ISOLATED DC-DC Converter
EC7BW SERIES
APPLICATION NOTE

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Content

EC7BW 20W Isolated DC-DC Converters

Application Note V12 August 2019

1. Introduction

The EC7BW series offer 20 watts of output power in a 1.00x1.00x0.4 inches copper packages. The EC7BW series has a 4:1 wide input voltage range of 9-36 and 18-75VDC, and provides a precisely regulated output. This series has features such as high efficiency, 1500VDC of isolation and allows an ambient operating temperature range of –40°C to 85°C (de-rating above 71 °C). The modules are fully protected against input UVLO (under voltage lock out), output over-current, over-voltage protection and continuous short circuit conditions. Furthermore, the standard control functions include remote on/off and adjustable output voltage. All models are very suitable for distributed power architectures, telecommunications, battery operated equipment and industrial applications.

2. DC-DC Converter Features

* 20W Isolated Output
* Efficiency to 90%
* Fixed Switching Frequency
* 4: 1 Wide Input Range
* Regulated Outputs
* Continuous Short Circuit Protection
* Pi Input Filter
* Safety Meets UL60950-1, EN60950-1, and IEC60950-1
* Meets EN50155 with External Circuits
* Shock & Vibration Meets EN50155 (EN61373)
* Fire & Smoke meet EN45545-2

3. Electrical Block Diagram

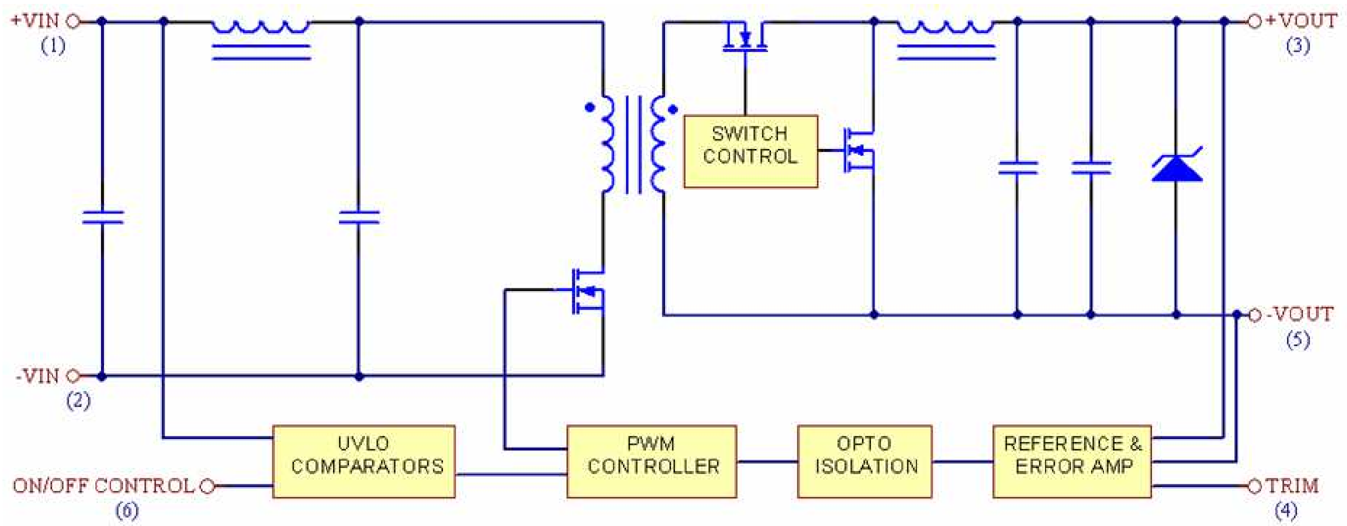


Figure1 Electrical Block Diagram of Single output module

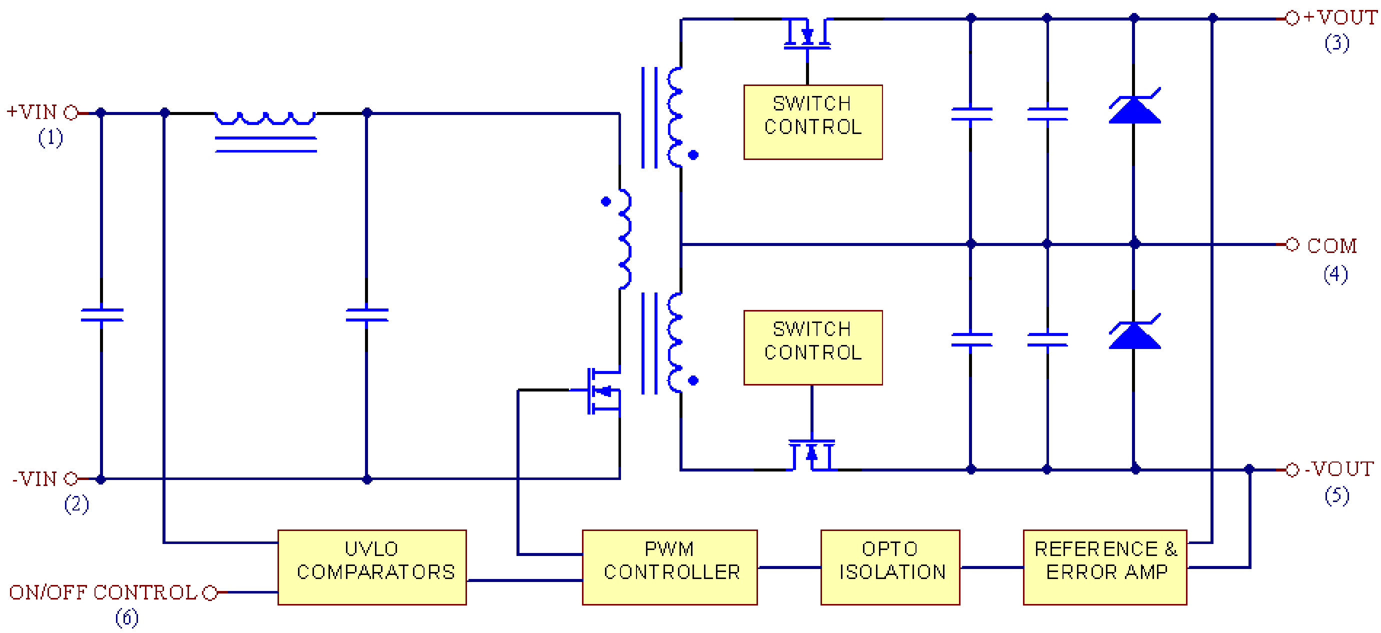


Figure2 Electrical Block Diagram of XXD05

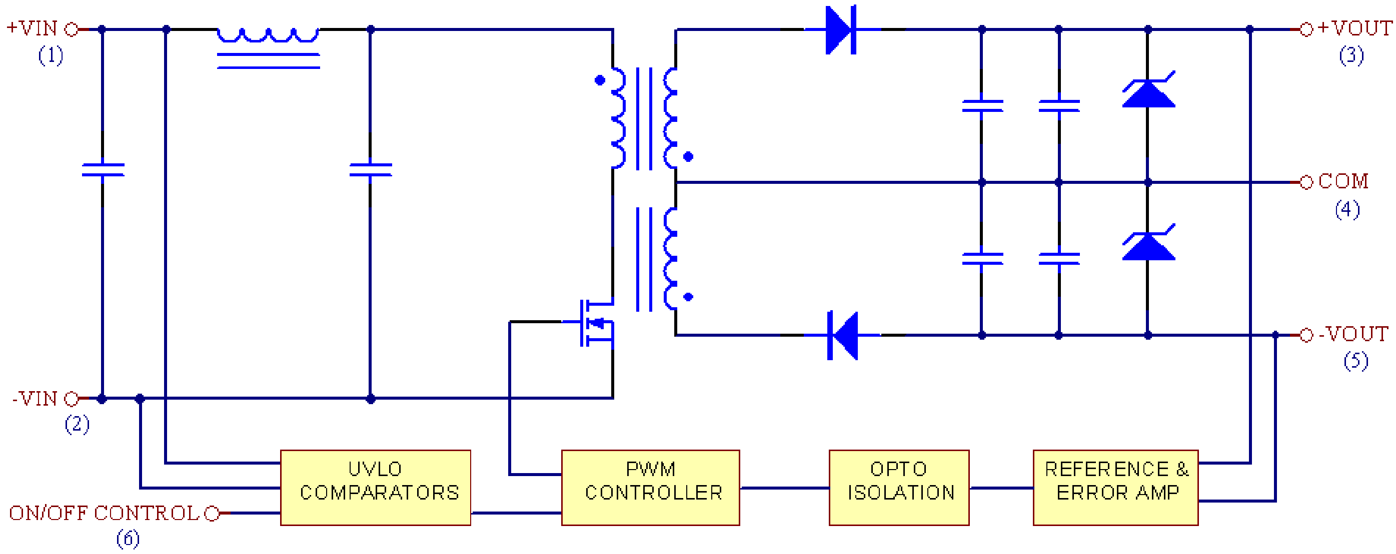


Figure3 Electrical Block Diagram of XXD12 and XXD15

4. Technical Specifications

(All specifications are typical at nominal input, full load at 25℃ unless otherwise noted.)

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
Input Voltage						
Continuous		24Vin 48Vin	-0.3 -0.3		36 75	Vdc
Transient	100ms	24Vin 48Vin			50 100	Vdc
Operating Ambient Temperature	De-rating, above 71℃	All	-40		+85	℃
Case Temperature		All			105	℃
Storage Temperature		All	-55		+125	℃
Input/Output Isolation Voltage	1 minute	All	1500			Vdc

INPUT CHARACTERISTICS						
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
Operating Input Voltage		24Vin 48Vin	9 18	24 48	36 75	Vdc
Input Under-Voltage Lockout						
Turn-On Voltage Threshold		24Vin 48Vin	8 16.5	8.5 17	8.8 17.5	Vdc
Turn-Off Voltage Threshold		24Vin 48Vin	7.7 15.5	8 16	8.3 16.5	Vdc
Lockout Hysteresis Voltage		24Vin 48Vin		0.6 0.9		Vdc
Maximum Input Current	100% Load, Vin=9V	24Vin		2610		mA
	100% Load, Vin=18V	48Vin		1305		
No-Load Input Current	Vin=Nominal input	24S33 24S05 24S12 24S15 24D05 24D12 24D15 48S33 48S05 48S12 48S15 48D05 48D12 48D15		55 55 55 55 70 35 35 25 25 25 25 25 25 25		mA
Inrush Current (I^2t)		All			0.1	A^2s
Input Reflected-Ripple Current	P-P thru 12uH inductor, 5Hz to 20MHz	All		30		mA

OUTPUT CHARACTERISTIC

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Set Point	Vin=Nominal Vin, Io=Io.max, Tc=25℃	Vo=3.3 Vo=5.0 Vo=12 Vo=15 Vo=±5V Vo=±12V Vo=±15V	3.2505 4.925 11.82 14.775 4.925 11.82 14.775	3.3 5 12 15 5 12 15	3.3495 5.075 12.18 15.225 5.075 12.18 15.225	Vdc
Output Voltage Balance	Vin=nominal, Io=Io_{max}, Tc=25℃	Dual			±1.0	%
Output Voltage Regulation						
Load Regulation	Io= Full Load to min. Load	All			±1.0	%
Line Regulation	Vin=low line to high line	Single Dual			±0.2 ±0.5	% %
Temperature Coefficient	Tc=-40℃ to 85℃	All			±0.03	%/℃
Output Voltage Ripple and Noise						
Peak-to-Peak	Full Load,20MHz bandwidth 0.1uF Ceramic capacitor	All			75	mV
Operating Output Current Range		Vo=3.3V Vo=5V Vo=12V Vo=15V Vo=±5V Vo=±12V Vo=±15V	0 0 0 0 0 0 0		5.5 4 1.67 1.33 2 0.835 0.666	A
Output DC Current-Limit Inception	Output Voltage =90% Nominal Output Voltage	All	110	125	150	%
Maximum Output Capacitance	Full load, Resistance	Vo=3.3V Vo=5V Vo=12V Vo=15V Vo=±5V Vo=±12V Vo=±15V			5500 4000 1800 1500 2000 1000 800	uF

DYNAMIC CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Current Transient						
Step Change in Output Current	75% to 100% of Io max. di/dt=0.1A/us	All			±5	%
Setting Time (within 1% $Vo_{nominal}$)		All			500	us
Turn-On Delay and Rise Time						
Turn-On Delay Time, From On/Off Control	Von/off to 10%Vo, set	All		1.5		ms
Turn-On Delay Time, From Input	Vin,min. to 10%Vo, set	All		2.5		ms
Output Voltage Rise Time	10%Vo, set to 90%Vo, set	All		6		ms

EFFICIENCY						
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
100% Load	Vin=Nominal Vin, Io=Io_{max}, Tc=25℃	24S33 24S05 24S12 24S15 24D05 24D12 24D15 48S33 48S05 48S12 48S15 48D05 48D12 48D15		87 90 90 90 89 88 88 88 90 90 90 89 88 88		%

ISOLATION CHARACTERISTICS						
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
Input to Output	1 minutes	All			1500	Vdc
Isolation Resistance		All	100			MΩ
Isolation Capacitance		All		1000		pF

FEATURE CHARACTERISTICS						
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
Switching Frequency		Single Dual		350 400		KHz
On/Off Control ,Positive Remote On/Off logic						
Logic Low (Module Off)	Von/off at Ion/off=1.0mA	All	0		1.2	V
Logic High (Module On)	Von/off at Ion/off=0.1uA	All	5.5 or Open Circuit		75	V
On/Off Control, Negative Remote On/Off logic						
Logic Low (Module On)	Von/off at Ion/off=1.0mA	All	0		1.2	V
Logic High (Module Off)	Von/off at Ion/off=0.1uA	All	5.5 or Open Circuit		75	V
On/Off Current (for both remote on/off logic)	Ion/off at Von/off=0.0V	All		0.3	1	mA
Leakage Current (for both remote on/off logic)	Logic High, Von/off=15V	All			30	uA
Off Converter Input Current	Shutdown input idle current	All		4	10	mA
Output Voltage Trim Range	Pout=max rated power (Single Output)	All	-10		+10	%
Output Over Voltage Protection	Zener or TVS Clamp	Vo=3.3V Vo=5.0V Vo=12V Vo=15V		3.9 6.2 15 18		Vdc

GENERAL SPECIFICATIONS						
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
MTBF	Io=100%of Io.max;Ta=25℃ per MIL-HDBK-217F	All		720		K hours
Weight		All		35		grams

5. Main Features and Functions

5.1 Operating Temperature Range

The EC7BW series converters can be operated by a wide ambient temperature range from -40℃ to 85℃(de-rating above 71℃). The standard model has a Copper case and case temperature can not over 105℃ at normal operating.

5.2 Remote On/Off

The EC7BW series allows the user to switch the module on and off electronically with the remote on/off feature. All models are available in “positive logic” and “negative logic” (optional) versions. The converter turns on if the remote on/off pin is high (>5.5Vdc or open circuit). Setting the pin low (0 to <1.2Vdc) will turn the converter off. The signal level of the remote on/off input is defined with respect to ground. If not using the remote on/off pin, leave the pin open (converter will be on). Models with part number suffix “N” are the “negative logic” remote on/off version. The unit turns off if the remote on/off pin is high (>5.5Vdc or open circuit). The converter turns on if the on/off pin input is low (0 to <1.2Vdc). Note that the converter is off by default.

5.3 UVLO (Under Voltage Lock Out)

Input under voltage lockout is standard on the EC7BW unit. The unit will shut down when the input voltage drops below a threshold, and the unit will operate when the input voltage goes above the upper threshold.

5.4 Over Current Protection

All models have internal over current and continuous short circuit protection. The unit operates normally once the fault condition is removed. At the point of current limit inception, the converter will go into hiccup mode protection.

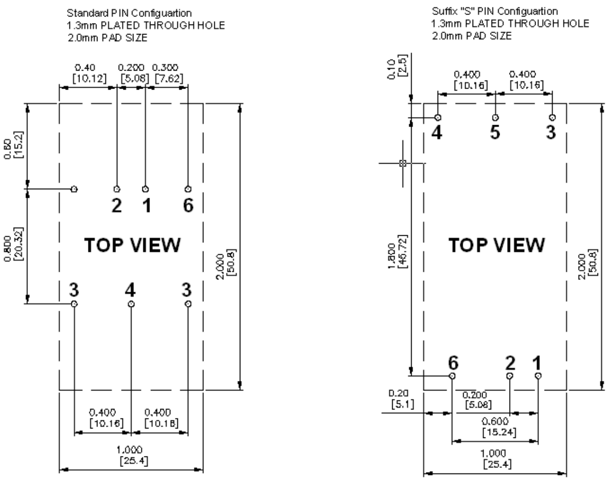
5.5 Over Voltage Protection

The over-voltage protection consists of a zener diode to limiting the output voltage.

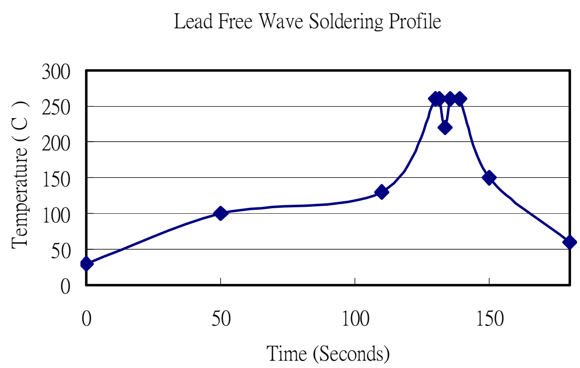
6. Applications

6.1 Recommended Layout PCB Footprints and Soldering Information

The system designer or the end user must ensure that other components and metal in the vicinity of the converter meet the spacing requirements to which the system is approved. Low resistance and low inductance PCB layout traces are the norm and should be used where possible. Due consideration must also be given to proper low impedance tracks between power module, input and output grounds. The recommended footprints and soldering profiles are shown as Figure4.



Note: Dimensions are in inches (millimeters)



Note：

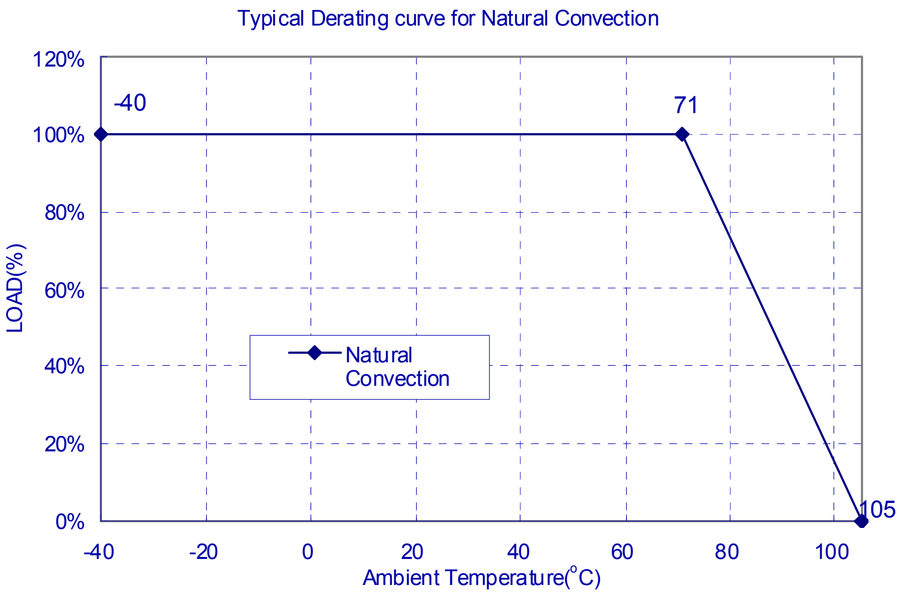
1. Soldering Materials: Sn/Cu/Ni
2. Ramp up rate during preheat: 1.4 ℃/Sec (From 50℃ to 100℃)
3. Soaking temperature: 0.5 ℃/Sec (From 100℃ to 130℃), 60±20 seconds
4. Peak temperature: 260℃, above 250℃ 3~6 Seconds
5. Ramp up rate during cooling: -10.0 ℃/Sec (From 260℃ to 150℃)

Figure4 Recommended PCB Layout Footprints and Wave Soldering Profiles for B packages

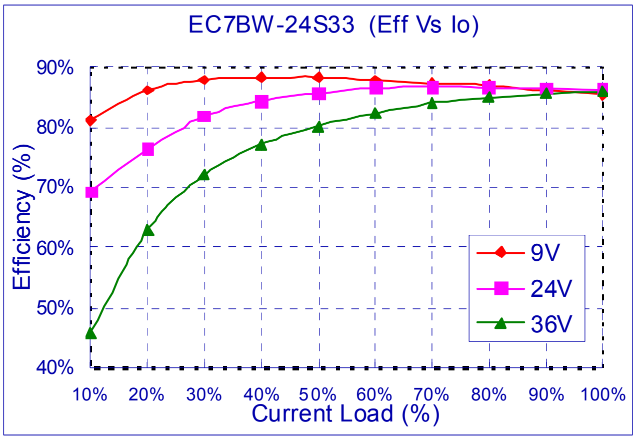
6.2 Power De-Rating Curves for EC7BW Series

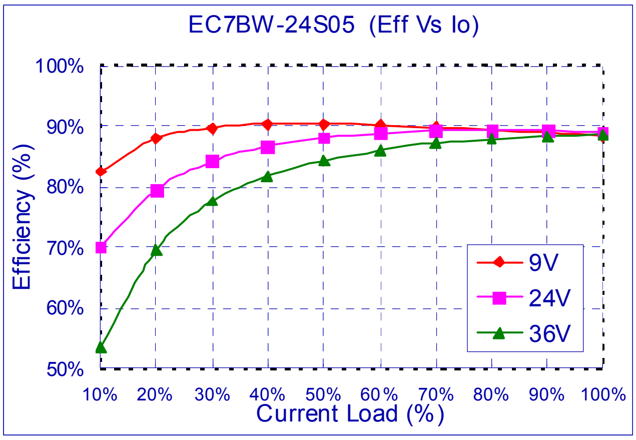
Operating Ambient temperature Range: -40℃ ~ 85℃ (derating above 71℃).

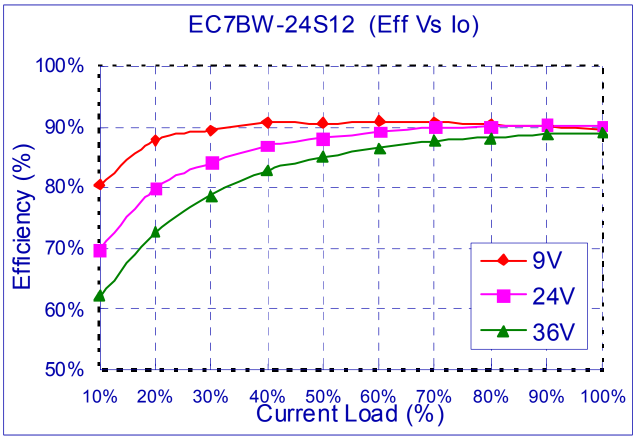
Maximum case temperature under any operating condition should not exceed 105℃.

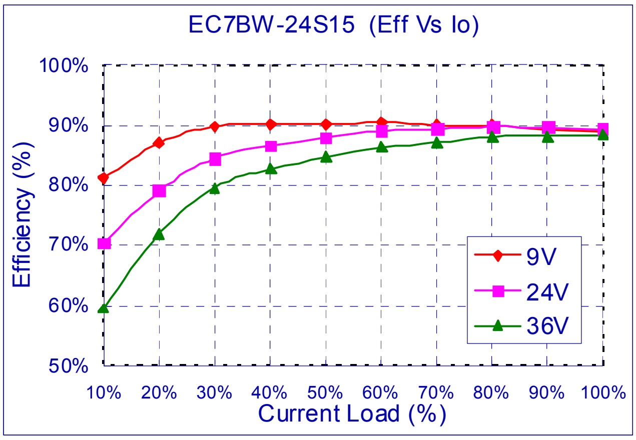


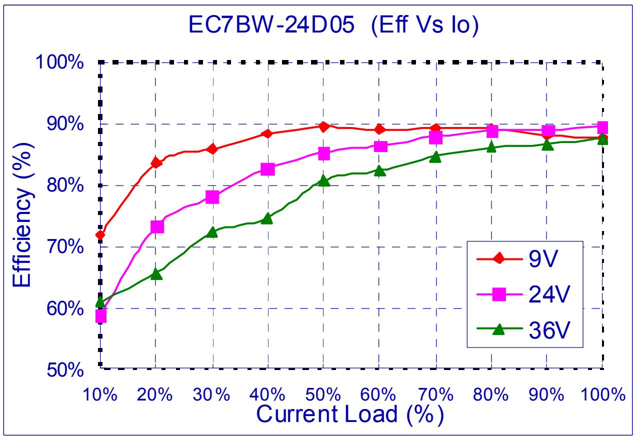
6.3 Efficiency vs. Load Curves

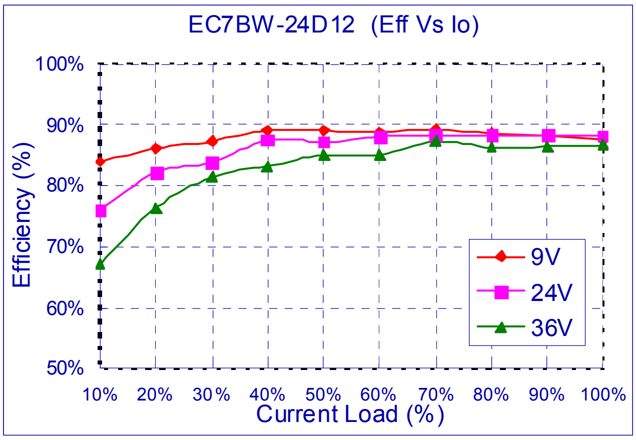


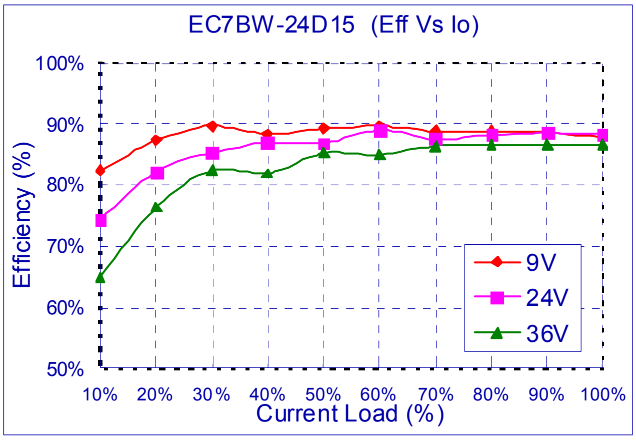


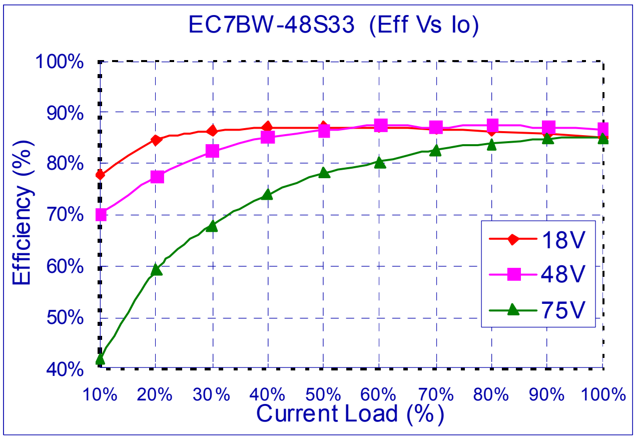


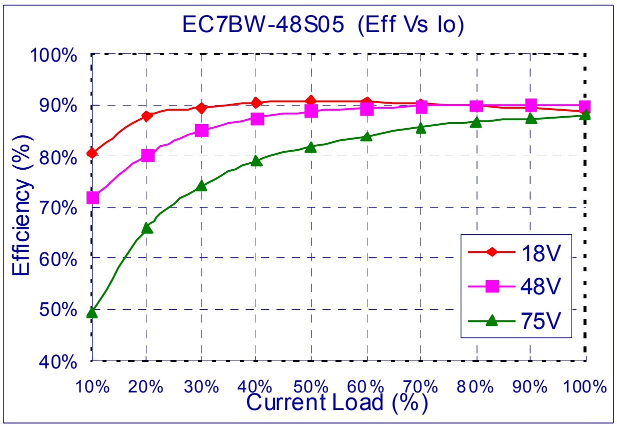


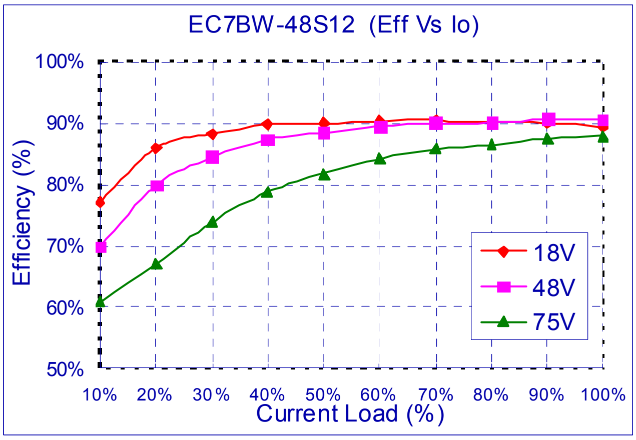


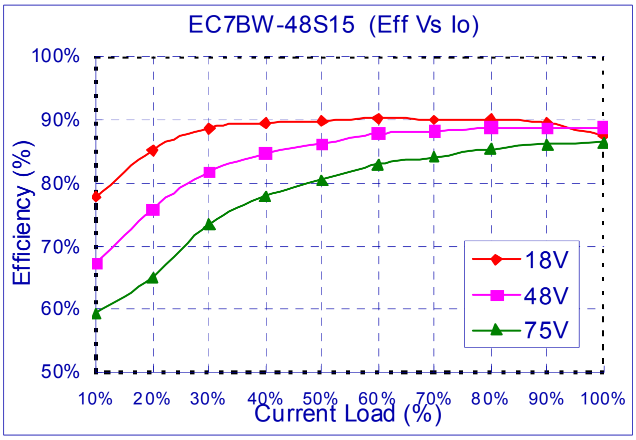


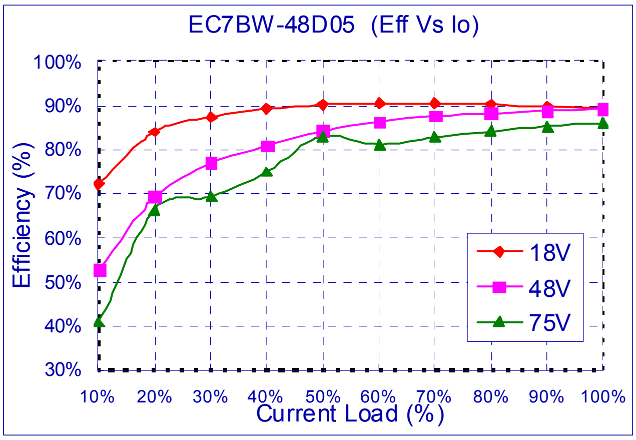

EC7BW-24D15 (Eff Vs Io)
Efficiency (%)
Current Load (%)
9V
24V
36V

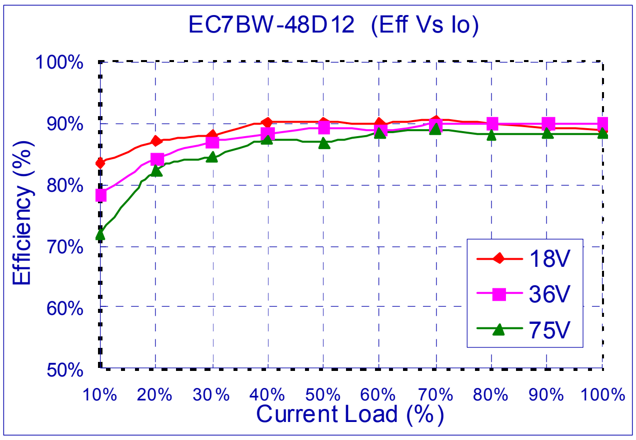

EC7BW-48S33 (Eff Vs Io)
Efficiency (%)
Current Load (%)
18V
48V
75V

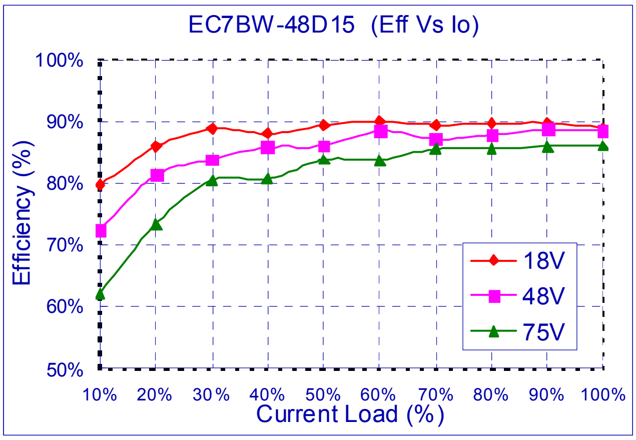

EC7BW-48S05 (Eff Vs Io)
Efficiency (%)
Current Load (%)
18V
48V
75V


EC7BW-48S12 (Eff Vs Io)
Efficiency (%)
Current Load (%)
18V
48V
75V


EC7BW-48S15 (Eff Vs Io)
Efficiency (%)
Current Load (%)
18V
48V
75V


EC7BW-48D05 (Eff Vs Io)
Efficiency (%)
Current Load (%)
18V
48V
75V

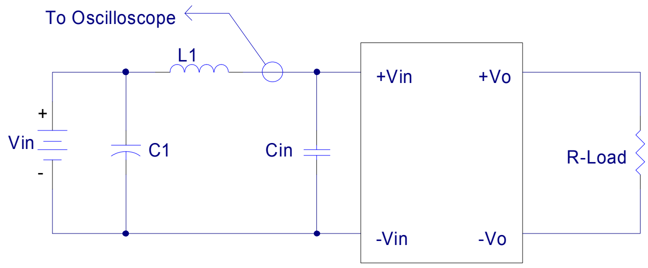

EC7BW-48D12 (Eff Vs Io)
Efficiency (%)
100%
90%
80%
70%
60%
50%
10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Current Load (%)
18V
36V
75V


EC7BW-48D15 (Eff Vs Io)
Efficiency (%)
100%
90%
80%
70%
60%
50%
10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Current Load (%)
18V
48V
75V

6.4 Input Capacitance at the Power Module

The converters must be connected to low AC source impedance. To avoid problems with loop stability source inductance should be low. Also, the input capacitors (Cin) should be placed close to the converter input pins to de-couple distribution inductance. However, the external input capacitors are chosen for suitable ripple handling capability. Low ESR capacitors are good choice. Circuit as shown in Figure5 represents typical measurement methods for reflected ripple current. C1 and L1 simulate a typical DC source impedance. The input reflected-ripple current is measured by current probe to oscilloscope with a simulated.

source Inductance (L1).



L1: 12uH
C1: 220uF ESR<0.3ohm @100KHz
Cin: 33uF ESR<0.7ohm @100KHz

Figure5 Input Reflected-Ripple Test Setup

6.5 Test Set-Up

The basic test set-up to measure parameters such as efficiency and load regulation is shown in Figure6. When testing the modules under any transient conditions please ensure that the transient response of the source is sufficient to power the equipment under test. We can calculate the

- Efficiency
- Load regulation and line regulation.

The value of efficiency is defined as:

$$\eta = \frac{V_O \times I_O}{V_{IN} \times I_{IN}} \times 100\%$$

Where

V_O is output voltage,
I_O is output current,
V_{IN} is input voltage,
I_{IN} is input current.

The value of load regulation is defined as:

$$Load.reg = \frac{V_{FL} - V_{NL}}{V_{NL}} \times 100\%$$

Where

V_{FL} is the output voltage at full load
V_{NL} is the output voltage at 10% load

The value of line regulation is defined as:

$$Line.reg = \frac{V_{HL} - V_{LL}}{V_{LL}} \times 100\%$$

Where

V_{HL} is the output voltage of maximum input voltage at full load.
V_{LL} is the output voltage of minimum input voltage at full load.

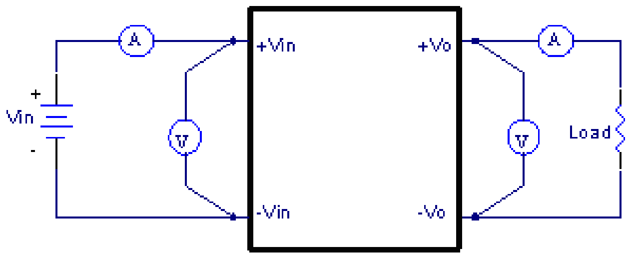


Figure6 EC7BW Series Test Setup

6.6 Output Voltage Adjustment

In order to trim the voltage up or down one needs to connect the trim resistor either between the trim pin and -Vo for trim-up and between trim pin and +Vo for trim-down. The output voltage trim range is ±10%. This is shown in Figures 7 and 8:

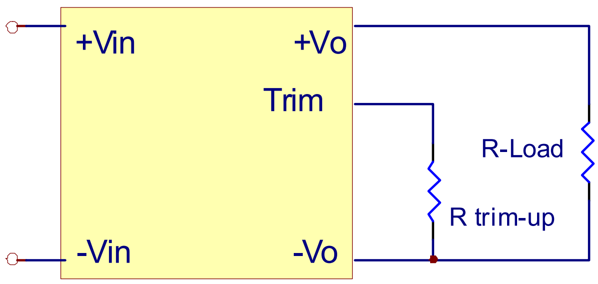


Figure7 Trim-up Voltage Setup

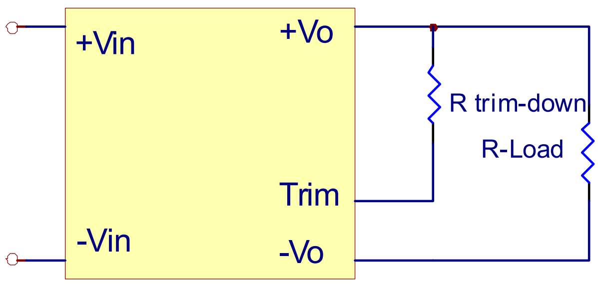


Figure8 Trim-down Voltage Setup

1. The value of Rtrim-up defined as:

$$Rtrim-up = \left(\frac{Vr \times R1 \times (R2+R3)}{(Vo - Vo,nom) \times R2}\right) - Rt \quad (K\Omega)$$

Where

R trim-up is the external resistor in Kohm.
$V_{O,\ nom}$ is the nominal output voltage.
V_O is the desired output voltage.
R1, Rt, R2, R3 and Vr are internal to the unit and are defined in Table 1.

Table 1 – Trim up and Trim down Resistor Values

Model Number	Output Voltage(V)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Rt (KΩ)	Vr (V)
EC7BW24S33 EC7BW48S33	3.3	2.74	1.8	0.27	9.1	1.24
EC7BW24S05 EC7BW48S05	5.0	2.32	2.32	0	8.2	2.5
EC7BW24S12 EC7BW48S12	12.0	6.8	2.4	2.32	22	2.5
EC7BW24S15 EC7BW48S15	15.0	8.06	2.4	3.9	27	2.5

For example, to trim-up the output voltage of 5.0V module (EC7BW-24S05) by 10% to 5.5V, R trim-up is calculated as follows:

$V_o - V_{o,\ nom}$ = 5.5 – 5.0 = 0.5V
R1 = 2.32 KΩ
R2 = 2.32 KΩ
R3 = 0 KΩ
Rt = 8.2 KΩ,
Vr= 2.5 V

$$Rtrim-up = \left(\frac{2.5 \times 2.32 \times (2.32+0)}{0.5 \times 2.32}\right) - 8.2 = 3.4 (K\Omega)$$

2. The value of R trim-down defined as:

$$Rtrim-down = R1 \times \left(\frac{Vr \times R1}{(Vo,nom - Vo) \times R2} - 1\right) - Rt \quad (K\Omega)$$

Where

R trim-down is the external resistor in Kohm.
$V_{O,\ nom}$ is the nominal output voltage.
V_O is the desired output voltage.
R1, Rt, R2, R3 and Vr are internal to the unit and are defined in Table 1

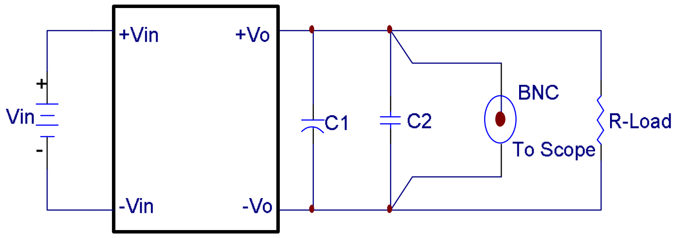
For example, to trim-down the output voltage of 5.0V module (EC7BW-24S05) by 10% to 4.5V, R trim-down is calculated as follows:

$V_{O,nom}$ – Vo = 5.0 – 4.5 = 0.5V
R1 = 2.32 KΩ
R2 = 2.32 KΩ
R3 = 0 KΩ
Rt = 8.2 KΩ
Vr= 2.5 V

$$Rtrim-down = 2.32 \times \left(\frac{(2.5 \times 2.32)}{0.5 \times 2.32} - 1\right) - 8.2 = 1.08 \quad (K\Omega)$$

6.7 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure9. A coaxial cable was used to prevent impedance mismatch reflections disturbing the noise readings at higher frequencies. Measurements are taken with output appropriately loaded and all ripple/noise specifications are from D.C. to 20MHz Band Width.



Note: C1: None
C2: 0.1uF Ceramic capacitor

Figure9 Output Voltage Ripple and Noise Measurement Set-Up

6.8 Output Capacitance

The EC7BW series converters provide unconditional stability with or without external capacitors. For good transient response low ESR output capacitors should be located close to the point of load. These series converters are designed to work with load capacitance to see technical specifications.

7. Safety & EMC

7.1 Input Fusing and Safety Considerations.

The EC7BW series converters have not an internal fuse. However, to achieve maximum safety and system protection, always use an input line fuse. We recommended a time delay fuse 4A for 24Vin models and 2A for 48Vin modules. Figure10 circuit is recommended by a Transient Voltage Suppressor diode across the input terminal to protect the unit against surge or spike voltage and input reverse voltage.

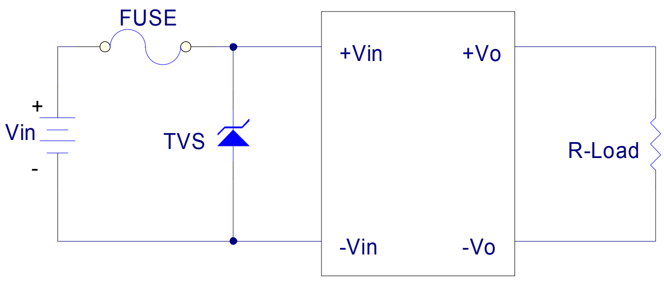
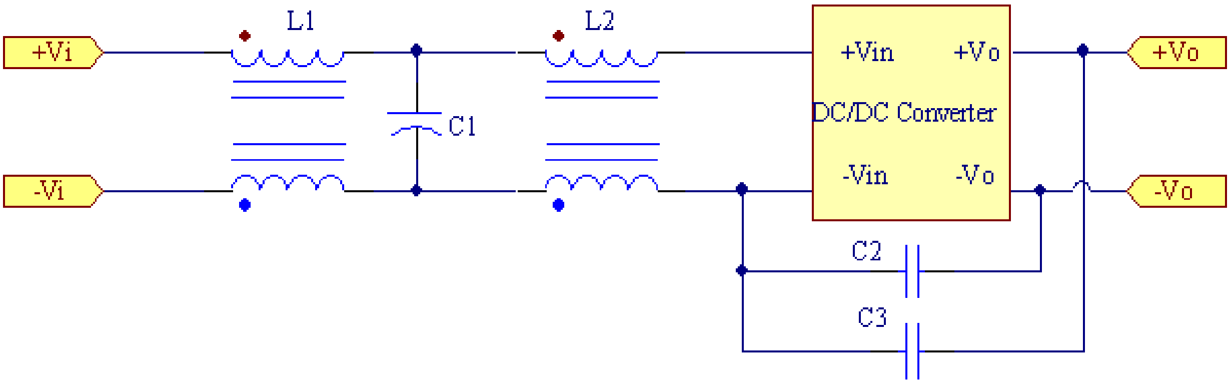


Figure10 Input Protection

7.2 EMC Considerations

EMI Test standard: EN55032 Class A and B Conducted Emission
Test Condition: Input Voltage: Nominal, Output Load: Full Load

(1) EMI and conducted noise meet EN55032 Class B:



Figur11 Connection circuit for conducted EMI testing

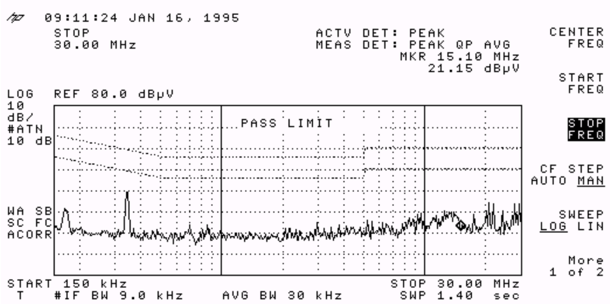
Model No.	EN55032 Class B				
	C1	C2	C3	L1	L2
EC7BW-24S33	220uF/50V KY	1000pF/2KV	1000pF/2KV	Jump Wire	1.2mH
EC7BW-24S05	220uF/50V KY	1000pF/2KV	1000pF/2KV	Jump Wire	1.2mH
EC7BW-24S12	220uF/50V KY	1000pF/2KV	1000pF/2KV	Jump Wire	1.2mH
EC7BW-24S15	220uF/50V KY	1000pF/2KV	1000pF/2KV	Jump Wire	1.2mH
EC7BW-48S33	220uF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH
EC7BW-48S05	220uF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH
EC7BW-48S12	220uF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH
EC7BW-48S15	220uF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH

Note:

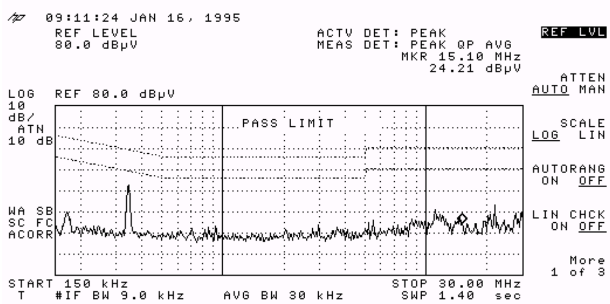
C1 is NIPPON-CHEMICON KY series or NICHICON PW series aluminum capacitor, C2, C3 are ceramic capacitors
Jump Wire: 0.7mm min.

EC7BW 20W Isolated DC-DC Converters

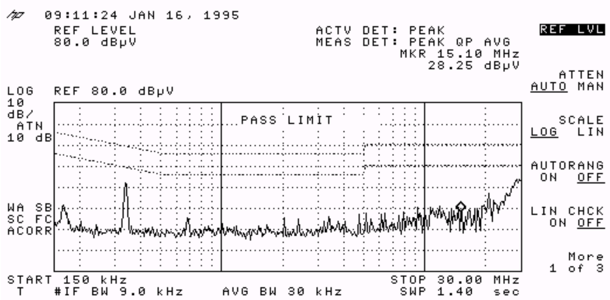
Application Note V12 August 2019



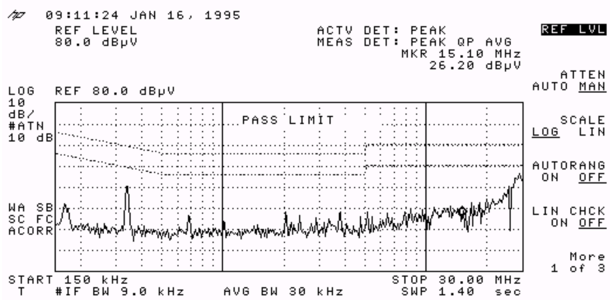
Conducted Class B of EC7BW-24S33



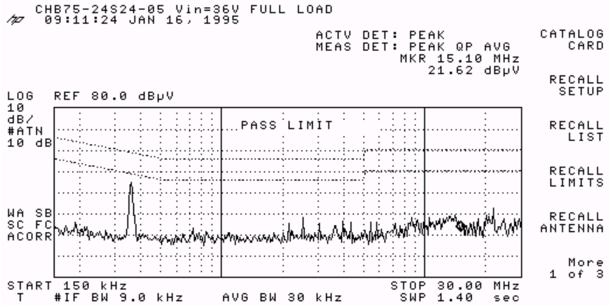
Conducted Class B of EC7BW-24S05



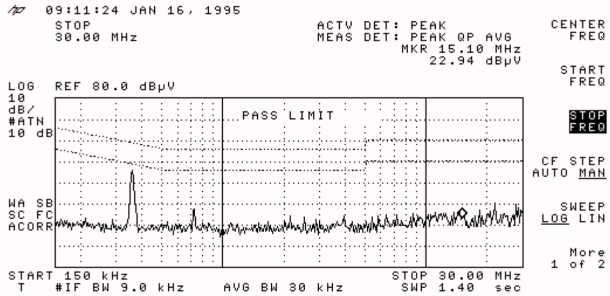
Conducted Class B of EC7BW-24S12



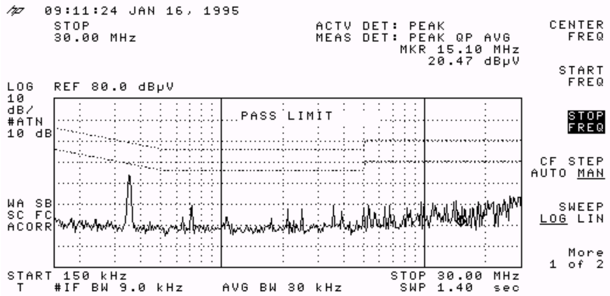
Conducted Class B EC7BW-24S15



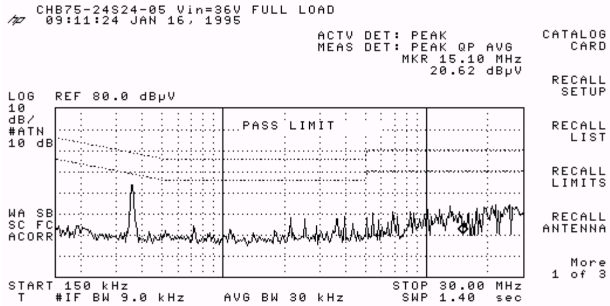
Conducted Class B of EC7BW-48S33



Conducted Class B of EC7BW-48S05

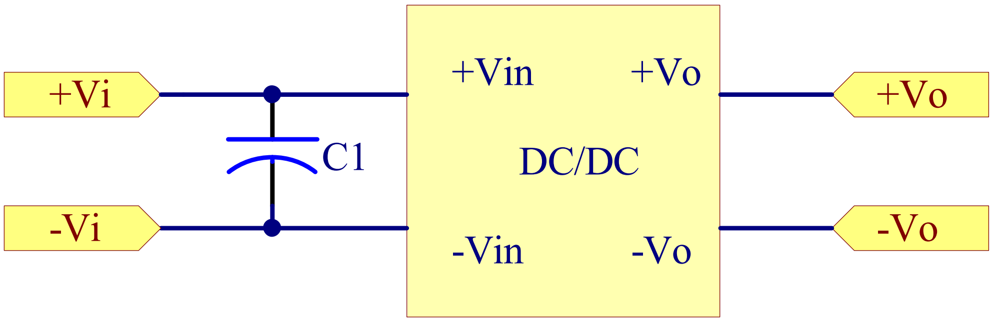


Conducted Class B of EC7BW-48S12



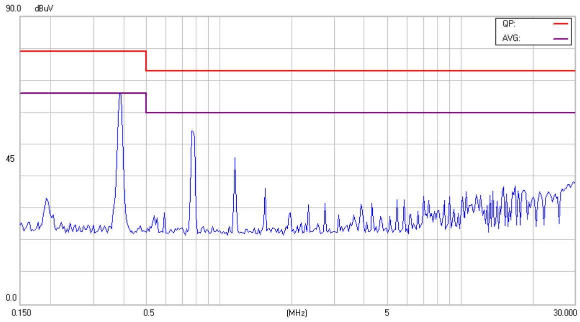
Conducted Class B of EC7BW-48S15

(2) EMI and conducted noise meet EN55032 Class A:

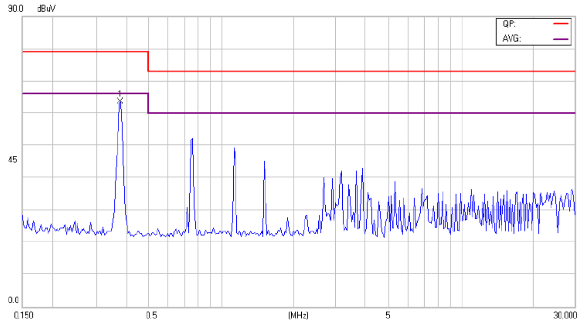


Figur12 Connection circuit for conducted EMI testing

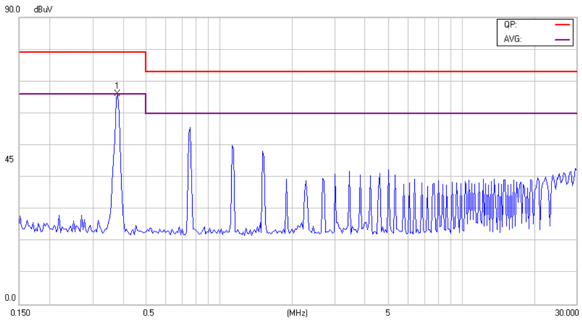
Model No.	EN55032 Class A
	C1
EC7BW-24D05	10uF/50V/MLCC 1210
EC7BW-24D12	10uF/50V/MLCC 1210
EC7BW-24D15	10uF/50V/MLCC 1210
EC7BW-48D05	NC
EC7BW-48D12	NC
EC7BW-48D15	NC



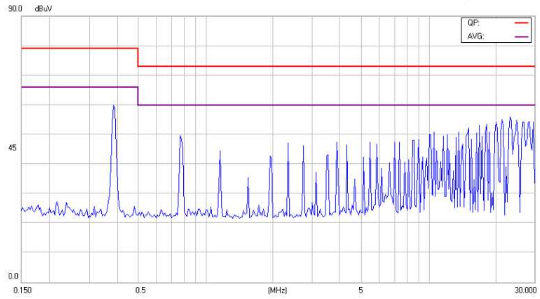
Conducted Class A of EC7BW-24D05



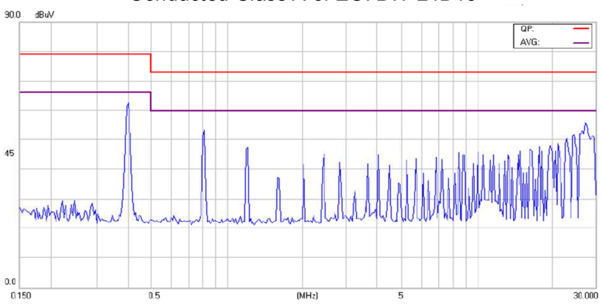
Conducted Class A of EC7BW-24D12



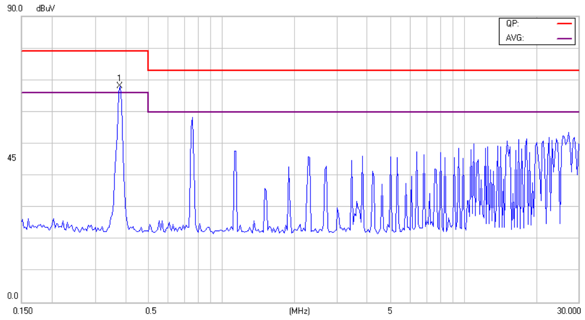
Conducted Class A of EC7BW-24D15



Conducted Class A of EC7BW-48D05

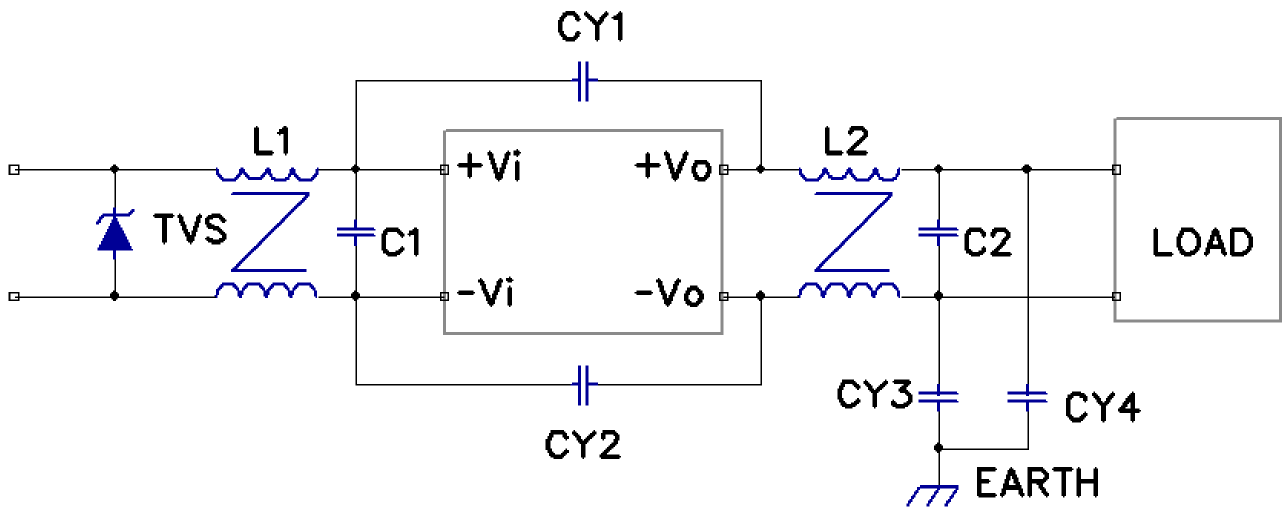


Conducted Class A of EC7BW-48D12



Conducted Class A of EC7BW-48D15

(3) EMI Meet EN50121-3-2:2016



Figur13 Connection circuit for Single Output

MODULE	EN50121-3-2							
	TVS	C1	C2	CY1 & CY2	CY3	CY4	L1	L2
EC7BW-24S33	1.5KE47A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	4700pF Y1	4700pF Y1	1.37mH	0.4mH
EC7BW-24S05	1.5KE47A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	2200pF Y1	NC	Jump Wire	0.4mH
EC7BW-24S12	1.5KE47A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	4700pF Y1	4700pF Y1	1.37mH	0.4mH
EC7BW-24S15	1.5KE47A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	6800pF Y1	6800pF Y1	1.37mH	0.4mH
EC7BW-48S33	1.5KE91A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	4700pF Y1	4700pF Y1	1.37mH	0.4mH
EC7BW-48S05	1.5KE91A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	4700pF Y1	4700pF Y1	1.37mH	0.4mH
EC7BW-48S12	1.5KE91A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	6800pF Y1	6800pF Y1	1.37mH	0.4mH
EC7BW-48S15	1.5KE91A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	6800pF Y1	6800pF Y1	1.37mH	0.4mH

Note:

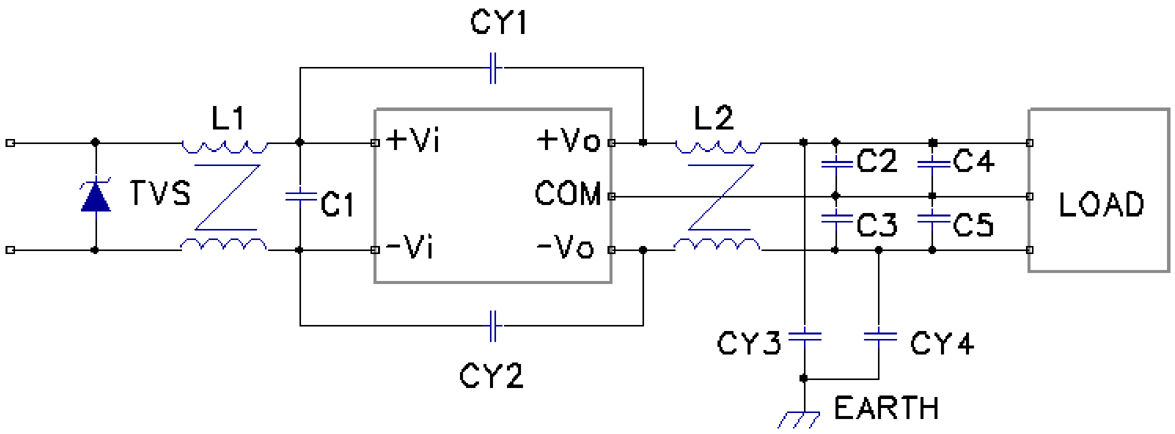
C1 is NIPPON-CHEMICON KY series or NICHICON PW series aluminum capacitor, C2, CY1, CY2 are ceramic capacitors.

CY3, CY4: 2200pF (CD Series TDK) or equivalent, 4700pF (CD Series TDK) or equivalent, 6800pF (CD Series TDK) or equivalent.

L1: 1.37mH (VAC L2012 W902 12*8*4.5) or equivalent.

L2: 0.4mH (GREDMANN FCN0129 12*8*4.5) or equivalent.

Jump Wire: 0.7mm min.



Figur14 Connection circuit for Dual Output

MODULE	EN50121-3-2						
	TVS	C1 & C4 & C5	C2 & C3	CY1 & CY2	CY3 & CY4	L1	L2
EC7BW-24DXX	1.5KE47A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	1500pF Y1	0.4mH	2.5mH
EC7BW-48DXX	1.5KE91A	47uF/100V KY	2.2uF/50V MLCC	1500pF/2KV MLCC	1500pF Y1	0.4mH	2.5mH

Note:

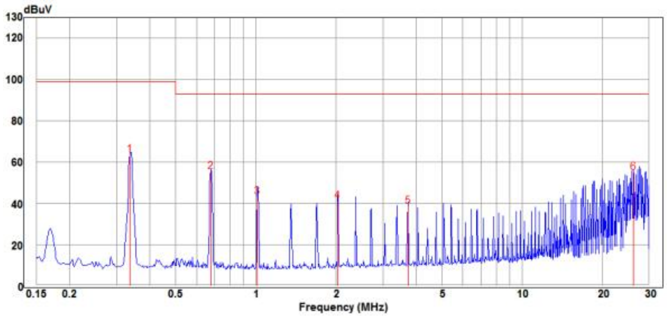
C1, C4, C5 are NIPPON-CHEMICON KY series or NICHICON PW series aluminum capacitor, C2, C3, CY1, CY2 are ceramic capacitors.

CY3, CY4 1500pF (CD Series TDK) or equivalent.

L1, L2: 0.4mH, 2.5mH (GREDMANN FCN0129 12*8*4.5) or equivalent.

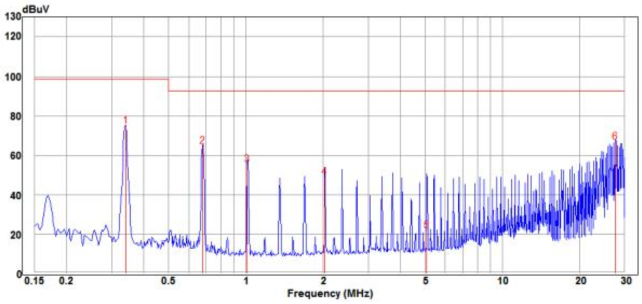
(4) Conducted Emission (Input):

Line



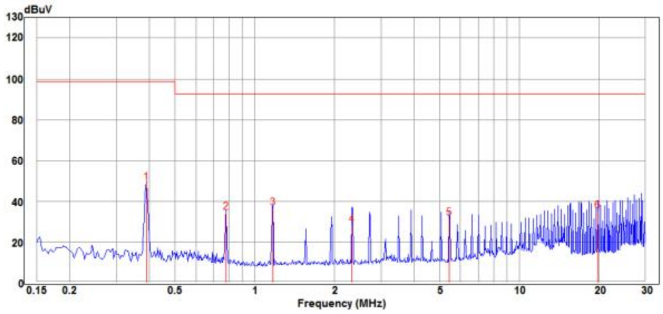
Conducted of EC7BW-24S05

Neutral



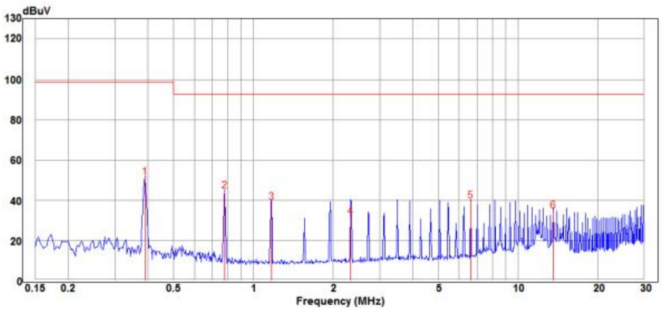
Conducted of EC7BW-24S05

Line



Conducted of EC7BW-48D15

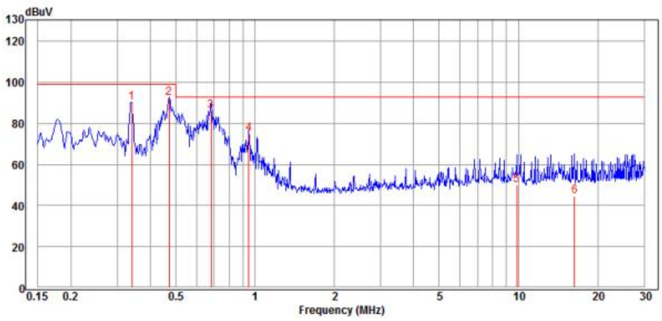
Neutral



Conducted of EC7BW-48D15

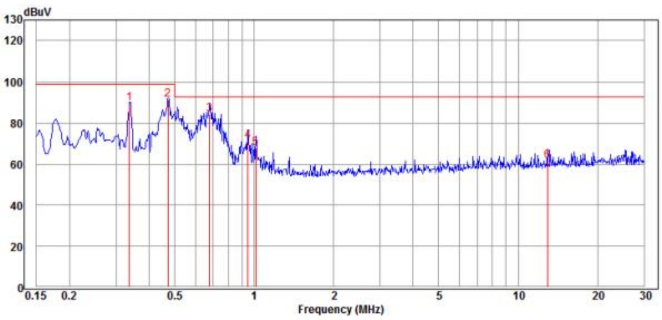
(5) Conducted Emission (Output):

Positive



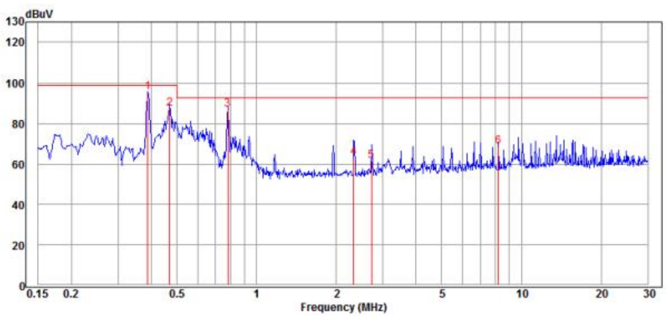
Conducted of EC7BW-24S05

Negative



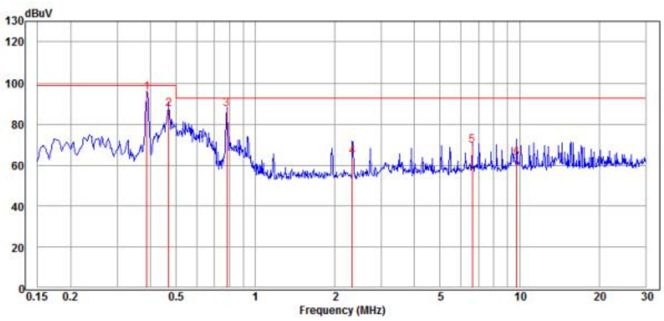
Conducted of EC7BW-24S05

Positive



Conducted of EC7BW-48D15

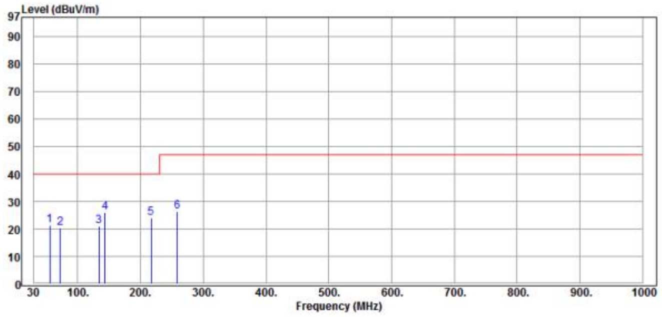
Negative



Conducted of EC7BW-48D15

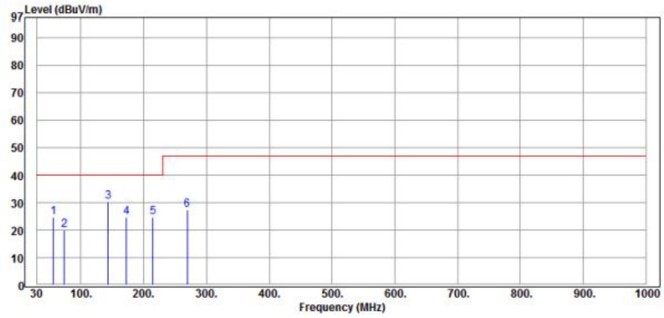
(6) Radiated Emission:

Horizontal



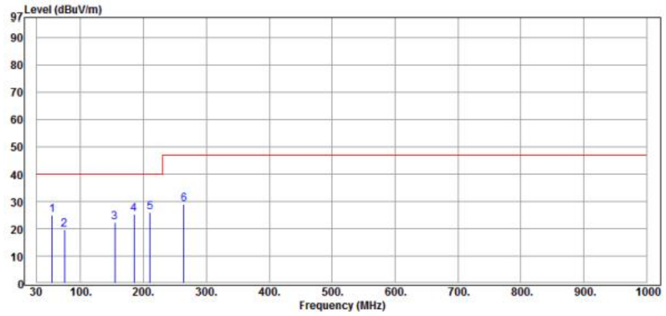
EC7BW-24S05

Vertical



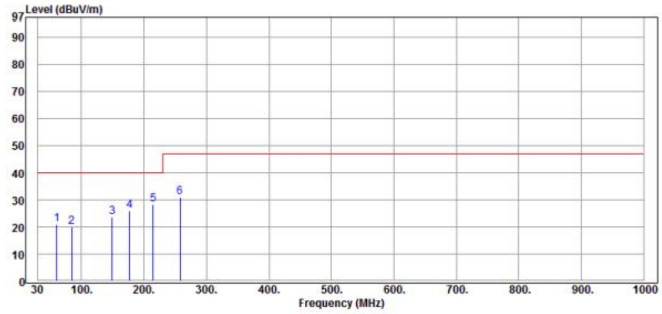
EC7BW-24S05

Horizontal



EC7BW-48D15

Vertical



EC7BW-48D15

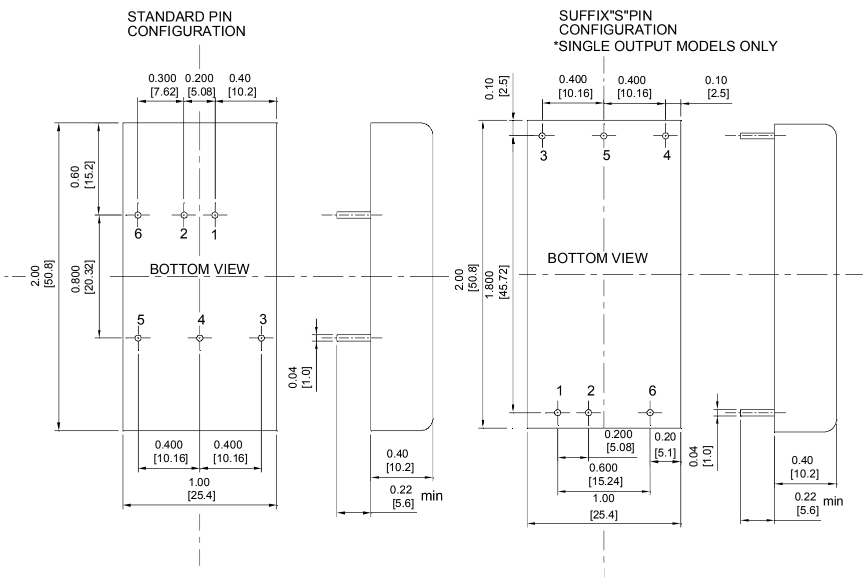
8. Part Number

EC7BW – XX X XX X X

- EC7BW Series
- 24 : Nominal Input Voltage 24VDC
  48 : Nominal Input Voltage 48VDC
- S : Single Output
  D : Dual Output
- 33 : Output Voltage 3.3 VDC
  05 : Output Voltage 5 VDC
  12 : Output Voltage 12 VDC
  15 : Output Voltage 15 VDC
- None : Positive Logic
  N : Negative Logic
- None: Standard
  S : Alternative Pin Configuration, Single output models only

9. Mechanical Specifications

All Dimensions In Inches (mm)
Tolerances Inches: X.XX= ±0.04 , X.XXX= ±0.010
Millimeters: X.X= ±1.0 , X.XX= ±0.25



PIN CONNECTION		
Pin	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	Common
5	-V Output	-V Output
6	Remote On/Off	

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