AC-DC SWITCHING ADAPTER
TR18RDM Series
APPLICATION NOTE

Approved By:

Department	Approved By	Checked By	Written By
Research and Development Department	Enoch	Yang Ovid	Su Shih Hang
Quality Assurance Department	Ryan	Benny	

Content

1. INTRODUCTION 3
2. TR18RDM SERIES FEATURES 3
3. ELECTRICAL BLOCK DIAGRAM 3
4. TECHNICAL SPECIFICATIONS 4
5. MAIN FEATURES AND FUNCTIONS 7
5.1 Operating Temperature Range 7
5.2 Output Protection 7
6. EMC & SAFETY 7
7. APPLICATIONS 7
7.1 Power De-Rating Curve 7
7.2 Test Set-Up 7
7.3 Output Ripple and Noise Measurement 8
8.TR18RDM SERIES OUTLINE DIAGRAMS 8
8.1. Mechanical Outline Diagrams 8
8.2. Packing Information 9
9. PART NUMBER 10

TR18RDM Series

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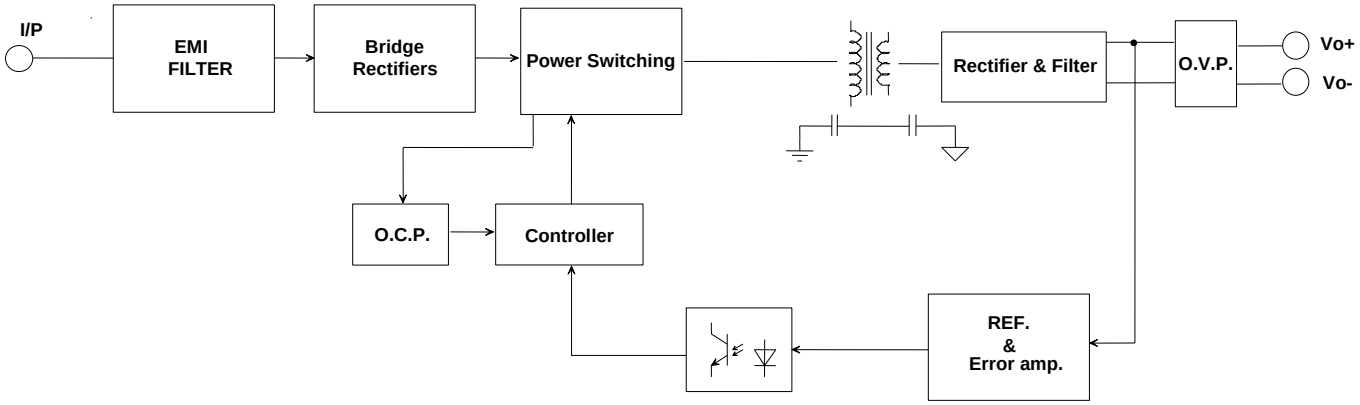
1. Introduction

This application note describes the features and functions of Cincon's TR18RDM series of adapter, switching AC-DC power. These are highly efficient, reliable, compact, high power density, single output AC/DC power . The power is fully protected against short circuit and over-voltage conditions. Cincon's world class automated manufacturing methods, together with an extensive testing and qualification program, ensure that the TR18RDM series power is extremely reliable.

2. TR18RDM Series Features

- Universal Input Range 80~264VAC
- Interchangeable AC Plugs
- Continuous Short Circuit Protection
- Over Voltage Protection
- Approved EN55011, FCC CFR47 Part 18 Class B
- Meets EN60335-1
- Approved EN60601-1-11 for Home Healthcare Applications
- Meets 2MOPP Class II
- Meets CoC Tier 2 & DoE Level VI
  (Output Cable Length≦1800mm)
- No Load Power Consumption<75mW
- Low Leakage Current < 30uA
- Meets IP22

3. Electrical Block Diagram



4. Technical Specifications

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

ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input Voltage (Continuous)	See derating curve	All	80		264	Vac
Operating Temperature	See derating curve	All	-30		+70	℃
Storage Temperature		All	-30		+85	℃
Input/Output Isolation Voltage		All	4000			Vac
Altitude		All			5000	m

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Operating Voltage Range		All	100		240	Vac
Input Frequency Range		All	47		63	Hz
Maximum Input Current	100% Load, Vin=100Vac	All			0.8	A
Leakage Current		All			50	uA
Inrush Current	Vin=240Vac, cold start at 25℃.	All			45	A

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Set Point	Voltage setpoint at 60% full load. Tc=25℃	TR18RDM050	4.90	5	5.10	Vdc
		TR18RDM090	8.82	9	9.18	
		TR18RDM120	11.76	12	12.24	
		TR18RDM150	14.70	15	15.30	
		TR18RDM180	17.64	18	18.36	
		TR18RDM240	23.52	24	24.48	
Operating Output Current Range		TR18RDM050			3	A
		TR18RDM090			2	
		TR18RDM120			1.5	
		TR18RDM150			1.2	
		TR18RDM180			1	
		TR18RDM240			0.75	
Holdup Time	Vin=115Vac	All		12		ms
Output Voltage Regulation						
Load Regulation	from 60% to full load and from 60% to 20% load	TR18RDM050			±5	%
		TR18RDM090			±3	
		TR18RDM120			±2	
		TR18RDM150			±2	
		TR18RDM180			±2	
		TR18RDM240			±2	
Line Regulation	Vin=high line to low line, full load	All			±1	%
Over Voltage Protection		TR18RDM050			7.14	Vdc
		TR18RDM090			12.6	
		TR18RDM120			15.75	
		TR18RDM150			18.9	
		TR18RDM180			23.1	

		TR18RDM240			31.5	
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
Output Ripple and Noise	1. Add a 0.1uF ceramic capacitor and a 10uF aluminum electrolytic capacitor to output 2. Ocilloscope is 20MHz band width. 3. Ambient temperature=25℃	TR18RDM050			100	mVp-p
		TR18RDM090			100	
		TR18RDM120			120	
		TR18RDM150			120	
		TR18RDM180			120	
		TR18RDM240			120	
Load Capacitance	1. Ambient temperature=25℃ 2. Input voltage is 115VAC and 230VAC 3. Output is max. load	TR18RDM050			3000	uF
		TR18RDM090			2000	
		TR18RDM120			1500	
		TR18RDM150			1200	
		TR18RDM180			1000	
		TR18RDM240			750	
Efficiency	Efficiency measured at 75% load and input voltage is 230Vac.	TR18RDM050		82		%
		TR18RDM090		86		
		TR18RDM120		86		
		TR18RDM150		86		
		TR18RDM180		86		
		TR18RDM240		86		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input to Output	1 minute	All			4000	Vac
Isolation Resistance		All	100			MΩ

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency	Vin=115Vac , Io=100%	All		65		KHz
	Vin=230Vac , Io=100%	All		65		KHz

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
MTBF	Vin=115Vac , Io=100%; Ta=25℃ per MIL-HDBK-217F	All	750			K hours
Weight		All		115		g
Safety	Class II, IEC60601-1, EN60601-1-11, EN60601-1, ANSI/AAMI ES60601-1					Ed.3.1
EMC Emission	EN55011 Class B, EN61000-3-2:2014, EN6100-3-3:2013, FCC CFR47 Part 18					Ed.4.0
Conducted disturbance	EN55011, FCC CFR47 Part 18					
Radiated disturbance	EN55011, FCC CFR47 Part 18,					
Harmonic current emissions	EN61000-3-2:2014					
Voltage fluctuations & flicker	EN61000-3-3:2013					
EMC Immunity	EN60601-1-2:2015, IEC61000-4-2,3,4,5,6,8,11					
Electrostatic discharge (ESD)	IEC 61000-4-2:2008					Criteria A
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2010					Criteria A
Electrical fast transient (EFT)	IEC 61000-4-4:2012					Criteria A
Surge	IEC 61000-4-5:2014					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 and interruptions	IEC 61000-4-11:2004					Criteria A

5. Main Features and Functions

5.1 Operating Temperature Range

The highly efficient design of Cincon's TR18RDM series power has resulted in their ability to operate within ambient temperature environments from -30℃ to 70℃. Due consideration must be given to the de-rating curves when ascertaining the maximum power that can be drawn from the power. The maximum power which can be drawn is influenced by a number of factors, such as:

- Input voltage range
- Permissible Output load (per derating curve)

5.2 Output Protection

All different voltage models have a full continuous short-circuit protection. The unit will auto recover once the short circuit is removed. To provide protection in a fault condition, the unit is equipped with internal over-current protection. The unit operates normally once the fault condition is removed. The power module will supply up to 120%-140% of rated current. In the event of an over current converter will go into a hiccup mode protection.

6. EMC & Safety

■ Emission and Immunity (Ed4.0)

EN55011, EN61000-3-2, EN61000-3-3

EN60601-1-2, IEC61000-4-2, 3, 4, 5, 6, 8, 11

FCC CFR47 Part 18 Class B

■ Safety (Ed3.1)

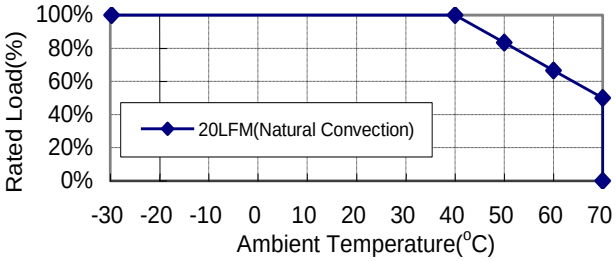
IEC60601-1:2005+A1, EN60601-1-11

EN60601-1:2006+A11:2011+A1+A12

ANSI/AAMI ES60601-1:2005/A1:2012

7. Applications

7.1 Power De-Rating Curve



7.2 Test Set-Up

The basic test set-up to measure parameters such as efficiency and load regulation is shown in Figure 1. When testing the Cincon's TR18RDM series under any transient conditions, please ensure that the transient response of the source is sufficient to power the equipment under test. We can calculate the

- Efficiency
- Load regulation and line regulation.

The value of efficiency is defined as:

$$\eta = \frac{Vo \times Io}{Pin} \times 100\%$$

Where:

Vo is output voltage,

Io is output current,

Pin is input power

The value of load regulation is defined as:

$$Load\ reg. = \frac{V_{FL} - V_{NL}}{V_{NL}} \times 100\%$$

Where:

V_{FL} is the output voltage at full load

V_{NL} is the output voltage at 10% load

The value of line regulation is defined as:

$$Line\ reg. = \frac{V_{HL} - V_{LL}}{V_{LL}} \times 100\%$$

Where:

V_{HL} is the output voltage of maximum input voltage at full load. V_{LL} is the output voltage of minimum input voltage at full load.

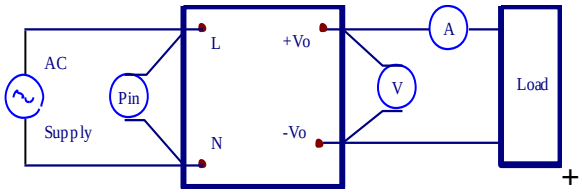


Figure 1. TR18RDM Series Test Setup

7.3 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure 2 Measured method:
Add a 0.1 uF ceramic capacitor and a 10 uF electrolytic capacitor to output at 20 MHz Band Width.

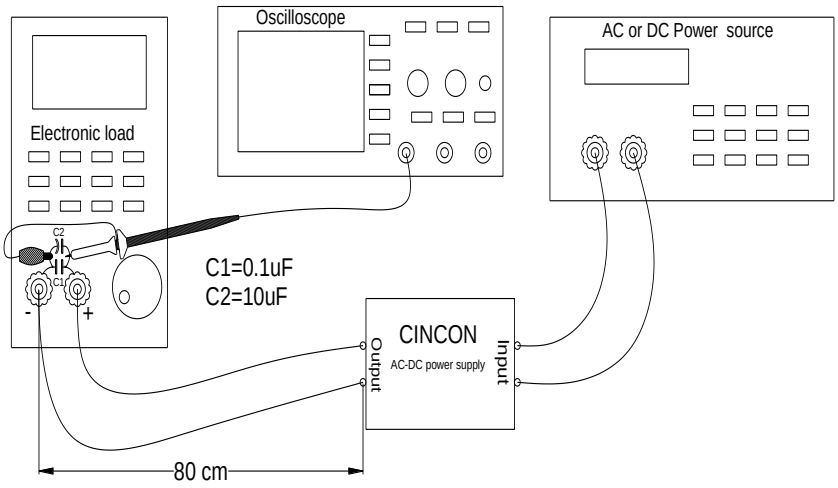


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

8.TR18RDM Series Outline Diagrams

8.1. Mechanical Outline Diagrams

All Dimensions are in inches[mm]
Tolerance:Inches:X.XXX±0.02
Millimeters:X.XX±0.5
UNIT: inches[mm]

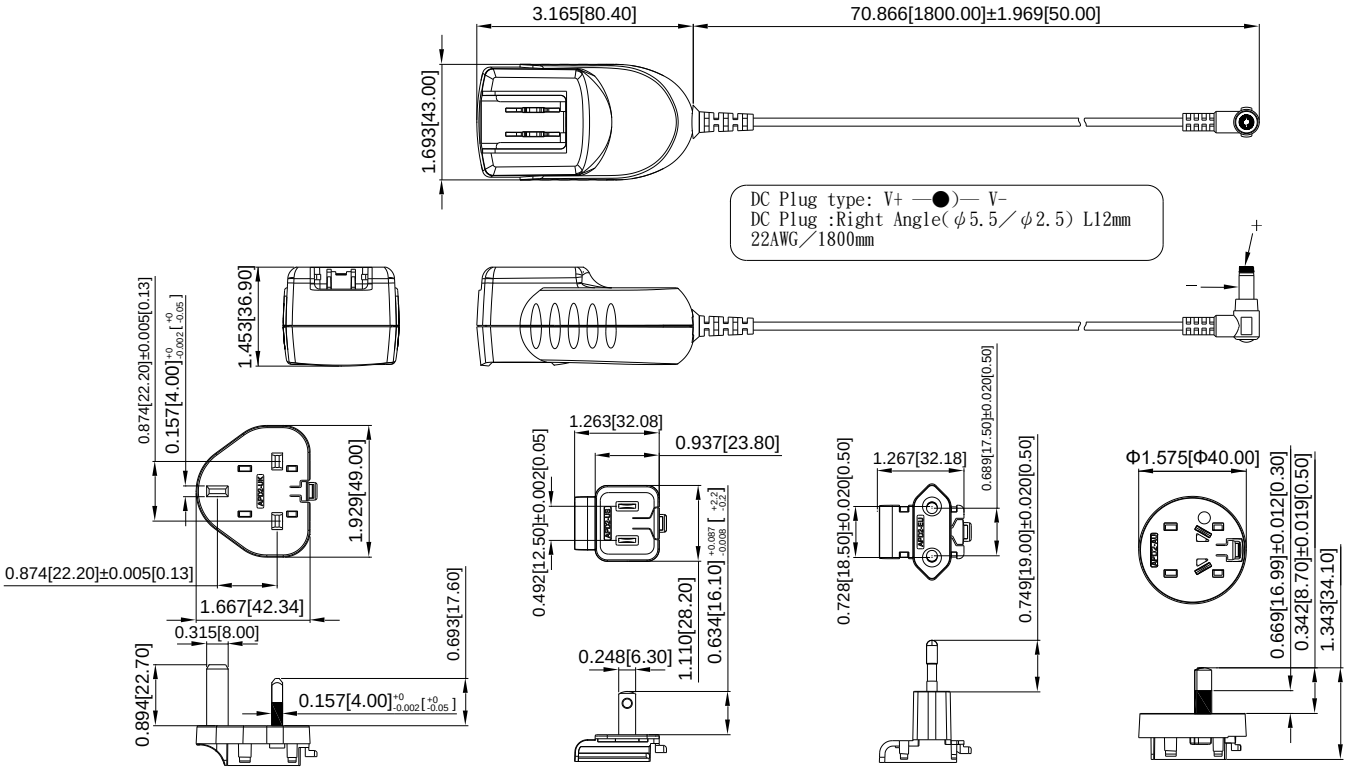
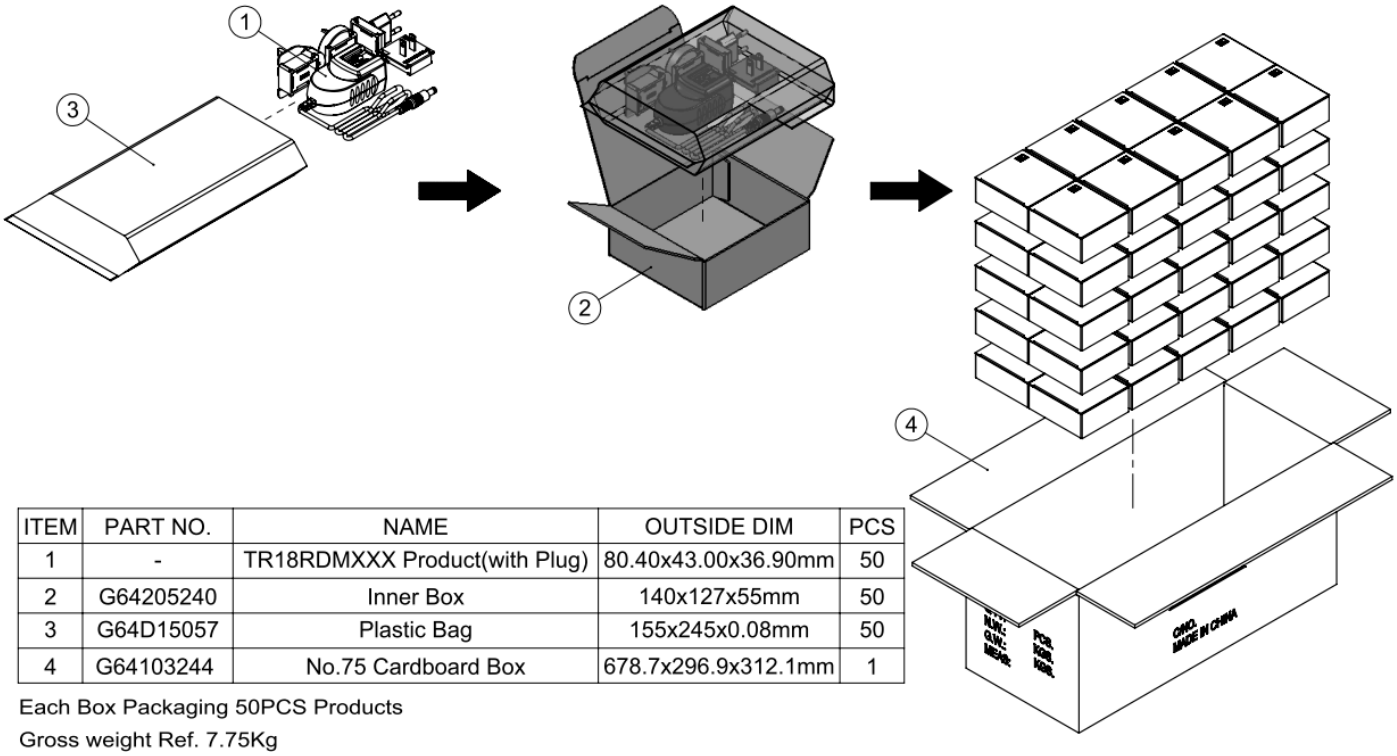


Figure 3. TR18RDM series Mechanical Outline Diagram

8.2. Packing Information

The packing information for TR18RDM series is showing as follows:



ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	TR18RDMXXX Product(with Plug)	80.40x43.00x36.90mm	50
2	G64205240	Inner Box	140x127x55mm	50
3	G64D15057	Plastic Bag	155x245x0.08mm	50
4	G64103244	No.75 Cardboard Box	678.7x296.9x312.1mm	1

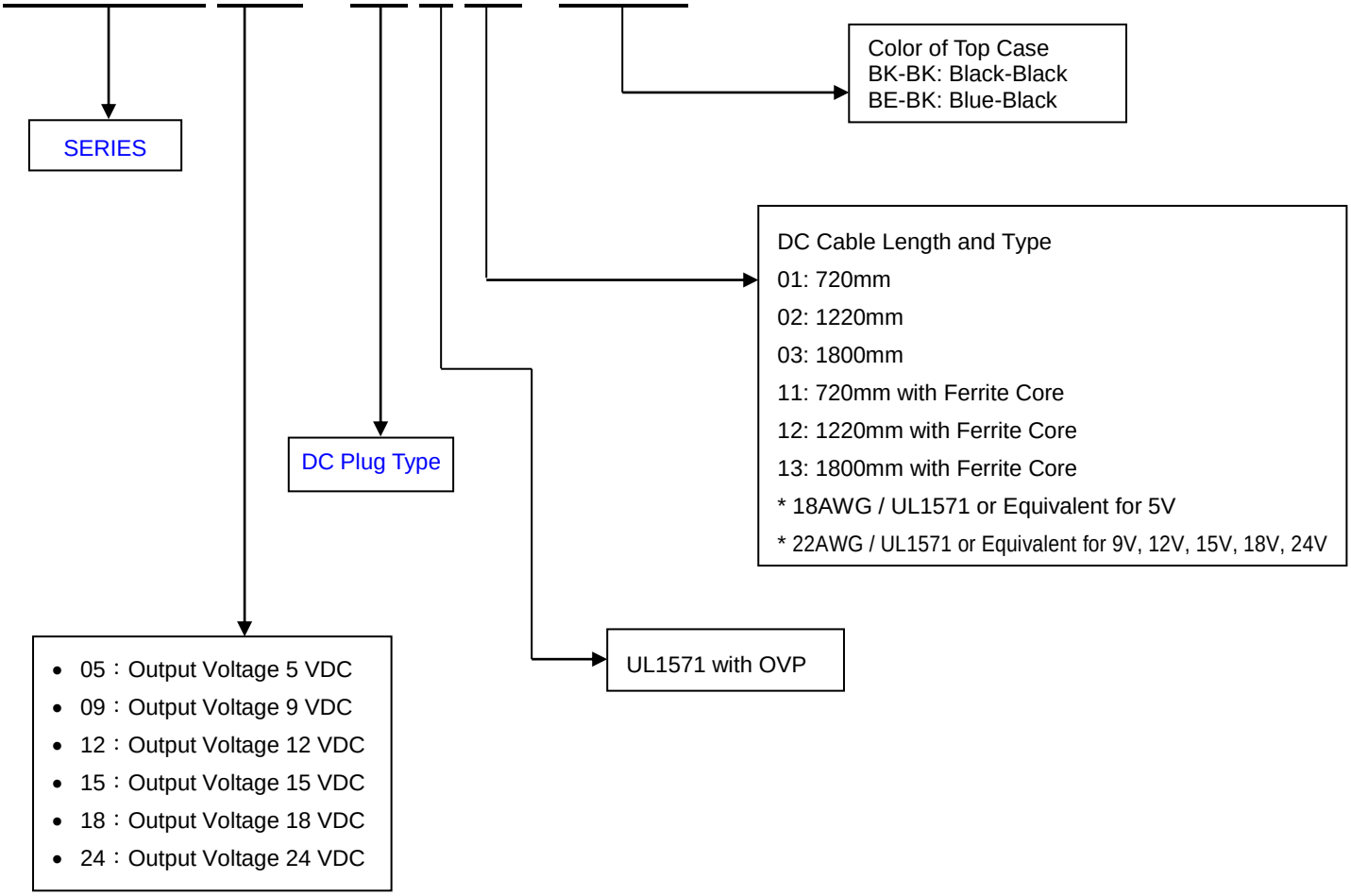
Each Box Packaging 50PCS Products

Gross weight Ref. 7.75Kg

TR18RDM 50pcs a box, including the total weight of package material about 7.75Kg

9. Part Number

TR18RDM XXX – XX G XX - XX-BK



CINCON ELECTRONICS CO., LTD.

Headquarters:

14F, No.306, Sec.4, Hsin Yi Rd.
Taipei, Taiwan
Tel: 886-2-27086210
Fax: 886-2-27029852
E-mail: support@cincon.com.tw
Web Site: http://www.cincon.com

Factory:

No. 8-1, Fu Kung Rd.
Fu Hsing Industrial Park
Fu Hsing Hsiang,
Chang Hua Hsien, Taiwan
Tel: 886-4-7690261
Fax: 886-4-7698031

Cincon North America:

1655 Mesa Verde Ave. Ste 180
Ventura, CA 93003
Tel: 805-639-3350
Fax: 805-639-4101
E-mail: info@cincon.com