BATRON

Specification for
BTHQ 42005VSS-SMN-LEDwhite

Version July 2003

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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

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

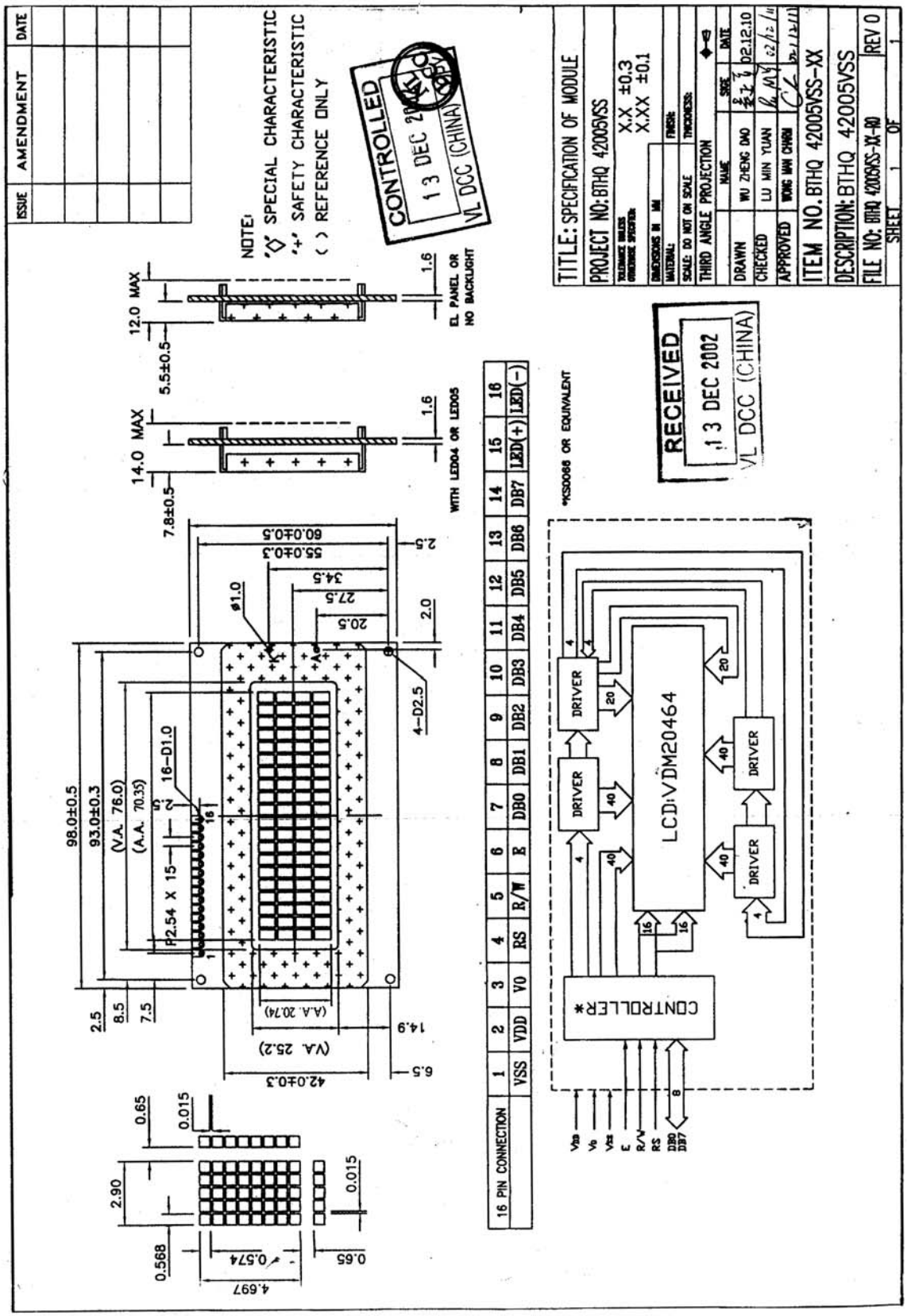

Figure 1: Module Specification

3. Backlight specification

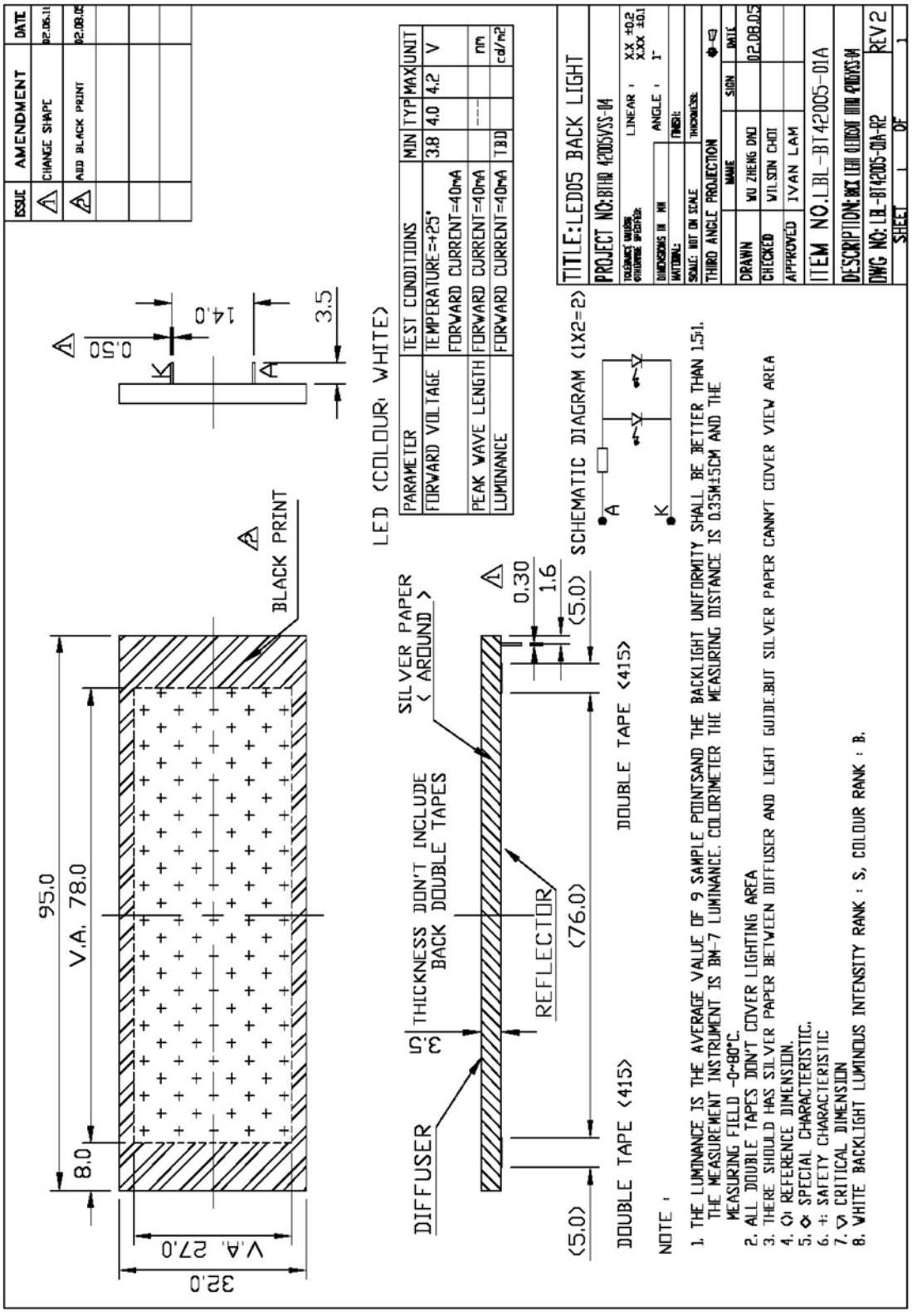

Figure 2: Backlight Specification

4. Interface signals

Table 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 ºC)

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 Condition

Table 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 Ta = 25 °C, VDD = 5V±5%, VSS=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VDD -VSS		4.75	5.0	5.25	V
Supply voltage (LCD)	VLCD =VDD –V0	VDD=5.0V, Ta=0 °C, Note1.	-	4.80	-	V
		VDD=5.0V, Ta=25°C, Note1.	4.10	4.40	4.70	V
		VDD=5.0V,Ta=50 °C, Note1.	-	4.20	-	V
Input signal voltage (except OSC1)	V_{IH1}	"High" level	2.2	-	VDD	V
	V_{IL1}	"Low" level	-0.3	-	0.6	V
Supply Current (Logic & LCD)	IDD	Character mode, VDD = 5V	-	1.0	1.5	mA
		Checker board mode, VDD = 5V	-	1.2	1.8	mA
Supply Current (LCD)	I0	Character mode, VDD = 5V, Note (1)	-	0.2	0.3	mA
		Checker board mode, VDD = 5V, Note (1)	-	0.2	0.3	mA
Supply voltage of white LED05 backlight	VLED	Forward current =40mA Number of LED dies =1x2=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 Ta =0 °C To +50 °C, VDD = +5V±5%, VSS = 0V.

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

Table 6

Parameter	Symbol	Min.	Max.	Unit
E Cycle Time	tc	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	tc	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

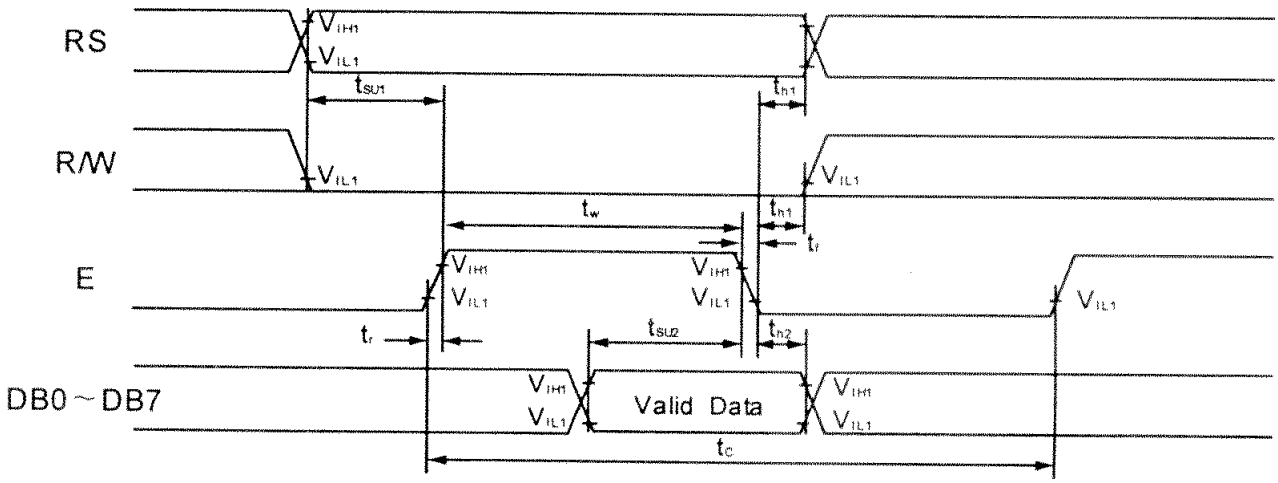

Figure 3 : Write Mode Timing Diagram

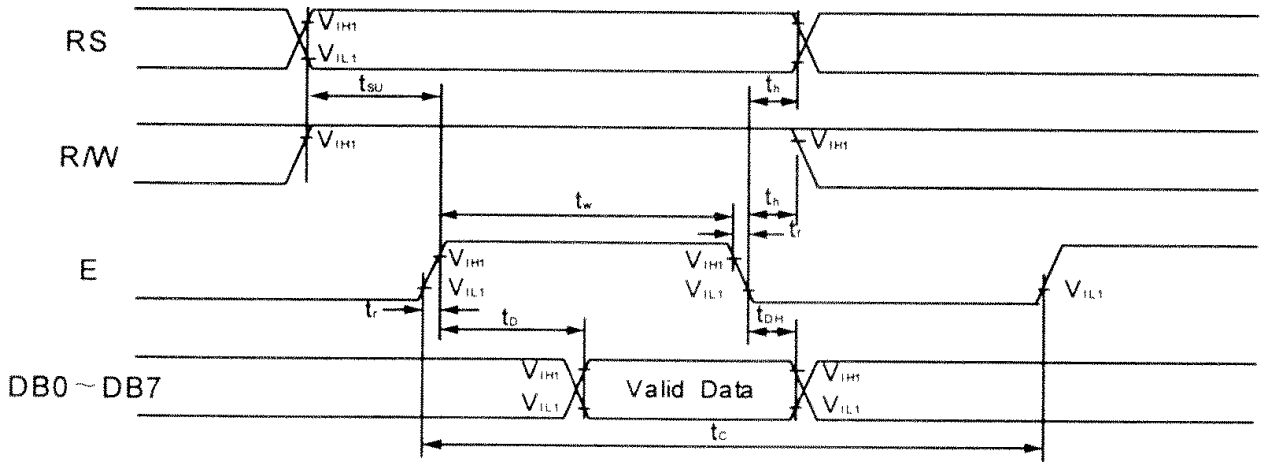

Figure 4 : Read Mode Timing Diagram

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.

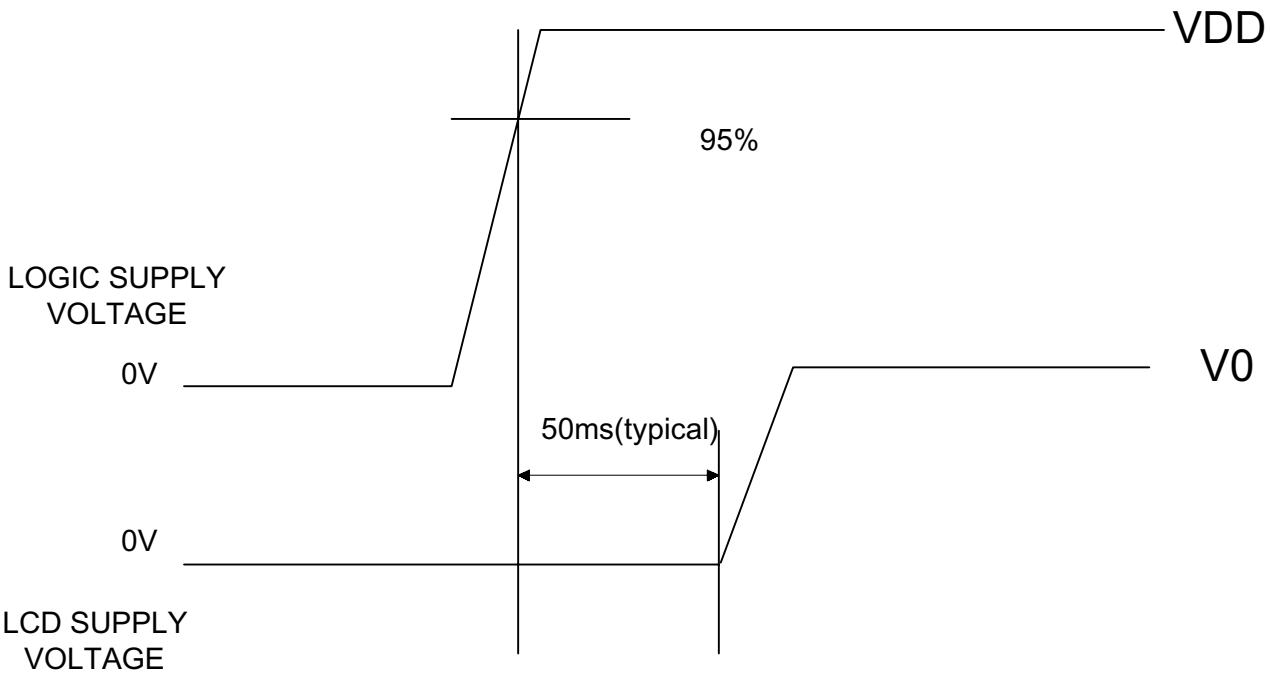

Figure 5: Timing Diagram of VDD Against V0.

6.4 Character Generator ROM (KS0066U-10B)