intersil

CD40257BMS

CMOS Quad 2 Line to 1 Line Data Selector/Multiplexer

December 1992

Features

- High Voltage Type (20V Rating)
- 3-State Outputs
- 100% Tested for Quiescent Current at 20V
- 5V, 10V and 15V Parametric Ratings
- Maximum Input Current of 1µA at 18V Over Full Package Temperature Range; 100nA at 18V and +25°C
- Noise Margin (Over Full Package/Temperature Range)
  - 1V at VDD = 5V
  - 2V at VDD = 10V
  - 2.5V at VDD = 15V
- Standardized Symmetrical Output Characteristics
- Meets All Requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

Applications

- Digital Multiplexing
- Shift Right/Shift Left Registers
- True/Complement Selection

Description

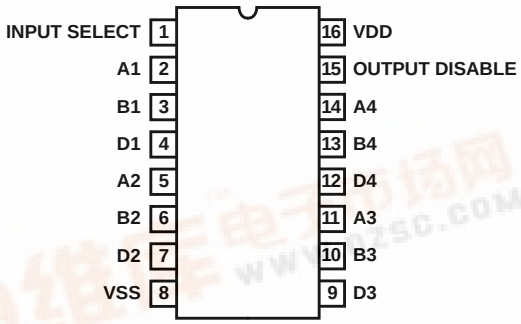
CD40257BMS is a data selector/multiplexer featuring three state outputs which can interface directly with and drive data lines of bus oriented systems.

The CD40257BMS is supplied in these 16-lead outline packages:

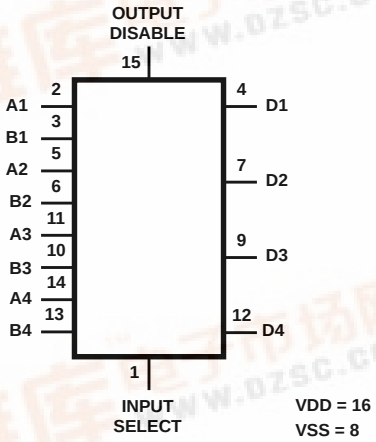
Braze Seal DIP	H4T
Frit Seal DIP	H1E
Ceramic Flatpack	H3X

Pinout

CD40257BMS
TOP VIEW



Functional Diagram



Specifications CD40257BMS

Absolute Maximum Ratings

DC Supply Voltage Range, (VDD) . . . . . -0.5V to +20V
(Voltage Referenced to VSS Terminals)
Input Voltage Range, All Inputs . . . . . -0.5V to VDD +0.5V
DC Input Current, Any One Input . . . . . ±10mA
Operating Temperature Range . . . . . -55^oC to $+125^oC$
Package Types D, F, K, H
Storage Temperature Range (TSTG) . . . . . -65^oC to $+150^oC$
Lead Temperature (During Soldering) . . . . . $+265^oC$
At Distance 1/16 ± 1/32 Inch (1.59mm ± 0.79mm) from case for 10s Maximum

Reliability Information

Thermal Resistance	θ_{ja}	θ_{jc}
Ceramic DIP and FRIT Package	$80^oC/W$	$20^oC/W$
Flatpack Package	$70^oC/W$	$20^oC/W$

Maximum Package Power Dissipation (PD) at $+125^oC$
For T_A = -55^oC to $+100^oC$ (Package Type D, F, K) 500mW
For T_A = $+100^oC$ to $+125^oC$ (Package Type D, F, K). . . . . Derate Linearity at 12mW/^oC to 200mW
Device Dissipation per Output Transistor 100mW
For T_A = Full Package Temperature Range (All Package Types)
Junction Temperature . . . . . $+175^oC$

TABLE 1. DC ELECTRICAL PERFORMANCE CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS (NOTE 1)		GROUP A SUBGROUPS	TEMPERATURE	LIMITS MIN	LIMITS MAX	UNITS
Supply Current	IDD	VDD = 20V, VIN = VDD or GND		1	$+25^oC$	-	2	µA
				2	$+125^oC$	-	200	µA
		VDD = 18V, VIN = VDD or GND		3	-55^oC	-	2	µA
Input Leakage Current	IIL	VIN = VDD or GND	VDD = 20	1	$+25^oC$	-100	-	nA
				2	$+125^oC$	-1000	-	nA
			VDD = 18V	3	-55^oC	-100	-	nA
Input Leakage Current	IIH	VIN = VDD or GND	VDD = 20	1	$+25^oC$	-	100	nA
				2	$+125^oC$	-	1000	nA
			VDD = 18V	3	-55^oC	-	100	nA
Output Voltage	VOL15	VDD = 15V, No Load		1, 2, 3	$+25^oC$, $+125^oC$, -55^oC	-	50	mV
Output Voltage	VOH15	VDD = 15V, No Load (Note 3)		1, 2, 3	$+25^oC$, $+125^oC$, -55^oC	14.95	-	V
Output Current (Sink)	IOL5	VDD = 5V, VOUT = 0.4V		1	$+25^oC$	0.53	-	mA
Output Current (Sink)	IOL10	VDD = 10V, VOUT = 0.5V		1	$+25^oC$	1.4	-	mA
Output Current (Sink)	IOL15	VDD = 15V, VOUT = 1.5V		1	$+25^oC$	3.5	-	mA
Output Current (Source)	IOH5A	VDD = 5V, VOUT = 4.6V		1	$+25^oC$	-	-0.53	mA
Output Current (Source)	IOH5B	VDD = 5V, VOUT = 2.5V		1	$+25^oC$	-	-1.8	mA
Output Current (Source)	IOH10	VDD = 10V, VOUT = 9.5V		1	$+25^oC$	-	-1.4	mA
Output Current (Source)	IOH15	VDD = 15V, VOUT = 13.5V		1	$+25^oC$	-	-3.5	mA
N Threshold Voltage	VNTH	VDD = 10V, ISS = -10µA		1	$+25^oC$	-2.8	-0.7	V
P Threshold Voltage	VPTH	VSS = 0V, IDD = 10µA		1	$+25^oC$	0.7	2.8	V
Functional	F	VDD = 2.8V, VIN = VDD or GND		7	$+25^oC$	VOH > VDD/2	VOL < VDD/2	V
		VDD = 20V, VIN = VDD or GND		7	$+25^oC$			
		VDD = 18V, VIN = VDD or GND		8A	$+125^oC$			
		VDD = 3V, VIN = VDD or GND		8B	-55^oC			
Input Voltage Low (Note 2)	VIL	VDD = 5V, VOH > 4.5V, VOL < 0.5V		1, 2, 3	$+25^oC$, $+125^oC$, -55^oC	-	1.5	V
Input Voltage High (Note 2)	VIH	VDD = 5V, VOH > 4.5V, VOL < 0.5V		1, 2, 3	$+25^oC$, $+125^oC$, -55^oC	3.5	-	V
Input Voltage Low (Note 2)	VIL	VDD = 15V, VOH > 13.5V, VOL < 1.5V		1, 2, 3	$+25^oC$, $+125^oC$, -55^oC	-	4	V
Input Voltage High (Note 2)	VIH	VDD = 15V, VOH > 13.5V, VOL < 1.5V		1, 2, 3	$+25^oC$, $+125^oC$, -55^oC	11	-	V
Tri-State Output Leakage	IOZL	VIN = VDD or GND VOUT = 0V	VDD = 20V	1	$+25^oC$	-0.4	-	µA
				2	$+125^oC$	-12	-	µA
			VDD = 18V	3	-55^oC	-0.4	-	µA
Tri-State Output Leakage	IOZH	VIN = VDD or GND VOUT = VDD	VDD = 20V	1	$+25^oC$	-	0.4	µA
				2	$+125^oC$	-	12	µA
			VDD = 18V	3	-55^oC	-	0.4	µA

NOTES: 1. All voltages referenced to device GND, 100% testing being implemented.
2. Go/No Go test with limits applied to inputs.
3. For accuracy, voltage is measured differentially to VDD. Limit is 0.050V max.

TABLE 2. AC ELECTRICAL PERFORMANCE CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS MIN	LIMITS MAX	UNITS
Propagation Delay Data Input Output	TPHL1 TPLH1	VDD = 5V, VIN = VDD or GND (Notes 1, 2)	9	+25°C	-	300	ns
			10, 11	+125°C, -55°C	-	405	ns
Propagation Delay Select to Output	TPHL TPLH2	VDD = 5V, VIN = VDD or GND (Notes 1, 2)	9	+25°C	-	380	ns
			10, 11	+125°C, -55°C	-	513	ns
Propagation Delay Output Disable to Output	TPZH, HZ TPZL, LZ	VDD = 5V, VIN = VDD or GND (Notes 2, 3)	9	+25°C	-	190	ns
			10, 11	+125°C, -55°C	-	257	ns
Transition Time	TTHL TTLH	VDD = 5V, VIN = VDD or GND (Notes 1, 2)	9	+25°C	-	200	ns
			10, 11	+125°C, -55°C	-	270	ns

NOTES:

1. CL = 50pF, RL = 200K, Input TR, TF < 20ns.
2. -55°C and +125°C limits guaranteed, 100% testing being implemented.
3. CL = 50pF, RL = 1K, Input TR, TF < 20ns.

TABLE 3. ELECTRICAL PERFORMANCE CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS	NOTES	TEMPERATURE	LIMITS MIN	LIMITS MAX	UNITS
Supply Current	IDD	VDD = 5V, VIN = VDD or GND	1, 2	-55°C, +25°C	-	1	µA
				+125°C	-	30	µA
		VDD = 10V, VIN = VDD or GND	1, 2	-55°C, +25°C	-	2	µA
				+125°C	-	60	µA
		VDD = 15V, VIN = VDD or GND	1, 2	-55°C, +25°C	-	2	µA
				+125°C	-	120	µA
Output Voltage	VOL	VDD = 5V, No Load	1, 2	+25°C, +125°C, -55°C	-	50	mV
Output Voltage	VOL	VDD = 10V, No Load	1, 2	+25°C, +125°C, -55°C	-	50	mV
Output Voltage	VOH	VDD = 5V, No Load	1, 2	+25°C, +125°C, -55°C	4.95	-	V
Output Voltage	VOH	VDD = 10V, No Load	1, 2	+25°C, +125°C, -55°C	9.95	-	V
Output Current (Sink)	IOL5	VDD = 5V, VOUT = 0.4V	1, 2	+125°C	0.36	-	mA
				-55°C	0.64	-	mA
Output Current (Sink)	IOL10	VDD = 10V, VOUT = 0.5V	1, 2	+125°C	0.9	-	mA
				-55°C	1.6	-	mA
Output Current (Sink)	IOL15	VDD = 15V, VOUT = 1.5V	1, 2	+125°C	2.4	-	mA
				-55°C	4.2	-	mA
Output Current (Source)	IOH5A	VDD = 5V, VOUT = 4.6V	1, 2	+125°C	-	-0.36	mA
				-55°C	-	-0.64	mA
Output Current (Source)	IOH5B	VDD = 5V, VOUT = 2.5V	1, 2	+125°C	-	-1.15	mA
				-55°C	-	-2.0	mA
Output Current (Source)	IOH10	VDD = 10V, VOUT = 9.5V	1, 2	+125°C	-	-0.9	mA
				-55°C	-	-1.6	mA
Output Current (Source)	IOH15	VDD =15V, VOUT = 13.5V	1, 2	+125°C	-	-2.4	mA
				-55°C	-	-4.2	mA

TABLE 3. ELECTRICAL PERFORMANCE CHARACTERISTICS(Continued)

PARAMETER	SYMBOL	CONDITIONS	NOTES	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Input Voltage Low	VIL	VDD = 10V, VOH > 9V, VOL < 1V	1, 2	+25°C, +125°C, -55°C	-	3	V
Input Voltage High	VIH	VDD = 10V, VOH > 9V, VOL < 1V	1, 2	+25°C, +125°C, -55°C	+7	-	V
Propagation Delay Data Input to Output	TPHL1 TPLH1	VDD = 10V	1, 2, 3	+25°C	-	140	ns
		VDD = 15V	1, 2, 3	+25°C	-	100	ns
Propagation Delay Select to Output	TPHL2 TPLH2	VDD = 10V	1, 2, 3	+25°C	-	170	ns
		VDD = 15V	1, 2, 3	+25°C	-	130	ns
Propagation Delay Output Disable to Output	TPZH, HZ TPZL, LZ	VDD = 10V	1, 2, 4	+25°C	-	100	ns
		VDD = 15V	1, 2, 4	+25°C	-	80	ns
Transition Time	TTHL TTLH	VDD = 10V	1, 2, 3	+25°C	-	100	ns
		VDD = 15V	1, 2, 3	+25°C	-	80	ns
Input Capacitance	CIN		1, 2	+25°C	-	7.5	pF

NOTES:

1. All voltages referenced to device GND.
2. The parameters listed on Table 3 are controlled via design or process and are not directly tested. These parameters are characterized on initial design release and upon design changes which would affect these characteristics.
3. CL = 50pF, RL = 200K, Input TR, TF < 20ns.
4. CL = 50pF, RL = 1K, Input TR, TF < 20ns.

TABLE 4. POST IRRADIATION ELECTRICAL PERFORMANCE CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS	NOTES	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Supply Current	IDD	VDD = 20V, VIN = VDD or GND	1, 4	+25°C	-	7.5	µA
N Threshold Voltage	VNTH	VDD = 10V, ISS = -10µA	1, 4	+25°C	-2.8	-0.2	V
N Threshold Voltage Delta	ΔVTN	VDD = 10V, ISS = -10µA	1, 4	+25°C	-	±1	V
P Threshold Voltage	VTP	VSS = 0V, IDD = 10µA	1, 4	+25°C	0.2	2.8	V
P Threshold Voltage Delta	ΔVTP	VSS = 0V, IDD = 10µA	1, 4	+25°C	-	±1	V
Functional	F	VDD = 18V, VIN = VDD or GND	1	+25°C	VOH > VDD/2	VOL < VDD/2	V
		VDD = 3V, VIN = VDD or GND					
Propagation Delay Time	TPHL TPLH	VDD = 5V	1, 2, 3, 4	+25°C	-	1.35 x +25°C Limit	ns

NOTES:
1. All voltages referenced to device GND.
2. CL = 50pF, RL = 200K, Input TR, TF < 20ns.
3. See Table 2 for +25°C limit.
4. Read and Record

TABLE 5. BURN-IN AND LIFE TEST DELTA PARAMETERS +25°C

PARAMETER	SYMBOL	DELTA LIMIT
Supply Current - MSI-1	IDD	± 0.2µA
Output Current (Sink)	IOL5	± 20% x Pre-Test Reading
Output Current (Source)	IOH5A	± 20% x Pre-Test Reading

TABLE 6. APPLICABLE SUBGROUPS

CONFORMANCE GROUP		MIL-STD-883 METHOD	GROUP A SUBGROUPS	READ AND RECORD
Initial Test (Pre Burn-In)		100% 5004	1, 7, 9	IDD, IOL5, IOH5A
Interim Test 1 (Post Burn-In)		100% 5004	1, 7, 9	IDD, IOL5, IOH5A
Interim Test 2 (Post Burn-In)		100% 5004	1, 7, 9	IDD, IOL5, IOH5A
PDA (Note 1)		100% 5004	1, 7, 9, Deltas	
Interim Test 3 (Post Burn-In)		100% 5004	1, 7, 9	IDD, IOL5, IOH5A
PDA (Note 1)		100% 5004	1, 7, 9, Deltas	
Final Test		100% 5004	2, 3, 8A, 8B, 10, 11	
Group A		Sample 5005	1, 2, 3, 7, 8A, 8B, 9, 10, 11	
Group B	Subgroup B-5	Sample 5005	1, 2, 3, 7, 8A, 8B, 9, 10, 11, Deltas	Subgroups 1, 2, 3, 9, 10, 11
	Subgroup B-6	Sample 5005	1, 7, 9	
Group D		Sample 5005	1, 2, 3, 8A, 8B, 9	Subgroups 1, 2 3

NOTE: 1. 5% Parameteric, 3% Functional; Cumulative for Static 1 and 2.

TABLE 7. TOTAL DOSE IRRADIATION

CONFORMANCE GROUPS	MIL-STD-883 METHOD	TEST		READ AND RECORD	
		PRE-IRRAD	POST-IRRAD	PRE-IRRAD	POST-IRRAD
Group E Subgroup 2	5005	1, 7, 9	Table 4	1, 9	Table 4

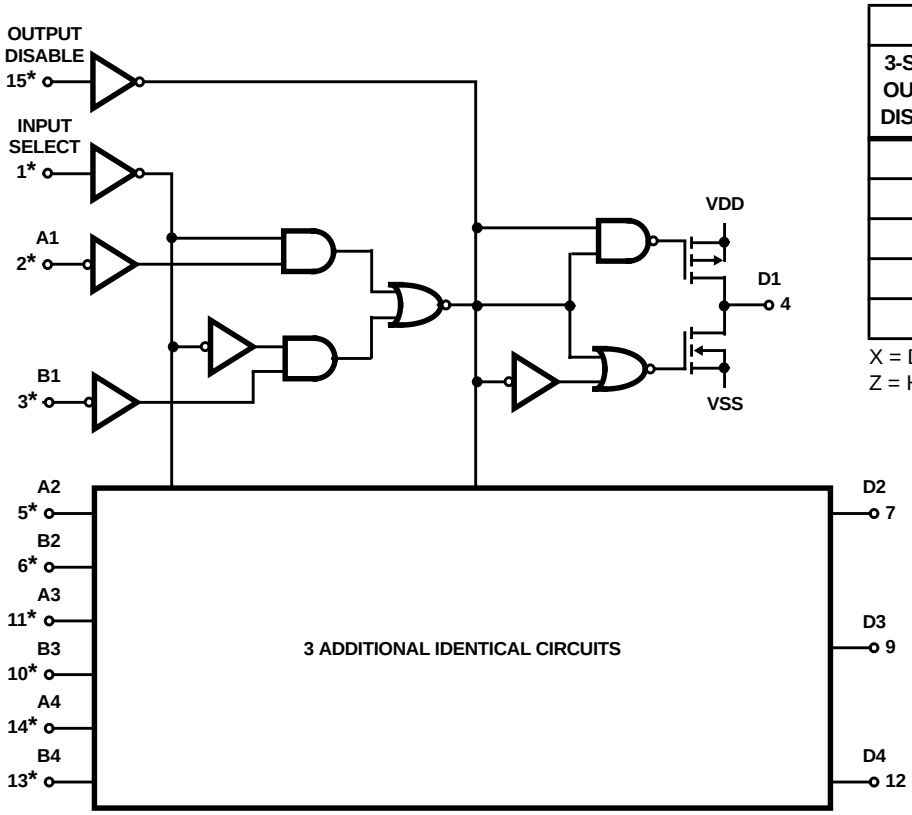
TABLE 8. BURN-IN AND IRRADIATION TEST CONNECTIONS

FUNCTION	OPEN	GROUND	VDD	9V ± -0.5V	OSCILLATOR	
					50kHz	25kHz
Static Burn-In 1 (Note 1)	4, 7, 9, 12	1-3, 5, 6, 8, 10, 11, 13-15	16			
Static Burn-In 2 (Note 1)	4, 7, 9, 12	8, 15	1-3, 5, 6, 10, 11, 13, 14, 16			
Dynamic Burn-In (Note 1)	-	8, 15	16	4, 7, 9, 12	2, 3, 5, 6, 10, 11, 13, 14	1
Irradiation (Note 2)	4, 7, 9, 12	8	1-3, 5, 6, 10, 11, 13-16			

NOTES:

1. Each pin except VDD and GND will have a series resistor of 10K ± 5%, VDD = 18V ± 0.5V
2. Each pin except VDD and GND will have a series resistor of 47K ± 5%; Group E, Subgroup 2, sample size is 4 dice/wafer, 0 failures, VDD = 10V ± 0.5V

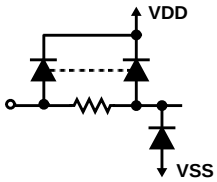
Logic Diagram



TRUTH TABLE

INPUTS				OUTPUT
3-STATE OUTPUT DISABLE	SELECT	A	B	D
1	X	X	X	Z
0	0	0	X	0
0	0	1	X	1
0	1	X	0	0
0	1	X	1	1

X = Don't care Logic 1 = High Logic 0 = Low
Z = High impedance



* ALL INPUTS ARE PROTECTED BY CMOS PROTECTION NETWORK

FIGURE 1.

Typical Performance Characteristics

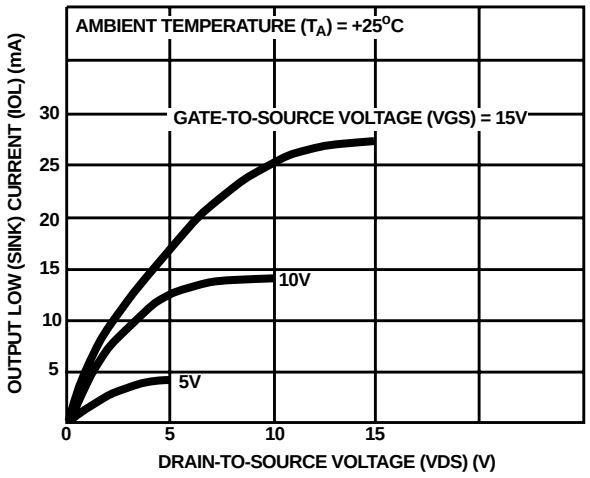


FIGURE 2. TYPICAL OUTPUT LOW (SINK) CURRENT CHARACTERISTICS

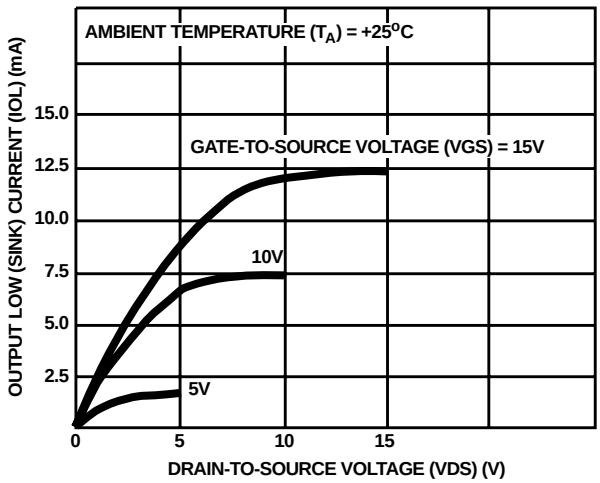


FIGURE 3. MINIMUM OUTPUT LOW (SINK) CURRENT CHARACTERISTICS

Typical Performance Characteristics (Continued)

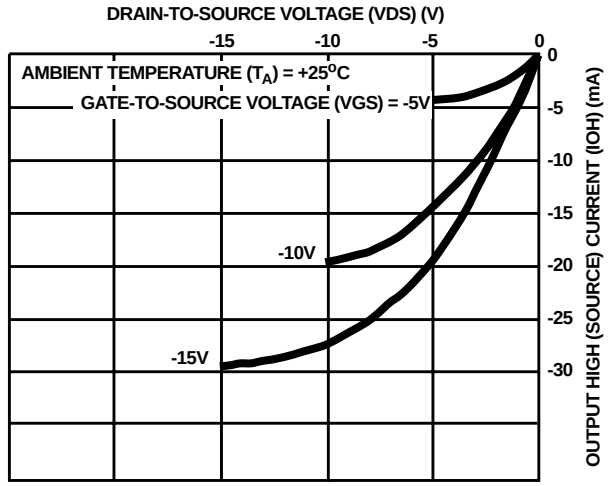


FIGURE 4. TYPICAL OUTPUT HIGH (SOURCE) CURRENT CHARACTERISTICS

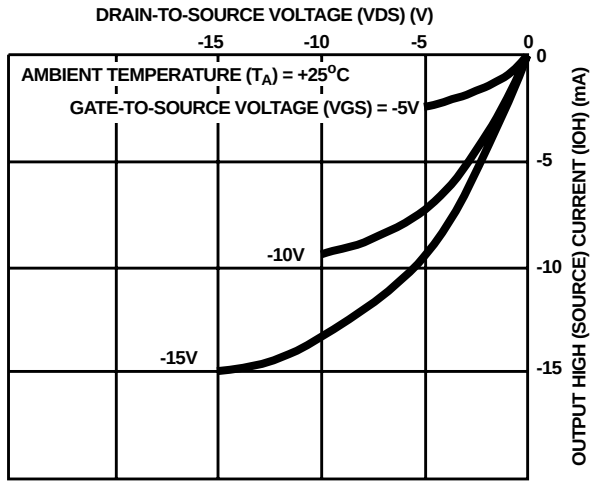


FIGURE 5. MINIMUM OUTPUT HIGH (SOURCE) CURRENT CHARACTERISTICS

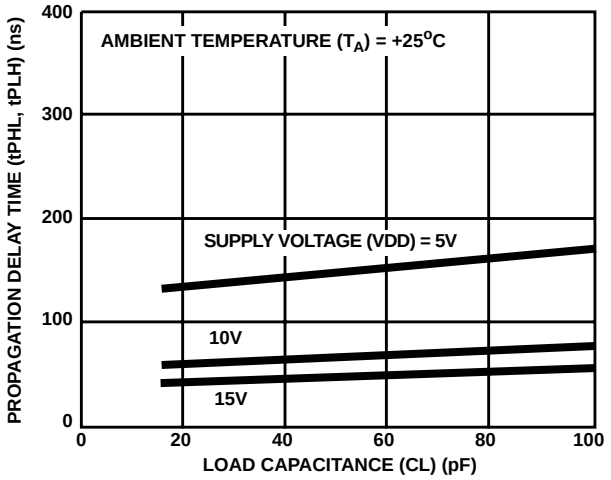


FIGURE 6. TYPICAL PROPAGATION DELAY TIME AS A FUNCTION OF LOAD CAPACITANCE (DATA INPUT TO OUTPUT)

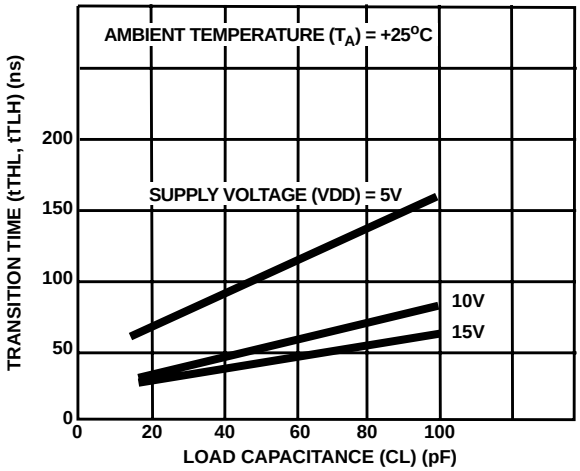


FIGURE 7. TYPICAL TRANSITION TIME AS A FUNCTION OF LOAD CAPACITANCE

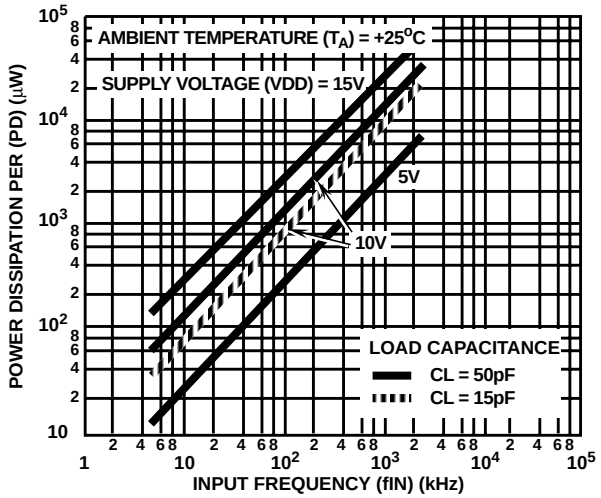
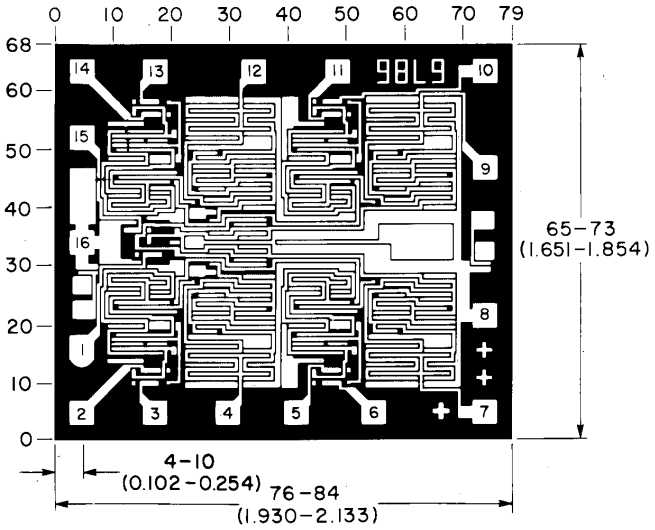


FIGURE 8. TYPICAL DYNAMIC POWER DISSIPATION AS A FUNCTION OF INPUT FREQUENCY (ONE INPUT TO ONE OUTPUT)

Chip Dimensions and Pad Layout



Dimensions in parenthesis are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10^{-3} inch).

METALLIZATION: Thickness: 11kÅ – 14kÅ, AL.

PASSIVATION: 10.4kÅ - 15.6kÅ, Silane

BOND PADS: 0.004 inches X 0.004 inches MIN

DIE THICKNESS: 0.0198 inches - 0.0218 inches

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