

FUNCTIONAL SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS	Conditions (1)	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous	Full power operation	0		6	Vdc
Output Power		0		72.6	W
Output Current	Current-limited, no damage, short-circuit protected	0		20	A
On/Off Control				5.5	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	2.4	5	5.5	Vdc
Recommended External Fuse	Fast blow			34	A
Turn On/Start-up threshold	Rising input voltage	1.95	2.05	2.15	Vdc
Undervoltage Shutdown		1.8	1.92	2.07	
Internal Filter Type			C-TYPE		
Input current					
Full Load Conditions	Vin = nominal (3.3Vo set)		14.18	14.72	A
Low Line	Vin @ min, 3.3 Vout		15.72	16.36	A
Inrush Transient			TBD		A ² -Sec.
Short Circuit Input Current			50		mA
No Load Input Current	3.3Vout, Iout @ 0		63	90	mA
No Load Input Current	1.2V, Iout @ 0		59	86	mA
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 (5Vin @ 20A load current)	@ Vin nom, 3.63Vout	91.5	93.6		%
	@ Vin nom, 3.3Vout	91	93.1		
	@ Vin min=4.5Vin, 3.3Vout	91	93.3		
	@Vin nom, 1.8Vout	84	88.4		
	@Vin nom, 1.2Vout	80	84.2		
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		6,355,830		Hours
Calculated MTBF (4b)	Per MIL-HDBK-217N2 Method		4,941,433		Hours

DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency			600		KHz
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		50		µSec
Dynamic Load Peak Deviation	same as above		±300		mV

FEATURES and OPTIONS					
Remote On/Off Control (5)					
"N" suffix					
Negative Logic, ON state	Pin open=ON	-0.2		Vin-1.7	V
Negative Logic, OFF state		Vin-0.7		+Vin-max	V
Control Current	open collector/drain			3	mA
"P" suffix					
Positive Logic, ON state	Pin open=ON	+Vin-0.7V		Vin-max	V
Positive Logic, OFF state		-0.3		0.8	V
Control Current	open collector/drain			3	mA
Tracking/Sequencing(optional)					
Slew Rate				2	V/mS
Tracking Accuracy	Rising input (0.5V/ms)		±150		mV
Tracking Accuracy	Falling input(0.5V/ms)		±100		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
Remote Sense				500	mV

FUNCTIONAL SPECIFICATIONS (CONT.)

OUTPUT						
Total Output Power			0	66	72.6	W
Voltage						
Nominal Output Voltage Range (13)	See trim formula		0.6		3.63	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	33		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.				± 0.6	%
Load Regulation	Iout=min. to max.				± 0.3	%
Ripple and Noise (8)	3.3Vo, 12Vin			40	100	mV pk-pk
	2.5Vo, 12Vin			35	100	
	1.8Vo, 12Vin			35	100	
	0.6Vo, 7Vin			30	100	
Temperature Coefficient	At all outputs			± 0.02		% of Vnom./°C
Maximum Capacitive Loading (14)	Low ESR; >0.001, <0.01 ohm		94		1000	μ F
	ESR > 0.01 ohm				10000	μ F
MECHANICAL						
Outline Dimensions				1.3X0.53X0.34		Inches
				33.02x13.46x8.75		mm
Weight				0.2		Ounces
				5.4		Grams
ENVIRONMENTAL						
Operating Ambient Temperature Range (9)	full power, all output voltages, see derating curves		-40		85	°C
Storage Temperature	Vin = Zero (no power)		-55		125	°C
Thermal Protection/Shutdown	Measured in center			TBD		°C
RoHS rating				RoHS-6		

Notes

- Specifications are typical at +25°C, Vin = nominal (+5V), Vout = nominal (+3.3V), 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 2x47 μ F ceramic output capacitors and a 22 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 °C, full output load, natural air convection.
- Mean Time Before Failure is calculated using the MIL-HDBK-217N2 method, ground benign, +25°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° 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.
- Other input or output voltage ranges will be reviewed under scheduled quantity special order.
- Maximum PC board temperature is measured with the sensor in the center of the converter.
- Do not exceed maximum power specifications when adjusting the output trim.
- The maximum output capacitive loads depend on the the Equivalent Series Resistance (ESR) of the external output capacitor and, to a lesser extent, the distance and series impedance to the load. Larger caps will reduce output noise but may change the transient response. Newer ceramic caps with very low ESR may require lower capacitor values to avoid instability. Thoroughly test your capacitors in the application. Please refer to the Output Capacitive Load Technical Note.
- Do not allow the input voltage to degrade lower than the input undervoltage shutdown voltage at all times. Otherwise, you risk having the converter turn off. The undervoltage shutdown is not latching and will attempt to recover when the input is brought back into normal operating range.
- The outputs are not intended to sink appreciable reverse current.
- "Hiccup" overcurrent operation repeatedly attempts to restart the converter with a brief, full-current output. If the overcurrent condition still exists, the restart current will be removed and then tried again. This short current pulse prevents overheating and damaging the converter. Once the fault is removed, the converter immediately recovers normal operation.