



MICROVERTER® DC-DC Converters, 200-250 Watt Family

World's Most Advanced Ultra High Density Single and Triple Output DC-DC Converters

Up to 252 Watts
28, 48, and 300 VDC Input

DESCRIPTION

MicroVerter modules are high density DC-DC converters designed for use in tele-com and other centralized modular and distributed power applications. Three input voltage ranges are available and all use metal PC boards, planar transformers, and surface mount construction to produce up to 252 watts in a tiny package.

FEATURES

- Miniature Size
- High Density – Up to 58 W/in.³
- Constant Frequency – 370KHz
- Parallelable with Current Sharing
- Fault Tolerant – n+m Redundancy
- Extremely Low Thermal Resistance
- Output Good Signal
- Synchronization Option
- UL, CSA, & TUV Approvals
- Non-Shutdown Over Voltage Protection
- Logic On-Off
- Thermal Protection
- Current Limit/Short Circuit Protection
- Isolated Auxiliary Outputs

Evaluation Boards and Triple Output Modules Available



MODEL SELECTION

Model Number				
28 VDC (20-32V)	48 VDC (36-72V)	300 VDC (220-400V)	Output	
			Voltage	Current
Single Output				
μV28-2	μV48-2	μV300-2	2.1V	60A
μV28-3	μV48-3	μV300-3	3.3V	50A
μV28-5	μV48-5	μV300-5	5V	40A
μV28-8	μV48-8	μV300-8	8V	30A
μV28-12	μV48-12	μV300-12	12V	20A
μV28-15	μV48-15	μV300-15	15V	16A
μV28-24	μV48-24	μV300-24	24V	10A
μV28-28	μV48-28	μV300-28	28V	9A
Triple Output				
μV28-T512	μV48-T512	μV300-T512	5V	35A*
			12V	3A*
			-12V	3A*
μV28-T515	μV48-T515	μV300-T515	5V	35A*
			15V	3A*
			-15V	3A*

*Maximum Total Output Power 185 W. (See p. 19 for min. load requirements.)

Option: -S Synchronization Feature

MICROVERTER® μV28 SERIES SPECIFICATIONS

INPUT	MIN	TYPICAL	MAX	UNITS	CONDITIONS
Input voltage	20	24-28	32	VDC	
Brownout	18			VDC	75% full output power
In rush charge		2.6x10 ⁻⁴		Coulombs	
Input reflected ripple		20		%	full load, nominal line
No load power dissipation		1.5		watts	singles
		7.5		watts	triples
Logic disabled power in		0.35		watts	
Input ripple rejection		60		dB	@ 120 Hz
Input overvoltage	32		60	VDC	no damage to units
OUTPUT (Singles and Main Output of Triple)					
Set point accuracy			±1	%	no load
Load regulation		.02	.2	%	0 to full load
Line regulation		.02	.2	%	over range
Ripple		1	3	%p-p	0 to 20 MHz
Trim range	±10			%	consult factory for extended range
Remote sense compensation			0.5	V total	
OVP (non shutdown auto. recovery)		120*		%	* or Vout +.5V whichever is greater
Current Limit (auto.recovery)		110-120		%	full load
Current sharing (automatic)		±5		%	full load
Transient response singles		50		μs	20-80% load, .5A/μs, Vout 1%
Transient response main output triples		200		μs	10-20A, aux. loads 2.5A, .25A/μs, Vout 1%
Transient response (see page 19)					
Temp drift			.02	%/°C	
Efficiency (see curves page 17)					
OUTPUT (Auxiliary Outputs of Triples)					
Set point accuracy		±0.5	±1	%	10A on main, no load auxiliaries
Load regulation		.2	.5	%	0 to full load
Line regulation		.01	.1	%	over range
Ripple		.25	.5	%p-p	0 to 20 MHz
Current Limit (auto. recovery)		110-120		%	full load
Transient response		200		μs	20-80% load, Vout within 1%
Transient response		200		μs	low line to high line, Vout 1%
Transient response		200		μs	50-100% load, Vout 1%
Temp drift		.06		%/°C	
CONTROL					
Turn on time		2.5		ms	input power applied, Vout 1%
Logic turn on time		1		ms	Vout within 1%
Logic disabled current		1		mA	sink
ISOLATION					
Input to output	1000			VDC	consult factory for procedure
Input to case	1000			VDC	
Output to case	200			VDC	
Input to output capacity		2200		pF	
THERMAL					
Operating temperature	-40		+100	°C case	
Automatic shut down temperature	+100	+105	+110	°C case	
Thermal resistance case to ambient		4.2		°C/w	single @ Tc=100°C
		3.3		°C/w	triple @ Tc=100°C
WEIGHT					
singles		7		oz.	
triples		9		oz.	
SIZE					
singles		0.5x2.4x3.6		inches	
triples		0.5x2.4x4.6		inches	
(outline drawings see page 16)					

MICROVERTER® μV48 SERIES SPECIFICATIONS

INPUT	MIN	TYPICAL	MAX	UNITS	CONDITIONS
Input voltage	36	48	72	VDC	
Brownout	32			VDC	75% full output power
In rush charge		2.6x10 ⁻⁴		Coulombs	
Input reflected ripple		20		%	full load, nominal line
No load power dissipation		2.5		watts	singles
		7.5		watts	triples
Logic disabled power in		1		watts	
Input ripple rejection		60		dB	@ 120 Hz
Input overvoltage	72		100	VDC	no damage to unit
OUTPUT (Singles and Main Output of Triple)					
Set point accuracy			±1	%	no load
Load regulation		.02	.2	%	0 to full load
Line regulation		.02	.2	%	over range
Ripple		1	3	%p-p	0 to 20MHz
Trim range	±10			%	consult factory for extended range
Remote sense compensation			0.5	V total	
OVP (non shutdown auto. recovery)		120*		%	* or Vout +.5V whichever is greater
Current Limit (auto.recovery)		110-120		%	full load
Current sharing (automatic)		±5		%	full load
Transient response singles		50		μs	20-80% load, .5A/μs, Vout 1%
Transient response main output triples		200		μs	10-20A, aux. loads 2.5A, .25A/μs, Vout 1%
Transient response (see page 19)					
Temp drift			.02	%/°C	
Efficiency (see curves page 17)					
OUTPUT (Auxiliary Outputs of Triples)					
Set point accuracy		±0.5	±1	%	10A on main, no load auxiliaries
Load regulation		.2	.5	%	0 to full load
Line regulation		.01	.1	%	over range
Ripple		.25	.5	%p-p	0 to 20 mHz
Current Limit (auto.recovery)			110-120	%	full load
Transient response		200		μs	20-80% load, Vout within 1%
Transient response		200		μs	low line to high line, Vout 1%
Transient response		200		μs	50-100% load, Vout 1%
Temp drift		.06		%/°C	
CONTROL					
Turn on time		2.5		ms	input power applied, Vout 1%
Logic turn on time		1		ms	Vout within 1%
Logic disabled current		1		mA	sink
ISOLATION					
Input to output	3000			VDC	consult factory for procedure
Input to case	1500			VDC	
Output to case	500			VDC	
Input to output capacity		2200		pF	
THERMAL					
Operating temperature	-40		+100	°C case	
Automatic shut down temperature	+100	+105	+110	°C case	
Thermal resistance case to ambient		4.2		°C/w	single @ Tc=100°C
		3.3		°C/w	triple @ Tc=100°C
WEIGHT					
singles		7		oz.	
triples		9		oz.	
SIZE					
singles		0.5x2.4x3.6		inches	
triples		0.5x2.4x4.6		inches	
(outline drawings see page 16)					

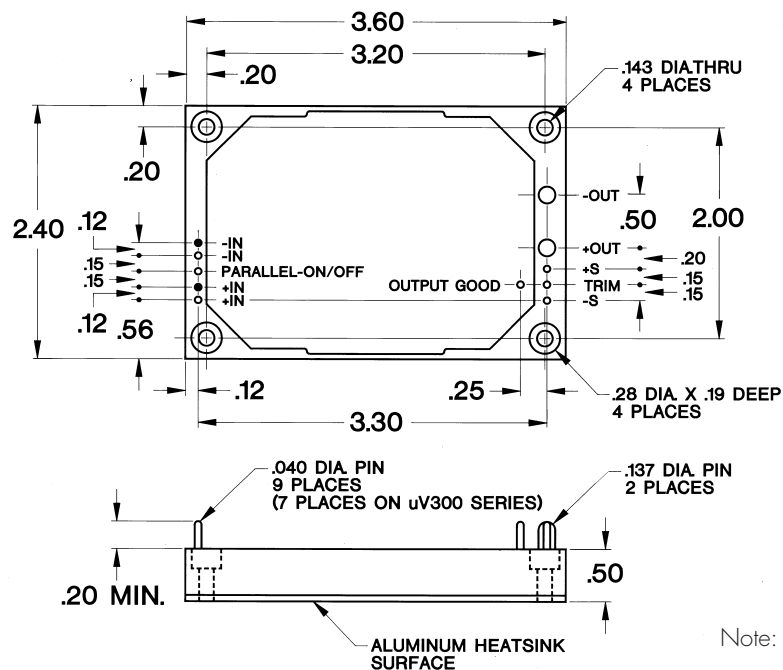
MICROVERTER® μV300 SERIES SPECIFICATIONS

INPUT	MIN	TYPICAL	MAX	UNITS	CONDITIONS
Input voltage	220	300	400	VDC	
Brownout	180			VDC	75% full output power
In rush charge		4.5x10 ⁻⁵		Coulombs	
Input reflected ripple		20		%	full load, nominal line
No load power dissipation		2.5		watts	singles
		7.5		watts	triples
Logic disabled power in		1		watts	
Input ripple rejection (120Hz)		60		dB	@ 120 Hz
OUTPUT (Singles and Main Output of Triple)					
Set point accuracy			±1	%	no load
Load regulation		.02	.2	%	0 to full load
Line regulation		.02	.2	%	over range
Ripple		1	3	%p-p	0 to 20 MHz
Trim range	±10	+10, -30		%	consult factory for extended range
Remote sense compensation			0.5	V total	
OVP (non shutdown auto. recovery)		120*		%	* or Vout +.5V whichever is greater
Current Limit (auto.recovery)		110-120		%	full load
Current sharing (automatic)		±5		%	full load
Transient response singles		50		μs	20-80% load, .5A/μs, Vout 1%
Transient response main output triple		200		μs	10-20A, aux. loads 2.5A, .25A/μs, Vout 1%
Transient response (See page 19)					
Temp drift			.02	%/°C	
Efficiency (See curves page 17)					
OUTPUT (Auxiliary Outputs of Triples)					
Set point accuracy		±0.5	±1	%	10A on main, no load auxiliaries
Load regulation		.2	.5	%	0 to full load
Line regulation		.01	.1	%	over range
Ripple		.25	.5	%p-p	0 to 20 mHz
Current Limit (auto.recovery)		110-120		%	full load
Transient response		200		μs	20-80% load, Vout within 1%
Transient response		200		μs	low line to high line, Vout 1%
Transient response		200		μs	50-100% load, Vout 1%
Temp drift		.06		%/°C	
CONTROL					
Turn on time		250		ms	input power applied, Vout 1%
Logic turn on time		2		ms	Vout within 1%
Logic disabled current		1		mA	sink
ISOLATION					
Input to output	4500			VDC	consult factory for procedure
Input to case	2500			VDC	
Output to case	500			VDC	
Input to output capacity		5700		pF	
THERMAL					
Operating temperature	-40		+100	°C case	
Automatic shut down temperature	+100	+105	+110	°C case	
Thermal resistance case to ambient		4.2		°C/w	single @ Tc=100°C
		3.3		°C/w	triple @ Tc=100°C
WEIGHT					
singles		7		oz.	
triples		9		oz.	
SIZE					
singles		0.5x2.4x3.6		inches	
triples		0.5x2.4x4.6		inches	
(outline drawings see page 16)					



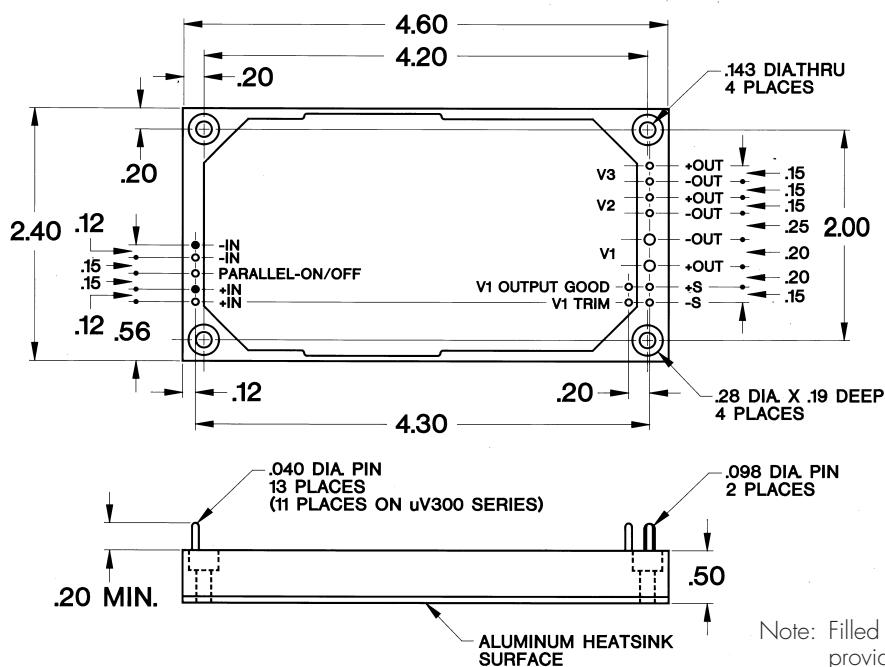
MICROVERTER® Outline Drawings

SINGLE OUTPUT



Note: Filled pins (marked •) are not provided in μ V300 series models

TRIPLE OUTPUT

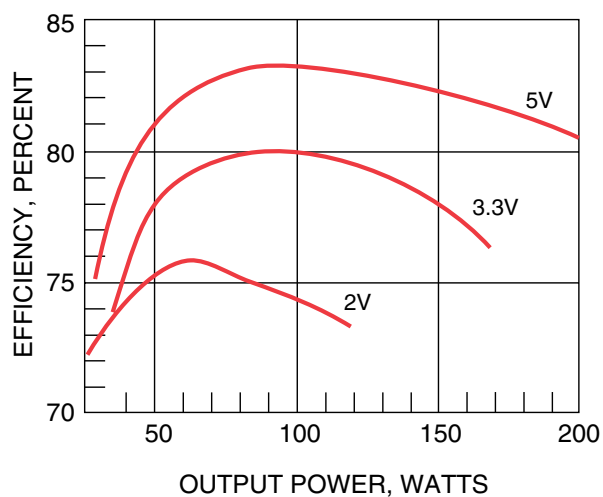


Note: Filled pins (marked •) are not provided in μ V300 series models

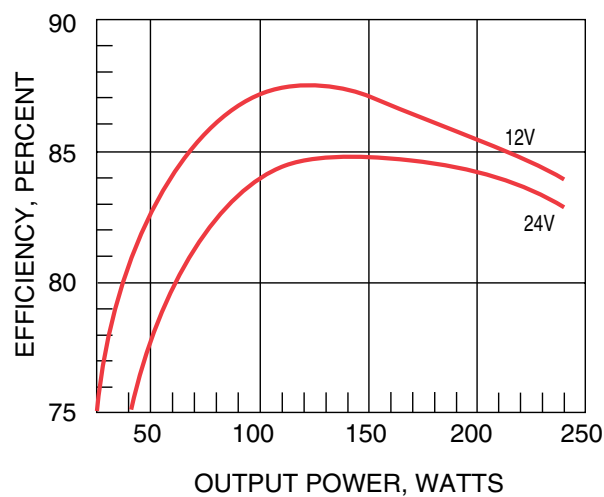
Performance Data

EFFICIENCY CURVES

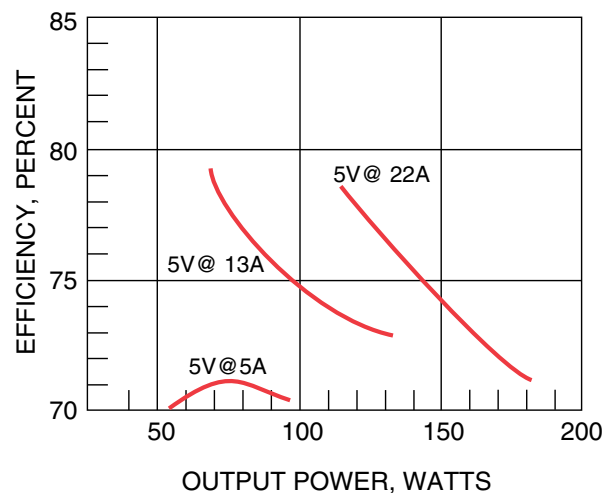
2, 3, & 5V Output Models



12 & 24V Output Models

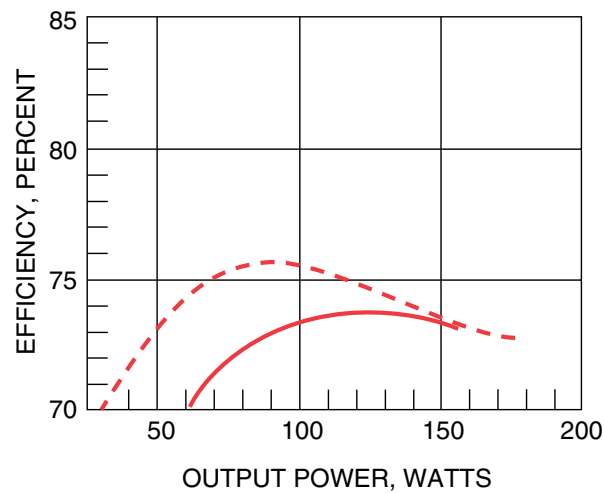


Triple Output Models



5V Load Fixed, Aux. Output Loads
Varied From 0 to 3A Each

Triple Output Models



— Aux. Loads Fixed at $\pm 2A$, 5V Load Varied
---- All Loads Varied

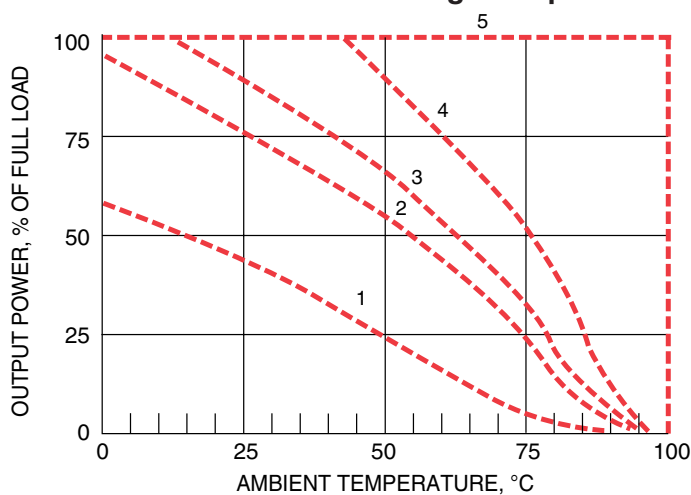
Note: Typical Efficiency for $T_c = 25^\circ C$ and Nominal Input.
Input and Output Measured at the Pins.



MICROVERTER® Performance Data (continued)

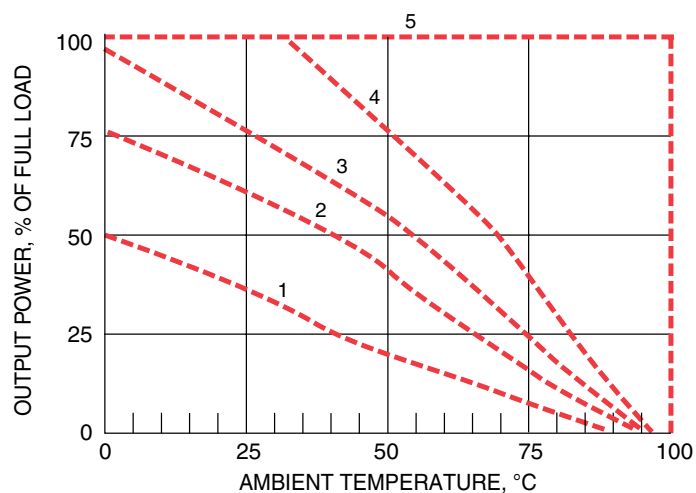
THERMAL PERFORMANCE

Thermal Performance-Single Output



- 1 - With No Heatsink and No Airflow
- 2 - With 2005 Heatsink and No Airflow or, with a 2.2°C/W Heatsink
- 3 - With 2005 Heatsink and 200 LFM Airflow or, with a 1.8°C/W Heatsink
- 4 - With 2005 Heatsink and 400 LFM Airflow or with a 1.2°C/W Heatsink
- 5 - Output Power vs. Case Temperature. No Derating Required for $T_c < 100^\circ\text{C}$

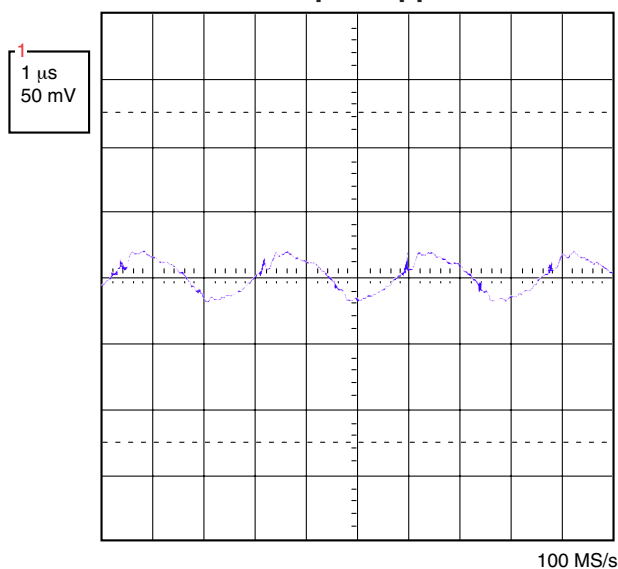
Thermal Performance-Triple Output Models



- 1 - With No Heatsink and No Airflow
- 2 - With 2006 Heatsink and No Airflow or, with a 2.0°C/W Heatsink
- 3 - With 2006 Heatsink and 200 LFM Airflow or, with a 1.5°C/W Heatsink
- 4 - With 2006 Heatsink and 400 LFM Airflow or with a 1.0°C/W Heatsink
- 5 - Output Power vs. Case Temperature. No Derating Required for $T_c < 100^\circ\text{C}$

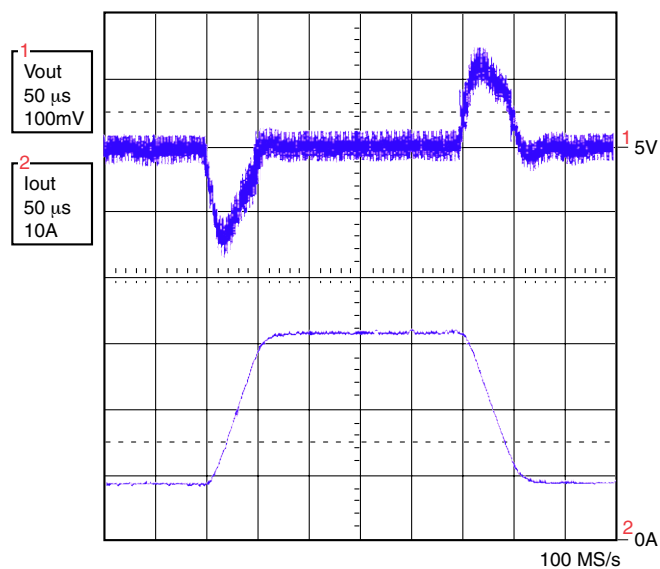
OUTPUT RIPPLE & TRANSIENT RESPONSE

Output Ripple



MODEL μ V48-5. 48V INPUT, 40A LOAD,
DSO, 400MHZ ANALOG BW, 100 MS/s SAMPLING.

Transient Response

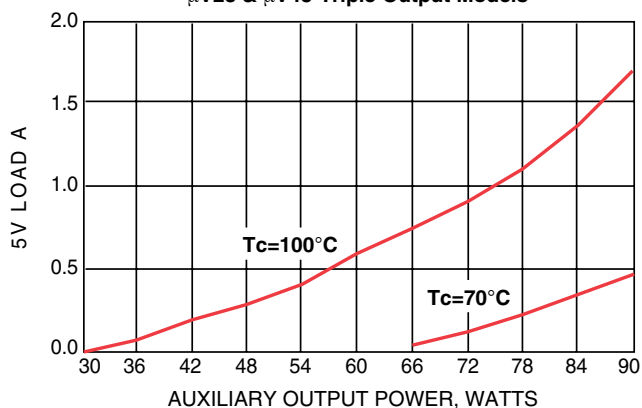


MODEL μ V48-5
LOAD STEP 8A-32A-8A. CURRENT SLEW RATE 0.5A/ μ s.

MINIMUM LOAD - TRIPLES

Minimum 5V Load vs. Auxiliary Output Power

μ V28 & μ V48-Triple Output Models



Minimum 5V Load vs. Auxiliary Output Power

μ V300 Triple Output Models

