Ref. Certif. No.

NO112397

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

SYSTEME CEI DACCEPTATION MUTUELLE DE CERTIFICATS DESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

CB TEST CERTIFICATE CERTIFICAT D'ESSAI OC

Product Produit	AC-DC, AC/DC-DC Converter
Name and address of the applicant Nom et adresse du demandeur	Bel Fuse Inc. 206 Van Vorst St. Jersey City, NJ 07302 USA
Name and address of the manufacturer Nom et adresse du fabricant	Bel Fuse Inc. 206 Van Vorst St. Jersey City, NJ 07302 USA
Name and address of the factory Nom et adresse de l'usine Note: When more than one factory, please report on page 2 Note: Lorsque il y plus d'une usine, veuillez utiliser la deuxième page	☑ Additional information on page 2
Ratings and principal characteristics Valeurs nominales et caractéristiques principales	PFE1100-12 Series, SNP1100-12 Series, SPABRCD-01G, SPABRCD-02G: 100–240 Vac, 12-5 A, 50-60 Hz; PFE850-12 Series, SNP850-12 Series: 100–240 Vac, 10-4 A, 50-60 Hz; PFE600-12 Series, SNP600-12 Series, SPAFCBK-09G: 100–240 Vac, 8-3 A, 50-60 Hz; PFE1100-12-NAS435: 100-127 Vac (Canada & U.S.A :120-127 Vac), 11 A, 50- 60Hz; 200-240 Vac, 6 A, 50-60Hz; 200-300 Vdc, 6 A
Trademark (if any) Marque de fabrique (si elle existe)	bel POWER SOLUTIONS & PROTECTION a bel group
Type of Manufacturer's Testing Laboratories used Type de programme du laboratoire d'essais constructeur	CTF Stage 2
Model / Type Ref. Ref. De type	
Additional information (if necessary may also be reported on page 2) Les informations complémentaires (si nécessaire, peuvent être indiqués sur la deuxième page	☑ Additional information on page 2
A sample of the product was tested and found to be in conformity with Un échantillon de ce produit a été essayé et a été considéré conforme à la	IEC 62368-1:2018
As shown in the Test Report Ref. No. which forms part of this Certificate Comme indiqué dans le Rapport dessais numéro de référence qui constitue partie de ce Certificat	399858

This CB Test Certificate is issued by the National Certification Body
Ce Certificat dessai OC est établi par l'Organisme **National de Certification**

Nemko

Philip Pedersen vei 11,
NO-1366 Lysaker, Norway

Date: 09-06-2020

Signature: Juan Z. Saussey
Certification Department

BPS Asia Pacific Electronics (Shenzhen) Co., Ltd.
Building# 6, Nanming Road, Gongming Town Huahong
Xintong Industrial Park, Guangming District
Shenzhen 518108
China

Bel Power Solutions, s.r.o.
Areal ZTS 924
01841 Dubnica nad Vahom
Slovakia

Additional information(if necessary)
Information complémentaire (si nécessaire)

Output rating: See General Information. PFE and SNP units are followed by -054NA or -054RA, where N indicates normal airflow (from rear to front), R indicates reverse airflow (from front to rear), A for AC input; (Models name maybe followed by alpha-numeric characters denoting non-safety critical options)

Nemko
Philip Pedersen vei 11,
NO-1366 Lysaker, Norway

Date: 09-06-2020

Signature: Juan Z. Saussey
Certification Department

TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number..... :	399858
Date of issue ..... :	7 June, 2020
Total number of pages..... :	118
Name of Testing Laboratory preparing the Report..... :	Nemko USA Inc. 2210 Faraday Ave. Suite 150, Carlsbad, CA 92008, USA
Applicant's name ..... :	Bel Fuse Inc.
Address ..... :	206 Van Vorst St., Jersey City, NJ 07302, USA
Test specification:	
Standard..... :	IEC 62368-1: 2018
Test procedure..... :	CB Scheme
Non-standard test method..... :	N/A
Test Report Form No. ..... :	IEC62368_1C
Test Report Form(s) Originator.... :	UL(US)
Master TRF..... :	Dated 2019-01-17

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description..... :	AC-DC, AC/DC-DC Converter
Trade Mark ..... :	bel POWER SOLUTIONS & PROTECTION a bel group
Manufacturer..... :	Same as Applicant
Model/Type reference..... :	PFE1100-12 Series, PFE850-12 Series, PFE600-12 Series SNP1100-12 Series, SNP850-12 Series, SNP600-12 Series SPABRCD-01G, SPABRCD-02G, SPAFCBK-09G PFE and SNP units are followed by -054NA or -054RA, where… N indicates normal airflow (from rear to front), R indicates reverse airflow (from front to rear), A for AC input; (Models name maybe followed by alpha-numeric characters denoting non-safety critical options) PFE1100-12-NAS435
Ratings..... :	PFE1100-12 Series, SNP1100-12 Series, SPABRCD-01G, SPABRCD-02G: 100–240 Vac, 12-5 A, 50-60 Hz PFE850-12 Series, SNP850-12 Series: 100–240 Vac, 10-4 A, 50-60 Hz PFE600-12 Series, SNP600-12 Series, SPAFCBK-09G: 100–240 Vac, 8-3 A, 50-60 Hz PFE1100-12-NAS435: 100-127 Vac (Canada & U.S.A :120-127 Vac), 11 A, 50-60Hz; 200-240 Vac, 6 A, 50-60Hz; 200-300 Vdc, 6 A Output rating: See General Information

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	Nemko USA Inc.	
Testing location/ address..... :		2210 Faraday Ave. Suite 150, Carlsbad, CA 92008, USA	
Tested by (name, function, signature)..... :			
Approved by (name, function, signature).. :			
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address..... :			
Tested by (name, function, signature)..... :			
Approved by (name, function, signature).. :			
☒	**Testing procedure: CTF Stage 2:**	BPS Asia Pacific Electronics (Shenzhen) Co., Ltd.	
Testing location/ address..... :		Building#6, Nanming Road, Gongming Town Huahong Xintong Industrial Park Guangming District 518108 Shenzhen PEOPLE'S REPUBLIC OF CHINA	
Tested by (name + signature)..... :		Editha Vergara (Customer Representative)	
Witnessed by (name, function, signature). :		Jeff Busch (Project Handler)	
Approved by (name, function, signature).. :		George Daverin (Verificator)	
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address..... :			
Tested by (name, function, signature)..... :			
Witnessed by (name, function, signature). :			
Approved by (name, function, signature).. :			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

Attachment 1: Europe Group National Differences and National Differences according to EN 62368-1:2020 +A11:2020 (25 pages)

Attachment 2: National Differences: USA and Canada (8 pages)

Attachment 3: Photos (7 pages)

Attachment 4: Miscellaneous Documentation, e.g. Magnetics drawing, PWB drawing, etc. (35 pages)

(Not for publication – Engineering use only)

Attachment 5: PWB Thermal cycling tests (19 pages)

(Not for publication – Engineering use only)

Summary of testing:

This test report is based on Nemko test report Ref. No. 351890, with appended CB Certificates, No. NO103876. This test report includes the addition of Bel transformer suppliers and upgrade to IEC 62368-1:2018. For continuity, the entire report has been reissued. No tests were considered necessary.

The equipment is a component, switch mode power supply with AC input (ES3/PS3) and DC voltage outputs (ES1/PS3) for building-in.

Intended location: The equipment is to be installed in the end product where the suitability of installation is to be evaluated in the end product.

Safety Instructions: Instructions shall be supplied in a language suitable for the country into which the product is to be sold.

Maximum operating temperatures: Equipment for building-in. Heating test was conducted monitoring the internal components temperature. Accessibility to high component temperature must be considered on end system equipment.

Equipment markings: Identification marking (trade-mark and model name) are marked on the equipment. However, the durability test was not considered because the equipment is a component level product for building-in. Therefore, the marked surface is not to be located in an external area where it is likely to be cleaned with cleaning solution, rubbed, etc.

The unit tested is a prototype with all possible options and worst case of the family models when necessary. The following tests have been performed with acceptable results.

Tests performed (name of test and test clause):	**Testing location:**
4.1.1 Connector Interruption test	BPS Asia Pacific Electronics (Shenzhen) Co., Ltd.
5.2 Classification of electrical energy sources	Building#6, Nanming Road, Gongming Town Huahong Xintong Industrial Park Guangming District 518108 Shenzhen PEOPLE'S REPUBLIC OF CHINA
5.4.1.8 Determination of working Voltage measurement	
5.4.2, 5.4.3 Minimum clearances/creepage distances	
5.4.8 Humidity	
5.4.9 Electric Strength tests	
5.5.2.2 Stored discharge on capacitors	
5.6.6 Resistance of protective conductors and terminations	
5.7.4 Unearthed accessible parts	
5.7.5 Earthed accessible conductive part (Prospective touch voltage, touch current and protective conductor current)	

6.2.2 Power source circuit classifications 5.4.1.4, 9.3, B.1.5, B.2.6 – Temperature measurements B.2.5 Input B.3, B.4 Abnormal operating and fault condition tests R- Limited Short Circuit test T- Mechanical and Stress Relief test	

Summary of compliance with National Differences (List of countries addressed):

The list of countries recognizing the CB Scheme is actively updated on the iecee.org website.

All CENELEC members according to EN 62368-1:2014 +A11:2017.

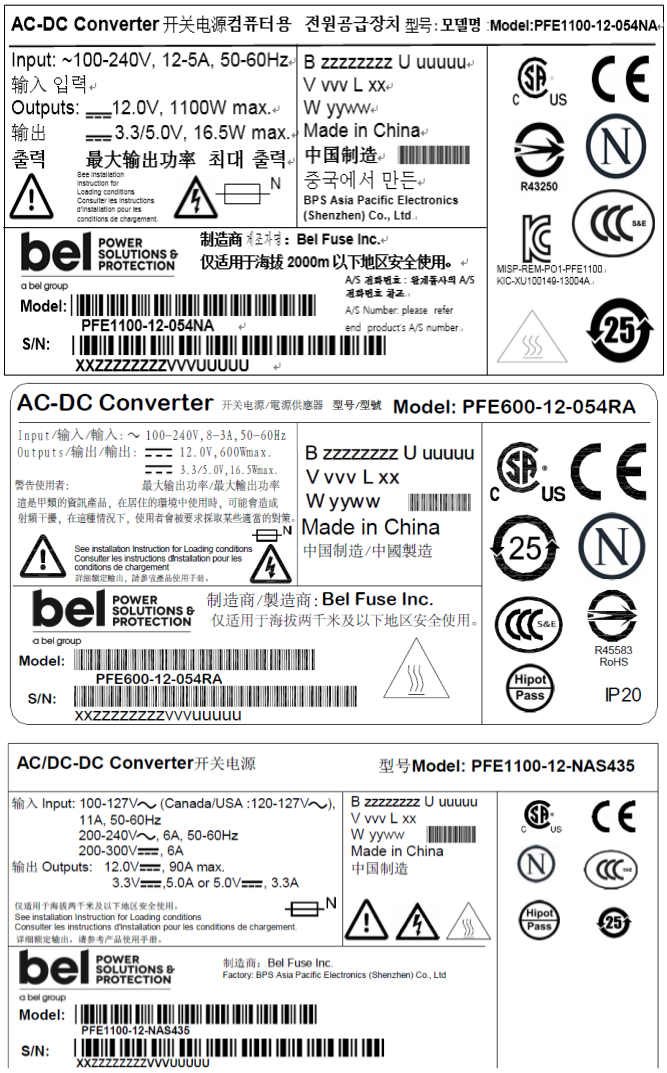
All National Differences listed in the IECEE Online Bulletin are covered by the Common Modifications, Special National Conditions, National Differences, and the National Requirements noted above except for the following countries which are documented in National Differences Appendixes attached to this report.

Canada/USA (According to IEC 62368-1:2018)

☒ **The product fulfils the requirements of IEC 62368-1:2018 and EN 62368-1:2020 +A11:2020.**

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Calibration	All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Further information about traceability will be given on request.
Measurement uncertainty	Measurement uncertainties are calculated for all instruments and instrument set-ups given in this report. Calculations are based on the principles given in the standard EA-4/02 (Dec. 1999), IEC Guide 115:2007, and other relevant internal Nemko-procedures. Further information about measurement uncertainties will be given on request.
Evaluation of results	If not explicitly stated otherwise in the standard, the test is passed if the measured value is equal to or below (above) the limit line, regardless of the measurement uncertainty. If the measured value is above (below) the limit line, the test is not passed - ref IEC Guide 115:2007. The instrumentation accuracy is within limits agreed by IECEE-CTL.

Test item particulars:	
Product group ..... :	☐ end product ☒ built-in component
Classification of use by ..... :	☒ Ordinary person ☐ Children likely present ☒ Instructed person ☒ Skilled person
Supply connection ..... :	☒ AC mains ☒ DC Mains (for PFE1100-12-NAS435) ☐ not mains connected: ☐ ES1 ☐ ES2 ☐ ES3
Supply tolerance ..... :	☒ +10%/-10% ☐ +20%/-15% ☒ +3.3%/-10% (180-310Vdc for PFE1100-12-NAS435) ☐ None
Supply connection – type ..... :	☒ pluggable equipment type A - ☐ non-detachable supply cord ☒ appliance coupler ☐ direct plug-in ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☐ other:
Considered current rating of protective device ..... :	☒ 20 A for North America; 16 A for Europe Location: ☒ building ☐ equipment ☐ N/A
Equipment mobility ..... :	☐ movable ☐ hand-held ☐ transportable ☐ direct plug-in ☐ stationary ☒ for building-in ☐ wall/ceiling-mounted ☐ SRME/rack-mounted ☐ other:
Overvoltage category (OVC) ..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV ☐ other:
Class of equipment ..... :	☒ Class I ☐ Class II ☐ Class III ☐ Not classified ☐
Special installation location ..... :	☒ N/A ☐ restricted access area ☐ outdoor location ☐
Pollution degree (PD) ..... :	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified T_{ma} ..... :	35°C to 65°C, see general product information for details.
IP protection class ..... :	☐ IPX0 ☒ IP20
Power systems ..... :	☒ TN ☒ TT ☒ IT (Norway only) - 230 V $_{L-L}$ ☐ not AC mains
Altitude during operation (m) ..... :	☐ 2000 m or less ☒ 4000 m
Altitude of test laboratory (m) ..... :	☐ 2000 m or less ☒ 38 m
Mass of equipment (kg) ..... :	1.04 kg maximum

Possible test case verdicts:	
- test case does not apply to the test object ... :	N/A
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ... :	F (Fail)
Testing:	
Date of receipt of test item ..... :	April 2018
Date (s) of performance of tests..... :	May – June 2015, April 13 to April 16 2018
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	☐ **Yes** ☒**Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	BPS Pacific Electronics (Shenzhen) Co.,Ltd. Building# 6, Nanming Road, Gongming Town Huahong Xintong Industrial Park Guangming District 518108 Shenzhen PEOPLE'S REPUBLIC OF CHINA

General product information and other remarks:

The subject model is a component type AC-DC or AC/DC-DC power supply, intended for building in, provided with an overall metal enclosure except front panel (with plastic), housing components operating at ES2 and ES3 voltages. The unit has two DC outputs, 12V main output and 3.3V or 5V standby output. Multiple polygonal holes are provided on the front and rectangular holes on the rear of the enclosure.

The unit is provided with AC inlet, output connector, metal enclosure, plastic front panel and fan. The fan is installed on the main board slot thru the fan metal bracket. The unit consists of four boards namely: Main, Control, Auxiliary and Bulk capacitor boards. Control board is connected to the main board by connectors. The bulk capacitor board is soldered to the Main board. The auxiliary board is soldered on top of the bulk capacitor board and connected to the control board by two pin connector.

The unit is also equipped with status LED indicators on the front panel.

Model Differences –

Model PFE1100 and PFE850 are exactly the same as SNP1100 and SNP850 except for model names.

Model PFE850/SNP850 are the same as PFE1100/SNP1100 except for bulk capacitors, main converter and output FETS, and lower maximum output power.

Models PFE600 and SNP600 are the same as PFE1100 and SNP1100, except for PFC circuit, only one main converter stage, no auxiliary and bulk capacitor PCB, different main and control boards PCB layout and lower maximum output power.

Models PFE1100-12-054RA and PFE850-054RA are exactly the same as PFE1100-12-054NA and PFE850-054NA except for reverse air flow (air from input to output) and slight different control board PWB layout. Also, 3.3V output for PFE1100-12-054RA and PFE850-12-054RA is limited to 3.5 A (11.55 W).

Model PFE600-054RA is exactly the same as PFE600-054NA except for airflow direction.

Model SPABRCD-01G is exactly the same as model PFE1100-12-054RA except for the customer ID and model name.

Model SPABRCD-02G is exactly the same as model PFE1100-12-054NA except for the customer ID and model name.

Model SPAFCBK-09G is exactly the same as model PFE600-12-054RA except for the value of in rush thermistor RT3.

Model PFE1100-12-NAS435 is exactly the same as model PFE1100-12-054NA except for the input/output ratings, fan and power inlet connector.

ELECTRICAL RATING

	Input			Output (DC)	
Model	V	A	Hz	V	W
PFE1100-12, SNP1100-12 SPABRCD-01G SPABRCD-02G	100-240 Vac	12-5	50-60	V1: 12 V2: 3.3**/5V	1100* 16.5
PFE850-12, SNP850-12	100-240 Vac	10-4	50-60	V1: 12 V2: 3.3**/5V	850* 16.5
PFE600-12, SNP600-12, SPAFCBK-09G	100-240 Vac	8-3	50-60	V1: 12 V2: 3.3/5V	600* 16.5
PFE1100-12-NAS435	100-127 Vac*** 200-240 Vac 200-300Vdc	11 6 6	50-60 50-60 —	V1: 12 V2: 3.3/5V	1100* 16.5

*) V1 maximum output power de-rated at different input voltages and operating ambient temperatures. See Condition of Acceptability for details.
**) 3.3V output current is limited to 3.5 A at 35°C and 45°C operating ambient and derated to 3 A above 45°C ambient for models PFE1100-12-054RA, PFE850-12-054RA, SPABRCD-01G and SPABRCD-02G.
***) Canada & U.S.A input voltage is 120-127 Vac

Additional application considerations – (Considerations used to test a component or sub-assembly) –

When installed in the end use equipment, the following are among the consideration to be made:

1) Equipment shall be installed only by trained service personnel, according to the manufacturer installation instructions.
2) Evaluated for use in a Pollution Degree 2 environment, up to 4000 m altitude, maximum 65 °C ambient.
3) Temperature tests shall be considered for specific installation conditions in the end system.
4) Evaluated as Class I (earthed equipment). Reliable connection to Protective Earth shall be provided in the end use installation.
5) Evaluated for connection to AC power with a branch circuit protector rated max 20 A
6) The detachable power supply cord connector for the detachable power supply cord is considered the main disconnect device.
7) Spacings were evaluated for an operating altitude of max 4000m, based on IEC-60664-1 altitude correction factor is 1.29.
8) The front panel, top, bottom and sides of the enclosure provided with the equipment complies with safeguard requirements for Electrical Energy Sources and Fire Enclosures. Suitability of the rear enclosure side openings is to be determined in the end system.
9) The Output circuits are ES1; output V1 is PS3.
10) The Connector Current Interruption Test was performed on the Tyco Type Minipak HDL connector (1926736-3), Output Connector for 100 cycles (insertion/withdrawal). Testing for additional cycles shall be determined during the end product evaluation, depending on end product application.
11) The maximum output rating of unit varies with input voltage and ambient,
12) The equipment was tested on a listed 30 A branch circuit. If used on a branch circuit greater than this, additional testing may be necessary.
13) All models have been tested at input voltage of 90-264 V ac, operating ambient of 35°C, 45°C, 55°C and 65°C, based on the below maximum load conditions on V1

Model SNP1100-12, PFE1100-12-054NA and SPABRCD-02G, Maximum load:

	Maximum Operating Ambient		
Input Voltage	35°C	45°C	55°C
90-135 V	50 A	48 A	32 A
135-180 V	82 A	69 A	45 A
180-264 V	90 A	79 A	49.5 A

Model PFE1100-12-NAS435, Maximum load:

		Maximum Operating Ambient		
	Input	45°C	55°C	65°C
Canada & USA	120 - 127Vac	90A	70A	58A
	200 - 240Vac	90A	78A	66A
All countries except Canada & USA	100 - 127Vac	80A	70A	58A
	200 - 240Vac	90A	78A	66A
All countries	200 - 300Vdc	90A	78A	66A

Model PFE1100-12-054RA and SPABRCD-01G, maximum load:

	Maximum Operating Ambient			
Input Voltage	35°C	45°C	55°C	65°C
90-135 V	80 A	—	—	—
135-264 V	90 A	—	—	—
90-180 V	—	70 A	53 A	36 A
180-264 V	—	90 A	73 A	56 A

Model SNP850-12, PFE850-12-054NA Maximum load:

	Maximum Operating Ambient		
Input Voltage	45°C	55°C	65°C
90-115 V	70 A	60 A	50 A
115-264 V	70 A	70 A	65 A

Model PFE850-12-054RA, maximum load:

	Maximum Operating Ambient		
Input Voltage	45°C	55°C	65°C
90-145 V	65 A	—	—
145-264 V	70 A	—	—
90-180 V	—	57.5 A	50 A
180-264 V	—	65.5 A	58.2 A

Models SNP600-12 and PFE600-12-054NA, maximum load:

	Maximum Operating Ambient		
Input Voltage	45°C	55°C	65°C
90-264 V	50 A	43 A	36 A

Model PFE600-12-054RA and SPAFCBK-09G, maximum load on V1:

	Maximum Operating Ambient		
Input Voltage	45°C	55°C	65°C
90-110 V	45 A	38 A	31 A
110-264 V	50 A	43 A	36 A