

DESCRIPTION

The MCB600 is a modular, user configurable power supplies offering unrivalled performance and flexibility.

Delivering 600 W from a 600 g, $5^{"} \times 3^{"} \times 10$ package, the MCB600 is the smallest commercially available configurable power solution.

Each system consists of an input module together with up to four isolated output modules.

The series carry full UL60601 safety approvals and comply with EN61000-3, EN61000-4 and EN55022 class B EMC standards.

2 Year Warranty

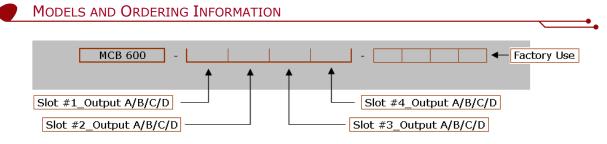
KEY FEATURES

- Universal input voltage
- Active power factor correction
- High power density (25 W/in³)
- 600 W output in 5"x3"x1U footprint
- Field configurable
- Medical safety approved
- High reliability
- High efficiency

MARKET SEGMENTS AND APPLICATIONS

- Industrial Electronics & Computers
- Test and Measurement Equipment
- Automation and Drives
- Broadcast & Entertainment

- Parallel operation
- Accurate wired current share
 - Current output signal
 - N+1 redundant (external diodes)
 - Global 5 V, 200 mA bias supply
 - RoHS-6 compliant
- Remote voltage programming
- Remote current programming
- Printing
- Industrial & Process Controls
- Medical Applications
- Telecommunications



Use "0" for unused slots. A slot cover bracket will be fitted at factory

The factory might issue a 4 digit code for a specific configuration which can be used for next and future orders of the same configuration When ordering an input unit with no ouput inserted, simply order "MCB600"

Output Module	Nominal Voltage	Rated Current	Voltage Adjustment	Load Regulation	Line Regulation	ΟVΡ	Output Power
Α	5 V	25.0 A	1.5 to 7.5 V	±50 mV	±0.1 %V _{NOM}	9.5 V	125 W
В	12 V	15.0 A	4.5 to 15 V	±100 mV	±0.1 %V _{NOM}	18 V	150 W
С	24 V	7.5 A	9 to 30 V	±150 mV	±0.1 %V _{NOM}	36 V	150 W
D	48 V	3.75 A	18 to 58 V	±300 mV	±0.1 %V _{NOM}	66 V	150 W
0 (zero)				Unused slots			



INPUT SPECIFICATIONS

Parameter	Details	Min	Тур	Max	Units
AC input voltage	Nominal range is 100 to 240 V _{RMS}	85		264	V _{RMS}
AC input frequency		47	50/60	63	Hz
DC input voltage		120		300	V_{DC}
Power rating	Derate by 0.83%/V _{RMS} below 120 V _{RMS} (600 W at 120 V _{RMS} , 450 W at 90 V _{RMS})			600	W
Input current	At 600 W output and 120 V _{RMS} input			6	А
Inrush current	265 V _{RMS} , cold start			20	А
Fusing	5x20 fast acting fuse			8	А
Input current limit	Maintains power factor		8		А
Efficiency	Configuration dependent		86	89	%
Idle power	All outputs fitted and enabled All outputs fitted and disabled		28 21		W
Power factor	Typical value at 300 W output at 240 V _{RMS}		0.96	0.99	
Hold up	600 W output at 120 V _{RMS} input	17	20	21	ms
UVLO	Turn on only	78		84	V _{RMS}
Over temperature	Internally monitored. Latching	115		125	°C
Reliability	At 40 °C, 80% load			2	FPMH

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SIGNALS

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Parameter	Details	Min	Тур	Max	Units
Bias voltage		4.8	5	5.2	V
Bias current		0		200	mA
Power Good Voltage	PNP open collector with internal 10 K Ω pull down resistor	8	10	15	V
Power Good Current		0		20	mA
Inhibit voltage		2		15	V
Inhibit current	10 KΩ input impedance	0.2		1.5	mA
Global inhibit voltage		3		15	V
Global inhibit current	5 KΩ input impedance	0.6		3	mA
AC_OK voltage		1		4	V
AC_OK current		-10		20	mA
AC_OK warning	See user manual for exceptions	5			ms

SAFETY

Parameter	Details	Min	Max	Units
	Input to Output		4000	V _{RMS}
Isolation voltage Isolation clearance	Input to Chassis		1500	V _{RMS}
	Output to Chassis		250	V _{DC}
	Output to Output		250	V _{DC}
Isolation clearance	Primary to Secondary (Reinforced)	7		mm
	Primary to Chassis (Basic)	2.5		mm
Tealation and anota	Primary to Secondary (Reinforced)	12		mm
Isolation creepage	Primary to Chassis (Basic)	4		mm
Leakage current	265 V _{AC} , 63 Hz, 25 °C		300	μA
Agency Approvals	_c UR _{us} , Demko, CB Certificate			
Standards	IEC/EN60601-1; UL 60601-1 ; CAN/CSA-C22.2 No. 601	.1-M90;		
Stanuarus	CE Mark: LVD 73/23/EEC.			
	UL: E304543-A3-UL-1			
Agency File Numbers	CB Certificate: DK-20543			
	Demko Certificate: Forthcoming			





ENVIRONMENTAL

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Parameter	Details	Min	Max	Units
Storage				
Temperature		-40	+85	°C
Humidity	Relative, non condensing	5	95	%
Altitude		-200	5000	m
Air pressure		54	106	kPa
Operating				
Temperature	Full power	-20	50	°C
	Derate by 2.5%/°C above 50 °C	50	70	°C
Humidity	Relative, non condensing	5	95	%
Altitude		-200	3000	m
Air pressure		69	106	KPa
Noise level	Variable. Measured at 1 m from fan intake	35	60	dB(A)
Shock	3000 bumps at 10 g (16 ms) half sine wave			
Vibration	1.5 g, 10 to 200 Hz sine wave, 20 g for 15 min ir	n 3 axes random	vibration	
Installation				
Equipment class	I			
Installation	Category II			
Pollution Degree	2			
Material Group	IIIb (Indoor use only)			
Flammability Rating	94V-2			
IP Rating	IP10			
RoHS Compliance	2002/95/EC			

ELECTROMAGNETIC COMPATIBILITY EMC

Parameter	Standard	Level
Emissions		
Radiated electric field	EN55011, EN55022, FCC	В
Conducted emissions	EN55011, EN55022, FCC	В
Harmonic distortion	EN61000-3-2	Compliant
Flicker and fluctuation	EN61000-3-3	Compliant
Immunity		
Electrostatio discharge		
Electrostatic discharge	EN61000-4-2 (15 kV air, 8 kV contact)	4
Radiated RFI	EN61000-4-2 (15 kV air, 8 kV contact) EN61000-4-3 (10 V/m)	4 3
		4 3 4
Radiated RFI Fast transient, burst	EN61000-4-3 (10 V/m)	4 3 4 3
Radiated RFI Fast transient, burst Input line surges	EN61000-4-3 (10 V/m) EN61000-4-4 (4 kV)	4
	EN61000-4-3 (10 V/m) EN61000-4-4 (4 kV) EN61000-4-5 (1 kV L-N, 2 kV L-E)	4

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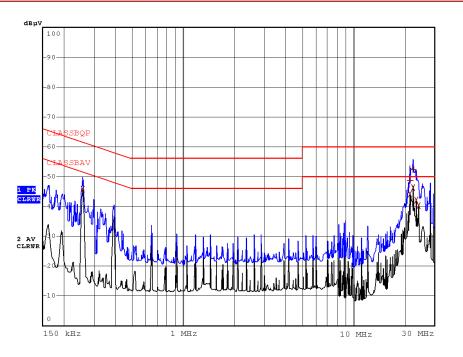
RELIABILITY

Component	Details	Мах	Units
Fan	Mag. Lev. Standard	2.7	FPMH
Input	Excluding Fan	2	FPMH
Output	See output specifications	1	FPMH
Warranty		2	Years



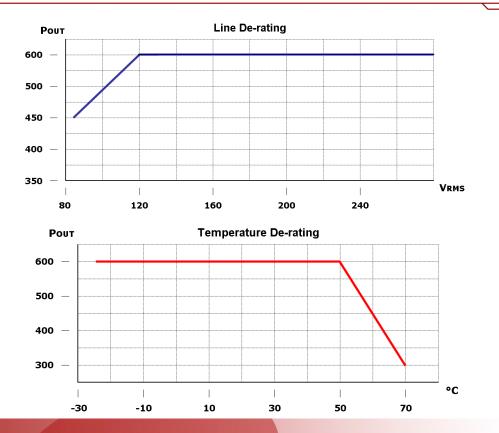


TYPICAL CONDUCTED EMISSIONS



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TEMPERATURE AND LINE DE-RATING





MECHANICAL SPECIFICATIONS – OUTLINE DRAWING AND DIMENSIONS

Specification	Details		Nominal	Units
Dimensions	Height is 1U		77.7 x 136.25 x 41.0	mm
Noight	Chacolo L innut		3.06 x 5.36 x 1.61 360	in
Weight	Chassis + input Output modules		60	g
	Chassis + input		0.794	g Ib
	Output modules		0.132	lb lb
Mounting		unting through M4 scr		10
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		41±0,5		
	N - N E - E: L - Li			+ Slot #4
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		22,7± 0,50	●	🕂 Slot #3 •
		H Airfl	ow	
MH1, MH2, MH3, M Screw type	н4, мн5 М4	1		🕀 Slot #2 ᅌ
Tightening torque	Tighten to 1.5 Nm			v
	4.00 mm max,	N.		
Penetration depth	including chassis	E ·	$\bigcirc \oplus$	🕀 Slot #1 _
OUTPUT MODULES			₄ <u>⊨</u>	
Screw type	M3X5, C/Sink, Posi,		133,75±0,50	
	Stainless steel	~ [141.2	-
Tightening torque Penetration depth	Tighten to 0.75 Nm	2,5	141,3	
CHASSIS X 2	Defined by screw	11		
	M3X5, C/Sink, Posi,	23,5	i0 48,65	
Screw type	Stainless steel			
Tightening torque	Tighten to 0.75 Nm			0
Penetration depth	Defined by screw	24,05		یخ
CHASSIS X 2		Ň M	н4мн5	_
Screw type	M2.5X4, C/Sink, Posi,	<u>'</u>	_ 	
	Stainless steel Tighten to 0.45 Nm		'	
Tightening torque Penetration depth	Defined by screw	Y		
FAN X 2	Defined by Screw	 M4 (2x) 7	⊽ 4 mm (max)	M4 (3x) ∓4 mm (ı
	M3X30, C/Sink, Posi,			(JX) ¥4 mm (I
Screw type	Stainless steel			
Tightening torque	Tighten to 0.70 Nm			
Penetration depth	Defined by screw	<u>↑</u>	МН1	∖⊺₽
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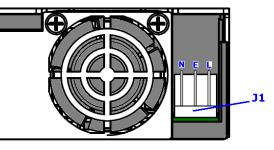
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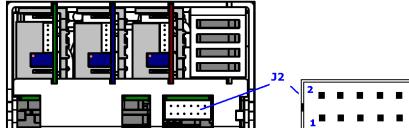
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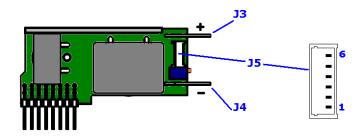


MECHANICAL SPECIFICATIONS - CONNECTORS AND PIN ASSIGNMENT

F	PIN ASSIGNMENT				
Circuit	Details				
	J1				
1	Neutral				
2	Earth				
3	Live				
	J2				
1	Power Good Slot #1				
2	Inhibit Slot #1				
3	Power Good Slot #2				
4	Inhibit Slot #2				
5	Power Good Slot #3				
6	Inhibit Slot #3				
7	Power Good Slot #4				
8	Inhibit Slot #4				
9	Global Inhibit				
10	AC OK				
11	+5V 200mA, Bias Supply				
12	СОМ				
	J5				
1	–Sense				
2	+Sense				
3	Voltage Control				
	Current Control				
4	Current Sharing				
-	Current Monitor COM				
5					
6	+5V 10mA, Bias Supply				
Desitive	J3				
Positive	•				
	J4				
Negative Output					







COUNTERPART CONNECTORS							
Reference	Details	Manufacturer	Housing PN	Terminal PN			
AC Mains Input J1	 5.08 mm (0.200 in), 3 circuits housing, with friction lock, or, any direct equivalent. Crimp terminal, 18-24 AWG, tin finish, or, any direct equivalent. 	Molex	0010013036	0008701031			
Power Unit Signal J2	 2.00 mm (0.079 in) 12 circuits housing with locking ramp, or, any direct equivalent. Crimp terminal 24-30 AWG, gold finish, or, any direct equivalent. 	Molex	0511101260	0503948051			
Output Power J3/J4	• Quick Disconnect Receptacle compatible with PCB mounting TAB, size 0.80X6.35 mm. Tin finish.	Vogt AG Tyco Electronics	NA	3967 640907-1			
Output Signal J5	 1.25 mm (0.049 in), 6 circuits housing, Crimp terminal 28-32 AWG, tin finish, or , any direct equivalent 	Molex	0510210600	050058800			
Notes:							

Output power terminal and wire current rating must exceed maximum short circuit output current. E.g. OP-A: 25*1.25 = 31.25 A.
 Direct equivalents may be used for any connectors parts
 All cables must be rated 105°C min, equivalent to UL1015.



OUTPUT SPECIFICATIONS – MODULE A (OP-A)

Parameter	Test conditions / Notes	Min	Nominal	Max	Units
Output voltage range		1.5	5	7.5	V
Rated current				25	А
Average output power				125	W
Peak output power	<5 s, 50% duty cycle			187.5	W
Initial voltage accuracy	Factory set units, Measured at sense terminals	-0.5		0.5	% V _{SET}
Output voltage adjustment	Manual: 11-turns potentiometer		0.545		V/turn
Load regulation	Measured at sense terminals	-50		50	mV
Line regulation	Measured at sense terminals	-0.1		0.1	%V _{NOM}
Cross regulation	Measured at sense terminals	-0.2		0.2	%V _{NOM}
Minimum load			0		А
Output temperature drift		-0.02		0.02	%/°C
Ripple and Noise	20 MHz bandwidth, peak-peak			1	%V _{NOM}
Transient response	25% to 75% load transient, at 1A/ μ s, recovery to within 10% of V _{SFT}			1 100	V µs
Turn on rise time	Monotonic, 10% to 90%	1.5		3.5	ms
Turn on overshoot				0.1	%V _{SET}
Turn on delay	From AC on to Power Good From Enable to Power Good		600 15	750 20	ms
Current sharing accuracy				5	%I _{MAX}
Open sense offset	Open sense, voltage offset due to bias currents			2	%V _{NOM}
Hold-up voltage				6	V
Isolation to ground	Each terminal			250	V
Over current protection	% of rated current	105		125	%I _{RATED}
Reverse current protection	% of rated current	-6		0	%I _{RATED}
Short circuit protection (Hiccup mode)	Period Duty cycle Voltage threshold (at sense)		125 3 1		ms % V
Over voltage protection	Latching		9.5		V
Over temperature protection	Internally monitored, latching	115		125	°C
Sense cable protection	On positive terminal On negative terminal	-1 none		2 1	V
Power good threshold	Low threshold only		90		%V _{SET}
Output current signal	$I_{SGN} = 0.6 + I_{OUT} / (I_{RTD} * 1.25)$	0		110	%I _{RATED}
Current limit control	$I_{LMT} = (V_{CTRL} - 0.6) * I_{RTD} * 1.25$	0		110	%I _{RATED}
Remote voltage control	$V_{OUT} = V_{SET} ((1.8 - V_{CTRL}) / 0.6)$	0		300	%V _{SET}
Bias supply	10 mA max	4.5	5	5.2	V
Reliability	At 40 °C, 80% load			1	FPMH
Warranty				2	Years
Wire size	Power cables	12	10		AWG
Weight				60	g
Size	60 mm x 35 mm x 17 mm, or, 2.36	in x 1.38 ir	n x 0.67 in		





OUTPUT SPECIFICATIONS – MODULE B (OP-B)

Parameter	Test conditions / Notes	Min	Nominal	Max	Units
Output voltage range		4.5	12	15	V
Rated current				15	A
Average output power				150	W
Peak output power	<5 s, 50% duty cycle			225	W
Initial voltage accuracy	Factory set units, Measured at sense terminals	-0.5		0.5	$\% V_{SET}$
Output voltage adjustment	Manual: 11-turns potentiometer		0.954		V/turn
Load regulation	Measured at sense terminals	-100		100	mV
Line regulation	Measured at sense terminals	-0.1		0.1	%V _{NOM}
Cross regulation	Measured at sense terminals	-0.2		0.2	%V _{NOM}
Minimum load			0		А
Output temperature drift		-0.02		0.02	%/°C
Ripple and Noise	20 MHz bandwidth, peak-peak			1	%V _{NOM}
Transient response	25% to 75% load transient, at 0.5A/µs; recovery to within 10% of VSFT			1.5 100	V µs
Turn on rise time	Monotonic, 10% to 90%	1.5		3.5	ms
Turn on overshoot		1.5		0.1	%V _{SFT}
	From AC on to Power Good		600	750	ms
Turn on delay	From Enable to Power Good		15	20	ms
Current sharing accuracy			10	5	%I _{MAX}
Open sense offset	Open sense, voltage offset due to bias currents			2	$%V_{NOM}$
Hold-up voltage				12.5	V
Isolation to ground	Each terminal			250	V
Over current protection	% of rated current	105		125	%I _{RATED}
Reverse current protection	% of rated current	-6		0	%I _{RATED}
Short circuit protection (Hiccup mode)	Period Duty cycle Voltage threshold (at sense)		125 3 2		ms % V
Over voltage protection	Latching		18		V
Over temperature protection	Internally monitored, latching	115		125	°C
Sense cable protection	On positive terminal On negative terminal	-1 none		2 1	V
Power good threshold	Low threshold only		90		%V _{NOM}
Output current signal	$I_{SGN} = 0.6 + I_{OUT} / (I_{RTD} * 1.25)$	0		110	%I _{RATED}
Current limit control	$I_{IMT} = (V_{CTRI} - 0.6) * I_{RTD} * 1.25$	0		110	%I _{RATED}
Remote voltage control	$V_{OUT} = V_{SET} ((1.8 - V_{CTRL}) / 0.6)$	0		300	%V _{SET}
Bias supply	10 mA maximum	4.5	5	5.2	V
Reliability	At 40 °C, 80% load		-	1	FPMH
Warranty	,			2	Years
Wire size	Power cables	16	14	10	AWG
Weight				60	g
Size	60 mm x 35 mm x 17 mm, or, 2.36	5 in x 1.38	in x 0.67 in		

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OUTPUT SPECIFICATIONS - MODULE C (OP-C)

Parameter	Test conditions / Notes	Min	Nominal	Max	Units
Output voltage range		9	24	30	V
Rated current				7.5	A
Average output power				150	W
Peak output power	<5 s, 50% duty cycle			225	W
Initial voltage accuracy	Factory set units, Measured at sense terminals	-0.5		0.5	$\% V_{SET}$
Output voltage adjustment	Manual: 11-turns potentiometer		1.9		V/turn
Load regulation	Measured at sense terminals	-150		150	mV
Line regulation	Measured at sense terminals	-0.1		0.1	%V _{NOM}
Cross regulation	Measured at sense terminals	-0.2		0.2	%V _{NOM}
Minimum load			0		A
Output temperature drift		-0.02		0.02	%/°C
Ripple and Noise	20 MHz bandwidth, peak-peak			1	%V _{NOM}
Transient response	25% to 75% load transient, at 0.25A/μs; recovery to within 10% of VSET			3 100	V µs
Turn on rise time	Monotonic, 10% to 90%	1.5		3.5	ms
Turn on overshoot		1.5		0.1	%V _{SFT}
	From AC on to Power Good		600	750	ms
Turn on delay	From Enable to Power Good		15	20	ms
Current sharing accuracy			15	5	%I _{MAX}
Open sense offset	Open sense, voltage offset due to bias currents			2	$%V_{NOM}$
Hold-up voltage				25	V
Isolation to ground	Each terminal			250	V
Over current protection	% of rated current	105		125	%I _{RATED}
Reverse current protection	% of rated current	-6		0	%I _{RATED}
Short circuit protection	Period		125		ms
(Hiccup mode)	Duty cycle		3		%
• • •	Voltage threshold (at sense)		3.5		V
Over voltage protection	Latching		36		V
Over temperature protection	Internally monitored, latching	115		125	°C
Sense cable protection	On positive terminal On negative terminal	-1 none		2 1	V
Power good threshold	Low threshold only		90		%V _{SET}
Output current signal	$I_{SGN} = 0.6 + I_{OUT}/(I_{RTD}*1.25)$	0		110	%I _{RATED}
Current limit control	$I_{\rm IMT} = (V_{\rm CTRI} - 0.6) * I_{\rm RTD} * 1.25$	0		110	%I _{RATED}
Remote voltage control	$V_{OUT} = V_{SET} ((1.8 - V_{CTRL}) / 0.6)$	0		300	%V _{SET}
Bias supply	10 mA max	4.5	5	5.2	V
Reliability	At 40 °C, 80% load	1.5	5	1	FPMH
Warranty				2	Years
Wire size	Power cables	20	18	10	AWG
Weight				60	g
Size	60 mm x 35 mm x 17 mm, or, 2.3	6 in x 1.38	in x 0.67 in		2





OUTPUT SPECIFICATIONS - MODULE D (OP-D)

Parameter	Test conditions / Notes	Min	Nominal	Max	Units	
Output voltage range		18	48	58		
Rated current				3.75	A	
Average output power				150	W	
Peak output power	Less than 5 s, 50% duty cycle			225	W	
Initial voltage accuracy	Factory set units, Measured at sense terminals	-0.5		0.5	$\% V_{SET}$	
Output voltage adjustment	Manual: 11-turns potentiometer		3.6		V/turn	
Load regulation	Measured at sense terminals	-300		300	mV	
Line regulation	Measured at sense terminals	-0.1		0.1	%V _{NOM}	
Cross regulation	Measured at sense terminals	-0.2		0.2	%V _{NOM}	
Minimum load			0		А	
Output temperature drift		-0.02		0.02	%/°C	
Ripple and Noise	20 MHz bandwidth, peak-peak			1	%V _{NOM}	
Transient response	25% to 75% load transient, at 0.25A/µs; recovery to within 10% of VSFT			3 100	V µs	
Turn on rise time	Monotonic, 10% to 90%	1.5		3.5	ms	
Turn on overshoot				0.1	%V _{SET}	
	From AC on to Power Good		600	750	ms	
Turn on delay	From Enable to Power Good		15	20	ms	
Current sharing accuracy				5	%I _{MAX}	
Open sense offset	Open sense, voltage offset due to bias currents			2	$%V_{NOM}$	
Hold-up voltage				50	V	
Isolation to ground	Each terminal			250	V	
Over current protection	% of rated current	105		125	%I _{RATED}	
Reverse current protection	% of rated current	-6		0	%I _{RATED}	
Short circuit protection (Hiccup mode)	Period Duty cycle		125 3		ms %	
• • •	Voltage threshold (at sense)		3.5		V	
Over voltage protection	Latching		66		V	
Over temperature protection	Internally monitored, latching	115		125	°C	
Sense cable protection	On positive terminal On negative terminal	-3 none		3 2	V	
Power good threshold	Low threshold only		90		%V _{SET}	
Output current signal	$I_{SGN} = 0.6 + I_{OUT} / (I_{RTD} * 1.25)$	0		110	%I _{RATED}	
Current limit control	$I_{IMT} = (V_{CTRI} - 0.6) * I_{RTD} * 1.25$	0		110	%I _{RATED}	
Remote voltage control	$V_{OUT} = V_{SET} ((1.8 - V_{CTRL}) / 0.6)$	0		300	%V _{SET}	
Bias supply	10 mA max	4.5	5	5.2	V	
Reliability	At 40 °C, 80% load	115	J	1	FPMH	
Warranty				2	Years	
Wire size	Power cables	20	18	10	AWG	
Weight				60	g	
Size	60 mm x 35 mm x 17 mm, or, 2.36 in x 1.38 in x 0.67 in					

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Eu and RoW

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