

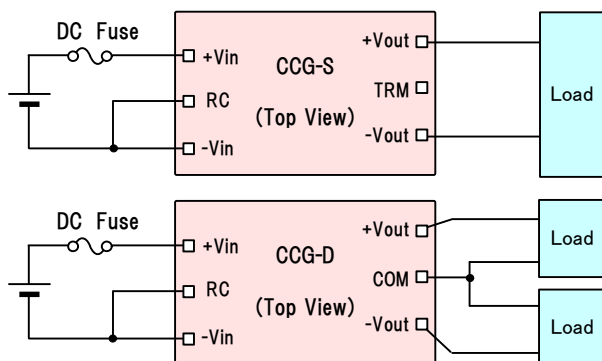
This document presents a basic usage of the CCG6 or CCG10 series. Please refer to the [instruction manual](#) for details.

1. Features

- (1) Withstand Voltage (IN-OUT 1.0kVAC or 1.5kVDC, 1min.)
- (2) Remote ON/OFF Control (RC terminal)
- (3) Adjustable Output Voltage, 95% to 110% of the Nominal (Single Output Model only)
- (4) Over Current Protection (120% approx. or more, Hiccup Type)
- (5) EMI VCCI Class A (with an External Filter)

2. Basic Connection

The CCG can operate by connecting as shown in the figure below, only with an external DC fuse. (There is no built-in input fuse.)



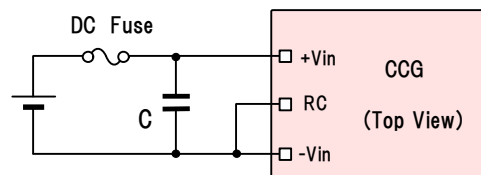
Recommended Fuse Type : DC86V11CT series (SOC)

Model	Fuse current rating
CCG6/10-12-xxS/D	8A max
CCG6/10-24-xxS/D	4A max
CCG6/10-48-xxS/D	2.5A max

Note) Please consider equivalent I^2t Characteristics when obtaining replacement fuse of DC86V11CT series.

3. External Input Capacitor

The CCG can operate without external input capacitors. External capacitor can reduce input ripple voltage and conducted emission noise. So, please connect it in addition if necessary.

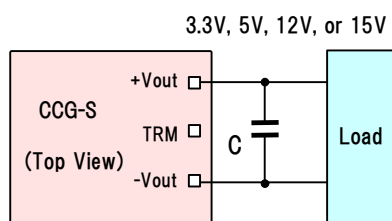


4. External Output Capacitor

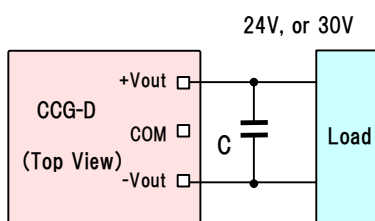
The CCG can operate without external output capacitors. But an external output capacitor can reduce output ripple noise and spike noise. So, please connect it in addition if necessary. The table below shows allowable maximum capacitive load.

Output Voltage \ Model	CCG6	CCG10	Application Configuration
3.3V, 5V	470μF	470μF	Fig. 5-(a)
12V, 15V	220μF	220μF	
±12V, ±15V	100μF	100μF	Fig. 5-(b)
±12V, ±15V	220μF	220μF	Fig. 5-(c)

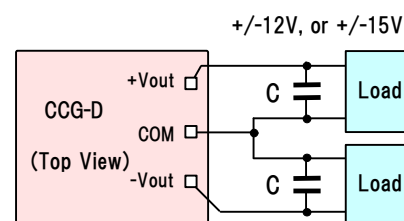
5. Application Example Configuration



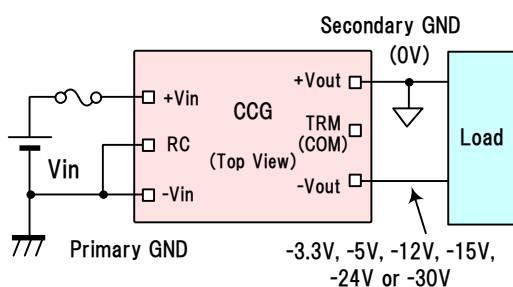
(a) Single Output by CCG-S



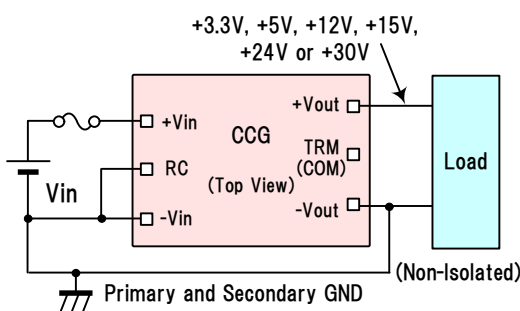
(b) Single Output by CCG-D



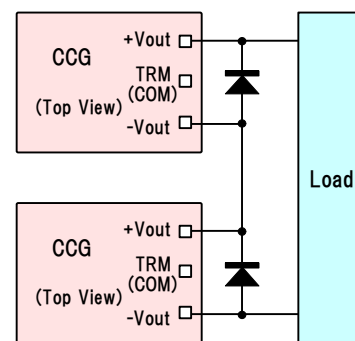
(c) Dual Output by CCG-D



(d) Negative Output by CCG



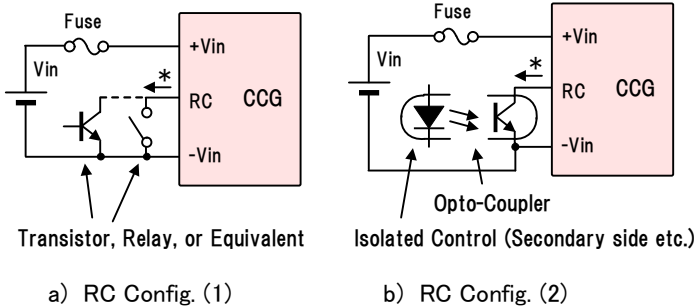
(e) Non-isolated Output by CCG



(f) Series Output by CCG

6. Remote ON/OFF Control

The CCG's output can be enabled/disabled by RC terminal without turning the input voltage on and off (Negative Logic). If a remote control function is not required, please connect the RC terminal to the -Vin.



Remote Control	RC terminal Condition
(Output) ON	Short on the -Vin terminal, or $0V \leq V_{RC} \leq 0.5V$ on the -Vin
(Output) OFF	Open from the -Vin terminal (Recommended)

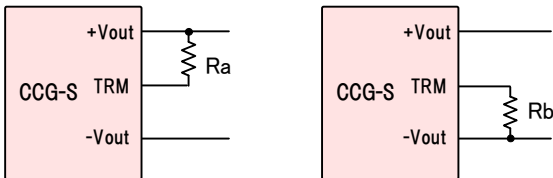
* The RC terminal current is 1.5mA (max.), and it flows from the RC to the -Vin terminal.

7. Output Voltage Adjustment (** CCG-S only)

Output voltage adjustment is available by using the TRM terminal with connection some external resistors as follows. If no need output adjustment, a TRM terminal should be opened.

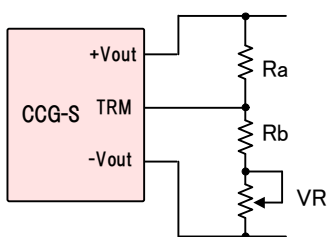
Adjustable Range : -5%~+10% of nominal output voltage

** Please refer to the "6-2." column on the instruction manual in detail, for a calculation method of the resistance value.



"Vout" Trimming down

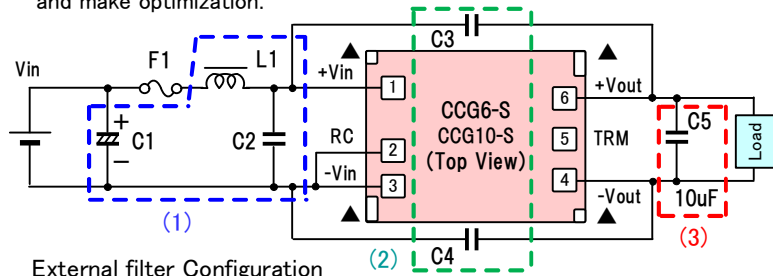
"Vout" Trimming up



"Vout" Trimming around nominal

8. External Filter for EMI

If being required EMI countermeasures for the CCGs alone, please study adding the external filter as follows. (For VCCI Class-A) This filter may not need if EMI countermeasures are taken in the front stage power supply. Please refer to the supplementary below and make optimization.



External filter Configuration

- (1) (Blue) : Conducted Emission Noise Reduction (0.15 to 5MHz)
- (2) (Green) : Conducted Emission Noise Reduction (5MHz or more) or Radiated Emission Noise Reduction (around 50MHz)
- (3) (Red) : Output Ripple Noise Reduction (Not reducing EMI)

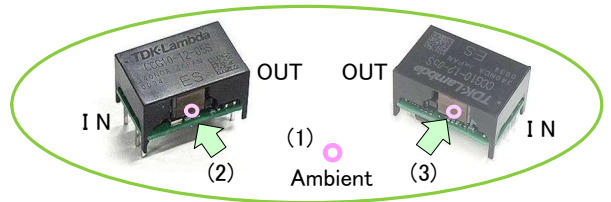
Model	External Filter					
	C1 (ELEC.)	C2 (MLCC)	L1 (L)	C3 (MLCC)	C4 (MLCC)	C5 (MLCC)
CCG6-12	220uF	10uF	1.5uH	470pF	470pF	10uF
CCG10-12	470uF	10uF	1.5uH	470pF	470pF	10uF
CCG6-24	100uF	10uF	10uH	1,000pF	1,000pF	10uF
CCG10-24	100uF	10uF	10uH	1,000pF	1,000pF	10uF
CCG6-48	39uF	2.2uF	22uH	1,000pF	1,000pF	10uF
CCG10-48	39uF	2.2uF	22uH	1,000pF	1,000pF	10uF

* L1 : LQH5BPN****TOL (MURATA) or equivalent inductor
 C5 : It is recommended to add MLCC between +/- each output for the dual output (CCG-D) model.

9. Temperature Derating

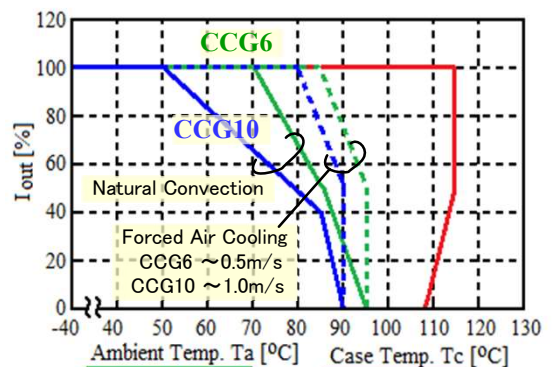
Please use the CCGs so that the temperature of the ambient and the both sides of a transformer are within the specified range.

[Temperature measurement point]



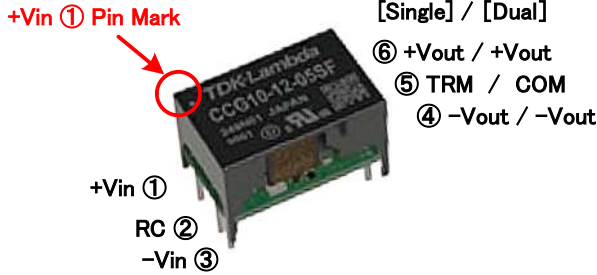
[Output derating]

The specified value of the transformer side temperature varies depending on the model. For details, please refer to "7." Column in the instruction manual. (Case means Transformer.)



10. Structure & Material

< Top View Photo >



< Side View Photo >



The inside of the case is a hollow structure without any resin filling, it avoids quality risks during reflow soldering in SMD types.

< Material >

- Plastic Case : PPS* Resin (*Poly Phenylene Sulfide)
 - Terminal Pins : Cu base material, with Ni+Sn plated
 - Product PCB : 4 layer, FR-4 (UL94V-0)
- * The components and materials used in CCG is UL94V-0, but the CCG product itself has not received flame retardant certification.

11. Detail Block Diagram with Explanation

(1) Schematic Construction

The CCG has Separately Exited Flyback Converter. A synchronous rectifier is applied for the 3.3V or 5V output model of the CCG10 series.

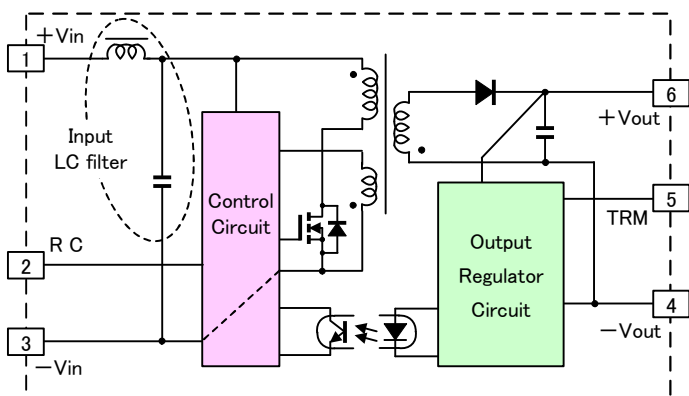
(2) Withstand Volt. between Input and Output

1kVAC or 1.5kVDC (1 min. each). Its insulation is achieved by Transformer and Opto-Coupler.

(3) Switching Frequency (for reference)

400kHz typical (fixed)
Tolerance ; +/-15% approximately

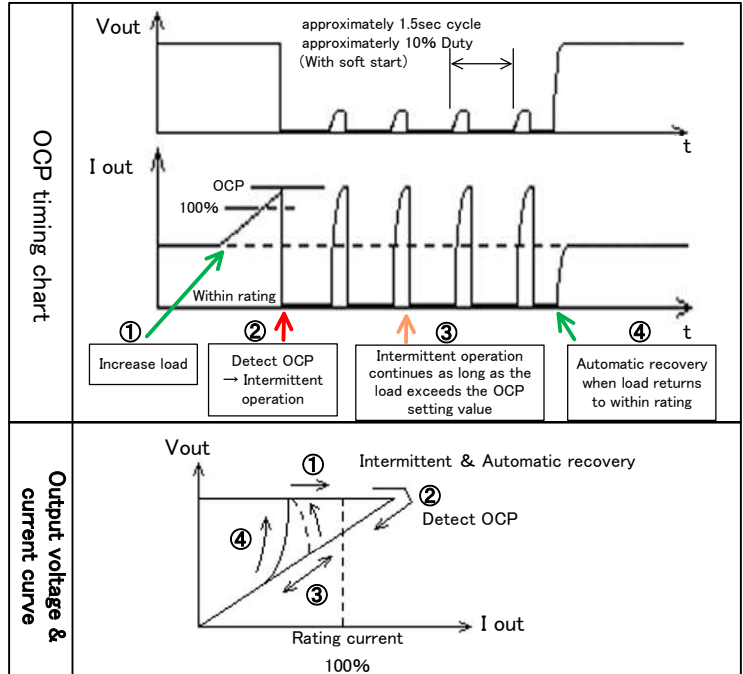
Block Diagram, Single Output Example



12. Over Current Protection

Output overcurrent condition (short circuit or exceed the OCP setting value) will cause intermittent operation. Output will be recovered automatically, when load returns to within rating.

- * OCP function works almost instantaneously (approximately 30ms)
- * Please refer to the [Evaluation Data](#) for the OCP setting values.

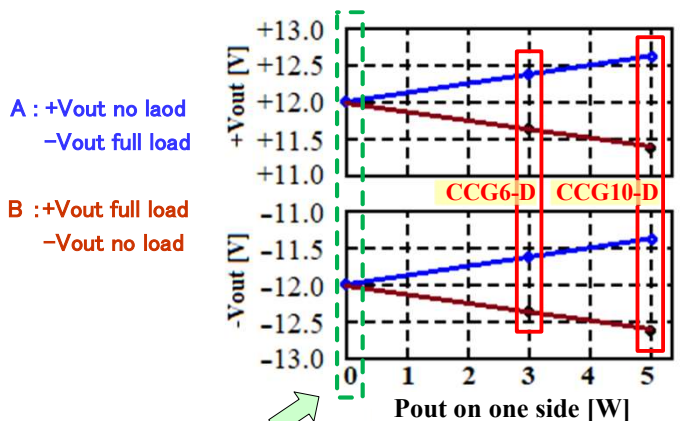


13. About Using the Dual Output Model

The load regulation for unbalance loads (20% vs 100%) are specified. Please note that if the load is More unbalanced, the output voltage will deviate from the specifications.

[Characteristic example for ±12V output model]

* When one side is full load and the other side is no load.



No load or balanced load condition

14. Mounting Method & Soldering Condition

Please refer to the [instruction manual](#) "8." for mounting PCB design (dimensions/pattern design) and soldering conditions.