Remote Head Series
Product Specifications

Features
• Various Connector Types
• Cased or Board Models
• Multiple Head Configurations
• 16 DIP Switches
Product Precautions

- Handle the camera with care. Do not abuse the camera. Avoid striking or shaking it. Improper handling or storage could damage the camera.
- Do not pull or damage the camera cable.
- During camera use, do not wrap the unit in any material. This will cause the internal temperature of the unit to increase.
- Do not expose the camera to moisture, or do not try to operate it in wet areas.
- Do not operate the camera beyond its temperature, humidity and power source ratings.
- While the camera is not being used, keep the lens or lens cap on the camera to prevent dust or contamination from getting in the Sensor or filter area and scratching or damaging this area.
- Do not keep the camera under the following conditions:
  - In wet, moist, and high humidity areas
  - Under hot direct sunlight
  - In high temperature areas
  - Near an object that releases a strong magnetic or electric field
  - Areas with strong vibrations
- Apply the power that satisfies the requirements specified in this document to the camera.
- Use a soft cloth to clean the camera. Use pressured air spray to clean the surface of the glass. DO not scratch the surface of the glass.
- The camera is a general-purpose electronic device; using the camera for the equipment that may threaten human life or cause dangers to human bodies directly in case of failure or malfunction of the camera is not guaranteed. Use the camera for special purposes at your own risk.
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1 Naming Method

**CCU**

**STC-R6xxx xxx**

- **Back Panel**
  - PWT, PWJ, PWC
- **CCU Shape**
  - None: Cased Model
  - C: Board Model
- **Scan Mode**
  - 0: NTSC
  - 5: PAL
- **Sensor Size**
  - 4: 1/4” Color CCD
- **Shape**
  - R: Remote Head

**CCD Remote Head**

**STC-R6xx xxx x**

- **Cable Length**
  - 2, 3, 5, 10m
- **CCD Head Type**
  - HD: Straight Type
  - UHD: L Angle Type
  - LHD: L Angle Type
- **Scan Mode**
  - 0: NTSC
  - 5: PAL
- **Sensor Size**
  - 4: 1/4” Color CCD
- **Shape**
  - R: Remote Head
# 2 Electronic Specifications STC-R640, STC-R645

<table>
<thead>
<tr>
<th>Model Number</th>
<th>STC-R640</th>
<th>STC-R645</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Sensor</td>
<td>1/4 inch Interline CCD ICX228AKB</td>
<td>1/4 inch Interline CCD ICX229AKB</td>
</tr>
<tr>
<td>Active Picture Elements</td>
<td>768(H) x 494(V)</td>
<td>752 (H) x 582 (V)</td>
</tr>
<tr>
<td>Signal Format</td>
<td>NTSC</td>
<td>PAL</td>
</tr>
<tr>
<td>Scanning System</td>
<td>2:1 Interlaced</td>
<td></td>
</tr>
<tr>
<td>Scanning Frequency</td>
<td>Horizontal Frequency 15.734kHz Vertical Frequency 59.94Hz</td>
<td>Horizontal Frequency 15.625kHz Vertical Frequency 50.00Hz</td>
</tr>
<tr>
<td>Sync System</td>
<td>Internal / External: Cased Model, Internal: Board Model</td>
<td></td>
</tr>
<tr>
<td>Horizontal Resolution</td>
<td>480 TV Lines</td>
<td></td>
</tr>
<tr>
<td>S/N Ratio</td>
<td>More than TBD dB (AGC=OFF)</td>
<td>More than TBD dB (AGC=OFF)</td>
</tr>
<tr>
<td>Video Output Format</td>
<td>VBS, Y/C(1.0Vp-p 75Ω)</td>
<td></td>
</tr>
<tr>
<td>Minimum Scene illumination</td>
<td>TBD lx, F1.2 (AGC=ON)</td>
<td></td>
</tr>
<tr>
<td>Electronic Shutter</td>
<td><strong>[Dip Switch]</strong> 1/60(1/50:PAL), 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000 sec <strong>[Auto/Control Software]</strong> High Speed Shutter: 1/60(1/50:PAL) to 1/100000 sec Low Speed Shutter: 1 to 256FLD</td>
<td></td>
</tr>
<tr>
<td>White Balance</td>
<td>Auto / Push to Set / Manual (default: Auto)</td>
<td></td>
</tr>
<tr>
<td>AGC</td>
<td>ON / OFF (default: ON)</td>
<td></td>
</tr>
<tr>
<td>Gamma</td>
<td>0.45/1.0 (Switchable, Configurable through the control software), Default:0.45</td>
<td></td>
</tr>
<tr>
<td>Image Rotation</td>
<td>Normal (Default), Horizontal Flip, Vertical Flip, Horizontal Vertical Flip</td>
<td></td>
</tr>
<tr>
<td>Still Image</td>
<td>Support</td>
<td></td>
</tr>
<tr>
<td>CCD Head</td>
<td>Lens Mount C Mount, Fixed lens</td>
<td></td>
</tr>
<tr>
<td>Optical LPF</td>
<td>IR Cut Filter</td>
<td></td>
</tr>
<tr>
<td>Cable Length</td>
<td>2,3,5,10m(TBD)</td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>DC9V to 15V</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>95mA ± 20mA</td>
<td></td>
</tr>
<tr>
<td>Operational Temperature</td>
<td>-10°C to +50°C</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-30°C to +60°C</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>CCD Case: 51(W) x 51(W) x 55.5(D) mm CCU Board(C): 45(W) x 45(W) x 30(D) mm ※1</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>CCD Case: Approximately TBD g CCU Board(C): Approximately TBD g</td>
<td></td>
</tr>
<tr>
<td>Compliance</td>
<td>RoHS, REACH Compliance</td>
<td></td>
</tr>
</tbody>
</table>

※1 Excluding back panel connector and components.
3 Spectral Sensitivity Characteristics

3.1 STC-R640 (ICX228AKB)

3.2 STC-R645 (ICX229AKB)
# Switch Specifications

<table>
<thead>
<tr>
<th>SW No.</th>
<th>Function</th>
<th>SW2</th>
<th>SW3</th>
<th>SW4</th>
<th>SW5</th>
<th>SW6</th>
<th>SW7</th>
<th>SW8</th>
<th>SW9</th>
<th>SW10</th>
<th>SW11</th>
<th>SW12</th>
<th>SW13</th>
<th>SW14</th>
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<tbody>
<tr>
<td>1</td>
<td>Shutter Mode</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
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<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>2</td>
<td>Shutter Speed</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>3</td>
<td>(SW201-1-ON: Available)</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>Flicker Compensation Mode</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
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<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>5</td>
<td>(SW201-1-OFF: Available)</td>
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<td>ON</td>
<td>OFF</td>
<td>OFF</td>
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<td>6</td>
<td>Back Light Compensation</td>
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<td>OFF</td>
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<td>ON</td>
<td>OFF</td>
<td>OFF</td>
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</tr>
<tr>
<td>7</td>
<td>(SW201-1-ON: Available)</td>
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<td>ON</td>
<td>OFF</td>
<td>OFF</td>
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<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<tr>
<td>8</td>
<td>Back Light Correction Mode</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<td>ON</td>
<td>OFF</td>
<td>OFF</td>
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<td>9</td>
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<td>ON</td>
<td>OFF</td>
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<tr>
<td>10</td>
<td>Low Luminance Control</td>
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<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<td>ON</td>
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</tr>
<tr>
<td>11</td>
<td>(SW201-1-OFF: Available)</td>
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<td>OFF</td>
<td>ON</td>
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<tr>
<td>12</td>
<td>WB</td>
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<td>13</td>
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<td>ON</td>
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<tr>
<td>14</td>
<td>Push to Set</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>15</td>
<td>Gamma</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>16</td>
<td>0.45(Preset)</td>
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<td>ON</td>
<td>OFF</td>
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<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>17</td>
<td>1.0(Manual)</td>
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<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
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<td>OFF</td>
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<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
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</tr>
</tbody>
</table>

### Notes
- AGC is available SW201-1 ON and OFF
- Flicker Less
- Gain Modification
### Factory Setting

<table>
<thead>
<tr>
<th>SW</th>
<th>No.</th>
<th>OFF</th>
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<tbody>
<tr>
<td>SW201</td>
<td>1</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>●</td>
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</tr>
<tr>
<td></td>
<td>3</td>
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<tr>
<td></td>
<td>4</td>
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<td>●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>●</td>
<td></td>
</tr>
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<td>SW202</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>●</td>
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</tr>
<tr>
<td></td>
<td>3</td>
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<tr>
<td></td>
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<td>●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>●</td>
<td></td>
</tr>
</tbody>
</table>

**Caution**
- Internal Sync is unstable while adjusting the phase of input signal and output signal on External Sync.
- External Sync may work even in Internal Sync [Factory Default] mode, however External Sync is not in phase with Internal Sync.
- To set the internal sync again, please turn the camera OFF and ON after selecting Internal Sync.
5 4 Description of each Back Panel (STC-R640/645)

5.1 Case: PWT Model

DC +12V Input

+12V Input: DC 9V to 15V
Sentech Provide AC adopter: UN310-2P

Y/C OUT (S-Video)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y OUT (1Vp-p 75Ω)</td>
</tr>
<tr>
<td>2</td>
<td>C OUT (300mVp-p 75Ω)</td>
</tr>
<tr>
<td>3</td>
<td>GND (Y OUT)</td>
</tr>
<tr>
<td>4</td>
<td>GND (C OUT)</td>
</tr>
</tbody>
</table>

Y/C Output

- BNC Connector (VBS 1.0Vp-p 75Ω)
- BNC Connector, External Sync signal (VBS) input
- Internal/External Sync (automatic select)
- Configurable through Control Software "DQUCtrl" in the CD-ROM with RS-232C cable (Stereo Pin-jack / D-Sub Pin9).

PC Communication Terminal

- Refer to the Section "Switch Specifications".
5.2 Case: PWJ Model

Y/C OUT (S-Video)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y OUT(1Vp-p 75Ω)</td>
</tr>
<tr>
<td>2</td>
<td>C OUT(300mVp-p 75Ω)</td>
</tr>
<tr>
<td>3</td>
<td>GND(Y OUT)</td>
</tr>
<tr>
<td>4</td>
<td>GND(C OUT)</td>
</tr>
</tbody>
</table>

DC +12V Input (DC Jack)

+12V DC Jack(Center Plus) DC9V to 15V
Sentech Provide AC adopter : UN310-1210

BNC Connector

Video Output (VBS 1.0Vp-p 75Ω)

External Sync(VBS)

BNC Connector, External Sync signal (VBS) input
Internal/External Sync (automatic select)

PC Communication Terminal

Configurable through Control Software “DQUCtrl” in the CD-ROM with RS-232C cable (Stereo Pin-jack / D-Sub Pin9).

DIP Switch

Refer to the Section “Switch Specifications”
5.3 Case: PWC Model

Y/C OUT (S-Video) | Y/C Output
---|---
Pin 1 | Y OUT (1Vp-p 75Ω)
Pin 2 | C OUT (300mVp-p 75Ω)
Pin 3 | GND (Y OUT)
Pin 4 | GND (C OUT)

Pin 12 Connector

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>+12V</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>Y OUT</td>
</tr>
<tr>
<td>5</td>
<td>GND (EXT HD)</td>
</tr>
<tr>
<td>6</td>
<td>EXT HD</td>
</tr>
<tr>
<td>7</td>
<td>EXT VD</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>C OUT</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>+12V</td>
</tr>
<tr>
<td>12</td>
<td>GND (EXT VD)</td>
</tr>
</tbody>
</table>

Note: The Y,C Signal on Pin 12 and Y,C Signal on Y/C cannot be used simultaneously.
### External Sync HD/VD

<table>
<thead>
<tr>
<th></th>
<th>NTSC(STC-620 Series)</th>
<th>NTSC(STC-630 Series)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Polarity</strong></td>
<td>Active Low, Falling Edge</td>
<td></td>
</tr>
<tr>
<td><strong>External Sync</strong></td>
<td>Automatic detection</td>
<td></td>
</tr>
<tr>
<td><strong>HD</strong></td>
<td>HD signal(Pin6), HD GND(Pin5)</td>
<td></td>
</tr>
<tr>
<td><strong>VD</strong></td>
<td>VD signal(Pin7), GND(Pin12)</td>
<td></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>HD 15.734kHz ±50ppm, VD 59.94Hz ±50ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 15.625kHz ±50ppm, VD 50.00Hz ±50ppm</td>
<td></td>
</tr>
<tr>
<td><strong>HD, VD Amplitude</strong></td>
<td>3 to 5v</td>
<td></td>
</tr>
<tr>
<td><strong>impedance</strong></td>
<td>2.3K ohm</td>
<td></td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>VD width: 9H(TYP), HD width 6 usec</td>
<td></td>
</tr>
</tbody>
</table>

*Power Input only  
Sentech Provide AC adopter: UN310-12P  
BNC Connector  
Video Output (VBS 1.0Vp-p 75Ω)  
PC Communication Terminal  
Configurable through Control Software" DQUCtrl" in the CD-ROM with RS-232C cable (Stereo Pin-jack / D-Sub Pin9).  
DIP Switch  
Refer to the Section "Switch Specifications"  

### 5.1 Board: P2,L2,CS2 Common Specification

*Refer to each Connector on the Section "Dimensions"
6 List of Fixed Lens

<table>
<thead>
<tr>
<th></th>
<th>Lens model</th>
<th>Focal length</th>
<th>F No.</th>
<th>Field of view (1/4&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>diagonal</td>
</tr>
<tr>
<td>Standard 2.7mm</td>
<td>VL-2720VES</td>
<td>f= 2.693 mm</td>
<td>F/2.0</td>
<td>100.3</td>
</tr>
<tr>
<td>Standard 4mm</td>
<td>MSC-444STE</td>
<td>f= 4.010 mm</td>
<td>F/2.5</td>
<td>65.5</td>
</tr>
<tr>
<td>Option 8mm</td>
<td>MSC-8STE</td>
<td>f= 8.000 mm</td>
<td>F/2.5</td>
<td>32.36</td>
</tr>
<tr>
<td>Option 16mm</td>
<td>VL-1618STE</td>
<td>f= 16.000 mm</td>
<td>F/2.5</td>
<td>16.05</td>
</tr>
<tr>
<td>Option 16mm</td>
<td>VL-1618STF</td>
<td>f= 16.000 mm</td>
<td>F/11</td>
<td>16.05</td>
</tr>
</tbody>
</table>

*Note: C mount adapter is available.

7 Cable Length

2,3,5,10m (TBD)

8 CCD Remote Head Shape

8mm MSC-444STE  f= 4.010 mm  F/2.5  65.5  51.9  38.7

Straight Head (HD) type

Fixed Lens Model  C Mount Model

L angle head (UHD) type

Fixed Lens Model  C Mount Model

L Angle Head (LHD) type

Fixed Lens Model  C Mount Model
9 Dimensions

9.1 CCD Remote Head

**Straight Head (HD) type**

**L angle head (UHD) type**

**L Angle Head (LHD) type**

Unit: mm
9.2 Cased (C-Mount): PWT, PWJ, PWC

Unit: mm
9.3 Board

2-Φ2.1 Through Hole

2-Temporary Spacer

2-Temporary Screw

Unit: mm
10 Camera Set Up

When the user sets up the camera the following items may be required.

Camera: The model number of camera
Control Software: DQUCtrl,
Communication Cable: Serial Pin Jack cable (Serial Pin to RS232C Cable)
Power: DC 12V (Please refer to Section “Error! Reference source not found. Error! Reference source not found.”)

11 The communication protocol specifications and Control Software manual

11.1 Communication settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate</td>
<td>115,200bps</td>
</tr>
<tr>
<td>Data bit</td>
<td>8 bits</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop bit</td>
<td>2 bits</td>
</tr>
<tr>
<td>Flow control</td>
<td>None</td>
</tr>
</tbody>
</table>

11.2 Communication format

The format for the sending / receiving data between the PC and the camera (DSP register or FLASHROM) is shown below:

11.2.1 Specifications of the sent commands

<table>
<thead>
<tr>
<th>Function</th>
<th>1Byte</th>
<th>2Byte (COM)</th>
<th>3Byte</th>
<th>4Byte</th>
<th>5Byte</th>
<th>-----</th>
<th>-----</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSP register WRITE*</td>
<td>SW</td>
<td>57h</td>
<td>CAT</td>
<td>STB</td>
<td>DT0</td>
<td>---</td>
<td>DTn</td>
</tr>
<tr>
<td>DSP register READ</td>
<td>SW</td>
<td>52h</td>
<td>CAT</td>
<td>STB</td>
<td>ENB</td>
<td>CS</td>
<td></td>
</tr>
<tr>
<td>FLASHROM WRITE (ALL Categories)</td>
<td>SW</td>
<td>7Ah</td>
<td>CS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASHROM WRITE (1 Category)</td>
<td>SW</td>
<td>79h</td>
<td>CAT</td>
<td>CS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASHROM WRITE (Byte)</td>
<td>SW</td>
<td>78h</td>
<td>CAT</td>
<td>STB</td>
<td>ENB</td>
<td>CS</td>
<td></td>
</tr>
<tr>
<td>FLASHROM READ (Byte)</td>
<td>SW</td>
<td>58h</td>
<td>CAT</td>
<td>STB</td>
<td>ENB</td>
<td>CS</td>
<td></td>
</tr>
</tbody>
</table>

* The packet byte length varies are depending on the length of the data strings (DT0 to DTn) to be written in the DSP registers.

The DSP registers data load from the FLASH ROM when power on the camera.
It is necessary to save data into the FLASH ROM to keep changing data before power off the camera.

# Checkpoints:

________________________
DSP register WRITE (COM=57[h])
In order to write the Data into the DSP register on DT0 to DTn set the Category and Start Byte.
The maximum number of registers that can be written with one packet is 58 bytes.

DSP register READ (COM=52[h])
In order to read the Data from the DSP register on Start Byte to End Byte set the Category and Start Byte, End Byte.
The maximum number of registers that can be read with one packet is 60 bytes.

FLASHROM WRITE (ALL Categories) (COM=7A[h])
Write all of the current DSP register data into the FLASH ROM.

FLASHROM WRITE (1 Category) (COM=79[h])
Write the current DSP register data on one specific category into FLASH ROM.

FLASHROM WRITE (Byte) (COM=78[h])
Write the current DSP register data from start byte to end byte on one specific category into the FLASH ROM.

FLASHROM READ (COM=58[h])
Read the current DSP register data from start byte to end byte on one specific category on the FLASH ROM.
The maximum number of data inside the FLASH ROM that can be read with one packet is 60 bytes.

<Abbreviation symbols>

<table>
<thead>
<tr>
<th>SW:</th>
<th>Start Word</th>
<th>Setting of the number of the valid bytes from SW and CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM:</td>
<td>Command</td>
<td>Setting of the commands and codes</td>
</tr>
<tr>
<td>CS:</td>
<td>Check Sum</td>
<td>Setting of the check sum from SW to CS</td>
</tr>
<tr>
<td>CAT:</td>
<td>Category</td>
<td>Setting of the target category</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Please refer to Section &quot;11.3 Camera Control Command and Software Manual&quot; for further information on this function.</td>
</tr>
<tr>
<td>STB:</td>
<td>Start Byte</td>
<td>Setting of the start byte (any setting from 1[h] to FE[h] can be selected)</td>
</tr>
<tr>
<td>ENB:</td>
<td>End Byte</td>
<td>Setting of the end byte (any setting from 1[h] to FE[h] can be selected)</td>
</tr>
<tr>
<td>DTn:</td>
<td>Data0 to Datan</td>
<td>Setting of the data to be written in the DSP register</td>
</tr>
</tbody>
</table>
# Examples:

**DSP register write (Write the data 0x20 to address category 09, 0x64):**

06, 57, 09, 64, 20, EA

06: 06 byte data  
57: DSP register write  
09: Category 09  
64: Start byte 0x64  
20: Write data 0x20  
EA: Check Sum

**DSP register read (Read the data on address category 09 from 0x64 to 0x65):**

06, 52, 09, 64, 65, 2A

06: 06 byte data  
52: DSP register read  
09: Category 09  
64: Start byte 0x64  
65: End byte 0x65  
2A: Check Sum

**All categories data write into FLASH ROM:**

03, 7A, 7D

03: 03 byte data  
7A: All categories data write into FLASH ROM  
7D: Check Sum

**One category data write into FLASH ROM (Write the all of data on category 09):**

04, 79, 09, 86

04: 04 byte data  
79: One category data write into FLASH ROM  
09: Category 09  
86: Check Sum
11.2.2 Specifications of the received data

<table>
<thead>
<tr>
<th>Function</th>
<th>1Byte</th>
<th>2Byte</th>
<th>3Byte</th>
<th>----</th>
<th>----</th>
<th>----</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSP register WRITE</td>
<td>SW</td>
<td>ST</td>
<td>CS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSP register READ</td>
<td>SW</td>
<td>ST</td>
<td>Read DT0 ---- Read DTn</td>
<td>CS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASHROM WRITE (ALL Categories)</td>
<td>SW</td>
<td>ST</td>
<td>CS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASHROM WRITE (1 Category)</td>
<td>SW</td>
<td>ST</td>
<td>CS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASHROM WRITE (Byte)</td>
<td>SW</td>
<td>ST</td>
<td>CS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASHROM READ (Byte)*</td>
<td>SW</td>
<td>ST</td>
<td>Read DT0 ---- Read DTn</td>
<td>CS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The packet byte length varies depending on the length of the data strings (DT0 to DTn) that have been read.

<Abbreviation symbols>

<table>
<thead>
<tr>
<th>SW: Start Word</th>
<th>The number of the valid bytes from SW and CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST: Status Word</td>
<td>The sent command result</td>
</tr>
<tr>
<td></td>
<td>Successful completion: Number of bytes received previously</td>
</tr>
<tr>
<td></td>
<td>Unsuccessful completion: An error code</td>
</tr>
<tr>
<td></td>
<td>Error codes</td>
</tr>
<tr>
<td>CS: Check Sum</td>
<td>The check sum from SW to CS</td>
</tr>
<tr>
<td>DTn: Data0 to Datan</td>
<td>Read data</td>
</tr>
</tbody>
</table>

#Example of Successful completion (DSP register WRITE)

Send: 0x06, 0x57, 0x09, 0x64, 0x20, 0xEA

Receive: 0x03, 0x06, 0x09

06: 06 byte data
57: DSP register WRITE
09: Category 09
64: Start byte 0x64
65: Write data 0x20
EA: Check Sum

03: 03 byte data
06: Number of bytes received previously
09: Check Sum
Detail of error code

0xF1 (Category number error)
When a non-existent category is selected on Memory Write or Read command, this error code is output.

#Example
Send: 0x06, 0x52, 0x20, 0x01, 0x01, 0x7A
Receive: 0x03, 0xF1, 0xF4
0x20 is a non-existent category, therefore ST return 0xF1.

0xF2 (Byte number error)
When unavailable Start Byte or End Byte is selected on Memory Write or Read command, this error code is output.

#Example
Send: 0x06, 0x52, 0x03, 0xFE, 0xFE, 0x57
Receive: 0x03, 0xF2, 0xF5
0xFE is out of valuable rage of Start Byte on Category 03, 0xF2 is output.

0xF3 (Communication format error)
When sending the command, the error on RS232C Communication format (e.g. over run error, framing error) comes up, this error code is output.

#Example
When 1StopBit was sent, even 2StopBit format is correct. This error code is output.

0xF4 (Time out error)
When the number of valid bytes is not received within a certain period, this error code is output.

#Example
Send: 0x06, 0x52, 0x03, 0x01, 0x01
Receive: 0x03, 0xF4, 0xF7
In this case data is received after a certain period.
In this case 1byte data did not receive (send) as CS, 0xF4 will be output after certain period.

0xFE (Check Sum error, Communication byte error)
When Check Sum (CS) or Transfer byte number is wrong, this error code is output.

#Example
Send: 0x06, 0x52, 0x03, 0x01, 0x01, 0x55
Receive: 0x03, 0xFE, 0x01
Check Sum was wrong (it should be 0x5D), 0xFE is output.

#Example
Send: 0x05, 0x52, 0x03, 0x01, 0x01, 0x5C
Receive: 0x03, 0xFE, 0x01
Total Byte number was wrong (it should be 0x06), 0xFE is output.
11.3 Camera Control Command and Software Manual

This camera can be controlled through the communication protocol or Control Software (DQUCtrl). Control Software has same functions. When the user would like to access the function register directory, the user can refer to the address information shown below.

11.3.1 Port Driver Function

The Camera settings can be set through External Switch (SW201,202,PushSW), for a more detailed description, please refer to the Section "Switch Specifications".

When the camera setting changes through the External Switch (SW201,202,PushSW), the Port Driver should be "ON". If the Port Driver is set "OFF", the External Switch (SW201,202,PushSW) setting will not be reflected.

However, when the camera settings change through the Control Software, the Port Driver should be "OFF" before the register is set. If the Port Driver is set "ON", the External Switch (SW201,202,PushSW) setting will be reflected.

When the Port Driver is "ON", the External Switch (SW201,202,PushSW) setting is still available.

Below is an example of how to use the Port Driver on AWB Mode.

The related register with the Port Driver function is in the rectangular box on the Control Software (DQUCtrl).

- (e.g. Upper right side in the rectangular box: Port Driver function's combo box, Bottom side in the rectangular box: AWB Mode's combo box.)

When the Port Driver Function is "ON", the External Switch(SW201,202,PushSW) should work. Under this condition, AWB mode cannot be controlled through the Control Software.

If the user would like to control AWB Mode through the Control Software, the Port Driver Function should be set to "OFF".

When the Port Driver Function is "OFF", the Control Software can control this function. However when the Port Driver Function is "OFF", the External Switch's settings are disabled. Therefore AWB cannot be controlled through the External Switch.
Select AE Mode (AEMODE)

Selects the AE control mode
AE mode has to be set as “Auto exposure (AEME = 0 (0h))” to activate this mode selection. AEMODE can control middle- and high-brightness areas on AE. When user set this parameter through Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).

Category: 03d
Start byte: 002H.0-2
Condition: AEME = 0 (0h) (AE mode)
Setting: 0 (0h) to 2 (2h)
Selection:
0h: Shutter
1h: Reserved
2h: Shutter Fix

Detailed description of AEMODE

SHTMAX, SHTMIN described in this section refers to the upper limit of the electronic shutter speed and the lower limit of the electronic shutter speed, respectively.

The upper limits of the electronic shutter speed are set using the SHTMAXML, SHTMAXL, SHTMAXH and SHTMAXM parameters.

The lower limits of the electronic shutter speed are set using the SHTMINML, SHTMINL, SHTMINH and SHTMINMH parameters.
For details on the electronic shutter speed range settings, refer to the Sections “AE minimum exposure time”, “AE maximum exposure time”.

AEMODE=0[h] Shutter

In this mode, auto exposure control is exercised in the middle- and high-brightness areas using the electronic shutter. The electronic shutter speed is controlled across a range from SHTMIN and SHTMAX.
Luminance

<table>
<thead>
<tr>
<th>L</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>UMSMODE Select Region</td>
<td>Shutter Auto Control Region</td>
</tr>
</tbody>
</table>

AEMODE=2[h] Shutter Fix
In this mode, the electronic shutter value is fixed. Used as the electronic shutter value is the setting selected by ME. For further information regarding ME, please refer to Section 3.3.7 ME.

AE User Reference Level (AEREFLVL)
When control is exercised using the mechanical iris and electronic shutter, AE operates so that the brightness converges at the base reference position.
When the base reference is set high, the brightness converges at a high position; when it is set low, it converges at a low position.

- Category: 03d
- Start byte: 003H.0-004H.1
- Condition: AEME = 0 (0h) (AE mode)
- Setting: 0 (0h) to 1023 (3FFh)

AE Speed (AESPEED)
The convergence speed of AE can be adjusted. If the convergence speed is too high, AE may oscillate near the convergence position. The AE oscillation can be prevented by adjusting the convergence speed.
The higher the AESPEED parameter setting, the lower the convergence speed; conversely, the lower the parameter setting, the higher the speed.

Sets the AE convergence speed
AE Base Reference Level
AE mode has to be set as “Auto exposure (AEME = 0 (0h)” to activate this AE convergence speed setting

- Category: 03 d
- Start byte: 009H.0-7
- Condition: AEME = 0 (0h) (AE mode)
- Setting: 0 (0h) to 255 (FFh)
- Selection: 0[h] (fast) to FF[h] (slow)

AE Dead Band (AEDBAND)
The dead bands are provided to ensure that AE will not track the very minor changes in the brightness. AE operates only when the brightness has changed from the convergence level by an amount exceeding the values set by the dead bands.
The dead bands are adjusted by the following parameters, and can be adjusted only for the AGC control area and the low-speed shutter area. Increasing the value widens the dead band, and makes it more difficult for AE to follow changes in the brightness.

Sets the dead bands for the AGC control area and the low-speed shutter area
AE mode has to be set as “Auto exposure (AEME = 0 (0h))” to activate this AE dead band adjustment setting

Category: 03 d
Start byte: 00BH.0-7
Condition: AEME = 0 (0h) (AE mode)
Setting: 0 (0h) to 255 (FFh)
Selection:
0[h] (no dead band) to FF[h] (maximum dead band)

---

**AE minimum exposure time**
Sets the minimum exposure time for the auto exposure control

High-speed shutter MAX value (1/10s Unit) SHTXML : Shutter upper limit: Set the denominator of the 1/10[s] digit.
High-speed shutter MAX value (1/100s Unit) SHTMAXL : Shutter upper limit: Set the denominator of the 1/100[s] digit.
High-speed shutter MAX value (1/1000s Unit) SHTMAXH : Shutter upper limit: Set the denominator of the 1/1000[s] digit.
High-speed shutter MAX value (1/10000s Unit) SHTMAXMH : Shutter upper limit: Set the denominator of the 1/10000[s] digit.

<table>
<thead>
<tr>
<th>Category</th>
<th>SHTXML</th>
<th>SHTMAXL</th>
<th>SHTMAXH</th>
<th>SHTMAXMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>03d</td>
<td>The minimum exposure time for the auto exposure control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start byte</td>
<td>00DH.0-3</td>
<td>00DH.4-7</td>
<td>00EH.0-3</td>
<td>00EH.4-7</td>
</tr>
<tr>
<td>Setting</td>
<td>0 (0h) to 9 (9h)</td>
<td>0 (0h) to 9 (9h)</td>
<td>0 (0h) to 9 (9h)</td>
<td>0 (0h) to 10 (Ah)</td>
</tr>
<tr>
<td>Selection</td>
<td>Sets the denominator of the 1/10[s] digit</td>
<td>Sets the denominator of the 1/100[s] digit</td>
<td>Sets the denominator of the 1/1000[s] digit</td>
<td>Sets the denominator of the 1/10000[s] digit</td>
</tr>
</tbody>
</table>
In order to set the exposure time; 1/60 to 1/100,000 seconds on NTSC, 1/50 to 100,000 seconds on PAL, use the following command:

Category: 03d
Start byte: 13d.0
Condition: \texttt{AEME} = 0 (0h) (AE mode), \texttt{AEMODE} = 0(h)

**AE maximum exposure time**

Sets the maximum exposure time for the auto exposure control

<table>
<thead>
<tr>
<th>SHTMINML</th>
<th>SHTMINL</th>
<th>SHTMINH</th>
<th>SHTMINMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outline</td>
<td>The maximum exposure time for the auto exposure control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>03d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start byte</td>
<td>00FH..0-3</td>
<td>00FH..4-7</td>
<td>010H.0-3</td>
</tr>
<tr>
<td>Setting</td>
<td>0 (0h) to 9 (9h)</td>
<td>0 (0h) to 9 (9h)</td>
<td>0 (0h) to 9 (9h)</td>
</tr>
<tr>
<td>Selection</td>
<td>Sets the denominator of the 1/10[s] digit</td>
<td>Sets the denominator of the 1/100[s] digit</td>
<td>Sets the denominator of the 1/1000[s] digit</td>
</tr>
</tbody>
</table>

In order to set the exposure time; 1/60 to 1/100,000 seconds on NTSC, 1/50 to 100,000 seconds on PAL, use the following command:

Category: 03d
Start byte: 15d.0
Condition: \texttt{AEME} = 0 (0h) (AE mode), \texttt{AEMODE} = 0(h)
Setting: 000A

# Examples:

Set the shutter speed to 1/250[s].

\begin{align*}
\text{SHTMAXML} & \rightarrow 5 \ (1/10s \ digit) & \text{SHTMINML} & \rightarrow 5 \ (1/10s \ digit) \\
\text{SHTMAXL} & \rightarrow 2 \ (1/100s \ digit) & \text{SHTMINL} & \rightarrow 2 \ (1/100s \ digit) \\
\text{SHTMAXH} & \rightarrow 0 \ (1/1,000s \ digit) & \text{SHTMINH} & \rightarrow 0 \ (1/1,000s \ digit) \\
\text{SHTMAXMH} & \rightarrow 0 \ (1/10,000s \ digit) & \text{SHTMINMH} & \rightarrow 0 \ (1/10,000s \ digit)
\end{align*}
Under MinShutter Mode (UMSMODE)

Selects the AE control mode (low-brightness areas).

AE mode has to be set as “Auto exposure (AEME = 0 (0h)” to activate this AE control mode selection for the low brightness areas. When user set this parameter through Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).

Category: 03 d
Start byte: 002H.3-5
Condition: AEME = 0 (0h) (AE mode), Port Driver Function (SW202.1-3) = “ON”
Setting: 0 (0h) to 5 (5h)
Selection:
0h: UMSOFF Mode
1h: AGC Mode
2h: SLOW Shutter Mode
3h: AGC -> SLOW Shutter
4h: SLOW Shutter -> AGC
5h: AGC -> SLOW Shutter -> AGC

Detailed description of UMSMODE

One of the following six modes for UMSMODE (under min. shutter modes) can be selected as the control method under low-brightness conditions where the sufficient exposure cannot be achieved using the electronic shutter or mechanical iris.

UMSMODE=0[h] UMSOFF Mode

In this mode, no exposure control is exercised in the low-brightness areas.
AGC is fixed at the gain value which was set using the AGCMIN parameter (CAT9_Be80_bit0-7).
UMSMODE=1[h] AGC Mode
In this mode, auto exposure control is exercised over the low-brightness areas using AGC. The control range for AGC is set using the AGCMIN and AGCMAX.

UMSMODE=2[h] SLOW Shutter Mode
In this mode, auto exposure control is exercised in the low-brightness areas using the low-speed shutter. The maximum storage time is set using SLOWMAX. This time can be set in 1-field increments, and a maximum of 512 fields can be stored.

UMSMODE=3[h] AGC -> AGC -> SLOW Shutter
In this mode, auto exposure control is exercised in the low-brightness areas using AGC and the low-speed shutter.
When a low-brightness area is entered from a middle-brightness area, AGC control is exercised first. When the gain value of AGC reaches its maximum, operation transfers to low-speed shutter control. The control range for AGC is set using the AGCMIN and AGCMAX parameters. The maximum storage time of the low-speed shutter is set using SLOWMAX. The AGCMAX value serves as the AGC gain value in the low-speed shutter control area.
UMSMODE=4[h] SLOW -> SLOW Shutter -> AGC

In this mode, auto exposure control is exercised in the low-brightness areas using the low-speed shutter and AGC. When a low-brightness area is entered from a middle-brightness area, low-speed shutter control is exercised first.

When the storage time of the low-speed shutter reaches its maximum, operation transfers to AGC control.

The maximum storage time of the low-speed shutter is set using SLOWMAX. The control range for AGC is set using the AGCMIN and AGCMAX parameters. The SLOWMAX value serves as the electronic shutter value in the AGC control area.

UMSMODE=5[h] AGC -> AGC -> SLOW Shutter -> AGC

In this mode, the signal-to-noise ratio and dynamic resolution can be adjusted by dividing the low-brightness areas into three control areas and by inserting the low-speed shutter area inside the AGC area. When a low-brightness area is entered from a middle-brightness area, AGC control is exercised first. When the gain value of AGCMID is reached, operation transfers to low-speed shutter control. Then, when the storage time of the low-speed shutter reaches its maximum, operation returns to AGC control. The AGC control range is set using the AGCMIN, AGCMID and AGCMAX parameters. The maximum storage time of the low-speed shutter is set using SLOWMAX.

The value which was set by AGCMID serves as the AGC gain value in the low-speed shutter control area. The value which was set by SLOWMAX serves as the shutter value in the AGC control area after low-speed shutter control.

* Set the maximum value (AGCMAX), minimum value (AGCMIN) and boundary value (AGCMID) of the AGC gain in such a way that all three values stand in the proper correlation to one another.
(AGCMAX > AGCMID > AGCMIN)

Low-speed shutter control is exercised within the predetermined range of the number of storage fields. The
upper limit of the number of storage fields can be set as desired.

**Slow Shutter Max Accumulation Time (SLOWMAX)**
Sets the upper limit of the number of low-speed shutter storage fields

- **Category:** 03 d
- **Start byte:** 015H.1-016H.1
- **Condition:** $AEME = 0$ (0h) (AE mode), $UMSMODE = 2,3,4,5(h)$
- **Setting:** 0 (0h) to 511 (1FFh)
- **Selection:**
  - The upper limit of the number of storage fields can be set in the 1 to 512 range.
  - Number of storage fields $[FLD] = \text{Setting} + 1$

**AGC MAX Gain (AGCMAX)**
Sets the maximum gain for the AGC control

- **Category:** 03 d
- **Start byte:** 012H.0-7
- **Condition:** $AEME = 0$ (0h), $UMSMODE=1,3,4,5(h)$
- **Setting:** 0 (0h) to 255 (FFh)
- **Selection:**
  - 00 - FF[h]
  - *Note: Configurable value depends on camera model.*

**AGC MID Gain (AGCMID)**
Sets the boundary value of the AGC gain
- The boundary value of the AGC gain has to be smaller than the maximum gain (AGCMAX) and the greater than the minimum gain (AGCMIN) for the AGC control.

- **Category:** 03 d
- **Start byte:** 014H.0-7
- **Condition:** $UMSMODE = 5$ (5h), $\text{AGCMAX} > \text{AGCMID} > \text{AGCMIN}$
- **Setting:** 0 (0h) to 255 (FFh)
- **Selection:**
  - 00 - FF[h]
  - *Note: Configurable value depends on camera model.*

**AGC MIN Gain (AGCMIN)**
Sets the minimum gain for the AGC control

- **Category:** 09 d
- **Start byte:** 050H.0-7
- **Condition:** -
- **Setting:** 0 (0h, low gain) to 255 (FFh, high gain)
- **Selection:**
  - 00 - FF[h]: Low gain - High gain
  - *Note: Configurable value depends on camera model.*
11.3.3 Chroma

**High Luminance Chroma Suppress Selection (CSHLON)**
Sets the high-brightness chroma suppression function to ON or OFF.

- **Category:** 02 d
- **Start byte:** 03DH.2
- **Condition:** -
- **Selection:**
  - 0[h] : OFF
  - 1[h] : ON

**High Luminance Chroma Suppress Threshold (CSHLTH)**
Sets the high-brightness chroma suppression brightness threshold. If the boundary value is set too low, even the Normal Luminance Chroma Suppress might reach high luminance and suppress the normal Chroma signal.

- **Category:** 02 d
- **Start byte:** 03DH.3-03EH.4
- **Condition:** -
- **Setting:** 000 (0h) to 1023 (3FFh) (low to high)

**High Luminance Chroma Suppress Step Width (CSHLSTEP)**
Sets the high-brightness chroma suppression step width 0[h] to F[h] (sharp to smooth)

- **Category:** 02 d
- **Start byte:** 03EH.5-03FH.0
- **Condition:** -
- **Setting:** 0 (0h) to 15 (Fh) (sharp to smooth)
Low Luminance Chroma Suppress Selection (CSLLON)

The low-brightness chroma suppression function suppresses the chroma signal level in the low-brightness (low signal-to-noise ratio) areas to make the color noise inconspicuous. It treats brightness below the threshold level as noise, and suppresses the colors in those areas.

Sets the low-brightness chroma suppression function to ON or OFF.

Category: 02 d
Start byte: 03FH.1
Condition: -
Selection:

0[h] : OFF
1[h] : ON

Low Luminance Chroma Suppress Threshold (CSLLTH)

Chroma suppression is applied to the brightness levels below the CSLLTH setting, but bear in mind that if CSLLTH is set too high, the normal brightness areas will also be treated as low-brightness areas and the normal chroma signals will also be suppressed.

Category: 02 d
Start byte: 03FH.2 - 040H.3
Condition: -
Setting: 0 (0h) to 1023 (3FFh) (low to high)

Low Luminance Chroma Suppress Step Width (CSLLSTEP)

Sets the low-brightness chroma suppression function to ON or OFF.

Category: 02 d
Start byte: 040H.4-7
Condition: -
Setting: 0 (0h) to 15 (Fh) (sharp to smooth)
Chroma signal negative/positive reversal function.

Category: 02 d  
Start byte: 040H.4-7  
Condition: -  
Setting: 0 (0h) to 1 (1h)  
0[h]: Simultaneous Setting 1[h]: Separate Setting

Users can use the hue and gain adjustments to adjust the colors to their preference by setting the color gain parameters (RYGAIN0-4, BYGAIN0-4) and phase parameters (RYHUE0-4, BYHUE0-4). There are two setting options: the 4-quadrant simultaneous setting which is used to adjust all four quadrants using only the parameters of the first quadrant, and the 4-quadrant separate setting which is used to adjust each of the four quadrants separately. The 4-quadrant separate setting enables color adjustments with a greater degree of freedom.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-Y GAIN 1st to 4th Quadrant Limit (RYGAIN0-4)</td>
<td>Category: 02 d</td>
<td>Adjusts the R-Y GAIN in quadrants 1 to 4</td>
</tr>
<tr>
<td></td>
<td>Start byte: 041H_bit0 to 050H_bit7</td>
<td>Adjusts the B-Y GAIN in quadrants 1 to 4</td>
</tr>
<tr>
<td>R-Y Hue 1st to 4th Quadrant Limit (RYHUE0-4)</td>
<td></td>
<td>Adjusts the R-Y Hue in quadrants 1 to 4</td>
</tr>
<tr>
<td>B-Y Hue 1st to 4th Quadrant Limit (BYHUE0-4)</td>
<td></td>
<td>Adjusts the B-Y Hue in quadrants 1 to 4</td>
</tr>
</tbody>
</table>

Note:  
Be very careful with the settings when setting the HUE and GAIN to be adjusted separately for the four quadrants since problems may occur in the color reproduction along the boundaries between the quadrants if considerably different gain and hue settings are established for each quadrant.
11.3.4 Gamma

It is possible to select one of two gamma operations—the preset mode operation or user mode operation—by setting the GAMMAMODE parameter.

**Gamma Function Mode (GAMMAMODE)**

Sets the Y variable gamma

Category: 02 d
Start byte: 00DH.0
Condition: -
Setting: 0 (0h) to 1 (1h)
Selection:
- 0h: Manual (This mode cannot be selected through control software.)
- 1h: Preset mode

In each of these modes, the gamma curve can be set separately for the luminance (Y) signal and chroma signal. In the preset mode, any of nine predetermined gamma curves can be selected using the four parameters of **YGAM**, **YNK**E, **CGAM**, **CKNEE**. . .
Y Gamma level (YGAM)

Sets the Y variable gamma
This DSP value describe the reciprocal value, the Gamma value on camera should be reciprocal.

Category: 02 d
Start byte: 00DH.4-7
Condition: GAMMAMODE = 1
Setting: 0 (0h) to 8 (8h)
Selection:
0h: Gamma = 1.2 (Gamma = 0.83)
1h: Gamma = 1.4 (Gamma = 0.71)
2h: Gamma = 1.6 (Gamma = 0.62)
3h: Gamma = 1.8 (Gamma = 0.55)
4h: Gamma = 2.0 (Gamma = 0.50)
5h: Gamma = 2.2 (Gamma = 0.45)
6h: Gamma = 2.4 (Gamma = 0.41)
7h: Gamma = 2.6 (Gamma = 0.38)
8h: Gamma = 1.0 (Gamma = 1.00)

Y Kneel level (YKNEE)

Set the Y variable kneel

Category: 02 d
Start byte: 00EH.0-3
Condition: GAMMAMODE = 1
Setting: 0 (0h) to 8 (8h)
Selection:
0h: 104%
1h: 106%
2h: 108%
3h: 110%
4h: 112%
5h: 114%
6h: 116%
7h: 118%
8h: Max output signal

The low-brightness side with an output level up to 100% is the Y gamma area. The gamma curve has an increasingly higher output level as the YGAM preset value is increased from 0[h] to 7[h]. A setting of 8[h] selected for YGAM produces gamma characteristics where the input and output levels up to 100% are connected by a straight line. The high-brightness side with input and output levels in excess of 100% is the Y knee area. The gradient of the knee characteristics becomes increasingly lower as the YKNEE preset value is decreased from 7[h] to 0[h].
Chroma Gamma level (CGAM)
Set the C variable gamma.
This DSP value describe the reciprocal value, the Gamma value on camera should be reciprocal.

Category: 02 d
Start byte: 14 d.4-7
Condition: GAMMAMODE = 1
Setting: 0 (0h) to 8 (8h)
Selection:
- 0h: Gamma = 1.2 (Gamma = 0.83)
- 1h: Gamma = 1.4 (Gamma = 0.71)
- 2h: Gamma = 1.6 (Gamma = 0.62)
- 3h: Gamma = 1.8 (Gamma = 0.55)
- 4h: Gamma = 2.0 (Gamma = 0.50)
- 5h: Gamma = 2.2 (Gamma = 0.45)
- 6h: Gamma = 2.4 (Gamma = 0.41)
- 7h: Gamma = 2.6 (Gamma = 0.38)
- 8h: Gamma = 1.0 (Gamma = 1.00)

Chroma Kneel level (CKNEE)
Set the C variable kneel

Category: 02 d
Start byte: 15 d.0-3
Condition: GAMMAMODE = 1
Setting: 0 (0h) to 8 (8h)
Selection:
- 0h: 104%
- 1h: 106%
- 2h: 108%
- 3h: 110%
- 4h: 112%
- 5h: 114%
- 6h: 116%
- 7h: 118%
- 8h: Max output signal

Any chroma gamma and knee level can be set by combining one of nine chroma gamma curves using CGAM with one of nine chroma knee levels using CKNEE. The low-range side with an output level up to 100% is the chroma gamma area. The gamma curve has an increasingly higher output level as the CGAM preset value is increased from 0h to 7h. A setting of 8h selected for CGAM produces gamma characteristics where the input and output levels up to 100% are connected by a straight line. The high-range side with input and output levels in excess of 100% is the chroma knee area. The gradient of the knee characteristics becomes increasingly lower as the CKNEE preset value is decreased from 8h to 1h. A setting of 0h selected for CKNEE produces knee characteristics which connect a level up to the maximum.
11.3.5 BLC

The backlight compensation function provides compensation by increasing the brightness of the overall screen so that subjects being shot with a loss of dark detail due to backlight will have just the right brightness level.

Back Light Compensation

| Port Driver Function (SW201.7) | [C01_0040H:0-2] | D2H|ON |
|-------------------------------|------------------|-----|
| Back Light Compensation Switch | [C03_01EH:0]     | D0H|OFF |

| Port Driver Function (SW201.6) | [C01_0044H:0-2] | D2H|ON |
|-------------------------------|------------------|-----|
| Back Light Compensation Function | [C08_01EH:1-2] | D1H|Auto Weighted Average |

Back Light Compensation Switch (BLCON)

When using the backlight and excessive front lighting compensation functions, set 1[h] (ON) for the BLCON. When a user sets this parameter through the Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).

Category: 03d
Start byte: 01EH.0
Condition: AEME = 0 (0h) (AE mode),
Setting: 0 (0h) to 1 (1h)
Selection:
0h: OFF
1h: ON

Back Light Compensation Function (BLCMODE)

Selects the backlight compensation function mode
When the user sets this parameter through the Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).

Category: 03d
Start byte: 01EH.1-2
Condition: AEME = 0 (0h) (AE mode), Port Driver Function (SW201.8) = “ON”
Setting: 0 (0h) to 3 (3h)
Selection:
0h: Fixed weighted Average
1h: Auto weighted Average
2h: Reserved
3h: Reserved
Fixed Weighted Average (WEIGHT0- WEIGHT8)

The fixed weighting mode works when the position of the subject to be shot is already known. There are nine detector frames, and a weighting can be set separately for each. By increasing the weighting of the frame where the subject to be shot is present, the exposure is controlled so that the brightness is just right for the subject.

Category: 03

0 Window: WEIGHT0 Start byte: 06FH.0-7
1 Window: WEIGHT1 Start byte: 070H.0-7
2 Window: WEIGHT2 Start byte: 071H.0-7
3 Window: WEIGHT3 Start byte: 072H.0-7
4 Window: WEIGHT4 Start byte: 073H.0-7
5 Window: WEIGHT5 Start byte: 074H.0-7
6 Window: WEIGHT6 Start byte: 075H.0-7
7 Window: WEIGHT7 Start byte: 076H.0-7
8 Window: WEIGHT8 Start byte: 077H0-7

Condition: **AEME** = 0 (0h) (AE mode), **BLCON** =1 (1h)

Setting: 0 (0h) to 255 (FFh)

Selection:

0[h] (minimum weighting) - FF[h] (maximum weighting)

Correlation between frames and weighting parameters

<table>
<thead>
<tr>
<th>Window 0</th>
<th>Window 1</th>
<th>Window 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window 3</td>
<td>Window 4</td>
<td>Window 5</td>
</tr>
<tr>
<td>Window 6</td>
<td>Window 7</td>
<td>Window 8</td>
</tr>
</tbody>
</table>

**Auto Weighting mode**

In the auto weighting mode, backlight compensation, which is not dependent on the position of the subject, can be implemented. The mode works when there is a difference in brightness between the background and subject to be shot.
AE Detector Frames

Size of Auto Weight Window to be determined Horizontal: \texttt{AEDWH1}, \texttt{AEDWH2} and Vertical: \texttt{AEDWV1}, \texttt{AEDWV2}.

AED Frame Horizontal 1,2 (AEDWH1, AEDWH2)

AEDWH1: AED Frame Horizontal 1
AEDWH2: AED Frame Horizontal 2

<table>
<thead>
<tr>
<th>Outline</th>
<th>Sets the horizontal positions of the AED frames</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>03 d</td>
</tr>
<tr>
<td>Start byte</td>
<td>03EH.1 to 03FH.1, 03FH.2 to 040H.2</td>
</tr>
<tr>
<td>Setting</td>
<td>0 (0h) to 480 (1E0h), 1 \leq AEDWH1 \leq Maximum horizontal value -2</td>
</tr>
<tr>
<td>Selection</td>
<td>This sets the horizontal positions of the AED frames Increase or decrease 1 value, shift 2 pixels (2pixel/1[h])</td>
</tr>
</tbody>
</table>

The maximum horizontal values differ depending on the CCD image sensor used.

AED Frame Vertical 1,2 (AEDWV1, AEDWV2)

AEDWV1: AED Frame Vertical 1
AEDWV2: AED Frame Vertical 2

<table>
<thead>
<tr>
<th>Outline</th>
<th>Sets the vertical positions of the AED frames</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>03 d</td>
</tr>
<tr>
<td>Start byte</td>
<td>043H.2 to 044H.2, 045H.0 to 046H.0</td>
</tr>
<tr>
<td>Setting</td>
<td>0 (0h) to 290 (122h), 1 \leq AEDWV1 \leq Maximum vertical value -2</td>
</tr>
<tr>
<td>Selection</td>
<td>This sets the vertical positions of the AED frames Increase or decrease 1 value, shift 2 lines (lines /1[h])</td>
</tr>
</tbody>
</table>

The maximum vertical values differ depending on the CCD image sensor used.

AE Detector frame settings
Set the parameters so that the following conditions are met.

\[ \text{AEDWH}_1 < \text{AEDWH}_2 \]
\[ \text{AEDWV}_1 < \text{AEDWV}_2 \]

Number of effective pixels per CCD device

<table>
<thead>
<tr>
<th></th>
<th>760H NTSC</th>
<th>760H PAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of effective horizontal pixels</td>
<td>768</td>
<td>752</td>
</tr>
<tr>
<td>Number of effective vertical pixels</td>
<td>492</td>
<td>580</td>
</tr>
</tbody>
</table>

AE detector frame setting range

<table>
<thead>
<tr>
<th></th>
<th>760H NTSC</th>
<th>760H PAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum horizontal value</td>
<td>1 (1h)</td>
<td>1(1h)</td>
</tr>
<tr>
<td>(minimum value of AEDWH1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum horizontal value</td>
<td>383(18Fh)</td>
<td>375(177h)</td>
</tr>
<tr>
<td>(maximum value of AEDWH2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum vertical value</td>
<td>1(1h)</td>
<td>1(1h)</td>
</tr>
<tr>
<td>(minimum value of AEDWV1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum vertical value</td>
<td>245(F5h)</td>
<td>289(121h)</td>
</tr>
<tr>
<td>(maximum value of AEDWV2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11.3.6 White Balance

AWB Mode (Auto White Balance Operation Mode (AWB))
Auto White Balance (AWB) is a function which compensates for deviations in the white color caused by changes in the color temperature of the light source to control the white balance gain within the chroma signal processing so that the colors are reproduced correctly. When the user sets this parameter through the Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).

Category: 05 d
Start byte: 001H.0-3
Condition: -
Setting: 0 (0h) to 8 (8h)
Selection:
0h: ATW (Auto trace white balance)
1h: Full Pull IN
2h: Reserved
3h: Hold
4h: Reserved
5h: Reserved
6h: Reserved
7h: User
8h: Reserved

ATW (Auto trace white balance)
This function automatically tracks the changes in the color temperature, and adjusts the white balance. Pull-in control is exercised only when the color temperature is determined to be inside the pull-in frame.

Full Pull IN (Push to set white balance)
This function adjusts the white balance regardless of the subject conditions. Pull-in control is exercised at all times independently of the pull-in frame which was set by the pre-white balance adjustment. This mode works faster than ATW mode.
Hold

In this mode, the colors are held using the gain values established immediately before control was set to the hold mode. A push-lock mode can be configured by using this function in combination with the Push mode. In this mode, operation is set to the hold mode after pull-in in the Push mode and the R and B gain values established at that point are written into the Flash ROM.

User

In this mode, fixed gain values \texttt{WBUSR}R (R gain for the user mode), \texttt{WBUSB}B (B gain for the user mode) are referred.

Manual White Balance (USER Mode)

\textbf{R Gain Of USER Mode (WBUSR)}

Sets the R gain for the manual (user) white balance

Category: 05 d
Start byte: 013H.0-014H.3
Condition: \texttt{AWB} = 7 (7h): User
Setting: 0 (0h) to 4095 (FFh)

\textbf{B Gain Of USER Mode (WBUSB)}

Sets the B gain for the manual (user) white balance

Category: 05 d
Start byte: 015H.0-016H.3
Condition: \texttt{AWB} = 7 (7h): User
Setting: 0 (0h) to 4095 (FFFh)

11.3.7ME

![ME Setting](image)
Select AE/ME (AEME)
The AEME parameter is used to select auto exposure control (AE) or manual exposure control (ME).

Category: 03 d
Start byte: 001H.0
Condition: -
Setting: 0 (0h) to 1 (1h)
Selection:
0h: AE (Auto exposure)
1h: ME (Manual exposure)

Select ME Mode (MEMODE)
Selects the manual exposure control mode
AE mode has to be set as "Manual exposure (AEME = 1 (1h)" to activate this manual exposure control mode selection. With manual exposure (ME), users can set the shutter values including the low-speed shutter and AGC values as desired.

Category: 04 d
Start byte: 001H.0
Condition: AEME = 1 (1h) (ME mode)
Setting: 0 (0h) to 1 (1h)
Selection:
0h: Shutter + AGC Manual
1h: SLOW Shutter + AGC Manual

Manual Shutter Speed (MSHTSEL)
Select the preset exposure time.

When the user sets this parameter through the Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).

Category: 04 d
Start byte: 001H.2-4
Condition: Port Driver Function (SW201.2-4) OFF, Port Driver Function (SW201.2-4) = “ON”
Setting: 0 (0h) to 7(7h)
Selection:
0h: User Setting
1h: 1/125
2h: 1/250
3h: 1/500
4h: 1/1000
5h: 1/2000
6h: 1/4000
7h: 1/10000

*Note: When 0h is selected, shutter speed value refer from electric shutter value of NSUB,TREAD.
Manual Shutter (TREAD)
Electronic shutter preset setting

Category: 04 d
Start byte: 033H.0-034H.4
Condition: MEMODE = 0 (0h)
Setting: 0 (0h) to 1151 (47Fh)

Manual Shutter (NSUB)
Electronic shutter preset setting

Category: 04 d
Start byte: 035H.0-036H.2
Condition: MEMODE = 0 (0h)
Setting: 0 (0h) to 311 (137h)

Electronic shutter exposure time calculation formula
nsub: NSUB  tread: TREAD

The formulas for calculating the electronic shutter exposure times are listed in the table below.
The electronic shutter exposure time extends from the SUB pulse applied last during one VD period to
the read pulses.
"nsub" in the table below indicate the SUB pulse; "tread" indicates the read pulse.
The SUB pulse is set in HD increments and the higher the value, the shorter the exposure time.
The read pulse is set in clock increments and the higher the value, the longer the exposure time.

<table>
<thead>
<tr>
<th>CCD Type</th>
<th>Exposure time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3&quot;, 1/2&quot;</td>
<td>NTSC</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PAL</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#Example
1/100 sec exposure on NTSC : nsub = 104, tread = 459
Manual Slow Shutter (SSFLD)
Electronic shutter preset setting

Category: 04 d
Start byte: 083H.0-7
Condition: MEMODE = 1 (1h)
Setting: 0 (0h) to 255 (FFh)
Selection:

Manual Slow Shutter (SLNSUB)
Electronic shutter preset setting

Category: 04 d
Start byte: 073H.0-074H.2
Condition: MEMODE = 1 (1h)
Setting: 0 (0h) to 624 (270h)
Selection:

Low-speed shutter exposure time calculation formulas
ssfld : SSFLD
nsub : SLNSUB

With the low-speed shutter settings, the formula used to calculate the exposure time differs from one CCD type to another. The higher the "nsub" value, the shorter the exposure time in HD increments. Furthermore, the higher the "ssfld" value, the longer the exposure time in 2-field increments.

<table>
<thead>
<tr>
<th>CCD Type</th>
<th>Exposure time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3&quot; 1/2&quot; NTSC</td>
<td>(524 - nsub) * 63.49us + (((ssfld + 1) * 2) - 2) * 16,634us Setting range: nsub=0-524, ssfld=0-255 But when ssfld=0, setting nsub=524 is prohibited.</td>
</tr>
<tr>
<td>PAL</td>
<td>(624 - nsub) * 64.00us + (((ssfld + 1) * 2) - 2) * 19,968us Setting range: nsub=0-624, ssfld=0-255 But when ssfld=0, setting nsub=624 is prohibited.</td>
</tr>
</tbody>
</table>

#Example
1/2 sec exposure on NTSC : nsub = 508, ssfld = 15 => 500ms
Manual AFE Gain (APGA)

VGA (Variable Gain Amp) preset setting for AFE
Selects the ME control mode. Work on AEME = 1.
AFE gain (analog gain)

Category: 04.d
Start byte: 003H.0-004H.2
Condition: AEME = 1 (1h) (ME mode)
Setting: 0 (0h) to 1580 (62Ch)
Selection:
Gain value [dB] = (APGA parameter value * 0.0342) - 6

AFE VGA (Variable gain amp) value calculation formula

The formula for calculating the VGA value of this camera is shown below.

<Parameters supported>
APGA parameters : APGA
Gain value [dB] = (APGA parameter value * 0.0342) - 6

The setting ranges of the APGA parameters (APGA) differ depending on the DPGA value as shown in "APGA parameter setting range" as shown in the table below.
The DPGA value is determined solely by the saturation signal volume of the CCD image sensor used.

APGA parameter setting range:

<table>
<thead>
<tr>
<th>DPGA (CAT13_Byte42_bit3-4)</th>
<th>APGA Setting range</th>
<th>Gain range supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0[h] - 524[h]</td>
<td>-6[dB] - 57[dB]</td>
</tr>
<tr>
<td>1</td>
<td>58[h] - 57C[h]</td>
<td>-3[dB] - 42[dB]</td>
</tr>
<tr>
<td>2</td>
<td>80[h] - 5D4[h]</td>
<td>0[dB] - 45[dB]</td>
</tr>
</tbody>
</table>

Correlation between APGA setting values and gain values
The figure below shows the correlation between the parameter setting values and the gain values.
11.3.8 Aperture

This function compensates the edges to increase the image resolution as it appears. The edge enhancement level is adjusted by setting the gain. System enables the horizontal and vertical aperture compensation to be set separately. VH aperture compensation for adjusting the overall aperture compensation gain is also available. To increase the resolution as it appears and enhance the edges, select high settings for the gain values. However, bear in mind that ringing will become more noticeable when the gain values are set too high.

### Horizontal Aperture Compensation

- **H Aperture Compensation High Frequency Gain (HAPGH)**
  - Sets the high-range gain for horizontal aperture compensation
  - Category: 02 d
  - Start byte: 055 H.0-1
  - Condition: -
  - Setting: 0 (0h) to 3(3h)
  - Selection:
    - 0h : x0
    - 1h : x1
    - 2h : x2
    - 3h : x4

- **H Aperture Compensation Low Frequency Gain (HAPGL)**
  - Sets the low-range gain for horizontal aperture compensation
  - Category: 02 d
  - Start byte: 055 H.2-3
  - Condition: -
  - Setting: 0 (0h) to 3(3h)
  - Selection:
    - 0h : x0
    - 1h : x0.5
    - 2h : x1
    - 3h : x2

The slice function in vertical aperture compensation and VH aperture compensation is used to eliminate the noise components which have been emphasized by the gain. When the slice level is increased, the noise is more readily eliminated but the resolution as it appears will deteriorate.
**V Aperture Compensation Gain (VAPG)**

Sets the vertical aperture compensation gain

- Category: 02 d
- Start byte: 055 H.4 - 7
- Condition: -
- Setting: 0 (0h) to 15(Fh) (x0 to x1)

**V Aperture Compensation Slice Level (VAPSL)**

Sets the slice level for the vertical aperture compensation

- Category: 02 d
- Start byte: 056 H.0 - 2
- Condition: -
- Setting: 0 (0h) to 7(7h) (slice level 0 - slice level max.)

**V,H Aperture Compensation Gain Level (VHAPG)**

Sets the gain level after adding the V and H aperture compensation values

- Category: 02 d
- Start byte: 001 H.0 - 3
- Condition: -
- Setting: 0 (0h) to 15(Fh) (x0 to x2)

**V,H Aperture Compensation Slice Level (VHAPSL)**

Sets the slice level after VH aperture compensation

- Category: 02 d
- Start byte: 057 H.2 - 4
- Condition: -
- Setting: 0 (0h) to 7(7h) (slice level 0 - slice level max.)
11.3.9 Other

Flickerless Function
Flicker occurs across the entire screen when subjects have been shot under conditions where the flashing periods for fluorescent lighting differ from the electronic shutter exposure times. This camera has two modes to deal with flicker; fixed shutter mode for fixing the electronic shutter value to the flashing period of the flicker, and the gain modulation mode for modulating the PGA value to the flashing period of the flicker.

Flickerless Function Mode (FLCMODE)
Selects the flicker-less mode for the AE and WDR long-time exposure side

When the user sets this parameter through the Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver Function, please refer to the Section Port Driver Function).

Category: 03 d
Start byte: 027 H.0-1
Condition: AEME = 0[h], Port Driver Function (SW201.5-6) = “ON”
Setting: 0 (0h) to 2(2h)
Selection:
0h : OFF
1h : Shutter Speed Fixed
2h : PGA Gain Control

Shutter Speed Fixed
In this mode, the electronic shutter speed is fixed to 1/100 (NTSC) or 1/120 (PAL) of the flashing period of the fluorescent lighting to minimize the flicker. In addition, if the 2 [h] fixed shutter mode has been selected as the AEMODE setting, the AE fixed shutter value takes precedence.

PGA Gain Control
The gain modulation mode makes use of the fact that the flashing of the flicker changes cyclically to control the digital gain inside the DSP to minimize the flicker.
Flipped Output Setting(MCOFLIPA)

The flip function enables the analog output or digital output of images whose top/bottom or left/right have been reversed or which have been rotated by 180 degrees.

When the user sets this parameter through the Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).

Category: 06 d
Start byte: 00C H.2-3
Condition: -
Setting: 0 (0h) to 3 (3h)
Selection:
0h: OFF (no flipping)
1h: Up/Down inversion
2h: Right/Left inversion
3h: 180 Degrees Rotation

Still Function(MCOMODEA)

The still function freezes the frames of moving images which are being shot. The image applying when the MCOMODEA parameter was set to 1[h] is freeze-framed. The electronic zoom or flip function can be applied to freeze-framed images.

When the user sets this parameter through the Control Software (DQUCtrl), please turn off the Port Driver (For further information regarding the Port Driver, please refer to the Section Port Driver Function).
Category: 06 d
Start byte: 00B H.6
Condition: -
Setting: 0 (0h) to 1(1h)
Selection:

0h: Normal
1h: Still
12 Revisions

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Changes</th>
<th>Note</th>
</tr>
</thead>
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<td>2014/05/13</td>
<td>New Document</td>
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<td>0.02</td>
<td>07/10/2014</td>
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<td></td>
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<td>English translation edit</td>
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