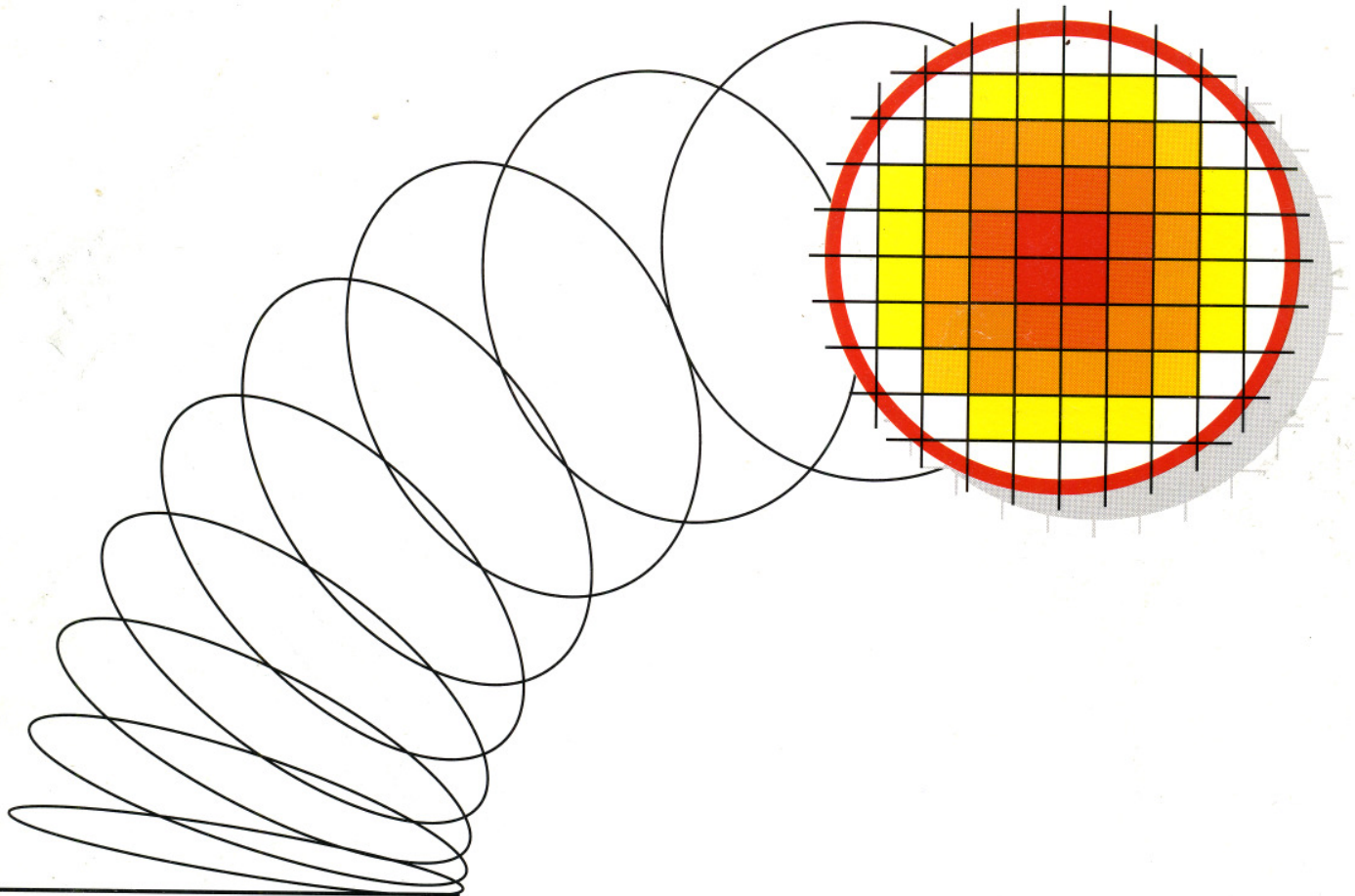




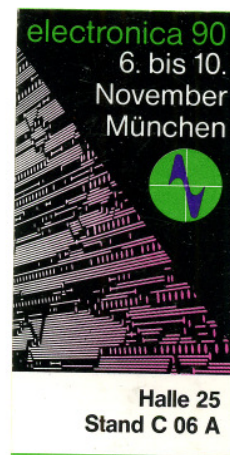
Short Form Catalog

D A T A C O N V E R T E R S - D S P P R O D U C T S



TRW LSI Products Inc.

-  A/D Converters
-  D/A Converters
-  Linear Products
-  Advanced Arithmetic Products
-  Imaging Products
-  Correlators
-  Transform Products
-  Fixed-Point Multipliers
-  Fixed-Point Multipliers-Accumulators
-  Memory/Storage Products



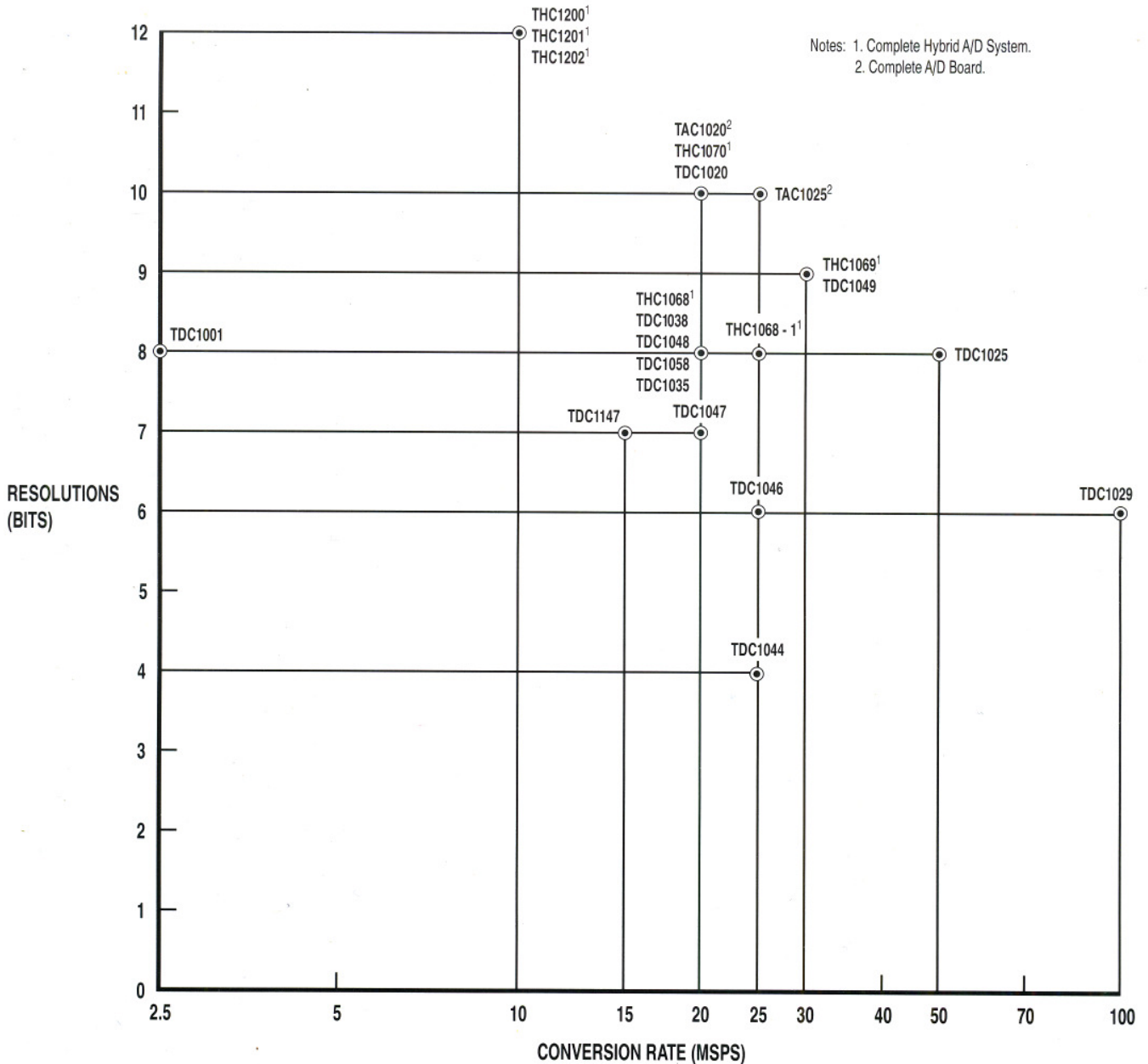
1988 - 1989
EMMY WINNER

TRW LSI Products Inc. grew from the TRW research labs in 1976. With a charter to bring the efforts of TRW's high technology research to the merchant market, it is the goal of TRW LSI to provide the best possible performance at the most competitive prices for demanding applications in commercial and military environments.

As the leader in high performance data converters, TRW LSI has defined the standard for high-speed 8, 9 and 10-bit A/D converters. Now we have advanced the state-of-the-art in A/D conversion technology with the introduction of the THC1200 family of very high-speed 12-bit converters.

TRW LSI has hundreds of man-years experience in the design, manufacture and test of high-speed A/D converters. Along with new capabilities for hybrid circuits, we are pushing the resolution of very high-speed A/D converters even further. Our capable Applications Staff is eager to discuss your next-generation system requirements and work with you to develop world-class solutions.

A/D Converter Spectrum



20100A

A/D Converters — TRW LSI's high-speed analog-to-digital converters utilize flash, two-pass and successive approximation architectures encompassing resolution from 4 to 12 bits and conversion rates from 2.5 to 100MSPS. All monolithic A/D converters are built using TRW's proven 3D (Triple Diffused) bipolar technology while hybrids combine various technologies to provide complete analog-to-digital conversion systems.

Product	Bits	Conv Rate ¹ (MSPS)	RMS/RMS SNR ^{1,2} (dB)	Package	Package Designator ³	Available Temp/ Testing ^{4,5}	Comments
TDC1044	4	25	N/A	16-Pin DIP	B9, N9	C, V	Low Power.
TDC1046	6	25	33	18-Pin DIP	B8	C, V, SMD	Low Power.
TDC1029	6	100	33	24-Pin DIP	B7	C	50MHz Input Bandwidth, ECL Compatible.
TDC1047	7	20	39	24-Pin DIP	B7	C, V	Video ADC.
TDC1147	7	15	36	24-Pin DIP	B7	C, V	No Pipeline Delay, Suited to Subranging Converter Applications.
TDC1001	8	2.5	N/A	18-Pin DIP	B8	C, A ⁶	Successive Approximation Converter.
TDC1025	8	50	44	68-Contact CC 68-Lead CC Evaluation Board	C1 L1 E1	C, A C, A C	ECL Compatible.
TDC1035	8	—	—	24-Pin DIP	B7	C, V	Digitizes Peak Value of Pulses as Narrow as 12ns.
TDC1038	8	20	45	28-Pin DIP 28-Lead PLCC Evaluation Board	B6, N6 R3 E1	C C C	Low Power Version of TDC1048. Requires $\pm 5V$ Supplies. Low Cost Drop-In Replacement for TDC1048.
TDC1048	8	20	45	28-Pin DIP 28-Contact CC Evaluation Board	B6, N6 C3 E1	C, V, SMD C, V, SMD C	Industry Standard Video A/D.
TDC1058	8	20	45	28-Pin DIP 28-Lead PLCC Evaluation Board	B6, N6 R3 E1	C C C	+5V Only, 575mW, Low Cost CXA1096 Replacement with TDC1048 Performance. The Best Cost/Performance 8-Bit Flash Converter Available.
THC1068	8	25	44	24-Pin DIP Evaluation Board	S7 E1	C, V C	Complete A/D System with Input Amplifier, Voltage Reference and Output Register.
TDC1049	9	30	48	64-Pin DIP 68-Contact CC 68-PGA Evaluation Board	J0, J3 C1 G8 E1	C, V, SMD C, V, SMD C, V C	Fastest Available 9-Bit ADC.
THC1069	9	37	47	32-Pin DIP Evaluation Board	S5 E1	B, V C	Complete A/D System with Input Amplifier, Voltage Reference and Output Register.
TDC1020	10	20	55	64-Pin DIP 68-PGA Evaluation Board ⁷	J1 G0 E1	C, V C, V C	TTL Video A/D with $\pm 2V$ Input Range.
TAC1020	10	20	55	Module	P3	C	Low Power Replacement for MOD-1020.
TAC1025	10	25	55	Module	P3	C	Low Power Replacement for ZAD 1025.
THC1070	10	20	54	32-Pin DIP Evaluation Board	S5 E1	B, V C	Complete A/D System with Input Amplifier, Voltage Reference and Output Register.
THC1200	12	10	62	46-Pin DIP Evaluation Board	S3 E1	B, V C	Complete A/D with Internal T/H and Voltage Reference. High-Speed Logic Selectable. $\pm 0.167V$ and $\pm 2.5V$ Input Ranges.
THC1201	12	10	62	46-Pin DIP Evaluation Board	S3 E1	B, V C	Complete A/D with Internal T/H and Voltage Reference. $\pm 1.0V$ Input Range.
THC1202	12	10	62	40-Pin DIP Evaluation Board	S6 E1	B, V C	Low Cost 12-Bit, Smallest Available. Complete with Internal T/H and Voltage Reference.

Notes: 1. Guaranteed.

2. See Data Book for Test Conditions.

3. See Back Page for Package Descriptions.

4. C = Commercial, $T_A = 0^\circ C$ to $70^\circ C$.

B = Industrial, $T_C = -25^\circ C$ to $85^\circ C$.

A = High Reliability, $T_C = -55^\circ C$ to $125^\circ C$.

V = MIL-STD-883 Compliant, $T_C = -55^\circ C$ to $125^\circ C$.

SMD = Available per Standard Military Drawing, $T_C = -55^\circ C$ to $125^\circ C$.

5. Consult Factory for Availability.

6. A = High Reliability, $T_C = -20^\circ C$ to $95^\circ C$.

7. Provisions for THC4940 T/H.

D/A Converters — TRW LSI's high-speed monolithic digital-to-analog converters employ segmented current switching techniques and offer resolution ranging from 4 to 12 bits with data rates up to 200MHz. They are all exceptionally well suited for applications ranging from waveform synthesis to video and high-speed computer graphics.

Product	Bits	Differential Linearity Error ¹ (± %)	Data Rate ¹ (MHz)	Rise Time ¹ (ns)	Package	Package Designator ²	Available Temp/Testing ^{3,4}	Comments
TDC1034	4	0.80	200	2	18-Pin DIP	B8	C	Low Cost ECL Graphics Ready.
TDC1334	Triple 4	0.80	200	2	28-Pin DIP	B6	C	Low Cost ECL Graphics Ready.
TMC0171	Triple 6	0.78	35	8	44-Lead PLCC 28-Pin DIP	R2 N6	C C	RAMDAC. 256 x 18 Lookup Table. INMOS 171 Compatible.
TDC1018	8	0.20	200	1.7	24-Pin DIP 28-Contact CC	B7 C3	C C	Low Cost ECL Graphics Ready.
TDC1318	Triple 8	0.20	200	2	40-Pin DIP	B5	C	Low Cost ECL Graphics Ready.
TDC1016-10	10	0.05	20 ⁵	5.5	24-Pin DIP 40-Pin DIP	N7 N5	C C	TTL and ECL Compatible.
- 9	10	0.10	20 ⁵	5.5	24-Pin DIP 40-Pin DIP	B7, N7 B5, N5	C, A C, A	TTL and ECL Compatible.
- 8	10	0.20	20 ⁵	5.5	24-Pin DIP 40-Pin DIP	B7, N7 B5, N5	C, A C, A	TTL and ECL Compatible.
TDC1041-1	10	0.048	20	4	28-Lead PLCC	R3	C	Low Cost, 10-Bit Video DAC.
TDC1041	10	0.096	20	4	28-Lead PLCC	R3	C	Very Low Cost Video DAC.
TDC1012-3	12	0.012	20	4	24-Pin DIP	J7, N7, R3	C	Lowest Glitch, TTL Compatible.
- 2	12	0.024	20	4	24-Pin DIP	J7, N7, R3	C, V	Ideally Suited for Signal Synthesis.
- 1	12	0.048	20	4	24-Pin DIP	J7, N7, R3	C, V	-70dBc Spurs. Drives 50Ω Directly.
TDC1012	12	0.096	20	4	24-Pin DIP	J7, N7	C, V	
TDC1112-3	12	0.012	50	4	24-Pin DIP	J7, N7, R3	C	Lowest Glitch, ECL Compatible.
- 2	12	0.024	50	4	24-Pin DIP	J7, N7, R3	C, V	Ideally Suited for Signal Synthesis.
- 1	12	0.048	50	4	24-Pin DIP	J7, N7, R3	C, V	-70dBc Spurs. Drives 50Ω Directly.
TDC1112	12	0.096	50	4	24-Pin DIP	J7, N7	C, V	

Notes: 1. Guaranteed.

2. See Back Page for Package Descriptions.

3. C = Commercial, T_A = 0°C to 70°C.

A = High Reliability, T_C = -55°C to 125°C.

V = MIL-STD-883 Compliant, T_C = -55° to 125°C.

4. Consult Factory for Availability.

5. ECL Mode Operates at 18MHz Maximum.

Linear Products — The THC4231 is a very wideband, low gain amplifier capable of driving the capacitive input of a high resolution flash A/D converter or providing a voltage output from a current output D/A converter. The THC4940 is the highest performance track/hold available. When used with the TDC1020 10-bit flash A/D converter, the THC4940 and TDC1020 are capable of true Nyquist sampling of 10MHz signals.

Product	-3dB Bandwidth ¹ (MHz)	Slew Rate ¹ (V/ns)	Settling Time ¹ (ns—1%)	Input Offset Voltage ¹ (mV)	Gain Flatness (dB)	Package	Package Designator ²	Available Temp/Testing ^{3,4}	Comments
THC4231 Amplifier	120	1.8	22	4.5	0.6	TO-8 Can	X1	B	Current Feedback Amplifier Eliminates Gain-Bandwidth Tradeoff.

Product	-3dB Bandwidth ¹ (MHz)	Acquisition Time ¹ (ns—1%)	Settling Time ¹ (ns—1mV)	Pedestal Offset ¹ (mV)	Aperature Jitter ¹ (ps _{rms})	Package	Package Designator ²	Available Temp/Testing ^{3,4}	Comments
THC4940 Track/Hold	110	22	18	8	1.6	24-Pin DIP	X2	B, A	Very Fast Sampling, Wideband T/H Amplifier.

Notes: 1. Guaranteed.

2. See Back Page for Package Descriptions.

3. B = Industrial, T_C = -25°C to 85°C.

A = High Reliability, T_C = -55°C to 125°C.

4. Consult Factory for Availability.

Advanced Arithmetic Products — TRW LSI offers the widest variety of advanced arithmetic products in the industry, including a bipolar-technology 22-bit family and a CMOS 32-bit family which is IEEE-754-Standard compatible and the only commercially available floating-point divider. TRW also offers a 32-bit fixed-point divider. All Advanced Arithmetic Products are TTL compatible.

Product	Description	Size	Clock Rate ¹ (MHz)	Power ² (Watts)	Package	Package Designator ³	Available Temp/Testing ^{4,5}	Comments
TDC1032	Floating-Point Arithmetic Unit	22-Bit	16.6	3.5	88-PGA	G5	C, V	16-Bit Fixed-Point Compatibility Mode.
TDC1032-1	Floating-Point Arithmetic Unit	22-Bit	20	3.5	88-PGA	G5	C	16-Bit Fixed-Point Compatibility Mode.
TDC1033	Floating-Point Registered ALU	22-Bit	8.3	4.1	88-PGA	G5	C, A	16-Bit Fixed-Point Compatibility Mode.
TDC1042	Floating-Point Multiplier	22-Bit	16.6	4.5	88-PGA	G5	C, A	16-Bit Fixed-Point Compatibility Mode.
TMC3032	Floating-Point Multiplier	32-Bit	8	0.21	64-Pin DIP 68-Contact CC	J3 A1	C C	IEEE-754 Format. Compatible with WTL1032-8.
TMC3032-1	Floating-Point Multiplier	32-Bit	10	0.21	64-Pin DIP 68-Contact CC	J3 A1	C C	IEEE-754 Format. Compatible with WTL1032-10.
TMC3033	Floating-Point Arithmetic Unit	32-Bit	8	0.21	64-Pin DIP 68-Contact CC	J3 A1	C C	IEEE-754 Format. Compatible with WTL1033-8.
TMC3033-1	Floating-Point Arithmetic Unit	32-Bit	10	0.21	64-Pin DIP 68-Contact CC	J3 A1	C C	IEEE-754 Format. Compatible with WTL1033-10.
TMC3200	Floating-Point Arithmetic Unit	32/34-Bit	10	0.16	88-PGA	G5	C, A	CMOS IEEE-754 Format with Internal Accumulate.
TMC3201	Floating-Point Multiplier	32/34-Bit	8	0.16	88-PGA	G5	C, A	CMOS IEEE-754 Format with Three-Port I/O.
TMC3202	1750A Accelerator	32-Bit	16	0.3	84-Lead CC	L3	C, V	MIL-1750A Standard Floating-Point Accelerator, 8MFLOP.
TMC3210	Floating-Point Divider	32-Bit	20	0.3	48-Pin DIP	J4	C, V	2.5MFLOP, IEEE-754 Format.
TMC3211	Integer Divider	32-Bit	20	0.5	120-PGA	H5	C	20MOPS.

Memory/Storage Products — TRW LSI shift registers are high-speed synchronous buffers useful for video data storage. The FIFO and three-port register file have numerous applications in asynchronous bus communications and various fixed and floating-point arithmetic architectures. All are TTL compatible.

Product	Description	Size	Clock Rate ¹ (MHz)	Power ² (Watts)	Package	Package Designator ³	Available Temp/Testing ^{4,5}	Comments
TDC1005	Shift Register	64x2	25	0.6	16-Pin DIP	B9	C, A	Expandable/Cascadable.
TDC1006	Shift Register	256x1	25	0.7	16-Pin DIP	B9	C, A	Expandable/Cascadable.
TDC1011	Programmable Shift Register	3-18x8	18	0.8	24-Pin DIP 28-Contact CC	B7, B2 C3	C, A C, A	B2 Package is .300 in. DIP.
TDC1030	FIFO Memory	64x9	15	1.8	28-Pin DIP 28-Contact CC	B6 C3	C, A C, A	Expandable/Cascadable.
TMC2011	Programmable Digital Delay	3-18x8	30	0.15	24-Pin DIP 28-Contact CC	B2 C3	C, V V	CMOS, TDC1011 Replacement.
TMC2011-1	Programmable Digital Delay	3-18x8	40	0.15	24-Pin DIP	B2	C	High-Speed Version.
TMC2111	Programmable Digital Delay	1-16x8	30	0.15	24-Pin DIP 28-Contact CC	B2 C3	C, V V	Enhanced Pipeline Delay.
TMC2111-1	Programmable Digital Delay	1-16x8	40	0.15	24-Pin DIP	B2	C	High-Speed Version.
TMC3220	Three-Port Register File	32x8 Bit	20	0.15	48-Pin DIP	J4	C, V	CMOS, 1 Write, 2 Read Ports.

- Notes: 1. Guaranteed.
 2. Bipolar: Worst Case.
 CMOS: All Inputs Toggling at Max Clock Rate, Unloaded.
 3. See Back Page for Package Descriptions.

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 V = MIL-STD-883 Compliant, $T_C = -55^\circ\text{C}$ to 125°C .
 5. Consult Factory for Availability.

Imaging Products — TRW LSI is the leader in dedicated products for image processing applications. FIR filters perform basic frequency-domain filtering on digitized signals. The Image Resampling Sequencer is a flexible address generator which performs numerous image filtering and manipulation functions. All Imaging Products are TTL compatible.

Product	Description	Size	Clock Rate ¹ (MHz)	Power ² (Watts)	Package	Package Designator ³	Available Temp/Testing ^{4,5}	Comments
TMC2301	Image Resampling Sequencer (IRS)	4Kx4K Pixels	15	0.4	68-Lead CC 68-Lead PLCC 68-PGA 68-PPGA	L1 R1 G8 H8	V C C C	
TMC2301 - 1	Image Resampling Sequencer (IRS)	4Kx4K Pixels	18	0.5	68-Lead CC 68-Lead PLCC 68-PGA 68-PPGA	L1 R1 G8 H8	V C C C	
TMC2301 - 2	Image Resampling Sequencer (IRS)	4Kx4K Pixels	20	0.5	68-Lead PLCC 68-PGA 68-PPGA	R1 G8 H8	C C C	
TMC2302	Manipulator	65K Pixels Per Side	30	0.8	120-PPGA	H5	C	
TDC1028	FIR Filter	4x4x8	10	3.7	48-Pin DIP	J4	C, A	8 Stages.
TMC2243	FIR Filter	10x10x3	20	0.5	68-PGA 68-PPGA	G8 H8	C, V C	3 Stages.
TMC2246	Image Filter	10x11x4	30	0.5	120-PPGA	H5	C	Four-Pixel Interpolator.
TMC2246 - 1	Image Filter	10x11x4	40	0.5	120-PPGA	H5	C	Higher Speed.
TMC2242	Half-Band Digital Filter	12x12	30	0.5	44-Lead PLCC	R2	C	Interpolating/Decimating Digital Filter.
TMC2242 - 1	Half-Band Digital Filter	12x12	40	0.5	44-Lead PLCC	R2	C	Interpolating/Decimating Digital Filter.
TMC2249	Digital Mixer	12x12	25	0.5	120-PPGA	H5	C	Cascadable, 12-Bit Mixer.
TMC2249 - 1	Digital Mixer	12x12	30	0.5	120-PPGA	H5	C	Higher Speed.
TMC2250	Matrix Multiplier	12x10x9	30	1.2	120-PPGA	H5	C	Flexible CMOS, 9-Multiplier Convolver.

Correlators — TRW LSI Products is a leader in correlators for high performance signal and image processing applications. Correlators provide a measure of similarity between two digital signal streams, useful in pattern recognition applications. All correlators are TTL compatible.

Product	Description	Size	Clock Rate ¹ (MHz)	Power ² (Watts)	Package	Package Designator ³	Available Temp/Testing ^{4,5}	Comments
TMC2023	Correlator	64x1	25	0.4	24-Pin DIP 28-Contact CC	B2, B7 C3	C, V, SMD V, SMD	CMOS, Compatible with TDC1023.
TMC2023 - 1	Correlator	64x1	30	0.4	24-Pin DIP 28-Contact CC	B2, B7 C3	C, V, SMD V, SMD	CMOS, Compatible with TDC1023.
TMC2220	Correlator	4x32 Bit	17	0.3	68-PGA 68-PPGA	G8 H8	C, V C	CMOS, Programmable, Digital Output.
TMC2220 - 1	Correlator	4x32 Bit	20	0.3	68-PGA 68-PPGA	G8 H8	C, V C	
TMC2221	Correlator	1x128 Bit	17	0.3	28-Pin DIP	B6	C, V	Serial Version of TMC2220.
TMC2221 - 1	Correlator	1x128 Bit	20	0.3	28-Pin DIP	B6	C, V	

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 SMD = Available per Standard Military Drawing, $T_C = -55^\circ\text{C}$ to 125°C .
 5. Consult Factory for Availability.

Transform Products — As a leader in Digital Signal Processing, TRW LSI strives to provide new and innovative products for applications which require high performance solutions. The TMC2310, our first transform product, is designed to support a variety of complex DSP functions and algorithms. Currently one of the fastest FFT products on the market, this device can greatly enhance system performance while reducing both software and hardware complexity.

Product	Description	Size	Clock Rate ¹ (MHz)	Power ² (Watts)	Package	Package Designator ³	Available Temp/Testing ^{4,5}	Comments
TMC2310	FFT Controller And Arithmetic Unit	16-Bit	20	0.75	88-PPGA	H7	C	1024-Point Complex FFT in 514 μ s with 19-Bit Intermediate Results and Block Floating-Point Rescaling. Also Supports FIR Filtering, Vector and Magnitude Squared Operations.
			15	0.75	100-Lead CC 88-PGA	L4 G5	V	
							V	
TMC2310-1	FFT	16-Bit	20	0.75	100-Lead CC 88-PGA	L4 G5	V V	Faster, Military Version.
TMC2311	Fast Cosine Transformer	8x8 Pixels	15	0.8	68-PLCC	R1	C	CMOS Data Compression Processor. CCITT Compliant.
TMC2330	Coordinate Transformer	16x16	20	0.7	120-PPGA	H5	C	CMOS Cartesian ↔ Polar Converter.
TMC2330-1	Coordinate Transformer	16x16	25	0.7	120-PPGA	H5	C	CMOS Cartesian ↔ Polar Converter.

Fixed-Point Multipliers and Multiplier-Accumulators — Available in word sizes of 8 to 16 bits and speeds of 40 to 145ns (25 to 7MHz), these products are used in discrete signal processing architectures, and as arithmetic hardware accelerators. Independently clocked input and output registers and three-state outputs are provided to simplify interfacing. All are TTL compatible.

Multiplier-accumulators perform the sum-of-products operation fundamental to most signal processing algorithms. Operating on word sizes of 8 to 16 bits, at speeds from 40 to 160ns (25 to 6MHz), the newer CMOS versions of the industry standard TDC1008, TDC1009, and TDC1010 offer considerable improvements in power dissipation with no loss in performance. All devices are TTL compatible and have full precision outputs, plus three extended bits.

Product	Size	Multiply Time ¹ (ns)	Power ² (Watts)	Package	Package Designator ³	Available Temp/Testing ^{4,5}	Comments
TMC208K	8x8	65	0.40	40-Pin DIP	B5, N5	C	CMOS, Compatible with MPY008H.
		70	0.40	40-Pin DIP	B5	V, SMD	
TMC208K-1	8x8	45	0.53	40-Pin DIP	B5, N5	C	CMOS, Compatible with MPY008HU.
		50	0.53	40-Pin DIP	B5	V, SMD	
TMC28KU	8x8	65	0.40	40-Pin DIP	B5, N5	C	CMOS, Compatible with MPY008HU.
		70	0.40	40-Pin DIP	B5	V, SMD	
TMC28KU-1	8x8	45	0.53	40-Pin DIP	B5, N5	C	CMOS, Compatible with MPY008HU.
		50	0.53	40-Pin DIP	B5	V, SMD	
TMC216H	16x16	145	0.37	64-Pin DIP	J3	C, V	CMOS, Compatible with MPY016H.
MPY012H	12x12	115	3.7	64-Pin DIP	J1	C, A	
MPY112K	12x12	50	2.4	48-Pin DIP	J4	C, A	16-Bit Product.
MPY016K	16x16	45	4.6	64-Pin DIP	J1	C, A	32-Bit Product, Also in 25MHz Speed.
MPY016K-1	16x16	40	4.6	64-Pin DIP	J1	C, A	32-Bit Product.
TMC2208	8x8	40	0.4	48-Pin DIP 68-PLCC	J4, N4 R1	C, V C	Replacement for TDC1008. Low Power CMOS.
TMC2009	12x12	135	0.32	64-Pin DIP	J3	C, V	CMOS.
TMC2210	16x16	80	0.33	64-Pin DIP	J0, N0	C, V	CMOS Industry Standard, 12.5MHz.
				68-PGA	G8	C, V	
				68-PPGA	H8	C	
TMC2210-1	16x16	65	0.40	64-Pin DIP	J0, N0	C, V	CMOS, 16MHz Version of Industry Standard TDC1010.
				68-PGA	G8	C, V	
				68-PPGA	H8	C	
				64-Pin DIP	N0	C	
-2	16x16	100	0.27	64-Pin DIP	N0	C	CMOS, 10MHz Version, Lower Cost. CMOS, 6MHz, Economical.
-3	16x16	160	0.16	64-Pin DIP	N0	C	

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 V = MIL-STD-883 Compliant, $T_C = -55^\circ\text{C}$ to 125°C .
 SMD = Available per Standard Military Drawing, $T_C = -55^\circ$ to 125°C .
 5. Consult Factory for Availability.

Direct Digital Synthesizers — The digital synthesis of RF signals make possible previously unattainable frequency stability, frequency resolution, and modulation capability. Coupled with one or two high-signal-purity D/A converters like the TDC1012 and TDC1112, the TMC2340 offers a wide range of operating modes, with Amplitude Modulation, Frequency Modulation, and Phase Modulation simultaneously supported.

Product	Clock Rate (MHz)	Frequency Resolution (Hz)	SFDR (dB)	Output	Package Designator	Available Temp/Testing	Comments
TMC2340	20	0.001	106	Dual 16-Bit	H5	C	AM, FM, PM, Quadrature Outputs.
TMC2340-1	25	0.001	106	Dual 16-Bit	H5	C	AM, FM, PM, Quadrature Outputs.

Standard Military Drawings — TRW LSI Products Inc. actively supports the Standard Military Drawing program with a growing family of Digital Signal Processing and Data Conversion components. Additional drawings are in the approval cycle. Contact the factory for information on the current status of SMD releases.

Product	TRW LSI Products Inc. Part Number	Standard Military Drawing (SMD) Part Number
A/D Converter		
6-Bit, 25MSPS	TDC1046B8V	5962-87786 01VA
8-Bit, 20MSPS	TDC1048B6V TDC1048C3V	5962-87600 01XA 5962-87600 013A
9-Bit, 30MSPS	TDC1049J0V TDC1049J3V TDC1049C1V	5962-88532 01XC 5962-88532 01YC 5962-88532 01ZA
Multiplier		
8 x 8 Bit, 70ns MPY Time 50ns MPY Time (-1)	TMC208KB5V TMC208KB5V1 TMC28KUB5V TMC28KUB5V1	5962-88739 01QA 5962-88739 02QA 5962-88739 03QA 5962-88739 04QA
Correlator		
64-Bit, 25MHz 30MHz (-1)	TMC2023B7V TMC2023B7V1 TMC2023C3V TMC2023C3V1 TMC2023B2V TMC2023B2V1	5962-89711 01JA 5962-89711 02JA 5962-89711 013A 5962-89711 023A 5962-89711 01LA 5962-89711 02LA

Packages

A1 68-Contact Hermetic Ceramic JEDEC Type 'A' Leadless Chip Carrier

B2 24-Pin CERDIP (0.3 in. wide)

B5 40-Pin CERDIP

B6 28-Pin CERDIP

B7 24-Pin CERDIP

B8 18-Pin CERDIP

C1 68-Contact Hermetic Ceramic JEDEC Type 'C' Leadless Chip Carrier

C2 44-Contact Hermetic Ceramic JEDEC Type 'C' Leadless Chip Carrier

C3 28-Contact Hermetic Ceramic JEDEC Type 'C' Leadless Chip Carrier

E1 Printed Circuit Board, Eurocard Format (100mm x 160mm)

G0 68-Pin Ceramic Pin Grid Array (Cavity Down, With Heat Sink)

G5 88-Pin Ceramic Pin Grid Array

G8 68-Pin Ceramic Pin Grid Array

H5 120-Pin Plastic Pin Grid Array

H7 88-Pin Plastic Pin Grid Array

H8 68-Pin Plastic Pin Grid Array

J0 64-Pin Hermetic Ceramic DIP (Without Heat Sink, Lid Up)

J1 64-Pin Hermetic Ceramic DIP (With Flat Heat Sink, Lid Down)

J3 64-Pin Hermetic Ceramic DIP (Without Flat Heat Sink, Lid Down)

J4 48-Pin Hermetic Ceramic DIP

J5 40-Pin Hermetic Ceramic DIP

J7 24-Pin Hermetic Ceramic DIP

L1 68-Lead Hermetic Ceramic Leaded Chip Carrier

L3 84-Lead Hermetic Ceramic Leaded Chip Carrier

L4 100-Lead Hermetic Ceramic Leaded Chip Carrier

N0 64-Pin Plastic DIP

N4 48-Pin Plastic DIP

N5 40-Pin Plastic DIP

N6 28-Pin Plastic DIP

N7 24-Pin Plastic DIP

N9 16-Pin Plastic DIP

P3 Circuit Board Module (5.0 in. x 7.0 in.)

R1 68-Lead Plastic J-Lead Chip Carrier

R2 44-Lead Plastic J-Lead Chip Carrier

R3 28-Lead Plastic J-Lead Chip Carrier

S3 46-Pin Hermetic Metal DIP

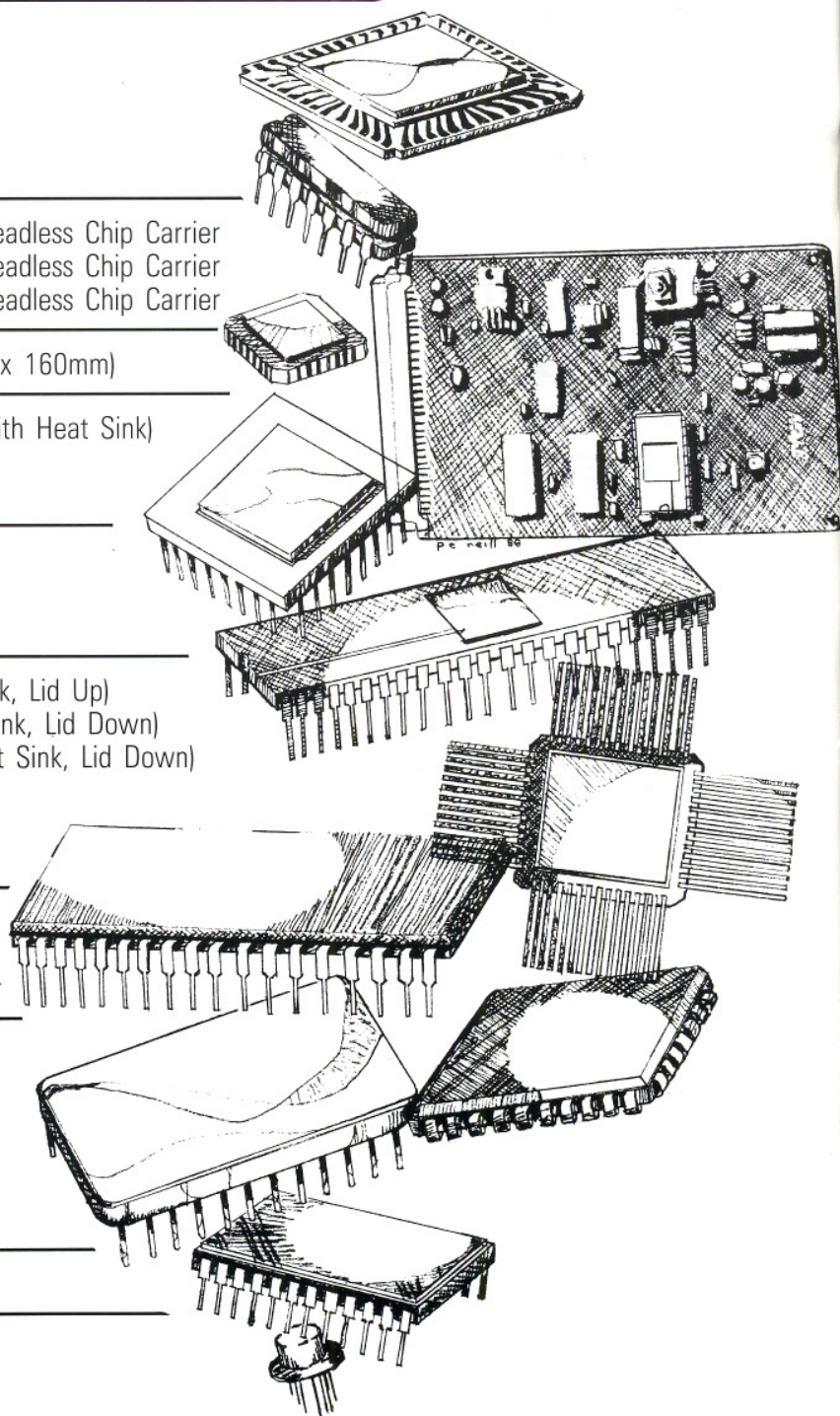
S5 32-Pin Hermetic Metal DIP

S6 40-Pin Hermetic Metal DIP

S7 24-Pin Hermetic Metal DIP

X1 12-Lead Metal Can (TO-8/MO-12 Style)

X2 24-Pin Ceramic DIP (0.8 in. wide)



Ordering Information

U.S. Sales Offices

TRW LSI Products Inc.

P.O. Box 2472
La Jolla, CA 92038
Phone: (619) 457-1000
FAX: (619) 455-6314

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1700 West Park Drive
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Westborough, MA 01581
Phone: (508) 870-0745
FAX: (508) 366-4251

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The University of Surrey
Guildford, Surrey GU2 5YD
England

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8000 Muenchen 70
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Phone: 89-710-3115
Telex: 851/5213456
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100-1, Sakado, Takatsu-ku
Kawasaki, 213
Japan

Phone: 044-812-7430
Telex: 3842196
FAX: 044-812-7433

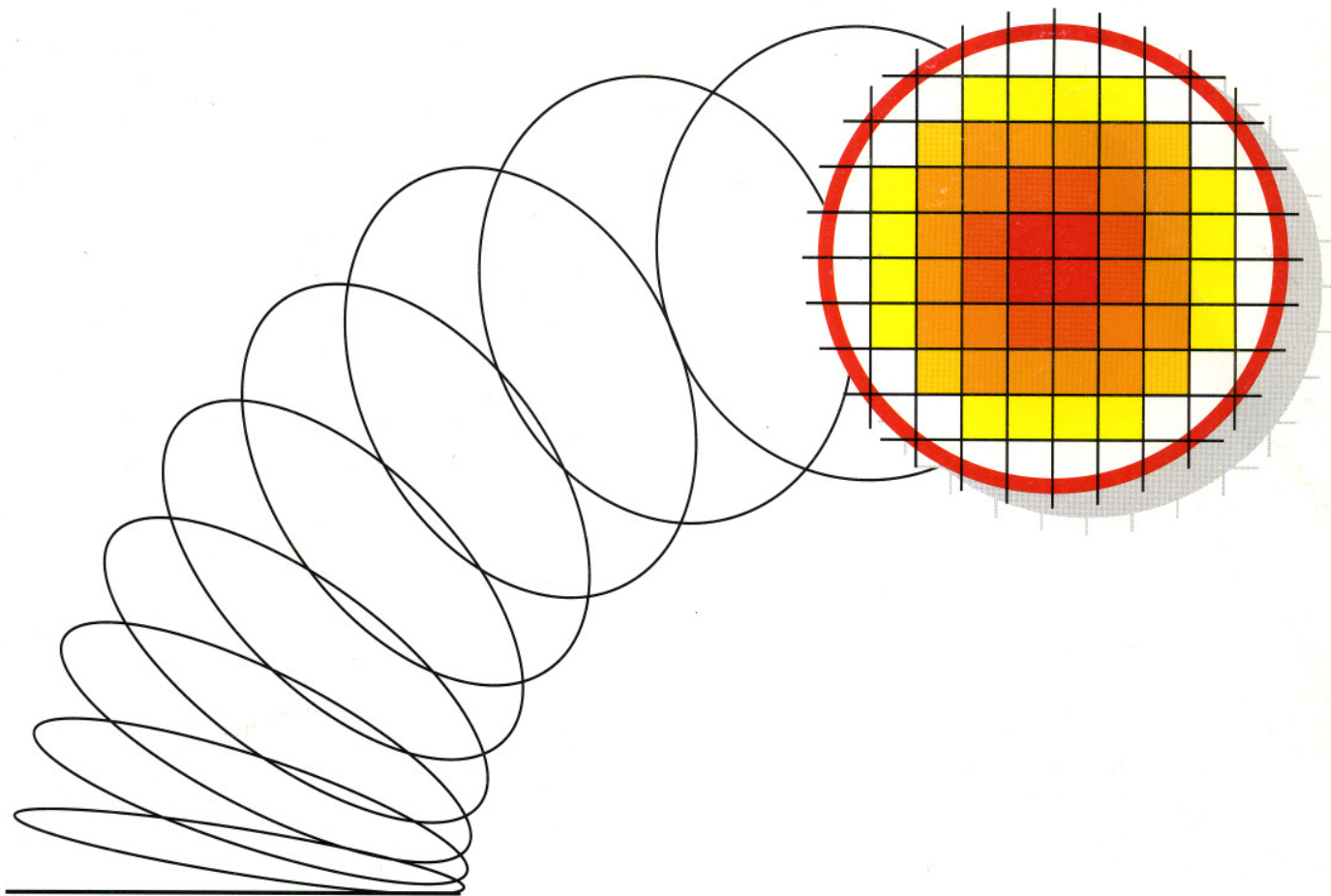
DIA Semicon Systems Inc.

Wacore 64, 1-37-8 Sangenjaya
Setagaya-ku
Tokyo, 154
Japan

Phone: 3-439-2700
Telex: 781/2425480
FAX: 3-439-2701

S h o r t F o r m C a t a l o g

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1988 - 1989
EMMY WINNER

TRW LSI Products Inc.

-  A/D Converters
-  D/A Converters
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-  Advanced Arithmetic Products
-  Imaging Products
-  Correlators
-  Transform Products
-  Fixed-Point Multipliers
-  Fixed-Point Multipliers-Accumulators
-  Memory/Storage Products

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ERGÄNZUNG ZUM KURZKATALOG

NEUE PRODUKTE STAND 3.9.1990

A/D WANDLER 10

Produkt	Bits	Wandlungsrate	Gehäuse	Screening	Beschreibung
TMC1061	10	1.8us	B3,N3	B,F	CMOS , Halbflash,200mW
TMC1241	13	13us	B6	B	Sukz. Appr. Incl. T/H
TMC12441	13	13us	B6	B	Selbstkalibrierung
TMC1251	13	7.7us	B7	B	Autozero, CMOS 70mW
TMC12451	13	7.7us	B7	B	12Bit + Vorzeichen
TMC1175	8	30MHZ		C	Flash Wandler, CMOS 7MHZ Bandbreite

D/A WANDLER 10

TMC0176-4	Triple 6	40	N6,R2	C	256x18LUT,Komp. zu G176
TMC0176-5	Triple 6	50	N6	C	und BT476
TMC0176-6	Triple 6	66	N6	C	" "
TMC0176-8	Triple 6	80	N6	C	" "
TMC1141R3C	10	50	R3	C	Linearität 0.1%
TMC1141R3C1	10	50	R3	C	Linearität 0.05%

LINEAR PRODUCTS

TDC4169	Spannungsreferenz	MH,NH,Y8	C
TDC4611	OpAmp mit Referenz	ME,NH	C
TDC4614	Triple OpAmp mit Referenz	M9,N9	C

IMAGING PRODUCTS 10

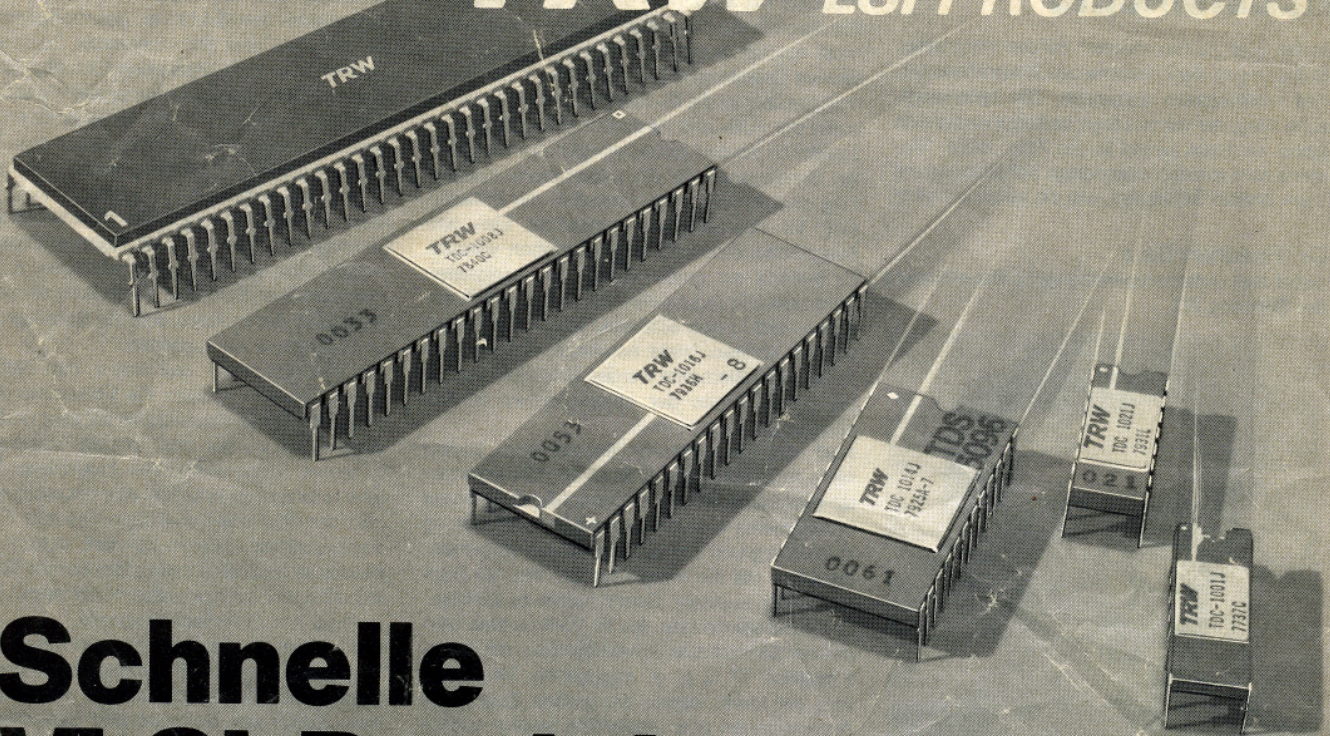
TMC2302	Manipulator	40MHZ	Version lieferbar
TMC2250	Matrix Multiplier	40MHZ	Version lieferbar

Anmerkung zu Gehäuse:

MH = 8pin Small Outline 0.3",0.05" Pitch
 NH = Plastic Dip 8Pin 0.3"
 ME = 14pin Small Outline
 M9 = 16pin Small Outline
 N9 = 16pin Plastic Dip 0.03"
 Y8 = Hermetic Metal Can 8 Pin

AUS UNSEREM PROFESSIONELLEN PROGRAMM

TRW LSI PRODUCTS



Schnelle VLSI-Produkte

MULTIPLIZIERER

TTL-Schaltungen mit höchster Verarbeitungsgeschwindigkeit. Berechnen parallel (mit quadratischer Matrix) $n \times n$ -Bit-Faktoren. Verarbeitungscode ist Zweierkomplement und Binärsystem. Vier D-Register sind für das Speichern der X- und Y-Faktoren und für das "Double Precision"-Ergebnis mitintegriert. 3-State-Ausgänge ermöglichen eine einfache Integration in Bus-Systeme.

MULTIPLIZIERER-AKKUMULATOREN

Parallele, quadratische $n \times n$ -Bit-Multiplikation mit nachfolgender Akkumulation auf einem Chip. Per Programmierschluß kann der Akku-Inhalt vom neuen Ergebnis subtrahiert oder dazuaddiert werden. Für Summenbildung

über viele Zyklen hinweg steht ein erweitertes Akku-/Ausgangsregister zur Verfügung.

A/D-WANDLER

Parallelwandler mit 2^n-1 Komparatoren auf dem Chip. Ohne "Sample and Hold" lassen sich Videosignale mit einem einzigen Taktsignal in Digitalwerte umwandeln. Geringe Leistungsaufnahme, kleine Abmessungen und zuverlässige Technologie zeichnen diese Konverter aus. Ausgangswort in verschiedene Codes umschalt- und invertierbar. Nur zwei Betriebsspannungen erforderlich.

Wandler mit sukzessiver Approximation für die schnelle Datenerfassung.

D/A-WANDLER

Volles Deglitching wird bei diesen Convertern durch ein Höchstmaß an Beherrschung der VLSI-Technik erreicht. Ein mitintegrierter Ausgangsverstärker ($R_{out} = 75 \Omega$) ermöglicht direkten Anschluß von Koaxkabeln. Die Eingänge der untereinander kompatiblen 8-, 9- und 10-Bit-Video-D/A-Wandler sind ECL- und TTL-kompatibel. Verarbeitungscode ist programmierbar, Testmöglichkeit für Ausgangskreis mitintegriert.

STATISCHE SCHIEBEREGISTER

Extrem schnelle, lange Schieberegister. Ideal für Verzögerungsleitungen und schnelle Zwischenspeicher in Echtzeitsystemen. TTL-Technologie, komplementäre Ausgänge.

KORRELATOREN

Vergleichen zwei seriell einzuschiebende 64stufige Schieberegister über exklusiv – oder – Gatter, deren Ausgänge aufsummiert werden. Für definierte Ausblendungen ist eine Maskenprogrammierbarkeit über ein drittes Schieberegister vorgesehen.

Bitte fordern Sie ausführliche Informationen an. Direktkontakt: Herr Rösch

	MULTIPLIZIERER				MULTIPLIZIERER-AKKUMULATOREN			A/D-WANDLER				D/A-WAND.	SCHIEBEREGISTER		KORRELAT.
TYP	MPY-8HJ	MPY-8HJ-1	MPY-12HJ	MPY-16HJ	TDC-1008J	TDC-1009J	TDC-1010J	TDC-1007J	TDC-1014J	TDC-1021J	TDC-1001J	TDC-1016J	TDC-1005J	TDC-1006J	TDC-1004J
Wortlänge (Bit)	8x8	8x8	12x12	16x16	8x8	12x12	16x16	8	6	4	8	8/9/10	2x64	1x256	2x64
Verarbeitungszeit (ns)	$T_M =$ 30 60 110 140				$T(M+ACC) =$ 100 135 155			$T_{CONV} =$ 50 40 40 400				50			
Taktfrequenz (MHZ)													25 25	15	

365-107-

TRW

Elektronische Bauelemente Vertriebs GmbH

Konrad-Celtis-Str. 81, 8000 München 70
Tel. 089/714 60 65, Telex 05-24360 trw ec d

Ein Unternehmen der
TRW ELECTRONIC COMPONENTS GROUP, LOS ANGELES

TDC1041



High-Speed Monolithic Digital-to-Analog Converter

10-Bit, 20MHz, 15ns Settling to 1 LSB

TDC1012



Digital-To-Analog Converter

12-Bit, 20MHz, 30ns Settling Time

The TDC1012 is a bipolar 12-bit monolithic digital-to-analog

Features

- 12-Bit Resolution
- 20MHz Data Rate
- Differential Linearity Error Of $\pm 1/2$ LSB

TDC1112



Monolithic D/A Converter

12-Bit, 50MSPS

Features

- 12-Bit Resolution

TDC4611



Adjustable Voltage Reference with Operational Amplifier

The TDC4611 comprises a precision adjustable voltage

TMC2340



Digital Synthesizer

Dual 16-Bit, 25MOPS

The TMC2340 performs waveform synthesis, modulation,

- Guaranteed 25MSPS Pipelined Data Throughput Rate
- 15-Bit Magnitude, 32-Bit Phase Data Input Precision