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component news

SSI/MSI digital IC quality level met

Recent issues of *Component News* have reported on the progress of the SSI/MSI digital IC reliability project. The goal of this project was to set a company-wide "plant quality level" for these devices, plus provide a way to verify the quality and reliability of incoming lots.

As a result, a 0.1% AQL (acceptable quality level), 0.006%/1000 hr. reliability level was instituted for all parts purchased directly from vendors. In addition, Component Test Engineering and Incoming Inspection have purchased the equipment they need to confirm the quality level.

Because most of the first 100 Tek part numbers affected by this new level were on hand before the test equipment and procedures were implemented, a shelf stock inspection was recently performed to confirm compliance. Seventy-five part numbers were sampled at Incoming Inspection with the following results:

208 lot dates sampled
39,927 parts tested
0.1% AQL
12 rejects found
0.03% failure rate

The sample size used for this inspection was 120 to 280 (depending on lot size), with 0 defects allowed (1% LTPD). Two defective lot dates were returned to the vendor.

Based on this large sampling, we feel the quality goal is being met. The reliability sample testing portion of this project will be implemented when the equipment is installed early this year.

If you have any questions or need more information, contact **Merle Vanderzanden, Procurement Quality Control, ext. 2350.**

Editor's note: For a listing of the first 200 part types affected by the new quality level, see *Component News* Issue 288 (pages 5-9), and Issue 292 (pages 14-16).

Also in this issue

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Nonvolatile memory selection guide

Due to a surge of interest in nonvolatile memory devices, the following device comparison has been compiled. Please note that some manufacturers are advertising devices that are not yet being produced.

Because this table will be continually expanded and updated, it will be made available on the CYBER by February 1982. Access information will be published in a future issue of *Component News*, and will also be available by calling Caroline Driver, ext. 2555.

Component Engineering's evaluation of the 3400 and 1400 families of EAROMs has resulted in "Not Recommended" ratings. Although not yet complete, evaluation of the Intel 2816 and Xicor X2201 has shown these to be well-constructed devices, capable of meeting their specifications.

EAROMs — EEPROMs

Size (bits)	Organization	Vendor	Vendor P/N	Technology	Supply Voltages (incl. prog.)	*Endurance/ Retention	Read Access Time	# of Pins	Comments
82	82 X 1	GI	ER0082	*P-MNOS	+5, −30	1K/10 yr.	100μS	18	Bit erasable
256	16 X 16	Motorola	2801	*FG NMOS	+5, +25	—	—	14	Serial
		Panasonic	MN1218	P-MNOS	±5, −28	10K/10 yr.	—	18	Byte erase; no response to inquiries
	32 X 8	Hughes	3300	CMOS	+5	10K/10 yr.	600nS	18	Byte erase; samples 1Q82
	64 X 4	Synertek	2801	NMOS si gate double poly	+5, +21	10K/ —	450nS	16	Byte erase; test device, not intended for mass production
512	32 X 16	GI	ER2051	P-MNOS	+5, −28	10K/10 yr.	1μS	28	Word erasable
		NCR	2051						
		Nitron	NC7051						
	64 X 8	GI	ER2055	P-MNOS	+5, −28	10K/10 yr.	2μS	22	Byte erasable
		NCR	2055						
		Nitron	NC7055						
700	50 X 14	GI	ER1450	P-MNOS	−35	10K/10 yr.	—	14	Serial
1024	128 X 8	GI	ER4201	N-MNOS	+5, +24	1K/10 yr.	650nS	24	Avail. 1Q82; (GI has functional silicon but yield difficulties); address, data and mode latches; needs external RC for stand alone programming
		GI	ER5901	N-MNOS si gate	+5	—	—	24	Avail. 4Q82; similar to 4201
1400	100 X 14	GI	ER1400	P-MNOS metal gate	−35	10K/10 yr.	—	14	Serial; Tek P/N 156-1566-00 "Not recommended"
		NCR	1400						
		Nitron	NC7400						
		Mitsubishi	M5G1400						
2048	256 X 8	Synertek	2802	—	—	—	—	—	Engineering samples 1Q82
4096	512 X 8	Hughes	3004	CMOS	+5, +16	100K/10 yr.	650nS	24	Bulk erase only
		Hughes	3704	CMOS	+5, +16	100/10 yr.	650nS	24	3004 die — only guaranteed 100 cycles
		Xicor	*TBA	NMOS triple poly	+5	—	—	24	Samples 2Q82
	1024 X 4	GI	ER3400	P-MNOS	+5, −12, −30	1K/10 yr.	900nS	22	"Not recommended"
		NCR	3400						
		Nitron	NC7451						

continued on page 3

Size (bits)	Organization	Vendor	Vendor P/N	Technology	Supply Voltages (incl. prog.)	*Endurance/ Retention	Read Access Time	# of Pins	Comments
8192	1024 X 8	Hughes	3008	CMOS	+5, +16	100K/10 yr.	650nS	24	Bulk erase only
		Hughes	3708	CMOS	+5, +16	100/10 yr.	650nS	24	3008 die — only guaranteed 100 cycles
	2048 X 4	GI	2810	P-MNOS	+5, −14, −24	10K/1 yr.	1.6µS	24	
		NCR	2811						
		Nitron	7810						
16384	2048 X 8	GI	ER5716	N-MNOS si gate	+5, +25	10K/10 yr.	350nS	24	Samples 1Q82; similar to Hitachi 48016
		GI	ER5816	N-MNOS	+5, +21	10K/10 yr.	—	24	Samples 2Q82; similar to Intel 2816
		GI	ER5916	N-MNOS	+5	10K/10 yr.	—	24	Samples Aug. 82; Intel 2816-compatible (was P/N'd ER5816,now P/N'd ER5916)
		Hitachi	48016P	N-MNOS	+5, +25	— /10 yr.	350nS	24	4Q81 for volume production; programs similar to 2716 EPROM; no byte erase
		Hughes	TBA	CMOS	—	—	—	—	Samples 1Q82
		Intel	2815	FG HMOS	+5, +22	10K/10 yr.	350nS	24	2816 die but needs 50mS programming pulse; costs about 30% less than 2816
		Intel	2816	FG HMOS	+5, +22	10K/10 yr.	350nS	24	Byte erase; needs RC on Vpp; P/N 156-1602-00
		Intel	2816A	FG HMOS	+5	—	—	24	Available 1983
		Intel	2817	FG HMOS-E	+5, +21	10K/10 yr.	350nS		Avail. 1Q82; latches address, data and control signals and self-times byte write; transparent erase before write; static 21V Vpp; needs external timing cap
		Motorola	2816	FG NMOS	+5, +25	10K/ —	450nS	24	Avail. 2Q82; no byte erase; similar to 2716 EPROM in programming
		National	2816	—	+5, +21	10K/10 yr.	350nS	24	Samples 1Q82; Intel 2816 compatible
		NCR	2161	P-MNOS	+5, −12, −29	1K/10 yr.	—	24	Byte erase; time multiplexed address/data bus; must be clocked
		NCR	2168	P-MNOS	+5, −12, −23, −29	1K/10 yr.	5.6µS	24	No byte erase; time multiplexed address/data bus; must be clocked
		NCR	3416	P-MNOS	—	10K/10 yr.	—	28	Avail. 1Q82; on-chip latches for address and data
		Synertek	TBA	—	—	—	—	24	Samples 2Q82; similar to Intel 2816
		Synertek	TBA	—	+5	—	—	—	Available in 1½ to 2 years; 5V-only 2816
		Xicor	X2816	NMOS triple poly	+5	—	—	24	Samples 3Q82; Intel 2816 compatible but 5V-only; can also use 21V Vpp; because this is a triple poly process no bulk erase is needed
32768	4096 X 8	Motorola	2832	FG HMOS	+5, +21	10K/10 yr.	—	28	Samples 3Q82; byte erase; latched data bus; has internal fuses for partials; no RC on Vpp.

*** NOTES:**

FG = Floating gate
MNOS = Metal nitride oxide semiconductor
P-MNOS = P-channel MNOS
N-MNOS = N-channel MNOS

TBA = To be announced
Endurance = Number of write/erase cycles
SNOS = Silicon nitride oxide semiconductor

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Nonvolatile RAMs

Size (bits)	Organization	Vendor	Vendor P/N	Technology	Supply Voltages (incl. prog.)	*Endurance/ Retention	Read/Write Cycle	# of Pins	Comments
256	64 X 4	Hughes	HNVM3500	CMOS	+5	—	350nS/350nS	18	Samples 2Q82; Xicor X2210 compatible
		Xicor	X2210	*FG NMOS triple poly	+5	1K/10 yr.	300nS/300nS	18	10mS store; 1500nS recall; should have 10K endurance by mid-1982
336	21 X 16	NCR	7033	P-MNOS	—	—	—	—	Samples 1Q82; production 2Q82
1024	256 X 4	Xicor	X2212	FG NMOS triple poly	+5	1K/10 yr.	300nS/300nS	18	10mS store; 1200nS recall; should have 10K endurance by mid-1982
	1024 X 1	Xicor	X2201	FG NMOS triple poly	+5	1K/10 yr.	300nS/300nS	18	Will be discontinued 1Q82; replaced by X2201A
		Xicor	X2201A	FG NMOS triple poly	+5	1K/10 yr.	300nS/300nS	18	Production Feb. 1982; uses only one store pulse; should have 10K endurance by mid-1982
2048	256 X 8	NCR	1734	P-MNOS	+5, −12, +28, −21	10K/3-30 day	450nS/450nS	—	Availability unknown; multiplexed address and data bus; must be clocked; separate erase and store operations; retention is function of store pulse width and temperature
4096	512 X 8	NCR	4485	*SNOS	+5, ±22	10K/30-365 day	450nS/450nS	28	Samples now; production 1Q82; retention depends on number of store pulses; 10mS store; 10mS erase; separate erase and store operations
		GI	ER5304	N-MNOS si gate	+5	10K/10 yr.	300nS/300nS	24	Samples 3Q82; this schedule may slip; 10mS store; 1μS recall

* NOTES:

FG = Floating gate
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For more information on any of these devices, please contact **Jim McKay (ext. 2557), or Gary Johnson (ext. 2009), Digital/Memory Component Engineering**.

Quality and reliability assurance policy for semiconductors —

Effects on Component Preconditioning and Test

According to the Tektronix Quality Management Requirements, semiconductor device quality and reliability is the responsibility of part suppliers. It is Tek's responsibility to define our quality and reliability requirements and communicate them to our suppliers.

Component Preconditioning and Test is affected by the implementation of this policy. In the past, Component Preconditioning and Test has been performing burn-in and test on transistors and ICs on a production basis within equipment capacity limitations. Our thrust will be to transfer the accountability for quality and reliability requirements to suppliers.

We have also selected a number of reputable test labs to support our burn-in requirements where the supplier does not presently meet our needs. This will release equipment capacity to provide additional quality and reliability verification auditing of incoming lots.

To implement this policy, efforts are now being made to change the source of parts processed by Component Preconditioning and Test. Merle Vanderzanden is the project manager, and he can be reached on ext. 2350.

David Matthews, manager
Procurement Engineering and
Quality Assurance

HTRB vs. power bias reliability testing

A proposal has been made to convert to high-temperature reverse bias (HTRB) as a means of burn-in stress. The HTRB testing would be performed by outside test labs for screening transistors. This proposal has raised the concerns of power bias fans who are skeptical of the effectiveness of HTRB.

The primary function of burn-in is to identify and remove process-contaminated devices. The HTRB method accomplishes this very well, in a more controlled and less expensive manner, on the full range of bipolar devices utilizing all manufacturing processes.

It is true that, to some extent, power bias also identifies devices with mechanical integrity (bonding) problems, but not optimally. Here, a temperature cycling test would be most desirable.

Component Reliability Enginering (CRE) accepts the HTRB method for independent test lab screening of transistors. However, CRE has the option of specifying an additional temperature cycling test on any devices suspected of, or having the history of, mechanical integrity problems.

Following are some recent transistor HTRB/power bias test results which demonstrate correlation in identifying contamination in two package styles. All samples of each package style had the same date codes. Fifty devices were used in each test; all devices were pretested for DC electrical specifications.

Tek P/N	Package style	Supplier	Power bias test per 062-5869-00 results	HTRB test per 062-5870-00 results
151-0190-00	TO-92	Motorola	48% failed for h_{FE}	42% failed for h_{FE}
151-0406-00	TO-39	TI	98% failed for BV_{CEO}	94% failed for BV_{CEO}

For more information, please contact **Norm Sanneman, ext. 1606.**

Ozone-resistant rubber insulating materials

If a high voltage difference is impressed between a conductor and ground, it may overstress the intervening air or gas, causing ionization and partial discharges to occur. In most instances, partial discharges occur when both solid and gaseous insulations are interposed between a conductor and ground.

The stress (measured in volts per mil) in each insulation is inversely proportionate to the dielectric constant of that insulation. The dielectric strength of the solid insulation is much higher than that of the gaseous. Stress is consequently higher in the gas and is often sufficient to ionize it. The current is limited by the solid, but the ionization of the gas gives rise to partial discharges.

Partial discharges readily convert ordinary oxygen into ozone, a powerful oxidizing agent that can cause degradation of certain types of insulation. Natural rubber and synthetic rubber (isoprene) are two insulative materials that do not stand up well when subjected to ozone, although they exhibit good electrical resistivity. The deteriorating effect of ozone on these materials is generally seen as cracking. Alternate rubber materials worth considering are:

1. Butyl (also known as isobutene isoprene) and chlorobutyl (also known as chlorinated isobutene isoprene) — These rubber materials are very resistant to ozone, oxygen and heat. They are impermeable to air and gases. In addition, they exhibit high energy absorption and excellent electrical resistivity.

2. Ethylene propylene (EPR) and ethylene propylene diene monomer (EPDM) — These materials resist aging from ozone, oxygen, UV radiation and heat. They also show good electrical resistivity and are therefore frequently used as electrical insulators.

3. Chlorosulfonated polyethylene (commonly called Hypalon®) — Exhibits **virtually total resistance to ozone** and excellent resistance to weather, heat and crack growth. In addition, it has good dielectric properties. It is a moderately expensive material and is mainly used for special applications, particularly where outstanding environmental resistance is needed. One of its common applications is as high-voltage cable insulation.

4. Silicone and fluorosilicone — Although at the high end of the cost scale for rubber-like materials, these materials have good dielectric properties, excellent resistance to ozone and weathering, and they withstand temperature extremes very well.

Among other materials that resist ozone well are epichlorohydrin, the ethylene/acrylic family of rubber materials, perfluoroelastomer, fluorocarbon and urethane. However, these materials have only fair electrical resistivity, and consequently may not be suited for use in a high-voltage environment.

For more information, please contact **Katherine Dennett, ext. 2314**.

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What is the Component Information System?

The Component Information System (CIS) is a:

- computerized data base that
- resides on the CYBER computer,
- contains information about purchased components,
- is accessed by on-line terminals, and
- provides hard-copy reports.

The CIS answers questions like:

What is the Tek part number for the part with manufacturer part number XYZ?
Is the part recommended for new design?
Who are the approved vendors?
Is the component sole-sourced or source-controlled?
Is the part controlled by Product Safety?

If you would like to know more about the Component Information System, call **Jim Sasser (ext. 2587)** to request a CIS presentation for your group. Here's a short outline of Jim's presentations:

1. Overview of CIS — What is it? Who uses it? Information content. Value?
2. Application of CIS — Detailed information content. How to access information. Standard and custom reports/displays.
3. Training — Hands-on training and/or review of data base structure for S2000 programmers.

Reliability basics

The exponential reliability equation

The exponential formula for reliability is commonly used to determine the reliability of systems, instruments and components. It is accurate in determining the reliability only after early (infant) failures have been removed and no device has had any wearout damage or performance degradation due to age.

In the simplest case, when a device is subject only to failures that occur at random, and the expected number of failures is the same for equally long operating periods, the device's reliability is mathematically defined by the well-known exponential formula:

$$R(t) = e^{-\lambda t} = e^{-t/m}$$

where: R = the probability that the device will not fail in the operating time (t)
t = operating (mission) time
λ = a constant; the chance or random failure rate
m = the mean-time-to-failure (MTTF) for non-repairable units; or mean-time-between-failures (MTBF) for repairable units.

This expression applies to systems, instruments and components when only chance failures occur during their useful life, and the failure rate is a constant (see Figure 1).

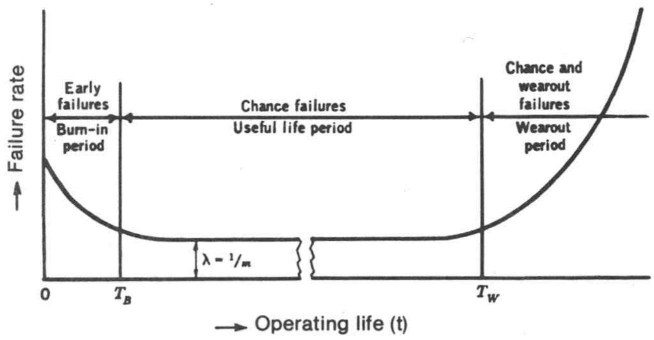

Figure 1

To illustrate this, we can derive the general reliability expression, and then assume a constant failure rate to arrive at $R = e^{-\lambda t}$.

$$R(t) = \frac{N_s}{N_s + N_f} = \frac{N_s}{N_o}$$

where: $R(t)$ = reliability at a specified time
N_s = number of survivors at that time
N_f = number of failures at that time
$N_o = N_s + N_f$ = total number of units

Since $N_s = N_o - N_f$, then:

$$R(t) = \frac{N_o - N_f}{N_o} = 1 - \frac{N_f}{N_o}$$

and:

$$\frac{dR}{dt} = -\frac{1}{N_o}\frac{dN_f}{dt}$$

$$-N_o\frac{dR}{dt} = \frac{dN_f}{dt}$$

The term dN_f/dt can be interpreted as the number of components failing in the time interval dt. That is equivalent to the rate at which the component population still on test at time t is failing. At time t there are N_s components still on test.

Therefore, dN_f/dt components will fail out of the N_s components. The rate at which they fail is $dN_f/N_s dt$, that is failure rate λ. Dividing both sides of the previous equation by N_s gives:

$$\lambda = \frac{-N_o}{N_s}\frac{dR}{dt} = \frac{1}{N_s}\frac{dN_f}{dt}$$

$$\lambda = -\frac{1}{R}\frac{dR}{dt}$$

$$\lambda dt = \frac{-dR}{R}$$

$$\int_0^t \lambda dt = -\int_1^R \frac{dR}{R} = -\ell nR$$

continued on page 8

$$\ell n R = -\int_0^t \lambda dt$$

$$R = e^{-\int_0^t \lambda dt}$$

That is the general expression for reliability where λ can be any variable and integrable function of time t. When λ is a constant, as in our special case:

$$R = e^{-\lambda \int_0^t dt}$$

$$R = e^{-\lambda t}$$

That is the familiar expression used to calculate system, instrument and component reliability. It applies only when λ is a constant.

During its useful life, the probability of failure is independent of the age of the component. The important time is the mission or operating time within the useful life of the device (see Figure 2).

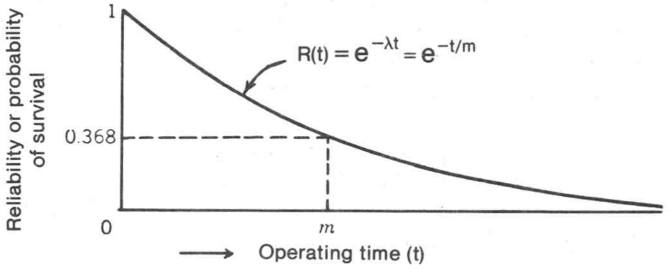

Figure 2 — Graph of the exponential equation shows the relationship between reliability and mission time.

As an example, if a device has a useful life of 10,000 hours and the failure rate is known to be 1%/1000 hours (or the equivalent MTTF of 100,000 hours) or 0.00001 failures per hour:

$$R = e^{-\lambda t} = e^{-(.00001)(10,000)} = 0.9048$$

The probability of it surviving to 10,000 hours is 90.48% if the operating time began at the start of its useful life. The probability of it surviving to 1000 hours is 99%. If it survives to 1000 hours, the probability of survival to 2000 hours is 99%. If it survives to 9000 hours, the probability of it surviving to 10,000 hours is 99%.

If the mission time is only 1000 hours, the time can be any 1000-hour increment that starts earlier than 9000 hours. The reliability will be the same for each 1000-hour mission.

As the mission or operating time increases within the useful life of the device, the reliability or probability of survival decreases.

Mean-time-to-failure (MTTF) and mean-time-between-failures (MTBF) are terms used to specify reliability. An MTTF of 100,000 hours does not mean that the system, instrument or component will last for 100,000 hours. For example:

$$R = e^{\frac{-t}{m}} = e^{\frac{-100,000}{100.000}} = 0.368$$

That is, the system, instrument or component has a 36.8% chance of surviving an operating time equal to its MTTF or MTBF.

Calculating system reliability during useful life

To determine the reliability of a *system* or *instrument* during its useful life, the failure rate of each *component* during its useful life must be known.

The composite failure rate is the sum of the individual failure rates.

$$\lambda_c = \lambda_1 + \lambda_2 + \lambda_3 + \lambda_4 \ldots \lambda_n \qquad (1)$$

$$R(t) = R_1 R_2 R_3 R_4 \ldots R_n \qquad (2)$$

$$R(t) = e^{-\lambda_1 t} \cdot e^{-\lambda_2 t} \cdot e^{-\lambda_3 t} \ldots e^{-\lambda_n t} \qquad (3)$$

$$R(t) = e^{-t(\lambda_1 + \lambda_2 + \lambda_3 \ldots \lambda_n)} \qquad (4)$$

Reliability prediction computer programs currently in use at Tek (such as MTBF) use equation (1) above, by summing all the failure rates of individual components then taking the reciprocal to get MTBF.

If you have any questions, or for more information, please contact me on ext. 0544.

Ken Davenport
ICM Reliability Engineering

Board bucket references

Are you in the market for a board bucket system and need more information? In the past two years, members of the CSC Microprocessor Support group and Component Engineering have compiled three articles dealing with various microprocessor development tools available to Tek employees.

All three articles were originally published in *Component News*, and are now available as reprints. Following is a brief description of each.

"Poor Man's Disk Operating System" (*Component News 278*, Feb. 5, 1980) describes a relatively inexpensive system that is readily adaptable for use with most microprocessor evaluation boards. The system uses a 6800-based board bucket with ROM, RAM, CPU, I/O boards and an added disk controller board. The disk controller board is designed to be bus compatible and uses FLEX 2 software from Technical Systems Consultants.

Another article deals with "Two New Operating Systems for the Board Bucket" (*Component News 288*, May 5, 1981). One operating system uses software called FLEX 09, which includes an editor and assembler just as FLEX 2 does. The second operating system supports more than one MPU. It was written for the 8080, but can be run on the 8085 or the Z80 as well. This software was originally written by Digital Research Corporation and is called CP/M 2.2.

The third article is entitled "A New Look at the Board Bucket," and describes some recent developments by the Microprocessor Support group. The article also includes a list of important applications within Tektronix for the board bucket. This article appeared in *Component News 291*, Oct. 9, 1981.

If you'd like a reprint of any of these articles, please contact Jacquie Workman, D/S 58-122, ext. 6867.

8085 μP problem

The 8085 8-bit microprocessor, Tek P/N 156-1088-xx, has been found to have a misleading set of application information in the Intel data book.

The problem relates to the clock circuit. The Intel data book shows two possible circuits for external drive of the clock pins. One circuit is labeled as working from 1-10MHz. It uses two gates with their outputs each being pulled to 5 volts through 470 ohm resistors. One gate drives pin 1 and the other drives pin 2. This circuit seems to work quite well.

The other circuit shows pin 1 driven with a gate and a pullup resistor of 470 ohms. Pin 2 is left to float. The label on the drawing says that the circuit is good from 1-6MHz. This is not really the case. As you get near 4MHz the part will do funny things.

The solution is to pull up pin 2 with a 470 ohm resistor also. This problem has been reported in several of our products.

For more information, please contact **Wilton Hart, ext. 2572**.

Tektronix Designer's Guide to
Connectors

This 51-page handbook, authored by evaluation engineers in Procurement Engineering, is written for the person needing comprehensive information about commonly-used connectors and connector applications at Tektronix.

Information includes:

- Contact theory, finishes and materials
- Contact environmental considerations and terminations
- Component level contact systems (IC sockets)
- Board interconnection systems (posts, edgecard connectors)
- Instrument interconnection systems (rectangular, circular and RF connectors)

The text is amply supported by graphs, tables and illustrations.

For a copy, please call Hidred Garcia, ext. 2563.

TECHNICAL STANDARDS

New Publications

EIA/TEPAC Pub. #116. EIA Tube Engineering Panel Advisory Council, Optical Characteristics of Cathode Ray Tube Screens — Erratum Page.

EIA RS 437-A. Sensitive Switches.

EIA RS 445-3. Illuminated and Non-Illuminated Pushbutton Switches; 0.750 Square Mounting, 1 and 2 Poles, 0.001 to 10 Amperes.

EIA RS 448-4. Standard Test Methods for Electromechanical Switches.

EIA RS 445-1. Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Connecting and Terminating Devices.

EIA RS 468. Lead Taping of Components in the Radial Configuration for Automatic Insertion.

ANSI/IPC-CF-150E. Copper Foil for Printed Wiring Applications.

ANSI/NCCLS ASI-1-1981. Preparation of Manuals for Installation, Operation and Repair of Laboratory Instruments.

ANSI S2.17. Techniques of Machinery Vibration Measurement.

AMS 3195C. Silicone Rubber Sponge.

IEC 668. Dimensions of Panel Areas and Cutouts for Panel and Rack-Mounted Industrial Process Measurement and Control Instruments.

IEC Guide 104. Guide to the Drafting of Safety Standards, and the Role of Committees with Safety Pilot Functions.

IPC-D-320A. Printed Board, Rigid, Single- and Double-Sided, End Product Standard.

ISO/DIS 6081. Acoustics; Noise Emitted by Machinery and Equipment (draft circulated for comment and approval).

ISO 1000. SI Units and Recommendations for Use of Their Multiples and of Certain Other Units. Second Edition.

CISPR Pub. #16. Specification for Radio Interference Measuring Apparatus and Measurement Methods.

IPC Technical Report. Measles in Printed Wiring Boards; Information Document.

NASA Tech. Briefs. Rapid Testing of Pulse Transformers. A method was devised whereby low frequency (100Hz and 1KHz) sinusoidal measurements of a pulse transformer were related (both experimentally and theoretically) to pulse droop. High frequency measurements (1MHz and 4MHz) were related to pulse rise time. The method saves an order of magnitude of time over the traditional methods of pulse transformer parameter determination, i.e., pulse generators and oscilloscopes (MSC-18202).

The following NASA "Technical Support Package" documents were recently received by Technical Standards and are available for review:

SIMs Prototype System 4-Performance Test Report (1979)
Models of MOS and JOS Devices (1980)
Placement Technique for Semicustom Digital LSI Circuits (1980)
Cost Models and Economical Packaging of LSIs (1980)
An Automated Photolithography Facility for ICs (1980)
Extracting Energy from Natural Flow (1980)
Improved Process Control for VMOS FETs (1979)
Coatings for Hybrid Microcircuits (1980)
JANTX2N2060 Transistor (1980)
JANTX2N2219A Dual Transistor (1980)
JANTX2N2369A Transistor (1980)
JANTX2N2432A Transistor (1980)
JANTX2N2484 Transistor (1980)
JANTX2N2605 Transistor (1980)
JANTX2N2905A Transistor (1980)
JANTX2N2929 Dual Transistor (1980)
JANTX2N2945A Transistor (1980)
JANTX2N3637 Transistor (1980)
JANTX2N3811 Transistor (1980)
JANTX2N4150 Transistor (1980)
JANTX2N4856 Field Effect Transistor (1980)
JANTX1N2970B Zener Diode (1980)
JANTX1N2989B Zener Diode (1980)
JANTX1N3016B Zener Diode (1980)
JANTX1N3031B Zener Diode (1980)
JANTX1N5622 Diode (1980)

For more information about any of these publications, contact Technical Standards, D/S 58-306, ext. 1800.

ComponentNews NewComponents

Vendor	Number	Description	When Available	Tek P/N	Engineer to contact, ext.
memory and I/O devices					
AMD	27S191A-DC	PROM, 2K × 8, 35nS T_{aa}	now	TBA	Pat Emmons, 2009
Intel	2764	EPROM, 8K × 8, 250nS T_{acc}	now	TBA	Pat Emmons, 2009
Fujitsu	2764-25	EPROM, 8K × 8, 250nS T_{acc}	now	TBA	Pat Emmons, 2009
AMD	2732	EPROM, 4K × 8, 450nS T_{acc}	now	156-1403-00	Pat Emmons, 2009
Fujitsu	2732	EPROM, 4K × 8, 450nS T_{acc}	now	156-1403-00	Pat Emmons, 2009
Hitachi	2732	EPROM, 4K × 8, 450nS T_{acc}	now	156-1403-00	Pat Emmons, 2009
optoelectronic and passive devices					
Belden		Cable Assembly, two 24AWG wires, molded miniature phone plugs both ends, 90 inches long	Feb. '82	012-1021-00	E. Doolittle, 2309
3M		Cable assembly, socket/socket, 50 conductor flat cable, 10.0 inches long	now	175-6671-00	E. Doolittle, 2309
Advanced Circuit Tech.		Jumper cable, 10 conductors, tin finish, Kapton insulation, 0.5 inches long	Feb. '82	175-6420-00	E. Doolittle, 2309
		Cable assembly, 1 meter GPIB cable, double shielded	now	012-0630-07	E. Doolittle, 2309

Transformer safety standard proposed

Transformer and Coil Engineering and Product Safety have proposed a Tektronix Safety Standard entitled "Supply Circuit (Mains) — Connected Transformers." Two years in preparation, this standard reflects IEC, UL, CSA and VDE requirements.

The standard applies to all transformers connected to the primary circuit of Tektronix products, including high-frequency transformers in switching-mode power supplies.

The committee which drafted this standard is now soliciting comments and suggestions from within Tektronix. Copies are available for review, and your comments should be in writing. In response to comments, the draft will be revised and distributed to division, EMCM and other managers for formal approval.

This standard will be in effect for all new products in the 1984 Tek catalog.

If you'd like a copy of this standard to review, please contact me at D/S 58-306, ext. 1801. Comments are due by February 19, 1982.

Roy Eckelman
Technical Standards

mega • watt *n (mega- + watt)*: the response you get from a million people who cannot hear you.

D.L.

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