

# STANDARD TECHNOLOGIES CORPORATION

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PRODUCT BRIEF

## ST1601

### Serial Controlled Math Processor

#### Pin Identification

1	MCL	CKPL	28
2	NC1	NC15	27
3	NC2	NC14	26
4	NC3	NC13	25
5	NC4	NC12	24
6	NC5	NC11	23
7	OE	BUSY	22
8	VSS	CS	21
9	OSCI	VDD	20
10	OSCO	VSS	19
11	NC6	NC10	18
12	NC7	NC9	17
13	NC8	SDO	16
14	SCL	SDI	15

NC=NO CONNECT

#### FLOATING POINT MATH FUNCTIONS

- \*Multiply
- \*Divide
- \*Add
- \*Subtract
- \*Sine
- \*Square root

#### CONVERSION UTILITIES

- \*Binary I/O
- \*Two's compliment I/O
- \*BCD I/O

#### GENERAL DESCRIPTION

The ST1601 is a high performance, low cost math processor specifically designed to supplement 3-wire SPI type processors. Use of the ST1601 greatly simplifies arithmetic data handling in embedded control applications which would otherwise put a heavy burden on the requirements of the host processor. Controlled by a high-speed internal RISC type processor core, the ST1601 quickly calculates floating point results having mantissa's up to 16 bits with exponents up to 8 bits (plus signs). A flexible I/O format facilitates data translation to and from Binary, Two's compliment, and BCD, so the ST1601 can be commanded to accept one type of data format and output the result in another format. This feature is very useful for instance in reading data from a binary A/D converter, applying a calibration factor, and outputting the result directly to a BCD type display driver without requiring any conversion by the host processor. While the 3-wire SPI interface is common on many popular microcontrollers, if not present on your processor, it is easily simulated in software.

## SPECIFICATIONS

### DATA INPUT STRUCTURE

	-----VARIABLE A-----			-----VARIABLE B-----		
<u>Command</u>	<u>Mantissa</u>	<u>Exponent</u>	<u>Mantissa</u>	<u>Exponent</u>	<u>Signs</u>	
1 byte	2[3] bytes	1[2] byte	2[3] bytes	1[2] byte	1 byte	

### DATA OUTPUT STRUCTURE

	-----RESULT-----			
<u>Command</u>	<u>Mantissa</u>	<u>Exponent</u>	<u>Signs</u>	
1 byte	2[3] bytes	1[2] byte	1 byte	

Notes: SIGNS byte is only used for straight binary format.  
 [ ] = Number of bytes for BCD format.

### TYPICAL COMPUTING TIMES @ 20MHz

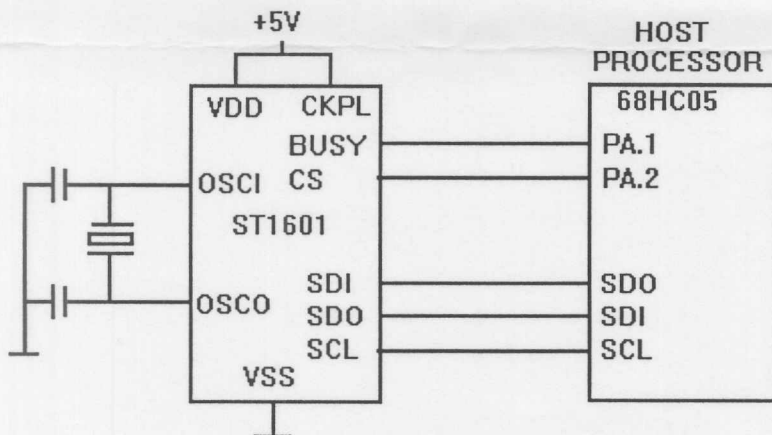
ADDITION	600uS
SUBTRACTION	700uS
MULTIPLICATION	3mS
DIVISION	2mS
SQUARE ROOT	8mS
SINE	500uS

### ACCURACY

0% error
0% error
0.03% max error
0.04% max error
0.1% max error
0.3% max error

<b>Supply voltage</b>	4.5 to 5.5 V
<b>Supply current</b>	13mA typ @ 20MHz
<b>Operating speeds</b>	4MHz, 10MHz, 20MHz (on-chip xtal or ext clock)
<b>Operating temps</b>	0 to +70C, -40 to +85C, -40 to +125C
<b>Packages</b>	300 mil 28 pin DIP, 300 mil 28 pin SOIC
<b>SPI Clock</b>	Selectable as normally high or normally low polarity

### TYPICAL APPLICATION



Specifications subject to change without notice.

rev 4/22/96

Dear Customer,

Thank you for your interest in our products! Per your request we are submitting information for your evaluation. Enclosed is a short form product brief on the **ST1601 Serial Math Co-Processor**. This information is of a general nature, so do not hesitate to contact us for detailed technical or pricing information if you have further interest in this or other products.

The **ST1601** is the first in a series of intelligent math processors used to supplement embedded microcontrollers using a standard 3-wire serial interface. In addition to the **ST1601**, the following products are scheduled for release throughout the next year.

**ST1606** Same as ST1601 but with a programmable 32-bit pulse counter.  
*Scheduled for 3rd quarter 1996*

*The following are scheduled for 4th quarter 1996.*

**ST1602** Floating point Add, Sub, Mult, Div, Square root, Exponential.

**ST1603** Floating point Add, Sub, Mult, Div, Square root, base 10 Log.

**ST1604** Floating point Add, Sub, Mult, Div, Square root, natural Log.

**ST1605** Floating point Add, Sub, Mult, Div, Square root, and four 8-bit A/D inputs which can be integrated into calculations.

**ST1607** Add, Sub, Mult, Div, Square root. Fixed point 32-bit processor for high speed/high resolution.

**ST1608** Add, sub, mult, div, square root. Fixed point 24-bit processor for very high speed/high resolution.

A complete technical manual is available for the ST1601 and a preliminary manual for the ST1606. Product briefs are available for all future products listed above.

All products are available in a wide variety of operating speeds and temperature grades with prices ranging from \$11.66 to \$21.17 each in 100 piece lots. Please request our current price schedule for full details.