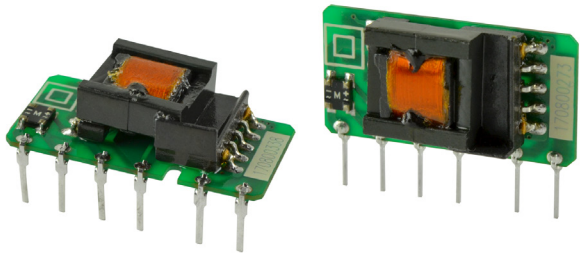
CUI INC®

SERIES: PBO-1 | DESCRIPTION: AC-DC POWER SUPPLY

FEATURES

- up to 1 W continuous power
- ultra-compact SIP package
- available in straight-pin and bent-pin configurations
- wide input voltage range
- over current and short circuit protections
- 3,000 Vac isolation
- UL 60950-1, CE safety approvals



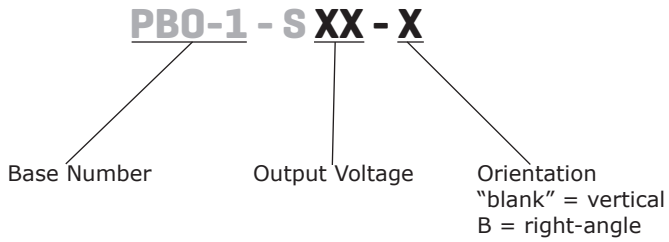
RoHS c UL us CE

MODEL

MODEL	output voltage (Vdc)	output current min (mA)	output current max (mA)	output power max (W)	ripple and noise[1] max (mVp-p)	efficiency[2] typ (%)
PBO-1-S5	5	10	200	1	120	66
PBO-1-S9	9	5.55	111	1	120	67
PBO-1-S12	12	4.15	83	1	120	70
PBO-1-S15	15	3.35	67	1	120	69
PBO-1-S24	24	2.1	42	1	120	68

Notes:
1. At full load, nominal input, 20 MHz bandwidth oscilloscope, see Application Circuit.
2. At 230 Vac input.
3. All specifications are measured at Ta=25°C, humidity <75%, 115 or 230 Vac input voltage, and rated output load unless otherwise specified.

PART NUMBER KEY



INPUT

parameter	conditions/description	min	typ	max	units
voltage		85 70		305 430	Vac Vdc
frequency		47		63	Hz
current	at 115 Vac at 277 Vac			0.12 0.06	A A
inrush current	at 115 Vac at 277 Vac		9 15		A A
no load power consumption	24 Vdc output models all other models			0.3 0.25	W W

OUTPUT

parameter	conditions/description	min	typ	max	units
capacitive load	5 Vdc output models all other models			220 100	µF µF
initial set point accuracy	5 Vdc output models all other models			±8 ±5	% %
line regulation	at full load		±1.5		%
load regulation	from 5~100% load		±2.5		%
hold-up time	at 230 Vac	150	180		ms
switching frequency				100	kHz
temperature coefficient			±0.15		%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
over current protection	auto recovery	110		500	%
short circuit protection	continuous, auto recovery				

SAFETY & COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute	3,000			Vac
safety approvals	UL 60950-1, EN 60950-1, IEC 60950-1				
safety class	Class II				
conducted emissions	CISPR32/EN55032, Class A (external circuit required, see Figure 1)				
	CISPR32/EN55032, Class B (external circuit required, see Figure 2)				
radiated emissions	CISPR32/EN55032, Class A (external circuit required, see Figure 1)				
	CISPR32/EN55032, Class B (external circuit required, see Figure 2)				
ESD	IEC/EN61000-4-2, contact ±4 kV, Class B				
radiated immunity	IEC/EN61000-4-3, 10V/m, Class A (external circuit required, see Figure 2)				
EFT/burst	IEC/EN61000-4-4, ±2 kV, Class B (external circuit required, see Figure 1)				
	IEC/EN61000-4-4, ±4 kV, Class B (external circuit required, see Figure 2)				
surge	IEC/EN61000-4-5, line to line ±1 kV, Class B (external circuit required, see Figure 1)				
	IEC/EN61000-4-5, line to line ±1 kV/line to ground ±2 kV, Class B (external circuit required, see Figure 2)				
conducted immunity	IEC/EN61000-4-6, 10 Vr.m.s, Class A (external circuit required, see Figure 2)				
voltage dips & interruptions	IEC/EN61000-4-11 Class B, 0%-70% (external circuit required, see Figure 2)				
MTBF	as per MIL-HDBK-217F at 25°C	200,000			hours
RoHS	2011/65/EU				

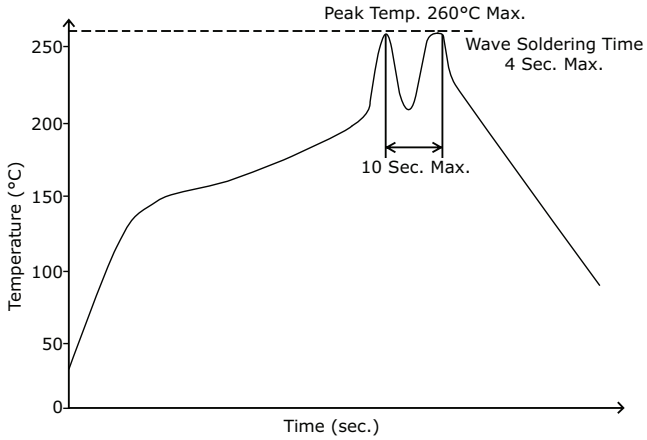
Notes: 1. The power supply is considered a component which will be installed into final equipment. The final equipment still must be tested to meet the necessary EMC directives.

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		85	°C
storage temperature		-40		105	°C
storage humidity	non-condensing			85	%

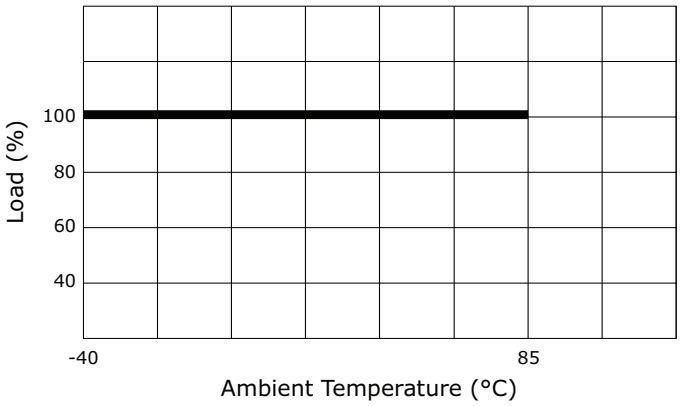
SOLDERABILITY

parameter	conditions/description	min	typ	max	units
hand soldering	for 3~5 seconds	350	360	370	°C
wave soldering	for 5~10 seconds	255	260	265	°C

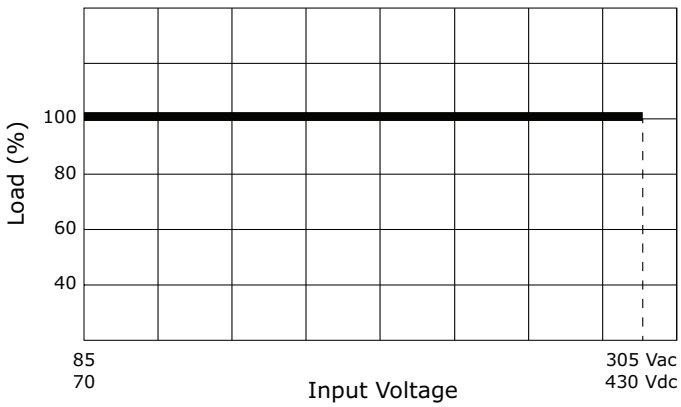


DERATING CURVES

Load vs. Ambient Temperature
(at 85~305 Vac / 70~430 Vdc Input Voltage)

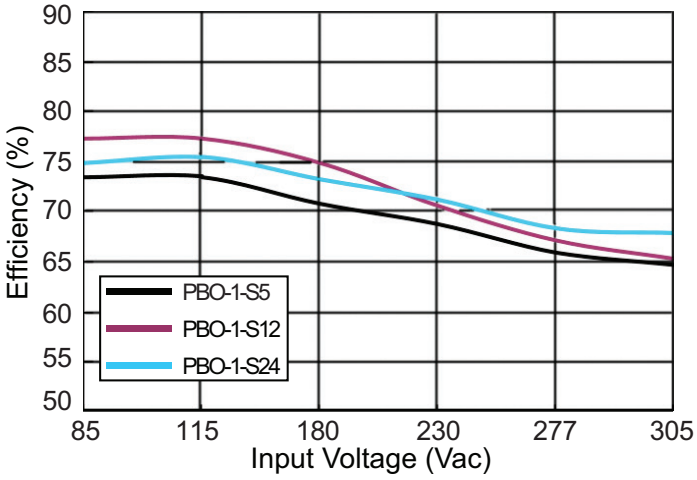


Load vs. Input Voltage
(at 25°C Ambient Temperature)

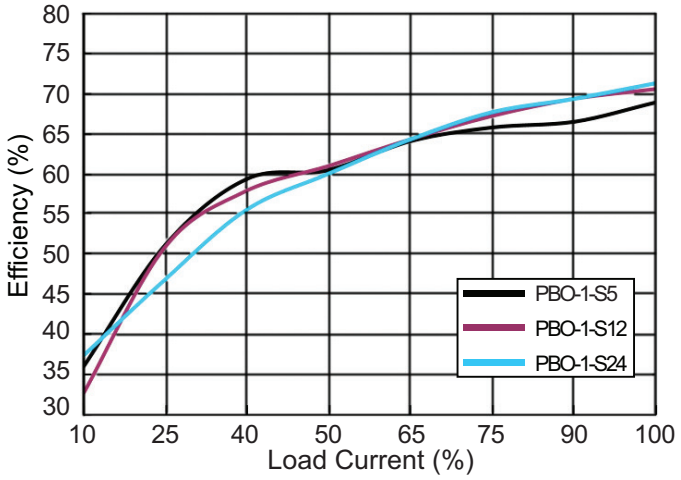


EFFICIENCY CURVES

Efficiency vs. Input Voltage
(at full load)



Efficiency vs. Load Current
(at 230 Vac)



MECHANICAL

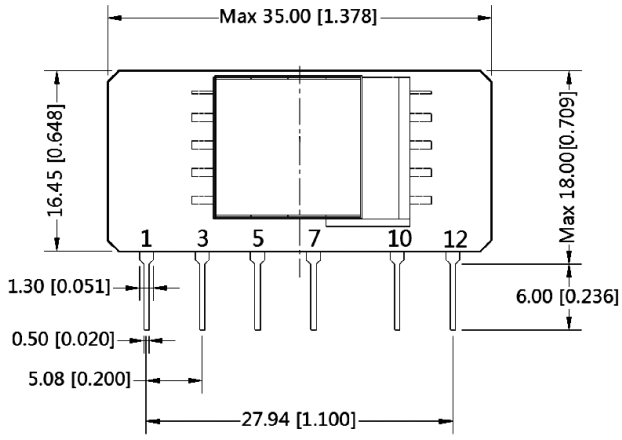
parameter	conditions/description	min	typ	max	units
dimensions	vertical models: 35.00 x 11.00 x 18.00 (1.38 x 0.43 x 0.71 inches) right-angle models: 35.00 x 18.00 x 11.00 (1.38 x 0.71 x 0.43 inches)				mm mm
weight			6		g

MECHANICAL DRAWING

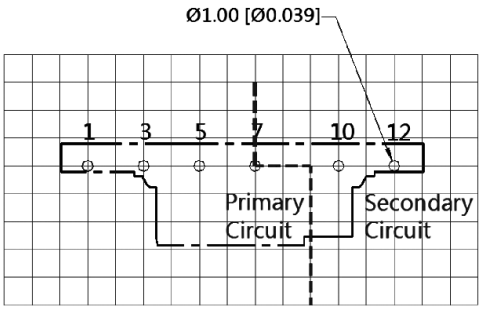
Vertical Orientation
units: mm[inch]
tolerance: ±0.50[±0.020]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS	
PIN	Function
1	AC (N)
3	AC (L)
5	+V(CAP)
7	-V(CAP)
10	-Vo
12	+Vo

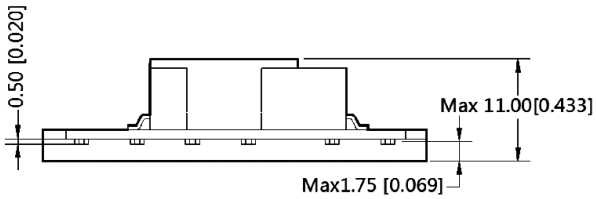
Note: 1. It is required to add C1 between pins 5 & 7 (see application circuits).



Front View



Note:Grid 2.54*2.54mm
Top View
PCB Layout



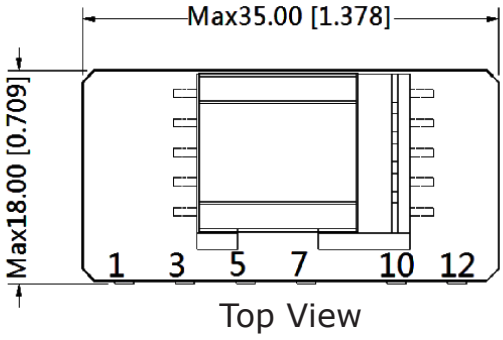
Bottom View

MECHANICAL DRAWING (CONTINUED)

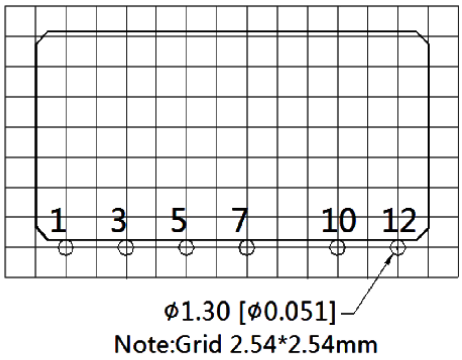
Right-angle Orientation
units: mm[inch]
tolerance: ±0.50[±0.020]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS	
PIN	Function
1	AC (N)
3	AC (L)
5	+V(CAP)
7	-V(CAP)
10	-Vo
12	+Vo

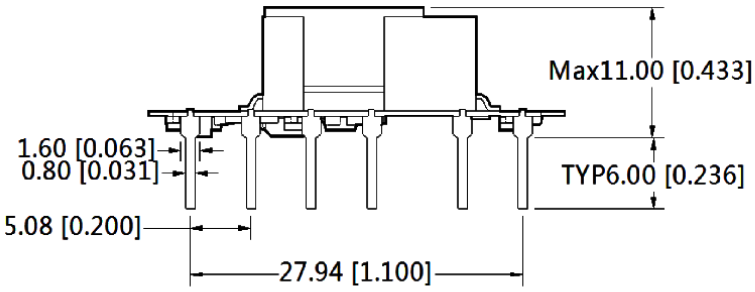
Note: 1. It is required to add C1 between pins 5 & 7 (see application circuits).



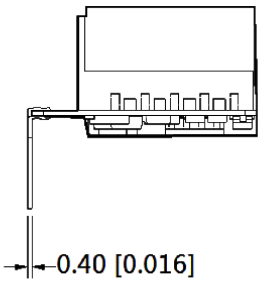
Top View



Top View
PCB Layout



Front View



Right View

APPLICATION CIRCUIT

Figure 1

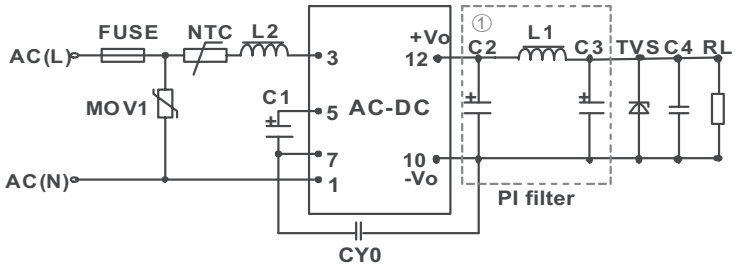


Table 1

Recommended External Circuit Components											
Vo (Vdc)	FUSE[1]	MOV1	NTC	L2	C1[1]	CY0	C2[1,2]	L1[1]	C3[1]	TVS	C4
5	1A/300V	S14K350	15D-5	1mH	4.7μF/450V	1nF/400Vac	100μF/16V	2.2μH	68μF/35V	SMBJ7.0A	0.1μF/50V
9	1A/300V	S14K350	15D-5	1mH	4.7μF/450V	1nF/400Vac	150μF/35V	2.2μH	68μF/35V	SMBJ12A	0.1μF/50V
12	1A/300V	S14K350	15D-5	1mH	4.7μF/450V	1nF/400Vac	100μF/35V	2.2μH	68μF/35V	SMBJ20A	0.1μF/50V
15	1A/300V	S14K350	15D-5	1mH	4.7μF/450V	1nF/400Vac	100μF/35V	2.2μH	68μF/35V	SMBJ20A	0.1μF/50V
24	1A/300V	S14K350	15D-5	1mH	4.7μF/450V	1nF/400Vac	100μF/35V	2.2μH	68μF/35V	SMBJ30A	0.1μF/50V

Note: 1. Required components.
2. For 5 Vdc outputs, C2 should be a solid-state capacitor.

EMC RECOMMENDED CIRCUIT

Figure 2

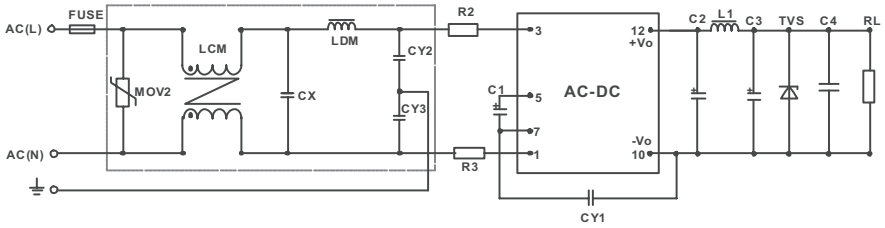


Table 2

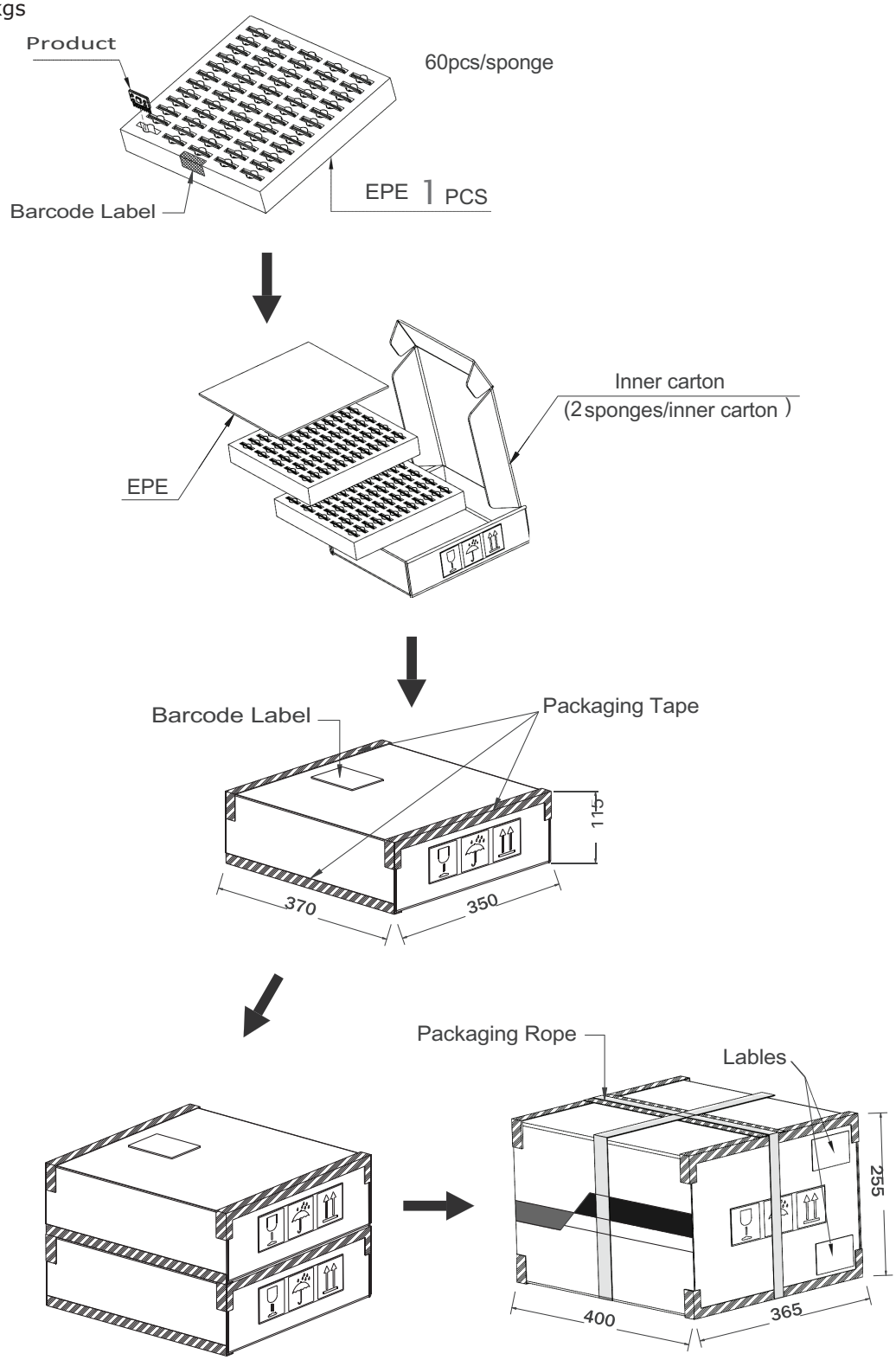
Recommended External Circuit Components	
FUSE	1 A/300 V, slow fusing
MOV2	S14K350
LCM	3.50 mH
CX	0.1 μF/275 Vac
LDM	0.33 mH
CY1/CY2/ CY3	1 nF/400 Vac
R2/R3	33 Ω/3 W

Note: Also refer to Table 1.

Notes: 3. C1 is required for both AC and DC inputs.
4. It is required to add pi-type filter circuit (C2, C3, & L1) to the output. The capacitors are recommended to be high frequency and low impedance electrolytic capacitors. For capacitance and rated ripple current of capacitors, refer to the datasheets provided by the manufacturers. Voltage derating of capacitors should be 80% or above.
5. C4 is a ceramic capacitor used to filter high frequency noise.
6. For current of L1 & L2 refer to the datasheets provided by the manufacturers. Current derating should be 80% or above.
7. TVS is a recommended component to protect post-circuits (if converter fails).
8. It is required to have a distance ≥6.4 mm for safety between external components in primary and secondary circuit.
9. It is recommended to add an insulation sheet between the bottom of the right-angle versions and the PCB when mounting.

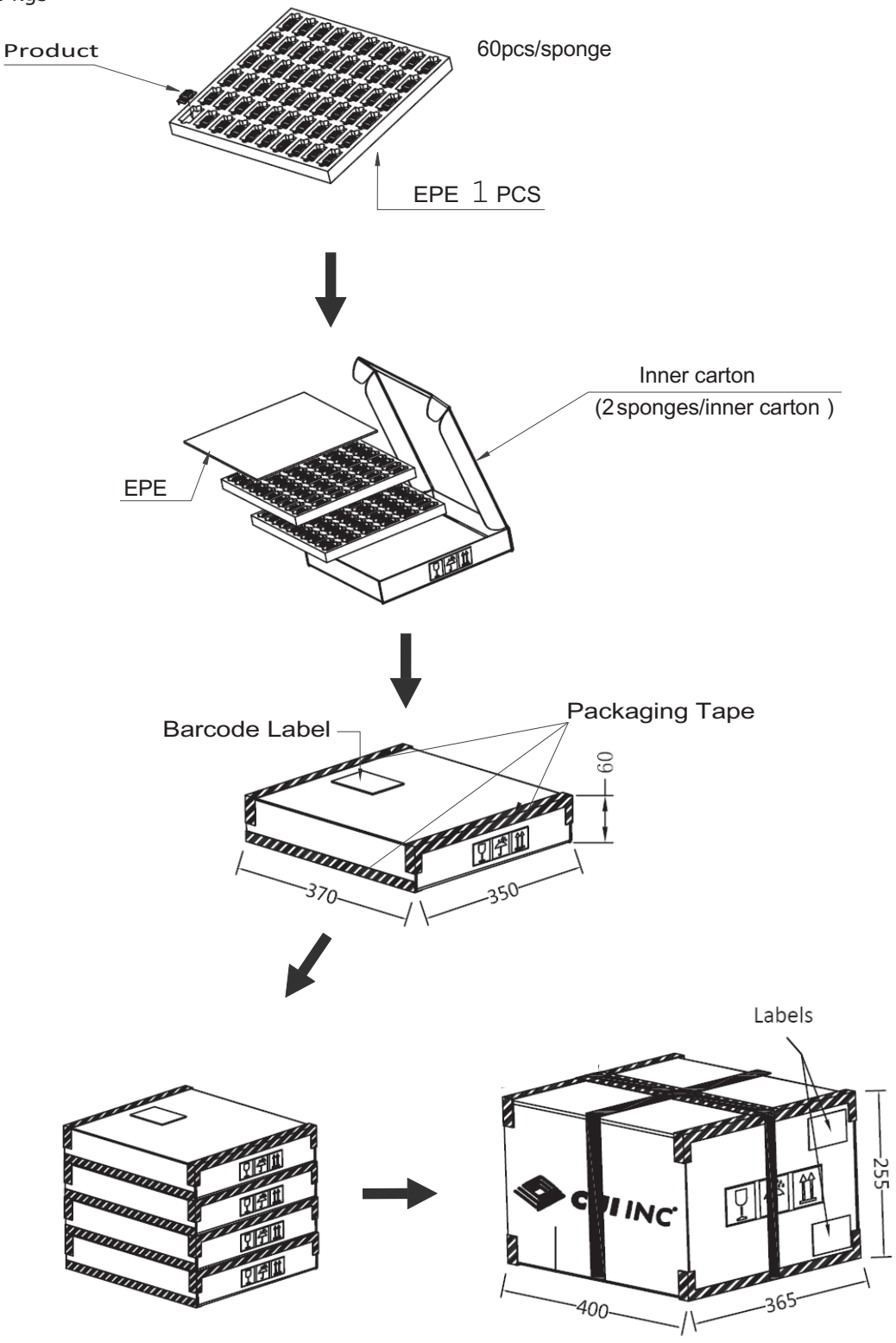
PACKAGING

Vertical Orientation
Inner Box Size: 370 x 350 x 115 mm
Carton Size: 400 x 365 x 255 mm
Inner Box QTY: 120 pcs per inner box
Carton QTY: 240 pcs per carton
Carton Weight: 2 kgs



PACKAGING (CONTINUED)

Right-angle Orientation
Inner Box Size: 370 x 350 x 60 mm
Carton Size: 400 x 365 x 255 mm
Inner Box QTY: 120 pcs per inner box
Carton QTY: 480 pcs per carton
Carton Weight: 2.31 kgs



REVISION HISTORY

rev.	description	date
1.0	initial release	12/08/2017

The revision history provided is for informational purposes only and is believed to be accurate.

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