MGC3130

Single-Zone 3D Tracking and Gesture Controller Product Brief

Introduction:

The MGC3130 is a three-dimensional (3D) gesture recognition, motion tracking and approach detection controller based on Microchip's patented GestIC® technology for embedded usage. It enables user command input with natural hand and finger movements. Utilizing the principles of electrical near-field sensing, the MGC3130 contains all the building blocks to develop robust 3D input sensing systems. Implemented as a low-power mixed-signal configurable controller, it provides a large set of smart functional features with integrated signal driver, a frequency adaptive input path for automatic noise suppression and a digital signal processing unit. The MGC3130 is a true single-chip solution to enable 3D input sensing in a huge variety of products. Microchip's on-chip Colibri Suite removes host processing needs, reduces system power consumption, enables auto wake-up and results in fast time-to-market success. The MGC3130 is a unique single-chip solution that provides gesture information, as well as positional data of the human hand in real time and allows realization of a new generation of 3D user interfaces across various industries.

Applications:

- Notebooks/Keyboards/PC Peripherals
- Audio Products (UI)
- Lighting Control
- Electronic Readers
- Remote Controls
- Game Controllers
- Displays
- Mobile Phones/Tablets

Power Features:

- Variety of Several Power Operation modes include:
  - Processing mode: 20 mA @ 3.3V, typical
  - Programmable Self Wake-up: 110 µA @ 3.3V
  - Deep Sleep: 9 µA @ 3.3V, typical

Key Features:

- Recognition of 3D Hand Gestures and x, y, z Positional Data
- Proximity and Touch Sensing Capabilities
- Built-in Colibri Gesture Suite
- Advanced 3D Signal Processing Unit
- Detection Range: 0 to 15 cm
- Receiver Sensitivity: <1 fF
- Position Rate: 200 positions/sec
- Spatial Resolution: up to 150 dpi
- Carrier Frequency: 44 kHz to 115 kHz, auto-selected
- Channels Supported:
  - Up to five receive (Rx) channels
  - One transmit (Tx) channel
- On-chip Auto Calibration
- Noise Susceptibility Reduction:
  - On-chip analog filtering
  - On-chip digital filtering
  - Automatic frequency hopping
- Enables the use of Low-Cost Electrode Material including:
  - Printed circuit board
  - Conductive paint
  - Conductive foil
  - Laser Direct Structuring (LDS)
  - ITO structures
- Field Upgrade Capability
- Small Outline, 28-lead QFN package, 5x5 mm
- Operating Voltage: 2.5V to 3.465V (single supply)
- Temperature Range: -20°C to +85°C

Peripheral Features:

- 2x I^{2}C™ or SPI Interface for Configuration and Streaming of Positional and Gesture Data
- Multi-zone Support via Master/Slave Architecture

Functional Description:

Microchip Technology's GestIC technology utilizes electrical near-field (E-field) sensing. The chip is connected to electrodes that are sensing the E-field variance. The GestIC device then calculates the users hand motion relatively to the sensing area in x, y, z data points and classifies the movement pattern into gestures in real time.

In addition, by utilizing the principles of E-field sensing, the GestIC system is immune to ambient influences such as light or sound, which have a negative impact to the majority of other 3D technologies. Also, it allows full surface coverage of the electrode area with no detection blind spots of a user's action.

Microchip Technology's MGC3130 configurable controller uses up to five E-field receiving electrodes. Featuring a Signal Processing Unit (SPU), a wide range of 3D gesture applications are being processed on the MGC3130, which allows short development cycles.

Always-on 3D sensing, even for battery-driven mobile devices, is enabled due to the chip's low-power design and the variety of programmable power modes. A Self Wake-up mode triggers interrupts to the application host, reacting to the interaction of a user with the device and supporting the host system in overall power reduction.

Besides the digital Interface (I^2C), the MGC3130 features the Gesture Port. Gesture Port is a configurable input/output interface to the host using up to five Extended I/O pins of the MGC3130. The configuration is done using the Aurea Design tool provided by Microchip.

GestIC sensing electrodes are driven by a low-voltage signal with a frequency in the range of 100 kHz, which allows their electrical conductive structure to be made of any low-cost material. Even the reuse of existing conductive structures, such as a display's ITO coating, is feasible, making the MGC3130 an overall, very cost-effective system solution.

Figure 1 provides an overview of the main building blocks of MGC3130.
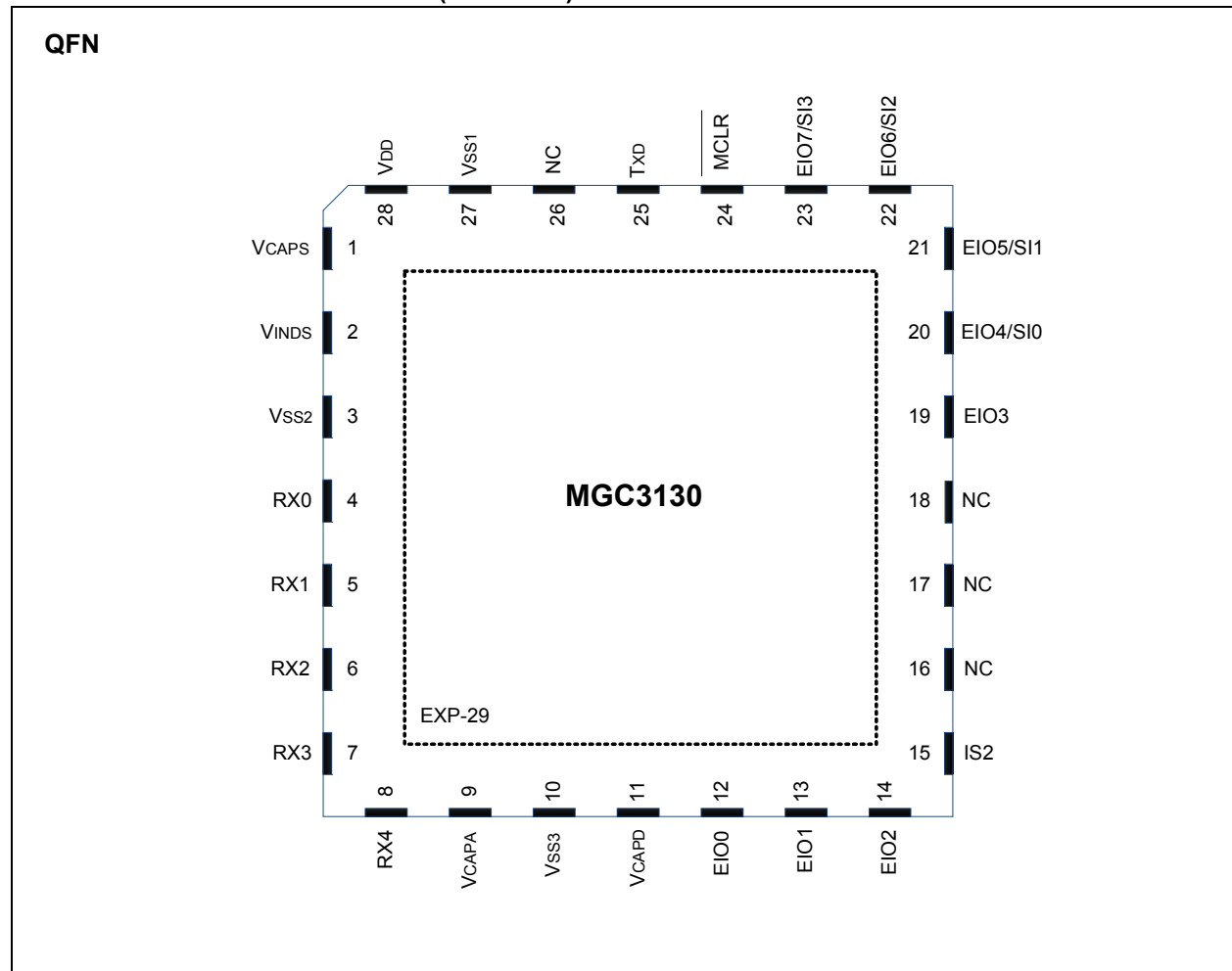
FIGURE 1:   MGC3130 CONTROLLER BLOCK DIAGRAM
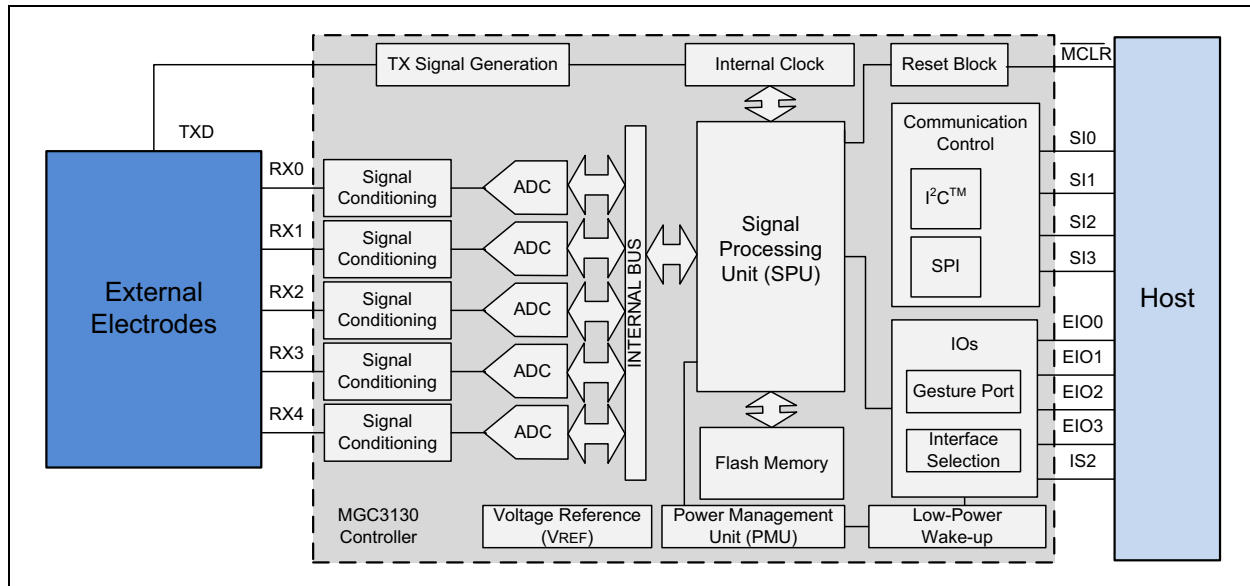
Note: Currently, only single-zone I^2C™ Slave mode is supported. Other modes are planned for future releases of GestIC library. Please contact your Microchip representative for further details.

Advance Information

Package Type

The device is available in 28-lead QFN packaging (see).

FIGURE 2: **28-PIN DIAGRAM (MGC3130)**

TABLE 1: 28-PIN QFN PINOUT DESCRIPTION

Pin Name	Pin Number	Pin Type	Buffer Type	Description
VCAPS	1	P	—	External filter capacitor (10 µF) connection for internal STEP-UP converter (optional).
VINDS	2	P	—	External inductor (4.7 µH) + Schottky diode connection for internal STEP-UP converter usage (optional).
VSS2	3	P	—	Ground reference for the STEP-UP converter.
RX0	4	I	Analog	Analog input channels: Receive electrode connection.
RX1	5	I	Analog	
RX2	6	I	Analog	
RX3	7	I	Analog	
RX4	8	I	Analog	
VCAPA	9	P	—	External filter capacitor (4.7 µF) connection for internal analog voltage regulator (3V).
VSS3	10	P	—	Common ground reference for analog and digital domain.
VCAPD	11	P	—	External filter capacitor (4.7 µF) connection for internal digital voltage regulator (1.8V).
EIO0	12	I/O	ST	Extended IO0 (EIO0)/Transfer Status (TS). TS line requires external 10 kΩ pull-up.
EIO1	13	I/O	ST	Extended IO1 (EIO1)/Interface Selection Pin 1 (IS1).
EIO2	14	I/O	ST	Extended IO2 (EIO2)/IRQ0.
IS2	15	I	ST	Interface Selection Pin 2 (IS2).
NC	16	—	—	Reserved: do not connect.
NC	17	—	—	Reserved: do not connect.
NC	18	—	—	Reserved: do not connect.
EIO3	19	I/O	ST	Extended IO3 (EIO3)/IRQ1/SYNC.
EIO4/SI0	20	I/O	ST	Extended IO4 (EIO4)/Serial Interface 0 (SI0): I^2C™_SDA0/SPI_MISO. When I^2C™ is used, this line requires an external 1.8 kΩ pull-up.
EIO5/SI1	21	I/O	ST	Extended IO5 (EIO5)/Serial Interface 1 (SI1): I^2C™_SCL0/SPI_MOSI. When I^2C™ is used, this line requires an external 1.8 kΩ pull-up.
EIO6/SI2	22	I/O	ST	Extended IO6 (EIO6)/Serial Interface 2 (SI2): I^2C™_SDA1/SPI_CS. When I^2C™ is used, this line requires an external 1.8 kΩ pull-up.
EIO7/SI3	23	I/O	ST	Extended IO7 (EIO7)/Serial Interface 3 (SI3): I^2C™_SCL1/SPI_SCLK. When I^2C™ is used, this line requires an external 1.8 kΩ pull-up.
$\overline{MCLR}$	24	I/P	ST	Master Clear (Reset) input. This pin is an active-low Reset to the device. It requires external 10 kΩ pull-up.
TXD	25	O	Analog	Transmit electrode connection.
NC	26	—	—	Reserved: do not connect.
VSS1	27	P	—	Common ground reference for analog and digital domains.
VDD	28	P	—	Positive supply for peripheral logic and I/O pins. It requires an external filtering capacitor (100 nF).
EXP	29	P	—	Exposed pad. It should be connected to Ground.

Legend: P = Power; ST = Schmitt Trigger input with CMOS levels; O = Output; I = Input; — = N/A

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