PLLatinum™ Family of PLL and PLL + VCO Products

Selection Guide

2006

National Semiconductor

The Sight & Sound of Information

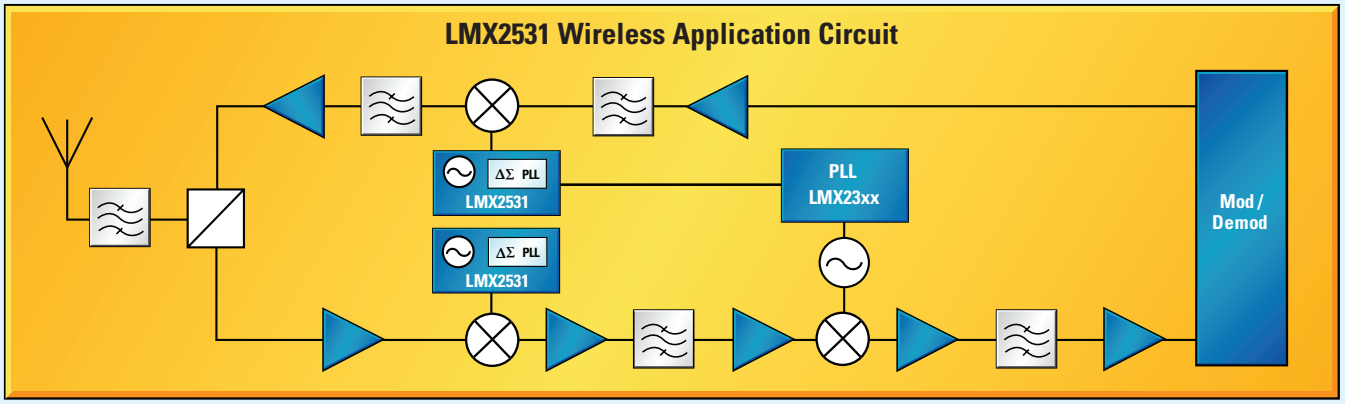
Featured Products

LMX2531 – Industry's Lowest Phase Noise Single-Chip PLL + VCO

High performance and wide frequency range (765 MHz to 2790 MHz) for various applications requiring a low-noise local oscillator

Typical Applications

- 3G basestations
- Data converter clocking
- Wireless LAN
- Broadband wireless access
- CATV equipment
- RFID
- Bar code scanners
- Automotive applications

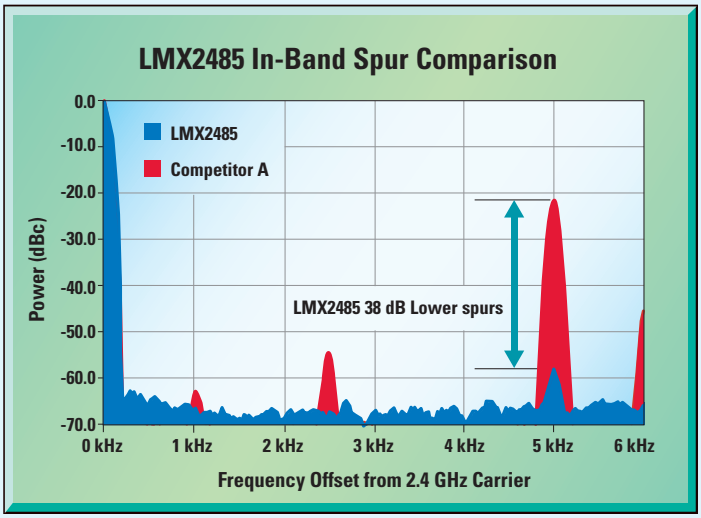


LMX2485/86/87 – Latest RF Synthesizers Lead Industry with Lowest Power Consumption and Best System Performance

Frequency coverage of 50 MHz to 6.0 GHz with low power, high-performance delta-sigma fractional-N PLL including auxiliary integer-N PLL.

Typical Applications

- Wireless basestations
- Applications that modulate data onto a signal such as WLAN, WiMAX, and OFDM
- Test and measurement equipment
- Satellite links
- Automotive applications



PLLatinum™ Family of PLL Products

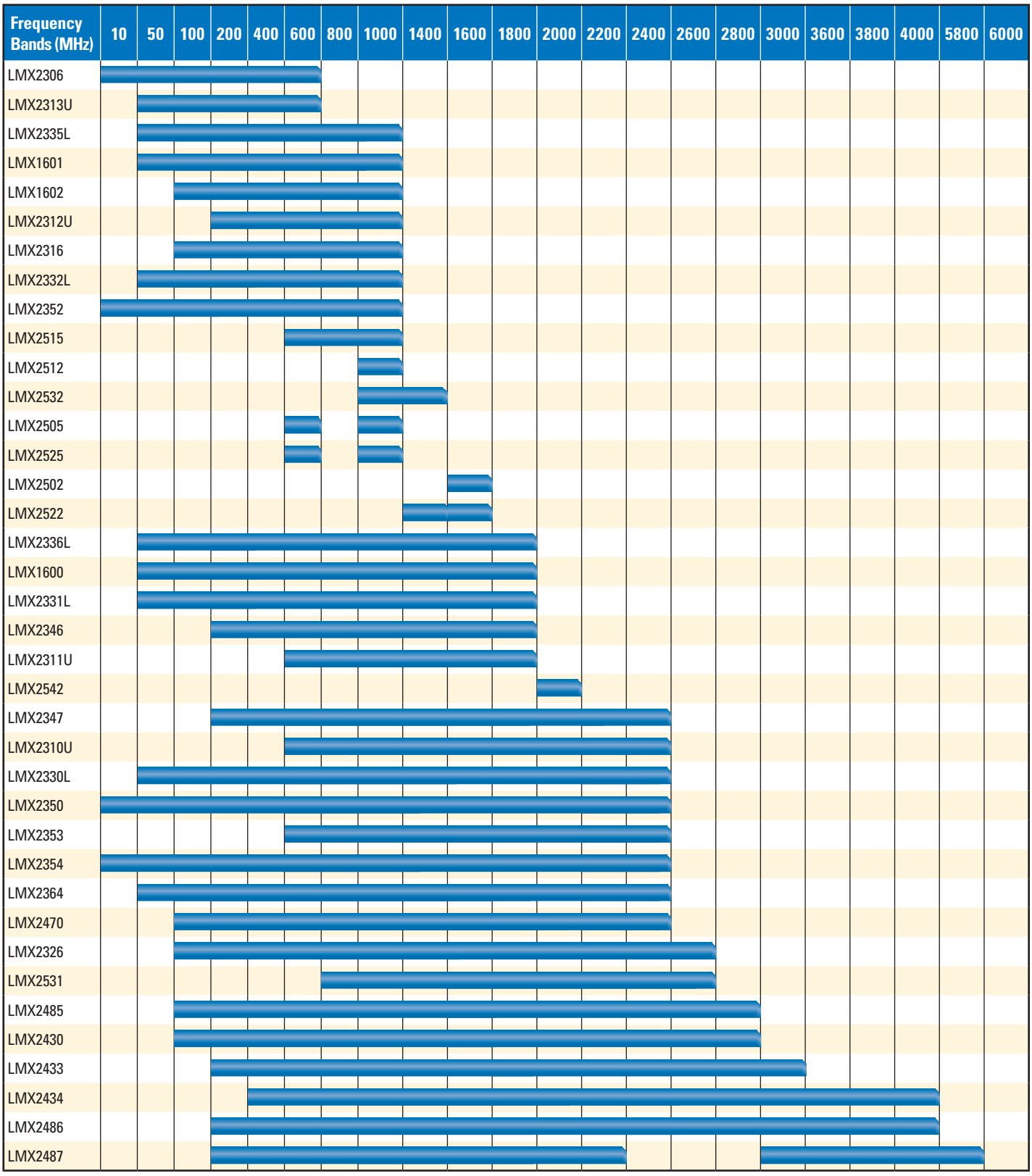
Product ID	Main Operating Frequency Range (GHz)	Aux. Operating Frequency Range (MHz)	Main Normalized Phase Noise (dBc/Hz)	Supply Current (mA)	Supply Voltage Range (V)	Package Size (mm)
Single Integer PLLs						
LMX2326	0.1 to 2.8	—	-210	4.7	2.3 to 5.5	3.5 x 3.5 x 1.0
LMX2310U	0.5 to 2.5	—	-212	2.3	2.7 to 5.5	3.5 x 3.5 x 0.8
LMX2347	0.2 to 2.5	—	-217	3.6	2.7 to 5.5	3.5 x 3.5 x 0.6
LMX2311U	0.5 to 2.0	—	-212	2.0	2.7 to 5.5	3.5 x 3.5 x 0.8
LMX2346	0.2 to 2.0	—	-217	3.0	2.7 to 5.5	3.5 x 3.5 x 1.0
LMX2312U	0.2 to 1.2	—	-212	1.4	2.7 to 5.5	3.5 x 3.5 x 0.8
LMX2316	0.1 to 1.2	—	-210	2.5	2.3 to 5.5	3.5 x 3.5 x 1.0
LMX2313U	45 to 600 MHz	—	-212	1.0	2.7 to 5.5	3.5 x 3.5 x 0.8
LMX2306	25 to 550 MHz	—	-210	1.7	2.3 to 5.5	3.5 x 3.5 x 1.0
Dual Integer PLLs						
LMX2434	1.0 to 5.0	500 to 2500	-219	7.0	2.35 to 2.75	3.5 x 3.5 x 0.6
LMX2433	0.5 to 3.6	250 to 1700	-219	5.2	2.25 to 2.75	3.5 x 3.5 x 0.6
LMX2430	0.25 to 3.0	100 to 800	-219	4.2	2.25 to 2.75	3.5 x 3.5 x 0.6
LMX2330L	0.5 to 2.5	45 to 510	-211	5	2.7 to 5.5	3.5 x 3.5 x 0.8
LMX2336L	0.2 to 2.0	50 to 1100	-211	5.5	2.7 to 5.5	4.5 x 3.5 x 1.0
LMX2331L	0.2 to 2.0	45 to 510	-211	4	2.7 or 5.5	3.5 x 3.5 x 0.8
LMX1600	0.2 to 2.0	40 to 500	-197	5	2.7 to 3.6	3.5 x 3.5 x 1.0
LMX2332L	0.1 to 1.2	45 to 510	-211	3	2.7 to 5.5	3.5 x 3.5 x 0.8
LMX1601	0.1 to 1.1	40 to 500	-197	4	2.7 to 3.6	3.5 x 3.5 x 1.0
LMX1602	0.1 to 1.1	100 to 1100	-197	5	2.7 to 3.6	3.5 x 3.5 x 1.0
LMX2335L	0.1 to 1.1	50 to 1100	-211	4	2.7 to 5.5	3.5 x 3.5 x 1.0
Fractional PLLs						
New LMX2487	3.0 to 6.0	250 to 2300	-209	8.2	2.5 to 3.6	4.0 x 4.0 x 0.75
New LMX2486	1.0 to 4.5	250 to 3000	-210	8.3	2.5 to 3.6	4.0 x 4.0 x 0.75
New LMX2485	0.5 to 3.0	75 to 800	-209	5	2.5 to 3.6	4.0 x 4.0 x 0.75
New LMX2485E	0.05 to 3.0	75 to 800	-209	5	2.5 to 3.6	4.0 x 4.0 x 0.75
LMX2364	0.5 to 2.6	50 to 850	-210	7	2.7 to 5.5	4.5 x 3.5 x 0.6
LMX2470	0.5 to 2.6	75 to 800	-210	4.1	2.25 to 2.75	4.5 x 3.5 x 0.6
LMX2353	0.5 to 2.5	—	-201	5.5	2.7 to 5.5	3.5 x 3.5 x 1.0
LMX2350	0.5 to 2.5	10 to 550	-201	6.5	2.7 to 5.5	4.5 x 3.5 x 1.0
LMX2354	0.5 to 2.5	10 to 550	-204	6	2.7 to 5.5	4.5 x 3.5 x 1.0
LMX2352	0.25 to 1.2	10 to 550	-201	4.75	2.7 to 5.5	4.5 x 3.5 x 1.0

PLLatinum™ Family of PLL Products

High-Performance PLL + VCO Products

Product IDs	Frequency Range (MHz)	Alternate Frequency Range (MHz)	Phase Noise at Offset Frequency	Supply Current (mA)	Supply Voltage Range (V)	Package Size (mm)
New LMX2531-2570E	2336 to 2790 —	— 1168 to 1395	-149 dBc/Hz at 5 MHz -152 dBc/Hz at 5 MHz	38 41	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-2265E	2178 to 2400 —	— 1089 to 1200	-150 dBc/Hz at 5 MHz -154 dBc/Hz at 5 MHz	38 41	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-2080E	1904 to 2274 —	— 952 to 1137	-150 dBc/Hz at 5 MHz -154 dBc/Hz at 5 MHz	34 37	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-1910E	1834 to 2028 —	— 917 to 1014	-151 dBc/Hz at 5 MHz -155 dBc/Hz at 5 MHz	34 37	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-1742	1760 to 1866 —	— 880 to 933	-152 dBc/Hz at 5 MHz -152 dBc/Hz at 5 MHz	34 37	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-1778E	1726 to 1840 —	— 863 to 920	-152 dBc/Hz at 5 MHz -154 dBc/Hz at 5 MHz	34 37	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-1700E	1662 to 1770 —	— 831 to 885	-153 dBc/Hz at 5 MHz -154 dBc/Hz at 5 MHz	34 37	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-1650E	1590 to 1700 —	— 795 to 850	-154 dBc/Hz at 5 MHz -155 dBc/Hz at 5 MHz	34 37	2.8 to 3.2	6 x 6 x 0.75
New LMX2531-1570E	1530 to 1636 —	— 765 to 818	-154 dBc/Hz at 5 MHz -155 dBc/Hz at 5 MHz	34 37	2.8 to 3.2	6 x 6 x 0.75
LMX2542-2121	2087 to 2155	—	-134 dBc/Hz at 900 kHz	22	2.7 to 3.3	5 x 5 x 0.75
LMX2522-1635	1619 to 1650	1355	-138 dBc/Hz at 1.25 MHz	17	2.7 to 3.3	5 x 5 x 0.75
LMX2502-1635	1619 to 1650	—	-138 dBc/Hz at 1.25 MHz	17	2.7 to 3.3	5 x 5 x 0.75
LMX2525-1321	1270 to 1395	633 to 768	-137 dBc/Hz at 1 MHz	14	2.5 to 3.3	4 x 5 x 0.75
LMX2505-1321	1270 to 1395	633 to 768	-137 dBc/Hz at 1 MHz	14	2.5 to 3.3	5 x 5 x 0.75
LMX2515-1321	1270 to 1395	—	-137 dBc/Hz at 1 MHz	14	2.5 to 3.3	5 x 5 x 0.75
LMX2532-1065	1052 to 1078	1392	-139 dBc/Hz at 900 kHz	17	2.7 to 3.3	5 x 5 x 0.75
LMX2512-1065	1052 to 1078	—	-139 dBc/Hz at 900 kHz	17	2.7 to 3.3	5 x 5 x 0.75
LMX2532-0967	954 to 980	1490	-139 dBc/Hz at 900 kHz	17	2.7 to 3.3	5 x 5 x 0.75
LMX2512-0967	954 to 980	—	-139 dBc/Hz at 900 kHz	17	2.7 to 3.3	5 x 5 x 0.75
LMX2515-0701	633 to 768	—	-137 dBc/Hz at 1 MHz	10	2.5 to 3.3	5 x 5 x 0.75

Frequency Band Solution Finder



Wireless Evaluation Boards

Product ID	Order ID	Description
—	LMX-UTILITY-BD	Blank utility board designed complement evaluation boards
LMX1600/01/02	LMX1600/01/02EVAL	2.0 GHz Dual RF/IF, 1.1 GHz dual RF/IF, 1.1 GHz dual RF/RF integer PLLs
LMX2306	LMX2306EVAL	550 MHz single integer PLL
LMX2310U	LMX2310UEVAL	2.5 GHz Ultra-low power, single integer PLL
LMX2311U	LMX2311UEVAL	2.0 GHz Ultra-low power, single integer PLL
LMX2312U	LMX2312UEVAL	1.2 GHz Ultra-low powe, single integer PLL
LMX2313U	LMX2313UEVAL	600 MHz Ultra-low power, single integer PLL
LMX2316	LMX2316EVAL	1.2 GHz Single integer PLL
LMX2326	LMX2326EVAL	2.8 GHz Single integer PLL
LMX2330L	LMX2330LEVAL	2.5 GHz Low-power, dual RF/IF integer PLL
LMX2331L	LMX2331LEVAL	2.0 GHz Low-power, dual RF/IF integer PLL
LMX2332L	LMX2332LEVAL	1.2 GHz Low-power, dual RF/IF integer PLL
LMX2335L	LMX2335LEVAL	1.1 GHz Low-power, dual RF integer PLL
LMX2336L	LMX2336LEVAL	2.0 GHz Low-power, dual RF integer PLL
LMX2346	LMX2346EVAL	2.0 GHz Low phase noise, single integer PLL
LMX2347	LMX2347EVAL	2.5 GHz Low phase noise, single integer PLL
LMX2354	LMX2354EVAL	2.5 GHz Dual RF/IF Frac-N PLL
LMX2364	LMX2364EVAL	2.6 GHz High-performance, dual RF/IF Frac-N PLL
LMX2430	LMX2430EVAL	3.0 GHz Ultra low phase noise, dual RF/IF integer PLL
LMX2433	LMX2433EVAL	3.6 GHz Ultra low phase noise, dual RF integer PLL
LMX2434	LMX2434EVAL	5.0 GHz Ultra low phase noise, dual RF integer PLL
LMX2470	LMX2470EVAL	2.6 GHz Dual RF/IF Delta-Sigma PLL
LMX2485	LMX2485EVAL	3.0 GHz High-performance, dual RF/IF Delta-Sigma PLL
LMX2485E	LMX2485E EVAL	50 to 3000 MHz High-performance, dual RF/IF Delta-Sigma PLL
LMX2486	LMX2486EVAL	4.5 GHz High-performance, dual RF Delta-Sigma PLL
LMX2487	LMX2487EVAL	6.0 GHz High-peformance, dual RF Delta-Sigma PLL
LMX2502-1635	LMX25021635EVAL	Frequency synthesizer system with integrated RF/IF PLLs, and RF VCO
LMX2505-1321	LMX25051321EVAL	Frequency synthesizer system with dual integrated VCOs
LMX2512-0967	LMX25120967EVAL	Frequency synthesizer system with integrated RF/IF PLLs and RF VCO
LMX2512-1065	LMX25121065EVAL	Frequency synthesizer system with integrated RF/IF PLLs and RF VCO
LMX2522-1635	LMX25221635EVAL	Frequency synthesizer system with integrated RF/IF PLLs, RF, and GPS VCOs
LMX2525-1321	LMX25251321EVAL	Frequency synthesizer system with dual integrated VCOs
LMX2531-1570	LMX25311570EVAL	Frequency synthesizer system with integrated VCO
LMX2531-1650	LMX25311650EVAL	Frequency synthesizer system with integrated VCO
LMX2531-1700	LMX25311700EVAL	Frequency synthesizer system with integrated VCO
LMX2531-1742	LMX25311742EVAL	Frequency synthesizer system with integrated VCO
LMX2531-1778	LMX25311778EVAL	Frequency synthesizer system with integrated VCO
LMX2531-1919	LMX25311910EVAL	Frequency synthesizer system with integrated VCO
LMX2531-2080	LMX25312080EVAL	Frequency synthesizer system with integrated VCO
LMX2531-2265	LMX25312265EVAL	Frequency synthesizer system with integrated VCO
LMX2531-2570	LMX25312570EVAL	Frequency synthesizer system with integrated VCO
LMX2532-0967	LMX25320967EVAL	Frequency synthesizer system with integrated RF/IF PLLs, RF, and GPS VCOs
LMX2532-1065	LMX25321065EVAL	Frequency synthesizer system with integrated RF/IF PLLs, RF, and GPS VCOs
LMX2542-2121	LMX25422121EVAL	Cellular and GPS frequency synthesizer system with integrated VCO

Design Tools

WEBENCH® Online Design and Prototyping Environment

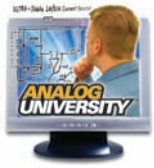
Let WEBENCH dramatically accelerate your design process – it's online, always up-to-date, and (best of all) it's free. In just four simple steps, go from component selection to a completed, customized prototype in just 24 hours.

- **Choose** a part
- **Create** a design
- **Analyze** it using electrical and thermal simulation
- **Build** it with your custom kit that is delivered 24 hours later

Use EasyPLL in WEBENCH to specify PLL parameters, customize the loop filter, analyze the simulation results, and examine the wave forms. You can change parameters and analyze the results in order to fine tune the design. Experience it today and see why WEBENCH is used by designers worldwide to create over 18,000 designs each and every month.

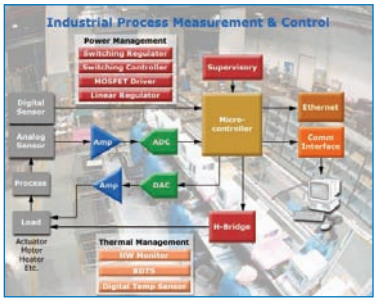
webench.national.com

Analog University®



Expand your knowledge and understanding of analog with our free online educational training tool.

analogU.national.com



Online Seminars

FREE online seminars by industry experts. Log onto National's analog online seminars today.

www.national.com/onlineseminars

Application Solutions

Access over 100 dynamic diagrams for medical systems, consumer electronics, communications, and many more applications.

solutions.national.com

News@National.com

Register to receive updates on the products and technical topics that interest you—spam-free!

www.national.com/newsletter

National's Analog Edge

National's monthly analog design technical journal.

edge.national.com

Packaging Solutions

For More Information

National Semiconductor provides a comprehensive set of support services. Product information, including sales literature and technical assistance, is available through National's Customer Support Centers.

For samples, evaluation boards, datasheets, and online design tools, visit: **wireless.national.com**

Americas
Email: new.feedback@nsc.com
Phone: 1-800-272-9959

Europe
Fax: +49 (0) 180-530 85 86
Email: europe.support@nsc.com
Phone: Deutsch +49 (0) 69 9508 6208
English +44 (0) 870 24 0 2171
Français +33 (0) 1 41 91 87 90

Asia Pacific
Email: ap.support@nsc.com

Japan
Fax: 81-3-5639-7507
Email: jpn.feedback@nsc.com
Phone: 81-3-5639-7560

National Semiconductor
2900 Semiconductor Drive
PO Box 58090
Santa Clara, CA 95052
1 800 272 9959

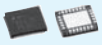
Visit our website at:
www.national.com

For more information, send email to:
new.feedback@nsc.com

Packaging

AVAILABLE LEAD-FREE

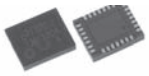
Many design qualities are required for effective portable devices, and one of the most important is packaging. National's leadership in small form factor packaging covers Die and Wafer Scale packaging to the technologically advanced LLP packaging. For more information, visit **www.national.com/packaging**



Leadless Leadframe Package (LLP®)
As small as - 4.0 mm x 4.0 mm x 0.75 mm

National's LLP® provides excellent power dissipation capability in a very small package footprint. Unlike conventional leaded plastic packages, the LLP contains pads on the bottom of the package for PCB mounting.

Thin Shrink Small Outline Package (TSSOP)
As small as - 6.4 mm x 5.0 mm x 1.1 mm



Chip Scale Packaging (CSP, TCSP, UTCSP)
As small as - 3.5 mm x 3.5 mm x 0.6 mm

National Semiconductor
The Sight & Sound of Information

550240-014