DC-DC Converter
FK6-XXSXXE2C3 Series

Typical Features

- ◆ Wide input voltage range (4:1), output power 6W
- ◆ Efficiency up to 87% (Typ.)
- ◆ Standby power consumption 0.15W (Typ.)
- ◆ Continuous short circuit protection, self-recovery
- ◆ Input under voltage, output short circuit, over current protections
- ◆ Isolation voltage 3000VDC
- ◆ Operating temperature from -40°C to +85°C
- ◆ Good EMI performance & standard pin-out alignment

EN62368-1

Application Field

FK6-XXSXXE2C3 series --- DC-DC modular converters with SIP package, output power 6W, ultra-wide input voltage range, low standby power consumption, isolated and regulated single output. This series of products can be widely used in the fields of Industrial control, Instrumentation, Communication, Electricity Power, Internet of Things and BMS, etc.

Typical Product List

Certificate	Part No.	Input Voltage Range		Output Voltage/Current (Vo/Io)		Input Current (mA) Typ. @Nominal volt		Max. Capacitive Load	Efficiency @Full load, Nominal volt	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io (mA)	Full load	No Load	(uF)	Min (%)	Typ. (%)
CE	FK6-18S3V3E2C3	24	9 - 36	3.3	1350	238	5	1800	76	78
	FK6-18S05E2C3			5	1200	305	5	1000	80	82
	FK6-18S09E2C3			9	667	298	10	470	82	84
	FK6-18S12E2C3			12	500	298	10	470	84	86
	FK6-18S15E2C3			15	400	298	10	220	85	87
	FK6-18S24E2C3			24	250	298	10	100	83	85
	FK6-18S48E2C3			48	125	300	10	100	84	86
CE	FK6-36S3V3E2C3	48	18 - 75	3.3	1600	158	5	1200	76	79
	FK6-36S05E2C3			5	1200	158	5	680	80	83
	FK6-36S09E2C3			9	667	143	10	330	82	84
	FK6-36S12E2C3			12	500	143	10	330	84	86
	FK6-36S15E2C3			15	400	143	10	150	85	87
	FK6-36S24E2C3			24	250	143	10	100	84	86

Note 1: The part number letter C indicates the part with ON/OFF control function.

Note 2: The value of efficiency is tested at nominal input voltage and rated load.

Note 3: The maximum capacitive load is the capacitance allowed to be used when the power supply starts at full load. The converter may not start if the capacitor exceeds this value.

Note 4: The chip could operate at jitter frequency situation with no load or light load to decrease the no-load power consumption and improve light-load efficiency. No load is not available, at least ≥5% load is recommended to avoid the output ripple increasing.

Note 5: Please contact Aipu sales for other output voltages requirements of this series but not listed in this table.

Input Specifications

Items	Test Condition	Min	Typ.	Max	Unit
Standby power consumption	Full input voltage range	/	0.15	/	W
Input current Max	Full input voltage range	/	/	0.9	A
Start-up voltage	Nominal input voltage 24V series	/	7	9	VDC
	Nominal input voltage 48V series	/	16	18	
Under voltage protection	Nominal input voltage 24V series	/	6.5	9	VDC
	Nominal input voltage 48V series	/	15.5	18	
Input inrush voltage (1sec max)	Nominal input voltage 24V series	-0.7	/	50	VDC
	Nominal input voltage 48V series	-0.7	/	100	
Input filter	/	Capacitor Filter			
Hot-plug	/	NA			
ON/OFF Control (Ctrl*)	Turn ON the Converter	No connection or connected to the high level (3.5-12VDC)			
	Turn OFF the Converter	Connected to -Vin or low level (0-1.2VDC)			
	Current value for switching OFF	6mA (Typ.)			

*Note: The voltage of Ctrl is relative to the input -Vin.

Output Specifications

Items	Test Condition		Min	Typ.	Max	Unit
Output voltage accuracy	Vin=24V		/	±1	±2	%
	Vin=48V		/	±1	±3	%
Voltage regulation	Full voltage range, rated load		/	±0.5	±1	%
Load regulation	Nominal input voltage, 5%-100% load		/	±1	±1.5	%
Ripple & Noise	5%-10% load, 20MHz Bandwidth	FK6-18S48E2C3 FK6-36S24E2C3	/	120	200	mVp-p
		Others	/	80	120	
Dynamic response deviation	25% rated load step, nominal input voltage	3.3V & 5V outputs	/	±5	±8	%
		Others	/	±3	±5	%
Dynamic response time	25% rated load step, full input voltage range		/	300	500	uS
Temperature drift coefficient	Full load		/	/	±0.03	%/°C
Turn-on delay	Nominal input voltage		/	100	/	mS
Output overshoot	Full input voltage range		/	/	10	%Vo
Over current protection			110	150	230	%Io
Short circuit protection			Continuous, self-recovery			

Note: Ripple & Noise ≤5%Vo at 0-5% load, it is tested by the Parallel-line method, please refer to the following test instruction.

General Specifications

Items	Test Condition	Min	Typ.	Max	Unit
Switching frequency	Operating mode (PWM)	/	350	/	KHz
Operating temperature	Refer to the Temperature Derating Graph	-40	/	+85	°C
Storage temperature	/	-55	/	+125	

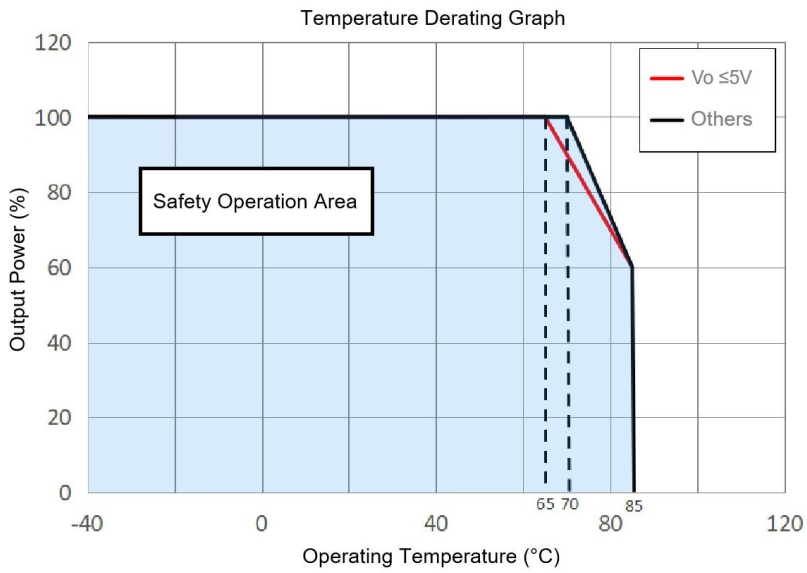
Case temperature Max	Within the operating derating range		/	/	+105	°C
Pin soldering temperature	1.5mm from the case, soldering time 10S		/	/	300	°C
Relative humidity	No condensing		5	/	95	%RH
Isolation voltage	I/P-O/P	Test 1 Min, Leakage current <1mA	3000	/	/	VDC
	I/P&O/P-Case		1000	/	/	VDC
Isolation capacitance	I/P-O/P	100KHz/0.1V	/	1000	/	pF
Insulation resistance	I/P-O/P	@500VDC	1000	/	/	MΩ
MTBF	MIL-HDBK-217F@25℃		1000	/	/	KHrs
Case material	Flame-retardant and heat-resistant plastic in Black					
Vibration	10-150Hz, 5G, 0.75mm, along X, Y and Z					
Cooling method	Nature Air					

Weight/Dimensions	Part No.	Weight (Typ.)	Dimensions L x W x H	
	FK6-XXSXXE2C3	5g	22.00 X 9.50 X 12.00 mm	0.866 X0.374X 0.472 inch

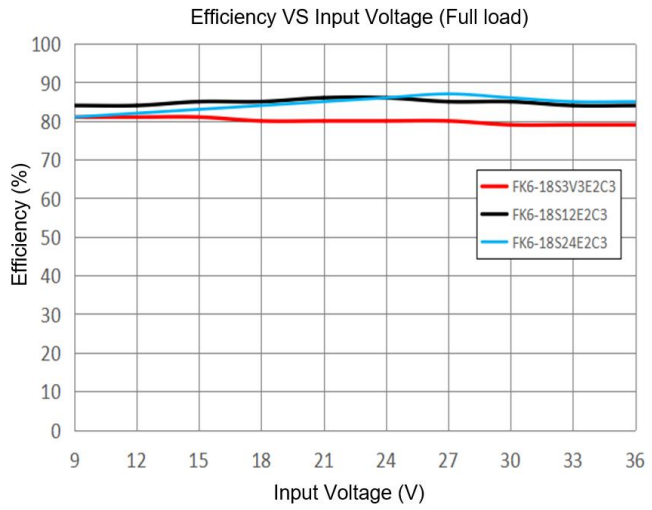
EMC Performance

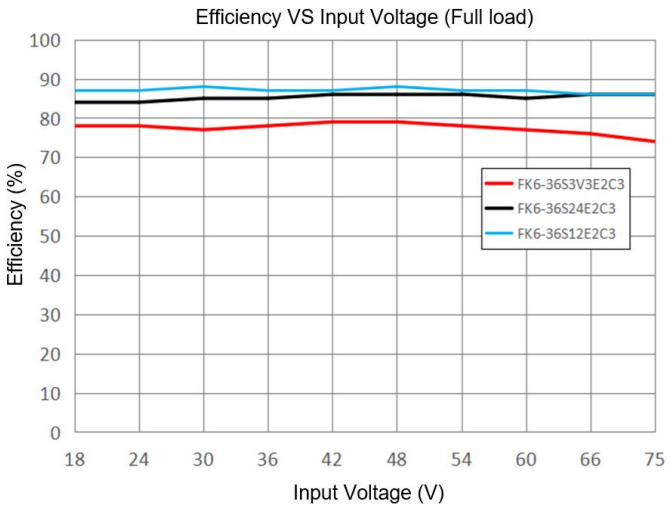
Items			Test Standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS B (with the Recommended EMC Circuit)
		RE	CISPR32/EN55032	CLASS B (with the Recommended EMC Circuit)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf .Criteria B (with the Recommended EMC Circuit)
		CS	IEC/EN61000-4-6	3Vr.m.s Perf. Criteria B (with the Recommended EMC Circuit)
		ESD	IEC/EN61000-4-2	Contact ±4KV Perf. Criteria B
		Surge	IEC/EN61000-4-5	±2KV Perf. Criteria B (with the Recommended EMC Circuit)
		EFT	IEC/EN61000-4-4	±2KV Perf. Criteria B (with the Recommended EMC Circuit)

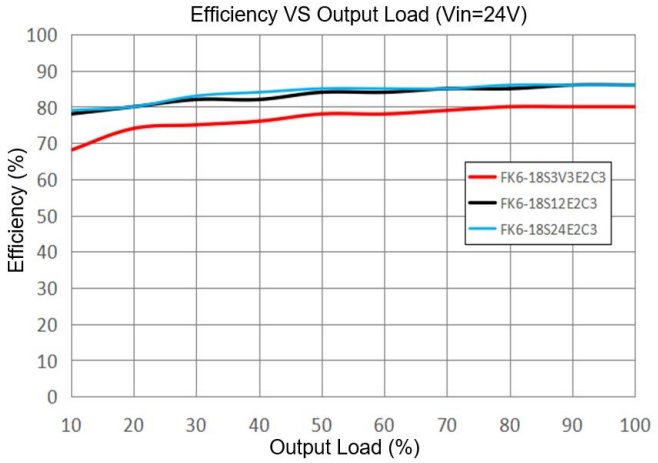
Temperature Derating Graph

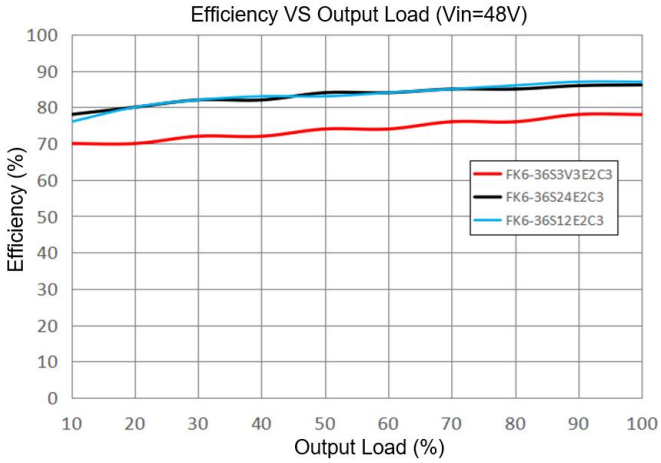


Efficiency Graphs

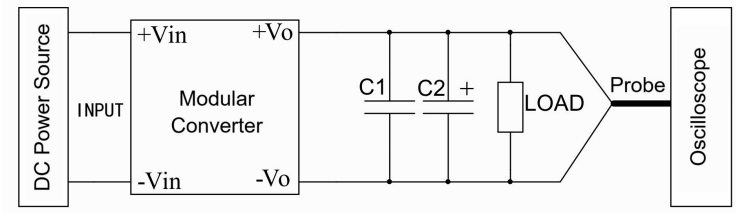








Ripple & Noise Test Instruction（Parallel-line Method, 20MHz bandwidth）



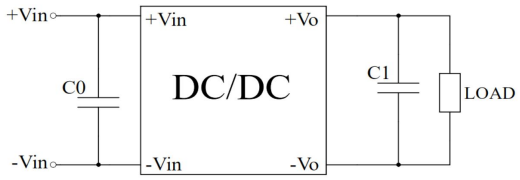
1. The Ripple & Noise test needs the cables in parallel, an oscilloscope that should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. One polypropylene capacitor C1(0.1uF) and one high frequency low impedance electrolytic capacitor C2(10uF) are connected in parallel with the probe.

2. Refer to the test diagram, the converter output connects to the electronic load by the jig with cables which size should be defined according to the output current value. The test can start at the converter output terminals after the input power on.

3. It is recommended to use a ≥5% load or a high frequency low impedance electrolytic capacitor (≥100uF) load at the output to avoid the output ripple increasing.

Recommended Circuits for Application

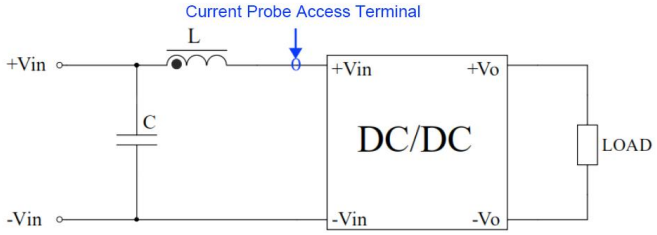
1, DC/DC test circuit diagram



Component	Vin=24V	Vin=48V
C0	47-100uF/50V	47-100uF/100V
C1	100uF/50V	

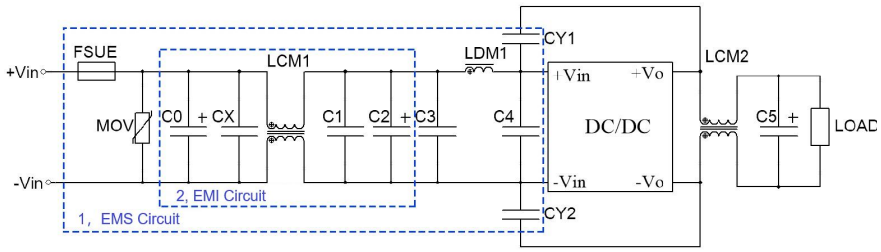
2, Input reflecting ripple current test circuit diagram

A low ESR capacitor is recommended for C which withstanding voltage should be more than the max input voltage.



Component	Parameters
C	220uF/100V
L	4.7uH/15A

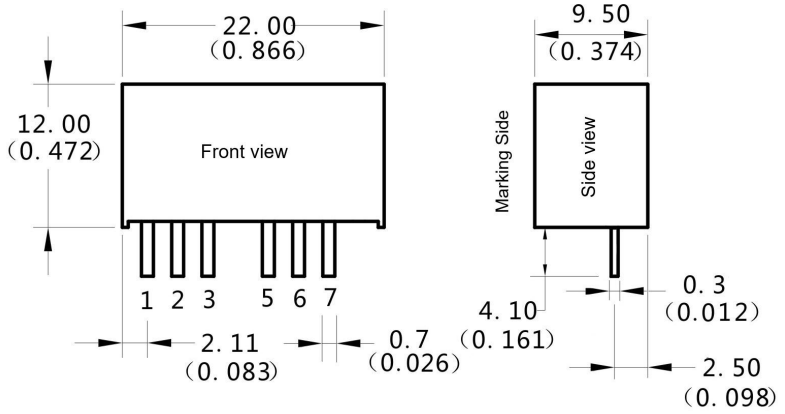
3, Recommended EMC circuit diagram

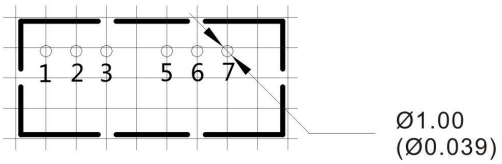


Note: Part 1 circuit is for EMS, part 2 for EMI filtering, both can be adjusted according to the actual situation.

Component	Vin=24V	Vin=48V
FUSE	TBD by customer	
MOV	14D560K	14D101K
CX	0.47uF/50V	0.47uF/100V
LCM1	20mH	20mH
C0	1000uF/50V	500uF/100V
C1, C3, C4	1uF/50V	1uF/100V
C2	47uF/50V	47uF/100V
LDM1	4.7uH	4.7uH
LCM2	30uH	30uH
C5	47uF/63V	47uF/50V
CY1, CY2,	Y1/2.2nF/400VAC	

Mechanical Dimensions





PCB layout vertical view
Grid 2.54x2.54(0.10x0.10)

Unit: mm(inch)
Pin section tolerance ±0.10(±0.004)
General tolerance ±0.50[±0.020]

Pin-out Function Description

Pin No.	1	2	3	5	6	7
FK6-XXSXXE2C3	-Vin	+Vin	Ctrl	No Connection	+Vo	-Vo

Application Notice

1.The product should be used according to the specifications, otherwise it could be permanently damaged.

2. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.

3. The product performance cannot be guaranteed if it works under over-load condition.

4. Unless otherwise specified, all values or indicators are tested at Ta=25℃, humidity<75%RH, nominal input voltage and rated load (pure resistance load).

5. All values or indicators on this datasheet have been tested based on Aipupower test specifications.

6.The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.

7. Aipupower can provide customization service.

8. The product should operate under the condition of nature air, please contact us if it could be used at a closed space.

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