

## XMN and XMNP low-noise signal sources

Pascall's XMN and XMNP series are designed to provide a range of high-performance building blocks for frequency synthesiser designers. They can also be used as stand-alone fixed-frequency signal sources.

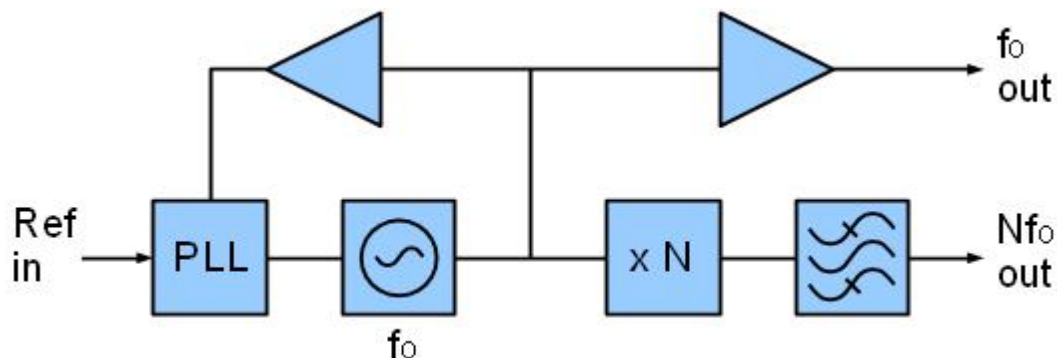
The XMN combines a Pascall OCXOF with a frequency multiplier and bandpass filter, to give an output with  $\leq -80$ dBc sub-harmonics and exceptionally low noise floor. In addition to the multiplied frequency, an output is provided at the oscillator's frequency. The XMNP adds a phase-locked loop, to enable the module to be locked to an external reference.

Frequency multiplication of low-noise signals presents significant design challenges. Care is needed at each stage, to avoid seriously degrading the noise floor or increasing flicker of phase noise. An integrated solution allows optimum interfacing between sections, and relieves system designers of the task of specifying separate oscillators, multipliers and filters. As an example, the 840MHz output of the XM7P-E-840.0-10.0-15 has typical phase noise of  $-167$ dBc/Hz at 100kHz offset, which is equivalent to  $-184$ dBc/Hz at the oscillator frequency of 120MHz.

Because of their very low phase noise floor, the XMN / XMNP series can also offer an alternative to SAW oscillators in many applications, giving an improvement in close-in phase noise. A further advantage is the availability of crystals at custom frequencies, which eliminates the high development cost and lead time associated with non-standard SAW frequencies.

### Typical applications:

- Low-noise frequency synthesisers
- Phase noise test systems
- Radar and EW
- NMR / MRI
- Scientific research



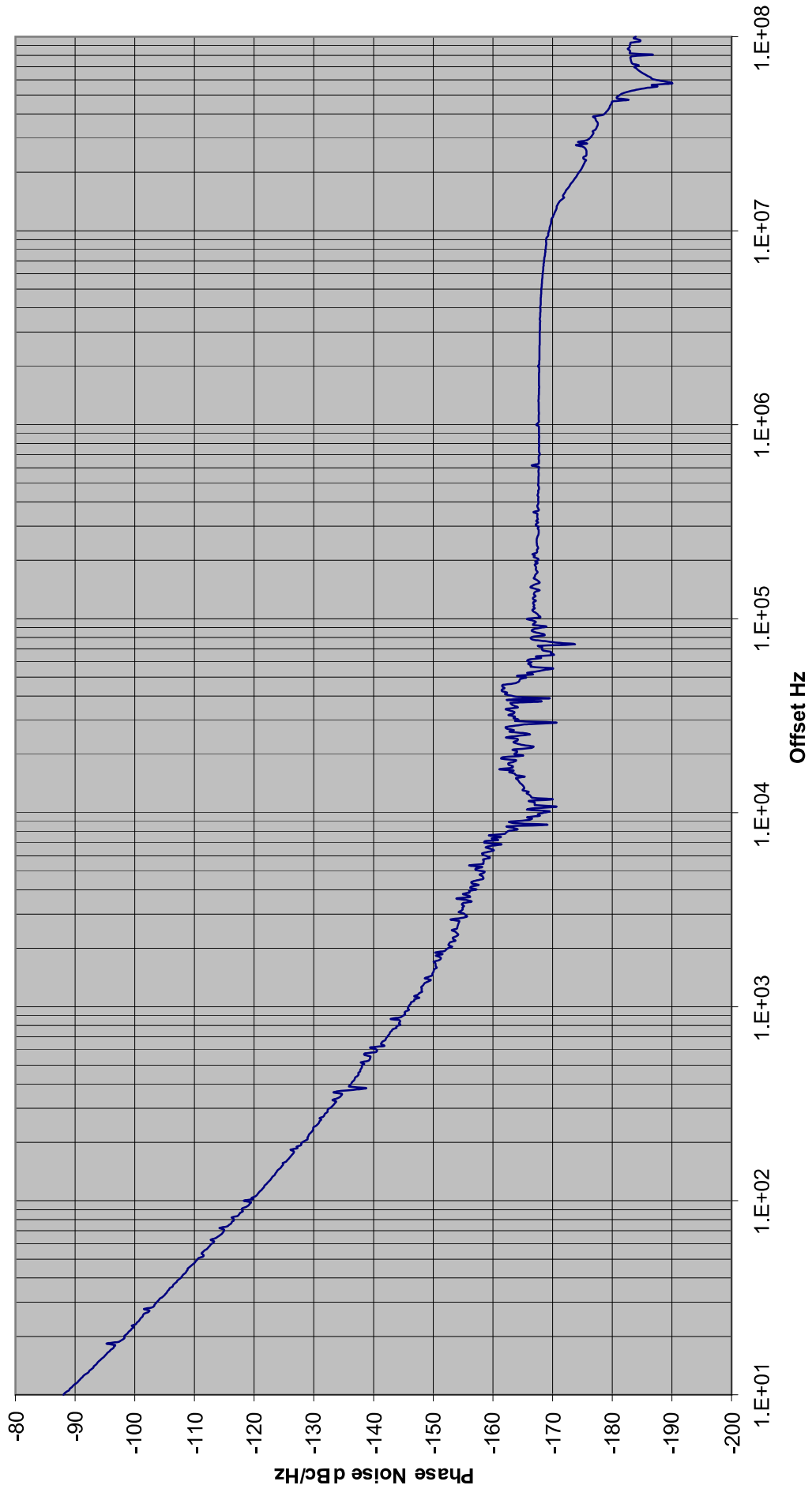
*Simplified Block Diagram*

**840 MHz + 120 MHz Phase-locked Signal Source**  
**Part Number XM7P-E-840.0-10.0-15**

Parameter	Value
<b>840MHz output</b>	
Output power	13 dBm ± 2 dB, 50 ohms
Harmonics	≤ -30 dBc
Sub-harmonics	≤ -80 dBc
Phase noise (guaranteed)	
10Hz offset	≤ -80 dBc/Hz
100Hz offset	≤ -115 dBc/Hz
1kHz offset	≤ -143 dBc/Hz
10kHz offset	≤ -159 dBc/Hz
≥ 100kHz offset	≤ -162 dBc/Hz
<b>120MHz output</b>	
Output power	13 dBm ± 2 dB, 50 ohms
Harmonics	≤ -25 dBc
Phase noise (guaranteed)	
10Hz offset	≤ -97 dBc/Hz
100Hz offset	≤ -132 dBc/Hz
1kHz offset	≤ -160 dBc/Hz
10kHz offset	≤ -176 dBc/Hz
≥ 100kHz offset	≤ -182 dBc/Hz
<b>Free-running performance</b>	
Tuning range	± ≥ 6 x 10 <sup>-6</sup>
Tuning mechanism	Mechanical, using multi-turn potentiometer
Temperature stability	± ≤ 2 x 10 <sup>-7</sup> with respect to +25°C
Aging/year	≤ 0.5 x 10 <sup>-6</sup> after 30 days
<b>Phase-locked loop</b>	
Reference input frequency	10MHz
Reference input power	-3dBm to +16dBm (50 ohms)
Loop bandwidth	≤ 1Hz
Lock indication	LED indicator plus TTL-compatible output (High = locked)
Tune voltage monitor	0 to +10.6V (1k source resistance)
Supply voltage	
Supply voltage	+15V ± 5%
Operating temperature	
Operating temperature	-30°C to +70°C
<b>Power consumption</b>	
Steady state	≤ 8.5W @ 25 °C
Warm up	≤ 12W
Warm up time	< 5 minutes to meet full spec@ 25 °C
RF connectors	SMA jack, female
Dimensions	101.6x87.5x20.3 mm (excluding connectors)

Issue: **Preliminary**  
Date: 25-May-11

**XM7P-E-840.0-10.0-15 sn112826 (840MHz output)**




## 1000 MHz + 142.857143 MHz Signal Source Part Number XM7-E-1000.0-E-12

Parameter	Value
<b>1000MHz output</b>	
Output power	13 dBm $\pm$ 2 dB, 50 ohms
Harmonics	$\leq$ -30 dBc
Sub-harmonics	$\leq$ -80 dBc
Phase noise (guaranteed)	
10Hz offset	$\leq$ -75 dBc/Hz
100Hz offset	$\leq$ -110 dBc/Hz
1kHz offset	$\leq$ -140 dBc/Hz
10kHz offset	$\leq$ -159 dBc/Hz
$\geq$ 100kHz offset	$\leq$ -162 dBc/Hz
<b>142.857143MHz output</b>	
Output power	13 dBm $\pm$ 2 dB, 50 ohms
Harmonics	$\leq$ -25 dBc
Phase noise (guaranteed)	
10Hz offset	$\leq$ -92 dBc/Hz
100Hz offset	$\leq$ -127 dBc/Hz
1kHz offset	$\leq$ -157 dBc/Hz
10kHz offset	$\leq$ -176 dBc/Hz
$\geq$ 100kHz offset	$\leq$ -178 dBc/Hz
<b>Tuning</b>	
Tuning range	$\pm \geq 6 \times 10^{-6}$
Tuning mechanism	Electrical; positive slope
Tuning voltage	0 to +10 V
Reference voltage output	+10.5V nominal (source impedance 10k $\Omega$ in parallel with 22 $\mu$ F)
Temperature stability	
Temperature stability	$\pm \leq 5 \times 10^{-7}$ , -20 to +60°C (with respect to +25°C)
Aging/year	$\leq 0.5 \times 10^{-6}$ after 30 days continuous operation
Functional temperature range	-40°C to +70°C (mounting base temperature)
<b>Power</b>	
Supply voltage	+12V $\pm$ 5%
Steady-state power consumption	$\leq$ 8W @ 25 °C
Warm-up power consumption	$\leq$ 12W
Warm up time	< 5 minutes to meet full spec at 25 °C
RF connectors	SMA jack, female
Dimensions	101.6x57.2x20.3 mm (excluding connectors)

Issue: **Preliminary**

Date: 29-November-11

Engineering approval:  Garry Thorp

Sales approval:  Aftab Khan