



# 2022

Holtek eBook

## About Holtek

Holtek Semiconductor is a leading professional IC design house in Taiwan having its major business activities focused in the area of microcontroller and peripheral component design and marketing. From its origins in 1998, the company has continuously focused its energies in the advancement

of new product development and skills innovation. The company's ability to keep in line with market trends, has given Holtek the means of releasing a wide range of highly successful and extremely competitive IC devices.

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## Reference Design

## HOLTEK Smart Wall-mounted and Portable EV Charger Reference Design

The global new energy vehicle market has shown a huge growth trend in the past few years. In the first quarter of 2022, the total global sales of new energy vehicles have reached 2 million units, with pure battery electric vehicles (BEVs) seeing the strongest growth, with sales reaching 1.5 million units. However, the production and sales of new energy vehicles in China had also exceeded 3.5 million units and the total inventory were up to 7.84 million units in 2021. It is expected that the total sales of new energy vehicles in the Chinese market will reach 7~9 million units in 2025 and the total inventory will near to 31 million units. With the rapidly growth of electric vehicle (EV) market, in order to solve the problems of insufficient charging piles and low density of charging stations, the demand for smart home charging piles

and portable EV charging equipment will increase rapidly. According to the data of China Electric Vehicle Charging Infrastructure Promotion Alliance (EVCIPA), in the end of 2021, there were 2.617 million charging piles for new energy vehicles in China, and the vehicle pile ratio has reached 3:1. It is expected that the number of charging piles will reach 12.336 million units in 2025, where including 6.785 million private AC piles, 3.053 million public AC piles and 2.498 million public DC piles, and the vehicle pile ratio will reach 2.5:1.

According to the electric output power, the electric vehicle charging modes are divided into slow charging and fast charging, and the power supply modes are divided into alternating current (AC) and direct current (DC).

According to IEC 61851 specification, the charging modes are divided into four categories, including:

### Mode 1:

Here the EV is directly connected to a standard home electrical socket via a charging cable (current  $\leq 16A$ ). As such cables have no protection features, many countries have banned or restricted their use in public localities.

### Mode 2:

Here the EV charging is used to connect the vehicle to the household AC power grid (single-phase  $\leq 250V$ /three-phase  $\leq 480V$ , current  $\leq 32A$ ) via a charging cable equipped with a control and protection device (IC-CPD). **This protection device can detect and monitor ground connections, and support over-current and over-temperature protection.** This not only retains the convenience of charging and ensures safer charging, but also complies with electrical specifications. As for common products on the present day market, these **include portable charging guns** which offer slow AC charging.

### Mode 3:

Here the EV is connected to stationary AC power supply equipment (EVSE) via a charging cable, and the EV battery is charged by an on-board charger (OBC) in the vehicle. These offer PWM communication, various types of control and a range of protection functions which can meet public safety requirements. Mode 3 (current  $\leq 250A$ ) charging is compatible with Mode 2 (current  $\leq 32A$ ) charging. Here common market products include **wall-mounted charging piles** which have a power of 7kW~11kW and include both AC fast charging and AC slow charging.

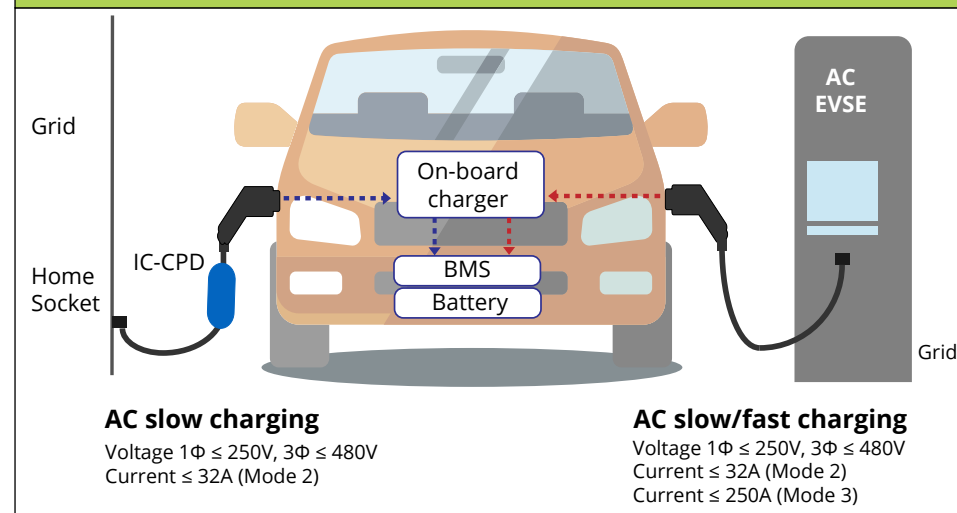
### Mode 4:

This is an external charging device mode which has a DC output. The DC current directly charges the battery without passing through any on-board charger (OBC). Generally, the power provided by EVSE is much larger than that of OBC, which can greatly reduce the required charging time. It requires a higher-level of communication and more stringent safety features. The charging cable is permanently connected to the power supply equipment. A representative product here would be **DC super charging piles**, which have a general power capability of around 30kW or more, which puts it into the fast DC charging category.

The AC charging equipment has the advantages of lower cost and easier equipment installation, this greatly resolves the mileage anxiety pain experienced when using electric vehicles. For the **portable AC chargers**, in being able to be conveniently carried

and the ability to effectively charge almost anywhere, while the **wall-mounted and standing charging piles** will continue to see an increased presence in households, communities, office building and car parks, etc.

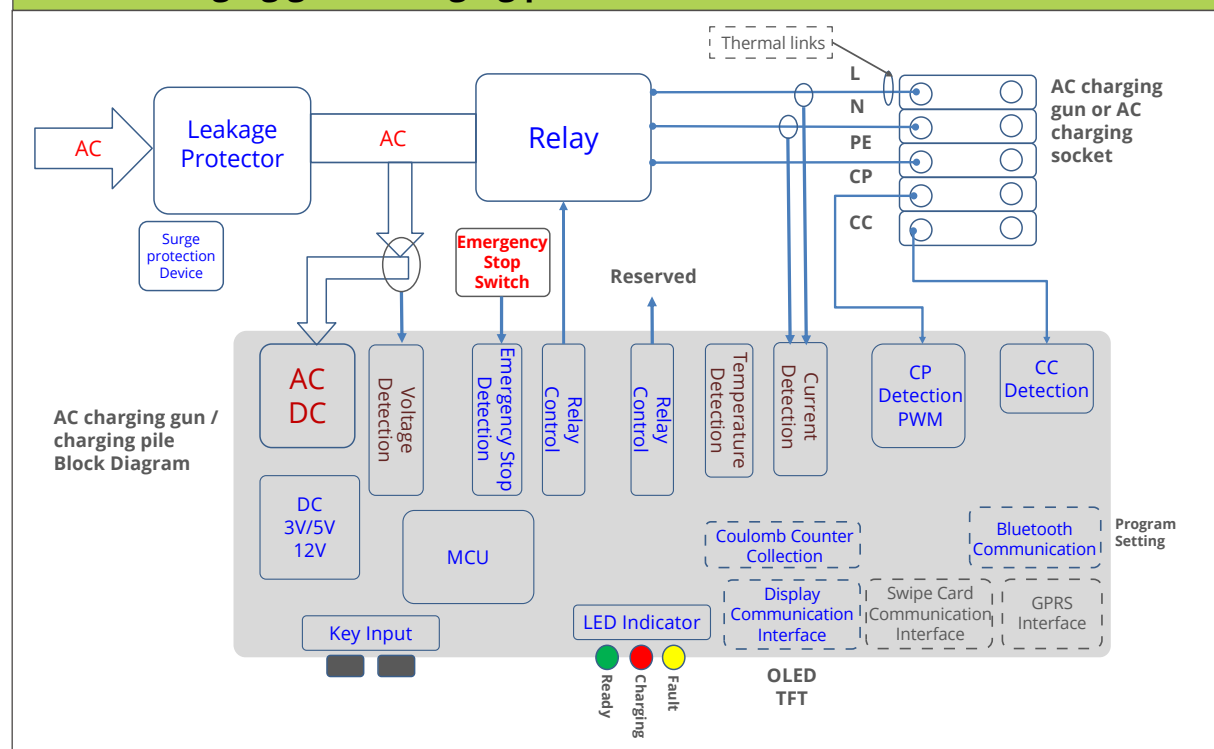
## Wall-mounted and standing charging piles



The common **AC charging pile** and **portable charging gun** are complied with national standards. The main hardware includes AC/DC conversion power management and the charging control and protection features can detect and monitor ground condition. This protection device supports over-current and over-temperature protection functions and integrates a key input of human-machine interface

and LED charging status indication. In addition, according to the application requirements of charging products, the peripheral applications can be expended such as coulomb counter collection, swipe card communication, bluetooth communication, OLED/TFT display communication and GPRS interface, etc. The detailed applications can refer the AC charging pile and portable charging gun block diagram.

## GB AC charging gun / charging pile



For electric vehicle charging equipment, HOLTEK has already released different types of Arm® Cortex®-M core 32-bit based MCUs and peripheral IC. These 32-bit devices can meet the needs of portable charging guns, wall-mounted

chargers and standing charging piles application for various types of AC charging equipment. The portable charging gun IC can refer to the following recommended solutions:

| Solution 1                                                               | Solution 2                                                                                                                    | Solution 3                                                                                       |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>LED indicator</b><br><b>Fixed current</b><br><b>(8/10/13/16/32A)</b>  | <b>LED indicator</b><br><b>Adjustment current</b><br><b>OLED display states</b><br><b>and electrical</b><br><b>parameters</b> | <b>Bluetooth</b><br><b>TFT/OLED display</b><br><b>states and electrical</b><br><b>parameters</b> |
| <b>Touch key type:</b><br>HT32F50230/32QFN<br>(32KB ROM / 4KB RAM)       | <b>Touch key type:</b><br>HT32F50241/48LQFP<br>(64KB ROM / 8KB RAM)                                                           | <b>Touch key type:</b><br>HT32F67741/46QFN<br>(64KB ROM / 8KB RAM)                               |
| <b>Touch IC:</b><br>BS83A02C/BS812C-1(2 key)<br>BS83A01C/BS811C-1(1 key) | <b>Touch IC:</b><br>BS83A02C/BS812C-1(2 key)<br>BS83A01C/BS811C-1(1 key)                                                      | <b>Touch IC:</b><br>BS83A02C/BS812C-1(2 key)<br>BS83A01C/BS811C-1(1 key)                         |

HOLTEK is a professional leading MCU IC design company with highly proficient and experienced technical support teams and a global sales and business service system. Holtek's full series of Arm® Cortex®-M 32-bit MCUs have already entered volume production and have passed UL/IEC 60730-1 Class

B software certification, therefore they can provide relevant and complete self-inspection procedures. All of these combined advantages gives Holtek has the highly competitive in home smart wall-mounted EV charging pile and lightweight portable EV charger reference design.

## Related MCU/IC products:

**32-Bit Arm® Cortex®-M0+ MCU**  
[HT32F50230](#)  
[HT32F50241](#)

**Enhanced Touch I/O Flash MCU**  
[BS83A02C](#)  
[BS83A01C](#)

**32-Bit Arm® Cortex®-M0+ BT5.2 BLE MCU**  
[HT32F67741](#)

**Enhanced Touch Key**  
[BS812C-1](#)  
[BS811C-1](#)



## PRODUCT NEWS

**HT6xL25x0A Low Power A/D MCU**

Holtek is delighted to announce the release of its new Low Power MCUs, the A/D Flash HT66L2540A/HT66L2550A MCUs and the A/D Flash with LCD driver HT67L2540A/HT67L2550A MCUs. The new integrated high-accuracy and low-current oscillators, LIRC and LXT, when added to the four-stage flexible frequency convertor, MIRC, further reduces the 10/12-bit SAR type ADC conversion current. The combination of these features ensure that the devices are very suitable for use in a range of power sensitive products.

The devices have excellent current consumption characteristics. When using the 32768Hz, the standby current is as low as 0.5μA at 3V, while the operating current is as low as 8μA at 3V. Additionally, the ADC conversion current with the slow clock source can be as low as 60μA at 3V. These characteristics provide enhanced solutions for low current applications which use disposable batteries or solar cells as their power source or for consumer

products which utilise a passive power supply such as NFC, RF energy etc.

The HT6xL25x0A devices provide up to 8K×16 of Flash Program Memory, a 512×8 RAM and a 512×8 EEPROM. With regards to peripheral features, the devices include an 8-channel 10/12-bit SAR ADC, an internal temperature sensor, multi-function Timer Modules, flexible oscillator options as well as I<sup>2</sup>C/SPI/UART communication interfaces. The HT67L25x0A devices also include an integrated R/C type LCD driver which can drive up to a 128 pixel LCD display. The devices are supplied in wide range of available package types which range from 16-pin NSOP to 64-pin LQFP types.

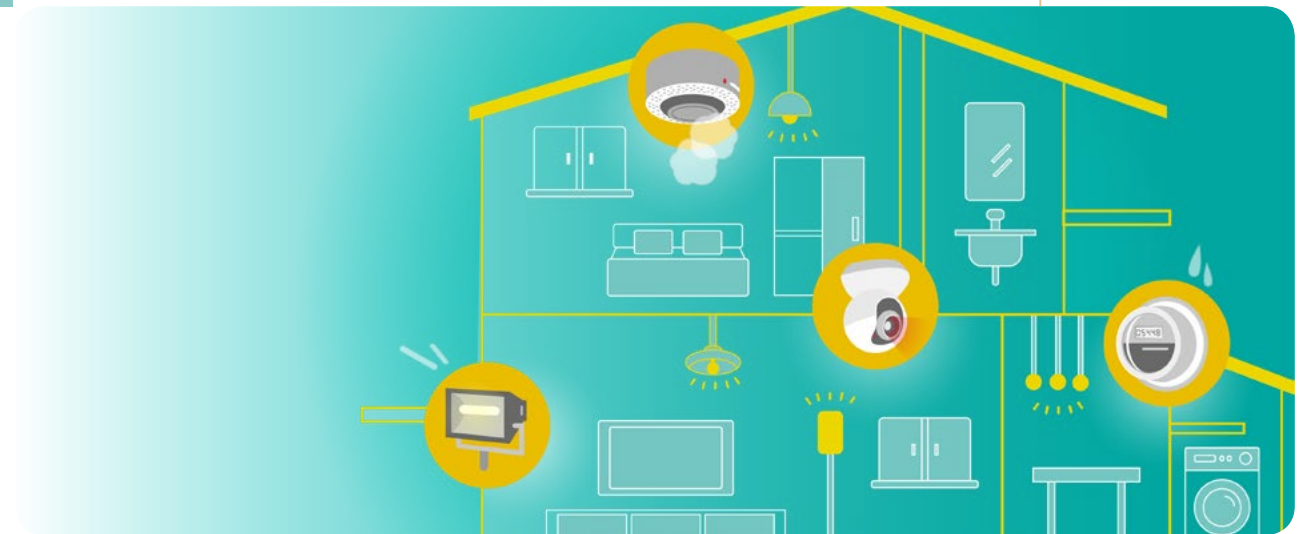
More about  
HT66L2540A/50A



More about  
HT67L2540A/50A



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## PRODUCT NEWS

**HT7463C/D Asynchronous Step-Down Converter ICs**

Holtek has released two new asynchronous step-down converter devices, the HT7463C and HT7463D, which are suitable for 48V systems, smart lighting, security products, smart meters and smart home appliances. These new devices have an input voltage range of 4.5V~60V and an input voltage maximum rating of 66V. The devices are excellent for use in 5V/12V/24V/36V/48V input voltage applications, such as 12V/24V adaptors, 36V security bus products and 48V battery packs. Their 0.6A output current capability is able to supply a stable voltage for WiFi modules, PLC modules and LEDs.

These devices are able to limit the input power during power on by connecting resistors and capacitors to the EN pin. For input power applications with power limitations, such as for bus power, this function can reduce the inrush current during power on and therefore avoid large input voltage drops.

These two new devices are divided according to switching frequency. The HT7463C has a switching frequency of 1.25MHz, which is suitable for applications which have a low voltage difference between their input and output and which have a low-output-ripple requirement. For smart meter applications, by using suitable inductors and output capacitors, a 1% output ripple value can be achieved. The HT7463D has a switching frequency of 550kHz, making it more suitable for applications which have larger voltage differences between their input and output, such as security products and 48V systems.

More about  
HT7463C/D



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## PRODUCT NEWS

**BC45F0023** Hopping Encryption MCU

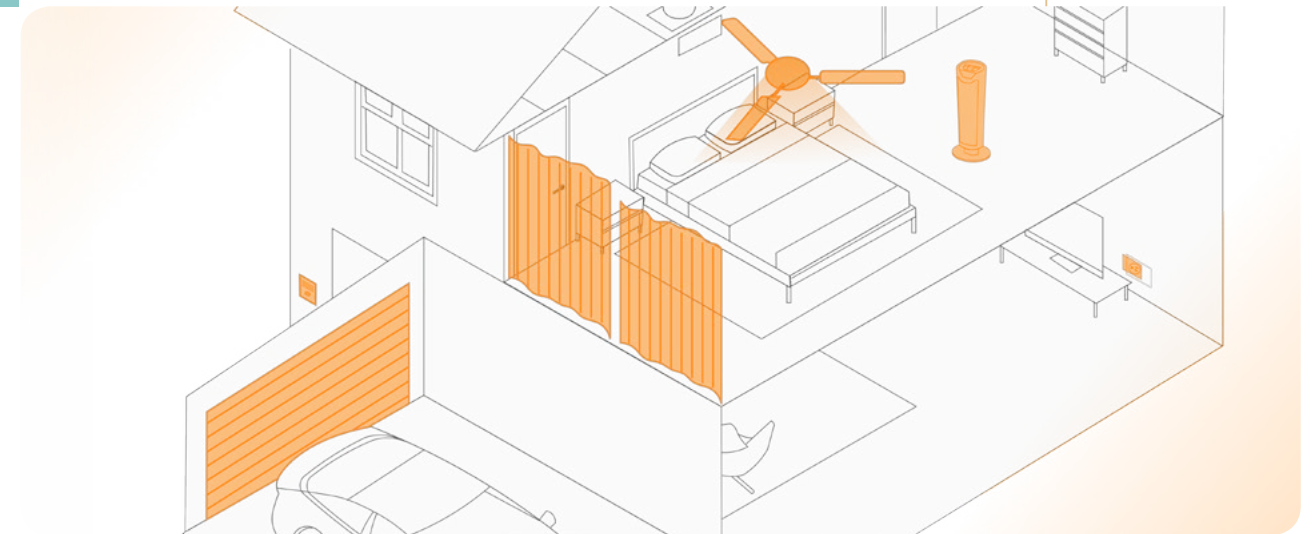
Holtek is pleased to announce the release of its new Hopping Encryption Flash MCU, the BC45F0023. With an integrated hardware encryption and decryption engine, the device is suitable for use in a wide range of wireless transmission encryption and decryption applications which require confidentiality, anti-theft and security functions.

The device includes a Flash Program Memory capacity of 2K×15, a Data Memory capacity of 128×8 and an EEPROM Data Memory capacity of 64×8. Other features include 11 I/O lines, two 10-bit Timer Modules, two Time Base functions, an internal and external voltage detection function as well as

a high-speed hardware encryption and decryption engine. The high-speed hardware requires only 2tSYS to complete an encryption/decryption operation.

The device has an operating voltage of 1.8V~5.5V. It is supplied in a 16-pin NSOP package type and meets with industrial specification requirements of -40°C~85°C operating temperature.

[More about BC45F0023](#)

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## PRODUCT NEWS

**BC2302C/D** Sub-1GHz Low-IF OOK RF Receiver ICs

Holtek is delighted to announce the release of its new Sub-1GHz Low-IF OOK high performance RF receiver devices, the BC2302C and BC2302D. These new devices now have a wider operating voltage and stronger anti-interference characteristics making them suitable for use in both mains or battery powered wireless receiver products such as bathroom ceiling heaters and ventilators, wireless doorbells, rolling doors, smart drying racks and many other products which require a wireless control receiver.

These new devices operate within the sub-1GHz ISM license-free frequency bands and are also compliant with ETSI/FCC specifications. The devices have an operating voltage range of 2.4V~5.5V, have a low receiving current of only 4mA in the 433MHz frequency band, a high receiving sensitivity of up to -112dBm at a 10Ksps data rate and a maximum transmission rate of 40Ksps. Additional advantages include their high

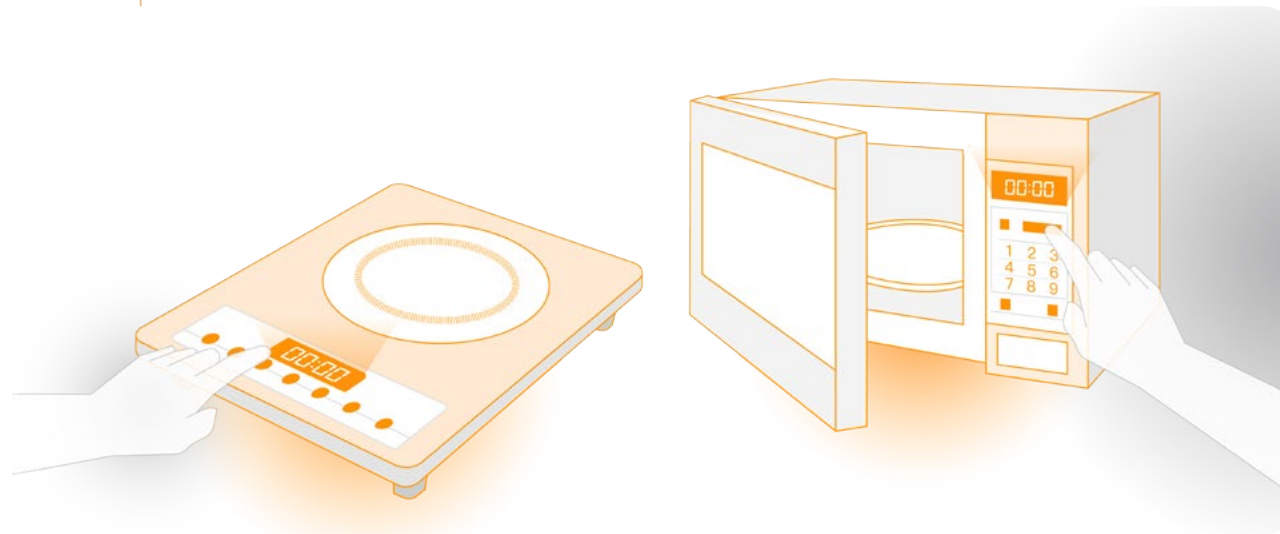
anti-interference characteristics which can reduce the effects of interference from power and RF sources, making them more convenient for integrated systems.

The devices are able to immediately operate to receive RF signals after Power-on without having to first undergo any configuration or to be connected to an MCU via their integrated I<sup>2</sup>C interface. The devices are supplied in 8-pin SOP-EP package types, which are fully compatible with the BC2302A/BC2302B devices and which meet with the industrial specification operating temperature of -40°C ~85°C.

[More about BC2302C/D](#)

[More about BC2302A/B](#)

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## PRODUCT NEWS

## BS82C16CA/BS82D20CA Touch Flash MCU with Driver

Holtek is delighted to announce the release of its new Touch Flash MCUs, the BS82C16CA and BS82D20CA series. This series has improved noise immunity and provides a higher range of system resources. The package types are fully compatible with the predecessor devices, the BS82C16A-3 and BS82D20A-3. These features combine to ensure that the devices are suitable for use in touch key applications which require an LCD/LED display, such as induction cookers, microwave ovens, electric heating tables, etc.

The devices provide 16/20 touch keys all of which have passed conductive susceptibility 10V dynamic testing. The devices have a wide range operating voltage of 1.8V~5.5V, a 4K×16/8K×16 Flash Program Memory, a 512×8/768×8 RAM and a 512×8 EEPROM. With regards to peripheral features, the

devices also include a software LCD function, an LED driver, a high speed UART interface and an I<sup>2</sup>C interface.

The devices are supplied in 24-pin SOP/SSOP, 28-pin SOP/SSOP and 48-pin LQFP package types. Holtek also fully supports the devices with a comprehensive suite of hardware and software development tools as well as a touch key function library which enables designers to develop their products more rapidly.

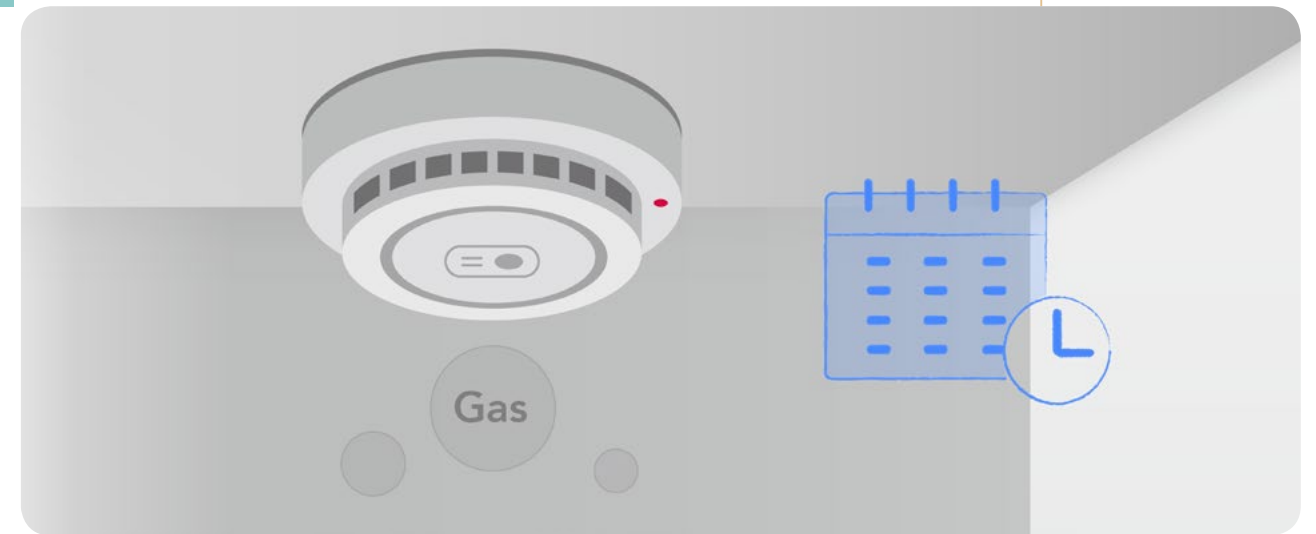
More about  
BS82C16CA/D20CA



More about  
BS82B12A-3/C16A-3  
D20A-3



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## PRODUCT NEWS

## BA45F6763 Semiconductor Gas Detector MCU with Calendar Function

Holtek wishes to announce the release of its new semiconductor gas detector Flash MCU, the BA45F6763. The device is suitable for use in semiconductor gas detector alarms which are required to record their abnormal statuses or event times.

The device contains a 16K×16 Flash Program Memory, a 1024×8 RAM and a 1024×8 EEPROM. With regard to peripheral features, the device also includes two 10-bit PTMs, a 16-bit CTM, a 16-bit STM as well as an SPI/I<sup>2</sup>C and two UARTs communication interfaces. The integrated 12-bit A/D converter can be used to measure semiconductor gas detector analog signals. The device has an independently powered calendar function, which when used together with the IAP/EEPROM, can be used to record different abnormal status conditions and alarm events along with their date and time.

The BA45F6763 is supplied in 28-pin SSOP and 48-pin LQFP package types. Compared with the previous BA45F6753 device, this new device has increased Flash ROM, RAM and EEPROM memory capacity, includes communication interfaces as well as an event recording capability. As their pins are fully compatible, these new features ensure that this device can meet the needs of more diverse semiconductor gas detection products.

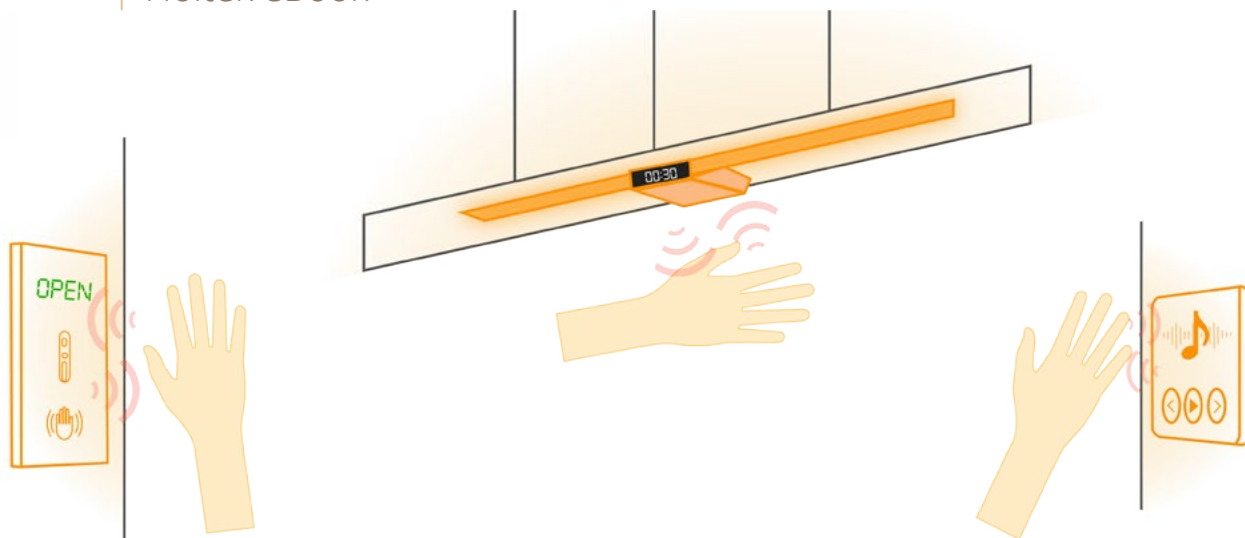
More about  
BA45F6763



More about  
BA45F6753



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## PRODUCT NEWS

## BM32S3021-1 1D IR Gesture Control Digital Module

Holtek is pleased to announce the release of its new 1D IR Gesture Control Digital Module, the BM32S3021-1. This new device includes fully integrated active IR emission, reception and optical functions. The module supports gesture detection with a distance of up to 25cm and has the characteristics of high recognition and low misjudgment, allowing the device to meet the requirements of a large number of product applications. These features combine to ensure that this gesture control digital module is suitable for use in a wide range of smart electronic products, such as smart lighting control, smart sound products, smart desk lamps and door sensing switches, etc.

The BM32S3021-1 operating principle is that gesture direction is detected by a change in infrared reflection when hands enter the detection range. Having a modular design and the integration of a special algorithm ensure that the designer's development time is greatly reduced. The module also includes a UART interface, which when used together with a dedicated parameter

platform, the required module parameters can be rapidly setup and adjusted to implement fast and convenient product development.

With regard to pin connections, this new module has only five stamp holes, which can be increased by adding a pin header to implement connections at different angles, for example upright at 90 degrees. The high degree of flexibility offered by this module provides for a wide range of application possibilities. In addition to supplying a dedicated parameter platform, Holtek also provides a technical service team who can be called upon for assistance.

More about  
BM32S3021-1

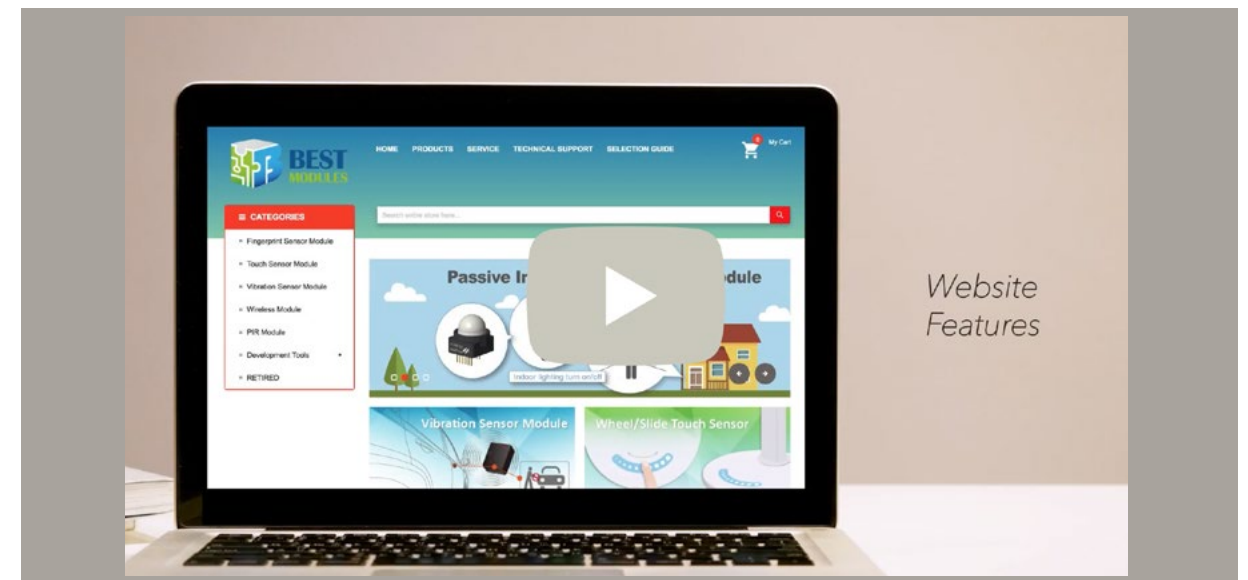


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About Best Modules

<https://www.bestmodulescorp.com/>



Website  
Features

Best Modules was established in the year 2016. As a professional electronic module designer it provides a range of high quality electronic modular products for use by electronic professionals and enthusiasts alike, enabling them to rapidly and easily implement their product designs.

The products provided by Best Modules are purchased online for which we have setup our unique website [www.bestmodulescorp.com](http://www.bestmodulescorp.com) on which customers can, no matter where they are, conveniently procure our products. By using express delivery service providers, after completing their order and under normal conditions, customers can expect to have the product in their hands within a few days. Fully tested products will be shipped directly to you from our own warehouse.

Our many years of accumulated product planning, design and volume production experience in the electronic industry both in Taiwan and China, has enabled us to release hundreds of products onto the market. With our rigorous working approach we hope to release onto the market new products different to those from other related companies. Product characteristics will be those of high quality,

clear specification, highly functionally integrated and ease of volume production. In using Best Modules' products we hope that our customers can not only rapidly implement their creative product idea but also ensure a quick transition into volume production.

As for customer service and support for our products, Best Modules is very willing to share both our skill and experience and will provide a full customer support to enable our customers to become familiar with our products as quickly as possible. For customers that might wish to order custom spec modules beyond our standard product range, we also offer a custom design module service.

Best Modules promises to maintain a trustworthy, responsible and creative approach as it strives ahead with the continual design of new modules. The future will see a release of high quality and diverse electronic modules providing customers with a wide range of solutions for their IoT, robotic and other as yet unimagined application areas, whether it be for their professional applications or for their hobby DIY projects.

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## Recommended Products

<https://www.bestmodulescorp.com/>


## Electrochemical CO Detector Digital Sensor **BM22S3221-1**

The BM22S3221-1 is an electrochemical CO (Carbon Monoxide) detector sensor, mainly used to detect carbon monoxide. When the carbon monoxide concentration exceeds the default calibration concentration, the voltage output of the alarm pin (pin 5) changes from low level to high level (default). It is easy to make a CO

detector by supplying power to this sensor and monitoring the alarm output pin.

Each BM22S3221-1 has been calibrated at the factory to maintain consistent characteristics. The calibrated alarm threshold is 180ppm.

[Read more](#)


## Catalytic Combustible Gas Detector Digital Sensor **BM22S3031-1**

The BM22S3031-1 is a catalytic combustible gas detector sensor, mainly used to detect methane. When the gas concentration exceeds the default calibration concentration, the voltage output of the alarm pin (pin 5) changes from low level to high level (default). It is easy to make a gas detector by supplying power to

this sensor and monitoring the alarm output pin.

Each BM22S3031-1 has been calibrated at the factory to maintain consistent characteristics. The calibrated alarm threshold is 9% LEL (Lower Explosion Limit), which is about 4500ppm.

[Read more](#)
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## Recommended Products

<https://www.bestmodulescorp.com/>


## PIR Detector Digital Module **BM22S4221-1**

PIR sensors (Passive Infrared Sensor) allow you to sense motion, almost always used to detect whether a human has moved in or out of the detection range. They are small, inexpensive, low-power, easy to use, and don't wear out. For these reasons, they are commonly found in appliances and gadgets used in homes or businesses, such as security systems, automatic doors, intelligent lighting, garden lights, guest reception monitors, etc.

The BM22S4221-1 is a low-power consumed PIR sensor module, which

is composed of a Fresnel lens, a PIR sensor, and an MCU. The Fresnel lens helps focus the PIR sensor's field of view. The BM22S4221-1 allows you to set the sensitivity, trigger time, and many other parameters so that you can tailor-fit it to your application.

When the module senses the motion, the output pin (pin 5) changes from low level to high level (default). It is easy to make a PIR detector by supplying power to this sensor and monitoring the output pin.

[Read more](#)


## Smoke Detector Digital Sensor **BM22S2021-1**

The BM22S2021-1 is a smoke detector sensor with two channels (LED transmitters) to detect white smoke and black smoke. Each sensor has been calibrated at the factory. When the concentration of smoke exceeds the default calibration, the

voltage output of the alarm pin (pin 5) changes from low level to high level (default). It is easy to make a gas detector by supplying power to this sensor and monitoring the alarm output pin.

[Read more](#)
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*Sharing Success Through Excellence*

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