

# Single 2-Input NAND Gate

## NLV74HC1G00

The NLV74HC1G00 is a high speed CMOS 2-input NAND gate fabricated with silicon gate CMOS technology.

The internal circuit is composed of multiple stages, including a buffer output which provides high noise immunity and stable output.

The NLV74HC1G00 output drive current is 1/2 compared to MC74HC series.

### Features

- High Speed:  $t_{PD} = 7 \text{ ns}$  (Typ) at  $V_{CC} = 5 \text{ V}$
- Low Power Dissipation:  $I_{CC} = 1 \mu\text{A}$  (Max) at  $T_A = 25^\circ\text{C}$
- High Noise Immunity
- Balanced Propagation Delays ( $t_{pLH} = t_{pHL}$ )
- Symmetrical Output Impedance ( $I_{OH} = I_{OL} = 2 \text{ mA}$ )
- Chip Complexity: < 100 FETs
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

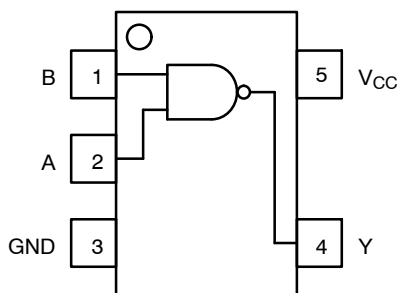


Figure 1. Pinout

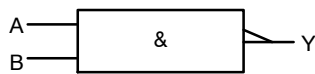


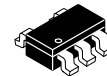
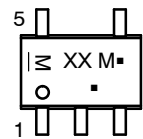
Figure 2. Logic Symbol

PIN ASSIGNMENT	
1	B
2	A
3	GND
4	Y
5	$V_{CC}$

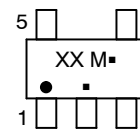


SC-88A  
DF SUFFIX  
CASE 419A

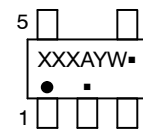
### MARKING DIAGRAMS



TSOP-5  
DT SUFFIX  
CASE 483



Commercial



NLV Prefix

XXX = Device Code  
M = Date Code\*  
A = Assembly Location  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or position may vary depending upon manufacturing location.

### FUNCTION TABLE

Inputs		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

### ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 6 of this data sheet.

# NLV74HC1G00

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage	-0.5 to V <sub>CC</sub> +0.5	V
V <sub>OUT</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> +0.5	V
I <sub>IK</sub>	DC Input Diode Current	±20	mA
I <sub>OK</sub>	DC Output Diode Current	±20	mA
I <sub>OUT</sub>	DC Output Source/Sink Current	±12.5	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC Supply Current per Supply Pin or Ground Pin	±25	mA
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction Temperature Under Bias	+150	°C
θ <sub>JA</sub>	Thermal Resistance (Note 1)	SC-88A 377 TSOP-5 320	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	SC-88A 332 TSOP-5 390	mW
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating	Oxygen Index: 28 to 34 UL 94 V-0 @ 0.125 in	
V <sub>ESD</sub>	ESD Withstand Voltage (Note 2)	Human Body Model 2000 Charged Device Model 1000	V
I <sub>LATCHUP</sub>	Latchup Performance (Note 3)	±500	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 20 ounce copper trace with no air flow per JESD51-7.
2. HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to JESD22-C101-F. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued per JEDEC/JEP172A.
3. Tested to EIA/JESD78 Class II.

# NLV74HC1G00

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	DC Supply Voltage	2.0	6.0	V
V <sub>IN</sub>	DC Input Voltage	0.0	V <sub>CC</sub>	V
V <sub>OUT</sub>	DC Output Voltage	0.0	V <sub>CC</sub>	V
T <sub>A</sub>	Operating Temperature Range	-55	+125	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time			ns
		V <sub>CC</sub> = 2.0 V	0	1000
		V <sub>CC</sub> = 3.0 V	0	600
		V <sub>CC</sub> = 4.5 V	0	500
		V <sub>CC</sub> = 6.0 V	0	400

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			-40°C ≤ T <sub>A</sub> ≤ 85°C		-55°C ≤ T <sub>A</sub> ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V <sub>IH</sub>	High-Level Input Voltage		2.0	1.5	-	-	1.5	-	1.5	-	V
			3.0	2.1	-	-	2.1	-	2.1	-	
			4.5	3.15	-	-	3.15	-	3.15	-	
			6.0	4.20	-	-	4.20	-	4.20	-	
V <sub>IL</sub>	Low-Level Input Voltage		2.0	-	-	0.5	-	0.5	-	0.5	V
			3.0	-	-	0.9	-	0.9	-	0.9	
			4.5	-	-	1.35	-	1.35	-	1.35	
			6.0	-	-	1.80	-	1.80	-	1.80	
V <sub>OH</sub>	High-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OH</sub> = -20 μA	2.0	1.9	2.0	-	1.9	-	1.9	-	V
			3.0	2.9	3.0	-	2.9	-	2.9	-	
			4.5	4.4	4.5	-	4.4	-	4.4	-	
			6.0	5.9	6.0	-	5.9	-	5.9	-	
		4.5	4.18	4.31	-	4.13	-	4.08	-		
		6.0	5.68	5.80	-	5.63	-	5.58	-		
V <sub>OL</sub>	Low-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OL</sub> = 20 μA	2.0	-	0.0	0.1	-	0.1	-	0.1	V
			3.0	-	0.0	0.1	-	0.1	-	0.1	
			4.5	-	0.0	0.1	-	0.1	-	0.1	
			6.0	-	0.0	0.1	-	0.1	-	0.1	
		4.5	-	0.17	0.26	-	0.33	-	0.40		
		6.0	-	0.18	0.26	-	0.33	-	0.40		
I <sub>IN</sub>	Input Leakage Current	V <sub>IN</sub> = 6.0 V or GND	6.0	-	-	±0.1	-	±1.0	-	±1.0	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	6.0	-	-	1.0	-	10	-	40	μA

# NLV74HC1G00

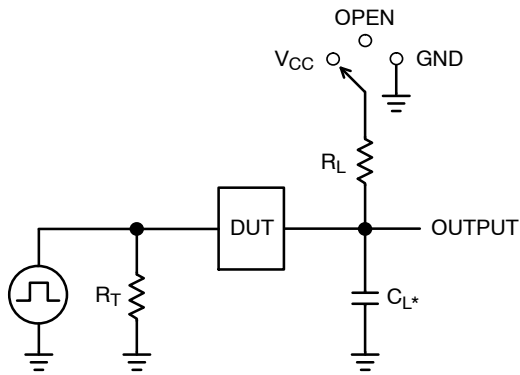
## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	T <sub>A</sub> = 25°C			-40°C ≤ T <sub>A</sub> ≤ 85°C		-55°C ≤ T <sub>A</sub> ≤ 125°C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, (A or B) to Y	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 15 pF	-	3.5	15	-	20	-	25	ns
		V <sub>CC</sub> = 2.0 V C <sub>L</sub> = 50 pF	-	20	100	-	125	-	155	
		V <sub>CC</sub> = 3.0 V	-	11	27	-	35	-	90	
		V <sub>CC</sub> = 4.5 V	-	8	20	-	25	-	35	
		V <sub>CC</sub> = 6.0 V	-	7	17	-	21	-	26	
t <sub>TLH</sub> , t <sub>THL</sub>	Output Transition Time	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 15 pF	-	3	10	-	15	-	20	ns
		V <sub>CC</sub> = 2.0 V C <sub>L</sub> = 50 pF	-	25	125	-	155	-	200	
		V <sub>CC</sub> = 3.0 V	-	16	35	-	45	-	60	
		V <sub>CC</sub> = 4.5 V	-	11	25	-	31	-	38	
		V <sub>CC</sub> = 6.0 V	-	9	21	-	26	-	32	
C <sub>IN</sub>	Input Capacitance		-	5	10	-	10	-	10	pF

C <sub>PD</sub>	Power Dissipation Capacitance (Note 4)	Typical @ 25°C, V <sub>CC</sub> = 5.0 V		pF
		10		

4. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no-load dynamic power consumption; P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

# NLV74HC1G00

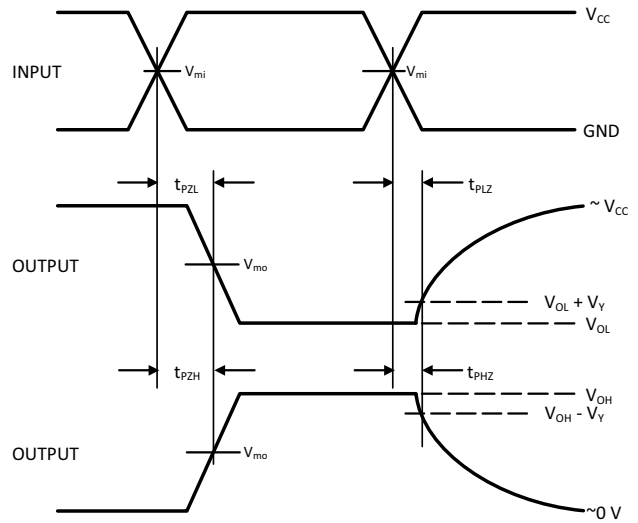
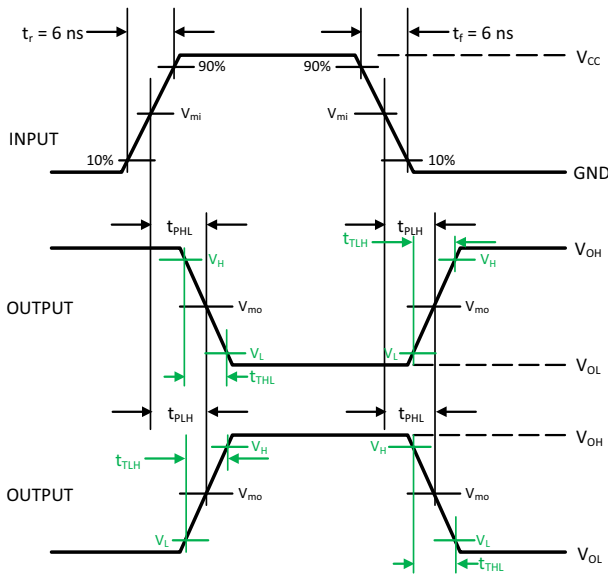


\* $C_L$  includes probe and jig capacitance  
 $R_T$  is  $Z_{OUT}$  of pulse generator (typically 50  $\Omega$ )  
 $f = 1$  MHz

**Figure 3. Test Circuit**

Test	Switch Position	$C_L$ , pF	$R_L$ , $\Omega$
$t_{PLH} / t_{PHL}$	Open	See AC Characteristics Table	X
$t_{TLH} / t_{THL}$ (Note 5)	Open		X
$t_{PLZ} / t_{PZL}$	$V_{CC}$		1 k
$t_{PHZ} / t_{PZH}$	GND		1 k

X - Don't Care



**Figure 4. Switching Waveforms**

$V_{CC}$ , V	$V_{mi}$ , V	$V_{mo}$ , V		$V_L$ , V	$V_H$ , V	$V_Y$ , V
		$t_{PLH}$ , $t_{PHL}$	$t_{PZL}$ , $t_{PLZ}$ , $t_{PZH}$ , $t_{PHZ}$			
3.0 to 3.6	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{OL} + 0.1 (V_{OH} - V_{OL})$	$V_{OL} + 0.9 (V_{OH} - V_{OL})$	0.3
4.5 to 5.5	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{OL} + 0.1 (V_{OH} - V_{OL})$	$V_{OL} + 0.9 (V_{OH} - V_{OL})$	0.3

5.  $t_{TLH}$  and  $t_{THL}$  are measured from 10% to 90% of  $(V_{OH} - V_{OL})$ , and 90% to 10% of  $(V_{OH} - V_{OL})$ , respectively.

# NLV74HC1G00

## ORDERING INFORMATION

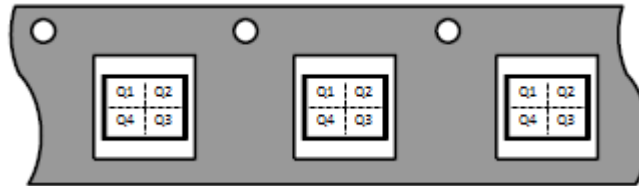
Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping <sup>†</sup>
NLV74HC1G00DFT1G*	SC-88A	H1	Q2	3000 / Tape & Reel
MC74HC1G00DFT2G-L22038	SC-88A	H1	Q4	3000 / Tape & Reel
NLVHC1G00DFT2G*	SC-88A	H1	Q4	3000 / Tape & Reel
MC74HC1G00DTT1G	TSOP-5	H1	Q4	3000 / Tape & Reel
NLV74HC1G00DTT1G*	TSOP-5	H1	Q4	3000 / Tape & Reel

<sup>†</sup>For complete information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

## PIN 1 ORIENTATION IN TAPE AND REEL

Direction of Feed



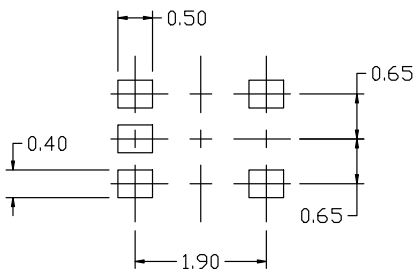
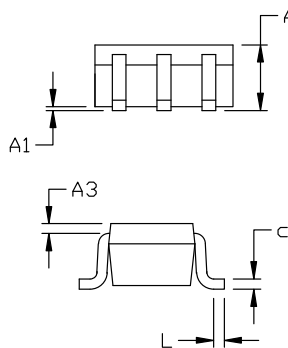
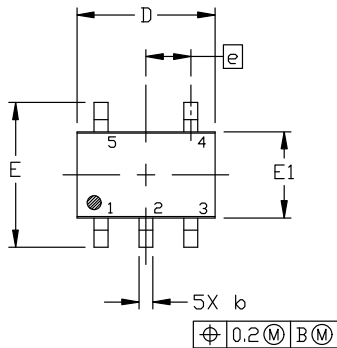
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 2:1

## SC-88A (SC-70-5/SOT-353) CASE 419A-02 ISSUE M

DATE 11 APR 2023



### RECOMMENDED MOUNTING FOOTPRINT

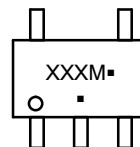
\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.1016MM PER SIDE.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.80	0.95	1.10
A1	---	---	0.10
A3	0.20 REF		
b	0.10	0.20	0.30
c	0.10	---	0.25
D	1.80	2.00	2.20
E	2.00	2.10	2.20
E1	1.15	1.25	1.35
e	0.65 BSC		
L	0.10	0.15	0.30

### GENERIC MARKING DIAGRAM\*



\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

XXX = Specific Device Code

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### STYLE 1:

1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

#### STYLE 2:

1. ANODE
2. EMITTER
3. BASE
4. COLLECTOR
5. CATHODE

#### STYLE 3:

1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. CATHODE 1

#### STYLE 4:

1. SOURCE 1
2. DRAIN 1/2
3. SOURCE 1
4. GATE 1
5. GATE 2

#### STYLE 5:

1. CATHODE
2. COMMON ANODE
3. CATHODE 2
4. CATHODE 3
5. CATHODE 4

#### STYLE 6:

1. EMITTER 2
2. BASE 2
3. EMITTER 1
4. COLLECTOR
5. COLLECTOR 2/BASE 1

#### STYLE 7:

1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

#### STYLE 8:

1. CATHODE
2. COLLECTOR
3. N/C
4. BASE
5. EMITTER

#### STYLE 9:

1. ANODE
2. CATHODE
3. ANODE
4. ANODE
5. ANODE

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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<b>DESCRIPTION:</b>	<b>SC-88A (SC-70-5/SOT-353)</b>	<b>PAGE 1 OF 1</b>

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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

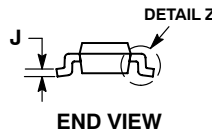
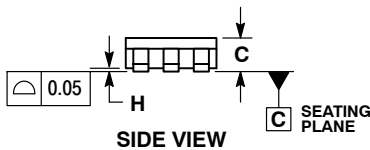
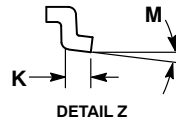
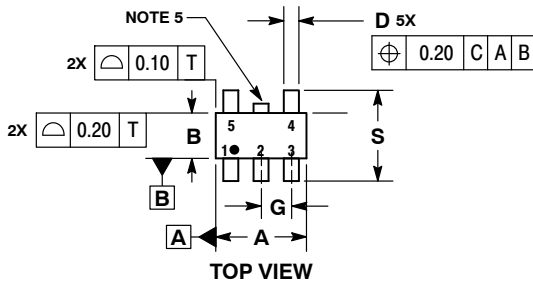
ON Semiconductor®



SCALE 2:1

### TSOP-5 CASE 483 ISSUE N

DATE 12 AUG 2020

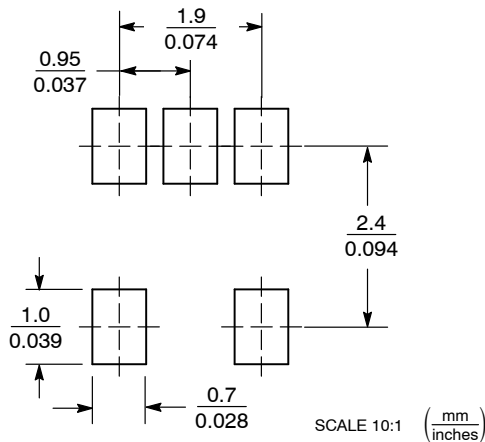


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSION A.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

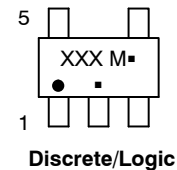
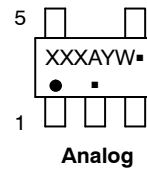
DIM	MILLIMETERS	
	MIN	MAX
A	2.85	3.15
B	1.35	1.65
C	0.90	1.10
D	0.25	0.50
G	0.95 BSC	
H	0.01	0.10
J	0.10	0.26
K	0.20	0.60
M	0°	10°
S	2.50	3.00

#### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

#### GENERIC MARKING DIAGRAM\*



- XXX = Specific Device Code    XXX = Specific Device Code  
 A = Assembly Location        M = Date Code  
 Y = Year                            ■ = Pb-Free Package  
 W = Work Week  
 ■ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present.

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