



20AC1E_4 series

20W - AC-DC converter

AC-DC Converter

20 Watt

- ⊕ Wide input voltage range: 85-265VAC/120-380VDC
- ⊕ No load power consumption $\leq 0.15W$
- ⊕ Transfer efficiency: 88% (typ.)
- ⊕ Switching frequency: 65kHz
- ⊕ Protections: short-circuit, over-current, over-voltage
- ⊕ Isolation voltage: 4000VAC
- ⊕ Meets IEC62368/UL62368/EN62368 test standard
- ⊕ Pass LPS test
- ⊕ Plastic case, meet flammability UL94 V-0
- ⊕ 5000m altitude application

Introducing our state-of-the-art 20AC1E_4 series, designed for versatility and reliability: With a wide input voltage range of 85-265VAC/120-380VDC, this module ensures adaptability across various operating environments. It boasts an impressively low no-load power consumption of $\leq 0.15W$, optimizing energy efficiency. Delivering a high transfer efficiency of 88% (typical), and operating at a switching frequency of 65kHz, this module guarantees smooth and efficient performance. Equipped with comprehensive protections against short-circuit, over-current, and over-voltage, it ensures safe operation under all conditions. The module features a high isolation voltage of 4000VAC, providing robust safety and reliability.



Common specifications	
Short circuit protection	Full input voltage range - Continuous, Self-recovery Hiccup
Over current protection	Input 100-265VAC - $\geq 130\%$ Io Self-recovery - Hiccup
Over voltage protection	Output 5VDC ≤ 10 VDC Output 12VDC ≤ 18 VDC Output 15VDC ≤ 20 VDC Output 24VDC ≤ 30 VDC
Switching frequency	65 KHz (typ.)
Operating temperature	-40°C - +75°C Derating base on Temperature Derating Curve (see product characteristic curve)
Storage temperature	-40°C - +85°C
Soldering temperature	Wave soldering 260 \pm 4°C, time 5-10S Manual soldering 360 \pm 8°C, time 4-7S
Relative humidity	10~90% RH
Hot plug	Unavailable
Remote control terminal	Unavailable
Safety standard	EN60950, IEC60950, UL62368
Vibration	10-55Hz, 10G,30Min, alongX,Y,Z
Safety class	CLASS II
MTBF (MIL-HDBK-217F@25°C)	>300,000 Hours
Case material	Black flame-retardant heat-resistant plastic (UL94 V-0)
Packing dimension	53.8 x 28.8 x 23.5 mm
Product weight	50g(TYP.)
Cooling method	Natural air cooling

Output specifications					
Item	Operating condition	Min	Typ	Max	Units
Voltage accuracy	Full input voltage range, Any load		± 1.0	± 2.0	%
Line Regulation	Nominal Load			± 0.5	%
Load regulation	Nominal input voltage, 20%~100% load			± 1.0	%
Minimum load	Single Output	0			%
Turn-on delay time	Input 115VAC (full load) Input 220VAC (full load)		500		mS
Power-off holding time	Input 115VAC (full load) Input 220VAC (full load)		14 70		mS
Dynamic response	Overshoot range 25%~50%~25% Recovery time 50%~75%~50%	-5.0		+5.0	%
		-5.0		+5.0	mS
Output overshoot	Input full voltage range		$\leq 10\%V_o$		%
Drift coefficient		-	$\pm 0.03\%$	-	%/°C
Ripple noise*			80	100	mV

Note: *Ripple& Noise is tested by Twisted Pair Method, details please see Ripple& Noise Test at back.

Isolation specifications					
Item	Operating Conditions	Min	Typ	Max	Units
Isolation voltage	Input-Output Test 1min, leakage current $\leq 5mA$	4000			VAC
Insulation resistance	Input-Output @ DC500V	100			MΩ

Input specifications					
Item	Operating condition	Min	Typ	Max	Units
Input voltage range	AC input	85	220	265	VAC
	DC input	120	310	380	VDC
Input frequency range		47	50	63	Hz
Input current	100VAC			0.4	A
	220VAC			0.25	A
Surge current	100VAC			10	A
	220VAC			20	A
No-load power consumption	Input 115VAC Input 230VAC		0.08	0.1	W
External fuse	3.15A-5A/250VAC slow-fusing				
Leakage current	0.5mA TYP/230VAC/50Hz				

- The product should be used under the specification range, otherwise it will cause permanent damage to it.
- Product's input terminal should connect to fuse;
- If the product operated below the minimum load request, we cannot ensure that the performance of product is in accordance with all the indexes in this manual;
- If the product worked beyond the load range, we cannot ensure that the performance of product is in accordance with all the indexes in this manual;
- Unless otherwise specified, data in this datasheet are tested under conditions of Ta = 25°C, humidity <75% when inputting nominal voltage and outputting rated load (pure resistance load);
- All index testing methods in this datasheet are based on our company's corporate standards.
- The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, please directly contact our technician for specific information;
- We can provide customized product service;
- The product specification may be changed at any time without prior notice.

Example:
20AC1E_05S4
 20 = 20Watt; AC = AC-DC; 1E = Cost effective;
 05 = 5Vout; S = Single output; 4 = 4 kVAC isolation

20AC1E_4 series

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EMC specifications

EMC	EMI	CE	CISPR22/EN55032	CLASS B (see recommended circuit Photo 2)
EMC	EMI	RE	CISPR22/EN55032	CLASS B (see recommended circuit Photo 2)
EMC	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria B (see recommended circuit Photo 1)
EMC	EMS	CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria B (see recommended circuit Photo 1)
EMC	EMS	ESD	IEC/EN61000-4-2	Contact $\pm 6\text{KV}$ / Air $\pm 8\text{KV}$ Perf.Criteria B
EMC	EMS	Surge	IEC/EN61000-4-5	$\pm 1\text{KV}$ $\pm 2\text{KV}$ Perf.Criteria B (Bare board) Perf.Criteria B (see recommended circuit Photo 1)
EMC	EMS	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$ Perf.Criteria B (see recommended circuit Photo 1)
EMC	EMS	Voltage dips and interruptions	IEC/EN61000-4-11	0%~70% Perf.Criteria B

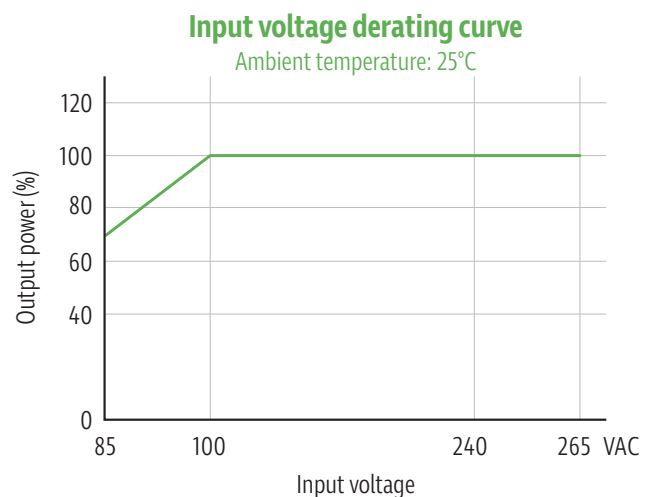
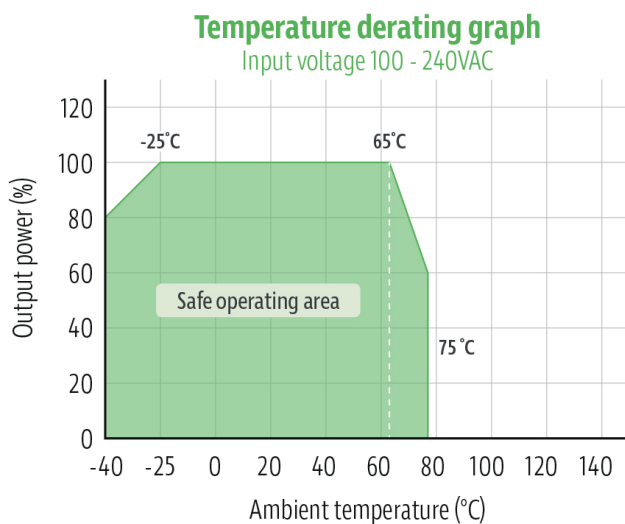
Product Selection Guide

Approval	Model	Output Power (W)	Output Voltage V_o (V)	Output Current I_o (mA)	Max. Capacitive Load (μF)	Ripple & Noise 20MHz (Max)	Efficiency Full Load, 220VAC Typ. (%)
	20AC1E_05S4	20	+5.0	4000	10000	50	82
	20AC1E_09S4	20	+9	2222	6000	80	83
	20AC1E_12S4	20	+12	1666	5000	80	84
	20AC1E_15S4	20	+15	1333	3000	80	85
	20AC1E_24S4	20	+24	833	2000	100	88

Note:

- 1: The typical output efficiency is based on that product is full loaded and burned-in after half an hour.
- 2: The fluctuation range of full load efficiency (%typ) is $\pm 2\%$, full load output efficiency = total output power/module's input power.

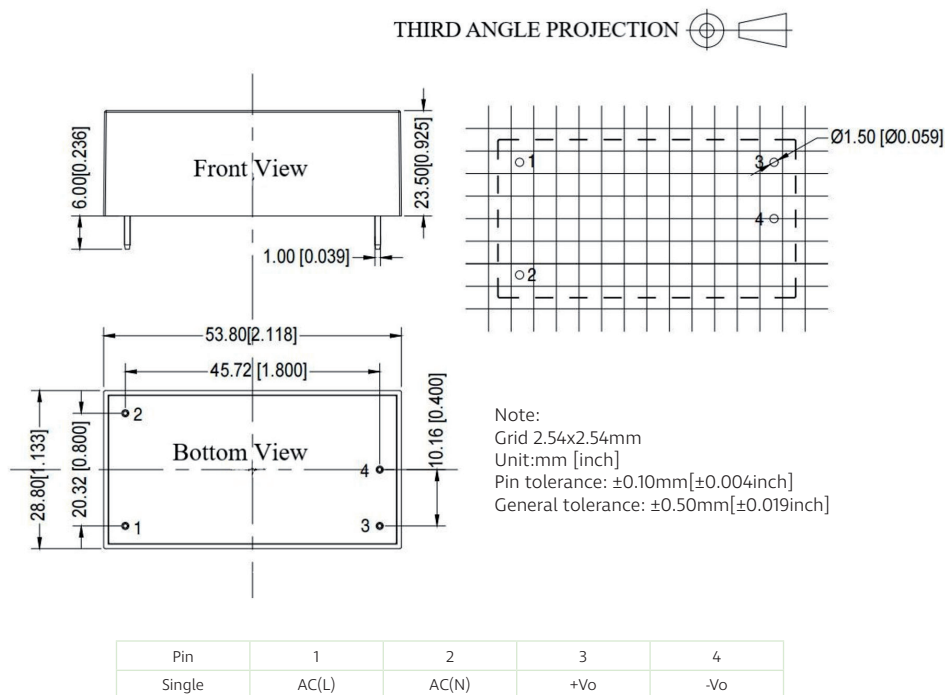
Product characteristic curve



Note

- 1: Input Voltage should be derated base on Input Voltage Derating Curve when it is 85~100VAC/240~265VAC/120~140VDC/ 340~380VDC.
- 2: Our product is suitable to use under natural air cooling environment, if use it under closed condition, please contact with us.

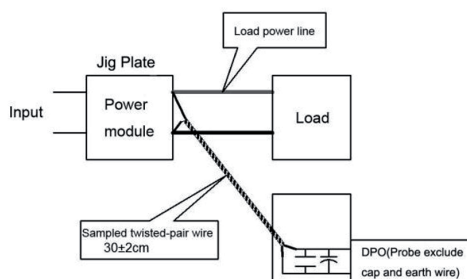
Dimensions and recommended layout



Ripple & noise Test: (twisted pair method 20MHz bandwidth)

Test Method:

- 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.
- Output Ripple& Noise Test Method: Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm \pm 2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



Typical application circuit



Photo 1

FUSE	Recommended 2A, 250VAC(necessary)	C2	0.1uF/50V	TVS1	24V:SMBJ30.0A
MOV	14D511K	TVS1	5V:SMBJ7.0A	TVS1	48V:SMBJ30.0A
NTC	5D-9	TVS1	9V:SMBJ12.0A	LCM	common mode inductor 180uH
C1	electrolytic capacitor 220uF	TVS1	12V:SMBJ20.0A		

- Note:
- C1 is output high frequency low impedance filter electrolytic capacitor, it can decrease output ripple. Customer can choose according to their own condition. The withstand voltage is over 1.2 times of output voltage.
 - TVS1 is transient voltage absorber, suggested to protect post circuit when the module fails. Please choose the right model per above table.

EMC solution recommended circuit (used under high EMC requirement)

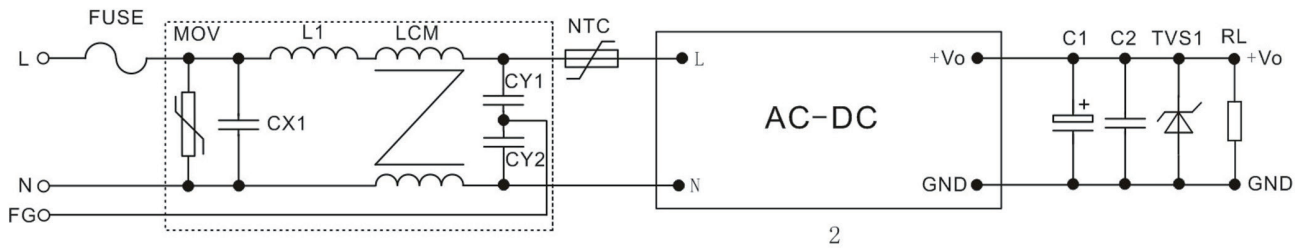


Photo 2

FUSE	Recommended 2A, 250VAC (necessary)	CY1, CY2	1nF/400VAC
MOV	14D511K	L1	820uH
NTC	5D-9	LCM	15-25mH
CX1	0.1uF/275VAC		