

Radiation Hardened 4-Bit Synchronous Counter

January 1996

Features

- Devices QML Qualified in Accordance with MIL-PRF-38535
- Detailed Electrical and Screening Requirements are Contained in SMD# 5962-96716 and Harris' QM Plan
- 1.25 Micron Radiation Hardened SOS CMOS
- Total Dose >300K RAD (Si)
- Single Event Upset (SEU) Immunity: <math> < 1 \times 10^{-10}</math> Errors/Bit/Day (Typ)
- SEU LET Threshold >100 MEV-cm²/mg
- Dose Rate Upset >10¹¹ RAD (Si)/s, 20ns Pulse
- Dose Rate Survivability >10¹² RAD (Si)/s, 20ns Pulse
- Latch-Up Free Under Any Conditions
- Military Temperature Range -55°C to +125°C
- Significant Power Reduction Compared to ALSTTL Logic
- DC Operating Voltage Range 4.5V to 5.5V
- Input Logic Levels
 - VIL = 0.8V Max
 - VIH = VCC/2 Min
- Input Current ≤ 1μA at VOL, VOH
- Fast Propagation Delay 25ns (Max), 16ns (Typ)

Description

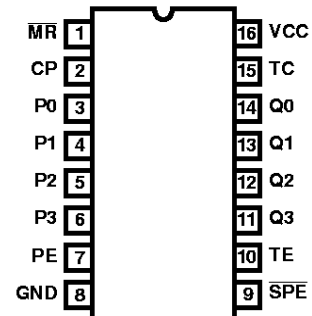
The Harris ACTS161MS is a Radiation Hardened 4-Bit Binary Synchronous Counter, featuring asynchronous reset and load ahead carry logic. The MR is an active low master reset. SPE is an active low Synchronous Parallel Enable which disables counting and allows data at the preset inputs (P0 - P3) to load the counter. CP is the positive edge clock. TC is the terminal count or carry output. Both TE and PE must be high for counting to occur, but are irrelevant to loading. TE low will keep TC low.

The ACTS161MS utilizes advanced CMOS/SOS technology to achieve high-speed operation. This device is a member of a radiation hardened, high-speed, CMOS/SOS Logic family.

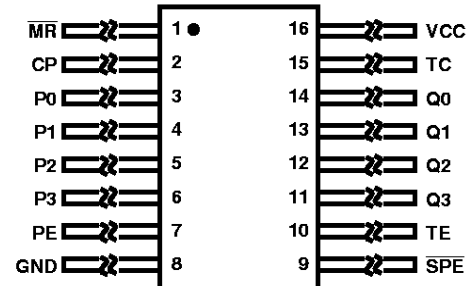
The ACTS161MS is supplied in a 16 lead Ceramic Flatpack (K suffix) or a Ceramic Dual-In-Line Package (D suffix).

Pinouts

16 PIN CERAMIC DUAL-IN-LINE
MIL-STD-1835, DESIGNATOR CDIP2-T16,
LEAD FINISH C
TOP VIEW



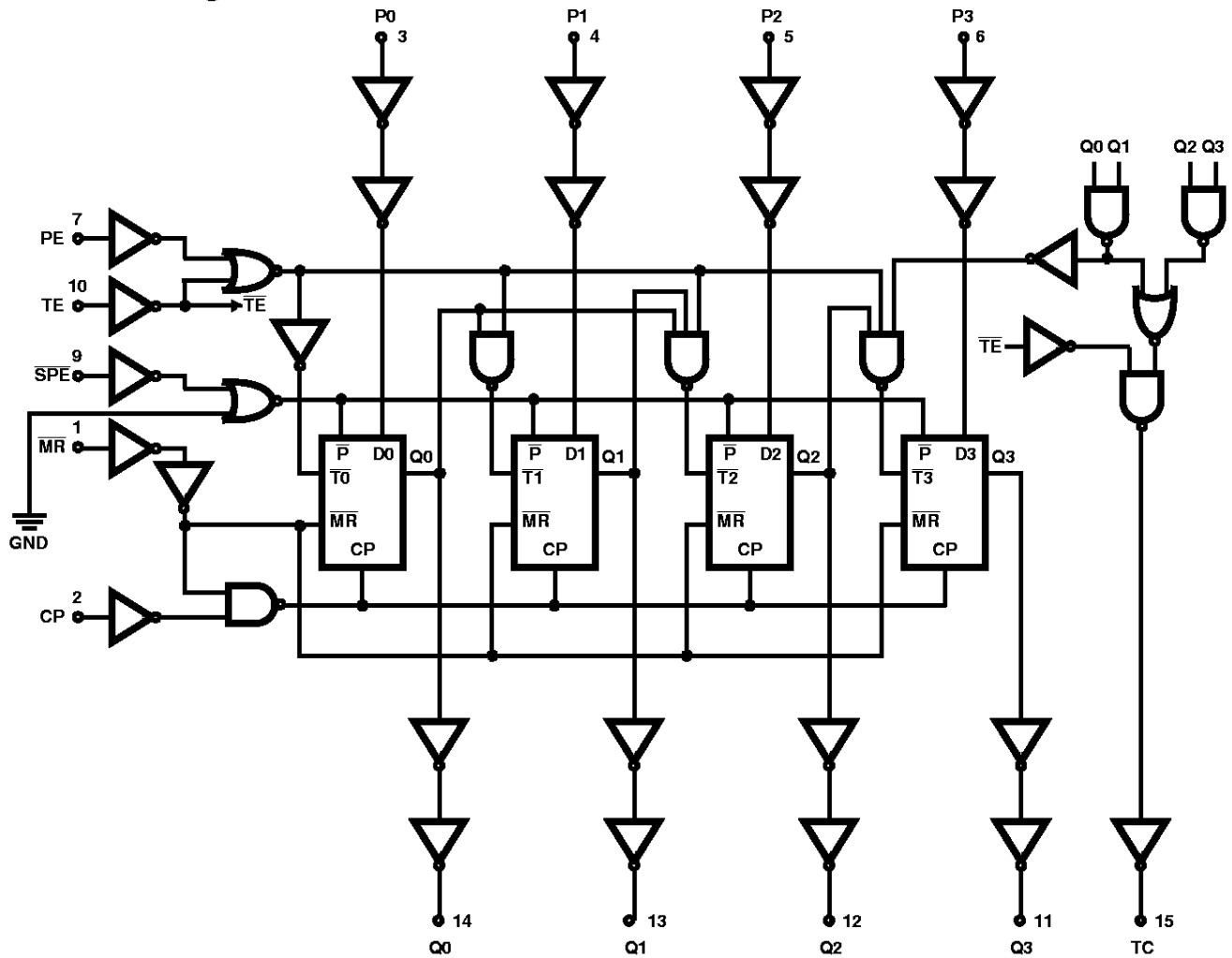
16 PIN CERAMIC FLATPACK
MIL-STD-1835, DESIGNATOR CDFP4-F16,
LEAD FINISH C
TOP VIEW






Ordering Information


| PART NUMBER | TEMPERATURE RANGE | SCREENING LEVEL | PACKAGE |
|-----------------|-------------------|-----------------------|--------------------------|
| 5962F9671601VEC | -55°C to +125°C | MIL-PRF-38535 Class V | 16 Lead SBDIP |
| 5962F9671601VXC | -55°C to +125°C | MIL-PRF-38535 Class V | 16 Lead Ceramic Flatpack |
| ACTS161D/Sample | 25°C | Sample | 16 Lead SBDIP |
| ACTS161K/Sample | 25°C | Sample | 16 Lead Ceramic Flatpack |
| ACTS161HMSR | 25°C | Die | Die |

Functional Diagram



TRUTH TABLE

| OPERATING MODE | INPUTS | | | | | | OUTPUTS | |
|----------------|--------|---|------------|------------|------------|----------------|----------------|----------|
| | MR | CP | PE | TE | SPE | P _N | Q _N | TC |
| Reset (Clear) | L | X | X | X | X | X | L | L |
| Parallel Load | H |  | X | X | l | l | L | L |
| | H |  | X | X | l | h | H | (Note 1) |
| Count | H |  | h | h | h (Note 3) | X | count | (Note 1) |
| Inhibit | H | X | l (Note 2) | X | h (Note 3) | X | q _N | (Note 1) |
| | H | X | X | l (Note 2) | h (Note 3) | X | q _N | L |

H = High Steady State, L = Low Steady State, h = High voltage level one setup time prior to the Low-to-High clock transition, l = Low voltage level one setup time prior to the Low-to-High clock transition, X = Don't Care, q = Lower case letters indicate the state of the referenced output prior to the Low-to-High clock transition,  = Low-to-High Transition.

NOTES:

1. The TC output is High when TE is High and the counter is at Terminal Count (HHHH).
2. The High-to-Low transition of PE or TE should only occur while CP is High for conventional operation.
3. The Low-to-High transition of SPE should only occur while CP is High for conventional operation.

ACTS161MS

Die Characteristics

DIE DIMENSIONS:

88 mils x 88 mils
2240mm x 2240mm

METALLIZATION:

Type: AlSi
Metal 1 Thickness: $7.125\text{k}\text{\AA} \pm 1.125\text{k}\text{\AA}$
Metal 2 Thickness: $9\text{k}\text{\AA} \pm 1\text{k}\text{\AA}$

GLASSIVATION:

Type: SiO_2
Thickness: $8\text{k}\text{\AA} \pm 1\text{k}\text{\AA}$

WORST CASE CURRENT DENSITY:

$< 2.0 \times 10^5 \text{A/cm}^2$

BOND PAD SIZE:

$110\mu\text{m} \times 110\mu\text{m}$
4.3 mils x 4.3 mils

Metallization Mask Layout

