

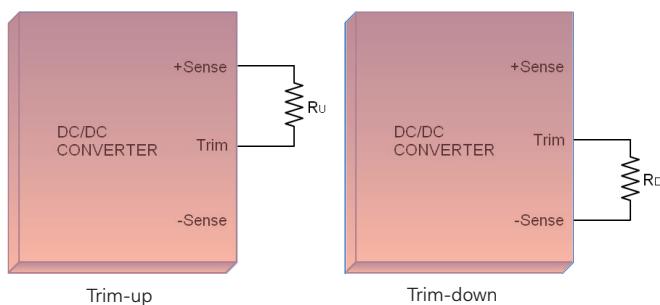
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## Output Voltage Adjustment

Output voltage is adjustable for 10% trim up or -20% trim down of nominal output voltage by connecting an external resistor between the Trim pin and either the +Sense or -Sense pins. With an external resistor between the Trim and -Sense pin, the output voltage set point decreases. With an external resistor between the Trim and +Sense pin, the output voltage set point increases. Maximum output deviation is  $\pm 10\%$  inclusive of remote sense. The value of external resistor can be obtained by equation or trim table shown in next page. The external TRIM resistor needs to be at least 1/8W of rated power.



Output voltage adjustment configurations

### Trim Equation

$$R_U = \left( \frac{V_{OUT}(100 + \Delta\%) - 100 + 2\Delta\%}{1.225\Delta\%} \right) k\Omega$$

$$R_D = \left( \frac{100}{\Delta\%} - 2 \right) k\Omega$$

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Trim Table

□□S3P3W Trim-Up		1	2	3	4	5	6	7	8	9	10
Trim-Up	(%)										
Vout	(V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU	(kΩ)	170.082	85.388	57.156	43.041	34.571	28.925	24.892	21.867	19.515	17.633
□□S05W Trim-Up		1	2	3	4	5	6	7	8	9	10
Trim-Up	(%)										
Vout	(V)	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50
RU	(kΩ)	310.245	156.163	104.803	79.122	63.714	53.442	46.105	40.602	36.322	32.898
□□S12W Trim-Up		1	2	3	4	5	6	7	8	9	10
Trim-Up	(%)										
Vout	(V)	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
RU	(kΩ)	887.388	447.592	300.993	227.694	183.714	154.395	133.452	117.745	105.528	95.755
□□S15W Trim-Up		1	2	3	4	5	6	7	8	9	10
Trim-Up	(%)										
Vout	(V)	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
RU	(kΩ)	1134.735	572.490	385.075	291.367	235.143	197.660	170.886	150.806	135.188	122.694
□□S24W Trim-Up		1	2	3	4	5	6	7	8	9	10
Trim-Up	(%)										
Vout	(V)	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40
RU	(kΩ)	1876.776	947.184	637.320	482.388	389.429	327.456	283.190	249.990	224.168	203.510
□□S28W Trim-Up		1	2	3	4	5	6	7	8	9	10
Trim-Up	(%)										
Vout	(V)	28.28	28.56	28.84	29.12	29.40	29.68	29.96	30.24	30.52	30.80
RU	(kΩ)	2206.571	1113.714	749.429	567.286	458.000	385.143	333.102	294.071	263.714	239.429
□□S48W Trim-Up		1	2	3	4	5	6	7	8	9	10
Trim-Up	(%)										
Vout	(V)	48.48	48.96	49.44	49.92	50.40	50.88	51.36	51.84	52.32	52.80
RU	(kΩ)	3855.551	1946.367	1309.973	991.776	800.857	673.578	582.665	514.480	461.447	419.020

□□S□□W Trim-Down		1	2	3	4	5	6	7	8	9	10
Trim-Down	(%)										
RD	(kΩ)	98.000	48.000	31.333	23.000	18.000	14.667	12.286	10.500	9.111	8.000
Trim-Down	(%)	11	12	13	14	15	16	17	18	19	20
RD	(kΩ)	7.091	6.333	5.692	5.143	4.667	4.250	3.882	3.556	3.263	3.000

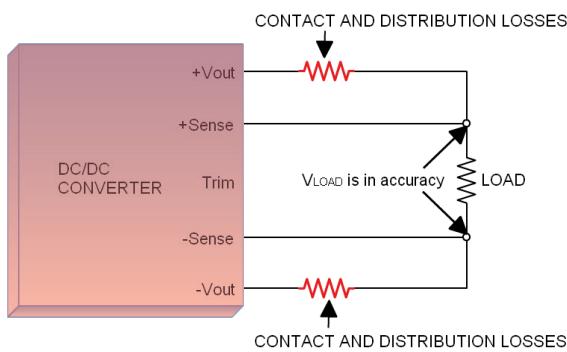
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### Remote Sense

To minimize the effects of distribution losses by regulating the voltage at the Remote Sense pin. The voltage between the Sense pin and OUTPUT pin must not exceed 10% of Vout, i.e.

$$[ +V_{out} \text{ to } -V_{out} ] - [ +Sense \text{ to } -Sense ] \leq 10\% V_{out}$$

The voltage between +Vout and -Vout terminals must not exceed the minimum output overvoltage protection threshold. This limit includes any increase in voltage due to remote sense compensation and trim function. If not using the remote sense feature to regulate the output at the point of load, then connect +Sense to +Vout and -Sense to -Vout.



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## Line Protection & EMC Considerations

### Typical Application

- Below shows some blocks connected between power source and DC/DC module. Install the circuit of the block which is required.
- Each block has individual function and should be placed on the corresponding location.
- If CEMI is an Aluminum electrolytic capacitor and connected in parallel with CEMS, The capacitance we recommended for meeting EMS requirements could be CEMS pluses CEMI.

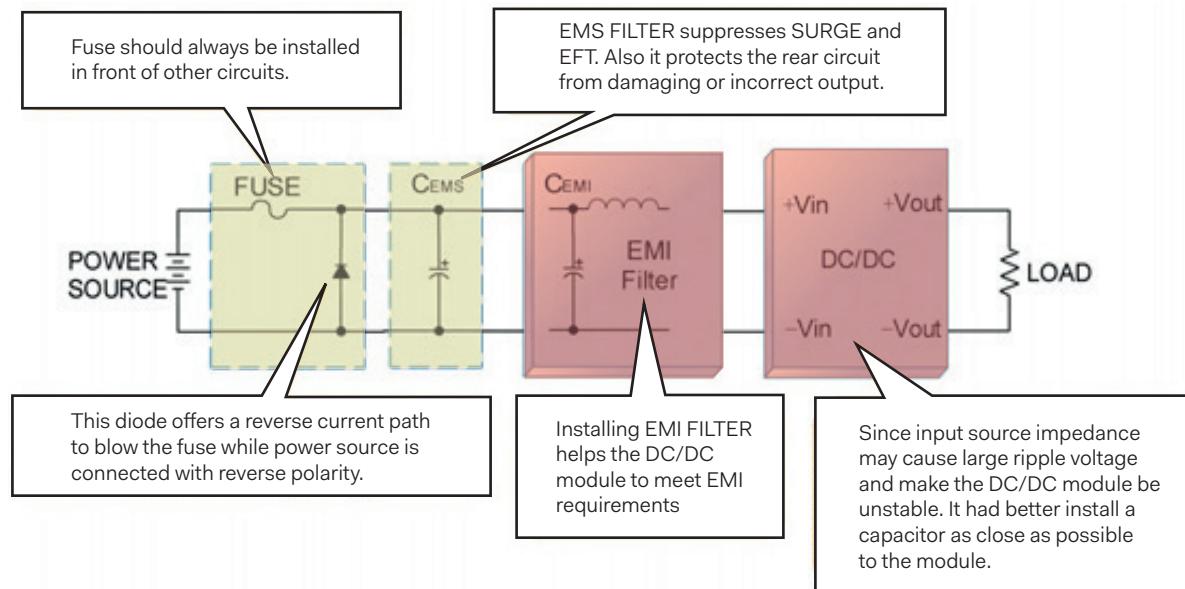


Fig Typical application

- Input source impedance: The power modules will operate as specifications without external components, assuming that the source voltage has a very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the power module. Since real-world voltage source has finite impedance, performance can be improved by adding external filter capacitor.  
The PAE200-24S□□W and PAE200-48S□□W recommended Nippon Chemi-con KY series, 100μF/100V.  
The PAE200-110S□□W recommended Ruby-con BXF series, 68μF/200V.

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## Line Protections

### Fuse

- The DC/DC converter is not internally fused. An input line fuse must always be used.
- Fuses should be installed in front of each module when multiple DC/DC converters connect to the same power source.

Model	Fuse Rating (A)	Fuse Type
PAE200-24S□□W	32	Fast-Acting
PAE200-48S□□W	20	Fast-Acting
PAE200-110S□□W	10	Fast-Acting

Table Fuse selection

- According to actual current value, calculating fuse ratings base on the following equations:

$$I_{FUSE} \geq I_{in} / (\text{rerating} \times \text{safety margin})$$

$$\text{Melting } I^2t = I_{PULSE,act}^2 \cdot t / 0.22$$

Where

$I_{FUSE}$  is current rating of fuse.

$I_{in}$  is actual value of input current.

Rerating is percentage of fuse rating base on ambient temperature. Fuse rating is variety under different ambient temperature.

Safety margin is percentage of fuse rating set by user.

Melting  $I^2t$  is pulse energy rating of fuse.

$I_{PULSE,act}$  is actual input pulse current.

$t$  is the width of the input pulse current.

## Reverse Input Voltage Protection

- Avoid the reverse polarity input voltage; otherwise, it will damage the DC/DC converter.
- It is likely to protect the module from the reverse input voltage by installing an external diode.
- The diode can block reverse voltage or blow the line fuse to protect DC/DC converter.
- Recommend using Schottky diode for reverse input voltage protection



Fig Reverse input voltage protection

Model	Voltage Rating of the Diode	Current Rating of the Diode
PAE200-24S□□W	60V	1~1.5 x Fuse Rating
PAE200-48S□□W	100V	1~1.5 x Fuse Rating
PAE200-110S□□W	200V	1~1.5 x Fuse Rating

Fig Reverse protection diode selection

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## EMS Considerations

- The module can meet EMS requirements as below.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5

Parameter	Conditions	Level
ESD	EN61000-4-2	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$
Radiated immunity	EN61000-4-3	20V/m
Fast transient	EN61000-4-4	$\pm 2\text{kV}$
Surge	EN61000-4-5	EN55024 $\pm 2\text{kV}$ and EN50155 $\pm 2\text{kV}$
Conducted immunity	EN61000-4-6	10Vr.m.s

Table EMS requirements

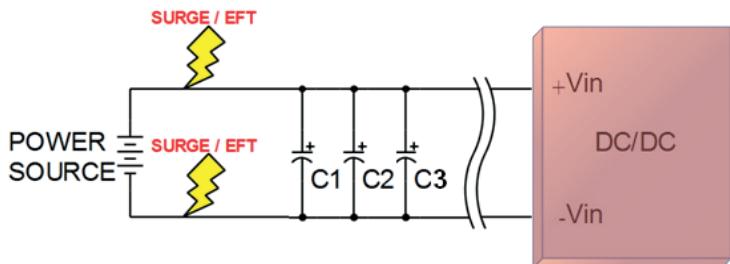


Fig Surge & EFT protections

- It should be noticed that the current path of the PCB trace. Wrong PCB layout reduces ability of suppressing SURGE or EFT.

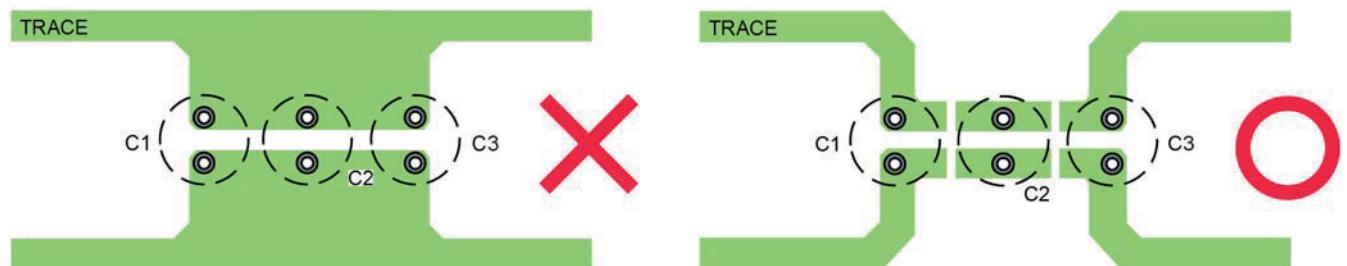


Fig PCB trace

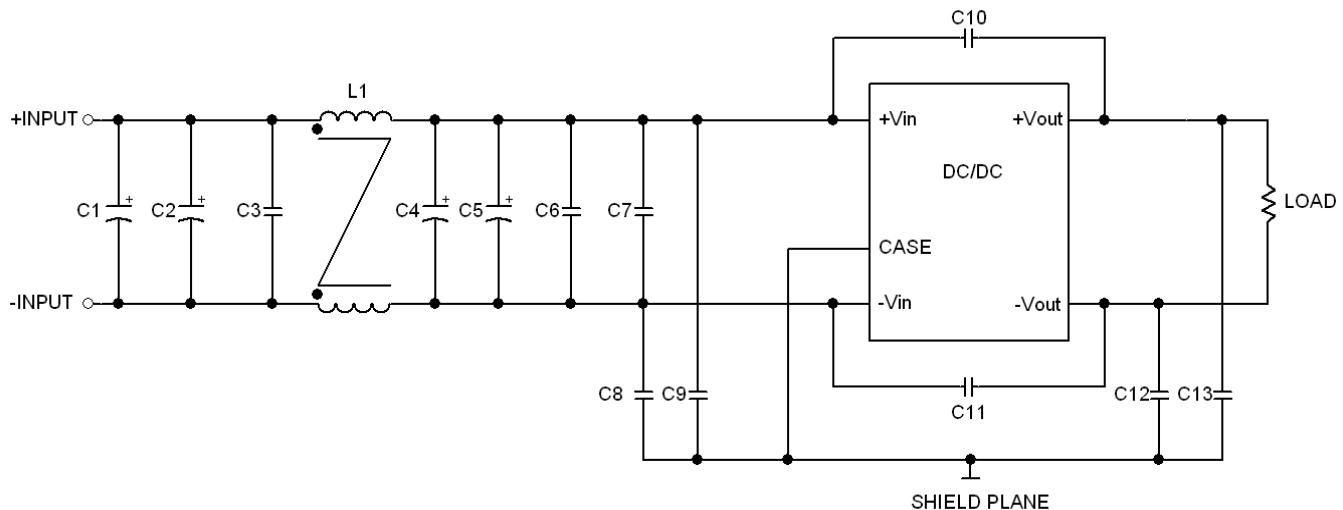
Model	Component	Specification	Reference
PAE200-24S□□W	C1, C2	220 $\mu\text{F}/100\text{V}$	Nippon Chemi-con KY series
PAE200-48S□□W			
PAE200-110S□□W	C1, C2, C3	100 $\mu\text{F}/250\text{V}$	Ruby-con BXF series

Table Surge & EFT filter

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### EMI Considerations

Recommended external EMI filter for EN55022 Class A



Model	C1, C2, C4	C3, C6, C7	C8, C9, C10, C11, C13	C12	L1
PAE200-24S□□W	470µF/50V Al Cap. (lie down) Chemi-con KY	4.7µF/50V 1812 MLCC	1000pF/3kV 1808 MLCC	3300pF/3kV 1808 MLCC	45µH Common Choke PMT-092
PAE200-48S□□W	220µF/100V Al Cap. (lie down) Chemi-con KY	2.2µF/100V 1812 MLCC	1000pF/3kV 1808 MLCC	1000pF/3kV 1808 MLCC	224µH Common Choke PMT-087
PAE200-110S□□W	150µF/200V Al Cap. (lie down) Chemi-con KXJ	1µF/250V 1812 MLCC	1000pF/3kV 1808 MLCC	1000pF/3kV 1808 MLCC	521µH Common Choke PMT-088

Table B.O.M External EMI Filter

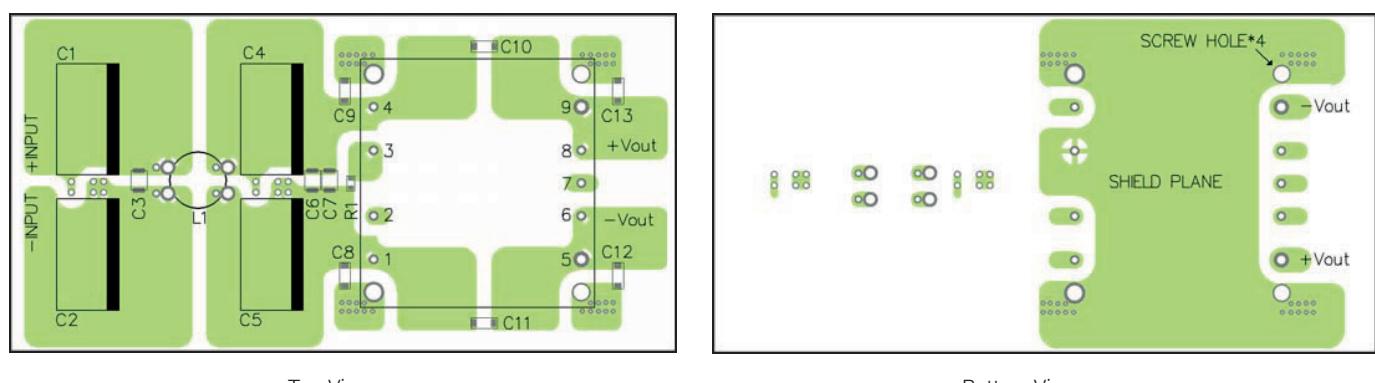
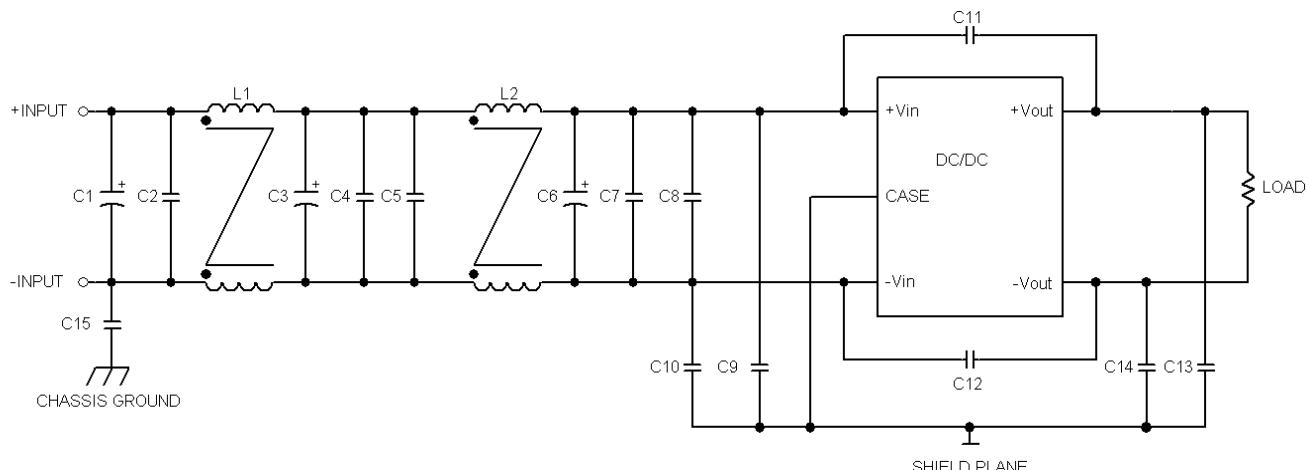


Fig Recommended Layout Pattern

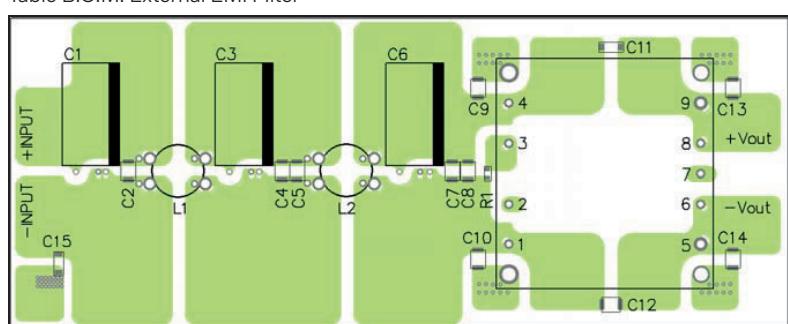
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Recommended external EMI filter for EN55022 Class B

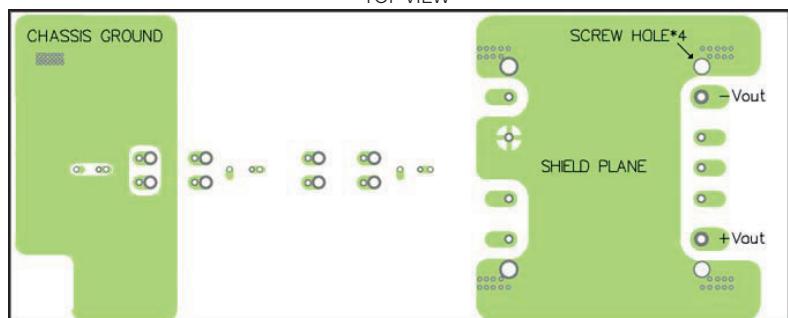


Model	C1, C3, C6	C2, C4, C5, C7, C8	C9, C10	C11	C12	C13, C14	C15	L1, L2
PAE200-24S□□W	470μF/50V Al Cap. (lie down) Chemi-con KY	4.7μF/50V 1812 MLCC	10nF/2kV 1812 MLCC	1000pF/3kV 1808 MLCC	4700pF/3kV 1812 MLCC	10nF/2kV 1812 MLCC	N/A	45μH Common Choke PMT-092
PAE200-48S□□W	220μF/100V Al Cap. (lie down) Chemi-con KY	2.2μF/100V 1812 MLCC	10nF/2kV 1812 MLCC	2200pF/3kV 1808 MLCC	4700pF/3kV 1812 MLCC	10nF/2kV 1812 MLCC	1000pF/3kV 1808 MLCC	224μH Common Choke PMT-087
PAE200-110S□□W	150μF/200V Al Cap. (lie down) Chemi-con KXJ	1μF/250V 1812 MLCC	2200pF/2kV 1808 MLCC	2200pF/3kV 1808 MLCC	2200pF/3kV 1808 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC	521μH Common Choke PMT-088

Table B.O.M. External EMI Filter



TOP VIEW



BOTTOM VIEW

Fig Recommended Layout Pattern

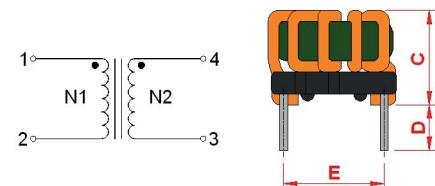
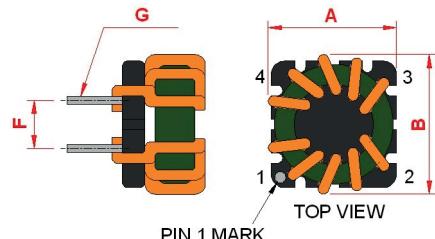
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**Specifications of Common Mode Choke and Differential Inductor**

**Part number:** PMT-087

Inductance:	224 $\mu$ H $\pm 35\%$ (100kHz/ 100mV)
DCR:	4.16 m $\Omega$
Rated Current:	15.4 A, max.
Dimensions:	A 16.6 $\pm 0.4$ B 16.4 $\pm 0.4$ C 12.5, max. D 5.0 $\pm 1.0$ E 13.9 $\pm 0.5$ F 6.1 $\pm 0.5$ G $\phi 1.6$ , max.

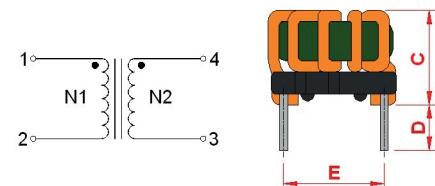
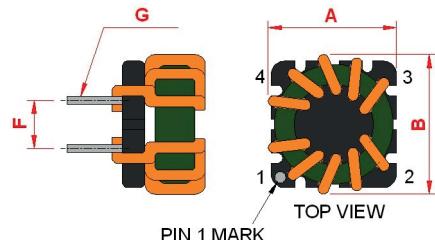
\* Recommended through hole:  $\phi 1.8$  mm



**Part number:** PMT-088

Inductance:	521 $\mu$ H $\pm 35\%$ (100kHz/ 100mV)
DCR:	14.25 m $\Omega$
Rated Current:	7.7 A, max.
Dimensions:	A 16.6 $\pm 0.4$ B 16.4 $\pm 0.4$ C 12.5, max. D 5.0 $\pm 1.0$ E 13.9 $\pm 0.5$ F 6.1 $\pm 0.5$ G $\phi 0.8$ , max.

\* Recommended through hole:  $\phi 1.0$  mm

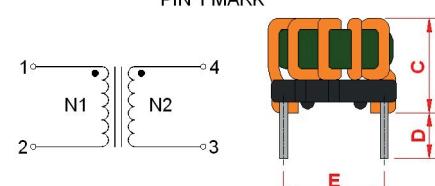
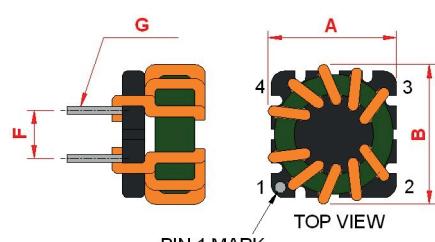


**Part number:** PMT-092

Inductance:	45 $\mu$ H $\pm 35\%$ (100kHz/ 100mV)
DCR:	1.4 m $\Omega$
Rated Current:	31.4 A, max.
Dimensions:	A 16.6 $\pm 0.4$ B 16.4 $\pm 0.4$ C 12.5, max. D 5.0 $\pm 1.0$ E 13.9 $\pm 0.5$ F 6.1 $\pm 0.5$ G $\phi 2.2$ , max.

\* Recommended through hole:  $\phi 2.4$  mm

All dimensions in mm



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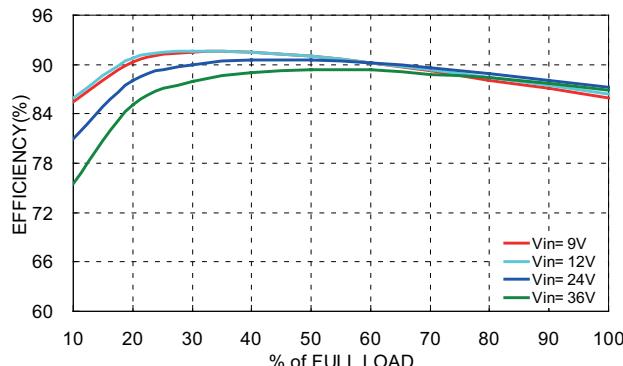
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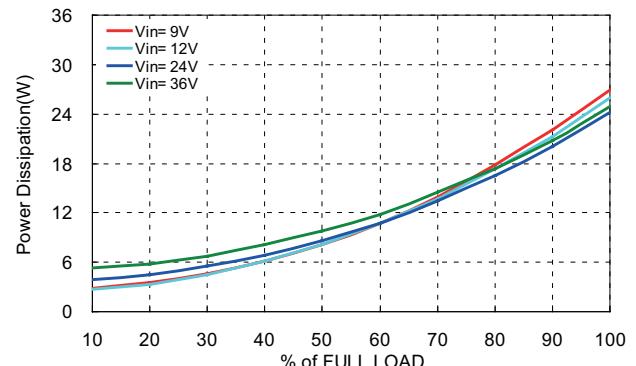
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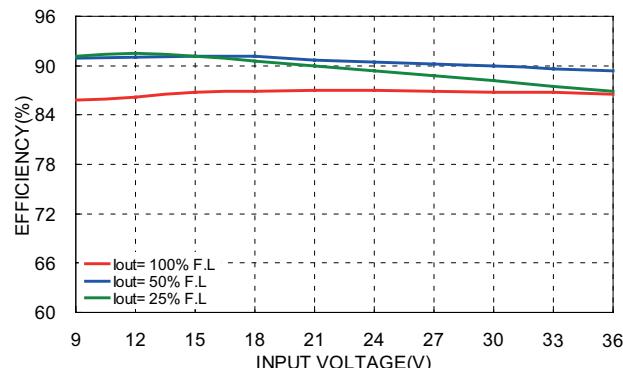
All test conditions are at 25°C. The figures are identical for PAE200-24S3P3W



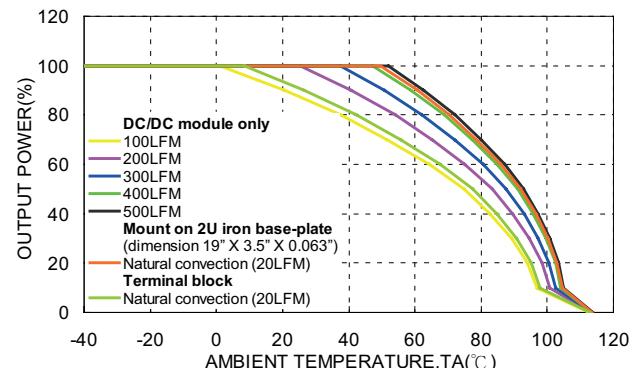
Efficiency versus Output Current



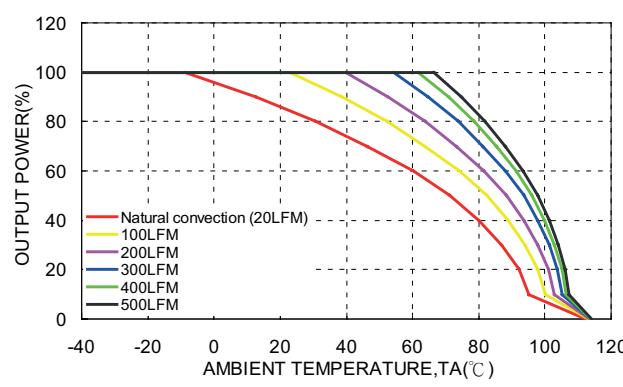
Power dissipation versus Output Current



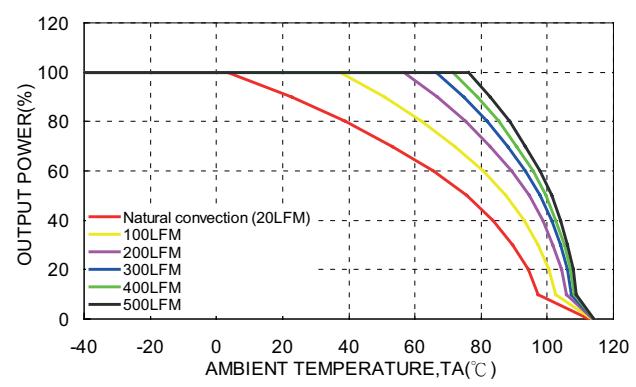
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



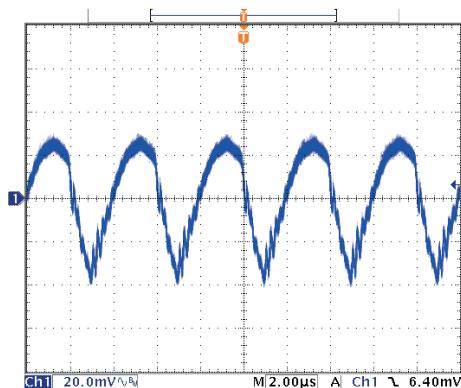
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



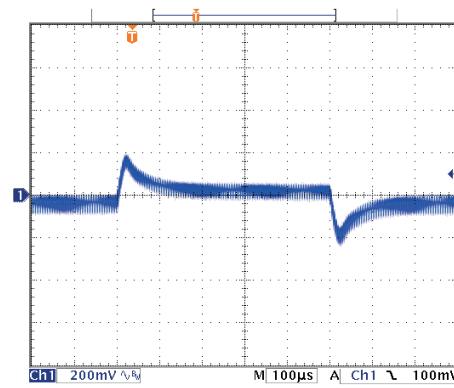
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

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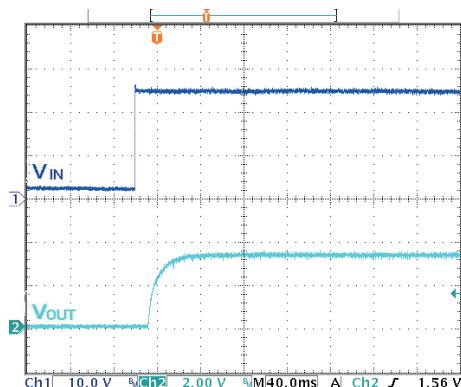
All test conditions are at 25°C. The figures are identical for PAE200-24S3P3W



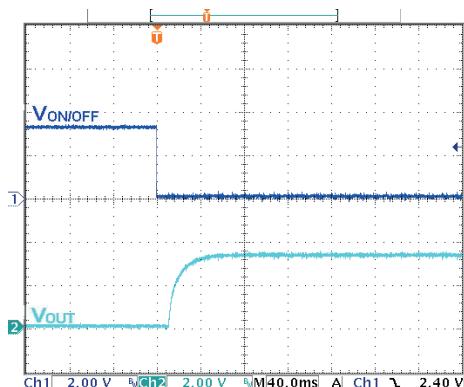
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



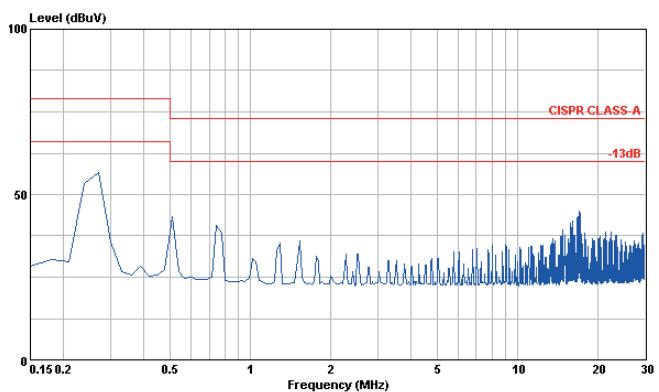
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



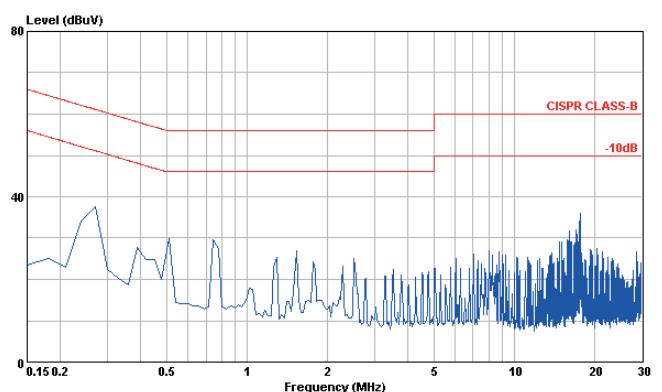
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

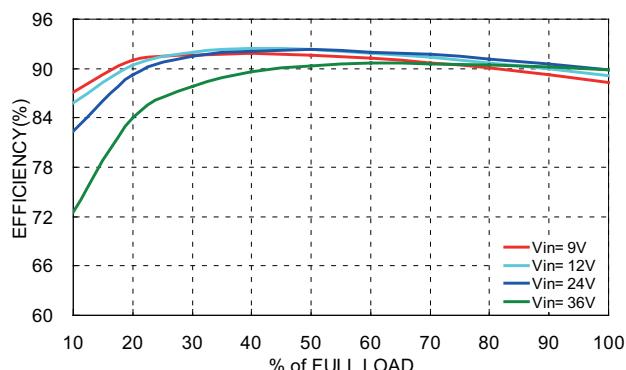
PAE200W Series

Up to 240W 4:1 Single Output

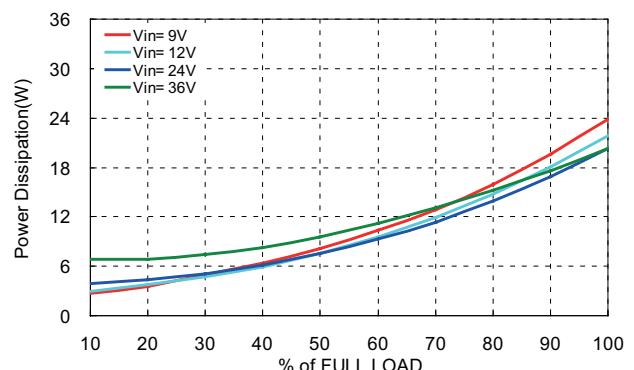
DC/DC Converter

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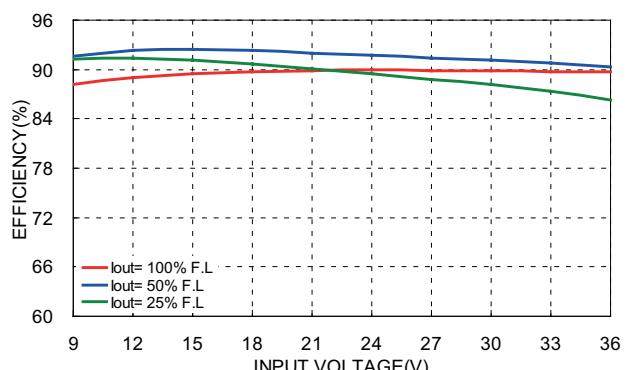
All test conditions are at 25°C. The figures are identical for PAE200-24S05W



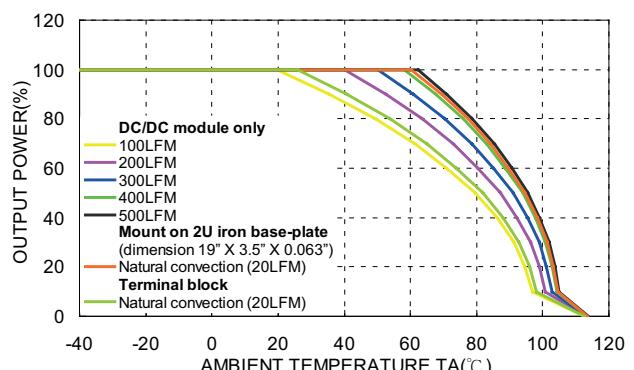
Efficiency versus Output Current



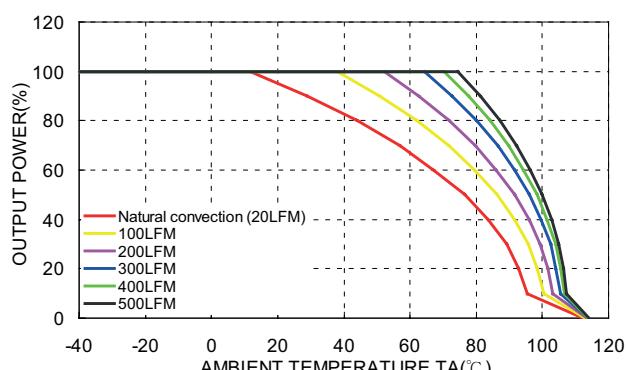
Power dissipation versus Output Current



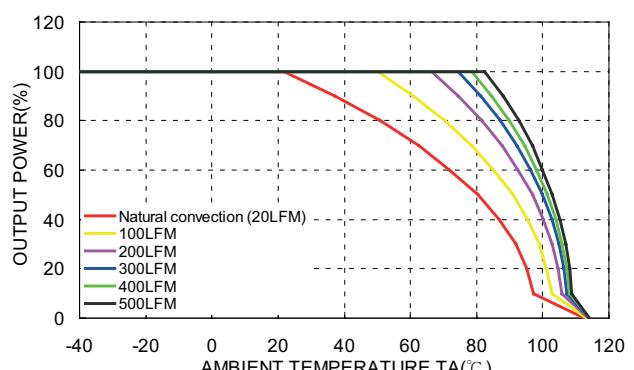
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



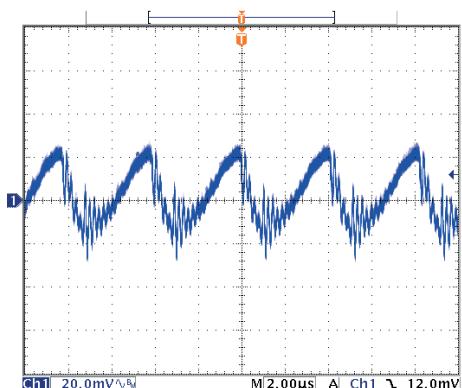
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



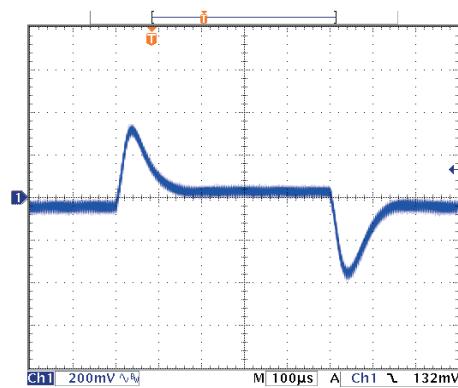
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

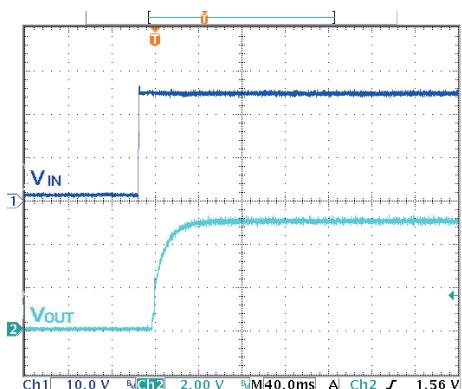
All test conditions are at 25°C. The figures are identical for PAE200-24S05W



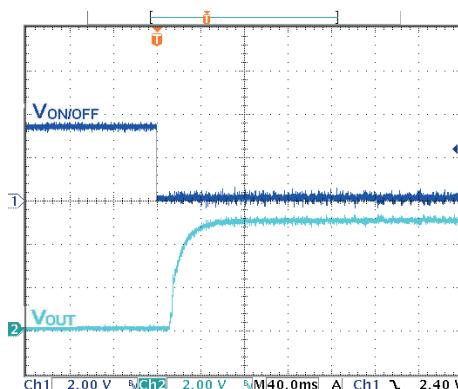
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



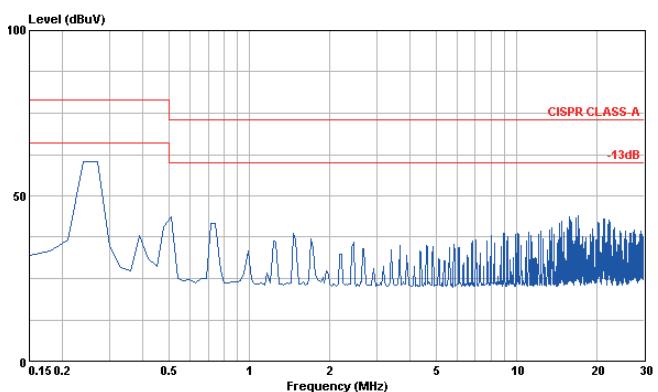
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



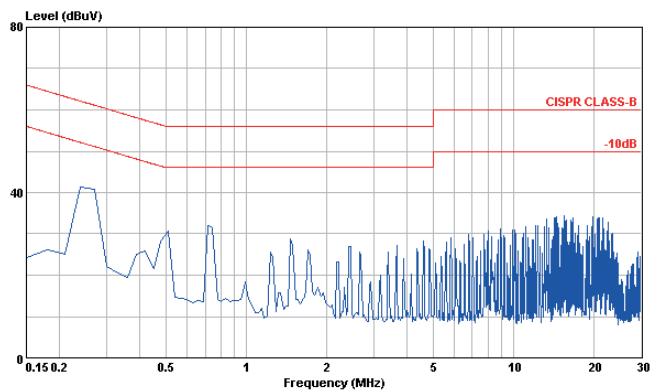
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

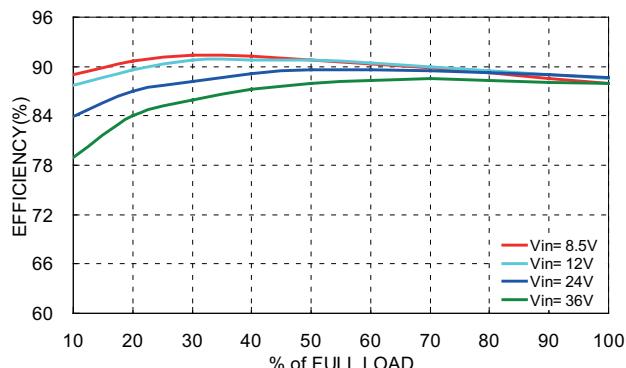
PAE200W Series

Up to 240W 4:1 Single Output

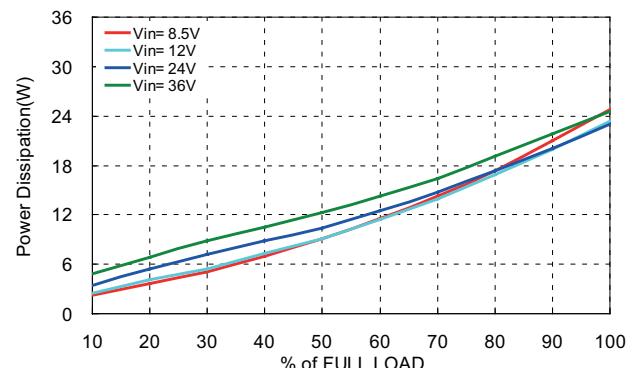
DC/DC Converter

Manual V1.0

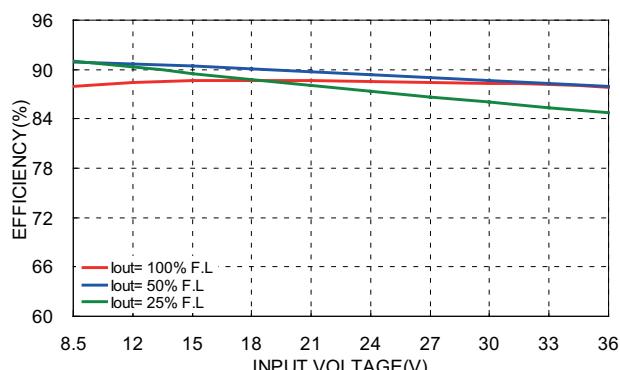
All test conditions are at 25°C. The figures are identical for PAE200-24S12W



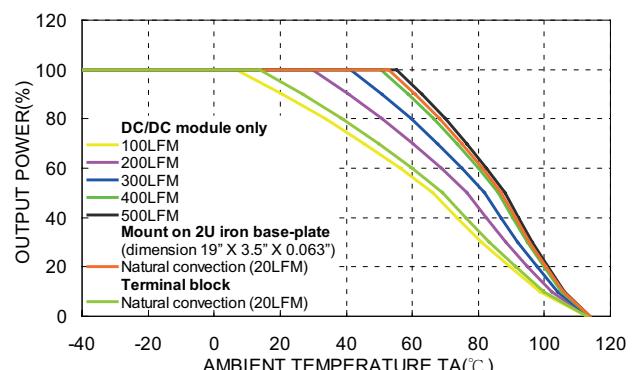
Efficiency versus Output Current



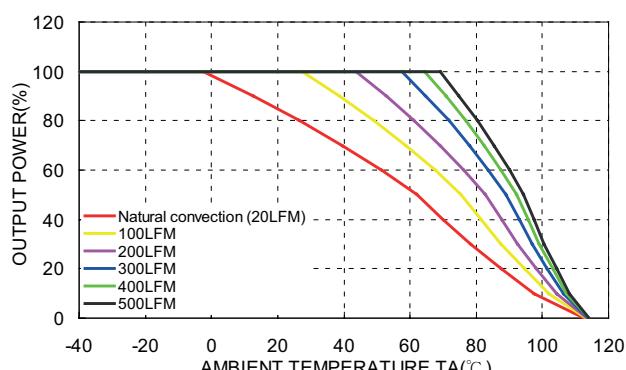
Power dissipation versus Output Current



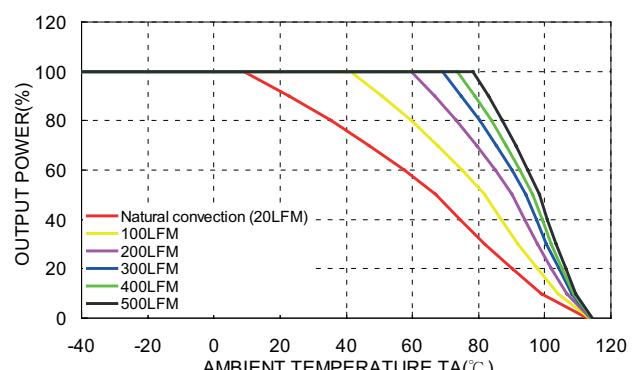
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



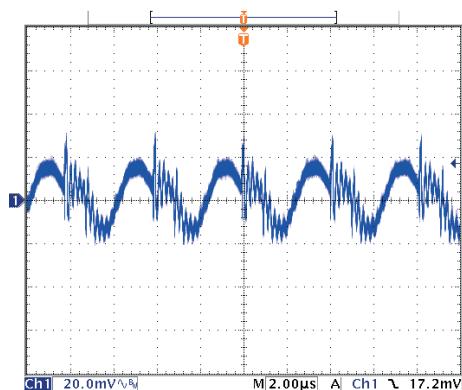
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



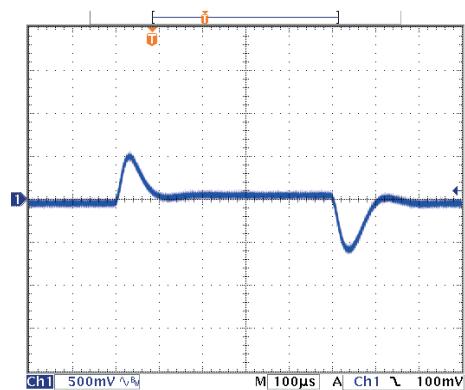
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

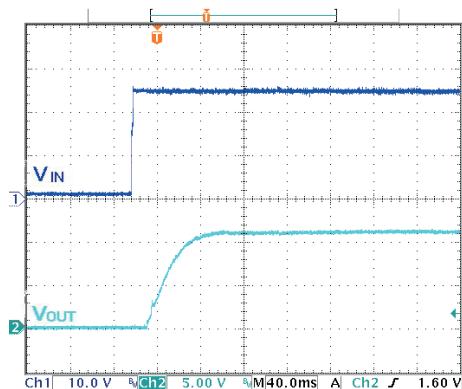
All test conditions are at 25°C. The figures are identical for PAE200-24S12W



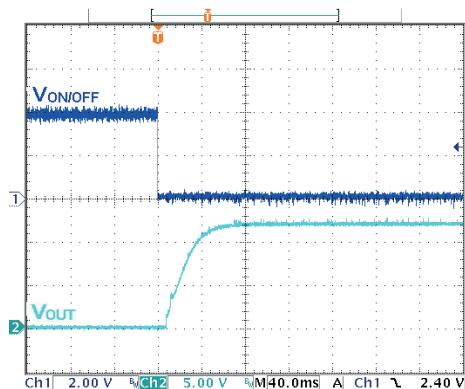
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



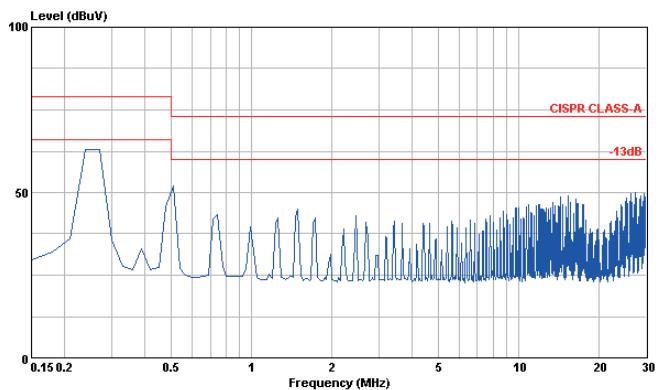
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



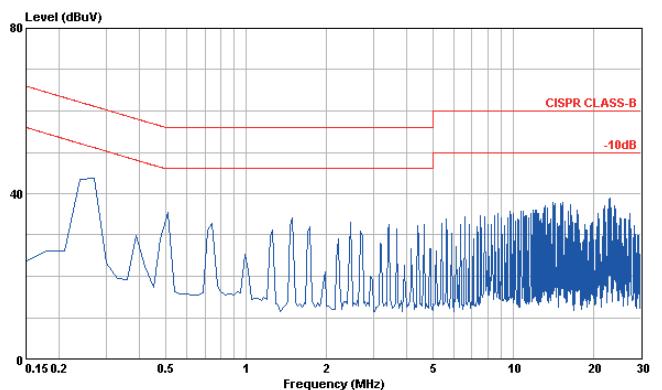
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

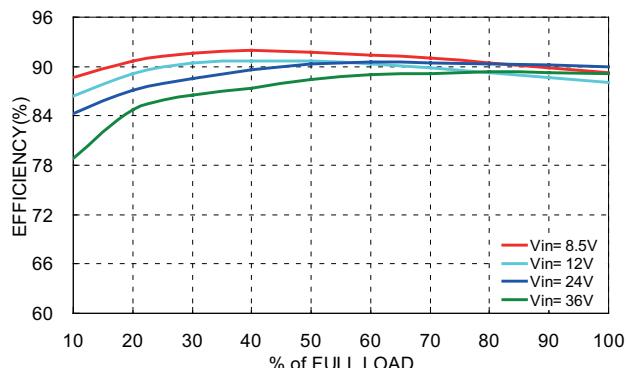
PAE200W Series

Up to 240W 4:1 Single Output

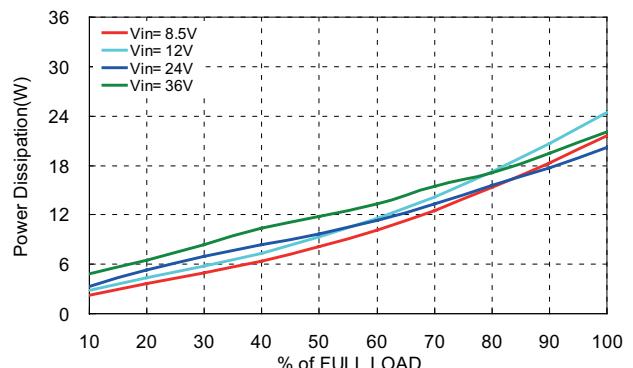
DC/DC Converter

Manual V1.0

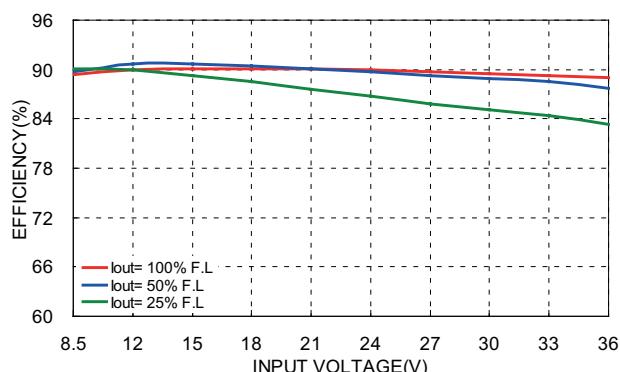
All test conditions are at 25°C. The figures are identical for PAE200-24S15W



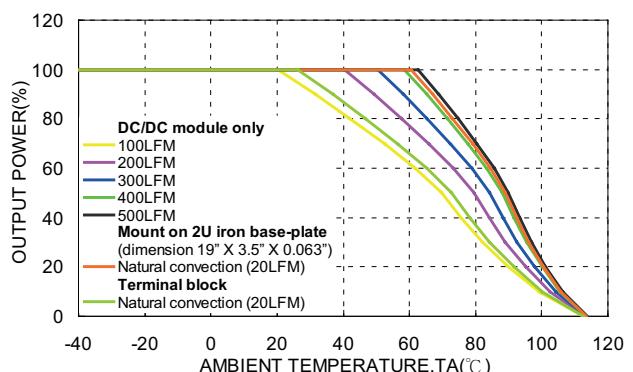
Efficiency versus Output Current



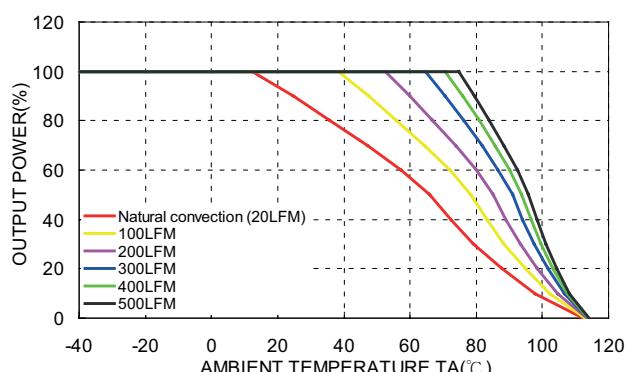
Power dissipation versus Output Current



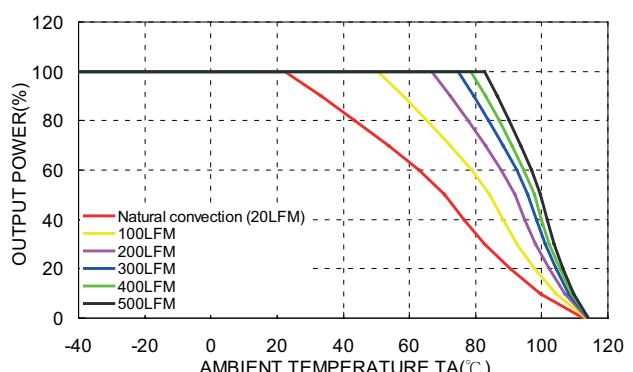
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



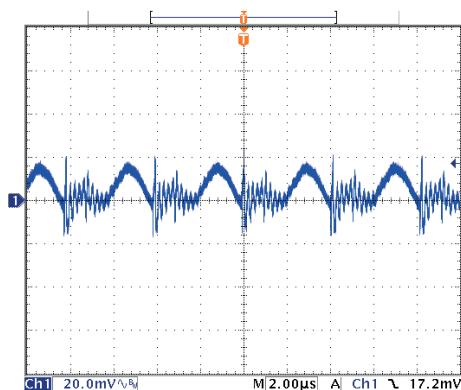
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



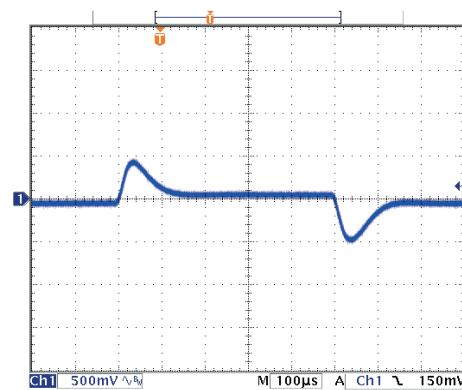
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

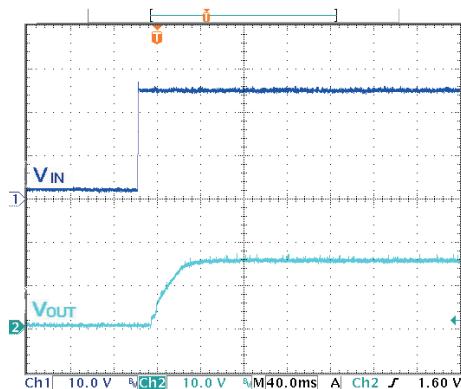
All test conditions are at 25°C. The figures are identical for PAE200-24S15W



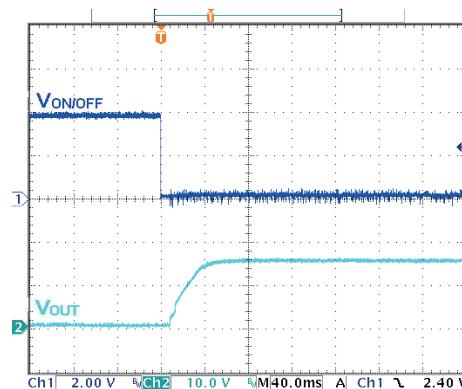
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



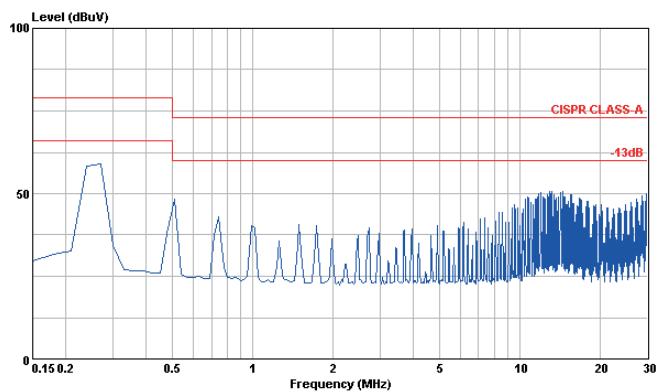
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



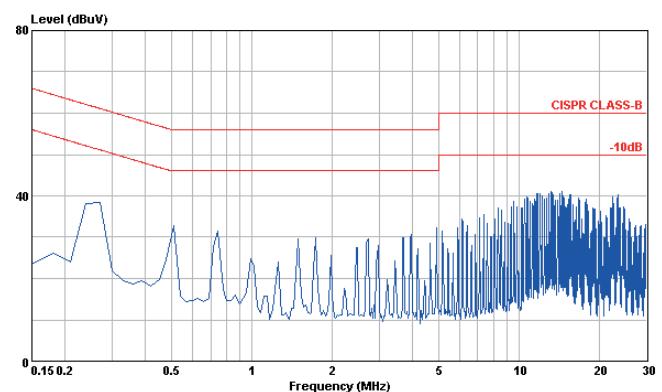
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

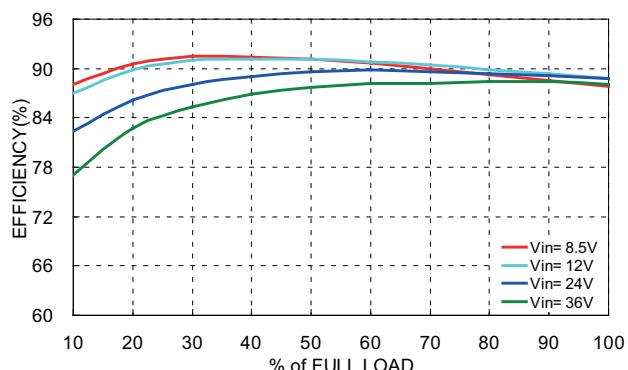
PAE200W Series

Up to 240W 4:1 Single Output

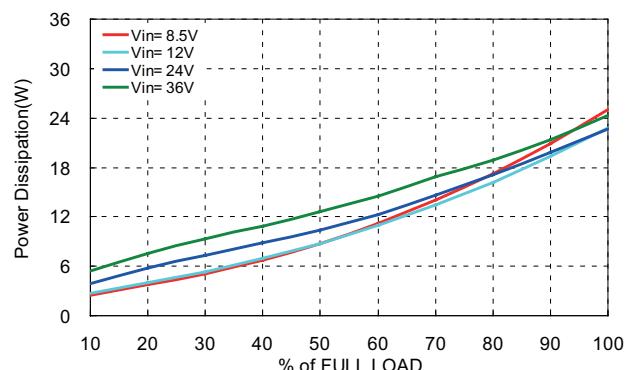
DC/DC Converter

Manual V1.0

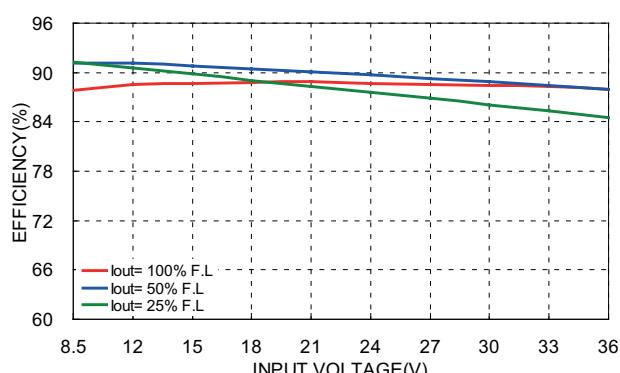
All test conditions are at 25°C. The figures are identical for PAE200-24S24W



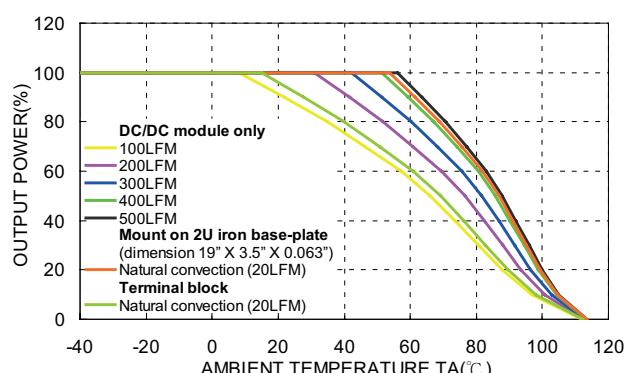
Efficiency versus Output Current



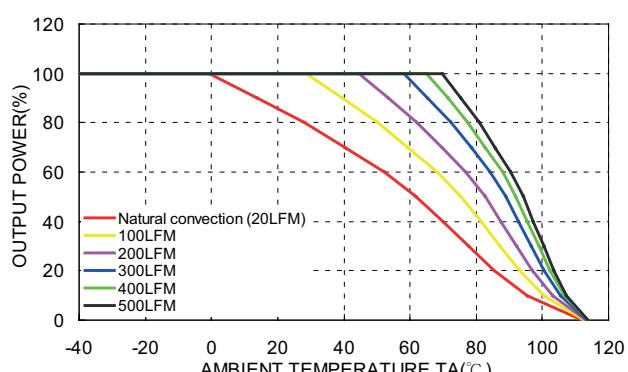
Power dissipation versus Output Current



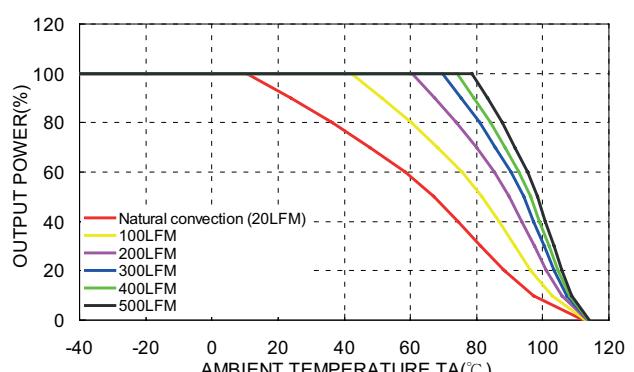
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



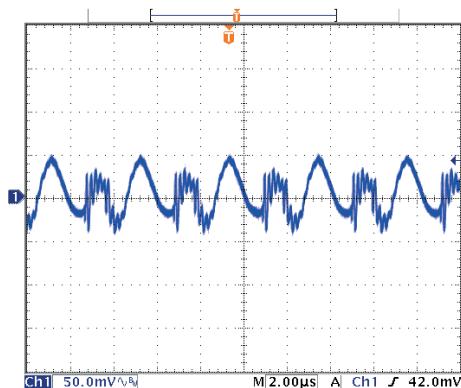
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



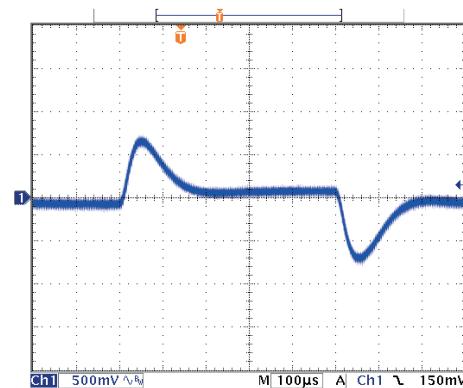
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

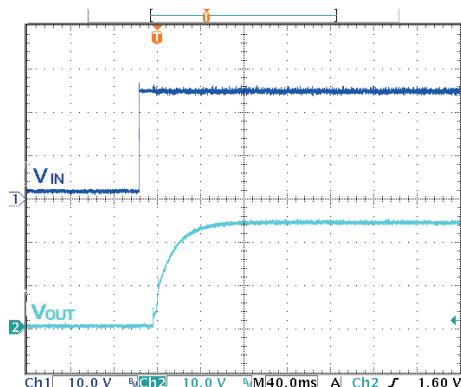
All test conditions are at 25°C. The figures are identical for PAE200-24S24W



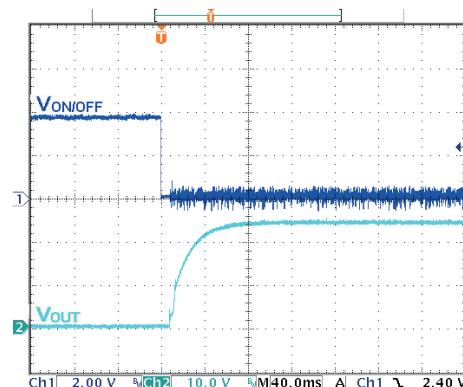
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



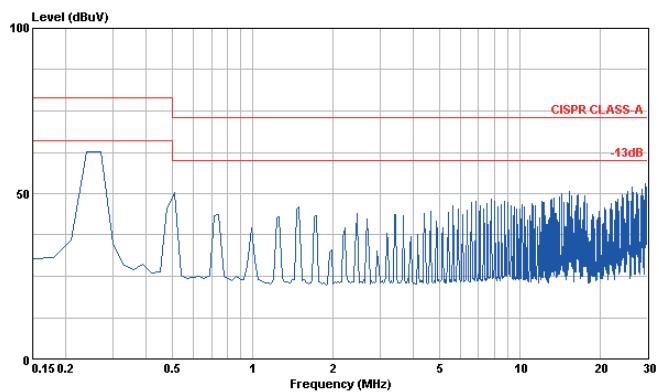
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



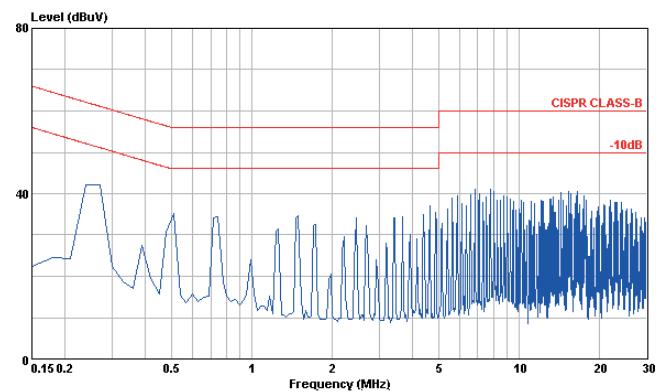
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

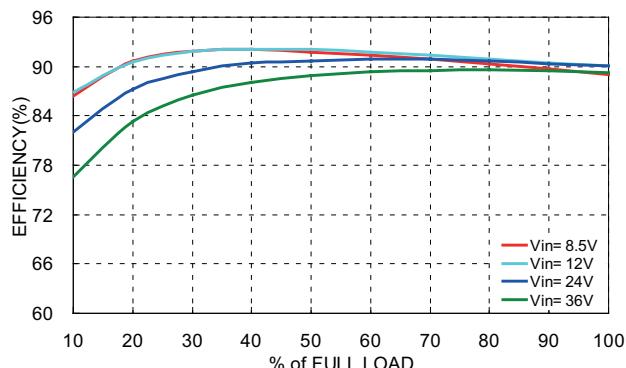
PAE200W Series

Up to 240W 4:1 Single Output

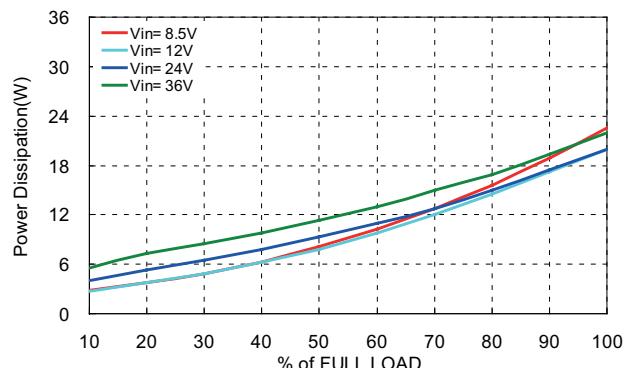
DC/DC Converter

Manual V1.0

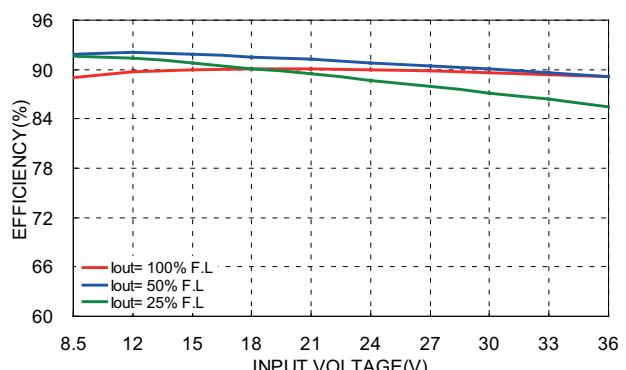
All test conditions are at 25°C. The figures are identical for PAE200-24S28W



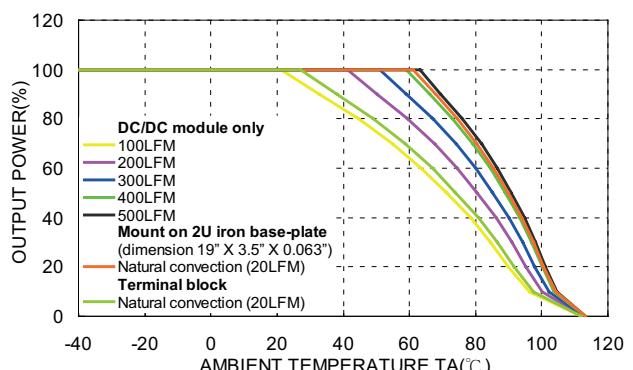
Efficiency versus Output Current



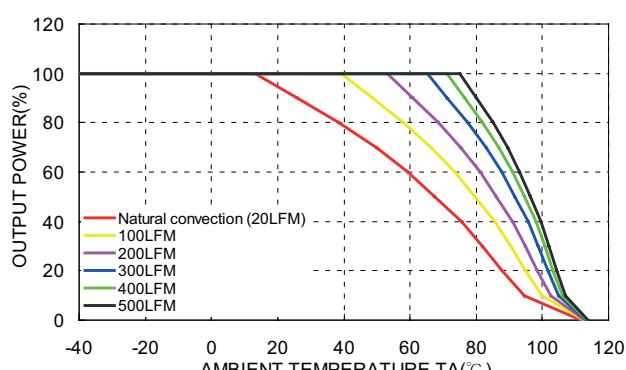
Power dissipation versus Output Current



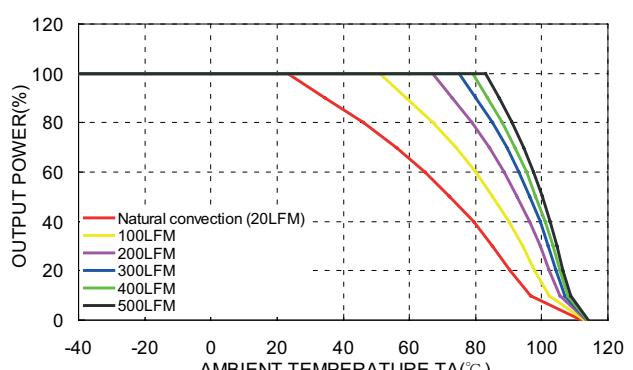
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



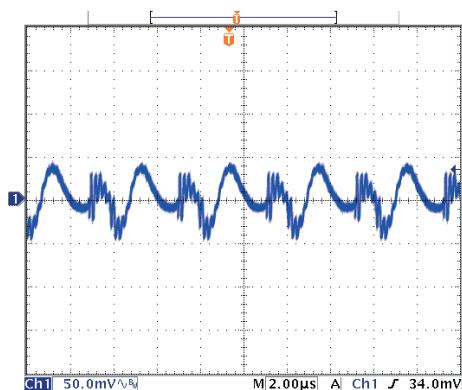
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



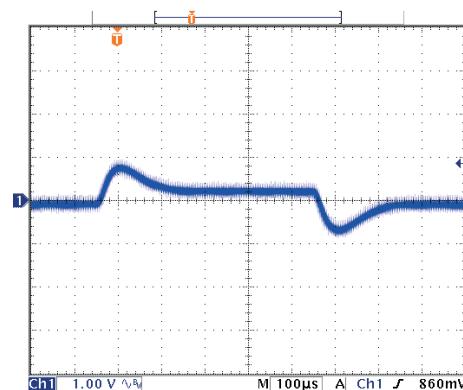
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

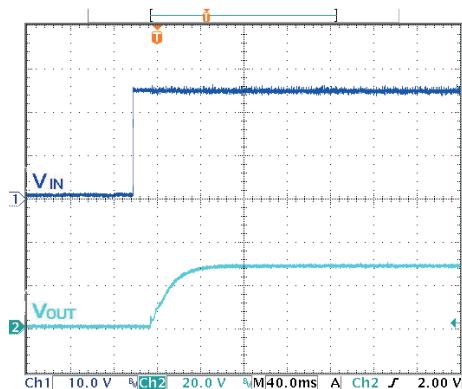
All test conditions are at 25°C. The figures are identical for PAE200-24S28W



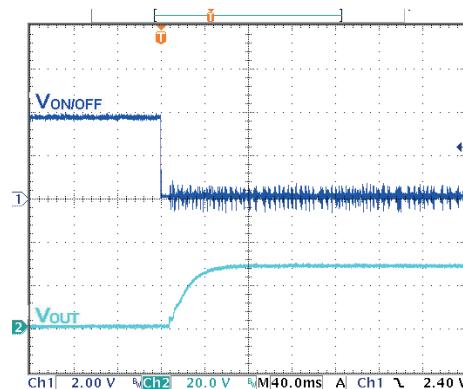
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



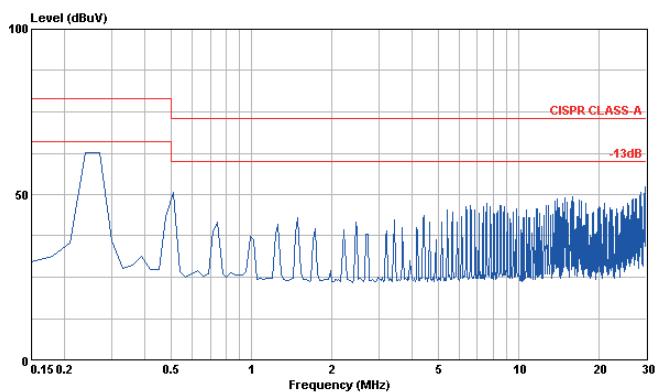
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



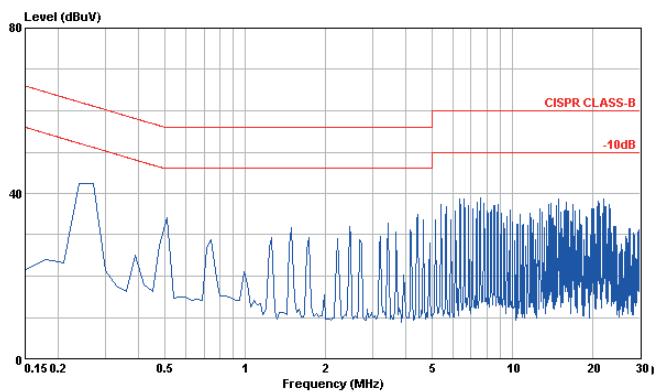
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

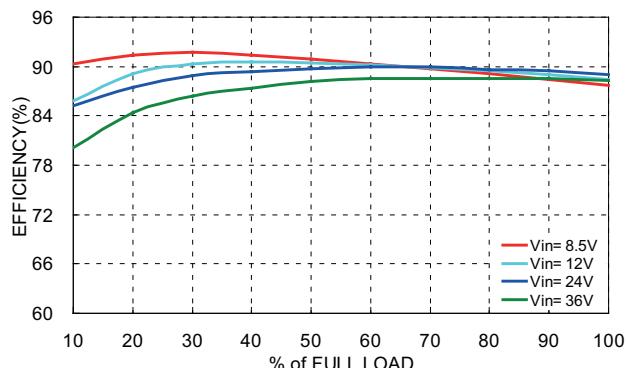
PAE200W Series

Up to 240W 4:1 Single Output

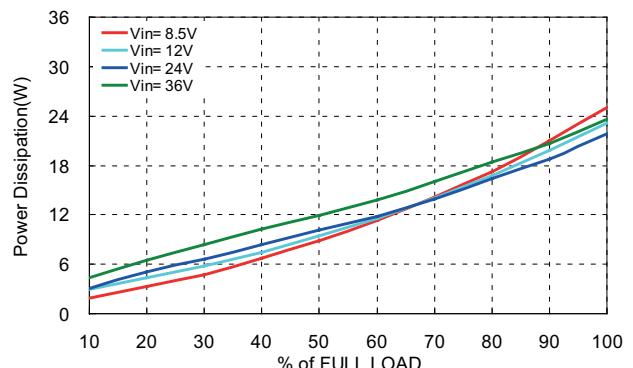
DC/DC Converter

Manual V1.0

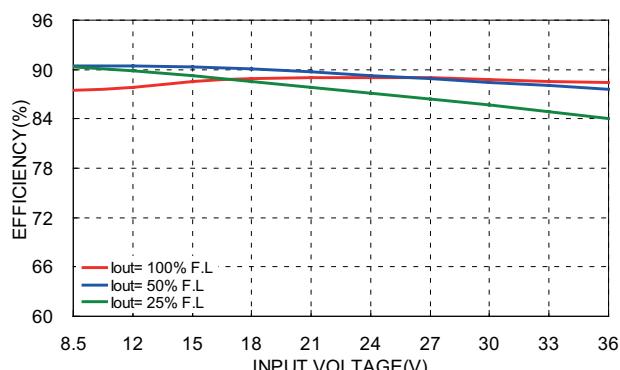
All test conditions are at 25°C. The figures are identical for PAE200-24S48W



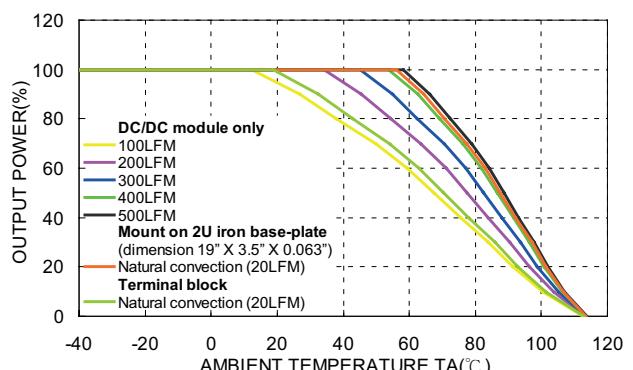
Efficiency versus Output Current



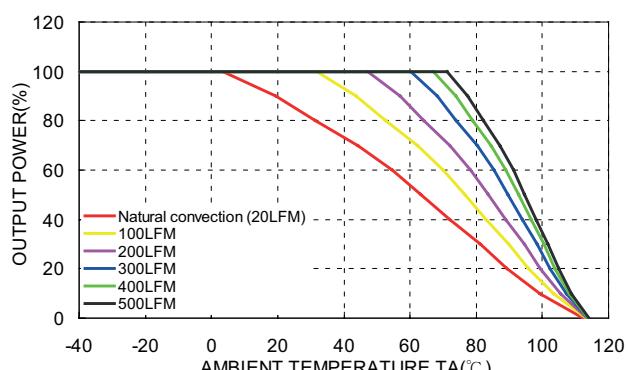
Power dissipation versus Output Current



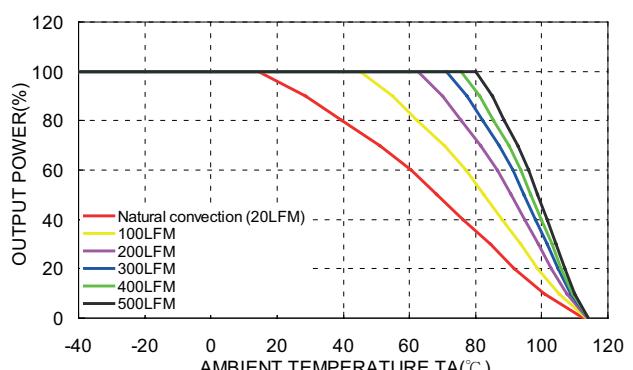
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



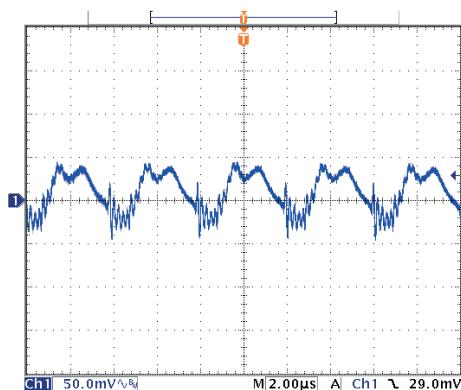
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



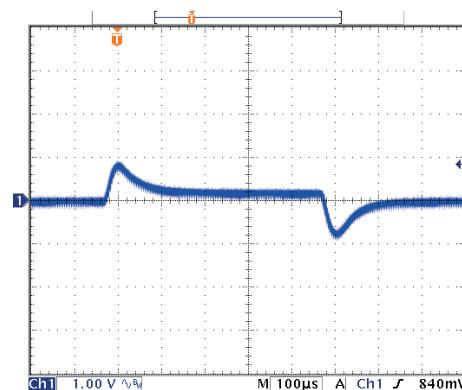
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

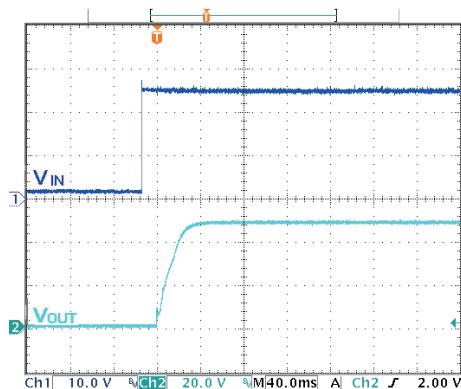
All test conditions are at 25°C. The figures are identical for PAE200-24S48W



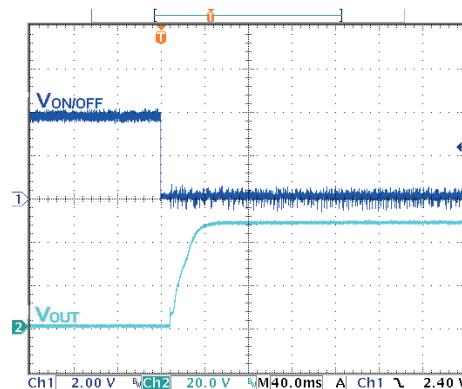
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



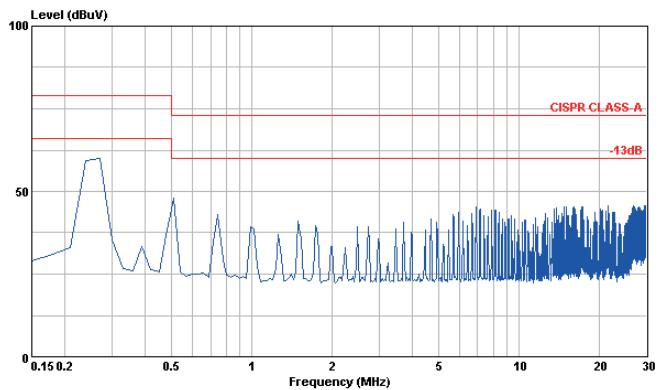
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



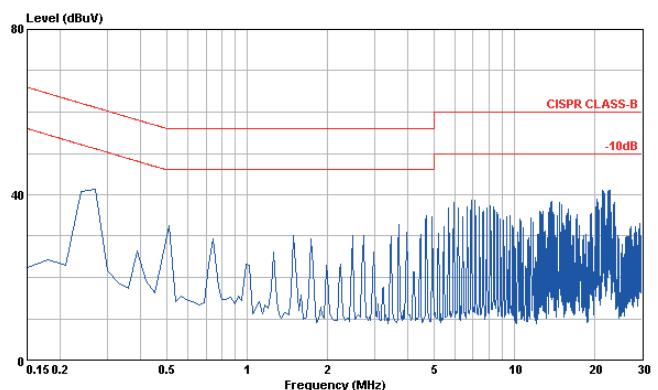
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

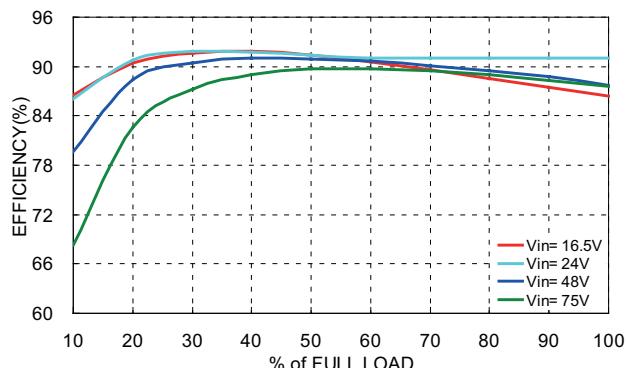
PAE200W Series

Up to 240W 4:1 Single Output

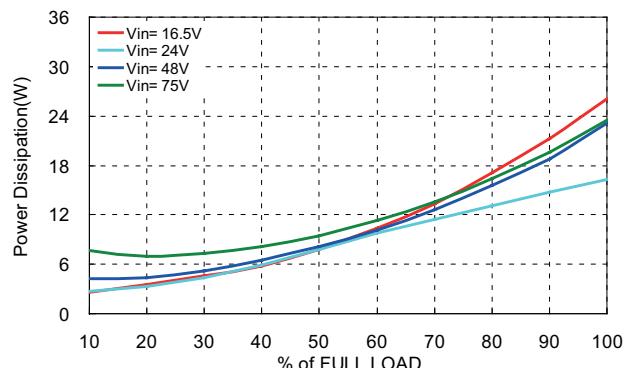
DC/DC Converter

Manual V1.0

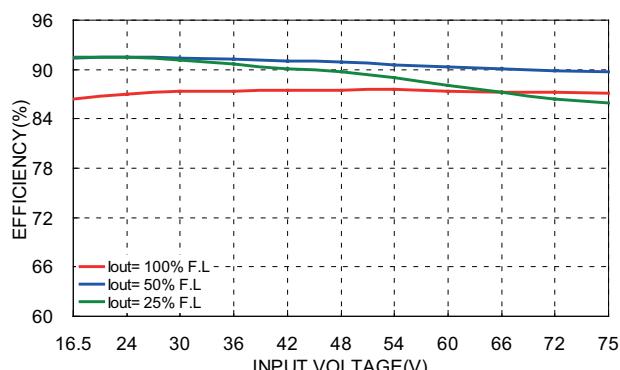
All test conditions are at 25°C. The figures are identical for PAE200-48S3P3W



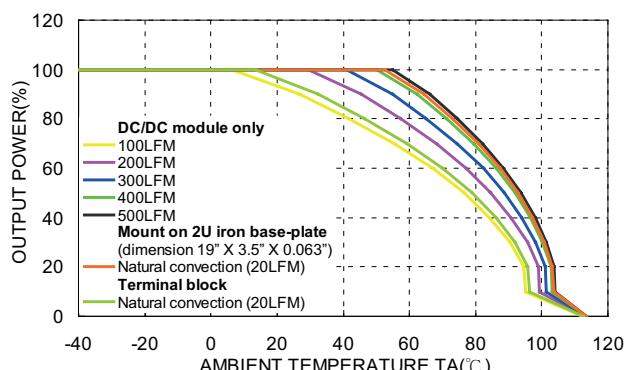
Efficiency versus Output Current



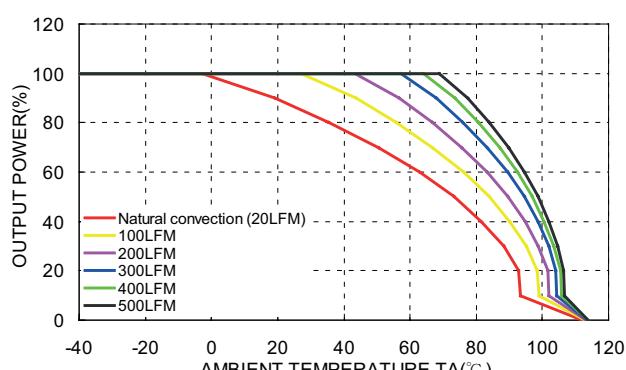
Power dissipation versus Output Current



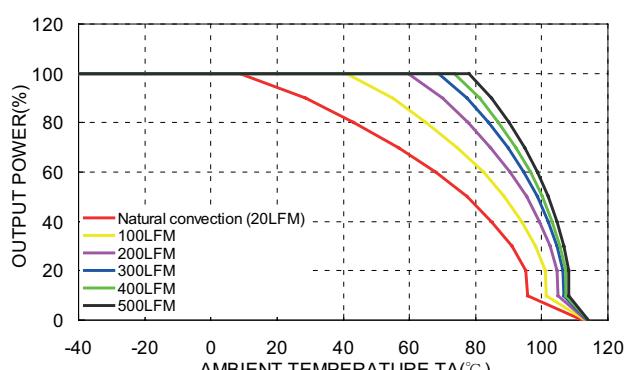
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



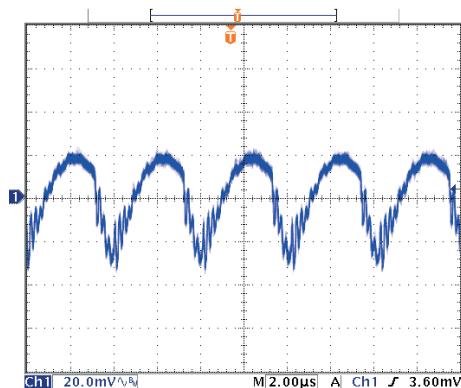
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



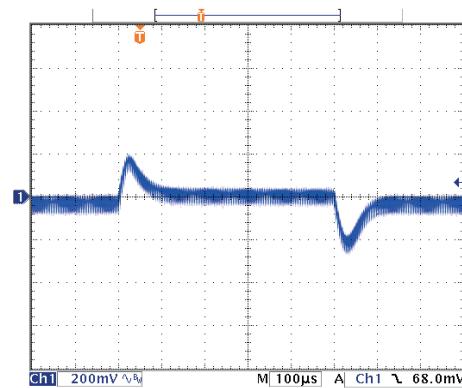
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

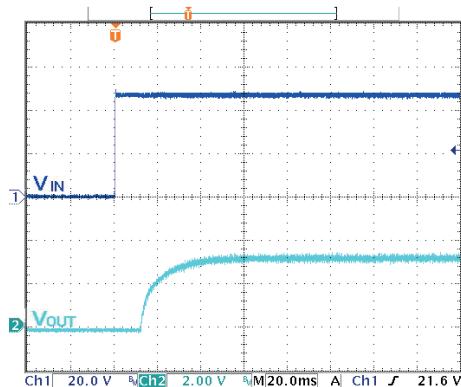
All test conditions are at 25°C. The figures are identical for PAE200-48S3P3W



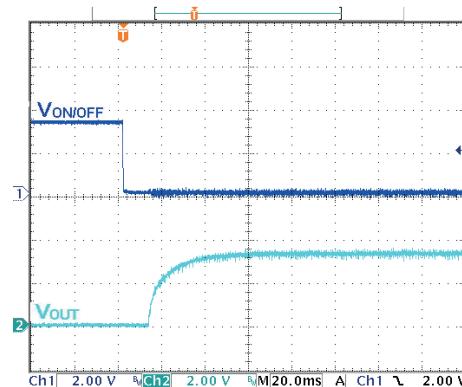
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



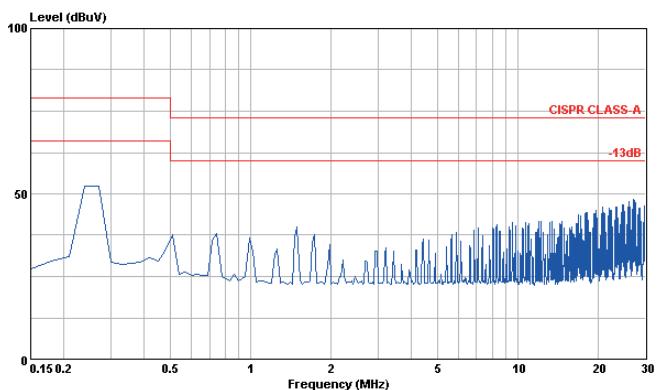
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



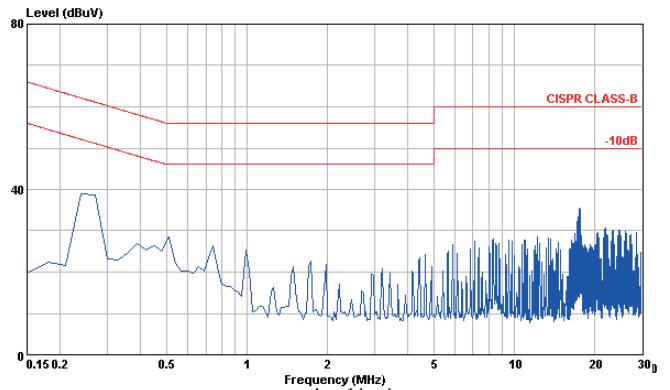
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



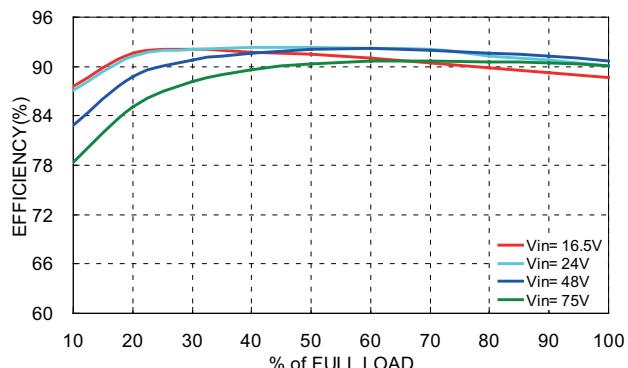
Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



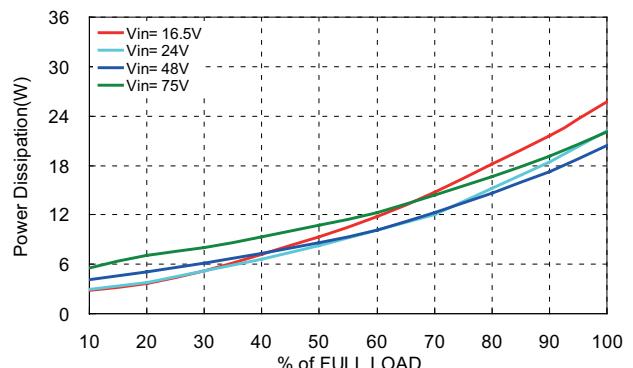
Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
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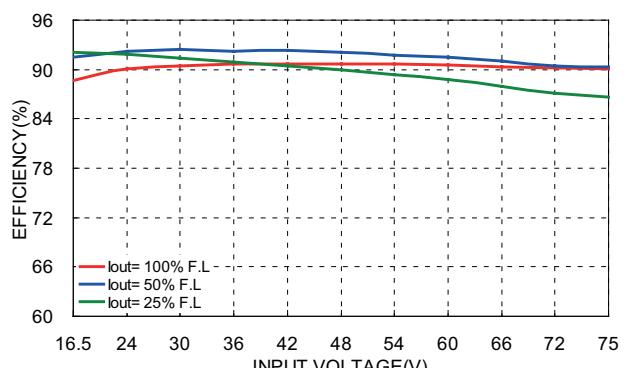
All test conditions are at 25°C. The figures are identical for PAE200-48S05W



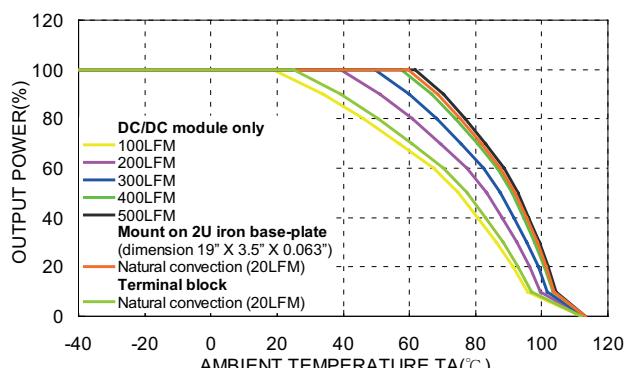
Efficiency versus Output Current



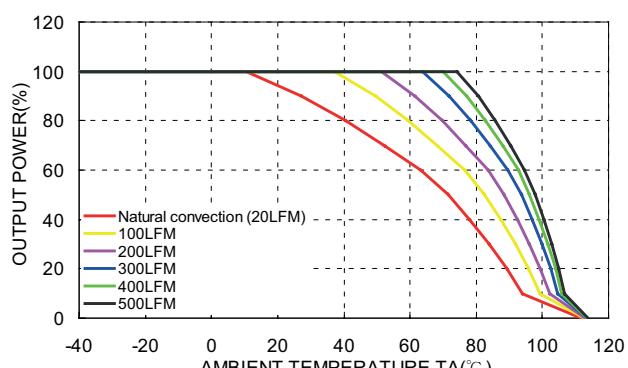
Power dissipation versus Output Current



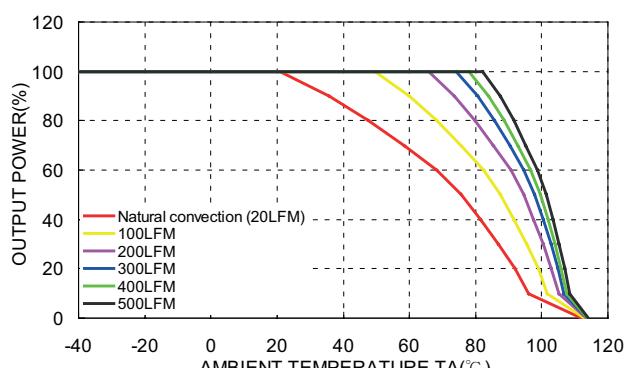
Efficiency versus Input Voltage  
 Full Load



Derating Output Current versus Ambient Temperature and Airflow  
 Vin(nom)



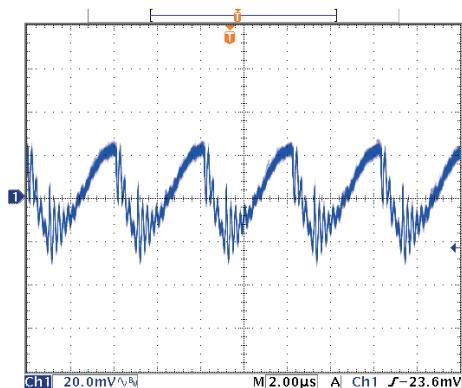
Derating Output Current versus Ambient Temperature and Airflow  
 With 0.24" Heat-Sink , Vin(nom)



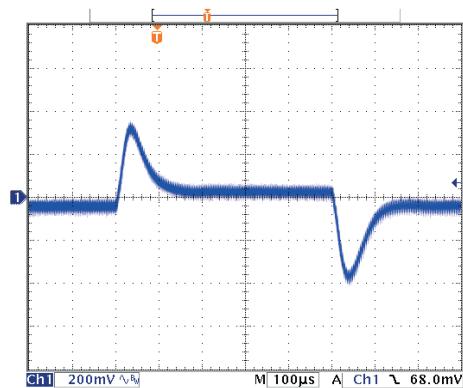
Derating Output Current versus Ambient Temperature and Airflow  
 With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
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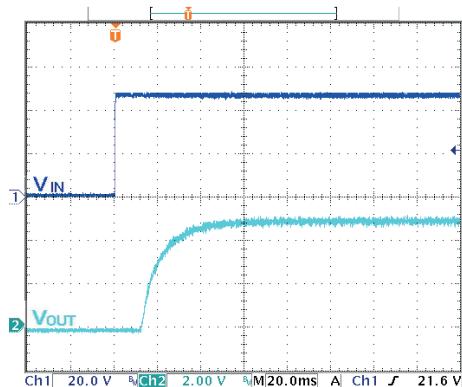
All test conditions are at 25°C. The figures are identical for PAE200-48S05W



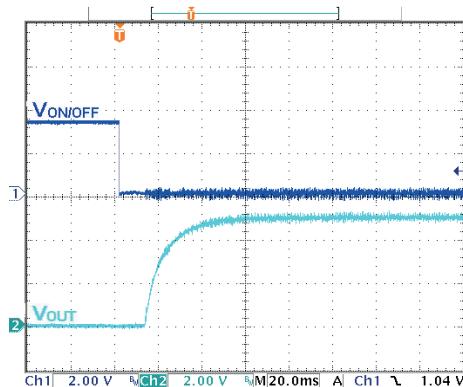
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



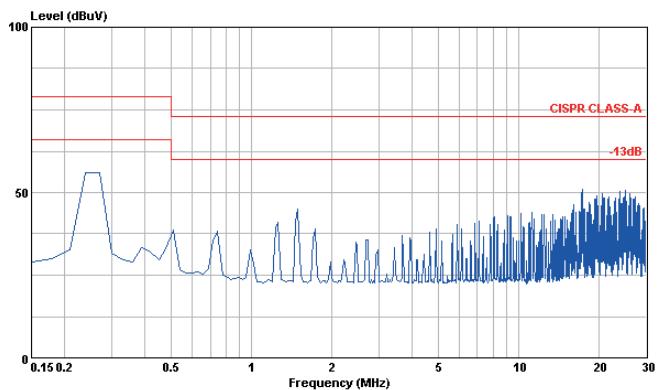
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



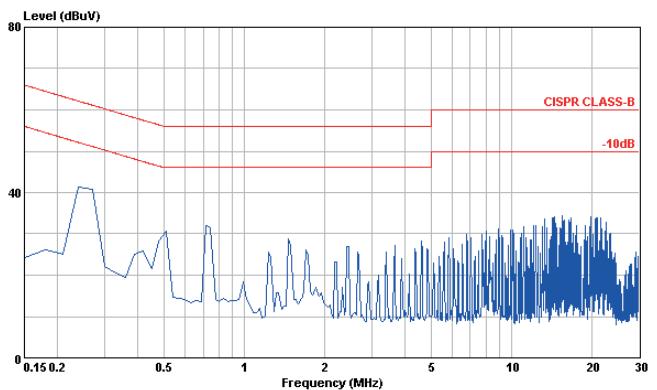
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

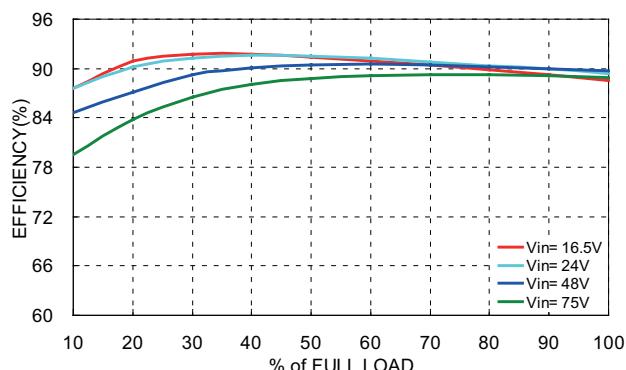
PAE200W Series

Up to 240W 4:1 Single Output

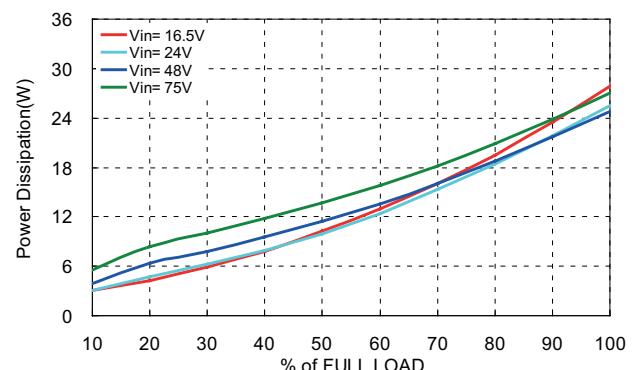
DC/DC Converter

Manual V1.0

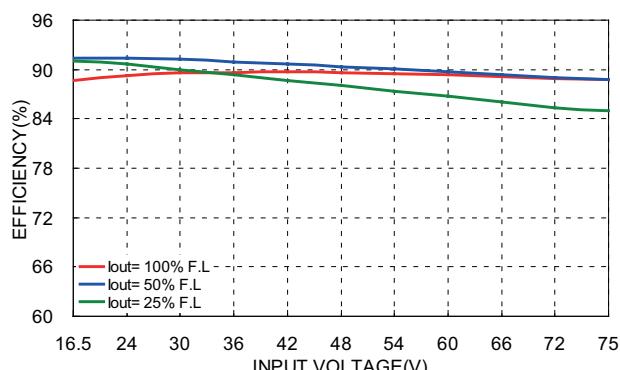
All test conditions are at 25°C. The figures are identical for PAE200-48S12W



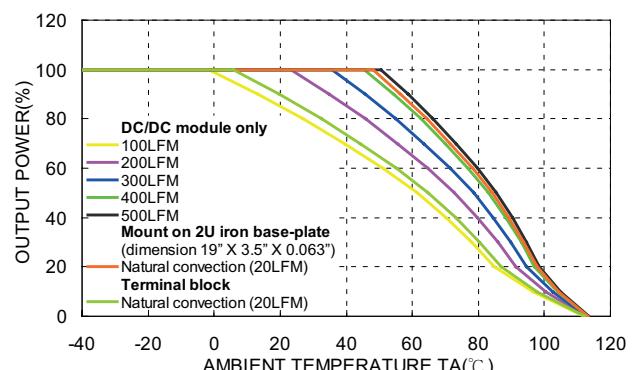
Efficiency versus Output Current



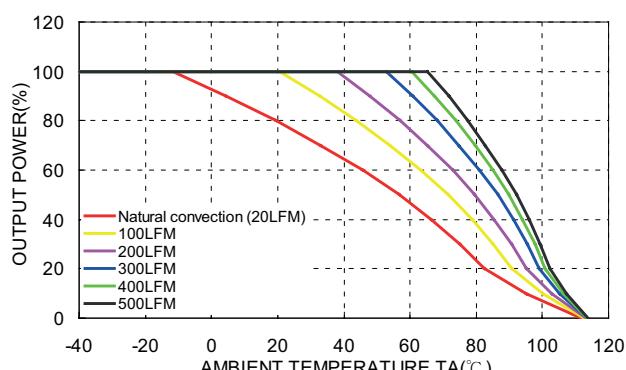
Power dissipation versus Output Current



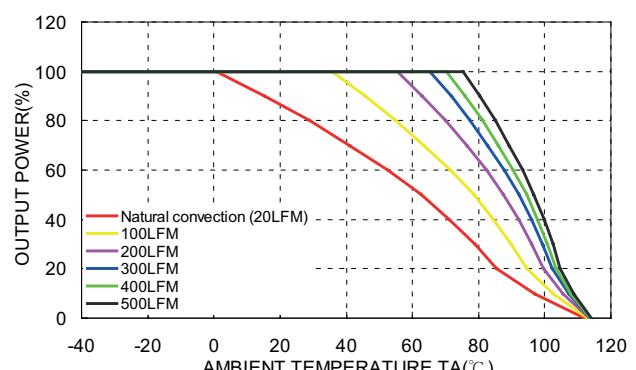
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



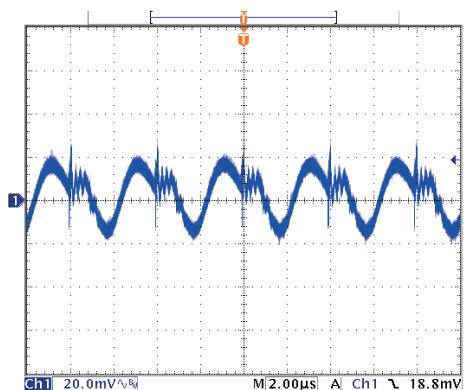
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



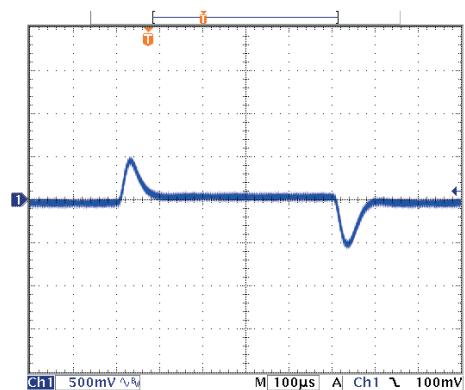
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
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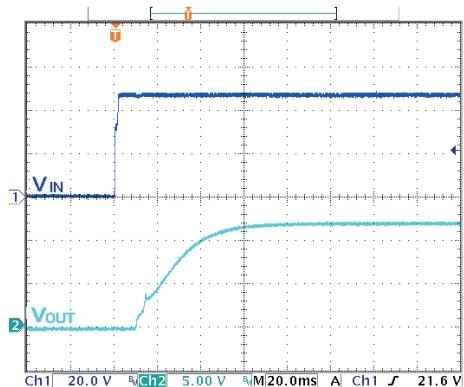
All test conditions are at 25°C. The figures are identical for PAE200-48S12W



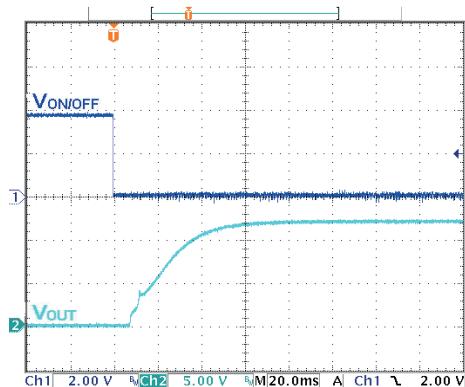
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



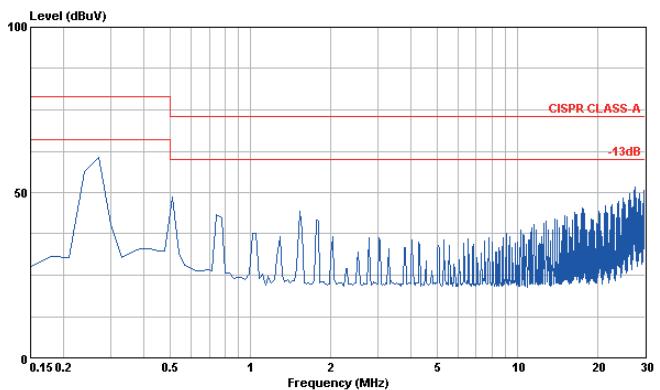
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



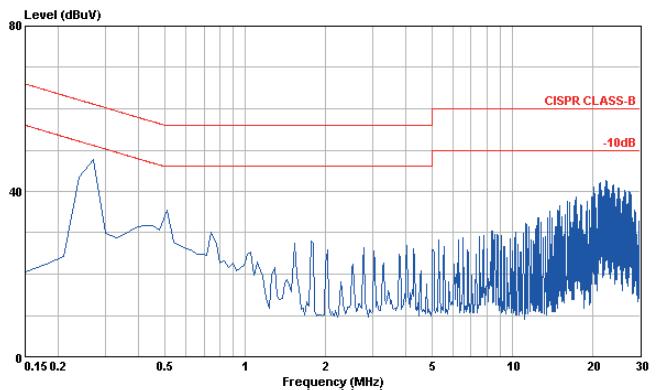
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

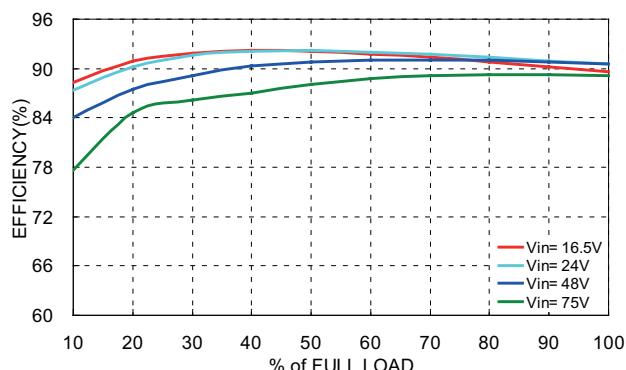
PAE200W Series

Up to 240W 4:1 Single Output

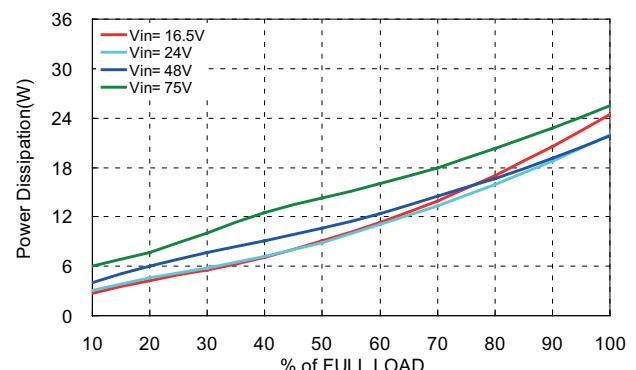
DC/DC Converter

Manual V1.0

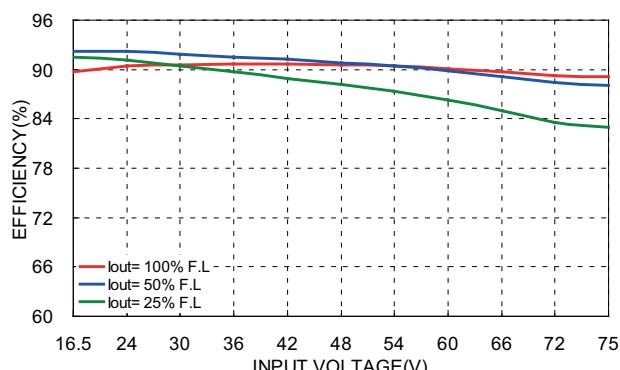
All test conditions are at 25°C. The figures are identical for PAE200-48S15W



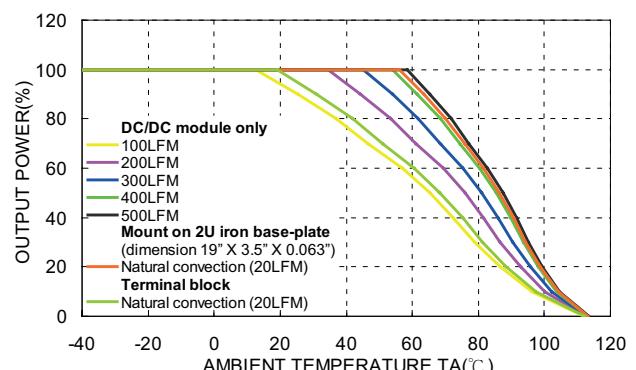
Efficiency versus Output Current



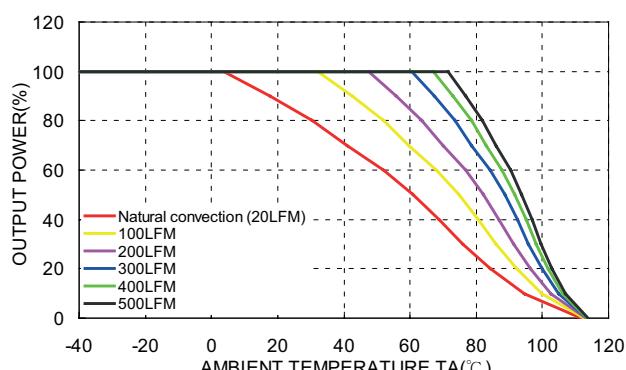
Power dissipation versus Output Current



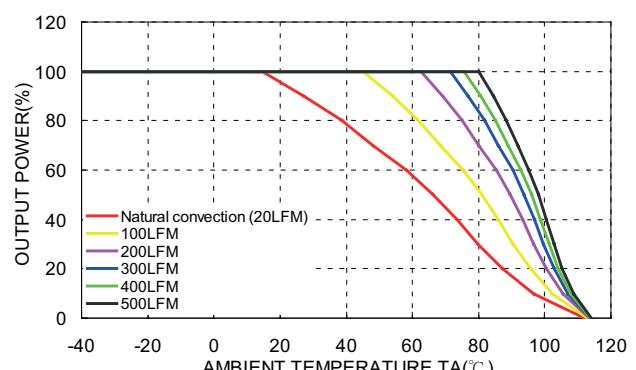
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



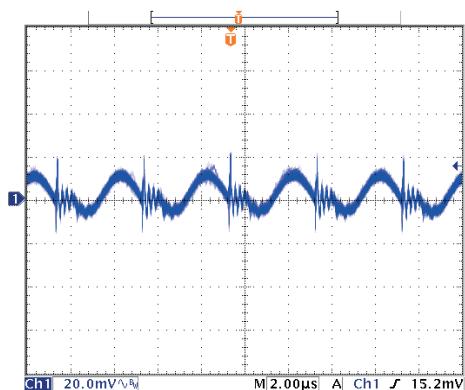
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



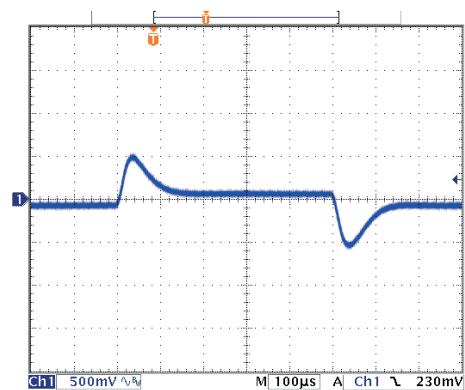
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
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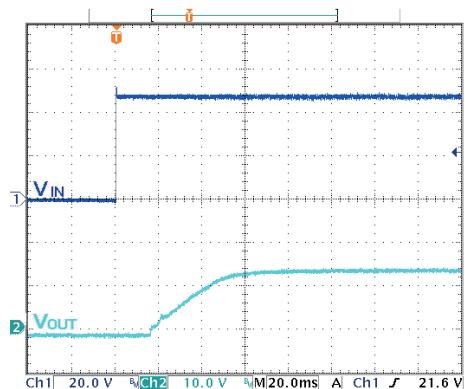
All test conditions are at 25°C. The figures are identical for PAE200-48S15W



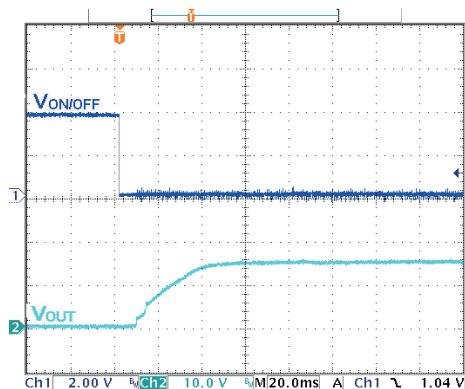
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



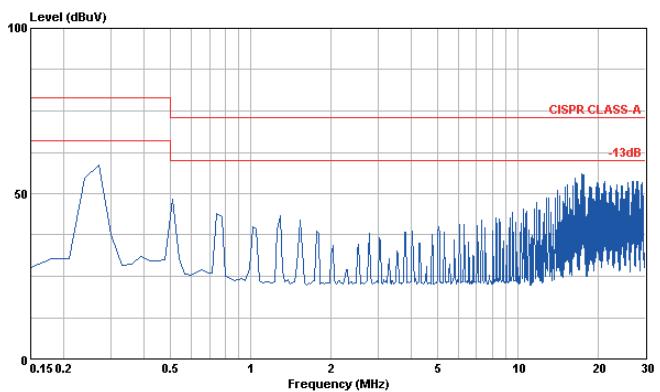
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



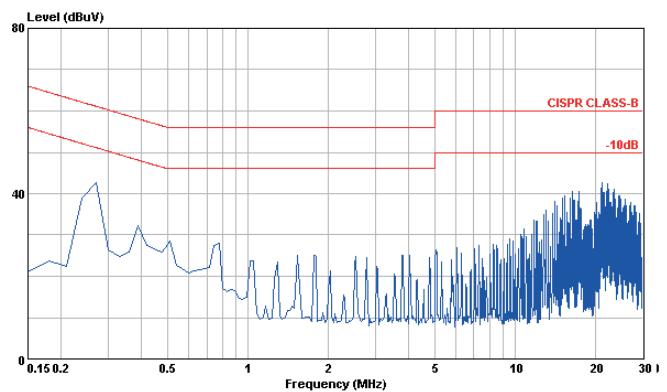
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

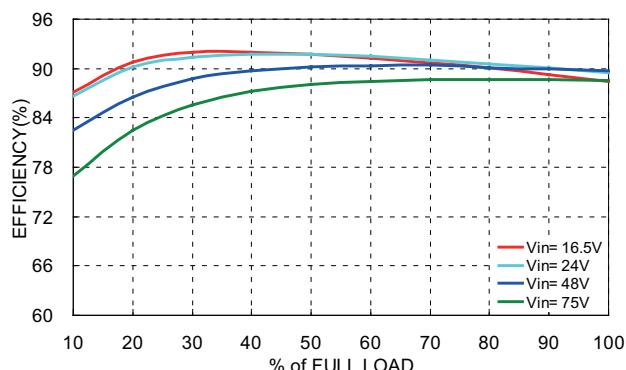
PAE200W Series

Up to 240W 4:1 Single Output

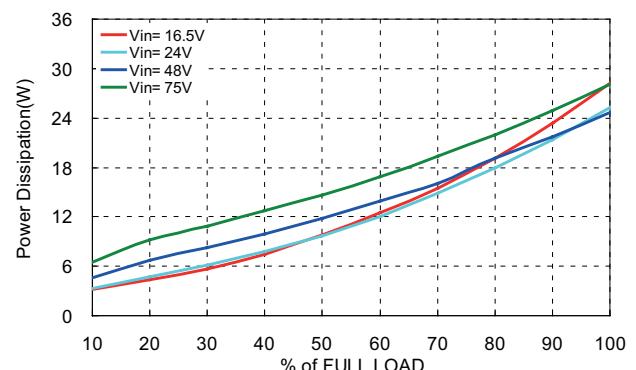
DC/DC Converter

Manual V1.0

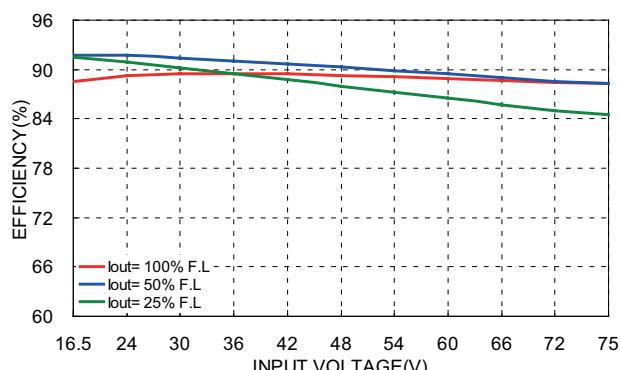
All test conditions are at 25°C. The figures are identical for PAE200-48S24W



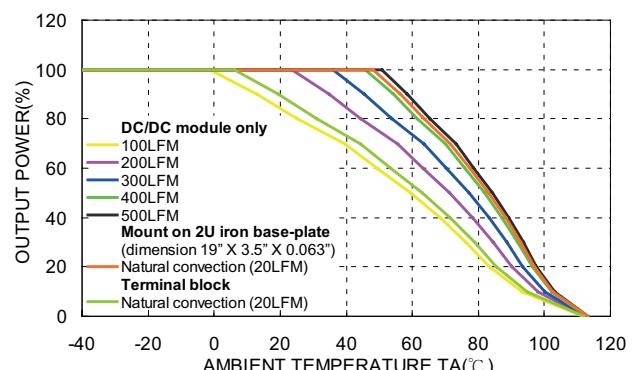
Efficiency versus Output Current



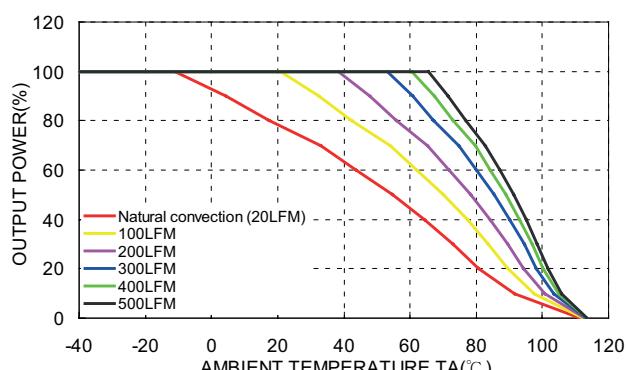
Power dissipation versus Output Current



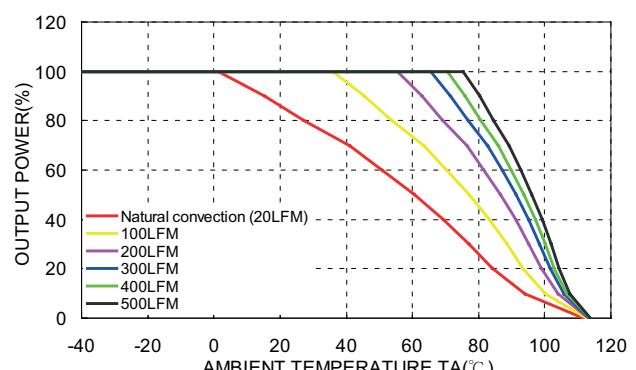
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



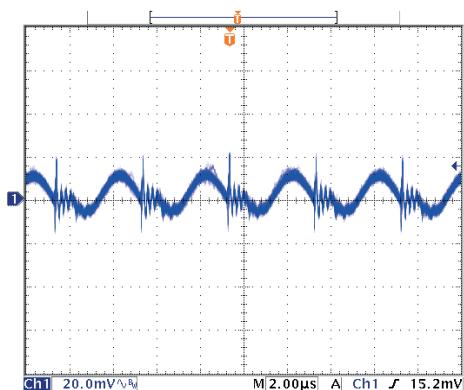
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



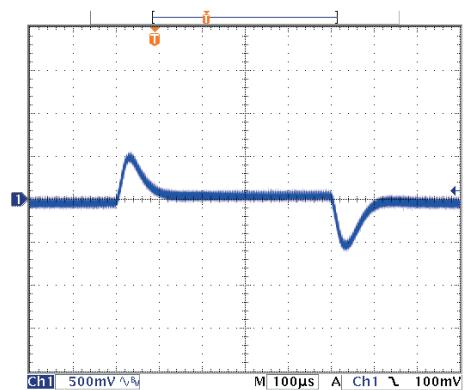
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
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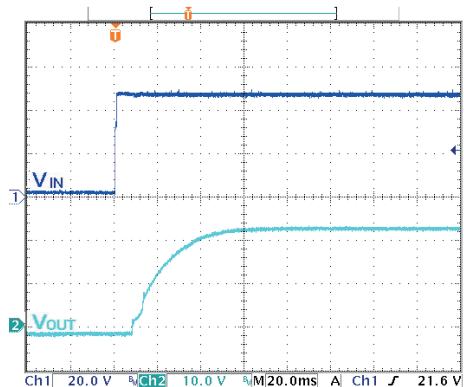
All test conditions are at 25°C. The figures are identical for PAE200-48S24W



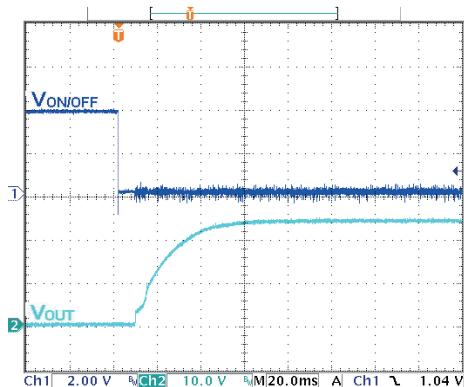
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



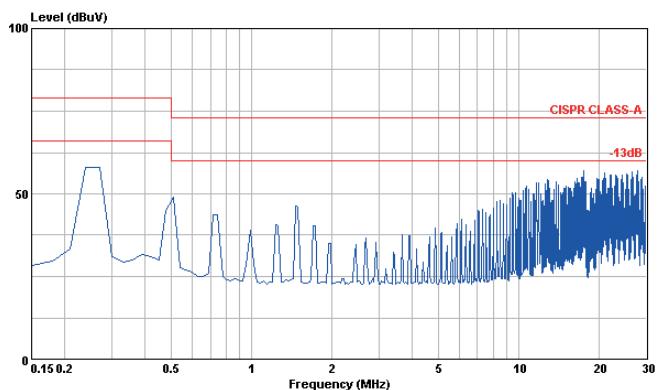
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



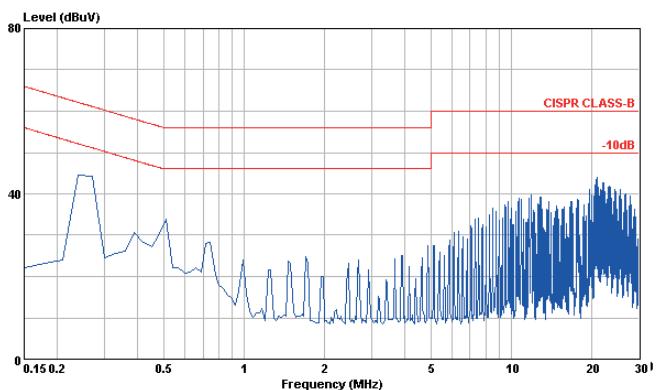
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



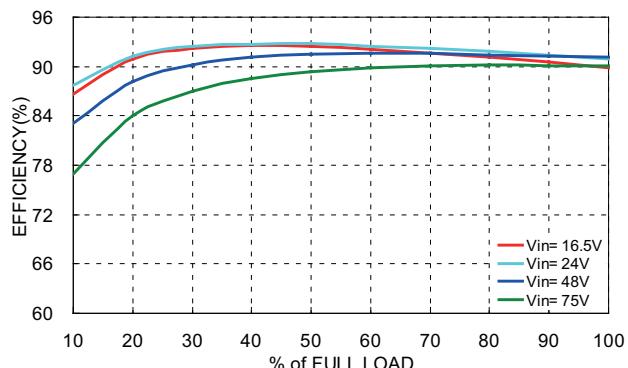
Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



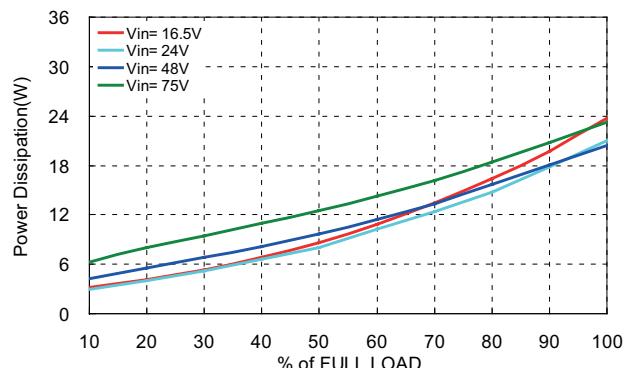
Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
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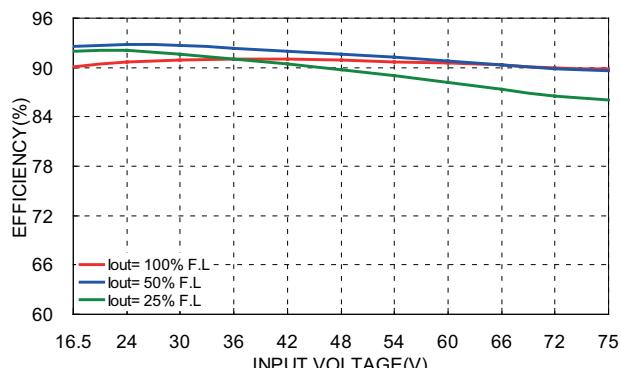
All test conditions are at 25°C. The figures are identical for PAE200-48S28W



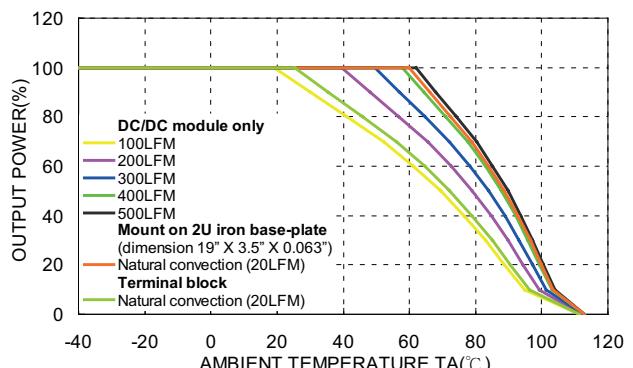
Efficiency versus Output Current



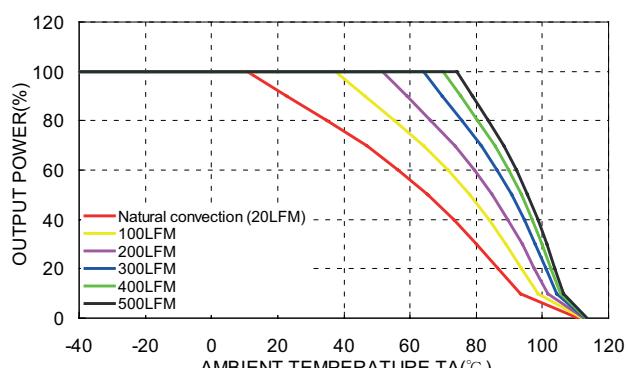
Power dissipation versus Output Current



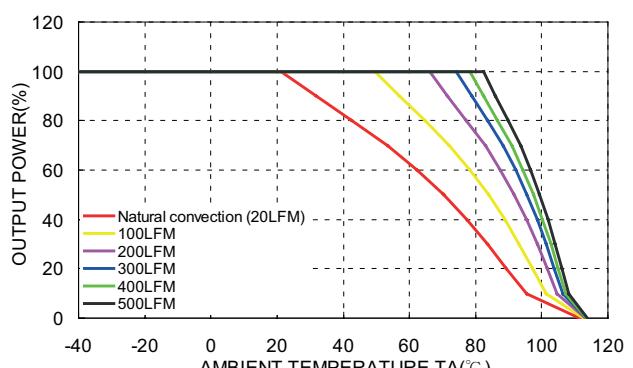
Efficiency versus Input Voltage  
 Full Load



Derating Output Current versus Ambient Temperature and Airflow  
 Vin(nom)



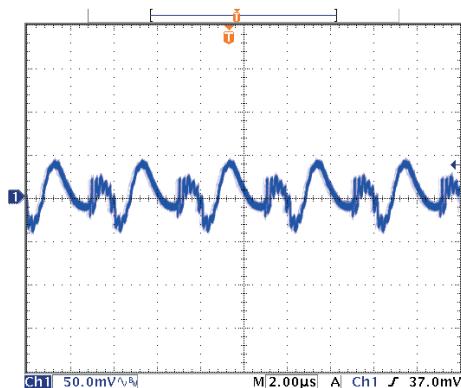
Derating Output Current versus Ambient Temperature and Airflow  
 With 0.24" Heat-Sink , Vin(nom)



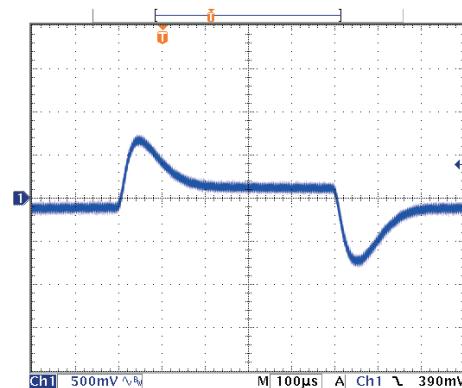
Derating Output Current versus Ambient Temperature and Airflow  
 With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

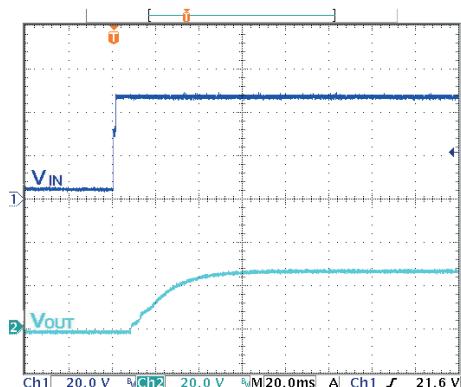
All test conditions are at 25°C. The figures are identical for PAE200-48S28W



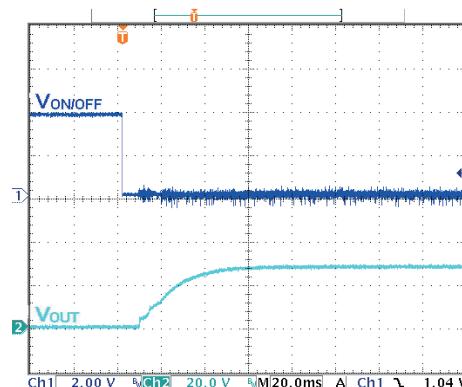
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



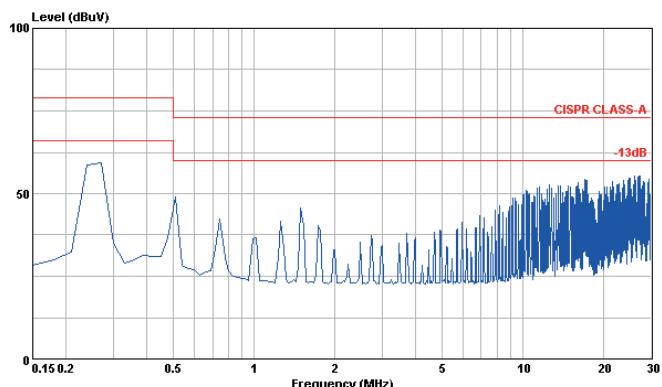
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



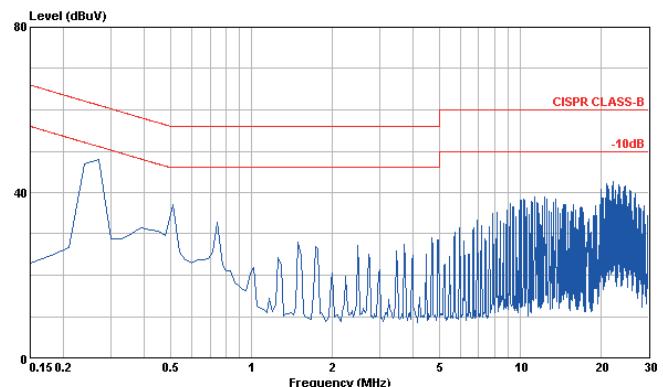
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

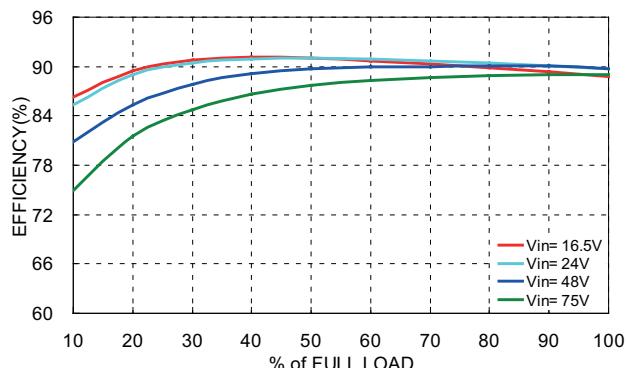
PAE200W Series

Up to 240W 4:1 Single Output

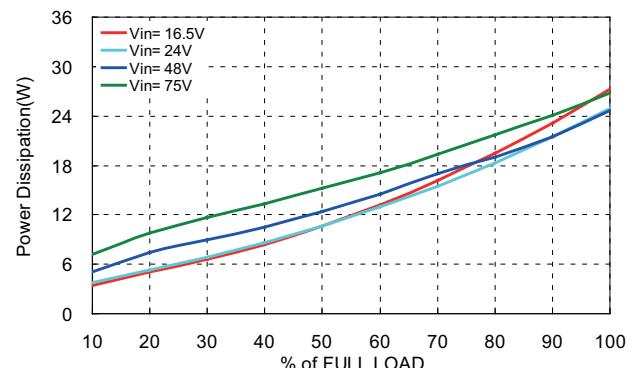
DC/DC Converter

Manual V1.0

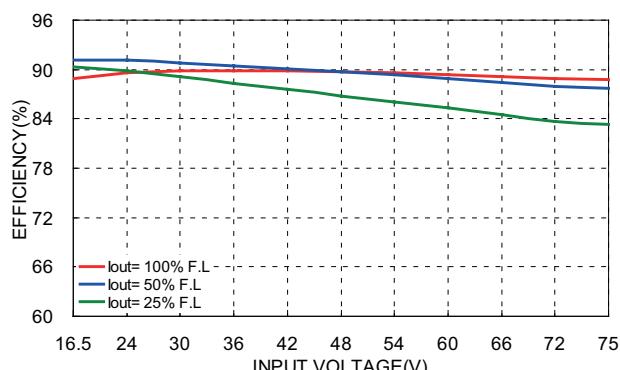
All test conditions are at 25°C. The figures are identical for PAE200-48S48W



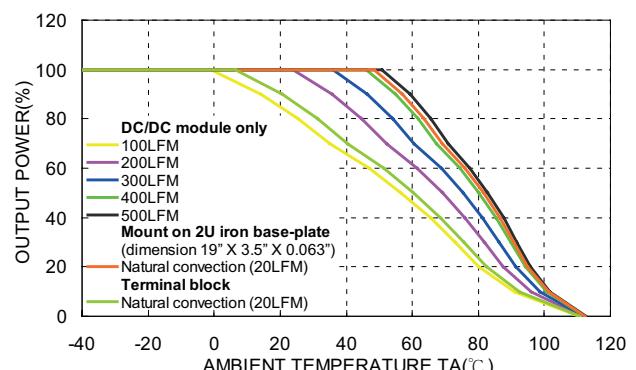
Efficiency versus Output Current



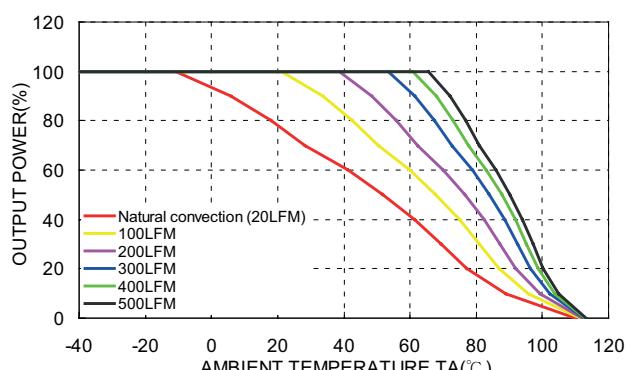
Power dissipation versus Output Current



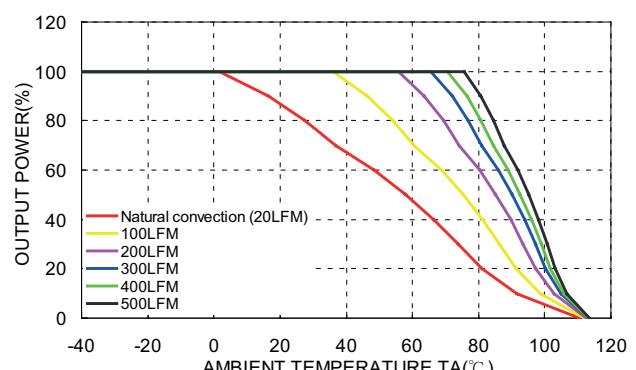
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



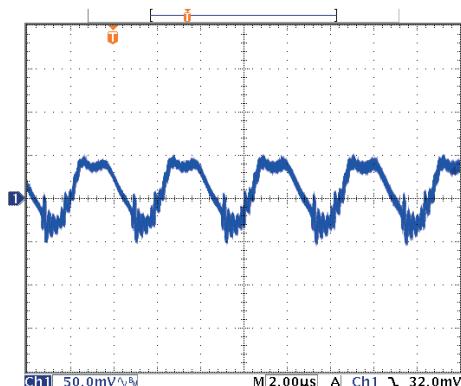
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



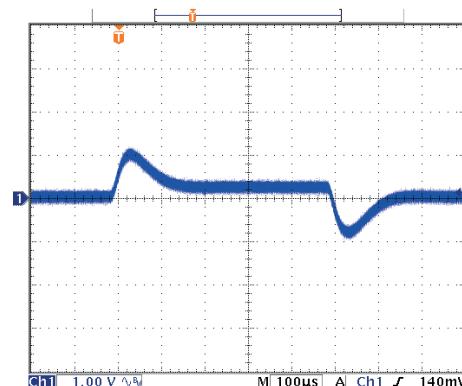
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

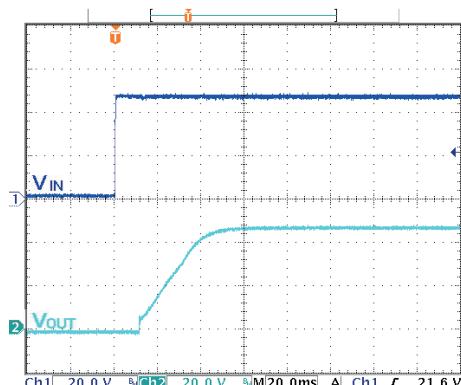
All test conditions are at 25°C. The figures are identical for PAE200-48S48W



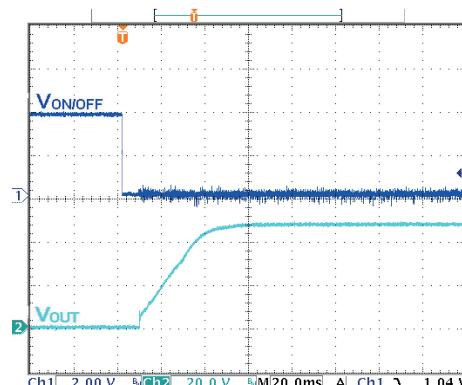
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



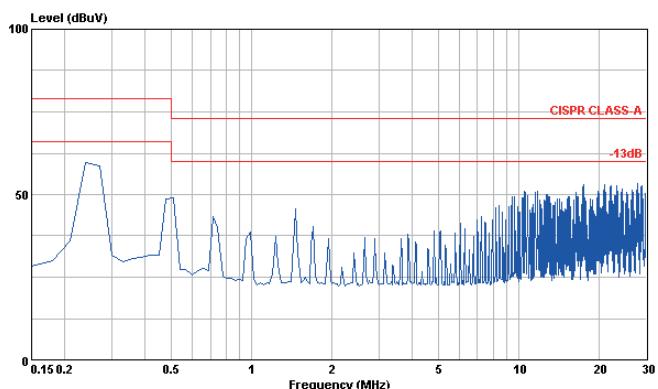
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



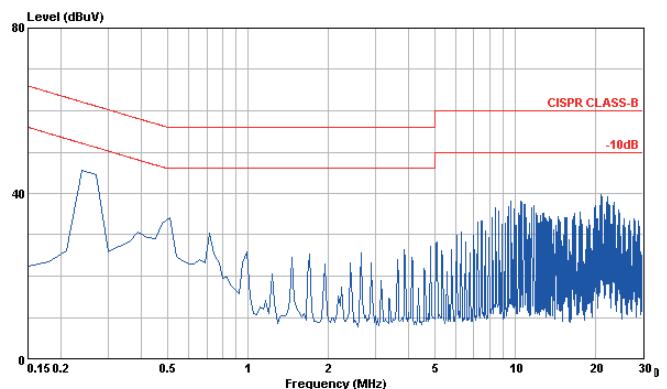
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

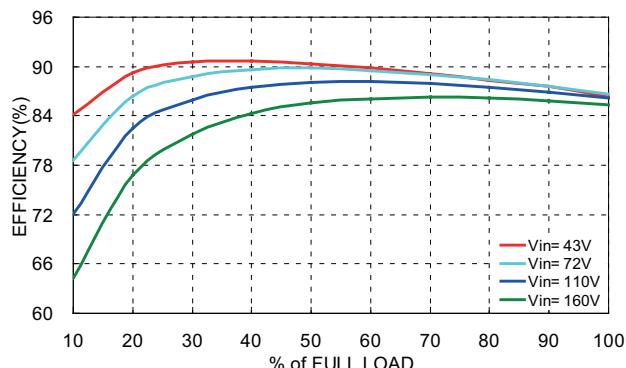
PAE200W Series

Up to 240W 4:1 Single Output

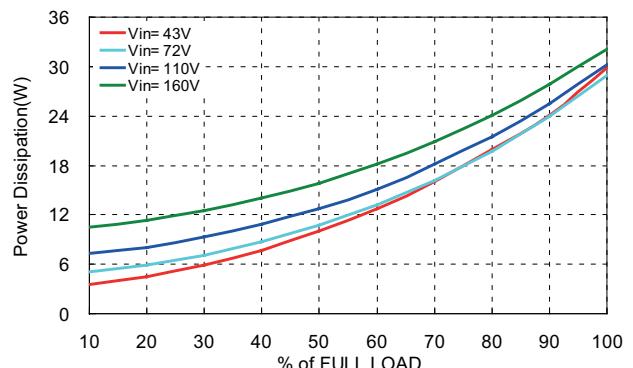
DC/DC Converter

Manual V1.0

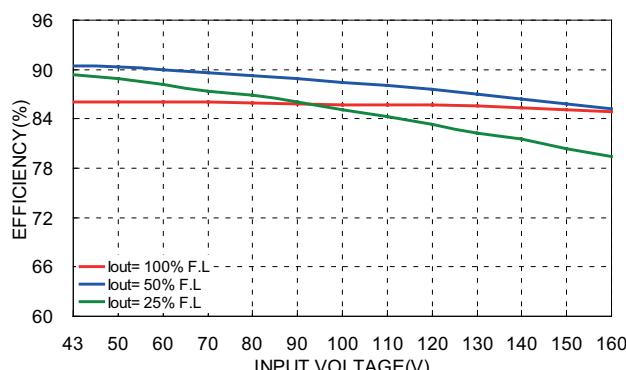
All test conditions are at 25°C. The figures are identical for PAE200-110S3P3W



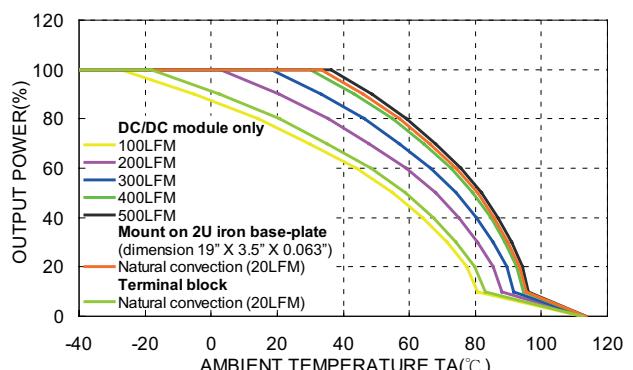
Efficiency versus Output Current



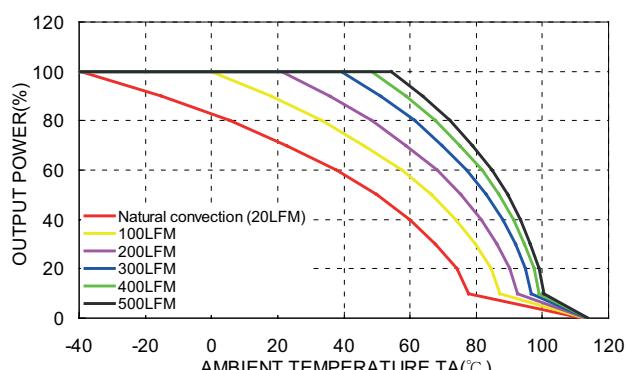
Power dissipation versus Output Current



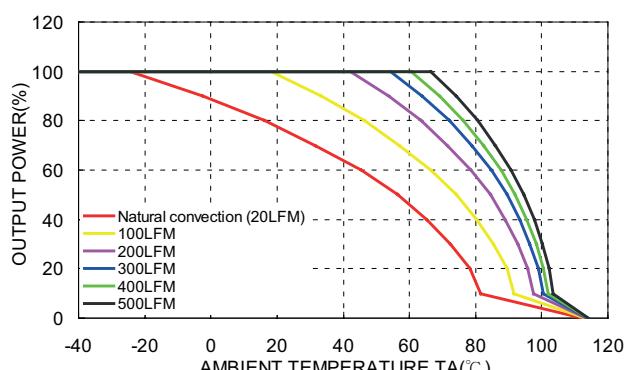
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



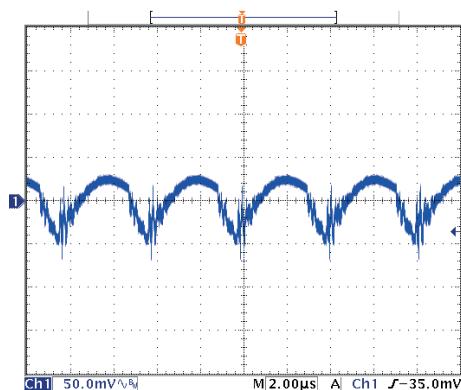
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



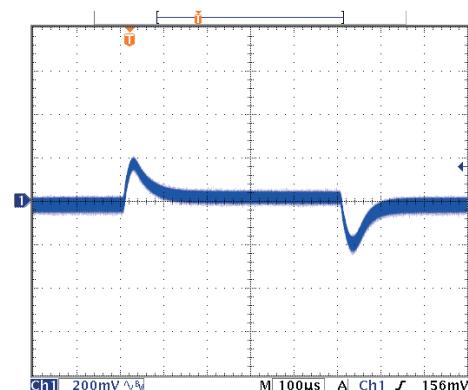
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

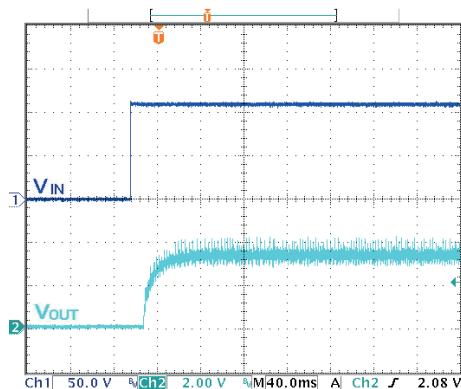
All test conditions are at 25°C. The figures are identical for PAE200-110S3P3W



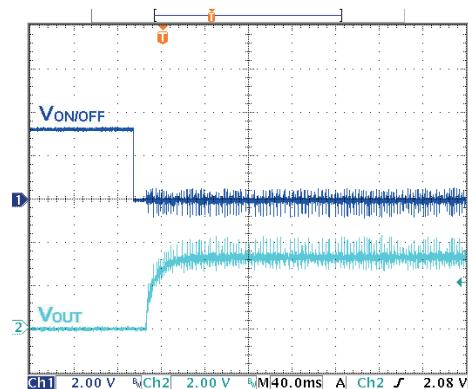
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



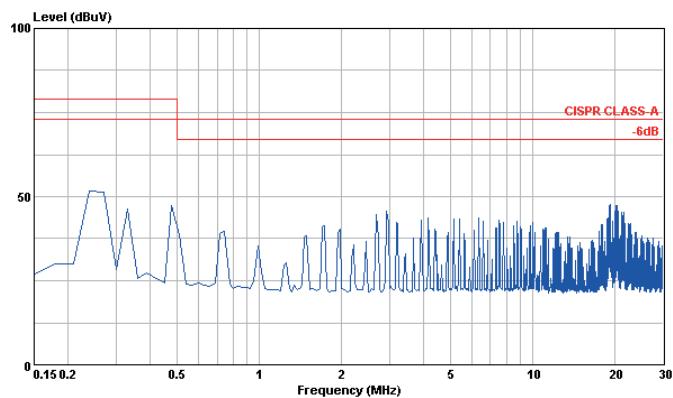
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



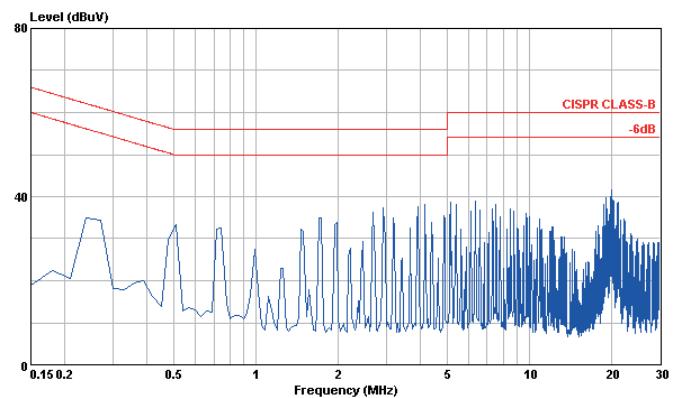
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

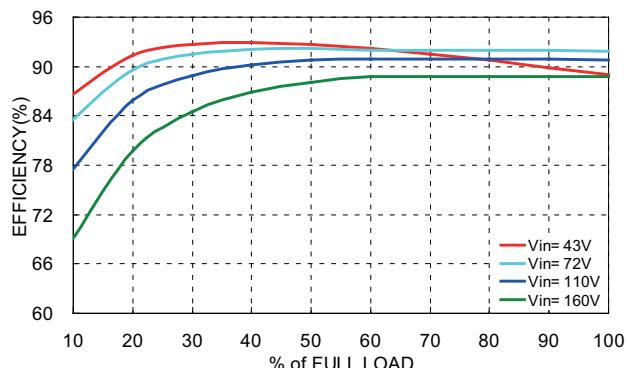
PAE200W Series

Up to 240W 4:1 Single Output

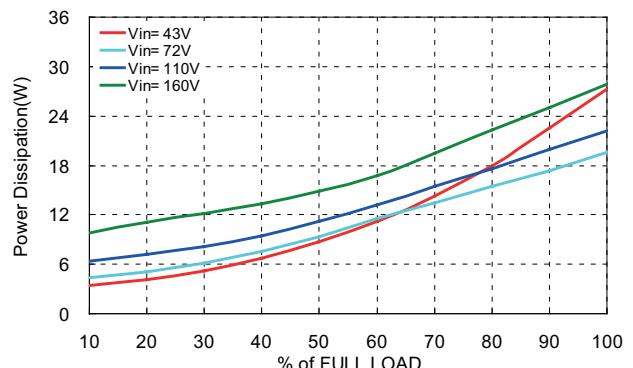
DC/DC Converter

Manual V1.0

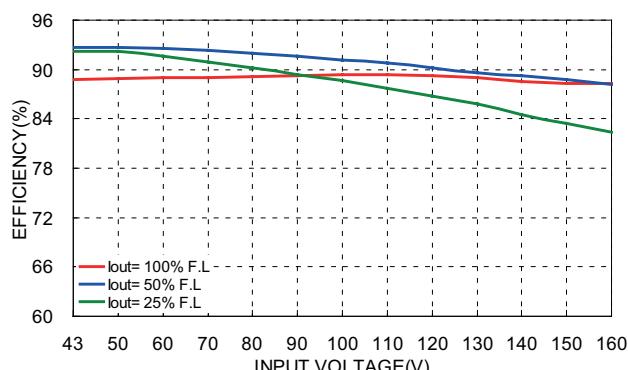
All test conditions are at 25°C. The figures are identical for PAE200-110S05W



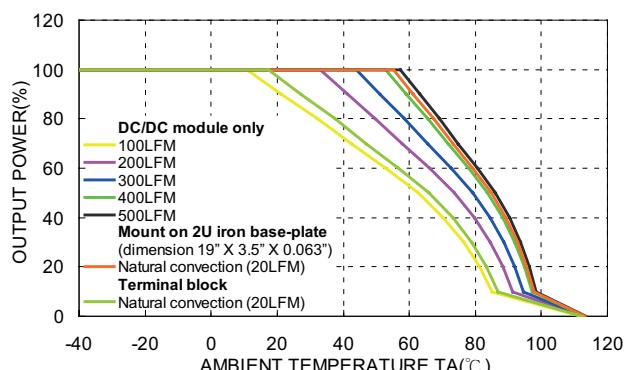
Efficiency versus Output Current



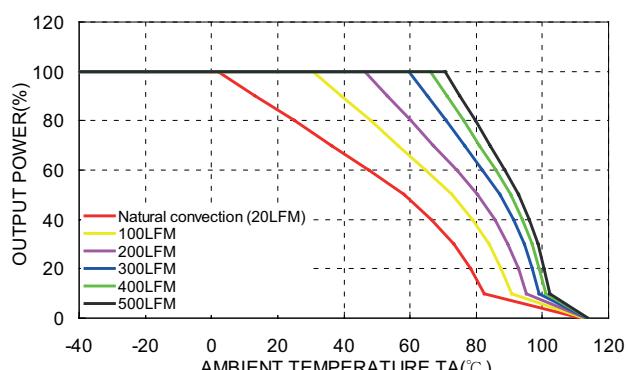
Power dissipation versus Output Current



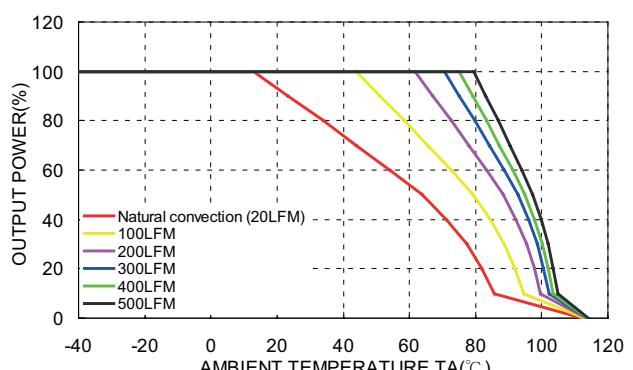
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



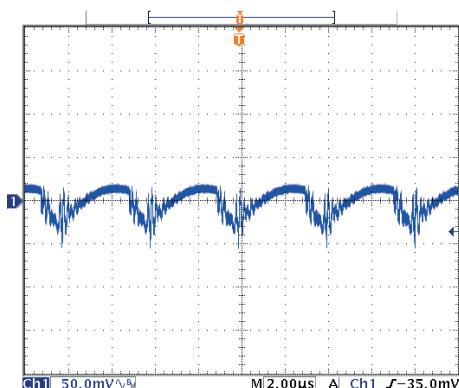
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



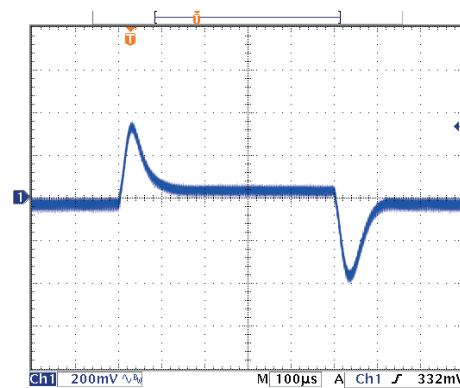
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

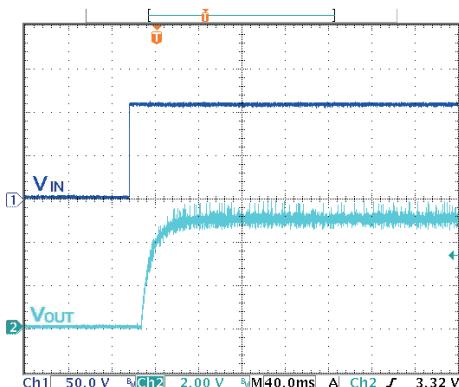
All test conditions are at 25°C. The figures are identical for PAE200-110S05W



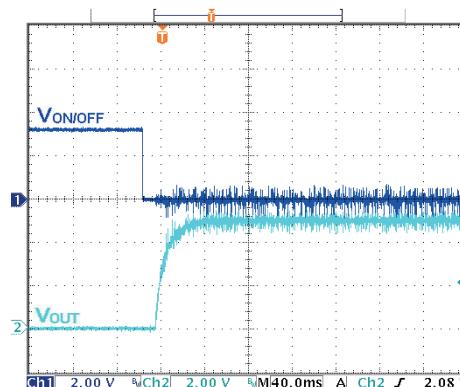
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



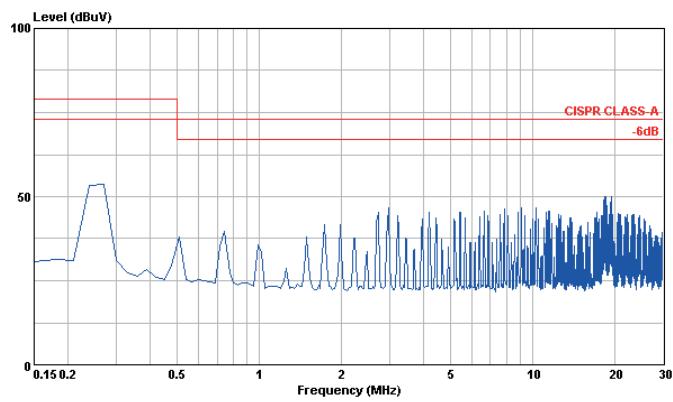
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



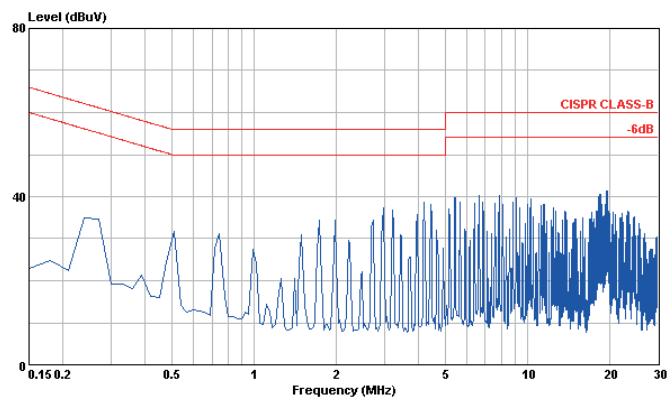
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

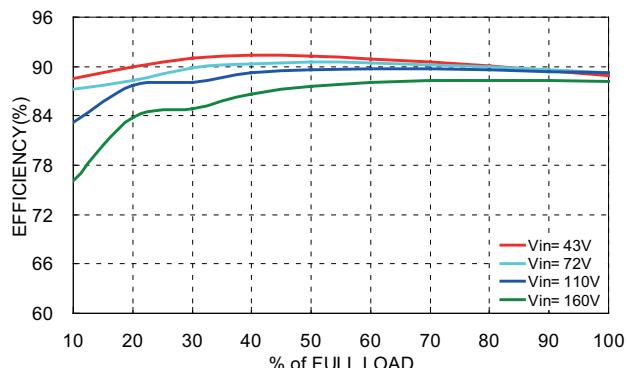
PAE200W Series

Up to 240W 4:1 Single Output

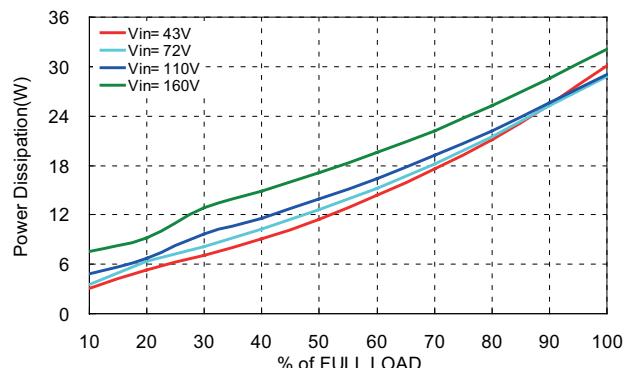
DC/DC Converter

Manual V1.0

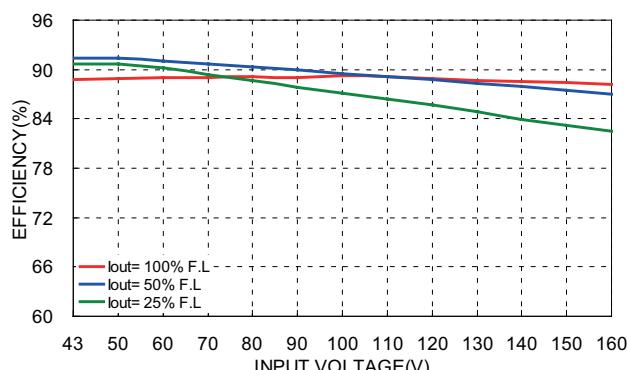
All test conditions are at 25°C. The figures are identical for PAE200-110S12W



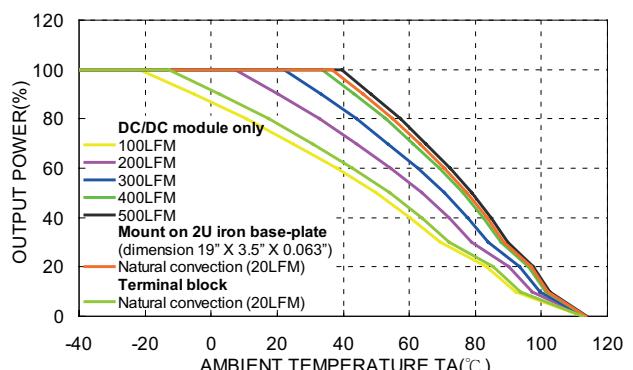
Efficiency versus Output Current



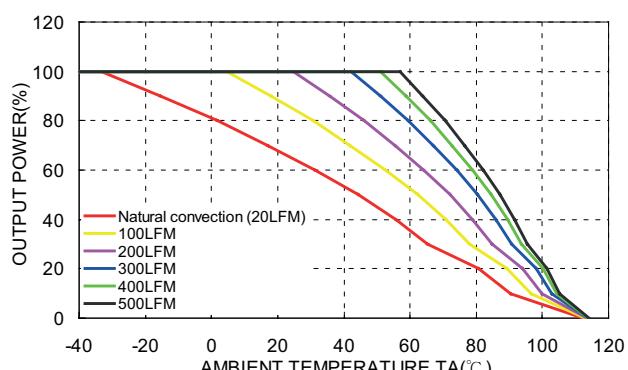
Power dissipation versus Output Current



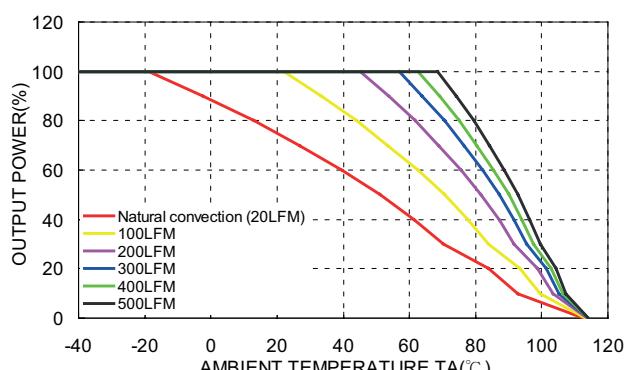
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



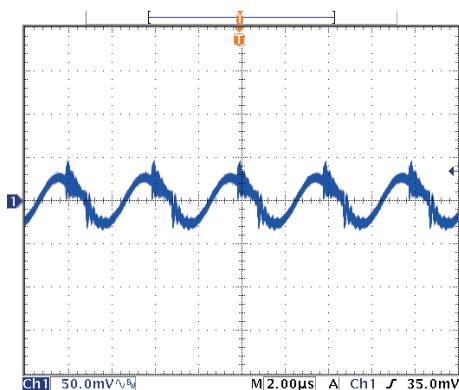
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



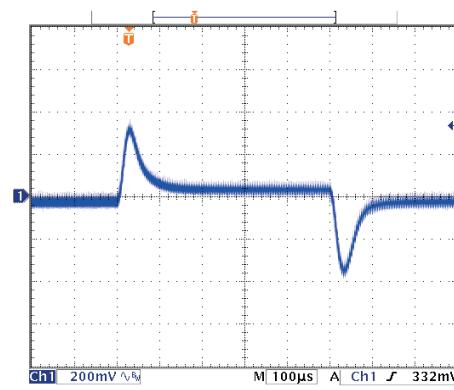
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

**POWERBOX Industrial Line**  
**PAE200W Series**  
**Up to 240W 4:1 Single Output**  
**DC/DC Converter**  
**Manual V1.0**

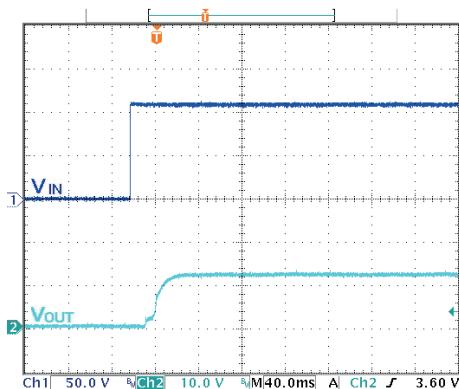
All test conditions are at 25°C. The figures are identical for PAE200-110S12W



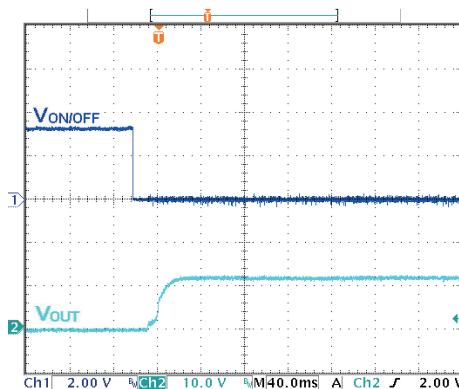
Typical Output Ripple and Noise.  
Vin(nom); Full Load



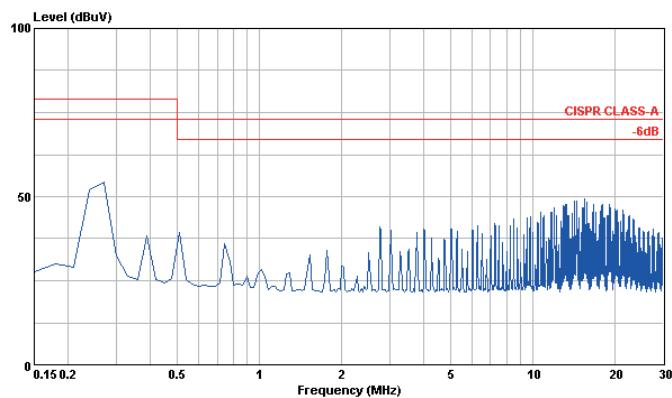
Transient Response to Dynamic Load Change from  
100% to 75% to 100% of Full Load; Vin(nom)



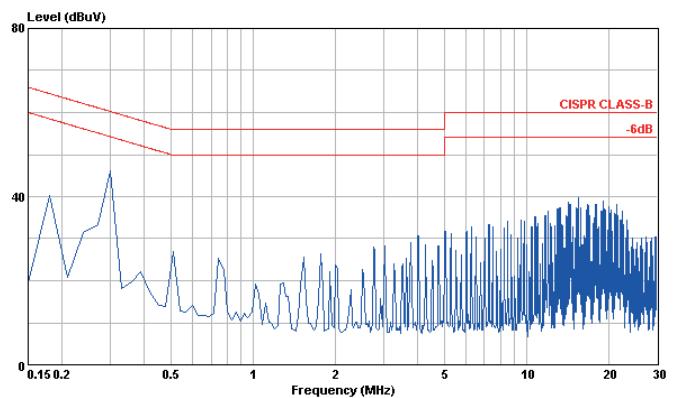
Typical Input Start-Up and Output Rise Characteristic  
Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
Vin(nom); Full Load

POWERBOX Industrial Line

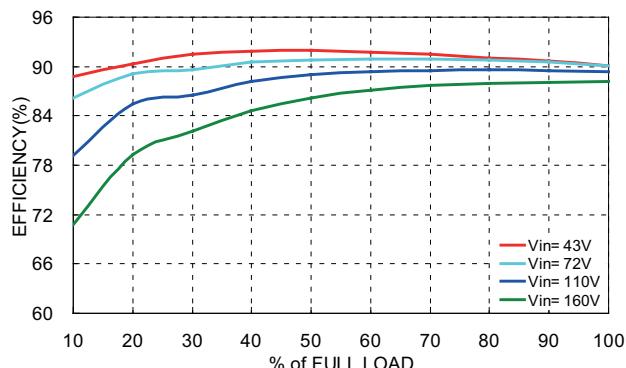
PAE200W Series

Up to 240W 4:1 Single Output

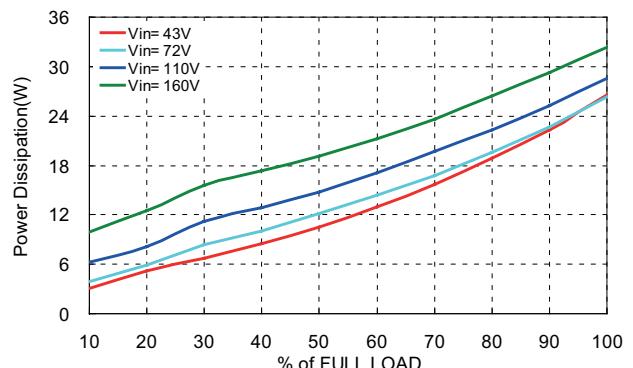
DC/DC Converter

Manual V1.0

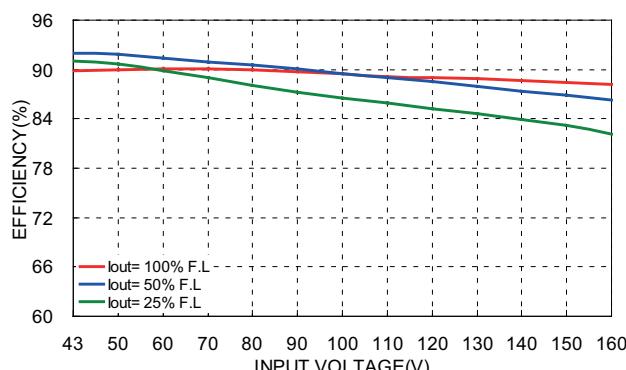
All test conditions are at 25°C. The figures are identical for PAE200-110S15W



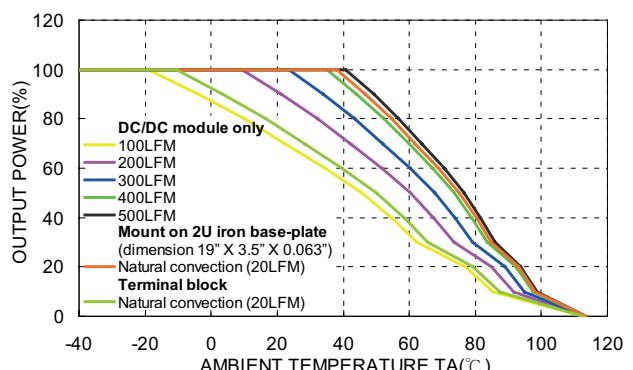
Efficiency versus Output Current



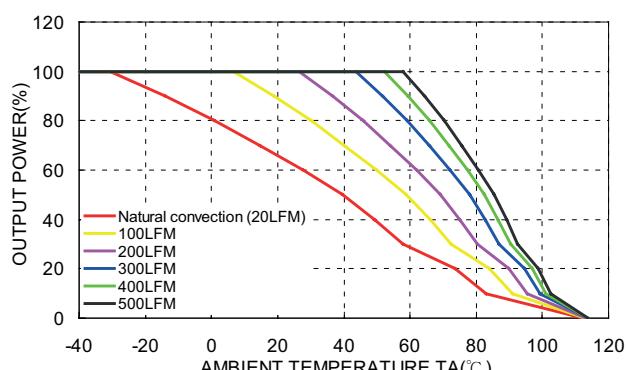
Power dissipation versus Output Current



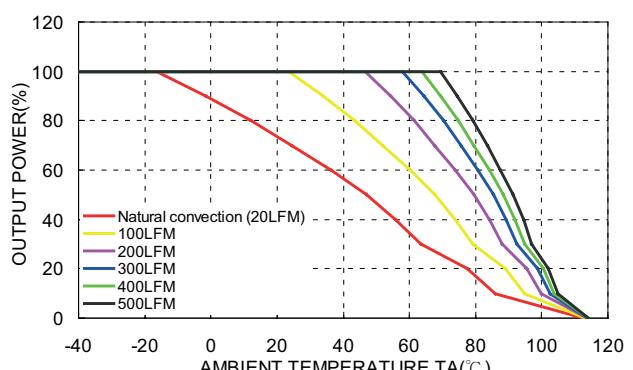
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



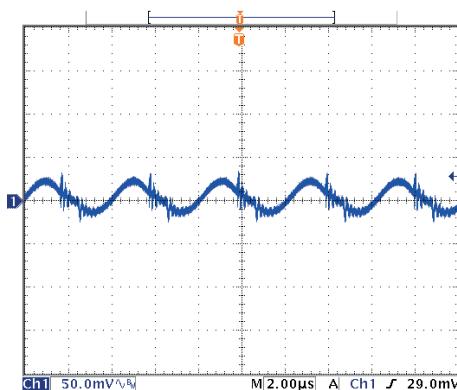
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



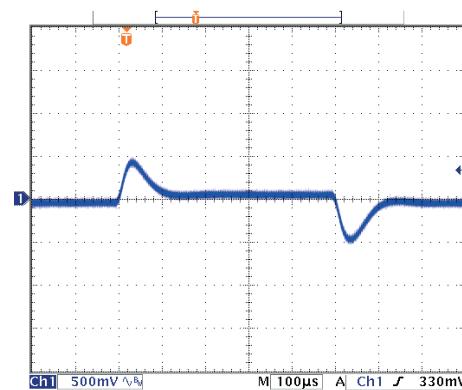
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
 Manual V1.0

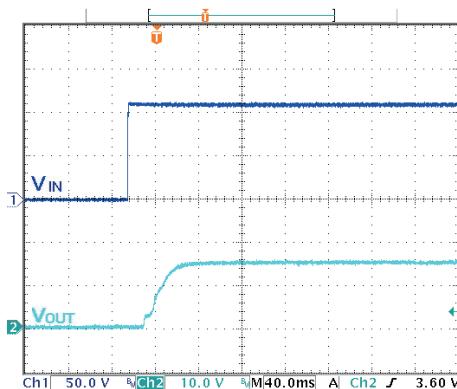
All test conditions are at 25°C. The figures are identical for PAE200-110S15W



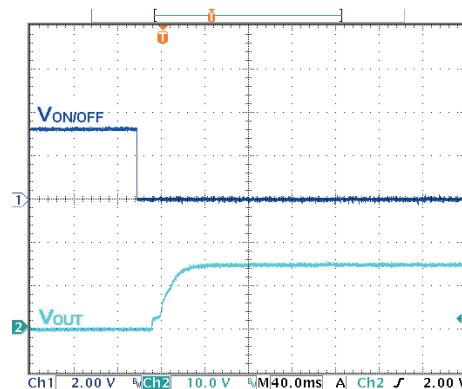
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



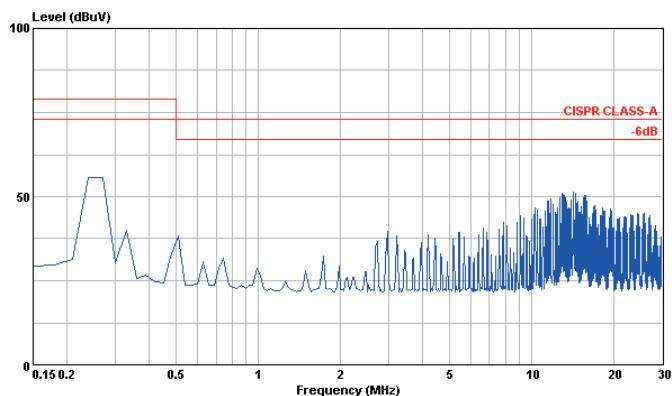
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



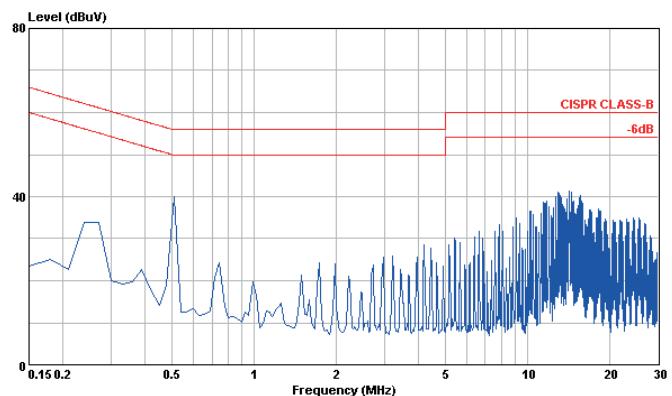
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

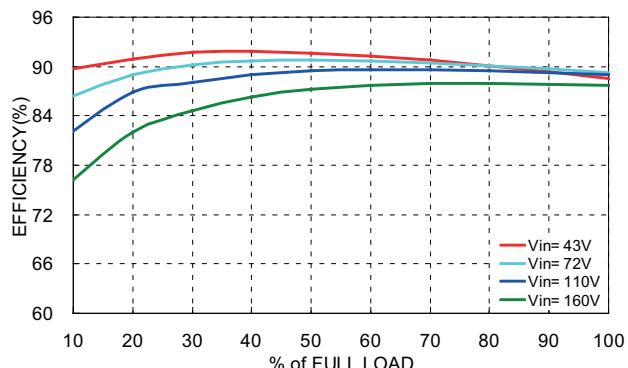
PAE200W Series

Up to 240W 4:1 Single Output

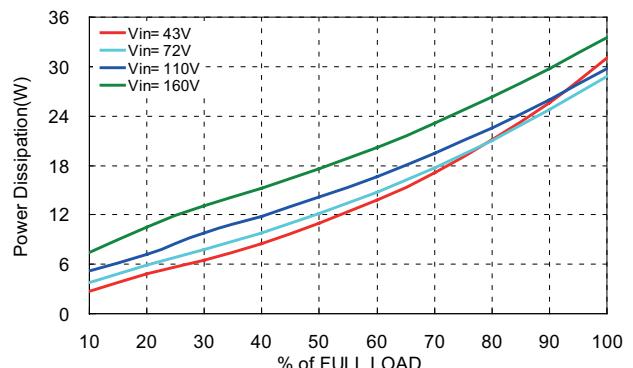
DC/DC Converter

Manual V1.0

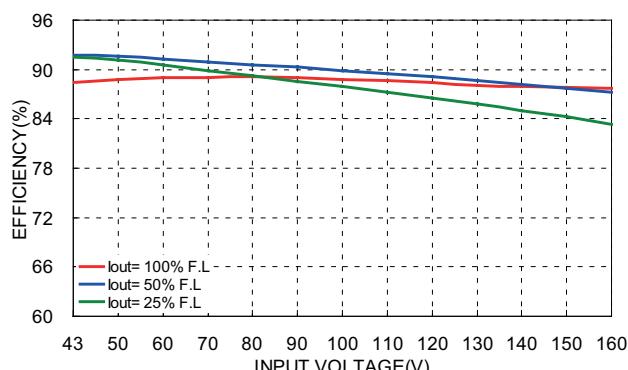
All test conditions are at 25°C. The figures are identical for PAE200-110S24W



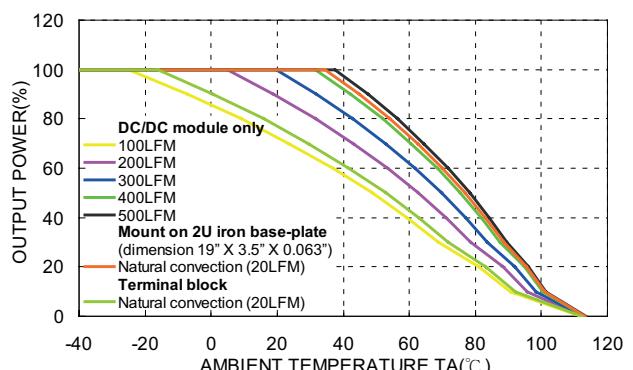
Efficiency versus Output Current



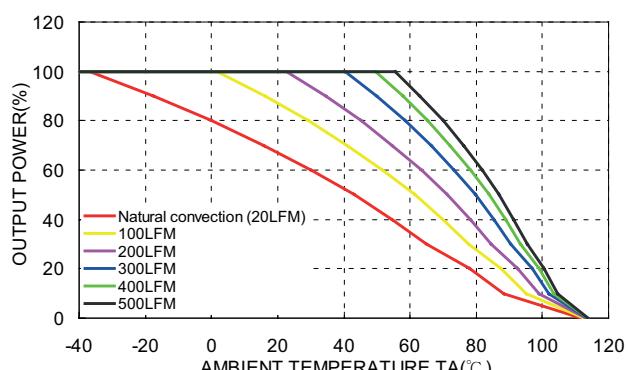
Power dissipation versus Output Current



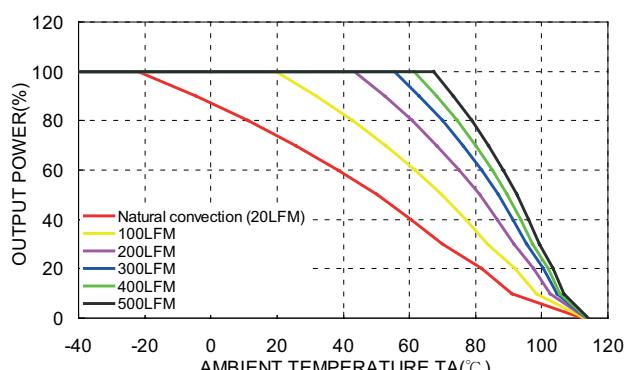
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



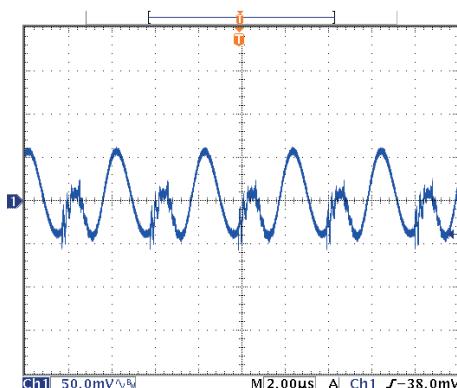
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



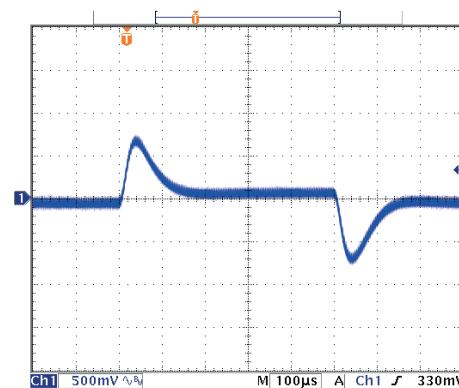
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
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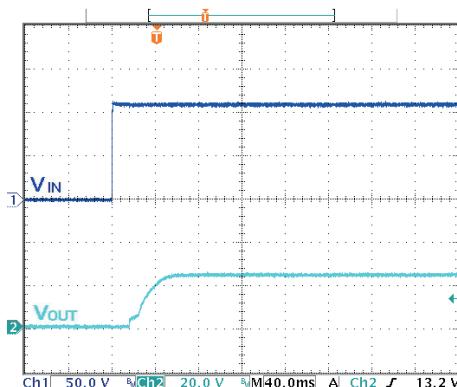
All test conditions are at 25°C. The figures are identical for PAE200-110S24W



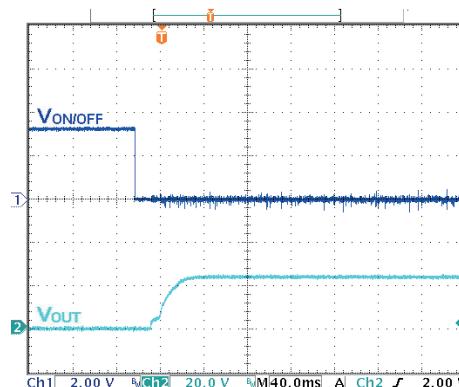
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



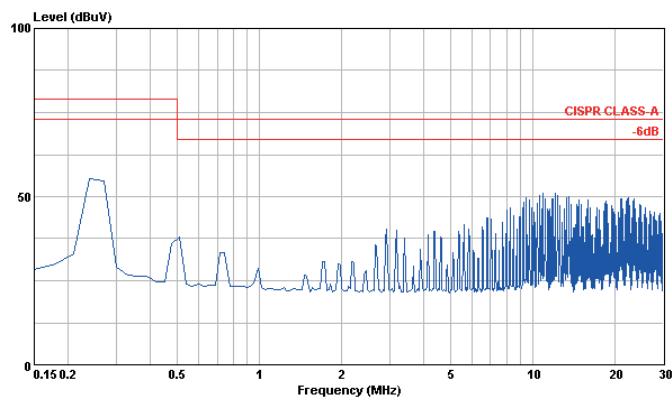
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



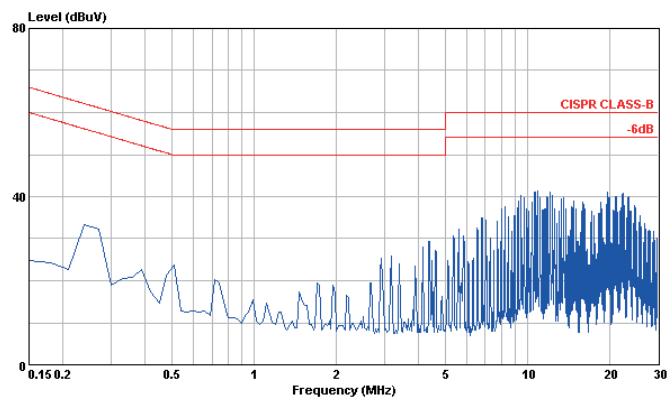
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

**POWERBOX Industrial Line**

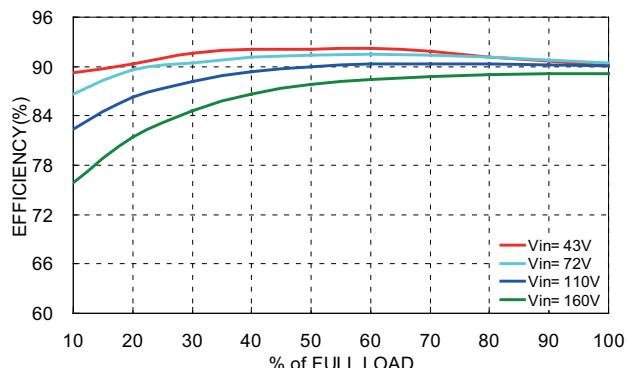
PAE200W Series

Up to 240W 4:1 Single Output

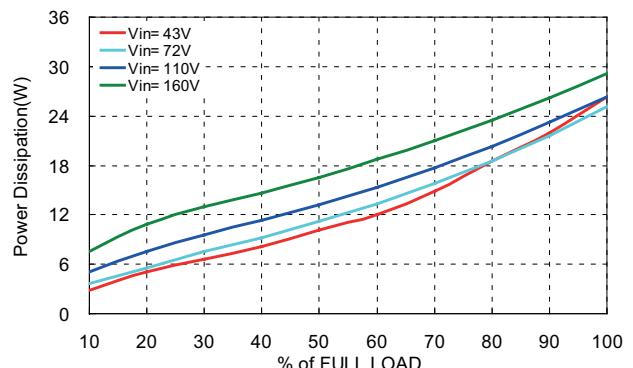
DC/DC Converter

Manual V1.0

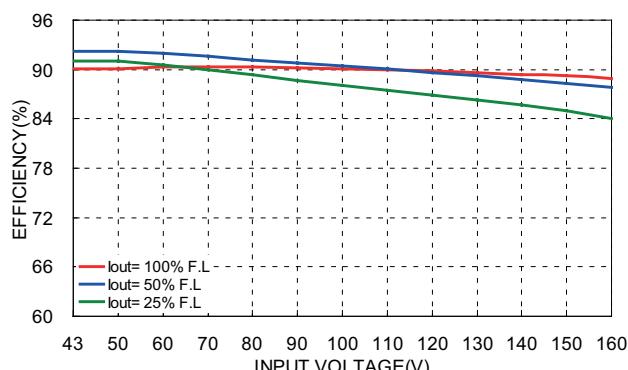
All test conditions are at 25°C. The figures are identical for PAE200-110S28W



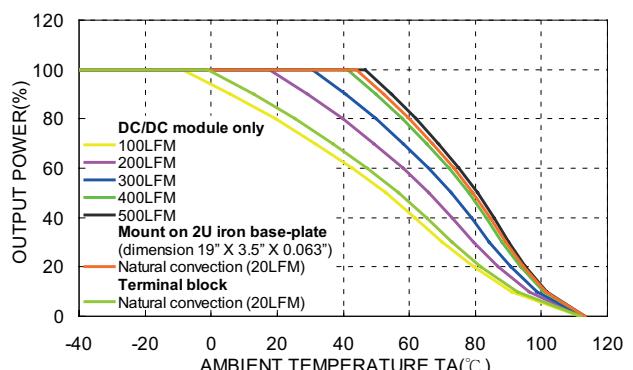
Efficiency versus Output Current



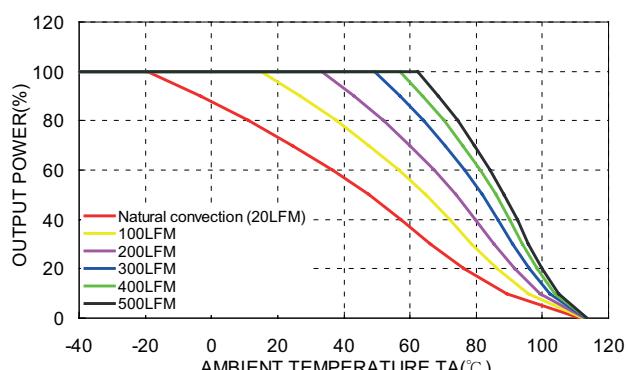
Power dissipation versus Output Current



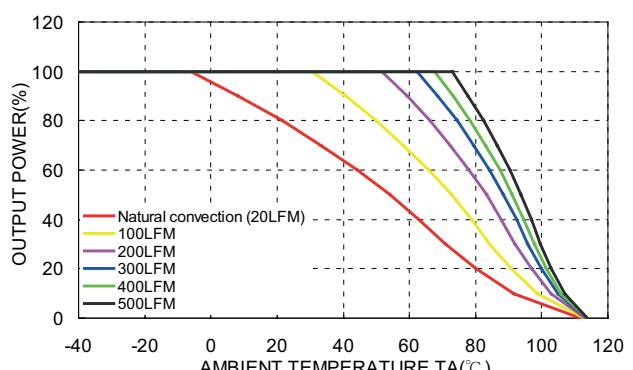
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



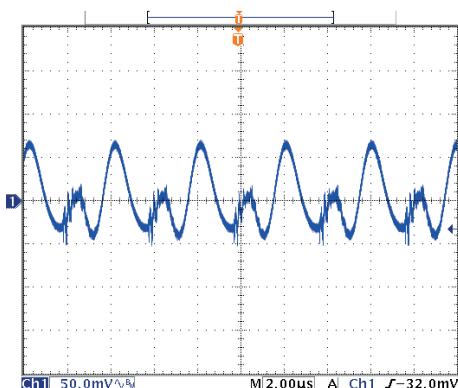
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



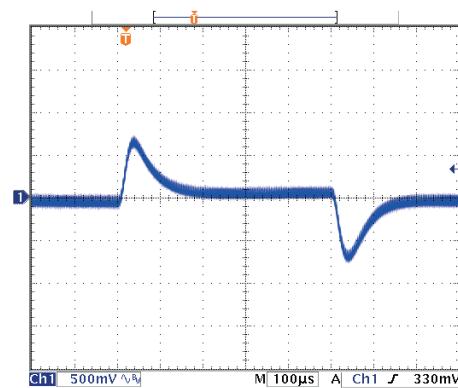
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
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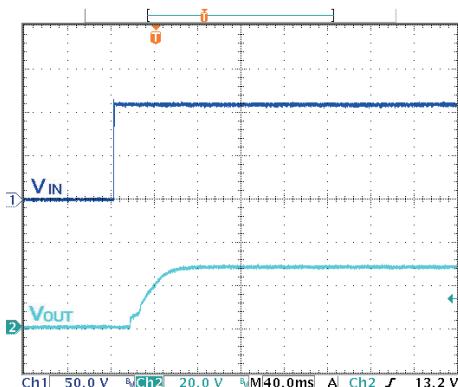
All test conditions are at 25°C. The figures are identical for PAE200-110S28W



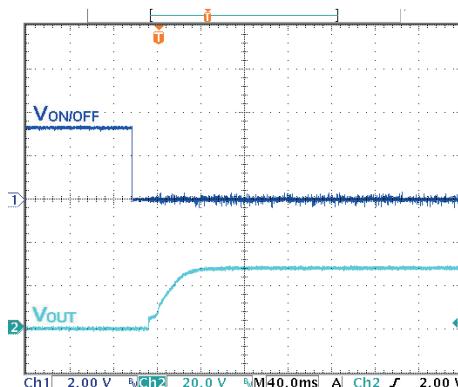
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



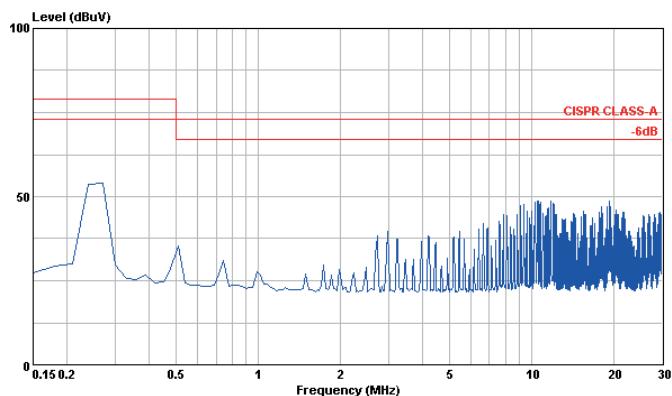
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



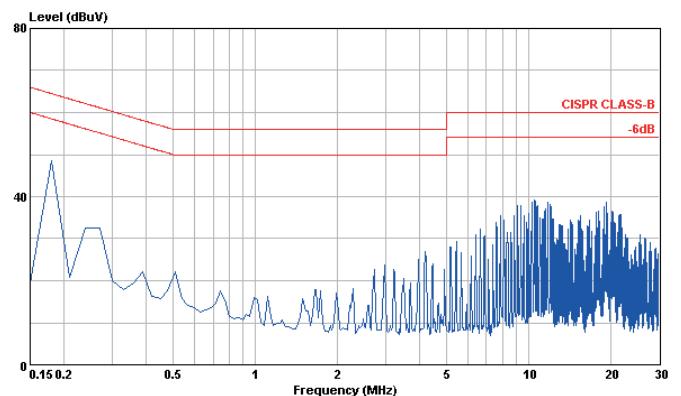
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load

POWERBOX Industrial Line

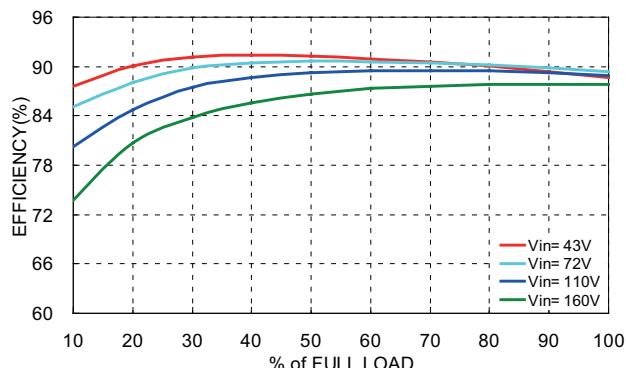
PAE200W Series

Up to 240W 4:1 Single Output

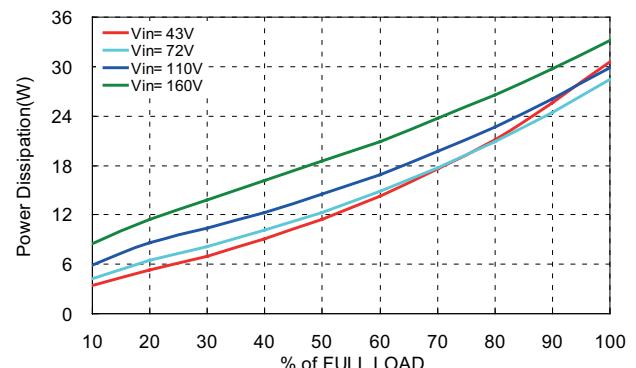
DC/DC Converter

Manual V1.0

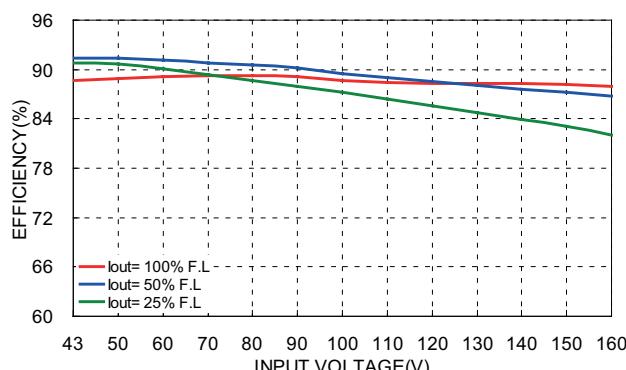
All test conditions are at 25°C. The figures are identical for PAE200-110S48W



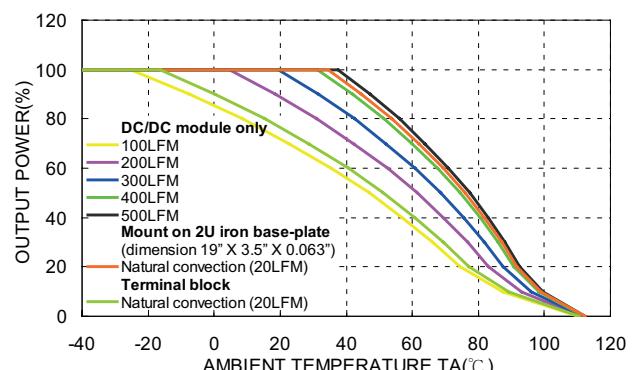
Efficiency versus Output Current



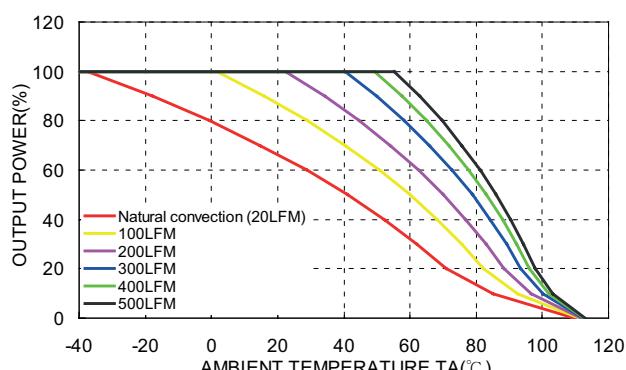
Power dissipation versus Output Current



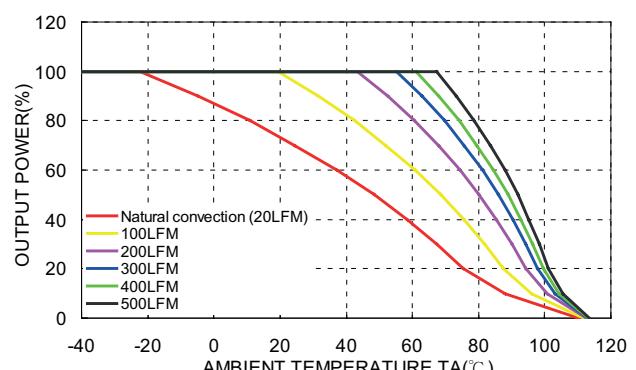
Efficiency versus Input Voltage  
Full Load



Derating Output Current versus Ambient Temperature and Airflow  
Vin(nom)



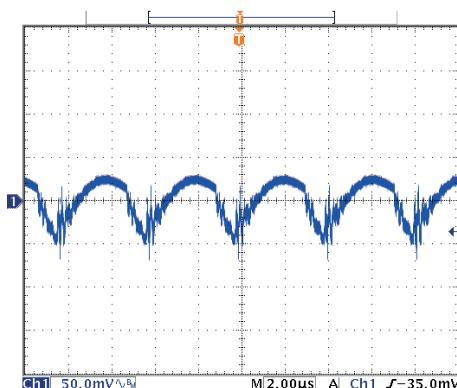
Derating Output Current versus Ambient Temperature and Airflow  
With 0.24" Heat-Sink , Vin(nom)



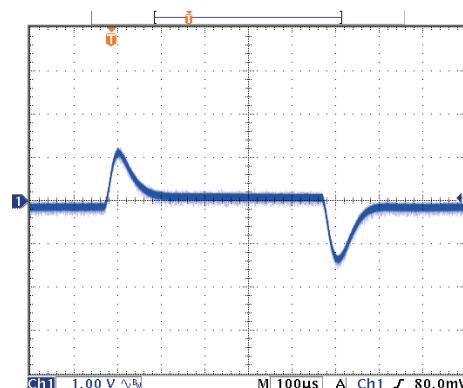
Derating Output Current versus Ambient Temperature and Airflow  
With 0.45" Heat-Sink , Vin(nom)

POWERBOX Industrial Line  
 PAE200W Series  
 Up to 240W 4:1 Single Output  
 DC/DC Converter  
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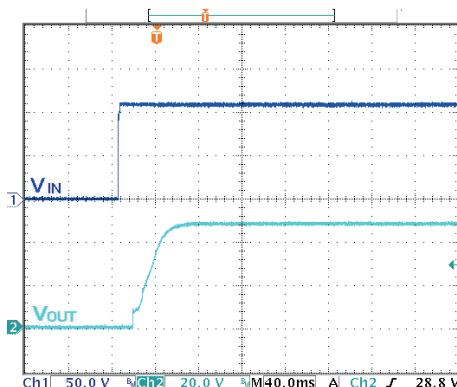
All test conditions are at 25°C. The figures are identical for PAE200-110S48W



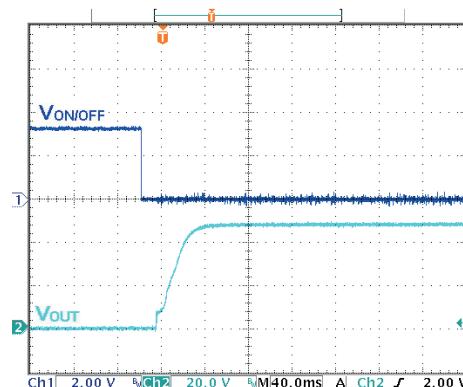
Typical Output Ripple and Noise.  
 Vin(nom); Full Load



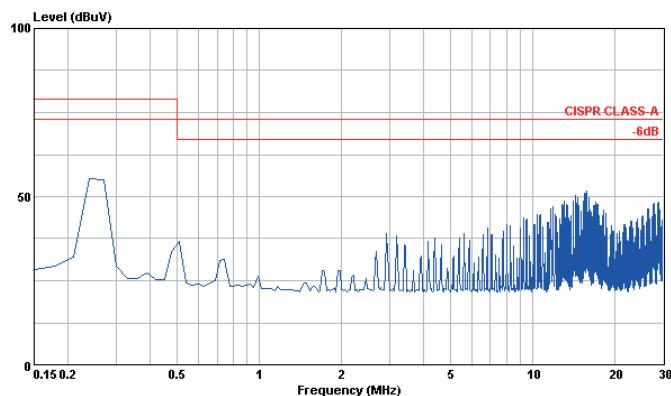
Transient Response to Dynamic Load Change from  
 100% to 75% to 100% of Full Load; Vin(nom)



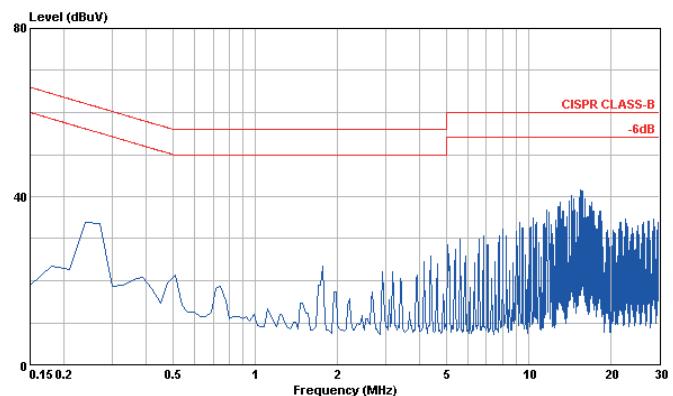
Typical Input Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Using ON/OFF Voltage Start-Up and Output Rise Characteristic  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class A  
 Vin(nom); Full Load



Conduction Emission of EN55022 Class B  
 Vin(nom); Full Load