8-Bit Shift Registers

UT54ACS164/UT54ACTS164

Features

- AND-gated (enable/disable) serial inputs
- Fully buffered clock and serial inputs
- Direct clear
- 1.2µ CMOS (ACTS) and 0.6µ CRH CMOS (ACS)
  - Latchup immune
- High speed
- Low power consumption
- Single 5 volt supply
- Available QML Q or V processes
- Flexible package
  - 14-pin DIP (ACTS only)
  - 14-lead flatpack
- UT54ACS164 - SMD 5962-96556
- UT54ACTS164 - SMD 5962-96557

Description

The UT54ACS164 and the UT54ACTS164 are 8-bit shift registers which feature AND-gated serial inputs and an asynchronous clear. The gated serial inputs (A and B) permit complete control over incoming data. A low at either input inhibits entry of new data and resets the first flip-flop to the low level at the next clock pulse. A high-level at both serial inputs sets the first flip-flop to the high level at the next clock pulse. Data at the serial inputs may be changed while the clock is high or low, providing the minimum setup time requirements are met. Clocking occurs on the low-to-high-level transition of the clock input.

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

Function Table

Inputs				Outputs	
$\overline{CLR}$	CLK	A	B	Q_A	Q_B ... Q_H
L	X	X	X	L	L L
H	L	X	X	Q_{A0}	Q_{B0} ... Q_{HO}
H	↑	H	H	H	Q_{An} ... Q_{Gn}
H	↑	L	X	L	Q_{An} ... Q_{Gn}
H	↑	X	L	L	Q_{An} ... Q_{Gn}

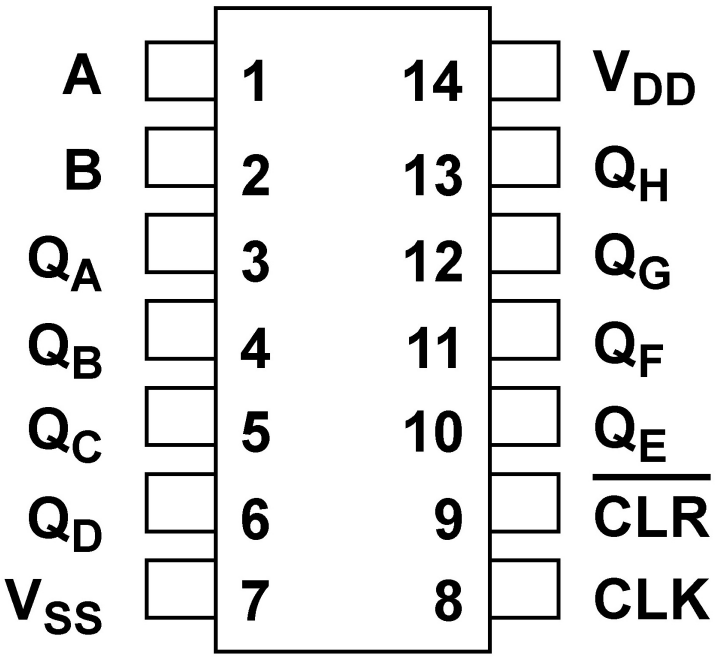
Notes:

1) Q_{A0}, Q_{B0}, Q_{H0} = the level of Q_A, Q_B or Q_H, respectively, before the indicated steady-state input conditions were established.
2) Q_{An} and Q_{Gn} = the level of Q_A or Q_G before the most recent ↑ transition of the clock; indicates a one-bit shift.

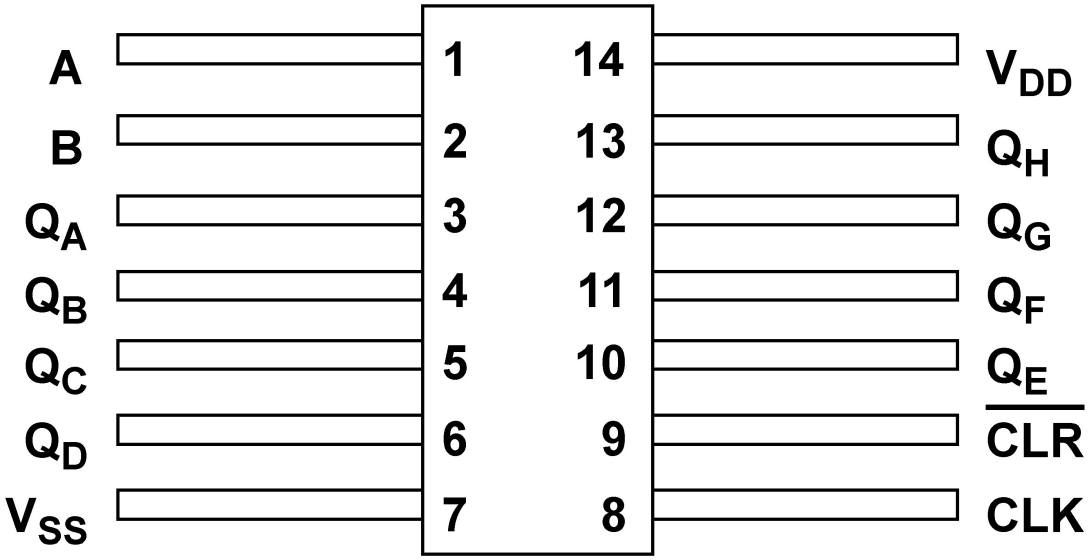
8-Bit Shift Registers

UT54ACS164/UT54ACTS164

Pinout



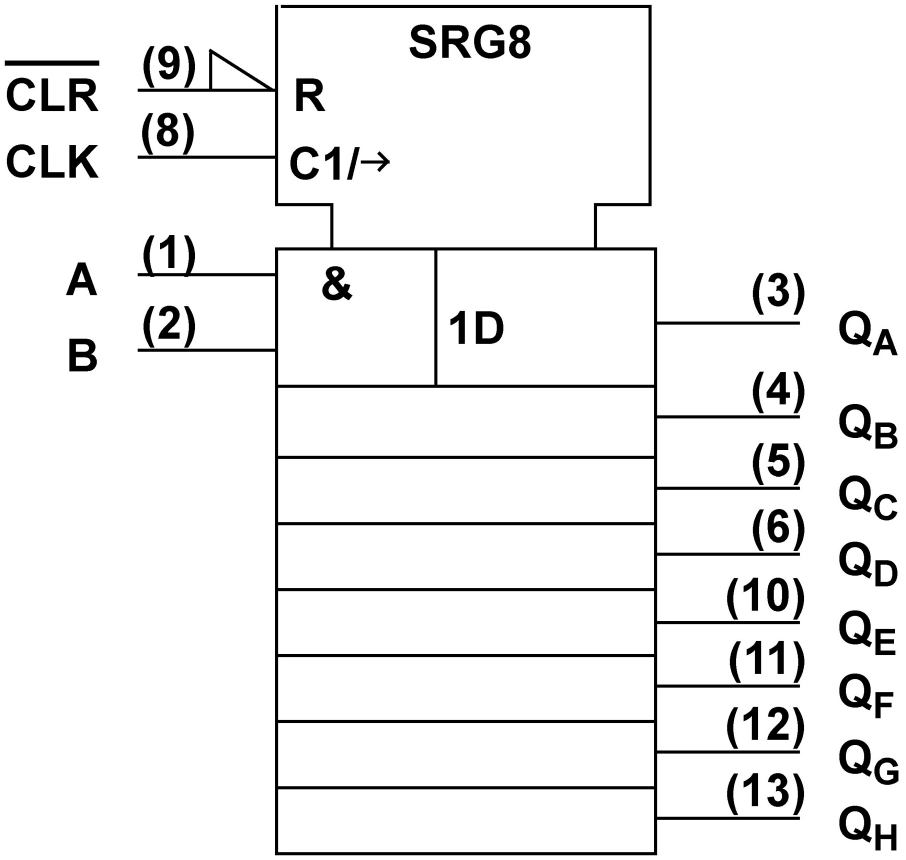
14-Pin DIP
Top View



14-Lead Flatpack
Top View

UT54ACS164/UT54ACTS164

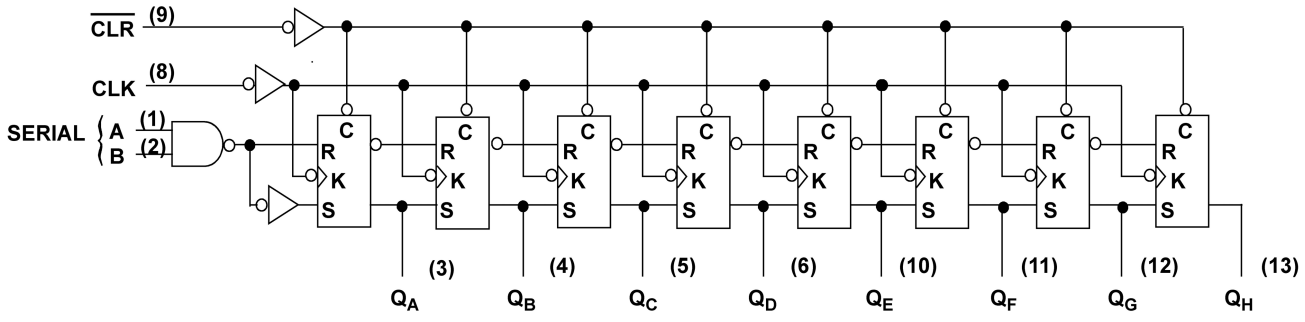
Logic Symbol



Note:

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

Logic Diagram



8-Bit Shift Registers

UT54ACS164/UT54ACTS164

Operational Environment [1]

Parameter	Limit	Units
Total Dose	1.0E6 (ACTS) 500K(ACS)	rads(Si)
SEU Threshold [2]	80	MeV-cm²/mg
SEL Threshold	120	MeV-cm²/mg
Neutron Fluence	1.0E14	n/cm²

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	15.0	°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

UT54ACS164/UT54ACTS164

DC Electrical Characteristics [7]

(V_{DD} = 5.0V ±10%; V_{SS} = 0V [6], -55°C < T_C < +125°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 .3V_{DD}	V
V_{IH}	High-level input voltage [1] ACTS ACS			.5V_{DD} .7V_{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} = 8mA I_{OL} = 100µA		0.40 0.25	V
V_{OH}	High-level output voltage [3] ACTS ACS		I_{OH} = -8mA I_{OH} = -100µA	.7V_{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		1.9	mW/ MHz
I_{DDQ}	Quiescent Supply Current	Pre-Rad	V_{IN} = V_{DD} or V_{SS} V_{DD} = V_{DD} MAX		10	µA
		Post-rad Device Type 01			50	
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 ≤ 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) Device type 01 is only offered with a TID tolerance guarantee of 1E6 rads(Si) (ACTS only), 1E5 rads(Si), 3E5 rads(Si), and 5E5 rads(Si), and is tested in accordance with MIL-STD-883 Test Method 1019 Condition A.
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 ±10%; V_{SS} = 0V [1], -55°C < T_C < +125°C) Unless otherwise noted, T_C is per the temperature range ordered.

Symbol	Parameter	Minimum	Maximum	Unit
t_{PHL}	CLK to Qn	4	21	ns
t_{PLH}	CLK to Qn	2	18	ns
t_{PHL}	$\overline{CLR}$ to Qn	5	21	ns
f_{MAX}	Maximum clock frequency		83	MHz
t_{SU1}	$\overline{CLR}$ inactive Setup time before CLK ↑	4		ns
t_{SU2}	Data setup time before CLK ↑	4		ns
t_H [3]	Data hold time after CLK ↑	2		ns
t_W	Minimum pulse width $\overline{CLR}$ low CLK high CLK low	6		ns

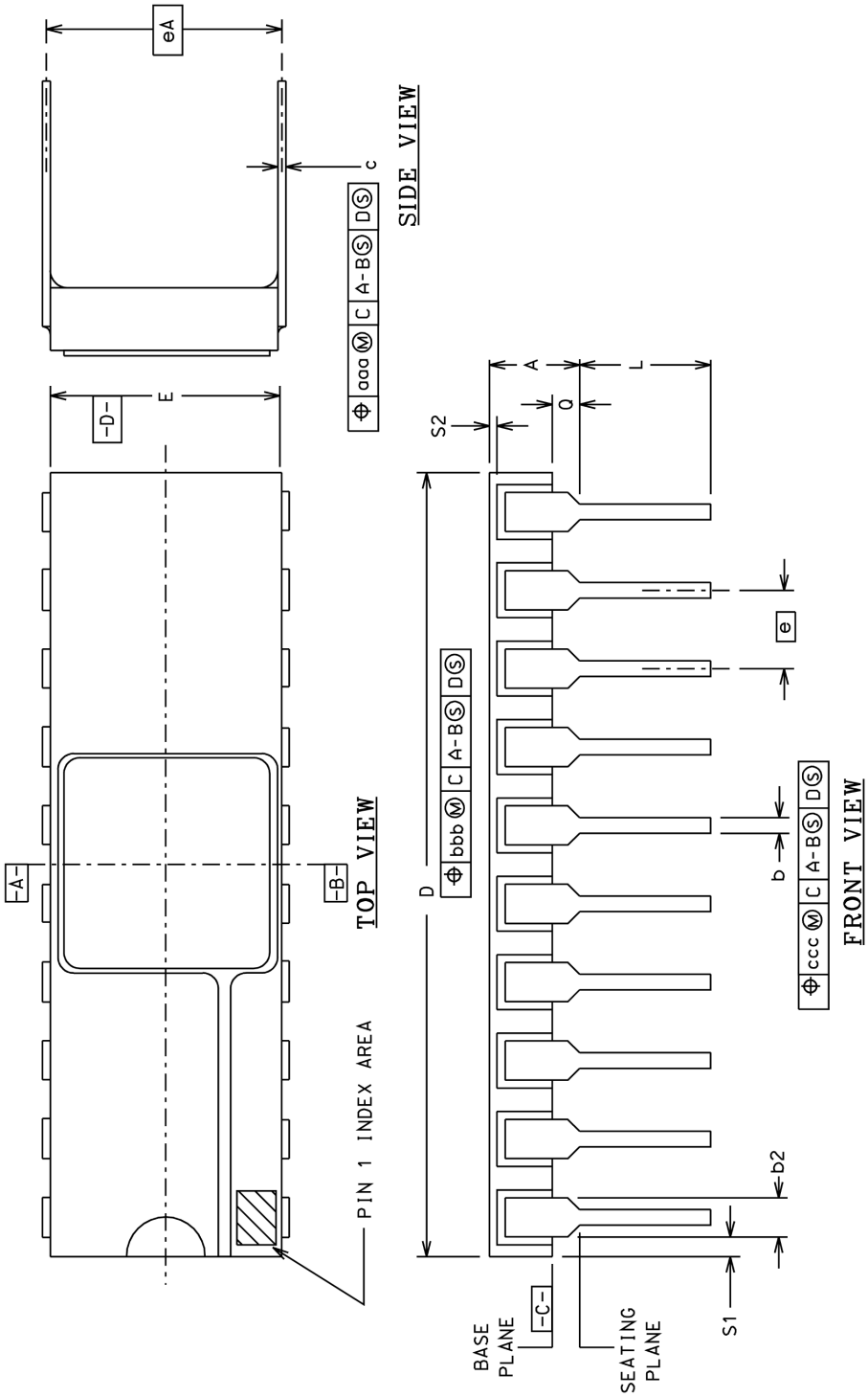
Notes:

1) Maximum allowable relative shift equals 50mV.
2) Device type 01 is only offered with a TID tolerance guarantee of 1E6 rads(Si) (ACTS only), 1E5 rads(Si), 3E5 rads(Si), and 5E5 rads(Si), and is tested in accordance with MIL-STD-883 Test Method 1019 Condition A.
3) Based on characterization, hold time (t_H) of 0ns can be assumed if data setup time (t_{SU2}) is ≥10ns. This is guaranteed, but not tested.

UT54ACS164/UT54ACTS164

Packaging

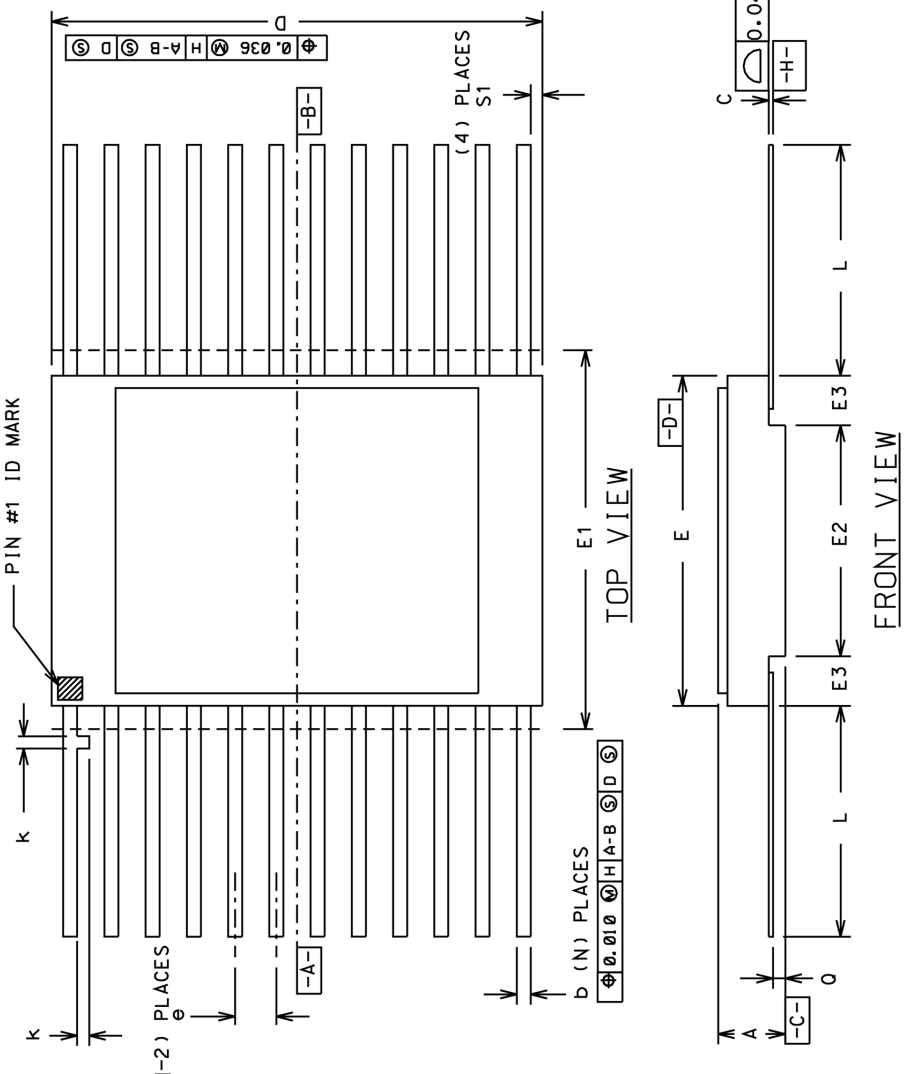
Side-Brazed Packages



PKG CONFIG	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 -----

UT54ACS164/UT54ACTS164

Flatpack Packages

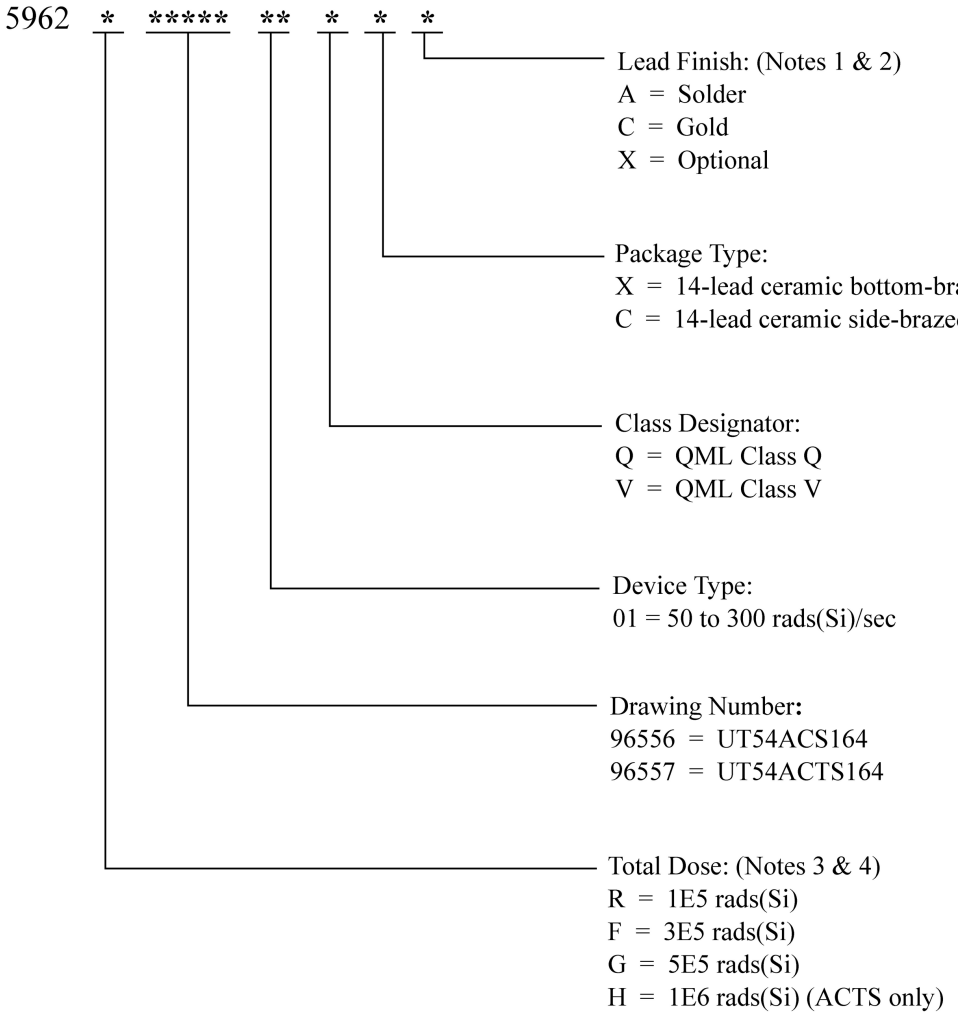


PKG CONFIG	LEAD COUNT	MIL-STD 1835 DWG CONF B	DIMENSION SYMBOLS														
			A	b	c	D	E	E1	E2	E3	e	k	L	Q	S1
-03	14	F-2A	0.115 0.045	0.022 0.015	0.009 0.004	0.390 -----	0.260 0.235	0.290 -----	----- 0.130	----- 0.030	0.050 BSC	0.015 0.008	0.370 0.270	0.045 0.026	----- 0.005
-04	16	F-5A	0.115 0.045	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

8-Bit Shift Registers

UT54ACS164/UT54ACTS164

UT54ACS164/UT54ACTS164: 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 01 is only offered with a TID tolerance guarantee of 1E6 rads(Si) (ACTS only), 1E5 rads(Si), 3E5 rads(Si), and 5E5 rads(Si), and is tested in accordance with MIL-STD-883 Test Method 1019 Condition A.

Datasheet Revision History

Revision Date	Description of Change	Author
10-17	Page 4 edited IDDQ Applied new CSES Data Sheet template to the document.	RT
1-18	Updates to reflect current SMD	RT

8-Bit Shift Registers

UT54ACS164/UT54ACTS164

Datasheet Definitions

	DEFINITION
Advanced Datasheet	CAES reserves the right to make changes to any products and services described herein at any time without notice. The product is still in the development stage and the datasheet **is subject to change**. Specifications can be **TBD** and the part package and pinout are **not final**.
Preliminary Datasheet	CAES reserves the right to make changes to any products and services described herein at any time without notice. The product is in the characterization stage and prototypes are available.
Datasheet	Product is in production and any changes to the product and services described herein will follow a formal customer notification process for form, fit or function changes.

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