

QUAD 2-INPUT "NAND" GATE

MC946 • MC846
MC949 • MC849

Add Suffix F for TO-86 ceramic flat package (Case 607).

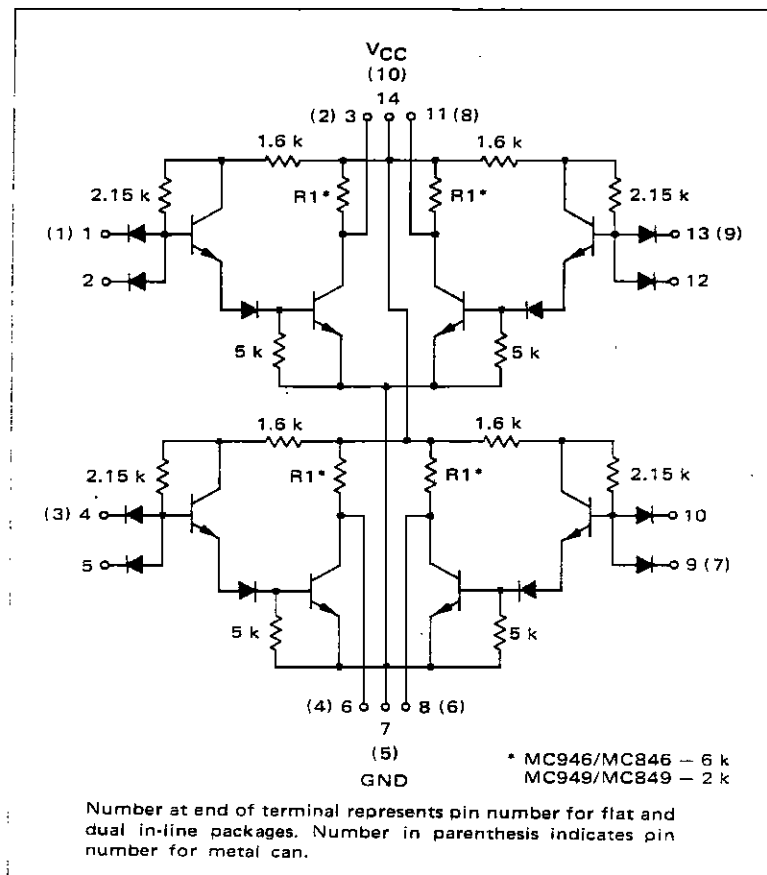
Suffix L for TO-116 ceramic dual in-line package (Case 632).

Suffix P for TO-116 plastic dual in-line package (Case 646) MC830 series only.

QUAD INVERTER

MC946 • MC846
MC949 • MC849

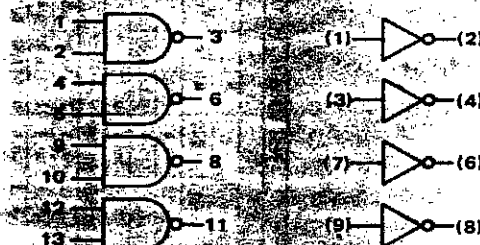
Suffix G for TO-100 metal package (Case 603-02).

MDTL MC930/830 series **MOTOROLA**

ISSUE A

This gate element, in the 14-pin flat and dual in-line packages, consists of four 2-input NAND gate circuits. This circuit can be used as a dual 2-input non-inverting gate, or as two bistable circuits when two dual 2-input gates are cross-coupled. Since the metal can (G suffix) has only 10 pins, that circuit consists of four inverters.

MC946F,L/MC846F,L,P MC946G/MC846G
MC949F,L/MC849F,L,P MC949G/MC849G

Positive Logic: $3 = 1 \cdot 2$ Positive Logic: $2 = \bar{1}$ Negative Logic: $3 = \bar{1} + 2$ Negative Logic: $2 = \bar{1}$

Input Loading Factor = 1

Output Loading Factor:

MC946/MC846 = 8

MC949/MC849 = 7

Total Power Dissipation:

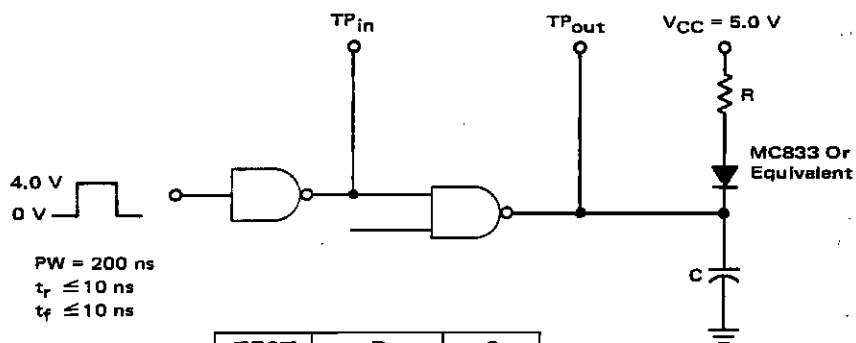
	MC946 MC846	MC949 MC849
Inputs Low	24 mW	24 mW
Inputs High	52 mW	84 mW
50% Duty Cycle	38 mW	54 mW

Propagation Delay Time:

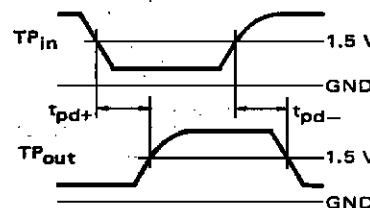
MC946/MC846 = 30 ns typ

MC949/MC849 = 25 ns typ

SWITCHING TIME TEST CIRCUIT AND WAVEFORMS



TEST	R	C
t_{pd+}	3.9 k ohms	30 pF
t_{pd-}	400 ohms	50 pF



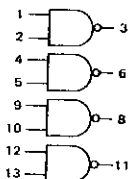
See General Information section for packaging.

ELECTRICAL CHARACTERISTICS

Test procedures are shown for only one gate. The other gates are tested in the same manner.

NOTE: Although the test conditions and test limits are the same for devices in ALL available packages, the table shows pin connections for testing only the flat and dual in-line packaged devices. To test devices in the metal can, substitute pin numbers shown in the conversion table below.

PACKAGE	PIN NUMBER													
Flat/Dual In-Line	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Metal Can	1	-	2	3	-	4	5	6	7	-	8	-	9	10



	@ Test Temperature
MC946, MC949	$\left\{ \begin{array}{l} -55^{\circ}\text{C} \\ +25^{\circ}\text{C} \\ +125^{\circ}\text{C} \end{array} \right.$
MC846, MC849	$\left\{ \begin{array}{l} 0^{\circ}\text{C} \\ +25^{\circ}\text{C} \\ +75^{\circ}\text{C} \end{array} \right.$

Characteristic	Symbol	Pin-Under Test	MC946, MC949 TEST LIMITS								MC846, MC849 TEST LIMITS								TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW:														Gnd
			-55°C		+25°C		+125°C		Unit	0°C		+25°C		+75°C		Unit	I _{OL}		I _{OH}		V _{IL}	V _{IH}	V _F	V _R	V _{CEX}	V _{CC}	V _{CCL}	V _{CCH}	V _{max}				
			Min	Max	Min	Max	Min	Max		Min	Max	Min	Max	Min	Max															Min	Max		
Output Voltage	V _{OL} V _{OHI}	3 3 3	- 2.50 2.50	0.40 - -	- 2.60 2.60	0.40 - -	- 2.50 2.50	- - -	0.45 ↓ ↓	Vdc 2.60 2.60	- - -	0.45 - 2.60	- - -	0.45 - 2.50	- - -	0.50 - 2.50	Vdc ↓ ↓	3 - -	- 3 -	- 1 2	1,2 - -	- - -	- - -	- - -	- - -	- - -	14 ↓ ↓	- - -	- - -	- - -	7 ↓ ↓		
Short Current MC946 MC846 MC949 MC849	I _{SC}	3 3 3	- - -	-1.34 - -1.60	- - -	-1.34 - -1.00	- - -	-1.30 - -3.90	mAde mAde mAde	- - -	-1.30 - -3.90	- - -	-1.30 - -3.90	- - -	-1.25 - -3.75	mAde mAde mAde	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	14 14 14	- - -	- - -	1,3,7 1,3,7 2,7			
Reverse Current	I _R	1 2 2	- - -	2.0 - 2.0	- - -	2.0 - 2.0	- - -	5.0 - 5.0	μAde μAde μAde	- - -	5.0 - 5.0	- - -	5.0 - 5.0	- - -	10 10 10	μAde μAde μAde	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	14 14 14	- - -	- - -	1,3,7 1,3,7 2,7			
Output Leakage Current	I _{CEX}	3	-	-	-	50	-	-	μAde	-	-	-	100	-	-	μAde	-	-	-	-	-	-	-	-	-	3,14	-	-	-	1,7			
Forward Current	I _F	1 2	- -	-1.60 -1.60	- -	-1.60 -1.60	- -	-1.50 -1.50	mAde mAde	- -	-1.40 -1.40	- -	-1.40 -1.40	- -	-1.33 -1.33	mAde mAde	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	14 14	- -	- -	7 7		
Power Drain Current (Total Device) MC946 MC846 At 919 MC849 All Types	I _{PDH} I _{PDH} I _{max}	14 14 14	- - -	- - -	13 - 21.4	- - -	- - -	- - -	mAde ↓ ↓	- - -	- - -	- - -	16 - 26.2	- - -	- - -	mAde ↓ ↓	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	14 14 14	- - -	- - -	- - -	7 7 1,4,7,9,12			
Switching Times	t _{pd} t _{pd} t _{pd} t _{pd}	1,3 1,3 1,3 1,3	- - - -	- - - -	25 10 15 10	80 30 60 30	- - - -	- - - -	ns ↓ ↓ ↓	- - - -	- - - -	25 10 15 10	80 30 60 30	- - - -	- - - -	ns ↓ ↓ ↓	Pulse In 1 ↓	Pulse Out 3 ↓	- - -	- - -	- - -	- - -	- - -	- - -	- - -	14 ↓ ↓	- - -	- - -	- - -	7 ↓ ↓			

Prms not listed are left open.