PXD10-Single Output DC/DC Converter

9 to 18 Vdc, 18 to 36 Vdc and 36 to 75 Vdc input, 3.3 to 15 Vdc Single Output, 10W

TDK·Lambda

c UL us VDE CE **CB Report**

Features

- Single output current up to 2A
- 10 watts maximum output power
- 2:1 wide input voltage range of 9-18, 18-36 and 36-75VDC
- Six-sided continuous shield
- High efficiency up to 87%
- Low profile:2.00×1.00×0.40 inches (50.8×25.4×10.2 mm)
- Fixed switching frequency
- RoHS compliant
- No minimum load
- Input to output isolation: 1600Vdc min
- Operating case temperature range: 100°C max
- Output over-voltage protection
- Over-current protection, auto-recovery
- Output short circuit protection

Options

- Heat sinks available for extended operation
- Remote on/off and logic configuration

Applications

- Distributed power architectures
- Computer equipment
- Communications equipment

General Description

The PXD10 single output series offers 10 watts of output power in a 2 X 1 X 0.4 inch package. It has a 2:1 wide input voltage of 9-18VDC, 18-36VDC and 36-75VDC,1600VDC isolation, short circuit, over voltage protection, and six sided shielding. All models are particularly suited for telecommunications, industrial, mobile telecom and test equipment applications.

Table of Contents

Absolute Maximum Rating				
Parameter	**Model**	**Min**	**Max**	**Unit**
Input Voltage Continuous Transient (100ms)	 12Sxx 24Sxx 48Sxx 12Sxx 24Sxx 48Sxx		 18 36 75 36 50 100	V_{DC}
Operating Ambient Temperature Standard (with derating)		-25	85	°C
Operating Case Temperature			100	°C
Storage Temperature	All	-55	105	°C

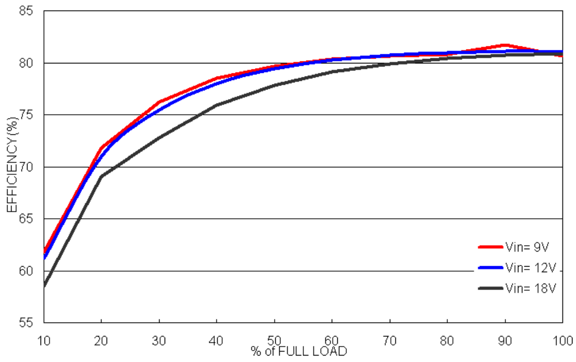
Output Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Output Voltage Range (Vin = Vin(nom); Full Load ; T_A=25 °C)	xxS3P3 xxS05 xxS12 xxS15	3.267 4.95 11.88 14.85	3.3 5 12 15	3.333 5.05 12.12 15.15	V_{DC}
Output Regulation Line (Vin(min) to Vin(max) at Full Load) Load (0% to 100% of Full Load)	All			±0.2 ±0.5	%
Output Ripple & Noise Peak -to- Peak (20MHz bandwidth)	All			50	mV_{P-P}
Temperature Coefficient	All			±0.02	%/°C
Output Voltage Overshoot (Vin(min) to Vin(max); Full Load ; T_A=25°C)	All		0	5	% V_{OUT}
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		 200 250		 mV μS
Output Current	xxS3P3 xxS05 xxS12 xxS15	0 0 0 0		2000 2000 830 670	mA
Output Over Voltage Protection (Zener diode clamp)	xxS3P3 xxS05 xxS12 xxS15		3.9 6.2 15 18		V_{DC}
Output Over Current Protection	All		130	150	% FL.
Output Short Circuit Protection	All	Hiccup, automatic recovery			

Input Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Operating Input Voltage	12Sxx	9	12	18	Vdc
	24Sxx	18	24	36	
	48Sxx	36	48	75	
Input Current	12S3P3			724	mA
(Maximum value at Vin = Vin(nom); Full Load)	12S05			1082	
	12S12			1037	
	12S15			1046	
	24S3P3			362	
	24S05			534	
	24S12			519	
	24S15			523	
	48S3P3			181	
	48S05			260	
	48S12			253	
	48S15			252	
Input Standby current	12S3P3		17		mA
(Typical value at Vin = Vin(nom); No Load)	12S05		21		
	12S12		38		
	12S15		36		
	24S3P3		15		
	24S05		22		
	24S12		18		
	24S15		36		
	48S3P3		11		
	48S05		14		
	48S12		14		
	48S15		10		
Input reflected ripple current (5 to 20MHz, 12μH source impedance)	All		30		mA_{P-P}
Start Up Time (Vin = Vin(nom) and constant resistive load)	All				mS
Power up			20		
Remote On/Off Control (Option)					V_{DC}
(The On/Off pin voltage is referenced to $-V_{IN}$)					
Positive logic					
On/Off pin High Voltage (Remote On)	Suffix –P	3.5		12	
On/Off pin Low Voltage (Remote Off)	Suffix –P	0		1.2	
Negative logic					
On/Off pin High Voltage (Remote On)	Suffix –N	0		1.2	
On/Off pin Low Voltage (Remote Off)	Suffix –N	3.5		12	
Remote Off input current	All		20		mA
Input current of Remote control pin	All	-0.5		1	mA

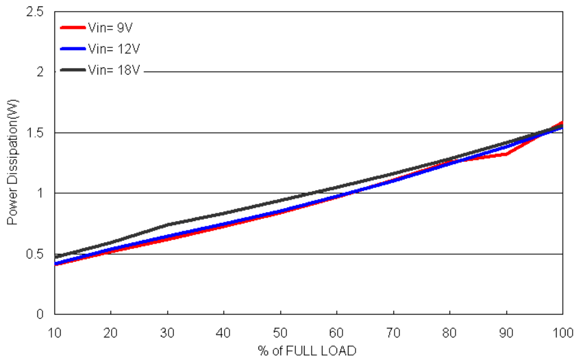
General Specification					
Parameter	**Model**	**Min**	**Typ**	**Max**	**Unit**
Efficiency (Vin = Vin(nom); Full Load ; T_A=25°C)	12S3P3 12S05 12S12 12S15 24S3P3 24S05 24S12 24S15 48S3P3 48S05 48S12 48S15		80 81 84 84 80 82 84 84 80 84 86 87		%
Isolation voltage Input to Output Input to Case, Output to Case	All	1600 1600			V_{DC}
Isolation resistance	All	1			GΩ
Isolation capacitance	All			300	pF
Switching Frequency	All		300		kHz
Weight	All		27.0		g
MTBF Bellcore TR-NWT-000332, T_C=40°C MIL-HDBK-217F	All		1.976×10^6 1.416×10^6		hours

Characteristic Curves

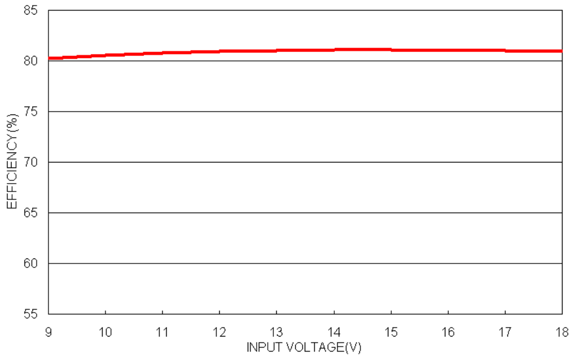
All test conditions are at 25°C.The figures are for PXD10-12S3P3



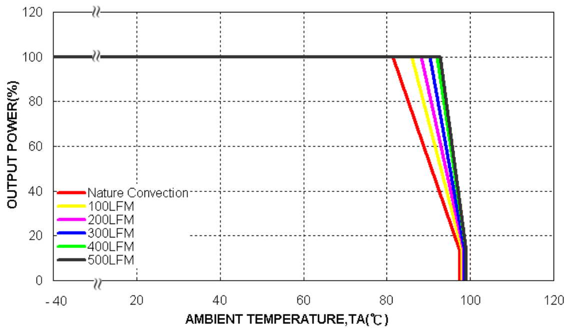
Efficiency versus Output Current



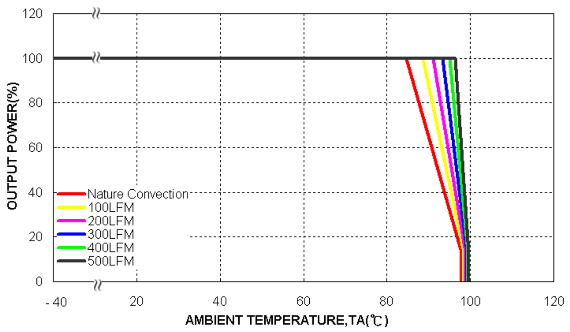
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



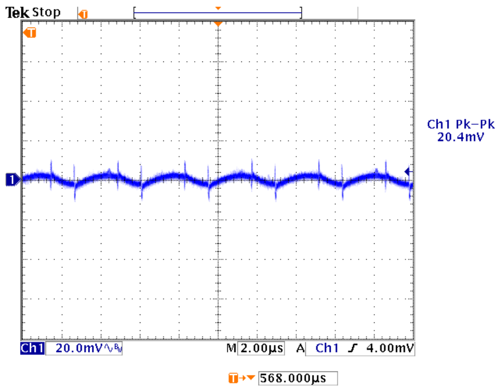
Derating Output Current versus Ambient Temperature and Airflow Vin = Vin(nom)



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

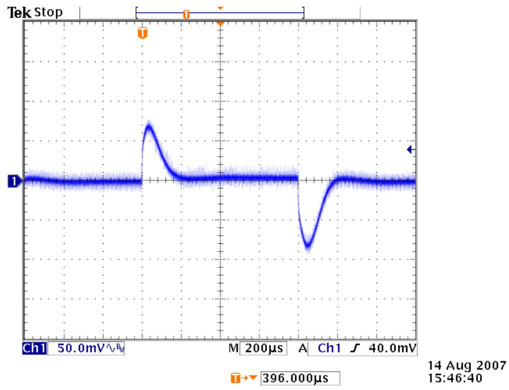
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-12S3P3



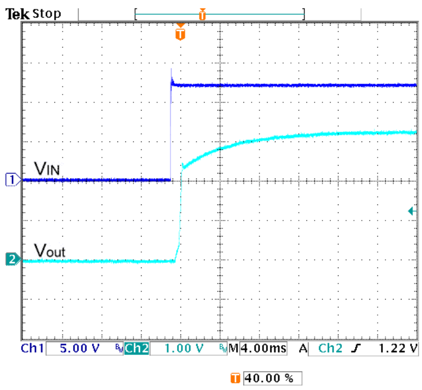
Typical Output Ripple and Noise.

Vin = Vin(nom); Full Load



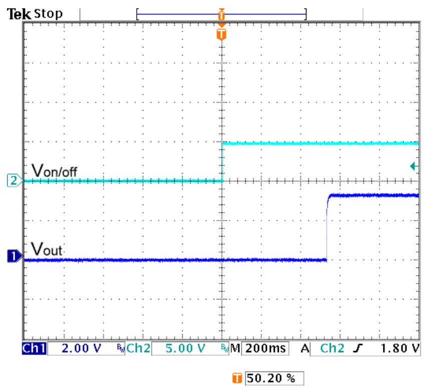
Transient Response to Dynamic Load Change from

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



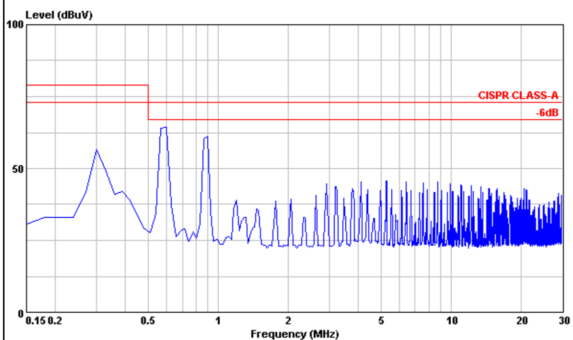
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



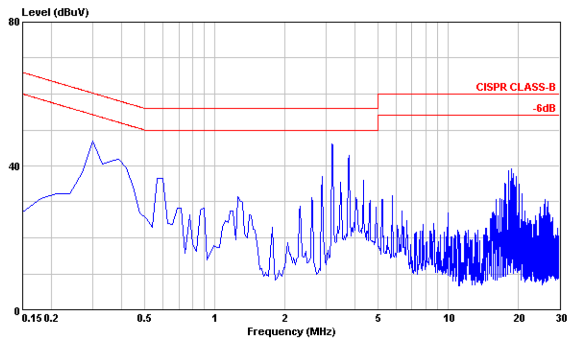
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

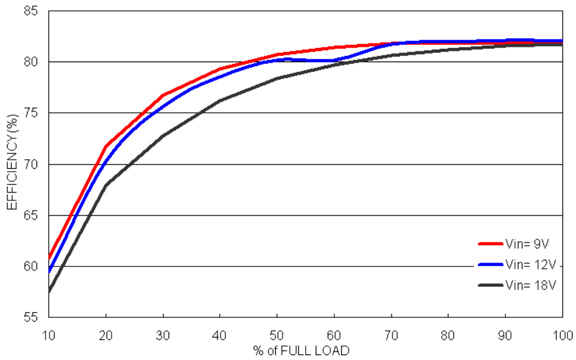


Conduction Emission of EN55022 Class B

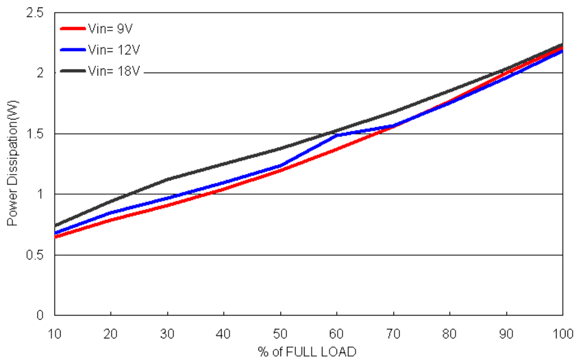
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

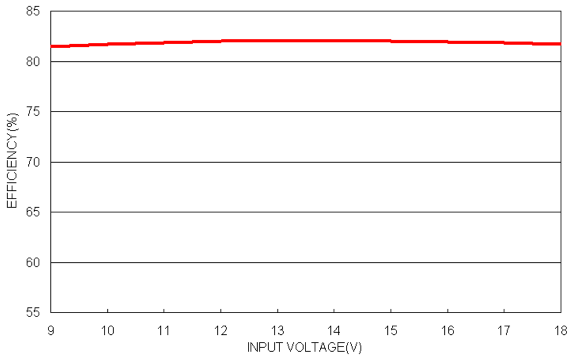
All test conditions are at 25°C.The figures are for PXD10-12S05



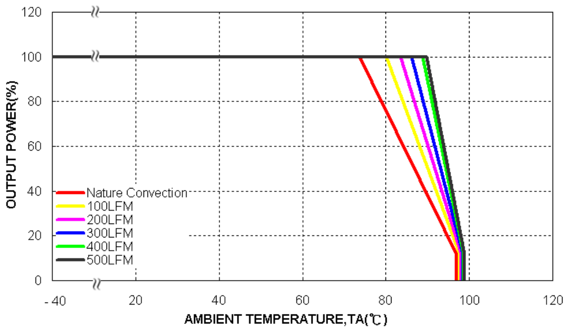
Efficiency versus Output Current



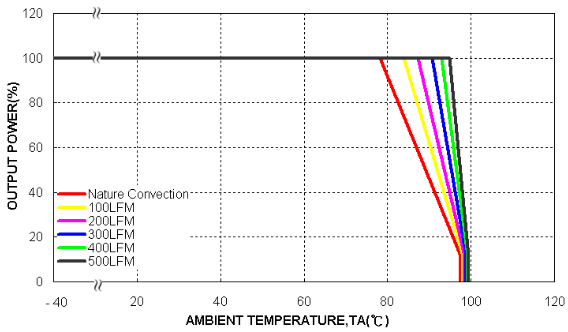
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



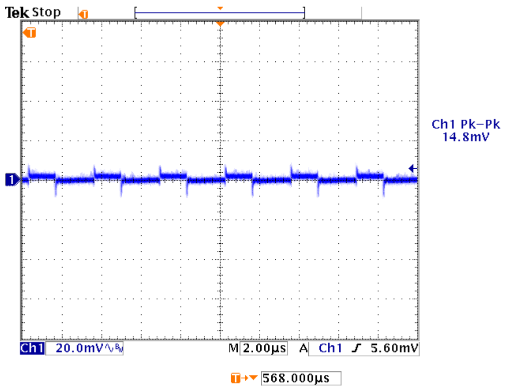
Derating Output Current versus Ambient Temperature and Airflow Vin = Vin(nom)



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

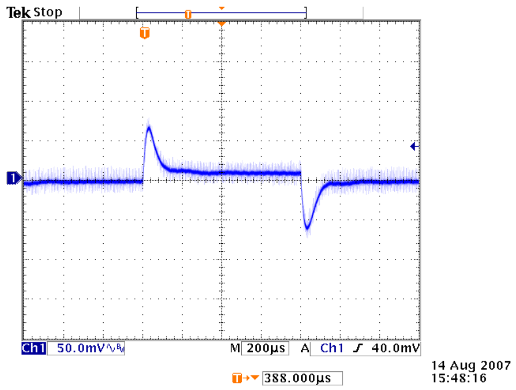
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-12S05



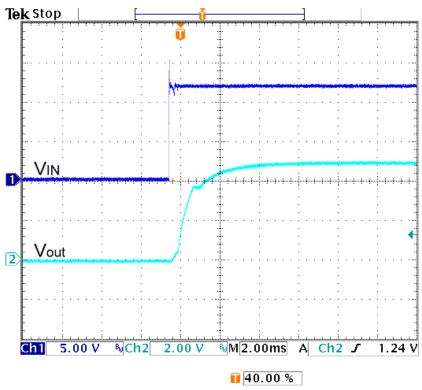
Typical Output Ripple and Noise.

Vin = Vin(nom); Full Load



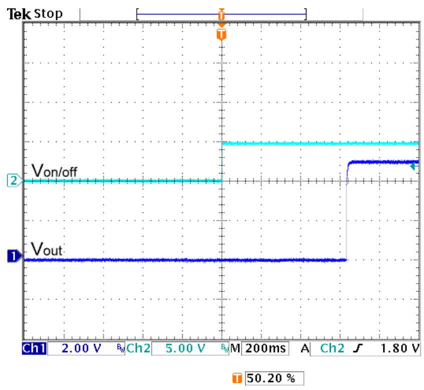
Transient Response to Dynamic Load Change from

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



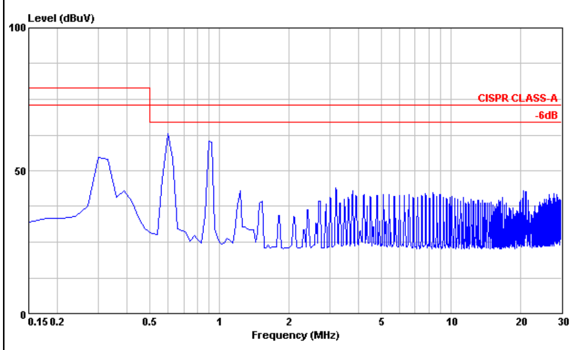
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



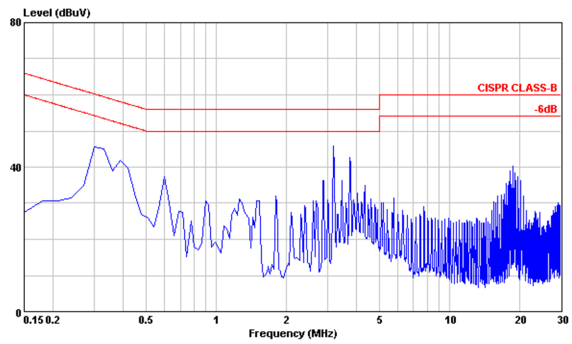
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

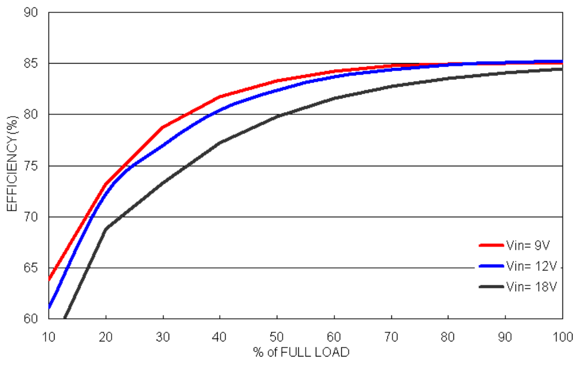


Conduction Emission of EN55022 Class B

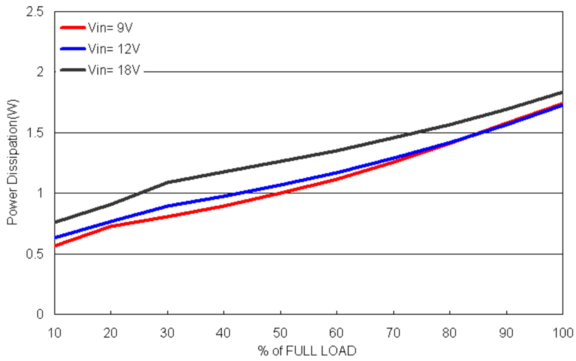
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

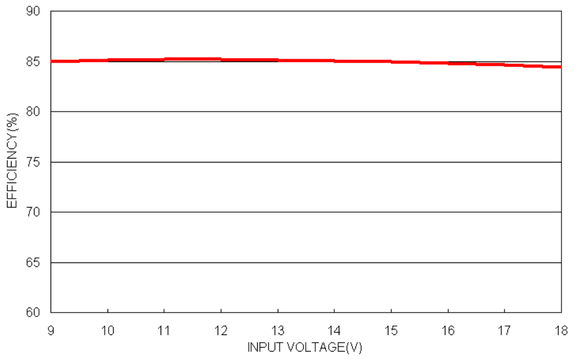
All test conditions are at 25°C.The figures are for PXD10-12S12



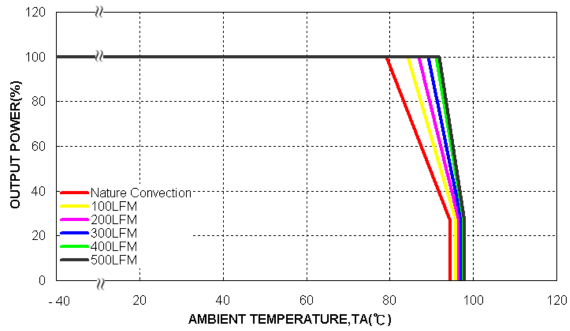
Efficiency versus Output Current



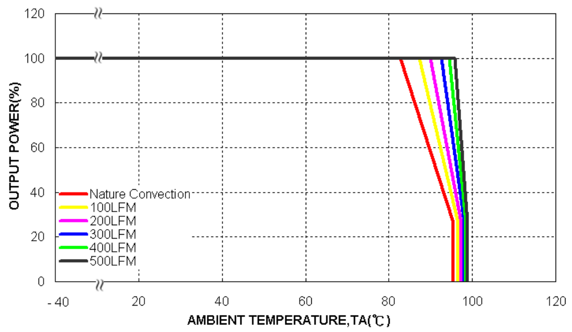
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



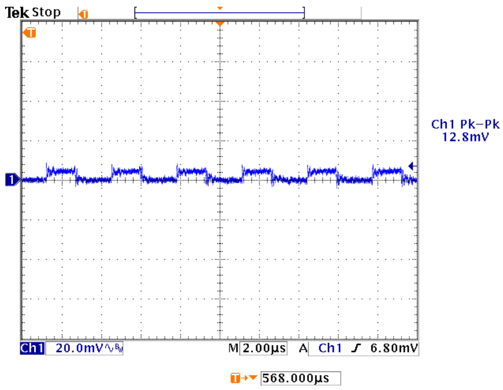
Derating Output Current versus Ambient Temperature and Airflow Vin = Vin(nom)



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

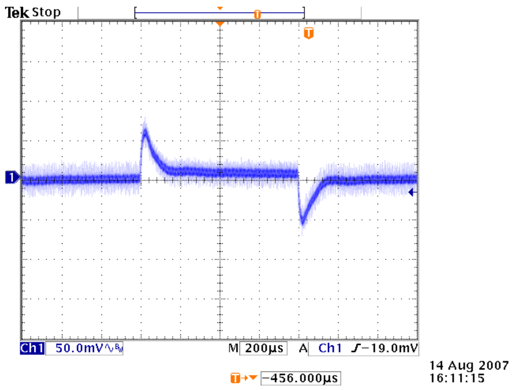
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-12S12



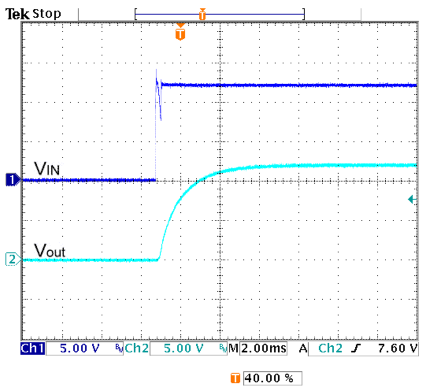
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



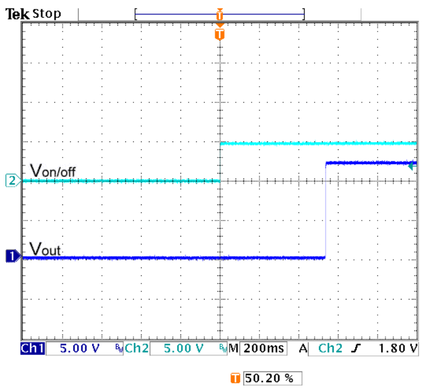
Transient Response to Dynamic Load Change from

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



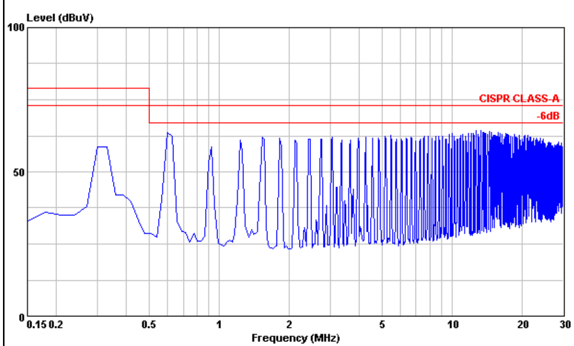
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



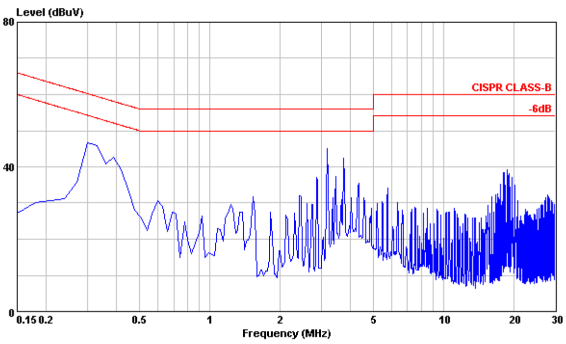
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

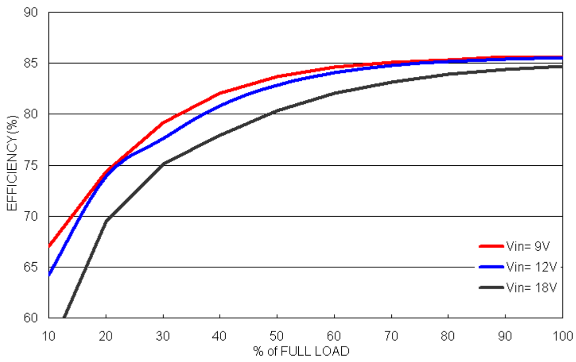


Conduction Emission of EN55022 Class B

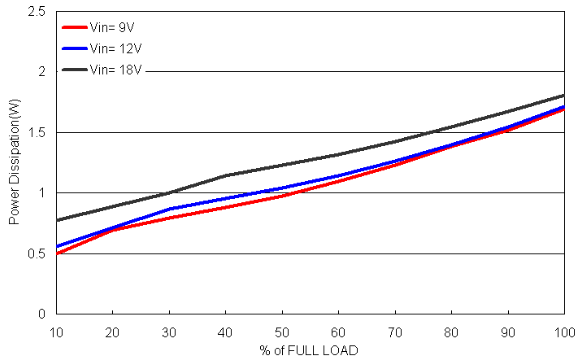
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

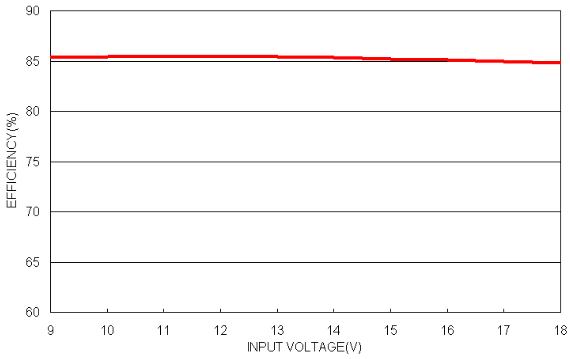
All test conditions are at 25°C.The figures are for PXD10-12S15



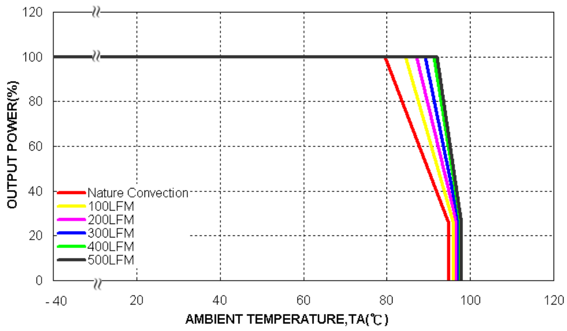
Efficiency versus Output Current



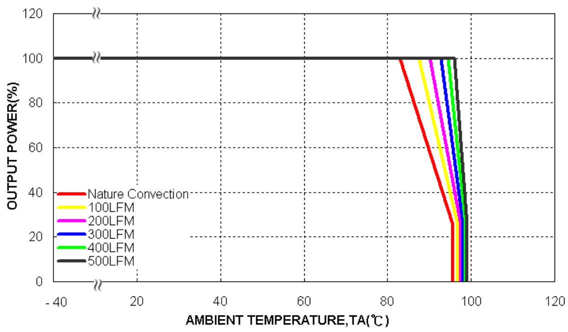
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



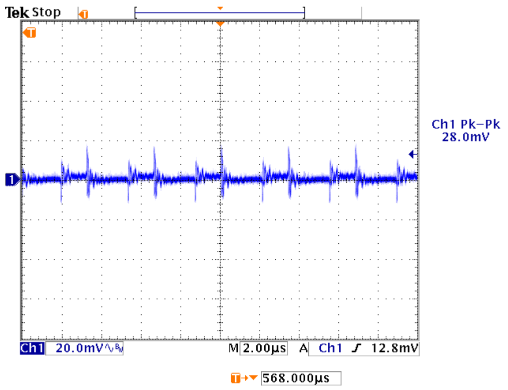
Derating Output Current versus Ambient Temperature and Airflow
Vin = Vin(nom)



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

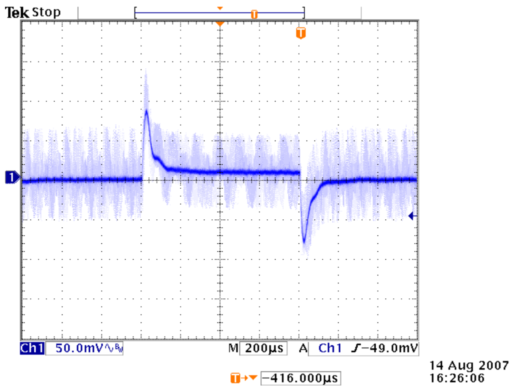
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-12S15



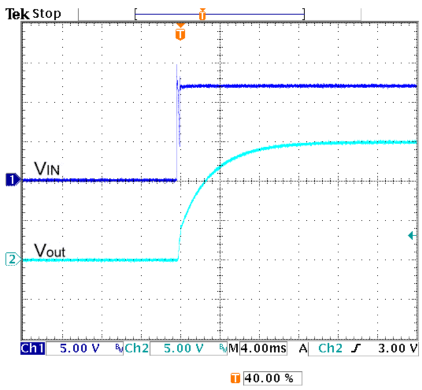
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



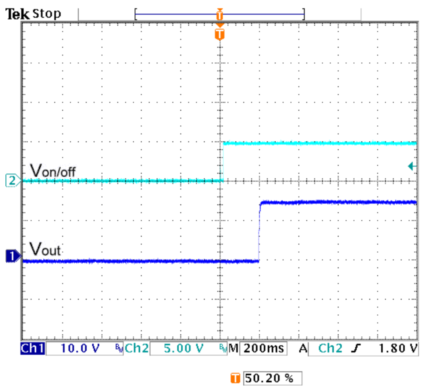
Transient Response to Dynamic Load Change from

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



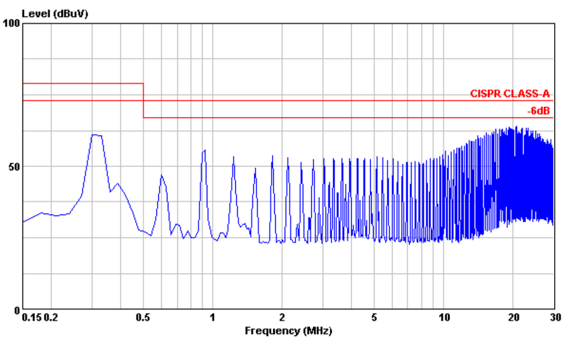
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



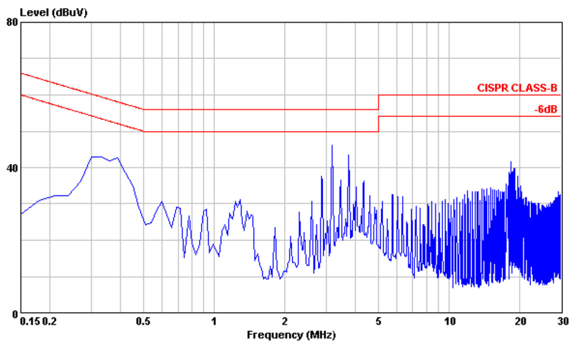
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

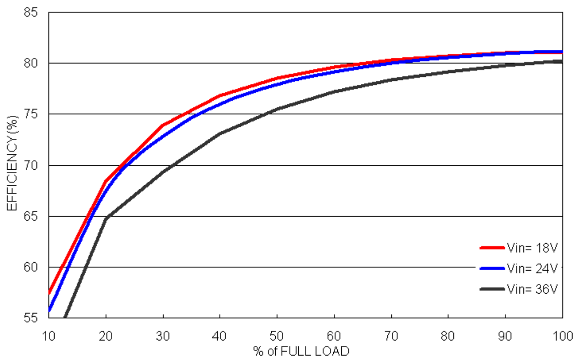


Conduction Emission of EN55022 Class B

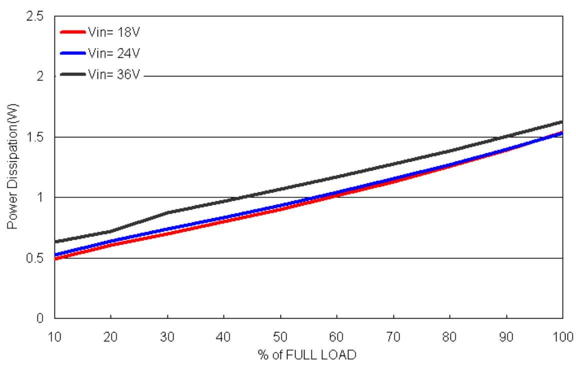
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

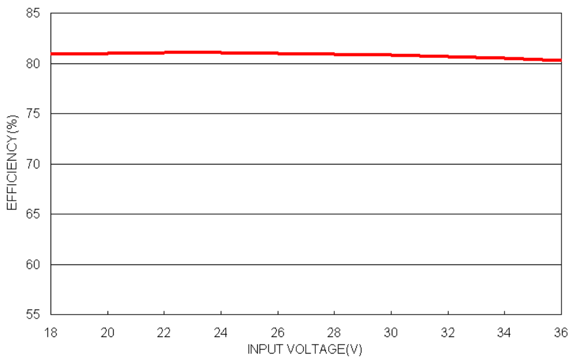
All test conditions are at 25°C.The figures are for PXD10-24S3P3



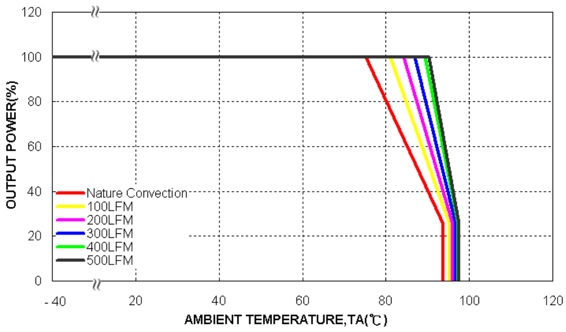
Efficiency versus Output Current



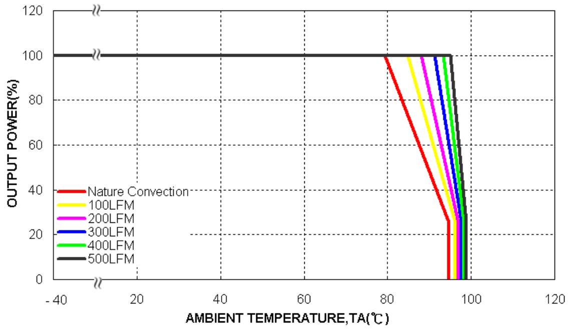
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



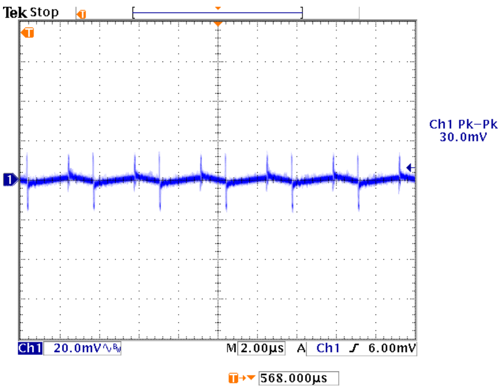
Derating Output Current versus Ambient Temperature and Airflow
Vin = Vin(nom)



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

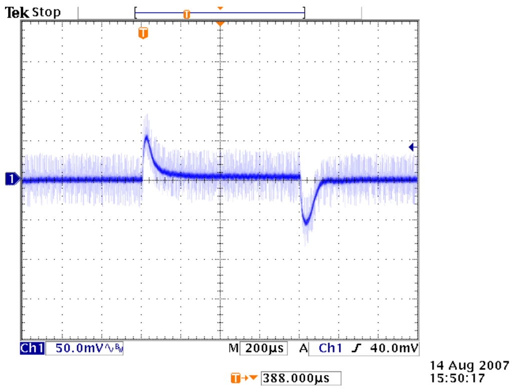
Characteristic Curves (Continued)

All test conditions are at 25°C. The figures are for PXD10-24S3P3



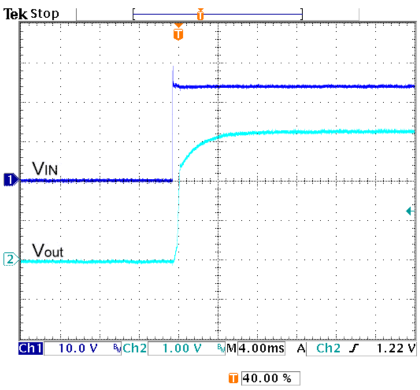
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



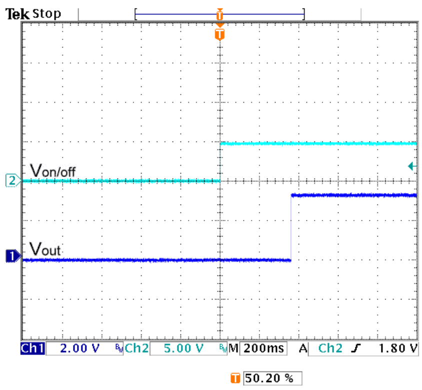
Transient Response to Dynamic Load Change from

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



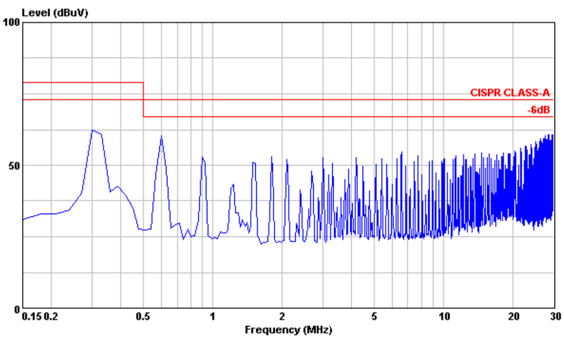
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



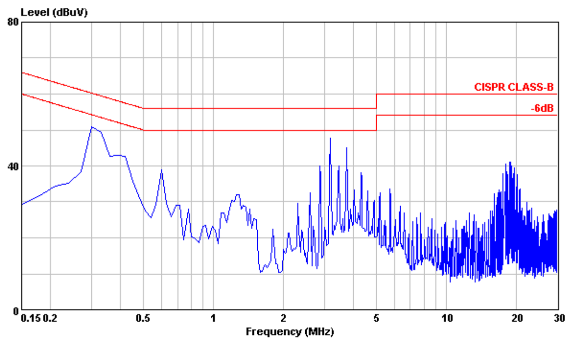
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

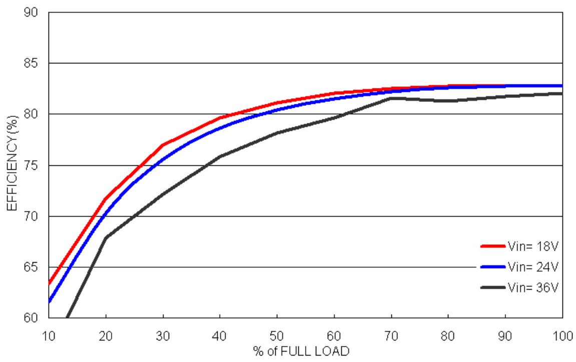


Conduction Emission of EN55022 Class B

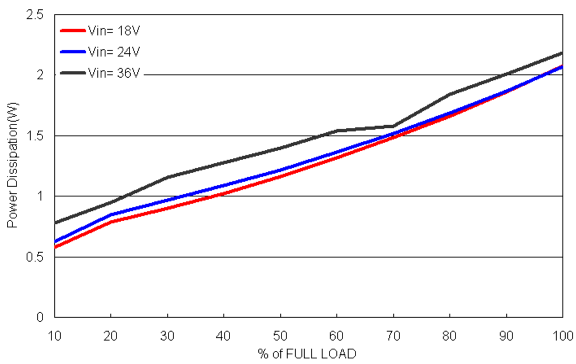
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

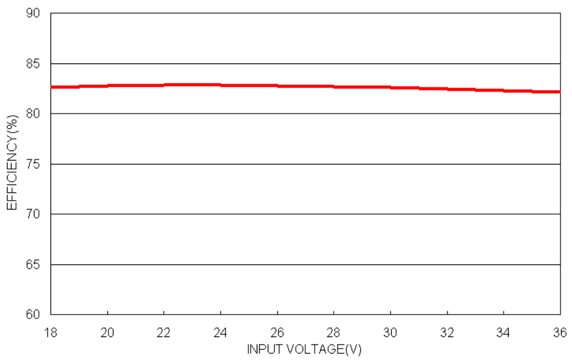
All test conditions are at 25°C.The figures are for PXD10-24S05



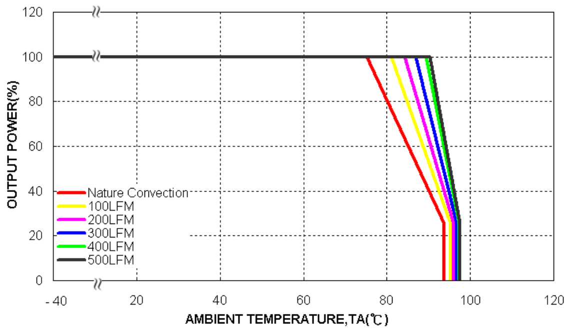
Efficiency versus Output Current



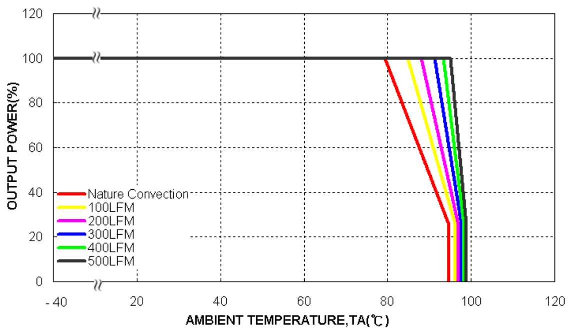
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



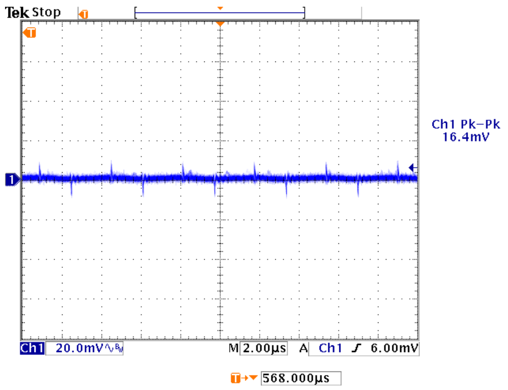
Derating Output Current versus Ambient Temperature and Airflow Vin = Vin(nom)



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

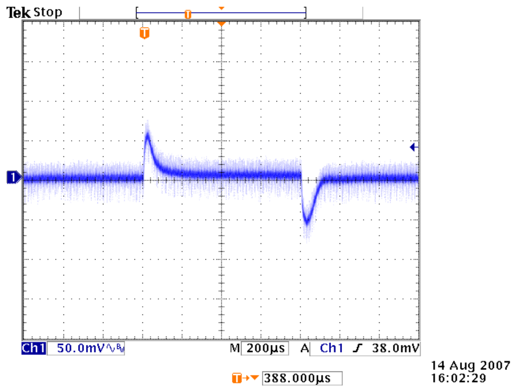
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-24S05



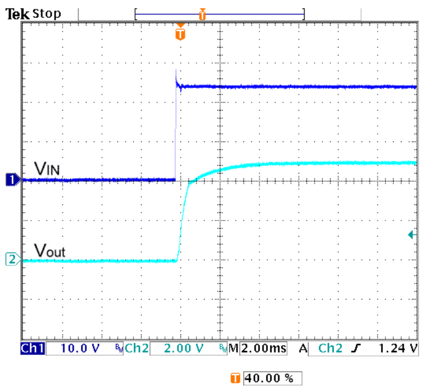
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



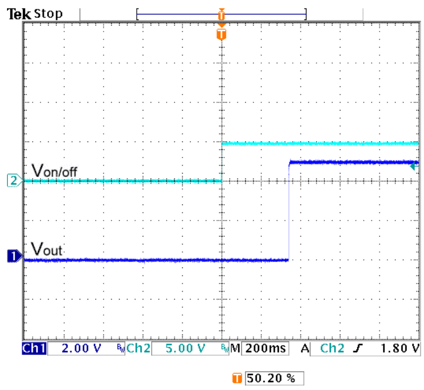
Transient Response to Dynamic Load Change from

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



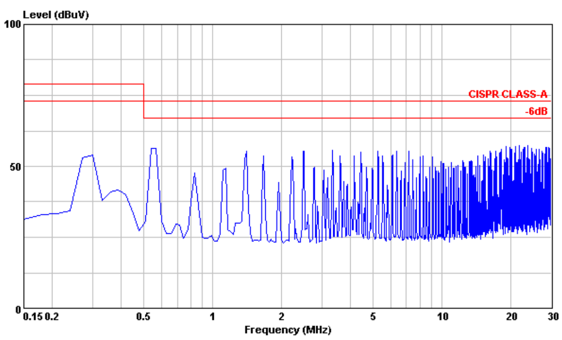
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



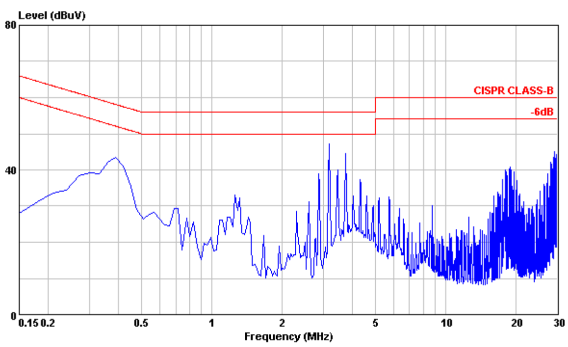
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

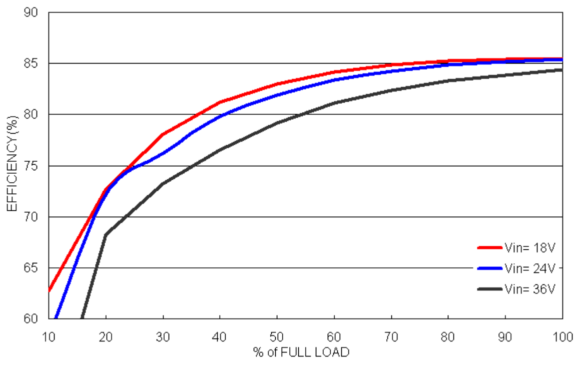


Conduction Emission of EN55022 Class B

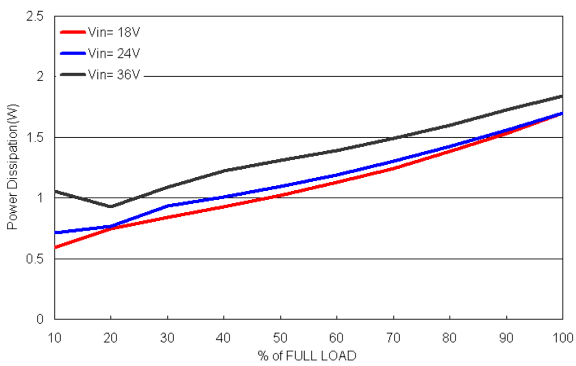
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

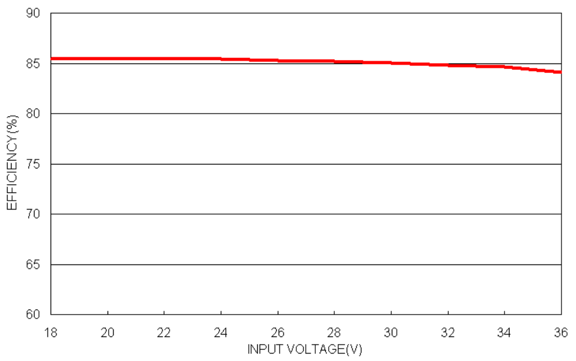
All test conditions are at 25°C.The figures are for PXD10-24S12



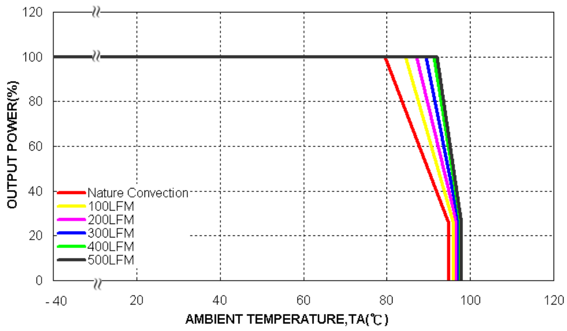
Efficiency versus Output Current



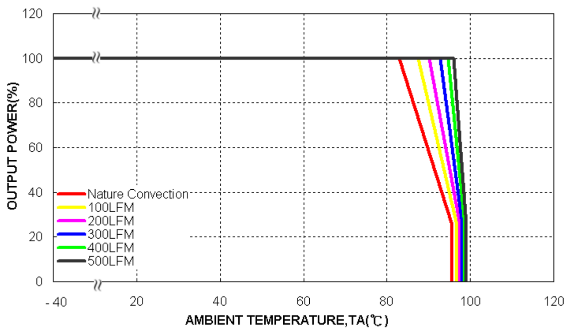
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



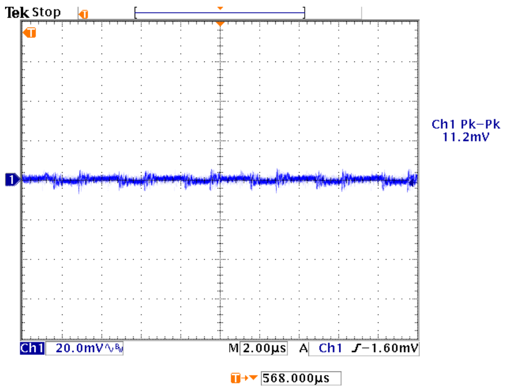
Derating Output Current versus Ambient Temperature and Airflow Vin = Vin(nom)



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

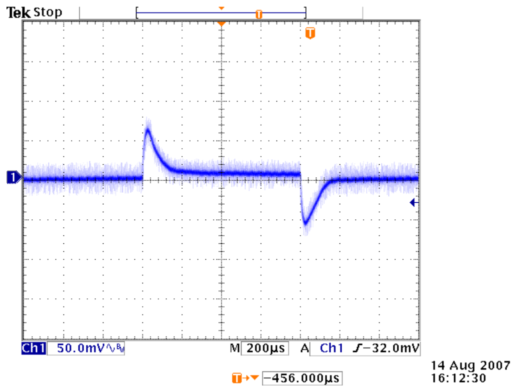
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-24S12



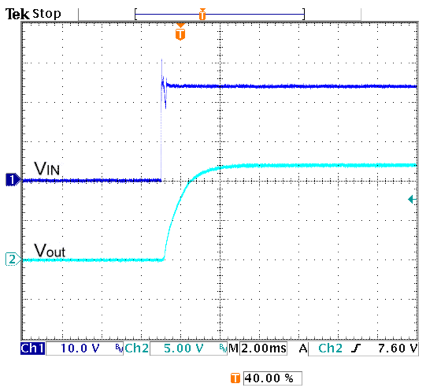
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



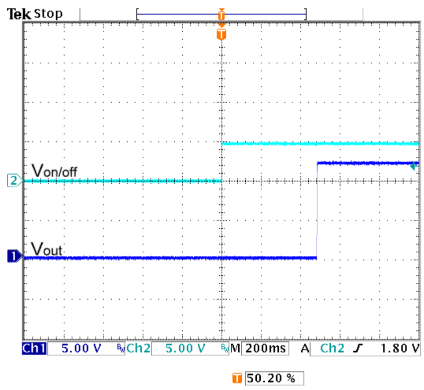
Transient Response to Dynamic Load Change from

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



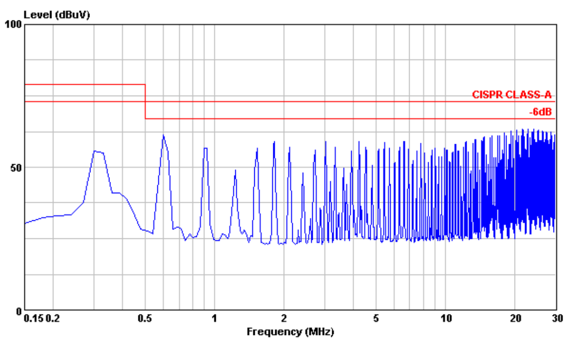
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



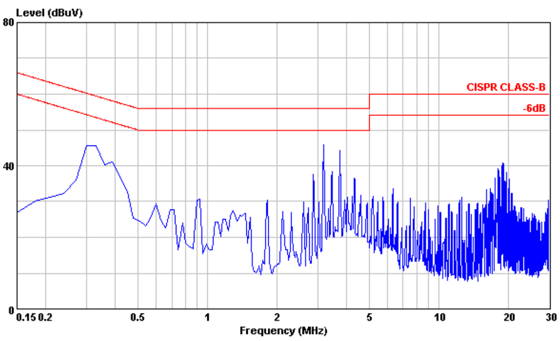
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

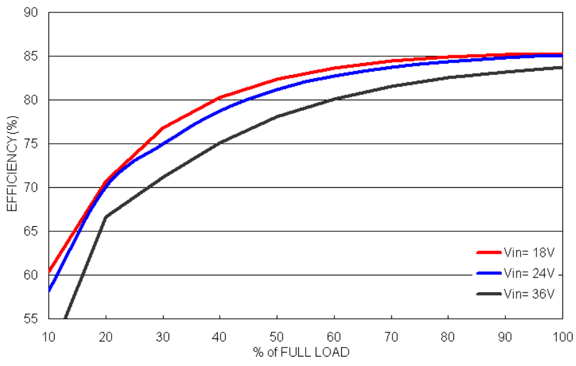


Conduction Emission of EN55022 Class B

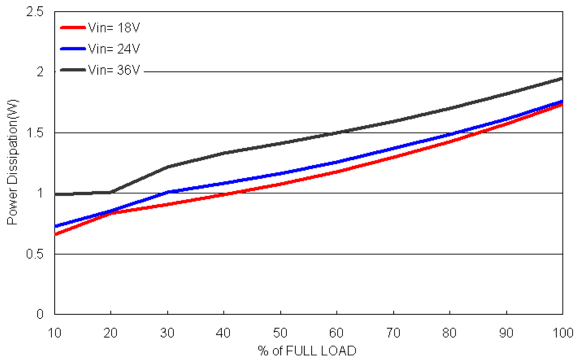
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

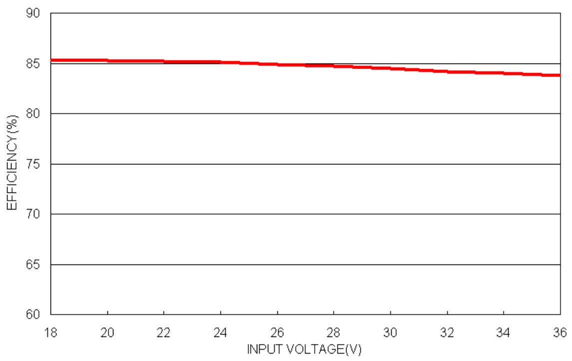
All test conditions are at 25°C.The figures are for PXD10-24S15



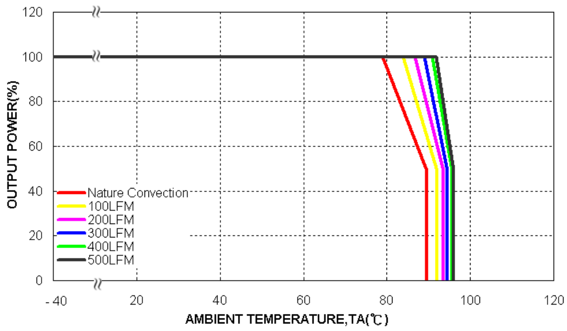
Efficiency versus Output Current



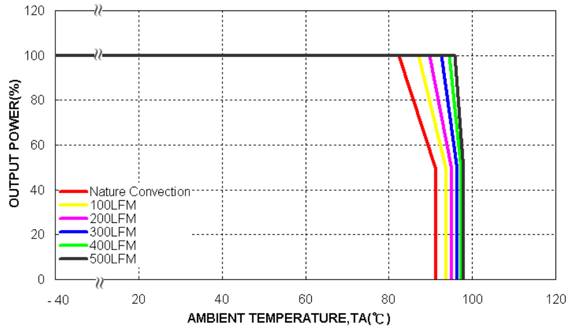
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



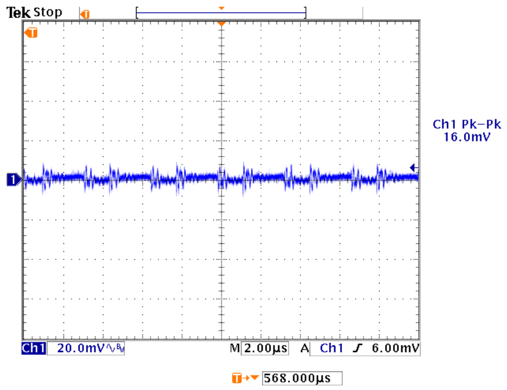
Derating Output Current versus Ambient Temperature and Airflow
Vin = Vin(nom)



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

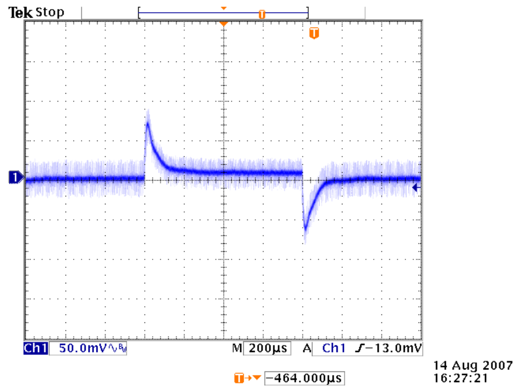
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-24S15



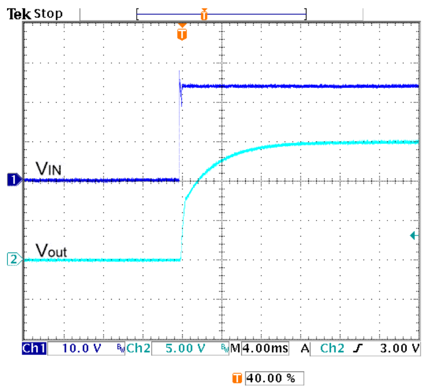
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



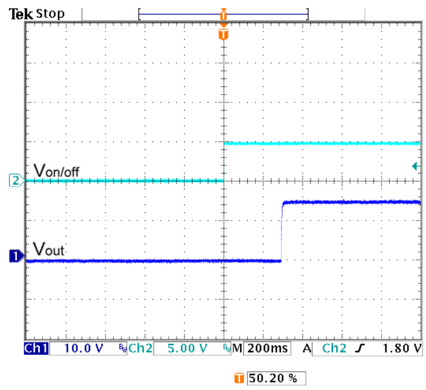
Transient Response to Dynamic Load Change from

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



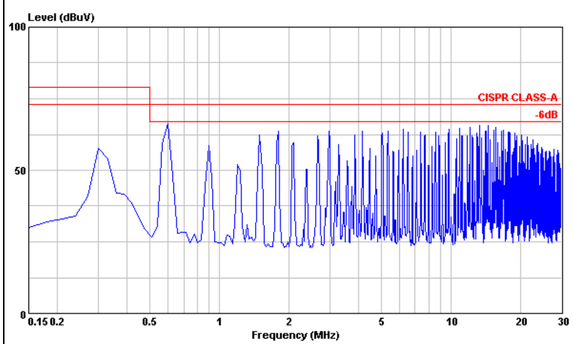
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



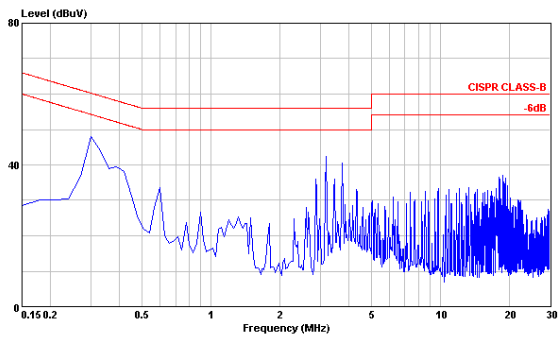
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

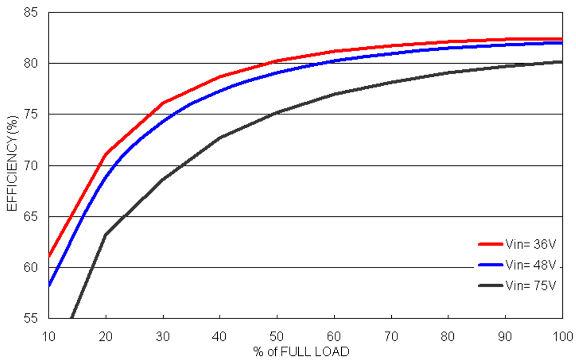


Conduction Emission of EN55022 Class B

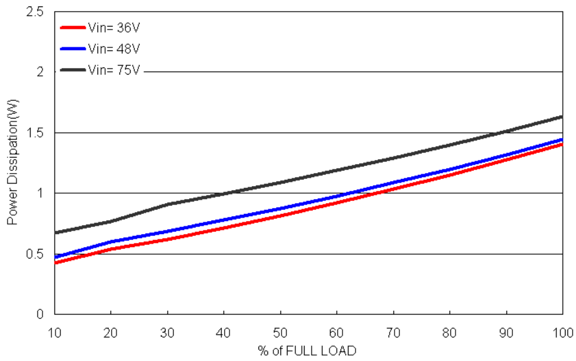
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

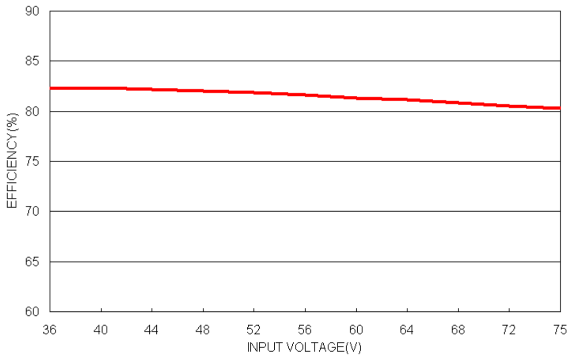
All test conditions are at 25°C.The figures are for PXD10-48S3P3



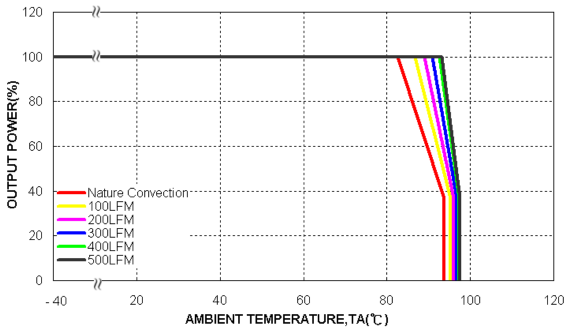
Efficiency versus Output Current



Power Dissipation versus Output Current

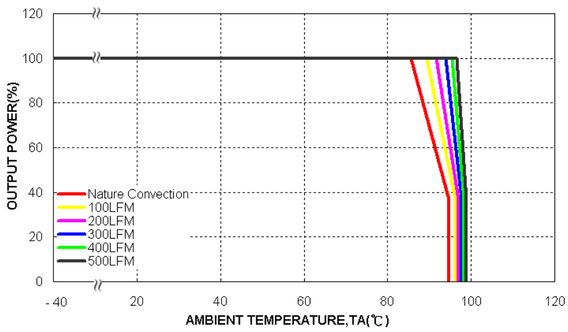


Efficiency versus Input Voltage. Full Load



Derating Output Current versus Ambient Temperature and Airflow

Vin = Vin(nom)

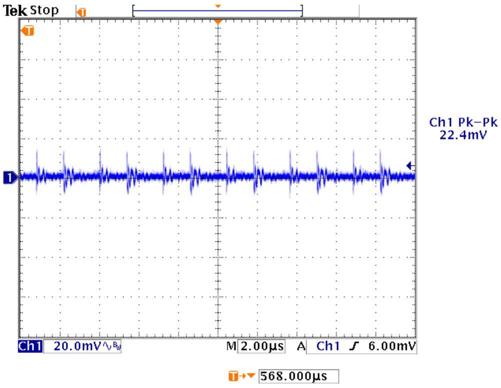


Derating Output Current Versus Ambient Temperature with Heat-Sink

and Airflow ,Vin = Vin(nom)

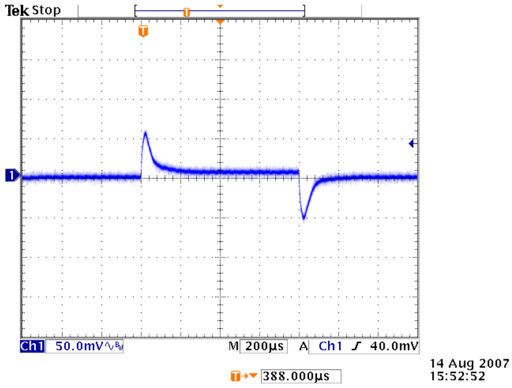
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-48S3P3



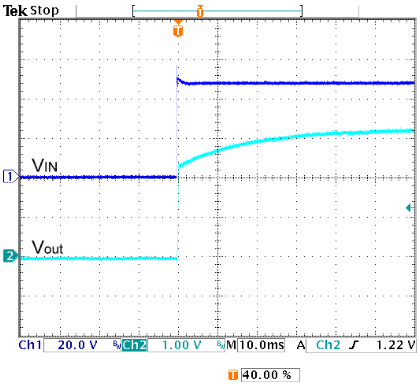
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



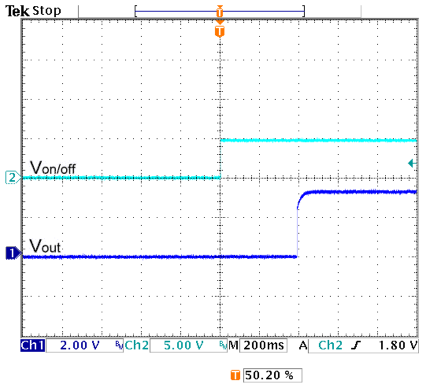
Transient Response to Dynamic Load Change from

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



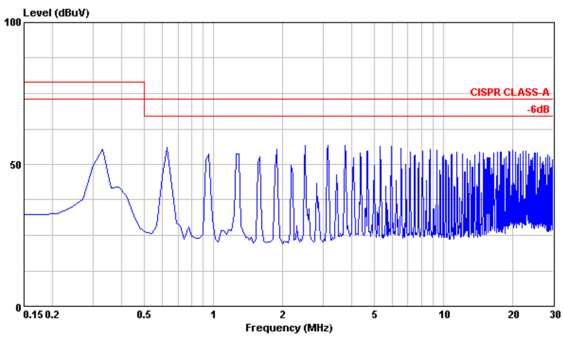
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



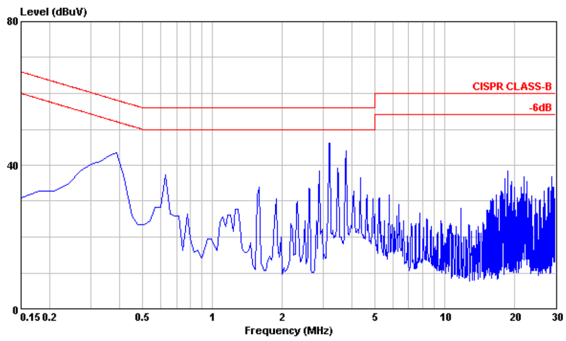
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

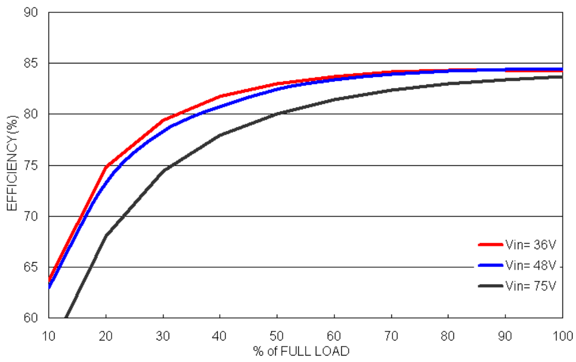


Conduction Emission of EN55022 Class B

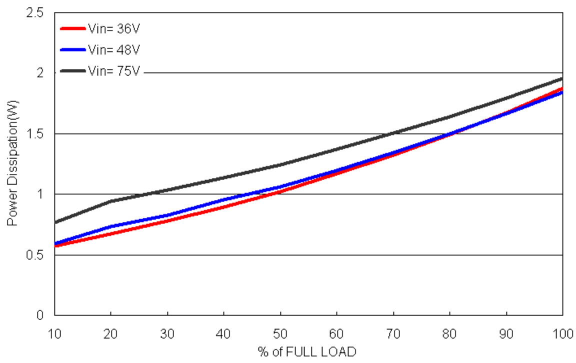
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

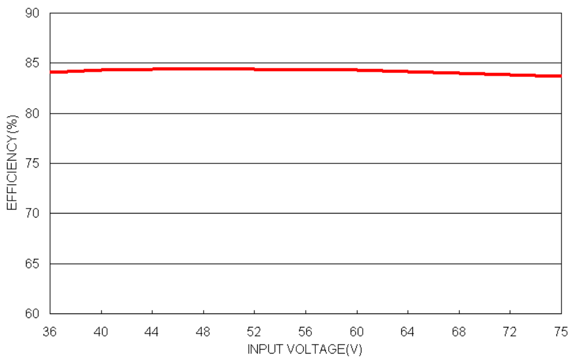
All test conditions are at 25°C.The figures are for PXD10-48S05



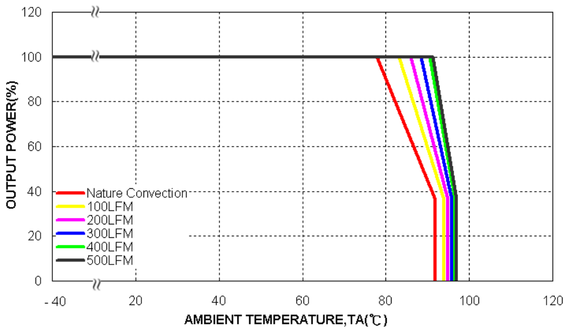
Efficiency versus Output Current



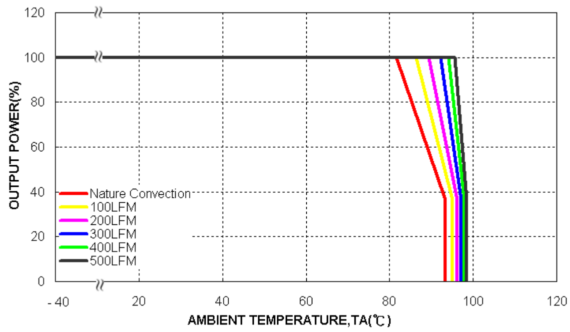
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



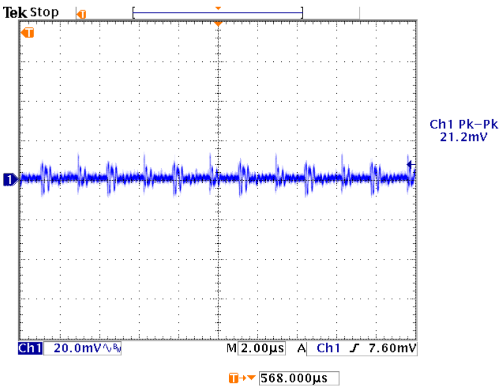
Derating Output Current versus Ambient Temperature and Airflow Vin = Vin(nom)



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

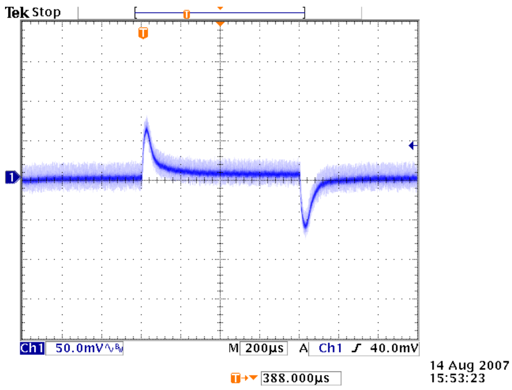
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-48S05



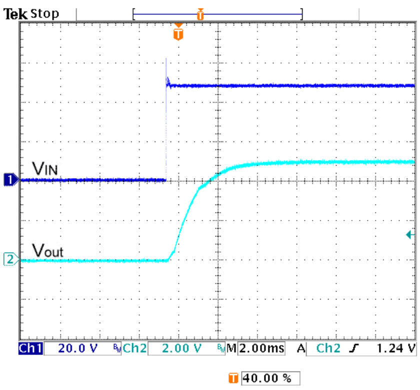
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



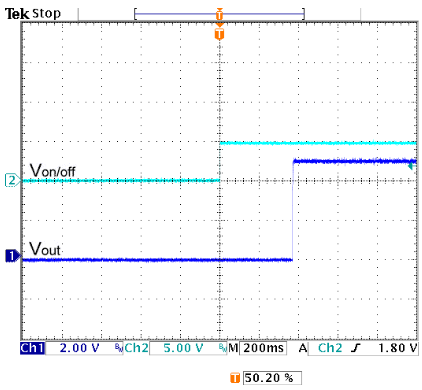
Transient Response to Dynamic Load Change from

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



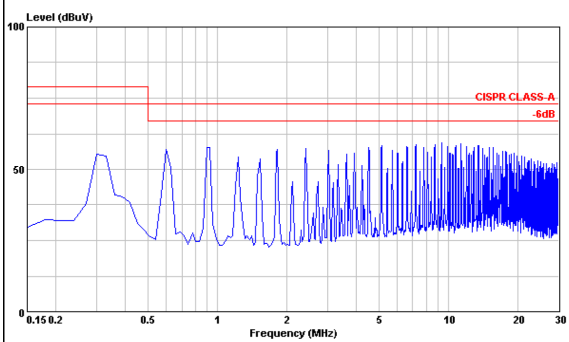
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



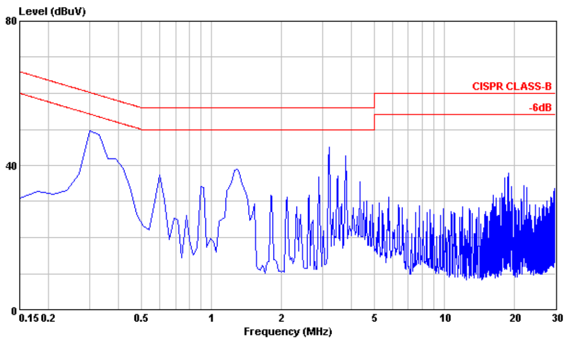
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

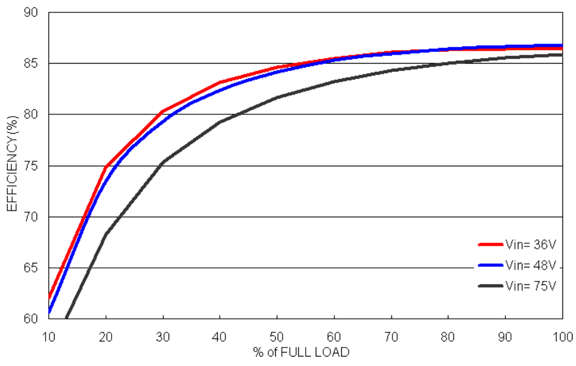


Conduction Emission of EN55022 Class B

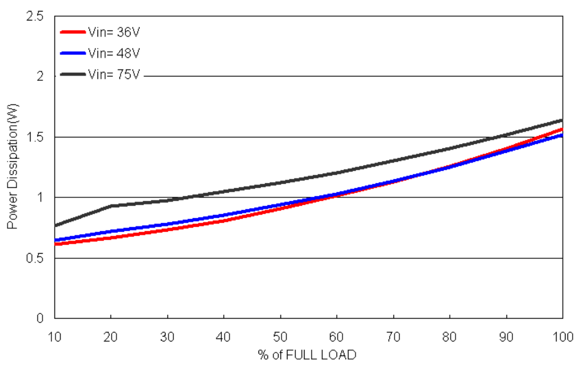
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

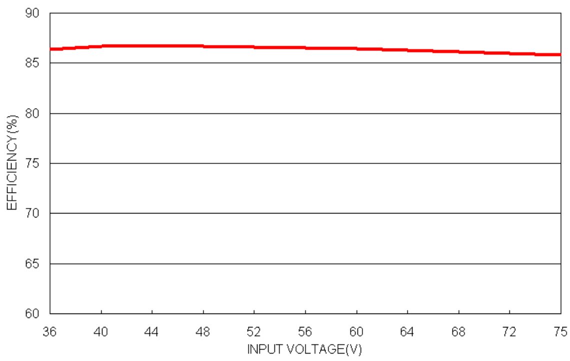
All test conditions are at 25°C.The figures are for PXD10-48S12



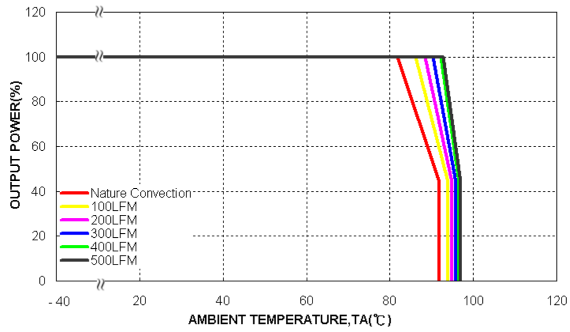
Efficiency versus Output Current



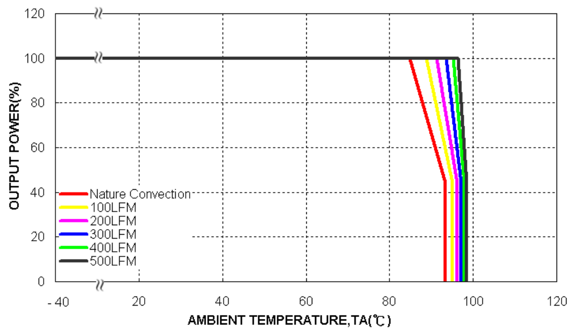
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



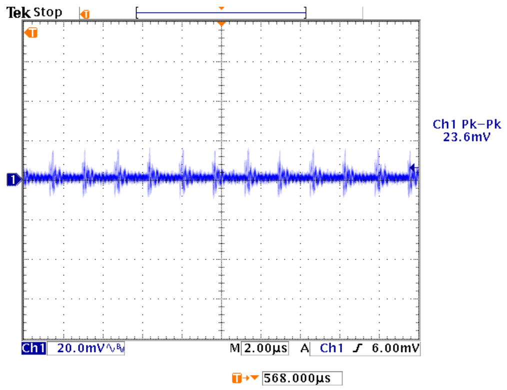
Derating Output Current versus Ambient Temperature and Airflow Vin = Vin(nom)



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

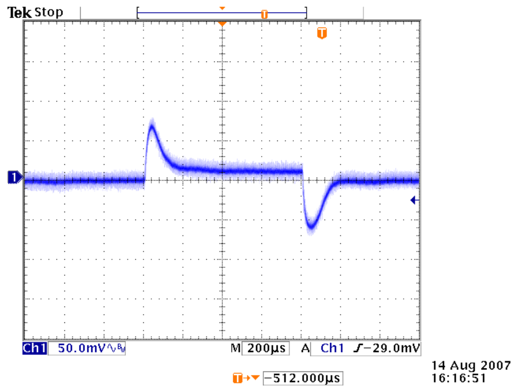
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-48S12



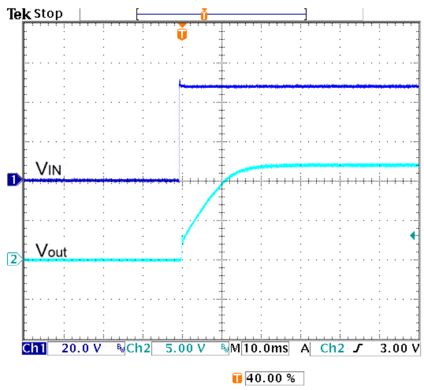
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



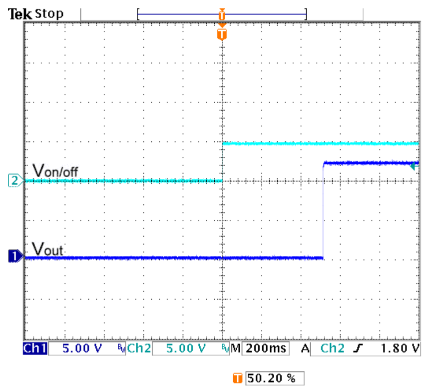
Transient Response to Dynamic Load Change from

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



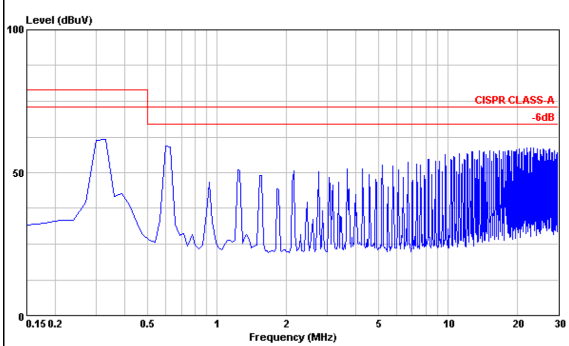
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



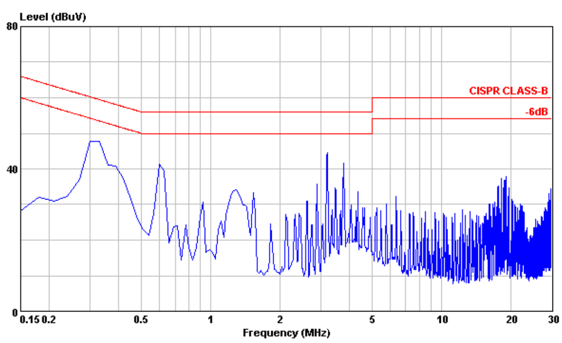
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

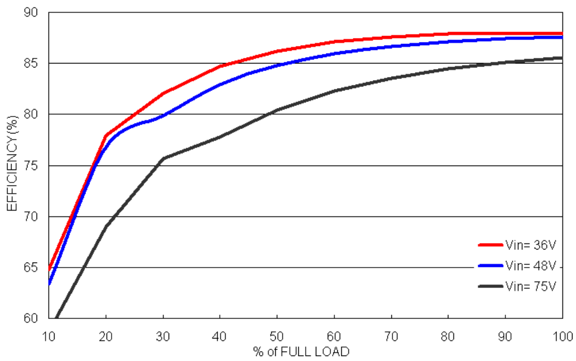


Conduction Emission of EN55022 Class B

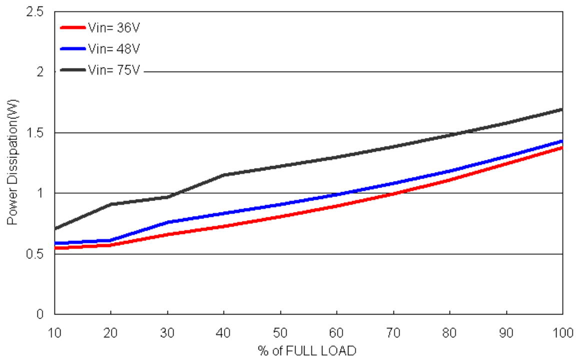
Vin = Vin(nom) ; Full Load

Characteristic Curves (Continued)

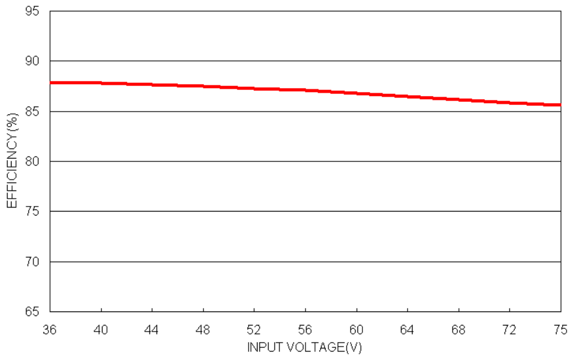
All test conditions are at 25°C.The figures are for PXD10-48S15



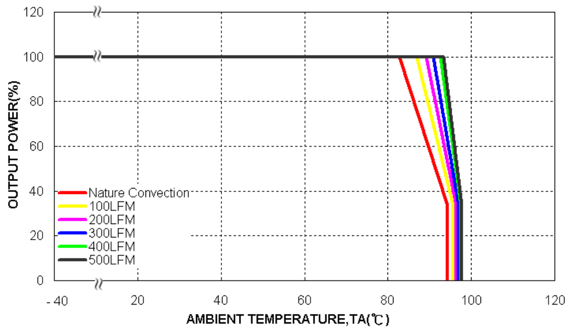
Efficiency versus Output Current



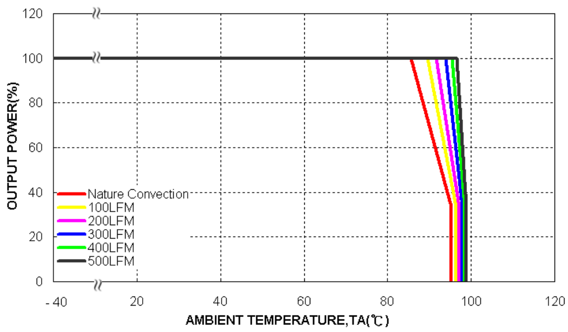
Power Dissipation versus Output Current



Efficiency versus Input Voltage. Full Load



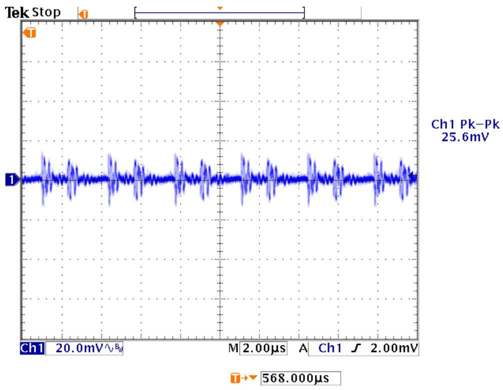
Derating Output Current versus Ambient Temperature and Airflow
Vin = Vin(nom)



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

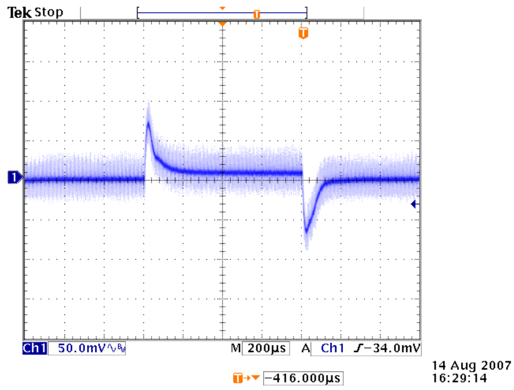
Characteristic Curves (Continued)

All test conditions are at 25°C.The figures are for PXD10-48S15



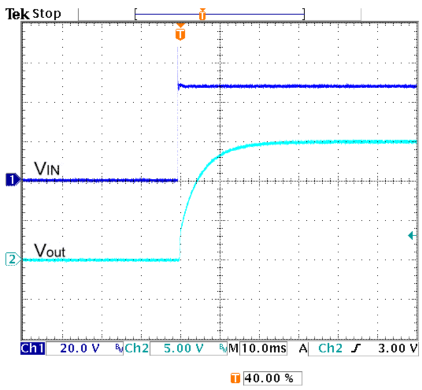
Typical Output Ripple and Noise.

Vin = Vin(nom) ; Full Load



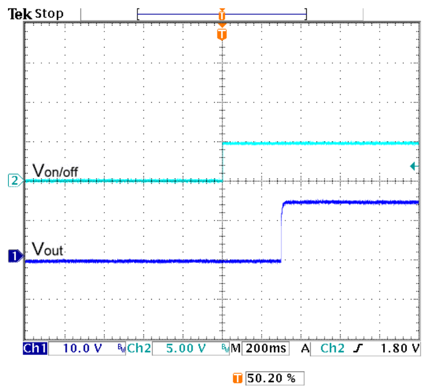
Transient Response to Dynamic Load Change from

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



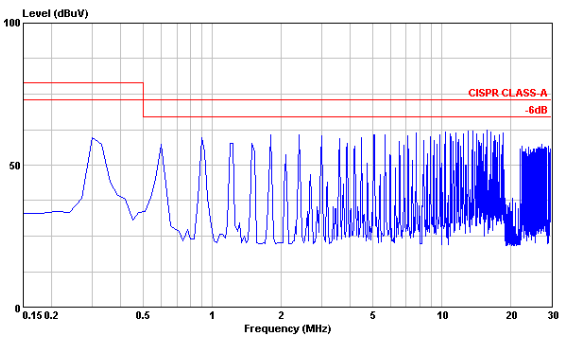
Typical Input Start-Up and Output Rise Characteristic

Vin = Vin(nom) ; Full Load



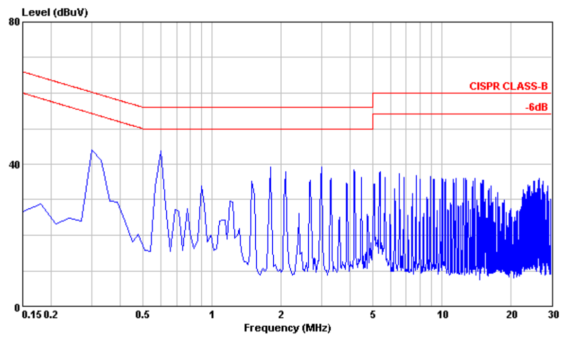
Using ON/OFF Voltage Start-Up and Vo Rise Characteristic

Vin = Vin(nom) ; Full Load



Conduction Emission of EN55022 Class A

Vin = Vin(nom) ; Full Load

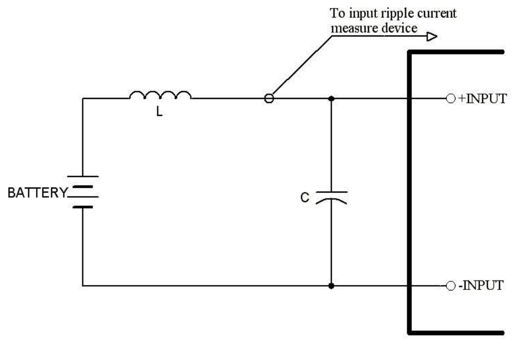


Conduction Emission of EN55022 Class B

Vin = Vin(nom) ; Full Load

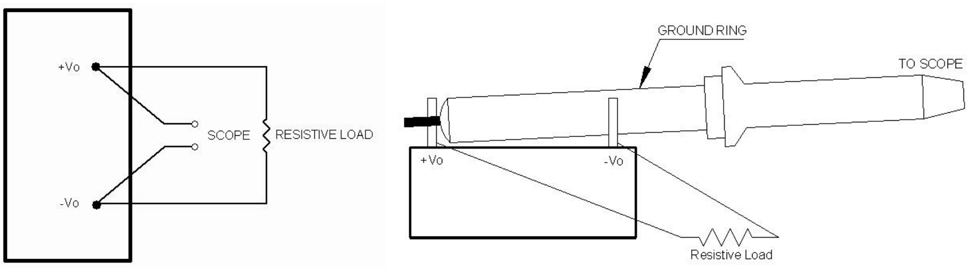
Test Configurations

Input reflected-ripple current measurement test:

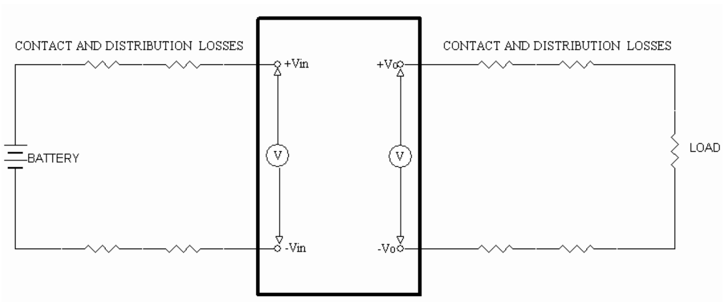


Component	Value	Voltage	Reference
L	12μH	----	----
C	100μF	100V	Aluminum Electrolytic Capacitor

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



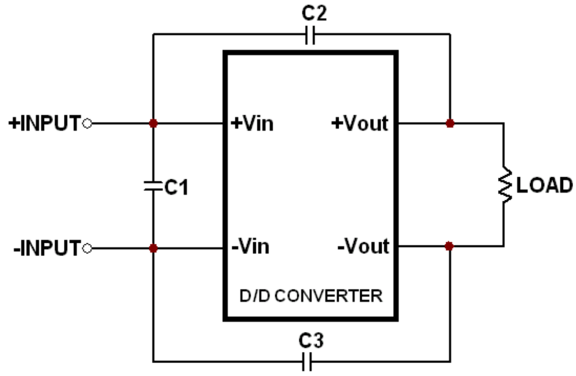
Output voltage and efficiency measurement test:



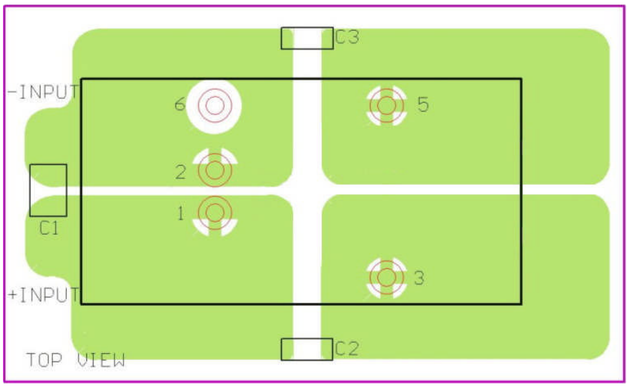
Note: All measurements are taken at the module terminals.

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

EMC considerations



Suggested schematic for EN55022 conducted emissions Class A limits



Recommended layout with input filter

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

PXD10-12Sxx

Component	Value	Voltage	Reference
C1	2.2µF	25V	1206 MLCC
C2,C3	1000pF	2KV	1808 MLCC

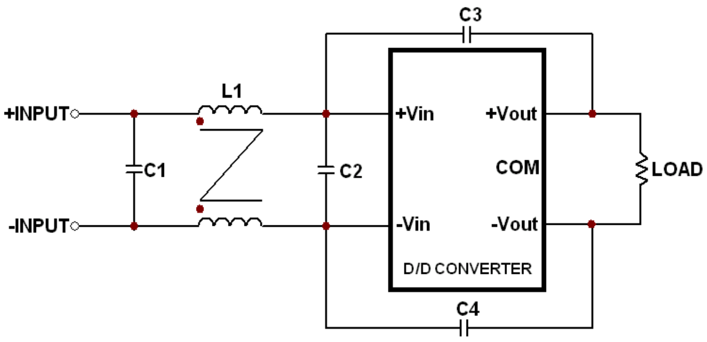
PXD10-24Sxx

Component	Value	Voltage	Reference
C1	----	----	----
C2,C3	1000pF	2KV	1808 MLCC

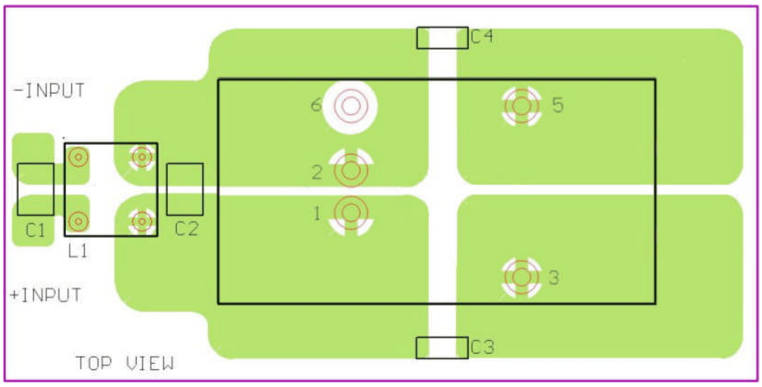
PXD10-48Sxx

Component	Value	Voltage	Reference
C1	----	----	----
C2,C3	1000pF	2KV	1808 MLCC

EMC considerations (Continued)



Suggested schematic for EN55022 conducted emissions Class B limits



Recommended layout with input filter

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

PXD10-12Sxx

Component	Value	Voltage	Reference
C1	3.3μF	50V	1812 MLCC
C3,C4	1000pF	2KV	1808 MLCC
L1	325μH	----	Common Choke

PXD10-24Sxx

Component	Value	Voltage	Reference
C1	2.2μF	50V	1812 MLCC
C3,C4	1000pF	2KV	1808 MLCC
L1	325μH	----	Common Choke

PXD10-48Sxx

Component	Value	Voltage	Reference
C1,C2	2.2μF	100V	1812 MLCC
C3,C4	1000pF	2KV	1808 MLCC
L1	325μH	----	Common Choke

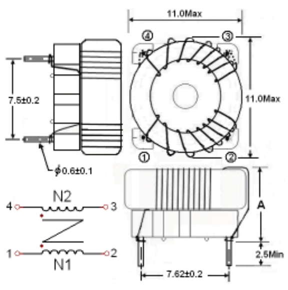
This Common Choke L1 has been define as follows:

- ■

  L-325μH±35% / DCR-35mΩ, max

  A height-8.8 mm, Max

  - ■ Test condition-100KHz / 100mV
  - ■ Recommended through hole-Φ0.8mm
- ■ All dimensions in millimeters



Input Source Impedance

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

Output Over Current Protection

When excessive output currents occur in the system, circuit protection is required on all power supplies. Normally, overload current is maintained at approximately 130 percent of rated current for the PXD10-xxSxx series.

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

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 power supply for a given time and then tries to restart the power supply. If the over-load condition has been removed, the power supply will start and operate normally; otherwise, the controller will see another over-current event and shut off the power supply, 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.

The hiccup operation can be done in various ways. For example, one can start hiccup operation any time an over-current event is detected or prohibit hiccup during a designated start-up interval (usually a few milliseconds). The reason for the latter operation is that during start-up, the power supply needs to provide extra current to charge up the output capacitor. Thus the current demand during start-up is usually larger than during normal operation and it is easier for an over-current event to occur. If the power supply starts to hiccup once there is an over-current, it might never start up successfully. Hiccup mode protection will give the best protection for a power supply against over current situations, since it will limit the average current to the load at a low level, thus reducing power dissipation and case temperature in the power devices.

Output Over Voltage Protection

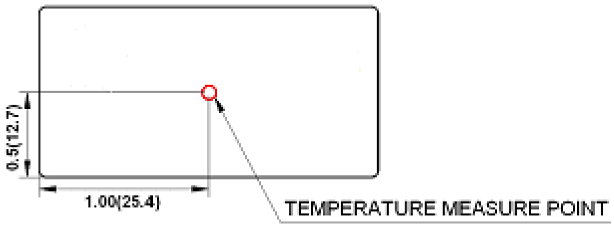
The output over-voltage protection consists of output Zener diode that monitors the voltage on the output terminals. If the voltage on the output terminals exceeds the over-voltage protection threshold, then the Zener diode clamps the output voltage.

Short Circuit Protection

Continuous, hiccup and auto-recovery mode.

Thermal Consideration

The power module 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 temperature of the power module is 100°C, lowering this temperature yields higher reliability.



TOP VIEW

Remote ON/OFF Control (Option)

Remote control is an optional feature.

Positive logic:

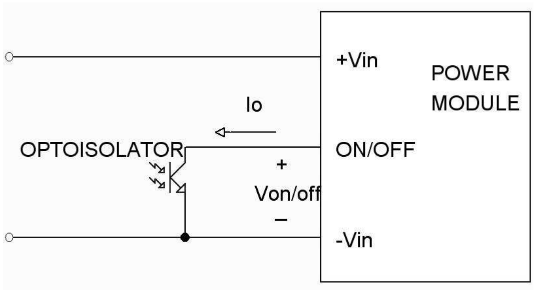
Turns the module On during logic High on the On/Off pin and turns Off during logic Low.

Negative logic:

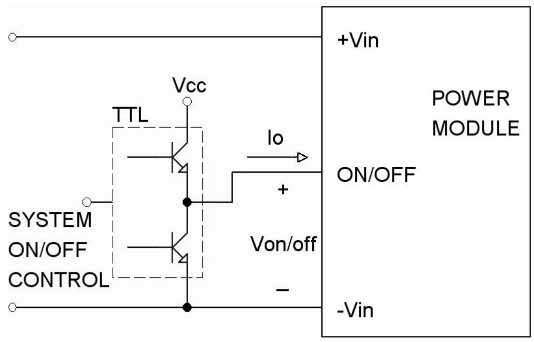
Turns the module On during logic Low on the On/Off pin and turns Off during logic High.

The On/Off pin is an open collector/drain logic input signal (Von/off) that referenced to $-V_{IN}$.

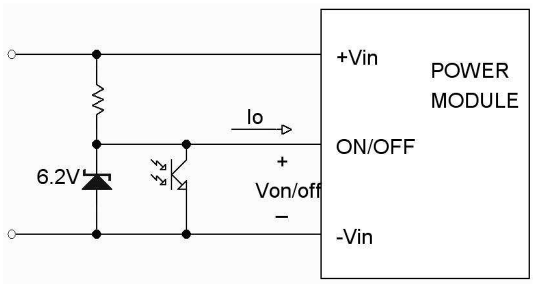
Remote On/Off Implementation



Isolated-Closure Remote On/Off



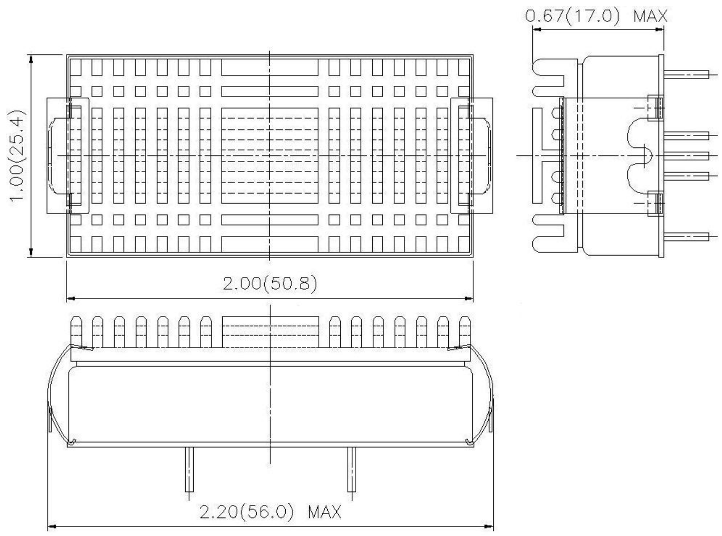
Level Control Using TTL Output



Level Control Using Line Voltage

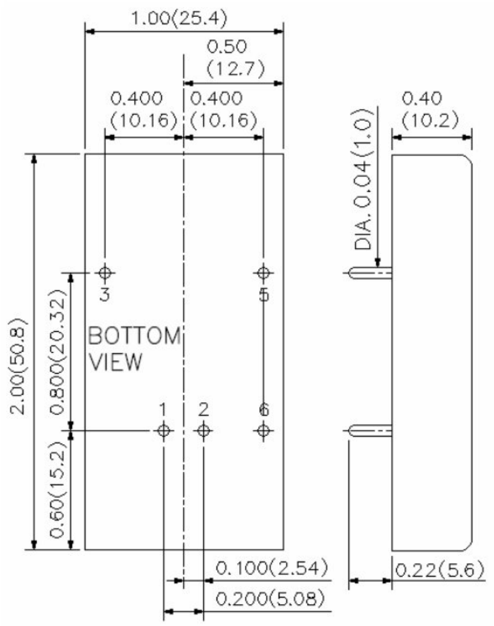
Heat Sink

Use heat-sink (7G-0020A) for lowering temperature and increased reliability of the module.



All dimensions in Inches (mm)

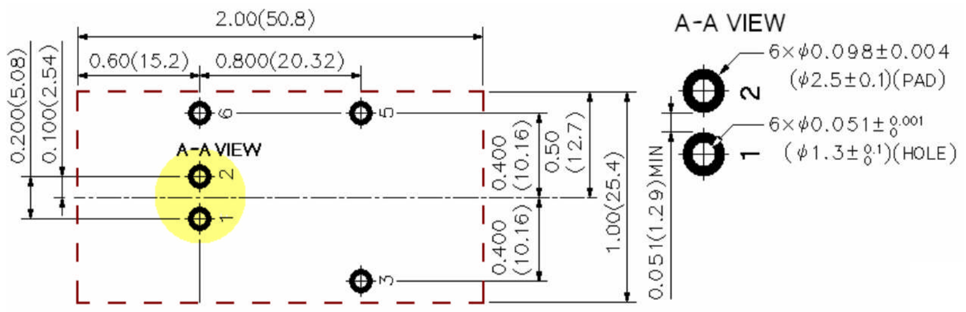
Mechanical Data



PIN CONNECTION	
Pin	Function
1	+ INPUT
2	- INPUT
3	+ OUTPUT
5	- OUTPUT
6	CTRL (Option)

1. All dimensions in Inches (mm)
   Tolerance-x.xx±0.02 (x.x±0.5)
   x.xxx±0.01 (x.xx±0.25)
2. Pin pitch tolerance ±0.01(0.25)
3. Pin dimension tolerance ±0.014(0.35)

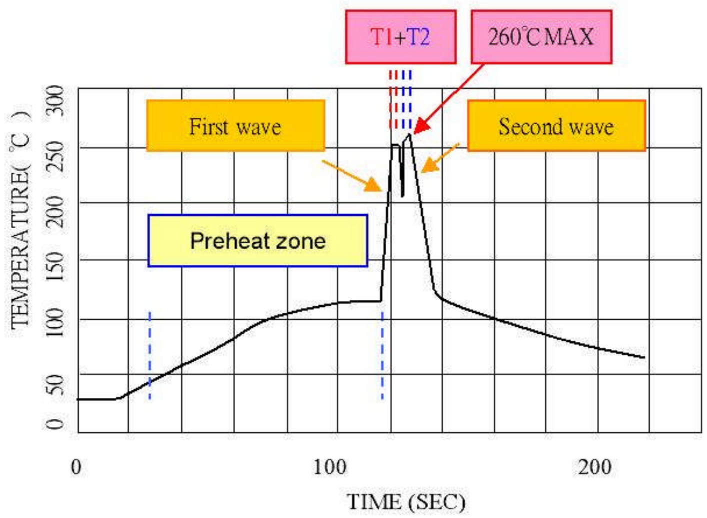
Recommended Pad Layout



1. All dimensions in Inches (mm)
   Tolerance-x.xx±0.02 (x.x±0.5)
   x.xxx±0.01 (x.xx±0.25)
2. Pin pitch tolerance ±0.01(0.25)

Soldering Considerations

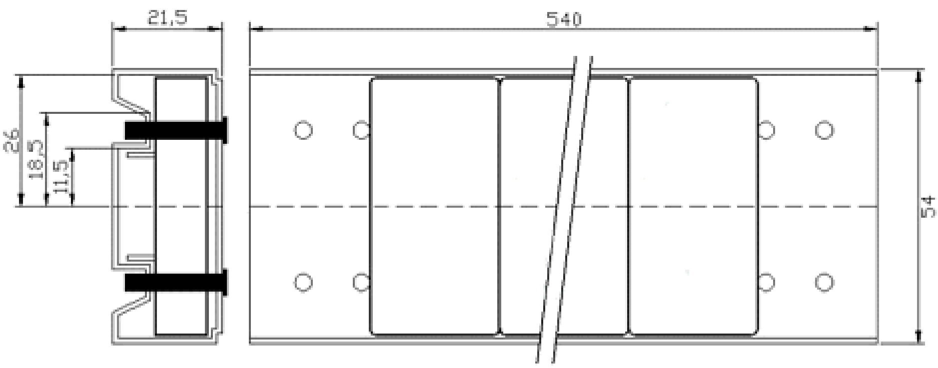
Lead free wave solder profile for PXD10-xxSxx series.



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



Dimensions in mm

20 Pieces per Tube

Part Number Structure

PXD 10 – 48 S 05 - P

Max. Output Power
10 Watts

Input Voltage Range
12V 9 ~ 18VDC
24V 18 ~ 36VDC
48V 36 ~ 75VDC

Single Output

Output Voltage
3P3 3.3VDC
05 5VDC
12 12VDC
15 15VDC

Remote Control
No Suffix: Without Remote Control
Suffix –P: Positive Logic
Suffix –N: Negative Logic

Model Number	Input Range	Output Voltage	Output Current Max. Load	Input Current Full Load (1)	Eff (2) (%)
PXD10-12S3P3	9 – 18 VDC	3.3VDC	2000mA	724mA	80
PXD10-12S05	9 – 18 VDC	5VDC	2000mA	1082mA	81
PXD10-12S12	9 – 18 VDC	12VDC	830mA	1037mA	84
PXD10-12S15	9 – 18 VDC	15VDC	670mA	1046mA	84
PXD10-24S3P3	18 – 36 VDC	3.3VDC	2000mA	362mA	80
PXD10-24S05	18 – 36 VDC	5VDC	2000mA	534mA	82
PXD10-24S12	18 – 36 VDC	12VDC	830mA	519mA	84
PXD10-24S15	18 – 36 VDC	15VDC	670mA	523mA	84
PXD10-48S3P3	36 – 75 VDC	3.3VDC	2000mA	181mA	80
PXD10-48S05	36 – 75 VDC	5VDC	2000mA	260mA	84
PXD10-48S12	36 – 75 VDC	12VDC	830mA	253mA	86
PXD10-48S15	36 – 75 VDC	15VDC	670mA	252mA	87

Note 1. Maximum value at nominal input voltage and full load of standard type.
Note 2. Typical value at nominal input voltage and full load.

Safety and Installation Instruction

Fusing Consideration

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

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of a 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 5A. 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 PXD10-xxSxx series of DC/DC converters 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 1.976×10^6 hours.

MIL-HDBK 217F NOTICE2 FULL LOAD, Operating Temperature at 25°C ℃. The resulting figure for MTBF is 1.416×10^6 hours.