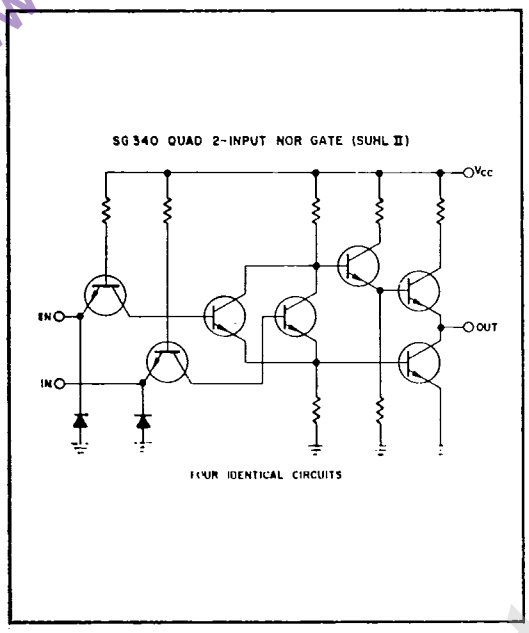
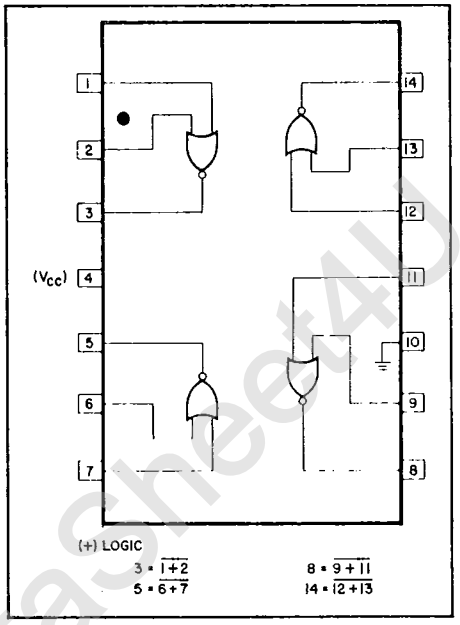
INTEGRATED CIRCUITS SUHL* II

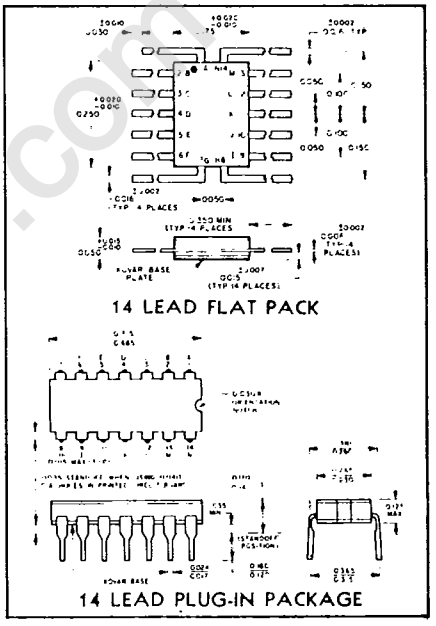
Quad 2-Input Nor/Nand Gate
SG 340 Series

NEW PRODUCT REPORT

Monolithic Silicon Epitaxial Circuit For Military Temp. Range—55° C to+125° C • Industrial 0° C to+75° C







CIRCUIT DESCRIPTION

The SG340 series of gates are members of the SUHL II family of logic elements which is a monolithic, epitaxial, saturated high speed logic family. Each package contains four circuits. Each circuit consists of two input transistors which are OR'ed together and then inverted. Each input has a clamp diode to assist in reducing the effects of system ringing. The gate functions as a NOR element in positive logic, and a NAND element in negative logic. The circuit is designed for high speed operation over the military and industrial temperature range without sacrificing characteristics of fan out, logic swing, noise immunity and capacitance drive at low power.

This circuit requires a single power supply and has the following outstanding features:

CHARACTERISTIC SUMMARY

1. High fan out . . . 11 min. for SG340; 6 min. for SG341; 9 min. for SG342 and 5 min. for SG343.
2. High speed . . . designed to operate at 20 mc, propagation delay time is typically 6 nsec.
3. High noise immunity . . . ±900 mV at 25°C and worst case fan out; ±450 mV from −55°C to +125°C at worst case fan out; ±600 mV from 0°C to +75°C at worst case fan out.
4. High capacitance drive . . . up to 600 pf.
5. High logic swing . . . Logic 0 is typically 0.26 volts; Logic 1 is typically 3.3 volts at 25°C.
6. Short circuit protection.
7. Low power . . . 22 mw average dissipation, per gate.
8. Low output impedance in the "0" and "1" level reduces noise pickup.
9. No complex loading rules since input and output are isolated.

These features offer the logic designer an integrated circuit with combined advantages of speed at low power, high reliability and a high degree of logic flexibility. The result is a digital element that facilitates system design when combined with other SUHL elements.

*Sylvania Universal High Level Logic

SG---00340-1X

RATINGS

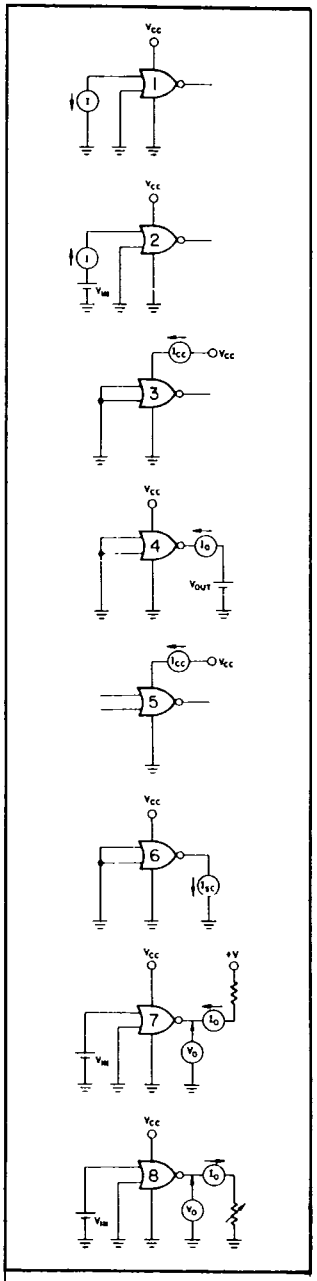
SG 340/341 VOLTAGE	Min.	Typ.	Max.
Supply voltage (D.C.)			8.0 V
Supply voltage (surge, 1 sec)			12.0 V
Supply voltage (operating)	4.5	5.0	6.0 V
Input voltage			5.5 V
Output voltage			5.5 V

SG 340/341 TEMPERATURE AND POWER	Min.	Typ.	Max.
Operating	−55		+125°C
Storage	−65		+200°C
Thermal gradient, junction to air (θja) (Flat Pack)			0.3°C/mW
Thermal gradient, junction to air (θja) (Plug-in)			0.15°C/mW
Power Dissipation (50% Duty Cycle, V_{CC} = +5v)		22	mW/Circuit

ELECTRICAL SPECIFICATIONS

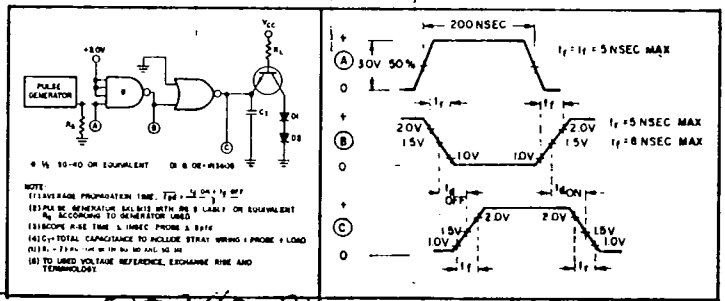
Characteristics at V_{CC} = +5.0V	Symbol	Values at Specified Temperatures −55°C	+25°C	+125°C	Units	Fig. No.
INPUT:						
Input Load Current	I_{IN}	2.0	2.0	2.0	mA Max.	1
@ V_{IN} =		0	0	0	Volts	
Other Inputs		0	0	0	Volts	
Input Leakage Current	I_{IN}	0.1	0.1	0.1	mA Max.	2
@ V_{IN} =		4.5	4.5	4.5	Volts	
Other Inputs		0	0	0	Volts	
Input (OFF Level) Breakdown Voltage	BV_{IN} "1"	5.5	5.5	5.5	Volts	2
I_{IN} =		1.0	1.0	1.0	mA Max.	
Other Inputs		0	0	0	Volts	
Logic "1" Threshold Voltage	V_{MIN} "1"	2.0	1.8	1.5	Volts	7
V_{OUT} =		0.45	0.45	0.45	Volts Max.	
I_{OUT} (SG 340)		22	22	22	mA	
I_{OUT} (SG 341)		12	12	12	mA	
Logic "0" Threshold Voltage	V_{MAX} "0"	0.9	1.1	0.9	Volts	8
V_{OUT} =		2.5	2.4	2.5	Volts Min.	
I_{OUT} (SG 340)		2.2	2.2	2.2	mA	
I_{OUT} (SG 341)		1.2	1.2	1.2	mA	
OUTPUT:						
Output Leakage Current	I_{OUT}	0.25	0.25	0.25	mA Max.	4
@ V_{OUT} =		5.5	5.5	5.5	Volts	
Inputs		0	0	0	Volts	
Output Short Circuit Current	I_{OUT}	25	25	25	mA Min.	6
		100	100	100	mA Max.	
@ Input		0	0	0	Volts	
Logic "0" Level	V_{OUT} "0"	0.40	0.40	0.45	Volts Max.	7
@ V_{IN} =		2.7	2.7	2.7	Volts	
I_{OUT} (SG 340)		22	22	22	mA	
I_{OUT} (SG 341)		12	12	12	mA	
Logic "1" Level	V_{OUT} "1"	2.8	3.1	3.15	Volts Min.	8
@ V_{IN} =		0.45	0.45	0.45	Volts	
I_{OUT} (SG 340)		2.2	2.2	2.2	mA	
I_{OUT} (SG 341)		1.2	1.2	1.2	mA	
POWER REQUIREMENTS:						
Breakdown Current	I_{CC}		40.0		mA Max.	3
@ V_{CC} =			8.0		Volts	
@ V_{IN} =			0		Volts	
"ON" State Current Drain	I_{CC}"0"	36.0	36.0	36.0	mA Max.	5
Inputs		Open	Open	Open		
"OFF" State Current Drain	I_{CC}"1"	24.0	24.0	24.0	mA Max.	3
Inputs		0	0	0	Volts	

TYPICAL TEST CONFIGURATION



SWITCHING SPECIFICATIONS

	CONDITIONS V_{CC} volts	T_A °C	Fanout SG340	Fanout SG341	C_L pfd.	LIMITS Time—nsec Max.
Switching Parameters						
Turn On Delay	+5.0	+25	1	1	15	10
Turn Off Delay			1	1	15	10
Rise Time Note 6			1	1	15	2.5
Fall Time Note 6			1	1	15	4.0



SG---00340-2X

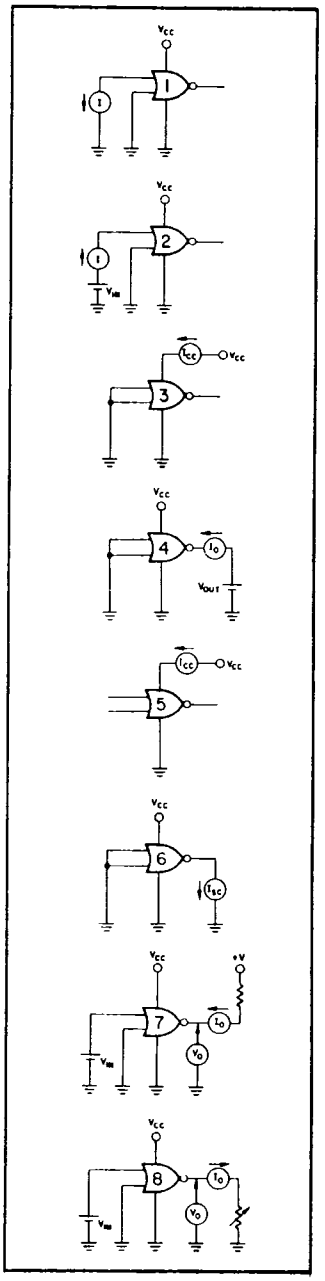
RATINGS

SG 342/343				SG 342/343			
VOLTAGE	Min.	Typ.	Max.	TEMPERATURE AND POWER	Min.	Typ.	Max.
Supply voltage (D.C.)			7.0 V	Operating	0		+75°C
Supply voltage (surge, 1 sec)			12.0 V	Storage	−65		+200°C
Supply voltage (operating)	4.5	5.0	6.0 V	Thermal gradient, junction to air (θja) (Flat Pack)			0.3°C/mW
Input voltage			5.5 V	Thermal gradient, junction to air (θja) (Plug-in)			0.15°C/mW
Output voltage			5.5 V	Power Dissipation (50% Duty Cycle, V_{CC} = +5v)		77	mW/Circuit

ELECTRICAL SPECIFICATIONS

Characteristics at V_{CC} = +5.0 V	Symbol	Values at Specified Temperatures 0°C	+25°C	+75°C	Units	Fig. No.
INPUT:						
Input Load Current	I_{IN}	2.5	2.5	2.5	mA Max.	1
@ V_{IN} =		0	0	0	Volts	
Other Inputs		0	0	0	Volts	
Input Leakage Current	I_{IN}	0.1	0.1	0.1	mA Max.	2
@ V_{IN} =		4.5	4.5	4.5	Volts	
Other Inputs		0	0	0	Volts	
Input (OFF Level) Breakdown Voltage	BV_{IN} "1"	5.5	5.5	5.5	Volts	2
I_{IN} =		1.0	1.0	1.0	mA Max.	
Other Inputs		0	0	0	Volts	
Logic "1" Threshold Voltage	V_{MIN} "1"	1.9	1.8	1.7	Volts	7
V_{OUT} =		0.45	0.45	0.45	Volts Max.	
I_{OUT} (SG 342)		22.5	22.5	22.5	mA	
I_{OUT} (SG 343)		12.5	12.5	12.5	mA	
Logic "0" Threshold Voltage	V_{MAX} "0"	1.0	1.1	1.0	Volts	8
V_{OUT} =		2.5	2.4	2.5	Volts Min.	
I_{OUT} (SG 342)		1.8	1.8	1.8	mA	
I_{OUT} (SG 343)		1.0	1.0	1.0	mA	
OUTPUT:						
Output Leakage Current	I_{OUT}	0.25	0.25	0.25	mA Max.	4
@ V_{OUT} =		5.5	5.5	5.5	Volts	
Inputs		0	0	0	Volts	
Output Short Circuit Current	I_{OUT}	25	25	25	mA Min.	6
		100	100	100	mA Max.	
@ Input		0	0	0	Volts	
Logic "0" Level	V_{OUT} "0"	0.40	0.40	0.45	Volts Max.	7
@ V_{IN} =		2.9	2.9	2.9	Volts	
I_{OUT} (SG 342)		22	22	22	mA	
I_{OUT} (SG 343)		12	12	12	mA	
Logic "1" Level	V_{OUT} "1"	2.9	3.0	3.0	Volts Min.	8
@ V_{IN} =		0.45	0.45	0.45	Volts	
I_{OUT} (SG 342)		1.8	1.8	1.8	mA	
I_{OUT} (SG 343)		1.0	1.0	1.0	mA	
POWER REQUIREMENTS:						
Breakdown Current	I_{CC}		44.0		mA Max.	3
@ V_{CC} =			7.0		Volts	
@ V_{IN} =			0		Volts	
"ON" State Current Drain	I_{CC} "0"	48.0	48.0	48.0	mA Max.	5
Inputs		Open	Open	Open		
"OFF" State Current Drain	I_{CC} "1"	30.0	30.0	30.0	mA Max.	3
Inputs		0	0	0	Volts	

TYPICAL TEST CONFIGURATION



SWITCHING SPECIFICATIONS

	CONDITIONS					LIMITS
	V_{CC} volts	T_A °C	Fanout SG342	Fanout SG343	C_T pfd.	Time—nsec Max.
Switching Parameters						
Turn On Delay	+5.0	+25	1	1	15	10
Turn Off Delay			1	1	15	10
Rise Time Note 6			1	1	15	2.5
Fall Time Note 6			1	1	15	4.0