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**SERIES:** PCN1-M | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

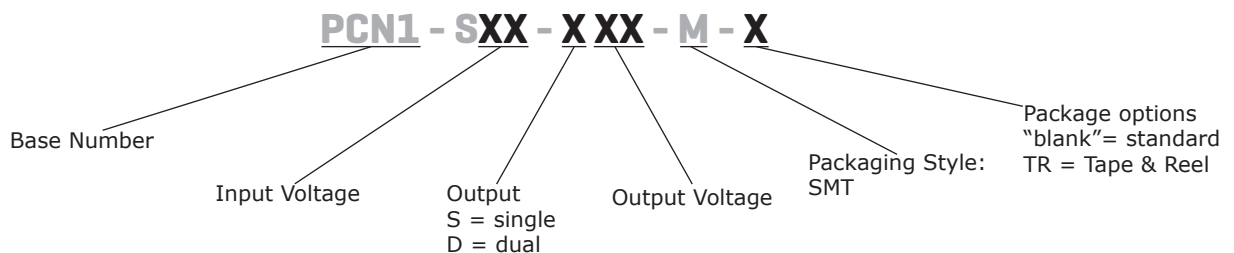
- up to 1 W isolated output
- industry standard surface mount package
- nominal input voltages: 5, 12 Vdc
- single/dual unregulated output
- 1,500 Vdc isolation voltage
- low ripple and noise
- -40 to 100°C
- efficiency up to 81%



MODEL	input voltage		output voltage	output current		output power	ripple & noise <sup>1</sup>	efficiency
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	max (mVp-p)	typ (%)
PCN1-S5-S5-M	5	4.5~5.5	5	0	200	1	75	79
PCN1-S5-S12-M	5	4.5~5.5	12	0	84	1	75	79
PCN1-S5-S15-M	5	4.5~5.5	15	0	67	1	75	79
PCN1-S5-D5-M	5	4.5~5.5	±5	0	±100	1	75	74
PCN1-S5-D12-M	5	4.5~5.5	±12	0	±42	1	75	78
PCN1-S5-D15-M	5	4.5~5.5	±15	0	±33	1	75	78
PCN1-S12-S5-M	12	10.8~13.2	5	0	200	1	75	80
PCN1-S12-S12-M	12	10.8~13.2	12	0	84	1	75	81
PCN1-S12-S15-M	12	10.8~13.2	15	0	67	1	75	81
PCN1-S12-D5-M	12	10.8~13.2	±5	0	±100	1	75	77
PCN1-S12-D12-M	12	10.8~13.2	±12	0	±42	1	75	80
PCN1-S12-D15-M	12	10.8~13.2	±15	0	±33	1	75	81

Notes: 1. At full load, nominal input, 20 MHz bandwidth oscilloscope, with a 0.33 µF ceramic capacitor on the output.  
 2. Required to add a 2.2 µF ceramic capacitor to the input to reduce input voltage stress.  
 3. All specifications are measured at Ta=25°C, nominal input voltage, and rated output load unless otherwise specified.

**PART NUMBER KEY**



## INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	5 Vdc input models	4.5	5	5.5	Vdc
	12 Vdc input models	10.8	12	13.2	Vdc
surge voltage	for maximum of 100 ms				
	5 Vdc input models			9	Vdc
	12 Vdc input models			18	Vdc
current	5 Vdc input models		250		mA
	12 Vdc input models		110		mA
filter	capacitive				
input reverse polarity protection	no				
input fuse	0.5 A time delay fuse for all models (recommended)				

Notes: 1. Required to add a 2.2  $\mu$ F ceramic capacitor to the input to reduce input voltage stress.

## OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load	single output models			220	$\mu$ F
	dual output models			100	$\mu$ F
voltage accuracy				$\pm 3.0$	%
line regulation	1.0% change in input voltage			$\pm 1.2$	%
load regulation	from 20% load to full load			$\pm 10$	%
switching frequency	at nominal Vin, full load		100		kHz
temperature coefficient				$\pm 0.05$	%/ $^{\circ}$ C

## PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	momentary			1	s

## SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute	1,500			Vdc
isolation resistance	input to output	1,000			M $\Omega$
isolation capacitance	input to output		10		pF
conducted emissions	EN 55022 Class B (external circuit required, see Figure 4)				
MTBF	as per MIL-HDBK-217F, full load, GB, 25 $^{\circ}$ C		1,500,000		hours
RoHS	2011/65/EU				

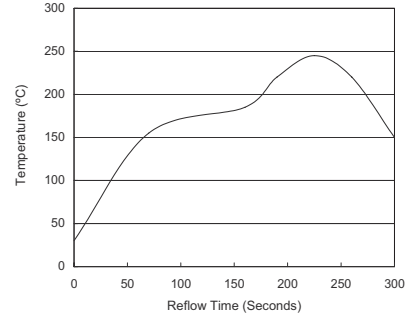
## ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		100	$^{\circ}$ C
storage temperature		-55		125	$^{\circ}$ C
operating humidity	non-condensing			95	%

## SOLDERABILITY

parameter	conditions/description	min	typ	max	units
reflow soldering	see reflow solder profile			245	°C

- Notes:
1. Soldering paste: SHENMAO PF610-P (Sn/Ag/Cu)
  2. Ramp up rate during preheat: 1.79°C/second (from 30°C~155°C)
  3. Soaking temperature: 0.33°C/second (from 155°C~185°C)
  4. Ramp up rate during reflow: 0.71°C/second (from 220°C~245°C)
  5. Peak temperature: 245°C (10 seconds max), above 220°C 40 to 70 seconds
  6. Ramp up rate during cooling: -1.75°C/second (from 220°C~150)



## MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	single output models: 0.54 x 0.36 x 0.29 [13.7 x 9.2 x 7.4 mm] dual output models: 0.64 x 0.36 x 0.29 [16.2 x 9.2 x 7.4 mm]				inches inches
case material	non-conductive black plastic				
weight	single output models dual output models		1.4 1.5		g g

## MECHANICAL DRAWING

### Single output models

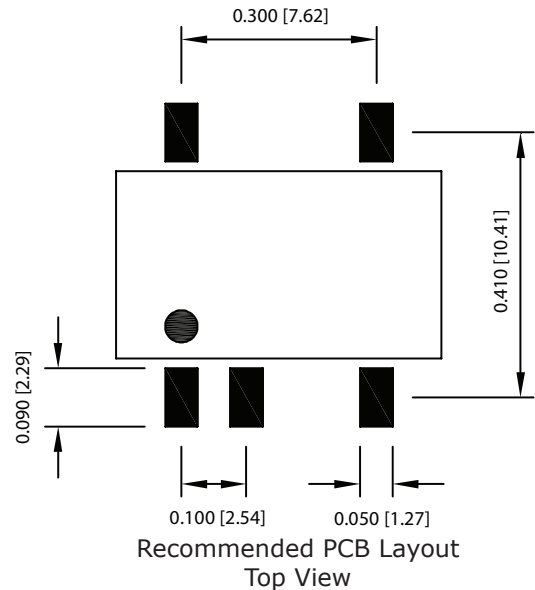
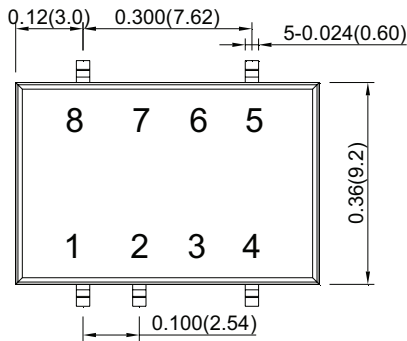
units: inches [mm]

tolerance: X.XX ±0.01 [±0.25]

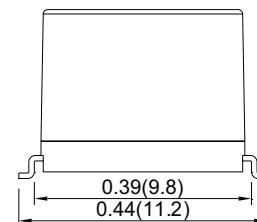
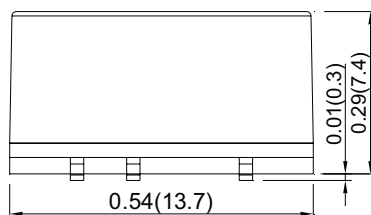
X.XXX ±0.005 [±0.13]

pin section tolerance: ±0.002[±0.05]

PIN CONNECTIONS	
PIN	Function
	Single
1	-Vin
2	+Vin
3	No pin
4	-Vout
5	+Vout
6	No pin
7	No pin
8	NC



NC=no connection



## MECHANICAL DRAWING (CONTINUED)

### Dual output models

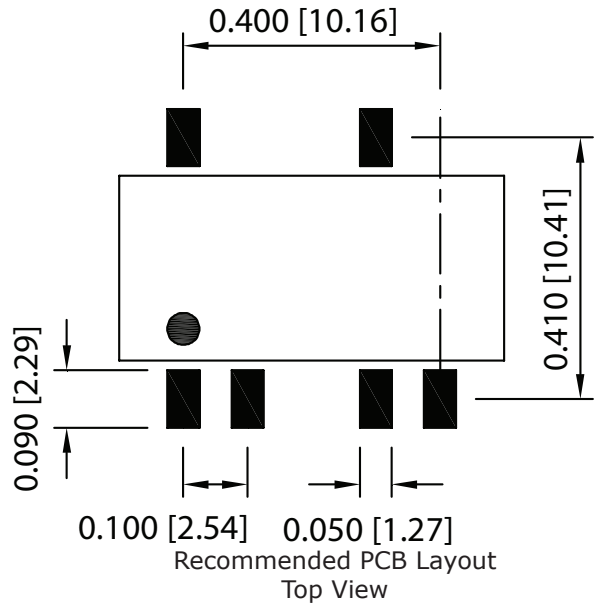
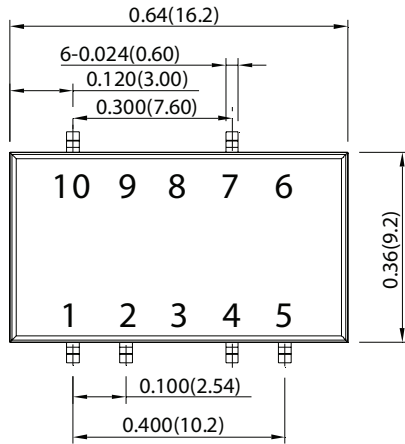
units: inches [mm]

tolerance: X.XX ±0.01 [±0.25]

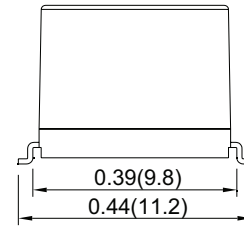
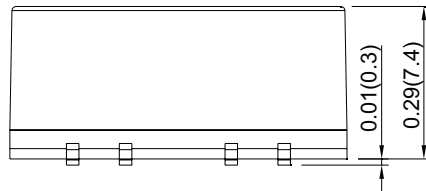
X.XXX ±0.005 [±0.13]

pin section tolerance: ±0.002[±0.05]

PIN CONNECTIONS	
PIN	Function
	Dual
1	-Vin
2	+Vin
3	No pin
4	Common
5	-Vout
6	No pin
7	+Vout
8	No pin
9	No pin
10	NC

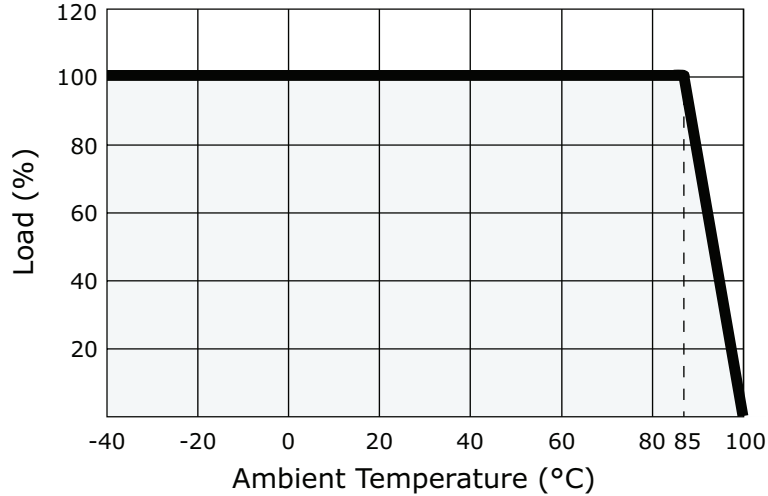


NC=no connection



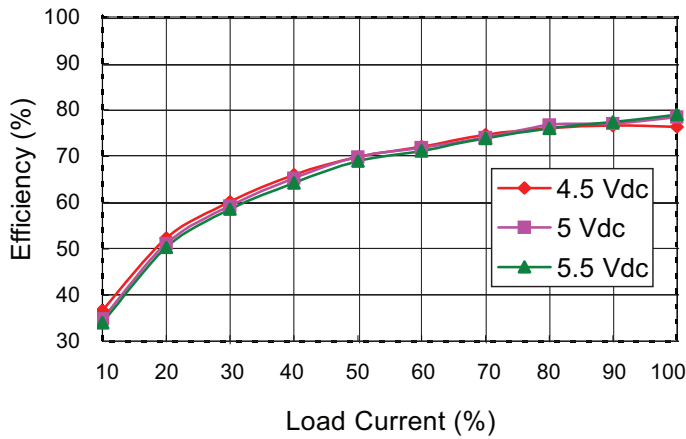
## DERATING CURVE

Temperature Derating Curve  
(Natural Convection)

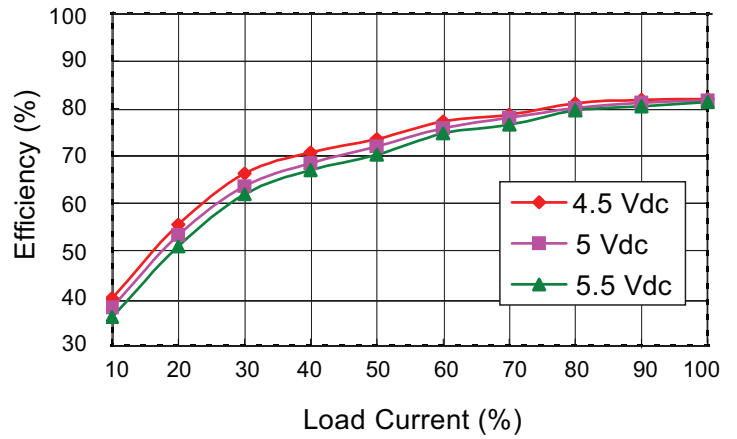


## EFFICIENCY CURVES

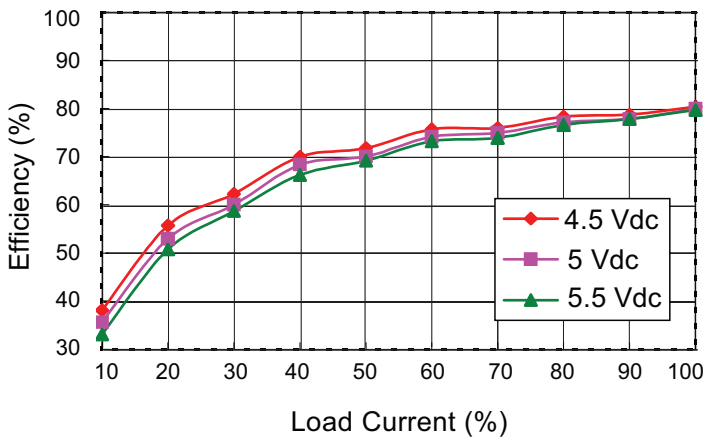
PCN1-S5-S5-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



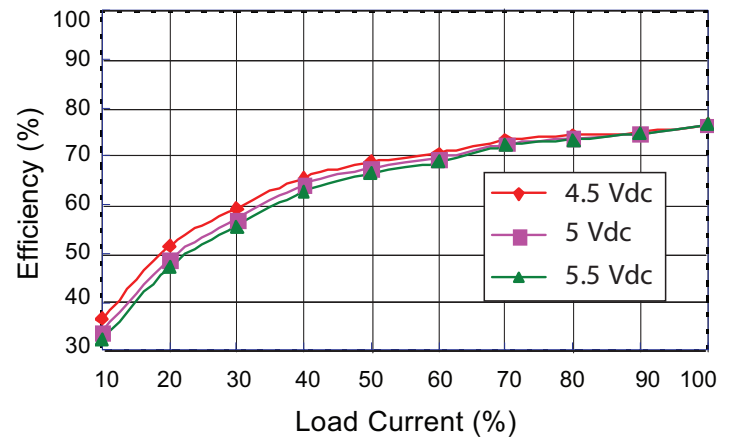
PCN1-S5-S12-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



PCN1-S5-S15-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)

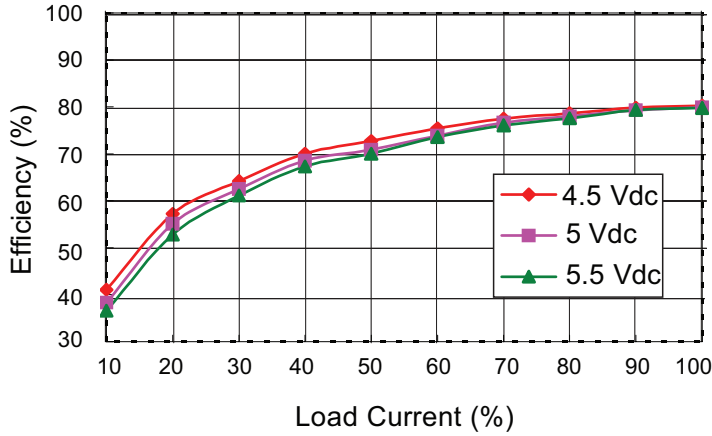


PCN1-S5-D5-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)

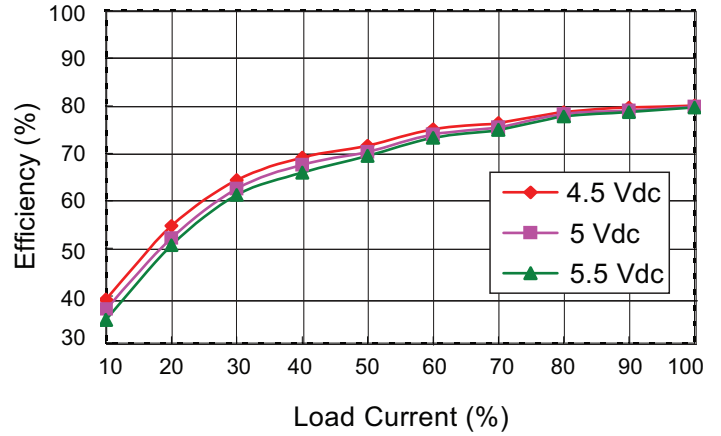


## EFFICIENCY CURVES (CONTINUED)

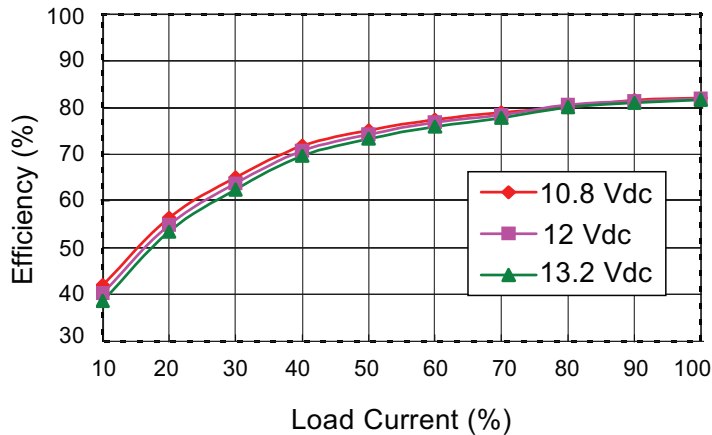
PCN1-S5-D12-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



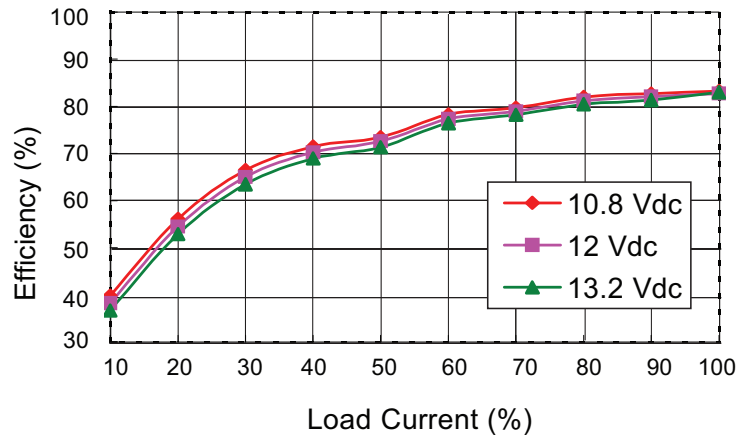
PCN1-S5-D15-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



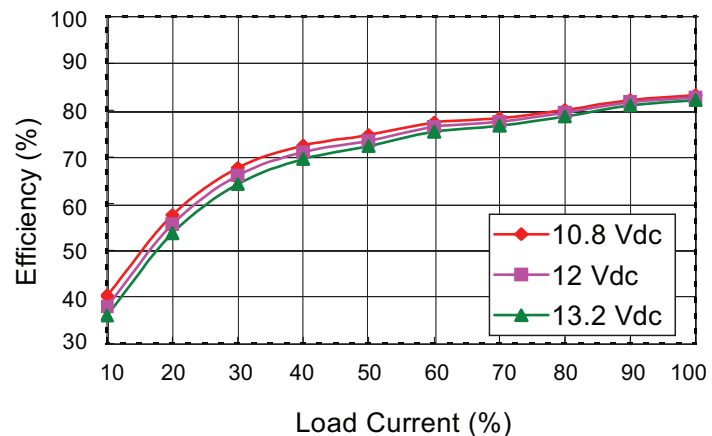
PCN1-S12-S5-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



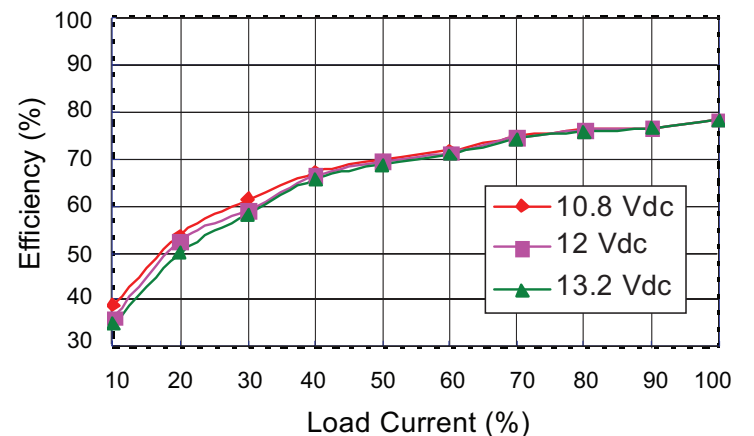
PCN1-S12-S12-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



PCN1-S12-S15-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)

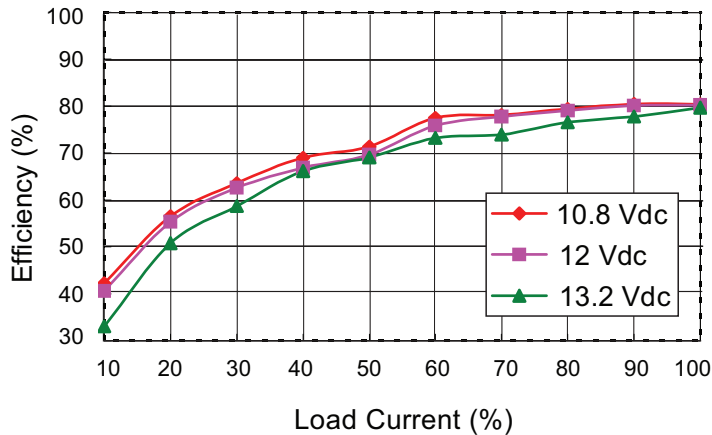


PCN1-S12-D5-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)

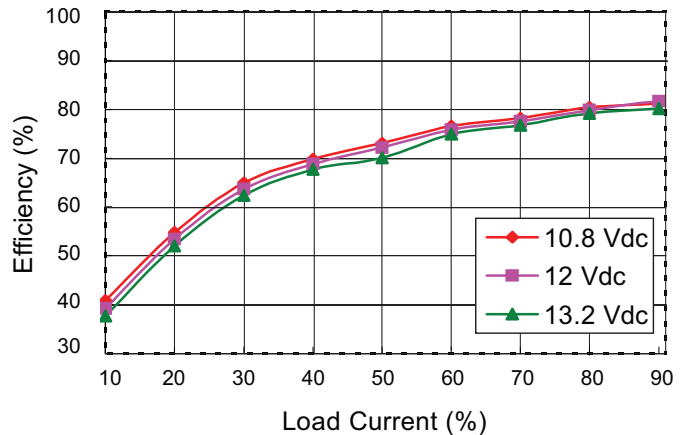


## EFFICIENCY CURVES (CONTINUED)

PCN1-S12-D12-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



PCN1-S12-D15-M Efficiency Curve  
(Efficiency vs. Line Voltage and Load Current)



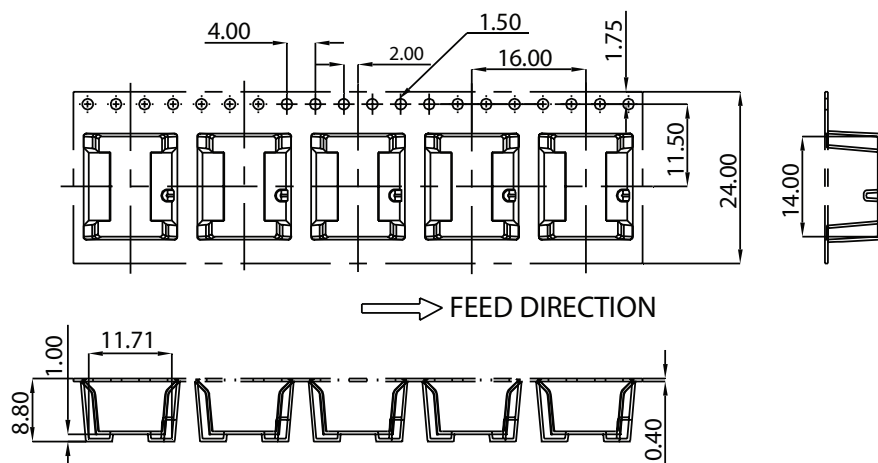
## PACKAGING

### Single output models

units: mm

Reel Size: Ø13"

QTY: 450 pcs per reel

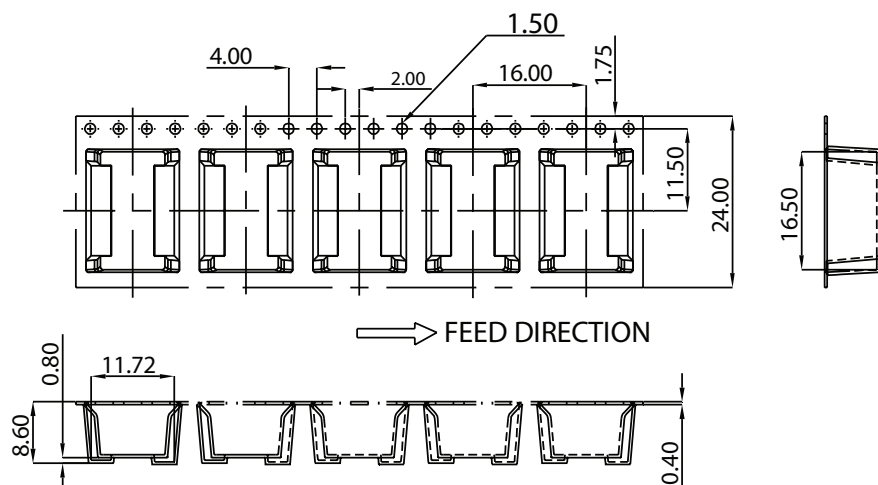


### Dual output models

units: mm

Reel Size: Ø13"

QTY: 450 pcs per reel

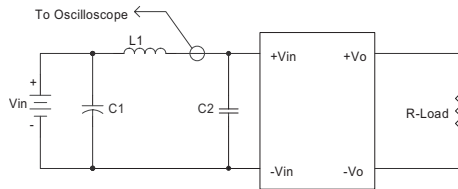




## TEST CONFIGURATIONS

### Input Ripple Current & Output Noise

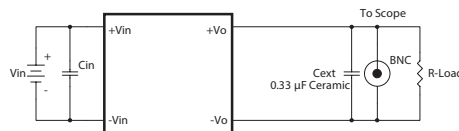
**Figure 1 Measuring Input Ripple Current**



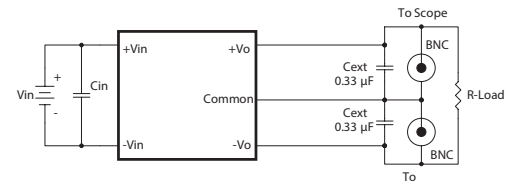
**Table 1**

L1	12 $\mu$ H
C1	2.2 $\mu$ F tantalum capacitor
C2	NC

**Figure 2 Measuring Output Ripple & Noise for Single Output Models**



**Figure 3 Measuring Output Ripple & Noise for Dual Output Models**



**Table 2**

Input Voltage (Vdc)	Cin
5	2.2 $\mu$ F ceramic capacitor
12	2.2 $\mu$ F ceramic capacitor

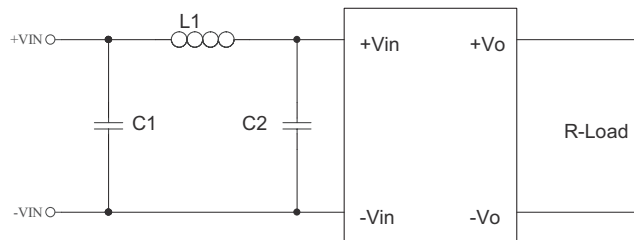
## EMC RECOMMENDED CIRCUIT

### Test Condition

Input Voltage: Nominal

Output Load: Full Load

**Figure 4 Conducted Emissions Test Circuit**



**Table 3**

EN55022 Class B Recommended External Circuit Components			
Input Voltage (Vdc)	C1 <sup>1</sup>	C2 <sup>1</sup>	L1
5	4.7 $\mu$ F / 25 V	4.7 $\mu$ F / 25 V	10 $\mu$ H
12	4.7 $\mu$ F / 25 V	4.7 $\mu$ F / 25 V	10 $\mu$ H

Notes: 1. Ceramic Capacitor

## REVISION HISTORY

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rev.	description	date
1.0	initial release	07/26/2016

The revision history provided is for informational purposes only and is believed to be accurate.



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