

Typical unit

The QBC-12/22-L48 DC/DC converter is one of DATEL's new generation, fully isolated, Intermediate Bus Converters, designed and optimized for total on-board solutions in combination with our non-isolated point of load converters of the HEN, LEN, LQN, LSM and LSN series.

FEATURES

- 264 Watts total output power
- 96% Ultra-high efficiency @ full load
- 48V Input (40.5 to 57V range)
- 12V/22A Output for Intermediate Bus Architectures with POL converters
- Input Over/Under Voltage Shutdown
- Synchronous-rectifier topology
- 150kHz fixed switching frequency
- Output current sharing
- Fully isolated, 2250V (BASIC)
- Low 80mVp-p ripple/noise
- Standard quarter-brick package
- Stable no-load condition
- Thermal shutdown
- Fully I/O protected
- IEC/EN/UL/cUL60950-1 certified

PRODUCT OVERVIEW

The QBC's convert the standard 48V (40.5 to 57V limited range) to a nonregulated 12V (9.6 to 13.5V range) bus voltage with a total output power of 264

Watts. Taking full advantage of a synchronous-rectifier topology, the QBC-series achieve ultra-high efficiency of 96%, minimizing power losses and enabling full-power operation to ambient temperatures up to +70°C with minimal air flow. These high-density, open-frame DC/DC converters are standard quarter-brick packages with industry-standard footprint and are only 0.42 inches (10.67mm) high, or 0.54 inches (13.72mm) with optional heat sink.

Assembled using fully automated, SMT-on-pcb techniques, QBC's provide fixed frequency conversion, output On/Off control with choice of positive (standard) or negative (optional) logic, stable no-

load operation, current sharing capability, and low output ripple/noise (80mVp-p).

The fully functional QBC bus converters feature full I/O fault protection including input overvoltage and undervoltage shutdown, output overvoltage, output current limiting, with choice of "hiccup" (standard) or "latching" (optional), short-circuit protection, and thermal shutdown.

All models are IEC/EN/UL60950-1 certified and EMC compliant. Safety, CB, HALT and EMC reports are available upon request.

Refer to the DATEL application note, Bus Converters Aim to Boost Efficiency In IBA-Based Power Designs.

ORDERING GUIDE SUMMARY ①

Model	Output						Input			Efficiency		Package/Pinout	
	V _{OUT}	I _{OUT} ⑤	R/N (mV p-p) ②		Regulation ③			V _{IN}		I _{IN} ④	Min.		Typ.
			Typ.	Max.	Line	Load	Temp.	Nom.	Range				
QBC-12/22-L48-C	12	22	80	120	±10%	±5%	±2%	48	40.5-57	125/5.7	94.5%	96%	C49, C50/P65

① Typical at TA = +25°C under nominal line voltage and nominal-load conditions, unless noted.

② Ripple/Noise (R/N) is tested/specified over a 20MHz bandwidth. All models are specified with an external 0.1µF multi-layer ceramic capacitor installed across their output pins.

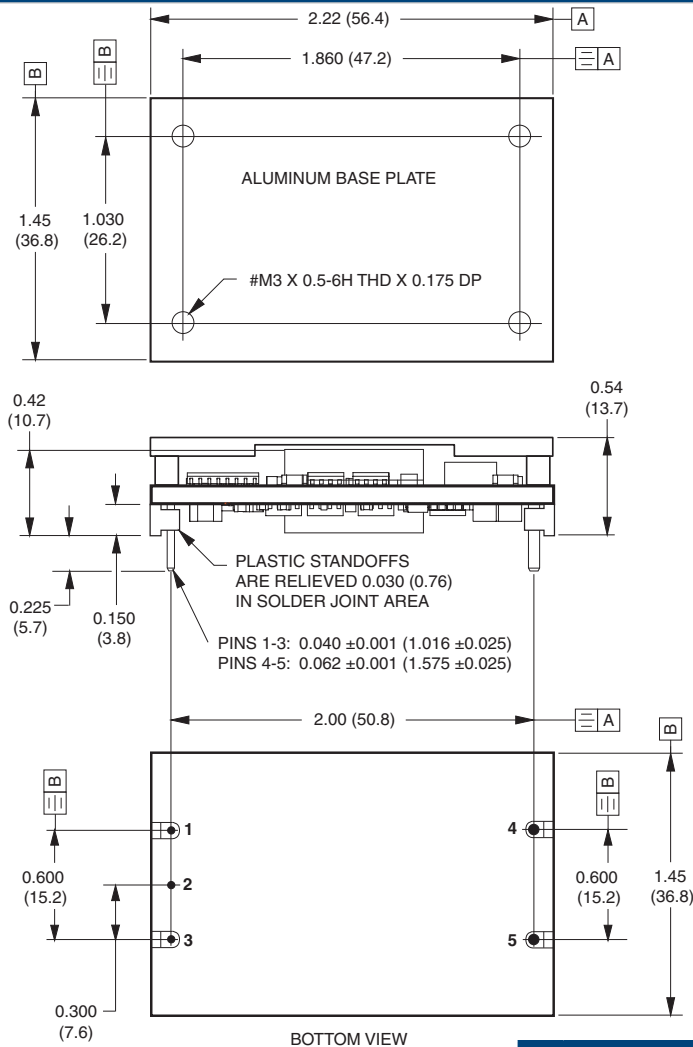
③ Devices have no minimum-load requirements and will regulate under no-load conditions. Regulation specifications describe the output-voltage deviation as the line voltage or load is varied from its midpoint value to either extreme.

④ Nominal line voltage, no-load/full-load conditions.

⑤ I_{OUT} max. at low line is 24 Amps; 20 Amps at high line. (See Performance Curves.)

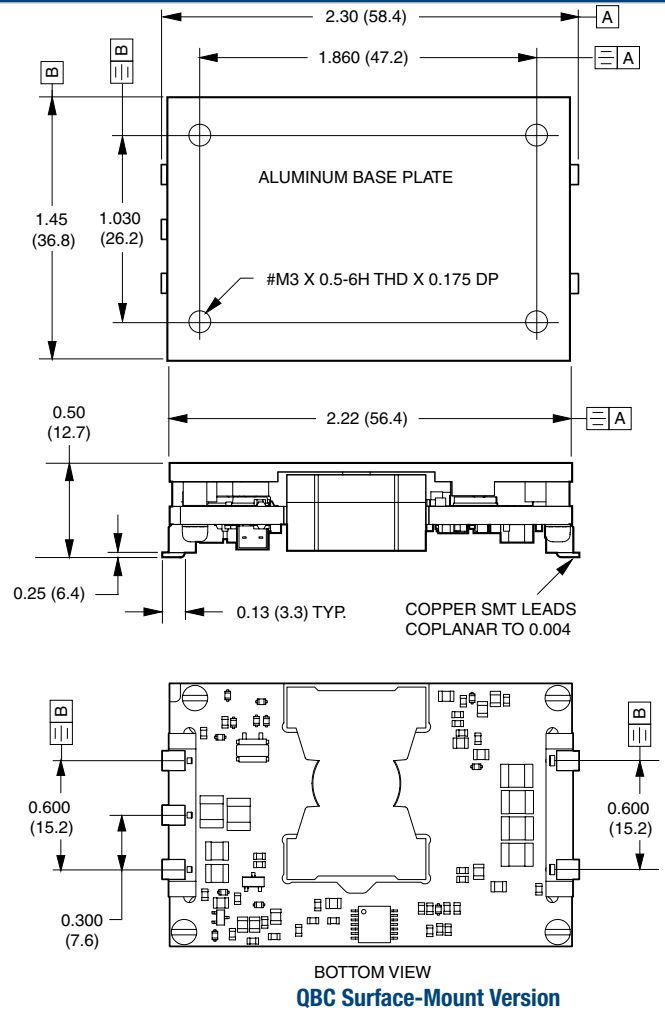


MECHANICAL SPECIFICATIONS



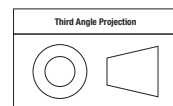
BOTTOM VIEW
DIMENSIONS ARE IN INCHES (MM)
QBC Through-Hole Version

INPUT/OUTPUT CONNECTIONS	
Pin	Function P65
1	-Input
2	Remote On/Off
3	+Input
4	-Output
5	+Output



BOTTOM VIEW
QBC Surface-Mount Version

Dimensions are in inches (mm shown for ref. only).

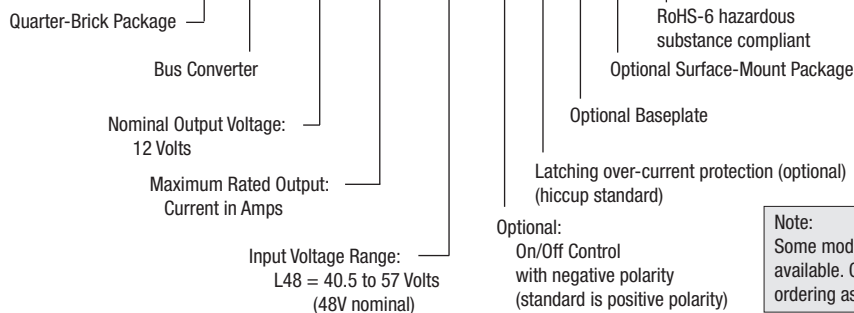


Tolerances (unless otherwise specified):
.XX ± 0.02 (0.5)
.XXX ± 0.010 (0.25)
Angles ± 2°

Components are shown for reference only.

PART NUMBER STRUCTURE

Q BC - 12 / 22 - L48 N L B M - C



Note:
Some model number combinations may not be available. Contact Murata Power Solutions for ordering assistance.

Performance/Functional Specifications

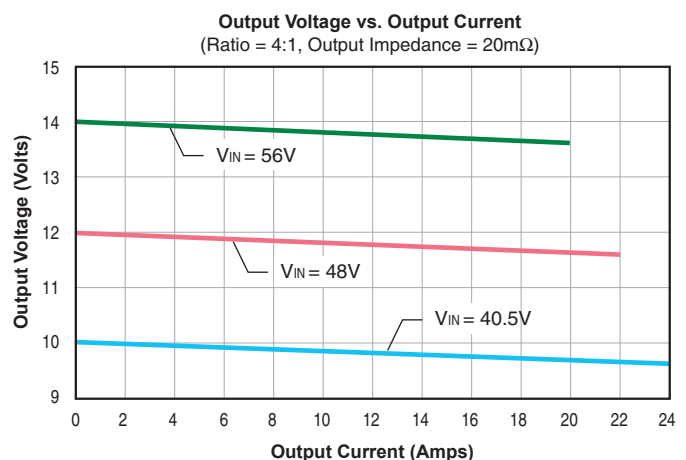
Typical @ TA = +25°C under nominal line voltage and full-load conditions unless noted. ①

Input	
Input Voltage Range	40.5-57 Volts (48V nominal)
Overvoltage Shutdown	57.5-59.5 Volts (58V typical)
Start-Up Threshold ②	37-40 Volts (39.5V typical)
Undervoltage Shutdown ②	36-39.5 Volts (38.5V typical)
Input Current	See Performance Spec
Input Reflected Ripple Current ③	10mVp-p
Internal Filter Type	Pi
Reverse Polarity Protection	None (see Absolute Max. Ratings)
On/Off Control ④	
Positive Logic	On= open (internal pull-up) Off= 0 to 0.8V (0.8mA max.)
Negative Logic ("N" Suffix)	On = pulled low to 0-0.8V (0.8mA max.) Off = open (internal pull-up)
Output	
V _{OUT} Range: (over line, load and temperature)	9.6 to 13.5V
Minimum Loading Per Spec	No load
Ripple/Noise (20MHz BW)	See Performance Spec
Line/Load Regulation	See Performance Spec
Efficiency	See Performance Spec
Isolation Voltage: Input/Output	2250Vdc min. (BASIC)
Isolation Resistance	10MΩ
Isolation Capacitance	470pF
Current Limit Inception ⑤	25-28 Amps @ 98% V _{OUT}
Short Circuit Current	TBD
Overvoltage Protection	13.85V
Capacitive Loading (Resistive Load)	10000uF
Temperature Coefficient	±0.02% /°C
Dynamic Characteristics	
Dynamic Load Response (50-75% load step to within 1.5% of V _{OUT}) ⑤	100μsec
Start up time: ⑥	
V _{IN} to V _{OUT}	30 msec
On/Off to V _{OUT}	30 msec
Switching Frequency, Fixed	150kHz (± TBD)
Environmental	
Calculated MTBF ⑦	TBC million hours
Operating PCB Temperature ⑧ without Derating	-40 to +100°C
Thermal Shutdown	+115 to +125°C
Storage Temperature	-55 to +125°C
Physical	
Dimensions	See Mechanical Dimensions
Pin Material underplate	Copper, solder coated over nickel
Weight	1.62 ounces (46 grams)
Primary to Secondary Insulation Level	Basic

- ① All models are tested and specified with no external output and no external input capacitors, and 300 lfm air flow, unless otherwise noted. All models will effectively regulate under no-load conditions (with perhaps a slight increase in output ripple/noise).
- ② See Technical Notes/Performance Curves for additional explanations and details.
- ③ Input Ripple Current is tested/specified over a 5-20MHz bandwidth with an external 33μF input capacitor and a simulated source impedance of 220μF and 12μH. See I/O Filtering, Input Ripple Current and Output Noise for details.
- ④ The On/Off Control is designed to be driven with open collector or by appropriate voltage levels
- ⑤ The Current-Limit-Inception point is the output current level at which the converter's power-limiting circuitry drops the output voltage 3% from its initial value. See Output Current Limiting and Short-Circuit Protection for more details.
- ⑥ For Start-Up-Time specifications, output settling time is defined as the output voltage having reached ±1% of its final value and the load current having reached at least 80% of its final value.
- ⑦ MTBF is calculated using TELCORDIA SR-332 Method 1 Case 3, ground fixed, +25°C ambient air and full-load conditions. Contact DATEL for demonstrated life test data.
- ⑧ All models are fully operational and meet all published specifications, including "cold start," at -40°C.

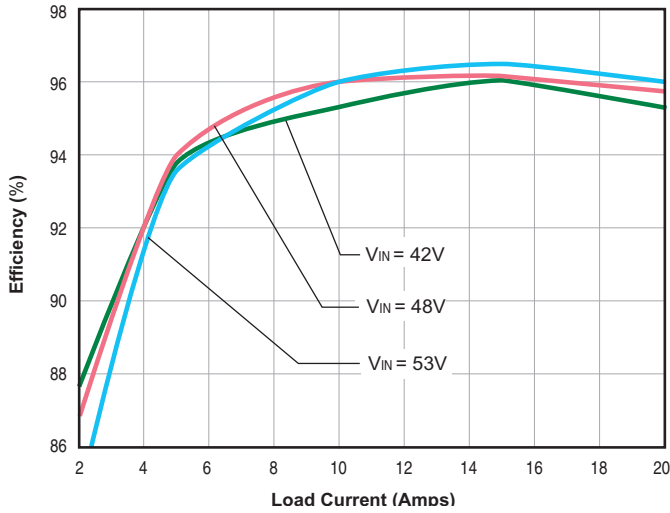
Absolute Maximum Ratings	
Input Voltage:	
Continuous or transient	60 Volts
Input Reverse-Polarity Protection	None (Input current must be <1.5A all the time)
Output Current	Current limited. Devices can withstand an indefinite output short circuit without damage.
Storage Temperature	-55 to +125°C
Lead Temperature (soldering, 10 sec.)	+300°C
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied.	

Typical Performance Curves

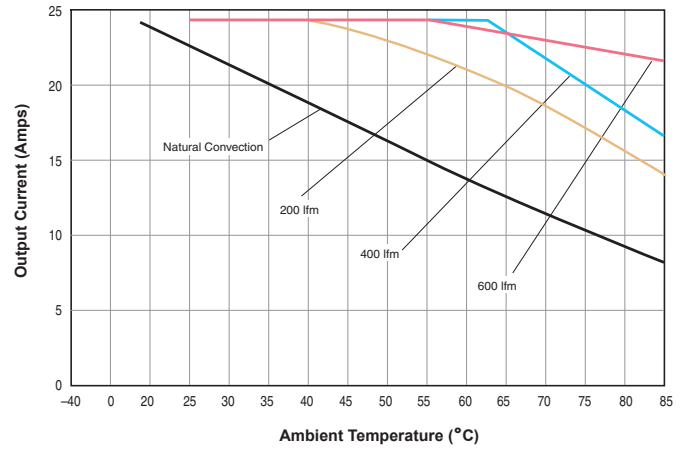


Typical Performance Curves

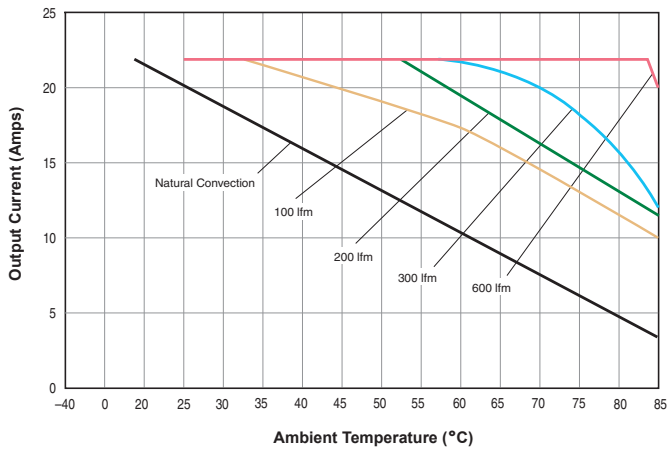
QBC-12/22-L48
Efficiency vs. Line Voltage and Load Current



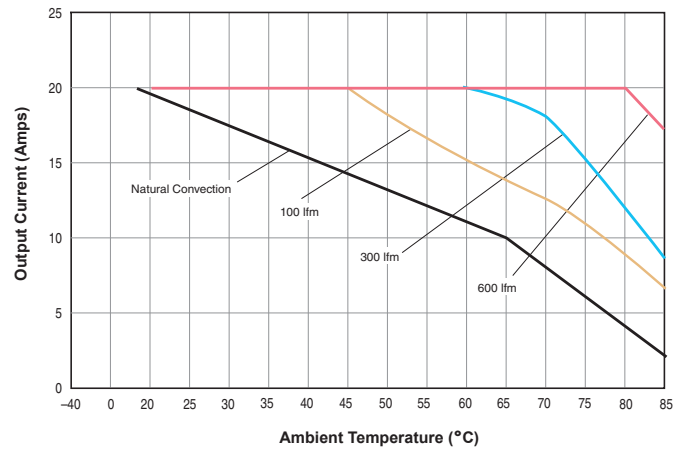
QBC-12/22-L48 Maximum Output Current vs. Ambient Temperature
VIN = 40.5V @ 24A max. (No baseplate, air flow direction from output pins to input pins.)



QBC-12/22-L48 Maximum Output Current vs. Ambient Temperature
VIN = 48V (No baseplate, air flow direction from output pins to input pins.)



QBC-12/22-L48 Maximum Output Current vs. Ambient Temperature
VIN = 57V @ 20A max. (No baseplate, air flow direction from output pins to input pins.)



Typical Performance Curves

