

# UT54ACS264/UT54ACTS264

## Radiation-Hardened

## Look-Ahead Carry Generators for Counters

### FEATURES

- Performs look-ahead carry across n-bit counters
- Accommodates active-high or active-low carry
- Improves cascaded counters system performance
- 1.2 $\mu$  radiation-hardened 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

### DESCRIPTION

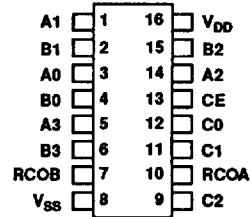
The UT54ACS264 and the UT54ACTS264 are look-ahead generators designed specifically to perform a carry-anticipate across any number of n-bit counters, thus increasing system clock frequency. A carry enable CE, and carry outputs RCOA and RCOB are provided for n-bit cascading.

Use the counter with either active-high-carry or active-low-carry counters. For active-high-carry counters, CE is active high, the A set of inputs and output RCOA are used. The B set of inputs are connected to a low logic level. For active-low-carry counters, CE is active low, the B set of inputs and output RCOB are used. The A set of inputs are connected to a high logic level.

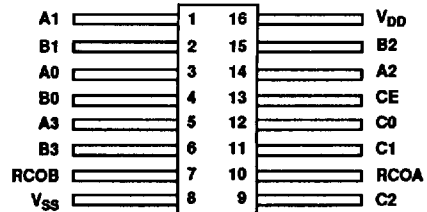
The devices are characterized over full military temperature range of -55°C to +125°C.

### PINOUTS

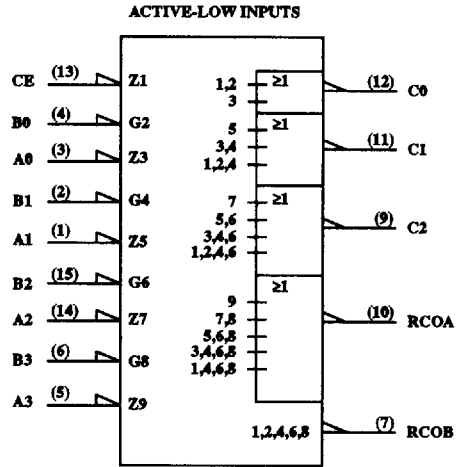
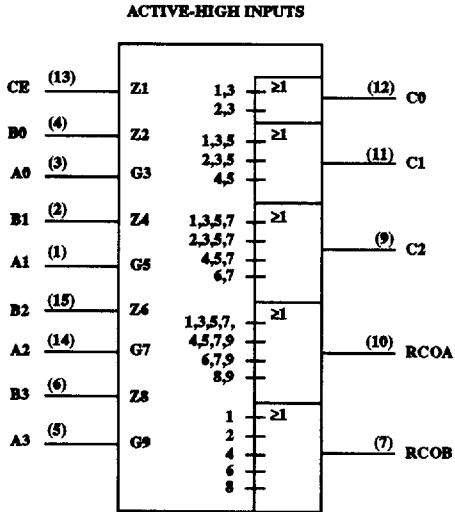
16-Pin DIP  
Top View



16-Lead Flatpack  
Top View



**LOGIC SYMBOL**



**FUNCTION TABLE FOR C0 OUTPUT**

INPUTS			OUTPUT
A0	B0	CE	C0
H	H	X	H
H	X	H	H
L	X	X	L
X	L	L	L

**FUNCTION TABLE FOR C2 OUTPUT**

INPUTS							OUTPUT
A2	A1	A0	B2	B1	B0	CE	C2
H	X	X	H	X	X	X	H
H	H	X	X	H	X	X	H
H	H	H	X	X	H	X	H
H	H	H	X	X	X	H	H
L	X	X	X	X	X	X	L
X	L	X	L	X	X	X	L
X	X	L	L	L	X	X	L
X	X	X	L	L	L	L	L

**FUNCTION TABLE FOR C1 OUTPUT**

INPUTS					OUTPUT
A1	A0	B1	B0	CE	C1
H	X	H	X	X	H
H	H	X	H	X	H
H	H	X	X	H	H
L	X	X	X	X	L
X	L	L	X	X	L
X	X	L	L	L	L

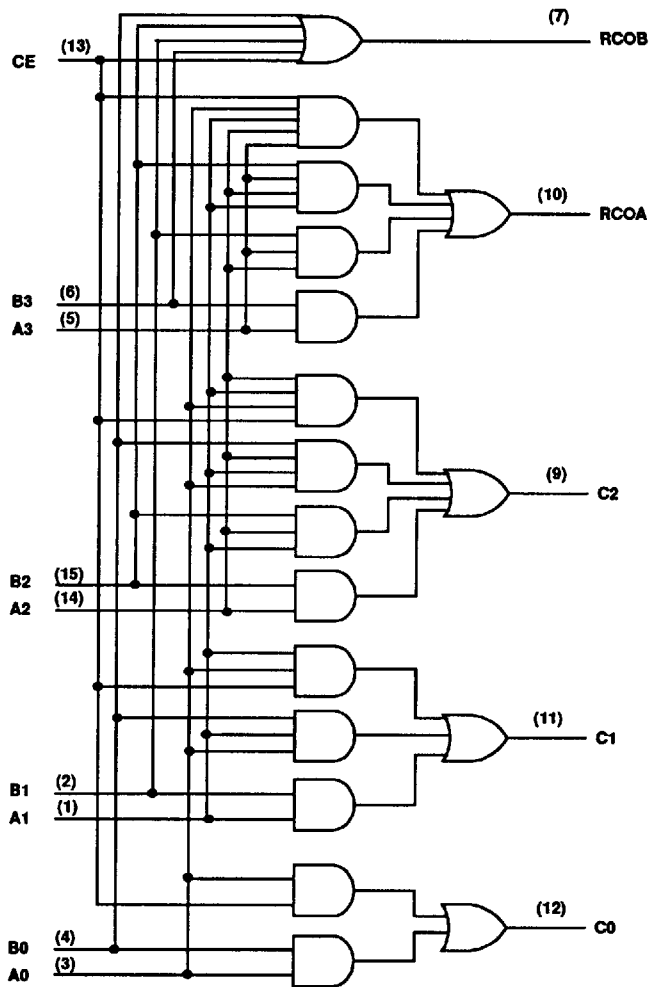
**FUNCTION TABLE FOR RCOA OUTPUT**

INPUTS								OUTPUT
A3	A2	A1	A0	B3	B2	B1	CE	RCOA
H	X	X	X	H	X	X	X	H
H	H	X	X	X	H	X	X	H
H	H	H	X	X	X	H	X	H
H	H	H	H	X	X	X	H	H
L	X	X	X	X	X	X	X	L
X	L	X	X	L	X	X	X	L
X	X	L	X	L	L	X	X	L
X	X	X	L	L	L	L	X	L
X	X	X	X	L	L	L	L	L

**FUNCTION TABLE FOR RCOB OUTPUT**

INPUTS					OUTPUT
B3	B2	B1	B0	CE	RCOB
H	X	X	X	X	H
X	H	X	X	X	H
X	X	H	X	X	H
X	X	X	H	X	H
X	X	X	X	H	H
L	L	L	L	L	L

LOGIC DIAGRAM



**RADIATION HARDNESS SPECIFICATIONS <sup>1</sup>**

PARAMETER	LIMIT	UNITS
Total Dose	1.0E6	rads(Si)
SEU & SEL Threshold <sup>2</sup>	80	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 7.0	V
V <sub>I/O</sub>	Voltage any pin	-3 to V <sub>DD</sub> +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	20	°C/W
I <sub>I</sub>	DC input current	±10	mA
P <sub>D</sub>	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 <sub>DD</sub>	Supply voltage	4.5 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

UT54ACS264/UT54ACTS264

DC ELECTRICAL CHARACTERISTICS <sup>7</sup>

(V<sub>DD</sub> = 5.0V ±10%; V<sub>SS</sub> = 0V <sup>6</sup>, -55°C < T<sub>C</sub> < +125°C)

SYMBOL	PARAMETER	CONDITION	MIN	MAX	UNIT
V <sub>IL</sub>	Low-level input voltage <sup>1</sup> ACTS ACS			0.8 .3V <sub>DD</sub>	V
V <sub>IH</sub>	High-level input voltage <sup>1</sup> ACTS ACS		.5V <sub>DD</sub> .7V <sub>DD</sub>		V
I <sub>IN</sub>	Input leakage current ACTS/ACS	V <sub>IN</sub> = V <sub>DD</sub> or V <sub>SS</sub>	-1	1	μA
V <sub>OL</sub>	Low-level output voltage <sup>3</sup> ACTS ACS	I <sub>OL</sub> = 8mA I <sub>OL</sub> = 100μA		0.40 0.25	V
V <sub>OH</sub>	High-level output voltage <sup>3</sup> ACTS ACS	I <sub>OH</sub> = -8mA I <sub>OH</sub> = -100μA	.7V <sub>DD</sub> V <sub>DD</sub> - 0.25		V
I <sub>OS</sub>	Short-circuit output current <sup>2,4</sup> ACTS/ACS	V <sub>O</sub> = V <sub>DD</sub> and V <sub>SS</sub>	-200	200	mA
P <sub>total</sub>	Power dissipation <sup>8,9</sup>	C <sub>L</sub> = 50pF		2.2	mW/ MHz
I <sub>DDQ</sub>	Quiescent Supply Current	V <sub>DD</sub> = 5.5V		10	μA
C <sub>IN</sub>	Input capacitance <sup>5</sup>	f = 1MHz @ 0V		15	pF
C <sub>OUT</sub>	Output capacitance <sup>5</sup>	f = 1MHz @ 0V		15	pF

Notes:

- Functional tests are conducted in accordance with MIL-STD-883 with the following input test conditions: V<sub>IH</sub> = V<sub>IH</sub>(min) + 20%, - 0%; V<sub>IL</sub> = V<sub>IL</sub>(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<sub>IH</sub>(min) and V<sub>IL</sub>(max).
- Supplied as a design limit but not guaranteed or tested.
- Per MIL-M-38510, for current density ≤ 5.0E5 amps/cm<sup>2</sup>, the maximum product of load capacitance (per output buffer) times frequency should not exceed 3,765 pF 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<sub>SS</sub> at frequency of 1MHz and a signal amplitude of 50mV rms maximum.
- Maximum allowable relative shift equals 50mV.
- All specifications valid for radiation dose ≤ 1E6 rads(Si).
- Power does not include power contribution of any TTL output sink current.
- Power dissipation specified per switching output.

**AC ELECTRICAL CHARACTERISTICS <sup>2</sup>** $(V_{DD} = 5.0V \pm 10\%; V_{SS} = 0V^1, -55^\circ C < T_C < +125^\circ C)$ 

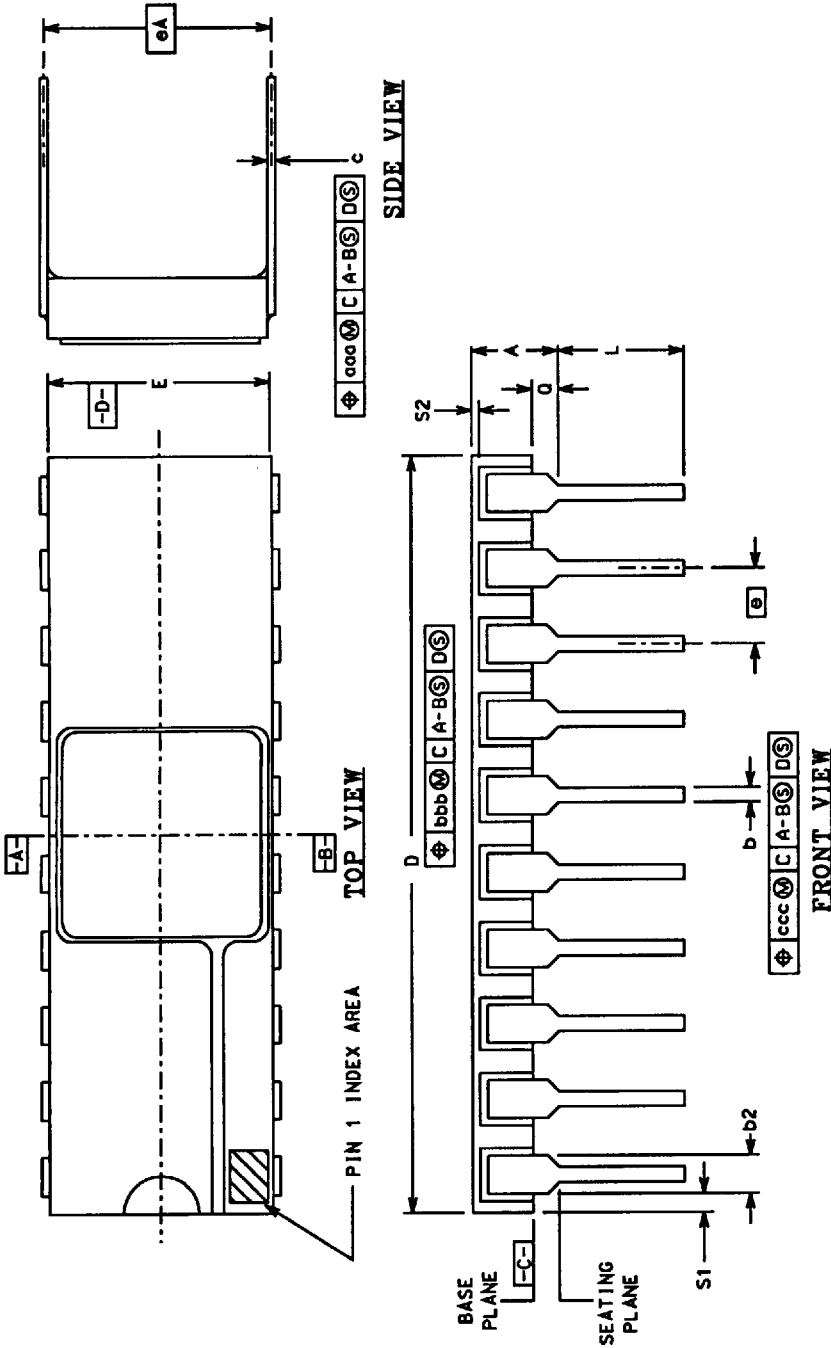
SYMBOL	PARAMETER	MINIMUM	MAXIMUM	UNIT
$t_{PLH}$	CE to C0, C1, C2	1	17	ns
$t_{PHL}$	CE to C0, C1, C2	1	16	ns
$t_{PLH}$	An or Bn to C0, C1, C2	1	15	ns
$t_{PHL}$	An or Bn to C0, C1, C2	1	17	ns
$t_{PLH}$	An, Bn or CE to RCOA	1	15	ns
$t_{PHL}$	An, Bn or CE to RCOA	1	15	ns
$t_{PLH}$	Bn or CE to RCOB	1	12	ns
$t_{PHL}$	Bn or CE to RCOB	1	15	ns

**Notes:**

1. Maximum allowable relative shift equals 50mV.
2. All specifications valid for radiation dose  $\leq 1E6$  rads(Si).

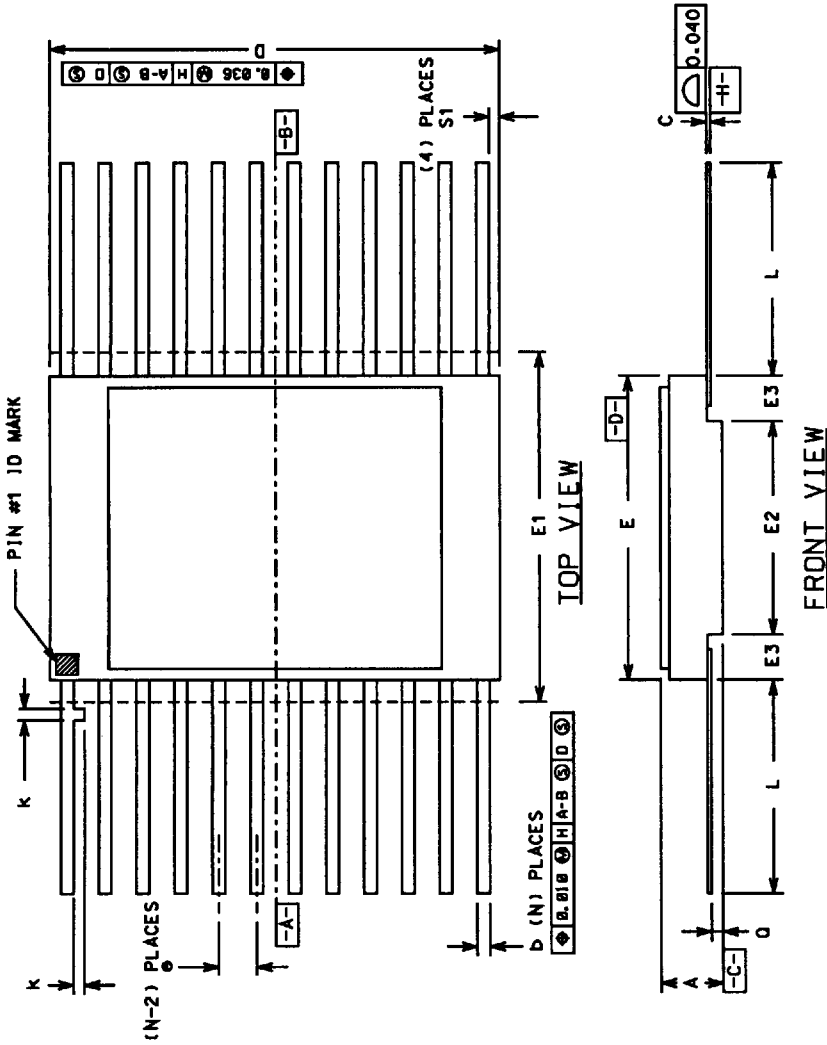
## 2.0 RAD-HARD MSI PACKAGES

### Side-Brazed Packages



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

# 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	O	S1		
-03	14	F-2A	0.115	0.022	0.009	0.390	0.260	0.290	---	---	0.130	0.030	0.050	0.015	0.370	0.045	---
			0.045	0.015	0.004	---	0.235	---	---	---	---	---	BSC	0.008	0.270	0.026	0.005
-04	16	F-5A	0.115	0.022	0.009	0.440	0.285	0.315	---	---	0.130	0.030	0.050	0.015	0.370	0.045	---
			0.045	0.015	0.004	---	0.245	---	---	---	---	---	BSC	0.008	0.250	0.026	0.005
-05	20	F-9A	0.115	0.022	0.009	0.540	0.300	0.330	---	---	0.130	0.030	0.050	0.015	0.370	0.045	---
			0.045	0.015	0.004	---	0.245	---	---	---	---	---	BSC	0.008	0.250	0.026	0.000