

Low Power 16-Input Multiplexer

General Description

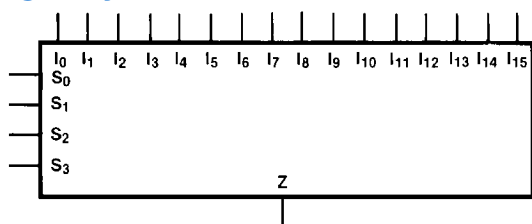
The 100364 is a 16-input multiplexer. Data paths are controlled by four Select lines (S_0 – S_3). Their decoding is shown in the truth table. Output data polarity is the same as the selected input data. All inputs have 50 k Ω pulldown resistors.

Features

- 35% power reduction of the 100164

- 2000V ESD protection
- Pin/function compatible with 100164
- Voltage compensated operating range = $-4.2V$ to $-5.7V$
- Available to industrial grade temperature range
- Standard Microcircuit Drawing (SMD) 5962-9459201

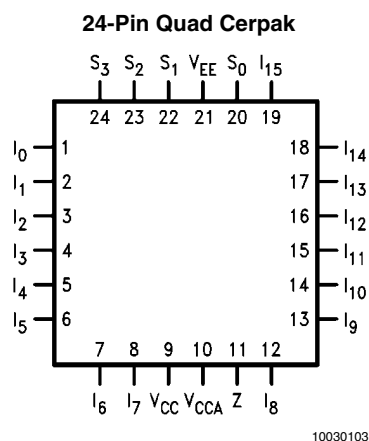
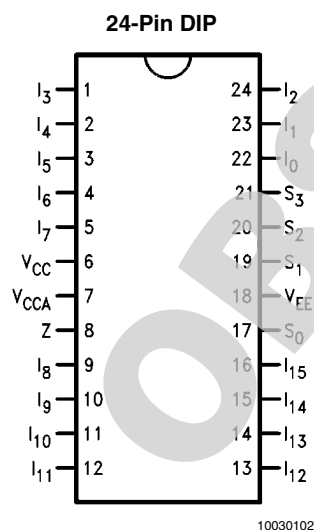
Logic Symbol



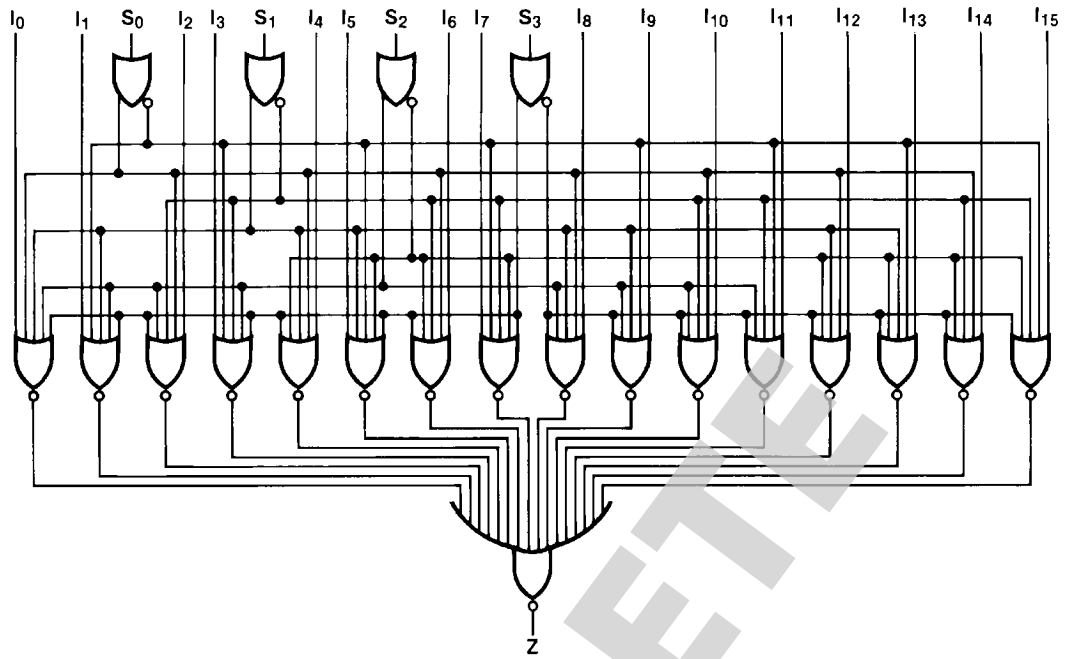
10030101

Pin Names	Description
I_0 – I_{15}	Data Inputs
S_0 – S_3	Select Inputs
Z	Data Output

Connection Diagrams



Logic Diagram



10030105

Truth Table

Select Inputs				Output
S ₀	S ₁	S ₂	S ₃	Z
L	L	L	L	I ₀
H	L	L	L	I ₁
L	H	L	L	I ₂
H	H	L	L	I ₃
L	L	H	L	I ₄
H	L	H	L	I ₅
L	H	H	L	I ₆
H	H	H	L	I ₇
L	L	L	H	I ₈
H	L	L	H	I ₉
L	H	L	H	I ₁₀
H	H	L	H	I ₁₁
L	L	H	H	I ₁₂
H	L	H	H	I ₁₃
L	H	H	H	I ₁₄
H	H	H	H	I ₁₅

H = HIGH Voltage Level
L = LOW Voltage Level

Absolute Maximum Ratings (Note 1)

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

Above which the useful life may be impaired

Storage Temperature (T_{STG}) -65°C to $+150^{\circ}\text{C}$

Maximum Junction Temperature (T_J)
Ceramic $+175^{\circ}\text{C}$

Pin Potential to

Ground Pin (V_{EE}) -7.0V to $+0.5\text{V}$

Input Voltage (DC) V_{EE} to $+0.5\text{V}$

Output Current

(DC Output HIGH)

-50 mA

ESD (Note 2)

$\geq 2000\text{V}$

Recommended Operating Conditions

Case Temperature (T_C)

Military

-55°C to $+125^{\circ}\text{C}$

Supply Voltage (V_{EE})

-5.7V to -4.2V

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

Note 2: ESD testing conforms to MIL-STD-883, Method 3015.

Military Version DC Electrical Characteristics

$V_{EE} = -4.2\text{V}$ to -5.7V , $V_{CC} = V_{CCA} = \text{GND}$, $T_C = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$

Symbol	Parameter	Min	Max	Units	T _c	Conditions	Notes	
V _{OH}	Output HIGH Voltage	-1025	-870	mV	0°C to +125°C	V _{IN} = V _{IH} (Max) or V _{IL} (Min)	Loading with 50Ω to -2.0V	(Notes 3, 4, 5)
		-1085	-870	mV	-55°C			
V _{OL}	Output LOW Voltage	-1830	-1620	mV	0°C to +125°C			
		-1830	-1555	mV	-55°C			
V _{OHC}	Output HIGH Voltage	-1035		mV	0°C to +125°C	V _{IN} = V _{IH} (Min) or V _{IL} (Max)	Loading with 50Ω to -2.0V	(Notes 3, 4, 5)
		-1085		mV	-55°C			
V _{OLC}	Output LOW Voltage		-1610	mV	0°C to +125°C			
			-1555	mV	-55°C			
V _{IH}	Input HIGH Voltage	-1165	-870	mV	-55°C to +125°C	Guaranteed HIGH Signal for All Inputs		(Notes 3, 4, 5, 6)
V _{IL}	Input LOW Voltage	-1830	-1475	mV	-55°C to +125°C	Guaranteed LOW Signal for All Inputs		(Notes 3, 4, 5, 6)
I _{IL}	Input LOW Current	0.50		μA	-55°C to +125°C	V _{EE} = -4.2V V _{IN} = V _{IL} (Min)		(Notes 3, 4, 5)
I _{IH}	Input HIGH Current		300	μA	0°C to +125°C	V _{EE} = -5.7V V _{IN} = V _{IH} (Max)		(Notes 3, 4, 5)
			450	μA	-55°C			
I _{EE}	Power Supply Current	-95	-35	mA	-55°C to +125°C	Inputs Open		(Notes 3, 4, 5)

Note 3: F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals -55°C), then testing immediately without allowing for the junction temperature to stabilize due to heat dissipation after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

Note 4: Screen tested 100% on each device at -55°C , $+25^{\circ}\text{C}$, and $+125^{\circ}\text{C}$, Subgroups 1, 2, 3, 7 and 8.

Note 5: Sampled tested (Method 5005, Table I) on each manufactured lot at -55°C , $+25^{\circ}\text{C}$, and $+125^{\circ}\text{C}$, Subgroups A1, 2, 3, 7 and 8.

Note 6: Guaranteed by applying specified input condition and testing V_{OH}/V_{OL} .

AC Electrical Characteristics

$V_{EE} = -4.2V$ to $-5.7V$, $V_{CC} = V_{CCA} = GND$

Symbol	Parameter	$T_C = -55^\circ C$		$T_C = 25^\circ C$		$T_C = +125^\circ C$		Units	Conditions	Notes
		Min	Max	Min	Max	Min	Max			
t_{PLH}	Propagation Delay	0.50	2.60	0.60	2.40	0.60	2.80	ns	Figures 1, 2	(Notes 7, 8, 9)
t_{PHL}	I_0 – I_{15} to Output									
t_{PLH}	Propagation Delay	0.70	3.30	0.90	3.10	1.00	3.50	ns		
t_{PHL}	S_0 , S_1 to Output									
t_{PLH}	Propagation Delay	0.50	2.90	0.70	2.60	0.60	3.00	ns		
t_{PHL}	S_2 , S_3 to Output									
t_{TLH}	Transition Time	0.20	1.20	0.20	1.20	0.20	1.20	ns		(Note 10)
t_{THL}	20% to 80%, 80% to 20%									

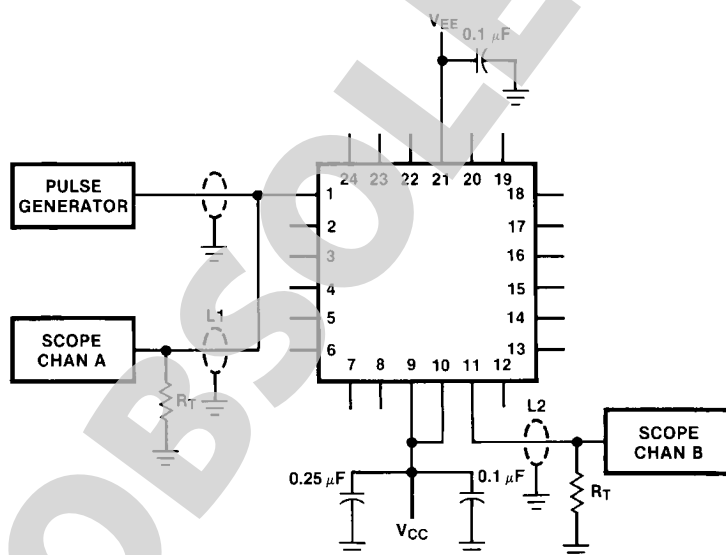
Note 7: F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals $-55^\circ C$), then testing immediately without allowing for the junction temperature to stabilize due to heat dissipation after power-up. This provides “cold start” specs which can be considered a worst case condition at cold temperatures.

Note 8: Screen tested 100% on each device at $+25^\circ C$, temperature only, Subgroup A9.

Note 9: Sample tested (Method 5005, Table I) on each Mfg. lot at $+25^\circ C$, Subgroup A9, and at $+125^\circ C$, and $-55^\circ C$ temp., Subgroups A10 and A11.

Note 10: Not tested at $+25^\circ C$, $+125^\circ C$ and $-55^\circ C$ temperature (design characterization data).

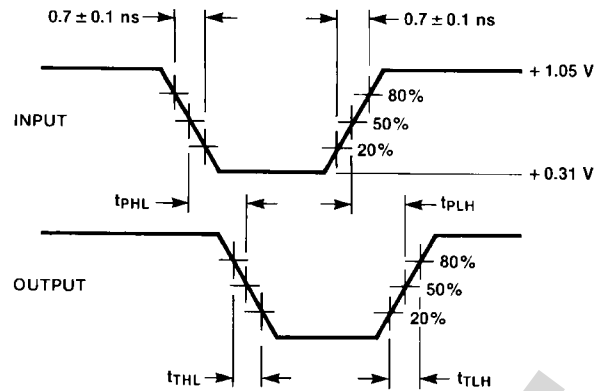
Test Circuit



10030106

FIGURE 1. AC Test Circuit

Switching Waveforms



Note 11: V_{CC} , $V_{CCA} = +2V$, $V_{EE} = -2.5V$

Note 12: L1 and L2 = Equal length 50Ω impedance lines

Note 13: $R_T = 50\Omega$ terminator internal to scope

Note 14: Decoupling 0.1 μF from GND to V_{CC} and V_{EE}

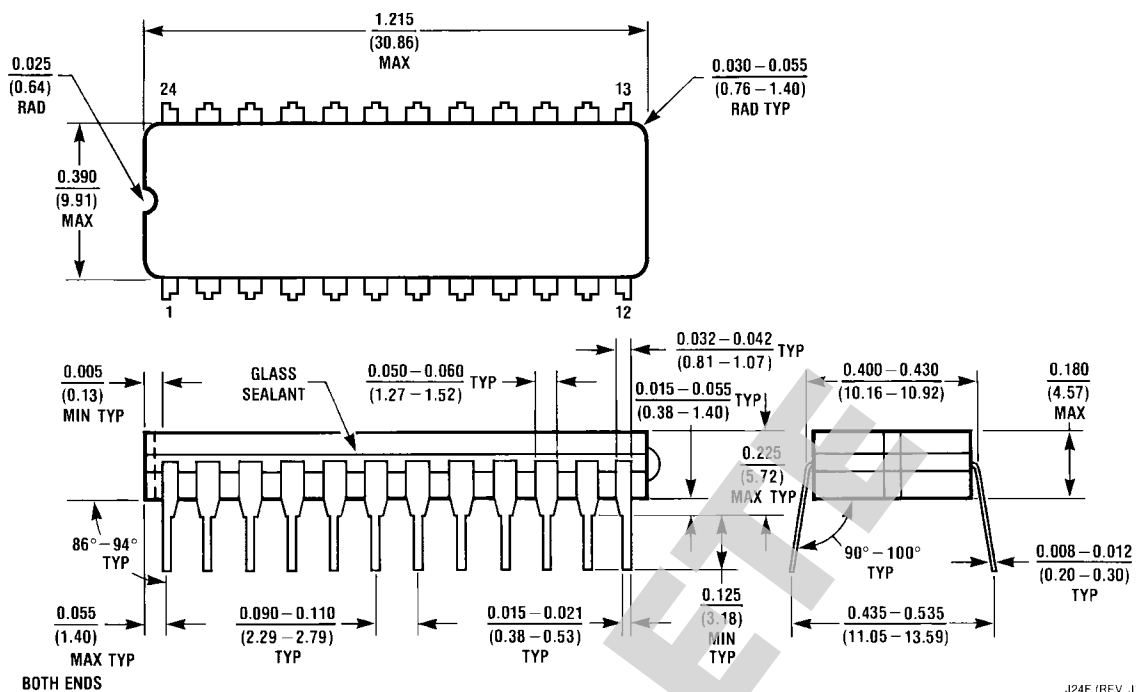
Note 15: All unused outputs are loaded with 50Ω to GND

Note 16: C_L = Fixture and stray capacitance ≤ 3 pF

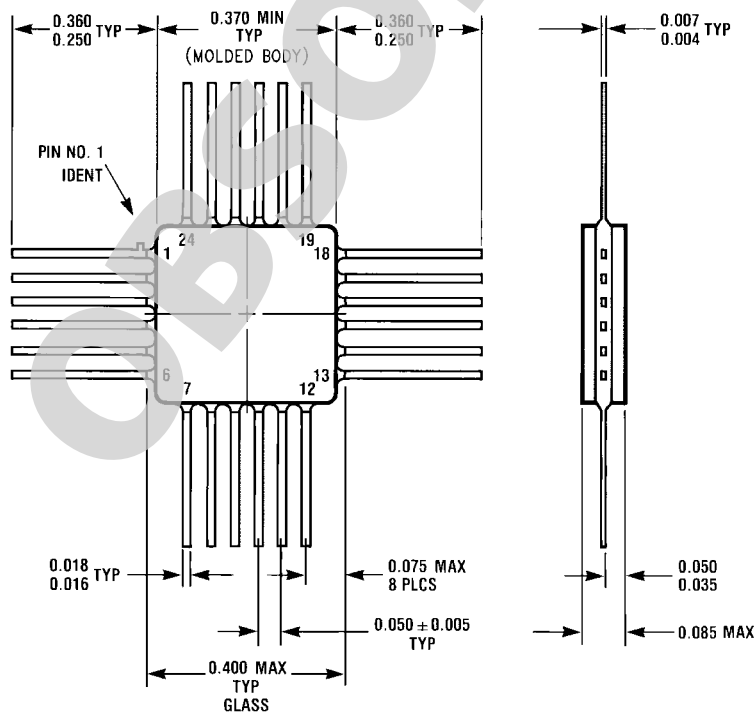
Note 17: Pin numbers shown are for flatpak; for DIP see logic symbol

FIGURE 2. Propagation Delay and Transition Times

Physical Dimensions inches (millimeters) unless otherwise noted



24-Lead Ceramic Dual-In-Line Package (0.400 Wide) (D)
NS Package Number J24E



24-Lead Quad Cerpak (F)
NS Package Number W24B

Notes

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