

# Features

# Regulated Converters

- 2:1 Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 88%
- Six-Sided Continuous Shield
- Fixed Operating Frequency



# RP15-F

15 Watt  
2" x 1"  
Single & Dual  
Output



## Description

The RP15-F series DC/DC converters are certified to UL 60950-1 and to cUL 60950-1. This makes them ideal for all telecom and industrial applications where approved safety standards are required. The industry standard 2" x 1" package meets military standards for thermal shock and vibration tolerance.

## Selection Guide

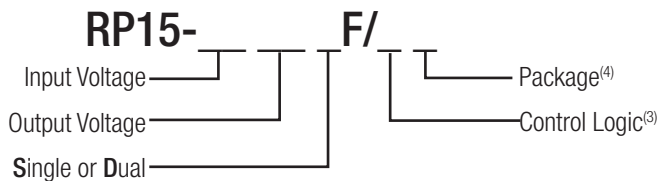
Part Number	Input Voltage Range (VDC)	Output Voltage (VDC)	Output Current (mA)	Input <sup>(1)</sup> Current (mA)	Efficiency <sup>(2)</sup> typ. (%)	Max. Capacitive Load <sup>(3)</sup> (µF)
RP15-123.3SF <sup>(3,4)</sup>	9-18	3.3	4000	1392	79	10200
RP15-1205SF <sup>(3,4)</sup>	9-18	5	3000	1524	82	7050
RP15-1212SF <sup>(3,4)</sup>	9-18	12	1250	1453	86	1035
RP15-1215SF <sup>(3,4)</sup>	9-18	15	1000	1453	86	705
RP15-243.3SF <sup>(3,4)</sup>	18-36	3.3	4000	688	80	10200
RP15-2405SF <sup>(3,4)</sup>	18-36	5	3000	744	84	7050
RP15-2412SF <sup>(3,4)</sup>	18-36	12	1250	735	85	1035
RP15-2415SF <sup>(3,4)</sup>	18-36	15	1000	735	85	705
RP15-483.3SF <sup>(3,4)</sup>	36-75	3.3	4000	340	81	10200
RP15-4805SF <sup>(3,4)</sup>	36-75	5	3000	377	83	7050
RP15-4812SF <sup>(3,4)</sup>	36-75	12	1250	359	87	1035
RP15-4815SF <sup>(3,4)</sup>	36-75	15	1000	363	86	705
RP15-1205DF <sup>(3,4)</sup>	9-18	±5	±1500	1506	83	±1020
RP15-1212DF <sup>(3,4)</sup>	9-18	±12	±625	1453	86	±495
RP15-1215DF <sup>(3,4)</sup>	9-18	±15	±500	1488	84	±165
RP15-2405DF <sup>(3,4)</sup>	18-36	±5	±1500	744	84	±1020
RP15-2412DF <sup>(3,4)</sup>	18-36	±12	±625	727	86	±495
RP15-2415DF <sup>(3,4)</sup>	18-36	±15	±500	727	86	±165
RP15-4805DF <sup>(3,4)</sup>	36-75	±5	±1500	368	85	±1020
RP15-4812DF <sup>(3,4)</sup>	36-75	±12	±625	355	88	±495
RP15-4815DF <sup>(3,4)</sup>	36-75	±15	±500	359	87	±165

### Notes:

- Note1: Maximum value at nominal input voltage and full load.  
Note2: Test by minimum Vin and constant resistor load.



## Model Numbering



### Ordering Examples

- RP15-2405SF/P = 24V Input, 5V Output, Positive Logic CTRL pin fitted  
RP15-4805DF-HC = 48V Input, ±5V Output, No CTRL pin, Heat-sink fitted

### Notes:

- Note3: add suffix "P" for CTRL function with positive logic (1=ON, 0=OFF), and trim pin  
add suffix "N" for CTRL function with negative logic (0=ON, 1=OFF), and trim pin  
Note4: add suffix -HC for premounted Heat-sink and clips

UL60950-1 Certified

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

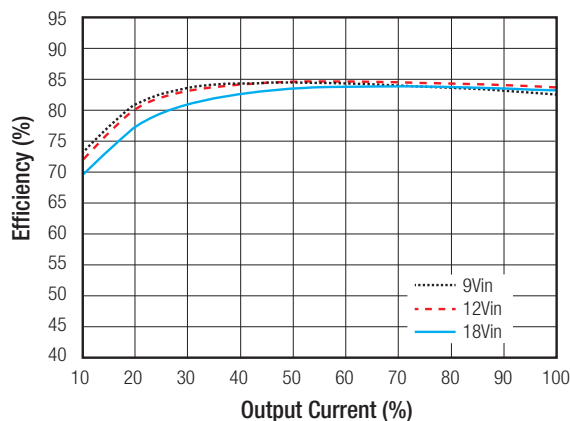
BASIC CHARACTERISTICS					
Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range	nom. Vin = 12V nom. Vin = 24V nom. Vin = 48V		9VDC 18VDC 36VDC	12VDC 24VDC 48VDC	18VDC 36VDC 75VDC
Under Voltage Lockout (UVLO)			none		
Input Filter			Pi-Type		
Input Reflected Ripple Current <sup>(6)</sup>	nominal Vin and full load			20mA <sub>p-p</sub>	
Input Surge Voltage	Vin = 12V, 100ms max. Vin = 24V, 100ms max. Vin = 48V, 100ms max.				36VDC 50VDC 100VDC
Start-up time	Power up			20ms	
Operating Frequency Range	measured by 20MHz bandwidth	Single	450kHz	500kHz	550kHz
		Dual	270kHz	300kHz	330kHz
Minimum Load <sup>(7)</sup>	of full load		10%		
Ripple and Noise	Single Dual			50mV <sub>p-p</sub> 75mV <sub>p-p</sub>	
Remote ON/OFF <sup>(8)</sup>	Positive logic	DC-DC ON DC-DC OFF	Open or 3.5V < Vr < 12V Short or 0V < Vr < 1.2V		
	Negative Logic	DC-DC ON DC-DC OFF	Short or 0V < Vr < 1.2V Open or 3.5V < Vr < 12V		
Input current of Remote pin (CTRL)	DC-DC OFF			20mA	
	DC-DC ON		-0.5mA		+1.0mA

**Notes:**

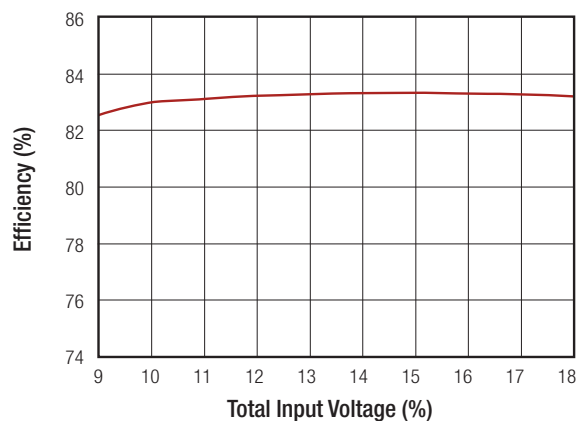
- Note6: Simulated source impedance of 12μH. 12μH inductor in series with +Vin.
- Note7: The RP15 series requires a minimum of 10% loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
- Note8: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin.

**RP15-1205SF**

**Efficiency vs. Output Current**

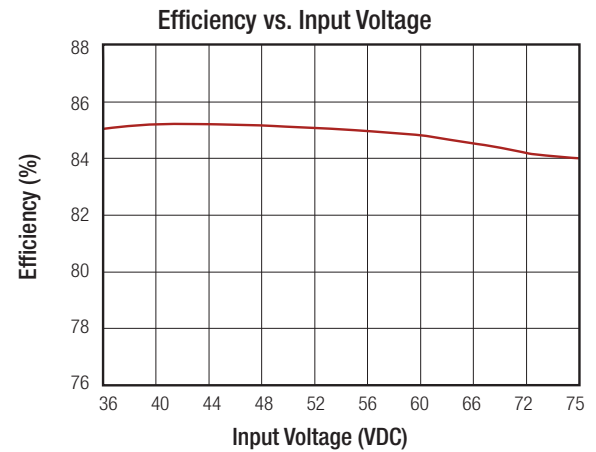
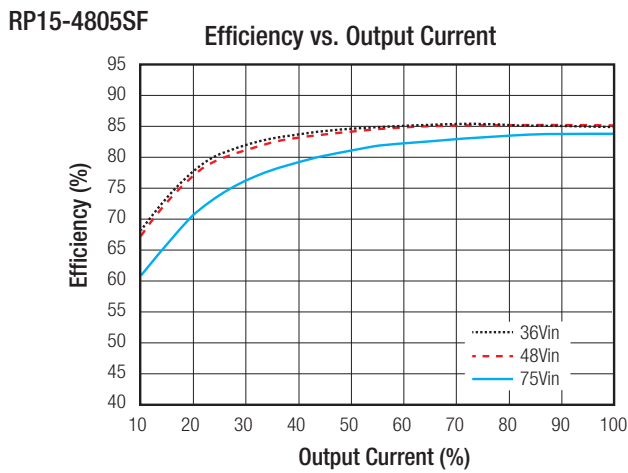
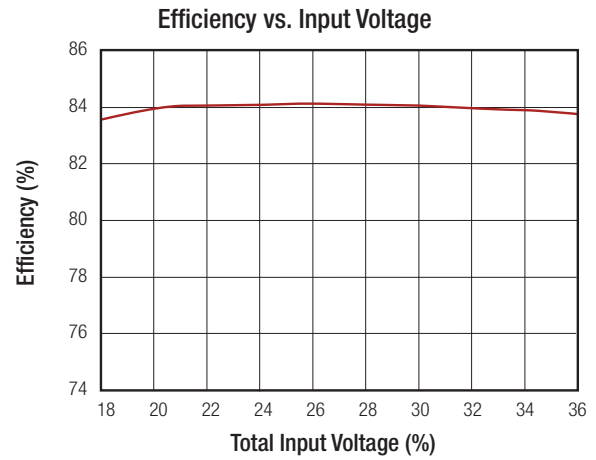
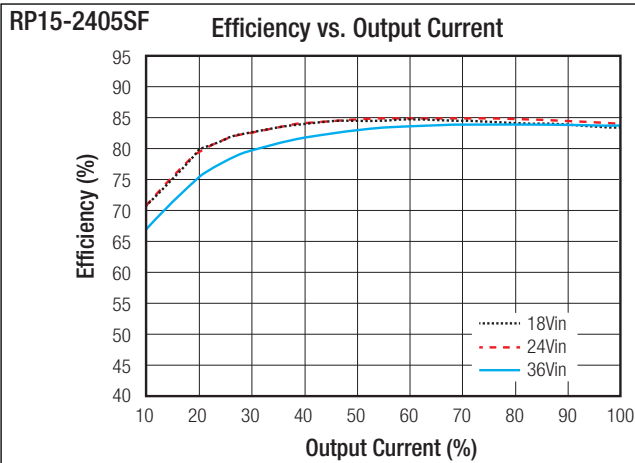


**Efficiency vs. Input Voltage**



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



**REGULATIONS**

Parameter	Condition	Value	
Output Voltage Accuracy	full load and nominal Vin	±1%	
Line Voltage Regulation	low line to high line at full load	±0.5%	
Load Voltage Regulation	10% to 100% load	Single	±0.5%
		Dual	±0.1%
Cross Regulation	asymmetrical 25% <-> 100% load	±5%	
Transient Response recovery time	25% load step change	250µs typ.	

**PROTECTIONS**

Parameter	Condition	Value	
Short Circuit Protection (SCP)		continuous, automatic recovery	
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout	3.9V
		5Vout	6.2V
		12Vout	15V
		15Vout	18V
Over Load Protection (OLP)	% of lout rated	150% typ.	
Isolation Voltage	I/P to O/P	1.6kVDC/1 minute	
	I/P (O/P) to case	1.6kVDC/1 minute	
Isolation Resistance	500VDC	1GΩ min.	
Isolation Capacitance		300pF typ.	

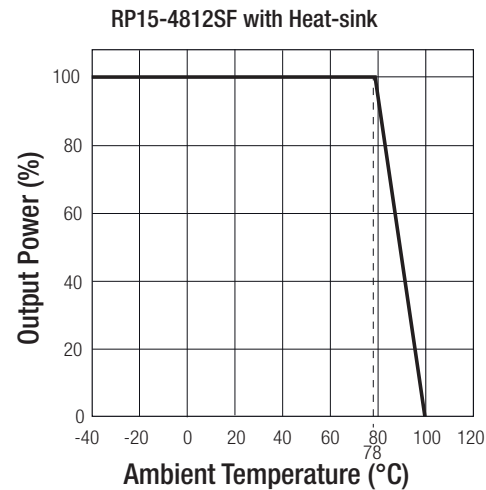
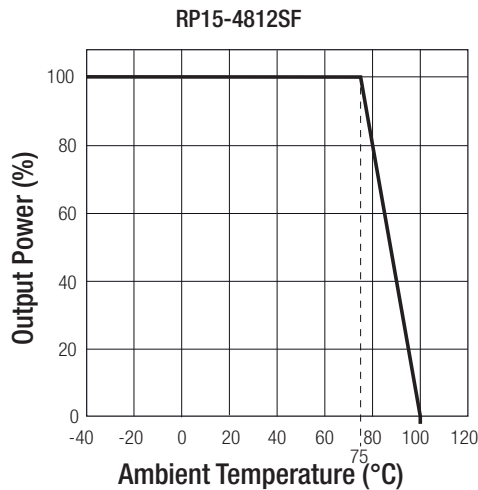
**Notes:**

Note9: This power module is not internally fused. An input line fuse must always be used.

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

ENVIRONMENTAL		
Parameter	Condition	Value
Operating Temperature Range	without derating	$-40^\circ\text{C}$ to $+75^\circ\text{C}$
	with derating	$-40^\circ\text{C}$ to $+100^\circ\text{C}$
Maximum Case Temperature		$+100^\circ\text{C}$
Temperature Coefficient		$\pm 0.02\%/^\circ\text{C}$ max.
Thermal Impedance	Natural convection (20LFM)	$12^\circ\text{C/Watt}$
	Natural convection (20LFM) with Heat-sink	$10^\circ\text{C/Watt}$
Operating Humidity		5% - 95% RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF	MIL-HDBK-217F	$2318 \times 10^3$ hours
	Bellcore TR-NWT-000332 <sup>(10)</sup>	$2041 \times 10^3$ hours

### Derating Graph<sup>(11)</sup>



#### Notes:

Note10: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at  $40^\circ\text{C}$  (Ground fixed and controlled environment).

Note11: 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](mailto:techsupportAT@recom-power.com)

### 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>(12)</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 B
Radiated Immunity	$\geq 10 \text{ V/m}$	EN61000-4-3, Criteria A
Fast Transient <sup>(13)</sup>	$\pm 2\text{kV}$	EN61000-4-4, Criteria B
Surge <sup>(13)</sup>	$\pm 1\text{kV}$	EN61000-4-5, Criteria B
Conducted Immunity	$10 \text{ Vr.m.s}$	EN61000-4-6, Criteria A

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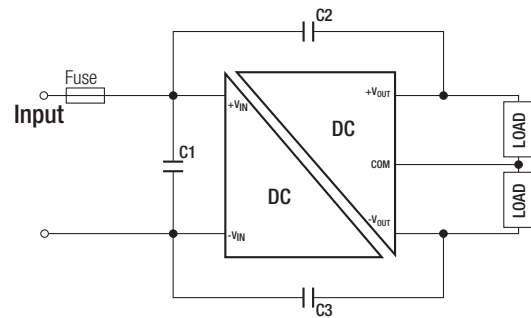
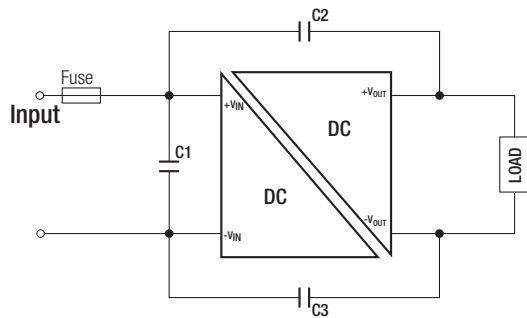
**Specifications** measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load otherwise noted

**Notes:**

Note10: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

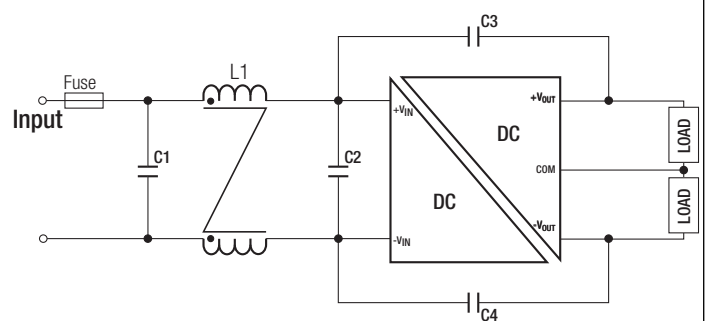
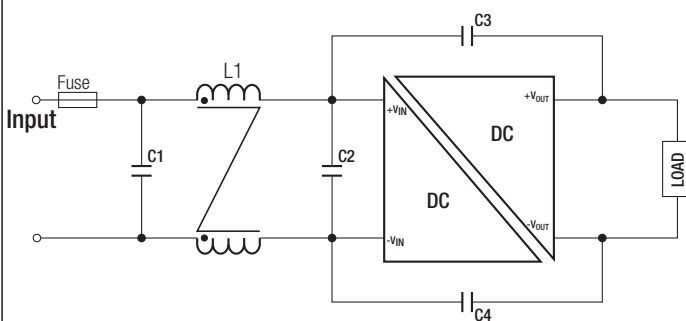
Note11: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220 $\mu\text{F}$ /100V.

**EMI Filtering Class A**



MODEL	C1	C2	C3
RP15-12xxS_DF	6.8 $\mu\text{F}$ /50V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC
RP15-24xxS_DF	2.2 $\mu\text{F}$ /50V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC
RP15-48xxS_DF	1.5 $\mu\text{F}$ /100V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC

**EMI Filtering Class B**



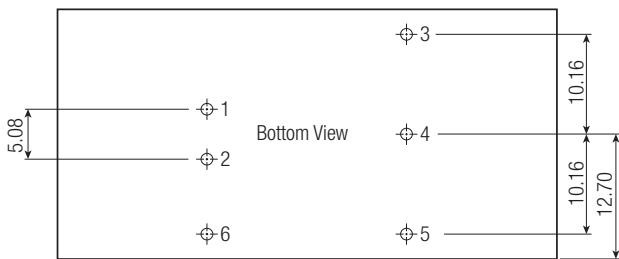
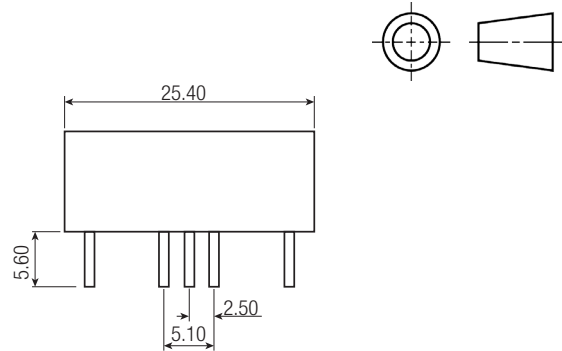
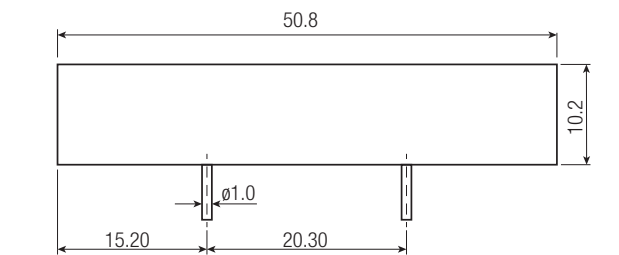
MODEL	C1	C2	C3/C4	L1
RP15-12xxS_DF	4.7 $\mu\text{F}$ /50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 325 $\mu\text{H}$ ref.: WE 744290321 ref.: CMC-06
RP15-24xxS_DF	3.3 $\mu\text{F}$ /50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 325 $\mu\text{H}$ ref.: WE 744290321 ref.: CMC-06
RP15-48xxS_DF	2.2 $\mu\text{F}$ /100V 1812 MLCC	2.2 $\mu\text{F}$ /100V 1812 MLCC	1000pF/2kV 1808 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)		50.8 x 25.4 x 10.2mm
Package Weight	without Heat-sink	27g
	with Heat-sink	37.89g

#### Dimension Drawing (mm)

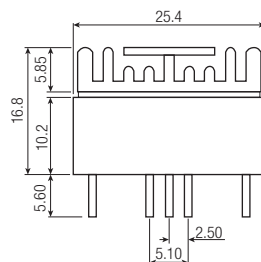
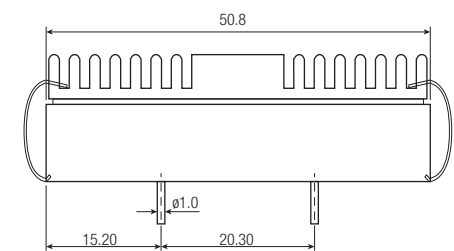
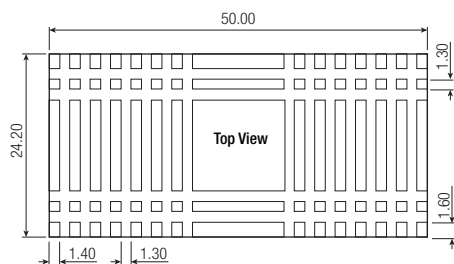


#### Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No Pin	Com
5	-Vout	-Vout
6*	CTRL*	CTRL*

\* Optional. See Note 8  
 Pin Pitch Tolerance  $\pm 0.25$  mm  
 Pin dimension tolerance  $\pm 0.1$  mm  
 X.X  $\pm 0.5$  mm  
 X.XX  $\pm 0.25$  mm

#### Dimension Drawing (mm) with Heat-sink



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

PACKAGING INFORMATION			
Parameter	Type		Value
Packaging Quantity	without Heat-sink	Tube	9pcs.
	with Heat-sink	Tray	20pcs.
Storage Temperature Range			-55°C to +125°C
Storage Humidity			5% - 95% RH