



Bipolar ROMs

DM7598/DM8598

DM7598/DM8598 TRI-STATE® 256-bit read only memory

general description

The DM7598/DM8598 is a customer programmed 256-bit read only memory, organized as 32 8-bit words. A 5-bit input code selects the appropriate word which then appears on the eight outputs. An enable input overrides the select inputs and blanks all outputs.

Although the DM7598/DM8598 can have its outputs tied together for word-expansion, the outputs are not open-collector, but rather the familiar totem-pole output with the capability of being placed in a "third-state." This unique TRI-STATE concept allows outputs to be tied together and then connected to a common bus line. Normal TTL outputs cannot be connected due to the low-impedance logical "1" output current which one device would have to sink from the other. If, however, on all but one of the connected devices both the upper and lower output transistors are turned "OFF," then the one remaining device in the normal low impedance state will have to supply to or sink from the other devices only a small amount of leakage current. This is exactly what occurs on the DM7598/DM8598.

A typical system connection demonstrating expansion to greater numbers of words is shown in *Figure 1*. While it is true that in a TTL system open-collector gates could be used to perform the logic function of these three-state elements, neither waveform integrity nor optimum

speed would be achieved. The low output impedance of the DM7598/DM8598 provides good capacitance drive capability and rapid transition from the logical "0" to logical "1" level thus assuring both speed and waveform integrity.

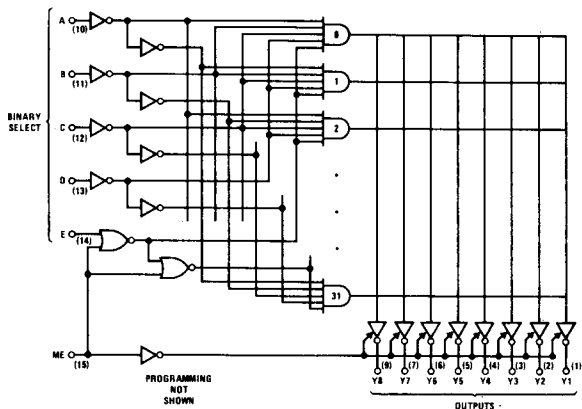
It is possible to connect as many as 128 DM8598s to a common bus line and still have adequate drive capability to allow fan-out from the bus. The example shown in *Figure 2* indicates how this guarantee can be made under worst-case conditions.

Figure 3 indicates how multiple packages can be used to increase word length.

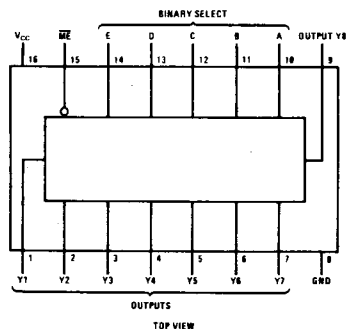
features

- Pin compatible with SN5488/SN7488
- Organized as 32 8-bit words
- Full internal decoding
- 26 ns typical access time
- 350 mW typical power dissipation
- Input clamp diodes
- Designed for bus-organized systems

logic and connection diagrams



Dual-In-Line Package



Order Number DM7598J or DM8598J
See Package 10
Order Number DM8598N
See Package 15

absolute maximum ratings (Note 1)

Supply Voltage	7V
Input Voltage	5.5V
Output Voltage	5.5V
Operating Temperature Range	
DM7598	-55°C to +125°C
DM8598	0°C to +70°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10 seconds)	300°C

operating conditions

	MIN	MAX	UNITS
Supply Voltage, V_{CC}			
DM7598	4.5	5.5	V
DM8598	4.75	5.25	V
Temperature, T_A			
DM7598	-55	+125	°C
DM8598	0	+70	°C

electrical characteristics (Note 2)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IH}	Logical "1" Input Voltage	$V_{CC} = \text{Min}$	2.0			V
V_{IL}	Logical "0" Input Voltage	$V_{CC} = \text{Min}$			0.8	V
V_{OH}	Logical "1" Output Voltage	$V_{CC} = \text{Min}$	$I_O = -2 \text{ mA}$, DM7598	2.4		V
			$I_O = -5.2 \text{ mA}$, DM8598	2.4		
V_{OL}	Logical "0" Output Voltage	$V_{CC} = \text{Min}$, $I_O = 12 \text{ mA}$			0.4	V
I_{OZ}	TRI-STATE Output Current	$V_{CC} = \text{Max}$	$V_O = 2.4 \text{ V}$		40	μA
			$V_O = 0.4 \text{ V}$		-40	
I_{IH}	Logical "1" Input Current	$V_{CC} = \text{Max}$	$V_{IN} = 2.4 \text{ V}$		25	μA
			$V_{IN} = 5.5 \text{ V}$		1	
I_{IL}	Logical "0" Input Current	$V_{CC} = \text{Max}$, $V_{IN} = 0.4 \text{ V}$			-1.0	mA
I_{OS}	Output Short Circuit Current	$V_{CC} = \text{Max}$, $V_O = 0 \text{ V}$, (Note 3)	-20		-70	mA
I_{CC}	Supply Current	$V_{CC} = \text{Max}$, Inputs Grounded		70	99	mA
V_{IC}	Input Clamp Voltage	$V_{CC} = \text{Min}$, $I_{IN} = -12 \text{ mA}$			-1.5	V

switching characteristics (Note 2)

SYMBOL	PARAMETER	PARAMETER CONDITIONS	TEST CONDITIONS	DM7598			DM8598			UNITS
				MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Propagation Delay Time, Low to High Level Output	Access Time from Address			23	65		23	50	ns
t_{PHL}	Propagation Delay Time, High to Low Level Output	Access Time from Address	$C_L = 50 \text{ pF}$, $R_L = 400\Omega$		29	65		29	50	ns
t_{ZH}	Output Enable Time to High Level	Access Times from Memory Enable			16	40		16	30	ns
t_{ZL}	Output Enable Time to Low Level	Access Times from Memory Enable			20	40		20	30	ns
t_{HZ}	Output Disable Time from High Level	Disable Times from Memory Enable	$C_L = 5.0 \text{ pF}$, $R_L = 400\Omega$		10	30		10	20	ns
t_{LZ}	Output Disable Time from Low Level	Disable Times from Memory Enable			22	45		22	40	ns

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified min/max limits apply across the -55°C to +125°C temperature range for the DM7598 and across the 0°C to +70°C range for the DM8598. All typicals are given for $V_{CC} = 5.0 \text{ V}$, and $T_A = 25^\circ \text{ C}$.

Note 3: Only one output at a time should be shorted.

typical applications

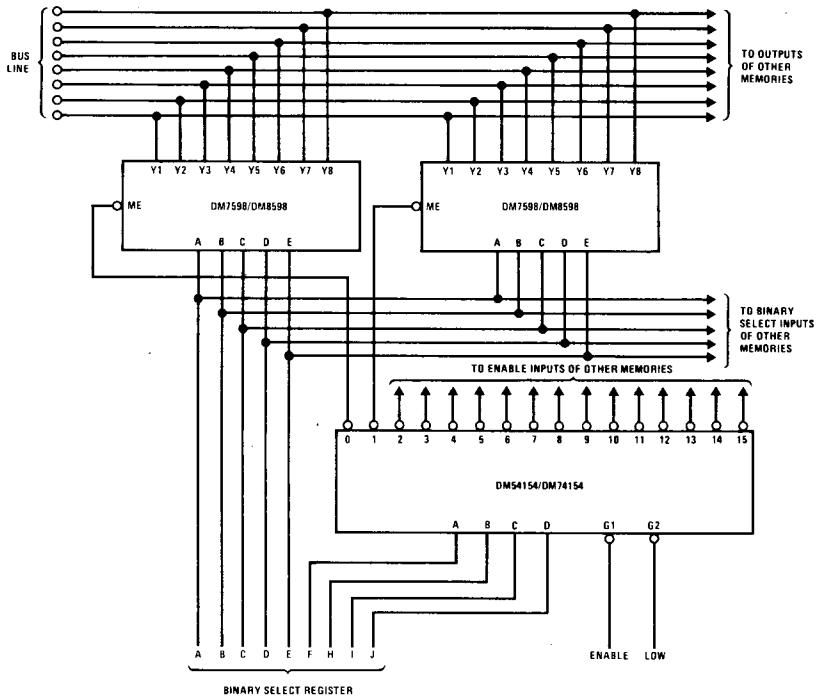


FIGURE 1. Expansion to Larger Word Capacity

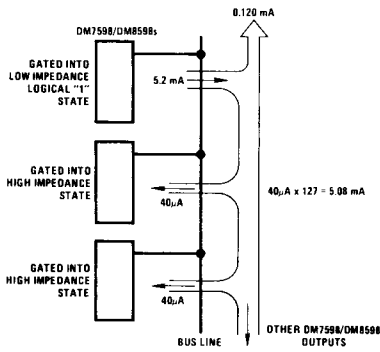


FIGURE 2.

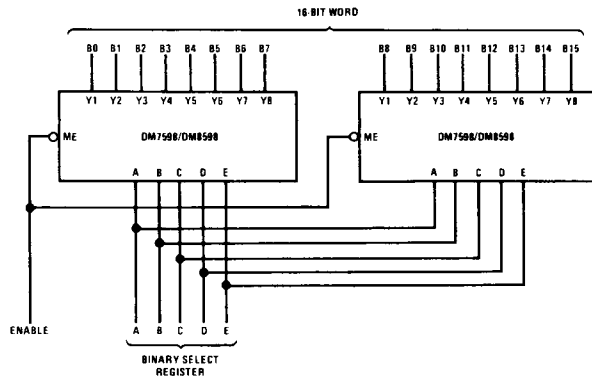


FIGURE 3.

truth table/order blank

A special pattern has been generated for the DM7598/DM8598. The AA pattern provides a sine table. The 5-bit input code linearly divides 90° into 32 equal segments. Each 8-bit output is therefore the sine of the angle applied.

EXAMPLE: Input 11010 means 26/32 of 90°, or about 73°. The corresponding output 1110100 indicates (1/2 + 1/4 + 1/8 + 1/16 + 1/64) or about 0.95, which is close to the sine of 73°. Rounding-off has not been employed, since without rounding-off it is possible to extend the accuracy with additional ROMs.

WORD	INPUTS						OUTPUTS							
	BINARY SELECT					ENABLE	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
	E	D	C	B	A	ME								
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	1	0	0	0	0	0	1	1	0	0
2	0	0	0	1	0	0	0	0	0	1	1	0	0	1
3	0	0	0	1	1	0	0	0	1	0	0	1	0	1
4	0	0	1	0	0	0	0	0	1	1	0	0	0	1
5	0	0	1	0	1	0	0	0	1	1	1	1	1	0
6	0	0	1	1	0	0	0	1	0	0	1	0	1	0
7	0	0	1	1	1	0	0	1	0	1	0	1	1	0
8	0	1	0	0	0	0	0	1	1	0	0	0	0	1
9	0	1	0	0	1	0	0	1	1	0	1	1	0	1
10	0	1	0	1	0	0	0	1	1	1	1	1	0	0
11	0	1	0	1	1	0	1	0	0	0	0	0	1	1
12	0	1	1	0	0	0	1	0	0	0	1	1	1	0
13	0	1	1	0	1	0	1	0	0	1	1	0	0	0
14	0	1	1	1	0	0	1	0	1	0	0	0	1	0
15	0	1	1	1	1	0	1	0	1	0	1	0	1	1
16	1	0	0	0	0	0	1	0	1	1	0	1	0	1
17	1	0	0	0	1	0	1	0	1	1	1	1	1	0
18	1	0	0	1	0	0	1	1	0	0	0	1	0	1
19	1	0	0	1	1	0	1	1	0	0	1	1	0	1
20	1	0	1	0	0	0	1	1	0	1	0	1	0	0
21	1	0	1	0	1	0	1	1	0	1	1	0	1	1
22	1	0	1	1	0	0	1	1	1	0	0	0	0	1
23	1	0	1	1	1	0	1	1	1	0	0	1	1	1
24	1	1	0	0	0	0	1	1	1	0	1	1	0	0
25	1	1	0	0	1	0	1	1	1	1	0	0	0	1
26	1	1	0	1	0	0	1	1	1	1	0	1	0	0
27	1	1	0	1	1	0	1	1	1	1	1	0	0	0
28	1	1	1	0	0	0	1	1	1	1	1	1	0	1
29	1	1	1	0	1	0	1	1	1	1	1	1	0	1
30	1	1	1	1	0	0	1	1	1	1	1	1	1	0
31	1	1	1	1	1	0	1	1	1	1	1	1	1	1
All	X	X	X	X	X	1	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z

X - Don't Care

The output levels are not shown on the truth table since the customer specifies the output condition he desires at each of the eight outputs for each of the 32 words (256 bits). The customer does this by filling out the Truth Table on this data sheet, and sending it in with his purchase order.

WORD	INPUTS						OUTPUTS							
	BINARY SELECT					ENABLE	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
	E	D	C	B	A	ME								
0	0	0	0	0	0	0								
1	0	0	0	0	1	0								
2	0	0	0	1	0	0								
3	0	0	0	1	1	0								
4	0	0	1	0	0	0								
5	0	0	1	0	1	0								
6	0	0	1	1	0	0								
7	0	0	1	1	1	0								
8	0	1	0	0	0	0								
9	0	1	0	0	1	0								
10	0	1	0	1	0	0								
11	0	1	0	1	1	0								
12	0	1	1	0	0	0								
13	0	1	1	0	1	0								
14	0	1	1	1	0	0								
15	0	1	1	1	1	0								
16	1	0	0	0	0	0								
17	1	0	0	0	1	0								
18	1	0	0	1	0	0								
19	1	0	0	1	1	0								
20	1	0	1	0	0	0								
21	1	0	1	0	1	0								
22	1	0	1	1	0	0								
23	1	0	1	1	1	0								
24	1	1	0	0	0	0								
25	1	1	0	0	1	0								
26	1	1	0	1	0	0								
27	1	1	0	1	1	0								
28	1	1	1	0	0	0								
29	1	1	1	0	1	0								
30	1	1	1	1	0	0								
31	1	1	1	1	1	0								
All	X	X	X	X	X	1	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z

X - Don't Care

Notice: This sheet must be completed and signed by an authorized representative of the customer's company before an order can be entered.

To be used by National only

Part Number _____

S.O. Number _____

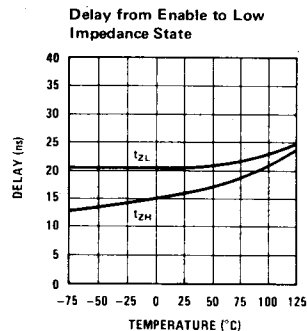
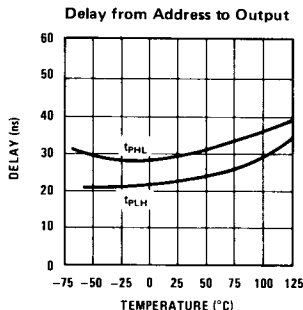
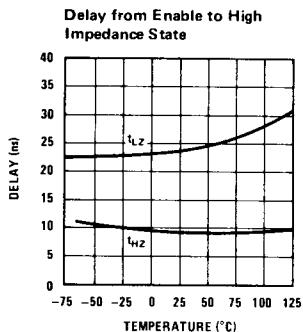
Date Received _____

Authorized Representative _____ Date _____

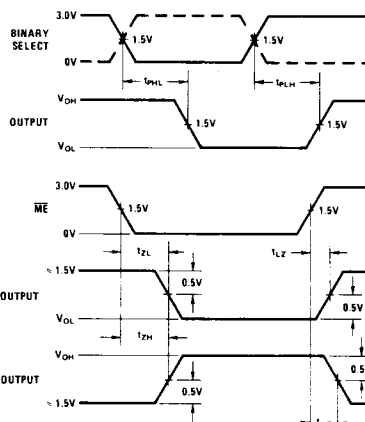
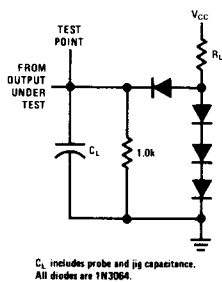
Company _____

Desired Part DM7598 DM8598

typical performance characteristics



ac test circuit and switching time waveforms



Note: Input waveforms are supplied by pulse generators having the following characteristics: $t_r \leq 10$ ns, $t_f \leq 10$ ns, PRR ≤ 1.0 MHz and $Z_{OUT} = 50\Omega$.

ordering instructions

Programming instructions for the DM7598/DM8598 are solicited in the form of a sequenced deck of 32 standard 80-column data cards providing the information requested under "data card format," accompanied by a properly sequenced listing of these cards, and the supplementary ordering data. Upon receipt of these items, a computer run will be made from the deck of cards which will produce a complete function table of the requested part. This function table, showing output conditions for each of the 32 words, will be forwarded to the purchaser as verification of the input data as

interpreted by the computer-automated design (CAD) program. This single run also generates mask and test program data; therefore, verification of the function table should be completed promptly.

Each card in the data deck prepared by the purchaser identifies the word specified and describes the levels at the eight outputs for that word. All addresses must have all outputs defined and columns designated as "blank" must not be punched. Cards should be punched according to the data card format shown.

ordering instructions (con't)

SUPPLEMENTARY ORDERING DATA

Submit the following information with the data cards:

- a) Customer's name and address
- b) Customer's purchase order number
- c) Customer's drawing number

The following information will be furnished to the customer:

- a) National's part number
- b) National's sales order number
- c) Date received

DATA CARD FORMAT

Col. 1–2: Punch a right-justified integer representing the positive-logic binary input address (00–31) for the word described on the card.

Col. 3–4: Blank

Col. 5: Punch "H" or "L" for output Y8. H = high-voltage level output, L = low-voltage level output.

Col. 6–9: Blank

Col. 10: Punch "H" or "L" for output Y7.

Col. 11–14: Blank

Col. 15: Punch "H" or "L" for output Y6.

Col. 16–19: Blank

Col. 20: Punch "H" or "L" for output Y5.

Col. 21–24: Blank

Col. 25: Punch "H" or "L" for output Y4.

Col. 26–29: Blank

Col. 30: Punch "H" or "L" for output Y3.

Col. 31–34: Blank

Col. 35: Punch "H" or "L" for output Y2.

Col. 36–39: Blank

Col. 40: Punch "H" or "L" for output Y1.

Col. 41–49: Blank

Col. 50–51: Punch a right-justified integer representing the current calendar day of the month.

Col. 52: Blank

Col. 53–55: Punch an alphabetic abbreviation representing the current month.

Col. 56: Blank

Col. 57–58: Punch the last two digits of the current year.

Col. 59: Blank

Col. 60–61: Punch "DM,"

Col. 62–66: Punch "7598" or "8598."

Col. 67–68: Blank

Col. 69–80: These columns may be used for any customer information or identification.