EMP-Detector V2.x

RoHS COMPLIANT Pb Pb-Free

DEVICE : EMP Detector V2.x

FEATURES : Detecting high energy pulses

APPLICATIONS : Detecting lightning and other types of high energy discharges

IMPORTANT : For pin-connections, check page 3

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INFO

With 2 years of thorough research and testing several prototypes at SMDking, we proudly present a new type of sensor which got available to the market. It is about our EMP (Electro Magnetic Pulse) sensor. This sensor can be used for a variety of usage :

- **Outdoor events**
  Early warning system for any outdoor sports, like golf, football, soccer, hockey, tennis etc.

- **Domotics**
  Warningsystem for upcomming storms , in order to shut down / activate devices or closing windows etc.

- **Scientific experiments**
  Detecting EMP's for analysis-purposes, like locating the impact of lighting by multiple sensors, or figuring out how lighting works.

- **Photography**
  The sublime way to catch a lighting-event by camera, when triggered by this EMP-detector. Can also be used as trigger for other events, like activating multiple flash-lights.

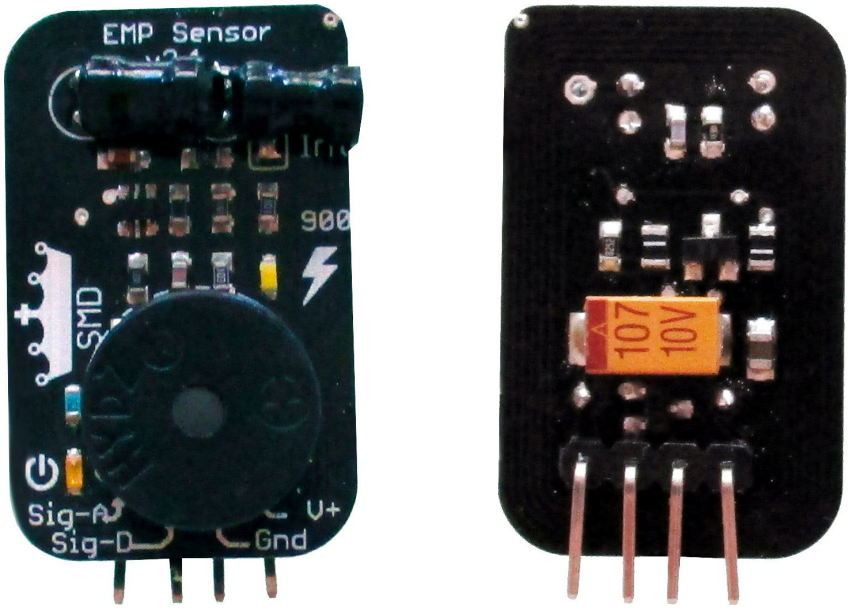
- **Arduino experiments**
  For the hobbyists who are interested in weather-conditions or detecting other types of EMP-sources.

- **Weather stations**
  Next to rain,- barometric,- temperature,- moisture-sensors, a lighting detector can be included.

SPECIFICATIONS

Input Voltage (Vcc)	: 3.3V to 5.0V DC
Input Current	: 5 mA to 40 mA at 5V DC
Dimensions	: 19 x 30 x 16 mm / 0.75 x 1.18 x 0.63 inch (W x L x H)
Weight	: 4.5 gram / 0.16 ounce
Pinning	: 1 = Vcc (3.3V to 5 V DC) 2 = Gnd 3 = Digital inverted output (sourcing upto 12.5 mA at Vcc) 4 = Analog output
Detection range	: Lighting upto 30 km / 20 miles away
Audible alarm	: 2300 +/- 400 Hz , approx 83 dB

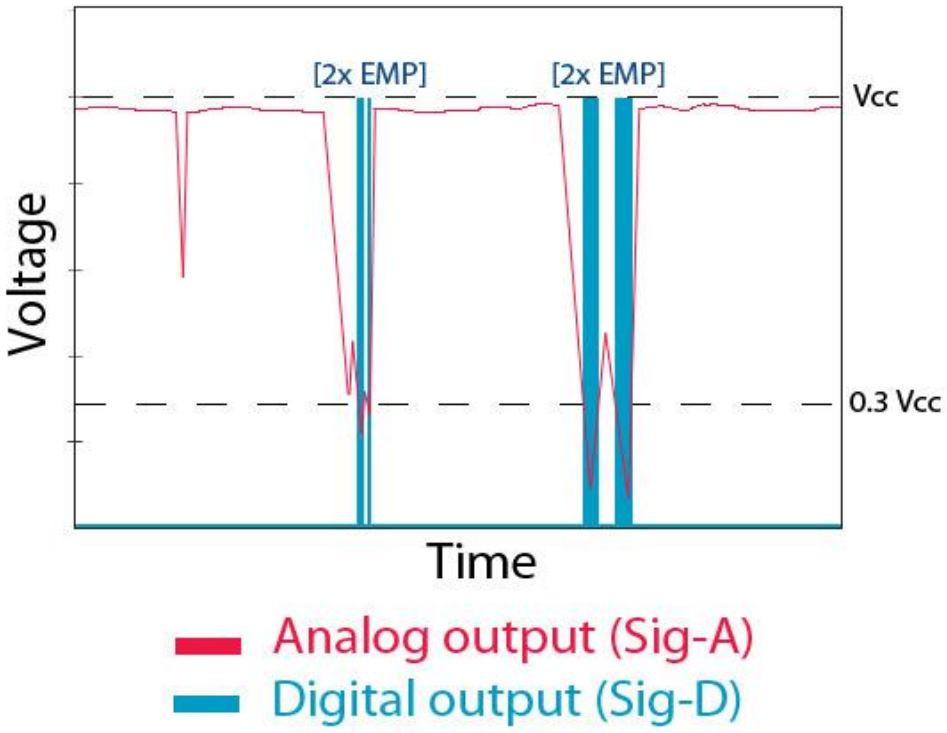
HOW IT OPERATES (pins)



Sig-A : Analog output. When no EMP is detected, a continuous signal (at Vcc level) will be generated. When minor / low energy EMP activity is detected, the signal will drop / fluctuate slightly.
When high energy EMP is detected, the signal will drop significantly.

Sig-D : This pin can be used as a trigger-function for high energy EMP's. When no or low activity is detected the pin will remain 0 Volts. When a good strong analog signal is detected, a digital high peek signal (Vcc level) will be generated. (See image below)

GND and V+ : For activating the sensor, [V+] and [Gnd] need to be connected to a powersource. The powersource should be at least 3.3V DC and max. 5.0 V DC.
The EMP-detector is running low power (5 mA), when no lighting is detected.
When lighting is detected, the detector requires a pulse of 40 mA. This peek is required to activate the onboard audible alarm.



LOCATION at PCB

PowerLED

This LED is active, when Vcc and GND are connected to a powersource of at least 3.3 Volts DC. The LED is located next to the power-symbol (left, near buzzer).

Flash-LED / Buzzer

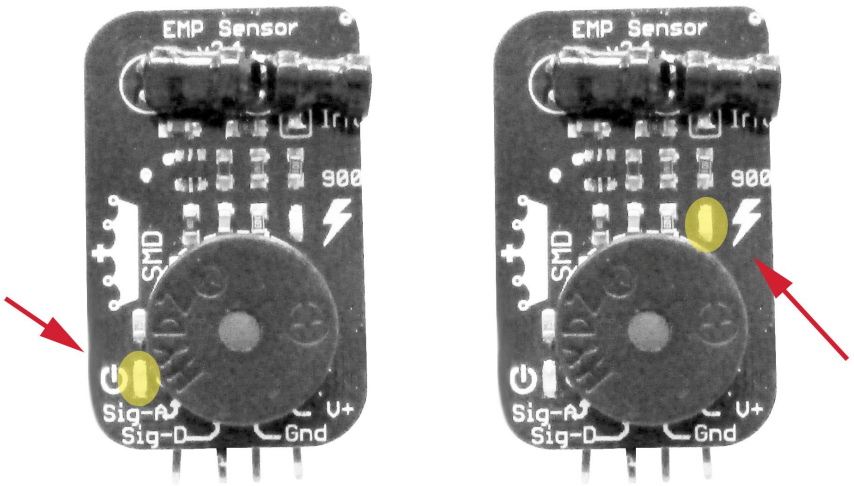
When a high energy EMP is detected :
- a LED will blink shortly (located next to the onboard "flash"-sign, near right top of buzzer)
- an audible alarm will be activated.

Antenna (Int/Ext)

Onboard is an integrated antenna. If you like to modify the detection-range you can add an external antenna. This antenna can be mounted to a dedicated pin-hole, which is available at the back. In such case it is required to desolder the "blob" the front-side of the sensor, next to the text "INT". When desoldering has been done properly, 2 pads will be visible.

For detecting at a longer range, you might start with an insulated copper wire of 6 feet / 1.80 m. Than start to shorten the wire by cutting off short pieces, until the desired detection has been reached.

NOTES :
1) Changing the detection-range, results in a shift of detection-range. Meaning : expanding to a longer distance detection-range, the sensor will be less sensitive for EMPs at short(er) distance.
2) Increasing thickness of insulated wire (EXT antenna), will have positive effects in detecting EMPs.



Power LED (red) Flash LED (white) Antenna

DETAILS ABOUT "DIGITAL PIN"

At the right, you see measurements, while lighting took place, while the sensor was powered at 5V DC.

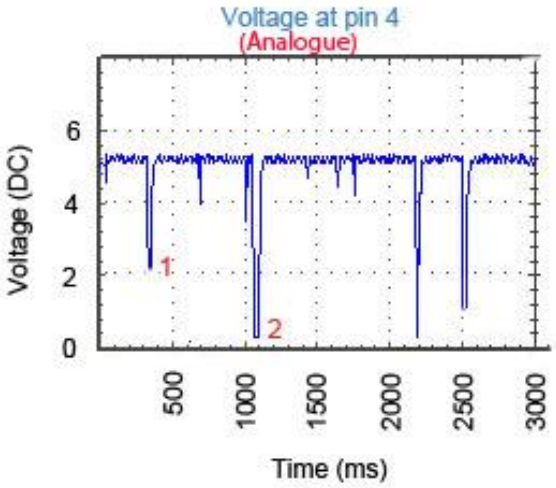
Please, keep the following in mind :

A) for reliable detection of EMPs, a Voltage-drop of nearly 0.7 * Vcc is required at pin "Analogue".

B) if Vcc is 5 Volts, than 0.7 * Vcc = 3.5 Volts.

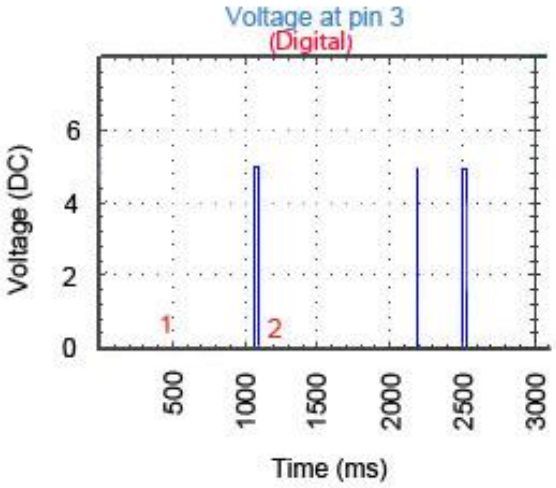
C) pin "Digital" will shift level when "Analogue" pin is at or below (5 - 3.5 =) 1.5 V

Vcc is the Voltage you use to power the sensor.



Examples to help understanding.

At the right you can see an actual read-out by an oscilloscope at pin "Analogue" (pin 4) and at pin "Digital" (pin 3).



Example 1)

A *low* or *medium* EMP is detected, and pin "analogue" will drop to 2 Volts.
5 Volts - 2 Volts = 3.0 Volts. This 3 volts is less than the minimum required drop of 3.5 Volts.
Pin "Digital" will stay at 0 Volts.

Example 2)

A *high* EMP is detected, and pin"Analogue" will drop to 0.2 Volts.
5 Volts - 0.2 Volts = 4.8 Volts. This 4.8 Volts is more than the minimum required drop of 3.5 Volts. Pin "Digital" will generate a pulse of 5 Volts.

Good to know

In general, pin "Digital" (pin 3) will respond with a delay of approx. **5 ns**, which is pretty fast, which makes it very interesting to use it as a trigger-function for activating external electronic devices.

Manufacturer : SMDKing
Datasheet : EMP detector / sensor V2
Version : 2.0
Date of release : 21st of june, 2017