Component News AND TECHNOLOGY

Tektronix

Component Information for Tektronix

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Contents

IrDA – A New Technology Standard 1
Viewing Tek Specifications In Specview 3
The Intel 80C51 Family Microcontrollers 4
The CN Mailing List . . . 7
Summary Of cedb And TekParts Forum Input 8
Benefits Of Using In-System Programmable Logic Devices 10
CSI Perspective 11
New CADIS Upgrade Released 12
Extra Copies Of PPL Rev 9 Available! 12
Recommended Derating Of Tantalum Capacitor's Working Voltage 13
ADI Design Seminar '95 13
2mm Connector Update 14
Is There A Fan Commodity Team? . . 17
"Fax Back" Systems Give Latest Data Sheets Fast 17
The Conan And Other Subminiature Connector Systems 18
The OS-CON Solid Aluminum Capacitor 20
Component Engineering Commodity Support List 23

IrDA – A New Technology Standard

by Martin Baggs

Wireless links are fast becoming the connections of choice for portable products from notebook computers to hand-held test-meters. To facilitate such data exchange across various products from different companies, a new standard has emerged. Called the IrDA standard, it defines a wireless infrared link and has been embraced by most of the major players such as Hewlett Packard, Compaq, Toshiba, etc. This standard is released by IrDA, the Infra-red Data Association. IrDA is an association of computing, communications, semiconductor and software companies world-wide. Currently there are more than 80 companies participating including such giants as HP, Intel and National Semiconductor.

The IrDA Standard

The IrDA standard consists of three parts: the Serial Infrared Physical Layer (IrDA-SIR), the Link Access Protocol (IrLAP), and the Link Management Protocol. Component Engineering, in conjunction with MBD, has ordered a copy of this standard and should receive it by the time this newsletter is published. The Physical Layer definition specifies the requirements placed on the actual components themselves. These include a 0-1m link distance, a half-duplex maximum baud rate of 115.2kbps (which will soon be increased up to 4Mbps with the next release of the IrDA standard), and an LED transmission wavelength of 850-900nm. The Link Access and the Link Management layers define the communications protocols for establishing and maintaining the link between the two devices (computer, printer, oscilloscope, etc.), and provide the robustness required for the dynamic multiuser environment. IrDA takes advantage of the universal asynchronous receiver/transmitter (UART) which exists in many platforms. A serial infrared (SIR) logic encoder/decoder converts the data from the UART into a pulse whose length is 3/16 of a bit period as specified by IrDA.

IrDA And Inter-connectivity

The importance of IrDA lies in the inter-connectivity between different products. According to IrDA chairman and Hewlett-Packard executive John Romano in an IrDA press release, "Infrared data transmission has a number of strong

Contents (cont.)

SQM - News From The Supplier Quality Management Group . 24
Supplier Quality Management Site Support List 25
Preferred Suppliers and Preferred Supplier Candidates 26
Reader Service Information 29

and practical advantages for mobile computer users in today's environment. No present international regulatory constraints exist and interference problems are minimal. Implementation costs are low (several dollars per device), and data exchange between IrDA devices will be simple, fast and convenient."

IrDA Allows "Point & Shoot" Data Transmission

In effect, IrDA will allow a "walk–up to" and "point and shoot" means of transferring data between devices in a simple yet compelling way. The benefits of such a point–and shoot method of transferring data are enormous. The user is no longer tethered via a physical cable to a printer or desktop computer. The establishment of the link and control are governed by the protocol and is transparent to the user. Also, infra–red remote control is a technology familiar to most people today with the prevalence of TV remote controls. Furthermore, infra–red communications are not susceptible to the common safety issues pertaining to measurement products, such as floating instruments, isolation boundaries, etc.

Industry Acceptance Of IrDA Compliant Devices

Several companies now offer a number of IrDA compliant devices. A self–contained transmitter/receiver module is available from HP, Temic (Telefunken) and Siemens. These mdoules require additional components to accomplish the SIR encode/decode and UART functions. Alternatively, an IC is available from Crystal Semiconductor which handles the protocol but without providing the UART or the LED/detector components. These IrDA compliant discrete devices are also now available in the marketplace.

Benefits Of Adopting IrDA In Tektronix

With IrDA being accepted in the industry, and with products now emerging with this technology built–in (for example, see the HP Omnibook family of computers) it is of benefit to Tektronix to incorporate this standard into our products, especially our hand–held instruments. And this is actively being done in at least two new Tek products. For one of these designs, Doug Huard of MBD is currently planning to use the Crystal Semiconductor CS8130 chip, which is a multi–standard IR transceiver chip, in conjunction with LEDs and a detector from Temic. This has the advantage of allowing both the IrDA and "TV remote" protocols to be employed, which is a design requirement since the product must be able to communicate with a Sony–Tek printer that makes use of the TV remote standard (@940nm emission). In future products it is likely that the TV remote requirement will be dropped, and the IrDA will be exclusively supported.

A final advantage to Tektronix of adopting this technology standard will be reaped at the manufacturing test and calibration stage. Rather than having to make a physical connection to each product the testing will be done via an infra–red link. This should be more reliable, easier and quicker. Additionally the higher transfer rate should speed this process.

Consider IrDA For Your Designs

If you are thinking of incorporating infra–red transmission into your product now is the time to consider the IrDA standard; now is the time for Tektronix to standardize on the preferred components to use in making this available to our design community.

The information in this article is based on press releases from IrDA and an article from Electronics Engineering Times ("Transceiver meets IrDA standards," Dec. 12, 1994, by Mark Kriss of HP.)

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Viewing Tek Specifications In Specview

Brian Diehm

Using Specview to view a specification document is pretty easy if you use the button in the Part Search Application to start Specview, or if you use a UNIX command line to enter the part number on a workstation or X terminal. But, some folks don't have a UNIX command line to enter the part number. And sometimes you want to use an already opened window to view a second specification.

Of course, if you're on a unix desktop or in the Part Search Application, you can easily bring up a second specification window using the same method you used to bring up the first one. But if you want to "re–use" the Specview window, read on. And, if you can only open Specview without specifying a part number, read on.

These operations require that you use the Open File command in WorldView (WorldView is the engine that Specview uses to display specification files). Unlike most documents distributed through WorldView, specifications are not "pressed" into WorldView "Collections," and so you do not use the Open Collection command. Using the Open File command requires different navigation strategies for Windows than for UNIX systems.

Windows

In Windows, you need to replace the *.pl filename that comes up in the Open File dialog box with *.* . This is required because the networking at Tektronix does not extend the file name length limitations of Windows, and so 9 digit part numbers must use the extension. The second item you must set is the drive selection, which you must set to the i: drive. Once these are set, you can easily navigate through the various directory levels to access the specification file you want (see Figure 1).

Workstations/X Terminals

In unix systems, the Open File dialog box starts you with a list of directories, each of the form:

. . ./Specfiles/000
. . ./Specfiles/003
. . ./Specfiles/004

The three digits ending each of these entries is the prefix of the part numbers to be found there. **Point to and double–click the directory directly; do not use the OK box at the bottom of the dialog.**

When selected, a list will appear that will let you select the next digit of the part number (the first of the 4 center digits). Again, point and double–click. The next level lets you select the second digit of the middle four digits, and then the last level lets you select the complete file.

For a "Quick Reference Brochure" please contact:

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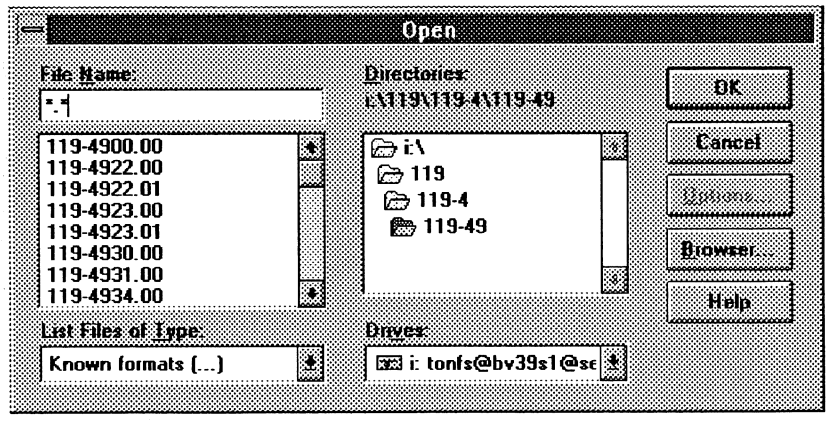
Figure 1. The Windows Specview Directory Screen.



The Intel 80C51 Family Microcontrollers

Jim Williamson

This article is a basic introduction to the Intel 80C51 family of microcontrollers and it's recent offspring. For many years, the various Motorola microcontroller families have been the dominant choice for Tektronix products. In recent years, however, the overwhelming success of Motorola's semiconductor operations has created major supply support problems. Their fab capacity has simply not kept pace with their growth rate. This is not only true of the MCUs; it has affected all of their product lines.

The Intel family suppliers have had a better handle on balancing growth with capacity. There haven't been the severe shortages with these suppliers that have plagued Motorola. Intel itself has been particularly aggressive in adding capacity. They have been building billion-plus dollar fabs approximately every eight months to support their leading edge X86 products.

What has been happening with their previous generation of wafer fabrication facilities? They are now used to manufacture microcontrollers and peripheral components. This gives them more than adequate capacity, process capability, and cost-effectiveness (i.e. the fabs were paid for by 386s, first generation 486s, etc.).

The discussion of the products will start with the venerable 80C51 family and move upward in performance.

The Standard 80C51 Family

The 80C51 family has its roots in the original 8048, Intel's first product designed expressly for embedded control, introduced in 1976. (It's still available, by the way). In 1980, the 8051 was introduced. It was a major architectural advancement over the 8048. It has a much broader and flexible instruction set, much larger address space and more on-chip resources. The CMOS version 80C51BH was introduced about 1985. Intel refers to all members of the 8051 family with the trademarked name "MCS-51". The ROMless versions have the 8031, 80C31 or 80C32 (enhanced) model numbers.

The basic hardware features of the MCS-51 are:

- 8-bit CPU optimized for control applications
- Extensive Boolean (single-bit logic) processing capabilities
- Separate 64kb-each data and program address spaces
- On-chip 4kb program memory (up to 32kb on some variations)
- On-chip 128b data memory (up to 256b on some variations)
- 4 8-bit I/O ports which are bit-addressable
- Two 16-bit timer/counters
- Basic full-duplex UART (serial data interface)
- Six source/five vector interrupt structure with two priority levels
- Built-in clock oscillator

The information listed above describes the basic features of most of the 80C51 products available from most suppliers. Intel over the years has licensed many other companies to produce their own versions of the MCS-51 family, or for use as processor cores in intelligent peripheral ICs and ASICs. Some of the licensees include Philips, Oki, Siemens, Matra-Harris (no current relation to the USA Harris), Dallas, Silicon Systems (core usage), Xicor (EEPROM memory) and probably many others the writer does not know about. AMD used to offer the 80C51 family (including some software-enhanced versions), but no longer do so.

Most of the Intel-produced variants are just enhancements of the basic set described above, although recently there have been a few versions that have added some specialized peripheral functions. The company that has done the most to expand the 80C51 family functionality is Philips. They have introduced literally dozens of variants that include such features as A/D converters, PWM (Pulse Width Modulator) outputs, Philips' I2C

serial protocol, other specialized interfaces, and much more. Their additions to the MCS–51 architecture are strongly reminiscent of the Motorola MC68HC05, where a basic processor core is mixed and matched with a huge library of special on–chip peripherals that yield easily customizable solutions for most any application.

The MCS–51 programmer's model has been much more uniform. The basic CPU has not changed much among the various "proliferations" (a favorite Intel–speak). The basic set consists of: 128b of RAM addressed from 00 to 7Fh for use as general purpose registers, bit addressable registers, and the stack; and an address space of 128b starting at 80h for use as "Special Function Registers" (SFRs). SFRs are the control registers of the on–board peripherals. Also in this space are addresses of the standard CPU registers that allow the direct manipulation of the registers just like any other location.

The standard CPU registers are the 8 bit accumulator "A", the 8 bit "B" register used with "A" for multiply and divide, an 8 bit stack pointer, an 8 bit "Program Status Word" (PSW), and a 16 bit index register called the "Data Pointer". Models with more RAM allow for more stack space "shadowed" in the same location as the SFRs. For more details see the Intel "Embedded Applications" data manual or the Philips 80C51 documentation.

Over the years, many third–party development tools have been introduced for the 80C51. Several companies offer assemblers, debuggers, in–circuit emulators and development systems. There are even C compilers for the 80C51 that are surprisingly efficient considering the architecture was never intended for high–level–language usage. Not all of the tools are expensive. Evaluation boards are not much more than a couple of hundred dollars, and there are even shareware/freeware assemblers available!

The Enhanced And Speedy Dallas DS80C320/DS87C520

Dallas Semiconductor has introduced a significantly redesigned 80C51 compatible product line. The major enhancement is the dramatically increased speed of execution. The usual method for an 80C51 speed boost is a higher clock frequency. Dallas did it differently. A standard MCS–51 processor has 12 clocks per machine cycle. The Dallas versions have changed that to 4 clocks per cycle.

Here is the full description of the enhancements. This is from the Dallas DS80C320 (ROMless) data sheet:

"The DS80C320 is a fast 80C31 /80C32 – compatible microcontroller. Wasted clock and memory cycles have been removed using a redesigned processor core. As a result, every 8051 instruction is executed between 1.5 and 3 times faster than the original for the same crystal speed. Typical applications will see a speed improvement of 2.5 times using the same code and same crystal. The DS80C320 offers a maximum crystal rate of 25MHz, resulting in apparent execution speeds of 62.5MHz (approximately 2.5X)."

"The DS80C320 is pin compatible with all three packages of the standard 80C32 and offers the same timer/counters, serial port, and I/O ports. In short, the DS80C320 is extremely familiar to 8051 users but provides the speed of a 16–bit processor."

"The DS80C320 provides several extras in addition to greater speed. These include a second full hardware serial port, seven additional interrupts, programmable watchdog timer, power–fail interrupt and reset. The DS80C320 also provides dual data pointers (DPTRs) to speed block data memory moves. It can also adjust the speed of off–chip data memory access to between two and nine machine cycles for flexibility in selecting memory and peripherals."

The dual data pointer enhancement has an interesting story behind it. When Dallas Semi engineers were in the process of defining the product, they had discussions with Tektronix TV Products engineers. The major request from the designers was the inclusion of the second pointer. The AMD enhanced versions had this feature. The AMD version P87C541 was Tektronix p/n 156–3818–00. Some time before the introduction of the Dallas devices, AMD exited the MCU business. The software in the TV applications utilized this feature extensively. The

TV engineers are in the process of incorporating the Dallas product into the applications that previously used the now-departed AMD item.

The Significantly Improved Intel MCS-251 Family

For the past several years Intel's main new embedded controller product focus has been on the high end, with their i960 family of scalar and superscaler 32 bit processors and 386 based MCUs for embedded MS-DOS applications. Recently, they have introduced a highly refined version of the MCS-51 architecture. The new version is called the MCS-251. The MCS-251 family is still an 8 bit system, and is binary code compatible with the MCS-51 family members. The N87C251SB initial offering is pin-compatible with existing PLCC44 87C51s. What they have done is to dramatically enhance the execution speed and ease of software development.

Here is a brief overview of the major enhancements of the MCS-251 architecture over the original MCS-51 (distilled from the Intel "MCS-251 Architecture" fact sheet):

It has a 3-stage pipelined CPU architecture with 1 state (2 clocks) per machine cycle vs. 6 states (12 clocks) per machine for the MCS-51. The code bus is 16 bit internal. The major benefit here is that the performance is increased by 5x to 15x at the same clock speed. If you wanted to maintain existing design throughput, the clock speed could be reduced, saving power and reducing EMI.

The instruction set has been enhanced with 16 bit and limited 32 bit data transfer, arithmetic and logic instructions; register to register operations eliminating the accumulator bottleneck; extended addressing modes and improved control instructions; and larger bit addressable space.

The MCS-251 is a register-based machine with 40 bytes accessible as: 16 8-bit registers, 16 16-bit registers or 10 32-bit registers, or a combination of all three types. There is 24-bit (16Mb) linear address space for both code and data. The stack space is 64kb and there are more stack manipulation instructions. All of this makes for increased efficiency for developing C language applications.

The interrupt facility has been improved. There are more sources (up to 64, depending on model), with programmable priority levels. The initial N87C251SB offering has 7 interrupts with 4 levels.

The architecture allows for up to 512b of SFR space. This would allow very complex peripherals to be included on future products.

Intel has pulled out all of the stops when it comes to software and hardware development. They have lined up an impressive number of leading third-party firms to develop all sorts of tools for the MCS-251. Assemblers, debuggers, and simulators are available now. C compilers and in-circuit emulators will be available shortly.

An information kit containing some development tool demo software, fact sheets on the architecture, a data sheet and a sample of the N87C251SB16 16MHz OTP EPROM PLCC44 version of the device is now available. Contact Dan Hawkinson at the local Intel distributor Wyle at 643-7900 for more information on obtaining one of the kits.

The Full 16 bit Extended Architecture Philips XA

When Philips decided to craft their own improved version, they made the decision to radically improve the product. Their extensively upgraded product is called the "XA", for "eXtended Architecture". This product is a full 16 bit processor, that is compatible with the 80C51 only at the source code level with translation. The XA assemblers make the task of translating 80C51 source code easy, with a one-to-one conversion.

Rather than position this as just an upgraded 80C51, Philips is comparing the XA to other 16 bit MCUs, such as the Intel 80C196, the Motorola 68HC16 and several other smaller players' 16 bit products.

Here is a list of features and architectural improvements of the XA family versus the 80C51:

- Upwardly compatible with the 80C51 architecture.
- 16 bit CPU operation with 24 bit address space (16Mb)(not fully externally implemented in all versions) via 8 bit segment registers. These segment registers have names similar to the 8086 types, but don't confusingly overlap like the 8086 ones. The XA appends the 8 bit MSB segment to the 16 bit base, unlike the 8086 which adds a 16 bit segment register value shifted left 4 bits to the 16 bit base. This gives the XA 256 distinct address zones.
- Eight 16 bit CPU registers each capable of performing all arithmetic and logic operations. This gets rid of the accumulator and DPTR bottlenecks, just like the MCS–251 does.
- Both 8 bit and 16 bit external bus operation, selectable.
- An enhanced instruction set that is a superset of the 80C51. It includes bit intensive logic operations as well as fast 16x16 multiply and 32/16 divide. It has been expressly designed for high–level languages such as C.
- Multi–tasking and real time executives that include up to 32 vectored interrupts, up to 16 software traps, and banked program memory to support context switching.
- Low power operation that includes power–down and standby modes.
- 1kb SFR address space.
- Enhanced 16 bit stack operation with two stack pointers (user and system) that grow from top down rather than bottom up.

The CPU core is partially pipelined, and like the Dallas upgrade and MCS–251, execute instructions in fewer clocks; in this case 3 clocks per register–register instruction cycle instead of 12 in the 80C51. With a 30MHz clock, this yields a basic machine cycle of 100nS.

The initial product of the XA family is the XA–G3. It will be available in ROMless, 32kb OTP or 32kb EPROM versions. There is 512b of on–chip data RAM. It has a 1Mb each code and data space, with 20 bit addresses. On–chip peripherals include three counter/timers, a watchdog timer, two advanced UARTs, and four 8 bit I/O ports. It comes in DIP40.6, PLCC44 and QFP44 packages.

Philips has not yet announced the software and hardware tools that will be available. Their "product roll–out" literature does strongly mention that this is a critical area of attention. They are working with the leading third–party tool developers to insure more than adequate development tools will be delivered soon.

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The CN Mailing List

Dave Bartles

With Tek employees constantly on the move keeping track of Component News subscribers can be tricky. Since the mailing list is no longer automated I am handling the adds and deletes manually. With the help of Pam Moss in the bldg. 78 Mail Center we have managed to track most of the current CN subscribers through various look–up services.

If you have moved recently please notify me by email so I can update my list and send you the latest Component News newsletters. It is my desire to keep all of my subscribers current with the latest component information.

Any other issues such as new subscriptions, canceled subscriptions, suggestions about service or content can also be sent to:

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Summary Of cedb And TekParts Forum Input

Julie Vincent

Three open forums were held plus a meeting with MBD NPI to take input on shutting down cedb and TekParts. About 40 people attended the forums on March 17, 21, and 24. In addition, Component Engineering received a number of responses from people wishing to make input but unable to attend the meetings. The following is a summary of the inputs from all sources:

Major Issues:

- **Knowledge of Tools:** A number of potential users were not familiar with all of the new tools available so a portion of the meetings were used to review the tools.
- **Speed:** Speed seemed to be the number one issue brought up by the using community. The access to cedb and TekParts is simple and the response time is generally less than 5 seconds. The access to Parts is particularly slow, made much worse by the cumbersome password process for signing on (see comments below). The majority of the users do not find the Parts system satisfactory to meet their needs. In particular the Forms 4, bit-mapped GUI takes too long to redraw.
- **Passwords:** Neither cedb or TekParts require passwords beyond system logon. The Oracle password requirements aggravate the users. Since the data in PDW is the same as what has always been available in cedb they generally see no reason for the burden of passwords to view data. The generic login in CADIS seems to be more palatable but still is slower than the users would like.
- **Single Part Inquiries:** A frequent use of the cedb & TekParts is to look up data on a single part. This operation is frequently done through a command line. No such ability currently exists in the new tools (at least not in Unix, although it can be done in SQL).
- **SQL:** It is rare for anyone in the user community to know Sequel – and they see no value in learning it. However, several of the system administrators were familiar with the relational database tools and languages.
- **Loading a List of Parts/Scripts/Ad Hoc Reports:** Looking for particular data on a list of parts (i.e. cost, part status) is a fairly common requirement of the users. In a number of cases, users have developed some standard Unix scripts or use TekParts functionality to extract information about a list of part numbers. The output is generally output to a file or formatted for a report. There currently is no method to directly access data in the new tools or to generate ad hoc reports.
- **Home Use:** One of the features of the flatfile system of cedb or TekParts is that the tools can be used from any VT100 terminal or via a modem for home use. The current GUI tools are adapted for those applications.
- **Color Mapping:** There is a color mapping problem if InterLeaf is brought up before Parts or CADIS. The first application "steals" the colors and may make the subsequent applications unreadable.
- **Motif vs OpenWindows:** One manufacturing engineer is currently using ComputerVision and can not run that application in Motif. Therefore he is unable to bring up Parts.
- **Contract Management Links:** Supply Base Management is concerned that we do not break the links to the Contract Management system.

Potential Bugs:

- **SpecView Problem:** One person indicated that they had Part Search blow up when they did a View Spec for a part without a spec.

Enhancements:

- CAD Data: There is a strong desire to have access to the CAD library data through CADIS. Ideally users would like to see drag–and–drop functionality for the tools. This equates to *lib_info* or *find_tpn*.
- Price: Many of the users would like to be able to access the piece price and the burden from their specific Division rather than the current "standard cost" which reflects the burdened price of the Division that "owns" the part. There was also a complaint that CADIS does not currently have cost on every part (it occurs only once even though the part shows up in the database multiple times based on various vendor part numbers).
- Problem Reports: There was a request to have a User Action in CADIS that would initiate an e–mail to report problems.
- Division Preferred Parts List: Several users indicated that they would like to be able to customize the preferred parts designation to a specific Division. For example, Network Displays may have a subset of the Preferred Parts List that they want to use in their business.

Cleanup:

- **Printers for CADIS:** Users would like to be able to point to a local printer queue when using CADIS rather than just having a few network printers available.
- **Better On Line Help:** There was a request to provide functionality that equates to the *TekParts –X* command. Also, in CADIS, to give definitions when initials are used (CR = Current Regular).

Management Issues:

- **IMS/BOM:** There were several inquiries on the inclusion of nomenclated items, the replacement for the Item Master System and the ability to look at a bill of materials (a current IMS capability). Where–used information is critical to a fair segment of the user group.
- **Machine Limits:** There were a couple of users that did not have sufficient machine capacity (RAM) to run the new tools.

Other Input:

- **Positive Feedback:** We also heard from some users that liked the new tools. CADIS seems to be a good search engine and several folks find Parts a useful tool as long as they open it when they first log on and then iconify it for easy access.

Next Steps:

Based on the input from our customer base, the Pangaea project team is reviewing the input and looking at alternatives for resolving the issues. The people attending the meetings and making input via e–mail have been put on a distribution list and will be kept abreast of progress and proposed solutions. Various members of the team have been investigating alternatives and we will publish a list of proposed solutions and target completion dates. Follow up articles will be included in subsequent issues of Component News.

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Benefits Of Using In–System Programmable Logic Devices

Norm Adre

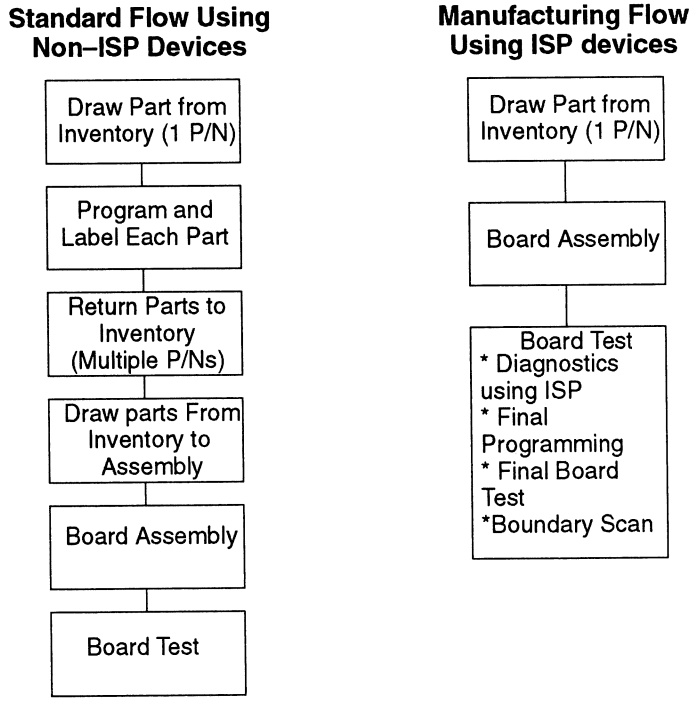
The traditional manufacturing flow of a Programmable Logic Device (PLD) has added costs when compared to the manufacturing flow of an In–System Programmable (ISP) PLD. These costs include: programming of the part; labeling of the programmed part, inventory storage of the programmed part; and finally, soldering the programmed part onto a printed circuit board.

With an ISP PLD, the preliminary steps prior to soldering are eliminated from the process (see Figure 1), and parts management costs are minimized. Although there are some costs associated with using an ISP PLD, such as designing in extra circuitry to access the programming pins, and they are a bit more expensive, these costs are much less compared to using a non–ISP PLD. For example, within Tektronix, the cost of setting up a new part number has been determined (from a part cost study done in 1994) to cost up to $1,296 with an annual maintenance cost of $415. Using a non–ISP PLD in production will increase parts management costs. For instance, Tek part number, 156–5924–00 a 22V10–25, has 32 programmed Tek part numbers. The Tek set–up costs for the 32 part numbers is $41,472 with an annual maintenance cost of $13,280. Using an ISP version of the 22V10 eliminates this cost by taking up one part number for all 32 programmed parts.

Another advantage of using an ISP PLD is the ability to use smaller packages other than PLCCs such as an SOIC or Thin plastic Quad Flat Pack (TQFP). A non ISP PLD in an SOIC or a TQFP package is generally not recommended for design because they have fragile leads compared to PLCCs, and can easily be damaged during programming.

Another benefit of the on–board programming and reprogramming of an ISP PLD is the capability to provide diagnostic testing including boundary scan. As a precaution, when programming a non–ISP PLD in SOIC or TQPF packages it is recommended that an automatic placement and handling machine is used to ensure coplanarity of the leads.

Figure 1. Manufacturing Flow: Non–ISP vs. ISPm Devices.



An ISP PLD eliminates this concern by having the device programmed on board.

Currently, there are three suppliers of ISP PLDs: AMD, Altera and Lattice. AMD offers ISP on their MACH 3 and 4 families that are in a PQFP package. Recently, Altera introduced a new high density Complex PLD, the MAX 9000 family, which offers ISP capabilities. In addition, Altera plans to provide ISP for their MAX 7000 family. Lattice has ISP capabilities for their ispLSI 1000, 2000 and 3000 family of CPLDs, and they offer an ISP version of the 22V10. All three vendor's ISP devices are programmed serially through a 4-pin test port on each device. For more details consult the vendor's databooks.

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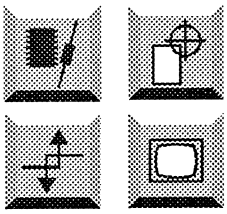
CSI Perspective
Brian Groves

CSI Perspective — Setting Goals For FY96



Now that the budget planning process is nearly complete, it is time to start setting goals for FY96. Working with you, there have been some great results over the past year. Preferred part usage now averages close to 60% across the company. Part numbers are down almost 10%, you have some new tools (Parts and CADIS) for finding preferred parts, and the New Part Request process has been streamlined with much more control in the division NPI groups.

So its time to set our sights on the next step. We would like to see preferred part usage continue to rise in your products. How can we help you with that? Over the past few months I have been getting some great suggestions on how to continue toward the goal of "fully enabling" each employee to make the right part and supplier choices for Tek to grow profitably. Here are some of the main "ideas" on the table for next year. Please let me know what you think:

- Working to embody preferred part selection in the NPI process.
- Continue to upgrade tools for part selection (CADIS and Parts)
- Refining/enhancing the preferred part criteria.
- Enhancing the scope of the preferred part list to include international manufacturing sites.
- Providing more detailed information to the desktop. We are experimenting with multimedia for component alerts and new technology announcements.
- A CSI home page on the Web with access to our tools and knowledge.
- Enhancing the list to include more mechanical parts.
- More visibility and training of our tools and services.

We will be compiling the official "business plan" to prioritize and schedule the ideas above. Please give us your input if you would like to see additional projects or efforts.

Thanks you for you support, comments and funding! We will continue to increase our effectiveness in assisting you with your product development needs.

For more details, ideas or an open ear, give me a call.

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New CADIS Upgrade Released

Wilton Hart

During this last weekend we released version 2.76 of CADIS. Due to the way this system works, we did not have a chance to test it before it was loaded. We have found several problems and some features now work differently. *(Note: The problems I have listed below may be resolved by the time this issue of CN is published.)* Here is a list of the problems found to date:

Problems

- The Pmx file in our home directories no longer works. This means you cannot do any user actions. For now Specview and cedb will not be available from CADIS. We hope to get this fixed shortly.
- The printer functions did not work when the new software was loaded. This has now been fixed.

Changes

There are several changes which affect the user interface here is a list:

Search Status/Interruptible Queries

In the past you clicked your mouse on an attribute and it then let you enter new data or change what was there. The new software requires that you click on the button to the left of the attribute field and then it will open up a dialog box. The information is then entered and the "ok" box selected. The search is then started but you can cancel it if you feel that it is taking too long. People had requested the ability to cancel a search.

Find Class

A new top bar Menu Option ("Find") is now available that gives users the ability to enter a text string for the class they wish to find. There are options to immediately be navigated to that point in the schema, or move to next match ("Find Next"). Searches begin at the class level at which the user is presently located. Wild card searches are supported using the * symbol as the wild card character.

Hide Root Attribute

Some root attributes are never used for searches. It is possible to hide these so they do not take up screen space. This is done by clicking on the OPTIONS menu at the top of the screen and choosing the Attribute Menu. A box will appear with all root attributes listed in it. The button at the far right of each attribute can be made white to hide or gray to show that attribute.

The user must hide attributes each time they initiate a session. The system does not remember the specific attributes a user has hidden at the end of the session.

If you have questions about CADIS please send email or call one of the following people:

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Extra Copies Of PPL Rev 9 Available!

CSI has extra copies of the Preferred Part List Revision 9.0 available. If you need extras or if you did not receive a copy please contact your Component Engineering Liaison (see page 23 for the list), or contact me at:

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Recommended Derating Of Tantalum Capacitor's Working Voltage

Nghi Nguyen

Most manufacturers of tantalum capacitors recommend that applications requiring a particular working voltage use a capacitor rated at twice that value. Particularly, if the capacitor is likely to be subjected to a rapid turn–on from a low impedance source. For instance, an application needing a 5 volt capacitor should use a tantalum capacitor rated at 10 volts. As a general rule, derate the tantalum capacitor's working voltage by 50%, or use the following formula:

$$1 - \frac{\text{User's working voltage}}{\text{capacitor rated voltage}} \times 100\%$$

The major reason for derating the working voltage is to minimize tantalum capacitor failures. For example, typically a 10 volt tantalum capacitor has a thicker dielectric than a 6.3 volt part, as such the probability of a defect site existing which has a low enough activation energy to cause a short circuit when 5 volts is applied is lower than the 6.3 volt tantalum capacitor. See Table 1 for the recommended working voltage derating for tantalum capacitors.

Table 1. Recommended Derating Table

Voltage Rail	Working Cap Voltage
3.3	6.3
5	10
10	20
12	25
15	35
≥24	Series Combinations

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ADI Design Seminar '95

Jim Williamson

Analog Devices will be presenting a seminar on "Practical Analog Design Techniques".

- ***When:*** Thursday, June 1 1995.
- ***Where:*** Embassy Suites – Washington Square, 9000 SW Washington Square Rd. Tigard, OR., 97223.
- ***Who:*** Rodger Dukehart 1-800-262-5643.

The seminar will cover:

- Optimizing single supply and low power analog and mixed–signal circuits.
- Accomplishing high speed and wide dynamic range system designs.
- Properly applying undersampled data systems.
- Taking advantage of the latest high–speed op amps and converters.
- Maximizing performance with precision op amps, in amps and converters.
- Avoiding pitfalls to low distortion measurements.
- Practical board and system level design techniques, tips and traps.
- Achieve high performance in multi-channel data aquisition circuits.

Advance registration is required so if you plan on attending please call:
Rodger Dukehart – 1-800-262-5643
Admission is $30 and covers lunch, refreshments and all seminar materials including a 500 page "Practical Analog Design Techniques" guide.

2mm Connector Update

John Young

This article is intended to be an update of the issues concerning the two row 2mm connector system. I will also provide some history about this new connector system and it's development.

Preliminary Recommendations

Based on industry trends and my research in the connector systems field, my preliminary recommendation for the 2mm connector system is:

- With the 2mm connector line systems still in a state of flux, we should only be using this connector system in places where size dictates. The 0.1 center line products remain the best system available. I expect that the 2mm system will be more common in the next 1 – 1.5 years.

Industry Trends

The 2mm connector system is beginning to gain popularity in the industry. Initial header pin length offerings in the connector systems ranged from 0.118 in. to 0.165 in. while the 0.152 in. pin length for headers appears to be more common today. Shrouded headers, however, are new enough that there has not been an industry tendency towards standardization. The 2mm connector is in current use in both the Measurement Systems Group and CPID. The reason for the high interest in this series of parts are that the size and pricing are competitive with 0.1 center line products. The 2mm series is also less expensive than either the 0.05 x 0.1 products or the 0.05 x 0.05 products.

2mm System Alternatives

The alternatives for the 2mm system have been the 0.05 x 0.1 center line systems like the AMP System 50 and other systems like the 0.050 Champ or the smaller 0.050 x 0.050 Rib Cage type products. There have been challenges to the use of some of these systems pertaining both manufacturability as well as routing traces using the 0.050 center line parts.

2mm Issues

The 2mm connector line has been introduced by at least 6 different suppliers. It is not intermateable when shrouded headers are used or polarization features are required for manufacturing. How could this happen? Briefly, the disk drive manufacturers wanted a two row interconnect scheme which would be competitively priced similar to the 0.1 center connectors. Additionally, they wanted a reduction in size. Initially, the disk drive industry promised volumes in the millions of lines per year. The drive towards the 2mm system has been a common theme in most industries recently, similar to the Hard Metric card cage systems introduced a few years ago.

Suppliers introduced a 2mm – 2 row connector system similar to the commonly available 0.1 center line system in wide use today. This connector series was initially offered in limited configurations: dual row, with a limited number of positions. The disk drive manufacturers' did not require a shroud due to the increased cost associated with the shrouded header. Initial product offerings were the 10, 44 and 50 position connectors.

The manufacturers volumes did not meet expected levels, therefore, suppliers decided to take this initial product and introduce it to the the market place. Soon after, the need for shrouded connectors surfaced due to concerns with the polarization and misalignment potential in blind mate applications. There was not the drive for manufacturer's to work together in formulating a shrouded connector, therefore tooling was designed and built for specific customer requirements without the visibility of the other players. Each supplier developed their own "standard part" offering. Much to everyone's surprise none of the parts were compatible however, they were interchangeable.

Table 1. Shrouded Header Dimensions For 50 Position Devices.

Manufacturer	Shroud Inside Dia. (mm)	Receptacle Overall Width (mm)	Center Plz Feature (mm)	Configuration
Samtec				
LTMM	50.61	54.0	3.17	RCPT
STMM	54.39		3.55	HDR
3M	55.45	51.6	1.0	RCPT
			1.3	HDR
AMP	Shrouded version N/A	50.39	3.3*	RCPT
Molex	50.85	2.02	2.0	RCPT
			2.4	HDR

*AMP has agreed to change the dimension of their polarization bump to accomodate the Molex type of part.

The 3M Connectors

We initially set up the 3M part for use in CPID. 3M had the majority of the market share as well as the best product offering. They did not introduce a shrouded version until we had difficulties with misregistration. 3M then developed a shrouded header for use with the molded recepticles we have been using in the 0.1 centerline products, and the standard press-on adhesive backed connectors. This resulted in the potential of the connectors to be misaligned in the shroud. To assure proper registration 3M developed a center polarization feature to aid in mating these connectors. Thus the problem surfaced.

Divergent Designs

At about the same time companies like Samtec, Molex, AMP and Elco were developing similar parts and strategies. The result was at least 2 different design approaches were taken. AMP and Molex tended to use a press-on connector scheme which would fit into a header without the extra space at the end of the male pins. The 3M, Samtec and now the Hollingsworth designs incorporated a press-on receptacle which required extra space at the end of the shroud. (Actually 3M offers it both ways, their part does not fit in their own housing without the potential of misregistration.) Samtec on the other hand, tooled two different shrouds; one for use with cable to board and the other designed for board to board applications similar to what is in use today with the 0.1 center line products. Each supplier added their own twist to the center polarization feature resulting in at least 3-6 different options.

Table 1 shows a partial listing of the shrouded header, receptacle and center polariztion feature dimensions for the 50 position 2mm connector.

Shrouded Header Alternatives

There are two shrouded header alternatives which are compatible.

- The 3M and the STMM series from Samtec and a new offering from Hollingsworth(part numbers are not available as of yet). Samtec or Hollingsworth have the only shrouded headers which will accommodate the 3M cable mount receptacle and intermateable within themselves.

These would be direct replacements to parts we would have to set up. The only disadvantage to date with replacing 3M as a supplier for these assemblies has been cost.

- The Molex to Molex or LTMM series from Samtec.

This option would create a cost savings due to the lower cost of the Molex headers and the intermateable lower cost AMP receptable.

We are currently using 3M parts. As an addendum, 3M has had difficulties with quality and delivery from the 3M Juarez plant. The manufacturing facilty at Juarez is being moved to Mentor, Ohio and this should resolve the quality and delivery problems we have had. We are continuing to work with both Molex and AMP to produce intermateable products. As noted above, AMP is in the process of updating the center polarization feature to comply with the Molex design. However, the polarization feature from 3M is smaller than the other suppliers of this type of product. The most common configurations for these are parts are 10, 44 and 50 position. 3M has the 12 position part tooled where others have not completed tooling as of yet.

Why The 2mm Connector System?

2mm connector systems were introduced 2 to 3 years ago initially from Berg. What are the drivers of an interconnect scheme? Why has the 2mm connector taken so long to be accepted in the market place? The common drivers for interconnect schemes are typically interface issues. However, occasionally the primary design goal is increased density decrease in size etc. Interface driven systems like SCSI, IEEE1284 may drive particular sizes but many times the popularity will then either cause a system to be discontinued or gain in configuration and number of positions. One odd example of this is the IEEE P1386. This system was envisioned for a mezzanine stacking system for PCI Card and VMEbus products. It promised higher volume, lower cost, more design flexibility, compatibility between mezzanine cards, upgrades and the like. This all may be true, however, the system is only compatable if you happen to need 64 positions. To increase or decrease density requires going to a different connector system which is not intermateable between the many manufacturers now producing 1mm and smaller stacking connectors.

SCSI type subminiature D type connectors, on 0.05 centers are another example. As long as the interconnect in a shielded SCSI interface compatablity is assured. However, if you want the non-shielded version, all guarantees are off. In most cases they are compatable but, you will find some that are not, the non-compliance may be due to contact design, stack height, or a host of other variables beyond the scope of this article. It is interesting to note that the SCSI type connectors have been around for more than 8 years.

2mm Metric Cable And Connector Options

There has been some resistance to accepting the metric cable and connector options in the 2mm product family. The 2mm connectors require a 1mm center line cable that is just not as well thought of versus the commonly used 0.05 center line cable used in the 0.1 center line connectors. If the issues of compatibly are resolved I think this system will see the same kind of volumes as the 0.1 center line products. This system would appear to be the best alternative to our need for a smaller interconnect scheme.

The Need For Standardization

From the articles I have reviewed commonality is not the focus. Most major manufacturers are focused on linking up with OEMs on new designs and developing a "product" which meets the needs of a design. Standards committees tend to look to the interface rather than a systems approach. This is exemplified by the PCMCIA standards which assume a common interface design but that is where it ends. Just try to find two parts that have the same footprint. As suppliers work closer with manufacturers the probability of commonality is greatly reduced. As we develop new systems we have a challenge to work towards standardization where ever possible.

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Is There A Fan Commodity Team?

Curt Bernal

There has been quite a bit of work going on behind the scenes in the fan commodity family. This is an important technology to focus on to increase Tektronix' ability to leverage, and to make better choices with regard to industry volumes and trends for new designs. A MAP (Materials Acquisition Plan) will be developed as part of this effort.

As some of you know, there was a kickoff meeting some time ago. Due to some personnel changes, the team has appeared to have "gone away". The effort is still underway headed up by Curt Bernal, and Laurie Horlacher, but the "model" by which this team will work by will have a different look to it than other commodity teams. The technical portion of the MAP will be coordinated by Curt Bernal, and the procurement portion will be coordinated by Laurie Horlacher.

Please note the key word "coordinated". The Fan Commodity thrust is still a team effort. The model is now for the team to operate in a non meeting format. For those who are interested in participating with input of any kind, contact Laurie for procurement related input, and Curt for technical related input. Laurie and Curt will prepare a MAP with preferred supplier candidates based on all of your input.

It is important to note that this is a non–meeting format. Communications can occur by voicemail, email, FAX, or by interplant mail. This will allow for minimal expenditures of time for all interested parties. As the MAP comes together, there may be the need to get together for one meeting so that all of the members can review it. You are all encouraged to give any input regarding fan procurement, and design strategies.

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"Fax Back" Systems Give Latest Data Sheets Fast

Jim Williamson

The major difficulty in designing circuits it always seems is to get up–to–date information on components. Data books frequently are out of date the day they are published, especially for fast–growing companies like Maxim or Altera. There are several reasons for this. The primary one is that printed books are expensive. It costs a lot of money to publish a thick book. It also takes a lot of time to gather and edit the information. This is the main reason why the best schedules seen for data book updates is once every two years. In today's fast–paced design arena, that's not often enough. Even if a device is in a book, if the book is much more than a year old, you don't know if the data sheet has changed.

The original high–tech answer to getting updated information in a reasonable time frame was going to be CD–ROM data books. CD–ROMs are fairly cheap to do these days. The pressing size needs to be only a few thousand to be very cost–effective. Unfortunately, the promise has yet to materialize. Very few suppliers have produced CD–ROM books. Stumbling blocks center on viewing software and platforms supported, and overall format. Without resolving these issues, CD–ROMs won't be a viable medium anytime soon.

What has gained popularity in recent years is the "Fax Back" or "Fax On Demand" concept. Fax Back systems typically are automated telephone answering

machines that prompt the user for which data sheet they want (up to some limit – usually 3 or so), and then sends this information to the user's fax machine. Most of the time these faxed data sheets are "digitally mastered", not scanned-in data. If you have a decent fax machine, these faxes have very high resolution and are quite usable. One of the nice things about these systems is that they operate 24 hours a day, 365 days a year. If you have an inspiration at 3:00 AM in the morning, you could get a data sheet for that dream part right then!

Listed below is a selection of Fax Back numbers. Most of these systems offer some sort of catalog that you can have faxed to you that lists the available documents. Another place to get document numbers is in magazine advertisements. Frequently, in an ad for a new part, at the bottom of the ad there will be the suppliers' Fax Back number along with the document number for the part in question.

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Table 1. Selection of Fax Back Numbers.

Supplier	Phone Number	Comments
Actel	(800) 262–1062	
Altera	(800) 525–8372	
AMD	(800) 222–9323	
AMP	(800) 522–6752	
Analog Devices	(800) 446–6212	
Dallas Semi	(214) 450–0441	
Harris	(407) 724–3818	
Intel	(800) 628–2283	
Maxim	(408) 737–7600	Ask for "MaxFax"; same number is for samples
Micron	(208) 368–5800	Need to call from fax machine, or be able to transfer to one *fast* after placing order!
Motorola	(602) 244–6609	
National Semi	(800) 272–9959	Customer Support Center; apps engineers here, too
Philips	(800) 282–2000	
SGS–Thomson	(214) 466–7768	
Sharp Microelect.	(800) 833–9437	
Siliconix	(408) 970–5600	

The Conan And Other Subminiature Connector Systems

John Young

What is the Conan connector? Where is the industry going with respect to subminiature board stacking components? These are the issues in connector systems that I will address in this article.

Subminiature Connectors

There are many suppliers developing subminiature connectors for the lap top industry. For the purpose of this article I will define subminiature as less than 1mm (0.039) spacing primarily used in mezzanine applications. The common design goal of these newer interconnect schemes is to reduce size, increase density and reduce cost in the competitive Lap Top market. New designs are coming out with great fervor. Systems ranging from

1mm, 200 positions to a 0.5mm 200 position connector from JAE.

Compatibility Issues

There remains the common problem of compatibility between suppliers. Currently there is not a standard governing the subminiature connectors with the exception of the IEEE P1386, 1mm Mezzanine connector standard which has utilized the 64 point part only. In general the systems are not second-sourced, Conan has been second sourced by Samtec. However, there are several outstanding patent issues to be resolved before Samtec can be considered a valid alternate source.

The Need For High Profile Parts

These systems are also focused towards closer board spacing. One problem we have had is locating a higher profile part. There are not many suppliers who offer higher profiles. The AMP FH type connector, on a 0.8mm center line offers stack heights between 5mm and 16mm. The Conan connector is a 1mm center line connector used for board stacking. This product ranges from 4.15 – 7mm stack height. Samtec has also tooled this part in a right angle version. We are currently using a 51 position part in Video Systems group. This connector has incorporated a blade-on-beam design which prevents stubbing and is tolerant of "banana peel" type mating. It has board retention pads on the ends of the connector which provide retention to the board and reduced stress on the solder joints during mate/unmate cycles. It also provides a passive latching mechanism. The header has a raised bump formed on the front of the connector contact which slightly increases insertion force but increases the withdrawal force to prevent accidental unmating. This feature actually has an audible click when fully engaged.

These types of products are becoming readily available as the lap top industry continues to expand.

Connector Processing And Dimensional Tolerance Issues

One of the primary issues we have had with the Conan connector is one of processing. Another potential issue would be dimensional tolerance requirement for use when we use two or more connectors to a board where a hard interconnect is required. In particular, the Conan system has been changing in specifications since the introduction of the part 2 years ago. Initial information suggested that we could use up to 3 connectors per board when used in a hard interconnect application. Today it is generally suggested that 2 is the maximum with a warning about using more than 2 per board. The Conan connector has been used by Compac, Motorola and other high profile manufacturers. However, in most applications 1 connector per board has been used. One of the applications was used by NWD. Initial testing revealed a +/– 0.003 placement accuracy when machine placed (Universal), and a 0.01 placement accuracy when hand placed with the option of no orientation posts. These parts have faired well through humidity shake and shock tests. The exception to this statement would be in applications where the connector is not secured close to the connector with a fastener. We have seen a problem with the connectors unmating slightly causing intermittent connections. The specification from Berg requires that the connectors be fully mated to within 0.023".

Conan Connector System Applications

For the rest of this article I would like to address our current application of these connector systems. I will focus on the NWD application. There is another application being used in Video Systems group which requires more than 2 connectors per board. As information is available I will keep the notes on these systems up to date.

The Conan connector system has an advantage over the AMP FH connector in some applications due to the audible click when fully mated. The first parts off the product line had some problems with the placement of the connectors to the pcb. The placement of the first connec-

tors were not as accurate as expected, therefore this audible click was not present on the first parts. The specification on this connector has been an allowance of a 10 degree rotation relative to the contact retention bump. When slightly misaligned the audible click is not present but, the connector will still perform within the design requirements, meeting the specs provided by Berg.

Another issue came to light after the introduction of the no-wash fluxes. This method of flux removal essentially consists of the fluxes being evaporated from the board surface rather than the more familiar board wash systems we have used for years. The no-wash fluxes leave a non-corrosive, non-conductive residue. We have seen some intermittents caused by this process. Today we are using a connector saver, or sacrificial connector plugged onto the pcb to aid in preventing this problem. So far, this appears to be effective.

We have also seen an instance of a poor solder joint causing intermittent connection problems.

At this point in time the Conan connector system appears to be a good candidate for subminiature connector applications. It appears to be fairly robust and as additional information is available I will keep you apprised.

We have not seen much activity with usage of parts on less than an 0.8mm center line. The AMP FH connector has been part numbered due to a higher board spacing requirement within the Measurement group.

The industry has not taken to the 0.5mm board stacking components with the exception of limited use by Compac. It is felt that the capability to process the required fine pitch reliability is still 6 months to a year off. Most of the suppliers producing these parts or proposed smaller pitches are projecting 1–2 years out.

For questions, comments or further discussion on this article please contact:

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The OS-CON Solid Aluminum Capacitor

Nghi Nguyen

Sanyo has developed a new type of capacitor called the OS-CON (aluminum solid capacitor with organic semiconductor electrolyte) which utilizes a solid TCNQ complex salt (N-n-butyl isoquinolinium) instead of the commonly known liquid electrolyte. This has resulted in a capacitor which has a good low equivalent series resistance (ESR), a high-frequency impedance; and temperature stability. Currently, the OS-CON is being offered by Vishay Sprague, and has been marketed by Sanyo since 1983.

Technology

The electrolyte immersed into elements is the most important material of an electrolytic capacitor. Conventional type electrolytic capacitors used an electrolytic solution consisting of solvent and solute, or manganese dioxide.

The OS-CON capacitor is constructed of an aluminum foil and a separator paper rolled into a cylindrical shape and impregnated with an organic semiconductor. This component is placed in an aluminum case and sealed with resin. Initial efforts to utilize an organic semiconductor as an electrolyte for capacitors have been attempted, but could not be used practically due to manufacturability issues with the material. The primary issue is that the organic semiconductor material has a lower heat resistance and weaker mechanical strength than an inorganic semiconductor. However, Sanyo has overcome this issue by developing the melting immersion method which synthesizes meltable organic semiconductor – i.e. the organic semiconductor re-crystallizes to a polycrystalline lump, by cooling and solidifying it within a certain period of time after it is

melted by heating, and recovers its initial conductivity.

OS-CON Capacitor Electrical Characteristics

Frequency Characteristics

The greatest advantage of OS–CON capacitors is that its high frequency characteristics are nearly equal to that of film capacitors. This is due to the high conductivity of the immersed organic semiconductor, and the advantageous structure of the OS–CON capacitors.

The OS–CON capacitors have a better high frequency characteristic than conventional aluminum capacitors. In the high frequency range, the OS–CON capacitor has a lower impedance than the conventional aluminum electrolytic capacitor by a factor of 10. Also, the capacitance and the size of an OS–CON capacitor is about 1/20th that of an equivalent conventional aluminum electrolytic capacitor. (see Figure 1 below)

Temperature Characteristic

The OS–CON capacitor has a temperature characteristic, particularly in the high frequency region, that is as stable as a film capacitor. It provides a good temperature characteristic in both high and low ranges. Hence, the OS–CON capacitor is optimum for power supplies in outdoor equipment including camera and portable radio unit. (see figure 2, page 21)

Impedance Characteristics

At the frequency of 1 MHz, with a 10µf capacitor, the OS–CON has an impedance of about 0.04 Ohms; an aluminum electrolytic capacitor has about 1.5 Ohms; and a tantalum capacitor about 0.230 Ohms. Typically, the impedance of an OS–CON is about 1/40th of an aluminum electrolytic capacitor.

Allowable Ripple Current

The ripple current of an OS–CON capacitor is much better than the conventional electrolytic capacitor. At 100 kHz, the ripple current of an OS–CON capacitor was found to be about 4 times that of an aluminum capacitor, and about 10 times that of a tantalum solid capacitor.

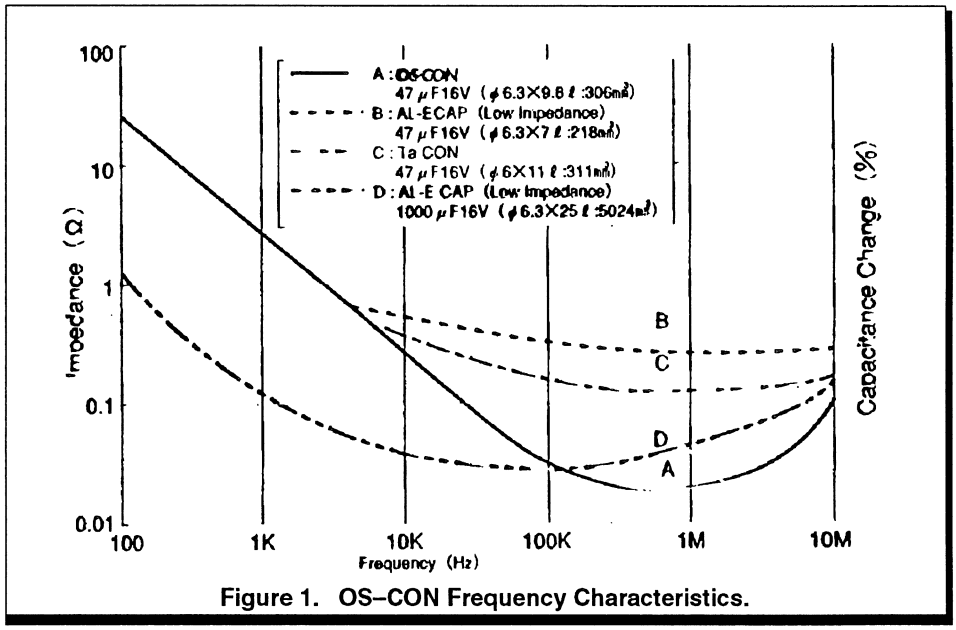

Figure 1. OS–CON Frequency Characteristics.

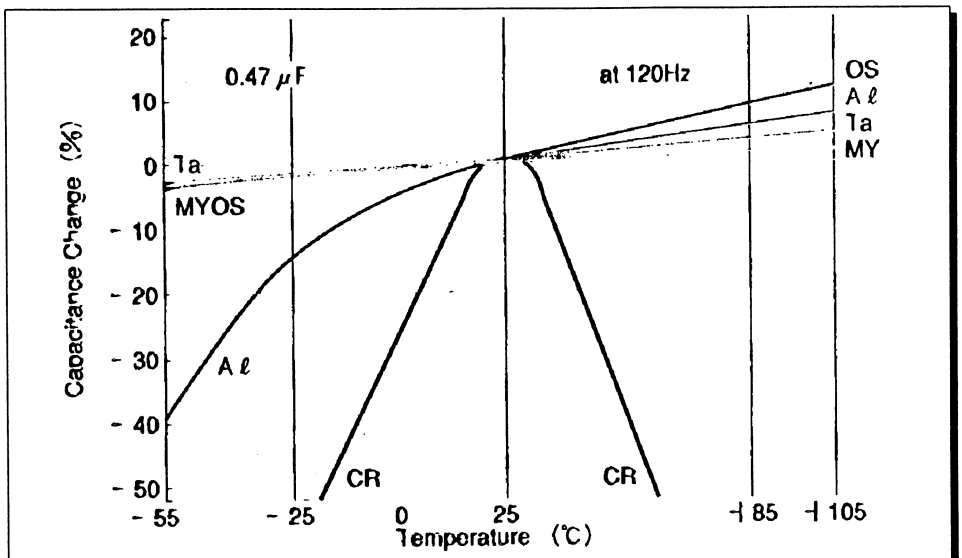

Figure 2. OS-CON Temperature Characteristics.

Reject Of Ripple Noise

The following application notes cover noise rejection and rejection of ripple of the OS-CON capacitor compared to conventional electrolytic capacitors.

Noise Rejection

Typically, the noise level of an aluminum electrolytic capacitor is high, and if the capacitance value is increased from 10 μf to 100 μf, the noise rejection performance is improved only by 1.3 times. In a tantalum capacitor, the noise level is half that of an aluminum electrolytic capacitor at 100 μf. The OS-CON capacitor has a noise level about 1/20th of that of an aluminum electrolytic capacitor (at 10 μf), and about 1/10th that of a tantalum capacitor.

At low temperatures (-20 °C), the noise level increases at frequencies of 100 KHz and above for aluminum electrolytic capacitors. Even though tantalum capacitors have good temperature characteristics, the noise level increases in the high frequency range. However, the filter performance of the OS-CON capacitor does not decrease at all - even at -20 °C.

Rejection Of Ripple Of Os-con

Test Setup: an OS-CON capacitor (33 μf/10 WV), a tantalum capacitor (100 μf/10 WV), and a low impedance aluminum electrolytic capacitor (1000 μf/10 WV) is connected to a smoothing circuit at the output of a switching regulator to compare their rejection qualities. The operating frequency of the switching regulator is about 240 KHz.

The results indicate that these three types of capacitors enabled ripple to be rejected almost equally at 25 °C. At a temperature of -20 °C, the OS-CON and tantalum capacitor's ripple noise is equivalent to that measured at 25 °C, while the ripple noise of an aluminum electrolytic capacitor at -20 °C is about four times that measured at 25 °C.

Recommendation

The OS-CON capacitors are substantially more expensive than the aluminum electrolytic capacitors. However, the OS-CON capacitors are competitive with tantalum prices. For example, a 22 μf OS-CON capacitor rated at 16v, costs 38 cents in quantities of 10,000, while a similar tantalum device costs 35 cents. By comparison, a similar aluminum electrolytic capacitor costs about 8 cents.

For questions, comments or further discussion on this article please contact:

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Component Engineering Commodity Support List

The liaison support activities for the Component Engineers have been adjusted to conform with the business and project plans of the individual IBDs for FY95. The significant change will be the use of teams of 2 Component Engineers to cover each IBD.

We intend to provide an additional Component Engineer to communicate to and from the IBDs, to better serve our customers requirements and provide faster response.

Some examples of the specific type of activities that the Component Engineers offers assistance are:

Each of the component engineers are prepared to coordinate the appropriate resources to answer your questions.

IBD Liaison Activities

- Participation with Engineering Project Teams
- Bill of Material Reviews
- Part and vendor reduction projects

Commodity Coverage Activities

- Generation and maintenance of Preferred Part Lists
- Coordination of component strategies
- Review of new technologies
- Coordination of part evaluations
- Assistance with part selection

IBD	Component Engineer (Liaison)			Commodity
	Name	Phone	E-Mail	Technical Strategy
CPID	Abe Ghahyasi	627-2567	abeg@mdhost.cse.tek.com	Memory
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NWD	Abe Ghahyasi	627-2567	abeg@mdhost.cse.tek.com	Memory
	John Young	627-2165	johny@mdhost.cse.tek.com	Interconnect, Mechanical
Electronic Tools & Accessories	Gary Johnson	627-1985	garyjo@sr71.CCI.tek.com	ASICs, Flat Panel Displays, Crystals
	Jim Williamson	627-2552	jimwi@mdhost.cse.tek.com	Linear/Discrete
T.V. Test	Norm Adre	627-2524	normana@mdhost.cse.tek.com	Digital
	Jim Williamson	627-2552	jimwi@mdhost.cse.tek.com	Linear/Discrete
Instruments Business	Wilton Hart	627-3035	wiltonh@mdhost.cse.tek.com	Peripherals
	Martin Baggs	627-2534	martinb@banyan.bv.tek.com	Circuit Boards/ Optics Documentation & Software
Communications Test (Redmond)	Curt Bernal	627-6103	curtb@mdhost.cse.tek.com	Electromechanical
	Martin Baggs	627-2534	martinb@banyan.bv.tek.com	Circuit Boards/ Optics Documentation & Software
Video Measurement Organization (GVG)	Gary Johnson	627-1985	garyjo@sr71.CCI.tek.com	ASICs, Flat Panel Displays, Crystals
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Colorado Data Systems	Curt Bernal	627-6103	curtb@mdhost.cse.tek.com	Electromechanical
	Wilton Hart	627-3035	wiltonh@mdhost.cse.tek.com	Peripherals
Board Build Operations	Nghi Nguyen	627-5098	nghin@mdhost.cse.tek.com	Passives
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	Norm Adre	627-2524	normana@mdhost.cse.tek.com	

SQM News From The Supplier Quality Management Group

SQM And BBO

Al Lavalle

For the next 12 months or so SQM will be concentrating on supplier quality issues in our BBO facility. Currently the BBO facility has about 18,000 active P/Ns coming from over 500 different suppliers. Just over 99% of the circuit boards from this plant go into a Measurement division product of some type.

Two of SQMs objectives over this next year are to:

- Drive the amount of "supplier caused" rejects down.
- Obtain as much reimbursement for those rejects as possible.

Over the last six months the dollar value of the material in this "vendor caused" reject category has been averaging about *2.4%* of the total amount of purchased material. Our goal is to get it down to less than *0.75%* by this time next year. Lately the dollars recovered from this material (credit back from the supplier) has been about *52%*, we're shooting for *80%* by years end.

Although there are over 500 suppliers, only three account for 1/2 of the reject dollars. Each of these three were once part of Tektronix, spinning them off resulted in certain conditions that makes the resolution of component quality issues difficult. These would include inadequate or non-existent specifications, certain contractual agreements, less direct communication, and loss of key people and "know how". Quality meetings are now underway with all three companies to resolve these issues.

SQM has also been visiting other local suppliers, roughly two per month. One company in particular is an example of how we would like most of our Quality Improvement Projects (QIPs) to work. With *this* supplier BBO was experiencing about 1 or 2 significant quality issues per week. Most were related to workmanship and although the dollar value of the components themselves was relatively low, line shut-downs were frequent. About four months ago a (QIP) was launched, since then there has been only two minor issues and no interruptions in production. We believe this improvement was due to the formation of quality teams at the suppliers site, and to drastically improved communication. To further the partnership, we are setting up regular visits here at Tek so they can send selected folks from their plant into our facility to see first hand how the products *they* build become an important part of *our* products.

Not all QIPs work this well. Certainly the issues that need to be addressed with *some* companies (like the three spin-offs mentioned above) can be complex or of a much larger scale but we intend to move forward, concentrating our efforts on the highest impact suppliers and report the status in future issues of Component News.

For questions, comments or further discussion on this article please contact:

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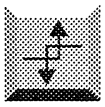
Each of the supplier quality engineers are prepared to coordinate the appropriate resources to answer your questions.



Supplier Quality Engineering Site Support List

Supplier Quality Engineers

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Component News invites you to submit your articles about component issues. If you feel you have information that could be helpful, how about writing about it? This publication is available for you to communicate design problems/ solutions, component alerts, new product info, and application notes.

Component News

The editor and the Component & Supplier Information group have tried to assure accuracy in the published material. We are not responsible for any errors or consequences of any errors in this publication. If you do find an error or an omission please contact the editor at the address listed below.

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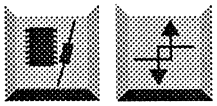

Preferred Suppliers And Preferred Supplier Candidates

Peggy Lewis

This is the most current list of Preferred Suppliers and Preferred Supplier Candidates from Supply Base Management. Shown in the list along with the supplier name is a code indicating the current status of the supplier and the Supply Base Manager's name for each commodity.

Legend:

SBM Supply Base Manager
C Candidate
P Preferred

Plastics:

SBM Harry Anderton
C Kaso Plastics Inc.
C Polycast Inc.
C Quality Plastics Co., Inc
C Triquest Precision Plastic
C Vision

Sheet Metal:

SBM Harry Anderton
P Accra-Fab
P Delta Eng & Mfg
C Dimensional Fabricators
C Grass Valley Group
C Gerome MFG Inc.
P Neilson MFG
P Triax Metal Products

Machined Parts:

SBM Harry Anderton
C Beaverton Parts, Inc.
P EMI Precision, Inc.
C Lite Specialty Mfg
C Davis Toll Inc.

Screw Machine Parts:

SBM Harry Anderton
C Revtek, Inc.
C Universal Precision, Inc.

Die Cast Parts:

SBM Harry Anderton
C TVT die Casting
C SKS Die Casting

Fourslide Parts:

SBM Harry Anderton
P Northwest Fourslide

Rotary Controls:

SBM Harry Anderton
C Bourns

Power Conversion Products:

SBM John Shoberg
C Ault
C Coilcraft/Deyoung
C Computer Products
C Delta
C TDK
C Zman
C Zytec

Elastomeric Keypads:

SBM Harry Anderton
C CRT

Packaging:

SBM Harry Anderton
C Packaging Resources

Printed Materials:

SBM Bill Florine
C Zerox

Memory Components:

SBM Peggy Lewis

DRAMs/VRAMS:

C NEC
C Samsung
P Toshiba
C T.I. (VRAMs only)

EPROMs/FLASH:

C AMD
C Cypress (PROMs only)
C Intel
C Xicor (EEPROM only)

SRAMs:

C Cypress
P Dallas Semi (BB SRAMs)
C NEC
C Samsung
P Toshiba
C T.I. (FIFOs only)

MROMs:

C Samsung
C Toshiba

ASICs:

SBM Paul Tenzeldam
C Maxim
C National
C NEC
C US2

Connectors:

SBM Bill Florine

(Complete connectors table on next page)

Connector Supplier Matrix

	Board to Board									Sockets							I/O				Power				
	Headers	Receptacles	<0.050	Backplane	Edgecard	Stacking	Elastomer	Screw Machine Type	Hi Rel Contact	Screw Machine	Stamped	ZIF	SIMM	PCMCIA	Lamp Sockets	CRT Sockets	Trapazoidal	Circular	Jacks & Plugs	Audio, Circular	IEC Conn Modls	Terminal Blocks	.156 Center Conn.	Other Rectnglr Disc	Circular
3M Company	1	1		L		X					L	X	L				L						X		
A/D Electronics																			2	X					2
AMP	2	2	2	1	1	1	1	1	1	1	1	1	1	1			1	1					2	1	
Berg Electronics	3	3		2	X						L		L	X										L	
ETI							2																		
Feller-Neumeyer																					2				
Fox Conn	X															2	X								
JST (Japan Solderless)	X		3	L												3	2								
McKenzie Tech	L							2		2	L														
Molex Products	X		1	L	L						X		1	L			L	X					1	2	
Mueller																			1						
Neutrik																		X	X	1					
Phoenix Co.																						1			
Samtec	3				L	L	3	3		X	L														
Schurter																					1				
Singatron																		X	1	X					1
SMK																1									
Triquest																1									
Viking Electronics	L		L	2							L						X								
Virginia Panel			3																						

Legend: 1, 2, or 3 = Preferred Supplier Candidates and their relative ranking for potential new business.
X = Fully capable in this technology L = Limited capability in this technology

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- ❑ Operational Amplifiers
- ❑ Programmable Logic
- ❑ Opto-Electronics
- ❑ Memory
- ❑ Capacitors, Batteries
- ❑ Microprocessors/RISC
- ❑ Hardware, Resistors
- ❑ Advanced Logic
- ❑ Connectors

Other .....

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