Desktop PC Power Supply NSP2-250 Series

Model	Description	Stock
NSP2-250-D2S	24 VDC input, DC startup possible, safety standard approved	Standard stock
NSP2-250-D4S	48 VDC input, DC startup possible, without safety	Contact us
NSP2-250-D4P	48 VDC input, DC startup possible, without safety, frontal DC input gate	Contact us
NSP2-250-D2S7	24 VDC input, Win2000/XP/Vista/7 compliant, safety standard approved	Standard stock

■Model Name Coding

NSP2 - 250 - D * * *
① ② ③④⑤⑥

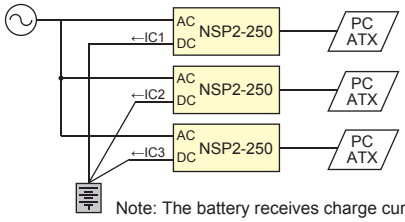
1. Series name
2. Output power
3. D-sub terminal
4. DC input voltage (2: 24V type, 4: 48V type)
5. S: Standard, P: Frontal DC input gate
6. 7: Corresponds to Windows2000/XP/Vista/7

*24V output compliant type, NSP2-250-F2S is on p.87

Features

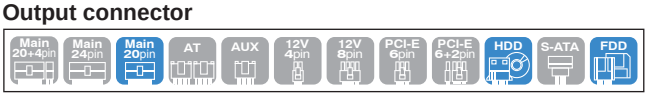
- With backup function, it protects your PC from blackout.
- This unit can be also used as a DC input power supply other than for backup use (both AC and DC inputs are available simultaneously). NSP2-250-D2S7 does not have a DC startup function.
- 48V input type and frontal DC input gate type are also available.
- Since DC input circuit is separated from the GND circuit, the unit can be used with either + or - grounding.
- PFC circuit is mounted for AC input, worldwide range input.
- Battery monitor terminal is mounted.
- This unit is a successor of NSP2-180 series.

Since DC input terminals are isolated, one external battery (lead) can operate multiple units (long-term continuous operation is possible).



Note: The battery receives charge current of (IC1~IC3) 0.5±0.2A from each NSP2-250 power supply.

Output connector



Refer to “Product Page Guideline” on p.13

Safety standard / Approval	UL	CSA	EN	CE	CCC
Reliability Grade	HFA	FA	HOA	OA	

*NSP2-250-D4S and NSP2-250-D4P have not acquired safety standard

Function

DC start | RS 232C | USB | TTL | PFC | Silence | 5VSB FAN | TSFC FAN | Connection | RoHS

*NSP2-250-D2S7 does not have a DC startup function

Automatic shutdown compliant OS

Windows 2000 | Windows XP | Windows Vista | Windows 7

*Only NSP2-250-D2S7 can make all outputs shutdown (no DC start up).
Other models can shutdown the OS, but +5VSB is still supplying.

Input

AC input	85 - 264V (worldwide range)
DC input	NSP2-250-D2S, D2S7: 20 - 32V NSP2-250-D4S, D4P : 40 - 59V *Battery package can be connected, DC startup available

*Battery package is optional (sold separately)
*NSP2-250-D2S7 does not have a DC startup function

Output

Output voltage	+3.3V	+5V	+12V	-5V	-12V	+5VSB
Max. current/ max. power (continuous)	10A	23A	12A	0.5A	0.5A	1A
	Total 133W					
	Total 217W					
	Total 230.5W					
Min. current	0A	1.5A	0A	0A	0A	0A

Dimensions

W×H×D (mm)	150×86×140 (PS/2 size)

General Specification Condition: at normal temperature and humidity unless otherwise specified

	Items		Specification						Measurement conditions, etc.
AC Input	Rated Voltage		100 - 240 VAC (85 - 264 VAC)						Worldwide range
	Input Frequency		50 / 60Hz						47 - 63Hz
	Efficiency	NSP2-250-D2S, D2S7	68% typ. (100 VAC), 70% typ. (240 VAC) *Characteristic data: Fig.3						At rated input/output with fully-charged battery
		NSP2-250-D4S, D4P	66% typ. (100 VAC), 70% typ. (240 VAC)						
	Power Factor		98% typ. (100 VAC), 94% typ. (240 VAC) *Characteristic data: Fig.4						
	Inrush Current		50A peak (100 VAC), 100A peak (240 VAC) *Characteristic data: Fig.5						At rated input/output at cold start (25°C)
	Input VA		375VA max. *Characteristic data: Fig.4						
DC Input	Rated Voltage	NSP2-250-D2S, D2S7	24 VDC (20 - 32 VDC)						DC startup possible except NSP2-250-D2S7
		NSP2-250-D4S, D4P	48 VDC (40 - 59 VDC)						DC startup possible
	Battery Discharge Cut-off Voltage	NSP2-250-D2S, D2S7	17±1V (shutdown of battery circuit)						
		NSP2-250-D4S, D4P	34±2V (shutdown of battery circuit)						
	Efficiency		70% typ.						At rated input/output
Output	Rated Voltage		+3.3V	+5V	+12V	-5V	-12V	+5VSB	
	Rated Current		10A	20A	7A	0.5A	0.5A	1.0A	
	Max. Current / Power		10A	23A	12A	0.5A	0.5A	1.0A	Max. output power: 230.5W
			133W max.						
			217W max.						
	Min. Current		0A	1.5A	0A	0A	0A	0A	
	Total Voltage Accuracy (%)		±4 max.	±4 max.	±4 max.	±5 max.	±5 max.	±5 max.	Total accuracy of temperature, input, and load fluctuations
	Max. Ripple Voltage (mVp-p)		50 max.	50 max.	100 max.	50 max.	100 max.	50 max.	Two wires are coming out from the output connector and connected into one at the edge. 47µF electrolytic capacitor is placed on it and it is measured. *Characteristic data: Fig.16
	Max. Spike Voltage (mVp-p)		100 max.	100 max.	200 max.	100 max.	200 max.	100 max.	
Protection	Overcurrent Protection	OCP Point (A)	13 min.*	23 min.*	13 min.*	Short protection			All other outputs are at rated loads and input voltage *If other outputs do not have rated load, total current of +3.3V and +5V outputs shall be 33A min.
		Method	All outputs except for +5VSB shutdown All outputs shutdown at DC operation			Fold back current limiting		All outputs shutdown	
	Recovery (Overcurrent)	At AC Operation	Reclosing AC input			Automatic recovery			
		At DC Operation	Reclosing AC input			Automatic recovery			
	Overvoltage Protection	OVP Point (V)	3.8 - 4.3	6.0 - 7.0	14.0 - 15.6	-	-	-	
		Method	All outputs shutdown except for +5VSB			-	-	-	
	Recovery (Overvoltage)	At AC Operation	Reclosing AC input			-	-	-	
		At DC Operation	Reclosing AC input			-	-	-	
Charge	Charge Voltage	NSP2-250-D2S, D2S7	27.3V typ. (at 25°C, with no load)						
		NSP2-250-D4S, D4P	54.2V typ. (at 25°C, with no load)						
	Charge Current	NSP2-250-D2S, D2S7	0.5±0.2A (with 24V battery voltage)			-	-	-	
		NSP2-250-D4S, D4P	0.5±0.2A (with 48V battery voltage)						
Environment	Operating Temp. / Humidity		0 to 60°C* (up to 50°C for safety standard compliance) / 10 to 90%						*Refer to Fig.2 No condensation
	Storage Temp. / Humidity		-25 to 70°C / 10 to 95%						No condensation
	Vibration		Displacement amplitude: 0.15mm (10-55Hz), Sweep cycles: 10, Test duration: 45 minutes each axis						JIS-C-0040-1995
	Mechanical Shock		Acceleration of 150m/s² for 11ms one time each in the X, Y and Z directions. No malfunction, damage, loosening or coming-off						JIS-C-0041-1995
Insulation	Dielectric Strength		AC input - DC output/FG/DC intput: 3000 VAC for 1 sec						
	Insulation Resistance		AC input - DC output/FG/DC intput: 50MΩ min.						At 500 VDC
			AC input - DC output/FG: 50MΩ min.						
	Leakage Current		0.5mA max. (100 VAC) / 1mA max. (240 VAC) *Characteristic data: Fig.6						YEW. TYPE3226 (1kΩ) or equivalent
EMC	Line Noise Immunity	NSP2-250-D2S, D2S7	± 2000V (pulse width: 100/800ns, repetitive cycle: 10-50ms)						No fluctuation of DC output or malfunction
		NSP2-250-D4S, D4P	± 2000V (pulse width: 100/800ns, repetitive cycle: 30-100Hz)						
	Electrostatic Discharge		EN61000-4-2 compliant						
	Radiated, Radio-Frequency EM Field		EN61000-4-3 compliant						
	Fast Transient Burst		EN61000-4-4 compliant						
	Lightning Surge		EN61000-4-5 compliant						
	RF Conducted Immunity		EN61000-4-6 compliant						
	Magnetic Field Immunity		EN61000-4-8 compliant						
	Voltage Dip / Regulation		EN61000-4-11 compliant						
	Conducted Emission		VCCI-A, FCC-A, EN55022-A, CISPR22-A compliant *Characteristic data: Fig.7 and 8						Measured by the unit embedded to our EMC measuring PC
	Harmonic Current Regulation		IEC61000-3-2(Ver.2.1) Class D, EN61000-3-2(A14) Class D compliant						At rated input/output
Others	Safety Standard	NSP2-250-D2S, D2S7	UL1950, CSA 22.2 No.234 (c-UL)						
		NSP2-250-D4S, D4P	UL, CSA (c-UL), EN compliant						
	Cooling System		Forced air cooling						
	Output Grounding		Capacitor grounding						
	Reliability Grade		FA (industrial equipment grade, double-sided through hole PCB)						Follow our standard
	MTBF		91,000H min.						Based on EIAJ RCR-9102
	Weight		1.8kg typ.						
	Warranty		5 years after delivery. If any faults belong to us, the defective unit shall be repaired or replaced at our cost.						Except for errors caused by operation not listed

Fig.1 Output Power Cross Regulation

Follow the graph below for the power distribution of the total power of +3.3V and +5V vs. +12V output power.

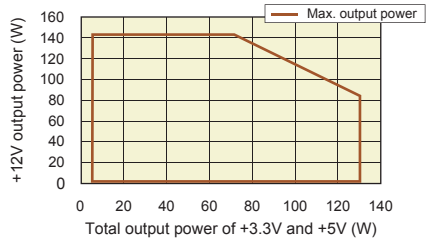
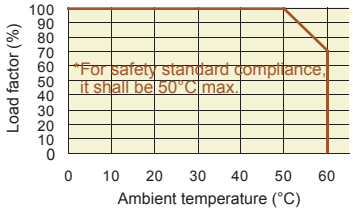
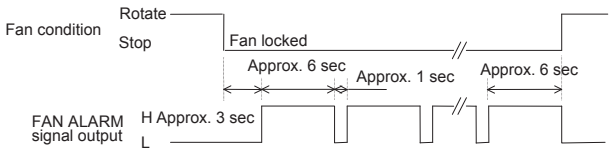


Fig.2 Temperature Derating

When the ambient temperature (near the airflow inlet) exceeds 50°C, follow the derating curve to derate rated current/power, max. current/power, and peak current/power.



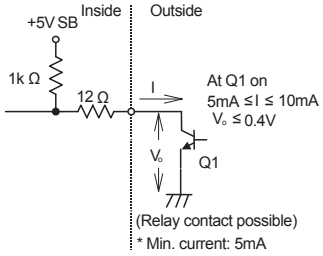
Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

	Items		Specification	Note
Input Signal	Output ON / OFF Control Signal (PS_ON#)		+3.3V, +5V, +12V, -5V, and -12V outputs shutdown with 'H' or 'OPEN' input (only NSP2-250-D2S7) (During the backup operation, battery connection is shut off with 'H' or 'OPEN' input.)	Signal input between the pin 14 of P1 connector and COM pin
	Battery Shutdown Signal for TTL (SHUT DOWN_T)		Battery connection is shutdown with 'L' input. (available only during the backup operation)	Signal input between the pin 2 of P12 connector and COM pin
	Battery Shutdown Signal for RS232C (SHUT DOWN_R)		Battery connection is shutdown with 'positive (+2.4V min.)' input. (available only during the backup operation)	The pin 4 of front panel RS232C connector
	Operation Switch Control (BATT CHECK)		At 'L' input, AC inverter is forcibly shutdown, and it will be switched to battery (DC) operation to make pseudo blackout.	The pin 5 of P12 connector
Output Signal	Normal Output Signal (PWR_OK)		'H' signal is delivered when the +5V output is normal (detection delay time: 200 - 350ms).	The pin 8 of P1 connector
	Blackout Detection Signal for TTL (AC FAIL_T)		The signal goes 'OPEN' at low AC input voltage and blackout detection (open collector output). (detection voltage: 80 VAC typ., detection delay time: 20 - 40ms after AC input failure)	The pin 3 of P12 connector
	Blackout Detection Signal for RS232C (AC FAIL_R)		'Negative (-9V typ.)' is delivered at low AC input voltage and blackout detection. (detection voltage: 80 VAC typ., detection delay time: 20 - 40ms after AC input failure)	The pin 8 of front panel RS232C connector
	Low Battery Voltage Signal for TTL (BATT LOW_T)	NSP2-250-D2S,D2S7	The signal goes 'OPEN' when the battery terminal voltage decreases to 19.3±0.5V typ. (open collector output). 'L' is delivered when the battery package is not connected.	The pin 4 of P12 connector
		NSP2-250-D4S,D4P	The signal goes 'OPEN' when the battery terminal voltage decreases to 40±1V typ. (open collector output). 'L' is delivered when the battery package is not connected.	
	Low Battery Voltage Signal for RS232C (BATT LOW_R)	NSP2-250-D2S,D2S7	'Negative (-9V typ.)' is delivered when the battery terminal voltage decreases to 19.3±0.5V typ. ('positive (+9V typ.)' is delivered when the battery package is not connected.)	The pin 1 of front panel RS232C connector
		NSP2-250-D4S,D4P	'Negative (-9V typ.)' is delivered when the battery terminal voltage decreases to 40±1V typ. ('positive (+9V typ.)' is delivered when the battery package is not connected.)	
	Fan Alarm Signal (FAN ALARM)		When the fan lock status continues, square waves, as shown below, are delivered constantly. 	The pin 6 of P12 connector

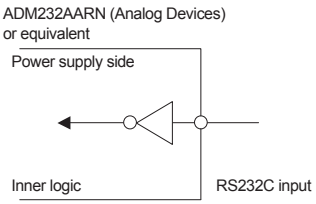
Signal Circuit

Input Signal Circuit

(PS_ON#), (SHUT DOWN_T), (BATT CHECK)

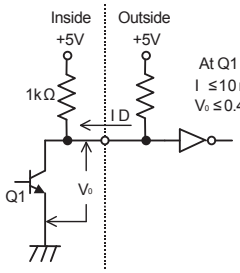


(SHUT DOWN_R)

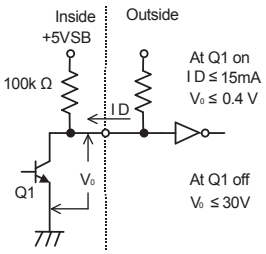


Output Signal Circuit

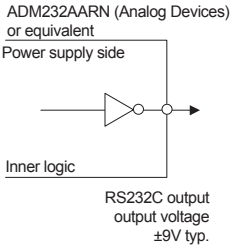
(PWR_OK)



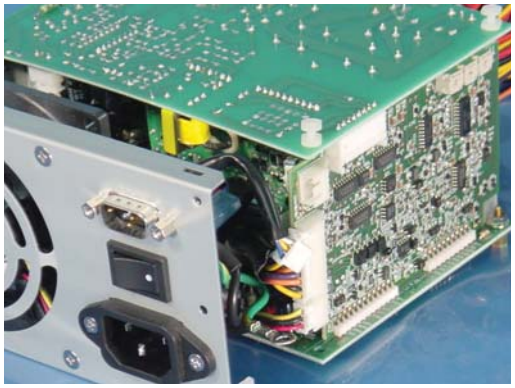
(AC FAIL_T), (FAN ALARM), (BATT LOW_T)

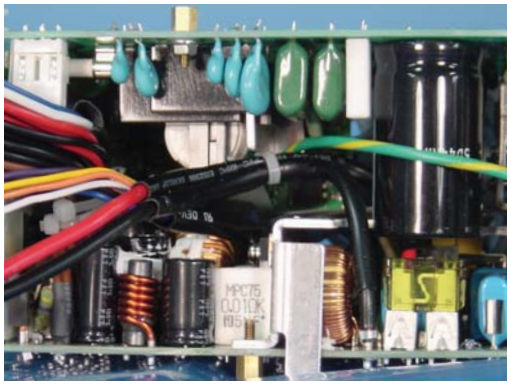


(AC FAIL_R), (BATT LOW_R)

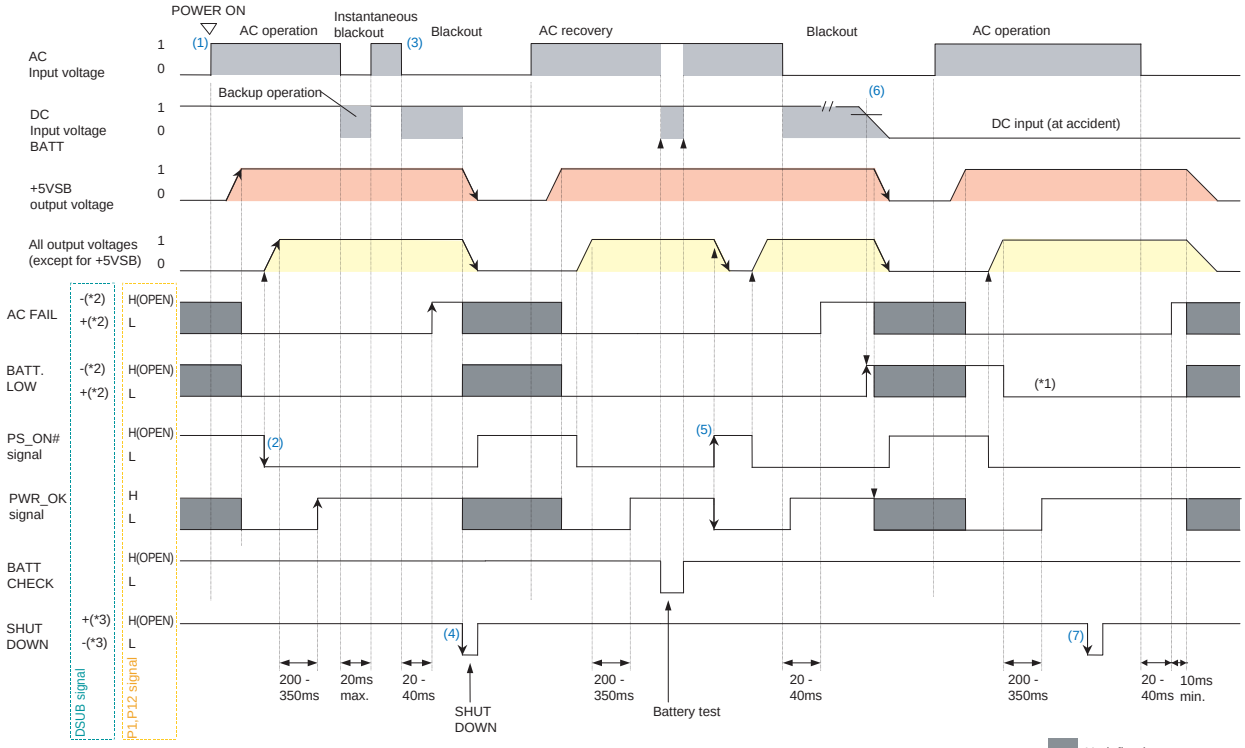


Internal Structure





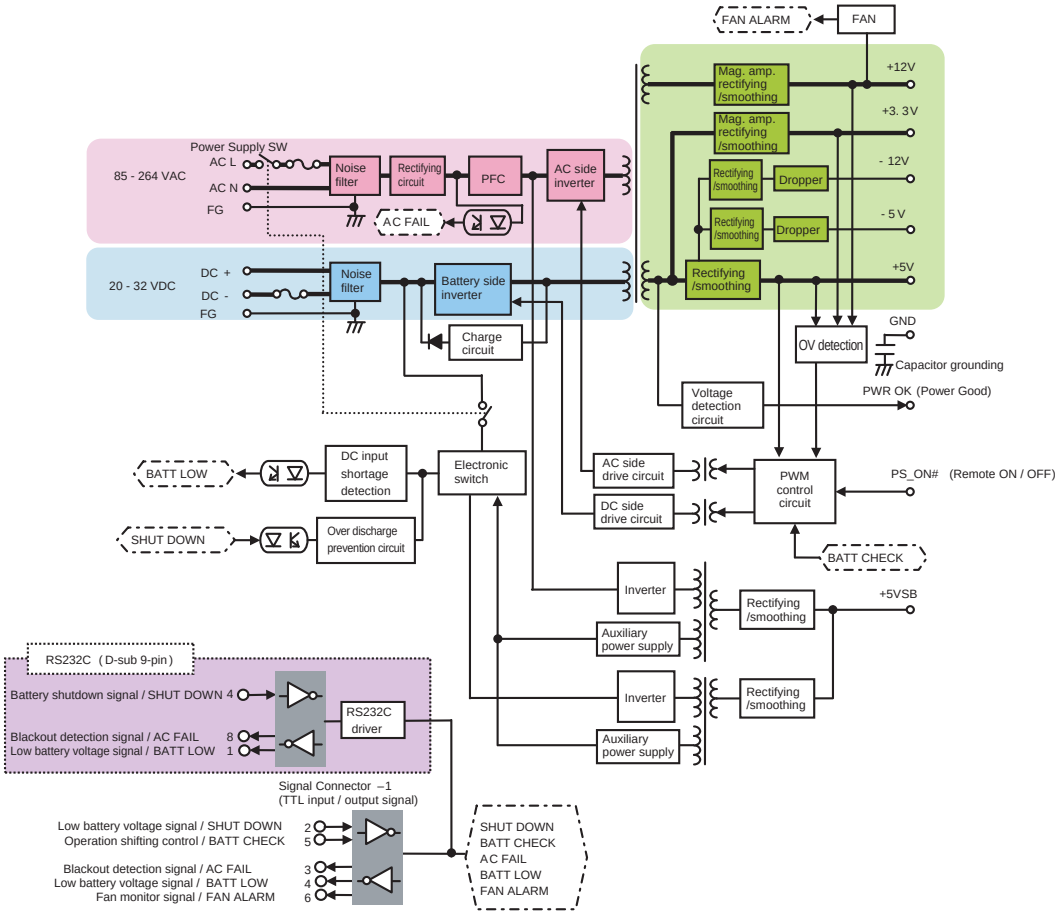
Sequence Diagram NSP2-250 series connected w/ dedicated battery package



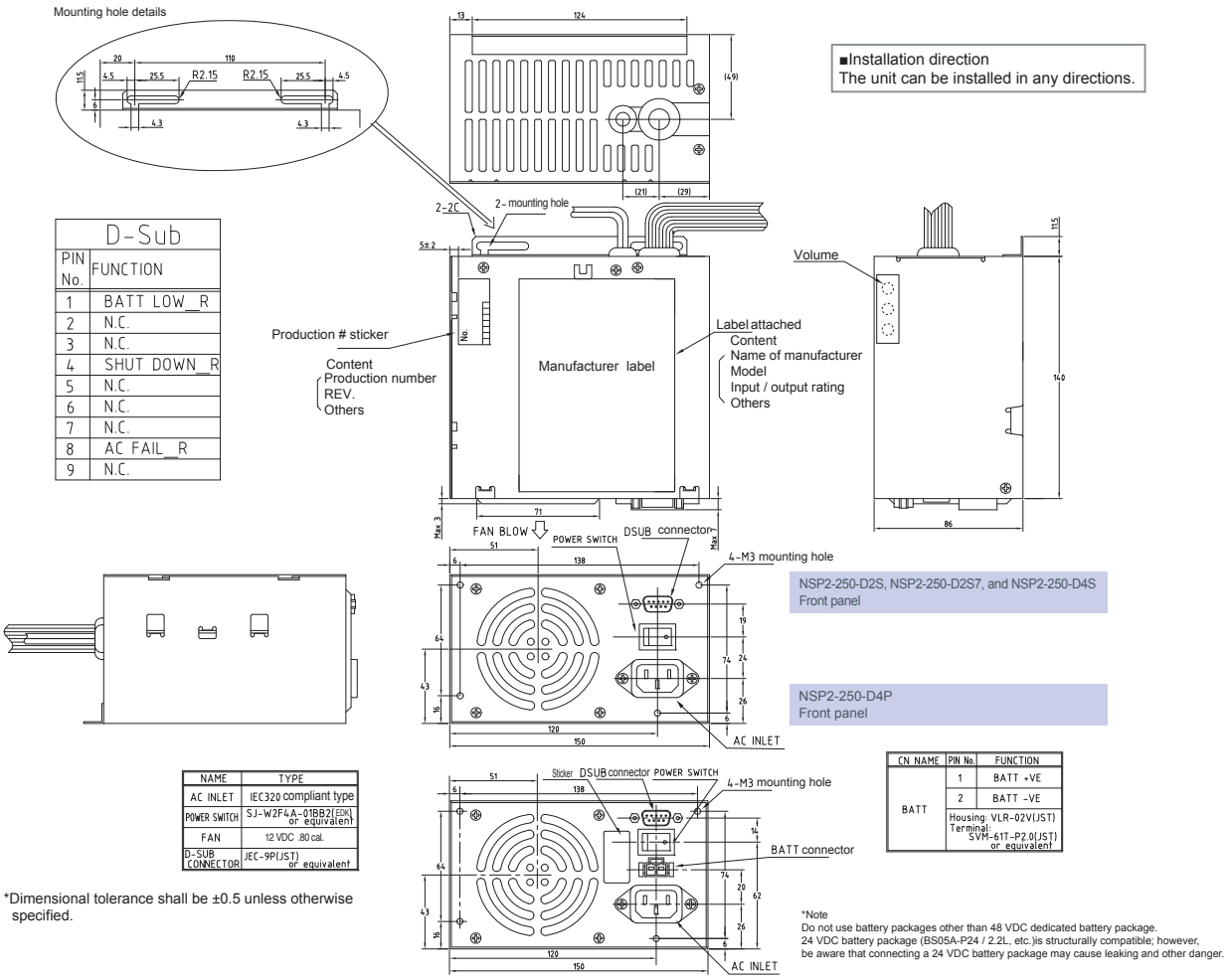
(*1)
Due to charger output, BATT.LOW is not delivered.
(*2)
Negative signal output is -9V typ.
Positive signal output is +9V typ.
(*3)
Negative signal input should be +0.4V to -30V.
Positive signal output should be +2.8V to +30V.

(1) With AC input, only +5VSB starts up.
(2) With PS_ON# 'L' input, all outputs start up. After 200 - 350ms, PWR_OK goes 'H'.
(3) AC FAIL 'negative(RS232C)' or '(OPEN) (TTL)' is delivered 20 - 40ms after blackout.
(4) At blackout, all outputs including +5VSB output shut down with SHUT DOWN 'positive (RS232C)' or 'L(TTL)' input.
(5) When AC input and all outputs including +5VSB are turned on, all outputs except for +5VSB shutdown with PS_ON# 'H' (OPEN) input.
(6) When the battery voltage decreases to 19.3V typ. at backup operation, BATT LOW 'negative (RS232C)' or '(OPEN)(TTL)' are delivered; after that, all outputs, including +5VSB shutdown.
(7) At AC input, the output does not change even SHUT DOWN 'positive (RS232C)' or 'L (TTL)' is input.

Block Diagram



Outline Drawing

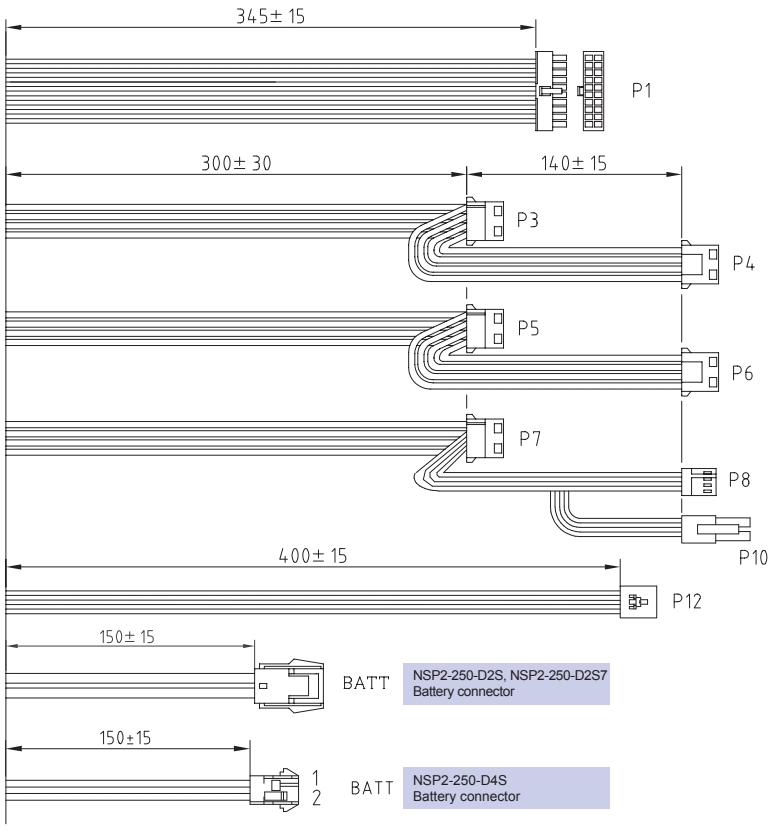


D-Sub	
PIN No.	FUNCTION
1	BATT LOW_R
2	N.C.
3	N.C.
4	SHUT DOWN_R
5	N.C.
6	N.C.
7	N.C.
8	AC FAIL_R
9	N.C.

NAME	TYPE
AC INLET	IEC320 compliant type
POWER SWITCH	SJ-W2F4A-01BB2(EDK) or equivalent
FAN	12 VDC .80 cal.
D-SUB CONNECTOR	JEC-9P(JST) or equivalent

CN NAME	PIN No.	FUNCTION
BATT	1	BATT +VE
	2	BATT -VE
	Housing: VLR-02V(JST) Terminal: SVM-61T-P2.0(JST) or equivalent	

Output Harness



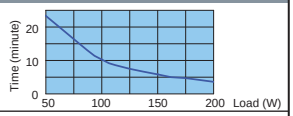
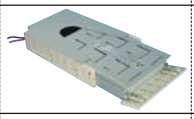
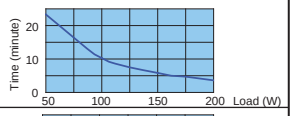
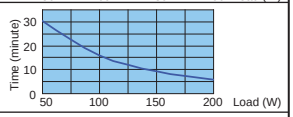
*The battery connector for NSP2-250-D4P is mounted on the front panel.

CN NAME	PIN No.	FUNCTION	WIRE COLOR	WIRE TYPE	CONNECTOR TYPE
P1	1	+3.3V	BROWN	UL1007 AWG#18	Housing: 5557-20R (Molex) Terminal: 5556 (Molex) or equivalent
	2	+3.3V	BROWN		
	3	COM	BLACK		
	4	+5V	RED		
	5	COM	BLACK		
	6	+5V	RED		
	7	COM	BLACK		
	8	P.G.	ORANGE	UL1007 AWG#22	
	9	+5Vs	YELLOW		
	10	+12V	YELLOW	UL1007 AWG#18	
	11	+3.3V	BROWN		
	12	-12V	BLUE		
	13	COM	BLACK		
	14	ON/OFF	VIOLET	UL1007AWG#22	
	15	COM	BLACK	UL1007 AWG#18	
	16	COM	BLACK		
	17	COM	BLACK		
	18	-5V	WHITE		
	19	+5V	RED		
	20	+5V	RED		
P3 ~ P7	1	+12V	YELLOW	UL1007 AWG#18	Hosing: LCP-04 (JST) Terminal: SLC22T 2.0 (JST) or equivalent
	2	COM	BLACK		
	3	COM	BLACK		
	4	+5V	RED		
P8	1	+5V	RED	UL1007 AWG#22	Housing: 171822-4 (AMP) Terminal: 170204-1 (AMP) or equivalent
	2	COM	BLACK		
	3	COM	BLACK		
	4	+12V	YELLOW		
P12	1	COM	BLACK	UL1007 AWG#22	Housing: 51030-0630 (Molex) Terminal: 50084-8114 (Molex) or equivalent
	2	SHUT DOWN	YELLOW		
	3	AC FAIL	BLUE		
	4	BATT LOW	WHITE		
	5	BATT CHECK	ORANGE		
	6	FAN ALARM	VIOLET		
P10	1	COM	BLACK	UL1007 AWG#22	Housing: ELP-02V (JST) Terminal: SLF-42T-1.3E (JST) or equivalent
	2	+12V	YELLOW		

BATT	1	BATT +VE	RED	UL1015 AWG#14	Housing:VLR-02V(JST) Terminal:SVM-61T-P2.0(JST) or equivalent
	2	BATT -VE	BLACK		
BATT	1	BATT +VE	RED	UL1015 AWG#14	Housing: Terminal:350873-03(AMP) or equivalent
	2	BATT -VE	BLACK		

Optional Components Sold Separately

Battery Package

Page	Picture	Model	Type	Shape (size)	Backup Time
P.401		BS05A-P24/2.2L(K)	Lead	5-inch bay fixed type (W×D×H=146×190×37mm)	
P.403		RBS01A-P24/2.2L(K)	Lead	5-inch bay fixed, removable type (W×D×H=146×245×42mm)	
P.407		BS06A-H24/2.5L (for standby use) BS06B-H24/2.5L (with fan, for cycle use)	Ni-MH	5-inch bay fixed type (W×D×H=146×181×38mm)	

*The backup time is a reference value at initial use; it is not a guaranteed value.
*Safety standard for a battery package is acquired as an optional component of a power supply.
BS06A-H24/2.5L, BS06B-H24/2.5L have not acquired safety standard as an optional component of NSP2-250 series.
*NSP2-250-D4S and NSP2-250-D4P only comply with lead batteries and require two batteries (serial connection). Also, the connector needs to be processed.

Cable

Picture	Model	Type	Description
	WH2601-02	RS232C communication cable	Dedicated to Windows 2000 / XP / Vista / 7 [RoHS]
	WH2753	AC power cord	125 VAC 12A [PSE]
	WH2753-02	AC power cord	125 VAC 12A (tracking resistance type) [PSE]

Software

Picture	Model	Type	Description
	NSP Pro 2	Automatic shutdown software	Dedicated to Windows 2000 / XP / Vista / 7

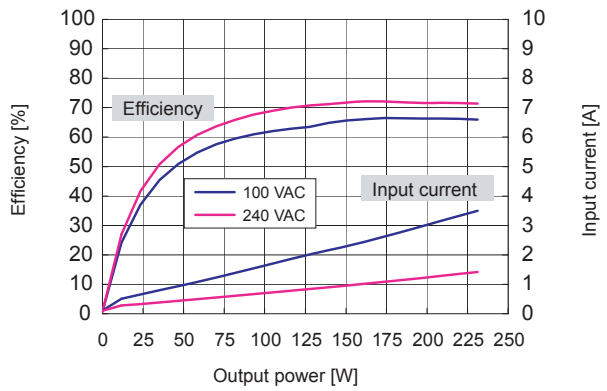
*Free software "NSP Pro 2" available at our web-site
*The UPS service of Windows 2000 and XP available
*Only NSP2-250-D2S7 can make all outputs shutdown (no DC start up).
Other models can shutdown the OS, but 5VSB is still supplying.

Other Optional Components

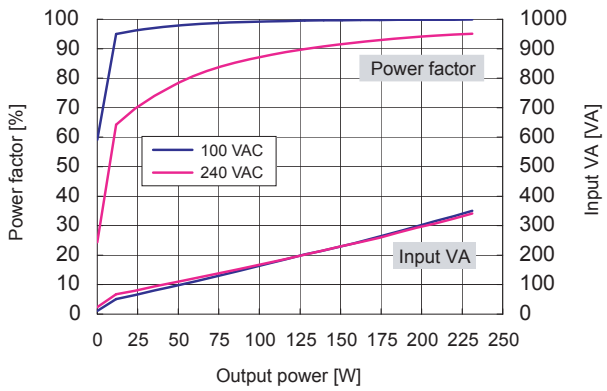
Model	Description	Model	Description
ACC2637	Automatic startup unit	WH5105	12V 4-pin connector conversion harness (80mm)
WH2820	20-pin extension harness (600mm)	WH5105-02	12V 4-pin connector conversion harness (320mm)
WH2747	20-pin extension harness (450mm)	WH5055	AT connector conversion harness
WH2892-02	20-pin extension harness (200mm)	ACC5046	Harness with PS_ON switch
WH2812	PCI-E 6-pin connector conversion harness	ACC5077	PS_ON terminal short connector
		WH5073	PS_ON terminal short 20-pin harness

Characteristics Data NSP2-250-D2S (Examples of actual measurement)

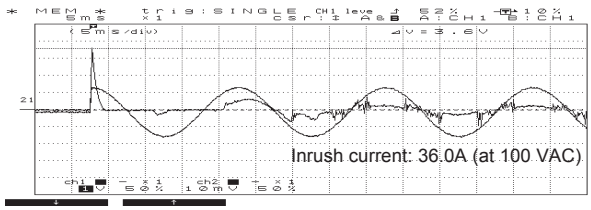
● Fig.3 Efficiency / Input Current vs. Output Power

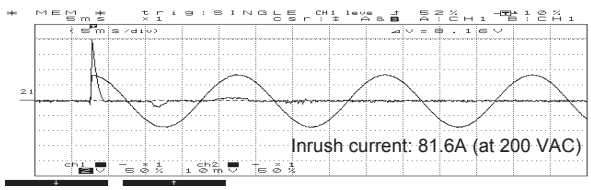


● Fig.4 Power Factor / Input VA vs. Output Power



● Fig.5 Inrush Current





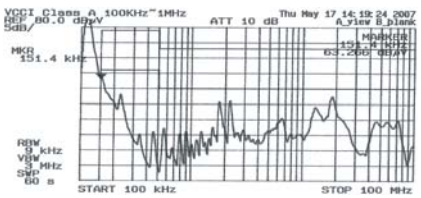
● Fig.6 Leakage Current

Input: 100 / 240 VAC
Load: Rated and min. load

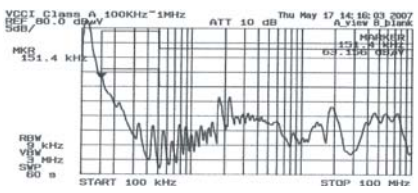
	Rated load	Min. load
100 VAC	0.28mA	0.27mA
240 VAC	0.66mA	0.70mA

● Fig.7 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: QP



Measuring point: L-FG

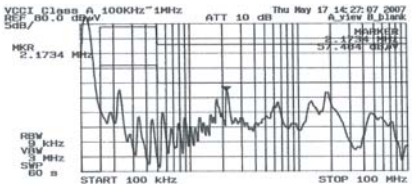


Measuring point: N-FG

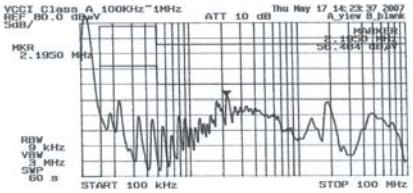
In-house measurement data

● Fig.8 Conducted Emission at 240 VAC

Input: 240 VAC
Load: Rated
Mode: QP



Measuring point: L-FG

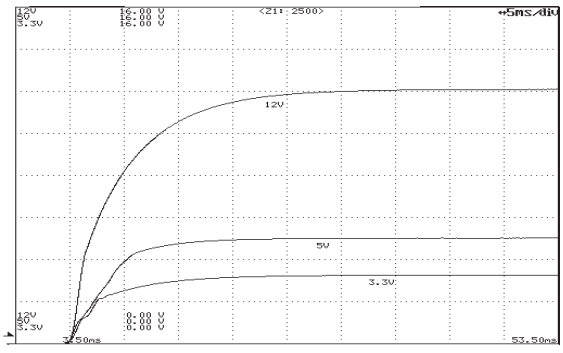


Measuring point: N-FG

In-house measurement data

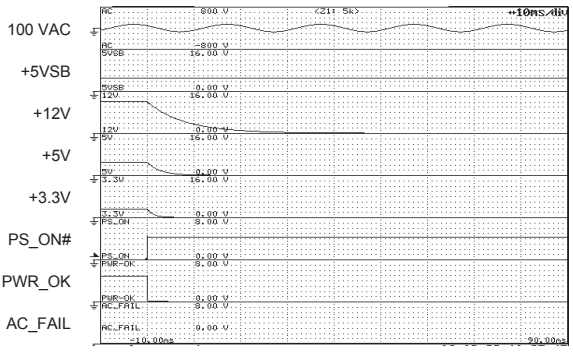
● Fig.9 Rising Characteristics at 100 VAC

Input: 100 VAC
Load: Rated
Time axis: 5ms/DIV



● Fig.10 Falling Characteristics at 100 VAC when REMOTE goes Off

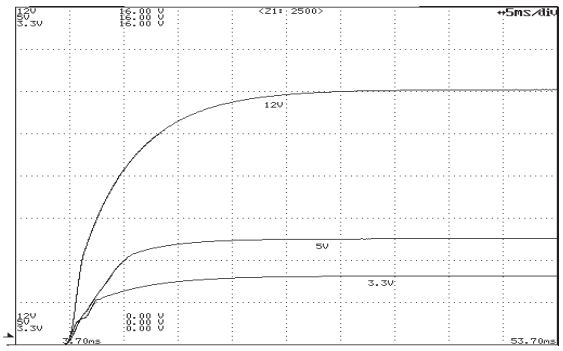
Input: 100 VAC
Load: Rated
Time axis: 10ms/DIV



Characteristics Data NSP2-250-D2S (Examples of actual measurement)

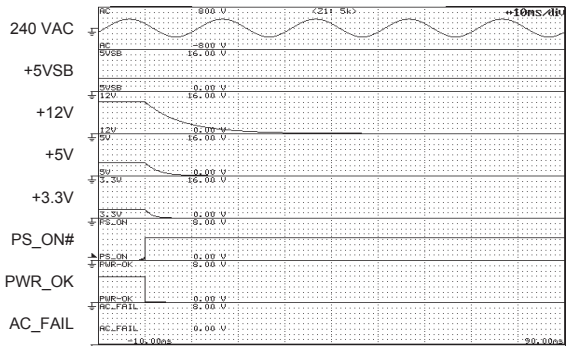
● Fig.11 Rising Characteristics at 240 VAC

Input: 240 VAC
Load: Rated
Time axis: 5ms/DIV



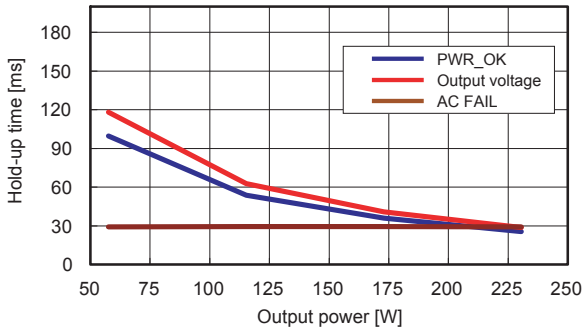
● Fig.12 Falling Characteristics at 240 VAC when REMOTE goes Off

Input: 240 VAC
Load: Rated
Time axis: 10ms/DIV



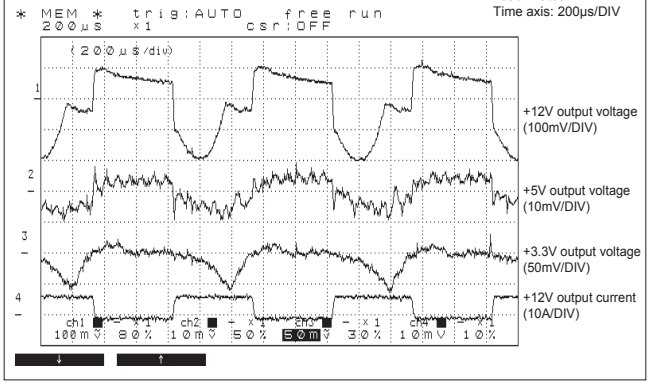
● Fig.13 Output Hold-up Time vs. Output Power

PWR_OK: the point that PWR_OK signal goes to "L"
Output voltage: the point any output voltage decreases to 95% except +5VSB
AC FAIL: the point that AC FAIL signal is delivered



● Fig.14 Dynamic Load Fluctuation Characteristics at 1kHz

Input: 100 VAC
Load: Rated
Time axis: 200µs/DIV



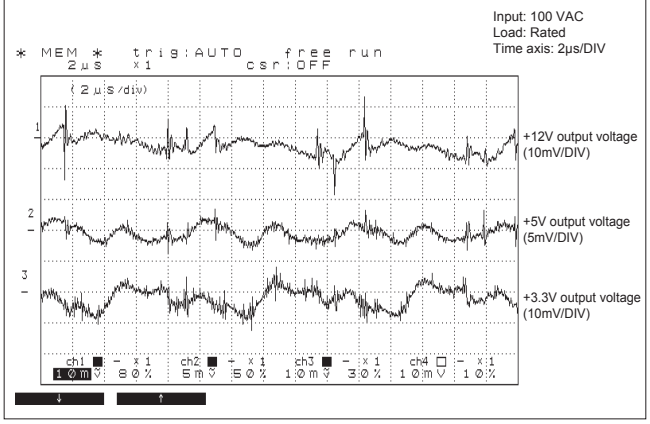
● Fig.15 Output Voltage Regulation

Output	Min. load	Rated load
+12V output	0A	7A
+5V output	1.5A	20A
+3.3V output	0A	10A

AC input voltage	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+12V output (min. load)	12.170 V	12.170 V	12.170 V	12.170 V	12.170 V	12.170 V
+12V output (rated load)	12.101 V	12.102 V	12.101 V	12.102 V	12.102 V	12.102 V
+5V output (min. load)	5.095 V	5.094 V	5.094 V	5.094 V	5.093 V	5.093 V
+5V output (rated load)	5.013 V	5.013 V	5.013 V	5.013 V	5.013 V	5.012 V
+3.3V output (min. load)	3.336 V	3.336 V	3.336 V	3.336 V	3.335 V	3.335 V
+3.3V output (rated load)	3.263 V	3.264 V	3.264 V	3.265 V	3.265 V	3.265 V

● Fig.16 Ripple and Spike Voltage

Input: 100 VAC
Load: Rated
Time axis: 2µs/DIV



● Fig.17 Ambient Temperature vs. Expected Service Life

■ Electrolytic capacitors

Input: 100 VAC
Load: Rated
Operating time: 24 consecutive hours

Intake air temp.	20°C	30°C	40°C	50°C
Expected service life (yr)	approx. 59	approx. 30	approx. 15	approx. 7.4

※ Lifetime shall be 15 years at longest due to deterioration of sealing plates.

■ Fan

Ambient temp.	20°C	30°C	40°C	50°C
Expected service life (yr)	approx. 8.1	approx. 8.1	approx. 8.1	approx. 8.1

● Fig.18 Over Current Protection (V-I Characteristic)

Input: 100 VAC