Typical Features

- ◆ Wide input voltage range 200-1200VDC (6:1)
- ◆ No load current as low as 1.0mA
- ◆ Efficiency up to 78%(Typ.)
- ◆ Operating temperature from -30℃ to +70℃
- ◆ Input anti-reverse, output over current & short circuit protections
- ◆ Isolation voltage 4000VDC
- ◆ Altitude during operation 2000m Max
- ◆ Application for Solar power generation, High-voltage inverter
- ◆ Industrial level design, standard size

Application Field

BK5-600SXXH1N4 Series --- Compact-size modular DC-DC converters with ultra-high input voltage wide range from 200 to 1200VDC, high efficiency, high reliability and regulated output. This series of products can be used for Solar power generation, High-voltage inverter, etc. with the performance of stable voltage output and multi-protections to keep the load safety while operating under abnormal conditions.

Typical Product List

Certificate	Part No.	Input Voltage Range		Output Specifications			Max Capacitive Load @600VDC	Ripple & Noise 20MHz (Max)	Efficiency @full load, 600VDC (Typ.)
		Nominal	Range	Power	Voltage	Current			
		(VDC)	(VDC)	P(W)	Vo(VDC)	Io(mA)	(uF)	mVp-p	%
-	*BK5-600S05H1N4	600	200-1200	5	5	1000	2000	250	68
-	BK5-600S12H1N4				12	417	1000	250	75
-	BK5-600S15H1N4				15	333	680	250	76
-	BK5-600S24H1N4				24	208	470	250	78

Note 1: Please contact Aipu sales for other output voltages requirements of this series but not listed in this table.

Note 2: The typical value of efficiency is based on the product tested after half an hour burn-in at full load.

Note 3: The full load efficiency should be in ±2% of the typical value in this table. The efficiency is calculated by the way that the full output power is divided by the input power.

Note 4: A current-limiting resistor (370Ω/10W wire-wound resistor) should be used at the input to suppress the surge current when the input voltage is at the range of 300-1200VDC, please refer to the following recommended circuit diagram.

Note 5: The suffix -T indicates the chassis package, -TS indicates the package of DIN Rail which width is 35mm.

Note 6: The * marked part has been developed in process.

Input Specifications

Item	Test Condition	Min.	Typ.	Max.	Unit
Input voltage range	DC input	200	600	1200	VDC
Stand-by power consumption	200VDC input	-	-	0.40	W
	600VDC input	-	-		

Input current	Input 200VDC @50% load	-	17	-	mA
	Input 600VDC @100% load	-	12	-	
	Input 1200VDC @40% load	-	4	-	
Input filter	-	Pi filter			

Output Specifications

Item		Test Condition	Min.	Typ.	Max.	Unit
Output voltage accuracy		Full input voltage range, any load	-	±2.0	±3.0	%
Line regulation		Full input voltage range	-	±0.5	±1.2	
Load regulation		20%-100% load, nominal input voltage	-	±1.0	±2.0	
Minimum load		Single output	10	-	-	%
Temperature drift coefficient		-	-	-	±0.05	%/℃
Turn-on delay time		Input 200VDC (full load)	-	2000	3000	mS
		Input 600VDC (full load)	-	750	1000	
		Input 1200VDC (full load)	-	400	800	
Power off hold-up time		Input 1200VDC (full load)	-	500	1500	
Dynamic response	Overshoot range	25%-50%-25%	-	±5.0	±6.0	%
	Recovery time	50%-75%-50%	-	300	500	mS
Output overshoot		0%-100% load	≤10			%Vo
Short circuit protection		Input 300-900VDC	Continuous protection, self-recovery			Hiccup
Over current protection		Full input voltage range	130%Io	-	200%Io	mA
Ripple & Noise		20MHz bandwidth, 5%-100% load	-	100	250	mV

Note: The Ripple and Noise is tested by the Parallel-line method (please refer to the following test instruction).

General Specifications

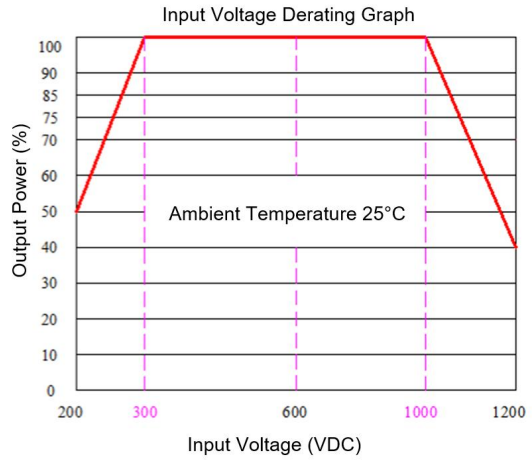
Item	Test Condition		Min.	Typ.	Max.	Unit
Operating frequency	-		-	65	70	KHz
Operating temperature	Refer to the Temperature Derating Graph		-30	-	+70	℃
Storage temperature	-		-40	-	+85	
Soldering temperature	Wave soldering		260±4℃, time 5-10S			
	Manual soldering		360±8℃, time 4-7S			
Storage humidity	No condensing		-	-	95	%RH
Isolation voltage	I/P - O/P	Test 1min, leakage current ≤5mA	4000	-	-	VDC
Insulation resistance	I/P - O/P	@500VDC	100	-	-	MΩ
MTBF	MIL-HDBK-217F@25℃		300	-	-	K Hours
Vibration	-		10-55Hz,10G, 30 Min, along X, Y, Z			
Case material	-		Aluminum (Black)			

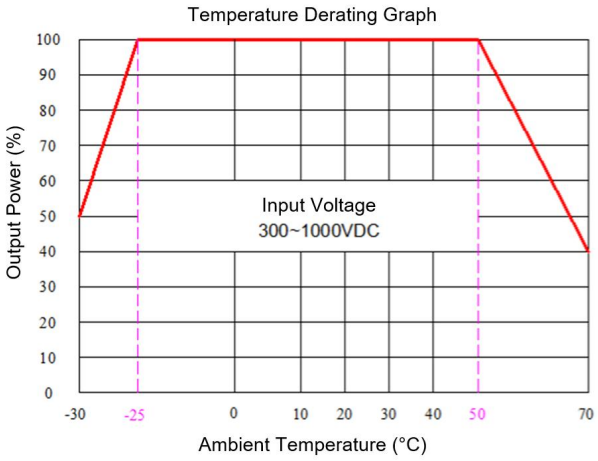
Weight & Dimensions	Package Type	Weight (Typ.)	Dimensions L x W x H	
	H1	155g	70.00X48.00X23.50 mm	2.756X1.890X0.925 inch
	H1-T	195g	96.00X53.80X32.50 mm	3.779X2.118X1.279 inch
	H1-TS	235g	96.00X53.80X37.00 mm	3.779X2.118X1.456 inch

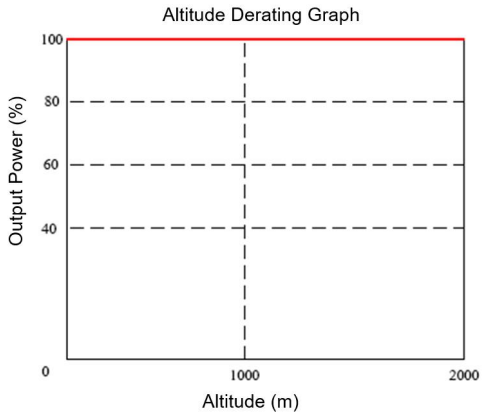
EMC Performance

Items			Standards	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS A (with the recommended circuit 2)
		RE	CISPR32/EN55032	CLASS A (with the recommended circuit 2)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf. Criteria B (with the recommended circuit 2)
		CS	IEC/EN61000-4-6	3Vr.m.s Perf. Criteria B (with the recommended circuit 2)
		ESD	IEC/EN61000-4-2	Contact ±6KV, Air ±8KV Perf. Criteria B (with the recommended circuit 1)
		Surge	IEC/EN61000-4-5	Line to line ±2KV, Perf. Criteria B (with the recommended circuit 2)
		EFT	IEC/EN61000-4-4	±2KV, Perf. Criteria B (with the recommended circuit 2)
		Voltage dips & Interruptions	IEC/EN61000-4-11	0%~70%, Perf. Criteria B

Product Characteristics Graphs







Note 1: The output power should be derated based on the input voltage derating graph at 200~300VDC & 1000~1200VDC.
Note 2: This product should operate under the condition of natural air, please contact us if it could be used at a closed space.

Recommended Typical Application Circuit & EMC Solution

1, Typical circuit diagram for application

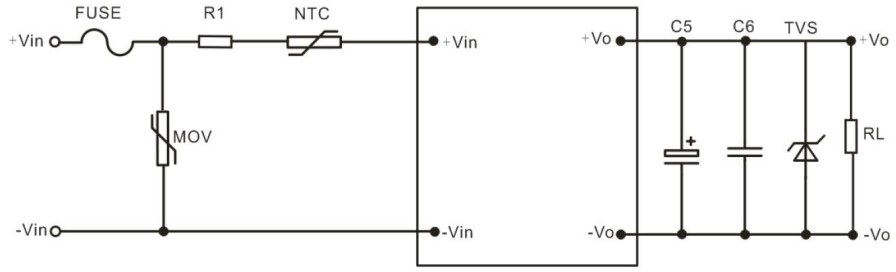


Figure – Circuit 1

Output Volt.	C5	C6	TVS
5V	680uF/16V	4.7uF/50V/1206	SMBJ10A
12V	470uF/25V	1.0uF/25V/1206	SMBJ15A
15V	330uF/35V	0.2uF/50V/1206	SMBJ18A
24V	220uF/50V	0.1uF/50V/1206	SMBJ28A

Note: A high-frequency, low-resistance electrolytic capacitor is recommended for C5 which capacitance and current should be referred to the manufacturer's specification. The withstand voltage should be derated at least 80%. C6 is a ceramic capacitor to suppress the high-frequency noise. TVS is recommended to protect the output circuit under abnormal condition.

2, Recommended EMC Circuit Diagram (for high EMC requirement)

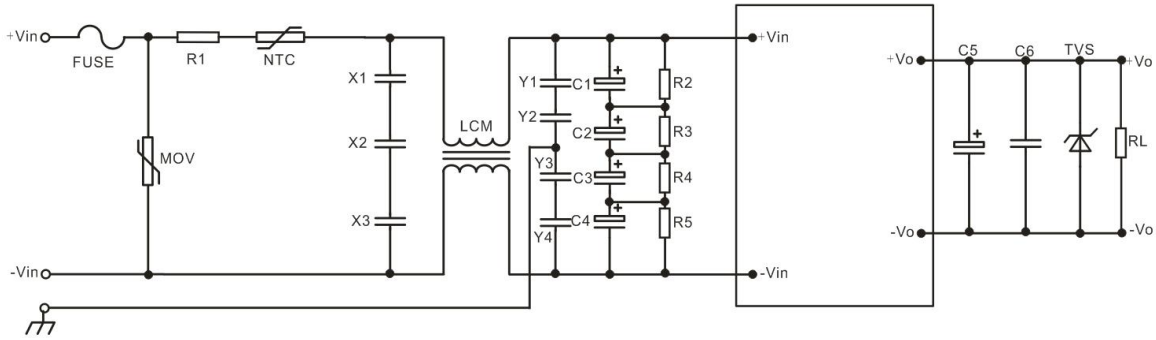
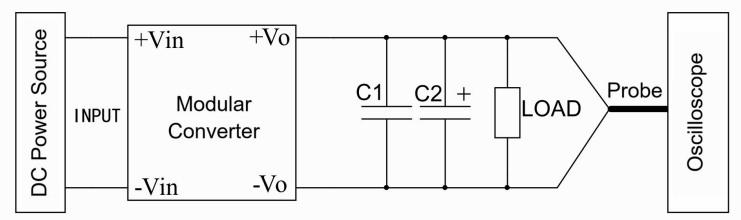


Figure – Circuit 2

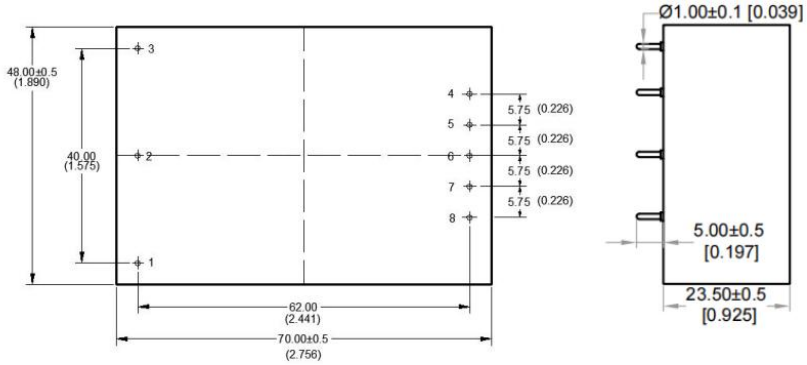
Components	Descriptions	Recommended Values	Remarks
FUSE	Shut off the input while the converter operating under abnormal condition	TBD by the actual input current	Required
R1 (Current-Limiting Resistor)	Suppress the start-up transient surge current	370Ω/10W wire-wound resistor	
NTC	Suppress the surge current	5D-15	
MOV (Metal Oxide Varistor)	Absorb the surges	20D152K/6500A	Optional according to the actual application
X1/X2/X3 (CBB Capacitors)	Suppress the differential mode interference	3x 105J/450V connected in series	
LCM (Common mode choke)	Suppress the Common mode interference	8mH/0.8A	
Y1/Y2/Y3/Y4 (Y Capacitors)		4x Y1/222M/400V connected in series	
C1/C2/C3/C4 (Electrolytic capacitors)	Low frequency Filter	220uF/450V	
R2/R3/R4/R5(SMD capacitors)	Voltages balance	1MΩ/2W	

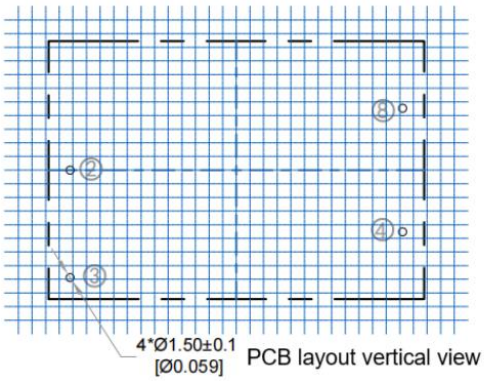
Ripple & Noise Test Instruction (Parallel-line Method, 20MHZ bandwidth)



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-resistance 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.

H1 Mechanical Dimensions



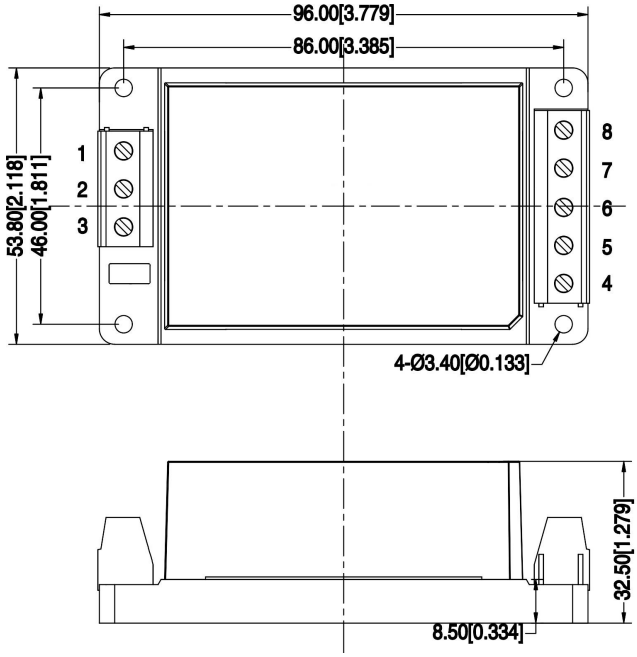


Unit: mm[inch]
Grid 2.54x2.54[0.10x0.10]
Pin diameter tolerance: ±0.10[±0.004]
General tolerance: ±0.50[±0.020]

Pin-out Function Description

Pin No.	1	2	3	4	5	6	7	8
Function	No Pin	-Vin	+Vin	+Vo	No Pin	No Pin	No Pin	-Vo

H1-T Package Mechanical Dimensions

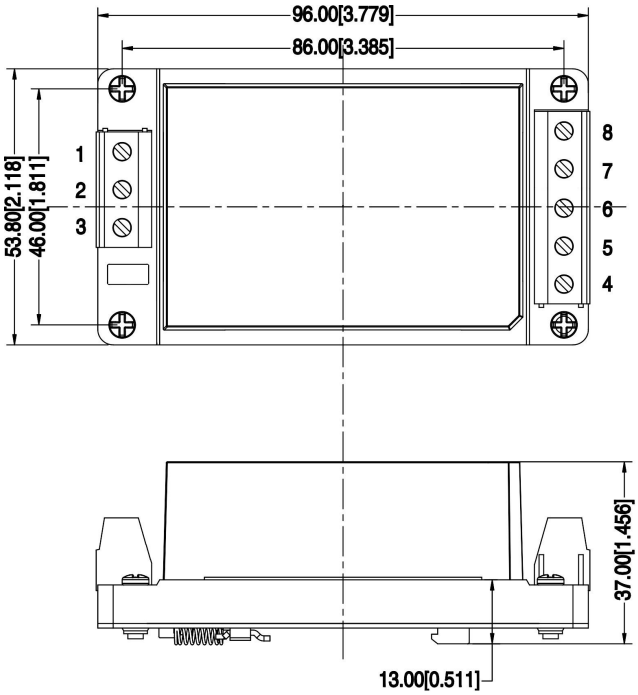


Note:
Unit: mm[inch]
Lead wires gauge: 24-12 AWG
Screwing torque: 0.4N.m Max
General tolerance: ±1.00[±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6	7	8
Function	NC	-Vin	+Vin	+Vo	NC	NC	NC	-Vo

H1-TS Package Mechanical Dimensions



Note:
Unit: mm[inch]
Lead wires gauge: 24-12 AWG
Screwing torque: 0.4N.m Max
General tolerance: ±1.00[±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6	7	8
Function	NC	-Vin	+Vin	+Vo	NC	NC	NC	-Vo

Application Notice

1.The product should be used according to the specification, 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 on this datasheet 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.

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