DC-DC Converter
CFK3-XXXXXE3 Series

Typical Features

- ◆ Wide input voltage range (2:1),Output Power 3W
- ◆ Transfer Efficiency up to 86%
- ◆ With remote shutdown function
- ◆ Continuous Short Circuit protection, Self-recovery
- ◆ No overshoot when switching on and off
- ◆ Isolation Voltage 3000 VDC
- ◆ Operating Temperature: -40°C~+85°C
- ◆ Plastic case, meets UL94-V0 requirements

Test conditions: Unless otherwise specified, all parameters are tested at nominal input voltage, pure resistive rated load and 25℃ room temperature.

Application Field

Widely used in instrumentation, communications, pure digital circuits, general low-frequency analog circuits, relay drive circuits, data exchange circuits and other fields.

Typical Product List

Part no.	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current (mA) (Nominal Voltage)		Max. Capacitive Load	Ripple & Noise Max	Efficiency (%)output full load, I/P nominal voltage	
	Nominal	Range	Voltage (VDC)	Current (mA) Max/Min	Full load typ.	No Load typ.	uF	mVp-p	Min.	Typ.
CFK3-05S3V3E3	5	4.5 - 9	3.3	758	735	53	2200	100	66	68
CFK3-05S05E3			5	600	801	38	2200	100	73	75
CFK3-05S09E3			9	333	769	54	1000	100	72	74
CFK3-05S12E3			12	250	763	39	1000	100	77	79
CFK3-05S15E3			15	200	829	50	680	100	74	76
CFK3-05S24E3			24	125	769	67	330	100	74	76
CFK3-12S3V3E3	12	9 - 18	3.3	758	275	15	2200	100	70	72
CFK3-12S05E3			5	600	316	6	2200	100	77	79
CFK3-12S12E3			12	250	306	18	1000	100	80	82
CFK3-12S15E3			15	200	314	25	680	100	80	82
CFK3-12S24E3			24	125	313	29	330	100	79	81
CFK3-24S3V3E3	24	18 - 36	3.3	758	140	12	2200	100	72	74
CFK3-24S05E3			5	600	157	6	2200	100	76	78
CFK3-24S12E3			12	250	152	4	1000	100	81	83
CFK3-24S15E3			15	200	148	5	680	100	84	86

CFK3-24S24E3			24	125	146	11	470	100	84	86
CFK3-48S05E3	48	36 - 75	5	600	77	2	2200	100	80	82
CFK3-48S12E3			12	250	74	1	1000	100	84	86
CFK3-48S15E3			15	200	78	6	470	100	82	84
CFK3-48S24E3			24	125	74	6	470	100	84	86
CFK3-05D05E3	5	4.5 - 9	±5	±300	811	47	1000	100	72	74
CFK3-05D12E3			±12	±125	807	41	680	150	72	74
CFK3-05D15E3			±15	±100	876	51	470	100	70	72
CFK3-05D17E3			±17	±88	748	72	330	100	73	75
CFK3-12D05E3	12	9 - 18	±5	±300	316	7	2200	100	77	79
CFK3-12D12E3			±12	±125	302	17	1000	100	81	83
CFK3-12D15E3			±15	±100	313	22	330	100	78	80
CFK3-24D05E3	24	18 - 36	±5	±300	156	10	2200	100	78	80
CFK3-24D12E3			±12	±125	141	10	680	100	83	85
CFK3-24D15E3			±15	±100	144	10	470	100	84	86
* CFK3-48D05E3	48	36 - 75	±5	±300	82	4.5	1000	100	77	79
* CFK3-48D12E3			±12	±125	78	5	470	100	80	82
* CFK3-48D15E3			±15	±100	78	6	330	100	80	82

1. "*" indicates a model under development;
2. In order to ensure that the module can work efficiently and reliably, its minimum output load cannot be less than 10% of the rated load when in use. If the power you need is indeed small, please connect a resistor in parallel at the output end. The recommended resistance value is equivalent to 10% of the rated power.
3. The capacitive load of the positive and negative outputs is the same.

Input Specification

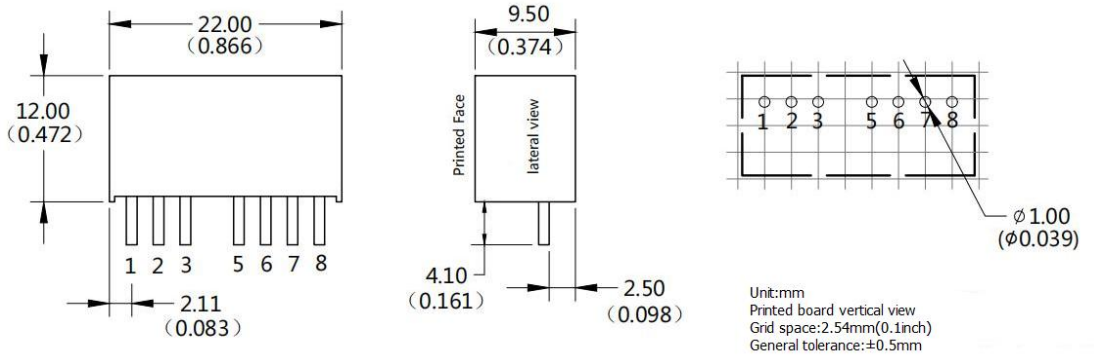
Item	Working Condition	Min.	Typ.	Max.	Unit
Maximum input surge voltage (1 second)	4.5-9V Input	-0.7	-	16	VDC
	9-18V Input	-0.7	-	25	
	18-36V Input	-0.7	-	50	
	36-75V Input	-0.7	-	100	
Start-up voltage	4.5-9V Input	3.5	4	4.5	VDC
	9-18V Input	4.5	8	9	
	18-36V Input	11	16	18	
	36-75V Input	24	33	36	
Standby power	0.5W (Max.)				
Input Filter	capacitor filter				

Output Specification			
Positive output voltage accuracy Accuracy	Full voltage full load	+Vo	⩽±2.0%
Negative output voltage accuracy		-Vo	⩽±3.0%
No-load output voltage accuracy		Vo	Main Road：⩽±3.0% Auxiliary Road：⩽±5.0%
Voltage Regulation	Nominal load, full voltage range	Vo	Main Road：⩽±0.2% Auxiliary Road：⩽±0.5%
Load regulation	10% ~ 100% nominal load	Vo	Main Road：⩽±0.5% Auxiliary Road：⩽±3%
Cross regulation	Dual output, main output 50% load, auxiliary output 10% ~ 100% load		⩽±5.0%
Ripple & Noise*	Nominal load, nominal voltage		⩽100mVp-p (20MHz Bandwidth)
Temperature drift coefficient	100% full load		±0.03%/℃
Dynamic Response	25% of nominal load step	△Vo/△t	⩽±5.0%/0.5ms(Typ.)
Output short circuit protection	Continuous, self-recovery		

Note: 1. Dual output module load imbalance: ±5%;
2. * Ripple & noise test uses twisted pair method, see design and application circuit reference for details.

General Specification		
Switching Frequency	Typical	450KHz (Typ.)
Operating Temperature	Refer to Temperature Derating Curve	-40℃ ~ +85℃
Storage Temperature	-	-55℃ ~ +125℃
Max Case Temperature	Within Temperature Derating Curve	+105℃
Relative Humidity	No condensing	5%~95%
Case Material		Black flame-retardant and heat-resistant plastic（UL94-V0）
Pin resistance soldering temperature	The distance between the soldering point and the shell is 1.5mm, 10 seconds	300℃ MAX
Isolation Voltage	Input to Output	3000Vdc ⩽ 0.5mA / 1min
MTBF	MIL-HDBK-217F@25℃	2X10^{5}Hrs
Product Weight	--	4.5g（Typ.）
Packing Method	Single-tube （225*20.5*12.5mm）	9PCS
	Single box （245*155*85mm）	432PCS（Total 48 tubes）

Packing Dimension



Packing Code	L x W x H	
E	22X9.5X12mm	0.866X0.374X0.472inch

Pin out Specifications

Single	1	2	3	4	5	6	7	8
	GND	+Vin	Ctrl	NP	NC	+Vo	0V	CS
Dual	1	2	3	4	5	6	7	8
	GND	+Vin	Ctrl	NP	NC	+Vo	0V	-Vo

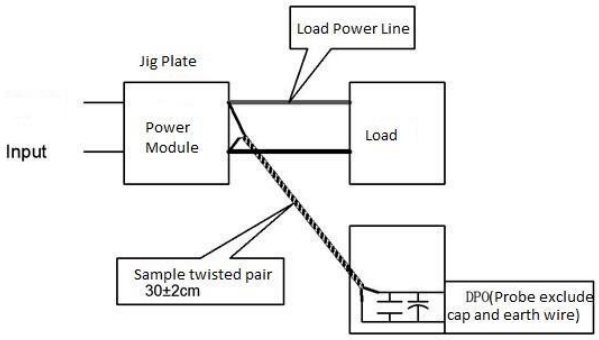
Note: If the pin definitions of the power module are inconsistent with those in the selection manual, the markings on the actual label shall prevail.

Ripple& Noise Test:（Twisted Pair Test Method 20MHz bandwidth）

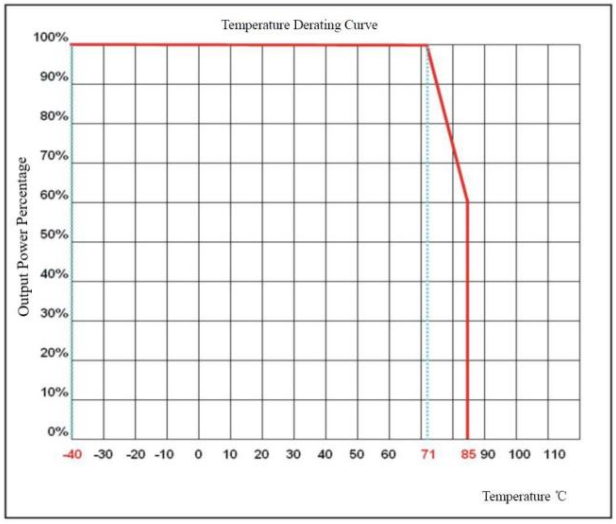
1.12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

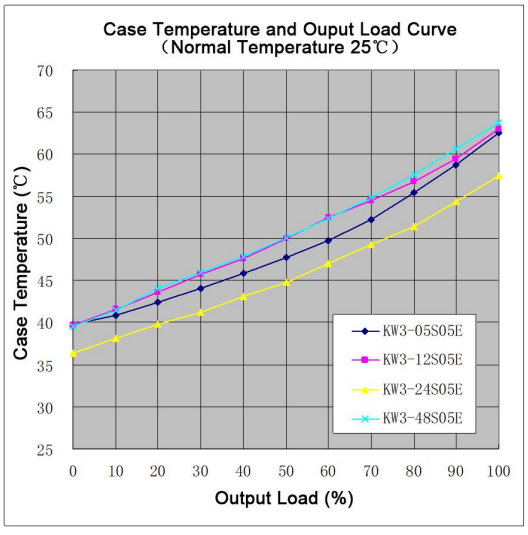
2. Output Ripple& Noise Test Method:

Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



Product characteristic curve





Design reference application

①CS terminal

This terminal provides a connection point for connecting the main filter capacitor inside the output end of the DC/DC converter (connected to the positive electrode of the capacitor). By connecting a low ESR capacitor between this terminal and the 7th pin terminal (connected to the negative electrode of the capacitor), the output ripple and noise can be further improved (generally CS≤ 47uF).

②Output load requirements

a. In order to ensure that the power module can work efficiently and reliably, it is recommended that its minimum load should not be less than 10% of the rated resistive load; if the power you need is indeed small, please connect a resistor equivalent to 10% of the rated load in parallel at the output end. If using a product with positive and negative outputs, try not to have a large imbalance in the load of the two channels, otherwise the original output voltage accuracy cannot be guaranteed.

b. The maximum capacitive load of the product is obtained from the nominal full load test; if it needs to be used under no-load conditions, the capacitive load at the output end must be reduced as much as possible or a resistor equivalent to 10% of the rated load must be connected in parallel at the output end, otherwise the output voltage may be unstable or even exceed the original output voltage accuracy range.

③Recommended circuit

DC/DC test circuit: If you need to further reduce the input and output ripple, the capacitance of the external capacitor can be appropriately increased, but the maximum capacitance of the filter capacitor must be less than the maximum capacitive load, otherwise it will easily cause difficulty in starting the power module.

General recommendation:

Ci: 100uF (5V&12V) / 10uF (24V&48V)

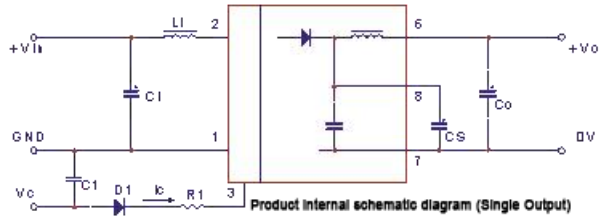
Li: 4.7uH～120uH

CS: 10uF～22uF

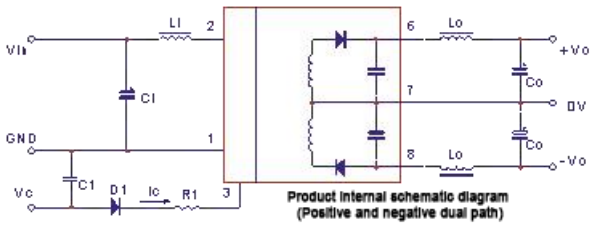
Co: 100uF (Typ.)

Lo: 2.2uH～10uH

C1: 47nF/100V



Single Output



Positive and negative dual output

Recommended Circuit 1& 2

④CTRL terminal

When it is suspended or high impedance, the module outputs normally; when it is connected to a high level (relative to the input ground), the module is shut down.

Note: The current flowing into this pin should be 5-10mA. If the current exceeds its maximum value (generally 20mA), it will cause permanent damage to the module. The R value can be calculated according to the following formula:

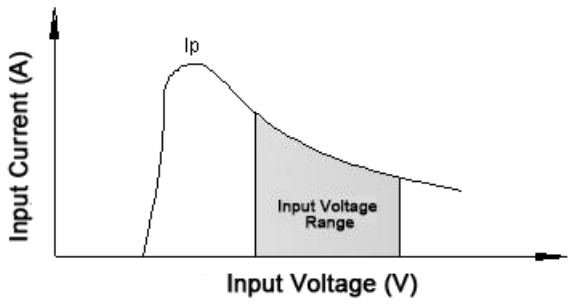
$$R = \frac{Vc - Vd - 0.7}{Ic} - 330$$ (see Recommended Circuit 1& 2)

Where Vc is the input voltage of the Ctrl pin, Vd is the forward voltage drop of D1, 0.7V and 330Ω are the voltage drop of the module transistor and the internal connection resistance of the control pin input terminal respectively, and Ic is the current flowing into the control terminal.

⑤ Input current

When using an unstable power supply, please ensure that the output voltage fluctuation range and ripple voltage of the power supply do not exceed the module's own specifications. The output current of the input power supply must be sufficient to cope with the instantaneous startup current Ip of the DC/DC module (see the figure below).

General: $Ip \leq 1.4 * Iin_{max}$



Note:

1. This product cannot be used in parallel and does not support hot swapping;
2. All indicator test methods in this article are based on our company's corporate standards;
3. Product specifications are subject to change without prior notice.