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
- 1.2µ 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

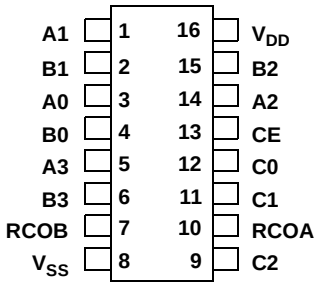
The UT54ACS264 and the UT54ACTS264 are look-ahead generators designed specifically to perform a carry-anticipate across any number of n-bit counters, thus increasing system clock frequency. A carry enable CE, and carry outputs RCOA and RCOB are provided for n-bit cascading.

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.

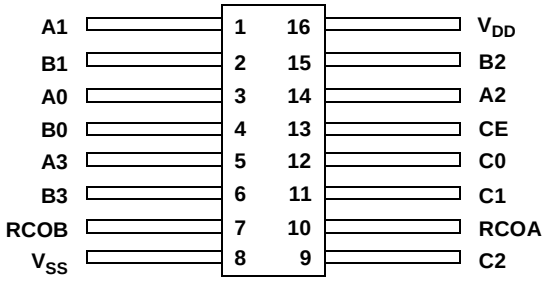
The devices are characterized over full military temperature range of -55°C to +125°C.

PINOUTS

16-Pin DIP
Top View

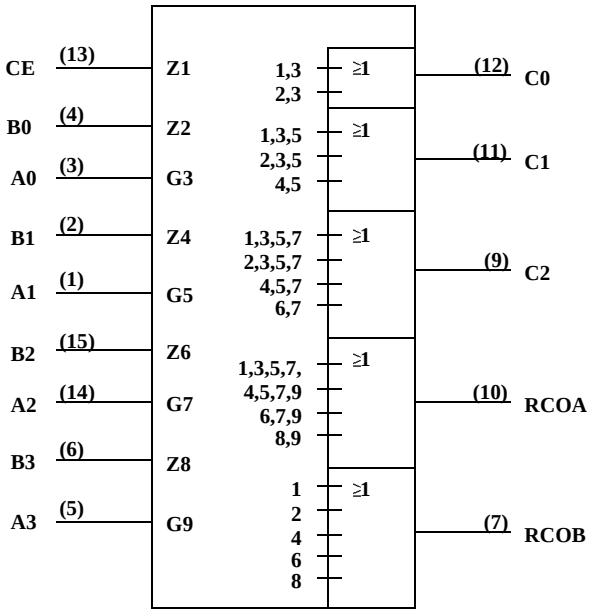


16-Lead Flatpack
Top View

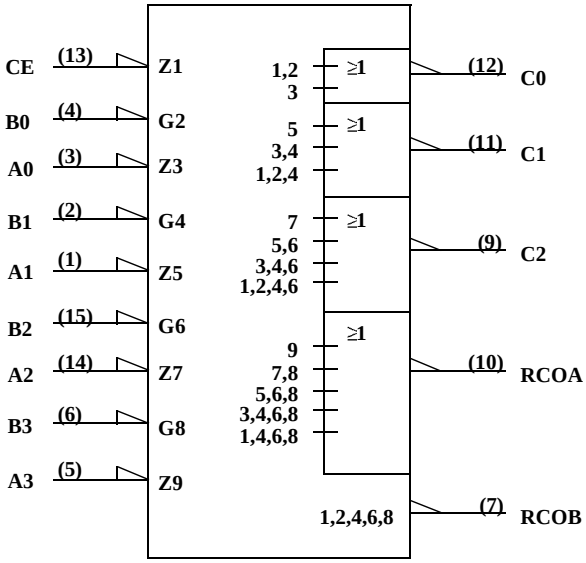


LOGIC SYMBOL

ACTIVE-HIGH INPUTS



ACTIVE-LOW INPUTS



Notes:

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

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 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 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

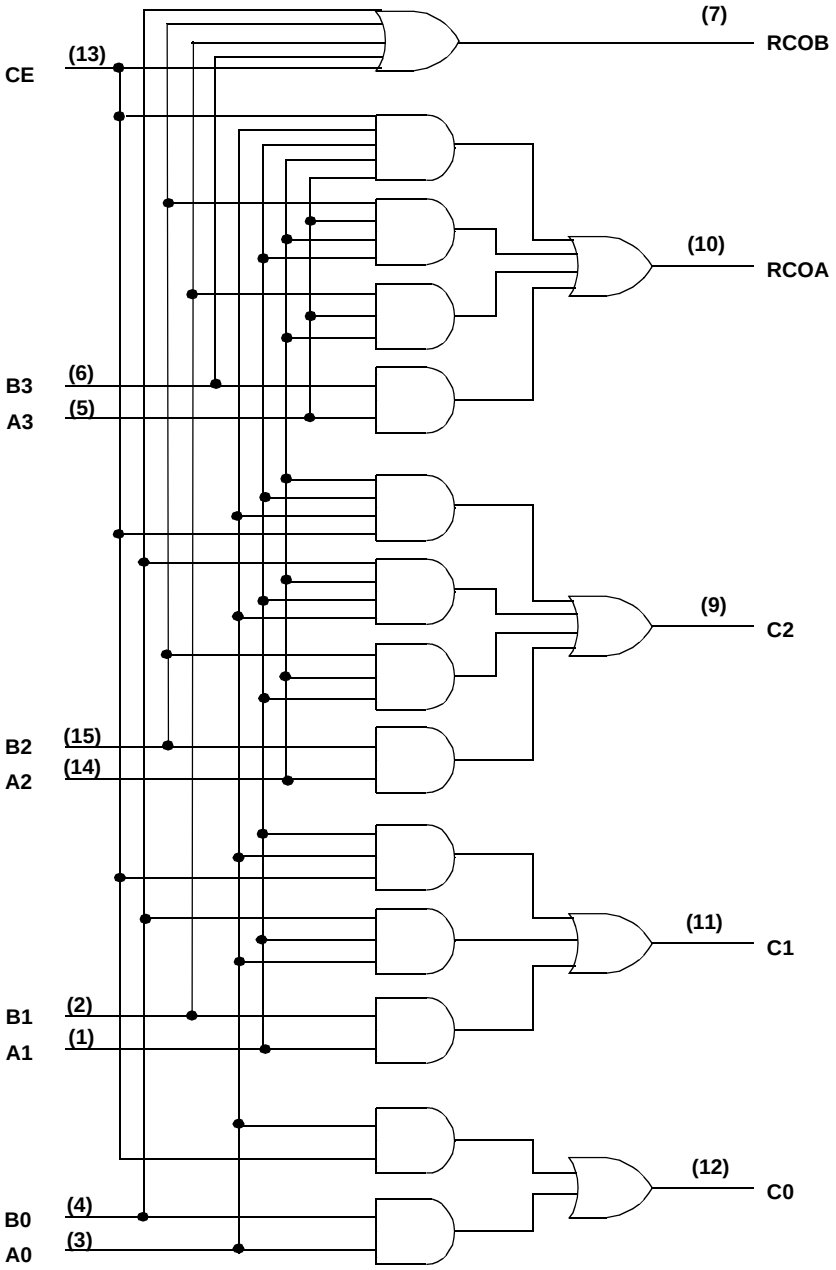
FUNCTION TABLE FOR C2 OUTPUT

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 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

LOGIC DIAGRAM



RADIATION HARDNESS SPECIFICATIONS [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	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

DC ELECTRICAL CHARACTERISTICS [7]

(V_{DD} = 5.0V ±10%; V_{SS} = 0V [6], -55°C < T_C < +125°C)

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		2.2	mW/ MHz
I_{DDQ}	Quiescent Supply Current	V_{DD} = 5.5V		10	µA
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 3,765 pF/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).
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)

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 ≤ 1E6 rads(Si).