Our Product of the Month
### PIR Detector Module
HT7M2XX6

- I^{2}C interface for Network Mode
- Can reliably detect passive infrared radiation
- Complete range of HOLTEK devices for a wide range of PIR applications including MCU based solutions
- Excellent and reliable solution for detection of human, animal or other object presence and motion
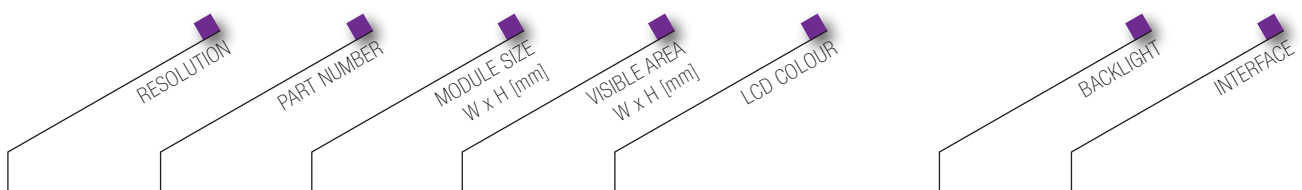- Applications: Security Monitoring Systems, Intelligent Lighting Control, Energy-saving Control

HOLTEK

PIR SENSOR AND DSP ALGORITHMS

LC-DISPLAYS, GRAPHIC (COB)
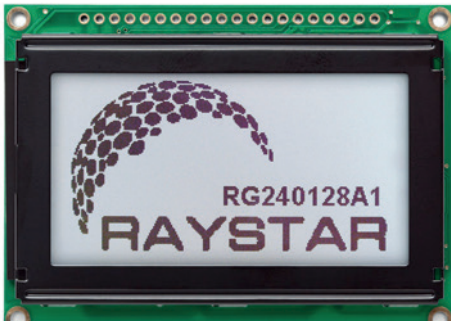
Standard LCD displays are used in many industrial applications. Raystar Optronics offers a wide range of standard graphical and alphanumerical LCDs. Size, resolution, backlight colour and LCD technology can also be collected for each display.

RESOLUTION · PART NUMBER · MODULE SIZE W x H [mm] · VISIBLE AREA W x H [mm] · LCD COLOUR · BACKLIGHT · INTERFACE

LC-DISPLAYS, GRAPHIC (COB)

RESOLUTION	PART NUMBER	MODULE SIZE W x H [mm]	VISIBLE AREA W x H [mm]	STN Grey	STN Y-G	STN Blue	FSTN	None	LED	INTERFACE
122 x 32	RG12232A/A1	84.0 x 44.0	60.0 x 18.0	•	•	•	•	•	•	6800/8080
122 x 32	RG12232A2	84.0 x 44.0	60.0 x 18.0	•	•	•	•	•	•	6800/SPI
122 x 32	RG12232B	65.4 x 28.2	54.8 x 19.0	•	•			•	•	6800/8080
122 x 32	RG12232B1	65.4 x 28.2	54.8 x 19.0	•	•			•	•	6800/8080
122 x 32	RG12232B2	65.4 x 28.2	54.8 x 19.0	•	•			•	•	6800/8080
122 x 32	RG12232B3	65.4 x 28.2	54.8 x 19.0	•	•		•	•		6800/SPI
122 x 32	RG12232C/C4	59.0 x 29.3	52.0 x 15.0	•	•		•	•	•	6800/8080
122 x 32	RG12232C1	59.0 x 29.3	52.0 x 15.0	•	•		•	•		6800/8080
122 x 32	RG12232C2	59.0 x 32.1	52.0 x 15.0	•	•		•	•	•	6800/8080
122 x 32	RG12232C3	59.0 x 29.3	52.0 x 15.0	•	•		•	•	•	6800
122 x 32	RG12232D	77.8 x 27.2	60.0 x 18.0	•	•		•	•	•	6800/8080
122 x 32	RG12232E	80.0 x 36.0	60.0 x 18.0	•	•	•	•	•	•	6800/8080
122 x 32	RG12232E1	80.0 x 36.0	60.0 x 18.0	•	•	•	•	•	•	6800/8080
122 x 32	RG12232P	80.0 x 36.5	64.0 x 17.9		•		•		•	6800/8080
128 x 64	RG12864A	93.0 x 70.0	72.0 x 40.0	•	•	•	•	•	•	6800
128 x 64	RG12864A2	93.0 x 70.0	72.0 x 40.0	•	•	•	•	•	•	
128 x 64	RG12864B	75.0 x 52.7	58.8 x 31.4	•	•	•	•	•	•	6800
128 x 64	RG12864B2	75.0 x 52.7	60.0 x 32.6	•	•	•	•	•	•	
128 x 64	RG12864C	78.0 x 70.0	62.0 x 44.0	•	•	•		•	•	6800
128 x 64	RG12864C1	78.0 x 70.0	62.0 x 44.0	•	•	•	•	•	•	
128 x 64	RG12864C4	78.0 x 70.0	62.0 x 44.0	•	•	•	•	•	•	8080
128 x 64	RG12864C5	78.0 x 70.0	62.0 x 44.0	•	•	•	•	•	•	8080
128 x 64	RG12864D	80.0 x 70.0	72.0 x 40.0	•	•	•		•	•	6800
128 x 64	RG12864E	113.0 x 53.0	72.0 x 40.0	•	•	•	•	•	•	6800
128 x 64	RG12864F	95.5 x 50.2	72.0 x 40.0	•	•	•	•	•	•	6800
128 x 64	RG12864G1	89.0 x 70.0	72.0 x 40.0	•	•	•		•	•	8080
128 x 64	RG12864H/H1	54.0 x 50.0	43.5 x 29.0	•	•		•	•		6800
128 x 64	RG12864J	83.0 x 52.7	60.0 x 32.6	•			•	•	•	6800/SPI
128 x 64	RG12864K	93.0 x 70.0	72.0 x 40.0	•	•	•	•	•	•	6800/SPI
128 x 64	RG12864L	93.0 x 70.0	72.0 x 40.0	•	•	•	•	•	•	6800/SPI
128 x 128	RG128128A	85.0 x 100.0	62.0 x 62.0	•	•	•	•		•	8080
128 x 128	RG128128B	72.5 x 69.9	50.0 x 49.0	•	•	•		•	•	6800
128 x 128	RG128128B1	65.5 x 70.0	50.0 x 49.0	•	•	•		•	•	8080

LC-DISPLAYS, GRAPHIC (COB)

RESOLUTION	PART NUMBER	MODULE SIZE W x H [mm]	VISIBLE AREA W x H [mm]	STN Grey	STN Y-G	STN Blue	FSTN B/W	None	LED	INTERFACE
128 x 128	RG128128H	92.0 x 106.0	73.0 x 73.0			•			•	8080
128 x 128	RG128128I	72.5 x 69.9	50.0 x 49.0	•	•	•	•		•	8080
144 x 32	RG14432A	85.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	6800/SPI
144 x 32	RG14432B	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	6800
144 x 32	RG14432C	84.0 x 44.0	66.0 x 16.0	•	•	•	•	•	•	6800/SPI
144 x 32	RG14432D	85.5 x 30.0	66.0 x 16.0	•	•	•	•	•	•	6800/SPI
144 x 32	RG14432E	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	6800/SPI
160 x 32	RG16032A	85.2 x 55.0	74.00 x 22.0	•	•	•		•	•	6800/8080
160 x 32	RG16032B	85.2 x 55.0	74.0 x 22.0	•	•	•		•	•	6800/SPI
160 x 32	RG16032C	85.2 x 55.0	72.0 x 22.0	•	•	•	•		•	6800/8080
160 x 32	RG16032E	122.0 x 44.0	99.0 x 24.0	•	•	•	•		•	6800/SPI
160 x 32	RG16080B	100.0 x 55.0	72.0 x 40.0	•	•	•	•	•	•	6800
160 x 80	RG16080B1	100.0 x 54.0	72.0 x 40.0		•	•	•		•	8080
160 x 80	RG16080C	93.0 x 70.0	72.0 x 40.0	•	•	•	•	•	•	6800
160 x 80	RG16080D	93.0 x 70.0	72.0 x 40.0				•		•	8080
160 x 128	RG160128A	129.0 x 102.0	101.0 x 82.0	•	•	•	•	•	•	8080
160 x 128	RG160128A1	129.0 x 102.0	101.0 x 82.0	•	•	•	•		•	8080
160 x 128	RG160128B	150.0 x 112.0	101.0 x 82.0	•	•	•	•		•	8080
160 x 160	RG160160A	89.2 x 85.0	62.0 x 62.0	•	•	•	•	•	•	No controller
160 x 160	RG160160B	85.0 x 100.0	62.0 x 62.0	•	•	•	•	•	•	6800
160 x 160	RG160160D	85.0 x 100.0	62.0 x 62.0	•	•	•	•	•	•	6800/8080
192 x 32	RG19232A	116.0 x 37.0	85.0 x 18.6	•	•	•	•	•	•	6800/SPI
192 x 32	RG19232A1	116.0 x 37.0	85.0 x 18.6	•	•	•	•	•	•	6800/SPI
192 x 64	RG19264A	120.0 x 62.0	102.0 x 39.0	•	•	•	•	•	•	6800
192 x 64	RG19264A1	130.0 x 65.0	102.0 x 39.0	•	•	•	•	•	•	6800
192 x 64	RG19264B	150.0 x 62.5	123.5 x 43.0	•	•	•	•	•	•	6800
192 x 64	RG19264C	100.0 x 60.0	84.0 x 31.0	•	•	•	•	•	•	6800
192 x 64	RG19264D	100.0 x 60.0	84.0 x 31.0		•	•			•	6800
192 x 128	RG192128A	102.3 x 86.0	78.5 x 55.0	•	•		•	•	•	6800
192 x 128	RG192128B	98.0 x 86.0	78.5 x 55.0	•	•		•	•	•	6800
192 x 128	RG192128C	102.3 x 86.0	78.5 x 55.0		•		•		•	8080
192 x 128	RG192128D	98.0 x 86.0	78.5 x 55.0		•		•		•	8080
202 x 32	RG20232A	146.0 x 43.0	123.0 x 23.0	•	•	•	•	•	•	6800/8080
202 x 32	RG20232A1	146.0 x 43.0	123.0 x 23.0	•	•	•	•	•	•	6800/SPI
240 x 64	RG24064A	180.0 x 65.0	133.0 x 39.0	•	•	•	•	•	•	8080
240 x 64	RG24064A1	180.0 x 65.0	133.0 x 39.0	•	•	•	•	•	•	6800
240 x 64	RG24064A2	180.0 x 65.0	133.0 x 39.0	•	•	•	•	•	•	8080
240 x 64	RG24064A3	180.0 x 65.0	133.0 x 39.0	•	•	•	•	•	•	6800/8080
240 x 64	RG24064A4	180.0 x 65.0	132.6 x 39.0	•	•	•	•	•	•	8080
240 x 64	RG24064A5	180.0 x 65.0	133.0 x 39.0	•	•	•	•	•	•	
240 x 64	RG24064B	180.0 x 72.0	133.0 x 39.0	•	•	•	•	•	•	8080
240 x 128	RG240128A	170.0 x 103.5	132.0 x 76.0	•	•	•	•	•	•	8080
240 x 128	RG240128A1	170.0 x 93.6	128.0 x 75.0	•	•	•	•	•	•	No controller
240 x 128	RG240128B	144.0 x 104.0	114.0 x 64.0	•	•	•	•	•	•	8080
240 x 128	RG240128B1	144.0 x 104.0	114.0 x 64.0	•	•	•	•	•	•	8080
240 x 128	RG240128B2	144.0 x 104.0	114.0 x 64.0	•	•	•	•	•	•	6800
240 x 128	RG240128F	140.0 x 82.0	114.0 x 64.0	•	•	•	•	•	•	6800/8080
240 x 128	RGZ240128B	144.0 x 104.0	114.0 x 64.0	•					•	

LC-DISPLAYS, ALPHANUMERIC/GRAPHIC (COG)

RESOLUTION · PART NUMBER · MODULE SIZE W x H [mm] · VISIBLE AREA W x H [mm] · LCD COLOUR · BACKLIGHT · INTERFACE

LC-DISPLAYS, ALPHANUMERIC/GRAPHIC (COG)

RESOLUTION	PART NUMBER	MODULE SIZE W x H [mm]	VISIBLE AREA W x H [mm]	STN Grey	STN Y-G	STN Blue	FSTN B/W	None	LED	INTERFACE
16 x 2	RX1602A1	72.1 x 29.6	61.0 x 15.1	●	●				●	
16 x 2	RX1602A2	72.1 x 29.6	61.0 x 15.1	●	●	●	●	●	●	6800/SPI
16 x 2	RX1602A3	74.2 x 25.5	61.0 x 15.1	●	●	●	●	●	●	I²C
16 x 2	RX1602A4	62.8 x 23.0	51.5 x 12.2	●	●	●	●	●	●	I²C
16 x 2	RX1602A5	51.2 x 20.7	40.0 x 10.0	●	●	●	●	●	●	I²C
16 x 2	RX1602B	85.0 x 30.0	76.0 x 18.0	●	●		●		●	I²C
20 x 2	RX2002A	74.2 x 25.2	61.0 x 15.1	●	●	●	●	●	●	I²C
20 x 4	RX2004A	74.3 x 36.4	60.5 x 22.18	●	●	●	●	●	●	I²C
24 x 2	RX2402A	86.2 x 24.7	72.3 x 11.84	●	●	●	●	●	●	I²C
128 x 64	RX12864A1	60.1 x 44.5	54.6 x 32.0	●	●	●	●	●	●	6800/8080/SPI
128 x 64	RX12864B	89.7 x 49.8	69.0 x 36.5	●	●	●	●		●	6800/8080/SPI
128 x 64	RX12864C2	55.2 x 39.8	45.2 x 27.0	●	●	●	●		●	6800/8080/SPI
128 x 64	RX12864D2	90.0 x 52.8	70.7 x 38.8	●	●	●	●	●	●	6800/8080/SPI
128 x 64	RX12864D3	80.0 x 54.0	70.7 x 38.8	●	●	●	●		●	6800/8080/SPI
128 x 64	RX12864H	80.0 x 54.0	70.7 x 38.8	●	●	●	●	●	●	6800/8080/SPI
144 x 64	RX14464A5	80.0 x 54.0	70.7 x 38.8			●			●	6800/8080/SPI/I²C
160 x 160	RX160160A	83.8 x 76.5	60.0 x 60.0	●	●	●	●		●	6800/8080
160 x 160	RX160160B	82.2 x 77.5	60.0 x 60.0	●	●	●	●		●	6800/8080
240 x 64	RX24064A1	142.5 x 51.7	130.2 x 37.6			●	●	●	●	6800/8080/SPI
240 x 64	RX24064B	142.5 x 51.7	129.0 x 37.6			●	●		●	6800/8080/SPI
240 x 64	RX24064C	111.4 x 45.5	106.2 x 31.2			●	●		●	6800/8080/SPI
240 x 64	RX24064D	86.2 x 39.3	80.8 x 24.8			●	●		●	6800/8080/SPI
240 x 128	RX240128A	98.7 x 67.7	92.0 x 53.0	●	●	●	●	●	●	6800/8080/SPI
240 x 160	RX240160A	93.0 x 64.2	78.5 x 47.5	●	●		●		●	6800/8080
320 x 240	RX320240A	160.0 x 109.0	120.0 x 90.0	●		●	●	●	●	No controller

Reserve technical changes!

6V, 3A, DIGITAL HIGH-EFFICIENCY, SYNCHRONOUS, STEP-DOWN CONVERTER

The **MP8843** is a highly integrated, highfrequency, synchronous, step-down switcher with an I²C **control interface**. The MP8843 can support up to 3 A of current from a wide 2.6 V to 6 V input supply range with excellent load and line regulation.

Constant-on-time (COT) control provides a fast transient response, high light-load efficiency, and eases loop stabilization.

The I²C interface allows for communication interface speed up to 3.4 Mbps. It controls the output voltage from 0.6 V to 1.1 V on the fly with 3.9 mV voltage steps. This interface also controls the output voltage transition slew rate and allows the power-save mode selection to meet different application requirements.

Protection features include internal soft start (SS), over-current protection (OCP), and overtemperature protection (OTP).

The MP8843 requires a minimal number of readily available, standard, external components and is available in an ultra-small QFN-12 (2 mm×2 mm) package.

FEATURES

» Constant-On-Time Control Mode
» I²C compatible interface up to 3.4 Mbps
» Programmable output voltage from 0,6 V to 1,1 V with 3.9 mV steps
» Power-Good-Indicator
» Programmable switching frequency from 1 MHz to 2 MHz
» Programmable voltage transition slew rate
» QFN-12 package

APPLICATIONS

» Processor Core Supply
» Micro converters
» Small/Handheld Devices
» Storage Drives
» Portable Instruments
» Battery-Powered Devices

PIN CONFIGURATION MP8843

TOP VIEW
QFN-12 (2 mm×2 mm)
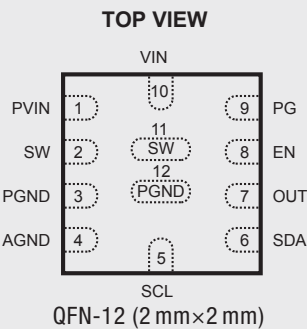
TYPICAL APPLICATION MP8843
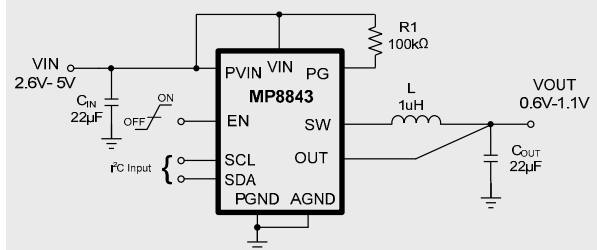
EFFICIENCYZ VS. LOAD
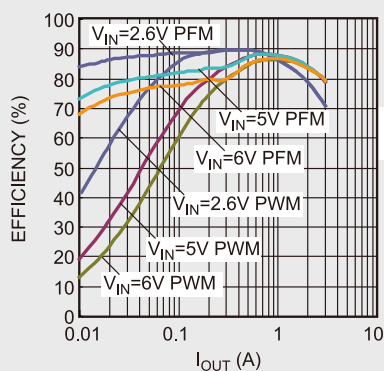
QUIESCENT VS. TEMPERATURE
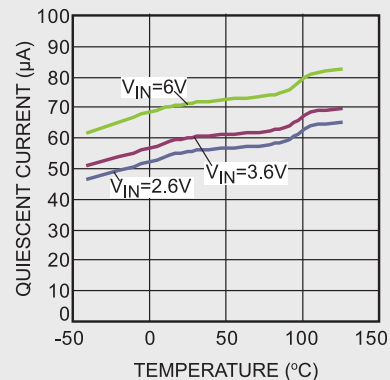
AC/DC SWITCHING REGULATOR WITH INTEGRATED 900 V MOSFET – HF900

The **HF900** is a flyback regulator with an integrated 900 V MOSFET. Requiring a minimum number of external components, the HF900 provides excellent power regulation in AC/DC applications that require high reliability. These applications include smart meters, large appliances, industrial controls, and products powered by unstable AC grids.

The regulator uses peak-current-mode control to provide excellent transient response and easy loop compensation. When the output power falls below a given level, the regulator enters burst mode to lower the standby power consumption.

The MPS proprietary 900 V monolithic process enables over-temperature protection (OTP) on the same silicon of the 900 V power FET, offering precise thermal protection. Also, it offers a full suite of protection features such as VCC undervoltage lockout, over-load protection, overvoltage protection, and short-circuit protection.

The HF900 is designed to minimize electromagnetic interference for wireless communication in home and building automation applications. The operating frequency is programmed externally with a single resistor, so the power supply's radiated energy can be designed to avoid the interference with wireless communication.

In addition to the programmable frequency, the HF900 employs a frequency jittering function that not only greatly reduces the noise level but also reduces the cost of the EMI filter.

The HF900 is available in SOIC14-11 and PDIP8-7EP packages.

FETURES

» Integrated 13 Ω 900 V-MOSFET and HV soft start circuit up to 8 W rated power
» Programmable switching frequency up to 300 kHz
» Frequency jittering for better EMI
» Full protection OTP, OVP, OLP, SCP, VCC UVLO, Input OVP, etc.
» High reliability due to accurate over-temperature protection: temperature sensing and control integrated on MOSFET
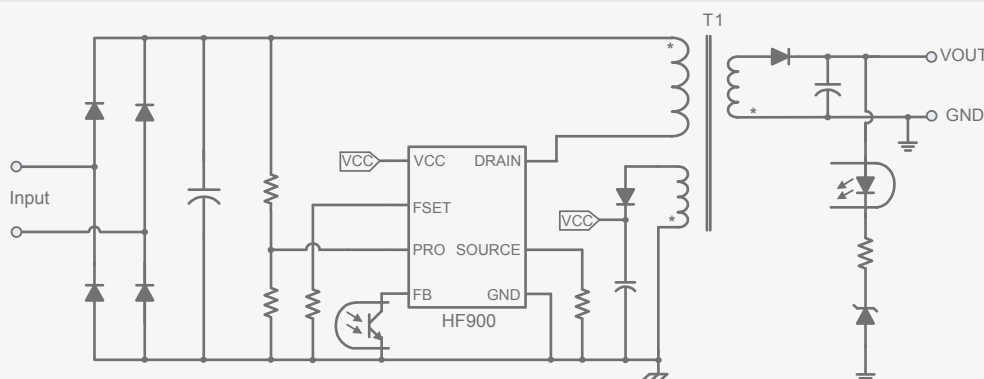» PRO for programmable Input Line OVP

BENEFITS

» High reliability
» Low EMI
» Low cost solution
» Suitable for power meter application
» Easy for customers to avoid frequency interferences with other circuits
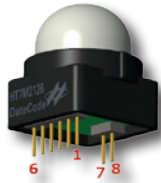
EFFICIENCY VS. LOAD
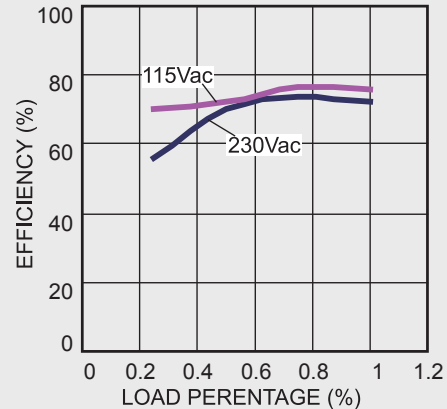
TYPICAL APPLICATION HF900

PDIP8-7 EP and **SOIC14-11** packages available

# PIR-DETECTOR MODULE HT7M21X6 – PIR SENSOR AND ELECTRONICS

HOLTEK's human body infrared detector modules, the HT7M21x6 series, come fully integrated with optical lenses, a passive infrared (PIR) sensor and DSP algorithms. These modules include a wide range of features such as low power consumption, an I²C communication interface and DSP algorithms which improve the reliability of the PIR detector. Their application range includes home security and surveillance systems as well as basic industrial safety detection.

FEATURES

- » Operating voltage: 2.7V ~ 5.5V
- » Low power consumption:
  operating mode (Moving objects) $< 1.5\,mA$,
  standby with detecting mode $< 40\,\mu A$ (3.3V)
- » Intelligent signal recognition algorithm
- » Interfaces: I²C for Network Mode / I/O for Stand-alone Mode
- » Adjustable sensing sensitivity, Network Mode
- » Custom trigger modes: Single/Continuous, Network Mode
- » Adjustable trigger output time: 16-bit×100 ms, Network Mode
- » Low voltage detection: 2.0/2.2/2.4/2.7/3.0/3.3/3.6/ 4.0 V options, Network Mode
- » Supports external optical sensors, e. g. photo transistors
- » Integrated temperature sensor with temp. compensation

WHY USE PIR SOLUTIONS

- » Can reliably detect passive infrared radiation
- » Reliable and inexpensive motion sensing solution
- » Excellent and reliable solution for detection of human, animal or other object presence and motion
- » Used in range of security products such as lighting and alarms
- » Complete range of Holtek devices for a wide range of PIR applications including MCU based solutions
- » Quick stabilisation: ready for stable operation within 12 seconds after power on
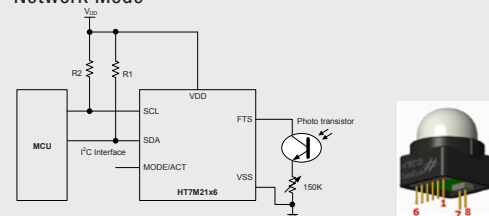
BLOCK DIAGRAM
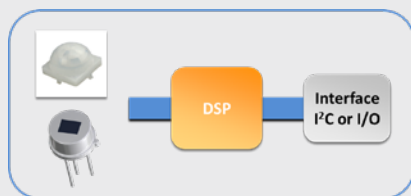
PRODUCTS

PIR-MODULES
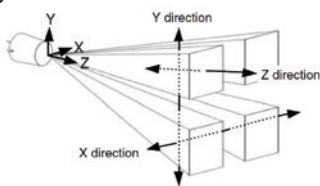
PART NUMBER	X, Y DIRECTION	Z DIRECTION
HT7M2126	121°, 77°	3.5 m ... 6 m
HT7M2136	91°, 10°	5.5 m ... 8 m
HT7M2156	10°, 20°	8 m ... 12 m
HT7M2176	86°, 75°	5 m ... 7.5 m

PIR-MCU

HT45F0027– OPAs 2K-word Flash Memory, Low Power & High Performance

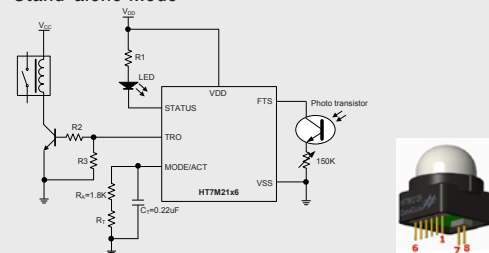## APPLICATION CIRCUITS

Network Mode

Interface & Pin Assignment – Network Mode

Pin #	Function	Description
1	VSS	Negative power supply, GND
2	VDD	Positive power supply
3	SDA	Serial Data Input/Output for I²C interface
4	SCL	Serial Clock Input for I²C interface
5	FTS	Photo transistor signal
6	VSS	Negative power supply, GND
7	MODE/ACT	Mode Selection/Motion Detection Output
8	TP1	No connection (Test pin)

Note: When the HT7M21x6 selects Network mode and the internal enable bit ACTEN is high, the MODE/ACT pin will output a high pulse signal with a width of 30 seconds.

Stand-alone Mode

Interface & Pin Assignment – Stand-alone Mode

Pin #	Function	Description
1	VSS	Negative power supply, GND
2	VDD	Positive power supply
3	STATUS	Warm-up/Detecting/Low voltage status
4	TRO	PIR trigger output
5	FTS	Photo transistor signal
6	VSS	Negative power supply, GND
7	MODE/DT	Mode & Duration time Selection
8	TP1	No connection (Test pin)

INNOVATIVE HALLSENSOR SOLUTION WITH INTEGRATED CAPACITORS
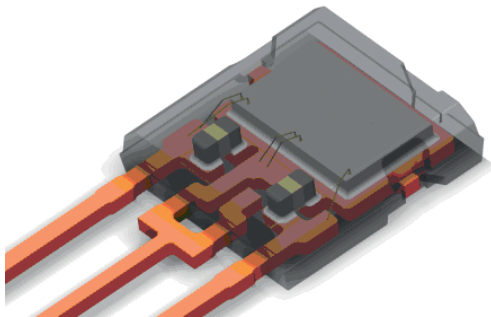
The direct-angle Hall-effect sensors HAC37xy from Micronas are suitable for multi-dimensional magnetic field measurements in automotive and industrial applications. The TO92UF package was especially designed for this new sensor and integrates both a chip from the HAL37xy sensor family based on Micronas' 3D technology as well as two capacitors up to 100 nF.

All members of the HAC37xy use a so-called pixel cell, which consists of one horizontal (B_z) and two vertical (B_x, B_y) Hall elements. The pixel cell measures three magnetic field vector components at one point. Magnetic filed lines in parallel to the sensor surface are detected by the vertical Hall elements, whereas the component perpendicular to the chip surface is captured by the horizontal Hall element. The ability to evaluate the relative strength out of the horizontal and vertical magnetic field components is the key for excellent angular performance.

The HAC37xy sensors enable angle measurements of up to 360° or linear measurements of up to 40mm. At the same time, the sensors achieve an ESD immunity of up to 8kV. Further more, the sensors meet all of the stringent EMC reqiurements, such as the current Bulk Current Injection (BCI), for example.

The leaded TO92UF package provides the option to weld or sold the sensor directly to a lead frame. This eliminates the need for a printed circuit board (PCB), thus reducing the total system size and cost. Examples for PCB-free module solutions in automotive applications are turbo chargers, EGR and throttle valves.

FURTHER PRODUCT FEATURES/ INFORMATION

» Functional saftey: ASIL-B ready
» Analog or digital output (PWM / SENT / Triggered SENT)
» Samples available
» SOP is planned for early 2017
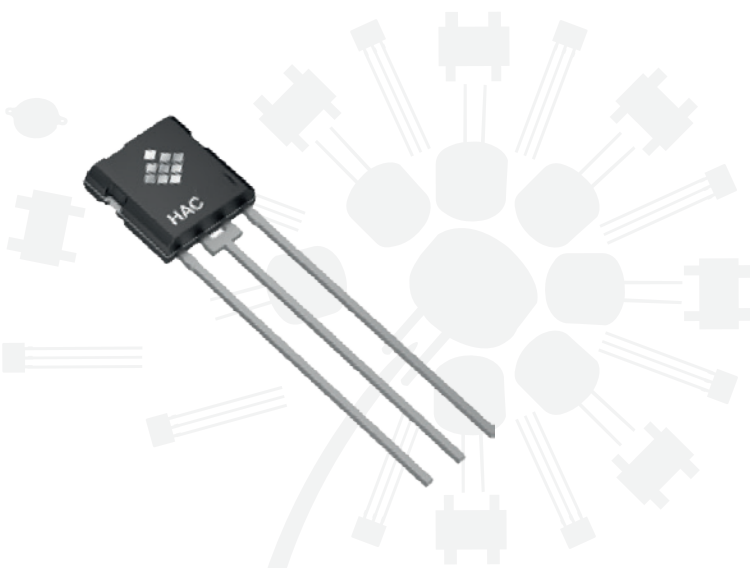
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