National Semiconductor

August 1998

54FCT240
Octal Buffer/Line Driver with TRI-STATE® Outputs

General Description

The 54FCT240 is an 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.

Features

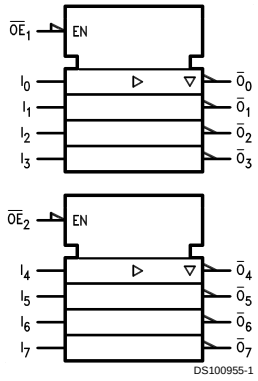
- Inverting TRI-STATE outputs drive bus lines or buffer memory address registers
- Output sink capability of 32 mA, source capability of 12 mA
- TTL input and output compatible levels
- CMOS power consumption
- Standard Microcircuit Drawing (SMD) 5962-8765501

Ordering Code:

Military	Package Number	Package Description
54FCT240DMQB	J20A	20-Lead Ceramic Dual-In-Line
54FCT240FMQB	W20A	20-Lead Cerpak
54FCT240LMQB	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

Logic Symbol

IEEE/IEC

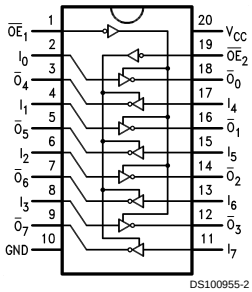


DS100955-1

Pin Names	Description
$\overline{OE}_1$, $\overline{OE}_2$	TRI-STATE Output Enable Inputs
I_0–I_7	Inputs
$\overline{O}_0$–$\overline{O}_7$	Outputs

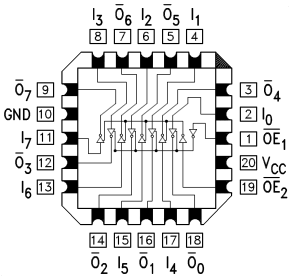
Connection Diagrams

Pin Assignment for DIP and Flatpak



DS100955-2

Pin Assignment for LCC



DS100955-3

TRI-STATE® is a registered trademark of National Semiconductor Corporation.
FACT® is a registered trademark of Fairchild Semiconductor Corporation.

Connection Diagrams (Continued)

Inputs		Outputs
$\overline{OE}_1$	I_n	(Pins 12, 14, 16, 18)
L	L	H
L	H	L
H	X	Z

Inputs		Outputs
$\overline{OE}_2$	I_n	(Pins 3, 5, 7, 9)
L	L	H
L	H	L
H	X	Z

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Storage Temperature	−65˚C to +150˚C
Ambient Temperature under Bias	−55˚C to +125˚C
Junction Temperature under Bias	
Ceramic	−55˚C to +175˚C
V_{CC} Pin Potential to	
Ground Pin	−0.5V to +7.0V
Input Voltage (Note 1)	−0.5V to +7.0V
Input Current (Note 1)	−30 mA to +5.0 mA
Voltage Applied to Any Output	
in the Disabled or	
Power-off State	−0.5V to 5.5V
in the HIGH State	−0.5V to V_{CC}
Current Applied to Output	
in LOW State (Max)	twice the rated I_{OL} (mA)

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	−55˚C to +125˚C
Supply Voltage	
Military	+4.5V to +5.5V

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT® circuits outside databook specifications.

DC Characteristics for 'FCT Family Devices

Symbol	Parameter		FCT240 Min	FCT240 Max	Units	V_{CC}	Conditions
V_{IH}	Input HIGH Voltage		2.0		V		Recognized HIGH Signal
V_{IL}	Input LOW Voltage			0.8	V		Recognized LOW Signal
V_{CD}	Input Clamp Diode Voltage			−1.2	V	Min	I_{IN} = −18 mA
V_{OH}	Output HIGH Voltage	54FCT	4.3		V	Min	I_{OH} = −300 µA
		54FCT	2.4		V	Min	I_{OH} = −12 mA
V_{OL}	Output LOW Voltage	54FCT		0.2	V	Min	I_{OL} = 300 µA
		54FCT		0.5	V	Min	I_{OL} = 32 mA
I_{IH}	Input HIGH Current			5	µA	Max	V_{IN} = 5.5V
I_{IL}	Input LOW Current			−5	µA	Max	V_{IN} = 0.0V
I_{OZH}	High Impedance Output Current			10	µA	Max	V_{IN} = 5.5V
I_{OZL}	High Impedance Output Current			-10	µA	Max	V_{IN} = 0.0V
I_{OS}	Output Short-Circuit Current			−60	mA	Max	V_{OUT} = 0.0V
I_{CCQ}	Power Supply Current			1.5	mA	Max	V_{IN} = 0.2V or V_{IN} = 5.3V
ΔI_{CC}	Power Supply Current			2.0	mA	Max	V_{IN} = 3.4V
I_{CCT}	Total Power Supply Current			4.8	mA	Max	V_{IN} = 3.4V or V_{IN} = GND, $\overline{OE}$ = GND, f_i = 10Mhz, outputs open, one bit toggling - 50% duty cycle
				4.0	mA	Max	V_{IN} = 5.3V or V_{IN} = 0.2V,$\overline{OE}$ = GND, f_i = 10Mhz, outputs open, one bit toggling - 50% duty cycle
I_{CCD}	Dynamic I_{CC}	No Load		0.25	mA/MHz	Max	Outputs Open, $\overline{OE}$ = GND, One Bit Toggling, 50% Duty Cycle

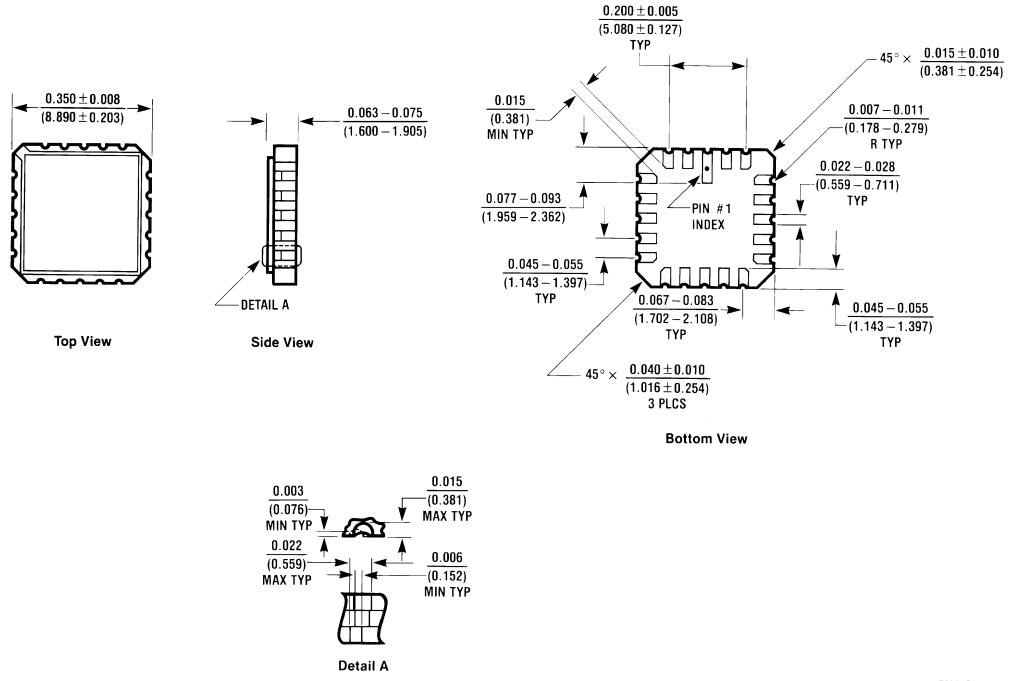
AC Electrical Characteristics

Symbol	Parameter	54FCT240 $T_A = -55^\circ C$ to $+125^\circ C$, $V_{CC} = 4.5V–5.5V$, $C_L = 50$ pF		Units	Fig. No.
		Min	Max		
t_{PLH}	Propagation Delay	1.5	9.0	ns	
t_{PHL}	Data to Outputs	1.5	9.0		
t_{PZH}	Output Enable	1.5	10.5	ns	
t_{PZL}	Time	1.5	10.5		
t_{PHZ}	Output Disable	1.5	12.5	ns	
t_{PLZ}	Time	1.5	12.5		

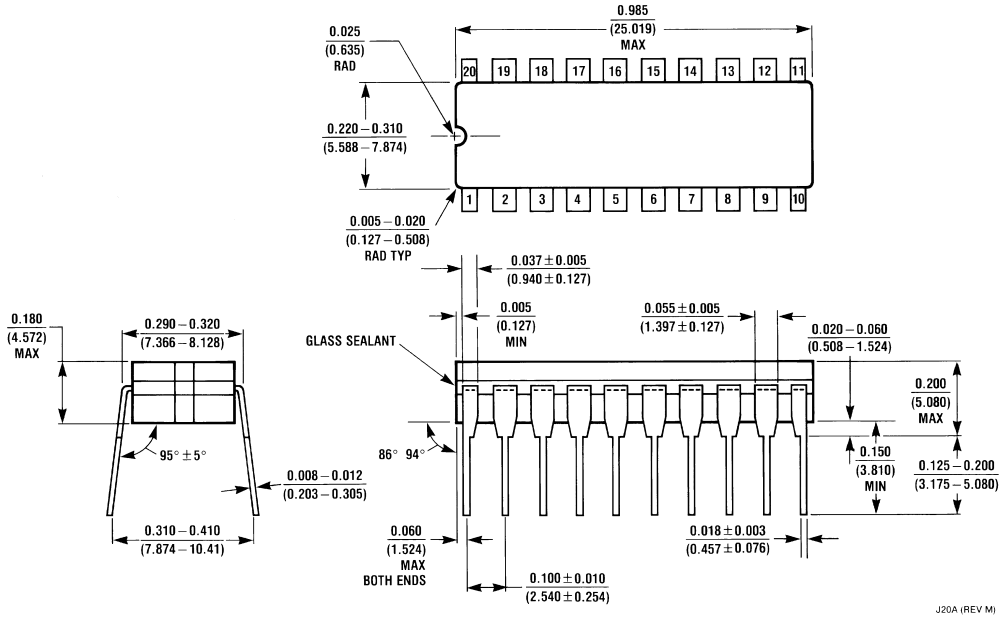
Capacitance

Symbol	Parameter	Max	Units	Conditions
C_{IN}	Input Capacitance	10	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance	12	pF	V_{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted

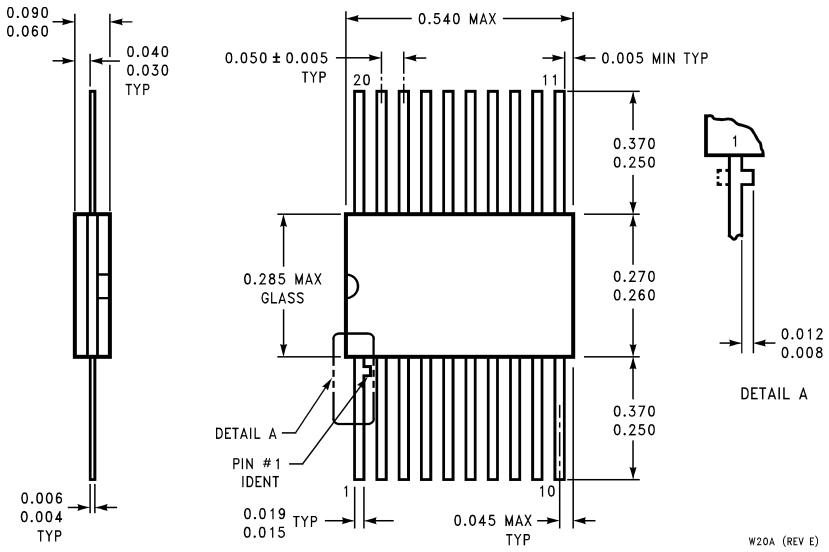


20 Terminal Ceramic Leadless Chip Carrier (L)
NS Package Number E20A



20 Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



20 Lead Ceramic Flatpak (F)
NS Package Number W20A

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5639-7560
Fax: 81-3-5639-7507