

### Typical Features

- ◆Wide Input Voltage Range ( 2:1), Output Power 3W
- ◆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°C~+85°C
- ◆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°C

### 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 uF	Ripple & Noise (Max.) mVp-p	Efficiency (%)	
	Nominal	Range	Voltage (VDC)	Current(mA) MAX./Min.	Full load Typ.	No Load Typ.			Min.	Typ.
FK3-05S05E3	5	4.5-9	5	600	801	38	2200	100	73	75
FK3-05S09E3			9	333	769	54	1000	100	72	74
FK3-05S12E3			12	250	763	39	1000	100	77	79
FK3-05S15E3			15	200	829	50	680	100	74	76
FK3-12S05E3	12	9 - 18	5	600	316	6	2200	100	77	79
FK3-12S12E3			12	250	306	18	1000	100	80	82
FK3-12S15E3			15	200	314	25	680	100	80	82
FK3-12S24E3			24	125	313	29	330	100	79	81
FK3-24S3V3E3	24	18 - 36	3.3	600	110	12	2700	100	72	74
FK3-24S05E3			5	600	157	6	2200	100	76	78
FK3-24S12E3			12	250	152	4	1000	100	81	83
FK3-24S15E3			15	200	148	5	680	100	84	86
FK3-24S24E3			24	125	146	11	470	100	84	86
FK3-48S05E3	48	36 - 75	5	600	77	2	2200	100	80	82
FK3-48S12E3			12	250	74	1	1000	100	84	86
FK3-48S15E3			15	200	78	6	470	100	82	84



FK3-48S24E3			24	125	74	6	470	100	84	86
FK3-05D05E3	5	4.5 - 9	±5	±300	811	47	1000	100	72	74
FK3-05D12E3			±12	±125	807	41	680	150	72	74
FK3-05D15E3			±15	±100	876	51	470	100	70	72
FK3-12D05E3	12	9 - 18	±5	±300	316	7	2200	100	77	79
FK3-12D12E3			±12	±125	302	17	1000	100	81	83
FK3-12D15E3			±15	±100	313	22	330	100	78	80
FK3-24D05E3	24	18 - 36	±5	±300	156	10	2200	100	78	80
FK3-24D12E3			±12	±125	141	10	680	100	83	85
FK3-24D15E3			±15	±100	144	10	470	100	84	86
*FK3-48D05E3	48	36 - 75	±5	±300	82	4.5	1000	100	77	79
*FK3-48D12E3			±12	±125	78	5	470	100	80	82
*FK3-48D15E3			±15	±100	78	6	330	100	80	82

1. "\*" are models being developing;
2. 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;
3. 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	0.5W (Max.)				
Input Filter	Capacitor Filter				

**Output Specifications**

Positive Output Voltage Accuracy	Full voltage Nominal 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%

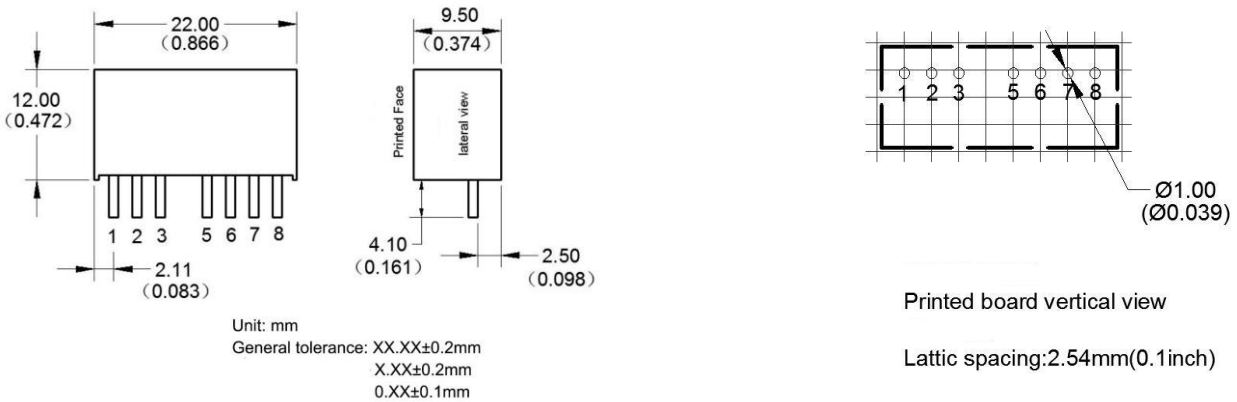
Line Regulation	Nominal load, full voltage range	Vo	Primary Output:≤±0.2%, Secondary Output:≤±0.5%
Load Regulation	10% ~ 100% nominal load	Vo	Primary Output:≤±0.5%, Secondary Output:≤±0.75%
Cross Regulation	Dual output, Primary output 50% load, secondary output 10%-100% load		≤±5.0%
Ripple & Noise	Nominal load, nominal voltage		≤100mVp-p (20MHz bandwidth)
Temperature Drift Coefficient	100% full load		±0.03%/°C
Dynamic Response	25% nominal load step change	ΔVo/Δt	≤±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	450KHz(Typ.)
Operating Temperature	Refer to Temperature Derating Curve	-40°C ~ +85°C
Storage Temperature		-55°C ~ +125°C
Max Case Temperature	Within Temperature Derating Curve	+105°C
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°C MAX
Isolation Voltage	Input to Output	3000Vdc ≤ 0.5mA / 1min
MTBF	MIL-HDBK-217F @25°C	2X10 <sup>5</sup> 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

Printed board vertical view

Lattice spacing:2.54mm(0.1inch)

Print board vertical view

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

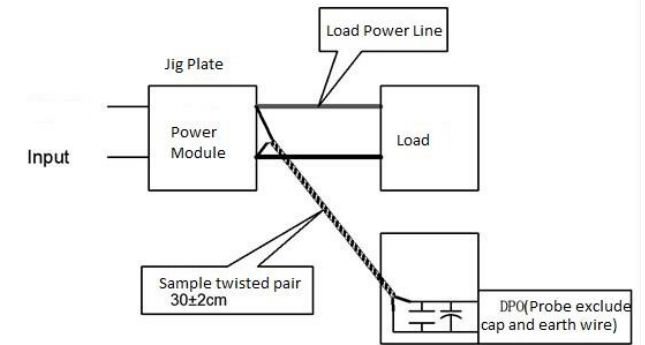
**Pin Function**

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

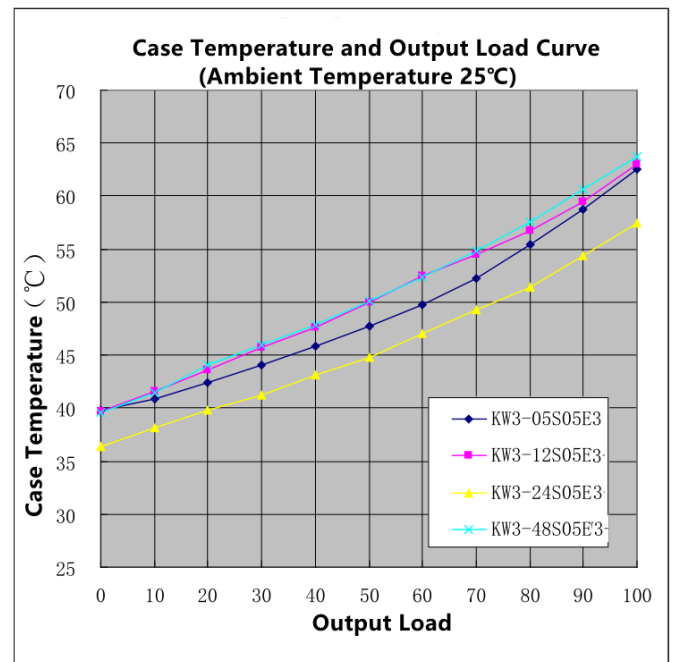
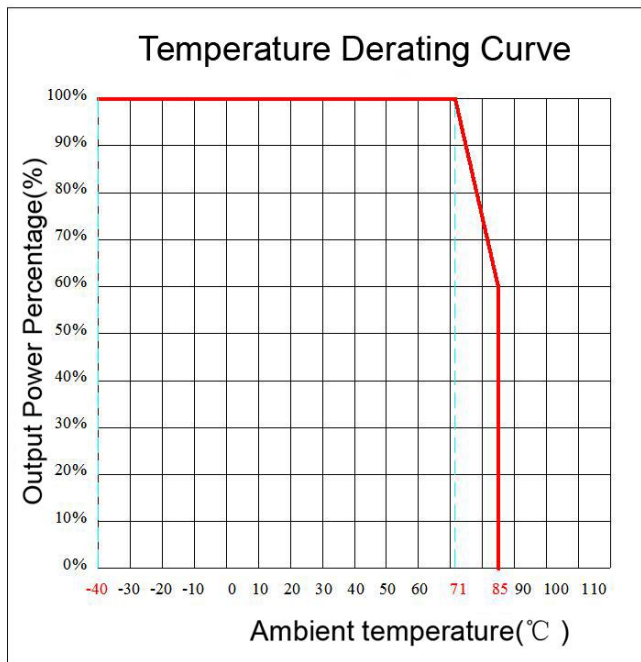
\* Note: if the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

**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 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.



**Temperature 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 may 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.

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

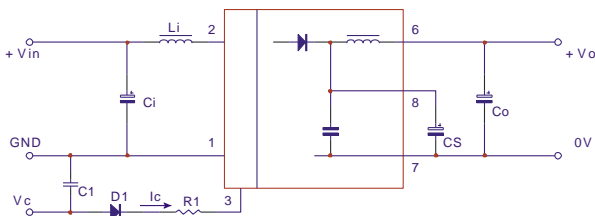
Li:4.7uH~120uH

CS:10uF~22uF

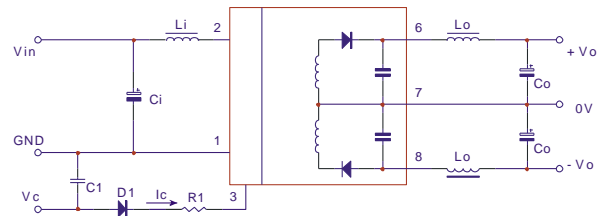
Co:100uF (Typ.)

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:

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

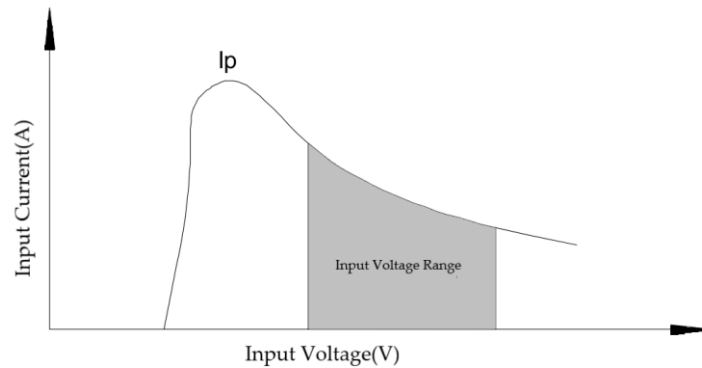
Vc is input voltage of Ctrl pin, Vd is forward voltage drop of D1, 0.7V and 330Ω are module's bipolar junction transistor voltage drop and inside connecting resistor of input terminal for control pin respectively, Ic is the input current of control terminal.



## 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  $I_p$  of the DC/DC converter(see below picture)

Normally:  $I_p \leq 1.4 * I_{in\_max}$



### 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.