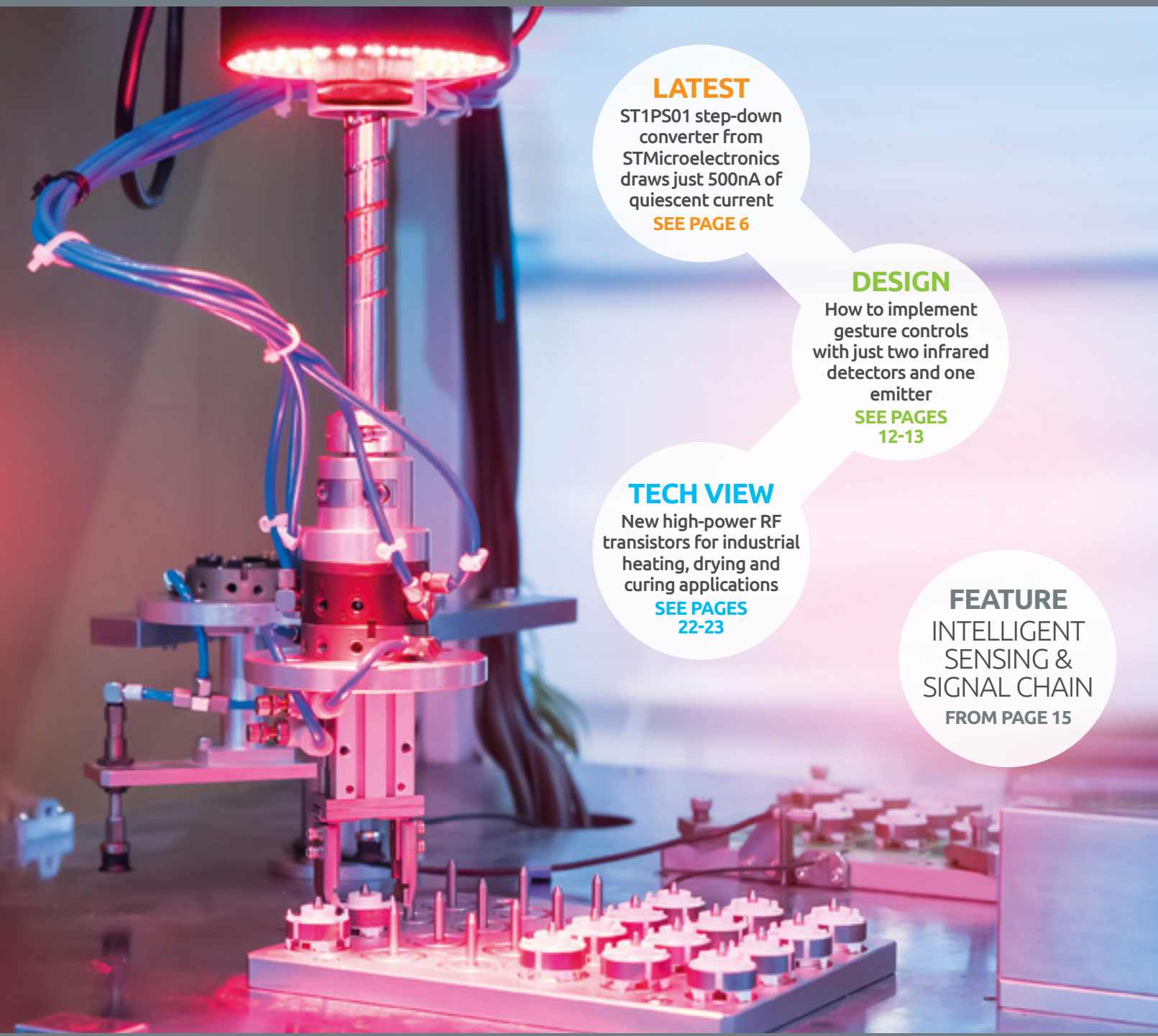
FTM

FUTURE TECHNOLOGY MAGAZINE

FUTURE ELECTRONICS

19-v EMEA



LATEST

ST1PS01 step-down converter from STMicroelectronics draws just 500nA of quiescent current

SEE PAGE 6

DESIGN

How to implement gesture controls with just two infrared detectors and one emitter

SEE PAGES 12-13

TECH VIEW

New high-power RF transistors for industrial heating, drying and curing applications

SEE PAGES 22-23

FEATURE

INTELLIGENT SENSING & SIGNAL CHAIN

FROM PAGE 15

Launch of multi-platform Wi-Fi solutions for IoT devices

Murata has announced that it is collaborating with Cypress Semiconductor and NXP Semiconductors to provide developers with mix-and-match wireless connectivity and processing solutions that accelerate OEMs' time-to-market for IoT products.

To create the new solutions, Murata has paired its wireless modules, based on Cypress's robust Wi-Fi® and Bluetooth® combination chips, with a broad range of processors from NXP's i.MX series. The solutions benefit from Murata's understanding of the hardware and software requirements of products ranging from battery-powered IoT devices, to industrial equipment and sub-systems for connected cars.

The solutions give developers a broad range of scalable processing platforms including i.MX 6, i.MX 7 and i.MX 8 application processors and i.MX RT crossover processors.

The Murata solutions feature various Wi-Fi/Bluetooth connectivity options, 1x1 802.11bgn, 802.11abgn and 802.11ac and 2x2 802.11ac, and feature Bluetooth 5.0 support. Murata has worked closely with Cypress and NXP to ensure that each hardware platform and its corresponding software are validated to provide a streamlined experience and to shorten the design cycle.

FOR MORE DETAILS AND DATA E-MAIL: INFO@MY-FTM.COM | REFERENCE NUMBER 19-v 01

LDO draws very low quiescent current to give long battery run-time in IoT end nodes

ON Semiconductor®

ON Semiconductor's NCP171 is a dual-mode Low Drop-Out (LDO) regulator which helps designers prolong the battery run-time of IoT devices by limiting the current drawn to almost nothing when the system is inactive.

The NCP171, a Super Low Iq (SLIQ) LDO, has an innovative dual-mode architecture which features two different LDO cores, one for use in Active mode, the other for Low-power mode. A signal on the device's Eco pin triggers switching between modes.

This dual-mode architecture mirrors the dual-mode operation of a typical battery-powered IoT node: in Active mode, it periodically performs intensive operations such as RF transmission, returning to Low-power mode when the system is either sleeping or executing tasks that draw very little battery power.

In these IoT nodes, energy usage in Low-power mode makes up by far the larger proportion of total power consumption. This means that the LDO's quiescent current, I_Q, is a vitally important parameter, as is its ability to provide high performance in Active mode.

In Low-power mode, the NCP171 draws only 50nA at no load. This mode also offers a built-in voltage offset factory-programmable to 50mV, 100mV, 150mV or 200mV, to further reduce system power consumption.

In Active mode, the NCP171 can provide up to 80mA of output current with excellent transient response for demanding RF and sensor applications, while maintaining a high power-supply rejection ratio of up to 65dB, and a typical drop-out voltage of just 41mV.

The LDO comes in a 1.2mm x 1.2mm package and is stable with only two 1µF capacitors, offering a smaller board footprint with fewer external components, higher system efficiency and lower overall cost than a circuit based on a buck regulator.

NCP171: Highly stable output with excellent transient response

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Battery-powered IoT sensors
- Battery-powered or disposable medical devices
- Smoke detectors
- Utility meters
- Home security and automation sensors
- Wearable devices

FEATURES

- Input-voltage range: 1.7V to 5.5V
- Output-voltage options: 0.8V, 1.0V, 1.2V, 1.65V, 1.7V, 1.8V, 2.8V, 3.3V
- Fixed output-voltage range: 0.6V to 3.3V in 50 mV steps
- ±2% output-voltage accuracy in Active mode
- Current limitation
- Thermal shut-down protection

FREE DEVELOPMENT BOARD

The STR-NCP171-EVK kit can be used with the Strata environment GUI which can enable/disable the LDO, switch between Active mode and Low-power mode, and monitor other telemetry on the platform, including input and output voltage, power dissipated and temperature.

Orderable Part Number: STR-NCP171-EVK

Apply at: www.my-boardclub.com

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New controller for human-centric lighting includes DALI, Bluetooth and real-time clock

OSRAM

The new DALIeco BT RTC from OSRAM is a compact stand-alone controller which can be installed in luminaires which have DALI DT8 Tunable White control gear. It may be used to provide Human-Centric Lighting (HCL) in settings such as offices, classrooms, meeting rooms or foyers.

The DALIeco BT RTC includes a real-time clock, to allow for precise adjustment of light level and color to suit the time of day and the day of the week. This means, for instance, that lighting can be set to match the opening hours of a shopping center, or the working hours of an office lobby.

The controller also features a built-in Bluetooth® wireless interface, so that it can be easily commissioned and operated via a smartphone. OSRAM's app for the DALIeco BT RTC supports both the Android™ and iOS operating platforms. In addition, the controller can also be adjusted via push-buttons for switching, dimming and color changing.

The DALIeco BT RTC can control up to 32 DALI control gear units. When connected to OSRAM DALI sensors, the controller can reduce total energy consumption of a lighting installation by implementing presence detection and daylight harvesting.

OSRAM DALI push-button couplers, for group and scene control, can also be connected to the DALIeco BT RTC.

OSRAM's DALIeco controller may implement scheduled adjustments to the color temperature of indoor lighting

Plug-and-play functions: no commissioning required

- Manual switching and dimming via standard push-button, OSRAM DALI PB coupler or OSRAM BT Control app
- Tunable white control via the Control app if DALI DT8 control gear units are connected
- HCL starts after smartphone synchronisation: Smartphone app controls HCL operation
- Daylight harvesting if OSRAM DALI sensors are connected and the set-point is stored by double-clicking the connected push-button
- Presence detection with a delay time of 15 minutes if OSRAM DALI sensors are connected

Additional functions with OSRAM BT Config app

- Individual adjustment of the HCL curve: The app supports adjustment of color temperature and brightness level during the day
- Timer features for automatic start
- Individual adjustment of single parameters: delay time, stand-by function, absence/presence mode
- Additional parameters for special applications include behaviour after power loss, push-button settings, adjustment of color temperature range, and minimum/maximum dimming value
- Fast commissioning through pre-defined profiles and feature sets for installations such as a single office, open-plan office, corridor, staircase or classroom
- User-defined profiles to adjust the parameters to specific requirements
- Easy and error-free copying to multiple controllers

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

Human-centric lighting for:

- Offices
- Meeting rooms
- Classrooms
- Foyers

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Photosensor offers human eye-like response to ambient light

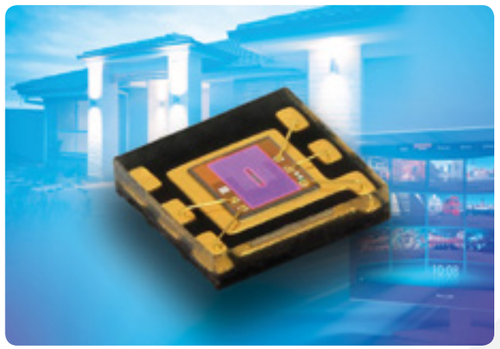
Vishay's VEML6035 is a low-power, high-sensitivity CMOS ambient light sensor which may be controlled by a host controller via a standard I²C interface.

Average power consumption in active mode is around 300µW. Vishay's patented Filtron™ technology, a wafer-level optical filter, provides an excellent spectral sensitivity profile which closely matches the human eye's response to light.

The VEML6035 incorporates a photodiode, amplifiers, and analogue and digital circuits in a single 2.0mm x 2.0mm x 0.4mm chip. It offers an active interruption feature which is triggered outside the threshold window settings, avoiding the need for instructions from the host.

Integrated temperature compensation maintains output stability over the operating-temperature range. A programmable shut-down mode keeps current to a low 0.5µA.

Vishay also supplies the VSMY5850 infrared emitter. Part of the SurfLight™ portfolio, the 850nm VSMY5850 is based on GaAlAs surface emitter chip technology, and offers high radiant intensity, high optical power and high speed. It is supplied in a low-profile 0805 surface-mount package.



VEML6035: Consumes just 300µW when active

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Mobile devices
- Backlight dimming control
- Lighting controls
- Optical switches
- Consumer electronics
- Computing equipment
- Industrial equipment

FEATURES (VEML6035):

- ≤10% ALS output tolerance
- Minimum detectable intensity of 0.0004lux/bit
- 100Hz and 120Hz flicker noise rejection
- High dynamic detection resolution
- Operating-voltage range: 1.7V to 3.6V

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REFERENCE NUMBER 19-v 04

Modular rotary encoders provide rugged performance in industrial environments

CUI's AMT series is a range of rugged, accurate modular encoders which is available in incremental, absolute, and commutation versions. The AMT encoders measure rotary position in applications such as motor-control systems in industrial, automation, robotics and renewable-energy equipment.

Based on CUI's proprietary capacitive sensing technology, the AMT products are immune to contaminants such as dirt, dust, and oil that commonly impair the performance of optical and other types of encoders in industrial environments. Because the AMT products are complete encoder systems with a locking hub, they are simple to assemble into end products.

The AMT10 and AMT11 series are **incremental encoders** available in up to 22 programmable resolutions and up to 4,096 positions per revolution.

Outputting 12 bits or 14 bits of absolute position information via an SSI, SPI or RS-485 communications interface, CUI's AMT20, AMT21, AMT22 and AMT23 **absolute encoders** feature low current draw, compact packages, and simple assembly. Offered with single- and multi-turn options, the encoders are available in up to nine different sleeve bore diameters.

The AMT31 series **commutation encoders** generate standard U/V/W communication signals for commutating brushless DC motors.

The AMT31's design simplifies the assembly process, reducing the time-consuming tasks of mounting and alignment to mere seconds with the One Touch Zero™ feature.

CUI's AMT modular encoders accept up to nine sleeve bore diameters

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Industrial equipment
- Automation equipment
- Robotics
- Renewable energy equipment

FEATURES

- Supported by AMT Viewpoint™ GUI
- High accuracy
- Compact package

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REFERENCE NUMBER 19-v 05

400mA automotive LDO provides fixed and adjustable output options

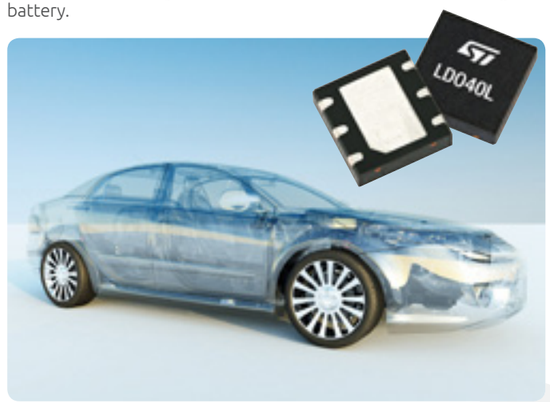
STMicroelectronics' LDO40L is an automotive Low Drop-Out (LDO) regulator which supplies a maximum output current of 400mA.

Because it features a low quiescent current of 45µA, the LDO40L is suitable for applications that are permanently connected to a car's battery.

This feature is especially important for electronic modules that remain in Active mode when the ignition is switched off.

The LDO40L's low drop-out voltage, just 140mV when supplying the maximum 400mA load, also contributes to low system power consumption.

The LDO handles a maximum input voltage of 38V. ST supplies the LDO in various fixed output-voltage options: 3.0V, 3.3V, 5.0V and 8.5V. There is also an adjustable output version: the output voltage can be set at between 2.5V and 11V by connecting a resistor divider between the Adjust pin and the output. Output voltage tolerance is ±1% at 25°C.



LDO40L: Low drop-out voltage and 45µA quiescent current

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APPLICATIONS

- Automotive applications
- Body control modules
- Instruments and clusters
- Automotive LED lighting
- Low-power industrial and consumer devices

FEATURES

- ±3% guaranteed output-voltage accuracy
- 70dB power-supply rejection ratio at 1kHz
- 20µV$_{rms}$ output noise at 10Hz to 100kHz
- Current limitation
- Thermal shut-down protection
- Operating-temperature range: -40°C to 125°C
- AEC-Q100 qualified to Grade 1

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REFERENCE NUMBER 19-v 06

New dual LDO's low quiescent current helps extend run-time of primary battery cells

Diodes Incorporated's new AP7345D family of dual Low Drop-Out (LDO) voltage regulators, which offer a high Power-Supply Rejection Ratio (PSRR) and low quiescent current, are ideal for applications powered by primary cells such as alkaline AA or AAA batteries.

The AP7345D parts feature an excellent PSRR of 75dB at 1kHz across the full output-voltage range. Quiescent current can be as low as 50µA.

The family comprises 22 devices covering a range of fixed dual-input/dual-output voltages between 1.2V and 3.6V. The LDO's input-voltage range extends from 1.7V to 5.25V, and each of the two channels can supply up to 300mA.

Output-voltage accuracy is a guaranteed ±1.5% across the whole operating-temperature range from -40°C to 85°C. The inclusion of short-circuit protection ensures that the LDO does not sustain damage in the event of a short circuit on either of the output-voltage rails.

The wide range of output-voltage options means that the AP7345D family can be used in a variety of battery-powered applications. The addition of an LDO in the power circuit enables more of the primary cells' voltage to be used, extending the useful lifetime between battery changes. In addition, choosing an LDO with high PSRR ensures a steady and regulated voltage is supplied to sensitive integrated circuits.

The AP7345D is supplied in an X2-DFN1612-8 package, providing a small PCB footprint and helping the system designer to achieve high power density.

AP7345D: Dual 300mA outputs

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Smartphones
- Tablets
- RF circuits
- Cameras
- Portable video equipment
- Portable media players
- Wireless adapters
- Wireless communications equipment

FEATURES

- 60µV$_{rms}$ output noise from 10Hz to 100kHz
- 0.02%/V line regulation
- 15mV load regulation
- 0.1µA stand-by current
- Drop-out voltage as low as 0.22V

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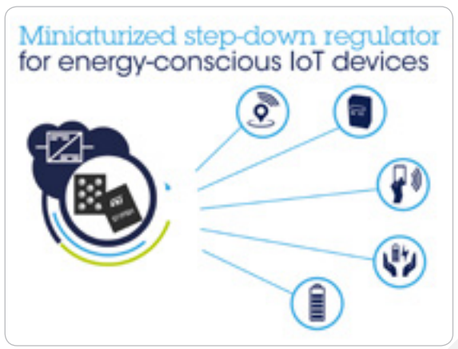
REFERENCE NUMBER 19-v 07

Efficient 400mA step-down converter offers digital output voltage selection

The ST1PS01 from STMicroelectronics is a synchronous step-down converter IC which provides a maximum output current of 400mA from an input at a voltage between 1.8V and 5.5V.

It is notable for its ultra-low quiescent current and when not switching, it draws just 500nA at an input voltage of 3.6V.



ST1PS01: Up to 94% conversion efficiency

Housed in an 8-ball flip-chip package measuring 1.14mm x 1.44mm, it is intended for use in product designs that require a small and thin PCB, and which benefit from the device's high conversion efficiency.

Using an enhanced peak-current control topology, the ST1PS01 achieves very high efficiency using an inductor of just 2.2µH and two small capacitors. It reaches 94% efficiency when supplying a 1mA load, and stepping a 3.6V input down to an output of 3.3V.

The output voltage can be set dynamically using two digital control inputs. ST supplies the converter in three versions, each providing a different set of output-voltage selection options:

- ST1PS01AJR: 1.9V, 2.0V, 2.1V or 2.8V
- ST1PS01DJR: 1.8V, 2.3V, 2.5V or 2.8V
- ST1PS01EJR: 1.8V, 2.7V, 3.0V or 3.3V

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Wearable devices
- Personal tracking monitors
- Smart watches and sport bands
- Energy harvesting
- Wireless sensors
- Single-cell lithium-ion battery applications

FEATURES

- 1.57V under-voltage lock-out threshold
- Embedded soft-start circuit
- Output voltage Power Good signal
- ±1.5% output-voltage accuracy

FREE DEVELOPMENT BOARD

The STEVAL-1PS01AJR evaluation board features the ST1PS01 synchronous step-down converter for applications in which high efficiency and PCB size and thickness are important.

Orderable Part Number: STEVAL-1PS01AJR

Apply at: www.my-boardclub.com

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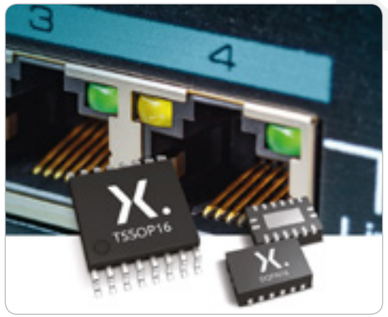
Bus switches feature 500MHz bandwidth for use in high-speed communications applications

Nexperia's new FET bus switches based on CB3Q technology have a high bandwidth of 500MHz on the data path. CB3Q is a higher-bandwidth technology than CBTLV(D), making these switches suitable for use in broadband networking and high-speed communications equipment.



Suitable for use in functions such as sensor multiplexing, memory interleaving and bus isolation, the CB3Q325x devices include a charge pump so that they can switch 5V signals while operating from a 2.5V or 3.3V supply node.

These low-voltage bus interface solutions feature low and flat on-resistance of around 4Ω, and a low input/output capacitance, minimising capacitive loading and signal distortion on the data bus. CB3Q switches are low-power solutions with a typical static current of 0.4mA.

The CB3Q FET bus switches are available in leadless DQFN16 and leaded TSSOP16 packages. The 74CB3Q3257PW-Q100 is suitable for automotive applications.

Part Number	Package	Description	Configuration
74CB3Q3253BQ 74CB3Q3253PW	DQFN16 (SOT763-1) TSSOP16 (SOT403-1)	Dual 1-of-4 FET multiplexer/ demultiplexer with charge pump	Dual SP4T switch
74CB3Q3257BQ 74CB3Q3257PW 74CB3Q3257PW-Q100	DQFN16 (SOT763-1) TSSOP16 (SOT403-1) TSSOP16 (SOT403-1)	4-bit 1-of-2 FET multiplexer/ demultiplexer with charge pump	Quad SPDT switch

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Sensor multiplexing
- Broadband communication
- Computing equipment
- Networking equipment
- Memory interleaving

FEATURES

- Supply-voltage range: 2.3V to 3.6V
- Over-voltage tolerant switch inputs
- Support for mixed-mode voltage operation
- I_{OFF} circuitry for partial power-down operation

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Space-saving holder for CoB LEDs integrates constant-current driver

TE Connectivity's (TE) LUMAWISE drive LED holder type Z50 DALI-2 enables luminaire designers to remove the driver box from spot and track lighting, creating a more aesthetically pleasing lighting solution.

LUMAWISE drive LED holders bring integrated functionality to TE's successful Zhaga-inspired range of LED holders. By incorporating an LED's constant-current driver into the LED holder assembly, lighting equipment manufacturers can realize an elegant luminaire design.

Operating from a 48V DC input, LUMAWISE drive LED holders work with a wide range of readily available constant-voltage power supplies, so that multiple fixtures may be powered by a single supply unit.

The LUMAWISE drive LED holder Type Z50 DALI-2 can be controlled with DALI signals. DALI lamp fixtures are intelligent, dimmable and can be controlled, monitored and maintained using a two-wire open standard protocol.

Output Current (mA)	Part Number	LED/CoB size (mm)	Global Trade Item Number
350	2316511-1	24 x 24	9421027422100
350	2316511-2	20 x 24	9421027422117
350	2316511-3	19 x 19	9421027422124
350	2316511-4	16 x 19	9421027422131
500	1-2316511-1	24 x 24	9421027422148
500	1-2316511-2	20 x 24	9421027422155
500	1-2316511-3	19 x 19	9421027422162
500	1-2316511-4	16 x 19	9421027422179
700	2-2316511-1	24 x 24	9421027422186
700	2-2316511-2	20 x 24	9421027422193
700	2-2316511-3	19 x 19	9421027422209
700	2-2316511-4	16 x 19	9421027422216
1,050	3-2316511-1	24 x 24	9421027422223
1,050	3-2316511-2	20 x 24	9421027422230
1,050	3-2316511-3	19 x 19	9421027422247
1,050	3-2316511-4	16 x 19	9421027422254

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Track lighting
- Spot lighting
- Downlights

FEATURES

- Compatible with Zhaga Book 12
- Dimming down to 3% of maximum current
- <5% flicker percentage
- Supports logarithmic and linear dimming
- 135° allowable beam angle

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Ethernet jacks with integrated magnetics save board space

Ethernet jacks from TE Connectivity (TE) with integrated magnetics and Power over Ethernet (PoE) capability offer a highly integrated connectivity solution for industrial Ethernet applications.

TE Ethernet jacks support power delivery via Power-over-Ethernet

The use of a three-wire choke improves EMI performance and allows for remote powering of peripherals over the Ethernet cable. The new jacks comply with the IEEE 802.3at PoE+ standard, under which up to 25.5W of power may be supplied per port.

The integrated magnetics eliminate the need for external magnetic components, saving board space and reducing system component count.

The TE Ethernet jacks operate over an industrial temperature range of -40°C to 85°C and can be used in reflow soldering production processes at 260°C for easy and cost-effective manufacturing.

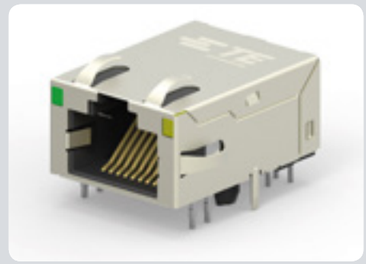
ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Industrial communications equipment
- Industrial machinery
- Production equipment
- Automated test equipment

FEATURES

- High resistance to corrosion
- Minimum 750 mating cycles
- 2,250V DC dielectric withstanding voltage



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Compact board-to-board connectors support high-speed data transmissions

HIROSE ELECTRIC EUROPE B.V.

Hirose has introduced the FX10, a series of board-to-board connectors that support a data transmission rate of >15Gbits/s. The FX10 series is intended for use in systems that need multiple stacking connectors on the same board.

The series consists of surface-mount headers and sockets in a fine pitch of 0.5mm, keeping the board space occupied by the connector to a minimum.

The FX10 series connectors are supplied as a two-piece unit in stacking heights that range from 4mm to 8mm. By using an interposer, a stacking height between 8mm and 13mm in 1mm steps can be achieved. This combination allows a misalignment range of ±0.3mm in the X and Y directions.

The innovative connector design features fixed ground plates on both sides of the header and receptacle for superior transmission characteristics. The connector may also be supplied without the ground plate: in this configuration, the space freed by the removal of the ground plate is filled with additional signal contacts.

Metal fittings are provided to protect against solder peeling and mechanical stress. The connector's design also provides for strong retention of the connector to the board.

FX10 connectors: 0.5mm pitch and ±0.3mm misalignment range

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Telecoms equipment
- Computers and servers
- Networking equipment
- Data centers

FEATURES

- 0.3A maximum current rating
- 0.5mm pitch
- 50V voltage rating
- 50 mating cycles
- Operating-temperature range: -55°C to 85°C

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REFERENCE NUMBER 19-v 12

Domed housing for streetlight sensor modules features IP66 rating

TE connectivity

LUMAWISE Endurance S domes from TE Connectivity (TE) are available in 40mm and 80mm diameters for use with Zhaga Book 18-compatible outdoor lights, such as street lights and area lights.

These Zhaga Book 18 lighting connectors consist of a standard receptacle interface on the lighting fixture, and the base and polycarbonate dome components for housing a control module.

The IP66-rated receptacle, base and dome assembly provides a sealed electrical interface between new slim-design LED streetlights and the associated sensor modules.

The Endurance S range is supplied in two diameters: 40mm and 80mm. The 40mm domes are available in two dome heights: the low version is 24.3mm, and the tall is 39.3mm. Three dome heights are available for the 80mm domes: 33.4mm, 43.4mm and 58.4mm.

All domes are available in clear and grey colors. IK09-rated, the assembly offers high resistance to impacts. An optional vent minimizes condensation inside the dome.


LUMAWISE Endurance S domes are supplied in clear and grey colors

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Street lighting
- Area lighting
- Outdoor luminaires
- Photo-controls
- Central management systems
- Occupancy sensor modules

FEATURES

- Contact ratings: 1.5A, 30V
- 10kV dielectric withstand voltage
- 4-pole contacts
- Versatile mounting options
- Secure low-torque mating of sealing cap or base and receptacle

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REFERENCE NUMBER 19-v 13

New vandal-resistant switch features robust capacitive touch sensor technology

E-SWITCH®

E-Switch has released a new series of anti-vandal switches which uses capacitive touch sensor technology to eliminate the risk of mechanical failure inherent in conventional electro-mechanical switch designs.


CS switches: Supplied with 150mm wire and connector

The CS switches are supplied with a 150mm wire and connector.

The CS series is available to fit two panel cut-out sizes, 19mm or 22mm diameter. Different versions of the switch provide a latching or momentary circuit function. The face of the switch has either a ring or a ring/power symbol, with color illumination options of red, green or blue.

The CS series features a single-pole, single-throw contact arrangement, long electrical life of 50 million cycles, and a contact rating of 1A at 5V to 24V DC.

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- White goods
- Security devices
- Commercial electronics
- Kiosks
- Electrical housewares
- Medical equipment

FEATURES

- 1mΩ maximum contact resistance
- Operating-temperature range: -20°C to 65°C
- 10mm maximum panel thickness
- 3.0Nm mounting nut torque

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REFERENCE NUMBER 19-v 14

Receptacles and tabs provide a fully insulated terminal for wiring connections

TE connectivity

The range of ultra-fast fully insulated FASTON receptacles and tabs from TE Connectivity (TE) offers the advantage of a completely protected terminal and a closed barrel wire crimp with comparable electromechanical performance to open barrel 'F' crimp FASTON terminals.

The user-friendly design combines easy mating with rounded corners. The .187 and .250 series receptacles incorporate a two-stage roll configuration and a cantilever-mounted dimple which provides easy insertion and multiple independent points of contact for reduced tab interface resistance.

Ultra-fast fully insulated FASTON terminals, which are offered as straight receptacles, flag receptacles and tabs, preclude the need for costly electrical safety interlocks or special protective shields to help prevent shock hazards. In addition, the risk of electrical short circuits from exposed leads is eliminated, even in equipment requiring close contact spacing.


FASTON: Color coding signals wire size

The receptacle housing completely encloses a tin-plated copper alloy premier FASTON receptacle which has been stress-relieved for increased durability and resistance to abuse. The FASTON receptacle is recessed sufficiently within the housing to allow its use in 600V applications.

The receptacle portion of the terminal is designed for positive mating with a variety of tabs, including those with shoulders. The housing has a slotted membrane which is displaced by two tab shoulders allowing proper engagement of tab and receptacle while maintaining the fully insulated characteristic.

Each assembly's translucent nylon housing is color-coded to signal the wire size.

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Large appliances
- Small appliances
- Automotive systems
- Lighting
- Industrial machinery

FEATURES

- Tin-plated copper alloy terminal
- 600V voltage rating
  - 1,000V-rated in signs and lighting fixtures
- Accepts 26 to 10 AWG wire sizes

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REFERENCE NUMBER 19-v 15

INTERCONNECT • PASSIVE • ELECTROMECHANICAL COMPONENT FOCUS FUTURE ELECTRONICS

Solid tantalum chip capacitors help save space in handheld devices

Vishay Intertechnology's T55, T58 and T59 series of vPolyTan™ solid tantalum surface-mount chip capacitors offer superior volumetric efficiency, enabling designers of handheld devices to provide greater capacitance in a smaller space.

Combining polymer tantalum technology with Vishay's high-efficiency MicroTan® packaging, these capacitors achieve industry-best capacitance-voltage ratings. Using patented Multi-Array Packaging (MAP) assembly technology, the vPolyTan capacitors save board space and enable the design of smaller and thinner end products. These capacitors are intended for decoupling, smoothing, filtering and energy-storage functions.

vPolyTan capacitors: High-efficiency MicroTan packaging

The T58 series devices are notable for their compact size, and the T59 for low Equivalent Series Resistance (ESR). The T55 are the high-performance parts in the VPolyTan family.

The T58 devices are available in versions with a capacitance value ranging from 1µF to 330µF, with capacitance tolerance of ±20%. Voltage ratings range from 6.3V to 35V DC. The T58 series is available in EIA case sizes ranging from 1608-09 to 3528-20.

The T59 capacitors offer capacitance values from 15µF to 470µF, with capacitance tolerance of ±10% or ±20%. Voltage ratings range from 16V to 75V.

ESR values are as low as 20mΩ at 100kHz.

Low ESR is also an attractive feature of the T55 capacitors: their polymer cathodes offer much better performance than that of manganese dioxide types.

ENERGY **INDUSTRIAL** LIGHTING MEDICAL TRANSPORT SECURITY **CONSUMER** **TELECOMS**

APPLICATIONS

- Infrastructure equipment
- Storage devices
- Networking equipment
- Computer motherboards

FEATURES

- 100% surge-current tested
- High ripple-current capability
- Stable capacitance over temperature
- No wear-out effect

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Connectors support high-volume production of wiring harnesses

TE Connectivity's (TE) AMP CT connectors are miniature wire-to-board and wire-to-wire connectors which are ideal for use in wiring harnesses.

A variety of harness-making machines are compatible with the AMP CT connector series, ranging from hand tools for low-volume production to high-speed automatic crimping machines for medium- to high-volume production.

AMP high-speed automatic crimping machines are easy to operate, eliminating the need for the tedious task of changing parts inside the equipment to adapt to different harness styles.

Two types of housings are available, including crimp and mass terminated, which are pre-loaded with insulation displacement contacts. The box or shrouded headers are highly resistant to scooping at mating/unmating.


AMP CT connectors: Compatible with various harness-making machines

ENERGY **INDUSTRIAL** LIGHTING MEDICAL TRANSPORT SECURITY **CONSUMER** TELECOMS

APPLICATIONS

- Business equipment
- Industrial machines
- PCs
- Printers
- Audio systems
- Air-conditioning units

FEATURES

- Wire size ratings:
  - Crimp housings accept AWG 22 to 30
  - Mass terminated housings accept AWG 24 to 28
- Kinks for self-retention on boards

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Metal EMI shields now available in range of standard shapes and sizes

As the complexity and functionality of electronics products increases, designers are looking for improved ways to reconcile the demand for thinner form factors with the requirement for multiple antennas, higher data rates and increased operating frequencies.

This intensifies the risk that EMI will impair system performance, and creates an urgent need for high-performance EMI shielding devices.

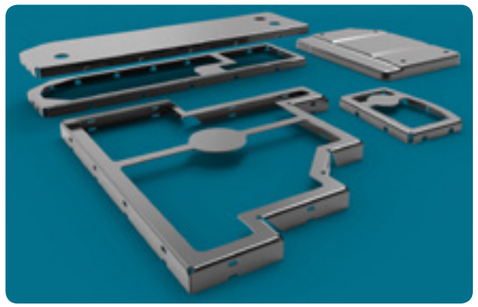
This is why TE Connectivity (TE) has extended its range of stamped one- and two-piece metal EMI shields, which help to provide isolation of board-level components, minimise crosstalk and reduce EMI susceptibility without impacting system speed.

TE is able to supply both custom designs and off-the-shelf solutions that are immediately available. The new standard Board-Level Shielding (BLS) portfolio is available in both industry-standard Cold-Rolled Steel (CRS) and aluminum.

Aluminum offers various benefits which include:

- Weight saving: aluminum is one-third the density of CRS material
- Improved thermal conductivity: aluminum can provide up to five times better thermal conductivity than CRS

Aluminum and CRS shields offer similar levels of attenuation of RF interference.


TE's Board level shielding: Produced in steel and aluminum

ENERGY **INDUSTRIAL** LIGHTING **MEDICAL** TRANSPORT SECURITY **CONSUMER** **TELECOMS**

APPLICATIONS

- Consumer electronics devices
- Routers
- Point-of-sale equipment
- Wireless meters
- Wireless speakers
- Wearable devices
- IoT equipment
- Drones
- Servers

FEATURES

- Standard portfolio available on-demand in CRS and aluminum materials
- Proven designed-in features
- Rapid-turn tooling and prototyping of custom products
- Streamlined, automated and continuous production line

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How to implement gesture control in automotive infotainment systems

By Jim Toal
Senior Manager, Product Marketing at Vishay

Fig. 1: Gesture control enhances the safety of sophisticated user interfaces in the car

Whether driving at high speed on Germany's Autobahns or on California's Highway 1 as it twists and turns along the Big Sur coast, drivers cannot afford to take their hands off the wheel or take their eyes off the road. A distracted driver is an unsafe driver, which is why car manufacturers are designing in features to keep the driver's eyes on the road and not on the large center console display.

To achieve this, they are developing new Human-Machine Interface (HMI) technologies which include heads-up displays, speech recognition and gesture control, as shown in Figure 1. Functions currently using simple swiping gesture controls include changing the radio channel, answering a phone call, playing the next song on a playlist, menu scrolling, navigation screen zooming, opening and closing the sunroof, and overhead dome light control. Gesture control and the sensors that enable the feature are available now mostly in premium vehicles.

A market study conducted in 2018 by Global Market Insights forecasts the automotive gesture recognition market to grow in value from $1.1m in 2017 to $13.6bn by 2024. The market for hand gesture recognition is projected to be greater than $8.6bn by 2024. Compounded annual growth between 2018 and 2024 for both North America and Europe is projected to be greater than 40%. The report states that safety regulations introduced by various governments are improving product penetration. But tough challenges, including high cost and complexity, and the difficulty of integrating new HMI technologies into system designs, will nevertheless raise barriers to the implementation of gesture recognition in cars in the years up to 2024.

Components for optical gesture systems

Optical sensors such as Vishay's VCNL4035 may be used to detect swiping hand motions. An optical gesture system can comprise an integrated proximity sensor that can pulse up to three emitters in quick succession, combined with external infrared emitters to create a zone in which a gesture can be performed.

In fact, for simple left- and right-swipe and zoom-in and zoom-out motions, only two emitters are needed. The internal LED driver will drive the left emitter while a proximity reading is made, as shown in Figure 2. This value is converted to a digital count, a number between 0 and around 65,000, as the ADC in the VCNL4035X01 has 16-bit resolution.

The multiplexer will then switch from the output connected to the left emitter, now driving the right emitter while taking another proximity reading. Both readings are saved in separate data registers within the sensor, so that they can be read by a host microcontroller individually. The microcontroller will then acquire these measurements and compare the two readings.

If the hand is closer to the left emitter, the output count of the sensor will initially be higher for the left reading than for the right reading. As the hand continues with its right swipe, the output counts from the sensor will become approximately equal as the hand reaches the center between the two emitters. Eventually the output associated with the right emitter will be higher than the left as the hand completes the left-to-right swipe. This sequence of operations could be rotated ninety degrees to enable up-and-down gesture control.

The zooming function is enabled by measuring the output of the sensor as the hand is moved closer or further away from the sensor. The algorithms for detecting these gestures are predicated on a threshold proximity value which is exceeded when a hand is present: at this point, the sensor count should be higher than the offset value that the sensor reads when nothing is in front of it.

More robust and complex algorithms record the signal of each emitter in a continuous stream, and a measurement frame is overlaid to enable the shape of the signal to be analyzed. The percentage overlay of one emitter's signal relative to the other can then be used to denote a time difference, which shows that a gesture has been made. Adding a third emitter will improve the resolution of the simple gestures described above and could possibly be used to recognize more complicated gestures.

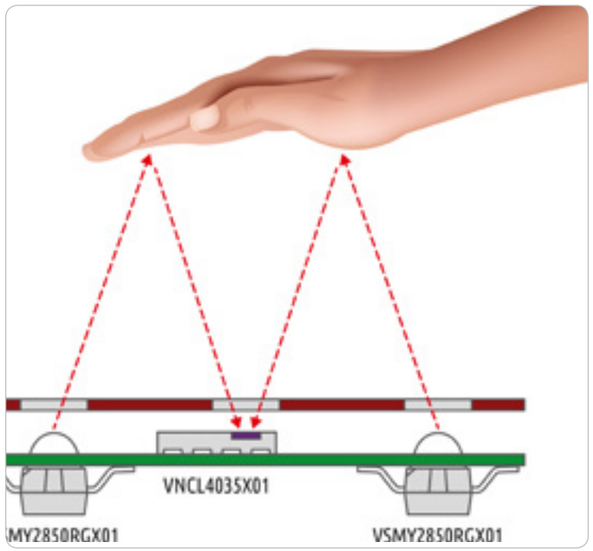

Fig. 2: A two-emitter/single-sensor system can detect simple swiping and zoom gestures

There are many variables to take account of when implementing a gesture-recognition system:

- Size of objects other than a hand
- Distance from object to sensor and emitter
- Speed of the moving object
- Reflectivity of the moving object
- Distance between emitters
- Threshold levels required to avoid false detection events
- Ambient lighting and sources of optical interference

The use of discrete emitters gives the design engineer valuable flexibility, as their placement determines the size of the gesture and sensitivity zone. Some sensors integrate emitters within a single package, which removes this flexibility. The typical sensing range of an infrared emitter and sensor system is 20cm.

While the system shown in Figure 2 uses infrared emitters and light-to-digital proximity sensors, other systems offer millimeter granularity by combining a time-of-flight sensor with a 3D camera. This is a more expensive system, but it does allow the measurement of small finger gestures, and not only of large swiping motions. First-generation applications in vehicles today detect large motions, but second-generation systems under development will detect multiple finger gestures. For instance, the motion that a user's fingers make when enlarging a photo on a smartphone screen may be recognised when made in the air. This requires the use of 3D camera systems.

This capability is similar to the motion-detection feature offered today by games consoles. For example, Microsoft's Kinect system for the Xbox console detects motion at distances up to approximately 3m. Gaming systems track the entire body motion of the player, but their automotive counterparts will only need to track the driver's hand gestures. The more complex the system for measuring gestures becomes, the more complex the middleware to convert the output of the sensor into a definable action.

Long-term outlook

Companies such as LG and Sony are joining more typical Tier 1 automotive manufacturers in developing automotive gesture-recognition systems. Customer comfort, multimedia, navigation and infotainment applications are taking on a higher priority as car makers implement more sophisticated Advanced Driver Assistance Systems (ADAS) and autonomous driving capabilities.

Eventually, there will be no need to avoid driver distraction: fully autonomous vehicles will have no driver, only passengers.

Proximity and ambient light sensor offers design flexibility in gesture applications

Vishay Intertechnology's VCNL4035X01 is an automotive-grade proximity and ambient light sensor which gives designers a flexible way to implement 2D or 3D gesture-recognition functions such as the swipe and zoom gestures described in the Design Note above.

Featuring Filtron™ technology, the VCNL4035 combines photodetectors for sensing proximity and ambient light, a signal conditioning IC, a 16-bit ADC and a driver for up to three external IR emitters in a 4.0mm x 2.4mm x 0.8mm surface-mount package.

It can be used to enable various functions:

- Gesture recognition
- Presence detection
- Collision avoidance in toys and robots

The support for external IR emitters for gesture applications gives the designer flexibility to locate the emitters in the optimal position, in contrast to fully integrated gesture-sensing modules, in which the emitters are located next to the sensor.

The device includes a programmable interrupt function, which allows both high and low thresholds to be set to reduce overall power consumption. The function can be programmed to trigger both the ambient light and proximity sensor.

VCNL4035X01: AEC-Q101 qualified for use in automotive gesture-sensing applications

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FEATURES

- AEC-Q101 qualified
- High immunity to interference from ambient light
- Temperature compensation
- I^2C interface
- Operating-voltage range: 2.5V to 3.6V

Expanding the options for industrial camera design with new high-resolution image sensors

ON Semiconductor®

Faster, better, cheaper. For years, this has been the goal of suppliers and manufacturers in the electronics industry, resulting in rapid gains in productivity across a variety of markets and applications. Camera manufacturers are no exception to this rule, as the ability to quickly and efficiently bring new camera models to market can provide a clear competitive advantage.

One of the easiest ways to do this is through the use of a platform camera design, in which the architecture of a single camera system is used as the basis for multiple end products. For many years, ON Semiconductor has worked to enable this type of family approach to industrial cameras. For example, many of ON Semiconductor's Interline Transfer Charge-Coupled Device (CCD) image sensors share a common architecture which allows a single camera design to use different image sensors. Likewise, cameras based on the PYTHON family of CMOS image sensors can be configured with any one of eight different values for resolution, from VGA to 25Mpixels, with just two different PCB design variants.

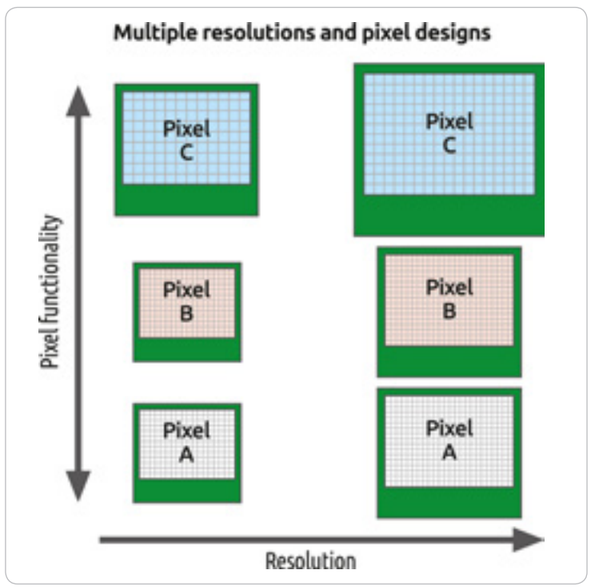

Fig. 1: The X-Class image sensors provide a choice of pixel features as well as a choice of resolution

But what if this design flexibility could be extended to include other product parameters as well as resolution? This is the goal of ON Semiconductor's new X-Class CMOS image sensors, which enable a single camera design to support different pixel features as well as different resolution values, as shown in Figure 1. Now, a single camera design can be scaled not only for the number of pixels in the image sensor but also the type of pixel used. Characteristics of the pixel functions that the designer can specify include:

- Global shutter/rolling shutter
- Enhanced dynamic range

As long as the pixel is in the common high-speed, low-power frame used across the X-Class platform, a single camera design can support it, speeding time-to-market for new camera designs and simplifying supply-chain logistics.

The first pixel to be deployed in this platform is a new 3.2µm design which combines excellent global-shutter imaging performance with low noise and high dynamic range. This X-Class Global Shutter (XGS) pixel enables the development of high-resolution, high-performance industrial image sensors in a compact size.

For instance, the new XGS 8000 and XGS 12000 image sensors offer the small package size and low-power operation needed for use in 29mm x 29mm camera designs. The differences between the two devices are in resolution and frame rate:

- The XGS 12000 is in a 1" optical format providing resolution of 12Mpixels at up to 90 frames/s
- The XGS 8000 is in a 1/1.1" optical format, and provides full 4K/UHD resolution (4096 x 2160 pixels) at up to 130 frames/s.

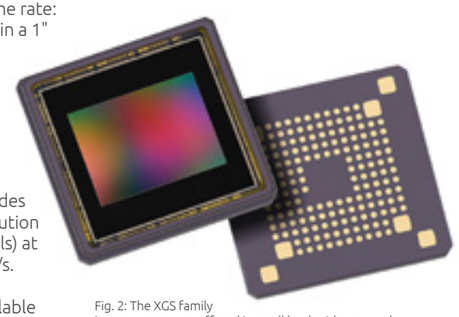

Fig. 2: The XGS family image sensors are offered in small land grid array packages

Since both are available not only in monochrome and color configurations but also in different speed grades, the most appropriate configuration can be matched to a given application, whether for general machine vision purposes such as inspection and industrial automation, or for broadcast or surveillance.

So the X-Class platform gives camera manufacturers a new design flexibility, changing how camera designs can be configured to support multiple products. As additional XGS resolutions and pixel options are added to the X-Class platform in the future, camera manufacturers will be able to quickly build from a single camera design to support additional product resolutions and features in a cost-effective manner.

In other words: faster, better, and cheaper.

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Sensor IC combines ambient light, capacitive, magnetic Hall effect and inductive sensing capabilities in a single chip

Azoteq

Azoteq has released the IQS621 ProxFusion® IC, a multi-functional ambient light, capacitive, magnetic Hall effect and inductive sensor intended for applications in which any one or more of these technologies may be deployed.

The IQS621 is part of the larger ProxFusion portfolio which offers multiple sensing technologies in various configurations in a single IC.

The part's capacitive sensing capability features:

- Full auto-tuning with adjustable sensitivity
- 2pF-200pF external capacitive load capability
- 10aF resolution
- High temperature stability

The ambient light sensor provides an absolute lux measurement output, and is compensated internally to match the sensor's output to the human eye's response to light intensity. The integrated Hall element is sensitive to magnetic fields in the range 10mT-200mT, and enables the user to implement a dual-direction contactless Hall switch.

The inductive sensing element works with a simple sensor coil implemented as a PCB trace. It performs two-level detection with hysteresis.

The IQS621 is supplied in a low-profile nine-pin 2.8mm x 2.5mm x 0.6mm package.

Part Number	Application	Capacitive Proximity and Touch Sensing	Hall Effect Sensing	Inductive Sensing	Active Infrared Sensing	Ambient Light Sensing	PIR Sensing
IQS620(A)	Mobile	•	•	•			•
IQS621	White goods	•	•	•		•	•
IQS622	Smartphones	•	•		•	•	•
IQS624	Rotary position sensing	•	•	•			
IQS625	Rotary position sensing	•	•				
IQS680	Lighting	•		•			•

The ProxFusion family of parts

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APPLICATIONS

- Portable electronics devices
- IoT devices
- Security equipment
- Home automation
- Lighting controls
- White goods and home appliances
- Wearable devices
- Human interface devices

FEATURES

- Automatic Tuning Implementation (ATI) for performance enhancement
- Few external components required
- Standard I²C interface
- Optional Ready indicator for event-mode operation

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Sensor node development kit includes Bluetooth Low Energy radio

STMicroelectronics' STEVAL-BCN002V1B is a sensor node evaluation kit which provides a ready-made platform for applications that connect motion and environmental sensors to a remote host via a Bluetooth® Low Energy (BLE) radio link.

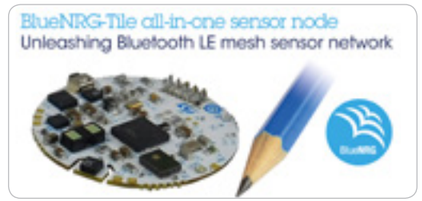
The STEVAL-BCN002V1 features a low-cost two-layer PCB, and is FCC and CE certified, and is supplied with board schematics, layout instructions and software.

The kit is comprised of an STEVAL-BCN002V1 multi-sensor board and an STEVAL-BCN002V1D programming board.

The CR2032 battery-powered STEVAL-BCN002V1 sensor board includes a BlueNRG-2 Bluetooth Low Energy system-on-chip. Its Arm® Cortex®-M0 runs both the Bluetooth protocol software and application code, including SensorFusion and VoiceOverBLE algorithms.

The sensor board also features:

- LSM6DSO six-axis inertial measurement unit
- LIS2MDL three-axis magnetometer with a digital output
- VL53L1X long range Time-of-Flight sensor based on ST FlightSense technology
- MP34DT05-A omnidirectional digital MEMS microphone
- LPS22HH MEMS pressure sensor, providing an absolute digital output over the range 260 to 1260hPa
- HTS221 capacitive relative humidity and temperature sensor



The sensor board communicates with any Bluetooth Low Energy-enabled smartphone running the ST BLE Sensor app, which is available on the Google Play and Apple iTunes stores.

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APPLICATIONS

- Internet of Things (IoT) devices
- Wearable devices
- Smart home and smart city products
- Tracking systems, beacons and supply-chain monitoring systems
- Smart agriculture

FEATURES

- STEVAL-BCN002V1 sensor board includes:
  - BlueNRG-2 system-on-chip
  - BALF-NRG-02D3 ultra-miniature balun and harmonic filter
- STEVAL-BCN002V1D programming board may be used to:
  - Program and debug firmware running on the sensor board
  - Supply power to the sensor board

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New automotive magnetic position sensors offer stray field immunity

Melexis' new MLX90371 and MLX90372 bring stray magnetic field immunity to the Triaxis® family of magnetic rotary and linear position sensors.

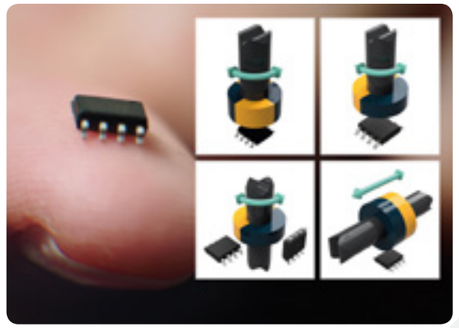
The parts support a wide variety of automotive position-sensing applications, including actuators in the powertrain and human machine interfaces. The MLX90371 features an analogue or PWM output signal. The MLX90372 provides a SENT or PWM output.

The sensors may be used to measure either on-axis rotary or linear motion with a four-pole or two-pole magnet.

Building on the legacy of the Triaxis sensor family, the MLX90371/90372 offer substantial improvements over the previous generation of products. The new stray field-immune mode greatly reduces or even eliminates the effect of stray fields from other magnets or from current-carrying conductors found in electric vehicles.

Other improvements introduced in the MLX90371 and MLX90372 include better EMC capability, higher temperature operation up to an ambient temperature of 160°C, and reduced thermal drift.

The Melexis devices are ready for use in applications that require compliance with the ISO 26262 functional safety standard to ASIL-B (MLX90371) or ASIL-C (MLX90372) grade. Options include a fully redundant dual-die package option.



Melexis position sensors measure linear or rotary motion

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APPLICATIONS

- Automotive drivetrain
  - Electric throttle body sensor
  - Coolant valve sensor
  - Turbo wastegate sensor
- Automotive human-machine interfaces
  - Rotary knobs
  - Menu and volume selectors
- Transmission
  - Clutch and fork position sensing
  - Lever/slide switch
- Chassis and safety devices
  - Ride-height sensor
  - Fuel level sensor
  - Accelerator, brake or clutch sensor

FEATURES

- Programmable linearisation algorithm: arbitrary points (8 points) or piece-wise-linear (32 points)
- Programmable measurement range
- 12-bit angular resolution
- 10-bit thermal accuracy
- AEC-Q100 qualified to Grade 0

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Range of slide switches for connected medical devices

C&K supplies a range of medical-grade switches which are validated for use in most environments in which patients are treated.

The switches are suitable for applications supporting the transmission, initiation, detection and collection of data – functions which are critical to the success of the next generation of connected medical devices. For instance, C&K switches are ideal for confirming an indication or action to initiate a testing process, or to transmit the data to an app on a mobile phone.

A slide switch from the C&K in the AYZ, JSM or Snap MM families could initiate a data transfer with a distinctive touch and feel. These C&K families of slide switches are designed for medical applications and are thin, small and light, and capable of meeting demanding expectations.

The switches are available in various configurations including:

- Single-pole double-throw
- Double-pole double-throw
- Single-pole triple-throw

C&K can also provide modified or full custom versions of its slide switches.

C&K's AYZ, JSM and Snap MM switches are suitable for use in medical devices

ENERGY **INDUSTRIAL** LIGHTING **MEDICAL** TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Connected medical devices
- Remote monitoring equipment
- Personal measuring equipment
- Pain management
- Drug delivery
- Wearable medical devices

FEATURES

- Low profile
- Long electrical and mechanical life
- Medical-grade components
- Potential for customisation

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New six-axis inertial measurement module features machine learning core

The LSM6DSOX from STMicroelectronics is an Inertial Measurement Unit (IMU) which features a three-axis digital accelerometer and a three-axis digital gyroscope. It offers always-on low-power features for use in small, battery-powered activity trackers.

Building on the high-performance platform of the earlier LSM6DSO, the LSM6DSOX adds a machine learning core, enabling developers to implement software through which the device can classify motion data based on known patterns.

The machine learning processing capability allows the designer to implement motion-detection algorithms for functions such as fitness logging, wellness monitoring, personal navigation and fall detection on the sensor rather than on an application processor.

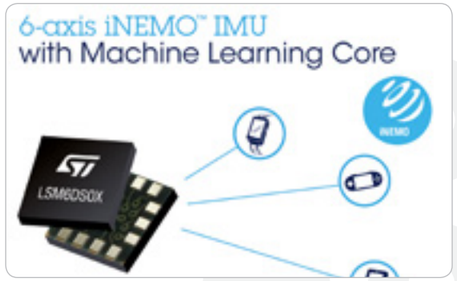
This reduces power consumption and latency in motion-based applications.

The machine learning processing capability uses decision-tree logic. The LSM6DSOX can be configured to run up to eight decision trees simultaneously and independently.

The machine-learning core works in conjunction with the integrated finite-state machine logic to perform recognition of motion patterns or to detect vibration. Designers creating activity-tracking products with the LSM6DSOX can train the core for classification using Weka, an open-source PC-based application, or other tools. They can generate settings and limits from sample data such as acceleration, speed and magnetic angle that characterize the types of movements to be detected.

The auxiliary output interface and configuration options also simplify use in optical image stabilisation and when closing fast control loops.

The LSM6DSOX is pin-compatible with other devices in ST's six-axis IMU family, such as the LSM6DSO, LSM6DSL and LSM6DSR.



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APPLICATIONS

- Motion tracking and gesture detection
- Sensor hubs
- Indoor navigation
- IoT and connected devices
- Smart power saving for battery-operated devices
- Camera image stabilisation
- Robotics and machine control
- Vibration monitoring and compensation

FEATURES

- Finite state machine for recognising up to 16 custom movements in low-power mode
- SPI/I²C and MIPI I3C™ serial interfaces
- Data acquisition from up to four external sensors
- Hardware-configurable pedometer, step detector and step counter
- Smart FIFO for up to 9kbytes of data in compressed mode

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Magnetic reed switch offers long life in proximity sensing applications

Littelfuse
Expertise Applied | Answers Delivered

Littelfuse's 59166 is a miniature overmoulded reed switch in a 16.0mm x 2.4mm x 2.4mm package with gullwing leads. When combined with a Littelfuse 57045 actuator, it forms a two-part magnetically-operated proximity switch.

It operates through non-ferrous materials such as wood, plastic and aluminum. Hermetically sealed, its contacts continue to operate long after optical and other technologies have failed due to contamination.

The 59166 has a normally open contact, capable of switching up to 200V DC at 10W. It is suitable for use with pick-and-place automated assembly equipment.

Littelfuse's 59166 reed switch is hermetically sealed

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APPLICATIONS

- Position sensing
- Limit sensing
- Security system switches
- Door switches

FEATURES

- Consumes no power in stand-by mode
- Thermoset overmoulded material
- ATEX-certified for use in explosive atmospheres
- Certified for use in Class I, Division 2 and Zone 2 hazardous locations in North America
- 1ms maximum operate and release time

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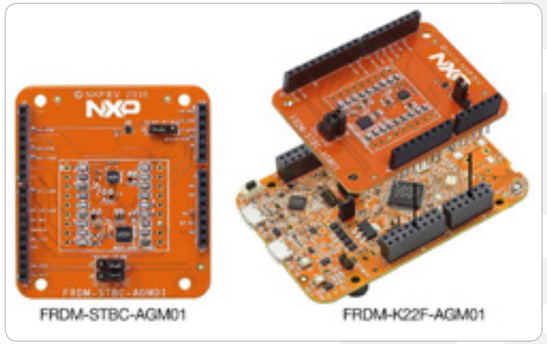
Software development package enables rapid integration of sensors into IoT system designs

The IoT Sensing Software Development Kit (ISSDK) is an embedded software framework for NXP Semiconductors' Sensor Toolbox ecosystem of digital and analogue sensor platforms for IoT applications.

The ISSDK provides a unified set of sensor support models for NXP's portfolio of sensors, and is compatible with a broad range of NXP's Arm® Cortex®-M core-based microcontrollers, including the LPC, Kinetis® and i.MX RT crossover platforms.

The software kit combines a set of robust sensor drivers and algorithms along with application examples to allow users to get started with NXP sensors. It is also offered as a middleware option in the MCUXpresso Config Tools.

The latest version 1.7.0 of the ISSDK enhances embedded application development with NXP sensors, and extends support for sensing in NXP's latest microcontrollers. It is available in custom MCUXpresso SDK downloads, based on user selections of supported kits or boards. It also provides reference software to accelerate end-user prototyping and development on NXP's sensor platforms.



NXP's ISSDK is compatible with various Freedom development boards

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS
- IoT devices
- Sensor nodes

FEATURES
- Provides:
  - Sensor register definitions
  - Register access interfaces
  - Sensor-level multiple register Read/Write interfaces
- Out-of-the-box examples and reference software
- Supports multiple toolchains:
  - MCUXpresso
  - IAR
  - Keil MDK
  - Arm GCC
- Supports sensor data visualisation and data analysis using STB-CE software

FREE DEVELOPMENT BOARDS

NXP development boards supported by the ISSDK include:
- **FRDM-K64-AGM01**
- **RD-KL25-AGMP01**
- **FRDM-FXS-MULT2-B**

Apply at: www.my-boardclub.com

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MEMS pressure sensor provides accurate digital output

STMicroelectronics' LPS33W is a small piezoresistive pressure sensor which functions as a digital-output barometer. The device comprises a sensing element, and an IC interface which communicates through I²C or SPI to the application's host controller.

The sensing element, which detects absolute pressure over a range from 260hPa to 1,260hPa, consists of a suspended membrane manufactured using a dedicated process developed by ST. Its pressure measurements are accurate to ±1.5hPa over a temperature range of 0°C to 65°C.

The LPS33W is available in a ceramic LGA package with a metal lid. The package is holed to allow external pressure to reach the sensing element, and gel inside the IC's package protects the electrical components from harsh environmental conditions. The LPS33W's board footprint is 3.3mm x 3.3mm. The sensor is guaranteed to operate over a temperature range from -40°C to 85°C.

ST's LPS33W withstands harsh operating conditions

FREE DEVELOPMENT BOARD

The STEVAL-MKI205V1 can be plugged into a standard DIL 24 socket. The adapter provides the complete LPS33W pin-out and comes ready to use with the required decoupling capacitors on the power supply line.

Orderable Part Number: STEVAL-MKI205V1

Apply at: www.my-boardclub.com

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS
- Wearable devices
- Altimeters and barometers for portable devices
- GPS positioning systems
- Weather stations
- E-cigarettes

FEATURES
- 3µA operating current at an output data rate of 1Hz
- 20x full scale over-pressure capability
- Embedded temperature compensation
- 24-bit pressure data output
- 16-bit temperature data output
- Output data-rate range: 1Hz to 75Hz
- Embedded FIFO for temperature and pressure data

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Accurate, low-power op amps ideal for use in sensor circuits powered by a lithium coin cell

The TSU111, 112 and 114 from STMicroelectronics are operational amplifiers which may be used in circuits supplied by a lithium-ion coin cell battery, or by a regulated voltage in low-power applications.

The op amps draw just 900nA when operating from a supply voltage of 3.3V at 25°C while offering 11.5kHz of gain bandwidth product. They work with any supply voltage in the range 1.5V-5.5V, fitting the output-voltage profile of standard lithium coin cells.

Thanks to their zero-drift technology the TSU11x op amps provide accurate amplification of low-voltage sensor signals: the input-offset voltage is a maximum 150µV at an ambient temperature of 25°C.

The performance of two TSU111 op amps is demonstrated in ST's P-NUCLEO-IKA02A1, a gas-sensing expansion board for STM32 Nucleo microcontroller development boards.

The TSU111 op amps perform signal conditioning for a choice of electrochemical gas sensors that may be mounted in standard sockets on the expansion board. The expansion board includes a low-current precision analogue temperature sensor, the STLM20, for compensation of gas readings.

TSU114: Low input-offset voltage

Part Number	Package
TSU111IQ11T	DFN6 1.2mm x 1.3mm
TSU111ICT	SC70-5
TSU112IQ2T	DFN8 2mm x 2mm
TSU112IST	MiniSO8
TSU114IPT	TSSOP14
TSU114IQ4T	QFN16 3mm x 3mm x 0.9mm

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS
- Sensor signal conditioning
- Battery-powered and portable devices

FEATURES
- 3.6µV$_{p-p}$ noise over 0.1Hz to 10Hz bandwidth
- Rail-to-rail input and output
- 10pA input bias current at 25°C
- 4kV ESD rating on the human body model

FREE DEVELOPMENT BOARD

A gas-sensing expansion board for STM32 Nucleo microcontroller development boards.

Orderable Part Number: P-NUCLEO-IKA02A1

Apply at: www.my-boardclub.com

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Resistors for high-reliability or high-power applications

Panasonic Industry supplies a choice of resistors for applications which require high reliability or high power capability.

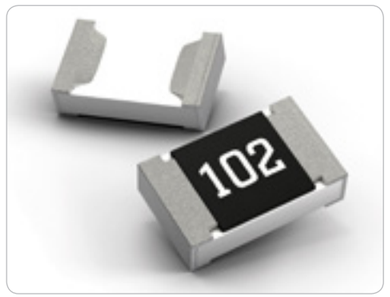
The **ERA series of thin-film chip resistors** are a high-reliability type of resistor. They offer stable performance at high temperature and high humidity: resistance change is far less than 0.1% after 1,000 hours of testing at a temperature of 85°C and 85% relative humidity.

These resistors are also notable for their high accuracy over their operating-temperature range of -55°C to 155°C. Resistance tolerance can be as low as ±0.05%. The ERA series devices also offer low current noise and excellent linearity.

There are five series of ERA resistors:
- ERA 1A: 0201 package, 0.05W power rating
- ERA 2A: 0402 package, 0.063W power rating
- ERA 3A: 0603 package, 0.1W power rating
- ERA 6A: 0805 package, 0.125W power rating
- ERA 8A: 1206 package, 0.25W power rating

Panasonic Industry also offers the **ERJ B series of high-power chip resistors**, a wide-terminal type. These resistors are for automotive electronic circuits and current sensing in power supplies. They feature high solder-joint reliability and excellent heat dissipation thanks to their wide terminals.

The **ERJ D series of high-power chip resistors**, also a wide-terminal type, are notable for their low temperature coefficient of resistance of ±100×10^{-6}/°C.



Panasonic resistors offer excellent linearity

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS
- Automotive systems
- Industrial equipment
- Computing equipment and servers
- Telecoms equipment
- Networking equipment
- Medical equipment
- Measurement equipment

FEATURES (ERA series)
- AEC-Q200 qualified
- Low temperature coefficient of resistance
- Compliant with reference standards:
  - IEC 60115-8
  - JIS C 5201-8
  - EIAJ RC-2133B

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Single-photon-sensitive light sensors offer long-range detection in LiDAR systems

The MicroRB-100xx-MLP products from ON Semiconductor are 1mm light sensors for Light Detection and Ranging (LiDAR) applications. Offering high detection efficiency coupled with single-photon sensitivity, they enable ranging systems to detect low-reflectivity targets over long distances.

The MicroRB-100xx-MLP is part of ON Semiconductor's RB series of Silicon Photomultiplier (SiPM) sensors. SiPM products are visible and near infrared light sensors which combine high detection efficiency, fast timing, single-photon sensitivity, and low operating voltages of <50V.

ON Semiconductor photosensors: High detection efficiency

The RB series provides higher sensitivity to the red and near infrared regions of the electromagnetic spectrum that are of interest to developers of LiDAR applications. LiDAR systems commonly operate at wavelengths in the range of 830nm to 940nm. In these applications, SiPM sensors are superior to avalanche photodiodes and PIN diodes because of their high gain and single-photon sensitivity.

The RB series SiPM products are suitable for use in LiDAR systems for various applications, including short- and long-range automotive systems, as well as delivery, warehousing and parking systems. Innovative retail, security and people-tracking applications could also benefit from the use of these sensors.

The MicroRB-100xx-MLP devices are backed by compatible power, laser driver and read-out solutions also from ON Semiconductor.

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Automotive LiDAR
- 3D mapping
- Robotics
- Industrial ranging
- Security equipment
- Smart cities
- Smart retail

FEATURES

- >100kA/W responsivity at 905nm
- >10% detection efficiency at 905nm
- Ultra-fast rise times and pulse widths
- Compact, robust micro-lead frame package

FREE DEVELOPMENT BOARD

The sensor Pin Adapter board is a small PCB which houses the MLP sensor and has through-hole pins to allow its use with standard sockets or probe clips.

Orderable Part Number: MICRORB-SMTPA-10035-GEVB

Apply at: www.my-boardclub.com

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3D MEMS accelerometers' filters help pinpoint vibration patterns

The KX132-1211 and KX134-1211 from ROHM Semiconductor are tri-axis MEMS accelerometers which feature a user-configurable three-stage Advanced Data Path (ADP) which filters out unwanted noise and events, and enables the developer to focus on the signal of interest.

The ADP consists of a low-pass filter, low-pass/high-pass filter, and a root mean square calculation engine. When used in applications such as motion and vibration sensing to monitor the health of industrial machinery, for instance, manufacturers can make their products smarter, more aware and more usable.

ROHM motion sensor: 4mm² footprint

The KX132-1211 measures acceleration in three axes over a full-scale range of ±2g, ±4g, ±8g, or ±16g. The KX134-1211 additionally supports full-scale ranges of ±32g and ±64g. The KX132/134 accelerometers integrate digital circuitry for interpreting characteristic patterns of motion. They perform wake-up and back-to-sleep detection, configured with a high-resolution threshold of as little as 3.9mg. Embedded processing engines also perform orientation, Directional-Tap™ and Double-Tap™ event and free-fall detection.

Fabricated using proprietary plasma micromachining process technology, the KX132/134 accelerometers offer low noise and high linearity over the entire operating-temperature range of -40°C to 105°C.

The devices are supplied in a 2mm x 2mm x 0.9mm 12-pin LGA plastic package. They operate from a supply-voltage range of 1.7V to 3.6V. Internal voltage regulators maintain stable operating characteristics when the supply voltage changes.

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Machine health monitoring
- Shock detection
- Sports training equipment

FEATURES

- Embedded temperature sensor
- 512-byte buffer
- 25.6kHz maximum output data rate
- Self-test function
- I²C and serial peripheral interfaces

FREE DEVELOPMENT BOARD

The RoKiX Sensor Node integrates multiple sensors for the measurement of 3D acceleration, 3D magnetism, 3D rotation, atmospheric pressure, and temperature. Expansion connectors enable the addition of more sensors such as an optical heart rate sensor, ambient light sensor, RGB color sensor or magnetic Hall effect sensor.

Orderable Part Number: RoKiX Sensor Node

Apply at: www.my-boardclub.com

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MEMS chip with three-axis accelerometer and temperature sensor includes internal motion-detection engine

STMicroelectronics' new LIS2DTW12 combines a MEMS three-axis accelerometer and a temperature sensor on a single die, providing a miniature sensing solution for space-constrained and battery-sensitive detectors such as shipping trackers, wearable devices and IoT end-points.

LIS2DTW12: Built-in free-fall, tap, orientation and other detection functions

Providing temperature measurements accurate to ±0.8°C, its performance is comparable to that of stand-alone standard temperature sensors. These temperature measurements support temperature compensation of the accelerometer's outputs.

The accelerometer itself offers five power-saving modes and two noise modes which enable developers to optimize power consumption and noise to meet the requirements of their application. It has user-selectable full-scale range from ±2g to ±16g, and measures acceleration at output data rates from 1.6Hz to 1.6kHz.

At just 0.7mm high, the LIS2DTW12 is a thinner package than many integrated motion sensors. It includes various power-saving features to enable the host device to run for longer between charges. These include:

- **50nA current in power-down mode**
- **Low-power modes that bring operating current down to as little as 1µA**
- **A dedicated internal engine for processing accelerometer signals, plus a large 32-level FIFO to reduce the need for the host controller to perform power-intensive processing operations**

The LIS2DTW12's internal motion engine performs free-fall and wake-up detection, single-/double-tap recognition, activity/inactivity detection, stationary/motion detection, portrait/landscape detection, and 6D/4D orientation. The LIS2DTW12 is pin-compatible with other devices in the 2x2 accelerometer family, such as the LIS2DW12, LIS2DH12 and LIS2DE12. An embedded self-test capability enables the user to check the functioning of the sensor in the final application.

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- Fragile shipment tracking
- Hearing aids
- Portable healthcare devices
- Wireless sensor nodes
- Metering equipment

FEATURES

- Supply-voltage range: 1.62V to 3.6V
- 1.3mg$_{rms}$ noise in low-power mode
- 0.38µA operating current in active low-power mode
- 16-bit accelerometer data output
- 12-bit temperature sensor output
- Survives 10,000g shock

FREE DEVELOPMENT BOARD

The STEVAL-MKI190V1 is an adapter board designed to facilitate the evaluation of the LIS2DTW12 product family. It supports fast system prototyping and device evaluation directly in the user's application.

Orderable Part Number: STEVAL-MKI190V1

Apply at: www.my-boardclub.com

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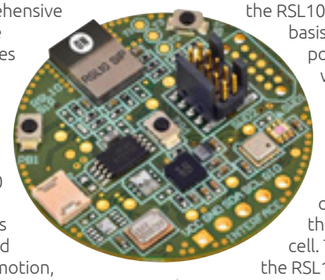
Sensor system development platform features Bluetooth and NFC connectivity

The RSL10 Sensor Development Kit from ON Semiconductor, which has the part number RSL10–SENSE–GEVK, is a compact, node-to-cloud IoT sensor platform which accelerates the development of circuit designs which implement Bluetooth® Low Energy wireless connectivity.

As well as providing comprehensive hardware and software, the RSL10–SENSE–GEVK includes a mobile app, RSL10 Sense and Control, to interact with sensors and actuators.



At the heart of the board is an RSL10, the industry's lowest-power Bluetooth v5.0 system-on-chip. The board also includes several sensors from ON Semiconductor and from Bosch. By combining motion, environmental and ambient light sensing with the low-power performance of the RSL10, the RSL10–SENSE–GEVK provides the basis for a new class of battery-powered static, mobile and wearable smart sensors for consumer and industrial applications in the IoT.

The system draws just 20µA in Deep Sleep mode, giving a typical battery life of more than one year from the supplied CR2032 coin cell. To help extend battery life, the RSL10–SENSE–GEVK provides a software configuration wizard which allows for flexible timing set-up.

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

APPLICATIONS

- IoT sensor nodes
- Wearable devices
- Worker safety equipment
- Asset monitoring

FEATURES

- Flexible NFC antenna
- NOA1305 ambient light sensor
- N24RF64 NFC smart tag
- BME680 pressure, temperature, air quality and humidity sensor
- BHI160 and BMM150 three-axis accelerometer, gyroscope and magnetometer
- INMP522 microphone

FREE DEVELOPMENT BOARD

Orderable Part Number: RSL10–SENSE–GEVK

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TECHNICAL VIEW FUTURE ELECTRONICS

The uses of specialist RF transistors in industrial heating applications

By Yves Francois
Senior Specialist FAE (EMEA), Future Electronics

RF and microwave power transistors are essential components in high-power communications equipment such as cellular base transmitter stations and TV broadcasting equipment.

Read this to find out about:

- The reasons to replace thermal with microwave heating techniques in industrial applications
- Why RF semiconductor equipment is preferable to the traditional magnetron
- New RF transistor products and tools from NXP for use in industrial heating and process applications

By contrast, solid-state RF components are rarely found in today's factories or process plants. This is about to change, however, with the introduction of a new generation of high-voltage, high-power RF transistors operating at frequencies ideal for certain industrial processes and operations. Drying, curing, welding and bonding processes all derive huge benefits from the application of RF rather than thermal energy for targeted heating operations.

And as this article explains, the recent introduction of a broad set of evaluation and development tools for RF energy components smooths the path from older magnetron-based microwave equipment to semiconductor-based systems for designers who have limited experience in implementing solid-state RF circuits.

The advantages of RF energy over thermal techniques

Some thermal processes used in industry today have barely changed for decades. For instance, drying of foodstuffs, fabrics and building materials is commonly performed by passing items through an oven, exposing them to hot air. Bonding of plastics or curing of adhesives often involves applying pressure to the location of the joint via a hot die.

If the material to be treated has a high enough dielectric loss factor, the application of RF/microwave energy can raise its temperature without exposing it to an external source of heat such as a die or hot air, as shown in Figure 1. The replacement of old thermal equipment with new RF energy techniques provides numerous benefits to the operators of industrial drying, curing and bonding processes:

- Heating time is typically between 2 and 20 times faster, as the heat is generated internally
- Reduced exposure time to high external sources of heat results in less deterioration of the treated material. In food processing for instance, heating through RF energy preserves more of the nutritional content of food than oven heating. In drying applications, the use of RF energy can reduce the risk of surface cracking.
- Since RF energy does not heat the ambient air, the heat transfer system is simpler. This can enable process operators to replace a batch process with a continuous process as well as to reduce floor space.
- The power of the RF energy applied to a material and the duration of the application of power may both be precisely controlled. Using information from moisture and temperature sensors, the system can stop applying RF power immediately when the target moisture level or temperature is reached.

Material	Loss Factor
Water	12
Field Corn	0.875
Phenolic Resin	0.320
Dry Wood	0.150
Paper	0.057
Silica Sand	0.020
Silica, Glass	0.002
Teflon	0.001

Fig. 1: Dielectric loss factor of various common materials. The higher the factor, the easier it is to heat with RF energy

These benefits result in reduced energy consumption, operating costs, maintenance requirements and downtime. For example, to dry cotton from 55% moisture to 9% with RF heating requires 57% less energy than fresh air drying, and 23% less energy than pressure air drying.

Welding of plastics is another application which benefits hugely from conversion to RF energy. Conventional plastic welding requires a hot die to be applied to two plastic sheets until the temperature throughout the material is high enough for them to fuse together. They must then be held together under pressure until the die cools. This means that the highest temperature is applied to the faces of the material, and the die must be heated and cooled each time a weld is made.

By contrast, dielectric heating allows the weld to be made with cold dies the temperature of which rises only a little during the weld and falls rapidly after bonding. Because the die is cool, the hottest spot is at the interface between the two sheets, where it is needed. This reduces energy cost and greatly accelerates the process.

Growing market for replacement of old microwave energy generators

The huge cost-saving and operational benefits of using RF energy put this technology in pole position to replace thermal ovens and other thermal energy equipment. In fact, microwave energy is already used in industrial processes, for instance in drying or sterilizing food. Traditionally, the generator of microwave energy in industrial equipment has been the magnetron, a technology first brought into production in the 1940s. A magnetron is a cavity vacuum tube, a bulky and heavy device.

Weight and size reduction is one of the important benefits of using solid-state transistors to generate RF or microwave energy, but there are many more benefits as well.

A transistor offers much greater control over both power output and frequency. A low-end magnetron is either fully on or off, and even a high-end magnetron can only control power output at above 60% of full power. By contrast, an RF/microwave transistor offers full control of output power over a range from <1% to 100% of full power.

A solid-state RF or microwave generator also offers a certain amount of frequency agility. Figure 2 shows the effect of tuning the frequency of a transistor rated at a nominal 2.45GHz. In a material sample of mixed composition, different components of the material might have a different dielectric loss factor and generate heat at different frequencies. Dynamic frequency sweeping across a transistor's frequency range redistributes hot and cold spots for even heating across the sample. Such dynamic, in-process frequency sweeping is not possible with a magnetron.

The generation of RF energy by solid-state components also produces equipment that is easier to install and operate in a factory. It provides a rapid response to changes in power requirement, and starts up instantly, with no delay for warming up or cooling.

A transistor system uses reliable, compact, and efficient switch-mode power supplies operating from a low-voltage supply.

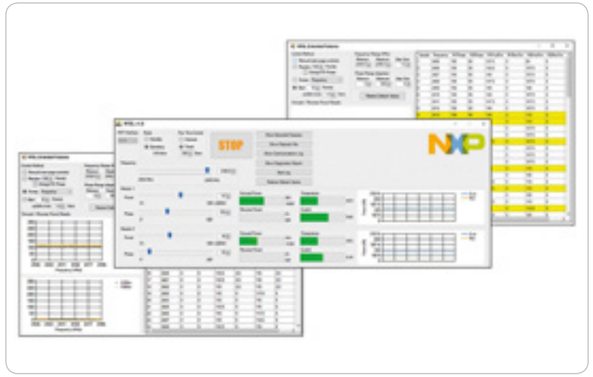

Fig. 2: NXP's Lab box RFEL software enables the user to sweep across phase and frequency to find the points with the best match to the load

For a power output of 800W, a magnetron requires a 4kV supply, whereas a microwave transistor runs from a safer 50V supply.

In addition, the solid-state technology requires no complicated electro-mechanical controls and sequencing, and is insensitive to vibration

This also contributes to the transistor's high reliability: the lifetime of a high-end 915MHz magnetron is between 2,000 and 6,000 hours, or up to eight months of continuous operation. When a magnetron needs to be replaced or serviced, a factory operator can expect downtime of between several hours and several days.

By contrast, a transistor's rated lifetime is 100 years, and it suffers no performance degradation over time. Even if a fault occurs, a hot-swap architecture allows a failed transistor to be quickly replaced with minimal downtime.

Finally, the transistor-based system will be smaller and lighter than the equivalent magnetron-based design: at 915MHz, a transistor-based RF generator can be half the size and weight of a magnetron system.

New components and new tools ease implementation of RF energy system designs

The scope for improved design outcomes from the replacement of a magnetron with solid-state components is clear. But how easy is it for industrial equipment designers to find the components and the tools that they need to meet their specific application requirements?

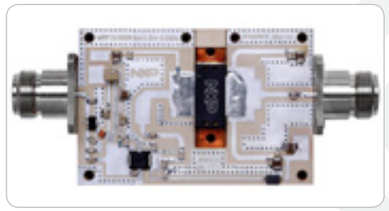

Fig. 3: The NXP RFEP24-250 power amplifier reference design features three stages of amplification, and is supplied as a board with a footprint of just 50mm x 76mm

Component availability has been much enhanced by the introduction by NXP Semiconductors of a range of RF power transistors intended for use in heating and process applications. Importantly, the NXP devices cover the frequencies of most interest to industrial applications:

- **MRFX1K80H:** 1MHz to 400MHz, 1,800W rating, 65V LDMOS device, 76% efficiency
- **MRF13750H:** 915MHz, 750W, 50V LDMOS device, 67% efficiency
- **MRF24300N:** 2.45GHz, 300W, 32V LDMOS device, 60% efficiency

All three devices offer higher power density and wider safety margins than previous generations of high-voltage RF transistors, and are thus able to deliver a greater power output in the application. Manufactured in a standard silicon Laterally-Diffused Metal-Oxide Semiconductor (LDMOS) fabrication process, these transistors benefit from a substantial cost advantage over competitors' equivalent RF transistors fabricated in an alternative semiconductor material, Gallium Nitride (GaN).

And now NXP supports these devices with a new portfolio of development tools for its RF energy transistors, as shown in Figure 4. The range of development tools addresses the requirements of design teams with different levels of RF circuit design expertise. At the most basic level, NXP supplies the transistor with a reference circuit schematic. The RF Energy Pallet (RFEP), shown in Figure 3, adds RF transistor drivers and a 50Ω matching circuit.

Fig. 4: NXP's RFEL24-500 RF energy lab box is a 2 x 250W, fully integrated RF development system designed for use by RF or non-RF engineers

On top of this, the RF Energy Module (RFEM) includes a microcontroller with embedded RF source, power, current and temperature sensors, circulator and coupler, and a command interface.

For a complete demonstration RF energy system, designers should use the RF Energy Lab Box (RFEL): this includes a power supply, heat-sink and fans, and provides a USB connection to a PC, as shown in Figure 4. NXP supplies RFEL control software with auto-tuning features to run on a PC. This software provides a rich demonstration of the capability of solid-state RF energy systems to use data to optimize system performance. The RFEL collects data about parameters such as reflected energy, and can dynamically adjust the frequency, power and phase generated by the RF transistor to maximize the transferred energy, or to distribute it to specific locations.

Hundreds of new applications for solid-state RF energy

The number of existing drying, curing and bonding applications to which RF energy could be applied is vast. But the ready availability of small, high-power RF transistors opens up many new applications for which a bulky, heavy magnetron is unsuitable. An example is handheld surgical equipment for skin ablation, but many others are sure to emerge as the advantages of solid-state RF energy equipment drive the replacement of magnetron technology in factories and process plants worldwide.

All images courtesy of NXP Semiconductors

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Standard, Custom, SiSo Rail, MiMo Rail

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Applicators, Insertion & Extraction Tools

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Auto, Copper, Data Bus, Pluggable I/O

CONNECTORS
Automotive, Card & Socket, Circular, PCB, Pluggable I/O, Rectangular, RF & Coax

EMI FILTERS
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FIBER OPTICS
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HARNESSING
Adhesives, Heat Shrink Components

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Circuit Breakers, Contactors, Relays

SENSORS
Automotive, Flow, Humidity, Piezo, Position, Pressure, Rate and Inertial, Temperature, Torque, Ultrasonic, Vibration

TERMINALS & SPLICES
Magnet Wire Terminals, PCB Terminals, Quick Disconnects, Splices

WIRE & CABLE
High Speed, Hook Up Wire, Multicore Cable, Sensor Cable, Twisted Pair Cable

FOR MORE DETAILS AND DATA E-MAIL:
INFO@MY-FTM.COM

REFERENCE NUMBER
19-v 38

EVERY CONNECTION COUNTS

TE connectivity