UT54ACS165E

8-Bit Parallel Shift Registers

October 2008
www.aeroflex.com/Logic

FEATURES

- Complementary outputs
- Direct overriding load (data) inputs
- Gated clock inputs
- Parallel-to-serial data conversions
- 0.6µm CRH CMOS Process
  - Latchup immune
- High speed
- Low power consumption
- Wide operating power supply from 3.0V to 5.5V
- Available QML Q or V processes
- 16-lead flatpack

DESCRIPTION

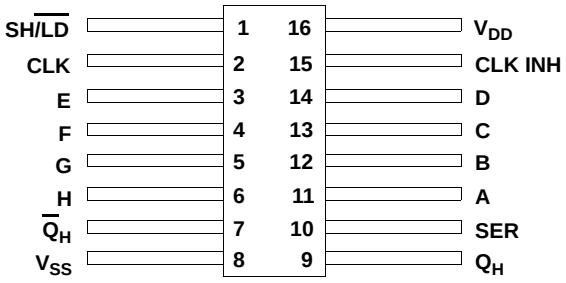
The UT54ACS165E is an 8-bit serial shift register that, when clocked, shifts the data toward serial output Q_H. Parallel-in access to each stage is provided by eight individual data inputs that are enabled by a low level at the SH/$\overline{LD}$ input. The devices feature a clock inhibit function and a complemented serial output $\overline{Q}_H$.

Clocking is accomplished by a low-to-high transition of the CLK input while SH/$\overline{LD}$ 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 SH/$\overline{LD}$ is held high. Parallel inputs to the registers are enabled while SH/$\overline{LD}$ is low independently of the levels of CLK, CLK INH or SER inputs.

The device is characterized over the full HiRel temperature range of -55°C to +125°C.

PINOUT

16-Lead Flatpack
Top View

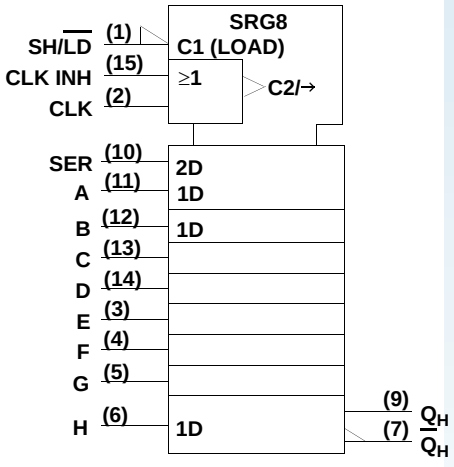


FUNCTION TABLE

INPUTS					INTERNAL OUTPUTS		OUTPUTS	
SH/$\overline{LD}$	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	$\overline{h}$
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	$\overline{Q}_H$

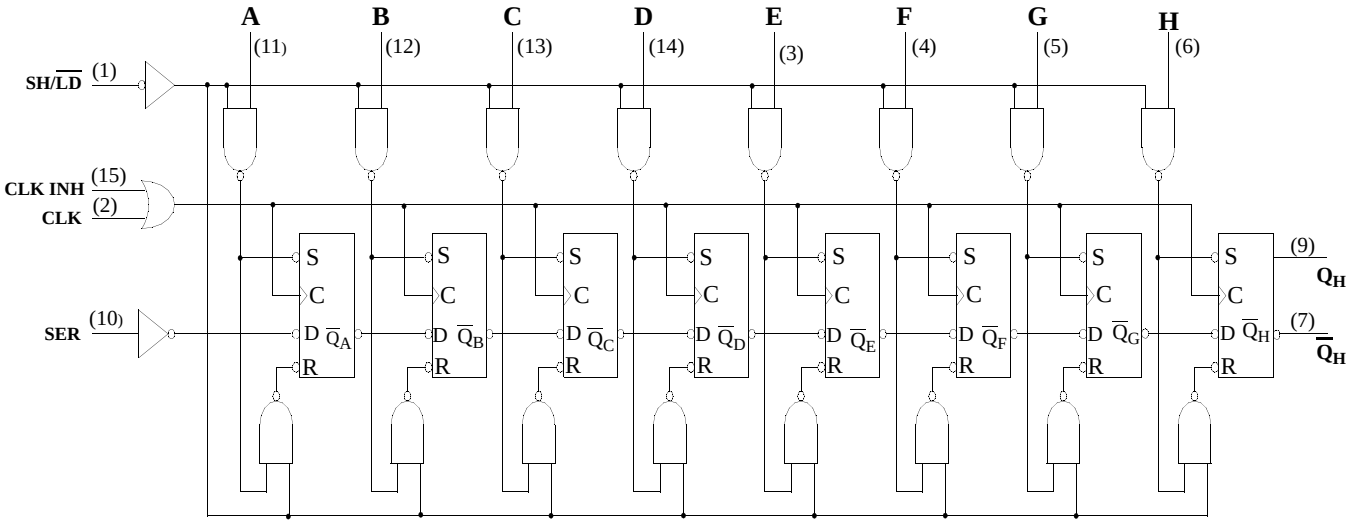
Note:
1. Q_n = The state of the referenced output one setup time prior to the Low-to-High clock transition.

LOGIC SYMBOL



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

LOGIC DIAGRAM



OPERATIONAL ENVIRONMENT [1]

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	3.0 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 FOR THE UT54ACS165E[7]

(V_{DD} = 3.0V to 5.5V; V_{SS} = 0V[6]; -55°C < T_C < +125°C)

SYMBOL	Description	CONDITION	VDD	MIN	MAX	UNIT
V_{IL}	Low-level input voltage [1]		3.0V		0.9	V
			5.5V		1.65	
V_{IH}	High-level input voltage [1]		3.0V	2.1		V
			5.5V	3.85		
I_{IN}	Input leakage current	V_{IN} = V_{DD} or V_{SS}	5.5V	-1	1	µA
V_{OL}	Low-level output voltage [3]	I_{OL} = 100µA	3.0V		0.25	V
			4.5V		0.25	
V_{OH}	High-level output voltage [3]	I_{OH} = -100µA	3.0V	2.75		V
			4.5V	4.25		
I_{OS}	Short-circuit output current [2,4]	V_O = V_{DD} and V_{SS}	3.0V	-100	100	mA
			5.5V	-200	200	
I_{OL}	Low level output current[9]	V_{IN} = V_{DD} or V_{SS}	3.0V	6		mA
		V_{OL} = 0.4V	5.5V	8		
I_{OH}	High level output current[9]	V_{IN} = V_{DD} or V_{SS}	3.0V		-6	mA
		V_{OH} = V_{DD}-0.4V	5.5V		-8	
P_{total}	Power dissipation [2, 8]	C_L = 50pF	5.5V		2.9	mW/ MHz
			3.0V		1.16	
I_{DDQ}	Quiescent Supply Current	V_{IN} = V_{DD} or V_{SS}	5.5V		10	µA
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 ≤5.0E5 amps/cm^2, the maximum product of load capacitance (per output buffer) times frequency should not exceed 3,765pF/ 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 ≤ 1E6 rads(Si) per MIL-STD-883 Method 1019 Condition A and section 3.11.2.
8. Power dissipation specified per switching output.
9. This value is guaranteed based on characterization data, but not tested.

AC ELECTRICAL CHARACTERISTICS FOR THE UT54ACS165E[2]

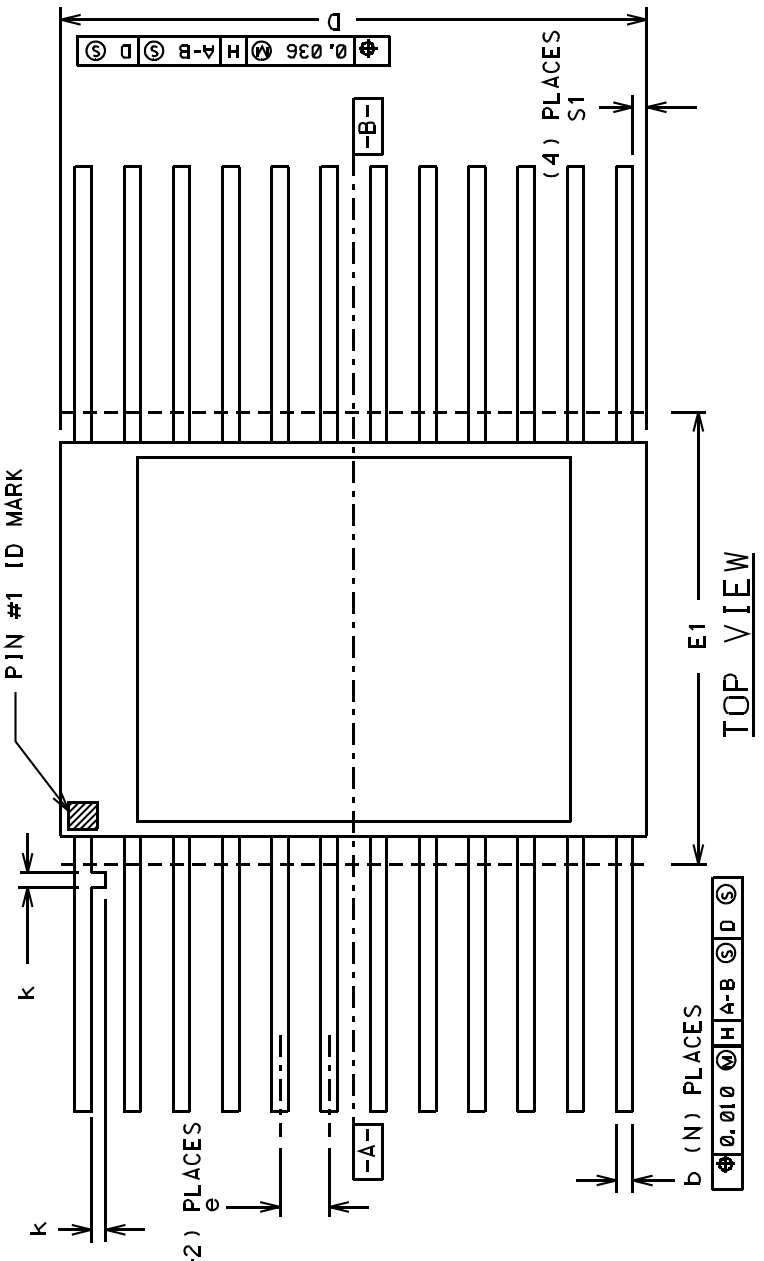
(V_{DD} = 3.0V to 5.5V; V_{SS} = 0V [1], -55°C < T_C < +125°C)

SYMBOL	PARAMETER	CONDITION	V_{DD}	MINIMUM	MAXIMUM	UNIT
t_{PLH1}	CLK or CLKINH to Q_H or $\overline{Q}_H$	C_L = 30pF	3.0V & 3.6V	2	18	ns
			4.5V & 5.5V	2	14	
		C_L = 50pF	3.0V & 3.6V	2	22	ns
			4.5V & 5.5V	2	18	
t_{PHL1}	CLK or CLKINH to Q_H or $\overline{Q}_H$	C_L = 30pF	3.0V & 3.6V	2	21	ns
			4.5V & 5.5V	2	17	
		C_L = 50pF	3.0V & 3.6V	2	25	ns
			4.5V & 5.5V	2	21	
t_{PLH2}	SH/$\overline{LD}$ to Q_H or $\overline{Q}_H$	C_L = 30pF	3.0V & 3.6V	2	18	ns
			4.5V & 5.5V	2	14	
		C_L = 50pF	3.0V & 3.6V	2	22	ns
			4.5V & 5.5V	2	18	
t_{PHL2}	SH/$\overline{LD}$ to Q_H or $\overline{Q}_H$	C_L = 30pF	3.0V & 3.6V	2	21	ns
			4.5V & 5.5V	2	17	
		C_L = 50pF	3.0V & 3.6V	2	25	ns
			4.5V & 5.5V	2	21	
t_{PLH3}	H to Q_H	C_L = 30pF	3.0V & 3.6V	2	17	ns
			4.5V & 5.5V	2	13	
		C_L = 50pF	3.0V & 3.6V	2	21	ns
			4.5V & 5.5V	2	17	
t_{PHL3}	H to Q_H	C_L = 30pF	3.0V & 3.6V	2	21	ns
			4.5V & 5.5V	2	17	
		C_L = 50pF	3.0V & 3.6V	2	25	ns
			4.5V & 5.5V	2	21	
t_{PLH4}	H to $\overline{Q}_H$	C_L = 30pF	3.0V & 3.6V	2	18	ns
			4.5V & 5.5V	2	14	
		C_L = 50pF	3.0V & 3.6V	2	22	ns
			4.5V & 5.5V	2	18	
t_{PLH4}	H to $\overline{Q}_H$	C_L = 30pF	3.0V & 3.6V	2	20	ns
			4.5V & 5.5V	2	16	
		C_L = 50pF	3.0V & 3.6V	2	24	ns
			4.5V & 5.5V	2	20	

SYMBOL	PARAMETER	CONDITION	V_{DD}	MINIMUM	MAXIMUM	UNIT
f_{MAX}	Maximum clock frequency	C_L = 50pF	3.0V, 4.5V, and 5.5V		71	MHz
t_{SU1}	SER, SH/$\overline{LD}$, CLKINH or CLK Setup time before CLK↑ or CLKINH↑	C_L = 50pF	3.0V, 4.5V, and 5.5V	7		ns
t_{SU2}	Data setup time before SH/$\overline{LD}$	C_L = 50pF	3.0V, 4.5V, and 5.5V	7		ns
t_{H1}	SER hold time after CLK or CLKINH↑	C_L = 50pF	3.0V, 4.5V, and 5.5V	2		ns
t_{H2}	CLKINH↑ hold time after CLK	C_L = 50pF	3.0V, 4.5V, and 5.5V	2		ns
t_{H3}[3]	Hold time for any input after SH/$\overline{LD}$	C_L = 50pF	3.0V, 4.5V, and 5.5V	2		ns
t_W	Minimum pulse width CLK or CLKINH high CLK or CLKINH low SH/$\overline{LD}$	C_L = 50pF	3.0V, 4.5V, and 5.5V	7		ns

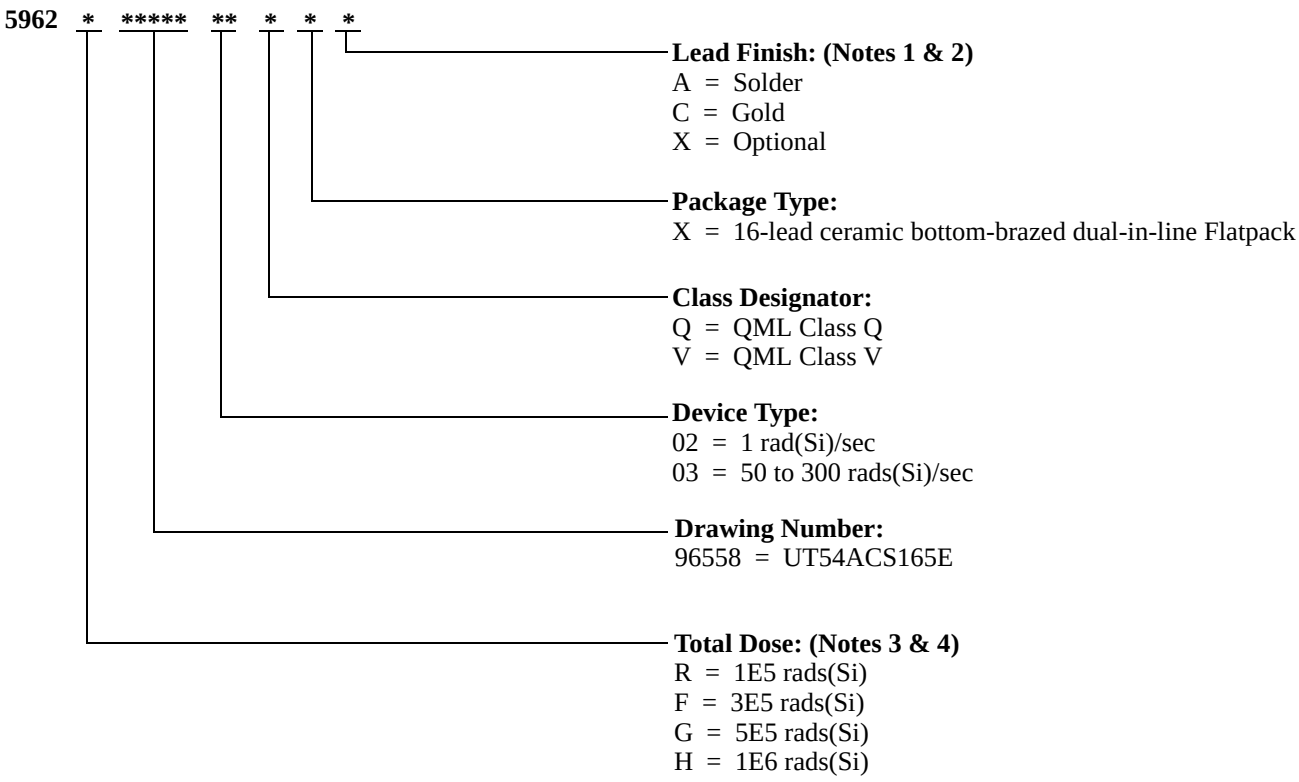
Notes:
1. Maximum allowable relative shift equals 50mV.
2. All specifications valid for radiation dose ≤ 1E6 rads(Si) per MIL-STD-883 Method 1019 Condition A and section 3.11.2.
3. Based on characterization, hold time (t_{H3}) of 0ns for data pins A-H, can be assumed if data setup time (t_{SU2}) is ≥10ns. This is guaranteed, but not tested.

Packaging



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	----- 0.030	0.050 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	----- 0.030	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	----- 0.030	0.050 BSC	0.015 0.008	0.370 0.250	0.045 0.026	----- 0.000

Ordering Information: UT54ACS165E: 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 HiRel

COLORADO
Toll Free: 800-645-8862
Fax: 719-594-8468

INTERNATIONAL
Tel: 805-778-9229
Fax: 805-778-1980

NORTHEAST
Tel: 603-888-3975
Fax: 603-888-4585

SE AND MID-ATLANTIC
Tel: 321-951-4164
Fax: 321-951-4254

WEST COAST
Tel: 949-362-2260
Fax: 949-362-2266

CENTRAL
Tel: 719-594-8017
Fax: 719-594-8468

www.aeroflex.com info-ams@aeroflex.com

AEROFLEX
A passion for performance.

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