National Semiconductor

54F/74F2241•54F/74F2244 Octal Buffers/Line Drivers with 25Ω Series Resistors in Outputs

General Description

The 'F2241 and 'F2244 are octal buffers and line drivers designed to drive the capacitive inputs of MOS memory drivers, address drivers, clock drivers and bus-oriented transmitters/receivers.

The 25Ω series resistors in the outputs reduce ringing and eliminate the need for external resistors.

Features

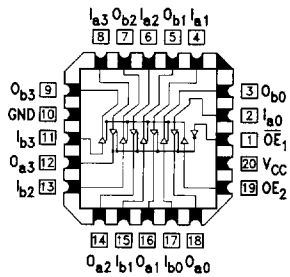
- TRI-STATE® outputs drive bus lines or buffer memory address registers
- 12 mA source current
- 25Ω series resistors in outputs eliminate the need for external resistors.
- Designed to drive the capacitive inputs of MOS devices
- Guaranteed 4000V minimum ESD protection

Ordering Code: See Section 5

Connection Diagrams

'F2241

Pin Assignment for LCC



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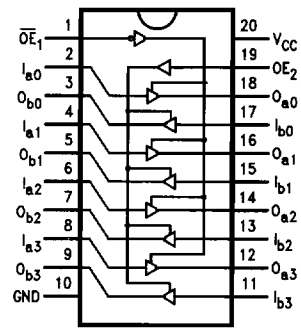
Pin Assignment for DIP, SOIC and Flatpak



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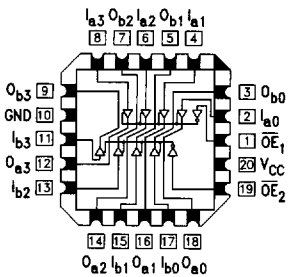
'F2244



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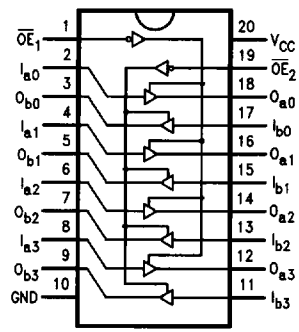

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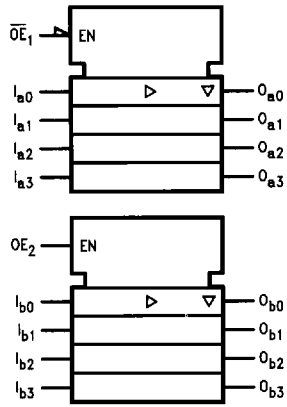
Logic Symbols

IEEE/IEC
'F2241



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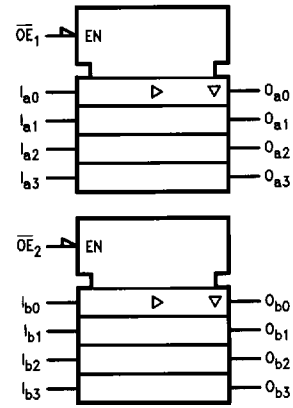
IEEE/IEC
'F2244



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Unit Loading/Fan Out: See Section 2 for U.L. definitions

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
$\overline{OE}_1$, $\overline{OE}_2$	TRI-STATE Output Enable Input (Active LOW)	1.0/1.667	20 μA/−1 mA
OE_2	TRI-STATE Output Enable Input (Active HIGH)	1.0/1.667	20 μA/−1 mA
I_{an}, I_{bn}	Inputs	1.0/2.667*	20 μA/−1.6 mA
O_{an},O_{bn}	Outputs	750/20	−15 mA/12 mA

*Worst-case 'F2241, 'F2244 disabled

Truth Tables

'F2241

$\overline{OE}_1$	I_{an}	O_{an}	OE_2	I_{bn}	O_{bn}
H	X	Z	L	X	Z
L	H	H	H	H	H
L	L	L	H	L	L

'F2244

$\overline{OE}_1$	I_{an}	O_{an}	$\overline{OE}_2$	I_{bn}	O_{bn}
H	X	Z	H	X	Z
L	H	H	L	H	H
L	L	L	L	L	L

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	−55°C to +175°C
V_{CC} Pin Potential to Ground Pin	−0.5V to +7.0V
Input Voltage (Note 2)	−0.5V to +7.0V
Input Current (Note 2)	−30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V_{CC} = 0V)	
Standard Output	−0.5V to V_{CC}
TRI-STATE Output	−0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I_{OL} (mA)
ESD Last Passing Voltage (Min)	4000V

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

Free Air Ambient Temperature	
Military	−55°C to +125°C
Commercial	0°C to +70°C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

DC Electrical Characteristics

Symbol	Parameter		54F/74F Min	54F/74F Typ	54F/74F Max	Units	V_{CC}	Conditions
V_{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal
V_{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal
V_{CD}	Input Clamp Diode Voltage				−1.2	V	Min	I_{IN} = −18 mA
V_{OH}	Output HIGH Voltage	54F 10% V_{CC}	2.4			V	Min	I_{OH} = −3 mA
		54F 10% V_{CC}	2.0					I_{OH} = −12 mA
		74F 10% V_{CC}	2.4					I_{OH} = −3 mA
		74F 10% V_{CC}	2.0					I_{OH} = −15 mA
		74F 5% V_{CC}	2.7					I_{OH} = −3 mA
V_{OL}	Output LOW Voltage				0.50	V	Min	I_{OL} = 1 mA
					0.75			I_{OL} = 12 mA
I_{IH}	Input HIGH Current	54F			20.0	μA	Max	V_{IN} = 2.7V
		74F			5.0			
I_{BVI}	Input HIGH Current Breakdown Test	54F			100	μA	Max	V_{IN} = 7.0V
		74F			7.0			
I_{CEX}	Output HIGH Leakage Current	54F			250	μA	Max	V_{OUT} = V_{CC}
		74F			50			
V_{ID}	Input Leakage Test	74F	4.75			V	0.0	I_{ID} = 1.9 μA All other pins grounded
I_{OD}	Output Leakage Circuit Current	74F			3.75	μA	0.0	V_{IOD} = 150 mV All other pins grounded
I_{IL}	Input LOW Current				−1.0	mA	Max	V_{IN} = 0.5V ($\overline{OE_1}$, $\overline{OE_2}$, OE_2)
					−1.6			V_{IN} = 0.5V (I_n)
I_{OZH}	Output Leakage Current				50	μA	Max	V_{OUT} = 2.7V
I_{OZL}	Output Leakage Current				−50	μA	Max	V_{OUT} = 0.5V
I_{OS}	Output Short-Circuit Current		−100		−225	mA	Max	V_{OUT} = 0V
I_{CCH}	Power Supply Current			40	60	mA	Max	V_O = HIGH
I_{CCL}	Power Supply Current			60	90	mA	Max	V_O = LOW
I_{CCZ}	Power Supply Current			60	90	mA	Max	V_O = HIGH Z

AC Electrical Characteristics: See Section 2 for Waveforms and Load Configurations

Symbol	Parameter	74F $T_A = +25°C$ $V_{CC} = +5.0V$ $C_L = 50\ pF$			54F $T_A, V_{CC} = Mil$ $C_L = 50\ pF$		74F $T_A, V_{CC} = Com$ $C_L = 50\ pF$		Units	Fig. No.
		Min	Typ	Max	Min	Max	Min	Max		
t_{PLH}	Propagation Delay	1.5		7.0	2.0	6.5	1.5	7.0	ns	2–3
t_{PHL}	Data to Output	2.5		8.0	2.0	7.0	2.0	8.0		
t_{PZH}	Output Enable Time	1.5		9.0	2.0	7.0	1.0	9.5	ns	2–5
t_{PZL}		2.5		11.5	2.0	8.5	2.5	12.0		
t_{PHZ}	Output Disable Time	1.5		9.0	2.0	7.0	1.0	9.5		
t_{PLZ}		1.5		8.5	2.0	7.5	1.5	9.5		