


MOTOROLA
MCM6670
MCM6674
128c X 7 X 5 CHARACTER GENERATOR

The MCM6670 is a mask-programmable horizontal-scan (row select) character generator containing 128 characters in a 5 X 7 matrix. A 7-bit address code is used to select one of the 128 available characters, and a 3-bit row select code chooses the appropriate row to appear at the outputs. The rows are sequentially displayed, providing a 7-word sequence of 5 parallel bits per word for each character selected by the address inputs.

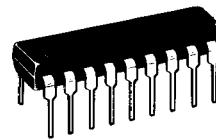
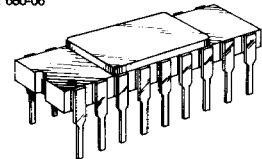
The MCM6674 is a preprogrammed version of the MCM6670. The complete pattern of this device is contained in this data sheet.

- Fully Static Operation
- TTL Compatibility
- Single $\pm 10\%$ +5 Volt Power Supply
- 18-Pin Package
- Diagonal Corner Power Supply Pins
- Fast Access Time, 350 ns (max)

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MOS

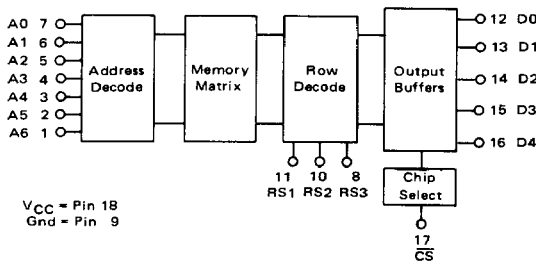
(N-CHANNEL, SILICON GATE)

128c x 7 x 5
HORIZONTAL-SCAN
CHARACTER GENERATOR
L SUFFIX
 CERAMIC PACKAGE
 CASE 680-06

P SUFFIX
 PLASTIC PACKAGE
 CASE 707-02

ABSOLUTE MAXIMUM RATINGS (See Note 1)

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 to +7.0	Vdc
Input Voltage	V_{in}	-0.3 to +7.0	Vdc
Operating Temperature Range	T_A	0 to +70	$^{\circ}C$
Storage Temperature Range	T_{stg}	-65 to +150	$^{\circ}C$

NOTE 1: Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to RECOMMENDED OPERATING CONDITIONS. Exposure to higher than recommended voltages for extended periods of time could affect device reliability.

BLOCK DIAGRAM

PIN ASSIGNMENT

A6	1	18	V_{CC}
A5	2	17	CS
A4	3	16	D4
A3	4	15	D3
A2	5	14	D2
A1	6	13	D1
A0	7	12	D0
RS3	8	11	RS1
GND	9	10	RS2

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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MCM6670•MCM6674**DC OPERATING CONDITIONS AND CHARACTERISTICS**
(Full operating voltage and temperature range unless otherwise noted.)**RECOMMENDED DC OPERATING CONDITIONS**

Parameter	Symbol	Min	Nom	Max	Unit
Supply Voltage	V _{CC}	4.5	5.0	5.5	V _{dC}
Input High Voltage	V _{IH}	2.0	–	5.5	V _{dC}
Input Low Voltage	V _{IL}	-0.3	–	0.8	V _{dC}

DC CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
Input Current (V _{in} = 0 to 5.5 V)	I _{in}	–	–	2.5	μA _{dC}
Output High Voltage (I _{OH} = -205 μA)	V _{OH}	2.4	–	V _{CC}	V _{dC}
Output Low Voltage (I _{OL} = 1.6 mA)	V _{OL}	–	–	0.4	V _{dC}
Output Leakage Current (Three-State) (CS = 2.0 V or CS = 0.8 V, V _{out} = 0.4 V to 2.4 V)	I _{LO}	–	–	10	μA _{dC}
Supply Current (V _{CC} = 5.5 V, T _A = 0°C)	I _{CC}	–	–	130	mA _{dC}

CAPACITANCE (T_A = 25°C, f = 1.0 MHz)

Characteristic	Symbol	Typ	Unit
Input Capacitance	C _{in}	5.0	pF
Output Capacitance	C _{out}	5.0	pF

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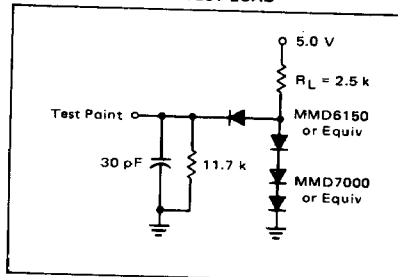
AC OPERATING CONDITIONS AND CHARACTERISTICS

(Full operating voltage and temperature range unless otherwise noted.)

AC TEST CONDITIONS

Condition	Value
Input Pulse Levels	0.8 V to 2.0 V
Input Rise and Fall Times	20 ns
Output Load	1 TTL Gate and $C_L = 30\text{ pF}$

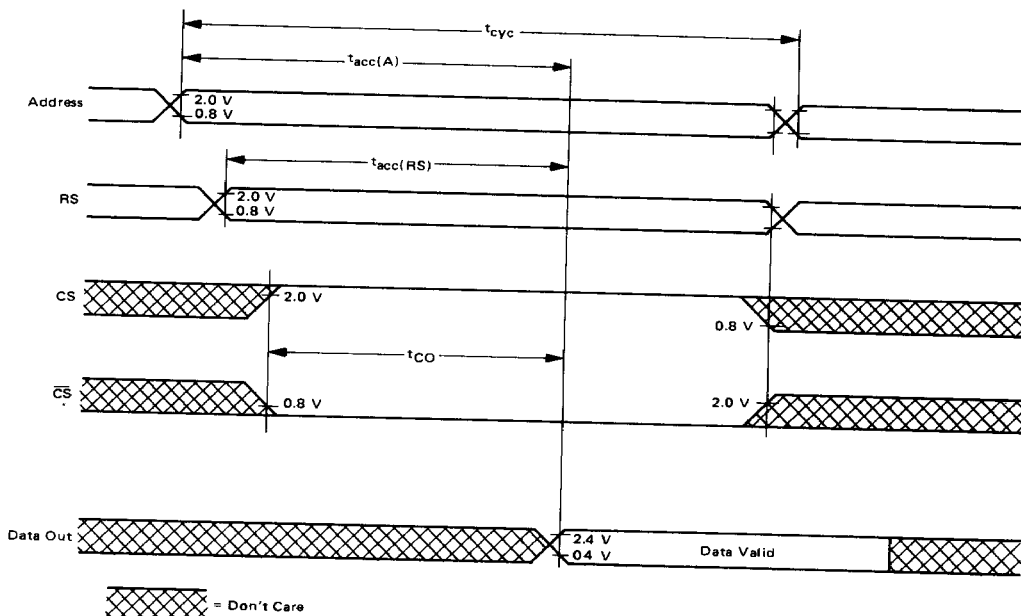
AC TEST LOAD



AC CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Cycle Time	t_{cyc}	350	—	ns
Address Access Time	$t_{acc(A)}$	—	350	ns
Row Select Access Time	$t_{acc(RS)}$	—	350	ns
Chip Select to Output Delay	t_{CO}	—	150	ns

TIMING DIAGRAM



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FIGURE 3 – CARD PUNCH FORMAT

Columns		
1-9	Blank	
10-25	Hex coding for first character	Column 10 on the first card contains either a zero or a one to program D4 of row R0 for the first character. Column 11 contains the hex character for D3 thru D0. Columns 12 and 13 contain the information to program R1. The entire first character is coded in columns 10 thru 25. Each card contains the coding for four characters; 32 cards are required to program the entire 128 characters. The characters must be programmed in sequence from the first character to the last in order to establish proper addressing for the part. Figure 3 provides an illustration of the correct format.
26	Slash (/)	
27-42	Hex coding for second character	
43	Slash (/)	
44-59	Hex coding for third character	
60	Slash (/)	
61-76	Hex coding for fourth character	
77-78	Blank	
79-80	Card number (starting 01; thru 32)	

FIGURE 4 – EXAMPLE OF CARD PUNCH FORMAT
(First 12 Characters of MCM6670P4)

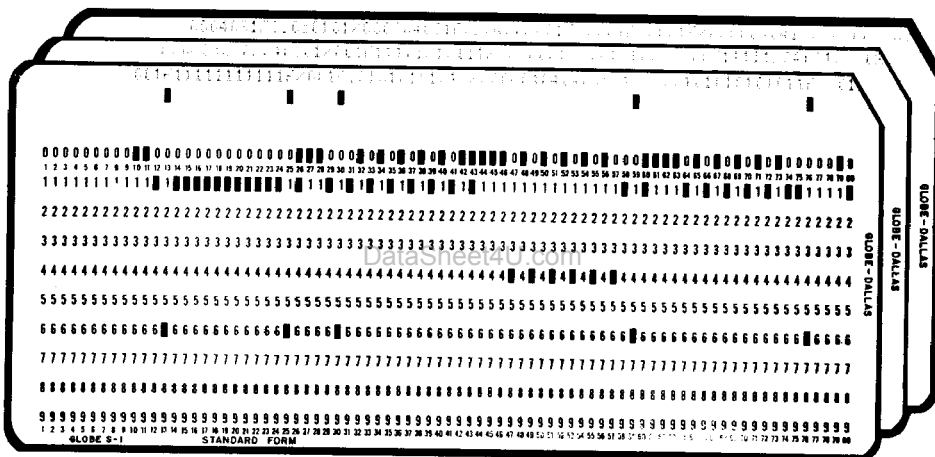


FIGURE 5 – PAPER TAPE FORMAT

Frames		
Leader	Blank Tape	
1 to M	Allowed for customer use ($M \leq 64$)	start of data entry. (Note that the tape cannot begin with a CR and/or LF, or the customer identification will be assumed to be programming data.)
M + 1, M + 2	CR; LF (Carriage Return; Line Feed)	
M + 3 to M + 66	First line of pattern information (64 hex figures per line)	Frame M + 3 contains a zero or a one to program D4 of row R0 for the first character. Frame M + 4 contains the hex character for D3 thru D0, completing the programming information for R0. Frames M + 5 and M + 6 contain the information to program R1. The entire first character is coded in Frames M + 3 thru M + 18. Four complete characters are programmed with each line. A total of 32 lines program all 128 characters (32 x 4). The characters must be programmed in sequence from the first character to the last in order to establish proper addressing for the part.
M + 67, M + 68	CR; LF	
M + 69 to M + 2114	Remaining 31 lines of hex figures, each line followed by a Carriage Return and Line Feed	
Blank Tape		
Frames 1 to M are left to the customer for internal identification, where $M \leq 64$. Any combination of alpha- numerics may be used. This information is terminated with a Carriage Return and Line Feed, delineating the		

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The formats below are given for your convenience in preparing character information for MCM6670 programming. THESE FORMATS ARE NOT TO BE USED TO TRANSMIT THE INFORMATION TO MOTOROLA. Refer to the Custom Programming instructions for detailed procedures.

Character Number _____

	MSB	LSB	HEX
R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

Character Number _____

	MSB	LSB	HEX
R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

Character Number _____

	MSB	LSB	HEX
R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

Character Number _____

	MSB	LSB	HEX
R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

Character Number _____

	MSB	LSB	HEX
R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

Character Number _____

	MSB	LSB	HEX
R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

Character Number _____

	MSB	LSB	HEX
R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

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R0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

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R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

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R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

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R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

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R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

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R2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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R4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	D4	D3	D0

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FIGURE 6 – MCM6674 PATTERN

A3...A0		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
A6...A4		D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0	D4...D0
000	R0																
	R7																
001	R0																
	R7																
010	R0																
	R7																
011	R0																
	R7																
100	R0																
	R7																
101	R0																
	R7																
110	R0																
	R7																
111	R0																
	R7																

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