

# DC/DC Ultra Wide Input Converter ECU 50 Watt Series



DC/DC converter module with input to output isolation of 1500 VDC • Pi-filter at input • Continuous short circuit proof • High efficiency • Low output ripple and noise • Low silhouette • 5-sided metal case • External output voltage adjust • Inhibit on/off control • Half brick case

DC/DC Konverter-Modul mit galvanischer Trennung Eingang / Ausgang von 1500 VDC • Pi-Filter am Eingang • Dauerkurzschlussfest • Hoher Wirkungsgrad • Gute Werte von Rippel und Noise • Geringe Bauhöhe • 5-seitiges Metallgehäuse • Externer Ausgangsspannungsabgleich • Inhibit • Half brick Gehäuse

Module convertisseur DC/DC avec séparation galvanique entrée/sortie 1500 VDC • Filtre d'entrée • Protection contre courts-circuits permanents • Rendement élevé • Très faible ondulation résiduelle de sortie • Hauteur réduite • Boîtier métallique à 5 faces • Ajustement externe de la tension de sortie • Fonction inhibit • Boîtier au format "half brick"

## Product range

## Typenübersicht

## Sommaire des types

PART NUMBER	INPUT VOLTAGE		INPUT CURRENT		OUTPUT		EFFICIENCY
	Nominal	Range	max. @ full load	No Load	Voltage	Current	Typical
ECU24-3V350	24 VDC	9...36 VDC	1.785 A	50 mA	3.3 VDC	10 A	77%
ECU24-5V050	24 VDC	9...36 VDC	2.57 A	50 mA	5.0 VDC	10 A	81%
ECU24-1250	24 VDC	9...36 VDC	2.51 A	50 mA	12 VDC	4.16 A	83%
ECU24-1550	24 VDC	9...36 VDC	2.51 A	50 mA	15 VDC	3.33 A	83%
ECU24-2450	24 VDC	9...36 VDC	2.51 A	50 mA	24 VDC	2.08 A	83%
ECU48-3V350	48 VDC	18...72 VDC	0.88 A	50 mA	3.3 VDC	10 A	78%
ECU48-5V050	48 VDC	18...72 VDC	1.27 A	50 mA	5.0 VDC	10 A	82%
ECU48-1250	48 VDC	18...72 VDC	1.24 A	50 mA	12 VDC	4.16 A	84%
ECU48-1550	48 VDC	18...72 VDC	1.24 A	50 mA	15 VDC	3.33 A	84%
ECU48-2450	48 VDC	18...72 VDC	1.24 A	50 mA	24 VDC	2.08 A	84%

# ECU 48 - 12 50 x

Product Series

Nominal Input Voltage

Nominal Output Voltage  
(3V3 = 3.3V)

Output Power in Watts

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

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	$T_c < T_{cmax}$	18		72	Vdc
$I_{nl}$	No load current	$I_{out} = 0; U_{in} > U_{in\ off}$		50		mA
$U_{in\ off}$	Under voltage lockout ( $U_{innom} = 24Vdc$ )	Power up ( $U_{innom} = 24Vdc$ )		8.8		Vdc
		Power down ( $U_{innom} = 24Vdc$ )		8		Vdc
	Under voltage lockout ( $U_{innom} = 48Vdc$ )	Power up ( $U_{innom} = 48Vdc$ )		17		Vdc
		Power down ( $U_{innom} = 48Vdc$ )		16		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	Vdc
		Off (open collector referenced to $-U_{in}$ )			< 0.8	Vdc
	Inhibit on/off control (negative logic; add suffix "N" to part number)	On (open collector referenced to $-U_{in}$ )			< 0.8	Vdc
		Off (open collector referenced to $-U_{in}$ )			open circuit	Vdc

## OUTPUT SPECIFICATIONS

Characteristics		Conditions	min	typ	max	unit
$U_{acc}$	Output voltage accuracy	of nominal output voltage			$\pm 1$	% $U_{out}$
	Line regulation	$I_{out} = I_{out\ nom}$			$\pm 0.2$	% $U_{out}$
	Load regulation	0% load up to 100% load			$\pm 0.2$	% $U_{out}$
	Load transient recovery time	25% to 100% step load change		600		us
	Load transient error band			1		% $U_{out}$
	Start-up time	Connection of input and until $U_{out} = 90\% U_{out\ nom}$		7		ms
	Temperature coefficient			$\pm 0.3$		%/°C
$U_{out\ trim}$	Output voltage adjustment	see "External output trim" page 7		$\pm 10$		% $U_{out\ nom}$
$U_{r\ n}$	Output ripple & noise	Bandwidth 20 Mhz; $U_{out} = 3.3$ or 5Vdc			100	mVpp
		Bandwidth 20 Mhz; $U_{out} = 12$ or 15Vdc			150	mVpp
		Bandwidth 20 Mhz; $U_{out} = 24Vdc$			240	mVpp

continued

Characteristics		Conditions	min	typ	max	unit
	Output capacitance				t.b.d.	F
	Output current limit	see current limit chart, page 4	110		160	% $I_{out\ nom}$
	Output short circuit	see short circuit protection graph, page 4	110	130	140	% $I_{out}$
	Output over voltage protection	of nominal output voltage	115		140	% $U_{out}$
	Output short circuit protection	hiccup-mode		continuous		

## GENERAL SPECIFICATIONS

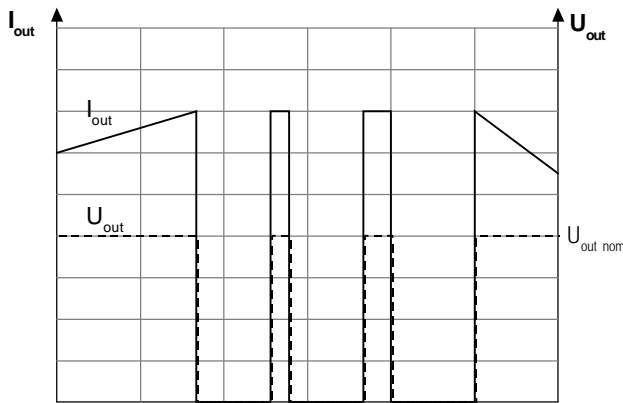
Characteristics		Conditions	min	typ	max	unit
$U_{iso}$	Isolation voltage	input/output, input/case, output/case	1'500			Vdc
	Isolation resistance	Input to output	100			MOhm
	Input / output capacitance				1'000	pF
	Switching frequency	Fixed	270	300	330	kHz
	Approvals		Meets UL / cUL1950, EN60950			
	Case material		5-sided aluminum case			
	Weight			100		g
	Pinning	see "case" page 7				
	Dimensions	see "case" page 7	57.9 x 50.8 x 12.7			mm
	Soldering temperature	maximum 10s			275	°C

## ENVIRONMENTAL SPECIFICATIONS

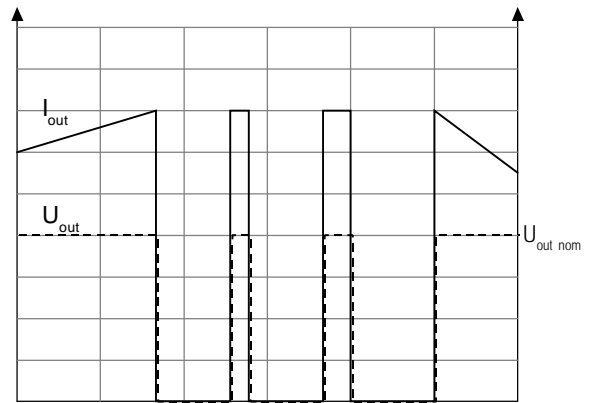
Characteristics		Conditions	min	typ	max	unit
	Vibration (sinusoidal)	Frequency 5-500 Hz Swep 1 Oct/min Duration 30 min (x,y,z axis) non operating	3			Grms
	Shock (half sinus)	Number of pulses 3 in 6 directions Pulse duration 18ms non operating	30			G
$T_c$	Operating temperatures	Case temperature, see also "Derating" page 5	-40		+100	°C
	Storage temperatures	Ambient temperature	-55		+105	°C
	Thermal shutdown	Case temperature	95	100	105	°C

# Typical characteristics

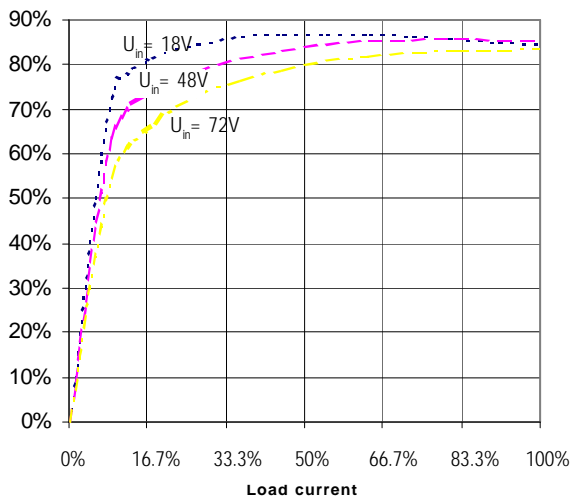
Current limit characteristic



Short circuit protection



Efficiency (typical ECU48-1550,  $U_{in} = 18-72Vdc$ )



## Inhibit on/off control

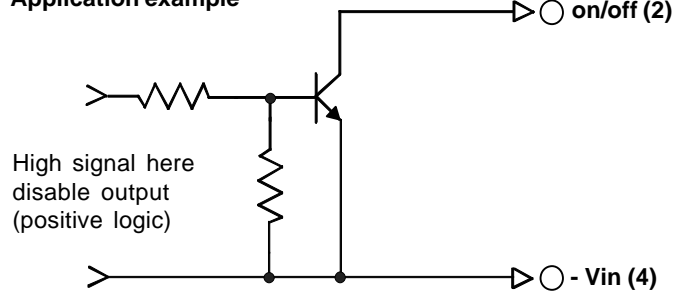
The ECU 50 Watt allows the user to switch the module on and off electronically by inhibit on/off feature. The converters are available in "positive logic" or "negative logic" (option) versions for inhibit on/off.

Logic table

Logic state (Pin 2)	Negative logic*	Positive logic
Logic low	Module on	Module off
Logic high	Module off	Module on

\* Suffix "N" to the model number with active low inhibit on /off

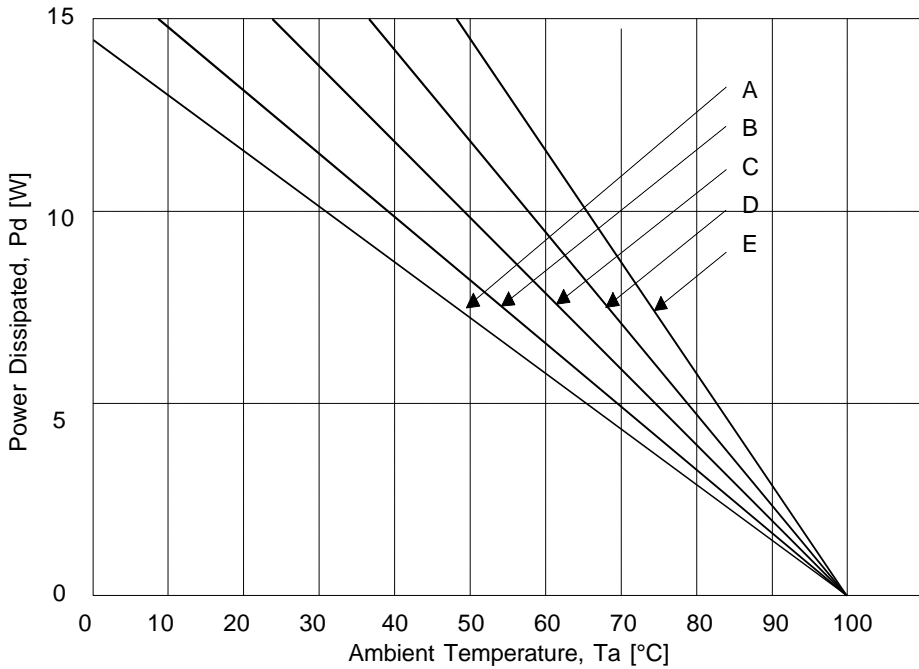
Application example



## Derating ECU 50 Watt Series

The operating case temperature range of ECU 50 series is -40°C to +100°C. When operating the ECU 50 series, proper derating or cooling is needed. The following curves are the derating curves of ECU 50 without and with heat sink. Please note that these are relative values in a test environment. Ambient temperature can not be exactly defined in an application, only the case temperature.

### Without Heat Sink: Power Dissipated vs Ambient Temperature and Air Flow ECU 50 Watt



- A : Natural Convection 0.1m/s
- B : 0.5m/s
- C : 1.0m/s
- D : 1.5m/s
- E : 2.0m/s

**Remark:**  
 Fabrimec recommends a free space of at least half the converter length above the converter at natural air flow. For the ECU 50 Watt this equals to:

Free space = 30.5mm min.

Where:

The Power Dissipation (Pd):  

$$Pd = Pi - Po = Po * (1 - \eta) / \eta$$

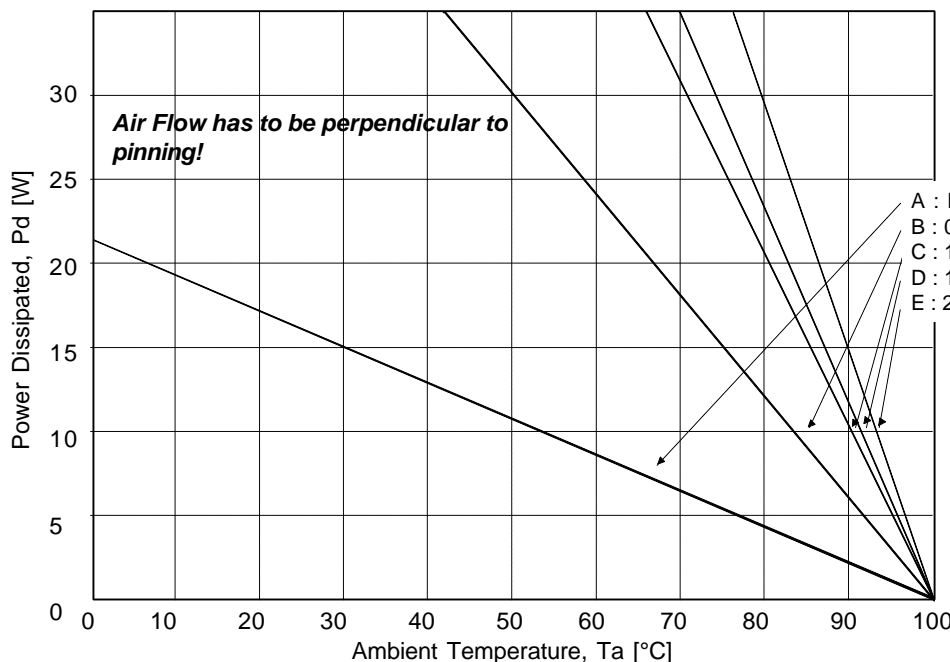
The temperature rise (delta T):  

$$\Delta T = Pd * Rca$$

The thermal resistances with out heat sink are listed below:

air flow rate	typical Rca
natural convection 0.1m/s	7.12 K/W
0.5m/s	6.21 K/W
1.0m/s	5.17 K/W
1.5m/s	4.29 K/W
2.0m/s	3.64 K/W

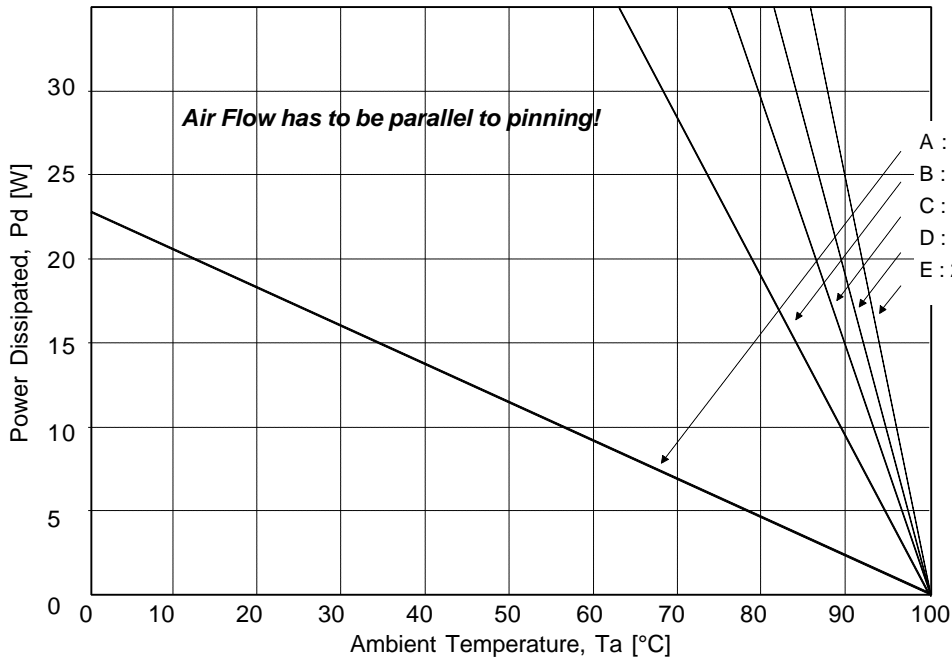
### With Heat Sink FH-6158-13: Power Dissipated vs Ambient Temperature; Height: 12.7mm



**Remark:**  
 Fabrimec recommends a free space of at least half the heat sink height above the heat sink at natural air flow. For the FH-6158-13 this equals to:

Free space = 6.5 mm min.

**With Heat Sink FH-5861-21: Power Dissipated vs Ambient Temperature; Height: 21mm**

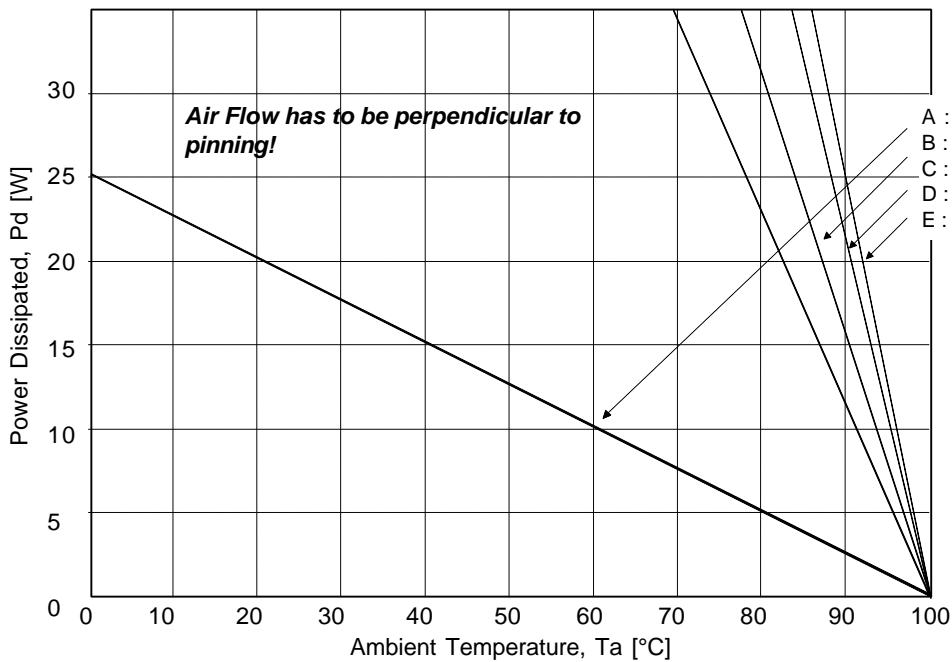


**Remark:**

Fabrimex recommends a free space of at least half the heat sink height above the heat sink at natural air flow. For the FH-5861-21 this equals to:

Free space = 10.5mm min.

**With Heat Sink FH-6158-25: Power Dissipated vs Ambient Temperature; Height: 25.4mm**

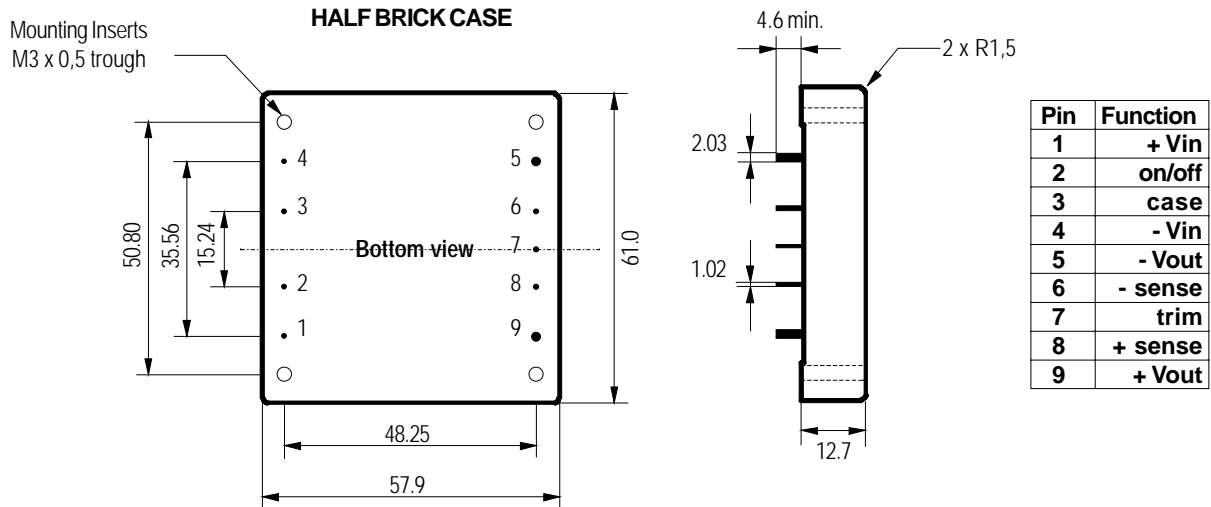


**Remark:**

Fabrimex recommends a free space of at least half the heat sink height above the heat sink at natural air flow. For the FH-6158-25 this equals to:

Free space = 12.5mm min.

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



## 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 différents 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.

**Notice:** All statements, technical information, and recommendations related to FABRIMEX's products are based on information believed to be reliable, but the accuracy or completeness thereof is not guaranteed. Before utilizing the product, the user should determine the suitability of the product for its intended use.

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