





NPI's, DESIGN & TECHNOLOGY NEWS







Bluetooth SoC includes advanced direction-finding capabilities

New Bluetooth[®] 5.3-certified BlueNRG-LPS system-on-chip (SoC) from STMicroelectronics includes an Arm[®] Cortex[®]-M0+ core in addition to powerful security capabilities.



STMicroelectronics has introduced the third generation of its Bluetooth® system-on-chip (SoC), now including Bluetooth direction-finding technology for location-tracking and real-time positioning applications.

By determining the direction of a Bluetooth Low Energy signal, the new Bluetooth 5.3 direction-finding feature in the BlueNRG-LPS can precisely estimate the location of another Bluetooth device with accuracy of just a few centimeters. To do so, it uses Bluetooth-specified technology including both angle-of-arrival (AoA) and angle-of-departure (AoD), as computed from signals captured by an antenna array.

BlueNRG-LPS can operate as the basis for an AoA-enabled tag, but can also control an antenna switch, and acts as an RF front end. With these capabilities, the SoC now enables a wide variety of applications that require indoor navigation, geofencing, or asset tracking, as well as real-time location finding for tools, assets, and goods.

The new BlueNRG-LPS has a streamlined architecture, and provides on-chip program and data memory capacity: 192 kbytes of Flash, and 24 kbytes of SRAM. Sized for lightweight end products, the BlueNRG-LPS is ideal for cost-sensitive and high-volume applications. Integrating an efficient step-down converter and protection circuitry, the SoC simplifies board layouts and streamlines the bill-of-materials, while allowing for a cost-saving two-layer PCB design.

The architecture supports the latest Bluetooth Low Energy power control specification, which enables fine-tuning of RF output power in 1 dBm increments, and up to +8 dBm, to permit longer battery run-time. In addition, Bluetooth path-loss monitoring enhances radio-link quality and prevents interference, ensuring robust connections for improved interaction between devices, even in crowded places, and faster response times.

Bluetooth 5.3 features supported by the BlueNRG-LPS include:

- Long range (Coded PHY)
- 2 Mbits/s data rate
- Periodic advertising
- Simultaneous connection
- Multi-role mode



FEATURES

- -104 dBm sensitivity at 125 kbits/s
- 0.8 μA operating current in deep stop mode
- 14 μA/MHz current to operate Cortex-M0+ core
- · Security features:
 - o True random number generator
 - o AES encryption co-processor
 - o Hardware public key accelerator
 - Support for various cryptographic algorithms
 - o CRC calculation unit
 - o 64-bit unique ID
- 12-bit ADC with eight input channels
- Operating-temperature range: -40°C to 105°C

APPLICATIONS

- Industrial equipment
- Home and industrial automation
- Asset tracking
- Real-time location systems
- Smart lighting
- Fitness, wellness and sports equipment
- Healthcare equipment
- Consumer medical devices
- Security/proximity sensing
- Remote controls
- Assisted living equipment
- Mobile phone peripherals
- PC peripherals

FREE DEV

The STEVAL-IDB012V1 evaluation platform enables engineers to test Bluetooth® Low Energy applications based on the low-power BlueNRG-LPS SoC, in combination with inertial and environmental MEMS sensors, a digital MEMS microphone, and various interface buttons and LEDs.

Orderable Part Number STEVAL-IDB012V1

APPLY HERE NOW

⊞ BUY NOW



















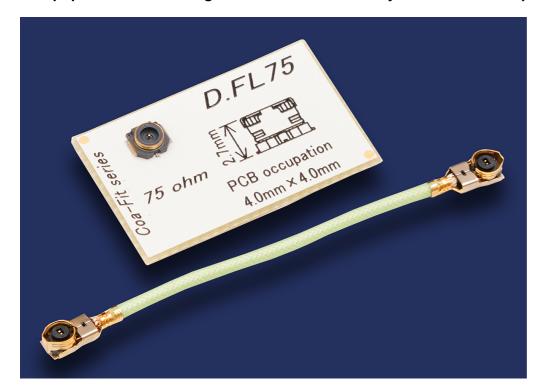






75 Ω connector complies with 12G-SDI standard for broadcasting equipment

The D.FL75 series connector from Hirose is a surface-mount design that saves space in densely populated board designs. The connector is easy to assemble and provides a secure termination.



The D.FL75 series from Hirose are 75 Ω surface-mount connectors which provide the high-speed capability required for 12G-SDI signal applications.

The 12G-SDI standard was specified by the Society of Motion Picture and Television Engineers (SMPTE) in response to the need for higher transmission speeds in broadcasting equipment. The standard is the TV and film industry's response to demand for content in higher definition, first 4K and now 8K.

The SMPTE 12G-SDI standard is used for transmissions between broadcast cameras and other equipment. The D.FL75 series connectors conform to the specifications of the standard.

These Hirose connectors fit in space-constrained board designs: they require mounting space of just 4 mm \times 4 mm, and their mated height is 2.9 mm maximum. This space-saving design gives the designer the freedom to configure board layouts that contain multiple high-density interfaces, including those with a narrow pitch, as well as multi-stage arrangements.

The D.FL75 connectors are terminated with an ultra-fine coaxial cable rated for signal frequencies of up to 12 GHz. The D.FL75 supports automatic mounting, and enables easy mating. A clear tactile click sounds when the connector is fully mated to assure the assembler of a complete electrical and mechanical connection.



FEATURES

- Return loss:
 - Minimum 17.7 dB between dc and 3 GHz
 - Minimum 13.9 dB between 3 GHz and 12 GHz
- Operating-temperature range: -40°C to 105°C
 Minimum 500 MO insulation
- Minimum 500 M Ω insulation resistance at 100 V dc
- · 20 mating cycles

APPLICATIONS

- Broadcasting and video equipment
- Commercial cameras
- Medical equipment





















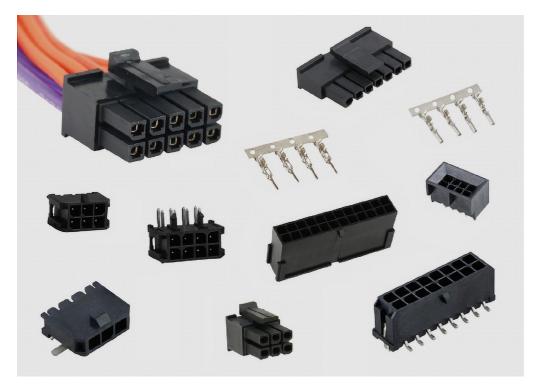






Power connectors offer flexible array of configuration options

The Minitek[®] Pwr 3.0 wire-to-wire and wire-to-board connectors from Amphenol Communications Solutions provide features that make them easy to assemble into end product designs.



The Minitek Pwr 3.0 series of wire-to-wire and wire-to-board connectors from Amphenol Communications Solutions provides a flexible choice for power systems that have a current requirement of up to 8.5 A per circuit. Amphenol also supplies the Minitek Pwr 3.0 HCC series, which offers higher current ratings of up to 12 A per circuit.

The Minitek Pwr 3.0 connectors support between two and 24 circuits in a dual-row configuration, and between two and 12 circuits in a single-row configuration.

The low insertion force required to install crimped terminals makes the Minitek Pwr 3.0 easy to assemble. The connectors' polarized geometry prevents mismating, while fully isolated terminals prevent damage to the terminals.

The connectors offer a blind mating interface option in the vertical and right-angle connectors in the dual-row through-hole type.

Amphenol

FEATURES

- Positive locking on housing with low thumb latch operation
- Fully polarized housings
- · Scoop-proof housings
- High retention force
- Complies with IEC 60335-1 standard for household appliances

APPLICATIONS

- Fan modules in computing equipment
- Telecoms and networking equipment
- Power supplies
- EV charging stations
- Robotics
- Energy storage systems
- Battery management systems
- Medical equipment
- Military Equipment
- · Automotive:
 - Infotainment
 - Lighting







DATASHEET

















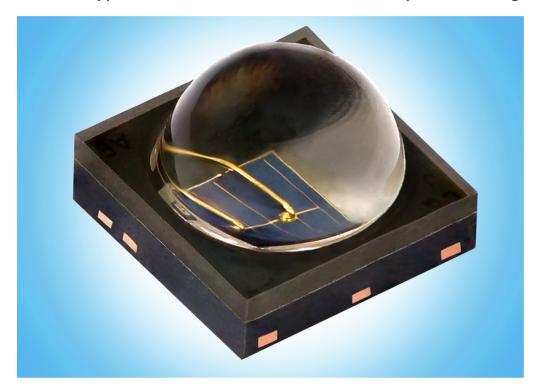






Infrared LEDs offer high optical power output

VSMA1094750X02 and VSMA1085750X02 IR LEDs from Vishay are suitable for use in emerging applications for IR illumination such as occupant monitoring in the cabin of a vehicle.



· AEC-Q102 qualified

FEATURES

- ±75° angle of half intensity
- 9 K/W maximum junction-to-solder point thermal resistance
- Up to 5 kV ESD rating according to ANSI/ESDA/JEDEC JS-001

APPLICATIONS

- Automotive:
 - Driver and occupant monitoring
- · Eye-tracking systems
- · Security and CCTV equipment

The VSMA1094750X02 and VSMA1085750X02, part of the Vishay SurfLight™ portfolio, are high-power infrared LEDs supplied in a lensed surface-mount package. The VSMA1094750X02 has a peak wavelength at 945 nm, and the VSMA1085750X02 at 850 nm.

The LEDs are based on a double-stack emitter chip which produces very high radiant power. The robust 42 mil chip supports a continuous drive current of up to 1.5 A, and can handle pulsed currents of up to 5.0 A. The LEDs' radiant power is a minimum of 370 mW/sr at a drive current of 1.5 A.

The compact VSMA1094750X02 and VSMA1085750X02 have a footprint of 3.4 mm x 3.4 mm and are 1.5 mm high.





























1 W isolated dc-dc converter module offers excellent regulation at the point of load

The MIE1W0505BGLVH isolated regulated dc-dc power module from Monolithic Power Systems includes built-in feedback blocking and circuit protection functions which ensure reliable operation.



The MIE1W0505BGLVH isolated power module from Monolithic Power Systems provides a ready-made way to provide regulated power at the point of load.

Operating from an input-voltage range of 3 V to 5.5 V, the MIE1W0505BGLVH supplies loads of up to 1 W. Excellent load and line regulation helps to maintain the stable operation of loads such as FPGAs or microprocessors.

The MIE1W0505BGLVH uses capacitive isolation technology for feedback blocking: this enables the module to regulate the output voltage without the need for an optocoupler and shunt regulator.

The power module offers isolation of 2.5 kVrms. Continuous short-circuit and over-temperature protection functions ensure reliable operation. The module complies with the requirements of the EN 55032 Class B standard for electromagnetic emissions.



FEATURES

- Supports infinite capacitive load
- ±0.4% load regulation
- ±0.5% line regulation
- CB certification according to IEC 62368-1
- Operating-temperature range: -40°C to 125°C
- 4 mm x 5 mm LGA-12 package

APPLICATIONS

- Industrial equipment
- · Consumer devices
- Digital isolators
- Isolated RS485/RS422/CAN interfaces



















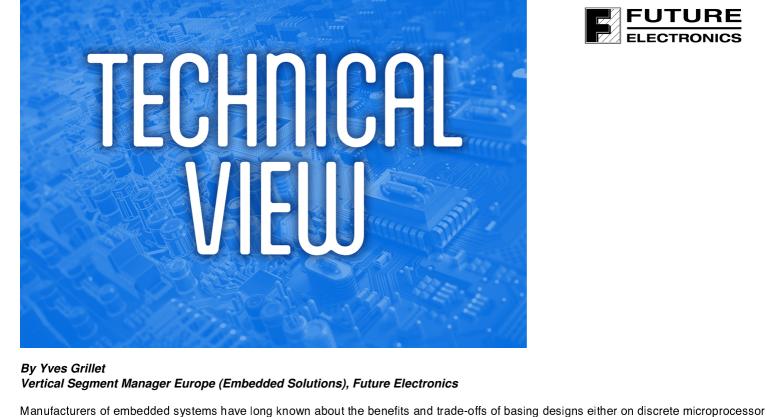


How to make your embedded system design more resilient in the face of supply-chain disruption Read this to find out about:

• Why a supply chain that includes advanced microprocessor chips is vulnerable to disruption

• How use of an off-the-shelf system-on-module insulates the OEM from supply-chain as well as design risks

• The advantages of the new OSM standard form factors now supported by leading SOM manufacturers





components or on a ready-made system-on-module (SOM). This is often referred to as the 'Make or Buy?' dilemma: buying in a complete

operation.

modular solution, which provides the microprocessor with its supporting components, such as memory and a power management system, on

a single compact PCB saves a substantial amount of development time. It frees specialist digital designers to work on the differentiated elements of a product design. But a modular solution's bill-of-materials cost is often higher than that of the equivalent discrete components. In addition, when using discrete components the designer has the freedom to make the design in any form factor, or with any non-standard component or technology elements.

designing for resilience. The problems which plagued the car industry in 2021-22 show how much economic damage can follow from severe disruption in the semiconductor supply chain. When a design is reliant on a single source of a key component that is not easily substituted, the production line is then at the mercy of that component's supply chain: it is the product's weakest link in the chain.

These arguments are well understood by OEMs, but a new factor affecting the choice is perhaps less well understood: the benefits of

So do embedded system manufacturers need to be thinking more deeply about how their choice of the key processor component affects the resilience of their production system?

The causes of volatility in the semiconductor supply chain The microprocessor is the key point of vulnerability in an embedded device OEM's supply chain because of the advanced technology on

which it is based. Embedded systems that run on a Linux® or Android™ operating system require high-performance processors that use the

latest packaging, high-speed interface and DRAM memory technologies.

microprocessor is also supported by dedicated companion chips such as a power management IC (PMIC), which will also usually be a singlesource part. The supply of any of these single-source parts can be subject to disruption due to various causes: the COVID-19 pandemic, interrupted transport links, international trade disputes and sanctions, and natural disasters such as earthquakes or volcanoes can halt shipments of a

microprocessor or its PMIC. Component shortages or extended lead times can also hamper a factory's ability to maintain normal production

This means that every microprocessor family is a unique part based on proprietary technology, and has a single source. In many cases, the

If this happens, it is not easy for the OEM to quickly implement a plan B: substituting a different microprocessor for the original microprocessor is difficult, and takes considerable development effort and time. The same applies to the device's companion PMIC. Because the PMIC provides the specific mix of power rails required by a specific microprocessor, it cannot simply be replaced by another part. Each PMIC also requires its own software driver running on the microprocessor to manage the power rails, optimize the PMIC's power consumption, and

control sequencing and other device-specific operations. A replacement PMIC requires a new software driver as well as a new hardware

Disruption to the supply chain of either the microprocessor or the PMIC will, in many cases, cause an embedded system OEM's production line to be halted, resulting in substantial economic losses. This has an important bearing on the Make or Buy decision, because the use of a SOM helps to insulate the OEM from supply chain disruption.

In addition to the supply-chain risk to which embedded system OEMs are exposed, development risk arises from the technical challenge of implementing a microprocessor-based design. This risk comes from two key elements of the design:

• The small pitch of the BGA package calls for specialist layout expertise to design the fan-out from the microprocessor. The package also calls for the use of special production machinery and a high-cost PCB with at least four layers • High-speed bus interfaces and high-speed DRAMs both require expert design capabilities

Dedicated CAD tools are used to configure the track timing, impedance, isolation characteristics, and shape of the PCB routing to be

compatible with the tolerances specified by the IC manufacturer. There is a substantial cost to this part of the development effort, both in

Avoiding development risk

terms of engineering time, and for acquisition of the CAD tools. If the OEM decides to make rather than buy, then, it is exposed to the risk of a single source of supply, alongside the requirement to manage

dedicated engineering teams, and undertake a long and complex development process. Even when a development is completed, the OEM

SOM: offloading the supply-chain and other risks The OEM which chooses the buy rather than make option shifts these risks on to the provider of the SOM: the SOM manufacturer will handle

all the complex issues involved in development of the microprocessor sub-system, maintaining it over time, porting the design to new versions

of the chip's software development kit (SDK), implementing chip upgrades, and managing a device's end-of-life (EOL).

SOM from a different manufacturer that features the same microprocessor • A SOM's standard footprint also enables the OEM to migrate a design from one generation of a microprocessor family to the next without

New smaller form factors heighten appeal of SOMs

314

230

230

200

476

662

SMARC_Full

Qseven

µQseven SODIMM

OSM_Medium

OSM_Large

• Product designers can concentrate on unique features which provide its added value • A SOM is provided in a standard form factor. This means that if the supply of a SOM from one manufacturer fails, it can be replaced by a

redesigning the end product's hardware. This capability also supports the development of a family of end product designs with low-end,

The simpler and quicker development process when using a SOM also gives the OEM more freedom to experiment with new design

concepts and advanced technologies

Use of a SOM dramatically shortens development time and can result in faster time-to-market

mid-range and high-end capabilities based on a family of microprocessor parts

82 mm x 80 mm

70 mm x 70 mm

40 mm x 70 mm

67.6 mm x 26 mm

30 mm x 45 mm

45 mm x 45 mm

In return for the premium paid via the SOM's higher unit cost, the OEM gains several valuable benefits:

must install advanced production equipment and processes to manufacture a high-cost PCB.

To a range of standard form factors for SOMs. Now a **Form Factor** Pins Size Area Area/Pin oduct designs. SMARC_Small 314 82 mm x 50 mm 4100 mm² 13.06

20.89

21.30

12.17

8.78

2.39

2.71

2.84

3.06

6560 mm²

4900 mm²

2800 mm²

1757.6 mm²

1350 mm²

2025 mm²

OSM Zero 188 450 mm² 30 mm x 15 mm 900 mm² OSM_Small 332 30 mm x 30 mm

Size

density than the earlier SMARC and Qseven standards for embedded computing modules	
The new Open Standard Modules™ (OSM) form factor, sget.org/standards/osm, was developed under the aegis of SGeT, the Standardization Group For Embedded Technologies. SGeT is known for its development of the earlier Smarc and Qseven standards. I developed the new OSM standard to provide a number of benefits:	ıt
 Increase I/O density, as shown in Figure 1 Meet demand for smaller, lower-cost embedded computer modules Provide a module in a package which can be soldered to the PCB, to avoid the use of connectors. A 1.25 mm ball pitch also helps to the hardware design more robust Offer pin-compatible options for swapping between different IC manufacturers and different Arm® processor or microcontroller archi Support the development of product families with different I/O options via the provision of four pin-compatible form factors. This elim the need to redesign a product's carrier board for each new variant of an end product design OSM modules are available in four different form factors, as shown in Figure 2. 	tectures

>> Variations across the OSM Standard

Form Factor

Size-S

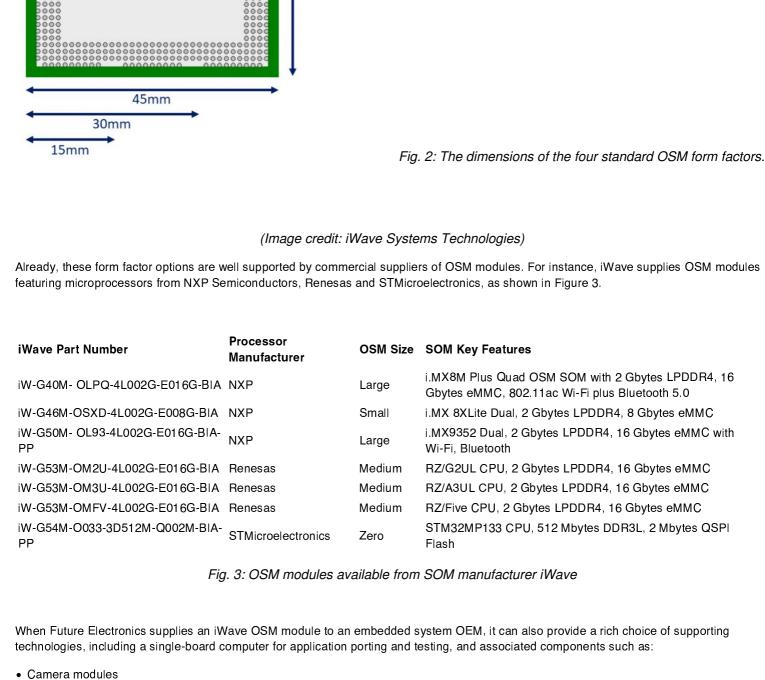
Fig. 1: The OSM standard offers much higher pin

188 Zero 30 mm x 15 mm Size-M 30 mm x 30 mm Small 332 Medium 30 mm x 45 mm 476 45 mm x 45 mm

Pinouts

30mm

45mm



iWave SOMs are also supported by the microprocessor manufacturer's software offerings, such as artificial intelligence and machine learning

By using an OSM embedded computer module, which has a standard footprint, I/O provision, functions and pin locations, design engineers can base multiple product designs on a single carrier board while retaining the ability to switch from one MPU to another, as shown in Figure

This minimizes the OEM's exposure to supply-chain risk, and makes a design resilient: with a SOM, the OEM can replace a microprocessor

Because the OSM standard is available in four standard footprints, the OEM can build a product family with feature sets ranging from simple

which is unavailable or on allocation with a different microprocessor, without the need for a hardware redesign.

and basic with the Zero OSM option, up to a highly integrated, high-performance

range -40°C to 85°C

-40°C to 85°C

· Wi-Fi and Bluetooth wireless modules GNSS satellite positioning sensors

libraries and a Linux or Android SDK.

LTE and other wireless communications modules

TFT displays Enclosures Heat-sinks

Conclusion

4: An iWave single-board computer that features various OSM SOMs: the ITX SBC iW-RainboW-G40S (top), and the ITX SBC iW-RainboW-G50S (bottom). (Image credit: iWave Systems Technologies) Specifications of the iWave SBC featured in Figure 4: Rainbow G40S featuring an I.MX8M Plus Quad microprocessor SOM

• Part number: iW-G40D- OLPQ-4L002G-E016G-BIA Key features: i.MX8M Plus Quad, 2 Gbytes of LPDDR4 DRAM, 16 Gbytes eMMC, Wi-Fi and Bluetooth connectivity, operating-temperature

- Rainbow G50S featuring an i.MX9352 microprocessor SOM Part number: iW-G50S-OL93-4L001G-E008G-BIA-PP

Key features: i.MX9352 Dual, 1 Gbyte of LPDDR4 DRAM, 8 Gbytes eMMC, Wi-Fi and Bluetooth connectivity, operating-temperature range

www.FutureElectronics.com

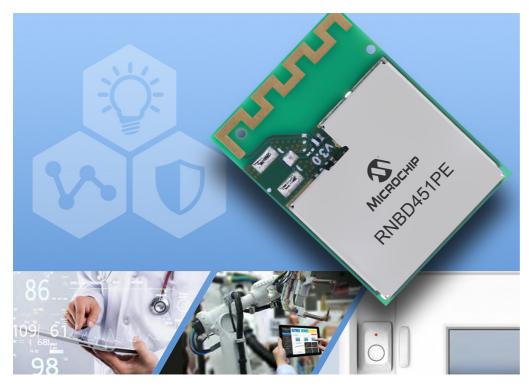
Fig.





Bluetooth Low Energy module with PCB antenna includes RF certifications for use worldwide

RNBD451PE from Microchip is a complete, off-the-shelf Bluetooth networking implementation, including radio, protocol stack and smartphone app, to enable OEMs to save development time and effort.



Microchip makes it easy to add Bluetooth[®] Low Energy networking capability to product designs with its RNBD451PE wireless module.

Microchip promotes the RNBD451PE as a plug-and-play solution, with no requirement for programming, RF design or regulatory certification. This means that the RNBD451PE saves time, money and engineering resources. The module can be controlled by any microcontroller using ASCII commands over a UART interface.

The RNBD451PE module includes a PCB antenna which provides optimal RF performance. It is also certified for compliance with RF regulations around the world, saving OEMs the time and expense associated with certification. RNBD451PE modules are pre-certified for use in the US, Canada, Europe, Taiwan, China, Japan, and South Korea.

Microchip supports the RNBD451PE with a free mobile app and source code for the Android $^{\text{TM}}$ and iOS $^{\text{(B)}}$ operating systems.



FEATURES

- Supports beacon feature of Bluetooth v5.2 specification
- Built-in Microchip transparent profile for UART data streaming
- Over-the-air remote configuration
- Enhanced security features
- Eight GPIOs
- 12-bit SAR ADC
- Supports up to six concurrent Bluetooth connections
- Up to +12 dBm programmable Transmit power
- -95 dBm receiver sensitivity at 1 Mbit/s
- Operating-temperature range: -40°C to 85°C

APPLICATIONS

- Medical devices
- Sports activity/fitness meters
- Beacons
- loT devices
- Remote controls
- Wearable devices
- Smart home equipment
- Industrial control

FREE DEV BOARD

Low-cost Bluetooth Low Energy networking evaluation board based on BNBD451

Orderable Part Number EV25F14A

APPLY HERE NOW

















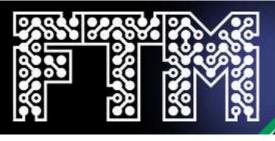












Combined Wi-Fi/Bluetooth radio chip offers very low power consumption

The AIROC CYW43012 SoC from Infineon is ideal for use in battery-powered products such as wireless IoT sensor nodes. The Murata Type 1LV module provides an easy way to implement the CYW43012 in end-product designs.



The AIROC™ CYW43012 from Infineon is an ultra-low power system-on-chip (SoC) which combines a dual-band 2.4 GHz/5 GHz Wi-Fi[®] 4 (802.11n) radio sub-system controlled by an Arm[®] Cortex[®]-M3 core, and a Bluetooth[®] 5.0 radio controlled by a Cortex-M4 core.

The CYW43012 is ideal for battery-powered applications that require very low power consumption. This entails no compromise in performance: the CYW43012 supports 256-QAM modulation for 20 MHz channels in the 5 GHz band, to enable data rates up to 78 Mbits/s in 802.11ac access points. The SoC includes an on-chip power amplifier and low-noise amplifiers for both the 2.4 GHz and 5 GHz bands.

With the next-generation AIROC CYW43022 Wi-Fi 5 (802.11ac) and Bluetooth 5.4 SoC under development, OEMs can use the CYW43012 now and easily migrate to the CYW43022 when it becomes available.

The easiest way to take advantage of the low power and high performance of the CYW43012 is by using the Murata Type 1LV, a fully integrated, off-the-shelf module for Wi-Fi and Bluetooth networking applications. The Type 1LV module, which has the part number LBEE59B1LV, is housed in a small, shielded package that is easy to accommodate in size- and power-sensitive applications.



FEATURES

- Bluetooth sub-system:
 - o Data rates up to 3 Mbits/s
 - Pulse code modulation for audio data
 - Complies with Bluetooth core specification v5.2
- Integrated IPv4/ IPv6 network stack
- Operating system support:
 - o Real-time operating systems
- Linux[®]/Android[™] (A-Class)
- 40 GPIOs

APPLICATIONS

- loT devices
- Handheld products
- Internet gateways

FREE DEV BOARD

Drop-in certified module based on CYW43012 SoC.

Orderable Part Number
Embedded Artists 1LV M.2 Module

APPLY HERE NOW















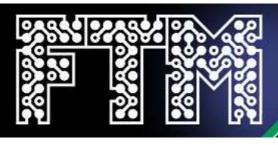






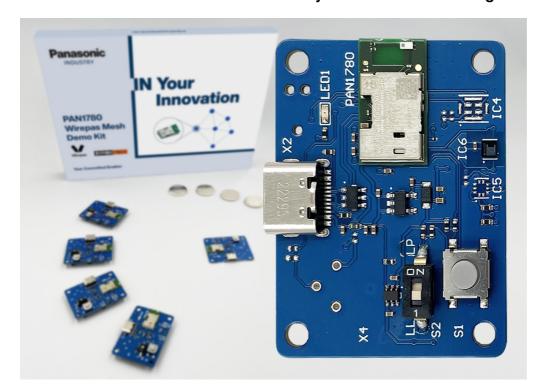






Easy-to-use demo kit provides simple implementation of mesh networking

The Wirepas Mesh Demo Kit features multiple sensor nodes based on the PAN1780 wireless module from Panasonic connected via ready-made mesh networking software from Symbiotech.



Panasonic Industry has announced the availability of a new demonstration kit which provides a ready-made implementation of mesh networking across a set of wireless sensor nodes based on its PAN1780 wireless module.

The PAN1780 modules support the Wirepas Mesh 2.4 GHz multi-hop mesh networking firmware. Wirepas Mesh 2.4 GHz offers easy-to-implement mesh connectivity for large-scale networks of up to 4 billion devices. Thanks to the firmware's dynamic role-granting feature, a device can be a node and router at the same time. This enables the creation of a decentralized network that organizes and optimizes itself automatically, thus lowering installation and maintenance costs.

Now Panasonic has collaborated with software producer Symbiotech to create a mesh networking demo kit. The kit consists of four battery-powered sensor nodes and a sink, providing a ready-made Wirepas mesh network.

The sensor nodes based on the PAN1780 offer long wireless transmission range, thanks to the module's optimized chip antenna. The Symbiotech software makes network set-up easy. It includes a user interface which shows sensor data, offers control of network nodes, and provides insights into the network's health.

The combination of the high-quality PAN1780 hardware, Wirepas' multi-hop wireless mesh technology, and Symbiotech's tailored software design gives engineers a quick and easy way to begin developing mesh networking applications.

Panasonic

INDUSTRY

FEATURES

- Certification:
 - ∘ CE RED
 - o FCC o ISED
 - o MIC
 - ∘ KCC
 - o RSM
 - o SRRC
- 4.8 mA Transmit current at 0 dBm output power
- 4.8 mA Receive current at 1 Mbit/s
- 0.4 µA current in System Off mode
- USB 2.0 Full-Speed interface
- Supply-voltage range: 1.7 V to 5.5 V
- Operating-temperature range: -40°C to 85°C

APPLICATIONS

- Smart homes and buildings
 - o Lighting controls
 - Building automation
 - Emergency exit lights
- Asset tracking
- Smart city equipment
- o Streetlights Smart agriculture
- Livestock monitoring
- Solar trackers Industrial IoT
- Industrial networks

FREE DEV BOARD

Evaluation board for PAN1780 wireless module.

Orderable Part Number

APPLY HERE NOW



BUY NOW



INFORMATION



MORE INFO























Op amps with 1.7 MHz bandwidth extend design flexibility in industrial and automotive applications

TSB62 series op amps from STMicroelectronics are available in three versions with a single-, dual- or quad-channel output. A wide input-voltage range enables use across multiple voltage domains.



The TSB62 series of operational amplifiers from STMicroelectronics provides a high degree of ruggedness and flexibility in industrial and automotive applications, thanks to the devices' gain-bandwidth product of 1.7 MHz.

The automotive-qualified TSB62 series consists of the single-channel TSB621, dual-channel TSB622, and guad-channel TSB624.

The op amps support a wide supply-voltage range from 2.7 V to 36 V, giving design engineers the freedom to use the same device for multiple applications that operate at different voltage domains.

The rail-to-rail output maximizes an analog system's dynamic range, while the low input-offset voltage of 1 mV ensures high precision when implemented in low-power devices.



FEATURES

- · Unity-gain stable
- 375 μA maximum current per operator at 36 V
- Input common-mode voltage includes ground
- 4 kV ESD rating on the human-body model
- EMI hardened
- Operating-temperature range: -40°C to 125°C
- 10 years' longevity commitment

APPLICATIONS

- · Industrial equipment
- Power supplies
- Automotive systems

⊞ BUY NOW



























Robust rocker switches ideal for industrial applications

The Littelfuse DSR series switches are supplied in various configuration options, including contact ratings up to 16 A and with or without illumination.



Littelfuse supplies the DSR series of rocker switches which feature a robust construction for use in harsh industrial environments. The DSR series switches achieve IP65-rated sealing above the panel in which they are mounted.

These black-bodied rocker switches are available either with or without illumination. With no illumination, the switches can be specified with either a red or black actuator.

The illumination options are provided by either an LED light source, from a dc power supply, or neon, from an ac supply. The illuminated versions of the switch are available with a red, green or blue actuator.



FEATURES

- Contact rating options:
 - o 16 A at 125 V ac/4 A at 250 V ac
 - o 16 A at 12 V dc
 - o 6 A at 28 V dc
- Minimum 10,000 make and break cycles at full load
- 100 MΩ minimum insulation resistance at 500 V dc
- Operating-temperature range: -25°C to 85°C

APPLICATIONS

- Control panels
- Heavy-duty equipment
- Industrial instruments

























optimization, and interoperability By Monolithic Power Systems



up to 22 million pounds of e-waste each year. This article will discuss USB Type-C connectors: how they work, how they are specified, and their typical applications, while using Monolithic Power Systems products to highlight how USB Type-C connectors can be optimized.

USB Type-C connectors The USB Type-C, also called USB-C, specification was published in 2014, and these connectors quickly gained popularity due to their ctors are reversible, meaning they do not require a

connectors, as shown in Figure 1. In particular, USB Typewider range of portable applications.

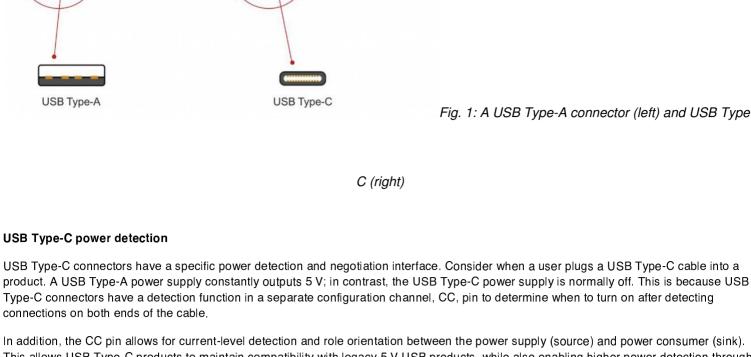


Figure 2 shows the basics of USB Type-C power detection.

the use of the USB Power Delivery (USB PD) protocol, which also uses power negotiation on the CC pin.

Source

This allows USB Type-C products to maintain compatibility with legacy 5 V USB products, while also enabling higher power detection through

CC Pin

Sink monitors for

orientation and

current

advertisement

Max Power Output

4.5 W or 7.5 W

2.5 W

7.5 W

7.5 W

15 W

Fig. 3: Communication over a

Fig. 1: A USB Type-A connector (left) and USB Type-

Cable

USB Type-C power levels

Mode of Operation with USB Type-C

Default USB Power (USB 2.0)

Default USB Power (USB 3.2)

Default USB Power (BC1.2)

USB Type-C 1.5A

USB Type-C 3.0A

USB Power Delivery

PD Communication

USB PD SPR

USB Type-C connectors are very powerful, and they support various newer standards, such as USB PD, USB 3.1, and DisplayPort. Older USB connectors can provide more than 7.5 W in a single direction, but USB Type-C can support single-direction and bidirectional applications up to 15 W with standard cables and minimal additional circuitry, as well as applications exceeding 15 W with USB PD compatibility. USB PD in the standard power range (SPR) can support up to 20 V at 100 W. A recent update to the USB PD specification called extended power range (EPR) can now supply up to 240 W. In addition, USB PD allows for bidirectional power flow, meaning a device can provide or

receive power, unlike single-direction connectors, such as a micro-B USB, which can only receive power. This wide power delivery range means that USB Type-C with PD can easily charge both smartphones and laptops. However, not all USB Type-C implementations support

Fig. 2: USB Type-C configuration channel on the CC pin

USB PD EPR Configurable up to 48 V 240 W Table 1: Power outputs over a USB Type-C connector

Type-C sources can supply up to 15 W of power at 5 V/3 A, while USB PD sources can go above 5 V, and thus exceed 15 W. Increased power delivery means that USB PD can charge devices much faster than legacy connectors. In addition, USB PD specifies the voltage and

USB PD can provide up to 240 W of power and is capable of bidirectional operation, meaning it can supply or receive power. Non-PD USB

For example, there are certain smartphones that utilize the USB Type-C connector. However, these phones only charge fast when plugged into a specific charging adapter with a specific cable because the product does not use USB PD. That means an off-the-shelf USB PD charging adapter may not charge the product quickly, even if its power rating is equivalent to the in-box adapter. This causes user confusion,

Data is transferred along the CC line

Cable

VBUS Source

USB Type-C connectors: compliance, safety, and optimization

features offered by Monolithic Power Systems' power management ICs.

adds to e-waste, and makes the product's safety and reliability dependent on a specific manufacturer's confidential charging protocol.

sources, from 100 mA to 1.5 A.

VBUS Source

protection circuit.

transient surge occurs.

recommended.

the temperature.

applications.

Monolithic Power Systems products for USB Type-C connections

into two distinct categories; applications that require ≤15 W, and applications that exceed 15 W.

sink CC controller operation. The MP2722 is an excellent choice for these applications.

These solutions provide DRP, and are typically organized into two main categories:

15 W charger IC that can both charge the battery, as well as provide a 5 V output and DRP CC controller.

Use case for safety and optimization

concerns.

Rather than obtain the certification, some manufacturers try to reduce costs by meeting the minimum physical requirement for a USB Type-C connector that can supply or receive power. Although this approach reduces cost, the missing features and functionality can result in safety risks that could lead to damage to the device itself or other products connected to it. Uncertified USB Type-C products can experience a myriad of failures and pose safety concerns, but there are ways to mitigate these issues with robust protection functions that protect the cable, source, and sink. Some of these concerns — as well their solutions — are discussed below. Point 1 describes a benefit of certified USB Type-C sinks, while the remaining points describe additional protection and optimization

1. Input-current detection on the CC pin: consider USB Type-C implementations without PD compatibility, for those below 15 W. A USB Type-C source can advertise three current levels: default, 1.5 A, and 3 A, where default is meant to be backwards-compatible with older USB

compliant sink can detect the value on the CC pin and adjust its input current limit accordingly to avoid drawing too much current from the source. Once a current limit is set, the sink can dynamically change how much current it draws as the source changes its advertisement. To reduce costs, some manufacturers place two resistors on the sink's CC pins so that the source turns on 5 V when the cable is connected between them, as shown in Figure 4. This configuration is only allowed if the sink does not draw more than the default current, as negotiated Cable

When resistors are used instead of proper input current detection, the sink does not look at its own CC pin. For example, if a computer has a USB Type-A port, it may only be capable of supplying 500 mA. If a sink does not recognize that its source can only supply 500 mA, it might try

Charger ICs in the sink typically also have an input-voltage loop, but this only prevents the input voltage from dropping too low. There is no guarantee that the sink charger IC's minimum input-voltage loop will react quickly enough, or be set high enough, to prevent damage to the source. Therefore, this protection should be treated as a backup to CC current detection and input current limiting, instead of the primary

Note that the simple resistor pull-down implementation can be used for sink applications that do not consume more than 1.5 A and implement

The USB Type-C specification does not require sinks to implement BC1.2 if they support CC pin detection. However, if the sink does not implement BC1.2, then only a maximum of 500 mA can safely be drawn from a USB 2.0 source advertising a default current on the CC pin. Adding BC1.2 to the sink allows for up to 1.5 A to be drawn from sources advertising a default current, such as legacy sources: this supplies

3. Non-compliant legacy cable detection: a legacy cable is defined as having a USB Type-C connector on one end and a different, legacy USB connector on the other end. To advertise the current level to the sink, legacy USB Type-A cables must implement a 56 k Ω pull-up resistor from the CC pin to the VBUS pin on the USB Type-C side. However, there are non-compliant legacy USB Type-C cables that are

CC Pin

Fig. 4: Input current detection using resistors

at a source with a 500

It is important for the sink to detect the source's CC pin advertisement to determine how much current can be drawn. A USB Type-C

BC 1.2 detection, as shown below.

This can lead to incorrect input current limit detection, as described with input current detection using the CC pin, or to an over-voltage event on the sink's CC pin, since the sink's CC pin may be directly shorted to VBUS. To avoid these problems, the USB Type-C sink device should be able to detect when a non-compliant legacy USB Type-C cable is attached, to protect the CC pins. 4. Over-voltage protection for the VBUS and CC pins: SPR PD charging adapters can go up to 21 V, and non-PD charging adapters can go up to 5.5 V. Therefore, it is recommended to protect VBUS up to at least 21 V in case there is a PD adapter malfunction or a VBUS

Under normal operating conditions, the CC pin should never experience a high voltage, since CC is either not physically connected to VBUS, for instance with a USB Type-C cable, or it is connected to VBUS through a 56 k Ω resistor, with a legacy cable. However, since the CC pins are physically located adjacent to the VBUS pins, it is possible for debris in the connector to create a short between them. It is also possible that a non-compliant cable could short VBUS to the CC pin. To protect the CC pins against both use cases, over-voltage protection is highly

uch as the MP2722 n s whether the cable is non-All FETs are Integrate С Input System CC2

Consider a cable that does not have USB Type-C on both ends. A charger IC could detect when a device has been plugged in, analyze the current limit, and determine whether the cables are compliant. For USB Type-C to USB Type-C cables, the CC pin passes all the way through

For legacy Type-A to Type-C cables, however, a resistor pulls up the CC voltage to VBUS. A few years ago, many of these cables were non-

VCC STAT/IB PG/NTC2 BATTSN RS NTC1 N PA

MP2651, which can both be used to create a complete USB PD solution. MP2722 USB Type-C battery charger

VBL

Figu

sink, source, or dual-role power solutions:

tablets — USB PD compatibility is required.

required is a 5 V regulator and a source CC controller.

more details, see the MP2731 USB PD reference design.

MP2731 USB PD battery charger The MP2731 is a 15 V, 4.5 A, switch-mode battery charger with NVDC power path, as well as an integrated ADC and I2C interface, A reference design using the MP2731 and external USB PD controller provides a complete solution for USB PD applications while complying with USB PD 3.0 specifications.

This design offers a DRP USB Type-C port that allows bidirectional power and fast charging in sink mode. When a USB input is present, the charger is configured as a sink and charges the battery. If a USB PD sink is connected to the port, the charger acts as a source and supplies

The MP2731 PD design can provide up to 18 W of PD fast charging. In addition, the MP2731 integrates an input-blocking FET, which makes using an additional USB PD input FET configuration optional, reducing BOM cost and PCB size. This design is recommended for any 1-series

The MP2760 is a 20 V, 6 A, buck-boost charger with NVDC power path for battery packs with from 1 to 4 cells in series. The charger features four integrated switching FETs, ADC, and I2C interface in an extremely compact solution. It can operate in boost mode, buck mode, and buck-boost mode, depending on the input and battery voltages. By operating in reverse, the MP2760 can power the input from the battery in source mode. The MP2760 battery charger is compliant with USB PD DRP operation across the full range of SPR voltage and current levels. The MP2651 is pin-compatible with the MP2760, but is optimized for applications that do not require an NVDC power path, such as power banks, power tools, and battery back-up products. Both devices are implemented with the CCG3PA USB PD controller to create a complete USB PD solution, shown in Figure 7. This solution inserted, the port can act as a sink and charge the battery. If a contains a DRI

MEZS7-1S-4SPDCharger

MP2760

PD Controller MP2013A CCG3PA

I2C

a regulated output voltage using the battery as the power source.

MP2760 and MP2651 boost, buck and buck-boost battery charger

sink is inserted

12C interface. 7

USB Type-C Connector

cell applications requiring faster charging through the implementation of USB PD.

- Conclusion USB Type-C connectors are versatile, incredibly small compared to older connectors, backwards-compatible with older USB standards, and can deliver high power up to 240 W.
 - 10110 **INFORMATION DATASHEET** DATASHEET #2

EU mandate for a common charger In June 2022, the EU parliament approved a mandate that will require the next generation of portable devices to be compatible with USB Type-C charging connectors. Manufacturers have until late 2024 to make their products compatible with USB Type-C cables by adding a USB Type-C connector. Affected product types include mobile phones, digital cameras, handheld video game consoles, portable speakers, keyboards, portable navigation devices, earbuds, mice, e-readers, headsets, and headphones. Laptops are also included, though manufacturers do not need to adhere to this mandate until 2026. In 2027, the EU parliament plans to add additional devices to this mandate. It will reconvene every five years thereafter to consider other applications. As this mandate begins to take effect, manufacturers will be required to offer a version of their product without a charging adapter; they can optionally offer an additional version with a charger included. If a consumer already owns a USB Type-C charging cable and charger, they can save money and reduce e-waste by opting for the version of the product without a new charger. It is estimated that this mandate can prevent

Source advertises

current and monitors

for connection

USB PD and this will be discussed in greater detail later in the article. Table 1 shows the different power levels for different modes of operation that are compatible with USB Type-C connections.

Nominal Voltage

5 V

5 V

5 V

5 V

5 V

Max Current

900 mA or 1.5 A (single- or dual-lane)

PD Communication

CC Pin

500 mA

1.5 A

1.5 A

3 A

current tolerances for both the source and sink. For products that support USB PD, there are two additional chips required (called PD controllers): one chip in the power supply (source), and a second chip in the portable device (sink). Using these two chips, the product communicates through the cable using the CC lines of each chip. The source communicates the voltage and current that it can support, while the sink, such as a speaker or phone, communicates the voltage and current that it requires. The source adjusts its output accordingly to ensure that the optimal voltage and current are supplied to the sink. Because these two chips increase costs, USB PD is typically not implemented for applications that can get by with less than 15 W of

USB PD interface

The requirement to implement USB PD for applications needing more than 15 W is part of the EU mandate. Although some companies have unique protocols to negotiate for higher voltage and power, the new EU mandate states that these other methods are not allowed, in order to ensure interoperability between different charging adapters and devices, and to maintain safe operation. Furthermore, using a protocol other than USB PD to increase the voltage above 5 V is specifically banned in the USB Type-C specification due to safety and interoperability

decide whether to submit their product for USB Type-C certification, which means the USB Type-C logo can be used on the product.

As manufacturers work to implement USB Type-C technology in their products, it is vital for them to recognize the difference between an implementation that is physically sufficient versus one that meets the requirements of the USB Type-C specification. A manufacturer can

2. BC1.2 and proprietary charger detection: BC1.2 is the standard that defines how a sink can detect the current output capability of a source that either does not have a USB Type-C connector, a legacy source, or supplies less than 1.5 A. This detection process is executed by using the D+ and D- pins. Proprietary charger detection adds to BC1.2 by allowing the sink to detect common charging adapters.

more power, shortens charging time, and leads to a better end user experience.

to draw 3 A, which would create an over-current condition and potentially damage the source's port.

either missing a pull-up resistor, floating or shorted, or they have a resistor of the incorrect value.

the cable, the source supply applies pull-ups, and then the sink, with charger IC, applies pull-downs.

pins. This is especially common in dual-role port or source applications, where the product applies a pull-up voltage or current to the CC pin while advertising source mode. If the product makes contact with any electrolytic liquid, such as water, then the device should be able detect this, force the product into sink mode by removing the CC pull-up bias and VBus, and alert the user. 6. Connector temperature monitoring: the USB Type-C connector has four VBUS pins and four ground pins in parallel. As the connector gathers debris or wears out over time, some pins may experience open-circuit conditions, which disrupts current flow and results in current crowding in the remaining pins. This additional current heats the connector. To avoid overheating and possible permanent damage, a USB

Type-C product should be able to monitor these conditions, alert the user if the connector must be cleaned, and reduce its current to lower

5. Connector moisture detection: Moisture on the connector can cause corrosion and damage over time, which can lead to shorted or open

w Host Fig. 5: Features of the

Monolithic Power Systems MP2722 switch-mode battery charger

A safe and compliant solution has a charger, over-voltage protection chip, and CC controller chip, or a chip that detects the CC pin. Some manufacturers forgo the CC pin detection and the over-voltage protection chip in the sink to reduce costs. While this implementation electrically functions for a sink, it does not ensure the safety of the attached products. Furthermore, this cannot be used for dual-role power

Monolithic Power Systems offers solutions that cover a wide range of USB applications. Rather than settle for parts that only meet the bare minimum implementation for USB Type-C connections, these products provide additional benefits for compliance, safety, and functionality.

A USB Type-C capable power management IC should be selected for the specific application. Generally, these products can be separated

smartwatches, and some tablets. These products do not necessarily require USB PD compatibility, and can simply rely on a CC controller to determine current level and device power role. Not requiring USB PD reduces cost because neither the source nor the sink require an

additional PD controller IC. Most products requiring less than 15 W use a single-cell battery or multiple cells in parallel. These products can be

• Sink only: For applications that only require a sink, a single-direction, 5 V, 15 W charger IC can be used to charge the battery and perform

Dual-role power (DRP): DRP solutions are bidirectional, meaning they can both sink and source power. The MP2722 is a bidirectional, 5 V,

For applications that require >15 W — laptops, power banks, large speakers, power tools, medical devices, and high-end smartphones and

• Single-cell USB PD: single-cell USB PD solutions, or multiple cells in parallel, are typically used in mid- to high-end phones, tablets, and power banks with a power rating of more than 20 W. The MP2731 buck charger is designed for implementation in these applications. For

 2- to 4-series cell USB PD: USB PD solutions with multiple cells in series are typically used for laptops, tablets, gaming devices, medical equipment and power banks that require more than 20 W. These applications require a buck-boost charger, such as the MP2760 or

The MP2722 is a highly integrated, 5 V, switch-mode battery charger for lithium-ion and lithium-polymer batteries. This battery charger provides narrow-voltage dc (NVDC) power path management, and can supply up to a 5 A charge current. It is fully compliant with USB Type-C 1.3 and provides an integrated CC DRP controller for bidirectional 15 W regulation in source or sink modes. The MP2722 also integrates 26 V over-voltage protection on the VBUS pin and 22 V over-voltage protection on the CC pins, and an I2C interface for flexible configurations.

Other 15 W DRP USB Type-C implementations require a separate charger IC, DRP CC controller, and an over-voltage protection IC for the

m area and cost savings, as shown in

ttery. For additional flexibility, both parts can be configured via an

medical devices, point-of-sale systems, drones, and cameras.

Source only: Source-only applications include power supplies and car chargers. These applications do not need a battery, so all that is

For applications ≤15 W, end product types include smartphones, point-of-sale (POS) systems, speakers, e-cigarettes, headphones,

CC Controller CC1 CC2 Charger OVP IC Fig. 6: Comparison of a traditional solution for USB Type-C charging with the MP2722 In addition, the MP2722 supports advanced USB Type-C features, which make it compliant, safe, and highly optimized. These features include connector temperature monitoring, connector moisture detection, non-compliant legacy cable detection, and BC1.2 for optimization with legacy charging adapters. Due to its small solution size and complete USB Type-C feature integration, the MP2722 is ideal for any 1series cell application for USB Type-C connectivity.

I2C

Fig. 7: USB PD solution based on the MP2760

By following the specifications for USB Type-C and USB PD and optimizations discussed in this article, manufacturers help to maintain interoperability between products, provide protections that can extend the product's lifetime, and contribute to the EU's goal of e-waste reduction. Although the common charger mandate in the EU is a recent development, MPS has long been creating charger ICs and battery management devices designed to cover a wide range of USB Type-C and USB PD applications. Buyers and manufacturers of portable

applications can benefit from its extensive portfolio as USB Type-C connectors become more and more common worldwide.

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FEATURES

Mbit/s

onsemi

 Bluetooth Low Energy 5.2 certified:
 Backwards compatibility with earlier Bluetooth specifications

• 4.3 mA peak Transmit current at 0

• -94 dBm sensitivity at 2 Mbits/s data

· Configurable output-power range: -

• Supply-voltage range: 1.2 V to 3.6 V

· Industrial automation and sensing

36 nA sleep mode current2.7 mA peak Receive current at 1

dBm output power

17 dBm to +6 dBm

APPLICATIONS

Wearable devicesAsset tracking

· Electronic tags

Access controlElectronic labels

Data loggers

Smart appliances

· Connected medical sensors

· Energy-harvesting switches

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Evaluation and development board for the

RSL15 Bluetooth wireless microcontroller.

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Bluetooth Low Energy MCU provides integrated solution for smart connected devices

The RSL15 Bluetooth Low Energy MCU from onsemi protects connected devices with a comprehensive set of advanced security functions including TrustZone support and root-of-trust.



The RSL15 from onsemi, a secure low-power wireless microcontroller which implements Bluetooth[®] Low Energy 5.2 networking, provides a complete set of control and connectivity functions for smart devices in industrial and medical applications.

Based on an Arm[®] Cortex[®]-M33 processor core, the RSL15 features built-in power management, a wide supply-voltage range suitable for coin cells, a flexible set of GPIOs, and an extensive set of peripherals. The RSL15 includes 80 kbytes of RAM. The MCU supplied in a WLCSP package has 512 kbytes of Flash memory, while the QFN-packaged MCU has either 284 kbytes or 512 kbytes

The RSL15 is backed by a comprehensive but easy-to-use software development kit (SDK) which includes a cybersecurity platform. It also provides various sample applications which demonstrate key features such as:

- Low-power Smart Sense mode for acquiring sensor data
- Tools for configuring power-management functions
- Bluetooth Low Energy functions
- Ultra low-power sleep modes

onsemi has ensured that connected devices based on the RSL15 are protected against cyber-attack. The RSL15 provides a comprehensive mix of security capabilities, including Arm TrustZone® technology, which provides trusted execution environments for at-risk peripherals and functions. The RSL15 also features Arm CryptoCell™-312 technology to provide root-of-trust and additional security mechanisms such as:

- True random number generator
- Standard encryption accelerators
- Support for a wide range of encryption functions, including:
 - o AES 128/192/256
 - ∘ SHA
 - o Public key infrastructure
 - Elliptic curve cryptography
 - Message authentication
- Secure boot embedded in hardware ROM
 - $\circ\,$ Hardware-based root-of-trust using secrets stored in dedicated hardware
 - Managed life-cycle model
- Secure key storage
- Secure debug controlled with certificates

The RSL15 supports capabilities provided by the Bluetooth 5.2 specification, including extended advertising, long range, a data-transmission rate of up to 2 Mbits/s, up to 10 simultaneous connections, and localization through detection of the angle of arrival and angle of departure of wireless transmissions.

The low power consumption of the RSL15 has been verified by the Embedded Microprocessor Benchmark Consortium. The MCU achieved a score of 60.5 on its ULPMark™-CoreMark benchmark in the performance category, the best in its class. On the ULPMark-CoreProfile benchmark, which calculates the deep-sleep efficiency of MCUs, the RSL15 holds second place, only behind the onsemi RSL10 wireless MCU.

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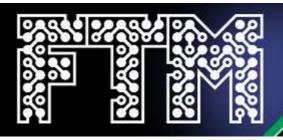












Integrated matching network and filter IC optimizes wireless performance of Bluetooth and Zigbee radios

The MLPF-WB-02D3 IC from STMicroelectronics integrates an impedance matching network and filter, and provides a ready-made RF circuit optimized for the STM32WB5x and STM32WB1x wireless microcontroller modules.



if a guamented

FEATURES

- 50 Ω nominal impedance on antenna side
- Low insertion loss
- 630 µm height after reflow

APPLICATIONS

- Short-range RF systems
 - o Bluetooth® 5.0
 - OpenThread
 - Zigbee
 - o IEEE 802.15.4

The MLPF-WB-02D3 IC from STMicroelectronics provides a ready-made impedance matching network and filter that optimize the RF performance of the STM32WB5x and STM32WB1x wireless microcontroller modules.

The impedance network is matched to the STM32WB5x and STM32WB1x devices in wafer-level chip-scale or ball-grid array packages. The filter provides deep rejection of harmonics.

The MLPF-WB-02D3 uses ST integrated passive devices (IPD) technology on a non-conductive glass substrate to provide outstanding RF performance. The device is supplied in a 1.6 mm x 1.0 mm chip-scale package with six bumps.



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INFORMATION



DATASHEET





















Antennas offer high reliability and sensitivity in IoT devices

Abracon supplies a versatile range of external whip antennas, chip antennas and multi-protocol antennas for IoT devices to connect wirelessly over long or short range, and to maintain accurate satellite positioning inputs.





FEATURES

- -6 dB maximum return loss
- Linear polarization
- 3 dBi peak gain
- 50 Ω impedance

APPLICATIONS

- IoT devices
- Machine-to-machine communications
- Set-top boxes

Abracon supplies a wide range of high-performance antennas and filters to support the connectivity requirements of new IoT device designs.

The range includes antennas for various long- and short-range radio technologies:

- Cellular telephone connectivity: 4G LTE and 5G
- Global navigation satellite systems (GNSS) positioning
- Wi-Fi[®] networking
- Bluetooth[®] networking
- Low-power wide-area networking (LPWAN)
- Ultra-wideband (UWB)
- · Industrial, scientific and medical bands (ISM)
- RFID
- SATCOM

The Abracon range includes the PRO-EX-296, a compact external whip antenna which is optimized for Wi-Fi and Bluetooth networking signals at a frequency of 2.4 GHz. The PRO-EX-296 offers high reliability and sensitivity. Easy to install, it offers customizable cable and connector options.

Abracon also supplies the ACAR0301-SW2 internal dual-band 2.4 GHz/5.5 GHz chip antenna for Wi-Fi connectivity. This low-profile chip antenna offers gain of 1.0/2.5 dBi. It has an omnidirectional pattern, and a low voltage standing-wave ratio of 2.0.

The AECW0801C09S IP67 external antenna is a multi-protocol combination product for GNSS, 4G cellular and Wi-Fi communication.

For satellite positioning, the AECW0801C09S supports GPS, GLONASS, BeiDou and QZSS constellations. Global 4G cellular band coverage includes CAT-M and NB-IoT networking. Easy to install, this antenna offers fully customizable RF cable and connector options.



















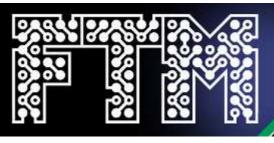












Integrated H-bridge IC simplifies design of motor driver circuits

MPQ6615 and MPQ6615-AEC1 ICs from Monolithic Power Systems provide a complete solution for driving motors operating from an input voltage up to 40 V, and with an output current up to 8 A.



The MP6615 from Monolithic Power Systems is an integrated H-bridge dc motor driver which implements a full bridge made up of four N-channel power MOSFETs. The motor driver also integrates pre-drivers, gate driver power supplies, and bidirectional current-sense amplifiers, enabling designers to reduce component count, simplify their board layout and save space.

The motor driver is also available in an AEC-Q100 grade 1 qualified version, with the part number MPQ6615-AEC1. Both parts operate over an input-voltage range of 4.75 V to 40 V.

The MP6615's 11 m Ω MOSFETs supply a continuous output current of up to 8 A. An internal charge pump is used to supply the gate driver for the high-side MOSFETs. A trickle charge circuit maintains a sufficient voltage at the gate driver to operate at a 100% duty cycle.

Internal safety features include thermal shutdown, under-voltage lockout, and over-current protection.

The MP6615 is supplied in a 6 mm x 6 mm TQFN-26 package.



FEATURES

- Protection functions:
 - o Under-voltage lockout
 - o Over-voltage protection
 - o Over-current protection
 - o Thermal shutdown

APPLICATIONS

- Industrial equipment
- Automotive systems:
 - o Brushed dc motors
 - o Door lock and latch motors
 - Seat actuators

FREE DEV BOARD

H-bridge dc motor driver evaluation board for automotive applications.

Orderable Part Number EVQ6615-QK-00A

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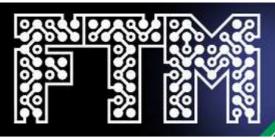












Ac-dc power modules feature very low stand-by power consumption

RAC15-K modules from RECOM enable developers to achieve low average power in systems such as wireless IoT devices that draw brief bursts of peak current for radio transmissions between long periods in sleep mode.



The RAC15-K series of 15 W ac-dc power regulation modules from RECOM are ideal for IoT and wireless applications which spend long periods in stand-by mode, thanks to their low energy losses especially in light-load conditions.

These highly integrated power modules support a universal mains input-voltage range of 85 V ac to 264 V ac, and are also specified for a dc input-voltage range of 120 V to 370 V. The modules are available in four variants with a fixed output voltage of 5 V, 12 V, 15 V, or 24 V dc. Typical peak conversion efficiency is up to 86%.

Operating over a temperature range of -40°C to 85°C, the RAC15-K products hold international safety certifications for a wide range of end product types, including industrial equipment, audiovisual and IT equipment, and household appliances. They provide fully protected single or dual outputs.

The modules achieve EMC Class B compliance without the need for external components. The RAC15-K modules are supplied in a standard 2" x 1" surface-mount package outline. They are available from stock in high volume from Future Electronics.

RECOM

FEATURES

- Ultra high-efficiency over entire load range
- For Class II installations
- 40 mW no-load power consumption
- 100 mVp-p output ripple and noise
- Protection functions:
 - o Over-current
 - o Over-voltage
 - o Short-circuit
- Three years' warranty

APPLICATIONS

- Industrial equipment
- IoT edge devices
- Home appliances
- Computing equipment
- Audio-visual equipment

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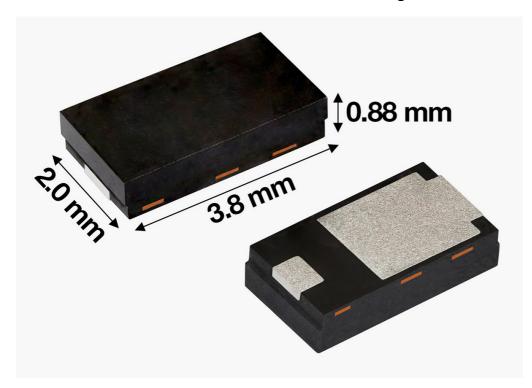






Ultra-fast 200 V rectifiers save space and improve thermal performance

With 1 A V, 2 A, 3 A, and 5 A options, the VS-xEAH02xM3 rectifiers from Vishay, in a new Power DFN package, enable power-system designers to increase current-handling capability with a smaller board design.



Vishay has introduced four series of 200 V FRED Pt ultra-fast rectifiers which handle higher current and occupy less board space than widely used competing components.

The 1 A-rated VS-1EAH02xM3, 2 A VS-2EAH02xM3, 3 A VS-3EAH02xM3, and 5 A VS-5EAH02xM3 rectifiers are housed in a low-profile Power DFN3820A package with wettable flanks. The package measures 3.8 mm x 2.0 mm x 0.9 mm. Compared to rectifiers in the SMP (DO-220AA) package with the same footprint, the VS-1EAH02xM3, VS-2EAH02xM3, VS-3EAH02xM3, and VS-5EAH02xM3 offer a 12% lower profile and more than double the current rating.

The rectifiers also offer equivalent or higher current ratings than larger devices in conventional SMB (DO-214AA) and SMC (DO-214AB) packages, as well as the eSMP series SlimSMA (DO-221AC), SlimSMAW (DO-221AD), and SMPC (TO-2778A) package styles.

The components' optimized copper mass, and the advanced die placement technology used in their assembly, provide for superior thermal performance that enables operation at high currents.

Each part is available in an AEC-Q101 qualified version. The package's wettable flanks for sidewall plating allow easy inspection with automated optical inspection, with no X-ray necessary.



FEATURES

- Reverse leakage current as low as 1 μA
- Operating-temperature range: -55°C to 175°C
- Forward voltage drop as low as 0.71
- Ideal for automated placement operations

APPLICATIONS

- · Automotive systems
- Small mobility devices
- Telecoms infrastructure
- Entertainment equipment
- Home appliances
- Industrial equipment
- Automation systems
- Motor drives
- Tools
- Home and building automation
- Medical equipment

















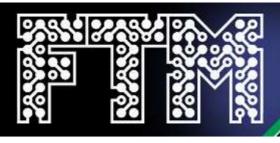








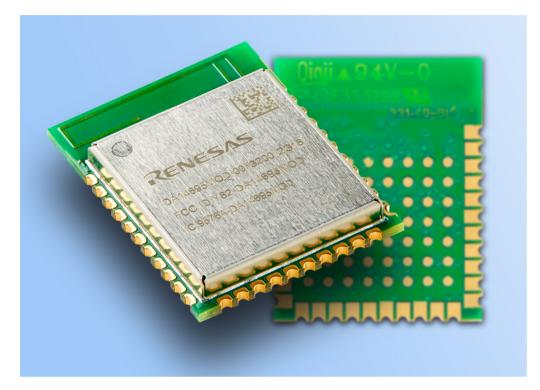






Fully integrated wireless module cuts development time for Bluetooth Low Energy systems

New DA14695MOD module from Renesas is built on the DA14695 Bluetooth[®] Low Energy networking SoC, and includes an antenna, memory and passive components in a compact surface-mount package.



Renesas has launched a fully integrated wireless module which provides a ready-made way to implement Bluetooth Low Energy networking, accelerating time-to-market and reducing design risk.

Based on the SmartBond DA14695 Bluetooth Low Energy v5.2 system-on-chip (SoC), the DA14695MOD integrates all the passive components required for a Bluetooth radio, along with an antenna and 32 Mbits of quad SPI Flash memory. The module is backed by an easy-to-use software development suite.

Particularly well suited to systems powered by a rechargeable battery, the DA14695 Module features a built-in JEITA-compliant USB charger including fuel gauge. It is supplied in a compact surface-mount package which measures 20 mm x 15.9 mm x 2.5 mm.

The DA14695 SoC on which the module is based is centered on an Arm[®] Cortex[®]-M33 microcontroller core with floating-point unit and DSP extensions. The SoC includes advanced power management functions, a cryptographic security engine, display controller, and analog and digital peripherals. The DA14695 SoC also features a Cortex-M0+ core that runs the software-configurable Bluetooth v5.2 media access controller and radio.

A programmable sensor node controller runs sensor node operations and data acquisition without intervention by the Cortex-M33 CPU, resulting in very low power consumption. The advanced power management unit in the DA14695 enables it to run on primary or rechargeable batteries, as well as to provide power to external devices through the integrated dc-dc converter and integrated LDOs.



FEATURES

- +6 dBm output power
- -97 dBm sensitivity
- Cryptographic engine algorithm support:
 - o AES-256
 - o SHA-1
 - o SHA-256
 - o SHA-512
- · LCD display controller
- 8-channel, 14-bit sigma-delta ADC
- FIPS 140-2-compliant true random number generator
- Real-time clock with 10 ms resolution
- Four general-purpose, 24-bit timers with PWM

APPLICATIONS

- Connected medical devices
- Asset tracking
- Wearable devices
- Fitness tracker wristbands and sports watches
- Home automation
- Voice-activated remote controls
- Gaming controllers
- Access control systems
- · Industrial automation





























Configurable PCIe packet switches offer broad design flexibility

Automotive-qualified PI7C9X3G606GPQ, PI7C9X3G808GPQ, and PI7C9X3G816GPQ from Diodes Incorporated ensure low latency and high availability in high-speed data processing applications such as telematics, ADAS and infotainment systems.



Diodes Incorporated has launched a series of automotive-compliant PCI Express[®] (PCIe[®]) 3.0 packet switches for in-vehicle networking applications that perform high-speed data processing.

The architecture used in these PCIe packet switches enables flexible port configuration: upstream, downstream, and cross-domain end-point (CDEP) ports may be assigned according to the application's requirements, with variable lane widths for each port.

The new parts are:

- PI7C9X3G606GPQ: 6-port/6-lane operation, 10 mm x 10 mm 144-pin chip-scale package
- PI7C9X3G808GPQ: 8-port/8-lane operation, 15 mm x 15 mm 196-pin BGA package
- PI7C9X3G816GPQ: 8-port/16-lane operation, 19 mm x 19 mm 324-pin BGA package

Because of these PCIe packet switches' high signal integrity, they can operate in board designs that have long trace lengths in which attenuation is higher than 30 dB. The switches can connect with up to seven different endpoints, and support multi-host applications, including with up to eight physical or 16 virtual DMA channels. Each switch features a built-in low-power clock buffer, a feature which simplifies board designs, saves space, and reduces component count.

The PI7C9X3G606GPQ, PI7C9X3G808GPQ, and PI7C9X3G816GPQ are AEC-Q100 Grade 3 qualified for use in automotive applications. Manufactured in IATF 16949 certified facilities, the packet switches support PPAP documentation.



FEATURES

- Less than 150 ns packet forwarding latency
- · Diagnostic software tools:
 - o PHY eye
 - MAC viewer
 - o Online remote loopback PRBS
 - o Compliance tests
- Reliability and monitoring features:
 - o Advanced error reporting
 - o Error handling
 - o End-to-end data protection
- Hot-plug and surprise removal capability

APPLICATIONS

- Automotive systems:
 - o ADAS
 - o ECUs
 - o Infotainment systems
 - o In-vehicle communication
 - o Central controllers
 - Telematics systems
 - o Cockpit controls















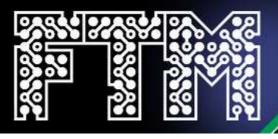












Compact LoRaWAN module offers low-power, application-ready platform

The Murata Type 1SJ module is a complete system including LoRaWAN radio, 32-bit microcontroller, memory, and system communications interfaces, giving designers a fast and easy way to implement low-power, wide-area networking.



The Type 1SJ LoRaWAN™ LBAA0QB1SJ module from Murata is suitable for a wide range of high-volume applications in which small size, long range, extended battery life, security, and a competitive price point are requirements.

Measuring just 10.0 mm x 8.0 mm x 1.6 mm, the Type 1SJ is based on a second-generation Semtech SX1262 LoRaWAN radio chip, and an STM32L072 microcontroller from STMicroelectronics on which developers can run their application software. The module, which has the part number LBAA0QB1SJ, also includes:

- RF switch
- 192 kbytes of Flash memory and 20 kbytes of RAM
- Temperature-controlled crystal oscillator
- Multiple communication interfaces
- Various GPIOs

The module supports ISM bands between 868 MHz and 916 MHz, including those used in Europe, the US, India, and countries in the Asia-Pacific region.

Operating from a single supply rail up to 3.9 V, the Type 1SJ module offers several low-power modes that allow the real time clock to operate while drawing a typical current of just 1.3 μ A, often extending the life of a single battery to many years.

The module has RF certification for most regions of the world.



FEATURES

- Performs LoRa and FSK signal modulation
- 118 mA Transmit current at 22 dBm
- 15.5mA Receive current at 125 kHz bandwidth
- -135.5dBm receiver sensitivity
- External antenna
- I2C/UART/USB/serial peripheral interfaces
- Operating-temperature range: -40°C to 85°C

APPLICATIONS

- · Smart metering
- Wearable devices
- Asset tracking
- Machine-to-machine communication
- loT edge nodes
- Smart agriculture
- Building automation
- Smart cities

FREE DEV BOARD

Evaluation kit for Murata Type 1SJ LoRaWAN module.

Orderable Part Number LBAA0QB1SJ-TEMP-EVK

APPLY HERE NOW































Electronic fuse provides resettable electrical protection for 12 V power systems

The STEF12S electronic fuse from STMicroelectronics provides comprehensive protection against over-currents, over-voltages and under-voltages, as well as offering optional reverse-current blocking.



The STEF12S from STMicroelectronics is an electronic fuse which provides over-current protection to high-power equipment operating from a 12 V dc power line.

Connected in series to the main power rail, the STEF12S detects and reacts to over-current or over-voltage conditions. When an overload condition occurs, the electronic fuse limits the output current to a safe value defined by the designer. If the overload condition persists, the fuse goes into an open state, disconnecting the load from the power supply.

In case of an over-voltage on the input, the STEF12S regulates the output to a preset safe value. Under-voltage lockout protection prevents the load from malfunctioning, keeping the device off if the rail voltage is too low.

The STEF12S's DFN10 package features a dedicated pin for controlling the gate voltage of an optional external N-channel MOSFET, which may be used to perform reverse-current blocking if the input voltage is lost.

The turn-on time of the fuse is programmable, which helps the power-system designer to control inrush current during start-up or hot-swap operations.

The electronic fuse is available in a latching version, the STEF12S, or with an auto-retry function, the STEF12SA. The STEF05S is a companion chip for use with 5 V power rails.









SAMPLES



















FEATURES

- 15 V output over-voltage clamp
- 25 V absolute maximum voltage
- · Adjustable current limit
- Thermal protection
- Integrated 40 m Ω power FET

APPLICATIONS

- Servers
- Telecoms and networking equipment
- 12 V industrial equipment





Fast turn-off dual synchronous rectifier offers broad design flexibility

The MP6924A dual intelligent rectifier from Monolithic Power Systems enables designers of LLC resonant converters to use continuous conduction, discontinuous conduction, or critical conduction modes.



MPS

FEATURES

- Operating-voltage range: 4.2 V to 35 V
- 175 μA quiescent current in lightload mode
- Supports high- and low-side rectification

APPLICATIONS

- · Industrial equipment
- · Ac-dc adapters

The MP6924A from Monolithic Power Systems is a dual intelligent rectifier for implementing synchronous rectification in LLC resonant converters. The MP6924A's fast turn-off, with a total delay of 35 ns, enables LLC converters to operate in both continuous conduction and discontinuous conduction modes. The device also supports operation in critical conduction mode.

The IC drives two N-channel standard or logic-level MOSFETs, regulates their forward voltage drop to around 29 mV, and turns the MOSFETs off before the switching current goes negative. The device can latch-off the gate driver under light-load conditions, limiting the current to 175 μ A.

The MP6924A requires a minimal number of readily available, standard external components, and is supplied in an SOIC-8 package.















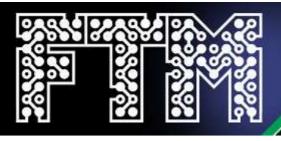












Compact 32.768 kHz tuning fork crystal provides stable output

The surface-mount ECX-31B crystal from ECS Inc. is ideal for industrial applications, and offers various load capacitance options. These crystals are recommended for use in STMicroelectronics microcontroller and microprocessor reference designs.



The ECX-31B from ECS Inc. is a series of 32.768 kHz tuning fork crystals which provide a stable output over an industrial operating-temperature range of -40°C to 85°C.

All versions of the ECX-31B are supplied in an industry-standard, surface-mount 3.2 mm x 1.5 mm x 0.9 mm package with a two-pad footprint, offering a standard equivalent series resistance of 70 k Ω . As standard, these crystals are specified with ± 20 ppm frequency tolerance. A ± 10 ppm tolerance option is available.

Various part numbers in the ECX-31B series can be specified to choose load capacitance options of 6 pF, 7 pF, 9 pF or 12.5 pF.

STMicroelectronics recommends ECS Inc. timing solutions for use with its STM32 LSE and HSE families of microcontrollers and microprocessors. Advice about integrating crystals into STM32-based designs may be found in the ST application note AN2867.

STM32 crystal selection tool available here.



FEATURES

- -0.034 ppm/°C temperature coefficient
- 1.05 pF shunt capacitance
- ±3 ppm maximum aging in first year at 25°C

APPLICATIONS

- Mobile devices
- IoT devices
- Industrial equipment
- · Automation equipment
- · Wireless devices
- Real-time clocks
- Microprocessor circuits
- · Al systems
- Networking equipment















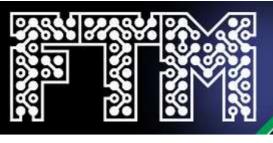














Complete cloud security solution protects IoT devices from cyber-attack

The OPTIGA™ Trust M from Infineon combines a compact hardware security module with comprehensive cryptography and other software to provide strong protection for cloud-connected devices.



The OPTIGA™ Trust M from Infineon is a high-end security solution which provides an anchor of trust for connecting IoT devices to the cloud, giving every IoT device its own unique identity. This individual, turnkey solution offers secure, zero-touch onboarding and the high performance needed for quick cloud access.

The OPTIGA Trust M chips and supporting software offer a wide range of security features. In particular, they support common asymmetric cryptography algorithms including:

- RSA up to 2048
- AES key up to 256, HMAC up to SHA512
- TLS v1.2 PRF and HKDF up to SHA512

The turnkey set-up with full system integration minimizes the design, integration and deployment effort required of product manufacturers. The OPTIGA Trust M's development process is certified according to the security standard IEC 62443-4-1 for industrial automation and control systems, acting as an enabler to achieve component-level certification according to IEC 62443-4-2.

The OPTIGA Trust M security solution is specified in two operating-temperature ranges:

- SLS32AIA010MK at a standard temperature range of -25°C to 85°C for most commercial implementations
- SLS32AIA010ML at an extended temperature range of -40°C to 105°C for harsh industrial environments

The OPTIGA Trust M chip is supplied in a USON-10 package that has a footprint of 3 mm \times 3 mm.



FEATURES

- High-end CC EAL6+ certified security controller
- ECC: NIST curves up to P-521, Brainpool r1 curve up to 512
- Hibernate mode for zero power consumption
- Open-source host code available on GitHub under MIT license
- Up to 10 kbytes of memory
 Protected updates
 - Trotected update
 - Usage countersDynamic object locking
- Configurable device security monitor
- 20 years' lifetime for industrial and infrastructure applications

APPLICATIONS

- Smart lightning
- Smart home
- Building automation
- Industrial robotics
- Programmable logic controllers
- Motor drives
- Drones

FREE DEV BOARD

OPTIGA Trust M IoT security development kit.

Orderable Part Number TRUSTMIOTSDKTOBO1

APPLY HERE NOW





INFORMATION



DATASHEET











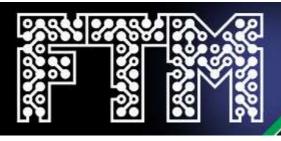












2.4 GHz wireless module provides easy way to implement Bluetooth networking

The STMicroelectronics STM32WB5MMG module is a complete wireless system including antenna, power supply and matching network. Low power consumption makes the module suitable for use with a battery power supply.



The STM32WB5MMG module from STMicroelectronics provides an easy way to implement Bluetooth Low Energy networking using the STM32WB55 wireless microcontroller.

The module supports not only the Bluetooth Low Energy v5.3 specifications, but also the Zigbee 3.0 and OpenThread wireless protocols, as well as proprietary IEEE 802.15.4 protocols operating at 2.4 GHz.

The STM32WB5MMG provides best-in-class RF performance thanks to its good receiver sensitivity and high output power. Its low-power features extend the run-time of small coin-cell batteries or energy harvesting systems.

The STM32WB5MMG requires no RF expertise, and helps to speed up development projects and reduce engineering costs. The module includes royalty-free protocol stacks.

The dual-core STM32WB55 MCU on which the STM32WB5MMG is based includes an embedded ultra low-power radio. It features an Arm Cortex -M4 core with floating point unit, DSP instructions, and a memory protection unit to enhance application security. An Arm Cortex-M0+ co-processor dedicated to managing the integrated IEEE 805.15.4 radio and the MCU cyber-protection features ensure real-time low-layer operations run smoothly without compromising application execution.

ST's patented ultra low-power microcontroller technologies and feature integration, which include the radio balun circuitry, ensure that the STM32WB55 wireless module helps designers to meet tight power and size constraints in a wide range of loT and wearable devices. Alongside generous provision of analog and system peripherals, the MCU's cyber-protection and identity features include secure firmware installation, customer key storage, a hardware public key authority, and cryptographic accelerators.



FEATURES

- Integrated chip antenna
- Dynamic and static concurrent modes
- Up to 75 m range
- 1 Mbyte of Flash memory
- 256 kbytes of SRAM
- Compatible with two-layer PCB
- Certifications: CE, FCC, IC, JRF, SRRC, RoHS, REACH, GOST, KC, NCC

APPLICATIONS

- Home automation
- Smart lighting
- Smart building
- loT devices

FREE DEV BOARD

Discovery kit for Bluetooth wireless microcontroller.

Orderable Part Number STM32WB5MM-DK

APPLY HERE NOW























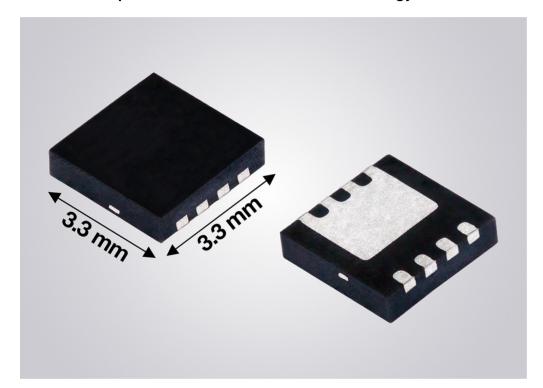






100 V MOSFETs offer improved efficiency in synchronous rectifiers and dc-dc converters

The 100 V SiSS5108DN, SiSS5110DN, and SiSS5112DN TrenchFET® power MOSFETs from Vishay benefit from improved trench semiconductor technology to reduce switching and conduction losses.



The 5th generation of Vishay TrenchFET power MOSFETs offers a superior combination of on-resistance and gate charge to provide for more efficient switching and conduction.

The TrenchFET technology applied in the 100 V SiSS5108DN, SiSS5110DN, and SiSS5112DN MOSFETs makes them ideal for use in synchronous rectification applications, and as the primary-side switch in dc-dc converters.

These 100 V MOSFETs are also tuned for the lowest product of on-resistance and output charge. They are housed in a PowerPAK 1212-8S package which has a footprint of 3.3 mm x 3.3 mm.



FEATURES

- 10.5 mΩ on-resistance at 10 V
- 11.2 nC gate charge
- 55.9 A maximum continuous drain current at a case temperature of 25°C
- 4 V maximum gate-source threshold voltage
- ±100 nA maximum gate-source leakage current

APPLICATIONS

- Dc-dc converters
- Power supplies
- Motor drives

Ⅲ BUY NOW















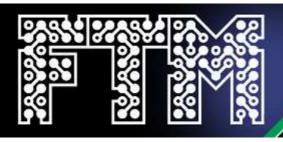






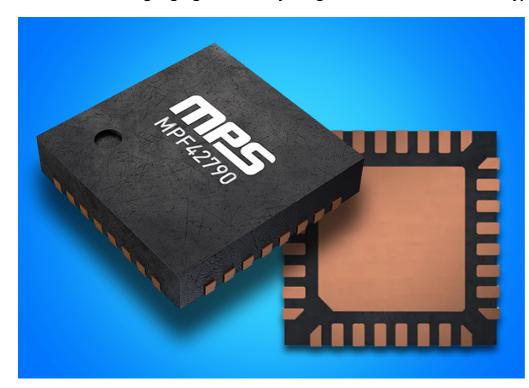






Fuel gauges provide accurate measurement of state of charge for lithium batteries

The MPF4279x family of fuel gauges from Monolithic Power Systems provides a ready-made solution for fuel gauging and battery usage information in the main types of lithium battery.



Monolithic Power Systems supplies a range of fuel gauges for use with various lithium battery chemistries, providing a comprehensive set of battery usage information to enable users to monitor the state of charge and health of their battery.

The Monolithic Power Systems fuel gauges use a sophisticated mixed-mode algorithm to compute not only the battery's state of charge (SOC), but also time to empty, time to full, available power, and state of health.

Fuel gauge systems are available for lithium-ion, lithium-polymer and lithium iron phosphate batteries. They can be paired with any analog front end that has cell-level ADC readings, and with battery packs that have two or more stacked cells.

Battery power system designers can use Monolithic Power Systems reference designs to accelerate the development of applications such as e-bikes and energy storage systems.

Part Number	Number of Series Cells	Battery Chemistry	External SOC Indication	Pack SOC Accuracy	Cell Impedance Monitoring
MPF42793	2 to 16	Lithium Iron Phosphate (LFP)	LED	n/a	Yes
MPF42790	2 to 16	Li-ion, Li-Polymer	LED	±3%	No
MPF42792	2 to 16	Li-ion, Li-Polymer		±3%	No
MPF42795	2 to 10	Li-ion, Li-Polymer	LED	±3%	No
MPF42797	2 to 10	Li-ion, Li-Polymer		±3%	No
MPF42791	2 to 16	Li-ion, Li-Polymer	LED	±2.5%	Yes





INFORMATION

SAMPLES



DATASHEET

















FEATURES

- · Lifetime logging capability
- I2C interface
- Resistance detection: MPF42791
- Thermal model: MPF42791

APPLICATIONS

- Energy storage systems
 - Uninterruptible power supplies
 - o Renewable energy storage
- · Light electric vehicles:
 - o E-scooters
 - o E-bikes
 - Golf carts
- · Automated ground vehicles
 - Industrial robots
 - Floor cleaners
 - o Forklifts
- · Cordless tools
- Garden equipment
- Drones



Integrated flyback controller IC offers high efficiency in appliance power supplies

The Power Integrations InnoSwitch™3-TN enables tight constant-current and constant-voltage regulation without the requirement for any external feedback components, simplifying power-supply designs and saving board space.



The InnoSwitch3-TN offline flyback controller ICs from Power Integrations simplify the development of power supplies for appliances and industrial auxiliary power systems supporting loads up to 21 W.

The InnoSwitch3-TN, supplied in a safety-qualified, compact MinSOP™-16A package, integrates a 725 V primary-side MOSFET, isolated feedback loop, synchronous rectification and secondary-side control.

In smart, connected appliances that require a high output current, the InnoSwitch3-TN devices enable ac-dc power conversion at efficiency of up to 90%, better than traditional approaches such as buck regulators that are often less than 60% efficient. Highly integrated, these Power Integrations flyback converters incorporate all the necessary feedback components while supporting isolated and non-isolated, single- and multi-output designs.

The InnoSwitch3-TN provides constant efficiency across the load range. No-load power consumption is less than 5 mW at 230 V ac.

The flexibility afforded by the Power Integrations FluxLink™ communication technology means that positive and negative outputs can easily be supplied. InnoSwitch3-TN ICs can be used in a 5 V single-output power supply, with two positive output rails, or with both positive and negative rails, without any external feedback components.

Safety-rated FluxLink technology also ensures reliable synchronous rectification and accurate constant voltage and constant current on the output. The low forward drop of the synchronous rectification MOSFET also ensures excellent cross-regulation performance.

Power integrations

FEATURES

- Input-voltage range: 85 V to 265 V ac
- Enables designs that easily meet global energy-efficiency regulations
- Protection functions:
 - o Output over-current
 - o Over-temperature
 - o Output over-voltage
 - Open-gate detection for the synchronous rectification FET
 - o Hysteretic thermal shut-down
- Accurate internal constant-current limit
- Operating-temperature range: -40°C to 150°C

APPLICATIONS

- Home appliances
- Industrial auxiliary power supplies

FREE DEV

Reference design for 12 W dual-output, open-frame power supply for appliances.

Orderable Part Number

APPLY HERE NOW





















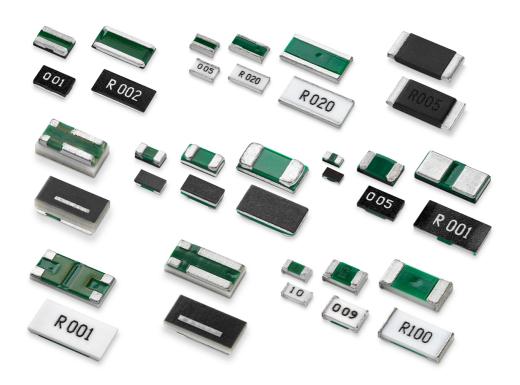






New current-sense resistors ideal for automotive and consumer electronics markets

Current-sense resistors from Littelfuse are notable for precisely specified resistance values, so engineers can use voltage and current monitoring outputs with confidence in applications such as motor control.





FEATURES

- Suitable for ac and dc circuits
- Cost-effective
- Compact

APPLICATIONS

- · Automotive systems
- Electric vehicles
- · Home appliances
- Consumer electronics
- Industrial automation

Littelfuse has announced the launch of new current-sense resistors which offer a more cost-effective solution for functions such as voltage monitoring, battery charging, and motor control, while also providing over-current protection.

The eight new resistors from Littelfuse are metal-foil, metal-strip, or metal-plate resistors optimized for measuring current. They offer a combination of high precision and low resistance. The various resistor families are available in a wide range of case sizes and resistance ratings.

Littelfuse offers its current-sense resistors as a more cost-effective option than other technologies such as Hall-effect sensors, current transformers, flux gate sensors for dc applications, and Rogowski coils for ac applications.

Video: Introducing the CSR series for current and voltage monitoring.





























Cortex-M33 core-based wireless MCU provides for more secure Bluetooth applications

The STM32WBA52 from STMicroelectronics features a high-performance radio which gives long range and a large link budget. A rich set of ST software resources helps accelerate development of security and other features.



The STM32WBA52 wireless microcontroller from STMicroelectronics provides a way for OEMs to implement Bluetooth Low Energy v5.3 wireless systems that achieve SESIP Level 3 security certification.

The STM32WBA52 MCU is based on a single Arm Cortex[®]-M33 core running at 100 MHz, which is the Arm core with the widest range of security capabilities, including TrustZone secure hardware partitioning, trusted firmware, secure boot, and secure debug. Using ST software packages and firmware, developers can create trusted and non-trusted sections to safeguard sensitive information such as cloud credentials or user data.

Supported by a dedicated STM32CubeWBA firmware package, the STM32WBA52 also supports current profiles for STM32WB microcontrollers, facilitating migration from the STM32WB to the STM32WBA series of devices. The STM32WBA52 features higher radio performance than the STM32WB MCUs: output power is up to +10 dBm, increasing a design's link budget.

For low-power applications, the STM32WBA's background autonomous mode (BAM) saves energy by enabling peripherals to use direct memory access without waking the CPU. Engineers can perform sensor monitoring operations in the BAM through an I2C, SPI, or UART interface.

Other new low-power features implemented in the STM32WBA52 enable the device to go rapidly from a connected run mode to a standby mode with the radio context written in the memory. In standby mode with real-time clock running, the MCU only draws 200 nA. Stop mode with 64 kbytes of RAM draws 16.3 μ A.



FEATURES

- Touch-sensing interface
- Advanced motor-control timer
- Maximum 2 Mbits/s data-transfer rate
- 1 Mbyte Flash memory
- 128 kbytes of RAM
- 12-bit ADC
- Hardware security:
 - Anti-tamper pins
 - o Unique hardware key

APPLICATIONS

- Industrial equipment
- Smart home equipment
- loT devices

FREE DEV

STM32 Nucleo-64 development board for STM32WBA52 MCU.

Orderable Part Number NUCLEO-WBA52CG

APPLY HERE NOW

BUY NOW















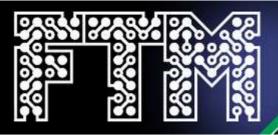












USB Type-C connectors support high data rates and high power throughput

Amphenol Communications Solutions provides a robust range of USB Type-C® connectors which offer long life and strong retention force, with flexible configurations including a waterproof connector.



USB Type-C connectors from Amphenol Communications Solutions support various USB protocols, such as USB 2.0, USB 3.0, USB 3.1, and USB 3.2, to provide features including a 10 Gbits/s data rate, and 5 A/20 V power capability.

The Amphenol USB Type-C connectors are notable for their low profile and reversible orientation, making them ideal for emerging product designs.

The connector configurations include vertical, right-angle and straddle-mount types. A waterproof USB Type-C connector is also available.

Amphenol

FEATURES

- Extended 5 A current rating for USB Power Delivery
- Up to 10,000 mating cycles
- Insertion-force range: 5 N to 20 N
- Extraction-force range: 8 N to 20 N

APPLICATIONS

- · Telecoms equipment
- · Storage equipment
- · Consumer devices
- Smartphones
- · Virtual reality cameras
- Medical equipment
- · Industrial computers
- Point-of-sale systems
- Automotive infotainment

⊞ BUY NOW

INFORMATION

DATASHEET























Internal 150 W ac-dc power supply features very low standby power consumption

The VGS-150C from CUI Inc is an internal power supply in a metal case which offers the safety and standards compliance required in many industrial and domestic products.



The VGS-150C from CUI Inc, a rugged ac-dc power supply, is ideal for industrial applications that require low standby power consumption. Maximum no-load power consumption is just 0.5 W.

Convection-cooled and housed in a compact metal case, the VGS-150C can supply up to 158 W to the load. The output-voltage options are 12 V, 15 V, 24 V, 36 V and 48 V dc, all adjustable to within $\pm 10\%$.

This internal ac-dc power supply is certified safe according to IEC 62368, and also meets the requirements of the IEC 61558, IEC 60335, and GB 4943 standards. Operating over a universal mains input-voltage range, this power supply is intended for use in OVC III applications.

The VGS-150C meets the requirements of EN 55032/CISPR32 Class B for conducted/radiated emissions.



FEATURES

- Safety approvals: CB, CE, UL/cUL
- Dimensions: 159 mm x 97 mm x 30 mm
- Up to 89% efficiency
- Up to 200 mVp-p ripple and noise
- Protection functions:
 - o Over-current
 - o Over-temperature
 - o Over-voltage
 - o Short-circuit
- Conformal coating and terminal cover options

APPLICATIONS

- EV charging stations
- Home appliances
- IoT devices

⊞ BUY NOW























Half-duplex RS-485 transceivers offer high performance in demanding industrial environments

New MxL831xx transceivers from MaxLinear provide ultra-low slew rate control for low EMI. Supplied in a standard 8-pin SOIC package, the transceivers give OEMs a new way to reduce supply-chain risk for industrial connectivity parts.



MaxLinear has launched two families of RS-485 serial transceivers which provide a reliable communications interface and low EMI in harsh industrial environments.

The slew-limited output drivers in the new MxL831xx transceivers reduce the transmission of EMI to protect sensitive equipment nearby, and reduce the reflections caused by cables that are improperly terminated.

The new MaxLinear offering consists of four products in two families: the MxL8310x and the MxL8311x. The MxL83101 and MxL83102 transceivers operate from a 5 V power supply. The MxL83111 and MxL83112 operate from a power-supply range of 3 V to 5.5 V. This allows for single product qualification for use in both 3.3 V and 5 V systems.

The transceivers are suitable for bidirectional communication on balanced multi-point bus transmission lines. They conform to the specifications of the RS-485 and RS-422 EIA standards. The bus pins tolerate electrical fast transient (EFT) events as specified by the IEC 61000-4-4 standard, protecting the system from short, high-voltage bursts that are caused by switch contactors, relays, faulty power connections or other sources.

The new transceivers are available in an industry-standard package and pin-out. Robust, reliable and interoperable with other RS-485 equipment, the MxL831xx products are well suited to a wide range of applications in demanding environments, and provide a secure way to broaden a manufacturer's supplier base for crucial connectivity components.



FEATURES

- Low-power shut-down mode
- Integrated EFT and ESD protection
- Longer than 1 km range
- 125°C maximum operating temperature

APPLICATIONS

- Factory automation
- Robotics
- Motor drives
- Building automation
- Security
- Heating, ventilation and air conditioning
- Solar-powered equipment
- Point-of-sale terminals

















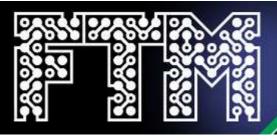






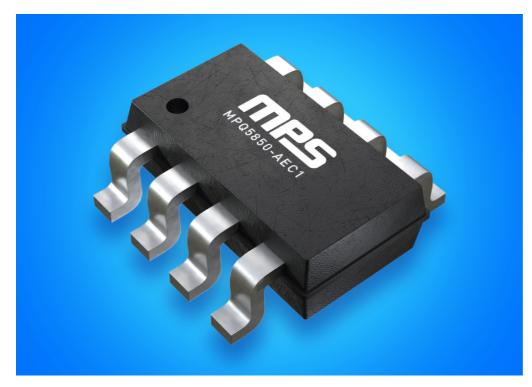






Smart diode controller provides reverse inputcurrent protection

The MPQ5850 and automotive-grade MPQ5850-AEC1 smart diode controllers, from Monolithic Power Systems, feature low power consumption in quiescent mode to extend battery run-time.



The MPQ5850 is a smart diode controller that can drive an external N-channel MOSFET to replace a Schottky diode for reverse input protection. It rectifies ac frequency inputs up to 100 kHz.

The low 20 mV dropout voltage minimizes power loss and supports a low minimum input voltage, which makes the MPQ5850 well-suited for cold-crank conditions in automotive applications.

Shutdown current of just 4 μ A also makes the device ideal for battery-powered applications. The ultra-fast transient response meets the requirements of the ISO 16750 standard.

The MPQ5850 includes an internal boost converter to provide a boost voltage that turns on the external N-channel MOSFET, even when the input voltage is low. An open-drain power good signal indicates when the external N-channel MOSFET is fully on.

The product is available in an AEC-Q100 Grade 1 qualified version with the part number MPQ5850-AEC1. This diode controller can handle the high transient voltages generated in automotive electronics: it features a -36 V blocking voltage, load dump capability up to 42 V, and cold crank down to 0 V.



FEATURES

- Low power consumption:
 - $\circ\,$ 4 μA current in standby mode
 - 30 μA steady-state quiescent current
- 2 mm x 3 mm TSOT23-8 package

APPLICATIONS

- Industrial equipment
- · Automotive systems

FREE DEV BOARD

Evaluation board for 36 V smart diode controller.

Orderable Part Number EVQ5850-J-00A

APPLY HERE NOW























How to protect super-speed interfaces against damage caused by ESD strikes By Nexperia



reached, so a low clamping voltage is more important than the absolute robustness of this device.

nexperia

voltage. As a result, the emphasis shifted from the question of how robust an ESD protection device was, to the strength of its protection of the system. SuperSpeed USB signals have fundamental frequencies as high as several GHz, which means that a device's S-parameters become a more appropriate attribute to study than capacitance when evaluating the RF performance of an ESD protection device. In addition, the use of

SuperSpeed USB connectivity standard, however, saw the development of transceivers that are highly sensitive to the remaining clamping

retimers or redrivers shortens the trace lengths between the ESD protection device and the IC it protects, which increases the peak clamping voltages for the same ESD diode. And as this article shows, there is much else to consider when designing-in protection for very fast data lines, such as those using the USB 4 or Thunderbolt protocols.

Failure modes of high-speed transceivers

Due to its sensitivity, a transceiver generally fails ESD tests before the limit of an external ESD protection device's operating parameters is

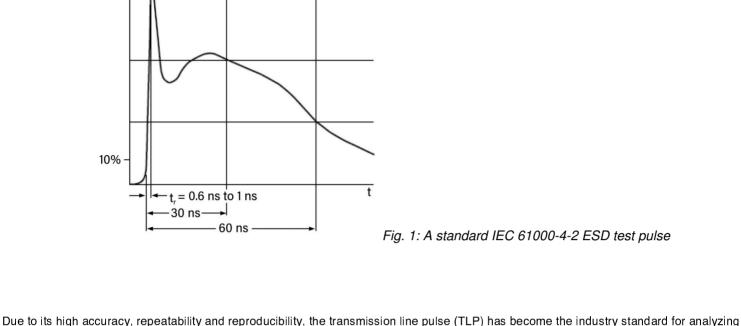
The protected IC can fail in one of two ways:

• Its on-chip ESD protection can be damaged due to thermal stress • The transceiver itself can fail due to peak voltage overstress

The first failure mode, overstressing the on-chip ESD protection, is normally revealed by increased leakage current, an indication of failing onchip protection. The main cause of damage here is the energy content of the ESD pulse.

If the transceiver is damaged due to voltage overstress, the leakage of the system might stay low, but the transceiver simply stops working. The main cause of this kind of damage is generally the steep rise time of the ESD pulse, which causes high peak voltages in CMOS gate oxides

For testing ESD 100% rd. This specifies an ESD pulse consisting of two elements: a first peak with a stee h a higher energy content, shown in Figure 1. 90%



looking at voltage behavior over time, as shown in Figure 3.

TLP Current (A)

SEED simulations can substantially reduce time to market.

15

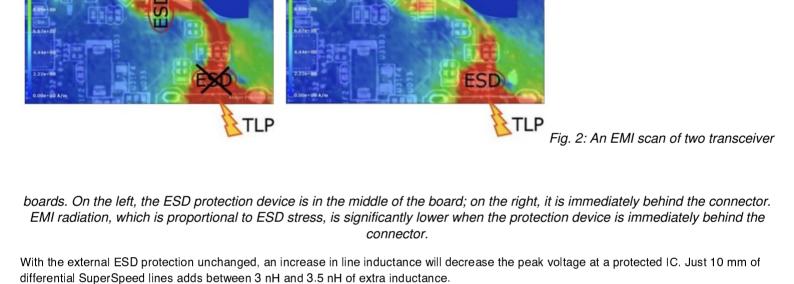
measurements.

the ESD behavior of single components or complete systems. These very fast TLP signals also allow for accurate peak voltage

Fig. 1: A standard IEC 61000-4-2 ESD test pulse

industance and resistance of the hoard traces can make to evetem-level robustness. The hest nosition for an external ESD protection device the signal line between the external ESD

So how should design engineers respond to a failure of an IEC 61000-4-2 test? In fact, it is common to overlook the contribution that the



integrity, the new position needs ESD protection with better peak pulse suppression. This calls for a study of the quasi-static I(V) curves in the data sheet of an ESD protection device, representing the clamping voltage for each current in a TLP test. While standard TLP pulses have a duration of 100 ns to show the same energy content as a corresponding

In USB 4 systems, retimer or redriver devices are a popular way to maintain signal integrity. Since these devices are typically positioned close

to the connector, the trace inductance between the ESD protection device and the protected IC is reduced. While this improves signal

IEC 61000-4-2 pulse, these values are 'static' from the point of view of a modern ESD protection device, which will have reached its full clamping performance after a few nanoseconds. Unfortunately, these curves do not show the peak voltage, which becomes obvious when

25 Actual peak 20 voltage

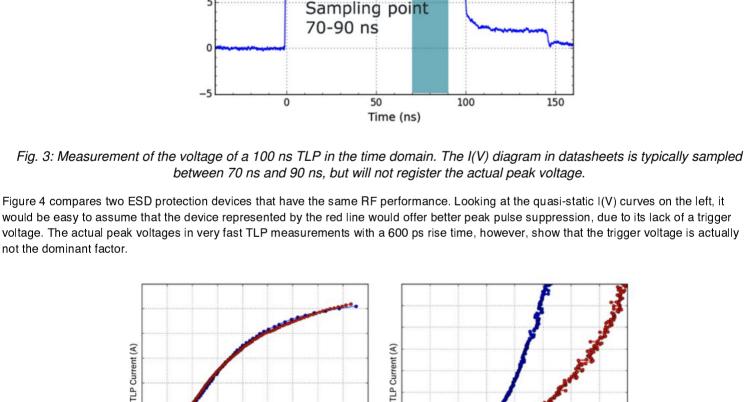


Fig. 4: The quasi-static 100 ns TLP diagram on the left compares two protection devices with similar clamping behavior. The right I(Vpeak) diagram from 0.6 ns to 5 ns in very fast TLP measurements shows that the peak voltage is not dominated by the

trigger voltage but by the switching speed of the protection devices.

To assess the ability of an ESD protection device to protect a given system, fully dynamic System-Efficient ESD Design (SEED) simulations are becoming standard. The term 'fully dynamic' means that the dynamic turn-on behavior of the protection device is taken into account.

Peak Voltage (V)

The peak pulse suppression performance of an ESD protection device is influenced by the switching speed and inductance of an ESD protection device. While this reinforces the view that low inductance in an ESD protection device helps to improve ESD clamping, it is less obvious that this industance, which might for example be attributable to bond wires, also weakens its RF performance. n device form a band-stop filter are shown in Figure 5.

TLP Voltage (V)

band-stop filter Figure 6 compares the calculated insertion loss of an ideal capacitance, with a dashed line, to the measured insertion loss of a wire-bonded device, with a solid line, that has the same capacitance at 10 GHz. -2 -6 -8

> -10 -12

Frequency (GHz)

Fig. 5: The parasitic inductance of an ESD protection device turns it into an LC

As can be seen clearly, the RF performance of the real device is notably lower due to the band-stop behavior of the added inductance. This means that the RF performance of ESD protection devices should be evaluated over S-parameters rather than just the device capacitance, since parasitic inductances can significantly reduce RF performance in the GHz range.

Fig. 6: Comparing a calculated pure capacitance, with a dashed line, to a measured device, with a solid line, shows that inductances turn ESD protection devices into band-stop filters with reduced RF performance compared to pure capacitances.

Always maximize the inductance between an ESD protection device and the protected IC

www.FutureElectronics.com

Conclusions

- Fully dynamic SEED simulations allow the engineer to evaluate complete systems against peak voltage and thermal overstress failure modes, and can help to reduce time-to-market
- The RF performance of ESD protection devices should be evaluated using S-parameters, since the capacitance and inductance of a protection device both have a marked influence in the GHz range