

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

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter				Pi-Type
Input Voltage Range	nom. $V_{in} = 12\text{V}$ nom. $V_{in} = 24\text{V}$ nom. $V_{in} = 48\text{V}$	9VDC 18VDC 36VDC	12VDC 24VDC 48VDC	18VDC 36VDC 75VDC
Input Surge Voltage	$V_{in} = 12\text{V}$, 100ms max. $V_{in} = 24\text{V}$, 100ms max. $V_{in} = 48\text{V}$, 100ms max.			25VDC 50VDC 100VDC
Under Voltage Lockout (UVLO)	$V_{in} = 12\text{V}$	DC-DC ON DC-DC OFF	8VDC	9VDC
	$V_{in} = 24\text{V}$	DC-DC ON DC-DC OFF	16VDC	18VDC
	$V_{in} = 48\text{V}$	DC-DC ON DC-DC OFF	33VDC	36VDC
Input Reflected Ripple Current ⁽⁵⁾			30mA _{p-p}	
Output Voltage Trimming ⁽⁶⁾	Single Output			$\pm 10\%$
Minimum Load		0%		
Start-up time	Power up ON/OFF CTRL			30ms 30ms
ON/OFF CTRL ⁽⁷⁾	Positive Logic	DC-DC ON DC-DC OFF	Open or $3.0\text{V} < V_r < 15\text{V}$ Short or $0\text{V} < V_r < 1.2\text{V}$	
	Negative Logic	DC-DC ON DC-DC OFF	Short or $0\text{V} < V_r < 1.2\text{V}$ Open or $3.0\text{V} < V_r < 15\text{V}$	
Input Current of CTRL Pin	DC-DC ON	-0.5mA		1.0mA
Standby Current	DC-DC OFF		2mA	
Internal Operating Frequency	3.3V _{out} , 5V _{out}	248kHz	275kHz	303kHz
	Others	297kHz	330kHz	363kHz
Ripple and Noise	20MHz BW, with a 1 μF M/C X7R and a 10 μF T/C	Single	75mV _{p-p}	
	20MHz BW, with a 1 μF M/C X7R and a 10 μF T/C for each output	Dual	100mV _{p-p}	

Notes:

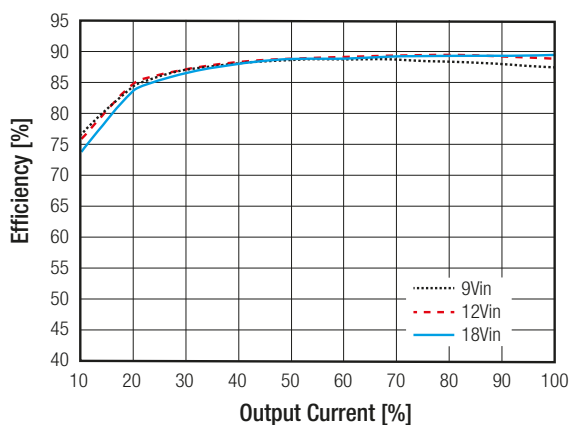
Note5: Simulated source impedance of 12 μH . 12 μH inductor in series with +Vin.

Note6: Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or -Vout pin

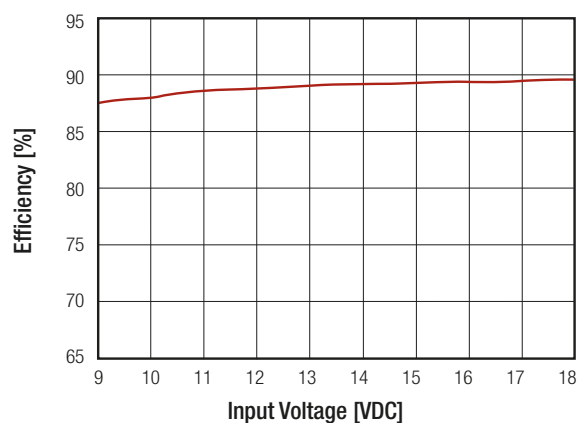
Note7: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin.
If no suffix is specified, the control pin will be omitted.

RP20-1205SA

Efficiency vs. Output Current



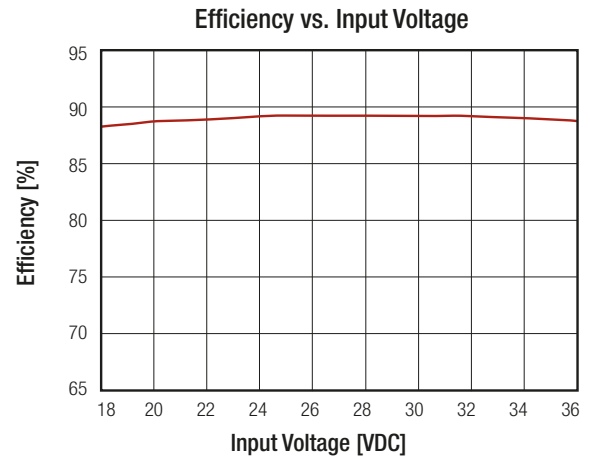
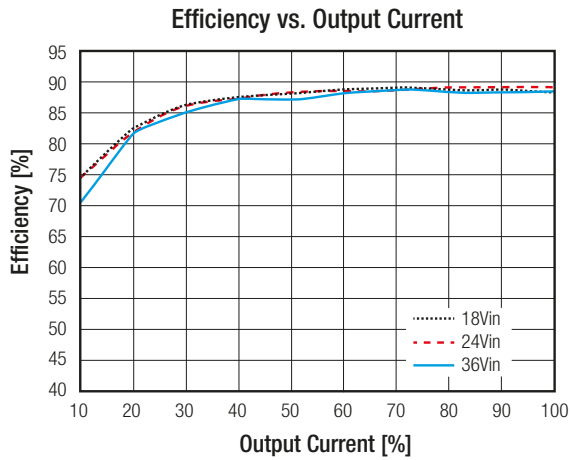
Efficiency vs. Input Voltage



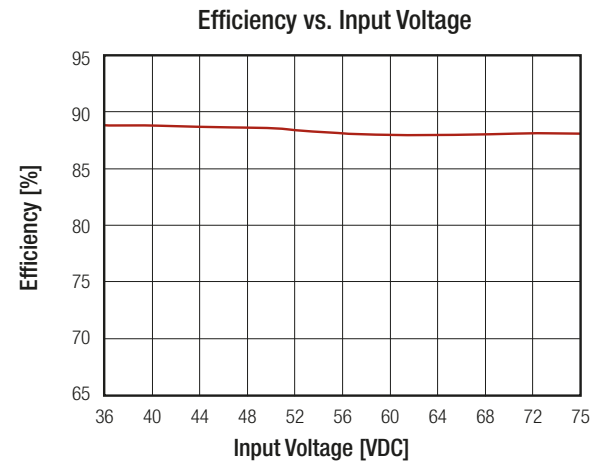
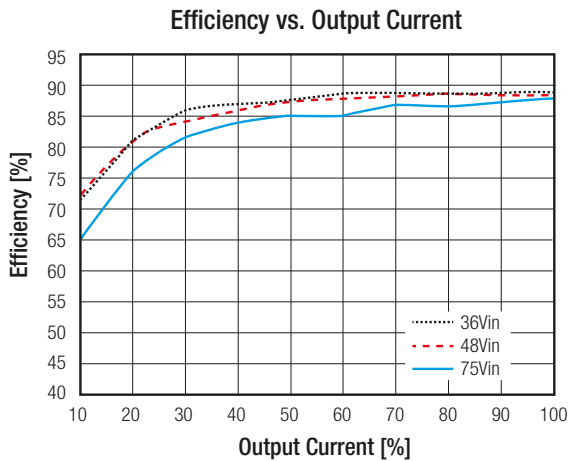
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Specifications (measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load otherwise noted)

RP20-2405SA



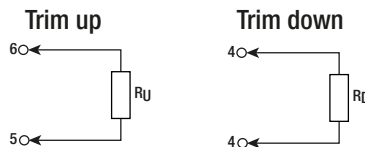
RP20-4805SA



External Output Trimming

Output Voltage Trimming

Some single/dual output Powerline converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. No general equation can be given for calculating the trim resistors, but the following trimtables give typical values for choosing these trimming resistors. If voltages between the given trim points are required, extrapolate between the two nearest given values to work out the resistor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.



RP20-xx3.3S

Trim up	1	2	3	4	5	6	7	8	9	10	%
V _{out} =	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.63	Volts
R _U =	385.071	191.511	126.990	94.730	75.374	62.470	53.253	46.340	40.963	36.662	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
V _{out} =	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.97	Volts
R _D =	116.719	54.779	34.133	23.810	17.616	13.486	10.537	8.325	6.604	5.228	kOhms

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

RP20-xx05S											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.4	5.45	5.50	Volts
R_{D} =	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	Volts
R_{D} =	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390	kOhms
RP20-xx12S											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20	Volts
R_{D} =	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	11.88	11.76	11.64	11.52	11.40	11.28	11.16	11.04	10.92	10.8	Volts
R_{D} =	776.557	308.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057	kOhms
RP20-xx15S											
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	15.15	15.3	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50	Volts
R_{D} =	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	14.85	14.70	14.55	14.40	14.25	14.10	13.95	13.80	13.65	13.50	Volts
R_{D} =	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223	kOhms

REGULATIONS		
Parameter	Condition	Value
Output Voltage Accuracy		$\pm 1.0\%$
Line Voltage Regulation	Single	$\pm 0.2\%$
	Dual	$\pm 0.5\%$
Load Voltage Regulation	0% to 100% load	$\pm 0.2\%$
		Dual
	10% load to 90% load	$\pm 0.1\%$
		Dual
Cross Regulation	asymmetrical 25% \leftrightarrow 100% load	$\pm 5.0\%$
Transient Response	25% load step change	recovery time
		250 μ s

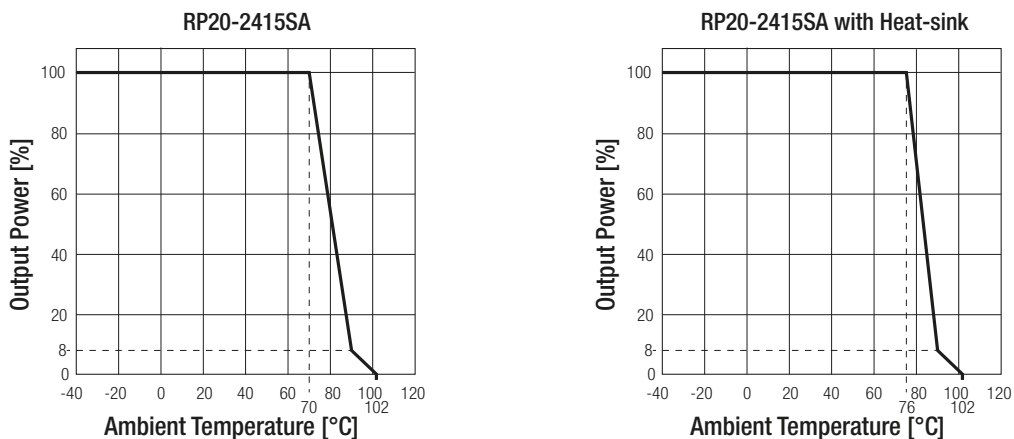
Specifications (measured at Ta = 25°C, nominal input voltage, full load otherwise noted)

PROTECTIONS			
Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout	3.7 - 5.4VDC
		5Vout	5.6 - 7.0VDC
		12Vout	13.5 - 19.6VDC
		15Vout	16.8 - 20.5VDC
Over Load Protection (OLP)			Hiccup mode, 150% of rated lout typ.
Isolation Voltage	tested for 1 minute	I/P to O/P	1.6kVDC
		I/P (O/P) to case	1.0kVDC
Isolation Resistance	tested with 500VDC		1GΩ min.
Isolation Capacitance			1500pF max.

Notes:
 Note8: This power module is not internally fused. An input line fuse must always be used.
 Recom suggests: 12Vin= T4A; 24Vin= T2A; 48Vin= T1.25A slow blow types

ENVIRONMENTAL			
Parameter	Condition		Value
Operating Temperature Range	without derating		-40°C to +70°C
	with derating		-40°C to +102°C
Maximum Case Temperature			+105°C
Operating Humidity			5% - 95% RH
Temperature Coefficient			±0.02%/°C max.
Thermal Impedance	natural convection 0.1m/s (20LFM)	without Heat-sink	17.6°C/Watt
		with Heat-sink	14.8°C/Watt
Thermal Shock			according to MIL-STD-810F
Vibration			according to MIL-STD-810F
MTBF	according to MIL-HDBK-217F, G.B. Bellcore TR-NWT-000332 ⁽⁹⁾	+25°C	1477 x 10 ³ hours
			1766 x 10 ³ hours

Derating Graph ⁽¹⁰⁾



Notes:

Note9: BELLCORE TR-NWT-000332. Case I: 50% Stress, Ta= 40°C. MIL-HDBK 217F Notice 2. Ta= 25°C, full load, (controlled environment)

Note10: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a partnumber not shown here please contact our technical support service at techsupportAT@recom-power.com

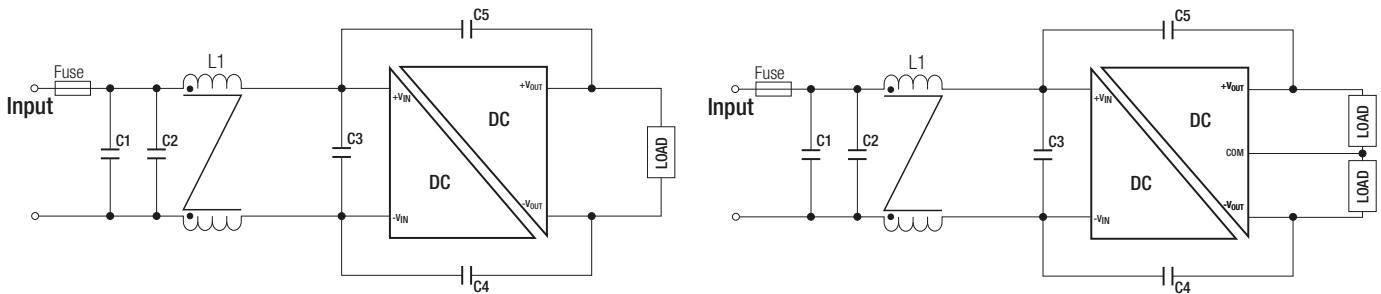
Specifications (measured at Ta = 25°C, nominal input voltage, full load otherwise noted)

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Condition	Standard
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003
EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external filter	EN55022, Class A or B
ESD Electrostatic discharge immunity test	Air ±8kV and Contact ±6kV	EN61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m	EN61000-4-3, Criteria A
Fast Transient and Burst Immunity ⁽¹¹⁾	±2kV	EN61000-4-4, Criteria A
Surge Immunity ⁽¹¹⁾	±2kV	EN61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10Vr.m.s	EN61000-4-6, Criteria A

Notes:

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, 220µF/100V.

EMI Filtering Class B



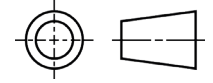
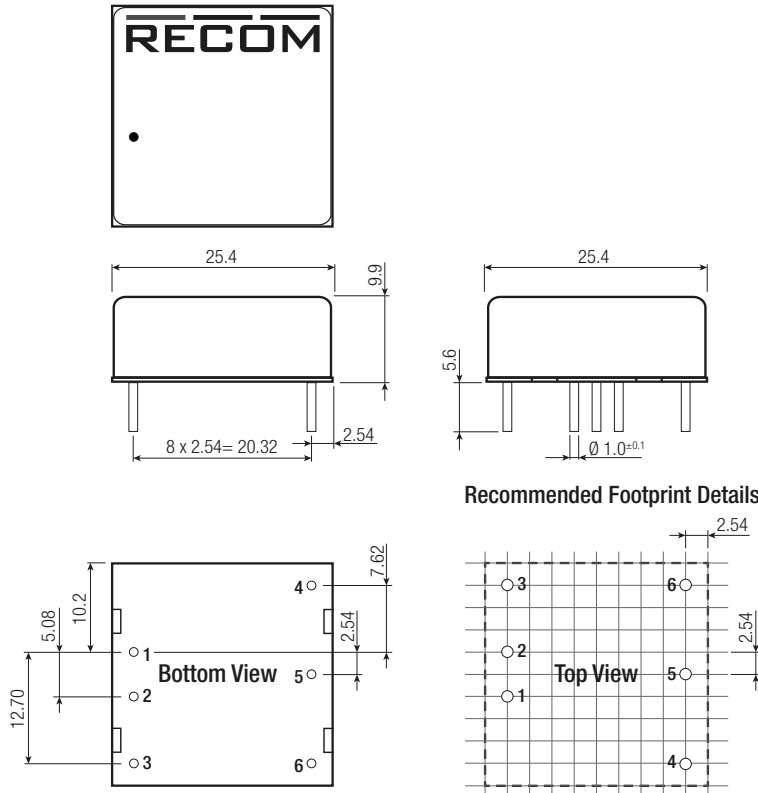
MODEL	C1	C2	C3	C4/C5	L1
RP20-12xxSA	4.7µF/25V 1812 MLCC	N/A	N/A	470pF/2kV 1808 MLCC	CMC: 325µH ref.: WE 744290321 ref.: CMC-06
RP20-24xxSA	4.7µF/25V 1812 MLCC	N/A	N/A	470pF/2kV 1808 MLCC	CMC: 325µH ref.: WE 744290321 ref.: CMC-06
RP20-48xxSA	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	470pF/2kV 1808 MLCC	CMC: 325µH ref.: WE 744290321 ref.: CMC-06

DIMENSIONS and PHYSICAL CHARACTERISTICS		
Parameter	Type	Value
Material	Case	Nickel coated copper
	Base	FR4 PCB
	Potting	Silicone (UL94 V-0)
Packaging Dimension (LxWxH)	without Heat-sink with Heat-sink	25.4 x 25.4 x 9.9mm 31.4 x 25.4 x 16.5mm
Packaging Weight	without Heat-sink with Heat-sink	15g 21.44g

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

Dimension Drawing (mm)

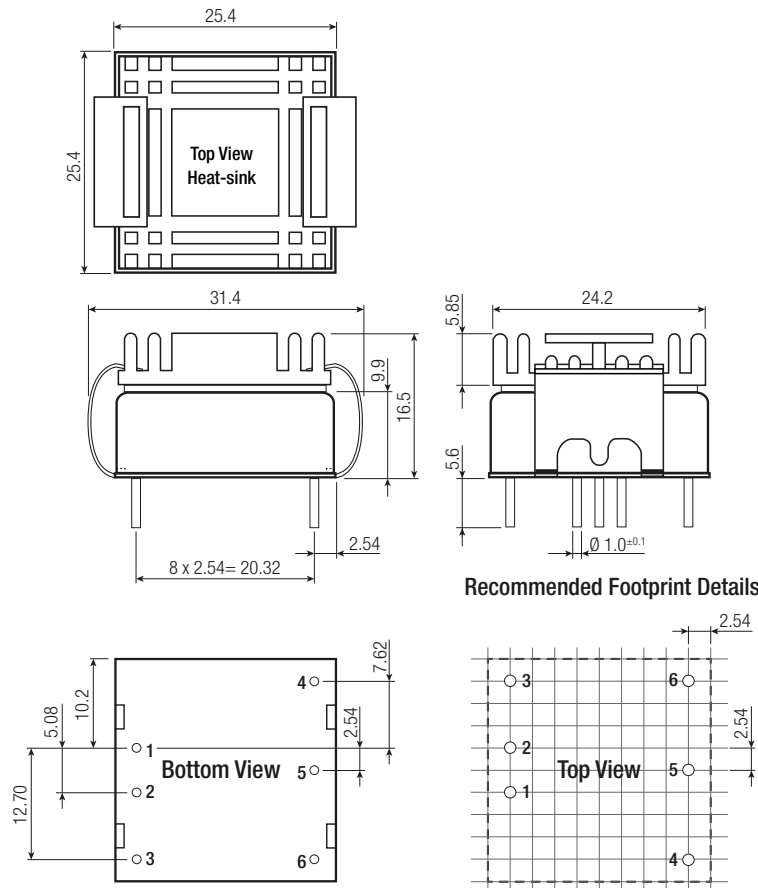


Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	Trim	Com
6	-Vout	-Vout

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 $\pm 0.25\text{mm}$

Dimension Drawing (mm) with Heat-sink



Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	Trim	Com
6	-Vout	-Vout

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 $\pm 0.25\text{mm}$

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PACKAGING INFORMATION		
Parameter	Type	Value
Packaging Dimensions (LxWxH)	without Heat-sink	Tube 230.0 x 180.0 x 28.0mm
	with Heat-sink	Tray 230.0 x 180.0 x 28.0mm
Packaging Quantity	without Heat-sink	Tube 8pcs
	with Heat-sink	Tray 20pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95% RH

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