



# TR30RAM SERIES 30 WATT AC-DC MEDICAL INTERCHANGEABLE PLUG ADAPTER

## Features

- Universal Input Range 90~264Vac
- High Efficiency up to 87%
- Interchangeable AC Plugs
- Leakage Current < 100uA
- Class II
- No Load Power Consumption < 0.3W
- Approval IEC/EN/UL 60601-1 2 MOPP
- Approval EN 55011, FCC 47 CFR Part 18 Class B
- Operating Altitude 3000m
- Over Voltage Protection
- Continuous Short Circuit Protection
- Meets CoC Tier 2 & DoE Level V



AC Plug Sold Separately



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	VOLTAGE ACCURACY NOTE1	RIPPLE& NOISE NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
TR30RAM050	5V	4.0A	±2%	50mV	±1%	±6%	80%
TR30RAM090	9V	3.0A	±2%	90mV	±1%	±3%	85%
TR30RAM120	12V	2.5A	±2%	120mV	±1%	±2%	85%
TR30RAM150	15V	2.0A	±2%	150mV	±1%	±2%	85%
TR30RAM180	18V	1.67A	±2%	180mV	±1%	±2%	86%
TR30RAM240	24V	1.25A	±2%	240mV	±1%	±2%	87%

Note:

1. Voltage accuracy is set at 60% full load.
2. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measuring @20MHz BW.
3. Line regulation is measured from 100V<sub>ac</sub> to 240V<sub>ac</sub> with 100% full load.
4. Load regulation is measured from 60% to 100% full load and from 60% to 20% full load (60%±40% full load).
5. Typical efficiency at 230 V<sub>ac</sub> and 75% full load at 25°C.

## PART NUMBER

Series	Output Voltage	AC Plug Type	DC Plug Type	Cable Type	Cable Length	Case Color
TR30RAM	XXX	-XXXX	-XX	X	XX	-XX-BK
30W Medical Adapter	050 :5V 090 :9V 120 :12V 150 :15V 180 :18V 240 :24V	Blank: Sold Separately ASUE: Include 4 Type AC Plug	<a href="#">See Page 6</a>	E : UL1185 with OVP	01 : 720mm 02 : 1220mm 03 : 1800mm 11 : 720mm with Ferrite Core 12 : 1220mm with Ferrite Core 13 : 1800mm with Ferrite Core <a href="#">See page 6 for restrictions</a>	Blank: Blue-Black GY-BK: Gray-Black RD-BK: Red-Black

Part Number Example:

**TR30RAM120-11E13-GY-BK**, 12V<sub>dc</sub> Output, DC Jack Type, Cable Length 1800mm with Ferrite Core, Case Color Gray-Black

**TR30RAM120-ASUE-11E03**, 12V<sub>dc</sub> Output, Include 4 Type AC Plug, DC Jack Type, Cable Length 1800mm, Case Color Blue-Black



# TR30RAM Series

## TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Safety approvals only to the AC input	All	90 120		264 370	$V_{ac}$ $V_{dc}$
Operating Case Temperature	See Derating Curve	All	0		60	°C
Storage Temperature		All	-20		85	°C
Operating Altitude		All			3000	m

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Voltage Range		All	100		240	$V_{ac}$
Input Frequency Range		All	47		63	Hz
Maximum Input Current	100% Full load, $V_{in}=100V_{ac}$	All			0.8	A
Leakage Current		All			100	uA
Inrush Current	$V_{in}=240V_{ac}$ , Cold start at 25°C	All		100		A

### OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	$V_{in}=115V_{ac}$ and $230V_{ac}$ , $I_o=60%$ Full load $T_c=25^\circ C$	TR30RAM050	4.90	5	5.10	$V_{dc}$
		TR30RAM090	8.82	9	9.18	
		TR30RAM120	11.76	12	12.24	
		TR30RAM150	14.70	15	15.30	
		TR30RAM180	17.64	18	18.36	
		TR30RAM240	23.52	24	24.48	
Operating Output Current Range	$V_{in}=115V_{ac}$ and $230V_{ac}$ , $T_c=25^\circ C$	TR30RAM050			4.0	A
		TR30RAM090			3.0	
		TR30RAM120			2.5	
		TR30RAM150			2.0	
		TR30RAM180			1.67	
		TR30RAM240			1.25	
Holdup Time	$V_{in}=115V_{ac}$	All		10		ms
Output Voltage Regulation						
Load Regulation	60%±40% Full load change	TR30RAM050			±6	%
		TR30RAM090			±3	
		TR30RAM120			±2	
		TR30RAM150			±2	
		TR30RAM180			±2	
		TR30RAM240			±2	
Line Regulation	$V_{in}=100V_{ac}$ to $240V_{ac}$	All			±1	%
Over Voltage Protection	TVS Component to clamp	TR30RAM050		7.44		$V_{dc}$
		TR30RAM090		12.10		
		TR30RAM120		16.20		
		TR30RAM150		19.50		
		TR30RAM180		23.10		
		TR30RAM240		32.00		
Over Current Protection	Auto recovery	All	110		160	%
Short Circuit Protection	Auto recovery	All				



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PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Ripple and Noise	1. Add a 0.1uF ceramic capacitor and a 10uF aluminum electrolytic capacitor to output 2. Oscilloscope is 20MHz band width 3. Ambient temperature=25°C	TR30RAM050			50	mV
		TR30RAM090			90	
		TR30RAM120			120	
		TR30RAM150			150	
		TR30RAM180			180	
		TR30RAM240			240	
Load Capacitance	1. $V_{in}=115V_{ac}$ and $230V_{ac}$ 2. Output is max. load 3. Ambient temperature=25°C	TR30RAM050			4000	uF
		TR30RAM090			3000	
		TR30RAM120			2500	
		TR30RAM150			2000	
		TR30RAM180			1670	
		TR30RAM240			1250	
Efficiency	1. $V_{in}=230V_{ac}$ 2. Output is 75% full load 3. Ambient temperature=25°C	TR30RAM050		80		%
		TR30RAM090		85		
		TR30RAM120		85		
		TR30RAM150		85		
		TR30RAM180		86		
		TR30RAM240		87		

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute	All			4000	$V_{ac}$
Isolation Resistance	Input to output	All	100			MΩ

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pout=max. rated power	All		65		kHz

## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	$I_o=100\%$ ; $T_a=25^\circ C$ per MIL-HDBK-217F	All	300			k hours
Humidity	Non-condensing	All			93	% RH
Shock	Meet MIL-STD-810F Table 516.5, Table 516.5-I 10ms, each axis 3 times( $\pm X$ 、 $\pm Y$ 、 $\pm Z$ axis)	All		75		g
Vibration	Meet MIL-STD-810F Table 514.5C-VIII, 15~2000Hz, X、Y、Z axis, 1 hour (each axis), Total 3 hrs.	All		4		g
Weight		All		220		g
Dimensions		All	4.278x2.440x1.445 inches (108.67x61.98x36.70 mm)			
<b>Safety</b>	Class II, IEC 60601-1:2005+CORR1:2006+CORR2:2007+A1:2012 EN 60601-1:2006+A11:2011+A1:2013+A12:2014 ANSI/AAMI ES 60601-1:2005 (Ed.3.0)					Ed.3.1
<b>EMC Emission</b>	EN 55011:2009+A1:2010, CISPR 11:2009+A1:2010, Class B EN 61000-3-2:2014, EN 61003-3:2013, FCC 47 CFR Part 18					
Conducted Disturbance	EN 55011:2009+A1:2010, CISPR 11:2009+A1:2010, FCC 47 CFR Part 18					Class B
Radiated Disturbance	EN 55011:2009+A1:2010, CISPR 11:2009+A1:2010, FCC 47 CFR Part 18					Class B
Harmonic Current Emissions	EN 61000-3-2:2014					Class A
Voltage Fluctuations & Flicker	EN 61000-3-3:2013					
<b>EMC Immunity</b>	EN 60601-1-2:2015, IEC 61000-4-2, 3, 4, 5, 6, 8, 11					Ed.4.0
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008, Air Discharge: $\pm 15kV$ Contact, Discharge: $\pm 8kV$					Criteria A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2006+A1:2007+A2:2010					Criteria A



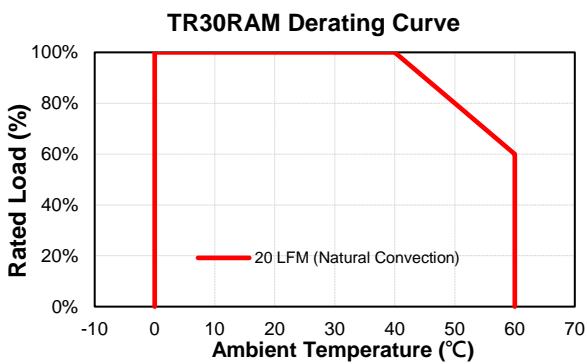
# TR30RAM Series

## GENERAL SPECIFICATIONS

Electrical Fast Transient (EFT)	IEC 61000-4-4:2012, $\pm 2\text{kV}$	Criteria A
Surge	IEC 61000-4-5:2014, L-N: $\pm 0.5\text{kV}$ , $\pm 1\text{kV}$	Criteria A
Conducted disturbances, induced by RF fields	IEC 61000-4-6:2013	Criteria A
Power frequency magnetic field	IEC 61000-4-8:2009	Criteria A
Voltage dips	IEC 61000-4-11:2004, Dips: 30% Reduction, Dips: >95% Reduction	Criteria A
Voltage interruptions	IEC 61000-4-11:2004, >95% reduction	Criteria B
Application Note Link	<a href="#">TR30RAM Series App Notes</a>	

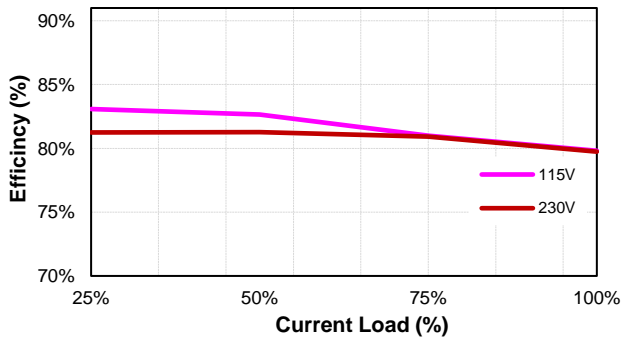
## CHARACTERISTIC CURVE

### Power Derating Curve

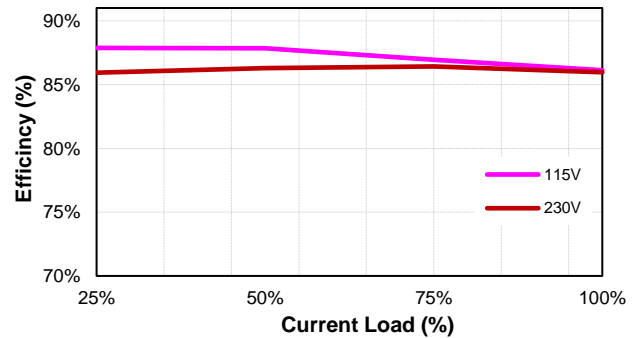


### Performance Data

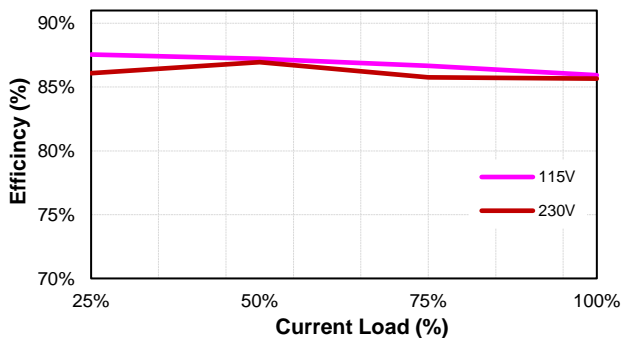
**TR30RAM050 (Eff Vs Io)**



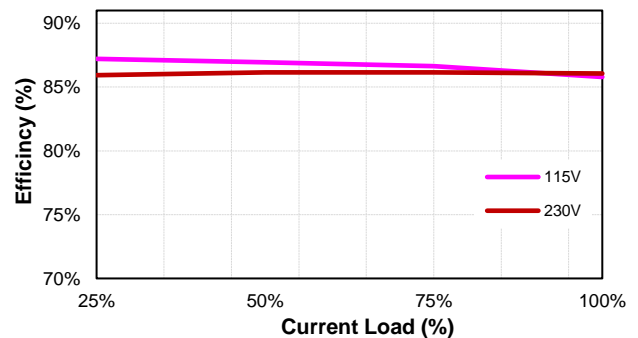
**TR30RAM090 (Eff Vs Io)**



**TR30RAM120 (Eff Vs Io)**



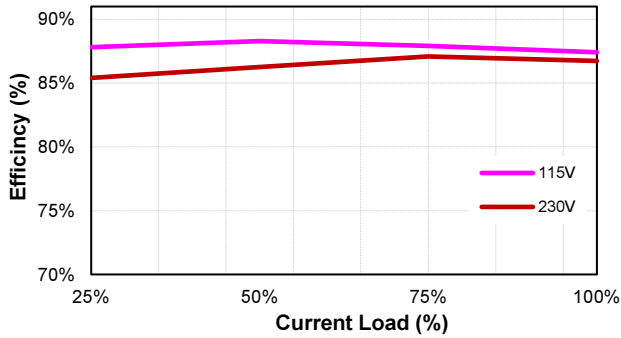
**TR30RAM150 (Eff Vs Io)**



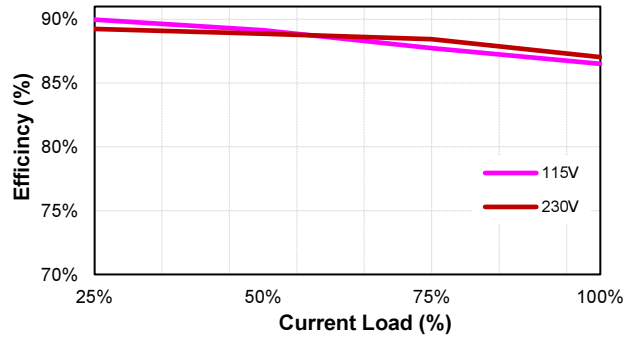


# TR30RAM Series

TR30RAM180 (Eff Vs Io)



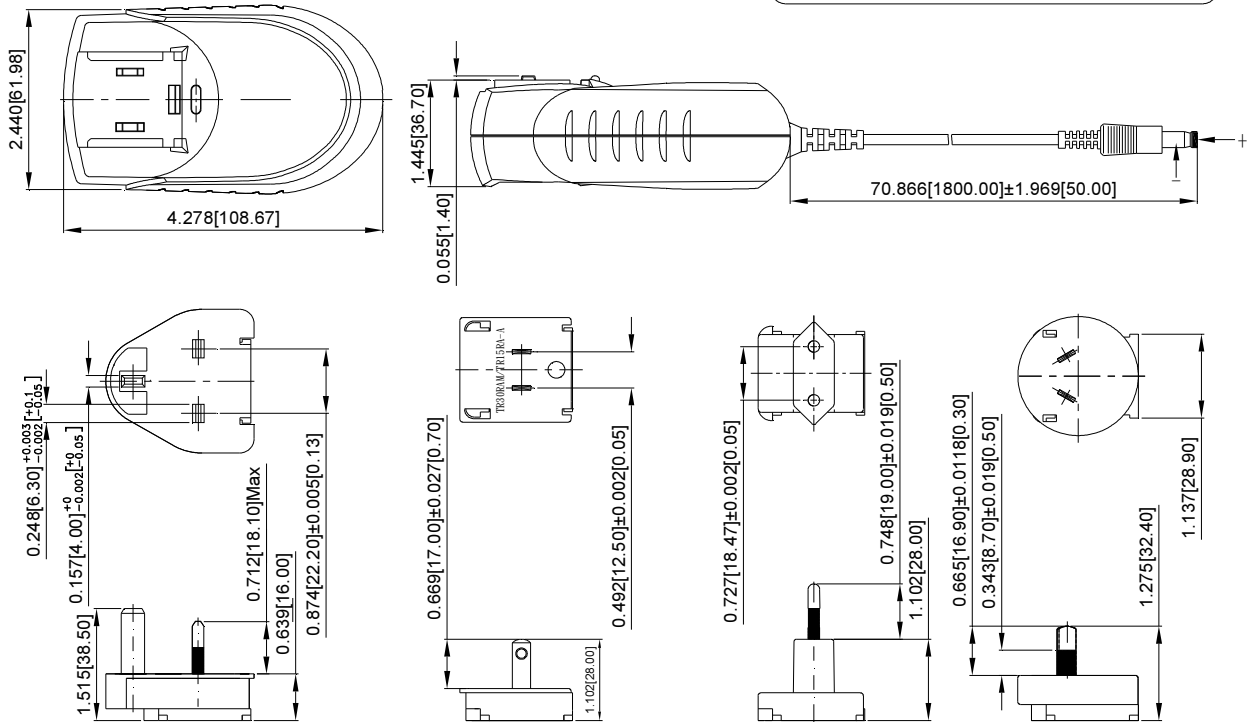
TR30RAM240 (Eff Vs Io)



## MECHANICAL SPECIFICATION

All Dimensions are in inches(mm)  
Tolerance: Inches: X.XXX±0.02  
Millimeters: X.XX±0.5

DC Plug type: V+ —●— V-  
DC Plug : Straight (φ 5.5 / φ 2.1) L12mm  
18AWG / 1800mm



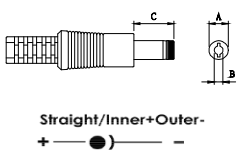
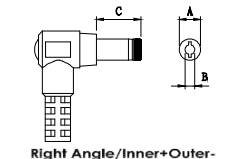
## INTERCHANGEABLE AC PLUG SPECIFICALLY for TR30RAM (SOLD SEPARATELY)

TYPE				
	U.K type (U)	American type (A)	European type (E)	Australian type (S)
ORDER NO.	AC PLUG RA-U	AC PLUGE RA-A	AC PLUGE RA-E	AC PLUGE RA-S



# TR30RAM Series

## STANDARD OUTPUT PLUG

DC Plug Type	Cable Number-XXXXX	A	B	C	Cable Type	Cable Length	Cable AWG
		OD (mm)	ID (mm)	L (mm)			
 <p>Straight/Inner+Outer- + ● -</p>	11E03	Φ5.5	Φ2.1	12	UL1185	1800mm without Core	16AWG for Vo: 5V, 9V 18AWG for Vo: 12V, 15V, 18V, 24V
	12E03	Φ5.5	Φ2.5	12			
	23E03	Φ5.5	Φ2.1	9.5			
	26E03	Φ5.5	Φ2.5	9.5			
 <p>Right Angle/Inner+Outer- + ● -</p>	01E03	Φ5.5	Φ2.1	12			
	02E03	Φ5.5	Φ2.5	12			
	21E03	Φ5.5	Φ2.5	9.5			
	24E03	Φ5.5	Φ2.1	9.5			

※Other DC Plug Type please refer to the link: <https://www.cincon.com/productdownload/TR30RAM-cable-DC-Plug.pdf>