

# SN55ALS130, SN75ALS130 QUADRUPLE LINE DRIVERS

D2299, FEBRUARY 1986—REVISED AUGUST 1989

- Meets IBM 360/370 I/O Interface Specification GA22-6974-3 (Also see SN55ALS126 and SN75ALS126)
- Minimum Output Voltage of 3.11 V at  $I_{OH} = -60$  mA
- Fault-Flag Circuit Output Signals Driver Output Fault
- Fault-Detection Current Limit Circuit Minimizes Power Dissipation During a Fault Condition
- Advanced Low-Power Schottky Circuitry
- Common Enable and Common Fault Flag
- Designed to be an Improved Replacement for the MC3485

## description

The SN55ALS130 and SN75ALS130 quadruple line drivers are designed to meet the IBM 360/370 I/O specification GA22-6974-3. The output voltage is 3.11 V minimum (at  $I_{OH} = -59.3$  mA) over the recommended ranges of supply voltage (4.5 V to 5.95 V) and temperature. Driver outputs use a fault-detection current-limit circuit to allow high drive current but still minimize power dissipation when the output is shorted to ground. The SN55ALS130 and SN75ALS130 are compatible with standard TTL logic and supply voltages.

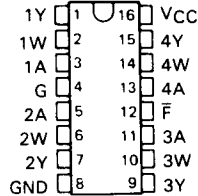
The SN55ALS130 and SN75ALS130 employ the IMPACT™ process to achieve fast switching speeds and low power dissipation. Fault-flag circuitry is designed to sense and signal a line short on any Y line. Upon detecting an output fault condition, the fault-flag circuit forces the driver output into a low state and signals a fault condition by causing the fault-flag output to go low.

The SN55ALS130 and SN75ALS130 can drive a 50- $\Omega$  load as required in the IBM GA22-6974-3 specification or a 90- $\Omega$  load as used in many I/O systems. Optimum performance can be achieved when the devices are used with either the SN75125, SN75127, SN75128, or SN75129 line receivers.

The SN55ALS130 is characterized for operation from  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN75ALS130 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

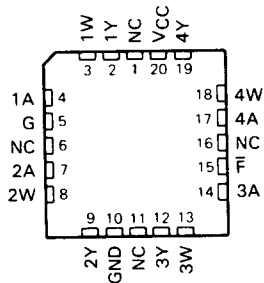
## SN55ALS130 . . . J PACKAGE SN75ALS130 . . . D, J, OR N PACKAGE

(TOP VIEW)



## SN55ALS130 . . . FK PACKAGE

(TOP VIEW)



NC—No internal connection

## FUNCTION TABLE

INPUTS		OUTPUTS			
G <sup>†</sup>	A	Y	F	W	
L	X	L	H	H	
X	L	L	H	H	
H	H	H	H	L	
H	H	S	L	H	

H = high level, L = low level, X = irrelevant, S = shorted to ground

<sup>†</sup>G and F are common to the four drivers. If any of the four Y outputs is shorted, the Fault-Flag will respond.

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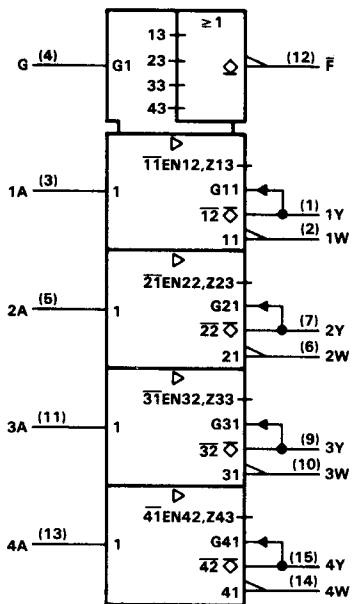
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# SN55ALS130, SN75ALS130 QUADRUPLE LINE DRIVERS

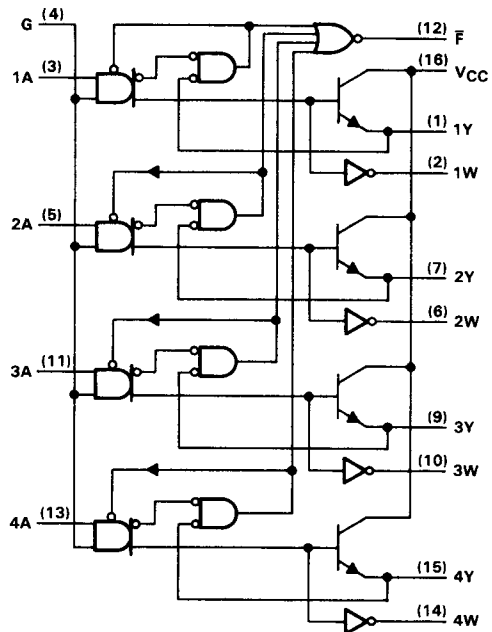
logic symbol†



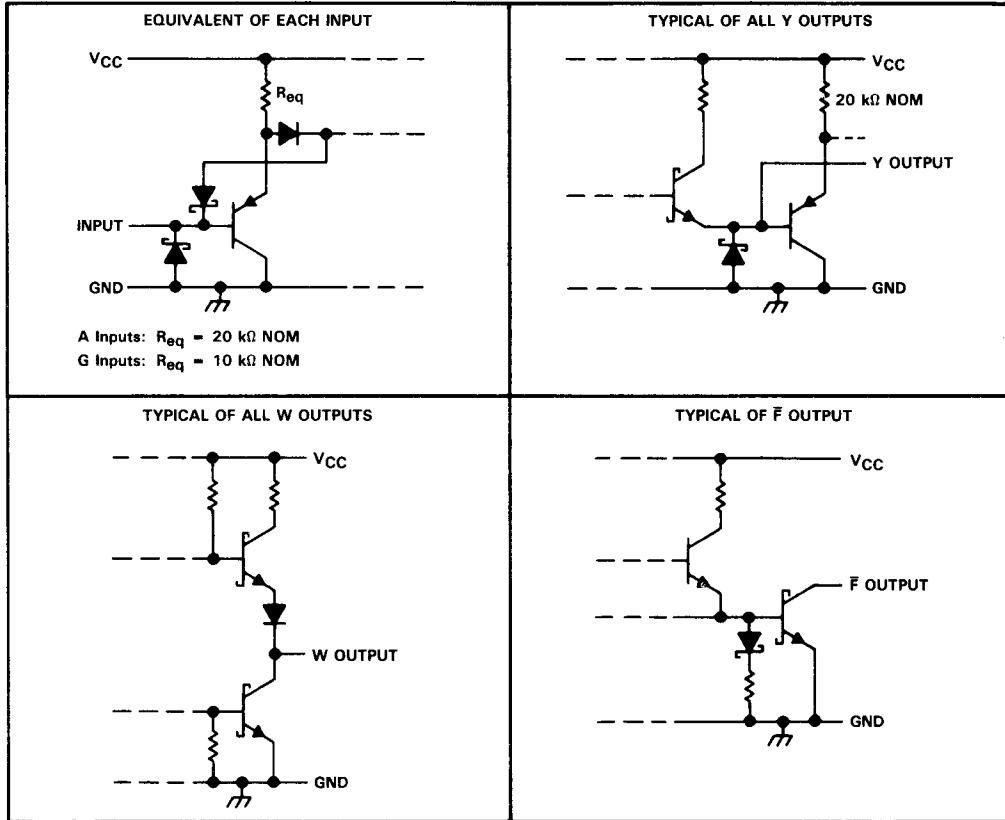
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for D, J, and N packages.

logic diagram (positive logic)



schematics of inputs and outputs



# SN55ALS130, SN75ALS130 QUADRUPLE LINE DRIVERS

## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, $V_{CC}$ .....	7 V
Input voltage .....	7 V
Continuous total dissipation .....	See Dissipation Rating Table
Operating free-air temperature range: SN55ALS130 .....	-55°C to 125°C
SN75ALS130 .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C
Case temperature for 60 seconds: FK package .....	260°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or N package .....	260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J package .....	300°C

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$	$T_A = 125^\circ\text{C}$
	POWER RATING		POWER RATING	POWER RATING
D	950 mW	7.6 mW/°C	608 mW	N/A
FK	1375 mW	11.0 mW/°C	880 mW	275 mW
J (SN55ALS130)	1375 mW	11.0 mW/°C	880 mW	275 mW
J (SN75ALS130)	1025 mW	8.2 mW/°C	656 mW	N/A
N	1150 mW	9.2 mW/°C	736 mW	N/A

## recommended operating conditions

	SN55ALS130			SN75ALS130			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, $V_{CC}$	4.5	5	5.95	4.5	5	5.95	V
High-level input voltage, $V_{IH}$	2			2			V
Low-level input voltage, $V_{IL}$	0.8			0.8			V
High-level output current, $I_{OH}$	-59.3			-59.3			mA
Operating free-air temperature, $T_A$	-55			125			°C

# SN55ALS130, SN75ALS130 QUADRUPLE LINE DRIVERS

## electrical characteristics over recommended operating free-air temperature range

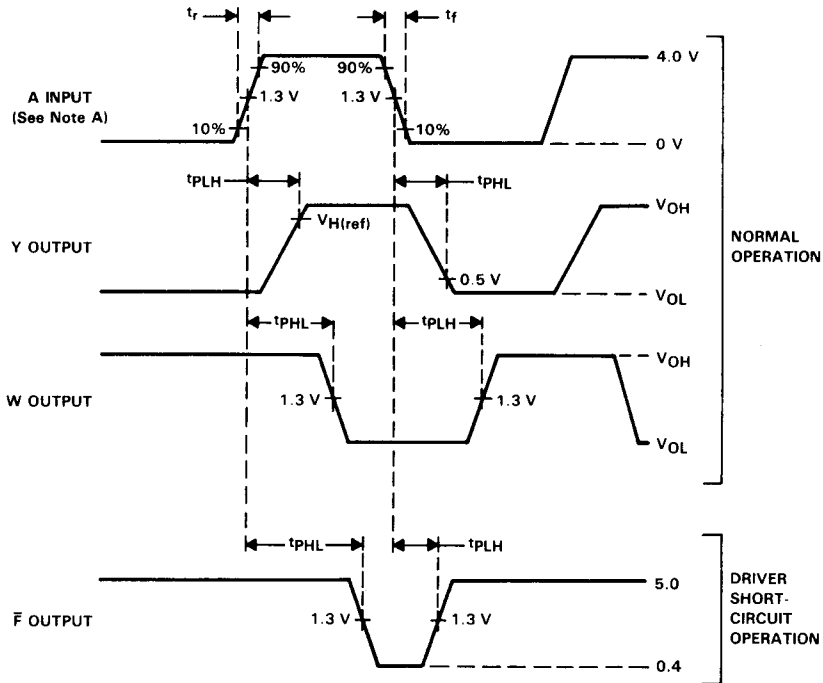
PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
$V_{IK}$	Input clamp voltage	A, G	$V_{CC} = 4.5 \text{ V}$ , $I_I = -18 \text{ mA}$		-1.5	V
$V_{OH}$	High-level output voltage	Y	$V_{CC} = 4.5 \text{ V}$ , $I_{OH} = -59.3 \text{ mA}$ , $V_{IH} = 2 \text{ V}$	3.11		V
		Y	$V_{CC} = 5.25 \text{ V}$ , $I_{OH} = -41 \text{ mA}$ , $V_{IH} = 2 \text{ V}$	3.9		
		W	$V_{CC} = 4.5 \text{ V}$ , $I_{OH} = -400 \mu\text{A}$ , $V_{IH} = 2 \text{ V}$	2.5		
$V_{OL}$	Low-level output voltage	Y	$V_{CC} = 5.5 \text{ V}$ , $I_{OL} = -240 \mu\text{A}$ , $V_{IL} = 0.8 \text{ V}$		0.15	V
		Y	$V_{CC} = 5.95 \text{ V}$ , $I_{OL} = -1 \text{ mA}$ , $V_{IL} = 0.8 \text{ V}$		0.15	
		$\bar{F}$	$V_{CC} = 4.5 \text{ V}$ , $I_{OL} = 8 \text{ mA}$ , Y at 0 V		0.5	
		W	$V_{CC} = 4.5 \text{ V}$ , $I_{OL} = 8 \text{ mA}$		0.5	
		Y	$V_{CC} = 4.5 \text{ V}$ , $V_{IL} = 0$ , $V_O = 3.11 \text{ V}$		100	
$I_{O(off)}$	Off-state output current	Y	$V_{CC} = 0$ , $V_{IL} = 0$ , $V_O = 3.11 \text{ V}$		200	$\mu\text{A}$
$I_{OH}$	High-level output current	$\bar{F}$	$V_{CC} = 5.95 \text{ V}$ , $V_{OH} = 5.95 \text{ V}$		100	$\mu\text{A}$
$I_I$	Input current	A	$V_{CC} = 4.5 \text{ V}$ , $V_{IH} = 5.5 \text{ V}$		100	$\mu\text{A}$
		G			400	
$I_{IH}$	High-level input current	A	$V_{CC} = 4.5 \text{ V}$ , $V_{IH} = 2.7 \text{ V}$		20	$\mu\text{A}$
		G			80	
$I_{IL}$	Low-level input current	A	$V_{CC} = 5.95 \text{ V}$ , $V_{IL} = 0.4 \text{ V}$		250	$\mu\text{A}$
		G			-1000	
$I_{OS}$	Short-circuit output	Y	$V_{CC} = 5.5 \text{ V}$ , $V_O = 0$ , $V_{IH} = 2.7 \text{ V}$		-5	mA
		W	$V_{CC} = 5.5 \text{ V}$ , $V_O = 0$	-15	-100	
		Y	$V_{CC} = 5.95 \text{ V}$ , $V_O = 0$ , $V_{IH} = 2.7 \text{ V}$		-5	
		W	$V_{CC} = 5.95 \text{ V}$ , $V_O = 0$	-15	-110	
$I_{CCH}$	Supply current, all outputs high		$V_{CC} = 5.5 \text{ V}$ , No load, $V_{IH} = 2.7 \text{ V}$		30	mA
			$V_{CC} = 5.95 \text{ V}$ , No load, $V_{IH} = 2.7 \text{ V}$		32	
$I_{CCL}$	Supply current, Y outputs low		$V_{CC} = 5.5 \text{ V}$ , No load, $V_{IL} = 0.4 \text{ V}$		45	mA
			$V_{CC} = 5.95 \text{ V}$ , No load, $V_{IL} = 0.4 \text{ V}$		47	

## switching characteristics over recommended operating free-air temperature range

PARAMETER		FROM	TO	TEST CONDITIONS	MIN	MAX	UNIT
$t_{PLH}$	Propagation delay time, low-to-high-level output	A	Y	$V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$ , $R_L = 50 \Omega$ , $C_L = 50 \text{ pF}$ , $V_{H(ref)} = 3.11 \text{ V}^\dagger$ , Input f = 1 MHz, See Figures 1 and 2		30	ns
$t_{PHL}$	Propagation delay time, high-to-low-level output					28	ns
$\frac{t_{PLH}}{t_{PHL}}$	Ratio of propagation delay times					0.3	3
$t_{PLH}$	Propagation delay time, low-to-high-level output	A	Y	$V_{CC} = 5.25 \text{ V}$ to $5.95 \text{ V}$ , $R_L = 90 \Omega$ , $C_L = 50 \text{ pF}$ , $V_{H(ref)} = 3.9 \text{ V}$ , Input f = 5 MHz, See Figures 1 and 2		34	ns
$t_{PHL}$	Propagation delay time, high-to-low-level output					34	ns
$t_{PLH}$	Propagation delay time, low-to-high-level output	A	W	$V_{CC} = 5 \text{ V}$ , $R_L = 2 \text{ k}\Omega$ , $C_L = 15 \text{ pF}$ , See Figures 1 and 2		34	ns
$t_{PHL}$	Propagation delay time, high-to-low-level output					21	ns
$t_{PLH}$	Propagation delay time, low-to-high-level output	A	$\bar{F}$	$V_{CC} = 5 \text{ V}$ , $R_L = 2 \text{ k}\Omega$ , $C_L = 15 \text{ pF}$ , See Figures 1 and 2		45	ns
$t_{PHL}$	Propagation delay time, high-to-low-level output					75	ns

$^\dagger$  For SN55ALS130 at  $T_A = -55^\circ\text{C}$ ,  $V_{H(ref)} = 2.5 \text{ V}$ .

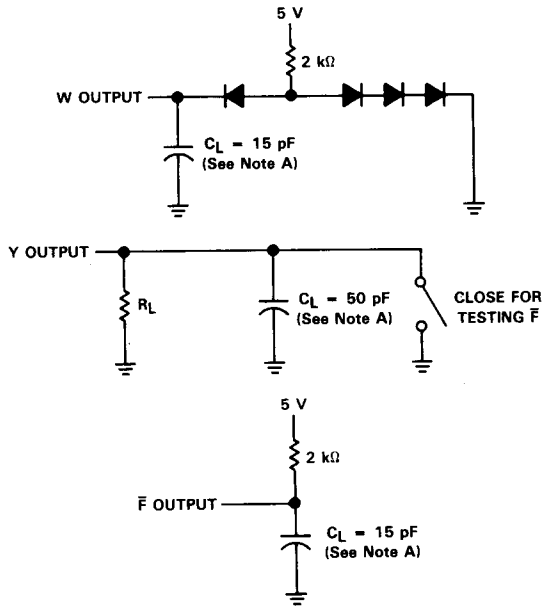
**PARAMETER MEASUREMENT INFORMATION**



NOTE A: The input pulse is supplied by a generator having the following characteristics: PRR  $\leq$  1 MHz, duty cycle  $\leq$  50%,  $t_r \leq$  6 ns,  $t_f \leq$  6 ns,  $Z_{out} \approx$  50  $\Omega$ .

**FIGURE 1. INPUT AND OUTPUT VOLTAGE WAVEFORMS**

PARAMETER MEASUREMENT INFORMATION



NOTE A:  $C_L$  includes probe and stray capacitance.

FIGURE 2. SWITCHING CHARACTERISTICS LOAD CIRCUITS