

NEXUS MACHINES LTD

4 digit 7 segment LED displays with Serial driver

B08M04

B14M04

B20M04

B25M04

B38M04

General Description

The B08M04, B14M04, B20M04, B25M04 and B38M04 displays are 4 digit seven segment LED displays combined with a 4 digit, direct drive, integrated circuit. The devices are available in high efficiency red, green and yellow colour variants. Each of the standard displays has a right hand decimal point in each digit whereas the -CL variant has colons for clock applications. LED sizes include 8mm (0.3 inch), 14mm (0.56inch), 20mm (0.8inch) 25mm (1inch) and 38mm (1.5inch) display areas.

The on board driver chip has a serial input format that features serial data, clock and chip enable. A single 5 volt supply is standard although the unit will work with vdd as high as 10 volts. The serial bus signals interface is HCMOS compatible. The data is sent as 36 bits of segment information a logic 1 driving the segment on. This enables standard numeric plus a wide variety of special characters to be generated. Both the normal and the clock variant have 2 spare outputs that can be used for driving external annunciator LED's. The LED current is programmed via an on board resistor (user alterable) to 15mA per segment.

Configuration

Dimensions

Dim (mm)	B08	B14	B20	B25	B38
A	58.5	58.5	75.0	97.0	121.0
B	2.54	2.54	2.54	2.54	2.54
C	8.0	14.0	20.0	25.0	38.0
D	32.0	35.0	36.0	42.0	52.0
E	51.5	51.5	68.5	90.0	115.5
Depth	16.0	16.0	18.0	18.0	18.0

Pinout

A	B	1	2	3	4	5	6	7	8	9	C	D
Brightness	An1	An2	Ce	Data	Clock	Vdd	Br	0V	Vled	Vled		

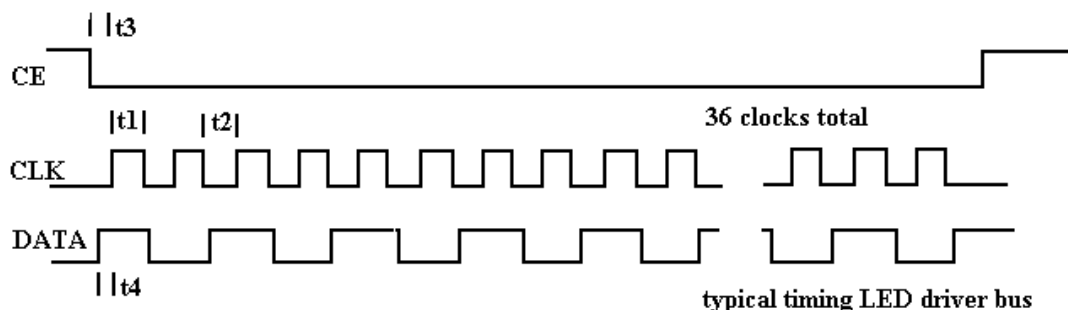
IMPORTANT NOTE: Links must be fitted in the brightness and the Vled pins (link AB and CD) if the internal brightness resistor and the Vdd led source are to be used.

Nexus Machines Ltd reserves the right to alter or withdraw the product specification and characteristics without prior notice at any time in line with product development. Nexus Machines Ltd sole and exclusive warranty is that stated in the warranty article of the conditions of sale. Although every effort is made to ensure this data is accurate no liability is accepted for errors or omissions that may affect the end product. 2902

Electrical Characteristics

Parameter	Min	Typ	Max	Units	Conditions
Supply voltage	4.75	5.0	10	V	
Voltage on output drivers			11	V	
Power supply current			7	mA	Excluding loads
Input voltage logic 0 (VL)	-0.3		0.8	V	Vcc=5.0 volts
Input voltage logic 1 (VH)	2.2		Vdd	V	Vcc=5.0 volts
Input voltage logic 1 (VH)	Vdd-2v		Vdd	V	Vcc>5.25 volts
Brightness input	0		0.75	mA	
Output sink current (seg off)			10	uA	Vout=3 volts
Output sink current (seg on)	0		10	uA	I brightness = 0uA
Output sink current (seg on)	2		4	mA	I brightness = 100uA
Output sink current (seg on)	15		25	mA	I brightness = 750uA
Brightness input voltage	3		4.3	volts	I brightness =750ma
Output matching			+ - 20	%	
Clock input frequency			500	Khz	Vcc = 5 volts
Clock High time	950			ns	tr = tf = 20ns
Clock Low time	950			ns	
Data input set up time	300			ns	
Data input hold time	300			ns	
Data enable input setup time	100			ns	
Operating temperature	0		70	deg C	V+ = Vled = 5v

LED Driver Bus Timing



Nexus Machines Ltd reserves the right to alter or withdraw the product specification and characteristics without prior notice at any time in line with product development. Nexus Machines Ltd sole and exclusive warranty is that stated in the warranty article of the conditions of sale. Although every effort is made to ensure this data is accurate no liability is accepted for errors or omissions that may affect the end product. 2902

Pin Functions

Annunciator 1 **Pin 1** Provides a spare LED drive output for external LED annunciator. Capable of sinking 20mA this pin should be connected to the cathode of the LED with the anode connected to the VLED pin voltage. It is connected to the 33rd segment driver pin.

Annunciator 2 **Pin 2** Provides a spare LED drive output for external LED annunciator. Capable of sinking 20mA this pin should be connected to the cathode of the LED with the anode connected to the VLED pin voltage. It is connected to the 34th segment driver pin.

Chip enable **Pin 3** This pin provides the data enable that when active low allows the data on the data pin to be clocked into the internal registers. When this pin goes high no data can be received.

Serial Data **Pin 4** Segment data is sent to the device via this pin. A logic 1 turns on the segment corresponding to that data bit. A full listing of segment vs data bit is outlined below.

Serial Clock **Pin 5** The serial clock pin clocks the data into the device on the rising edge of the clock waveform. Note that there are 36 clocks required to clock all of the data.

VDD **Pin 6** The positive supply voltage. Usually connected to +5 volts

Brightness **Pin 7** A resistor on this pin provides a current that is multiplied 20 times and provides the segment drive level. A resistor is provided on the board that can be linked in or an external resistor used if required. Note the segment current must not exceed 20mA. If an external potentiometer is used ensure that the minimum resistance is no less than 4k7

0 volts **Pin 8** Power and signal ground. Note that all of the segment current must flow through this pin and so it should be connected to the power supply star point.

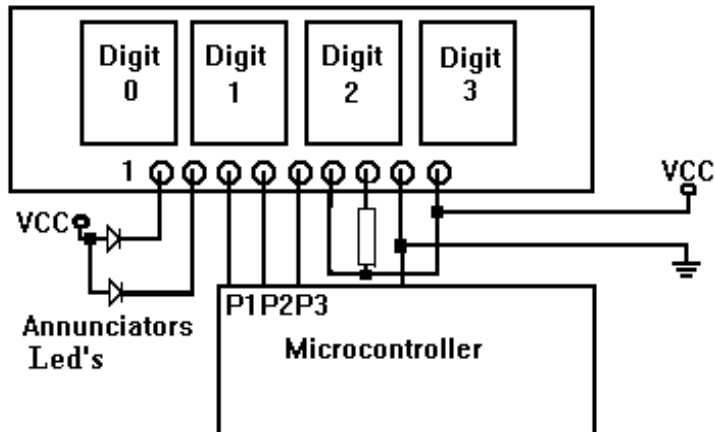
VLed **Pin 9** Supply voltage for the LED's. This is normally linked to the Vcc line but can be used to remove power from the LED displays.

Bit (clock) number vs segment connectivity.

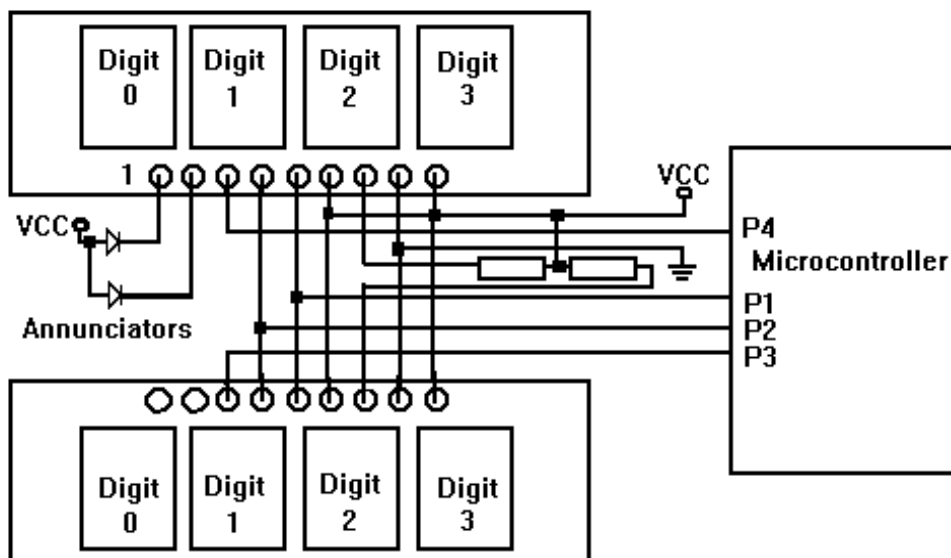
Bit 0	start	Bit 9	A2	Bit 17	A3	Bit 25	A4	Bit 33	AN1
Bit 1	A1	Bit 10	B2	Bit 18	B3	Bit 26	B4	Bit 34	AN2
Bit 2	B1	Bit 11	C2	Bit 19	C3	Bit 27	C4	Bit 35	Null
Bit 3	C1	Bit 12	D2	Bit 20	D3	Bit 28	D4		
Bit 4	D1	Bit 13	E2	Bit 21	E3	Bit 29	E4		
Bit 5	E1	Bit 14	F2	Bit 22	F3	Bit 30	F4		
Bit 6	F1	Bit 15	G2	Bit 23	G3	Bit 31	G4		
Bit 7	G1	Bit 16	dp2	Bit 24	dp3	Bit 32	dp4		
Bit 8	dp1								

Typical Applications

Simple 4 digit display to microcontroller interface.
External brightness resistor minimum of 4k7



Driving a pair of 4 digit displays from a common data and clock
Brightness resistors minimum value of 4k7



Part numbers

LED brightness Min/Typ (mCd)

Colour	0.3inch	0.56inch	0.8inch	1.0inch	1.50inch
Green	0.6 / 1.65	0.9 / 2.4	1.0 / 2.55	1.3 / 3.3	1.3 / 3.6
HE Red	0.6 / 1.8	0.9 / 2.4	1.0 / 2.55	1.4 / 3.6	1.4 / 3.6
Yellow	0.6 / 1.6	0.9 / 2.4	1.0 / 2.55	1.3 / 3.2	1.3 / 3.2

Colour	LED size	Manufacturers code
Green	8mm (0.3")	B08M04N-G
HE red	8mm (0.3")	B08M04N-R
Yellow	8mm (0.3")	B08M04N-Y
Green	14mm(0.56")	B14M04N-G
HE red	14mm(0.56")	B14M04N-R
Yellow	14mm(0.56")	B14M04N-Y
Green	20mm(0.8")	B20M04N-G
HE red	20mm(0.8")	B20M04N-R
Yellow	20mm(0.8")	B20M04N-Y
Green	20mm(0.8")	B20M04CL-G
HE red	20mm(0.8")	B20M04CL-R
Yellow	20mm(0.8")	B20M04CL-Y
Green	25mm (1.0")	B25M04N-G
HE red	25mm (1.0")	B25M04N-R
Yellow	25mm (1.0")	B25M04N-Y
Green	25mm (1.0")	B25M04CL-G
HE red	25mm (1.0")	B25M04CL-R
Yellow	25mm (1.0")	B25M04CL-Y
Green	38mm (1.5")	B38M04N-G
HE red	38mm (1.5")	B38M04N-R
Yellow	38mm (1.5")	B38M04N-Y
Green	38mm (1.5")	B38M04CL-G
HE red	38mm (1.5")	B38M04CL-R
Yellow	38mm (1.5")	B38M04CL-Y

Nexus Machines Ltd

Nexus Machines Ltd reserves the right to alter or withdraw the product specification and characteristics without prior notice at any time in line with product development. Nexus Machines Ltd sole and exclusive warranty is that stated in the warranty article of the conditions of sale.

Although every effort is made to ensure this data is accurate no liability is accepted for errors or omissions that may affect the end product. 2902

White Swan House
60 High Street
Godstone Surrey RH9 8LW

Email: sales@nexusmachines.com
Web : www.nexusmachines.com