

Product Typical Features

- ◆ Wide input voltage range (4:1), Output Power 20W
- ◆ Efficiency 90%(Typ.)
- ◆ Stand-by Power Consumption 0.05W(Typ.)
- ◆ Output fast start up
- ◆ Continuous Short Circuit protection, Self-recovery
- ◆ Input under voltage, output over voltage, short circuit, over current protections
- ◆ Isolation Voltage 3000VDC / 2150VAC
- ◆ Operating Temperature: -40°C~+85°C
- ◆ Good EMI performance
- ◆ International standard pin-out



Application Field

FD20-XXSXXA3C4 is a series of new designed with DIP 1X1 package, 20W output power, wide input range 4:1, low stand-by power consumption, isolated & regulated output DC/DC convertors. They can be widely used for industrial control, instrument, communication, power electricity and IoT fields. Additional circuit for EMC is recommended in this data sheet for the application with higher EMC requirement.

Typical Product List

Certificate	Part no.	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current (mA) @Rated Voltage		Max. Capacitive Load	Ripple & Noise		Efficiency (%)/@ full load	
		Rated	Range	Voltage (VDC)	Current (mA) MAX./Min.	Full load typ.	No Load typ.	uF	mVp-p		Min	Typ
									Typ	Max		
-	FD20-18S3V3A3C4	24	9-36	3.3	4000/0	626	30	10000	50	100	86	88
-	FD20-18S05A3C4	24	9-36	5	4000/0	926	30	5000	50	100	88	90
-	FD20-18S09A3C4	24	9-36	9	2222/0	926	30	3000	50	100	88	90
-	FD20-18S12A3C4	24	9-36	12	1667/0	926	5	1000	50	100	88	90
-	FD20-18S15A3C4	24	9-36	15	1333/0	926	5	800	50	100	88	90
-	FD20-18S24A3C4	24	9-36	24	833/0	926	5	500	50	100	88	90
-	FD20-36S3V3A3C4	48	18-75	3.3	4000/0	313	30	10000	50	100	86	88
-	FD20-36S05A3C4	48	18-75	5	4000/0	463	10	5000	50	100	86	88
-	FD20-36S09A3C4	48	18-75	9	2222/0	463	30	3000	50	100	88	90
-	FD20-36S12A3C4	48	18-75	12	1667/0	463	5	1000	50	100	88	90
-	FD20-36S15A3C4	48	18-75	15	1333/0	463	5	800	50	100	88	90
-	FD20-36S24A3C4	48	18-75	24	833/0	463	5	500	50	100	88	90

Note 1: The suffix -H indicates a part with Heat sink, -T (H) indicates a kind of packaging with terminals(with heat sink), -TS (H) indicates a kind of packaging of DIN Rail(with heat sink), the rail width 35mm. "C" means with control function.

Note 2: The maximum capacitive load is the capacitance allowed to be used when the power supply operate at full load. The convertor may not start up if the capacitor exceeds this value.

Note 3: The chip could operate at jitter frequency situation at no load or light load in order to decrease no-load power consumption, so no load is not available. $\geq 10\%$ load or a high-frequency resistance E-cap($\geq 470\mu\text{F}$) load is recommended, to avoid the output ripple increasing.

Note 4: Please contact with Aipu sales for other output voltages requirement in this series but no in this table.

Input Specifications

Item	Operating Condition	Min	Typ.	Max	Unit
Stand-by Consumption	Input voltage range	/	0.05	/	W
Input Under-Voltage Protection	24V rated input	5	7	9	VDC
	48V rated input	11	13	18	
Hot plug	Unavailable				
Input Filter	π filter				
*CTRL	Module turn-on	No connection or connect to high level (2.5-12VDC)			
	Module shut-off	Connect -Vin or low level (0-1.2VDC)			
	Current value for shut off	5mA (TYP)			

Note: *The voltage of CTRL is relative to -Vin

Output Specifications

Item	Operating Condition		Min	Typ.	Max	Unit
Output Voltage Accuracy	Input voltage range		/	±1	±2	%
Line Regulation	Rated load, full voltage range		/	±0.2	±0.5	%
Load Regulation	5%~100% rated load		/	±0.5	±1	%
Ripple & Noise	10%-100% load, 20MHz bandwidth		/	50	100	mVp-p
Dynamic Recovery Time	25% of rated load step, rated input voltage		/	250	500	us
Dynamic Response Deviation		3.3V、5V output	/	±5	±8	%
		Other output	/	±3	±5	%
Turn on delay	Rated input voltage		/	100	/	ms
Output voltage adjustable (Trim)	Input voltage range		Unavailable			
Output overvoltage protection			120	160	200	%Vo
Output overcurrent protection			120	150	220	%Io
Output start-up overshoot voltage			/	/	10	%Vo
Short circuit protection			Continuous, self-recovery			

Note: 0% -10% load ripple & noise $\leq 5\%V_o$; The ripple and noise are tested by the twisted pair method according to the Ripple & Noise test Instructions in this manual.

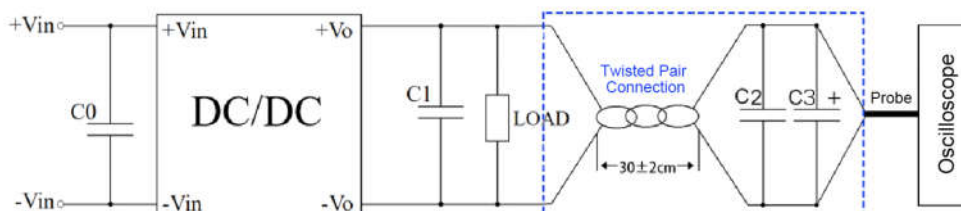
General Specifications

Item	Operating Condition	Min	Typ.	Max	Unit
Switching Frequency	Operating Mode (PWM)	/	350	/	KHz
Operating Temperature	Refer to temperature derating curve	-40	/	+85	°C
Storage Temperature	/	-55	/	+125	
Case Temperature	Within the working curve	/	/	+105	
Soldering Temperature	1.5mm distance from case, 10 sec.	/	/	300	
Relative Humidity	No condensation	5	/	95	%RH
Isolation Voltage	I/P-O/P, test 1 min, leakage current <0.5mA	3000	/	/	VDC
	I/P-O/P, test 1 min, leakage current <5mA	2150	/	/	VAC
MTBF	MIL-HDBK-217F@25°C	1000		/	K hours
Cooling Method	Natural air				
Case Material	Aluminum				
Weight/ Dimension	Part No.	Weight Typ.	L x W x H		
	FD20-XXSXXA3C4	18g	25.4X 25.4X12.5 mm	1X1X0.492inch	
	FD20-XXSXXA3C4-H	21g	25.4X25.4X18.0mm	1X1X0.708inch	
	FD20-XXSXXA3C4-T	39g	76X31.5X21.3mm	2.99X1.24X0.838inch	
	FD20-XXSXXA3C4-TH	42g	76X31.5X26.0mm	2.99X1.24X1.023inch	
	FD20-XXSXXA3C4-TS	59g	76X31.5X26.0mm	2.99X1.24X1.023inch	
	FD20-XXSXXA3C4-TS	62g	76X31.5X30.8mm	2.99X1.24X1.212inch	

EMC Performance

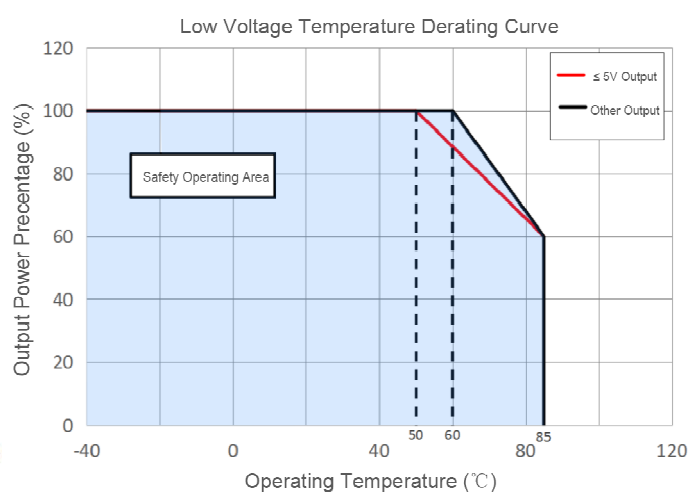
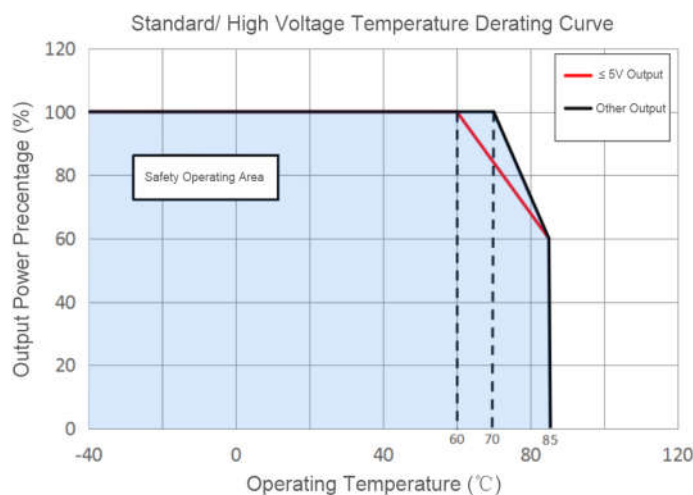
Total Items		Sub Items	Test Standard	Performance/Class	
EMC	EMI	CE	CISPR32/EN55032	CLASS B (EMC Recommended Circuit)	
		RE	CISPR32/EN55032	CLASS B (EMC Recommended Circuit)	
	EMS	RS	IEC/EN61000-4-3	10V/m	Perf.Criteria B (EMC Recommended Circuit)
		CS	IEC/EN61000-4-6	3Vr.m.s	Perf.Criteria B (EMC Recommended Circuit)
		ESD	IEC/EN61000-4-2	Contact ±4KV	Perf.Criteria B
		Surge	IEC/EN61000-4-5	±2KV	Perf.Criteria B (EMC Recommended Circuit)
		EFT	IEC/EN61000-4-4	±2KV	Perf.Criteria B (EMC Recommended Circuit)
		Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11	0%~70%	Perf.Criteria B

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



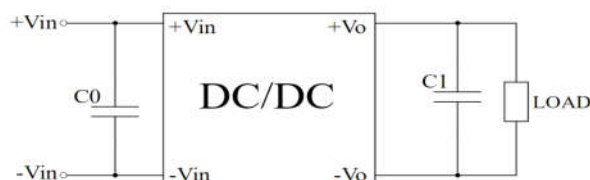
- 1) Ripple noise test need 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C2(0.1uF) polypropylene capacitor and C3(10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair. C0 & C1 refer to the application circuit recommended.
- 2) The power supply output connects to the load by the cables. The other side of the twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the polarity of the output and the oscilloscope probe should not be reverse. The test can be started after input power on.
- 3) No load is not available, $\geq 10\%$ load or a high-frequency resistance E-cap($\geq 470\mu\text{F}$) load is recommended, to avoid the output ripple increasing.

Product Performance Curve



Recommend Circuits for Applications

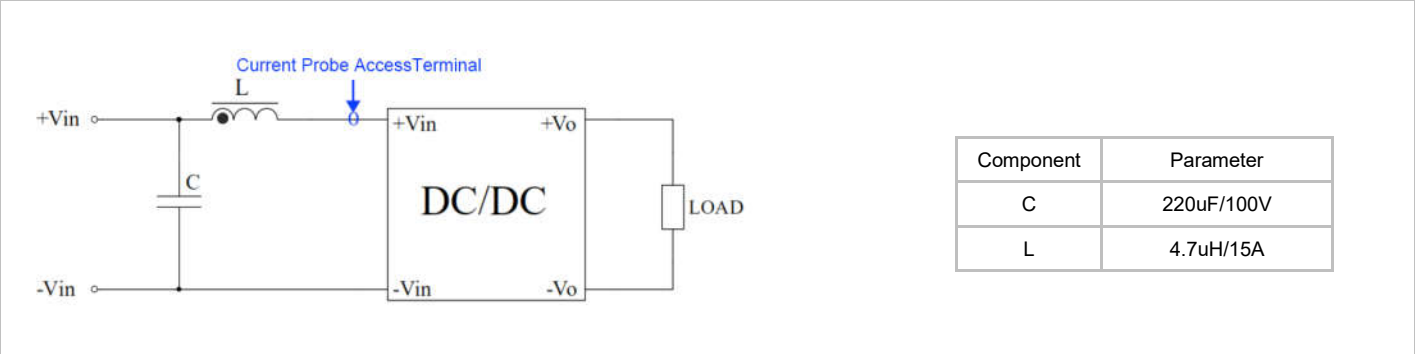
1. DC/DC test circuit:



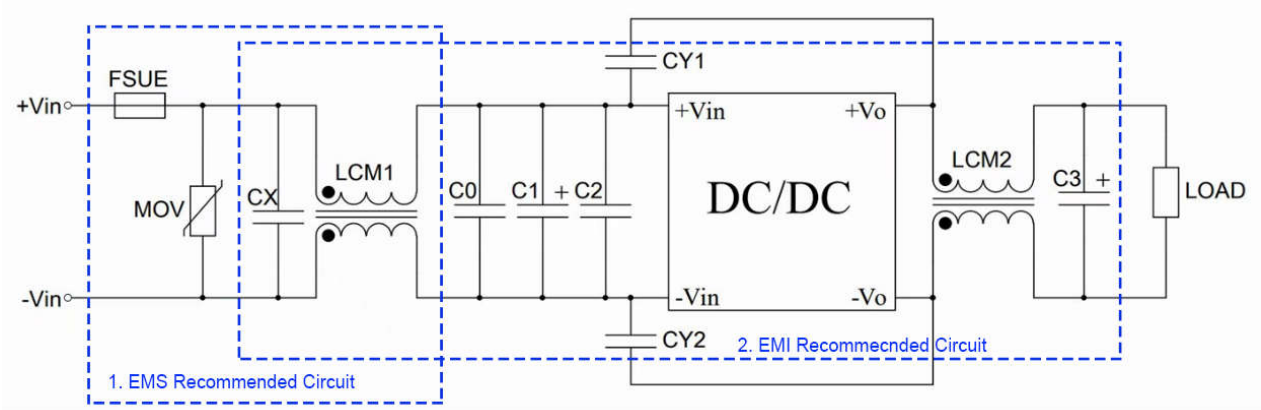
Component	Parameter
C0	47-100uF/100V
C1	470uF/50V

2. Input reflected ripple current test circuit:

C should be a low ESR type capacitor, its withstand voltage value should be greater than the maximum input voltage.



3. Recommended circuit for EMC.



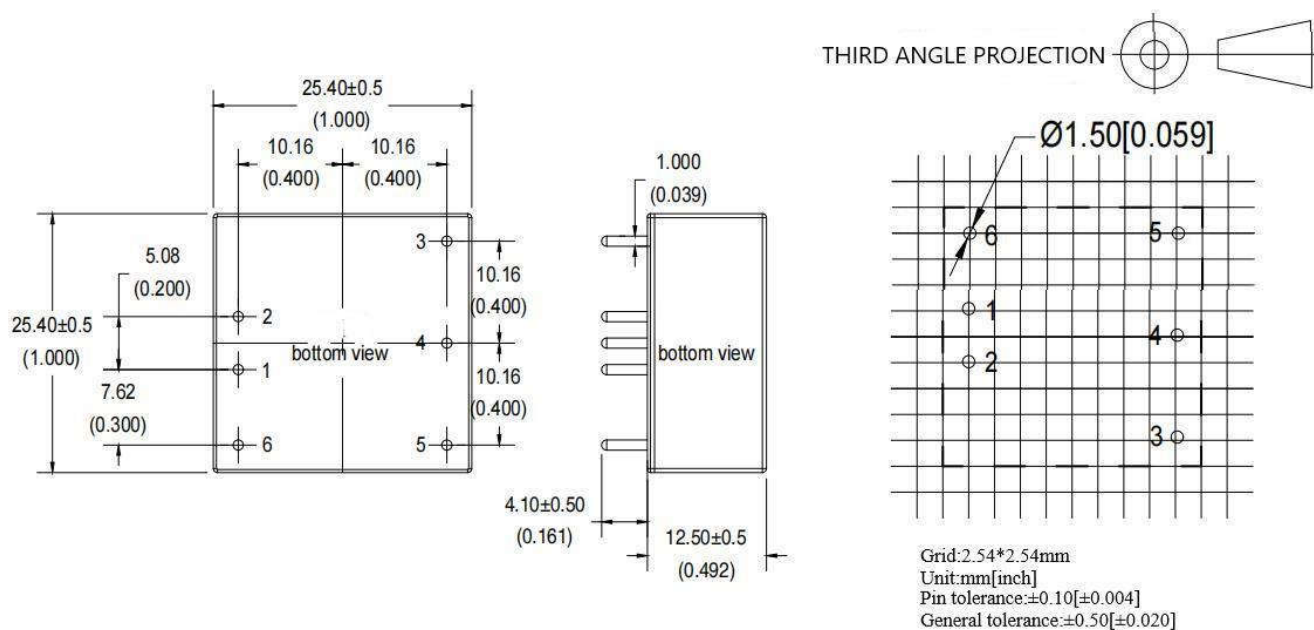
EMC Recommended Circuit

Note:

Part 1 in the figure is for EMS & part 2 is for EMI filtering, which can be adjusted according to the actual situation.

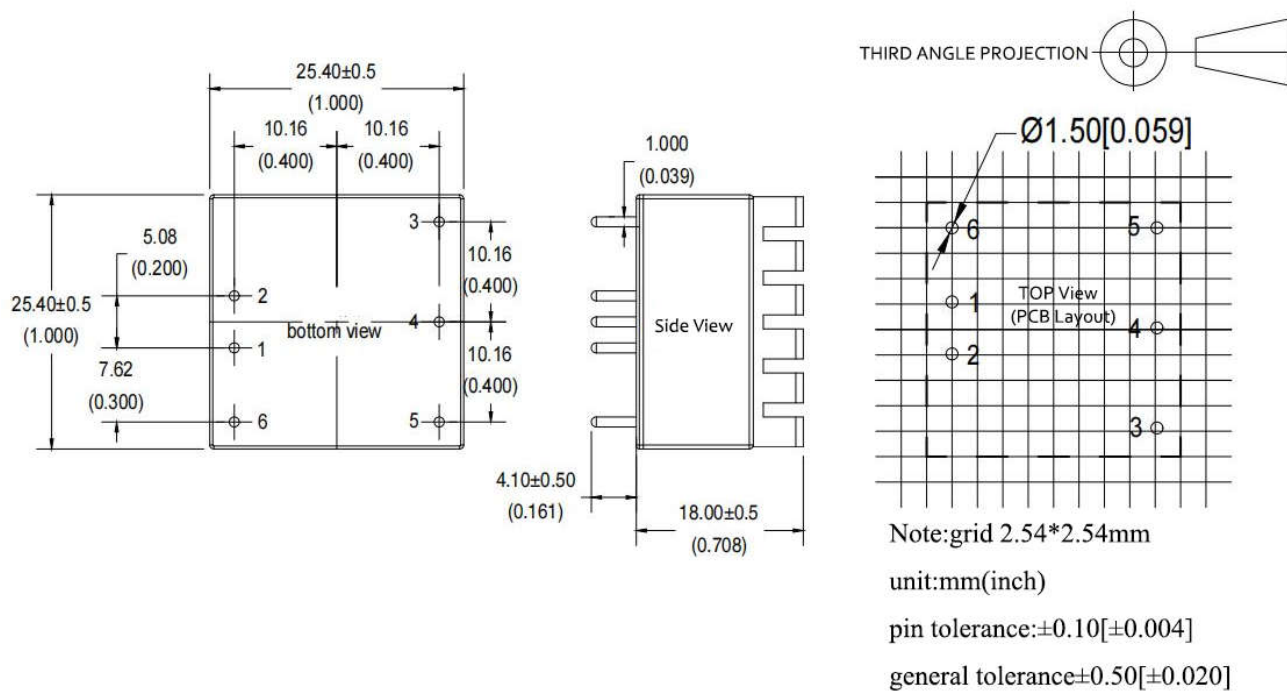
Component	24V input	48Vinput
FUSE	Fuse spec TBD by customer	
MOV	14D560K	14D101K
CX	0.47uF	0.47uF
LCM1	10mH	10mH
C0	1uF/100V	1uF/100V
C1	220uF/100V	220uF/100V
C2	1uF/100V	1uF/100V
LCM2	30uH	30uH
C3	47uF/50V	47uF/50V
CY1,CY2	2.2nF/2000V	

A3C4 Packaging Dimension (Without Heat Sink)



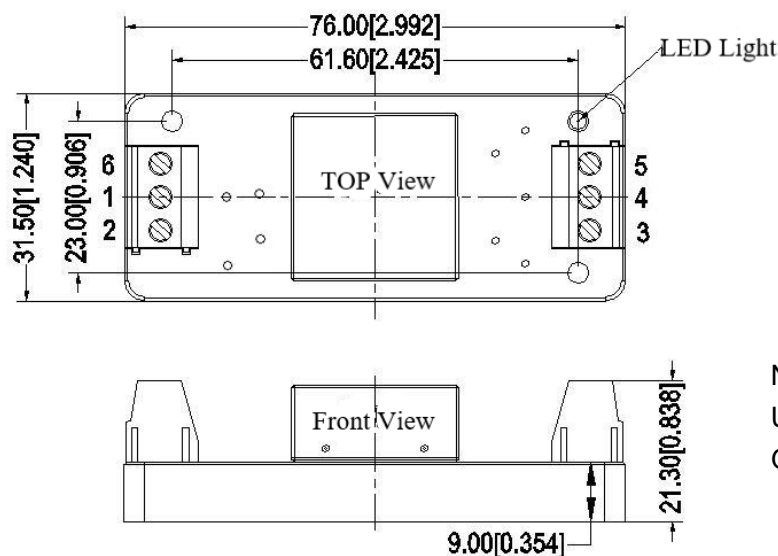
Pin No.	1	2	3	4	5	6
FD20-XXSXXA3C4	-Vin	+Vin	+Vo	NP	GND	Ctrl

A3C4-H Packaging Dimension (With Heat Sink)



Pin No.	1	2	3	4	5	6
FD20-XXSXXA3C4	-Vin	+Vin	+Vo	NP	GND	Ctrl

A3C4-T Packaging Dimension (Without Heat Sink)



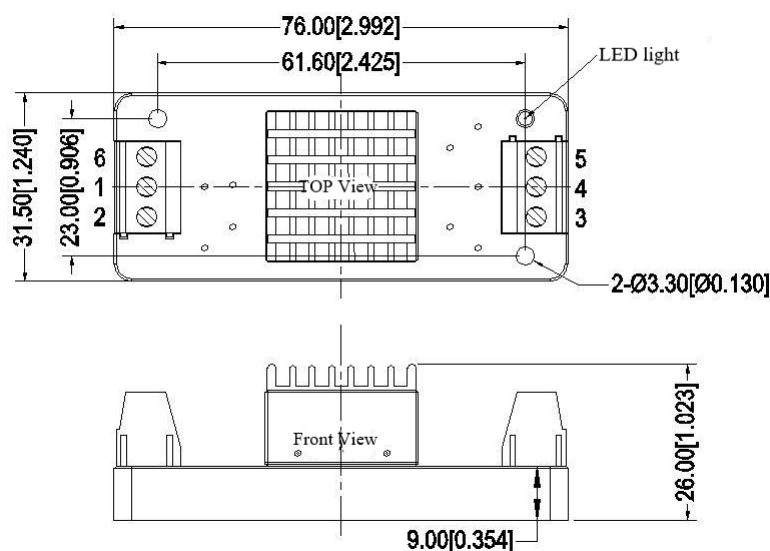
Note:

Unit: mm[inch]

General tolerance: $\pm 1[\pm 0.04]$

Pin No.	1	2	3	4	5	6
FD20-XXSXXA3C4	-Vin	+Vin	+Vo	NP	GND	Ctrl

A3C4-TH Packaging Dimension (With Heat Sink)



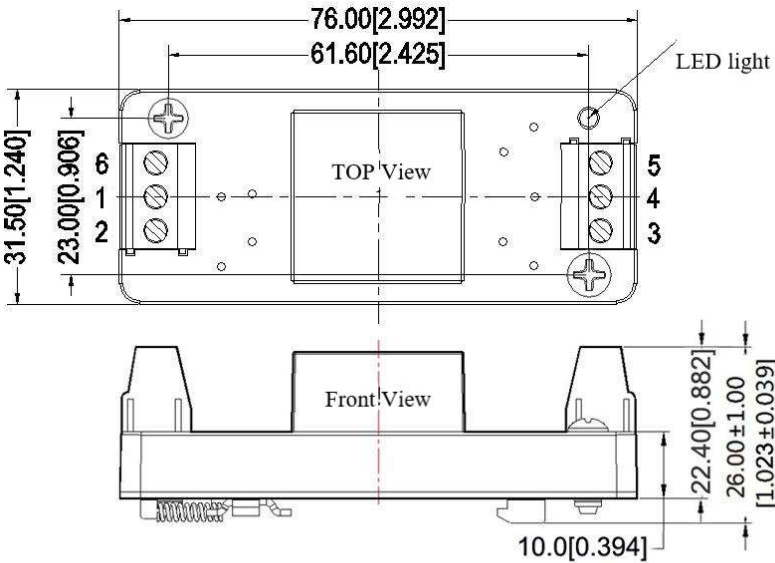
Note:

Unit: mm[inch]

General tolerance: $\pm 1[\pm 0.04]$

Pin No.	1	2	3	4	5	6
FD20-XXSXXA3C4	-Vin	+Vin	+Vo	NP	GND	Ctrl

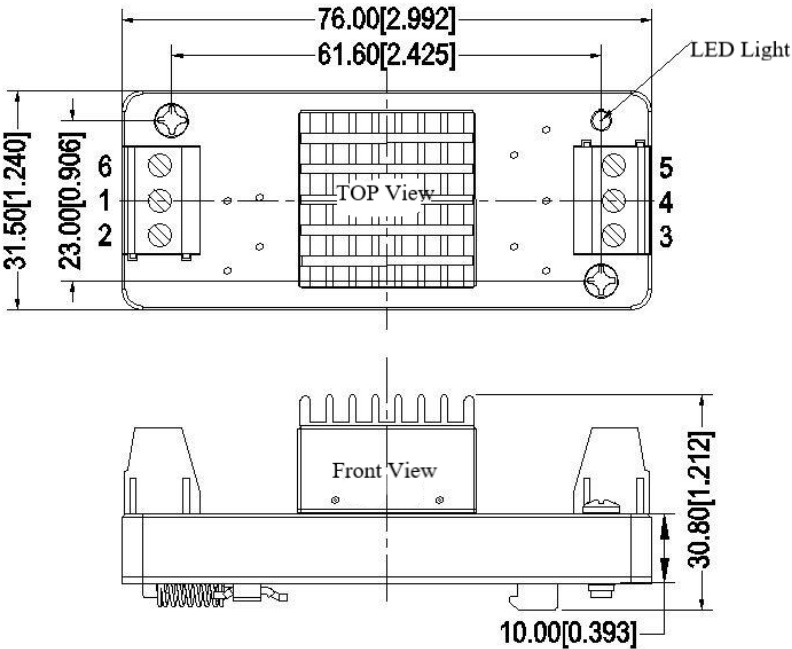
A3C4-TS Packaging Dimension (Without Heat Sink)



Note:
Unit: mm[inch]
General tolerance: ±1[±0.04]

Pin No.	1	2	3	4	5	6
FD20-XXSXXA3C4	-Vin	+Vin	+Vo	NP	GND	Ctrl

A3C4-TSH Packaging Dimension (With Heat Sink)



Note:
Unit: mm[inch]
General tolerance: ±1[±0.04]

Pin No.	1	2	3	4	5	6
FD20-XXSXXA3C4	-Vin	+Vin	+Vo	NP	GND	Ctrl

Note:

1. The products should be used according to the specifications in this manual, otherwise it could be permanently damaged.
2. The product performances in this manual cannot be guaranteed if it works at a lower load than the minimum load defined.
3. The product performances in this manual cannot be guaranteed if it works at over-load condition.
4. Unless otherwise specified, all values or indicators in this manual are tested at $T_a=25^{\circ}\text{C}$, humidity<75%RH, rated input voltage and rated load (pure resistance load).
5. All values or indicators in this manual had been tested based on Aipupower test specifications.
6. The specifications are specially for the parts listed in this manual, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirement.
7. Aipupower can provide customization service.

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