HWS650G

A296-01-01A

SPECIFICATIONS (1/3)

ITEMS \ MODEL				HWS650G -5	HWS650G -12	HWS650G -15	HWS650G -24	HWS650G -36	HWS650G -48	HWS650G -60
INPUT RATING										
Input Voltage Range	(*13)		-	85- 265VAC (47-63Hz)						
Efficiency (Typ.)		100/115VAC	%	88	91	92	92	92	92	91
	(*2)	200/230VAC	%	90	93	94	94	94	94	93
Input Current (Typ.)		100/115VAC	A	5.9/5.2	7.4/6.4	7.4/6.4	7.5/6.5	7.3/6.4	7.3/6.4	7.5/6.6
	(*2)	200/230VAC	A	3/2.7	3.8/3.3	3.8/3.3	3.8/3.3	3.8/3.3	3.8/3.3	3.9/3.4
Power Factor (Typ.)		100VAC	-	0.99						
	(*2)	200VAC	-	0.95						
Inrush Current (Typ.)		100VAC	A	20 at 1st Inrush, 40 at 2nd Inrush						
	(*2)(*3)	200VAC	A	40 at 1st Inrush, 40 at 2nd Inrush						
Leakage Current	(*4)		-	LESS THAN 0.75 mA (240VAC , 60Hz)						
OUTPUT RATING										
Nominal Output Voltage			V	5	12	15	24	36	48	60
Maximum Output Voltage	(*1)		V	6	14.4	18	28.8	43.2	57.6	66
Maximum Output Current (85VAC≤Vin≤265VAC)			A	100	54	43.5	27.5	18	13.5	11
Maximum Output Power (85VAC≤Vin≤265VAC)			W	500	648	652.5	660	648	648	660
Peak Output Current (170VAC≤Vin≤265VAC)	(*19)		A	-	-	-	33.5	-	-	-
Peak Output Power (170VAC≤Vin≤265VAC)	(*19)		W	-	-	-	804	-	-	-
CONSTANT VOLTAGE MODE										
Output Voltage Range by adjustment trimmer	(*1)		V	4 - 6	9.6 - 14.4	12 - 18	19.2 - 28.8	28.8 - 43.2	38.4 - 57.6	48 - 66
Output Voltage Setting Range by Programming	(*1)(*5)(*20)		V	0 - 6	0 - 14.4	0 - 18	0 - 28.8	0 - 43.2	0 - 57.6	0 - 66
Maximum Line Regulation	(*6)		mV	20	48	60	96	144	192	240
Maximum Load Regulation	(*7)		mV	30	72	90	144	216	288	360
Temperature Coefficient			-	0.02%/°C						
Maximum Ripple & Noise		0 ≤ Ta ≤ 70°C	mVp-p	240	250	250	250	250	300	400
	(*8)	-20 ≤ Ta < 0°C	mVp-p	400	350	350	350	350	500	800
Hold-up Time (Typ.)			-	20ms (80% load of Maximum Output Power at 100VAC)						
Output Voltage External Control Using CV-A Terminal			-	Apply external voltage : 0 - 6V (60V : 0 - 5.5V) Output Voltage : 0 - 120% (60V : 0 - 110%)						
CONSTANT CURRENT MODE										
Output Current External Setting Range	(*1)(*11)(*20)		A	0 - 100	0 - 54	0 - 43.5	0 - 27.5	0 - 43.2	0 - 57.6	0 - 66
Maximum Line Regulation	(*6)		mA	400	216	174	110	72	54	44
Maximum Load Regulation	(*12)		mA	600	324	261	165	108	81	66
Temperature Coefficient			-	0.02%/°C						
Output Current External Control Using CC-A Terminal			-	Apply external voltage : 0 - 5V Output Current : 0 - 100%						
PROTECTION										
Over Current Protection	(*9)		A	101<	55.6<	44.0<	33.9<	18.2<	13.7<	11.2<
Over Voltage Protection	(*10)		V	6.3 - 7.3	15.0 - 17.4	18.7 - 21.7	30.0 - 33.6	45.0 - 50.4	60.0 - 67.2	69.0 - 78.0
ANALOG PROGRAMMING AND MONITORING										
Remote ON/OFF Control			-	Possible						
Remote Sensing			-	Possible						
Parallel Operation	(*14)		-	Possible, Current balancing function is provided						
Series Operation	(*15)		-	Possible						
Output Voltage Monitor using CV-M terminal	(*16)		-	Output Voltage : 0 - 120% (60V : 0 - 110%) CV-M terminal voltage : 0 - 6V (60V : 0 - 5.5V)						
Output Current Monitor using CB terminal	(*16)		-	Output Current : 0 - 100% CB terminal voltage : 0 - 5V						
Monitoring Signal			-	CV PF, CC PF (Open Collector Output)						
AUXILIARY OUTPUT										
Output Voltage (Typ.)			V	5						
Maximum Output Current			A	2						

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SPECIFICATIONS (2/3)

ITEMS \ MODEL			HWS650G -5	HWS650G -12	HWS650G -15	HWS650G -24	HWS650G -36	HWS650G -48	HWS650G -60
ENVIRONMENT									
	Operating Temperature	(*17)	-	-20 ~ +70°C					
	Storage Temperature		-	-30 ~ +85°C					
	Operating Humidity		-	20 to 90%RH (Non Condensing)					
	Storage Humidity		-	10 to 95%RH (Non Condensing)					
	Vibration	(*18)	-	At no operating, 10 - 55Hz (Sweep for 1min) 19.6m/s^2 Constant, X,Y,Z 1hour each.					
	Shock	(*18)	-	Less than 196m/s^2					
	Cooling		-	Forced air cooling (Internal FAN)					
ISOLATION									
	Withstand Voltage		-	Input-FG : 2.5kVAC (20mA) for 1min. Input-Output : 3.0kVAC (20mA) for 1min. Output-Signal, AUX : 500VAC (100mA) for 1min. Output-FG : 1.8kVAC (100mA) for 1min.					
	Isolation Resistance		-	More than 10MΩ at 25°C and 70%RH, Output - Signal, AUX : 100VDC More than 100MΩ at 25°C and 70%RH, Output - FG : 500VDC					
STANDARD AND COMPLIANCE									
	Safety	(*13)	-	Approved by IEC/EN/UL/CSA 62368-1 (Altitude ≤ 5,000m) Designed to meet Den-an Appendix 12 (J62368-1)					
	Conducted Emission	(*18)	-	Designed to meet EN55011/EN55032-A, FCC-ClassA, VCCI-A		Designed to meet EN55011/EN55032-B, FCC-ClassB, VCCI-B			
	Radiated Emission	(*18)	-	Designed to meet EN55011/EN55032-B, FCC-ClassB, VCCI-B					
	Harmonic Current	(*18)	-	Designed to meet IEC61000-3-2					
	Immunity	(*18)(*21)	-	Designed to meet IEC61000-6-2 (IEC61000-4-2, -3, -4, -5, -6, -8, -11)					
	Line DIP	(*18)	-	Designed to meet SEMI-F47 (at 200VAC)					
MECHANICAL									
	Weight (Typ.)		-	840g					
	Size (W x H x D)		mm	83 x 41.5 x 152 (Refer to Outline Drawing)					

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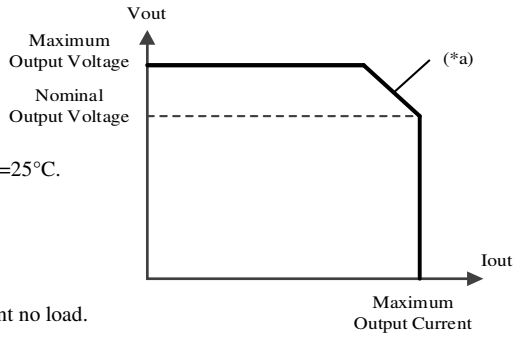
SPECIFICATIONS (3/3)

*Read Instruction Manual (A296-04-01_) carefully, before using the power supply unit.

=NOTES=

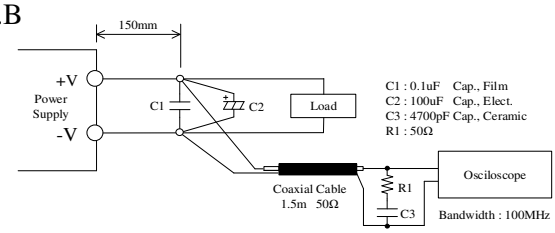
*1. When using the product above the nominal output voltage, derate the output current so that the maximum output power is not exceeded. Please refer to Fig. A.
(*a) Limited by maximum output power value

Fig.A



*2. Ta=25°C, nominal output voltage and maximum output power.
*3. Not applicable for the inrush current to Noise Filter for less than 0.2ms.
*4. Measured by the each measuring method of UL, CSA, EN and Den-an (at 60Hz), Ta=25°C.
*5. Output voltage external control range using CV-A terminal.
*6. 85 - 265VAC, constant load.
*7. No load - Full load, constant input voltage.
*8. Please refer to Fig.B for measurement of ripple noise voltage. Auxiliary output current no load.
*9. Constant current limit with automatic recovery.
If the overcurrent condition continues for more than 10 seconds, the output will shut down. (Only 5V and 24V model)
*10. OVP circuit will shut the output down, manual reset.
*11. Output current external control range using CC-A terminal.
*12. Minimum output voltage - Nominal output voltage, constant input voltage, maximum output current operation.
*13. For cases where conformance to various safety specs (UL, CSA, EN) are required, to be described as 100 - 240VAC (50 - 60Hz).
*14. Up to 5 units.
*15. Up to 3 units.
*16. Use a measuring instrument whose input impedance is 500kΩ or more.
*17. Output Derating
- Refer to OUTPUT CURRENT vs. AMBIENT TEMPERATURE (A296-01-02_).

Fig.B



*18. The specifications are based on TDK-Lambda standard measurement conditions.
The power supply is considered a component which will be installed into a final equipment.
The final equipment should be re-evaluated that it meets EMC, vibration and shock requirement.
*19. Output Peak Current
For 24V output model, please meet the following conditions.
Reduce average output current value according to output derating of A296-01-02_.

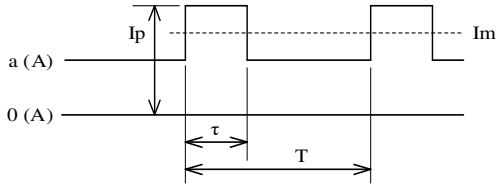
Input voltage range	: AC170V~265V
Continuous Peak output time (τ)	: Within 10 seconds
Peak output current (Ip)	: Within specification value
Average output current (Im)	: Within maximum output current (Iav)

$$Im = \frac{(Ip - a) \times \tau}{T} + a \leq Iav$$

$$Duty = \frac{\tau}{T} \times 100\ (\%)$$

Duty : up to 35%

Fig.C



Ip : Peak output current (A)
Iav : Maximum output current (A)
Im : Average output current (A)
τ : Peak current pulse width (sec)
T : Period (sec)

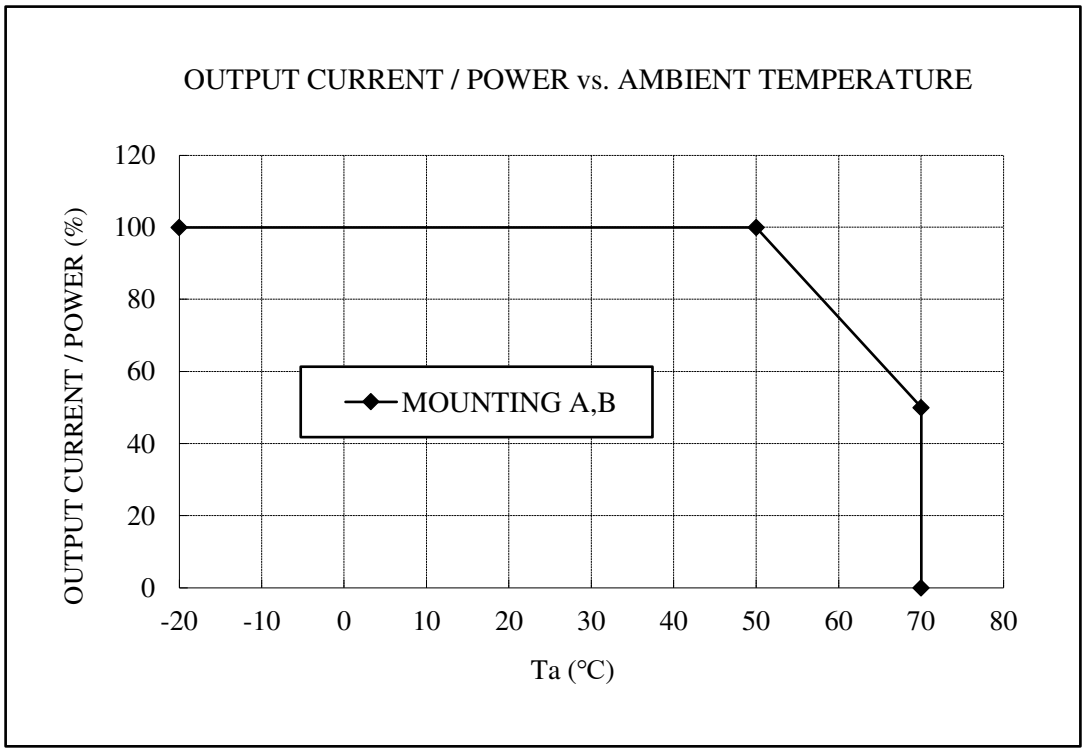
*20. This value is the range within which the output voltage and output current can be set by external signals.
Electrical characteristics are not guaranteed across the entire setting range.
Please refer to the instruction manual for details.
*21. Signal cables length: Less than 3m, DC output power port cables length: Less than 30m.

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OUTPUT DERATING

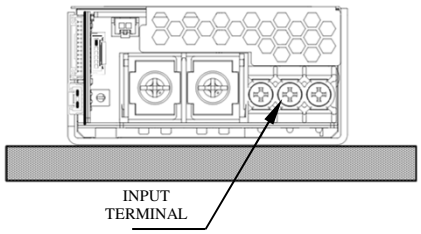
A296-01-02

Ta (°C)	OUTPUT CURRENT / POWER (%)
	MOUNTING A,B
-20 to +50	100
70	50



MOUNTING A

(STANDARD MOUNTING)



MOUNTING B

