

1600-A3 series



www.martekpower.com

Single, Dual, Triple Output DC/DC Converter



DESCRIPTIONS

The 1600-A3 series 16 watts high performance DC/DC converters are cost effective solution to the high reliability and performance requirements of power distribution systems in applications ranging from high speed data communications equipment to industrial robotic systems. The 1600 series operates from wide (3:1) input voltage ranges of 4.65 to 12 VDC; providing single, dual and triple output combinations of 3.3, 5, 12, 15, ± 5 , ± 12 and ± 15 VDC. All models are packaged in compact, low profile 2" X 2" X 0.4" metal cases.

OUTPUT CHARACTERISTICS

	Min	Typ	Max	Unit/Comments
Output Voltage Accuracy				
Single & Dual Outputs			± 1.0	% ¹
Triple Outputs - Primary			± 1.0	% ¹
- Auxiliaries			± 5.0	% ¹
Output Voltage Adjustment			± 5.0	% ¹
Voltage Balance:				
Dual Outputs			± 1.0	%; Equal Output Loads
Triple Outputs (Auxiliaries)			± 1.0	%; Equal Output Loads
Minimum Load			10%	Full Load
Line Regulation				
3.3V Outputs			± 0.3	% ²
Single & Dual Outputs			± 0.5	% ²
Triple Outputs - Primary			± 0.5	% ²
- Auxiliaries			5.0	% ²
Load Regulation				
Single Outputs			± 0.2	% ³
Dual Outputs			± 1.0	% ⁴ ; Equal Loads
Triple Outputs - Primary			± 0.5	% ⁴
- Auxiliaries			± 5.0	% ³ ; Equal Loads
Ripple/Noise				
3.3V and 5V Outputs			75	mV p-p ⁵
12V and 15V Outputs			1	% of Vout ⁵
Short Circuit Protection				Continuous, Automatic Recovery
Transient Recovery Time		200		μ S to within 1% error band for 50% step load change
Temperature Coefficient		± 0.01		% per °C
Over Voltage Protection				See Model Selection Guide

FEATURES

- Synchronization
- 6 sided Continuous Shielding
- Wide 3:1 Input Voltage Range
- 10.6W/In³ Power Density
- Efficiency to 80%
- Single, Dual & Triple Outputs
- Input Pi Filter
- >705,000 Hours MTBF

INPUT CHARACTERISTICS

	Min	Typ	Max	Unit/Comments
Input Voltage Range	4.65	5	12	VDC
Under Voltage Shutdown		4.5		VDC
Remote On / OFF Control				
Supply ON				5.5 VDC or Open Circuit
Supply OFF				0 VDC to 0.8 VDC
Logic Referenced to Negative Input				
Reverse Polarity Input Current			12	Amp
Input Filter				Pi Filter
Input Fuse Rating				See Model Selection Guide

GENERAL CHARACTERISTICS

	Min	Typ	Max	Unit/Comments
Switching Frequency	140			kHz
Isolation Voltage	1000			VDC, 1 minute
Isolation Resistance	1000			Mohm, 500VDC
Isolation Capacitance		60		pF, 100kHz, 1Volt
MTBF (MIL-HBK-217F)	705			Thousand Hours, +25°C, Ground Benign

¹ = Output voltage at nominal line & FL

² = % Output voltage measured from min. input line to maximum

³ = Output voltage measured from FL to 25% Load

⁴ = Output voltage measured from FL to no load

⁵ = Nom. Line @ FL, 20 Mhz B.W. using 1 μ F bypass capacitor

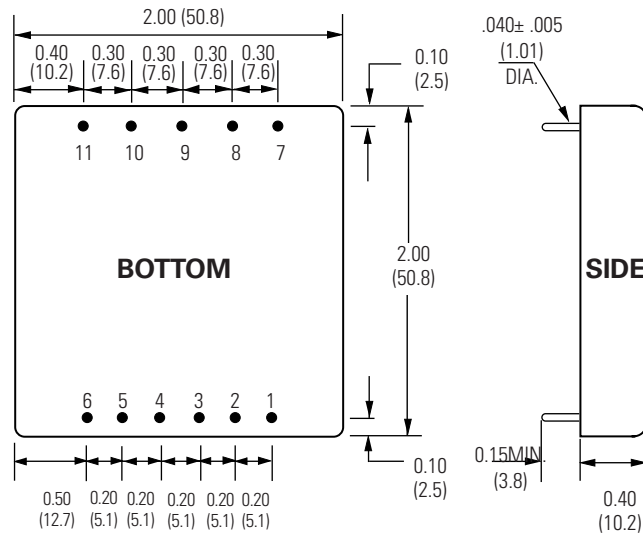
ENVIRONMENTAL SPECIFICATIONS

	Min	Typ	Max	Unit/Comments
Operating Temp. Range (Industrial)	-40		+71	°C; Ambient
Operating Temp. Range (Extended, "-X" suffix)	-55		+85	°C; Ambient
Storage Temp. Range	-55		+125	°C; Ambient
Relative Humidity		95		% Humidity; non-condensing
Cooling				Free-Air Convection

PHYSICAL CHARACTERISTICS

	Unit/Comments
Case Size	2.0 X 2.0 X 0.4 inches (51.0 X 51.0 X 10.2 mm)
Case Material	Coated Metal with Non-Conductive Base
Shield Connection	
12V and 24V Input Models	Negative Input, Pin 3
48V Input Models	Positive Input, Pin 4
Flammability	UL94V-0
Weight	79 Grams

OUTLINE DRAWING; CASE A3



PIN OUT CHART; CASE A3

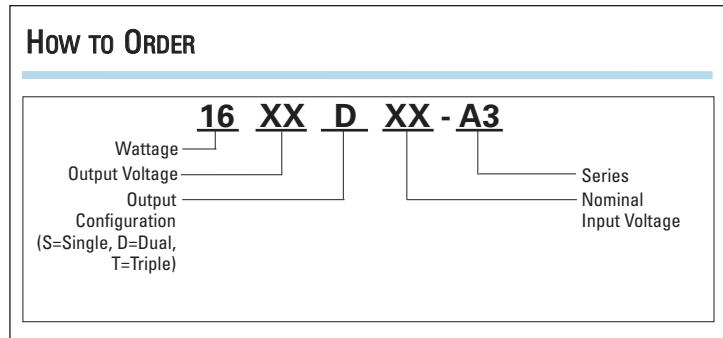
Pin	Single	Dual	Triple
1	Remote On/Off	Remote On/Off	Remote On/Off
2	Sync	Sync	Sync
3	- Vin	- Vin	- Vin
4	- Vin	- Vin	- Vin
5	+ Vin	+ Vin	+ Vin
6	+ Vin	+ Vin	+ Vin
7	Trim	Trim	-Vout (Aux)
8	- Vout	- Vout	Common (Aux)
9	- Vout	Common	- 5V Vout
10	+ Vout	+ Vout	+ 5V Vout
11	+ Vout	No Pin	+Vout (Aux)

Notes:

- Unless otherwise specified dimensions are in inches (mm).
Tolerances Inches mm
X.XX = ±0.02 X.X = ±0.5
X.XXX = ±0.010 X.XX = ±0.25

All specifications are typical at nominal input, nominal load and 25° C unless otherwise specified. External, low ESR, 10 microfarad (minimum) capacitor across output is recommended for operation.

How To ORDER



MODEL SELECTION CHART

Model	Nominal Input Voltage (VDC)	Output Voltage (VDC)	Full Load Output Current (mA)	No Load Input Current (mA)	Full Load Input Current (mA)	Output Over Voltage (VDC)	Fuse (A)	Efficiency @ FL (%)
1603S5-A3	5	3.3	4800	40	4230	4.7	8.0	75
1605S5-A3	5	5	3200	40	4300	6.8	8.0	74
1612S5-A3	5	12	1300	40	4200	15.0	8.0	76
1615S5-A3	5	15	1060	40	3950	18.0	8.0	80
1605D5-A3	5	±5	±1600	40	4200	±6.8	8.0	76
1612D5-A3	5	±12	±665	40	4200	±15.0	8.0	76
1615D5-A3	5	±15	±530	40	3800	±18.0	8.0	80
1605/12T5-A3	5	5, ±12	2000, ±250	40	4160	6.8, ±15.0	8.0	77
1605/15T5-A3	5	5, ±15	2000, ±200	40	4120	6.8, ±18.0	8.0	78

OUTPUT VOLTAGE ADJUSTMENT (1600-A3 SINGLE)

The converter's output voltage may be trimmed by up to $\pm 10\%$ of the nominal output voltage.

TRIM UP

Trim output voltage up by connecting an external resistor between Pins 7 and 8/9. Use the following equation, reference Table 1 for variable A.

$$\text{Radj-up} = \frac{A}{\Delta \%} - 10 \text{ (k}\Omega\text{)}$$

Example:

Trim 5% up for 12V Output units,
where $A = 1.97$, $\Delta \% = 0.05$

$$\text{Radj-up} = \frac{1.97}{0.05} - 10 \text{ (k}\Omega\text{)} = 29.4 \text{ k}\Omega$$

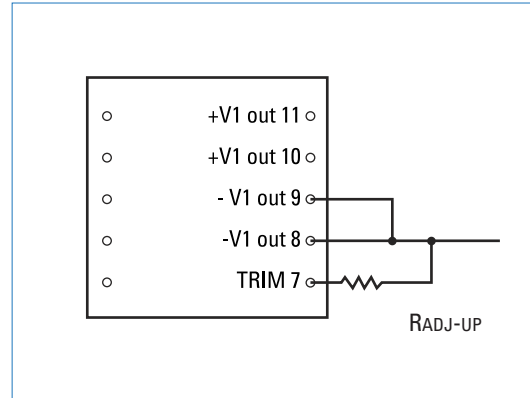


Table 1.

Output Voltage	A
3.3V	1.55
5.0V	1.25
12.0V	1.97
15.0V	2.07

TRIM DOWN

Trim output voltage down by connecting an external resistor between Pins 7 and 10/11. Use the following equation, reference Table 2 for variables C and D.

$$\text{Radj-down} = \frac{C}{\Delta \%} - D \text{ (k}\Omega\text{)}$$

Example:

Trim 5% down for 5V Output units,
where $C = 1.25$, $D = 12.5$, $\Delta \% = 0.05$

$$\text{Radj-down} = \frac{1.25}{0.05} - 12.5 \text{ k}\Omega = 12.5 \text{ k}\Omega$$

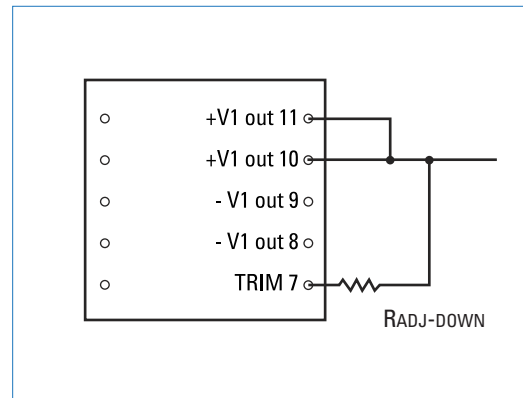


Table 2.

Output Voltage	C	D
3.3V	2.57	14.1
5.0V	1.25	12.5
12.0V	7.55	19.5
15.0V	10.3	22.4

OUTPUT VOLTAGE ADJUSTMENT (1600-A3 DUAL)

The converter's output voltage may be trimmed by up to $\pm 10\%$ of the nominal output voltage.

TRIM UP

Trim output voltage up by connecting an external resistor between Pins 7 and 8. Use the following equation, reference Table 1 for variable A.

$$\text{Radj-up} = \frac{A}{\Delta \%} - 10 \text{ (k}\Omega\text{)}$$

Example:

Trim 5% up for 12V Output units,
where $A = 2.6$, $\Delta \% = 0.05$

$$\text{Radj-up} = \frac{2.6}{0.05} - 10 \text{ (k}\Omega\text{)} = 42 \text{ k}\Omega$$

Both outputs trimmed up by 5%.

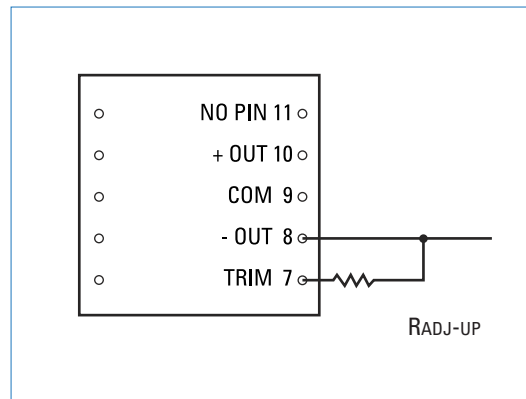


Table 1.

Output Voltage	A
$\pm 5.0\text{V}$	1.87
$\pm 12.0\text{V}$	2.6
$\pm 15.0\text{V}$	2.28

TRIM DOWN

Trim output voltage down by connecting an external resistor between Pins 7 and 10. Use the following equation, reference Table 2 for variables C and D.

$$\text{Radj-down} = \frac{C}{\Delta \%} - D \text{ (k}\Omega\text{)}$$

Example:

Trim 5% down for 5V Output units,
where $C = 5.63$, $D = 17.5$, $\Delta \% = 0.05$

$$\text{Radj-down} = \frac{5.63}{0.05} - 17.5 \text{ k}\Omega = 95.1 \text{ k}\Omega$$

Both outputs trimmed down by 5%.

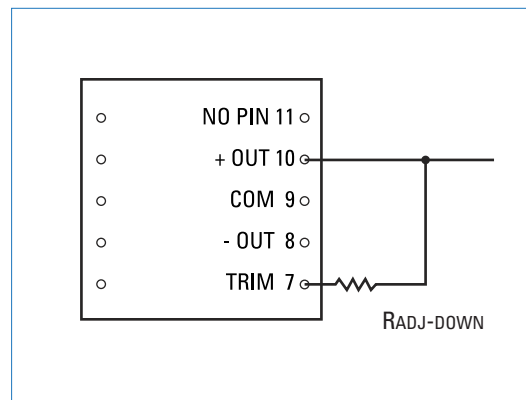


Table 2.

Output Voltage	C	D
$\pm 5.0\text{V}$	5.63	17.5
$\pm 12.0\text{V}$	19.3	31.5
$\pm 15.0\text{V}$	25.1	37.4