National Semiconductor

DM75S68/DM85S68/DM75S68A/DM85S68A
16 x 4 Edge Triggered Registers

General Description

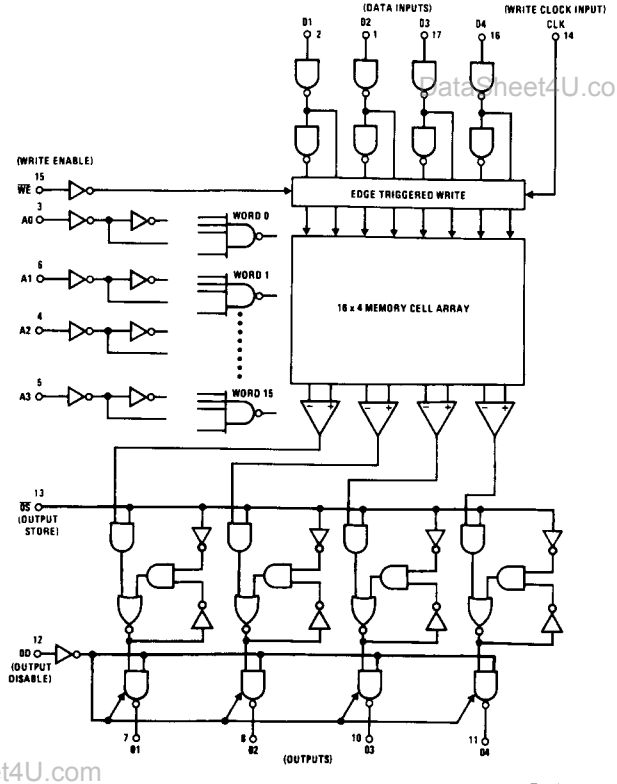
These Schottky memories are addressable "D" register files. Any of its 16 four-bit words may be asynchronously read or may be written into on the next clock transition. An input terminal is provided to enable or disable the synchronous writing of the input data into the location specified by the address terminals. An output disable terminal operates only as a TRI-STATE® output control terminal. The addressable register data may be latched at the outputs and retained as long as the output store terminal is held in a low state. This memory storage condition is independent of the state of the output disable terminal.

All input terminals are high impedance at all times, and all outputs have low impedance active drive logic states and the high impedance TRI-STATE condition.

Features

- On-chip output register
- PNP inputs reduce input loading
- Edge triggered write
- High speed—20 ns typ
- All parameters guaranteed over temperature
- TRI-STATE output
- Schottky-clamped for high speed
- Optimized for register stack applications
- Typical power dissipation—350 mW

Logic and Block Diagram



TL/F/9233–1

Pin Names

A_0–A_3	Address Inputs
D_1–D_4	Data Inputs
0_1–0_4	Data Outputs
$\overline{WE}$	Write Enable
CLK	Write Clock Input
$\overline{OS}$	Output Store
OD	Output Disable

O_D	$\overline{W_E}$	CLK	$\overline{O_S}$	MODE	OUTPUTS
0	X	X	0	Output Store	Data From Last Addressed Location
X	0	⌐	X	Write Data	Dependent on State of OD and $\overline{OS}$
0	X	X	1	Read Data	Data Stored in Addressed Location
1	X	X	0	Output Store	High Impedance State
1	X	X	1	Output Disable	High Inpedance State

0 = Low Level
1 = High Level
X = Don't Care

Absolute Maximum Ratings (Note 1)

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

Supply Voltage	7.0V
Input Voltage	5.5V
Output Voltage	5.5V
Storage Temperature Range	−65°C to +150°C
Temperature (Soldering, 10 sec.)	300°C

Operating Conditions

	Min	Max	Units
Supply Voltage, V_{CC}			
DM85S68/DM85S68A	4.75	5.25	V
DM75S68/DM75S68A	4.5	5.5	V
Temperature, T_A			
DM85S68/DM85S68A	0	70	°C
DM75S68/DM75S68A	−55	+125	°C

Electrical Characteristics

over recommended operating free-air temperature range unless otherwise noted (Notes 2 and 3)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
V_{IH}	High Level Input Voltage			2			V
V_{IL}	Low Level Input Voltage					0.8	V
V_{OH}	High Level Output Voltage	V_{CC} = Min	I_{OH} = −2.0 mA, DM75S68/DM75S68A	2.4			V
			I_{OH} = −5.2 mA, DM85S68/DM85S68A	2.4			V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = 16 mA	DM75S68/DM75S68A			0.5	V
			DM85S68/DM85S68A			0.45	V
I_{IH}	High Level Input Current	V_{CC} = Max, V_{IH} = 2.4V				25	μA
I_I	High Level Input Current at Maximum Voltage	V_{CC} = Max, V_{IH} = 5.5V				50	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_{IL} = 0.5V	Clock Input			−500	μA
			All Others			−250	μA
I_{OS}	Short Circuit Output Current (Note 4)	V_{CC} = Max, V_{OL} = 0V		−20		−55	mA
I_{CC}	Supply Current	V_{CC} = Max			70	100	mA
V_{IC}	Input Clamp Voltage	V_{CC} = Min, I_{IN} = −18 mA				−1.2	V
I_{OZ}	TRI-STATE Output Current	V_{CC} = Max	V_O = 2.4V			+40	μA
			V_O = 0.5V			−40	μA

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 DM75S68/DM75S68A and across the 0°C to +70°C range for the DM85S68/DM85S68A. All typicals are given for V_{CC} = 5.0V and T_A = 25°C.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

Note 4: Only one output at a time should be shorted.

Switching Characteristics over recommended operating range of T_A and V_{CC} unless otherwise noted

Symbol	Parameter		DM75S68		DM85S68		DM75S68A		DM85S68A		Units
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{ZH}	Output Enable to High Level			40		35		40		35	ns
t_{ZL}	Output Enable to Low Level			30		24		30		24	ns
t_{HZ}	Output Disable Time from High Level			35		15		35		15	ns
t_{LZ}	Output Disable Time from Low Level			35		18		35		18	ns
t_{AA}	Access Time	Address to Output		55		40		45		24	ns
t_{OSA}		Output Store to Output		35		30		35		20	ns
t_{CA}		Clock to Output		50		40		50		35	ns

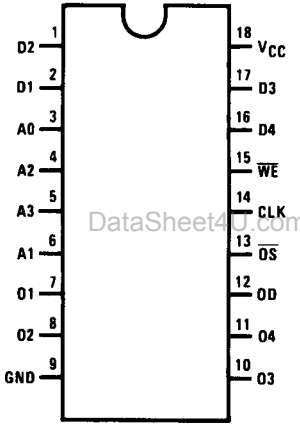
Switching Characteristics

over recommended operating range of T_A and V_{CC} unless otherwise noted (Continued)

Symbol	Parameter		DM75S68		DM85S68		DM75S68A		DM85S68A		Units
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{ASC}	Set-Up Time	Address to Clock	25		15		25		15		ns
t_{DSC}		Data to Clock	15		5		15		5		ns
t_{ASOS}		Address to Output Store	40		30		40		10		ns
t_{WESC}		Write Enable Set-Up Time	10		5		10		5		ns
t_{OSSC}		Store before Write	15		10		15		10		ns
t_{AHC}	Hold Time	Address from Clock	15		10		15		10		ns
t_{DHC}		Data from Clock	20		15		20		15		ns
t_{AHOS}		Address from Output Store	10		5		10		2		ns
t_{WEHC}		Write Enable Hold Time	20		15		20		10		ns

Connection Diagram

Dual-In-Line Package

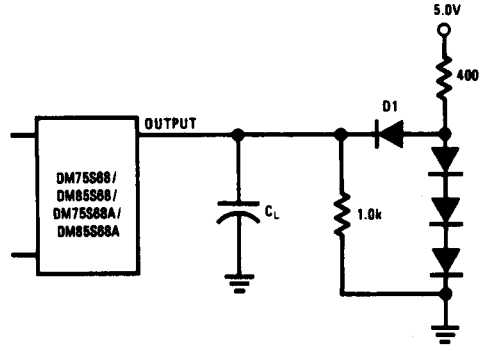


TL/F/9233–2

Top View

Order Number DM75S68J, DM85S68J, DM85S68N, DM75S68AJ, DM85S68AJ or DM85S68AN
See NS Package Number J18A or N18A

AC Test Circuit and Switching Time Waveforms

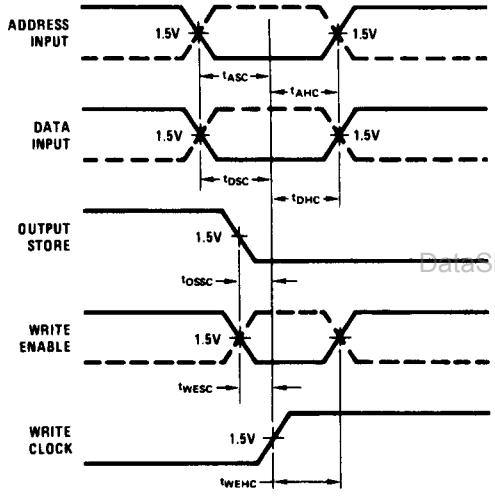


C_L = 5.0 pF for t_{HZ}, t_{LZ}
C_L = 30 pF for all others
C_L includes probe and jig capacitance
All diodes are 1N3064

TL/L/9233-3

Write Cycle

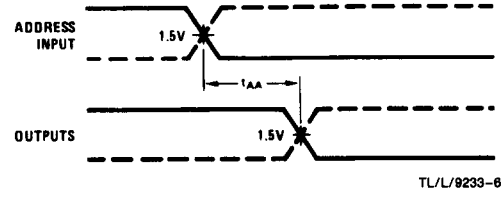
Clock Set-Up and Hold Time



TL/L/9233-4

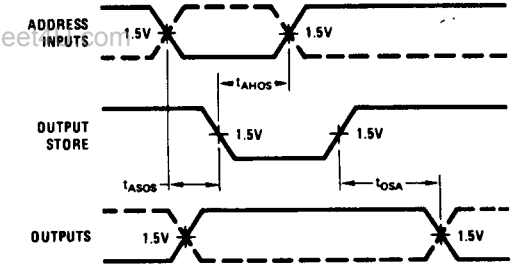
Read Cycle

Address to Output Access Time



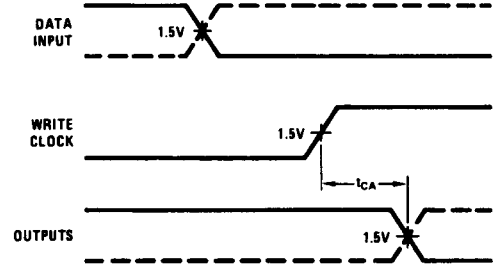
TL/L/9233-6

Output Store Access, Set-Up and Hold Time



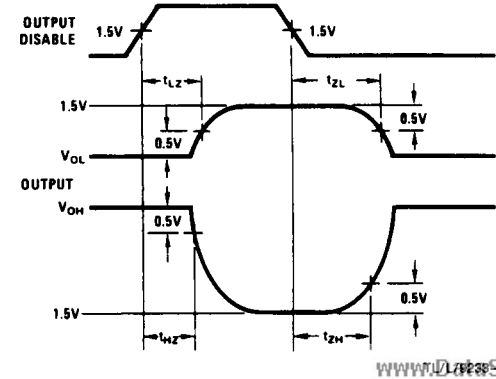
TL/L/9233-7

Clock to Output Access



TL/L/9233-5

Output Disable and Enable Time



TL/L/9233-8

Note: Input waveforms supplied by pulse generator having the following characteristics: V = 3.0V, $t_R \leq 2.5$ ns, PRR ≤ 1.0 MHz and Z_{OUT} = 50M.