



“IVICO”

I2C interfaced 16 segment VFD module with RGB backlight

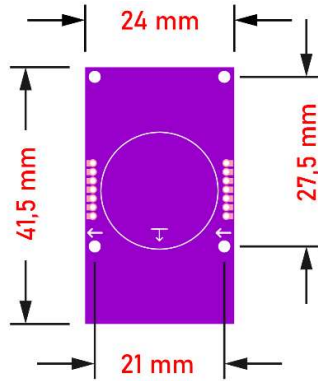
www.tiktoki.ge info@tiktoki.ge Proudly made in Republic of Georgia



Overview:

“Ivico” is I2C interfaced, 16 segment, stand alone VFD tube driver module with brightness control and adjustable RGB LED backlight. It is compatible with IV-4, IV-17 and some other VFD tubes.

Tech specs:



All holes are 2mm dia.
Dimensions are approximate
and can vary by $\pm 0.2\text{mm}$

Segment driving interface: I2C, up to 400 kHz

LED driving interface: 3 wire SPI, up to 1 MHz

Operating voltage: 3.6-5.5V

Operating temperature range: 0-85C

Current consumption: 50-200mA (Depends on supply voltage, brightness level and number of lit segments and LEDs)

Brightness adjustment: Analog/PWM

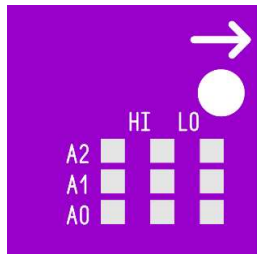
Physical dimensions: 41.5 X 24 X 5 mm (L-W-H).

Weight: <10 grams

Physical outline – see the picture on the left.

Electronic interfacing:

This module is built using TI's PCF8575 bus expander integrated circuit. Up to 8 modules can be connected to the same I2C bus, thanks to 3-bit I2C address selection bus. The LED backlight is provided by APA102C SPI led, with 24-bit color and separate, 6-bit brightness adjustment register (This type of LED is also known as SK6822 LED and libraries for Arduino and other development platforms are available). The module is fully self-contained – filament and high voltages are generated “on board” and no additional power supply is required. In case of need, there's a separate input for analog PWM dimming of VFD segments.



There are 3 solderable jumper positions on the rear side of the module. You have to set each pin either high or low, to assign each module its own I2C address. Do not leave these pins floating, to avoid undesirable effects. Use the following table for the address selection:

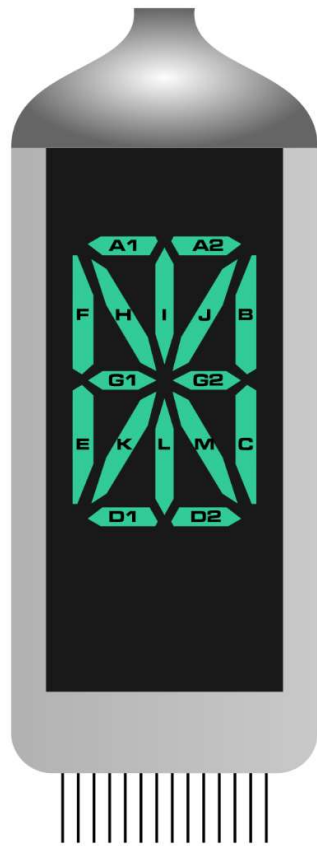
ADDRESS PINS			ADDRESS, DEC	ADDRESS, HEX
A2	A1	A0		
L	L	L	64	40
L	L	H	66	42
L	H	L	68	44
L	H	H	70	46
H	L	L	72	48
H	L	H	74	4A
H	H	L	76	4C
H	H	H	78	4E

Based on the data above, up to 8 modules can be connected in series. To do so, they have set of 7 connectors on each side. Modules should be connected from right to left, if observed from above – there are direction lines on each side of module, for easy connection. Please note, there are no pull-up resistors on the I2C bus, so you have to provide your own.

Connector pinout is as follows:

Connector number (from top to bottom)	Designation
1	Supply voltage, 3.6-5 volts (VDD)
2	Ground (VSS)
3	LED Data input/output (depending on side of connection)
4	LED Clock input/output (depending on side of connection)
5	PWM input (inversed) connect to GND if not using it.
6	I2C bus clock pin
7	I2C bus data pin

Segment data is shifted into PCF8575 as sequence of two bytes, the table below shows the bits and their corresponding segments. PLEASE NOTE – data bits are inverted – logical “1” means that segment is off, and logical “0” means that segment is on. Therefore, table below shows ON data for the particular segment – other bits should be set to 1, to turn other segments OFF:



SEGMENT	BYTE 1								BYTE 2							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
A1													0			
A2		0														
B					0											
C			0													
D1										0						
D2				0												
E											0					
F												0				
G1														0		
G2						0										
H																0
I															0	
J							0									
K										0						
L	0															
M								0								

Refer to the drawing at the left, for proper identification of the segments.

A major set of ASCII numerals and character codes based on the table above, will be available in the downloads section shortly.

Brightness control:

It is possible to control the brightness of the segments by either applying PWM or analog signal to the corresponding input of the module. High level on this pin turns the segments off, and low enables them at the full brightness. This feature is realized via changing the voltage applied to the grid of the tube, so if you decide to use PWM dimming on this pin, you should consider the fact, that grid can “sing” at the frequency of the PWM signal, and if you hit its self-resonance frequency (which usually lies in range of several kHz), this will physically destroy the tube! So, it is advisable to use PWM signal with at least 20kHz frequency.

Tube installation:

There is an arrow on the top of the PCB, which points to the direction, where tube front face should be looking. The decimal dot pins are not used, so there are no holes for them on PCB. You can either cut them off or bend sideways, if preferred.