

Q Series

60...132 Watt DC-DC Converters



Input voltage ranges up to 168 V DC
1 or 2 isolated outputs 3.3...48 V DC
3 kV AC I/O electric strength test voltage



- Extremely slim case (4TE wide), fully enclosed
- Extremely low inrush current, hot swappable
- Operating ambient temperature range -40...71°C with convection cooling

Selection chart

Output 1			Output 2			Type	Type	Options
U_o nom [V DC]	I_o nom [A]	I_o max [A]	U_o nom [V DC]	I_o nom [A]	I_o max [A]	Input Voltage 16...36 V DC	Input Voltage 38...75 V DC	
5.1	16	16	-	-	-	24Q1001-2R	48Q1001-2R	P
12	8	8	-	-	-	24Q2320-2R	48Q2320-2R	P
15	6.6	6.6	-	-	-	24Q2540-2R	48Q2540-2R	P
24	4	4	-	-	-	24Q2320-2R	48Q2320-2R	P
24	4.4	4.4	-	-	-	24Q2660-2R	48Q2660-2R	P
30	3.3	3.3	-	-	-	24Q2540-2R	48Q2540-2R	P
48	2.2	2.2	-	-	-	24Q2660-2R	48Q2660-2R	P
5.1	7.5	7.5	5.1	7.5	7.5	24Q2001-2R	48Q2001-2R	P
12	4	4	12	4	4	24Q2320-2R	48Q2320-2R	P
15	3.3	3.3	15	3.3	3.3	24Q2540-2R	48Q2540-2R	P
24	2.2	2.2	24	2.2	2.2	24Q2660-2R	48Q2660-2R	P

Output 1			Output 2			Type	Type	Type	Options
U_o nom [V DC]	I_o nom [A]	I_o max [A]	U_o nom [V DC]	I_o nom [A]	I_o max [A]	Input Voltage 14.4...36 V DC	Input Voltage 21.6...54 V DC	Input Voltage 35...75 V DC	
3.3	18	22	-	-	-	BQ 1101-7	GQ 1101-7	CQ 1101-7	-9
5.1	16	20	-	-	-	BQ 1001-7R	GQ 1001-7R	CQ 1001-7R	-9, P
12	8	10	-	-	-	BQ 2320-7R	GQ 2320-7R	CQ 2320-7R	-9, P
15	6.6	8	-	-	-	BQ 2540-7R	GQ 2540-7R	CQ 2540-7R	-9, P
24	4.4	5.5	-	-	-	BQ 2660-7R	GQ 2660-7R	CQ 2660-7R	-9, P
24	4	5	-	-	-	BQ 2320-7R	GQ 2320-7R	CQ 2320-7R	-9, P
30	3.3	4	-	-	-	BQ 2540-7R	GQ 2540-7R	CQ 2540-7R	-9, P
48	2.2	2.75	-	-	-	BQ 2660-7R	GQ 2660-7R	CQ 2660-7R	-9, P
5.1	7.5	9.5	5.1	7.5	9.5	BQ 2001-7R	GQ 2001-7R	CQ 2001-7R	-9, P
12	4	5	12	4	5	BQ 2320-7R	GQ 2320-7R	CQ 2320-7R	-9, P
15	3.3	4	15	3.3	4	BQ 2540-7R	GQ 2540-7R	CQ 2540-7R	-9, P
24	2.2	2.75	24	2.2	2.75	BQ 2660-7R	GQ 2660-7R	CQ 2660-7R	-9, P

2/12.2000

Cassette Style

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Output 1			Output 2			Type	Type	Options
$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	$I_{o\ max}$ [A]	$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	$I_{o\ max}$ [A]	Input Voltage 43...108 V DC	Input Voltage 65...168 V DC	
3.3	18	22	-	-	-	DQ 1101-7	EQ 1101-7	-9
5.1	16	20	-	-	-	DQ 1001-7R	EQ 1001-7R	-9, P
12	8	10	-	-	-	DQ 2320-7R	EQ 2320-7R	-9, P
15	6.6	8	-	-	-	DQ 2540-7R	EQ 2540-7R	-9, P
24	4	5.5	-	-	-	DQ 2660-7R	EQ 2660-7R	-9, P
24	4	5	-	-	-	DQ 2320-7R	EQ 2320-7R	-9, P
30	3.3	4	-	-	-	DQ 2540-7R	EQ 2540-7R	-9, P
48	2.2	2.75	-	-	-	DQ 2660-7R	EQ 2660-7R	-9, P
5.1	7.5	9.5	5.1	7.5	9.5	DQ 2001-7R	EQ 2001-7R	-9, P
12	4.4	5	12	4.4	5	DQ 2320-7R	EQ 2320-7R	-9, P
15	3.3	4	15	3.3	4	DQ 2540-7R	EQ 2540-7R	-9, P
24	2.2	2.75	24	2.2	2.75	DQ 2660-7R	EQ 2660-7R	-9, P

Input

Input voltage	refer to selection chart
Inrush current	ETS 300 132-2 typ. 40 A

Output

Efficiency	$U_{i\ nom}, I_{o\ nom}$	up to 88%
Output voltage setting accuracy	$U_{i\ nom}, I_{o\ nom}$	$\pm 0.6\% U_{o\ nom}$
Worst case output voltage 1	$U_{i\ min}...U_{i\ max}, 0...I_{o1\ max}, T_C\ min...T_C\ max$	$\pm 1.8\% U_{o\ nom}$
Minimum output current 1, 2	in parallel configuration not required	0 A
Minimum output current 1, 2	in individual or series configuration	10% $I_{o1,2\ nom}$
Load regulation output 2	$I_{o1,2\ min}...I_{o1,2\ max}$	typ. 100 mΩ • ($I_{o1} - I_{o2}$)
Output voltage switching noise	IEC/EN 61204, total, peak-peak	typ 0.3% $U_{o\ nom}$
Common current limit. $I_{o1} + I_{o2}$	rectangular U/I characteristic	typ. 130% ($I_{o1\ max} + I_{o2\ max}$)
Operation of units in parallel	by connecting the current sharing pins T	

Protection

Input reverse polarity	built-in fuse	
Input undervoltage lockout		typ. 90% $U_{i\ min}$
Input overvoltage lockout		typ. 110% $U_{i\ max}$
Input transient protection	varistor	
Output	no-load, overload and short-circuit proof	
Output overvoltage	second control loop	typ. 125% $U_{o\ nom}$
Overtemperature	switch-off with auto restart (-7 units)	T_C typ. 100°C

Control

Output voltage adjustment	with feature R	60/80...110% $U_{o\ nom}$
Inhibit on input side	TTL input, output(s) disabled if left open circuit	
Status indication	LEDs: In OK (-7 units), Out OK (all)	
Output good signal (Out OK)	isolated open collector signal	

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Safety

Approvals	EN 60950, UL 1950, CSA C22.2 No. 950	
Class of equipment		class I
Protection degree		IP 20/30
Electric strength test voltage	I/case, O/case, Out OK/case	1.5 kV AC
	I/O, Out OK/I, Out OK/O	3 kV AC
	O/O	300 V DC

EMC

Electrostatic discharge	IEC/EN 61000-4-2, level 4 (8/15 kV)	criterion B
Electromagnetic field	IEC/EN 61000-4-3, level 3 (10 V/m)	criterion A
Electr. fast transients/bursts	IEC/EN 61000-4-4, output/input, level 3/4 (2/4 kV)	criterion B
Surge	IEC/EN 61000-4-5, input, level 2/3 (1/2 kV)	criterion B
Conducted disturbances	IEC/EN 61000-4-6, level 2/3 (3/10 V)	criterion A
Electromagnetic emissions	CISPR 22/EN 55022, 24/48/BQ/CQ/GQ, conducted	class B

Environmental –2 units

Operating ambient temperature	$U_{i\text{ nom}}, I_{o\text{ nom}}$, convection cooled	–10...50°C
Operating case temperature T_C	$U_{i\text{ nom}}, I_{o\text{ nom}}$	–10...80°C
Storage temperature	non operational	–25...100°C
Damp heat	IEC/EN 60068-2-3, 93%, 40°C	21 days
Vibration, sinusoidal	IEC/EN 60068-2-6, 10...60/60...2000 Hz	0.15 mm/2 g_n
Shock	IEC/EN 60068-2-27, 6 ms	15 g_n
Bump	IEC/EN 60068-2-29, 6 ms	10 g_n
MTBF	MIL-HDBK-217F, G_B , 40°C, 24/48Q1000	588'000 h

Environmental –7 units

Operating ambient temperature	$U_{i\text{ nom}}, I_{o\text{ nom}}$, convection cooled	–25...71°C
	$U_{i\text{ nom}}, I_{o\text{ max}}$, convection cooled	–25...50°C
	$U_{i\text{ nom}}, I_{o\text{ nom}}$	–25...95°C
Operating case temperature T_C	$U_{i\text{ nom}}, I_{o\text{ max}}$	–25...85°C
	non operational	–40...100°C
Damp heat	IEC/EN 60068-2-3, 93%, 40°C	56 days
Vibration, sinusoidal	IEC/EN 60068-2-6, 10...60/60...2000 Hz	0.35 mm/5 g_n
Shock	IEC/EN 60068-2-27, 11 ms	50 g_n
Bump	IEC/EN 60068-2-29, 11 ms	25 g_n
Random vibration	IEC/EN 60068-2-64, 20...500 Hz	4.9 g_n rms
MTBF	MIL-HDBK-217F, notice 2, G_B , 40°C, BQ 2000	853'000 h

Options

Extended temperature range	–40...71°C, ambient, operating, for -7 units	-9
Output voltage adjustment	$\pm 10\%$ $U_{o\text{ nom}}$, excludes feature R and vice versa	P

Accessories

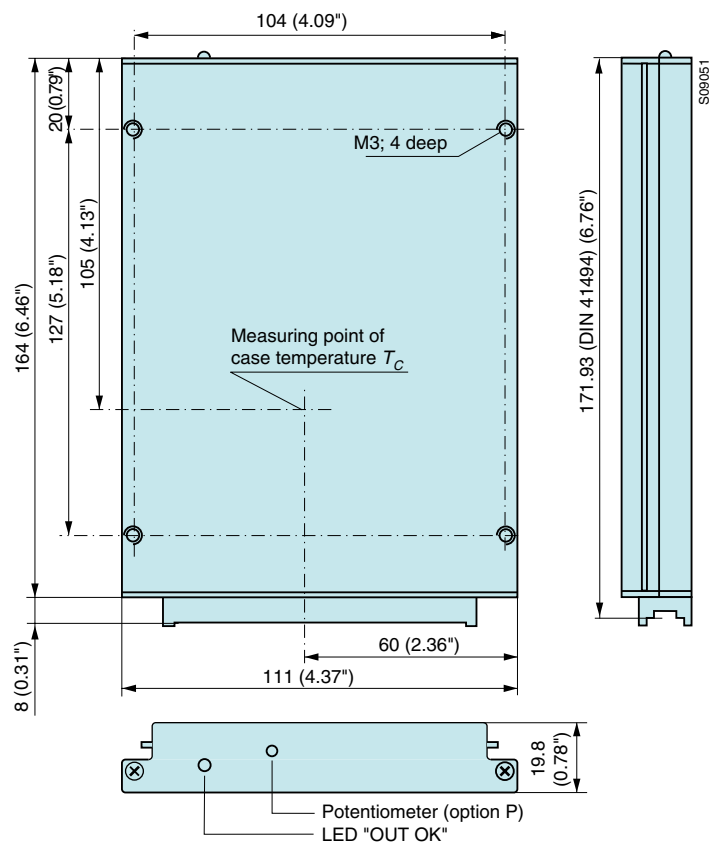
Front panels for 19" rack mounting in 3U or 6U configuration (Schroff/Intermas)
Mating H15 connectors with screw, solder, fast-on or press-fit terminals
Connector retention facilities and code key system for connector coding
Additional external input or output filters
Mechanical mounting supports for chassis, DIN-rail and PCB mounting

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Mechanical data

Tolerances ± 0.3 mm (0.012") unless otherwise indicated.



Pin allocation

Pin	Electrical determination	Q 1000	Q 2000
4	Output voltage (positive)	Vo1+	Vo1+
6	Output voltage (positive)	Vo1+	Vo2+
8	Output voltage (negative)	Vo1-	Vo1-
10	Output voltage (negative)	Vo1-	Vo2-
12	Sense line (positive)	S+	S+
14	Sense line (negative)	S-	S-
16	Output voltage control input	R	R
18	Current sharing control input	T	T
20	Do not connect (internal Gnd.)	-	-
22	Output good signal (positive)	Out OK+	Out OK+
24	Output good signal (negative)	Out OK-	Out OK-
26	Protective earth	⊕	⊕
28	Inhibit control input	i	i
30	Input voltage (positive)	Vi+	Vi+
32	Input voltage (negative)	Vi-	Vi-