PXE30-xxWSxx Single Output DC/DC Converters

10 to 40 Vdc or 18 to 75 Vdc input, 1.5 to 15 Vdc Single Output, 30W

TDK·Lambda

Features

- 30 WATTS MAXIMUM OUTPUT POWER
- OUTPUT CURRENT UP TO 8A
- STANDARD 2" X 1.6" X 0.4" PACKAGE
- HIGH EFFICIENCY UP TO 88%
- 4:1 WIDE INPUT VOLTAGE RANGE
- SIX-SIDED CONTINUOUS SHIELD
- FIXED SWITCHING FREQUENCY
- CE MARK MEETS 2006/95/EC, 93/68/EEC AND 2004/108/EC
- UL60950-1, EN60950-1 AND IEC60950-1 LICENSED
- ISO9001 CERTIFIED MANUFACTURING FACILITIES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC

Options

- Negative logic Remote On/Off

APPLICATIONS

Wireless Network
Telecom/Datacom
Industry Control System
Measurement
Semiconductor Equipment

General Description

The PXE30-xxWSxx series offers 30 watts of output power from a 2 x 1.6 x 0.4 inch package .It has a 4:1 wide input voltage of 10-40VDC or 18-75VDC and features 1600VDC of isolation, short-circuit and over-voltage protection.

Table of Contents

Absolute Maximum Rating				
Parameter	**Model**	**Min**	**Max**	**Unit**
Input Voltage Continuous Transient (100ms)	 24WSxx 48WSxx 24WSxx 48WSxx		 40 75 50 100	Vdc
Input Voltage Variation (complies with EST300 132 part 4.4)	All		5	V/ms
Operating Ambient Temperature (with derating)	All	-40	85	°C
Operating Case Temperature	All		100	°C
Storage Temperature	All	-55	105	°C

Output Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Output Voltage (Vin = Vin(nom) ; Full Load ; TA=25°C)	xxWS1P5 xxWS1P8 xxWS2P5 xxWS3P3 xxWS05 xxWS12 xxWS15	1.485 1.782 2.475 3.267 4.95 11.88 14.85	1.5 1.8 2.5 3.3 5 12 15	1.515 1.818 2.525 3.333 5.05 12.12 15.15	Vdc
Voltage Adjustability	All	-10		+10	%
Output Regulation Line (Vin(min) to Vin(max) at Full Load) Load (Min. to 100% of Full Load)	All	 -0.5 -0.5		 +0.5 +0.5	%
Output Ripple & Noise Peak-to-Peak (20MHz bandwidth) (Measured with a 0.1μF/50V MLCC)	xxWS1P5 xxWS1P8 xxWS2P5 xxWS3P3 xxWS05 xxWS12 xxWS15		60 60 60 60 75 100 100		mVp-p
Temperature Coefficient	All	-0.02		+0.02	%/°C
Output Voltage Overshoot (Vin(min) to Vin(max) ; Full Load ; T_A=25°C)	All		0	5	% Vo
Dynamic Load Response (Vin = Vin(nom) ; T_A=25°C) Load step change from 75% to 100% or 100 to 75% of Full Load Peak Deviation Setting Time (V_{OUT}-10% peak deviation)	 All All		 250 250		 mV μS
Output Current	xxWS1P5 xxWS1P8 xxWS2P5 xxWS3P3 xxWS05 xxWS12 xxWS15	0 0 0 0 0 0 0		8000 8000 8000 6000 6000 2500 2000	mA

Output Specification(Continued)					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Output Over Voltage Protection (Zener diode clamp)	xxWS1P5 xxWS1P8 xxWS2P5 xxWS3P3 xxWS05 xxWS12 xxWS15		3.9 3.9 3.9 3.9 6.2 15 18		Vdc
Output Over Current Protection	All			150	% FL.
Output Short Circuit Protection	All	Hiccup, automatics recovery			

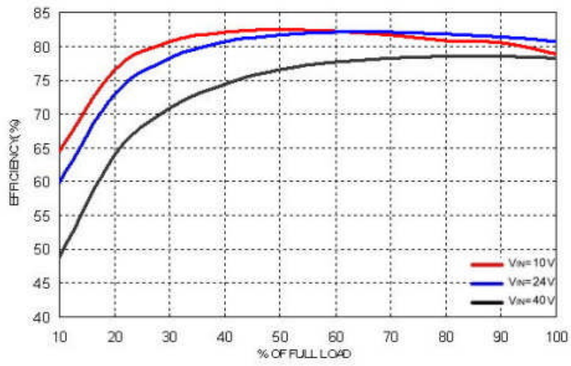
Input Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Operating Input Voltage	24WSxx 48WSxx	10 18	24 48	40 75	Vdc
Input Current (Maximum value at Vin = Vin(nom); Full Load)	24WS1P5 24WS1P8 24WS2P5 24WS3P3 24WS05 24WS12 24WS15 48WS1P5 48WS1P8 48WS2P5 48WS3P3 48WS05 48WS12 48WS15			658 759 1029 994 1506 1506 1488 329 380 508 497 744 753 744	mA
Input Standby Current (Typical value at Vin = Vin(nom); No Load)	24WS1P5 24WS1P8 24WS2P5 24WS3P3 24WS05 24WS12 24WS15 48WS1P5 48WS1P8 48WS2P5 48SW3P3 48WS05 48WS12 48WS15		35 35 40 50 65 65 70 20 20 25 30 30 35 45		mA
Under Voltage Lockout Turn-on Threshold	24WSxx 48WSxx			10 18	Vdc

Input Specification(Continued)					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Under Voltage Lockout Turn-off Threshold	24WSxx 48WSxx		8 16		Vdc
Input Reflected Ripple Current (5 to 20MHz, 12μH Source Impedance)	All		20		mAp-p
Start Up Time (Vin = Vin(nom) and Constant Resistive Load) Power Up Remote ON/OFF	All		10 10		mS
Remote ON/OFF Control (The ON/OFF pin voltage is referenced to $-V_{IN}$) Positive Logic DC-DC ON(Open) DC-DC OFF(Short) Negative Logic DC-DC ON(Short) DC-DC OFF(Open)	All	3 0 0 3		12 1.2 1.2 12	Vdc
Remote Off Input Current	All		3		mA
Input Current of Remote Control Pin	All	-0.5		0.5	mA

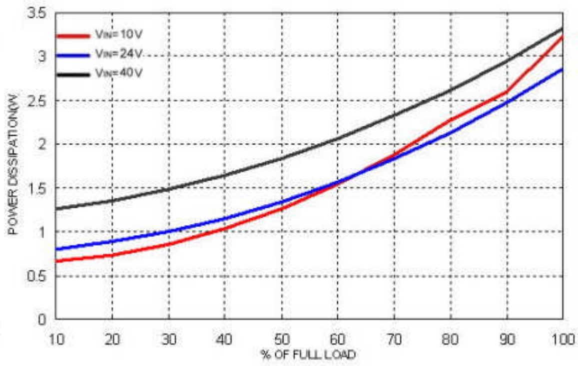
General Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Efficiency (Vin = Vin(nom) ; Full Load ; TA=25°C)	24WS1P5 24WS1P8 24WS2P5 24WS3P3 24WS05 24WS12 24WS15 48WS1P5 48WS1P8 48WS2P5 48WS3P3 48WS05 48WS12 48WS15		80 83 85 87 87 87 88 80 83 86 87 88 87 88		%
Isolation Voltage Input to Output Input to Case, Output to Case	All	1600 1600			Vdc
Isolation Resistance	All	1			GΩ
Isolation Capacitance	All			1000	pF
Switching Frequency	All		300		KHz
Weight	All		48		g
MTBF Bellcore TR-NWT-000332, TC=40°C MIL-HDBK-217F	All		1.315×10^6 3.456×10^5		hours
Over Temperature Protection	All		115		°C

Characteristic Curves

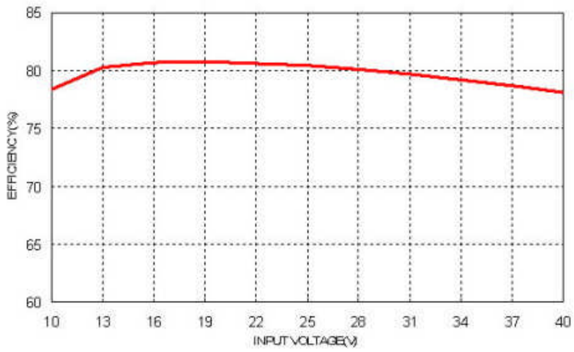
All test conditions are at 25°C.The figures are for PXE30-24WS1P5



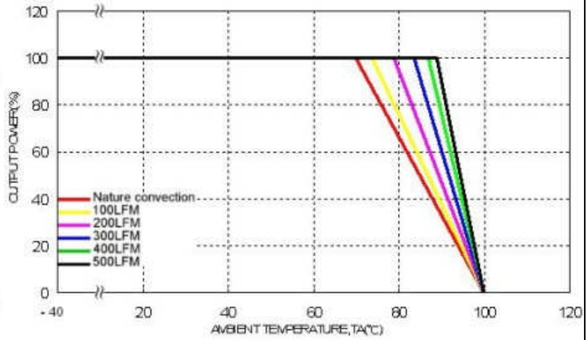
Efficiency Versus Output Current



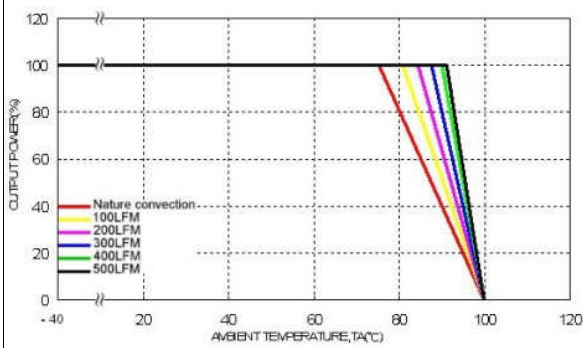
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



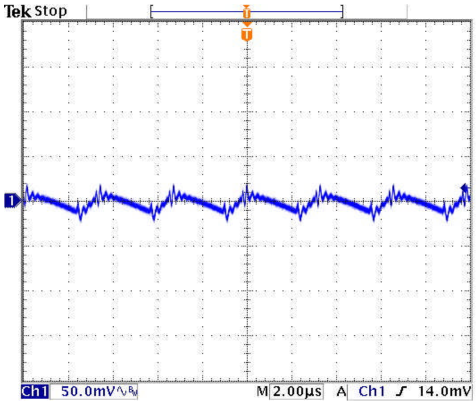
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

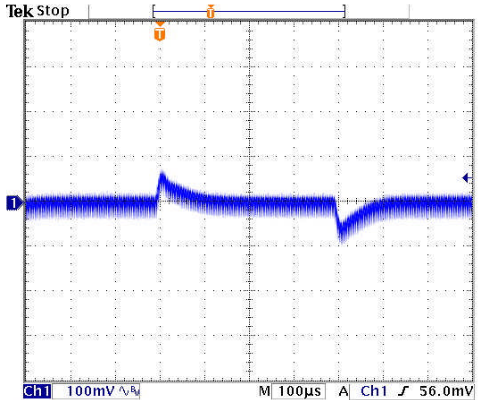
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-24WS1P5



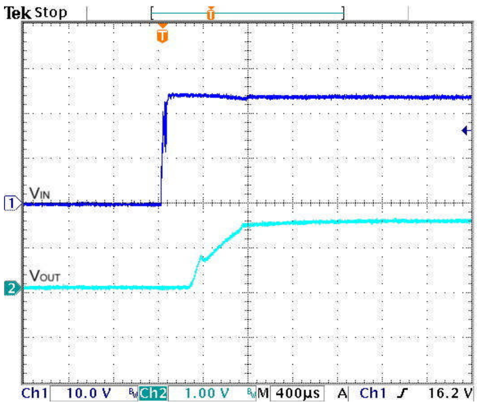
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



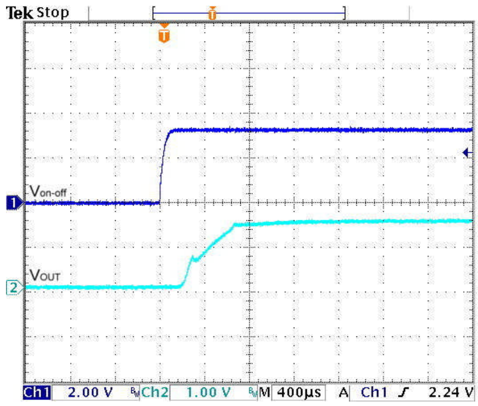
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



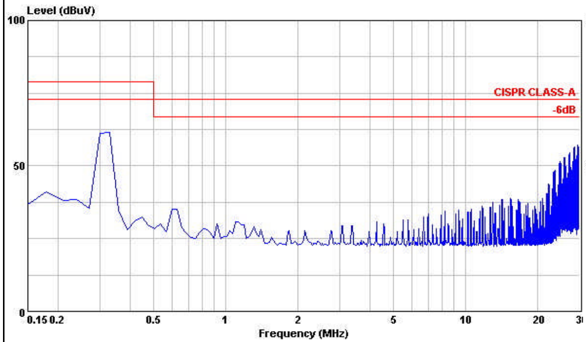
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



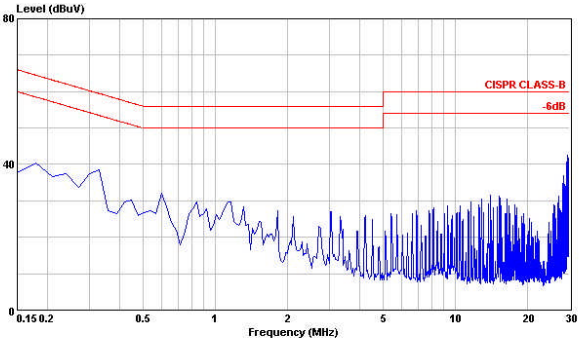
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

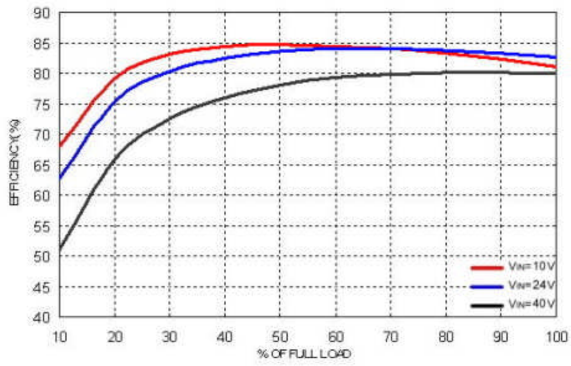


Conduction Emission of EN55022 Class B

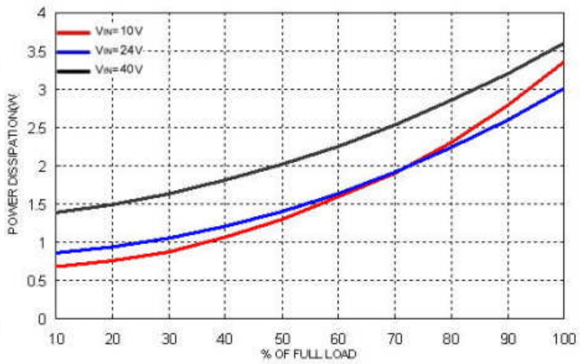
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

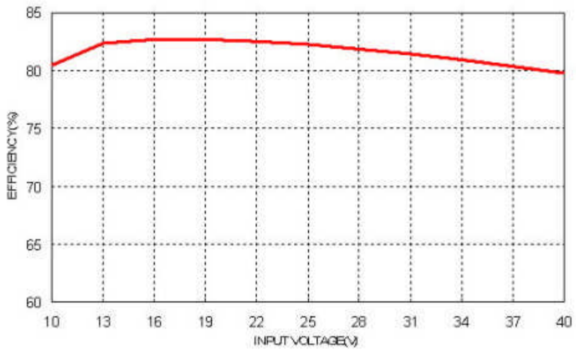
All test conditions are at 25°C.The figures are for PXE30-24WS1P8



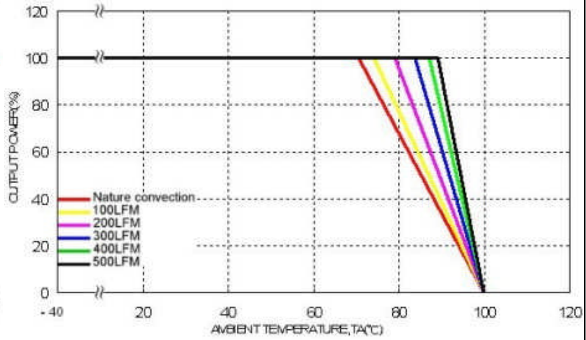
Efficiency Versus Output Current



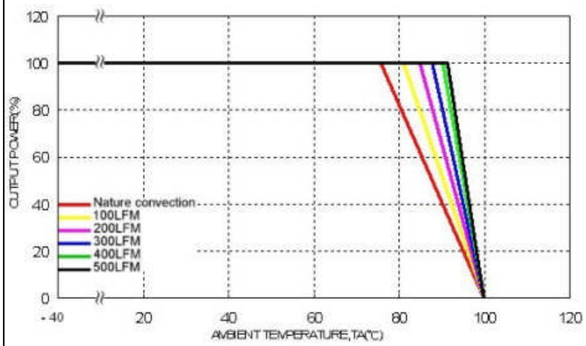
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



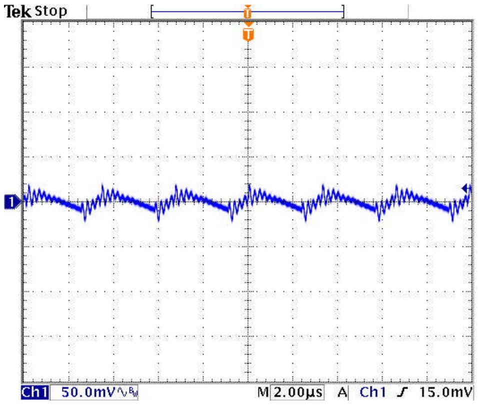
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

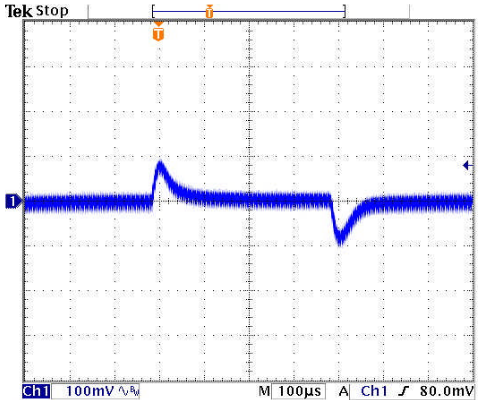
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-24WS1P8



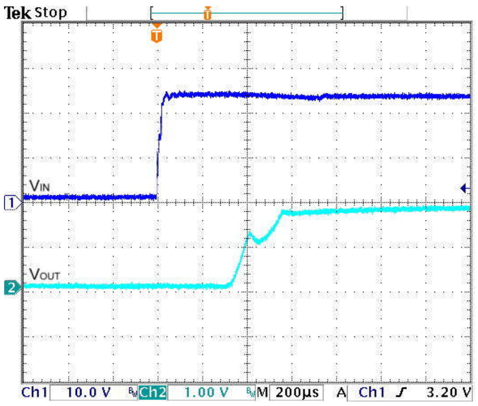
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



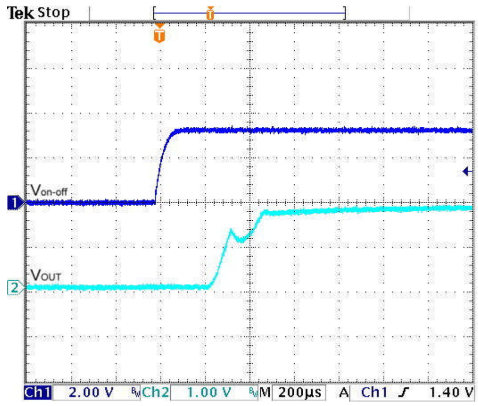
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



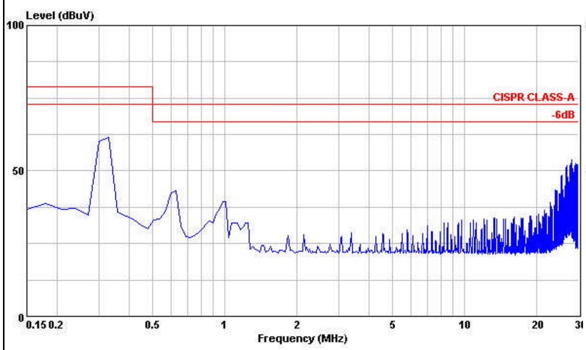
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



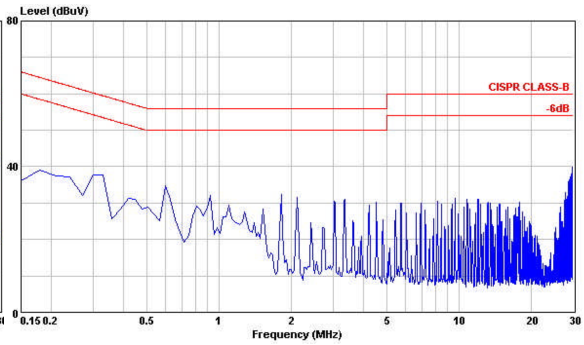
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

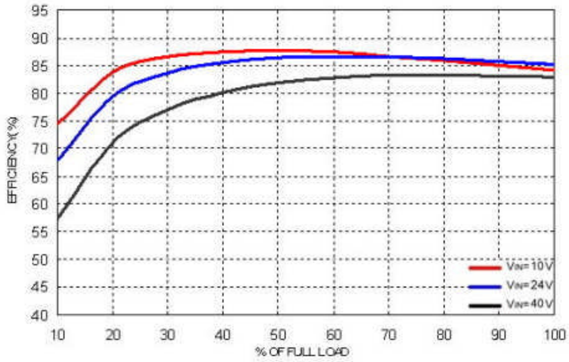


Conduction Emission of EN55022 Class B

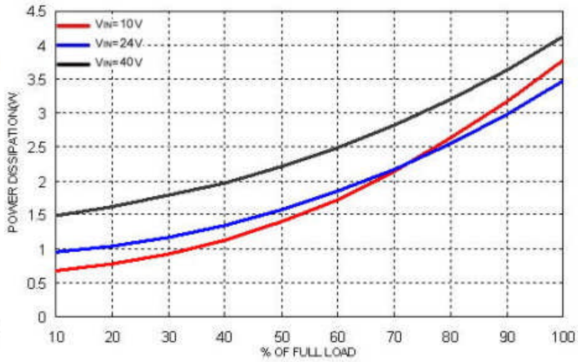
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

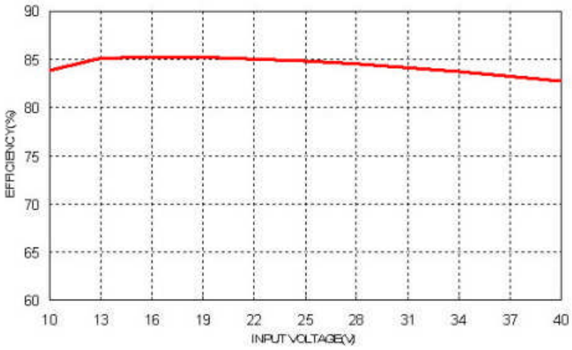
All test conditions are at 25°C.The figures are for PXE30-24WS2P5



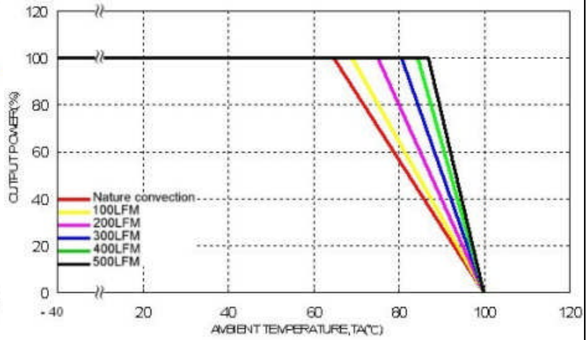
Efficiency Versus Output Current



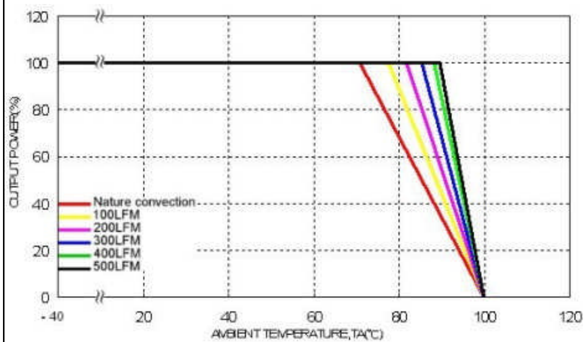
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



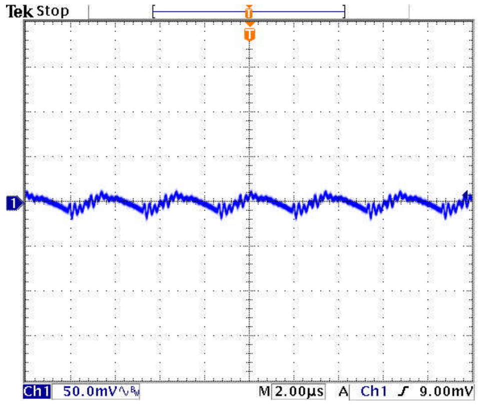
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

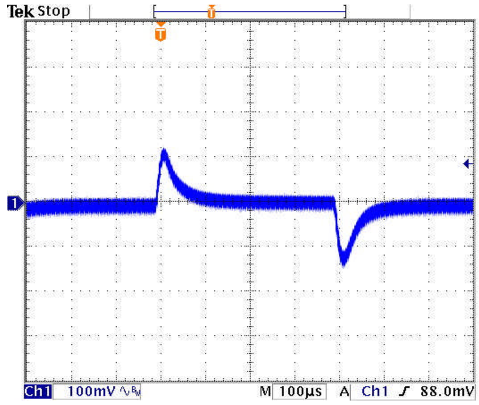
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-24WS2P5



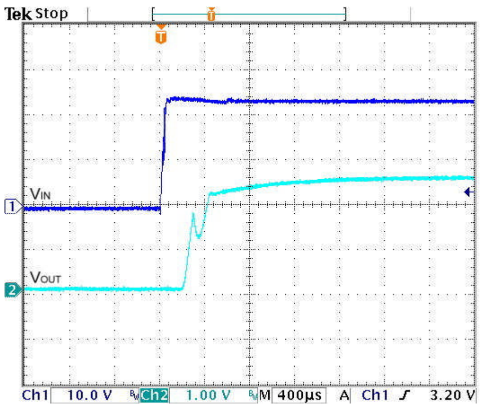
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



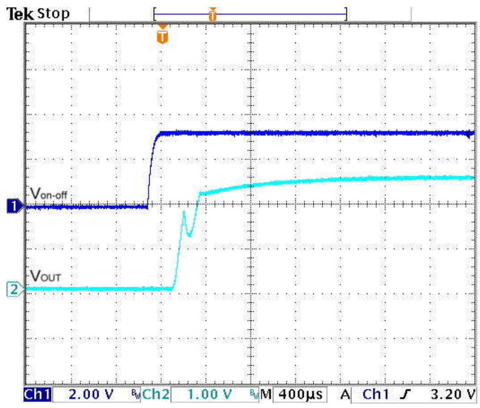
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



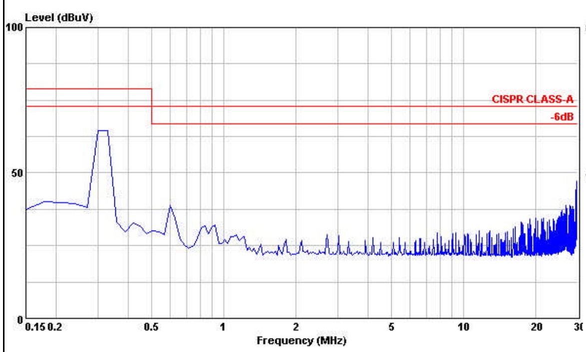
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



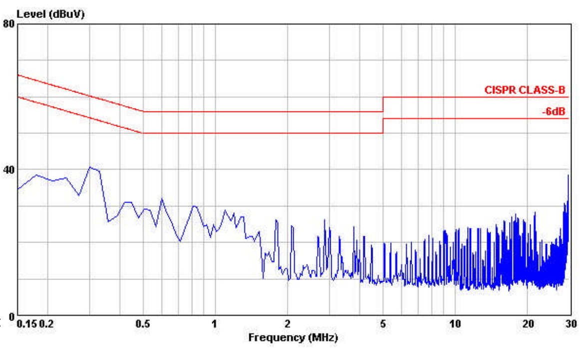
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

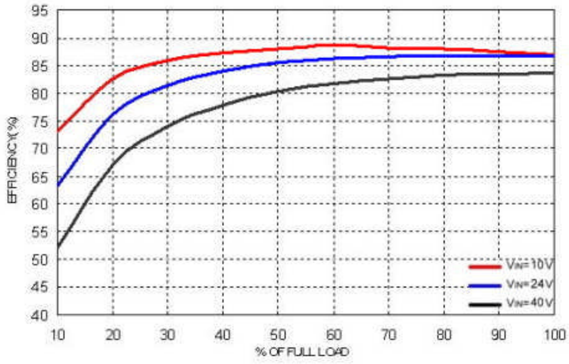


Conduction Emission of EN55022 Class B

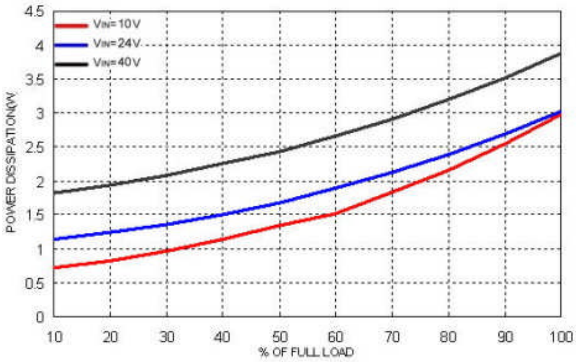
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

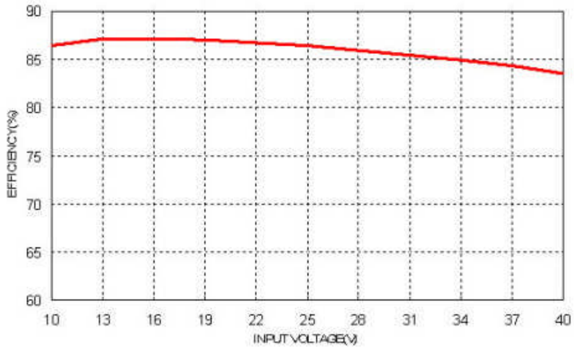
All test conditions are at 25°C.The figures are identical for PXE30-24WS3P3



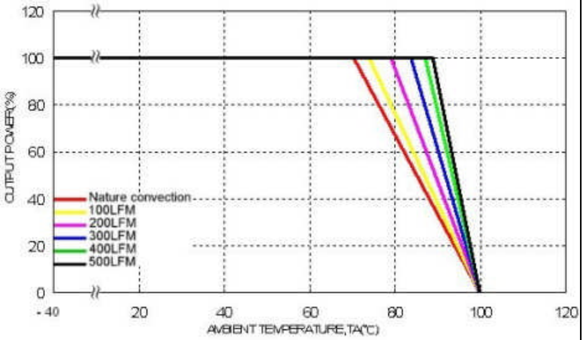
Efficiency Versus Output Current



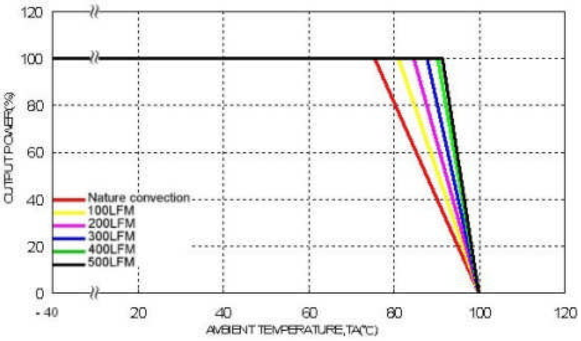
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



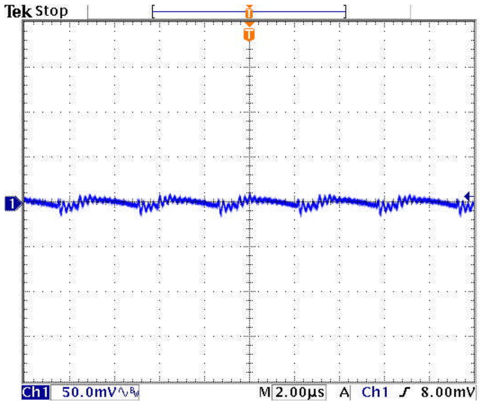
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

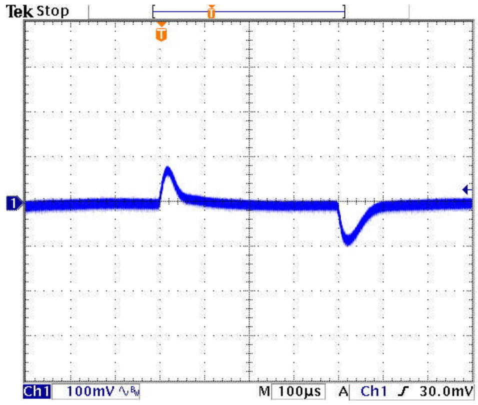
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-24WS3P3



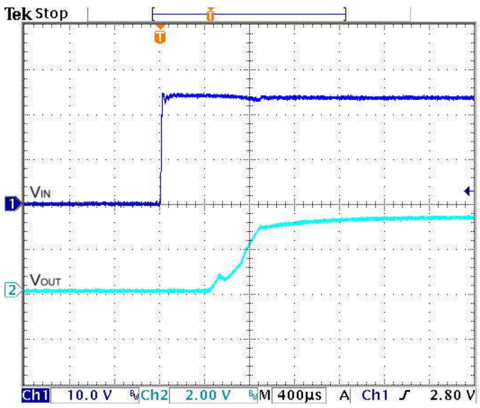
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



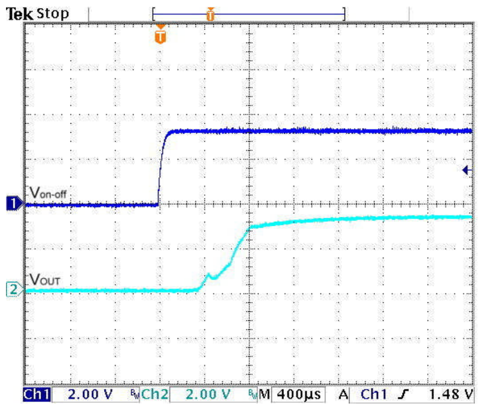
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



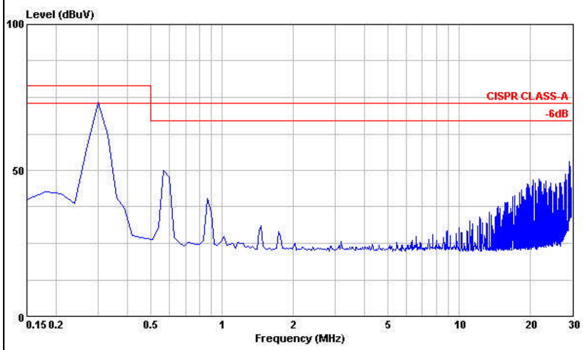
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



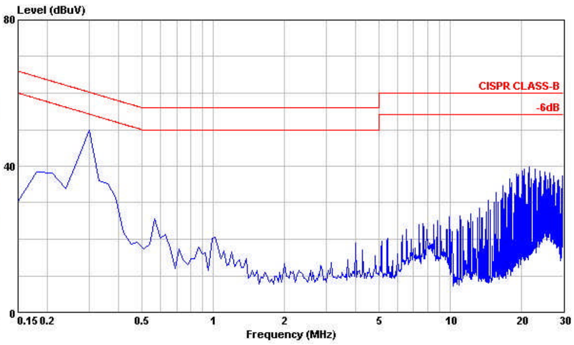
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

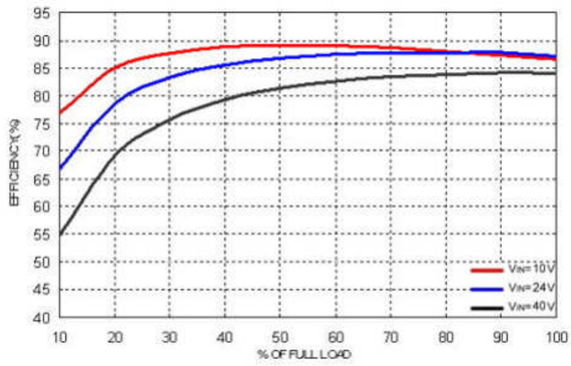


Conduction Emission of EN55022 Class B

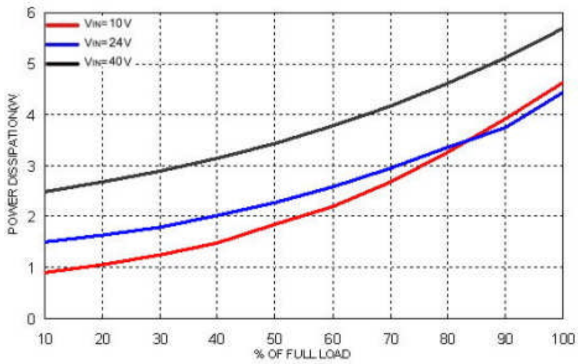
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

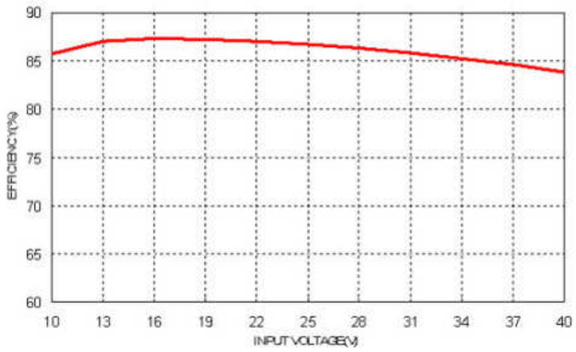
All test conditions are at 25°C.The figures are for PXE30-24WS05



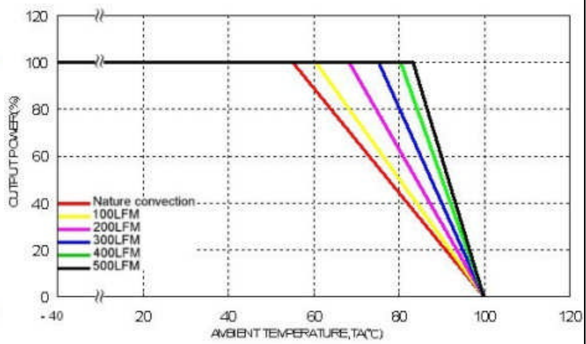
Efficiency Versus Output Current



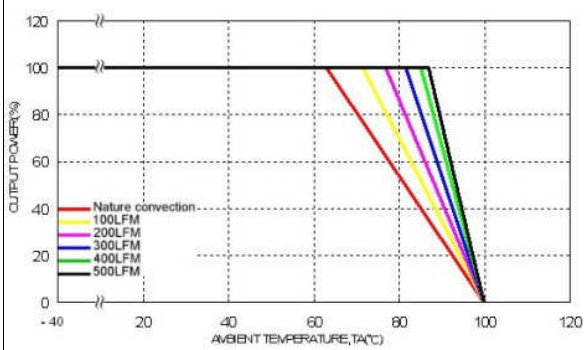
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



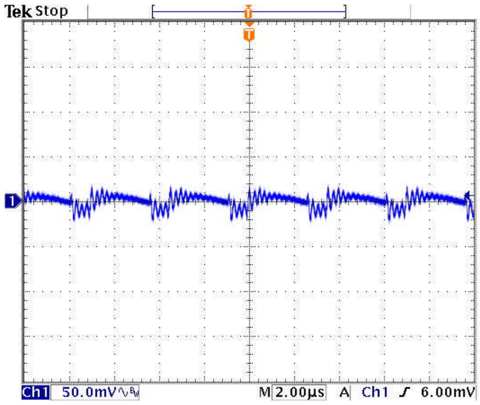
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

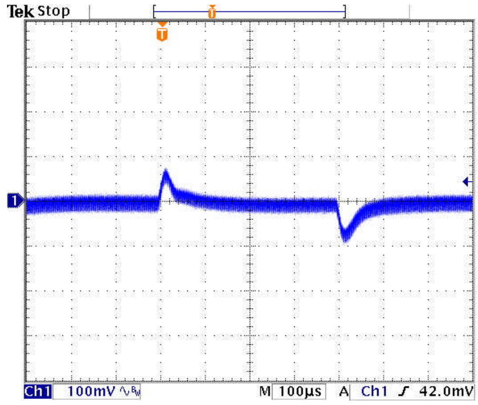
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-24WS05



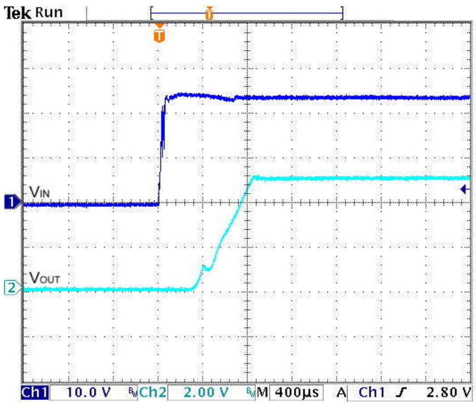
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



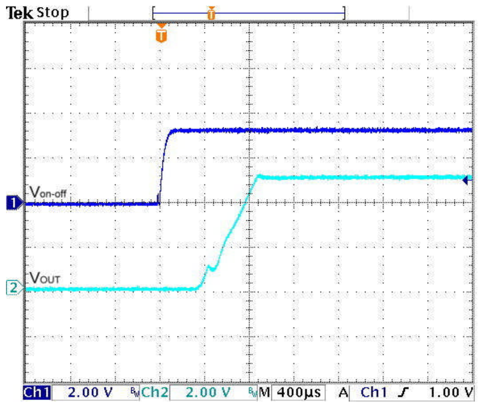
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



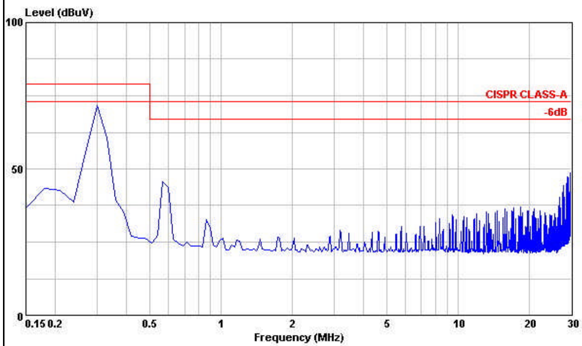
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



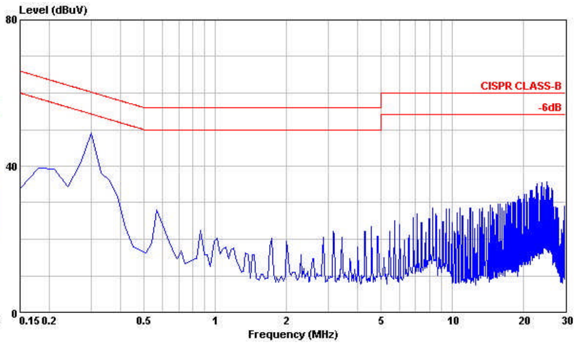
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

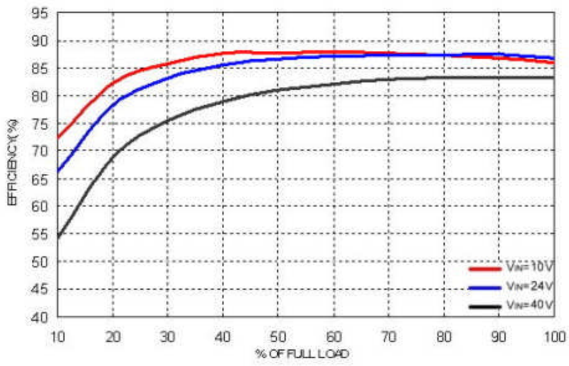


Conduction Emission of EN55022 Class B

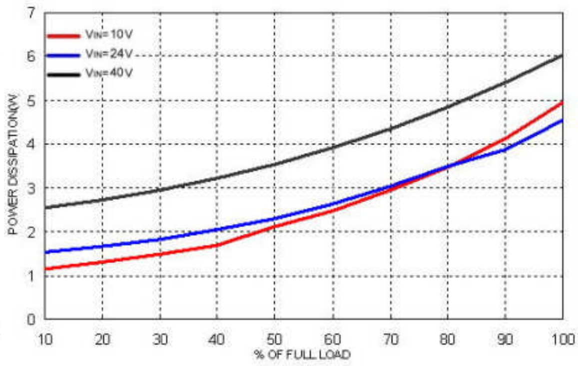
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

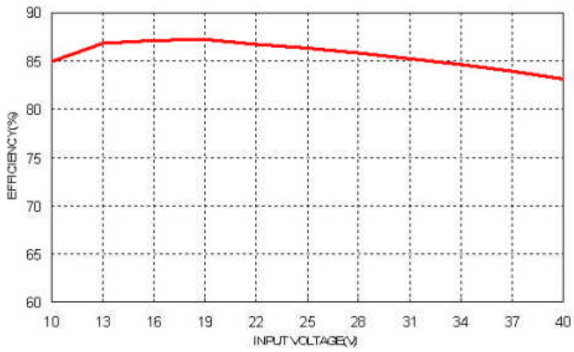
All test conditions are at 25°C.The figures are for PXE30-24WS12



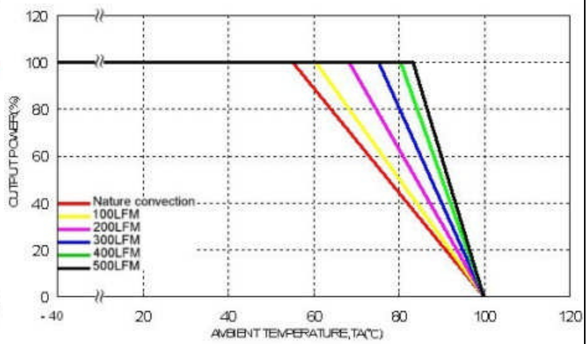
Efficiency Versus Output Current



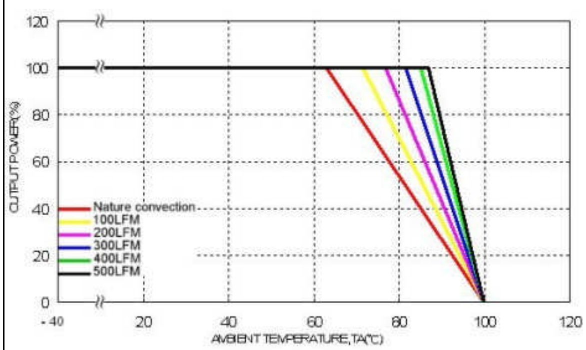
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



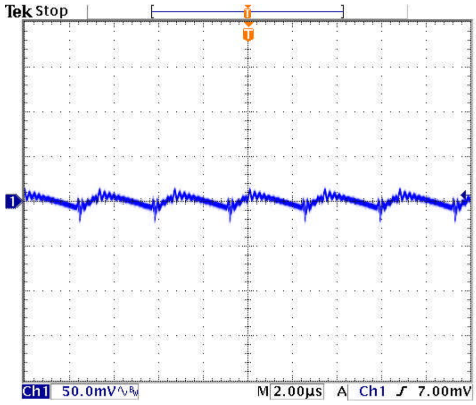
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



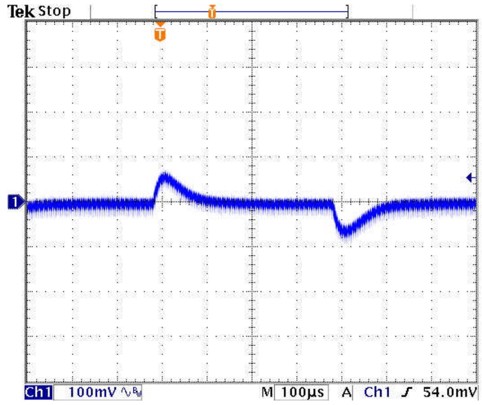
Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

Characteristic Curves (Continued)

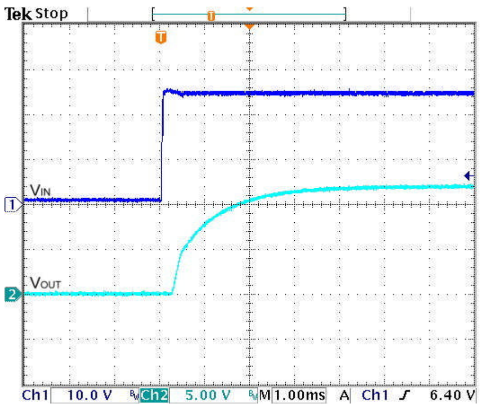
All test conditions are at 25°C.The figures are for PXE30-24WS12



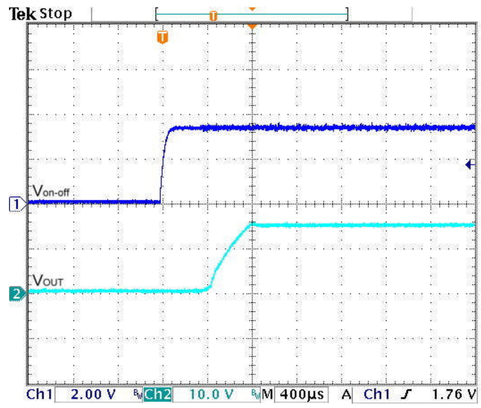
Typical Output Ripple and Noise.
Vin=Vin(nom), Full Load



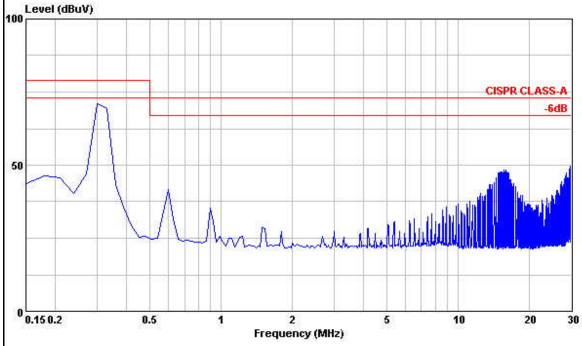
Transient Response to Dynamic Load Change from
100% to 75% to 100% of Full Load ; Vin=Vin(nom)



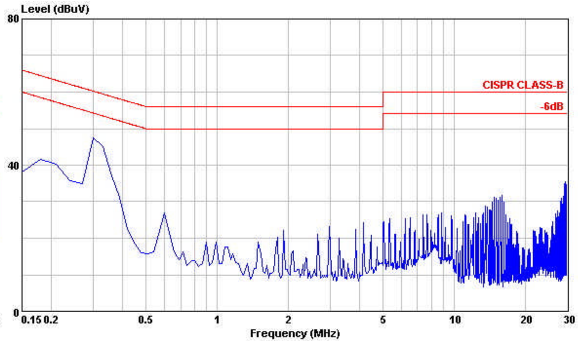
Typical Input Start-Up and Output Rise Characteristic
Vin=Vin(nom), Full Load



Using ON/OFF Voltage Start-Up and Vo Rise Characteristic
Vin=Vin(nom), Full Load



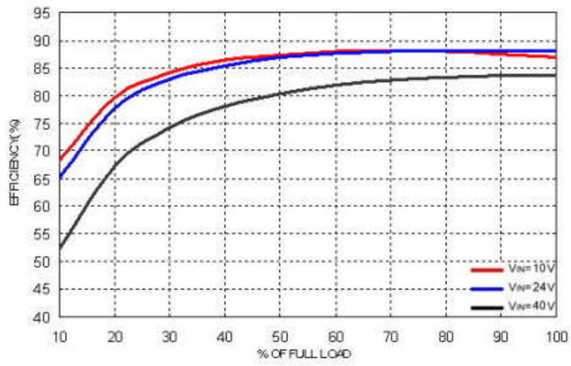
Conduction Emission of EN55022 Class A
Vin=Vin(nom), Full Load



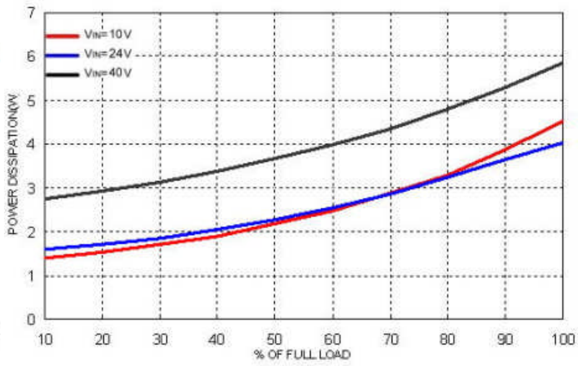
Conduction Emission of EN55022 Class B
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

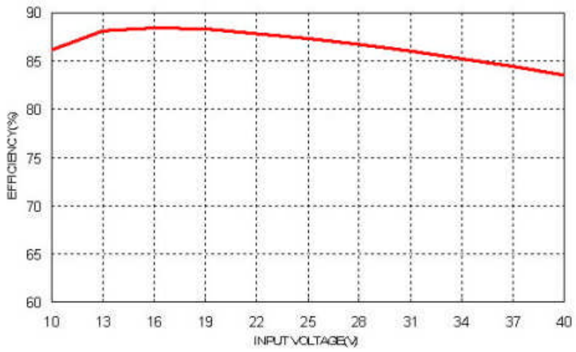
All test conditions are at 25°C.The figures are for PXE30-24WS15



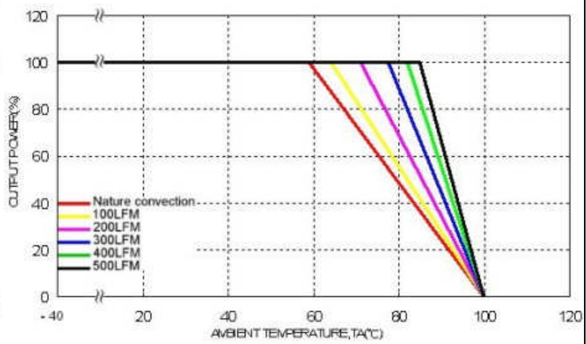
Efficiency Versus Output Current



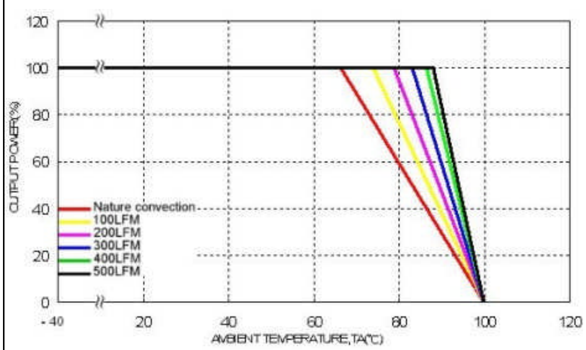
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



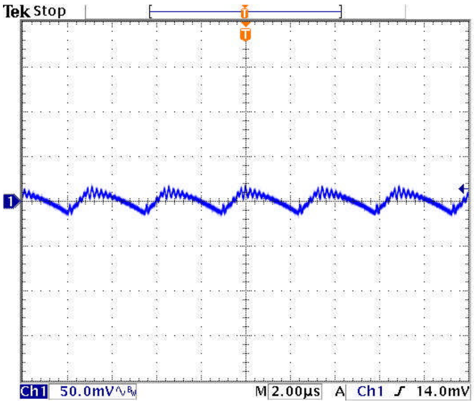
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

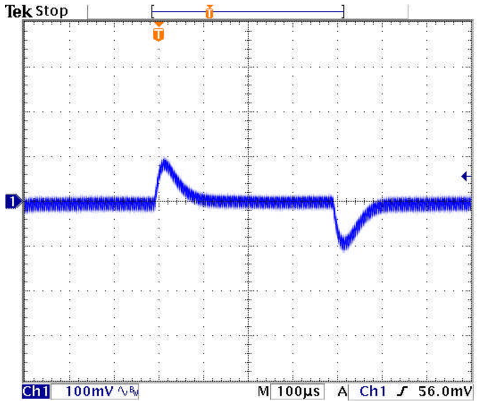
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are identical for PXE30-24WS15



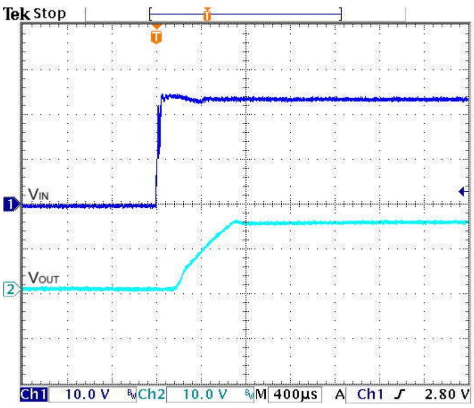
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



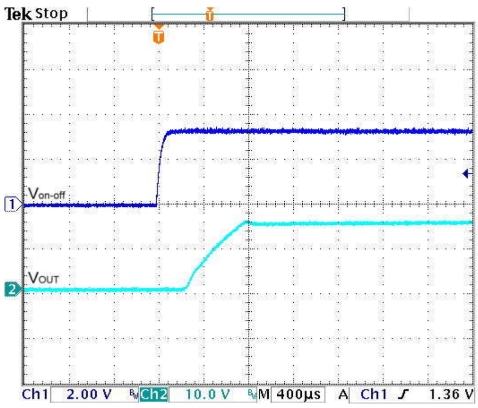
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



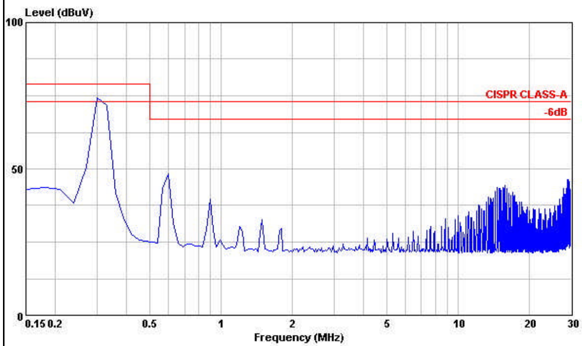
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



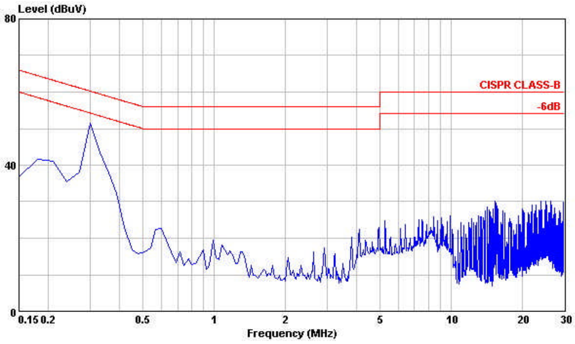
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class B

Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-48WS1P5

Efficiency Versus Output Current

Power Dissipation Versus Output Current

Efficiency Versus Input Voltage. Full Load

Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)

Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-48WS1P5

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

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

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

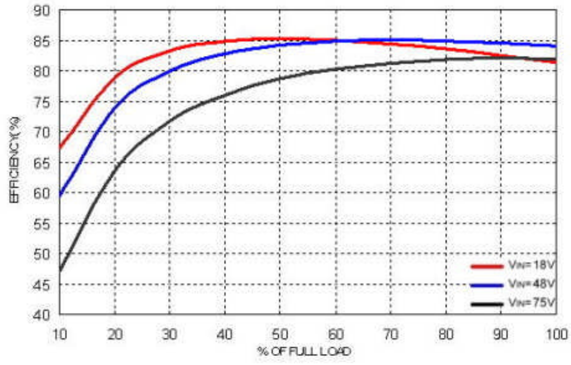
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic
Vin=Vin(nom), Full Load

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

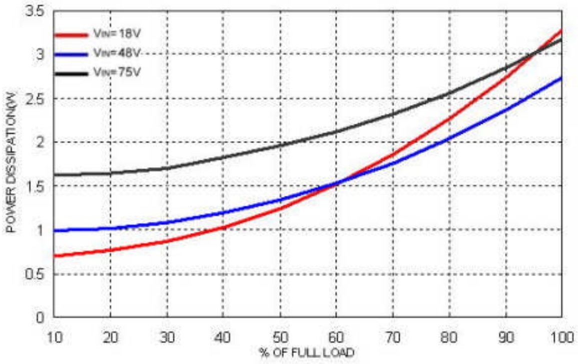
Conduction Emission of EN55022 Class B
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

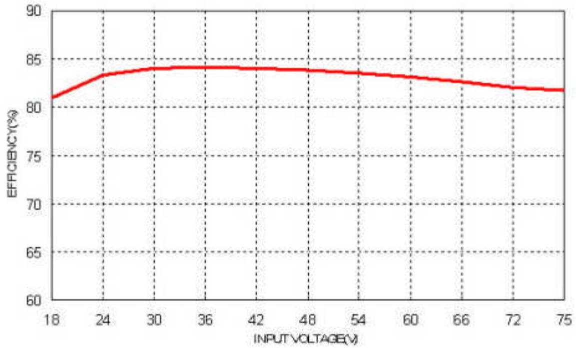
All test conditions are at 25°C.The figures are for PXE30-48WS1P8



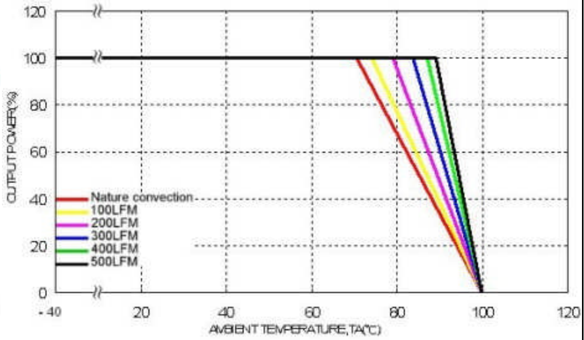
Efficiency Versus Output Current



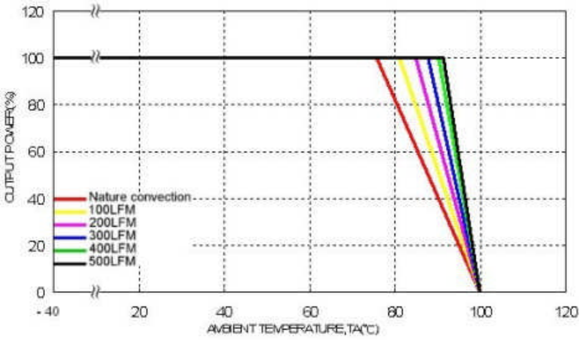
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



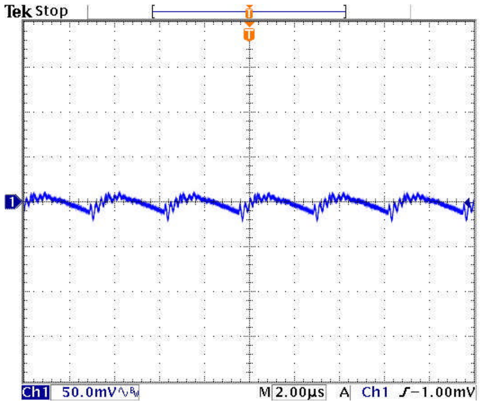
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

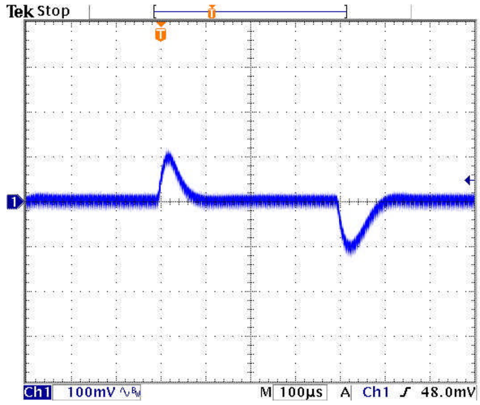
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-48WS1P8



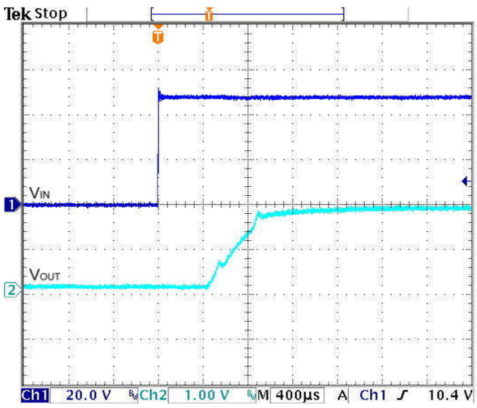
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



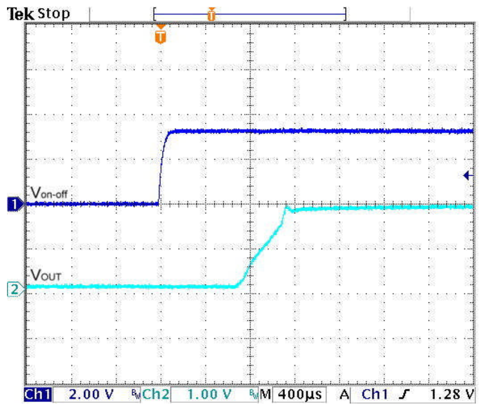
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



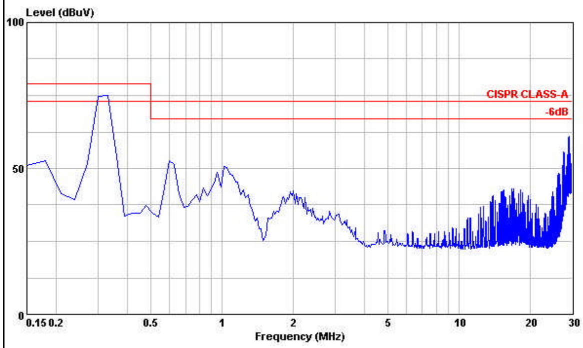
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



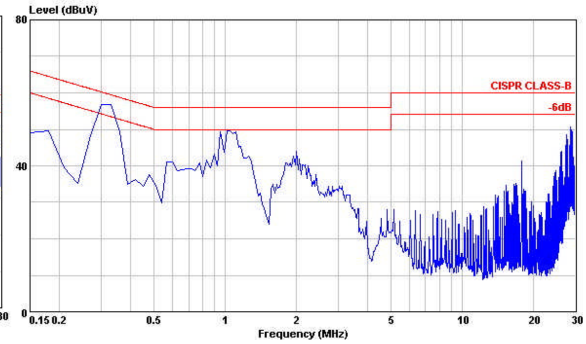
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

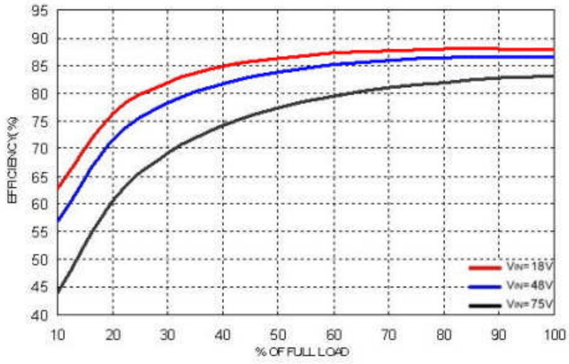


Conduction Emission of EN55022 Class B

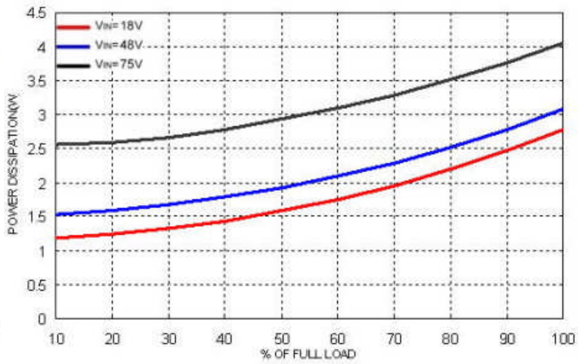
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

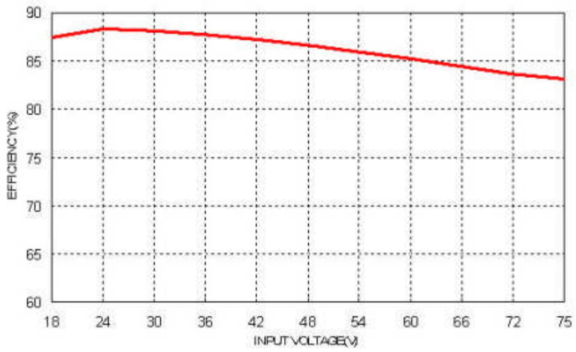
All test conditions are at 25°C.The figures are for PXE30-48WS2P5



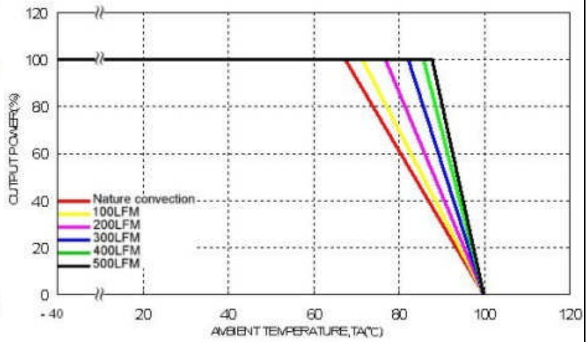
Efficiency Versus Output Current



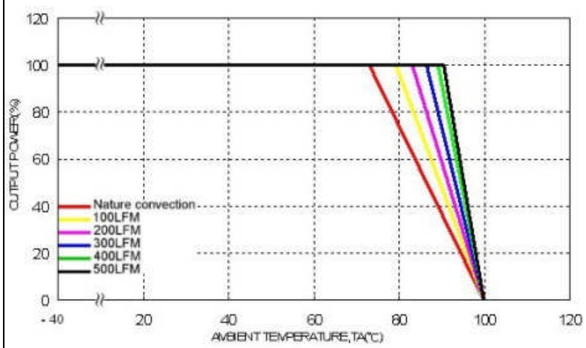
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



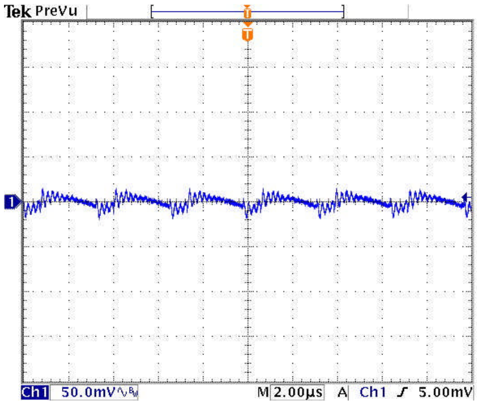
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

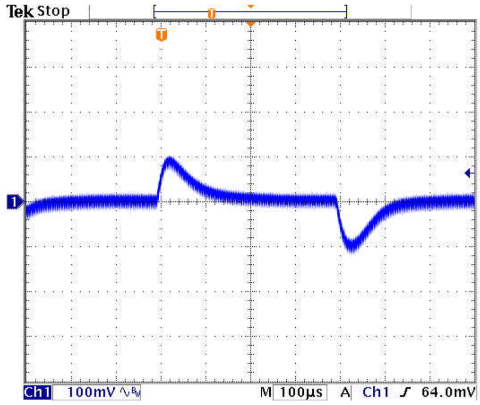
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-48WS2P5



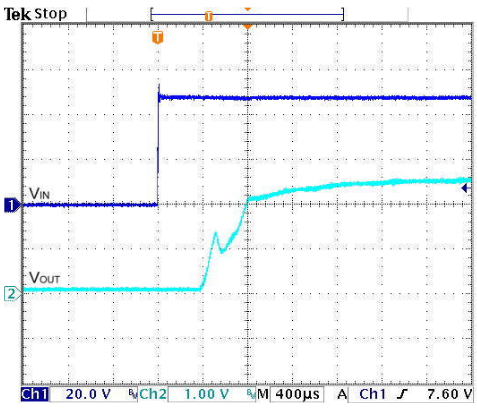
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



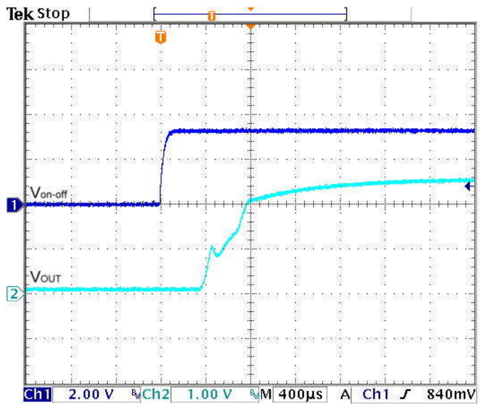
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



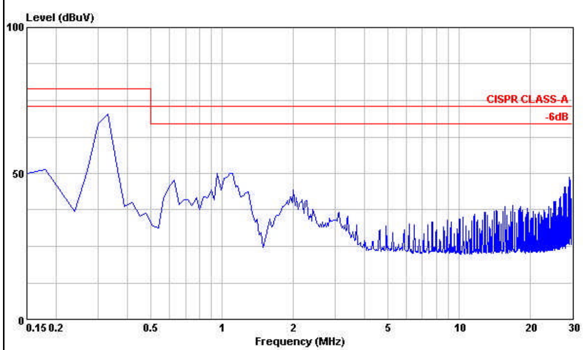
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



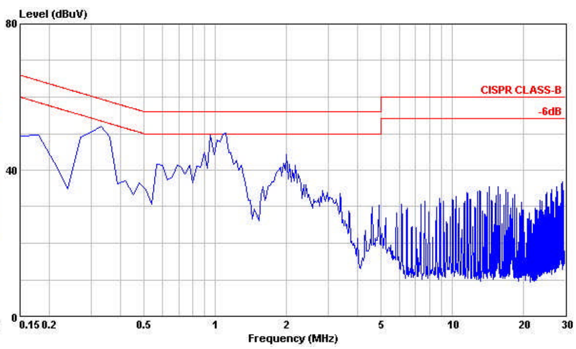
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

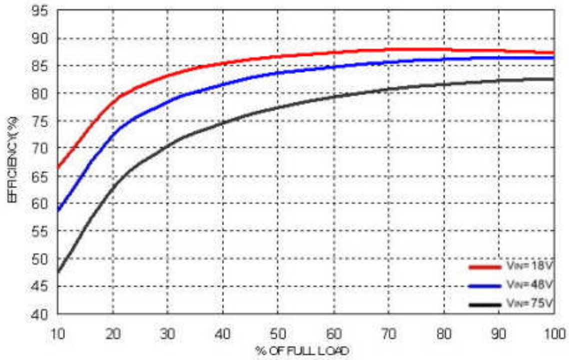


Conduction Emission of EN55022 Class B

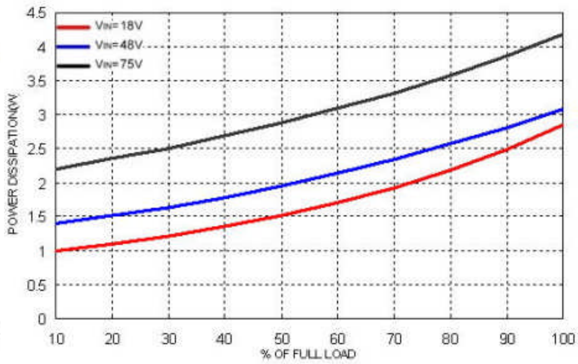
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

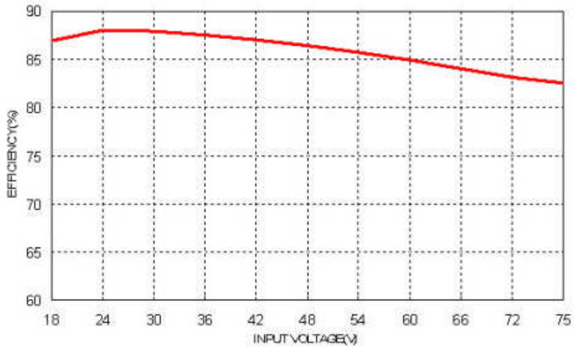
All test conditions are at 25°C.The figures are for PXE30-48WS3P3



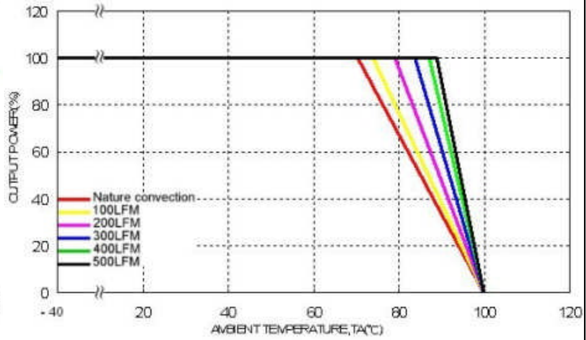
Efficiency Versus Output Current



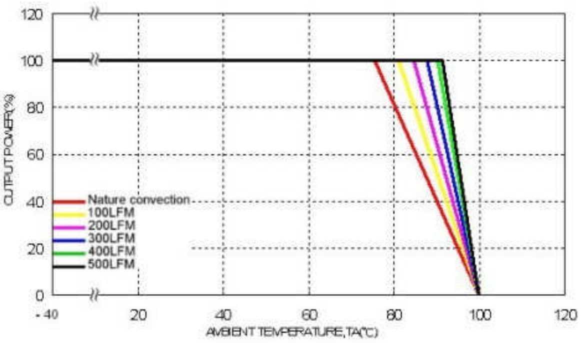
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



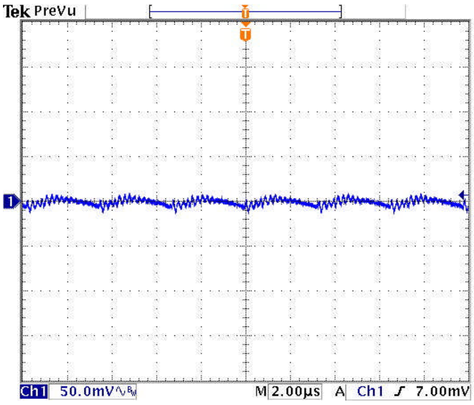
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



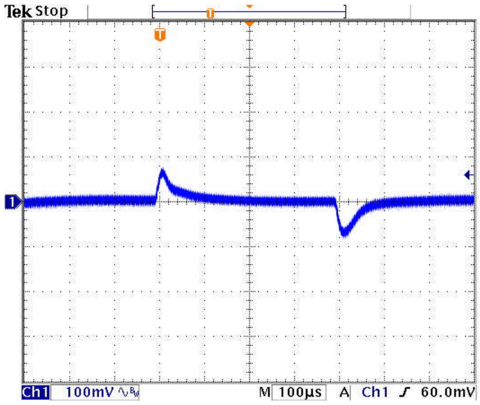
Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

Characteristic Curves (Continued)

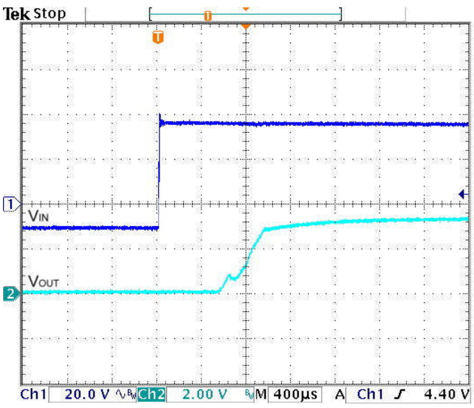
All test conditions are at 25°C.The figures are for PXE30-48WS3P3



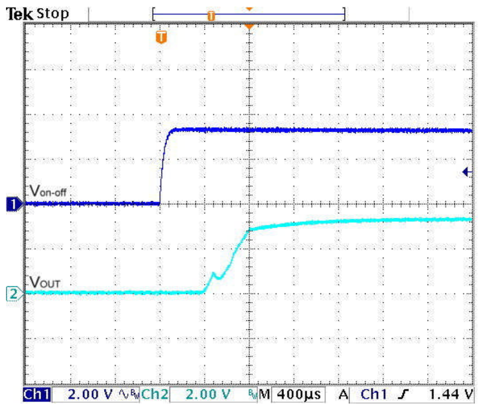
Typical Output Ripple and Noise.
Vin=Vin(nom), Full Load



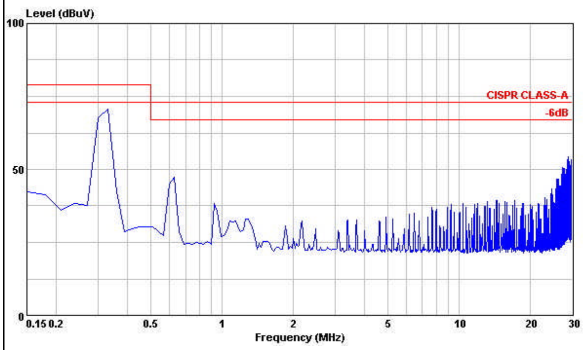
Transient Response to Dynamic Load Change from
100% to 75% to 100% of Full Load ; Vin=Vin(nom)



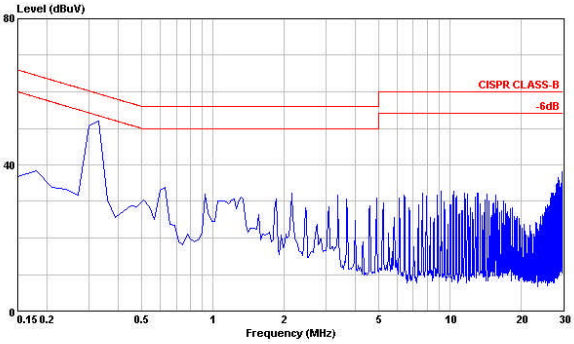
Typical Input Start-Up and Output Rise Characteristic
Vin=Vin(nom), Full Load



Using ON/OFF Voltage Start-Up and Vo Rise Characteristic
Vin=Vin(nom), Full Load



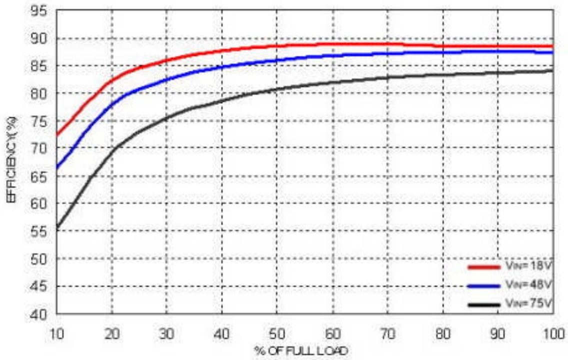
Conduction Emission of EN55022 Class A
Vin=Vin(nom), Full Load



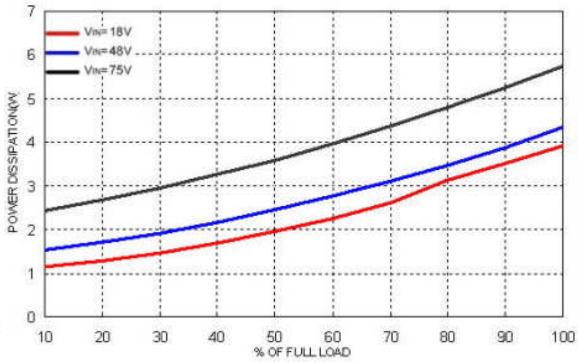
Conduction Emission of EN55022 Class B
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

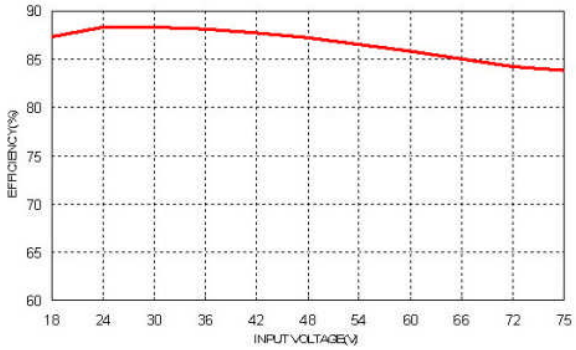
All test conditions are at 25°C.The figures are for PXE30-48WS05



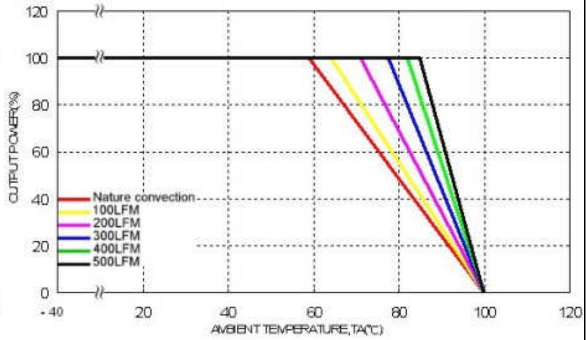
Efficiency Versus Output Current



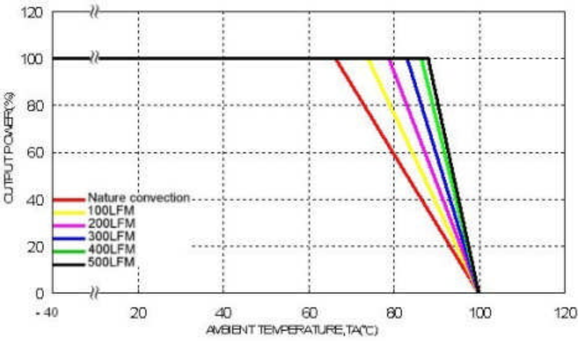
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



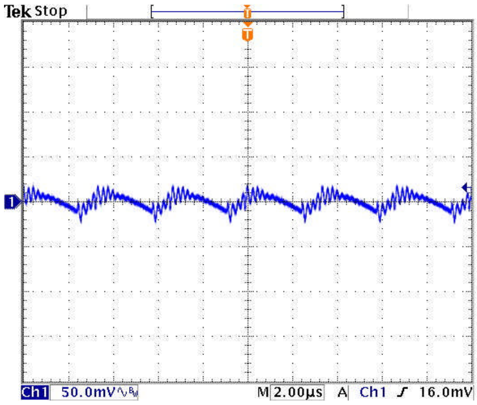
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



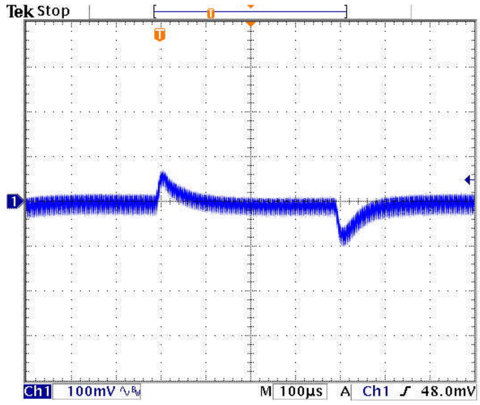
Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

Characteristic Curves (Continued)

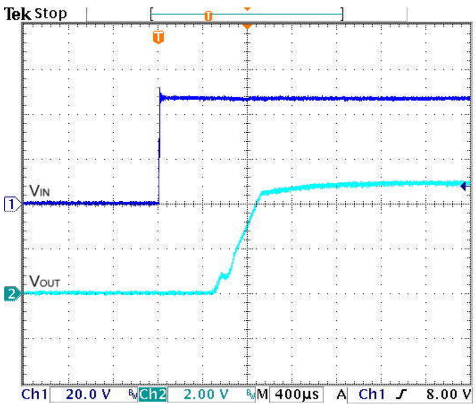
All test conditions are at 25°C.The figures are identical for PXE30-48WS05



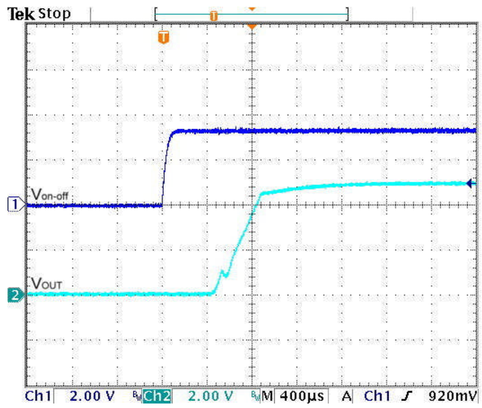
Typical Output Ripple and Noise.
Vin=Vin(nom), Full Load



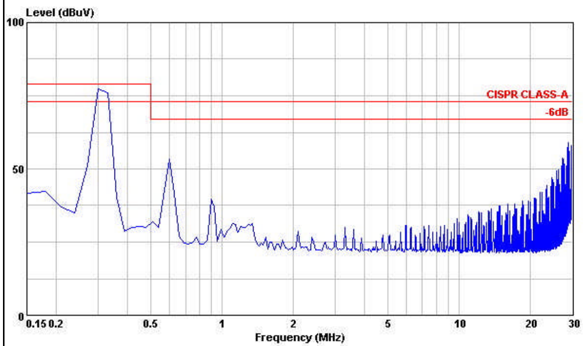
Transient Response to Dynamic Load Change from
100% to 75% to 100% of Full Load ; Vin=Vin(nom)



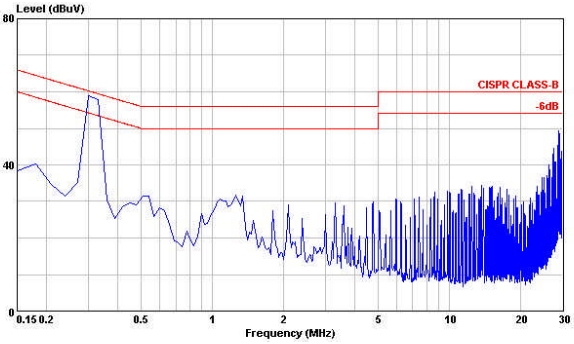
Typical Input Start-Up and Output Rise Characteristic
Vin=Vin(nom), Full Load



Using ON/OFF Voltage Start-Up and Vo Rise Characteristic
Vin=Vin(nom), Full Load



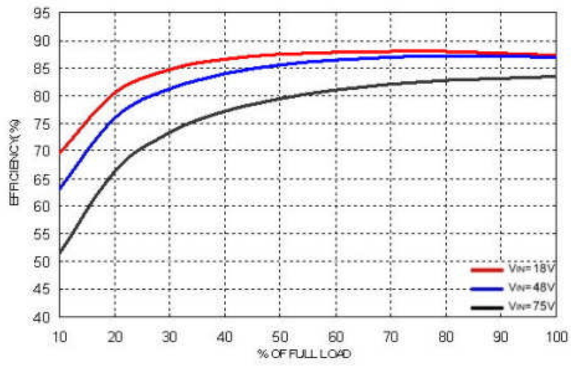
Conduction Emission of EN55022 Class A
Vin=Vin(nom), Full Load



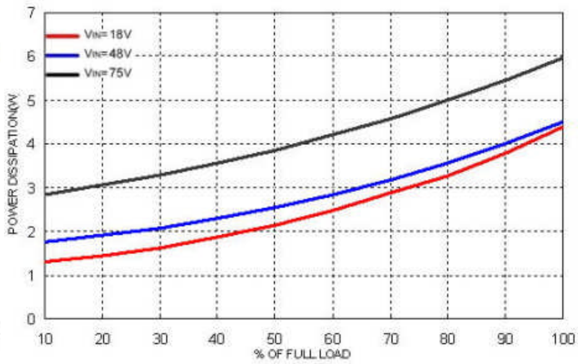
Conduction Emission of EN55022 Class B
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

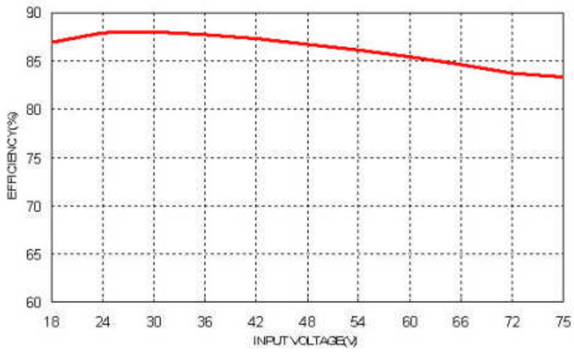
All test conditions are at 25°C.The figures are for PXE30-48WS12



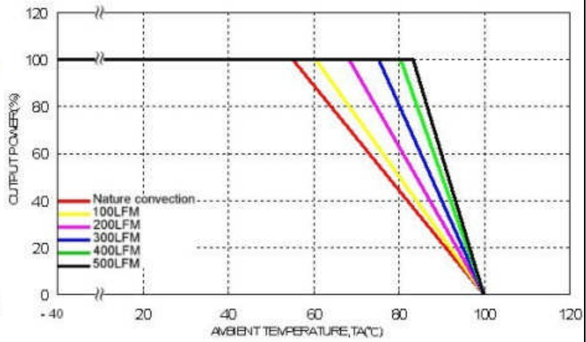
Efficiency Versus Output Current



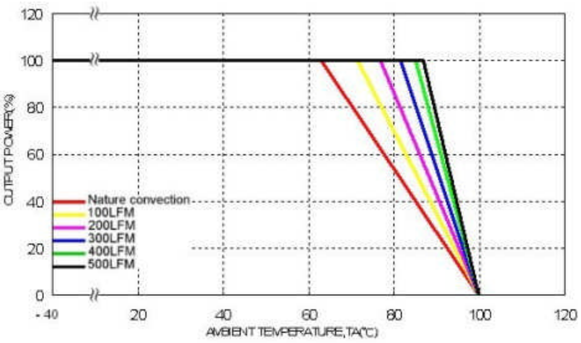
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



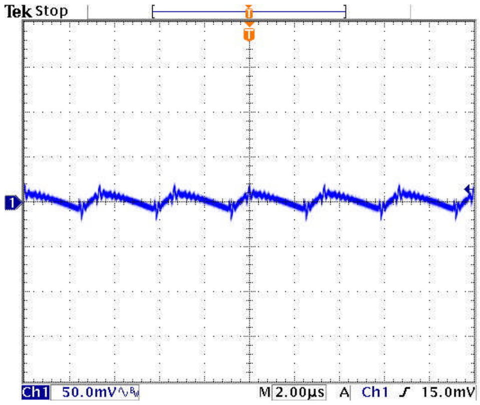
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

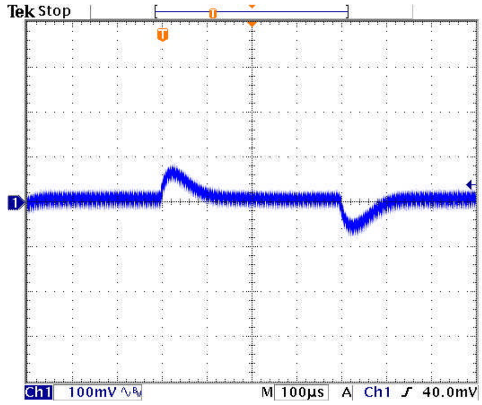
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-48WS12



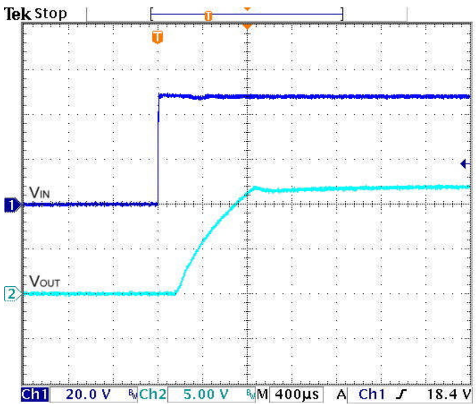
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



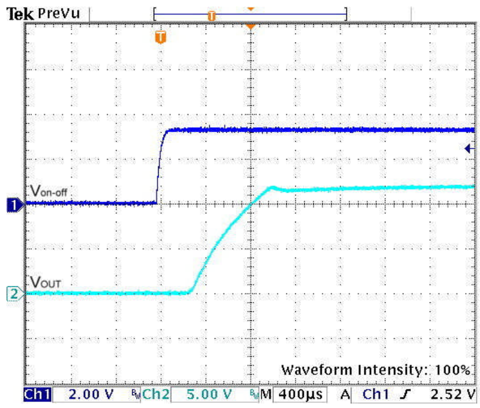
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



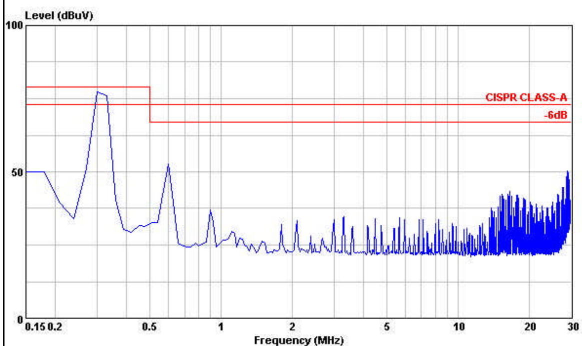
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



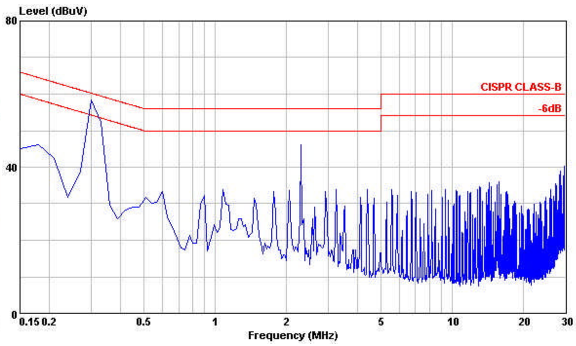
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

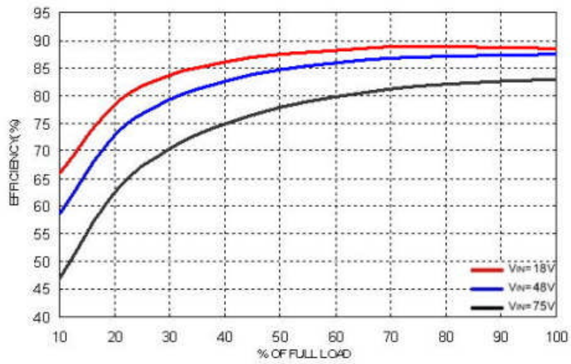


Conduction Emission of EN55022 Class B

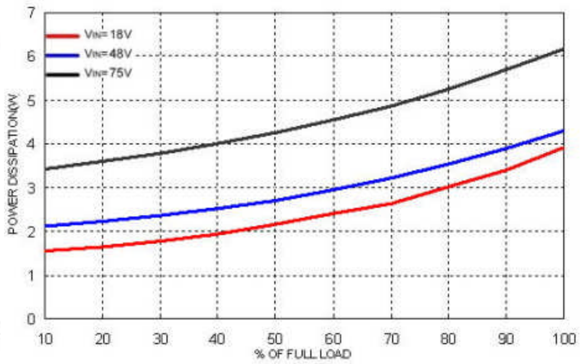
Vin=Vin(nom), Full Load

Characteristic Curves (Continued)

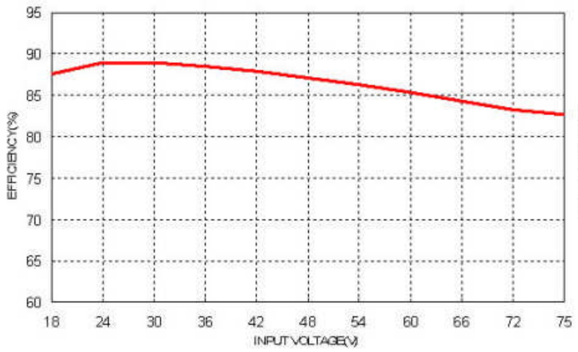
All test conditions are at 25°C.The figures are for PXE30-48WS15



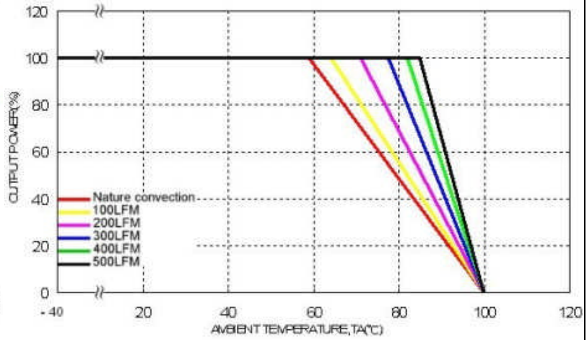
Efficiency Versus Output Current



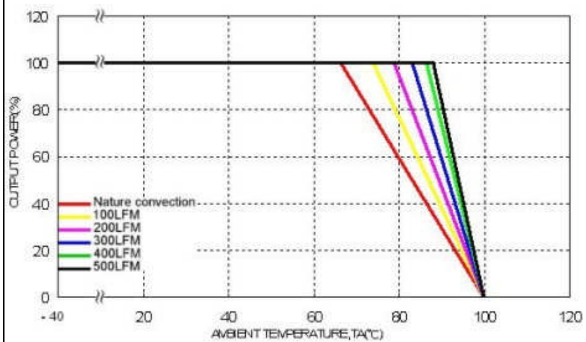
Power Dissipation Versus Output Current



Efficiency Versus Input Voltage. Full Load



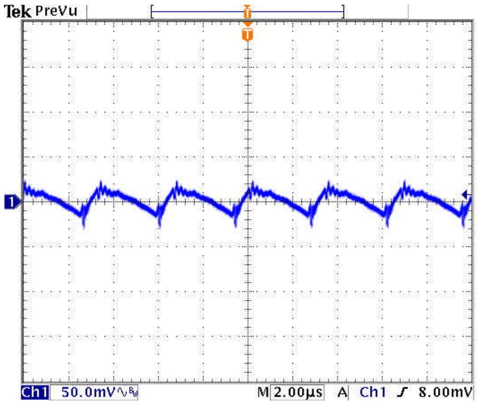
Derating Output Current Versus Ambient Temperature and Airflow Vin=Vin(nom)



Derating Output Current Versus Ambient Temperature with Heat-Sink and Airflow, Vin = Vin(nom)

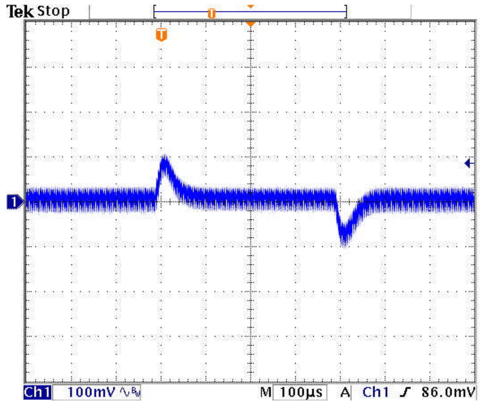
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXE30-48WS15



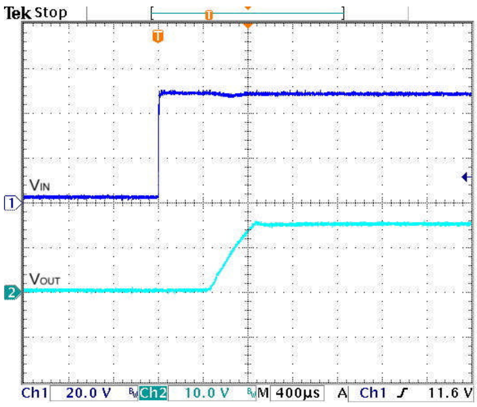
Typical Output Ripple and Noise.

Vin=Vin(nom), Full Load



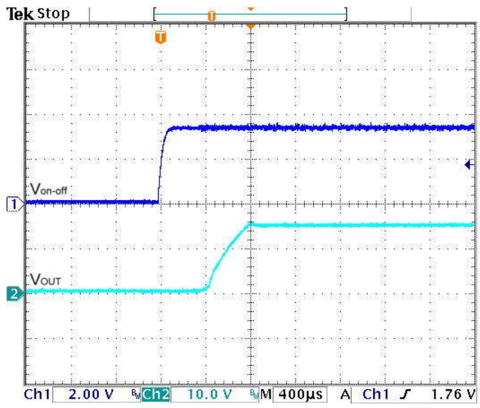
Transient Response to Dynamic Load Change from

100% to 75% to 100% of Full Load ; Vin=Vin(nom)



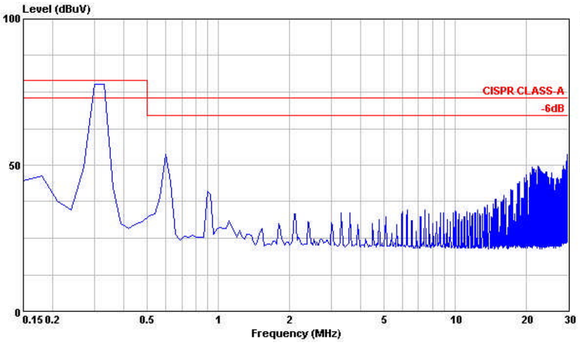
Typical Input Start-Up and Output Rise Characteristic

Vin=Vin(nom), Full Load



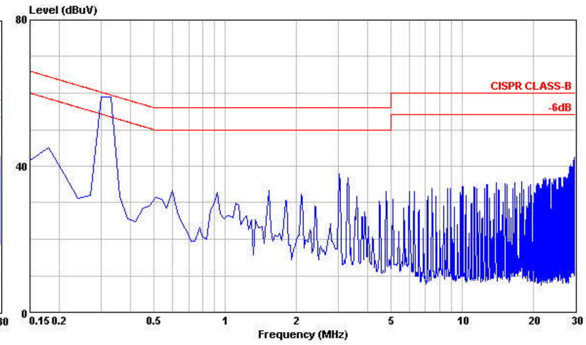
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin=Vin(nom), Full Load



Conduction Emission of EN55022 Class A

Vin=Vin(nom), Full Load

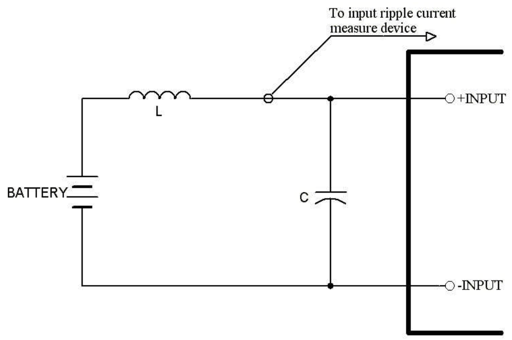


Conduction Emission of EN55022 Class B

Vin=Vin(nom), Full Load

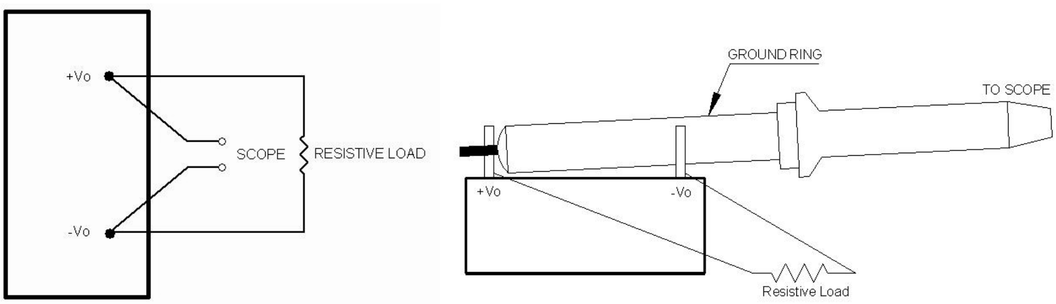
Test Configurations

Input reflected-ripple current measurement test:

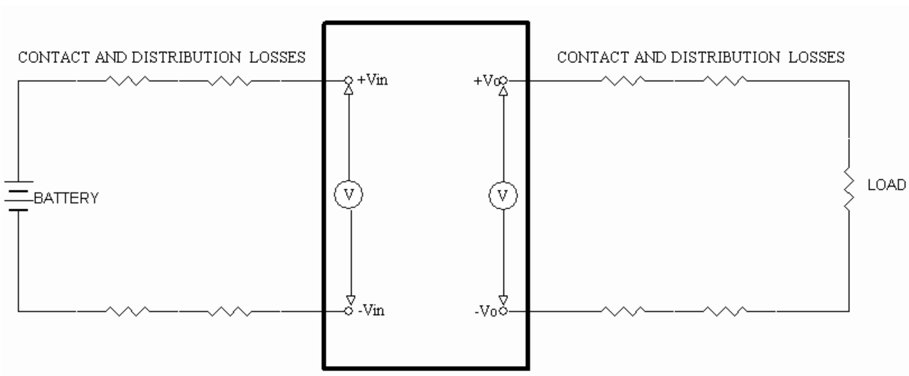


Component	Value	Voltage	Reference
L	12μH	----	----
C	220μF	100V	Aluminum Electrolytic Capacitor

Peak-to-peak output ripple & noise measurement test:



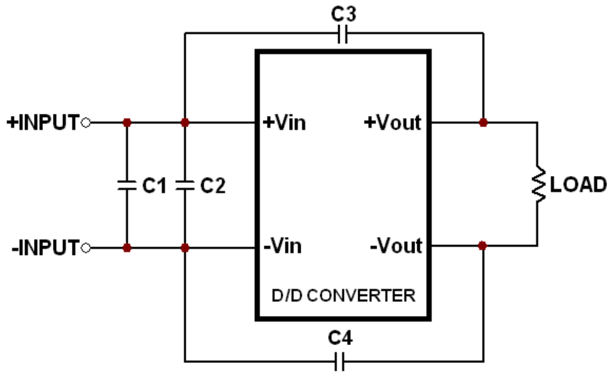
Output voltage and efficiency measurement test:



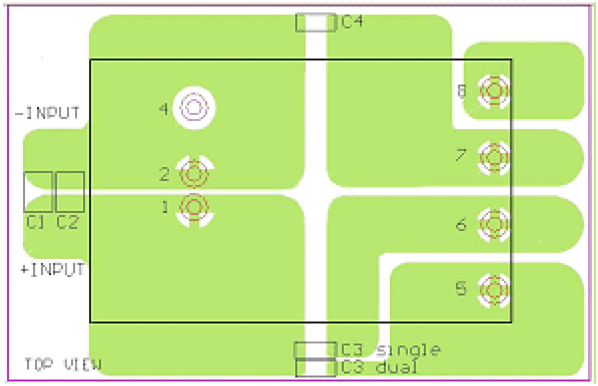
Note: All measurements are taken at the module terminals.

$$Efficiency = \left(\frac{V_o \times I_o}{V_{in} \times I_{in}} \right) \times 100\%$$

EMC Considerations



Suggested Schematic for EN55022 Conducted Emission Class A Limits



Recommended Layout with Input Filter

To meet conducted emissions EN55022 CLASS A needed the following components:

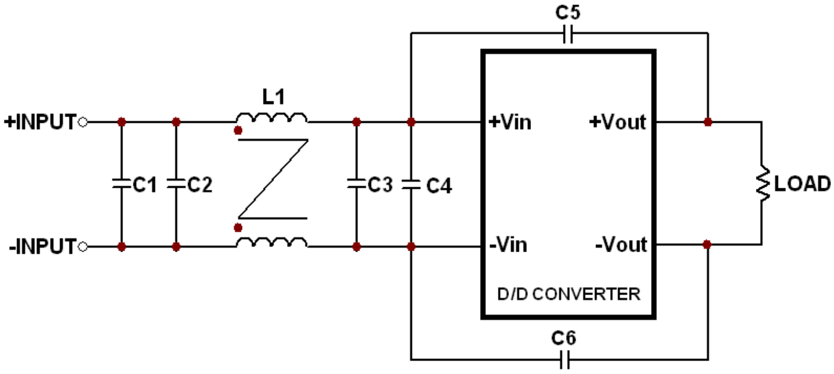
PXE30-24WSxx

Component	Value	Voltage	Reference
C1	6.8uF	50V	1812 MLCC
C3,C4	1000pF	2KV	1808 MLCC

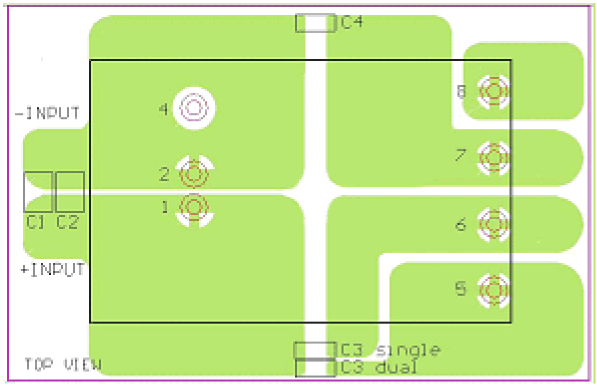
PXE30-48WSxx

Component	Value	Voltage	Reference
C1,C2	2.2uF	100V	1812 MLCC
C3,C4	1000pF	2KV	1808 MLCC

EMC Considerations (Continued)



Suggested Schematic for EN55022 Conducted Emission Class B Limits



Recommended Layout with Input Filter

To meet conducted emissions EN55022 CLASS B needed the following components:

PXE30-24WSxx

Component	Value	Voltage	Reference
C1,C3	6.8uF	50V	1812 MLCC
C5,C6	1000pF	2KV	1808 MLCC
L1	450uH	----	Common Choke

PXE30-48WSxx

Component	Value	Voltage	Reference
C1,C2	2.2uF	100V	1812 MLCC
C3,C4	2.2uF	100V	1812 MLCC
C5,C6	1000pF	2KV	1808 MLCC
L1	450uH	----	Common Choke

EMC Considerations (Continued)

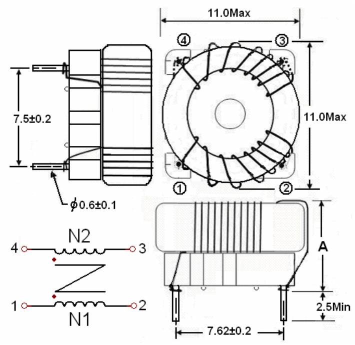
Common Choke L1 is defined as follows:

■

L:450μH±35% / DCR:25mΩ, max

A height: 9.8 mm, Max

■ All dimensions in millimeters



Input Source Impedance

The converter should be connected to a low impedance input source. Highly inductive source impedance can affect the stability of the converter. Input external L-C filter is recommended to minimize input reflected ripple current. The inductor has a simulated source impedance of 12μH and the capacitor is Nippon chemi-con KY series 220μF/100V. The capacitor must be located as close as possible to the input terminals of the converter for lowest impedance.

Output Over Current Protection

When excessive output currents occur in the system, circuit protection is required on all converters. Normally, overload current is maintained at approximately 150 percent of rated current for PXF40-xxSxx series.

Hiccup-mode is a method of operation in a converter whose purpose is to protect the power supply from being damaged during an over-current fault condition. It also enables the converter to restart when the fault is removed. There are other ways of protecting the converter when it is over-loaded, such as the maximum current limiting or current foldback methods.

One of the problems resulting from over current is that excessive heat may be generated in power devices; especially MOSFET and Schottky diodes and the temperature of these devices may exceed their specified limits. A protection mechanism has to be used to prevent these power devices from being damaged.

The operation of hiccup is as follows. When the current sense circuit sees an over-current event, the controller shuts off the converter for a given time and then tries to start up the converter again. If the over-load condition has been removed, the converter will start up and operate normally; otherwise, the controller will see another over-current event and will shut off the converter again, repeating the previous cycle. Hiccup operation has none of the drawbacks of the other two protection methods, although its circuit is more complicated because it requires a timing circuit. The excess heat due to overload lasts for only a short duration in the hiccup cycle, hence the junction temperature of the power devices is much lower.

Output Over Voltage Protection

The output over-voltage protection consists of an output Zener diode that monitors the voltage on the output terminals. If the voltage on the output terminals exceeds the over-voltage protection threshold, then the Zener diode clamps the output voltage.

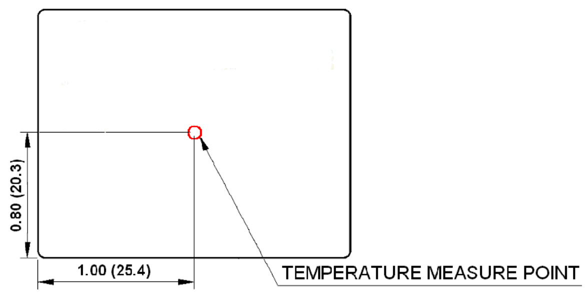
Short Circuitry Protection

Continuous, hiccup and auto-recovery mode.

During a short circuit condition the converter will shut down. The average current during this condition will be very low.

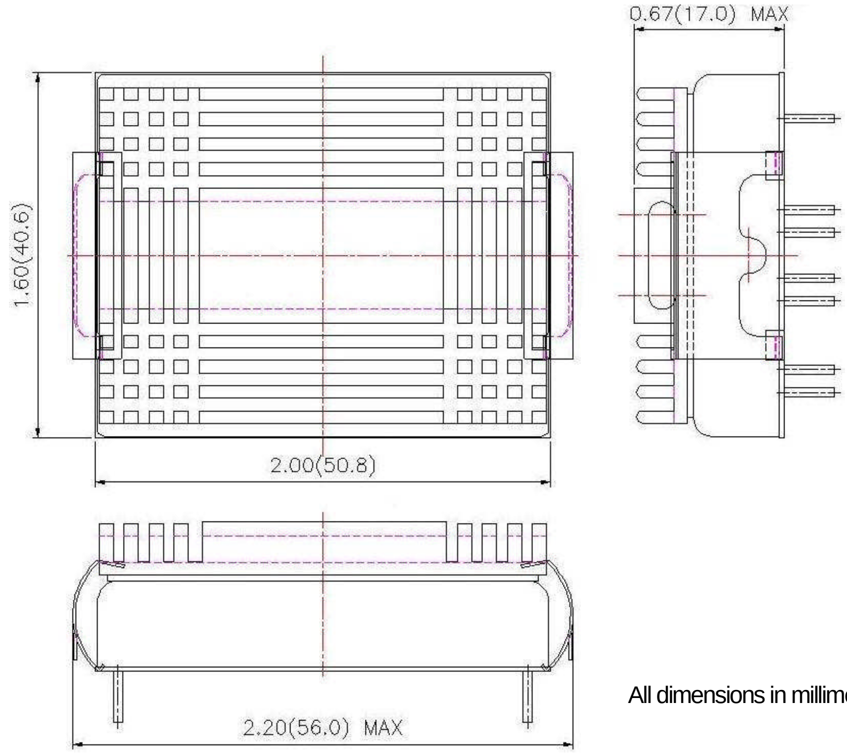
Thermal Consideration

The converter operates in a variety of thermal environments. However, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. Proper cooling can be verified by measuring the point as shown in the figure below. The temperature at this location should not exceed 100°C. When operating, adequate cooling must be provided to maintain the test point temperature at or below 100°C. Although the maximum point temperature of the converter is 100°C, limiting this temperature to a lower value will yield higher reliability.



Heat Sink Consideration

Use heat-sink (7G-0011C-F) f for lowering temperature and higher reliability of the module..

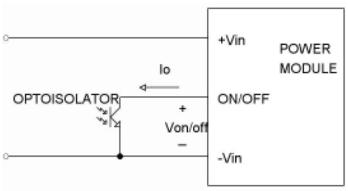


All dimensions in millimeters

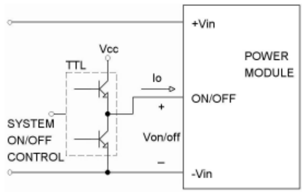
Remote ON/OFF Control

The Remote ON/OFF Pin is used to turn on and off the DC-DC converter. The user must use a switch to control the logic voltage (high or low level) of the ON/OFF pin, referenced to -Vi. The switch can be open collector transistor, FET or Opto-Coupler that is capable of sinking up to 0.5 mA at low-level logic Voltage. High-level logic of the ON/OFF signal (maximum voltage): the allowable leakage current of the switch at 12V is 0.5mA.

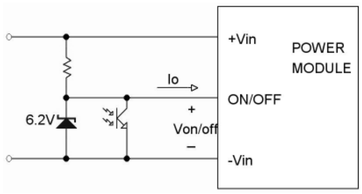
Remote ON/OFF Implementation Circuits



Isolated-Clontrol Remote ON/OFF



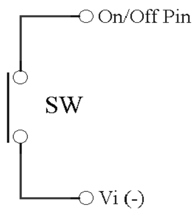
Level Control Using TTL Output

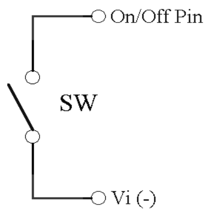


Level Control Using Line Voltage

There are two remote control options available, Positive Logic and Negative Logic.

a. Positive logic:

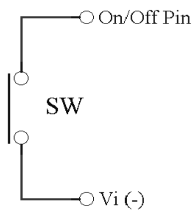


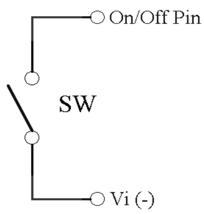


PXE30-xxWSxx module is turned off using Low-level logic

PXE30-xxWSxx module is turned on using High-level logic

b. Negative logic:

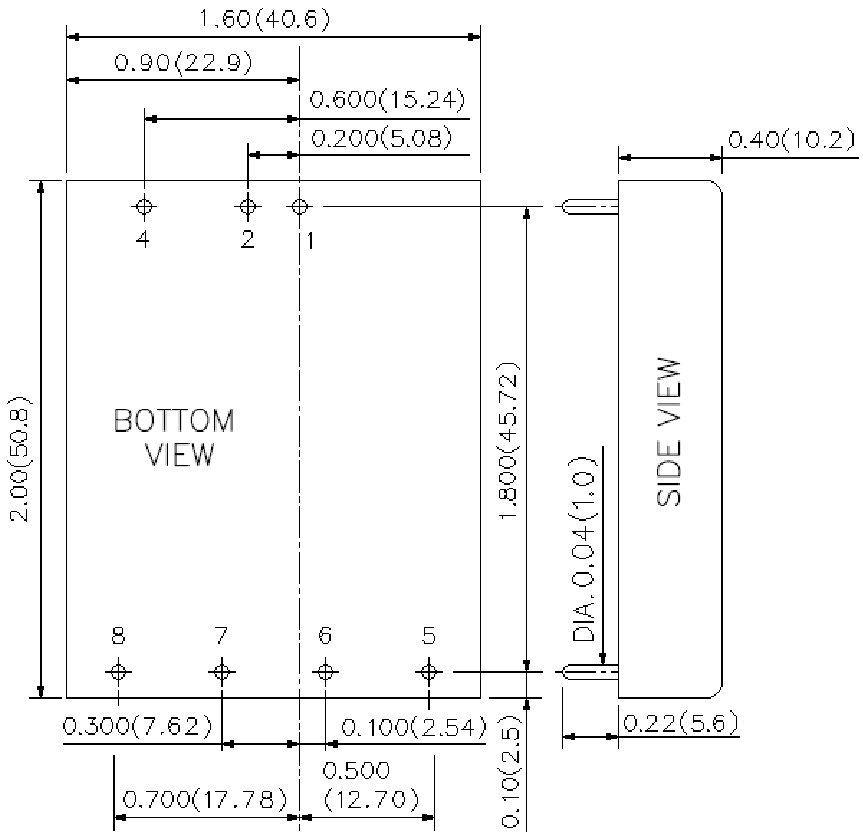




PXE30-xxWSxx module is turned on using Low-level logic

PXE30-xxWSxx module is turned off using High-level logic

Mechanical Data

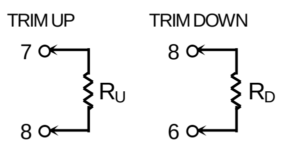


PIN CONNECTION

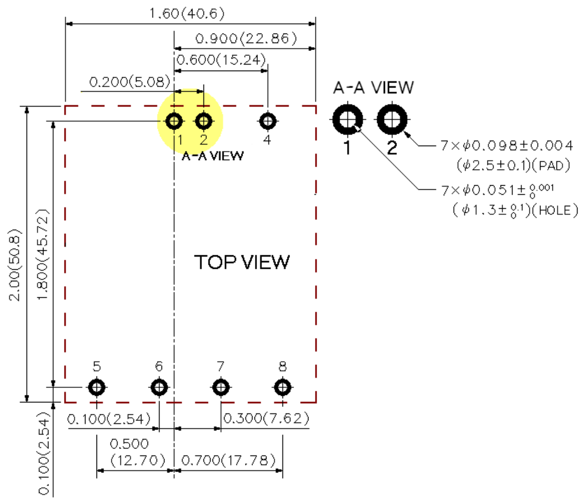
PIN	FUNCTION
1	+INPUT
2	-INPUT
4	CTRL
5	NO PIN
6	+OUTPUT
7	-OUTPUT
8	TRIM

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.

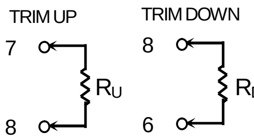


Recommended Pad Layout



Output Voltage Adjustment

Output voltage set point adjustment allows the user to increase or decrease the output voltage set point of a module. This is accomplished by connecting an external resistor between the TRIM pin and either the Vo(+) or Vo(-) pins. With an external resistor between the TRIM and Vo(-) pin, the output voltage set point increases. With an external resistor between the TRIM and Vo(+) pin, the output voltage set point decreases.



TRIM TABLE

PXE30-xxWS1P5

Trim up (%)	1	2	3	4	5	6	7	8	9	10
V_{OUT} (Volts)=	1.515	1.53	1.545	1.56	1.575	1.59	1.605	1.62	1.635	1.65
R_U (K Ohms)=	4.578	2.605	1.227	0.808	0.557	0.389	0.27	0.18	0.11	0.054
Trim down (%)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V_{OUT} (Volts)=	1.485	1.47	1.455	1.44	1.425	1.41	1.395	1.38	1.365	1.35
R_D (K Ohms)=	5.704	2.571	1.527	1.005	0.692	0.483	0.334	0.222	0.135	0.065

PXE30-xxWS1P8

Trim up (%)	1	2	3	4	5	6	7	8	9	10
V_{OUT} (Volts)=	1.818	1.836	1.854	1.872	1.89	1.908	1.926	1.944	1.962	1.98
R_U (K Ohms)=	11.639	5.205	3.06	1.988	1.344	0.915	0.609	0.379	0.2	0.057
Trim down (%)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V_{OUT} (Volts)=	1.782	1.764	1.746	1.728	1.71	1.692	1.674	1.656	1.638	1.62
R_D (K Ohms)=	14.66	6.57	3.874	2.525	1.716	1.177	0.792	0.503	0.278	0.098

PXE30-xxWS2P5

Trim up (%)	1	2	3	4	5	6	7	8	9	10
V_{OUT} (Volts)=	2.525	2.55	2.575	2.6	2.625	2.65	2.675	2.7	2.725	2.75
R_U (K Ohms)=	37.076	16.675	9.874	6.474	4.434	3.074	2.102	1.374	0.807	0.354
Trim down (%)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V_{OUT} (Volts)=	2.475	2.45	2.425	2.4	2.375	2.35	2.325	2.3	2.275	2.25
R_D (K Ohms)=	49.641	22.481	13.428	8.902	6.186	4.375	3.082	2.112	1.358	0.754

PXE30-xxWS3P3

Trim up (%)	1	2	3	4	5	6	7	8	9	10
V_{OUT} (Volts)=	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
R_U (K Ohms)=	57.930	26.165	15.577	10.283	7.106	4.988	3.476	2.341	1.459	0.753
Trim down (%)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V_{OUT} (Volts)=	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970
R_D (K Ohms)=	69.470	31.235	18.490	12.117	8.294	5.745	3.924	2.559	1.497	0.647

Output Voltage Adjustment(Continued)

PXE30-xxWS05

Trim up (%)	1	2	3	4	5	6	7	8	9	10
V_{OUT} (Volts)=	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500
R_U (K Ohms)=	36.570	16.580	9.917	6.585	4.586	3.253	2.302	1.588	1.032	0.588
Trim down (%)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V_{OUT} (Volts)=	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
R_D (K Ohms)=	45.533	20.612	12.306	8.152	5.660	3.999	2.812	1.922	1.230	0.676

PXE30-xxWS12

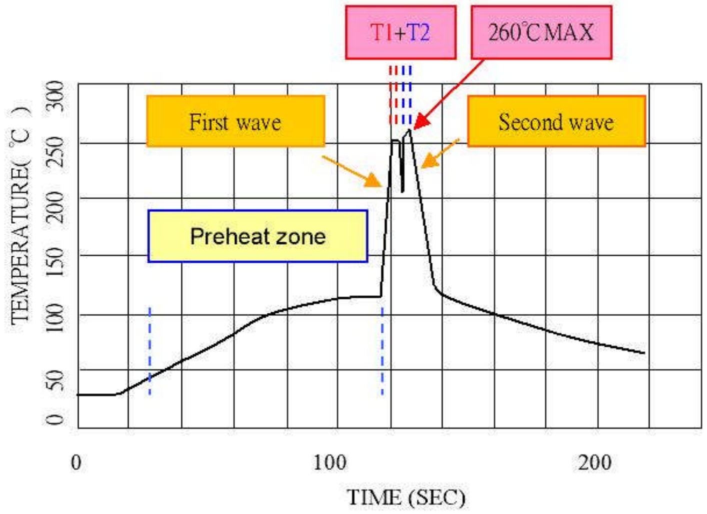
Trim up (%)	1	2	3	4	5	6	7	8	9	10
V_{OUT} (Volts)=	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
R_U (K Ohms)=	367.910	165.950	98.636	64.977	44.782	31.318	21.701	14.488	8.879	4.391
Trim down (%)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V_{OUT} (Volts)=	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
R_D (K Ohms)=	460.990	207.950	123.600	81.423	56.118	39.249	27.199	18.162	11.132	5.509

PXE30-xxWS15

Trim up (%)	1	2	3	4	5	6	7	8	9	10
V_{OUT} (Volts)=	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500
R_U (K Ohms)=	404.180	180.590	106.060	68.796	46.437	31.531	20.883	12.898	6.687	1.718
Trim down (%)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V_{OUT} (Volts)=	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
R_D (K Ohms)=	499.820	223.410	131.270	85.204	57.563	39.136	25.974	16.102	8.424	2.282

Soldering and Reflow Consideration

Lead free wave solder profile for PXE30-xxWSxx DIP type



Zone	Reference Parameter
Preheat zone	Rise temp. speed : 3°C / sec max. Preheat temp. : 100~130°C
Actual heating	Peak temp. : 250~260°C Peak time (T1+T2 time) : 4~6 sec

Reference Solder: Sn-Ag-Cu/Sn-Cu

Hand Welding: Soldering iron-Power 90W

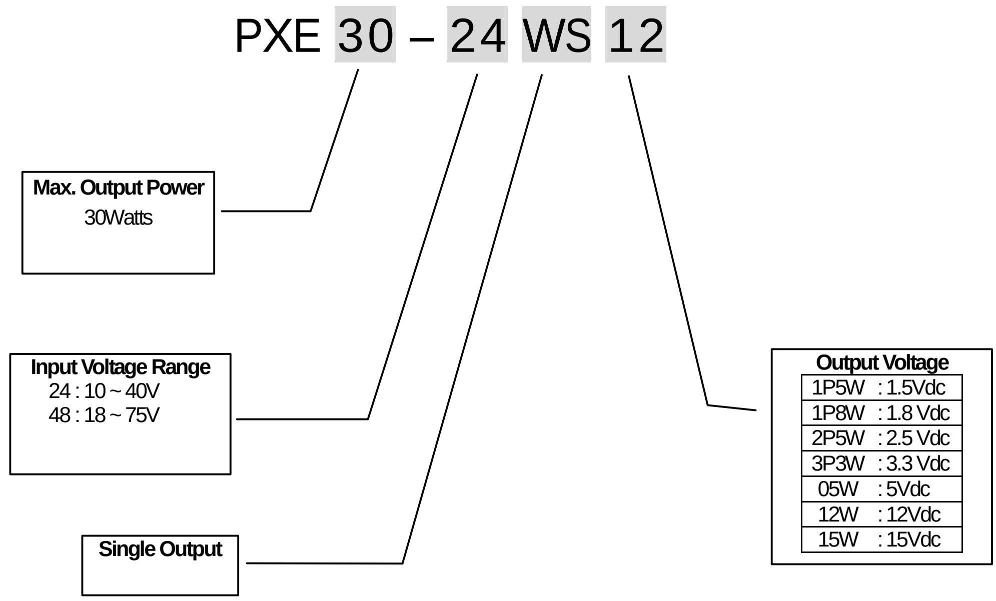
Welding Time: 2-4 sec

Temp.: 380-400 °C

Packaging Information

12 PCS per TUBE

Part Number Structure



Model Number	Input Range	Output Voltage	Output Current		Input Current		Eff [3] (%)
			Min. load	Full Load	No load[1]	Full Load[2]	
PXE30-24WS1P5	10 – 40 VDC	1.5 VDC	0mA	8000mA	35mA	658mA	80
PXE30-24WS1P8	10 – 40 VDC	1.8 VDC	0mA	8000mA	35mA	759mA	83
PXE30-24WS2P5	10 – 40 VDC	2.5 VDC	0mA	8000mA	40mA	1029mA	85
PXE30-24WS3P3	10 – 40 VDC	3.3 VDC	0mA	6000mA	50mA	994mA	87
PXE30-24WS05	10 – 40 VDC	5 VDC	0mA	6000mA	65mA	1506mA	87
PXE30-24WS12	10 – 40 VDC	12 VDC	0mA	2500mA	65mA	1506mA	87
PXE30-24WS15	10 – 40 VDC	15 VDC	0mA	2000mA	70mA	1488mA	88
PXE30-48WS1P5	18 – 75 VDC	1.5 VDC	0mA	8000mA	20mA	329mA	80
PXE30-48WS1P8	18 – 75 VDC	1.8 VDC	0mA	8000mA	20mA	380mA	83
PXE30-48WS2P5	18 – 75 VDC	2.5 VDC	0mA	8000mA	25mA	508mA	86
PXE30-48WS3P3	18 – 75 VDC	3.3 VDC	0mA	6000mA	30mA	497mA	87
PXE30-48WS05	18 – 75 VDC	5 VDC	0mA	6000mA	30mA	744mA	88
PXE30-48WS12	18 – 75 VDC	12 VDC	0mA	2500mA	35mA	753mA	87
PXE30-48WS15	18 – 75 VDC	15 VDC	0mA	2000mA	45mA	744mA	88

Note 1. Typical value at nominal input voltage and no load.
Note 2. Maximum value at nominal input voltage and full load.
Note 3. Typical value at nominal input voltage and full load.

Safety and Installation Instruction

Fusing Consideration

Caution: This converter is not internally fused. An input line fuse must always be used.

This encapsulated converter can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture. For maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse. The safety agencies require a slow-blow fuse with maximum rating of 6A. Based on the information provided in this data sheet on inrush energy and maximum DC input current; the same type of fuse with lower rating can be used. Refer to the fuse manufacturer's data for further information.

MTBF and Reliability

The MTBF of PXE30-xxWSxx DC/DC converter has been calculated using

Bellcore TR-NWT-000332 Case I: 50% stress, Operating Temperature at 40°C (Ground fixed and controlled environment). The resulting figure for MTBF is 1.315×10^6 hours.

MIL-HDBK-217F NOTICE2 FULL LOAD, Operating Temperature at 25°C ℃. The resulting figure for MTBF is 3.456×10^5 hours.