Modular Surge Protective Devices (SPDs) for Data & Signal Lines

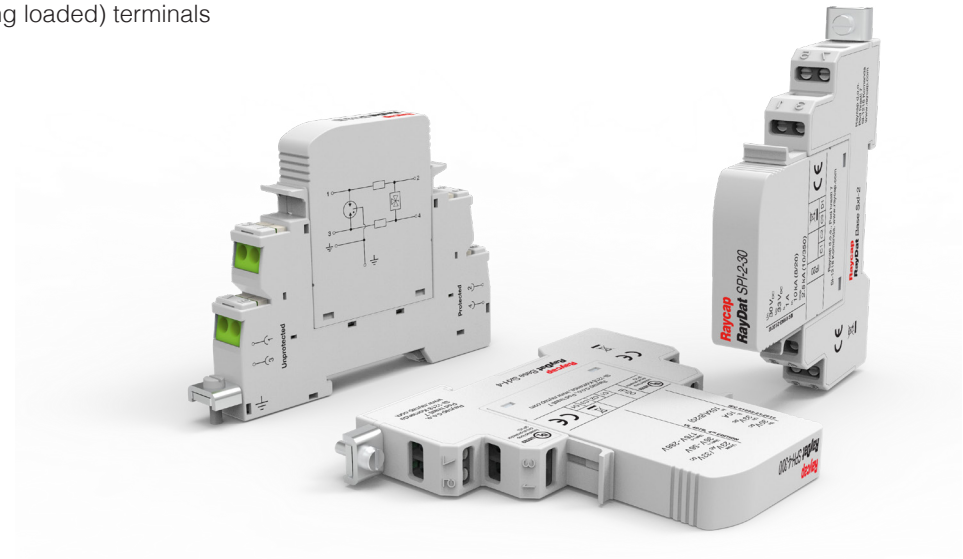
RayDat SP Series

RayDat SPH-2*
RayDat SPH-4*
RayDat SPI-2
RayDat SPI-4

*UL Listed

Special features:

- Very high surge ratings
- The connection lines remain enabled during module replacement
- High density – up to 2 protected pairs at only 12mm width
- Equipped with Screw or Quick connect (spring loaded) terminals



Symbol Legend:

DIN Rail Mounting

Screw Connect Terminals

Quick Connect Terminals

Modular design

Shield Directly Grounded

The RayDat SP Series of surge protective devices has been developed to protect a pair loop, which could be ungrounded onto data, signal and communication circuits. It is intended for those applications where high ground potential rises may frequently occur, such as in locations close to electric railways. The circuit topology consists of a multi-stage protector providing both, common (longitudinal) mode and differential (transverse) mode protection. Coarse protection is provided by a three terminal gas discharge tube (GDT), while fine protection is provided using a high-speed silicon avalanche diode (SAD) or metal oxide varistor (MOV) stage.

Care is taken between these two stages to ensure coordination without voltage or surge current blind spots occurring.
Thermal protection reduces the hazards of thermal runaway, should there be an inadvertent mains incursion fault. Both common (longitudinal) mode and differential (transverse) mode protection is provided. If the module is unplugged from the base, the connection lines remain enabled.

RoHS COMPLIANT CE UL LISTED

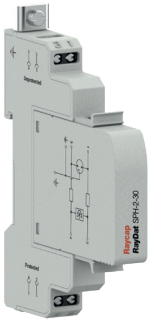
DATA SHEET

Modular SPD for Single Pair

RayDat SPH-2 Series

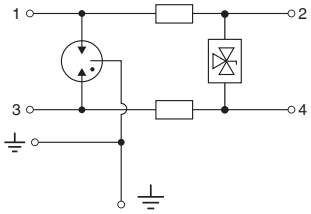
D1 • C1 • C2 • C3

UL Listed



IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz, 10 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



Technical Data

SPH-2 Series			30
Electrical			
Lines Protected			1 (2 Conductors)
Nominal Operating Voltage (DC)		U_n	30 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V
Rated Load Current at 25°C		I_L	1 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V
Rated Spark Overvoltage	(Line-Ground)		184-276 V
	(Line-Line)		36-44 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V
	(Line-Line)		≥ 33 MΩ
Serial Resistance per Path		R	1.6-2.0 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG
			4 mm², 2.5 mm² Q Version
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**30**
SPH-2-xxx			7082.84
SPH-2-xxxQ (Quick Connect Terminals)			7085.25
SPH-2-xxxM (module)			7082.85

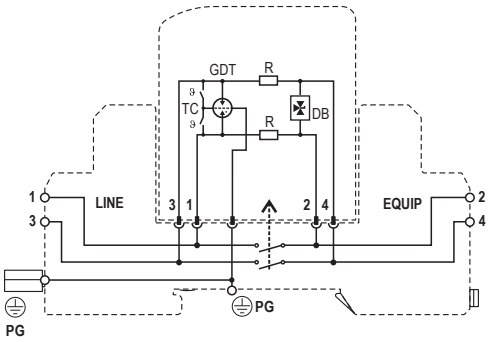
Information contained in this document is subject to change at any time without notice.

RayDat SPH-2 Series

Internal Configuration

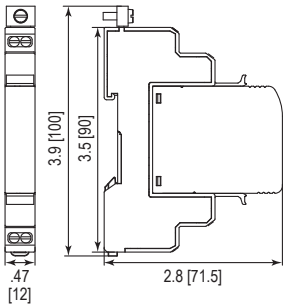
Legend

DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor
TC Thermo-clip

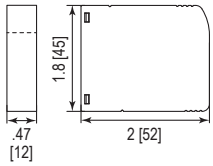


SPH-2-30

Dimensions & Packaging

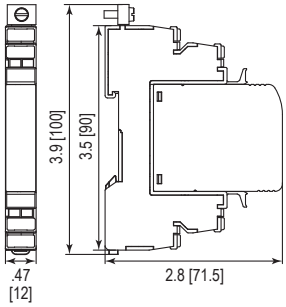


SPH-2 Series	30
Dimensions	
Weight per Unit	1.83 oz [52 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SPH-2-xxxM Series	30
Dimensions	
Weight per Unit	.84 oz [24 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

Quick Connect Terminals



SPH-2-xxxQ Series	30
Dimensions	
Weight per Unit	1.9 oz [54 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

Information contained in this document is subject to change at any time without notice.

RoHS COMPLIANT

© 2020 Raycap All rights reserved.

Raycap www.raycap.com

DATA SHEET

Modular SPD for Two Pair

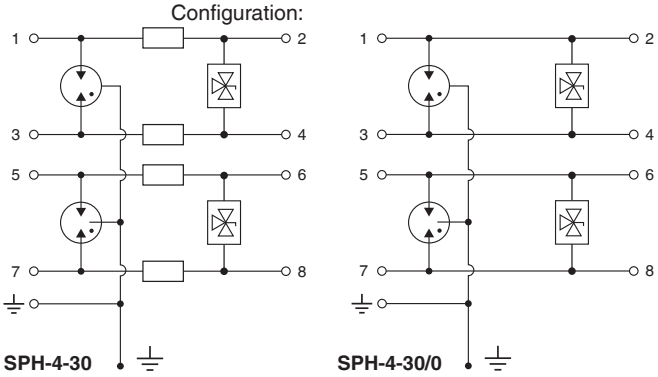
RayDat SPH-4 Series

D1 • C1 • C2 • C3

UL Listed

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



Technical Data

SPH-4 Series			30	30/0
Electrical				
Lines Protected			2 (4 Conductors)	
Nominal Operating Voltage (DC)		U_n	30 V	
Maximum Continuous Operating Voltage (DC)		U_c	33 V	
Rated Load Current at 25°C		I_L	1 A	10 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA	
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA	
D1 Impulse Current (10/350 µs)		I_{imp}	5 kA	
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V	
Rated Spark Overvoltage	(Line-Ground)		184-276 V	
	(Line-Line)		36-44 V	
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns	
	(Line-Ground)		< 100 ns	
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V	
	(Line-Line)		≥ 33 MΩ	
Serial Resistance per Path		R	1.6-2.0 Ω	0.1 Ω
Transverse Capacitance	(Line-Line)	C	50 pF	
	(Line-Ground)		5 pF	
Cut-off Frequency		f_G	30 MHz	
Mechanical				
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]	
Terminal Cross Section Multi-strand (max.)			12 AWG	
			4 mm², 2.5 mm² Q Version	
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]	
Degree of Protection IEC/EN 60529			IP 20 (built-in)	
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0	
Mounting IEC/EN 60715			35 mm DIN Rail	

Order Information

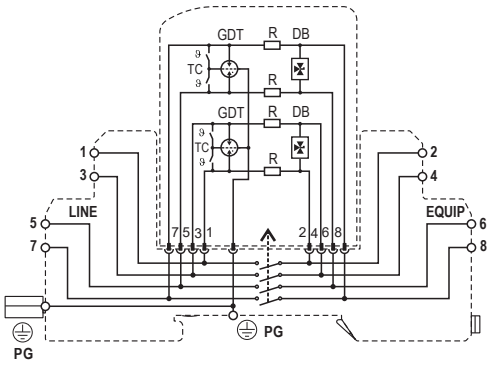
Order Code	30	30/0
SPH-4-xx	7082.82	7086.89
SPH-4-xxQ (Quick Connect Terminals)	7085.24	7085.28
SPH-4-xxM (module)	7082.83	7085.29

Information contained in this document is subject to change at any time without notice.

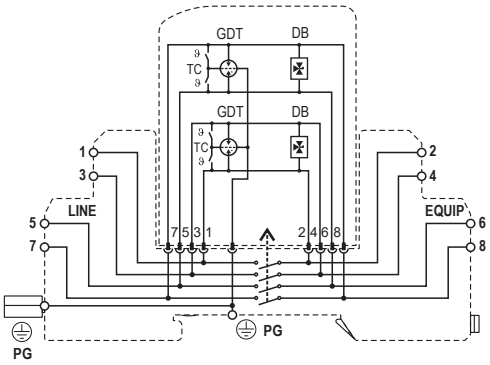
Internal Configuration

Legend

DB	*Diode Block*
GDT	*Gas Discharge Tube*
PG	*Protective Grounding*
R	*Resistor*
TC	*Thermo-clip*

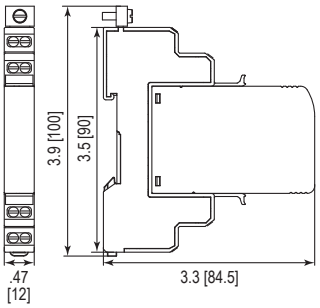


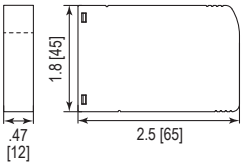
SPH-4-30



SPH-4-30/0

Dimensions & Packaging

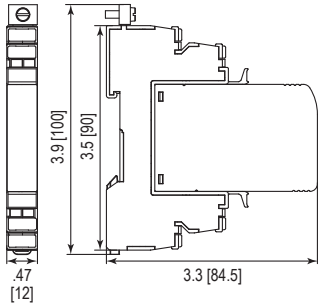




SPH-4 Series	30	30/0
Dimensions		
Weight per Unit	2.32 oz [66 g]	2.25 oz [64 g]
Dimensions DIN 43880	2/3 TE	
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity	15 pieces	

SPH-4-xxM Series	30	30/0
Dimensions		
Weight per Unit	1.05 oz [30 g]	.99 oz [28 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity	15 pieces	

Quick Connect Terminals



SPH-4-xxQ Series	30	30/0
Dimensions		
Weight per Unit	2.40 oz [68 g]	2.32 oz [66 g]
Dimensions DIN 43880	2/3 TE	
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity	15 pieces	

inches
[mm]

Information contained in this document is subject to change at any time without notice.

RoHS COMPLIANT

© 2020 Raycap All rights reserved.

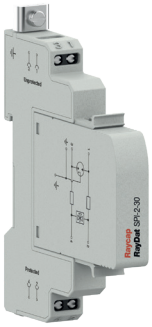
Raycap www.raycap.com

DATA SHEET

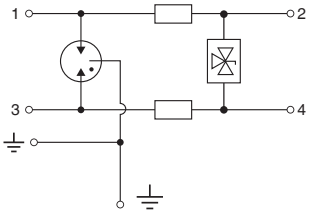
Modular SPD for Two Pair

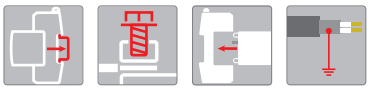
RayDat SPI-2 Series

D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz, 10 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





Technical Data

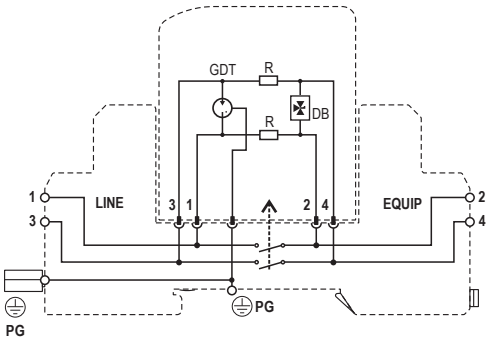
SPI-2 Series			30
Electrical			
Lines Protected			1 (2 Conductors)
Nominal Operating Voltage (DC)		U_n	30 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V
Rated Load Current at 25°C		I_L	1 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Total Impulse Current (10/350 µs)		I_{imp}	5 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V
Rated Spark Overvoltage	(Line-Ground)		184-276 V
	(Line-Line)		36-44 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V
	(Line-Line)		≥ 33 MΩ
Serial Resistance per Path		R	1.6-2.0 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG
			4 mm², 2.5 mm² Q Version
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**30**
SPI-2-xxx			7085.67
SPI-2-xxxM (module)			7085.68

Information contained in this document is subject to change at any time without notice.

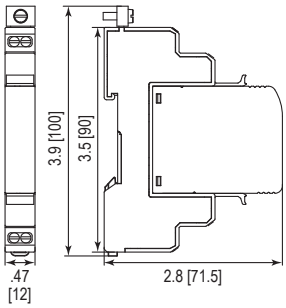
RayDat SPI-2 Series

Legend

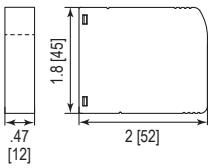
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor



Dimensions & Packaging



SPI-2 Series	30
Dimensions	
Weight per Unit	1.90 oz [54 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SPI-2-xxxM Series	30
Dimensions	
Weight per Unit	.84 oz [24 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

Information contained in this document is subject to change at any time without notice.

RoHS COMPLIANT CE

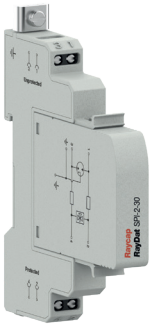
© 2020 Raycap All rights reserved.

DATA SHEET

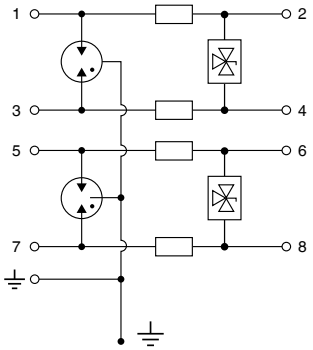
Modular SPD for Two Pair

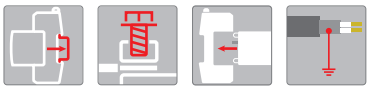
RayDat SPI-4 Series

D1 • C1 • C2 • C3



IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 30 V DC
Frequency Range: 30 MHz, 10 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:





Technical Data

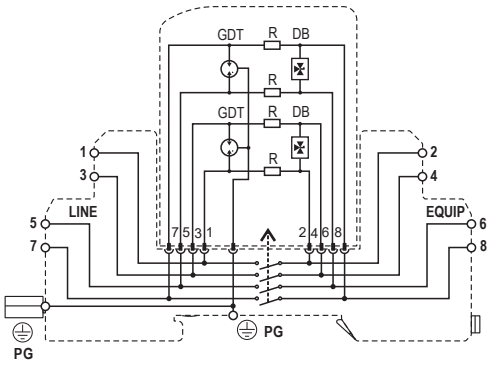
SPI-4 Series			30
Electrical			
Lines Protected			2 (4 Conductors)
Nominal Operating Voltage (DC)		U_n	30 V
Maximum Continuous Operating Voltage (DC)		U_c	33 V
Rated Load Current at 25°C		I_L	1 A
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Total Impulse Current (10/350 µs)		I_{imp}	10 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 80 V
Rated Spark Overvoltage	(Line-Ground)		184-276 V
	(Line-Line)		36-44 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns
	(Line-Ground)		< 100 ns
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}	> 1 GΩ / 100 V
	(Line-Line)		≥ 33 MΩ
Serial Resistance per Path		R	1.6-2.0 Ω
Transverse Capacitance	(Line-Line)	C	50 pF
	(Line-Ground)		5 pF
Cut-off Frequency		f_G	30 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			12 AWG
			4 mm², 2.5 mm² Q Version
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			**30**
SPI-4-xxx			7085.69
SPI-4-xxxM (module)			7085.70

Information contained in this document is subject to change at any time without notice.

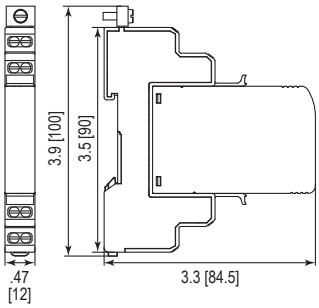
RayDat SPI-4 Series

Legend

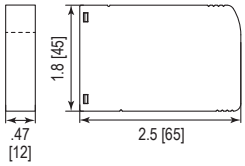
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor



Dimensions & Packaging



SPI-4 Series	30
Dimensions	
Weight per Unit	2.40 oz [68 g]
Dimensions DIN 43880	2/3 TE
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces



SPI-4-xxM Series	30
Dimensions	
Weight per Unit	1.05 oz [30 g]
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]
Minimum Package Quantity	15 pieces

inches
[mm]

Information contained in this document is subject to change at any time without notice.

RoHS COMPLIANT CE

© 2020 Raycap All rights reserved.