

UT54ACS08E/UT54ACTS08E

Quadruple 2-Input AND Gates

January, 2018

Datasheet

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FEATURES

- 0.6µm CRH CMOS Process
 - Latchup immune
- High speed
- Low power consumption
- Wide power supply operating range of 3.0V to 5.5V
- Available QML Q or V processes
- 14-lead flatpack
- UT54ACS08E-SMD-5962-96518
- UT54ACTS08E-SMD-5962-96519

DESCRIPTION

The UT54ACS08E and UT54ACTS08E are quadruple two-input AND gates. The circuits perform the Boolean functions $Y = A \cdot B$ or

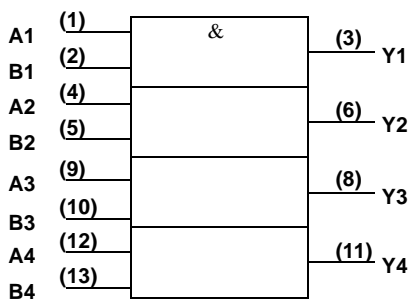
$$Y = \overline{\overline{A} + \overline{B}} \text{ in positive logic.}$$

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

FUNCTION TABLE

INPUT		OUTPUT
A	B	Y
H	H	H
L	X	L
X	L	L

LOGIC SYMBOL

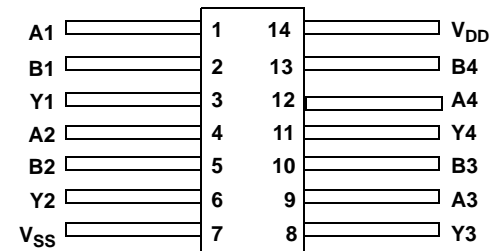


Note:

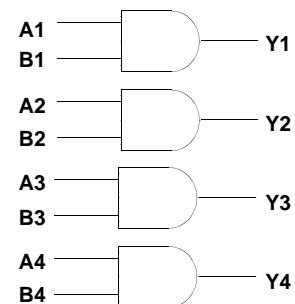
1. Logic symbol in accordance with ANSI/IEEE standard 91-1984 and IEC Publication 617-12.

PINOUT

14-Pin Flatpack
Top View



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 RATINGS¹

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	15.5 (ACS) 15.0 (ACTS)	°C/W
I _I	DC input current	±10	mA
P _D ²	Maximum package power dissipation permitted @ T _c =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 _{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 UT54ACS08E⁷

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

SYMBOL	DESCRIPTION	CONDITION	MIN	MAX	UNIT
V_{IL}	Low-level input voltage ¹	V_{DD} from 3.0V to 5.5V		$0.3 V_{DD}$	V
V_{IH}	High-level input voltage ¹	V_{DD} from 3.0V to 5.5V	$0.7 V_{DD}$		V
I_{IN}	Input leakage current	$V_{IN} = V_{DD}$ or V_{SS}	-1	1	μA
V_{OL}	Low-level output voltage ³	$I_{OL} = 100\mu A$ V_{DD} from 3.0V to 5.5V		0.25	V
V_{OH}	High-level output voltage ³	$I_{OH} = -100\mu A$ V_{DD} from 3.0V to 5.5V	$V_{DD} - 0.25$		V
I_{OS1}	Short-circuit output current ^{2,4}	$V_O = V_{DD}$ and V_{SS} , V_{DD} from 4.5V to 5.5V	-200	200	mA
I_{OS2}	Short-circuit output current ^{2,4}	$V_O = V_{DD}$ and V_{SS} , V_{DD} from 3.0V to 3.6V	-100	100	mA
I_{OL1}	Low level output current (sink) ⁹	$V_{IN} = V_{DD}$ or V_{SS} $V_{OL} = 0.4V$ V_{DD} from 4.5V to 5.5V	8		mA
I_{OL2}	Low level output current (sink) ⁹	$V_{IN} = V_{DD}$ or V_{SS} $V_{OL} = 0.4V$ V_{DD} from 3.0V to 3.6V	6		mA
I_{OH1}	High level output current (source) ⁹	$V_{IN} = V_{DD}$ 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 (source) ⁹	$V_{IN} = V_{DD}$ or V_{SS} $V_{OH} = V_{DD} - 0.4V$ V_{DD} from 3.0V to 3.6V	-6		mA
P_{total1}	Power dissipation ^{2,8}	$C_L = 50pF$, $V_{DD} = 4.5V$ to $5.5V$		1	mW/ MHz
P_{total2}	Power dissipation ^{2,8}	$C_L = 50pF$, $V_{DD} = 3.0V$ to $3.6V$		0.5	mW/ MHz

I_{DDQ}	Quiescent Supply Current	Pre-Rad All Device Types	$V_{IN} = V_{DD}$ or V_{SS}		10	μA
		Post-Rad Device Type - 03	$V_{DD} = V_{DD} \text{ MAX}$		50	
		Post-Rad Device Type - 02			130	
C_{IN}	Input capacitance ⁵		$f = 1\text{MHz}$ $V_{DD} = 0V$		15	pF
C_{OUT}	Output capacitance ⁵		$f = 1\text{MHz}$ $V_{DD} = 0V$		15	pF

- Notes:**
- 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 $V_{IL}(\text{max})$.
 - Supplied as a design limit but not guaranteed or tested.
 - 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 3,765pF/MHz.
 - Not more than one output may be shorted at a time for maximum duration of one second.
 - Capacitance measured for initial qualification and when design changes may affect the value. Capacitance is measured between the designated terminal and V_{SS} at a frequency of 1MHz and a signal amplitude of 50mV rms maximum.
 - Maximum allowable relative shift equals 50mV.
 - Device type 02 is only offered with a TID tolerance guarantee of 3E5 rads(Si), and 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.
 - Power dissipation specified per switching output.
 - Guaranteed by characterization, but not tested.

AC ELECTRICAL CHARACTERISTICS FOR THE UT54ACS08E²

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

SYMBOL	PARAMETER		V_{DD}	MINIMUM	MAXIMUM	UNIT
t_{PLH}	Input to Yn	$C_L = 50pF$	3.0V to 3.6V	2	15	ns
			4.5V to 5.5V	1	9	
t_{PHL}	Input to Yn	$C_L = 50pF$	3.0V to 3.6V	2	19	ns
			4.5V to 5.5V	1	9	

Notes:

1. Maximum allowable relative shift equals 50mV.
2. Device type 02 is only offered with a TID tolerance guarantee of 3E5 rads(Si), and 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.

DC ELECTRICAL CHARACTERISTICS FOR THE UT54ACTS08E⁷

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

SYMBOL	DESCRIPTION		CONDITION	VDD	MIN	MAX	UNIT
V_{IL}	Low-level input voltage ¹			3.0V		0.8	V
				5.5V		0.8	
V_{IH}	High-level input voltage ¹			3.0V	2.0		V
				5.5V	2.75		
I_{IN}	Input leakage current		$V_{IN} = V_{DD}$ or V_{SS}	5.5V	-1	1	μA
V_{OL}	Low-level output voltage ³		$I_{OL} = 6mA$	3.0V		0.4	V
			$I_{OL} = 8mA$	4.5V		0.4	V
V_{OH}	High-level output voltage ³		$I_{OH} = -6mA$	3.0V	2.4		V
			$I_{OH} = -8mA$	4.5V	3.15		V
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		$V_{IN} = V_{DD}$ or V_{SS} $V_{OL} = 0.4V$	3.0V	6		mA
				5.5V	8		
I_{OH}	High level output current		$V_{IN} = V_{DD}$ or V_{SS} $V_{OH} = V_{DD} - 0.4V$	3.0V	-6		mA
				5.5V	-8		
P_{total}	Power dissipation ^{2, 8, ,9}		$C_L = 50pF$	5.5V		1.8	mW/ MHz
				3.0V		0.72	
I_{DDQ}	Quiescent Supply Current	Pre-Rad All Device Types	$V_{IN} = V_{DD}$ or V_{SS} $V_{DD} = V_{DD} MAX$	5.5V		10	μA
		Post-Rad Device Type - 03		5.5V		50	
		Post-Rad Device Type - 02		5.5V		130	
ΔI_{DDQ}	Quiescent Supply Current Delta		For input under test $V_{IN} = V_{DD} - 2.1V$ For all other inputs $V_{IN} = V_{DD}$ or V_{SS}	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 3,765pF/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 02 is only offered with a TID tolerance guarantee of 3E5 rads(Si), and 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.
8. Power does not include power contribution of any TTL output sink current
9. Power dissipation specified per switching output.

AC ELECTRICAL CHARACTERISTICS FOR THE UT54ACTS08E²

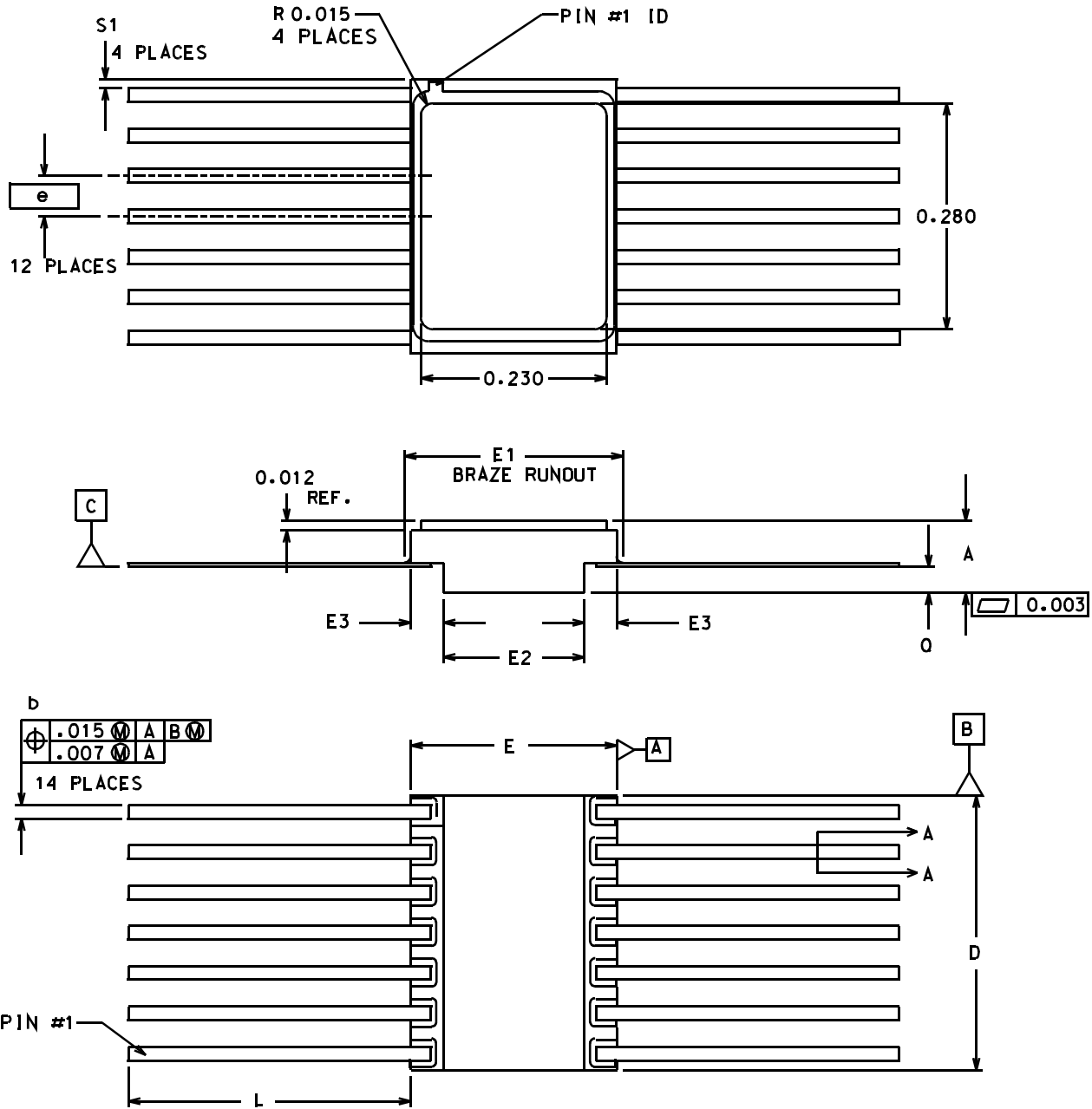
($V_{DD} = 3.0V$ to $5.5V$; $V_{SS} = 0V$ ¹, $-55^{\circ}C < T_C < +125^{\circ}C$)

SYMBOL	PARAMETER		V_{DD}	MINIMUM	MAXIMUM	UNIT
t_{PLH}	Input to Y_n	$C_L = 30pF$	3.0V to 3.6V	1	10	ns
			4.5V to 5.5V	1	6	
		$C_L = 50pF$	3.0V to 3.6V	1	14	ns
			4.5V to 5.5V	1	10	
t_{PHL}	Input to Y_n	$C_L = 30pF$	3.0V to 3.6V	1	13	ns
			4.5V to 5.5V	1	9	
		$C_L = 50pF$	3.0V to 3.6V	1	17	ns
			4.5V to 5.5V	1	13	

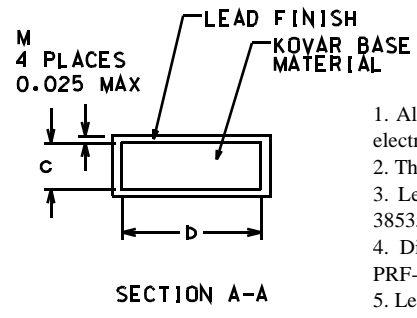
Notes:

1. Maximum allowable relative shift equals 50mV.
2. Device type 02 is only offered with a TID tolerance guarantee of 3E5 rads(Si), and 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.

Packaging



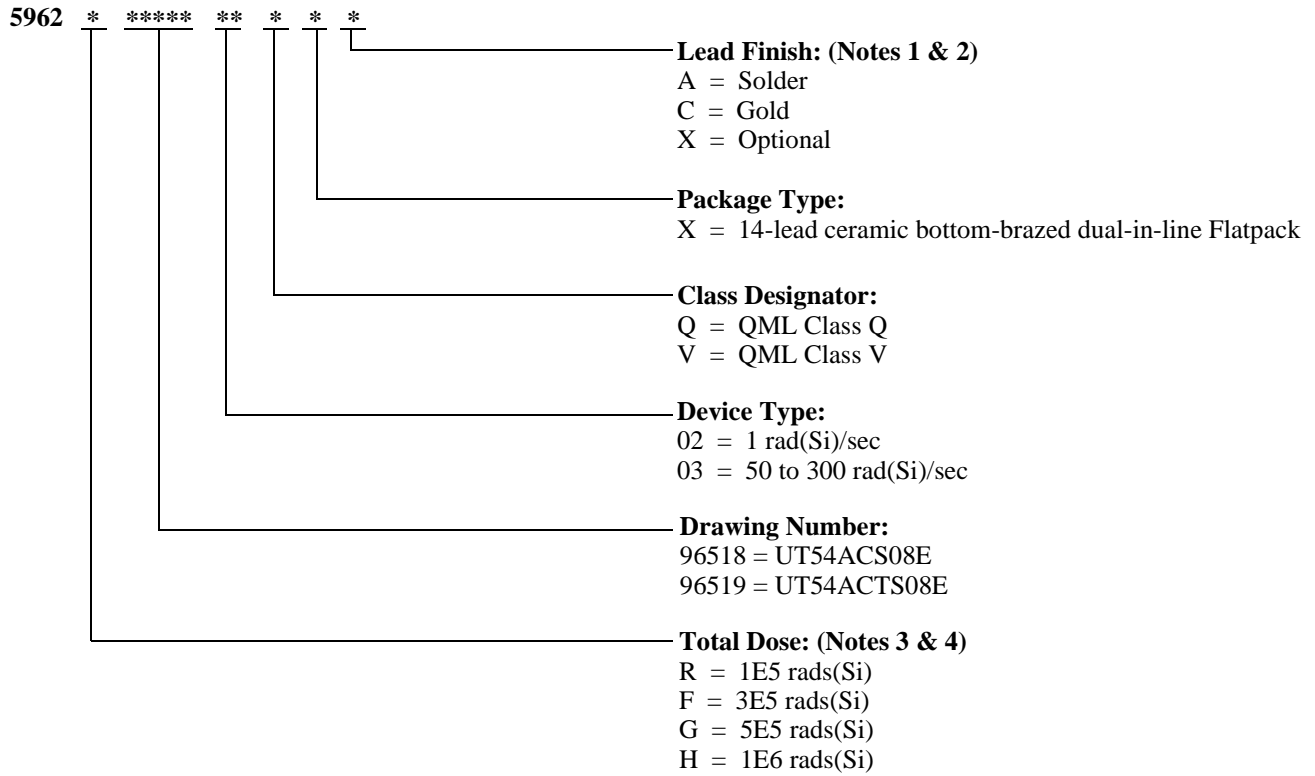
DIM	INCH		MILLIMETER	
	MIN.	MAX.	MIN.	MAX.
A	0.079	0.101	2.007	2.575
B	0.015	0.019	0.381	0.483
C	0.004	0.006	0.102	0.152
D	0.333	0.347	8.438	8.814
E	0.250	0.260	6.350	6.604
E1	-----	0.290	-----	7.366
E2	0.170	0.180	4.318	4.572
E3	0.030	-----	0.762	-----
e	0.050	BSC	1.270	BSC
L	0.340	0.360	8.636	9.144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



1. All exposed metallized areas are gold plated 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: UT54ACS08E and UT54ACTS08E: 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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DATA SHEET REVISION HISTORY

Revision Date	Description of Change	Author
10-17	Pages 4 and 6 edited IDDQ Applied new Cobham Data Sheet template to the document.	RT
1-18	Updates to reflect current SMD	RT