With Robust Parts for Harsh Environments

NXP’s Automotive Logic Parts
Lead the Way

Inside the Lab:
Linear Technology’s LTC2380-24

Connect a Raspberry Pi to the IBM Watson IoT Platform
Is the Universal Translator Finally Here?

Find out how the low-power translators from NXP are the solution for your mixed voltage applications!

WEBINAR • JUNE 23, 2016

This webinar from NXP will:

- Provide detailed insight on why these advanced, extremely low-power translators from NXP Logic are the solution for your mixed voltage applications.
- Explain how low-power voltage level translator products from NXP Semiconductors continues to support the migration of applications to low voltages resulting in power savings.
- Show how engineers can take advantage of the lower power translators and reduce the supply voltage without having to redesign existing mixed-voltage applications.

Speaker:

Tom Wolf is a Senior Product Application Engineer for Logic Devices at NXP Semiconductors. His design and application expertise extends to a wide array of systems including server/workstation design, optoelectronics, battery and energy systems and embedded controllers.

Times:
The Webinar will be held twice

1st run:
- 16h00 CEST / Berlin time
- 10h00 EST / New York time
- 7h00 PST / Los Angeles time

2nd run:
- 18h00 CEST / Berlin time
- 12h00 EST / New York time
- 9h00 PST / Los Angeles time

Register for Webinar:

http://www.eeweb.com/register/
Vishay Dale’s monochrome LCDs, or Liquid Crystal Displays, are available in both character and graphic modules. For the character modules the standard LCD sizes range from 8x2 to 40x4, and many backlight and LCD combinations are available for specific combinations. The LCD graphics modules have standard sizes ranging from 122x32 to 320x240 which is the QVGA, or Quarter Video Graphics Array. Supplementing the standard sizes, these modules have customer design capabilities for adding headers, backlight cables, heaters, 4-wire resistive touch panels, and both custom module and glass designs.

Vishay Dale also offers displays using the technology of VATN, or Vertically Aligned Twisted Nematic. VATN is a newer type of LCD technology that has cutting-edge features which offers industrial LCD displays a wider viewing angle.

Color TFT, or thin-film-transistor, is another display technology from Vishay. Standard sizes are available with formats of 3.5", 4.3", 5.7", 7.0", 8.0", 10.2" and 12.1" diagonal with other sizes in development. Most of the TFT models are offered with or without the SSD1963 controller along with options for resistive or capacitive touch panels and sunlight readable backlights.

Vishay Dale’s OLEDs, Organic Light Emitting Diodes, make an excellent choice for integration into new products given their key advantages, including:

- extra thin with no backlight required
- a wide temperature range of -40C to 80C
- high brightness up to 200 nits
- a viewing angle of 160 degrees in all directions
- 1/10th the power consumption of LCD displays
- a high contrast ratio of a minimum of 2000:1
- a faster response time of only 10 micro-seconds

Additionally, Vishay Dale also offers custom capabilities for all development levels of monochrome LCD’s and OLED products. Such custom capabilities include a wide temperature range, display mounting and termination, viewing direction, backlighting, and custom characters and icons. Vishay Dale’s engineering resources are available for assistance with your custom designs and ideas.


PCBWeb Designer is a free CAD desktop application for designing and manufacturing electronics hardware. The tool supports schematic capture and board layout, including integrated "click-to-order" manufacturing.

www.PCBWeb.com
Linear Technology’s LTC2380-24

Welcome to Inside the Lab with Arrow Electronics, the web series dedicated to exploring the latest in technology and electronics. Today we’ll show you Linear Technology’s LTC2380-24, a low power, 24-bit, 2 MSPS SAR ADC with an integrated filter that promises very high dynamic range with no missing codes, no latency and low distortion. We’ll walk you through our setup and highlight some of the things we did to maximize the performance of the demo.

We use a quality differential signal source and adjustable common mode voltage because the LTC2380-24 is such a highly precise SAR ADC and we need a quality signal source to show its AC performance. For this video, LTC’s DC1858A low distortion sine wave generator is used with the LT6363 amplifier to produce both the differential output and common mode level shifting necessary to drive the input of the LTC2380-24. The DC1216A is a low cost, low noise 100 MHz clock that we use as a quality clock source. Pads are available on the DC2289A for a first-order low-pass filter, but we didn’t use them. The board also includes buffers for the ADC input with the LTC6203, which band limits the input frequencies at the ADC input to approximately 940kHz. Finally, jumpers are available to switch between AC and DC coupling, with circuitry to set the input common mode level for AC coupled measurements.

Sponsored by Arrow Electronics
PScope, available for download at www.linear.com/solutions/PSCope, shows all of the parameters and harmonics of how the ADC works and all of the benefits you will gain from working with this high quality ADC. For DC measurements, the LTC DC590B communicates with LTC’s QuikEval, which shows noise levels of the ADC. LTC’s Linduino DC2026C could be used in place of the QuikEval. The Linduino has an Arduino footprint and was created for developing and distributing firmware libraries and code for SPI and I2C compatible integrated circuits.

The LTC2380-24 comes in a 16-lead 4mm x 3mm MSOP package and is drop-in pin compatible to the LTC2378 family of 16-, 18-, and 20-bit 1 MSPS no latency SAR ADCs, allowing designs that use these ADCs to easily upgrade to the 24-bit LTC2380. The simplicity of use combined with its high performance makes the LTC2380-24 ideal for use in the most demanding designs. For more information, visit Arrow.com. For

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PScope screenshot
QuickEval screenshot
LAPIS Semiconductor, a part of ROHM Semiconductor group and a leader in low-power MCUs, has released a 16-bit microcontroller starter kit. These MCUs lever LAPIS’ U16 CPU to blend low-power with the performance necessary for IoT devices, LED lighting, motor control, and industrial equipment. Three new families, the ML620500, ML620130, and ML620150, are available with different peripheral sets and features to address the needs of different application, however all are based on a high-performance, low-power 16-bit RISC CPU.

LAPIS 16-bit MCUs are perfect for applications that require better performance than 8-bit MUCs offer and greater power efficiency than 32-bit MCUs provide.

LAPIS 16-bit MCU

This demo uses the starter kit based on the ML620Q504. This MCU runs at an ultra-low power consumption, 0.45 µA in HALT mode and 250 µA/MHz in operation. A nanoEASE is used as a programmer debugger.

GitHub provides the most up-to-date information and documentation on the MCU. The LAPIS support site, which includes documentation on schematic, BOMs, user manuals, and nanoEASE drivers. Note that registration on the LAPIS support site must be completed before the support site is available.

Once the download is performed from the support site, the building and debugging process can begin. Downloaded codes can be modified.

To see this demonstration in action, view the video here. For any issues or questions, users can reach out to engineering@rohmsemiconductor.com.

LAPIS 16-bit MCUs are perfect for applications that require better performance than 8-bit MUCs offer and greater power efficiency than 32-bit MCUs provide.
Connect a Raspberry Pi to the IBM Watson IoT Platform

Getting started with Watson IoT is as easy as Pi

The Raspberry Pi has fueled the maker culture by offering more power than many low-end devices. With millions sold worldwide, it has become a symbol of innovation and creativity for the Internet of Things (IoT). Because many engineers begin tinkering with IoT ideas on a Raspberry Pi, IBM has committed to the Pi ecosystem to deliver a powerful prototyping environment for cognitive IoT solutions.
Also, because Pi is an open platform, people are using it for many purposes, including:

- automating household appliances
- building security systems
- simulating arcade cabinets
- creating sensor-based solutions for garage doors.

On the surface, these ideas sound like home uses, but once created, they can easily be expanded into enterprise or industrial settings.

This is why many developers and engineers use Raspberry Pi to create their first mock-ups to see how they might work. “It’s inexpensive. It has the I/O and sensors, you can connect it to other things, make it do something, and program it very easily from almost any operating system — Linux, Windows, Mac,” said Bret Greenstein, vice president of Watson Internet of Things Platform. “It’s super-easy to connect to, deploy your code to and do something interesting.”

Raspberry Pi is a game-changer because for the first time and at a low entry price point, makers can do everything they can do on a computer, but at the device level, moving from simulating devices in an IoT solution to using a real one. According to Greenstein, this is significant because as soon as you use a real device versus a simulated one, you’ll encounter the same problems that customers or users have in the real world, such as handling passwords and IDs across multiple devices or wondering what will happen when the device restarts and you lose your work.

“These are all real-world things that, as soon as you begin playing and using a real device, you can start to see the implications of,” said Greenstein.

The Raspberry Pi integrates nicely with the IBM Watson IoT platform. You’re able to connect it directly into the IoT platform, get data from it, interact with it, oversee device management on it, and treat it as any other smart device. This makes it easy to begin prototyping and simulating ideas in the Raspberry Pi environment. The ability to get hardware that combines power and openness while working with real things, instead of a simulation, gives you the freedom to take average products and make them smart, connected devices while also building out innovative solutions around them.

IMPACT ON THE INDUSTRY

“What’s really happening with IoT is that the regular objects are becoming aware — not consciously aware, but they’re becoming an active part of a business process,” Greenstein said. “So every light, every sensor, every thermostat, every printer, they’re all part of your business. And now you can actually see what’s happening with them, you can interact with them, and you can collect data from them.”

What this means is that you’ll no longer need to see if your printer is out of toner, for example, or if the coffee machine is working, because they’ll be part of your business network. These devices will be able to tell you what’s happening around them, such as whether people are walking by, how many people are in the room, or if something isn’t working properly.

Raspberry Pi can represent one of those smart endpoints in your business. If you can add intelligence to the devices within your business, imagine how much more efficient you can be.

In fact, these devices can get even smarter. You can add microphones, cameras and many other sensors to a Raspberry Pi, and it could listen and see for you. You can feed the data directly into Watson, and it could understand.

“The computing power it took to put a camera, microphone, and have that capability in a machine that costs thousands of dollars was nearly impossible only a few years ago, and now we can use Watson in the cloud for free, connected to a Raspberry Pi for $35, with a webcam that costs $5,” Greenstein said. “We can take an interactive voice recognition system, prototype it, then create it.”

INSPIRATION

With all of its capabilities, Raspberry Pi is set to inspire current and future generations of engineers, developers, and hobbyists. When you democratize computer and design capabilities through access, flexibility, and power while making it available to everyone, you create an environment of unlimited possibilities. Raspberry Pi is open and powerful enough for you to do wild experiments that might fail, but you don’t have to worry about wasting your investment and can just try again.

Now take that idea and combine it with the cloud, and you’ve got yourself

The Raspberry Pi integrates nicely with the IBM Watson IoT platform. You’re able to connect it directly into the IoT platform, get data from it, interact with it, oversee device management on it, and treat it as any other smart device.
You can take a programmable, fully open computer and combine it with cloud services, which means that you’ll have the power of the cloud no matter where you are.

Once you have the creativity of the IBM’s Watson IoT Platform and Bluemix environment, along with the data and the access to a device such as Raspberry Pi, what comes next is up to you.

To register for the Coursera Module: A developer’s guide to IoT

For further reading: IBM teams up with Coursera to skill up the new IoT developer

Free trial: Start your free trial of Watson IoT Platform today

Check out how you can build IoT apps on Raspberry Pi with Watson IoT Platform by clicking on the raspberry.

a game-changer. You can take a programmable, fully open computer and combine it with cloud services, which means that you’ll have the power of the cloud no matter where you are. Then you can get a hold of all the services in Bluemix, IBM’s hybrid cloud platform, to interact directly with your Raspberry Pi.

"Think of it this way: we connect the Raspberry Pi into the Watson IoT Platform so developers or engineers can interact with it — send commands, receive data from it — basically, your device is exposed to Watson IoT like a service in Bluemix," Greenstein said. "That means you can write applications in Bluemix that use the data from it. And it’s at that point that you’re coding at the Bluemix level. From there, [you] can either do development on the Pi itself, or you can do development in the cloud, having the Pi connected to the cloud."

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The Expo is the hub for hands-on learning with hundreds of robots from around the world.
The operating environment of automobile semiconductor components is much more hostile than that of semiconductors used in home or portable applications. A television set will generally spend its operating lifetime within an ambient temperature range of 0˚C to 40˚C. Due to internal heating, its semiconductor devices can be expected to operate between 20˚C and 60˚C. By comparison, an automobile is expected to start at temperatures lower than -20˚C and, in some cases, operate within the engine compartment at temperatures approaching 150˚C. To ensure the reliability of automotive electronics, the Automotive Electronics Council introduced its AEC-Q100 standard, which outlines procedures to be followed to ensure integrated circuits meet the quality and reliability levels required by automotive applications.
As the global number one supplier, the introduction of its Q100 logic portfolio shows NXP continuing to lead the way in automotive logic. NXP offers the feature rich Low Voltage CMOS (LVC) logic portfolio to enable the migration of electronic solutions from 5.5 V to lower power mixed 5.5 V / 3.3 V and beyond. The LVC family includes Standard Logic functions with supply range 1.65 V to 3.3 V, as well as Mini Logic functions with supply range 1.65 V to 5.5 V.

Operating at elevated temperatures reduces the lifetime of a semiconductor and temperature cycling has a negative impact on the stability of a package. In cases where there is no history of a product’s reliability within automotive applications, a series of stresses to simulate the life cycle within an automotive environment must be applied to guarantee conformance to the AEC-Q100 standard.

To ensure continued reliability, NXP logic maintains an extensive reliability monitoring program—the results of which are published half yearly. These QSUM reports are available upon request via your NXP sales representative.

Q100 devices are:
- manufactured in TS16949-certified and VDA-approved production facilities
- flagged as automotive lots
- subjected to additional process flow quality gates and stricter rules for lot dis-positioning and maverick lot handling

This ensures that automotive products:
- receive the highest priority
- have greater traceability for improved quality analysis
- that become outlier lots, passing a quality gate but outside of the acceptable distribution, are assigned to the non-Q100 type

Six sigma design philosophy is applied to all Q100 devices. This ensures that an end user application designed to the datasheet limits can tolerate a shift as high as one and a half sigma in NXP’s manufacturing processes. As the process control limits are much tighter than one and a half sigma, this virtually guarantees trouble free end user applications. During electrical test process, average test limits or statistical test limits are applied to screen outliers within automotive lots. Figure 1 shows the distribution of devices passing a test and the calculated statistical test limits in yellow. Although the outliers are within the upper and lower specification limits they are not delivered as Q100 products.

NXP’s first and second tier technical support teams give Q100 product design-in assistance their highest priority and upon request AEC-Q100 production part approval process (PPAP) qualification data will be made available. Due to the stricter qualification requirements of automotive end user applications, a 180-day process change notification (PCN) approval cycle is applied for Q100 products instead of the 90-day PCN approval cycle for standard types. In the unlikely event of a quality issue, NXP logic guarantees a 10 day through put time with initial verification within 24 hours for its Q100 portfolio.

There are many examples of NXP Q100 logic automotive application areas. The Q100 can be applied in I/O expansion, interface logic, control logic, and display drivers. Large pin count controllers are expensive, so when possible to reduce the complexity and pin-count of control solutions, input/output expansion devices such as multiplexer/demultiplexer devices are used. Figure 2 shows an example of an 81 multiplexer used to sequentially switch analog sensor signals to a single analog to digital pin of a microcontroller.

With high impedance inputs and low impedance outputs, interface logic such as registered or unregistered buffers and line drivers are used to interface between low drive outputs of a controller and higher loads of, for example, water pumps and window motors.

Control applications such as engine control units and body control modules change settings based upon a combination of input signals. Control logic consists of simple Boolean functions, such as AND or NAND, to facilitate changing settings in simple sub-systems that don’t require a microcontroller.

Display drivers integrate serial-in, parallel-out shift registers, which are...
common I/O expansion devices, with a number of MOSFET LED drivers. With 8-bit and 12-bit solutions, shift register based display drivers enable a controller to drive 8 or 12 LED’s using 3 output lines. Cascading devices as shown in figure 3 increases the number of LED’s controlled by the same 3 output lines. Display drivers reduce the size, complexity, pin count and ultimately cost of any micro-controller based solution.

A summary of NXP logic’s Q100 portfolio including a search by function and a parametric search within each function can be found at http://www.nxp.com/products/automotive/logic, and unlike the standard types, each Q100 device has a dedicated datasheet confirming that it has been qualified in accordance with AEC-Q100 and is suitable for automotive applications.

Display drivers reduce the size, complexity, pin count and ultimately cost of any micro-controller based solution.

Figure 3. NPIC6C596A in cascaded display driver application