

Specification for BTHQ 42005VSS-SMN-LEDwhite

Version July 2003

DOCUMENT REVISION HISTORY 1:

| DOCUMENT REVISION FROM TO | DATE | DESCRIPTION | CHANGED BY | CHECKED BY |
|---------------------------|------------|--|------------|----------------|
| A | 2003.07.04 | First Release. (Based on Test Specification: VL-TS-BTHQ 42005VSS-XX, REV. C, 2003.02.10). | HELEN HE | LU MIN YUAN |

CONTENTS

| | <u>Page No.</u> |
|---|-----------------|
| 1. GENERAL DESCRIPTION | 4 |
| 2. MECHANICAL SPECIFICATIONS | 4 |
| 3. BACKLIGHT SPECIFICATION | 6 |
| 4. INTERFACE SIGNALS | 7 |
| 5. ABSOLUTE MAXIMUM RATINGS | 8 |
| 5.1 ELECTRICAL MAXIMUM RATINGS (Ta=25°C) | 8 |
| 5.2 ENVIRONMENTAL CONDITION | 8 |
| 6. ELECTRICAL SPECIFICATIONS | 9 |
| 6.1 TYPICAL ELECTRICAL CHARACTERISTICS | 9 |
| 6.2 TIMING SPECIFICATIONS | 10 |
| 6.3 TIMING DIAGRAM OF VDD AGAINST V0 | 12 |
| 6.4 CHARACTER GENERATOR ROM (KS0066U-10B) | 13 |

**Specification
of
LCD Module Type
Model No.: BTHQ 42005VSS-06**

1. General Description

- 20 characters (5 x 8 dots) x 4 lines STN Transmissive Negative Blue Dot Matrix LCD module.
- Viewing Angle: 6 O'clock direction.
- Driving duty: 1/16 Duty, 1/5 bias.
- 'SAMSUNG' KS0066UP-10BCC (Die) LCD Controller & Driver or equivalent.
- 'SAMSUNG' KS0065B-PCC (Die) LCD Segment Drivers or equivalent.
- White LED05 backlight.

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

| Parameter | Specifications | Unit |
|--------------------|----------------------------------|-------|
| Outline dimensions | 98.0(W) x 60.0(H) x 14.0 MAX.(D) | mm |
| Viewing area | 76.0(W) x 25.2(H) | mm |
| Active area | 70.35(W) x 20.74(H) | mm |
| Display format | 20 characters x 4 lines | - |
| Character size | 2.90(W) x 4.697(H) (5 x 8 dots) | mm |
| Character spacing | 0.65(W) x 0.65(H) | mm |
| Character pitch | 3.55(W) x 5.347(H) | mm |
| Dot size | 0.568(W) x 0.574(H) | mm |
| Dot spacing | 0.015(W) x 0.015(H) | mm |
| Dot pitch | 0.583(W) x 0.589(H) | mm |
| Weight: | Approx.72.0 | grams |

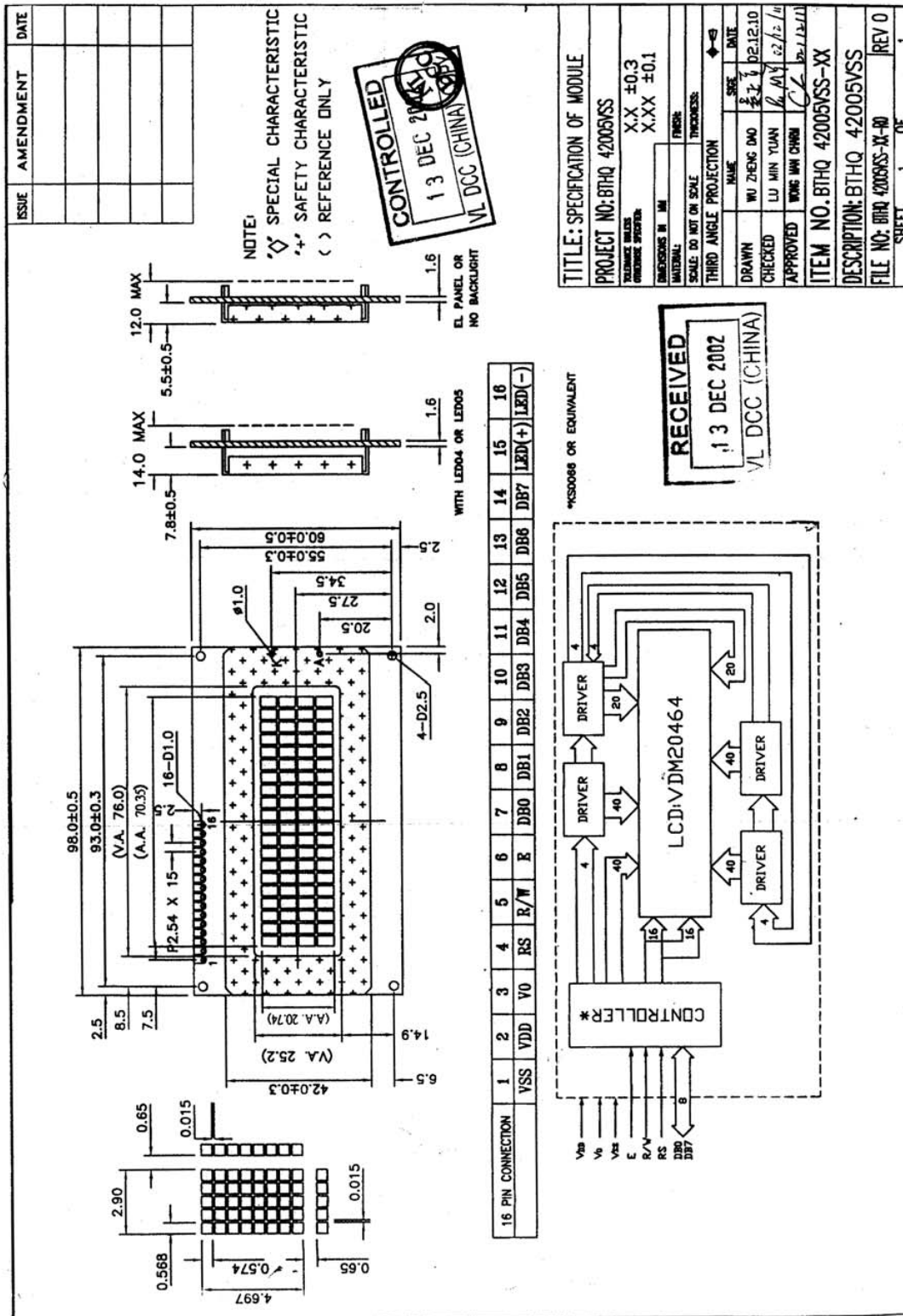


Figure 1: Module Specification

3. Backlight specification

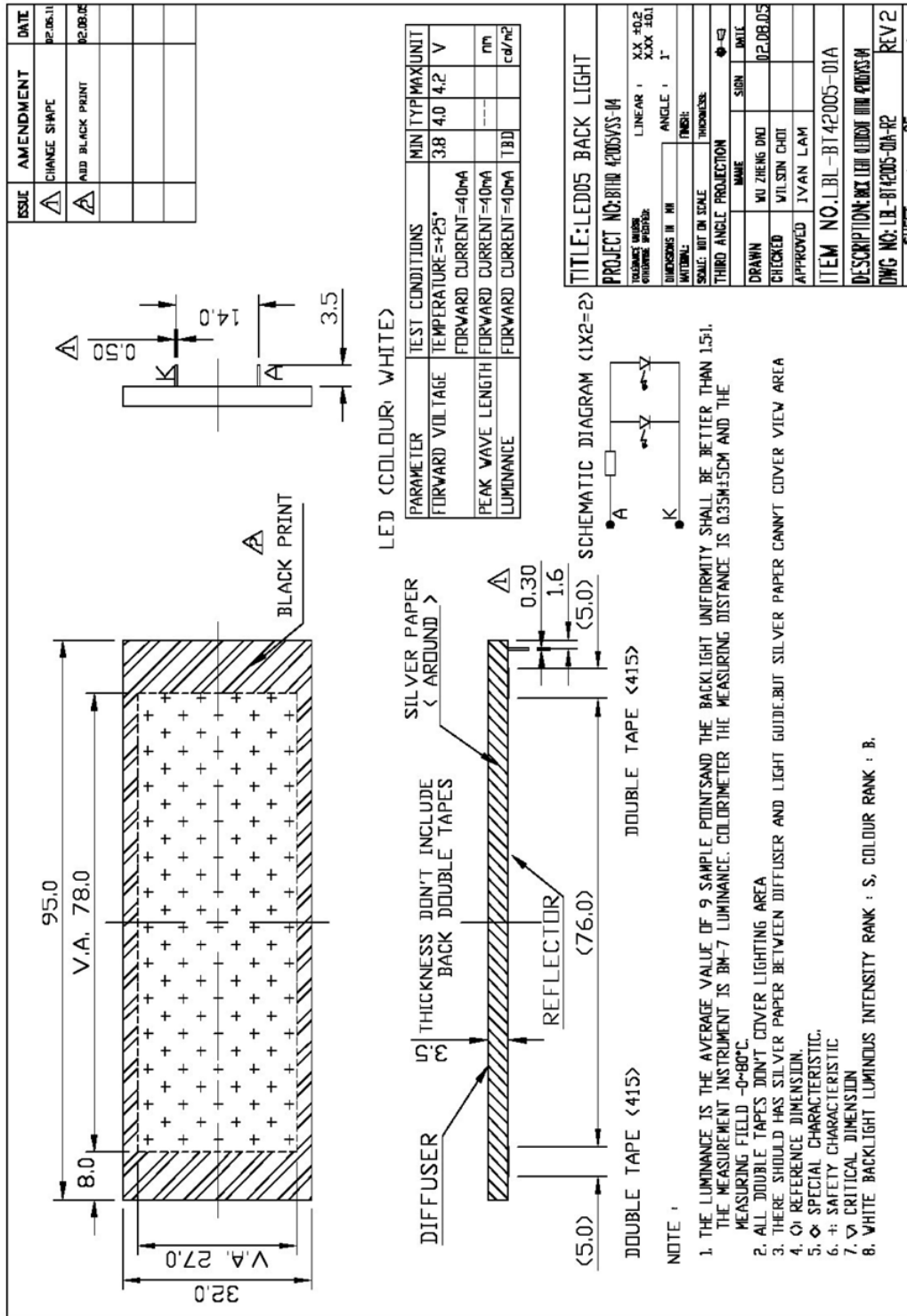


Figure 2: Backlight Specification

4. Interface signalsTable 2

| Pin No. | Symbol | Description |
|---------|--------|---|
| 1 | VSS | Ground (0V). |
| 2 | VDD | Power supply for logic (+5V). |
| 3 | V0 | Power supply for LCD driver. |
| 4 | RS | Register Select Input: “High” for Data register (for read and write) “Low” for Instruction register (for write), Busy flag, address counter (for read) |
| 5 | R/W | Read/Write signal: “High” for Read mode. “Low” for Write mode. |
| 6 | E | Enable . Start signal for data read /write. |
| 7 | DB0 | Data input/output (LSB). |
| 8 | DB1 | Data input/output. |
| 9 | DB2 | Data input/output. |
| 10 | DB3 | Data input/output. |
| 11 | DB4 | Data input/output. |
| 12 | DB5 | Data input/output. |
| 13 | DB6 | Data input/output. |
| 14 | DB7 | Data input/output (MSB). |
| 15 | LED(+) | Anode of backlight. |
| 16 | LED(-) | Cathode of backlight. |

5. Absolute Maximum Ratings**5.1 Electrical Maximum Ratings (Ta = 25 °C)**Table 3

| Parameter | Symbol | Min. | Max. | Unit |
|----------------------------------|-------------------|------|---------|------|
| Power Supply voltage (Logic) | VDD - VSS | -0.3 | +7.0 | V |
| Power Supply voltage (LCD drive) | VLCD =VDD - V0 | -0.3 | +15.0 | V |
| Input voltage | Vin | -0.3 | VDD+0.3 | V |

Note:

The modules may be destroyed if they are used beyond the absolute maximum ratings.
All voltage values are referenced to VSS = 0V.

5.2 Environmental ConditionTable 4

| Item | Operating Temperature (Topr) | | Storage Temperature (Tstg) | | Remark |
|--|--|-------|----------------------------|-------|-----------------|
| | Min. | Max. | Min. | Max. | |
| Ambient Temperature | 0°C | +50°C | -10°C | +60°C | Dry |
| Humidity | 95% max. RH for Ta ≤ 40°C < 95% RH for Ta > 40°C | | | | no condensation |
| Vibration (IEC 68-2-6) cells must be mounted on a suitable connector | Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction. | | | | 3 directions |
| Shock (IEC 68-2-27) Half-sine pulse shape | Pulse duration : 11 ms Peak acceleration: 981 m/s ² = 100g Number of shocks : 3 shocks in 3 mutually perpendicular axes. | | | | 3 directions |

6. Electrical Specifications

6.1 Typical Electrical Characteristics

At $T_a = 25\text{ }^\circ\text{C}$, $V_{DD} = 5V \pm 5\%$, $V_{SS} = 0V$.

Table 5

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|--------------------------|--|------|------|----------|------|
| Supply voltage (Logic) | $V_{DD} - V_{SS}$ | | 4.75 | 5.0 | 5.25 | V |
| Supply voltage (LCD) | $V_{LCD} = V_{DD} - V_0$ | $V_{DD} = 5.0V$, $T_a = 0\text{ }^\circ\text{C}$, Note1. | - | 4.80 | - | V |
| | | $V_{DD} = 5.0V$, $T_a = 25\text{ }^\circ\text{C}$, Note1. | 4.10 | 4.40 | 4.70 | V |
| | | $V_{DD} = 5.0V$, $T_a = 50\text{ }^\circ\text{C}$, Note1. | - | 4.20 | - | V |
| Input signal voltage (except OSC1) | V_{IH1} | “High” level | 2.2 | - | V_{DD} | V |
| | V_{IL1} | “Low” level | -0.3 | - | 0.6 | V |
| Supply Current (Logic & LCD) | IDD | Character mode, $V_{DD} = 5V$ | - | 1.0 | 1.5 | mA |
| | | Checker board mode, $V_{DD} = 5V$ | - | 1.2 | 1.8 | mA |
| Supply Current (LCD) | I0 | Character mode, $V_{DD} = 5V$, Note (1) | - | 0.2 | 0.3 | mA |
| | | Checker board mode, $V_{DD} = 5V$, Note (1) | - | 0.2 | 0.3 | mA |
| Supply voltage of white LED05 backlight | VLED | Forward current $= 40\text{mA}$ Number of LED dies $= 1 \times 2 = 2$ | 3.8 | 4.0 | 4.2 | V |

Note (1): There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

6.2 Timing Specifications

At $T_a = 0\text{ }^{\circ}\text{C}$ To $+50\text{ }^{\circ}\text{C}$, $V_{DD} = +5\text{V} \pm 5\%$, $V_{SS} = 0\text{V}$.

Refer to Fig. 2, the bus timing diagram for write mode.

Table 6

| Parameter | Symbol | Min. | Max. | Unit |
|--------------------------|------------|------|------|------|
| E Cycle Time | t_c | 500 | - | ns |
| E Rise/Fall Time | t_R, t_F | - | 20 | ns |
| E Pulse Width(high, low) | t_W | 230 | - | ns |
| R/W and RS Setup Time | t_{SU1} | 40 | - | ns |
| R/W and RS Hold Time | t_{H1} | 10 | - | ns |
| Data Set-up Time | t_{SU2} | 80 | - | ns |
| Data Hold Time | t_{H2} | 10 | - | ns |

Refer to Fig. 3, the bus timing diagram for read mode.

Table 7

| Parameter | Symbol | Min. | Max. | Unit |
|--------------------------|------------|------|------|------|
| E Cycle Time | t_c | 500 | - | ns |
| E Rise/Fall Time | t_R, t_F | - | 20 | ns |
| E Pulse Width(high, low) | t_W | 230 | - | ns |
| R/W and RS Setup Time | t_{SU} | 40 | - | ns |
| R/W and RS Hold Time | t_H | 10 | - | ns |
| Data Output Delay Time | t_D | - | 120 | ns |
| Data Hold Time | t_{DH} | 5 | - | ns |

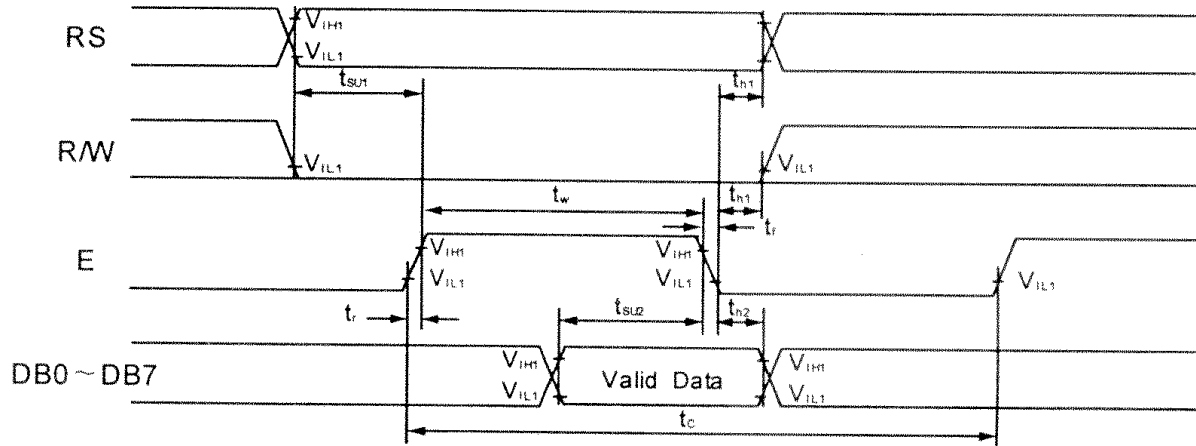


Figure 3 : Write Mode Timing Diagram

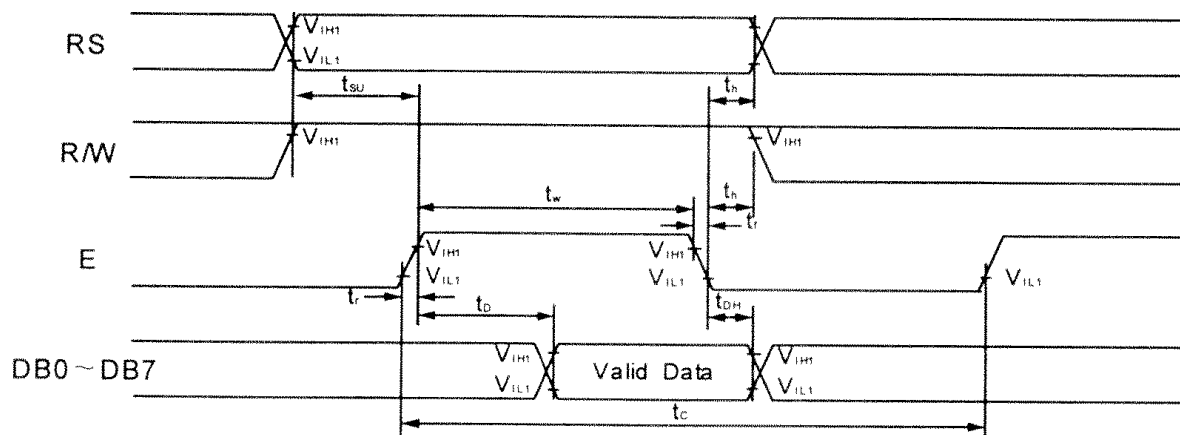


Figure 4 : Read Mode Timing Diagram

6.3 Timing Diagram of VDD Against V0

Power on sequence shall meet the requirement of Figure 4, the timing diagram of VDD against V0.

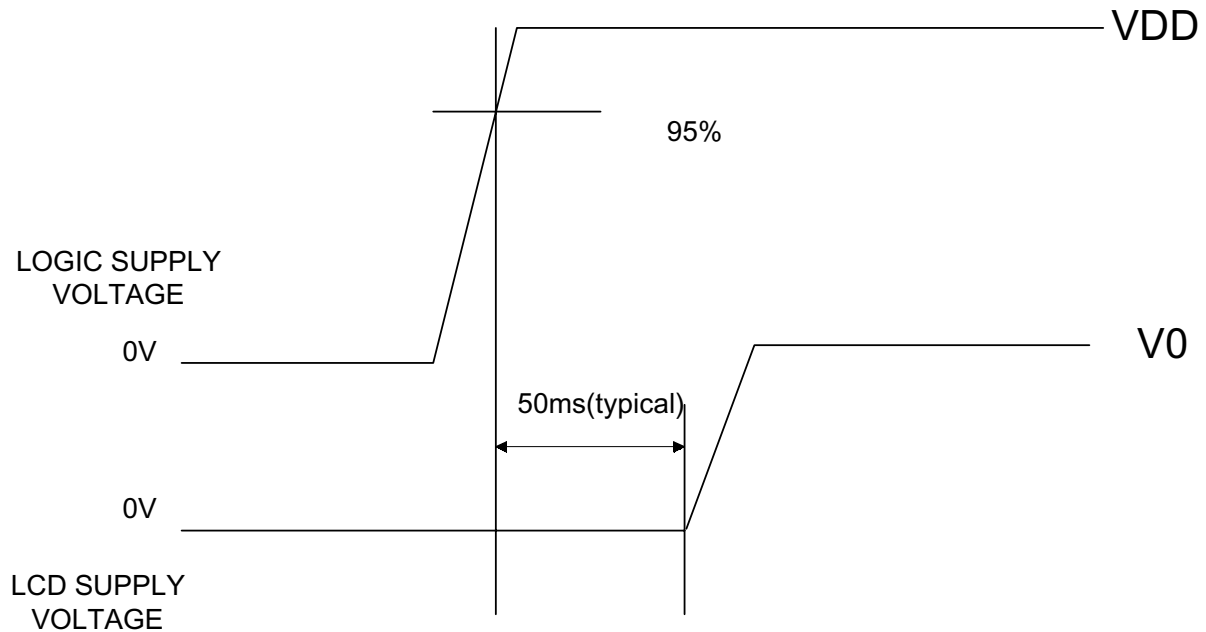


Figure 5: Timing Diagram of VDD Against V0.

6.4 Character Generator ROM (KS0066U-10B)

| Upper 4bit / Lower 4bit | LLLL | LLHL | LLHH | LHLL | LHLH | LHHL | LHHH | HLLL | HLLH | HLHL | HLHH | HHLL | HHLH | HHHL | HHHH |
|-------------------------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| LLLL (1) | CG RAM (1) | | | | | | | | | | | | | | |
| LLLH (2) | (2) | | | | | | | | | | | | | | |
| LLHL (3) | (3) | | | | | | | | | | | | | | |
| LLHH (4) | (4) | | | | | | | | | | | | | | |
| LHLL (5) | (5) | | | | | | | | | | | | | | |
| LHLH (6) | (6) | | | | | | | | | | | | | | |
| LHHL (7) | (7) | | | | | | | | | | | | | | |
| LHHH (8) | (8) | | | | | | | | | | | | | | |
| HLLL (1) | (1) | | | | | | | | | | | | | | |
| HLLH (2) | (2) | | | | | | | | | | | | | | |
| HLHL (3) | (3) | | | | | | | | | | | | | | |
| HLHH (4) | (4) | | | | | | | | | | | | | | |
| HHLL (5) | (5) | | | | | | | | | | | | | | |
| HHLH (6) | (6) | | | | | | | | | | | | | | |
| HHHL (7) | (7) | | | | | | | | | | | | | | |
| HHHH (8) | (8) | | | | | | | | | | | | | | |

Downloaded from Elcodis.com electronic components distributor