

Technology

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THE

TO

What's a component? Isn't it anything we design into an electronic product? That's a perennial discussion topic whenever we compile our annual list of the Top 101 Components (*see the table*). So, here's an attempt at an answer. A component is anything we use that isn't memory or a device that executes a program from memory.

It's a resistor, a discrete semiconductor device, a switch, a transient suppression device, or a battery. It doesn't have to be a linear device. For example, if it's a voltage regulator, it can be a switcher or a low-dropout regulator (LDO). It can even be the box you put your design inside, if it's a standard product you would buy from a distributor.

TOP OF THE LIST

So, what product rose to the top of this year's survey? (*see "Readers Pick The Top 101 Components" at electronicdesign.com*) It's a box with a particular variety of mounting arrangements: DIN rails. "DIN" is the acronym for "Deutsches Institut für Normung," the standards body that developed the EN (European Norm) 50022 standard for mounting circuit breakers on electrical panels. Apparently, DIN has been widely adopted for rack-mounting small assemblies in industrial control systems.

TOP

COMPONENTS

A series of DIN rail-mount enclosures from Automation Systems Interconnect has taken the number-one slot (Fig. 1). These enclosures come in 12.5-, 17.5-, 22.5-, 35-, 45-, and 67.5-mm wide housings. Ventilating slots ensure cooler, stable internal temperatures and reduce overheating issues. Snap-in covers enclose the opening of any unused connector slots. The cover can be cut to accept various connector interfaces and LEDs.

If that seems like a strange product to lead the list, consider how many *Electronic Design* readers are engaged in industrial control, the design of which is generally customized to each implementation. If the enclosures are as versatile as they seem, and they can be hung on any convenient EN50022 DIN rail in an equipment rack, this is a great solution.

WHAT'S HOT?

Take a look at number three on the list, the Brain Sentry Impact Sensor from STMicroelectronics. Mounted on sports helmets, the omnidirectional microelectromechanical-systems (MEMS) accelerometer accurately measures accelerations produced by collisions, regardless of the direction of the

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contact. The light (1 oz) and compact device also taps a unique battery-life management system that lets it be active for a full year without recharging.

It's no wonder why the Brain Sentry Impact Sensor attracted a lot of attention. It's also not surprising that the next component on the list is another accelerometer. The ADXL375 three-axis digital MEMS accelerometer from Analog Devices will find homes in low- and high-powered wireless sensor networks employed in concussion detection, transportation, asset tracking, and other applications.

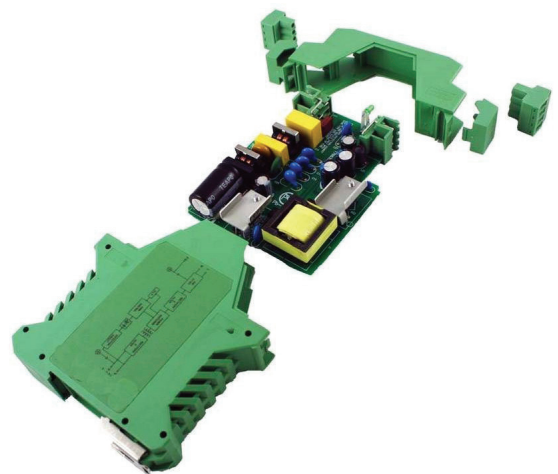
Already, the ADXL375 has been designed into the newest generation of the Blast Gauge body-worn blast detection system from BlackBox Biometrics. In addition to its low power drain, implying long intervals between charging, its integrated memory-management system consists of a 32-level first-in first-out (FIFO) memory. Its low-power modes can be used to set impact thresholds, store data, and reduce overall power consumption by offloading those functions from the host processor.

ODD OR INTRIGUING

Taking the sixth spot on this year's list, the ARL capacitive touch switch from CIT Relay & Switch offers embedded capacitive touch slider functionality that can be linear or rotary. The haptic feedback device's options include a pushbutton function and a timer for time-demand programs. Applications include audio and video equipment, automotive, lighting, instrumentation, and appliances.

Do you need to measure how much aerated liquid is in a tank? The liquid's fizziness may make that a tricky proposition. Positioned at number 21, the LL-01 Sentio series miniature ultrasonic liquid-level switches from Measurement Specialties operate when the liquid reaches their level, but no mechanical parts are involved.

2014 TOP 101 COMPONENTS		
Rank	Product	Company
1.	ASI DIN rail-mount enclosures	Automation Systems Interconnect
2.	CP2130 controller	Silicon Labs
3.	Brain Sentry Impact Sensor	STMicroelectronics
4.	ADXL375 three-axis digital MEMS accelerometer	Analog Devices
5.	Hybricon AFT16 COTS OpenVPX AFT chassis	Curtiss-Wright
6.	ARK capacitive touch switch	CIT Relay & Switch
7.	iBridge connector system	ERNI Electronics
8.	MC33816 programmable solenoid controller	Freescale Semiconductor
9.	Avikrimp and VersaKrimp ring terminals	Molex
10.	Titan EP flexible electronic packaging enclosure	AMCO Enclosures
11.	XGA thin-client display	IEE Inc.
12.	Model 8101 piezoelectric accelerometer	Measurement Specialties Inc.
13.	AIS-1240 and AIS-1440 camera controllers	Advantech Corp.
14.	AVX 9296 connectors	AVX
15.	Motion Cookies	Sen.se.
16.	AMP-204C and AMP-208C motion controllers	Adlink
17.	SCA720 MEMS accelerometer	Murata
18.	IllumiMate 1.00-mm and 1.25-mm connectors	Molex
19.	JS Slide switches	Measurement Specialties
20.	TP8 tantalum chip capacitor series	Vishay Intertechnology Inc.
21.	LL-01 Sentio switches	Measurement Specialties
22.	bq27421EVM-G1A fuel gauge IC	Texas Instruments
23.	SiT15xx MEMS oscillator/Telit Jupiter SE880 receiver	SiTime Corp. and Telit Wireless Systems
24.	FemtoFET MOSFETs	Texas Instruments
25.	LMP92064 digital current sensor and voltage monitor	Texas Instruments
26.	8U MicroTCA.4 chassis	VadaTech Inc.
27.	K12S key switches with LED colors	C&K Components
28.	T18 tantalum-cased electrolytic capacitors	Vishay Intertechnology
29.	12-mm EH pushbutton switch	CIT Relay & Switch
30.	VT866 MicroTCA	VadaTech
31.	7204e PCI Express serial interface adapter	Sealevel Systems
32.	AD pushbutton switch	CIT Relay & Switch
33.	IP65-rated miniature rocker switches	C&K Components
34.	FRFC 0805 flip-chip resistor	Vishay Precision Group
35.	NTC chip thermistors	Ametherm Inc.
36.	KSK-1A35/1 reed switch	Standex-Meder Electronics
37.	FOH 2-2 push-pull connector	Fischer Connectors SA
38.	TPL5000 and TPL5100 system timers	Texas Instruments
39.	MP1005M1ROD multilayer power inductor	TDK Corp.
40.	KXR94 and KXD94 accelerometers	Kionix Inc.
41.	Polymer fiber for high-resolution remote imaging	OMC
42.	SB Smart connector	Anderson Power Products
43.	SER80xx high-current shielded power inductors	Coilcraft
44.	TMR6 wide-input dc-dc converters	Power Sources Unlimited
45.	DMT of electrical double-layer capacitors	Murata Europe
46.	LSM303C eCompass	STMicroelectronics
47.	ISL29125 RGB digital light sensor	Intersil
48.	1111SQ high-frequency air core inductors	Coilcraft
49.	LTM8050 2A μ Module regulator	Linear Technology
50.	Tachyon laminates & prepregs	Isola Group



1. The latest DIN rail mount enclosures from Automation Systems Interconnect come in 12.5-, 17.5-, 22.5-, 35-, 45-, and 67.5-mm wide housings. Ventilating slots help to ensure cooler, stable internal temperatures and reduce overheating issues.

The sensing for these single-pole, single-throw (SPST) normally open switches is ultrasonic. They also can stand ambient

pressures up to 250 psig. Versions rated for pressures up to 500 psig are available, as are normally closed versions. They run on 5 to 30 V dc as well.

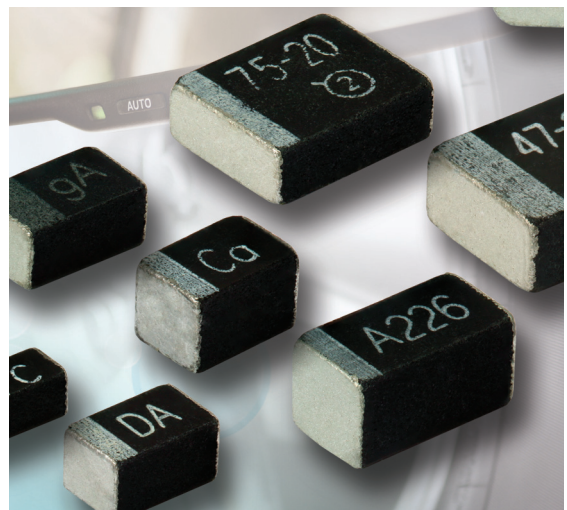
2014 TOP 101 COMPONENTS		
Rank	Product	Company
51.	LDC1000 data converter	Texas Instruments
52.	Si50x CMEMS oscillator	Silicon Laboratories
53.	VM3 snap-action switches	CIT Relay & Switch
54.	Lithium-ion capacitors	Taiyo Yuden
55.	Battery-free sensor kits	Farsens S.L.
56.	Snapdragon 800 processor	Qualcomm
57.	Model S subminiature pressure transducers	Honeywell International Inc.
58.	HCS high-current shunt resistors	Stackpole Electronics
59.	Dx35 laser distance measurement sensors	Sick Inc.
60.	CSD17381F4 and CSD25481F4 transistors	Texas Instruments
61.	70-dB analog MEMS microphone	InvenSense
62.	LSM9DS1 movement/position sensor	STMicroelectronics
63.	GLM and GLN ultra-broadband inductor series	AVX Corp.
64.	XP5 miniature pressure sensor	Measurement Specialties
65.	T4K82 13-Mpixel CMOS image sensor	Toshiba Electronics Europe
66.	MA40H1S-R sensors	Murata Europe
67.	LC898111 IAXB-MH IC	ON Semiconductor
68.	LTC6431-20 fixed-gain amplifier	Linear Technology
69.	DASSPLIT power splitters	Pulse Electronics
70.	Sprague T42 chip capacitors	Vishay Intertechnology
71.	ARS PRO enhanced sensor	Diversified Technical Systems
72.	VML0604 transistor	ROHM Semiconductor
73.	MGDDI-60 60-W dc-dc converters	Gaia Converter
74.	Type PFCH capacitors	Cornell Dubilier Electronics
75.	TR temperature-compensated pressure sensors	Merit Sensor
76.	AFT27S006N and AFT27S010N transistors	Freescale Semiconductor
77.	GXOS capacitors	AVX Corp.
78.	SMD power inductors	Bourns
79.	FFLC medium-power film capacitors	AVX Corp.
80.	89BSD piezoresistive silicon pressure sensor	Measurement Specialties
81.	Series IO ultrasonic sensors with pushbutton programming	Pepperl+Fuchs
82.	XR3070-78X ruggedized RS-485/RS-422 transceivers	Exar
83.	70-9155 board-to-board compression contacts	AVX Corp.
84.	IHLP high-current inductor	Vishay Intertechnology
85.	Single-side sensor	Neonode Inc.
86.	AS5162 position sensor	AMS
87.	DesignWare sensor IP subsystem	Synopsys
88.	LS32-1500 liquid-flow sensor	Sensirion AG
89.	PCX-7401 laser diode driver and current source	IXYS Colorado
90.	Model SP007 differential pressure transmitter	tecsis LP
91.	LIF400 linear encoders	Heidenhain Corp.
92.	P760 series disc magnet motor	Portescap
93.	VR and SR electric double-layer capacitors	ROHM Semiconductor
94.	SSC7102 sensor hub	Microchip Technology
95.	MC33901 and MC34901 transceivers	Freescale
96.	Versa Clock 5 programmable clock generators	Integrated Device Technology
97.	High Reliability MLCC ceramic capacitors	Yaiyo Yuden
98.	DHX91 system-on-chip	Everspring/DSP Group
99.	Python CMOS image sensors	ON Semiconductor
100.	CVC025CL-0902-0928 voltage controlled oscillator	Crystek
101.	TransGuard and StaticGuard VCLD series	AVX Corp.

Ranked at number 22, the Texas Instruments bq27421 lithium-ion (Li-ion) battery fuel gauge targets portable medical devices such as wearable health monitors and industrial devices like inventory scanners. It uses TI's impedance track advanced battery technology, which is quite a bit more sophisticated than simple fuel-gauge ICs that simply count coulombs going in and subtract coulombs out. Instead, the bq27421 provides more information about remaining battery capacity, state of charge, and battery voltage, extending the run-time of portable devices. The new and improved Gauge Studio software tool is available as well.

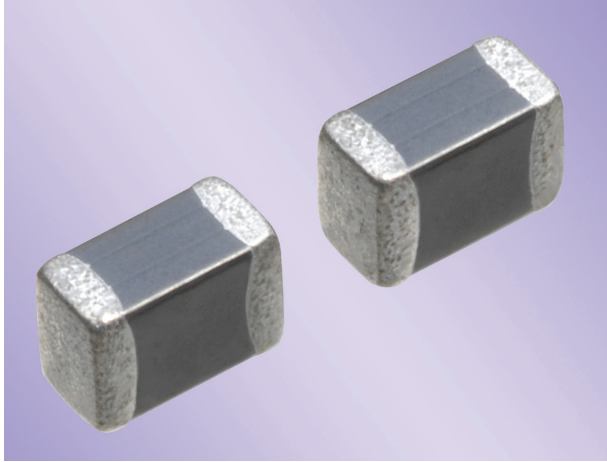
PASSIVES DRAW ATTENTION

Can there be anything new to say about resistors, capacitors, and coils? Can novel passives attract reader attention? There were 10 capacitors on the list, six inductors, and one lone resistor, which appeared at number 34. Vishay Precision Group's FRFC 0805 high-precision, next-generation, surface-mount, Bulk Metal Z1-Foil technology device is all about precision and long-term stability.

The resistor offers load-life stability of ±0.005% (50 ppm) at 70°C and rated power for 2000 hours. Its typical temperature coefficient of resistance (TCR) is ±0.005/°C from 0°C to 60°C and ±0.2 ppm/°C from -55°C to 125°C. Power TCR is 5 ppm at rated power, and tolerances run tight to ±0.01%. It's also small, even for a surface-mount passive. Its flip-chip configuration saves up to 35% of board space compared to



2. Vishay Intertechnology's TP8 molded, automotive-grade, solid-tantalum chip capacitor series is the first AEC-Q200-qualified lineup to deliver high capacitance-voltage ratings in 0603, 0805, and 0906 case sizes, according to the company.



3. TDK's MP1005M1R0D multilayer power inductors come in a 1.0- by 0.5- by 0.7-mm IEC 1005 case, the smallest available, for a shrink of approximately 60%.

surface-mount resistors with wraparound terminations. Resistances of 5 Ω to 8 k Ω are available.

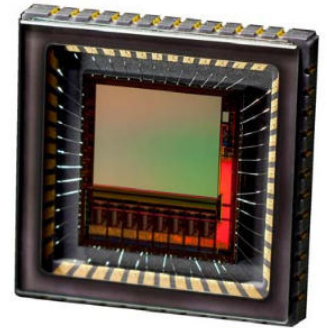
The 10 capacitors on the list ranged from the twentieth slot down to number 97. The top draw, Vishay Intertechnology's TP8 molded, automotive-grade, solid-tantalum chip capacitor

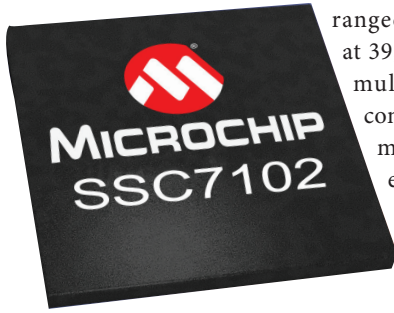
series, is the first AEC-Q200-qualified lineup to deliver high capacitance-voltage ratings in 0603, 0805, and 0906 case sizes, according to the company (Fig. 2).

Despite the smaller packaging, capacitance and voltage ratings still run from 1.0 μ F at 40 V to 100 μ F at 0.3 V. The devices offer standard capacitance tolerances of $\pm 10\%$ and $\pm 20\%$ and an operating temperature range of -55°C to 85°C , or 125°C with voltage derating. The caps are intended for energy storage, filtering, and decoupling in space-constrained automotive applications including tire pressure monitoring systems, camera modules, rearview mirrors, and remote keyless entry.

The six inductors that placed among this year's Top 101 Components

4. ON Semiconductor's Python CMOS image sensor family offers 0.3-, 0.5-, and 1.3-Mpixel resolutions. These devices enable in-pixel correlated double sampling (ipCDS), which delivers CCD-like optical performance from a CMOS imaging device.





5. Microchip's SSC7102 sensor hub can "fuse" data produced by multiple motion sensors such as accelerometers, magnetometers, and MEMS gyroscopes, plus environmental sensors for properties such as light intensity, temperature, humidity, and atmospheric pressure.

ranked from 39 to 84. Ranked at 39, TDK's MLP1005M1R0D multilayer power inductors come in a 1.0- by 0.5- by 0.7-mm IEC 1005 case, the smallest available, for a shrink of approximately 60% (Fig. 3). Rated inductance and current are 1.0 μ H and 500 mA. A new, low-loss ferrite material allows such high currents for their size. Applications include smartphones, tablets, digital cameras, and other mobile devices.

Number 84 in overall reader interest this

Typical dc resistance ranges from 3.87 to 163.0 m Ω . The guaranteed maximum range is from 4.14 to 173.0 m Ω . Also, the inductor will handle frequencies up to 1 MHz. Target applications include engine and transmission control units, diesel injection drivers, entertainment and navigation systems, noise suppression for motors, windshield wipers, and high-intensity discharge (HID) and LED lighting.

SENSORS RULE

Sensors constitute the largest category on our list, with 32 items. Ranked 99th, ON Semiconductor's Python CMOS image sensor family offers 0.3-, 0.5-, and 1.3-Mpixel resolutions. These devices enable in-pixel correlated double sampling (ipCDS), which delivers CCD-like (charge-coupled device) optical performance from a CMOS imaging device (Fig. 4).

Few industrial-control applications rely only on one or two sensors. Ranked at number 94, Microchip's SSC7102 sensor hub can "fuse" data produced by multiple motion sensors such as accelerometers, magnetometers, and MEMS gyroscopes, plus environmental sensors for properties such as light intensity, temperature, humidity, and atmospheric pressure (Fig. 5). It consumes approximately 4 mA while running complex sensor-fusion algorithms, extending battery life for Windows 8.1 tablets, laptops, ultrabooks, and smartphones. 