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Features

Regulated Converters

- 30W in a 1”x1” case
- 4:1 wide input voltage range
- 2kVDC/1min isolation
- IEC/EN62638-1certified
- Efficiency over 90%
- OVP, OLP, OTP, UVLO
- +110°C max. case temperature

RECOM
DC/DC Converter

REC30E-Z

30 Watt 1“ x 1“ Single & Dual Output

3 YEAR Warranty

Description

The REC30E-Z series are high power density, wide input voltage range 30W DC/DC converters in an industry standard 1”x1” case size. Despite their small size, the REC30E-Z converters are fully specified devices with output currents up to 7 amps, over 90% efficiency, no minimum load, 2000VDC/1min isolation, tight regulation, and low ripple/noise figures. The outputs are also fully protected against over-temperature, short circuits, overcurrent, and overvoltage, and the single output version offers a ±10% trim range. These converters will find industrial applications where board space is at a premium.



Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. (1) [%]	max. Capacitive Load (2) [µF]
REC30E-243.3SZ	9 - 36	3.3	7000	88.5	10000
REC30E-2405SZ	9 - 36	5	6000	89	7200
REC30E-2412SZ	9 - 36	12	2500	90	1200
REC30E-2415SZ	9 - 36	15	2000	90.5	1000
REC30E-2424SZ	9 - 36	24	1250	90.5	380
REC30E-2412DZ	9 - 36	±12	±1250	89	±750
REC30E-2415DZ	9 - 36	±15	±1000	90	±500
REC30E-483.3SZ	18 - 75	3.3	7000	88	10000
REC30E-4805SZ	18 - 75	5	6000	90	7200
REC30E-4812SZ	18 - 75	12	2500	90.5	1200
REC30E-4815SZ	18 - 75	15	2000	90.5	1000
REC30E-4824SZ	18 - 75	24	1250	91	380
REC30E-4812DZ	18 - 75	±12	±1250	90.5	±750
REC30E-4815DZ	18 - 75	±15	±1000	91	±500

Notes:

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

Note2: Max Cap Load is tested at nominal input and full resistive load

IEC62368-1 2nd Edition certified
IEC/EN62368-1 3rd Edition certified
EN55032 compliant
CB-Report

Model Numbering

REC30E- __ __ __ Z

- nom. Input Voltage
- nom. Output Voltage
- 4:1 Input
- **S**ingle or **D**ual

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DC/DC Converter

REC30E-Z Series

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

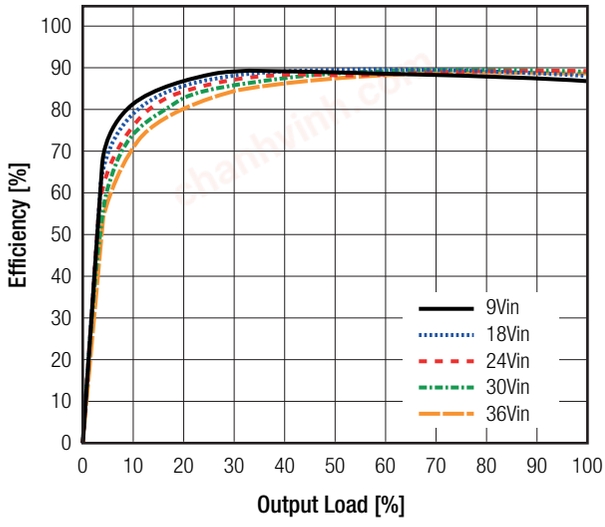
BASIC CHARACTERISTICS					
Parameter	**Condition**		**Min.**	**Typ.**	**Max.**
Internal Input Filter					Pi type
Input Voltage Range	nom. Vin= 24VDC		9VDC	24VDC	36VDC
	nom. Vin= 48VDC		18VDC	48VDC	75VDC
Input Surge Voltage	nom. Vin= 24VDC			50VDC	
	nom. Vin= 48VDC			100VDC	
Under Voltage Lockout (UVLO)	nom. Vin= 24VDC	DC-DC ON		9VDC	
		DC-DC OFF		7.5VDC	
	nom. Vin= 48VDC	DC-DC ON		18VDC	
		DC-DC OFF		15VDC	
Input Current	nom. Vin= 24VDC			1500mA	
	nom. Vin= 48VDC			690mA	
Quiescent Current					10mA
Output Voltage Trimming	single output			±10%	
Minimum Load				0%	
Start-up time				30ms	
ON/OFF CTRL	DC-DC ON			Open or 3.5VDC < V_{CTRL} < 15VDC	
	DC-DC OFF			Short or 0VDC < V_{CTRL} < 1.2VDC	
Input Current of CTRL Pin	DC-DC OFF			2mA	
Internal Operating Frequency	REC30E-243.3SZ, REC30E-483.3SZ			300kHz	
	REC30E-24xxS(D)Z			400kHz	
	REC30E-48xxS(D)Z			370kHz	
	REC30E-4815SZ, REC30E-2415DZ			430kHz	
Output Ripple and Noise (3)	20MHz BW			75mVp-p	

Notes:

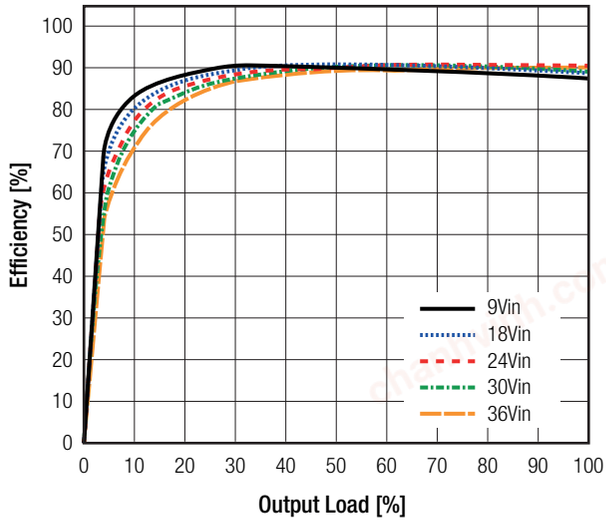
Note3: Measurements are made with a 0.1µF MLCC across output (low ESR)

Efficiency vs. Load

REC30E-243.3SZ



REC30E-2405SZ



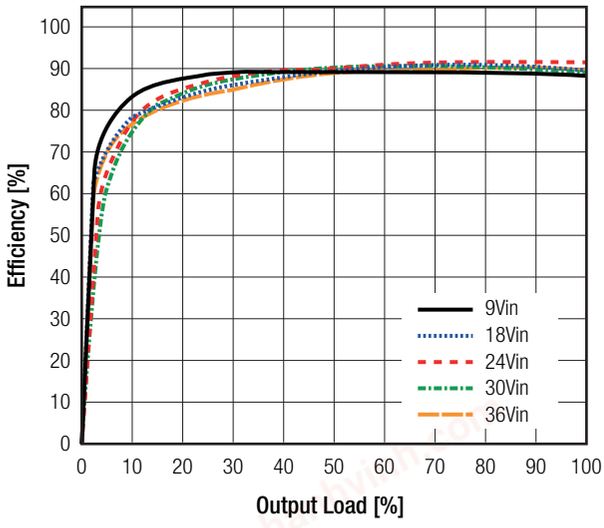
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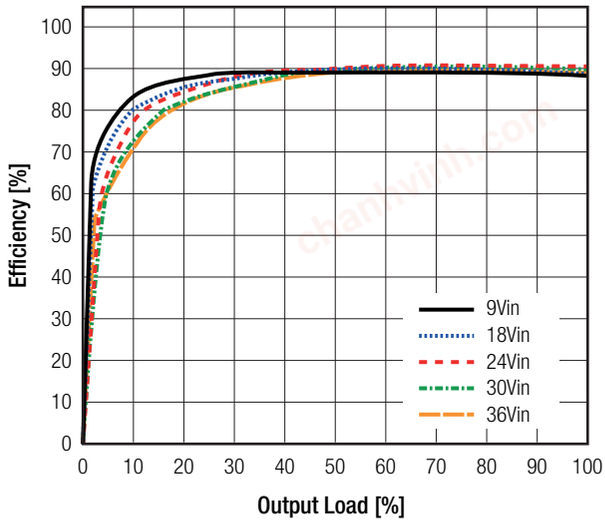
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Efficiency vs. Load

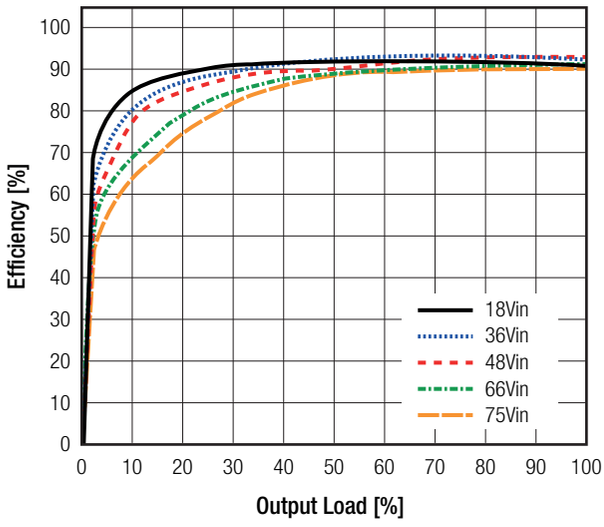
REC30E-2424SZ



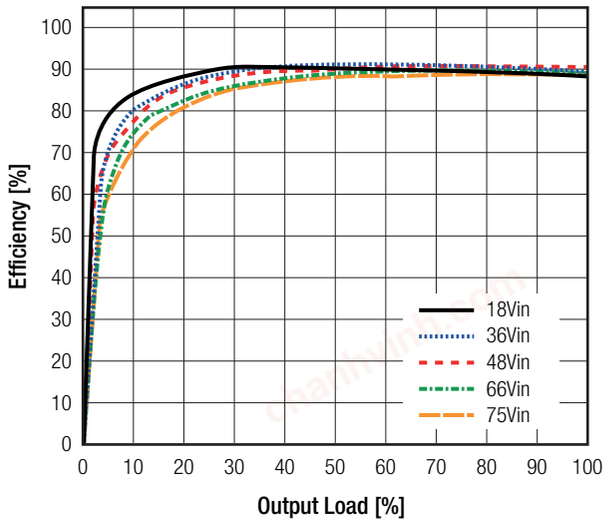
REC30E-2415DZ



REC30E-4812SZ



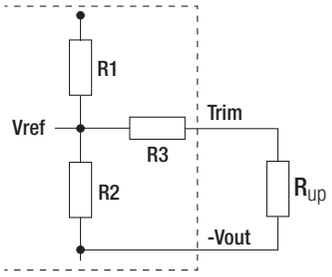
REC30E-4812DZ



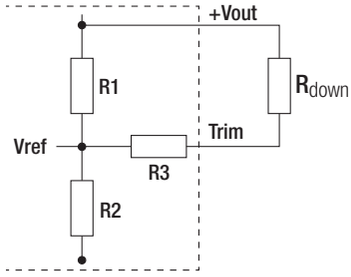
OUTPUT VOLTAGE TRIMMING

The REC30E-Z 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 the external trim resistors shown in the below examples are according to standard E96 values; therefore, the specified voltage may slightly vary.

Trim UP



Trim DOWN



continued on next page

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

OUTPUT VOLTAGE TRIMMING

$Vout_{nom}$ = nominal output voltage [VDC]
$Vout_{set}$ = trimmed output voltage [VDC]
$\Delta Vout$ = output voltage change [%]
V_{ref} = reference voltage [VDC]
R_{up} = external trim up resistor [Ω]
R_{down} = external trim down resistor [Ω]
R_1, R_2, R_3 = internal resistors [Ω]
k_u = trim up factor [ ]
k_d = trim down factor [ ]

$Vout_{nom}$	R_1 [Ω]	R_2 [Ω]	R_3 [Ω]	V_{ref} [VDC]
3.3VDC	16k6	10k	52k3	1.25
5VDC	10k		35k7	2.5
12VDC	38k		48k7	
15VDC	50k1		64k9	
24VDC	86k		73k2	

$$k_u = \left[\frac{Vref}{(Vout + \Delta Vout) - Vref}\right] * R1 \quad = k\Omega \qquad R_{up} = \left[\frac{k_u * R2}{R2 - k_u}\right] - R3 \quad = k\Omega$$

$$k_d = \left[\frac{(Vout + \Delta Vout) - Vref}{Vref}\right] * R2 \quad = k\Omega \qquad R_{down} = \left[\frac{k_d * R1}{R1 - k_d}\right] - R3 \quad = k\Omega$$

Trim Up: $Vout_{set}$= 26.4VDC

$Vout_{nom}$ = 24V, $\Delta Vout$ = 2.4V (10%)

$$k_u = \left[\frac{2.5V}{(24V + 2.4V) - 2.5V}\right] * 86k\Omega \quad = \mathbf{8k995\Omega} \qquad R_{up} = \left[\frac{8.995k\Omega * 10k\Omega}{10k\Omega - 8.995k\Omega}\right] - 73.2k\Omega \quad = \mathbf{16k4\Omega}$$

Trim down: $Vout_{set}$= 21.6VDC

$Vout_{nom}$ = 24V, $\Delta Vout$ = -2.4V (-10%)

$$k_d = \left[\frac{[24V + (-2.4V)] - 2.5V}{2.5V}\right] * 10k\Omega \quad = \mathbf{76k4\Omega} \qquad R_{down} = \left[\frac{76.4k\Omega * 86k\Omega}{86k\Omega - 76.4k\Omega}\right] - 73.2k\Omega \quad = \mathbf{611k2\Omega}$$

REGULATIONS

Parameter	Condition		Value
Output Accuracy			±1.0% typ.
Line Regulation	low line to high line, full load	Single	±0.2% typ.
		Dual	±0.5% typ.
Load Regulation	0% to 100% load	Single	0.2% typ.
		Dual	1.0% typ.
Cross Regulation	asymmetrical load 25% / 100%		±0.5% typ.
Transient Response Recovery Time	25% load step change (75% - 100%)		250µs

PROTECTIONS

Parameter	Type		Value
Short Circuit Protection (SCP)			continuous, auto recovery
Over Load Protection (OLP)	hiccup mode	nom. Vin= 24VDC	170% of rated I_{OUT}
		nom. Vin= 48VDC	190% of rated I_{OUT}
Over Temperature Protection (OTP)	automatic restart after cool down		115°C

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DC/DC Converter

REC30E-Z Series

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

Parameter	Type		Value
Over Voltage Protection (OVP)	internal clamping	REC30E-xx3.3SZ	5.3VDC min.
		REC30E-xx05SZ	6.2VDC min.
		REC30E-xx12SZ	15VDC min.
		REC30E-xx15SZ	18VDC min.
		REC30E-xx24SZ	30VDC min.
		REC30E-xx12DZ	±15VDC min.
		REC30E-xx15DZ	±18VDC min.
Isolation Voltage (4)	I/P to O/P	1 minute	2kVDC
Isolation Resistance	V_{ISO}= 500VDC		1GΩ min.
Isolation Capacitance			2400pF max.

Notes:

Note4: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL

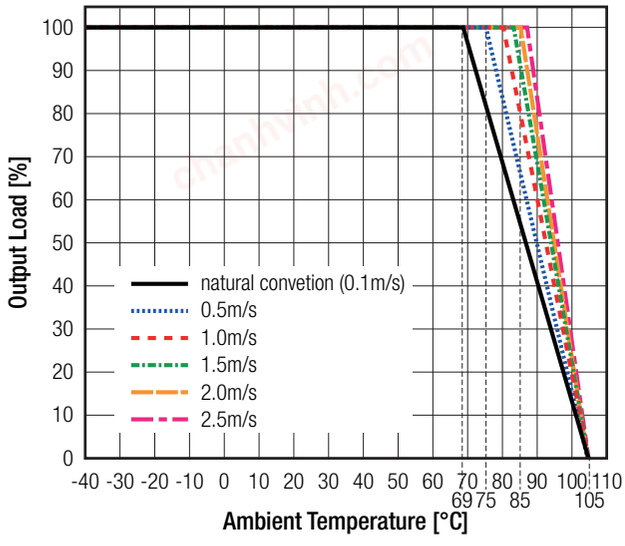
Parameter	Condition		Value
Operating Temperature Range (5)	refer to **"Derating Graph"**		-40°C to +105°C
Maximum Case Temperature			110°C
Temperature Coefficient			0.02%/K max.
Thermal Impedance	0.1m/s, horizontal		15.9K/W
Operating Altitude			5000m
Operating Humidity	non-condensing		5% - 95% RH max.
Pollution Degree			PD2
Vibration			according to MIL-HDBK-202G
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	560 x 10^3 hours

Notes:

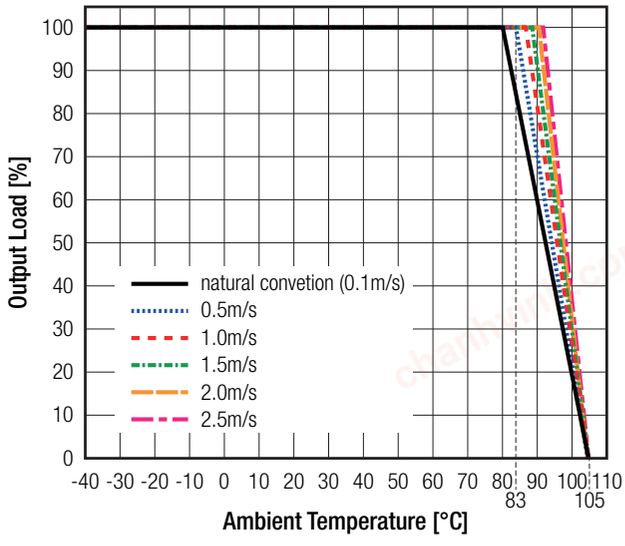
Note5: Test PCB: Eurocard 160x100mm 105µm copper, double layer horizontal

Derating Graph
(@chamber)

REC30E-2405SZ



REC30E-4812SZ



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DC/DC Converter

REC30E-Z Series

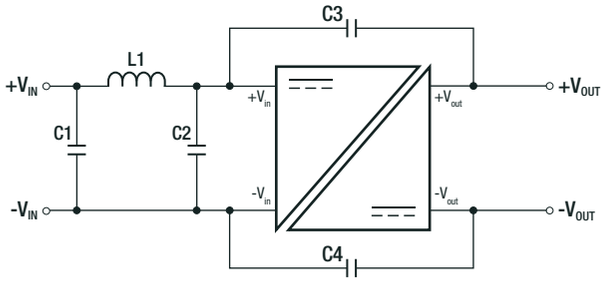
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report / File Number**	**Standard**
Audio/Video, information and communication technology equipment - Part1: Safety requirements 2nd Edition (CB Scheme)	2207062-CB	IEC62368-1:2014 2nd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements 2nd Edition		EN62368-1:2014+A11:2017
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition (CB Scheme)	2207062-1-CB	IEC62368-1:2018 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition		EN IEC 62368-1:2020+A11:2020
RoHS2		RoHS-2011/65/EU + AM-2015/863

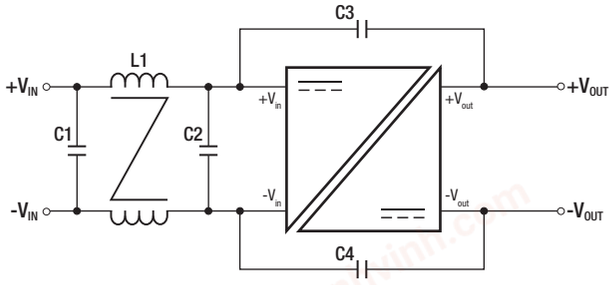
EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	without external components	EN55032:2015+A11:2020, Class A
	see filter below	EN55032:2015+A11:2020, Class B

EMC Filtering Suggestions according to EN55032

REC30E-24xxS(D)Z



REC30E-48xxS(D)Z



Component List Class B

MODEL	C1	L1	C2	C3	C4
REC30E-24xxS(D)Z	4.7µF	10µH	4.7µF	2200pF	2200pF
REC30E-48xxS(D)Z		32µH			

DIMENSION AND PHYSICAL CHARACTERISTICS		
Parameter	**Type**	**Value**
Material	case	nickel plated metal enclosure (UL94 V-2)
	baseplate	plastic (UL94 V-2)
	potting	silicone, (UL94 V-0)
	PCB	FR4, (UL94 V-1)
Dimension (LxWxH)		25.4 x 25.4 x 10.0mm
Weight		17g typ.

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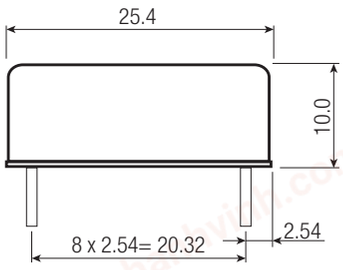
DC/DC Converter

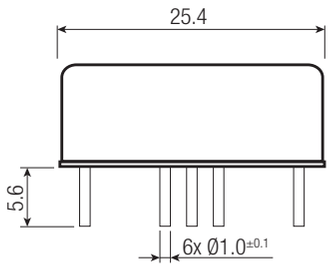
REC30E-Z Series

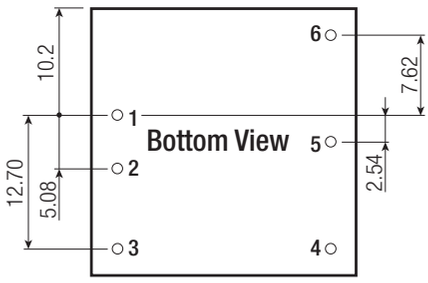
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)

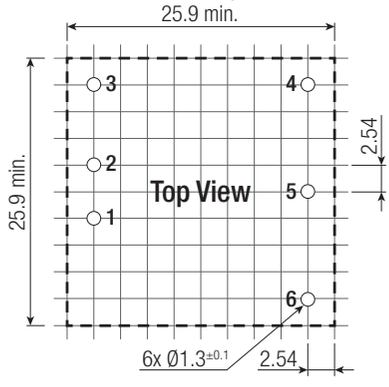








Recommended Footprint Details



Pinning Information

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

Tolerance:
x.x = ±0.5mm
x.xx = ±0.25mm

PACKAGING INFORMATION		
Parameter	**Type**	**Value**
Packaging Dimension (LxWxH)	tube	260.0 x 28.5 x 20.8mm
Packaging Quantity		8pcs
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.