



January 2003

Features

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

| Ordering Information | |
|-----------------------------|------------|
| ZL40804/DCA (tubes) | 8 pin SOIC |
| ZL40804/DCB (tape and reel) | 8 pin SOIC |
| -40°C to +85°C | |

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

Description

The ZL40804 are Bipolar 3.45V supply, very low power prescalers for professional applications with a fixed modulus of 4. The ultra low close in (10KHz 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 6GHz.

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

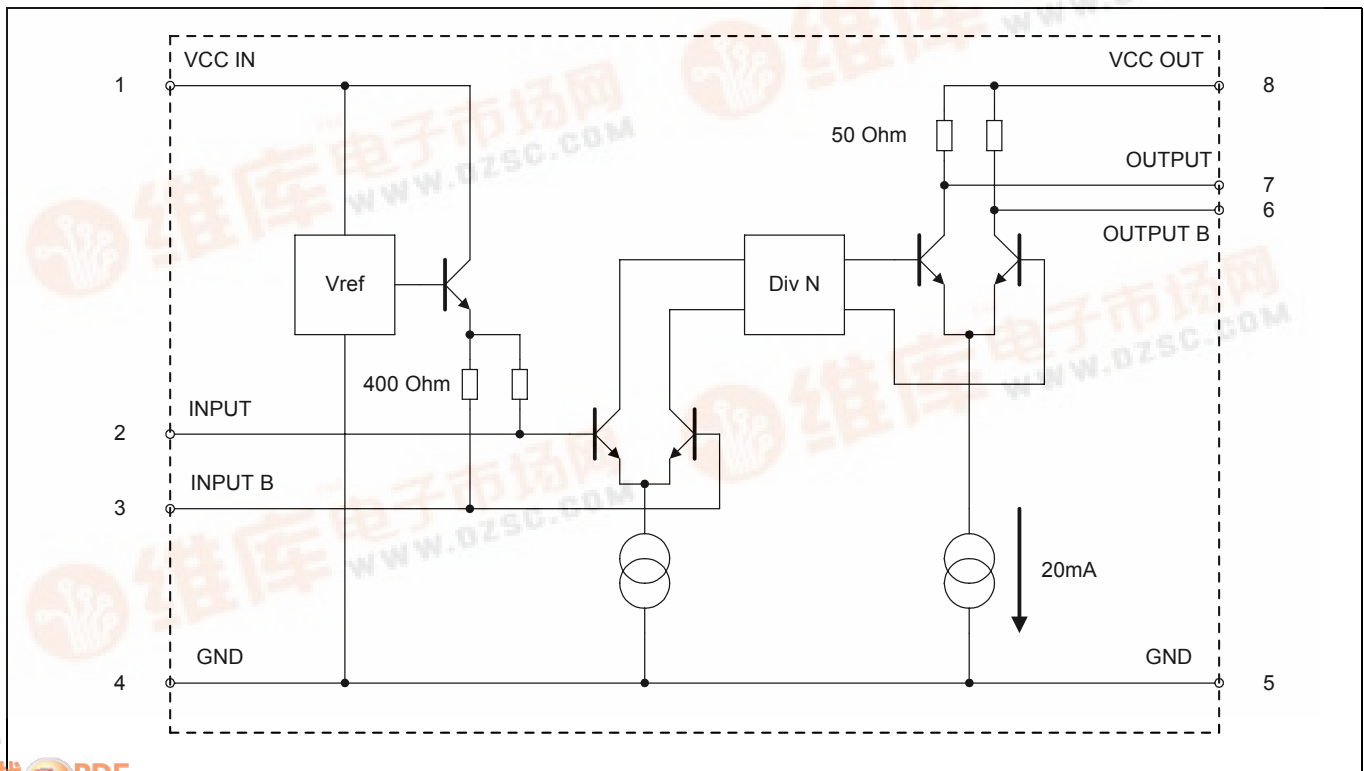


Figure 1 - Functional Block Diagram



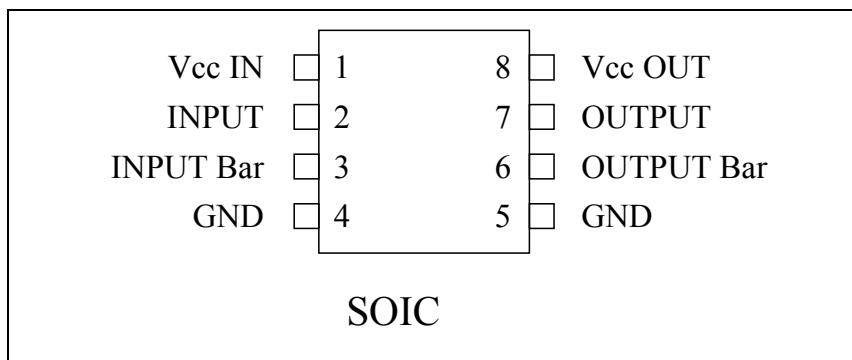


Figure 2 - Pin Connections – Top View

Application Configuration

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

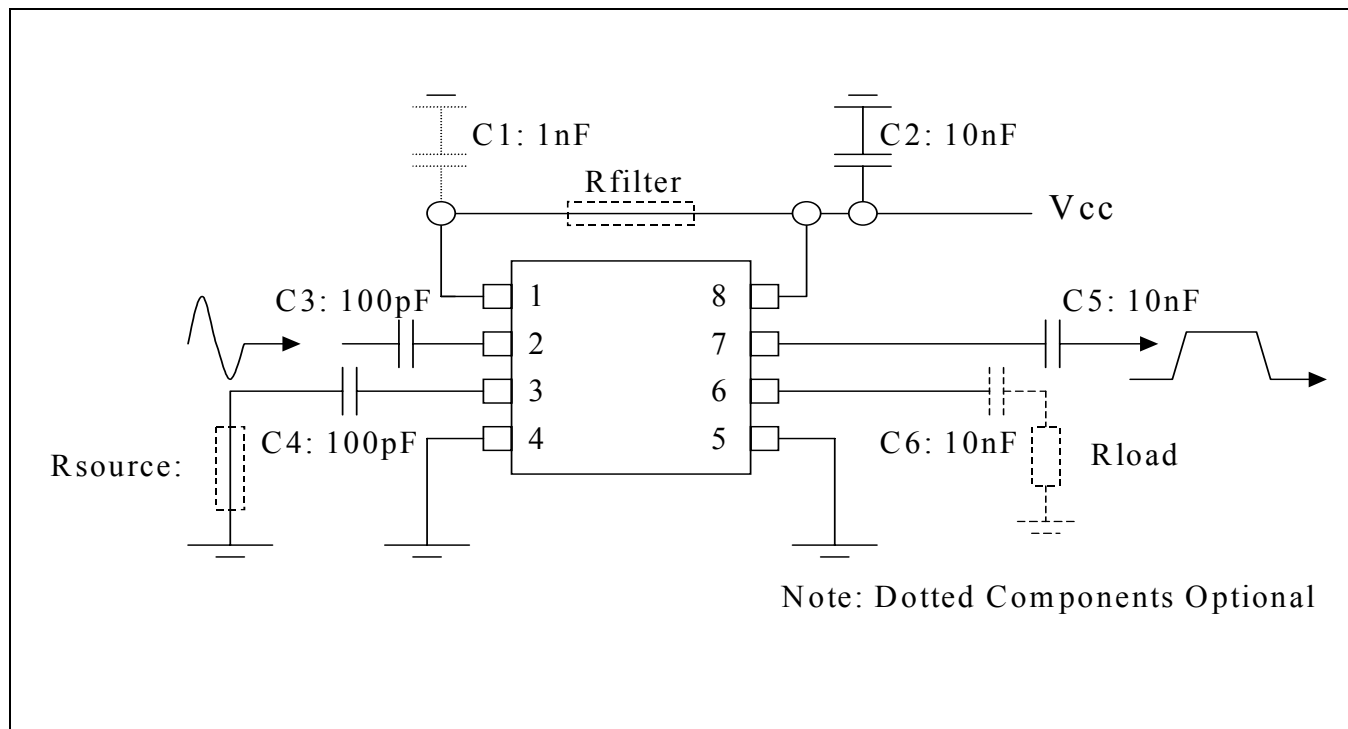


Figure 3 - Recommended circuit configuration

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

A blank application board is available.

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 0.35mA. 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

Fig 4 shows the equivalent input and output circuit.

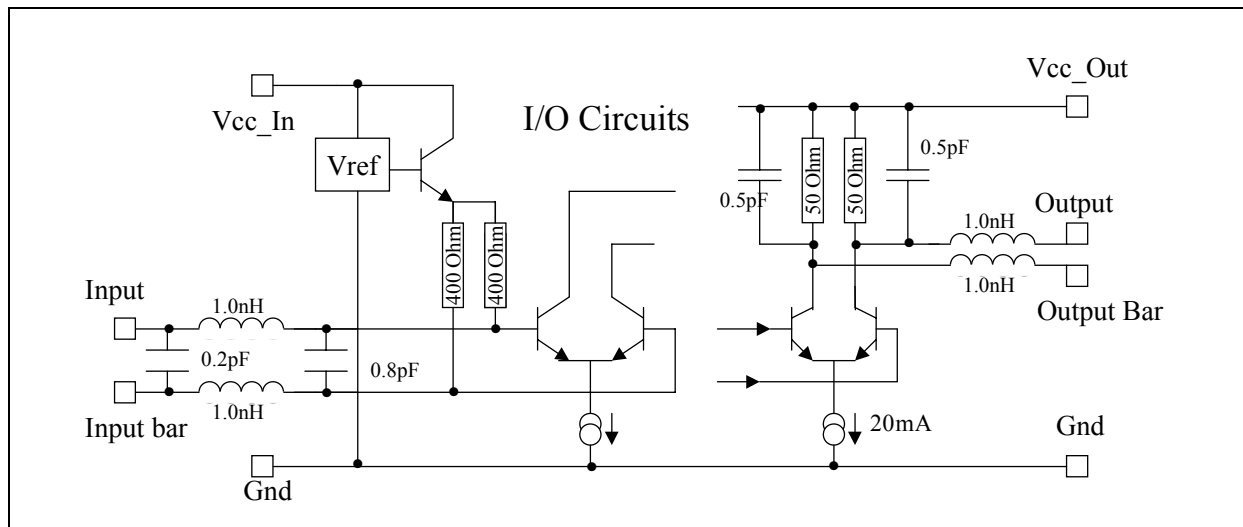


Figure 4 - Input and Output Equivalent Circuit

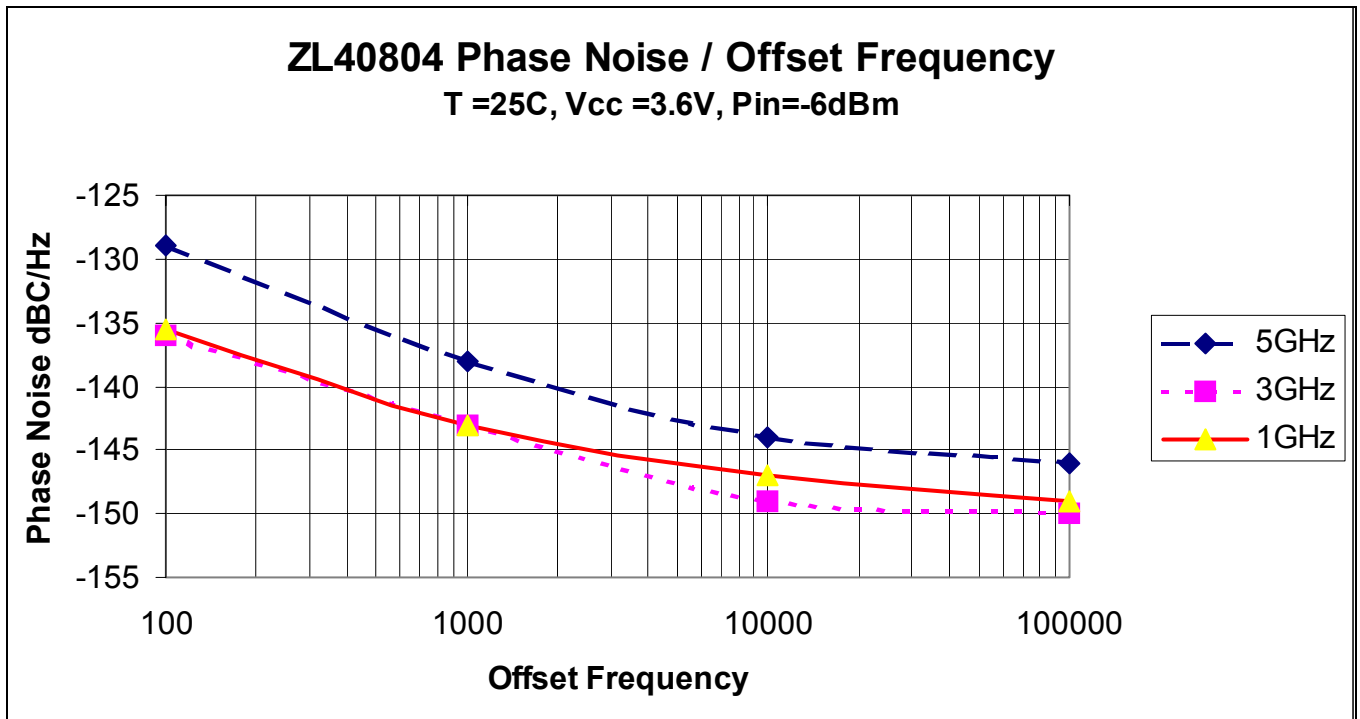


Figure 5 - ZL40804 Typical Phase Noise

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 _{ST} | -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[†]

| Characteristic | Pin | Min. | Typ. | Max. | Units | Conditions |
|--------------------------------------|-----|------|------|------|------------------|------------------------------------------------------------------|
| I _{cc_in} (Supply current) | 1 | | 0.35 | | mA | |
| I _{cc_out} (Supply current) | 8 | 36 | 61 | 96 | mA | |
| Input frequency | 2,3 | 1 | | 6 | GHz | RMS sinewave, |
| Input sensitivity | 2,3 | | -20 | -10 | dBm | f _{in} = 1GHz to 6GHz, Note 1 |
| Input overload | 2,3 | 4 | 10 | | dBm | f _{in} = 1GHz to 6GHz, Note 1 |
| Phase Noise | 6,7 | | -150 | | dBc/Hz | @ 10KHz Offset f _{in} = 3GHz |
| Output voltage | 6,7 | | 1 | | V _{p-p} | Differential Into 50ohm pull up resistors |
| Output power | 6,7 | -7 | -2 | 2 | dBm | f _{in} = 1GHz to 6GHz, P _{in} = -10dBm, Note 2 |
| Output t-rise | 6,7 | | 110 | | ps | f _{in} = 1GHz to 6GHz, P _{in} = -10dBm |
| Output t-fall | 6,7 | | 110 | | ps | f _{in} = 1GHz to 6GHz, P _{in} = -10dBm |
| 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 _{in} = 1GHz to 6GHz, I _n = -10dBm |
| Input. Edge Speed | | 500 | | | V/us | For < 1GHz input operation |

[†] These characteristics are guaranteed by design and characterisation over the following range of operating conditions unless otherwise stated:
T_{amb} = -40C to +85C, V_{cc} = 3.3V to 3.6V

Note 1: P_{in} = power measured into 50 ohm Load from 50 ohm Source.

Note 2: P_{out} Single Ended AC coupled Single 50 ohm Termination.

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

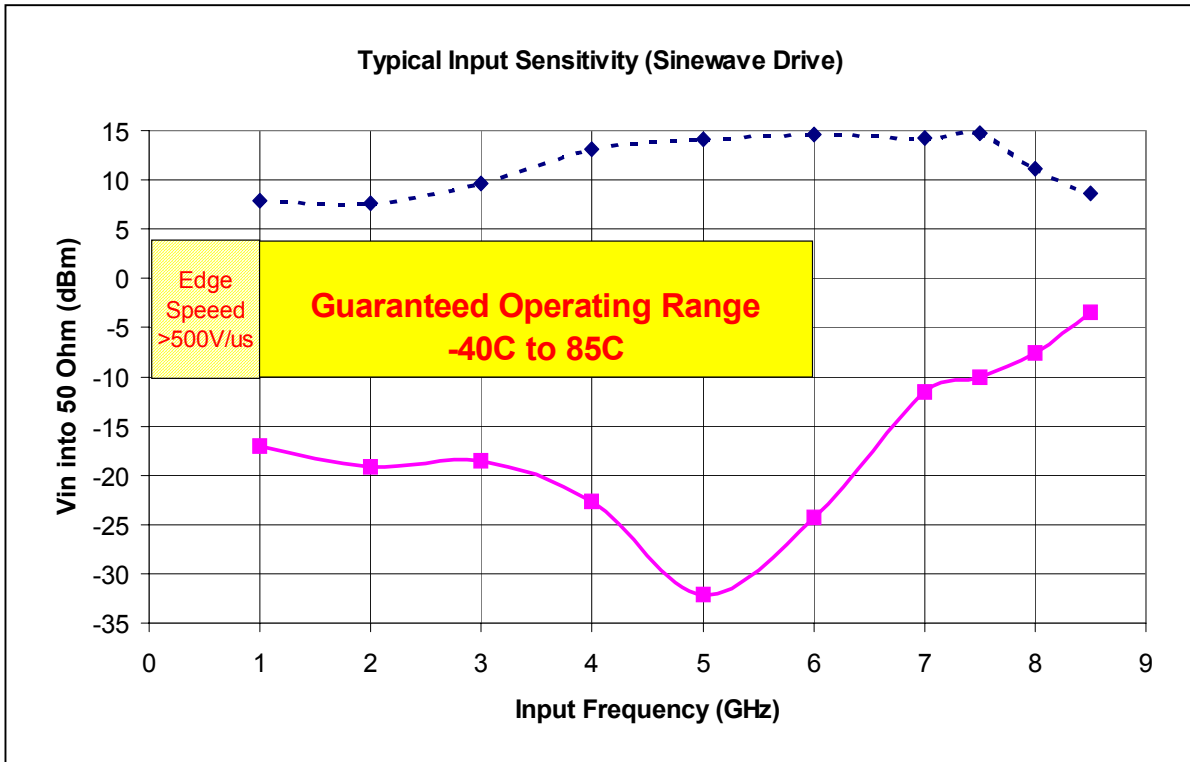


Figure 6 - Typical Input Sensitivity (sine wave drive)

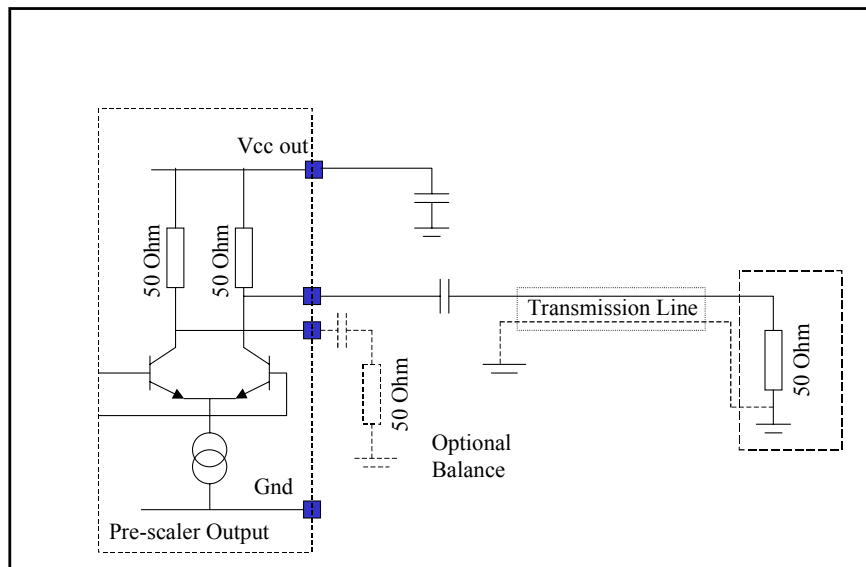


Figure 7 - Single Ended AC Coupled Single Termination

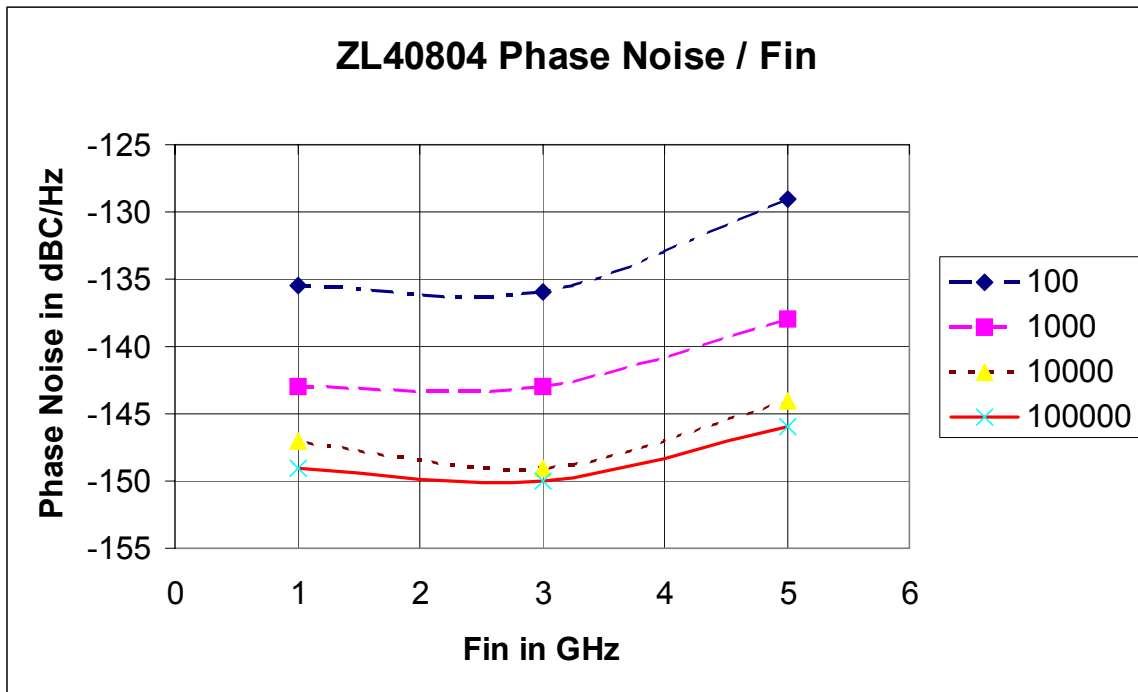


Figure 8 - ZL40804 Phase Noise vs Input Frequency

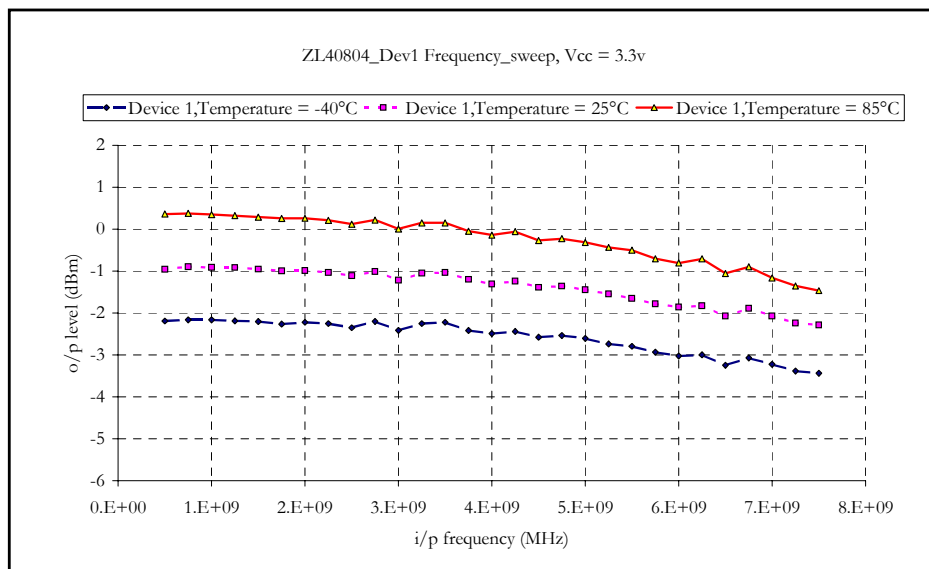
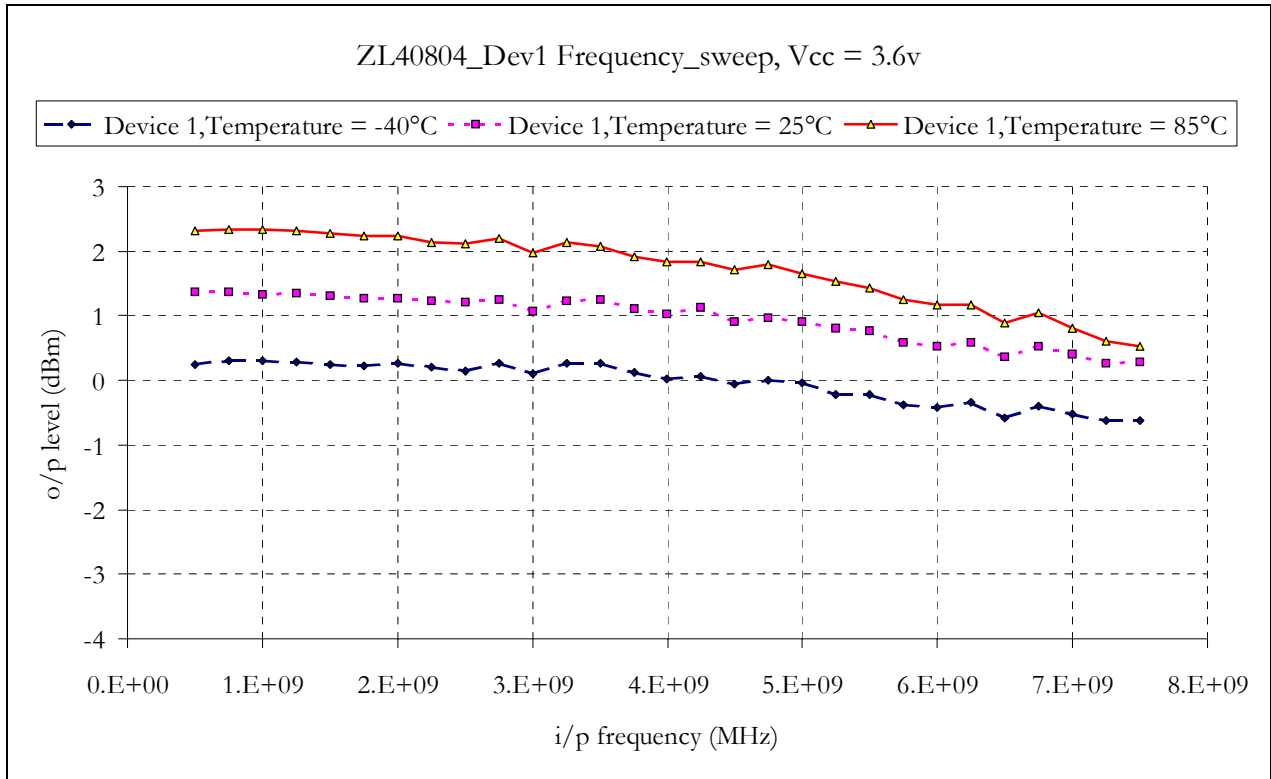


Figure 9 - ZL40804 Pout vs Input Frequency (Vcc = 3.3V, T=25C, T=85C)



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

Single Ended or Differential Load

Figures 11 and 12 illustrate the output waveform when measured differential and single ended with a 5GHz waveform at the input at a level of +2dBm. 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 6dB output power.

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

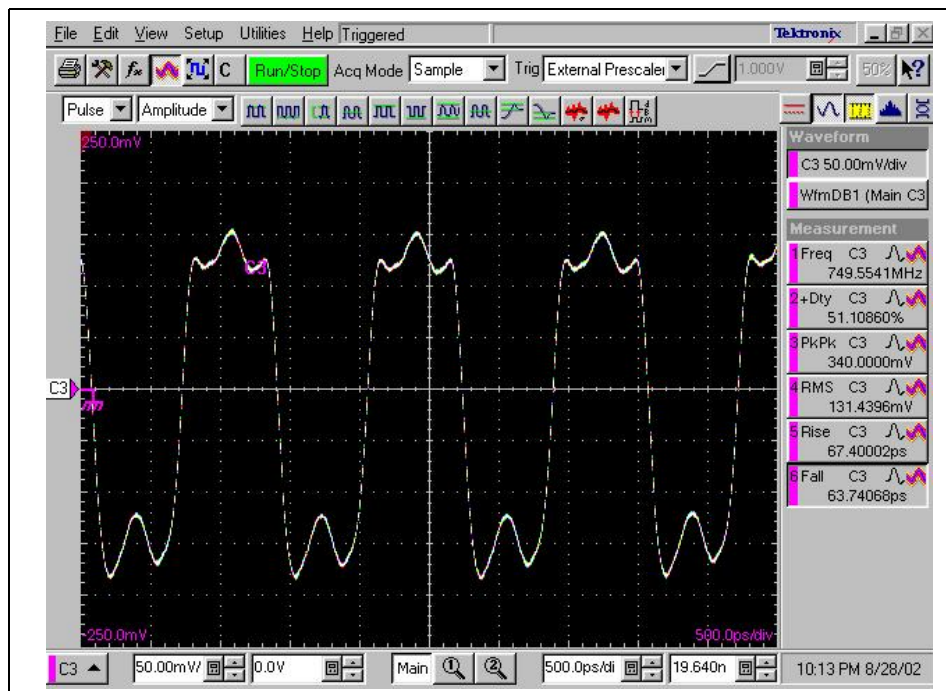


Figure 11 - ZL40804 Single Ended Out @ 3GHz +2dBm

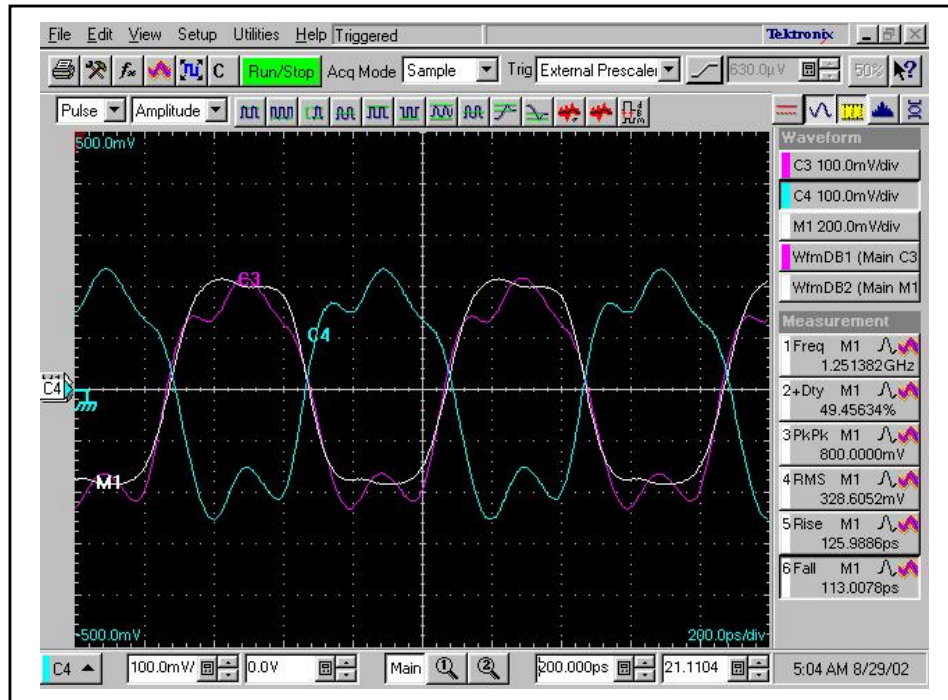


Figure 12 - ZL40804 Differential Out @ 5GHz +2dBm



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