

*The Aries Series are very high efficiency non-isolated DC/DC Converters with:*

- Horizontal or Vertical Mount
- Very High Efficiency
- 2.5V or 3.3V Output @ up to 24A
- Fixed Frequency Operation
- Trimmable Over Voltage Protection
- Output Voltage Trim
- Two Year Warranty

## CONTROL FUNCTIONS

- Remote Sense
- Output Enable

## PROTECTION FEATURES

- Over Temperature Protection
- Over Voltage Protection
- Over Current Protection

## TYPICAL CHARACTERISTICS

- Output Setpoint Accuracy:  $\pm 1\%$
- Load & Line Regulation:  $\pm 0.5\%$
- Noise & Ripple: 90mVp-p
- Total Regulation:  $\pm 5\%$
- Output Trim

# GENERAL SPECIFICATIONS

*Operating Air Temperature from 0°C to +45°C with 500 LFM.*

<b>3.3V Output Unit</b>						
<b>Input Characteristics</b>						
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Operating Input Range	$V_I$	$I_O = 24A$	4.5	—	5.5	V
No Load Input Power	$P_{IL}$	$V_I = V_{Inom}$	—	—	2	W
Input Current	$I_I$	$V_I = 5V, I_O = 24A, V_O = 3.3V$	—	—	20	A
Efficiency	N	$V_I = 5V, I_O = 24A, V_O = 3.3V$	88	—	—	%
Reflected Input Ripple (Note 1)	$dI_I$	$V_I = 5V, I_O = 24A$	—	—	5.2	$A_{P-P}$
Switching Frequency	$F_S$		—	250	—	kHz
<b>Output Characteristics</b> (Over the complete baseplate temperature and input voltage ranges.)						
Output Voltage Set Point	$V_O$	$V_I = 5V, I_O = 12A$	3.267	3.300	3.333	V
Rated Output Current	$I_O$	$V_O = V_{Onom}$ (externally)	—	24	—	A
Load & Line Regulation		$V_I = 4.5-5.5V, I_O = 0-24A$	—	—	15	mV
Noise and Ripple		$V_I = 5.0V, I_O = 24A$	—	60	90	$mV_{P-P}$
Load Range			0	—	24	A
Total Regulation (Load, Line, Temp, Drift)		$V_I = 4.5-5.5V, I_O = 0-24A$	3.135	3.300	3.465	V
Remote Sense Compensation (Round Trip)		$V_I = 4.5-5.5V, I_O = 24A$	—	—	100	mV
Output Overvoltage Protection (Nom) See Note 3, Latching		$V_I = 5V, I_O = 12A, V_O = 3.3V$	3.8	—	4.2	V
Output Voltage Protection Response Time	$t_{OVP}$	$V_I = 5V, I_O = 12A, V_O = 3.3V$	—	—	150	$\mu s$
Current Limit (Nom)	$I_L$	$V_I = 5V, V_O = 3.3V$	25	—	30	A
Short Circuit Output Voltage Compliance	$V_{SC}$	$V_I = 5V, I_O = 42A$	—	—	0.6	$V_O$
Load Transient Response, $V_O$ Deviation from Steady State	$V_{OPK}$	$I_O = 9-14A @ 0.05A/\mu s (di/dt)$ , pos or neg step	—	—	80	mV
Settling Time		$V_O = 3.3V$	—	—	1200	$\mu s$
Turn on Time	$t_{ON}$	$V_I = 4.5-5.5V, I_O = 0-24A$ per figures 3, 4, & 5	—	—	10	ms
External Load Capacitance (Note 2)			1000	—	9900	$\mu f$

- Notes: 1. Input filter capacitor  $C_{in} = 1000\mu F$  (330 $\mu F$ , ESR 60m $\Omega$ , 3 capacitors in parallel) Provide 3" loop between positive terminal of  $C_{in}$  and  $V_{in}$  of the converter to measure reflected input ripple current.
2. The converter output voltage shall be stable when (30) 330 $\mu F$  (9900 $\mu F$  total) tantalum (ESR  $\leq 60m\Omega$ ) capacitors are connected across the output of the converter.
3. Adjustment pins J2-18 & 19 are normally left open; see Output Voltage Setting Table on page 5 if using OVP and output voltage trim adjustment.

## General Specifications

Operating Temperature	0°C to +45°C Ambient Air Temp.	
Storage Temperature	-40°C to +100°C	
Relative Humidity	10% to 95% RH, Non-condensing	
Vibration	10-500Hz, 0.75g peak	
Material Flammability	UL94V-0	
Weight	100 grams typ. with heatsink	
MTBF	MIL-HDBK-217E	1,200,000 hours*

\*Note: 50% load; 45°C ambient, 500LFM; calculated MTBF

# GENERAL SPECIFICATIONS

Operating Air Temperature from 0°C to +45°C with 200 LFM.

2.5V Output Unit						
Input Characteristics						
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Operating Input Range (See note 1)	$V_I$	$I_O = 24A$	3.2	—	5.5	V
No Load Input Power	$P_{IL}$	$V_I = V_{Inom}$	—	—	2	W
Input Current	$I_I$	$V_I = 3.43V, I_O = 24A, V_O = 2.5V$	—	—	21.5	A
	$I_I$	$V_I = 5V, I_O = 24A, V_O = 2.5V$	—	—	15	A
Efficiency	N	$V_I = 3.43V, I_O = 24A, V_O = 2.5V$	86	—	—	%
	N	$V_I = 5V, I_O = 24A, V_O = 2.5V$	83.5	—	—	%
Reflected Input Ripple	$dI_I$	$V_I = 3.43V, I_O = 24A$	—	—	3.0	$A_{P-P}$
(See note 2)	$dI_I$	$V_I = 5V, I_O = 24A$	—	—	5.2	$A_{P-P}$
Searching Frequency	$F_S$		—	250	—	kHz
Output Characteristics						
Output Voltage Set Point	$V_O$	$V_I = 5V, I_O = 12A$	2.470	2.495	2.520	V
Rated Output Current	$I_O$	$V_O = V_{Onom}$ (externally)	—	24	—	A
Load & Line Regulation		$V_I = 3.2-5.5V, I_O = 0-24A$	—	—	15	mV
Noise and Ripple		$V_I = 5.0V, I_O = 24A$	—	60	90	$mV_{P-P}$
Load Range			0	—	24	A
Total Regulation (Load, Line, Temp, Drift)		$V_I = 3.2-5.5V, I_O = 0-24A$	2.370	2.495	2.620	V
Remote Sense Compensation (Round Trip)		$V_I = 3.2-5.5V, I_O = 24A$	—	—	100	mV
Output Overvoltage Protection (Nom) See note 4, Latching		$V_I = 3.43V, I_O = 12A, V_O = 2.5V$	2.76	—	2.94	V
Output Voltage Protection Response Time	$t_{OVP}$	$V_I = 3.43V, I_O = 12A, V_O = 2.5V$	—	—	150	$\mu s$
Current Limit	$I_L$	$V_I = 5V, V_O = 2.5V$	25	—	30	A
Short Circuit Output Voltage Compliance	$V_{SC}$	$V_I = 5V, I_O = 42A$	—	—	0.6	$V_O$
Load Transient Response, $V_O$ Deviation from Steady State Settling Time	$V_{OPK}$	$I_O = 9-14A @ 0.05A/\mu s(di/dt)$ , pos or neg step $V_O = 2.5V$	—	—	60	mV
Turn on Time	$t_{ON}$	$V_I = 3.19-5.5V, I_O = 0-24A$ per figures 3, 4, & 5	—	—	10	ms
External Load Capacitance (note 3)			150	—	9,900	$\mu f$

- Notes: 1. Connector J1 pins 1, 2, 3, and 5 are all connected together. Connector J1 pin 4 is always connected to 3.3V rail.  
 2. Input filter capacitor  $C_{in} = 1000\mu F$  (330 $\mu F$ , ESR = 60m $\Omega$ , 3 capacitors in parallel) Provide 3" loop between positive terminal of  $C_{in}$  and  $V_{in}$  of the converter; to measure reflected input ripple current.  
 3. The converter output voltage shall be stable when (30) 330 $\mu f$  (9900 $\mu F$  total) tantalum (ESR  $\leq 60m\Omega$ ) capacitors are connected across the output of the converter.  
 4. Adjustment pins J2-18 & 19 are normally left open; see Table IV if using OVP and output voltage trim adjustment.

## GENERAL SPECIFICATIONS

### Output Voltage Setting & Typical Output Voltage DC\_OK\_H Threshold — 3.3V Output Unit

Trimmed Vout			VOVP Trip			R1	R2	Output Voltage
-1.2%	Typ Vo	+1.2%	-1.2%	Typ	+1.2%	TRIM	OVP	DC_OK_H Threshold
2.662	2.694	2.727	3.642	3.687	3.731	2.26K	10.6K	2.809 ±6%
2.919	2.954	2.989	3.660	3.705	3.749	4.32K	11.4K	2.823 ±6%
3.031	3.068	3.105	3.723	3.768	3.814	6.65K	15.4K	2.871 ±6%
3.154	3.192	3.231	3.819	3.865	3.912	14.7K	31.6K	2.945 ±6%
3.264	3.303	3.343	3.915	3.962	4.010	OPEN	OPEN	3.019 ±6%

- Notes:
1. R1 and R2 are external to the converter and shall be 0.1% tolerance.
  2. Connect R1 from connector J2 pin 18 to J2 pin 16 to adjust output.  
Connect R2 from connector J2 pin 19 to J2 pin 16 to adjust OVP level.
  3. Output Voltage Setting tolerance ±1.2% at V1 = 5.0V & IO= 12A

### Output Voltage Setting & Typical Output Voltage DC\_OK\_H Threshold — 2.5V Output Unit

Output	VOVP Trip			R1	R2	Output Voltage
Voltage	Min	Typ	Max			DC_OK_H Threshold
2.000	2.40	2.50	2.60	2.26K	10.6K	1.755 ±6%
2.200	2.46	2.52	2.64	4.32K	11.4K	1.775 ±6%
2.300	2.56	2.60	2.74	6.65K	15.4K	1.800 ±6%
2.400	2.66	2.70	2.84	14.7K	31.6K	1.895 ±6%
2.500	2.76	2.80	2.94	OPEN	OPEN	1.965 ±6%

- Notes:
1. R1 and R2 are external to the converter and shall be 0.1% tolerance.
  2. Connect R1 from connector J2 pin 18 to J2 pin 16 to adjust output.  
Connect R2 from connector J2 pin 19 to J2 pin 1 to adjust OVP level.
  3. Output Voltage Setting tolerance ±1.0% at V1 = 3.43V & IO= 12A

# APPLICATION NOTES

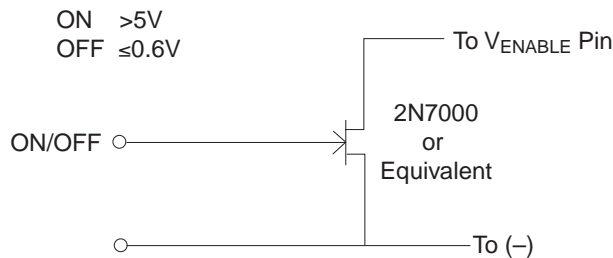
## Control Signal Characteristics

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Enable_L		$V_I = 5V, I_O = 24A$				
Enable_L Source Current			—	—	1.0	mA
Enable_L Voltage Low			—	—	0.8	V
Enable_L Voltage High			2.6	—	—	V
Enable_L Low (Turn On Delay)			—	—	10	ms
Enable_L Low (Output Voltage)			2.458	2.495	2.532	V
Bias Current (12 Volt)	$I_{bias}$	$V_I = 5V, I_O = 24A$	—	70	100	mA
DC_OK_H High		$V_I = 3.43V, I_O = 24A, V_O = \geq 2.1V$	3.3	—	—	V
DC_OK_H Low		$V_I = 3.43V, I_O = 24A, V_O = \leq 1.8V$	—	—	0.8	V
Fault_H High (OVP latched)		$V_I = 3.43V, I_O = 24A$	3.3	—	5	V
Fault_H Low			—	—	0.8	V
Fault_H Source Current (OVP latched)			10	—	—	mA

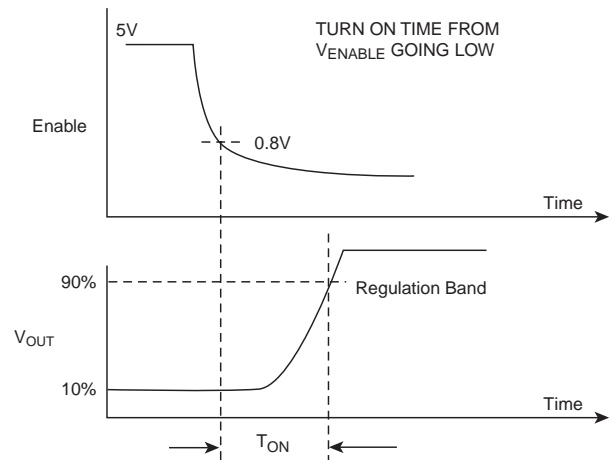
Note: Fault-H occurs when the output voltage level is over the OVP threshold, pass transistor in the converter is shorted when input voltage is applied, or when a difference between input to output voltage exceeds 2.4 volts with the input voltage only at 3.3V nominal and not at 5V nominal.

**Enable L:** This input signal is used to enable the output of the converter when activated (active Low). The signal is referenced to output side (-Sense) or GND.

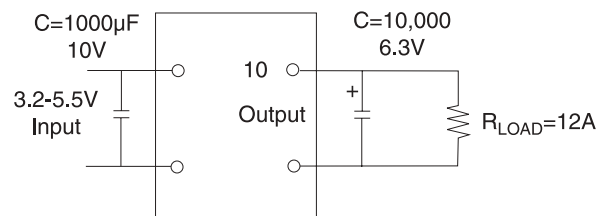
### Enable Circuit Turn-On Time



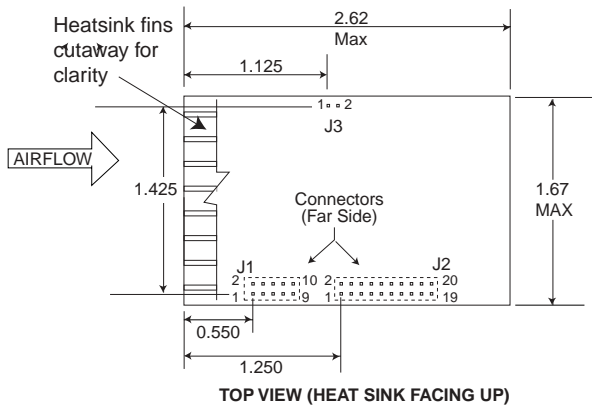
### Turn-On Time



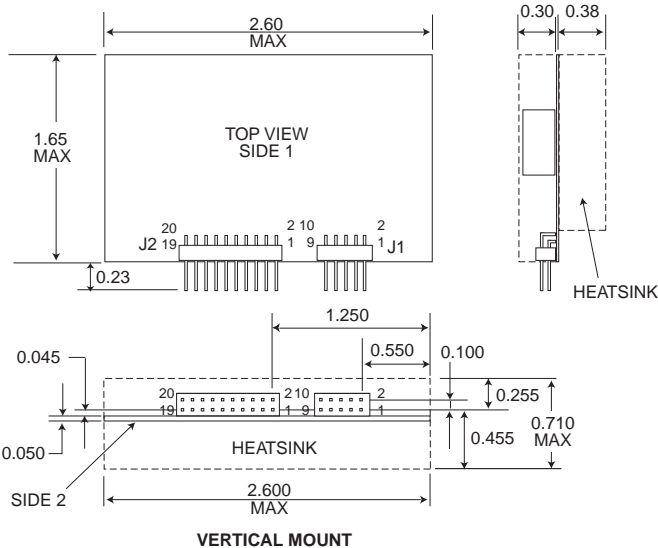
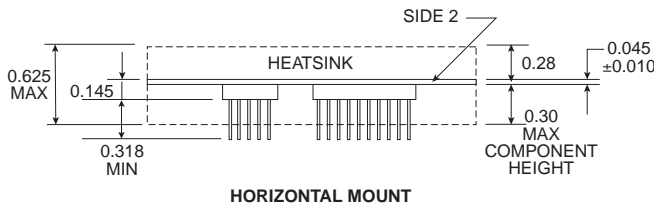
### Output Load Conditions



# PACKAGE DETAIL



NOTES:  
 J1, J2, J3 PINS ON  
 0.100 CENTERS  
 OUTPUT PINS ARE  
 25MM SQ.



J1			
Pin	Designation	Pin	Designation
1	VIN	2	VIN
3	VIN	4	NC
5	VIN	6	VIN RTN
7	VIN RTN	8	VIN RTN
9	VIN RTN	10	NC
J2			
Pin	Designation	Pin	Designation
1	VOUT RTN	2	FAULT_H
3	VOUT RTN	4	DC_OK_H
5	VOUT RTN	6	VOUT RTN
7	VOUT RTN	8	VOUT
9	VOUT	10	VOUT
11	VOUT	12	VOUT
13	VOUT	14	VOUT
15	+SENSE	16	-SENSE
17	ENABLE_L	18	TRIM
19	OVP_ADJ	20	+12V
J3			
Horizontal mount. Mechanical support only.			

## ORDERING INFORMATION

Standard Model Number	Input Voltage	Output Voltage	Max Current	Efficiency Typ @ max load
GPA3V0-24H or V	3.2-5.0V	3.3V	24A	89.5%
GPA3V0-16H or V	3.2-5.0V	3.3V	16A	83%
GPA2V5-24H or V	5.0V	2.5V	24A	87%

Example:

**GPA3V0-24 H**

Part Number \_\_\_\_\_

Option: \_\_\_\_\_

Package Style

H = Horizontal

or

V = Vertical

Galaxy Power Inc. warrants to the original purchaser that the products conform to this data sheet and are free from material and workmanship defects for a period of two (2) years from the date of manufacture, if this product is used within specified conditions. Galaxy Power Inc. reserves the right to make changes to the product(s) or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such products or information. For additional details on this limited warranty consult the factory.



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