UT54ACS541/UT54ACTS541

Radiation-Hardened
Octal Buffers & Line Drivers, Three-State Outputs

Dec. 1, 2003

FEATURES

- Three-state outputs drive bus lines or buffer memory address registers
- 1.2μ radiation-hardened CMOS (ACS541) and 0.6μ CRH CMOS process (ACTS541)
  - Latchup immune
- High speed
- Low power consumption
- Single 5 volt supply
- Available QML Q or V processes
- Flexible package
  - 20-pin DIP (not available for the ACTS541)
  - 20-lead flatpack

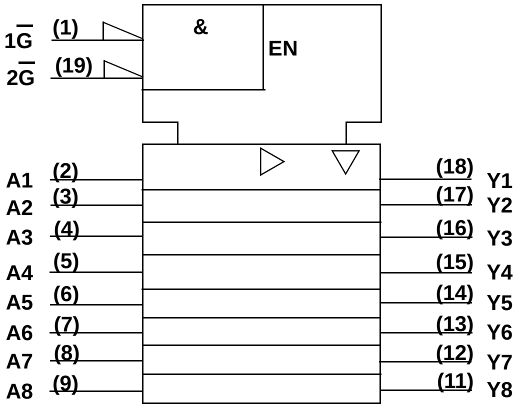
DESCRIPTION

The UT54ACS541 and the UT54ACTS541 are non-inverting octal buffers and line drivers which improve the performance and density of three-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The devices are characterized over full military temperature range of -55°C to +125°C.

FUNCTION TABLE

INPUTS			OUTPUT
$\overline{1G}$	$\overline{2G}$	An	Yn
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

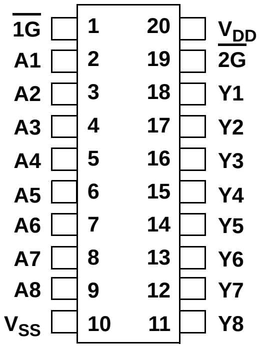
LOGIC SYMBOL



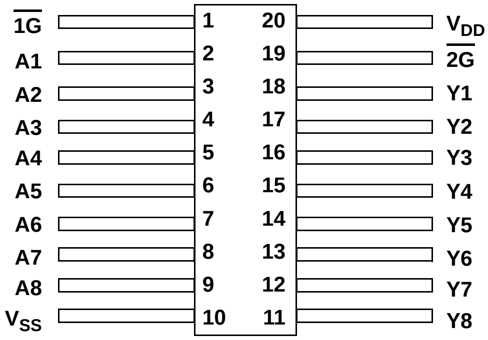
Note:
1. Logic symbol in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

PINOUTS

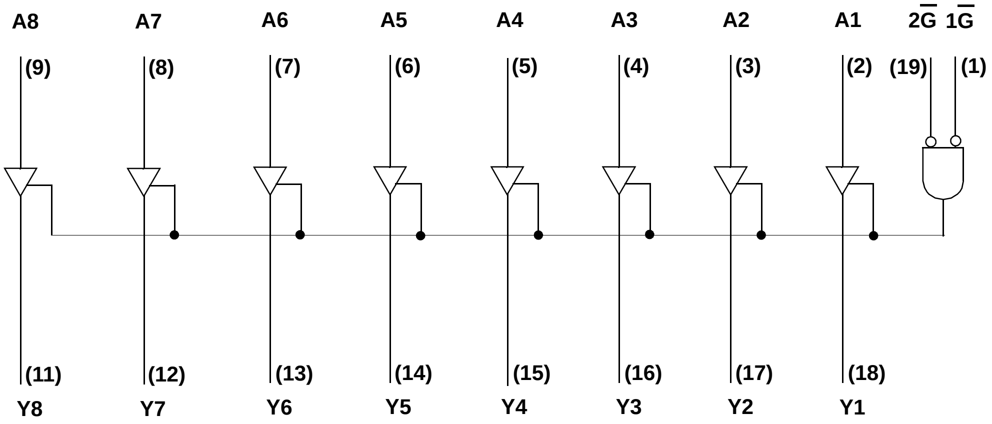
20-Pin DIP
Top View



20-Lead Flatpack
Top View



LOGIC DIAGRAM



RADIATION HARDNESS SPECIFICATIONS [1]

PARAMETER	LIMIT	UNITS
Total Dose	1.0E6 (ACS541) 5.0E5 (ACTS541)	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} = 12.0mA I_{OL} = 100µA		0.40 0.25	V
V_{OH}	High-level output voltage [3] ACTS ACS	I_{OH} = -12.0mA I_{OH} = -100µA	.7V_{DD} V_{DD} - 0.25		V
I_{OZ}	Three-state output leakage current	V_O = V_{DD} and V_{SS}	-30	30	µA
I_{OS}	Short-circuit output current [2,4] ACTS/ACS	V_O = V_{DD} and V_{SS}	-300	300	mA
I_{OL}	Output current[10] (Sink)	V_{IN} = V_{DD} or V_{SS} V_{OL} = 0.4V	12		mA
I_{OH}	Output current[10] (Source)	V_{IN} = V_{DD} or V_{SS} V_{OH} = V_{DD} - 0.4V	-12		mA
P_{total}	Power dissipation [2, 8, 9]	C_L = 50pF		2.1	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 ACS specifications are valid for radiation dose $\leq$1E6 rads(Si), and all ACTS specifications are valid for radiation dose $\leq$5E5 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}	An to Yn	1	11	ns
t_{PHL}	An to Yn	1	14	ns
t_{PZL}	$\overline{G}$ low to Yn active	2	14	ns
t_{PZH}	$\overline{G}$ low to Yn active	2	15	ns
t_{PLZ}	$\overline{G}$ high to Yn three-state	2	12	ns
t_{PHZ}	$\overline{G}$ high to Yn three-state	2	13	ns

Notes:
1. Maximum allowable relative shift equals 50mV.
2. For the ACTS version, all specifications are valid for radiation dose ≤1E6 rads(Si). For the ACTS version, all specifications are valid for radiation dose ≤5E5 rads(Si).