This user guide describes the UART Interface channel setup, protocol details, and supported commands to configure and control the OLED Driver. For additional UART protocol information, refer to BIT-UG 0000: User Guide, Protocol, UART, General.

Underlined command labels indicate user-issued command.

1 Channel Configuration

Baud rate	115.2k
Data bits	8
Stop bits	1
Parity	none
Flow control	none

2 Command Prompt

Indicates when the system is ready to accept a command.

RDY>

3 ChanChar

None

Ref: BIT-UG-0000: User Guide, Protocol, UART, General

4 Command Transactions

In all cases, the OLED Driver is ready to process a UART command following the transmission of the command prompt (**RDY>**). The OLED Driver UART contains a 1KB command buffer so multiple commands may be collected for sequential processing. However, the recommended method for issuing multiple UART commands is to issue them individually waiting for the returned command prompt following a command transmission before transmitting the next command. Response times for the OLED Driver to issue the command prompt may vary depending on the execution time of the most recently transmitted command, however most commands are executed prior to the transmission of the command prompt. Maximum response time is TBD.

4.1 Examples

In each of the following case examples the characters transmitted by the host are underlined. Carriage return [CR] and line feed [LF] characters are not shown.

4.1.1 Unsigned Integer

The host requests a read-back of the pattern selection (OPATT):

```
RDY>OPATT
    0-OPATT    2 [02]
RDY>
```

The response line begins with four space characters, followed by a channel character (“0-“), followed by an echo of the command, followed by a decimal version of the status value, followed by a hexadecimal version of the value in square brackets.

Notes:

1. The channel character will always be zero.
2. The number of spaces between fields is variable.
3. The number of digits in the hexadecimal value is variable.
4. There is no “0x” prefix attached to the hexadecimal value.
5. Following the status read-back line the device will return a new prompt (“**RDY>**”).

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Here the host sets a new pattern value:

```
RDY>OPATT 6
RDY>
```

And reads it back as before:

```
RDY>OPATT
    0-OPATT    6 [06]
RDY>
```

4.1.2 Signed Integer

These communications are the same as for the unsigned case, except that the decimal form of the value can be preceded by a minus sign.

```
RDY>HPOS
    0-HPOS       0 [0000]
RDY>
```

Set HPOS to negative 2:

```
RDY>HPOS -2
RDY>
```

In the following sequence the host reads back the current HPOS value, sets a new value of (positive) 5, and then reads back the new setting:

```
RDY>HPOS
    0-HPOS     -2 [fffffffe]
RDY>HPOS 5
RDY>HPOS
    0-HPOS      5 [0005]
RDY>
```

4.1.3 Floating Point (f-p)

In this case the value returned will contain a decimal point:

```
RDY>OTEMP
    0-OTEMP    61.521 [42761568]
RDY>
```

Note that negative floating point values are also supported.

4.1.4 Error

Error responses are typically appended to the command line that caused the error:

```
RDY>XYZ -- ERROR: CommandUnsupported
RDY>
```

The label “ERROR:” is always preceded by a space-hyphen-hyphen-space sequence.

The text following the “ERROR:” label is generally descriptive of the problem, and the string will contain no spaces or punctuation.

5 Command Table

Label	access	Index	Argument (all numerical values in decimal) min	Factory Default [1]	max	Type	unit	Auto-Save	Description Class	Function
SDVA	r/w	n/a	0	-00, -01: **0** -10, -11: **1**	1	unsigned int	n/a	Yes	Input Control	Set video input format for analog SDV input 0 = Y, CVBS 1 = Y/C
SDVD	r/w	n/a	0	-00, -10: **0** -01, -11: **1**	1	unsigned int	n/a	Yes	Input Control	Set video input format for digital SDV input 0 = NTSC / YCbCr 4:2:2 1 = PAL / YCbCr 4:2:2
VTD	r/w	n/a	0	**7**	10	unsigned int	n/a	Yes	Input Control	User-Selectable Digital w/Sync Input Format Control 0 = *reserved* 1 = *reserved* 2 = VESA 640x480_60 3 = VESA 640x480_72 4 = VESA 640x480_75 5 = VESA 640x480_85 6 = VESA 800x600_56 **7 = VESA 800x600_60** 8 = VESA 800x600_72 9 = VESA 800x600_75 10 = VESA 800x600_85
IVQ	r	n/a	n/a	n/a	n/a	n/a	ref para 6.1	n/a	Input Control	Query input video returns lock status, vert & horiz resolution & frequencies
BRT	r/w	n/a	0	**8**	BRTMOD	unsigned int	n/a	Yes	Image Control	Set brightness (luminance)
BRTMOD	r/w	n/a	4	**16**	32	unsigned int	n/a	Yes	Image Control	Set number of BRT adjustment steps (modulus)
BRTINC	w	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Image Control	Increment BRT by 1
BRTDEC	w	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Image Control	Decrement BRT by 1
MAXLUM	r/w	n/a	10	**100**	100	unsigned int	%	Yes	Image Control	Set maximum display luminance, **100%** = display device upper limit
GAMMA	r/w	n/a	1.0	**1.8**	2.2	f-p	exp	Yes	Image Control	Set display gamma value Typical values: 1.0, 1.6, 1.7, **1.8**, 1.9, 2.0, 2.1, 2.2
COLOR	r/w	n/a	0	**4**	4	unsigned int	n/a	Yes	Image Control	Set color mode **Color OLED (BIT1011B1):** SDV analog / SDV digital / VESA digital / Notes 0 — blk/w — n/a — blk/w — digital SDV displays color 1 — blk/r — blk/r — blk/r — SDV Digital: true monochrome only for monochrome input, else "off" colors are suppressed 2 — blk/g — blk/g — blk/g 3 — blk/b — blk/b — blk/b **4 — color — color — n/a — VESA displays blk/w (0)** **Monochrome OLED (BIT1011B2):** SDV Analog / SDV Digital / VESA Digital / Notes 0 — Monochrome in color of OLED — full luminance 1 2 — reduced luminance 3 **4 — full luminance**
HPOS	r/w	n/a	[3] -92 [4] -12	**0**	[3] +92 [4] +12	signed int	column	Yes	Image Control	Set horizontal image position offset **0 = default center neutral**
VPOS	r/w	n/a	[3] -72 [4] -12	**0**	[3] +72 [4] +12	signed int	row	Yes	Image Control	Set vertical image position offset **0 = default center neutral**
HSCAN	r/w	n/a	0	**0**	1	unsigned int	n/a	Yes	Image Control	Set horizontal image scan direction **0 = normal L → R** 1 = reversed R → L
VSCAN	r/w	n/a	0	**0**	1	unsigned int	n/a	Yes	Image Control	Set vertical image scan direction **0 = normal T → B** 1 = reversed B → T
DPDC	r/w	n/a	1	**100**	100	unsigned int	%	Yes	Image Control	Set frame duty-cycle (**100% = no row blanking**)
OPATT	r/w	n/a	0	**0**	**8**	unsigned int	n/a	No	Image Control	Set OLED Driver Test Pattern **0 = No Pattern** 1 = White Field 2= Color Bar 3 = Gray Scale 4 = Checker Board 5 = Vertical Lines 6 = Horizontal Lines 7 = Grid Pattern 8 = Black Field
WBCR	r/w	n/a	0	**256**	255	unsigned int	n/a	Yes	Image Control	Set Red channel pixel gain: 0 = 0% **256 = 100%**
WBCG	r/w	n/a	0	**256**	255	unsigned int	n/a	Yes	Image Control	Set Green channel pixel gain: 0 = 0% **256 = 100%**
WBCB	r/w	n/a	0	**256**	255	unsigned int	n/a	Yes	Image Control	Set Blue channel pixel gain: 0 = 0% **256 = 100%**
POWER	r/w	n/a	0	**1**	1	unsigned int	n/a	Yes	System	Set power mode 0 = powered-down (low-power) **1 = operational**

Label	access	Index	Argument (all numerical values in decimal) min	Factory Default (1)	max	Type	unit	Auto-Save	Description Class	Function
LEDEN	r/w	n/a	0	**1**	1	unsigned int	n/a	Yes	System	Set LED enable: **0** = BLU and RED LEDs disabled **1 = BLU and RED LEDs enabled**
OMONOCHR	r/w	n/a	0	BIT1011B1: **0** BIT1011B2: **1**	1	unsigned int	n/a	Yes	System	Set OLED type: 0 = Color XL 1 = Monochrome Green XLT
OTEMP	r	n/a	n/a	n/a	n/a	signed f-p	°C	n/a	System	Query OLED Temperature
OLEDSN	r	n/a	n/a	n/a	n/a	ASCII	n/a	n/a	System	Returns OLED Serial Number (5 Chars)

(1) Factory Default values overwritten upon change by auto-save function.

6 Detailed Command Descriptions

6.1 INPUT CONTROL COMMANDS

SDVA

Sets video format for analog SDV input.

SDVA = 0 Monochrome: Y
Color: CVBS

SDVA = 1 Color: Y/C

SDVD

Sets video format for digital SDV input.

SDVD = 0 NTSC
SDVD = 1 PAL

VTD

Sets the user-selectable digital w/sync input format.

VTD = 0 *reserved*
VTD = 1 *reserved*
VTD = 2 selects format VESA 640x480_60
VTD = 3 selects format VESA 640x480_72
VTD = 4 selects format VESA 640x480_75
VTD = 5 selects format VESA 640x480_85
VTD = 6 selects format VESA 800x600_56
VTD = 7 selects format VESA 800x600_60
VTD = 8 selects format VESA 800x600_72
VTD = 9 selects format VESA 800x600_75
VTD = 10 selects format VESA 800x600_85

IVQ

Queries input video.
The response to an IVQ query has a unique format, unlike standard commands and responses:

```
RDY>IVQ
RDY> NTSC Locked
RDY>
```

Note that the response line in this case starts with a prompt plus a space rather than four spaces.
If no valid data is available then IVQ will substitute zeros:

```
RDY>IVQ
RDY> 0 x 0 0.0MHz Unlocked
RDY>
```

6.2 IMAGE CONTROL CONTROL COMMANDS

BRT

Sets OLED image brightness level (luminance) in unit increments from 0 (min) to **BRTMOD** value (max).

BRTMOD

Sets the number of BRT steps over luminance range.
Example:

BRTMOD = 16
BRT steps = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, **16**

BRTINC

Increments **BRT** value by 1. If **BRT** = **BRTMOD**, no operation.

BRTDEC

Decrements **BRT** value by 1. If **BRT** = 0, no operation.

MAXLUM

Sets luminance value for **BRT** = **BRTMOD** as a percentage of maximum OLED luminance.

GAMMA

Sets display gamma value.

COLOR

Sets display color mode.

COLOR = 0 Monochrome:
BIT1011B1 w/ Color OLED: blk/wht
BIT1011B2 w/ Monochrome OLED: monochrome in color of OLED, full luminance

COLOR = 1 Monochrome
BIT1011B1 w/ Color OLED: blk/red
BIT1011B2 w/ Monochrome OLED: monochrome in color of OLED, reduced luminance

COLOR = 2 Monochrome
BIT1011B1 w/ Color OLED: blk/grn
BIT1011B2 w/ Monochrome OLED: monochrome in color of OLED, reduced luminance

COLOR = 3 Monochrome
BIT1011B1 w/ Color OLED: blk/blu
BIT1011B2 w/ Monochrome OLED: monochrome in color of OLED, reduced luminance

COLOR = 4 Color
BIT1011B1 w/ Color OLED: full color
BIT1011B2 w/ Monochrome OLED: monochrome in color of OLED, full luminance

HPOS

Sets horizontal image position.
Negative values move image to the left, positive values move image to the right.
Unit = 1 column

VPOS

Sets vertical image position.
Negative values move image up, positive values move image down.
Unit = 1 row

HSCAN

Sets horizontal scan direction.

HSCAN = 0 normal horizontal scan direction (L → R)
HSCAN = 1 reverse horizontal scan direction (L ← R)

Normal scan orientation specified in product datasheet.

VSCAN

Sets vertical scan direction.

VSCAN = 0 normal vertical scan direction (T → B)
VSCAN = 1 reverse vertical scan direction (T ← B)

Normal scan direction specified in product datasheet.

DPDC

Sets Display PWM Duty Cycle.

OPATT

Sets bult-in test pattern.

OPATT = 0 No pattern selected, input video displayed
OPATT = 1 White Field
OPATT = 2 Color bar
OPATT = 3 Gray scale
OPATT = 4 Checker board
OPATT = 5 Vertical lines
OPATT = 6 Horizontal lines
OPATT = 7 Grid pattern
OPATT = 8 Black Field

WBCx

With BIT1011B1 + Color OLED, sets R/G/B channel gain values of White Balance Control.

x = R, G, B

The White Balance Control (**WBC**) function provides a method for adjusting the R-G-B mix of video data applied to the OLED to establish a desired white chromaticity value by attenuating excessively strong color component(s). The applied R/G/B color pixel values are as follows:

$RED_{applied}$ = RED * (**WBCR**/256)
$GRN_{applied}$ = GRN * (**WBCG**/256)
$BLU_{applied}$ = BLU * (**WBCB**/256)

With BIT1011B2 + Monochrome OLED, redudes luminance.

6.3 SYSTEM COMMANDS

POWER

Sets and/or reports power mode.

POWER = 0: Power down command / OLED Driver is in powered-down state
POWER = 1: Power up command / OLED Driver is in operational state

LEDEN

Sets **ACT**, **OOL** indicator LED mode.

LEDEN = 0 LEDs disabled
1 LEDs enabled

OTEMP

Reads OLED temperature in Celsius and [hexadecimal] formats.
Example (acutal OLED temperature will vary):

```
RDY>OTEMP
RDY> 0-OTEMP   51.765 [424F0F10]
RDY>
```

OLEDSN

Reads 5 character alphanumeric OLED serial number.
Example (acutal OLED SN will vary):

```
RDY>OLEDSN
RDY> OLED SERIAL NUMBER: "Z10VP"
RDY>
```

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