

## SMBU60 series

V1.1

The SMBU60 series of AC/DC switching mode power supplies provide 63 Watts of continuous output power. All supplies are UL94V-1 min compliant. All models meet FCC Part-18 class B and CISPR-11 EN55011 class B emission Limits and are designed to comply with UL/c-UL(UL 60601-1:2nd Edition), TUV/T-mark(IEC 60601-1:2nd Edition) and CE marking conformity assessment. All units are 100% burned in and tested.

**RoHS2**  
2011/65/EU



## 63W Open Frame Medical Grade Power Supply

### FEATURES:

- \* Wide Operating Voltage, 80 to 275 VAC, 47 to 63 Hz
- \* Internal EMI filter
- \* Single to Quad Output
- \* Power Fail Detect (Optional)
- \* Crowbar Mode Over Voltage Protection
- \* Class I system
- \* 5 year warranty

### APPLICATIONS:

- \* Medical Equipment
- \* Patient Monitor
- \* Ultrasound system
- \* Blood chemistry analyzer
- \* Medical Image

### GENERAL SPECIFICATION:

- \* **Short Circuit Protection:** Auto Recovery
- \* **Cooling:** Free Air Convection
- \* **Protection Classes:** Class I
- \* **Safety:** UL/c-UL(UL 60601-1:2ndEdition), TUV/T-mark(IEC 60601-1:2ndEdition)

### APPROVALS:



### Electrical Characteristics:

Symbol	Characteristic	Condition	Min.	Typ.	Max.	Unit
Vins	Safety Approval Input Voltage Range	Safety Approval & Specification in Label	100		240	VAC
Vin	Input Operate Voltage Range	Detail to see Fig.1 (Derate linearly from 100% load at 90VAC to 80% load at 80VAC)	80		275	VAC
Fi	Input Frequency	Sine wave	47		63	Hz
Po	Output Power Range	See Rating Chart			63	W
Iil	Low Line Input Current	Full Load, Vin=100VAC		1.6		A
Iih	High Line Input Current	Full Load, Vin=240VAC		0.8		A
IrL	Low Line Input Inrush Current	Full Load, 25°C, Cool start, Vin=100VAC			35	A
IrH	High Line Input Inrush Current	Full Load, 25°C, Cool start, Vin=240VAC			70	A
Ik	Safety Ground Leakage Current	Vin=264VAC, Fi=63Hz			0.17	mA
η	Efficiency	Full Load, Vin=230VAC, Detail to see Rating Chart	See Rating Chart			
ΔVoi	Line Regulation	Full Load, Vin=100~120VAC or 200~240VAC			1	%
OVP	Over Voltage Protection		112		132	%
OLP	Over Load Protection	Recovers automatically after fault condition is removed	110		150	%
ttr	Time of Transient Response	Full Load, Vin=110VAC			4	ms
thu	Hold-Up Time	Full Load, Vin=110VAC	See Rating Chart			
ts	Start-up time	Full Load, Vin=100~240VAC			2	s
Ris	Insulation Resistance		50			MΩ
Tc	Temperature Coefficient	All Condition			±0.04	%/°C
HV	Dielectric Withstanding Voltage (P-S)	Primary to Secondary, limit current <10mA			4000	VAC
Vpg	Dielectric Withstanding Voltage (P-G)	Primary to PE, limit current <10mA			1500	VAC
EMI	EMC Emission	Compliance to EN55011 (CISPR11), EN60601-1-2	B			Class

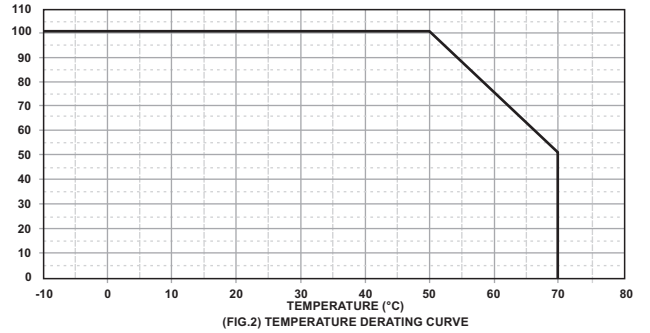
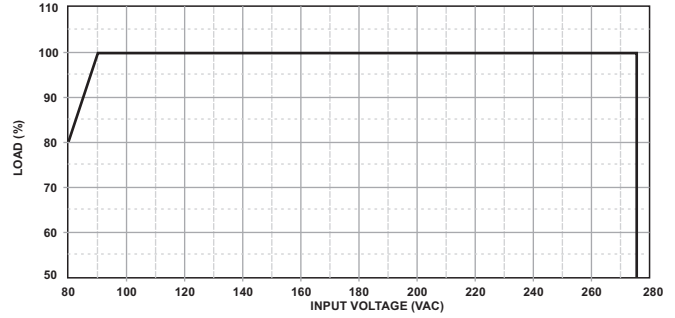
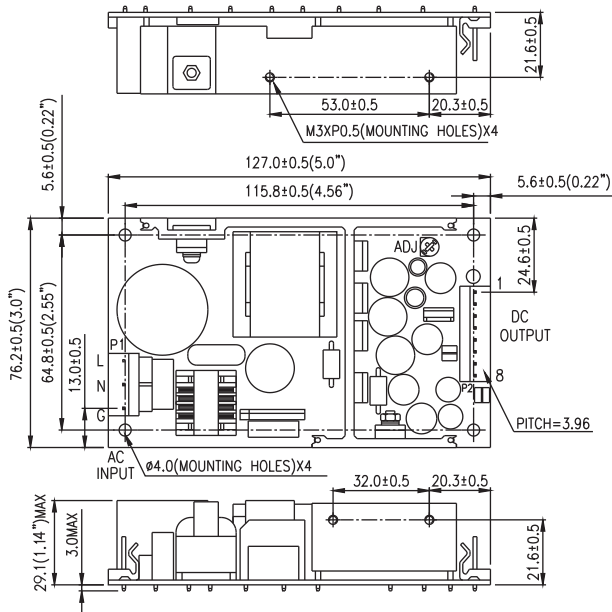
### Environmental:

Symbol	Characteristic	Condition	Min.	Typ.	Max.	Unit
To	Operating Temperature	Detail to see Fig.2 (Derate linearly from 100% load at 50°C to 50% load at 70°C)	-10		70	°C
Ts	Storage Temperature	10 ~ 95% RH	-40		85	°C
Ho	Operating Humidity	non-condensing	0		95%	RH
Hs	Storage Humidity		0		95%	RH
ESDa	Electro Static Discharge	Air Discharge, IEC61000-4-2			8	kV
ESDc	Electro Static Discharge	Contact Discharge, IEC61000-4-2			6	kV
MTBF	Mean Time Between Failure	Operating Temperature at 25°C, Calculated per MIL-HDBK-217F	100k			h
ELEV	Operating Altitude (Elevation)	All condition			3000	m
VBR	Vibration	10 ~ 500Hz, 10min./1cycle, 60min. each along X, Y, Z axes			5	G
VsI	Surge Voltage	Line-Neutral			1	kV
Vsg	Surge Voltage	Line-PE & Neutral-PE			2	kV

### SPECIFICATION NOTE :

1. Output can provide up to peak load when the power supply starts up. Continuous staying in more than rated load is not allowed.
2. At factory, in 60% rated load condition, each output is checked to be within voltage accuracy.
3. Line regulation is defined by changing  $\pm 10\%$  of input voltage from nominal line at rated load.
4. Load regulation is defined by changing  $\pm 40\%$  of measured output load from 60% rated load.
5. Ripple & noise is measured by using 20MHz bandwidth limited oscilloscope and terminated each output with a 0.47uF capacitor at rated load and nominal line.
6. Hold up time is measured from the end of the last charging pulse to the time which the main output drops down to low limit of main output at rated load and nominal line.
7. Efficiency is measured at rated load, and nominal line.

### MECHANICAL DIMENSIONS: ( UNIT: mm )



### PACKING :

1. Dimensions are shown in inches or mm.
2. Net weight: 300g approx.
3. Input connector mates with Molex housing 09-50-3051 and Molex 2478 series crimp terminal.
4. Output connector mates with Molex housing 09-50-3081 and Molex 2478 series crimp terminal.

### PIN CHART

MODEL	PIN	1	2	3	4	5	6	7	8 (Optional)
SMBU60-1XX	OUT	OUT	OUT	RTN	RTN	RTN	RTN	RTN	PFD
SMBU60-2XX	Vo2	Vo1	Vo1	COM	COM	N/C	N/C	N/C	PFD
SMBU60-215	N/C	Vo1	Vo1	COM	COM	Vo3	N/C	N/C	PFD
SMBU60-3XX	Vo2	Vo1	Vo1	COM	COM	Vo3	N/C	N/C	PFD
SMBU60-4XX	Vo2	Vo1	Vo1	COM	COM	Vo3	Vo4	N/C	PFD

Note: Vo1:Output#1 Vo2:Output#2 Vo3:Output#3 Vo4:Output#4

### Rating Chart: (Single Output)

MODEL NO.	Setting Voltage Range (Factory setting, can't be adjusted)		Output Current (Based on the output volt.)		Maximum Output Power (W)	Ripple & Noise (mVp-p)	Total Regulation (%)	Typ. Efficiency (%)	Typ. No Load Consumption (W)	Hold-Up Time (ms)	Protection Mode
	min	max	min	max							
	(VDC)	(VDC)	(A)	(A)							
SMBU60-101	3.0	5.0	10.0	16.66	50	100	±5	73.5	3	16	Hiccup
SMBU60-102	5.0	6.0	9.16	11.00	55	100	±5	73.5	3	16	Hiccup
SMBU60-103	6.0	8.0	7.50	10.00	60	100	±5	73.5	3	16	Hiccup
SMBU60-104	8.0	11.0	5.72	7.87	63	100	±3	73.5	3	16	Hiccup
SMBU60-105	11.0	13.0	4.84	5.72	63	100	±3	73.5	4	16	Hiccup
SMBU60-105-1	11.0	13.0	3.46	4.09	45	100	±3	73.5	4	16	Hiccup
SMBU60-106	13.0	16.0	3.93	4.84	63	100	±3	73.5	4	16	Hiccup
SMBU60-107	16.0	21.0	3.00	3.93	63	100	±3	73.5	4	16	Hiccup
SMBU60-108	21.0	27.0	2.33	3.00	63	100	±2	73.5	5	16	Hiccup
SMBU60-109	27.0	33.0	1.90	2.33	63	100	±2	73.5	5	16	Hiccup
SMBU60-110	33.0	40.0	1.57	1.90	63	100	±2	73.5	6	16	Hiccup

### Rating Chart: (Multi Output)

MODEL NO.	Setting Voltage Range (Factory setting, can't be adjusted)	Output Current (Based on the output volt.)		Maximum Output Power	Ripple & Noise	Total Regulation	Typ. Efficiency	Typ. No Load Consumption	Hold-Up Time	Protection Mode
		min	max							
	(VDC)	(A)	(A)	(W)	(mVp-p)	(%)	(%)	(W)	(ms)	
SMBU60-200	+3.3	1.4	7.0	59.1	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
SMBU60-201	+5.0	0.7	7.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.3	3.0		100	±5				
SMBU60-202	+5.0	0.7	7.0	63	100	±5	73.5	4	16	Hiccup
	+15.0	0.45	3.0		100	±5				
SMBU60-203	+5.0	0.7	7.0	63	100	±5	73.5	4	16	Hiccup
	+24.0	0.4	2.0		100	±5				
SMBU60-204	+3.3	1.4	7.0	63	100	±6	73.5	3	16	Hiccup
	+5.0	0.5	5.0		100	±5				
SMBU60-215	+5.0	0.7	7.0	48.1	100	±5	73.5	4	16	Hiccup
	-24.0	0.2	2.0		100	±5				
SMBU60-300	+3.3	1.2	6.0	63	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
SMBU60-300-1	+3.3	1.2	6.0	63	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
SMBU60-301	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.3	3.0		100	±5				
	-5.0	0.0	0.8		100	±5				
SMBU60-301-1	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.3	3.0		100	±5				
	+5.0	0.0	0.8		100	±5				
SMBU60-302	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
SMBU60-302-1	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
SMBU60-303	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+15.0	0.45	3.0		100	±5				
	-15.0	0.0	0.8		100	±5				
SMBU60-303-1	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+15.0	0.45	3.0		100	±5				
	+15.0	0.0	0.8		100	±5				
SMBU60-305	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+24.0	0.4	2.0		100	±5				
	-12.0	0.0	0.8		100	±5				
SMBU60-305-1	+5.0	1.2	6.0	63	100	±5	73.5	5	16	Hiccup
	+24.0	0.4	2.0		100	±5				
	+12.0	0.0	0.8		100	±5				
SMBU60-306	+3.3	1.2	6.0	59.8	100	±6	73.5	5	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-5.0	0.0	0.8		100	±5				
SMBU60-306-1	+3.3	1.2	6.0	59.8	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+5.0	0.0	0.8		100	±5				
SMBU60-308	+3.3	0.5	5.0	53.5	100	±6	73.5	3	16	Hiccup
	+5.0	0.5	5.0		100	±5				
	-12.0	0.0	1.0		100	±5				
SMBU60-308-1	+3.3	0.5	5.0	53.5	100	±6	73.5	3	16	Hiccup
	+5.0	0.5	5.0		100	±5				
	+12.0	0.0	1.0		100	±5				
SMBU60-400	+3.3	1.2	6.0	63	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	-5.0	0.0	0.8		100	±5				
SMBU60-400-1	+3.3	1.2	6.0	63	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	+5.0	0.0	0.8		100	±5				
SMBU60-400-2	+3.3	1.2	6.0	63	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	-5.0	0.0	0.8		100	±5				
SMBU60-400-3	+3.3	1.2	6.0	63	100	±6	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	+5.0	0.0	0.8		100	±5				

### Rating Chart: (Multi Output)

MODEL NO.	Setting Voltage Range (Factory setting, can't be adjusted)	Output Current (Based on the output volt.)		Maximum Output Power	Ripple & Noise	Total Regulation	Typ. Efficiency	Typ. No Load Consumption	Hold-Up Time	Protection Mode
		min	max							
		(VDC)	(A)							
SMBU60-401	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	-5.0	0.0	0.8		100	±5				
SMBU60-401-1	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.3	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	+5.0	0.0	0.8		100	±5				
SMBU60-401-2	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.3	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	-5.0	0.0	0.8		100	±5				
SMBU60-401-3	+5.0	0.6	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.3	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	+5.0	0.0	0.8		100	±5				
SMBU60-402	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	-12.0	0.0	0.8		100	±5				
SMBU60-402-1	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	+12.0	0.0	0.8		100	±5				
SMBU60-402-2	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	-12.0	0.0	0.8		100	±5				
SMBU60-402-3	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	+12.0	0.0	0.8		100	±5				
SMBU60-403	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	-24.0	0.0	0.8		100	±5				
SMBU60-403-1	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	-12.0	0.0	0.8		100	±5				
	+24.0	0.0	0.8		100	±5				
SMBU60-403-2	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	-24.0	0.0	0.8		100	±5				
SMBU60-403-3	+5.0	1.2	6.0	63	100	±5	73.5	4	16	Hiccup
	+12.0	0.6	3.0		100	±5				
	+12.0	0.0	0.8		100	±5				
	+24.0	0.0	0.8		100	±5				
SMBU60-404	+5.0	0.6	6.0	63	50	±5	78	4	16	Hiccup
	+15.0	0.45	3.0		100	±5				
	-15.0	0.0	0.8		100	±5				
	-5.0	0.0	0.8		50	±5				
SMBU60-404-1	+5.0	0.6	6.0	63	50	±5	78	4	16	Hiccup
	+15.0	0.45	3.0		100	±5				
	-15.0	0.0	0.8		100	±5				
	+5.0	0.0	0.8		50	±5				
SMBU60-404-2	+5.0	0.6	6.0	63	50	±5	78	4	16	Hiccup
	+15.0	0.45	3.0		100	±5				
	+15.0	0.0	0.8		100	±5				
	-5.0	0.0	0.8		50	±5				
SMBU60-404-3	+5.0	0.6	6.0	63	50	±5	78	4	16	Hiccup
	+15.0	0.45	3.0		100	±5				
	+15.0	0.0	0.8		100	±5				
	+5.0	0.0	0.8		50	±5				