



**MICROCIRCUIT DATA SHEET**

**MN54ABT240-X REV 0B0**

Original Creation Date: 09/06/95  
 Last Update Date: 09/24/98  
 Last Major Revision Date: 03/19/97

**OCTAL BUFFER AND LINE DRIVER WITH TRI-STATE OUTPUTS**

**General Description**

The ABT240 is an inverting octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus oriented transmitter or receiver which provides improved PC board density.

**Industry Part Number**

54ABT240

**NS Part Numbers**

54ABT240E-QML \*  
 54ABT240J-QML \*\*  
 54ABT240W-QML \*\*\*

**Prime Die**

NB240

**Controlling Document**

See Features Page

**Processing**

MIL-STD-883, Method 5004

**Quality Conformance Inspection**

MIL-STD-883, Method 5005

Subgrp	Description	Temp ( °C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

**Features**

- Output sink capability 48mA, source capability of 24mA
- Guaranteed latchup protection
- High impedance glitch free bus loading during entire power up and power down cycle
- Nondestructive hot insertion capability
- SMD : 5962-9318801Q2A\*, QRA\*\*, QSA\*\*\*

**(Absolute Maximum Ratings)**

(Note 1)

Vcc Pin Potential to Ground Potential	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30mA to +5.0mA
Voltage Applies To Any Output In the Disabled or Power-Off State In The High State	-0.5V to 5.5V -0.5V to Vcc
Current Applies To Output In The Low State (Max)	96mA
Junction Temperature (Tj) Ceramic	+175C
Thermal Resistance Junction-to-Case (Theta JC)	See Mil-Std 1835
Storage Temperature	-65C to +150C
Lead Temperature (Soldering, 10 seconds)	+300C
ESD Classification	Class 3
Maximum Power Dissipation	500 mW

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

**Recommended Operating Conditions**

Supply Voltage (Vcc)	4.5V to 5.5V
Operating Temperature	-55C to +125C
Minimum Input Edge Rate (dV/dt) Data Input Enable Input	50 mV/ns 20 mV/ns
Maximum Output Current High Level (Ioh) Low Level (Iol)	-24 mA 48 mA

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: 4.5V to 5.5V Temp Range: -55C to 125C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ICCH	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 4	VCC		250.0	uA	1, 2, 3
ICCL	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 4	VCC		30.0	mA	1, 2, 3
ICCZ	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 4	VCC		250.0	uA	1, 2, 3
ICCT	Supply Current	VCC=5.5V, OE=0.0V Input under test=3.4V Other inputs=5.5V or 0.0V	1, 4	VCC		2.5	mA	1, 2, 3
		VCC=5.5V, OE=3.4V Other inputs=5.5V or 0.0V	1, 4	VCC		2.5	mA	1, 2, 3
		VCC=5.5V, OE=5.5V Input under test=3.4V Other inputs=5.5V or 0.0V	1, 4	VCC		50.0	uA	1, 2, 3
IIH	High Level Input Current	VCC=5.5V, VINH=5.5V	1, 4	IN		2.0	uA	1, 2, 3
IIL	Low Level Input Current	VCC=5.5V, VINL=0.0V	1, 4	IN		-2.0	uA	1, 2, 3
IOZH	Maximum TRI-STATE Leakage Current HIGH	VCC=5.5V, VOUT=2.7V VINL=0.0V, VIH (OE)=2.0V	1, 4	OUT		10.0	uA	1, 2, 3
IOZL	Maximum TRI-STATE Leakage Current LOW	VCC=5.5V, VOUT=0.5V VINH=5.5V, VIH (OE)=2.0V	1, 4	OUT		-10.0	uA	1, 2, 3
ICEX	Output High Leakage Current	VCC=5.5V, VOUT=5.5V VINH=5.5V	1, 4	OUT		50.0	uA	1, 2, 3
IOS	Output Short Circuit Current	VCC=5.5V, VOUT=0.0V VINH=5.5V	1, 4, 10	OUT	-100	-275	mA	1, 2, 3
IOS1	Output Short Circuit Current	VCC=5.5V, VOUT=2.5V VINH=5.5V	1, 4, 10	OUT	-50	-180	mA	1, 2, 3
IBVI	Input High Current Breakdown Test	VCC=5.5V, VINH=7.0V	1, 4	OUT		7.0	uA	1, 2, 3
IZZ	Bus Drainage Test	VCC=0.0V, VOUT=4.5V, VINL=0.0V	1, 4	OUT	-100	100	uA	1, 2, 3
VOL	Low Level Output Voltage	VCC=4.5V, IOL=48.0mA, VINH=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT		0.55	V	1, 2, 3

## Electrical Characteristics

### DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: 4.5V to 5.5V Temp Range: -55C to 125C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
VOH	High Level Output Voltage	VCC=4.5V, IOH=-24.0mA, VINH=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT	2.0		V	1, 2, 3
		VCC=4.5V, IOH=-3mA, VINH=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT	2.5		V	1, 2, 3
		VCC=5.0V, IOH=-3mA, VINH=5.0V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT	3.0		V	1, 2, 3
VID	Input Leakage Test	VCC=0.0V, IID=1.9uA, VINL=0.0V	1, 4	IN	4.75		V	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IKL=-18mA, VINH=4.5V, VINL=0.0V	1, 4	IN		-1.2	V	1, 2, 3
VOLP	Low Level Ground Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	IN		0.9	V	4
VOLV	Low Level Ground Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	IN		-1.35	V	4
VOHP	High Level VCC Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	IN		1.55	V	4
VOHV	High Level VCC Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	IN		-0.55	V	4
CIN	Input Capacitance	VCC=0.0V	7	IN		10.0	pF	4
COUT	Output Capacitance	VCC=5.5V	7	OUT		16.0	pF	4

## Electrical Characteristics

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC: CL=50pF RL=500 OHMS TRISE/TFALL = 3.0ns

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	In to On	1.0	4.3	ns	9
			2, 5	In to On	0.8	5.5	ns	10, 11
tpHL	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	In to On	1.0	4.5	ns	9
			2, 5	In to On	1.0	5.5	ns	10, 11
tpZL	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OE to On	1.1	6.2	ns	9
			2, 5	OE to On	0.8	7.7	ns	10, 11
tpZH	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OE to On	1.1	5.8	ns	9
			2, 5	OE to On	0.8	7.5	ns	10, 11
tpHZ	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OE to On	1.5	5.9	ns	9
			2, 5	OE to On	1.0	7.5	ns	10, 11
tpLZ	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OE to On	1.5	5.9	ns	9
			2, 5	OE to On	1.0	7.2	ns	10, 11

Note 1: SCREEN TESTED 100% ON EACH DEVICE AT -55C, +125C & +25C TEMP., SUBGROUPS 1,2,3,7 & 8.

Note 2: SCREEN TESTED 100% ON EACH DEVICE AT -55C, +25C & +125C TEMP., SUBGROUPS A9, A10 & A11.

Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMP. ONLY, SUBGROUP 9.

Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C, +125C & -55C TEMP., SUBGROUPS A1, 2, 3, 7 & 8.

Note 5: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C, +125C & -55C TEMP., SUBGROUPS A9, 10, & 11.

Note 6: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C TEMP ONLY, SUBGROUP A9.

Note 7: NOT TESTED (GUARANTEED BY DESIGN CHARACTERIZATION DATA).

Note 8: MAX NUMBER OF OUTPUTS DEFINED AS (N). N-1 DATA INPUTS ARE DRIVEN 0V TO 3.0V. ONE OUTPUT @ VOL OR @ VOH.

Note 9: MAX NUMBER OF DATA INPUTS (N) SWITCHING. (N-1) INPUTS SWITCHING 0V TO 3.0V. INPUT-UNDERTEST SWITCHING: 3V TO THRESHOLD (VILD), 0V TO THRESHOLD (VIHD), FREQ.= 1 MHZ.

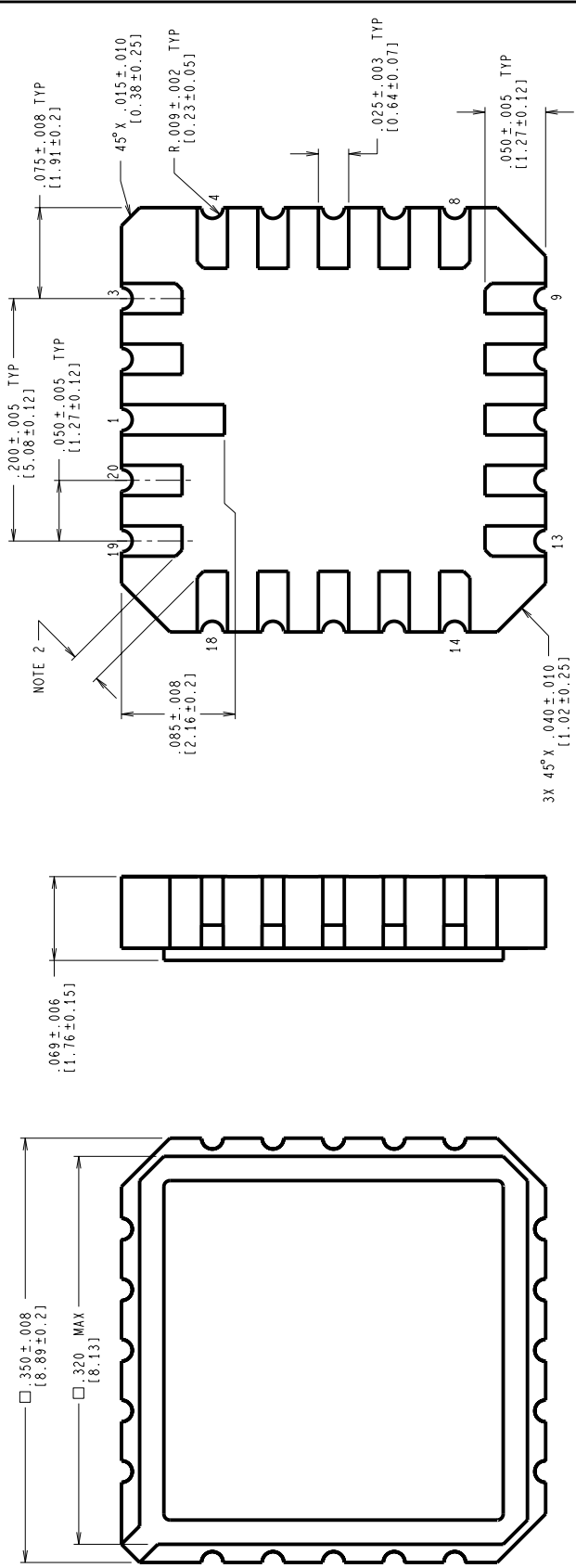
Note 10: MAXIMUM TEST DURATION NOT TO EXCEED ONE SECOND, NOT MORE THAN ONE OUTPUT SHORTED AT ONE TIME.

## Graphics and Diagrams

GRAPHICS#	DESCRIPTION
E20ARE	LCC (E), TYPE C, 20 TERMINAL(P/P DWG)
J20ARM	CERDIP (J), 20 LEAD (P/P DWG)
W20ARF	CERPACK (W), 20 LEAD (P/P DWG)

See attached graphics following this page.

REVISIONS			
LTR	DESCRIPTION	E.C.N.	DATE
E	REVISE AND REDRAW	10005	02/10/94 DEG/



- NOTES: UNLESS OTHERWISE SPECIFIED.
- LEAD FINISH TO BE ONE OF THE FOLLOWING:
    - 50 MICRONS/12.7 MICROMETERS MINIMUM GOLD PLATING OVER 50-350 MICRONS/1.27-8.89 MICROMETERS NICKEL.
    - SOLDER DIP.
    - SOLDER THICKNESS PER LATEST REVISION OF MIL-STD-1835.
  - CORNER PADS MAY HAVE A  $45^\circ$  X  $0.20$  IN/  $0.51$  mm MAXIMUM CHAMFER TO ACCOMPLISH THE  $0.015$  IN/  $0.38$  mm DIMENSION.
  - REFERENCE JEDEC REGISTRATION MS-004, VARIATION CB, DATED 7/90.

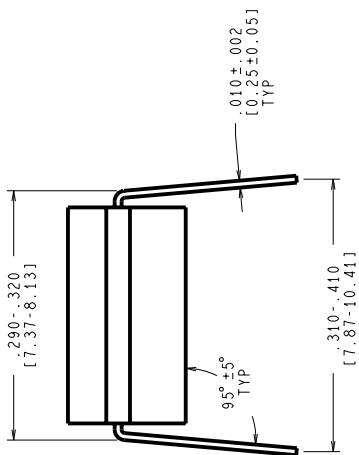
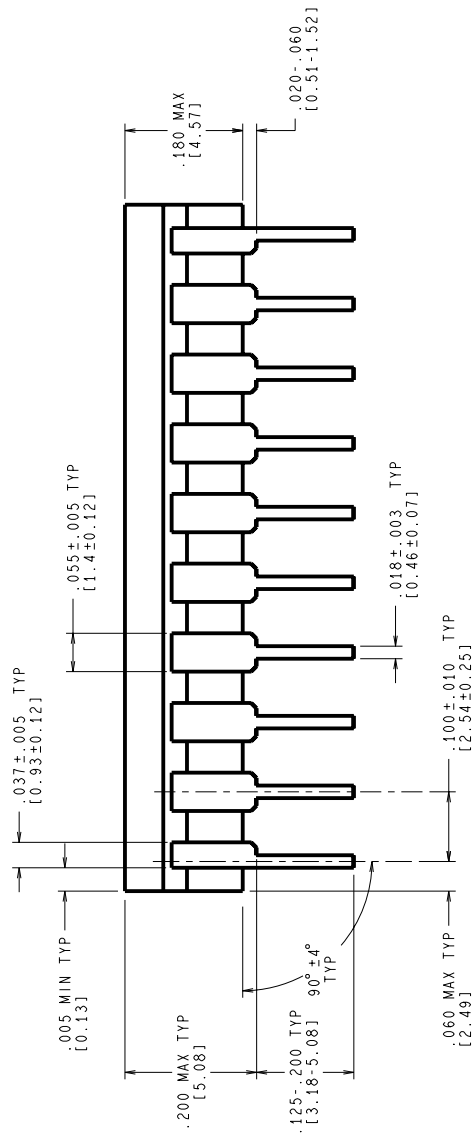
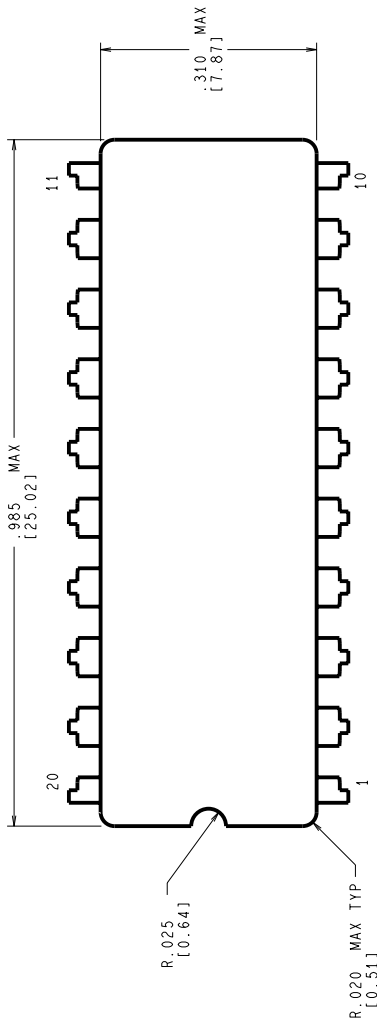
CONTROLLING DIMENSION IS INCH  
VALUES IN [ ] ARE MILLIMETERS

MIL/AERO CONFIGURATION CONTROL	
NATIONAL SEMICONDUCTOR CORPORATION 2300 Semiconductor Drive, Santa Clara, Ca. 95052-8000	
APPROVALS	DATE
DRN: <i>Deane Gedy</i>	02/10/94
DFTG: CHK.	
ENGR: CHK.	
APPROVAL	
LEADLESS CHIP CARRIER, TYPE C, 20 TERMINAL	
SCALE	SIZE
N/A	C
DRAWING NUMBER	
MKT-E20A	
REV	E
DO NOT SCALE DRAWING SHEET 1 of 1	



REVISIONS

LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
N	REVISE AND REDRAW PER CURRENT STANDARD: UPDATE TITLE & MIL/AERO STAMP.	11696	03/27/1997	MS/



CONTROLLING DIMENSION IS INCH  
 VALUES IN [ ] ARE MILLIMETERS

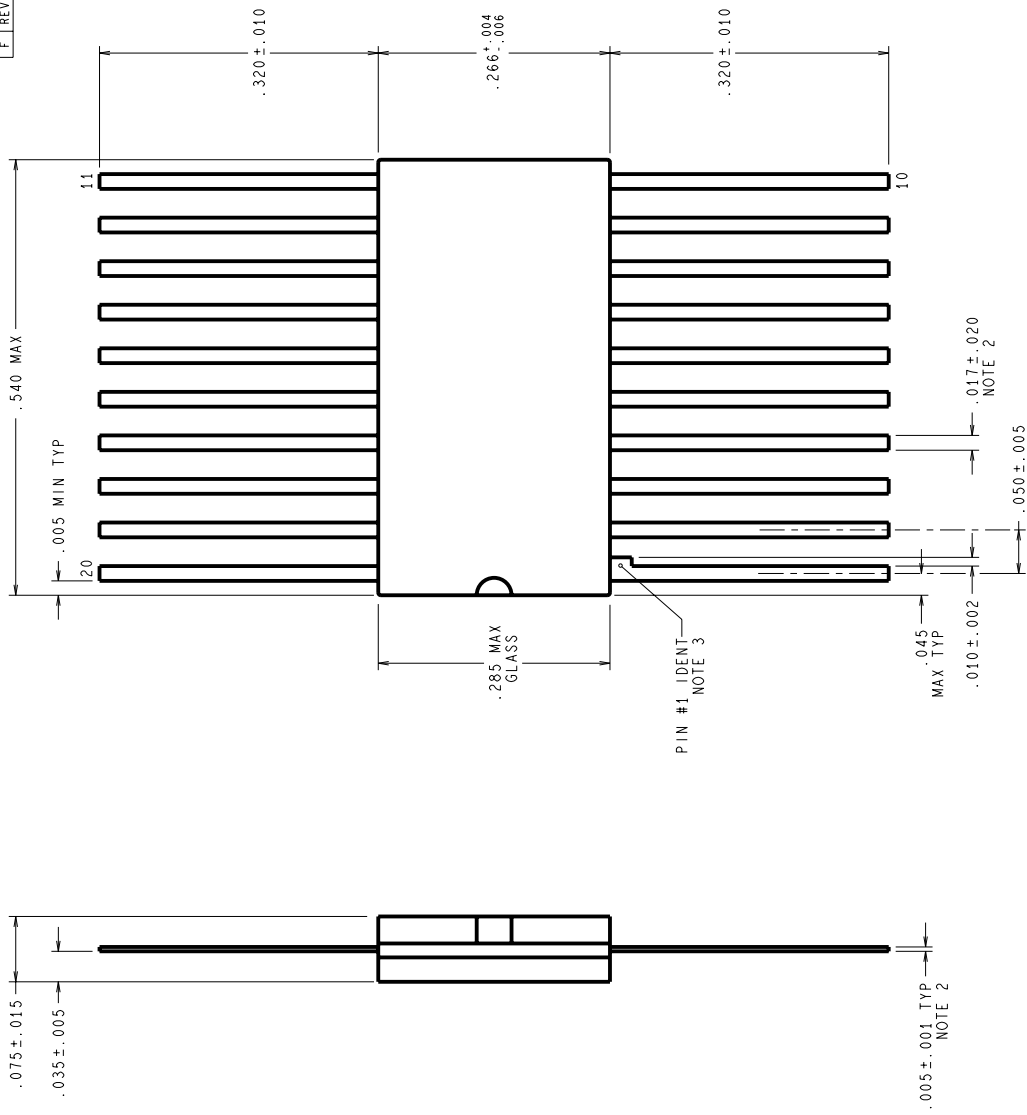
NOTES: UNLESS OTHERWISE SPECIFIED

- LEAD FINISH TO BE ONE OF THE FOLLOWING:
  - 200 MICROMETERS/ 5.08 MICROMETERS MINIMUM SOLDER MEASURED AT THE CREST OF THE MAJOR FLATS.
  - 200 TO 800 MICROMETERS/ 5.08 TO 20.32 MICROMETERS TIN PLATE OVER 50 TO 300 MICROMETERS/ 1.27 TO 7.62 MICROMETERS NICKEL UNDERPLATE OR BASIS METAL.
  - 50 TO 100 MICROMETERS/ 1.27 TO 2.54 MICROMETERS GOLD OVER 50 TO 350 MICROMETERS/ 1.27 TO 8.89 MICROMETERS NICKEL UNDERPLATE.
- NO JEDEC REGISTRATION AS OF 03/27/1997.

MIL-PRF-38535  
 CONFIGURATION CONTROL

APPROVALS	DATE	SCALE	SIZE	DRAWING NUMBER	REV
DRW: MARYA SUCHY	03/27/1997	N/A	C	(SC)MKT-J20A	N
DATE CHK:					
ENGR. CHK:					
PROJECTION					
<b>National Semiconductor</b> 2800 Semiconductor dr., Santa Clara, CA 95052-8090					
<b>CERDIP, 20 LEAD,                  .300 CENTERS</b>					
DO NOT SCALE DRAWING					
SHEET 1 of 1					

REVISIONS			
LTR	DESCRIPTION	E.C.N.	DATE
F	REVISE AND REDRAW PER NEW STANDARD.	10512	07/28/94
			BY/APP'D DEG/



NOTES: UNLESS OTHERWISE SPECIFIED.

- LEAD FINISH: SOLDER DIPPED WITH Sn60 OR Sn63 SOLDER CONFORMING TO MIL-M-38510 TO A MINIMUM THICKNESS OF 200 MICROINCHES. SOLDER MAY BE APPLIED OVER LEAD BASIS METAL OR Sn PLATE.
- MAXIMUM LIMIT MAY BE INCREASED BY .003 INCHES AFTER LEAD FINISH APPLIED.
- LEAD 1 IDENTIFICATION SHALL BE:
  - A NOTCH OR OTHER MARK WITHIN THIS AREA
  - A TAB ON LEAD 1, EITHER SIDE
- NO JEDEC REGISTRATION AS OF 02/70/94.

MIL/AERO  
CONFIGURATION CONTROL

MIL-M-38510  
CONFIGURATION CONTROL

APPROVALS		DATE
DRN	<i>D. F. Gedy</i>	07/28/94
DTG. CHK.		
ENGR. CHK.		
PROJECTION		
National Semiconductor		
2800, Semiconductor dr., Santa Clara, CA 95052-8090		
CERPACK, 20 LEAD		
SCALE	SIZE	DRAWING NUMBER
N/A	C	MKT-W20A
DO NOT SCALE DRAWING		REV
		F
		SHEET 1 of 1

**Revision History**

Rev	ECN #	Rel Date	Originator	Changes
0B0	M0001562	09/24/98	Bill Petcher	Changed MDS MN54ABT240-X REV 0A0 to MN54ABT240-X REV 0B0