National Semiconductor

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LMX5453
Micro-Module Integrated Bluetooth®2.0 Baseband Controller and Radio

1.0 General Description

The LMX5453 is a highly integrated Bluetooth 2.0 compliant solution. The integrated baseband controller and 2.4 GHz radio combine to form a complete, small form-factor (6.1 mm x 9.1 mm x 1.2 mm) Bluetooth node.

The on-chip memory, ROM, and Patch RAM provide lowest cost and minimize design risk with the flexibility of firmware upgrades.

The firmware supplied in the on-chip ROM supports a complete Bluetooth Link Manager and HCI with communication through a UART or USB interface. This firmware features point-to-point and point-to-multipoint link management, supporting data rates up to 723 kbps.

The radio employs an integrated antenna filter and switch to minimize the number of external components.

The radio has a heterodyne receiver architecture with a low intermediate frequency (IF), which enables the IF filters to be integrated on-chip. The transmitter uses direct IQ-modulation with Gaussian-filtered bit-stream data, a voltage-controlled oscillator (VCO) buffer, and a power amplifier.

The LMX5453 module is lead free and RoHS (Restriction of Hazardous Substances) compliant. For more information on those quality standards, please visit our green compliance website at http://www.national.com/quality/green/

2.0 New Features

The LMX5453 is a drop in replacement for the LMX5452. The LMX5453 has new features added:

- eSCO
- eSCO over USB HCI transport
- Enhanced scatternet
- Interlaced scan
- Flushing
- Audio PCM slave mode support
- Generic PCM configuration

3.0 Applications

- Mobile Handsets
- USB Dongles
- Stereo Headsets
- Personal Digital Assistants
- Personal Computers
- Automotive Telematics

4.0 Features

- Compliant with the Bluetooth 2.0 Core Specification
- Better than -80 dBm input sensitivity
- Class 2 operation
- Low power consumption
- Accepts external clock or crystal input:
  - — Clocking option 12/13 MHz with PLL bypass mode for power reduction
  - — 10-20 MHz external clock or crystal network
  - — Secondary 32.768 kHz oscillator for low-power modes
  - — Advanced power management features
- High integration:
  - — Implemented in 0.18 µm CMOS technology
  - — RF includes on-chip antenna filter and switch
- On-chip firmware with complete HCI
- Embedded ROM (200K) and Patch RAM (16.6K) memory
- Up to 7 Asynchronous Connection Less (ACL) links
- Support for two simultaneous voice or Extended Synchronous Connection Oriented (eSCO) and Synchronous Connection Oriented (SCO) and links
- Enhanced scatternet
- Interlaced scan
- Flushing
- Audio PCM slave mode support
- Generic PCM configuration
- Fractional-N Sigma/Delta modulator
- Operating voltage range 2.5–3.6V

4.0 Features (Continued)

- I/O voltage range 1.6–3.6V
- 60-pad micro-module BGA package (6.1 mm x 9.1 mm x 1.2 mm)

5.0 Interfaces

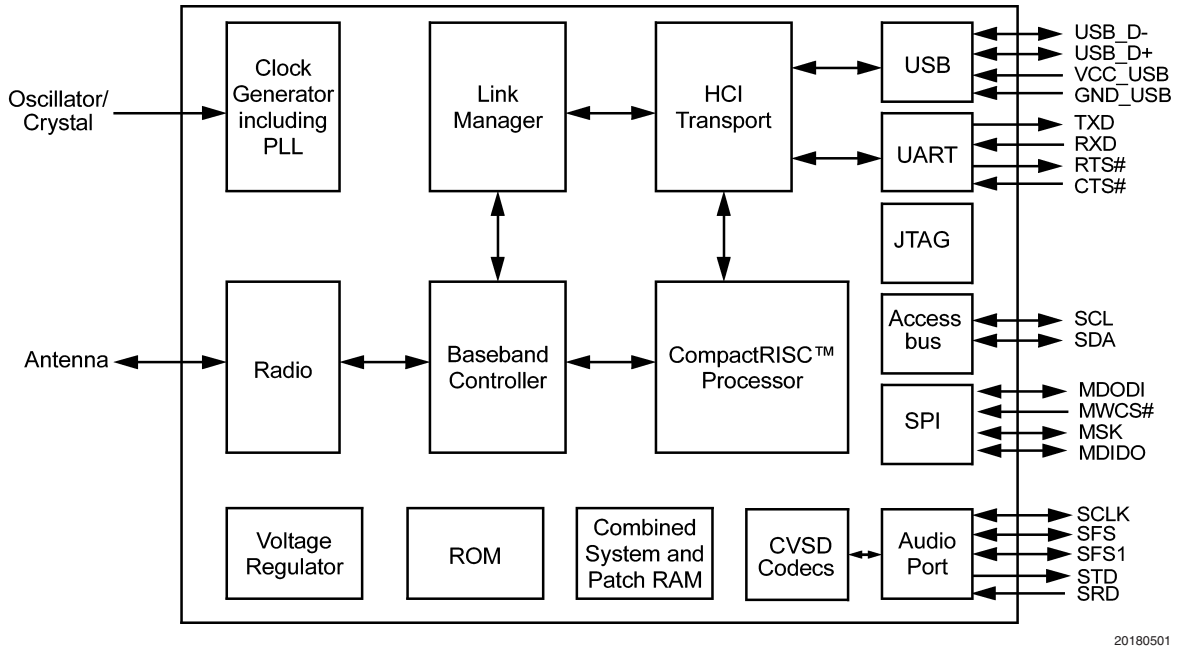
- Full-duplex UART supporting transfer rates up to 921.6 kbps including baud rate detection for HCI
- Full speed (12 Mbps) USB 2.0 for HCI
- ACCESS.bus and SPI/Microwire for interfacing with external non-volatile memory
- Advanced Audio Interface (AAI) for interfacing with external 8-kHz PCM codec
- Up to 3 GPIO port pins (OP4/PG4, PG6, PG7) controllable by HCI commands
- JTAG based serial on-chip debug interface
- Single Rx/Tx-pad radio interface

6.0 Ordering Information

Order Number	Spec.	Shipment Method
LMX5453SM	NOPB (Note 1)	320 pcs Tray
LMX5453SMX	NOPB (Note 1)	2500 pcs Tape & Reel

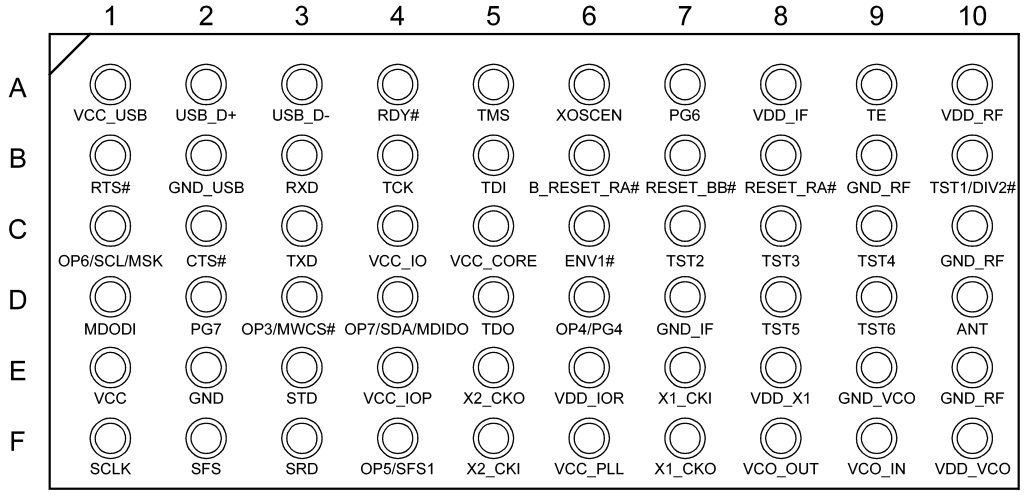
Note 1: NOPB = No Pb (No Lead)

7.0 Functional Block Diagram



8.0 Connection Diagram

FBGA, Plastic, Laminate, 9x6x1.2mm, 60 Ball, 0.8mm Pitch Package (SLF60A)



X-ray - Top View

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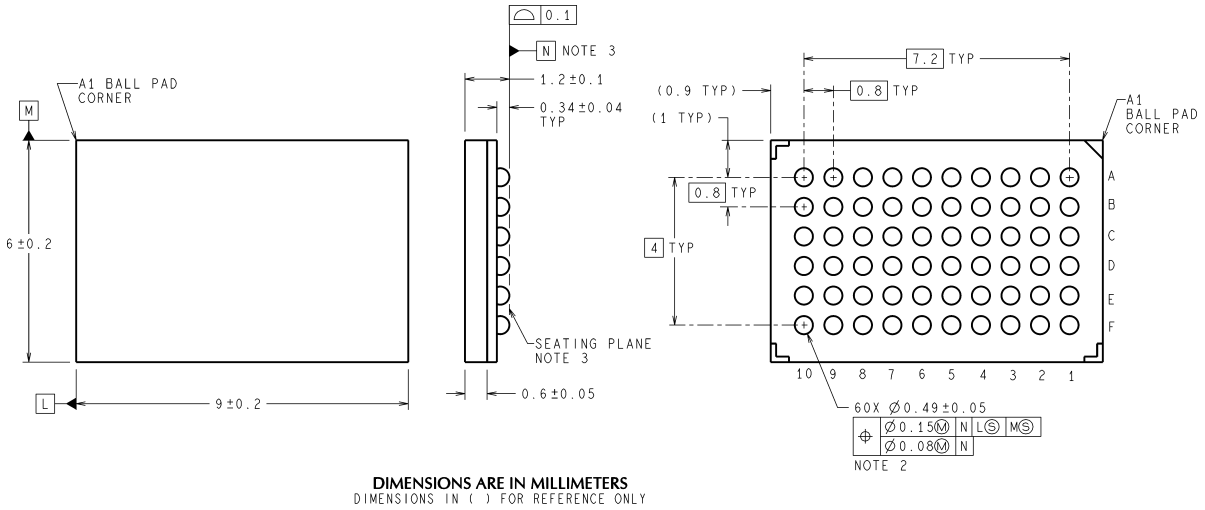
9.0 Physical Dimensions inches (millimeters) unless otherwise noted



DIMENSIONS ARE IN MILLIMETERS
DIMENSIONS IN ( ) FOR REFERENCE ONLY

SLF60A (Rev A)

FBGA, Plastic, Laminate, 9x6x1.2mm, 60 Ball, 0.8mm Pitch Package
NS Package Number SLF60A

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