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Smart Graphic Module

Graphic UART Commands

1. Directory

2.Commands List

Commands Category	CommandCode	Data Code	Explanation	Note
System Information	0x00	Address of Data + Data Length (read only)	Read System Information	Table 1
	0x01	None	Show OSD Information	
System Clock (RTC)	0x20	Address of Data + Data Length (read only)	Read Clock	Table 2
	0x21	Address of Data + Data Length + Data[n]	Set Clock	
Key	0x22	Address of Data + Data Length (read only)	Read key set status	Table 5
	0x23	Address of Data + Data Length + Data[n]	Set key set Status	
Touch Screen Panel (TSP)	0x24	Address of Data + Data Length (read only)	Read Parameter of Touch	Table 6
	0x25	Address of Data + Data Length + Data[n]	Set Parameter of Touch	
EEPROM	0x26	Address of Data + Data Length (read only)	Read EEPROM data	Table 3
	0x27	Address of Data + Data Length + Data[n]	Write EEPROM data	
Screen parameter	0x28	Address of Data + Data Length (read only)	Read Color/Bright/Backlight data	Table 4
	0x29	Address of Data + Data Length + Data[n]	Set Color/Bright/Backlight data	
User Interface	0x70	Key code 0 + Key code 1	Respond Key code	
	0x71	Touch event + Coordinate X + Coordinate Y	Respond Touch event 0x01：press；0x00：release	
Drawing	0x8D	Coordinate X + Coordinate Y + color number.	Drawing Dot	
	0x8E	Start Coordinate X + Start Coordinate Y +End Coordinate X + End Coordinate Y + Color number.	Drawing Line	
	0x8F	Start Coordinate X + Start Coordinate Y +End Coordinate X + End Coordinate Y + Color number + parameter	Drawing Block or Frame	
Stick Picture	0xA0	Picture number	Original coordinate from flash memory	
	0xA1	Coordinate X + Coordinate Y + Picture number	From flash memory	
	0xA4	Coordinate X + Coordinate Y + picture number	From flash memory	
	0xA5	Coordinate X + Coordinate Y + picture number+ Transparent/sieve parameter	Transparent/Sieve Function from Cache memory	
	0xA8	Coordinate X + Coordinate Y + picture number	Pictures from USB FLASH Drive	
	0xAA	Coordinate X + Coordinate Y + Number of animate + Period + animate style + picture number	Animate from cache memory	
	0xAC	Coordinate X + Coordinate Y + font library number + Length of Character + Character [n]	Text / Digit	
User Information	0xD0	Coordinate X + Coordinate Y + color + word length + ASCII code [n]	Show character for tentative	
Other function	0xFB	Buzzer Sound period	Start Buzzer	

	0xFE	None	Update flash memory by USB FLASH Drive	

3. Communication Specification

3.1 Communication Format

115200 – N – 8 – 1

115200 bps : 115200 Bits/Second

N: Parity Checking (None)

8: Data is 8 Bits

1: one stop bit

Data Format

Name	Start Code	Length Code	Length Checking Code	Command and Data code	Checksum	Stop code
(Byte)	1	1	1	n (1~21Bytes)	1	1
Sending Format	0xF1	0x06	0xF7	0x20 0x00 0x07	0x1E	0xF4
Respond Format	0xF2	0x0D	0xFF	0x20 0x00 0x07 0x00…	0x45	0xF8

3.2 Data Format

Note: Data format length range 6~26 Bytes

※ Start Code: First byte value is fixed

Ex. 0xF1 : Send

0xF2 : response

※ Data Length Code: Total Bytes of from Length Checking Code to Stop Code

Exp. 0x06 : 0xF7 0x20 0x00 0x07 0x1E 0xF4

0x0D : 0xFF 0x20 0x00 0x07 0x00 0x32 0x23 0x10 0x12 0x08 0x03 0xA8 0xF8

※ Length Checking Code: Start code + data length code

Exp. 0xF1+ 0x06 = 0xF7

0xF2+ 0x0D = 0xFF

※ Command and Data code: 0x20 0x00 0x07

Command code

Exp. 0x20

Address of Data

Exp. 0x00

Total Bytes to send/respond

Exp. 0x07

Send/Respond Data

Exp. 0x00 0x32 0x23 0x10 0x12 0x08 0x03

※ Checksum : Sum from Length Checking Code to Last Data (get low byte)

Exp. 0xF7+0x20+0x00+0x07 = ~~0x01~~ 0x1E

0xFF+0x20+0x00+0x07+0x00+0x32+0x23+0x10+0x12+0x08+0x03 = ~~0x01~~ 0xA8

※ Stop Code: Last Byte, the value is fixed

Exp. 0xF4 **Send**

0xF8 **response**

Example: RTC Send and Response

Send 0xF1 0x06 0xF7 0x20 0x00 0x07 0x1E 0xF4

Respond 0xF2 0x0D 0xFF 0x20 0x00 0x07 0x00 0x32 0x23 0x10 0x12 0x08 0x03 0xA8 0xF8

4.Commands Explanation

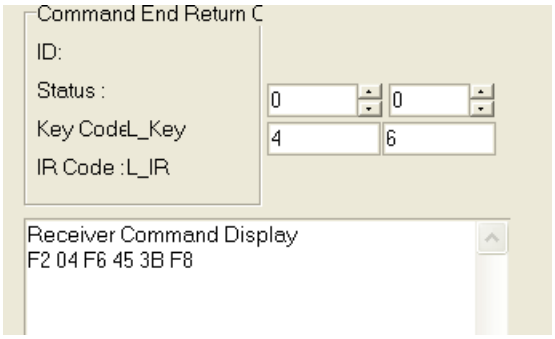
4.1 System Information

■ SGM Ready Message

SGM is power on will spend time to loading picture, Please wait busy signal go to low or receive since SGM 0x45 command.

Example:

Respond 0xF2 0x04 0xF6 0x45 03B 0xF8



■ System Information

Command:

Command Code	Address of data	Data length
0x00	0x10	0x04

※ Command Code: 0x00 means reading resolution of TFT-LCD panel

※ Address of data: from 0x10，0x10~0x11 Horizontal Pixels，0x12~0x13 Vertical Pixels

※ Data Length : 0x04 is 4

Table 1 : System Information

Reg.Adr.	Type	Name	Byte	Initial Value	
0x00h	Version ID	Reserved			
0x01h		Reserved			
0x02h		Reserved			
0x03h		Reserved			
0x04h		Reserved			
0x05h		Reserved			
0x06h		Reserved			
0x07h		Reserved			
0x08h		Reserved			
0x09h		Reserved			
0x0Ah		Reserved			
0x0Bh		Reserved			
0x0Ch		Reserved			
0x0Dh		Reserved			
0x0Eh		Reserved			
0x0Fh		Reserved			
0x10h	Panel Horizontal Pixels	Size XH	1	0x03	High Byte
0x11h		Size XL	1	0x20	Low Byte
0x12h	Panel Vertical Pixels	Size YH	1	0x02	High Byte
0x13h		Size YL	1	0x58	Low Byte

Respond:

Horizontal Pixels		Vertical Pixels	
0x03	0x20	0x02	0x58

Example:

Send 0xF1 0x06 0xF7 0x00 0x10 0x04 0x0B 0xF4

Respond 0xF2 0x0A 0xFC 0x00 0x10 0x04 0x03 0x20 0x02 0x58 0x8D 0xF8

■ Smart Graphic Module Information

Command:

Command Code
0x01

※ **Command: 0x01 is to show Smart Graphic Module information on the screen; send other command Information window will close.**

Example :

Send 0xF1 0x04 0xF5 0x01 0xF6 0xF4

4.2 RTC (Real Time Clock)

※ **Accuracy of clock is by second from system, not applicable for less than one second**

■ **System Clock**

Command :

command Code	Address of Data	Data length
0x20	0x00	0x07

※ **Clock set data refer to Table 2.**

Table 2 : System Clock (RTC)

Reg.Adr.	Type	Name	Byte								
0x00h	Time/Date	Sec.	1	BCD 00~59							
0x01h		Min.	1	BCD 00~59							
0x02h		Hour	1	BCD 00~23							
0x03h		Day	1	BCD 01~31							
0x04h		Month	1	BCD 01~12							
0x05h		Year	1	BCD 00~99							
0x06h		Day of Week	1	BCD 0~6 (0 is Sunday；1 is Monday ……and so on)							
0x07h	Clock Mode	Clock Display Mode	1	Bit 7	On/Off	1: display on 0: display off					
				0: 12 Hour 1: 24 Hour	Format 1	Sec/min/hr/date/mon/year/week					
					Format 2	Date/mon/year/week Hr/min/sec (AM/PM)	※ character height must below 40 Pixels otherwise overlap will occur				
					Format 3	Year/mon/date/week Hr/min/sec (AM/PM)					
				Display parameter (Reg.0x20h~ 0x3Fh)							
0x08h		Reserved	1								
0x09h		Reserved	1								
0x0Ah		Alarm Mode	1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
				Alarm on/off	Time's up auto-boot	Time's up auto-shut down	On/off Message	1:Alarm Mode 0:Countdown Mode	-	-	-
0x0Bh		Alarm Match Item	1	1: Repeat 0: Single	-	Week	Month	Date	HR	Min	-
0x0Ch	Alarm	Sec.	1	BCD 00~59							

0x0Dh	Data Set	Min	1	BCD 00~59
0x0Eh		Hour	1	BCD 00~23
0x0Fh		Day	1	BCD 01~31
0x10h		Month	1	BCD 01~12
0x11h		Day of Week	1	BCD 0~6 (0 is Sunday；1 is Monday …… and so on)
0x12h	Message	Mode	1	0x00 (define by user) set on/off by 0x0A bit 4
0x13h		Key Word	1	0x00 (define by user)
0x20h	Clock display position	Horizontal position	2	0~1023
0x21h				
0x22h		Vertical position	2	0~1023
0x23h				
0x24h	Character Library	Character Library Number	1	Default: Typ0；Library selected by user must comply with ASCII code rule

Respond:

Second	Minute	Hour	Date	Mon	Year	Week
0x00	0x32	0x23	0x10	0x12	0x08	0x03

※ Seconds, minutes, hours, dates, months, year and weeks are defined as BCD code in Smart Graphic Module processor

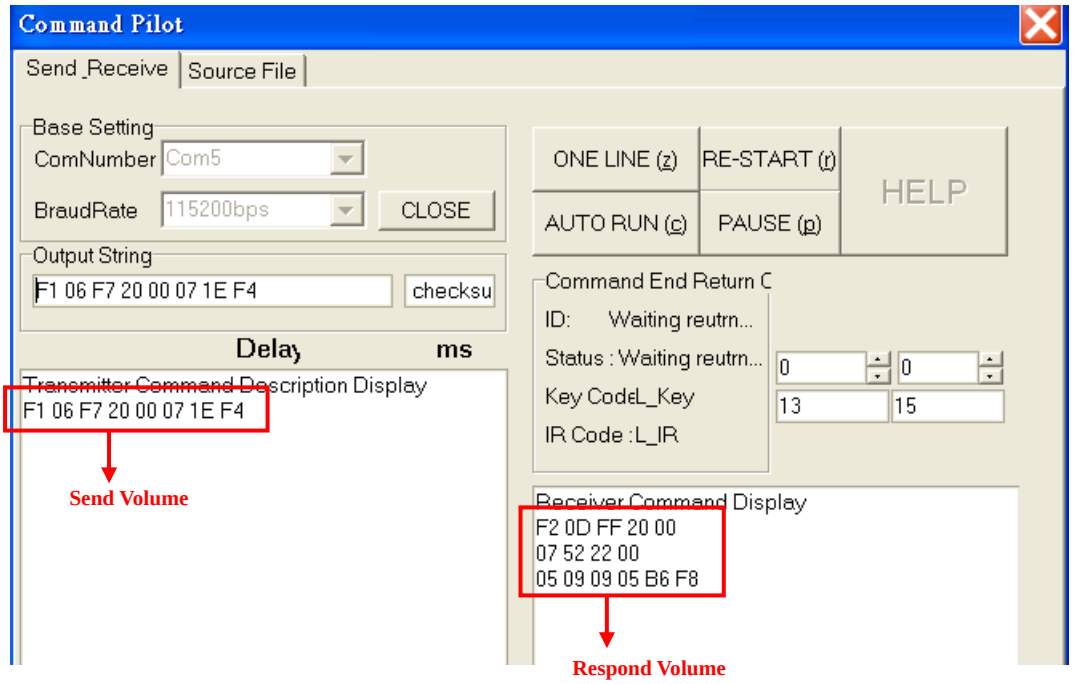
Example：0x32 = BCD 32 do not equal the 50 in Decimal

BCD is to use one byte separate the high 4 bits for decimal, the low 4 bits store unit.

Example：Read current second, minute, hour, day, month, year, week, ? (Example: 23:32:00,Dec 10, 2008, Wednesday)

Send 0xF1 0x06 0xF7 0x20 0x00 0x07 0x1E 0xF4

Respond 0xF2 0x0D 0xFF 0x20 0x00 0x07 0x00 0x32 0x23 0x10 0x12 0x08 0x03 0xA8 0xF8



■ Read Alarm clock

Command:

Command Code	Address of Data	Data length
0x20	0x0D	0x04

※ **Parameter Address refer to Table 2**

Response:

Min	Hour	Date	Mon
0x30	0x08	0x03	0x09

Example: Read current minute, hour, date, month, (Exp: 23:32,Dec 10)

Send 0xF1 0x06 0xF7 0x20 0x0D 0x04 0x28 0xF4

Respond 0xF2 0x0A 0xFC 0x20 0x0D 0x04 0x30 0x08 0x03 0x09 0x71 0xF8

■ Set system clock

Command:

Command Code	Address of Data	Data length	Min	Hour	Date	Mon	Year	Week
0x21	0x01	0x06	0x00	0x08	0x03	0x09	0x09	0x03

※ **Address of data refer to Table 2**

Example: Set clock "2009/09/03 08:00 Wed"

Send: 0xF1 0x0C 0xFD 0x21 0x01 0x06 0x00 0x08 0x03 0x09 0x09 0x03 0x45 0xF4

■ Set character and location for clock display

Command :

Command Code	Address of Data	Data length	Coordinate X		Coordinate Y		Character Library number
0x21	0x20	0x05	0x01	0xF0	0x01	0x60	0x00

※ **Address of data refer to Table 2**

Example : Set coordinate of clock display set (496, 352)，character library Typ 0

Send: 0xF1 0x0B 0xFC 0x21 0x20 0x05 0x01 0xF0 0x01 0x60 0x00 0x94 0xF4

■ Set clock display format

Command:

Command Code	Address of Data	Set Data length	Clock Format
0x21	0x07	0x01	0x02

※ **Address of data refer to Table 2**

Example: Set format 2 as time display

Send: 0xF1 0x0C 0xFD 0x21 0x01 0x06 0x00 0x08 0x03 0x09 0x09 0x03 0x45 0xF4 **set clock**

0xF1 0x0B 0xFC 0x21 0x20 0x05 0x01 0xF0 0x01 0x60 0x00 0x94 0xF4 **set format and location of clock**

0xF1 0x07 0xF8 0x21 0x07 0x01 0x02 0x23 0xF4

Display:

03/09/2009 Wed
08:00:00 AM

■ Set Alarm

Example : Set "09/03 08:30"

Command :

Command Code	Address of Data	Data length	Set Alarm Mode	Alarm match item
0x21	0x0A	0x02	0x98	0x1E

Command Code	Address of Data	Data length	Min	Hour	Date	Mon
0x21	0x0D	0x04	0x30	0x08	0x03	0x09

※ **Address of data refer to Table 2**

Example : **Send** 0xF1 0x08 0xF9 0x21 0x0A 0x02 0x98 0x1E 0xDC 0xF4

0xF1 0x0A 0xFB 0x21 0x0D 0x04 0x30 0x08 0x03 0x09 0x71 0xF4

After complete above steps Alarm will ring at "09/03 08:30"

■ **Advanced Alarm Set**

Example : Time to boot / Respond on / Alarm Mode Respond every 30 minutes 0x01 0xAC

1. Respond information set

Command Code	Address of Data	Data length	message default by user
0x21	0x12	0x02	0x01 0xAC

※ **Address of data refer to Table 2**

2. Set Alarm Mode and match item

Command Code	Address of Data	Data length	Set Alarm Mode	Alarm match item
0x21	0x0A	0x02	0xD8	0x82

Alarm mode(0xD8) : Alarm on / Auto-boot / message on /alarm

Alarm match item (0x82) : alarm repeat / minute

3. Set every 30 minutes alarm

Command Code	Address of Data	Data length	Data
0x21	0x0D	0x01	0x30

Example : Send 0xF1 0x08 0xF9 0x21 0x12 0x02 0x01 0xAC 0xDB 0xF4

0xF1 0x08 0xF9 0x21 0x0A 0x02 0xD8 0x82 0x80 0xF4

0xF1 0x07 0xF8 0x21 0x0D 0x01 0x30 0x57 0xF4

After complete above steps will Respond message on every 30 minutes

0xF2 0x08 0xFA 0x20 0x12 0x02 0x01 0xAC 0xDB 0xF8

4.3 EEPROM

※ **Use as normal EEPROM, to recognize labeled customers record saving space total 32 Bytes**

■ **Read EEPROM data**

Example : read the 3 address after 0x03h。

Command :

Command Code	Address of Data	Data length
0x26	0x03	0x03

Table 3 : EEPROM

Parameter Address	Type	Name	Byte	
0x00h			1	0xFF
0x01h			1	0xFF
0x02h ~ 0x1Dh			1~1	0xFF
0x1Eh			1	0xFF
0x1Fh			1	0xFF

Respond :

0x26 0x03 0x03 0x5F 0x54 0x65

Example: Send 0xF1 0x05 0xF6 0x26 0x03 0x03 0x22 0xF4

Respond 0xF2 0x09 0xFB 0x26 0x03 0x03 0x5F 0x54 0x65 0x3F 0xF8

■ Write EEPROM data

Example :

Write from 00h to 0x07h Save to "FDT_Test" ，FDT_Test" Transfer to ASCII 0x46 0x44 0x54 0x5F 0x54 0x65 0x73 0x74

Command :

Command Code	Address of Data	Data length	F	D	T	_	T	e	s	t
0x27	0x00	0x07	0x46	0x44	0x54	0x5F	0x54	0x65	0x73	0x74

※ Address of data refer to Table 3

Example : Send 0xF1 0x0F 0x00 0x27 0x00 0x07 0x46 0x44 0x54 0x5F 0x54 0x65 0x73 0x74 0x0B 0xF4

4.4 Screen Parameter

■ Read Screen parameter

Example : Read brightness

Command :

Command Code	Address of Data	Data length
0x28	0x01	0x01

Table 4 : Screen Parameter

Reg.Adr.	Type	Name	Byte	Initial Value	
0x00h	Initial	Reset	1	0	> 0 Reset
0x01h	Picture	Brightness	1	16	0~31
0x02h		Saturation	1	16	0~31
0x03h	Mirror	Vertical	1	0x00	
0x04h		Horizontal	1	0x00	
0x05h	Backlight	Dimming	1	9	9~0
0x06h		On/Off	1	0x01	
0x07h	Power on/off	On/Off	1	0	1: Power Off 0: Power On

Respond :

0x28 0x01 0x01 0x10

Example: Send 0xF1 0x05 0xF6 0x28 0x01 0x01 0x20 0xF4

Respond 0xF2 0x07 0xF9 0x28 0x01 0x01 0x10 0x33 0xF8

■ Set Screen parameter

Command :

Command Code	Address of Data	Data length	Brightness	Saturation
0x29	0x01	0x02	0x10	0x10

※ **Address of data refer to Table 4**

Example : Set brightness and Saturation as 16

Send 0xF1 0x08 0xF9 0x29 0x01 0x02 0x10 0x10 0x45 0xF4

■ Recall Screen parameter

Command :

Command Code	Address of Data	Data length	Parameter Value
0x29	0x00	0x01	0x01

※ **Command Code:** 0x29 **Recall Screen Parameter command**

※ **Address of Data:** 0x00 **Initial parameter register address**

※ **Parameter Value:** 0x01 **Normal Value is** 0x00 **，Recall default parameter value if this value greater than 0.**

Example:

0xF1 0x07 0xF8 0x29 0x00 0x01 0x01 0x23 0xF4

4.5 Stick Picture function

※ **Easy graphic arranger offer Uart command transmitting function.**

■ Stick Background Picture (Full Screen Picture)

Command :

Command Code	Picture number	
0xA0	0x00	0x04

※ **Command Code:** 0xA0 **means picture is extracted from flash memory , and stick background picture at origin coordinate(0,0).**

※ **Picture Number:** 0x00 0x04 **means picture number is 4.**

Example:

Send: 0xF1 0x06 0xF7 0xA0 0x00 0x04 0x9B 0xF4

■ Stick Picture (Flash memory area)

Command :

Command Code	X Coordinate		Y Coordinate		Picture Number	
0xA1	0x01	0x48	0x01	0xC8	0x00	0x01

※ **Command Code:** 0xA1 **stick pictures from flash Memory**

※ **X Coordinate:** 0x01 0x48 **means X coordinate is 328；(Range : 0 ~ 799 but depends panel resolution)；**
Value must be 8*n value.

※ **Y Coordinate:** 0x01 0xC8 **means Y coordinate is 456；(Range : 0 ~ 599 but depends panel resolution)；**
Value must be 8*n value

※ **Picture Number:** 0x00 0x01 **means picture number is 1**

Example :

Send: 0xF1 0x08 0xF9 0xA1 0x01 0x48 0x01 0xC8 0x00 0x01 0xAD 0xF4

■ Stick Picture (Cache memory area)

Command :

Command Code	Coordinate X		Coordinate Y		Picture Number	
0xA4	0x01	0x48	0x01	0xC8	0x00	0x1C

※ **Command Code:** 0xA4 **means picture extracted from Cache memory**

※ **X Coordinate:** 0x01 0x48 **X coordinate is 328；(Range : 0 ~ 799 but depends panel resolution) ；**
value must be 8*n value

※ **Y Coordinate:** 0x01 0xC8 **Y coordinate is 456；(Range : 0 ~ 599 but depends panel resolution ；**
value must be 8*n value

※ **Picture Number :** 0x00 0x1C **picture number is 28.(Range : 0 ~ 4095)**

Example :

Send: 0xF1 0x0A 0xFB 0xA4 0x01 0x48 0x01 0xC8 0x00 0x1C 0xCD 0xF4

■ Stick Picture with transparent/sieve parameter (Cache memory area)

command:

Command Code	Coordinate X		Coordinate Y		Picture Number		Transparent	Sieve
0xA5	0x01	0x48	0x01	0xC8	0x00	0x1C	0x09	0x02

※ **Command Code:** 0xA5 **means picture is read from Cache memory，also sticked Transparent & Sieve**

※ **X Coordinate:** 0x01 0x48 **means X coordinate is 328.(Range : 0 ~ 799 but depends panel resolution) ；**
value must be 8*n value.

※ **Y Coordinate:** 0x01 0xC8 **means Y coordinate is 456.(Range : 0 ~ 599 but depends panel resolution) ；**
value must be 8*n value.

※ **Picture Number:** 0x00 0x1C **means picture number is 28.(Range : 0 ~ 4095)**

※ **Transparent :** 0x09 **picture transparent 9，(Range : Min.0 ~Max.15)， the bigger value set on transparent of front**

picture view,the clearer the background

※ Sieve : 0x02 picture sieve effect 2，Sieve will filter out the darker area of front picture view in order to let background clearly presented. (Range : Min.0 ~Max.15)

Example :

Send: 0xF1 0x0C 0xFD 0xA4 0x01 0x48 0x01 0xC8 0x00 0x1C 0x09 0x02 0xDA 0xF4

■ Stick Picture (USB Flash Drive)

※ Download picture resolution must be less or equal to panel resolution

Command :

Command Code	Coordinate X		Coordinate Y		Picture Number	
0xA8	0x01	0x48	0x01	0xC8	0x00	0x1C

※ Command Code: 0xA8 means picture was read from USB Flash Drive

※ Coordinate X: 0x01 0x48 means X coordinate is 328. (Range : 0 ~ 799 but depends panel resolution) ；
Value must be 8*n value

※ Coordinate Y: 0x01 0xC8 means Y coordinate is 456.(Range : 0 ~ 599 depends panel resolution) ；
Value must be 8*n value

※ Picture Number: 0x00 0x1C means picture number is FJI_U028； picture file name in USB must be applied the naming rule「FJI_U[xxx]」；(Range : FJI_U000 ~ FJI_U999)

■ Stick dynamic pictures

Command :

Command Code	Coordinate X		Coordinate Y		PID	Period	Dynamics and quantity	Picture Number	
0xAA	0x01	0xF0	0x01	0x50	0x00	0x86	0xC5	0x00	0x01

※ Command Code0xAA : dynamic pictures (animation)

※ X Coordinate: 0x01 0xF0 stick picture coordinate location is 496.(Range 0~799 but depends panel resolution)；must apply 8*n value to stick picture

※ Y coordinate: 0x01 0x50 stick picture coordinate location is 336.(Range : 0 ~ 599 but depends panel resolution)；
Must apply 8*n value to stick picture

※ PID (Dynamic Picture ID): can define range 0~3 , therefore maximum 4 dynamic pictures can be existing in same background picture.

※ Period :

Binary「Bit 7」: interval time unit 「1」 : 1Sec「0」 : 50mSec

Binary「Bit 6~0」: intervals times (Range : 0 ~ 128)。

Attention!! Cannot control time accurately, depends on the system load。

※ Dynamics and quantity :

Binary「Bit 7」: 「1」: sequence mode, Picture number is series, refer「Bit 5~0」(Range : 1 ~ 63)

「0」 : order mode, Which pictures order for dynamics , refer「Bit 1~0」(Range : 1 ~ 4)。

Binary「Bit 6」:「1」: repeat mode 「0」: None 1: Repeat。

Binary「Bit 5~0」:

※ Picture number : dynamics and quantity _ bit 7 : 1 (sequence mode)

> Picture number : 0x00 0x03 (only start picture number, how many pictures by Bit 5~0)

dynamics and quantity _ bit 7 : 0 (order mode)

dynamics and quantity _ bit 1~0 : 10 (3 pictures)

>Picture number : 0x00 0x03 0x00 0x10 0x00 0x1A (order 3 picture number)

Example :

Send: 0xF1 0x0C 0xFD 0xAA 0x01 0xF0 0x01 0x50 0x00 0x86 0xC5 0x00 0x01 0x35 0xF4

■ Stick digits or characters

Command :

Command Code	Coordinate X		Coordinate Y		Transparent and Library number	Data length	T	e	s	t
0xAC	0x01	0x80	0x00	0x10	0x00	0x04	0x54	0x65	0x73	0x74

Example : Character “Test”

0xF1 0x0E 0xFF 0xAC 0x01 0x80 0x00 0x10 0x00 0x04 0x54 0x65 0x73 0x74 0xE0 0xF4

0xAC：Stick Digits Or Characters Command Code

0x01 0x80：X Coordinate Is Hexadecimal, Change To Decimal is 384。

0x00 0x10：Y Coordinate is Hexadecimal, Change To Decimal is 16。

0x00：bit 7 is Transparent flag,

The Font Background is Transparency if bit7 is 1 And Font Background Color Must Be Black (See Easy Graphic Arranger)

Bit6~0 is Font Library Number

0x04：Font Number (Range From 0x01～0x10)

0x54：First Font Code

0x65：Second Font Code

0x73：Third Font Code

0x74：Fourth Font Code

4.6 User information display

Command :

Command Code	Coordinate X	Coordinate Y	Color Index	Data length	G	r	a	p	h	i	c
0xD0	0x01	0x02	0x01	0x07	0x47	0x72	0x61	0x70	0x68	0x69	0x63

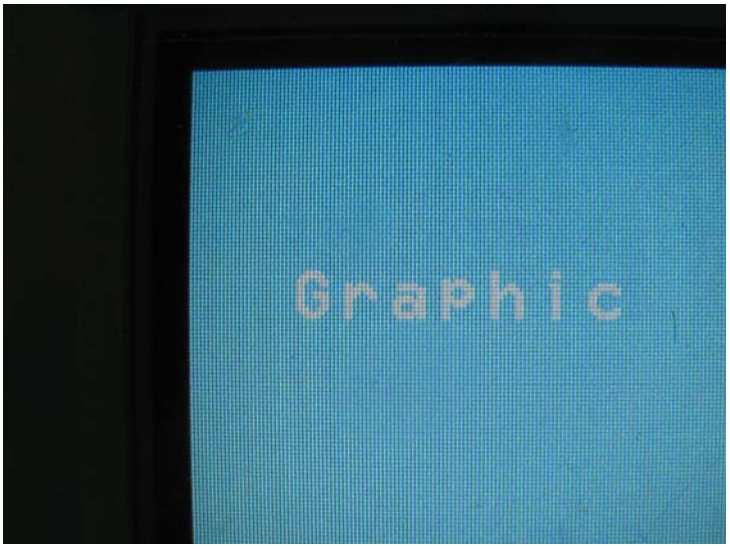
Information Display

data	bytes	Note		
Coordinate X	1	0~38		
Coordinate Y	1	0~12		
Color Index	1	bit5 : 0 None 1 Flash	bit4 : 0 None 1 Board	Bit3~0: 0~15 color
Data length	1	1~16 character		
Data	1~16	ASCII code Use SGM built-in FONT		

Example: show "Graphic" on the screen, total 7 character, coordinate (1,2), white color

Send:

0xF1 0x0F 0x00 0xD0 0x01 0x02 0x01 0x07 0x47 0x72 0x61 0x70 0x68 0x69 0x63 0x99 0xF4



4.7 Other Function

■ Set Buzzer

Command :

Command Code	sound Buzzer Times (each unit of 10mSec)
0xFB	0x04

※Set Buzzer sound

0x00 = always OFF

0x01 ~ 0xFE = Unit *10mSec

0xFF = always ON

Example : Set buzzer call time 40 mSec。

Send: 0xF1 0x05 0xF6 0xFB 0x04 0xF5 0xF4

■ Update picture Library

Command Code
0xFE

Example :

Send: 0xF1 0x04 0xF5 0xFE 0xF3 0xF4

4.8 Key function

*This function is optional for hardware

Quantity of key refer to program version or through command 0x01 checking quantity of key，this set value will respond key code thru 0x70, follow the published version of the program to set the order of Key。respond value of Key refer to figure of EEPROM，this command is to set these respond values，each key code have 2 bytes.

Example :

Build-in 9 Key :

Set Key0 0x01 0x30；Set Key1 0x01 0x31；Set Key2 0x01 0x32；Set Key3 0 x01 0x33，

Set Key4 0x01 0x34；Set Key5 0x01 0x35；Set Key6 0x01 0x36；Set Key7 0x01 0x37，

Set Key8 0x01 0x38；set Key9 0x01 0x39。

■ Set Key status

Command :

Command Code	Address of Data	Data length	Key0 ~ Key7 Key code[n]
0x23	0x00	0x14	0x01 0x30 0x01 0x31 0x01 0x32 0x01 0x33 0x01 0x34 0x01 0x35 0x01 0x36

Table 5 : Key respond Parameter

Address	Type	Name	Byte	Default
0x00h	Key0	Key Code 0	1	0x00
0x01h		Key Code 1	1	0x00
0x02h ~ 0x39h	Key1 ~ Key 31	Key Code 0	1	0x00
		Key Code 1	1	0x00
0x40h	Key32	Key Code 0	1	0x00
0x41h		Key Code 1	1	0x00

Example : Send

0xF1 0x14 0x05 0x23 0x00 0x14 0x01 0x30 0x01 0x31 0x01 0x32 0x01 0x33 0x01 0x34 0x01 0x35 0x01 0x36 0xA8 0xF4

After set will save to EEPROM。

■ Read Key status

Command :

Command Code	Address of Data	Data length
0x22	0x00	0x14

Respond :

0x22 0x00 0x14 0x01 0x30 0x01 0x31 0x01 0x32 0x01 0x33 0x01 0x34 0x01 0x35 0x01

Exp: Send 0xF1 0x06 0xF7 0x22 0x00 0x14 0x2D 0xF4

Respond 0xF2 0x14 0x05 0x22 0x00 0x14 0x01 0x30 0x01 0x31 0x01 0x32 0x01 0x33 0x01 0x34 0x01 0x35 0x01 0x36 0xA8 0xF8

4.9 TSP Function

■ Read parameter of touch function

Command Code	Address of Data	Data length
0x24	0x00	0x01

■ Set parameter of touch function

Command Code	Address of Data	Data length	data
0x25	0x00	0x01	0x01

Table 6 : Touch Parameter

Address	Type	Name	Byte		Initial unofficial value
0x00h	Start TSP calibrate	Touch calibrate	1	1:Enable calibrate : Respond Calibrate Direct 0:Disable calibrate: Respond original Direct (0->1: Startup Calibrate)	0
0x01h	Origin point set	Quadrant	1	00: origin point up left 01.origin point up right 02: origin point down left 03: origin down left	Don't care

Start calibrate

When parameter 0x00h is 0 ，send 0x25 0x00 0x01 0x01 **will start calibrate process, after complete calibration will return to the first picture(LOGO).**

Example :

Send 0xF1 0x06 0xF7 0x24 0x00 0x01 0x1C 0xF4 **read calibration status**

Respond 0xF2 0x07 0xF9 0x24 0x00 0x01 0x00 0x1E 0xF8 **no calibration (* if OK can't calibrate)**

Send 0xF1 0x07 0xF8 0x25 0x00 0x01 0x01 0x1C 0xF4 **write enable and start calibration**

Origin point set

Example :

Send 0xF1 0x07 0xF8 0x25 0x01 0x01 0x01 0x20 0xF4

Set origin point at up right, User press left side of touch screen but response is at right side.

The SGM will come back to up-left original point (0x00) when TSP recalibrate.

4.10 User interface Response

※ **Only with buttons or touch screen panel can return information**

- **Press key response**

Respond : 0x70 key code 0 key code 1

Example :

Press key 0 → 3 → 1 → 2 will respond sequentially

key 0 respond: 0xF2 0x06 0xF8 0x70 0x01 0x30 0x99 0xF8

key 3 respond: 0xF2 0x06 0xF8 0x70 0x01 0x33 0x9C 0xF8

key 1 respond: 0xF2 0x06 0xF8 0x70 0x01 0x31 0x9A 0xF8

key 2 respond: 0xF2 0x06 0xF8 0x70 0x01 0x32 0x9B 0xF8

- **Touch function response Respond:** 0x71 touch event Coordinate X Coordinate Y

Touch event 0x00 **Release**

0x01 **Press**

TSP Press event Respond : 0xF2 0x09 0xFB 0x71 0x01 0x01 0x0F 0x01 0x2C 0xAA 0xF8

TSP Release event Respond : 0xF2 0x09 0xFB 0x71 0x00 0x01 0x0D 0x01 0x2C 0xA7 0xF8

4.11 Drawing commands

- **Drawing Dot**

Command :

Command Code	Coordinate X	Coordinate Y	Color Number
0x8D	0x01 0x90	0x01 0x70	0x0F

※ **Command:** 0x8D **Drawing 2x2 pixels on the screen.**

※ **X Coordinate:** 0x01 0x90 **X Coordinate is 400. (Range : 0 ~ 799 depend on TFT-LCD panel resolution) ;**

※ **Y Coordinate:** 0x01 0x70 **Y Coordinate is 368. (Range : 0 ~ 599 depend on TFT-LCD panel resolution) ;**

※ **Color number :** 0x0F **color number 0x0F (see Table A)**

Example :

0xF1 0x09 0xFA 0x8D 0x01 0x90 0x01 0x70 0x0F 0x98 0xF4

■ **Drawing Line**

Command :

Command Code	Start Coordinate X	Start Coordinate Y	End Coordinate X	End Coordinate Y	Color Number
0x8E	0x00 0xFA	0x00 0x32	0x00 0xFA	0x00 0xC8	0x26

※ **Command: 0x8E Drawing line, wide is 2 pixels**

※ **Start X Coordinate: 0x00 0xFA Start X coordinate is 250. (Range : 0 ~ 799 depend on TFT-LCD panel resolution)**

Value must be 2 times

※ **Start Y Coordinate: 0x00 0x32 Start Y coordinate is 50. (Range : 0 ~ 599 depend on TFT-LCD panel resolution)**

※ **End X Coordinate: 0x00 0xFA End X coordinate is 250. (Range : 0 ~ 799 depend on TFT-LCD panel resolution)**

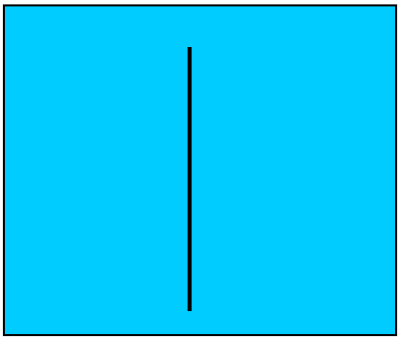
Value must be 2 times

※ **End Y Coordinate: 0x00 0xC8 End Y coordinate is 00. (Range : 0 ~ 599 depend on TFT-LCD panel resolution)**

※ **Color number : 0x26 color number 26(see Table A)**

Example : Draw line

0xF1 0x0D 0xFE 0x8E 0x00 0xFA 0x00 0x32 0x00 0xFA 0x00 0xC8 0x26 0xA0 0xF4 (250,50) (250,200)



■ **Drawing Block and Frame**

Command :

Command Code	Start Coordinate X	Start Coordinate Y	End Coordinate X	End Coordinate Y	Color Number	mode
0x8F	0x00 0x39	0x00 0x39	0x01 0x29	0x01 0x29	0x30	0x01

※ **Command: 0x8F Drawing 2 pixels outline frame and block.**

※ **Start X Coordinate: 0x00 0x39 Start X coordinate is 57. (Range : 0 ~ 799 depend on TFT-LCD panel resolution)**

※ **Start Y Coordinate: 0x00 0x39 Start Y coordinate is 57. (Range : 0 ~ 599 depend on TFT-LCD panel resolution)**

※ **End X Coordinate: 0x01 0x29 End X coordinate is 297. (Range : 0 ~ 799 depend on TFT-LCD panel resolution)**

※ **End Y Coordinate: 0x01 0x29 End Y coordinate is 297. (Range : 0 ~ 599 depend on TFT-LCD panel resolution)**

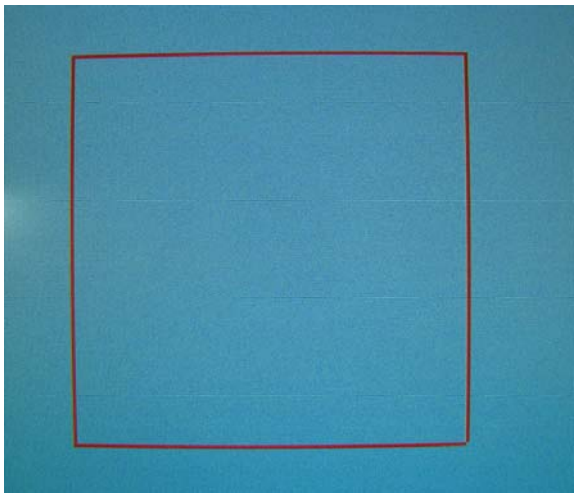
※ **Color number : 0x30 color number 0x30 (see Table A)**

※ **Mode: 0x01 : Frame**

0x00 : Block

Example 1. : Drawing Frame

0xF1	0x0E	0xFF	0x8F	0x00	0x39	0x00	0x39	0x01	0x29	0x01	0x29	0x30	0x01	0x85	0xF4



Example 2.: Drawing Block

0xF1	0x0E	0xFF	0x8F	0x00	0x39	0x00	0x39	0x01	0x29	0x01	0x29	0x30	0x00	0x84	0xF4

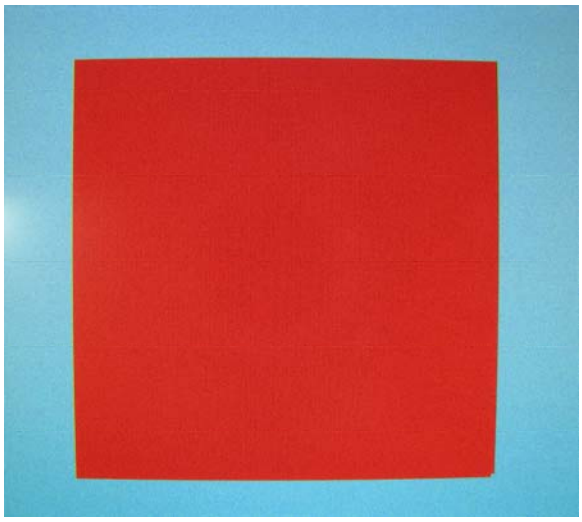


Table A : Color Number

Ntice：not support 0x00 and 0x01 color

0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x10	0x11	0x12	0x13	0x14	0x15	0x16	0x17	0x18	0x19	0x1A	0x1B	0x1C	0x1D	0x1E	0x1F
0x20	0x21	0x22	0x23	0x24	0x25	0x26	0x27	0x28	0x29	0x2A	0x2B	0x2C	0x2D	0x2E	0x2F
0x30	0x31	0x32	0x33	0x34	0x35	0x36	0x37	0x38	0x39	0x3A	0x3B	0x3C	0x3D	0x3E	0x3F