

カラーカメラモジュール

テクニカルマニュアル

FCB-ER8550/ER8530

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取り扱い上のご注意

ソフトウェア

当社が提供するデモンストレーションソフトウェアやお客様自作のアプリケーションソフトウェアによって生じた、お客様のハードウェアおよびソフトウェアの損害等について、当社は一切その責任を負いませんのであらかじめご了承ください。

操作

コンピューターのコントロールソフトウェアは、カメラの電源を入れて映像が出た後に立ち上げてください。

使用・保存場所

非常に明るい被写体（照明や太陽など）を長時間にわたって撮影しないでください。また、次のような場所での使用や保管は避けてください。

- 極端に暑い所や寒い場所（動作温度：－5℃～＋60℃）
- 強力な電波を発するテレビやラジオの送信所の近く
- 蛍光灯や窓の反射の影響を受ける所
- 不安定な照明の下（フリッカーを起こします。）
- 激しく振動する所
- レーザー光を映さない

お手入れ

レンズ表面に付着したごみやほこりは、市販のブローアード払ってください。

その他

- 本機の仕様および外観は、改良のため予告なく変更することがありますが、ご了承ください。
- 規定外の電源電圧は加えないでください。規定外の電源電圧での使用は、火災や感電の原因になります。
- 本カメラに搭載されている CMOS 撮像素子および IC は、静電気が印加されると破壊に至る場合があります。直接ハンドリングする場合はアースバンドを使用し、作業台などの下には導電マットなどを敷き、静電気防止対策をしてください。

- 異常や不具合が起きたときは、お買い上げ店にご相談ください。

本機の取り扱いについて

- 本機取扱いの際は、板金カバー以外の全ての部分に過度な負荷をかけないように注意してください。故障の原因となります。
- 本機は、ハウジングへの組込みを前提としているため、太陽光のような強い光を直接前面以外の方向から受けないようにしてください。画像品質劣化の原因となります。

CMOS 特有の現象

撮影画面に出る下記の現象は、CMOS 撮像素子特有の現象で、故障ではありません。

ローリングシャッター

CMOS は方式上、各ラインごとにシャッターを切っていますので、画面上と下では時間差が発生するため、カメラを動かすと縦の映像が斜めになります。

白点

CMOS 撮像素子は非常に精密な技術で作られていますが、宇宙線などの影響により、まれに画面上に微小な白点が発生する場合があります。

これは CMOS 撮像素子の原理に起因するもので故障ではありません。

また、下記の場合、白点が見えやすくなります。

- 高温の環境で使用するとき
- マスターゲイン（感度）を上げたとき
- スローシャッターモードのとき

折り返しひずみ

細かい模様、線などを撮影すると、ぎざぎざやちらつきが見えることがあります。

カメラ組み込み上のご注意

電源を一日に平均 3 回以上 ON/OFF するような機器に組み込む場合、通信 COMMAND 'CAM_TempInq'(VISCA)、'CAM_Temperature'(PTP) を用いセット内の温度を確認してください。

セット内の温度上昇が、通電直後状態から温度が安定した状態まで 12℃以下になるように放熱を行ってください。

レンズ特有の現象

ゴースト

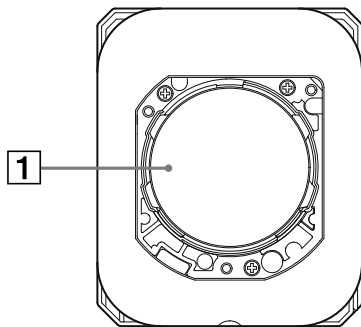
太陽など強い光がレンズ入射角の近くにあった場合、レンズ内側での乱反射から映像に高輝度の影が現れることがあります。

商標について

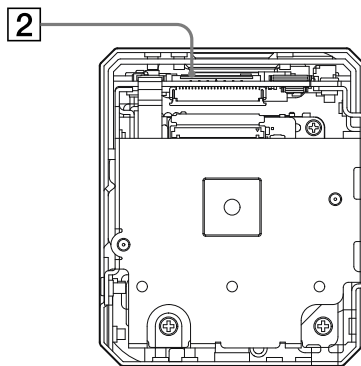
- “Exmor R”、“StableZoom” は、ソニー株式会社の商標です。
- HDMI、High-Definition Multimedia Interface、および HDMI ロゴ は、米国およびその他の国における HDMI Licensing Administrator, Inc. の商標または、登録商標です。

各部の名称と働き

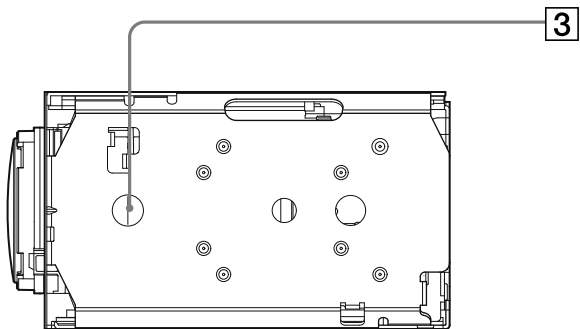
前面



背面



底面



① レンズ

② CN1701 端子

③ 三脚用ネジ穴

三脚を使うときは、ネジの長さが 6 mm 以下のものをお使いください。
また、必ず三脚固定用ネジでしっかり固定してください。

基本機能

機能説明

カメラコントロールは、VISCA コマンド及び、PTP を用いたコマンドで行います。PTP によるカメラコントロールは別冊の「カメラコントロール PTP 編」をご覧ください。

一般

- **Power On/Off**
カメラの電源を On/Off します。
Off 時は画面は非表示ですが、VISCA コマンドを受け付けます。
- **I/F Clear**
FCB カメラ内のコマンドバッファをクリアします。
- **Address Set**
VISCA はデジチェーンが可能なプロトコルで、RS-232C のラインに 7 台のカメラを接続できます。この時アドレスセットによって 1 ～ 7 番までのアドレスを割り振れば、同一 PC でカメラをコントロールすることができます。
FCB シリーズはカメラを直接チェーン接続することはできませんが、新しくカメラを接続した場合は必ずアドレスセットによってアドレスを確定してください。
- **ID Write**
カメラに ID を設定します。
- **Mute**
画面を消して同期信号を出します。
- **Lens Initialize**
レンズのズームとフォーカスのイニシャライズを行います。電源 On 時にもズームとフォーカスのイニシャライズを実施します。
- **APR (Auto Pixel Restoration)**
FCB カメラの動作中にセットの温度が上がり、CMOS 撮像素子の白点が発生する場合があります。
APR は、この白点を検出補正し、目立たなくします。

APR の検出機能は白点が発生している状態で行う必要があります。

通電直後などでカメラの温度が上がらず、白点が発生していない状態で APR を用いても検出することができませんので、必ず白点が発生している状態で使用してください。

APR を ON にし、電源 OFF/ON を行うことで、白点が検出補正されセットに記録されます。

APR による補正が終了しましたら、必ず“APR”を OFF にしてください。補正のデータは“APR”が OFF でも維持されます。

ズーム

20 倍光学ズームレンズを採用しています。デジタルズームを使用すると 240 倍までズームできます。

- **光学 20 倍、f=4.4 mm ～ 88.0 mm (F2.0 ～ F3.8)**

ズームには次のモードがあります。

スタンダードモード

バリエابلモード

ズームスピードは 8 ステップあります。

- ◆ スタンダード、バリエابلモードではこのコマンド自体ではストップしません。
ストップさせる場合は、ストップコマンドを送る必要があります。

ダイレクトモード

ズームポジションを設定することにより、指定の位置に最速で移動します。

デジタルズーム

デジタルズームモードには、OFF、コンバインモード、セパレートモードがあります。

コンバインモード

従来のズーム方式です。光学ズームが MAX になった後にデジタルズームモードになります。

セパレートモード

光学ズームとデジタルズームを独自に操作できるモードです。

光学倍率のどこからでもデジタルズームの倍率を操作できます。

コンバインモードの場合はデジタルズームの範囲を設定できます。

スーパーレゾリューションズーム

ソニー独自開発の「全画素超解像技術」により、拡大時でも画質を低下させることなく解像感を保ったまま優れた画像を提供します。

光学ズーム 20 倍との組み合わせにより、4K では 30 倍、FHD では 40 倍までズームを実現します。

Continuous Zoom Position Reply について

コマンドで Continues Zoom Position Reply を On にすると、ズームダイレクトモード時やプリセット動作時でのズーム移動時に、随時ズームポジションのデータをカメラから出力します。

Continues Zoom Position Reply : y0 07 04 69 0p
0p 0q 0q 0q 0q FF

pp : D-Zoom Position

qqqq : Zoom Position

フォーカス

フォーカスには次のモードがあります。

• Auto Focus Mode

AF（オートフォーカス）は、画面中心の測定枠内で映像信号レベルの高い周波数成分、つまり輝度が高くコントラストの強いものにフォーカスを合わせます。最短合焦距離は wide 端で 80 mm、tele 端で 800 mm です。

- Normal AF Mode

通常の AF が常に働いているモードです。

- Interval AF Mode

AF 動作をある一定間隔で実施するモードです。AF の動作時間とストップしている時間は Set Time コマンドにより 1 秒単位で設定が可能です。初期値はそれぞれ 5 秒に設定されています。

- Zoom Trigger Mode

ズームを動かしたとき、設定した時間だけ（初期値は 5 秒）AF モードとなり、その後止まります。

• AF Sensitivity

AF の感度切り換えの設定が可能です。

- Normal

フォーカスの追従速度が速くなります。動きの多い被写体を撮影する際ご利用ください。通常はこのモードが最適です。

- Low

フォーカスの安定性が向上します。照度が低いとき、明るさが多少変化しても AF は動作せず、安定した画像が得られます。

• Manual Focus Mode

マニュアルフォーカスにはスタンダードモード、バリアブルモードがあります。スタンダードモードは固定のスピードで移動します。バリアブルモードは 8 ステップのスピードがあります。

◆ スタンダード、バリアブルモードではこのコマンド自体ではストップしません。ストップさせる場合は、ストップコマンドを送る必要があります。

• One Push Trigger Mode

Trigger コマンドを送ったとき、被写体にフォーカスが合うようにレンズが移動します。次の Trigger コマンドが入るまでフォーカスレンズはそのままの位置を保ちます。

• Near Limit 設定

1000 (∞) ~ F000 (80 mm) まで設定が可能です。
初期値 : B000h (35 cm)

• スポットフォーカスモード

特定の部分にフォーカスを合わせることができます。

通常のオートフォーカスで目的の被写体にピントが合いにくいときなどに用います。

フォーカスを合わせる範囲は、画面全体を縦 16 × 横 16 に分割した領域で指定します。

ホワイトバランス

ホワイトバランスには以下のモードがあります。

• Auto

画面全体の色情報からホワイトバランスの出力を計算するモードです。カメラ内部に設定した黒体放射上の色温度カーブ (2500K ~ 7500K) に適合した出力値が出ます。初期値はこのモードに設定されています。

• ATW

Auto Tracing White balance (2000K ~ 10000K)

• Indoor

3200K 基準モード

• Outdoor

5800K 基準モード

• One Push WB

ワンプッシュホワイトバランスは、一度被写体を照らす照明条件を設定すると強制的に白に引き込み、その条件のまま撮影できる機能です。被写体の周りの条件に影響されないでそのままの色を自然に出します。設定する場合、白に引き込みたい被写体を写してワンプッシュホワイトバランストリガーを送ります。

ワンプッシュホワイトバランスのデータは電源を Off にすると消去されます。電源を一度 Off にした場合は、再度ワンプッシュホワイトバランスを設定してください。

• Manual WB

R ゲインと B ゲインを手動で 256 ステップまで設定できるモードです。

• Outdoor Auto

屋外専用のオートホワイトバランスモードです。朝方、夕方のホワイトバランスが自然になります。

• Sodium Vapor Lamp Auto

Sodium Vapor Lamp (ナトリウムランプ) に対応したオートホワイトバランスモードです。

- **Sodium Vapor Lamp**
Sodium Vapor Lamp（ナトリウムランプ）専用の固定ホワイトバランスモードです。
- **Sodium Vapor Lamp Outdoor Auto**
Sodium Vapor Lamp（ナトリウムランプ）に対応した屋外専用のオートホワイトバランスモードです。

ご注意

ナトリウムランプは、高圧ナトリウムに対応しています。低圧では一部引き込まないものがあります。

AE（自動露光モード）

高輝度から低照度の被写体まで最適に映し出せるように、多彩な露光調整ができます。

- **Full Auto**
アイリス、ゲイン、シャッタースピードを自動で調整します。
- **Gain Limit 設定**
AE モード Full Auto、シャッター優先、アイリス優先、ブライト、スポット露光および Manual モードでゲインリミットの設定が可能です。S/N を重視した映像を得たい場合は、この設定を利用してください。
- **シャッター優先¹⁾**
アイリスとゲインは Auto、シャッタースピードは任意の設定（1/1 ～ 1/10,000 秒、高速 16 ステップ+低速 12 ステップ）で調整します。
1) 東日本地域（電源周波数 50 Hz）でのフリッカーは、1/100 秒に設定することによりなくなります。
- **アイリス優先**
ゲインとシャッタースピードは Auto、アイリスは任意の設定（F2.0 ～ Close、22 ステップ）で調整します。
- **ゲイン**
アイリスとシャッタースピードは、ゲインは任意の設定（0 ～ 36 dB、13 ステップ、高感度モード時 0 ～ 48 dB、17 ステップ）で調整します。
- **Manual**
シャッタースピード、アイリス、ゲインの任意の設定で調整します。
- **ブライト**
アイリスとゲインの組み合わせ（Close ～ F2.0 までは 34 ステップ、高感度モードで 38 ステップ）で調整します。

AE－シャッター優先

高速 16 ステップ、低速 12 ステップ、計 28 ステップの設定が可能です。スローシャッターの設定を行うと、被写体の明るさに応じてスローシャッターとなります。ただしメモリーを通しての出力ですので、AF の追従性は低下し、表示されるフレーム数も低下します。高速シャッターは 1/10,000 秒まで設定が可能です。アイリスとゲインは自動となります。

データ	59.94/29.97 モード	50/25 モード	23.98 モード
21	1/10000	1/10000	1/10000
20	1/6000	1/6000	1/4800
1F	1/4000	1/3500	1/2400
1E	1/3000	1/2500	1/1200
1D	1/2000	1/1750	1/576
1C	1/1500	1/1250	1/400
1B	1/1000	1/1000	1/288
1A	1/725	1/600	1/200
19	1/500	1/425	1/192
18	1/350	1/300	1/144
17	1/250	1/215	1/120
16	1/180	1/150	1/100
15	1/125	1/120	1/96
14	1/100	1/100	1/60
13	1/90	1/60	1/50
12	1/60	1/50	1/48
11	1/50	1/30	1/40
10	1/30	1/25	1/25
OF	1/20	1/20	1/24
OE	1/15	1/15	1/20
OD	1/10	1/12	1/12
OC	1/8	1/8	1/8
OB	1/6	1/6	1/6
OA	1/4	1/4	1/4
9	1/3	1/3	1/3
8	1/2	1/2	1/2
7	2/3	2/3	2/3
6	1/1	1/1	1/1

AE－アイリス優先

F2 から Close まで 22 ステップの設定が可能です。

ゲインとシャッタースピードは自動となります。

データ	設定値	データ	設定値
19	F2	OE	F5.2
18	F2.2	OD	F5.6
17	F2.4	OC	F6.2
16	F2.6	OB	F6.8
15	F2.8	OA	F7.3
14	F3.1	09	F8
13	F3.4	08	F8.7
12	F3.7	07	F9.6
11	F4	06	F10
10	F4.4	05	F11
OF	F4.8	00	CLOSE

AE マニュアル

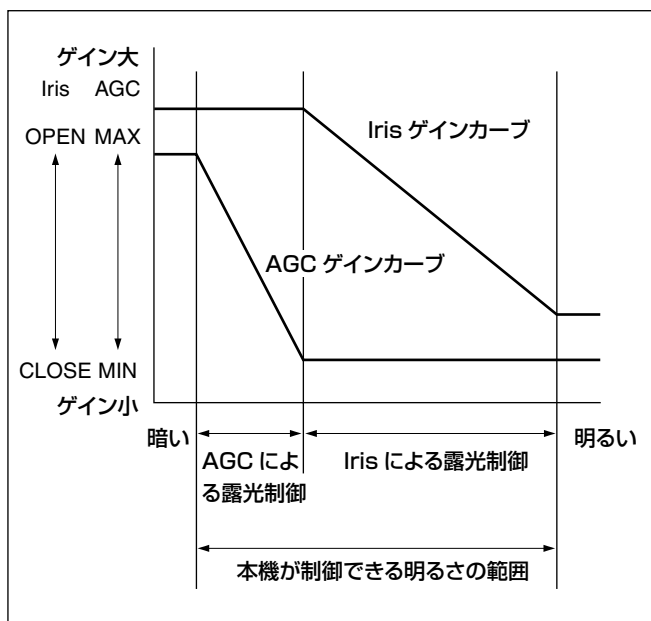
シャッタースピード（28 ステップ）、アイリス（22 ステップ）、ゲイン（17 ステップ）を個々に設定が可能です。

AE ブライト

ブライトコントロールはゲインおよびアイリスの組み合わせによる明るさ調整機能です。暗い場合はゲインによる露光制御、明るい場合はアイリスによる露光制御が行われます。

ゲイン、アイリスともに固定となりますので、カメラの感度を一定にして撮影するときを使用します。Full Auto またはシャッター優先モードからブライトモードに切り換えた場合、いったん切り換え前の状態をホールドします。

AE モードが、Full Auto モードまたはシャッター優先モードの場合にだけブライトモードに切り換えることができます。



データ	アイリス	ゲイン	データ	アイリス	ゲイン
29*	F2.0	48 dB	16	F2.6	0 dB
28*	F2.0	45 dB	15	F2.8	0 dB
27*	F2.0	42 dB	14	F3.1	0 dB
26*	F2.0	39 dB	13	F3.4	0 dB
25	F2.0	36 dB	12	F3.7	0 dB
24	F2.0	33 dB	11	F4	0 dB
23	F2.0	30 dB	10	F4.4	0 dB
22	F2.0	27 dB	0F	F4.8	0 dB
21	F2.0	24 dB	0E	F5.2	0 dB
20	F2.0	21 dB	0D	F5.6	0 dB
1F	F2.0	18 dB	0C	F6.2	0 dB
1E	F2.0	15 dB	0B	F6.8	0 dB
1D	F2.0	12 dB	0A	F7.3	0 dB
1C	F2.0	9 dB	9	F8.0	0 dB
1B	F2.0	6 dB	8	F8.7	0 dB
1A	F2.0	0 dB	7	F9.6	0 dB
19	F2.0	0 dB	6	F10	0 dB
18	F2.2	0 dB	5	F11	0 dB
17	F2.4	0 dB	00	CLOSE	0 dB

* 高感度モード ON 時

シャッター優先モードからブライトモードへ切り換えた場合は、シャッター優先モード時に設定したシャッタースピードが保持されます。

Gain Limit 設定

AE モードの Full Auto、シャッター優先、アイリス優先でゲインリミットの設定が可能です。S/N を重視した映像を得たい場合は、この設定を利用してください。

Gain Point 設定

0dB とゲインリミットの中間に設定して、設定値のゲインに達した時点からシャッタースピードを変更することが可能です。

動体を優先した映像を得たい場合は、この設定を利用してください。

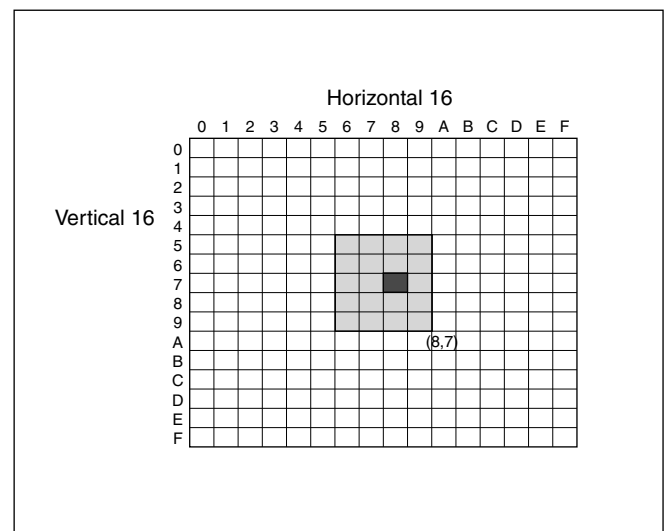
スポット露光モード

Full Auto AE では画面全体のレベルを算出し、それが最適になるように絞り、ゲインなどを決定しています。スポット AE では被写体の特定の部分を指定することで、その部分に重み付けをして計算し、ゲイン、アイリスなどが最適に働いて画像を得ることができます。

例えば、動きが多く、輝度変化が激しいような画面では、変化の少ないところにスポットを指定することで画面の変化を抑えることができます。

下図のように縦 16 横 16 の範囲で指定できます。

指定した中心（黒）を含む周辺ブロック（アミ）の値でレベルを算出します。スポット AE 枠は、縦 5 横 4 に固定されています。



露出補正

露出補正は AE 時の明るさを調整する機能です。標準の明るさを「0」とし、これに対し 1.5 dB ずつワンステップで明るくしたり暗くしたりできます。

データ	ステップ	設定値
0E	+ 7	+ 10.5 dB
0D	+ 6	+ 9 dB
0C	+ 5	+ 7.5 dB
0B	+ 4	+ 6 dB
0A	+ 3	+ 4.5 dB
09	+ 2	+ 3 dB
08	+ 1	+ 1.5 dB
07	0	0 dB
06	- 1	- 1.5 dB
05	- 2	- 3 dB
04	- 3	- 4.5 dB
03	- 4	- 6 dB
02	- 5	- 7.5 dB
01	- 6	- 9 dB
00	- 7	- 10.5 dB

スロー AE（自動露光モード）

スロー AE Response（自動露光応答）機能は、露光の応答スピードを遅くする機能です。通常は、約 1 秒で適切な露光になるように、自動的に収束するよう設定されています。露光の応答スピードは、スロー AE 機能を使って、初期設定値（01h）～約 10 分（30h）（通常シャッター時）まで遅くすることができます。

例えば、通常の設定（約 1 秒）では、車のヘッドライトが画面に入ると、すぐに高輝度（ヘッドライト）を映し出せるように露光を調節します。従って、周辺の画面つまり、車のヘッドライト以外の被写体は相対的に暗くなり、識別ができなくなります。

しかし、スロー AE 機能を使えば応答時間が長くなり、高輝度（ヘッドライト）光が短時間映った場合でも、周辺被写体はきちんと識別できるようになります。

高解像度モード

エッジを強調し、より解像度感のある映像が得られます。

輪郭強調（アパーチャー）

被写体の輪郭を強調する機能です。Auto の場合には自動的に調整します。

Manual に設定することで複数の設定項目を調整することができますようになります。ゲインアップした際に発生するノイズ粒子にも輪郭強調によって輪郭がつき、目立つノイズになることがあります。レベルの調整で輪郭強調の強度を抑えるか、クリスプニングでノイズにつく輪郭強調の量を調整してください。

逆光補正

被写体の背景が明るすぎ、AE によって被写体が暗くなったときに逆光補正を行うと被写体が見やすくなります。

Visibility Enhancer (VE)

撮像シーンに応じてカメラ画像の暗い部分を明るくし、はっきり見えるように輝度とコントラストを自動補正します。

Defog モード

被写体に霧がかかり、コントラストが低くなったときに Defog モードにすると被写体が見やすくなります。

この機能は OFF、弱、中、強の 4 段階が選択できます。

Highlight Compensation (HLC)

HLC（ハイライト補正）は、強力なスポット光を検出して AE や AF を調整し、必要に応じて光エリアをマスクします。屋内駐車場や夜間の屋外で自動車の数やナンバープレートを読み取りやすくします。

Maximum Shutter Limit（高速シャッターリミット）

被写体が明るくなるとシャッター速度が速くなりますが、そのシャッター速度の上限にリミットをかける機能です。明るい被写体を撮像する際にパラパラ感が抑制されて滑らかな動きの映像になります。

Minimum Shutter Limit（低速シャッターリミット）

被写体が暗くなるとシャッター速度が遅くなってからゲインを上げますが、このシャッター速度にリミットをかける機能です。暗所で移動する物体を撮像する際にぶれを抑えます。

ノイズリダクション

NR（Noise Reduction）は、ノイズ（固定パターンノイズ、ランダムノイズなど）を除去して、より鮮明な映像を得るための機能です。

この機能は、Off の状態を含めて、レベル 1 からレベル 5 まで 6 段階あります。

効果はゲインに応じて段階的にかかり、設定値は NR 効果のリミッターとなります。なお、明るい条件では、レベルを変更しても NR の効果はありません。

レベル 7Fh に設定したときは、2D/3D の NR を個別に設定ができます。

高感度モード

最大ゲイン量が増加し、より暗い環境でも明るい出力が得られます。

ただし、ゲインが強くなっている状態ではノイズの多い映像となります。

ガンマ可変モード

スタンダード (00h)、ストレートガンマ (01h)、512 パターン (02h) の設定が可能です。

ガンマオフセット

ガンマ可変の各モードで、- 16 (00h) ~ + 64 (40h) で輝度の設定が可能です。

温度読み出し機能

カメラ内部に付いている温度センサーの換算値 (hex) を問い合わせコマンドで読み出しできます。換算値には ± 3℃ の誤差があり、かつ温度センサーはカメラ内部に付いているため、この換算値はカメラの周囲温度ではありません。参考値としてお使いください。

スローシャッター On/Off

「On」に設定すると、被写体照度が下がったときに自動でスローシャッターに入るように制御します。AE モードが Full Auto のときのみ有効です。初期値は「オートスローシャッター Off」に設定されています。

低照度色消しモード

低照度での色消しの設定が可能です。低照度での色ノイズが気になる場合に有効です。

低照度色消しの設定は、4 段階の設定（無効と 3 段階の有効）が可能です。

ICR (IR カットリムーバブル) モード

CMOS の前に装着されている IR カットフィルターをメカニカルな機構で装着したり、取りはずしたりすることができます。IR カットフィルターを取りはずすことで、赤外領域の感度がアップし、より暗いところの映像をとらえることができます。

なお、ICR モードを On にした場合は、「白黒」の映像となります。

カラーゲイン可変

カラーゲインの設定が可能です。鮮やかな色を希望する場合に有効です。

カラーゲインの初期値設定 100% (4h) を、約 60% (0h) ~ 約 200% (Eh) まで 15 段階の設定が可能です。

カラー位相可変

カラー位相の設定が可能です。

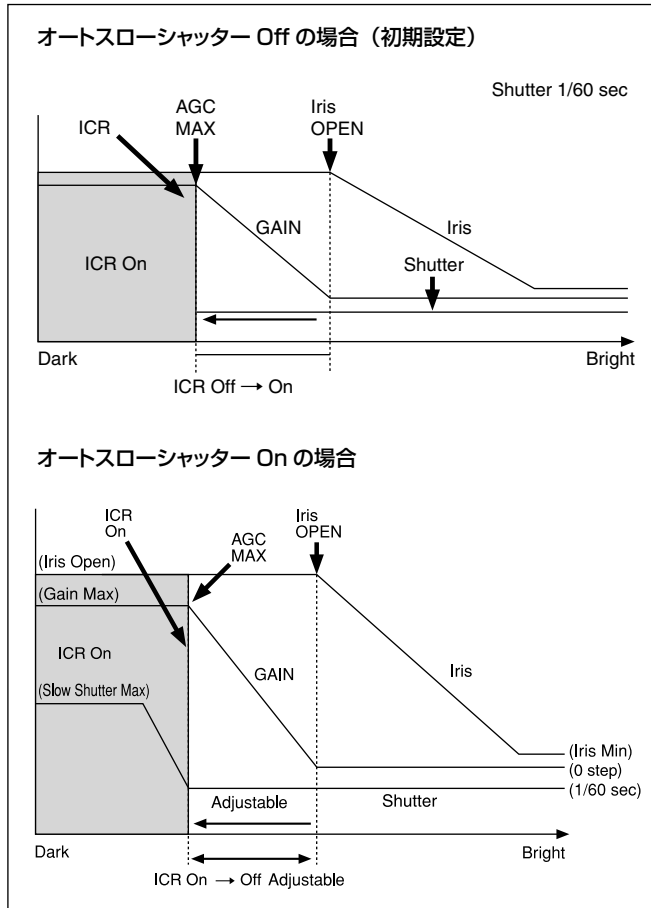
カラー位相の初期値は 0 度 (7h) で、約 -14 度 (0h) から約 +14 度 (Eh) まで 15 段階の設定が可能です。

Auto ICR モード

オートICRモードはIRカットフィルターの脱着を自動で行います。ある一定の暗さになると自動的にIRカットフィルターを取り除き（ICR On）、赤外領域の感度をアップさせる機能です。また、ある一定の明るさになると自動的にIRカットフィルターを装着します（ICR Off）。

なお、IRライト装着のシステムにおいても、誤動作が起きないようにカメラの内部データを活用して判断しています。

オートICRモードは、AE Full Auto 設定で機能します。



で注意

On/Off の条件には明るさ以外の情報も利用しているため、画面いっぱい青っぽい被写体を映した場合などに誤動作する場合があります。

カメラ ID

65,536 (0000h ~ FFFFh) 台までの ID 設定が可能です。内部の不揮発性メモリーへ記憶されるので、データは保存されます。

Picture Effect

以下の機能が 있습니다。

- **Black & White:** 白黒映像

イメージスタビライザー

イメージスタビライザー機能を On にすると、振動などで起こる画面ぶれに対して、ぶれの少ない映像を得られます。

10 Hz 前後の振動周波数で補正効果があります。イメージスタビライザー機能は、デジタルズーム方式を採用しており、画角や解像度に変化が現れますが、感度は保持されます。

で注意

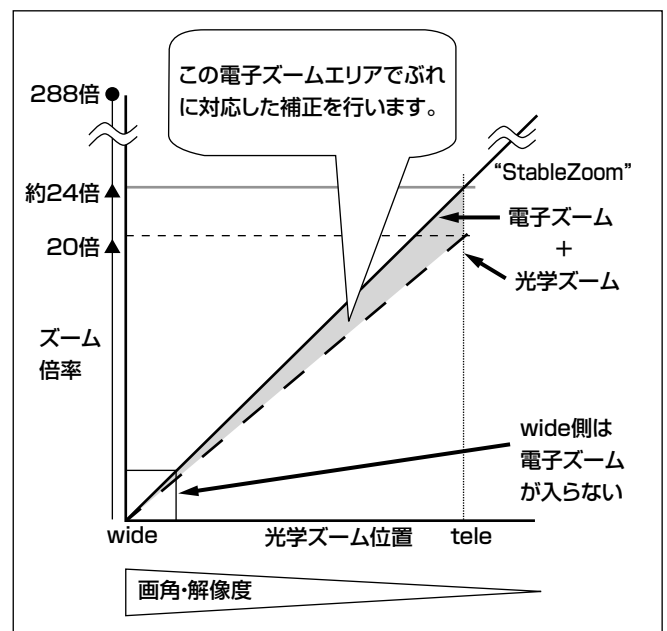
高周波の振動成分がある環境下では、手ブレ補正が正しく働かない場合があります。そのような環境下で使用する場合には、イメージスタビライザー機能 Off にしてご使用ください。

“StableZoom”

“StableZoom” は、ズーム倍率に応じてイメージスタビライザー機能による補正を行い、光学ズームと電子ズームを合わせて、なめらかに約 24 倍までズームする機能です。さらに電子ズームすると、最大 288 倍になります。

wide 側では、電子ズームが入らないため、解像度が低下しない映像が得られます。一方、tele 側では、イメージスタビライザー機能による補正効果が最大になり、ぶれを抑えます。

“StableZoom” は、レジスター設定で On/Off できます。



その他

上下左右反転

この機能によりカメラからの映像出力を上下左右反転できます。

左右反転

この機能によりカメラからの映像出力を左右反転できます。

フリーズ

この機能によりカメラのフィールドメモリーに 1 枚の映像をキャプチャーし、連続的にこの映像を出力することが可能です。

- ◆ カメラの内部での通信が V 周期であるため、コマンドを送ってから 3V ~ 4V 後の映像をキャプチャーすることになります。したがって、EVEN、ODD やコマンドを送ってからの時間を特定することはできません。

電子 Pan/Tilt

4K (3840 × 2160) モード時に、指定位置の画像を Full HD (1920 × 1080) に切り出し、表示します。

切り出し画像の中心座標は、コマンドにより指定できます。切り出しサイズは FHD に固定の為、変更はできません。

メモリー (ポジションプリセット)

ポジションプリセット機能により、カメラの機能を 16 通りプリセットすることが可能です。

この機能により、以下の項目をその都度調節しなくても瞬時に希望の状態に合わせることができます。

- ズームポジション
- デジタルズーム On/Off/スーパーリゾリューションズーム
- フォーカス Auto/Manual
- フォーカスポジション
- AE モード
- シャッター制御値
- ブライトコントロール
- アイリス制御値
- ゲイン制御値
- 露出補正 On/Off
- 露出レベル
- 逆光補正 On/Off
- スローシャッター On/Off
- ホワイトバランス
- R/B ゲイン
- 輪郭強調 (アパーチャー)
- ICR On/Off
- Defog

カスタムプリセット

ポジションプリセット機能同様に、カメラの機能を記憶しておくことができます。電源 On 時には、この機能でメモリーした設定で立ち上がります。

- ◆ 設定項目については「初期値とカスタムプリセットとバックアップ」(24 ページ) を参照してください。

ユーザーメモリーエリア

ユーザーが自由に書き換えることができる 16 byte 分のメモリーエリアを確保しました。

顧客ごとの ID や、システムとの対応に個々につけるなど自由にお使いください。

ご注意

メモリーの書き換え可能回数は無限ではありません。操作のたびに書き換えるなど、頻繁な書き換えにはご注意ください。

レジスター設定

レジスター設定コマンドで、カメラの初期設定を設定、変更できます。

レジスター設定コマンド:

8x 01 04 24 mm Op 0q FF
mm : Register No. (=00 ~ 7F)
pq : Register Value (=00 ~ FF)

レジスター問い合わせコマンド:

8x 09 04 24 mm FF
mm : Register No.
y0 50 Op 0p FF
pp : Register Value
(カメラから返されます。)

レジスター設定項目および No. は、以下のとおりです。

詳しくは、「レジスター設定」(54、55 ページ) をご覧ください。

Baud Rate : 00

通信速度の設定が可能です。

Monitoring Mode : 72

出力モードの設定が可能です。

Zoom Limit : 50 (wide 側)、51 (tele 側)

Zoom の wide 端や tele 端の設定ができます。

D-Zoom Max : 52

電子ズームの最大値の設定ができます。(初期値は× 12 になります。)

FocusOffset : 55

ドームカバーなどをカメラレンズの前に置いた場合、カメラの焦点距離が変わる場合があります。特に Tele 端では、その影響が AF の範囲を超え、追従しない場合がありますが、この値を変更することで対応できます。

- ◆ 詳しくは、「レジスター設定」(55 ページ) をご覧ください。

拡張モード : 5F

ON/OFF の設定が可能です。(初期値は OFF です。)

詳しくは、18 ページをご覧ください。

ご注意

レジスター設定を変更した場合は、電源を切ってから再度電源を入れてください。

プライバシーゾーンマスキング設定

詳しくは 15 ページをご覧ください。

タイトル表示

- 1 行 20 文字、最大 11 行まで設定が可能です。
- 行ごとに、表示のオン／オフ、水平の開始位置、点滅、色などが設定可能です。
- タイトル表示とカメラの状態表示が重なる行の場合は、タイトル表示が優先されます。タイトル未設定の行はカメラの状態が表示されます。

縦表示位置	00h ~ 0Ah	
横表示位置	00h ~ 1Fh	
表示色	00h	WHITE
	01h	YELLOW
	02h	VIOLET
	03h	RED
	04h	CYAN
	05h	GREEN
	06h	BLUE
表示点滅	00h	Off
	01h	On

00	01	02	03	04	05	06	07
A	B	C	D	E	F	G	H
08	09	0A	0B	0C	0D	0E	0F
I	J	K	L	M	N	O	P
10	11	12	13	14	15	16	17
Q	R	S	T	U	V	W	X
18	19	1A	1B	1C	1D	1E	1F
Y	Z	&		?	!	1	2
20	21	22	23	24	25	26	27
3	4	5	6	7	8	9	0
28	29	2A	2B	2C	2D	2E	2F
À	È	Ì	Ò	Ù	Á	É	Í
30	31	32	33	34	35	36	37
Ó	Ú	Â	Ê	Ô	Æ		Ã
38	39	3A	3B	3C	3D	3E	3F
Ö	Ñ	Ç	ß	Ä	Ï	Ö	Ü
40	41	42	43	44	45	46	47
Å	\$		¥		£	ı	ı
48	49	4A	4B	4C	4D	4E	4F
ø	”	:	,	.	,	/	-

プライバシーゾーンマスキング機能

プライバシーゾーンマスクは、家の窓や出入り口などプライバシーにかかわる場所を保護するための機能です。カメラの視野内にある窓や出入り口などのプライバシーゾーンをモニター上でマスクし、見えないようにします。

特長

- パン／チルト位置に応じて最大 24 箇所にマスク設定可能
- 画面上の 8 箇所に同時にマスク表示可能
- プライバシーゾーンごとにマスクのオン／オフが可能
- 24 箇所のプライバシーゾーンそれぞれに、選択した 2 色を割り当て可能
- ズームのインターロック制御
- パン／チルトのインターロック制御
- パン／チルトのノンインターロック制御

設定コマンドの詳細

Set Mask

コマンド: 8x 01 04 76 mm nn Or Or Os Os FF

パラメーター:

mm	マスクを設定 「パラメーター」の「mm: マスク設定リスト」参照 (16 ページ)
nn	マスクを新規に設定するか既存マスクをリセットするかを 選択「パラメーター」の「nn: 設定」参照 (16 ページ)
rr	マスク幅の $\frac{1}{2}$ の値 w を設定
ss	マスク高の $\frac{1}{2}$ の値 h を設定 「パラメーター」の「pp:x, qq:y, rr:w, ss:h」を 参照 (16 ページ)

使いかた: 被写体を画面の中心に表示した上で、マスクを設定してください。「nn」の値が 1 の場合、現在のパン／チルト／ズーム位置が内部メモリに記憶されます。

「nn」の値が 0 の場合、メモリの内容は変更されません。

ご注意

- マスクが設定可能なチルト角は± 70 度までとなります。
- 被写体の大きさ（縦と横）の約 2 倍以上の大きさに設定することをおすすめします。

Set Display

コマンド: 8x 01 04 77 pp pp pp pp FF

パラメーター:

pp pp pp pp	24 箇所のプライバシーゾーンがそれぞれビットと対応「パラメーター」の「pp pp pp pp: マスクビット」参照 (17 ページ)
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使いかた: 24 箇所のプライバシーゾーンは、単一の VISCA コマンドにより個別にオン／オフすることができます。表示したいプライバシーゾーンのビットは 1 に、表示したくないプライバシーゾーンのビットは 0 に設定します。

Set Mask Color

コマンド: 8x 01 04 78 pp pp pp pp qq rr FF

パラメーター:

pp pp pp pp	24 箇所のプライバシーゾーンがそれぞれビットと対応「パラメーター」の「pp pp pp pp: マスクビット」参照 (17 ページ)
qq	カラーコードを設定
rr	カラーコードを設定 「パラメーター」の「qq, rr: カラーコード」参照 (17 ページ)

使いかた: マスクカラーとして異なる 2 色を選択できます。

選択した 2 色を個別に割り当てることができます。

パラメーターのビット (pp pp pp pp) が 0 の場合、マスクカラーはカラーコード「qq」の色となります。パラメーターのビット (pp pp pp pp) が 1 の場合、マスクカラーはカラーコード「rr」の色となります。

設定例: 8x 01 04 78 00 00 00 03 00 07 FF

マスクカラーの設定は、マスク A とマスク B が白（カラーコード 07h）、マスク C ～ X が黒（カラーコード 00h）となります。

Set Pan Tilt Angle

コマンド: 8x 01 04 79 Op Op Op Oq Oq Oq FF

パラメーター:

ppp	パン角度
qqq	チルト角度 「パラメーター」の「パン／チルト角度の設定」参照 (17 ページ)

使いかた: パン／チルト角度の設定値は 16 進数で入力します。パラメーターに対するパン／チルト角度の分解能は 0.088°です。

ご注意

- パン／チルト角度を設定する際は、パン／チルトの位置を FCB カメラの中心位置に持ってきて設定してください。
- パン／チルト角度の設定やズームをすると、約 1 秒間マスクを一回り拡大して表示します。

Set PTZ Mask

コマンド: 8x 01 04 7B mm Op Op Op Oq Oq Oq Or Or Or Or FF

パラメーター:

mm	マスクを設定 「パラメーター」の「mm: マスク設定リスト」参照 (16 ページ)
ppp	パン角度 (000 ～ FFF) 「パラメーター」の「パン／チルト角度の設定」参照 (17 ページ)
qqq	チルト角度 (000 ～ FFF) 「パラメーター」の「パン／チルト角度の設定」参照 (17 ページ)
rrrr	ズーム位置 (0000 ～ 4000) 「ズーム倍率とズーム位置 (参考値)」参照 (52 ページ)

使いかた: 1 つのコマンドで、パン、チルト角度の設定とズーム位置の設定を行い、望みの位置にマスクを設定が可能です。
設定値は 16 進数で入力します。

ご注意

プライバシーゾーンマスクはズームによる画角の変化に応じて追従します。画角の変化が大きい D-Zoom や上下左右反転を使用した場合は、追従が一瞬遅れることがあります。

Non Interlock Mask

コマンド: 8x 01 04 6F mm Op Op Oq Oq Or Or Os Os FF

パラメーター:

mm	マスクを設定 「パラメーター」の「mm: マスク設定リスト」参照 (16 ページ)
pp	画面上でのマスクの中央位置 x を設定
qq	画面上でのマスクの中央位置 y を設定
rr	マスク幅の $1/2$ の値 w を設定
ss	マスク高の $1/2$ の値 h を設定 「パラメーター」の「pp:x, qq:y, rr:w, ss:h」参照 (16 ページ)

使いかた: パン／チルトにマスクを連動させたくない場合に設定します。

各パラメーター設定時、以下の制限があります。(16 進表記)

x: $\pm 50h$ w: $\pm 50h$

y: $\pm 2Dh$ h: $\pm 2Dh$

ご注意

Set Mask コマンドと Non Interlock Mask コマンドが同じマスクに対して設定された場合は、後に設定されたコマンドが有効となります。

パラメーター

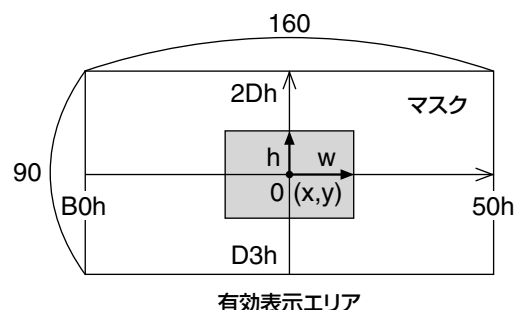
mm: マスク設定リスト

マスク名	mm (16 進数)	マスク名	mm (16 進数)
Mask_A	00h	Mask_M	0Ch
Mask_B	01h	Mask_N	0Dh
Mask_C	02h	Mask_O	0Eh
Mask_D	03h	Mask_P	0Fh
Mask_E	04h	Mask_Q	10h
Mask_F	05h	Mask_R	11h
Mask_G	06h	Mask_S	12h
Mask_H	07h	Mask_T	13h
Mask_I	08h	Mask_U	14h
Mask_J	09h	Mask_V	15h
Mask_K	0Ah	Mask_W	16h
Mask_L	0Bh	Mask_X	17h

nn: 設定

nn	設定
00h	既存マスクのサイズをリセット (値: w, h)。
01h	マスクサイズを新規に設定 (値: w, h)。

pp: x, qq: y, rr: w, ss: h



ご注意

マスクの表示優先順位は、A（高）からX（低）となります。非連動マスクを設定する場合は、優先順位の高いマスクを設定することをおすすめします。

pp pp pp pp : マスクビット

	pp								pp							
ビット	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
マスク	-	-	X	W	V	U	T	S	-	-	R	Q	P	O	N	M

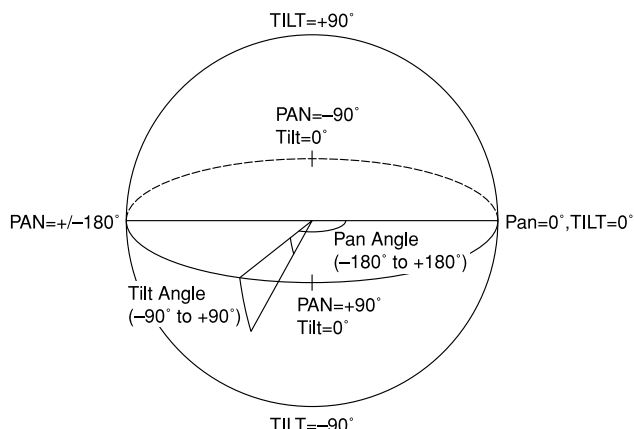
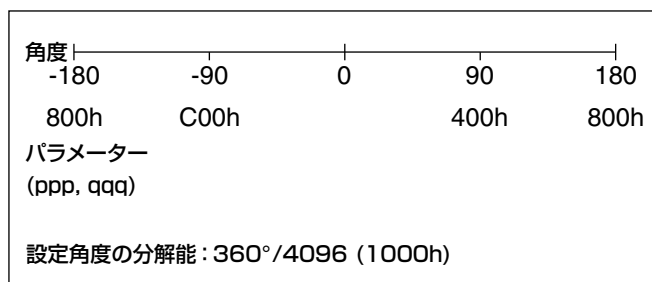
	pp								pp							
ビット	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
マスク	-	-	L	K	J	I	H	G	-	-	F	E	D	C	B	A

「-」は「0」に設定すること

qq, rr : カラーコード

マスク (色)	コード (qq, rr)	半透明 (qq, rr)
Black	00 h	10 h
Gray1	01 h	11 h
Gray2	02 h	12 h
Gray3	03 h	13 h
Gray4	04 h	14 h
Gray5	05 h	15 h
Gray6	06 h	16 h
White	07 h	17 h
Red	08 h	18 h
Green	09 h	19 h
Blue	0A h	1A h
Cyan	0B h	1B h
Yellow	0C h	1C h
Magenta	0D h	1D h
Mosaic	7Fh	

パン／チルト角度の設定



拡張コマンド

拡張コマンドには、下記の項目（既出）が対応しています。モードを On にする（「レジスター設定」の「拡張モード」55 ページ参照）ことで、記載にある動作を実現します。

•露出補正

約 0.2dB ずつワンステップ (-128 (00h) ~+ 127 (FFh)) で設定が可能です。

◆本機能に関しては、10 ページをご覧ください。

•輪郭強調（アパーチャ）

256 ステップ (00h ~ FFh) で設定が可能です。

◆本機能に関しては、10 ページをご覧ください。

•カラーゲイン可変

カラーゲインの初期値は 100% (80h) で、約 0% (00h) ~約 200% (FFh) まで 256 段階で設定が可能です。

◆本機能に関しては、11 ページをご覧ください。

•カラー位相可変

カラー位相の初期値は 0 度 (80h) で、約 -14 度 (00h) から約 +14 度 (FFh) まで 256 段階の設定が可能です。

◆本機能に関しては、11 ページをご覧ください。

•Auto ICR

Auto ICR 時の ICR On → Off のしきい値 (Threshold) の設定が可能です。

設定範囲は、0 step (00h) ~ 255 step (FFh) です。Auto ICR 時の ICR Off → On のしきい値 (On Level) の設定が可能です。

設定範囲は、0 step (00h) ~ 28 step (1Ch) です。

◆本機能に関しては、12 ページをご覧ください。

ご注意

拡張モードが Off のときに、カメラに拡張コマンドを送ると CMD_NOT_EXEC を返します。

拡張モードが On のときに、カメラにノーマルコマンドを送ると CMD_NOT_EXEC を返します。

外部同期機能 (FCB-ER8550)

CN1701 の 15pin に同期信号を入力することで、自動的に外部同期が動作します。
下記に外部同期が可能な組み合わせを示します。

Input External Signal format Camera Mode	Tri-State Sync			NTSC Black burst	PAL Black burst
	1080/59.94i	1080/50i	1080/47.95i		
3840 x 2160/29.97p	○	×	×	○	×
3840 x 2160/25p	×	○	×	×	○
3840 x 2160/23.98p	×	×	○	×	×
1920 x 1080/59.94p	○	×	×	○	×
1920 x 1080/59.94i	○	×	×	○	×
1920 x 1080/50p	×	○	×	×	○
1920 x 1080/50i	×	○	×	×	○
1920 x 1080/29.97p	○	×	×	○	×
1920 x 1080/25p	×	○	×	×	○
1920 x 1080/23.98p	×	×	○	×	×
1280 x 720/59.94p	○	×	×	○	×
1280 x 720/50p	×	○	×	×	○
720 x 480/59.94p	○	×	×	○	×
720 x 576/50p	×	○	×	×	○

External signal spec

- Tri-State SYNC : partial part of SMPTE 240M/274M
 - NTSC Black burst : EBU N14/SMPTE RP-154/ SMPTE 170M/SMPTE 318M
 - PAL Black burst : ITU-R BT.470-6
- H Phase の調整機能はありません。

ご注意

- 外部同期信号を入力後、外部同期状態に変わるまで設定変更は行わないでください。
- 外部同期信号が不安定な場合は、外部同期状態になりません。
- 次の場合、画像やデータなどが乱れて誤動作となる恐れがあります。
 - 入力可能な外部同期信号以外を入力したとき。
 - 外部同期が非対応の場合に外部同期信号を入力したとき。

ファームウェアのアップデートについて

概要

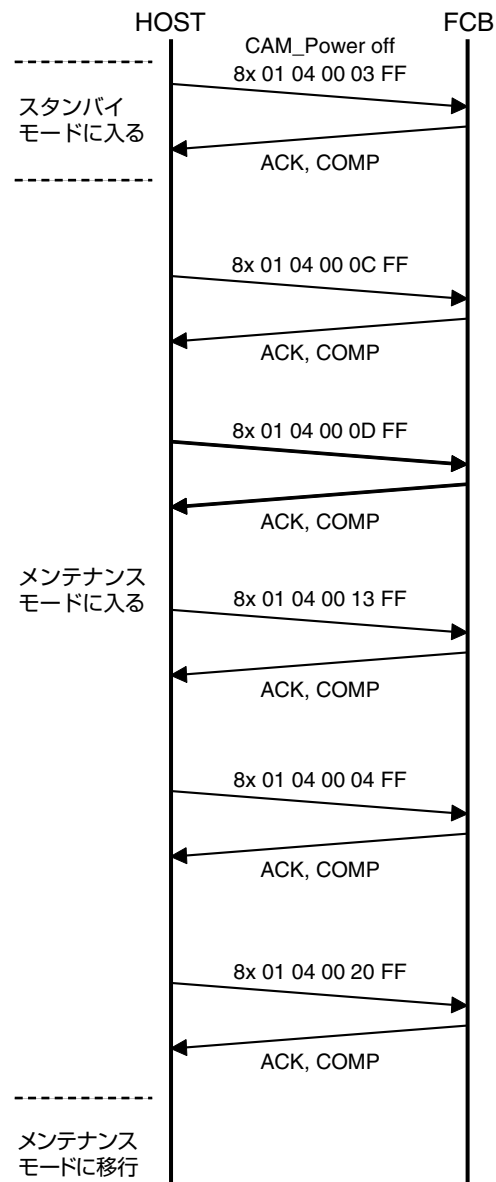
本書では、ファームウェアバージョンアップの詳細について説明します。

メンテナンスモード時のシリアル・ポート設定

通信速度	115200 bps
データ長	8ビット
パリティ	なし
ストップビット	1ビット
フロー制御	なし

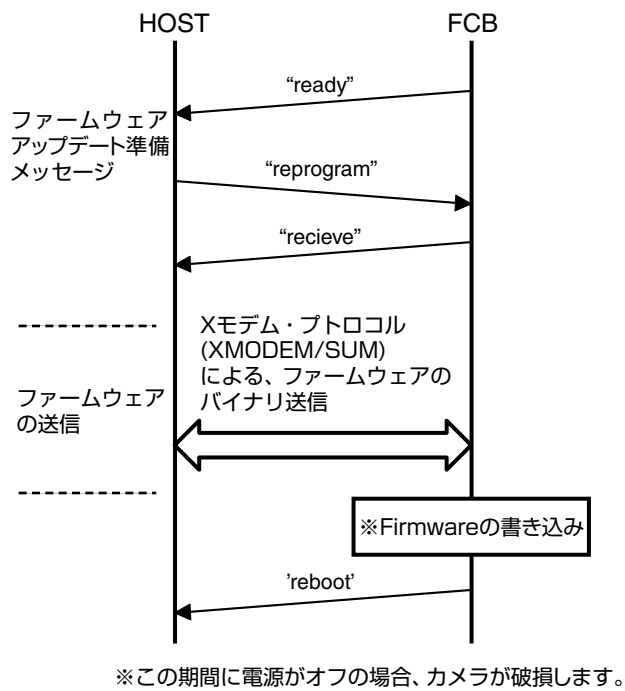
アップデート手順 (UART)

メンテナンスモードに入ります。

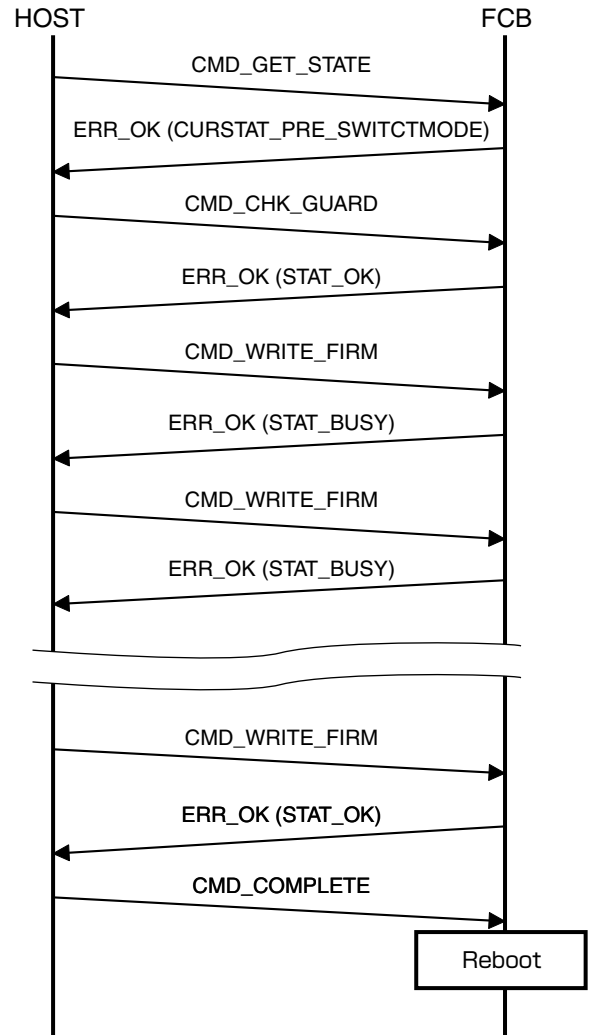
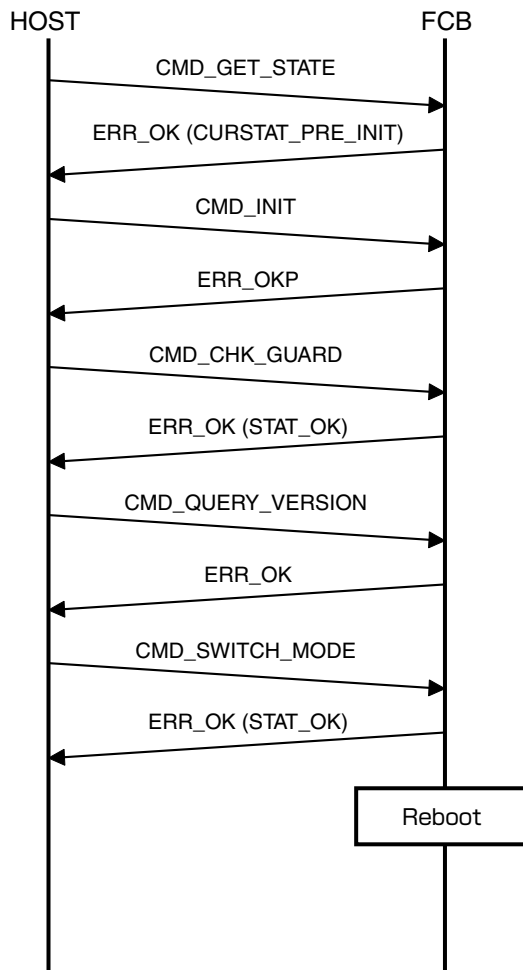


※メンテナンスモードに移行するまで約14秒かかります。
※この期間に電源がオフの場合、カメラが破損します。

メンテナンスモード



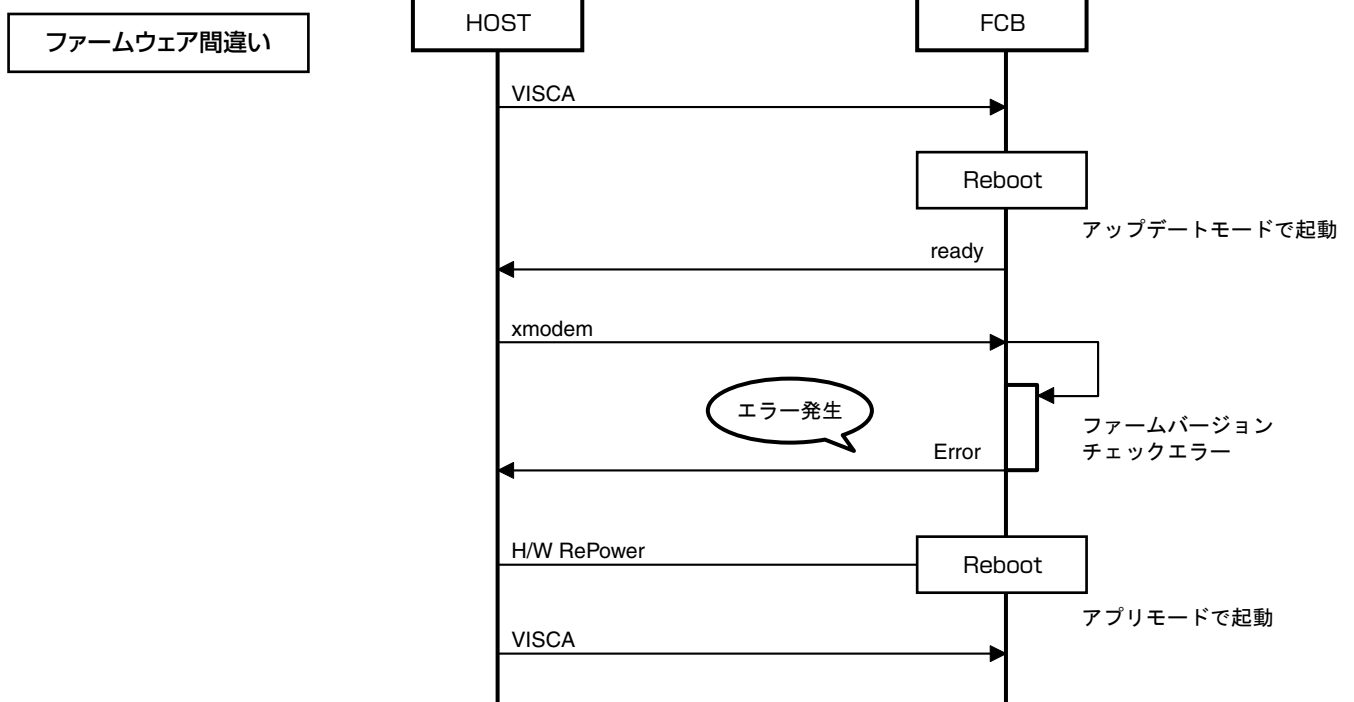
アップデート手順 (USB)



エラー発生パターン

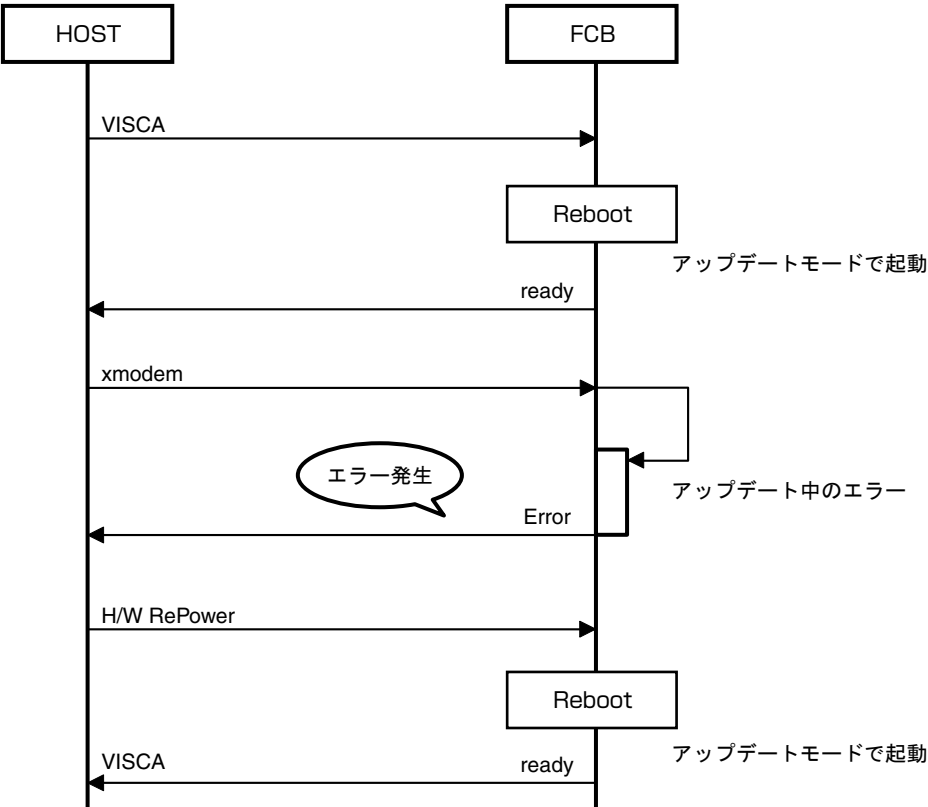
アップデート (UART) のエラーパターンは、以下になります。

UART update-error 1



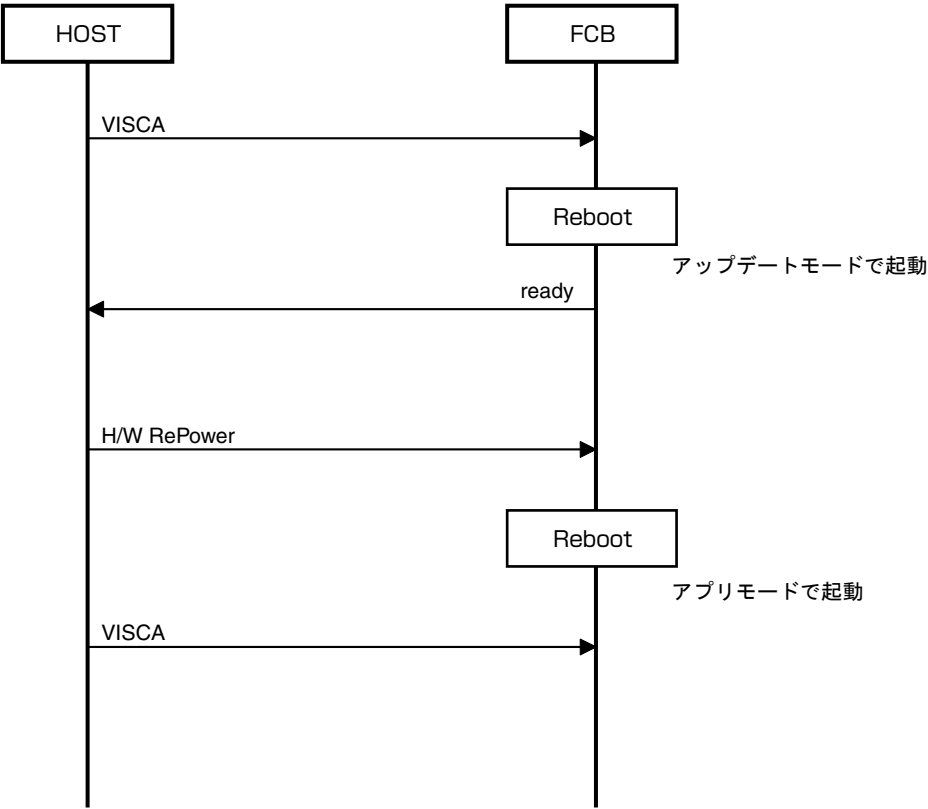
UART update-error 2

アップデート中のエラー

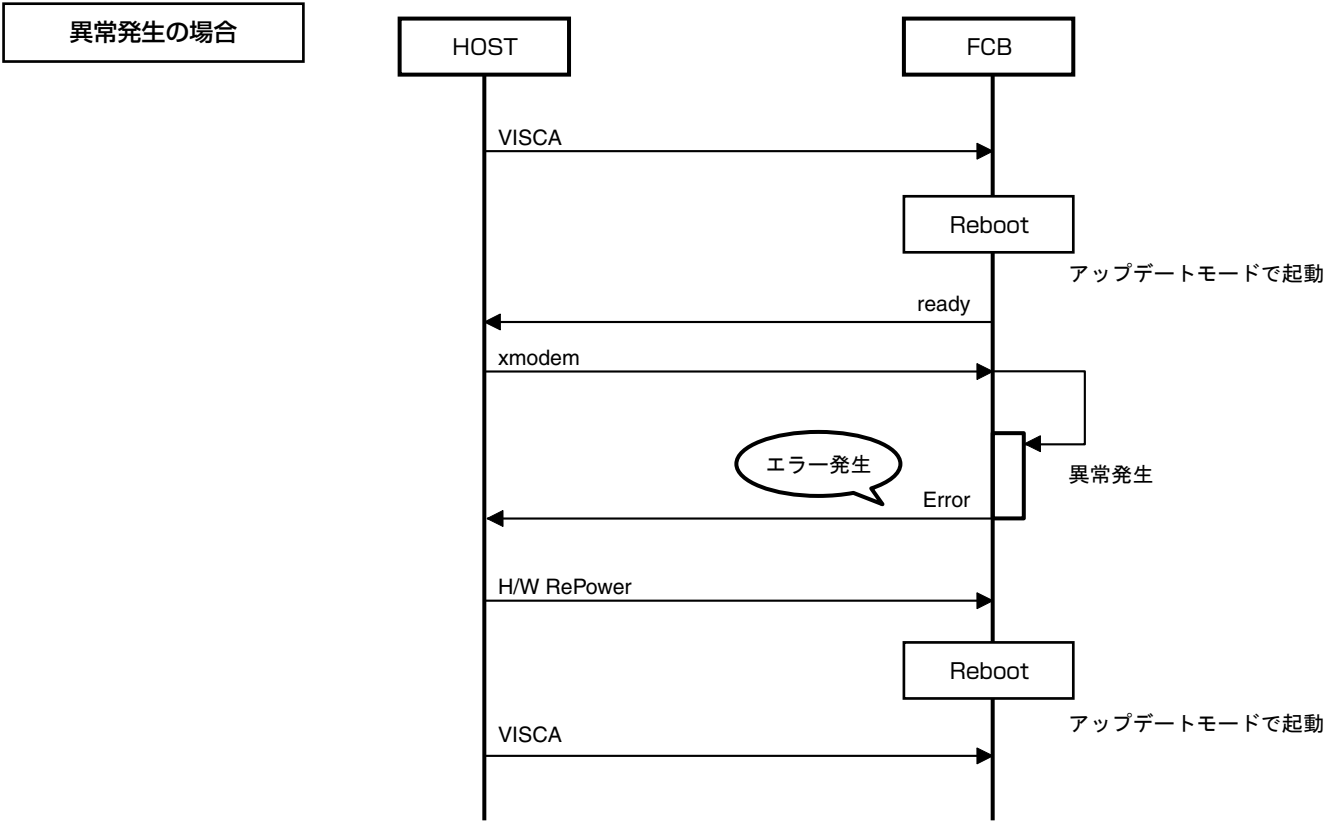


UART update-error 3

アップデートしなかった場合

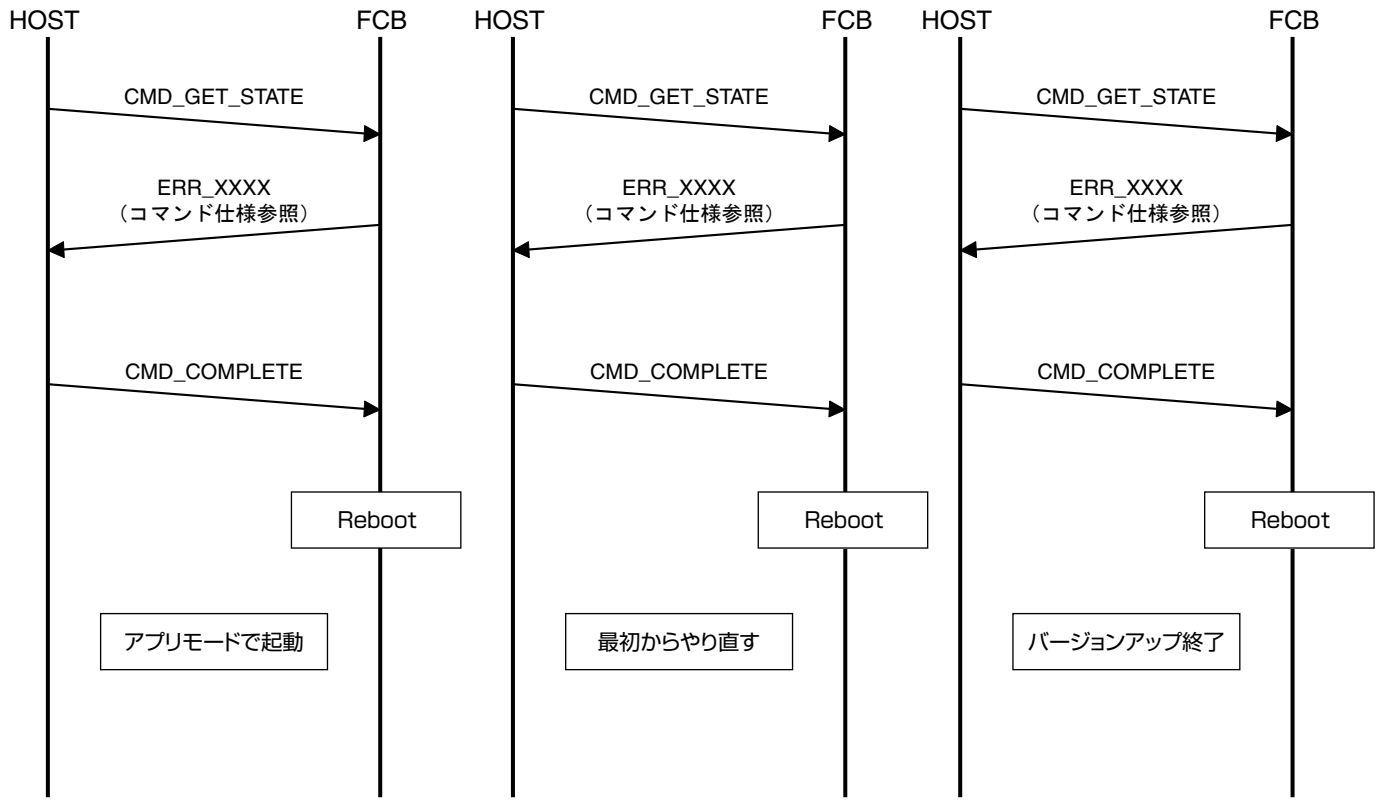


UART update-error 4



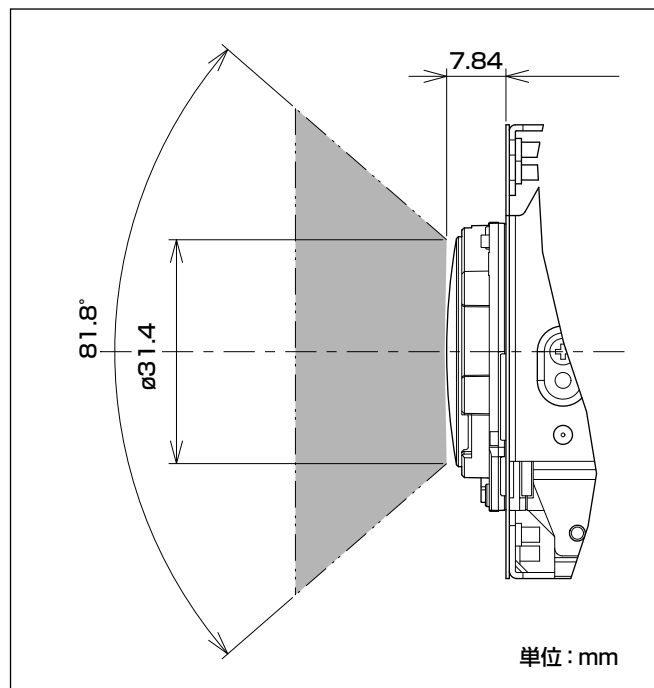
アップデート手順 (USB)

アップデート (USB) のエラーパターンは、以下になります。

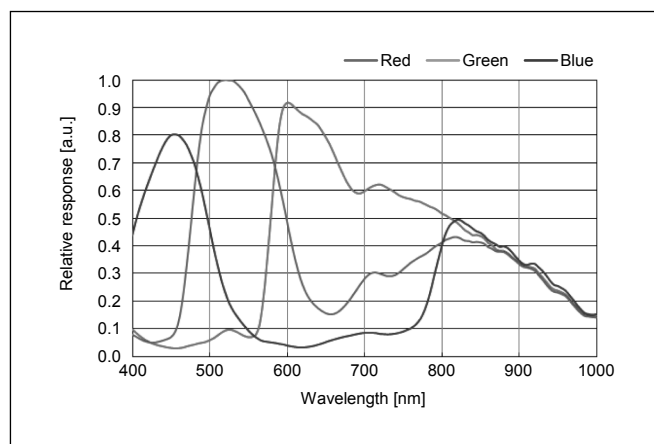


ケラレについて

ハウジングを設計する際は、下図のケラレ制限にご注意ください。



分光感度特性例



特性例は参考値です。保証するものではありません。

IR カットフィルターをはずした状態、レンズの特性および光源特性を除いたデータです。

初期値とカスタムプリセットとバックアップ

「初期値」は、工場出荷時の設定値です。

「スタンバイ時バックアップ」は、スタンバイモードにしても保持されるデータを○、保持されないデータを×で示しています。

Mode/Position 設定	初期値設定	カスタムプリセット	スタンバイ時バックアップ
Zoom Position	wide 端	○	○
D-Zoom On/Off	Off	○	○
D-Zoom Separate/Combine	Combine	○	○
D-Zoom Position	00h	○	○
Focus Position	—	○	○
Focus Auto/Manual	Auto	○	○
Near Limit 設定	B000 (35 cm)	○	○
AF Sensitivity	Normal	○	○
AF Mode	Normal	○	○
AF 駆動時間	5 秒	○	○
AF インターバル	5 秒	○	○
WB Mode	Auto	○	○
WB Data (Rgain、Bgain)	—	○	○
One Push WB Data	—	○	○
AE Mode	Full Auto	○	○
AE Response	01h	○	○
Shutter Position	—	○	○
Maximum Shutter Limit	1Dh: 1/2000 (59.94 fps) 1Dh: 1/1750 (50 fps) 1Dh: 1/2000 (29.97 fps) 1Dh: 1/1750 (25 fps) 1Eh: 1/1200 (23.98 fps)	○	○
Minimum Shutter Limit	12h: 1/60 (59.94 fps) 12h: 1/50 (50 fps) 10h: 1/30 (29.97 fps) 10h: 1/25 (25 fps) 12h: 1/48 (23.98 fps)	○	○
Slow Shutter Limit	0Dh: 1/10 (59.94 fps) 0Dh: 1/10 (29.97 fps) 0Dh: 1/12 (50 fps) 0Dh: 1/12 (25 fps) 0Dh: 1/12 (23.98 fps)	○	○
Iris Position	19h: F2.0	○	○
Gain Position	01h: 0 dB	○	○
Bright Position	—	○	○
露出補正 On/Off	Off	○	○
露出補正量	± 0	○	○
BackLight On/Off	Off	○	○
Spot AE On/Off	Off	○	○
Spot AE 位置設定	X=8、Y=8	○	○
Detail Level	07h	○	○
高解像度モード On/Off	Off	○	○
左右反転 On/Off	Off	○	○
フリーズ On/Off	Off	×	×
Picture Effect	Off	○	○
ICR On/Off	Off	○	○

Mode/Position 設定	初期値設定	カスタム プリセット	スタンバイ時 バックアップ
Auto ICR On/Off	Off	○	○
Auto ICR スレッシュレベル	0Eh	○	○
Camera Memory	工場出荷時と同じ	×	○
Display On/Off	Off	○	○
Mute On/Off	Off	×	×
Auto ICR Alarm On/Off	Off	○	○
NR レベル	3	○	○
Image Stabilizer	Off	○	○
Gain Limit	Off	○	○
低照度色消し	1h (Low)	○	○
Color Gain	4h (100%)	○	○
Color Hue	7h (0 度)	○	○
Title Display On/Off	Off	○	○
Title 設定	—	○	○
Mask 設定	—	○	○
Mask Color 設定	—	○	○
センターライン表示 On/Off	Off	○	○
上下左右反転 On/Off	Off	○	○
Privacy Zone On/Off	Off	○	○
Privacy Zone 設定	—	○	○
Camera ID	0000h	×	○
ZoomPos 連続出力 On/Off	Off	×	○
ZoomPos 連続出力 インターバル	3Ch	×	○
HLC レベル	Off	○	○
HLC マスクレベル	Off	○	○

ご注意

- 不揮発メモリーの書き込み可能回数（カスタムプリセット実行）は有限です。
- デジタルズーム中のプライバシーゾーン設定についてはカスタムプリセットで保持されません。

モード条件

条件

Mode	Power Off	イニシャル中	Power On	フリーズ On	MemRecall
Address Set	○	○	○	○	○
IF_Clear	○	○	○	○	○
Command Cancel	○	○	○	○	○
Power On/Off	○	○	○	○	○

レンズ

Mode	Power Off	イニシャル中	Power On	フリーズ On	MemRecall	Zoom Direct	Focus Direct	ZnFo Direct	Focus Auto
Zoom Tele/Wide/Stop	×	×	○	○	×	×	○	×	○
Zoom Direct	×	×	○	○	×	○	○	×	○
Zoom Focus Direct	×	×	○	○	×	×	×	○	×
D-Zoom On/Off	×	×	○	○	×	×	○	×	○
D-Zoom Separate/Combine	×	×	○	○	×	×	○	×	○
D-Zoom Tele/Wide/Stop	×	×	○	○	×	○	○	○	○
D-Zoom × 1/Max	×	×	○	○	×	○	○	○	○
D-Zoom Direct	×	×	○	○	×	○	○	○	○
Focus Far/Near/Stop	×	×	○	○	×	○	×	×	×
Focus Direct	×	×	○	○	×	○	○	×	×
Focus Auto/Manual	×	×	○	○	×	○	×	×	○
One Push AF	×	×	○	○	×	○	×	×	×
Focus Near Limit	×	×	○	○	×	○	×	×	○
AF Sensitivity Normal/Low	×	×	○	○	×	○	○	○	○
AF Mode Norm/Interval/Zoom	×	×	○	○	×	○	○	○	○
AF 起動時間/インターバル設定	×	×	○	○	×	○	○	○	○
Camera Memory Set/Reset	×	×	○	○	×	×	×	×	○
Camera Memory Recall	×	×	○	○	○	×	×	×	○
Lens Initialize	×	×	○	○	×	×	×	×	○

ホワイトバランス

Mode	Power Off	イニシャル中	Power On	フリーズ On	MemRecall	WB Auto	Indoor	Outdoor	Outdoor Auto	Sodium Lamp	Sodium Lamp Auto	Sodium Lamp Outdoor Auto	OnePush	ATW	Manual
WB Mode 切換	×	×	○	○	×	○	○	○	○	○	○	○	○	○	○
One Push WB	×	×	○	○	×	×	×	×	×	×	×	×	○	×	×
RGain 設定	×	×	○	○	×	×	×	×	×	×	×	×	×	×	○
BGain 設定	×	×	○	○	×	×	×	×	×	×	×	×	×	×	○

露出

Mode	Power Off	イニシャル中	Power On	フリーズ On	MemRecall	AE Full Auto	AE Manual	Shutter Priority	Iris Priority	Bright
AE Full Auto	×	×	○	○	×	○	○	○	○	○
AE Manual	×	×	○	○	×	○	○	○	○	○
Shutter Priority	×	×	○	○	×	○	○	○	○	○
Iris Priority	×	×	○	○	×	○	○	○	○	○
Bright	×	×	○	○	×	×	×	○	×	○
Shutter 設定	×	×	○	○	×	×	○	○	×	×
Iris 設定	×	×	○	○	×	×	○	×	○	×
Gain 設定	×	×	○	○	×	×	○	×	×	×
Bright 設定	×	×	○	○	×	×	×	×	×	○
Auto Slow Shutter On/Off	×	×	○	○	×	○	○	○	○	○
露出補正 On/Off	×	×	○	○	×	○	○	○	○	○
露出補正設定	×	×	○	○	×	○	○	○	○	○
BackLight On/Off	×	×	○	○	×	○	○	○	○	○
SpotAE On/Off	×	×	○	○	×	○	○	○	○	○
SpotAE 設定	×	×	○	○	×	○	○	○	○	○
Defog On/Off	×	×	○	○	○	○	○	○	○	○
Minimum Shutter On/Off	×	×	○	○	×	○	○	○	○	○
VE On/Off	×	×	○	○	×	○	○	○	○	○
HLC Setting (On/Off/Mask Level)	×	×	○	○	×	○	○	○	○	○

その他

Mode	Power Off	イニシャル中	Power On	フリーズ On	MemRecall
Aperture 設定	×	×	○	○	×
高解像度モード On/Off	×	×	○	○	○
左右反転 On/Off	×	×	○	○	○
フリーズ On/Off	×	×	○	○	○
Picture Effect 設定	×	×	○	○	○
ICR On/Off	×	×	○	○	○
Auto ICR On/Off	×	×	○	○	×
Auto ICR スレッシュレベル設定	×	×	○	○	○
Auto ICR Alarm On/Off	×	○	○	○	○
Display On/Off	×	×	○	○	○
Mute On/Off	×	×	○	○	○
Title 設定	×	×	○	○	○
Mask On/Off	×	×	○	○	○
Mask 設定	×	×	○	○	○
MD On/Off	×	×	○	○	○
ID Write	×	×	○	○	○
Memory Save	×	×	○	○	○
Register Value 設定	×	×	○	○	○
NR レベル設定	×	×	○	○	○
Chroma Suppress	×	×	○	○	○
Color Gain	×	×	○	○	○
Color Hue	×	×	○	○	○

コマンドリスト

VISCA/RS-232C コマンド

本コマンドリストをもとに作成した RS-232C コントローラソフトウェアの動作により生じたお客様のハードウェアおよびソフトウェアの不具合、損害についてソニー（株）は保証いたしませんのであらかじめご了承ください。

VISCA の概要

VISCA ではコンピューターなどコマンドを出す側をコントローラー、FCB カメラなどコマンドを受ける側を周辺機器と呼びます。FCB カメラはそれが一つの周辺機器となります。VISCA では RS-232C に準拠した通信を用い、FCB カメラのような周辺機器を 1 台のコントローラーに 7 台まで接続することができます。RS-232C のパラメーターは以下のとおりです。

- 通信速度：9.6 kbps/19.2 kbps/38.4 kbps/
115.2 kbps
- データ長：8 ビット
- スタートビット：1 ビット
- ストップビット：1 ビット
- パリティなし

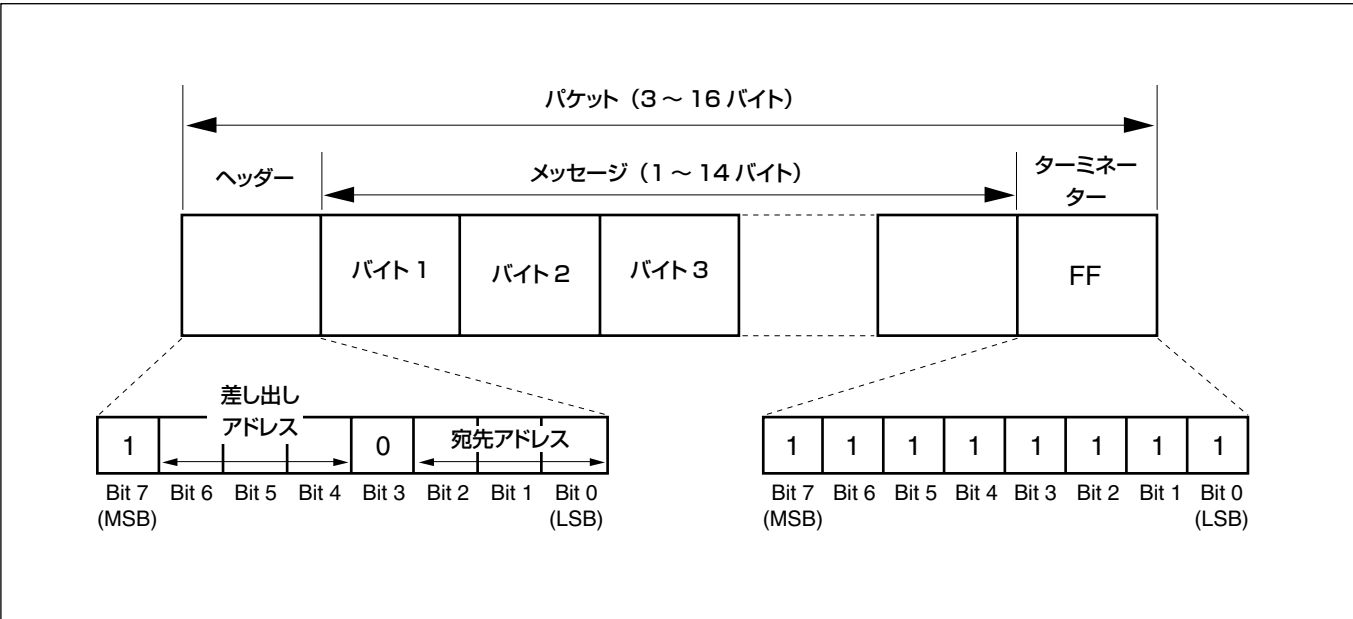
XON/XOff、RTS/CTS などを使用するフローコントロールはサポートしていません。

VISCA の通信形式

VISCA パケットの構造

VISCA 通信の基本単位をパケットと呼びます。パケットの最初のバイトはヘッダーと呼び、差し出しと宛先のアドレスが入っています。例えば、アドレス 0 のコントローラーからアドレス 1 の FCB カメラへ送るパケットのヘッダーは 16 進数で 81h となります。アドレス 2 の FCB カメラへ送るパケットは 82h となります。コマンドリスト表ではヘッダーを 8X としてありますので、X の部分に FCB カメラのアドレスを入れてください。また、アドレス 1 の FCB カメラからの応答パケットのヘッダーは 90h となります。アドレス 2 の FCB カメラからのパケットは A0h となります。

カメラ ID に依らずコマンドを送信することをブロードキャストといいます。
ブロードキャストの場合はヘッダーを 16 進数で 88h とします。
ターミネーターは FFh でパケットの終わりを示します。
ブロードキャストで送信されたコマンドに対し、カメラ側で対応できるのは Address Set と IF_Clear の2つのコマンドのみです。



コマンドと問い合わせ

- コマンド (Command)
FCB カメラに動作の指示をします。
- 問い合わせ (Inquiry)
FCB カメラの状態などを調べるのに使用します。

	Command Packet	Note
Inquiry	8X QQ RR ...FF	QQ ¹⁾ =Command/Inquiry, RR ²⁾ =category code

¹⁾ QQ =01 (Command), 09 (Inquiry)
²⁾ RR =00 (Interface), 04 (camera 1), 06 (Pan/Tilt),
07 (camera 2)

X =1 ~ 7: FCB カメラのアドレス

コマンドと問い合わせに対する応答

● Acknowledge メッセージ

コマンドを受け取ったとき FCB カメラが返します。問い合わせの場合、Acknowledge メッセージは返されません。

● 完了メッセージ

コマンドや問い合わせを実行終了したとき FCB カメラが返します。コマンドが問い合わせの場合は、パケットの 3 バイト目以降に問い合わせに対する応答データが入ります。Acknowledge メッセージが省略された場合、ソケット番号には 0 が入ります。

	Reply Packet
Acknowledge	X0 4Y FF
Completion (Commands)	X0 5Y FF
Completion (Inquiries)	X0 5Y ...FF
X = 9 ~ F: FCB カメラのアドレス + 8、Y = ソケット番号	

● エラーメッセージ

コマンドを実行できないとき、または実行に失敗したときは、Acknowledge メッセージのかわりにエラーメッセージを返します。Acknowledge メッセージ後、すぐには処理を完了しない一部のコマンド（ズーム等）では Acknowledge メッセージの後でエラーメッセージを返す場合があります。

問い合わせ命令を実行できないとき、または実行に失敗したときは、完了メッセージのかわりにエラーメッセージを返します。

Error Packet	Description
X0 6Y 01 FF	Message length error (>14bytes)
X0 6Y 02 FF	Syntax Error
X0 6Y 03 FF	Command buffer full
X0 6Y 04 FF	Command cancelled
X0 6Y 05 FF	No socket (to be cancelled)
X0 6Y 41 FF	Command not executable
X = 9 ~ F: FCB カメラのアドレス + 8、Y = ソケット番号	

ソケット番号

FCB カメラにコマンドメッセージを送ったときは、完了メッセージかエラーメッセージが戻ってくるのを待ってから次のコマンドメッセージを送るようにしてください。しかし、より高度な使い方に対応するため、FCB カメラはコマンド用のバッファ（メモリ）を 2 組持っていて、実行中のコマンドを含めて 2 つまでのコマンドを受け取れるようになっています。FCB カメラはコマンドを受け取ったとき、どちらのコマンドバッファを使ったかを Acknowledge メッセージのソケット番号で知らせます。完了メッセージやエラーメッセージにもソケット番号がついているので、どちら

のコマンドが終了したのかを知ることができます。コマンドバッファが 2 つとも使われているときでも、FCB カメラ管理用コマンドと一部の問い合わせメッセージは実行可能です。

これらのコマンドや問い合わせに対しては Acknowledge メッセージが返されず、ソケット番号 0 の完了メッセージのみが返されます。

コマンド実行中止

コマンドを送ってから取り消したいときは Cancel コマンドを送ります。2 つのコマンドを送った後そのうち 1 つだけを取り消したいときは、キャンセルメッセージを使います。

	Cancel Packet
Cancel	8X 2Y FF
X = 1 ~ 7: FCB カメラのアドレス、Y = ソケット番号	

このコマンドに対しては Command canceled のエラーメッセージが返されますが、動作異常を示すものではありません。コマンドがキャンセルされたメッセージです。

VISCA コマンド / Acknowledge プロトコル

コマンド	Command Message	Reply Message	コメント
一般コマンド	81 01 04 38 02 FF (Example)	90 41 FF (Acknowledge)+90 51 FF (Completion) 90 42 FF 90 52 FF	コマンドの受け付けに対して Acknowledge、コマンドの実行完了に対して Completion を返す。
	81 01 04 38 FF (Example)	90 60 02 FF (Syntax Error)	対応していないコマンド、またはパラメーターが不足しているコマンドを受け付けた。
	81 01 04 38 02 FF (Example)	90 60 03 FF (Command Buffer Full)	実行中のコマンドが 2 つあり、コマンドを受け付けることができなかった。
	81 01 04 08 02 FF (Example)	90 61 41 FF (Command Not Executable) 90 62 41 FF	現在のモードではそのコマンドを実行することができなかった。
問い合わせコマンド	81 09 04 38 FF (Example)	90 50 02 FF (Completion)	問い合わせコマンドには Acknowledge は返さない。
	81 09 05 38 FF (Example)	90 60 02 FF (Syntax Error)	対応していないコマンドを受け付けた。
Address Set	88 30 01 FF	88 30 02 FF	機器アドレスを+ 1 して戻される。
IF_Clear(Broadcast)	88 01 00 01 FF	88 01 00 01 FF	同じコマンドが返される。
IF_Clear (x に対して)	8x 01 00 01 FF	z0 50 FF (Completion)	このコマンドに関しては Acknowledge は返さない。
Command Cancel	8x 2y FF	z0 6y 04 FF (Command Canceled)	指定したソケットのコマンドがキャンセルされたとき返される。キャンセルされたコマンドの Completion は返されない。
		z0 6y 05 FF (No Socket)	指定したソケットのコマンドがすでに完了していたとき、指定したソケット番号が間違っていたとき返される。

VISCA カメラ発行メッセージ

Acknowledge / 完了 メッセージ

	Command Message	コメント
Acknowledge	z0 4y FF (y:Socket No.)	コマンドを受け付けたことに対して返される。
Completion	z0 5y FF (y:Socket No.)	コマンドの実行完了で返される。

z = 機器アドレス +8

エラーメッセージ

	Command Message	コメント
Syntax Error	z0 60 02 FF	コマンドフォーマットが異なるか、コマンドパラメーターが不正なコマンドを受けたときに返される。
Command Buffer Full	z0 60 03 FF	2 つのソケットがすでに使われていて (2 つのコマンドを実行中)、さらにコマンドを受けたときコマンドが受け付けられなかったことを示す。
Command Canceled	z0 6y 04 FF (y:Socket No.)	キャンセルコマンドで指定したソケットで、実行中のコマンドがキャンセルされたときに返される。実行中のコマンドの完了メッセージは戻らない。
No Socket	z0 6y 05 FF (y:Socket No.)	キャンセルコマンドで指定したソケットで、実行中のコマンドがないとき、もしくは無効なソケット番号を指定したときに返される。
Command Not Executable	z0 6y 41 FF (y:Socket No.)	条件により、動作不可能なコマンドを受けたときに返される。例えばオートフォーカス中、マニュアルでフォーカスを制御するコマンドを受けたときなどである。

Network Change メッセージ

	Command Message	コメント
Network Change	z0 38 FF	カメラに電源が通電されたとき発行される。

FCB カメラコマンド

コマンドリスト (1/6)

Command Set	Command	Command Packet	Comments
AddressSet	Broadcast	88 30 0p FF	アドレス設定 p:Address
IF_Clear	—	8x 01 00 01 FF	I/Fクリア
	Broadcast	88 01 00 01 FF	
CommandCancel	—	8x 2p FF	p: Socket No. (=1 or 2)
CAM_Power	On	8x 01 04 00 02 FF	電源オン/オフ
	Off (Standby)	8x 01 04 00 03 FF	
CAM_Zoom	Stop	8x 01 04 07 00 FF	—
	Tele (Standard)	8x 01 04 07 02 FF	
	Wide (Standard)	8x 01 04 07 03 FF	
	Tele (Variable)	8x 01 04 07 2p FF	p=0 (低速) ~7 (高速)
	Wide (Variable)	8x 01 04 07 3p FF	
	Direct	8x 01 04 47 0p Oq Or Os FF	pqrs: Zoom Position 最小0000h 最大4000h (Separateモード時) 最大4000h (Combineモード、DZoom=Off時) 最大5556h (Combineモード、DZoom=スーパーリゾリューションズーム、モニタリングモード QFHD時) 最大6000h (Combineモード、DZoom=スーパーリゾリューションズーム、モニタリングモード FHD以下時) 最大7AC0h (Combineモード、DZoom=On時)
CAM_DZoom	On	8x 01 04 06 02 FF	デジタルズームオン/オフ/スーパーリゾリューションズーム
	Off	8x 01 04 06 03 FF	
	Super Resolution Zoom	8x 01 04 06 04 FF	
	Combine Mode	8x 01 04 36 00 FF	光学/デジタルズーム複合
	Separate Mode	8x 01 04 36 01 FF	光学/デジタルズーム単独
	Stop	8x 01 04 06 00 FF	—
	Tele (Variable)	8x 01 04 06 2p FF	p=0 (低速) ~7 (高速)
	Wide (Variable)	8x 01 04 06 3p FF	* Separate Modeのときに有効
	x1/Max	8x 01 04 06 10 FF	x1/MAX 倍率切り換え * Separate Mode のときに有効
	Direct	8x 01 04 46 00 00 0p Oq FF	pq: D-Zoom Position (00h ~ EBh) * Separate Mode のときに有効
CAM_Focus Mode	Auto Focus	8x 01 04 38 02 FF	AFオン/オフ
	Manual Focus	8x 01 04 38 03 FF	
	Auto/Manual	8x 01 04 38 10 FF	
CAM_Focus	Stop	8x 01 04 08 00 FF	—
	Far (Standard)	8x 01 04 08 02 FF	
	Near (Standard)	8x 01 04 08 03 FF	
	Far (Variable)	8x 01 04 08 2p FF	p=0 (低速) ~7 (高速)
	Near (Variable)	8x 01 04 08 3p FF	
	Direct	8x 01 04 48 0p Oq Or Os FF	pqrs: Focus Position 0000h ~ F000h
	One Push Trigger	8x 01 04 18 01 FF	ワンプッシュAFトリガー
	Near Limit	8x 01 04 28 0p Oq Or Os FF	pqrs: Focus Near Limit Position 1000h~F000h
CAM_AFMode	Normal AF	8x 01 04 57 00 FF	AF動作モード
	Interval AF	8x 01 04 57 01 FF	
	Zoom Trigger AF	8x 01 04 57 02 FF	
	Active/Interval Time	8x 01 04 27 0p Oq Or Os FF	pq: 動作時間、rs: インターバル

コマンドリスト (2/6)

Command Set	Command	Command Packet	Comments
CAM_SpotFocus	On	8x 01 05 08 02 FF	pq: X (0h~Fh),rs: Y(0h~Fh)
	Off	8x 01 05 08 03 FF	
	Position	8x 01 05 68 0p 0q 0r 0s FF	
CAM_AFSensitivity	Normal	8x 01 04 58 02 FF	AF感度切り換え
	Low	8x 01 04 58 03 FF	
CAM_IRCorrection	Standard	8x 01 04 11 00 FF	Focus IR補正データの切り換え
	IR Light	8x 01 04 11 01 FF	
CAM_ZoomFocus	Direct	8x 01 04 47 0p 0q 0r 0s 0t 0u 0v 0w FF	pqrs: Zoom Position tuvw: Focus Position
CAM_Initialize	Lens	8x 01 04 19 01 FF	レンズイニシャライズ起動
	Camera	8x 01 04 19 03 FF	カメラリセット
CAM_WB	Auto	8x 01 04 35 00 FF	ノーマルオート
	Indoor	8x 01 04 35 01 FF	インドアモード
	Outdoor	8x 01 04 35 02 FF	アウトドアモード
	One Push WB	8x 01 04 35 03 FF	ワンプッシュWBモード
	ATW	8x 01 04 35 04 FF	全引き込みオート
	Manual	8x 01 04 35 05 FF	マニュアル設定モード
	Outdoor Auto	8x 01 04 35 06 FF	アウトドアオート
	Sodium Lamp Auto	8x 01 04 35 07 FF	ナトリウム灯光源含むオート
	Sodium Lamp	8x 01 04 35 08 FF	ナトリウム灯光源固定モード
	Sodium Lamp Outdoor Auto	8x 01 04 35 09 FF	ナトリウム灯光源含むアウトドアオート
CAM_WBTrigger	One Push Trigger	8x 01 04 10 05 FF	ワンプッシュWBトリガー
CAM_RGain	Reset	8x 01 04 03 00 FF	Rゲインマニュアル設定
	Up	8x 01 04 03 02 FF	
	Down	8x 01 04 03 03 FF	
	Direct	8x 01 04 43 00 00 0p 0q FF	pq: R Gain 00h~FFh
CAM_BGain	Reset	8x 01 04 04 00 FF	Bゲインマニュアル設定
	Up	8x 01 04 04 02 FF	
	Down	8x 01 04 04 03 FF	
	Direct	8x 01 04 44 00 00 0p 0q FF	pq: B Gain 00h~FFh
CAM_AE	Full Auto	8x 01 04 39 00 FF	フルオート
	Manual	8x 01 04 39 03 FF	マニュアル設定モード
	Shutter Priority	8x 01 04 39 0A FF	シャッター優先モード
	Iris Priority	8x 01 04 39 0B FF	アイリス優先モード
	Gain Priority	8x 01 04 39 0E FF	ゲイン優先モード
	Bright	8x 01 04 39 0D FF	ブライトモード(マニュアル)
CAM_LowLightBasis Brightness	On	8x 01 05 39 02 FF	p: Position
	Off	8x 01 05 39 03 FF	
	Position	8x 01 05 49 0p FF	
CAM_Shutter	Reset	8x 01 04 0A 00 FF	シャッター設定
	Up	8x 01 04 0A 02 FF	
	Down	8x 01 04 0A 03 FF	
	Direct	8x 01 04 4A 00 00 0p 0q FF	pq: Shutter Position
CAM_MaxShutter	Limit	8x 01 05 2A 00 0p 0q FF	pq: 高速シャッターリミット
CAM_MinShutter	Limit	8x 01 05 2A 01 0p 0q FF	pq: 低速シャッターリミット
CAM_SlowShutter	On	8x 01 04 5A 02 FF	スローシャッターオン/オフ
	Off	8x 01 04 5A 03 FF	
	Limit	8x 01 05 5A 0p 0q FF	pq: Slow Shutter Limit

コマンドリスト (3/6)

Command Set	Command	Command Packet	Comments
CAM_Iris	Reset	8x 01 04 0B 00 FF	アイリス設定
	Up	8x 01 04 0B 02 FF	
	Down	8x 01 04 0B 03 FF	
	Direct	8x 01 04 4B 00 00 0p 0q FF	pq: Iris Position
CAM_Gain	Reset	8x 01 04 0C 00 FF	ゲイン設定
	Up	8x 01 04 0C 02 FF	
	Down	8x 01 04 0C 03 FF	
	Direct	8x 01 04 4C 00 00 0p 0q FF	pq: Gain Position
	Gain Limit	8x 01 04 2C 0p FF	p: Gain Limit
	Gain Point Pos	8x 01 05 4C 0p 0q FF	pq: Gain Point
	Gain Point On/Off	8x 01 05 0C 0p FF	p:2=On, 3=Off
CAM_Bright	Reset	8x 01 04 0D 00 FF	ブライト設定
	Up	8x 01 04 0D 02 FF	
	Down	8x 01 04 0D 03 FF	
	Direct	8x 01 04 4D 00 00 0p 0q FF	pq: Bright Position
CAM_ExpComp	On	8x 01 04 3E 02 FF	露出補正オン／オフ
	Off	8x 01 04 3E 03 FF	
	Reset	8x 01 04 0E 00 FF	露出補正量設定
	Up	8x 01 04 0E 02 FF	
	Down	8x 01 04 0E 03 FF	
	Direct	8x 01 04 4E 00 00 0p 0q FF	pq: ExpComp Position 00h~0Eh
CAM_BackLight	On	8x 01 04 33 02 FF	逆光補正オン／オフ
	Off	8x 01 04 33 03 FF	
CAM_SpotAE	On	8x 01 04 59 02 FF	スポットAE設定
	Off	8x 01 04 59 03 FF	
	Position	8x 01 04 29 0p 0q 0r 0s FF	pq: X (0h~Fh) 、rs: Y (0h~Fh)
CAM_AE_Response	Direct	8x 01 04 5D pp FF	pp: AEレスポンス設定 (01h~30h) 、初期値: 01h
CAM_VE	Off	8x 01 04 3D 03 FF	VEオフ
	VE On	8x 01 04 3D 06 FF	VEオン
	Set Parameter	8x 01 04 2D 00 0q 0r 0s 00 00 00 00 FF	q : 表示明るさレベル (0 : 暗 ~ 6 : 明) r : 補正輝度選択 (0 : より暗い、1 : 暗い、2 : 補正なし、3 : 明るい) s : 補正強度 (0 : Low、1 : Mid、2 : High)
CAM_Defog	On	8x 01 04 37 02 0p FF	Defogオン／オフ p : Defog強度 (0 : mid、1 : low、2 : mid、3 : high)
	Off	8x 01 04 37 03 00 FF	
CAM_Aperture	Reset	8x 01 04 02 00 FF	輪郭強調 (アパーチャ) 設定
	Up	8x 01 04 02 02 FF	
	Down	8x 01 04 02 03 FF	
	Level	8x 01 04 42 00 00 0p 0q FF	pq: Aperture Gain (00h~0Fh)
	Mode	8x 01 05 42 01 0p FF	Auto (0)/Manual (1)の選択
	BandWidth	8x 01 05 42 02 0p FF	p: 帯域設定 0: default(初期値) 1: 低域 2: 中域 3: 広域 4: 広帯域
	Crispening	8x 01 05 42 03 0p FF	p: クリスプニング (0h~7h)
	H/V balance	8x 01 05 42 04 0p FF	p: H/V Balance (5h~9h)
	B/W balance	8x 01 05 42 05 0p FF	p: B/W Balance (0h~4h)
	Limit	8x 01 05 42 06 0p FF	p: リミット (0h~7h)
	HighLightDetail	8x 01 05 42 07 0p FF	p: 高輝度ディテール (0h~4h)
	SuperLow	8x 01 05 42 08 0p FF	p: 超低域強調 (0h~7h)

コマンドリスト (4/6)

Command Set	Command	Command Packet	Comments
CAM_HR	On	8x 01 04 52 02 FF	高解像度モードオン／オフ
	Off	8x 01 04 52 03 FF	
CAM_NR	Noise Reduction	8x 01 04 53 pp FF	p: NR設定 (00h: Off、01h～05h: レベル、7Fh: 2D/3Dマニュアル設定)
	2D NR/3D NR	8x 01 05 53 Op Oq FF	p: 2D NRレベル (0h～5h)、q: 3D NRレベル (0h～5h)
CAM_Stabilizer	On	8x 01 04 34 02 FF	イメージスタビライザーオン／オフ
	Off	8x 01 04 34 03 FF	
CAM_Gamma	—	8x 01 04 5B Op FF	p: Gamma設定 (0: Standard、1: Straight、2: Pattern)
	Pattern	8x 01 05 5B Op Oq Or FF	pqr: 選択パターン (001h～200h)
	Offset	8x 01 04 1E 00 00 00 0s 0t 0u FF	s: オフセット極性 (0のときプラス方向、1のときマイナス方向) tu: オフセット s=0 (00h～40h) オフセット s=1 (00h～40h)
CAM_HighSensitivity	On	8x 01 04 5E 02 FF	高感度モードオン／オフ
	Off	8x 01 04 5E 03 FF	
CAM_LR_Reverse	On	8x 01 04 61 02 FF	左右反転オン／オフ
	Off	8x 01 04 61 03 FF	
CAM_Freeze	On	8x 01 04 62 02 FF	フリーズオン／オフ
	Off	8x 01 04 62 03 FF	
CAM_PictureEffect	Off	8x 01 04 63 00 FF	ピクチャーエフェクト設定
	Black & White	8x 01 04 63 04 FF	
CAM_PictureFlip	On	8x 01 04 66 02 FF	上下左右反転オン／オフ
	Off	8x 01 04 66 03 FF	
CAM_ICR	On	8x 01 04 01 02 FF	ICRモードオン／オフ
	Off	8x 01 04 01 03 FF	
CAM_AutoICR	On	8x 01 04 51 02 FF	Auto ICRモードオン／オフ
	Off	8x 01 04 51 03 FF	
	Threshold	8x 01 04 21 00 00 Op Oq FF	pq: ICR On→Offスレッショレベル (00h～FFh)
CAM_AutoICRArmReply	On	8x 01 04 31 02 FF	Auto ICR切り換わりアラーム オン／オフ
	Off	8x 01 04 31 03 FF	
	(Reply)	y0 07 04 31 02 FF	ICR オフ→オン
		y0 07 04 31 03 FF	ICR オン→オフ
CAM_Memory	Reset	8x 01 04 3F 00 pp FF	pp: メモリー番号 (=0h～63h)
	Set	8x 01 04 3F 01 pp FF	
	Recall	8x 01 04 3F 02 pp FF	
CAM_Custom	Reset	8x 01 04 3F 00 7F FF	電源オン時に、このモードで立ち上がります。
	Set	8x 01 04 3F 01 7F FF	
	Recall	8x 01 04 3F 02 7F FF	
CAM_MemSave	Write	8x 01 04 23 0X Op Oq Or 0s FF	X: 00h～07h (アドレス) 計 16 Byte pqrs: 0000h～FFFFh (データ)
CAM_Display	On	8x 01 04 15 02 FF	ディスプレイオン／オフ
	Off	8x 01 04 15 03 FF	
	On/Off	8x 01 04 15 10 FF	
CAM_MultiLineTitle	Title Set1	8x 01 04 73 1L 00 nn pp qq 00 00 00 00 00 00 FF	L: Line Number、nn: H-Position pp: Color、qq: Blink
	Title Set2	8x 01 04 73 2L mm nn pp qq rr ss tt uu vv ww FF	L: Line Number mnpqrstuvw: 表示文字設定 (1～10文字目)
	Title Set3	8x 01 04 73 3L mm nn pp qq rr ss tt uu vv ww FF	L: Line Number mnpqrstuvw: 表示文字設定 (11～20文字目)

コマンドリスト (5/6)

Command Set	Command	Command Packet	Comments
CAM_MultiLineTitle	Title Clear	8x 01 04 74 1p FF	タイトル設定クリア (p: 0h~Ah, F=all line)
	On	8x 01 04 74 2p FF	タイトル表示オン/オフ (p:0h~Ah, F=all line)
	Off	8x 01 04 74 3p FF	
CAM_Mute	On	8x 01 04 75 02 FF	ミュートオン/オフ
	Off	8x 01 04 75 03 FF	
	On/Off	8x 01 04 75 10 FF	
CAM_PrivacyZone	SetMask	8x 01 04 76 mm nn Or Or Os Os FF	mm: マスク指定 nn 00: Modify, 01: New rr: W, ss: H
	SetMaskTable	8x 01 05 70 Op FF	p: Table (0h ~ 1h)
	Display	8x 01 04 77 pp pp pp pp FF	マスク表示 On/Off 設定 pp pp pp pp: マスク指定 (0: Off, 1: On)
	SetMaskColor	8x 01 04 78 pp pp pp pp qq rr FF	pp pp pp pp: マスクの表示色指定 qq: 0 選択時の色設定 rr: 1 選択時の色設定
	SetPanTiltAngle	8x 01 04 79 Op Op Op Oq Oq Oq FF	パンチルト角度設定 ppp: Pan, qq: Tilt
	SetPTZMask	8x 01 04 7B mm Op Op Op Oq Oq Oq Or Or Or Or FF	マスクに対するパン/チルト/ズーム設定 ppp: Pan, qq: Tilt, rrr: Zoom, mm: マスク指定
	Non_InterlockMask	8x 01 04 6F mm Op Op Oq Oq Or Or Os Os FF	mm: 非連動マスク指定 pp: X, qq: Y, rr: W, ss: H
	CenterLineOff	8x 01 04 7C 03 FF	センターライン表示オフ
	CenterLineOn	8x 01 04 7C 04 FF	センターライン表示オン
CAM_IDWrite	—	8x 01 04 22 Op Oq Or Os FF	pqrs: カメラID (=0000h~FFFFh)
CAM_ContinuousZoomPosReply	On	8x 01 04 69 02 FF	ZoomPosition data Continuous Outputオン/オフ
	Off	8x 01 04 69 03 FF	
	(Reply)	y0 07 04 69 Op Op Oq Oq Oq Oq FF	pp: D-Zoom Position * 00: ズームモードが Combine のとき qqqq: Zoom Position
CAM_ZoomPosReplyIntervalTimeSet	—	8x 01 04 6A 00 00 Op Op FF	pp: Interval Time [V周期] 01h~FFh
CAM_ContinuousFocusPosReply	On	8x 01 04 16 02 FF	Focus Position data Continuous Output オン/オフ
	Off	8x 01 04 16 03 FF	
	(Reply)	y0 07 04 16 00 00 Op Op Op Op FF	pppp: Focus Position
CAM_FocusPosReplyIntervalTimeSet	—	8x 01 04 1A 00 00 Op Op FF	pp: Interval Time [V周期] 01h~FFh
CAM_RegisterValue	—	8x 01 04 24 mn Op Oq FF	mn: Register No. (=00h~7Fh) pq: Register Value (=00h~FFh)
CAM_ChromaSuppress	—	8x 01 04 5F Op FF	p: Chroma Suppress 設定レベル 00: オフ 01h ~ 03h: オン (3 段階)。数字が大きくなるにつれて効果が高くなる。
CAM_ColorGain	Direct	8x 01 04 49 00 00 00 Op FF	p: Color Gain 設定 0h (60%) ~ Eh (200%)
CAM_ColorHue	Direct	8x 01 04 4F 00 00 00 Op FF	p: Color Hue 設定 0h (-14 度) ~ Eh (+14 度)

コマンドリスト (6/6)

Command Set	Command	Command Packet	Comments
CAM_ExExpComp (拡張コマンド)	Reset	8x 01 04 1F 0E 00 00 FF	露出補正レベルリセット
	Up	8x 01 04 1F 0E 02 pp FF	露出補正レベルを上げる pp: ステップ数 pp=00h ~ 7Fh (ただし、00h のときは 01h と同じ動作)
	Down	8x 01 04 1F 0E 03 pp FF	露出補正レベルを下げる pp: ステップ数 pp=00h ~ 7Fh (ただし、00h のときは 01h と同じ動作)
	Direct	8x 01 04 1F 4E 00 00 Op 0q FF	指定レベルに露出補正を設定する pq: レベル pq=00h ~ FFh
CAM_ExAperture (拡張コマンド)	Reset	8x 01 04 1F 02 00 00 FF	輪郭強調 (アパーチャー) リセット
	Up	8x 01 04 1F 02 02 pp FF	輪郭強調 (アパーチャー) レベルを上げる pp: ステップ数 pp=00h ~ 7Fh (ただし、00h のときは 01h と同じ動作)
	Down	8x 01 04 1F 02 03 pp FF	輪郭強調 (アパーチャー) レベルを下げる pp: ステップ数 pp=00h ~ 7Fh (ただし、00h のときは 01h と同じ動作)
	Direct	8x 01 04 1F 42 00 00 Op 0q FF	指定レベルに輪郭強調 (アパーチャー) を設定する pq: レベル pq=00h ~ FFh
CAM_ExAutoICR (拡張コマンド)	Threshold (On → Off)	8x 01 04 1F 21 00 00 Op 0q FF	pq: Auto ICR 時の ICR On → Off のしきい値 pq=00h ~ FFh
	On Level	8x 01 04 1F 21 01 00 Or 0s FF	pq: Auto ICR 時の ICR Off → On のしきい値 pq=00h ~ 16h
CAM_ExColorGain (拡張コマンド)	Direct	8x 01 04 1F 49 00 00 Op 0q FF	Color Gain 設定 pq: ゲイン設定レベル pq=00h (0%) ~ FFh (200%)
CAM_ExColorHue (拡張コマンド)	Direct	8x 01 04 1F 4F 00 00 Op 0q FF	Color Hue 設定 pq: 位相設定レベル pq=00h (-14 度) ~ FFh (14 度)
CAM_HLC	Parameter Set	8x 01 04 14 0p 0q FF	p: HLC レベル (0: Off, 1: On) q: HLC マスクレベル (0: Off, 1: On)
CAM_ColorBar	Off	8x 01 7E 04 7D 00 FF	—
	On (Color bar 100% 8 色)	8x 01 7E 04 7D 01 FF	
	On (Color bar 100% 7 色)	8x 01 7E 04 7D 02 FF	
	On (Gray scale)	8x 01 7E 04 7D 03 FF	
CAM_ePT	On	8x 01 7E 06 00 02 FF	yyyy: Pan Position、zzzz: Tilt Position ※補足追加 Pan Position は 6 画素単位、 Tilt Position は 4.5 画素単位 (小数切り捨て) 単位の指定になる。
	Off	8x 01 7E 06 00 03 FF	
	Absolute Position	8x 01 7E 06 20 00 00 Oy Oy Oy Oz Oz Oz Oz FF	
CAM_MaintenanceMode	Step1	8x 01 04 00 0C FF	メンテナンスモードで使用
	Step2	8x 01 04 00 0D FF	
	Step3	8x 01 04 00 13 FF	
	Step4	8x 01 04 00 04 FF	
	Update	8x 01 04 00 20 FF	

問い合わせコマンドリスト (1/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_PowerInq	8x 09 04 00 FF	y0 50 02 FF	On
		y0 50 03 FF	Off (Standby)
CAM_ZoomPosInq	8x 09 04 47 FF	y0 50 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM_DZoomModelInq	8x 09 04 06 FF	y0 50 02 FF	D-Zoom On
		y0 50 03 FF	D-Zoom Off
		y0 50 04 FF	スーパーリゾリューションズーム
CAM_DZoomC/ SModelInq	8x 09 04 36 FF	y0 50 00 FF	Combine Mode
		y0 50 01 FF	Separate Mode
CAM_DZoomPosInq	8x 09 04 46 FF	y0 50 00 00 0p 0q FF	pq: D-Zoom Position
CAM_FocusModelInq	8x 09 04 38 FF	y0 50 02 FF	Auto Focus
		y0 50 03 FF	Manual Focus
CAM_FocusPosInq	8x 09 04 48 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Position
CAM_FocusNearLimitInq	8x 09 04 28 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Near Limit Position
CAM_SpotFocusModelInq	8x 09 05 08 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_SpotFocusPosInq	8x 09 05 68 FF	y0 50 0p 0q 0r 0s FF	pq: X、rs: Y
CAM_AFSensitivityInq	8x 09 04 58 FF	y0 50 02 FF	AF Sensitivity Normal
		y0 50 03 FF	AF Sensitivity Low
CAM_AFModelInq	8x 09 04 57 FF	y0 50 00 FF	Normal AF
		y0 50 01 FF	Interval AF
		y0 50 02 FF	Zoom Trigger AF
CAM_AFTimeSettingInq	8x 09 04 27 FF	y0 50 0p 0q 0r 0s FF	pq: 動作時間、rs: インターバル
CAM_LowLightBasis BrightnessInq	8x 09 05 39 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_LowLightBasis BrightnessPosInq	8x 09 05 49 FF	y0 50 0p FF	p: Position
CAM_IRCorrectionInq	8x 09 04 11 FF	y0 50 00 FF	Standard
		y0 50 01 FF	IR Light
CAM_WBModelInq	8x 09 04 35 FF	y0 50 00 FF	Auto
		y0 50 01 FF	Indoor
		y0 50 02 FF	Outdoor
		y0 50 03 FF	One Push WB
		y0 50 04 FF	ATW
		y0 50 05 FF	Manual
		y0 50 06 FF	Outdoor Auto
		y0 50 07 FF	Sodium Lamp Auto
		y0 50 08 FF	Sodium Lamp
		y0 50 09 FF	Sodium Lamp Outdoor Auto
CAM_RGainInq	8x 09 04 43 FF	y0 50 00 00 0p 0q FF	pq: R Gain
CAM_BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain
CAM_AEModelInq	8x 09 04 39 FF	y0 50 00 FF	Full Auto
		y0 50 03 FF	Manual
		y0 50 0A FF	Shutter Priority
		y0 50 0B FF	Iris Priority
		y0 50 0D FF	Bright
CAM_ShutterPosInq	8x 09 04 4A FF	y0 50 00 00 0p 0q FF	pq: Shutter Position
CAM_MaxShutterInq	8x 09 05 2A 00 FF	y0 50 0p 0q FF	pq: 高速シャッターリミット

問い合わせコマンドリスト (2/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_MinShutterInq	8x 09 05 2A 01 FF	y0 50 0p 0q FF	pq: 低速シャッターリミット
CAM_SlowShutterInq	8x 09 04 5A FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_SlowShutterLimitInq	8x 09 05 5A FF	y0 50 0p 0q FF	pq: Slow Shutter Limit
CAM_IrisPosInq	8x 09 04 4B FF	y0 50 00 00 0p 0q FF	pq: Iris Position
CAM_GainPosInq	8x 09 04 4C FF	y0 50 00 00 0p 0q FF	pq: Gain Position
CAM_GainLimitInq	8x 09 04 2C FF	y0 50 0q FF	p: Gain Limit
CAM_GainPointInq	8x 09 05 4C FF	y0 50 0p 0q FF	pq: Gain Point
Gain Point On/Off Inq	8x 09 05 0C FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_BrightPosInq	8x 09 04 4D FF	y0 50 00 00 0p 0q FF	pq: Bright Position
CAM_ExpCompModelInq	8x 09 04 3E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ExpCompPosInq	8x 09 04 4E FF	y0 50 00 00 0p 0q FF	pq: ExpComp Position
CAM_BackLightModelInq	8x 09 04 33 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_SpotAEPoSInq	8x 09 04 29 FF	y0 50 0p 0q 0r 0s FF	pq: X Position, rs: Y Position
CAM_SpotAEModelInq	8x 09 04 59 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_VEModelInq	8x 09 04 3D FF	y0 50 03 FF	Off
		y0 50 06 FF	VE On
CAM_VEParameterInq	8x 09 04 2D FF	y0 50 00 0q 0r 0s 0t 0u 00 00 FF	q: 表示明るさレベル (0: 暗~6: 明) r: 補正輝度選択 (0: より暗い、1: 暗い、2: 補正なし、3: 明るい) s: 補正強度 (00h: Low、01h: Mid、02h: High) tu: 常に0
CAM_AEResponseInq	8x 09 04 5D FF	y0 50 pp FF	pp: 01h~30h
CAM_DefogInq	8x 09 04 37 FF	y0 50 02 0p FF	p: Defog強度 (0: mid、1: low、2: mid、3: high)
		y0 50 03 00 FF	Defogオフ
CAM_ApertureInq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain
CAM_ApertureModelInq	8x 09 05 42 01 FF	x0 50 0p FF	p: Auto (0)、Manual (1)
CAM_ApertureBandwidthInq	8x 09 05 42 02 FF	x0 50 0p FF	p: 帯域設定
CAM_ApertureCrispeningInq	8x 09 05 42 03 FF	x0 50 0p FF	p: クリスプニング
CAM_ApertureH/VBalance	8x 09 05 42 04 FF	x0 50 0p FF	p: H/Vバランス
CAM_ApertureB/WBalance	8x 09 05 42 05 FF	x0 50 0p FF	p: B/W バランス
CAM_ApertureLimitInq	8x 09 05 42 06 FF	x0 50 0p FF	p: リミット
CAM_ApertureHighLightDetailInq	8x 09 05 42 07 FF	x0 50 0p FF	p: 高輝度ディティール
CAM_ApertureSuperLowInq	8x 09 05 42 08 FF	x0 50 0p FF	p: 超低域強調
CAM_HRModelInq	8x 09 04 52 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_NRInq	8x 09 04 53 FF	y0 50 0p FF	ノイズリダクション p: 00h~05h、7Fh
CAM_NR2D3DInq	8x 09 05 53 FF	y0 50 0p 0q FF	p: 2D NR Level, q: 3D NR Level
CAM_StabilizerModelInq	8x 09 04 34 FF	y0 05 02 FF	On
		y0 05 03 FF	Off
CAM_GammaInq	8x 09 04 5B FF	y0 50 0p FF	ガンマ p: 00h、01h
CAM_GammaPatternInq	8x 09 05 5B FF	y0 50 0p 0q 0r FF	pqr: 選択パターン

問い合わせコマンドリスト (3/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_GammaOffsetInq	8x 09 04 1E FF	y0 50 00 00 00 0s 0t 0u FF	s: オフセット極性(0のときプラス方向、1のときマイナス方向) tu: オフセット s=0(00h~40h) オフセット s=1(00h~10h)
CAM_HighSensitivityInq	8x 09 04 5E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_LR_ReverseModelInq	8x 09 04 61 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_FreezeModelInq	8x 09 04 62 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_PictureEffectModelInq	8x 09 04 63 FF	y0 50 00 FF	Off
		y0 50 04 FF	Black & White
CAM_PictureFlipModelInq	8x 09 04 66 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ICRModelInq	8x 09 04 01 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_AutoICRModelInq	8x 09 04 51 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_AutoICRThresholdInq	8x 09 04 21 FF	y0 50 00 00 0p 0q FF	pq: ICR On → Off Threshold Level
CAM_AutoICRAAlarmReplyInq	8x 09 04 31 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_AutoICRAAlarmReply	(Reply)	y0 07 04 31 0p FF	p: 2=Off → On、3=On → Off
CAM_MemoryInq	8x 09 04 3F FF	y0 50 pp FF	pp: 最後にRecallしたメモリー番号
CAM_MemSaveInq	8x 09 04 23 0X FF	y0 50 0p 0q 0r 0s FF	X: 00h ~ 07h (アドレス) pqrs: 0000h ~ FFFFh (データ)
CAM_DisplayModelInq	8x 09 04 15 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_MuteModelInq	8x 09 04 75 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_SetMaskTableInq	8x 09 05 70 FF	y0 50 0m FF	m: Table
CAM_PrivacyDisplayInq	8x 09 04 77 FF	y0 50 pp pp pp pp FF	pp pp pp pp : マスク表示 (0: Off、1: On)
CAM_PrivacyPanTiltInq	8x 09 04 79 FF	y0 50 0p 0p 0p 0q 0q 0q FF	ppp: Pan、qqq: Tilt
CAM_PrivacyPTZInq	8x 09 04 7B mm FF	y0 50 0p 0p 0p 0q 0q 0q 0r 0r 0r 0r FF	mm: マスク指定 ppp: Pan、qqq: Tilt、rrrr: Zoom
CAM_PrivacyMonitorInq	8x 09 04 6F FF	y0 50 pp pp pp pp FF	pp pp pp pp: 現在マスクが表示されている
CAM_IDInq	8x 09 04 22 FF	y0 50 0p 0q 0r 0s FF	pqrs: カメラ ID
CAM_VersionInq	8x 09 00 02 FF	y0 50 00 20 mn pq rs tu vw FF	mnpq: Model Code 0709: FCB-ER8530 070A: FCB-ER8550 rstu: ROM version vw: Socket Number (=02)
CAM_ContinuousZoomPosReplyModelInq	8x 09 04 69 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ZoomPosReplyIntervalTimeInq	8x 09 04 6A FF	y0 50 00 00 0p 0p FF	pp: Interval Time
CAM_ContinuousFocusPosReplyModelInq	8x 09 04 16 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ExAutoICROnLevelInq	8x 09 04 1F 21 01 FF	y0 50 00 00 0p 0q FF	pq: Auto ICR時のICR Off-Onのしきい値 pq=00h~1Ch
CAM_HLCInq	8x 09 04 14 FF	y0 50 0p 0q FF	p: HLC レベル (0: OFF、1: 弱、2: 中、3: 強) q: HLC マスクレベル (0: OFF、1 ~ F: レベル弱~強)

問い合わせコマンドリスト (4/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_RegisterValueInq	8x 09 04 24 pp FF	y0 50 0q 0q FF	pp: Register No.
CAM_FocusPosReplyIntervalInq	8x 09 04 1A FF	y0 50 00 00 Op Op FF	pp: Interval Time
(Reply)	-	y0 07 04 16 00 00 Op Op Op Op FF	pppp: Focus Position
CAM_ColorBarInq	8x 09 7E 04 7D FF	y0 50 00 FF	OFF
		y0 50 01 FF	カラーバー 100% 8 色
		y0 50 02 FF	カラーバー 100% 7 色
		y0 50 03 FF	グレースケール
CAM_ePTModelInq	8x 09 7E 06 00 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ePTPositionInq	8x 09 7E 06 20 FF	y0 50 00 00 Op Op Op Op Op Op Op Op FF	pppp: Pan Position tttt: Tilt Position
CAM_TempInq	8x 09 04 68 FF	y0 50 00 00 Op Op FF	pp: Lens Temperature
CAM_ExExpCompPosInq (Extended Mode)	8x 09 04 1F 4E FF	y0 50 00 00 Op Op FF	pp: Exposure compensation level
CAM_ExAutoICRThresholdInq (Extended Mode)	8x 09 04 1F 21 00 FF	y0 50 00 00 Op Op FF	pp: ICR On→Off threshold level when Auto ICR
CAM_ExDetailInq (Extended Mode)	8x 09 04 1F 42 FF	y0 50 00 00 Op Op FF	pp: Ex Detail Level
CAM_ChromaSuppressInq	8x 09 04 5F FF	y0 50 Op FF	p: Chroma Suppress setting level
CAM_ColorGainInq (Saturation)	8x 09 04 49 FF	y0 50 00 00 00 Op FF	p: Color Gain
CAM_ExColorGainInq (Extended Mode)	8x 09 04 1F 49 00 FF	y0 50 Op Op FF	pp: Color Gain
CAM_ColorHueInq	8x 09 04 4F FF	y0 50 00 00 00 Op FF	p: Color Hue
CAM_ExColorHueInq (Extended Mode)	8x 09 04 1F 4F 00 FF	y0 50 Op Op FF	pp: Color Hue
CenterLine	8x 09 04 7C FF	y0 50 Op FF	p: 3=Off, 4=On

ブロック問い合わせコマンドリスト

レンズ制御系問い合わせコマンド..... Command Packet 8x 09 7E 7E 00 FF

Byte	Bit	Comments	Byte	Bit	Comments	Byte	Bit	Comments	
0	7	Destination Address	6	7	0	12	7	0	
	6			6	0		6	0	
	5			5	0		5	0	
	4			4	0		4	0	
	3	Source Address		3	Focus Near Limit (H)		3	0	
	2			2			0	2	0
	1			1			0	1	0
	0			0			0	0	0
1	7	0 Completion Message (50h)	7	7	0	13	7	0	
	6	1		6	0		6	Digital Zoom (H)	
	5	0		5	0		5	DZoomMode 0: Combine 1: Separate	
	4	1		4	0		4	0: Normal 1: Interval 2: Zoom Trigger	
	3	0		3	Focus Near Limit (L)		3	AF Sensitivity 0: Low 1: Normal	
	2	0		2			2		
	1	0		1			1		
	0	0		0			0		
2	7	0	8	7	0	14	7	0	
	6	0		6	0		6	0	
	5	0		5	0		5	0	
	4	0		4	0		4	0	
	3	Zoom Position (HH)		3	Focus Position (HH)		3	Low Contrast 検出 1: Yes 0: No	
	2			2			2		2
	1			1			1		1
	0			0			0		0
3	7	0	9	7	0	15	7	1 Terminator (FFh)	
	6	0		6	0		6	1	
	5	0		5	0		5	1	
	4	0		4	0		4	1	
	3	Zoom Position (HL)		3	Focus Position (HL)		3	Focus コマンド 1: 実行中 0: 停止	
	2			2			2		2
	1			1			1		1
	0			0			0		0
4	7	0	10	7	0	11	7	0	
	6	0		6	0		6	0	
	5	0		5	0		5	0	
	4	0		4	0		4	0	
	3	Zoom Position (LH)		3	Focus Position (LH)		3	Zoom Position (LL)	
	2			2			2		2
	1			1			1		1
	0			0			0		0
5	7	0	11	7	0	11	7	0	
	6	0		6	0		6	0	
	5	0		5	0		5	0	
	4	0		4	0		4	0	
	3	Zoom Position (LL)		3	Focus Position (LL)		3	Zoom Position (LL)	
	2			2			2		2
	1			1			1		1
	0			0			0		0

カメラ制御系問い合わせコマンド Command Packet 8x 09 7E 7E 01 FF

Byte	Bit	Comments	Byte	Bit	Comments	Byte	Bit	Comments	
0	7	Destination Address	6	7	0	11	7	0	
	6			6	0		6	0	
	5			5	0		5	0	
	4			4	0		4	Iris Position	
	3	3		WB Mode	3				
	2	2							
	1	1							
	0	0							
1	7	0 Completion Message (50h)	7	7	0	12	7	0	
	6	1		6	0		6	0	
	5	0		5	0		5	0	
	4	1		4	0		4	0	
	3	0		3	Aperture Gain		3	Gain Position	
	2	0		2					
	1	0		1					
	0	0		0					
2	7	0	8	7	0	13	7	0	
	6	0		6	0		6	0	
	5	0		5	0		5	0	
	4	0		4	0		4	Bright Position	
	3	R Gain (H)		3	Exposure Mode		3		
	2			2					
	1			1					
	0			0					
3	7	0	9	7	0	14	7	0	
	6	0		6	0		6	0	
	5	0		5	高解像度モード 1: On 0: Off		5	0	
	4	0		4	VE 1: On 0: Off		4	0	
	3	R Gain (L)		3	Spot AE 1: On 0: Off		3	Exposure Comp. Position	
	2			2	Back Light 1: On 0: Off		2		
	1			1	Exposure Comp. 1: On 0: Off		1		
	0			0	Slow Shutter 1: On 0: Off		0		
4	7	0	10	7	0	15	7	1 Terminator (FFh)	
	6	0		6	0		6	1	
	5	0		5	0		5	1	
	4	0		4	0		4	1	
	3	B Gain (H)		3	Shutter Position		3	1	
	2			2			2	1	
	1			1			1	1	
	0			0			0	1	
5	7	0							
	6	0							
	5	0							
	4	0							
	3	B Gain (L)							
	2								
	1								
	0								

その他問い合わせコマンド..... Command Packet 8x 09 7E 7E 02 FF

Byte	Bit	Comments	Byte	Bit	Comments	Byte	Bit	Comments
0	7	Destination Address	6	7	0	12	7	0
	6			6	0		6	0
	5			5	0		5	0
	4			4	0		4	Memory 1: あり 0: なし
	3	Source Address		3	0		3	0
	2			2	0		2	ICR 1: あり 0: なし
	1			1	0		1	Stabilizer 1: あり 0: なし
	0			0	0		0	System 1: 1/50、1/25 0: 1/59.94、1/29.97
1	7	0 Completion Message (50h)	7	7	0	13	7	0
	6	1		6	0		6	0
	5	0		5	0		5	0
	4	1		4	0		4	0
	3	0		3	0		3	0
	2	0		2	0		2	0
	1	0		1	0		1	0
	0	0		0	0		0	0
2	7	0	8	7	0	14	7	0
	6	0		6	0		6	0
	5	0		5	0		5	0
	4	0		4	0		4	0
	3	Auto ICR Alarm (1: On、0: Off)		3	Camera ID (HH)		3	0
	2	Auto ICR 1: On 0: Off		2			2	0
	1	0		1			1	0
	0	Power 1: On 0: Off		0			0	0
3	7	0	9	7	0	15	7	1 Terminator (FFh)
	6	Stabilizer 1: On 0: Off		6	0		6	1
	5	0		5	0		5	1
	4	ICR 1: On 0: Off		4	0		4	1
	3	フリーズ 1: On 0: Off		3	Camera ID (HL)		3	1
	2	左右反転 1: On 0: Off		2			2	1
	1	0		1			1	1
	0	0		0			0	1
4	7	0	10	7	0			
	6	0		6	0			
	5	Privacy Zone 1: On 0: Off		5	0			
	4	Mute 1: On 0: Off		4	0			
	3	Title Display 1: On 0: Off		3	Camera ID (LH)			
	2	Display 1: On 0: Off		2				
	1	0		1				
	0	0		0				
5	7	0	11	7	0			
	6	0		6	0			
	5	0		5	0			
	4	0		4	0			
	3	Picture Effect Mode		3	Camera ID (LL)			
	2			2				
	1			1				
	0			0				

拡張機能 1 問い合わせコマンド Command Packet 8x 09 7E 7E 03 FF

Byte	Bit	Comments	Byte	Bit	Comments	Byte	Bit	Comments	
0	7	Destination Address	6	7	0	11	7	0	
	6			6	0		Color Gain (0h (60%) ~ Eh (200%))		
	5			5	0				
	4			4	0				
	3	Source Address		3	AF インターバル時間 (H)		3	Advanced Privacy (1: あり, 0: なし)	
	2			2			2		
	1			1			1	Reserved	
	0			0			0		
1	7	0 Completion Message (50h)	7	7	0	12	1	Reserved	
	6	1		6	0		上下左右反転 (1: あり, 0: なし)		
	5	0		5	0				
	4	1		4	0		AE Response		
	3	0		3	AF インターバル時間 (L)				
	2	0		2				2	
	1	0		1				1	
	0	0		0				0	
2	7	0	8	7	0	13	7	0	
	6	0		6	0		Gamma		
	5	0		5	0			高感度モード (1: On, 0: Off)	
	4	0		4	0				NR レベル
	3	Digital Zoom Position (H)		3	SpotAE Position (X)		3		
	2			2			2		
	1			1			1		
	0			0			0		
3	7	0	9	7	0	14	7	0	
	6	0		6	0		Chroma Suppress		
	5	0		5	0			Gain Limit	
	4	0		4	0				
	3	Digital Zoom Position (L)		3	SpotAE Position (Y)		3		1 Terminator (FFh)
	2			2			6	1	
	1			1			5	1	
	0			0			0	4	
4	7	0	10	7	0	15	3	1	
	6	0		6	0		2	1	
	5	0		5	0		1	1	
	4	0		4	0		0	1	
	3	AF 起動時間 (H)		3	0		AF 起動時間 (L)		
	2			Reserved	2			1	
	1			0	1			1	
	0			上下左右反転 (1: On, 0: Off)	0			1	
5	7	0							
	6	0							
	5	0							
	4	0							
	3	AF 起動時間 (L)							
	2								
	1								
	0								
0									

拡張機能 2 問い合わせコマンド Command Packet 8x 09 7E 7E 04 FF

Byte	Bit	Comments	Byte	Bit	Comments	Byte	Bit	Comments
0	7	Destination Address	6	7	0	11	7	0
	6			0	6		0	
	5			0	5		0	
	4			0	4		0	
	3	Source Address		3	0		3	0
	2			0	2		0	
	1			補正強度	1		0	
	0			0: Low 1: Mid 2: High	0		0	
1	7	0 Completion Message (50h)	7	7	0	12	7	0
	6	1		6	0		6	0
	5	0		5	0		5	0
	4	1		4	0		4	0
	3	0		3	0		3	0
	2	0		2	0		2	0
	1	0		1	0		1	0
	0	0		0	Defog 0: Off 1: On		0	0
2	7	0	8	7	0	13	7	0
	6	0		6	0		6	0
	5	0		5	0		5	0
	4	0		4	0		4	0
	3	0		3	0		3	0
	2	0		2	0		2	0
	1	VE		1	Defog Level		1	0
0	0: Off 2: VE On		0			0		
3	7	0	9	7	0	14	7	0
	6	0		6	0		6	0
	5	0		5	0		5	0
	4	0		4	0		4	0
	3	0		3	0		3	0
	2	0		2	0		2	0
	1	0		1	0		1	0
	0	0		0	0		0	0
4	7	0	10	7	0	15	7	1 Terminator (FFh)
	6	0		6	0		6	1
	5	0		5	0		5	1
	4	0		4	0		4	1
	3	0		3	0		3	1
	2	表示明るさレベル設定		2	0		2	1
	1			0: 暗～ 6: 明	1		1	
0			0	1				
5	7	0						
	6	0						
	5	0						
	4	0						
	3	0						
	2	0						
	1	補正輝度選択						
0	0: より暗い 1: 暗い 2: 補正なし 3: 明るい							

拡張機能 3 問い合わせコマンド Command Packet 8x 09 7E 7E 05 FF

Byte	Bit	Comments	Byte	Bit	Comments	Byte	Bit	Comments
0	7	Destination Address	6	7	0	11	7	0
	6			Reserved	6		Reserved	
	5				5			
	4				4			
	3	3						
	2	2						
	1	1						
	0	0						
1	7	0 Completion Message (50h)	7	7	0	12	7	0
	6	1		6	Reserved		6	Reserved
	5	0		5			5	
	4	1		4			4	
	3	0		3			3	
	2	0		2			2	
	1	0		1			1	
	0	0		0			0	
2	7	0	8	7	0	13	7	0
	6	0		6	Reserved		6	Reserved
	5	0		5			5	
	4	0		4			4	
	3	Color Hue (0h (−14度) ~ Eh (+14度))		3			3	
	2			2				
	1			1				
	0			0				
3	7	0	9	7	0	14	7	0
	6	Reserved		6	Reserved			
	5			5				
	4			4				
	3			3				
	2			2				
	1			1				
	0			0				
4	7	0	10	7	0	15	7	1 Terminator (FFh)
	6	Reserved		6	Reserved		6	1
	5			5			5	1
	4			4			4	1
	3			3			3	1
	2			2			2	1
	1			1			1	1
	0			0			0	1
5	7	0						
	6	Reserved						
	5							
	4							
	3							
	2							
	1							
	0							

VISCA コマンド設定値

露出制御 (1/3)		59.94/ 29.97 モード	50/25 モード	23.98 モード
シャッター スピード/ 低速 シャッター リミット	21	1/10000	1/10000	1/10000
	20	1/6000	1/6000	1/4800
	1F	1/4000	1/3500	1/2400
	1E	1/3000	1/2500	1/1200
	1D	1/2000	1/1750	1/576
	1C	1/1500	1/1250	1/400
	1B	1/1000	1/1000	1/288
	1A	1/725	1/600	1/200
	19	1/500	1/425	1/192
	18	1/350	1/300	1/144
	17	1/250	1/215	1/120
	16	1/180	1/150	1/100
	15	1/125	1/120	1/96
	14	1/100	1/100	1/60
	13	1/90	1/60	1/50
	12	1/60	1/50	1/48
	11	1/50	1/30	1/40
	10	1/30	1/25	1/25
	OF	1/20	1/20	1/24
	OE	1/15	1/15	1/20
	OD	1/10	1/12	1/12
	OC	1/8	1/8	1/8
	OB	1/6	1/6	1/6
	OA	1/4	1/4	1/4
	09	1/3	1/3	1/3
	08	1/2	1/2	1/2
	07	2/3	2/3	2/3
	06	1/1	1/1	1/1

		59.94/ 29.97 モード	50/25 モード	23.98 モード
高速 シャッター リミット	21	1/10000	1/10000	1/10000
	20	1/6000	1/6000	1/4800
	1F	1/4000	1/3500	1/2400
	1E	1/3000	1/2500	1/1200
	1D	1/2000	1/1750	1/576
	1C	1/1500	1/1250	1/400
	1B	1/1000	1/1000	1/288
	1A	1/725	1/600	1/200
	19	1/500	1/425	1/192
	18	1/350	1/300	1/144
	17	1/250	1/215	1/120
	16	1/180	1/150	1/100
	15	1/125	1/120	1/96
	14	1/100	1/100	1/60
	13	1/90	1/60	1/50
	12	1/60	1/50	1/48
	11	1/50	1/30	1/40
	10	1/30	1/25	1/25
	OF	-	-	1/24
スロー シャッター リミット	11	1/50	1/30	1/40
	10	1/30	1/25	1/25
	OF	1/20	1/20	1/24
	OE	1/15	1/15	1/20
	OD	1/10	1/12	1/12
	OC	1/8	1/8	1/8
	OB	1/6	1/6	1/6
	OA	1/4	1/4	1/4
	09	1/3	1/3	1/3
	08	1/2	1/2	1/2
	07	2/3	2/3	2/3
	06	1/1	1/1	1/1

露出制御 (2/3)

アイリス	19	F2.0
	18	F2.2
	17	F2.4
	16	F2.6
	15	F2.8
	14	F3.1
	13	F3.4
	12	F3.7
	11	F4.0
	10	F4.4
	0F	F4.8
	0E	F5.2
	0D	F5.6
	0C	F6.2
	0B	F6.8
	0A	F7.3
	09	F8
	08	F8.7
	07	F9.6
	06	F10
	05	F11
	00	CLOSE

		高感度モード	
		Off	On
ゲインリミット	D	36 dB	48 dB
	C	33 dB	45 dB
	B	30 dB	42 dB
	A	27 dB	39 dB
	9	24 dB	36 dB
	8	21 dB	33 dB
	7	18 dB	30 dB
	6	15 dB	27 dB
	5	12 dB	24 dB
	4	9 dB	21 dB

ゲイン	11	48 dB
	10	45 dB
	0F	42 dB
	0E	39 dB
	0D	36 dB
	0C	33 dB
	0B	30 dB
	0A	27 dB
	09	24 dB
	08	21 dB
	07	18 dB
	06	15 dB
	05	12 dB
	04	9 dB
	03	6 dB
	02	3 dB
	01	0 dB

0E ~ 11 は高感度モードオンのときにのみ設定可能

露出制御 (3/3)

		アイリス	ゲイン
ブライト	29	F2.0	48 dB
	28	F2.0	45 dB
	27	F2.0	42 dB
	26	F2.0	39 dB
	25	F2.0	36 dB
	24	F2.0	33 dB
	23	F2.0	30 dB
	22	F2.0	27 dB
	21	F2.0	24 dB
	20	F2.0	21 dB
	1F	F2.0	18 dB
	1E	F2.0	15 dB
	1D	F2.0	12 dB
	1C	F2.0	9 dB
	1B	F2.0	6 dB
	1A	F2.0	3 dB
	19	F2.0	0 dB
	18	F2.2	0 dB
	17	F2.4	0 dB
	16	F2.6	0 dB
	15	F2.8	0 dB
	14	F3.1	0 dB
	13	F3.4	0 dB
	12	F3.7	0 dB
	11	F4.0	0 dB
	10	F4.4	0 dB
	0F	F4.8	0 dB
	0E	F5.2	0 dB
	0D	F5.6	0 dB
	0C	F6.2	0 dB
	0B	F6.8	0 dB
	0A	F7.3	0 dB
	09	F8.0	0 dB
	08	F8.7	0 dB
	07	F9.6	0 dB
	06	F10	0 dB
	05	F11	0 dB
	00	CLOSE	0 dB

26 ～ 29 は高感度モードオンのときにのみ設定可能

露出補正	0E	+ 7	+ 10.5 dB
	0D	+ 6	+ 9 dB
	0C	+ 5	+ 7.5 dB
	0B	+ 4	+ 6 dB
	0A	+ 3	+ 4.5 dB
	09	+ 2	+ 3 dB
	08	+ 1	+ 1.5 dB
	07	0	0 dB
	06	− 1	− 1.5 dB
	05	− 2	− 3 dB
	04	− 3	− 4.5 dB
	03	− 4	− 6 dB
	02	− 5	− 7.5 dB
	01	− 6	− 9 dB
	00	− 7	− 10.5 dB

ズーム倍率とズーム位置（参考値）

Optical Zoom Ratio	Optical Zoom Position Data
× 1	0000
× 2	0DC1
× 3	186C
× 4	2015
× 5	2594
× 6	29B7
× 7	2CFB
× 8	2FB0
× 9	320C
× 10	342D
× 11	3608
× 12	37AA
× 13	391C
× 14	3A66
× 15	3B90
× 16	3C9C
× 17	3D91
× 18	3E72
× 19	3F40
× 20	4000

デジタルズーム、コンバインモード時

Digital Zoom Ratio	Digital Zoom Position Data
1 ×	4000
2 ×	6000
3 ×	6AAB
4 ×	7000
5 ×	7334
6 ×	7556
7 ×	76DC
8 ×	7800
9 ×	78E4
10 ×	799A
11 ×	7A2F
12 ×	7AC0

デジタルズーム、セパレートモード時

Digital Zoom Ratio	Digital Zoom Position Data
1 ×	00
2 ×	80
3 ×	AA
4 ×	C0
5 ×	CC
6 ×	D5
7 ×	DB
8 ×	E0
9 ×	E3
10 ×	E6
11 ×	E8
12 ×	EB

レンズ制御

Zoom Position	0000 wide 端	～	4000 光学 tele 端	～	7AC0 デジタル tele 端
Focus Position	1000 Far 端	～	F000 Near 端		
Focus Near Limit	1000 : Inf 2000 : 5 m 3000 : 3 m 4000 : 2 m 5000 : 1.5 m 6000 : 1.2 m 7000 : 1.0 m 8000 : 0.8 m 9000 : 0.6 m A000 : 47 cm B000 : 35 cm (初期値) C000 : 26 cm D000 : 17 cm E000 : 10 cm F000 : 8 cm			先に示した距離は温特等によりばらつくので、目安の値としてください。 *下位 1 バイトは 00 固定です。	

wide/tele リミット設定

Wide/Tele リミット設定値	Wide Limit		Tele Limit	
	ズーム位置	倍率	ズーム位置	倍率
00	0000	1.00	4000	20.00
10	0170	1.09	3E8F	18.14
20	02E0	1.18	3D1F	16.53
30	0450	1.28	3BAF	15.12
40	05C0	1.38	3A3F	13.89
50	0730	1.47	38CF	12.80
60	08A1	1.58	375E	11.83
70	0A11	1.69	35EE	10.96
80	0B81	1.81	347E	10.18
90	0CF1	1.94	32F7	9.44
A0	0E61	2.07	319E	8.83
B0	0FD1	2.19	302E	8.22
C0	1142	2.32	2EBD	7.65
D0	12B2	2.44	2D4D	7.13
E0	1422	2.58	2BDD	6.66
F0	1592	2.72	2A6D	6.22
FF	16EB	2.85	2914	5.85

温度読み出し換算値（参考値）

読み出し値pq (hex)	温度換算値 (℃)
FB	- 8 ~ - 2
00	- 3 ~ + 3
0A	7 ~ 13
14	17 ~ 23
1E	27 ~ 33
28	37 ~ 43
32	47 ~ 53
3C	57 ~ 63

レジスター設定

レジスター設定は電源入れ直しで有効になります。モード設定を変更した際は、電源を Off にした後、再度電源を On にして確認してください。

ご注意

VISCA/USB_PTP 切り替えで PTP に切り替えた場合、それ以降、VISCA での通信はできなくなります。
VISCA に切り替える場合、PTP コントロールにて VISCA に切り替えてください。PTP のコントロールに関しては、別冊の「FCB カメラコントロール仕様 PTP 編」をご覧ください。

	Register No.	Value	
VISCA ボーレート	00	00 (初期値)	9600 bps
		01	19200 bps
		02	38400 bps
		03	57600 bps
		04	115200 bps
VISCA/ USB_PTP 切り替え	01	00 (初期値: 00)	VISCA
		01	USB_PTP
デジタルア ウトプット	60	00 (初期値)	YUV
		01	RGB
モニタリン グモード	72	1D (初期値)	システム: QFHD (3840×2160) 29.97p 出力: 3840×2160 29.97p 1920×1080 29.974p 電子パン・チルト On 時
		1E	システム: QFHD (3840×2160) 25p 出力: 3840×2160 25p 1920 ×1080 25p 電子パン・チルト On 時
		20	システム: QFHD (3840×2160) 23.98p 出力: 3840×2160 23.98p 1920×1080 50p 電子パン・チ ルト On 時
		13	システム: FHD (1920×1080) 59.94p 出力: 1920×1080 59.94p
		14	システム: FHD (1920×1080) 50p 出力: 1920×1080 50p
		01	システム: FHD (1920×1080) 59.94i 出力: 1920×1080 59.94i
		04	システム: FHD (1920×1080) 50i 出力: 1920×1080 50i
		06	システム: FHD (1920×1080) 29.97p 出力: 1920×1080 29.97p
		08	システム: FHD (1920×1080) 25p 出力: 1920×1080 25p
		1F	システム: FHD (1920×1080) 23.98p 出力: 1920×1080 23.98p
		09	システム: HD (1280×720) 59.94p 出力: 1280×720 59.94p

モニタリングモードのシステムのフレームレートは画面の更新間隔です。

	Register No.	Value	
モニタリングモード	72	0C	システム:HD (1280×720) 50p 出力:1280×720 50p
		1B	システム:SD (720×480) 59.94p 出力:720×480 59.94p
		1C	システム:SD (720×576) 50p 出力:720×576 50p
Zoom Limit	50	00-FF (初期値:00)	Wide Limit (0:無効)
	51	00-FF (初期値:00)	Tele Limit (0:無効)
D-Zoom Max	52	00-EB (初期値:EB)	最大電子 Zoom 倍率= 256 ÷ (256 - Value)
"StableZoom"	53	00 (初期値:00)	Off
		01	On
APR	56	00 (初期値:00)	起動時 APR OFF
		01	起動時 APR ON
FocusOffset @DomeCover	55	00-FF (初期値:00)	00: なし～ FF: 最大
拡張モード	5F	00	OFF
		bit:0 露出補正 256 段階拡張 On/Off bit:1 輪郭強調 (アパーチャ) 256 段階拡張 On/Off bit:2 Color Gain/Hue 256 段階拡張 On/Off bit:3 Auto ICR Off → On 設定有効化 On/Off * いずれの bit も 1 で有効、0 で Off	

その他

AF 起動時間 ¹⁾	00	～	FF
AF インターバル時間 ¹⁾	00	～	FF
スポット AE X 座標	00	～	0F
スポット AE Y 座標	00	～	0F
R ゲイン	00	～	FF
B ゲイン	00	～	FF
輪郭強調 (アパーチャ) レベル	00	～	0F
AE Response	01	～	30
AutoICR On → Off スレッシュレベル	00	～	FF
Chroma Suppress 設定レベル	00	～	03
Color Gain 設定レベル	00	～	0E
Color Hue 設定レベル	00	～	0E

¹⁾ 1 秒単位

ファームウェアアップデート用 USB コマンド

コマンド／レスポンスの基本仕様

- 通信は Packet 単位で行う。
- Packet は、Header (32Byte) と Body (0Byte ~) で構成される。
- コマンド／レスポンスの 2 種類の Packet を定義する。
 - コマンド ホスト→本機へのデータ転送
 - レスポンス 本機→ホストへのデータ転送
 - 1 つのコマンドパケットに対して、必ず 1 つのレスポンスパケットを返す。
※ただし、特定のコマンドではレスポンスがない。
- バイト配列はリトルエンディアンとする。

■ 記法の説明

型の表記

uint: 符号無し整数 (データ長によらない)

Binary: バイナリーデータ列

■ Packet 構造

Packet は、固定長 (32Byte) の Header とサイズ可変の Body から構成される。
最大パケットサイズはコマンドごと、あるいは通信のパラメーター中に定める。

データ配置	Size[Byte]	設定値
Packet{		
Packet Header	32	Packet Header
Body	n	Binary
}		

■ Packet Header (コマンド／レスポンスどちらも共通)

データ配置	Size[Byte]	設定値
Packet Header{		
BodySize	4	uint
Protocol Version	2	uint
Command ID	2	uint
Response ID	2	uint
Sequence No.	2	uint
reserved	4	uint
reserved	4	uint
reserved	4	uint
reserved	8	uint
}		

■ 意味

Body Size

Packet Header に続く Body のサイズ (Packet Header のサイズは含まない)

Protocol Version

通信プロトコルのバージョン 0x0100 固定
(ホストはファームウェアデータに含まれるプロトコルバージョンを設定する)

Command ID

- Command packet: 実行する Command を設定する。
- Response packet: 対応する Command packet と同じ値が設定される。

Response ID

- Command packet: 0x0000 固定
- Response packet: 対応する Command の処理結果を表す ID
- 詳細は各コマンドごとの仕様を参照 (58 ~ 62 ページ)

Sequence No.

- Command packet: すべてのコマンドに一意的シーケンス番号 1 ~ 65536 溢れた場合、1 に戻る。
- Response packet: 対応する Command のシーケンス番号をそのまま返す。
シーケンス番号の値が飛んだ場合も、特にエラーにはしない。

■ Body

- 各 Command、Response のパラメーターとなるデータが格納される。
- 各 Command、Response ごとに異なる。

ID 一覧

Command ID	ID の定義	概要説明
/* 初期通信 */		
0x0001	CMD_INIT	通信初期化を実行する。
/* 突入条件判定 */		
0x0010	CMD_CHK_GUARD	突入条件判定を開始する。
/* Firm バージョン問い合わせ */		
0x0020	CMD_QUERY_VERSION	Firmware のバージョンを問い合わせる。
/* 起動モード切り替え要求 */		
0x0030	CMD_SWITCH_MODE	ファームアップモードへの切り替えを実行する。
/* Firmware 書き換え */		
0x0040	CMD_WRITE_FIRM	Firmware データの転送と書き込みを実行する。
/* 書き換え処理の完了確認通知 */		
0x0100	CMD_COMPLETE	ファームアップ処理の完了確認を通知する。
/* 本機内ファームアップ処理状態の取得 */		
0x0200	CMD_GET_STATE	ファームアップ処理のステータス (状態) を取得する。

Response ID	ID の定義 (STAT_ も同じ)	概要説明 (細かい意味はコマンドごとに異なる)
/* 正常系 */		
0x0001	ERR_OK	正常終了
0x0002	ERR_BUSY	処理中
/* 通信プロトコルエラー */		
0x0100	ERR_PROV	プロトコルバージョン違い
0x0101	ERR_SEQUENCE	シーケンスエラー。コマンドを受信できる状態ではない。
0x0102	ERR_BIG	パケットが大きすぎる。(受信バッファが足りない)
0x0103	ERR_INVALID_PARAM	パラメーターが不正
/* 0x1xxx : 本機内部処理エラー */		
0x1xxx	ERR_INTERNAL	本機側での内部処理エラー

Response ID	ID の定義	概要説明 (細かい意味はコマンドごとに異なる)
/* 正常系 */		
0x0001	STAT_OK	
0x0002	STAT_BUSY	
/* 突入条件ステータス */		
0x0140	STAT_INVALID_MODEL	機種が違う
0x0141	STAT_INVALID_REGION	仕向けが違う
/* Firm データエラー */		
0x0040	STAT_INVALID_DATA	受信した Firmware データが不正 (壊れている) (改竄されたりして、パッケージファイルの CRC では検出できないもの)

本機内部処理エラーは、ResponseID フィールドにエラーとして通知する。

CurStatus ID	ID の定義	概要説明
0x0100	CURSTAT_PRE_INIT	CMD_INIT 受信前
0x0200	CURSTAT_PRE_SWITCHMODE	CMD_SWITCHMODE 受信後

コマンド仕様

Command	説明																								
CMD_GET_STATE	■ 概要 本機内部のファームアップ処理のステータスを取得する。 ※このコマンドは通信が成立していればいつでも受け付けられます。 ■ Command parameter なし ■ Response (ID / Parameter) ERR_OK 初期化成功。パラメーターに以後の最大パケットサイズ、最少タイムアウトを返す。 パラメーター→ <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>OK Parameter{</td><td></td><td></td></tr><tr><td>currentState ID</td><td>2</td><td>uint</td></tr><tr><td>}</td><td></td><td></td></tr></table> ■ 意味 currentState ID 受信した時点でのセット状態 各 STAT の ID は ID 一覧（57 ページ）を参照 CURSTAT_PRE_INIT 起動時 ※ PC アプリは CMD_INIT を発行するところから CURSTAT_SWITCHMODE モード切替処理中（INIT で戻れない状態） ※ PC アプリは CMD_SWITCM_MODE の発行から ERR_PROV packet header に設定された通信プロトコルバージョンに対応していない パラメーターなし ■ 備考	パラメーターデータ配置	Size[Byte]	型	OK Parameter{			currentState ID	2	uint	}														
パラメーターデータ配置	Size[Byte]	型																							
OK Parameter{																									
currentState ID	2	uint																							
}																									
CMD_INIT	■ 概要 通信初期化を実行し、必要なパラメーターを受け渡す。 本機側は受信することで、内部状態を初期状態に戻す。 受信できない状態があります。 ■ Command parameter なし ■ Response (ID / Parameter) ERR_OK 初期化成功。パラメーターに以後の最大パケットサイズ、最少タイムアウトを返す パラメーター→ <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>OK Parameter{</td><td></td><td></td></tr><tr><td>maxCmdPacketSize</td><td>4</td><td>uint</td></tr><tr><td>maxResPacketSize</td><td>4</td><td>uint</td></tr><tr><td>minTimeOut</td><td>4</td><td>uint</td></tr><tr><td>intervalBeforeCommand</td><td>4</td><td>uint</td></tr><tr><td>intervalBeforeResponse</td><td>4</td><td>uint</td></tr><tr><td>}</td><td></td><td></td></tr></table> ■ 意味 maxCmdPacketSize 初期化成功後の Command packet の最大パケットサイズ [Byte] CMD_GET_STATE を除く maxResPacketSize 初期化成功後の Response packet の最大パケットサイズ [Byte] minTimeOut 通信初期化成功後の各コマンド共通の最少タイムアウト時間 [msec] ホストはこれ以上の値でタイムアウトする必要がある。 intervalBeforeCommand ホストがレスポンスを受信してから、次のコマンドを発行するまでの min 時間 [msec] intervalBeforeResponse ホストがコマンドを発行してから、それに対するレスポンスの受信要求を発行するまでの min 時間 [msec]	パラメーターデータ配置	Size[Byte]	型	OK Parameter{			maxCmdPacketSize	4	uint	maxResPacketSize	4	uint	minTimeOut	4	uint	intervalBeforeCommand	4	uint	intervalBeforeResponse	4	uint	}		
パラメーターデータ配置	Size[Byte]	型																							
OK Parameter{																									
maxCmdPacketSize	4	uint																							
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minTimeOut	4	uint																							
intervalBeforeCommand	4	uint																							
intervalBeforeResponse	4	uint																							
}																									

Command	説明																																																				
CMD_INIT	ERR_PROV packet header に設定された通信プロトコルバージョンに対応していない。 パラメーターなし ERR_SEQUENCE 通信シーケンスエラー。パラメーターなし CMD_INIT 受信不可状態 ■ 備考																																																				
CMD_CHK_GUARD	■ 概要 突入条件確認処理を開始する。 ■ Command Parameter <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>CHK_GUARD Parameter{</td><td></td><td></td></tr><tr><td>dataNo</td><td>4</td><td>uint</td></tr><tr><td>remainSize</td><td>4</td><td>uint</td></tr><tr><td>firmData</td><td>dataSize</td><td>Binary</td></tr><tr><td>}</td><td></td><td></td></tr></table> ■ 意味 dataNo 突入条件確認のためにこのコマンドを発行した回数 0 は使わない 1 から firmData の有無は関係なくインクリメントしてください。 remainSize まだ送信していないファームウェアのデータサイズ。（最終転送のときゼロとなる。） 後述の WRITE_FIRM コマンドと整合を持たせる。 firmData 突入条件確認のためにファームウェア（'FDAT' チャンクの Data 部分）データ先頭部分を分割して転送する。送るデータのサイズは windowsSize で指定される。STAT_OK が返ってきたら終了。 ※ 64、65 ページを参照 ■ Response (ID / Parameter) Response ID によらず共通のパラメーター <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>Response Parameter{</td><td></td><td></td></tr><tr><td>windowSize</td><td>4</td><td>uint</td></tr><tr><td>numStatus</td><td>4</td><td>uint</td></tr><tr><td>for (i = 0; i < numStatus; i++){</td><td></td><td></td></tr><tr><td>Status ID</td><td>2</td><td>uint</td></tr><tr><td>}</td><td></td><td></td></tr><tr><td>{</td><td></td><td></td></tr></table> ■ 意味 windowSize 本機が受信可能な firmData サイズ windowSize 以下の firmData を含むパケットが受信可能 packetSize ≥ 32[byte](ヘッダ) + windowSize + 8 (firmData 以外のパラメーター) を満たす必要がある。 numStatus このあとに続く Status ID の数 Status ID 突入条件確認結果 <table><tr><td>STAT_OK</td><td>条件を満たしている。</td></tr><tr><td>STAT_BUSY</td><td>処理中</td></tr><tr><td>STAT_INVALID_MODEL</td><td>機種が違う</td></tr><tr><td>STAT_INVALID_REGION</td><td>仕向けが違う</td></tr><tr><td>STAT_INVALID_DATA</td><td>Firm データが壊れている。</td></tr></table> OK、Busy の場合、必ず先頭の Status ID として設定される。 ERR_OK コマンドを正常に受信した ERR_PROV packet header に設定された通信プロトコルバージョンに対応していない。パラメーターなし	パラメーターデータ配置	Size[Byte]	型	CHK_GUARD Parameter{			dataNo	4	uint	remainSize	4	uint	firmData	dataSize	Binary	}			パラメーターデータ配置	Size[Byte]	型	Response Parameter{			windowSize	4	uint	numStatus	4	uint	for (i = 0; i < numStatus; i++){			Status ID	2	uint	}			{			STAT_OK	条件を満たしている。	STAT_BUSY	処理中	STAT_INVALID_MODEL	機種が違う	STAT_INVALID_REGION	仕向けが違う	STAT_INVALID_DATA	Firm データが壊れている。
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Command	説明																					
CMD_CHK_GUARD	ERR_SEQUENCE 通信シーケンスエラー。パラメーターなし 通信初期化後でないと受信できない。 ERR_BIG packet サイズが大きすぎる。 ERR_INVALID_PARAM dataNo が不正（値が飛んだ）。 dataSize が不正。 上記以外のエラーは本機内部処理エラー																					
CMD_QUERY_VERSION	■ 概要 新・旧ファームウェアのバージョンを問い合わせる。 ■ Command parameter なし ■ Response (ID / Parameter) ERR_OK 正常終了。パラメーターで新・旧ファームウェアのバージョンを返す。 パラメーター→ <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>OK Parameter{</td><td></td><td></td></tr><tr><td>oldFirmMinorVersion</td><td>2</td><td>uint</td></tr><tr><td>oldFirmMajorVersion</td><td>2</td><td>uint</td></tr><tr><td>newFirmMinorVersion</td><td>2</td><td>uint</td></tr><tr><td>newFirmMajorVersion</td><td>2</td><td>uint</td></tr><tr><td>}</td><td></td><td></td></tr></table> ■ 意味 oldFirmMinorVersion oldFirmMajorVersion 旧 Firmware のマイナーバージョン、メジャーバージョン番号 newFirmMinorVersion newFirmMajorVersion 新 Firmware のマイナーバージョン、メジャーバージョン番号 突入条件確認前であれば、0x0000 固定→まだバージョン不明 ERR_PROV packet header に設定された通信プロトコルバージョンに対応していない パラメーターなし ERR_SEQUENCE 通信シーケンスエラー。 パラメーターなし 通信初期化されたあとでないと受け付けできない。 上記以外のエラーは本機内部処理エラー	パラメーターデータ配置	Size[Byte]	型	OK Parameter{			oldFirmMinorVersion	2	uint	oldFirmMajorVersion	2	uint	newFirmMinorVersion	2	uint	newFirmMajorVersion	2	uint	}		
パラメーターデータ配置	Size[Byte]	型																				
OK Parameter{																						
oldFirmMinorVersion	2	uint																				
oldFirmMajorVersion	2	uint																				
newFirmMinorVersion	2	uint																				
newFirmMajorVersion	2	uint																				
}																						
CMD_SWITCH_MODE	■ 概要 ファームアップモードへの切り替えを行う。 ■ Command parameter なし ■ Response (ID / Parameter) ERR_OK ファームアップモード切替コマンド正常受信 パラメーター→ <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>OK Parameter{</td><td></td><td></td></tr><tr><td>reserved = 0</td><td>4</td><td>uint</td></tr><tr><td>numStatus = 1</td><td>4</td><td>uint</td></tr><tr><td>Status ID</td><td>2</td><td>uint</td></tr><tr><td>}</td><td></td><td></td></tr></table> ■ 意味 numStatus この後に続く Status の数（1固定） Status ID STAT_OK モード切り替え処理正常終了 STAT_BUSY モード切替処理中	パラメーターデータ配置	Size[Byte]	型	OK Parameter{			reserved = 0	4	uint	numStatus = 1	4	uint	Status ID	2	uint	}					
パラメーターデータ配置	Size[Byte]	型																				
OK Parameter{																						
reserved = 0	4	uint																				
numStatus = 1	4	uint																				
Status ID	2	uint																				
}																						

Command	説明																																				
CMD_SWITCH_MODE	ERR_PROV packet header に設定された通信プロトコルバージョンに対応していない。 パラメーターなし ERR_SEQUENCE 通信シーケンスエラー。 パラメーターなし 本体アプリ動作中かつ、突入条件が成立していないと受け付けられない。 上記以外のエラーは本機内部エラー																																				
CMD_WRITE_FIRM	■ 概要 ファームウェアの書き換え処理を行う。 ■ Command Parameter <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>WRITE_FIRM Parameter{</td><td></td><td></td></tr><tr><td> dataNo</td><td>4</td><td>uint</td></tr><tr><td> remainSize</td><td>4</td><td>uint</td></tr><tr><td> firmData</td><td></td><td>Binary</td></tr><tr><td>}</td><td></td><td></td></tr></table> ■ 意味 dataNo ファームウェアデータ転送のためにこのコマンドを発行した回数 0 は使わない。 ファームウェアデータ転送のたびにインクリメントされる。 通信初期化によってリセットされる。 remainSize まだ送信していないファームウェアのデータサイズ。(最終転送のときゼロとなる。) firmData ファームウェア ('FDAT' チャンクの Data 部分) データを分割して転送する。 ※ 64、65 ページを参照 ■ Response (ID / Parameter) Response ID によらず共通のパラメーター <table><tr><th>パラメーターデータ配置</th><th>Size[Byte]</th><th>型</th></tr><tr><td>Response Parameter{</td><td></td><td></td></tr><tr><td> windowSize</td><td>4</td><td>uint</td></tr><tr><td> numStatus = 1</td><td></td><td></td></tr><tr><td> Status ID</td><td>2</td><td></td></tr><tr><td>}</td><td></td><td></td></tr></table> ■ 意味 windowSize 本機が受信可能な firmData サイズ windowSize 以下の firmData を含むパケットが受信可能 packetSize ≥ 32[byte](ヘッダ) + windowSize + 8 (firmData 以外のパラメーター) を満 たす必要がある。 Status ID 書き換え処理ステータス STAT_OK Firm 書き換え処理正常完了。 STAT_BUSY 処理中 STAT_INVALID_DATA Firm データが壊れている。 ERR_OK 正常に Firm データを受信した。 ERR_PROV packet header に設定された通信プロトコルバージョンに対応していない。パラメーターなし ERR_SEQUENCE 通信シーケンスエラー。 パラメーターなし Updater モード動作中、突入条件確認後でないと受付できない。 ERR_BIG packet サイズが大きすぎ受信できなかった。 受信バッファの容量が足りずに受信できなかった。 このエラーが発生したら、当該パケット全体が破棄される。	パラメーターデータ配置	Size[Byte]	型	WRITE_FIRM Parameter{			dataNo	4	uint	remainSize	4	uint	firmData		Binary	}			パラメーターデータ配置	Size[Byte]	型	Response Parameter{			windowSize	4	uint	numStatus = 1			Status ID	2		}		
パラメーターデータ配置	Size[Byte]	型																																			
WRITE_FIRM Parameter{																																					
dataNo	4	uint																																			
remainSize	4	uint																																			
firmData		Binary																																			
}																																					
パラメーターデータ配置	Size[Byte]	型																																			
Response Parameter{																																					
windowSize	4	uint																																			
numStatus = 1																																					
Status ID	2																																				
}																																					

Command	説明
CMD_WRITE_FIRM	ERR_INVALID_PARAM dataNo が不正（値が飛んだ）。dataSize が不正。 上記以外のエラーは本機内部エラー ■ 備考
CMD_COMPLETE	■ 概要 ファームウェアの書き換え完了通知を受け取ったことの確認通知 ■ Command parameter なし ■ Response なし このコマンドを受信したら本機側は自動的に再起動する。

CMD_CHK_GUARD / CMD_WRITE_FIRM の発行方法

■ Packet Header（コマンド／レスポンスどちらも共通）

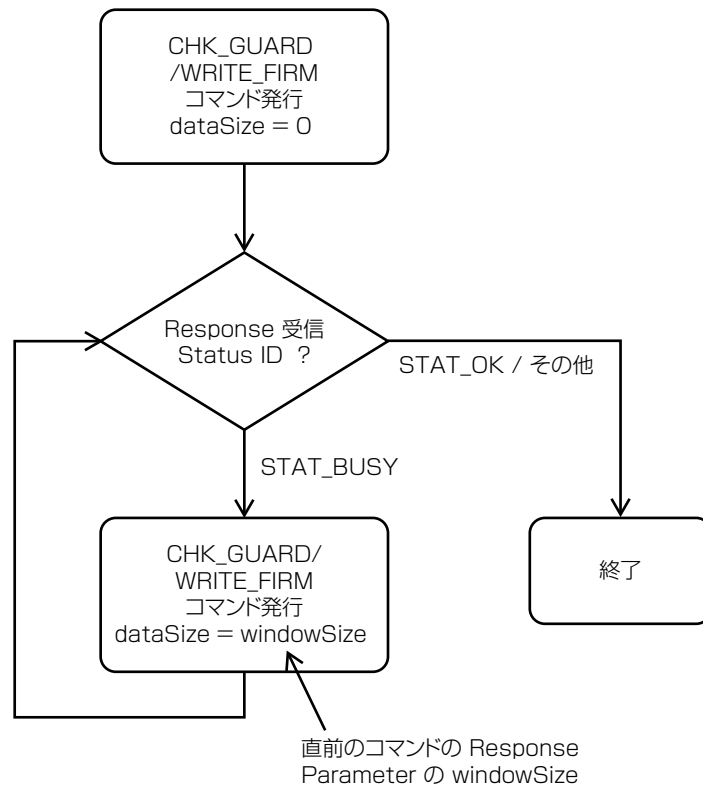
データ配置	Size[Byte]	型
Packet Header{		
BodySize	4	uint
Protocol Version	2	uint
Command ID	2	uint
Response ID	2	uint
Sequence No.	2	uint
reserved	4	uint
reserved	4	uint
reserved	4	uint
reserved	8	uint
}		

■ Command Parameter

パラメーターデータ配置	Size[Byte]	型
CHK_GUARD Parameter{		
dataNo	4	uint
remainSize	2	uint
firmData	dataSize	Binary
}		

パラメーターデータ配置	Size[Byte]	型
Response Parameter{		
windowSize	4	uint
numStatus	4	uint
for (i = 0; i < numStatus; i++){		
Status ID	2	uint
}		
}		

CHK_GUARD コマンド、WRITE_FIRM コマンドでホストから本機にファームウェアデータを転送します。転送する dataSize は直前に発行した Response データにセットされる windowSize 以下の値を指定してください。最初にコマンドを送信する際は firmData を送らず (dataSize を 0 にセットして) コマンドを発行し、Response データにセットされる windowSize を確認してから実際にデータを転送するコマンドを発行してください。STAT_BUSY 以外が返ってくるまでデータを送り続けてください。

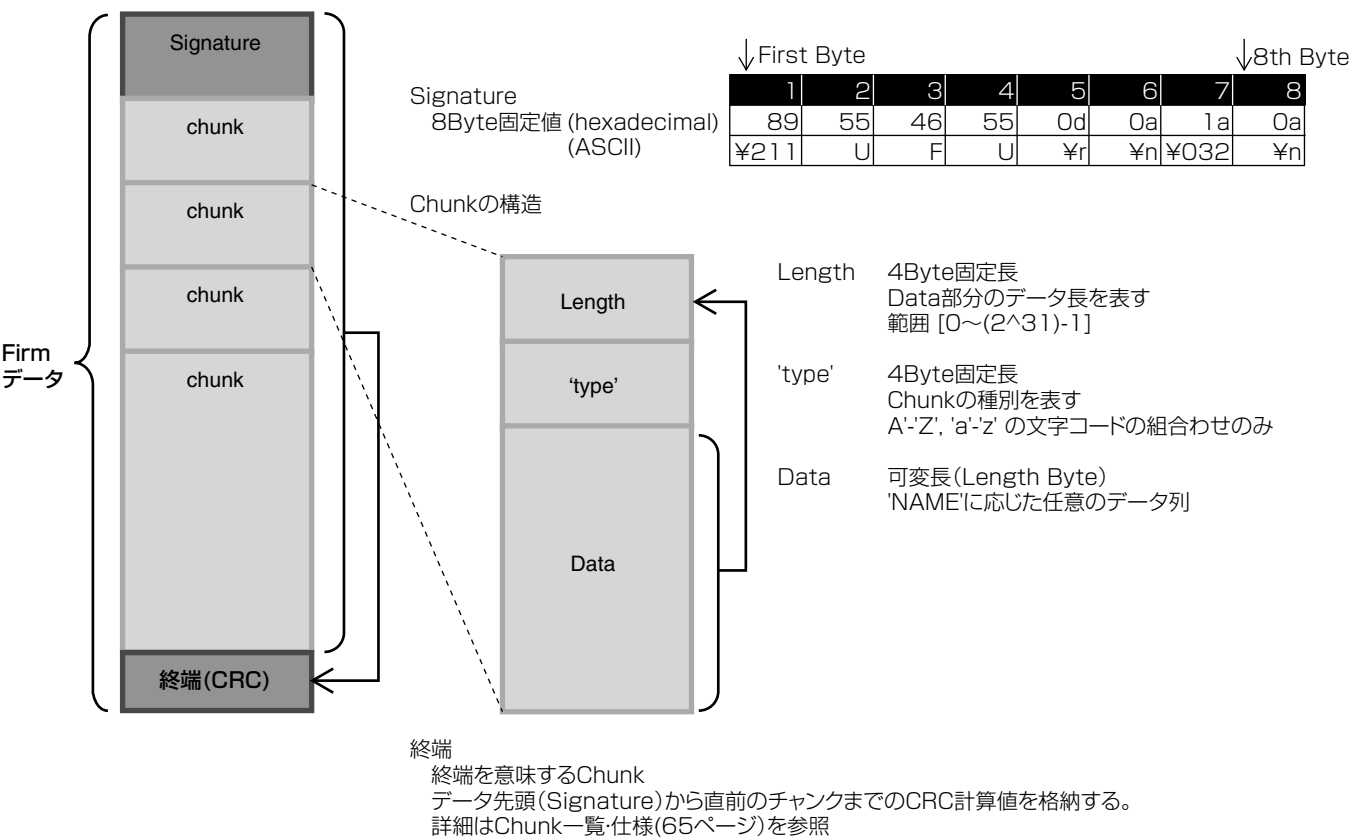


カメラ Mode / Updater Mode の判別方法

UUD Firmware データ構造に記載されているように、ファームウェアパッケージのデータの UDID Chunk に Update の対象となる機器の USB PID、USB VID、動作モードが記載されています。アップデートするホストは、本機から USB Descriptor を取得した USB PID、USB VID が UDID Chunk に含まれることを確認し、その ID の動作モードによって、本機がカメラ Mode で起動しているか、Updater Mode で起動しているかを判断してください。

UUD Firmware データの構造

- データ先頭に Signature
- Signature に続けて可変長の Chunk が 1 つ以上続く
- データ終端に CRC32 計算値を含む Chunk
- バイトオーダーは Big エンディアン (MSB First)



Chunk 一覧・詳細仕様 (Ver.1.0)

型の説明	
uint	符号無し整数（データ長にはよらない。）
Binary	バイナリーデータ列

Chunk type	説明																												
DATV	Firmware データ構造のバージョン ■ 制約条件 必ず先頭のチャンクとして存在する。 ■ データ配置 <table><tr><th>配置</th><th>Size[Byte]</th><th>型</th><th>値</th></tr><tr><td>DATV Chunk{</td><td></td><td></td><td></td></tr><tr><td>length</td><td>4</td><td>uint</td><td>0x00000004</td></tr><tr><td>type</td><td>4</td><td>uint</td><td>'DATV'</td></tr><tr><td>firmDataVersion</td><td>2</td><td>uint</td><td></td></tr><tr><td>reserved</td><td>2</td><td>uint</td><td></td></tr><tr><td>}</td><td></td><td></td><td></td></tr></table> ■ 意味 firmDataVersion ユーザーファームアップのプロトコルバージョンを示す。 0x0100 固定 reserved 0x0000	配置	Size[Byte]	型	値	DATV Chunk{				length	4	uint	0x00000004	type	4	uint	'DATV'	firmDataVersion	2	uint		reserved	2	uint		}			
配置	Size[Byte]	型	値																										
DATV Chunk{																													
length	4	uint	0x00000004																										
type	4	uint	'DATV'																										
firmDataVersion	2	uint																											
reserved	2	uint																											
}																													
PROV	ファームアップ通信プロトコルバージョン ■ 制約条件 必ず2番目のチャンクとして存在する。 ■ データ配置 <table><tr><th>配置</th><th>Size[Byte]</th><th>型</th><th>値</th></tr><tr><td>PROV Chunk{</td><td></td><td></td><td></td></tr><tr><td>length</td><td>4</td><td>uint</td><td>0x00000004</td></tr><tr><td>type</td><td>4</td><td>uint</td><td>'PROV'</td></tr><tr><td>firmProtocolVersion</td><td>2</td><td>uint</td><td></td></tr><tr><td>reserved = 0</td><td>2</td><td>uint</td><td>0x0000</td></tr><tr><td>}</td><td></td><td></td><td></td></tr></table> ■ 意味 firmProtocolVersion ユーザーファームアップのプロトコルバージョンを示す。 0x0100 固定	配置	Size[Byte]	型	値	PROV Chunk{				length	4	uint	0x00000004	type	4	uint	'PROV'	firmProtocolVersion	2	uint		reserved = 0	2	uint	0x0000	}			
配置	Size[Byte]	型	値																										
PROV Chunk{																													
length	4	uint	0x00000004																										
type	4	uint	'PROV'																										
firmProtocolVersion	2	uint																											
reserved = 0	2	uint	0x0000																										
}																													

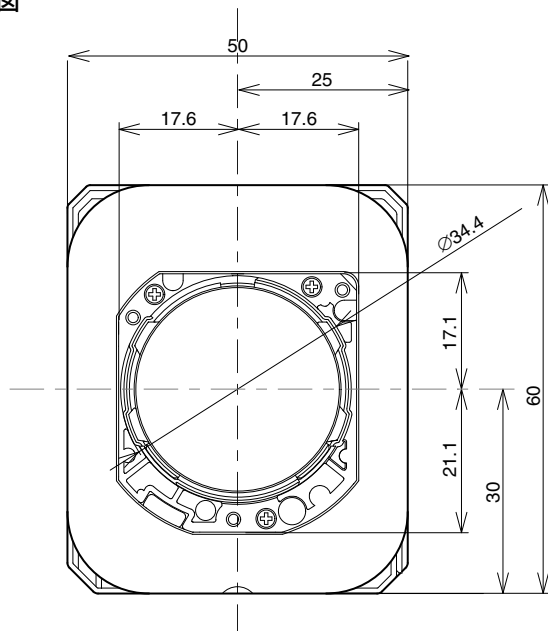
Chunk type	説明																																																				
UDID	ファームアップ対象となる本機に対応する PID、VID のリスト ■ 制約条件 必ずチャンクとして存在する。 ■ データ配置 <table><thead><tr><th>配置</th><th>Size[Byte]</th><th>型</th><th>値</th></tr></thead><tbody><tr><td>UDID Chunk{</td><td></td><td></td><td></td></tr><tr><td>length</td><td>4</td><td>uint</td><td>4+id_count*8</td></tr><tr><td>type</td><td>4</td><td>uint</td><td>'UDID'</td></tr><tr><td>id_count</td><td>4</td><td>uint</td><td></td></tr><tr><td>/* Descriptor ID List */</td><td></td><td></td><td></td></tr><tr><td>for (i=0; i < id_count; i++){</td><td></td><td></td><td></td></tr><tr><td> PID</td><td>2</td><td>ID</td><td></td></tr><tr><td> VID</td><td>2</td><td>ID</td><td></td></tr><tr><td> 動作モード</td><td>1</td><td>uint</td><td></td></tr><tr><td> reserved = 0</td><td>3</td><td>uint</td><td>0x000000</td></tr><tr><td> }</td><td></td><td></td><td></td></tr><tr><td>}</td><td></td><td></td><td></td></tr></tbody></table> ■ 意味 id_count 対応する VID、PID のリストの数 PID 対応する PID VID 対応する VID 動作モード PID、VID の対が本体アプリ動作中のものなのか、Updater モード動作のものかの識別情報 本体アプリ動作時 ID 0x01 Updater 動作時 ID 0x02	配置	Size[Byte]	型	値	UDID Chunk{				length	4	uint	4+id_count*8	type	4	uint	'UDID'	id_count	4	uint		/* Descriptor ID List */				for (i=0; i < id_count; i++){				PID	2	ID		VID	2	ID		動作モード	1	uint		reserved = 0	3	uint	0x000000	}				}			
配置	Size[Byte]	型	値																																																		
UDID Chunk{																																																					
length	4	uint	4+id_count*8																																																		
type	4	uint	'UDID'																																																		
id_count	4	uint																																																			
/* Descriptor ID List */																																																					
for (i=0; i < id_count; i++){																																																					
PID	2	ID																																																			
VID	2	ID																																																			
動作モード	1	uint																																																			
reserved = 0	3	uint	0x000000																																																		
}																																																					
}																																																					
FDAT	Firmware データ ■ 制約条件 必ずチャンクとして存在する。 ■ データ配置 <table><thead><tr><th>配置</th><th>Size[Byte]</th><th>型</th><th>値</th></tr></thead><tbody><tr><td>FDAT Chunk{</td><td></td><td></td><td></td></tr><tr><td>length</td><td>4</td><td>uint</td><td></td></tr><tr><td>type</td><td>4</td><td>uint</td><td>'FDAT'</td></tr><tr><td>Firmware データ</td><td>length</td><td>Binary</td><td></td></tr><tr><td>}</td><td></td><td></td><td></td></tr></tbody></table> ■ 意味 Firmware データ	配置	Size[Byte]	型	値	FDAT Chunk{				length	4	uint		type	4	uint	'FDAT'	Firmware データ	length	Binary		}																															
配置	Size[Byte]	型	値																																																		
FDAT Chunk{																																																					
length	4	uint																																																			
type	4	uint	'FDAT'																																																		
Firmware データ	length	Binary																																																			
}																																																					
DEND	データ終端を示すチャンク ■ 制約条件 必ずチャンクとして存在する。 このチャンク以降のデータストリームは無視される。 ■ データ配置 <table><thead><tr><th>配置</th><th>Size[Byte]</th><th>型</th><th>値</th></tr></thead><tbody><tr><td>DEND Chunk{</td><td></td><td></td><td></td></tr><tr><td>length</td><td>4</td><td>uint</td><td></td></tr><tr><td>type</td><td>4</td><td>uint</td><td>'DEND'</td></tr><tr><td>CRC</td><td>4</td><td>uint</td><td></td></tr><tr><td>}</td><td></td><td></td><td></td></tr></tbody></table> ■ 意味 CRC Signature から、DEND チャンク直前のチャンクまでのデータストリームに対して計算された CRC32 の値。 実装 : http://www.w3.org/TR/2003/REC-PNG-20031110/#D-CRCAppendix	配置	Size[Byte]	型	値	DEND Chunk{				length	4	uint		type	4	uint	'DEND'	CRC	4	uint		}																															
配置	Size[Byte]	型	値																																																		
DEND Chunk{																																																					
length	4	uint																																																			
type	4	uint	'DEND'																																																		
CRC	4	uint																																																			
}																																																					

仕様

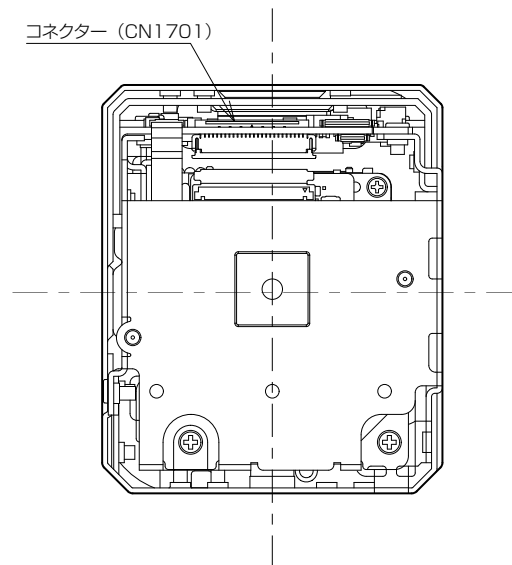
イメージャー	1/2.5 Type "Exmor R" CMOS センサー	ホワイトバランス	Auto、ATW、Indoor、Outdoor、One Push WB、Manual WB、Outdoor Auto、Sodium Vapor Lamp (Fix/Auto/Outdoor Auto)
有効画素数	約 851 万画素	ゲイン	Auto/Manual (0 ~ 48 dB (0 ~ 16 step)) Max. Gain Limit (9 ~ 48 dB (3 ~ 12 step))
レンズ	20 倍ズームレンズ f = 4.4 mm (Wide)、88.0 mm (Tele)、F2.0 ~ F3.8 ズーム移動時間 光学 Wide - 光学 Tele 3.0 sec (Focus Tracking On) 光学 Wide - スーパーリゾリューションズーム Tele 3.4 sec 光学 Wide - デジタルズーム Tele 5.0 sec フォーカス移動時間 ∞ ~ Near 0.1 sec	ノイズリダクション	On/Off (レベル 5 ~ レベル 1/Off、6 ステップ)
デジタルズーム	12 倍 (光学ズームとの組み合わせで最大 240 倍)	Defog モード	On/Off (Low、Mid、High)
画角 (水平)	約 70.2 度 (Wide 端、イメージスタビライザー Off) 約 4.1 度 (Tele 端、イメージスタビライザー Off) 約 60.0 度 (Wide 端、イメージスタビライザー On) 約 3.5 度 (Tele 端、イメージスタビライザー On)	輪郭強調 (アパーチャ)	16 ステップ
最至近撮影距離	80 mm (Wide 端)、800mm (Tele 端)	プリセット	16 通りの設定
最低被写体照度 (Typical 値)	0.4 lx (1/30 sec、50%、高感度モード On 時) 1.6 lx (1/30 sec、50%、高感度モード Off 時) 0.06 lx (1/4 sec (1/3 sec)、50%、高感度モード On 時) 0.21 lx (1/4 sec (1/3 sec)、50%、高感度モード Off 時)	カメラコントロール IF	VISCA protocol (CMOS 3.1V) PTP USB 9.6 kbps、19.2 kbps、38.4 kbps、115.2 kbps、Stop bit、1 bit
同期方式	内部同期 / 外部同期 (FCB-ER8550 のみ)	映像出力	Digital (HDMI)
被写体照度範囲	100 lx ~ 100,000 lx	保存温度 / 湿度	- 20 °C ~ + 60 °C / 20% ~ 95% 絶対湿度 : 36 g/m ³
映像 S/N	50 dB (Weight On)	動作温度 / 湿度	- 5 °C ~ + 60 °C / 20% ~ 80% 絶対湿度 : 36 g/m ³
逆光補正	On/Off	電源	6 V ~ 12 V DC
シャッタースピード	1/1 sec ~ 1/10000 sec (28 ステップ)	消費電力	3.0 W (モーター動作時 4.0 W)
		質量	約 275 g
		外形寸法	50 (W) × 60 (H) × 93.3 (D) mm

外形寸法図

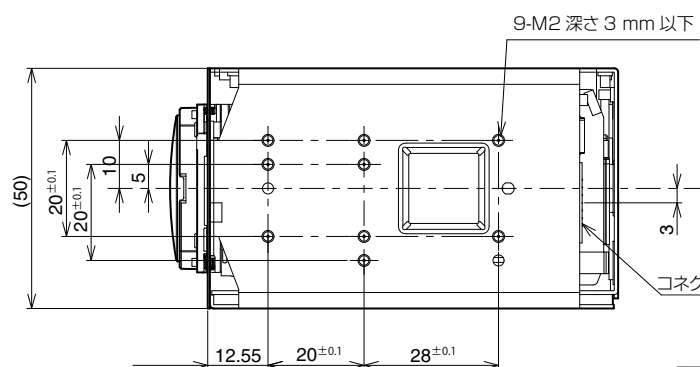
正面



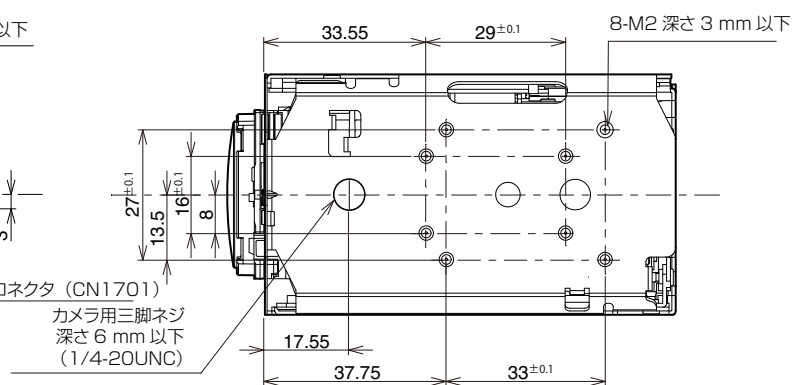
背面



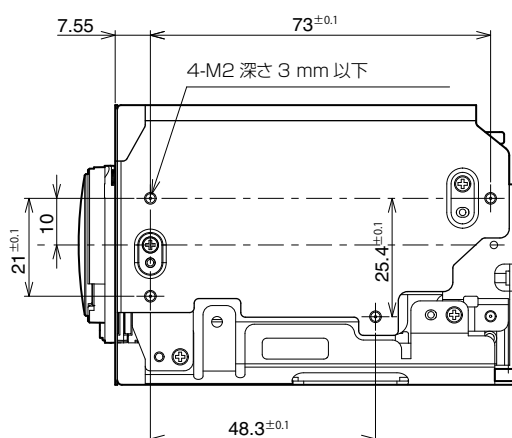
上面



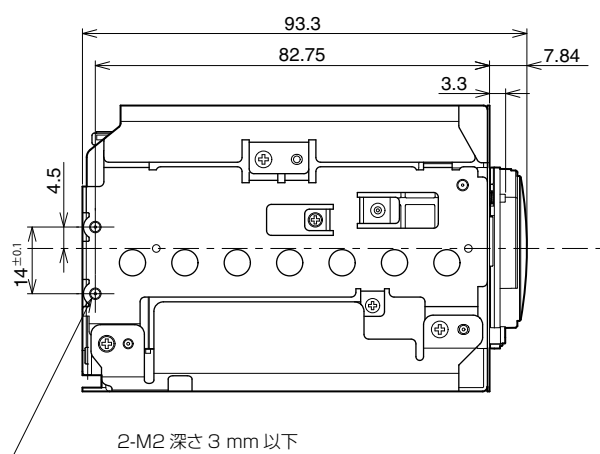
底面



左側面



右側面

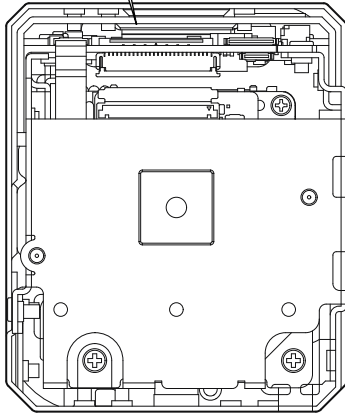


単位 : mm

ピン配列

Connector (CN1701)

1 2 29 30



CN1701

KEL Co. USL00-30L-C

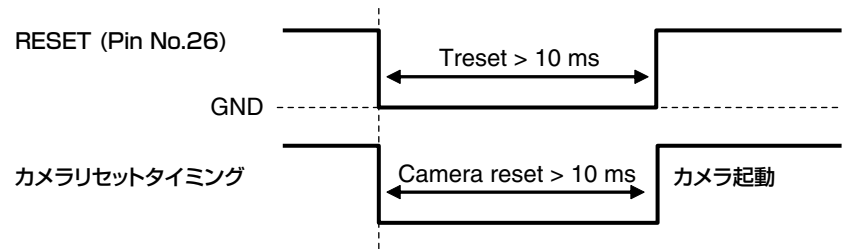
Pin No.	I/O	Name	Level
1	–	GND	
2	O	TMD5 Clock –	
3	O	TMD5 Clock +	
4	–	GND	
5	O	TMD5 Data 0 –	
6	O	TMD5 Data 0 +	
7	–	GND	
8	O	TMD5 Data 1 –	
9	O	TMD5 Data 1 +	
10	–	GND	
11	O	TMD5 Data 2 –	
12	O	TMD5 Data 2 +	
13	–	GND	
14	O	XSD0_ACC_LED	FCB-ER8550 のみ
15	I	EXT_SYNC	FCB-ER8550 のみ
16	O	EXT_SYNC_LOCK	FCB-ER8550 のみ
17	I	Hot Plug Detect	TMD5 Out : 5V DC TMD5 Stop : Open or GND
18	O	+ 5V Power	
19	I	USB_VBUS	USB 通信 Active : 5V DC USB 通信 InActive : Open or GND
20	–	GND	
21	I/O	USB_D –	
22	I/O	USB_D +	
23	–	GND	
24	I	VISCA_RxD	CMOS 3.1V (High : Min 2.3 [V], Low : Max 1.0 [V])
25	O	VISCA_TxD	CMOS 3.1V (High : Min 2.7 [V], Low : Max 0.4 [V])
26	I	RESET	リセット動作 : Low (GND) リセット解除 : Open (High Impedance)
27	I	DC IN	6 ~ 12 V DC
28	I	DC IN	6 ~ 12 V DC
29	I	DC IN	6 ~ 12 V DC
30	I	DC IN	6 ~ 12 V DC

※ Pin No.18 は、HDMI の 5V 電源として使用される事を想定しています。

※ USB 通信をご使用される場合は、Pin No.19 に USB ホストの VBUS を接続してください。
もしお客様側で VBUS がご用意できない場合は、Pin No.19 に Pin No.18 を接続頂くようお願いします。

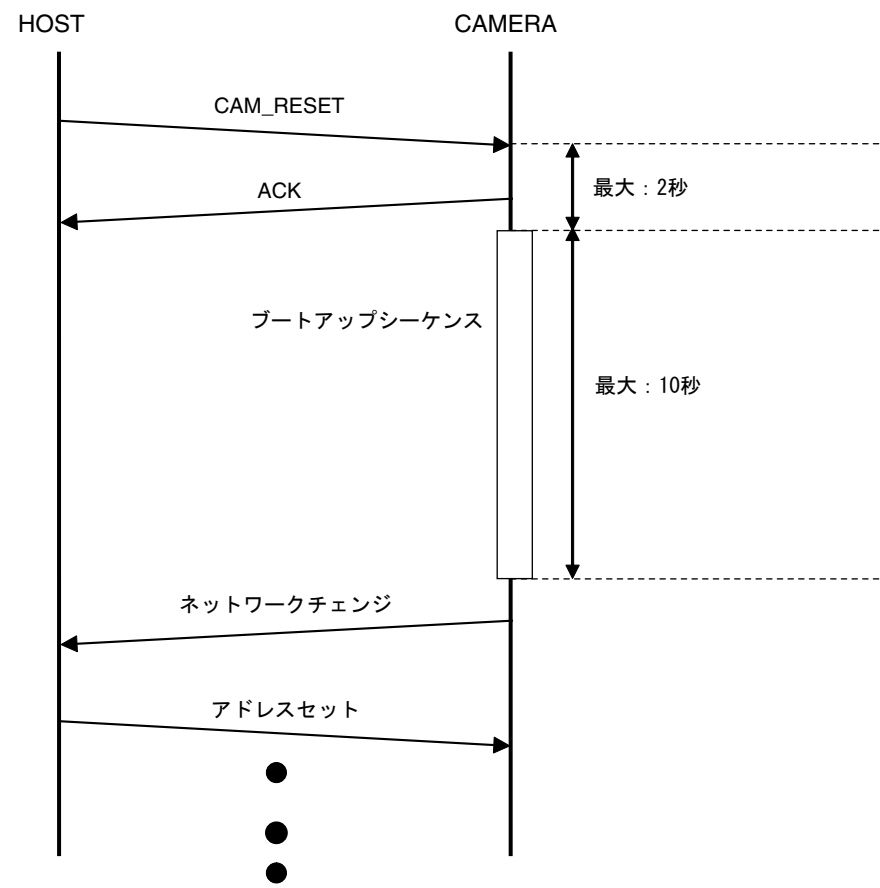
リセットタイミング仕様

カメラをリセットする場合、Low(GND) レベルのパルス幅が 10ms 以上になるパルスを入力してください。



Visca コマンドによるリセットについて

カメラリセット後、Network Change が発行されるまでに要する時間は下記になります。



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[linux-kernel]
[R8168-Driver]
[busybox]
[dosfstools]
[e2fsprogs]
[gcc-gplv3-libs]
[glibc]
[libmcheckb]
[procps]
[electric fence]
[util-linux-ng]

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Nelson Morgan and John Wawrzynek. More information is available through the Web page

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