



# 3G HD/SD CHROMAKEY DVK-300HD



## RS232 ASCII CONTROL PROTOCOL DESCRIPTION

DATE : 2015.11.9

## 1. Hardware Specification

### 1.1 Serial Port Specification

| Item           | Description                     |
|----------------|---------------------------------|
| Baud Rate      | 38,400                          |
| Word Size      | 8 bits, 1 Start bit, 1 Stop bit |
| Parity         | ODD                             |
| Communications | RS-232                          |
| Connector      | 9-Pin D-Sub                     |

### 1.2 Serial Data Word Description



Start bit always low

Data 8 bit, LSB first

Odd Parity

Stop bit always high

### 1.3 Command/Message Block Structure

|              |               |                 |                |                |     |                |              |
|--------------|---------------|-----------------|----------------|----------------|-----|----------------|--------------|
| Sync<br>Byte | Byte<br>Count | Command<br>Byte | Parameter<br>1 | Parameter<br>2 | ... | Parameter<br>N | Check<br>Sum |
|--------------|---------------|-----------------|----------------|----------------|-----|----------------|--------------|

| Item                   | Description                                                                                                                                 |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Sync Byte              | 0xAA                                                                                                                                        |
| Byte Count             | The total number of subsequent bytes in the block (from command byte to Check Sum byte).<br>Valid byte count values range from 0x01 to 0xFF |
| Command Code           | Command Code Byte                                                                                                                           |
| Parameter 0 ~ 254 Byte | Parameters                                                                                                                                  |
| Check Sum              | Check Sum (Command + Parameter 1 + Parameter 2 + Parameter N) & 0xFF                                                                        |

#### Example:

Set ChromaKey mode

0xAA 0x04 0x10 0x01 0x01 0x12

0xAA : Sync Byte

0x04 : Byte Count

0x10 : Command Code = Operation mode

0x01 : Parameter 1 = Set keying mode

0x01 : Parameter 2 = Chroma

0x12 : Check Sum = (0x10 + 0x01 + 0x01) & 0xFF

## 1.4 Status and Data Replies

|              |               |                     |              |
|--------------|---------------|---------------------|--------------|
| Sync<br>Byte | Byte<br>Count | Response<br>Message | Check<br>Sum |
|--------------|---------------|---------------------|--------------|

| Item             | Description                                                                                                                                 |      |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------|------|
| Sync Byte        | 0xAA                                                                                                                                        |      |
| Bytes Count      | The total number of subsequent bytes in the block (from command byte to Check Sum byte).<br>Valid byte count values range from 0x01 to 0xFF |      |
| Response Message |                                                                                                                                             |      |
|                  | Command Error                                                                                                                               | 0x40 |
|                  | Command Accepted                                                                                                                            | 0x80 |
|                  | Data Message                                                                                                                                | Data |
| Check Sum        | (Sum of Response Message) & 0xFF                                                                                                            |      |

## 2. Command list

### 2.1 Operation mode

| <b>Operation mode</b><br>Select between Chroma key, Luma key, or Disable processing |                                 |                                 |
|-------------------------------------------------------------------------------------|---------------------------------|---------------------------------|
| Command Code                                                                        | <b>0x10</b>                     |                                 |
| Parameter 1                                                                         | 0x01                            | Set keying mode                 |
|                                                                                     | 0x02                            | Set background color            |
|                                                                                     | 0x03                            | Background color tone detection |
| Parameter 2                                                                         | Keying mode                     |                                 |
|                                                                                     | 0x01                            | Chroma                          |
|                                                                                     | 0x02                            | Luma                            |
|                                                                                     | 0x03                            | Disable                         |
|                                                                                     | Background color                |                                 |
|                                                                                     | 0x01                            | Blue (chroma) / Black (luma)    |
|                                                                                     | 0x02                            | Green (chroma) / White (luma)   |
|                                                                                     | Background color tone detection |                                 |
|                                                                                     | 0x00                            | Off – Default color             |
|                                                                                     | 0x01                            | On – Detect real color tone     |

#### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.2 Matte settings

| Matte settings |             |                    |
|----------------|-------------|--------------------|
| Command Code   | 0x11        |                    |
| Parameter 1    | 0x01        | Set matte Black    |
|                | 0x02        | Set matte White    |
|                | 0x03        | Set matte Cutoff   |
|                | 0x04        | Set matte Softness |
| Parameter 2    | bit1 ~ bit0 | Matte bit9 ~ bit8  |
|                | bit7 ~ bit2 | 0                  |
| Parameter 3    | bit7 ~ bit0 | Matte bit7 ~ bit0  |

### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.3 Matte control

| Matte control |                   |                           |
|---------------|-------------------|---------------------------|
| Command Code  | 0x12              |                           |
| Parameter 1   | 0x01              | Set matte denoise         |
|               | 0x02              | Show alpha matte          |
| Parameter 2   | Set matte denoise |                           |
|               | 0x00              | denoise Off               |
|               | 0x01              | denoise LOW               |
|               | 0x02              | denoise HIGH              |
|               | Show alpha matte  |                           |
|               | 0x00              | Alpha matte view disabled |
|               | 0x01              | Alpha matte view enabled  |

### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.4 Matte color tolerance

| Set matte color tolerance |                         |
|---------------------------|-------------------------|
| Command Code              | 0x13                    |
| Parameter 1               | matte_color bit7 ~ bit0 |

### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.5 Matte luminance tolerance

| Set matte luma tolerance |                        |
|--------------------------|------------------------|
| Command Code             | 0x14                   |
| Parameter 1              | matte_luma bit7 ~ bit0 |

### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.6 Spill color correction

| Spill correction |             |                               |
|------------------|-------------|-------------------------------|
| Command Code     | 0x15        |                               |
| Parameter 1      | 0x01        | Set color of spill correction |
|                  | 0x02        | Set coarse spill correction   |
|                  | 0x03        | Set fine spill correction     |
| Parameter 2      | bit1 ~ bit0 | spill bit9 ~ bit8             |
|                  | bit7 ~ bit2 | 0                             |
| Parameter 3      | bit7 ~ bit0 | spill bit7 ~ bit0             |

Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.7 Edge correction

| Edge correction |             |                  |
|-----------------|-------------|------------------|
| Command Code    | 0x16        |                  |
| Parameter 1     | bit1 ~ bit0 | Edge bit9 ~ bit8 |
|                 | bit7 ~ bit2 | 0                |
| Parameter 2     | bit7 ~ bit0 | Edge bit7 ~ bit0 |

Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.8 Garbage mask

| Garbage mask        |             |                                              |
|---------------------|-------------|----------------------------------------------|
| <b>Command Code</b> | <b>0x17</b> |                                              |
| Parameter 1         | 0x01        | Left garbage (must be <= Right garbage mask) |
|                     | 0x02        | Right garbage (must be >= Left garbage mask) |
|                     | 0x03        | Top garbage (must be <= Bottom garbage mask) |
|                     | 0x04        | Bottom garbage (must be >= Top garbage mask) |
| Parameter 2         | bit1 ~ bit0 | garbage bit9 ~ bit8                          |
|                     | bit7 ~ bit2 | 0                                            |
| Parameter 3         | bit7 ~ bit0 | garbage bit7 ~ bit0                          |

### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.9 Post correction

| Post correction |                                           |                                           |
|-----------------|-------------------------------------------|-------------------------------------------|
| Command Code    | 0x18                                      |                                           |
| Parameter 1     | 0x01                                      | Post correction enable                    |
|                 | 0x02                                      | Post correction brightness                |
|                 | 0x03                                      | Post correction contrast                  |
|                 | 0x04                                      | Post correction saturation                |
|                 | 0x05                                      | Post correction ambient color value Red   |
|                 | 0x06                                      | Post correction ambient color value Green |
|                 | 0x07                                      | Post correction ambient color value Blue  |
|                 | 0x08                                      | Post correction ambient intensity         |
| Parameter 2     | Post correction enable                    |                                           |
|                 | 0x00                                      | disable                                   |
|                 | 0x01                                      | enable                                    |
|                 | Post correction brightness                |                                           |
|                 | bit7 ~ bit0                               | brightness bit7 ~ bit0                    |
|                 | Post correction contrast                  |                                           |
|                 | bit7 ~ bit0                               | contrast bit7 ~ bit0                      |
|                 | Post correction saturation                |                                           |
|                 | bit7 ~ bit0                               | saturation bit7 ~ bit0                    |
|                 | Post correction ambient color value Red   |                                           |
|                 | bit7 ~ bit0                               | Ambient_red bit7 ~ bit0                   |
|                 | Post correction ambient color value Green |                                           |
|                 | bit7 ~ bit0                               | Ambient_green bit7 ~ bit0                 |
|                 | Post correction ambient color value Blue  |                                           |
|                 | bit7 ~ bit0                               | Ambient_blue bit7 ~ bit0                  |
|                 | Post correction ambient intensity         |                                           |
|                 | bit7 ~ bit0                               | Ambient_intensity bit7 ~ bit0             |

### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.10 Save/Load preset

| Save/Load presets |                     |                     |
|-------------------|---------------------|---------------------|
| Command Code      | 0x19                |                     |
| Parameter 1       | 0x01                | Save current preset |
|                   | 0x02                | Load preset         |
| Parameter 2       | Save current preset |                     |
|                   | 0x01                | Save to slot 1      |
|                   | 0x02                | Save to slot 2      |
|                   | 0x03                | Save to slot 3      |
|                   | 0x04                | Save to slot 4      |
|                   | Load preset         |                     |
|                   | 0x01                | Load from slot 1    |
|                   | 0x02                | Load from slot 2    |
|                   | 0x03                | Load from slot 3    |
|                   | 0x04                | Load from slot 4    |

### Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.11 Input configuration

| Input configuration |                  |                  |
|---------------------|------------------|------------------|
| Command Code        | 0x1A             |                  |
| Parameter 1         | 0x01             | Camera input     |
|                     | 0x02             | Background input |
| Parameter 2         | Camera input     |                  |
|                     | 0x01             | SDI              |
|                     | 0x02             | HDMI             |
|                     | Background input |                  |
|                     | 0x01             | SDI              |
|                     | 0x02             | HDMI/DVI         |
|                     | 0x03             | VGA              |

Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.12 Outputs configuration

| Outputs configuration |                     |                     |
|-----------------------|---------------------|---------------------|
| Command Code          | 0x1B                |                     |
| Parameter 1           | 0x01                | Alpha matte visible |
|                       | 0x02                | PVW mirror          |
| Parameter 2           | Alpha matte visible |                     |
|                       | 0x01                | PVW only            |
|                       | 0x02                | PGM only            |
|                       | 0x03                | PVW + PGM           |
|                       | PVW mirror          |                     |
|                       | 0x00                | disable             |
|                       | 0x01                | enable              |

Return

| Item             | Sync Byte | Byte Count | Response Message | Check Sum | In Response To      |
|------------------|-----------|------------|------------------|-----------|---------------------|
| Command Error    | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command     |
| Command Accepted | 0xAA      | 0x02       | 0x80             | 0x80      | Valid Write Command |

## 2.13 Discover

| Discover     |      |                |
|--------------|------|----------------|
| Command Code | 0x1C |                |
| Parameter 1  | 0x01 | Password       |
|              | 0x02 | MAC address    |
|              | 0x03 | IP, port, mask |
|              | 0x11 | Name           |
|              | 0x12 | Default name   |
|              | 0x13 | Version        |
|              | 0x21 | Preset 1 name  |
|              | 0x22 | Preset 2 name  |
|              | 0x23 | Preset 3 name  |
|              | 0x24 | Preset 4 name  |

### Return Command Error

| Item          | Sync Byte | Byte Count | Response Message | Check Sum | In Response To  |
|---------------|-----------|------------|------------------|-----------|-----------------|
| Command Error | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command |

### Return Password:

| Return           |                                          |
|------------------|------------------------------------------|
| Sync Byte        | 0xAA                                     |
| Byte Count       | 0x13                                     |
| Byte 1           | 0x1C                                     |
| Byte 2           | 0x01                                     |
| Byte 3 – Byte 18 | Password (padded with 0x00s to 16 bytes) |
| Check sum        | (Byte 1 + ... + Byte 16) & 0xFF          |

### Return MAC address:

| Return          |                                |
|-----------------|--------------------------------|
| Sync Byte       | 0xAA                           |
| Byte Count      | 0x09                           |
| Byte 1          | 0x1C                           |
| Byte 2          | 0x02                           |
| Byte 3 – Byte 8 | MAC address                    |
| Check sum       | (Byte 1 + ... + Byte 8) & 0xFF |

Return IP, port, mask:

| Return            |                                 |
|-------------------|---------------------------------|
| Sync Byte         | 0xAA                            |
| Byte Count        | 0x0D                            |
| Byte 1            | 0x1C                            |
| Byte 2            | 0x03                            |
| Byte 3 – Byte 6   | IP                              |
| Byte 7 – Byte 10  | Port                            |
| Byte 11 – Byte 14 | Mask                            |
| Check sum         | (Byte 1 + ... + Byte 14) & 0xFF |

Return Name/Default Name:

| Return          |                                                                |              |
|-----------------|----------------------------------------------------------------|--------------|
| Sync Byte       | 0xAA                                                           |              |
| Byte Count      | length of Name/Default name + 0x03 (maximum name length is 64) |              |
| Byte 1          | 0x1C                                                           |              |
| Byte 2          | 0x11                                                           | Name         |
|                 | 0x12                                                           | Default name |
| Byte 3 – Byte n | Name/Default name (string without trailing ¥0)                 |              |
| Check sum       | (Byte 1 + ... + Byte n) & 0xFF                                 |              |

Return Version:

| Return            |                                 |
|-------------------|---------------------------------|
| Sync Byte         | 0xAA                            |
| Byte Count        | 0x13                            |
| Byte 1            | 0x1C                            |
| Byte 2            | 0x13                            |
| Byte 3 – Byte 6   | ARM version                     |
| Byte 7 – Byte 10  | FPGA version                    |
| Byte 11 – Byte 14 | NIOS version                    |
| Byte 15 – Byte 18 | Hardware version                |
| Check sum         | (Byte 1 + ... + Byte 18) & 0xFF |

Return Preset Name:

| Return          |                                                                 |               |
|-----------------|-----------------------------------------------------------------|---------------|
| Sync Byte       | 0xAA                                                            |               |
| Byte Count      | length of Preset name + 0x03 (maximum preset name length is 32) |               |
| Byte 1          | 0x1C                                                            |               |
| Byte 2          | 0x21                                                            | Preset 1 name |
|                 | 0x22                                                            | Preset 2 name |
|                 | 0x23                                                            | Preset 3 name |
|                 | 0x24                                                            | Preset 4 name |
| Byte 3 – Byte n | Preset name (string without tailing ¥0)                         |               |
| Check sum       | (Byte 1 + ... + Byte n) & 0xFF                                  |               |

## 2.14 Get

Get parameter value command is modification of standard set command by adding Get flag to Command Code and skip parameter value bytes:

| Get           |      |                                                                                                                |
|---------------|------|----------------------------------------------------------------------------------------------------------------|
| Command Code  | 0x80 |                                                                                                                |
| [Parameter 1] | 0x?? | Parameter number according to standard set command.<br>Field is optional for commands with only one parameter. |

Return Command Error:

| Item          | Sync Byte | Byte Count | Response Message | Check Sum | In Response To  |
|---------------|-----------|------------|------------------|-----------|-----------------|
| Command Error | 0xAA      | 0x02       | 0x40             | 0x40      | Invalid Command |

Return Command Accepted:

| Return     |                                |                                         |
|------------|--------------------------------|-----------------------------------------|
| Sync Byte  | 0xAA                           |                                         |
| Byte Count | n + 1                          |                                         |
| Byte 1     | Command code                   |                                         |
| Byte 2     | Parameter 1                    | Parameter is optional                   |
| Byte 3     | Value byte 1                   | Parameter value bytes (usually 1 ... 3) |
| ...        | ...                            |                                         |
| Byte n     | Value byte m                   |                                         |
| Check sum  | (Byte 1 + ... + Byte n) & 0xFF |                                         |

Example:

| Get operation mode |                    |                                 |
|--------------------|--------------------|---------------------------------|
| Command Code       | 0x90 (0x10 + 0x80) |                                 |
| Parameter 1        | 0x01               | Get keying mode                 |
|                    | 0x02               | Get background color            |
|                    | 0x03               | Background color tone detection |

Return Get keying mode:

| Return     |                                   |                 |
|------------|-----------------------------------|-----------------|
| Sync Byte  | 0xAA                              |                 |
| Byte Count | 0x04                              |                 |
| Byte 1     | 0x90                              | Command code    |
| Byte 2     | 0x01                              | Get keying mode |
| Byte 3     | Keying mode                       |                 |
|            | 0x01                              | Chroma          |
|            | 0x02                              | Luma            |
|            | 0x03                              | Disable         |
| Check sum  | (Byte 1 + Byte 2 + Byte 3) & 0xFF |                 |

Return Get background color:

| Return     |                                   |                               |
|------------|-----------------------------------|-------------------------------|
| Sync Byte  | 0xAA                              |                               |
| Byte Count | 0x04                              |                               |
| Byte 1     | 0x90                              | Command code                  |
| Byte 2     | 0x02                              | Get background color          |
| Byte 3     | Background color                  |                               |
|            | 0x01                              | Blue (chroma) / Black (luma)  |
|            | 0x02                              | Green (chroma) / White (luma) |
| Check sum  | (Byte 1 + Byte 2 + Byte 3) & 0xFF |                               |

Return Get Background color tone detection - Default color:

| Return     |      |                                 |
|------------|------|---------------------------------|
| Sync Byte  | 0xAA |                                 |
| Byte Count | 0x04 |                                 |
| Byte 1     | 0x90 | Command code                    |
| Byte 2     | 0x03 | Background color tone detection |
| Byte 3     | 0x00 | Default color                   |
| Check sum  | 0x93 |                                 |

Return Get Background color tone detection - Real color tone detected:

| Return     |                                |                                    |
|------------|--------------------------------|------------------------------------|
| Sync Byte  | 0xAA                           |                                    |
| Byte Count | 0x06                           |                                    |
| Byte 1     | 0x90                           | Command code                       |
| Byte 2     | 0x03                           | Background color tone detection    |
| Byte 3     | bit7 ~ bit0                    | Background color Red bit7 ~ bit0   |
| Byte 4     | bit7 ~ bit0                    | Background color Green bit7 ~ bit0 |
| Byte 5     | bit7 ~ bit0                    | Background color Blue bit7 ~ bit0  |
| Check sum  | (Byte 1 + ... + Byte 5) & 0xFF |                                    |