



**NOVATEK**

聯詠科技

# ***Data Sheet***

***For NT71856***

Timing Controller for High Performance  
LCD Panel\_AUX\_Application Note

Preliminary V0.5

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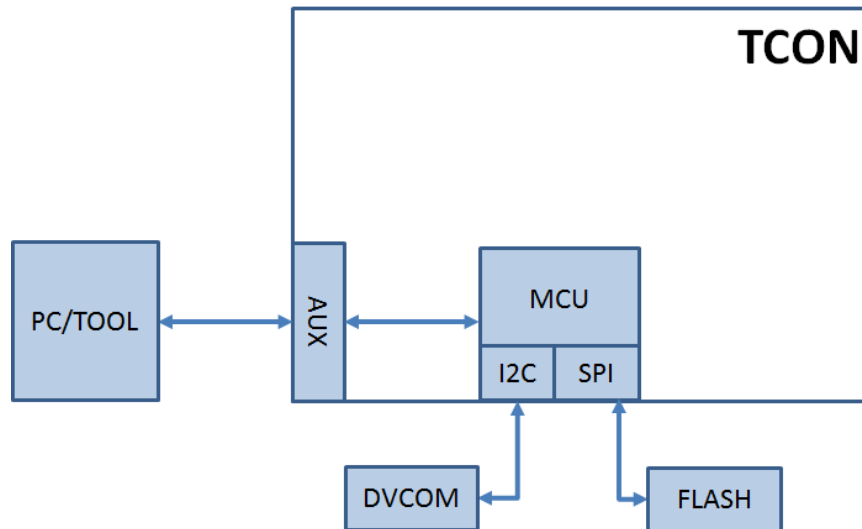
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## Revision History

Specification Revision History			
Version	Content	Editor	Release Date
0.1	1. Preliminary SPEC V0.1	Jym	2023/03/25
0.2	1. Add enable I2C to output pin setting for VCOM adjust	Jym	2023/05/02
0.3	1. Add disable 16-32 mode for NT71856	Jym	2023/07/01
0.4	1. fix enable 16-32 mode for NT71856 typo	Jym	2023/07/04
0.5	1. Add PDF on/off flow	Jym	2023/08/14

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## 1. Block Diagram



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## 2. AUX command discriptions

### 1. Write EDID device @ Flash (32 mode I2C command)

**(If Flash is protected, need to unprotect first. [AUX cmd 4])**

**(After change EDID setting, strongly recommend to protect FLASH[AUX cmd 3])**

step	AUX command	Description
1	9 004C1 00 00 rdVal	關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)	
	8 004C1 wrVal	
2	8 00102 00 C0	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	4 00062 01 60 00	Write Aux Device Address:0x00062, page 0x60; offset:00
	4 00062 00 data0	MOT=1,Write Data0
	4 00062 00 data1	MOT=1,Write Data1
	4 00062 00 data2	MOT=1,Write Data2
	.....	
	4 00062 00 data(n-1)	MOT=1, data(n-1)
	0 00062	MOT=0,Release I2C Bus
4	8 00102 00 00	Wr DPCD 0x00102=0x00 開啟 16/32 mode function
5	9 004C1 00 00 rdVal	開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)	
	8 004C1 wrVal	

PS: 4 00062 00 data (n-1) & 0 00062 can combined to 0 00062 00 data(n-1)

**2.Read EDID device @ Flash (32mode I2C command)**

step	AUX command	Description
1	9 004C1 00 00 rdVal	關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)	
	8 004C1 wrVal	
2	8 00102 00 C0	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	4 00062 01 60 00	Write Aux Device Address:0x00062, page 0x60; offset:00
	5 00062 00	MOT=1,Read Data0
	5 00062 00	MOT=1,Read Data1
	.....	MOT=1,Read Data....
	5 00062 00	MOT=1,Read Data(n-1)
	1 00062	MOT=0,Release I2C Bus
4	8 00102 00 00	Wr DPCD 0x00102=0x00 開啟 16/32 mode function
5	9 004C1 00 00 rdVal	開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)	
	8 004C1 wrVal	

### 3. Write Flash protect command

step	AUX command	description
1	9 004C1 00 00 rdVal	關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)	
	8 004C1 wrVal	
2	8 00102 00 C0	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	Set flash WP pin to high	Disable Flash hardware write protect
4	4 00062 01 FF 01	Write Aux Device Address:0x00062, page 0xFF; offset:01;
	4 00062 00 9C	Write Aux Device Address:0x00062, Write protect data:9C
	0 00062	MOT=0,Release I2C Bus
5	Set flash WP pin to low	Enable Flash hardware write protect This step is optional by user request
6	8 00102 00 00	Wr DPCD 0x00102=0x00 開啟 16/32 mode function
7	9 004C1 00 00 rdVal	開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)	
	8 004C1 wrVal	

PS: protect data 依照各 Flash protect command 定義

**4. Disable Flash protect command**

step	AUX command	description
1	9 004C1 00 00 rdVal	關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)	
	8 004C1 wrVal	
2	8 00102 00 C0	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	Set flash WP pin to high	Disable Flash hardware write protect
4	4 00062 01 FF 01	Write Aux Device Address:0x00062, page 0xFF; offset:01;
	4 00062 00 00	Write Aux Device Address:0x00062, Write protect data:00
	0 00062	MOT=0,Release I2C Bus
5	Set flash WP pin to low	Enable Flash hardware write protect This step is optional by user request
6	8 00102 00 00	Wr DPCD 0x00102=0x00 開啟 16/32 mode function
7	9 004C1 00 00 rdVal	開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)	
	8 004C1 wrVal	



**5. Write DVcom device @ EE I2C (16 mode I2C command)**

Type1) Depend on DVCOM command (有 register offset)

step	AUX command		description
1	9 004C1 00 00 rdVal		關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)		
	8 004C1 wrVal		
2	Request Reply	80 0102 00 C0 00	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	Request Reply	4 00060 01 02 04 00	Read Back original setting of register 0x0204
	Request Reply	5 00060 00 00 rdVal	
	Request Reply	1 00060 00	
	Request Reply	wrVal = rdVal&0xF0	Set BIT3~BIT0 or read value to 0
	Request Reply	4 00060 01 02 04 00	Set register 0x0204 with wrVal to enable send I2C to output pin
	Request Reply	4 00060 00 wrVal 00	
	Request Reply	0 00060 00	
4	Request Reply	40 004F 00 2C 00	Write Aux Device Address:0x0004F, word offset:2C (如果不用 offset 不用打此行) (以實際應用 DVCOM 規範設計為準)
	Request Reply	40 004F 00 AA 00	MOT=1,Write Data0=0xAA (以實際應用 DVCOM 規範設計為準)
	Request Reply	00 00 4F 00	MOT=0,Release I2C Bus
5	Request Reply	80 01 02 00 00 00	開啟 16/32 mode function
6	9 004C1 00 00 rdVal		開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)		
	8 004C1 wrVal		

※範例僅供參考，實際應用需依據 VCOM IC SPECIFICATION 修改 device address, word offset and data 或更換 step2 之 Aux command

Type2) Depend on DVCOM command(沒有 register offset)

step	AUX command		description
1	9 004C1 00 00 rdVal		關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)		
	8 004C1 wrVal		
2	Request Reply	80 01 02 00 C0 00	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	Request Reply	4 00060 01 02 04 00	Read Back original setting of register 0x0204
	Request Reply	5 00060 00 00 rdVal	
	Request Reply	1 00060 00	
	Request Reply	wrVal = rdVal&0xF0	Set BIT3~BIT0 or read value to 0
	Request Reply	4 00060 01 02 04 00	Set register 0x0204 with wrVal to enable send I2C to output pin
	Request Reply	4 00060 00 wrVal 00	
	Request Reply	0 00060 00	
4	Request Reply	40 00 4F 00 80 00	Write Aux Device Address:0x0004F Data 0x80
	Request Reply	00 00 4F 00	MOT=0,Release I2C Bus
5	Request Reply	80 01 02 00 00 00	開啟 16/32 mode function
6	9 004C1 00 00 rdVal		開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)		
	8 004C1 wrVal		

※範例僅供參考，實際應用需依據 VCOM IC SPECIFICATION 修改 device address and data 或更換 step2 之 Aux command

**6.Read DVcom device @ EE I2C (16 mode I2C command)**

Type1)Depend on DVCOM command(有 register offset)

step	AUX command		description
1	9 004C1 00		關閉 16/32 mode function for NT71856
	00 rdVal		
	wrVal = ((rdVal 0x04)&0xF7)		
	8 004C1 wrVal		
2	Request	80 01 02 00 C0	Wr DPCD 0x00102=0xC0 切換 16/32 mode function
	Reply	00	
3	Request	4 00060 01 02 04	Read Back original setting of register 0x0204
	Reply	00	
	Request	5 00060 00	
	Reply	00 rdVal	Set BIT3~BIT0 or read value to 0
	Request	1 00060	
	Reply	00	
	Request	wrVal = rdVal&0xF0	
	Reply		
4	Request	4 00060 01 02 04	Set register 0x0204 with wrVal to enable send I2C to output pin
	Reply	00	
	Request	4 00060 00 wrVal	Write Aux Device Address: 0x0004F, word offset = 2C (如果不用 offset 不用打此行) (以實際應用 DVCOM 規範設計為準)
	Reply	00	
	Request	0 00060	
	Reply	00	
4	Request	40 00 4F 00 2C	MOT=1,Read Data (以實際應用 DVCOM 規範設計為準)
	Reply	00	
	Request	50 00 4F 00	
	Request	10 00 4F	MOT=0,Release I2C Bus
	Reply	00	
5	Request	80 01 02 00 00	切換 16/32 mode function
	Reply	00	
6	9 004C1 00		開啟 16/32 mode function for NT71856
	00 rdVal		
	wrVal = (rdVal 0x0C)		
	8 004C1 wrVal		

※範例僅供參考，實際應用需依據 VCOM IC SPECIFICATION 修改 device address, word offset and data 或更換 step2 之 Aux command

Type2) Depend on DVCOM command (沒有 register offset)

step	AUX command		description
1	9 004C1 00 00 rdVal		關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)		
	8 004C1 wrVal		
2	Request Reply	80 01 02 00 C0 00	Wr DPCD 0x00102=0xC0 切換 16/32 mode function
3	Request Reply	4 00060 01 02 04 00	Read Back original setting of register 0x0204
	Request Reply	5 00060 00 00 rdVal	
	Request Reply	1 00060 00	
	Request Reply	wrVal = rdVal&0xF0	Set BIT3~BIT0 or read value to 0
	Request Reply	4 00060 01 02 04 00	Set register 0x0204 with wrVal to enable send I2C to output pin
	Request Reply	4 00060 00 wrVal 00	
	Request Reply	0 00060 00	
4	Request Reply	50 00 4F 00 20	Write Aux Device Address: 0x0004F, MOT=1 reply DEFER
	Request Reply	50 00 4F 00 20	由於上一筆回 DEFER，需再下一次 request。 直到回應 data 為止。
	...	...	..
	Request Reply	50 00 4F 00 00 80	MOT=1,Read Data0(以範例來說為 0x80)
	Request Reply	10 00 4F 00	MOT=0,Release I2C Bus
5	Request Reply	80 01 02 00 00 00	切換 16/32 mode function
6	9 004C1 00 00 rdVal		開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)		
	8 004C1 wrVal		

※範例僅供參考，實際應用需依據 VCOM IC SPECIFICATION 修改 device address and data 或更換 step2 之 Aux command

**7.AUX enable / disable PSR (32mode I2C command)**

step	AUX command	Description
1	9 004C1 00 00 rdVal	關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)	
	8 004C1 wrVal	
2	8 00102 00 C0	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	4 00062 01 83 7F	Write Aux Device Address:0x00062, page 0x83; offset:7F
	4 00062 00 01	Write Aux Device Address:0x00062, data:01
	0 00062	MOT=0,Release I2C Bus
4	測試 pattern(打其他畫面測試)	此時送 DPCD command 無效
5	4 00062 01 83 7F	Write Aux Device Address:0x00062, page 0x83; offset:7F
	4 00062 00 00	Write Aux Device Address:0x00062, data:00
	0 00062	MOT=0,Release I2C Bus
6	8 00102 00 00	Wr DPCD 0x00102=0x00 開啟 16/32 mode function
7	9 004C1 00 00 rdVal	開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)	
	8 004C1 wrVal	

PS: step 2 為開啟 PSR mode; step 4 為關閉 PSR。

各 command 間請 delay 10ms 時間。

**8.PDF enable**

step	AUX command	Description
1	9 004C1 00 00 rdVal	關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)	
	8 004C1 wrVal	
2	8 00102 00 C0	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	4 00060 01 02 0E	Read back data of register 0x20E
	1 00060 00 00 rdVal	
	wrVal = rdVal 0x80	Set Bit7 or read value to 1 to enable PDF
	4 00060 01 02 0E	Write back to register 0x20E with wrVal to enable PDF
	1 00060 00 wrVal	
4	8 00102 00 00	Wr DPCD 0x00102=0x00 開啟 16/32 mode function
5	9 004C1 00 00 rdVal	開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)	
	8 004C1 wrVal	

**9.PDF disable**

step	AUX command	Description
1	9 004C1 00 00 rdVal	關閉 16/32 mode function for NT71856
	wrVal = ((rdVal 0x04)&0xF7)	
	8 004C1 wrVal	
2	8 00102 00 C0	Wr DPCD 0x00102=0xC0 關閉 16/32 mode function
3	4 00060 01 02 0E	Read back data of register 0x20E
	1 00060 00 00 rdVal	
	wrVal = rdVal&0x7F	Set Bit7 or read value to 0 to disable PDF
	4 00060 01 02 0E	Write back to register 0x20E with wrVal to disable PDF
	1 00060 00 wrVal	
4	8 00102 00 00	Wr DPCD 0x00102=0x00 開啟 16/32 mode function
5	9 004C1 00 00 rdVal	開啟 16/32 mode function for NT71856
	wrVal = (rdVal 0x0C)	
	8 004C1 wrVal	

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