

Features

- Eighth brick format
- 4:1 input voltage range
- 1.5kV basic isolation
- Remote ON/OFF, sense, and trim pins
- UVLO, OTP, OVP, OCP and SCP
- 92% efficiency (typical)

Regulated Converter



RPA100E-W

100 Watt
Eighth Brick
Single Output



UL62368-1 - certified
CAN/CSA-C22.2 No. 62368-1 - certified
CISPR22 compliant

Description

The RPA100E-W is a low cost 100W DC/DC converter in industry standard 1/8th brick low profile format (58.4mm x 23mm x 11mm) and pinning. The 4:1 input range covers 24V, 28V, or 48V nominal input voltages, and the trimmable output voltage options are 5V or 12V. The efficiency is particularly high (typically 92%) to permit full load operation from -40°C up to +50°C ambient temperature with only free air convection and up to 85°C with forced air cooling. The isolation voltage is 1.5kVDC/1 minute (basic insulation grade). Applications include demanding industrial power supplies, telecom, and PoE circuits.

Selection Guide

Part Number	Input Voltage Range [VDC]	Nom. Output Voltage [VDC]	Output Current [A]	Efficiency typ. ⁽¹⁾ [%]
RPA100E-4805SW/N	18-75	5	25	91
RPA100E-4812SW/N	18-75	12	9	92

Notes:

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Model Numbering



Notes:

Note2: suffix "N" = negative CTRL function, refer to "ON/OFF CTRL"

Ordering Examples:

RPA100E-4805SW/N	18-75Vin,	5VDC Output,	Single,	Negative control logic
RPA100E-4812SW/N	18-75Vin,	12VDC Output,	Single,	Negative control logic

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

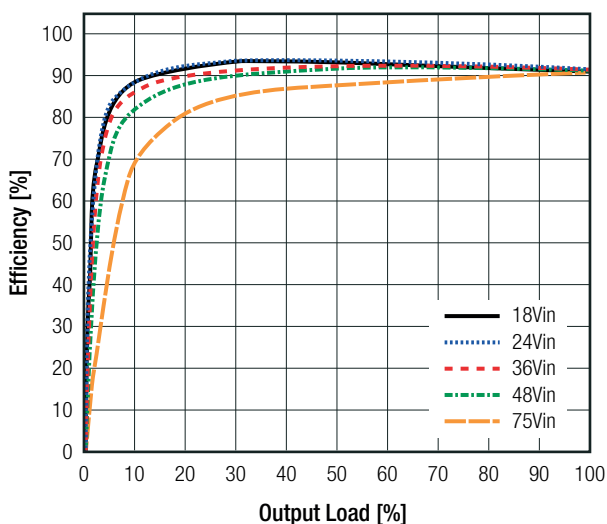
Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range	nom V_{IN} = 48VDC		18VDC	48VDC	75VDC
Absolute Maximum Input Voltage	continuous		0VDC		80VDC
Input Surge Voltage	100ms max.				100VDC
Under Voltage Lockout (UVLO)	DC-DC ON		16.5VDC	17.2VDC	17.9VDC
	DC-DC OFF		15.5VDC	16.2VDC	16.9VDC
	hysteresis		0.3VDC	1VDC	1.8VDC
Input Current	V_{IN} = 18VDC, full load	V_{OUT} = 5VDC V_{OUT} = 12VDC			8.9A 7.7A
Inrush Current					1A ² s
Quiescent Current	V_{IN} = 48VDC, no load	V_{OUT} = 5VDC V_{OUT} = 12VDC		55mA 60mA	
Standby Current	DC-DC OFF		V_{OUT} = 5VDC V_{OUT} = 12VDC	5mA 12mA	
Output Voltage Trimming ⁽³⁾	refer to "OUTPUT VOLTAGE TRIMMING"		V_{OUT} = 5VDC V_{OUT} = 12VDC	-20% -10%	+10%
Minimum Load			0%		
Start-up Time	Power up ON/OFF CTRL			55ms 55ms	
ON/OFF CTRL ⁽⁴⁾	Negative Logic	DC-DC ON DC-DC OFF	-0.7VDC < V_{CTRL} < 0.8VDC Open or 3VDC < V_{CTRL} < 5VDC		
Input Current of CTRL pin					1mA
Leakage Current of CTRL pin	logic high, V_{CTRL} = 5VDC				50µA
Internal Operating Frequency	V_{OUT} = 5VDC V_{OUT} = 12VDC			300kHz 350kHz	
Output Ripple & Noise ⁽⁵⁾	5-20MHz BW, 48Vin, full load		V_{OUT} = 5VDC V_{OUT} = 12VDC	70mVp-p 80mVp-p	
Remote Sense	P_{OUT} ≤ max rated power, I_{OUT} ≤ I_{OUT} max				10%

Notes:

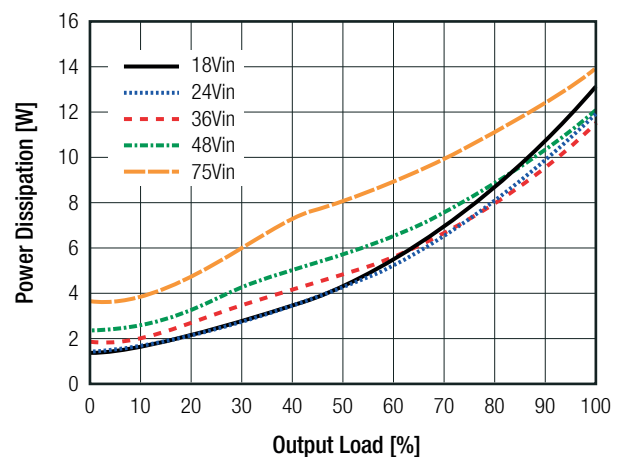
- Note3: Trim up when input voltage is greater than 20VDC only
- Note4: If CTRL function is not used, please short the CTRL pin to -Vin
- Note5: Measurements are made with a 1µF ceramic, 10µF tantalum across output

RPA100E-4805W/N

Efficiency vs. Output Current



Power Dissipation vs. Output Current

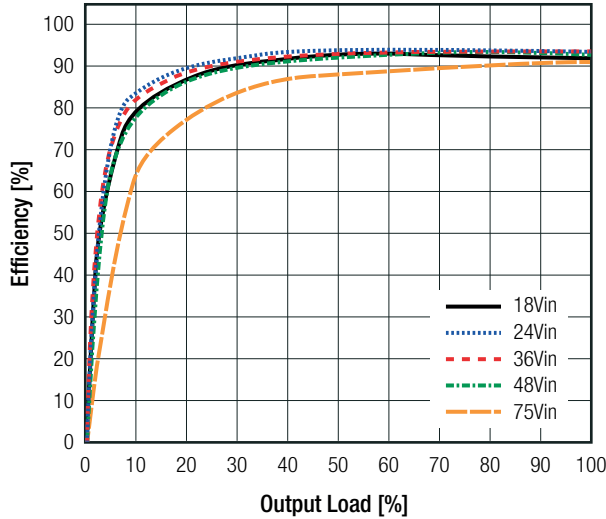


continued on next page

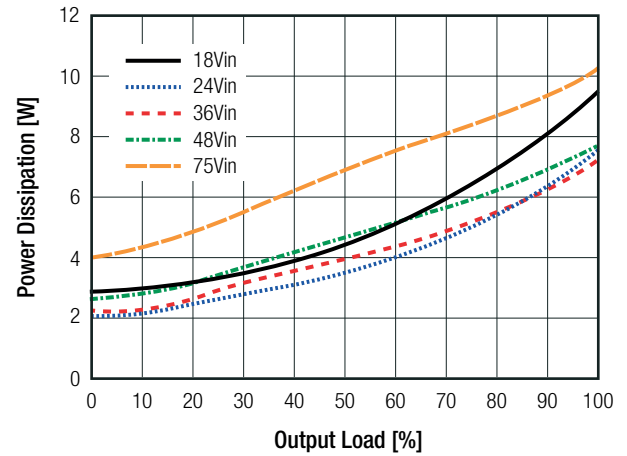
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

RPA100E-4812W/N

Efficiency vs. Output Current

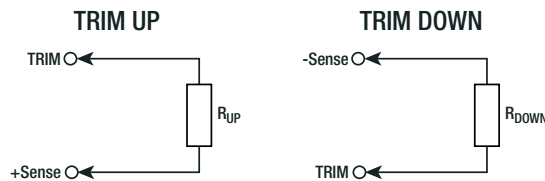


Power Dissipation vs. Output Current



OUTPUT VOLTAGE TRIMMING

RPA100E-W converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. The values for trim resistors shown in trim tables below are according to standard E96 values; therefore, the specified voltage may slightly vary; they can also be calculated with below shown equation.



- V_{OUTnom} = nom. output voltage [VDC]
- V_{OUTset} = trimmed output voltage [VDC]
- ΔV_{OUT} = output voltage change [%]
- R_{up} = trim up resistor [Ω]
- R_{down} = trim down resistor [Ω]

Calculation:

$$R_{UP} = \frac{5.11 \times V_{OUTnom} \times (100 + \Delta V_{OUT})}{1.225 \times \Delta V_{OUT}} - \frac{511}{\Delta V_{OUT}} - 10.22$$

$$R_{DOWN} = \frac{511}{\Delta V_{OUT}} - 10.22$$

Practical Example RPA100E-4812SW/N trim up +10%

$V_{OUTnom} = 12V, \Delta V_{OUT} = +10\%$ (13.2VDC)

$$R_{UP} = \left[\frac{5.11 \times 12 \times (100 + 10)}{1.225 \times 10} \right] - \frac{511}{10} - 10.22 = 489.3k\Omega$$

R_{UP} according to E96 \approx **487k Ω**

Practical Example RPA100E-4812SW/N trim down -10%

$V_{OUTnom} = 12V, \Delta V_{OUT} = -10\%$ (10.8VDC)

$$R_{DOWN} = \left[\frac{511}{10} \right] - 10.22 = 40.88k\Omega$$

R_{DOWN} according to E96 \approx **41k Ω**

continued on next page

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

RPA100E-4805SW/N

$\Delta V_{OUT} =$	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	[%]
$V_{OUTset} =$	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50	[VDC]
$R_{UP} =$	1M58	806k	536k	402k	324k	274k	237k	205k	187k	169k	[Ω]

$\Delta V_{OUT} =$	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
$V_{OUTset} =$	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	[VDC]
$R_{DOWN} =$	499k	243k	162k	118k	90k9	75k	63k4	53k6	46k4	41k2	[Ω]

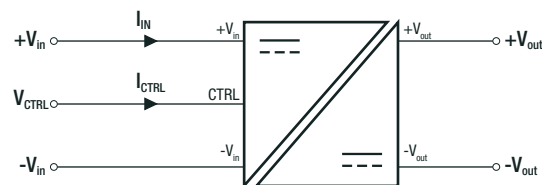
$\Delta V_{OUT} =$	11	12	13	14	15	16	17	18	19	20	[%]
$V_{OUTset} =$	28.48	28.16	27.84	27.52	27.20	26.88	26.56	26.24	25.92	25.60	[VDC]
$R_{DOWN} =$	36k5	32k4	29k4	26k1	23k7	21k5	20k	18k2	16k5	15k4	[Ω]

RPA100E-4812SW/N

Trim up	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	[%]
$V_{OUTset} =$	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20	[VDC]
$R_{UP} =$	4M53	2M26	1M58	1M15	931k	787k	681k	604k	536k	487k	[Ω]

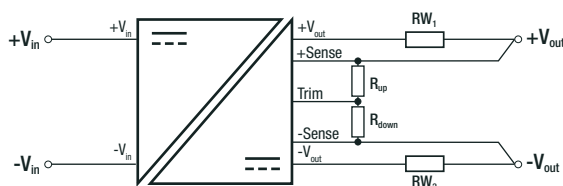
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
$V_{OUTset} =$	11.88	11.76	11.64	11.52	11.40	11.28	11.16	11.04	10.92	10.80	[VDC]
$R_{DOWN} =$	499k	243k	162k	118k	90k9	75k	63k4	53k6	46k4	41k2	[Ω]

ON/OFF CTRL



Negative Logic DC-DC ON
DC-DC OFF $-0.7VDC < V_{CTRL} < 0.8VDC$
Open or $3VDC < V_{CTRL} < 5VDC$

REMOTE SENSE



RW_1 ... wire losses +
 RW_2 ... wire losses -
 R_{up} ... trim up resistor
 R_{down} ... trim down resistor

The output voltage can be adjusted by both trim and remote sense. De-rate the maximum output power if using the trim or sense function to increase the output voltage.

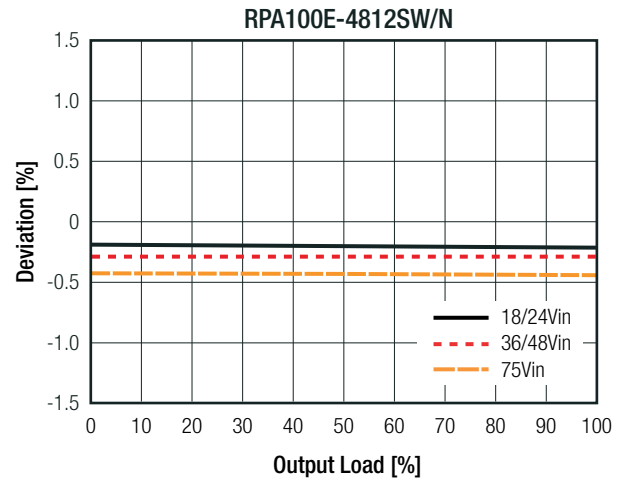
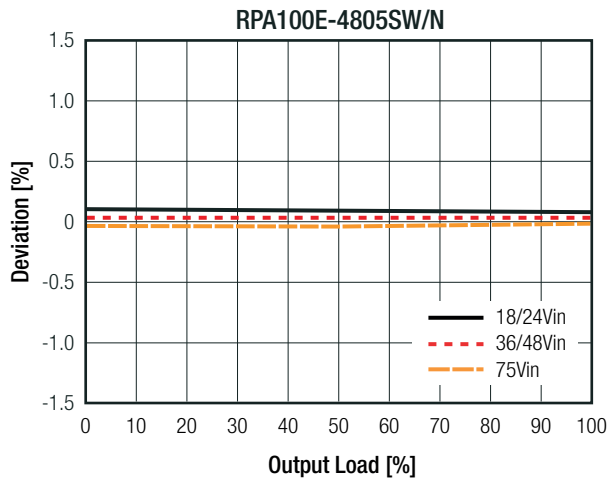
REGULATIONS

Parameter	Condition	Value
Output Accuracy		$\pm 1.5\%$ max.
Line Regulation	low line to high line	± 0.05 typ. / $\pm 0.2\%$ max.
Load Regulation	0% to 100% load	0.05 typ. / 0.2% max.
Transient Response	25% load change	$V_{OUT} = 5VDC$ $V_{OUT} = 12VDC$ 200mV typ. 400mV typ.
	recovery time	200 μs typ.

continued on next page

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Deviation vs. Load



PROTECTIONS

Parameter	Type	Value
Short Circuit Protection (SCP)		hiccup mode, auto recovery
Over Voltage Protection (OVP)	over full temperature range; % of V_{OUTnom}	115% - 140%, hiccup mode
Over Current Protection (OCP)	% of rated I_{OUT}	110% - 140%, hiccup mode
Over Temperature Protection (OTP) ⁽⁷⁾	48Vin, 80% I_{OUT} , 1m/s (refer to "Airflow direction")	measured on "HOTSPOT1" $V_{OUT}= 5VDC$ +132°C typ. $V_{OUT}= 12VDC$ +130°C typ.
	measured on "NTC RESISTOR"	$V_{OUT}= 5VDC$ +130°C typ. $V_{OUT}= 12VDC$ +125°C typ.
Isolation Voltage ⁽⁸⁾		1.5kVDC
Isolation Resistance		10MΩ min.
Isolation Capacitance		1000pF typ.
Insulation Grade		basic

Notes:

- Note7: Automatic restart after temperature is within specification. A thermocouple should be placed on NTC for best OTP function. Hotspot1 temperature is just for reference only.
- Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage
- Note9: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: 20A normal blow type

ENVIRONMENTAL

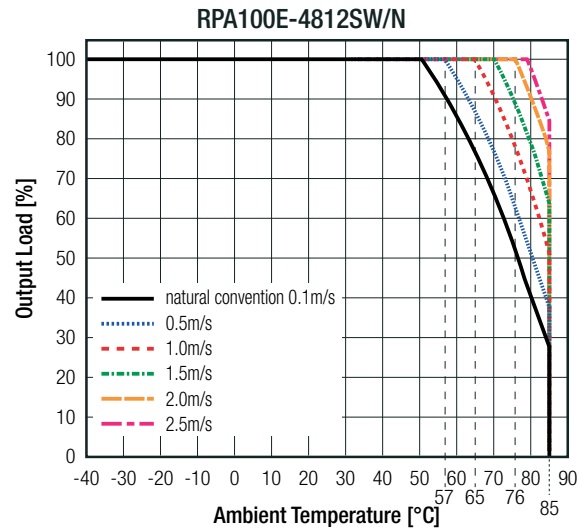
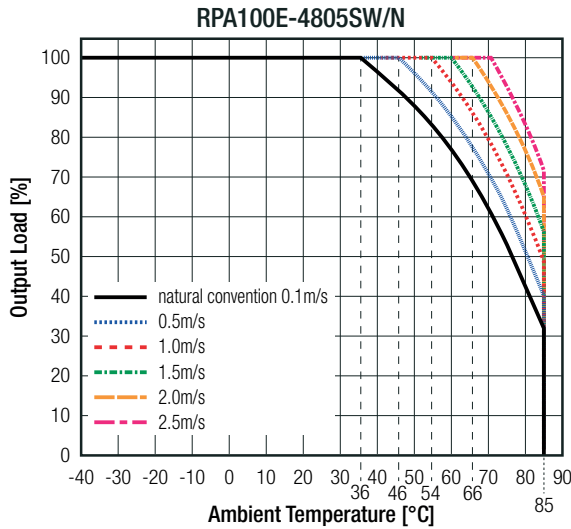
Parameter	Condition	Value
Operating Temperature Range	refer to "Derating Graph"	-40°C to +85°C
Maximum Hotspot1 Temperature	$V_{OUT}= 5VDC$	+116°C
	$V_{OUT}= 12VDC$	+115°C
Temperature Coefficient		±0.01%/K
Operating Altitude		4000m
Operating Humidity	non-condensing	95% RH max.
Pollution Degree		PD2
Mechanical Shock		30G, 11ms, 3 times, half sine
Vibration		2.4Grms, 10-500Hz, 30min along x, y and z axis
MTBF	80% load, $T_{AMB}= +25°C$, 1.5m/s airflow	$V_{OUT}= 5VDC$ 7300 x 10 ³ hours
		$V_{OUT}= 12VDC$ 4500 x 10 ³ hours

continued on next page

Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

Derating Graph

(Module vertical mounted and at $V_{in} = 24\text{VDC}$, refer to "APPLICATION and INSTALLATION")



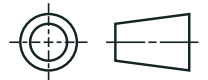
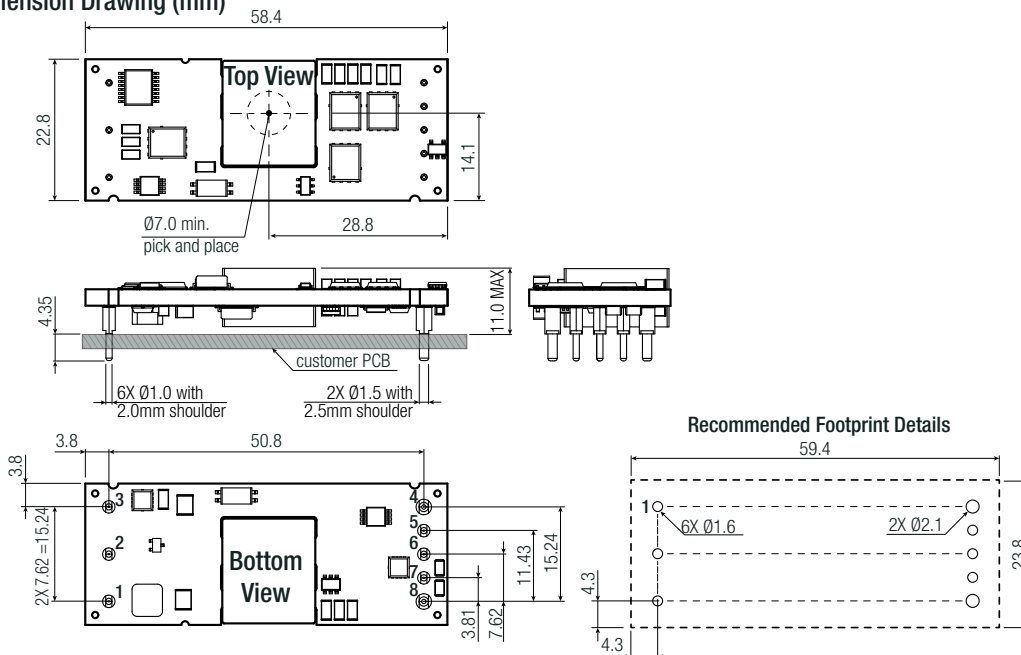
SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Audio/Video, information and communication technology equipment - Safety requirements	E224736	UL62368-1:2014 2nd Edition CSA C22.2 No. 62368-1-14, 2nd Edition
RoHS2		RoHS 2011/65/EU + AM2015/863
EMC Compliance	Condition	Standard / Criterion
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	with external filter	CISPR22, Class B

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	PCB	FR4, UL94 V-0
Dimension (LxWxH)		58.8 x 22.8 x 11.0mm
Weight		24.6g typ.

Dimension Drawing (mm)



Pinning Information

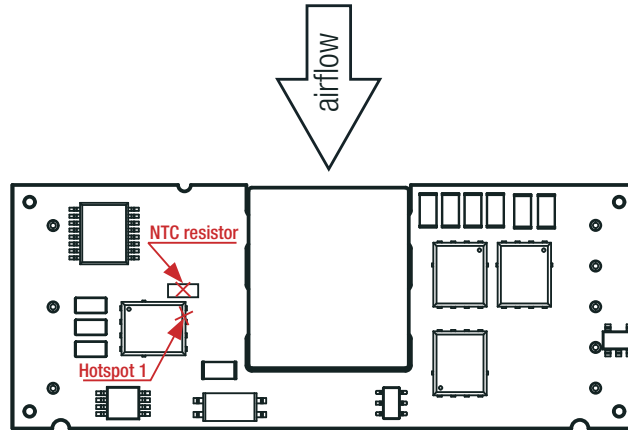
Pin #	Single
1	+Vin
2	CTRL
3	-Vin
4	-Vout
5	-Sense
6	Trim
7	+Sense
8	+Vout

Tolerance:
 xx.x = $\pm 0.5\text{mm}$
 xx.xx = $\pm 0.25\text{mm}$

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

APPLICATION AND INSTALLATION

Airflow direction
(vertically mounted)



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	box	221.0 x 128.0 x 33.0mm
Packaging Quantity		6pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	95% RH max.

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.