SPECIFICATION

MODULE NO.: RFD12864-59B1

Rev：01

Date：2009-11-24

APPROVED	CHECKED	PREPARED

Customer Approval:	☐ Accept
	☐ Reject
	Comment:
	Approved by:

History of Version

Date	Ver	Description	PREPARED	Checked
2009/11/24	01	New sample	XQC	--

CONTENTS

1.DIMENSIONAL OUTLINE

PIN	SYMBOL
1	NC
2	CS1B
3	/RES
4	A0
5	NC
6	NC
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC
13	SCK
14	SDA
15	VDD
16	VSS
17	NC
18	VO
19	XV0
20	NC
21	NC
22	NC
23	NC
24	VG
25	NC
26	NC
27	NC
28	NC
29	NC
30	NC
31	NC
32	NC
33	NC
34	NC

NOTES:
1. DISPLAY TYPE: STN/POSITIVE/YELLOW-GREEN
2. OPERATING VOLTAGE: Vdd=3.3V
3. OPERATING TEMPERATURE: -10℃~60℃
4. STORAGE TEMPERATURE: -20℃~70℃
5. DRIVE MODE: 1/64D,1/9B
6. VIEWING DIRECTION: 6:00
7. POLARIZER TYPE: TRANSMISSIVE
8. CONNECTOR: COG/ST7567
9. Backlight: Green/3.0V,15mA

2.FUNCTIONS & FEATURES

2-1. Format : 128X64 Dots
2-2. LCD mode : STN, Y-G Transmissive Mode
2-3. Viewing direction : 6 o'clock
2-4. Driving scheme : 1/64 Duty cycle, 1/9 Bias
2-5. Low power operation : Power supply voltage range (V_{DD}): 3.3V
2-6. VLCD adjustable for best contrast : LCD driving voltage (V_{OP}): 9.0V
2-7. Operating temperature : -10℃~60℃
2-8. Storage temperature : -20℃~70℃
2-9. Backlight :Green side LED (Vf=3.0V,If=15mA)

3.MECHANICAL SPECIFICATIONS

3-1. Module size : 64.8mm(L)*39.5mm(W)*5.0mm(H)
3-2. Viewing area : 53.6mm(L)*28.6mm(W)
3-3. Dot pitch : 0.38mm(L)*0.39mm(W)
3-4. Dot size : 0.35mm(L)*0.36mm(W)

4.BLOCK DIAGRAM

C63

C32

128*64 DOTS

C31

C0

S127 S126

S1 S0

Controller / Driver

Timing Signal Display Data
Logic Power Supply
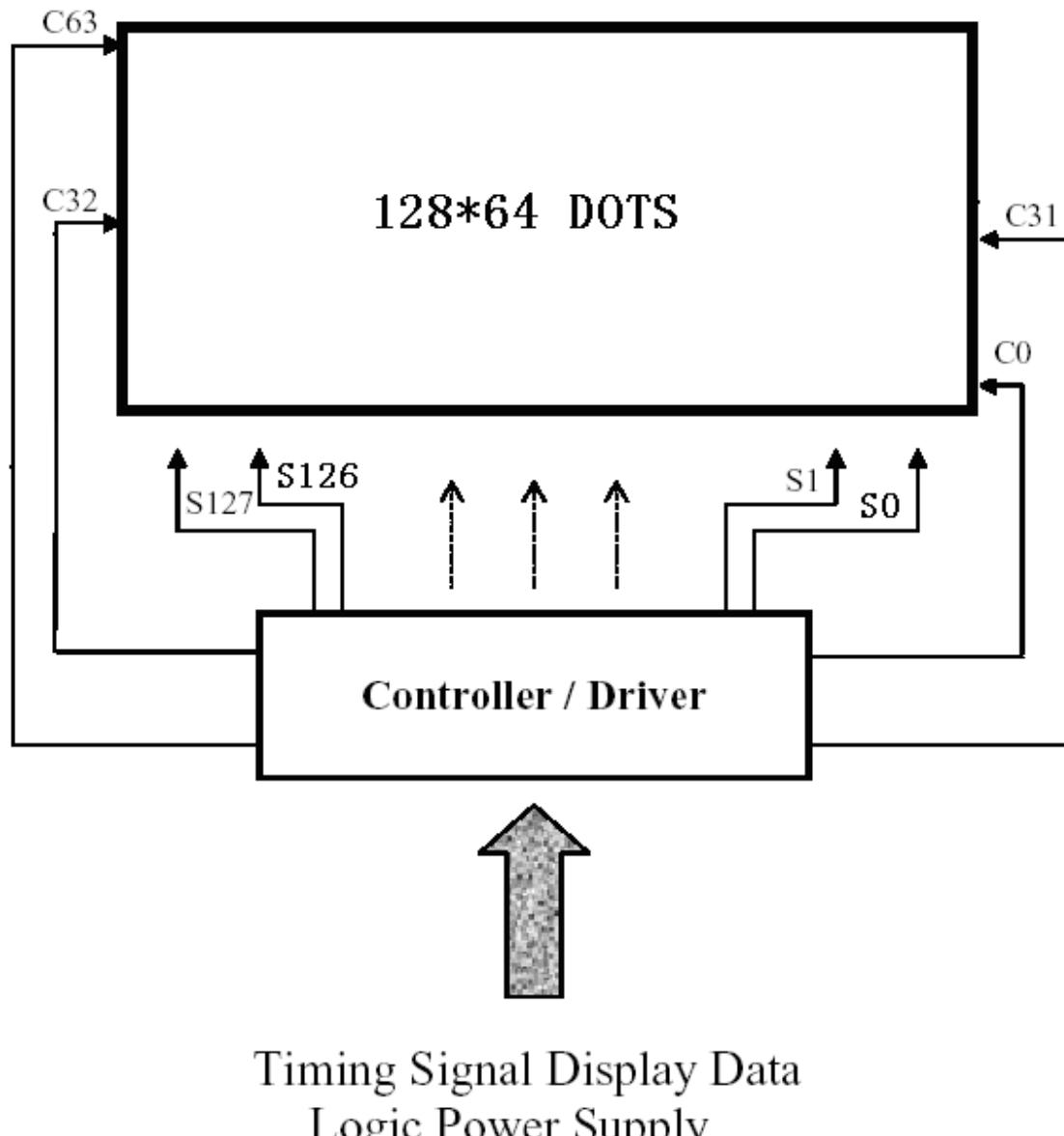
5.POWER SUPPLY
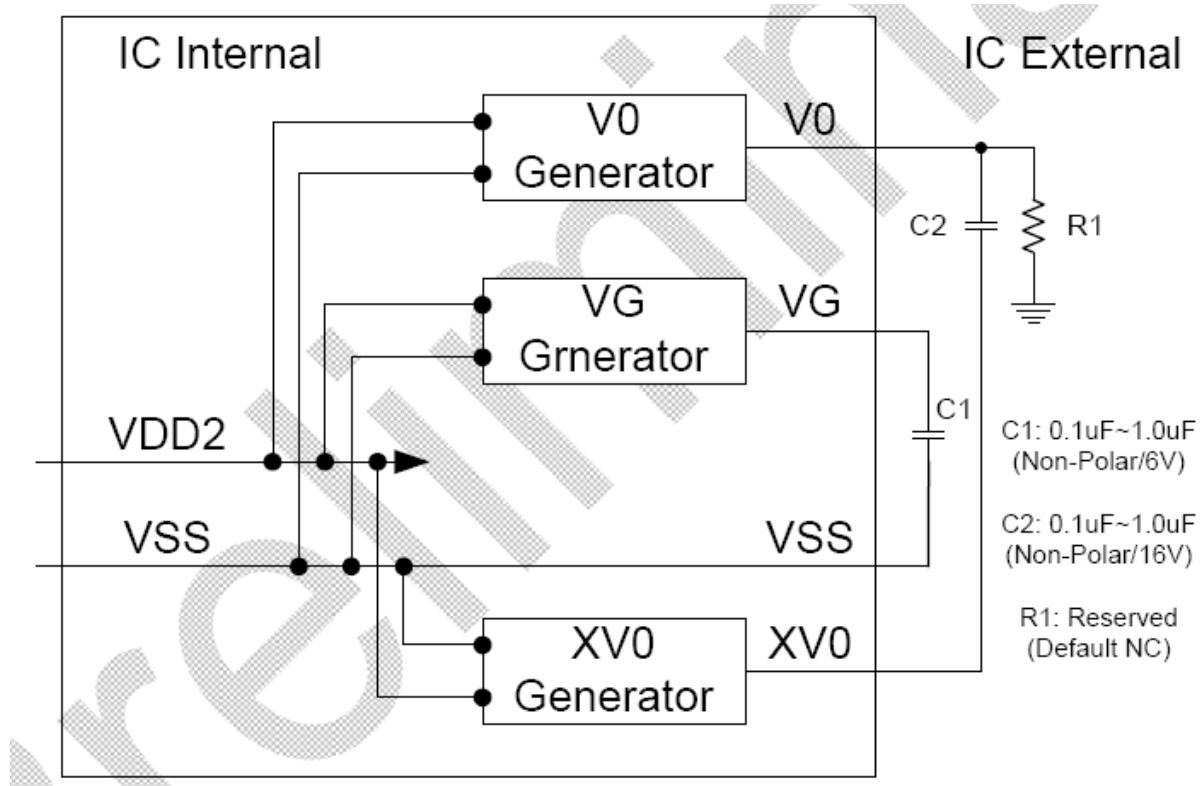
6. PIN DESCRIPTION

No.	Symbol	Function
1,5-12,17,20-23,25-34	NC	--
2	CS1B	This is the chip select signal. When CS1B = "L", then the chip select becomes active, and data/command I/O is enabled
3	/RES	When /RES= "L", the settings are initialized
4	A0	Selects register date "H" and instruction "L"
13	SCK	When the serial interface is selected (P/S = "L"), then D7
14	SDA	serves as the serial data input terminal (SDA) and D6 serves as the serial clock input terminal (SCK). At this time, D0 to D5 are set to high impedance. When the chip select is inactive, D0 to D7 are set to high impedance.
15	VDD	Supply voltage for logic circuit +3.0V
16	VSS	Ground
18	V0	LCD driving voltage for common circuits at negative frame.
19	XV0	LCD driving voltage for common circuits at positive frame.
24	VG	LCD driving voltage for segment circuits.

7.MAXIMUM ABSOUTE LIMIT (T=25°C)

Item	Symbol	Standard value	Unit
Power supply voltage for logic	V_{DD}	-0.3~+3.6	V
LCD Power supply voltage	V0-XV0	-0.3~16	V
LCD Power driving voltage	VG,VM	-0.3~V_{DD}	V
Operating temperature	Topr	-10~+60	°C
Storage temperature	Tstg	-20~+70	°C

Notes

1. Stresses above those listed under Limiting Values may cause permanent damage to the device.

2. Parameters are valid over operating temperature range unless otherwise specified. All voltages are with respect to VSS unless otherwise noted.

3. Insure the voltage levels of V0, VDD2, VG, VM, VSS and XV0 always match the correct relation:

V0 ≥ VDD > VG > VM > VSS ≥ XV0

8.ELECTRICAL CHARACTERISTICS

8-1 DC Characteristics

Item	Symbol	Min	Typ	Max	Unit	Test condition
Operating voltage	V_{DD}	2.4	-	3.3	V	-
Voltage regulator operation voltage	V_0	4.0	-	13.5	V	-
Dynamic current consumption	I_{DD}	-	135	2000	μA	V_{DD}=3.0V, V_0=11.0V, 4x booster, display pattern checker, High-Power mode, Ta=25°C
Sleep mode	I_{DD}	-	0.1	4	μA	V_{DD}=3.0V ,Ta=25°C
Standby mode	I_{DD}	-	5	10	μA	V_{DD}=3.0V ,Ta=25°C
High-level-Input voltage	V_{IH}	0.8V_{DD}	-	V_{DD}	V	A0, D0~D7, WR,CS1 , RES,
Low-level Input voltage	V_{IL}	0	-	0.2V_{DD}	V	
High-level output voltage	V_{OH}	0.8V_{DD}	-	V_{DD}	V	I_{OH}=-0.5mA
low-level output voltage	V_{OL}	0	-	0.2V_{DD}	V	I_{OL}=0.5mA
Input leakage current	I_{IKG}	-1.0	-	1.0	μA	V_{IN}=V_{SS} or V_{DD}(A0, WR,CS1)
LCD driving voltage	V_{LCD}	8.8	9.0	9.2	V	V_{LCD}=V_O-V_{SS}

8-2 AC Characteristics

Serial Interface Timing
The 4-line SPI Interface
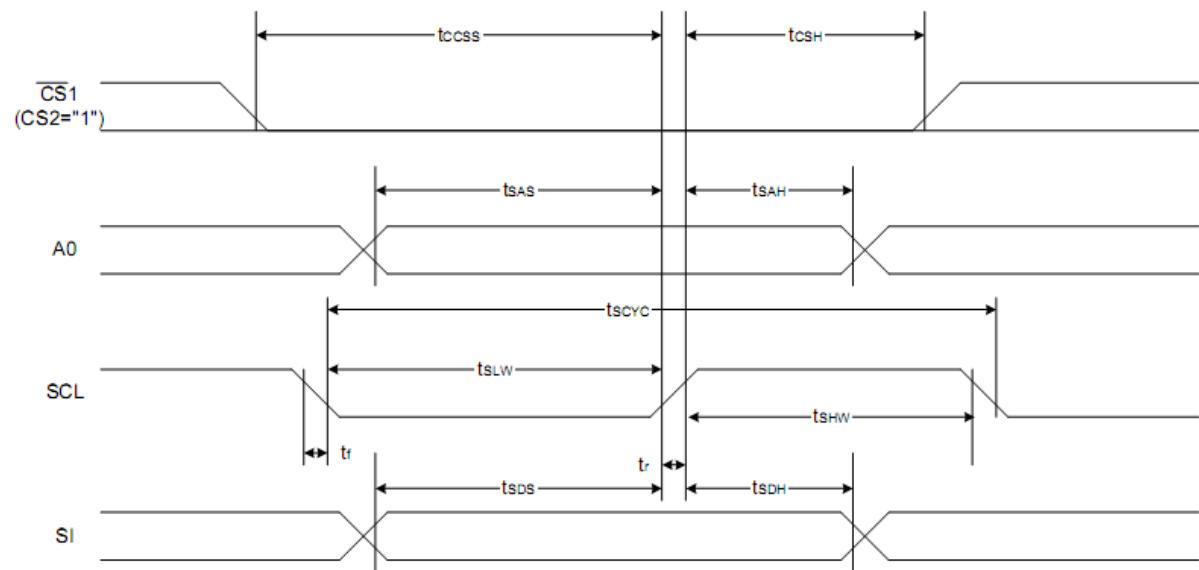
$(VDD = 3.3V, Ta = -30 \text{ to } 85°C)$

Item	Signal	Symbol	Condition	Rating		Unit
				Min.	Max.	
4-line SPI Clock Period	SCL	t_{SCYC}		50	--	ns
SCL "H" pulse width		t_{SHW}		25	--	
SCL "L" pulse width		t_{SLW}		25	--	
Address setup time	A0	t_{SAS}		20	--	
Address hold time		t_{SAH}		10	--	
Data setup time	SI	t_{SDS}		20	--	
Data hold time		t_{SDH}		10	--	
CS-SCL time	CS	t_{CSS}		20	--	
CS-SCL time		t_{CSH}		40	--	

(VDD = 2.7V, Ta = −30 to 85℃)

Item	Signal	Symbol	Condition	Rating		Unit
				Min.	Max.	
4-line SPI Clock Period	SCL	t_{SCYC}		100	--	ns
SCL "H" pulse width		t_{SHW}		50	--	
SCL "L" pulse width		t_{SLW}		50	--	
Address setup time	A0	t_{SAS}		30	--	
Address hold time		t_{SAH}		20	--	
Data setup time	SI	t_{SDS}		30	--	
Data hold time		t_{SDH}		20	--	
CS-SCL time	CS	t_{CSS}		30	--	
CS-SCL time		t_{CSH}		60	--	

Reset Timing
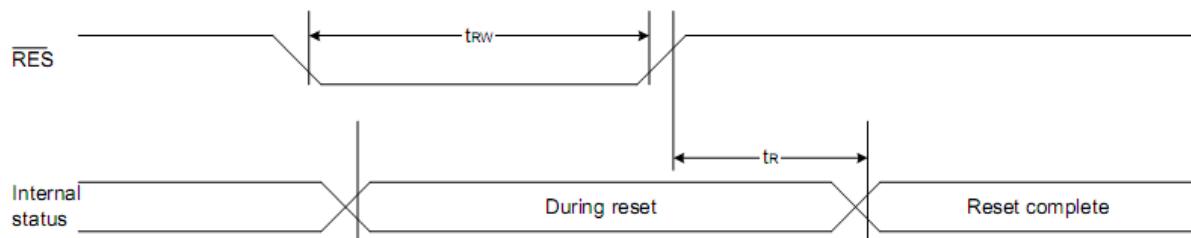
(VDD = 3.3V, Ta = −30 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		t_R		—	—	1.0	us
Reset "L" pulse width	/RES	t_{RW}		1.0	—	—	us

(VDD = 2.7V, Ta = −30 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		t_R		—	—	2.0	us
Reset "L" pulse width	/RES	t_{RW}		2.0	—	—	us

9.CONTROL AND DISPLAY COMMAND

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=1, display ON D=0, display OFF
(2) Set Start Line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set display start line
(3) Set Page Address	0	0	1	0	1	1	Y3	Y2	Y1	Y0	Set page address
(4) Set Column Address	0	0	0	0	0	1	X7	X6	X5	X4	Set column address (MSB)
	0	0	0	0	0	0	X3	X2	X1	X0	Set column address (LSB)
(5) Read Status	0	1	0	MX	D	RST	0	0	0	0	Read IC Status
(6) Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write display data to RAM
(7) Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read display data from RAM
(8) SEG Direction	0	0	1	0	1	0	0	0	0	MX	Set scan direction of SEG MX=1, reverse direction MX=0, normal direction
(9) Inverse Display	0	0	1	0	1	0	0	1	1	INV	INV =1, inverse display INV =0, normal display
(10) All Pixel ON	0	0	1	0	1	0	0	1	0	AP	AP=1, set all pixel ON AP=0, normal display
(11) Bias Select	0	0	1	0	1	0	0	0	1	BS	Select bias setting 0=1/9; 1=1/7 (at 1/65 duty)
(12) Read-modify-Write	0	0	1	1	1	0	0	0	0	0	Column address increment: Read:+0 , Write:+1
(13) END	0	0	1	1	1	0	1	1	1	0	Exit Read-modify-Write mode
(14) RESET	0	0	1	1	1	0	0	0	1	0	Software reset
(15) COM Direction	0	0	1	1	0	0	MY	-	-	-	Set output direction of COM MY=1, reverse direction MY=0, normal direction
(16) Power Control	0	0	0	0	1	0	1	VB	VR	VF	Control built-in power circuit ON/OFF
(17) Regulation Ratio	0	0	0	0	1	0	0	RR2	RR1	RR0	Select regulation resistor ratio
(18) Set EV	0	0	1	0	0	0	0	0	0	1	Double command!! Set electronic volume (EV) level
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	
(19) Set Booster	0	0	1	1	1	1	1	0	0	0	Double command!! Set booster level: 00=4X, 01=5X, 10=6X
	0	0	0	0	0	0	0	0	BL1	BL0	
(20) Power Save	0	0	Compound Command								Display OFF + All Pixel ON
(21) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(22) Test	0	0	1	1	1	1	1	1	1	-	Do NOT use. Reserved for testing.

Note: Symbol "-" means this bit can be "H" or "L".