CFK1-XXXXXE3 Series

DC-DC Converter

Typical Features

- ◆Wide Input Voltage Range (2:1), Output Power 1W
- ◆High Efficiency up to 86%
- ◆With remote control Switch-off function
- ◆Continuous Short Circuit protection, Self-recovery
- ◆No Overshooting when turn-on or off
- ◆Isolation Voltage 3000VDC
- ◆Operating Temperature: -40℃～+85℃
- ◆Plastic Case, meet UL94 V-0 standard

Test Condition: Unless otherwise specified, data in the datasheet should be tested under the conditions of inputting nominal voltage, pure resistance rated load and Ta=25℃

Application Field

It could be widely used for instrument, communication, pure digital circuit, general low frequency analog circuit, relay drive circuit, data exchange circuit, etc.

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 (%)	
	Nominal	Range	Voltage (VDC)	Current(mA) MAX./Min.	Full load Typ.	No Load Typ.	uF	mVp-p	Min.	Typ.
CFK1-05S05E3	5	4.5 - 9	5	200	264	24	3000	100	74	76
CFK1-05S12E3			12	83	270	32	680	100	72	74
CFK1-05S15E3			15	67	288	66	1000	100	67	69
CFK1-12S3V3E3	12	9 - 18	3.3	303	115	15	2200	100	73	75
CFK1-12S05E3			5	200	105	12	2200	100	78	80
CFK1-12S12E3			12	83	102	16	1000	100	80	82
CFK1-12S15E3			15	67	104	15	470	100	78	80
CFK1-24S3V3E3	24	18 - 36	3.3	303	57	10	2200	100	74	76
CFK1-24S05E3			5	200	52	10	2200	100	79	81
CFK1-24S12E3			12	83	52	10	680	100	78	80
CFK1-24S15E3			15	67	49	10	1000	100	84	86
CFK1-24S24E3			24	42	56	10	680	100	76	78
CFK1-48S05E3	48	36 - 75	5	200	28	5	2200	100	76	78
CFK1-48S12E3			12	83	25	5	680	100	80	82
CFK1-48S15E3			15	67	25	5	470	100	80	82
CFK1-05D05E3	5	4.5 - 9	±5	±100	268	26	1000	100	72	74

CFK1-05D12E3			±12	±42	271	40	680	100	72	74
CFK1-05D15E3			±15	±33	280	49	470	100	69	71
CFK1-12D05E3	12	9 - 18	±5	±100	108	14	1000	100	75	77
CFK1-12D12E3			±12	±42	106	20	680	100	78	80
CFK1-12D15E3			±15	±33	103	20	470	100	78	80
CFK1-24D05E3	24	18 - 36	±5	±100	55	10	1000	100	75	77
CFK1-24D12E3			±12	±42	52	10	470	100	78	80
CFK1-24D15E3			±15	±33	50	10	470	100	82	84
CFK1-48D05E3	48	36 - 75	±5	±100	26	5	1000	100	78	80
CFK1-48D12E3			±12	±42	27	5	680	100	79	81
CFK1-48D15E3			±15	±34	25	5	330	100	80	82

1. To ensure this module operate efficiently and reliably, the minimum output load could not be less than 10% of the nominal load during operation. If the actual output power is too small, please connect a resistor in parallel at the output, the resistance recommended equal to 10% nominal power;
2. The positive and negative output is the same as the capacitive loads.

Input Specifications

Item	Test Condition	Min.	Typ.	Max.	Unit
Max Input Overshoot Voltage (1Second)	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	
Turn-on 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	
Stand-by Power Consumption	0.3W (Max.)				
Input Filter	Capacitor Filter				

Output Specifications

Positive Output Voltage Accuracy	Full voltage full load	+Vo	≤±2.0%
Negative Output Voltage Accuracy		-Vo	≤±3.0%
No Load Output Voltage Accuracy		Vo	Primary Output:≤±3.0%, Secondary Output:≤±5.0%
Line Regulation	Nominal load, full voltage range	Vo	Primary Output:≤±0.2%, Secondary Output:≤±0.5%
Load Regulation	10% ~ 100% nominal load	Vo	Primary Output:≤±0.5%, Secondary Output:≤±0.75%
Cross Regulation	Dual output, Primary output 50% load, secondary output 10%-100% load		≤±5.0%

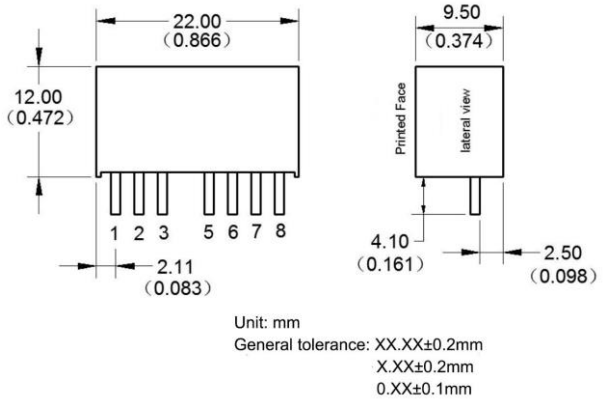
Ripple & Noise	Nominal load, nominal voltage	≤100mVp-p （20MHz bandwidth）	
Temperature Drift Coefficient	100％ full load	±0.03%/℃	
Dynamic Response	25% nominal load step change	△Vo/△t	≤±5.0%/0.5ms(Typ.)
Output Short Circuit Protection	Continuous, Self-recovery		

Note: 1.Un-balancing loads of dual output:±5%;
2. Ripple & Noise Tested by twisted-pair method, for details please check Design and Application Circuit.

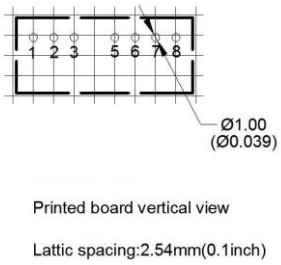
General Specifications

Switching Frequency	typical	250KHz
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 heat-resistant Plastic(UL94 V-0)
Pin withstand welding temp	Distance to case 1.5mm, 10s	300℃ MAX
Isolation Voltage	Input to Output	3000Vdc ≤ 0.5mA / 1min
MTBF	MIL-HDBK-217F@25℃	2X10^{5}Hrs
Product Weight		4.5g(Typ.)
Package	Tube(225*20.5*12.5mm)	9PCS/Tube
	Inner Box(245*155*85mm)	432PCS(Total 48Tubes)

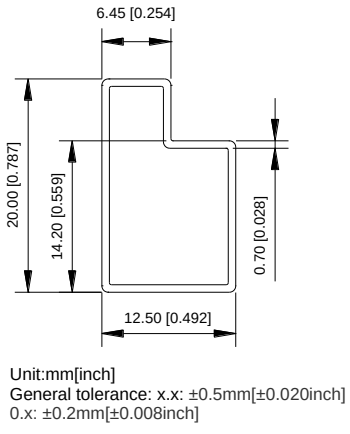
Packing Dimension



Packing Dimension



Recommend PCB Layout



Packing

Packing Code	L x W x H	
E	22 × 9.5 × 12mm	0.866× 0.374 × 0.472inch

Pin Function

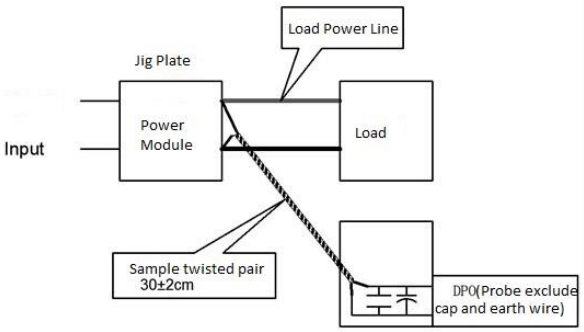
Single(S)	1	2	3	4	5	6	7	8
	GND	+Vin	Ctrl	NP	NC	+Vo	0V	CS
Dual(D)	GND	+Vin	Ctrl	NP	NC	+Vo	0V	-Vo

* Note: if the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

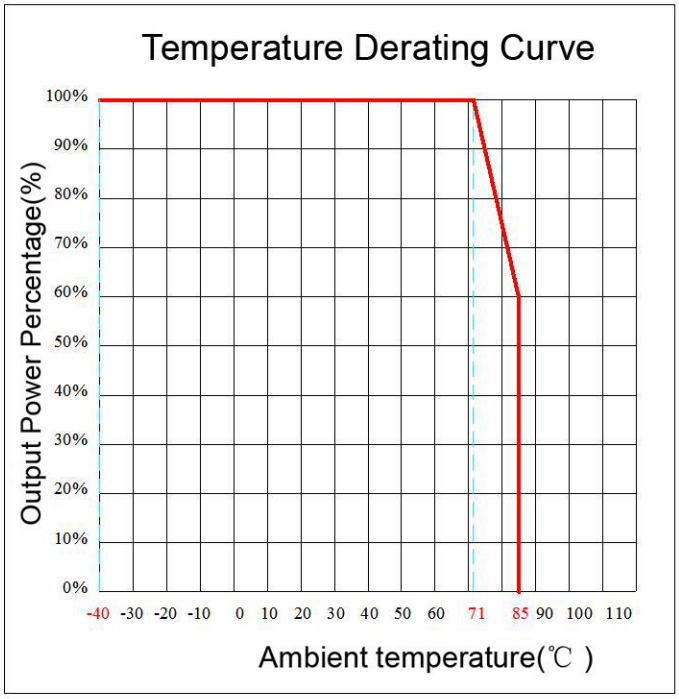
Ripple& Noise Test: (Twisted Pair Method 20MHZ bandwidth)

a.12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 47uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

b. Input terminal connect to power supply, output terminal connected 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.



Temperature Derating Curve



Design and Application Circuit Recommended

1.CS terminal

This terminal provides a connection point to connect the inside main filter capacitor of output terminal for the DC/DC converter(capacitor positive) , and can further improve the output ripple and noise through connecting a low ESR capacitor(Normal CS≤47uF) between this terminal and the 7 pin (capacitor negative).

2. Output Load Request

a. To ensure this module operate efficiently and reliably, the minimum load recommended not to be less than 10% of the nominal load. If the actual power is too small, please connect a resistor in parallel at output terminal, the resistance equal to 10% nominal load. If use positive negative dual output product, please try to avoid big unbalances between loads, or the original output voltage accuracy cannot be ensured.

b. The maximum capacitive load is tested under nominal input full load; if use it under no load condition, should try to decrease the output capacitive load or connect a resistor in parallel at output terminal, the resistance equal to 10% nominal load, otherwise it ma y cause the output voltage be un-stable or even exceed the original output voltage accuracy range.

3.Recommended Circuit

DC/DC test circuit: If customers want to further decrease input& output ripple, the capacitance of external capacitor can be increased properly, but the maximum capacitance of the filter capacitor should be less than the maximum capacitive load, otherwise it will make it difficult to turn-on the module.

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

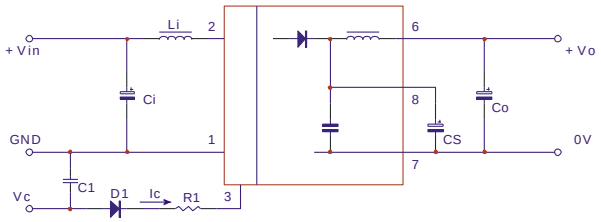
Li:4.7uH～120uH

CS:10uF～22uF

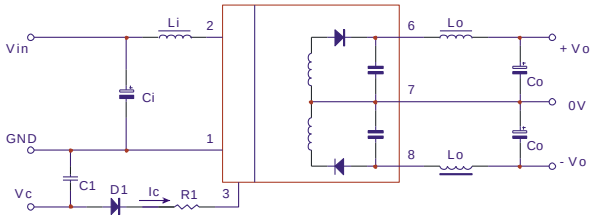
Co:100uF (Typ.)

Lo:2.2uH～10uH

C1:47nF/100V



Single Output



Positive Negative Dual Output

Photo 13

4.CTRL Terminal

Suspended or high resistance, output of module runs normally; Connect to high level (relative to input ground), module turns off.

Note: The proper current flowing into this pin is 5-10mA, It will cause permanent damage to module if the current exceed its maximum value(typically 20mA). The R is calculated according to the following formula:

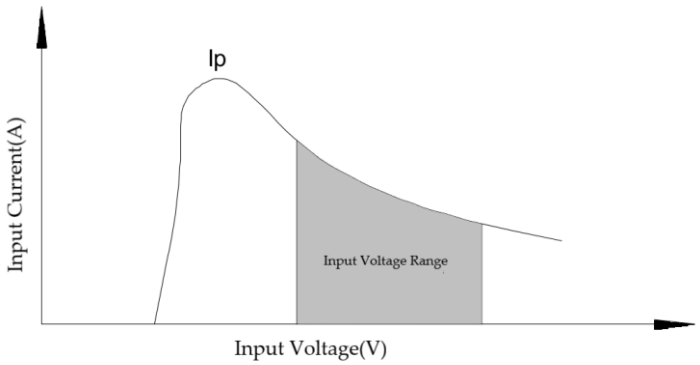
$$R = \frac{Vc - Vd - 0.7}{Ic} - 330 \quad \text{(See Photo 13)}$$

Vc is input voltage of Ctrl pin, Vd is forward voltage drop of D1, 0.7V and 330Ω are module's bipolar junction transistor voltage drop and inside connecting resistor of input terminal for control pin respectively, Ic is the input current of control terminal.

5.Input Current

When unstable power supply connected, please ensure that the output voltage fluctuating range of power supply and the ripple voltage is within the module's index, output current of input power supply must be able to meet instant turn-on current Ip of the DC/DC converter (see below picture)

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



Note:

1.This product cannot be used in parallel, and do not support hot-plugging;

2. All index testing methods in this datasheet are based on our Company's corporate standards

3. The product specification may be changed at any time without prior notice.