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Earthquake click

PID: MIKROE-2561

Weight: 30 g



Earthquake click carries D7S, the world's smallest high-precision seismic sensor from Omron. The click is designed to run on either 3.3V or 5V power supply. It communicates with the target MCU over I2C interface, with additional functionality provided by the following pins on the mikroBUS™ line: PWM, INT, CS.

When an earthquake occurs with a seismic intensity equivalent to 5 Upper or higher on the JMA (Japan Meteorological Agency) Seismic Intensity Scale, the D7S will activate the shutoff output to notify the user that an earthquake has occurred.

How it works

Using the SI (spectral intensity) value, which has a high correlation with the seismic intensity scale that indicates the magnitude of an earthquake, provides higher-precision judgment of seismic intensity scales.

The 3-axis acceleration Sensor and Omron's unique SI value calculation algorithm achieve high precision and low consumption. (Higher degree of freedom for incorporation into devices and prolonged operation on battery power).

Shutoff output terminal (INT1) operates equivalent to a conventional mechanical vibration sensor and ensures compatibility with mechanical vibration sensors.

I2C interface is able to obtain earthquake-related information from the sensor with communications from external devices.

Spectral intensity

The SI value (or spectral intensity) is equivalent to the magnitude of the destructive energy imposed by seismic motion on structures.

Low power consumption

The power consumption during standby is **90 μ A or less**. On average, during processing, the sensor uses around 300 μ A.

JMA seismic intensity scale

JMA or Japan Meteorological Agency intensity scale is used in Japan and Taiwan to measure the intensity of earthquakes. The scale goes from 0 to 7. The level 5 on this scale indicates when objects inside a house start falling down, like books from the shelf, dishes in a cupboard, cracks are formed on walls, etc.

Key features


- D7S seismic sensor
 - 90 μ A power consumption in standby
 - Acceleration Detection Range $-2,000$ to $2,000$ gal
 - Shutoff Output (INT1) Output at seismic intensity level 5 or higher
- I2C interface
- 3.3V or 5V power supply

Specification

Product Type	Motion
Applications	Vibration sensor, fire prevention systems, electricity meters, gas meters, chemical plants, bridges, tunnels, etc.
MCU	D7S seismic sensor
Key Features	Low power consumption, Acceleration Detection Range $-2,000$ to $2,000$ gal, Shutoff Output (INT1) Output at seismic intensity level 5 or higher
Key Benefits	The click can calculate seismic activity and detect an earthquake
Interface	I2C
Power Supply	3.3V or 5V
Compatibility	mikroBUS
Click board size	S (28.6 x 25.4 mm)

Pinout diagram

This table shows how the pinout on **Earthquake click** corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	 mikroBUS™				Pin	Notes
Not connected	NC	1	AN	PWM	16	INT2	Processing notification output
Not connected	NC	2	RST	INT	15	INT1	Shutoff output
Initial setting input	SETTING	3	CS	TX	14	NC	Not connected
Not connected	NC	4	SCK	RX	13	NC	Not connected
Not connected	NC	5	MISO	SCL	12	SCL	I2C clock
Not connected	NC	6	MOSI	SDA	11	SDA	I2C data
Power supply	+3.3V	7	3.3V	5V	10	+5V	Power supply
Ground	GND	8	GND	GND	9	GND	Ground

Maximum ratings

Description	Min	Typ	Max	Unit
Power Supply Voltage	-0.3		6.0	V
Average Current Consumption during Processing			300	uA
Operating Temperature	-30	-	70	°C

Jumpers and settings

Designator	Name	Default Position	Default Option	Description:
JP1	PWR.SEL.	Left	3.3V	Power Supply Voltage Selection 3.3V/5V, left position 3.3V, right position 5V

Programming

Code examples for Earthquake click, written for MikroElektronika hardware and compilers are available on Libstock.

Code snippet

The following code calls initialization functions, and then checks the status and SI value registers every 5 seconds.

```
01 void main() {
02
03     system_init ();
04     eq_init(0x55);
05
06     while (1)
07     {
08         UART_Write_Text( "\r\n Status: " );
09         si_value = eq_read_status ();
10         IntToStr( si_value, uart_text );
11         UART_Write_Text(uart_text);
12         UART_Write( 32 );
13
14         /*reads strongest SI value detected during current quake */
15         UART_Write_Text( " Current SI value: " );
16         si_value = eq_si_rs ();
17         IntToStr( si_value, uart_text );
18         UART_Write_Text(uart_text);
19         UART_Write( 32 );
20
21         Delay_ms (5000);
22     }
23 }
```