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

RECOM
DC/DC Converter

RPMGQ-20

20 Amp QTR Brick Open Frame Single Output

3 YEAR warranty

Description

The RPMGQ-20 series is a non-isolated 20A DC/DC converter in a quarter brick package. The high efficiency and thermal design of the product means that minimal derating is required, even at high temperatures. The device is exceptionally suited for 24V, 28V, and 48V power rails as a point of load solution in a distributed power architecture. Trimmable output, remote sense, and remote control features as well as undervoltage lockout, overload, over-temperature, and short circuit protections are standard.

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 [µF]
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}= 880µF + C_{OUT}= 4000µF

Model Numbering

RPMGQ -20

- RPMGQ: Quarter Brick
- RPMGQ: nom. Output Voltage
- -20: max. Output Current

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		2.3A	
	RPMGQ12-20		5.2A	
Quiescent Current (no load)			30mA	
No Load Power Consumption	V_{IN}= 24VDC		720mW	
	V_{IN}= 48VDC		1440mW	
	V_{IN}= 60VDC		1800mW	
Internal Power Dissipation				10W

continued on next page

RPMGQ-20 Series

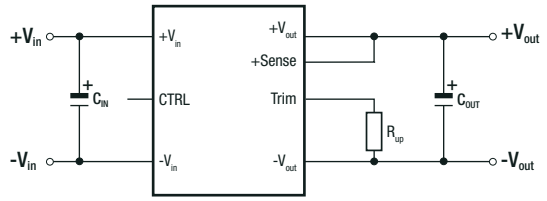
Specifications (measured @ ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

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 1.8V<V_{CTRL}<5.4VDC
	DC-DC OFF					Short or 0V<V_{CTRL}<0.9VDC
Standby Current	DC-DC OFF CTRL to GND	RPMGQ5.0-20	V_{IN}= 24VDC		0.065mA	
			V_{IN}= 48VDC		0.126mA	
			V_{IN}= 60VDC		0.156mA	
		RPMGQ12-20	V_{IN}= 24VDC		0.065mA	
			V_{IN}= 48VDC		0.133mA	
			V_{IN}= 60VDC		0.162mA	
Internal Operating Frequency				200kHz	210kHz	220kHz

Notes:

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

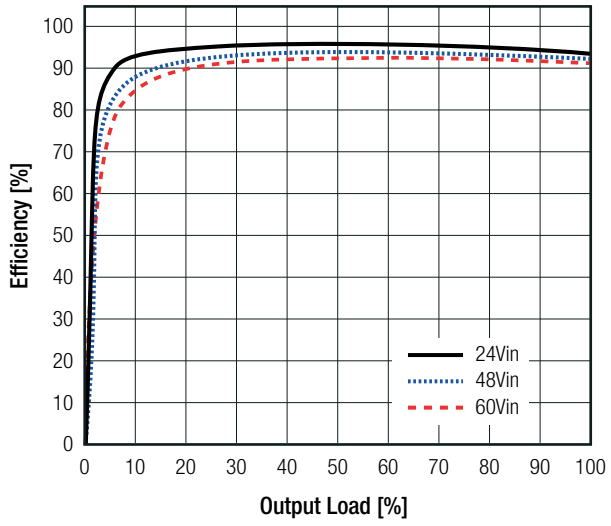
Typical Application



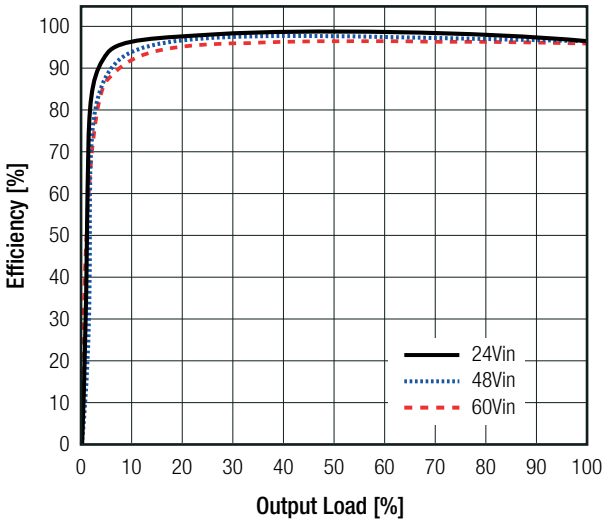
VOUTset	C_{IN}	R_{up}	C_{OUT}
15VDC	>200µF	10kΩ	>=1000µF
For nom. V_{OUT} leave Trim pin open			

Efficiency vs. Load

RPMGQ5.0-20



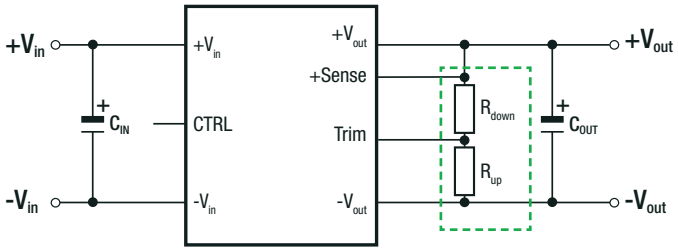
RPMGQ12-20



Specifications (measured @ ta= 25°C, nom. Vin, 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.



$Vout_{nom}$	= nominal output voltage	[VDC]
$Vout_{set}$	= 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:

$$\boldsymbol{R_{UP}} = \frac{V_{REF} \times R3 \times (R4 + R5) - R4 \times R5 \times (V_{OUTset} - V_{REF})}{(V_{OUTset} - V_{REF}) \times R4 - V_{REF} \times R3} = k\Omega$$

$$\boldsymbol{R_{DOWN}} = \frac{V_{OUTset} \times (R3 \times R4 + R4 \times R5) - V_{REF} \times (R3 \times R4 + R4 \times R5 + R3 \times R5)}{V_{REF} \times (R3 \times R4) - R4 \times V_{OUTset}} = k\Omega$$

RPMGQ5.0-20

Trim up

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

Trim down

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

RPMGQ12.0-20

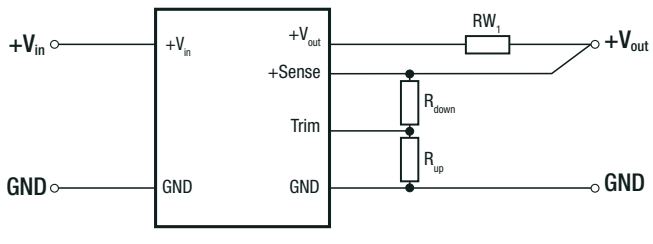
Trim up

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

Trim down

$Vout_{set}$ =	8.0	9.0	10.0	11.0	[VDC]
R_{down} (E96) ≈	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 @ ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

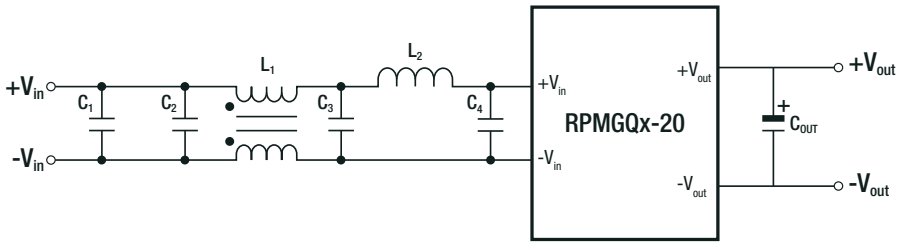
REGULATIONS				
Parameter	**Condition**			**Value**
Output Accuracy				±1.0% max.
Line Regulation	low line to high line, full load			0.5% typ. / ±1.0% max.
Load Regulation	0% to 100% load			0.5% typ. / ±1.0% max.
Transient Response	5% - 100%	RPMGQ5.0-20	V_{IN}= 24VDC	40mV typ.
			V_{IN}= 48VDC	70mV typ.
			V_{IN}= 60VDC	90mV typ.
	5% - 100%	RPMGQ12-20	V_{IN}= 24VDC	50mV typ.
			V_{IN}= 48VDC	95mV typ.
			V_{IN}= 60VDC	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}= 24VDC		30mA typ.
	V_{IN}= 48VDC		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 330µF	3x 22µF	10µF	1000µF	56µH	10µH	>=1000uF

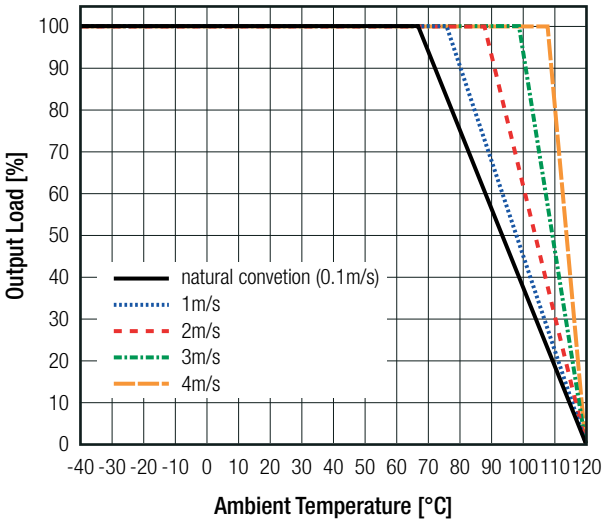
Specifications (measured @ ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

ENVIRONMENTAL			
Parameter	**Condition**		**Value**
Operating Temperature Range	with forced airflow		-40°C to +120°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 x 10^3 hours
		RPMGQ12-20	1239 x 10^3 hours

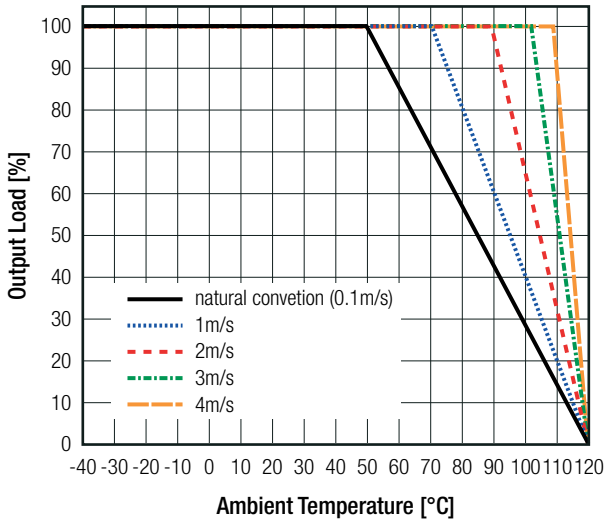
Derating Graph

24Vin

RPMGQ5.0-20

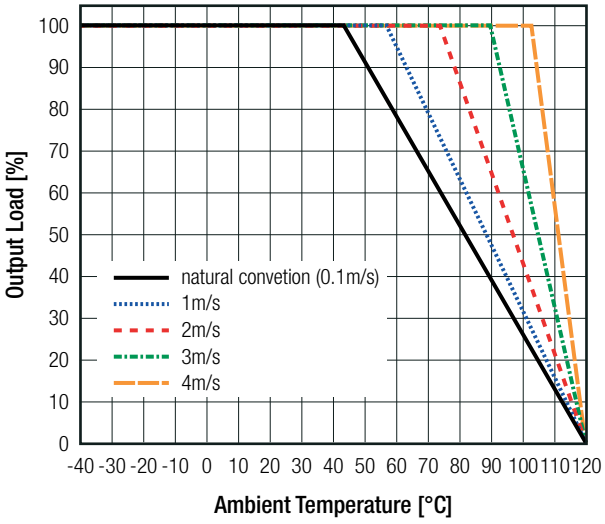


RPMGQ12-20

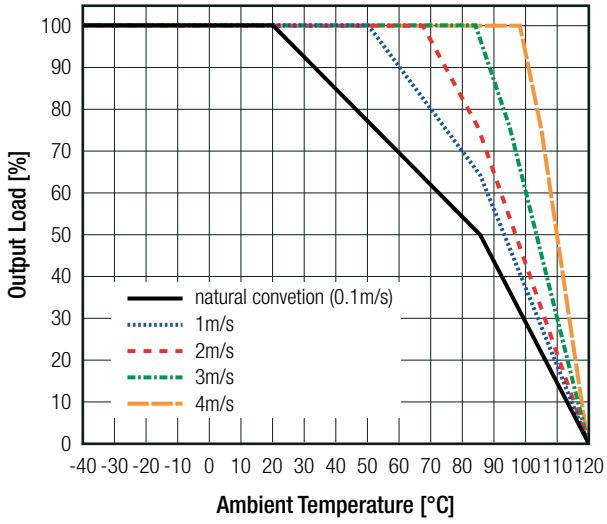


48Vin

RPMGQ5.0-20



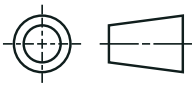
RPMGQ12-20



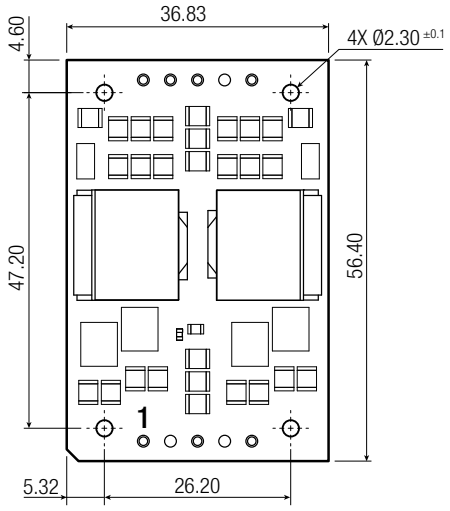
Specifications (measured @ ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

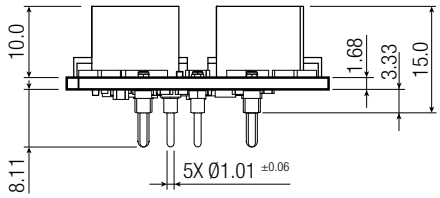
DIMENSION AND PHYSICAL CHARACTERISTICS		
Parameter	**Type**	**Value**
Material	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		56.4 x 36.83 x 15.0mm
Weight		29g typ.

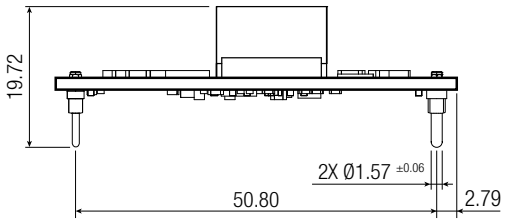
Dimension Drawing (mm)



Top View



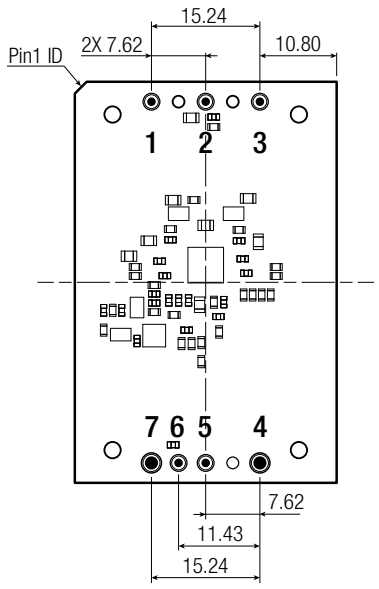




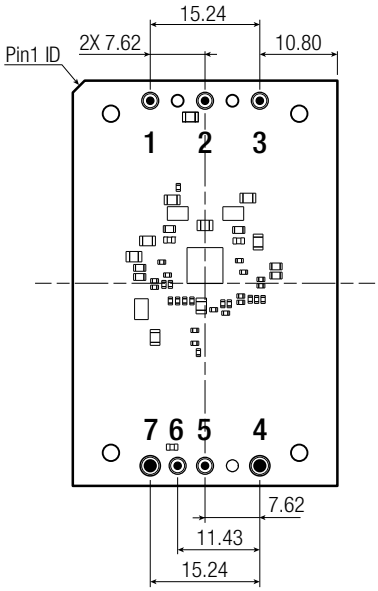
Pinning Information

Pin #	Single	Pin Ø
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= ±0.5mm
xx.xx= ±0.25mm

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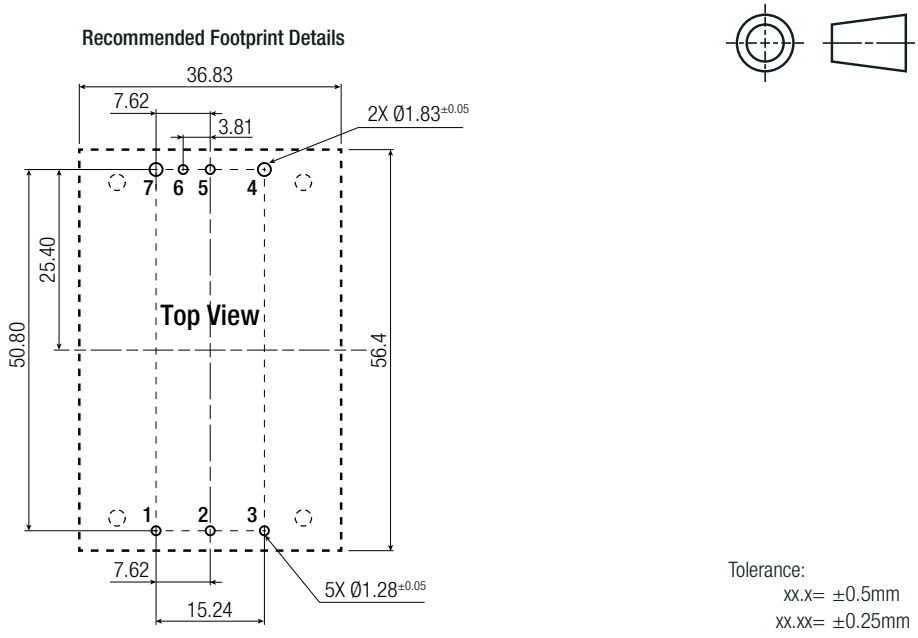
Specifications (measured @ ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)



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.