

DESCRIPTION

The S5480/N7480 is a single-bit, high-speed, binary full adder with gated complementary inputs, complementary sum (Σ and $\bar{\Sigma}$) outputs and inverted carry output. Designed for medium- and high-speed, multiple-bit, parallel-add/serial-carry applications, the circuit (see schematic diagram) utilizes diode-transistor logic (DTL) for the gated inputs, and high-speed, high-fan-out transistor-transistor logic (TTL) for the sum and carry outputs. The circuit is entirely compatible with both DTL and TTL logic families. The implementation of a single-inversion, high-speed, Darlington-connected serial-carry circuit minimizes the necessity for extensive "look-ahead" and carry-cascading circuits. The power dissipation has been maintained considerably below that attainable with equivalent standard integrated circuits connected to perform full-adder functions.

TRUTH TABLE (See Notes 1, 2, and 3)

LOGIC

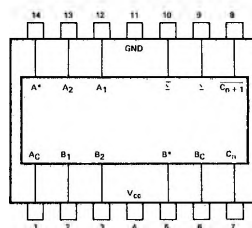
C_n	B	A	C_{n+1}	$\bar{\Sigma}$	Σ
0	0	0	1	1	0
0	0	1	1	0	1
0	1	0	1	0	1
0	1	1	0	1	0
1	0	0	1	0	1
1	0	1	0	1	0
1	1	0	0	1	0
1	1	1	0	0	1

NOTES:

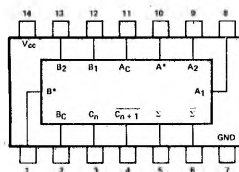
1. $A = \bar{A}^* \cdot \bar{A}_C$, $B = \bar{B}^* \cdot \bar{B}_C$ where $A^* = \bar{A}_1 \cdot \bar{A}_2$, $B^* = \bar{B}_1 \cdot \bar{B}_2$.
2. When A^* or B^* are used as inputs, A_1 and A_2 or B_1 and B_2 respectively, must be connected to GND.

PIN CONFIGURATIONS

W PACKAGE

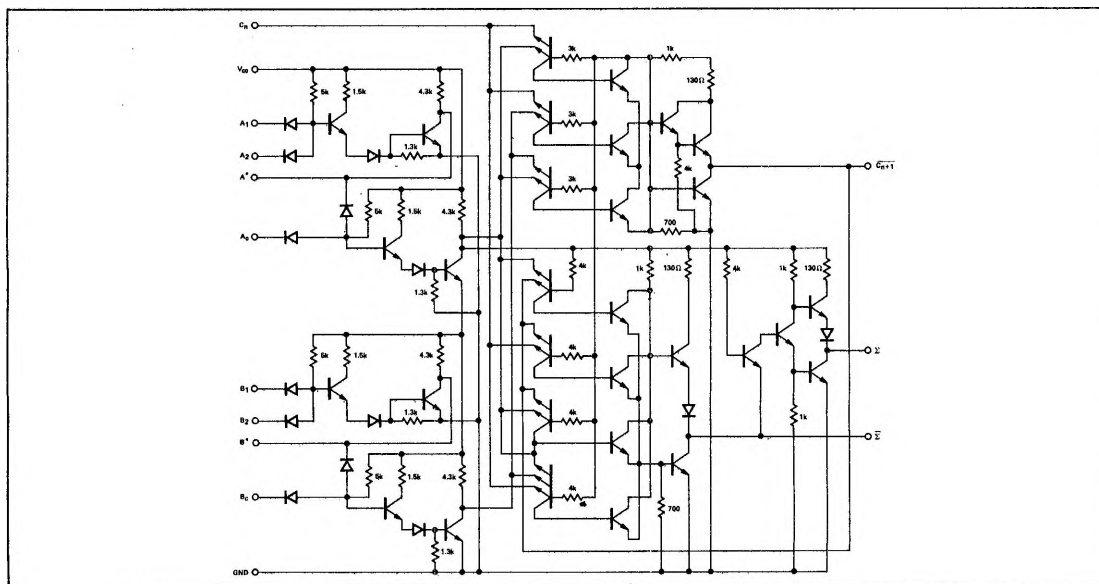


A,F PACKAGE



3. When A_1 and A_2 or B_1 and B_2 are used as inputs, A^* or B^* respectively, must be open or used to perform Dot-OR logic.
4. The voltages are with respect to ground terminal.
5. Input signals must be zero or positive with respect to network ground terminal.

SCHEMATIC DIAGRAM



DIGITAL 54/74 TTL SERIES ■ S5480, N7480

RECOMMENDED OPERATING CONDITIONS

	MIN	NOM	MAX	UNIT
Supply Voltage V_{CC} : S5480 Circuits	4.5	5	5.25	V
N7480 Circuits	4.75	5	5.25	V
Normalized Fan-Out from Outputs: C_{n+1} , N			5	
Σ or Σ , N			10	
A* or B*, N			3	
Operating Free-Air Temperature Range, T_A : S5480 Circuits	-55	25	125	°C
N7480 Circuits	0	25	70	°C

ELECTRICAL CHARACTERISTICS (over recommended operating free-air temperature range unless otherwise noted)

PARAMETER	TEST CONDITIONS*	MIN	TYP**	MAX	UNIT
$V_{in(1)}$ Logical 1 input voltage	$V_{CC} = \text{MIN}$	2			V
$V_{in(0)}$ Logical 0 input voltage	$V_{CC} = \text{MIN}$			0.8	V
$V_{out(1)}$ Logical 1 output voltage	$V_{CC} = \text{MIN}$	2.4	3.5		V
$V_{out(0)}$ Logical 0 output voltage	$V_{CC} = \text{MIN}$		0.22	0.4	V
$I_{in(0)}$ Logical 0 level input current at A ₁ , A ₂ , B ₁ , B ₂ , A _C or B _C	$V_{CC} = \text{MAX}$, $V_{in} = 0.4V$			-1.6	mA
$I_{in(0)}$ Logical 0 level input current at A* or B*	$V_{CC} = \text{MAX}$, $V_{in} = 0.4V$			-2.6	mA
$I_{in(0)}$ Logical 0 level input current at C _n	$V_{CC} = \text{MAX}$, $V_{in} = 0.4V$			-8	mA
$I_{in(1)}$ Logical 1 level input current at A ₁ , A ₂ , B ₁ , B ₂ , A _C or B _C	$V_{CC} = \text{MAX}$, $V_{in} = 2.4V$ $V_{CC} = \text{MAX}$, $V_{in} = 5.5V$			15 1	μA mA
$I_{in(1)}$ Logical 1 level input current at C _n	$V_{CC} = \text{MAX}$, $V_{in} = 2.4V$ $V_{CC} = \text{MAX}$, $V_{in} = 5.5V$			200 1	μA mA
I_{OS} Short circuit output current at Σ or Σ †	$V_{CC} = \text{MAX}$	S5480 -20 N7480 -18		-57 -57	mA
I_{OS} Short circuit output current at C _{n+1} †	$V_{CC} = \text{MAX}$	S5480 -20 N7480 -18		-70 -70	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}$	S5480 N7480	21 21	31 35	mA

SWITCHING CHARACTERISTICS, $V_{CC} = 5V$, $T_A = 25^\circ C$

PARAMETER†	FROM INPUT	TO OUTPUT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{pd1}	C_n	C_{n+1}	$C_L = 15pF$, $R_L = 780\Omega$		13	17	ns
t_{pd0}	C_n	C_{n+1}	$C_L = 15pF$, $R_L = 780\Omega$		8	12	ns
t_{pd1}	B_C	C_{n+1}	$C_L = 15pF$, $R_L = 780\Omega$		18	25	ns
t_{pd0}	B_C	C_{n+1}	$C_L = 15pF$, $R_L = 780\Omega$		38	55	ns
t_{pd1}	A_C	Σ	$C_L = 15pF$, $R_L = 400\Omega$		52	70	ns
t_{pd0}	A_C	Σ	$C_L = 15pF$, $R_L = 400\Omega$		62	80	ns
t_{pd1}	B_C	Σ	$C_L = 15pF$, $R_L = 400\Omega$		38	55	ns
t_{pd0}	B_C	Σ	$C_L = 15pF$, $R_L = 400\Omega$		56	75	ns
t_{pd1}	A_1	A*	$C_L = 15pF$		48	65	ns
t_{pd0}	A_1	A*	$C_L = 15pF$		17	25	ns
t_{pd1}	B_1	B*	$C_L = 15pF$		48	65	ns
t_{pd0}	B_1	B*	$C_L = 15pF$		17	25	ns

* For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

** All typical values are at $V_{CC} = 5V$, $T_A = 25^\circ C$

† Not more than one output should be shorted at a time.

‡ t_{pd1} is propagation delay time to logical 1 level. t_{pd0} is propagation delay time to logical 0 level.