



8.2. Description of Level 1 Command

8.2.1. NOP (00h)

00h					NOP (N	o Opera	ation)						
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	0	0	0	0	0	0	00h
Parameter					No F	Paramet	er.						
	This comr	mand is an	empty com	ımand; it does not l	nave any	effect or	n the dis	olay mo	dule. Ho	wever it	can be i	used to t	erminate
Description	Frame Me	emory Write	e or Read a	s described in RAM	//WR (Me	mory W	rite) and	RAMRI) (Memo	ory Read	d) Comm	ands.	
	X = Don't	care.											
Restriction	None												
					Status			Ava	ilability				
Б				Normal Mode Or	n, Idle Mo	de Off,	Sleep O	ut	Yes				
Register				Normal Mode O	n, Idle Mo	de On,	Sleep O	ut	Yes				
Availability				Partial Mode Or	, Idle Mo	de Off, S	Sleep Οι	ıt	Yes				
				Partial Mode Or	, Idle Mo	de On, S	Sleep Οι	ıt	Yes				
					Sleep In	1			Yes				
					Status		Default '	Value					
Default				Power	On Sequ	ence	N/A	\					
Delauit				S	W Reset		N/A	\					
				H	W Reset		N/A	1					
Flow Chart	None												





8.2.2. Software Reset (01h)

01h					SV	/RESET							
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	0	0	0	0	0	1	01h
Parameter					No F	aramete	er.						
	When the	Software	Reset com	mand is written, it c	auses a	software	e reset.	It resets	s the co	mmands	and pa	arameter	s to thei
Description				default tables in eac			-	.)					
			emory conte	ents are unaffected b	y this co	mmand							
	X = Don't												
		_		ec before sending ne			_						
Restriction		-		the registers during						_	-		
	necessary	to wait 12	20msec befo	ore sending Sleep or	ut comm	and. So	ftware F	Reset Co	mmand	cannot	be sent	during S	lleep Ou
	sequence												
					Status			Ava	ailability	1			
				Normal Mode On,		de Off, S	Sleep O		Yes	1			
Register				Normal Mode On,	Idle Mo	de On, S	Sleep O	ut	Yes				
Availability				Partial Mode On,	Idle Mo	de Off, S	Sleep Ou	ıt	Yes				
				Partial Mode On,	Idle Mo	de On, S	Sleep Ou	ıt	Yes				
					Sleep In				Yes				
					Status		Default ' N/A						
Default				Power C	V Reset	ence	N/A						
					V Reset		N/A						
						•		<u> </u>					
				SWRESET(01h)									
							[Le	gend		7		
				*						\neg	İ		
						\		Col	mmand		į		
			Disp	olay whole blank scre	een		¦	Par	ameter		į		
					/		(D	isplay		į		
Flow Chart							<	A	ction	>	į		
				*			[] (/lode		į		
			,	Set	\		1		vioue		İ		
				Commands to S/W Default Values				Sequen	tial trans	fer			
							L				;		
				Sleep In Mode									





8.2.3. Read display identification information (04h)

04h				RDDIDIF (Re	ad Disp	lay Ider	tificatio	n Infori	mation)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	0	0	0	1	0	0	04h
1 st Parameter	1	1	1	XX	Х	Х	Х	Χ	Х	Χ	Х	Χ	Х
2 nd Parameter	1	1	1	XX				ID1	[7:0]				XX
3 rd Parameter	1	1	1	XX				ID2	[7:0]				XX
4 th Parameter	1	1	1	XX				ID3	[7:0]				XX
Description Restriction	The 1 st The 2 nd The 3 rd	paramete paramete paramete	r is dumm er (ID1 [7:0 er (ID2 [7:0	its display identificati y data.)]): LCD module's ma]): LCD module/drive]): LCD module/drive	anufactur er versior	er ID.							
Restriction													
					Statu				vailability	/			
Register				Normal Mode (Yes				
				Normal Mode (Yes	_			
Availability				Partial Mode C					Yes Yes				
				1 artial Wode C	Sleep		, Olcop (Jul	Yes				
Default				5	Status On Seq SW Rese	et	See de	It Value scription scription scription	1				
Flow Chart			2nd Param 3rd Param	eter: Dummy Read leter: Send LCD module' eter: Send panel type an eter: Send module/driver	s manufac	turer infor		- 	/	7	F	Display Action Mode	





8.2.4. Read Display Status (09h)

09h				RDI	OST (Re	ad Disp	lay Stat	us)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	0	0	1	0	0	1	09h
1 st Parameter	1	↑	1	XX	Х	Х	Х	Х	Х	Χ	Х	Х	Χ
2 nd Parameter	1	↑	1	XX			I	D [31:25]			0	00
3 rd Parameter	1	↑	1	XX	0	ı	D [22:20]		D [1	9:16]		61
4 th Parameter	1	↑	1	XX	0 0 0			0	0		D [10:8]		00
5 th Parameter	1	↑	1	XX	D [7:5]			0	0	0	0	0	00

This command indicates the current status of the display as described in the table below:

Bit	Description	Value	Status
DO4		0	Booster OFF
D31	Booster voltage status	1	Booster ON
Doo	Davis adduces and an	0	Top to Bottom (When MADCTL B7='0')
D30	Row address order	1	Bottom to Top (When MADCTL B7='1')
Doo	O allegar and decrease and an	0	Left to Right (When MADCTL B6='0').
D29	Column address order	1	Right to Left (When MADCTL B6='1').
Doo	Davida alimana aviahana a	0	Normal Mode (When MADCTL B5='0').
D28	Row/column exchange	1	Reverse Mode (When MADCTL B5='1').
D07	Mautical vaturals	0	LCD Refresh Top to Bottom (When MADCTL B4='0')
D27	Vertical refresh	1	LCD Refresh Bottom to Top (When MADCTL B4='1').
Doc	DCD/DCD and an	0	RGB (When MADCTL B3='0')
D26	RGB/BGR order	1	BGR (When MADCTL B3='1')
Doc	Hard-andal metro-als and an	0	LCD Refresh Left to Right (When MADCTL B2='0')
D25	Horizontal refresh order	1	LCD Refresh Right to Left (When MADCTL B2='1')
D24	Not used	0	
D23	Not used	0	
D22		404	40 hilleber
Dod	Interface color pixel format	101	16-bit/pixel
D21	definition	110	40 hilleber
D20		110	18-bit/pixel
D10	Idla mada ON/OFF	0	Idle Mode OFF
D19	Idle mode ON/OFF	1	Idle Mode ON
D10	Double made ON/OFF	0	Partial Mode OFF
D18	Partial mode ON/OFF	1	Partial Mode ON.
D17	Class IN/OLIT	0	Sleep IN Mode
D17	Sleep IN/OUT	1	Sleep OUT Mode.
D16	Display normal made ON/OFF	0	Display Normal Mode OFF.
D16	Display normal mode ON/OFF	1	Display Normal Mode ON.
D15	Vertical scrolling status	0	Scroll OFF
D14	Not used	0	
D13	Inversion status	0	Not defined
D12	All pixel ON	0	Not defined
D11	All pixel OFF	0	Not defined
D40	Diamin. ON/OFF	0	Display is OFF
D10	Display ON/OFF	1	Display is ON
	Tandana (Kasa) III ON (OFF	0	Tearing Effect Line OFF
D9	Tearing effect line ON/OFF	1	Tearing Effect ON
		000	GC0
		001	
D[8:6]	Gamma curve selection	010	
		011	
		other	Not defined

Description

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		ĺ				0		Made 1 V/ DI	lanking only
		D5	Tearin	g effect line m	ode	1	Mode	Mode 1, V-Bl	king and V-Blanking.
		D4		Notuced		0	iviode		
		D3		Not used		0			
		D3 D2		Not used		0			
		D1		Not used		0			
		D0		Not used		0			
	X = Don			Not used					
Restriction	7. 20								
					Statu	us		Availability	
				Normal Mod	le On, Idle I	Mode C	ff, Sleep Out	Yes	
Register				Normal Mod	le On, Idle	Mode C	n, Sleep Out	Yes	
Availability				Partial Mode	e On, Idle N	Mode O	ff, Sleep Out	Yes	
				Partial Mode	e On, Idle N	Mode O	n, Sleep Out	Yes	
					Sleep	ln .		Yes	
					Status		Default Val	ue	
Default				Powe	er On Sequ	ience	32'h006100	00h	
Default					SW Reset	:	32'h006100	00h	
					HW Reset	į .	32'h006100	00h	
									F
									Legend
				RDD	ST(09h)				
									Command
							Host		
					\		Driver		Display
Flow Chart				Dummy Read : Send D[31:25] d				/	Action
		31	d Parameter:	Send D[19:16] c	display status				7,00,011
				Send D[10:8] dis Send D[7:5] disp					Mode
									Sequential transfer
									ii





8.2.5. Read Display Power Mode (0Ah)

0Ah			<u> </u>			PM (Read	Display	y Power	Mode)					
	D/CX	RDX	WRX		D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑ ↑		XX	0	0	0	0	1	0	1	0	0Ah
1 st Parameter	1	<u>.</u>	1		XX	X	X	X	X	X	X	X	X	X
2 nd Parameter	1	†	1		XX	D7	D6	D5	D4	D3	D2	D1	D0	08
	This co	mmand inc	dicates the	current	t status of th			ibed in t	he table					
				Bit	Value	Booster	escription			Commen	It			
				D7	1	Booster C			_					
			ŀ		0		e Mode		/K					
				D6	1		e Mode							
					0		ial Mode							
				D5	1		ial Mode							
Description				5.	0		ep In M							
				D4	1		ep Out M							
				D3	0	Display I	Normal N	Mode Of	i.					
				,										
			l	Set to '0	,									
	X = Dor	n't care												
Restriction														
						Status	8		A	/ailability	,			
				No	rmal Mode			Sleep C		Yes	7			
Register				No	rmal Mode	On, Idle M	lode On	Sleep (Out	Yes				
Availability				Pa	artial Mode (On, Idle M	ode Off,	Sleep C	ut	Yes				
				Pa	artial Mode (On, Idle M	ode On,	Sleep C	ut	Yes	_			
						Sleep	ln			Yes				
						Status		Default	Value	1				
					Pow	er On Sec	IIIANCA	8'h(
Default					1 000	SW Rese		8'h(
						HW Rese		8'h(•				
										1				
							7				ŗ	L	egend.]
					RDDPN	1(0Ah)					-			一 川
				L							-		ommand	<u> </u>
								lost ————			_	P	arameter	_/
Flow Chart						<u>, </u>	D	river			_ !		Display	\neg \Box
Flow Criart											7 i		Action	> il
			1st Paramete 2nd Paramete		my Read d D[7:2] displa	y power mo	de status			/	/ ¦			\leq \Box
										/	!		Mode	→
											-	Seque	ential trans	sfer
											-			<u> </u>
	<u> </u>													'





8.2.6. Read Display MADCTL (0Bh)

0.2.0. Tie8		. ,		,	RDDMA	DCTL (I	Read Di	splay M	ADCTL)					
	D/CX	RDX	WR	y T	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	↑ ↑	^	XX	0	0	0	0	1	0	1	1	0Bh	
1 st Parameter	1	↑	1		XX	X	X	Х	X	X	X	X	X	X	
2 nd Parameter	1	1	1		XX	D7	D6	D5	D4	D3	D2	D1	D0	00	
	This co	mmand inc	dicates	the curre	nt status of the	display	as desci	ribed in 1	he table			•	•		
			Bit	Value			Descripti				Comi	ment			
			DIL	0	Ton to	Bottom			B7_'0')		Com				
			D7	1		to Top	`					_			
				0		o Right (•		-			
			D6	1		to Left (-			
			D.C.	0		al Mode						-			
			D5	1	Revers	se Mode	(When	MADCT	L B5='1')		-			
Description			D4	0	LCD Refresh	Top to E	Bottom (When M	ADCTL	B4='0')		-			
			D4	B4='1').		-									
			D3			-									
						-									
			D2	0	32='0').										
			- D.4	1	32='1').										
			D1		Set t										
	V D-	D1 Switching between Segment outputs and RAM Set to '0' D0 Switching between Segment outputs and RAM Set to '0' X = Don't care													
	X = Dor	nt care													
Restriction															
				_							_				
						Status	;		A۱	/ailability	,				
Register					lormal Mode O					Yes					
					lormal Mode O					Yes					
Availability					Partial Mode Or					Yes	_				
				-	Partial Mode Or			Sleep C	out	Yes					
						Sleep I	n			Yes					
						Status		Defaul	t Value						
Default					Power	On Seq	uence	8'h	00h						
Delault					S	W Rese	t	No Ch	nange						
					H	IW Rese	t	8'h	00h						
											г				
												L	.egend	- []	
					RDDMADCT	L(0Bh)							ommand		
								lost				7		=	
											-		arameter	=	
Flow Chart	_							river			\rightarrow !		Display		
			1st Para	meter: Du	mmy Read						/		Action	>	
					nd D[7:2] display	power mo	de status			/	/		Mode	\neg $ $	
										/	-			_	
												Seque	ential trans	sfer	
														<u> </u>	





8.2.7. Read Display Pixel Format (0Ch)

0Ch							RDDCO	LMOD (I	Read Di	spla	y Pix	cel F	orm	at)				
	D/CX	RDX	V	/RX	Т		017-8	D7	D6	D	5	D4	П	D3	D2	D1	D0	HEX
Command	0	1		↑			XX	0	0	C)	0		1	1	0	0	0Ch
1 st Parameter	1	1		1			XX	Χ	Χ	X	(Χ		Χ	Χ	Х	Χ	Х
2 nd Parameter	1	1		1			XX	RIM		DPI	[2:0]			0		DBI [2:0]		06
	This co	mmand	indica	ates 1	the c	urrei	nt status of th	ne displa	y as des	cribe	ed in	the t	able	below	:			
			RIM	DI	PI [2:	0]	RGB Into	erface F	ormat		DI	BI [2:	0]	MCL	J Interfac	ce Forma	ıt	
			0	0	0	0		eserved			0	0	0		Reser			
			0	0	0	1	Re	eserved			0	0	1		Reser	ved		
			0	0	1	0	Re	eserved		_	0	1	0		Reser	ved		
		-	0	0	1	1		eserved		4	0	1	1		Reser			
5		-	0	1	0	0		eserved		_	1	0	0		Reser			
Description		-	0	1	0	1		oits / pixe		4	1	0	1		16 bits /			
		-	0	1	1	0		oits / pixe	el	\dashv	1	1	0		18 bits /			
			0	1	1	1		eserved oits / pixe	N.	\dashv	1	1	1		Reser	vea		
			1	1	0	1	(6-bit 3 tim											
		-						oits / pixe		7								
			1	1	1	0	(6-bit 3 time											
	X = Dor	X = Don't care																
Restriction																		
riestriction																		
								Ct-t					۸.	الله والم				
						N	ormal Mode	Stat		ff CI	oon	Out	A۱	/ailabilit Yes	ty			
Register							ormal Mode							Yes	\dashv			
Availability							artial Mode (Yes				
Availability							artial Mode (Yes				
								Sleep						Yes				
				Γ						D	efau	It Va	ue					
						S	tatus	F	RIM		DPI	l [2:0		DB	I [2:0]			
Default					Pow	ver C	n Sequence	1	'b0		3't	0000		3'	b110			
				ļ		SW	/ Reset	No	Chang		No (Chan	g	No	Chang			
				L		HV	/ Reset	1	'b0		3't	0000		3'	b110			
															ŗ		egend	
															-		.egend	<u> </u>
							RDDCOLM	MOD(0Ch)							-		command	
										Hos	t				-	P	'arameter	-
										– – - Drive	– – – er						Display	= $ $
Flow Chart	_						V	<u>'</u>							— i			</td
							nmy Read								/ i	<_	Action	<i>→</i>
			2n	o Para	amete	r: Se	nd D[7:2] displa	y pixel for	mat statu:	5				/	/ :		Mode	
														/	ļ			_
															j	Seque	ential trar	sfer
															i.			





8.2.8. Read Display Image Format (0Dh)

0Dh					RDDI	IM (Read	d Displa	y Image	Mode)					
	D/CX	RDX	WRX	D17	-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	(0	0	0	0	1	1	0	1	0Dh
1 st Parameter	1	1	1	XX		Х	Х	Х	Х	Х	Х	Х	Х	Х
2 nd Parameter	1	1	1	XX	(0	0	0	0	0		D [2:0]		00
Description	This cor		dicates the	current sta	D [2 00 00 01 01 Oth	2:0] 0 1 0 1	Gamr	Description a curve	tion e 1 (G2.2					
Restriction														
Register Availability				Norma Partia	al Mode C al Mode C I Mode C I Mode C	On, Idle I On, Idle I	Mode Of Mode Or Mode Off Mode On	, Sleep , Sleep (Out Out Out	vailabilit Yes Yes Yes Yes Yes	у			
Default				P	ower On SW I	Reset	се	3'b 3'b	o000 0000 0000					
Flow Chart		HW Reset 3'b000 RDDIM(0Dh)												





8.2.9. Read Display Signal Mode (0Eh)

0Eh				R	DDSM (Rea	ad Displ	ay Sign	al Mode	<u>:</u>)						
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX		
Command	0	1	1	XX	0	0	0	0	1	1	1	0	0Eh		
1 st Parameter	1	1	1	XX	Х	Χ	Х	Х	Х	Χ	Χ	Х	Х		
2 nd Parameter	1	1	1	XX	D7	D6	D5	D4	D3	D2	D1	D0	00		
Description	This co		ndicates t	he current status Bit Value D7	Tearing e Tearing e Tearing e Tearing e Horizonta Horizonta Vertical s Vertical s Pixel cloo Pixel cloo Data ena Data ena Reserver Reserver	effect line effect	Description OFF ON OM OFF ON OM OFF ON OM OFF ON OM OFF ON OM OFF ON OM OFF OM OFF OM OM OM OM OM OM OM OM OM OM OM OM OM	erface) (erface) (oace) OFace) ONaB interface) (all interface) (all interface) (all interface)	OFF ON F ace) OFF ace) ON						
Restriction															
Register Availability		Status Availability Normal Mode On, Idle Mode Off, Sleep Out Yes Normal Mode On, Idle Mode On, Sleep Out Yes Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes Sleep In Yes													
Default				F	Statu Power On S SW Re HW Re	equence set	8'	ult Value h00h h00h h00h							
Flow Chart				meter: Dummy Read meter: Send D[7:0] d	DSM(0Eh)		Host Driver					Legenc Command Parameter Display Action Mode			





8.2.10. Read Display Self-Diagnostic Result (0Fh)

0Fh				RDDSDF	R (Read D	isplay S	Self-Diag	gnostic	Result)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	0	0	1	1	1	1	0Fh
1 st Parameter	1	↑	1	XX	Х	Χ	Χ	Х	Χ	Χ	Χ	Х	Χ
2 nd Parameter	1	1	1	XX	D7	D6	0	0	0	0	0	0	00
	Bit	_	Descripti						ction				
	D7		ter Loading	1	Invert the						operly.		
	D6		nctionality D		Invert the	e D6 bit	if the dis	splay is f		lity			
Description	D5		Not Use						'0'				
Description	D4 D3		Not Use						'0'				
	D3	+	Not Use						·0'				
	D1		Not Use						ʻ0'				
	D0		Not Use						·0'				
				,									
Restriction													
					0:								
				A1 184 1	Sta		N// OI		Availabil	ity			
Register				Normal Mod Normal Mod					Yes Yes	_			
				Partial Mode					Yes	\dashv			
Availability				Partial Mode					Yes	_			
				i artiar wood	Slee		n, olcci	Jour	Yes				
					Statu	ıc	Dofo	ault Valu					
				Po	wer On S			3'h00h	5				
Default				10	SW Re			3'h00h					
					HW Re			3'h00h					
						,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							
												Legend	d
				RDDS	SDR(0Fh)					į			一 i l
										į		Command	<u> </u>
							Host			!		Parameter	<u>/ il</u>
Flow Chart					\rightarrow		Driver			!		Display	
Flow Chart												Action	₹ il
				Dummy Read : Send D[7:6] disp	olay self-dia	gnostic st	atus						\leq il
										/		Mode	_/ i
											Sen	uential trar	nsfer
											-		
										l			'





8.2.11. Enter Sleep Mode (10h)

10h					SPLIN	(Enter S	Sleep Mo	ode)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	0	1	0	0	0	0	10h
Parameter						No Parai	meter						
	This comn	nand cause	es the LCD	module to e	nter the	minimur	n power	consu	mption me	ode. In t	this mod	le e.g. th	e DC/DC
	converter i	s stopped,	Internal osci	llator is stopp	ed, and	panel sca	anning is	stoppe	ed.				
Description													
	MCU interf	face and me	emory are st	ill working an	d the me	mory ke	eps its co	ontents					
	X = Don't o	care											
			o effect who	en module is	already	in sleen	in mode	. Sleer	n In Mode	can onl	v he left	hv the S	Sleen Out
				sary to wait	-	-					-	-	-
Restriction				-			_						
				ilize. It will be		ary to wai	t 120ms	ec atter	sending 8	sleep Ou	it comma	and (wher	ı in Sieep
	In Mode) b	efore Sleep	o In commar	nd can be sen	it.								
			Г		Sta	ntus			Availabili	tv			
				Normal Mode			Off, Sleep	Out	Yes	_			
Register			-	Normal Mode					Yes				
Availability			-	Partial Mode					Yes				
			-	Partial Mode		ep In	n, Sieep	Out	Yes Yes				
					Statu	S	Defa	ult Valu	ie				
Default				Pow		equence		IN Mo					
Boladit					SW Re			IN Mo					
					HW Re	set	Sleep	IN Mo	de				
	It takes 12	0msec to g	et into Sleep	In mode afte	r SLPIN	commar	nd issued	d.					
										ļ-:		egend	
						▼					_	egena	<u> </u>
						· ·					С	ommand	
		SPLIN (10	h)			p DC/DC					P	arameter	7 i
						onverter				l		Display	\dashv :
					\		_/			-			-/ i
	Disasta		-1	\		\downarrow				-	<_	Action	> ¦
Flow Chart	(Autom	y whole blar natic No effe	ct to DISP			· · ·				İ		Mode	
	ON	I/OFF comm	nands)	/	Sto	p Interna	1			ij			_
			/		/	scillator				į	Seque	ential trans	fer
		\downarrow			\		_/			i			≤
	/	▼				\downarrow							
		Drain char from LCI	ge \		Slee	ep In Mod	Α						
		panel	- /		0.00	V الالالا							
	\		/										

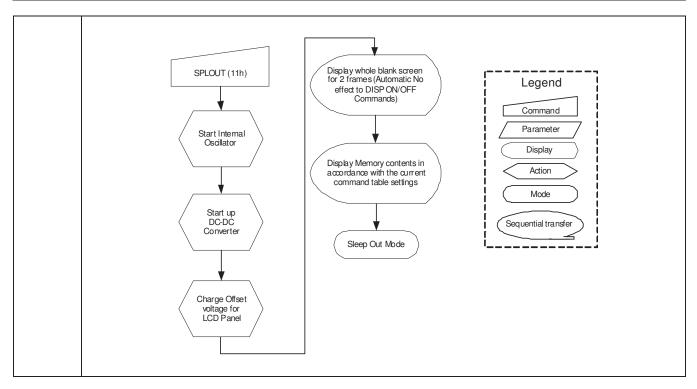




8.2.12. Sleep Out (11h)

11h					SLF	POUT (SI	eep Out	:)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	0	1	0	0	0	1	11h
Parameter						No Parai	neter						
Description		de e.g. the [off sleep mod	de. erter is enabl	ed, Inter	nal oscilla	ator is sta	arted, a	nd panel :	scanning	is starte	ed.	
Restriction	Command and clock 5msec and when this I functions of	(10h). It wi circuits stal d there can oad is done during this 5	Il be necessabilize. The denot be any are and when the	en module is ary to wait 5m display module abnormal visuabne the display me be necessare sent.	nsec before loads a	ore sendi all display on the d	ng next o r supplie display in Gleep Ou	commarer's factor mage if t -mode	nd, this is only default factory defactory def	to allow to allow to allow to allow to allow to allow to allow the allow to allow the allow to allow the allow to allow the allow to allow the allow to allow the allow to allow the allow to allow the allow to allow the allow to allow the allow to allow the	ime for to to the red d registe	he supplegisters or values	y voltages during this are same diagnostic
Register Availability				Normal Mode Normal Mode Partial Mode Partial Mode	e On, Idle e On, Idle e On, Idle e On, Idle	e Mode C Mode O	n, Sleep ff, Sleep	Out Out Out	Availabili Yes Yes Yes Yes Yes	ty			
Default				Pov	Statu ver On S SW Re HW Re	equence eset	Sleep	ult Valu IN Mod IN Mod	le le				
Flow Chart	It takes 12	0msec to b	ecome Slee	p Out mode a	fter SLP	OUT con	nmand is	sued.					









8.2.13. Partial Mode ON (12h)

12h					PTLO	N (Partia	I Mode (On)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	0	1	0	0	1	0	12h
Parameter						No Para	meter						
Description		de, the Nor	-	node The part				-	the Part	ial Area	commar	nd (30H).	To leave
Restriction	This comm	nand has no	effect when	n Partial mode	e is active	Э.							
				Normal Mode	Sta e On. Idle		Off. Sleep		Availabili Yes	ty			
Register			Ī	Normal Mode					Yes				
Availability				Partial Mode	On, Idle	Mode C	off, Sleep	Out	Yes				
,				Partial Mode	On, Idle	Mode C	n, Sleep	Out	Yes				
					Slee	p In			Yes				
Default				Power Or	atus n Sequer Reset Reset	No	Defa ormal Dis ormal Dis	play Mo	de ON de ON				
Flow Chart	See Partia	l Area (30h)										





8.2.14. Normal Display Mode ON (13h)

13h				NORON	(Norm	al Displa	ay Mod	e On)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	0	1	0	0	1	1	13h
Parameter					No F	Paramete	er						
Description	Normal di	splay mod	e on means	ay to normal mode. Partial mode off. I mode On command	l (12h)								
Restriction	This com	mand has i	no effect wh	nen Normal Display r	node is	active.							
Register Availability				Normal Mode On, Normal Mode On, Partial Mode On, Partial Mode On,	Idle Mo	de On, S de Off, S de On, S	Sleep Ou Sleep Ou	ut ut it	Yes Yes Yes Yes Yes Yes	-			
Default				Status Power On Sec SW Rese	et	Norma Norma	al Displa	Value y Mode y Mode y Mode	ON				
Flow Chart	See Partia	al Area (30	h)										





8.2.15. Display Inversion OFF (20h)

20h		,)		/OFF (Dis	nlay Inya	reion OF	E)				
2011		l		I					ı	T _	I	T _	I
Commercial	D/CX	RDX	WRX	D17-8	D7	D6 0	D5	D4	D3	D2	D1	D0	HEX
Command Parameter	0	1	1	XX	0		1 Paramete	0	0	0	0	0	20h
raiaiiielei	This co	mmand	is used t	o recover from o	dienlay inv			:1					
	This co	mmand	makes n	o change of the	content c	of frame me	emory.						
	This co	mmand	doesn't d	change any othe	er status.								
				Mem	norv				Display I	Panel			
						1		1.1					
Description						\pm					_		
Description						+	N	-			_		
						$ \perp$	\Box						
						+	V				_		
						\perp					_		
						+		+	+++		_		
	X = Do	n't care											
B	-			<i>"</i>									
Restriction	I his co	mmand	nas no e	ffect when mode	ule alread	y is invers	ion OFF i	mode.					
						0							
				Norma	al Mode C	Status On, Idle Mo	do Off S	leen Out	Availab Yes				
Register						On, Idle Mo			Yes				
Availability						n, Idle Mo			Yes				
				Partia	al Mode C	n, Idle Mo		leep Out	Yes				
						Sleep In			Yes				
					Sta	atus		Default Va	lue				
Default				F	Power On	Sequence	Displa	ay Inversi	on OFF				
Boldan						Reset		ay Inversi					
					HW	Reset	Displa	ay Inversi	on OFF				
							ר <u>י</u> ן יו ר		Legen	d	7		
				Display In	version O	n Mode) į		090				
							/ ¦		Comman	d	Ì		
							I I		Paramete		ļ		
							į		i ai airiicid				
Flow Chart				INV	/OFF(20h	1)	-		Display		1		
1 low Onart									Action		į		
							1						
							į		Mode		l I		
				Display In	version O	ff Mode) ¦				į		
								Sequ	ıential tra	nster	}		
							i,						
	<u>I</u>												





8.2.16. Display Inversion ON (21h)

21h					DIN	VON (Dis	splay Inve	rsion ON)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	1	0	0	0	0	1	21h
Parameter						No	Paramete	r					
Description	This co	mmand	l doesn't d	o change of the change any other mode, the Dis	er status.						ame men	nory to the	e display.
Postriotion	X = Doi		l l	ffoot when me	dula alroad	v ia invar	nion ON m	odo.		111		1	
Restriction	inis co	ııımano	паѕ по е	ffect when mo	uule alread	y is invers	SIUII UN M	oue.					
Register Availability				Norr Part	nal Mode C nal Mode C ial Mode O ial Mode O	n, Idle Mo n, Idle Mo	ode Off, S ode On, S ode Off, Sl ode On, Sl	leep Out eep Out	Yes Yes Yes Yes Yes	; ;			
Default				Pow	Status er On Sequ SW Reset HW Reset		Displa Displa	Default Val ay Inversionay Inversionay Inversional	on OFF				
Flow Chart					IVON(21h)				Leger Comman Paramet Display Action Mode	er /			





8.2.17. Gamma Set (26h)

26h			,		GAM	SET (Ga	mma S	et)					
	D/CV	BDV	WRX	D17.0				1	Da	Da	D1	DO	HEV
Command	D/CX 0	RDX 1	VV ⊓∧ ↑	D17-8 XX	D7 0	D6 0	D5 1	D4 0	D3 0	D2 1	D1 1	D0 0	HEX 26h
Parameter	1	1	<u> </u>	XX	0	U		1	7:0]	'	'		01
- aramotor				ne desired Ga	amma cı	rve for th	ie curre			imum of	4 fixed o	iamma c	
									•				
	be selecte	a. The curv	e is selected	by setting th					r as descr	ibea in tr	ne rabie		
				GC [7:	0]		/e Selec						
Description				01h 02h		Gamma	curve 1	(G2.2)					
Besonption				02h									
				08h									
	Note: All o	ther values	are undefin	<u> </u>									
	X = Don't	naro											
Restriction	Values of	GC [7:0] no	t shown in ta	able above ar	e invalid	and will r	not char	ige the d	current se	lected G	amma cı	urve until	valid
	value is re	ceived.											
			_										
						itus			Availabili	ty			
Register				Normal Mode					Yes				
			-	Normal Mode					Yes				
Availability			-	Partial Mode Partial Mode					Yes Yes				
				T ditial Mode		p In	11, Oloop	, out	Yes				
			_					•					
					Stati			ult Valu	е				
Default				Pov		equence		'h01h	_				
					SW R			<u>'h01h</u> 'h01h					
					1100 110	3301	1 0	110 111					
							į		Lege	end	-		
				GAMSET	(26h)			_			1 İ		
							I		Comm	and]		
							Ì	i /	Param	eter	7 !		
							— ¦			=	i		
Flow Chart				st Parameter	· GC[7·0]		/ j		Displa	ıy)		
1 low Chart				ot i aramotor	. 40[1.0]		ľ	' <	Actio	n	,		
		Δ	<u>'</u>			/	($\overline{}$	(i		
				\downarrow			į		Mod	e) <u> </u>		
							 	 _/			, į		
				New Gamma			Ì	S	equential	transfer	$) \mid \cdot$		
				Loade	α								





8.2.18. Display OFF (28h)

28h			11 (20	,		DISPOF	F (Displa	y OFF)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	1	0	1	0	0	0	28h
Parameter		•			•	No	Paramet	er		•	•	•	•
	page in	nserted. ommand	I makes n	o enter into DIS to change of containing any other	ntents of f her status on the dis	rame mer		de, the ou			emory is c	disabled a	nd blank
Description	V. D.			Mer	mory				Display F	Panel			
	-	n't care											
Restriction	This co	ommand	l has no e	effect when mod	ule is alre	ady in dis	play off n	node.					
Register Availability				Norm Partia	al Mode (al Mode C		ode Off, S ode Off, S ode Off, S		Availab Yes Yes Yes Yes	; ;			
Default						Status er On Seq SW Rese HW Rese	uence t	Default Va Display O Display O Display O	FF FF				
Flow Chart				DISF	POFF (28h			Sec	Comman Paramet Display Action Mode	nd der /			





8.2.19. Display ON (29h)

29h		, ,	14 (231	-,		DISDOI	N (Displa	av ON)					
2911	D (0) (1451	D.17.0	T ==	T	T	1			T 5.	T 50	11574
Command	D/CX 0	RDX 1	WRX	D17-8 XX	D7 0	D6 0	D5 1	D4 0	D3 1	D2 0	D1 0	D0 1	HEX 29h
Parameter	U] 0		Parame		ı	1 0] 0	!	2911
· aramotor	This co	ommand	l makes n	o recover from to change of col	ntents of f	OFF mod	le. Outpu		rame Me	emory is e	nabled.		
Description				Memory				+	Disp	olay Par	iel	- - - - -	
Restriction		on't care		effect when mod	lule is alre	ady in dis	play on ı	mode.	++-	 	 	-	
Register Availability				Norm Parti	al Mode C al Mode C	On, Idle M On, Idle Mo	ode Off, ode On, ode Off, ode On,	Sleep Out Sleep Out Sleep Out Sleep Out	Availab Yes Yes Yes Yes				
Default						Status er On Seq SW Rese HW Rese	t	Default Va Display Of Display Of Display Of	=F =F				
Flow Chart				DI	SPON(29)	n)			Paramete Display Action Mode		·		





8.2.20. Column Address Set (2Ah)

8.2.20. C	Colum	ın Add	dress	Set (2Ah)									
2Ah					CA	SET (Col	umn Ad	dress Set)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	1	0	1	0	1	0	2Ah
1 st Parameter	1	1	1	XX	SC15	SC14	SC13	SC12	SC11	SC10	SC9	SC8	Neted
2 nd Parameter	1	1	1	XX	SC7	SC6	SC5	SC4	SC3	SC2	SC1	SC0	Note1
3 rd Parameter	1	1	1	XX	EC15	EC14	EC13	EC12	EC11	EC10	EC9	EC8	Note 1
4 th Parameter	1	1	1	XX	EC7	EC6	EC5	EC4	EC3	EC2	EC1	EC0	Note1
Description	other of represe	driver sta	atus. Th	to define area of e values of SC line in the Frame	[15:0] a	nd EC [18			hen RAN			_	
Restriction	Note 1	: When S	SC [15:0	be equal to or les] or EC [15:0] is ç = 1), data of out o	reater t	nan 00EF		MADCTL'	s B5 = 0)	or 013Fh			
Register Availability				Normal Partial	Mode C Mode O	n, Idle Mo n, Idle Mo	de On, de Off, S de On, S	Sleep Out Sleep Out Sleep Out	Availab Yes Yes Yes Yes	5 5			
Default			Pov	Status wer On Sequence SW Reset	<u> </u>	15:0]=000 15:0]=000	Oh If I	Default Va E0 MADCTL's MADCTL's	D [15:0]=0 B5 = 0: E	C [15:0]=			

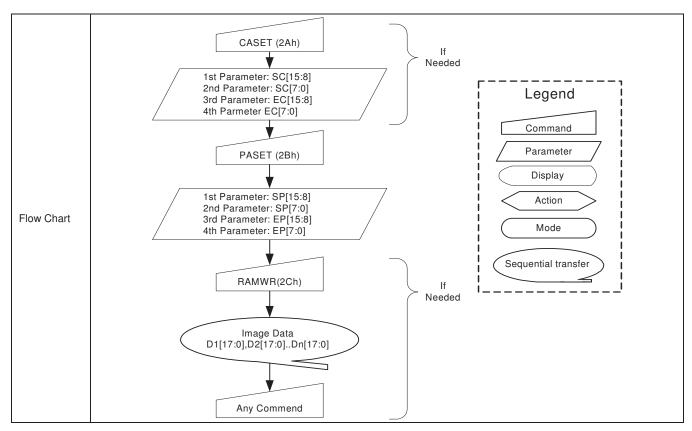
SC [15:0]=0000h

EC [15:0]=00EFh

HW Reset









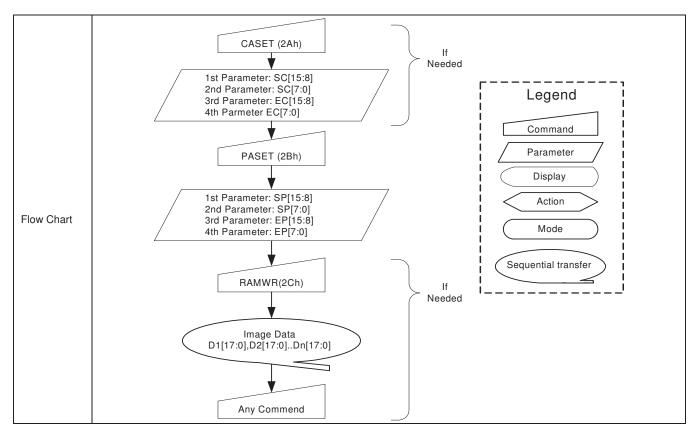


8.2.21. Page Address Set (2Bh)

2Bh				Ct (ZDII)	P	ASET (Pa	age Ag	ddre	ess Set)					
	D/CX	RDX	WRX	D17.0			Ī			Da	Do	D1	DO	ПЕЛ
Command	0	1		D17-8 XX	D7 0	D6 0	D5)	<u>D4</u> 0	D3 1	D2 0	D1 1	D0 1	HEX 2Bh
1 st Parameter	1	1	<u> </u>	XX	SP15	SP14	SP1	13	SP12	SP11	SP10	SP9	SP8	2011
2 nd Parameter	1	1		XX	SP7	SP6	SP		SP4	SP3	SP2	SP1	SP0	Note1
3 rd Parameter	1	1	<u> </u>	XX	EP15	EP14	EP1		EP12	EP11	EP10	EP9	EP8	
4 th Parameter	1	1	<u></u>	XX	EP7	EP6	EP		EP4	EP3	EP2	EP1	EP0	Note1
Description	This co	ommand Iriver sta	atus. Th	to define area of e values of SP ne in the Frame I	f frame r [15:0] a	nemory w	here I	MCL	J can acc	ess. This	comman	d makes	no chang	
Restriction	SP [15			be equal to or le			n (Whe	en M	IADCTL's	s B5 = 0)	or 00EFh	(When M	ADCTL's	B5 = 1).
			_		y		(, ,		(
	data of	out of ra	ange will	be ignored.										
						Status				Availab				
Register						n, Idle M				Yes				
_						n, Idle Mo				Yes				
Availability						n, Idle Mo				Yes				
				Partial	Mode O	n, Idle Mo		n, Sle	eep Out	Yes				
						Sleep II	n			Yes	3			
				01-1				_	- f lt \ / -	.t				
			Day	Status	0 601	15:01 000	noh		efault Va					
Default			Po	wer On Sequenc		15:0]=000			[15:0]=01 ADCTL's		EP [15:0]=	:013Fh		
				SW Reset	SP [15:0]=000)()h				EP [15:0]=			
				HW Reset	SP [15:0]=000	00h	EP	[15:0]=01	3Fh				
L														











8.2.22. **Memory Write (2Ch)**

	y ***	ne (2	011)											
						RAMW	VR (Memo	ry Write)					
D/CX	RDX	WRX	D1	7-8	D7	D6	D5	D ₁	4	D3	D2	D1	D0	HEX
t		1	>	(X	0	0	1			1	1	0	0	2Ch
<u> </u>		1												XX
1		1												XX
†	1	d is used	to trans	sfer data	from MC	CU to fr				mmand r	nakes no	change to	o the oth	
								-				_		
				-			-		_	_				
Page p	ositions	s. The St	art Colu	ımn/Star	t Page po	sitions	are differ	ent in ac	cord	ance witl	n MADCT	L setting.) Then D	[17:0] is
stored	in frame	e memor	y and th	e colum	n register	and th	ne page re	gister in	crem	ented. Se	ending ar	y other co	ommand o	can stop
frame	Write. X	(= Don't	care.											
In all c	olor mo	des, ther	e is no i	restrictio	n on leng	th of pa	arameters							
						Stat	tus			Availab	oility			
				Norma	al Mode C			, Sleep	Out					
				Norma	al Mode C	n, Idle	Mode On	, Sleep	Out	Yes				
				Partia	l Mode O	n, Idle	Mode Off,	Sleep (Dut	Yes				
				Partia	l Mode O			Sleep (Dut					
						Slee	p In			Yes				
				(Status			Defaul	t Val	ue				
						nce								
			L	110	v neset		Contents	or men	iory	S HOL CIE	areu			
							_)						
			C	CASET (2	2Ah)				lf					
		/		V										
		/ 2	nd Para	meter: S	C[7:0]					Ĺ		ond	1	
										į	Leg	enu	, İ	
				<u> </u>	<u> </u>)		. [Com	mand] [
				ACET (C	NDL)					/	Para	meter	7 İ	
				ASET (2	2011)					_			\ i	
				V	2(45.0)						Dist	Diay	' i	
		/ 2	nd Para	meter: S	P[7:0]						Act	tion	>	
										(Mo	ode) !	
					[]		_/							
										(Sequentia ~	al transfer) [
			R	RAMWR(2	2Ch)			>		i			i	
				\forall				1100	ucu					
)							
			_		\ll]								
			Α	ny Comn	nend			J						
	D/CX 0 1 1 1 This constatus. Page page page page page page page page p	D/CX RDX 0 1 1 1 1 1 1 1 This command status. When Page positions stored in frame frame Write. X	D/CX RDX WRX 0 1 ↑ 1 1 ↑ 1 1 ↑ This command is used status. When this com Page positions. The St stored in frame memory frame Write. X = Don't In all color modes, ther	D/CX RDX WRX D1 0 1 ↑	D/CX RDX WRX D17-8 0 1 ↑ XX 1 1 ↑ ↑ 1 1 ↑ ↑ This command is used to transfer data status. When this command is accept Page positions. The Start Column/Star stored in frame memory and the column frame Write. X = Don't care. In all color modes, there is no restriction Normal Normal Partial Partial Partial Partial Partial Parameter: Signal Parameter: Signal Parameter: Signal Parameter: Elements of the Passet (2) 1st Parameter: Signal Parameter: Signal Parameter: Elements of the Passet (2) 1st Parameter: Signal Parameter: Elements of the Passet (2) 1st Parameter: Signal Parameter: Elements of the Passet (2) 1st Parameter: Elements of the Passet (2) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Parameter: Signal Parameter: Elements of the Passet (3) 1st Parameter: Signal Passet (3) 2nd Parameter: Signal Passet (3) 2nd Parameter: Signal Passet (3) 2nd Parameter: Signal Passet (3) 2nd Parameter: Signal Passet (3) 2nd Passet	D/CX RDX WRX D17-8 D7 0 1 ↑ XX 0 1 1 ↑ ↑ This command is used to transfer data from MC status. When this command is accepted, the company and the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, there is no restriction on length of the column register frame Write. X = Don't care. In all color modes, the column register frame Write. X = Don't care. In all color modes, the column register frame Write. X = Don't care. In all color modes, the column register frame Write. X = Don't care. In all color modes, the column register frame Write. X = Don't care. In all color modes, the column register frame Write. X = Don't care. In all color modes, the column register frame Write. X = Don't care. In all color modes, the column register	D/CX RDX WRX D17-8 D7 D6 0 1 ↑ XX 0 0 0 1 1 ↑ XX 0 0 0 1 1 ↑ This command is used to transfer data from MCU to f status. When this command is accepted, the column Page positions. The Start Column/Start Page positions stored in frame memory and the column register and the frame Write. X = Don't care. In all color modes, there is no restriction on length of partial Mode On, Idle Normal Mode On, Idle Partial Mode On, Idle Partial Mode On, Idle Slee Status Power On Sequence SW Reset HW Reset CASET (2Ah) 1st Parameter: SC[15:8] 2nd Parameter: SC[7:0] 1st Parameter: EP[15:8] 4th Parmeter EC[7:0] RAMWR(2Ch) RAMWR(2Ch)	RAMWR (Memor D/CX RDX WRX D17-8 D7 D6 D5 0 1 ↑ XX 0 0 0 1 1 1 1 ↑ 1 1 ↑ 1 1 ↑ This command is used to transfer data from MCU to frame memor status. When this command is accepted, the column register and Page positions. The Start Column/Start Page positions are differ stored in frame memory and the column register and the page reframe Write. X = Don't care. In all color modes, there is no restriction on length of parameters Normal Mode On, Idle Mode Off	D/CX RDX WRX D17-8 D7 D6 D5 D-	PAMWR (Memory Write) D/CX RDX WRX D17-8 D7 D6 D5 D4 0 1 1 XX 0 0 1 1 0 1 1 1 1 D1 D1 [17:0] 1 1 1 D D1 [17:0] This command is used to transfer data from MCU to frame memory. This costatus. When this command is accepted, the column register and the page Page positions. The Start Column/Start Page positions are different in accord stored in frame memory and the column register and the page register increm frame Write. X = Don't care. In all color modes, there is no restriction on length of parameters. Status Normal Mode On, Idle Mode Off, Sleep Out Partial Mode On, Idle Mode On, Sleep Out Partial Mode On, Idle Mode On, Sleep Out Sleep In Status Power On Sequence Contents of memory is SW Reset Contents of memory in HW Reset Con	D/CX RDX WRX D17-8 D7 D6 D5 D4 D3	Dicx RDX WRX D17-8 D7 D6 D5 D4 D3 D2	DiCX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1	Dicx RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1 D0





8.2.23. Color Set (2Dh)

2Dh	RGBSET (Color Set)													
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	0	0	1	0	1	1	0	1	2Dh	
1 st Parameter	1	1	1	XX	0	0			XX					
n th Parameter	1	1	1	XX	0	0	Rnn [5:0]							
32 nd Parameter	1	1	1	XX	0	0			R31	[5:0]			XX	
33 rd Parameter	1	1	1	XX	0	0			G00	[5:0]			XX	
n th Parameter	1	1	1	XX	0	0	Gnn [5:0]							
96 th Parameter	1	1	1	XX	0	0			G64	[5:0]			XX	
97 th Parameter	1	1	1	XX	0	0			B00	[5:0]			XX	
n th Parameter	1	1	1	XX	0	0			Bnn	[5:0]			XX	
128 th Parameter	1	1	1	XX	0	0			B31	[5:0]			XX	
Description	128 byt	This command is used to define the LUT for 16-bit to 18-bit color depth conversion. 128 bytes must be written to the LUT regardless of the color mode. Only the values in Section 7.4 are referred. This command has no effect on other commands, parameter and contents of frame memory. Visible change takes effect next time the frame memory is written to.											s effect	
Restriction														
	Status Availability													
	Status Availability Normal Mode On, Idle Mode Off, Sleep Out Yes													
Register							de On, Sl		Yes					
Availability									Yes					
Availability		Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes												
		Sleep In Yes												
Default	Status Default Value Power On Sequence Random values SW Reset Contents of LUT protected HW Reset Random values													
Flow Chart	RGBSET (2Dh) Command 1st Parameter: R00[5:0] 32nd Parameter: R31[5:0] 33rd Parameter: G00[5:0] 96th Parameter: G63[5:0] 97th Parameter: B00[5:0] 128th Parameter: B31[5:0] Mode Sequential transfer													

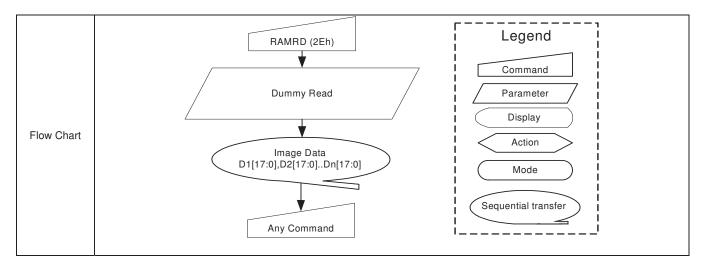




8.2.24. Memory Read (2Eh)

2Eh						RAMRD	(Memory	Read)						
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HE	
Command	0	1	VV □ ∧	XX	0	0	1	0	1	1	1	0	2E	
1 st Parameter	1	1	↑	XX	X	X	X	X	X	X	X	X	X	
2 nd Parameter	1	1	†	7//			•	1 [17:0]	, , ,		Ι Λ		X	
:	1	1	†		Dx [17:0]									
(N+1) th Parameter	1	1	1		Dn [17:0]									
Description	If Mem The co frame column increm proces If Mem The co frame proces	ory According or According or According are reacted by property or According or Acc	ess contrad page reat (SC, er equals Pixels are ess Contrad page rat (SC, et at (SC, et	rs image data set_column_ad ol B5 = 0: egisters are re SP). The colu the End Colu read from the er command. rol B5 = 1: egisters are re SP). The page I Page (EP) va e frame memorid.	set to the mn regist mn (EC) frame moset to the register is thus. The part of the set to the part of t	Start Coli er is ther value. The emory un Start Coli s then inco	e_address umn (SC) n incremented column (SC) cremented ster is the	and Start nted and register register and Start and pixe	Page (SP pixels read is then read requals the Page (SP ls read from SP and), respected from the set to SC re End Particle (), respected mush the frainthe columns.	tively. Pixelie frame rolling and the age (EP) vitively. Pixelie memonan register	els are reamemory upage regional value or the els are reamy until the residue increments.	ad fro intil th sister the ho ad fro ad fro e pag nente	
	There is no restriction on length of parameters.													
Restriction	There	s no res	triction o	n length of par	ameters.									
Restriction	There	s no res	triction o	n length of par	ameters.	Status			Availabi	lity				
Restriction	mere	s no res	triction o				ode Off, SI	leep Out	Availabi Yes	lity				
Restriction	THEIE	s no res	triction o	Norma	al Mode O	n, Idle Mo	ode Off, Sl			lity				
Register	There	s no res	striction o	Norma Norma	al Mode O al Mode O	n, Idle Mo n, Idle Mo		eep Out	Yes	lity				
	There	s no res	striction o	Norma Norma Partia	al Mode O al Mode O ıl Mode Oı	n, Idle Mo n, Idle Mo n, Idle Mo	ode On, SI	eep Out	Yes Yes	lity				
Register	There	s no res	etriction o	Norma Norma Partia	al Mode O al Mode O ıl Mode Oı	n, Idle Mo n, Idle Mo n, Idle Mo	ode On, Sl ode Off, Sl ode On, Sl	eep Out	Yes Yes Yes	lity				
Register	mere	s no res	triction o	Norma Norma Partia	al Mode O al Mode O Il Mode O Il Mode O	n, Idle Mo n, Idle Mo n, Idle Mo n, Idle Mo	ode On, Sl de Off, Sl de On, Sl d	eep Out eep Out	Yes Yes Yes Yes Yes Yes	lity				
Register Availability	mele	s no res	triction o	Norma Norma Partia Partia	al Mode O al Mode O Il Mode O Il Mode O Il Mode O	n, Idle Mo n, Idle Mo n, Idle Mo n, Idle Mo Sleep Ir	ode On, Sl ode Off, Slo ode On, Slo	eep Out eep Out eep Out	Yes Yes Yes Yes Yes Yes					
Register	mele	s no res	triction o	Norma Norma Partia Partia	al Mode O al Mode O Il Mode O Il Mode O	n, Idle Mo n, Idle Mo n, Idle Mo n, Idle Mo Sleep Ir	ode On, Sl ode Off, Slo ode On, Slo ode On, Slo ontents of	eep Out eep Out eep Out Default Va	Yes Yes Yes Yes Yes Yes	omly				







Description

a-Si TFT LCD Single Chip Driver 240RGBx320 Resolution and 262K color

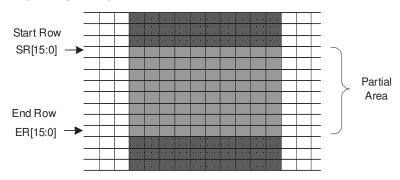


8.2.25. Partial Area (30h)

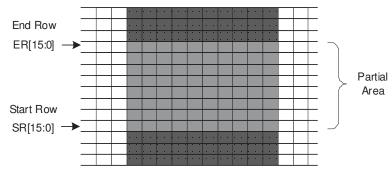
30h		PLTAR (Partial Area)											
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	1	1	0	0	0	0	30h
1 st Parameter	1	1	↑	XX	SR15	SR14	SR13	SR12	SR11	SR10	SR9	SR8	00
2 nd Parameter	1	1	↑	XX	SR7	SR6	SR5	SR4	SR3	SR2	SR1	SR0	00
3 rd Parameter	1	1	↑	XX	ER15	ER14	ER13	ER12	ER11	ER10	ER9	ER8	01
4 th Parameter	1	1	↑	XX	ER7	ER6	ER5	ER4	ER3	ER2	ER1	ER0	3F
	This co	ommano	defines	the partial mod	de's displ	av area.	There are	e 2 paran	neters as	sociated	with this	command	, the first

This command defines the partial mode's display area. There are 2 parameters associated with this command, the first defines the Start Row (SR) and the second the End Row (ER), as illustrated in the figures below. SR and ER refer to the Frame Memory Line Pointer.

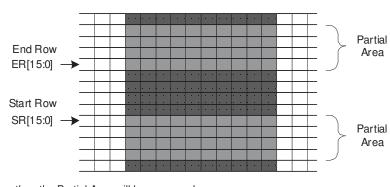
If End Row>Start Row when MADCTL B4=0:-



If End Row>Start Row when MADCTL B4=1:-



If End Row<Start Row when MADCTL B4=0:-



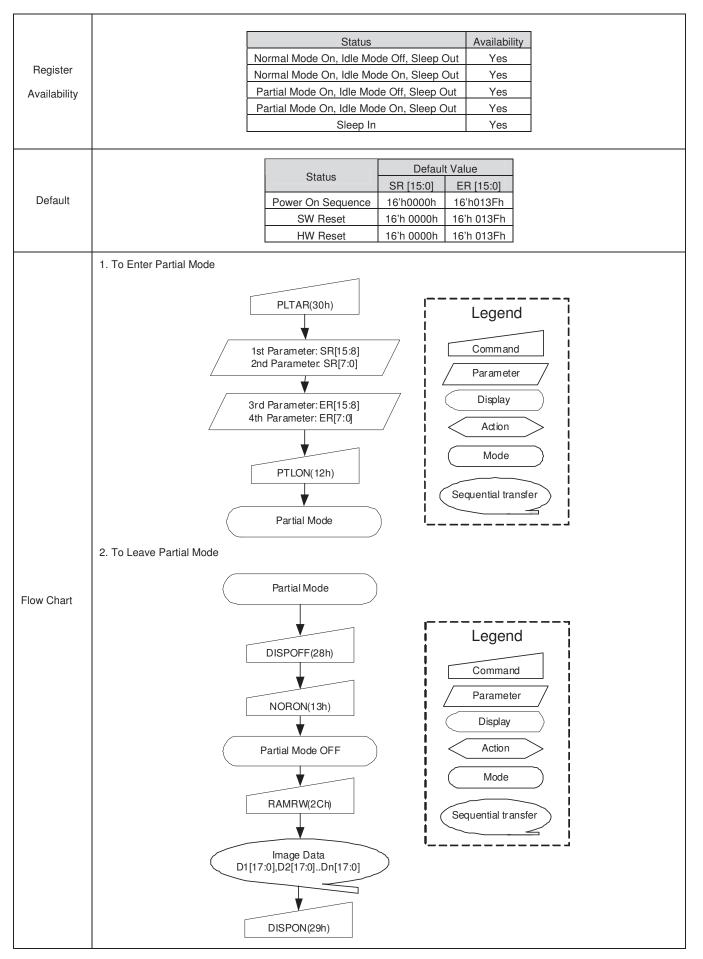
If End Row = Start Row then the Partial Area will be one row deep.

X = Don't care.

Restriction SR [15...0] and ER [15...0] cannot be 0000h nor exceed 013Fh.











8.2.26. Vertical Scrolling Definition (33h)

33h					VSCRDE	F (Vertic	al Scrolli	ng Defini	ition)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	1	1	0	0	1	1	33h
1 st Parameter	1	↑	1	XX				TFA	[15:8]				00
2 nd Parameter	1	↑	1	XX				TFA	[7:0]				00
3 rd Parameter	1	↑	1	XX		TFA [15:8] TFA [7:0] VSA [15:8]							
4 th Parameter	1	↑	1	XX				VSA	[7:0]				40
5 th Parameter	1	↑	1	XX				BFA	[15:8]				00
6 th Parameter	1	1	1	XX				BFA	[7:0]				00

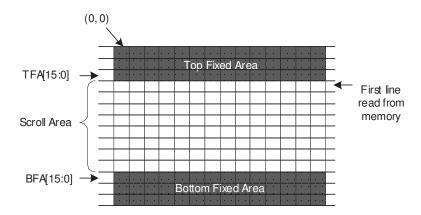
This command defines the Vertical Scrolling Area of the display.

When MADCTL B4=0

The 1st & 2nd parameter TFA [15...0] describes the Top Fixed Area (in No. of lines from Top of the Frame Memory and Display).

The 3rd & 4th parameter VSA [15...0] describes the height of the Vertical Scrolling Area (in No. of lines of the Frame Memory [not the display] from the Vertical Scrolling Start Address). The first line read from Frame Memory appears immediately after the bottom most line of the Top Fixed Area.

The 5th & 6th parameter BFA [15...0] describes the Bottom Fixed Area (in No. of lines from Bottom of the Frame Memory and Display). TFA, VSA and BFA refer to the Frame Memory Line Pointer.



Description

When MADCTL B4=1

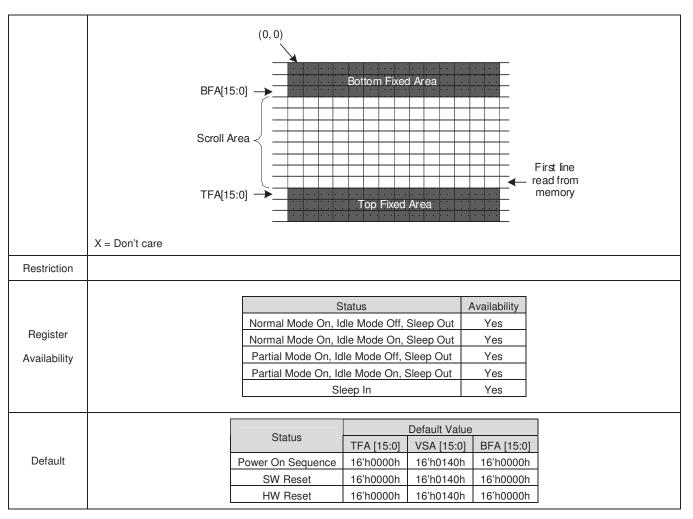
The 1st & 2nd parameter TFA [15...0] describes the Top Fixed Area (in No. of lines from Bottom of the Frame Memory and Display).

The 3rd & 4th parameter VSA [15...0] describes the height of the Vertical Scrolling Area (in No. of lines of the Frame Memory [not the display] from the Vertical Scrolling Start Address). The first line read from Frame Memory appears immediately after the top most line of the Top Fixed Area.

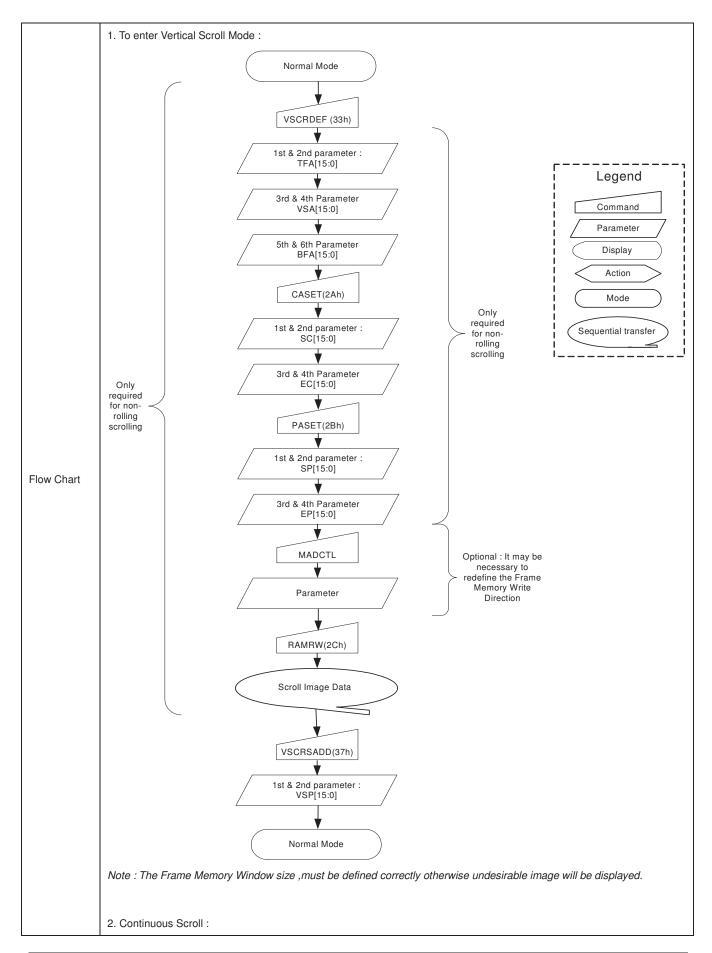
The 5th & 6th parameter BFA [15...0] describes the Bottom Fixed Area (in No. of lines from Top of the Frame Memory and Display).





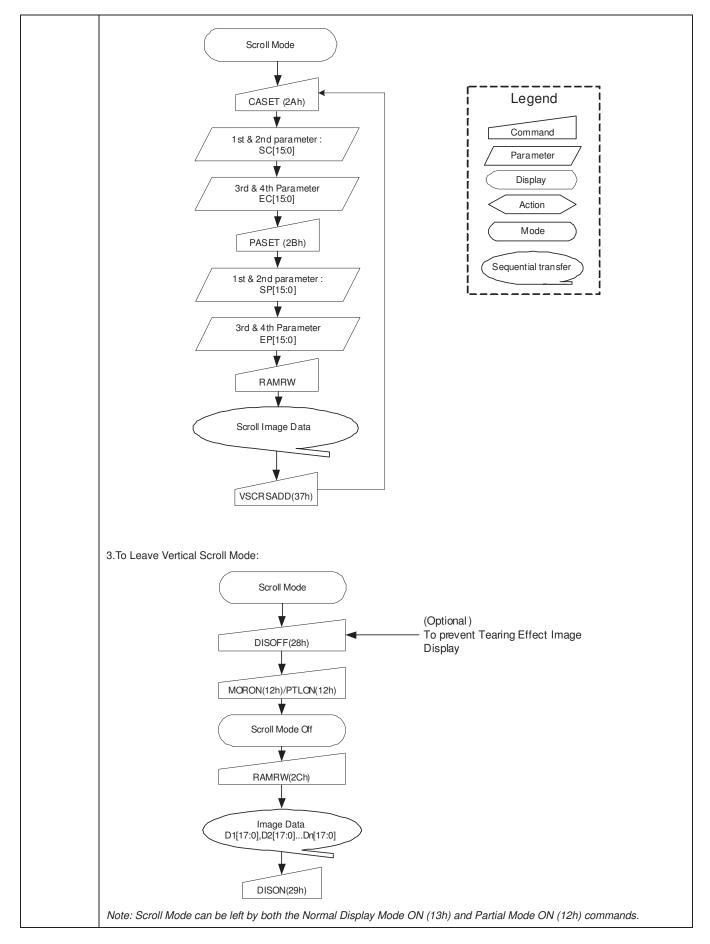
















8.2.27. Tearing Effect Line OFF (34h)

34h	TEOFF (Tearing Effect Line OFF)												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	1	1	0	1	0	0	34h
Parameter		No Parameter											
Description		This command is used to turn OFF (Active Low) the Tearing Effect output signal from the TE signal line. X = Don't care. This command has no effect when Tearing Effect output is already OFF.											
Restriction	This co	mmand	has no e	effect when Teari	ng Effect o	output is a	lready OF	F.					
Register Availability	Status Availability Normal Mode On, Idle Mode Off, Sleep Out Yes Normal Mode On, Idle Mode On, Sleep Out Yes Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes Sleep In Yes												
Default	Status Default Value Power On Sequence OFF SW Reset OFF HW Reset OFF												
Flow Chart				TEC	Output O F F(34h) Output OF			Pa I	egend ommand arameter Display Action Mode	fer			



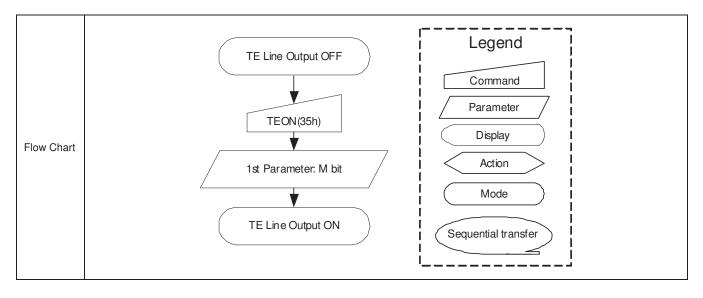


8.2.28. Tearing Effect Line ON (35h)

35h	TEON (Tearing Effect Line ON)												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	1	1	0	1	0	1	35h
Parameter	1	1	↑	XX	0	0	0	0	0	0	0	М	00
Description	This command is used to turn ON the Tearing Effect output signal from the TE signal line. This output is not affected by changing MADCTL bit B4. The Tearing Effect Line On has one parameter which describes the mode of the Tearing Effect Output Line. When M=0: The Tearing Effect Output line consists of V-Blanking information only: Vertical Time Scale When M=1: The Tearing Effect Output Line consists of both V-Blanking and H-Blanking information:												
	Note: [-	le //	Effect Lin			ct Output	pin will be	e active I	_ow.		
Restriction	This co	mmand	has no e	effect when Tearin	g Effect o	utput is al	Iready ON	١					
Register Availability	This command has no effect when Tearing Effect output is already ON Status Availability Normal Mode On, Idle Mode Off, Sleep Out Yes Normal Mode On, Idle Mode On, Sleep Out Yes Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes Sleep In Yes												
Default					Power S'	Status On Seque W Reset W Reset		efault Val OFF OFF OFF	ue				











8.2.29. **Memory Access Control (36h)**

36h	MADCTL (Memory Access Control)												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	1	1	0	1	1	0	36h
Parameter	1	1	1	XX	MY	MX	MV	ML	BGR	МН	0	0	00

This command defines read/write scanning direction of frame memory.

This command makes no change on the other driver status.

Bit	Name	Description
MY	Row Address Order	
MX	Column Address Order	These 3 bits control MCU to memory write/read direction.
MV	Row / Column Exchange	
ML	Vertical Refresh Order	LCD vertical refresh direction control.
BGR	RGB-BGR Order	Color selector switch control
Ban	nab-ban Oldel	(0=RGB color filter panel, 1=BGR color filter panel)
MH	Horizontal Refresh ORDER	LCD horizontal refreshing direction control.

Note: When BGR bit is changed, the new setting is active immediately without update the content in Frame Memory again.

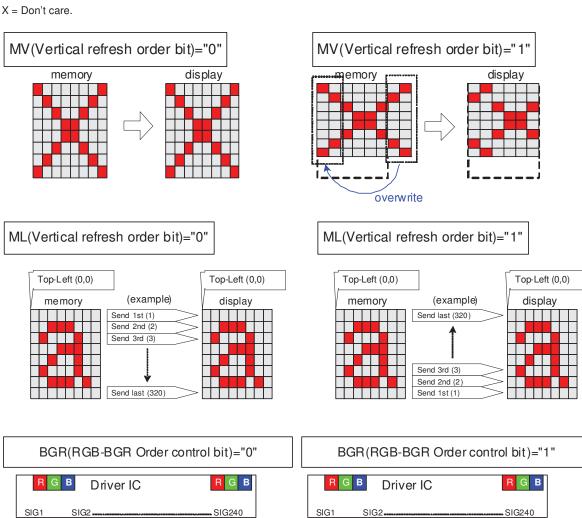
SIG1

R G B

G B

LCD Panel

Description



SIĞ1

SIG2

LCD Panel

В

SIG240

В

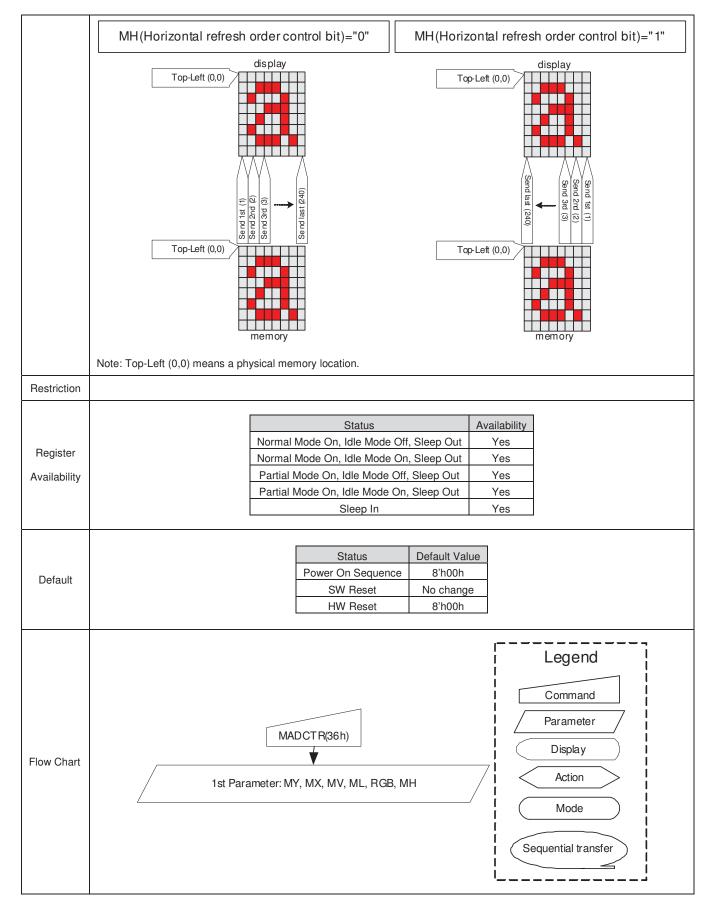
В

SIG240

G B











8.2.30. Vertical Scrolling Start Address (37h)

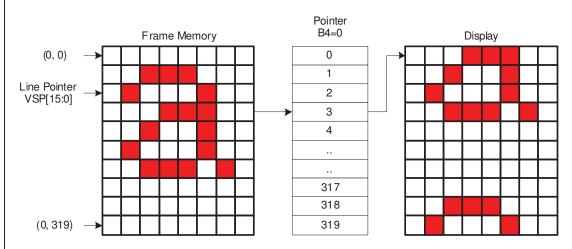
37h		VSCRSADD (Vertical Scrolling Start Address)												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	↑	XX	0	0	1	1	0	1	1	1	37h	
1 st Parameter	1	1	1	XX	VSP [15:8] 00									
2 nd Parameter	1	1	1	XX	VSP [7:0] 00								00	

This command is used together with Vertical Scrolling Definition (33h). These two commands describe the scrolling area and the scrolling mode. The Vertical Scrolling Start Address command has one parameter which describes the address of the line in the Frame Memory that will be written as the first line after the last line of the Top Fixed Area on the display as illustrated below:-

When MADCTL B4=0

Example:

When Top Fixed Area = Bottom Fixed Area = 00, Vertical Scrolling Area = 320 and VSP='3'.

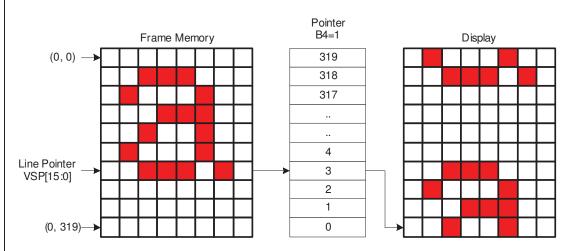


Description

When MADCTL B4=1

Example:

When Top Fixed Area = Bottom Fixed Area = 00, Vertical Scrolling Area = 320 and VSP='3'.



Note: (1) When new Pointer position and Picture Data are sent, the result on the display will happen at the next Panel Scan to avoid tearing effect. VSP refers to the Frame Memory line Pointer.

(2) This command is ignored when the ILI9341 enters Partial mode.

X = Don't care





Restriction					
			Status		Availability
		Norm	al Mode On, Idle Mode (Off, Sleep Out	Yes
Register		Norm	al Mode On, Idle Mode (On, Sleep Out	Yes
Availability		Partia	al Mode On, Idle Mode C	Off, Sleep Out	No
		Partia	al Mode On, Idle Mode C	n, Sleep Out	No
			Sleep In		Yes
			Ctatus	Default Val	ue
			Status	VSP [15:0)]
Default			Power On Sequence	16'h0000	h
			SW Reset	16'h0000	h
			HW Reset	16'h0000	h
Flow Chart	See Vertical Scrolling Definition	(33h)	description.		





8.2.31. Idle Mode OFF (38h)

38h					IDM	OFF (Idle	Mode O	FF)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	1	1	1	0	0	0	38h
Parameter						No Para	ameter						
	This con	nmand is ι	used to rec	over from Idle	e mode oi	٦.							
Description	In the id	le off mode	e, LCD car	n display max	imum 262	2,144 colo	rs.						
	X = Don	't care.											
Restriction	This con	nmand has	s no effect	when module	e is alreac	ly in idle o	ff mode.						
										_			
						Status	0". 01		Availabili	ty			
Register				Normal M Normal M					Yes Yes				
Availability				Partial Mo					Yes				
Availability				Partial Me					Yes				
						eep In			Yes				
Default				F	SW F	tus Sequence Reset Reset	e Idle m	ult Value node OF node OF node OF	F F				
Flow Chart				Idle mod	(38h)			Co Pa D D I	egend mmand rameter isplay Action Mode	fer			



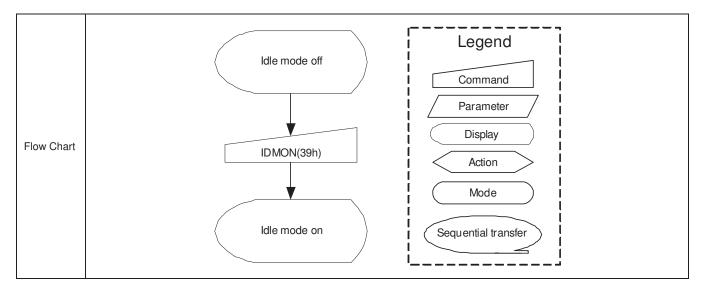


8.2.32. Idle Mode ON (39h)

39h			Ì	,		IDMON	(Idle Mod	le ON)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑ ↑	XX	0	0	1	1	1	0	0	1	39h
Parameter	Ŭ			701			Paramete					· ·	0011
i arameter	This co	mmand	is used	to enter into Idle	mode on		Taramet	<u> </u>					
	In the i	dle on m	node, col	or expression is	reduced.	The prima	ary and th	e seconda	ary colors	using MS	B of each	R, G and	B in the
	Frame	Memory	, 8 color	depth data is d	isplayed.								
		1		Memory	1 1				, F	Panel Di	splay	1 1	
						_							
ı						_							
ı						_	_						
ı						_	`	> -		_			
Description						_							
						_							
						_							
İ		Memory Contents vs. Display Color											
					$\frac{\text{Mem}}{\text{R}_5 \text{R}_4 \text{R}_3 \text{F}}$	nory Cont	ents vs. E	oisplay Col GG2 G1 G0	or R- R.	B ₃ B ₂ B ₁ B	la.		
				Black	0XXX		0XX	(XXX		XXXXX	0		
1				Blue	0XXX			(XXX		XXXXX			
				Red	1XXX			(XXX	02	XXXXX			
				Magenta	1XXX		0X)	(XXX		XXXXX			
				Green	0XXX			(XXX		XXXXX			
				Cyan	0XXX			(XXX		XXXXX	_		
				Yellow	1XXX	XX	1X)	(XXX	02	XXXXX	_		
				White	1XXX	XX	1X)	(XXX	1.	XXXXX			
Destriction		n't care.			hala ta aba	t t - 1 - 11	"	_					
Restriction	This co	mmand	nas no e	effect when mod	dule is aire	ady in idi	e off mode	9.					
						Status			Availal	bility			
Register					al Mode C				Yes				
					al Mode C			•	Yes				
Availability					<u>al Mode C</u> al Mode C				Ye:				
				Faiti	ai Mode C	Sleep I		neep Out	Yes				
						0.000							
						Status		Default Va	lue				
Default					Power	^r On Sequ	ience l	dle mode (OFF				
Deiauit					5	SW Reset	l	dle mode (OFF				
					ŀ	HW Reset	l	dle mode (OFF				
	<u> </u>												











8.2.33. COLMOD: Pixel Format Set (3Ah)

3Ah	PIXSET (Pixel Format Set)														
OAII	D/OV	DDV	MDV		47.0			_	_			D.O.		D0	LIEV
Command	D/CX	RDX	WRX		17-8	D7	D6	D5	+ '	D4	D3	D2	D1	D0	HEX
Command Parameter	1	1	↑ ↑		XX XX	0	0	1 DPI [2:	01	1	0	0	DDI to:0	0	3Ah 66
Farameter	·					1	ao doto			intor	rface. DPI [2	·01 io +bo	DBI [2:0		
			•				_	-			_	_	•		
	interface	e and DB	8I [2:0] is	the pixe	I format (of MCU int	erface. I	f a parti	cular	inte	erface, either	RGB int	terface or	MCU inte	rface, is
	not used	d then the	e corresp	onding	oits in the	e paramete	er are igr	ored. T	he pi	xel f	format is sho	wn in the	e table be	elow.	
				PI [2:0]	RGB	Interface	Format	DE	31 [2:0	01	MCU Interf	ace Forr	mat		
			0)	Reserved	ł	0	0	0	Rese	erved			
			0	0		Reserved	ł	0	0	1	Rese	erved			
Description			0	1)	Reserved	ł	0	1	0	Rese	erved			
			0	1	_	Reserved		0	1	1		erved			
			1	1 1)	Reserved		1	0	0		erved			
			1	0		16 bits / pix		1	0	1		/ pixel			
			1	1		18 bits / pix Reserved		1	1	0		/ pixel			
	If using	1 1 1 Reserved 1 1 1 Reserved If using RGB Interface must selection serial interface.													
		X = Don't care													
	X = Don	i't care													
Restriction															
		Status Availability													
Deviates					Normal N	lode On, I	dle Mode	e Off, SI	еер (Out	Yes				
Register						Node On, I					Yes				
Availability				-		lode On, Id					Yes				
				-	Partial IV	lode On, Id	leep In	On, Sie	ер С	Jut	Yes Yes				
							ccp III				1 100				
									D	efau	ılt Value				
					Status			DPI [2:				31 [2:0]			
Default			Pov	ver On	Sequenc	е		3'b110)		3	'b110			
				S	W Reset		1	No Char	ige		No (Change			
				Н	W Reset			3'b110)		3'	'b110			
									Г				1		
				٢					İ		Leger	nd	-		
					COL	MOD (3Ah)		į	r					
				L					į	L	Comma	nu ,	,		
						₩			į	\angle	Paramet	ter	į		
Flanco Ola ant				/ ,)PI[2:0] F	RGB pixel fo	rmat		į		Display	'	į		
Flow Chart			/			1CU pixel fo			-	<	Action		į		
			_					_/		,			į		
						\			 	(Mode		-		
					^ n	Command					Sequential tr	ansfer			
					Ally	Command					- Coquontiar ti		/		
									1_				'		
	•														





8.2.34. Write_Memory_Continue (3Ch)

3Ch	Write_Memory_Continue												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	0	0	1	1	1	1	0	0	3Ch
1 St Downstan	4	4		D1	D1	D1	D1	D1	D1	D1	D1	D1	000
1 st Parameter	I	ı	T	[178]	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	3FF
X th Parameter	4	4		Dx	Dx	Dx	Dx	Dx	Dx	Dx	Dx	Dx	000
X Parameter	I	ı	T	[178]	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	3FF
Nth Davanastav	4	4		Dn	Dn	Dn	Dn	Dn	Dn	Dn	Dn	Dn	000
N th Parameter	ļ	ļ	ſ	[178]	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	3FF

This command transfers image data from the host processor to the display module's frame memory continuing from the pixel location following the previous write memory continue or write memory start command.

If set_address_mode B5 = 0:

Data is written continuing from the pixel location after the write range of the previous write_memory_start or write_memory_continue. The column register is then incremented and pixels are written to the frame memory until the column register equals the End Column (EC) value. The column register is then reset to SC and the page register is incremented. Pixels are written to the frame memory until the page register equals the End Page (EP) value and the column register equals the EC value, or the host processor sends another command. If the number of pixels exceeds (EC – SC + 1) * (EP – SP + 1) the extra pixels are ignored.

If set_address_mode B5 = 1:

Description

Data is written continuing from the pixel location after the write range of the previous write_memory_start or write_memory_continue. The page register is then incremented and pixels are written to the frame memory until the page register equals the End Page (EP) value. The page register is then reset to SP and the column register is incremented. Pixels are written to the frame memory until the column register equals the End column (EC) value and the page register equals the EP value, or the host processor sends another command. If the number of pixels exceeds (EC - SC + 1) * (EP - SP + 1) the extra pixels are ignored.

Sending any other command can stop frame Write.

Frame Memory Access and Interface setting (B3h), WEMODE=0

When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the exceeding data will be ignored.

Frame Memory Access and Interface setting (B3h), WEMODE=1

When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the column and page number will be reset, and the exceeding data will be written into the following column and page.

Restriction

A write_memory_start should follow a set_column_address, set_page_address or set_address_mode to define the write address. Otherwise, data written with write_memory_continue is written to undefined addresses.





	Status		Availability	
	Normal Mode On, Idle Mo	ode Off, Sleep Out	Yes	
Register	Normal Mode On, Idle Mo	ode On, Sleep Out	Yes	
Availability	Partial Mode On, Idle Mo	de Off, Sleep Out	Yes	
	Partial Mode On, Idle Mo	de On, Sleep Out	Yes	
	Sleep In		No	
	Status	Default Val	IIQ.	
	Power On Sequence	Random val		
Default	SW Reset	No change		
	HW Reset	No change		
	THY HOSSE	140 onang		
Flow Chart	Write_memory_continue Image Data D1[17:0],D2[17:0],Dn[17:0] Next Command		Pa	egend emmand rameter Display Action Mode Sequential transfer





8.2.35. Read_Memory_Continue (3Eh)

				• •									
3Eh	Read_Memory_Continue												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	0	1	1	1	1	1	0	3Eh
1 st Parameter	1	1	1	XX	Х	Х	Х	Х	Х	Х	Х	Х	Х
ond Davassatav	4		4	D1	D1	D1	D1	D1	D1	D1	D1	D1	000
2 nd Parameter	1	T	1	[178]	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	3FF
x st Parameter	4		4	Dx	Dx	Dx	Dx	Dx	Dx	Dx	Dx	Dx	000
x Parameter	ı		1	[178]	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	3FF
N st Parameter	4		4	Dn	Dn	Dn	Dn	Dn	Dn	Dn	Dn	Dn	000
n Parameter	l ————————————————————————————————————	T	l	[178]	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	3FF
	This command transfers image data from the display module's frame memory to the host processor continuing from the												
	leasting fellowing the annuity and groups antique (OFb) or good groups, that (OFb) against												

location following the previous read_memory_continue (3Eh) or read_memory_start (2Eh) command.

If set_address_mode B5 = 0:

Pixels are read continuing from the pixel location after the read range of the previous read_memory_start or read_memory_continue. The column register is then incremented and pixels are read from the frame memory until the column register equals the End Column (EC) value. The column register is then reset to SC and the page register is incremented. Pixels are read from the frame memory until the page register equals the End Page (EP) value and the column register equals the EC value, or the host processor sends another command.

Description

If set_address_mode B5 = 1:

Pixels are read continuing from the pixel location after the read range of the previous read_memory_start or read_memory_continue. The page register is then incremented and pixels are read from the frame memory until the page register equals the End Page (EP) value. The page register is then reset to SP and the column register is incremented. Pixels are read from the frame memory until the column register equals the End Column (EC) value and the page register equals the EP value, or the host processor sends another command.

This command makes no change to the other driver status.

Restriction

A read_memory_start should follow a set_column_address, set_page_address or set_address_mode to define the read location. Otherwise, data read with read_memory_continue is undefined.

Register	
Availability	

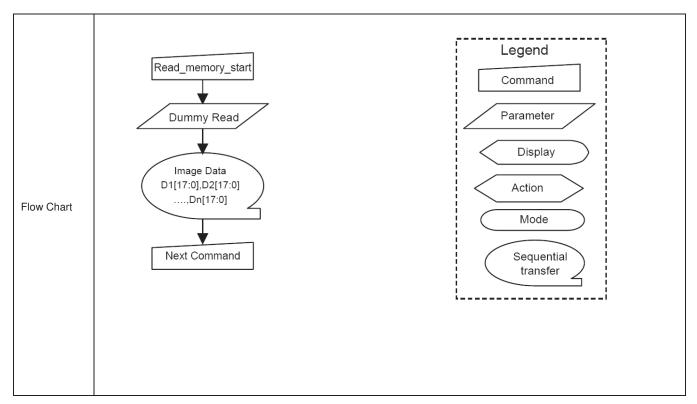
Status	Availability
Normal Mode On, Idle Mode Off, Sleep Out	Yes
Normal Mode On, Idle Mode On, Sleep Out	Yes
Partial Mode On, Idle Mode Off, Sleep Out	Yes
Partial Mode On, Idle Mode On, Sleep Out	Yes
Sleep In	Yes

Default

Status	Default Value
Power On Sequence	Random data
SW Reset	No change
HW Reset	No change











8.2.36. Set_Tear_Scanline (44h)

44h		_	1110 (111		Set	_Tear_S	Scanline							
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	0	1	0	0	0	1	0	0	44h	
1 st Parameter	1	1	1	XX	0	0	0	0	0	0	0	STS [8]	00	
2 nd Parameter	1	1	↑	XX	STS [7]	STS [6]	STS [5]	STS [4]	STS [3]	STS [2]	STS [1]	STS [0]	00	
Description	The TE sign describes the Vertical T	nal is not at ne Tearing ime Scal	e anline with \$	hanging set_ ut Line mode STS=0 is equall be active I	address	_mode b	tvo	dl th M=0.	g Effect	Line On		e parame		
Restriction	-	-												
Register Availability	Status Availability Normal Mode On, Idle Mode Off, Sleep Out Yes Normal Mode On, Idle Mode On, Sleep Out Yes Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes Sleep In Yes													
Default				Stat Power On S SW Reset HW Reset		е	STS [8	ult Value 3:0]=000 3:0]=000 3:0]=000	Oh Oh					
Flow Chart		set_tear_ and 1st paramed 2nd paramed TE Out	<	Para D Ac Ac	end mand meter isplay tion Mode equentiar									





8.2.37. Get_Scanline (45h)

45h					(Get_Sca	nline							
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	0	1	0	0	0	1	0	1	45h	
1 st Parameter	1	1	1	XX	Х	Χ	Х	Χ	Х	Χ	Х	Х	Х	
2 nd Parameter	1	1	1	XX	0	0	0	0	0	0	GTS [9]	GTS [8]	00	
3 rd Parameter	1	1	1	XX	GTS [7]	GTS [6]	GTS [5]	GTS [4]	GTS [3]	GTS [2]	GTS [1]	GTS [0]	00	
Description	display devi	ice is defin Line 0.	ed as VSYN	ean line, GTS NC + VBP + \ eturned by ge	/ACT + \	VFP. The	e first sc	-						
Restriction	None													
Register Availability		Status Availability Normal Mode On, Idle Mode Off, Sleep Out Yes Normal Mode On, Idle Mode On, Sleep Out Yes Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes Sleep In Yes												
Default		Sleep In Yes Default Value GTS [9:0] Power On Sequence GTS [9:0]=0000h SW Reset GTS [9:0]=0000h HW Reset GTS [9:0]=0000h												
Flow Chart														





8.2.38. Write Display Brightness (51h)

51h					WR	DISBV (W	rite Displ	ay Brightr	ness)						
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX		
Command	0	1	1	XX	0	1	0	1	0	0	0	1	51h		
Parameter	1	1	1	XX	DBV[7]	DBV[6]	DBV[5]	DBV[4]	DBV[3]	DBV[2]	DBV[1]	DBV[0]	00		
				-	brightness ationship b				utput brigl	ntness of t	he display.	. This relat	ionship		
Description					ecification. alue mean	s the lowe	st brightne	ess and FF	h value m	eans the h	nighest brig	ghtness.			
Restriction	None														
				N	ormal Mod	Stat e On Idle		Sleen Out	Availat Yes						
Register															
Availability		Normal Mode On, Idle Mode On, Sleep Out Yes Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes													
		Partial Mode On, Idle Mode On, Sleep Out Yes													
Default	Partial Mode On, Idle Mode On, Sleep Out Yes														
Flow Chart	Legend Command Parameter DBV[70] Display														





8.2.39. Read Display Brightness (52h)

52h		op.a.			RDD	-	ad Display	y Brightne	ss Value)				
<u> </u>	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	0	1	0	1	0	0	1	0	52h
1 st Parameter	1	↑	1	XX	Х	Х	Х	Х	Х	Х	Х	Х	Х
2 nd Parameter	1	1	1	XX	DBV[7]	DBV[6]	DBV[5]	DBV[4]	DBV[3]	DBV[2]	DBV[1]	DBV[0]	00
Description	It shou	ld be ch	ecked w	hat the re	play modu	between t	his returne				of the disp		ness.
				_	-	ter value o	n the data	lines if the	MCU wa	nts to reac	I more than	n one para	meter
Restriction	(= more	e than 2	RDX cy	cle) on D	BI Mode.								
	Only 2	nd param	neter is s	ent on D	SI (The 1s	t paramete	er is not se	ent).					
						St	atus		Avail	ability			
				Ī	Normal Mo			ff, Sleep O		es			
Register								n, Sleep O		es			
Availability					Partial Mo	de On, Idle	e Mode Of	f, Sleep O	ut Y	es			
					Partial Mo	de On, Idle	e Mode Or	n, Sleep Oi	ut Y	es			
				(Sleep In				Y	es			
Default	Partial Mode On, Idle Mode On, Sleep Out Yes Sleep In												
Flow Chart					Send	1 RDDISB 1 st Parame 2nd Parame	Dis	<u>Host</u> play	Parr D A See	egend mmand ameter display Action Mode quential cansfer			



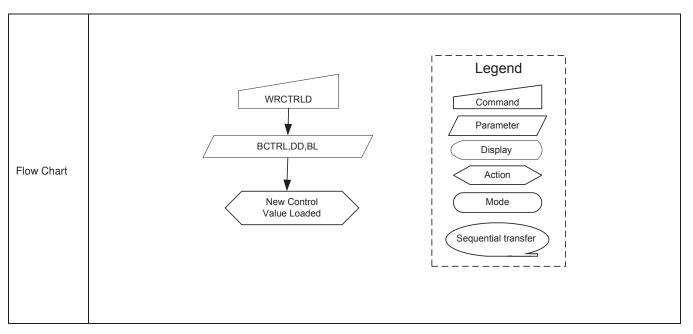


8.2.40. Write CTRL Display (53h)

53h	WRCTRLD (Write Control Display) D/CX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1 D0 HEX													
33	D/CX	BDX	WRX						D3	D2	D1	DO	HFX	
Command	0	1	<u> </u>	XX	0	1	0	1	0	0	1	1	53h	
Parameter	1	1	<u> </u>	XX	0	0	BCTRL	0	DD	BL	0	0	00	
	This comma	and is used	to control	display bright	tness.									
							ad to outite	h hriaht	naaa far	dianlass				
		_		On/Off, This		ways us	sea to switc	in bright	ness ior	display.				
	0 = Off	(Brightnes	ss registers	are 00h, DB	V[70])									
	1 = On	(Brightnes	s registers	are active, a	ccording	g to the	other parar	neters.)						
	DD : Display	Dimmina	only for me	anual brightne	oce cotti	na								
		_	-		555 SEIII	ng								
	DD = (): Display L	Dimming is	OII										
	DD = 1	: Display [Dimming is	on										
Description	BL: Backlig	ht Control (On/Off											
	0 = Off	(Complete	elv turn off l	oacklight circ	uit. Con	trol lines	must be lo	ow.)						
			,	3				,						
	1 = On Dimming function is adapted to the brightness registers for display when hit BCTRL is changed at DD−1, e.g. BCTRL: 0 →													
	Dimming function is adapted to the brightness registers for display when bit BCTRL is changed at DD=1, e.g. BCTRL: 0 →													
	1 or 1 \rightarrow 0.													
	When BL hi	t change fr	om "On" to	"Off", backlig	nht is tur	ned off	without ara	dual din	nmina e	ven if dir	mmina-c	ın (DD–1) are	
		t ondrige in	0111 011 10	On , baoking	jiit io tai	noa on	minout gra	auui aiii	iiiiiig, c	von n an	illining c	11 (DD=1) are	
	selected.													
Restriction	None													
			-	James al Marala		atus	0((0)		vailabilit	У				
Register				Normal Mode Normal Mode					Yes Yes	-				
Availability				Partial Mode					Yes	\dashv				
				Partial Mode					Yes					
				Sleep In			•		Yes					
							Defaul	It Value			1			
				Status	Е	BCTRL)D	Е	 3L	1			
Default			Power	On Sequenc		1'b0		b0		b0				
				W Reset		1'b0	1'	'b0	1	b0				
			Н	W Reset		1'b0	1'	b0	1	b0				







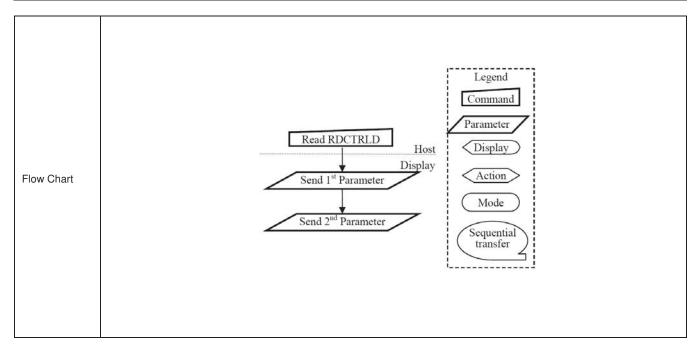




8.2.41. Read CTRL Display (54h)

54h					RDCTR	LD (Rea	d Control Dis	splay)						
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	0	1	0	1	0	1	0	0	54h	
1 st Parameter	1	1	1	XX	Χ	Χ	Χ	Χ	Х	Χ	Χ	Χ	XX	
2 nd Parameter	1	↑	1	XX	0	0	BCTRL	0	DD	BL	0	0	00	
Description	BCTRL: Brightness Control Block On/Off, '0' = Off (Brightness registers are 00h) '1' = On (Brightness registers are active, according to the DBV[70] parameters.) DD: Display Dimming '0' = Display Dimming is off '1' = Display Dimming is on BL: Backlight On/Off '0' = Off (Completely turn off backlight circuit. Control lines must be low.) '1' = On The display module is sending 2nd parameter value on the data lines if the MCU wants to read more than one parameter (= more than 2 RDX cycle) on DBI.													
Restriction	(= more tl	han 2 RDX	cycle) on I	OBI.				ne MCL	wants to	read m	nore tha	n one pa	arameter	
Register Availability		Only 2nd parameter is sent on DSI (The 1st parameter is not sent). Status Availability Normal Mode On, Idle Mode Off, Sleep Out Yes Normal Mode On, Idle Mode On, Sleep Out Partial Mode On, Idle Mode Off, Sleep Out Partial Mode On, Idle Mode On, Sleep Out Sleep In Yes												
Default	Status Default Value BCTRL DD BL Power On Sequence 1'b0 1'b0 1'b0 SW Reset 1'b0 1'b0 1'b0 HW Reset 1'b0 1'b0 1'b0													









8.2.42. Write Content Adaptive Brightness Control (55h)

	Conte	THE AGE	<u> </u>					<u> </u>						
55h	D (5)			1			1		Bright					
	D/CX	RDX	1 ↑ XX 0 1 0 1 0 1 0									D0	HEX	
Command	0	1	<u> </u>						1				1	55h
Parameter	This com	mand is us	sed to set	narame	-	0 or imag	0 e conte	0 nt based	0	0 e briah	0 tness co	C [1]	C [0]	00
			use 4 diff			_			•				-	ble
Description					C [1	·01	Г	Default \	/alue					
					2'b0			Off						
					2'b0		User		ce Image					
					2'b1			Still Pic						
					2'b1			loving I						
Restriction	None													
						S	tatus			Avai	lability]		
				Norma	l Mode			e Off, SI	eep Out		es			
Register									eep Out		es/	ĺ		
Availability				Partial	Mode	On, Id	le Mode	Off, Sle	eep Out		es/			
				Partial	Mode	On, Id	le Mode	On, Sle	eep Out	١	es/			
				Partial Mode On, Idle Mode On, Sleep Ou Sleep In							es_			
					Stat				efault Va					
Default						Sequen	ice		C [1:0]=0					
					SW R				C [1:0]=0					
					HW R	eset		(C [1:0]=0	0h				
Flow Chart	Temperal Personal Personal Personal Section New Adaptive house blade Sequential transfer													





8.2.43. Read Content Adaptive Brightness Control (56h)

	au Coi	nem A		Brighti			<u> </u>							
56h				RDCABC (R							ı	ı		
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	0	1	0	1	0	1	1	0	56h	
1 st Parameter	1	<u></u>	1	XX	X	X	X	X	X	X	X	X	XX	
2 nd Parameter	1	<u> </u>	1	XX	0	0	0	0	0	0	C [1]	C [0]	00	
Description				he settings f	ntent ada	aptive in	nage fun	ctionalit	_			-	w.	
Description					[1:0]		efault V	alue						
					000	Haar	Off							
					001			e Image	<u> </u>					
					o10 o11		Still Pict loving Ir							
					011	IV	ioving ii	nage						
Restriction	(= more th	nan 2 RDX	cycle) on E	2nd paramet DBI. DSI (The 1st				s if the N	1CU war	nts to rea	ad more ti	han one p	arameter	
					Sta	atus			Availa	bility				
				Normal Mode			Off, Slee	ep Out	Ye	i				
Register														
Availability		Normal Mode On, Idle Mode On, Sleep Out Yes Partial Mode On, Idle Mode Off, Sleep Out Yes												
				Partial Mode	On, Idle	e Mode	On, Slee	p Out	Ye	s				
			_ :	Sleep In					Ye	s				
Default		Partial Mode On, Idle Mode Off, Sleep Out Yes Partial Mode On, Idle Mode On, Sleep Out Yes Sleep In Yes Status Default Value Power On Sequence C [1:0]=00h SW Reset C [1:0]=00h HW Reset C [1:0]=00h												
Flow Chart				Read R Send 1 st I	v Parame	eter	Ho Disp	ost lay	Par D	egend omman ameter Display Action Mode quentiransfer	d d			





8.2.44. Write CABC Minimum Brightness (5Eh)

5Eh	Backlight Control 1 D/CX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1 D0 HEX												
	D/CX	RDX	WRX	D17-8 D7 D6 XX 0 1			D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX		1	0	1	1	1	1	0	5Eh
Parameter	1	1	1	XX	CMB [7]	CMB [6]	CMB [5]	CMB [4]	CMB [3]	CMB [2]	CMB [1]	CMB [0]	00
	This cor	nmand is	s used to	set the mir	nimum brig	htness val	ue of the o	display for	CABC fur	nction.			
	CMB[7:0	D]: CABC	minimun	n brightnes	s control,	this param	eter is use	ed to avoid	I too much	n brightne	ss reduction	on.	
	When C	ABC is a	active, CA	BC canno	t reduce t	he display	brightnes	s to less t	han CAB(C minimur	m brightne	ss setting	. Image
	process	ing functi	ion is wor	ked as noi	mal, even	if the brigi	ntness car	not be cha	anged.				
Description	This fur	ection do	es not af	fect to the	other fun	ction, mar	nual bright	ness setti	ng. Manu	al brightn	ess can b	e set the	display
Description	brightne	ss to les	s than CA	BC minim	um brightn	ess. Smo	oth transiti	on and din	nming fun	ction can	be worked	l as norma	al.
	When d	lisplay br	rightness	is turned	off (BCTF	RL=0 of "V	/rite CTRI	Display	(53h)"), C	ABC mir	nimum brig	htness se	etting is
	ignored.												
	In princ	iple relat	tionship i	s that 00h	n value m	eans the	lowest bri	ghtness f	or CABC	and FFh	value m	eans the	highest
	brightne	ss for CA	ABC.										
						Status	3		Availab	oility			
				Nor	mal Mode	On, Idle M	lode Off, S	Sleep Out	Yes	;			
Register				Nor	mal Mode	On, Idle M	lode On, S	Sleep Out	Yes	;			
Availability				Pai	tial Mode	On, Idle M	ode Off, S	leep Out	Yes	;			
				Pai	tial Mode	On, Idle M	ode On, S	leep Out	Yes	;			
				Slee	ep In				Yes	;			
	Status Default Value												
	CMB [7:0]												
Default				<u> </u>	Power On S			8'h00h					
				<u> </u>	SW R			No Chan					
					HW P	leset		8'h00h	<u> </u>				





8.2.45. Read CABC Minimum Brightness (5Fh)

5Fh														
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	0	1	0	1	1	1	1	1	5Fh	
1 st Parameter	1	1	1	XX	Х	Х	Χ	Х	Χ	Х	Х	Х	Х	
2 nd Parameter	1	1	1	XX	CMB [7]	CMB [6]	CMB [5]	CMB [4]	CMB [3]	CMB [2]	CMB [1]	CMB [0]	00	
Description	In princi	ple the re	elationship BC minim	e minimum p is that 00 um bright alue mear)h value m	eans the	owest brig	ghtness ar	num brigh	tness (5E	Eh)" comn	nand. In p	orinciple	
						Status	8		Availab	oility				
				Norr	mal Mode	On, Idle M	lode Off, S	Sleep Out	Yes	;				
Register				Norr	mal Mode	On, Idle M	lode On, S	Sleep Out	Yes	5				
Availability				Par	tial Mode (On, Idle M	ode Off, S	leep Out	Yes	;				
				Par	tial Mode (On, Idle M	ode On, S	leep Out	Yes	5				
				Slee		•	,	'	Yes	3				
					Sta	+		Default Va	alue					
					Sia	ius		CMB [7:	:0]					
Default				ı	Power On	Sequence		8'h00h	1					
				SW Reset No Chan					hange					
					HW F	Reset		8'h00h	1					





8.2.46. Read ID1 (DAh)

DAh						RDID1 (F	Read ID1)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	0	1	1	0	1	0	DAh
1 st Parameter	1	1	1	XX	Х	X	Χ	Χ	X	Χ	Х	X	Х
2 nd Parameter	1	↑	1	XX				ID1	[7:0]				XX
Description	The 1 st pa	aramete aramete	r is dumı	ne LCD module's i my data. i module's manufa			nd it is s	pecified	by User				
Restriction													
Register Availability				Normal Mo Normal Mo Partial Mo Partial Mo	de On, de On, de On,	Idle Mode	On, Slee	ep Out ep Out	Availabi Yes Yes Yes Yes	lity			
Default			-	Status Power On Seque SW Reset HW Reset		Before MT 8'h 8'h	t Value P progra 00h 00h	um) (A	Default After MTP MTP v MTP v	program alue alue)		
Flow Chart				1st Parame 2nd Param	DID1(DA	nmy Read	Host Driver				F	Legend Command Parameter Display Action Mode	offer





8.2.47. Read ID2 (DBh)

DBh						RDID2	(Read ID)2)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	0	1	1	0	1	1	DBh
1 st Parameter	1	1	1	XX	Х	X	Х	Χ	X	X	Х	Х	Х
2 nd Parameter	1	1	1	XX	1				ID2 [6:0]			XX
Description	changes The 1 st pa	each tim aramete aramete can be p	ne a revis r is dumi er is LCD	track the LCD makes to my data. module/driver wheel by MTP fun	the displa	ay, materia	al or const	truction s	specification	ons.		greement) and
Restriction													
Register Availability				Norma Partial	Mode O	Status n, Idle Mo n, Idle Mo n, Idle Mo n, Idle Mo Sleep In	de On, SI de Off, SI de On, SI	eep Out eep Out					
Default				Status Power On Se SW Res HW Res	quence et	(Before I	ault Value MTP prog 3'h80h 3'h80h		Default After MTP MTP v MTP v	program) /alue /alue			
Flow Chart						ummy Reac					Pa E	egend mmand rameter bisplay Action Mode	





8.2.48. Read ID3 (DCh)

DCh						RDID	3 (Read I	D3)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	0	1	1	1	0	0	DCh
1 st Parameter	1	1	1	XX	Х	Х	Х	Χ	X	Χ	Х	Х	Х
2 nd Parameter	1	1	1	XX					3 [7:0]				XX
		-		the LCD modu	le/driver a	ınd It is sp	ecified by	User.					
				mmy data.									
Description	The 2 nd	param	eter is LC	D module/drive	er ID.								
	The ID	3 can be	e prograr	mmed by MTP f	unction.								
	X = Do	n't care											
Restriction													
						0				****			
				Norm	val Mode (Status	ode Off, S	Sloon Ou	Availat				
Register							lode On, S						
Availability							ode Off, S						
7 (Valiability							ode On, S						
						Sleep I	n		Yes	3			
				State	ıe	De	fault Valu	е	Defaul	t Value			
						(Before	MTP pro	gram)	(After MTF)		
Default				Power On S		-	8'h00h			value			
				SW R			8'h00h			value	_		
				HW R	eset		8'h00h		MIP	value			
							_			Г			1
											L	egend	
					RDID3(DCh)					С	ommand	7
							_ Ho	st			/ P	arameter	-
							Driv	er				Display	\preceq $\mid \mid$
Flow Chart	/	/								——————————————————————————————————————			-/ i
					Parameter:					_ / i		Action	<i>></i>
				2110	Parameter:	Sena iD3[/	:0]			/ i		Mode	$) \mid \mid$
										- i			_
										İ	Sedne	ential transfe	
										ı			'



8.3. Description of Level 2 Command

8.3.1. RGB Interface Signal Control (B0h)

B0h					IFMODE (Inte	erface M	lode Cor	ntrol)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	1	0	1	1	0	0	0	0	B0h
Parameter	1	1	1	XX	ByPass_MODE	RCM [1]	RCM [0]	0	VSPL	HSPL	DPL	EPL	40
Description	EPL: D DPL: D HSPL: VSPL: RCM [DE polari DOTCLK HSYNC VSYNC 1:0]: RG	ty ("0"= polarity polarity polarity B interfa	High enable for set ("0"= data for ("0"= Low level ("0"= Low level acce selection (re		= Low er time, "1' igh level gh level erface se ry or Dire	omes effectively of the common	RGB into etched a ck) ck) ift registe a Path ster (def	erface) t the fallin	ng time)			
Restriction	EXTC :	should b	e high to	enable this cor	mmand								
Register Availability				Norma Partial	Status Mode ON, Idle Mo I Mode ON, Idle Mo Mode ON, Idle Mo Mode ON, Idle Mo Sleep I	ode OFF, ode OFF, ode ON,	Sleep O Sleep O	OUT OUT OUT	vailability Yes Yes Yes Yes Yes				
Default				Status ON Sequence SW Reset HW Reset	ByPass_MODE 1'b0 1'b0 1'b0	RCM 2'b' 2'b' 2'b'	10	/SPL I 1'b0 1'b0	HSPL 1'b0 1'b0 1'b0	DPL 1'b0 1'b0 1'b0	EPL 1'b1 1'b1 1'b1		





8.3.2. Frame Rate Control (In Normal Mode/Full Colors) (B1h)

B1h				FRMCTR1	(Frame R	ate Cont	rol (In No	rmal Mod	de / Full d	colors))			
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	1	0	1	1	0	0	0	1	B1h
1 st Parameter	1	1	↑	XX	0	0	0	0	0	0	DIVA	[1:0]	00
2 nd Parameter	1	1	↑	XX	0	0	0		F	RTNA [4:0)]		1B

Formula to calculate frame frequency:

Frame Rate= $\frac{}{\text{Clocks per line } x \text{ Division ratio } x \text{ (Lines} + \text{VBP} + \text{VFP)}}$

Sets the division ratio for internal clocks of Normal mode at MCU interface.

fosc: internal oscillator frequency

Clocks per line: RTNA setting Division ratio: DIVA setting

Lines: total driving line number VBP : back porch line number VFP: front porch line number

	RTI	NA [4:0]		Frame Rate (Hz)
1	0	0	0	0	119
1	0	0	0	1	112
1	0	0	1	0	106
1	0	0	1	1	100
1	0	1	0	0	95
1	0	1	0	1	90
1	0	1	1	0	86
1	0	1	1	1	83

	RTI	NA [4:0]		Frame Rate (Hz)
1	1	0	0	0	79
1	1	0	0	1	76
1	1	0	1	0	73
1	1	0	1	1	70(default)
1	1	1	0	0	68
1	1	1	0	1	65
1	1	1	0	1	63
1	1	1	1	1	61

Description

DIVA [1:0]: division ratio for internal clocks when Normal mode.

DIVA	[1:0]	Division Ratio
0	0	fosc
0	1	fosc / 2
1	0	fosc / 4
1	1	fosc / 8

RTNA [4:0]: RTNA[4:0] is used to set 1H (line) period of Normal mode at MCU interface.

	RTI	VA [4:0]		Clock per Line
0	0	0	0	0	Setting prohibited
0	0	0	0	1	Setting prohibited
0	0	0	1	0	Setting prohibited
0	0	0	1	1	Setting prohibited
0	0	1	0	0	Setting prohibited
0	0	1	0	1	Setting prohibited
0	0	1	1	0	Setting prohibited
0	0	1	1	1	Setting prohibited
0	1	0	0	0	Setting prohibited
0	1	0	0	1	Setting prohibited
0	1	0	1	0	Setting prohibited

	RTI	NA [4:0]		Clock per Line
0	1	0	1	1	Setting prohibited
0	1	1	0	0	Setting prohibited
0	1	1	0	1	Setting prohibited
0	1	1	1	0	Setting prohibited
0	1	1	1	1	Setting prohibited
1	0	0	0	0	16 clocks
1	0	0	0	1	17 clocks
1	0	0	1	0	18 clocks
1	0	0	1	1	19 clocks
1	0	1	0	0	20 clocks
1	0	1	0	1	21 clocks

	RTI	NA [4:0]		Clock per Line
1	0	1	1	0	22 clocks
1	0	1	1	1	23 clocks
1	1	0	0	0	24 clocks
1	1	0	0	1	25 clocks
1	1	0	1	0	26 clocks
1	1	0	1	1	27 clocks
1	1	1	0	0	28 clocks
1	1	1	0	1	29 clocks
1	1	1	1	0	30 clocks
1	1	1	1	1	31 clocks
1	1	1	1	1	31 clocks





Restriction	EXTC should be high to enable this command									
			Status			Availability				
		Normal Mode ON, Idle Mode OFF, Sleep OUT								
Register		Nor	mal Mode ON, Idle Mode	e ON, Sleep (TUC	Yes				
Availability	Partial Mode ON, Idle Mode OFF, Sleep OUT Yes									
•		Par	Yes							
		Sleep IN				Yes				
				5 (1					
			Status	Defau						
				DIVA [1:0]		A [4:0]				
Default			Power ON Sequence	2'b00	5'h	1Bh				
			SW Reset	2'b00	5'h	ı1Bh				
			HW Reset	2'b00	5'h	ı1Bh				





8.3.3. Frame Rate Control (In Idle Mode/8 colors) (B2h)

B2h		FRMCTR2 (Frame Rate Control (In Idle Mode / 8I colors))											
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	0	0	1	0	B2h
1 st Parameter	1	1	1	XX	0	0	0	0	0	0	DIVB	[1:0]	00
2 nd Parameter	1	1 1 ↑ XX 0 0 0 RTNB [4:0]								1B			

Formula to calculate frame frequency

Frame Rate= $\frac{}{\text{Clocks per line } x \text{ Division ratio } x \text{ (Lines} + \text{VBP} + \text{VFP)}}$

Sets the division ratio for internal clocks of Idle mode at MCU interface.

fosc: internal oscillator frequency

Clocks per line: RTNB setting Division ratio: DIVB setting

Lines: total driving line number VBP : back porch line number VFP : front porch line number

	RTI	NB [4:0]	Frame Rate (Hz)	
1	0	0	0	0	119
1	0	0	0	1	112
1	0	0	1	0	106
1	0	0	1	1	100
1	0	1	0	0	95
1	0	1	0	1	90
1	0	1	1	0	86
1	0	1	1	1	83

		RTI	NB [4:0]	Frame Rate (Hz)	
1	_	1	0	0	0	79
1	ı	1	0	0	1	76
1	1	1	0	1	0	73
1		1	0	1	1	70(default)
1		1	1	0	0	68
1		1	1	0	1	65
1		1	1	0	1	63
1	1	1	1	1	1	61

Description

DIVB [1:0]: division ratio for internal clocks when Idle mode.

DIVB	[1:0]	Division Ratio			
0	0	fosc			
0	1	fosc / 2			
1	0	fosc / 4			
1	1	fosc / 8			

RTNB [4:0]: RTNB[4:0] is used to set 1H (line) period of Idle mode at MCU interface.

	RTI	NB [4:0]	Clock per Line		
0	0	0	0	0	Setting prohibited	
0	0	0	0	1	Setting prohibited	
0	0	0	1	0	Setting prohibited	
0	0	0	1	1	Setting prohibited	
0	0	1	0	0	Setting prohibited	
0	0	1	0	1	Setting prohibited	
0	0	1	1	0	Setting prohibited	
0	0	1	1	1	Setting prohibited	
0	1	0	0	0	Setting prohibited	
0	1	0	0	1	Setting prohibited	
0	1	0	1	0	Setting prohibited	

	RTI	NB [4:0]	Clock per Line	
0	1	0	1	1	Setting prohibited
0	1	1	0	0	Setting prohibited
0	1	1	0	1	Setting prohibited
0	1	1	1	0	Setting prohibited
0	1	1	1	1	Setting prohibited
1	0	0	0	0	16 clocks
1	0	0	0	1	17 clocks
1	0	0	1	0	18 clocks
1	0	0	1	1	19 clocks
1	0	1	0	0	20 clocks
1	0	1	0	1	21 clocks

	RTI	NB [4:0]		Clock per Line
1	0	1	1	0	22 clocks
1	0	1	1	1	23 clocks
1	1	0	0	0	24 clocks
1	1	0	0	1	25 clocks
1	1	0	1	0	26 clocks
1	1	0	1	1	27 clocks
1	1	1	0	0	28 clocks
1	1	1	0	1	29 clocks
1	1	1	1	0	30 clocks
1	1	1	1	1	31 clocks
_ '	<u> </u>	<u> </u>	1	1	31 CIOCKS





Restriction	EXTC should be high to enable this command							
			Status			Availability		
		Nor	mal Mode ON, Idle Mode	OFF, Sleep	OUT	Yes		
Register		Nor	mal Mode ON, Idle Mode	e ON, Sleep (TUC	Yes		
Availability		Par	tial Mode ON, Idle Mode	OFF, Sleep (TUC	Yes		
		Pai	Yes					
			Sleep IN		Yes			
				Defau	lt Valu	e		
			Status	DIVB [1:0]		IB [4:0]		
Default			Power ON Sequence	2'b00	5'h	n1Bh		
			SW Reset	2'b00	5'h	n1Bh		
		HW Reset		2'b00	5'ł	n1Bh		





8.3.4. Frame Rate control (In Partial Mode/Full Colors) (B3h)

B3h		FRMCTR3 (Frame Rate Control (In Partial Mode / Full colors))											
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	1	0	1	1	0	0	1	1	B3h
1 st Parameter	1	1	↑	XX	0	0	0	0	0	0	DIVC	[1:0]	00
2 nd Parameter	1	1	1	XX	0	0	0		F	RTNC [4:0)]	•	1B

Formula to calculate frame frequency:

Frame Rate= $\frac{}{\text{Clocks per line } x \text{ Division ratio } x \text{ (Lines} + \text{VBP} + \text{VFP)}}$

Sets the division ratio for internal clocks of Partial mode (Idle mode off) at MCU interface.

fosc: internal oscillator frequency

Clocks per line: RTNC setting Division ratio: DIVC setting

Lines: total driving line number VBP : back porch line number VFP: front porch line number

	RTI	NC [4:0]	Frame Rate (Hz)	
1	0	0	0	0	119
1	0	0	0	1	112
1	0	0	1	0	106
1	0	0	1	1	100
1	0	1	0	0	95
1	0	1	0	1	90
1	0	1	1	0	86
1	0	1	1	1	83

	RTI	NC [4:0]	Frame Rate (Hz)	
1	1	0	0	0	79
1	1	0	0	1	76
1	1	0	1	0	73
1	1	0	1	1	70(default)
1	1	1	0	0	68
1	1	1	0	1	65
1	1	1	0	1	63
1	1	1	1	1	61

Description

DIVC [1:0]: division ratio for internal clocks when Partial mode.

DIVO	[1:0]	Division Ratio			
0	0	fosc			
0	1	fosc / 2			
1	0	fosc / 4			
1	1	fosc / 8			

RTNC [4:0]: RTNC [4:0] is used to set 1H (line) period of Partial mode at MCU interface.

RTNC [4:0]					Clock per Line		
0	0	0	0	0	Setting prohibited		
0	0	0	0	1	Setting prohibited		
0	0	0	1	0	Setting prohibited		
0	0	0	1	1	Setting prohibited		
0	0	1	0	0	Setting prohibited		
0	0	1	0	1	Setting prohibited		
0	0	1	1	0	Setting prohibited		
0	0	1	1	1	Setting prohibited		
0	1	0	0	0	Setting prohibited		
0	1	0	0	1	Setting prohibited		
0	1	0	1	0	Setting prohibited		

RTNC [4:0]					Clock per Line		
0	1	0	1	1	Setting prohibited		
0	1	1	0	0	Setting prohibited		
0	1	1	0	1	Setting prohibited		
0	1	1	1	0	Setting prohibited		
0	1	1	1	1	Setting prohibited		
1	0	0	0	0	16 clocks		
1	0	0	0	1	17 clocks		
1	0	0	1	0	18 clocks		
1	0	0	1	1	19 clocks		
1	0	1	0	0	20 clocks		
1	0	1	0	1	21 clocks		

	RTI	NC [4:0]		Clock per Line
1	0	1	1	0	22 clocks
1	0	1	1	1	23 clocks
1	1	0	0	0	24 clocks
1	1	0	0	1	25 clocks
1	1	0	1	0	26 clocks
1	1	0	1	1	27 clocks
1	1	1	0	0	28 clocks
1	1	1	0	1	29 clocks
1	1	1	1	0	30 clocks
1	1	1	1	1	31 clocks





Restriction	EXTC should be high to enable this command						
			Status			Availability	
		Normal Mode ON, Idle Mode OFF, Sleep OUT				Yes	
Register		Normal Mode ON, Idle Mode ON, Sleep OUT				Yes	
Availability			Partial Mode ON, Idle Mode OFF, Sleep OUT				
		Partial Mode ON, Idle Mode ON, Sleep OUT			Yes		
				Yes			
Default			Status	Default Valu		е	
			- Claids	DIVC [1:0]	RTN	C [4:0]	
			Power ON Sequence	2'b00	5'l	n1Bh	
			SW Reset	2'b00	5'l	n1Bh	
			HW Reset	2'b00	5'l	n1Bh	





8.3.5. Display Inversion Control (B4h)

B4h		INVTR (Display Inversion Control)											
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	0	1	0	0	B4h
1 st Parameter	1	1	1	XX	0	0	0	0	0	NLA	NLB	NLC	02
			n mode s										
	NLA: II	nversion	setting in	full colors no	mal mode (Normal mo	ode on)						
	NLB: I	nversion	setting in	Idle mode (Id	le mode on)							
Description	NLC: I	nversion	setting in	full colors pa	rtial mode (F	Partial mod	le on / Id	le mode (off)				
Description					NLA / I	NLB / NLC	In	version					
						0		inversion					
						1	Fram	e inversio	n				
Restriction	EXTC should be high to enable this command												
ricotriction	LX10	Silouid be	- Ingirito c										
						Status			Availab	oility			
Register					Mode ON,				Yes				
					I Mode ON,				Yes				
Availability					Mode ON,				Yes				
				Parlia	Mode ON,	Sleep IN	ON, Sie	ер ООТ	Yes				
						овер пу			103	>			
							1 -						
					Sta	tus		efault Valu					
Default					Power ON	Seguence	1'b0	NLB 1'b1	1'b0				
Boldan						Reset	1'b0	1'b1	1'b0				
					H/W I		1'b0	1'b1	1'b0				





8.3.6. Blanking Porch Control (B5h)

PRCTR (Blanking Porch)												
D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
0	1	↑	XX	1	0	1	1	0	1	0	1	B5h
1	1	↑	XX	0		VFP [6:0]				02		
1	1	↑	XX	0				VBP [6:0]				02
1	1	↑	XX	0	0	0			HFP [4:0]			0A
1	1	↑	XX	0	0	0 0 HBP [4:0]				14		
	D/CX 0 1 1 1	D/CX RDX 0 1 1 1 1 1 1 1 1 1	D/CX RDX WRX 0 1 ↑ 1 1 ↑ 1 1 ↑ 1 1 ↑ 1 1 ↑	0 1 ↑ XX 1 1 ↑ XX 1 1 ↑ XX 1 1 ↑ XX	D/CX RDX WRX D17-8 D7 0 1 ↑ XX 1 1 1 ↑ XX 0 1 1 ↑ XX 0 1 1 ↑ XX 0	D/CX RDX WRX D17-8 D7 D6 0 1 ↑ XX 1 0 1 1 ↑ XX 0 0 1 1 ↑ XX 0 0 1 1 ↑ XX 0 0	D/CX RDX WRX D17-8 D7 D6 D5 0 1 ↑ XX 1 0 1 1 1 ↑ XX 0 0 1 1 1 ↑ XX 0 0 0 0 1 1 ↑ XX 0 0 0 0	D/CX RDX WRX D17-8 D7 D6 D5 D4 0 1 ↑ XX 1 0 1 1 1 1 ↑ XX 0 0 0 0 1 1 ↑ XX 0 0 0 0	D/CX RDX WRX D17-8 D7 D6 D5 D4 D3 0 1 ↑ XX 1 0 1 1 0 1 1 ↑ XX 0 VFP [6:0] 1 1 ↑ XX 0 VBP [6:0] 1 1 ↑ XX 0 0 0	D/CX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 0 1 ↑ XX 1 0 1 1 0 1 1 1 ↑ XX 0 VFP [6:0] VFP [6:0] 1 1 ↑ XX 0 0 0 HFP [4:0]	D/CX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1 0 1 ↑ XX 1 0 1 1 0 1 0 1 1 ↑ XX 0 VFP [6:0] VFP [6:0] 1 1 ↑ XX 0 0 0 HFP [4:0]	D/CX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1 D0 0 1 ↑ XX 1 0 1 1 0 1 0 1 1 1 ↑ XX 0 VFP [6:0] VFP [6:0] 1 1 ↑ XX 0 0 0 HFP [4:0]

VFP [6:0] / **VBP [6:0]:** The VFP [6:0] and VBP [6:0] bits specify the line number of vertical front and back porch period respectively.

VFP [6:0] VBP [6:0]	Number of HSYNC of front/back porch	VFP [6:0] VBP [6:0]	Number of HSYNC of front/back porch
0000000	Setting inhibited	1000000	64
0000001	Setting inhibited	1000001	65
0000010	2	1000010	66
0000011	3	1000011	67
0000100	4	1000100	68
0000101	5	1000101	69
0000110	6	1000110	70
0000111	7	1000111	71
0001000	8	1001000	72
0001001	9	1001001	73
0001010	10	1001010	74
0001011	11	1001011	75
0001100	12	1001100	76
0001101	13	1001101	77
:	:	:	:
:	:	:	:
0111101	61	1111101	125
0111110	62	1111110	126
0111111	63	1111111	127

Description

Note: VFP + VBP ≤ 254 HSYNC signals

HFP [4:0] / **HBP [4:0]:** The HFP [4:0] and HBP [4:0] bits specify the line number of horizontal front and back porch period respectively.

HFP [4:0] HBP [4:0]	Number of DOTCLK of the front/back porch
00000	Setting prohibited
00001	Setting prohibited
00010	2
00011	3
00100	4
00101	5
00110	6
00111	7
01000	8
01001	9
01010	10
01011	11
01100	12
01101	13
01110	14
01111	15

HFP [4:0] HBP [4:0]	Number of DOTCLK of front/back porch
10000	16
10001	17
10010	18
10011	19
10100	20
10101	21
10110	22
10111	23
11000	24
11001	25
11010	26
11011	27
11100	28
11101	29
11110	30
11111	31





Restriction	EXTC should be high	ld be high to enable this command						
				Status		Availab	ility	
			Normal Mode	ON, Idle Mode	OFF, Sleep O	UT Yes		
Register			Normal Mode	ON, Idle Mode	e ON, Sleep Ol	JT Yes		
Availability			Partial Mode	ON, Idle Mode	OFF, Sleep Ol	JT Yes		
		Partial Mode ON, Idle Mode ON, Sleep OUT Yes						
				Sleep IN		Yes		
			01-1		Default	Value		
			Status	VFP [6:0]	VBP [6:0]	HFP [4:0]	HBP [4:0]	
Default		Power (ON Sequence	7'h02h	7'h02h	5'h0Ah	5'h14h	
			W Reset	7'h02h	7'h02h	5'h0Ah	5'h14h	
		H	W Reset	7'h02h	7'h02h	5'h0Ah	5'h14h	





8.3.7. Display Function Control (B6h)

B6h	DISCTRL (Display Function Control)												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	1	0	1	1	0	1	1	0	B6h
1 st Parameter	1	1	↑	XX	0	0	0	0	PTG	[1:0]	PT	[1:0]	0A
2 nd Parameter	1	1	↑	XX	REV	GS	SS	SM		ISC	[3:0]		82
3 rd Parameter	1	1	↑	XX	0	0			NL J	[5:0]			27
4 th Parameter	1	1	1	XX	0	0			PCDI	V [5:0]			XX

PTG [1:0]: Set the scan mode in non-display area.

PTG1	PTG0	Gate outputs in non-display area	Source outputs in non-display area	VCOM output	
0	0	Normal scan	Set with the PT [2:0] bits	VCOMH/VCOML	
0	1	Setting prohibited			
1	0	Interval scan	Set with the PT [2:0] bits		
1	1	Setting prohibited			

PT [1:0]: Determine source/VCOM output in a non-display area in the partial display mode.

PT [1:0]		Source output or	n non-display area	VCOM output on non-display area			
PI	[1:0]	Positive polarity Negative polarity		Positive polarity	Negative polarity		
0	0	V63	V0	VCOML	VCOMH		
0	1	V0	V63	VCOML	VCOMH		
1	0	AGND	AGND	AGND	AGND		
1	1	Hi-Z	Hi-Z	AGND	AGND		

SS: Select the shift direction of outputs from the source driver.

SS	Source Output Scan Direction
0	S1 → S720
1	S720 → S1

In addition to the shift direction, the settings for both SS and BGR bits are required to change the assignment of R, G, and B dots to the source driver pins.

Description

To assign R, G, B dots to the source driver pins from S1 to S720, set SS = 0.

To assign R, G, B dots to the source driver pins from S720 to S1, set SS = 1.

REV: Select whether the liquid crystal type is normally white type or normally black type.

REV	Liquid crystal type
0	Normally black
1	Normally white

ISC [3:0]: Specify the scan cycle interval of gate driver in non-display area when PTG [1:0] ="10" to select interval scan.

Then scan cycle is set as odd number from 0~29 frame periods. The polarity is inverted every scan cycle.

ISC [3:0]	Scan Cycle	$f_{FLM} = 60Hz$
0000	1 frame	17ms
0001	3 frames	51ms
0010	5 frames	85ms
0011	7 frames	119ms
0100	9 frames	153ms
0101	11 frames	187ms
0110	13 frames	221ms
0111	15 frames	255ms

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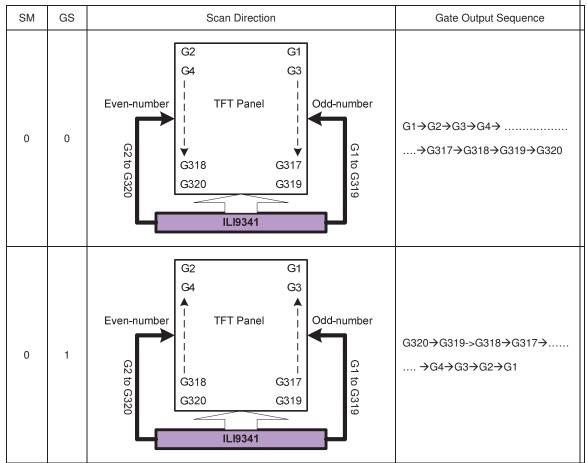


1000	17 frames	289ms
1001	19 frames	323ms
1010	21 frames	357ms
1011	23 frames	391ms
1100	25 frames	425ms
1101	27 frames	459ms
1110	29 frames	493ms
1111	31 frames	527ms
	1001 1010 1011 1100 1101 1110	1001 19 frames 1010 21 frames 1011 23 frames 1100 25 frames 1101 27 frames 1110 29 frames

GS: Sets the direction of scan by the gate driver in the range determined by SCN [4:0] and NL [4:0]. The scan direction determined by GS = 0 can be reversed by setting GS = 1.

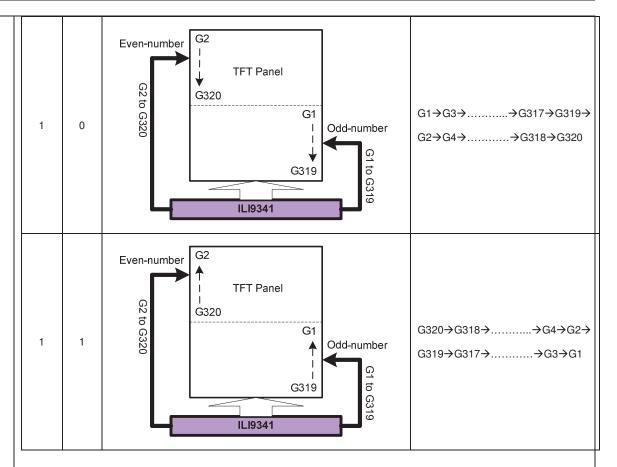
GS	Gate Output Scan Direction
0	G1 → G320
1	G320 → G1

SM: Sets the gate driver pin arrangement in combination with the GS bit to select the optimal scan mode for the module.









NL [5:0]: Sets the number of lines to drive the LCD at an interval of 8 lines. The GRAM address mapping is not affected by the number of lines set by NL [5:0]. The number of lines must be the same or more than the number of lines necessary for the size of the liquid crystal panel.

		NL [5:0]	LCD Drive Line		
0	0	0	0	0	0	Setting prohibited
0	0	0	0	0	1	16 lines
0	0	0	0	1	0	24 lines
0	0	0	0	1	1	32 lines
0	0	0	1	0	0	40 lines
0	0	0	1	0	1	48 lines
0	0	0	1	1	0	56 lines
0	0	0	1	1	1	64 lines
0	0	1	0	0	0	72 lines
0	0	1	0	0	1	80 lines
0	0	1	0	1	0	88 lines
0	0	1	0	1	1	96 lines
0	0	1	1	0	0	104 lines
0	0	1	1	0	1	112 lines
0	0	1	1	1	0	120 lines
0	0	1	1	1	1	128 lines
0	1	0	0	0	0	136 lines
0	1	0	0	0	1	144 lines
0	1	0	0	1	0	152 lines
0	1	0	0	1	1	160 lines
0	1	0	1	0	0	168 lines

		NL [5:0]	LCD Driver Line		
0	1	0	1	0	1	176 lines
0	1	0	1	1	0	184 lines
0	1	0	1	1	1	192 lines
0	1	1	0	0	0	200 lines
0	1	1	0	0	1	208 lines
0	1	1	0	1	0	216 lines
0	1	1	0	1	1	224 lines
0	1	1	1	0	0	232 lines
0	1	1	1	0	1	240 lines
0	1	1	1	1	0	248 lines
0	1	1	1	1	1	256 lines
1	0	0	0	0	0	264 lines
1	0	0	0	0	1	272 lines
1	0	0	0	1	0	280 lines
1	0	0	0	1	1	288 lines
1	0	0	1	0	0	296 lines
1	0	0	1	0	1	304 lines
1	0	0	1	1	0	312 lines
1	0	0	1	1	1	320 lines
		Oth	ers			Setting inhibited

PCDIV [5:0]:





			exte	rnal fosc=	$\frac{DC}{2\times (P)}$	TCLK CDIV	<u>(</u> +1)			
					(.		,			
Restriction	EXTC should be high to er	nable thi	is command							
				Status			Availability			
Register			nal Mode ON					Yes Yes		
Availability			mal Mode ON ial Mode ON					Yes		
,			tial Mode ON	, Idle Mode				Yes		
				Sleep IN				Yes		
	Status		PTG [1:0]	PT [1:0]	REV	Default GS	Value SS	SM	ISC [3:0]	NL [5:0]
Default	Power ON Seq	uence	2'b10	2'b10	1'b1	1'b0	1'b0	1'b0	4'b0010	6'h27h
	SW Rese		2'b10	2'b10	1'b1	1'b0	1'b0	1'b0	4'b0010	6'h27h
	HW Rese	t	2'b10	2'b10	1'b1	1'b0	1'b0	1'b0	4'b0010	6'h27h





8.3.8. Entry Mode Set (B7h)

B7h	ETMOD (Entry Mode Set)													
	D/CX	RDX	WRX	D17-8	D7	D6		D		D3	D2	D1	D0	HEX
Command	0	1	↑ ↑	XX	1	0	1	1		0	1	1	1	B7h
Parameter	1	1	1	XX	0	0	0	C		DSTB	GON	DTE	GAS	06
Description	DSTB: interna saved. Note:	The ILI9 I logic po Rewrite ILI9341 (1) Exit (2) Inpu to th	341 drive wer and Frame N provides Deep St. t a RESX e initial s WR D/C D[17:	er enters the De SRAM power an Ilemory content a It two ways to ex It wo ways to ex It wo ways to ex It wo ways to ex It wo ways to ex It wo ways to ex It wo ways to ex It wo ways to ex It was and by Mode by It wo with effect It was a way of the way of	ep Standl re turn off, and instru it the Dee pull down ctive low 2 Don Care GAS 0 1	by Mod the dis ctions a p Stand CSX to level do Wait 1m	le when D splay data after the D dby Mode to low ("0") uration to s or more Low voltage En Dis	stored in stored	set to lin the andby s. the in.	high ("1" Frame Mode is Side log	"). In Dee Memory a exited.	p Standby and the ins	y mode, b	ooth are not
					1	1	Norr	nal disp	lay					
Restriction	EXTC :	should be	e high to	enable this com	mand									
Register Availability	Status Availability Normal Mode ON, Idle Mode OFF, Sleep OUT Yes Normal Mode ON, Idle Mode ON, Sleep OUT Yes Partial Mode ON, Idle Mode OFF, Sleep OUT Yes Partial Mode ON, Idle Mode ON, Sleep OUT Yes Sleep IN Yes													
Default					Status r ON Seq SW Rese HW Rese	t	DSTB 1'b0 1'b0 1'b0	GON 1'b1 1'b1 1'b1	1'b1	GAS 1 1'b0 1 1'b0				





8.3.9. Backlight Control 1 (B8h)

B8h		Backlight Control 1											
-	D/CX	RDX	WRX	D17-8	B D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	1	0	0	0	B8h
Parameter		1	1	XX	0	0	0	0	TH_UI [3]	TH_UI [2]	TH_UI [1]	TH_UI [0]	0C
	TH_UI [3:0]: These bits are used to set the percentage of grayscale data accumulate histogram value in the user interface (UI) mode. This ratio of maximum number of pixels that makes display image white (=data "255") to the total or pixels by image processing.												
		TH UI [Descr	iption		TH_UI	[3:0]	Description		
Description			4'0h	1		99	%		4'81	h	84%		
·	4'1h			1	98%				4'91	h	82%		
		4'2h			96%				4'A	4'Ah			
			4'3h		94%					4'Bh			
			4'4h		92%				4'C		76%		
			4'5h		90%				4'D		74%		
		4'6h			88%				4'E	1	72%		
			4'7h		86% 4'F			h	70%				
						Sta	atus			Availability	,		
				Norma	al Mode	On, Idl	e Mod	e Off,	Sleep Out	Yes			
Register				Norma	al Mode	On, Idl	e Mod	e On,	Sleep Out	Yes			
Availability				Partia	l Mode (On, Idle	Mode	Off, S	Sleep Out	Yes			
				Partia	l Mode (On, Idle	Mode	On, S	Sleep Out	Yes			
ı			Sleep In							Yes			
Default		Status Default Value TH_UI [3:0]											
Default				-	Power (•	;	4'b0110				
Ì	L	SV	V Rese	et		No change							

HW Reset

4'b0110





8.3.10. Backlight Control 2 (B9h)

B9h		Backlight Control 2											
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	1	0	0	1	B9h
Parameter	1	1	↑	XX	TH_MV [3]	TH_MV [2]	TH_MV [1]	TH_MV [0]	TH_ST [3]	TH_ST [2]	TH_ST [1]	TH_ST [0]	СС

TH_ST [3:0]: These bits are used to set the percentage of grayscale data accumulate histogram value in the still picture mode. This ratio of maximum number of pixels that makes display image white (=data "255") to the total of pixels by image processing.

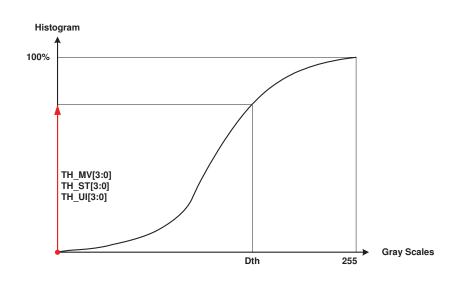
TH_ST [3:0]	Description
4'0h	99%
4'1h	98%
4'2h	96%
4'3h	94%
4'4h	92%
4'5h	90%
4'6h	88%
4'7h	86%

TH_ST [3:0]	Description				
4'8h	84%				
4'9h	82%				
4'Ah	80%				
4'Bh	78%				
4'Ch	76%				
4'Dh	74%				
4'Eh	72%				
4'Fh	70%				
4'Fh	70%				

TH_MV [3:0]: These bits are used to set the percentage of grayscale data accumulate histogram value in the moving image mode. This ratio of maximum number of pixels that makes display image white (=data "255") to the total of pixels by image processing.

TH_MV [3:0]	Description
4'0h	99%
4'1h	98%
4'2h	96%
4'3h	94%
4'4h	92%
4'5h	90%
4'6h	88%
4'7h	86%

TH_MV [3:0]	Description			
4'8h	84%			
4'9h	82%			
4'Ah	80%			
4'Bh	78%			
4'Ch	76%			
4'Dh	74%			
4'Eh	72%			
4'Fh	70%			



Description





		Status	Availability		
	Normal Mode C	Normal Mode On, Idle Mode Off, Sleep Out			
Register	Normal Mode C	On, Idle Mode On, Sleep Out	Yes		
Availability	Partial Mode O	n, Idle Mode Off, Sleep Out	Yes		
	Partial Mode O	n, Idle Mode On, Sleep Out	Yes		
	Sleep In	Sleep In			
	0	. Default Val			
	Status	TH_MV [3:0]	TH_ST [3:0]		
Default	Power On Sequence	4'b1100	4'b1100		
	SW Reset	No change	No change		
	HW Reset	4'b1100	4'b1100		



Description

a-Si TFT LCD Single Chip Driver 240RGBx320 Resolution and 262K color



8.3.11. Backlight Control 3 (BAh)

BAh	Backlight Control 3												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	1	0	1	0	BAh
Parameter	1	1	1	XX	0	0	0	0	DTH_UI [3]	DTH_UI [2]	DTH_UI [1]	DTH_UI [0]	04

DTH_UI [3:0]: This parameter is used set the minimum limitation of grayscale threshold value in User Icon (UI) image mode.

This register setting will limit the minimum Dth value to prevent the display image from being too white and the display quality is not acceptable.

DTH_UI [3:0]	Description
4'0h	252
4'1h	248
4'2h	244
4'3h	240
4'4h	236
4'5h	232
4'6h	228
4'7h	224

DTH_UI [3:0]	Description
4'8h	220
4'9h	216
4'Ah	212
4'Bh	208
4'Ch	204
4'Dh	200
4'Eh	196
4'Fh	192

	Status	Availability
	Normal Mode On, Idle Mode Off, Sleep Out	Yes
Register	Normal Mode On, Idle Mode On, Sleep Out	Yes
Availability	Partial Mode On, Idle Mode Off, Sleep Out	Yes
	Partial Mode On, Idle Mode On, Sleep Out	Yes
	Sleep In	Yes

Status	Default Value
Status	DTH_UI [3:0]
Power On Sequence	4'b0100
SW Reset	No change
HW Reset	4'b0100





8.3.12. Backlight Control 4 (BBh)

BBh	Backlight Control 4												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	1	0	1	1	BBh
Parameter	1	1	1	XX	DTH_MV [3]	DTH_MV [2]	DTH_MV [1]	DTH_MV [0]	DTH_ST [3]	DTH_ST [2]	DTH_ST [1]	DTH_ST [0]	65

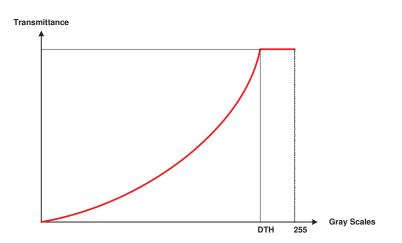
DTH_ST [3:0]/DTH_MV [3:0]: This parameter is used set the minimum limitation of grayscale threshold value. This register setting will limit the minimum Dth value to prevent the display image from being too white and the display quality is not acceptable.

DTH_ST [3:0]	Description
4'0h	224
4'1h	220
4'2h	216
4'3h	212
4'4h	208
4'5h	204
4'6h	200
4'7h	196

DTH_ST [3:0]	Description
4'8h	192
4'9h	188
4'Ah	184
4'Bh	180
4'Ch	176
4'Dh	172
4'Eh	168
4'Fh	164

DTH_MV [3:0]	Description
4'0h	224
4'1h	220
4'2h	216
4'3h	212
4'4h	208
4'5h	204
4'6h	200
4'7h	196

DTH_MV [3:0]	Description
4'8h	192
4'9h	188
4'Ah	184
4'Bh	180
4'Ch	176
4'Dh	172
4'Eh	168
4'Fh	164



	Status	Availability
	Normal Mode On, Idle Mode Off, Sleep Out	Yes
Register	Normal Mode On, Idle Mode On, Sleep Out	Yes
Availability	Partial Mode On, Idle Mode Off, Sleep Out	Yes
	Partial Mode On, Idle Mode On, Sleep Out	Yes
	Sleep In	Yes
	1	

Description





	Otatus	Default Value							
	Status	DTH_MV [3:0]	DTH_ST [3:0]						
Default	Power On Sequence	4'b0110	4'b0101						
	SW Reset	No change	No change						
	HW Reset	4'b0110	4'b0101						





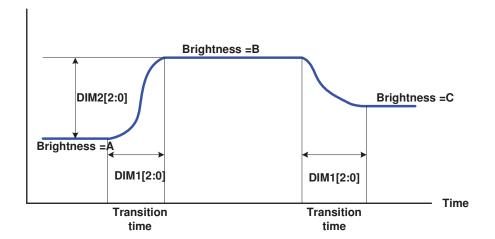
8.3.13. Backlight Control 5 (BCh)

BCh		Backlight Control 5												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	1	0	1	1	1	1	0	0	BCh	
Parameter	1	1	1	XX	DIM2 [3]	DIM2 [2]	DIM2 [1]	DIM2 [0]	0	DIM1 [2]	DIM1 [1]	DIM1 [0]	44	

DIM1 [2:0]: This parameter is used to set the transition time of brightness level to avoid the sharp brightness transition on vision.

DIM1 [2:0]	Description
3'0h	1 frame
3'1h	1 frame
3'2h	2 frames
3'3h	4 frames
3'4h	8 frames
3'5h	16 frames
3'6h	32 frames
3'7h	64 frames

Description



DIM2 [3:0]: This parameter is used to set the threshold of brightness change.

When the brightness transition difference is smaller than DIM2 [3:0], the brightness transition will be ignored.

For example:

If | brightness B - brightness A| < DIM2 [2:0], the brightness transition will be ignored and keep the brightness A.

	Status	Availability
	Normal Mode On, Idle Mode Off, Sleep Out	Yes
Register	Normal Mode On, Idle Mode On, Sleep Out	Yes
Availability	Partial Mode On, Idle Mode Off, Sleep Out	Yes
	Partial Mode On, Idle Mode On, Sleep Out	Yes
	Sleep In	Yes

Default

Chahua	Defaul	t Value
Status	DIM2 [3:0]	DIM1 [2:0]
Power On Sequence	4'b0100	4'b0100
SW Reset	No change	No change
HW Reset	4'b0100	4'b0100



Description

a-Si TFT LCD Single Chip Driver 240RGBx320 Resolution and 262K color



8.3.14. Backlight Control 7 (BEh)

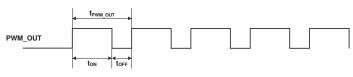
BEh		Backlight Control 7											
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	1	1	1	0	BEh
Parameter	1	1	1	XX	PWM_	PWM_	PWM_	PWM_	PWM_	PWM_	PWM_	PWM_	0F
			' '		DIV[7]	DIV[6]	DIV[5]	DIV[4]	DIV[3]	DIV[2]	DIV[1]	DIV[0]	_

PWM_DIV [7:0]: PWM_OUT output frequency control. This command is used to adjust the PWM waveform frequency of

PWM_OUT. The PWM frequency can be calculated by using the following equation.

$$f_{PWM_OUT} = \frac{16MHz}{(PWM_DIV[7:0]+1)\times255}$$

PWM_DIV [7:0]	f _{PWM_OUT}
8'h0	62.74 KHz
8'h1	31.38 KHz
8'h2	20.915KHz
8'h3	15.686KHz
8'h4	12.549 KHz
8'hFB	249Hz
8'hFC	248Hz
8'hFD	247Hz
8'hFE	246Hz
8'hFF	245Hz



Note: The output frequency tolerance of internal frequency divider in CABC is ±10%

	Status	Availability
	Normal Mode On, Idle Mode Off, Sleep Out	Yes
Register	Normal Mode On, Idle Mode On, Sleep Out	Yes
Availability	Partial Mode On, Idle Mode Off, Sleep Out	Yes
	Partial Mode On, Idle Mode On, Sleep Out	Yes
	Sleep In	Yes

Status	Default Value
Power On Sequence	PWM_DIV [7:0]=0Fh
SW Reset	No change
HW Reset	PWM_DIV [7:0]=0Fh





8.3.15. Backlight Control 8 (BFh)

BFh							Bac	klight Co	ntrol 2					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	!	D1	D0	HEX
Command	0	1	1	XX	1	0	1	1	1	1		1	1	BFh
Parameter	1	1	1	XX	0	0	0	0	0	LEDO	NR	LEDONPOL	LEDPWMPOL	00
	LEDP	WMPC	L: The	bit is use	d to d	efine polarit	y of LE	EDPWM s	ignal.					
					BL LEDPWMPOL LEDPWM pin									
					0	0 0								
					0	1			1					
					1	0			al polarity					
				L	1	1		Inverse	ed polarity	of PW	M sig	nal		
	LEDONPOL: This bit is used to control LEDON pin.													
		BL LEDONPOL LEDON pin												
	0 0 0													
Description					0	1			1					
	1 0 LEDONR													
					1	1		Ir	versed L	EDONF	3			
	LEDO	NR: T	nis bit is	used to	contro	l LEDON pi	n.							
						LEDONR		De	escription					
					0 Low									
						1			High					
							Sta				vailab	oility		
						nal Mode O					Yes			
Register						nal Mode O					Yes			
Availability						ial Mode O					Yes			
						ial Mode O	n, Idle	Mode On,	Sleep O	ut	Yes			
					Slee	p In					Yes			
					St	atus				t Value				
							_	DONR	LEDON	POL	LEDP	WMPOL		
Default				Pov	wer On Sequence			1'b0	1'b0		1'b0			
					SW	Reset	No	change	No cha	nge	No	change		
					HW	Reset		1'b0	1'b0)	1	1'b0		
	<u> </u>													





8.3.16. Power Control 1 (C0h)

C0h	PWCTRL 1 (Power Control 1)																	
3011	D/OV	DDV	MEN		17.0				·				Do		D0	T 54		LIEV
0	D/CX	RDX	WRX		17-8		D7	<u> </u>	D5)4	D3	-	D2	D1	D0	HEX
Command 1 st Parameter	0	1	<u> </u>		XX XX		0	0	0		()	0 VD	H [5:	0	0	0	C0h 21
i Farameter	VRH [5:0]: Set the GVDD level, which is a reference level for the											ovol (voltago l	ovol	21
Description	VRH [5	5:0]: Set		D level, VRH 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 0 1 1 0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	white white	0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 0 1 1 0 0 0 1 0 0 0 1 0	0 3 1 3 0 3 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 1 0 1 1 1 0 1 1 1 0 1 1 1 0 1 1 1 0 1 1 1 0 1 1 1 0 1 1 1 1 0 1 1 1 1 0 1 1 1 1 0 1		aibited aibited aibited		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	VI 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1	And the And th	gray	yscale 0	Voltage Voltag	evel.	
Restriction	EXTC	should h	e high to	anahla	thie	com	mand											
i logillolloll		Jiloulu D	o mgm to	JIIADIE		JUIT	manu											
Register Availability	Status Availability Normal Mode ON, Idle Mode OFF, Sleep OUT Yes Normal Mode ON, Idle Mode ON, Sleep OUT Yes Partial Mode ON, Idle Mode OFF, Sleep OUT Yes Partial Mode ON, Idle Mode ON, Sleep OUT Yes Sleep IN Yes																	
Default							Pow	Status ver ON Sequ SW Reset HW Reset	t			21h	e					





8.3.17. Power Control 2 (C1h)

C1h					PW	CTRL 2 (I	Power Co	ontrol 2)					
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	0	0	0	0	0	1	C1h
Parameter	1	1	1	XX	0	0	0	1	0		BT [2:0]		10
Description	Select the optimal step-up factor for the operating voltage. To reduce power consumption, set a smaller factor.												
Restriction	EXTC s	should b	e high to	enable this com	mand								
						Status			Availat	sility			
				Normal N	Ande ON		OFF SI	eep OUT	Yes				
Register					Mode ON				Yes				
Availability					lode ON,			-	Yes				
					∕lode ON,				Yes	;			
						Sleep IN			Yes	5			
Default					Power	Status ON Seque W Reset W Reset		efault Val BT [2:0] 3'b000 3'b000	ue				





8.3.18. VCOM Control 1(C5h)

C5h					VM	ICTRL1 (COM Co	ontrol 1)							
	D/CX														
Command	0	1	↑	XX 1 1 0 0 0 1 0 1 C											
1 st Parameter	1	1	↑	XX	0		VMH [6:0]								
2 nd Parameter	1	1	↑	XX	0	VML [6:0]									

VMH	[6:0]	: Set the	VCOMH	voltage.
-----	-------	-----------	--------------	----------

	et the VCOMH	 					
VMH [6:0]	VCOMH(V)	VMH [6:0]	VCOMH(V)	VMH [6:0]	VCOMH(V)	VMH [6:0]	VCOM
0000000	2.700	0100000	3.500	1000000	4.300	1100000	5.10
0000001	2.725	0100001	3.525	1000001	4.325	1100001	5.12
0000010	2.750	0100010	3.550	1000010	4.350	1100010	5.15
0000011	2.775	0100011	3.575	1000011	4.375	1100011	5.17
0000100	2.800	0100100	3.600	1000100	4.400	1100100	5.20
0000101	2.825	0100101	3.625	1000101	4.425	1100101	5.22
0000110	2.850	0100110	3.650	1000110	4.450	1100110	5.25
0000111	2.875	0100111	3.675	1000111	4.475	1100111	5.27
0001000	2.900	0101000	3.700	1001000	4.500	1101000	5.30
0001001	2.925	0101001	3.725	1001001	4.525	1101001	5.32
0001010	2.950	0101010	3.750	1001010	4.550	1101010	5.35
0001011	2.975	0101011	3.775	1001011	4.575	1101011	5.37
0001100	3.000	0101100	3.800	1001100	4.600	1101100	5.40
0001101	3.025	0101101	3.825	1001101	4.625	1101101	5.42
0001110	3.050	0101110	3.850	1001110	4.650	1101110	5.45
0001111	3.075	0101111	3.875	1001111	4.675	1101111	5.47
0010000	3.100	0110000	3.900	1010000	4.700	1110000	5.50
0010001	3.125	0110001	3.925	1010001	4.725	1110001	5.52
0010010	3.150	0110010	3.950	1010010	4.750	1110010	5.55
0010011	3.175	0110011	3.975	1010011	4.775	1110011	5.57
0010100	3.200	0110100	4.000	1010100	4.800	1110100	5.60
0010101	3.225	0110101	4.025	1010101	4.825	1110101	5.62
0010110	3.250	0110110	4.050	1010110	4.850	1110110	5.65
0010111	3.275	0110111	4.075	1010111	4.875	1110111	5.67
0011000	3.300	0111000	4.100	1011000	4.900	1111000	5.70
0011001	3.325	0111001	4.125	1011001	4.925	1111001	5.72
0011010	3.350	0111010	4.150	1011010	4.950	1111010	5.75
0011011	3.375	0111011	4.175	1011011	4.975	1111011	5.77
0011100	3.400	0111100	4.200	1011100	5.000	1111100	5.80
0011101	3.425	0111101	4.225	1011101	5.025	1111101	5.82
0011110	3.450	0111110	4.250	1011110	5.050	1111110	5.85
0011111	3.475	0111111	4.275	1011111	5.075	1111111	5.87

Description

٧N

VIL [6:0] : Set	the VCOML v	olta	age					
VML [6:0]	VCOML(V)		VML [6:0]	VCOML(V)	VML [6:0]	VCOML(V)	VML [6:0]	VCOML(V)
0000000	-2.500		0100000	-1.700	1000000	-0.900	1100000	-0.100
0000001	-2.475		0100001	-1.675	1000001	-0.875	1100001	-0.075
0000010	-2.450		0100010	-1.650	1000010	-0.850	1100010	-0.050
0000011	-2.425		0100011	-1.625	1000011	-0.825	1100011	-0.025
0000100	-2.400		0100100	-1.600	1000100	-0.800	1100100	0
0000101	-2.375		0100101	-1.575	1000101	-0.775	1100101	Reserved
0000110	-2.350		0100110	-1.550	1000110	-0.750	1100110	Reserved
0000111	-2.325		0100111	-1.525	1000111	-0.725	1100111	Reserved
0001000	-2.300		0101000	-1.500	1001000	-0.700	1101000	Reserved
0001001	-2.275		0101001	-1.475	1001001	-0.675	1101001	Reserved
0001010	-2.250		0101010	-1.450	1001010	-0.650	1101010	Reserved
0001011	-2.225		0101011	-1.425	1001011	-0.625	1101011	Reserved
0001100	-2.200		0101100	-1.400	1001100	-0.600	1101100	Reserved
0001101	-2.175		0101101	-1.375	1001101	-0.575	1101101	Reserved
0001110	-2.150		0101110	-1.350	1001110	-0.550	1101110	Reserved
0001111	-2.125		0101111	-1.325	1001111	-0.525	1101111	Reserved
0010000	-2.100		0110000	-1.300	1010000	-0.500	1110000	Reserved
0010001	-2.075		0110001	-1.275	1010001	-0.475	1110001	Reserved
0010010	-2.050		0110010	-1.250	1010010	-0.450	1110010	Reserved
0010011	-2.025		0110011	-1.225	1010011	-0.425	1110011	Reserved





	0010100	-2.000	0110100	-1.200		0100	-0.400	1110100	Reserved
	0010101	-1.975	0110101	-1.175	101	0101	-0.375	1110101	Reserved
	0010110	-1.950	0110110	-1.150		0110	-0.350	1110110	Reserved
	0010111	-1.925	0110111	-1.125	101	0111	-0.325	1110111	Reserved
	0011000	-1.900	0111000	-1.100		1000	-0.300	1111000	Reserved
	0011001	-1.875	0111001	-1.075	101	1001	-0.275	1111001	Reserved
	0011010	-1.850	0111010	-1.050		1010	-0.250	1111010	Reserved
	0011011	-1.825	0111011	-1.025	101	1011	-0.225	1111011	Reserved
	0011100	-1.800	0111100	-1.000	101	1100	-0.200	1111100	Reserved
	0011101	-1.775	0111101	-0.975	101	1101	-0.175	1111101	Reserved
	0011110	-1.750	0111110	-0.950	101	1110	-0.150	1111110	Reserved
	0011111	-1.725	0111111	-0.925	101	1111	-0.125	1111111	Reserved
Restriction	EXTC should be	e high to enab	le this command	d Status	;		Availabilit	iy	
			Normal Mode	ON Idle Mo	de OFF, SI	een OU			
Register			Normal Mode						
							1	_	
Availability			Partial Mode					_	
			Partial Mode			ep OUT	1		
				Sleep I	N		Yes		
			Sta	tus		efault Va			
					VMH [6:0] \	/ML [6:0]		
Default			Power ON	Sequence	7'h31		7'h3C		
			SW F	Reset	7'h31		7'h3C		
			HW	Rest	7'h31		7'h3C		



Description

a-Si TFT LCD Single Chip Driver 240RGBx320 Resolution and 262K color



8.3.19. VCOM Control 2(C7h)

C7h					VM	CTRL1 (VCOM Co	ontrol 1)						
	D/CX	CX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1 D0 HEX												
Command	0	1	↑	XX	1	1	0	0	0	1	1	1	C7h	
Parameter	1 1 1 \ \ \ \ XX \ \ \ \ \ \ \ \ \ \ \ \											C0		

nVM: nVM equals to "0" after power on reset and VCOM offset equals to program MTP value. When nVM set to "1", setting of VMF [6:0] becomes valid and VCOMH/VCOML can be adjusted.

VMF [6:0]: Set the VCOM offset voltage.

)]: Set the \	COM offset	voltage.				
	VMF[6:0]	VCOMH	VCOML	VMF[6:0]	VCOMH	VCOML
	0000000	VMH	VML	1000000	VMH	VML
	0000001	VMH - 63	VML - 63	1000001	VMH + 1	VML + 1
	0000010	VMH - 62	VML - 62	1000010	VMH + 2	VML + 2
	0000011	VMH - 61	VML - 61	1000011	VMH + 3	VML + 3
	0000100	VMH - 60	VML - 60	1000100	VMH + 4	VML + 4
	0000101	VMH – 58	VML – 58	1000101	VMH + 5	VML + 5
	0000110	VMH – 58	VML – 58	1000110	VMH + 6	VML + 6
	0000111	VMH – 57	VML – 57	1000111	VMH + 7	VML + 7
	0001000	VMH – 56	VML – 56	1001000	VMH + 8	VML + 8
	0001001	VMH - 55	VML - 55	1001001	VMH + 9	VML + 9
	0001010	VMH – 54	VML – 54	1001010	VMH + 10	VML + 10
	0001011	VMH – 53	VML – 53	1001011	VMH + 11	VML + 11
	0001100	VMH – 52	VML – 52	1001100	VMH + 12	VML + 12
	0001101	VMH – 51	VML -51	1001101	VMH + 13	VML + 13
	0001110	VMH – 50	VML – 50	1001110	VMH + 14	VML + 14
	0001111	VMH – 49	VML – 49	1001111	VMH + 15	VML + 15
	0010000	VMH – 48	VML – 48	1010000	VMH + 16	VML + 16
	0010001	VMH – 47	VML – 47	1010001	VMH + 17	VML + 17
	0010010	VMH – 46	VML – 46	1010010	VMH + 18	VML + 18
	0010011	VMH – 45	VML – 45	1010011	VMH + 19	VML + 19
	0010100	VMH – 44	VML – 44	1010100	VMH + 20	VML + 20
	0010101	VMH – 43	VML – 43	1010101	VMH + 21	VML + 21
	0010110	VMH – 42	VML – 42	1010110	VMH + 22	VML + 22
	0010111	VMH – 41	VML – 41	1010111	VMH + 23	VML + 23
	0011000	VMH – 40	VML – 40	1011000	VMH + 24	VML + 24
	0011001	VMH – 39	VML – 39	1011001	VMH + 25	VML + 25
	0011010	VMH – 38	VML – 38	1011010	VMH + 26	VML + 26
	0011011	VMH – 37	VML – 37	1011011	VMH + 27	VML + 27
	0011100	VMH – 36	VML – 36	1011100	VMH + 28	VML + 28
	0011101	VMH – 35	VML – 35	1011101	VMH + 29	VML + 29
	0011110	VMH – 34	VML – 34	1011110	VMH + 30	VML + 30
	0011111	VMH – 33	VML – 33	1011111	VMH + 31	VML + 31
	0100000	VMH – 32	VML – 32	1100000	VMH + 32	VML + 32
	0100001	VMH – 31	VML – 31	1100001	VMH + 33	VML + 33
	0100010	VMH – 30	VML – 30	1100010	VMH + 34	VML + 34
	0100011	VMH – 29	VML – 29	1100011	VMH + 35	VML + 35
	0100100	VMH – 28	VML – 28	1100100	VMH + 36	VML + 36
	0100101	VMH – 27	VML – 27	1100101	VMH + 37	VML + 37
	0100110	VMH – 26	VML – 26	1100110	VMH + 38	VML + 38
	0100111	VMH – 25	VML – 25	1100111	VMH + 39	VML + 39
	0101000	VMH – 24	VML – 24	1101000	VMH + 40	VML + 40
	0101001	VMH – 23	VML – 23	1101001	VMH + 41	VML + 41
	0101010	VMH – 22	VML – 22	1101010	VMH + 42	VML + 42
	0101011	VMH – 21	VML – 21	1101011	VMH + 43	VML + 43
	0101100	VMH – 20	VML – 20	1101100	VMH + 44	VML + 44
	0101101	VMH – 19	VML - 19	1101101	VMH + 45	VML + 45
	0101110	VMH – 18	VML – 18	1101110	VMH + 46	VML + 46
	0101111	VMH - 17	VML - 17	1101111	VMH + 47	VML + 47
	0110000	VMH – 16	VML - 16	1110000	VMH + 48	VML + 48
	0110001	VMH – 15 VMH – 14	VML – 15 VML – 14	1110001	VMH + 49	VML + 49
	0110010		VML – 14	1110010	VMH + 50 VMH + 51	VML + 50
	0110011	VMH – 13 VMH – 12	VML – 13	1110011	VMH + 51	VML + 51 VML + 52
	0110100	v ivi□ - 12	V IVIL - IZ	1110100	V IVI□ + O∠	V IVIL + JZ

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								_	
	0110101	I VMH – 11 VML –	11	1110101	٧N	ЛН + 53	VML + 53		
	0110110) VMH – 10 VML –	10	1110110	٧N	ЛН + 54	VML + 54		
	0110111	VMH – 9 VML -	- 9	1110111	٧N	ЛН + 55	VML + 55		
	0111000) VMH – 8 VML -	- 8	1111000	٧N	ЛН + 56	VML + 56		
	0111001	I VMH−7 VML-	- 7	1111001	٧N	/IH + 57	VML + 57		
	0111010) VMH – 6 VML -	- 6	1111010	V٨	ЛН + 58	VML + 58		
	0111011	I VMH – 5 VML -	- 5	1111011	٧N	ЛН + 59	VML + 59		
	0111100) VMH – 4 VML -	- 4	1111100	V٨	ЛH + 60	VML + 60		
	0111101			1111101		/IH + 61	VML + 61		
	0111110) VMH – 2 VML -	- 2	1111110	V٨	ЛH + 62	VML + 62		
	0111111	VMH − 1 VML -	- 1	1111111	V٨	ЛН + 63	VML + 63]	
Restriction	EXTC should be high to enable	e this command							
	Γ	Sta	atus			Availabilit	V		ļ
	ľ	Normal Mode ON, Idle		OFF Sleen	OLIT	Yes	,		
Register						Yes			
_	}	Normal Mode ON, Idle							
Availability		Partial Mode ON, Idle				Yes			
		Partial Mode ON, Idle	Mode	ON, Sleep C	DUT	Yes			
		Sle	ep IN			Yes			
							-		ļ
		Status		Defau	lt Valu	ie			,
		Status		nVM	۷N	ЛF [6:0]			
Default		Power ON Sequence)	1'b1	7	"h40h			
		SW Reset		1'b1	7	"h40h			
		HW Reset		1'b1	7	''h40h			ļ
		·		·					





8.3.20. NV Memory Write (D0h)

D0h	NVMWR (NV Memory Write) D/CX RDX WRX D17-8 D7 D6 D5 D4 D3 D2 D1 D0 HEX														
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX		
Command	0	1	↑	XX	1	1	0	1	0	0	0	0	D0h		
1 st Parameter	1	1	<u> </u>	XX	0	0	0	0	0	PG	M_ADR [2:0]	00		
2 nd Parameter	1	1	<u></u>	XX				PGM_D	ATA [7:0]				XX		
	This co	mmand	is used to	program the I	NV memor	y data. A	ter a succ	essful M	ΓP operat	ion, the in	formation	of PGM_	_DATA		
	[7:0] w	ill progra	mmed to	NV memory.											
	PGM_	ADR [2:0)]: The se	lect bits of ID1	, ID2, ID3	and VMF	[6:0] prog	ramming.							
				PGM	ADR [2:0	Progr	ammed N	V Memor	y Selection	n					
Description				0	0 0			ogrammir	•						
				0	0 1		ID2 pr	ogrammir	ng						
				0	1 0		ID3 pr	ogrammir	ng						
				1 0 0 VMF [6:0] programming											
			Others Reserved												
Restriction				orogrammed da											
. 100111011011			g to												
						Status			Availal	oility					
				Normal	Mode ON,		le OFF, SI	eep OUT	Yes						
Register					Mode ON				Yes	3					
Availability				Partial	Mode ON,	Idle Mod	e OFF, Sle	ep OUT	Yes	3					
,				Partial	Mode ON,	Idle Mod	le ON, Sle	ep OUT	Yes	5					
				Sleep IN Yes											
					24-4		D	efault Val	ue						
					Status	PG	M_ADR [2	2:0] PG	M_DATA	[7:0]					
Default				Power C	N Sequen	се	3'b000		MTP valu	е					
				SV	V Reset		3'b000		MTP valu	е					
				HV	V Reset		3'b000		MTP valu	е					





8.3.21. NV Memory Protection Key (D1h)

D1h					NVMP	KEY (NV	Memory	Protection I	(ey)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	0	1	0	0	0	1	D1h
1 st Parameter	1	1	1	XX				KEY [2	3:16]				55h
2 nd Parameter	1	1	1	XX				KEY [15:8]				AAh
3 rd Parameter	1	1	1	XX				KEY [7:0]				66h
Description		A66h to		y programming		-							ing will
Restriction	EXTC:	CTC should be high to enable this command											
Register Availability				Norma Partial	l Mode C Mode Of	N, Idle M	ode OFF lode ON ode OFF ode ON,	F, Sleep OUT , Sleep OUT F, Sleep OUT Sleep OUT	Availal Yes Yes Yes Yes	5 5 5 5			
Default			Status Default Value Power ON Sequence KEY [23:0]=55AA66h SW Reset KEY [23:0]=55AA66h HW Reset KEY [23:0]=55AA66h										





8.3.22. NV Memory Status Read (D2h)

D2h														
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HE	
Command	0	1	↑	XX	1	1	0	1	0	0	1	0	D2l	
1 st Parameter	1	1	1	XX	Х	Χ	Х	X	Χ	Χ	X	Х	Х	
2 nd Parameter	1	1	1	XX	0	ID	2_CNT	[2:0]	0	- 1	D1_CNT	[2:0]	XX	
3 rd Parameter	1	↑	1	XX	BUSY	V٨	/IF_CNT	[2:0]	0	I	D3_CNT	[2:0]	XX	
			_	_		V mem	ory.		program	record	. The bits	will increa	se "+1	
					Status	-		Avail	ability					
				0	0		0		rammed	_				
Description				0	0		1	Programn	ned 1 tim	е				
				0	1		1	Programm	ed 2 time	es				
				1	1		1	Programm	ed 3 time	es				
					0 1	THE O	Idle Busy							
Restriction	EXTC	should be	high to e	nable this comma	and									
									A !! !!					
				Nie was al Ma		tatus	. 055 0	L OUT	Availabi	ility				
Register				Normal Mo					Yes Yes					
A 11 - 1- 1114				Partial Mod					Yes					
Availability				Partial Mo					Yes					
				1 artial Wo		eep IN	014, 01	ссроот	Yes					
					<u> </u>	cop III			100					
				Status	ID 5 5	. . .		Default Value		011=	DI IGN			
Defends			_		ID3_CN	IT ID	2_CNT	ID1_CNT	VMF_		BUSY			
Default				r ON Sequence	X	+	X	X	X		X			
											· · · · · · · · · · · · · · · · · · ·			
				SW Reset HW Reset	X	-	X	X	X		X			





8.3.23. Read ID4 (D3h)

D3h		RDID4 (Read ID4)												
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX	
Command	0	1	1	XX	1	1	0	1	0	0	1	1	D3h	
1 st Parameter	1	1	1	XX	Х	Χ	Χ	Χ	Χ	Χ	Х	Х	Х	
2 nd Parameter	1	1	1	XX	0	0	0	0	0	0	0	0	00h	
3 rd Parameter	1	1	1	XX	1	0	0	1	0	0	1	1	93h	
4 th Parameter	1	↑	1	XX	0	1	0	0	0	0	0	1	41h	
Description	The 1 st	param	eter is dun eter mear	nmy read period as the IC version er mean the IC n	1.	ne.								
Restriction	EXTC :	XTC should be high to enable this command												
Register Availability				Normal Partial N	Mode ON Mode ON,	Status , Idle Mod , Idle Mod Idle Mod , Idle Mod Sleep IN	le ON, Sle e OFF, Sle e ON, Sle	eep OUT	Availal Yes Yes Yes Yes	S S S S				
Default	Status Default Value Power ON Sequence 24'h009341h SW Reset 24'h009341h HW Reset 24'h009341h													





8.3.24. Positive Gamma Correction (E0h)

E0h					PGAM	CTRL (Po	sitive Ga	amma Con	trol)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	1	0	0	0	0	0	E0h
1 st Parameter	1	1	↑	XX	0	0	0	0		VP63	[3:0]		08
2 nd Parameter	1	1	1	XX	0	0			VP62	[5:0]			
3 rd Parameter	1	1	1	XX	0	0			VP61	[5:0]			
4 th Parameter	1	1	1	X	0	0	0	0		VP59	[3:0]		05
5 th Parameter	1	1	1	XX	0	0	0		V	'P57 [4:0]			
6 th Parameter	1	1	1	XX	0	0	0	0		VP50	[3:0]		09
7 th Parameter	1	1	1	XX	0			V	/P43 [6:0]				
8 th Parameter	1	1	1	XX		VP27	7 [3:0]			VP36	[3:0]		
9 th Parameter	1	1	1	XX	0			\	/P20 [6:0]				
10 th Parameter	1	1	1	XX	0	0	0	0		VP13	[3:0]		0B
11 th Parameter	1	1	1	XX	0	0	0		,	VP6 [4:0]			
12 th Parameter	1	1	1	XX	0	0	0	0		VP4	[3:0]		00
13 th Parameter	1	1	1	XX	0	0			VP2	[5:0]			
14 th Parameter	1	1	1	XX	0	0			VP1	[5:0]			
15 th Parameter	1	1	1	XX	0	0	0	0		VP0	[3:0]		00
Description	Set the	gray so	cale volta	age to adjust the	e gamma	character	istics of t	he TFT pan	el.				
Restriction	EXTC	should l	oe high to	enable this co	mmand								
						Status			Availal	oility			
				Norma	l Mode Of	N, Idle Mo	de OFF,	Sleep OUT	Yes	3			
Register				Norma	l Mode O	N, Idle Mo	de ON, S	Sleep OUT	Yes	3			
Availability				Partial	Mode ON	I, Idle Mo	de OFF, S	Sleep OUT	Yes	6			
				Partia	l Mode Ol	N, Idle Mo	de ON, S	Sleep OUT	Yes	S			
						Sleep I	N		Yes	S			
Default													





8.3.25. Negative Gamma Correction (E1h)

E1h					NGAMCT	RL (Nega	ative Gar	nma Corre	ection)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	1	0	0	0	0	1	E1h
1 st Parameter	1	1	1	XX	0	0	0	0		VN63	[3:0]		08
2 nd Parameter	1	1	1	XX	0	0			VN62	[5:0]			
3 rd Parameter	1	1	1	XX	0	0			VN61	[5:0]			
4 th Parameter	1	1	1	XX	0	0	0	0		VN59	[3:0]		07
5 th Parameter	1	1	1	XX	0	0	0		\	/N57 [4:0]			
6 th Parameter	1	1	1	XX	0	0	0	0		VN50	[3:0]		05
7 th Parameter	1	1	1	XX	0			١	/N43 [6:0]				
8 th Parameter	1	1	1	XX		VN36	6 [3:0]			VN27	[3:0]		
9 th Parameter	1	1	1	XX	0			١	/N20 [6:0]				
10 th Parameter	1	1	1	XX	0	0	0	0		VN13	[3:0]		04
11 th Parameter	1	1	1	XX	0	0	0		,	VN6 [4:0]			
12 th Parameter	1	1	1	XX	0	0	0	0		VN4	[3:0]		0F
13 th Parameter	1	1	1	XX	0	0			VN2	[5:0]			
14 th Parameter	1	1	1	XX	0	0			VN1	[5:0]			
15 th Parameter	1	1	1	XX	0	0	0	0		VN0	[3:0]		0F
Description Restriction				age to adjust the		character	istics of th	ne TFT par	nel.				
						Status			Availa	bility			
				Normal	Mode Of	N, Idle Mo	de OFF, S	Sleep OUT	Yes	S			
Register				Norma	l Mode Ol	N, Idle Mo	de ON, S	Sleep OUT	Yes	S			
Availability				Partial	Mode ON	I, Idle Mo	de OFF, S	Sleep OUT	Yes	S			
				Partial	Mode Of	N, Idle Mo	de ON, S	leep OUT	Yes	S			
						Sleep II	N		Yes	3			
Default													





8.3.26. Digital Gamma Control 1 (E2h)

E2h					DGAM	CTRL (Di	jital Gam	ıma Co	ontrol	1)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4		D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	1	0		0	0	1	0	E2h
1 st Parameter	1	1	1	XX		RCA	[3:0]				BCA	0:8]		XX
:	1	1	1	XX		RCA	([3:0]				BCA	Ax [3:0]		XX
16 th Parameter	1	1	1	XX		RCA1	5 [3:0]				BCA	15 [3:0]		XX
Description				acro-adjustn acro-adjustn			_							
Restriction	EXTC	should b	e high to	enable this	command									
Register Availability				Norm Parti	al Mode ON nal Mode OI al Mode ON nal Mode ON	N, Idle Mo	de ON, S de OFF, S de ON, S	Sleep C	DUT	Availa Ye Ye Ye Ye	98 98 98 98			
Default					Stat Power ON SW R HW R	Sequence eset	RCAx	D D	BCA:	e x [3:0] BD BD BD				





8.3.27. Digital Gamma Control 2(E3h)

E3h					DGAM	CTRL (Di	gital Gam	ıma C	ontro	l 2)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4		D3	D2	D1	D0	HEX
Command	0	1	1	XX	1	1	1	0		0	0	1	1	E3h
1 st Parameter	1	1	1	XX		RFA	0 [3:0]				BFA	0:8] 0		XX
:	1	1	1	XX		RFA:	k [3:0]				BFA	Ax [3:0]		XX
64 rd Parameter	1	1	↑	XX		RFA6	3 [3:0]				BFA	63 [3:0]		XX
Description		-		icro-adjustme icro-adjustme	Ü	· ·								
Restriction	EXTC :	should b	e high to	enable this	command									
Register Availability				Norm Partia	al Mode ON al Mode ON al Mode ON al Mode ON	N, Idle Mo	de OFF, S de OFF, S de ON, S	Sleep C Sleep C	DUT DUT	Ye Ye Ye	ability es es es es es			
Default					State Power ON	Sequence	RFAx	BD	BFA	\x [3:0] ГВD				
				-	SW F		TE			TBD	-			
				L	HW F	teset	TE	שא		ΓBD	_			





8.3.28. Interface Control (F6h)

F6h						IFCTL (16bits Data	Format Sele	ction)				
	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
Command	0	1	↑	XX	1	1	1	1	0	1	1	0	F6h
1 st Parameter	1	1	↑	XX	MY_ EOR	MX_ EOR	MV_ EOR	0	BGR_ EOR	0	0	WE MODE	01
2 nd Parameter	1	1	1	XX	0	0	EPF [1]	EPF [0]	0	0	MDT [1]	MDT [0]	00
3 rd Parameter	1	1	↑	XX	0	0	ENDIAN	0	DM [1]	DM [0]	RM	RIM	00

MY_EOR / MX_EOR / MV_EOR / BGR_EOR:

The set value of MADCTL is used in the IC is derived as exclusive OR between 1st Parameter of IFCTL and MADCTL Parameter.

MDT [1:0]: Select the method of display data transferring.

WEMODE: Memory write control

WEMODE=0: When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the exceeding data will be ignored.

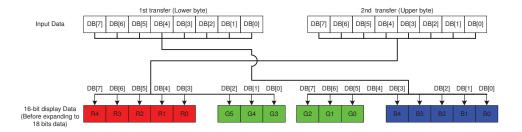
WEMODE=1: When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the column and page number will be reset, and the exceeding data will be written into the following column and page.

ENDIAN: Select Little Endian Interface bit. At Little Endian mode, the host sends LSB data first.

ENDIAN	Data transfer Mode
0	Normal (MSB first, default)
1	Little Endian (LSB first)

Note: Little Endian is valid on only 65K 8-bit and 9-bit MCU interface mode.

Description



DM [1:0]: Select the display operation mode.

DM [1]	DM [0]	Display Operation Mode
0	0	Internal clock operation
0	1	RGB Interface Mode
1	0	VSYNC interface mode
1	1	Setting disabled

The DM [1:0] setting allows switching between internal clock operation mode and external display interface operation mode.

However, switching between the RGB interface operation mode and the VSYNC interface operation mode is prohibited.





RM: Select the interface to access the GRAM.

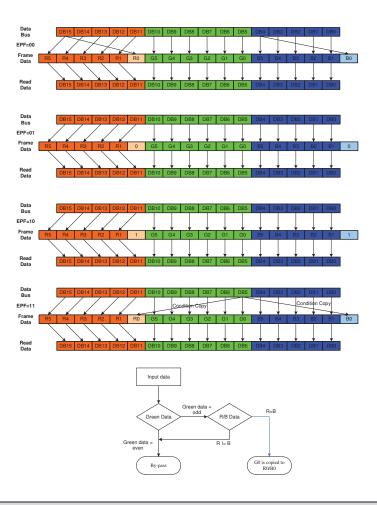
Set RM to "1" when writing display data by the RGB interface.

RM	Interface for RAM Access
0	System interface/VSYNC interface
1	RGB interface

RIM: Specify the RGB interface mode when the RGB interface is used. These bits should be set before display operation through the RGB interface and should not be set during operation.

RIM	COLMOD [6:4]	RGB Interface Mode
0	110 (262K color)	18- bit RGB interface (1 transfer/pixel)
0	101 (65K color)	16- bit RGB interface (1 transfer/pixel)
4	110 (262K color)	6- bit RGB interface (3 transfer/pixel)
1	101 (65K color)	6- bit RGB interface (3 transfer/pixel)

EPF [1:0]: 65K color mode data format.



EPF [1:0]	Expand 16 bbp (R,G,B) to 18bbp (R,G,B)
00	MSB is inputted to LSB r [5:0] = {R [4:0], R [4]} g [5:0] = {G [5:0]} b [5:0] = {B [4:0], B [4]}





		01		8 [4:0], 0} G [5:0]} G [4:0], 0} : : 4:0] = 5'h1F → r	[5:0], b[5:0] = 6'	h3F						
		10	r [5:0] = {R g [5:0] = {C b [5:0] = {E Exception:	G [5:0]} ´ 3 [4:0], 1}	[5:0], b[5:0] = 6'	h00						
		11	Compare R Case 1: R Case 2: R Case 3: R	R [4:0], G [5:1], B =G=B \rightarrow r [5:0] = =B \neq G \rightarrow r [5:0] = =G \neq B \rightarrow r [5:0] = =G \neq R \rightarrow r [5:0] =	[4:0] case: {R [4:0], G [0]} {R [4:0], R [4]}, {R [4:0], G [0]}	g [5:0] = {G g [5:0] = {G g [5:0] = {G	i [5:0]}, b [i [5:0]}, b [5:0] = { 5:0] = {	B [4:0], B B [4:0], B	[0]} [0]}		
Restriction	EXTC s	should be hiç	gh to enable	e this command								
Restriction	EXTC s	should be hiç	gh to enable	e this command	Status		Ava	lability				
	EXTC :	should be hiç	gh to enable	e this command Normal Mode C		FF, Sleep O		lability 'es				
Restriction Register	EXTC :	should be hig	gh to enable	Normal Mode C	N, Idle Mode O N, Idle Mode C	N, Sleep O	UT T					
	EXTC :	should be hig	gh to enable	Normal Mode O Normal Mode O Partial Mode O	N, Idle Mode O N, Idle Mode O N, Idle Mode O	N, Sleep O	UT UT	'es 'es 'es				
Register	EXTC:	should be hig	gh to enable	Normal Mode C	N, Idle Mode O ON, Idle Mode O N, Idle Mode O N, Idle Mode O	N, Sleep O	UT UT	'es 'es 'es				
Register	EXTC :	should be hig	gh to enable	Normal Mode O Normal Mode O Partial Mode O	N, Idle Mode O N, Idle Mode O N, Idle Mode O	N, Sleep O	UT UT	'es 'es 'es				
Register	EXTC:	should be hiç	gh to enable	Normal Mode O Normal Mode O Partial Mode O	N, Idle Mode O ON, Idle Mode O N, Idle Mode O N, Idle Mode O	N, Sleep Ol FF, Sleep Ol N, Sleep Ol	UT UT UT JT	'es 'es 'es				
Register	EXTC		gh to enable	Normal Mode O Normal Mode O Partial Mode O	N, Idle Mode O ON, Idle Mode O N, Idle Mode O N, Idle Mode O	N, Sleep Ol FF, Sleep Ol N, Sleep Ol	UT UT	/es /es /es /es	DM [1:0]	RM	RIM	
Register	EXTC	Sta		Normal Mode O Normal Mode O Partial Mode O Partial Mode O EPF [1:0]	N, Idle Mode O ON, Idle Mode O N, Idle Mode O N, Idle Mode O Sleep IN	DN, Sleep Ol FF, Sleep Ol N, Sleep Ol Defaul	UT UT UT UT UT UT UT UT UT UT UT UT UT U	/es /es /es /es /es		RM 1'b0	RIM 1'b0	
Register Availability	EXTC	Sta Power ON	atus	Normal Mode O Normal Mode O Partial Mode O Partial Mode O EPF [1:0]	N, Idle Mode O ON, Idle Mode O N, Idle Mode O N, Idle Mode O Sleep IN	DN, Sleep Ol FF, Sleep Ol N, Sleep Ol Defaul	UT UT UT JT It Value WEMOD	/es /es /es /es /es	DM [1:0]			