

FUNCTIONAL SPECIFICATIONS

| ABSOLUTE MAXIMUM RATINGS | Conditions (1) | Minimum | Typical/Nominal | Maximum | Units |
|---------------------------|--|---------|-----------------|---------|-------|
| Input Voltage, Continuous | Full power operation | 0 | | 15 | Vdc |
| Output Power | | 0 | | 110 | W |
| Output Current | Current-limited, no damage, short-circuit protected | 0 | | 20 | A |
| On/Off Control | | | | 14 | Vdc |
| Power Good Pin | | | | 6 | Vdc |
| Synchronized Pin | | | | 12 | Vdc |
| Sequence Pin | | | | Vin max | Vdc |
| Storage Temperature Range | Vin = Zero (no power) | -55 | | 125 | °C |

Absolute maximums are stress ratings. Exposure of devices to greater than 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 or recommended.

| INPUT | | | | | |
|-------------------------------------|---|-----|--------|-------|----------------------|
| Operating voltage range (7) | See output voltage vs input voltage | 4.5 | 12 | 14 | Vdc |
| Recommended External Fuse | Fast blow | | | 36 | A |
| Turn On/Start-up threshold | Rising input voltage | 3.9 | 4.2 | 4.5 | Vdc |
| Undervoltage Shutdown | | 3.7 | 4 | 4.3 | |
| Internal Filter Type | | | C-TYPE | | |
| Input current | | | | | |
| Full Load Conditions | Vin = nominal (5Vo set) | | 8.87 | 9.29 | A |
| Low Line | Vin @ min, 5Vout | | 15.12 | 15.85 | A |
| Inrush Transient | | | TBD | | A ² -Sec. |
| Short Circuit Input Current | | | TBD | | mA |
| No Load Input Current | 5Vout, Iout @ 0 | | 75 | 150 | mA |
| No Load Input Current | 1V, Iout @ 0 | | 35 | 70 | |
| Shut-Down Mode Input Current | | | 1 | | mA |
| Reflected (back) ripple current (2) | Measured at input with specified filter | | TBD | | mA, pk-pk |

GENERAL and SAFETY

| | | | | | |
|---------------------------------------|---|------|-----------|--|-------|
| EFFICIENCY (12Vin @ 12A load current) | @ Vin nom, 5Vout | 91 | 94 | | % |
| | @ Vin min=8Vin, 5Vout | 91.5 | 94.5 | | |
| | @ Vin nom, 3.3Vout | 89 | 92 | | |
| | @ Vin nom, 2.5Vout | | 90 | | |
| | @ Vin nom, 1.8Vout | 83.5 | 88 | | |
| Safety | Certified to UL-60950-1, CSA-C22.2 No.60950-1, IEC/60950-1, 2nd edition (pending) | | Yes | | |
| Calculated MTBF (4a) | Per Telcordia SR332, issue 1 class 3, ground fixed, Tambient=+25°C | | 8,068,510 | | Hours |
| Calculated MTBF (4b) | Per Mil-HDBK-217N2 Method | | 4,514,048 | | Hours |

DYNAMIC CHARACTERISTICS

| | | | | | |
|---------------------------------|---|-----|------|-----|------|
| Fixed Switching Frequency | | | 400 | | KHz |
| Synchronization frequency range | | 420 | | 600 | KHz |
| High level input voltage | | 3 | | 12 | Vdc |
| Low level input voltage | | 0 | | 0.8 | Vdc |
| Input current SYNC pin | VSYNC = 3.0V | | | 1 | mA |
| Minimum pulse width, SYNC | | 250 | | | nS |
| Minimum pulse set-up/hold time | SYNC pin (note 15) | 250 | | | nS |
| Startup Time | Power On to Vout regulated | | | 6 | mS |
| Startup Time | Remote ON to Vout regulated | | | 6 | mS |
| Dynamic Load Response | 50-100-50% load step, settling time to within ±2% of Vout di/dt = 1 A/μSec | | 100 | | μSec |
| Dynamic Load Peak Deviation | same as above | | ±200 | | mV |

FEATURES and OPTIONS

| | | | | | |
|---------------------------|----------------------|-----------|--|----------|----|
| Remote On/Off Control (5) | | | | | |
| "N" suffix | | | | | |
| Negative Logic, ON state | Pin open=ON | 0 | | 0.7 | V |
| Negative Logic, OFF state | | 2 | | +Vin-max | V |
| Control Current | open collector/drain | | | 3 | mA |
| "P" suffix | | | | | |
| Positive Logic, ON state | Pin open=ON | +Vin-0.8V | | Vin-max | V |
| Positive Logic, OFF state | | 0 | | 2.5 | V |
| Control Current | open collector/drain | | | 3 | mA |
| Remote Sense | | | | 500 | mV |

FUNCTIONAL SPECIFICATIONS (CONT.)

| FEATURES and OPTIONS, CONT. | Conditions (1) | Minimum | Typical/Nominal | Maximum | Units |
|--|---|---------|----------------------|-----------|--------------------------|
| Tracking/Sequencing(optional) | | | | | |
| Slew Rate | | | | TBD | V/mS |
| Tracking Accuracy | Rising input (0.5V/ms) | | TBD | | mV |
| Tracking Accuracy | Falling input(0.5V/ms) | | TBD | | mV |
| Power Good Option | | | | | |
| PGOOD, Open Drain Configuration, Sinking: | | | | | |
| Vout window for PGOOD: True | | -10% | | 10% | Vset |
| Vout window for PGOOD: False | | | 0.05 | | Vdc |
| OUTPUT | | | | | |
| Total Output Power | | 0 | 100 | 110 | W |
| Voltage | | | | | |
| Nominal Output Voltage Range (13) | See trim formula | 0.69 | | 5.5 | Vdc |
| Setting Accuracy | At 50% load | -1.5 | | 1.5 | % of Vnom. |
| Output Voltage Overshoot-Startup | | | | 3 | % Vo set |
| Current | | | | | |
| Output Current Range | | 0 | 20 | 20 | A |
| Minimum Load | | | No minimum load | | |
| Current Limit Inception (6) | 98% of Vnom., after warmup | 20.2 | 32 | | A |
| Short Circuit | | | | | |
| Short Circuit Current (17) | Hiccup technique, autorecovery within $\pm 1\%$ of Vout | | 0.02 | | A |
| Short Circuit Duration (remove short for recovery) | Output shorted to ground, no damage | | Continuous | | |
| Short circuit protection method | Current limiting | | | | |
| Regulation (10) | | | | | |
| Total Regulation Band | | -2.5 | Vo set | 2.5 | % Vo set |
| Line Regulation | Vin=min. to max. Vout=nom. | | | ± 0.4 | % |
| Load Regulation | Iout=min. to max. | | | ± 0.3 | % |
| Ripple and Noise (8) | 5Vo, 12Vin | | 45 | 100 | mV pk-pk |
| | 3.3Vo, 12Vin | | 35 | 80 | |
| | 1.8Vo, 12Vin | | 35 | 80 | |
| | 0.69Vo, 7Vin | | 30 | 70 | |
| Temperature Coefficient | At all outputs | | ± 0.02 | | % of Vnom./ $^{\circ}$ C |
| Maximum Capacitive Loading (14) | Low ESR; >0.001 , <0.01 ohm | 188 | | 1000 | μ F |
| | ESR > 0.01 ohm | | | 10000 | |
| MECHANICAL | | | | | |
| Outline Dimensions | | | 1.3 x 0.53 x 0.34 | | Inches |
| | | | 33.02 x 13.46 x 8.75 | | mm |
| Weight | | | 0.2 | | Ounces |
| | | | 5.4 | | Grams |
| ENVIRONMENTAL | | | | | |
| Operating Ambient Temperature Range (9) | full power, all output voltages, see derating curves | -40 | | 85 | $^{\circ}$ C |
| Storage Temperature | Vin = Zero (no power) | -55 | | 125 | $^{\circ}$ C |
| Thermal Protection/Shutdown | Measured in center | | TBD | | $^{\circ}$ C |
| RoHS rating | | | RoHS-6 | | |

Notes

- Specifications are typical at +25 $^{\circ}$ C, Vin = nominal (+12V), Vout = nominal (+5V), full load, external caps and natural convection unless otherwise indicated. Extended tests at full power must supply substantial forced airflow. All models are tested and specified with external 188 μ F ceramic output capacitors and a 44 μ F external input capacitor. All capacitors are low ESR types. These capacitors are necessary to accommodate our test equipment and may not be required to achieve specified performance in your applications. However, Murata Power Solutions recommends installation of these capacitors. All models are stable and regulate within spec under no-load conditions.
- Input Back Ripple Current is tested and specified over a 5 Hz to 20 MHz bandwidth. Input filtering is Cin = 2 x 100 μ F ceramic, Cbus = 1000 μ F electrolytic, Lbus = 1 μ H.
- Note that Maximum Power Derating curves indicate an average current at nominal input voltage. At higher temperatures and/or lower airflow, the DC-DC converter will tolerate brief full current outputs if the total RMS current over time does not exceed the Derating curve.
- Mean Time Before Failure is calculated using the Telcordia (Belcore) SR-332 Method 1, Case 3, ground fixed conditions, Tpcboard = +25 $^{\circ}$ C, full output load, natural air convection.
- Mean Time Before Failure is calculated using the MIL-HDBK-217N2 method, ground benign, +25 $^{\circ}$ C., full output load, natural convection.
- The On/Off Control Input should use either a switch or an open collector/open drain transistor referenced to -Input Common. A logic gate may also be used by applying appropriate external voltages which do not exceed +Vin.
- Short circuit shutdown begins when the output voltage degrades approximately 2% from the selected setting.
- Please observe the voltage input and output specifications in the voltage range graph.
- Output noise may be further reduced by adding an external filter. At zero output current, the output may contain low frequency components which exceed the ripple specification. The output may be operated indefinitely with no load.
- All models are fully operational and meet published specifications, including "cold start" at -40 $^{\circ}$ C.
- Regulation specifications describe the deviation as the line input voltage or output load current is varied from a nominal midpoint value to either extreme.