

# MBC600 Series AC-DC/DC-DC Open-Frame Medical Power Supplies



## Features

- 600 W standard, 420 W convection cooled
- Size: 5.0" x 8.0" x 1.6" (127.0 x 203.2 x 40.6 mm)
- High efficiency up to 94.0%
- Universal input voltage range: 90-277 VAC / 120-240 VDC
- Active power factor correction
- Less than 5 W dissipation at standby mode
- Parallel operation with active current sharing
- Digital control for circuit loop and power management
- Fully protected ( OTP, OCP, OVP, SCP )
- PMBus™ for control, programming and monitoring
- Designed to meet Class B per CISPR 22 and EN 55022
- Approved to the latest version of the following medical safety standards: IEC 60601-1, EN 60601-1, CAN/CSA C22.2 No. 60601-1, ANSI/AAMI ES60601-1, 2 x MOPP
- CE marked LVD

## Applications

- Diagnostic Equipment
- Drug Pump
- Dialysis
- Ultrasound
- Surgical Device
- Home Health Care
- Monitoring Devices
- Imaging Equipment
- Hospital Beds
- Therapy Devices

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# MBC600 Series

## 1 Ordering Information

| MODELS                        | OUTPUT VOLTAGE (VDC) | MAX LOAD CONVECTION | MAX LOAD 300 LFM | MINIMUM LOAD | RIPPLE & NOISE | TOTAL REGULATION |
|-------------------------------|----------------------|---------------------|------------------|--------------|----------------|------------------|
| MBC600-1012G                  | 12 V                 | 35.0 A              | 50.0 A           | 0 A          | 1%             | ± 2%             |
| MBC600-1024G                  | 24 V                 | 17.5 A              | 25.0 A           | 0 A          | 1%             | ± 2%             |
| MBC600-1048G                  | 48 V                 | 8.8 A               | 12.5 A           | 0 A          | 1%             | ± 2%             |
| V <sub>fan</sub> (all models) | 12 V                 | 1.0 A               | 1.0 A            | 0 A          | 1%             | ± 20%            |
| V <sub>sb</sub> (all models)  | 5 V                  | 1.0 A               | 1.0 A            | 0 A          | 2%             | ± 2%             |

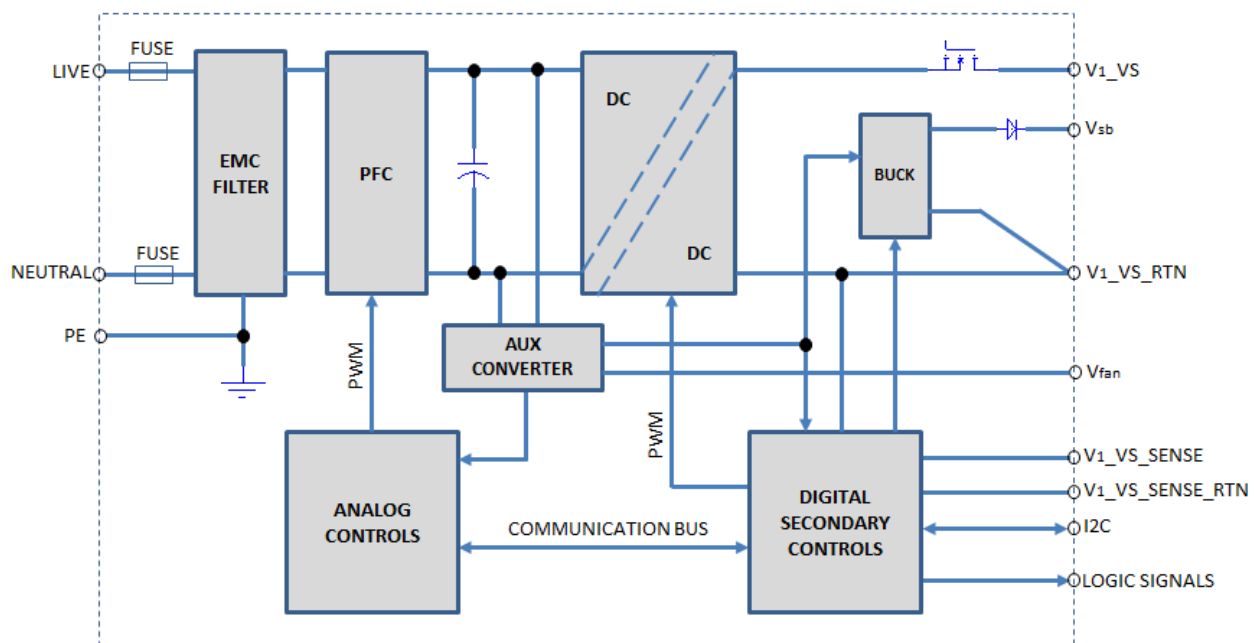
### NOTES:

1. Peak current rating on V1 (main output) is 120% of max, lasting 3 second with max of 10% duty cycle.
2. Combined output power of V1 plus fan supply and standby supply should not exceed max power rating.
3. +/-20% tolerance of V<sub>fan</sub> includes the factors of set point accuracy, line and load regulation.
4. Air flow over long edge (either direction) required for air flow rating. See mechanical drawing, Figure 7 on page 11.
5. More than 800K hours MTBF is to be calculated according to Bellcore TR-332 standard current edition at 25 °C.

## 2 Overview

The MBC600 SERIES AC-DC/DC-DC power supply can operate using AC or DC input. It is a highly efficient front-end power supply. The PFC stage adopts an analog controller in continuous conduction mode to achieve high power factor and high efficiency. The DC/DC stage is fully DSP controlled and employs soft switching resonant techniques in conjunction with synchronous rectification for high efficiency and better thermal control. With a wide input operational voltage range and minimal linear derating of output power with temperature, the MBC600 SERIES maximizes power availability in demanding server, network, and other high availability applications. The supply is convection cooled or fan cooled and ideally suited for integration with a matching airflow path. An active OR-ing MOSFET on the output ensures no reverse current and renders the supply ideally suited for operation in redundant power systems. The always-on standby output V<sub>sb</sub> (5 Volts) provides power to external power distribution and management controllers. It is protected with an active OR-ing diode for maximum reliability. In addition, the PMBus allows full monitoring of the supply, including input and output voltage, current, power, and internal temperatures. Current share signal (V1\_I<sub>share</sub>) is used for current sharing, and the difference between two units is within 2.5 A if system load is more than 25% of full load. The current share signal (V1\_I<sub>share</sub>) voltage shall be a linear function  $V_{cs} = 8 \times I_{out}/I_{max}$  for a single power supply. Example: for MBC600-1012G, VCS is 8 V at 50 A loading; I<sub>max</sub> is 50 A of MBC600-1012G.

Figure 1 - MBC600 SERIES Block Diagram



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## 3 Input

General Condition:  $T_{amb} = -25$  to  $70^{\circ}\text{C}$  unless otherwise noted.

| PARAMETER            |                           | DESCRIPTION / CONDITION                                                                                                       | MIN  | NOM     | MAX | UNIT |
|----------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------|------|---------|-----|------|
| V <sub>in</sub>      | Input Voltage Ranges      | Universal Input                                                                                                               | 90   | 100-250 | 277 | VAC  |
|                      |                           |                                                                                                                               | 120  |         | 240 | VDC  |
| I <sub>in max</sub>  | Max Input Current         | V <sub>in</sub> = 90 VAC / 60 Hz, Full load                                                                                   |      |         | 9   | Arms |
| I <sub>inrush</sub>  | Inrush Current Limitation | V <sub>i min</sub> to V <sub>i max</sub> ,                                                                                    |      |         | 20  | Apk  |
| F <sub>i</sub>       | Input Frequency           |                                                                                                                               | 47   | 50/60   | 63  | Hz   |
| PF                   | Power Factor              | V <sub>in nom</sub> , 50 Hz, > 50% full load.                                                                                 | 0.95 | 0.99    | 1   |      |
| η                    | Efficiency without Fan    | V <sub>in</sub> = 230 VAC, 20% of Full load, T <sub>amb</sub> = 25°C                                                          |      | 91.0    |     | %    |
|                      |                           | V <sub>in</sub> = 230 VAC, 50% of Full load, T <sub>amb</sub> = 25°C                                                          |      | 94.0    |     |      |
|                      |                           | V <sub>in</sub> = 230 VAC, 100% of Full load, T <sub>amb</sub> = 25°C                                                         |      | 93.0    |     |      |
| P <sub>min</sub>     | Min Power at no Load      | V <sub>in</sub> = 120 VAC, T <sub>amb</sub> = 25°C, if diable V1                                                              |      |         | 5   | W    |
| I <sub>leakage</sub> | Leakage Current           | V <sub>in</sub> = 277 VAC, T <sub>amb</sub> = 25°C, Input to Earth                                                            |      | 250     | 300 | uA   |
| T <sub>hold</sub>    | Hold-up Time              | V <sub>in</sub> = 230 VAC, Full load, V <sub>sb</sub> within regulation, stay within 90%*V <sub>1nom</sub> from AC zero point | 16   |         |     | mS   |

## 4 Output

General Condition:  $T_{amb} = -25$  to  $70^{\circ}\text{C}$  unless otherwise noted.

| PARAMETER                      |                                                                                                 | DESCRIPTION / CONDITION                                                                                                      | MIN  | NOM   | MAX  | UNIT                 |
|--------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------|-------|------|----------------------|
| Main Output V <sub>1</sub>     |                                                                                                 |                                                                                                                              |      |       |      |                      |
| V <sub>1</sub> set             | Output Set point Accuracy                                                                       | 0.5 · I <sub>1 nom</sub> , T <sub>amb</sub> = 25°C                                                                           | -0.5 |       | +0.5 | % V <sub>1 nom</sub> |
| V <sub>1</sub> nom             | Nominal Output Voltage                                                                          | Refer to ordering information table as above                                                                                 |      |       |      | VDC                  |
| V <sub>1</sub> total reg       | Total Regulation                                                                                | V <sub>in min</sub> to V <sub>in max</sub> , 0 to 100% I <sub>1 nom</sub> , T <sub>amb min</sub> to T <sub>amb max</sub>     | -2   |       | +2   | % V <sub>1 nom</sub> |
| V <sub>adj</sub>               | Voltage Adjustment                                                                              | V <sub>1</sub> output voltage could be adjusted with the potentiometer or I2C protocol                                       |      | +/-10 |      | % V <sub>1 nom</sub> |
| V <sub>1</sub> pp              | Output Ripple Voltage                                                                           | V <sub>1 nom</sub> , I <sub>1 nom</sub> , 20 MHz BW #1                                                                       |      |       | 1    | % V <sub>1 nom</sub> |
| V <sub>1</sub> Load reg        | Load Regulation                                                                                 | V <sub>i</sub> = V <sub>i nom</sub> , 0...100% I <sub>1 nom</sub>                                                            |      |       | 2    | % V <sub>1 nom</sub> |
| V <sub>1</sub> Line reg        | Line Regulation                                                                                 | V <sub>i</sub> =V <sub>i min</sub> ...V <sub>i max</sub>                                                                     |      |       | 1    | % V <sub>1 nom</sub> |
| I <sub>share</sub>             | Current Sharing<br>abs (I <sub>1</sub> -I <sub>2</sub> ), between any<br>two units in parallel) | when Bus load ≥ 25% of full load                                                                                             |      |       | 2.5  | A                    |
|                                |                                                                                                 | when Bus load <25% of full load #2                                                                                           |      |       | 3.5  | A                    |
| V <sub>1</sub> dyn             | Dynamic Load Regulation                                                                         | 50 to 100% of load change, 50 Hz, 50%<br>duty cycle, 1 A/us                                                                  | -5   |       | +5   | % V <sub>1 nom</sub> |
| T <sub>v1 rec</sub>            | Recovery Time                                                                                   |                                                                                                                              |      | 0.5   | 5    | mS                   |
| V <sub>1</sub> Overshoot       | V1 overshoot at turn-on                                                                         |                                                                                                                              |      |       | 1    | %                    |
| C <sub>v1 Load</sub>           | Capacitive Loading                                                                              | T <sub>amb</sub> = 25°C, C <sub>Load</sub> = 220 uF/A·I <sub>1nom</sub>                                                      |      |       |      | μF                   |
| Standby Output V <sub>sb</sub> |                                                                                                 |                                                                                                                              |      |       |      |                      |
| V <sub>sb</sub> nom            | Nominal Output Voltage                                                                          |                                                                                                                              |      | 5     |      | VDC                  |
| V <sub>sb</sub> total reg      | Total Regulation                                                                                | V <sub>sb min</sub> to V <sub>sb max</sub> , 0 to 100% I <sub>sb nom</sub> , T <sub>amb min</sub><br>to T <sub>amb max</sub> | -2   |       | +2   | % V <sub>sb</sub>    |
| P <sub>sb</sub> nom            | Nominal Output Power                                                                            | V <sub>sb</sub> = 5 VDC                                                                                                      |      | 5     |      | W                    |
| V <sub>sb</sub> pp             | Output Ripple Voltage                                                                           | V <sub>sb nom</sub> , I <sub>sb nom</sub> , 20 MHz BW                                                                        |      |       | 100  | mV                   |
| V <sub>sb</sub> Load reg       | Load Regulation                                                                                 | V <sub>sb</sub> = V <sub>sb nom</sub> , 0...100% I <sub>sb nom</sub>                                                         |      |       | 2    | % V <sub>sb</sub>    |
| V <sub>sb</sub> Line reg       | Line Regulation                                                                                 | V <sub>sb</sub> =V <sub>sb min</sub> ...V <sub>sb max</sub>                                                                  |      |       | 2    | % V <sub>sb</sub>    |
| I <sub>sb</sub> max            | Current Limitation                                                                              | Constant current limit then hiccup                                                                                           | 120  |       | 150  | % I <sub>sb</sub>    |
| V <sub>sb</sub> dyn            | Dynamic Load Regulation                                                                         | 50 to 100% of load change, 50 Hz, 50%<br>duty cycle, 1 A/us                                                                  | -5   |       | +5   | % V <sub>sb</sub>    |
| T <sub>sb</sub> rec            | Recovery Time                                                                                   |                                                                                                                              |      | 0.5   | 5    | mS                   |
| C <sub>sb</sub> Load           | Capacitive Loading                                                                              | T <sub>amb</sub> = 25°C                                                                                                      |      |       | 220  | μF                   |

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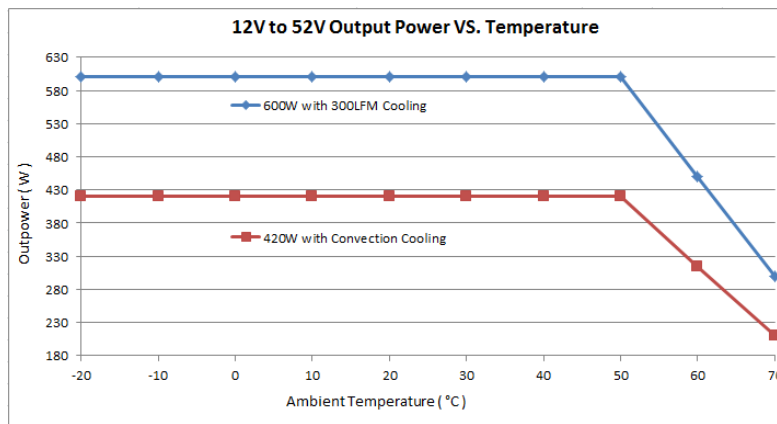
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| Fan Output $V_{fan}$  |                         |                                                                                               |     |                      |
|-----------------------|-------------------------|-----------------------------------------------------------------------------------------------|-----|----------------------|
| $V_{fan\ nom}$        | Nominal Output Voltage  |                                                                                               | 12  | VDC                  |
| $V_{fan\ total\ reg}$ | Total Regulation        | $V_{fan\ min}$ to $V_{fan\ max}$ , 0 to 100% $I_{fan\ nom}$ , $T_{amb}$ min to $T_{amb\ max}$ | -20 | +20 % $V_{fan\ nom}$ |
| $P_{fan\ nom}$        | Nominal Output Power    | $V_{fan} = 12\ VDC$ , Power derating linearly to 50% at 70°C, refer to figure 2               | 12  | W                    |
| $V_{fan\ pp}$         | Output Ripple Voltage   | $V_{fan\ nom}$ , $I_{fan\ nom}$ , 20 MHz BW                                                   |     | 2 % $V_{fan\ nom}$   |
| $I_{fan\ max}$        | Current Limitation      | $T_{amb} = 25^{\circ}C$                                                                       | 270 | % $I_{fan\ nom}$     |
| $V_{fan\ dyn}$        | Dynamic Load Regulation | 50 to 100% of load change, 50 Hz, 50% duty cycle, 1 A/us                                      | -5  | +5 % $V_{fan\ nom}$  |
| $T_{fan\ rec}$        | Recovery Time           |                                                                                               | 0.5 | 5 mS                 |
| $C_{fan\ Load}$       | Capacitive Loading      | $T_{amb} = 25^{\circ}C$                                                                       | 220 | $\mu F$              |

## NOTES:

1. The output noise and ripple measurement was made with 20 MHz bandwidth using a 6 inch twisted pair, terminated with a 10 uF tantalum capacitor in parallel with a 0.1 uF ceramic capacitor.
2. For MBC600-1048G, the current share abs ( $I_1$ - $I_2$ ) should be less than 3 A at light load (< 25% of full load)

Figure 2 - Output Power vs. Temperature



NOTE: Power derating linearly to 50% at 70°C for the output including main output  $V_1$ ,  $V_{fan}$ .

## 5 Protection

| PARAMETER      | DESCRIPTION / CONDITION        | MIN                                                                         | NOM | MAX           | UNIT            |
|----------------|--------------------------------|-----------------------------------------------------------------------------|-----|---------------|-----------------|
| F              | Input Fuses (L+N)              | Not user accessible, slow-acting (F)                                        | 10  |               | A               |
| $V_{in\ ov}$   | Input Over Voltage Limit       | 285VAC/245VDC                                                               | /   | 295VAC/255VDC | V               |
|                | Recovery                       | 280VAC/240VDC                                                               | /   | 290VAC/250VDC | V               |
| $V_{in\ uv}$   | Input Under Voltage Limit      | 75VAC/105VDC                                                                | /   | 85VAC/115VDC  | V               |
|                | Recovery                       | 80VAC/110VDC                                                                | /   | 90VAC/120VDC  | V               |
| $V_1\ ov$      | OV Threshold $V_1$             | $V_1$ will be latched until reset by AC input or INHIBIT signal.            | 110 | 132           | % $V_1\ nom$    |
| $V_{sb\ ov}$   | OV Threshold $V_{sb}$          | $V_{sb}$ will be latched until reset by AC input or INHIBIT signal.         | 110 | 120           | % $V_{sb\ nom}$ |
| $I_1\ lim$     | Current Limit $V_1$            | Over current limit meet below curve, Figure 3                               |     |               |                 |
| $I_{sb\ lim}$  | Current Limit $V_{sb}$         | Standby output will be entered into CC mode if output current is above 1.2A | 1.2 | 2             | A               |
| $I_{fan\ lim}$ | Current Limit $V_{fan}$        | $T_{amb} = 25^{\circ}C$                                                     | 2.7 |               | A               |
| $T_{SD}$       | Over Temperature On Heat Sinks | No damage, Automatic shut-down and recovers.                                |     |               |                 |

The Output is protected against an overload or a Short Circuit for indefinite duration. The unit shall meet this requirement when in general operating conditions. Over current limit should meet below curve within +/-1.5 A tolerance, and the unit is allowed to hiccup under over current conditions.

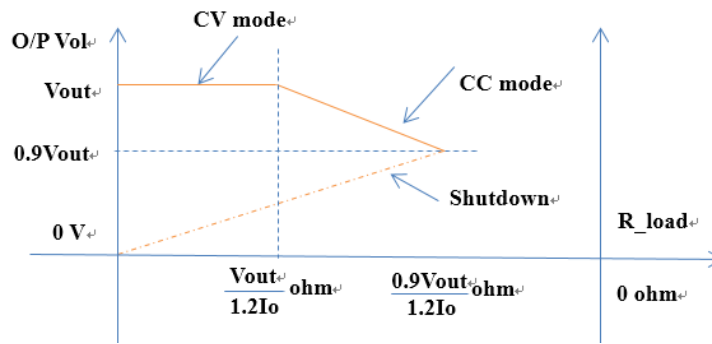
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Figure 3 - Over Current Mode



## 6 Graphical User Interface

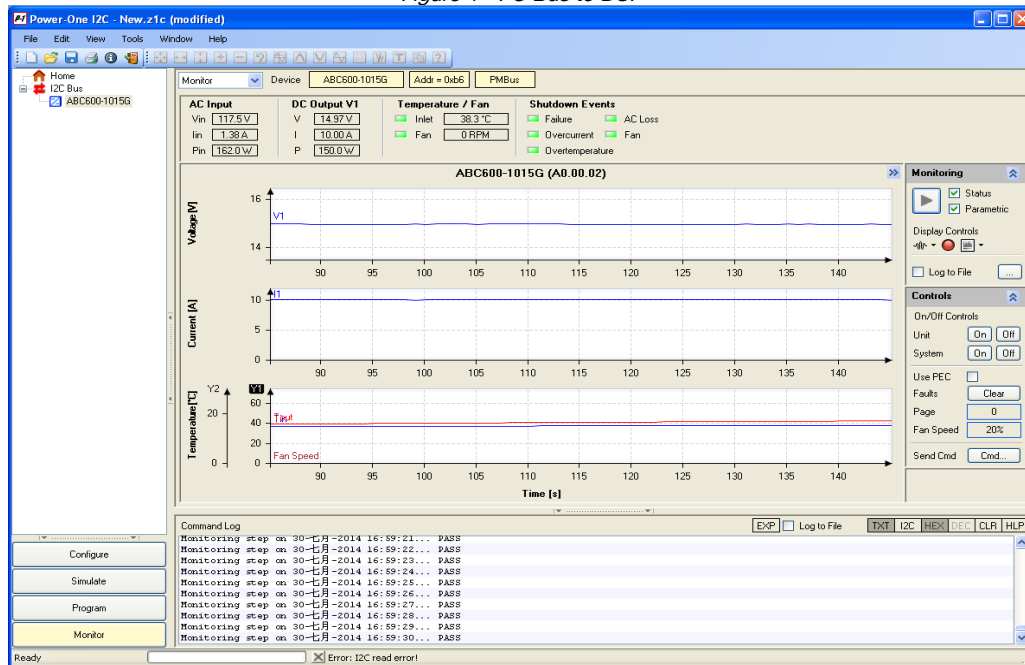
Bel Power Solutions provides with its “Bel Power Solutions I<sup>2</sup>C Utility” a Windows® XP/Vista/Win7 compatible graphical user interface allowing the programming and monitoring of the MBC600 Series Front-End. The utility can be downloaded on [www.belpowersolutions.com](http://www.belpowersolutions.com) and supports both the PSMI and PMBus™ protocols.

The GUI allows automatic discovery of the units connected to the communication bus and will show them in the navigation tree. In the monitoring view the power supply can be controlled and monitored.

Reference Documents:

- BCA.00029\_AA\_ABC600 Series PMBus Communication Manual.pdf
- PMBus Specification Part I Revision 1.1
- PMBus Specification Part II Revision 1.1
- System Management Bus (SMBus) Specification Revision 2.0

Figure 4 - I<sup>2</sup>C Bus to DSP



The sensor commands shall meet the following accuracy requirements.

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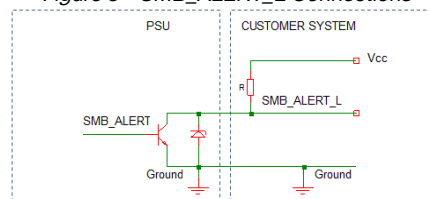
| COMMAND   | 10%-20% OF MAX LOAD | 20%-100% OF MAX LOAD | REMARK                                        |
|-----------|---------------------|----------------------|-----------------------------------------------|
| READ_IIN  | < 0.5A              | +/-20%               | It is for corresponding to max input current  |
| READ_IOUT | +/-5%               | +/-2.5 A             | It is for corresponding to max output current |
| READ_VIN  | +/-3%               | +/-2.5 V             | It is for corresponding to max input voltage  |
| READ_VOUT | +/-2%               | +/-2%                |                                               |
| READ_PIN  | - - -               | +/-20%               | It is for corresponding to max input power    |
| READ_POUT | +/-5 %              | +/-5%                | It is for corresponding to max output power   |

## 7 Timing Diagram and Signals

Unless defined otherwise, all control signals shall be TTL compatible with respect to the output return and shall be isolated from the primary circuit and be SELV rated. All input signals shall be driven from an open collector with the pull-up resistor located in the power supply and shall be capable of sourcing up to 4 mA. Unless otherwise specified, signal levels for parameters listed in the table below are general LVTTTL signals.

| PARAMETER                                              | DESCRIPTION/CONDITION                                                                                                                                                                                                  |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A0, A1                                                 | PMBus selected address Pin.                                                                                                                                                                                            |
| SDA, SCL                                               | SDA is serial data signal and SCL is serial clock signal (I <sup>2</sup> C).                                                                                                                                           |
| SMB_ALERT_L                                            | Output alert signal. It shall be an open collector with the pull-up resistor located at the receiving end. This signal will be asserted due to fault or warning events. High = Normal, Low = Alert, Refer to Figure 5. |
| V <sub>I</sub> _I <sub>share</sub>                     | Current share signal. The PSU can operate at redundant mode by connecting V <sub>I</sub> _I <sub>share</sub> signal of each power supply together.                                                                     |
| V <sub>I</sub> _VS_SENSE, V <sub>I</sub> _VS_SENSE_RTN | Remote Sense signal for V <sub>I</sub> , V <sub>I</sub> _VS_SENSE is positive sense, V <sub>I</sub> _VS_SENSE_RTN is negative sense.                                                                                   |
| V <sub>sb</sub> , SGND                                 | V <sub>sb</sub> is standby output, and SGND is secondary ground.                                                                                                                                                       |
| +VP                                                    | Source voltage located at receiving end. Provide a voltage for power good signal. Refer to Figure 6.                                                                                                                   |
| PW_OK_H                                                | Output power good signal. It is isolated from the output. Goes high/low when output is within regulation. Refer to Figure 6 (two methods for Power Good connection).                                                   |
| INHIBIT_L, INHIBIT_L_RTN                               | Power up signal. It is isolated from the output. Apply a DC voltage between INHIBIT_L and INHIBIT_L_RTN can power up the unit. Refer to Figure 6.                                                                      |
| V <sub>fan</sub> , SGND                                | V <sub>fan</sub> is fan output to provide energy for user, and SGND is secondary ground.                                                                                                                               |

Figure 5 - SMB\_ALERT\_L Connections



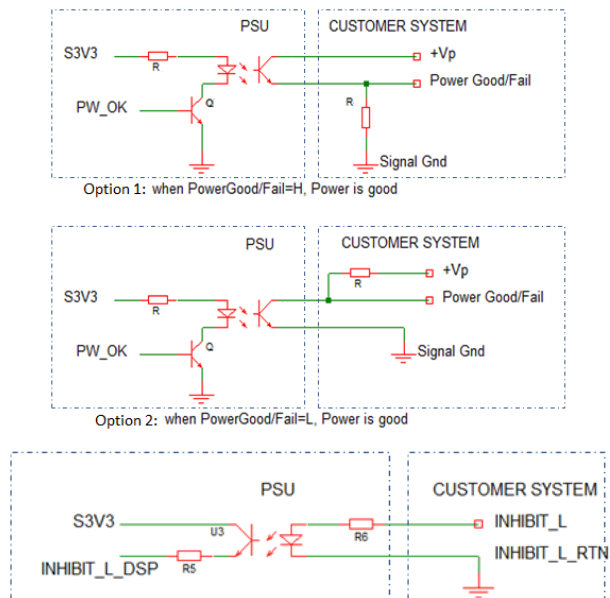
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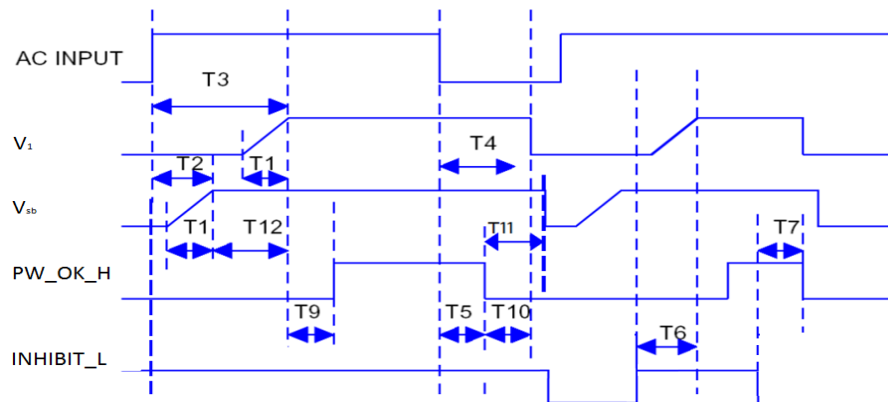
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Figure 6 - Isolated Signal Output Connections



Low-Voltage TTL (LVTTTL) Voltage Levels

| PARAMETER                                             | SYMBOL     | MIN | MAX | UNIT |
|-------------------------------------------------------|------------|-----|-----|------|
| Output High Voltage                                   | $V_{oh}$   | 2.4 | 3.6 | V    |
| Output Low Voltage                                    | $V_{ol}$   | 0   | 0.4 | V    |
| Input High Voltage                                    | $V_{ih}$   | 2.0 | 3.6 | V    |
| Input Low Voltage                                     | $V_{il}$   | 0   | 0.8 | V    |
| Sink current(PW_OK_H)                                 | $I_{sink}$ |     | 4   | mA   |
| Operate voltage (between INHIBIT_L and INHIBIT_L_RTN) | $V_{ope}$  | 2.0 | 10  | V    |
| Max operate current (SMB_ALERT_L)                     | $I_{ope}$  |     | 30  | mA   |





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| PARAMETER                                   | CONDITION/COMMENTS                                                                          | MIN | NOM | MAX  | UNIT |
|---------------------------------------------|---------------------------------------------------------------------------------------------|-----|-----|------|------|
| T1 (T <sub>V<sub>out</sub>_rise</sub> )     | Output voltage rise time from each output                                                   | 0.5 |     | 100  | mS   |
| T2 (TVAC <sub>on_V<sub>sb</sub>on</sub> )   | Delay from AC being applied to V <sub>sb</sub> being within regulation                      |     |     | 2500 | mS   |
| T3 (TVAC <sub>on_V<sub>1on</sub></sub> )    | Delay from AC being applied to V1 being within regulation                                   |     |     | 3000 | mS   |
| T4 (T <sub>V<sub>1</sub>_holdup</sub> )     | Time V1 stay within 90% normal output after loss of AC                                      | 16  |     |      | mS   |
| T5 (T <sub>pwok_holdup</sub> )              | Delay from loss of AC to de-assertion of PW_OK_H                                            | 10  |     |      | mS   |
| T6 (T <sub>inhibitH_V<sub>1on</sub></sub> ) | Delay INHIBIT_L active to V1 output voltages within regulation                              |     |     | 1000 | mS   |
| T7 (T <sub>inhibitL_pwok</sub> )            | Delay from INHIBIT_L de-active to PW_OK_H being de-asserted                                 |     |     | 50   | mS   |
| T9 (T <sub>V<sub>1on</sub>_pwok</sub> )     | Delay from V1 within regulation to PW_OK_H asserted at turn on                              | 100 |     | 1000 | mS   |
| T10 (T <sub>pwok_off_V1</sub> )             | Delay from PW_OK_H de-asserted to V1 dropping out of regulation at 60% loading of full load | 1   |     |      | mS   |
| T11 (T <sub>pwok_off_V<sub>sb</sub></sub> ) | Delay from PW_OK_H de-asserted to V <sub>sb</sub> dropping out of regulation                | 20  |     |      | mS   |
| T12 (T <sub>V<sub>sb</sub>_V1</sub> )       | Delay from V <sub>sb</sub> being in regulation to V1 being in regulation at AC turn on      | 50  |     | 1000 | mS   |

## 8 Environmental

| PARAMETER                      | DESCRIPTION/CONDITION                                                                                                                      | CRITERION                  |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Operating Temperature          | See derating charts above Figure 2, T <sub>amb min</sub> = - 25°C, T <sub>amb max</sub> = 70°C                                             | - 25 to 70°C               |
| Storage Temperature            |                                                                                                                                            | - 40 to 85°C               |
| Relative Humidity              | Operating humidity:<br>Non-operating humidity, non-condensing                                                                              | 5%-90%<br>5%-95%           |
| Altitude                       | Operating:<br>Non-operating:                                                                                                               | 10,000 ft.<br>40,000 ft.   |
| CE Mark                        | Complies with LVD Directive                                                                                                                |                            |
| Conducted Emissions:           | EN55022-B, CISPR22-B, FCC PART15-B                                                                                                         | Criterion B                |
| Static Discharge               | EN61000-4-2, Level-3                                                                                                                       | Criterion A                |
| RF Field Susceptibility        | EN61000-4-3, Level-3                                                                                                                       | Criterion A                |
| Fast Transients/Bursts         | EN61000-4-4, Level-3                                                                                                                       | Criterion B                |
| Radiated Emissions             | EN55022-B, CISPR22-B, FCC PART15-B                                                                                                         | Criterion B                |
| Surge Susceptibility           | EN61000-4-5, Level-3                                                                                                                       | Criterion B                |
| RF Immunity                    | EN61000-4-6, Level-3                                                                                                                       | Criterion A                |
| Magnetic Fields                | EN61000-4-8, Level-4                                                                                                                       | Criterion A                |
| Voltage Interruptions          | EN61000-4-11                                                                                                                               | Criterion B                |
| Harmonic Current               | EN61000-3-2, Level A                                                                                                                       | Criterion A                |
| Voltage Fluctuations / Flicker | EN61000-3-3                                                                                                                                |                            |
| Vibration                      | Operating: Random vibration; 5 to 500 Hz (10 minutes, each axis).<br>Non-Operating: Random vibration; 5 to 500 Hz (10 minutes, each axis). | Max. 2.4Grms<br>Max. 6Grms |
| Shock                          | Operating: half-sine, 11 ± 3 mS, 3-axis.<br>Non-Operating: half-sine, 11 ± 3 mS, 3-axis.                                                   | Max. 15G<br>Max. 40G       |



# MBC600 Series

## 9 Safety/Approvals

Maximum electric strength testing is performed according to IEC/EN 60601, ES/CSA60601-1. Input-to-output electric strength tests should not be repeated in the field. Bel Power Solutions will not honor any warranty claims resulting from electric strength field tests.

| PARAMETER                | DESCRIPTION / CONDITION                                                                      | CRITERION                                            |
|--------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------|
| Agency Approvals         | IEC 60601-1,<br>EN 60601-1,<br>CAN/CSA C22.2 No. 60601-1,<br>ANSI/AAMI ES60601-1<br>2 X MOPP | Approved by independent body<br>(see CE Declaration) |
| Isolation Strength       | Input (L/N) to case (PE)<br>Input (L/N) to output<br>Output to case (PE)                     | Basic<br>Reinforced<br>Functional                    |
| Creepage / Clearance     | Primary (L/N) to protective earth (PE)<br>Primary to secondary                               | Min 4.0/2.5 mm<br>Min 8/5 mm                         |
| Electrical Strength Test | Input to case<br>Input to output<br>Output and Signals to case                               | 1781/2519 VAC/VDC<br>4607/6516 VAC/VDC<br>500 VDC    |

## 10 Mechanical

| PARAMETER                         | CONDITIONS/DESCRIPTION                                                                                                                                                                                                                      |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions (L x W x H)            | 203.2 x 127 x 40.64 mm                                                                                                                                                                                                                      |
| Mounting                          | (Location/Hardware); Dimensions Drawing Figure 7                                                                                                                                                                                            |
| Input                             | Connector type: Molex 26-62-4056 or equivalent; (J101); Figure 7                                                                                                                                                                            |
| Output                            | Connector type: M4 screw terminal; (J106/107); Figure 7                                                                                                                                                                                     |
| Signal                            | Connector type: AMTEK 2211MS-208GW-U; (J102); Figure 7                                                                                                                                                                                      |
| Outline Drawing<br>Pins/Functions | See Mechanical Drawing/ Figure 7                                                                                                                                                                                                            |
| Weight                            | 0.9 kg                                                                                                                                                                                                                                      |
| Mounting distance                 | Distance from top of the components (component side) to the customer's metal chassis – Natural cooling: 101.6 mm<br>Distance from top of the components (component side) to the customer's metal chassis – Force cooling: 5 mm <sup>1</sup> |

<sup>1</sup> 5 mm is not required if there is insulator between PSU and customer chassis.

| CONNECTOR                    | PIN DESCRIPTION                                                                                                                                                                                                                                                                                            | HOUSING                        | CRIMP TERMINAL                   | WIRE GAUGE |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|------------|
| J101                         | J101-1 = Live<br>J101-2 = Live<br>J101-3 = not fitted<br>J101-4 = Neutral<br>J101-5 = Neutral                                                                                                                                                                                                              | Molex 09-50-3051 or equivalent | Molex 08-50-0105 or equivalent   | AWG#18~16  |
| J102                         | J102-1: A0<br>J102-2: A1<br>J102-3: SDA<br>J102-4: SCL<br>J102-5: SMB_ALERT_L<br>J102-6: V1_Ishare<br>J102-7: V1_VS_SENSE<br>J102-8: V1_VS_SENSE_RTN<br>J102-9: SGND<br>J102-10: Vsb<br>J102-11: +VP<br>J102-12: PW_OK_H<br>J102-13: INHIBIT_L<br>J102-14: INHIBIT_L_RTN<br>J102-15: Vfan<br>J102-16: SGND | JST PHDR-16VS or equivalent    | JST SPHD-001T-P0.5 or equivalent | AWG#22~26  |
| J103                         | J103: EARTH                                                                                                                                                                                                                                                                                                | NA                             | Molex 19002-0024 or equivalent   | AWG#16     |
| Output terminal<br>J106/J107 | J107 = V1_VS_RTN<br>J106 = V1_VS                                                                                                                                                                                                                                                                           | NA                             | Molex 0190670067 or equivalent   | AWG#6      |

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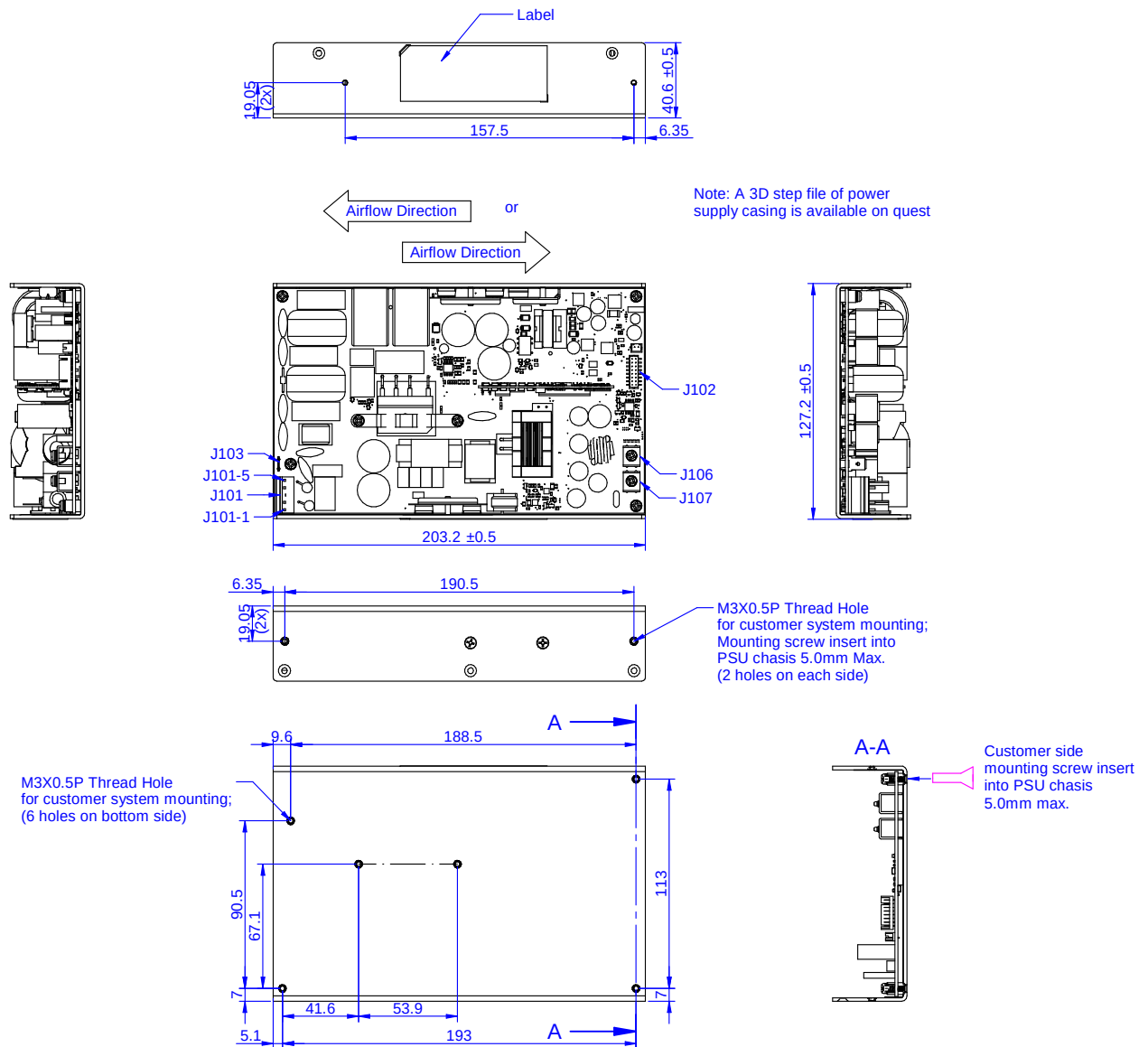
[belpowersolutions.com](http://belpowersolutions.com)

# MBC600 Series

## 11 Accessories

| ITEM                                                                              | DESCRIPTION                                                                                                                           | ORDERING PART NUMBER | SOURCE                                                                   |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------|
|  | <b>I²C Utility</b><br>Windows XP/Vista/7 compatible<br>GUI to program, control and<br>monitor PET Front-Ends (and<br>other I²C units) | N/A                  | <a href="http://www.belpowersolutions.com">www.belpowersolutions.com</a> |

Figure 7 - Dimensions Drawing



For more information on these products consult: [tech.support@psbel.com](mailto:tech.support@psbel.com)

**NUCLEAR AND MEDICAL APPLICATIONS** - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

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