

DATA SHEET



SPOD80A

80-Channels Dot Matrix Column/Row OLED Driver

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Version 1.0

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80-CHANNELS DOT MATRIX COLUMN/ROW OLED DRIVER

1. GENERAL DESCRIPTION

The SPOD80A, an 80-channels dot matrix column/row OLED driver, is fabricated by low power CMOS technology. By incorporating an 80-bit shift register, an 80-bit data latch, and an 80-bit driver, the SPOD80A can drive constant current/voltage to 80 column/row lines simultaneously according to the selection mode and input data.

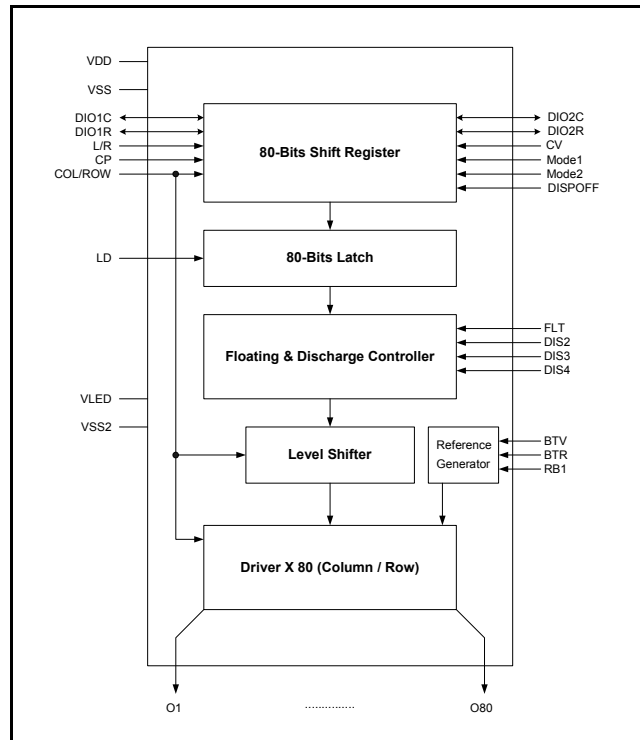
2. FEATURES

- Shift Clock frequency: 5.0MHz (Max.) (VDD = 2.4V - 5.5V)
- Serial data input
- Current/Voltage driving modes are selectable with CV pin (for column driver only)
- Supply voltage for OLED driver: 9.0V - 16V
- Internal discharge circuit
- Cascade function
- Built-in display off function
- 12 types of driving configurations

3. PACKAGE

- Bare chip

4. BLOCK DIAGRAM



5. SIGNAL DESCRIPTIONS

| Mnemonic | PIN No. | Type | Description |
|---|--|--------|--|
| O17 - O1 O40 - O18 O63 - O61 O80 - O64 | 1 - 17 80 - 102 55 - 77 32 - 48 | O | Column/Row output |
| CP | 24 | I | Data shift clock. The data is shifted to 80 bits shift register at the falling edge of 'CP' when used as column driver. |
| LD | 23 | I | Data load pulse. When used as a column driver, a row of display data is latched at the falling edge of 'LD'. When used as a row driver, 'LD' is the shift clock input. |
| DIO1C DIO2C DIO1R DIO2R | 25 19 26 20 | I/O | Series data input/output of column/row driver. 1). When 'L/R' = 1, 'DIO1C' and 'DIO1R' are series data inputs of column driver and row driver respectively. 'DIO2C' and 'DIO2R' are series data outputs of column driver and row driver respectively. 2). When 'L/R' = 0, 'DIO2C' and 'DIO2R' are series data inputs of column driver and row driver respectively. 'DIO1C' and 'DIO1R' are series data outputs of column driver and row driver respectively. 3). When 'MODE1' ⊕ 'Mode2' = 0, 'COL/ROW' = 1, SPOD80A is used as dedicated column driver, series data input of row driver, 'DIO1R' or 'DIO2R' depending on 'L/R', should be connected to VSS or float. 4). When 'MODE1' ⊕ 'Mode2' = 0, 'COL/ROW' = 0, SPOD80A is used as dedicated row driver, series data input of column driver, 'DIO1C' or 'DIO2C' depending on 'L/R', should be connected to VSS or float. |
| COL/ROW | 51 | I | Column driver/Row driver selection |
| VDD | 27 | - | Power supply of digital circuit |
| VSS | 18 | - | GND of digital circuit |
| VLED | 54 79 108 | - | Power supply of OLED driving buffer |
| VSS2 | 49 78 103 | - | GND of OLED driving buffer |
| L/R | 50 | I | Selection of data shift direction |
| MODE1 MODE2 | 53 52 | I | Mode selection. There are 12 modes can be selected when combine 'MODE1', 'MODE2' with 'COL/ROW' and 'L/R'. |
| CV | 22 | I | Selection of driving method, default is 'H'. CV = 1, current driving mode CV = 0, voltage driving mode This mode selection is valid when used as column driver only. |
| BTV BTR | 28 29 | I I | Brightness control input. By adjusting an external voltage (VBT) and resistor (RBT), the output current in O[1:80] can be adjusted, see function description. This adjustment is valid when used as column driver and CV = 1 only. |
| RB1 | 31 | - | Internal/external resistor selection. Connect this pin to ground while using internal resistor, or float it when using external resistor |

| Mnemonic | PIN No. | Type | Description |
|----------------------|-------------------|------|--|
| DIS2 DIS3 DIS4 | 106 105 104 | I | Pulse width control of internal discharge By setting DIS2 - DIS4, the pulse width of internal discharge can be set to be 0, 2, 4, 6, 8, 10, 12, 14 TWCP. Where DIS4 is MSB; DIS2 is LSB. The default value of DIS4, 3, 2 is 010. |
| FLT | 107 | I | Output voltage control. While set to 'H', the driver will be float when input data is '0'. While set to 'L', the driver outputs deselect level (VSS2) when input data is '0'. This mode selection is valid only when used as column driver. The default value is 'H'. |
| DISPOFF | 21 | I | Control for output deselect level 1). While set to 'L', the driver outputs deselect level (VSS2). 2). While set to 'H', the driver outputs constant current/voltage depending on mode selection. |
| VBS | 30 | - | Bypass capacitor A 0.1 μ F capacitor connecting to VSS2 is necessary |

6. FUNCTIONAL DESCRIPTIONS

6.1. 12 Types of Driving Configurations

| COL/ROW | Mode1 | Mode2 | L/R | O[1:16] | O[17:32] | O[33:48] | O[49:64] | O[65:80] |
|---------|-------|-------|-----|---------|----------|----------|----------|----------|
| 1 | 0/1 | 0/1 | 1 | COL | COL | COL | COL | COL |
| 1 | 0/1 | 0/1 | 0 | COL | COL | COL | COL | COL |
| 1 | 0 | 1 | 1 | COL | COL | COL | COL | ROW |
| 1 | 0 | 1 | 0 | ROW | COL | COL | COL | COL |
| 1 | 1 | 0 | 1 | COL | COL | COL | ROW | ROW |
| 1 | 1 | 0 | 0 | ROW | ROW | COL | COL | COL |
| 0 | 1 | 0 | 1 | COL | COL | ROW | ROW | ROW |
| 0 | 1 | 0 | 0 | ROW | ROW | ROW | COL | COL |
| 0 | 0 | 1 | 1 | COL | ROW | ROW | ROW | ROW |
| 0 | 0 | 1 | 0 | ROW | ROW | ROW | ROW | COL |
| 0 | 0/1 | 0/1 | 1 | ROW | ROW | ROW | ROW | ROW |
| 0 | 0/1 | 0/1 | 0 | ROW | ROW | ROW | ROW | ROW |

Note: When 'Mode1' ⊕ 'Mode2' = 0, SPOD80A is used as dedicated column driver or row driver.

When 'Mode1' ⊕ 'Mode2' = 1, SPOD80A is used as column/row driver.

6.2. Current/Voltage Driving Mode

SPOD80A provides two kinds of driving methods, current driving and voltage driving. By setting CV = 'H', outputs programmed to be column driver will source a constant current when input data is 'H'; and will be high impedance or deselect level (VSS2) when input data is 'L'.

By setting CV = 'L', outputs programmed to be column driver will output select level (VLED) when input data is 'H'; and will be high impedance or deselect level (VSS2) when input data is 'L'.

6.3. Relationship between the Display Data and Driver Output PINs

6.3.1. Column driver

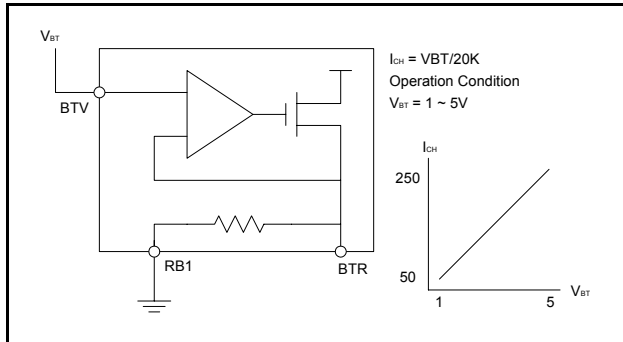
| COL/ROW | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mode1 | 0/1 | 0/1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | |
| Mode2 | 0/1 | 0/1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| L/R | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | |
| Data In | DIO1C | DIO2C | DIO1C | DIO2C | DIO1C | DIO2C | DIO1C | DIO2C | DIO1C | DIO2C | |
| Data Out | DIO2C | DIO1C | DIO2C | DIO1C | DIO2C | DIO1C | DIO2C | DIO1C | DIO2C | DIO1C | |
| Figure of Clock | 1st | O[80] | O[1] | O[64] | O[17] | O[48] | O[33] | O[32] | O[49] | O[16] | O[65] |
| | 16th | O[65] | O[16] | O[49] | O[32] | O[33] | O[48] | O[17] | O[64] | O[1] | O[80] |
| | 17th | O[64] | O[17] | O[48] | O[33] | O[32] | O[49] | O[16] | O[65] | NA | NA |
| | 32nd | O[49] | O[32] | O[33] | O[48] | O[17] | O[64] | O[1] | O[80] | NA | NA |
| | 33rd | O[48] | O[33] | O[32] | O[49] | O[16] | O[65] | NA | NA | NA | NA |
| | 48th | O[33] | O[48] | O[17] | O[64] | O[1] | O[80] | NA | NA | NA | NA |
| | 49th | O[32] | O[49] | O[16] | O[65] | NA | NA | NA | NA | NA | NA |
| Figure of Clock | 64th | O[17] | O[64] | O[1] | O[80] | NA | NA | NA | NA | NA | NA |
| | 65th | O[16] | O[65] | NA | NA | NA | NA | NA | NA | NA | NA |
| | 80th | O[1] | O[80] | NA | NA | NA | NA | NA | NA | NA | NA |

6.3.2. Row driver

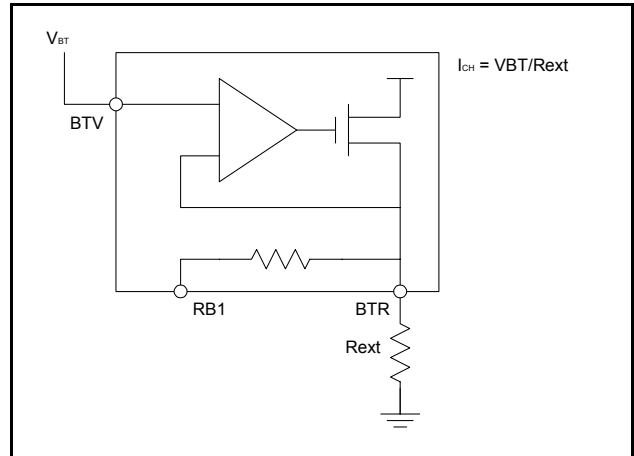
| COL/ROW | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mode1 | 0/1 | 0/1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | |
| Mode2 | 0/1 | 0/1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| L/R | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | |
| Data In | DIO1R | DIO2R | DIO1R | DIO2R | DIO1R | DIO2R | DIO1R | DIO2R | DIO1R | DIO2R | |
| Data Out | DIO2R | DIO1R | DIO2R | DIO1R | DIO2R | DIO1R | DIO2R | DIO1R | DIO2R | DIO1R | |
| Figure of Clock | 1st | O[1] | O[80] | O[17] | O[64] | O[33] | O[48] | O[49] | O[32] | O[65] | O[16] |
| | 16th | O[16] | O[65] | O[32] | O[49] | O[48] | O[33] | O[64] | O[17] | O[80] | O[1] |
| | 17th | O[17] | O[64] | O[33] | O[48] | O[49] | O[32] | O[65] | O[16] | NA | NA |
| | 32nd | O[32] | O[49] | O[48] | O[33] | O[64] | O[17] | O[80] | O[1] | NA | NA |
| | 33rd | O[33] | O[48] | O[49] | O[32] | O[65] | O[16] | NA | NA | NA | NA |
| | 48th | O[48] | O[33] | O[64] | O[17] | O[80] | O[1] | NA | NA | NA | NA |
| | 49th | O[49] | O[32] | O[65] | O[16] | NA | NA | NA | NA | NA | NA |
| | 64th | O[64] | O[17] | O[80] | O[1] | NA | NA | NA | NA | NA | NA |
| | 65th | O[65] | O[16] | NA | NA | NA | NA | NA | NA | NA | NA |
| | 80th | O[80] | O[1] | NA | NA | NA | NA | NA | NA | NA | NA |

6.4. Brightness Control

6.4.1. Using internal resistor



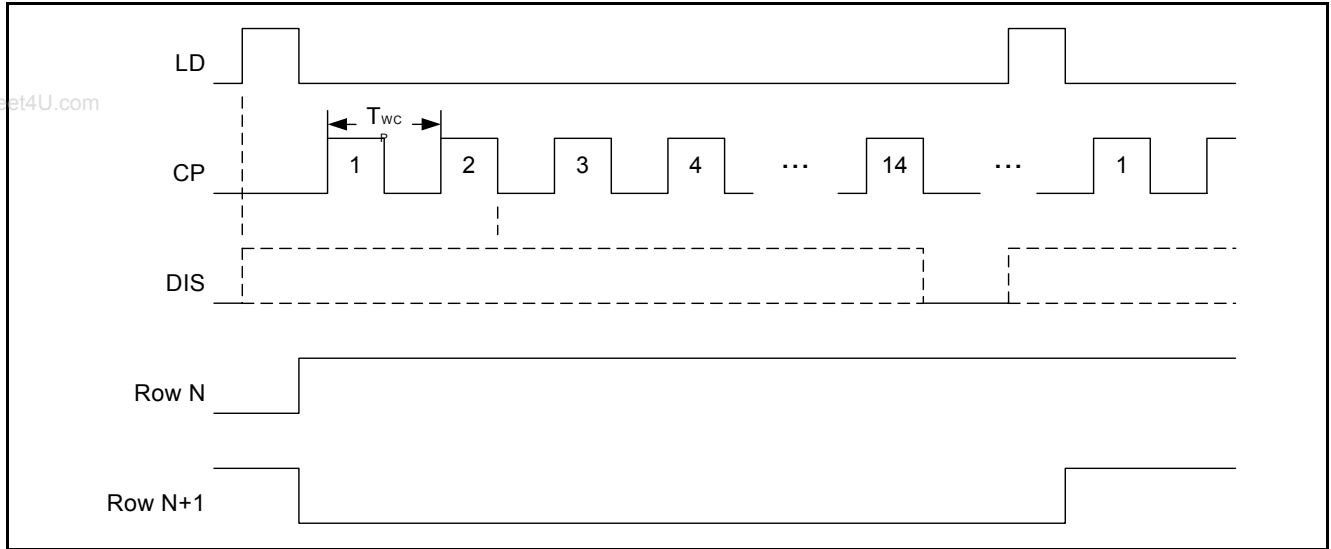
6.4.2. Using external resistor



6.5. Internal Discharge Function

SPOD80A supports internal discharge function. An internal discharge pulse will be active at the rising edge of 'LD', and be inactive at the falling edge of 'CP', the duration of the internal discharge pulse is programmable. By setting DIS2 - DIS4, user

can set discharge pulse width to be 0, 2, 4, 6, 8, 10, 12, 14 T_{WCP} , period of shift clock CP. The default value of DIS4 - DIS2 is 010, where DIS2 is LSB; DIS4 is MSB. This function is only valid when used as column driver.



7. ELECTRICAL SPECIFICATIONS

7.1. Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|---------------------------------|------------------|----------------|------|
| Supply voltage (Logic) | VDD | -0.5 ~ 7.0 | V |
| Supply voltage (Driving buffer) | V _{LED} | -0.5 ~ 18.0 | V |
| Input voltage range | V _{IN} | -0.5 ~ VDD+0.5 | V |
| Output voltage range | V _{OUT} | -0.5 ~ VDD+0.5 | V |
| Storage temperature | T _{STG} | -45.0 to 125.0 | °C |

Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device. For normal operational conditions see AC/DC Electrical Characteristics.

7.2. Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---------------------------------|------------------|-------|------|------|------|
| Supply voltage (Logic) | VDD | 2.4 | - | 5.5 | V |
| Supply voltage (Driving buffer) | VLED | 9.0 | - | 16.0 | V |
| Operating temperature | T _{OPR} | -20.0 | - | 70.0 | °C |

7.3. DC Characteristics

7.3.1. Column mode

(VSS = VSS2 = 0V ; VDD = 2.4V - 5.5V; VLED = 16.0V; T_{OPR} = -20°C ~ 70°C)

| Parameter | Symbol | Conditions | Applicable pin | Min. | Typ. | Max. | Unit |
|---------------------------|--------------------|------------------------------------|--|-----------|------|------|------|
| Input voltage | V _{IH} | VDD = 3.3V | DIO1C, L/R, DIO2C, CP, DIO1R, CV, DIO2R, LD, MODE1, FLT, MODE2, COL/ROW, DIS2, DIS3, DIS4, DISPOFF | 2.0 | - | - | V |
| | V _{IL} | VDD = 3.3V | | - | - | 0.8 | V |
| Output voltage (1) | V _{OH1} | I _{OH} = -0.2mA | DIO1C, DIO2C, DIO1R, | VDD-0.2 | - | - | V |
| | V _{OL1} | I _{OL} = 0.2mA | DIO2R | - | - | 0.2 | V |
| Input leakage current (1) | I _{HIL1} | V _{IN} = VDD | L/R, CP, LD, COL/ROW, MODE1, MODE2, DISPOFF | - | - | 1.0 | μA |
| | I _{LIL1} | V _{IN} = VSS | | -1.0 | - | - | μA |
| Input leakage current (2) | I _{HIL2} | V _{IN} = VDD | CV, DIS3, FLT | - | - | 1.0 | μA |
| | I _{LIL2} | V _{IN} = VSS | | -40 | - | - | μA |
| Input leakage current (3) | I _{HIL3} | V _{IN} = VDD | DIS2, DIS4 | - | - | 40 | μA |
| | I _{LIL3} | V _{IN} = VSS | | -1.0 | - | - | μA |
| I/O leakage current | I _{HIO1} | V _{IN} = VDD | DIO1C, DIO2C, DIO1R, | - | - | 2.0 | μA |
| | I _{LIO1} | V _{IN} = VSS | DIO2R | -2.0 | - | - | μA |
| Column ON output current | I _{CH} | V _{BTV} = 5.0V, CV = 'H' | *1 | -200 | -250 | -300 | μA |
| Column OFF output current | I _{CL} | CV = 'H', FLT = 'H' | | -1.0 | - | - | μA |
| Column On output voltage | V _{CH} | CV = 'L', I _{CH} = -0.2mA | *1 | VLED-0.3V | - | - | V |
| Column OFF output voltage | V _{CL} | CV = 'L', I _{CL} = 0.2mA | | - | - | 0.3 | V |
| Supply current | I _{CVDD} | *2 | VDD | - | - | 1.0 | mA |
| | I _{CVLED} | | VLED | - | - | 200 | μA |
| Display OFF current | I _{COFF1} | *3 | VDD | - | - | 1.0 | mA |
| | I _{COFF2} | | VLED | - | - | 1.0 | μA |

7.3.2. Row mode

(VSS = VSS2 = 0V ; VDD = 2.4V - 5.5V; VLED = 16.0V; T_{OPR} = -20°C ~ 70°C)

| Parameter | Symbol | Conditions | Applicable pin | Min. | Typ. | Max. | Unit |
|---------------------------|--------------------|-----------------------------|--|----------|------|------|------|
| Input voltage | V _{IH} | VDD = 3.3V | DIO1C, L/R, DIO2C, CP, DIO1R, CV, DIO2R, LD, MODE1, FLT, MODE2, COL/ROW, DIS2, DIS3, DIS4, DISPOFF | 2.0 | - | - | V |
| | V _{IL} | VDD = 3.3V | | - | - | 0.8 | V |
| Output voltage | V _{OH} | I _{OH} = -0.2mA | DIO1C, DIO2C, DIO1R, | VDD-0.2 | - | - | V |
| | V _{OL} | I _{OL} = 0.2mA | DIO2R, | - | - | 0.2 | V |
| Input leakage current | I _{HIL1} | V _{IN} = VDD | L/R, CP, LD, COL/ROW, | - | - | 1.0 | μA |
| | I _{LIL1} | V _{IN} = VSS | MODE1, MODE2, DISPOFF | -1.0 | - | - | μA |
| Input leakage current (2) | I _{HIL2} | V _{IN} = VDD | CV, DIS3, FLT | - | - | 1.0 | μA |
| | I _{LIL2} | V _{IN} = VSS | | -40 | - | - | μA |
| Input leakage current (3) | I _{HIL3} | V _{IN} = VDD | DIS2, DIS4 | - | - | 40 | μA |
| | I _{LIL3} | V _{IN} = VSS | | -1.0 | - | - | μA |
| I/O leakage current | I _{HIOl} | V _{IN} = VDD | DIO1C, DIO2C, DIO1R, DIO2R | - | - | 2.0 | μA |
| | I _{LIOl} | V _{IN} = VSS | | -2.0 | - | - | μA |
| Row OFF output voltage | V _{RH} | I _{RH} = -0.2mA | *4 | VLED-0.3 | - | - | V |
| Row ON output voltage | V _{RL} | I _{RL} = 48mA (*5) | | - | - | 1.92 | V |
| Supply current | I _{RVDD} | *2 | VDD | - | - | 1.0 | mA |
| | I _{RVLED} | | VLED | - | - | 150 | μA |
| Display OFF current | I _{ROFF1} | *3 | VDD | - | - | 1.0 | mA |
| | I _{ROFF2} | | VLED | - | - | 1.0 | μA |

Note*1: Depending on the selected mode, the applicable pins will be

| COL/ROW | Mode1 | Mode2 | L/R | Applicable Pins |
|---------|-------|-------|-----|-----------------|
| 1 | 0/1 | 0/1 | 1 | O[1:80] |
| 1 | 0/1 | 0/1 | 0 | O[1:80] |
| 1 | 0 | 1 | 1 | O[1:64] |
| 1 | 0 | 1 | 0 | O[17:80] |
| 1 | 1 | 0 | 1 | O[1:48] |
| 1 | 1 | 0 | 0 | O[33:80] |
| 0 | 1 | 0 | 1 | O[1:32] |
| 0 | 1 | 0 | 0 | O[49:80] |
| 0 | 0 | 1 | 1 | O[1:16] |
| 0 | 0 | 1 | 0 | O[65:80] |

Note*2: VDD = 3.0V, f_{CP} = 2.08MHz, f_{LD}=12.8KHz, No load. The input data is turned over by CP.

Note*3: VDD = 3.0V, f_{CP} = 5.0MHz, No load. The input data is turned over by CP. DISPOFF set to 'L'.

Note*4: Depending on the selected mode, the applicable pins will be

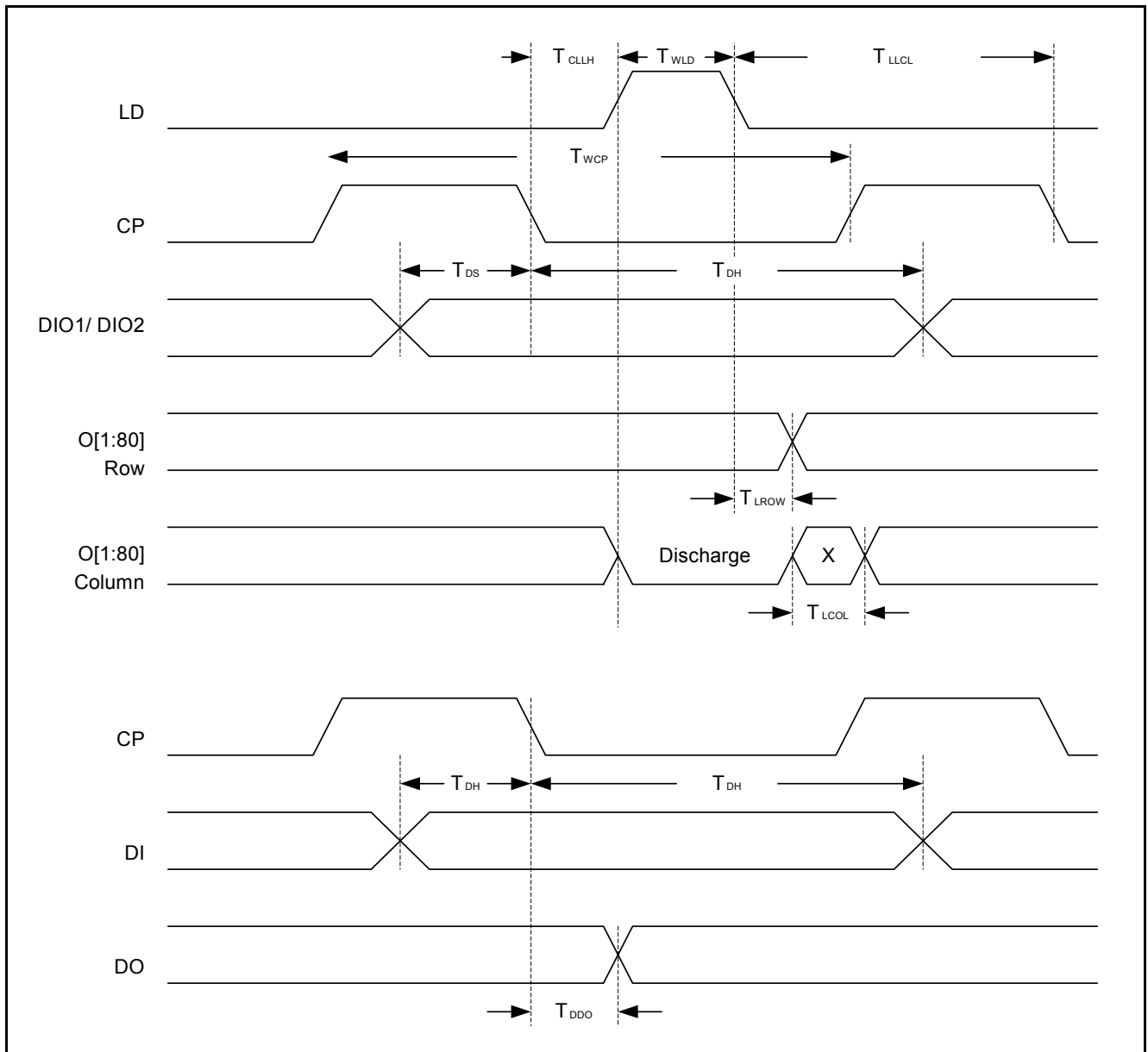
| COL/ROW | Mode1 | Mode2 | L/R | Applicable Pins |
|---------|-------|-------|-----|-----------------|
| 1 | 0 | 1 | 1 | O[65:80] |
| 1 | 0 | 1 | 0 | O[1:16] |
| 1 | 1 | 0 | 1 | O[49:80] |
| 1 | 1 | 0 | 0 | O[1:32] |
| 0 | 1 | 0 | 1 | O[33:80] |
| 0 | 1 | 0 | 0 | O[1:48] |
| 0 | 0 | 1 | 1 | O[17:80] |
| 0 | 0 | 1 | 0 | O[1:64] |
| 0 | 0/1 | 0/1 | 1 | O[1:80] |
| 0 | 0/1 | 0/1 | 0 | O[1:80] |

Note*5: Because of the row driving capability of SPOD80A, the maximum column lines that SPOD80A can drive are 160. That is, there are only 2 SPOD80As can cascade as column drivers when using SPOD80A as row driver.

7.4. AC Characteristic

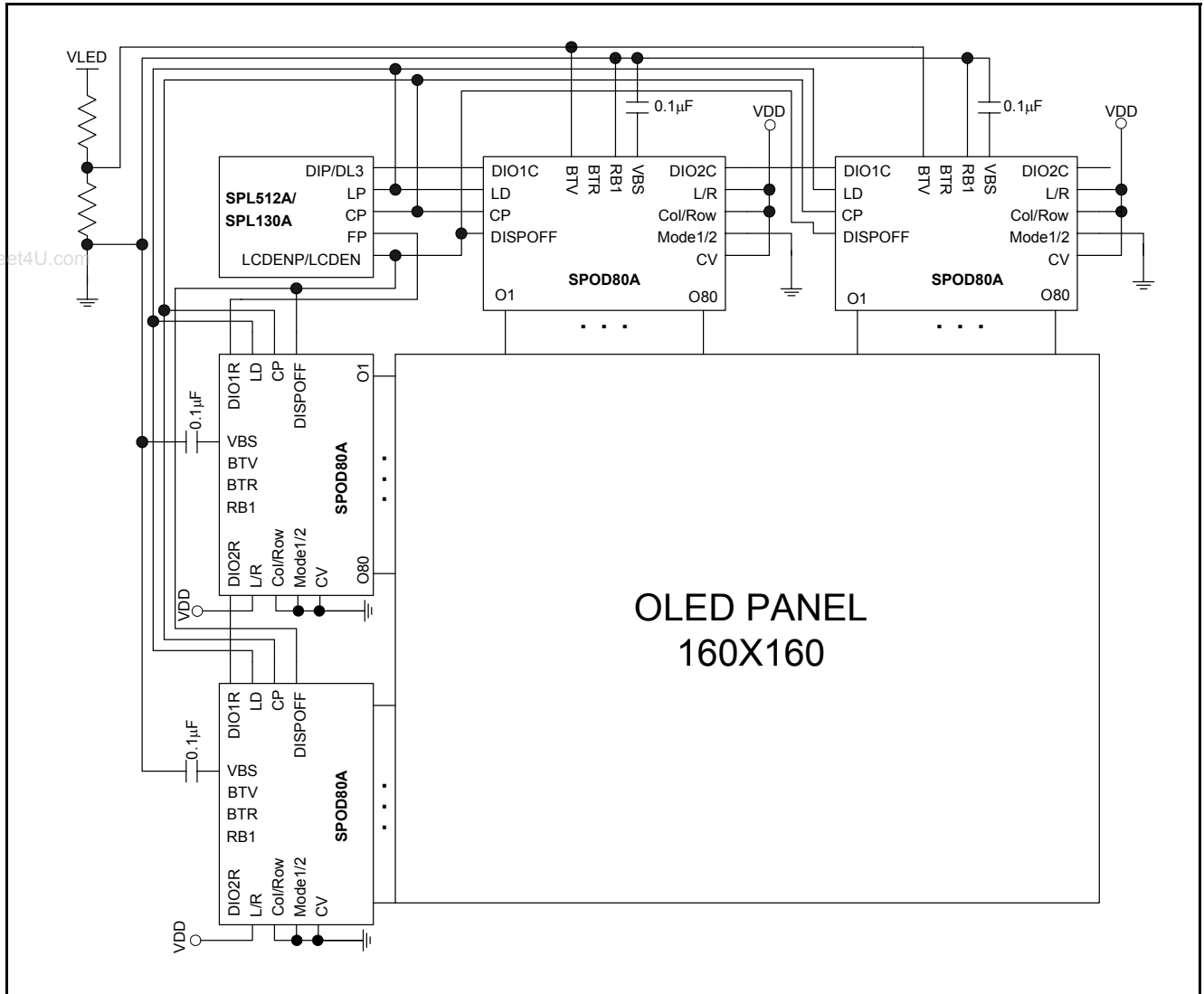
(VSS = VSS2 = 0V; VDD = 2.4V - 5.5V; VLED = 16.0V; T_{OPR} = -20°C ~ 70°C)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--------------------------|-------------------|-----------------------|------|------|------|------|
| Shift clock period | T _{WCP} | | 200 | - | - | ns |
| Data latch in setup time | T _{DS} | | 40 | - | - | ns |
| Data latch in hold time | T _{DH} | | 40 | - | - | ns |
| CP low to LD high | T _{CLLH} | | 20 | - | - | ns |
| LD low to CP low | T _{LLCL} | | 20 | - | - | ns |
| LD 'H' pulse width | T _{WLD} | | 100 | - | - | ns |
| LD low to Row output | T _{LROW} | Load = 0.6nF | - | - | 9.0 | μs |
| LD high to column output | T _{LCOL} | *6 | - | - | - | ns |
| Output delay time | T _{DDO} | C _L = 15pF | 40 | - | 100 | ns |



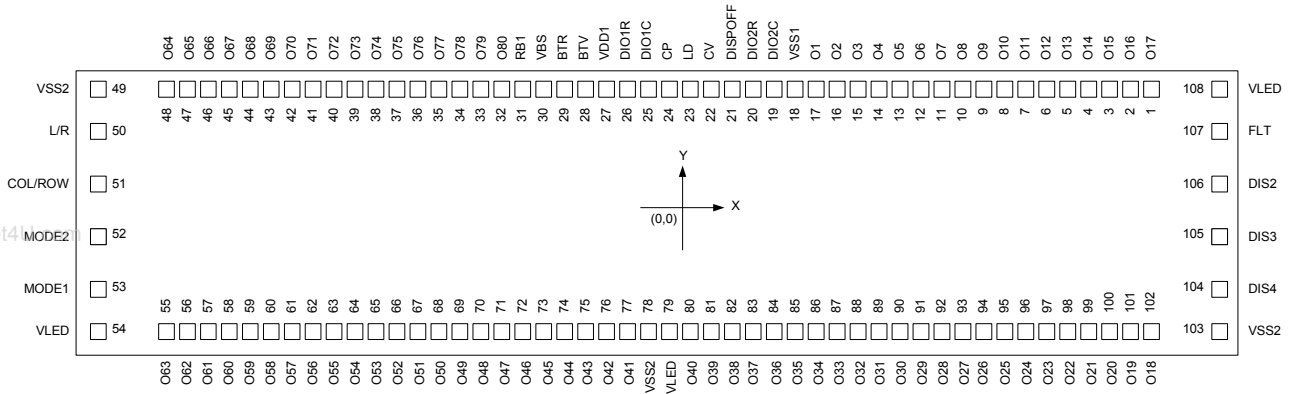
Note*6: Depending on loading, please refer to DC characteristics.

8. APPLICATION CIRCUIT



9. PACKAGE/PAD LOCATIONS

9.1. PAD Assignment



Chip Size: 7960 μ m x 1470 μ m

PAD Size: 100 μ m x 100 μ m

This IC substrate should be connected to VSS

Note1: Chip size included scribe line.

Note2: To ensure that the IC function properly, bond all VDD and VSS pins.

Note3: The 0.1 μ F capacitor between VDD and VSS should be placed to IC as close as possible.

9.2. Ordering Information

| Product Number | Package Type |
|-----------------|--------------|
| SPOD80A-nnnnV-C | Chip form |

Note1: Code number (nnnnV) is assigned for customer.

Note2: Code number (nnnn = 0000 - 9999); version (V = A - Z).

9.3. PAD Locations

| PAD No. | PAD Name | X | Y | PAD No. | PAD Name | X | Y |
|---------|----------|-------|-----|---------|----------|-------|------|
| 1 | O17 | 3329 | 598 | 45 | O67 | -2871 | 598 |
| 2 | O16 | 3169 | 598 | 46 | O66 | -3021 | 598 |
| 3 | O15 | 3019 | 598 | 47 | O65 | -3171 | 598 |
| 4 | O14 | 2869 | 598 | 48 | O64 | -3331 | 598 |
| 5 | O13 | 2729 | 598 | 49 | VSS2 | -3833 | 586 |
| 6 | O12 | 2589 | 598 | 50 | L/R | -3833 | 383 |
| 7 | O11 | 2449 | 598 | 51 | COL/ROW | -3833 | 127 |
| 8 | O10 | 2309 | 598 | 52 | MODE2 | -3833 | -128 |
| 9 | O9 | 2169 | 598 | 53 | MODE1 | -3833 | -384 |
| 10 | O8 | 2029 | 598 | 54 | VLED | -3833 | -588 |
| 11 | O7 | 1889 | 598 | 55 | O63 | -3331 | -600 |
| 12 | O6 | 1749 | 598 | 56 | O62 | -3171 | -600 |
| 13 | O5 | 1609 | 598 | 57 | O61 | -3021 | -600 |
| 14 | O4 | 1469 | 598 | 58 | O60 | -2871 | -600 |
| 15 | O3 | 1329 | 598 | 59 | O59 | -2731 | -600 |
| 16 | O2 | 1189 | 598 | 60 | O58 | -2591 | -600 |
| 17 | O1 | 1049 | 598 | 61 | O57 | -2451 | -600 |
| 18 | VSS1 | 909 | 598 | 62 | O56 | -2311 | -600 |
| 19 | DIO2C | 769 | 598 | 63 | O55 | -2171 | -600 |
| 20 | DIO2R | 629 | 598 | 64 | O54 | -2031 | -600 |
| 21 | DISPOFF | 489 | 598 | 65 | O53 | -1891 | -600 |
| 22 | CV | 349 | 598 | 66 | O52 | -1751 | -600 |
| 23 | LD | 209 | 598 | 67 | O51 | -1611 | -600 |
| 24 | CP | 69 | 598 | 68 | O50 | -1471 | -600 |
| 25 | DIO1C | -71 | 598 | 69 | O49 | -1331 | -600 |
| 26 | DIO1R | -211 | 598 | 70 | O48 | -1191 | -600 |
| 27 | VDD1 | -351 | 598 | 71 | O47 | -1051 | -600 |
| 28 | BTV | -491 | 598 | 72 | O46 | -911 | -600 |
| 29 | BTR | -631 | 598 | 73 | O45 | -771 | -600 |
| 30 | VBS | -771 | 598 | 74 | O44 | -631 | -600 |
| 31 | RB1 | -911 | 598 | 75 | O43 | -491 | -600 |
| 32 | O80 | -1051 | 598 | 76 | O42 | -351 | -600 |
| 33 | O79 | -1191 | 598 | 77 | O41 | -211 | -600 |
| 34 | O78 | -1331 | 598 | 78 | VSS2 | -71 | -600 |
| 35 | O77 | -1471 | 598 | 79 | VLED | 69 | -600 |
| 36 | O76 | -1611 | 598 | 80 | O40 | 209 | -600 |
| 37 | O75 | -1751 | 598 | 81 | O39 | 349 | -600 |
| 38 | O74 | -1891 | 598 | 82 | O38 | 489 | -600 |
| 39 | O73 | -2031 | 598 | 83 | O37 | 629 | -600 |
| 40 | O72 | -2171 | 598 | 84 | O36 | 769 | -600 |
| 41 | O71 | -2311 | 598 | 85 | O35 | 909 | -600 |
| 42 | O70 | -2451 | 598 | 86 | O34 | 1049 | -600 |
| 43 | O69 | -2591 | 598 | 87 | O33 | 1189 | -600 |
| 44 | O68 | -2731 | 598 | 88 | O32 | 1329 | -600 |



| PAD No. | PAD Name | X | Y | PAD No. | PAD Name | X | Y |
|---------|----------|------|------|---------|----------|------|------|
| 89 | O31 | 1469 | -600 | 99 | O21 | 2869 | -600 |
| 90 | O30 | 1609 | -600 | 100 | O20 | 3019 | -600 |
| 91 | O29 | 1749 | -600 | 101 | O19 | 3169 | -600 |
| 92 | O28 | 1889 | -600 | 102 | O18 | 3329 | -600 |
| 93 | O27 | 2029 | -600 | 103 | VSS2 | 3832 | -588 |
| 94 | O26 | 2169 | -600 | 104 | DIS4 | 3832 | -384 |
| 95 | O25 | 2309 | -600 | 105 | DIS3 | 3832 | -128 |
| 96 | O24 | 2449 | -600 | 106 | DIS2 | 3832 | 127 |
| 97 | O23 | 2589 | -600 | 107 | FLT | 3832 | 383 |
| 98 | O22 | 2729 | -600 | 108 | VLED | 3832 | 586 |

10. DISCLAIMER

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11. REVISION HISTORY

| Date | Revision # | Description | Page |
|---------------|------------|--|---------------|
| APR. 30, 2001 | 0.1 | Original | 11 |
| JUN. 29, 2001 | 1.0 | 1. Delete " <i>PRELIMINARY</i> " 2. Correct PACKAGE description in the " <i>3. PACKAGE</i> " 3. Correct chip size 4. Add Note1 to Note3 in the " <i>9.1 PAD Assignment</i> " 5. Renew to a new document format | 1 13 13 |

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