

## EPM Serie 2-3W - Wide Input Range DC-DC Converter

### Features

LEAD FREE  
 1500-3000VDC ISOLATION  
 SINGLE IN LINE PACKAGE  
 UP TO 2-3W REGULATED OUTPUT  
 POWER  
 NO EXTERNAL COMPONENTS REQUIRED  
 INTERNAL FILTERING  
 100% BURN IN  
 HIGH EFFICIENCY  
 UL 94V-0 PACKAGE MATERIAL  
 CUSTOM SOLUTIONS AVAILABLE  
 ROHS COMPLIANT



### Specification

#### Output Specification

Voltage Set-point Accuracy	+/-2% max.
Temperature Coefficient	+/-0.05%/°C
Ripple & Noise(20MHz BW) <sup>1</sup>	Output=3.3V 50mVp-p max. 100mVp-p max.
Line Regulation <sup>2</sup>	+/-0.5% max.
Load Regulation <sup>3</sup>	Output=3.3V +/--1% max. +/-0.5% max.
Minimum Load	Output=3.3V +/--1% max.
Short Circuit Protection	20% of Full Load
Short Circuit Restart	Continuous
Over Load Protection	Automatic
Capacitive Load	150% typ.
	5V: 1000uF max.
	12V: 470uF max.
	15V: 330uF max.
	Other Output: ±220uF max.

#### Input Specification

Input Voltage Range	2:1 or 4:1 Input Range
Input Filter Protection	Capacitor Type
Start up Time (Nominal Input)	Fuse Recommended
Remote ON/OFF Control	10mS max.
Operating Temperature	Table 1
	PM22; PM24 : -40°C to 85°C
	PM32; PM34 : -40°C to 71°C

#### Environmental Specifications

Case Temperature	+95°C max.
Storage Temperature	-55°C to +105°C
Humidity	95% max.
Cooling	Free-Air Convection
Efficiency	70% min.

#### General Specifications

Isolation Voltage <sup>4</sup>	1500VDC or 3000VDC
Isolation Resistance	109 ohms min.
Isolation Capacitance	80pF max.
Switching Frequency	100 KHz min.
MTBF <sup>5</sup>	>400,000 Hours
Weight	4.8g typ.
Case Material	Non-Conductive Plastic
Case Size	21.80mm*9.20mm*11.10mm
Potting Material	Epoxy(UL94V-0)
Radiated Emissions	EN55022 Class B

ALL SPECIFICATIONS TYPICAL AT NOMINAL LINE, FULL LOAD, AND 25 °C UNLESS OTHERWISE NOTED

<sup>1</sup> Measured with 1uF ceramic capacitor connects to the output pins.

<sup>2</sup> High Line to Low Line.

<sup>3</sup> Load Regulation is for output load current change from 20% to 100%.

<sup>4</sup> 1500VDC for 10 seconds 3000VDC for 3 seconds.

<sup>5</sup> MIL-HDBK-217F @25°C, Ground Benign.

## Selection Guide 2:1 2W Output

MODEL NUMBER	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (mA)	INPUT <sup>6</sup> CURRENT(mA)		EFF (%) <sup>7</sup>	ISOLATION <sup>8</sup> (VDC)	PACKAGE
				FULL LOAD	NO LOAD			
PM22-01(-3K)	4.5-9	3.3	500	465	50	71	1500(3000)	H
PM22-02(-3K)	4.5-9	5	400	555	50	72	1500(3000)	H
PM22-03(-3K)	4.5-9	9	222	519	50	77	1500(3000)	H
PM22-04(-3K)	4.5-9	12	150	480	50	75	1500(3000)	H
PM22-05(-3K)	4.5-9	15	120	456	50	79	1500(3000)	H
PM22-06(-3K)	9-18	3.3	500	205	30	67	1500(3000)	H
PM22-07(-3K)	9-18	5	400	219	20	76	1500(3000)	H
PM22-08(-3K)	9-18	9	222	225	20	74	1500(3000)	H
PM22-09(-3K)	9-18	12	168	209	20	80	1500(3000)	H
PM22-10(-3K)	9-18	15	133	209	20	80	1500(3000)	H
PM22-11(-3K)	9-18	24	83	213	20	78	1500(3000)	H
PM22-12	9-18	+/-5	+/-200	225	20	74	1500	H
PM22-13	9-18	+/-12	+/-83	225	20	74	1500	H
PM22-14	9-18	+/-15	+/-67	225	20	74	1500	H
PM22-15(-3K)	18-36	3.3	500	93	12	74	1500(3000)	H
PM22-16(-3K)	18-36	5	400	110	12	76	1500(3000)	H
PM22-17(-3K)	18-36	9	222	111	13	75	1500(3000)	H
PM22-18(-3K)	18-36	12	168	104	11	80	1500(3000)	H
PM22-19(-3K)	18-36	15	133	105	11	79	1500(3000)	H
PM22-20(-3K)	18-36	24	83	107	11	78	1500(3000)	H
PM22-21	18-36	+/-5	+/-200	112	12	74	1500	H
PM22-22	18-36	+/-12	+/-83	112	12	74	1500	H
PM22-23	18-36	+/-15	+/-67	112	12	74	1500	H
PM22-24(-3K)	36-75	3.3	500	46	8	75	1500(3000)	H
PM22-25(-3K)	36-75	5	400	56	8	74	1500(3000)	H
PM22-26(-3K)	36-75	9	222	55	8	75	1500(3000)	H
PM22-27(-3K)	36-75	12	168	51	8	82	1500(3000)	H
PM22-28(-3K)	36-75	15	133	51	8	82	1500(3000)	H
PM22-29(-3K)	36-75	24	83	54	8	77	1500(3000)	H
PM22-30	36-75	+/-5	+/-200	56	8	74	1500	H
PM22-31	36-75	+/-12	+/-83	54	8	77	1500	H
PM22-32	36-75	+/-15	+/-67	54	8	77	1500	H

Note: Other input to output voltages may be available. Please contact factory.

FOR EXAMPLE:           PM22-12  
                                   (H PACKAGE 2W SINGLE OUTPUT 1500VDC ISOLATION)  
                                   PM22-11(-3K)  
                                   (H PACKAGE 2W SINGLE OUTPUT 3000VDC ISOLATION)

<sup>6</sup> NOMINAL INPUT VOLTAGE.

<sup>7</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

<sup>8</sup> 1500VDC for 10 seconds 3000VDC for 3 seconds.

## Selection Guide 2:1 2W Output

MODEL NUMBER	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (mA)	INPUT <sup>9</sup> CURRENT(mA)		EFF (%) <sup>10</sup>	ISOLATIO N <sup>11</sup> (VDC)	PACKAGE
				FULL LOAD	NO LOAD			
PM22-33	4.5-9	3.3	500	465	50	71	1500	J
PM22-34	4.5-9	5	400	555	50	72	1500	J
PM22-35	4.5-9	9	222	519	50	77	1500	J
PM22-36	4.5-9	12	150	500	50	72	1500	J
PM22-37	4.5-9	15	120	500	50	72	1500	J
PM22-38	9-18	3.3	500	205	30	67	1500	J
PM22-39	9-18	5	400	219	20	76	1500	J
PM22-40	9-18	9	222	225	20	74	1500	J
PM22-41	9-18	12	168	213	20	78	1500	J
PM22-42	9-18	15	133	213	20	78	1500	J
PM22-43	9-18	24	83	213	20	78	1500	J
PM22-44	18-36	3.3	500	93	12	74	1500	J
PM22-45	18-36	5	400	112	12	74	1500	J
PM22-46	18-36	9	222	111	13	75	1500	J
PM22-47	18-36	12	168	107	11	78	1500	J
PM22-48	18-36	15	133	107	11	78	1500	J
PM22-49	18-36	24	83	107	11	78	1500	J
PM22-50	36-75	3.3	500	52	8	67	1500	J
PM22-51	36-75	5	400	56	8	74	1500	J
PM22-52	36-75	9	222	55	8	75	1500	J
PM22-53	36-75	12	168	51	8	82	1500	J
PM22-54	36-75	15	133	51	8	82	1500	J
PM22-55	36-75	24	83	54	8	77	1500	J

Note: Other input to output voltages may be available. Please contact factory.

<sup>9</sup> NOMINAL INPUT VOLTAGE.

<sup>10</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

<sup>11</sup> 1500VDC for 10 seconds 3000VDC for 3 seconds.

## Selection Guide 4:1 2W Output

MODEL NUMBER	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (mA)	INPUT <sup>12</sup> CURRENT(mA)		EFF (%) <sup>13</sup>	ISOLATION <sup>14</sup> (VDC)	PACKAGE
				FULL LOAD	NO LOAD			
PM24-01(-3K)	9-36	3.3	500	205	30	70	1500(3000)	H
PM24-02(-3K)	9-36	5	400	222	20	74	1500(3000)	H
PM24-03(-3K)	9-36	9	222	225	20	74	1500(3000)	H
PM24-04(-3K)	9-36	12	165	213	20	78	1500(3000)	H
PM24-05(-3K)	9-36	15	133	213	20	78	1500(3000)	H
PM24-06(-3K)	9-36	24	83	213	20	78	1500(3000)	H
PM24-07	9-36	+/-15	+/-67	220	20	76	1500	H
PM24-08(-3K)	18-75	3.3	500	98	12	70	1500(3000)	H
PM24-09(-3K)	18-75	5	400	112	12	74	1500(3000)	H
PM24-10(-3K)	18-75	9	222	112	13	74	1500(3000)	H
PM24-11(-3K)	18-75	12	165	107	11	78	1500(3000)	H
PM24-12(-3K)	18-75	15	133	107	11	78	1500(3000)	H
PM24-13(-3K)	18-75	24	83	107	11	78	1500(3000)	H

Note: Other input to output voltages may be available. Please contact factory.

<sup>12</sup> NOMINAL INPUT VOLTAGE.

<sup>13</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

<sup>14</sup> 1500VDC for 10 seconds 3000VDC for 3 seconds.

## Selection Guide (4) 2:1 3W Output

MODEL NUMBER	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (mA)	INPUT <sup>15</sup> CURRENT(mA)		EFF (%) <sup>16</sup>	ISOLATION <sup>17</sup> (VDC)	PACKAGE
				FULL LOAD	NO LOAD			
				PM32-01(-3K)	4.5-9			
PM32-02(-3K)	4.5-9	5	600	800	100	75	1500(3000)	H
PM32-03(-3K)	4.5-9	9	333	778	100	77	1500(3000)	H
PM32-04(-3K)	4.5-9	12	250	779	100	77	1500(3000)	H
PM32-05(-3K)	4.5-9	15	200	779	100	77	1500(3000)	H
PM32-06	4.5-9	+/-5	+/-300	789	100	76	1500	H
PM32-07	4.5-9	+/-12	+/-125	779	100	77	1500	H
PM32-08	4.5-9	+/-15	+/-100	779	100	75	1500	H
PM32-09(-3K)	9-18	3.3	700	263	45	73	1500(3000)	H
PM32-10(-3K)	9-18	5	600	336	45	74	1500(3000)	H
PM32-11(-3K)	9-18	9	333	320	45	78	1500(3000)	H
PM32-12(-3K)	9-18	12	250	320	45	78	1500(3000)	H
PM32-13(-3K)	9-18	15	200	310	45	81	1500(3000)	H
PM32-14	9-18	+/-5	+/-300	324	45	77	1500	H
PM32-15	9-18	+/-12	+/-125	320	45	78	1500	H
PM32-16	9-18	+/-15	+/-100	320	45	78	1500	H
PM32-17(-3K)	18-36	3.3	700	128	20	75	1500(3000)	H
PM32-18(-3K)	18-36	5	600	162	20	77	1500(3000)	H
PM32-19(-3K)	18-36	9	333	152	20	82	1500(3000)	H
PM32-20(-3K)	18-36	12	250	158	20	79	1500(3000)	H
PM32-21(-3K)	18-36	15	200	154	20	81	1500(3000)	H
PM32-22	18-36	+/-5	+/-300	162	20	77	1500	H
PM32-23	18-36	+/-12	+/-125	158	20	79	1500	H
PM32-24	18-36	+/-15	+/-100	158	20	79	1500	H
PM32-25(-3K)	36-75	3.3	700	66	12	73	1500(3000)	H
PM32-26(-3K)	36-75	5	600	81	12	77	1500(3000)	H
PM32-27(-3K)	36-75	9	333	80	12	78	1500(3000)	H
PM32-28(-3K)	36-75	12	250	79	12	79	1500(3000)	H
PM32-29(-3K)	36-75	15	200	76	12	82	1500(3000)	H
PM32-30(-3K)	36-75	24	125	79	12	79	1500(3000)	H
PM32-31	36-75	+/-5	+/-300	81	12	77	1500	H
PM32-32	36-75	+/-12	+/-125	79	12	79	1500	H
PM32-33	36-75	+/-15	+/-100	79	12	79	1500	H

<sup>15</sup> NOMINAL INPUT VOLTAGE.

<sup>16</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

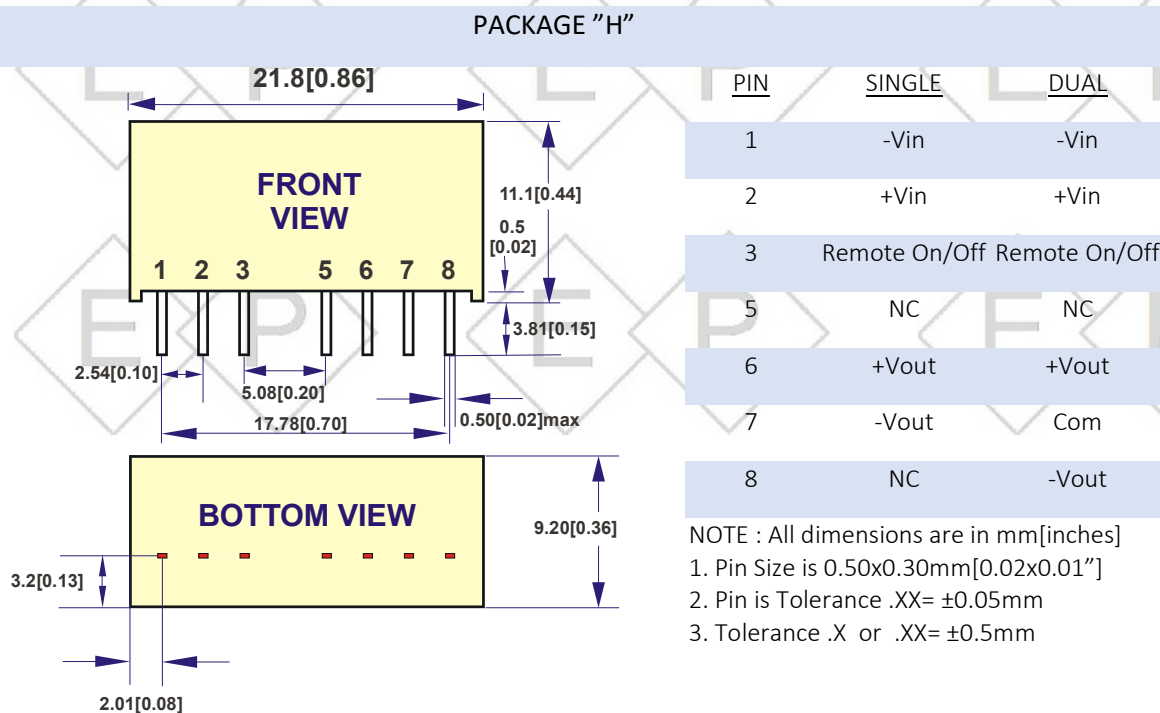
<sup>17</sup> 1500VDC for 10 seconds 3000VDC for 3 seconds.

## Selection Guide (5) 4:1 3W Output

MODEL NUMBER	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (mA)	INPUT <sup>18</sup> CURRENT(mA)		EFF (%) <sup>19</sup>	ISOLATION <sup>20</sup> (VDC)	PACKAGE
				FULL LOAD	NO LOAD			
PM32-01	9-36	5	600	313	40	80	1500	K
PM32-02	9-36	9	333	312	40	80	1500	K
PM32-03	9-36	12	250	305	40	82	1500	K
PM32-04	9-36	15	200	305	40	82	1500	K
PM32-05	18-75	5	600	156	20	80	1500	K
PM32-06	18-75	9	333	156	20	80	1500	K
PM32-07	18-75	12	250	152	20	82	1500	K
PM32-08	18-75	15	200	152	20	82	1500	K

Note: Other input to output voltages may be available. Please contact factory.

## Mechanical Dimensions (1) & Recommended Footprint Details

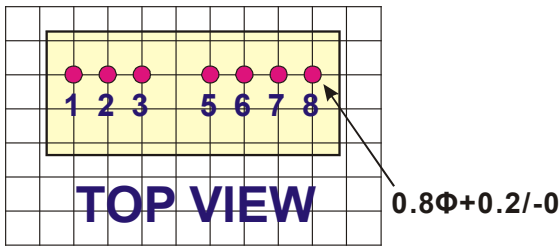


**All dimensions are in mm[inches]**

<sup>18</sup> NOMINAL INPUT VOLTAGE.

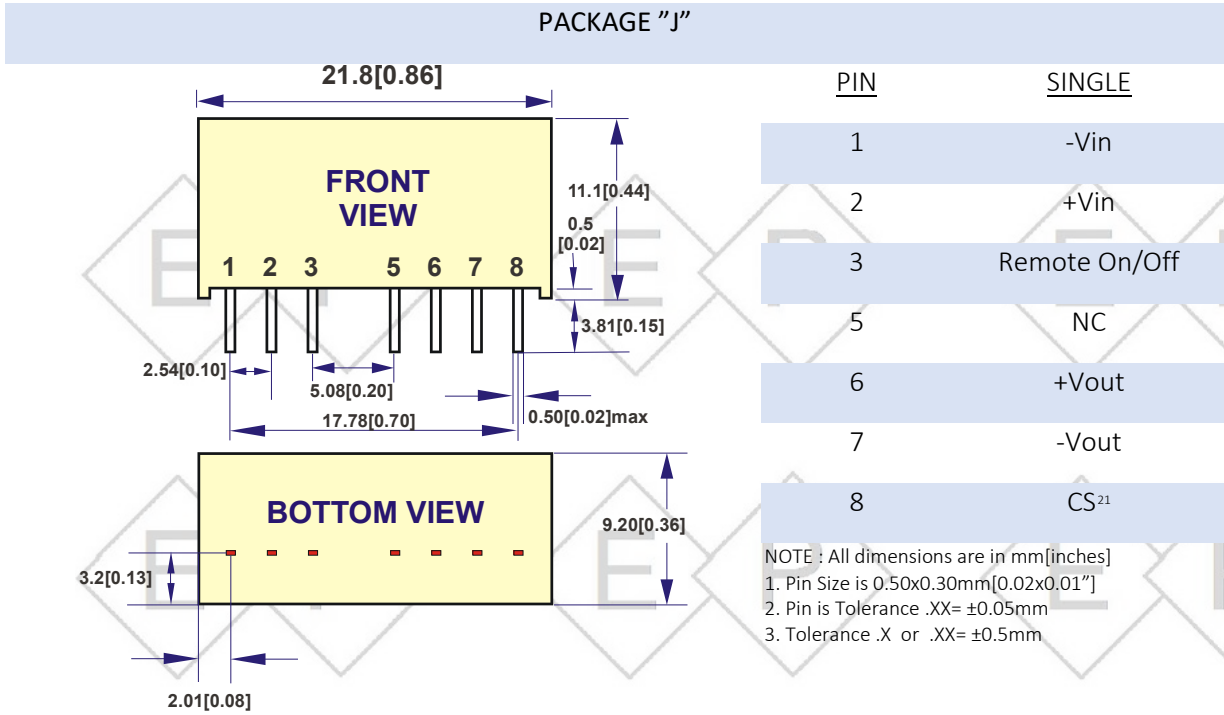
<sup>19</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

<sup>20</sup> 1500VDC for 10 seconds 3000VDC for 3 seconds.

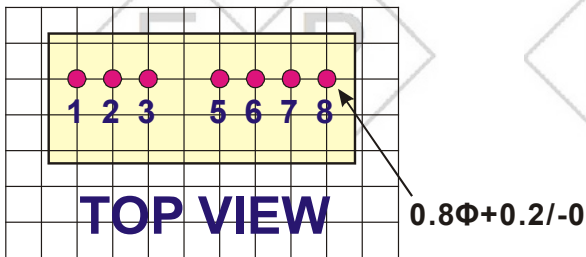


GRID:2.54 mm

**Mechanical Dimensions (2) & Recommended Footprint Details**



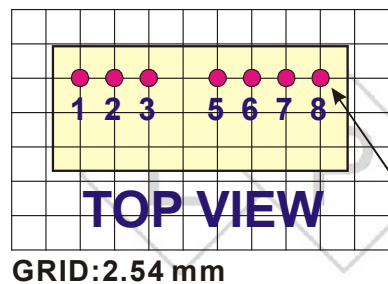
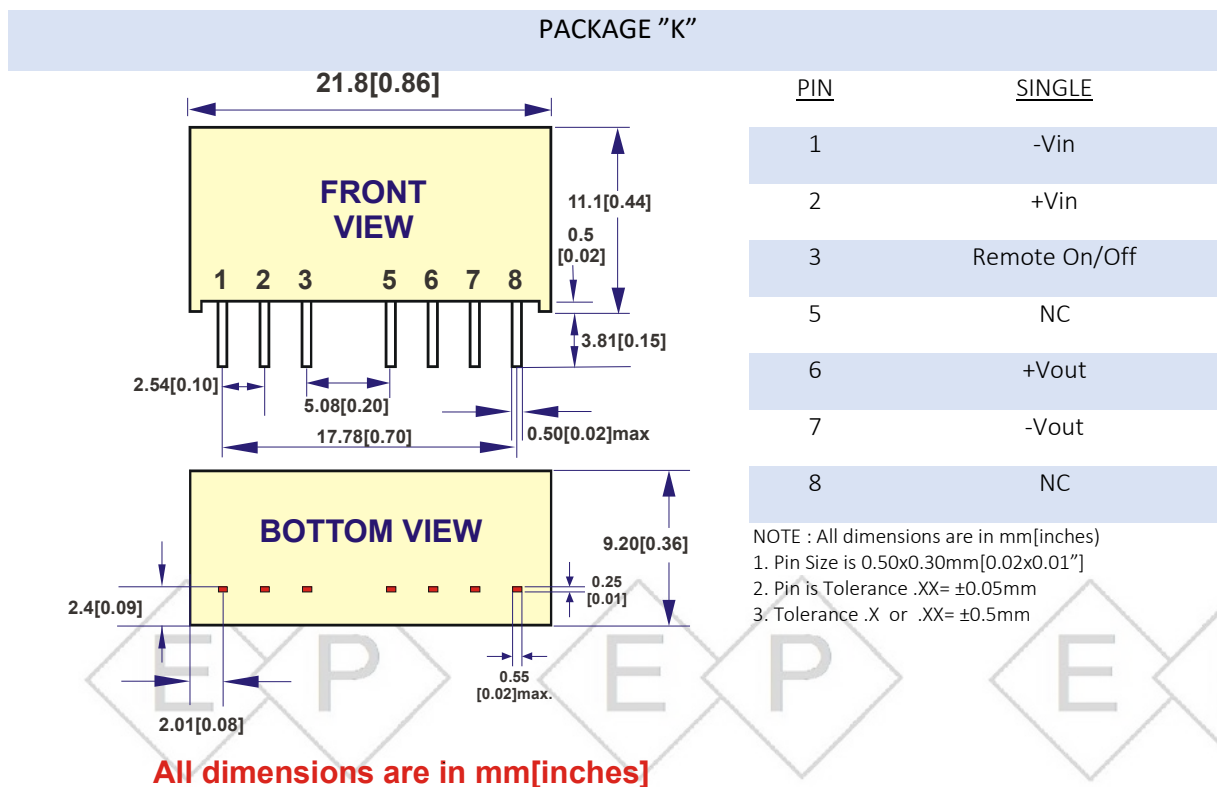
**All dimensions are in mm[inches]**



GRID:2.54 mm

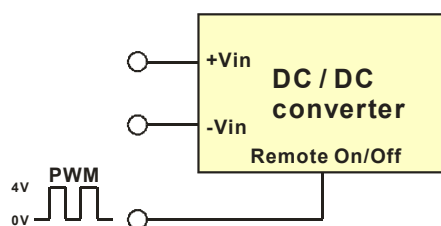
<sup>21</sup>Additional capacitance can be added from this pin to pin7. Any lower ESR capacitor will remove ripple and noise to some degree. The desired ripple figure. Values can be up to 100µF.

## Mechanical Dimensions (3) & Recommended Footprint Details



**Table 1 (Remote On/Off Control)**

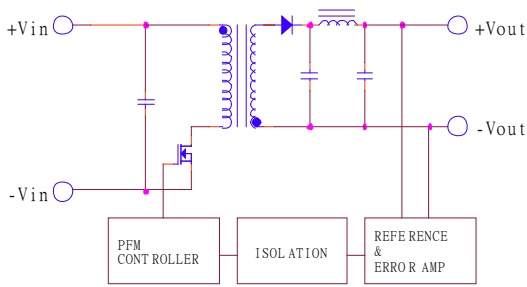
Parameter	Remote On/Off Control	
	Min	Max
Supply On	Under 1 VDC or Open Circuit	
Supply Off	4VDC	
Standby Input Current	0.2mA	
Control Input Current(On)	-0.5mA	
Control Input Current(Off)	5mA	
Control Common	Referenced to -Vin (pin 2&3)	



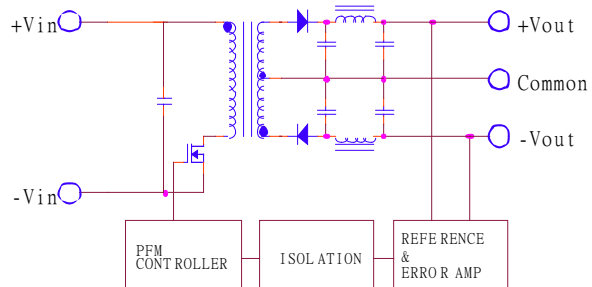


## Simplified Schematic

SINGLE OUTPUT

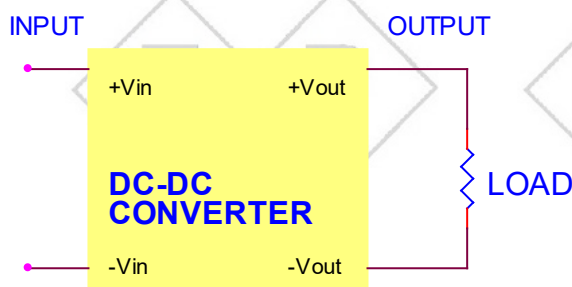


DUAL OUTPUT

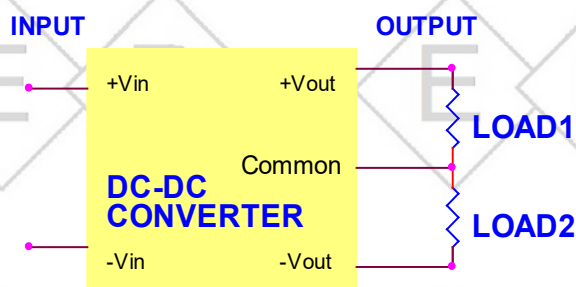


## Typical Applications

SINGLE OUTPUT



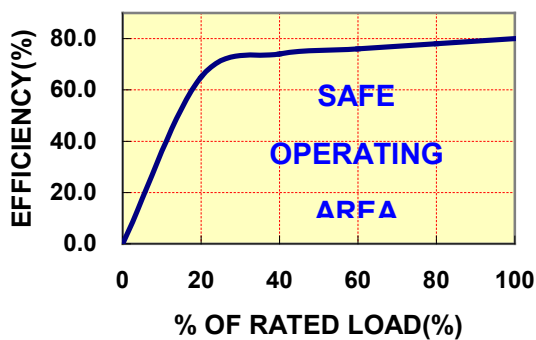
DUAL OUTPUT



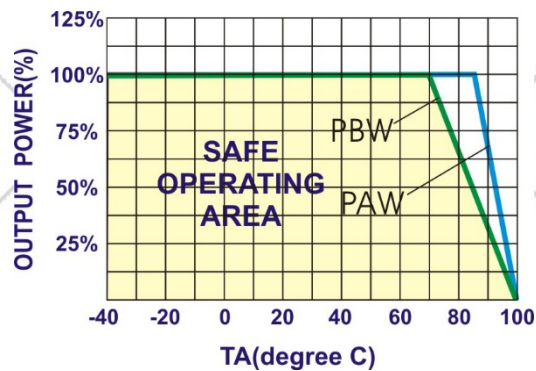
## Typical Performance Curves

Specifications typical at TA=25 °C, nominal input voltage, rated output current unless otherwise specified.

OUTPUT LOAD VS EFFICIENCY

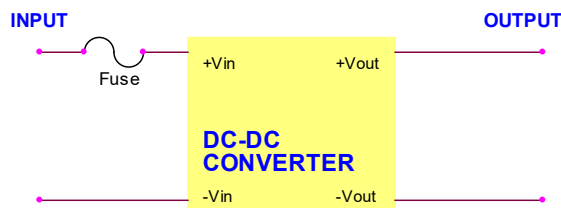


TEMPERATURE DERATING



## Input Fuse Selection Guide

4.5-9V	9-18V(9-36V)	18-36V(18-75V)	36-75V
INPUT VOLTAGE(VDC)	INPUT VOLTAGE(VDC)	INPUT VOLTAGE(VDC)	INPUT VOLTAGE(VDC)
2000mA Slow-Blow Type	1000mA Slow-Blow Type	500mA Slow-Blow Type	200mA Slow-Blow Type



Note: Certain applications may require the installation of external fuse in front of the input.

## EPM 2-3 Watt Series Application Notes:

### EXTERNAL CAPACITANCE REQUIREMENTS:

No external capacitance is required for operation of the EP 2-3 Watt series.

To meet the reflected ripple requirements of the converter, an input impedance of less than 0.5 ohm from DC to 100KHz is required.

External output capacitance is not required for operation, however it is recommended that 10uF tantalum and 0.1uF ceramic capacitance be selected for reduced system noise.

Additional output capacitance may be added for increased filtering, but should not exceed 220uF.

We Can Offer EMC-Filter According To EN55011/22 Class B.

### Negative Outputs:

A negative output voltage may be obtained by connecting the +OUT to circuit ground and connecting -OUT as the negative output.

Spezifikationen können sich ohne Vorankündigung ändern.

Für etwaige fehlerhafte Angaben oder unvollständige Bezeichnungen kann keine Haftung übernommen werden.