MTCH112

Dual Channel Proximity Touch Controller Product Brief

FEATURES

- Capacitative Proximity Detection System:
  - High Signal to Noise Ratio (SNR)
  - Adjustable sensitivity
  - Noise Rejection Filters
  - Scanning method actively optimized to attenuate strongest noise frequencies
  - Automatic calibration with optional user presets
  - Dynamic threshold management adjusts sensitivity of sensor based on the level of environmental noise
  - Constant press calibration tracks the expected offset when the sensor is pressed and adjusts the threshold to automatically achieve the best press/release behavior
  - User-defined "minimum shift" values specify the lowest amount of signal change to activate a state transition. Automatic thresholds never decrease below these settings.
  - Automatic Environmental Compensation
- No Required External Components
- Low-Power mode: Highly Configurable Low-Power mode
  - 1ms to 4s Sleep interval between sensor samples
- Response Time as Low as 10 mS
- Hardware Error Detection notifies if either sensors is shorted to VDD, VSS, or the other sensor
- Operating Voltage Range: 1.8V to 3.6V
- Operating Temperature: -40°C to +85°C

GENERAL DESCRIPTION

The Microchip mTouch™ MTCH112 Dual Channel Proximity/Touch Controller provides an easy way to add proximity and/or touch sensor detection to any application. The device implements either two capacitive sensors or one sensor and one active guard driver. The optional device configuration through I²C™ allow presets to be loaded in a production environment. Automatic calibration routines are used by default to choose the best options, so user configuration is not required.

The MTCH112 uses a sophisticated optimization algorithm to actively eliminate noise from the signal. While the noise level is being measured, the requirements for a proximity or touch detection are updated to reflect the degree of uncertainty in the readings. When a press is detected for the first time, the threshold is automatically calibrated to choose a smart threshold for the 'release' and next press. This creates a system that dynamically optimizes the signal-to-noise ratio for its environment.

PACKAGE TYPE

The device is available in 8-lead SOIC and DFN.

FIGURE 1: 8-PIN SOIC, DFN DIAGRAM FOR MTCH112

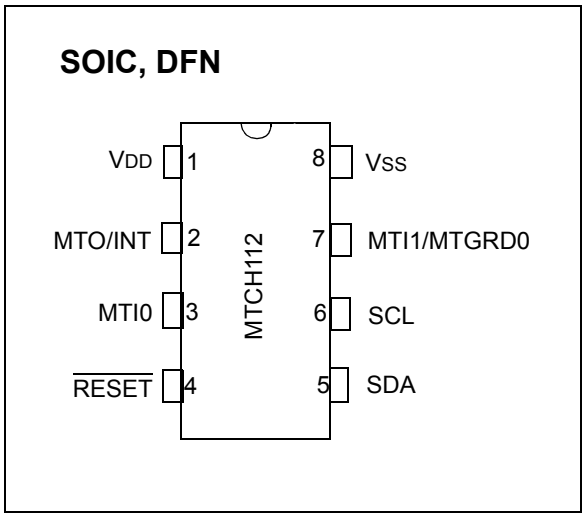

TABLE 1: 8-PIN DESCRIPTION

Name	8-Pin SOIC and DFN	Description
VDD	1	Power Supply Input
MTO/INT	2	Detect Output (Active-Low) Notification Interrupt Pin
MTI0	3	Proximity/Touch Sensor Input
$\overline{\text{RESET}}$	4	Device Reset (Active-Low)
SDA	5	I²C™ Data
SCL	6	I²C™ Clock
MTI1/ MTGRD0	7	Proximity/Touch Sensor Input and Active Guard Shield for MTI0
VSS	8	Ground Reference

TABLE 2: POWER CONSUMPTION

		1.8V	3.0V			3.0V	3.6V
CLKSEL	**SLEEP (S)**	**Typ (µA)**	**Typ (µA)**	**CLKSEL**	**SLEEP (S)**	**Typ (µA)**	**Typ (µA)**
16 MHz	0	640	990	32 MHz	0	1952	2350
	0.001	580	900		0.001	1780	2140
	0.002	540	830		0.002	1630	1970
	0.004	460	710		0.004	1400	1690
	0.008	360	560		0.008	1090	1320
	0.016	250	390		0.016	760	915
	0.032	160	240		0.032	470	570
	0.064	89	140		0.064	270	320
	0.128	48	74		0.128	150	170
	0.256	25	38		0.256	75	91
	0.512	13	20		0.512	39	46
	1	6.8	11		1	20	24
	2	3.6	5.5		2	10	12
	4	1.9	3.0		4	5	6
	8	1.1	1.8		8	3	3
	16	0.7	1.1		16	1.7	2
	32	0.5	0.8		32	1	1
	64	0.4	0.7		64	0.8	0.9
	128	0.3	0.6		128	0.7	0.7
	256	0.3	0.5		256	0.6	0.6

PIN DESCRIPTION

MTI

Connect the sensor to this input. An additional resistor of at least 4.7kΩ is recommended for best noise immunity. Sensors up to 40 pF in capacitance are supported. Sensors work best when the base capacitance is minimized. This will maximize the percentage change in capacitance when a finger is added to the circuit.

MTGRD0

The waveform on MTGRD0 will shield or guard MTI0's sensor from the effect of nearby noise sources or power planes if MTGRD0's trace surrounds MTI0's trace and sensor. The pin will be driven in phase with MTI0 to minimize the voltage differential between the two pins. This does not interfere with measuring capacitive changes on the MTI1 sensor.

MTO

The mTouch™ output pin is always driven to either V_{DD} or V_{SS} by the device. The MTCH112 OUTCON register determines the behavior of the MTO/INT pin. The pin is always active-low, but the states in which this output occurs can be adjusted in the device's OUTCON register. If no options are selected for output states, the MTO pin acts as an interrupt to a master device. The MTCH112 will pulse low for at least 1ms if any state changes occur. Further information must be determined by communicating through I^2C with the device.

SDA/SCL

These pins are the serial data (SDA) and clock (SCL) connections of the I^2C interface. They should be connected to the I^2C master SDA and SCL signals with a 1.5k pull-up resistor to V_{DD}.

REVISION HISTORY

Revision A (October 2012)

Initial release of this Product Brief.

NOTES:

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