

UT54ACS165/UT54ACTS165

8-Bit Parallel Shift Registers

Datasheet

November 2010

www.aeroflex.com/logic



FEATURES

- ❑ Complementary outputs
- ❑ Direct overriding load (data) inputs
- ❑ Gated clock inputs
- ❑ Parallel-to-serial data conversions
- ❑ 1.2μ CMOS
 - Latchup immune
- ❑ High speed
- ❑ Low power consumption
- ❑ Single 5 volt supply
- ❑ Available QML Q or V processes
- ❑ Flexible package
 - 16-pin DIP
 - 16-lead flatpack
- ❑ UT54ACS165 - SMD 5962-96558
- ❑ UT54ACTS165 - SMD 5962-96559

DESCRIPTION

The UT54ACS165 and the UT54ACTS165 are 8-bit serial shift registers that, when clocked, shift the data toward serial output Q_H . Parallel-in access to each stage is provided by eight individual data inputs that are enabled by a low level at the $\overline{SH/LD}$ input. The devices feature a clock inhibit function and a complemented serial output $\overline{Q_H}$.

Clocking is accomplished by a low-to-high transition of the CLK input while $\overline{SH/LD}$ is held high and CLK INH is held low. The functions of the CLK and CLK INH (clock inhibit) inputs are interchangeable. Since a low CLK input and a low-to-high transition of CLK INH will also accomplish clocking, CLK INH should be changed to the high level only while the CLK input is high. Parallel loading is disabled when $\overline{SH/LD}$ is held high. Parallel inputs to the registers are enabled while $\overline{SH/LD}$ is low independently of the levels of CLK, CLK INH or SER inputs.

The devices are characterized over full military temperature range of -55°C to +125°C.

FUNCTION TABLE

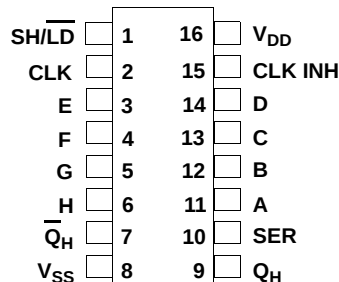
INPUTS					INTERNAL OUTPUTS		OUTPUTS	
$\overline{SH/LD}$	CLK INH	CLK	SER	PARALLEL A ... H	$\overline{Q_A}$	$\overline{Q_B}$	Q_H	$\overline{Q_H}$
L	X	X	X	a ... h	a	b	h	h
H	L	L	X	X	Q_A	Q_B	Q_H	$\overline{Q_H}$
H	L	↑	H	X	H	Q_A	Q_G	$\overline{Q_G}$
H	L	↑	L	X	L	Q_A	Q_G	$\overline{Q_G}$
H	H	X	X	X	Q_A	Q_B	Q_H	$\overline{Q_H}$

Note:

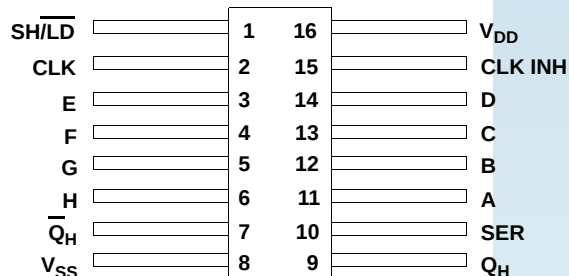
1. Q_n = The state of the referenced output one setup time prior to the Low-to-High clock transition.

PINOUTS

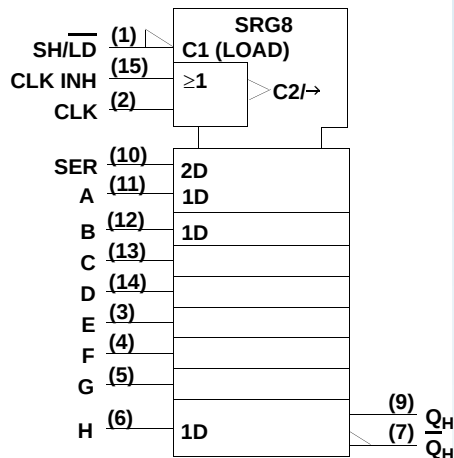
16-Pin DIP Top View



16-Lead Flatpack Top View



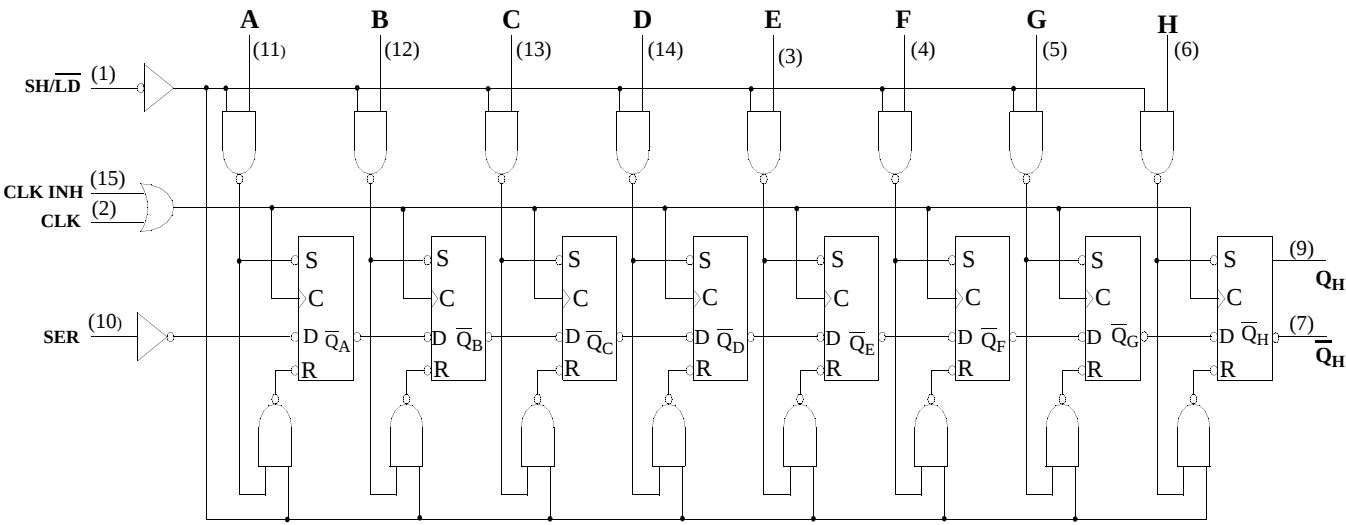
LOGIC SYMBOL



Note:

1. Logic symbol in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

LOGIC DIAGRAM



OPERATIONAL ENVIRONMENT¹

PARAMETER	LIMIT	UNITS
Total Dose	1.0E6	rads(Si)
SEU Threshold ²	80	MeV-cm ² /mg
SEL Threshold	120	MeV-cm ² /mg
Neutron Fluence	1.0E14	n/cm ²

Notes:

1. Logic will not latchup during radiation exposure within the limits defined in the table.
2. Device storage elements are immune to SEU affects.

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	LIMIT	UNITS
V _{DD}	Supply voltage	-0.3 to 7.0	V
V _{I/O}	Voltage any pin	-.3 to V _{DD} +.3	V
T _{STG}	Storage Temperature range	-65 to +150	°C
T _J	Maximum junction temperature	+175	°C
T _{LS}	Lead temperature (soldering 5 seconds)	+300	°C
Θ _{JC}	Thermal resistance junction to case	20	°C/W
I _I	DC input current	±10	mA
P _D	Maximum power dissipation	1	W

Note:

1. Stresses outside the listed absolute maximum ratings may cause permanent damage to the device. This is a stress rating only, functional operation of the device at these or any other conditions beyond limits indicated in the operational sections is not recommended. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMIT	UNITS
V _{DD}	Supply voltage	4.5 to 5.5	V
V _{IN}	Input voltage any pin	0 to V _{DD}	V
T _C	Temperature range	-55 to + 125	°C

DC ELECTRICAL CHARACTERISTICS ⁷

($V_{DD} = 5.0V \pm 10\%$; $V_{SS} = 0V$ ⁶, $-55^{\circ}C < T_C < +125^{\circ}C$); Unless otherwise noted, T_c is per the temperature range ordered.

SYMBOL	PARAMETER	CONDITION	MIN	MAX	UNIT
V_{IL}	Low-level input voltage ¹ ACTS ACS			0.8 .3 V_{DD}	V
V_{IH}	High-level input voltage ¹ ACTS ACS		.5 V_{DD} .7 V_{DD}		V
I_{IN}	Input leakage current ACTS/ACS	$V_{IN} = V_{DD}$ or V_{SS}	-1	1	μA
V_{OL}	Low-level output voltage ³ ACTS ACS	$I_{OL} = 8.0mA$ $I_{OL} = 100\mu A$		0.40 0.25	V
V_{OH}	High-level output voltage ³ ACTS ACS	$I_{OH} = -8.0mA$ $I_{OH} = -100\mu A$	.7 V_{DD} $V_{DD} - 0.25$		V
I_{OS}	Short-circuit output current ^{2,4} ACTS/ACS	$V_O = V_{DD}$ and V_{SS}	-200	200	mA
I_{OL}	Output current ¹⁰ (Sink)	$V_{IN} = V_{DD}$ or V_{SS} $V_{OL} = 0.4V$	8		mA
I_{OH}	Output current ¹⁰ (Source)	$V_{IN} = V_{DD}$ or V_{SS} $V_{OH} = V_{DD} - 0.4V$	-8		mA
P_{total}	Power dissipation ^{2, 8, 9}	$C_L = 50pF$		2.9	mW/ MHz
I_{DDQ}	Quiescent Supply Current	$V_{DD} = 5.5V$		10	μA
ΔI_{DDQ}	Quiescent Supply Current Delta ACTS	For input under test $V_{IN} = V_{DD} - 2.1V$ For all other inputs $V_{IN} = V_{DD}$ or V_{SS} $V_{DD} = 5.5V$		1.6	mA
C_{IN}	Input capacitance ⁵	$f = 1MHz @ 0V$		15	pF
C_{OUT}	Output capacitance ⁵	$f = 1MHz @ 0V$		15	pF

Notes:

1. Functional tests are conducted in accordance with MIL-STD-883 with the following input test conditions: $V_{IH} = V_{IH(min)} + 20\%$, $- 0\%$; $V_{IL} = V_{IL(max)} + 0\%$, $- 50\%$, as specified herein, for TTL, CMOS, or Schmitt compatible inputs. Devices may be tested using any input voltage within the above specified range, but are guaranteed to $V_{IH(min)}$ and $V_{IL(max)}$.
2. Supplied as a design limit but not guaranteed or tested.
3. Per MIL-PRF-38535, for current density $\leq 5.0E5$ amps/cm², the maximum product of load capacitance (per output buffer) times frequency should not exceed 3,765 pF/MHz.
4. Not more than one output may be shorted at a time for maximum duration of one second.
5. Capacitance measured for initial qualification and when design changes may affect the value. Capacitance is measured between the designated terminal and V_{SS} at frequency of 1MHz and a signal amplitude of 50mV rms maximum.
6. Maximum allowable relative shift equals 50mV.
7. All specifications valid for radiation dose $\leq 1E6$ rads(Si).
8. Power does not include power contribution of any TTL output sink current.
9. Power dissipation specified per switching output.
10. This value is guaranteed based on characterization data, but not tested.

AC ELECTRICAL CHARACTERISTICS ²

($V_{DD} = 5.0V \pm 10\%$; $V_{SS} = 0V$ ¹, $-55^{\circ}C < T_C < +125^{\circ}C$); Unless otherwise noted, T_c is per the temperature range ordered.

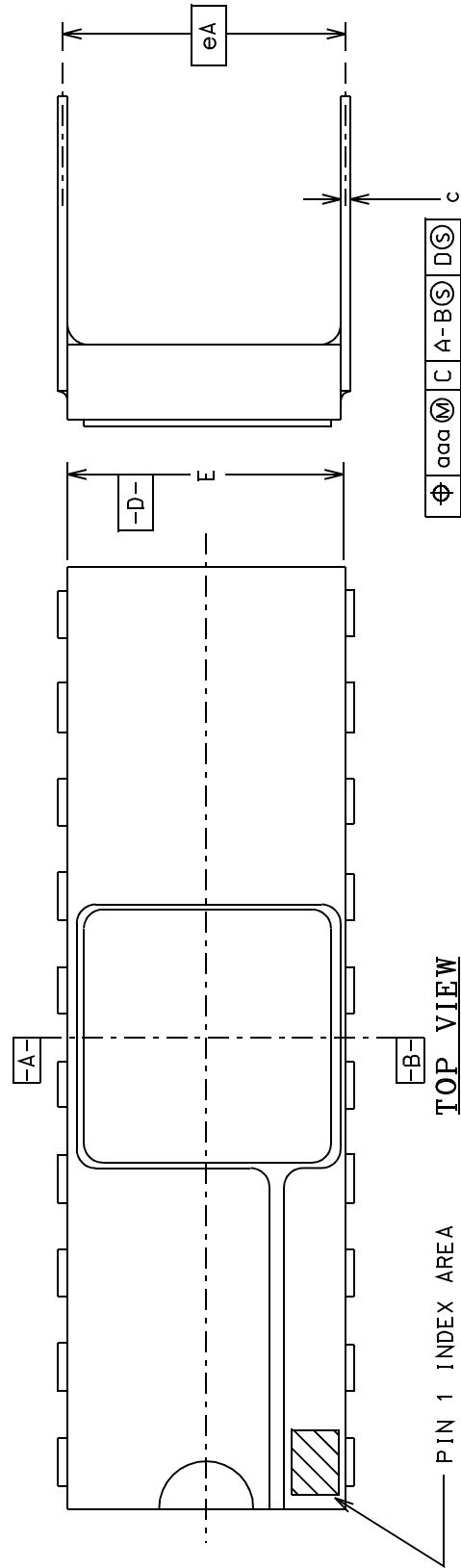
SYMBOL	PARAMETER	MINIMUM	MAXIMUM	UNIT
t_{PHL}	CLK or CLK INH to Q_H or $\overline{Q}_H$	2	21	ns
t_{PLH}	CLK or CLK INH to Q_H or $\overline{Q}_H$	2	18	ns
t_{PHL}	$SH/\overline{LD}$ to Q_H or $\overline{Q}_H$	2	21	ns
t_{PLH}	$SH/\overline{LD}$ to Q_H or $\overline{Q}_H$	2	18	ns
t_{PHL}	H to Q_H	2	21	ns
t_{PLH}	H to Q_H	2	17	ns
t_{PHL}	H to $\overline{Q}_H$	2	20	ns
t_{PLH}	H to $\overline{Q}_H$	2	18	ns
f_{MAX}	Maximum clock frequency		71	MHz
t_{SU1}	SER, $SH/\overline{LD}$, CLKINH or CLK Setup time before CLK $\uparrow$ or CLK INH $\uparrow$	7		ns
t_{SU2}	Data setup time before $SH/\overline{LD}$	7		ns
t_{H1}	SER hold time after CLK or CLK INH $\uparrow$	2		ns
t_{H2}	CLK INH hold time after CLK $\uparrow$	2		ns
t_{H3}^3	Hold time for any input after $SH/\overline{LD}$	2		ns
t_W	Minimum pulse width CLK or CLK INH high CLK or CLK INH low $SH/\overline{LD}$	7		ns

Notes:

1. Maximum allowable relative shift equals 50mV.
2. All specifications valid for radiation dose $\leq 1E6$ rads(Si).
3. Based on characterization, hold time (t_{H3}) of 0ns for data pins A-H, can be assumed if data setup time (t_{SU2}) is ≥ 10 ns. This is guaranteed, but not tested.

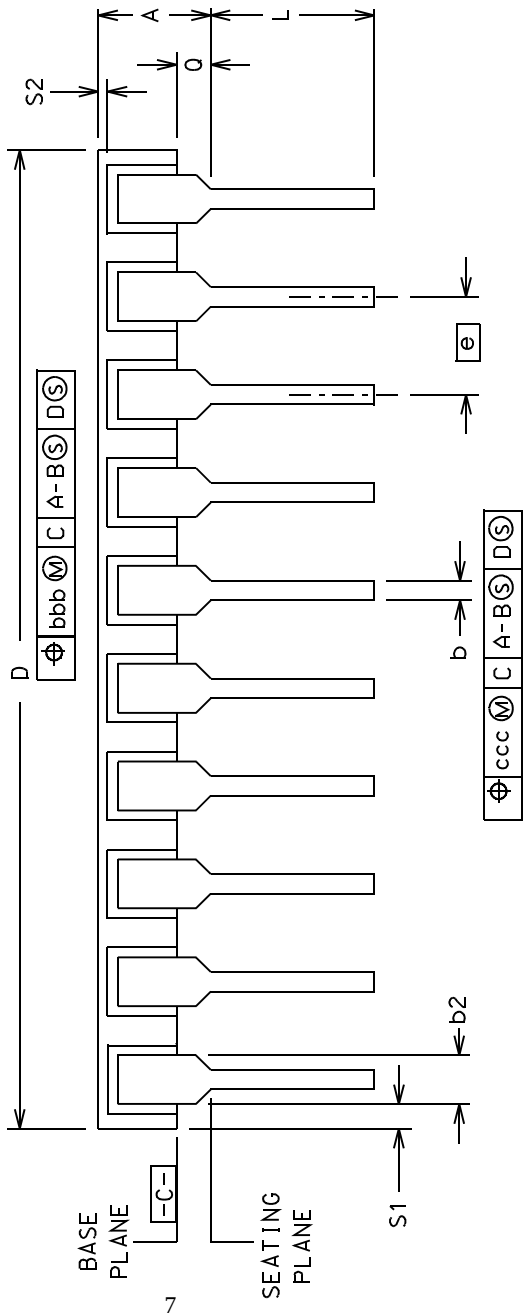
PACKAGING

Side-Brazed Packages



SIDE VIEW

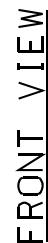
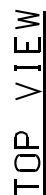
TOP VIEW



FRONT VIEW

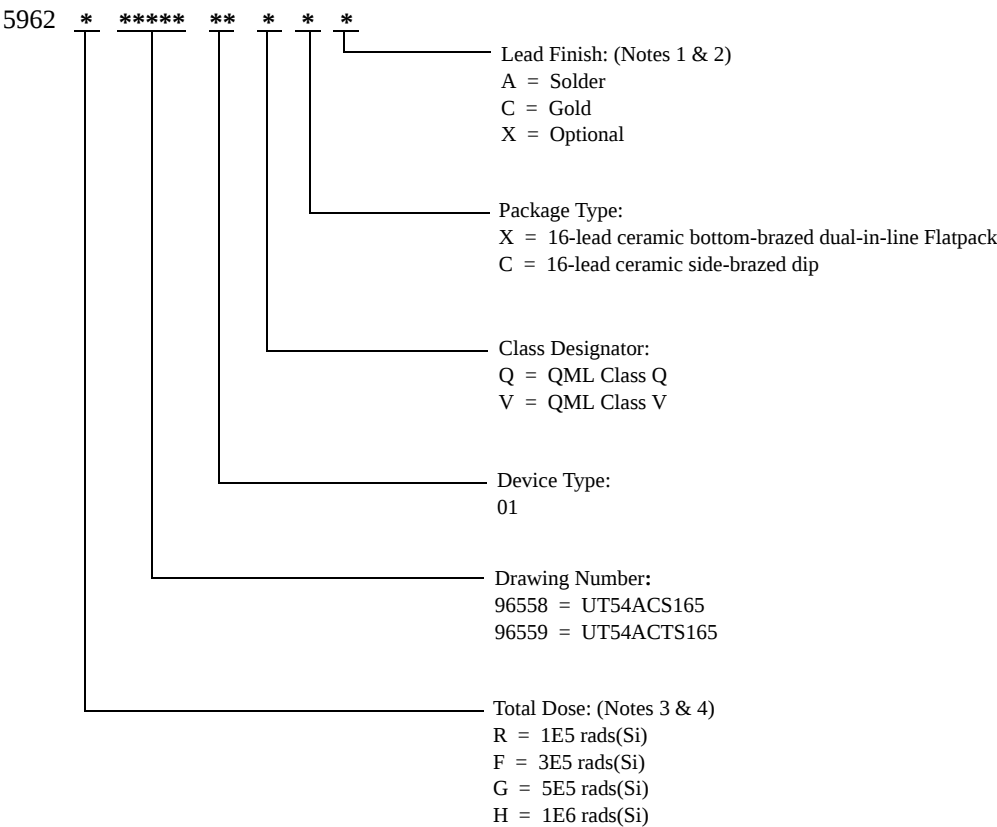
PKG CONF	LEAD COUNT	MIL-STD- 1835 DWG CONF C	DIMENSION SYMBOLS														
			A	b	b2	c	D	E	e	eA	L	Q	S1	S2	aaa	bbb	ccc
-01	14	D-1	0.200 -----	0.026 0.014	0.065 0.045	0.018 0.008	0.785 -----	0.310 0.220	0.100 BSC	0.300 BSC	0.200 0.125	0.060 0.015	----- 0.005	----- 0.005	0.015 -----	0.030 -----	0.010 -----
-02	16	D-2	0.200 -----	0.026 0.014	0.065 0.045	0.018 0.008	0.840 -----	0.310 0.220	0.100 BSC	0.300 BSC	0.200 0.125	0.060 0.015	----- 0.005	----- 0.005	0.015 -----	0.030 -----	0.010 -----
-03	20	D-8	0.200 -----	0.026 0.014	0.065 0.045	0.018 0.008	1.060 -----	0.310 0.220	0.100 BSC	0.300 BSC	0.200 0.125	0.070 0.015	----- 0.005	----- 0.005	0.015 -----	0.030 -----	0.010 -----

PIN #1 ID MARK



PKG CONFIG	LEAD COUNT	MIL-STD 1835 DWG CONF B	DIMENSION SYMBOLS												
			A	b	c	D	E	E1	E2	E3	e	k	L	Q	S1
-03	14	F-2A	0.115 0.045	0.022 0.015	0.009 0.004	0.390 -----	0.260 0.235	0.290 -----	----- 0.130	----- BSC	0.015 0.008	0.370 0.270	0.045 0.026	----- 0.005	
-04	16	F-5A	0.115 0.045	0.022 0.015	0.009 0.004	0.440 -----	0.285 0.245	0.315 -----	----- 0.130	0.050 BSC	0.015 0.008	0.370 0.250	0.045 0.026	----- 0.005	
-05	20	F-9A	0.115 0.045	0.022 0.015	0.009 0.004	0.540 -----	0.300 0.245	0.330 -----	----- 0.130	0.050 BSC	0.015 0.008	0.370 0.250	0.045 0.026	----- 0.000	

UT54ACS165/UT54ACTS165: SMD



- Notes:**
- 1. Lead finish (A,C, or X) must be specified.
 - 2. If an “X” is specified when ordering, part marking will match the lead finish and will be either “A” (solder) or “C” (gold).
 - 3. Total dose radiation must be specified when ordering. QML Q and QML V not available without radiation hardening. For prototype inquiries, contact factory.
 - 4. Device type 02 is only offered with a TID tolerance guarantee of 3E5 rads(Si) or 1E6 rads(Si) and is tested in accordance with MIL-STD-883 Test Method 1019 Condition A and section 3.11.2. Device type 03 is only offered with a TID tolerance guarantee of 1E5 rads(Si), 3E5 rads(Si), and 5E5 rads(Si), and is tested in accordance with MIL-STD-883 Test Method 1019 Condition A.

Aeroflex Colorado Springs - Datasheet Definition

Advanced Datasheet - Product In Development

Preliminary Datasheet - Shipping Prototype

Datasheet - Shipping QML & Reduced Hi-Rel

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused