
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 I²C™ 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.

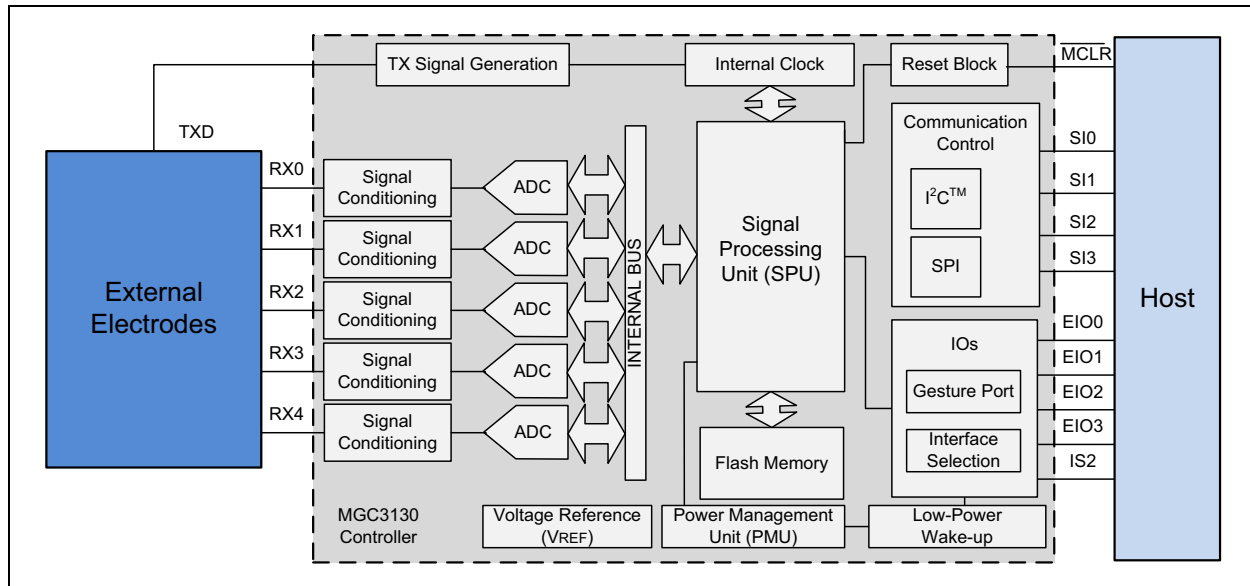
Always-on 3D sensing, even for battery-driven mobile devices, is enabled due to the chip's low-power design and the variety of programmable power modes. A Self Wake-up mode triggers interrupts to the application host, reacting to the interaction of a user with the device and supporting the host system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

Besides the digital Interface (I²C), 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 I²C™ Slave mode is supported. Other modes are planned for future releases of GestIC library. Please contact your Microchip representative for further details.

Package Type

The device is available in 28-lead QFN packaging (see [Figure 2](#)).

FIGURE 2: 28-PIN DIAGRAM (MGC3130)

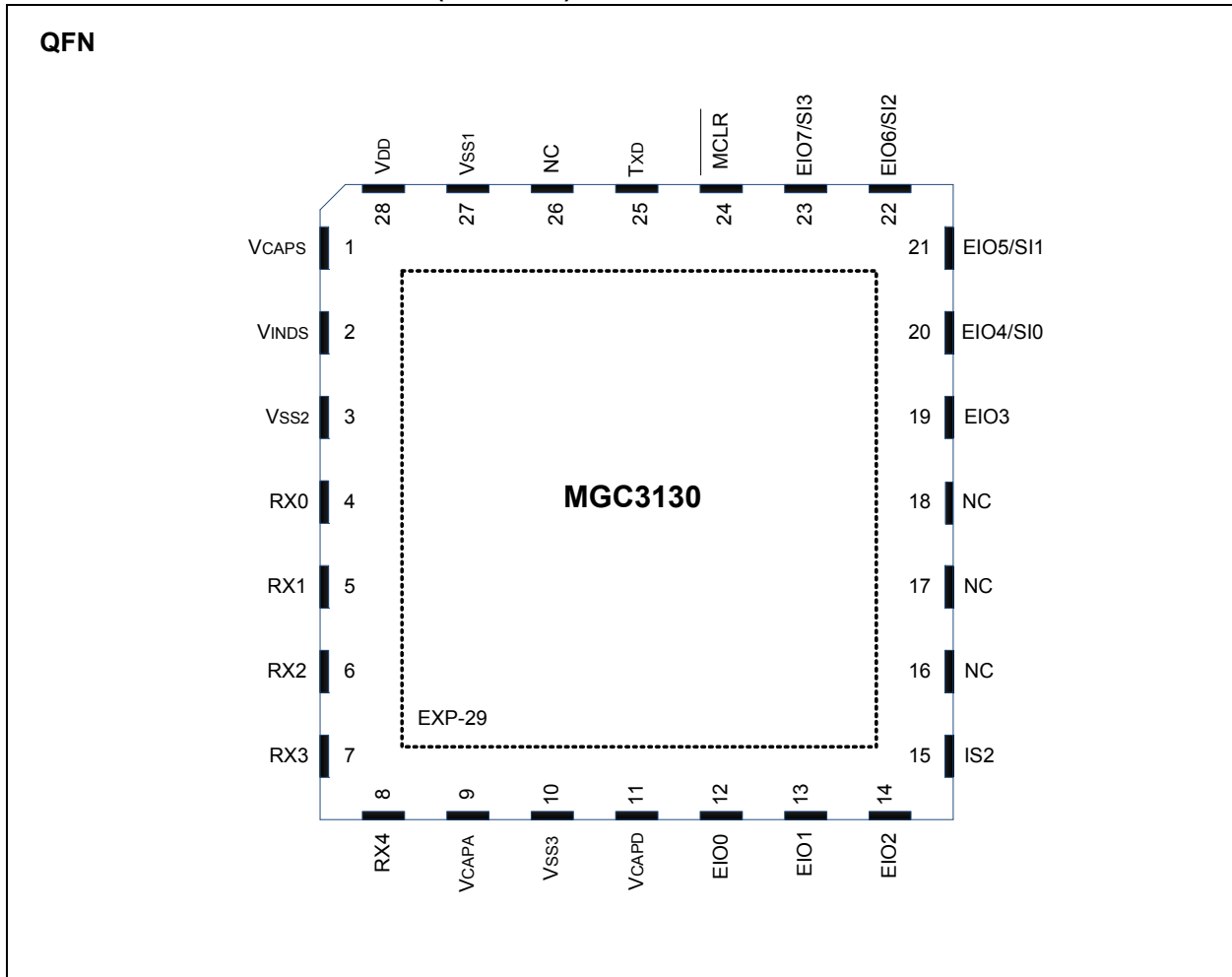


TABLE 1: 28-PIN QFN PINOUT DESCRIPTION

Pin Name	Pin Number	Pin Type	Buffer Type	Description
VCAPS	1	P	—	External filter capacitor (10 μ F) connection for internal STEP-UP converter (optional).
VINDS	2	P	—	External inductor (4.7 μ H) + 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 μ F) 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 μ F) connection for internal digital voltage regulator (1.8V).
EIO0	12	I/O	ST	Extended IO0 (EIO0)/Transfer Status (TS). TS line requires external 10 k Ω 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 ² C™_SDA0/SPI_MISO. When I ² C™ is used, this line requires an external 1.8 k Ω pull-up.
EIO5/SI1	21	I/O	ST	Extended IO5 (EIO5)/Serial Interface 1 (SI1): I ² C™_SCL0/SPI_MOSI. When I ² C™ is used, this line requires an external 1.8 k Ω pull-up.
EIO6/SI2	22	I/O	ST	Extended IO6 (EIO6)/Serial Interface 2 (SI2): I ² C™_SDA1/SPI_CS. When I ² C™ is used, this line requires an external 1.8 k Ω pull-up.
EIO7/SI3	23	I/O	ST	Extended IO7 (EIO7)/Serial Interface 3 (SI3): I ² C™_SCL1/SPI_SCLK. When I ² C™ is used, this line requires an external 1.8 k Ω pull-up.
MCLR	24	I/P	ST	Master Clear (Reset) input. This pin is an active-low Reset to the device. It requires external 10 k Ω 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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