XL4067 SOP24/XL4067-SS SSOP24
XD4067 DIP-24/XD14067 DIP-24

CMOS Analog Multiplexers/Demultiplexers

High-Voltage Types (20-Volt Rating)

XL4067 — Single 16-Channel Multiplexer/Demultiplexer
XD4067 — Differential 8-Channel Multiplexer/Demultiplexer

■ XL4067 and XD4067 CMOS analog multiplexers/demultiplexers* are digitally controlled analog switches having low ON impedance, low OFF leakage current, and internal address decoding. In addition, the ON resistance is relatively constant over the full input-signal range.

The XL4067 is a 16-channel multiplexer with four binary control inputs, A,B,C,D, and an inhibit input, arranged so that any combination of the inputs selects one switch.

The XL4067 is a differential 8-channel multiplexer having three binary control inputs A, B, C, and an inhibit input. The inputs permit selection of one of eight pairs of switches.

A logic "1" present at the inhibit input turns all channels off.

The XL4067 and XD4067 types are supplied in 24-lead hermetic dual-in-line ceramic packages (F3A suffix), 24-lead dual-in-line plastic packages (E suffix), 24-lead small-outline packages (M, M96, and NSR suffixes), and 24-lead thin shrink small-outline packages (P and PWR suffixes).

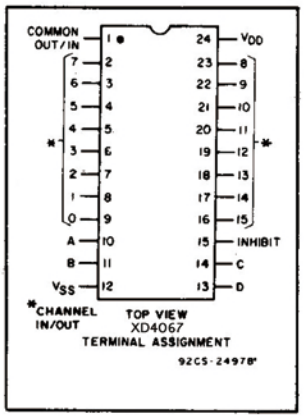
*When these devices are used as demultiplexers, the channel in/out terminals are the outputs and the common out/in terminals are the inputs.

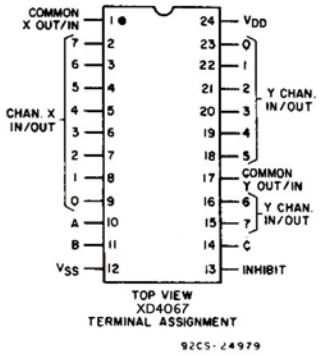
Features:

- Low ON resistance: 125Ω (typ) over 15 Vp-p signal-input range for V_{DD}-V_{SS}=15V
- High OFF resistance: channel leakage of ±10pA(typ)@V_{DD}-V_{SS}=10V
- Matched switch characterlstics: RON=5Ω (typ) for V_{DD}-V_{SS}=15V
- Very low quiescent power disspation under all digital-control input and supply conditions: 0.2μW(typ)@VDD-VSS=10V
- Binary address decoding onn chip
- 5-V,10-V and 15-V paranetric ratings
- 100% tested for quiescent current at 20V
- Standardized symmertical output characteristics
- Maximum input current of 1μA at 18V over full package temperature range; 100 nA at 18 V and 25°C
- Meets all requirements of JEDEC tentative Standard NO.13B, "standard Specifications for Description of 'b' Series CMOS Devices"

Applications:

- Analong and digital multiplexing and demultiplexing
- A/D and D/A conversion
- Signal gating





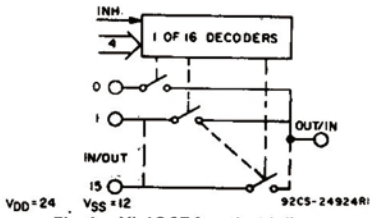


Fig. 1 — XL4067 *functional diagram.*

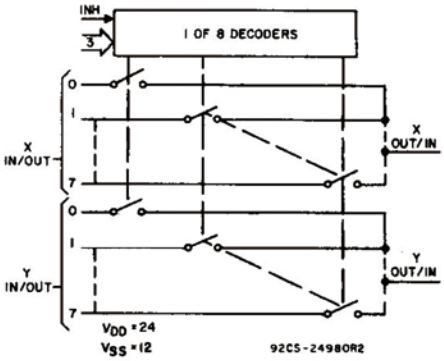


Fig. 2—XD4067 *functional diagram.*

Recommended Operating Conditions at T_A = 25°C (Unless Otherwise Specified)

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges. Values shown apply to all types except as noted.

Characteristic	Min.	Max.	Units
Supply-Voltage Range (T_A=Full Package-Temp. Range)	3	18	V
Multiplexer Switch Input Current Capability	–	25	mA
Output Load Resistance	100	–	Ω

NOTE:
In certain applications, the external load-resistor current may include both V_{DD} and signal-line components. To avoid drawing V_{DD} current when switch current flows into the transmission gate inputs, the voltage drop across the bidirectional switch must not exceed 0.8 volt (calculated from R_{ON} values shown in ELECTRICAL CHARACTERISTICS CHART) No V_{DD} current will flow through R_L if the switch current flows into terminal 1 on the XL4067; terminals 1 and 17 on the XD4067.

XL4067 TRUTH TABLE

A	B	C	D	Inh	Selected Channel
X	X	X	X	1	None
0	0	0	0	0	0
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15

XD4067 TRUTH TABLE

A	B	C	Inh	Selected Channel
X	X	X	1	None
0	0	0	0	0X, 0Y
1	0	0	0	1X, 1Y
0	1	0	0	2X, 2Y
1	1	0	0	3X, 3Y
0	0	1	0	4X, 4Y
1	0	1	0	5X, 5Y
0	1	1	0	6X, 6Y
1	1	1	0	7X, 7Y

ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							Units
	V_{is} (V)	V_{SS} (V)	V_{DD} (V)	−55	−40	+85	+125	+25 Min.	+25 Typ.	+25 Max.	
SIGNAL INPUTS (V_{is}) AND OUTPUTS (V_{OS})											
Quiescent Device Current, I_{DD} Max.			5	5	5	150	150	–	0.04	5	µA
			10	10	10	300	300	–	0.04	10	
			15	20	20	600	600	–	0.04	20	
			20	100	100	3000	3000	–	0.08	100	
ON-state Resistance $V_{SS} \leq V_{is} \leq V_{DD}$ r_{on} Max.		0	5	800	850	1200	1300	–	470	1050	Ω
		0	10	310	330	520	550	–	180	400	
		0	15	200	210	300	320	–	125	240	
Change in on-state Resistance (Between Any Two Channels) Δr_{on}		0	5	–	–	–	–	–	15	–	Ω
		0	10	–	–	–	–	–	10	–	
		0	15	–	–	–	–	–	5	–	
OFF Channel Leakage Current: Any Channel OFF Max. or All Channels OFF (Common OUT/IN) Max.		0	18	±100*		±1000*		–	±0.1	±100*	nA
Capacitance: Input, C_{is}		−5	5	–	–	–	–	–	5	–	pF
Output, C_{os} XL4067				–	–	–	–	–	55	–	
XD4067				–	–	–	–	–	35		
Feedthrough, C_{ios}				–	–	–	–	–	0.2		
Propagation Delay Time (Signal Input to Output	V_{DD}	R_L = 200 KΩ C_L=50 pF t_r, t_f=20 ns	5	–	–	–	–	–	30	60	ns
			10	–	–	–	–	–	15	30	
			15	–	–	–	–	–	10	20	
CONTROL (ADDRESS or INHIBIT) V_C											
Input Low Voltage, V_{IL} Max.	=V_{DD} thru 1 KΩ	R_L=1 KΩ to V_{SS} I_{IS}<2 µA on all OFF Channels	5	1.5				–	–	1.5	V
			10	3				–	–	3	
			15	4				–	–	4	
Input High Voltage, V_{IH} Min.			5	3.5				3.5	–	–	
			10	7				7	–	–	
			15	11				11	–	–	

* Determined by minimum feasible leakage measurement for automatic testing.

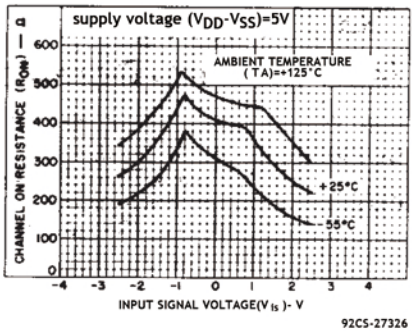


Fig. 3—Typical ON resistance vs. input signal voltage (all types).

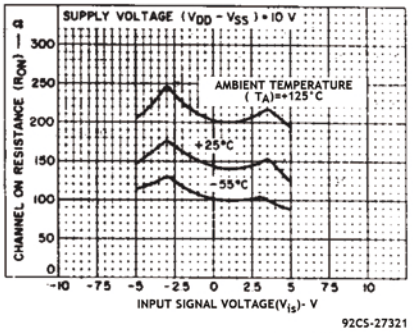


Fig. 4—Typical ON resistance vs. input signal voltage (all types)

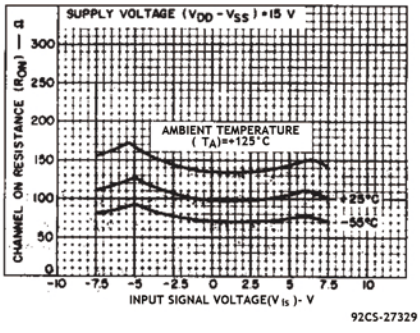


Fig. 5—Typical ON resistance vs. input signal voltage (all types).

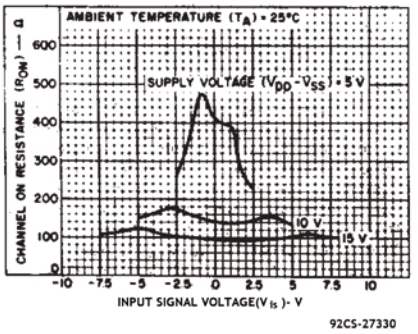


Fig. 6—Typical ON resistance vs. input signal voltage (all types).

ELECTRICAL CHARACTERISTICS (Cont'd)

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							Units
	V_{is} (V)	V_{SS} (V)	V_{DD} (V)	−55	−40	+85	+125	+25 Min.	+25 Typ.	+25 Max.	
Input Current, I_{IN} Max.	V_{IN} = 0, 18 V		18	±0.1	±0.1	±1	±1	–	$\pm 10^{-5}$	±0.1	μA
Propagation Delay Time: Address or Inhibit-to-Signal OUT (Channel turning ON)	R_L-10 KΩ, C_L-50 pF, t_r, t_f=20 ns	0	5	–	–	–	–	–	325	650	ns
		0	10	–	–	–	–	–	135	270	
		0	15	–	–	–	–	–	95	190	
Address or Inhibit-to-Signal OUT (Channel turning OFF)	R_L=300Ω, C_L=50pF, t_r, t_f=20 ns	0	5	–	–	–	–	–	220	440	ns
		0	10	–	–	–	–	–	90	180	
		0	15	–	–	–	–	–	65	130	
Input Capacitance, C_{IN}	Any Address or Inhibit Input			–	–	–	–	–	5	7.5	pF

MAXIMUM RATINGS, *Absolute-Maximum Values:*

DC SUPPLY-VOLTAGE RANGE, (V_{DD})
(Voltages referenced to V_{SS} Terminal) ..... -0.5V to +20V
INPUT VOLTAGE RANGE, ALL INPUTS ..... -0.5V to V_{DD} +0.5V
DC INPUT CURRENT, ANY ONE INPUT ..... ±10mA
POWER DISSIPATION PER PACKAGE (P_D):
For T_A = -55°C to +100°C 500mW
For T_A = +100°C to +125°C ..... Derate Linearity at 12mW/°C to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR
FOR T_A = FULL PACKAGE-TEMPERATURE RANGE (All Package Types) 100mW
OPERATING-TEMPERATURE RANGE (T_A) ..... -55°C to +125°C
STORAGE TEMPERATURE RANGE (T_{stg}) ..... -65°C to +150°C
LEAD TEMPERATURE (DURING SOLDERING):
At distance 1/16 ± 1/32 inch (1.59 ± 0.79mm) from case for 10s max ..... +265°C

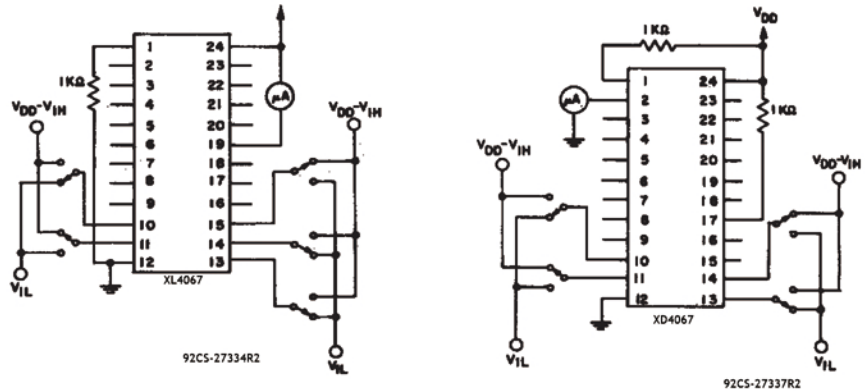


Fig. 8—Input voltage—measure <2 μA on all OFF channels (e.g., channel 12).

TEST CIRCUITS

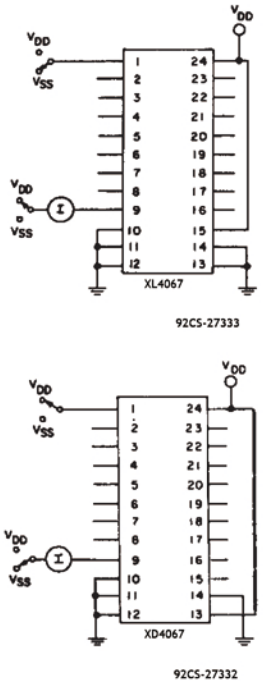


Fig. 7—OFF channel leakage current—any channel OFF.

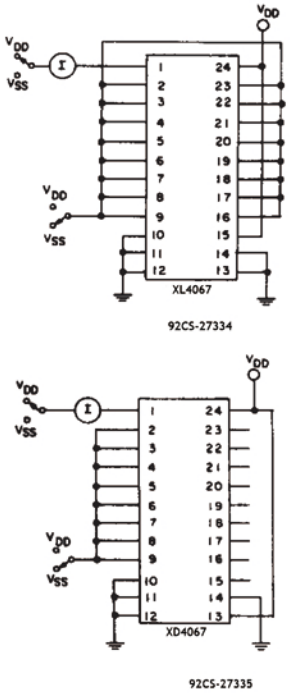


Fig. 9—OFF channel leakage current—all channels OFF.

ELECTRICAL CHARACTERISTICS (Cont'd)

CHARACTERISTIC	TEST CONDITIONS V_{is} (V)	V_{DD} (V)	R_L (KΩ)			TYPICAL VALUES	UNITS
Cutoff (−3-dB) Frequency Channel ON (Sine Wave Input)	5●	10	1	V_{os} at Common OUT/IN	XL4067	14	MHz
	$20 \log \frac{V_{os}}{V_{is}} = -3$ dB				XD4067	20	
				V_{os} at Any Channel		60	
Total Harmonic Distortion, THD	2●	5	10			0.3	%
	3●	10				0.2	
	5●	15				0.12	
	f_{is} = 1 kHz sine wave						
−40-dB Feedthrough Frequency (All Channels OFF	5●	10	1	V_{os} at Common OUT/IN	XL4067	20	MHz
	$20 \log \frac{V_{os}}{V_{is}} = -40$ dB				XD4067	12	
				V_{os} at Any Channel		8	
Signal Crosstalk (Frequency at −40 dB)	5●	10	1	Between Any 2 Channels▲		1	MHz
	$20 \log \frac{V_{os}}{V_{is}} = -40$ dB			Between Sections CD4097 Only	Measured on Common	10	
					Measured on Any Channel	18	
Address-or-Inhibit-to-Signal Crosstalk	—	10	10*			75	mV (Peak)
	V_{SS}=0, t_r,t_f=20 ns, $V_C = V_{DD} - V_{SS}$ (Square Wave)						

● Peak-to-peak voltage symmetrical about $\frac{V_{DD}-V_{SS}}{2}$

▲ Worst case.

* Both ends of channel.

TEST CIRCUITS (Cont'd)

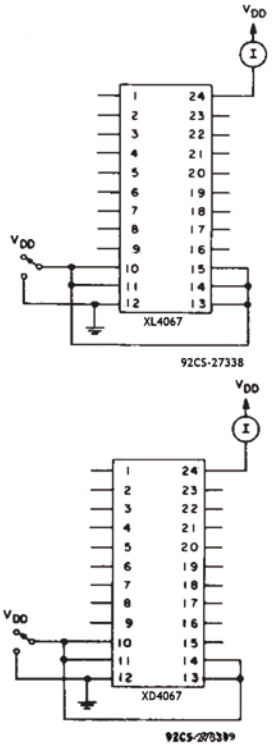
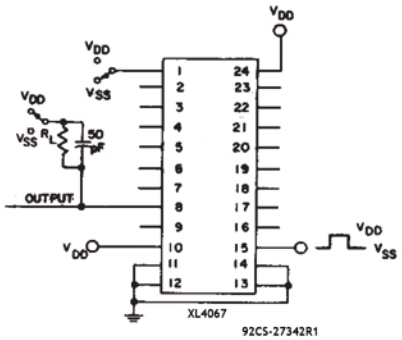
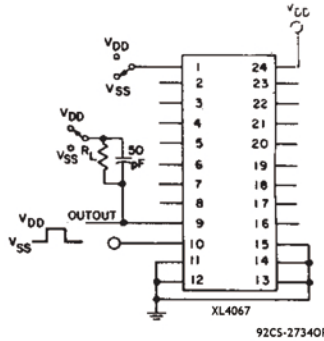
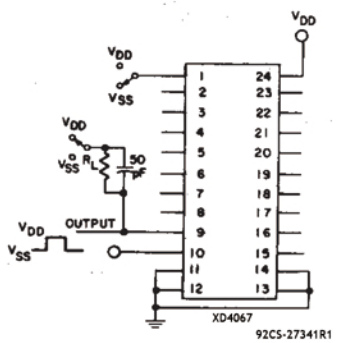
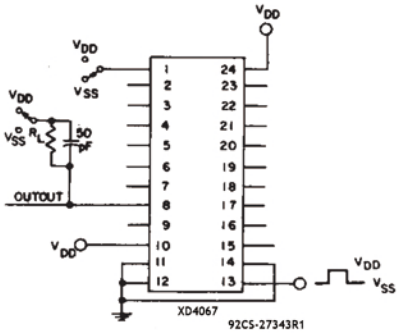


Fig. 10– Quiescent device current.









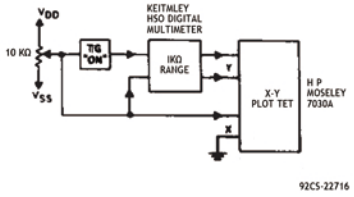


Fig. 13– Channel ON resistance measurement circuit.

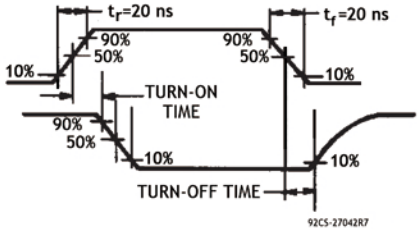


Fig. 14– Propagation delay waveform channel being turned ON (R_L = 10 K Ω, C_L = 50 pF).

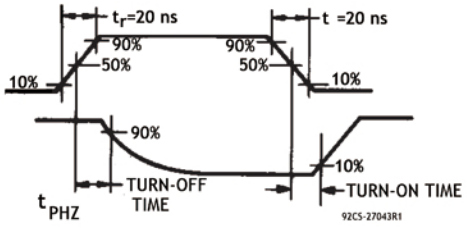


Fig. 15– Propagation delay waveform, channel being turned OFF (R_L = 300 Ω, C_L = 50 pF).

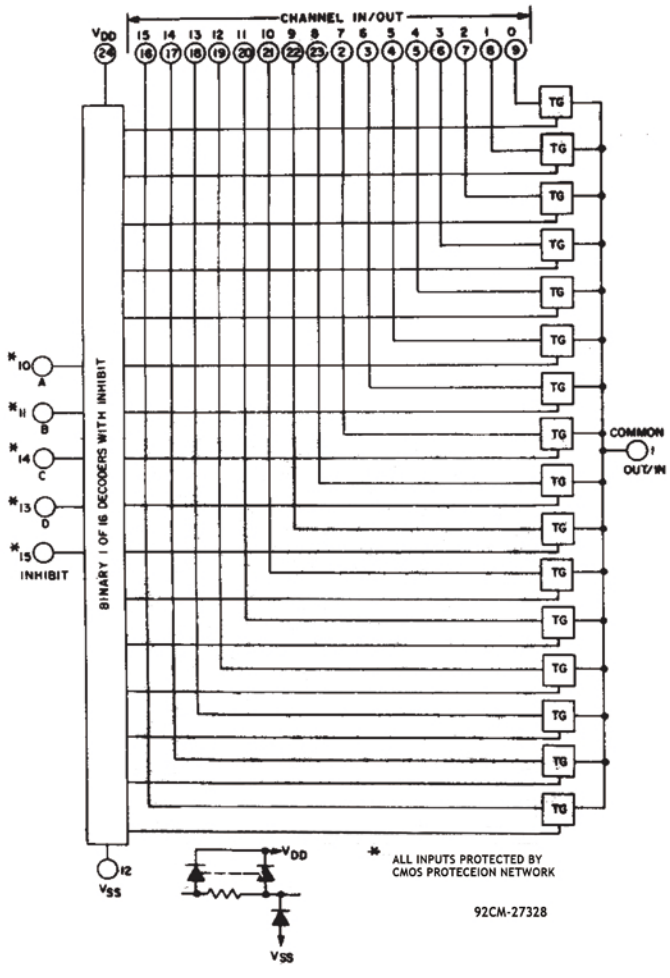


Fig. 16–XL4067 logic diagram.

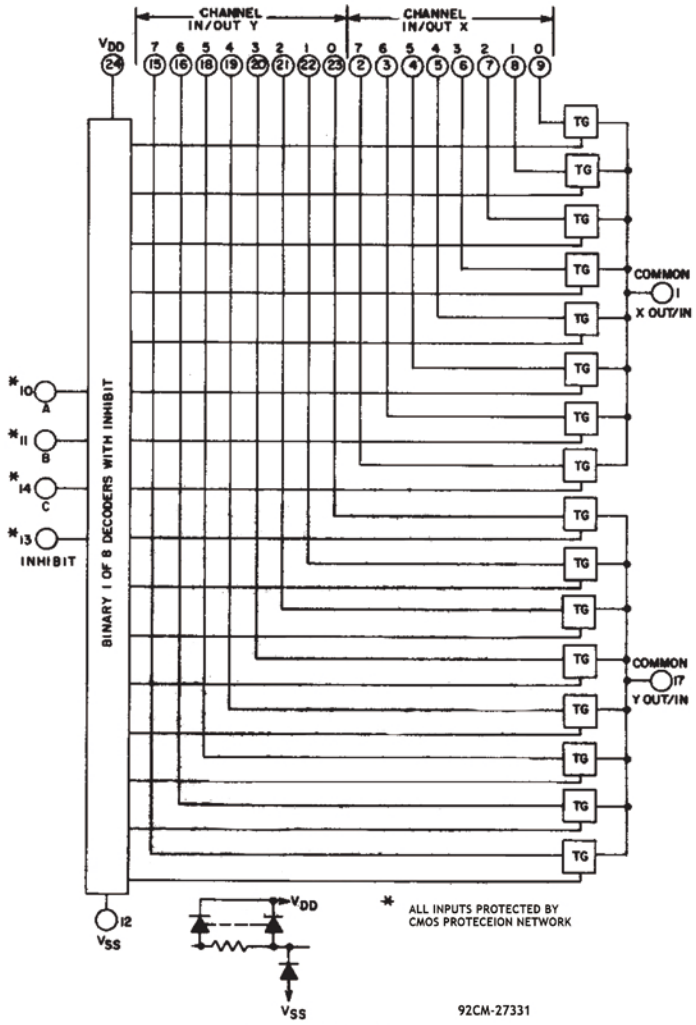


Fig. 17–XD4067 logic diagram.

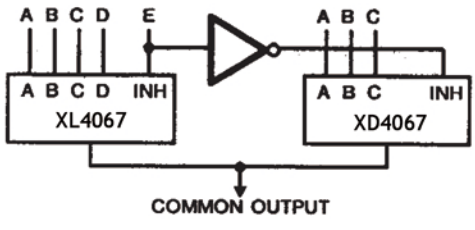


Fig. 18–24-to-1 MUX Addressing

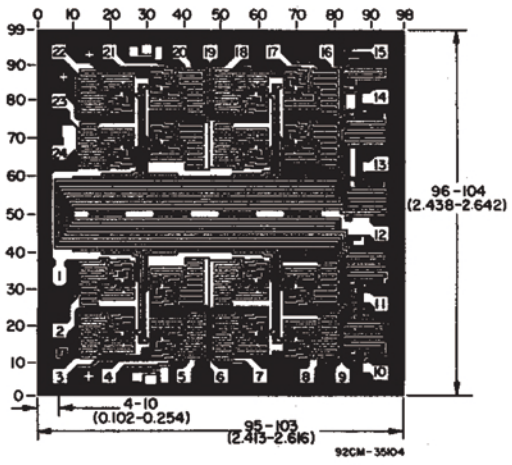
SPECIAL CONSIDERATIONS

In applications where separate power sources are used to drive V_{DD} and the signal inputs, the V_{DD} current capability should exceed V_{DD}/R_L (R_L=effective external load). This provision avoids permanent current flow or clamp action on the V_{DD} supply when power is applied or removed from the XL4067 or XD4067.

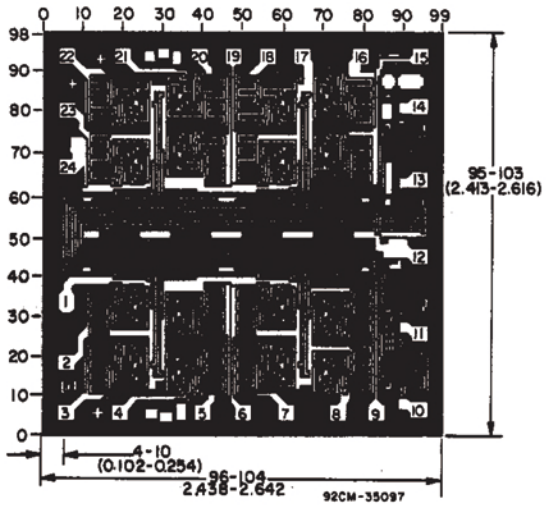
When switching from one address to another, some of the ON periods of the channels of the multiplexers will overlap momentarily, which may be objectionable in certain applications. Also when a channel is turned on or off by an address input, there is a momentary conductive path from the channel to V_{SS}, which will dump some charge from any capacitor connected to the input or output of the channel. The inhibit input turning on a channel will similarly dump some charge to V_{SS}.

The amount of charge dumped is mostly a function of the signal level above V_{SS}. Typically, at $V_{DD}-V_{SS}$=10 V, a 100-pF capacitor connected to the input or output of the channel will lose 3-4% of its voltage at the moment the channel turns on or off. This loss of voltage is essentially independent of the address or inhibit signal transition time, if the transition time is less than 1-2 μs. When the inhibit signal turns a channel off, there is no charge dumping to V_{SS}. Rather, there is a slight rise in the channel voltage level (65 mV typ.) due to capacitive coupling from inhibit input to channel input or output. Address inputs also couple some voltage steps onto the channel signal levels.

In certain applications, the external load-resistor current may include both V_{DD} and signal-line components. To avoid drawing V_{DD} current when switch current flows into the transmission gate inputs, the voltage drop across the bidirectional switch must not exceed 0.8 volt (calculated from R_{ON} values shown in ELECTRICAL CHARACTERISTICS CHART). No V_{DD} current will flow through R_L if the switch current flows into terminal 1 on the XL4067, terminals 1 and 17 on the XD4067.



Dimensions and pad layout for XL4067.



Dimensions and pad layout for XD4067.

以上信息仅供参考.如需帮助联系客服人员。谢谢 XINLUDA