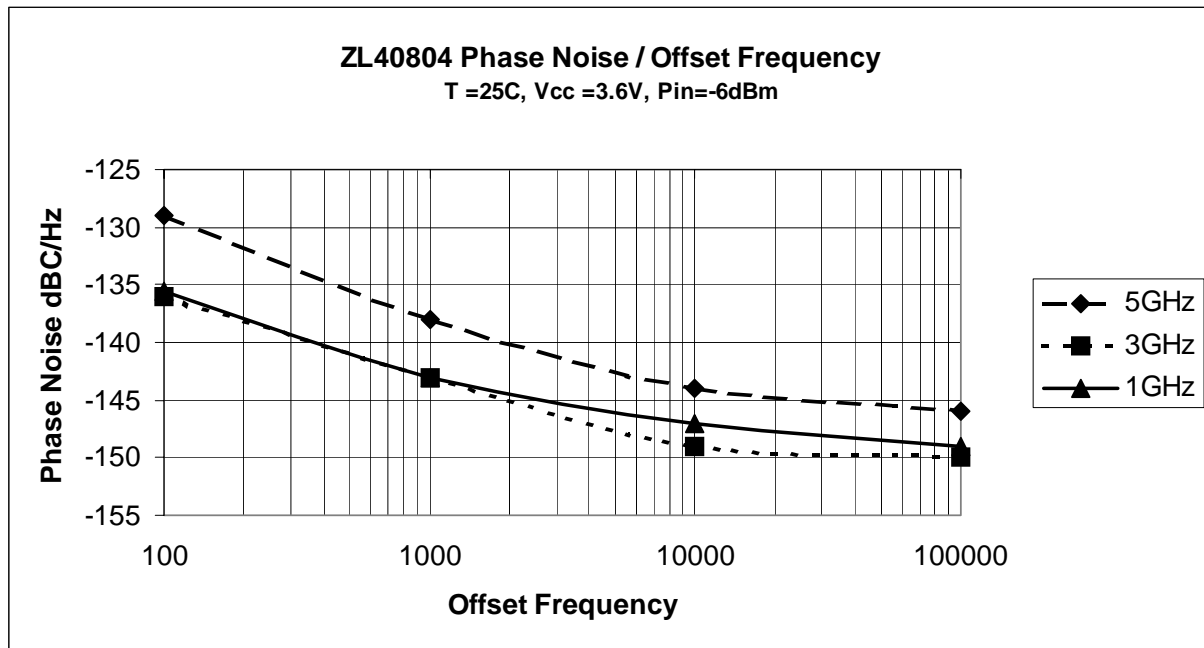


Figure 5 - ZL40804 Typical Phase Noise

**Absolute Maximum Ratings**

	Parameter	Symbol	Min.	Max.	Units	Comments
1	Supply voltage	Vcc	-0.5	6	V	
2	RFin			12	dBm	
3	All I/O ports		-0.5	Vcc+0.5	V	
4	Storage temperature	T <sub>ST</sub>	-55	150	°C	
5	ESD protection			2	kV	Mil-std 883B / 3015 cat1

**Operating Range**

Characteristic	Min.	Typ.	Max.	Units	Comments
Supply Voltage (Vcc)	3.3		3.6	V	
RFin Frequency Range	0.1		6	GHz	
Operating Junction Temperature	-40		+125	°C	
Junc'n to Amb't resistance Theta Ja		150		°C/W	4 layer FR4 Board
Junc'n to Case resistance Theta Jc		60		°C/W	4 layer FR4 Board

## AC/DC Characteristics

### Electrical Characteristics<sup>†</sup>

Characteristic	Pin	Min.	Typ.	Max.	Units	Conditions
I <sub>cc_in</sub> (Supply current)	1		0.35		mA	
I <sub>cc_out</sub> (Supply current)	8	36	61	96	mA	
Input frequency	2,3	1		6	GHz	RMS sinewave,
Input sensitivity	2,3		-20	-10	dBm	f <sub>in</sub> = 1 GHz to 6 GHz, Note 1
Input overload	2,3	4	10		dBm	f <sub>in</sub> = 1 GHz to 6 GHz, Note 1
Phase Noise	6,7		-150		dBc/Hz	@ 10 KHz Offset Fin = 3 GHz
Output voltage	6,7		1		Vp-p	Differential Into 50 ohm pull up resistors
Output power	6,7	-7	-2	2	dBm	f <sub>in</sub> = 1 GHz to 6 GHz, Pin = -10 dBm, Note 2
Output t-rise	6,7		110		ps	f <sub>in</sub> = 1 GHz to 6 GHz, Pin = -10 dBm
Output t-fall	6,7		110		ps	f <sub>in</sub> = 1 GHz to 6 GHz, Pin = -10 dBm
T – prop delay	2,6		250		ps	50% IN to 50% OUT
Jitter			0.1		ps	
Output Duty Cycle	6,7	45	50	55	%	f <sub>in</sub> = 1 GHz to 6 GHz, In = -10 dBm
Input. Edge Speed		500			V/us	For < 1 GHz input operation

<sup>†</sup> These characteristics are guaranteed by design and characterization over the following range of operating conditions unless otherwise stated:  
T<sub>amb</sub> = -40C to +85C, V<sub>cc</sub> = 3.3 V to 3.6 V

Note 1: Pin = power measured into 50 ohm Load from 50 ohm Source.

Note 2: Pout Single Ended AC coupled Single 50 ohm Termination.

For details of the test set-up, refer to the Application Note for RF Prescalers.

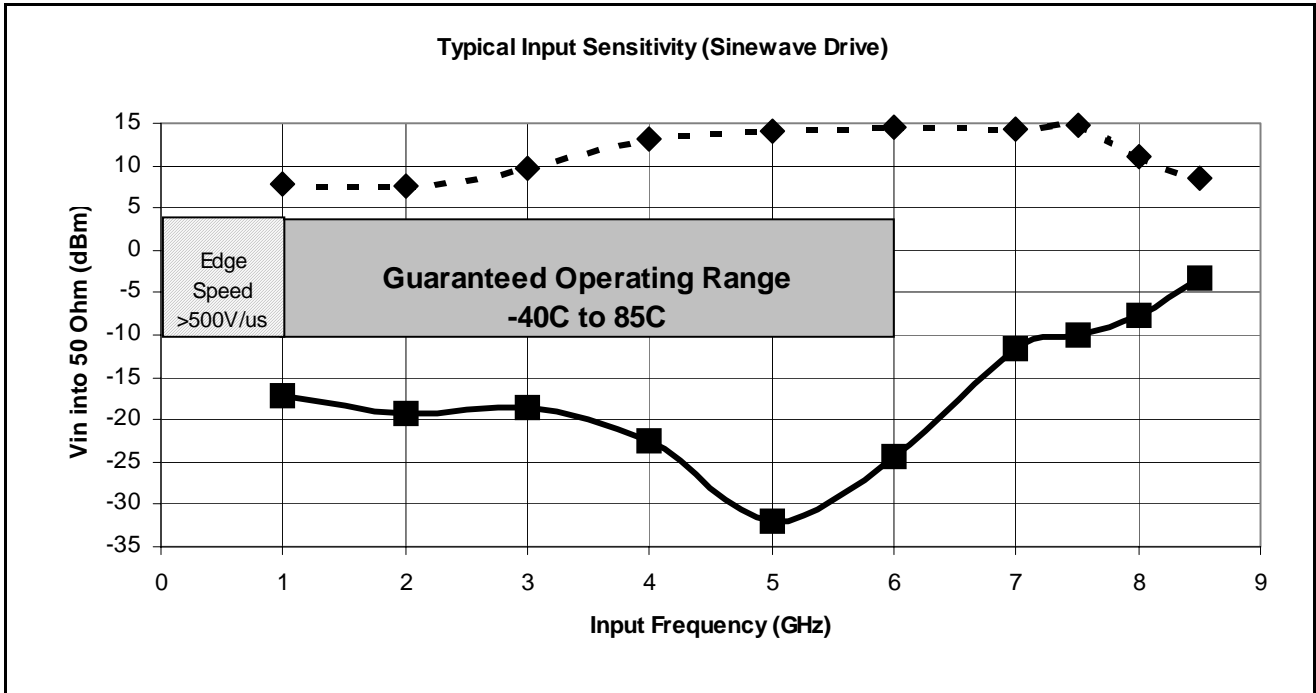


Figure 6 - Typical Input Sensitivity (sine wave drive)

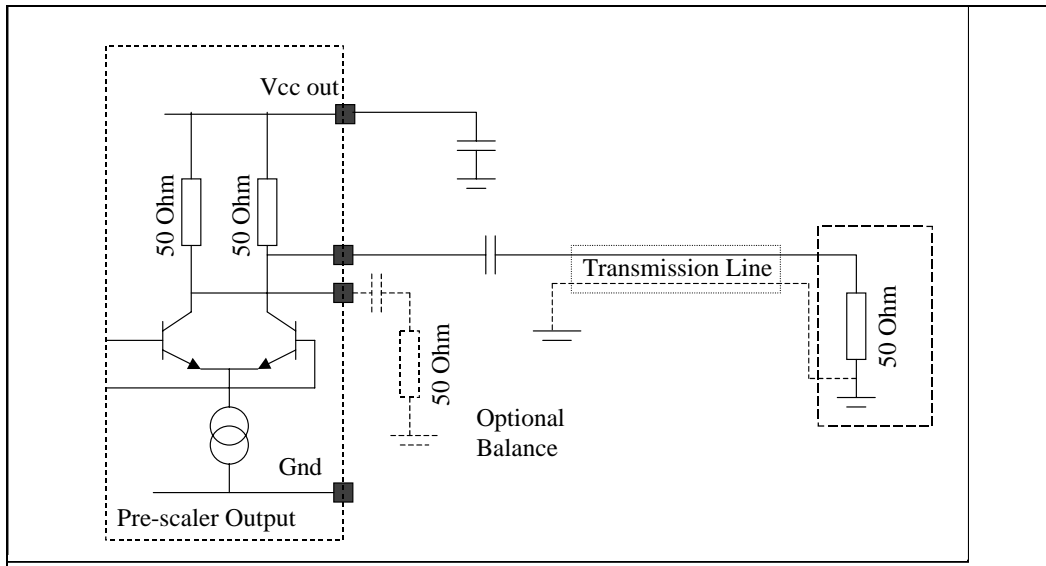


Figure 7 - Single Ended AC Coupled Single Termination

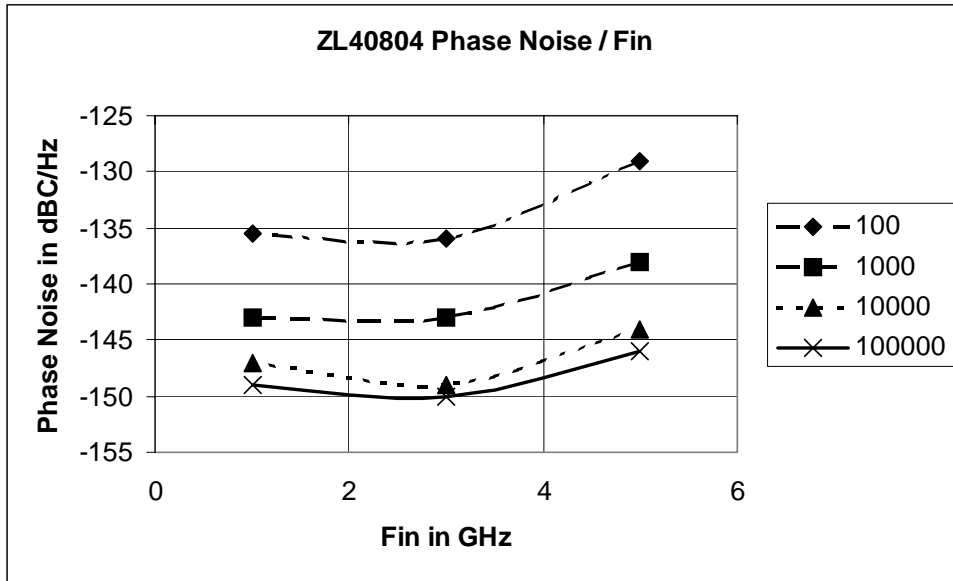


Figure 8 - ZL40804 Phase Noise vs Input Frequency

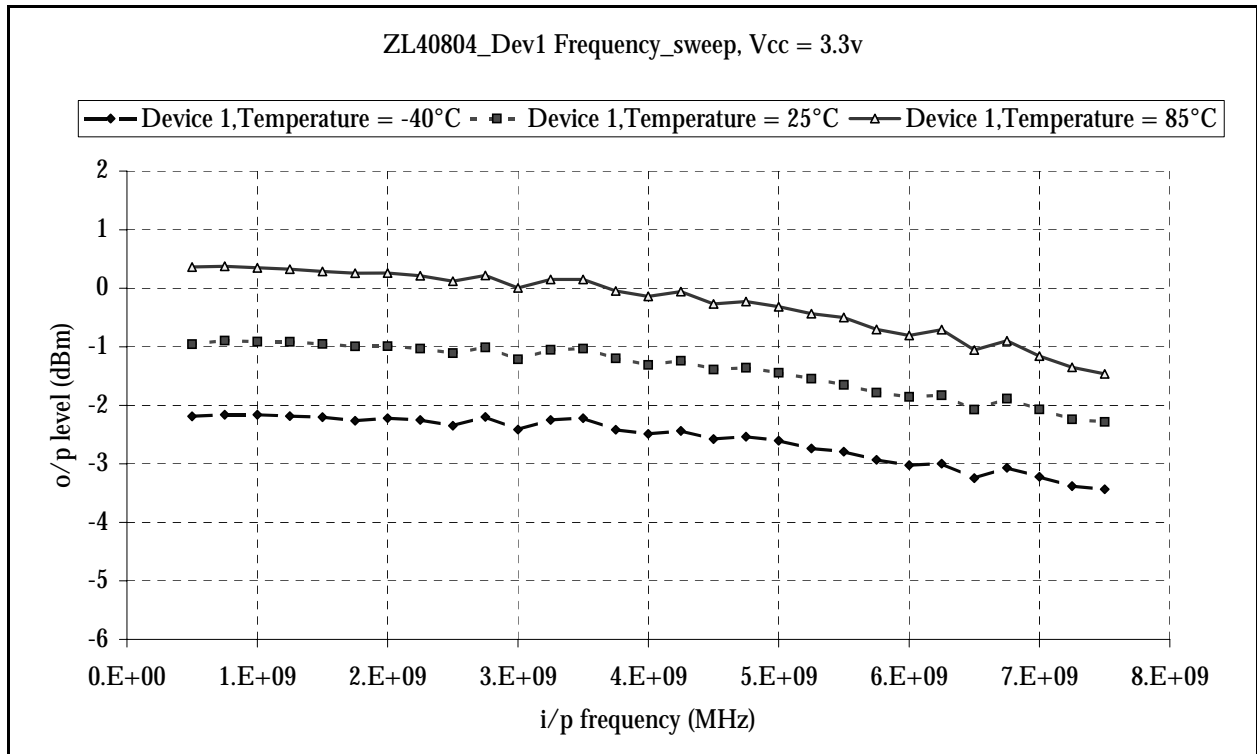
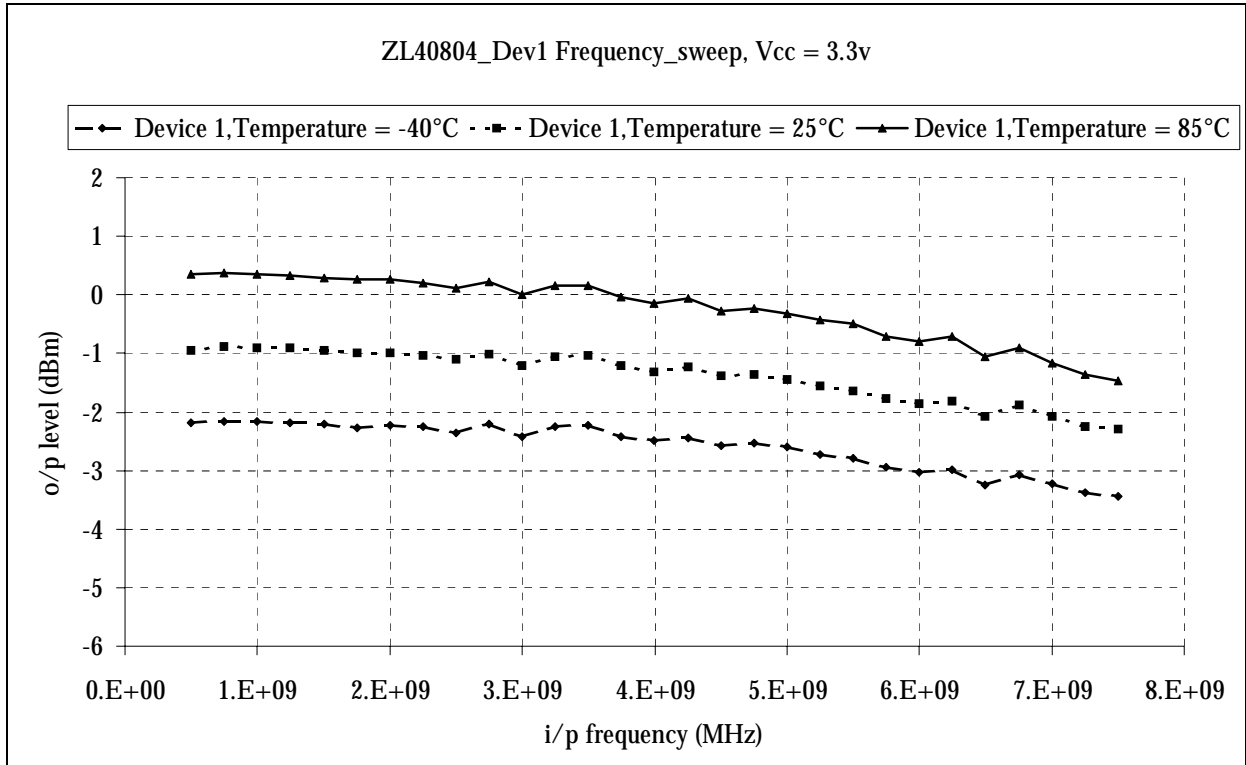
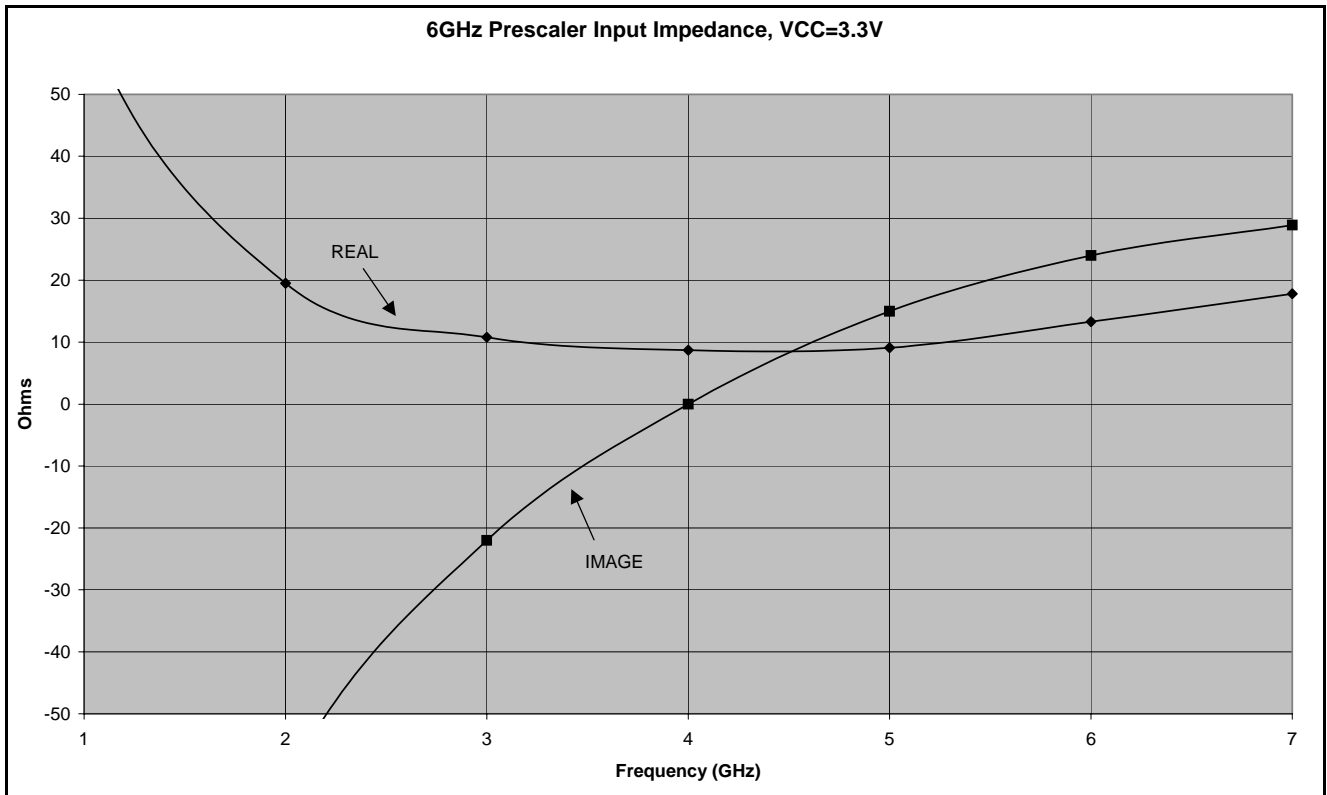


Figure 9 - ZL40804 Pout vs Input Frequency (Vcc = 3.3 V, T=25C, T=85C)

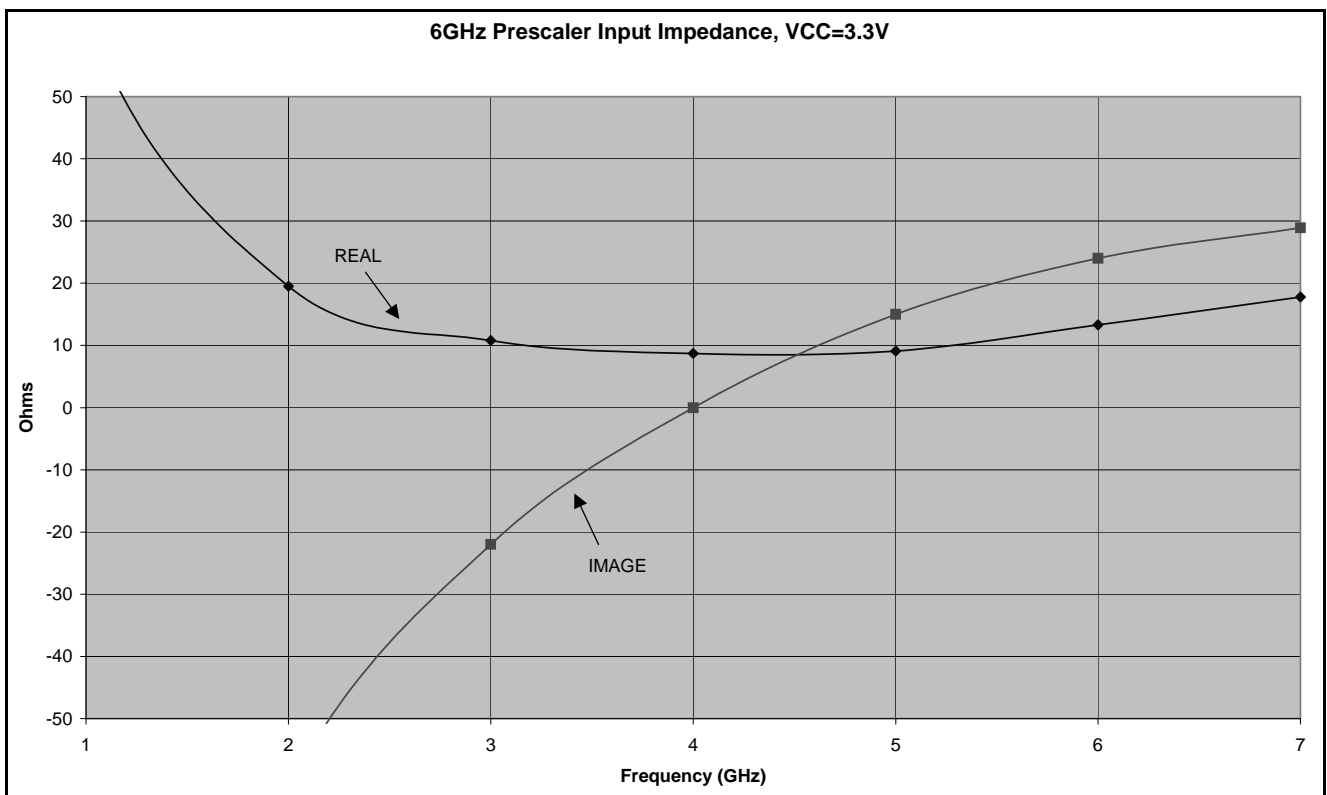


**Figure 10 - ZL40804 Pout / Input Frequency**  
 (Vcc = 3.6 V, T=25C, T=85C)





**Figure 11 - Input Impedance of 6 GHz Prescalers**



**Figure 12 - Input Impedance of 6 GHz Prescalers (Typical)**

## Single Ended or Differential Load

Figures 11 and 12 illustrate the output waveform when measured differential and single ended with a 5 GHz waveform at the input at a level of +2 dBm. The single ended output contains some input frequency break through which contributes to the distortion present. This is a common mode signal which is rejected if the output is taken differentially.

Differential operation also provides an additional 6 dB output power.

Differential Operation reduces the radiated EMI in the system and reduces the susceptibility to common mode system noise.

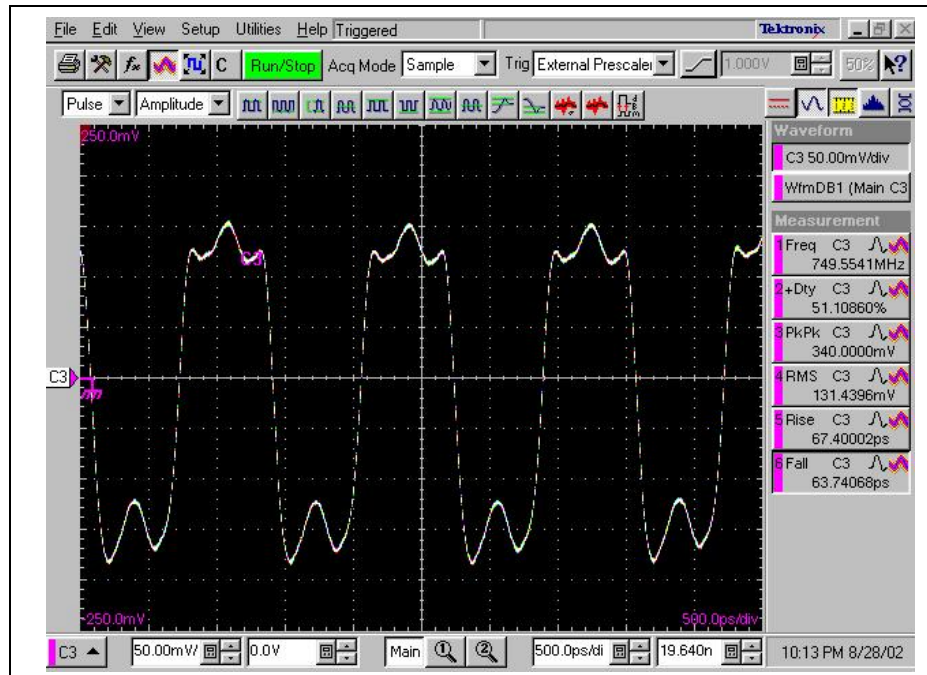


Figure 13 - ZL40804 Single Ended Out @ 3 GHz +2 dBm

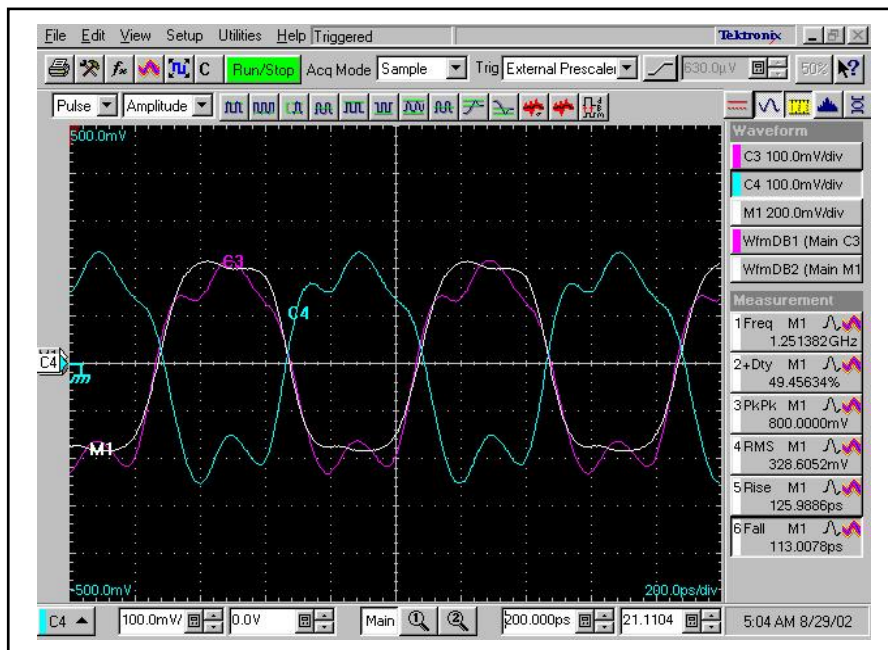
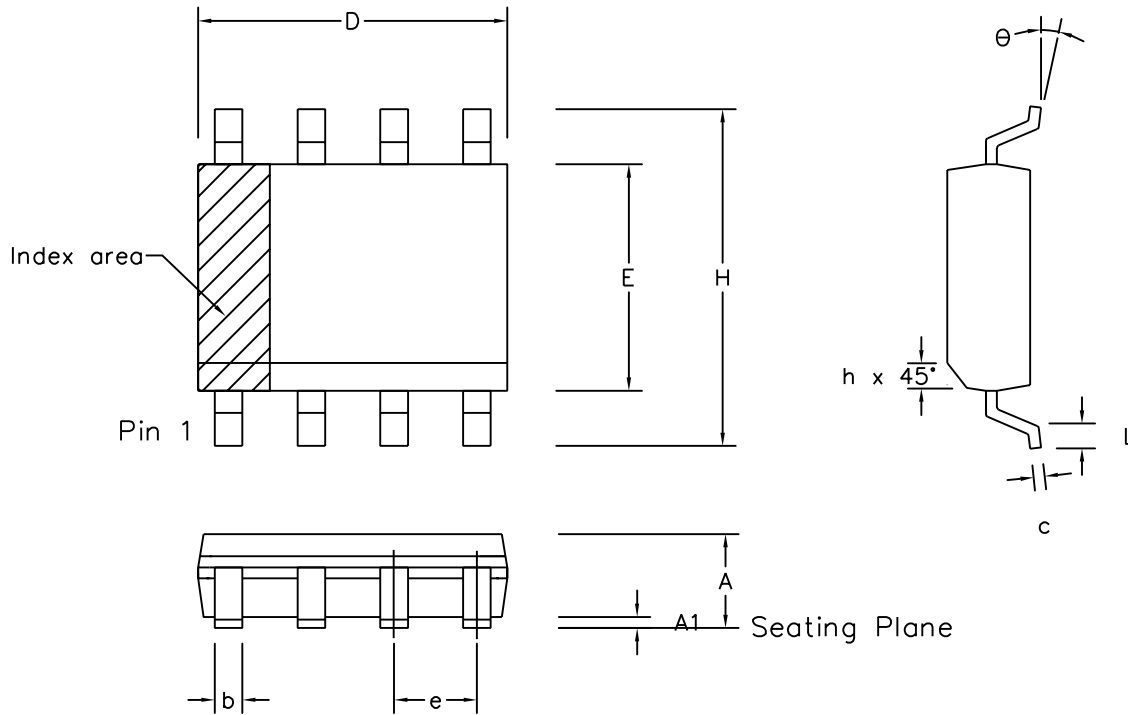



Figure 14 - ZL40804 Differential Out @ 5 GHz +2 dBm



	Min mm	Max mm	Min inch	Max inch
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
H	5.80	6.20	0.228	0.244
E	3.80	4.00	0.150	0.157
L	0.40	1.27	0.016	0.050
e	1.27 BSC		0.050 BSC	
b	0.33	0.51	0.013	0.020
c	0.19	0.25	0.008	0.010
O	0°	8°	0°	8°
h	0.25	0.50	0.010	0.020
Pin Features				
N	8		8	
Conforms to JEDEC MS-012AA Iss. C				

Notes:

1. The chamfer on the body is optional. If not present, a visual index feature, e.g. a dot, must be located within the cross-hatched area.
2. Controlling dimensions are in inches.
3. Dimension  $D$  do not include mould flash, protusion or gate burrs. These shall not exceed 0.006" per side.
4. Dimension  $E1$  do not include inter-lead flash or protusion. These shall not exceed 0.010" per side.
5. Dimension  $b$  does not include dambar protusion / intrusion. Allowable dambar protusion shall be 0.004" total in excess of  $b$  dimension.

© Zarlink Semiconductor 2002 All rights reserved.							Package Code DC
ISSUE	1	2	3	4	5		Previous package codes
ACN	6745	201936	202595	203705	212424		MP / S
DATE	5Apr95	27Feb97	12Jun97	9Dec97	22Mar02		Package Outline for 8 lead SOIC (0.150" Body width)
APPRD.							GPD00010



**For more information about all Zarlink products  
visit our Web Site at  
[www.zarlink.com](http://www.zarlink.com)**

Information relating to products and services furnished herein by Zarlink Semiconductor Inc. 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 I<sup>2</sup>C components conveys a licence under the Philips I<sup>2</sup>C Patent rights to use these components in and I<sup>2</sup>C System, provided that the system conforms to the I<sup>2</sup>C Standard Specification as defined by Philips.

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

Copyright Zarlink Semiconductor Inc. All Rights Reserved.

**TECHNICAL DOCUMENTATION - NOT FOR RESALE**

---