TECHNICAL
DATA SHEET

AA45A-59FKE-R AA45E-59FKE-R AA45K-59FKE-R

PHIHONG

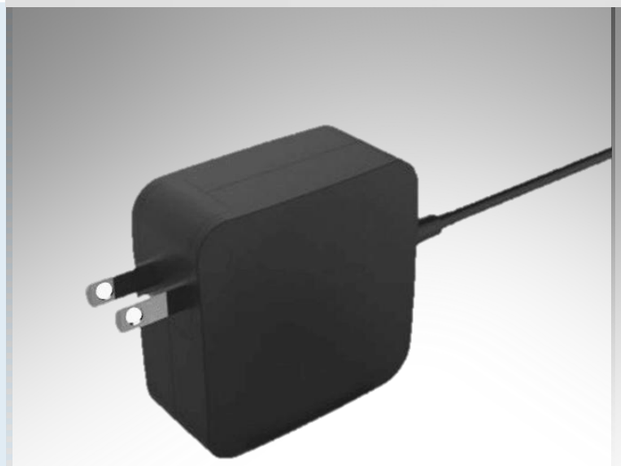
DESCRIPTION

This 45-watt USB Power Delivery Wall Adapter with USB-C Plug, built with the latest Power Delivery 3.0 technology. Designed for maximum versatility, this compact and lightweight charger delivers fast, reliable charging for smartphones, laptops, tablets, networking devices and more. Featuring a high-speed USB-C plug, ensuring safe, optimized performance every time.

AA45A-59FKE-R

FEATURES

- Power Delivery 3.0
- Support PPS protocol
- USB-C Output Connector
- US DoE Level VI Efficiency Compliance
- Over-Voltage, Over-Current, Short Circuit, & Over-Temperature Protection
- Class B EMI
- Fixed Prongs for the USA and Canada



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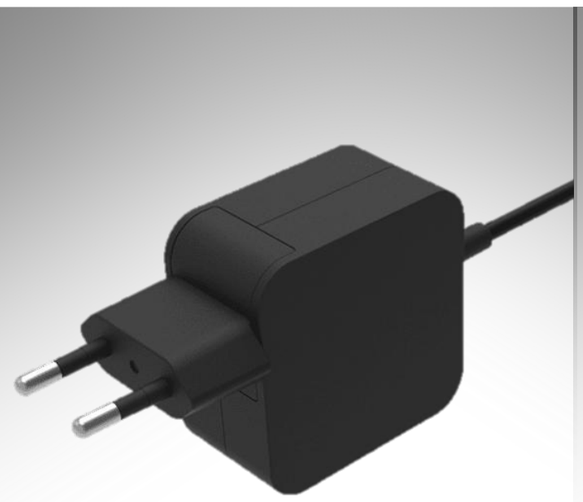
For US



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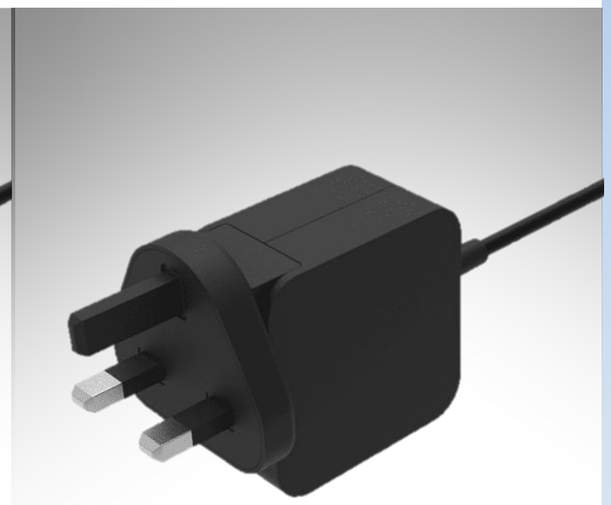
For Europe



AA45K-59FKE-R
For UK

Contact Us for more info www.phihong.com +510-445-0100

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45-watt USB Power Delivery 3.0 Wall Adapter

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Input

AC input voltage range	90 VAC to 264 VAC
AC input voltage rating	100VAC ~ 240VAC
AC input frequency	47Hz - 63 Hz
AC input current	1.2A (RMS) Max. at 100Vac
Leakage current	25uA Max. at 240Vac / 50Hz
Inrush current	The inrush current of the power supply should be less than the rating of its critical components (include bridge diode, surge limiting device) for all condition. At 264Vac/50Hz, 90 degrees, the condition inrush current must be < 150A. The I2 t shall < 22% of the fuse, surge limiting device and bridge diode rating

Output

DC Output voltage	5V/ 9V / 15V / 20V (PPS : 5V~21V)
DC Output Voltage Regulation measured at cable end	For 5Vdc output : 4.85V - 5.25V at output current 0A - 3A. For 9Vdc output: 8.55V - 9.45V at output current 0A - 3A. For 15Vdc output: 14.25V - 15.7 V at output current 0A - 3A. For 20Vdc output: 19V - 21V at output current 0A - 2.25A
Maximum Load Current	0A - 3A continuous with 5Vdc ; 0A - 3A continuous with 9Vdc 0A - 3A continuous with 15Vdc ; 0A - 2.25A continuous with 20Vdc
Programmable Power Supply Voltage Ranges (PPS Mode)	Operating max current: should be rated current * 110%. PPS mode follows USB PD Specification. It shell be supporting PD CC/CV setting on PPS mode. PPS mode Operating Current Limit accuracy should be ±150mA. PPS mode Operating Current Limit setting minimum should be 50mA
Noise Ripple NOTE： 1) Measures at the cable end. 2) Measurements shall be made with an oscilloscope with 20MHz Bandwidth. 3) Outputs should be bypassed at a connector with a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor across output connector terminals	For 5Vdc output: 180mV For 9Vdc output: 200mV For 15Vdc output: 300mV For 20Vdc output: 300mV

Overall Performance

Output Power	45 Watt Max
Efficiency for single output NOTE： Measured at the cable end. Testing at 100%, 75%, 50%, 25% of rated current output and then computing the arithmetic average of these four values. Measure efficiency at 100%, 75%, 50%, 25% load after burn in 30min ,at 115Vac/60Hz & 230Vac/50Hz.	The power supply shall meet DOE VI+1% / COC V5 Tier 2 spec measuring the cable end. CoC v5 Tier2 5V / 3A : Average Efficiency >81.835%, 10% Load Efficiency >72.48% 9V / 3A : Average Efficiency >87.295%, 10% Load Efficiency >77.295% 15V / 3A: Average Efficiency >88.852%, 10% Load Efficiency >78.852% 20V / 2.25A: Average Efficiency > 88.852%,10% Load Efficiency >78.852% DOE VI+1% 5V / 3A: Average Efficiency >82.385% 9V / 3A: Average Efficiency >87.620% 15V / 3A: Average Efficiency >88.727% 20V / 2.25A: Average Efficiency > 89.0%
Power Saving	< 0.075 W at 115Vac/60Hz & 230Vac/50Hz (5V Only) Power saving requirement: The power consumption of the device in off mode shall not exceed 0.30W at 20V (0.15W). Must comply with the requirements " ErP (EU) 2023/826" specification.
AC Turn on Delay Time	< 3 sec Max.at 100Vac & 240Vac (5V Only)
Hold Up Time	> 5 ms at 100Vac/60Hz & Max load
Transient Response	Transient condition: For 5V mode: Output voltage range: Max 5.8V Min 4.5V For 9V mode: Output voltage shall within +/- 8%
Overshoot	The output overshoot at turn on shall not exceed 10% of normal voltage value with or without the load connected.
Output Rise Time Measured from the 10% point to the 90% point of the normal	At turn on the rise time of output voltage shall be less than 40ms (5V Only).
Acoustic test	Input Condition: Vin: 90Vac~264Vac, Frequency : 47Hz to 63 Hz Microphone at a distance of 10cm from the surface and noise level is less than 20dB
Peak load (For 20V /15V)	Shall support below loading condition without any damage, safety issues and protection happened. The output voltage shall be more than 18.1V (20V Mode)/13.5V (15V mode) at input voltage 100-240V/50Hz-60Hz.
Surge load (For 20V/15V)	The adapter should support a surge load with 120% of maximum load for 1min, maximum load for 9min and output voltage should be more than 18.5V/13.7V at 100-240Vac/50Hz-60Hz.
Hot Plugging	Plugging a live AC adapter into the system with 100uF (for 5V Mode) and 1000uF (for 15V/20V Mode) capacitance shall not trigger any protections or cause the adapter to shut down.

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Protection

Over Current Protection (OCP)	for 90Vac ~ 264Vac -The maximum constant current shall be 3.1~3.6A for Vo < 15V with 60ms deglitch time. -The maximum constant current shall be 3.8A ~ 4.3A for Vo = 15V with 60ms deglitch time. -The maximum constant current shall be 2.9A ~ 3.4A for Vo = 20V with 60ms deglitch time. -The adapter shall be DC latch off and no component damaged. -When fault condition is removed and re-plug in DC plug, the output voltage must return to the normal condition. -The adapter cannot have any safety issue or be damaged when the load condition is before over current protection point (OTP is allowed). -Meet LPS
Over Voltage Protection (OVP)	-Maximum output voltage can't be over 35% for Vo ≥ 15V and 50% for other Vo rating. -The adapter shall be AC latch off and no component damaged. -When fault condition is removed and re-plug in AC plug, the output voltage must return to the normal condition.
Short Circuit Protection (SCP)	-The adapter shall be DC latch off and no component damaged. -When fault condition is removed and re-plug in DC plug, the output voltage must return to the normal condition.
Over Temperature Protection (OTP)	-The adapter shall be AC (primary protection) or DC (secondary protection) latch off and no component damaged. -Must put a thermal sensor at the secondary side for PD IC to read/report temperature. -If PD IC lack OTP pin, it must have internal OTP and be able to report temperature. -No fire and no melted of the enclosure. -When fault condition is removed and re-plug in AC or DC plug, the output voltage must return to the normal condition.
Output Pins Short Protection	-When any two pins (including signal pins) of the output plug short, there should be no damage to any components. (Protection is allowed)

Other Specifications

Environmental Requirements	- Operating Temperature： 0℃ to 40℃ - Storage Temperature： -30℃ to 80℃ - Operating Relative Humidity： 10% - 90% RH - Storage Relative Humidity： 5% - 95% RH - Operation Altitude： 5000 M - Surface Temperature rise : < 45 ℃ @ Ambient 25℃ (Input Voltage 100Vac/240Vac Output 95% Load)
Reliability	Life/Power On Hours -The power supply must be designed to operate for 30,000 power on hours. -AC input voltage: 100 and 240Vrms / DC output load: 95% -Ambient Temp.: 25°C
MTBF	The power supply shall be designed to operate for 150,000 operation hours at 90% confidence–level while operating under the following condition. -AC input voltage: 100 and 240Vrms/DC output load: 95% -Ambient Temp. :25°C
Burn-in Test Condition	More than 2 hours at 40°C, normal input voltage with 20V/2.25A output. AC on/off must be tested. No any component damage or fault condition during the test.
AC On/Off Test	- Input: 264Vac/63Hz - Load Condition: Full Load - Ambient: 25℃ - AC ON 4sec and OFF 1sec for 10000 cycles

Safety and EMC

Safety	The power supply unit shall follow the safety standard (UL/IEC/EN 62368-1) - Certificate : CB, UL/cUL, NRCan, DOE, FCC, CE, UKCA
EMC	EMI: F.C.C part15 class B , CISPR22 class B. The limits should be meet with a margin more than 3dB with all system applicable.
	EMS : EN55035 , ESD: EN 61000-4-2 (ESD) Contact discharges: +- 8KV Criterion A Air discharge: +- 12KV Criterion A Air discharge: +- 15KV Criterion B
	Radiated Immunity: EN 61000-4-3 (RS) , 80-1000MHz, 3V/m, 80% AM(1KHz), Criterion A
	Electrical Fast Transients: EN 61000-4-4 (EFT), 2kV, Criterion B
	Surge: Lighting Surge: ±1KV (L-N) ; ± 2KV (L-FG; N-FG), Impulse Noise Test: 1KV, Criteria A
	Common Mode Noise (CMN): EN 61000-4-6 (CS), Test voltage Condition: 3V Test Frequency: 150KHz ~ 600KHz, Specification: CMN Max.: 2V @150K~600K

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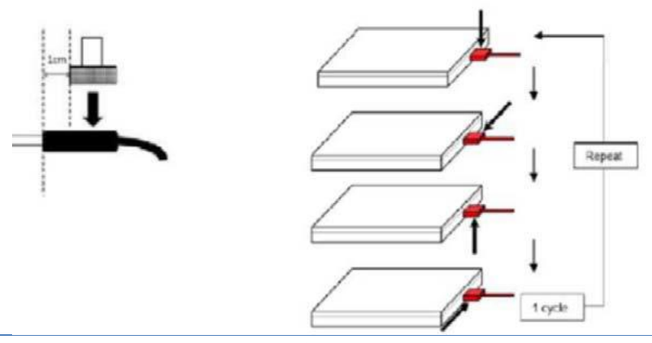
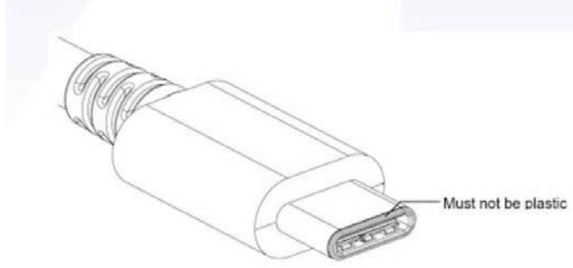
Safety and EMC

Voltage Fluctuations and Flicker	EN61000-3-3
HI-POT test	Primary to Secondary: 3.0KVac or 4.0KVdc for 1 minute
Insulation Resistance	> 30M ohm at 500Vdc between primary and secondary

Mechanical

Drop Test	Drop 6 times (6 faces) from a height of 1.1M & 1.3M by individual unit onto a concrete surface. 1.1M : Electrical - The unit should meet output specification (5.0V, 3.0A & 9.0V, 3.0A & 15.0V, 3.0A & 20.0V, 2.25A) after 110cm testing ; Mechanical - There shall be no visual damage and no sound after shaking the unit. 1.3M : Electrical - The unit cannot meet output specification is acceptable after 130cm testing; Mechanical - There shall be no visual damage and no sound after shaking the unit.
Bending test	- 200g weight, 90° angle to each side(Total angle 180°), 3000 cycles of arbitrary direction, 40 cycles/min. Disconnection rate <= 10% between case to S/R for 3000 cycles Disconnection rate <= 30% between plug to coil for 3000 cycles - Without damage to the insulations
Winding test	- 200g weight,1080° angle on X-axis and Y-axis, 500 cycles of each direction 4 cycles/min. Disconnection rate of the wire shall be less than 30%
Tensile Test	Load: 10Kgf at Plug end and Bushing each for 1minute, Angle: 90° /180° Criteria: The withdrawal of cord should be less than 2mm or without disconnection of cord
DC Power Cord Wire Push Test	a) Fixture: 6mm, 10.5mm & 20mm aluminum block and ψ12mm aluminum bar b) Increase pressure by speeding up 2 mm per minute on the tested item until maximum force reached to 130 kg Criteria: After testing the V+ wire and Ground wire can't short
Type C Plug Requirements	Type-C plugs for use with devices must comply with the standard, with the following exceptions: Must demonstrate a minimum strength of 1.75 Nm in all 4 orientations, rather than 0.75 Nm as defined in section 3.8.1.7 (USB Type C Spec) - Can exceed the maximum plug strength of 2.0 and 3.5 Nm as defined in section 3.8.1.7 - Transverse overload force in all 4 orientations should meet 9Kg/1cm/50 cycles (as below)  
Input AC Inlet	Fixed Pin US/CN/EU (AC plug material can not include ferrous alloy)
Output Cable	WM Type：(2000mm 50mm)
Output Plug	TYPE C, Should support BC1.2 DCP to allow charging older devices through legacy cable (D+/D should be short at connect side)
Tumbling Test (For EU & UK)	Test condition: 1. Tumbling barrel height: 50cm ; 2. Rotational speed: 50 R.P.M. ; 3. Times: 250 cycles Electrical: The unit cannot meet output specification is acceptable after testing. Mechanical: 1. There shall be no visual damage and no sound after shaking the unit. 2. The dimension of pins shall be meet the plug gauge requirements.

Model Information

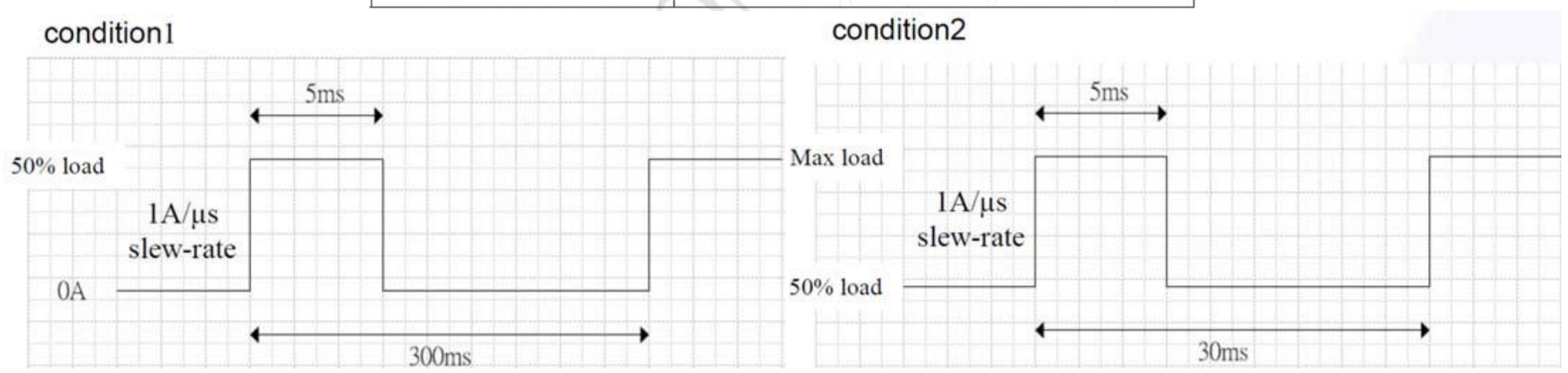
Plastic Case	Case Material PC ;	Noninflammable Grade 94V-0;	Color Black;
Dimension	MODEL NO.	Dimension	Weight
	AA45A-59FKE-R	53.0mm*53.0mm*28.5mm	180g±20g
	AA45E-59FKE-R	71.3mm*53.0mm*35.8mm	195g±20g
	AA45K-59FKE-R	63.4mm*71.4mm*49.2mm	190g±20g
AC Socket Type	AA45A-59FKE-R	US plug	
	AA45E-59FKE-R	EU plug	
	AA45K-59FKE-R	UK plug	
DC cable	Type	2.0M/18AWG	

TECHNICAL DATA

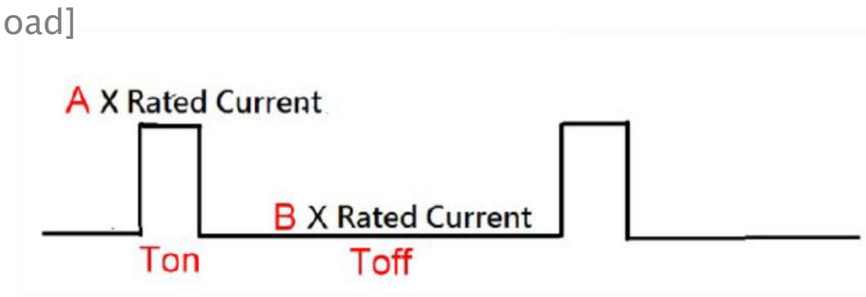
[Transient condition]

Transient condition

Transient for 15V/20V	Specification
Transient Current Range	0.05A ~ Full Load
Transient Frequency	100Hz ~ 100KHz
Slew rate	2.5A/us
Criteria*	Output voltage regulation shall be less than 8 %

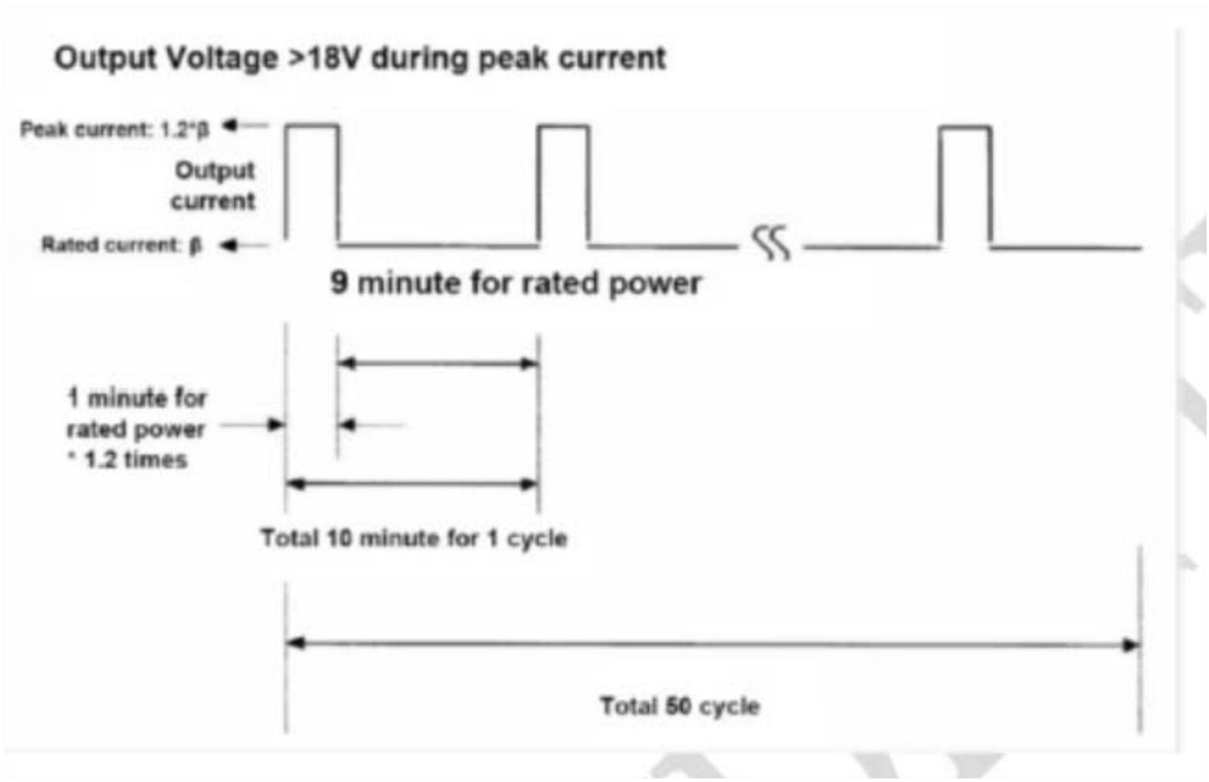


[Peak load]



Spec	Ton	Toff	A	B
1	2ms	18ms	200%	90%
2	250us	2.25ms	225%	87.5%

[Surge load]



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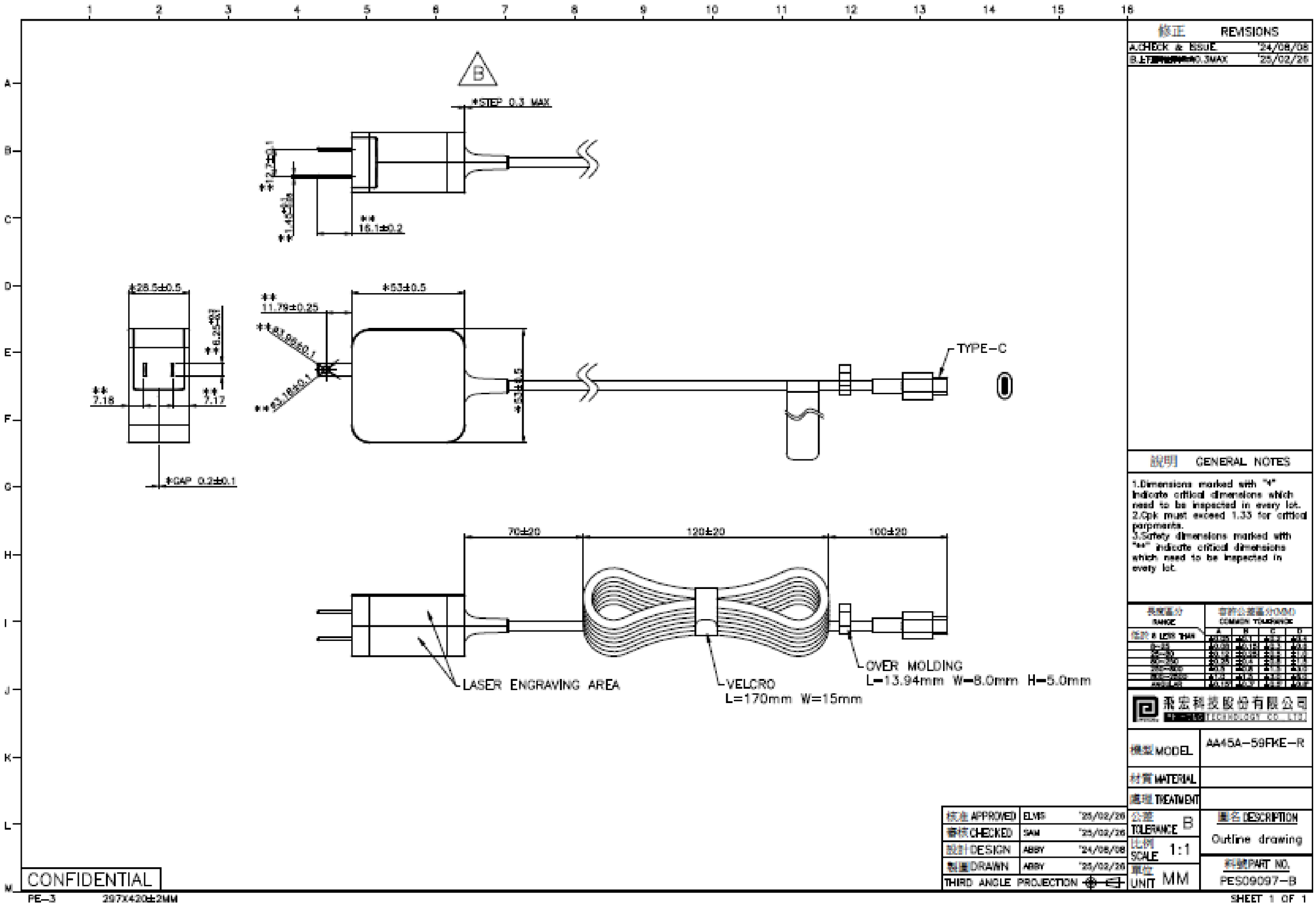

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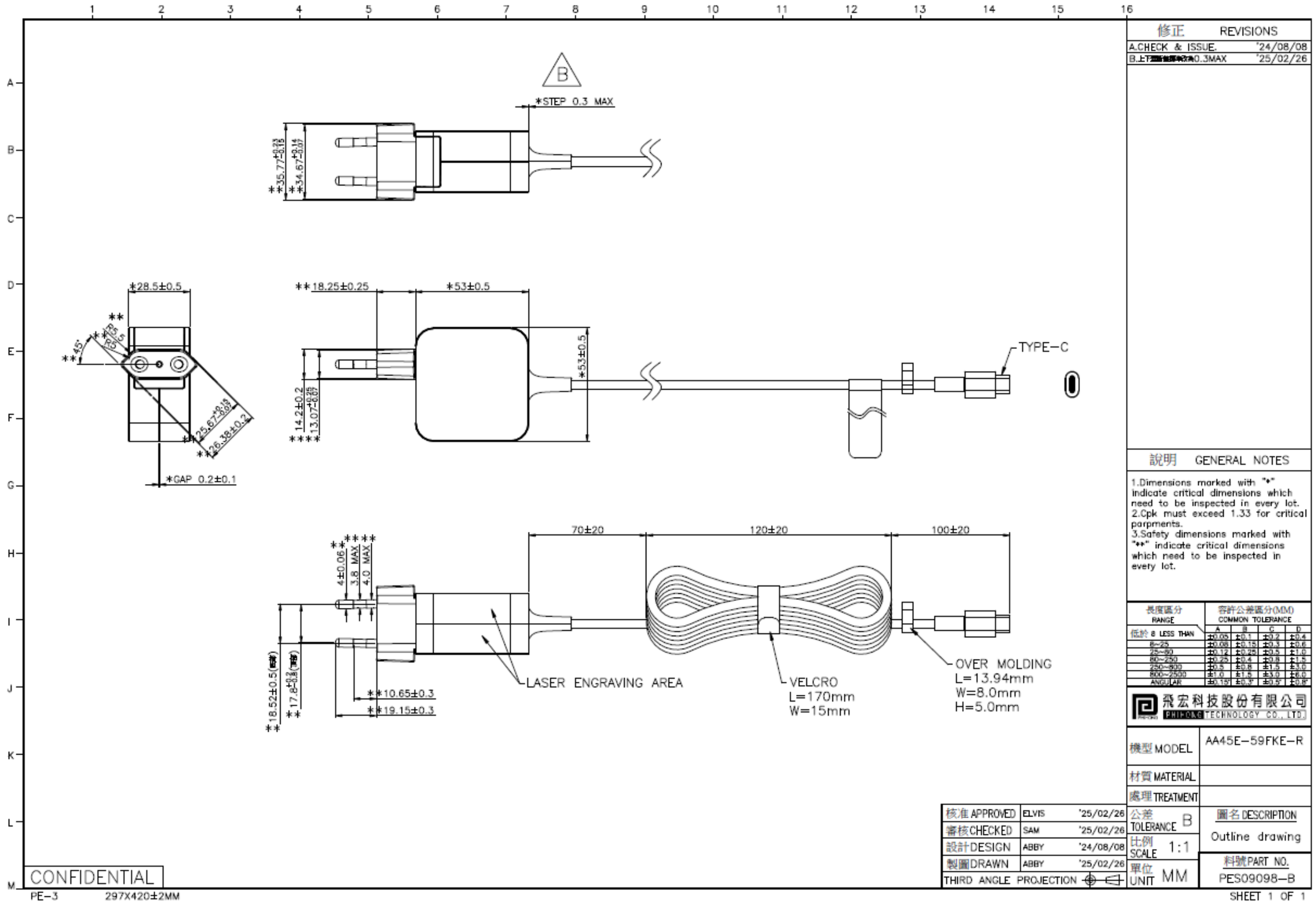

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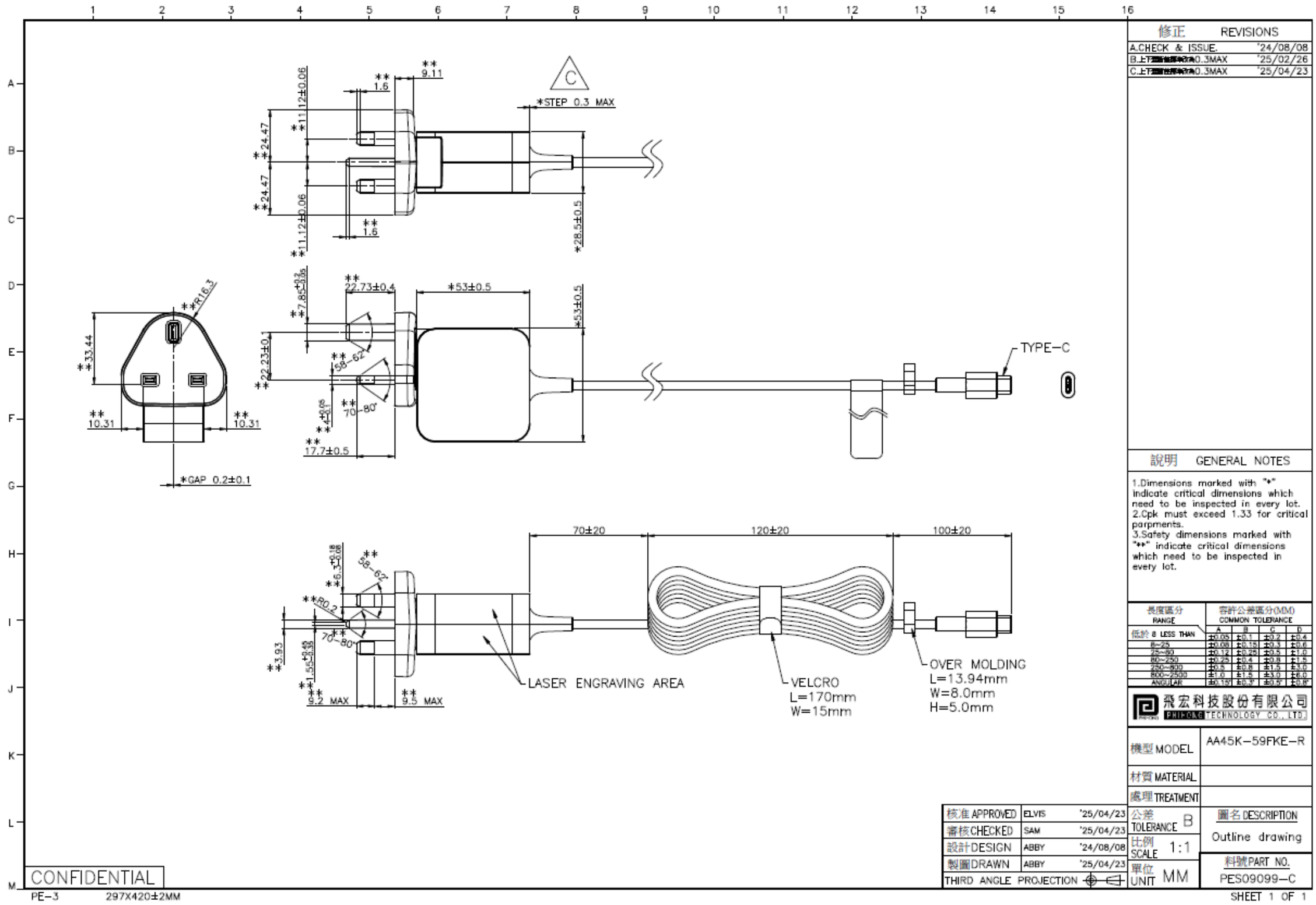

PHIHONG 50 YEARS OF HISTORY IN THE POWER SUPPLIES INDUSTRY

Since its founding in 1972, Phihong has emerged as a prominent power supply company, serving as a key supplier of solutions for consumer, mobile/portable, enterprise, telecom, datacom, and industrial applications.