


Features

Switching Regulator

- 20A non isolated quarter brick
- 18 to 75VDC wide input range
- 3.3 to 24VDC adjustable output
- Standard industrial quarter brick format
- High efficiency up to 98%
- Operating temperature derates to 120°C

RPMGQ-20

**20 Amp
QTR Brick
Open Frame
Single Output**



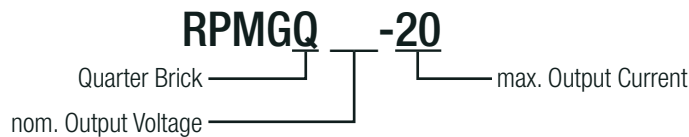
Selection Guide

Part Number	Input Voltage Range ⁽¹⁾ [VDC]	Output Voltage [VDC]	Vout Adjust Range [VDC]	Output Current max. [A]	Efficiency typ. [%]	Max. Capacitive Load [μ F]
RPMGQ5.0-20	18-75	5	3.3 - 8	20	91 - 94	15000
RPMGQ12-20	18-75	12	8 - 24	20	95 - 97	12000

Notes:

Note1: Measured Values are with $C_{IN}= 880\mu$ F + $C_{OUT}= 4000\mu$ F

Model Numbering



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				capacitor
Input Voltage Range		18VDC		75VDC
Absolute Maximum Input Voltage				80VDC
Undervoltage Lockout (UVLO)	DC-DC ON DC-DC OFF		16.5VDC 14.0VDC	
Input Current	RPMGQ5.0-20 RPMGQ12-20		2.3A 5.2A	
Quiescent Current (no load)			30mA	
No Load Power Consumption	V _{IN} = 24VDC V _{IN} = 48VDC V _{IN} = 60VDC		720mW 1440mW 1800mW	
Internal Power Dissipation				10W

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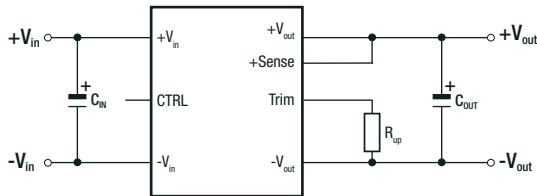
Specifications (measured @ $t_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

Parameter	Condition		Min.	Typ.	Max.
Output Voltage Trimming ⁽²⁾	RPMGQ5.0-20		3.3VDC		8VDC
	RPMGQ12-20		8VDC		24VDC
Minimum Load			0%		
Startup-time	RPMGQ5.0-20			13ms	
	RPMGQ12-20			20ms	
Rise-time	RPMGQ5.0-20			8ms	
	RPMGQ12-20			16ms	
ON/OFF CTRL	DC-DC ON		Open or $1.8\text{V} < V_{CTRL} < 5.4\text{VDC}$		
	DC-DC OFF		Short or $0\text{V} < V_{CTRL} < 0.9\text{VDC}$		
Standby Current	DC-DC OFF CTRL to GND	RPMGQ5.0-20	$V_{IN} = 24\text{VDC}$	0.065mA	
			$V_{IN} = 48\text{VDC}$	0.126mA	
			$V_{IN} = 60\text{VDC}$	0.156mA	
		RPMGQ12-20	$V_{IN} = 24\text{VDC}$	0.065mA	
			$V_{IN} = 48\text{VDC}$	0.133mA	
			$V_{IN} = 60\text{VDC}$	0.162mA	
Internal Operating Frequency			200kHz	210kHz	220kHz

Notes:

Note2: For more detailed information, please refer to "OUTPUT VOLTAGE TRIMMING"

Typical Application

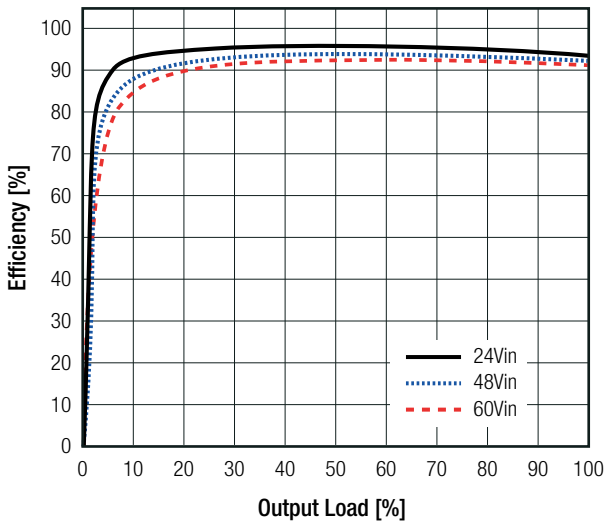


VOUTset	CIN	Rup	COUT
15VDC	>200µF	10kΩ	>=1000µF

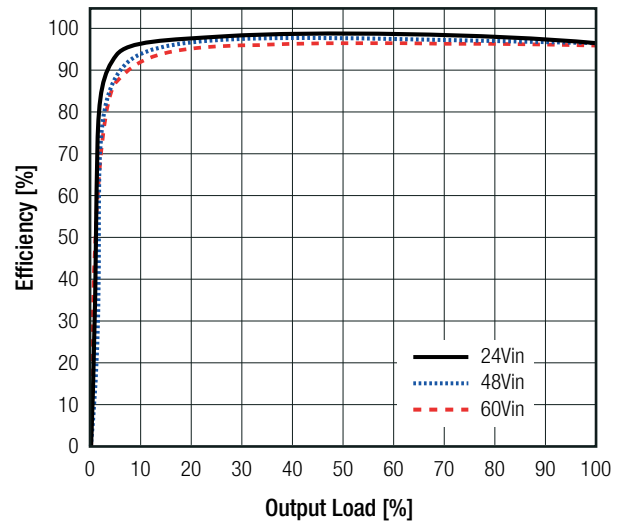
For nom. V_{OUT} leave Trim pin open

Efficiency vs. Load

RPMGQ5.0-20



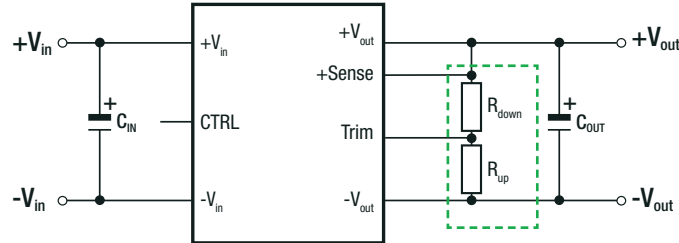
RPMGQ12-20



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

OUTPUT VOLTAGE TRIMMING

The RPMGQ series offers the feature of trimming the output voltage over a range between 3.3V and 8V 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.



$V_{out_{nom}}$ = nominal output voltage [VDC]
 $V_{out_{set}}$ = trimmed output voltage [VDC]
 R_{up} = trim up resistor [Ω]
 R_{down} = trim down resistor [Ω]
 R_3, R_4, R_5 = internal resistors [Ω]

	R_3 [Ω]	R_4 [Ω]	R_5 [Ω]	V_{REF} [VDC]
RPMGQ5.0-20	18k72	3k48	3k48	0.8
RPMGQ12-20	48k7	3k48	2k87	0.8

Calculation:

$$R_{UP} = \frac{V_{REF} \times R_3 \times (R_4 + R_5) - R_4 \times R_5 \times (V_{OUTset} - V_{REF})}{(V_{OUTset} - V_{REF}) \times R_4 - V_{REF} \times R_3} = k\Omega$$

$$R_{DOWN} = \frac{V_{OUTset} \times (R_3 \times R_4 + R_4 \times R_5) - V_{REF} \times (R_3 \times R_4 + R_4 \times R_5 + R_3 \times R_5)}{V_{REF} \times (R_3 \times R_4) - R_4 \times V_{OUTset}} = k\Omega$$

RPMGQ5.0-20

Trim up

$V_{out_{set}} =$	5.5	6.0	7.0	8.0	[VDC]
R_{up} (E96) \approx	33k2	13k3	4k42	1k69	[Ω]

Trim down

$V_{out_{set}} =$	3.3	3.6	4.0	4.5	[VDC]
R_{down} (E96) \approx	22k6	31k6	51k	113k	[Ω]

RPMGQ12.0-20

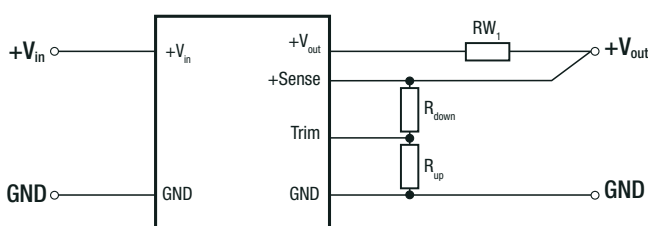
Trim up

$V_{out_{set}} =$	15.0	18.0	20.0	24.0	[VDC]
R_{up} (E96) \approx	10k	3k57	2k	0k374	[Ω]

Trim down

$V_{out_{set}} =$	8.0	9.0	10.0	11.0	[VDC]
R_{down} (E96) \approx	84k5	130k	221k	499k	[Ω]

REMOTE SENSE



The output voltage can be adjusted via the trim and sense functions.

The maximum output voltage from Trim and Sense function combined is 8VDC for RPMGQ5.0-20 and 24VDC for RPMGQ12-20. Derating may be required when using Trim and/or sense functions.

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

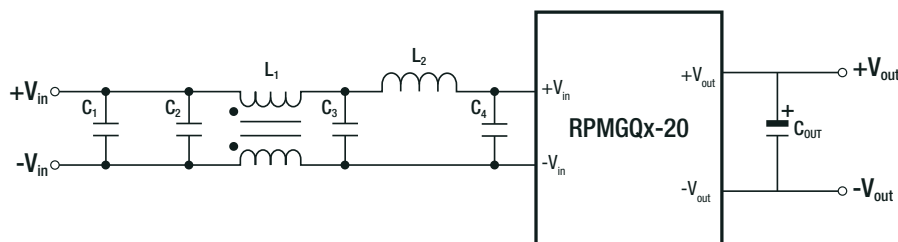
Specifications (measured @ $t_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

REGULATIONS				
Parameter	Condition			Value
Output Accuracy				$\pm 1.0\%$ max.
Line Regulation	low line to high line, full load			0.5% typ. / $\pm 1.0\%$ max.
Load Regulation	0% to 100% load			0.5% typ. / $\pm 1.0\%$ max.
Transient Response	5% - 100%	RPMGQ5.0-20	$V_{IN} = 24\text{VDC}$	40mV typ.
			$V_{IN} = 48\text{VDC}$	70mV typ.
			$V_{IN} = 60\text{VDC}$	90mV typ.
	5% - 100%	RPMGQ12-20	$V_{IN} = 24\text{VDC}$	50mV typ.
			$V_{IN} = 48\text{VDC}$	95mV typ.
			$V_{IN} = 60\text{VDC}$	110mV typ.

PROTECTIONS			
Parameter	Condition		Value
Short Circuit Protection (SCP)	hiccup mode, auto recovery	RPMGQ5.0-20	22.1A
		RPMGQ12-20	20.6A
Short Circuit Input Current	$V_{IN} = 24\text{VDC}$		30mA typ.
	$V_{IN} = 48\text{VDC}$		18mA typ.
Over Current Protection (OCP)	hiccup mode, auto recovery	RPMGQ5.0-20	22.1A
		RPMGQ12-20	20.6A
Over Temperature Protection (OTP)	measured on IC		160°C , auto restart after cool down

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Report / File Number	Standard
RoHS 2+		RoHS 2011/65/EU + AM2015/863
EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - emission requirements	with external components (see filter suggestions below)	EN55032, Class A and B

EMC filtering suggestion according to EN55032



Component List Class A

C1	C2	C3	C4	L1	L2	C _{OUT}
2x 330 μF	3x 22 μF	10 μF	1000 μF	56 μH	10 μH	$\geq 1000\mu\text{F}$

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

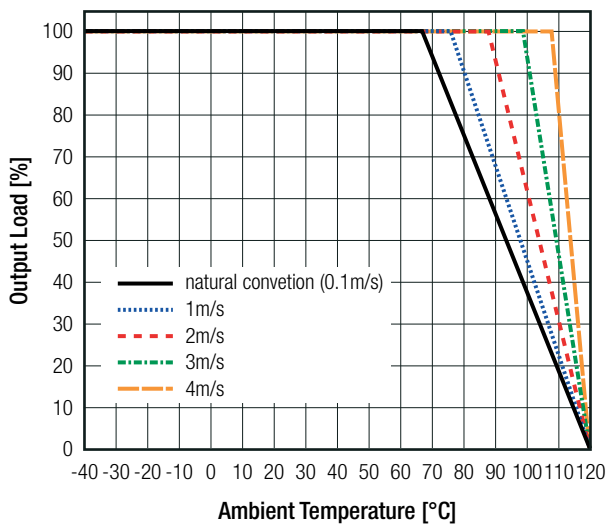
ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	with forced airflow		-40°C to $+120^\circ\text{C}$
Operating Humidity	non-condensing		5% - 95% RH max.
Operating Altitude			5000m
Vibration	MIL-STD-833G, method 2026 test condition II, letter "B"		
MTBF	according to MIL-HDBK-217F, G.B.	RPMGQ5.0-20	1208×10^3 hours
		RPMGQ12-20	1239×10^3 hours

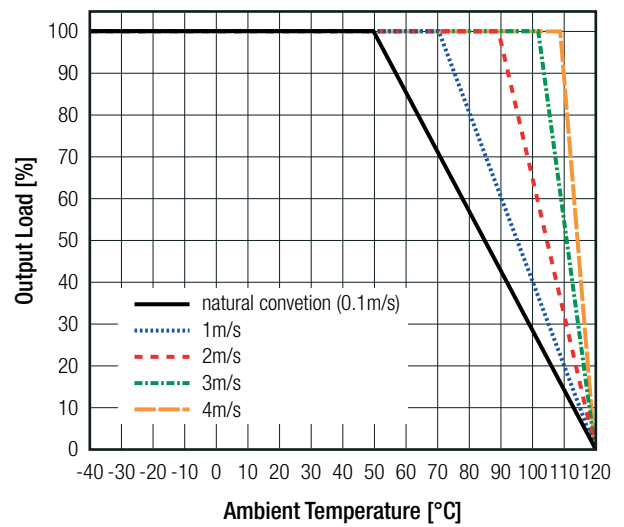
Derating Graph

24Vin

RPMGQ5.0-20

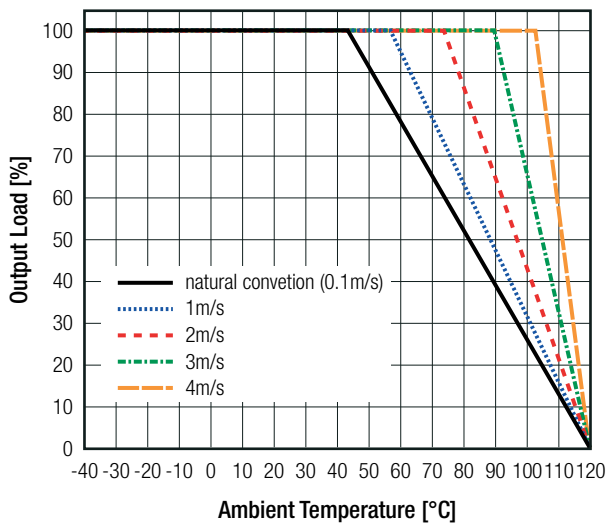


RPMGQ12-20

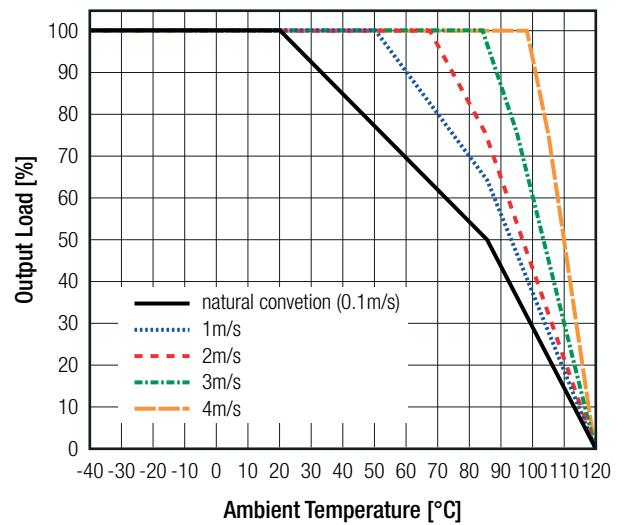


48Vin

RPMGQ5.0-20



RPMGQ12-20

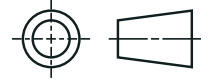
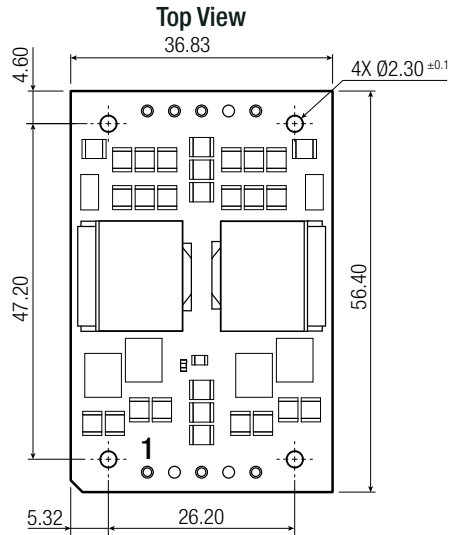


Specifications (measured @ $t_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

DIMENSION AND PHYSICAL CHARACTERISTICS

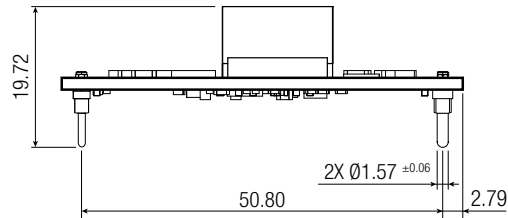
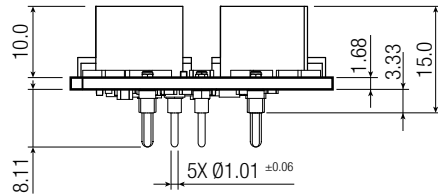
Parameter	Type	Value
Material	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		56.4 x 36.83 x 15.0mm
Weight		29g typ.

Dimension Drawing (mm)

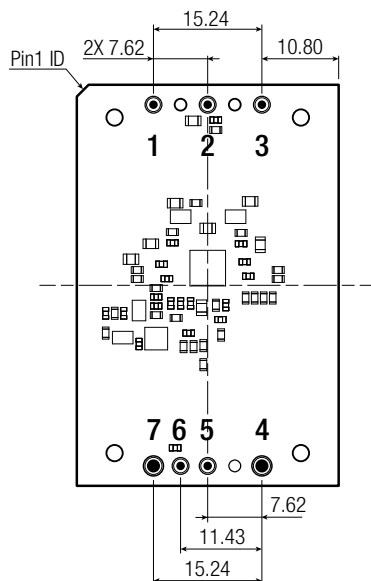


Pinning Information

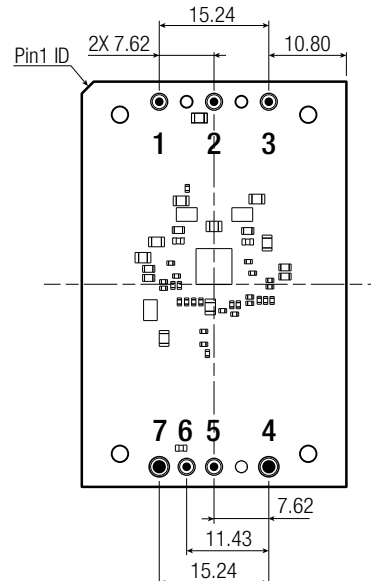
Pin #	Single	Pin \varnothing
1	+Vin	1.02
2	CTRL/UVLO	1.02
3	-Vin	1.02
4	-Vout	1.57
5	TRIM	1.02
6	+SENSE	1.02
7	+Vout	1.57



Bottom View RPMGQ5.0-20



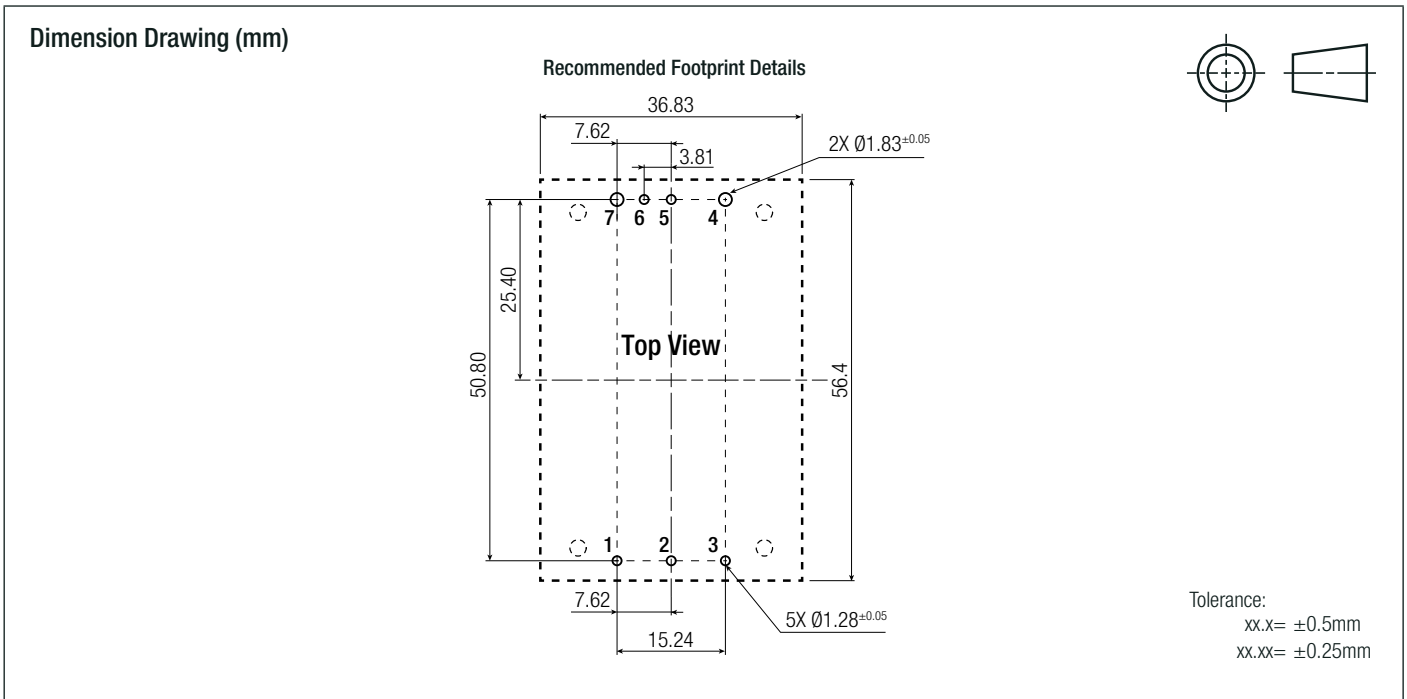
Bottom View RPMGQ12-20



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

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



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tray	305.0 x 165.0 x 45.0mm
Packaging Quantity		10pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	95% RH max.

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