

# UT54ACTS74E

Dual D Flip-Flops with Clear & Preset

October, 2008

Datasheet

[www.aeroflex.com/Logic](http://www.aeroflex.com/Logic)



## FEATURES

- 0.6μm CRH CMOS process
  - Latchup immune
- High speed
- Low power consumption
- Wide power supply operating range from 3.0V to 5.5V
- Available QML Q or V processes
- 14-lead flatpack
- UT54ACTS74E-SMD- 5962-96535

## DESCRIPTION

The UT54ACTS74E contains two independent D-type positive triggered flip-flops. A low level at the Preset or Clear inputs sets or resets the outputs regardless of the levels of the other inputs. When Preset and Clear are inactive (high), data at the D input meeting the setup time requirement is transferred to the outputs on the positive-going edge of the clock pulse. Following the hold time interval, data at the D input may be changed without affecting the levels at the outputs.

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

## FUNCTION TABLE

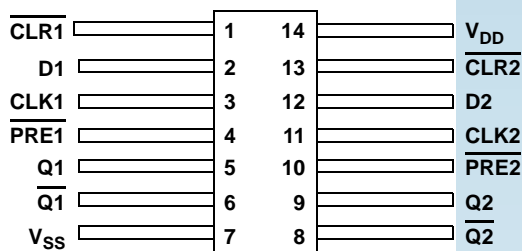
INPUTS				OUTPUT	
$\overline{\text{PRE}}$	$\overline{\text{CLR}}$	CLK	D	Q	$\overline{\text{Q}}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H <sup>1</sup>	H <sup>1</sup>
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q <sub>o</sub>	$\overline{\text{Q}}_o$

### Note:

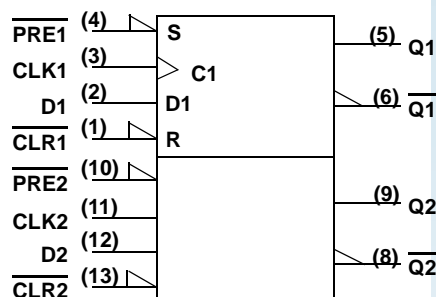
1. The output levels in this configuration are not guaranteed to meet the minimum levels for V<sub>OH</sub> if the lows at preset and clear are near V<sub>IL</sub> maximum. In addition, this configuration is nonstable; that is, it will not persist when either preset or clear returns to its inactive (high) level.

## PINOUTS

14-Lead Flatpack  
TopView



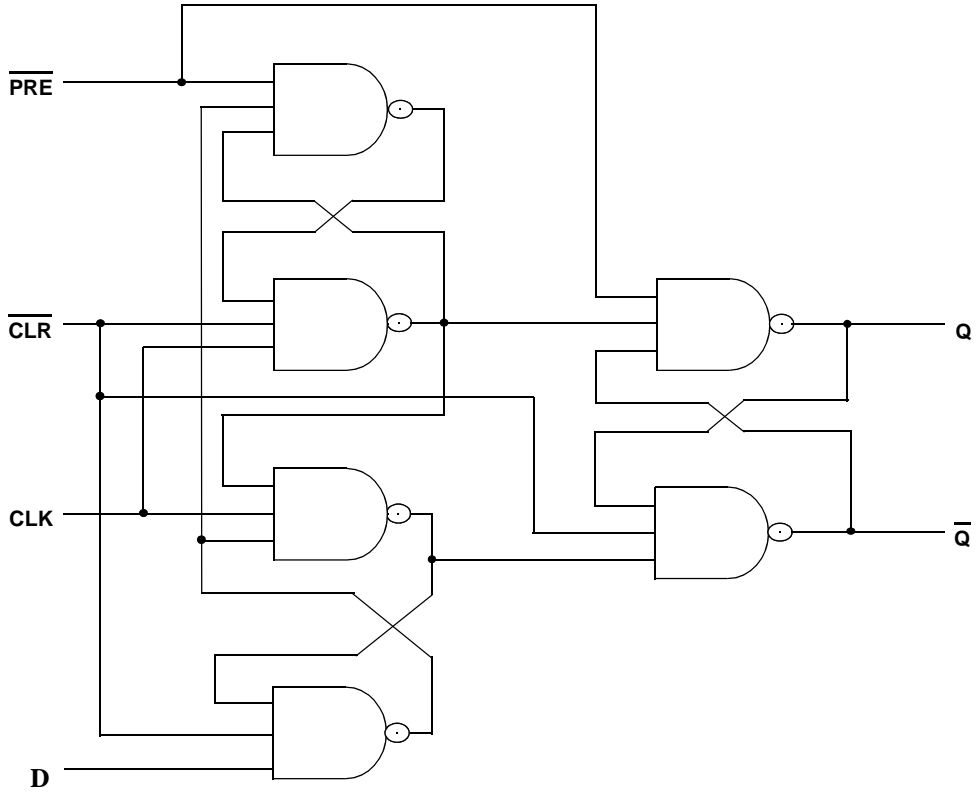
## LOGIC SYMBOL



### Note:

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

# LOGIC DIAGRAM



## OPERATIONAL ENVIRONMENT <sup>1</sup>

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

**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 <sub>DD</sub>	Supply voltage	-0.3 to 6.0	V
V <sub>I/O</sub>	Voltage any pin	-0.3 to V <sub>DD</sub> +0.3	V
T <sub>STG</sub>	Storage Temperature range	-65 to +150	°C
T <sub>J</sub>	Maximum junction temperature	+175	°C
T <sub>LS</sub>	Lead temperature (soldering 5 seconds)	+300	°C
Θ <sub>JC</sub>	Thermal resistance junction to case	15.5	°C/W
I <sub>I</sub>	DC input current	±10	mA
P <sub>D</sub> <sup>2</sup>	Maximum package power dissipation permitted @ T <sub>C</sub> = +125°C	3.2	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.
2. Per MIL-STD-883, method 1012.1, Section 3.4.1,  $P_D = (T_{J(max)} - T_{C(max)}) / \Theta_{JC}$

## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMIT	UNITS
V <sub>DD</sub>	Supply voltage	3.0 to 5.5	V
V <sub>IN</sub>	Input voltage any pin	0 to V <sub>DD</sub>	V
T <sub>C</sub>	Temperature range	-55 to + 125	°C

### DC ELECTRICAL CHARACTERISTICS FOR THE UT54ACTS74E<sup>7</sup>

( $V_{DD} = 3.0V$  to  $5.5V$ ;  $V_{SS} = 0V$ <sup>6</sup>;  $-55^{\circ}C < T_C < +125^{\circ}C$ )

SYMBOL	DESCRIPTION	CONDITION	MIN	MAX	UNIT
$V_{IL1}$	Low-level input voltage <sup>1</sup>	$V_{DD}$ from 4.5V to 5.5V		0.8	V
$V_{IL2}$	Low-level input voltage <sup>1</sup>	$V_{DD}$ from 3.0V to 3.6V		0.8	V
$V_{IH1}$	High-level input voltage <sup>1</sup>	$V_{DD}$ from 4.5V to 5.5V	$0.5 V_{DD}$		V
$V_{IH2}$	High-level input voltage <sup>1</sup>	$V_{DD}$ from 3.0V to 3.6V	2.0		V
$I_{IN}$	Input leakage current	$V_{IN} = V_{DD}$ or $V_{SS}$	-1	1	$\mu A$
$V_{OL1}$	Low-level output voltage <sup>3</sup>	$I_{OL} = 8ma$ $V_{DD} = 4.5V$ to $5.5V$		0.4	V
$V_{OL2}$	Low-level output voltage <sup>3</sup>	$I_{OL} = 6ma$ $V_{DD} = 3.0V$ to $3.6V$		0.4	V
$V_{OH1}$	High-level output voltage <sup>3</sup>	$I_{OH} = -8ma$ $V_{DD}$ from 4.5V to 5.5V	$0.7 V_{DD}$		V
$V_{OH2}$	High-level output voltage <sup>3</sup>	$I_{OH} = -6ma$ $V_{DD}$ from 3.0V to 3.6V	2.4		V
$I_{OS1}$	Short-circuit output current <sup>2,4</sup>	$V_O = V_{DD}$ and $V_{SS}$ $V_{DD}$ from 4.5V to 5.5V	-200	200	mA
$I_{OS2}$	Short-circuit output current <sup>2,4</sup>	$V_O = V_{DD}$ and $V_{SS}$ $V_{DD}$ from 3.0V to 3.6V	-100	100	mA
$I_{OL1}$	Low level output current <sup>9</sup>	$V_{IN} = V_{DD}$ or $V_{SS}$ $V_{OL} = 0.4V$ $V_{DD}$ from 4.5V to 5.5V	8		mA
$I_{OL2}$	Low level output current <sup>9</sup>	$V_{IN} = V_{DD}$ or $V_{SS}$ $V_{OL} = 0.4V$ $V_{DD}$ from 3.0V to 3.6V	6		mA
$I_{OH1}$	High level output current <sup>9</sup>	$V_{IN} = V_{DD}$ or $V_{SS}$ $V_{OH} = V_{DD}-0.4V$ $V_{DD}$ from 4.5V to 5.5V	-8		mA
$I_{OH2}$	High level output current <sup>9</sup>	$V_{IN} = V_{DD}$ or $V_{SS}$ $V_{OH} = V_{DD}-0.4V$ $V_{DD}$ from 3.0V to 3.6V	-6		mA

$P_{total1}$	Power dissipation <sup>2, 8</sup>	$C_L = 50\text{pF}$ $V_{DD} = 4.5\text{V to } 5.5\text{V}$		1.0	mW/ MHz
$P_{total2}$	Power dissipation <sup>2, 8</sup>	$C_L = 50\text{pF}$ $V_{DD} = 3.0\text{V to } 3.6\text{V}$		0.5	mW/ MHz
$I_{DDQ}$	Quiescent Supply Current	$V_{IN} = V_{DD}$ or $V_{SS}$ $V_{DD}$ from 3.0V to 5.5V		10	$\mu\text{A}$
$\Delta I_{DDQ}$	Quiescent Supply Current Delta	For input under test $V_{IN} = V_{DD} - 2.1\text{V}$ For all other inputs $V_{IN} = V_{DD}$ or $V_{SS}$ $V_{DD} = 5.5\text{V}$		1.6	mA
$C_{IN}$	Input capacitance <sup>5</sup>	$f = 1\text{MHz}$ $V_{DD} = 0\text{V}$		15	pF
$C_{OUT}$	Output capacitance <sup>5</sup>	$f = 1\text{MHz}$ $V_{DD} = 0\text{V}$		15	pF

**Notes:**

1. Functional tests are conducted in accordance with MIL-STD-883 with the following input test conditions:  $V_{IH} = V_{IH}(\text{min}) + 20\%$ , - 0%;  $V_{IL} = V_{IL}(\text{max}) + 0\%$ , - 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  $V_{IH}(\text{min})$  and  $V_{IL}(\text{max})$ .
2. Supplied as a design limit but not guaranteed or tested.
3. Per MIL-PRF-38535, for current density  $\leq 5.0\text{E}5$  amps/cm<sup>2</sup>, 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  $\leq 1\text{E}6$  rads(Si) per MIL-STD-883 Method 1019.
8. Power dissipation specified per switching output.
9. Guaranteed by characterization, but not tested.

## AC ELECTRICAL CHARACTERISTICS FOR THE UT54ACTS74E<sup>2</sup>

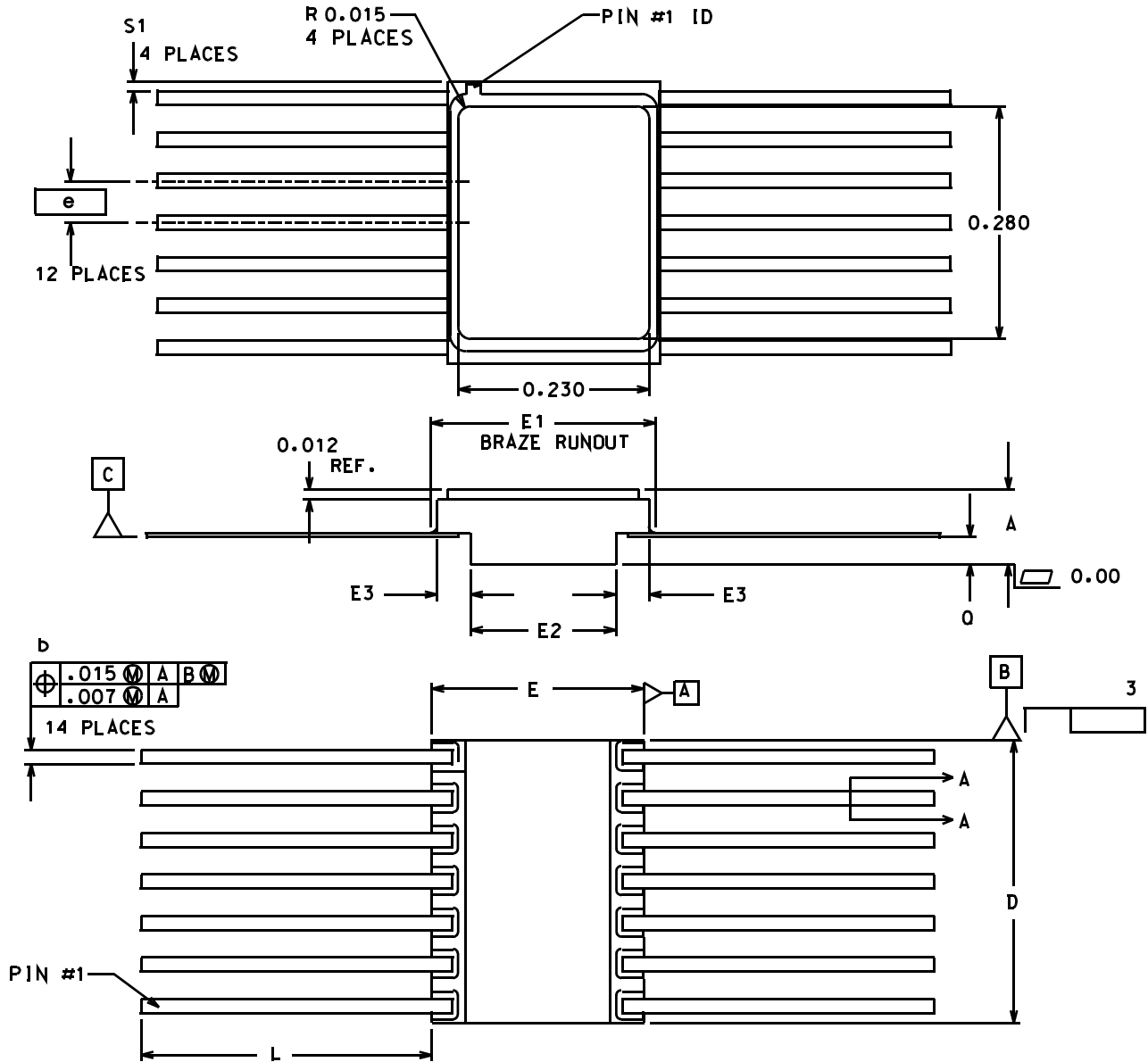
( $V_{DD} = 3.0V$  to  $5.5V$ ;  $V_{SS} = 0V^1$ ;  $-55^{\circ}C < T_C < +125^{\circ}C$ )

SYMBOL	PARAMETER	CONDITION	$V_{DD}$	MINIMUM	MAXIMUM	UNIT
$t_{PHL1}$	CLK $\uparrow$ to Q, $\bar{Q}$	$C_L = 50pF$	3.0V to 3.6V	3	30	ns
			4.5V to 5.5V	3	14	
$t_{PLH1}$	CLK $\uparrow$ to Q, $\bar{Q}$	$C_L = 50pF$	3.0V to 3.6V	3	20	ns
			4.5V to 5.5V	2	11	
$t_{PHL2}$	$\overline{PRE}$ to $\bar{Q}$	$C_L = 50pF$	3.0V to 3.6V	4	30	ns
			4.5V to 5.5V	3	15	
$t_{PLH2}$	$\overline{PRE}$ to Q	$C_L = 50pF$	3.0V to 3.6V	3	20	ns
			4.5V to 5.5V	3	12	
$t_{PHL3}$	CLR to Q	$C_L = 50pF$	3.0V to 3.6V	4	30	ns
			4.5V to 5.5V	3	15	
$t_{PLH3}$	CLR to $\bar{Q}$	$C_L = 50pF$	3.0V to 3.6V	3	21	ns
			4.5V to 5.5V	2	12	
$f_{MAX}$	Maximum clock frequency	$C_L = 50pF$	3.0V to 3.6V		100	MHz
			4.5V to 5.5V		125	
$t_{SU1}$	Data setup time before CLK $\uparrow$	$C_L = 50pF$	3.0V to 3.6V	4		ns
			4.5V to 5.5V	3		
$t_{SU2}$	$\overline{PRE}$ or $\overline{CLR}$ inactive Setup time before CLK $\uparrow$	$C_L = 50pF$	3.0V to 3.6V	1		ns
			4.5V to 5.5V	1		
$t_H$	Data hold time after CLK $\uparrow$	$C_L = 50pF$	3.0V to 3.6V	0		ns
			4.5V to 5.5V	0		
$t_{W1}$	Minimum pulse width CLK high or low	$C_L = 50pF$	3.0V to 3.6V	5		ns
			4.5V to 5.5V	4		
$t_{W2}$	Minimum pulse width $\overline{PRE}$ or $\overline{CLR}$ low	$C_L = 50pF$	3.0V to 3.6V	5		ns
			4.5V to 5.5V	4		

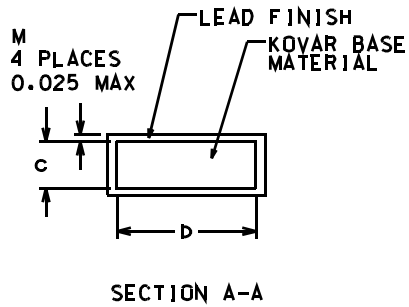
### Notes:

1. Maximum allowable relative shift equals 50mV.
2. All specifications valid for radiation dose  $\leq 1E6$  rads(Si) per MIL-STD-883 Method 1019.

# Packaging



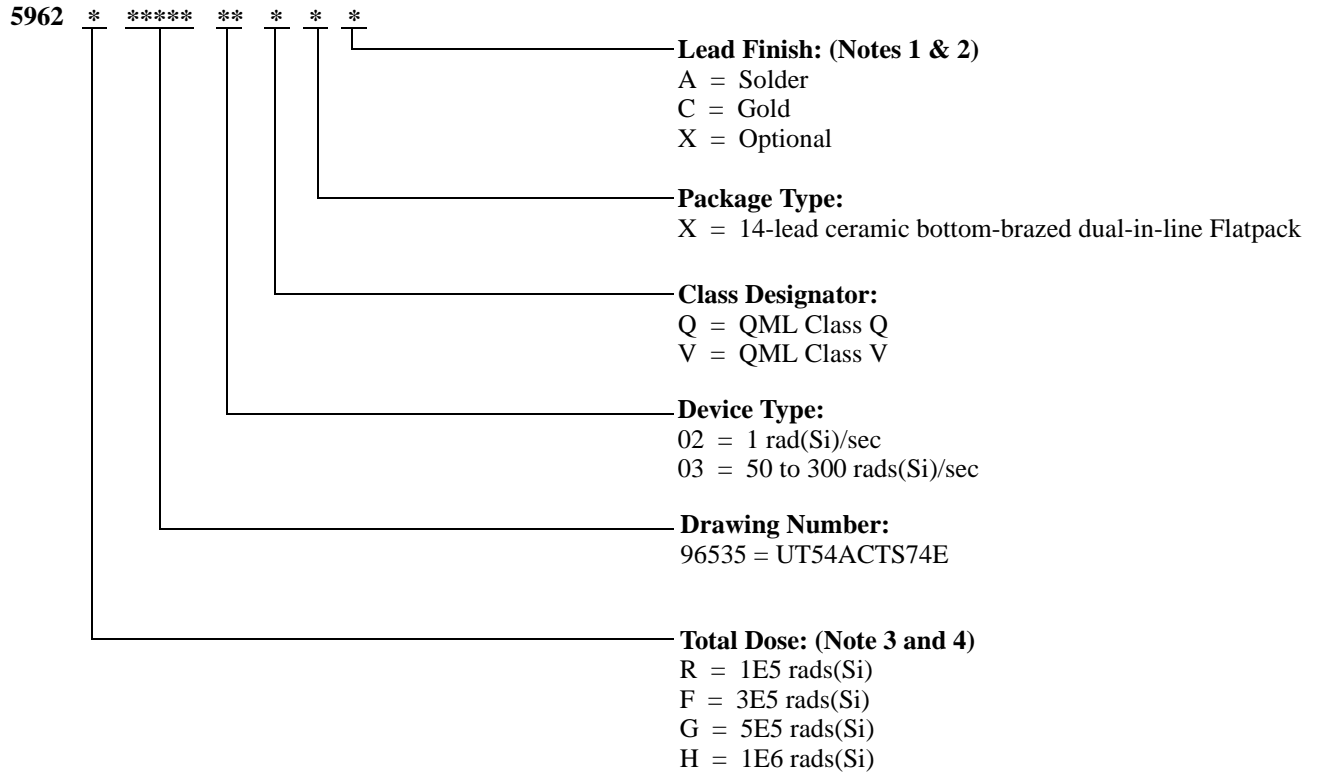
DIM	INCH		MILLIMETER	
	MIN.	MAX.	MIN.	MAX.
A	0.079	0.101	2.007	2.575
b	0.015	0.019	0.381	0.483
c	0.004	0.006	0.102	0.152
D	0.333	0.347	8.438	8.814
E	0.250	0.260	6.350	6.604
E1	-----	0.290	-----	7.366
E2	0.170	0.180	4.318	4.572
E3	0.030	-----	0.762	-----
e	0.050	BSC	1.270	BSC
L	0.340	0.360	8.636	9.144
Q	0.026	-----	0.660	-----
S1	0.005	-----	0.127	-----



1. All exposed metallized areas are gold plated over electroplated nickel per MIL-PRF-38535.
2. The lid is electrically connected to  $V_{SS}$ .
3. Lead finishes are in accordance with MIL-PRF-38535.
4. Dimension symbol is in accordance with MIL-PRF-38533.
5. Lead position and colanarity are not measured.

Figure 1. 14-lead Flatpack

## Ordering Information: UT54ACTS74E: 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**

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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