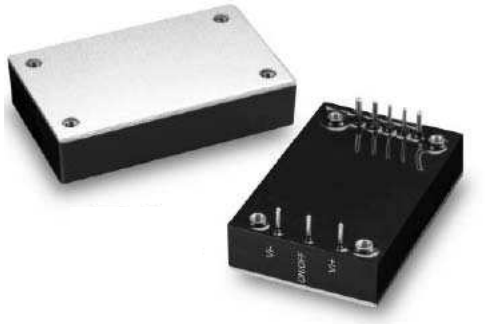
PART NUMBER: VQB100W **DESCRIPTION:** quarter-brick dc-dc converter

features

- **100W isolated output**
- **Efficiency to 88%**
- **250 kHz switching frequency**
- **monotonic start-up**
- **input under-voltage protection**
- **over-temperature protection**
- **over-current protection**
- **remote on/off**
- **industry standard quarter-brick package**



RoHS

MODEL

MODEL	input voltage nominal (V dc)	input voltage range (V dc)	output voltage (V dc)	output current [1] (A)	input current no load[2] (mA)	input current full load[2] (mA)	efficiency typ.[3] (%)
VQB100W-Q48-S3R3	48	18.0~75.0	3.3	30	60	2344	88
VQB100W-Q48-S5	48	18.0~75.0	5	20	60	2367	88
VQB100W-Q48-S12	48	18.0~75.0	12	8.3	30	2358	88
VQB100W-Q48-S15	48	18.0~75.0	15	6.7	30	2379	88
VQB100W-Q48-S24	48	18.0~75.0	24	4.17	30	2369	88

notes:
1. see output derating (page 3)
2. input currents are measured at nominal input voltage
3. efficiency is measured at nominal line, full load

INPUT

parameter	conditions/description	min	nom	max	units
input voltage range		18	48	75	V dc
under voltage lockout	48 Vin power up		17		V dc
	48 Vin power down		16		V dc
remote on/off control[4]	section 2 in the application notes				
input filter	PI type				

notes:
4. add suffix “N” to the model number for negative logic on/off control

PART NUMBER: VQB100W **DESCRIPTION:** quarter-brick dc-dc converter

OUTPUT

parameter	conditions/description	min	nom	max	units
voltage accuracy				±1.5	%
transient response	25% step load change			<500	μ sec
external trim adj. range				±10	%
ripple & noise (20MHz BW)	3.3V, 5V			40	mV RMS
				100	mV pk-pk
	12V& 15V			60	mV RMS
				150	mV pk-pk
	24V			100	mV RMS
				240	mV pk-pk
temperature coefficient			±0.03		%/°C
short circuit protection	continuous				
line regulation[5]				±0.2	%
load regulation[6]				±0.2	%
over voltage protection trip range, % Vo nom.		115		140	%
over current protection	% nominal output current	110		160	%

GENERAL SPECIFICATIONS

parameter	conditions/description	min	nom	max	units
switching frequency			250		KHz
operating ambient temp.[7]		-40		100	°C
storage temperature		-40		105	°C
thermal shutdown case temp.			110		°C
case material	aluminum base-plate, plastic case				

ISOLATION SPECIFICATIONS

parameter	conditions/description	min	nom	max	units
isolation voltage	input/output	1500			V dc
	input/case	1500			V dc
	output/case	1500			V dc
isolation resistance		100			MΩ

notes:
5. measured from high line to low line at full load
6. measured from full load to zero load at nominal input
7. see output derating curve (page 3)

PART NUMBER: VQB100W **DESCRIPTION:** quarter-brick dc-dc converter

APPLICATION NOTES

1. OUTPUT DE-RATING

The operating case temperature range for VQB100W is -40 ~ +100°C. When operating the VQB100W series, proper derating or cooling is needed. The maximum case temperature under any operating condition should not exceed 100°C.

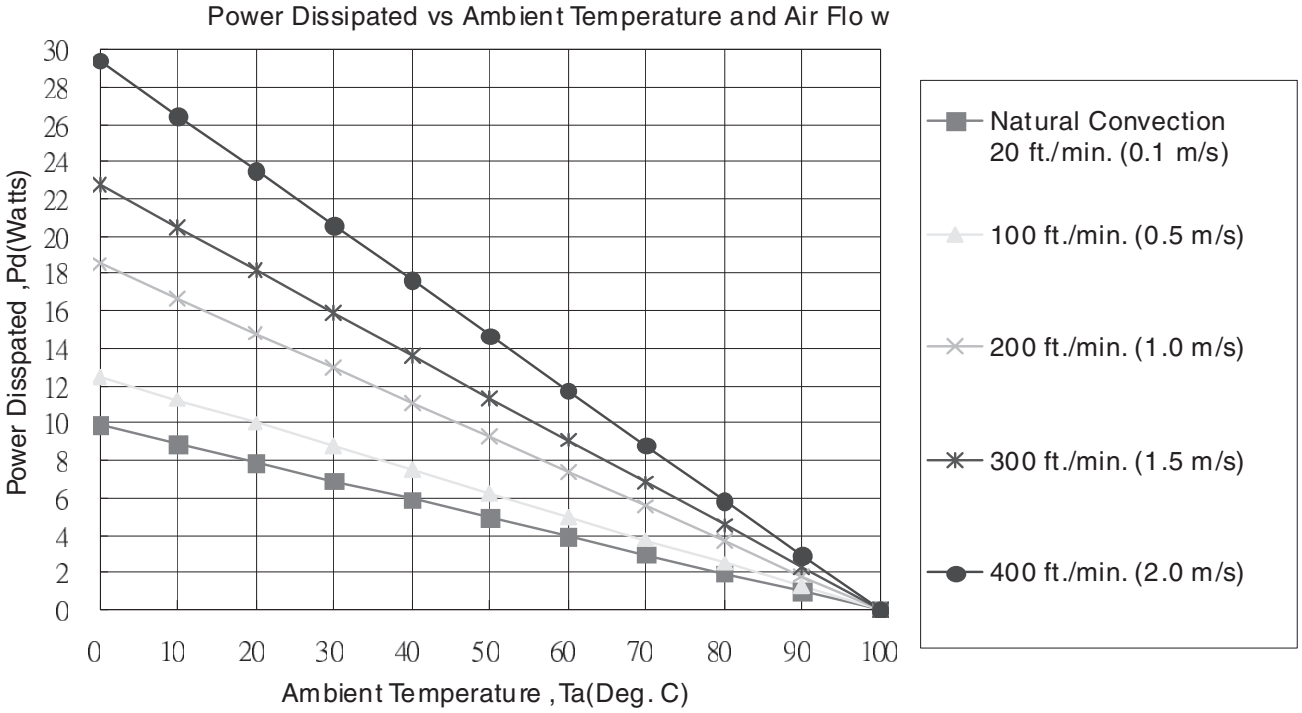


FIGURE 1. OUTPUT DERATING (FORCED CONVECTION WITH NO HEAT SINK)

Example:

What is the minimum airflow necessary for a VQB100W-Q48-S5 operating at nominal line, an output current of 20 A, and a maximum ambient temperature of 40°C?

Solution:

Given: Vin=48 V dc, Vo=5 V dc, Io=20 A

Determine Power dissipation (Pd):

Pd=Pi-Po=Po(1-η)/η

Pd=5×20×(1-0.88)/0.88=13.64 W

Determine airflow:

Given: Pd=13.64 W and Ta=40°C

Check above Power de-rating curve:

minimum airflow= 400 ft./min.

AIR FLOW RATE	TYPICAL R_{ca}
Natural Convection 20ft./min. (0.1m/s)	10.1 ℃/W
100 ft./min. (0.5m/s)	8.0 ℃/W
200 ft./min. (1.0m/s)	5.4 ℃/W
300 ft./min. (1.5m/s)	4.4 ℃/W
400 ft./min. (2.0m/s)	3.4 ℃/W

Chart of Thermal Resistance vs Air Flow

Verifying:

The maximum temp. rise ΔT = Pd × Rca=13.64×3.44=46.4°C. The maximum case temperature Tc=Ta+ΔT=86.4°C<100°C

Where:

The Rca is thermal resistance from case to ambience.The Ta is ambient temperature and the Tc is case temperature.

2. OUTPUT TRIMMING (OPTIONAL)

The output voltages are preset to nominal values as indicated by the models table at the factory. If desired, the output voltage may optionally be trimmed to a different value (+/- 10%) with external resistors and/or potentiometer as shown below.

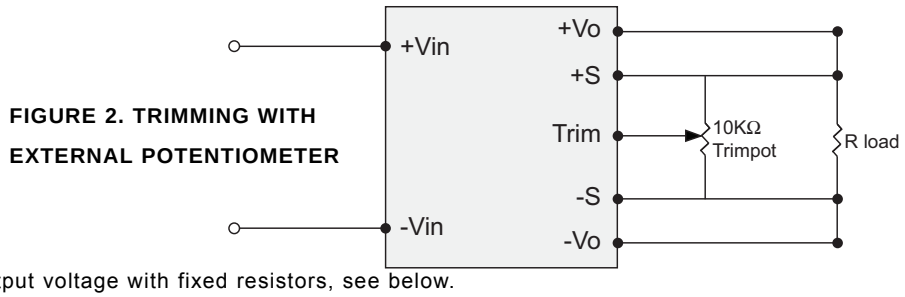


FIGURE 2. TRIMMING WITH EXTERNAL POTENTIOMETER

To trim the output voltage with fixed resistors, see below.

Trim-Up

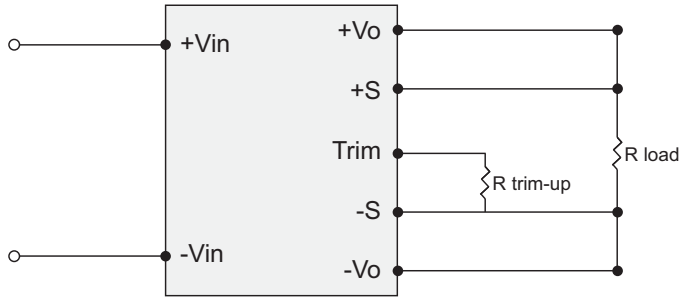


FIGURE 3: TRIM-UP VOLTAGE SETUP

Trim-Down

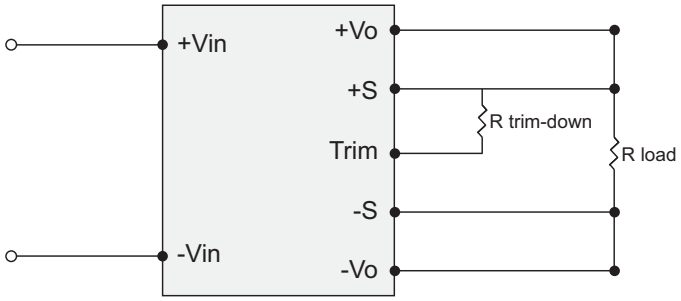


FIGURE 4: TRIM-DOWN VOLTAGE SETUP

3. REMOTE OUTPUT ON/OFF CONTROL

The converter output can be enabled or disabled through the On/Off pin. The control logic is shown in this table. A common control circuit is shown below.

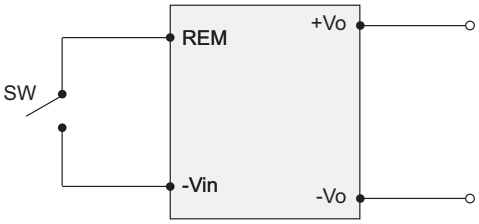


FIGURE 5. REMOTE ON/OFF CONTROL

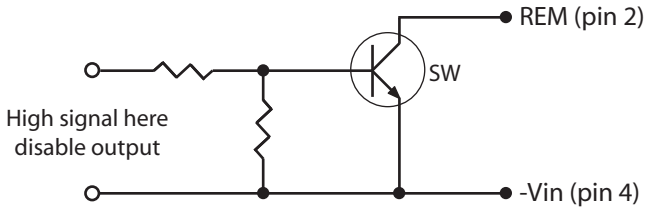


FIGURE 6. REMOTE ON/OFF CONTROL WITH TRANSISTOR SWITCH

Logic Table	Negative logic	Positive logic
SW Closed (V_{REM} <1.2 V)	Output on	Output off
SW Open (V_{REM} >3.5 V)	Output off	Output on

4. OUTPUT NOISE MEASUREMENT SCHEMATIC

For proper output ripple and noise measurement, connect a 10µF tantalum and a 1µF ceramic capacitor across the output. Set the scope bandwidth to 20MHz. Probe directly off of one of the capacitors, using a small ground clip to minimize measurement error.

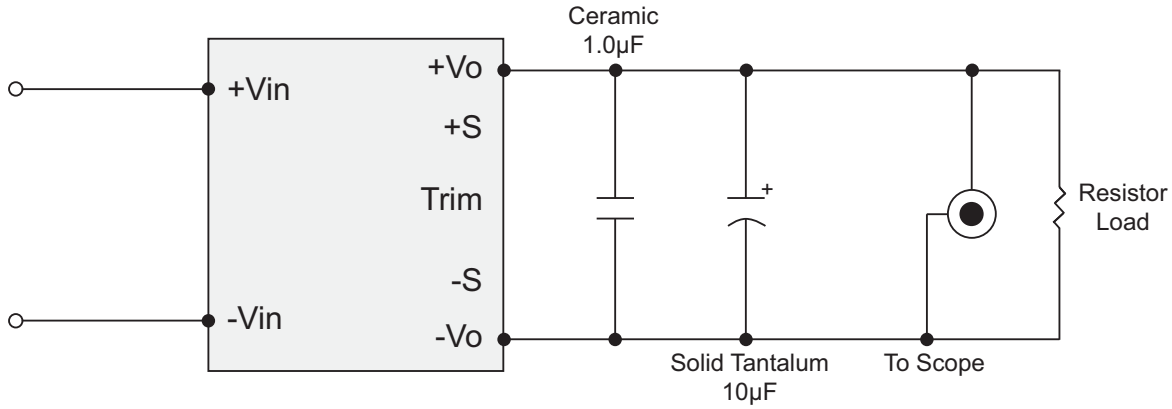
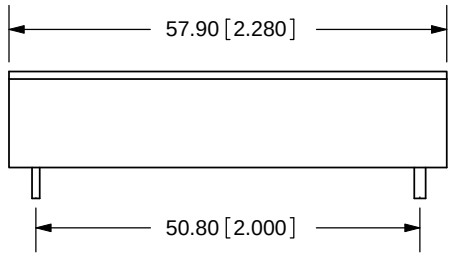
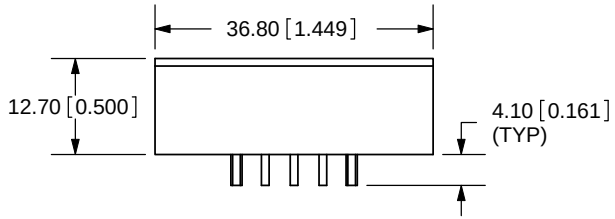
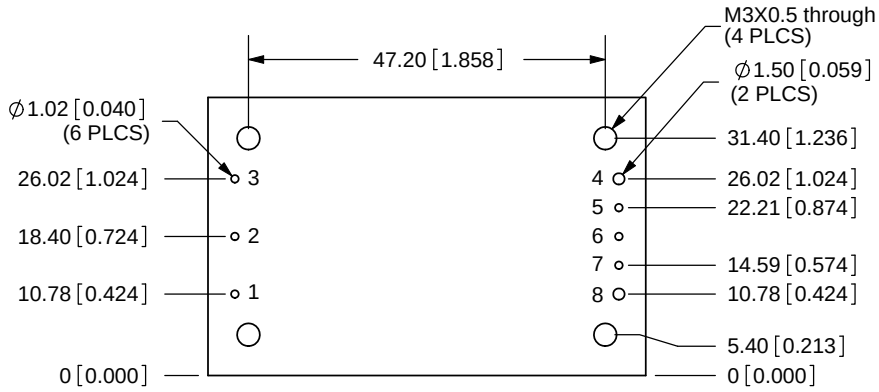


FIGURE 7. OUTPUT NOISE MEASUREMENT CIRCUIT

REV.	DESCRIPTION	DATE
A	NEW DRAWING	12/30/2008







TOLERANCE:
X.X ±0.5mm
X.XX ±0.25mm

RoHS

PIN CONNECTION	
Pin	Function
1	+Vin
2	ON/OFF
3	-Vin
4	-Vout
5	-Sense
6	Trim
7	+Sense
8	+Vout

CUI INC
20050 SW 112th Ave.
Tualatin, OR 97062
Phone: 503-612-2300
800-275-4899
Fax: 503-612-2383
Website: www.cui.com

TITLE: DC-DC CONVERTER	REV: A
PART NO. VQB100W	UNITS: MM [INCHES]
DRAWN BY: JMS	APPROVED BY:
	SCALE: 1:1

PC FILE NAME: VQB100W