4.7.3. 8-bit Parallel MCU Interface

The DBI TYPE B 8-bit parallel bus interface of the ILI9488 is used by setting the external pin IM [2:0] as 011. Figure 109 shows this system interface.

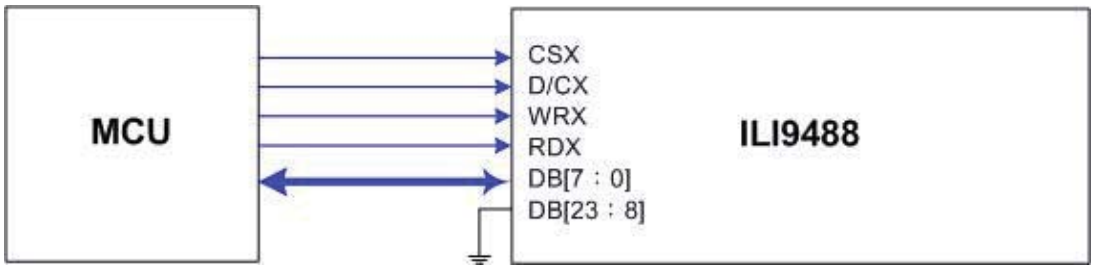


Figure 109: 8-bit Parallel MCU Interface

The available display data formats are:

- 65K-Colors, RGB 5, 6, 5 bits input data (set Standard Command 3Ah, DBI [2:0] as 101)
- 262K-Colors, RGB 6, 6, 6 bits input data (set Standard Command 3Ah, DBI [2:0] as 110)

4.7.3.1. 8-bit Data Bus for 16-bit/pixel (RGB 5-6-5 Bits Input), 65K-color

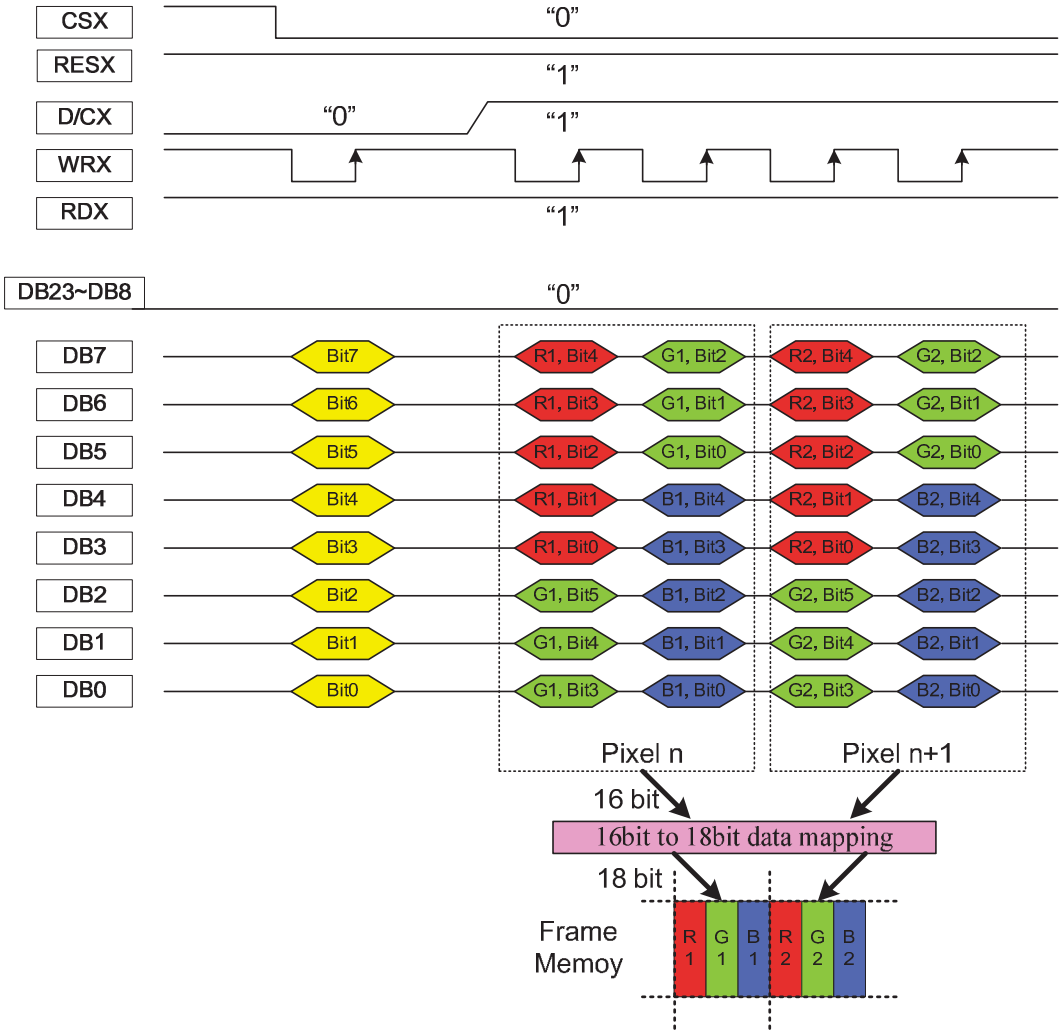


Figure 110: 8-bit Data Bus for 16-bit/pixel (RGB 6-5-6 Bits Input), 65K-color

Notes:

1. The data order is as follows: MSB = DB7, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green data, and MSB = Bit 4, LSB = Bit 0 for Red and Blue data.
2. 2-times transfer is used to transmit 1 pixel data to the 16-bit color depth information.
3. '-' = void

4.7.3.2. 8-bit Data Bus for 18-bit/pixel (RGB 6-6-6 Bits Input), 262K-color

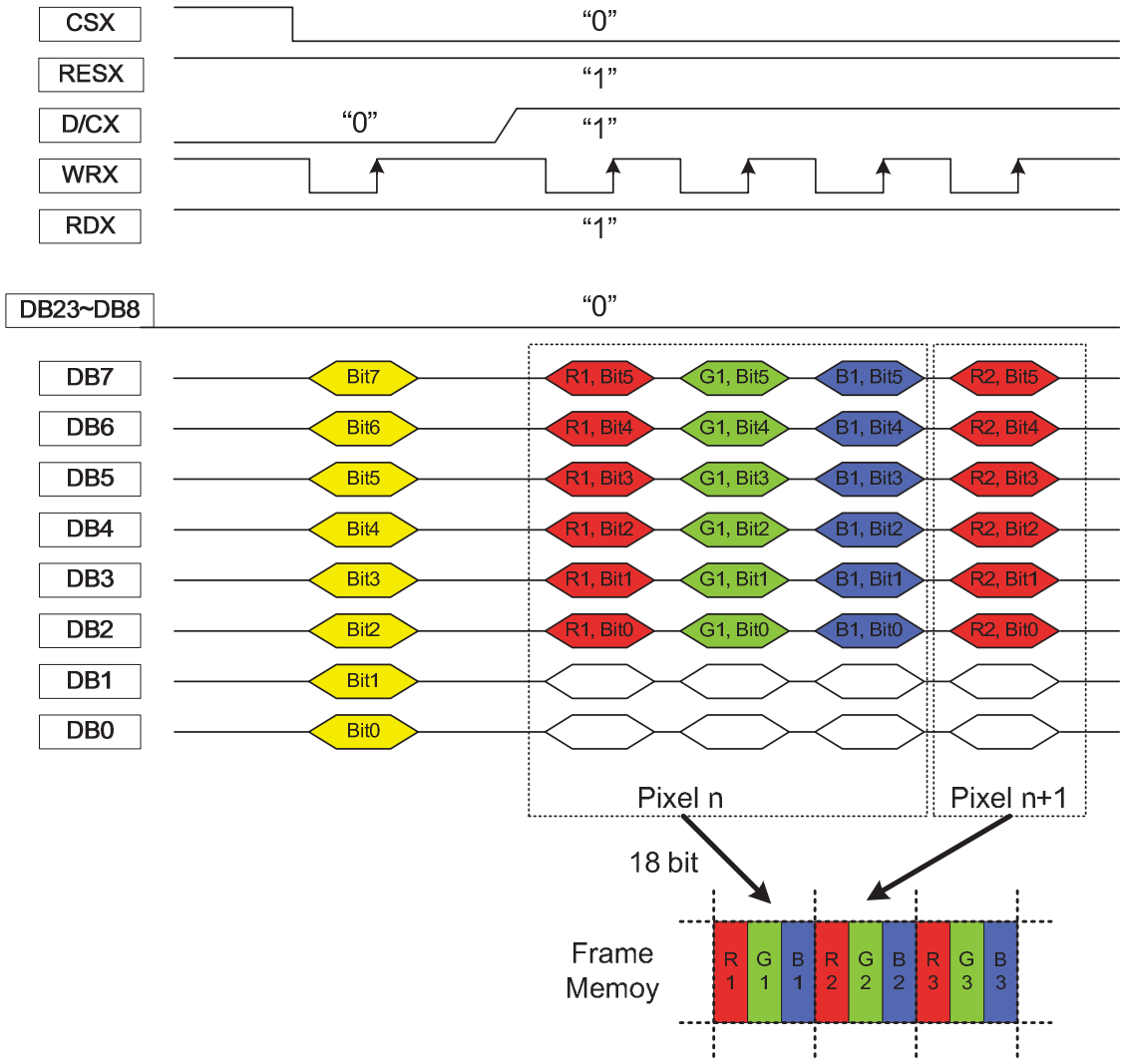


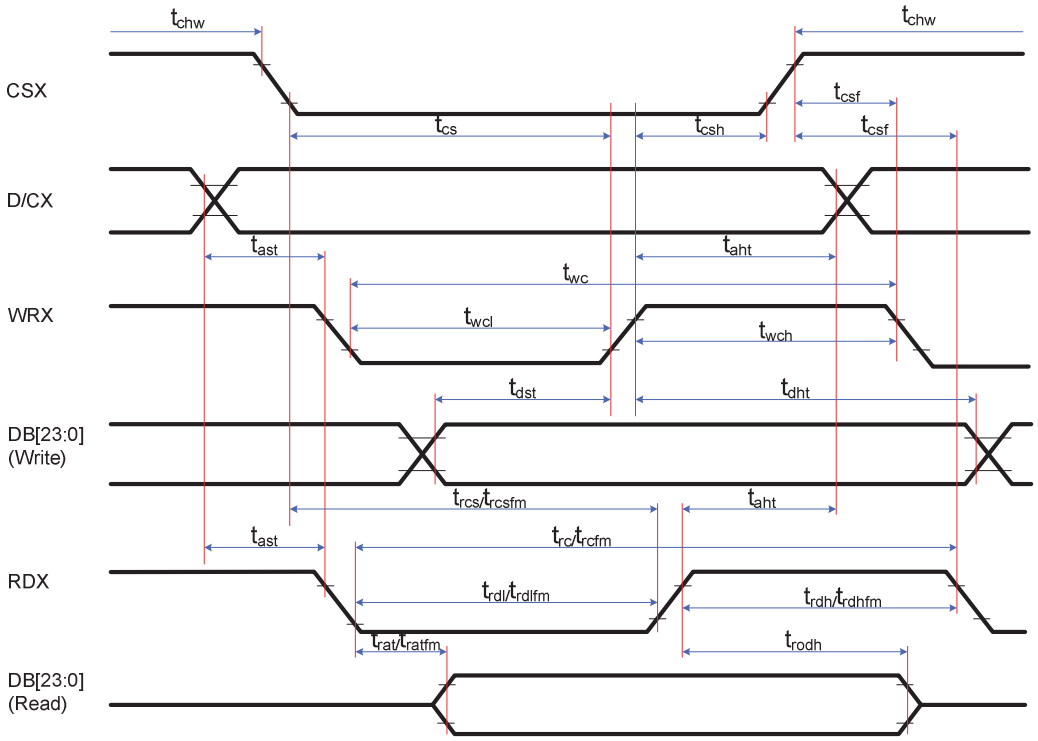
Figure 111: 8-bit Data Bus for 18-bit/pixel (RGB 6-6-6 Bits Input), 262K-color

Notes:

1. The data order is as follows: MSB = DB7, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green, Red and Blue data.
2. 3-times transfer is used to transmit 1 pixel data to the 18-bit color depth information.
3. '-' = void

17.4. AC Characteristics

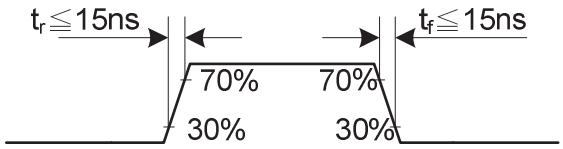
17.4.1. DBI Type B (Display Parallel 8-/9-/16-/18-/24-bit interface) Timing Characteristics



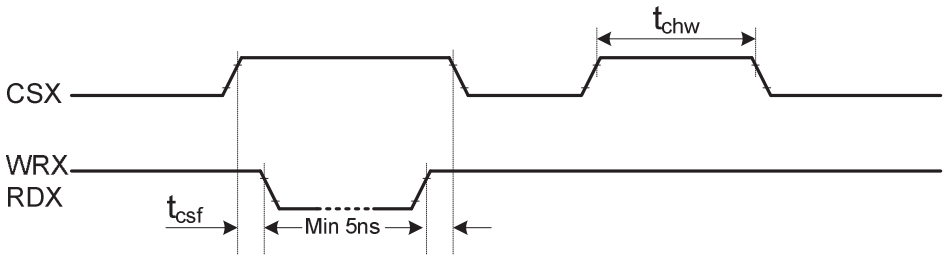
Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	-
	that	Address hold time (Write/Read)	0	-	ns	-
CSX	tchw	CSX "H" pulse width	0	-	ns	-
	tcs	Chip Select setup time (Write)	15	-	ns	-
	trcs	Chip Select setup time (Read ID)	45	-	ns	-
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	-
	tcsf	Chip Select Wait time (Write/Read)	0	-	ns	-
WRX	twc	Write cycle	30	-	ns	-
	twrh	Write Control pulse H duration	15	-	ns	-
	twrl	Write Control pulse L duration	15	-	ns	-
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	When read from Frame Memory
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	When read ID data
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
DB [23:0], DB [17:0], DB [15:0], DB [8:0], DB [7:0]	tdst	Write data setup time	10	-	ns	For maximum, CL=30pF For minimum, CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

Notes:

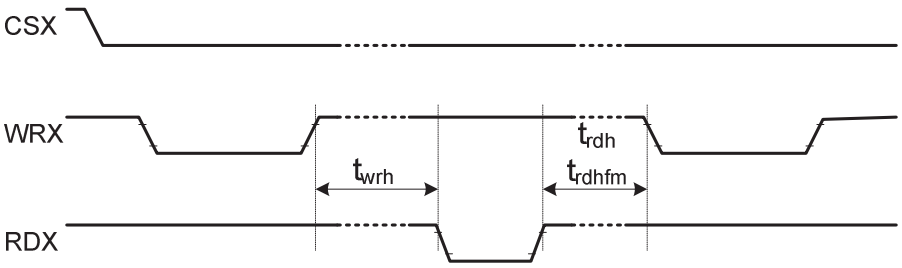
1. Ta = -30 to 70 ℃, IOVCC = 1.65V to 3.3V, VCI = 2.5V to 3.3V, AGND = DGND = 0V
2. Logic high and low levels are specified as 30% and 70% of IOVCC for input signals.
3. Input signal rising time and falling time:



4. The CSX timing:



5. The Write to Read or the Read to Write timing:



5. Command

5.1.Command List

5.1.1. Standard Command List

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
NOP	0	1	↑	XX	0	0	0	0	0	0	0	0	00h
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Soft Reset	0	1	↑	XX	0	0	0	0	0	0	0	1	01h
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read display identification information	0	1	↑	XX	0	0	0	0	0	1	0	0	04h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	ID1 [7:0]								XX
	1	↑	1	XX	ID2 [7:0]								XX
	1	↑	1	XX	ID3 [7:0]								XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Number of the Errors on DSI	0	1	↑	XX	0	0	0	0	0	1	0	1	05h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	P [7:0]								XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Display Status	0	1	↑	XX	0	0	0	0	1	0	0	1	09h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [31:24]								XX
	1	↑	1	XX	D [23:16]								XX
	1	↑	1	XX	D [23:8]								XX
	1	↑	1	XX	D [7:0]								XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Display Power Mode	0	1	↑	XX	0	0	0	0	1	0	1	0	0Ah
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Display MADCTL	0	1	↑	XX	0	0	0	0	1	0	1	1	0Bh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Pixel Format	0	1	↑	XX	0	0	0	0	1	1	0	0	0Ch
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	DPI [2:0]			0	DBI [2:0]			XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Display Image Mode	0	1	↑	XX	0	0	0	0	1	1	0	1	0Dh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:0]								XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Display signal Mode	0	1	↑	XX	0	0	0	0	1	1	1	0	0Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D7	D6	D5	D4	D3	D2	D1	D0	XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Display Self-Diagnostic Result	0	1	↑	XX	0	0	0	0	1	1	1	1	0Fh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D7	D6	0	0	0	0	0	D0	XX
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Sleep IN	0	1	↑	XX	0	0	0	1	0	0	0	0	10h
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Sleep OUT	0	1	↑	XX	0	0	0	1	0	0	0	1	11h
Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Partial Mode ON	0	1	↑	XX	0	0	0	1	0	0	1	0	12h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Normal Display Mode ON	0	1	↑	XX	0	0	0	1	0	0	1	1	13h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Display Inversion OFF	0	1	↑	XX	0	0	1	0	0	0	0	0	20h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Display Inversion ON	0	1	↑	XX	0	0	1	0	0	0	0	1	21h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
All Pixel OFF	0	1	↑	XX	0	0	1	0	0	0	1	0	22h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
All Pixel ON	0	1	↑	XX	0	0	1	0	0	0	1	1	23h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Display OFF	0	1	↑	XX	0	0	1	0	1	0	0	0	28h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Display ON	0	1	↑	XX	0	0	1	0	1	0	0	1	29h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Column Address Set	0	1	↑	XX	0	0	1	0	1	0	1	0	2Ah
	1	1	↑	XX	SC [15:8]								XX
	1	1	↑	XX	SC [7:0]								XX
	1	1	↑	XX	EC [15:8]								XX
	1	1	↑	XX	EC [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Page Address Set	0	1	↑	XX	0	0	1	0	1	0	1	1	2Bh
	1	1	↑	XX	SP [15:8]								XX
	1	1	↑	XX	SP [7:0]								XX
	1	1	↑	XX	EP [15:8]								XX
	1	1	↑	XX	EP [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Memory Write	0	1	↑	XX	0	0	1	0	1	1	0	0	2Ch
	1	1	↑	D1 [23:0]									XX
	1	1	↑	Dx [23:0]									XX
	1	1	↑	Dn [23:0]									XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Memory Read	0	↑	↑	XX	0	0	1	0	1	1	1	0	2Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	D1 [23:0]									XX
	1	↑	1	Dx [23:0]									XX
	1	↑	1	Dn [23:0]									XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Partial Area	0	1	↑	XX	0	0	1	1	0	0	0	0	30h
	1	1	↑	XX	SR [15:8]								XX
	1	1	↑	XX	SR [7:0]								XX
	1	1	↑	XX	ER [15:8]								XX
	1	1	↑	XX	ER [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Vertical Scrolling Definition	0	1	↑	XX	0	0	1	1	0	0	1	1	33h
	1	1	↑	XX	TFA [15:8]								XX
	1	1	↑	XX	TFA [7:0]								XX
	1	1	↑	XX	VSA [15:8]								XX
	1	1	↑	XX	VSA [7:0]								XX
	1	1	↑	XX	BFA [15:8]								XX
	1	1	↑	XX	BFA [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Tearing Effect Line OFF	0	1	↑	XX	0	0	1	1	0	1	0	0	34h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Tearing Effect Line ON	0	1	↑	XX	0	0	1	1	0	1	0	1	35h
	1	1	↑	XX	0	0	0	0	0	0	0	M	XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Memory Access Control	0	1	↑	XX	0	0	1	1	0	1	1	0	36h
	1	1	↑	XX	MY	MX	MV	ML	BGR	MH	X	X	XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex

Vertical Scrolling Start Address	0	1	↑	XX	0	0	1	1	0	1	1	1	37h
	1	1	↑	XX	VSP [15:8]								XX
	1	1	↑	XX	VSP [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Idle Mode OFF	0	1	↑	XX	0	0	1	1	1	0	0	0	38h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Idle Mode ON	0	1	↑	XX	0	0	1	1	1	0	0	1	39h

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Interface Pixel Format	0	1	↑	XX	0	0	1	1	1	0	1	0	3Ah
	1	1	↑	XX	0	DPI [6:4]			0	DBI [2:0]			XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Memory Write Continue	0	1	↑	XX	0	0	1	1	1	1	0	0	3Ch
	1	1	↑	D1 [23:0]									XX
	1	1	↑	Dx [23:0]									XX
	1	1	↑	Dn [23:0]									XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Memory Read Continue	0	↓	↑	XX	0	0	1	1	1	1	1	0	3Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	D1 [23:0]									XX
	1	↑	1	Dx [23:0]									XX
	1	↑	1	Dn [23:0]									XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Write Tear Scan line	0	1	↑	XX	0	1	0	0	0	1	0	0	44h
	1	1	↑	XX	N [15:8]								XX
	1	1	↑	XX	N [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Tear Scan Line	0	↓	↑	XX	0	1	0	0	0	1	0	1	45h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	N [15:8]								XX
	1	↑	1	XX	N [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Write Display Brightness value	0	1	↑	XX	0	1	0	1	0	0	0	1	51h
	1	↑	1	XX	DBV [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Display Brightness Value	0	1	↑	XX	0	1	0	1	0	0	1	0	52h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	DBV [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Write CTRL Display value	0	1	↑	XX	0	1	0	1	0	0	1	1	53h
	1	1	↑	XX	0	0	BCTRL	0	DD	BL	0	0	XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read CTRL Display value	0	1	↑	XX	0	1	0	1	0	1	0	0	54h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	0	BCTRL	0	DD	BL	0	0	XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Write Content Adaptive Brightness Control value	0	1	↑	XX	0	1	0	1	0	1	0	1	55h
	1	1	↑	XX	0	0	0	0	0	0	C [1:0]		XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read Content Adaptive Brightness Control value	0	1	↑	XX	0	1	0	1	0	1	1	0	56h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	0	0	0	0	0	C [1:0]		XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Write CABC Minimum Brightness	0	1	↑	XX	0	1	0	1	1	1	1	0	5Eh
	1	1	↑	XX	CMB [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read CABC Minimum Brightness	0	1	↑	XX	0	1	0	1	1	1	1	1	5Fh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	CMB [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read automatic brightness	0	1	↑	XX	0	1	1	0	1	0	0	0	68h

control self-diagnostic result	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:6]		0	0	0	0	0	0	XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read ID1	0	1	↑	XX	1	1	0	1	1	0	1	0	DAh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	ID1 [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Read ID2	0	1	↑	XX	1	1	0	1	1	0	1	1	DBh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	ID2 [7:0]								XX

Command Function	D/CX	RDX	WRX	D [23:8]	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex
Read ID3	0	1	↑	XX	1	1	0	1	1	1	0	0	DCh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	ID3 [7:0]								XX