PRODUCTION QUANTITIES AVAILABLE FOR IMMEDIATE DELIVERY

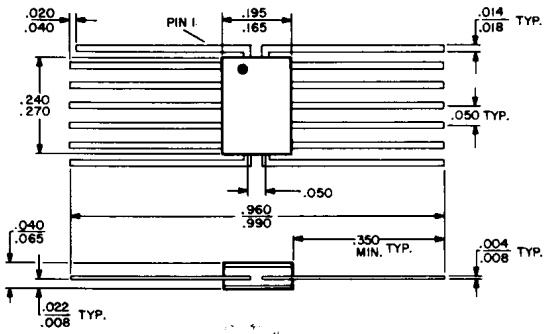
High performance

SUHL Integrated Circuits . . . *The finest TTL saturated logic in the industry.*

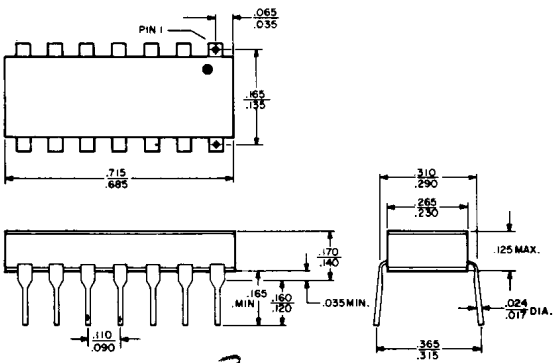
Type Nos.	Function
SG-40, SG-41, SG-42, SG-43	Dual 4-Input NAND/NOR Gate
SG-50, SG-51, SG-52, SG-53	Expandable Quad 2-Input OR Gate
SG-60, SG-61, SG-62, SG-63	Single 8-Input NAND/NOR Gate
SG-70, SG-71, SG-72, SG-73	Expandable Dual Output, Dual 2-Input OR Gate
SG-80, SG-81, SG-82, SG-83	Dual Pulse Shaper/Delay-AND Gate
SG-90, SG-91, SG-92, SG-93	Exclusive-OR with Complement
SG-100, SG-101, SG-102, SG-103	Expandable Triple 3-Input OR Gate
SG-110, SG-111, SG-112, SG-113	Expandable Dual 4-Input OR Gate
SG-120, SG-121, SG-122, SG-123	Expandable Single 8-Input NAND/NOR Gate
SG-130, SG-131, SG-132, SG-133	Dual 4-Input Line Driver
SG-140, SG-141, SG-142, SG-143	Quad 2-Input NAND/NOR Gate
SG-150, SG-151, SG-152, SG-153	Quad 2-Input OR Expander
SG-160, SG-161, SG-162, SG-163	Triple 2-Input Bus Driver
SG-170, SG-171, SG-172, SG-173	Dual 4-Input OR Expander
SG-180, SG-181, SG-182, SG-183	Dual 4-Input AND Expander
SG-190, SG-191, SG-192, SG-193	Triple 3-Input NAND/NOR Gate
SG-280, SG-281, SG-282, SG-283	Dual 4-Input AND/OR Gate
G-330, 331, 332, 333	Quad 2-Input NAND/NOR Gate
SG-351, SG-353	Quad 2-Input Lamp Driver
SG-370, 371, 372, 373	Hex 1-Input Inverter
SF-30, SF-31, SF-32, SF-33	Single Phase SRT Flip-Flop
SF-50, SF-51, SF-52, SF-53	J-K Flip-Flop (AND Inputs)
SF-60, SF-61, SF-62, SF-63	J-K Flip-Flops (OR Inputs)
SF-80, SF-81, SF-82, SF-83	Dual D Flip-Flop
SF-100, SF-101, SF-102, SF-103	Dual 35MHz Flip-Flop (Separate Clock)
SF-110, SF-111, SF-112, SF-113	Dual 35MHz J-K Flip-Flop (Common Clock)
SG-200, SG-201, SG-202, SG-203	Expandable Single 8-Input NAND/NOR Gate
SG-210, SG-211, SG-212, SG-213	Expandable Dual 4-Input OR Gate
SG-220, SG-221, SG-222, SG-223	Quad 2-Input NAND/NOR Gate
SG-230, SG-231, SG-232, SG-233	Quad 2-Input OR Expander
SG-240, SG-241, SG-242, SG-243	Dual 4-Input NAND/NOR Gate
SG-250, SG-251, SG-252, SG-253	Expandable Quad 2-Input OR Gate
SG-260, SG-261, SG-262, SG-263	Single 8-Input NAND/NOR Gate
SG-270, SG-271, SG-272, SG-273	Dual 4-Input OR Expander
SG-290, SG-291, SG-292, SG-293	Dual 2 & 3 Input AND/OR Expander
SG-300, SG-301, SG-302, SG-303	Expandable Triple 3-Input OR Gate
SG-310, SG-311, SG-312, SG-313	Expandable Dual Output Dual 2-Input OR Gate
SG-320, SG-321, SG-322, SG-323	Triple 3-Input NAND/NOR Gate
SG-340, 341, 342, 343	Quad 2-Input NAND/NOR Gate
SG-380, 381, 382, 383	Hex 1-Input Inverter
SF-91, SF-93	Dual D Flip-Flop
SF-120, SF-121, SF-122, SF-123	Dual 50MHz J-K Flip-Flop (Separate Clock)
SF-130, SF-131, SF-132, SF-133	Dual 50MHz J-K Flip-Flop (Common Clock)
SF-200, SF-201, SF-202, SF-203	50MHz J-K Flip-Flop (AND Inputs)
SF-210, SF-211, SF-212, SF-213	50MHz J-K Flip-Flop (OR Inputs)

Digital Functional Arrays . . . *High-density, low-geometry multi-function circuits.*

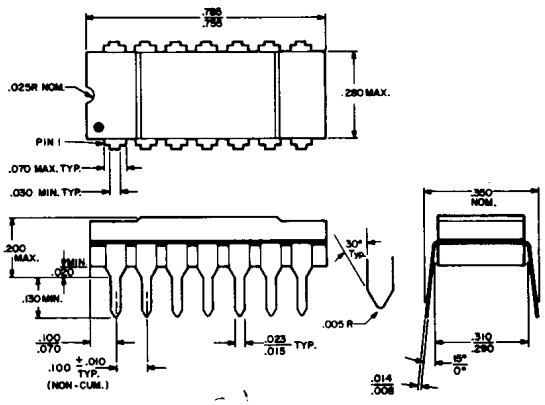
SM10 Series	Full Adder
SM20 Series	Dependent Carry Fast Adder
SM30 Series	Independent Carry Fast Adder
SM40 Series	Carry Decoder
SM60 Series	4-Bit Storage Register
SM70 Series	Bus Transfer Output 4-Bit Storage Register
SM80 Series	Cascade Pullup Output 16-Bit Scratch Pad Memory
SM90/92 Series SM91-93 Series	Decade Frequency Divider
SM110	4-Bit Shift Register
SM120 Series	Parity Generator/Checker
SM130 Series	Comparator
SM140 Series	Programmable Binary Divider
SM150 Series	Programmable Decade Divider
SM160 Series	Binary Counter
SM170 Series	Decade Counter
SM180 Series	Binary Up/Down Counter
SM190 Series	Decade Up/Down Counter
SM200 Series	BCD to 7-Segment Translator
SM210 Series	Dual 4-Bit Multiplexer
SM220 Series	Demultiplexer
SG7400N	Quad 2-Input NAND/NOR Gate
SG7402N	Quad 2-Input Positive
SG7410N	Triple 3-Input NAND/NOR Gate
SG7420N	Dual 4-Input NAND/NOR Gate
SG7450N	Expandable Dual 2 Wide 2-Input AND-OR-INVERT Gate
SG7454N	4 Wide 2-Input AND-OR INVERT Gate
SG7460N	Dual 4-Input OR Expander
SF7472N	J-K Master-Slave Flip-Flop
SF7473N	Dual J-K Master Slave Flip-Flop w/Clear
SF7474N	Dual "D" Flip-Flop
SM7444N	BCD to Decimal Decoder
SM7491N	8-Bit Shift Register
SA20, SA21	Wide-band Video Amplifiers



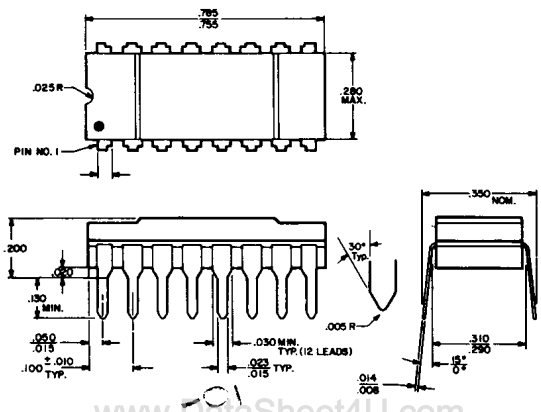
14-lead, metal lid, ceramic flat pack (TO-85)



14-lead, metal lid, ceramic dual-in-line (TO-116)



14-lead, CERDIP dual-in-line (TO-116)



16-lead, CERDIP dual-in-line

GENERAL CHARACTERISTICS
SUHL I INTEGRATED CIRCUITS

Absolute Maximum Ratings

	Military	Industrial	Unit
Supply Voltage	8	7	Vdc.
Operating Temperature	−55° to +125°	0° to +75°	°C
Storage Temperature	−65° to +200°	−65° to +200°	°C

Electrical Characteristics at 25° C, Vcc=5V

Input Characteristics	Min.	Typ.	Max.	Unit
Logic 1 Voltage	1.7		5.5	Volts
Logic 1 Current			100	μA
Logic 0 Voltage			1.2	Volts
Logic 0 Current		1.0		mA
Capacitance		2.0		pf
Positive Noise Immunity[1]	1.0			Volts
Negative Noise Immunity	1.0			Volts
Frequency		20		MHz
Output Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
Logic 1 Voltage[2]	3.0	3.5	3.8	Volts
Logic 0 Voltage		0.26	0.45	Volts
Short Circuit Output Current	10		45.0	mA
Propagation Delay Time/Gate (varies with element designed to be used up to 20 MHz)		10	20	ns
Fan-Out	varies with elements designed for fan-outs of 6 to 30			

GENERAL CHARACTERISTICS
SUHL II INTEGRATED CIRCUITS

Absolute Maximum Ratings

	Military	Industrial	Unit
Supply Voltage	8	7	Vdc.
Operating Temperature	−55° to +125°	0° to +75°	°C
Storage Temperature	−65° to +200°	−65° to +200°	°C

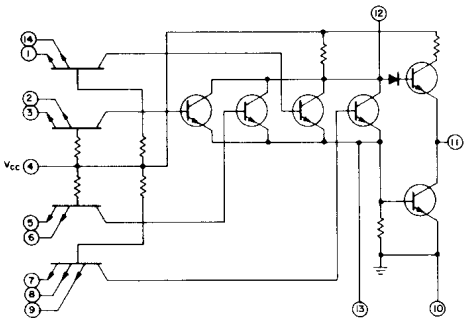
Electrical Characteristics at 25° C, Vcc=5V

Input Characteristics	Min.	Typ.	Max.	Unit
Logic 1 Voltage	1.7		5.5	Volts
Logic 1 Current			100	μA
Logic 0 Voltage			1.1	Volts
Logic 0 Current		1.7		mA
Capacitance		1.5		pf
Positive Noise Immunity[1]		1.0		Volts
Negative Noise Immunity		1.5		Volts
Output Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
Logic 1 Voltage[2]	3.0	3.5	3.8	Volts
Logic 0 Voltage		0.26	0.45	Volts
Short Circuit Output Current[3]			65.0	mA
Propagation Delay Time/Gate (varies with element designed to be used up to 40 mc)		6	10	ns
Fan-Out	varies with elements designed for fan-outs of 5 to 12			

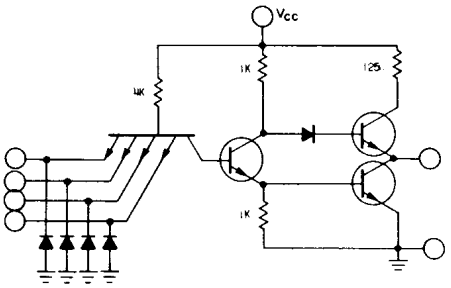
1. Noise immunity is that voltage superimposed on the input which will not propagate beyond the following stage. ■ 2. With max Vce (sat) on inout. ■ 3. One second pulse.

TYPICAL CIRCUITS SUHL I

Basic NOR Gate

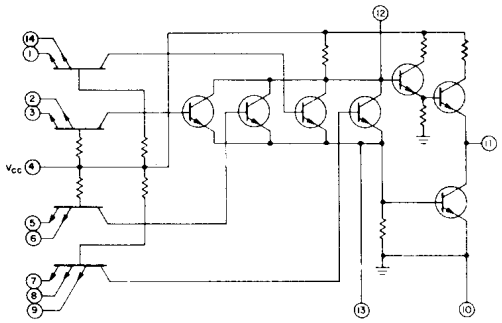


Basic NAND Gate

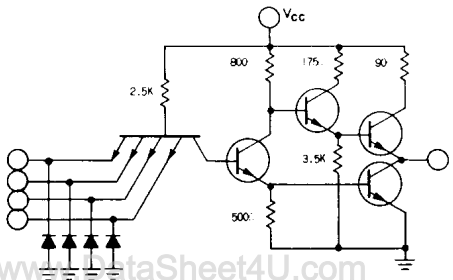


TYPICAL CIRCUITS SUHL II

Basic NOR Gate

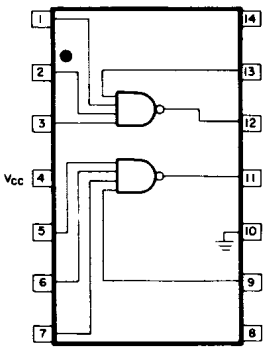


Basic NAND Gate



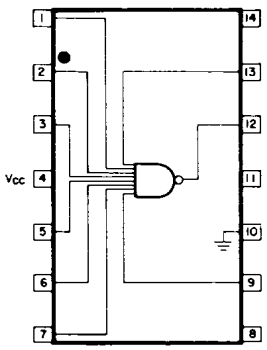
NAND/NOR GATES SUHL I

Dual 4-Input NAND/NOR Gate



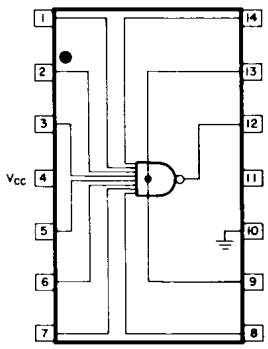
SG-40
SG-41
SG-42
SG-43

Single 8-Input NAND/NOR Gate



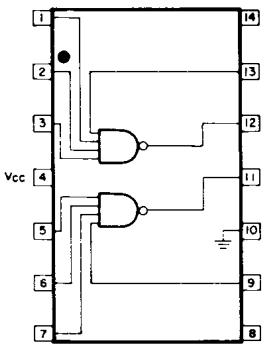
SG-60
SG-61
SG-62
SG-63

Expandable Single 8-Input NAND/NOR Gate



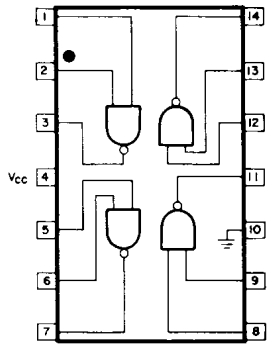
SG-120
SG-121
SG-122
SG-123

Dual 4-Input Line Driver



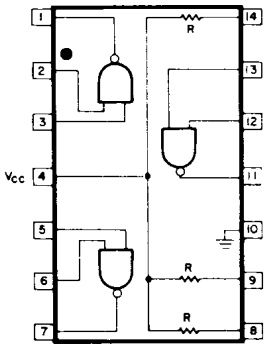
SG-130
SG-131
SG-132
SG-133

Quad 2-Input NAND/NOR Gate



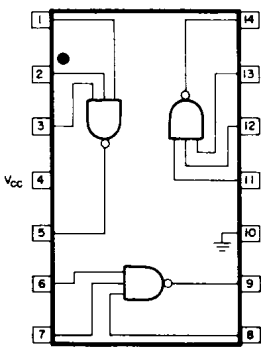
SG-140
SG-141
SG-142
SG-143

Triple 2-Input Bus Driver



SG-160
SG-161
SG-162
SG-163

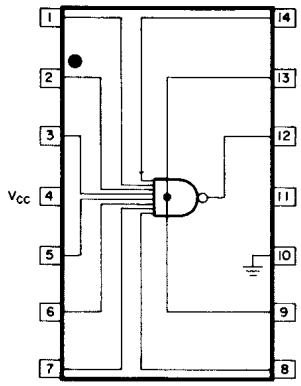
Triple 3-Input NAND/NOR Gate



SG-190
SG-191
SG-192
SG-193

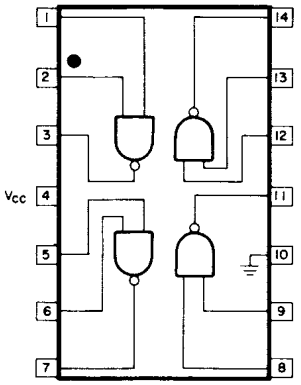
NAND/NOR GATES SUHL II

Expandable Single 8-Input NAND/NOR/Gate



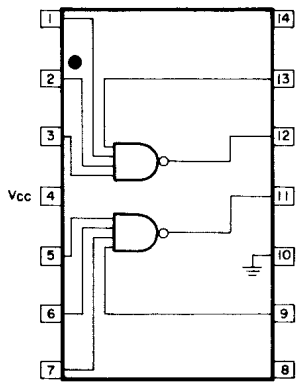
SG-200
SG-201
SG-202
SG-203

Quad 2-Input NAND/NOR Gate



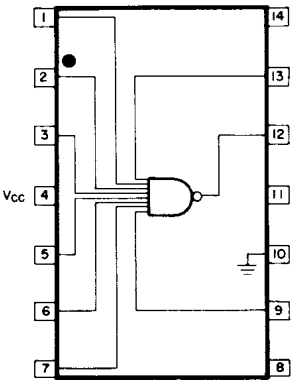
SG-220
SG-221
SG-222
SG-223

Dual 4-Input NAND/NOR Gate



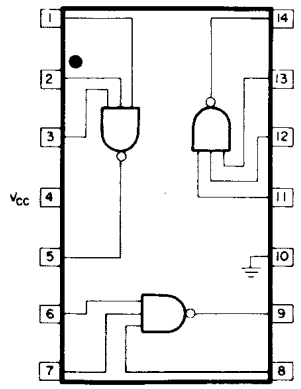
SG-240
SG-241
SG-242
SG-243

Single 8-Input NAND/NOR Gate



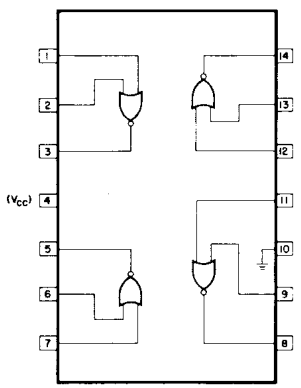
SG-260
SG-261
SG-262
SG-263

Triple 3-Input NAND/NOR Gate



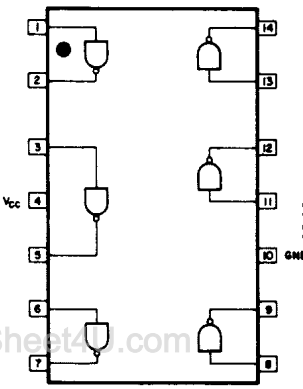
SG-320
SG-321
SG-322
SG-323

Quad 2-Input NOR/NAND Gate



SG-340
SG-341
SG-342
SG-343

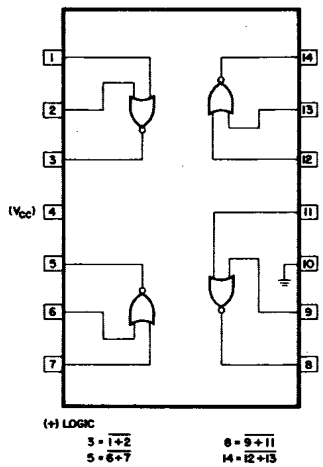
HEX-1-Input Inverter



SG-380
SG-381
SG-382
SG-383

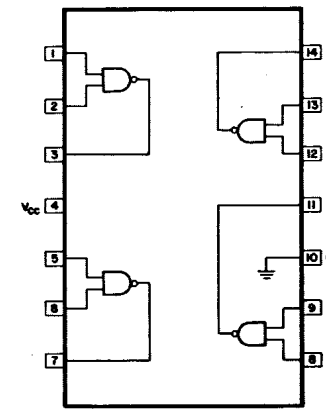
NAND/NOR GATES SUHL I

Quad 2-Input NOR/NAND Gate



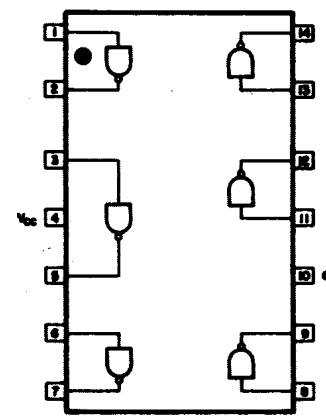
SG-330
SG-331
SG-332
SG-333

Quad 2-Input Lamp/Line Driver



SG-351
SG-353

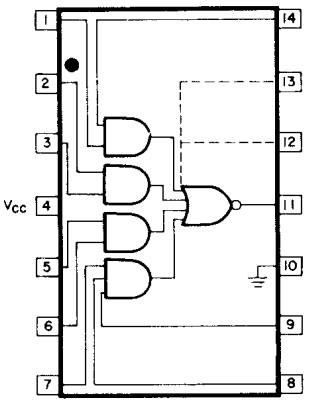
HEX-1-Input Inverter



SG-370
SG-371
SG-372
SG-373

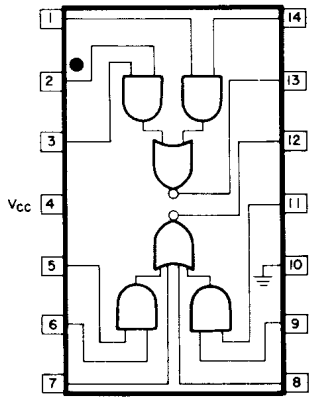
AND-NOR GATES SUHL I

Expandable Quad 2-Input OR Gate



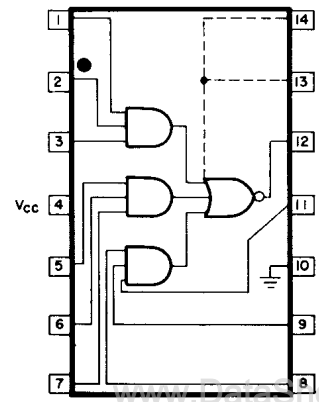
SG-50
SG-51
SG-52
SG-53

Expandable Dual Output Dual 2-Input OR Gate



SG-70
SG-71
SG-72
SG-73

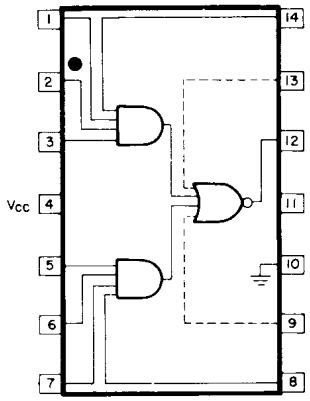
Expandable Triple 3-Input OR Gate



SG-100
SG-101
SG-102
SG-103

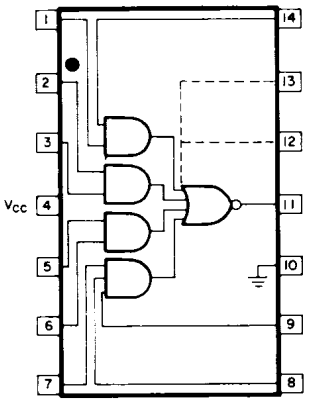
AND-NOR GATES SUHL II

Expandable Dual 4-Input OR Gate



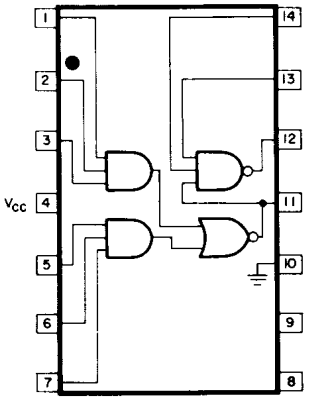
SG-210
SG-211
SG-212
SG-213

Expandable Quad 2-Input OR Gate



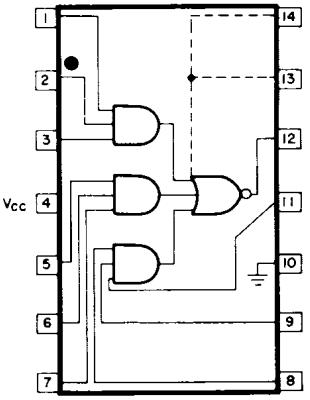
SG-250
SG-251
SG-252
SG-253

Exclusive OR with Complement



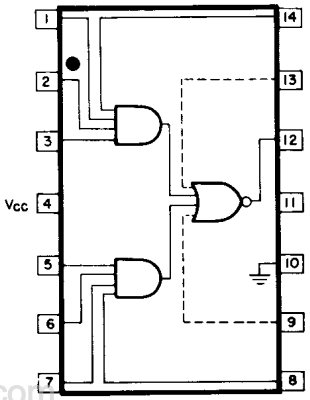
SG-90
SG-91
SG-92
SG-93

Expandable Triple 3-Input OR Gate



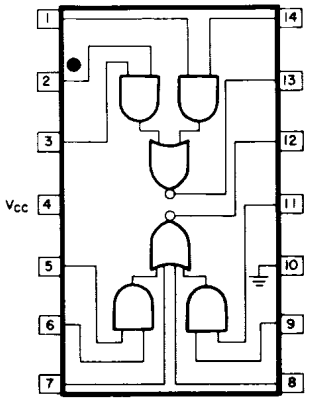
SG-300
SG-301
SG-302
SG-303

Expandable Dual 4-Input OR Gate



SG-110
SG-111
SG-112
SG-113

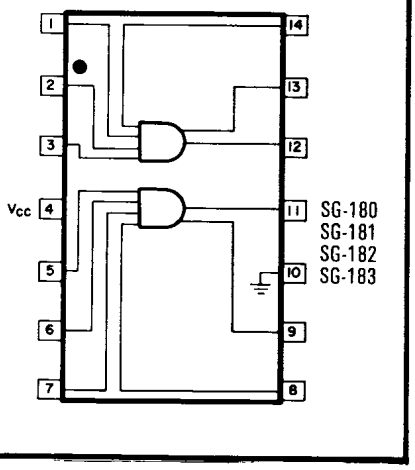
Expandable Dual Output Dual 2-Input OR Gate



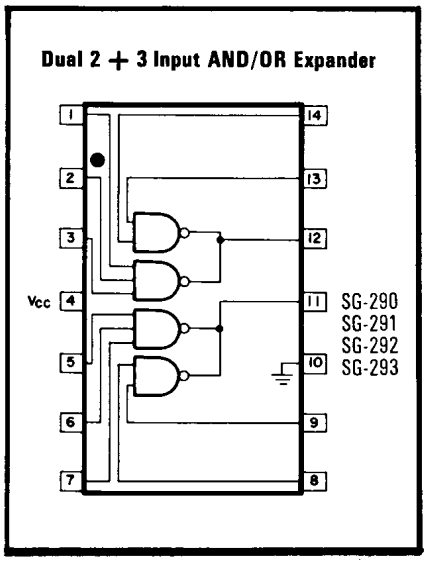
SG-310
SG-311
SG-312
SG-313

AND EXPANDERS SUHL I & SUHL II

Dual 4-Input AND Expander

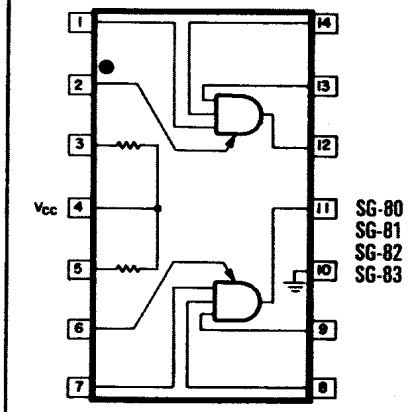


Dual 2 + 3 Input AND/OR Expander

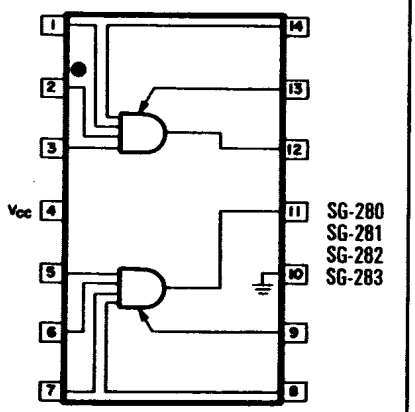


NON-INVERTING GATES SUHL I

Dual Pulse Shaper/Delay-AND Gate

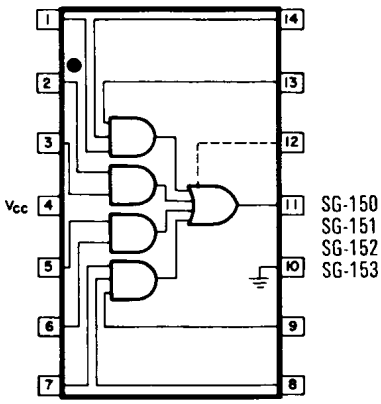


Dual 4-Input AND/OR Gate

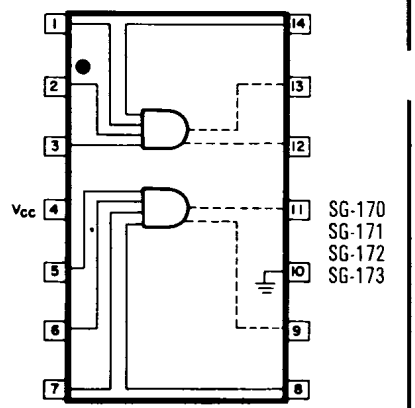


OR EXPANDERS SUHL I

Quad 2-Input OR Expander

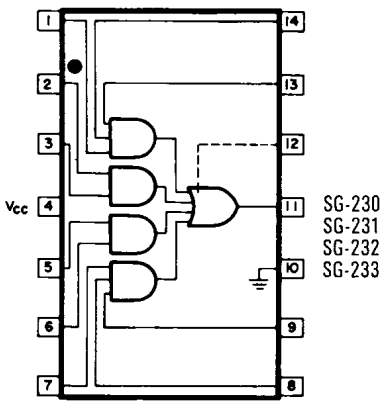


Dual 4-Input OR Expander

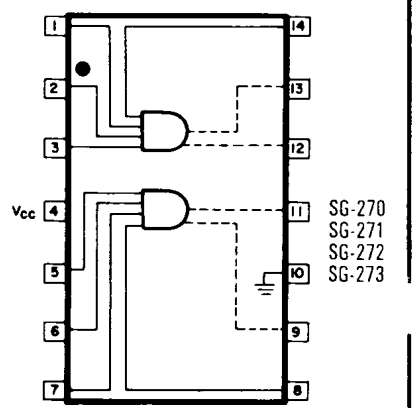


OR EXPANDERS SUHL II

Quad 2-Input OR Expanders

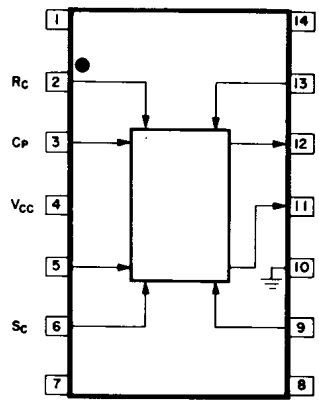


Dual 4-Input OR Expander



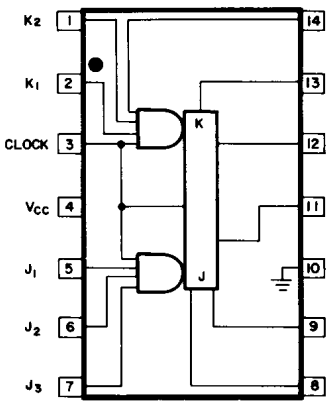
FLIP-FLOPS SUHL I

Single Phase SRT Flip-Flop



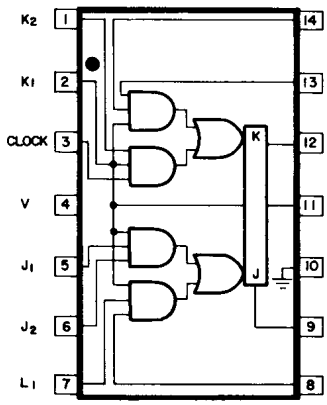
SF-30
SF-31
SF-32
SF-33

J-K Flip-Flop (AND Inputs)



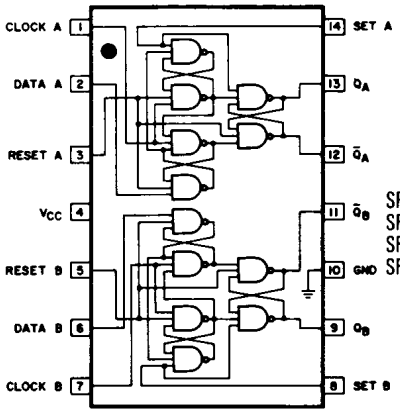
SF-50
SF-51
SF-52
SF-53

J-K Flip-Flop (OR Inputs)



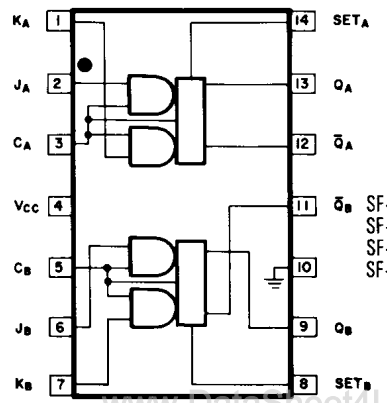
SF-60
SF-61
SF-62
SF-63

Dual "D" Flip-Flop (Separate clock)



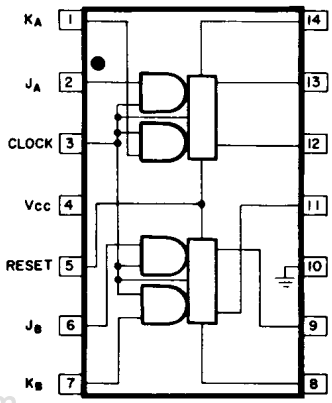
SF-80
SF-81
SF-82
SF-83

Dual 35 MHz J-K Flip-Flop (Separate Clock)



SF-100
SF-101
SF-102
SF-103

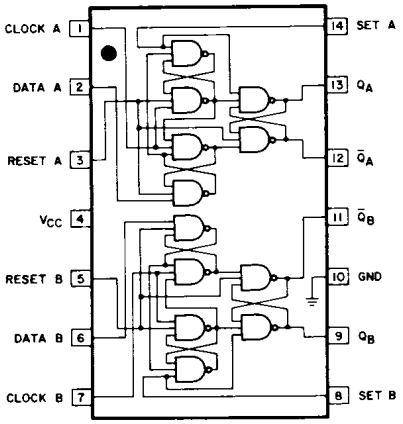
Dual 35 MHz J-K Flip-Flop (Common Clock)



SF-110
SF-111
SF-112
SF-113

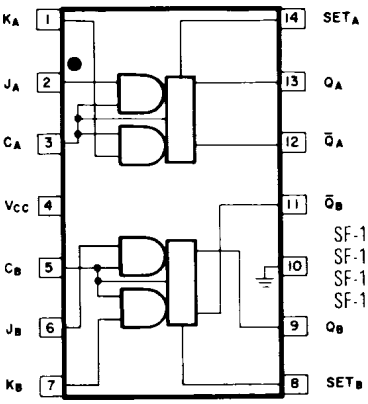
FLIP-FLOPS SUHL II

Dual "D" Flip-Flop (Separate clock)



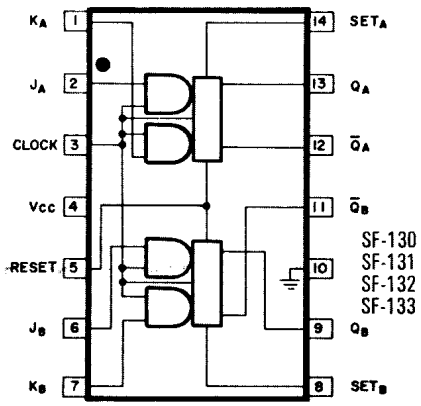
SF-91
SF-93

Dual 50 MHz J-K Flip-Flop (Separate Clock)



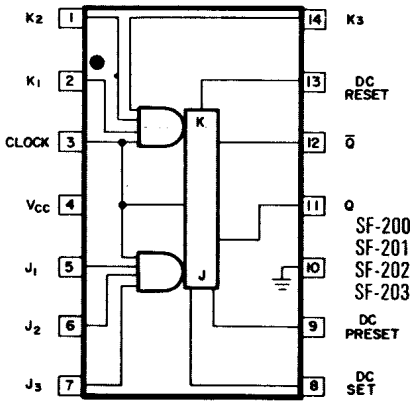
SF-120
SF-121
SF-122
SF-123

Dual 50 MHz J-K Flip-Flop (Common Clock)



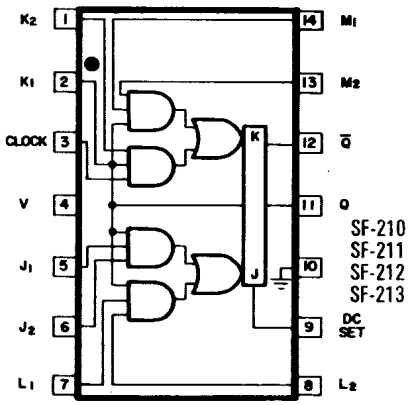
SF-130
SF-131
SF-132
SF-133

50 MHz J-K Flip-Flop (AND Inputs)



SF-200
SF-201
SF-202
SF-203

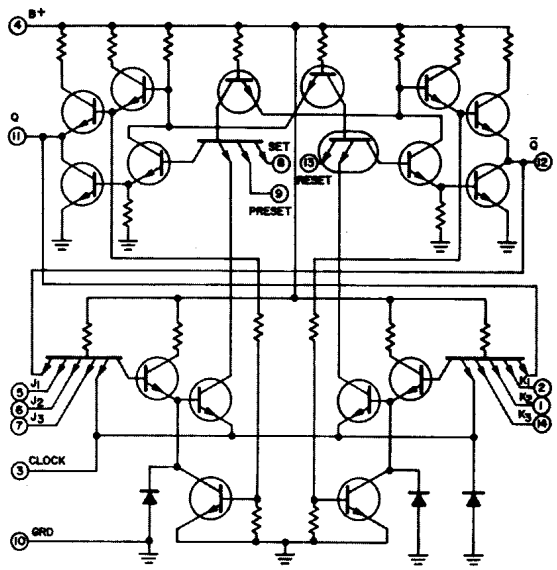
50 MHz J-K Flip-Flop (OR Inputs)



SF-210
SF-211
SF-212
SF-213

TYPICAL CIRCUIT DIAGRAMS

50 MHz J-K Flip-Flop (AND Inputs)



50 MHz J-K Flip-Flop (OR Inputs)