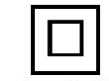




power supplies for industry  
 open frame PSU 40W 24VDC/1,7A  
 TYP INR-ES 045  
 Nr. 20045



# Features

- 40W convection-cooled @ 50°C ambient
- Wide operating temperature -20~70°C
- Compact size 2" x 3" with low profile 1"
- High efficiency up to 90%
- No-load power consumption < 0.3W
- Low inrush current
- Class II, also class I with optional functional ground connected
- Design to meet ITE standard IEC, EN, UL 60950-1 2<sup>nd</sup> Edition
- Meets EMI CISPR 22 / FCC Part 15 class B

## 1. Description

Model No.	Output Voltage	Mini. Output Current	Rated Output Current	Peak Output Current (Note 4)	Line Regulation (Note 1)	Load Regulation (Note 1)	Ripple & Noise p-p (Note 1)	Initial Setting Accuracy (Note 2)
<b>INR ES 045</b>	<b>+24V</b>	0 A	1.7 A	2.2 A	±1%	±1%	±1%	±2%

**Total Output Power:** Max. 40W with convection cooled at 50°C environment temperature, with 7 CFM at 70°C environment temperature (Note 3).

Note: 1) Please refer to paragraph 3 for detail notes & conditions.

2) Initial setting accuracy is at Input 115VAC and output at 60% rated load.

3) Air flow from top-center of PSU with distance 50 mm maximum.

4) Peak current lasting < 15sec. with a maximum 10% duty cycle. Its average output power must not exceed nominal.

## 2. Input Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Input Voltage	Continuous input range.	85	115 / 230	264	VAC
		130		370	VDC <sup>(Note 1)</sup>
Input Frequency	At AC input.	47	50 / 60	63	Hz
Input Current	Nominal AC Input Voltage (115/230VAC), rated load.			1.5 / 0.8	A
Inrush Current	Nominal AC Input Voltage (115/230VAC), one cycle at 25°C cold start.			40	A
Input Protect	Non-user serviceable internally located AC input line fuse				
No-load Power Consumption	Nominal AC Input Voltage (230VAC)			0.3	W
Earth Leakage Current	At input 264VAC, 63Hz, rated load			0.25	mA

Note: 1) only for electrical function. In safety approvals, it is considered and applied AC input version.

### 3. Output Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Output Voltage					See Chart of Description
Output Power	Nominal AC Input Voltage (115/230VAC).				See Chart of Description
Initial Setting Accuracy					See Chart of Description
Turn-on Delay	Time required for initial output voltage stabilization.		1	3.5	Sec
Hold Up Time	Nominal AC Input Voltage (115/230VAC), rated load.	12			ms
Efficiency	Nominal AC Input Voltage (115/230VAC), rated load. <small>(Note 1)</small>	86 / 87		91	%
Minimum load					See Chart of Description
Ripple & Noise	Rated load, measured by a 20MHz bandwidth limited oscilloscope and the each output is connected with a 10 $\mu$ F Electrolytic Capacitor and a 0.1 $\mu$ F Ceramic Capacitor.				See Chart of Description
Line Regulation	Less than $\pm 1\%$ at rated load with $\pm 10\%$ changing in input voltage 115VAC.				See Chart of Description
Load Regulation	Measured from 60% to 100% rated load and from 60% to 20% rated load (60% $\pm 40\%$ rated load).				See Chart of Description

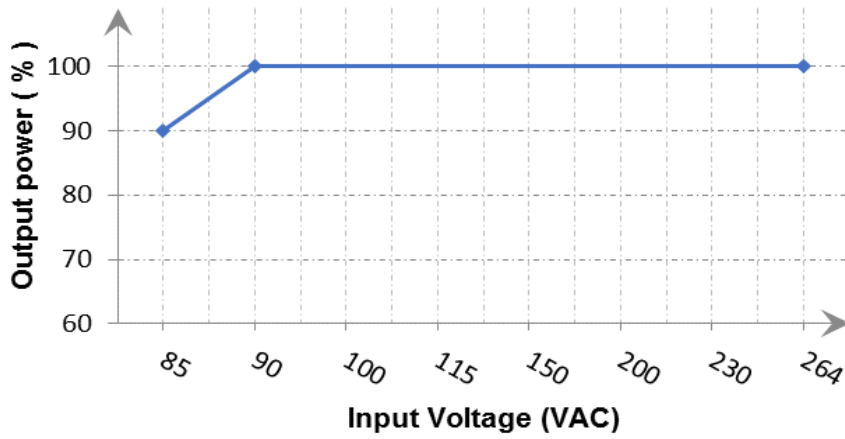
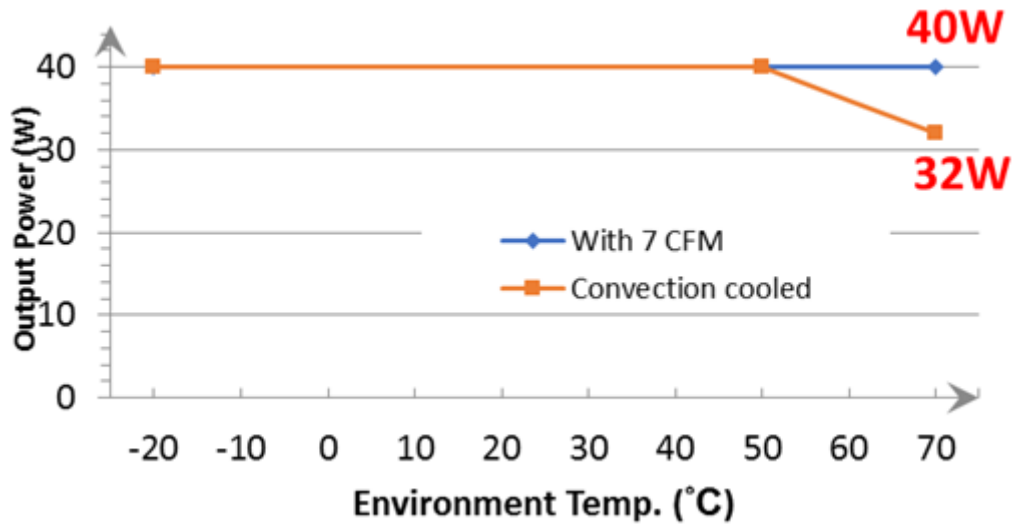
Note: 1) Measured after warm-up above 1 hr.

### 4. Environment Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Operating Temperature	Please refer to the performance curves as following.	-20		+70	$^{\circ}$ C
Start-up Temperature	Without specification stabled <small>(Note 1)</small> .	-40			$^{\circ}$ C
Storage Temperature		-40		+85	$^{\circ}$ C
Relative Humidity	Non-condensing.	5		95	%RH
Altitude	Operating Non-operating			3K 4K	Meter

Note: 1) Specification stabilized within 20 minutes. When input voltage is below 100VAC, the it should be derated 80% rated load.

Performance curves



Input Voltage Derating

## 5. Safety Approvals, EMI and EMS Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Approvals	CB : IEC 60950-1, 2 <sup>nd</sup> edition				
	UL: UL 60950-1, 2nd Edition			Approved	
	cUL: CSA C22.2 No. 60950-1-07, 2nd Edition				
Dielectric Withstand	Input to Output	3000			VAC
	Input to FG	1500			
Insulation Resistance	Input to Output				
	Input to FG	DC500V, / 25°C	100		MΩ
	Output to FG				
EMI (Note 1~3)	EN 55022 / CISPR 22 & FCC Part 15	B			
	EN 61000-3-2	A			Class
	EN 61000-3-3				
EMS (Note 1, 3)	IEC 61000-4-2 ±8KV air discharge, ±6KV contact discharge	A			
	IEC 61000-4-3 10V/m	A			
	IEC 61000-4-4 ±2KV Line & PE	A			
	IEC 61000-4-5 L-N:±1KV, L/N-PE:±2KV	A			
	IEC 61000-4-6 10Vrms	A			
	IEC 61000-4-8 10A/m	A			Criteria
	IEC 61000-4-11 Voltage dips >95%, 0.5 cycle	A			
	Voltage dips 30%, 25 cycles	A / B (Note. 4)			
Voltage dips 60%, 5 cycles	A / B (Note. 4)				
	Voltage interruptions >95%, 250 cycles	C			

Note: 1) As a build-in type power supply, the power supply needs to be installed in a suitable enclosure to pass the EMI/EMC

tests. The final assembly has to comply with the valid EMI/EMC and safety.

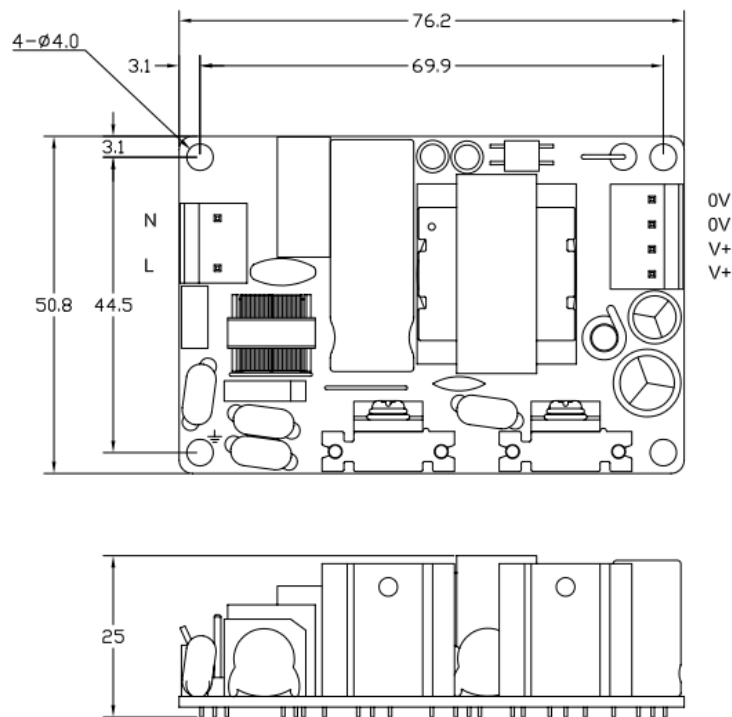
- 2) The mounting holes shall be connected to each other for EMI purpose.
- 3) The EMC test conditions are applied for AC input voltage only.
- 4) The test result of input 240Vac / 100Vac is criteria A / B.

## 6. Mechanical Specification

Parameter	Conditions/Description					
Dimension	76.2 (L) x 50.8 (W) x 25 (H) mm, Tolerance +/- 0.5mm.					
Connector & Pin Assignment	Location	Pin		Assignment	Proposed Housing	Proposed Terminals
Pin Assignment	CN1 (Input)	MX 1	JT 3	AC in (N)	MOLEX: 09-05-1031 (5195-03) or 09-52-4034 (5239-03);	MOLEX: 5194 or 5225 2478, 2578, 5176 or 5168; JST: SVH-21T-P1.1 (Note 1)
		MX 2	JT 2	N / A		
		MX 3	JT 1	AC in (L)	JST: VHR-3N (Note 1)	
	Pin Assignment	CN2 (Output)	MX 1	JT 4	+ V	MOLEX: 09-05-1041 (5195-04) or 09-52-4044 (5239-04);
MX 2			JT 3	+ V		
MX 3			JT 2	0 V	JST: VHR-4N (Note 1)	
MX 4			JT 1	0 V		

Note: 1) Exist with model no. suffixed -J, please see the detail in paragraph 5.

## Mechanical drawing



(Unit:mm)

### SPECIFICATION

For

SWITCHING POWER SUPPLY INR ES 045

#### Revision history

REV.	Jan. 7 <sup>th</sup> 2013	Established.
REV.	Sep. 23 <sup>rd</sup> 2013	<ul style="list-style-type: none"> <li>a) Remove Power factor</li> <li>b) Inrush current from 30A to 40A</li> <li>c) Remove over/under shoot</li> <li>d) -40 degree C start up change to 80% rated load when input below 100VAC</li> <li>e) Initial voltage setting from <math>\pm 1\%</math> to <math>\pm 2\%</math></li> </ul>
REV.	May 29 <sup>th</sup> 2014	Add 7 CFM at 70 degree C for 40W
REV.	Jun. 13 <sup>th</sup> 2014	Add Mechanical drawing , Packing Info & Cover option; Delete EN61204-3 in EMI
REV.	Dec. 26 <sup>th</sup> 2014	Change mechanical drawing.
REV.	Mar. 5 <sup>th</sup> 2015	Change mechanical drawing for adding size of screw holes.
REV.	April 8 <sup>th</sup> 2015	Added class II, UL and CE logo
REV.	Nov. 6 <sup>th</sup> 2015	Change mechanical drawing.



## ■ REO Elektronik AG

Im Halbiacker 5a · CH-8352 Elsau

Tel.: +41 (0)52 363 2820

Fax: +41 (0)52 363 1241

E-Mail: [info@reo.ch](mailto:info@reo.ch)

Internet: [www.reo.ch](http://www.reo.ch)

Shop: [shop.reo.ch](http://shop.reo.ch)

### Divisions:

#### REO Vibratory Feeding and Power Electronics Division

REO Vibratory Feeding and Power Electronics Division  
Brühler Straße 100 · D-42657 Solingen  
Tel.: +49 (0)212 8804 0 · Fax: +49 (0)212 8804 188  
E-Mail: [info@reo.de](mailto:info@reo.de)

#### REO Train Technologies Division

REO Train Technologies Division  
Erasmusstraße 14 · D-10553 Berlin  
Tel.: +49 (0)30 3670236 0 · Fax: +49 (0)30 3670236 10  
E-Mail: [zentrale.berlin@reo.de](mailto:zentrale.berlin@reo.de)

#### REO Drives Division

REO Drives Division  
Holzhausener Straße 52  
D-16866 Kyritz  
Tel.: +49 (0)33971 485 0 · Fax: +49 (0)33971 485 90  
E-Mail: [info@reo.de](mailto:info@reo.de)

#### REO Medical and Current Transformer Division

REO Medical and Current Transformer Division  
Schulholzinger Weg 7 · D-84347 Pfarrkirchen  
Tel.: +49 (0)8561 9886 0 · Fax: +49 (0)8561 9886 40  
E-Mail: [info@reo.de](mailto:info@reo.de)

#### REO Test and PowerQuality Division

REO Test and PowerQuality Division  
Brühler Straße 100 · D-42657 Solingen  
Tel.: +49 (0)212 8804 0 · Fax: +49 (0)212 8804 188  
E-Mail: [info@reo.de](mailto:info@reo.de)

### PRODUCTION+SALES:

#### ■ China

REO Shanghai Inductive Components Co., Ltd  
No. 536 ShangFeng Road · Pudong, 201201 Shanghai · China  
Tel.: +86 (0)21 5858 0686 · Fax: +86 (0)21 5858 0289  
E-Mail: [info@reo.cn](mailto:info@reo.cn) · Internet: [www.reo.cn](http://www.reo.cn)

#### ■ India

REO GPD INDUCTIVE COMPONENTS PVT. LTD  
2/202 Luna Road · Village Luna · Taluka Padra  
Vadodara · 391440 · India  
Tel.: +91 (2662) 221723  
E-Mail: [info@reogpd.com](mailto:info@reogpd.com) · Internet: [www.reo-ag.in](http://www.reo-ag.in)

#### ■ USA

REO-USA, Inc.  
8450 E. 47th St · USA-Indianapolis, IN 46226  
Tel.: +1 317 8991 395 · Fax: +1 317 8991 396  
E-Mail: [info@reo-usa.com](mailto:info@reo-usa.com) · Internet: [www.reo-usa.com](http://www.reo-usa.com)

### SALES:

#### ■ France

REO VARIAC S.A.R.L.  
ZAC Du Clos aux Pois 1 · 6/8 rue de la Closerie-LISSES · F-91048 Evry Cédex  
Tel.: +33 (0)1 6911 1898 · Fax: +33 (0)1 6911 0918  
E-Mail: [reovariac@reo.fr](mailto:reovariac@reo.fr) · Internet: [www.reo.fr](http://www.reo.fr)

#### ■ Great Britain

REO (UK) Ltd.  
Units 2-4 Callow Hill Road · Craven Arms · Shropshire SY7 8NT · UK  
Tel.: +44 (0)1588 673 411 · Fax: +44 (0)1588 672 718  
E-Mail: [main@reo.co.uk](mailto:main@reo.co.uk) · Internet: [www.reo.co.uk](http://www.reo.co.uk)

#### ■ Italy

REO ITALIA S.r.l.  
Via Treponti, 29 · I-25086 Rezzato (BS)  
Tel.: +39 030 279 3883 · Fax: +39 030 279 0600  
E-Mail: [info@reotalia.it](mailto:info@reotalia.it) · Internet: [www.reotalia.it](http://www.reotalia.it)

#### ■ Poland

REO CROMA Sp. z o.o.  
ul. Pozaryskiego 28, bud 20 · PL-04-703 Warszawa  
Tel.: +48 (0)22 812 3066 · Fax: +48 (0)22 815 6906  
E-Mail: [croma@croma.com.pl](mailto:croma@croma.com.pl) · Internet: [www.croma.com.pl](http://www.croma.com.pl)

#### ■ Spain

REO ESPAÑA 2002 S.A.  
C/Manuel Ventura i Campeny 21B · local 9 · E-08339 Vilassar de Dalt (Barcelona)  
Tel.: +34 937 509 994 · Fax: +34 937 509 995  
E-Mail: [info@reospain.com](mailto:info@reospain.com) · Internet: [www.reospain.com](http://www.reospain.com)

#### ■ Turkey

REOTURKEY ELEKTRONİK San. ve Tic. Ltd. Şti.  
Halil Rifatpasa Mah. · Darülceme CD Perpa Tic Merkezi  
B Blok Kat 8 No:1095 · TR-34384 Sisli – Istanbul  
Tel.: +90 (0)212 2215 118 · Fax: +90 (0)212 2215 119  
E-Mail: [info@reo-turkey.com](mailto:info@reo-turkey.com) · Internet: [www.reo-turkey.com](http://www.reo-turkey.com)