

## Migrating from PE9704 to PE97042

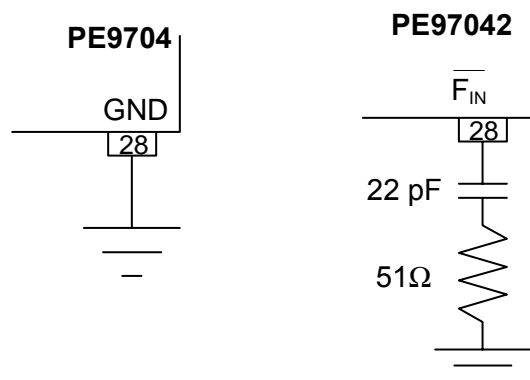
### Introduction

A new generation of low phase noise frequency synthesizers has been released to address the need of the space application requirements for low phase noise. Three new products – PE97022, PE97042 and PE97632, are based on the existing products – PE9702, PE9704 and PE9763 respectively. Careful planning and attention have been made during design to minimize the effort and changes required for the migration from the existing products to the new products. There are trade-offs between design constraint and extent of phase noise improvement. The priority is always given first to produce a solution with the lowest phase noise possible and then with minimum effort for the migration. This application note describes in detail the necessary steps that are needed to migrate from an existing design that uses PE9704 to PE97042 to achieve improved phase noise.

### Migrating From PE9704 to PE97042

Migrating from PE9704 to PE97042 requires one change to the way pin 28 is connected. Pin 28 is “GND” in PE9704 but is “ $F_{IN}$ ” in PE97042. Instead of tying pin 28 directly to “GND” as is in PE9704, pin 28 for PE97042 needs to have a 22 pF capacitor in series to a 51  $\Omega$  resistor to “GND” as shown in *Fig. 1* below.

**Figure 1. Pin 28 configuration differences between PE9704 and PE97042**

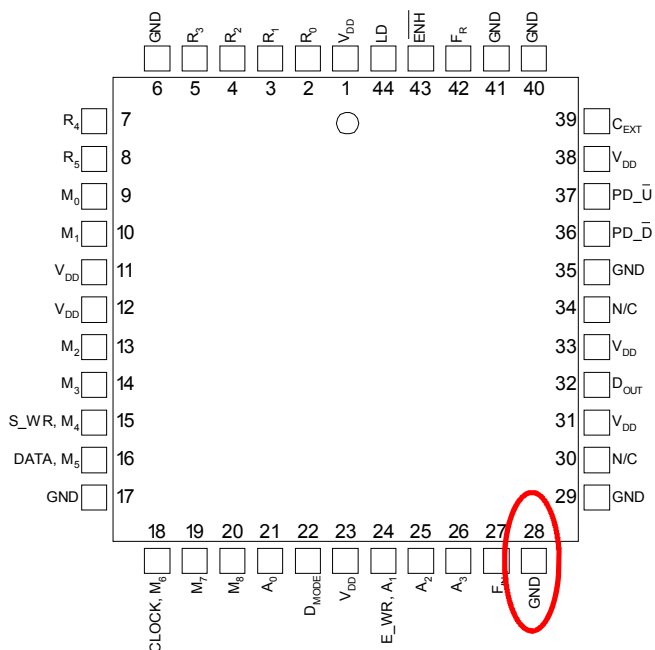
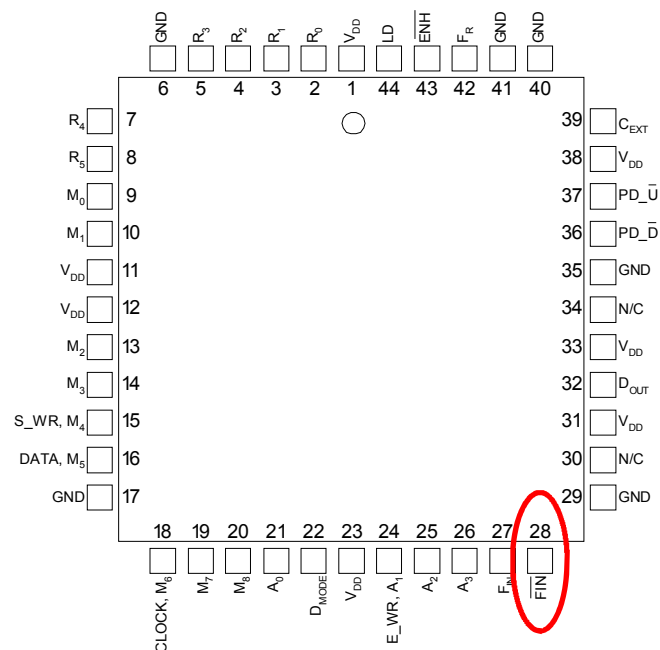


### Summary:

- Details of low phase noise availability in new PLL products
- Migration from PE9704 to PE97042
  - PE97042 pin 28 connection difference from PE9704
  - Minor PCB Modification Necessary when moving from PE9704 to PE97042
  - Phase Noise greatly improved by raising  $V_{DD}$  to 3.3 V on PE97042
- Pin 28 Configuration Differences Diagram
- Comparison of pin-out diagram
- Operational Specification Comparison chart between PE9702 and PE97022
- Phase Noise Comparison graph between PE9704 and PE97042

Pin 28 is the only pin difference between PE9704 and PE97042, which requires board modification. There is no other pin difference. PE97042 can operate at 3.0 V nominal  $V_{DD}$  and benefit from the lower phase noise but the phase noise can be further improved by raising the  $V_{DD}$  supply level to 3.3V. See *Fig. 4* for a comparison between the Typical Phase Noise levels for the two parts.

One important specification difference between PE9704 and PE97042 is that the typical operational  $I_{DD}$  for PE97042 is about 10 mA more than that for PE9704. Please see *Tables 1&2* for a comparison of operational specifications.

**Figure 2. PE9704 Pin Configurations (Top View)**

**Figure 3. PE97042 Pin Configurations (Top View)**

**Table 1. PE9704 Operational Specifications**

Symbol	Parameter/Conditions	Min	Max	Units
$V_{DD}$	Supply voltage	2.85	3.15	V

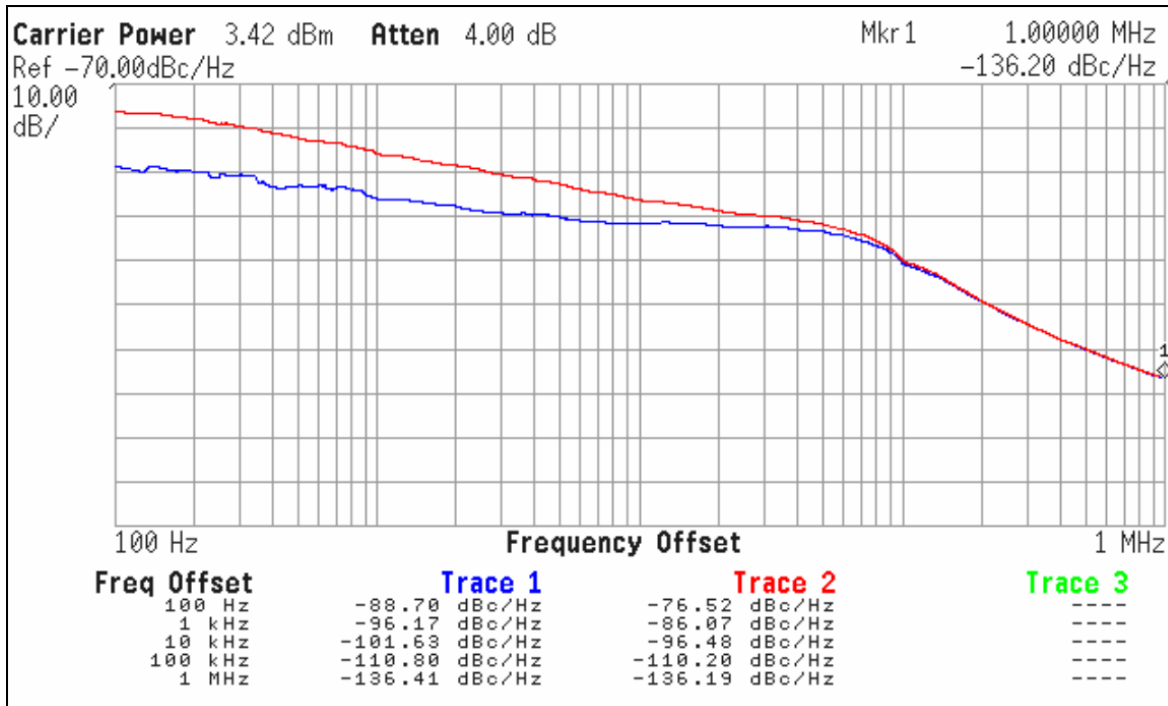
Symbol	Parameter	Conditions	Typ	Units
$I_{DD}$	Operational supply current; Prescaler disabled Prescaler enabled	$V_{DD} = 2.85$ to $3.15$ V	10 24	mA mA
$\Phi_N$	Normalized Phase Noise	$V_{DD} = 2.85$ to $3.15$ V	-210	dBc/ Hz

**Table 2. PE97042 Operational Specifications**

Symbol	Parameter/Conditions	Min	Max	Units
$V_{DD}$	Supply voltage	2.85	3.45	V

Symbol	Parameter	Conditions	Typ	Units
$I_{DD}$	Operational supply current; Prescaler disabled Prescaler enabled	$V_{DD} = 3.3$ V	15 40	mA mA
$\Phi_N$	Normalized Phase Noise	$V_{DD} = 3.3$ V	-216	dBc/ Hz

Figure 4. Typical Phase Noise for PE97042 (Trace 1) and PE9704 (Trace 2), Fvco = 1.92 GHz, Fcomp = 20 MHz, Loop Bandwidth = 50 kHz



### Conclusion

This application has described the steps necessary to convert any existing design that uses PE9704 to the newer, lower phase noise PE97042. For help or more information about this report, please contact Peregrine Applications Support at help@psemi.com.

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