

UNCONTROLLED DOCUMENT

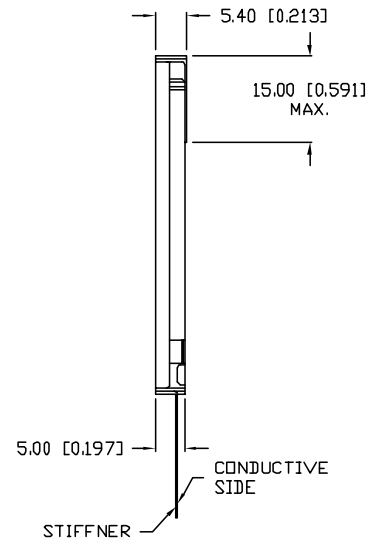
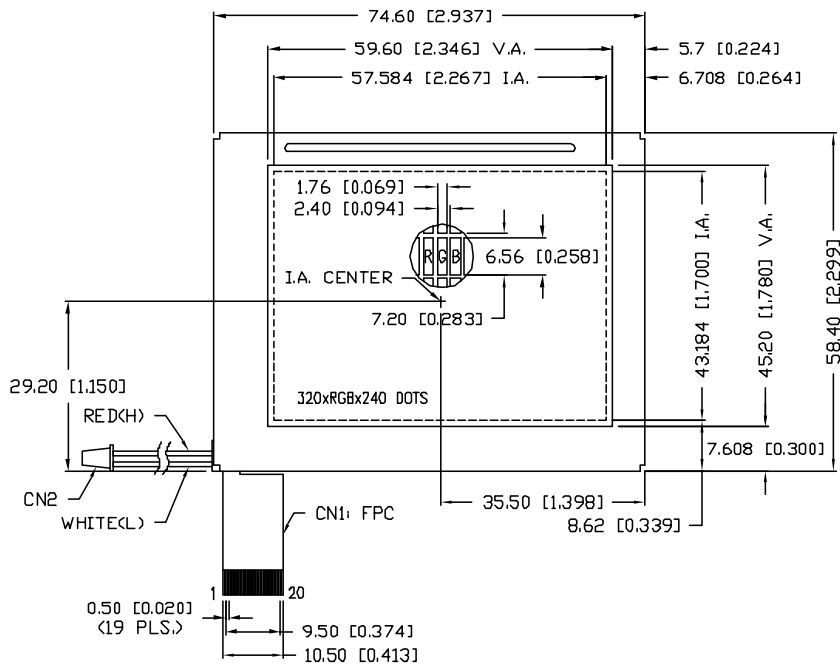
SC:1

PART NUMBER

REV.

LCM-S320240GCN-28

PRELIMINARY IN P/N DIR




NOTES:

1. CN1: FPC: PITCH 0.5mm, WIDTH 10.5mm.
2. CN2: BHSR-02VS-1(JST); (PIN1-HOT, PIN2-GND).

*UNLESS OTHERWISE SPECIFIED TOLERANCES PER DECIMAL PRECISION ARE: X=±1 [±0.038], XX=±0.5 [±0.020], XXX=±0.25 [±0.010], XXXX=±0.127 [±0.006]. LEAD SIZE=±0.05 [±0.002], LEAD LENGTH=±0.75 [±0.030]. NN= ^{+DECIMAL PRECISION} _{-0.00} MAX.= ^{+0.00} _{-DECIMAL PRECISION}

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| REV. | PART NUMBER LCM-S320240GCN-28 | <p>CONFIDENTIAL INFORMATION</p> <p>THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE PROPERTY OF LUMEX INC. EXCEPT AS SPECIFICALLY AUTHORIZED IN WRITING BY LUMEX INC., THE HOLDER OF THIS DOCUMENT SHALL KEEP ALL INFORMATION CONTAINED HEREIN CONFIDENTIAL AND SHALL PROTECT SAME IN WHOLE OR IN PART FROM DISCLOSURE AND DISSEMINATION TO ALL THIRD PARTIES.</p> <p>RELIABILITY NOTE</p> <p>OUR MANY YEARS OF EXPERIENCE DATA ACCUMULATION INDICATE THAT SOLDER HEAT IS A MAJOR CAUSE OF EARLY AND FUTURE FAILURE. PLEASE PAY ATTENTION TO YOUR SOLDERING PROCESS.</p> |  <p>290 E. HELEN ROAD PALATINE, IL 60067-6976 PHONE: +1.847.359.2790 US WEB: www.lumex.com TW WEB: www.lumex.com.tw</p> |
| | 2.8" COLOR STN, 320 x 240 GRAPHIC MODULE. NEGATIVE, TRANSMISSIVE, CCFL BACKLIGHT, 1/242 DUTY, 6:00 VIEW ANGLE, WEIGHT: 35g. | <p>DRAWN BY: CT</p> <p>CHECKED BY:</p> <p>APPROVED BY:</p> | <p>DATE: 1.17.03</p> <p>PAGE: 1 OF 5</p> <p>SCALE: N/A</p> |

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PRELIMINARY IN P/N DIR

PIN CONFIGURATION CN1

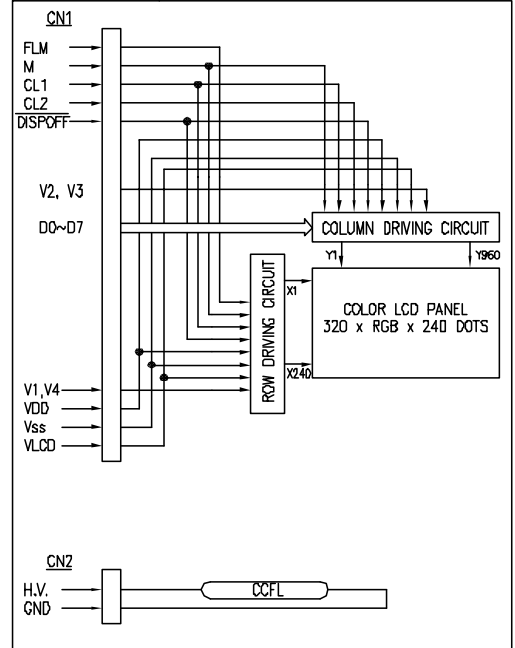
| PIN NO. | SYMBOL | LEVEL | FUNCTION |
|---------|---------|-------|------------------------------------|
| 1 | Vss | - | GND |
| 2 | D0 | H/L | DISPLAY DATA |
| 3 | D1 | H/L | DISPLAY DATA |
| 4 | D2 | H/L | DISPLAY DATA |
| 5 | D3 | H/L | DISPLAY DATA |
| 6 | D4 | H/L | DISPLAY DATA |
| 7 | D5 | H/L | DISPLAY DATA |
| 8 | D6 | H/L | DISPLAY DATA |
| 9 | D7 | H/L | DISPLAY DATA |
| 10 | VDD | - | LOGIC SUPPLY VOLTAGE |
| 11 | VLCD | - | POWER SUPPLY FOR LCD DRIVER |
| 12 | V1 | - | POWER SUPPLY FOR LCD DRIVER |
| 13 | V2 | - | POWER SUPPLY FOR LCD DRIVER |
| 14 | V3 | - | POWER SUPPLY FOR LCD DRIVER |
| 15 | V4 | - | POWER SUPPLY FOR LCD DRIVER |
| 16 | DISPOFF | H/L | DISPLAY CONTROL SIGNAL H:ON, L:OFF |
| 17 | CL2 | H/L | DATA SHIFT CLOCK |
| 18 | M | H/L | CONTROL SIGNAL FOR AC DRIVING |
| 19 | CL1 | H/L | INPUT DATA LATCH SIGNAL |
| 20 | FLM | H/L | SCAN START-UP SIGNAL |

INPUT DATA ALLOCATION TABLE

| DATA SIGNAL | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Y | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| X | 1 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 2 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 3 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 4 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 5 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 6 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 7 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 8 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 9 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 10 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 238 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 239 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| | 240 | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |

R: RED G: GREEN B: BLUE

BLOCK DIAGRAM 320 x RGB x 240 DOTS



PIN CONFIGURATION CN2

| PIN NO. | SYMBOL | FUNCTION |
|---------|--------|-------------------------------|
| 1 | H.V. | POWER SUPPLY VOLTAGE FOR CCFL |
| 2 | GND | CCFL GND |

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| REV. | PART NUMBER |
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| | LCM-S320240GCN-28 |

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2.8" COLOR STN, 320 x 240 GRAPHIC MODULE.
 NEGATIVE, TRANSMISSIVE, CCFL BACKLIGHT, 1/242 DUTY,
 6:00 VIEW ANGLE, WEIGHT: 35g.

RELIABILITY NOTE
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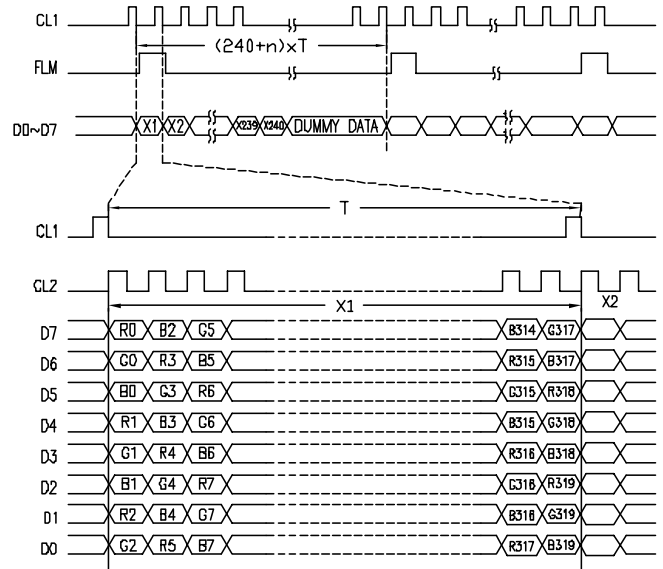
LCM-S320240GCN-28

PRELIMINARY IN P/N DIR

ELECTRICAL CHARACTERISTICS

| ITEM | SYMBOL | CONDITION | STANDARD VALUE | | | UNIT | |
|-----------------------------|------------------|--|----------------------|-------|--------------------|------------------|-------------------|
| | | | MIN. | TYP. | MAX. | | |
| SUPPLY VOLTAGE FOR LOGIC | V _{DD} | - | 2.5 | 3.3 | 4.5 | V | |
| POWER SUPPLY FOR LCD DRIVER | V _{LCD} | - | - | 25.0 | - | V | |
| | V1 | - | - | 23.44 | - | V | |
| | V2 | - | - | 21.87 | - | V | |
| | V3 | - | - | 3.13 | - | V | |
| | V4 | - | - | 1.56 | - | V | |
| INPUT SIGNAL VOLTAGE | V _{IH} | "H" LEVEL | 0.8V _{DD} | - | - | V | |
| | V _{IL} | "L" LEVEL | - | - | 0.2V _{DD} | V | |
| POWER SUPPLY CURRENT | I _{DD} | V _{DD} =3.3V | - | 2.0 | 3.0 | mA | |
| | I _{LCD} | V _{IN} =V _{DDOR} V _{SS} | - | - | 1.5 | mA | |
| | I _{IN} | V _{DD} =3.3V | - | - | 10.0 | mA | |
| FRAME FREQUENCY (NOTE 1) | f _{FLM} | - | 60 | 75 | 90 | Hz | |
| CCFL BACKLIGHT | STARTING VOLTAGE | V _S | T _a =5°C | 700 | - | V _{rms} | |
| | LAMP VOLTAGE | V _L | T _a =25°C | - | 270 | V _{rms} | |
| | FREQUENCY | f _L | T _a =25°C | 40 | 60 | 80 | KHz |
| | LAMP CURRENT | I _L | T _a =25°C | - | 1.5 | - | mA _{rms} |
| | BRIGHTNESS | - | - | - | 50 | - | cd/m ² |

INTERFACE TIMING CHART



CAUTION:

1. MAKE SURE THAT THERE IS NO FLICKER AND RIPPLE PHENOMENON WHEN SETTING THE FRAME FREQUENCY.

ABSOLUTE MAXIMUM RATINGS

| ITEM | SYMBOL | TEST CONDITION | STANDARD VALUE | | UNIT |
|-----------------------------|-----------------------------------|----------------------|----------------|----------------------|------|
| | | | MIN | MAX | |
| SUPPLY VOLTAGE FOR LOGIC | V _{DD} -V _{SS} | T _a =25°C | -0.3 | 7.0 | V |
| POWER SUPPLY FOR LCD DRIVER | V _{LCD} -V _{SS} | T _a =25°C | 0 | 40.0 | V |
| INPUT VOLTAGE | V _I | T _a =25°C | -0.3 | V _{DD} +0.3 | V |
| OPERATING TEMPERATURE* | T _{opr} | - | 0 | +50 | °C |
| STORAGE TEMPERATURE | T _{stg} | - | -20 | +70 | °C |

*ALSO AVAILABLE IN WIDE OPERATING TEMPERATURE: -20°C TO +70°C

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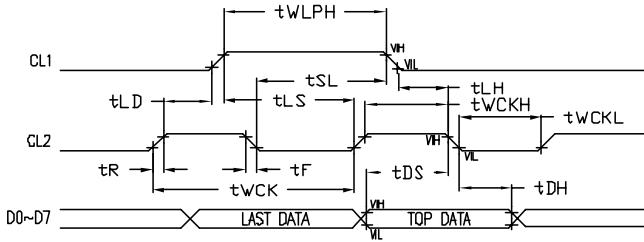
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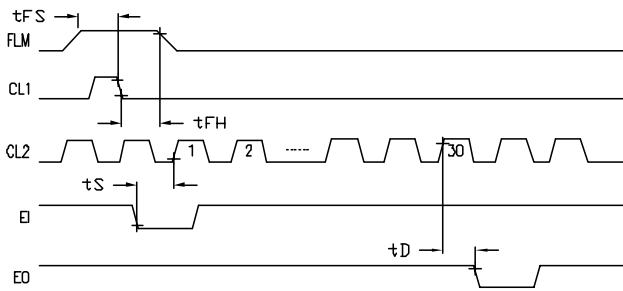
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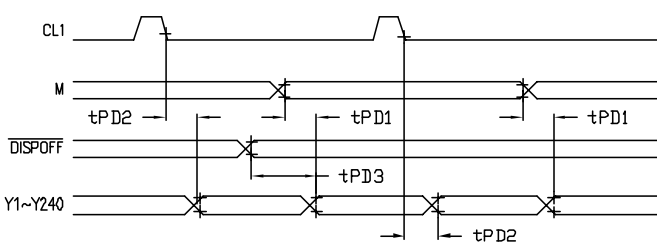
INPUT TIMING CHARACTERISTIC



INPUT/OUTPUT TIMING CHARACTERISTIC



INPUT/OUTPUT TIMING CHARACTERISTIC



AC CHARACTERISTICS

(VDD = 3.0~4.5V, VSS = 0V, Ta = -20°C~+85°C)

| ITEM | SYMBOL | CONDITION | STANDARD VALUE | | | UNIT |
|---|-------------------|-----------|----------------|------|------|------|
| | | | MIN. | TYP. | MAX. | |
| SHIFT CLOCK PERIOD | t _{WCK} | - | 66 | - | - | ns |
| SHIFT CLOCK "H" PULSE WIDTH | t _{WCKH} | - | 23 | - | - | ns |
| SHIFT CLOCK "L" PULSE WIDTH | t _{WCKL} | - | 23 | - | - | ns |
| DATA SETUP TIME | t _{DS} | - | 15 | - | - | ns |
| DATA HOLD TIME | t _{DH} | - | 23 | - | - | ns |
| LATCH PULSE "H" PULSE WIDTH | t _{LPH} | - | 30 | - | - | ns |
| SHIFT CLOCK RISE TO LATCH PULSE RISE TIME | t _{LD} | - | 0 | - | - | ns |
| SHIFT CLOCK FALL TO LATCH PULSE FALL TIME | t _{SL} | - | 50 | - | - | ns |
| LATCH PULSE RISE TO SHIFT CLOCK RISE TIME | t _{LS} | - | 30 | - | - | ns |
| LATCH PULSE FALL TO SHIFT CLOCK FALL TIME | t _{LH} | - | 30 | - | - | ns |
| ENABLE SETUP TIME | t _S | - | 15 | - | - | ns |
| INPUT SIGNAL RISE TIME | t _R | - | - | - | 50 | ns |
| INPUT SIGNAL FALL TIME | t _F | - | - | - | 50 | ns |
| OUTPUT DELAY TIME(1) | t _D | - | - | - | 4.1 | ns |
| OUTPUT DELAY TIME(2) | t _{PD1} | - | - | - | 1.2 | ns |
| OUTPUT DELAY TIME(3) | t _{PD2} | - | - | - | 1.2 | ns |
| OUTPUT DELAY TIME(4) | t _{PD3} | - | - | - | 1.2 | ns |
| FLM SETUP TIME | t _{FS} | - | 100 | - | - | ns |
| FLM HOLD TIME | t _{FH} | - | 50 | - | - | ns |

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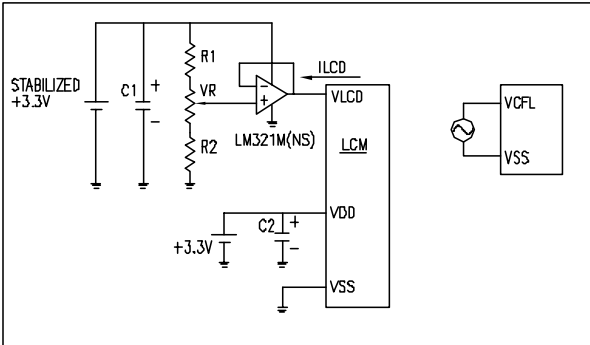
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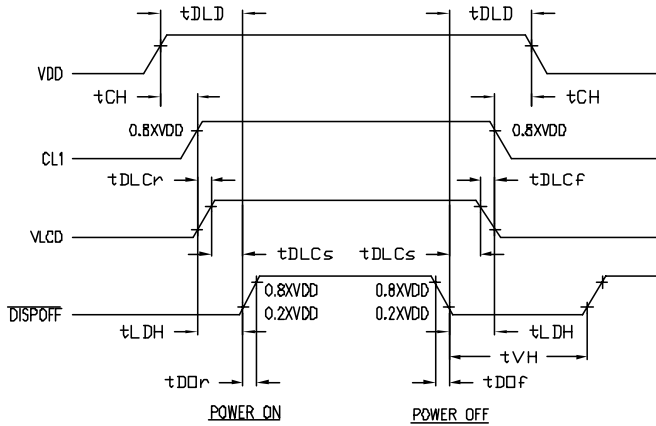
POWER SUPPLY FOR LCM



| OPTICAL CHARACTERISTICS | | SYMBOL | CONDITION | STANDARD VALUE | | | UNIT |
|--------------------------|--------------|--------|------------------------------------|----------------|------|------|------|
| ITEM | | | | MIN. | TYP. | MAX. | |
| CONTRAST RATIO | | CR | $\theta = 0^\circ$ | - | 20 | - | - |
| CHROMATICITY COORDINATES | R | X | $\theta = 0^\circ, \phi = 0^\circ$ | - | 0.49 | - | - |
| | | Y | | - | 0.35 | - | - |
| | G | X | | - | 0.33 | - | - |
| | | Y | | - | 0.49 | - | - |
| | B | X | | - | 0.20 | - | - |
| | | Y | | - | 0.21 | - | - |
| W | X | - | 0.32 | - | - | | |
| | Y | - | 0.35 | - | - | | |
| RESPONSE TIME | RISE: NOTE 1 | T_r | | - | 190 | - | ms |
| | FALL: NOTE 2 | T_f | | - | 110 | - | |

NOTES:

1. THE TIME THAT THE LUMINANCE LEVEL REACHES 90% OF FULL BRIGHTNESS LEVEL FROM 0% WHEN "ON" SIGNAL IS APPLIED.
2. THE TIME THAT THE LUMINANCE LEVEL REACHES 10% OF FULL BRIGHTNESS LEVEL FROM 100% WHEN "OFF" SIGNAL IS APPLIED.



| POWER SUPPLY SEQUENCE | | | |
|-----------------------|------|------|------|
| SYMBOL | MIN. | MAX. | UNIT |
| t_{DLDCr} | 200 | - | ms |
| t_{CH} | 0 | - | ms |
| t_{LDH} | 20 | - | ms |
| t_{DDr} | - | 100 | ns |
| t_{DDf} | 0 | 100 | ns |
| t_{DLDCf} | 0 | - | ms |
| t_{DLDCs} | 0 | - | ms |
| t_{VH} | 20 | - | ms |
| t_{VH} | 200 | - | ms |

WARNING:

1. POWER ON/OFF SHOULD BE PERFORMED USING DISPOFF FUNCTION.
2. INCORRECT POWER SUPPLY SIGNAL SEQUENCE MAY CAUSE PERMANENT DAMAGE TO THE LCD.

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