

## High pixel 3CCD camera

# HV-F202GV

## Operation Manual



Thank you for purchase this fine Hitachi Kokusai Electric 3CCD camera.  
Before using the camera, please read this operation manual carefully.  
There is a possibility that the revised edition is exhibited on web.  
Please confirm by web shown in an Installation Guide.

## Hitachi Kokusai Electric Inc.

### **RoHS Compliant**

These products comply with the requirement of the RoHS (Restriction of the use of Certain Hazardous Substances in Electrical and electronic Equipment) Directive 2002/95/EC.

# IMPORTANT SAFETY INSTRUCTIONS

## 1. Read Instructions

All the safety and operating instructions should be read before the product is operated.

## 2. Retain Instructions

The safety and operating instructions should be retained for future reference.

## 3. Heed Warnings

All warnings on the product and the operating instructions should be adhered to.

## 4. Follow Instructions

All operating and use instructions should be followed.

## 5. Cleaning

Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

## 6. Attachments

Do not use attachments not recommended by the product manufacturer as they may cause hazards.

## 7. Water and Moisture

Do not use this product near water - for example, near a bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.

## 8. Accessories

Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.

## 9. Moving

A product and cart combination should be moved with care.

Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.

## 10. Ventilation

Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered.

The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

## 11. Power Sources

This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

## 12. Grounding or Polarization

This product is equipped with a three-wire grounding-type plug a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

## 13. Power-Cord Protection

Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plug, convenience receptacles, and the point where they exit from the product.

## 14. Lightning

For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the product due to lightning and power-line surges.

## 15. Overloading

Do not overload wall outlets, extension cords or integral convenience receptacles as this can result in a risk of fire or electric shock.

**16. Object and Liquid Entry**

Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

**17. Inflammable and Explosive Substance**

Avoid using this product where there are gases, and also where there are inflammable and explosive substances in the immediate vicinity.

**18. Heavy Shock or Vibration**

When carrying this product around, do not subject the product to heavy shock or vibration.

**19. Servicing**

Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

**20. Damage Requiring Service**

Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- a. When the power-supply cord or plug is damaged.
- b. If liquid has been spilled, or objects have fallen into the product.
- c. If the product has been exposed to rain or water.
- d. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- e. If the product has been dropped or damaged in any way.
- f. When the product exhibits a distinct change in performance-this indicates a need for service.

**21. Replacement Parts**

When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part.

Unauthorized substitutions may result in fire, electric shock, or other hazards.

**22. Safety Check**

Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

**23. Wall or Ceiling Mounting**

The product should be mounted to a wall or ceiling only as recommended by the manufacturer.

**24. Heat**

The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

# WICHTIGE SICHERHEITS ANWEISUNGEN

## 1. Alle Anweisungen lesen

Vor Betrieb des Erzeugnisses sollten alle Sicherheits- und Bedienungsanleitungen gelesen werden.

## 2. Die Anweisungen aufbewahren

Die Sicherheits- und Bedienungsanleitungen sollten fünftigen Bezug aufbewahrt werden.

## 3. Warnungen beachten

Die Warnungen auf dem Erzeugnis und in den Bedienungsanleitungen sollten beachtet werden.

## 4. Anweisungen befolgen

Alle Bedienungsanleitung- und Verwendungsanweisungen sollten befolgt werden.

## 5. Reinigung

Den Stecker des Geräts vor Reinigung aus der Steckdose ziehen. Keine flüssigen Reinigungsmittel oder Aerosolreiniger verwenden. Zum Reinigen einen feuchten Lappen verwenden.

## 6. Zubehör

Nur vom Hersteller des Erzeugnisses empfohlenes Zubehör verwenden, da es sonst zu Störungen kommen kann.

## 7. Wasser und Feuchtigkeit

Dieses Erzeugnis nicht in der Nähe von Wasser verwenden - z.B. in der Nähe einer Badewanne, eines Waschbeckens, einer Küchenspüle, eines Waschzubers, in einem nassen Keller, in der Nähe eines Schwimmbeckens usw.

## 8. Aufstellung

Das Erzeugnis nicht auf einen unstabilen Wagen, Stand, Dreifuß, Träger oder Tisch stellen.

Das Erzeugnis kann sonst herunterfallen und ein Kind oder einen Erwachsenen schwer verletzen.

Außerdem kann das Gerät schwer beschädigt werden. Nur mit einem Wagen, Stand, Dreifuß, Träger oder Tisch verwenden, der vom Hersteller empfohlen oder mit dem Erzeugnis verkauft worden ist. Für jegliche Anbringung sollten die Anweisungen des Herstellers befolgt werden, und das vom Hersteller empfohlene Anbringungszubehör sollte verwendet werden.

## 9. Eine Kombination von Erzeugnis und Wagen sollte vorsichtig bewegt werden

Schneller Halt, übermäßige Krafteinwirkung und unebene Oberflächen können Umkippen der Kombination von Erzeugnis und Wagen verursachen.

## 10. Ventilation

Slitze und Öffnungen im Gehäuse dienen der Ventilation. Sie sind für zuverlässigen Betrieb des Gerätes und Schutz vor Überhitzung erforderlich und dürfen nicht blockiert oder abgedeckt werden. Die Öffnungen sollten niemals dadurch blockiert werden, daß, das Gerät auf ein Bett, ein Sofa, einen Teppich oder eine ähnliche Oberfläche gestellt wird.

Das Gerät sollte nur dann in Einbauinstallation wie in einem Bücherschrank oder einem Gestell verwendet werden, wenn angemessene Ventilation vorgesehen ist bzw. Die Anweisungen des Herstellers befolgt worden sind.

## 11. Stromversorgung

Dieses Erzeugnis sollte nur an der auf dem Typenschild angegebenen Stromversorgungsart betrieben werden. Wenn Sie nicht sicher sind, was für eine Stromversorgung Sie haben, so wenden Sie sich bitte an Ihren Erzeugnishändler oder an das lokale Elektrizitätswerk. Beziehen Sie sich für Batteriebetrieb oder andere Stromquellen vorgesehene Erzeugnisse bitte auf die Bedienungsanleitungen.

## 12. Erdung oder Polarisierung

Dieses Erzeugnis ist mit einem Schutzkontaktstecker mit drei Leitern ausgerüstet, mit einem Erdungskontakt. Dieser Stecker paßt nur in eine Schuko-Steckdose. Dies ist eine Sicherheitsmaßnahme. Wenn Sie den Stecker nicht in die Steckdose stecken können, so wenden Sie sich bitte an Ihren Elektriker, damit er die veraltete Schutz des Schutzkontaktsteckers unwirksam macht.

## 13. Netzkabelschutz

Netzkabel sollten so verlegt werden, daß möglichst nicht darauf getreten wird und daß sie nicht eingeklemmt werden, mit besonderer Beachtung der Kabel an Stackern, Verlängerungskabeln und dem Austritt des Kabels aus dem Erzeugnis.

## 14. Blitzschlag

Für zusätzlichen Schutz des Erzeugnisses während eines Gewitters oder bei Nichtverwendung für lange Zeit den Stecker aus der Steckdose ziehen. Dies verhindert Beschädigung durch Blitzschlag und Netzspannungsschläge.

## 15. Überlastung

Wandsteckdosen, Verlängerungskabel und eingebaute Bequemlichkeitssteckdosen nicht überlasten, da dies Feuer oder elektrischen Schlag verursachen kann.

#### **16. Eindringen von Fremdkörpern und Flüssigkeit**

Niemals Objekte irgendwelcher Art durch die Öffnungen in das Gerät schieben, da diese unter hoher Spannung stehende Teile berühren oder kurzschließen können, wodurch es zu Feuer oder elektrischem Schlag kommen kann. Niemals Flüssigkeiten irgendwelcher Art auf das Erzeugnis verschütten.

#### **17. Entflammare und explosive Substanzen**

Vermeiden Sie Verwendung dieses Erzeugnisses an Orten mit Gasen bzw. entflammaren oder explosiven Substanzen in der direkten Umgebung.

#### **18. Starke stöße oder Vibrationen**

Setzen Sie das Erzeugnis beim Transport nicht starken Stößen oder Vibrationen aus.

#### **19. Wartung**

Versuchen Sie nicht, dieses Erzeugnis Selbst zu warten, da Sie sich durch Öffnen bzw. Entfernen von Abdeckungen hohen Spannungen und sonstigen Gefährdungen aussetzen können.

Beziehen Sie sich für jegliche Wartung auf qualifiziertes Wartungspersonal.

#### **20. Beschädigung, die Wartung erfordert**

Ziehen Sie den Stecker dieses Erzeugnisses aus der Steckdose und wenden Sie sich an qualifiziertes Wartungspersonal, wenn eine der folgenden Bedingungen vorliegt:

- a. Wenn das Netzkabel oder der Stecker beschädigt ist.
- b. Bei Eindringen von Flüssigkeit oder Fremdkörpern in das Gerät.
- c. Wenn das Erzeugnis Regen oder Wasser ausgesetzt worden ist.
- d. Wenn das Erzeugnis bei Befolgen der Bedienungsanleitungen nicht normal funktioniert.

Nur die Regelelemente verstellen, die in den Bedienungsanleitungen behandelt werden, da unangemessene Einstellung anderer Regelelemente Beschädigung verursachen kann und oft beträchtliche Arbeit durch einen qualifizierten Techniker erfordert, um das Erzeugnis wieder, zu normalem Betrieb zurückzubringen.

- e. Wenn das Erzeugnis fallen gelassen oder beschädigt worden ist.
- f. Wenn das Erzeugnis eine klare Änderung in der Leistung zeigt-dies weist darauf hin, daß Wartung erforderlich ist.

#### **21. Ersatzteile**

Wenn Ersatzteile erforderlich sind, darauf achten, daß der Wartungstechniker nur die vom Hersteller festgelegten Ersatzteile oder Teile mit den gleichen Charakteristiken wie die ursprünglichen Teile verwendet. Unautorisierte Ersatzteile können Feuer, elektrischen Schlag oder sonstige Gefährdungen verursachen.

#### **22. Sicherheitsprüfung**

Bitten Sie den Wartungstechniker nach der Vollendung von Wartung oder Reparaturarbeiten an diesem Erzeugnis um die Durchführung von Sicherheitsprüfungen, um zu bestimmen, daß das Erzeugnis im angemessenen Betriebszustand ist.

#### **23. Anbringung an der Wand oder an der Decke**

Das Erzeugnis sollte nur entsprechend den Empfehlungen des Herstellers an einer Wand oder an der Decke angebracht werden.

#### **24. Wärme**

Das Erzeugnis sollte fern von Wärmequellen wie Radiatoren, Heizwiderständen, Öfen und anderen Wärme erzeugenden Erzeugnissen (einschließlich Verstärkern) aufgestellt werden.

# MISES EN GARDE IMPORTANTES

## 1. Lire les instructions

Lire toutes les instructions de sécurité et de fonctionnement avant de faire fonctionner l'appareil.

## 2. Conserver ces instructions

Conserver les instructions de sécurité et de fonctionnement à des fins de référence ultérieure.

## 3. Tenir compte des avertissements

Tous les avertissements qui figurent sur l'appareil et dans le mode d'emploi devront être respectés.

## 4. Observer les instructions

Observer toutes les instructions de fonctionnement et d'utilisation.

## 5. Nettoyage

Avant de procéder au nettoyage, débrancher l'appareil de la prise secteur. Ne pas utiliser de produits de nettoyage liquides ou en aérosol.

Nettoyer l'appareil avec un chiffon humide.

## 6. Fixations

Ne pas utiliser de fixations non recommandées par le fabricant de l'appareil car elles pourraient être source de danger.

## 7. Eau et humidité

Ne pas utiliser l'appareil à proximité d'eau - par exemple près d'une baignoire, d'un lavabo, d'un évier ou d'un bac à lessive, dans un sous-sol humide, ou près d'une piscine, etc.

## 8. Accessoires

Ne pas placer l'appareil sur un chariot, un socle, un pied, un support ou une table instables. L'appareil pourrait tomber, blessant grièvement des enfants ou des adultes, et étant sérieusement endommagé.

Utiliser exclusivement le chariot, le socle, le pied, le support ou la table recommandés par le fabricant, ou vendus avec l'appareil. Pour tout montage de l'appareil, respecter les instructions du fabricant, et utiliser à cette fin l'accessoire de montage recommandé par le fabricant.

## 9. L'appareil monté sur son chariot devra être déplacé avec précaution

Des arrêts brusques, une force excessive et des surfaces irrégulières pourraient provoquer le renversement de l'ensemble appareil-chariot.

## 10. Ventilation

Les fentes et les ouvertures du coffret sont prévues pour la ventilation ainsi que pour garantir un fonctionnement en toute sécurité de l'appareil et le protéger de toute surchauffe, et ces ouvertures ne devront donc être ni obstruées ni recouvertes. Ne jamais obstruer les ouvertures en plaçant l'appareil sur un lit, un sofa, un tapis ou toute surface similaire. Ne jamais placer l'appareil dans un support confiné, par exemple une bibliothèque ou une étagère, sans ventilation suffisante ou sans respecter les instructions du fabricant.

## 11. Sources d'alimentation

L'appareil devra être alimenté exclusivement sur le type d'alimentation indiqué sur l'étiquette signalétique. Si l'on n'est pas sûr du type d'alimentation du local, consulter le revendeur de l'appareil ou la compagnie d'électricité locale. Pour les appareils qui fonctionnent sur batterie ou sur d'autres sources, voir le mode d'emploi.

## 12. Mise à la terre ou polarisation

L'appareil est doté d'une fiche trifilaire avec mise à la terre, dont la troisième broche assure la mise à la terre. Cette fiche ne rentrera que dans les prises trifilaires de mise à la terre. Ceci est une mesure de sécurité. Si la fiche ne rentre pas dans la prise, faire remplacer la prise défectueuse par un électricien.

Ne pas rendre vaine la mesure de sécurité assurée par cette prise avec mise à la terre.

## 13. Protection du cordon d'alimentation

Acheminer les cordons d'alimentation de façon qu'on ne risque pas de marcher dessus ou de les coincer sous un objet placé dessus ou contre eux.

Faire particulièrement attention aux fiches des cordons, à la proximité des prises, et à l'endroit où ils ressortent de l'appareil.

## 14. Foudre

Pour renforcer la protection de l'appareil pendant un orage, ou si l'on s'en éloigne ou qu'on reste longtemps sans l'utiliser, le débrancher de la source d'alimentation. Ceci permettra d'éviter tout dommage de l'appareil dû à la foudre et aux surtensions de ligne.

## 15. Surcharge

Ne pas surcharger les prises, rallonges et prises multiples car cela pourrait entraîner un risque de feu ou de choc électrique.

## **16. Pénétration d'objets et de liquides**

Ne jamais enfoncer d'objets d'aucune sorte dans les ouvertures de l'appareil car ils pourraient toucher des points de tension dangereuse ou court-circuiter des pièces, ce qui pourrait provoquer un feu ou un choc électrique. Ne jamais renverser de liquide d'aucune sorte sur l'appareil.

## **17. Substances inflammables et explosives**

Eviter d'utiliser l'appareil en présence de gaz, ainsi qu'à proximité immédiate de substances inflammables et explosives.

## **18. Chocs ou vibrations violents**

Lorsqu'on transporte l'appareil, ne pas le soumettre à des chocs ou des vibrations violents.

## **19. Réparations**

Ne pas tenter de réparer l'appareil soi-même car le fait d'ouvrir ou de retirer les caches risque d'exposer l'utilisateur à des tensions dangereuses notamment. Confier toute réparation à un personnel qualifié.

## **20. Dommages nécessitant réparations**

Débrancher l'appareil de la source d'alimentation et confier les réparations à un personnel qualifié dans les cas suivants:

- a. Lorsque le cordon d'alimentation ou sa fiche sont endommagés
- b. Si du liquide s'est renversé sur l'appareil ou que des objets sont tombés dedans
- c. Si l'appareil a été exposé à la pluie ou à l'eau.
- d. Si l'appareil ne fonctionne pas normalement lorsqu'on observe les instructions d'utilisation.

Ne régler que les commandes couvertes par le mode d'emploi ; en effet, un réglage incorrect des autres commandes pourrait entraîner des dommages et nécessiteront souvent des travaux de réparation coûteux par un technicien qualifié pour remettre l'appareil en état de marche.

- e. Si l'appareil est tombé ou qu'il a été endommagé.
- f. Si l'appareil affiche une nette modification de ses performances, cela signifie qu'il a besoin d'être réparé.

## **21. Pièces de rechange**

Si l'on a besoin de pièces de rechange, veiller à ce que le technicien de réparation utilise exclusivement les pièces de rechange spécifiées par le fabricant ou des pièces ayant les mêmes caractéristiques que les pièces d'origine. Les pièces de rechange non autorisées risquent de provoquer un feu, un choc électrique et autres dangers.

## **22. Vérification de sécurité**

Après tout travail d'entretien ou de réparation de l'appareil, demander au technicien de réparation d'effectuer les vérifications de sécurité pour s'assurer que l'appareil est en bon état de marche.

## **23. Montage au mur ou au plafond**

L'appareil ne pourra être monté au mur ou au plafond que de la manière recommandée par le fabricant.

## **24. Chaleur**

Eloigner l'appareil des sources de chaleur, telles que radiateurs, appareils de chauffage, cuisinières, et de tout produit engendrant de la chaleur (y compris les amplificateurs).

## IMPORTANT NOTICE

### USA

These products have been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

#### WARNING

Changes or modifications not expressly approved by Hitachi Kokusai Electric Ltd. responsible for compliance could void the user's authority to operate the equipment.

### For Canada

This product does not exceed the class A/class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations.

Le présent appareil n'émet pas de bruits radioélectriques dépassant les limites applicable aux appareils numériques de classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministère des communications du Canada.



This page show the **declaration of conformity** for CE.  
That reference number is **KV-0367**, and report number is **V3T-0165**.

Ref.No.KV-0367

## Declaration of Conformity

**Manufacturer's Name:** Hitachi Kokusai Electric, Inc.  
**Manufacturer's Address:** 4-14-1 Sotokanda, Chiyoda-ku,  
Tokyo 101-8980, Japan

**Representative(s) Address  
in the EU:** Hitachi Kokusai Electric Europe GmbH  
Siemens Strasse 9, D-63263 Neu-Isenburg,  
Germany

declares, that the product:

**Product Name:** 3CCD Camera  
**Model Number(s):** HV-F202GV

conforms to the following Standards:

**EMC:** EN 61000-6-3/2007  
EN 61000-6-1/2007

### Supplementary Information:

"The product complies with the requirements of the Low Voltage  
Directive 2006/95/EC and the EMC Directive 2004/108/EC."

Signature:



K. Enomoto  
Senior Manager  
Quality Assurance Department II  
Hitachi Kokusai Electric Inc.



M. Momose  
Managing Director  
Hitachi Kokusai Electric Europe GmbH

Date: 19th Apr. ,2011

V3T-0165

Note : This product using the following equipment satisfied the CE standard.

The camera cable by shield type (C-201KSS).

LAN cable (C5E(S-HFR)(K)-HSL-1: Oki).

Clamp filters (ZCAT 2035-0930A: TDK) at both ends (camera and video processor ends).

# China RoHS

The following statement is related to the regulation on “ Measures for the Administration of the control of Pollution by Electronic Information Products “ , known as “ China RoHS “.

The table shows contained Hazardous Substances in this camera.

说明书（环境方面：补充资料）

对象产品：彩色摄像机

## 1. 电子产品污染控制标志



此标志是根据 2006 年 2 月 28 日公布的《电子信息产品污染控制管理办法》以及 SJ/T11364-2006《电子信息产品污染控制标识要求》而制定的，是用来表示适用于在中华人民共和国流通的电子信息产品的环保使用期限。

只要遵守此类产品的安全事项以及使用上应注意的问题，从制造日起到此年限内，不会发生产品中的有害物质外泄、突变等，不会对环境、人体以及财产产生严重影响。同时，此年限是除去必须定期交换的保守部品的，是其他产品的环保使用期限。

产品在正常情况下使用完毕要废弃时，请遵守各地区对电子信息产品的回收·再利用的相关各项法律、法规。

另外，从第三者处转买的情况下即使在本期限内也视为失去效力。

## 2. 产品中有毒有害物质或元素的名称及含量

	部件名称	有毒有害物质或元素					
		铅 (Pb)	水银 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
1	主机	×	○	×	○	○	○

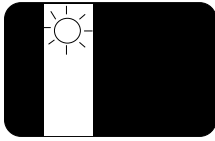
○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。  
×：表示该有毒有害物质至少在该部件的某一均材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

## Phenomena inherent to CCD imaging device

The following phenomena are inherent to a charge coupled device imaging element and do not indicate malfunction.

### 1) Smear and blooming

Vertical bands are visible when a strong light enters the scene. Adjust the camera aiming direction carefully to avoid strong direct or reflected light.



### 2) Fixed pattern noise

High ambient temperature can cause fixed pattern noise to appear throughout the scene.

### 3) Moire

Interaction between patterns can produce an additional "phantom" pattern to appear. The CCD picture elements (pixels) are arranged in a pattern, which can interact with a pattern in the scene (e.g., a performer wearing a finely striped necktie) to result in a Moire pattern. The effect should be considered when selecting costumes, props and other scene elements.

### 4) Ghosting

Strong direct or reflected light near an object of interest can cause ghosting of the object to appear in the picture. The effect is more obtrusive with certain iris settings and lens types. Select the scene layout and camera pointing direction carefully in order to avoid this effect.

### 5) White spot

Imperceptible white spots may rarely come up on the screen due to cosmic rays and so on. It becomes easy to appear when the sensitivity of the camera is raised in the operation at the high temperature.

# **Operating considerations Notes to users**

## **1. Important safety notes**

- Please supply the direct current 12V of the camera input power supply within the range of 11 to 13V
- Time will be needed for about four seconds by the time the camera works normally after turning on the power supply.
- Observe that flammable objects, water or metal do not enter the camera interior. These may lead to failure or accident.
- Do not modify the camera or use the camera with external covers removed. These may cause failure, void any warranties and pose a safety hazard.
- Stop using the camera at the approach of electrical storm (thunder audible). Protect the camera from rain if using it outdoors.
- In event the camera shows any abnormality, switch off the camera and disconnect the power cord. Contact a Hitachi Denshi service representative.

## **2. Handling**

- Do not attempt to remove cover.
- When installing or removing a lens, be sure to use care that water or dust does not enter the inside of the camera.

## **3. Installing and storage**

Avoid installing or storing the camera in the following environments.

- Environments exposed to direct sunlight, rain or snow.
- Environments where combustible or corrosive gas exists.
- Excessively warm or cold environment (Operating ambient temperature: -10 to 50°C).
- Humid or dusty environment.
- Place subjected to excessive vibration or shock.
- Environment exposed to strong electric or magnetic field.
- Do not aim the camera lens at the sun.
- Do not shoot strong light.

When such a scene is shot, vertical trailing will appear. However, this is not due to failure. In case strong light enters camera through the lens, partial deterioration in picture quality will result.

## **4. To obtain stable performance for long time**

When the camera is used continuously for long time under high ambient temperature, the inside electrical parts become deteriorated, resulting in shortening its life. To use the camera continuously for long time, the highest temperature must be below 40°C.

## **5. Connectors**

Confirm the power is off before connecting or disconnecting a signal cable. Grasp connectors by the body, not the attached wires.

## **6. Cleaning**

- Use a blower or a lens brush to remove dusts on the lens or the optical filter.
- Wipe dirt on the case off with dry soft cloth. If dirt is hardened, wipe them off with cloth moistened with neutral detergent liquid; wipe the cover with dry cloth.
- Do not use benzene, thinner, alcohol, liquid cleaner or spray-type cleaner.
- In event dust or other debris is lodged between the CCD and optical filter, consult dealer for cleaning by an optical technician.

# Table of Contents

1. Overview .....	1.
2. Standard Composition .....	1
3. Features .....	1
4. Section name and functions .....	2
5. Camera mounting .....	2
6. Lens .....	2
7. Connector .....	3
8. System example .....	4
9. Functions and operations .....	6
10. Frame rate .....	23
11. Packet size and Packet delay .....	24
12. Trigger mode .....	25
13. Digital output .....	28
14. Trigger operation and timing chart .....	29
15. Input / Output signal .....	32
16. Spectral response .....	32
17. Specifications .....	33
18. Dimensions .....	34

## Overview

HV-F202GV is high precision 3CCD progressive scan color camera, which has single chip digital processing LSI, a C mount prism, 1/1.8 inch 2,000,000 pixels square CCD and Gigabit Ethernet interface.

Since these cameras are Power over Ethernet (PoE) type, power supply is input via LAN cable.

## Standard composition

### Check when unpacking

Camera .....	1
Installation guide .....	1
Plug for DC IN/SYNC connector (HR10A-10P-12S) .....	1

### Optional accessories

(1) 12 pin plug	HR10A-10P-12S(01)
(2) Junction box	JU-F30/JC-100
(3) Tripod adaptor	TA-F202
(4) LAN cable (CAT5E or CAT6)	

In the CE Marking region, use a high flexibility shielded cable (recommended C5E(S-HFR)(K)-HSL-1: Oki). Refer to page 5.

### (5) Camera cable

	Molded type	Shield type
2m	C-201KSM	C-201KSS
5m	C-501KSM	C-501KSS
10m	C-102KSM	C-102KSS

In the CE Marking region, use the shield type and attach clamp filter (ZCAT 2035-0930A: TDK) at both ends (camera and video processor ends). Refer to page 5.

Note : When not using the specified junction box, LAN cable, camera cable and clamp filter, malfunctions may be caused.

## Features

### •High resolution and color fidelity

The 1/1.8-inch 2.02 million pixels square lattices progressive scan CCD and dichroic prism for RGB color achieves a high resolution of UXGA picture and good color reproduction.

### •Small and lightweight

The small SDR connector for digital output allows the camera size and mass to be drastically reduced to 55(W) x 55(H) x 89(D) mm / approx. 350g.

### •Gigabit Ethernet

By adoption of Gigabit Ethernet interface, high-speed connection of maximum of 1 Gbps can be possible. Moreover, by using hub or switcher, construction of multiple camera system can be easily performed. It is also possible to 100m.

### •GigE Vision™ correspondence

Based on Industrial camera interface standard GigE Vision, a maximum of 1Gbps high speed data transmit is available and suitable for image processing.

### •GENiCAM™ correspondence

Development of camera control system is easy because industrial camera control API "GENiCAM" lead EMVA (European Machine Vision Association).

### •Various picture quality enhancement

Independent size color masking is the Hitachi innovation for optimizing color balance. Saturation and hue of 6 colors (Red, Green, Blue, Cyan, Magenta and Yellow) can be adjusted independently to deliver the best color in image capture, microscope and other applications.

In-out gradation control can be arbitrarily adjusted by using LUT.

### •Auto shading correction

Color shading due to aberration of the lens is automatically compensated or reduced.

### •Versatile CCD drive functions

Video frame capture on demand using external trigger signal

Long integration mode (max. 10 seconds)

Variable shutter mode (min. 1/100,000 second)

Auto electronic shutter mode

### •Power over type Ethernet

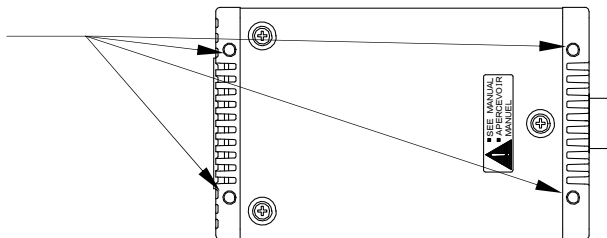
Power supply can be input via Ethernet cable.

GigE Vision™ and the distinctive logo are trademarks of AIA (Automated Imaging Association).

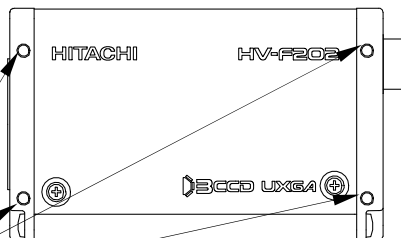
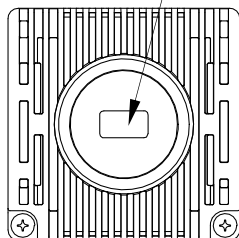
GENiCAM™ is a trademark of EMVA (European Machine Vision Association). Ethernet is a trademark of XEROX Corporation.

## Section name and functions

Camera / Tripod adaptor mounting screw holes

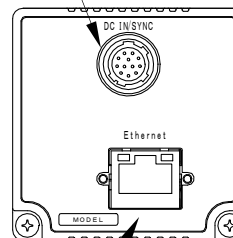


Lens mount (C mount)



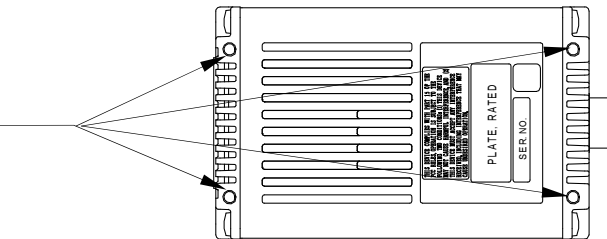
**DC IN/SYNC connector**

Use for DC+12V power and external trigger /VD signal input.



Camera / Tripod adaptor mounting screw holes

Camera / Tripod adaptor mounting screw holes

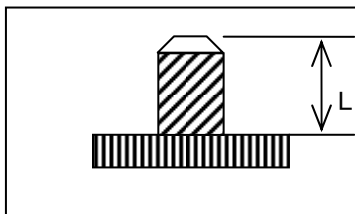


**Ethernet connector**

Use for digital video output and camera control signal input/output signal.

## Camera mounting

Attached optional accessory the tripod adaptor "TA-F202", mount the camera to a tripod or mounting bracket.



Screw type: U1/4-20

Length L = 4 to 5.5mm

Screws longer than 5.5 mm can cause internal damage, while less than 4 mm prevents secure fastening and risks dropping to cause damage and injury.

## Lens

### CAUTION

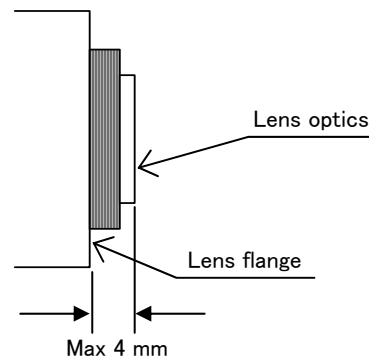
Observe the dimensions of the lens mounting selection as illustrated at the right.

If the dimensions are not observed, do not use such a lens, because the lens and the camera will be damaged.

### Selecting a lens

The proper lens is important for obtaining adequate performance from the camera. Especially in the case of a three elements CCD system C mount camera, the lens incidence and exit distances are important. If separation is too short, color irregularity is apt to occur at the top and bottom of the image.

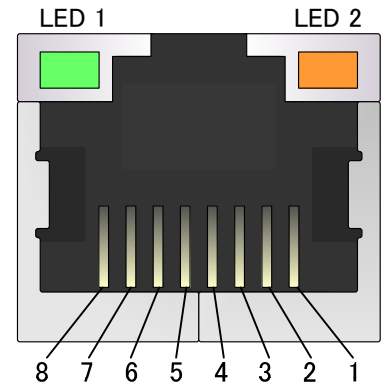
Conversely if too long, where the lens iris is a nearly fully open, resolution is impaired, while shading and flare can seriously detract from image quality. When using 3 CCD color system camera, it is also recommended to use a lens designed for this purpose.



# Connector

## 1. Ethernet connector

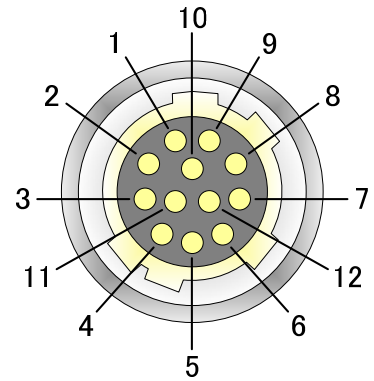
PIN NO.	Signal
1	TRP1+
2	TRP1-
3	TRP2+
4	TRP3+
5	TRP3-
6	TRP2-
7	TRP4+
8	TRP4-



Status	LED 1	LED 2
Immediately after Power ON	Green Light On	Orange Light On
1Gb Transmission	Green Light On	Orange Blink On
100Mb Transmission	Red Light On	Orange Blink On

## 2. DCIN/SYNC connector

PIN NO.	Signal	PIN NO.	Signal
1	GND (+12V)	7	TRIG-A / VD (H) IN
2	+12V	8	TRIG-B (C) IN
3	GND	9	TRIG-B (H) IN
4	N.C.	10	FLASH / VD (H) OUT
5	FLASH / VD (C) OUT	11	N.C.
6	N.C.	12	TRIG-A / VD (C) IN



Connector (matching camera: SNH-10-12(RPCB) SANWOO or equivalent)  
 Plug (matching cable plug: HR10A-10P-12S(01) HIROSE or equivalent)

TRIG-A/VD and TRIG-B are input using digital isolation, and FLASH/VD OUT is output by digital Isolation, therefore 8/12/5 pin are isolate from 1/3 pin.

When the system requirement should be connect to GND and that doesn't need isolation, please connect 8/12/5 pin to 3 pin.

Please do not connect 1 pin and 3 pin when using PoE. When connecting it, PoE may stop the power supply.

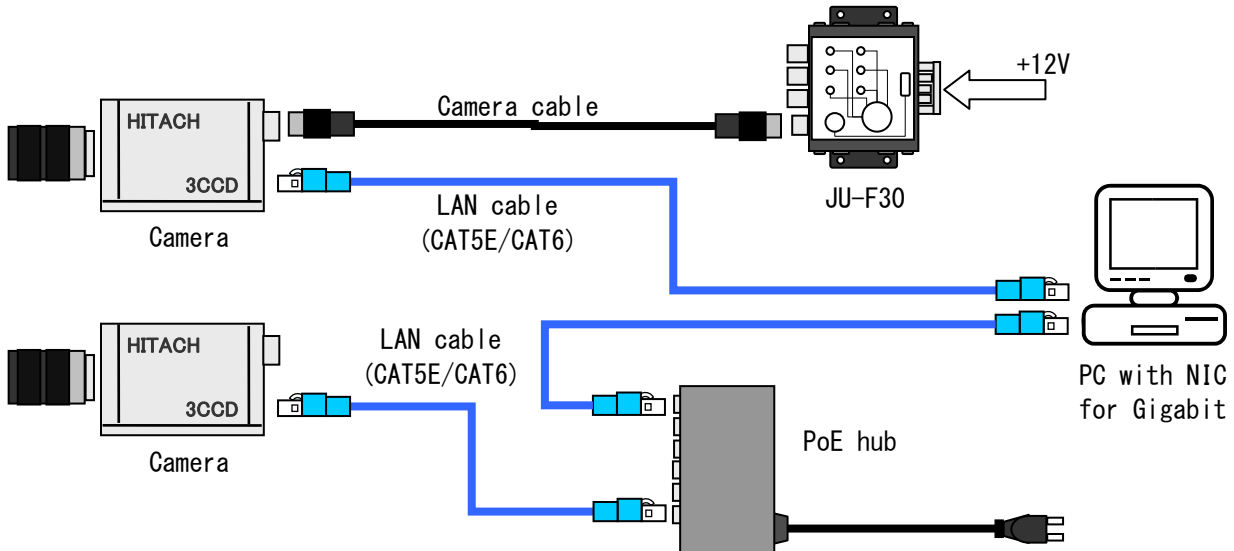
(Note) Please do not unplug and insert cable (digital out cable) with a power supplied to a camera.

Install clamp filter (ZCAT2035-0930A: TDK) at both ends (camera and video processor ends) in the CE marking region.



# System example

HV-F202GV connect to PC sing LAN cable.



**(\*) Note that following point when connecting the camera**

- (1) Please connect the camera to device for Gigabit Ethernet (1000BASE-T).
- (2) Please use LAN cable of CAT5E or more (recommendation: CAT6 straight cable).
- (3) To the NIC for Jumbo frame is recommended to be used  
Recommended NIC: Intel Pro1000 PT Desktop
- (4) When the camera is connected to Laptop PC, please use the one whose built-in LAN is Gigabit Ethernet (1000BASE-T) correspondence.  
The external LAN card (CardBus32 or USB2.0) may not display the cameras ability because of the bus limitation.  
ExpressCard is corresponded on the standard but useable product is unconfirmed (.as of April, 2011).
- (5) Please connect the camera and PC by 1 to 1 as much as possible  
Please use the device corresponded to Jumbo frame when using the switching hub etc.
- (6) Please confirm if the camera and the connected LAN port have same subnet.

Example-1: Same subnet --> Controllable

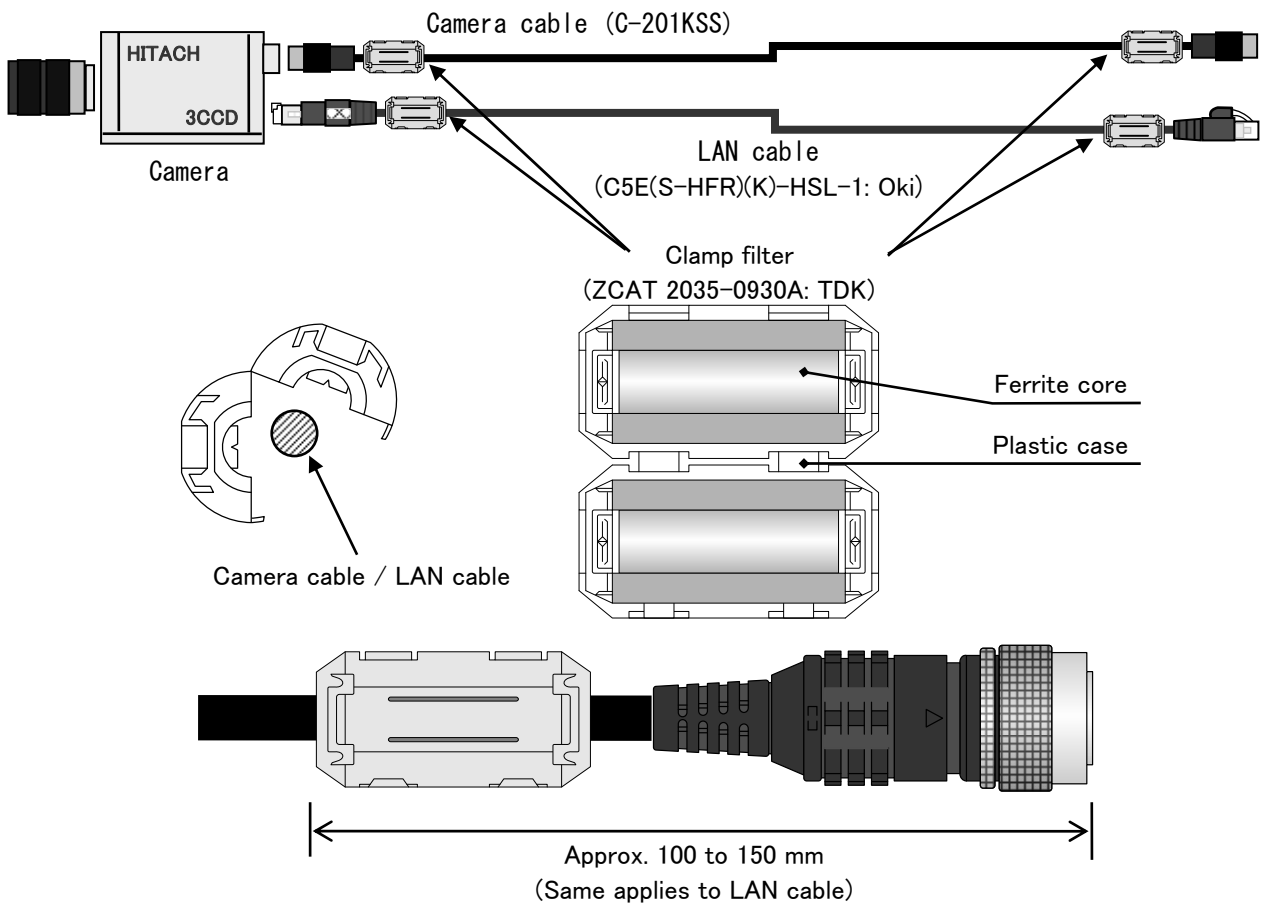
	IP address	Subnet mask	Subnet
Camera	192.168.1.100	255.255.255.0	<b>192.168.1.0/24</b>
LAN port	192.168.1.1	255.255.255.0	<b>192.168.1.0/24</b>

Example-2: Different subnet --> Uncontrollable

	IP address	Subnet mask	Subnet
Camera	192.168.1.100	255.255.255.0	<b>192.168.1.0/24</b>
LAN port	192.168.2.1	255.255.255.0	<b>192.168.2.0/24</b>

- (7) A striped noise might be caused according to the equipment (hub etc.) connected with the camera.  
In that case, please connect the cable to another port of the equipment again.
- (8) Please disable UAC (User Account Control) when using WindowsVista.  
Please set UAC to "Never notify" when using Windows7.

(9) In the CE Marking region, use following specified cables and clamp filters.



# Functions and operations

Various mode setup and adjustment of HV-F202GV are performed by the remote control via Gigabit Ethernet. Operation and adjustment way of function utilized are described below.

Each command is roughly divided into the following five kinds according to a use.

Enumeration	: It is a command treating an enumerated type parameter.
Integer	: It is a command treating an integer type parameter.
Float	: It is a command treating an floating point type parameter.
Command	: It is a command for performing a function.
String	: It is a command treating a character string.

“Standard” means the function based on GENiCAM™ Standard Feature Naming Convention (SFNC) and “Custom” means the original function. The software for GENiCAM™ can operate by using command name. Moreover, it can also be operated by reading /writing the value to address directly.

## 1. Commands for acquisition

### (1) ACQUISITION : Setting for image acquisition method

Command name	: AcquisitionMode (Enumeration / Standard)
Address	: A0030000 h
Values (Factory setting 1)	: 1 “Continuous” Frames are captured continuously until stopped with the STOP command. 2 “MultiFrame” The number of frames specified by FRAME COUNT is captured. 3 “SingleFrame” One frame is captured.

#### •START : Acquisition start

Command name	: AcquisitionStart (Command / Standard)
Address	: A0030004 h
Values (write only)	: 1 Start the acquisition of the camera image.

#### •STOP : Acquisition stop

Command name	: AcquisitionStop (Command / Standard)
Address	: A0030008 h
Values (write only)	: 0 Stop the acquisition of the camera image.

#### •EXTRA MODE : Special one shot \*using when MODE is SingleFrame

Command name	: AcquisitionModeExtra (Enumeration / Custom)
Address	: A0F30018 h
Values (Factory setting 0)	: 0 “Off” The camera releases the shutter according to internal synchronization. 1 “On” The camera releases the shutter when START command is received.

#### •FRAME COUNT : Set the number of capture \*using when MODE is MultiFrame

Command name	: AcquisitionFrameCount (Integer / Standard)
Address	: A003000C h
Values (Factory setting 1)	: 1 to 255 Set the number of frames to be acquired in MultiFrame mode.

• **FRAMERATE 1 : Set the frame rate**

Command name : AcquisitionFrameRate (Float / Standard)  
Address : A0030010 h  
Values (Factory setting 30): 7.0 to 30.0: Control the Frame rate in 1 fps step.  
An actual frame rate is decided by size of the picture. **\* Refer to page 23 "Frame rate"**

• **FRAMERATE 2 : Set the frame rate**

Command name : AcquisitionFrameRateRaw (Integer / Standard)  
Address : A0030014 h  
Values (Factory setting 30): 7 to 30: Control the Frame rate in 1 fps step.  
An actual frame rate is decided by size of the picture. **\* Refer to page 23 "Frame rate"**

Note : FRAMERATE 1 and FRAMERATE 2 are same functions.  
If one is changed then the other is changed to same value.

• **CURRENT FRAMERATE 1 : Current actually frame rate**

Command name : CurrentFrameRate (Float / Custom)  
Address : A0F30100 h  
Values (read only) : 7.0 to 30.0: It is frame rate that camera actually drives.  
**\* Refer to page 23 "Frame rate"**

• **CURRENT FRAMERATE 2 : Current actually frame rate**

Command name : CurrentFrameRateRaw (Integer / Custom)  
Address : A0F30104 h  
Values (read only) : 7 to 30: It is frame rate that camera actually drives.  
**\* Refer to page 23 "Frame rate"**

Note : CURRENT FRAMERATE 1 and CURRENT FRAMERATE 2 are same functions.  
Those show same value.

## 2. Commands for acquisition image

### (1) WIDTH MAX : Maximum width of the image

Command name : WidthMax (Integer / Standard)  
Address : A002F008 h  
Values (read only) : 1600

### (2) HEIGHT MAX : Maximum height of the image

Command name : HeightMax (Integer / Standard)  
Address : A002F00C h  
Values (read only) : 1200

### (3) WIDTH : Set the actual image width

Command name : Width (Integer / Standard)  
Address : A0020000 h  
Values (Factory setting 1600)

: 2 to WIDTH MAX Set the actual image width at intervals of 2 pixels.

### (4) HEIGHT : Set the actual image height

Command name : Height (Integer / Standard)  
Address : A0020004 h  
Values (Factory setting 1200)

: 2 to HEIGHT MAX Set the actual image height at intervals of 2 pixels.

### (5) OFFSET : Setting of start position of the actual image

#### •OFFSET X : Set the horizontal offset

Command name : OffsetX (Integer / Standard)  
Address : A0020008 h  
Values (Factory setting 0) : 0 to (WIDTH MAX – WIDTH + 2)

Set the horizontal start position of the actual image at intervals of 2 pixels.

#### •OFFSET Y : Set the vertical offset

Command name : OffsetY (Integer / Standard)  
Address : A002000C h  
Values (Factory setting 0) : 0 to (HEIGHT MAX – HEIGHT + 2)

Set the vertical start position of the actual image at intervals of 2 pixels.

### (6) PIXEL FORMAT : Set the pixel format

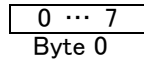
Command name : PixelFormat (Enumeration / Standard)  
Address : A0020014 h  
Values : \*Refer the following table

Following format is available

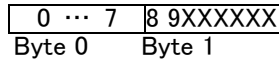
Format	Values
Mono8	01080001 <sub>16</sub>
Mono10	01100003 <sub>16</sub>
Mono12	01100005 <sub>16</sub>
RGB8Packed	02180014 <sub>16</sub>
BGR8Packed	02180015 <sub>16</sub>
RGB10V1Packed	0220001C <sub>16</sub>
RGB12Packed	0218001A <sub>16</sub>
YUV422Packed	0210001F <sub>16</sub>
YUV422_10Packed	80180001 <sub>16</sub>
YUV422_12Packed	80180002 <sub>16</sub>

Pixel alignments of each Pixel format are following.

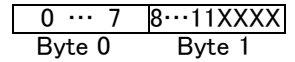
• Mono8



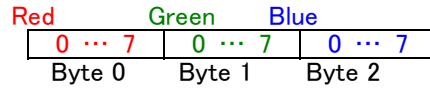
• Mono10



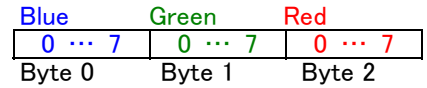
• Mono12



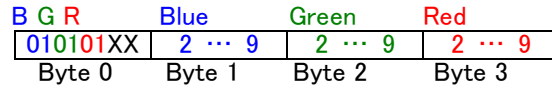
• RGB8Packed



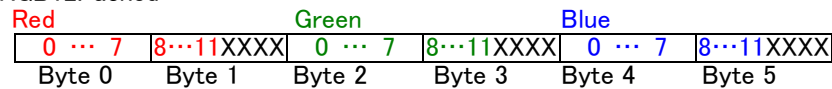
• BGR8Packed



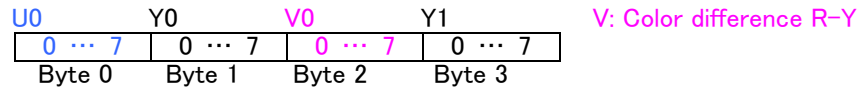
• RGB10V1Packed



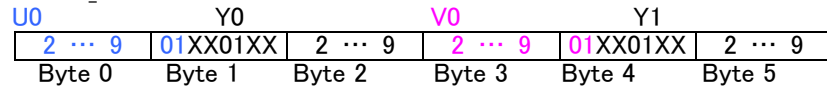
• RGB12Packed



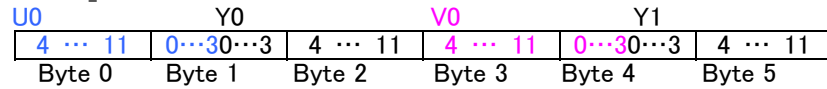
• YUV422Packed



• YUV422\_10Packed



• YUV422\_12Packed



### 3. Commands of the image adjustment

#### (1) BLACKLEVEL : Setting of master black level

##### •LEVEL 1 : Adjustment of master black level

Command name : BlackLevel (Float / Standard)  
Address : A0070018 h  
Values (Factory setting 0): -64 to 63.5 (based on the 255 steps)

##### •LEVEL 2 : Adjustment of master black level

Command name : BlackLevelRaw (Integer / Standard)  
Address : A0070014 h  
Values (Factory setting 128): 0 to 255      Black level is reduced at 0 side and raised at 255 side.

Note : Since LEVEL1 and LEVEL2 are link together,  
if one is changed then the other is changed to corresponding value.

#### (2) SHRAPNESS : Setting of object contour correction

##### •LEVEL : Adjust sharpness level

Command name : SharpnessRaw (Integer / Custom)  
Address : A0FF0004 h  
Values (Factory setting 0) : 0 to 255      Setting value toward 0 side reduces correction for soft contour and 255 side increase correction for sharper contours.

#### (3) MANUAL GAIN : Setting of electrical sensitivity

##### •LEVEL1 : Adjust electrical sensitivity 1

Command name : Gain (Float / Standard)  
Address : A0070008 h  
Values (Factory setting 0) : 0.00 to 12.00      Adjust the gain level 0 to 12.00dB in 342 steps at intervals of 0.03519dB.

##### •LEVEL2 : Adjust electrical sensitivity 2

Command name : GainRaw (Integer / Standard)  
Address : A0070004 h  
Values (Factory setting 0) : 0 to 341      Adjust the gain level 0 to 12.00dB in 342 steps at intervals of 0.03519dB.

Note : Since LEVEL1 and LEVEL2 are link together,  
if one is changed then the other is changed to corresponding value.

#### (4) AUTO GAIN CONTROL : Adjust electrical sensitivity automatically (AGC)

Command name : GainAuto (Enumeration / Standard)  
Address : A007000C h  
Values (Factory setting 0) : 0 "Off"      Automatic gain control is not performed and **MANUAL GAIN** is validated.  
2 "Continuous"      The video level is automatically adjusted in the range of 0 to 18dB.  
Adjustment range can be changeable by setting of LOWER/UPPER LIMIT.

**\*This command is given to priority more than MANUAL GAIN.**

##### •LOWER LIMIT1 : Lower limit 1 of automatic adjustment range

Command name : GainAutoLowerLimit (Float / Standard)  
Address : A0F70028 h  
Values (Factory setting 0) : 0.00 to 12.00      Adjust the gain level 0 to 12.00dB in 342 steps at intervals of 0.03519dB.

• **UPPER LIMIT1 : Upper limit 1 of automatic adjustment range**

Command name : GainAutoUpperLimit (Float / Standard)

Address : A0F7002C h

Values (Factory setting 12.0): 0.00 to 12.00 Adjust the gain level 0 to 12.00dB in 342 steps at intervals of 0.035191dB.

• **LOWER LIMIT2 : Lower limit 2 of automatic adjustment range**

Command name : GainAutoLowerLimitRaw (Integer / Standard)

Address : A0F70020 h

Values (Factory setting 0) : 0 to 341 : Adjust the gain level 0 to 12.00dB in 342 steps at intervals of 0.03519dB.

• **UPPER LIMIT2 : Upper limit 2 of automatic adjustment range**

Command name : GainAutoUpperLimitRaw (Integer / Standard)

Address : A0F70024 h

Values (Factory setting 341) : 0 to 341 Adjust the gain level 0 to 12.00dB in 342 steps at intervals of 0.03519dB.

Note : Since LIMIT1 and LIMIT2 are link together,  
if one is changed then the other is changed to corresponding value.

**(5) MANUAL WHITE BALANCE : Setting of manual white balance**

• **SELECTOR : Switch the adjustment color (RED / BLUE)**

Command name : BalanceRatioSelector (Enumeration / Standard)

Address : A0070024 h

Values (Factory setting 1) : 1 "Red" Switch the color adjusted at LEVEL Red.  
3 "Blue" Switch the color adjusted at LEVEL Blue.

• **LEVEL1 (related to SELECTOR) : Adjust the RED / BLUE gain**

Command name : BalanceRatio (Float / Standard)

Address : A0070028 h

Values (Factory setting 1): 0.5 to 2.0 Adjust the RED / BLUE gain range from x0.5 to x2.0 .

• **LEVEL2 (related to SELECTOR) : Adjust the RED / BLUE gain**

Command name : BalanceRatioRaw (Integer / Standard)

Address : A0F7000C h

Values (Factory setting 128): 0 to 255 Adjust the RED / BLUE gain in 256 steps.

Note : Since LEVEL1 and LEVEL2 are link together,  
if one is changed then the other is changed to corresponding value.

**(6) AUTO WHITE BALANCE : Setting of auto white balance**

Command name : BalanceWhiteAuto (Enumeration / Standard)

Address : A0070020 h

Values (Factory setting 0) : 0 "Off" Automatic white adjustment is not performed  
and can adjust **MANUAL WHITE BALANCE**.  
1 "Once" Automatic white adjustment is performed  
that affects features on the **MANUAL WHITE BALANCE**.  
And after adjustment this feature automatically will turn to "Off".  
2 "Continuous" White balance is adjusted in real time (automatic tracking).

**\*This command is given to priority more than MANUAL WHITE BALANCE.**



**(7) ELECTRIC SHUTTER : Setting of electric shutter**

Command name : ExposureMode (Enumeration / Standard)  
 Address : A0030040 h  
 Values (Factory setting 0) : 0 "Off" Shutter Off ( exposure 1/30second )  
 1 "Timed" Shutter speed according to setting.  
 2 "TriggerWidth" It become ONE trigger mode. **\*Refer to page 25 "Trigger mode"**

**(8) SHUTTER SPEED : Setting of the shutter speed**

**•VARIABLE1 : Setting of the Variable shutter 1**

Command name : ExposureTime (Float / Standard)  
 Address : A0030044 h  
 Values (Factory setting 33333)  
 : 10 to 10000000 Set the shutter speed in the range from 1/100000 to 10 second in us.

**•VARIABLE2 : Setting of the Variable shutter 2**

Command name : ExposureTimeRaw (Integer / Standard)  
 Address : A0030048 h  
 Values (Factory setting 834 = 342<sub>16</sub>)  
 : 0 to 1536 Set the shutter speed in the range from 10 to 1/100000 second in 1536 steps.

Setting value can be derived as follows. (*ShutterSpeed*: μsec)

a) Setting value  $XY_{16}$  obtained from exposure time.

$$X = \text{int}(\log(\text{ShutterSpeed})) - 1$$

$$YY = \text{int}\left(\left(\frac{\text{ShutterSpeed}}{10^{X+1}} - 1\right) \times \frac{100_{16}}{9}\right)$$

b) Exposure time obtained from setting value  $XY_{16}$ .

$$\text{ShutterSpeed} = 10^{X+1} \times \left(1 + \frac{YY_{16}}{100_{16}} \times 9\right) [\mu\text{sec}]$$

Ex. 1 Exposure time = setting value  $XY_{16}$  to obtain 1/125sec (= 8000μsec)

$$X = \text{int}(\log(8000)) - 1$$

$$= 2$$

$$YY = \text{int}\left(\left(\frac{8000}{10^{2+1}} - 1\right) \times \frac{100_{16}}{9}\right)$$

$$= \text{int}\left(7 \times \frac{100_{16}}{9}\right)$$

$$= C7_{16}$$

$$\therefore XY_{16} = 2C7_{16}$$

Ex. 2 Setting value 25D<sub>16</sub> that produces 1/234.22 second exposure time.

$$\text{ShutterSpeed} = 10^{2+1} \times \left(1 + \frac{5D_{16}}{100_{16}} \times 9\right)$$

$$= 4269.53 [\mu\text{sec}]$$

$$= \frac{1}{234.22} [\text{sec}]$$

Note : Since VARIABLE1 and VARIABLE2 are linked together,  
if one is changed then the other is changed to corresponding value.

**(9) AUTO ELECTRIC SHUTTER : Setting of Auto Electric Shutter (AES)**

Command name : ExposureAuto (Enumeration / Standard)  
Address : A003004C h  
Values (Factory setting 0) : 0 "Off" AES is not performed and **SHUTTER SPEED** is validated.  
2 "Continuous" Shutter speed is automatically adjusted in the range from normal shutter to 1/100000 second according to light source brightness  
Adjustment range can be changeable by setting of LOWER/UPPER LIMIT.

**\*This command is given to priority more than SHUTTER SPEED.**

**•LOWER LIMIT1 : Lower limit 1 of automatic adjustment range**

Command name : ExposureAutoLowerLimit (Float / Custom)  
Address : A0F30020 h  
Values (Factory setting 10) : 10 to 33333 Set limit value in the range from 1/100000 second to normal shutter in us.

**•UPPER LIMIT1 : Upper limit 1 of automatic adjustment range**

Command name : ExposureUpperLimit (Float / Custom)  
Address : A0F30024 h  
Values (Factory setting 33333)  
: 10 to Factory setting value  
Set limit value in the range from 1/100000 second to normal shutter in us.

**•LOWER LIMIT2 : Lower limit 2 of automatic adjustment range**

Command name : ExposureLowerLimitRaw (Integer / Custom)  
Address : A0F30028 h  
Values (Factory setting 0) : 0 to 834 = 342<sub>16</sub> Set limit value in the range from 1/100000 to normal shutter in 1536 steps.

**•UPPER LIMIT2 : Upper limit 2 of automatic adjustment range**

Command name : ExposureUpperLimitRaw (Integer / Custom)  
Address : A0F3002C h  
Values (Factory setting 834 = 342<sub>16</sub>)  
: 0 to Factory setting value  
Set limit value in the range from 1/100000 to normal shutter in 1536 steps.

Note : Since LIMIT1 and LIMIT2 are linked together,  
if one is changed then the other is changed to corresponding value.

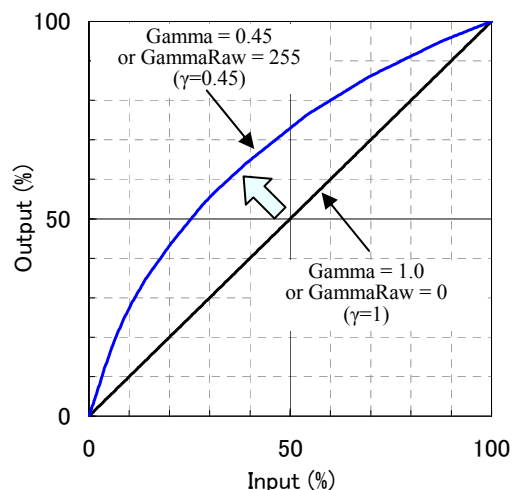
**(10) GAMMA : Setting of gamma correction**

•**LEVEL1 : Adjust gamma correction level**

Command name : Gamma (Float / Custom)  
 Address : A0070030 h  
 Values (Factory setting 1.0) : 1.0 to 0.45  
 Gamma correction coefficient is set up in 1.0 to 0.45.

•**LEVEL2 : Adjust gamma correction level**

Command name : GammaRaw (Integer / Custom)  
 Address : A0F70014 h  
 Values (Factory setting 0) : 0 to 255 Set gamma curve in 256 steps.



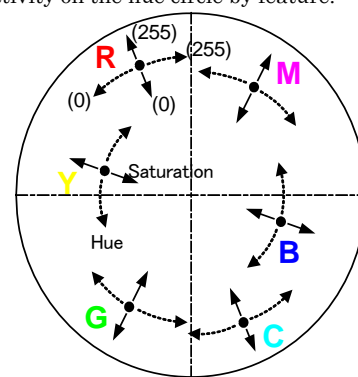
**(11) ALC ADJUST : Setting of Auto Level Control (ALC) of image level**

•**VIDEO LEVEL : Setting value of video level when AGC or AES is ON**

Command name : ALCAdjustRaw (Integer / Custom)  
 Address : A0FF000C h  
 Values (Factory setting 128) : 0 to 255 Setting value toward 0 side decrease convergence level and 255 side increase convergence level.

**(12) MASKING : Setting of 6 vector independent masking (primary color R G B and complementary color Ye Cy Mg saturation and hue can be separately varied).**

Command name : MaskingMode (Enumeration / Custom) Adjust directivity on the hue circle by feature.  
 Address : A0FF001C h  
 Values (Factory setting 0) : 0 "Off" Not perform masking functions.  
 1 "On" Perform masking functions.



•**SELECTOR : Select the color done masking**

Command name : MaskingSelector (Enumeration / Custom)  
 Address : A0FF0020 h  
 Values : 1 "Red" Perform masking function about Red.  
 2 "Green" Perform masking function about Green.  
 3 "Blue" Perform masking function about Blue.  
 4 "Yellow" Perform masking function about Yellow.  
 5 "Cyan" Perform masking function about Cyan.  
 6 "Magenta" Perform masking function about Magenta.

•**SATURATION (related to SELECTOR) : Adjust saturation of the color selected at SELECTOR**

Command name : MaskingSaturationRaw (Integer / Custom)  
 Address : A0FF0024 h  
 Values (Factory setting 128) : 0 to 255 Adjust the saturation of the color selected at SELECTOR in 256 steps.

•**HUE (related to SELECTOR) : Adjust hue of the color selected at SELECTOR**

Command name : MaskingHueRaw (Integer / Custom)  
 Address : A0FF0028 h  
 Values (Factory setting 128) : 0 to 255 Adjust the hue of the color selected at SELECTOR in 256 steps.

SELECTOR	Toward 0 side ...	Toward 255 side ...
Red	Come near to Yellow	Come near to Magenta
Green	Come near to Cyan	Come near to Yellow
Blue	Come near to Magenta	Come near to Cyan
Yellow	Come near to Green	Come near to Red
Cyan	Come near to Blue	Come near to Green
Magenta	Come near to Red	Come near to Blue

**(13) PAINT BLACK : Setting of paint black (color level of Red, Green and Blue can be separately varied)**

Command name : PaintBlackMode (Enumeration / Custom)  
Address : A0FF002C h  
Values (Factory setting 0) : 0 "Off" Not perform the paint black functions.  
1 "On" Perform paint black functions.

**•SELECTOR : Switch the color doing Paint black**

Command name : PaintBlackSelector (Enumeration / Custom)  
Address : A0FF0030 h  
Values (Factory setting 1) : 1 "Red" Perform the paint black function about Red.  
2 "Green" Perform the paint black function about Green.  
3 "Blue" Perform the paint black function about Blue.

**•LEVEL (related to SELECTOR) : Adjust level of color selected at SELECTOR**

Command name : PaintBlackRaw (Integer / Custom)  
Address : A0FF0034 h  
Values (Factory setting 0) : 0 to 255 Adjust the color level of the color selected at SELECTOR in 256 steps.

**(14) KNEE : Setting of knee**

Command name : KneeMode (Enumeration / Custom)  
Address : A0FF0010 h  
Values (Factory setting 0) : 0 "Off" Not perform knee.  
1 "On" Knee function provides natural graduation in bright portions.

**•KNEE POINT : Adjust knee point**

Command name : KneePointRaw (Enumeration / Custom)  
Address : A0FF0014 h  
Values (Factory setting 0) : 0 to 32 Setting value toward 0 side increase start level of knee and 32 side decrease start level of knee.

**•KNEE SLOPE : Adjust knee slope**

Command name : KneeSlopeRaw (Integer / Custom)  
Address : A0FF0018 h  
Values (Factory setting 0) : 0 to 159 Setting value toward 0 side intensify effective of knee and 159 side weaken effective of knee.

**(15) AUTO SHADING : Correct unevenness on the surface chromatically and luminously.**

Command name : AutoShadingMode (Enumeration / Custom)  
Address : A0FF0060 h  
Values (Factory setting 0) : 0 "Off" Disable correction of shading.  
1 "On" Enable correction of shading

**•DETECT : Detect unevenness on the surface**

Command name : AutoShadingStart (Command / Custom)  
Address : A0FF0064 h  
Values (write only) : 1 When 1 is written, start shading detection.  
The camera takes a object of gray flat screen that detect unevenness on the surface chromatically and luminously.  
And after detection this feature automatically will turn to "0".

**(16) WHITE SPOT CORRECT : Setting of whit spot correction**

Command name : WhiteSpotCorrectMode (Enumeration / Custom)  
Address : A0FF00A0 h  
Values (Factory setting 1) : 0 "Off" Disable correction of white spot noise.  
1 "On" Enable correction for stored white spots.

**•LEVEL : Setting for the threshold level**

Command name : WhiteSpotCorrectLevelRaw (Integer / Custom)  
Address : A0FF00A4 h  
Values (Factory setting 20): 0 to 255 Set the threshold level of white spot detection in 8-bit gradation.

**•DETECT : Detect the white spot**

Command name : WhiteSpotCorrectDetect (Command / Custom)  
Address : A0FF00A8 h  
Values (write only) : 1 When 1 is written, start white spot detection  
The pixel having video level that exceeds LEVEL is judged as white spot.  
And after detection this feature automatically will turn to 0.

**•STATUS : Status of detection**

Command name : WhiteSpotCorrectStatus (Enumeration / Custom)  
Address : A0FF00AC h  
Values (read only) : 0 "NoDetect" It means there is no pixel having video level that exceeds threshold.  
1 "NormalEnd" Normal end: It means that white detection is finished.  
2 "OverDetect" Error end: It means that the number of detected pixels are exceeded correctable number.  
3 "Busy" It means while detecting.

**(17) LOOK UP TABLE : Setting of look up table**

Command name : LUTEnable (Enumeration / Standard(\*))  
Address : A0080004 h  
Values (Factory setting 0) : 0 "Off" Disable look-up-table feature. And that can use a gamma and a knee feature.  
1 "On" Enable look-up-table feature.  
And that makes disable on the gamma and the knee feature.

(\* ) With this camera, a setup of ON/OFF is applied to a total color regardless of the state of LUTSelector.

**•SELECTOR : Switch the color (All/Red/Green/Blue) doing adjustment.**

Command name : LUTSelector (Enumeration / Standard)  
Address : A0080000 h  
Values : 0 "Luminance" The LUTValue affects adjustment on all color of RGB.  
1 "Red" The LUTValue affects adjustment on the color of Red.  
2 "Green" The LUTValue affects adjustment on the color of Green.  
3 "Blue" The LUTValue affects adjustment on the color of Blue.

**•INDEX (related to SELECTOR) : Video level before look-up-table.**

Command name : LUTIndex (Integer / Standard)  
Address : A0080008 h  
Values : 0 to 255 Setting original input video level 0 to 100% by 256 steps.

**•VALUE (related to SELECTOR and INDEX) : Video level after look-up-table.**

Command name : LUTValue (Integer / Standard)  
Address : A008000C h  
Values : 0 to 255 Setting conversion output video level by 256 steps for the INDEX value.

Note : When LUTSelector sets "Luminance", data-write affects all colors on RGB,  
and data-read affects a color of Green.

#### 4. Commands of Input / Output signal

(1) TRIGGER : Setting of the external trigger \*Refer to page 25 "Trigger mode" about details of trigger mode

•**SELECTOR : Select the trigger action**

Command name : TriggerSelector (Enumeration / Standard)  
Address : A0030020 h  
Values (Factory setting 1) : 1 "FrameStart" Select this when using normal trigger mode.  
4 "FrameTransferStart" Select this when using reset control mode.  
5 "VDReset" Select this when using VD reset mode.

•**MODE (related to SELECTOR) : Select the mode selected at SELECTOR**

Command name : TriggerMode (Enumeration / Standard)  
Address : A0030024 h  
Values (Factory setting 0) : 0 "Off" Set trigger mode selected at SELECTOR to OFF.  
1 "On" Set trigger mode selected at SELECTOR to ON.

•**SOURCE (related to SELECTOR) : Select the trigger source selected at SELECTOR**

Command name : TriggerSource (Enumeration / Standard)  
Address : A003002C h  
Values (Factory setting 0) : 0 "Line1" Input trigger signal from 7 pin of DCIN/SYNC connector (TRIG A).  
2 "Line3" Input trigger signal from 9 pin of DCIN/SYNC connector (TRIG B).  
7 "Software" Use software trigger.

•**POLARITY (related to SELECTOR) : Select polarity of trigger signal selected at SELECTOR**

Command name : TriggerActivation (Enumeration / Standard)  
Address : A0030030 h  
Values (Factory setting 1) : 0 "FallingEdge" Falling of input signal is made into trigger signal.  
1 "RisingEdge" Rising of input signal is made into trigger signal.

•**SOFTWARE (related to SELECTOR) : Generate the software trigger selected at SELECTOR**

\*using when SOURCE is Software

Command name : TriggerSoftware (Command / Standard)  
Address : A0030028 h  
Values (write only) : 1 Whenever 1 is written, the software trigger is generated.

•**DELAY TIME1 (related to SELECTOR) : Set the duration of trigger delay selected at SELECTOR**

Command name : TriggerDelay (Float / Standard)  
Address : A0030034 h  
Values : (Refer to table) A range and a step of trigger delay time was shown below.

•**DELAY TIME2 (related to SELECTOR) : Set the duration of trigger delay selected at SELECTOR**

Command name : TriggerDelayRaw (Integer / Standard)  
Address : A0030038 h  
Values (Factory setting 0) : 0 to 4095 A range and a step of trigger delay time was shown below.

Selected trigger action	Range 0 ~ 4095	step
FrameStart	0.44 $\mu$ s ~ 6.55ms	approx.1.60 $\mu$ s
FrameTransferStart	56.36 $\mu$ s ~ 6.61ms	

Note : Since DELAY TIME1 and DELAY TIME2 are linked together,  
if one is changed then the other is changed to corresponding value.

(2) DIGITAL I/O : Setting of input / output line

•**SELECTOR : Select the line**

Command name : LineSelector (Enumeration / Standard)  
Address : A0040000 h  
Values (Factory setting 1) : 0 "Line1" Setting of 7 pin of DCIN/SYNC connector.  
1 "Line2" Setting of 10 pin of DCIN/SYNC connector.  
2 "Line3" Setting of 9 pin of DCIN/SYNC connector.

•**MODE (related to SELECTOR) : Input/output of the line selected at SELECTOR**

Command name : LineMode (Enumeration / Standard)  
Address : A0040008 h  
Values (Read only) : 0 "Input" It means selected line is using for input (when MODE is Line1/Line3).  
1 "Output" It means selected line is using for output (when MODE is Line2).

•**SOURCE : Selection of the signal outputs from a 10 pin. \*using when MODE is Output**

Command name : LineSource (Enumeration / Standard)  
Address : A0040010 h  
Values (Factory setting 1) : 0 "Off" Nothing is output.  
1 "ExposureActive" Flash pulse (strobe) is output.  
2 "Timer1Active" Adjusted flash pulse is output.  
3 "CameraVD" Camera VD signal is output.

•**INVERTER (related to SELECTOR) : Invert the output signal selected at SELECTOR**

Command name : LineInverter (Boolean / Standard)  
Address : A0040004 h  
Values (Factory setting 0) : FALSE (0) output signal is not inverted.  
TRUE (1) output signal is inverted.

•**FORMAT (related to SELECTOR) : Invert the input/output signal**

Command name : LineFormat (Enumeration / Standard)  
Address : A0040014 h  
Values (read only) : 2 "TTL" It means selected line is TTL level signal (when MODE is Line2).  
5 "OptoCoupled" It means selected line is Opto-Coupled (when MODE is Line1/Line3).

**(3) TIMER CONTROL : Control of timer to adjust flash pulse**

**\* Refer to page 28 "Digital output" about details of flash pulse adjustment**

•**SELECTOR : Select timer**

Command name : TimerSelector (Enumeration / Standard)  
Address : A0050000 h  
Values (Factory setting 1) : 0 "Timer1" Setting of timer 1.

•**WIDTH (related to SELECTOR) : Set the duration of timer**

Command name : TimerDurationRaw (Integer / Standard)  
Address : A0050008 h  
Values (Factory setting 0) : 0 Timer is stopped at the same time as the end of exposure.  
1 to 4096 Set the range from 1.6  $\mu$ s to 6.55 ms at interval approx. 1.6  $\mu$ s.

•**DELAY TIME (related to SELECTOR): Set the delay of timer**

Command name : TimerDelayRaw (Integer / Standard)  
Address : A0F40004 h  
Values (Factory setting 0) : 0 to 4096 Set the range from 0.08  $\mu$ s to 6.55 ms at interval approx. 1.6  $\mu$ s.

•**TRIGGER SOURCE (related to SELECTOR) : Select timer trigger source**

Command name : TimerTriggerSource (Enumeration / Standard)  
Address : A0050020 h  
Values (Factory setting 0) : 0 "Off" Timer does not start  
1 "ExposureStart" Timer starts at the same time as the start of exposure.

## 5. Commands about SAVE/LOAD

This product can save settings of 1. 2. 3. 4. to four memories.

### (1) USER SETS : Setting of SAVE/LOAD

#### •SELECTOR : Select the SAVE/LOAD channel

Command name : UserSetSelector (Enumeration / Standard)  
Address : A00A0000 h  
Values (Factory setting 0) : 0 "Default" Factory setting  
1 "UserSet1" Channel 1  
2 "UserSet2" Channel 2  
3 "UserSet3" Channel 3  
4 "UserSet4" Channel 4

#### •LOAD (related to SELECTOR of USER SETS) : Load execution

Command name : UserSetLoad (Command / Standard)  
Address : A00A0004 h  
Values (write only) : 1 When 1 is written, load the memory channel selected at SELECTOR

#### •SAVE (related to SELECTOR of USER SETS) : Save execution

Command name : UserSetSave (Command / Standard)  
Address : A00A0008 h  
Values (write only) : 1 When 1 is written, save to the memory channel selected at SELECTOR  
\* "Default" cannot be saved

### (2) DEFAULT USER SETS : Select the channel to load and make active when the camera is reset

Command name : UserSetSelector (Enumeration / Standard)  
Address : A00A000C h  
Values (Factory setting 0) : 0 "Default" Factory setting is loaded when camera is reset.  
1 "UserSet1" Channel 1 is loaded when the camera is reset.  
2 "UserSet2" Channel 2 is loaded when the camera is reset.  
3 "UserSet3" Channel 3 is loaded when the camera is reset.  
4 "UserSet4" Channel 4 is loaded when the camera is reset.



## 6. Commands about information of the camera

### (1) VENDOR NAME : Vendor name

Command name : DeviceVendorName (String / Standard)  
Address : 00000048 h  
Values (read only) : "Hitachi Kokusai Electric Inc"

### (2) MODEL NAME : Camera name

Command name : DeviceModelName (String / Standard)  
Address : 00000068 h  
Values (read only) : "HV-F202GV "

### (3) MANUFACTURE INFO : Vendor information

Command name : DeviceManufactureInfo (String / Standard)  
Address : 000000A8 h  
Values (read only) : "3CCD Camera"

### (4) VERSION : Camera version

Command name : DeviceVersion (String / Standard)  
Address : 00000088 h  
Values (read only) : " 1.0.0.0 (F:0.1.0.0) "

\* different according to camera version

### (5) FIRMWARE VERSION : Firmware version of the camera

Command name : DeviceFirmwareVersion (String / Standard)  
Address : A0010090 h  
Values (read only) : "1.0.0.0"

\* different according to camera version

### (6) DEVICE ID : Unique ID of the camera (Serial Number)

Command name : DeviceID (String / Standard)  
Address : 000000D8 h  
Values (read only) : "YYMNNNNN" YY: Shipment Year() M: Shipment Month(\*) NNNNN: Number  
(\* ) Y = "1" to "9": It means January to September  
M = "X": It means October  
M = "Y": It means November  
M = "Z": It means December

\* different according to the camera

### (7) USER ID : User programmable ID

Command name : DeviceUserID (String / Standard)  
Address : A00100D0 h  
Values : Any null-terminated string (16 Byte)

## 7. Commands about GigE Vision transport layer

### (1) PAYLOAD SIZE : payload size

Command name : PayloadSize (Integer / Standard)  
Address : A009F000 h  
Values (read only) : Data size for 1 frame of the picture at Byte.

### (2) MAC ADDRESS : MAC address of the camera

Command name : GevMACAddress (Integer / Standard)  
Address : 00000008 h (upper address) 0000000C h (lower address)  
Values (read only) : XXXXXXXXXXXX h Device MAC Address.

### (3) IP CONFIGURATION : Setting of how to be assigned IP address

#### •LLA : Enable LLA

Command name : GevCurrentIPConfigurationLLA (Boolean / Standard)  
Address : 29-bit of 00000014 h  
Values (Factory setting 1) : TRUE (1) LLA (cannot set to FALSE)

#### •DHCP : Enable or disable DHCP

Command name : GevCurrentIPConfigurationDHCP (Command / Standard)  
Address : 30-bit of 00000014 h  
Values (Factory setting 1) : FALSE (0) Disable assigning IP address by DHCP  
TRUE (1) Enable assigning IP address by DHCP

#### •PERSISTENT IP : Enable or disable Persistent IP

Command name : GevCurrentIPConfigurationPersistentIP (Command / Standard)  
Address : 31-bit of 00000014 h  
Values (Factory setting 0) : FALSE (0) Disable persistent IP address of the camera.  
TRUE (1) Enable persistent IP address of the camera.

### (4) CURRENT IP : Current IP address, subnet mask and default gateway

#### •IP ADDRESS : Current IP address

Command name : GevCurrentIPAddress (Integer / Standard)  
Address : 00000024 h  
Values (read only) : IP address assigned to the camera

#### •SUBNET MASK : Current subnet mask

Command name : GevCurrentSubnetMask (Integer / Standard)  
Address : 00000034 h  
Values (read only) : Subnet mask assigned to the camera

#### •DEFAULT GATEWAY : Current default gateway

Command name : GevCurrentDefaultGateway (Integer / Standard)  
Address : 00000044 h  
Values (read only) : Default gateway assigned to the camera

### (5) PERSISTENT IP : Setting of persistent IP

\*When PERSISTENT IP of CONFIGURATION is enable

#### •IP ADDRESS : Setting of persistent IP address

Command name : GevCurrentIPAddress (Integer / Standard)  
Address : 0000064C h  
Values (Factory setting A9FD0102 h)  
: 0 to FFFFFFFF h Set persistent IP address.

#### •SUBNET MASK : Setting of persistent subnet mask

Command name : GevCurrentSubnetMask (Integer / Standard)  
Address : 0000065C h  
Values (Factory setting FFFF0000 h)  
: 0 to FFFFFFFF h Set persistent subnet mask.

**•DEFAULT GATEWAY : Setting of persistent default gateway**

Command name : GevPersistentDefaultGateway (Integer / Standard)  
Address : 0000066C h  
Values (Factory setting 0) : 0 to FFFFFFFF h Set persistent default gateway.

**(6) HEARTBEAT TIMEOUT : Setting of heartbeat timeout**

Command name : GevHeartbeatTimeout (Integer / Standard)  
Address : 00000938 h  
Values (Factory setting 3000): 300 to 10000 Set heartbeat timeout in ms.

**(7) TIME STAMP : Setting of timestamp**

**•TIME FREQUENCY : Frequency of timestamp**

Command name : GevTimestampTickFrequency (Integer / Standard)  
Address : 0000093C h (upper address) 00000940 h (lower address)  
Values (read only) : 100000000 Frequency of timestamp.

**•CONTROL LATCH : Latch of timestamp**

Command name : GevTimestampControlLatch (Command / Standard)  
Address : 00000944 h  
Values (write only) : 2 Timestamp count is latched to VALUE when 2 is written.

**•CONTROL RESET : Reset of timestamp**

Command name : GevTimestampControlReset (Command / Standard)  
Address : 00000944 h  
Values (write only) : 1 Current timestamp count is reset when 1 is written.

**•VALUE : Value of timestamp**

Command name : GevTimestampControlReset (Integer / Standard)  
Address : 00000948 h (upper address)0000094C h (lower address)  
Values (read only) : 0 to  $2^{64}$  Latched timestamp count by CONTROL LATCH is entered.

**(8) PACKET SIZE : Packet size of image data**

Command name : GevSCPSPacketSize (Integer / Standard)  
Address : 00000D04 h  
Values (Factory setting 1440): 512 to 16076 Set size of a packet when image data is transmitted.

**(9) PACKET DELAY : Packet delay of image data**

Command name : GevSCPD (Integer / Standard)  
Address : 00000D08 h  
Values (Factory setting 32): 10 to 1048575 Set delay time inter packets in 10 ns steps when image data is transmitted.  
**\* Refer to page 24 "Packet size and Packet delay" about details of packet delay.**

**(10) LINK SPEED : Setting of heartbeat timeout**

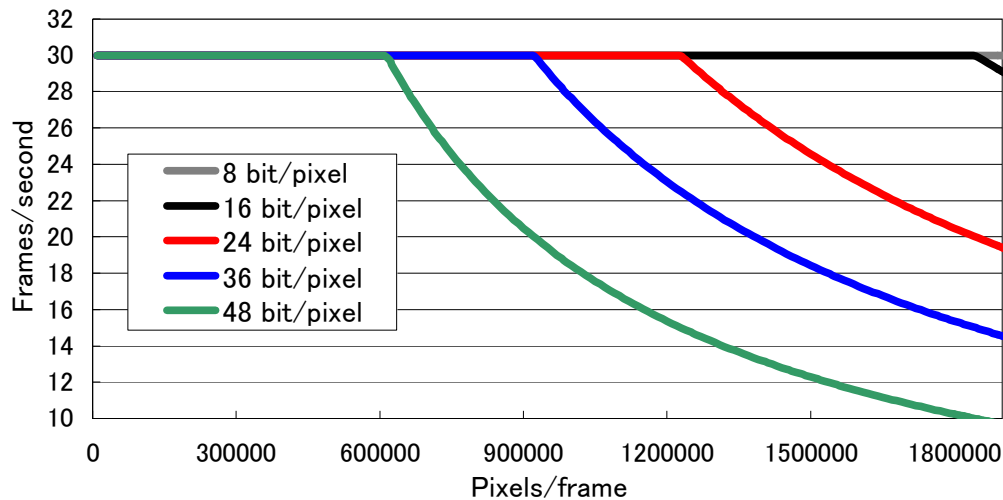
Command name : GevLinkSpeed (Integer / Standard)  
Address : 00000670 h  
Values (read only) : 1000 The camera is connected to 1000Mbps environment.  
100 The camera is connected to 100Mbps environment.

# Frame rate

Maximum frame rate of HV-F202GV are decided by data volume per pixel and number of pixel per frame. Data volume per pixel is as follows by set pixel format.

Data / pixel	Pixel format
8bit	MONO 8bit
16bit	YUV 8bit
24bit	RGB 8bit / YUV 10bit / YUV 12bit
32bit	RGB 10bit
48bit	RGB 12bit

Number of pixel is per frame is obtained by set image width and set image height. Frame rate of each model are as follows.



## ☉Camera functions related to frame rate

Actual frame rate of the camera depends on the setting.

Setting	Related GenICam command
Frame rate	AcquisitionFrameRateRaw / AcquisitionFrameRate
Shutter speed	ExposureMode / ExposureTime / ExposureTimeRaw
Trigger mode	TriggerSelector / TriggerMode

### 1. Frame rate

The camera drives at the frame rate set to AcquisitionFrameRate/Raw.

For example: when AcquisitionFrameRateRaw is 18, the camera drives at 18 fps.

### 2. Shutter speed

When shutter speed is set to less than  $1 / \text{setting frame rate}$ , intended frame rate cannot achieve.

For example: when frame rate is 30 and shutter speed is set to 1/10 second, the camera drive at up to 10 fps.

### 3. Trigger mode

The frame rate depends on cycle of input trigger signal. However, even if cycle of input trigger signal is shorter than frame rate, frame rate does not increase.

The above are based on the assumption that data transfer rate does not exceed 1 Gbps.

When "CurrentFrameRateRaw" is read, frame rate that the camera drives at that time is informed.

# Packet size and Packet delay

## 1. Packet size

HV-F202GV transfer image data in a packet including image data and data header. Since transferred packet number decrease when packet size is increased, transfer rate can improve.

If packet size is set more than MTU (Maximum Transmission Unit), the camera cannot transfer image data.

## 2. Packet delay

HV-F202GV can be set delay time inter image data packets. Image data transfer rate (or frame rate) decrease when packet delay is increased. This would prevent image data conflict when multiple camera connection.

Actual delay time by setting packet delay can be calculated as follows.

Payload size = Image width × Image height × Byte number per pixel [Byte]

\* Byte number per pixel by pixel format is following;

Byte num	Pixel format
1 Byte	Mono8
2 Byte	YUV422Packed / Mono10 / Mono12
3 Byte	RGB8Packed / BGR8Packed / YUV422_10Packed / YUV422_12Packed
4 Byte	RGB10V1Packed
6 Byte	RGB12Packed

Packet number per frame = Payload size / ( Setting of packet size - Data header size )

\* Setting of packet size = 512 to 16076 (configurable)

\* Data header size = 36 [Byte]

Data transmission time per frame = ( Payload size + Packet number per frame × Data header size ) / Data transmission rate [second]

\* Data transmission rate = 1,000,000,000 [bit per second] = 125,000,000 [Byte per second]

CCD transmission time per frame = Clocks per line × Lines per frame / Pixel clock [second]

Pixel clock	Clocks per line	Lines per frame	CCD transmission time per frame
72.0 [MHz]	1920 [clk]	1200 [line]	0.032 [second]

Inter packet delay time = Setting of packet delay × Packet delay unit [second]

\* Setting of packet delay = 10 to 1048575 (configurable)

\* Packet delay unit = 10 [nano second] =  $10^{-8}$  [second]

Total delay time = Packet number per frame × Inter packet delay time [second]

\* Total delay time < CCD transmission timer per frame - Data transmission time per frame

→ Delay time = CCD transmission timer per frame - Data transmission time per frame

Image grabbing time per frame = Data transmission time per frame + Delay time [second]

Frame rate = 1 / Image grabbing time per frame [frame per second]

# Trigger mode

Trigger mode settings of HV-F202GV are following procedure.

## 1. Fixed shutter mode

When external trigger signal is POSITIVE (TriggerActivation: "RisingEdge"), after the trigger signal rise, exposure is start  
The exposure time is set by the camera electronic shutter speed.

### (A) Hardware Trigger

- (1) TriggerSelector → "VDReset"
- (2) TriggerMode → "Off"
- (3) TriggerSelector → "FrameStart"
- (4) TriggerMode → "On"
- (5) TriggerSource → "Line1" / "Line3" / "Software"
- (6) TriggerActivation → "RisingEdge" / "FallingEdge"
- (7) ExposureMode → "Off" / "Timed" : When Off, exposure = 1/30second. When Timed, using value of ExposureTime.

### (B) Software trigger

- (1) TriggerSelector → "VDreset"
- (2) TriggerMode → "Off"
- (3) TriggerSelector → "FameStart"
- (4) TriggerMode → "On"
- (5) TriggerSource → "Software"
- (6) ExposureMode → "Off" / "Timed" : When Off, exposure = 1/30second. When Timed, using value of ExposureTime.

When actually operating, repeat (a) and (b) alternately.  
TriggerSoftware → write "1"

Timing by the software-trigger.  
Exposure by the value of ExposureTime.

## 2. ONE Trigger mode

When external trigger signal is POSITIVE (TriggerPolarity: "RisingEdge"), after the trigger signal rise, exposure is start.  
The trigger signal width equals the exposure time.

### Hardware trigger

- (1) TriggerSelector → "VDreset"
- (2) TriggerMode → "Off"
- (3) TriggerSelector → "FrameStart"
- (4) TriggerMode → "On"
- (5) TriggerSource → "Line1" / "Line3" ( Software is disable )
- (6) TriggerActivation → "RisingEdge" / "FallingEdge"
- (7) ExposureMode → "TriggerWidth"

### 3. Reset control mode

The readout timing can be set arbitrary set by input the trigger signal (Readout pulse) different from the exposure beginning when Fixed shutter mode or ONE Trigger mode.

Execute following procedure in addition Fixed shutter mode/ONE trigger mode settings.

- (1) TriggerSelector → "FrameTransferStart"
- (2) TriggerMode → "On"
- (3) TriggerSource → "Line1" / "Line3" / "Software" ... (\*1)
- (4) TriggerActivation → "RisingEdge" / "FallingEdge"

(\*1) Please be careful the value of TriggerSource when using reset control mode.

Available combination of TriggerSource

		TriggerSource (TriggerSelector: FrameTransferStrat)		
		Line1	Line3	Software
TriggerSource (TriggerSelector: FrameStart)	Line1	×	○	○
	Line3	○	×	○
	Software	○	○	○

### 4. VD reset mode

Internal VD is reset when input external VD signal falls and the camera synchronizes to external VD.

Exposure time is setting shutter speed.

- (1) TriggerSelector → "VDRReset"
- (2) TriggerMode → "On"
- (3) TriggerSource → "Line1" / "Line3"
- (4) TriggerActivation → "FallinEdge" / "RisingEdge"

#### 4. Others

Operation of the camera by the combination of each setting value is shown a table below.

SETTING OPERATION	Exposure Mode	Exposure Time	Exposure Auto	TriggerMode [TriggerSelector]			TriggerSource [TriggerSelector]		
				FrameStart	FrameTransferStart	VDReset	FrameStart	FrameTransferStart	VDReset
Normal									
SHUTTER:OFF	Off	Don't Care	Don't Care	Off	Off	Off	Don't Care	Don't Care	Don't Care
MANUAL SHUTTER	Timed	10u to 10	Off	Off	Off	Off	Don't Care	Don't Care	Don't Care
AUTO SHUTTER	Timed	Don't Care	Continuous	Off	Off	Off	Don't Care	Don't Care	Don't Care
VD									
SHUTTER:OFF	Off	Don't Care	Don't Care	Don't Care	Don't Care	On	Don't Care	Don't Care	Line1
MANUAL SHUTTER	Timed	Off	Off	Don't Care	Don't Care	On	Don't Care	Don't Care	Line1
AUTO SHUTTER	Timed	Don't Care	Continuous	Don't Care	Don't Care	On	Don't Care	Don't Care	Line1
One trigger									
SHUTTER:OFF	Off	Don't Care	Don't Care	On	Off	Off	*1	Don't Care	Don't Care
MANUAL SHUTTER	Timed	10u to 10	Off	On	Off	Off	*1	Don't Care	Don't Care
AUTO SHUTTER	Timed	Don't Care	Continuous	On	Off	Off	*1	Don't Care	Don't Care
PULSE WIDTH	TriggerWidth	Don't Care	Don't Care	On	Off	Off	*2	Don't Care	Don't Care
One trigger with reset control									
SHUTTER:OFF	Off	Don't Care	Don't Care	On	On	Off	*1	*1	Don't Care
MANUAL SHUTTER	Timed	10u to 10	Off	On	On	Off	*1	*1	Don't Care
AUTO SHUTTER	Timed	Don't Care	Continuous	On	On	Off	*1	*1	Don't Care
PULSE WIDTH	TriggerWidth	Don't Care	Don't Care	On	On	Off	*2	*1	Don't Care

\*1:Line1(7pin) , Line3(9pin) or Software trigger  
 \*2:Line1(7pin) or Line3(9pin)



# Digital output

The method of setting of digital output is explained.

## 1. Flash out (strobe pulse)

This camera can output flash pulse when trigger mode or electric shutter mode,

(A) When output flash pulse at the same time as exposure time and without delay.

- (1) LineSelector → "Line2"
- (2) LineSource → "ExposureActive" ... (\*1)
- (3) LineInverter → False / True ... (\*1)

(B) When adjust delay or duration of flash pulse

- (1) LineSelector → "Line2"
- (2) LineSource → "Timer1Active" ... (\*1)
- (3) LineInverter → False / True ... (\*1)
- (4) TimerSelector → "Timer1"
- (5) TimerDurationRaw → 1 to 4095 ... (\*2)
- (6) TimerDelayRaw → 0 to 4095
- (7) TimerTriggerSource → "ExposureStart"

(\*1) Following table shows polarity of flash out signal

LineInverter	Output flash signal
False	
True	

(\*2) When set to 0 → duration of flash pulse is equal to actual exposure time

## 2. VD out

This camera can output camera VD. It is used when synchronizing other camera.

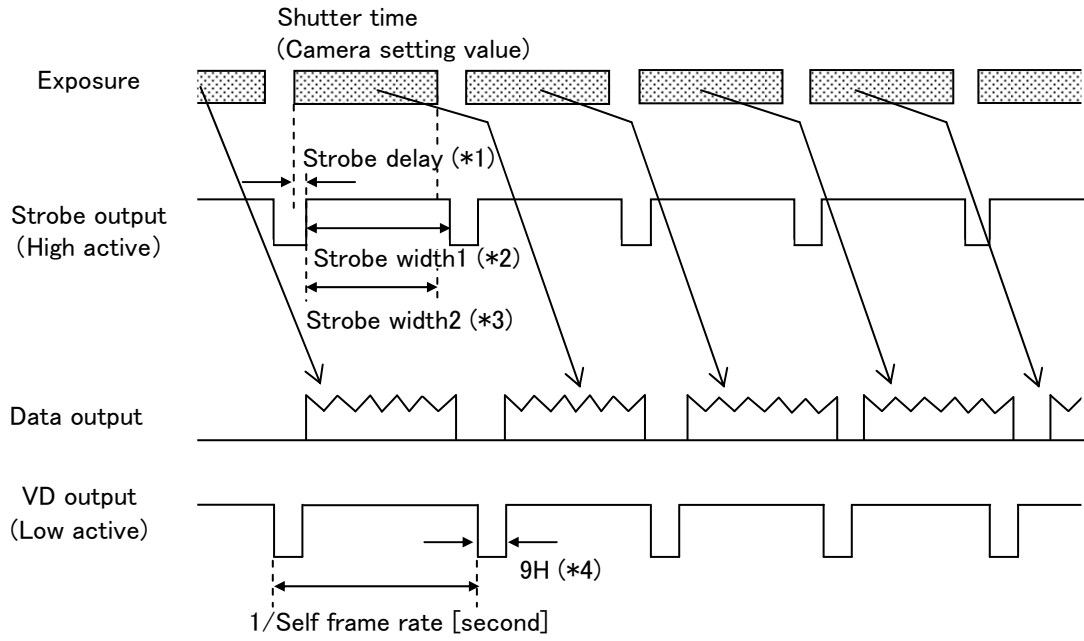
- (1) LineSelector → "Line2"
- (2) LineSource → "VD"
- (3) LineInverter → False / True ... (\*1)

(\*1) Following table shows polarity of VD signal

LineInverter	VD signal
False	
True	

# Trigger operation and timing chart

## 1. Normal mode

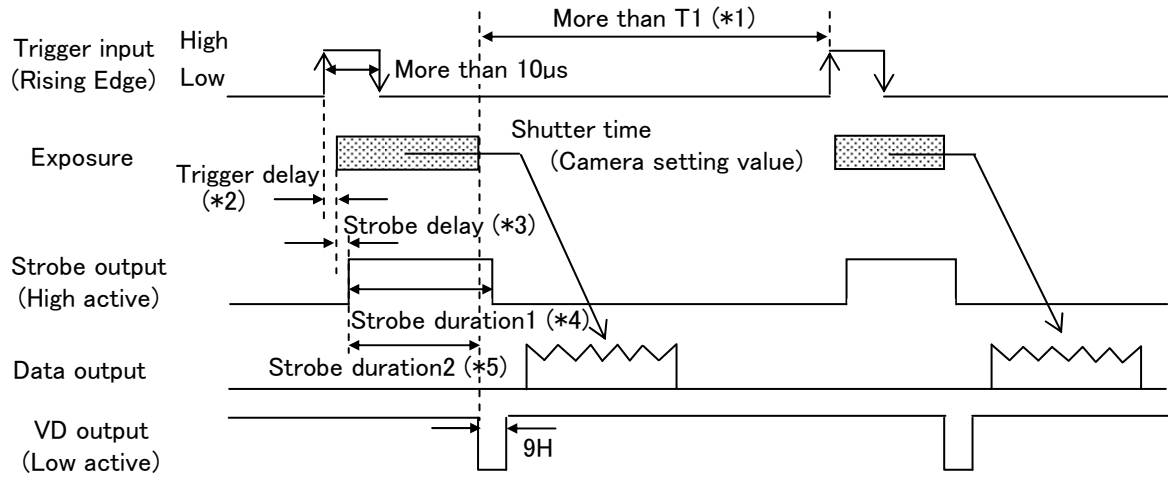


- (\*1) 0.08 $\mu$ s to 6.55ms      Approx. 1.6 $\mu$ s/step
- (\*2) 1.6 $\mu$ s to 6.55ms      Approx. 1.6 $\mu$ s/step
- (\*3) Shutter Time - Strobe delay (when duration time is set to 0)
- (\*4) 1H = Approx. 26.71 $\mu$ s

## 2. Fixed shutter mode

When external trigger signal is POSITIVE (high active), after the trigger signal rise, exposure is start. The exposure time is set by the camera electronic shutter speed. The video output is obtained immediately after the end of fixed exposure. The strobe signal start/end can be set to shutter time. Trigger signal input during exposure is disabled.

Even if the cycle of the input trigger signal is shorter than frame rate, frame rate does not increase. Input trigger signal is not effective from exposure start to data output.

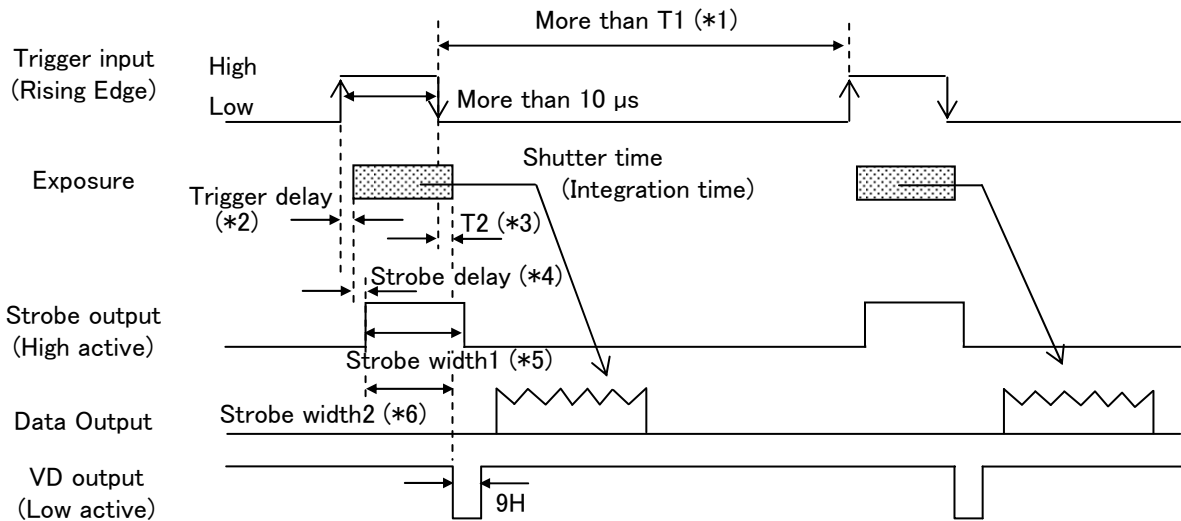


- (\*1)  $T1 = 1 / \text{Self frame rate [second]}$
- (\*2) 0.40µs to 6.55ms      Approx. 1.6µs/step
- (\*3) 0.40µs to 6.55ms      Approx. 1.6µs/step
- (\*4) 0.40µs to 6.55ms      Approx. 1.6µs/step
- (\*5) Shutter Time - Strobe delay (when duration time is set to 0)

## 3. ONE trigger mode

When external trigger signal is POSITIVE (high active), after the trigger signal rise, exposure is start. At the trigger signal falling edge, the internal VD signal is reset and the video data are transmitted. The trigger signal width equals the exposure time.

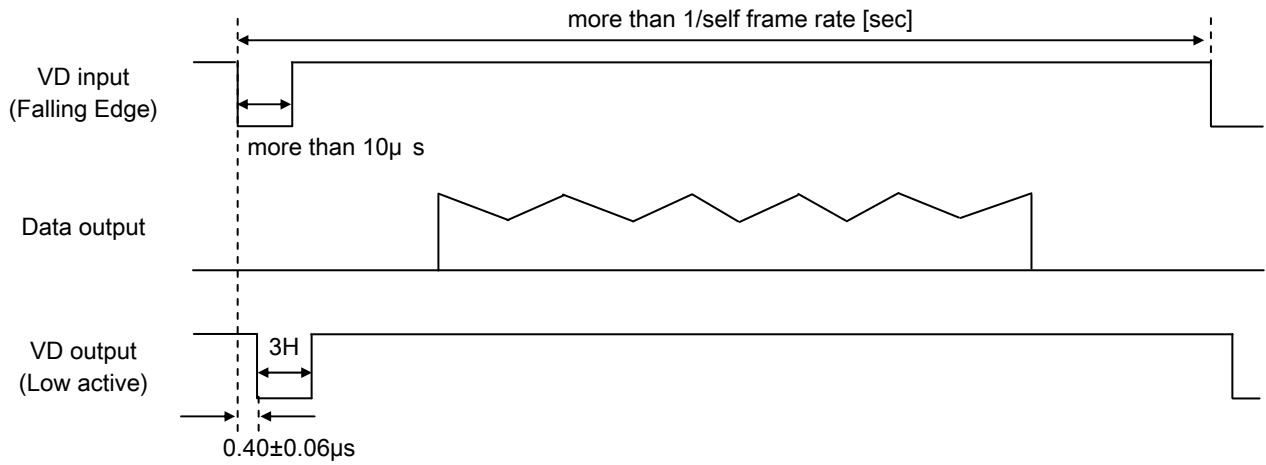
Even if the cycle of the input trigger signal is shorter than frame rate, frame rate does not increase. Input trigger signal is not effective from exposure start to data output.



- (\*1)  $T1 = 1 / \text{Self frame rate [second]}$
- (\*2) 0.40 to 6.55ms      Approx. 1.6µs/step
- (\*3) 15.6µs + Trigger delay
- (\*4) 0.40µs to 6.55ms      Approx. 1.6µs/step
- (\*5) 0.40µs to 6.55ms      Approx. 1.6µs/step
- (\*6) Shutter Time - Strobe delay (when duration time is set to 0)

#### 4. VD reset mode

When external VD pulse is inputted, internal VD is reset. Exposure time is established shutter speed.



NOTE: If the external VD of cycle which does not match the camera operation mode is input, shutter time has an error.

## Input / Output signal

### 1. Input signal

The level of the trigger signal input to HV-F202GV is as follows.

5Vp-p  $\pm$  0.5V

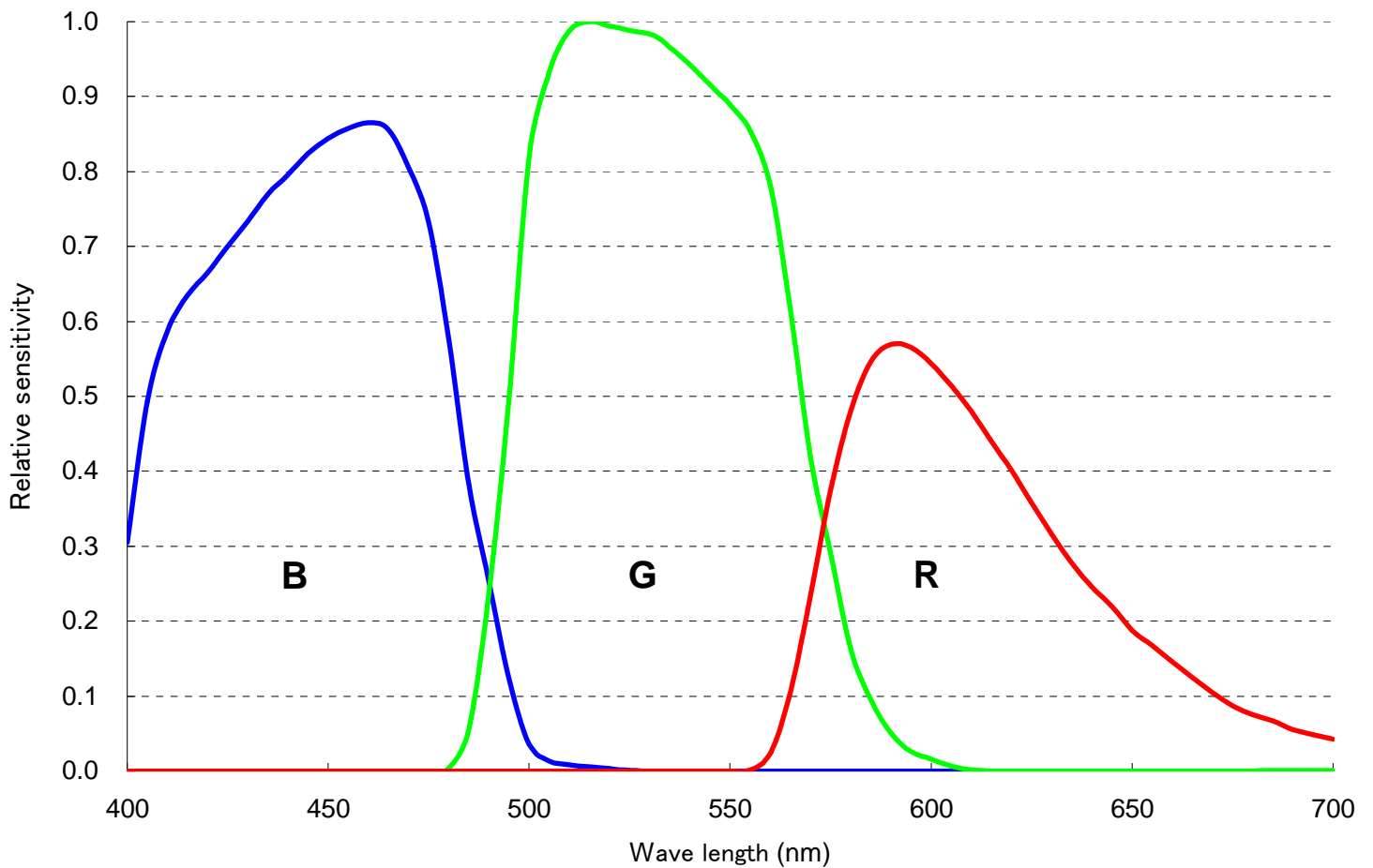
### 2. Output signal

The level of VD/Flash pulse signal output from HV-F202GV is as follows.

5Vp-p

## Spectral response

HV-F202GV Spectrum

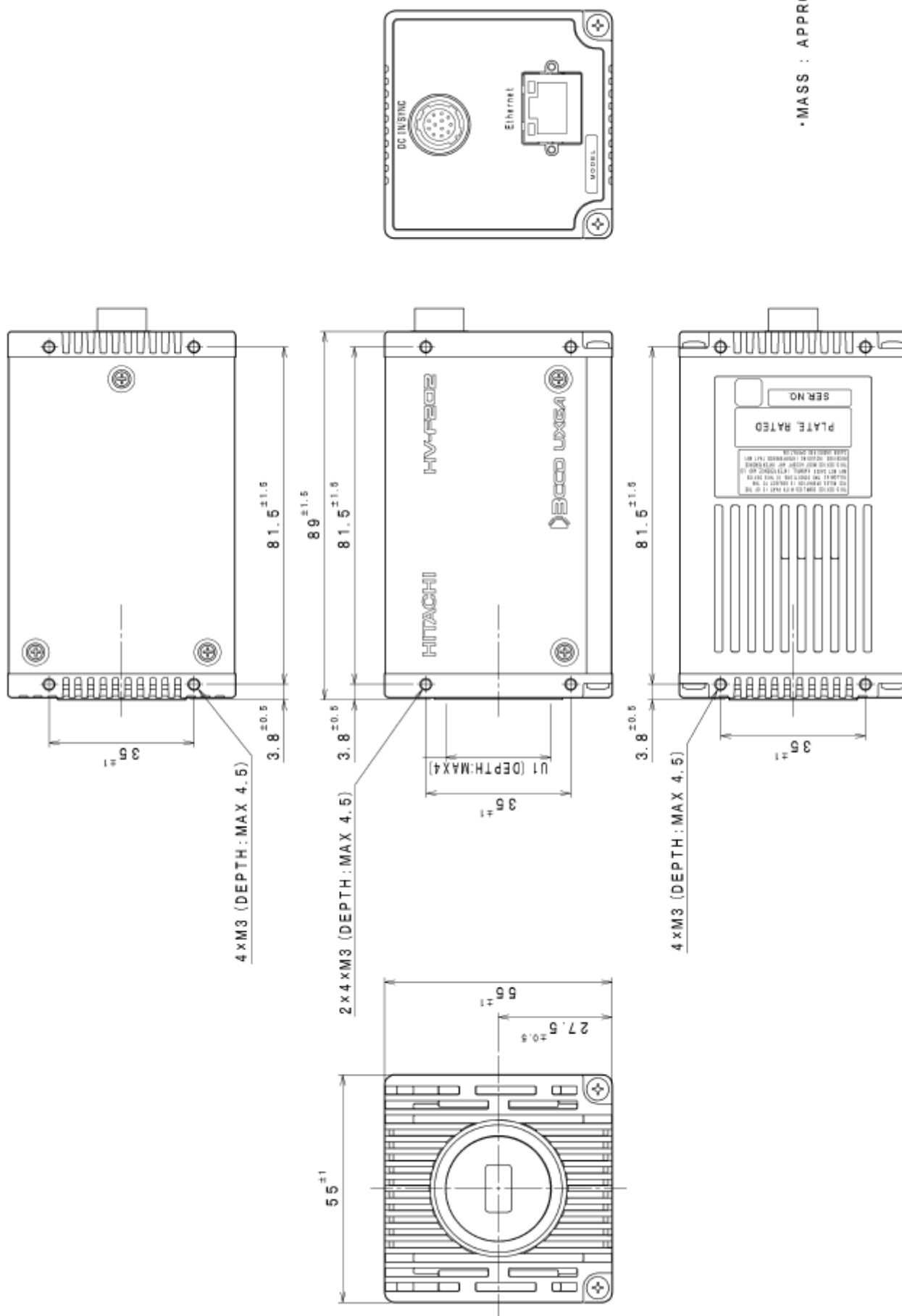


# Specifications

Specifications of HV-F202GV are showing.

1)	Optical system	1/1.8-inch F1.8 prism with IR cut filter
2)	Imaging device	1/1.8-inch interline CCD
	Total pixels	1688 (H) x 1248 (V)
	Effective pixels	1628 (H) x 1236 (V)
	Active pixels	1600 (H) x 1200 (V)
	Pixel pitch	4.4 $\mu$ m (H) x 4.4 $\mu$ m (V)
3)	Sensing area	7.16mm (H) x 5.44mm (V)
4)	Scanning system	Progressive scan
5)	Vertical scanning frequency	30 Hz
6)	Synchronization	Internal / VD external
7)	Lens mount	C mount (Mount surface projection less than 4.0mm)
8)	Fringe back	17.526mm (air conversion)
9)	Video output	
	Interface	Gigabit Ethernet
	Protocol	GigE Vision Version1.2 compliant
	Transmission speed	1Gbps
	Output data format	RGB 8/10/12 bit YUV422 8/10/12 bit Mono 8/10/12 bit
	Max output image size	1600 (H) x 1200 (V)
	Max frame rate (when full size)	30 frames per second RGB8bit: 18 fps, RGB10bit: 12 fps, RGB12bit: 9 fps YUV8bit: 28fps, YUV10/12bit: 18fps
10)	Sensitivity	2000lx, F5.6, 3200K
11)	Minimum illumination	12lx (F1.8, Gain MAX)
12)	Electronic shutter	
	Preset	1/30, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second
	Variable	10 to 1/100000 second
13)	External trigger function	
	Mode	OFF, Fixed shutter mode, ONE trigger mode, VD reset mode
	Trigger input	From DCIN/SYNC 12pin connector
	Input level	5Vp-p $\pm$ 0.5V
14)	Output signal	Strobe / VD : 5Vp-p
15)	Gamma	0.45 / 1.0 / LUT
16)	Gain	Manual / AGC : 0 to +12dB
17)	White balance	Manual / Once Auto / Continuous Auto
18)	Registration	Full screen 0.05% (not including lens response)
19)	Vertical contour correction	2H
20)	region of interest (ROI)	Selectable start position and width of picture grabbing in 2 pixels and 2 lines step
21)	Remote control	
	Control system	GigE Vision Version1.2, GENiCAM Version2.2 compliant
	Control items	TRIGGER, OUTPUT SIGNAL, SHUTTER SPEED, GAIN LEVEL, GAMMA, SHARPNESS, BLACKLEVEL, KNEE, ALC, WHITE BALANCE, MASKING, PAINT BLACK
22)	Power supply	DC12V $\pm$ 1V / 48V (PoE: IEEE802.3af compliant)
23)	Power consumption	Approx.680mA(Approx.8.2W)
24)	Ambient temperature	
	Operating	0 to 40°C less than 90% RH (without dew condensation)
	Storage	-10 to 50°C less than 70% RH (without dew condensation)
25)	Vibration endurance	10 to 100Hz (24.5 m/s <sup>2</sup> ), sweep: 10 minutes, XYZ, 30minutes
26)	Shock endurance	392 m/s <sup>2</sup> (vertical, horizontal, once each faze)
27)	Dimensions	55(W) x 55(H) x 89(D) mm (not including mount protrusions)
28)	Mass	Approx. 350g (not including the lens)
29)	Standard compositions	Camera, Installation guide, Plug for power supply

# Dimensions



• MASS : APPROX. 350 g

## Hitachi Kokusai Electric Inc.

UDX Akihabara Bldg.

14-1 Sotokanda 4-choume, Chiyoda-ku, Tokyo 101-8980, Japan

Phone: +81(0)3-6734-9432, Fax: +81(0)3-5209-5942

URL: <http://www.hitachi-kokusai.co.jp/global/>

## Hitachi Kokusai Electric (Shanghai) Co., Ltd.

Beijing Branch : Room 1415, Beijing Fortune Building, 5 Dong San Huan Bei-Lu,  
Chao Yang District, Beijing, 100004 China

Phone: +86(0) 10-6590-8755/8756, Fax: +86(0) 10-6590-8757

## Hitachi Kokusai Electric America, Ltd.

Headquarters and Northeast Office : 150 Crossways Park Drive, Woodbury, New York 11797, U.S.A.

Phone: (+1) 516-921-7200,

Fax: (+1) 516-496-3718

Midwest Sales : Phone: (+1) 330-334-4115, Service: (+1) 989-345-5379,

Fax: (+1) 516-496-3718

South Sales : Phone: (+1) 850-934-1234, Service: (+1) 256-774-3777

Latin Sales : Phone: (+1) 519-682-4420,

Fax: (+1) 516-496-3718

Parts Center : Phone: (+1) 516-682-4435,

Fax: (+1) 516-921-0993

West Office : 11258 Monarch, Unite Garden Grove, CA 92841, U.S.A.

Phone: (+1) 310-328-6116,

Fax: (+1) 310-328-6252

URL: <http://www.hitachikokusai.us>

## Hitachi Kokusai Electric Canada, Ltd.

Head Office : 1 Select Avenue, Unit#11, Scarborough, Ontario M1V, 5J3, Canada

Phone: (+1) 416-299-5900, Fax: (+1) 416-299-0450

Eastern Office : 5795 Chemin St. Francois St. Laurent, Quebec H4S, 1B6, Canada

Phone: (+1) 514-332-6687, Fax: (+1) 514-335-1664

URL: <http://www.hitachikokusai.ca>

## Hitachi Kokusai Electric Europe GmbH

Sales and Engineering Frankfurt Office : Siemensstr. 9, D-63263 Neu-Isenburg, Germany

Phone: +49(0) 6102-8332-0, Fax: +49(0) 6102-202616

London Office : Windsor House, Britannia Road, Waltham Cross,

Hertfordshire EN8 7NX, United Kingdom

Phone: +44(0) 845-121-2177, Fax: +44(0) 845-121-2180

General email address: [webmaster@hitachi-keu.com](mailto:webmaster@hitachi-keu.com)

URL: <http://www.hitachi-keu.com/>