

## Features

## Regulated Converters

- 2:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 88%
- Over Current Protection
- No Minimum Load Required

**RECOM**  
DC/DC Converter

## RP12-A

12 Watt  
DIP24/SMD  
Single & Dual  
Output

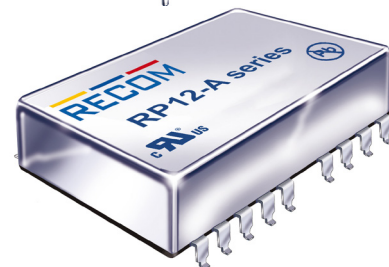
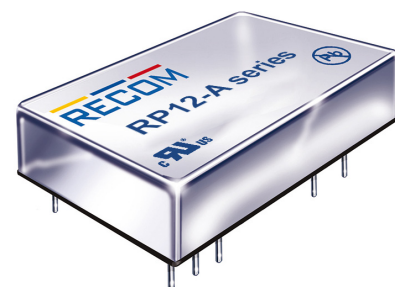


### Description

The RP12-A series DC/DC converters are certified to UL 60950-1 and cUL 60950-1. This makes them ideal for all telecom and industrial applications where approved safety standards are required. The DIP24 package is available in both pinned and SMD case styles and meets military standards for thermal shock and vibration tolerance.

### Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input <sup>(1)</sup> Current [mA]	Efficiency <sup>(1)</sup> typ. [%]	Max. Capacitive Load <sup>(2)</sup> [μF]
RP12-123.3SA <sup>(3)</sup>	9-18	3.3	3500	1146	84	2000
RP12-1205SA <sup>(3)</sup>	9-18	5.1	2400	1163	86	2000
RP12-1212SA <sup>(3)</sup>	9-18	12	1000	1163	86	430
RP12-1215SA <sup>(3)</sup>	9-18	15	800	1163	86	300
RP12-243.3SA <sup>(3)</sup>	18-36	3.3	3500	566	85	2000
RP12-2405SA <sup>(3)</sup>	18-36	5.1	2400	586	87	2000
RP12-2412SA <sup>(3)</sup>	18-36	12	1000	575	87	430
RP12-2415SA <sup>(3)</sup>	18-36	15	800	575	87	300
RP12-483.3SA <sup>(3)</sup>	36-75	3.3	3500	283	85	2000
RP12-4805SA <sup>(3)</sup>	36-75	5.1	2400	293	87	2000
RP12-4812SA <sup>(3)</sup>	36-75	12	1000	287	87	430
RP12-4815SA <sup>(3)</sup>	36-75	15	800	287	87	300
RP12-1205DA <sup>(3)</sup>	9-18	±5	±1200	1220	82	±1250
RP12-1212DA <sup>(3)</sup>	9-18	±12	±500	1149	87	±200
RP12-1215DA <sup>(3)</sup>	9-18	±15	±400	1149	87	±120
RP12-2405DA <sup>(3)</sup>	18-36	±5	±1200	602	83	±1250
RP12-2412DA <sup>(3)</sup>	18-36	±12	±500	568	88	±200
RP12-2415DA <sup>(3)</sup>	18-36	±15	±400	568	88	±120
RP12-4805DA <sup>(3)</sup>	36-75	±5	±1200	301	83	±1250
RP12-4812DA <sup>(3)</sup>	36-75	±12	±500	284	88	±200
RP12-4815DA <sup>(3)</sup>	36-75	±15	±400	284	88	±120



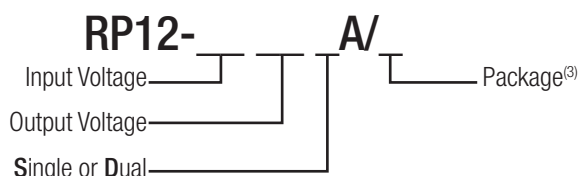
UL60950-1 Certified

### Notes:

Note1: Maximum value at nominal input voltage and full load.

Note2: Test by minimum Vin and constant resistor load.

### Model Numbering



### Ordering Examples:

RP12-2412SA/SMD = 24V Input, 12V Output, Single, SMD Package.

### Notes:

Note3: no suffix for standard package (DIP24), add suffix „SMD“ for SMD package.

**Specifications** measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load otherwise noted

## BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom. Vin = 12V	9VDC	12VDC	18VDC
	nom. Vin = 24V	18VDC	24VDC	36VDC
	nom. Vin = 48V	36VDC	48VDC	75VDC
Under Voltage Lockout (UVLO)	Vin = 12V DC-DC ON DC-DC OFF		8VDC	9VDC
	Vin = 24V DC-DC ON DC-DC OFF		16VDC	18VDC
	Vin = 48V DC-DC ON DC-DC OFF		33VDC	36VDC
Input Filter				Pi-Type
Input Reflected Ripple Current <sup>(4)</sup>	nominal Vin and full load		20mA <sub>p-p</sub>	
Input Surge Voltage	Vin = 12V, 100ms max.			36VDC
	Vin = 24V, 100ms max.			50VDC
	Vin = 48V, 100ms max.			100VDC
Start-up time	Power up		450ms	
	Remote ON/OFF		5ms	
Operating Frequency		360kHz	400kHz	440kHz
Minimum Load <sup>(5)</sup>	of full load	10%		
Ripple and Noise	20MHz bandwidth, with 1 $\mu$ F MLCC on output		85mV <sub>p-p</sub>	
Remote ON/OFF <sup>(6)</sup>	Positive Logic	DC-DC ON	Open or $3V < V_r < 12V$	
		DC-DC OFF	Short or $0V < V_r < 1.2V$	
Input current of Remote pin (CTRL)	DC-DC OFF		2.5mA	
	DC-DC ON	-0.5mA		+0.5mA

### Notes:

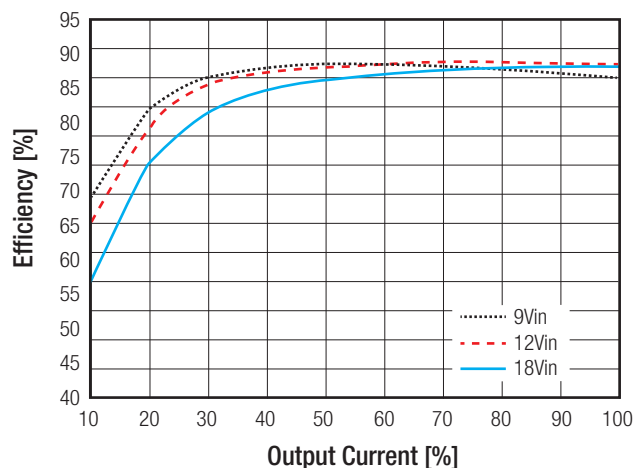
Note4: Simulated source impedance of 12 $\mu$ H. 12 $\mu$ H inductor in series with +Vin.

Note5: The RP12 series requires a minimum of 10% loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.

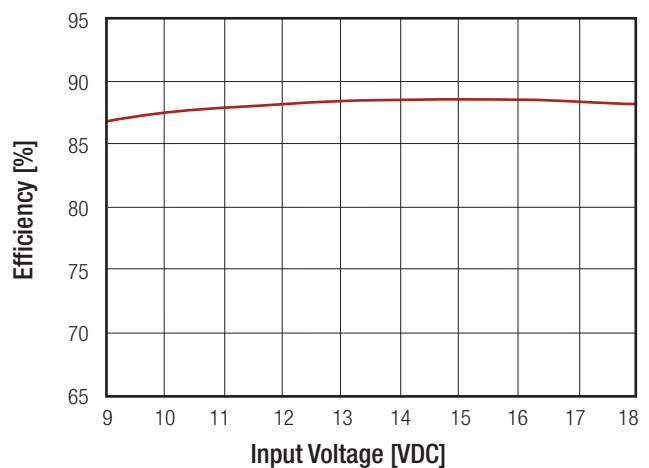
Note6: The ON/OFF control pin voltage is referenced to -Vin pin.

### RP12-1205SA

Efficiency vs. Output Current



Efficiency vs. Input Voltage

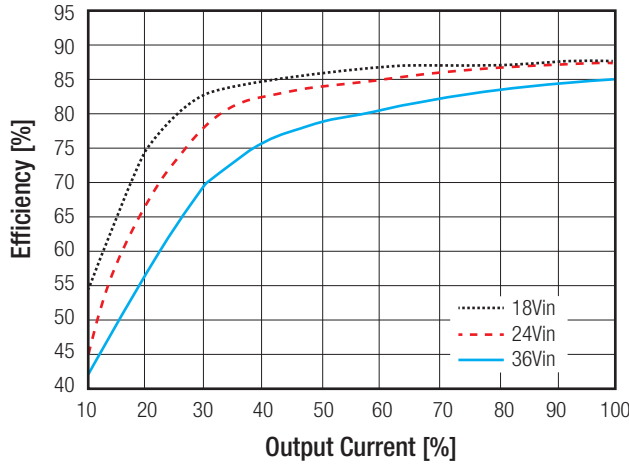


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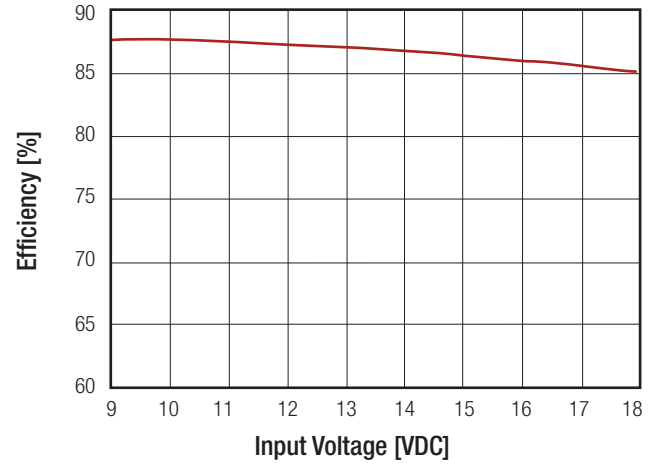
**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

**RP12-2405SA**

Efficiency vs. Output Current

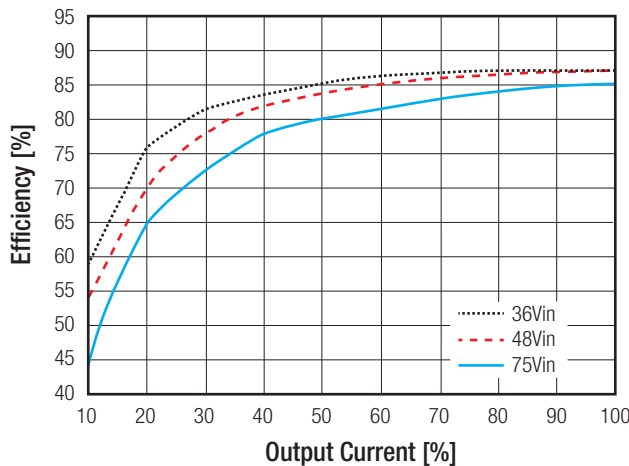


Efficiency vs. Input Voltage

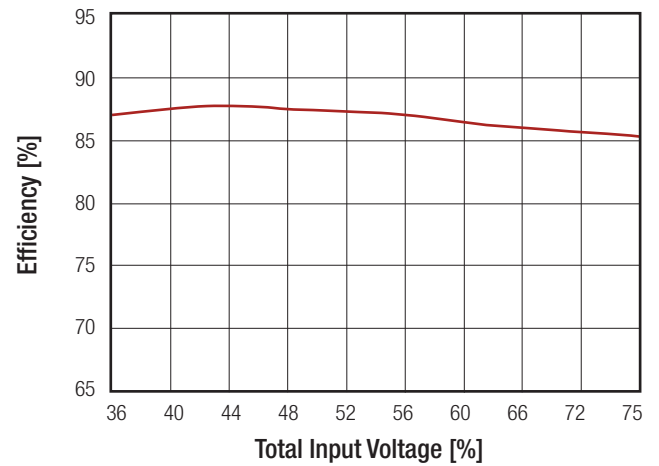


**RP12-4805SA**

Efficiency vs. Output Current



Efficiency vs. Input Voltage



**REGULATIONS**

Parameter	Condition		Value
Output Voltage Accuracy			±1.2%
Line Voltage Regulation	Single		±0.2%
	Dual		±0.5%
Load Voltage Regulation	no load to full load	DIP type	±0.5%
		SMD type	±1.0%
Cross Regulation	asymmetrical 25%<->100% load		±5%
Transient Response recovery time	25% load step change		250µs

**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

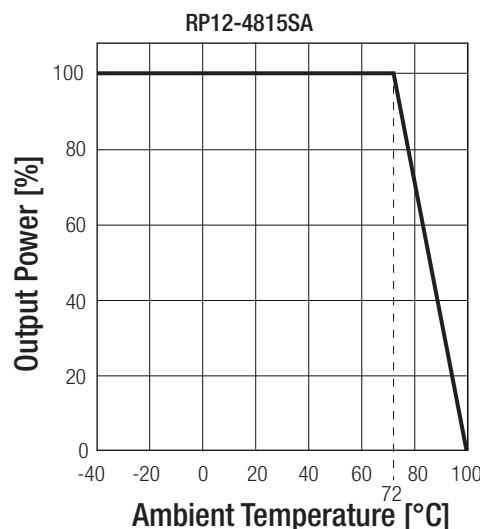
PROTECTIONS			
Parameter	Condition	Value	
Short Circuit Protection (SCP)		continuous, automatic recovery	
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout	3.9VDC
		5.1Vout	6.2VDC
		12Vout	15VDC
		15Vout	18VDC
Over Load Protection (OLP)	% of Iout rated	150% typ.	
Isolation Voltage	DIP24	I/P to O/P I/P (O/P) to case	1.6kVDC/1 minute 1.6kVDC/1 minute
	SMD	I/P to O/P I/P (O/P) to case	1.6kVDC/1 minute 1.0kVDC/1 minute
Isolation Resistance	500VDC	1GΩ min.	
Isolation Capacitance		1200pF max.	

**Notes:**

Note7: This power module is not internally fused. An input line fuse must always be used.

ENVIRONMENTAL			
Parameter	Condition	Value	
Operating Temperature Range	3.3Vout, ±5Vout	without derating	-40°C to +65°C
		with derating	-40°C to +100°C
	all others	without derating with derating	-40°C to +72°C -40°C to +100°C
Maximum Case Temperature		+100°C	
Temperature Coefficient		±0.02%/°C max.	
Thermal Impedance	Natural convection (20LFM)	20°C/Watt typ.	
Operating Humidity		5% - 95% RH	
Thermal Shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
MTBF	MIL-HDBK-217F	2064 x 10 <sup>3</sup> hours	
	Bellco TR-NWT-000332 <sup>(8)</sup>	2750 x 10 <sup>3</sup> hours	

**Derating Graph<sup>(9)</sup>**



**Notes:**

Note8: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).

Note9: Derating graphs are valid only for the shown part numbers. If you need detailed derating- information about a part-number not shown here please contact our technical support service at techsupportAT@recom-power.com.

**Specifications** measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load otherwise noted

### SAFETY AND CERTIFICATIONS

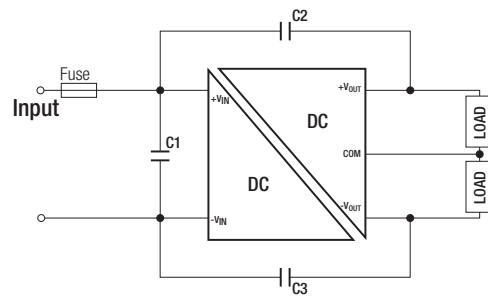
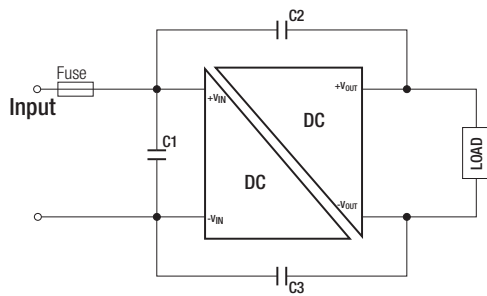
Certificate Type (Safety)	Report / File Number	Standard
UL General Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003
EMC Compliance	Condition	Standard / Criterion
EMI Standard <sup>(10)</sup>	with external filter	EN55022, Class A or B
ESD	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	EN61000-4-2, Criteria A
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient <sup>(11)</sup>	$\pm 2\text{kV}$	EN61000-4-4, Criteria A
Surge <sup>(11)</sup>	$\pm 1\text{kV}$	EN61000-4-5, Criteria A
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

#### Notes:

Note10: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$

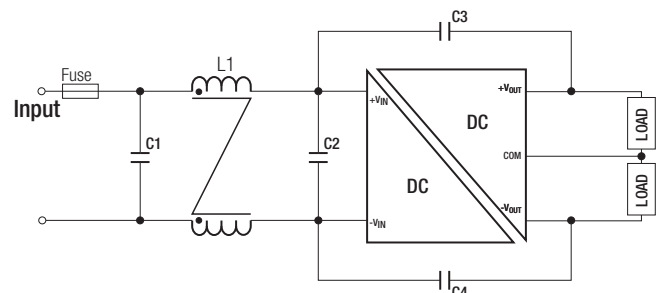
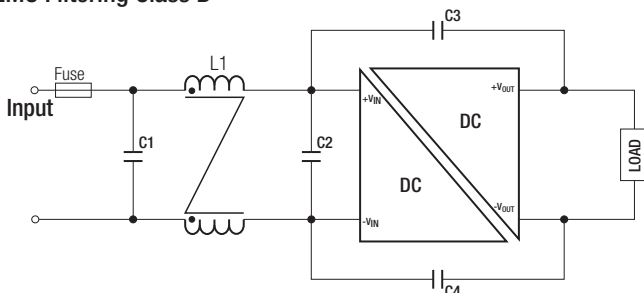
Note11: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

#### EMC Filtering Class A



MODEL	C1	C2/C3
RP12-12xxS_DA	6.8 $\mu\text{F}/50\text{V}$ 1210 MLCC	1000pF/2kV 1206 MLCC
RP12-24xxS_DA	4.7 $\mu\text{F}/50\text{V}$ 1210 MLCC	1000pF/2kV 1206 MLCC
RP12-48xxS_DA	2.2 $\mu\text{F}/100\text{V}$ 1812 MLCC	1000pF/2kV 1206 MLCC

#### EMC Filtering Class B



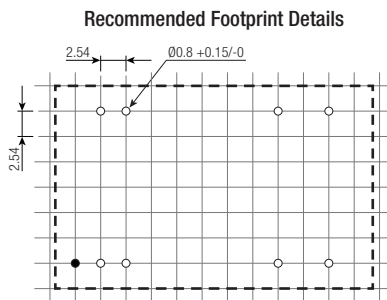
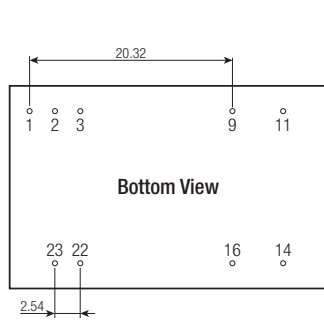
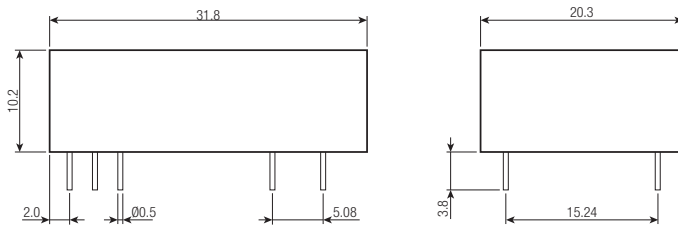
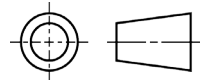
MODEL	C1	C2	C3/C4	L1
RP12-12xxS_DA	3.3 $\mu\text{F}/50\text{V}$ 1812 MLCC	N/A	1000pF/2kV 1206 MLCC	CMC: 325 $\mu\text{H}$ ref: WE 744290321 ref.: CMC-06
RP12-24xxS_DA	4.7 $\mu\text{F}/50\text{V}$ 1812 MLCC	N/A	1000pF/2kV 1206 MLCC	CMC: 325 $\mu\text{H}$ ref: WE 744290321 ref.: CMC-06
RP12-48xxS_DA	2.2 $\mu\text{F}/100\text{V}$ 1812 MLCC	2.2 $\mu\text{F}/100\text{V}$ 1812 MLCC	1000pF/2kV 1206 MLCC	CMC: 325 $\mu\text{H}$ ref: WE 744290321 ref.: CMC-06

**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

**DIMENSIONS and PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Material	Case	Nickel coated copper
	Base	Non-conductive black plastic
	Potting	Epoxy (UL94-V0)
Package Dimensions (LxWxH)	DIP	31.8 x 20.3 x 10.2mm
	SMD	32.0 x 20.3 x 11.2mm
Package Weight	DIP	18g
	SMD	20g

**DIP Dimension Drawing (mm)**

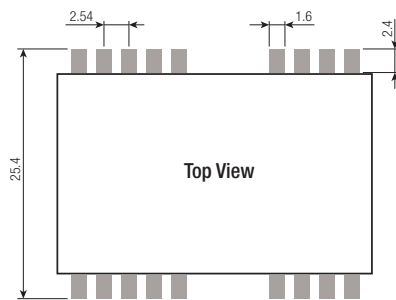
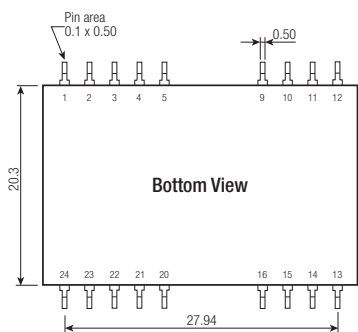
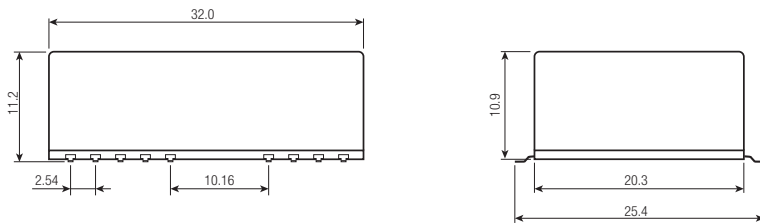


**Pin Connections**

Pin #	Single	Dual
1	Ctrl	Ctrl
2	-Vin	-Vin
3	-Vin	-Vin
9	NC	Com
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
22	+Vin	+Vin
23	+Vin	+Vin

Pin Pitch Tolerance  $\pm 0.25\text{mm}$   
 Pin dimension Tolerance  $\pm 0.1\text{mm}$   
 XX.X  $\pm 0.5\text{mm}$   
 XX.XX  $\pm 0.25\text{mm}$   
 NC = No Connection

**SMD Dimension Drawing (mm)**



**Pin Connections**

Pin #	Single	Dual
1	Ctrl	Ctrl
2	-Vin	-Vin
3	-Vin	-Vin
9	NC	Com
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
22	+Vin	+Vin
23	+Vin	+Vin
Others	NC	NC

Pin Pitch Tolerance  $\pm 0.25\text{mm}$   
 Pin dimension Tolerance  $\pm 0.1\text{mm}$   
 XX.X  $\pm 0.5\text{mm}$   
 XX.XX  $\pm 0.25\text{mm}$   
 NC = No Connection

**Specifications** measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load otherwise noted

PACKAGING INFORMATION		
Parameter	Type	Value
Packaging Quantity		7pcs.
Storage Temperature Range		$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Storage Humidity		5% - 95% RH

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