

# SYSTEM TIMING & CONTROL

## Design Guide

8th Edition

February 2009

## Spread-spectrum clock modulators reduce peak EMI in LCD panels

### Pin-selectable dither rate and magnitude reduce radiated emissions by up to 17dB

An integrated phase-locked loop (PLL) modulates the output clock around the center frequency at a pin-selectable magnitude, thus reducing peak EMI at fundamental and harmonic frequencies. This is accomplished without changing clock rise/fall times or adding the space, weight, design time, and costs associated with mechanical shielding.

#### Flexible

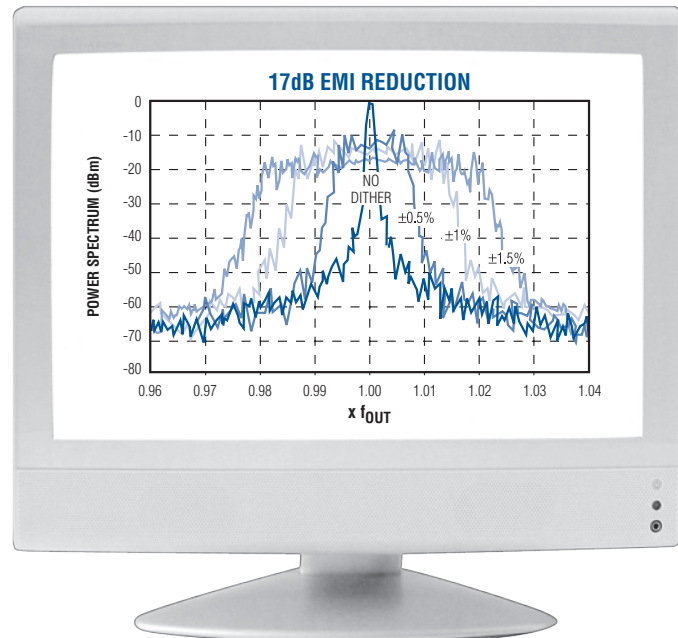
- Wide operating-temperature range
- Wide input-frequency range
- User-selectable dither magnitude and rate

#### Key benefits

- EMI reduction saves shielding costs
- High performance:  $\pm 75$ ps cycle-to-cycle jitter

#### Applications

- LCD televisions and computer monitors
- Automotive infotainment and telematics
- POS terminals
- Printers

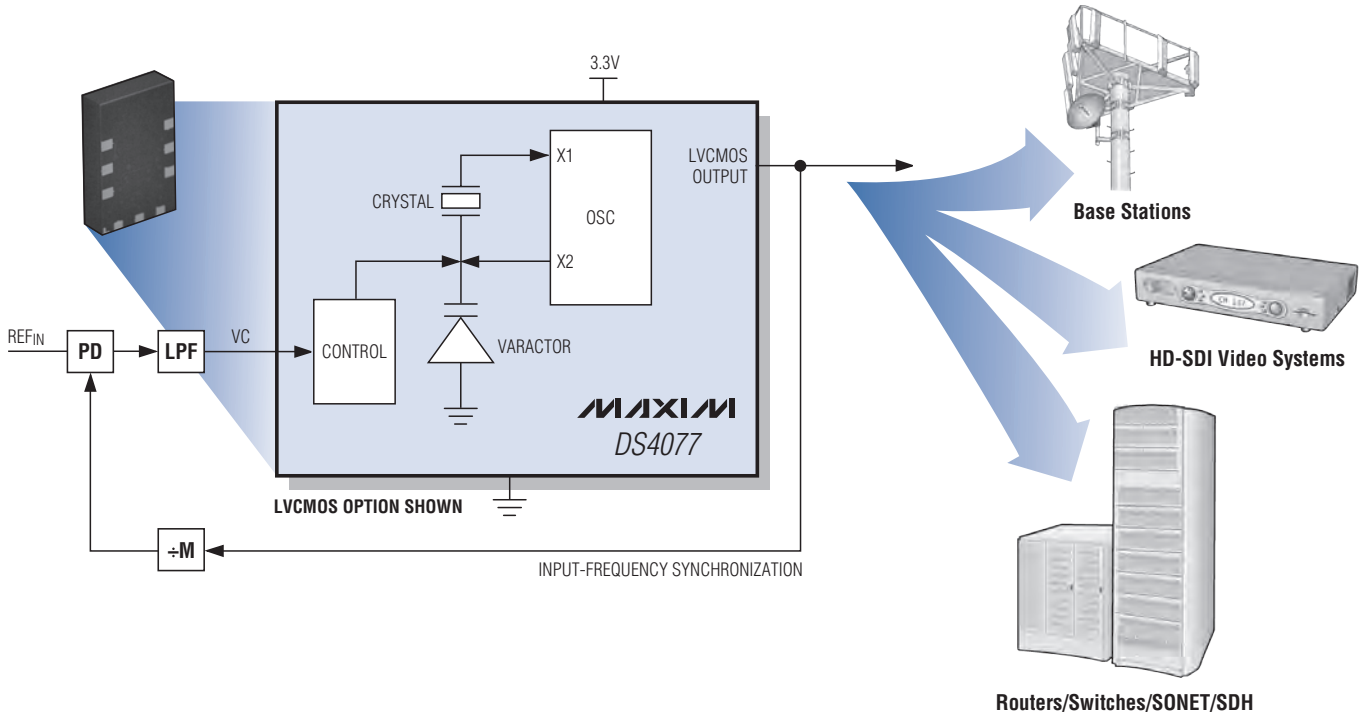


Part	Input	Input Freq Range (MHz)	Multiplier	Dither-Mag Selections (%)	Dither-Freq Selections ( $f_{osc}/x$ )	Temp Range (°C)	Package
DS1080L	Crystal/clock	16.0 to 33.4	1x, 2x, 4x	$\pm 0.5$ , $\pm 1.0$ , $\pm 1.5$	1024	-40 to +125	8- $\mu$ MAX <sup>®</sup>
DS1081L	Clock	16.0 to 134.0	1x	$\pm 0.5$ , $\pm 1.0$ , $\pm 1.5$ , $\pm 2.0$	512, 1024, 2048		8-TSSOP
DS1083L	Clock	16.0 to 134.0	1x	$\pm 0.75$ , $\pm 1.0$ , $\pm 1.25$ , $\pm 1.5$	512, 1024, 2048 (automatic)		6-SOT23

For additional EMI-reduction solutions, visit: [www.maxim-ic.com/Spread-Spectrum](http://www.maxim-ic.com/Spread-Spectrum)

# Low-noise VCXO provides <math>< 0.8\text{ps}\_{\text{RMS}}</math> jitter performance

The DS4077 is an extremely low-phase-noise, voltage-controlled crystal oscillator (VCXO) designed for use in wireless base stations, SONET/SDH systems, wireless radio, and HD-SDI video systems. The DS4077 uses a fundamental crystal (no frequency multiplication) and can operate from 50MHz to 122.88MHz. The device is packaged in a low-profile, 9mm x 14mm, 9-pin LGA and operates over the full industrial temperature range (-40°C to +85°C).



- >  $\pm 100\text{ppm}$  pullability range
- >  $\pm 69\text{ppm}$  absolute pull range (APR)
- <  $0.8\text{ps}_{\text{RMS}}$  low jitter (12kHz to 80MHz)
- < -145dBc phase noise at 10kHz offset
- < -75dBc spurious response
- $\pm 5\%$  linearity
- LVC MOS and LVDS outputs
- <  $\pm 30\text{ppm}$  temperature stability
- 50MHz to 122.88MHz operating frequency range
- 54, 61.44, 74.25, 76.8, 77.76, and 122.88MHz standard frequencies
- Custom frequencies available
- 3.3V,  $\pm 5\%$  power-supply operation

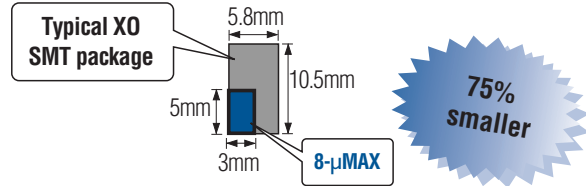
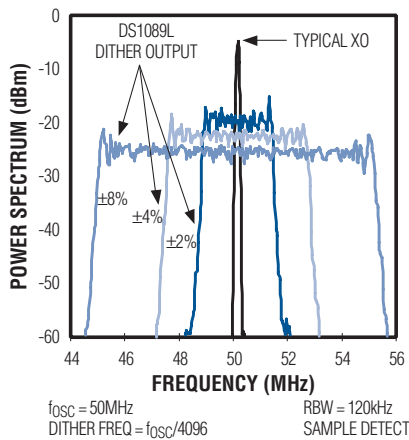
For Maxim's complete line of high-performance precision oscillators, go to: [www.maxim-ic.com/PrecisionOscillators](http://www.maxim-ic.com/PrecisionOscillators)

# Spread-spectrum oscillators reduce peak EMI by over 20dB

## Factory-trimmed frequency and dither settings reduce time to market

Most applications must meet the stringent radiated-emissions compliance standards established by government agencies. Yet, most crystal oscillators (XOs) do not offer inherent EMI reduction, forcing designers to use expensive shielding, filtering, or PCB-layout techniques to meet these EMI-compliance standards. Our spread-spectrum silicon oscillators solve this problem by spreading radiated emissions over a narrow spectrum, thus reducing peak energy at any one frequency. These oscillators are ideal for use as a frequency source for  $\mu$ Ps in applications with RS-232, USB, CAN, or LIN peripherals, including automotive infotainment/GPS, POS terminals, and office equipment.

### > 20dB EMI IMPROVEMENT OVER XOs



- Reduce peak EMI by over 20dB
- 75% smaller than typical SMT XO
- Lower active and standby power than typical XO
- Fast, reliable startup
- Less sensitive to shock/vibration than typical XO

- Wider temperature range than typical XO
- No price premium for higher frequency selections
- Factory trimmed, no programming required
- No external timing components required

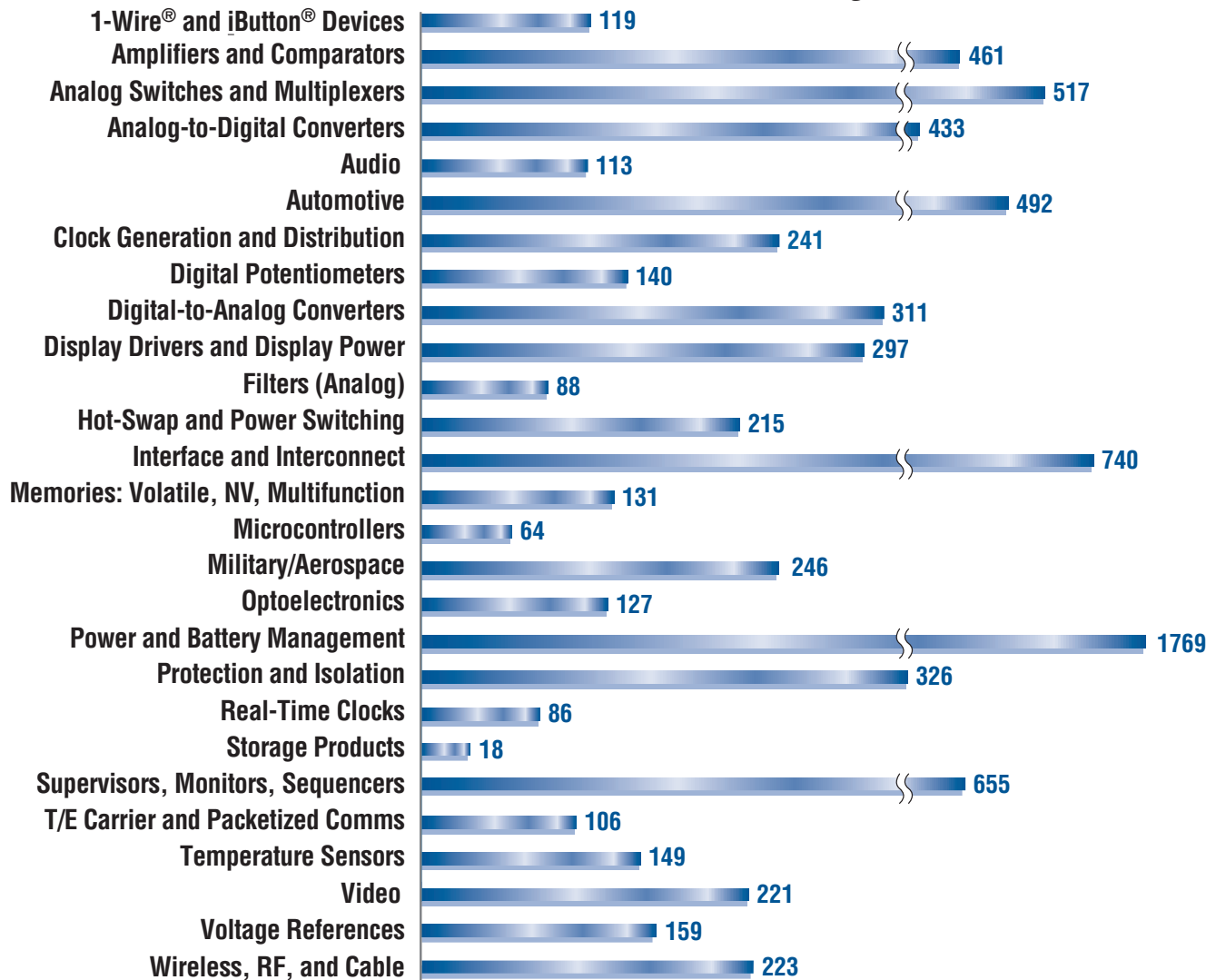
Part	Min Output Freq (kHz)	Max Output Freq (MHz)	Spread Spectrum	Dither-Mag Range (%)	Dither-Freq Range ( $f_{osc}/x$ )	Power Supply (V)	Temp Range (°C)	Package	Price <sup>†</sup> (\$)
DS1086	260	133	Down	0 to -4	4096	5.0, $\pm 5\%$	0 to +70	8-SO	0.90
DS1086L	130	66.6	Down	0 to -8	2048 to 8192	2.7 to 3.6	-40 to +85	8- $\mu$ MAX	0.90
DS1087L	130	66.6	Down	0 to -4	4096	2.7 to 3.6			0.85
DS1089L	130	66.6	Centered	0 to $\pm 8$	2048 to 8192	2.7 to 3.6			0.85
DS1090	125	8	Centered	0 to $\pm 4$	512 to 4096	2.7 to 5.5			0.68
DS1091L	130	66.6	Centered, down	0 to $\pm 4$ , 0 to -8	16 to 8192	3.0 to 3.6			-40 to +125
DS1094L	31.25	2	Down	0 to -8	128 to 1024	3.0 to 3.6	-40 to +85		1.93

<sup>†</sup>1000-up recommended resale. Prices provided are for design guidance and are FOB USA. International prices will differ due to local duties, taxes, and exchange rates. Not all packages are offered in 1k increments, and some may require minimum order quantities.

# Yes, we make that...

Maxim has one of the broadest and deepest analog and mixed-signal portfolios, with over 5900 ICs in 28 categories. We average more than one product introduction per day! For 25 years, we have delivered innovative engineering solutions that add value to our customers' products.

## 5900 ICs in 28 Product Categories



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Maxim Integrated Products, Inc.

120 San Gabriel Drive

Sunnyvale, CA 94086