

DC/DC Wide Input Converter ECW 50 Series



- * 2:1 input voltage range
- * Half Brick industry standard pinning
- * I/O isolation of 1'500 Vdc
- * Continuous short circuit proof
- * Over temperature protection
- * Remote on/off control
- * Sense
- * Ext. output voltage adjustment $\pm 10\%$
- * Metal case with non conductive base plate, five sides shielded
- * UL60950-1 registered



Product Range

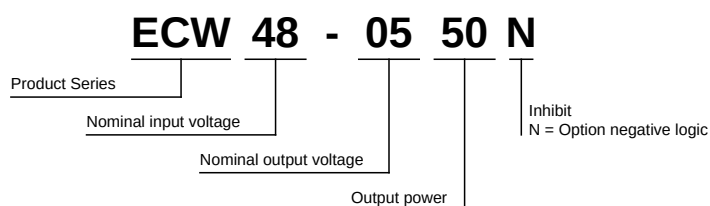
Model	Input nominal	Input range	lin @ Uin nom. full load	no load	Uout	Output Iout max.	power	Efficiency typ.	Max. capacity
Single									
ECW12-3V350	12Vdc	9...18Vdc	3481mA	50mA	3.3Vdc	10A	33W	79%	10'000uF
ECW12-0550	12Vdc	9...18Vdc	5020mA	50mA	5.1Vdc	10A	51W	83%	10'000uF
ECW12-1250	12Vdc	9...18Vdc	4781mA	50mA	12Vdc	4.16A	50W	87%	4'000uF
ECW12-1550	12Vdc	9...18Vdc	4781mA	50mA	15Vdc	3.33A	50W	87%	2'000uF
ECW12-2450	12Vdc	9...18Vdc	4781mA	50mA	24Vdc	2.08A	50W	87%	1'500uF
ECW24-3V350	24Vdc	18...36Vdc	1698mA	50mA	3.3Vdc	10A	33W	81%	10'000uF
ECW24-0550	24Vdc	18...36Vdc	2450mA	50mA	5.1Vdc	10A	51W	85%	10'000uF
ECW24-1250	24Vdc	18...36Vdc	2363mA	50mA	12Vdc	4.16A	50W	88%	10'000uF

ECW24-1550	24Vdc	18...36Vdc	2363mA	50mA	15Vdc	3.33A	50W	88%	4'000uF
ECW24-2450	24Vdc	18...36Vdc	2363mA	50mA	24Vdc	2.08A	50W	88%	2'000uF
ECW48-3V350	48Vdc	36...72Vdc	848mA	50mA	3.3Vdc	10A	33W	81%	10'000uF
ECW48-0550	48Vdc	36...72Vdc	1240mA	50mA	5.1Vdc	10A	51W	84%	10'000uF
ECW48-1250	48Vdc	36...72Vdc	1180mA	50mA	12Vdc	4.16A	50W	88%	10'000uF
ECW48-1550	48Vdc	36...72Vdc	1180mA	50mA	15Vdc	3.33A	50W	88%	4'000uF
ECW48-2450	48Vdc	36...72Vdc	1170mA	50mA	24Vdc	2.08A	50W	89%	2'000uF

Notes:

Measured at nominal input voltage

Nomenclature



Specifications

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

Input Specifications

Characteristic	Conditions	min	typ	max	unit
U_{IN} Input voltage		9 / 18 / 36	12 / 24 / 48	18 / 36 / 72	Vdc
U_{UVLO} Under voltage lockout		Off: 8 / 17 / 32, On: 8.8 / 17 / 34			Vdc
Max. input current at full load		See	product	range	A
No load input current			50		mA
Inrush current			-		A ² s
Input surge voltage		Max. 25 / 50 / 100			Vdc

Output Specifications

Characteristic	Conditions	min	typ	max	unit
U_{ACC} Output voltage accuracy			±1		%
Output voltage adjust			±10		%
Line regulation				±0.2	%
Load regulation				±0.2	%
Cross regulation					%
Load transient recovery time	75% / 100% step load change		< 500		us
Load transient error band			±5		%
Temperature coefficient			±0.03		%/K
Ramp up time		12V U_{in} : 3, others 0.4			ms
Start up time			5	< 20	ms
Ripple and noise	BW = 20MHz	3.3/5V: 75, 12/15V: 100, 24V: 240			mVpp

	Current limit		110		150	% Inom
	Over voltage protection		115		140	% Unom
	Short circuit protection					% Inom
	Short circuit characteristic		continuous			

General Specifications

Characteristic		Conditions	min	typ	max	unit
U _{ISO}	Isolation voltage	in/out, in/case, out/case	1500			Vdc
R _{ISO}	Isolation resistance		> 10M			Ohm
C _{ISO}	Isolation capacity		1000			pF
F _{SW}	Switching frequency		typ. 400, 48Vin: 300			kHz
	Approvals					
	Safety Approvals		UL / cUL 60950, only 18-36 & 36-72Vdc			
	MTBF		>1'000'000			h
	Case material		Aluminium			
	Compound material		UL 94V-0			
	PCB material		UL 94V-0			
	Weight		88			gr
	Dimensions		57.9 x 61.0 x 12.7			mm
	Soldering infos		275°C for 10 sec.			s

EMC Specifications

Characteristic		Conditions	
	EMC conducted	See EMC information	EN55022/11 Class A

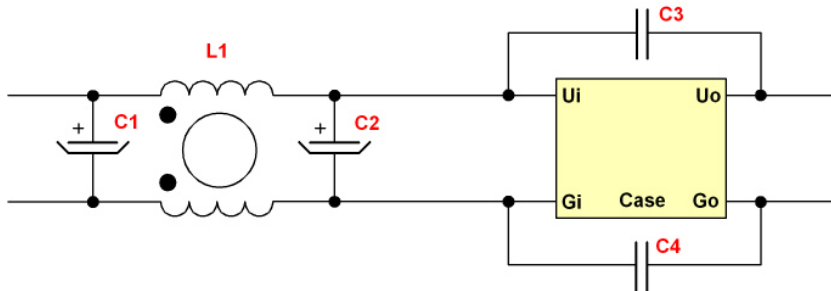
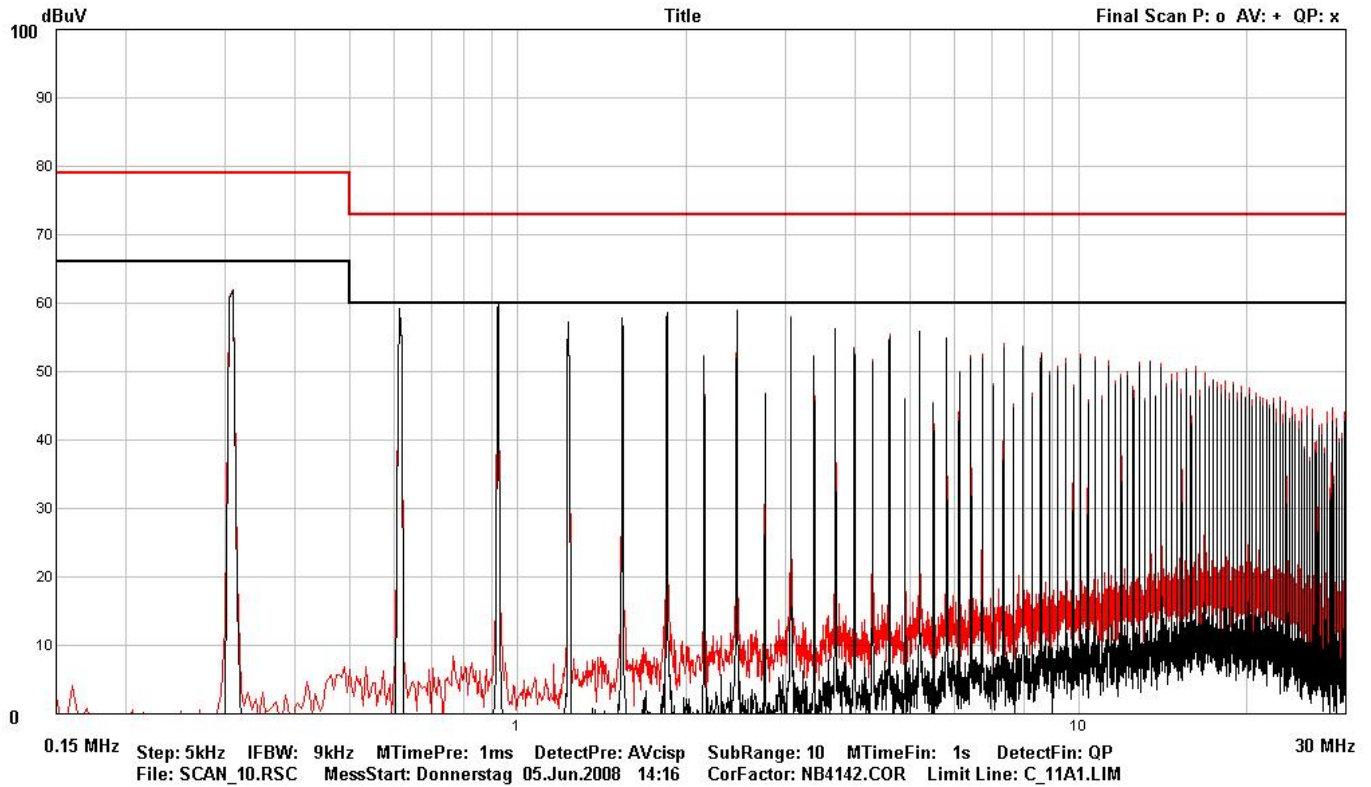
Environmental Specifications

Characteristic		Conditions	min	typ	max	unit
T _{CASE}	Operation temperature		-40...+100			°C
T _{AMB}	Storage temperature		-55...+105			°C
T _{SD}	Thermal shutdown range		Tcase = 100			°C

Own notes

EMC information

EMC emissions conducted, EN55022/11 Class A, Example: ECW24-0550



This was achieved with the following filter:
 C1 220uF / 50V Rubycon 50ZL220M10X16
 C2 220uF / 50V Rubycon 50ZL220M10X16
 C3 680 pF / 2kV Vishay 228271214616
 C4 680 pF / 2kV Vishay 228271214616
 L1 B64290-L45-X830 with 2 x 9 windings
 1.1 mm Cu

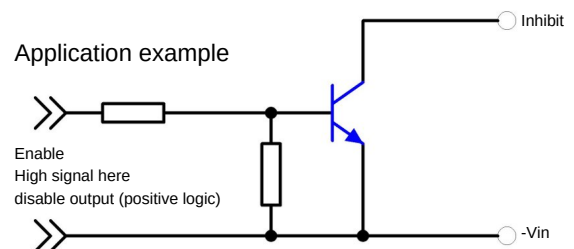
Inhibit

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

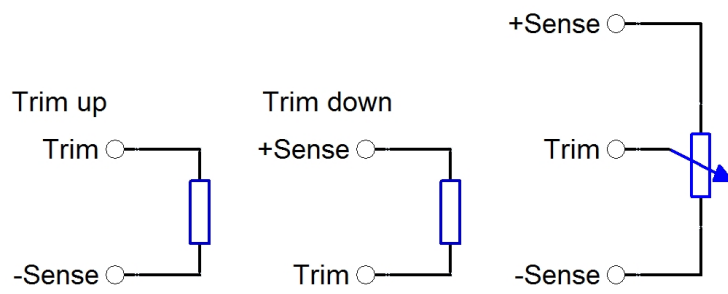
Logic table (inhibit pin)

Logic state	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



Trimming

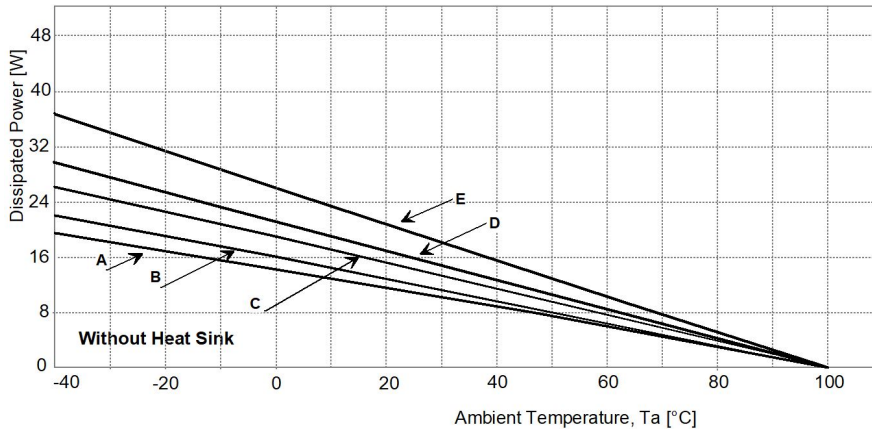


Own notes

Derating Formulas

The operating case temperature range of series is -40...+100°C. When operating the series, proper derating or cooling is needed. The following curves are the derating curves of 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 Dissipation vs Ambient Temperature and Air Flow for



Where:

Example: $V_{in} = 48V$, $V_{out} = 12V$, $I_{out} = 4.16A$, $T_a = 50^\circ C$, Air Flow = 0.1m/s

The power dissipation P_d :

$$P_d = P_i - P_o = \frac{P_o \cdot (1 - \eta)}{\eta}$$

Leads to:

$$P_d = \frac{12V \cdot 4.16A \cdot (1 - 0.88)}{0.88} = 6.81W$$

The temperature rise Delta T:

$$\Delta T = P_d \cdot R_{thca}$$

And this leads to:

$$\Delta T = 6.81W \cdot 7.12K/W = 48.5K$$

And:

$$T_c = T_a + \Delta T = 50^\circ C + 48.5K = 98.5^\circ C$$

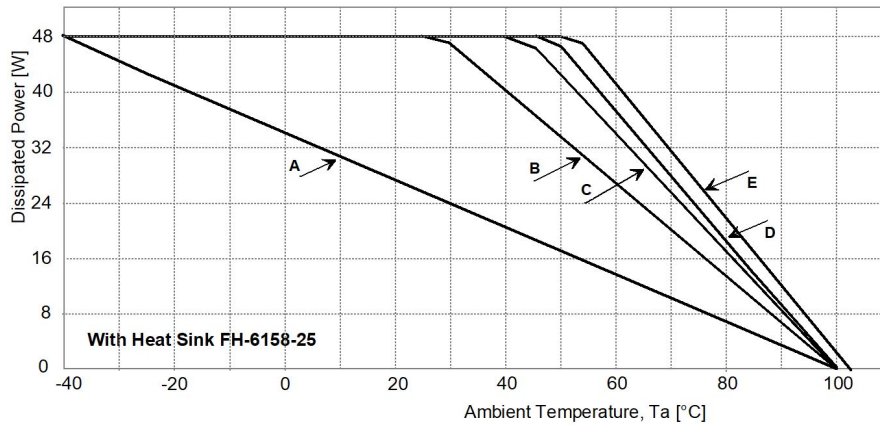
Which is below the max. T_c of 100°C.

The thermal resistances without heatsink are listed below:

Air flow rate	Typical R_{thca}
natural convection 0.1m/s	7.12 K/W
0.5 m/s	6.21 K/W
1.0 m/s	5.17 K/W
1.5 m/s	4.29 K/W
2.0 m/s	3.64 K/W

Derating Formulas

With Heat Sink FH-6158-25: Power Dissipation vs Ambient Temperature and Air Flow; Height: 25.4mm



Where:

Example: $V_{in} = 48V$, $V_{out} = 12V$, $I_{out} = 4.16A$, $T_a = 70^{\circ}C$, Air Flow = 0.1m/s

The thermal resistances with heat sink FH-6158-25 are listed below:

The power dissipation P_d :

$$P_d = P_i - P_o = \frac{P_o \cdot (1 - \eta)}{\eta}$$

Leads to:

$$P_d = \frac{12V \cdot 4.16A \cdot (1 - 0.88)}{0.88} = 6.81W$$

Air flow rate

Typical R_{thca}

natural convection 0.1m/s	3.00 K/W
0.5 m/s	1.44 K/W
1.0 m/s	1.17 K/W
1.5 m/s	1.04 K/W
2.0 m/s	0.95 K/W

The temperature rise ΔT :

$$\Delta T = P_d \cdot R_{thca}$$

And this leads to:

$$\Delta T = 6.81W \cdot 3.0K/W = 20.4K$$

And:

$$T_c = T_a + \Delta T = 70^{\circ}C + 20.4K = 90.4^{\circ}C$$

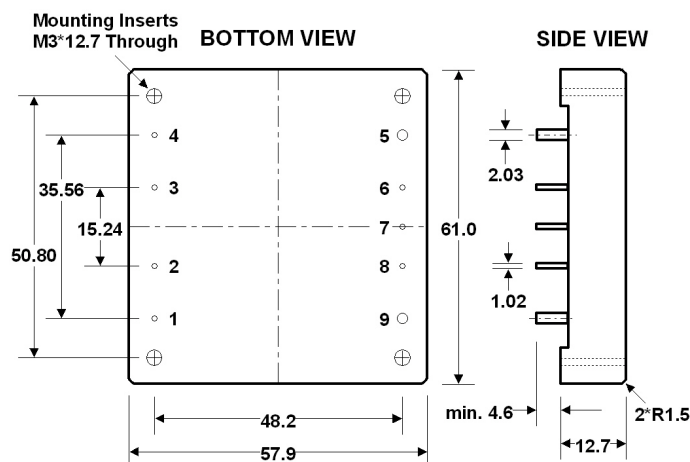
Which is below the max. T_c of $100^{\circ}C$.

Case

Normal tolerance 1/10 ± 0.5 mm, 1/100 ± 0.25 mm; Pin tolerance ± 0.05 mm diameter

NP = No pin, NC = Not connected, NA = Not available for electrical contact, do not connect, (opt) = optional

SINGLE OUTPUT ALU



Pin	Single
1	+Vin
2	on/off
3	Case
4	-Vin
5	-Vout
6	-Sense
7	Trim
8	+Sense
9	+Vout

Cleaning

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.

Own notes

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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