

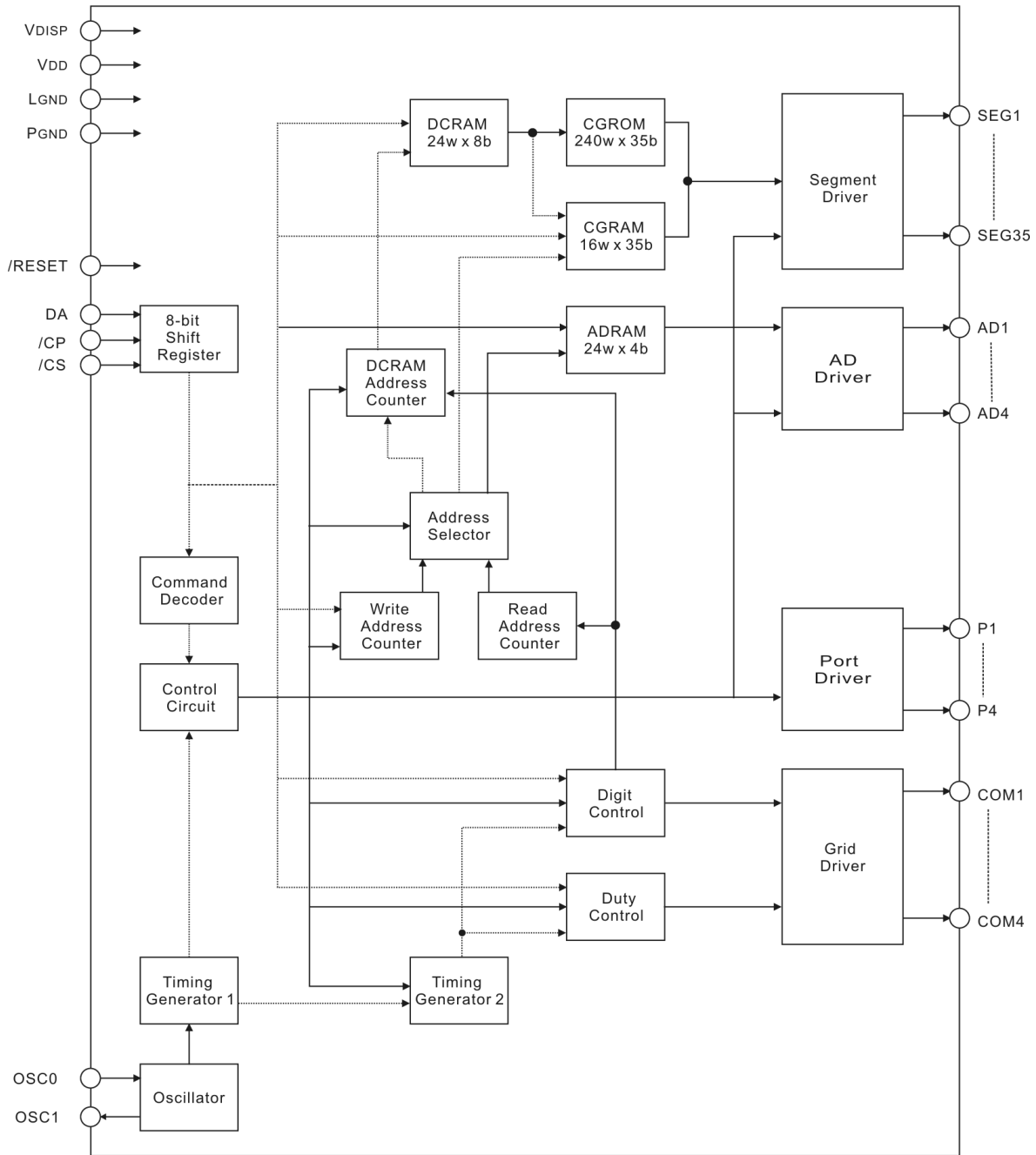
## DESCRIPTION

The PT6321 is a dot matrix fluorescent display tube controller driver IC which displays characters, numerics and symbols. Dot matrix fluorescent display tube drive signals are generated by serial data sent from a microcontroller. A display system is easily realized by internal ROM and RAM for character display.

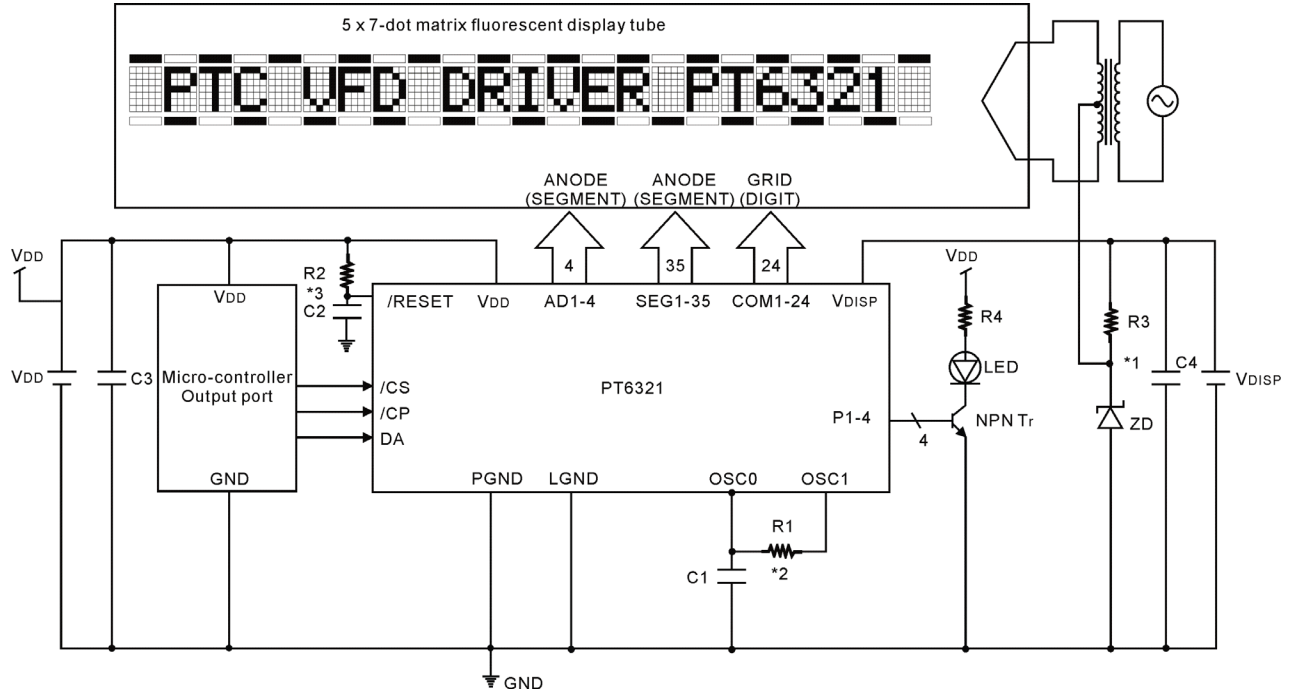
## FEATURES

- Logic power supply( $V_{DD}$ ):  $3.3V \pm 10\%$  /  $5.0V \pm 10\%$
- Fluorescent display tube drive power supply ( $V_{DISP}$ ): 20V~60V
- VFD driver output current (VFD driver output can directly be connected to the fluorescent display tube. No pull-down resistor is required.)
  - Segment driver (SEG1 to SEG35): -5.0mA ( $V_{DISP}=60V$ )
  - Segment driver (AD1 to AD4): -10.0mA ( $V_{DISP}=60V$ )
  - Grid driver (COM1 to COM24): -20.0mA ( $V_{DISP}=60V$ )
- General output port output current
  - Output driver (P1-4):  $\pm 1.0mA$  ( $V_{DD}=3.3V \pm 10\%$ )  
 $\pm 2.0mA$  ( $V_{DD}=5.0V \pm 10\%$ )
- Content of display
  - CGROM: 5x7 dots, 240 types (character data)
  - CGRAM: 5x7 dots, 16 types (character data)
  - ADRAM: 24 (display digit) x 4 bits (symbol data)
  - DCRAM: 24 (display digit) x 8 bits (register for character data display)
  - General output port: 4 bits (static mode)
- Display control function
  - Display digit: 9 to 24 digits
  - Display duty (contrast adjustment): 8 stages
  - All lights ON/OFF
- 3 interfaces with microcontroller: DA, /CS, /CP(4 interfaces if /RESET is added)
- 1-byte instruction execution (excluding data write to RAM)
- Built-in oscillation circuit (external C and R)  
80-pin plastic LQFP (LQFP80-P-1414-0.65-K)

# BLOCK DIAGRAM



# APPLICATION CIRCUIT



**Notes:**

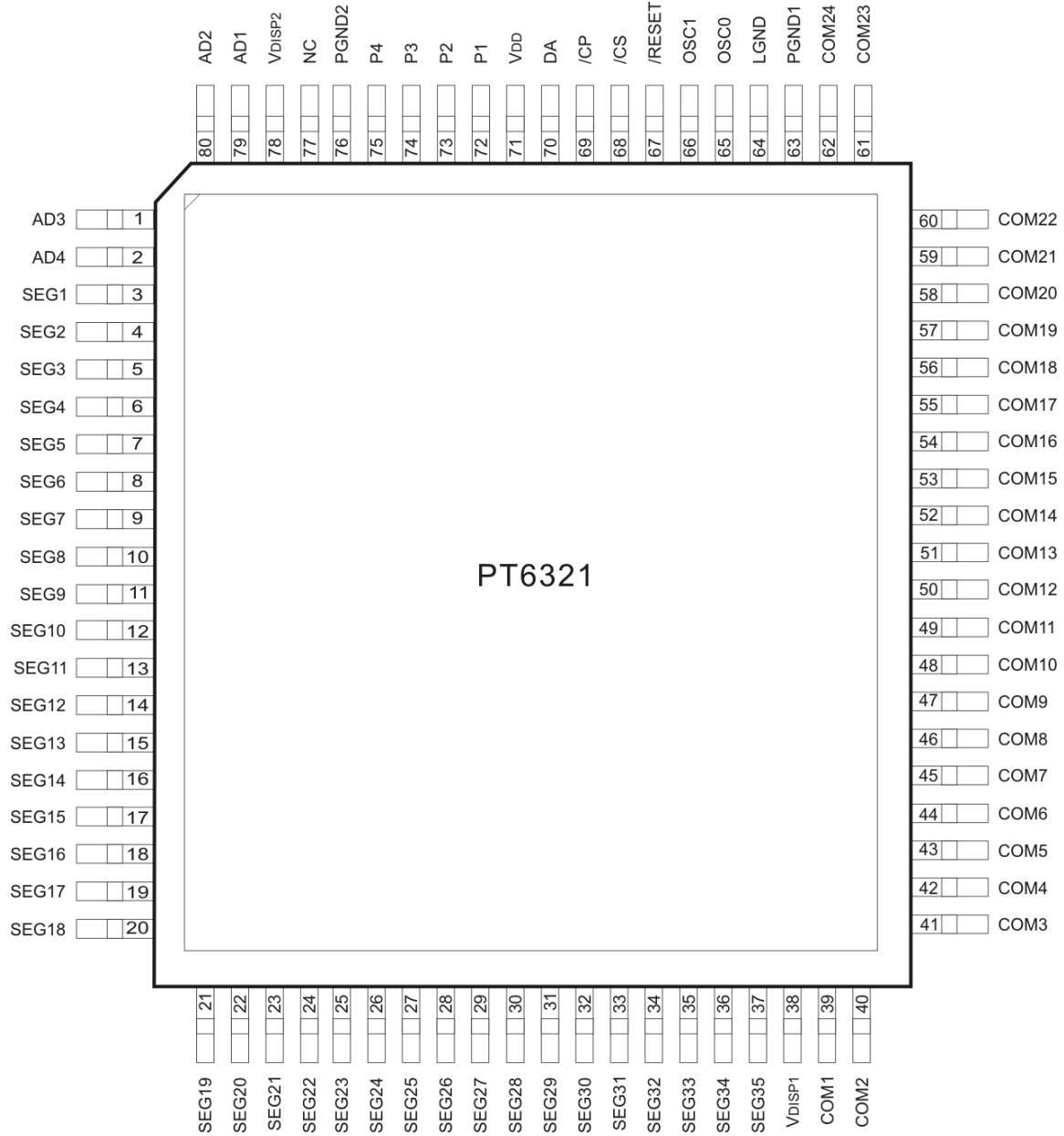
- \*1. The  $V_{DISP}$  voltage depends on the fluorescent display tube used. Adjust the value of the constants R3 and ZD to the  $V_{DISP}$  voltage used.
- \*2. The value of R1 & C1 depend on PT6321 supply voltage of  $V_{DD}$  ( $V_{DD}=5V$ : R1=3.3K $\Omega$ , C1=47pF;  $V_{DD}=3.3V$ : R1=3.3K $\Omega$ , C1=39pF)
- \*3. R2=1K $\Omega$ , C2=0.1 $\mu$ F



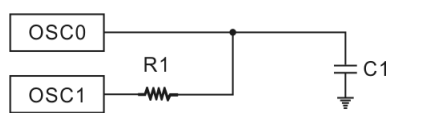
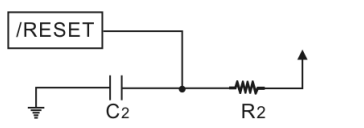
# ORDER INFORMATION

Valid Part Number	Package Type	Top Code
PT6321-LQ	80 Pins, LQFP	PT6321-LQ

# PIN CONFIGURATION



## PIN DESCRIPTION

Pin Name	I/O	Connects to	Description	Pin No
AD1~4	O	Fluorescent tube anode electrode	Fluorescent display tube anode electrode drives output. Directly connected to fluorescent display tube. No pull-down resistor is required. $I_{OH} > -10.0\text{mA}$	1,2,79,80
SEG1~35	O	Fluorescent tube anode electrode	Fluorescent display tube anode electrode drives output. Directly connected to fluorescent display tube. No pull-down resistor is required. $I_{OH} > -5.0\text{mA}$	3-37
$V_{DISP1\sim2}$		Power supply	$V_{DISP}$ -PGND are power supplies for driving fluorescent tubes	38,78
COM1~24	O	Fluorescent tube grid electrode	Fluorescent display tube grid electrode drives output. Directly connected to fluorescent display tube. No pull-down resistor is required. $I_{OH} > -20.0\text{mA}$	39-62
PGND1~2		Power supply	High Voltage GND pin	63,76
LGND		Power supply	Logic GND pin	64
OSC0	I	$C_1, R_1$	Connect R and C externally. The RC time constant depends on the VDD voltage used. Set the target oscillation frequency to 2 MHz.	65
OSC1	O		 (RC oscillation circuit) See Application Circuit)	66
/RESET	I	Microcontroller or $C_2, R_2$	Reset input. Setting this pin to "Low" initializes all the functions. The initial status is as follows. <ul style="list-style-type: none"> <li>• Address of each RAM..... address "00"H</li> <li>• Data of each RAM..... Content is undefined</li> <li>• Number of display digits..... 24 digits</li> <li>• Contrast adjustment..... 8/16</li> <li>• All lights ON or OFF....OFF mode</li> <li>• All outputs..... "Low" level</li> </ul>	67
		 (Circuit when R and C are connected externally) See application Circuit		
/CS	I	Microcontroller	Chip select input Setting this pin to "H" disables serial data transfer.	68
/CP	I	Microcontroller	Shift clock input. Serial data is shifted on the rising edge of /CP.	69
DA	I	Microcontroller	Serial data input (positive logic). Input from LSB.	70
$V_{DD}$		Power supply	Logic Voltage Pin	71
P1~4	O	LED drive control terminals	General port output. Output of these pins in static operation, so these pins can drive the LED. $I_{OH} > -2.0\text{mA}$	72-75

## **IMPORTANT NOTICE**

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