

Performance and Functional Specifications

See Note 1

Input	
Input Voltage Range	See Ordering Guide and Note 7.
Isolation	Not isolated
Start-Up Voltage	4.2 V
Undervoltage Shutdown (see Note 15)	3.4 V
Overvoltage Shutdown	None
Reflected (Back) Ripple Current (Note 2)	49 mA pk-pk
Internal Input Filter Type	Capacitive
Recommended External Fuse	4A
Reverse Polarity Protection	None, install external fuse
Input Current:	
Full Load Conditions	See Ordering Guide
Inrush Transient	0.16 A ² Sec.
Shutdown Mode (Off, UV, OT)	1 mA
Output in Short Circuit	5 mA
Low Line (Vin=Vmin)	2.24 A.
Remote On/Off Control (Note 5)	
Negative Logic	ON = Open pin or -0.2V to +0.3V. max. OFF = +3.5V min. to +Vin max.
Positive Logic	ON = Open pin (internally pulled up) or +3.5V to +Vin max. OFF = -0.3V to +0.4V. max. or ground
Current	1 mA max.
Tracking/Sequencing (optional)	
Slew Rate	See technical note on page 16
Tracking accuracy, rising input	2 Volts per millisecond, max.
Tracking accuracy, falling input	Vout = ±100 mV of Sequence In Vout = ±100 mV of Sequence In
Output	
Output Power	16.5W max.
Output Voltage Range	See Ordering Guide
Minimum Loading	No minimum load
Accuracy (50% load, untrimmed)	±1.5 % of Vnominal
Voltage Output Range (Note 13)	See Ordering Guide
Overvoltage Protection (Note 16)	None
Temperature Coefficient	±0.02% per °C of Vout range
Ripple/Noise (20 MHz bandwidth)	See Ordering Guide and note 8
Line/Load Regulation	See Ordering Guide and note 10
Efficiency	See Ordering Guide
Maximum Capacitive Loading (Note 14)	
Cap-ESR=0.001 to 0.01 Ohms	200 µF
Cap-ESR >0.01 Ohms	TBD
Current Limit Inception (Note 6)	
(98% of Vout setting, after warm up)	6 Amps
Short Circuit Mode	
Short Circuit Current Output	10 mA
Protection Method	Hiccup autorecovery upon overload removal. (Note 17)
Short Circuit Duration	Continuous, no damage (output shorted to ground)
Prebias Startup	Converter will start up if the external output voltage is less than Vnominal.
Power Good output	
PGood TRUE (HI)	open drain configuration, 5 mA sink max.
PGood FALSE (LO)	(Vset -10%) < Vout < (Vset +10%)
External pullup voltage	0.0V < Vout < 0.4V. See App. note. +5V max., referred to -Vin

Dynamic Characteristics	
Dynamic Load Response	200µSec max. to within ±2% of final value
(50-100% load step, di/dt=1A/µSec)	(Note 1)
Peak Deviation	250 mV
Start-Up Time	6 mSec for Vout=nominal (Vin On)
(Vin on or On/Off to Vout regulated)	6 mSec for Vout=nominal (Remote On/Off)
Switching Frequency	600 KHz

Environmental		
Calculated MTBF (hours)	OKL-T/3-W12	OKL2-T/3-W12
Telecordia method (4a)	10,011,000	9,227,000
Calculated MTBF (hours)		
MIL-HDBK-217N2 method (4b)	4,448,000	4,392,000
Operating Temperature Range (Ambient, vertical mount)		
See derating curves	-40 to +85 °C. with derating (Note 9)	
Storage Temperature Range	-55 to +125 °C.	
Thermal Protection/Shutdown	Included in PWM	
MSL Rating	2	
Relative Humidity	to 85%/+85 °C., non-condensing	

Physical	
Outline Dimensions	See Mechanical Specifications
Weight	0.06 ounces (1.6 grams)
Plating Thickness	Gold overplate 1.18µ" (0.03µm) on Nickel subplate 118.1µ" (3.0µm)
Safety	Certified to UL/cUL 60950-1, CSA-C22.2 No. 60950-1, IEC/EN 60950-1, 2nd Edition
Restriction of Hazardous Substances	RoHS-6 (does not claim EU RoHS exemption 7b—lead in solder)

Absolute Maximum Ratings	
Input Voltage (Continuous or transient)	0 V. to +15 Volts max.
On/Off Control	0 V. min. to +Vin max.
Input Reverse Polarity Protection	None, install external fuse
Output Current (Note 7)	Current-limited. Devices can withstand a sustained short circuit without damage. The outputs are not intended to accept appreciable reverse current.
Storage Temperature	-55 to +125 °C.
Lead Temperature	See soldering specifications
Absolute maximums are stress ratings. Exposure of devices to greater than any of 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.	

Specification Notes:

- Specifications are typical at +25 °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 10µF ceramic output capacitors and a 22 µF 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 µF ceramic, Cbus=1000 µF electrolytic, Lbus=1 µH.
- 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.

Specification Notes, Cont.:

- (4a) 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.
- (4b) Mean Time Before Failure is calculated using the MIL-HDBK-217N2 method, ground benign, +25°C., full output load, natural convection.
- (5) 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.
- (6) Short circuit shutdown begins when the output voltage degrades approximately 2% from the selected setting.
- (7) Please observe the voltage input and output specifications in the Voltage Range Graph on page 16.
- (8) 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.
- (9) All models are fully operational and meet published specifications, including "cold start" at -40° C.
- (10) Regulation specifications describe the deviation as the line input voltage or output load current is varied from a nominal midpoint value to either extreme.
- (11) Other input or output voltage ranges will be reviewed under scheduled quantity special order.
- (12) Maximum PC board temperature is measured with the sensor in the center of the converter.
- (13) Do not exceed maximum power specifications when adjusting the output trim.
- (14) 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 Application Note.
- (15) 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.
- (16) The outputs are not intended to sink appreciable reverse current.
- (17) "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.