

**General Safety Instructions:**

READ SAFETY INSTRUCTIONS

**Servicing:**

These products are not customer serviceable TDK-Lambda UK LTD and their authorised agents only are permitted to carry out repairs.

**Critical Components:**

These products are not authorised for use as critical components in nuclear control systems, life support systems or equipment for use in hazardous environments without the express written approval of the Managing Director of TDK-Lambda EMEA.

**Product Usage:**

These products are designed for use within a host equipment which restricts access to authorised competent personnel.

This product is a component power supply and is only to be installed by qualified persons within other equipment and must be not operated as a stand alone product.

This product is for sale to business to business customers and can be obtained via distribution channels. It is not intended for sale to end users.

This product is a component power supply and does not fall within the scope of the EMC directive. Compliance with the EMC directive must be considered in the final installation. Please contact your local TDK-Lambda office.

**Environmental:**

These products are IPX0, and therefore chemicals/solvents, cleaning agents and other liquids must not be used.

**Environment:**

This power supply is a switch mode power supply for use in applications within a Pollution Degree 2, overvoltage category II environment. Material Group IIIb PCB's are used within it.

**Output Loading:**

The output power taken from the power supply must not exceed the rating stated on the power supply label, except as stated in the product limitations in this handbook.

**Input Parameters:**

This product must be operated within the input parameters stated in the product limitations in this handbook.

**End of Life Disposal:**

The unit contains components that require special disposal. Make sure that the unit is properly disposed of at the end of its service life and in accordance with local regulations.



RISK OF ELECTRIC SHOCK

**High Voltage Warning:**

Dangerous voltages are present within the power supply. The professional installer must protect service personnel from inadvertent contact with these dangerous voltages in the end equipment.

**WARNING:** When installed in a Class 1 end equipment, this product must be reliably earthed and professionally installed.

The (+) or (-) output(s) can be earthed or left floating.

The unit cover(s)/chassis (where applicable) must not be made user accessible.

The mains input connector is not acceptable for use as field wiring terminals.

For encased products, do not use mounting screws, which penetrate the unit more than; See drawings.

Internal fuses protect the unit and must not be replaced by the user. In case of internal defect, the unit must be returned to TDK-Lambda UK LTD or one of their authorised agents.

A suitable mechanical, electrical and fire enclosure must be provided by the end use equipment for mechanical, electric shock and fire hazard protection.

The unit cover/chassis, where applicable, is designed to protect skilled personnel from hazards. They must not be used as part of the external covers of any equipment where they may be accessible to operators, since under full load conditions, part or parts of the unit chassis may reach temperatures in excess of those considered safe for operator access.

**Allgemeine Sicherheitsvorschriften:**

LESEN SIE DIE SICHERHEITSVORSCHRIFTEN

**Wartung:**

Diese Produkte können nicht durch den Kunden gewartet werden. Nur TDK-Lambda UK LTD. und deren zugelassene Vertriebshändler sind zur Durchführung von Reparaturen berechtigt.

**Kritische Komponenten:**

Diese Produkte sind nicht für die Verwendung als kritische Komponenten in nuklearen Kontrollsystemen, Lebenserhaltungssystemen oder Geräten in gefährlichen Umgebungen geeignet, sofern dies nicht ausdrücklich und in Schriftform durch den Geschäftsführer von TDK-Lambda EMEA genehmigt wurde.

**Produktverwendung:**

Diese Produkte sind zur Verwendung innerhalb von Host-Anlagen gedacht, die einen auf das Fachpersonal beschränkten Zugang haben.

Dieses Produkt ist eine Stromversorgungs-Komponente und sie darf nur von qualifiziertem Personal in andere Geräte eingebaut werden und sie darf NICHT als eigenständiges ("Stand-Alone") Gerät betrieben werden.

Dieses Produkt ist für den Verkauf an Geschäftskunden entwickelt worden und es kann über Distributionskanäle bezogen werden.

Es ist NICHT für den Verkauf an Endkunden gedacht und konzipiert.

Dieses Produkt ist eine Stromversorgungsbaugruppe und sie fällt NICHT in den Bereich der EMV Direktive.

Die Konformität mit der EMV Richtlinie muss in der finalen Gesamtinstallation betrachtet werden.

Bitte kontaktieren Sie Ihr regionales TDK-Lambda Vertriebsbüro im Falle von Rückfragen.

**Umwelt:**

Diese Produkte sind IPX0, aus diesem Grund dürfen keine Chemikalien/Lösungsmittel, Reinigungsmittel und andere Flüssigkeiten verwendet werden.

**Umgebung:**

Dieses Netzteil ist ein Schaltnetzteil zur Verwendung in einer Umgebung mit einem Verschmutzungsgrad 2, Überspannungskategorie II. Materialgruppe IIIb mit darin verwendeten PCBs.

**Ausgangsstrom:**

Der Ausgangsstrom des Netztesles darf die Leistung, die auf dem Label des Netztesles vermerkt ist, nur dann überschreiten, wenn dies in den Produktgrenzen dieses Handbuches ausgezeichnet ist.

**Eingangsparameter:**

Dieses Produkt muss innerhalb der Eingangsparameter, die in den Produktgrenzen dieses Handbuches angegeben sind, betrieben werden.

**Entsorgung am Ende der Betriebszeit:**

Das Gerät enthält Komponenten die unter Sondermüll fallen. Das Gerät muss am Ende der Betriebszeit ordnungsgemäß und in Übereinstimmung mit den regionalen Bestimmungen entsorgt werden.

**GEFAHR DURCH ELEKTRISCHEN SCHLAG****Hochspannungswarnung:**

Innerhalb des Netztesles gibt es gefährliche Spannungen. Der Elektroinstallateur muss das Wartungspersonal vor versehentlichem Kontakt mit den gefährlichen Spannungen im Endgerät schützen.

**WARNUNG!** Falls Sie unser Netzgerät in eine Anwendung mit Schutzklasse 1 eingebaut haben, stellen Sie sicher, dass es fachgerecht installiert und zuverlässig geerdet ist.

Die (+) oder (-) Ausgänge können geerdet werden oder unangeschlossen bleiben.

Die Abdeckung des Gerätes/das Gehäuse darf für den Benutzer nicht zugänglich sein.

Der Haupteingangsanschluss ist nicht für die Verwendung als Feldverdrahtungsanschluss geeignet.

Für ummantelt Produkte, verwenden Sie keine Schrauben, die das Gerät mehr als durchdringen; siehe Zeichnung. Eine interne Sicherung schützt das Gerät und darf durch den Benutzer nicht ausgetauscht werden. Im Fall von internen Defekten muss das Gerät an TDK-Lambda UK LTD oder einen der autorisierten Vertriebs Händler zurückgeschickt werden.

Ein geeignetes mechanisches, elektrisches und brandgeschütztes Gehäuse muss als Schutz vor der Gefahr von mechanischen Risiken, Stromschlägen und Brandschutz in dem Endgerät vorgesehen werden.

Die Geräteabdeckung/das Gehäuse ist so entworfen, dass das Fachpersonal vor Gefahren geschützt wird. Sie dürfen nicht als Teil der externen Abdeckung für Geräte verwendet werden, die für den Betreiber zugänglich sein müssen, da Teile oder das gesamte Gerätegehäuse unter voller Auslastung übermäßige Temperaturen erreichen kann, die für den Zugang des Betreibers nicht mehr als sicher betrachtet werden.

**Consignes générales de sécurité:**

LIRE LES CONSIGNES DE SECURITE

**Entretien:**

Ces produits ne peuvent pas être réparés par l'utilisateur. Seuls, TDK-Lambda UK LTD et ses agents agréés sont autorisés à effectuer des réparations.

**Composants critiques:**

Ces produits ne doivent pas être utilisés en tant que composants critiques dans des systèmes de commande nucléaire, dans des systèmes de sauvetage ou dans des équipements utilisés dans des environnements dangereux, sans l'autorisation écrite expresse du directeur général de TDK-Lambda EMEA.

**Utilisation du produit:**

Ces produits sont conçus pour être utilisés dans un équipement hôte dont l'accès n'est autorisé qu'aux personnes compétentes.

Ce produit est une alimentation considérée comme un composant devant être installé par des personnes qualifiées, dans un autre équipement. Il ne doit pas être utilisé en tant que produit fini.

Ce produit est destiné à la vente entre entreprises et peut être obtenu via des canaux de distribution.

Il n'est pas prévu à la vente pour les particuliers.

Ce produit est une alimentation considérée comme un composant, il ne relève pas du champ d'application de la directive CEM. Le respect de la directive CEM doit être pris en compte dans l'installation finale. Veuillez contacter votre bureau TDK-Lambda le plus proche.

**Environnement:**

Ces produits sont IPX0, et donc on ne doit pas utiliser des produits chimiques/solvants, des produits de nettoyage et d'autres liquides.

**Environnement fonctionnel :**

Cette alimentation fonctionne en mode commutation pour utilisation dans des applications fonctionnant dans un environnement avec Degré de Pollution 2 et catégorie de surtension II. Elle utilise des cartes des circuits imprimés (PCB) de Groupe IIIb.

**Intensité soutirée:**

L'intensité soutirée de l'alimentation ne doit pas dépasser l'intensité nominale marquée sur la plaque signalétique, sauf indications contraires dans les limitations du produit décrit dans ce manuel.

**Paramètres d'entrée:**

Ce produit doit être utilisé à l'intérieur des paramètres d'entrée indiqués dans les limitations du produit dans ce manuel.

**Elimination en fin de vie:**

L'alimentation contient des composants nécessitant des dispositions spéciales pour leur élimination. Vérifiez que cette alimentation est mise au rebut correctement en fin de vie utile et conformément aux réglementations locales en vigueur.



RISQUE DE CHOC ELECTRIQUE

**Attention-Danger haute tension:**

Des tensions dangereuses sont présentes dans l'alimentation. L'installateur doit protéger le personnel d'entretien contre un contact involontaire avec ces tensions dangereuses dans l'équipement final.

**AVERTISSEMENT:** Si ce produit est installé dans un équipement final de classe I, il doit être mis à la terre de manière fiable et installé par un professionnel averti.

Les sorties (+) ou (-) peuvent être raccordées à la terre ou laissées flottantes.

Le couvercle/châssis de l'alimentation ne doit pas être accessible à l'utilisateur. Le connecteur d'entrée d'alimentation principale ne doit pas être utilisé comme borne de raccordement.

N'utilisez pas de vis pénétrant dans le module sur une profondeur supérieure à : Voir dessins.

Un fusible interne protège le module et ne doit pas être remplacé par l'utilisateur. En cas de défaut interne, le module doit être renvoyé à TDK-Lambda UK LTD ou l'un de ses agents agréés.

Une enceinte appropriée doit être prévue par l'utilisateur final pour assurer la protection contre les chocs mécaniques, les chocs électriques et l'incendie.

Le couvercle et le châssis du module sont conçus pour protéger des personnels expérimentés. Ils ne doivent pas être utilisés comme couvercles extérieurs d'un équipement, accessible aux opérateurs car en condition de puissance maximum, des parties du châssis peuvent atteindre des températures considérées comme dangereuses pour l'opérateur.

**Norme generali di sicurezza:**

SI PREGA DI LEGGERE LE NORME DI SICUREZZA

**Manutenzione:**

Il cliente non può eseguire alcuna manutenzione su questi prodotti. L'esecuzione delle eventuali riparazioni è consentita solo a TDK-Lambda UK LTD e ai suoi agenti autorizzati.

**Componenti critici:**

Non si autorizza l'uso di questi prodotti come componenti critici all'interno di sistemi di controllo nucleari, sistemi necessari alla sopravvivenza o apparecchiature destinate all'impiego in ambienti pericolosi, senza l'esplicita approvazione scritta dell'Amministratore Delegato di TDK-Lambda EMEA.

**Uso dei prodotti:**

Questi prodotti sono progettati per l'uso all'interno di un'apparecchiatura ospite che limiti l'accesso al solo personale competente e autorizzato.

Questo prodotto è da considerarsi come un alimentatore professionale componente e come tale deve essere installato da personale qualificato all'interno di altre apparecchiature e non può essere utilizzato come prodotto indipendente.

Questo prodotto non è inteso per la vendita al dettaglio o agli utilizzatori finali.

Questo alimentatore è da considerarsi come un componente e come tale non è assoggettato dagli scopi della direttiva EMC. Conformità alla direttiva EMC deve essere considerata nell'installazione finale di utilizzo. Gli uffici di TDK-Lambda Sas Succursale Italiana sono a vostra disposizione per ulteriori raggugli.

**Condizioni ambientali:**

Questi prodotti sono classificati come IPX0, dunque non devono essere utilizzati sostanze chimiche/solventi, prodotti per la pulizia o liquidi di altra natura.

**Ambiente:**

Questo prodotto è un alimentatore a commutazione, destinato all'uso in applicazioni rientranti in ambienti con le seguenti caratteristiche: Livello inquinamento 2, Categoria sovratensione II. Questo prodotto contiene schede di circuiti stampati in materiali di Gruppo IIIb.

**Carico in uscita:**

La potenza in uscita ottenuta dall'alimentatore non deve superare la potenza nominale indicata sulla targhetta dell'alimentatore, fatto salvo dove indicato nei limiti per il prodotto specificati in questo manuale.

**Parametri di alimentazione:**

Questo prodotto deve essere utilizzato entro i parametri di alimentazione indicati nei limiti per il prodotto, specificati in questo manuale.

**Smaltimento:**

L'unità contiene componenti che richiedono procedure speciali di smaltimento. Accertarsi che l'unità venga smaltita in modo corretto al termine della vita utile e nel rispetto delle normative locali.



RISCHIO DI SCOSSA ELETTRICA

**Avvertimento di alta tensione:**

All'interno dell'alimentatore sono presenti tensioni pericolose. Gli installatori professionali devono proteggere il personale di manutenzione dal rischio di contatto accidentale con queste tensioni pericolose all'interno dell'apparecchiatura finale.

**ATTENZIONE:** Se installato in un'attrezzatura di classe I, questo prodotto deve essere collegato a terra in modo affidabile ed installato in modo professionale.

Le uscite (+) o (-) possono essere messa a terra o lasciate isolate.

I coperchi/il telaio dell'unità non devono essere accessibili da parte dell'utente.

Il connettore dell'alimentazione principale non può essere utilizzato come terminale di collegamento di campo.

Non utilizzare viti che penetrano nell'unità per più di : Vedi disegni

Un fusibile interno protegge l'unità e non deve essere sostituito dall'utente. Nell'eventualità di un difetto interno, restituire l'unità a TDK-Lambda UK LTD o a uno dei suoi agenti autorizzati.

L'apparecchiatura finale deve includere una recinzione meccanica, elettrica e antincendio per proteggere dai pericoli di natura meccanica, dalle scosse elettriche e dai pericoli di incendio.

Il coperchio/telaio dell'unità è realizzato per proteggere il personale esperto dai pericoli. Non deve essere usato come parte degli involucri esterni di qualsiasi apparecchiatura, se risulta accessibile da parte degli addetti, poiché è possibile che in condizioni di pieno carico una o più parti del telaio dell'unità giunga/giungano a temperature superiori ai limiti considerati sicuri per l'accesso da parte degli addetti.



**Instrucciones generales de seguridad:**

LEA LAS INSTRUCCIONES DE SEGURIDAD

**Servicio:**

Estos productos no pueden ser reparados por los clientes. TDK-Lambda UK LTD. y sus agentes autorizados son los únicos que pueden llevar a cabo las reparaciones.

**Componentes fundamentales:**

Estos productos no pueden ser utilizados como componentes fundamentales en sistemas de control nuclear, sistemas de soporte vital o equipos a utilizar en entornos peligrosos sin el consentimiento expreso por escrito del Director General de TDK-Lambda EMEA.

**Uso de los productos:**

Estos productos han sido diseñados para ser utilizados en un equipo central que restrinja el acceso al personal cualificado autorizado.

Este producto es una fuente de alimentación y sólo puede ser instalado por personal cualificado dentro de otros equipos y no debe ser tratado como un producto independiente. Este producto debe ser vendido entre empresas profesionales y solo puede obtenerse a través de los canales de distribución. No está destinado para la venta a usuarios finales

Este producto es una fuente de alimentación y no se ve afectada por la directiva EMC. El cumplimiento de la directiva EMC se debe considerar en la instalación final. Por favor, póngase en contacto con su oficina local de TDK – Lambda.

**Medioambiental:**

Estos productos son IPX0 y, por tanto, no pueden utilizarse sustancias químicas/disolventes, agentes de limpieza ni otros líquidos.

**Medio ambiente:**

Esta fuente de alimentación es una fuente de alimentación de modo conmutado a utilizar en aplicaciones dentro de un entorno con un Grado de contaminación 2 y una Categoría de sobretensión II. En él se utilizan policloruros de bifenilo del Grupo de materiales IIIb.

**Carga de salida:**

La potencia de salida tomada de la fuente de alimentación no puede sobrepasar el valor nominal indicado en la etiqueta de la fuente de alimentación, excepto en los casos indicados en las limitaciones del producto en este manual.

**Parámetros de entrada:**

Este producto debe ser utilizado dentro de los parámetros de entrada indicados en las limitaciones del producto en este manual.

**Desecho de la unidad:**

La unidad contiene componentes que deben ser desechados de una manera especial. Asegúrese de desechar correctamente la unidad al final de su vida útil y conforme a las normas locales vigentes.



PELIGRO DE DESCARGAS ELÉCTRICAS

**Advertencia de alta tensión:**

En esta fuente de alimentación hay tensiones peligrosas. El instalador profesional debe proteger al personal de servicio contra cualquier contacto accidental con estas tensiones peligrosas en el equipo final.

**ADVERTENCIA:** La instalación de este producto en un equipo de clase I la deben llevar a cabo profesionales y el producto debe estar conectado a tierra.

La salida o salidas (+) o (-) pueden conectarse a tierra o se las puede dejar flotando.

Debe impedirse el acceso de los usuarios a la cubierta o cubiertas y al chasis de la unidad.

El conector de entrada de la red no es apto para ser utilizado a modo de bornes de cableado de campo.

No utilice tornillos de montaje susceptibles de penetrar en la unidad más de: Ver dibujos.

Un fusible interno protege la unidad y este no debe ser nunca reemplazado por el usuario. En caso de existir algún defecto interno, la unidad debe ser enviada a TDK-Lambda UK LTD o a uno de sus agentes autorizados.

El equipo de uso final debe constituir un recinto de protección mecánica, eléctrica y contra incendios de protección mecánica, contra descargas eléctricas y contra el peligro de incendios.

La cubierta/chasis de la unidad ha sido diseñada para que proteja a las personas cualificadas de los peligros. No deben ser utilizadas como parte de las cubiertas externas de cualquier equipo al que pueden acceder los operarios, ya que bajo unas condiciones de carga completa, la pieza o piezas del chasis de la unidad pueden alcanzar temperaturas superiores a las consideradas seguras para el acceso de los operarios.

**Instruções gerais de segurança:**

LEIA AS INSTRUÇÕES DE SEGURANÇA

**Manutenção:**

Estes produtos não são podem ser submetidos a manutenção por parte do cliente. Apenas a TDK-Lambda UK LTD e os seus agentes autorizados têm permissão para realizar reparações.

**Componentes essenciais:**

Não é autorizada a utilização destes produtos como componentes essenciais de sistemas de controlo nuclear, sistemas de suporte de vida ou equipamento para utilização em ambientes perigosos sem a expressa autorização por escrito do Director-Geral da TDK-Lambda EMEA.

**Utilização do produto:**

Estes produtos foram concebidos para utilização dentro de um equipamento de alojamento que apenas permita o acesso a pessoal qualificado autorizado.

Este produto é uma alimentação considerado com um componente para ser instalado por pessoas qualificadas, em outros equipamentos. Não deve ser usado como um produto acabado.

Este produto é destinado para venda entre as empresas e pode ser obtido através de canais de distribuição.

Não se destina à venda aos particulares.

Este produto é uma alimentação considerado com um componente, não é dentro do application âmbito da directiva CEM.

Conformidade com a directiva CEM devem ser considerados na instalação final.

Entre em contacto com seu escritório TDK-Lambda mais próximo.

**Ambiental:**

Estes produtos são IPX0 e, como tal, não se devem utilizar químicos/solventes, agentes de limpeza e outros líquidos.

**Ambiente:**

Esta fonte de alimentação é uma fonte de alimentação do modo de comutação para utilização em aplicações com um Nível de Poluição 2 e ambientes da categoria de sobretensão II. São utilizadas placas de circuitos impressos do grupo de materiais IIIb.

**Carga de saída:**

A potência de saída extraída da fonte de alimentação não deve exceder a classificação assinalada na etiqueta da fonte de alimentação, excepto quando indicado nas limitações do produto neste guia.

**Parâmetros de entrada:**

Este produto deve ser utilizado dentro dos parâmetros de entrada indicados nas limitações do produto neste guia.

**Eliminação no fim de vida:**

A unidade contém componentes que necessitam de procedimentos especiais de eliminação. Certifique-se de que a unidade é devidamente eliminada no fim da sua vida útil e que tal é feito em conformidade com os regulamentos locais.



RISCO DE CHOQUE ELÉCTRICO

**Aviso de alta tensão:**

Estão presentes tensões perigosas dentro da fonte de alimentação. O profissional que realizar a instalação deve proteger o pessoal de assistência contra contactos inadvertidos com estas tensões perigosas do equipamento final.

**AVISO:** Quando instalado num equipamento de Classe I, este produto deve ser ligado à terra de forma fiável e instalado por um profissional.

As saídas (+) e (-) podem ser ligadas à terra ou deixadas soltas.

O chassis/cobertura(s) da unidade não deve estar acessível ao utilizador.

O conector de entrada de alimentação não deve ser utilizado como terminal de cablagens no local.

Não utilize parafusos de montagem, uma vez que estes penetrarão na unidade em mais do que: Veja os desenhos

Existe um fusível interno que protege a unidade e que não deve ser substituído pelo utilizador. Em caso de defeito interno, a unidade deve ser devolvida à TDK-Lambda UK LTD ou a um dos seus agentes autorizados.

O equipamento de utilização final deve fornecer um bastidor com protecção mecânica, eléctrica e contra incêndios adequada.

O chassis/cobertura da unidade está concebido de forma a proteger o pessoal especializado de perigos. Não devem ser utilizados como parte das coberturas externas de qualquer equipamento em que possam estar acessíveis aos operadores, uma vez que em condições de carga máxima, algumas peças do chassis da unidade podem atingir temperaturas superiores às consideradas seguras para o acesso do operador.

## **TDK-Lambda**

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# CCG Series

## Instruction Manual

### BEFORE USING THE POWER SUPPLY

Be sure to read this instruction manual thoroughly before using this product. Pay attention to all cautions and warnings before using this product. Incorrect usage could lead to an electrical shock, damage to the power supply or a fire hazard.

#### **DANGER**

Never use this product in locations where flammable gas or ignitable substances are present.

#### **INSTALLATION WARNING**

- When installing, ensure that work is done in accordance with the instruction manual. When installation is improper, there is risk of electric shock and fire.
- Installation shall be done by Service personnel with necessary and appropriate technical training and experience. There is a risk of electric shock and fire.
- Do not cover the product with cloth or paper etc. Do not place anything flammable around. This might cause damage, electric shock or fire.

#### **WARNING on USE**

- Do not touch this product or its internal components while circuit in operation, or shortly after shutdown. You may receive a burn.
- While this product is operating, keep your hands and face away from it as you may be injured by an unexpected situation.
- There are cases where high voltage charge remains inside the product. Therefore, do not touch even if they are not in operation as you might get injured due to high voltage and high temperature. You might also get electric shock or burn.
- Do not make unauthorized changes to this product nor remove the cover as you might get an electric shock or might damage the product. We will not be held responsible after the product has been modified, changed or disassembled.
- Do not use this product under unusual condition such as emission of smoke or abnormal smell and sound etc. Please stop using it immediately and shut off the product. It might lead to fire and electric shock. In such cases, please contact us. Do not attempt repair by yourself, as it is dangerous for the user.
- Do not operate and store these products in environments where condensation occurs due to moisture and humidity. It might lead fire and electric shock.
- Do not drop or apply shock to this product. It might cause failure. Do not operate these products mechanical stress is applied.

#### **CAUTION on MOUNTING**

- Confirm connections to input terminals, output terminals and signal terminals are correct as indicated in the instruction manual before switching on.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged or malfunction.
- Input line and output line, please use the wires as short and thick as possible.
- Do not use this product in special environment with strong electromagnetic field, corrosive gas or conductive substances and direct sunlight, or places where product is exposed to water or rain.
- Mount this product properly in accordance with the instruction manual, mounting direction and shall be properly be ventilated.
- Please shut down the input when connecting input and output of the product.
- When installing in environment where conductive foreign, dust and liquid may be present, please consider penetration of above foreign material in the power supply by installing filter, to prevent trouble or malfunction.

### **CAUTION on USE**

- Product individual notes are shown in the instruction manual. If there is any difference with common notes, individual notes shall have priority.
- Before using this product, be sure to read the catalog and instruction manual. There is risk of electric shock or damage to the product or fire due to improper use.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged, or cause electric shock or fire.
- For products without built-in protection circuit (element, fuse, etc.), insert fuse at the input to prevent smoke, fire during abnormal operation.
- For externally mounted fuse do not use other fuses aside from our specified and recommended fuse.
- This product was made for general purpose electronic equipment use and is not designed for applications requiring high safety (such as extremely high reliability and safety requirements. Even though high reliability and safety are not required, this product should not be used directly for applications that have serious risk for life and physical safety. Take sufficient consideration in fail-safe design (such as providing protective circuit or protective device inside the system, providing redundant circuit to ensure no instability when single device failure occurs).
- When used in environments with strong electromagnetic field, there is possibility of product damage due to malfunction.
- When used in environment with corrosive gas (hydrogen sulfide, sulfur dioxide, etc.), there is possibility that they might penetrate the product and lead to failure.
- When used in environments where there is conductive foreign matter, dust or liquid, there is possibility of product failure or malfunction.
- Provide countermeasure for prevention of lightning surge voltage as there is risk of damage due to abnormal voltage.
- Take care not to apply external abnormal voltage to the output terminals and signal terminals. Especially, applying reverse voltage or overvoltage more than the rated voltage to the output might cause failure, electric shock or fire.
- Never operate the product under overcurrent or short circuit condition. Insulation failure, or other damages may occur.
- The application circuits and their parameters are for reference only. Be sure to verify effectiveness of these circuits and their parameters before finalizing the circuit design. Moreover, we will not be responsible on application patent or utility model.
- Excessive stress could cause damage. Therefore, please handle with care.
- Use recommended external fuse to each products to ensure safe operation and compliance with the Safety Standards to which it is approved.
- The input power source to this product must have reinforced or double insulation from the mains.
- This product has possibility that hazardous voltage may occur in output terminal depending on failure mode. The output of these products must be protected by over voltage protection circuit in the end use equipment to maintain SELV.

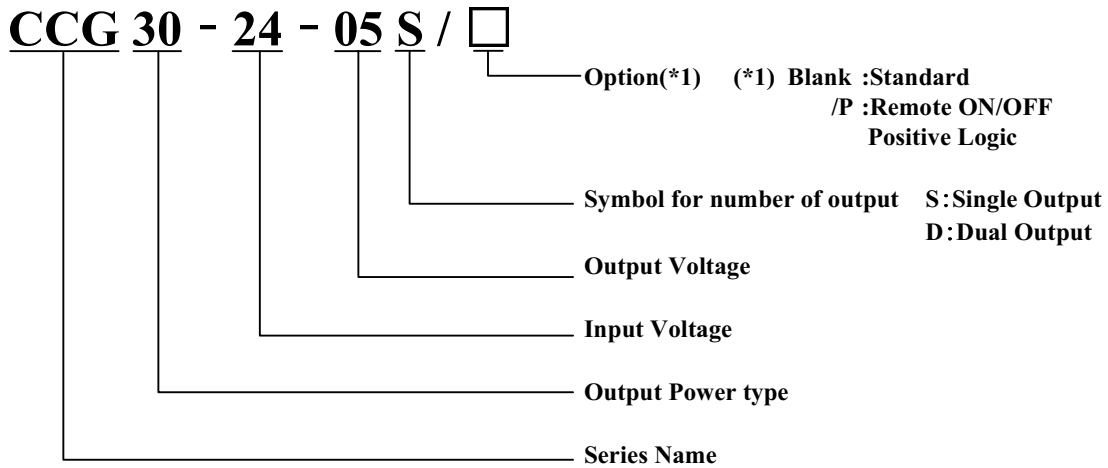
### **Note**

- Consider storage of the product at normal temperature and humidity avoiding direct exposure to sunlight at environment with minimal temperature and humidity changes. Storage of product at high temperature, high humidity and environments with severe changes in temperature and humidity might cause deterioration, and occurrence of condensation in the product.
- When disposing product, follow disposal laws of each municipality.
- Published EMI (CE, RE) or immunity is the result when measured in our standard measurement conditions and might not satisfy specification when mounted and wired inside end-user equipment.
- Use the product after sufficiently evaluating at actual end-user equipment.
- If products are exported, please register the export license application etc. by the Government of Japan according to Foreign Exchange and Foreign Trade Control Law.
- The information in the catalog or the instruction manual is subject to change without prior notice. Please refer to the latest version of the catalog or the instruction manual.
- No part of this document may be copied or reproduced in any form without prior written consent TDK-Lambda.

### **Note : CE MARKING**

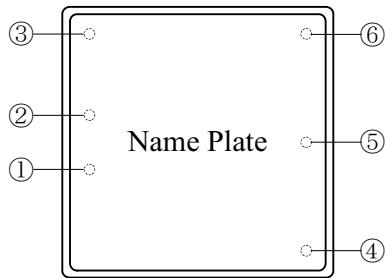
CE Marking indicated on the products which is covered by this handbook is applied to CCGxx-24-xxS/D with RoHS compliance and to CCGxx-48-xxS/D with low voltage directive and RoHS compliance.

## 1. Model name identification method

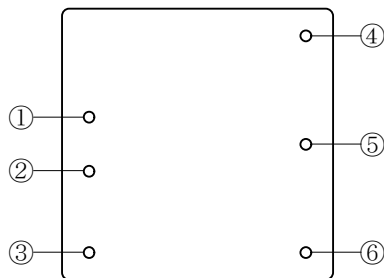


## 2. Terminal Explanation

### Top view



### Bottom view



### CCG-S

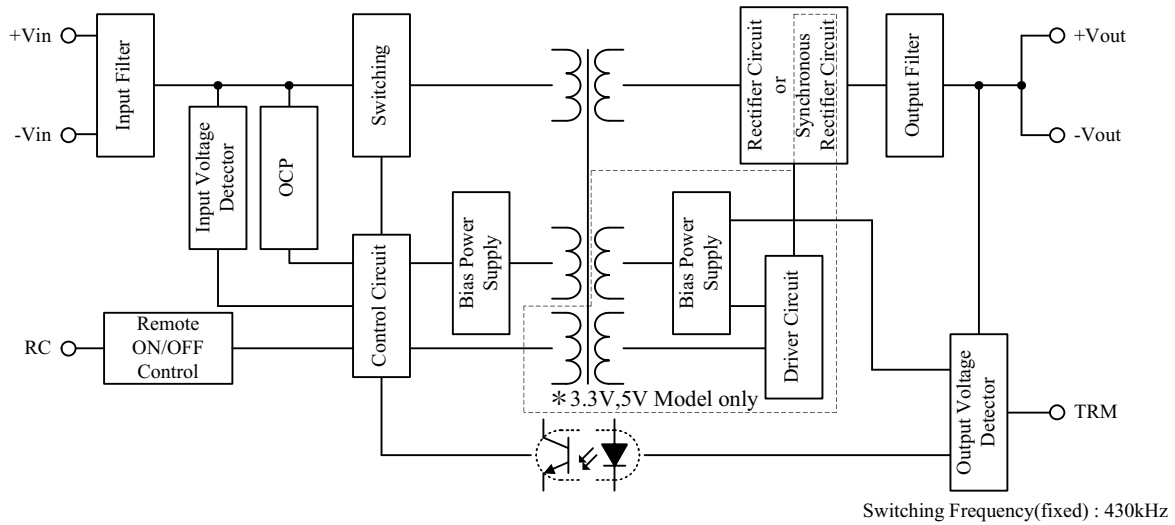
- ① +Vin : +Input Terminal
- ② -Vin : -Input Terminal
- ③ RC : Remote ON/OFF Control Terminal
- ④ +Vout : +Output Terminal
- ⑤ TRM : Output Voltage Trimming Terminal
- ⑥ -Vout : -Output Terminal

### CCG-D

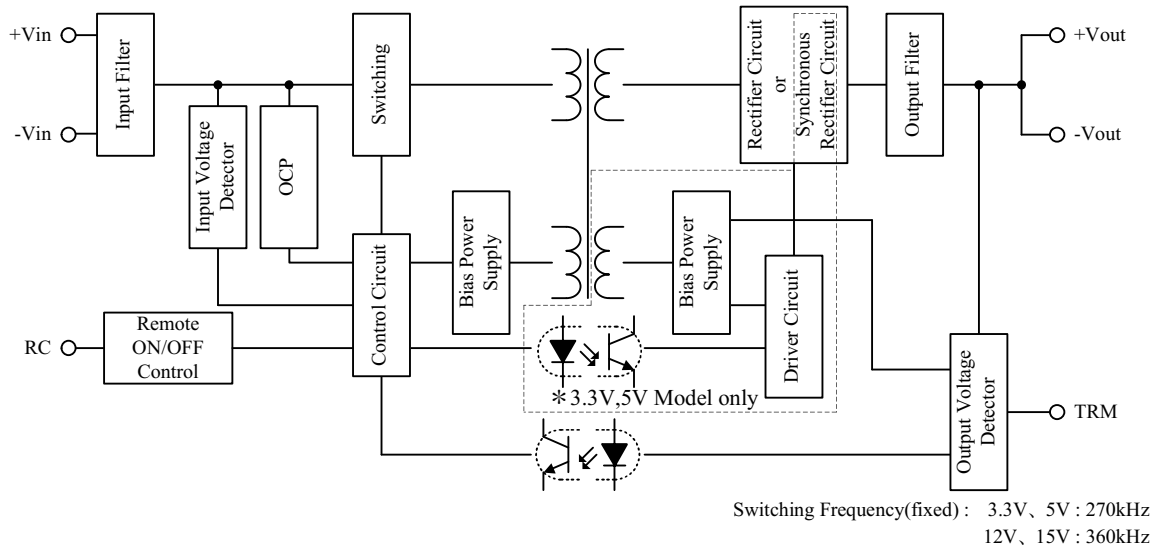
- ① +Vin : +Input Terminal
- ② -Vin : -Input Terminal
- ③ RC : Remote ON/OFF Control Terminal
- ④ +Vout : +Output Terminal
- ⑤ COM : Common Ground Terminal
- ⑥ -Vout : -Output Terminal

### 3. Block Diagram

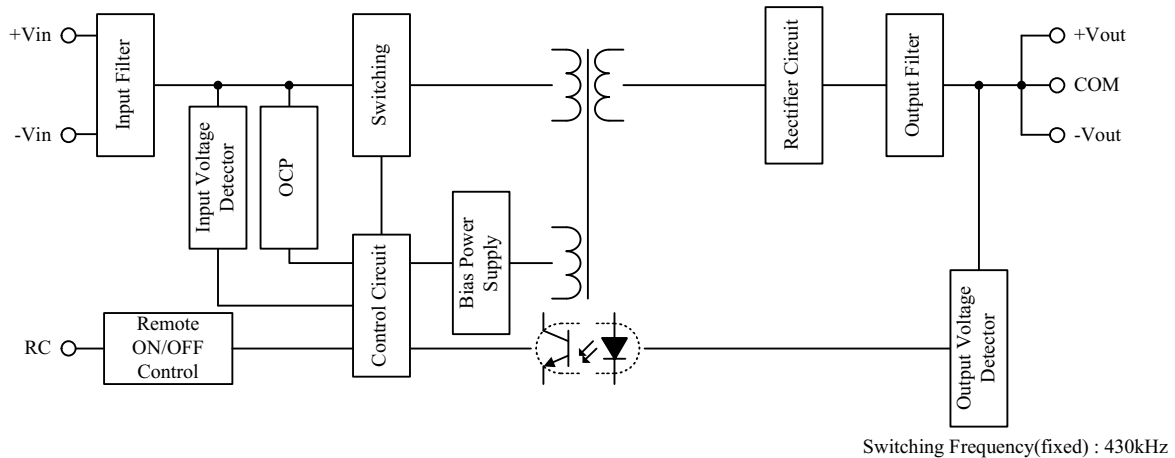
#### CCG15-S



#### CCG30-S

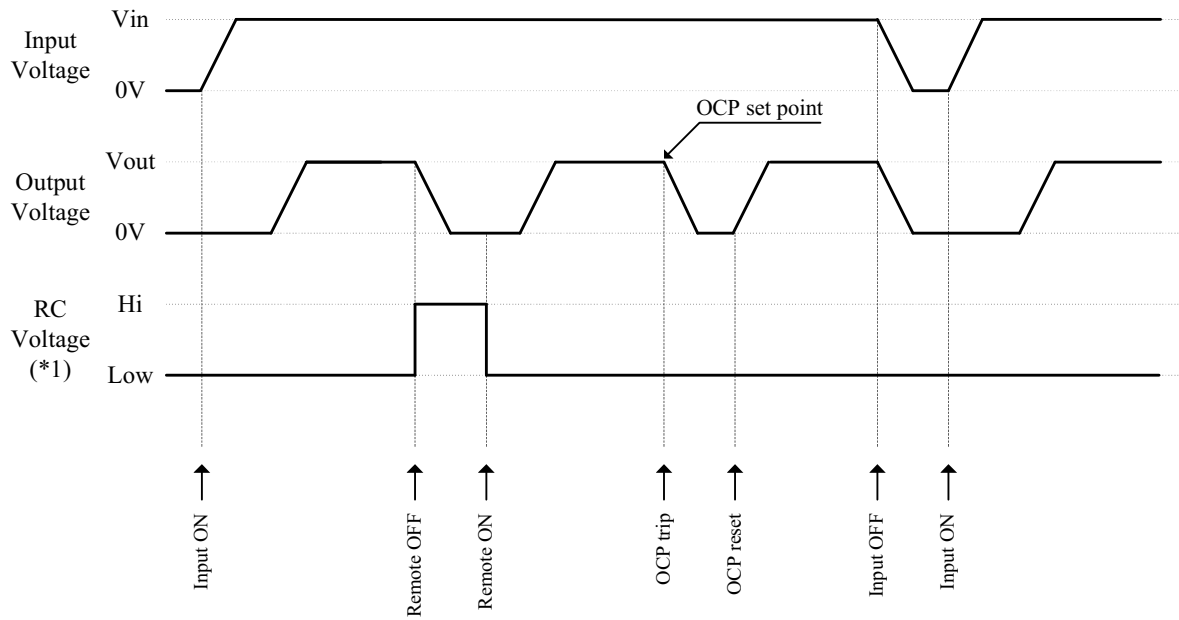


#### CCG-D





#### 4. Sequence Time Chart

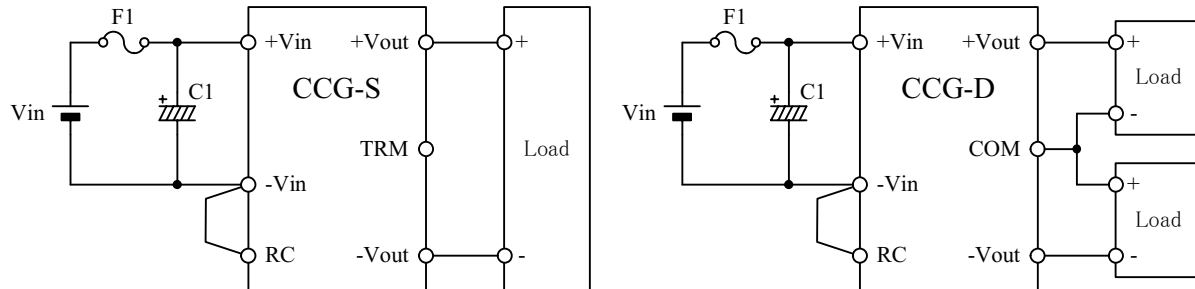


\*1 For example on above, RC Voltage shows Negative Logic control operation. For details on this function, please refer to Application Notes “6-7. Remote ON/OFF Control (RC terminal)” section.

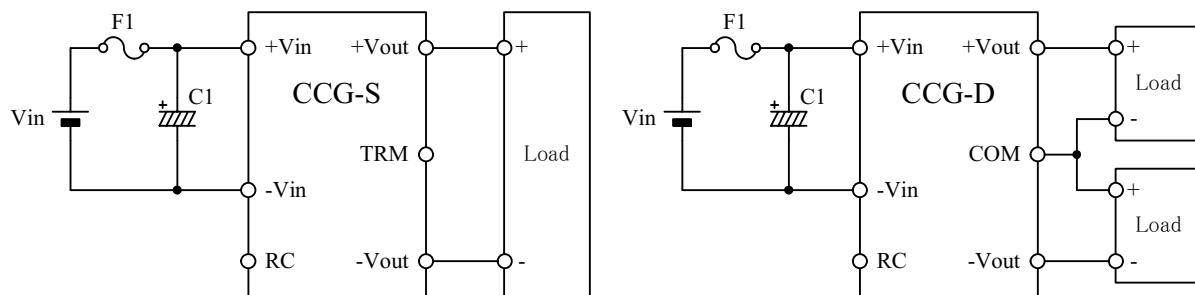
## 5. Terminal Connecting Method

In order to use the CCG series, this power supply must be connected with external components according to Fig.5-1.

If it is connected to wrong terminal, the power supply will be damaged. Pay attention to each wiring.



(a) Standard model (Negative Logic model)



(b) Positive Logic model

Fig.5-1 Basic connection

### F1 : Input Fuse

CCG series has no internal fuse.

Use external fuse to comply various Safety Standards and to improve safety.

Moreover, use fast-blow type for every power supply.

Furthermore, fuse must be connected to +Vin side if -Vin side is used as ground, or fuse must be connected to -Vin side if +Vin side is used as ground.

Consider margin over the actual input voltage to be used when selecting fuse. Moreover, consider  $I^2t$  fuse rating for surge current (inrush current) during line throw-in.

#### Input Fuse Recommended Current Rating

CCG15-24-xxS/D : 6.3A or lower

CCG15-48-xxS/D : 5.0A or lower

CCG30-24-xxS/D : 10A or lower

CCG30-48-xxS/D : 6.3A or lower

**C1 : External Input Capacitor**

To prevent the effect of input line inductance to the power supply, connect electrolytic capacitor between +Vin and -Vin terminals.

Recommended Capacitance

CCGxx-24-xxS/D : 120 $\mu$ F or more

CCGxx-48-xxS/D : 47 $\mu$ F or more

- Note) 1. Use low impedance electrolytic capacitor with excellent temperature characteristics.  
(Nippon Chemi-Con KZE series or equivalent)
2. When using CCG15-24-xxS below -10°C ambient temperature, connect more than two recommended capacitor in parallel to reduce ESR.
3. When input line inductance becomes excessively high due to insertion of choke coil, operation of the power supply could become unstable. For this case, increase capacitance of electrolytic capacitor more than recommended capacitance.
4. When steeply to open the input line by using the relay etc. when the power supply is operating, there is possibility of the power supply restarts due to the power input voltage rises. It is influenced by the impedance characteristics of pattern on printed circuit board, C1 and choke coil etc.  
Please use it on the actual machine sufficiently.

● **Protection for Reversed Input Connection**

Reverse input polarity would cause power supply damage. For cases where reverse connections are possible, connect a protective diode and fuse. Use protective diode with higher voltage rating than the input voltage, and with higher surge current rating than fuse current rating.

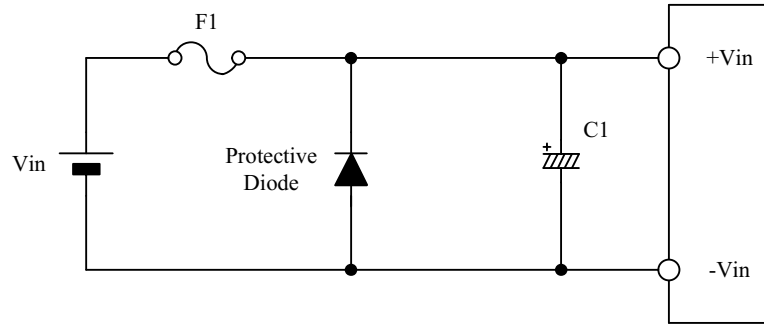


Fig.5-2 Protection for Reversed Input Connection

● **External Output Capacitor**

This power supply is capable of operating without external output capacitor. For case of abrupt changes in load current or the line to the load is long, operation might become unstable. In this case, it is possible to stabilize the output voltage by attaching capacitor.  
 CCG-S : between +Vout and -Vout terminal  
 CCG-D : between +Vout and COM terminal, -Vout and COM terminal  
 Maximum capacitance of external output capacitor is shown in Table 5-1.

Table 5-1 Maximum Capacitance of External Output Capacitor

Model	Maximum capacitance
3.3V	10,000 $\mu$ F
5V	7,200 $\mu$ F
12V, $\pm$ 12V	1,200 $\mu$ F
15V, $\pm$ 15V	1,000 $\mu$ F

Note) When using 3.3V and 5V output models of CCG30-S, output voltage might become unstable at input voltage dips or short interruption on connection output capacitor. In this case, it is possible to stabilize the output voltage by attaching input voltage retention diode and increase capacitance of C1 as shown in Fig.5-3. Use input voltage retention diode with higher current rating than fuse current rating. Moreover, choose a suitable capacitance of C1 in accordance with operating condition.

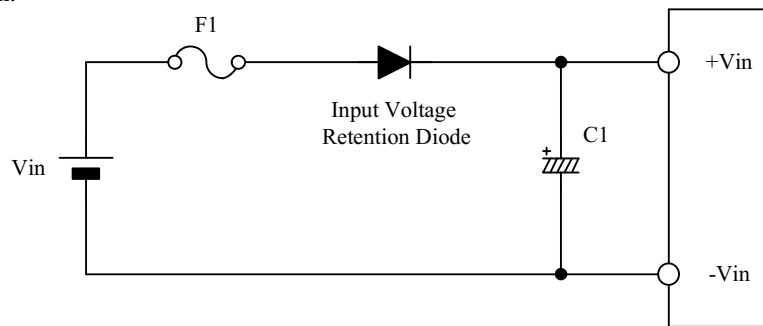


Fig.5-3 Caution about Connecting Output Capacitor

## 6. Explanation of Functions and Precautions

### 6-1. Input Voltage Range

Input voltage range for CCG series is indicated below.

Input Voltage Range

CCGxx-24-xxS/D : 9 - 36VDC

CCGxx-48-xxS/D : 18 - 76VDC

Take note that power supply might be damaged or not meet specification when applied input voltage which is out of specified range.

Ripple voltage ( $V_{rpl}$ ) which results from rectification and filtering of commercial AC line is might be included within the input voltage as shown in Fig.6-1.

In this case, ripple voltage must be limited within the voltage described below.

Allowable Input Ripple Voltage : 2Vp-p

When input ripple voltage exceed above value, the output ripple voltage might be large.

Take note that sudden input voltage change might be cause variation of output voltage transitionally.

Moreover, maximum value and minimum value of input voltage waveform must not go beyond the limit of above input voltage range.

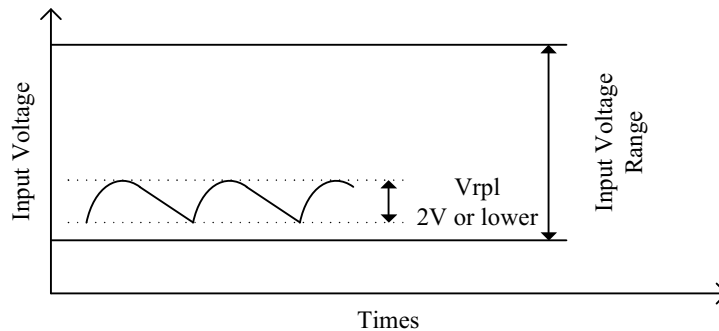


Fig.6-1 Input Ripple Voltage

### 6-2. Output Voltage Adjustment Range (Only CCG-S)

Output voltage could be adjusted within the range described below by connecting external resistor or variable resistor.

However, take note that power supply might be damaged when output voltage exceeds the range described below.

When increasing the output voltage, reduce the output current accordingly so as not to exceed the maximum output power.

Take note that when output voltage is decreased, maximum output current is until rated maximum output current of specification.

Output Voltage Adjustment Range :  $\pm 10\%$  of Nominal Output Voltage

● **Output Voltage Adjustment by External Resistor or Variable Resistor (Only CCG-S)**

(1) In case of adjusting output voltage lower

(1-1) Maximum output current

In case of adjusting output voltage lower, maximum output current is until rated maximum output current of specification.

ex) In case of CCG30-xx-12S

When setting 12V Model to 10.8V output, maximum output power =  $10.8V \times 2.5A = 27W$ .

(1-2) External resistor connecting method

Connect an external resistor or variable resistor  $R_a$  between TRM and +Vout terminal.

To prevent the effect of noise or other, connect as short as possible because TRM terminal is relatively high impedance.

Please refer to Table 6-1 when adjusting output voltage.

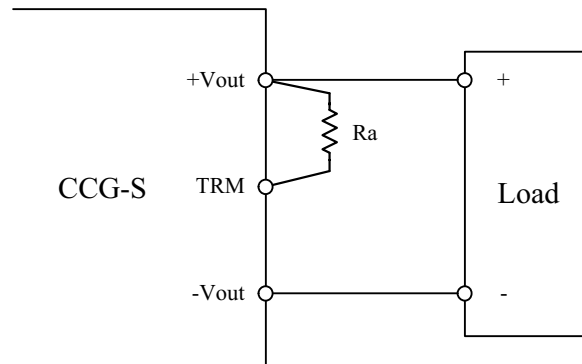


Fig.6-2 Basic Connection for Output Voltage Trim Down

Table 6-1 Equation of External Resistor and Output Voltage

Model	Equation	
CCGxx-xx-03S	$V_{out} (V) = 3.3 - \frac{16.05}{22.8 + R_a (k\Omega)}$	$R_a (k\Omega) = \frac{16.05}{3.3 - V_{out} (V)} - 22.8$
CCGxx-xx-05S	$V_{out} (V) = 5.01 - \frac{53.95}{32.3 + R_a (k\Omega)}$	$R_a (k\Omega) = \frac{53.95}{5.01 - V_{out} (V)} - 32.3$
CCGxx-xx-12S	$V_{out} (V) = 12.05 - \frac{445.7}{63.1 + R_a (k\Omega)}$	$R_a (k\Omega) = \frac{445.7}{12.05 - V_{out} (V)} - 63.1$
CCGxx-xx-15S	$V_{out} (V) = 15.08 - \frac{732.7}{74.7 + R_a (k\Omega)}$	$R_a (k\Omega) = \frac{732.7}{15.08 - V_{out} (V)} - 74.7$

Output Voltage :  $V_{out}(V)$ , External Resistor Value :  $R_a(k\Omega)$

Output voltage could be adjusted within the -10% of nominal output voltage by external resistor  $R_a$ .

(2) In case of adjusting output voltage higher

(2-1) Maximum output current

When increasing the output voltage, reduce the output current accordingly so as not to exceed the maximum output power.

ex) In case of CCG30-xx-12S

When setting 12V Model to 13.2V output, maximum output current =  $30W \div 13.2V = 2.272A$ .

(2-2) External resistor connecting method

Connect an external resistor or variable resistor  $R_b$  between TRM and -Vout terminal.

To prevent the effect of noise or other, connect as short as possible because TRM terminal is relatively high impedance.

Please refer to Table 6-2 when adjusting output voltage.

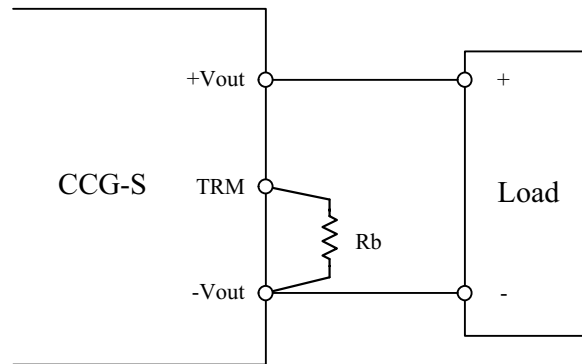


Fig.6-3 Basic Connection for Output Voltage Trim Up

Table 6-2 Equation of External Resistor and Output Voltage

Model	Equation	
CCGxx-xx-03S	$V_{out} (V) = 3.3 + \frac{9.67}{15+R_b (k\Omega)}$	$R_b (k\Omega) = \frac{9.67}{V_{out} (V)-3.3} - 15$
CCGxx-xx-05S	$V_{out} (V) = 5.01 + \frac{17.73}{18+R_b (k\Omega)}$	$R_b (k\Omega) = \frac{17.73}{V_{out} (V)-5.01} - 18$
CCGxx-xx-12S	$V_{out} (V) = 12.05 + \frac{50.96}{22+R_b (k\Omega)}$	$R_b (k\Omega) = \frac{50.96}{V_{out} (V)-12.05} - 22$
CCGxx-xx-15S	$V_{out} (V) = 15.08 + \frac{65.35}{22+R_b (k\Omega)}$	$R_b (k\Omega) = \frac{65.35}{V_{out} (V)-15.08} - 22$

Output Voltage :  $V_{out}(V)$ , External Resistor Value :  $R_b(k\Omega)$

Output voltage could be adjusted within the +10% of nominal output voltage by external resistor  $R_b$ .

### 6-3. Maximum Output Ripple and Noise

This output ripple and noise voltage is measured at connection as shown in Fig.6-4.  
 Connect ceramic capacitor (C2, C3 : 22 $\mu$ F)<sup>Note1)</sup> at 50mm distance from the output terminal.  
 Measure at C2 terminals as shown in Fig.6-4 using coaxial cable with JEITA attachment.  
 Use oscilloscope with 20MHz frequency bandwidth or equivalent.

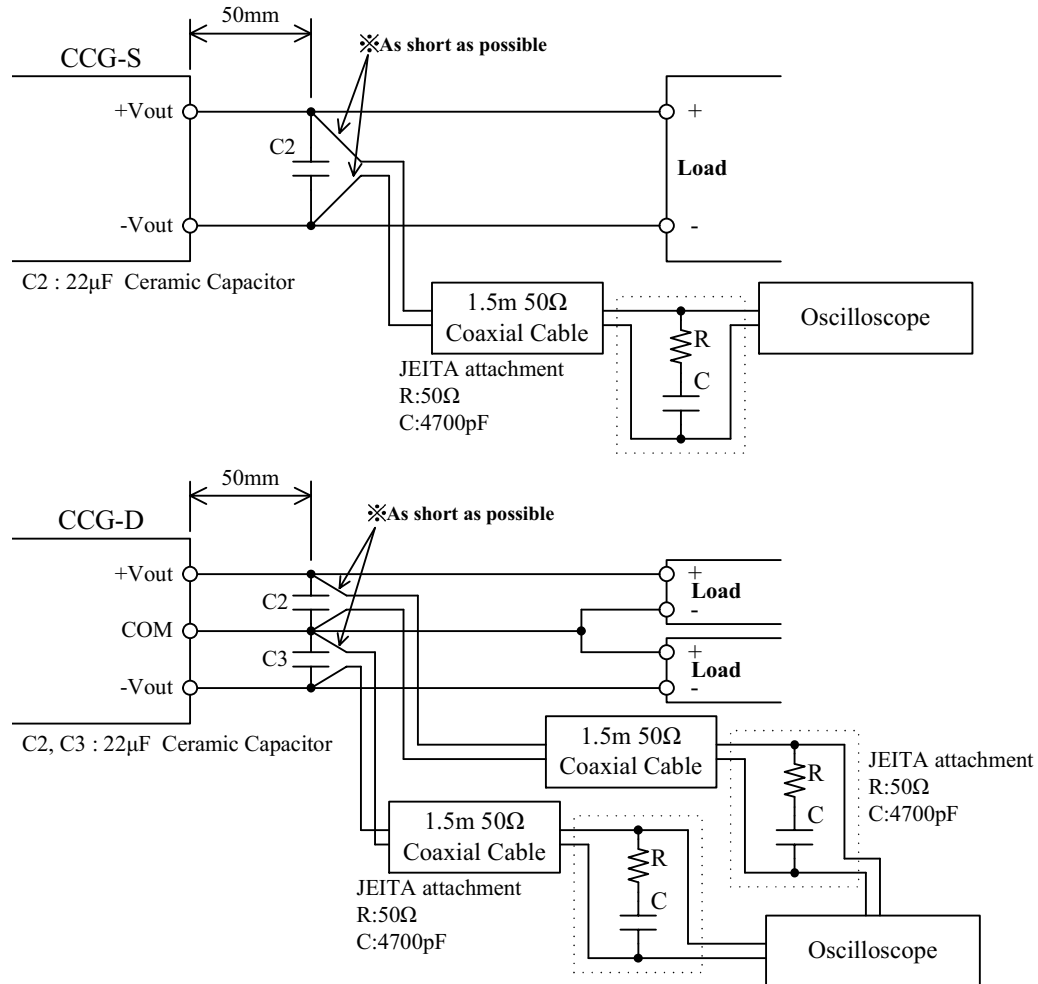


Fig.6-4 Measurement of Maximum Output Ripple and Noise

Take note that, PCB wiring design might influence output ripple voltage and spike noise voltage. Generally, increasing capacitance value of external capacitor can reduce output ripple voltage and connecting ceramic capacitor can reduce output spike noise voltage.

Note1) When using 3.3V and 5V output models of CCG30-S below -20 $^{\circ}$ C ambient temperature, use two ceramic capacitors in parallel to reduce ESR.



#### **6-4. Maximum Line Regulation**

Maximum value of output voltage change when input voltage is gradually varied (steady state) within specified input voltage range.

#### **6-5. Maximum Load Regulation**

Maximum value of output voltage change when output current is gradually varied (steady state) within specified output current range.

When using at dynamic load mode, output voltage fluctuation might increase.

Also, when CCG-D is used with unbalanced load, the output voltage with the higher load factor decreases and the output voltage with the lower load factor increases.

A thorough pre-evaluation must be performed before using this power supply.

#### **6-6. Over Current Protection (OCP)**

This power supply has built-in OCP function.

When short circuit or output current is in overload condition, it becomes intermittent operation.

Output will recover when short circuit or overload conditions are released.

Take note that power supply might be damaged at continuous overload conditions depending on thermal conditions.

### 6-7. Remote ON/OFF Control (RC terminal)

The output can be enabled/disabled by RC terminal without turning the input supply on and off. There are two type of control logic, Negative Logic and Positive Logic. Polarity of control logic is Determined by Product Specification.

In order to use remote ON/OFF control function, attach transistor, relay or equivalent switch between RC and -Vin terminal as shown in Fig.6-5.

For secondary control, isolation can be achieved through the use of a opto-coupler or equivalent as shown in Fig.6-6.

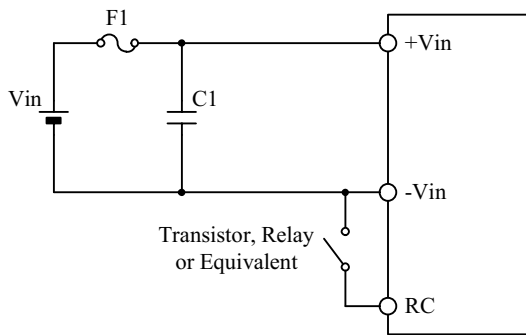


Fig.6-5 RC Connection (1)

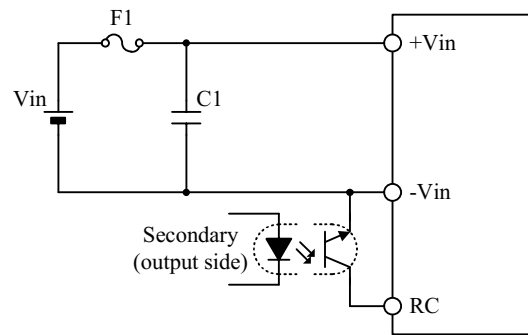


Fig.6-6 RC Connection (2)

Table 6-3 RC Connection

Logic	Switch	RC Voltage Range	Output Status
Negative Logic	Short	$0V \leq V_{RC} \leq 0.5V$	ON
	Open	$4V \leq V_{RC} \leq 18V$	OFF
Positive Logic	Short	$0V \leq V_{RC} \leq 0.5V$	OFF
	Open	Open <sup>Note4)</sup>	ON

- Note) 1. When remote ON/OFF control function is not used, between RC and -Vin terminals should be shorted on Negative Logic model. In contrast, RC and -Vin terminals should be opened on Positive Logic model.
2. Source current from RC terminal to -Vin terminal is 1mA or lower.
3. The allowable maximum RC terminal voltage of Negative Logic model is 18V, and Positive Logic model is 7V.
4. In case of applying external voltage into RC terminal with Positive Logic model, please contact us.
5. When using long wiring, for prevention of noise, attach capacitor between RC and -Vin terminal. The maximum capacitance between RC and -Vin terminal is 1μF.

### 6-8. Redundant Operation

Redundant operation is possible for loads that are within the maximum output power of one power supply. When one power supply is shut-down by the power failure etc., another one can continue to provide power.

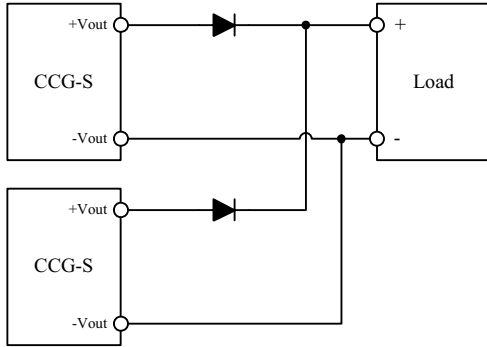


Fig.6-7 Redundant Operation Connection (CCG-S)

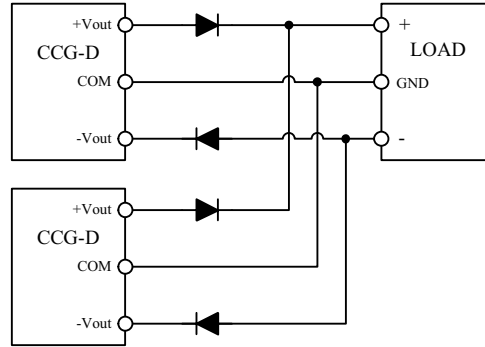


Fig.6-8 Redundant Operation Connection (CCG-D)

### 6-9. Parallel Operation

Parallel operation cannot be used.

### 6-10. Series Operation

Series operation is possible for CCG series.

Connections shown in Fig.6-9 and Fig.6-10 are possible.

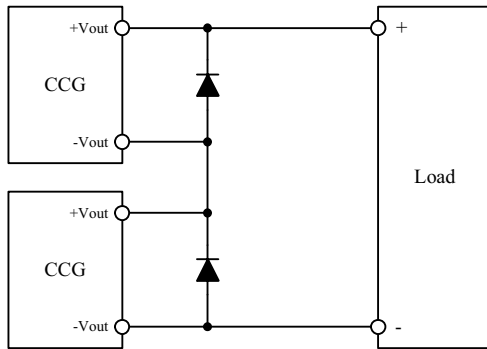


Fig.6-9 Series Operation for High Output Voltage

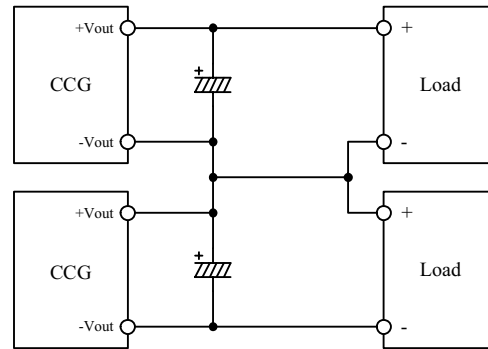


Fig.6-10 ±Output Series Operation

< Reference >

CCG-D can be used as 24V or 30V single output by connecting + Vout and -Vout to the load.

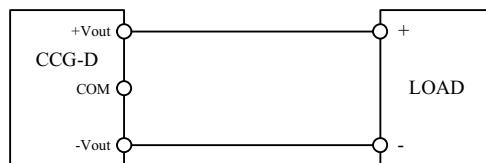


Fig.6-11 Connection when CCG-D single output is used

**6-11. Operating Ambient Temperature**

This is the allowable operating range.  
 Output load needs to be derated depending on the ambient temperature. There is no restriction on mounting direction but there should be enough consideration for airflow so that heat does not accumulate around the power supply vicinity. Determine external components configuration and mounting direction on PCB such that air could flow around the power supply at forced cooling and convection cooling. For better improvement of power supply reliability, derating of ambient temperature is recommended. For details, refer to "7.Output Derating" section.

**6-12. Operating Ambient Humidity**

Take note that condensation could lead to power supply abnormal operation or damage.

**6-13. Storage Ambient Temperature**

Take note that sudden temperature change can cause dew condensation, and it may affect solderability of terminals.

**6-14. Storage Ambient Humidity**

Take enough care when storing the power supply because rust which causes poor solderability would occurred on terminals when stored in high temperature, high humidity environment.

**6-15. Withstand Voltage**

This power supply is designed to have a withstand voltage of 1.5kVDC between input and output, 1.0kVDC between input and case and 1.0kVDC between output and case for 1 minute. When conducting withstand voltage test during incoming inspection, set the current limit value of the withstand voltage testing equipment to 10mA. Furthermore, avoid throw in or shut off of the testing equipment when applying or when shutting down the test voltage. Instead, gradually increase or decrease the applied voltage. Take note especially when using the timer of the test equipment because when the timer switches the applied voltage off, impulse voltage which has several times the magnitude of the applied voltage is generated causing damage to the power supply. Connect the terminals as shown in the diagram below.

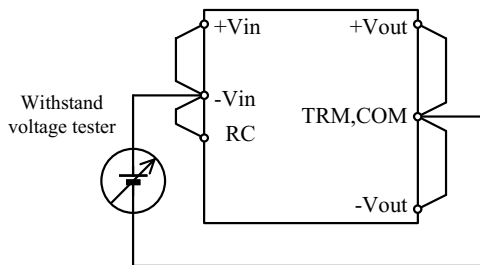


Fig.6-12 Withstand Voltage Test for Input - Output

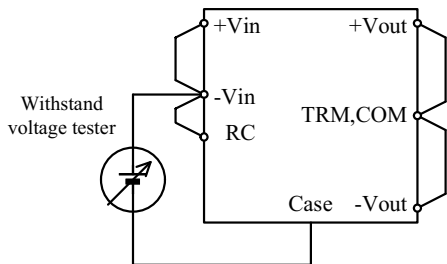


Fig.6-13 Withstand Voltage Test for Input - Case

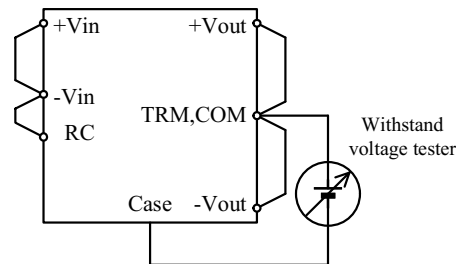


Fig.6-14 Withstand Voltage Test for Output - Case

### 6-16. Isolation Resistance

Isolation resistance value is  $100M\Omega$  and above at 500VDC applied voltage.

Use DC isolation tester (MAX 500V) between output and case.

Make sure that during testing, the isolation testers do not generate a high pulse when the applied voltage is varied. Ensure that the tester is fully discharged after the test.

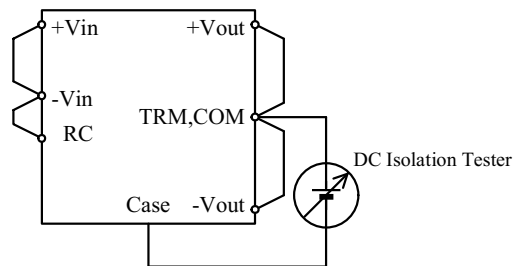


Fig.6-15 Isolation Resistance Test

### 6-17. Vibration

Vibration of power supply is defined when mounted on PCB.

### 6-18. Shock

Withstand shock value is define to be the value at TDK-Lambda shipment and packaging conditions, or when mounted on PCB.

### 6-19. Capacitance of Input - Output

This product has internal capacitor connected between input and output.

Capacitance of input - output :  $1000pF$

In case that high level and high frequency AC voltage is applied, loss of internal capacitor increase and the product might be damaged.

In case that voltage between input and output changes suddenly on the application or the load of high frequency pulse is connected to the output side, please contact us.

## 7. Output Derating

### 7-1. Output Derating Measurement Method

There is no restriction on mounting direction but there should be enough consideration for airflow so that heat does not accumulate around the power supply vicinity. Determine external components configuration and mounting direction on PCB such that air could flow around the power supply at forced cooling and conventional cooling. The derating of the output current is necessary when the ambient temperature is high. (See Output Current vs. Ambient Temperature.) Output Current vs. Ambient Temperature is measured according to Fig.7-1 and Fig.7-2. When mounting on actual device, do actual measurement based on measurement points shown in Fig.7-1 and Fig.7-2. For this measurement, in order not to exceed the Rating temperature of the critical component, refer to the case temperature measurement point shown on Fig.7-3.

(1) Output Current vs. Ambient Temperature Measurement Method (for convection cooling)

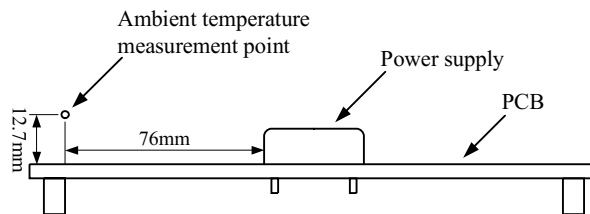


Fig.7-1 Output Current vs. Ambient Temperature Measurement Method (for convection cooling)

(2) Output Current vs. Ambient Temperature Measurement Method (for forced cooling)

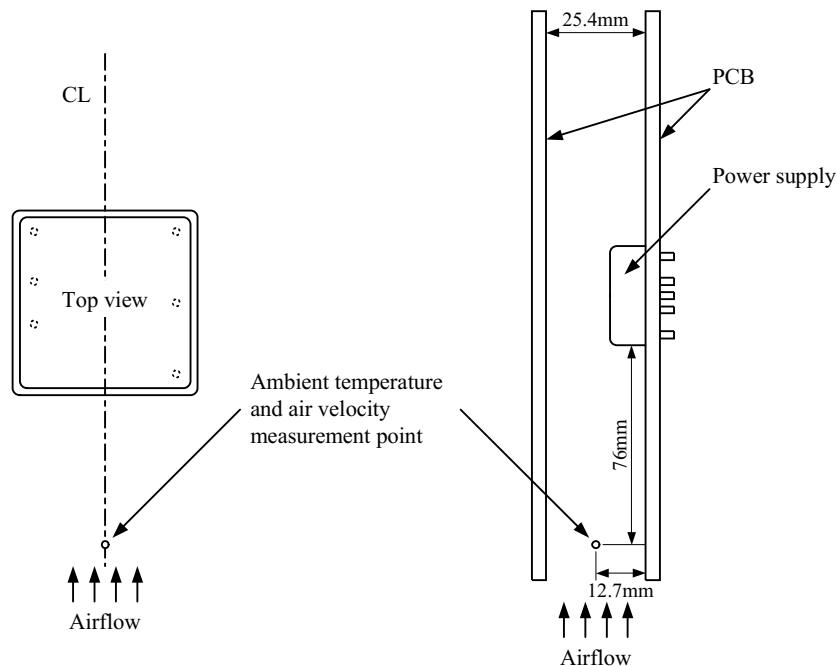


Fig.7-2 Output Current vs. Ambient Temperature Measurement Method (for forced cooling)

(3) Temperature Measurement Point on The Case

Confirm the temperature measurement point on the case of Fig.7-3 is below 110°C.

Moreover, clear the hole at the center of the label, and measure the metal part when you measure the case temperature.

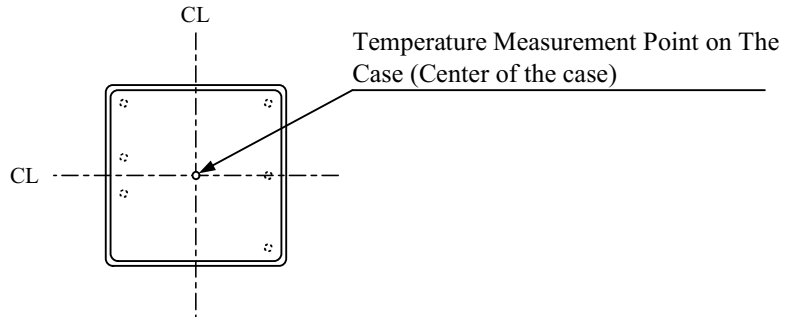


Fig.7-3 Temperature Measurement Point on The Case

7-2. Output Derating Curve

The following Output Current vs. Ambient Temperature is a measurement data when mounting on our evaluation PCB. The output derating curve is affected by the mounting board, the external components, and the ambient conditions. Therefore, use it after confirming the case temperature when the power supply operates with actual device does not exceed 110°C (Temperature Measurement Point On The Case). Moreover, use below 85°C ambient temperature.

\* Evaluation PCB Specification

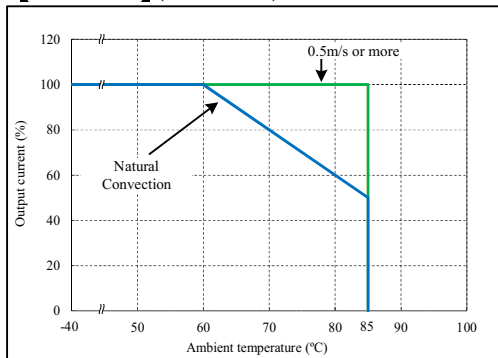
Size 150mm × 70mm t = 1.6mm

Material FR-4 (Double sided)

Copper 35μm

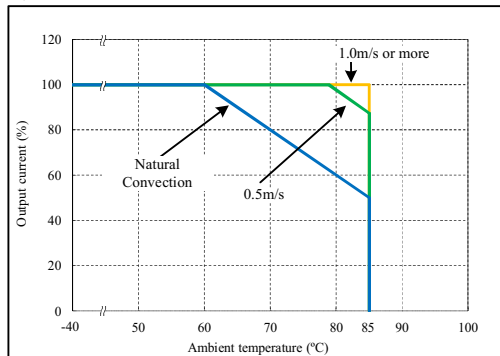
(1) Output Current vs. Ambient Temperature (Reference data : Vin=Typ.)

【CCG15-S】(All model)

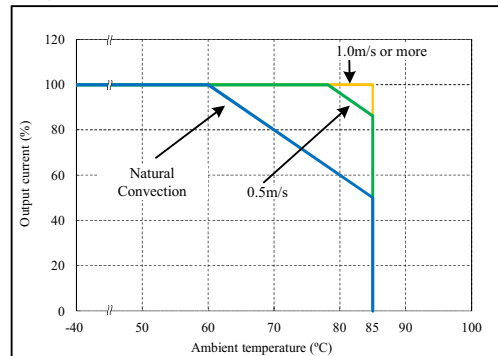


【CCG30-S】

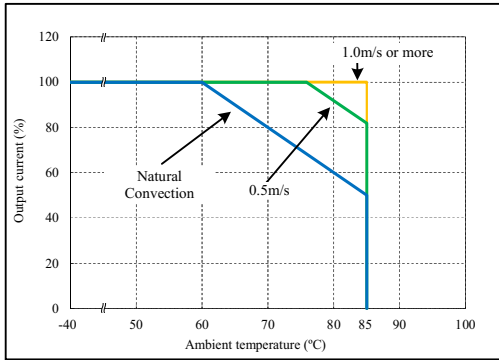
◆ CCG30-24-03S



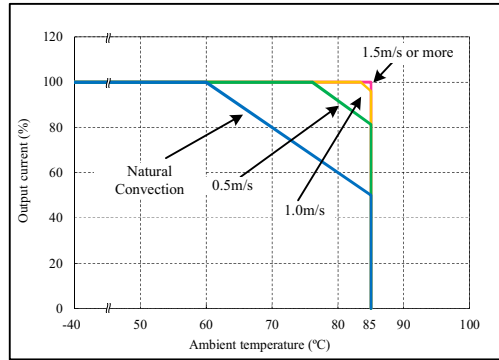
◆ CCG30-24-05S



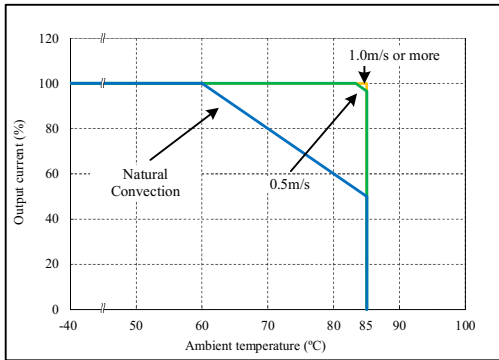
◆ CCG30-48-03S



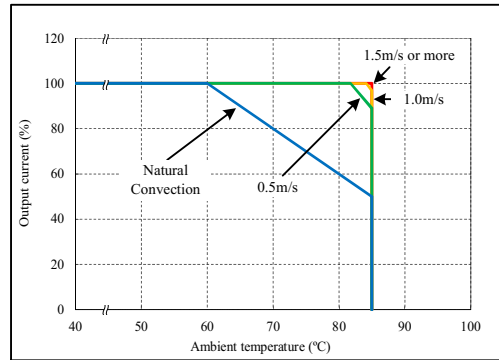
◆ CCG30-48-05S



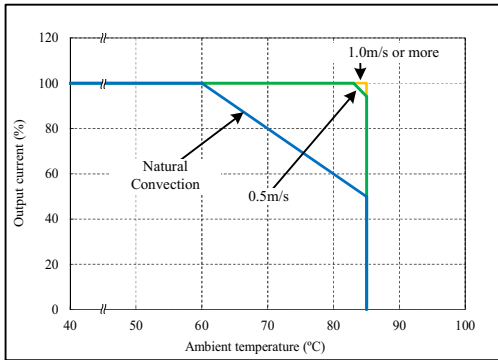
◆ CCG30-48-12S



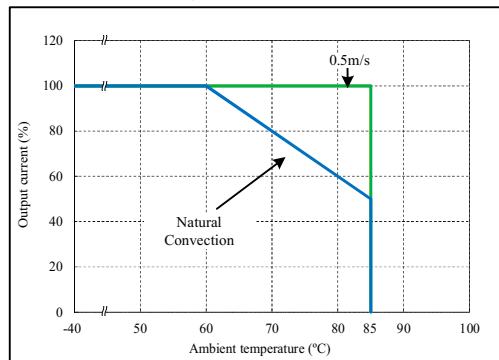
◆ CCG30-24-12D



◆ CCG30-48-12D

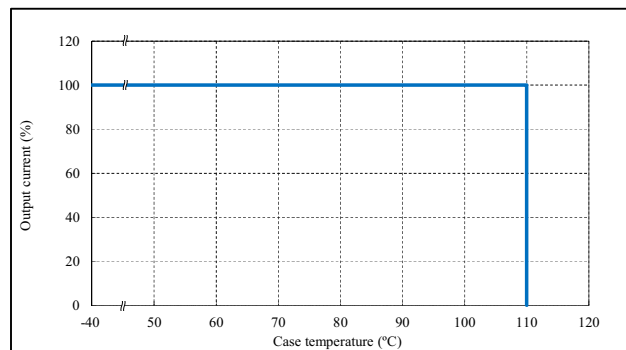


◆ CCG30-24-12S, CCG30-24-15S, CCG30-48-15S, CCG30-24-15D, CCG30-48-15D



\* Please see reliability data for Output Current vs. Ambient Temperature, when other input voltage is applied.

(2) Output Current vs. Case Temperature





## 8. Mounting Method, Soldering and Cleaning Condition

### 8-1. Mounting Method

#### (1) Mounting Holes on PCB

There is the recommended diameter of hole and pad of PCB in Table 8-1.

The mounting hole position is in Fig.8-1.

Also, see outline drawing for outline of the power supply.

Table 8-1 Recommended diameter of Hole and Pad of PCB

	Input / Output terminals
Pin diameter	$\phi 1.0\text{mm}$
Hole diameter	$\phi 1.5\text{mm}$
Pad diameter	$\phi 2.8\text{mm}$

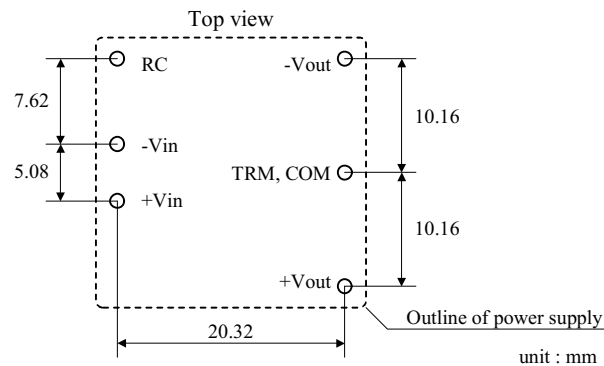


Fig.8-1 Dimension of Mounting Hole Position

#### (2) Recommended Material of PCB

Recommended materials of the printed circuit board is double sided glass epoxy with through holes.  
 (thickness : 1.6mm, copper : 35 $\mu\text{m}$ )

#### (3) Input / Output Pattern Width

Large current flows through input and output pattern. If pattern width is too narrow, heat on pattern will increase because of voltage drop of pattern. Relationship between allowable current and pattern width varies depending on materials of printed circuit board, thickness of conductor. It is definitely necessary to confirm on manufactures of printed circuit board for designing pattern.

#### (4) Method of Connecting Terminals

Connect +Vin, -Vin, +Vout, -Vout, COM with consideration of contact resistance.

### **8-2. Recommended Soldering Condition**

Recommended soldering conditions are as follows.

(1) Soldering Dip

Dip condition : 260°C within 10 seconds

Pre-heat condition : 110°C for 30 - 40 seconds

(2) Soldering Iron

350°C within 3 seconds

Note) Soldering time changes according to heat capacity of soldering iron, pattern on printed circuit board etc. Please confirm actual performance.

### **8-3. Recommended Cleaning Condition**

Recommended cleaning condition after soldering is as follows.

(1) Cleaning Solvent

IPA (isopropyl alcohol)

(2) Cleaning Procedure

Use brush and dry the solvent completely before use.

## **9. Before Concluding Power Module Damage**

Verify following items before concluding power supply damage.

### (1) No output voltage

- Is specified input voltage applied?
- Are the remote ON/OFF control terminal (RC), output voltage trimming terminal (TRM) correctly connected?
- For case where output voltage adjustment is used, is resistor or variable resistor setting, connections correctly done?
- Are there no abnormalities in the output load used?
- Is the case temperature within the specified temperature range?
- Is the ambient temperature within the specified temperature range?

### (2) Output voltage is high

- For case where output voltage adjustment is used, is resistor or variable resistor setting, connections correctly done?
- Is the ambient temperature within the specified temperature range?

### (3) Output voltage is low

- Is specified input voltage applied?
- For cases where output voltage adjustment is used, is resistor or variable resistor setting, connections correctly done?
- Are there no abnormalities in the output load used?

### (4) Load regulation or line regulation is large

- Is specified input voltage applied?
- Are the input terminals and the output terminals firmly connected?
- Is the input or output wire too thin?
- Is the input or output wire too long?

### (5) Output ripple voltage is large

- Is the measurement done according to methods described in the Instruction Manual or is it an equivalent method?
- Is the input ripple voltage value within the specified value?

## **10. Warranty Period**

Warranty period is 5 years.

For damages occurring at normal operation within this warranty period, exchange is free of charge.

Please read the General Safety Instruction before using the products.