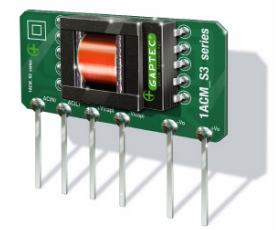
GAPTEC®
GREEN TECHNOLOGY

1ACM_S3 Series

1W- Single Output AC-DC Converter - Universal Input - Isolated & Regulated



AC-DC Converter 1 Watt

- **Wide input voltage range: 85~264VAC/70~400VDC**
- **Over current protection**
- **Short circuit protection (SCP)**
- **High efficiency, high power density**
- **Low power consumption, green power**
- **Industrial grade**
- **Open frame, ultra-slim SIP package**
- **Flexible design of peripheral circuit reduces layout problems**

The 1ACM_S3 series is a high efficiency green power module provided by GAPTEC. The features of this series are: Accepts either AC or DC input, wide input voltage, high efficiency, low loss, safety isolation etc. All models are particularly suitable for the applications such as industrial, electric power, instrumentation, smart home which do not have high requirement on EMC. EMC application circuit must be added if the products need to be applied to EMC harsh environment.

SHORT CIRCUIT PROTECTED · 100% RoHS compliant · c UL us UL-60950-1 (E347551) · CE

Common specifications

Short circuit protection:	Continuous, automatic recovery
Temperature rise at full load:	25°C TYP
Cooling:	Free air convection
Operation temperature range: (Power derating above 55°C)	-40°C to +85°C
Storage temperature range:	-40°C to +105°C
Lead temperature	300°C MAX, 1.5mm from case for 10 sec
Storage humidity range:	< 85%
Power derating:	-40°C ~ -20°C: 1.0%/°C MIN 55°C ~ 85°C: 0.67%/°C MIN
Safety standard:	IEC60950/EN60950/UL60950
Hot plug:	Unavailable
Case material:	Plastic [UL94-V0]
MTBF (MIL-HDBK-217F@25°C):	>300,000 hours
Weight:	6 gramm (Typ.)

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input voltage range	• Conventional • AC Input • DC Input	100 85 70		240 264 400	VAC VAC VDC
Input frequency		47		440	Hz
Input current	• 115VAC • 277VAC			0.12 0.06	A A
Inrush current	• 115VAC • 277VAC		9 15		A A

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-Output, tested for 1 minute	3000			VAC

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	• 5V output • Others			±8 ±5	% %
Line regulation	Full load		±1.5		%
Load regulation	5% to 100% load		±2.5		%
Temperature drift	100% full load		±0.15		%/°C
Ripple & Noise*	20MHz Bandwidth (peak-peak value)		50	120	mV
Stand-by Power Consumption				0.25	W
Over-current Protection	≥110%Io self-recovery				
Min. load			5		%
Switching frequency	Full load, nominal input			60	KHz
Hold-up Time	• 115VAC Input • 230VAC Input		40 180		ms ms

*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

Example:
1ACM_05S3
1 = 1Watt; AC = AC-DC; M = case style; 05 = 5Vout; S = Single Output; 3 = 3000 VDC isolation

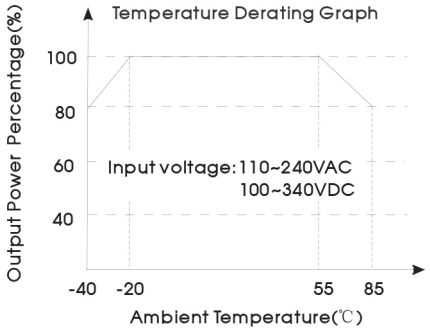
Note:
1. Models listed with strike-through text have been officially discontinued.
2. Unless otherwise specified, all specifications are measured at rated input voltage and rated output load, TA = 25°C, humidity < 75%.
3. All specifications stated in this datasheet are subject to the above listed models only. For specifications of non-standard models, please contact our technical support team.

Approval	Model	Package	Power [W]	Output [Vo]	Output [Io]	Ripple and Noise [mV, typ]	Efficiency [%, typ]	Capacitive load [µF, max]	Standby Power [W, typ]
UL/CE	1ACM_05S3	35x27x11mm	1	5V	200mA	120	66	220	0.5
UL/CE	1ACM_09S3	35x27x11mm	1	9V	111mA	120	67	100	0.5
UL/CE	1ACM_12S3	35x27x11mm	1	12V	83mA	120	70	100	0.5
UL/CE	1ACM_15S3	35x27x11mm	1	15V	67mA	120	69	100	0.5
UL/CE	1ACM_24S3	35x27x11mm	1	24V	42mA	120	68	100	0.5

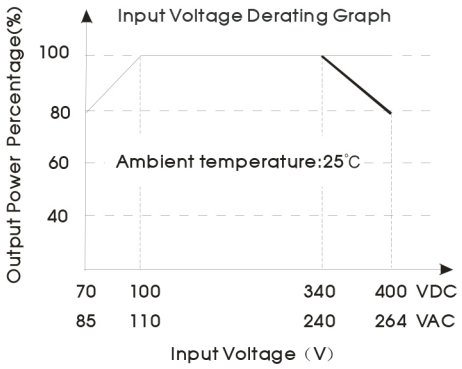
GAPTEC-Electronic GmbH & Co. KG
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Specifications subject to change without notice.

EMC specifications			
EMC / EMI / Conducted disturbance	CISPR22/EN55022, CISPR22/EN55022,	CLASS A (see Typical application circuit) CLASS B (see EMC solution-recommended circuit)	
EMC / EMI / Radiated emission	CISPR22/EN55022, CISPR22/EN55022,	CLASS A (see Typical application circuit) CLASS B (see EMC solution-recommended circuit)	
EMC / EMS / Electrostatic discharge	IEC/EN 61000-4-2	±4KV	perf. Criteria B
EMC / EMS / Radiation Immunity	IEC/EN 61000-4-3	10V/m (see EMC solution-recommended circuit)	perf. Criteria A
EMC / EMS / EFT	IEC/EN 61000-4-4 IEC/EN 61000-4-4	± 2kV (see Typical application circuit) ± 4kV (see EMC solution-recommended circuit)	perf. Criteria B perf. Criteria B
EMC / EMS / Surge Immunity	IEC/EN 61000-4-5	±2KV/±4KV (see Typical application circuit or EMC solution-recommended circuit)	perf. Criteria B
EMC / EMS / Conducted disturbance	IEC/EN 61000-4-6	10 Vr.m.s	perf. Criteria A
EMC / EMS / Immunity for power	IEC/EN 61000-4-8	10A/m	perf. Criteria A
EMC / EMS / Voltage dips, short and drop interruptions immunity	IEC/EN 61000-4-11	0%-70%	perf. Criteria B

Typical characteristics

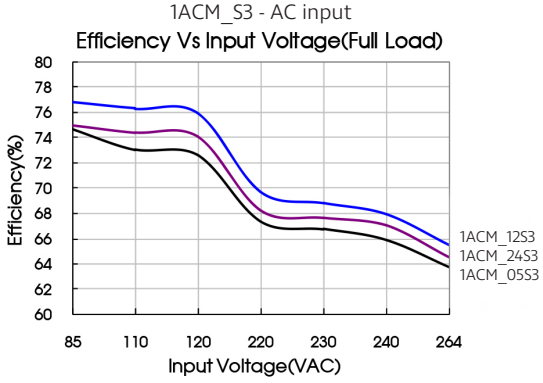


Note: Input voltage should be derated based on temperature derating when it is 85~110VAC /240~264VAC/70~100VDC/340~400VDC.

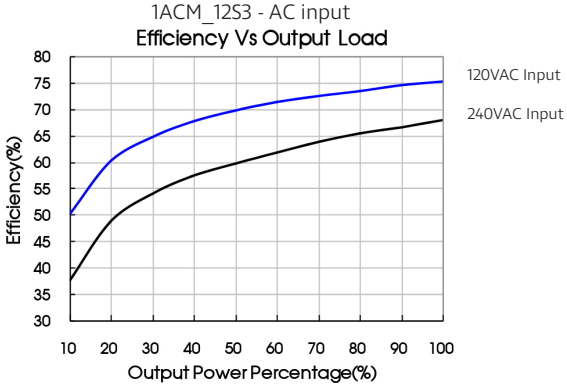


Efficiency

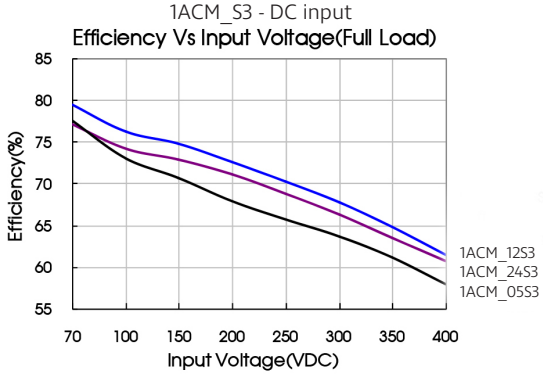
1ACM_S3 - AC input



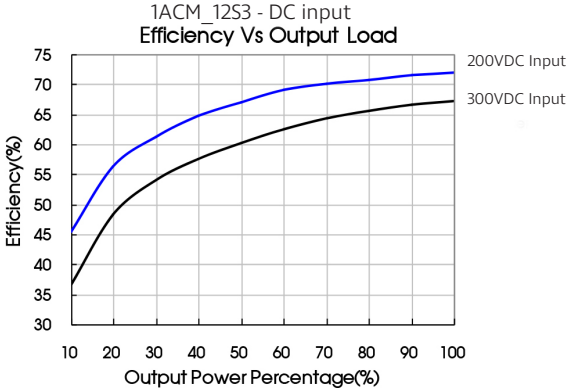
1ACM_12S3 - AC input



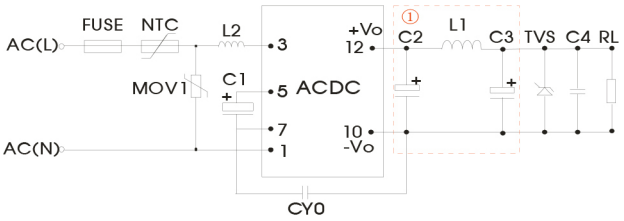
1ACM_S3 - DC input



1ACM_12S3 - DC input



Typical application circuit

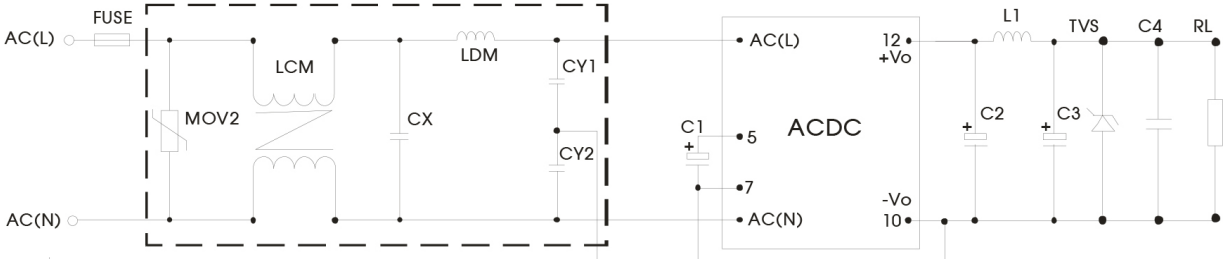


Note: ①is Pi filter circuit.

Model	Fuse (required)	NTC	MOV1	C1 (required)	L2	C2 (required)	L1 (required)	C3 (required)	C4	CY0	TVS
1ACM_05S3	1A/250V	5D-9	S14K350	4.7μF/400V	1mH	150μF/35V	2.2μH	68μF/35V	0.1μF/50V	1nF/400V	SMBJ7.0A
1ACM_09S3	1A/250V	5D-9	S14K350	1μF/400V	1mH	150μF/35V	2.2μH	68μF/35V	0.1μF/50V	1nF/400V	SMBJ12A
1ACM_12S3	1A/250V	5D-9	S14K350	1μF/400V	1mH	100μF/35V	2.2μH	68μF/35V	0.1μF/50V	1nF/400V	SMBJ20A
1ACM_15S3	1A/250V	5D-9	S14K350	1μF/400V	1mH	100μF/35V	2.2μH	68μF/35V	0.1μF/50V	1nF/400V	SMBJ20A
1ACM_24S3	1A/250V	5D-9	S14K350	1μF/400V	1mH	100μF/35V	2.2μH	68μF/35V	0.1μF/50V	1nF/400V	SMBJ30A

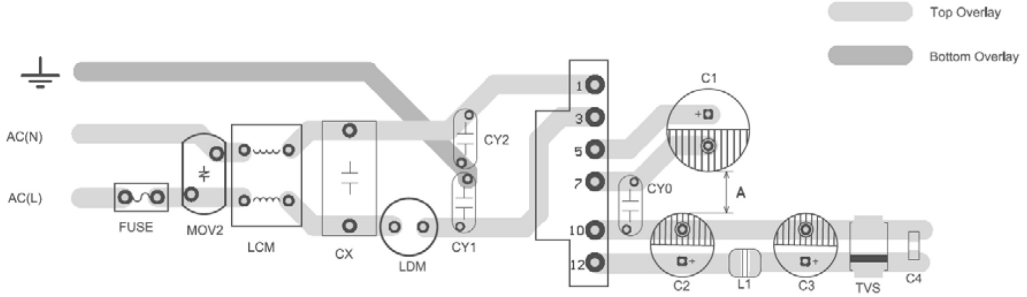
Note:
C1, C2 and C3 are electrolytic capacitors. They are required both AC input and DC input.
The value of C1 is recommended to be 4.7μF /400V. When the input voltage is above 370VDC, the recommended value of C1 is 4.7μF/450V). C2 and C3 are output filer capacitors, they are recommended to be high frequency and low impedance electrolytic capacitors. Capacitance and rated ripple current of capacitors refer to the datasheets provided by the manufactures. Voltage derating of capacitors should be 80% or above. C4 is a ceramic capacitor, which is used to filter high frequency noise. C2, C3 and L1 form a pi-type filter circuit. Current of L1 and L2 refer to the datasheets provided by the manufactures, current derating should be 80% or above. TVS is a recommended component to protect post-circuits (if converter fails).

EMC recommended circuit



EMC application circuit with higher requirements

EMC recommended circuit PCB lay-

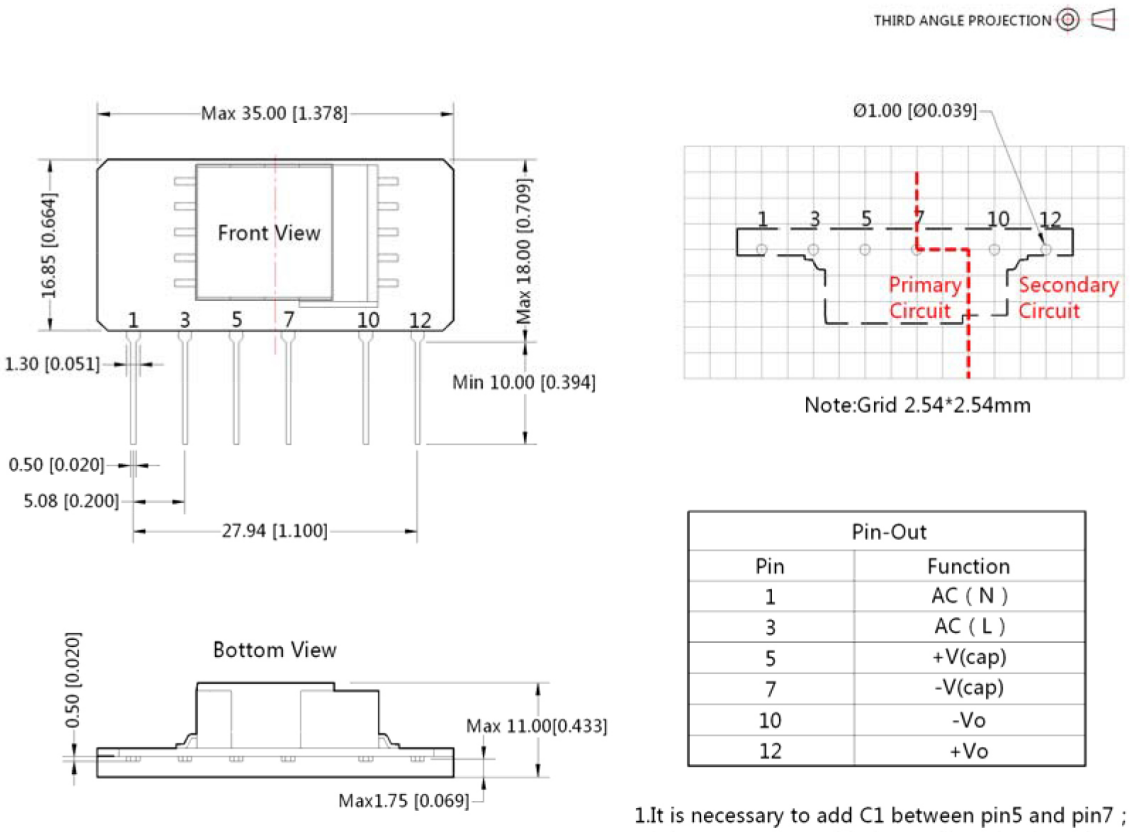


Recommended EMC circuit-PCB layout
Suggestions for safety regulation and wiring width: wire width ≥3mm, distance between wires ≥6mm, and distance between wire and ground ≥6mm, A≥6.4mm

Recommended Parameter

Components	Recommended parameter
MOV2	S14K350
CY1, CY2	1nF/400VAC
CX	0.1μF/275VAC
LCM	10mH
LDM	0.3mH
SP-ACB01	1KV/2KV Surge protector
Fuse (required)	1A/250V, slow fusing

Mechanical dimensions



Note:Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	AC (N)
3	AC (L)
5	+V(cap)
7	-V(cap)
10	-Vo
12	+Vo

Note:
Unit :mm[inch]
Pin diameter tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]

1.It is necessary to add C1 between pin5 and pin7 ;
2.It is necessary to add pi-type filter circuit to the output,such as the typical application of Figure 1;
3.It is needed to have distance ≥6.4mm for safety between external componets in primary circuit and secondary circuit.