

# Serial 7-Seg Display 2™

## Manual

*All Mikroelektronika's development systems feature a large number of peripheral modules expanding microcontroller's range of application and making the process of program testing easier. In addition to these modules, it is also possible to use numerous additional modules linked to the development system through the I/O port connectors. Some of these additional modules can operate as stand-alone devices without being connected to the microcontroller.*

# Additional Board

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## Serial 7-Seg Display 2 Additional Board

The *Serial 7-Seg Display 2* additional board features eight 7-segment displays used to display digits. Connection between the additional board and a development system is established via an IDC10 connector on the board and a 2x5 connector on one of the development system's ports. Communication between the additional board and a microcontroller is performed via a Serial Peripheral Interface (SPI), whereas eight 7-segment displays on the additional board are used to display digits. When connecting the board to a development system, it is necessary to set the appropriate switches on the DIP switch SW1 to the ON position.

In case EasyPIC, LV18F, EasyLV-18F, Easy24-33 and BigPIC development systems are used, the following switches on the DIP switch SW1 should be set to the ON position:

Switch 1 - MOSI  
Switch 4 - SCK

For EasyAVR and Easy8051 development systems, the following switches on the DIP switch SW1 should be set to the ON position:

Switch 3 - MOSI  
Switch 6 - SCK

For the EASYdsPIC development system, the following switches on the DIP switch SW1 should be set to the ON position:

Switch 2 - MOSI  
Switch 5 - SCK

Switches 7 and 8 on the DIP switch SW1 are used for connecting the CS pin (Chip Select) on the additional board to a development system. CS lines may be connected to different I/O port pins. Accordingly, it is necessary to define in the program, to be loaded into the microcontroller, which pins will be used as the CS pin (Chip Select).

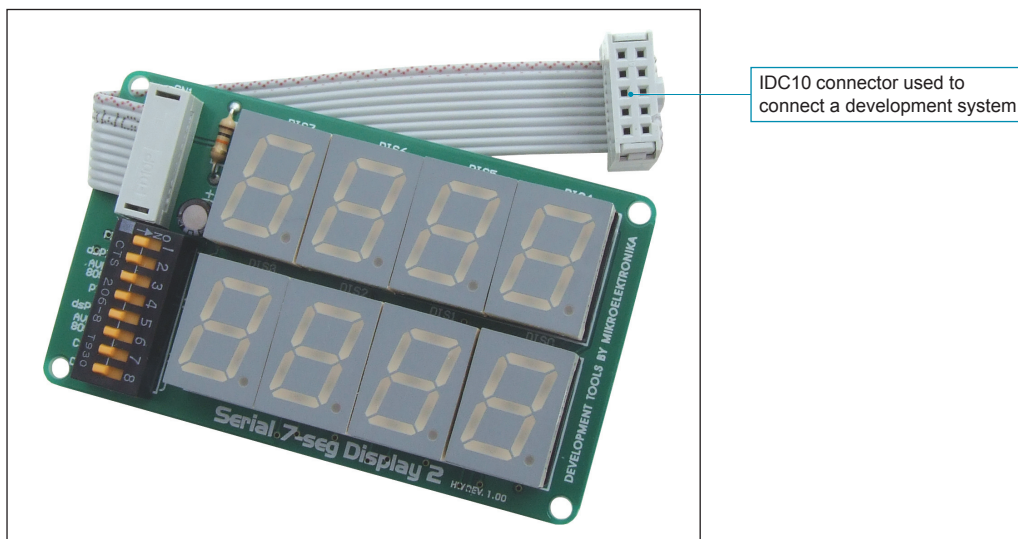


Figure 1: *Serial 7-Seg Display 2* additional board

Displaying digits is enabled by the time-division multiplexing. All the operations related to multiplexing and displaying digits are performed by using the MAX7219 circuit provided on the additional board. The time-division multiplexing of a 7-segment display is based on fast turning the display segments on/off in such a manner that one gets impression that all eight digits are active at the same time. The MAX7219 circuit feeds digit segments with a signal via pins marked SEGxx, whereas pins marked DIGx are used to select one of eight displays to show the appropriate number.

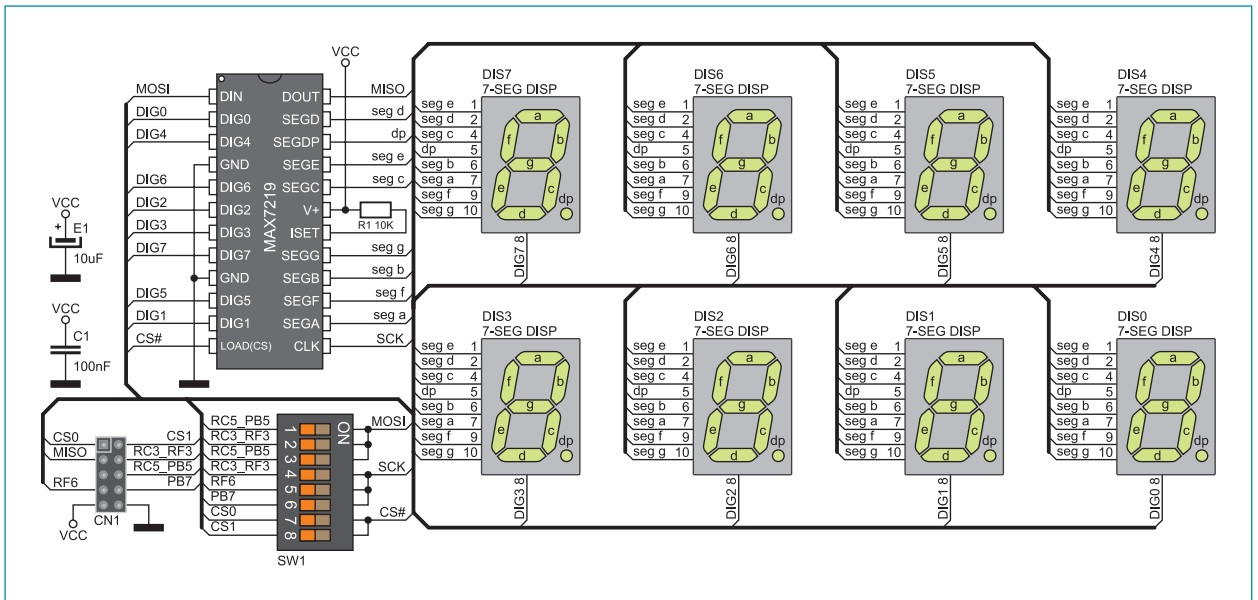


Figure 2: Serial 7-Seg Display 2 additional board connection schematic

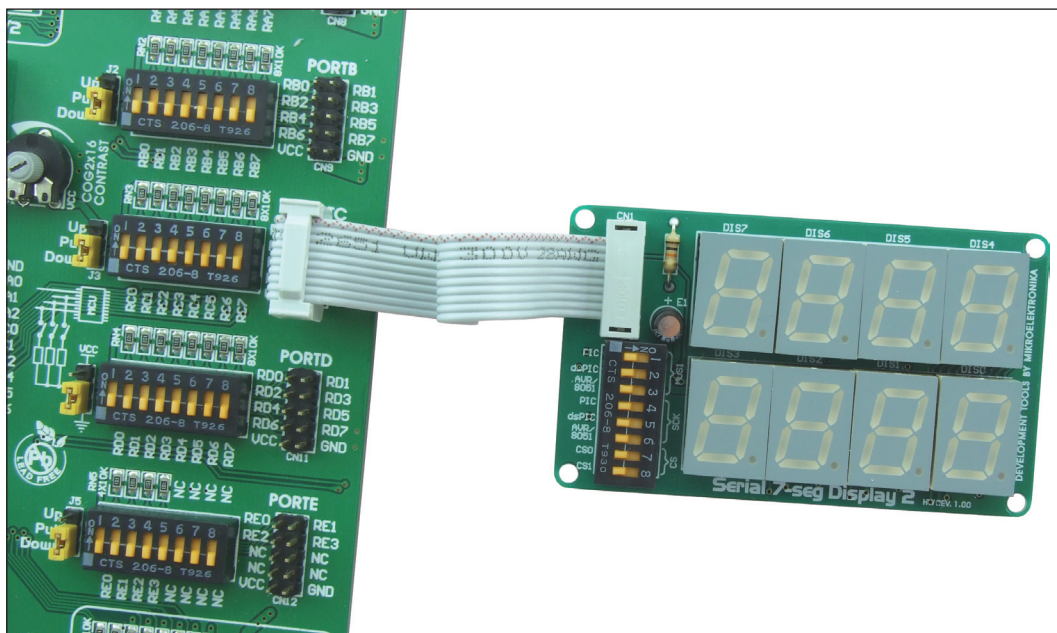


Figure 3: Serial 7-Seg Display 2 additional board connected to a development system

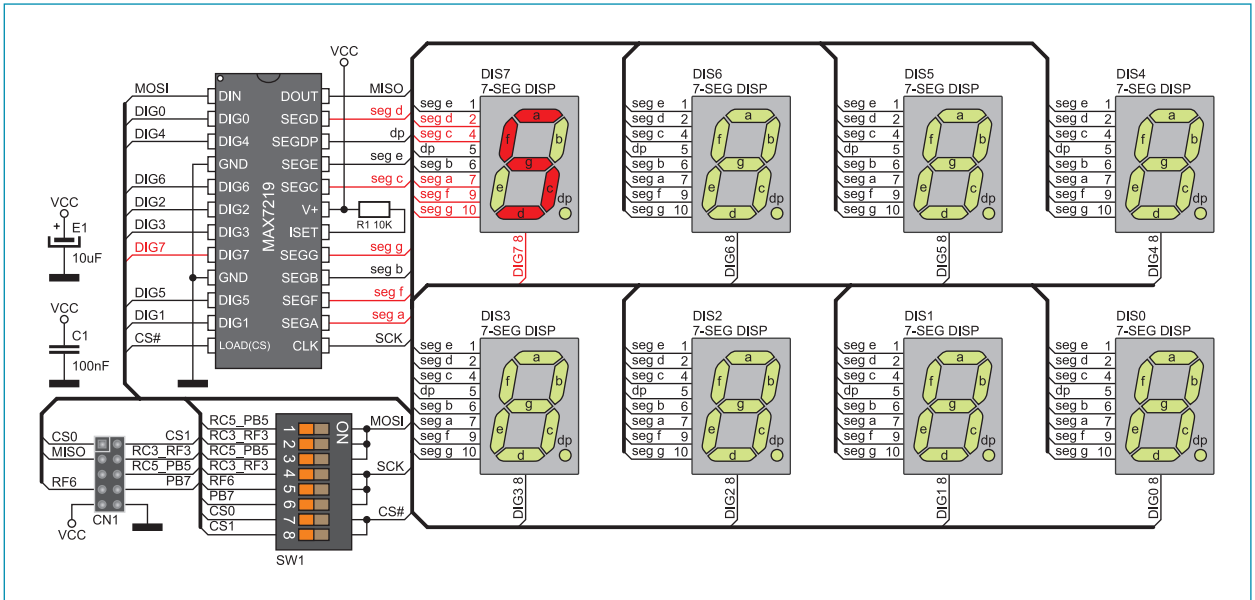


Figure 4: Time-division multiplexing performed on the DIS7 display

In Figure 4, signals provided by the MAX7219 circuit causes segments of the DIS7 display to show number 5. When this display turns off, the MAX7219 circuit sends a signal to the next display (DIS6), via the DIG6 pin, to show number 6. The same applies to digits DIS5, DIS4, DIS3, DIS2, DIS1 and DIS0. When one cycle is complete, another one automatically starts, which results in successive changing of display digits DIS7, DIS6, DIS5, DIS4 etc.

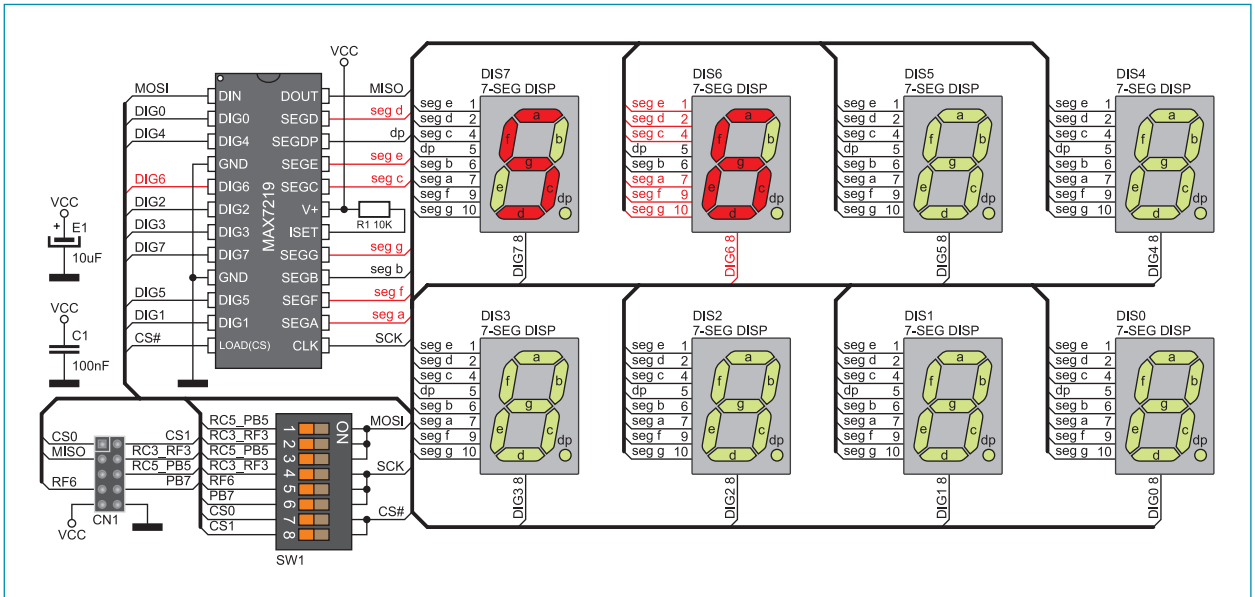


Figure 5: Principle of time-multiplexing performed on the DIS6 display





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