FABRIMEX POWER SUPPLIES
CH-8608 Bubikon/Switzerland

FABRIMEX
POWER SUPPLIES

Certified
Management-System
SQS
ISO 9001
Reg. Nr. 12666

DC/DC Wide Input Converter
ECW 40 Watt 'C' Series

DC/DC converter module with input to output isolation of 1500 VDC • Pi-filter at input • Continuous short circuit proof • Up to 90% efficiency • Low output ripple and noise • Low silhouette • External output voltage adjust • Remote on/off control • Sense • 2x2" case

DC/DC Konverter-Modul mit galvanischer Trennung Eingang / Ausgang von 1500 VDC • Pi-Filter am Eingang • Dauerkurzschlussfest • Bis zu 90% Wirkungsgrad • Gute Werte von Rippel und Noise • Geringe Bauhöhe • Externer Ausgangs-spannungsabgleich • Inhibit • Sense • 2x2" Gehäuse

Module convertisseur DC/DC avec séparation galvanique entrée/sortie 1500 VDC • Filtre d'entrée • Protection contre courts-circuits permanents • Rendement tres élevé • Très faible ondulation résiduelle de sortie • Hauteur réduite • Ajustement externe de la tension de sortie • Fonction inhibit • Sense • Boîtier au 2x2"

Product range — Typenübersicht — Sommaire des types

PART NUMBER	INPUT VOLTAGE		INPUT CURRENT		OUTPUT		EFFICIENCY
	Nominal	Range	max. @ full load	No Load	Voltage	Current	Typical
ECW24-0340C	24 VDC	18...36 VDC	1.325 A	100 mA	3.3 VDC	8 A	87%
ECW24-0540C	24 VDC	18...36 VDC	1.961 A	100 mA	5.0 VDC	8 A	89%
ECW24-1240C	24 VDC	18...36 VDC	2.048 A	100 mA	12.0 VDC	3.33 A	88%
ECW24-1540C	24 VDC	18...36 VDC	1.985 A	100 mA	15.0 VDC	2.67 A	89%
ECW48-0340C	48 VDC	36...72 VDC	0.655 A	50 mA	3.3 VDC	8 A	88%
ECW48-0540C	48 VDC	36...72 VDC	0.969 A	50 mA	5.0 VDC	8 A	90%
ECW48-1240C	48 VDC	36...72 VDC	1.000 A	50 mA	12.0 VDC	3.33 A	89%
ECW48-1540C	48 VDC	36...72 VDC	0.992 A	50 mA	15.0 VDC	2.67 A	89%

Nomenclature Nomenklatur Nomenclature

ECW 24 - 03 40 C x

Product Series

Nominal Input Voltage

Nominal Output Voltage

Output Power in Watts

2x2" Case

blank = positive logic inhibit on/off
N = negative logic inhibit on/off

Specifications Spezifikationen Spécifications

All values refer to an ambient temperature of 25°C and nominal rated values where nothing else is specified

INPUT SPECIFICATIONS

Characteristics		Conditions	min	typ	max	unit
U_{in}	Input voltage	$T_c < T_{c\,max}$; ECW 24-....C	18	24	36	Vdc
		$T_c < T_{c\,max}$; ECW 48-....C	36	48	72	Vdc
	Input transients	maximum 100ms (Uin = 18-36Vdc)		50		Vdc
		maximum 100ms (Uin = 36-72Vdc)		100		Vdc
I_{nl}	No load current	I_{out} = 0; $U_{in} > U_{in\,off}$	See "product range", page 1			mA
	Remote off current	Remote "off" activated			10	mA
$U_{in\,off}$	Under voltage lockout (U_{innom} = 24Vdc)	Power up	16.5	17	17.5	Vdc
		Power down	15.5	16	16.5	Vdc
		Under voltage lockout hysteresis		0.9		Vdc
	Under voltage lockout (U_{innom} = 48Vdc)	Power up	33	34	34.5	Vdc
		Power down	31.5	32	33	Vdc
		Under voltage lockout hysteresis		1.8		Vdc
	Full load current	$P_{out} = P_{max}$	See "product range", page 1			A
	Reversed polarity protection		none			
	Inhibit on/off control (positive logic)	On (open collector referenced to $-U_{in}$)	open circuit or > 3.5VDC			Vdc
		Off (open collector referenced to $-U_{in}$)	< 1.8 VDC			Vdc
	Inhibit on/off control (negative logic; add suffix "N" to part number)	On (open collector referenced to $-U_{in}$)	< 1.8 VDC			Vdc
		Off (open collector referenced to $-U_{in}$)	open circuit or > 3.5VDC			Vdc

OUTPUT SPECIFICATIONS

Characteristics		Conditions	min	typ	max	unit
U_{acc}	Ouput voltage accuracy	of nominal output voltage			±1	% U_{out}
	Line regulation	$I_{out} = I_{out\,nom}$			±0.5	% U_{out}
	Load regulation	0% load up to 100% load			±0.5	% U_{out}
	Load transient recovery time	25% to 100% step load change, see page 5		300		us
	Load transient error band			±5		% U_{out}
	Start-up time	Connection of input and until U_{out} = 90% $U_{out\,nom}$		8		ms
		From on/off control		15		ms
	Sense	See page 6			+10	% $U_{out\,nom}$
$U_{out\,trim}$	Output voltage adjustment	see "External output trim" page 7		±10		% $U_{out\,nom}$
$U_{r\,n}$	Output ripple & noise (Bandwidth 20 Mhz)	U_{out} = 3.3 & 5Vdc			50	mVpp
		U_{out} =12 & 15Vdc			75	mVpp

continued

Characteristics		Conditions		min	typ	max	unit
	Max. output capacitance	ECW..-0340C	(I_{out} = 8A)		10'000		uF
		ECW..-0540C	(I_{out} = 8A)		8'000		
		ECW..-1240C	(I_{out} = 3.33A)		3'300		
		ECW..-1540C	(I_{out} = 2.67A)		2'700		
	Output current limit	see current limit chart, page 5		110		150	% $I_{out\ nom}$
	Output short circuit	see short circuit protection chart, page 5			150		% $I_{out\ nom}$
	Output over voltage protection	ECW..-0340C ECW..-0540C ECW..-1240C ECW..-1540C	(V_{out}= 3.3V) (V_{out} = 5.0V) (V_{out} = 5.0V) (V_{out} = 12V)		3.9 6.2 15 18		V
	Output short circuit protection				continous		
	Temperature coefficient				±0.02		%/°C

GENERAL SPECIFICATIONS

Characteristics		Conditions	min	typ	max	unit
U_{iso}	Isolation voltage	input/output, input/case, output/case	1'500			Vdc
	Isolation resistance	Input to output	1'000			MOhm
	Input / output capacitance				1'000	pF
	Switching frequency	Fixed		350		kHz
	Approvals			UL / cUL60950		
	Case material			black coated copper with non-conductive base		
	Wheigt			65		g
	Pinning	see "case" page 8				
	Dimensions	see "case" page 8		50.8 x 50.8 x 10.2		mm
	Soldering temperature	see soldering graph, page 7			260	°C

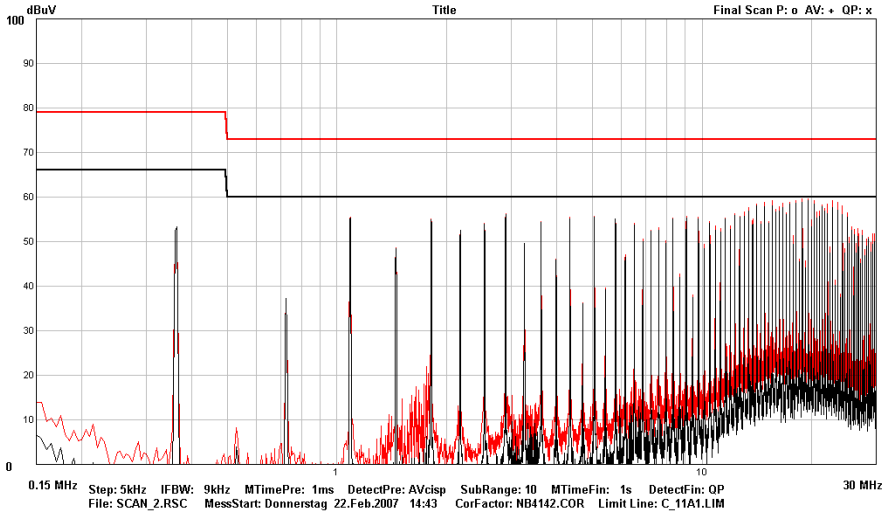
EMC SPECIFICATIONS

Characteristics		Conditions	min	typ	max	unit
	EMC conducted	EN 55022/11 See "EMC information" page 5	Class A			

ENVIRONMENTAL SPECIFICATIONS

Characteristics		Conditions	min	typ	max	unit
	Vibration (sinusoidal)	Frequency 5-500 Hz Swep 1 Oct/min Duration 30 min (x,y,z axis) non operating	3			Grms
	Shock (half sinus)	Number of pulses 3 in 6 directions Pulse duration 18ms non operating	30			G
T_c	Operating temperatures	Ambient temperature, derating from 60°C , see page 6	-40		see page 6	°C
	Storage temperatures	Ambient temperature	-55		+125	°C
	Thermal shutdown	Case Temperature		110		°C

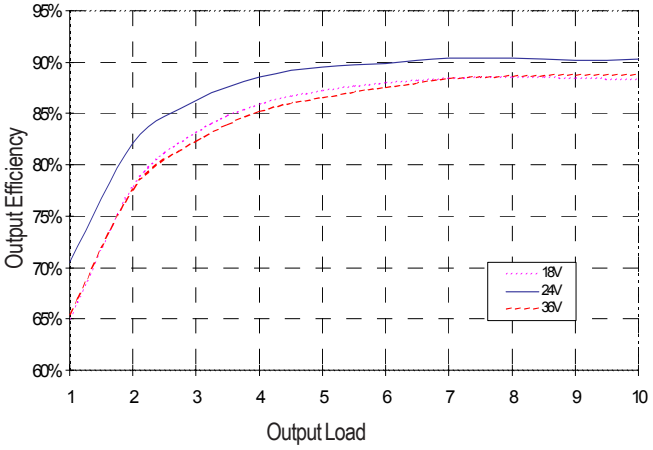
EMC information conducted, EN 55022/11 Class A



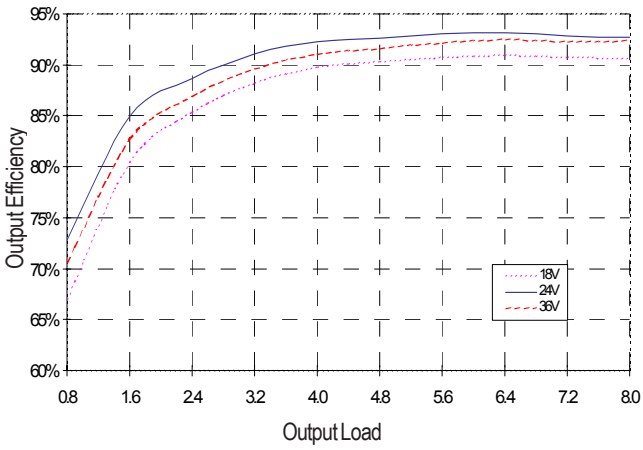
EMC test conducted at full load. No external components are needed. For further EMC requirements, please contact your local distributor / representative or contact Fabrimex directly.

Typical characteristics

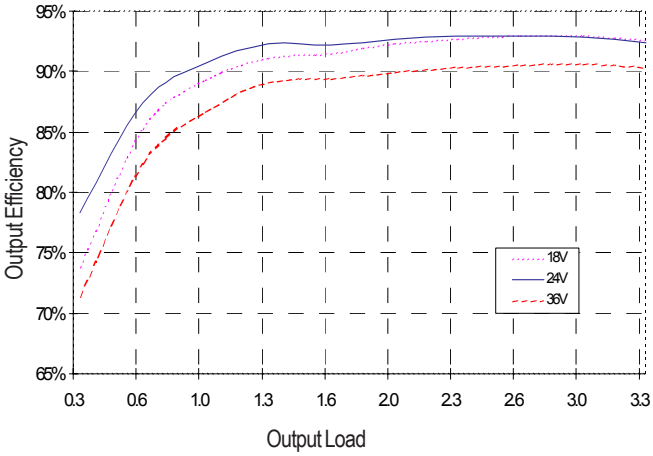
Efficiency U_{out} = 3.3Vdc (typical)



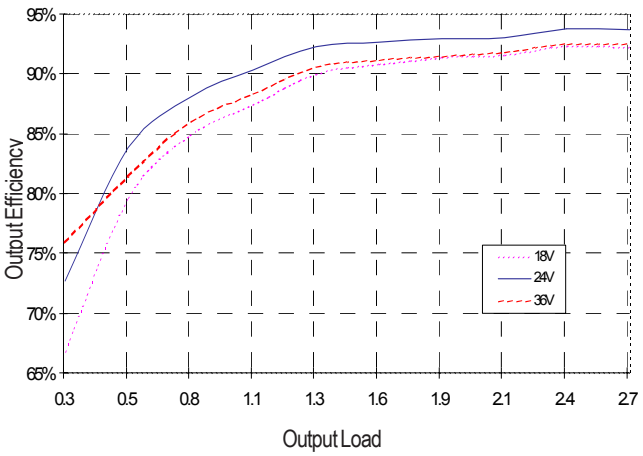
Efficiency U_{out} = 5.0Vdc (typical)



Efficiency U_{out} = 12.0Vdc (typical)

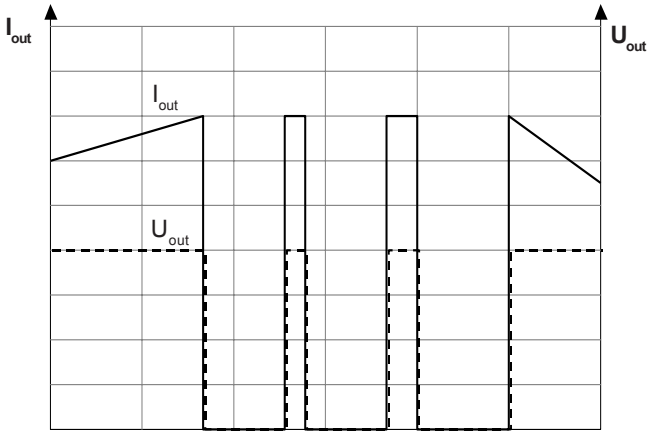


Efficiency U_{out} = 15.0Vdc (typical)

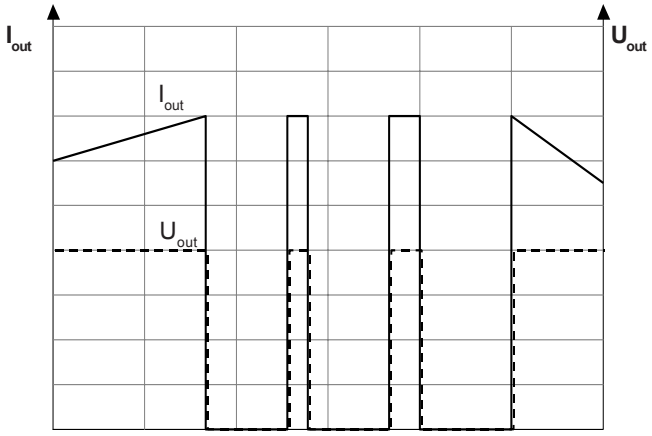


Typical characteristics

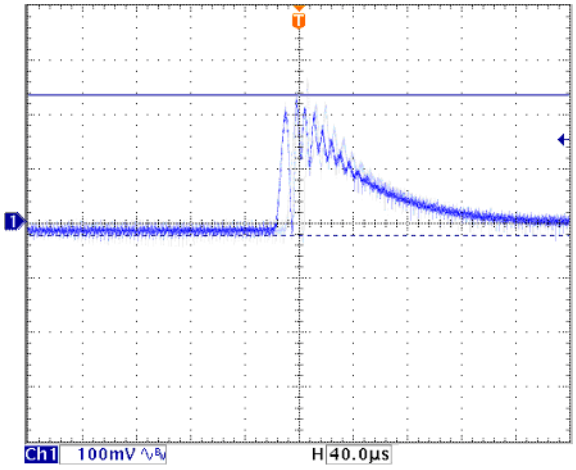
Current limit characteristic



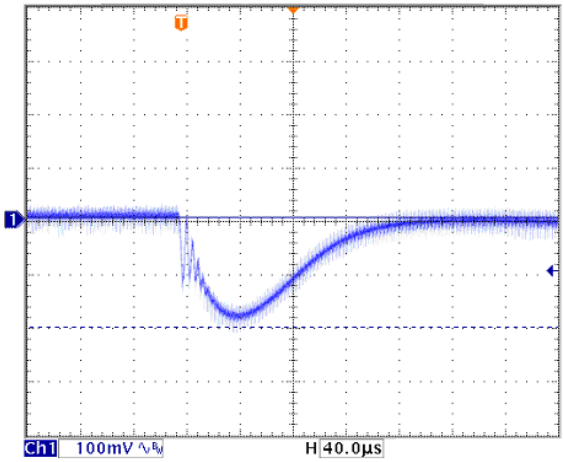
Short circuit protection



Dynamic load response EW24-0340C (typical)

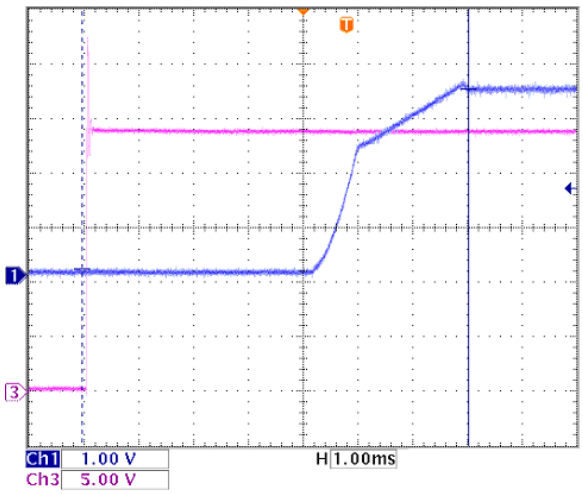


Dynamic load response: 100% -> 25%, Uin: 24V



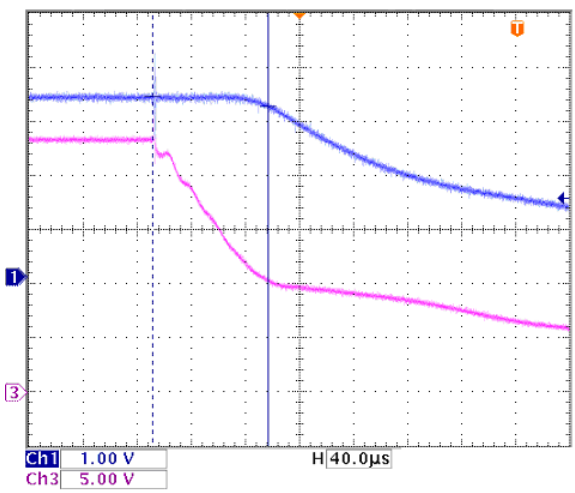
Dynamic load response: 25% -> 100%, Uin: 24V

Start-up time (typical)



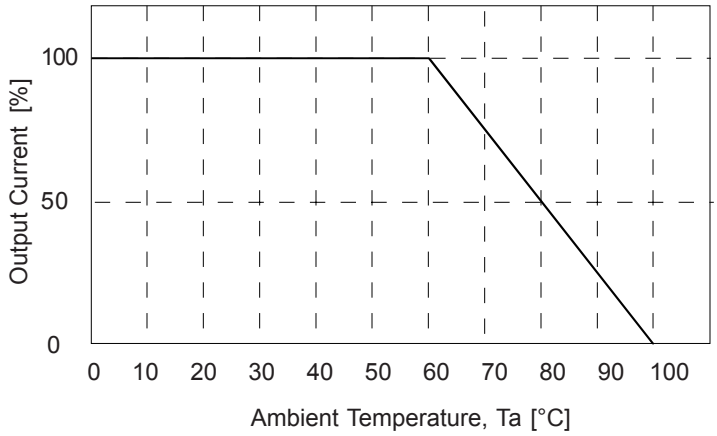
Switch-on at 100% load

Shut-down time (typical)



Switch-off at 100% load

Derating ECW 40 Watt Series



The operating ambient temperature range of ECW 40C series is -40°C to +100°C. When operating the ECW 40C series, proper derating or cooling is needed. The curves are the derating curves of the ECW 40C without heat sink at natural convection (0.1 m/s).

Please note that these are relative values in a defined environment. Ambient temperature can not be exactly defined in an application. For verification purposes, the maximum case temperature may not exceed 100°C anywhere.

Inhibit on/off control

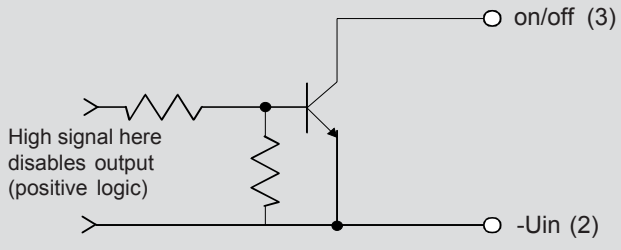
The ECW 40C allows the user to switch the module on and off electronically by inhibit on/off feature. The converters are available in "positive logic" or "negative logic" (option) versions for inhibit on/off. The signal level (control voltage) of the remote on/off pin is defined with respect to ground.
If not using the remote on/off pin, leave the pin 'open' and module will be on (positive logic).

Logic table

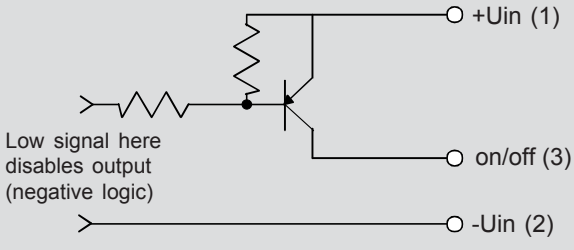
Positive logic	Logic Compatibility... CMOS or Opetn Collector TTL, ref. to -Vin	Module on Module off	> 3.5VDC or Open Circuit < 1.8VDC
Negative logic	Suffix "N" to the model number with negative logic remote ON/OFF	Module on Module off	< 1.8VDC > 3.5VDC or open

If the control voltage exceeds 5.5Vdc, then an external protective circuit has to be used similar to the following examples:

Application example postive logic:

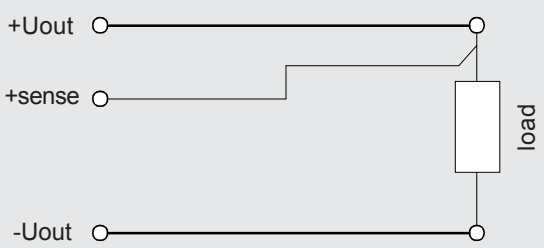


Application example negative logic:
(add suffix 'N' to part numer)



Remote Sense

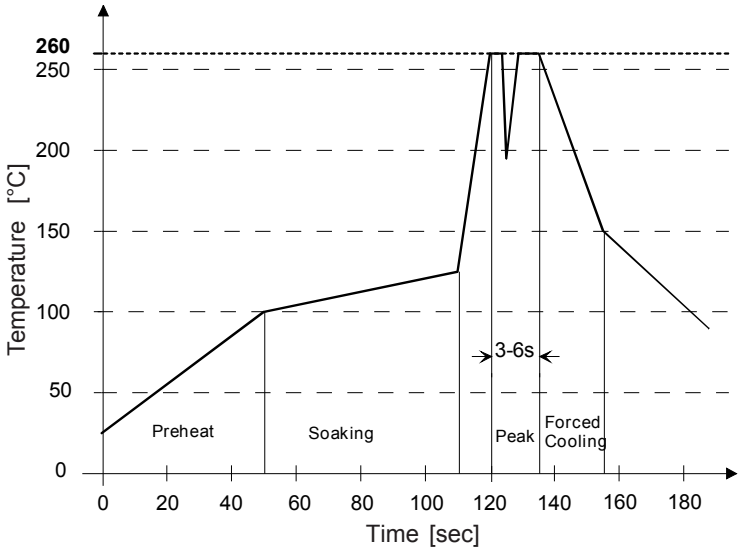
Application example sense function:



The ECW 40C allows the user to compensate a voltage drop between the converter and the load of maximum 500mV by using the sense function. For proper operation, the sense shall be connected as shown in the example, as close to the load as possible.

When the sense feature is not used, the +sense pin should be connected to +Uout and the -sense pin should be connected to -Uout.

Soldering Information



Limits:

Preheat: Ramp up rate during preheating is 1.4°C /sec; from 50°C to 100°C.

Soaking: Ramp up rate during soaking is 0.5°C / sec; from 100°C ro 130°C (60 ± 20sec).

Peak: Peak temperature is 260°C and maximum 3-6 sec above 250°C is allowed.

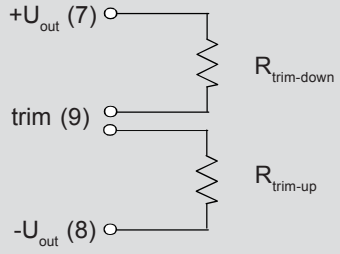
Cooling: Ramp down rate during forced cooling is -10°C / sec from 260°C to 150°C.

External output voltage trim

For the ECW 40W C series, the trim function allows the user to adjust the output voltage between ±10% by connecting an external resistor either between the trim pin and the common pin (trim-up) or the trim pin and the +Uout pin (trim-down).

Connection:

Example trim-up / trim-down function:

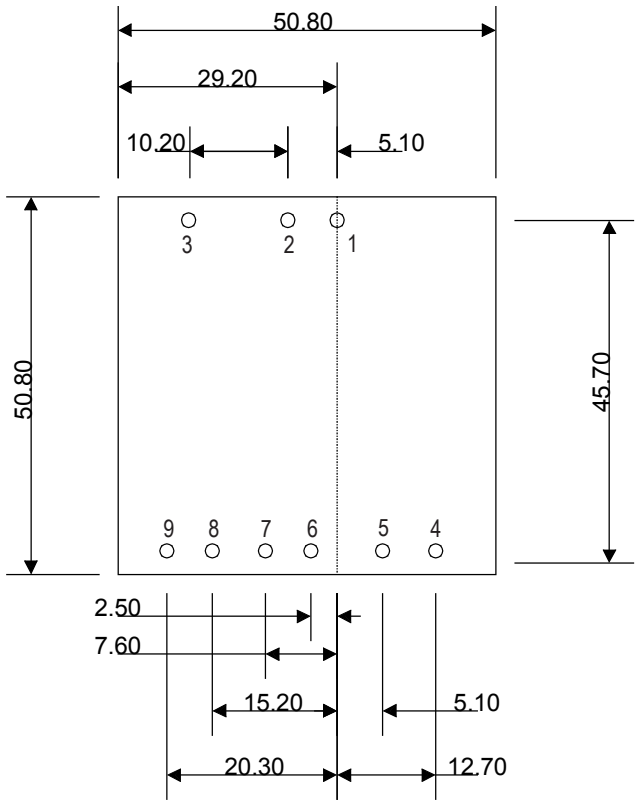


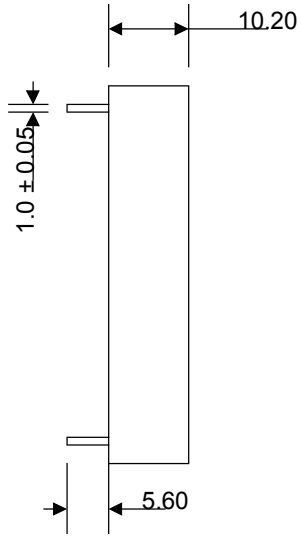
R_{trim} Calculation (where U_{out} is desired output voltage)**:**

$U_{out-nom}$	**$R_{trim-up}$**	**$R_{trim-down}$**
3.3 Vdc	$R_{trim-up} = (\frac{6.05}{(U_{out} - 3.3) \times 1.8}) - 9.1 \ (K\Omega)$	$R_{trim-down} = 2.74 \times (\frac{3.4}{(3.3 - U_{out}) \times 1.8} - 1) - 9.1 \ (K\Omega)$
5.0 Vdc	$R_{trim-up} = (\frac{5.8}{U_{out} - 5.0}) - 8.2 \ (K\Omega)$	$R_{trim-down} = \frac{5.22}{5.0 - U_{out}} - 8.2 \ (K\Omega)$
12.0 Vdc	$R_{trim-up} = (\frac{80.24}{(U_{out} - 12.0) \times 2.4}) - 22 \ (K\Omega)$	$R_{trim-down} = 6.8 \times (\frac{17}{(12.0 - U_{out}) \times 2.4} - 1) - 22 \ (K\Omega)$
15.0 Vdc	$R_{trim-up} = (\frac{53.28}{(U_{out} - 15.0) \times 2.4}) - 27 \ (K\Omega)$	$R_{trim-down} = 8.06 \times (\frac{20.15}{(15.0 - U_{out}) \times 2.4} - 1) - 27 \ (K\Omega)$

Case | Gehäuse | Boîtier

View from bottom; Normal tolerance 1/10 ±0.5 mm, 1/100 ±0.25 mm; Pin tolerance 0.5 mm diameter





Pin	Function
1	+Vin
2	- Vin
3	On/Off
4	NC
5	- Sense
6	+Sense
7	+Vout
8	-Vout
9	Trim

Cleaning | Waschen | Lavage

The modules are cleanable with the today's known and in the electronics industry usually used products.
Due to the different cleaning processes and new available products, we highly recommend to do a compatibility test when using the converters the first time.

Die Module sind waschbar mit den heute bekannten und in der Elektronikindustrie üblichen Reinigungsmitteln.
Bedingt durch die verschiedenen Reinigungsprozesse und neu auf den Markt kommende Mittel, raten wir dringend beim Ersteinsatz der Konverter eine Verträglichkeitsprüfung vorzunehmen.

Les modules sont lavables avec les solvants couramment utilisés dans l'industrie électronique.
Dû aux differents processus de lavage et aux nouveaux détergents disponibles sur le marché, il est strictement recommandé de faire un test de compatibilité avant la première utilisation.

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