

270V Wide Input Series DC/DC Converter

1 Features

- Input voltage range: 155~425V
- Typical input direct voltage: 270V
- Output voltage: 5V, 15V, 48V
- Output power: 400W, 150W, 300W
- Output voltage regulation range: -20%~10%
- Input under-voltage protection
- Output over-current/over-voltage protection
- Thermal protection
- Working temperature (T_C): -55~100°C
- Fix-frequency PWM control method
- Standard-brick size
- Pins function: compatibility with similar products of SynQor



119.02×63.14×13.05mm³

Weight: ≤270g

Table 1 product category

MI-270-05-FT-N-M-FB
MO-270-15-QT-N-M
MI-270-48-HT-N-M-F

2 Scope of application

For high reliability electronic systems in aviation, aerospace, etc.

3 Descriptions

270V Wide Input Series DC/DC Converters use two stages circuit topology, the first stage is voltage regulation stage, the second stage is input-output isolation stage. Output voltage produce error amplifying signal by error amplifier. This signal is use for control the duty ratio of PWM waveform thus controlling the output voltage of the whole module.

These series products has module circuits structure with PCB surface mounted technology, inside the products, using conductivity material for embedding and aluminum baseboard for cooling. The products' outlines are compatible with similar products' of SynQor, and their pins can be replacement.

4 Technical Specifications

Table 2: Rated conditions and Operating conditions

Absolute maximum rating	Operating conditions
Input Voltage: 475V Output Power: 440W, 165W, 330W Storage temperature: -65~135°C Lead welding temperature (10s) : 300°C Junction Temperature: <150°C	Input voltage: 155~425V Working temperature (Tc) : -55~100°C

No.	Character		Symbol	Conditions (Unless otherwise specified , -55°C≤T _c ≤125°C, V _{IN} =270V±10V)	Limit value		Unit	
					min	max		
1	Input under-voltage/V	turn-on voltage	V _{INL-ONT}	T _A =25°C	146	154	V	
		Turn-off voltage	V _{INL-OFF}	T _A =25°C	135	145	V	
2	Output Voltage		V _O	Full-load	T _A =25°C	4.95	5.05	V
					T _c =-55°C T _c =100°C	4.925	5.075	
3	Output Current		I _O	V _{in} =155V~425V	-	80	A	
4	Voltage regulation		S _v	155V 425V, Full-load T _A =25°C、 T _c =-55°C和 T _c =100°C	-	±0.30	%	
5	Load regulation		S ₁	No-load Full-load T _A =25°C、 T _c =-55°C和 T _c =100°C	-	±0.30	%	
6	Output voltage regulation range ^a		V _{TR}	T _A =25°C, 50% load	-20	10	%	
7	Output ripple voltage		V _{PP}	BW≤20MHz, full-load, peak-peak T _A =25°C、 T _c =-55°C T _c =100°C	-	400	mV	
8	Output over-voltage protection point		V _{OVp}	T _A =25°C, design guarantee	5.6	6.9	V	
9	Output current for over-current protection		I _{imax}	T _A =25°C	88	112	A	
10	Capacitive Load		C _O	T _A =25°C, Full-load	-	10000	μF	
11	efficiency		η	V _{in} =270V, Full-load, T _A =25°C	88	-	%	

a test only be needed when identified inspection or parameters are effected by changing process; b design guarantee, do not require test

table 3a electrical characteristics (MI-270-05-FT-N-M-FB)

table 3b function characteristics (MI-270-05-FT-N-M-FB)

characteristics	Conditions (Unless otherwise specified , -55°C≤T _c ≤125°C, V _{IN} =270V±10V)	criteria
Using function	ON/OFF voltage is over 2.4V, T _A =25°C,	No output
	ON/OFF voltage is lower than 0.7V or hung in the air, T _A =25°C	Normal Output

table 3c electrical characteristics (MO-270-15-QT-N-M)

No.	characteristics		Symbol	conditions (Unless otherwise specified , -55°C≤T _c ≤125°C, V _{IN} =270V±10V)	Limit value		Unit
					min	max	
1	Input under-voltage/V	turn-on voltage	V _{INL-ON}	T _A =25°C	145	155	V
		Turn-off voltage	V _{INL-OFF}	T _A =25°C	133	147	V
2	Output voltage		V _O	Full-Load T _A =25°C T _c =-55°C T _C =100°C	14.85 14.775	15.15 15.225	V
3	Output current		I _O	V _{in} =155V~425V	-	10	A
4	Voltage regulation		S _V	155V 425V, Full-load T _A =25°C、T _c =-55°C和 T _C =100°C	-	±0.30	%
5	Load regulation		S _I	No-load Full-load T _A =25°C、T _c =-55°C和 T _C =100°C	-	±0.30	%
6	Output voltage regulation range ^a		V _{TR}	T _A =25°C, 50% load	-20	10	%
7	Output ripple voltage		V _{PP}	BW≤20MHz, full-load, peak-peak T _A =25°C、T _c =-55°C和 T _C =100°C	-	120	mV
8	Output over-voltage ^b protection point		V _{OVP}	T _A =25°C, design guarantee	115	137	V

9	Output current for over-current protection	I_{imax}	$T_A=25^{\circ}\text{C}$	11	14	A
10	Capacitive Load	C_o	$T_A=25^{\circ}\text{C}$, Full-load	-	2000	μF
11	efficiency	η	$V_{in}=270\text{V}$, Full-load, $T_A=25^{\circ}\text{C}$	85	-	%
a test only be needed when identified inspection or parameters are effected by changing process;						
b design guarantee, do not require test						

Table 3d function characteristics (MX-270H-12-FP-N-M-F)

characteristics	Conditions (Unless otherwise specified , $-55^{\circ}\text{C}\leq T_c\leq 125^{\circ}\text{C}$, $V_{IN}=270\text{V}\pm 10\text{V}$)	criteria
Using function	ON/OFF voltage is over 2.4V, $T_A=25^{\circ}\text{C}$	No output
	ON/OFF voltage is lower than 0.7V or hung in the air, $T_A=25^{\circ}\text{C}$	Output voltage is Normal

table 3e electrical characteristic (MO-270-48-HT-N-M)

No.	Character		Symbol	(Unless otherwise specified , $-55^{\circ}\text{C}\leq T_c\leq 125^{\circ}\text{C}$, $V_{IN}=270\text{V}\pm 10\text{V}$)	Limit value		Unit	
					min	max		
1	Input under-voltage/ V	turn-on voltage	$V_{INL-ONT}$	$T_A=25^{\circ}\text{C}$	145	155	V	
		Turn-off voltage	$V_{INL-OFF}$	$T_A=25^{\circ}\text{C}$	133	147	V	
2	Output Voltage		V_o	Full-load	$T_A=25^{\circ}\text{C}$	47.52	48.48	V
					$T_c=-55^{\circ}\text{C}$ $T_c=100^{\circ}\text{C}$	47.280	48.720	
3	Output Current		I_o	$V_{in}=155\text{V}\sim 425\text{V}$	-	6.3	A	
4	Voltage regulation		S_v	155V 425V, Full-load $T_A=25^{\circ}\text{C}$ 、 $T_c=-55^{\circ}\text{C}$ $T_c=100^{\circ}\text{C}$	-	± 0.30	%	
5	Load regulation		S_1	No-load Full-load $T_A=25^{\circ}\text{C}$ 、 $T_c=-55^{\circ}\text{C}$ $T_c=100^{\circ}\text{C}$	-	± 0.30	%	
6	Output Voltage trimming range		V_{TR}	$T_A=25^{\circ}\text{C}$, 50% Load	-20	10	%	
7	Output ripple voltage		V_{PP}	BW $\leq 20\text{MHz}$, full-load, peak-peak	-	700	mV	

			$T_A=25^{\circ}\text{C}$ 、 $T_C=-55^{\circ}\text{C}$ $T_C=100^{\circ}\text{C}$			
8	Output over-voltage protection point	V_{OVP}	$T_A=25^{\circ}\text{C}$, design guarantee	55.8	64.2	V
9	Output current for over-current protection	I_{imax}	$T_A=25^{\circ}\text{C}$	6.9	9.2	A
10	Capacitive Load	C_o	$T_A=25^{\circ}\text{C}$, Full-load	-	1000	μF
11	Efficiency	η	$V_{in}=270\text{V}$, Full-load, $T_A=25^{\circ}\text{C}$	89	-	%
a test only be needed when identified inspection or parameters are effected by changing process; b design guarantee, do not require test						

table 3f function characteristics (MI-270-48-HT-N-M-F)

characteristics	conditions (Unless otherwise specified , $-55^{\circ}\text{C}\leq T_c\leq 125^{\circ}\text{C}$, $V_{IN}=270\text{V}\pm 10\text{V}$)	criteria
Using function	ON/OFF voltage is over 2.4V, $T_A=25^{\circ}\text{C}$	No output
	ON/OFF voltage is lower than 0.7V or hung in the air, $T_A=25^{\circ}\text{C}$	Output voltage is Normal

5 Circuit block diagram

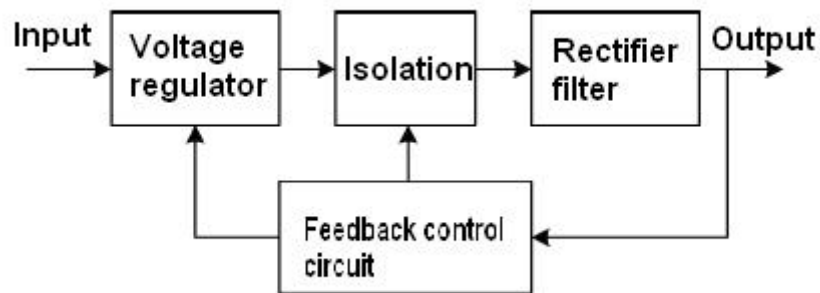


Diagram 2 Product schematic diagram

6 Typical Characteristic Curve

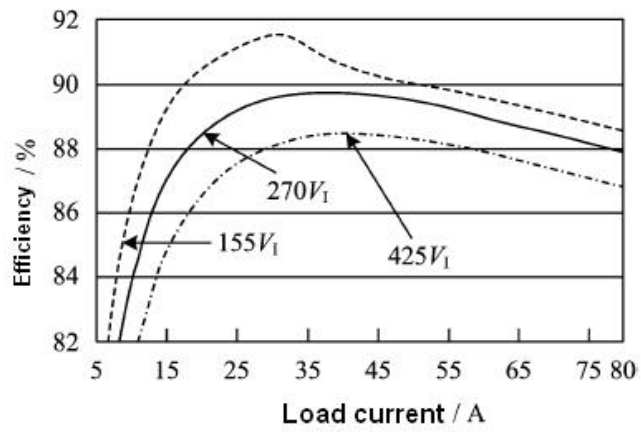


Diagram 3 MI-270-05-FT-N-M-FB efficiency (Output Power)

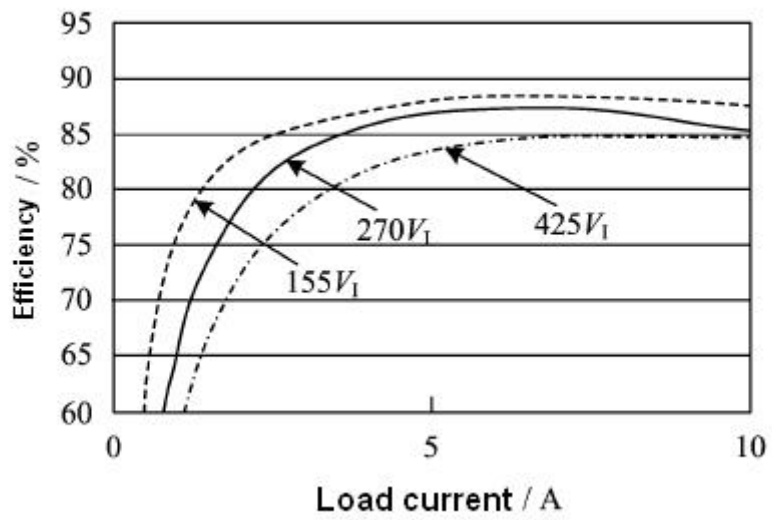


Diagram 4 MO-270-15-QT-N-M efficiency (Output Power)

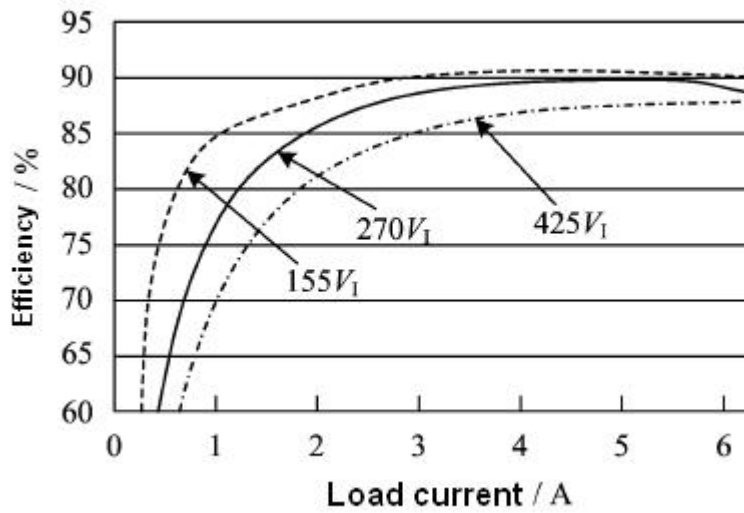


Diagram 5 MI-270-48-HT-N-M-F efficiency (Output Power)

7.MTBF Curve

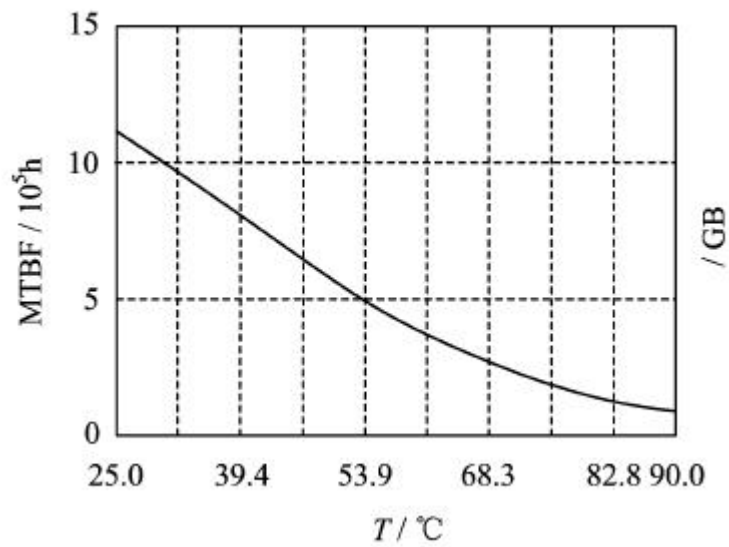


Diagram 6 MTBF Curve

(Predicting the ground is in good condition)

8 Pin Designation

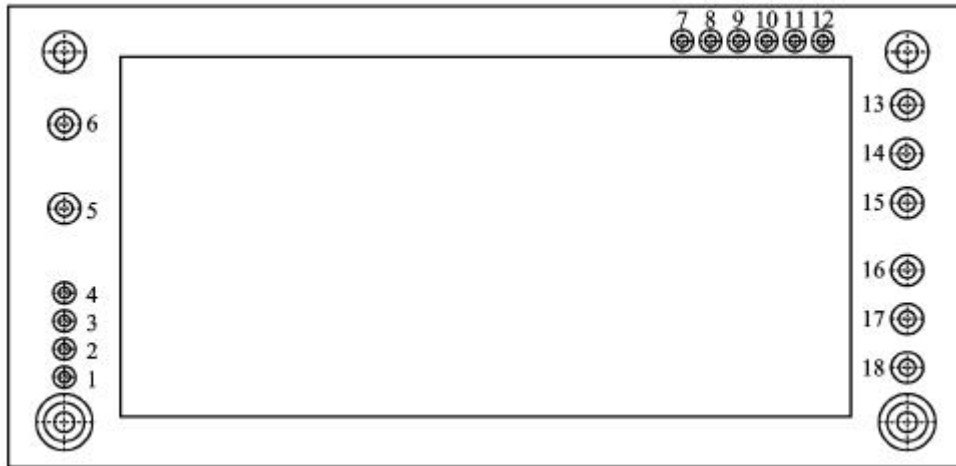


Figure 7 MI-270-05-FT-N-M-FB Out Bottom View

Table 4 MI-270-05-FT-N-M-FB Pin Designation

Pin	Symbol	Designation
1	SyncIn	Synchronizing signal Input
2	SyncOut	Synchronizing signal Output
3	ON/OFF (+)	Positive Enabling(relative to ON/OFF(-))
4	ON/OFF(-)	Negative Enabling (isolation common)
5	Vin (+)	Positive Input
6	Vin (-)	Negative Input
7	Vaux	Auxiliary power output (relative to output common)
8	Start Sync	Synchronizing signal start
9	I Share	Paralleled current sharing Signal
10	TRIM	Output voltage regulation
11	SENSE(+)	Positive Output Induction
12	SENSE(-)	Negative Output Induction
13	Vout (-)	Negative Output
14	Vout (-)	Negative Output
15	Vout (-)	Negative Output
16	Vout (+)	Positive Output
17	Vout (+)	Positive Output
18	Vout (+)	Positive Output

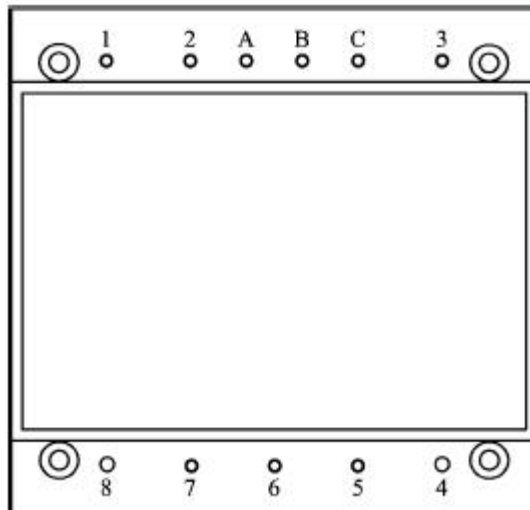


Figure 8 MO-270-15-QT-N-M Out Bottom View

Table 5 MO-270-15-QT-N-M Pin Designation

Pin	Symbol	Designation
1	Vin+	Positive Input
2	ON/OFF	Positive Enabling
A	ClockSync	Synchronizing signal
B	StartSync	Synchronizing start
C	Ishare	Paralleled current sharing
3	Vin-	Negative Input
4	Vo-	Negative Output
5	S-	Negative Output Induction
6	Trim	Output voltage regulation
7	S+	Positive Output Induction
8	Vo+	Positive Output

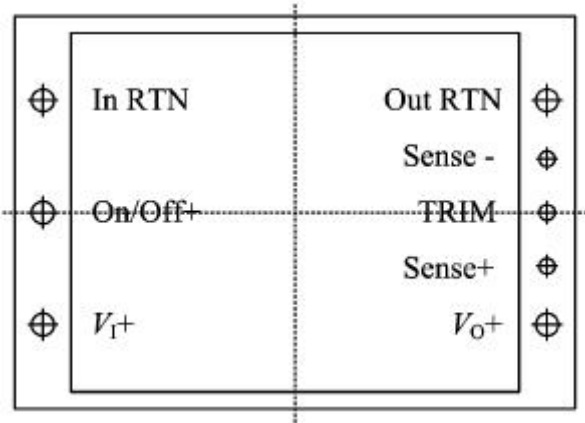


图 8 MI-270-48-HT-N-M-F Upward view

9 Typical Connection Diagram

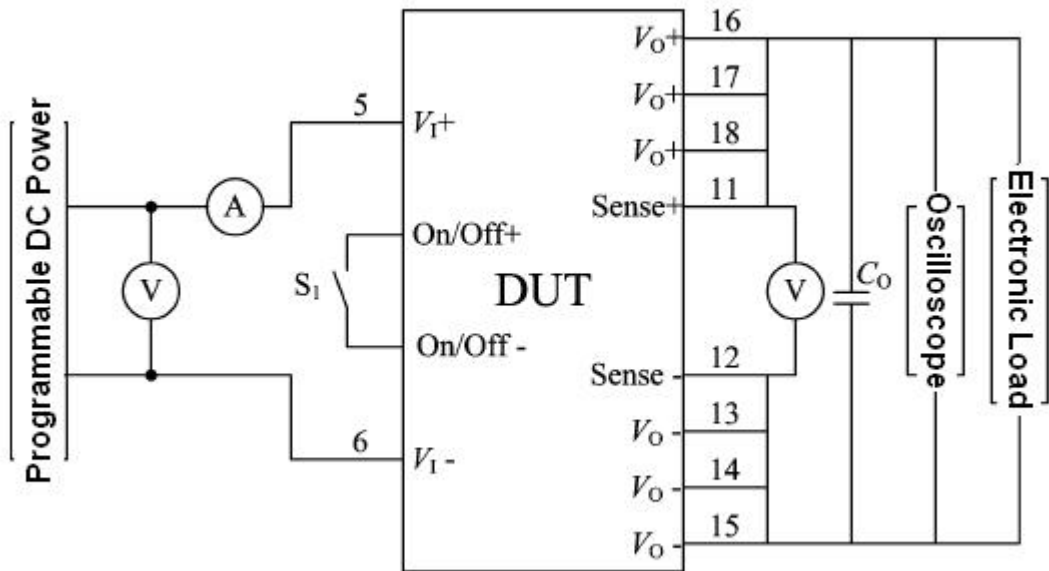


Diagram 10: Electrical testing connection diagram

10. Package Specifications

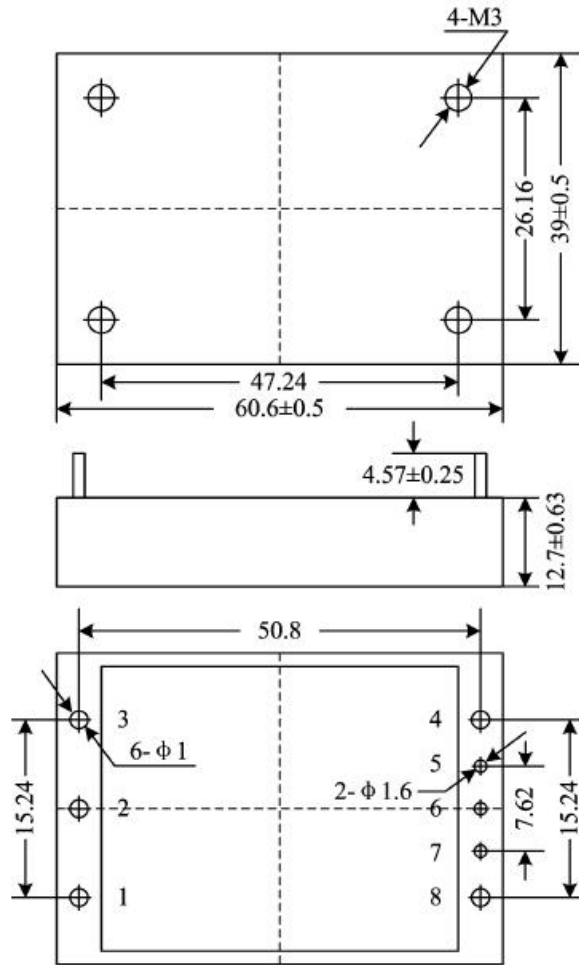


Diagram 12: MO-270-15-QT-N-M Package outline drawing

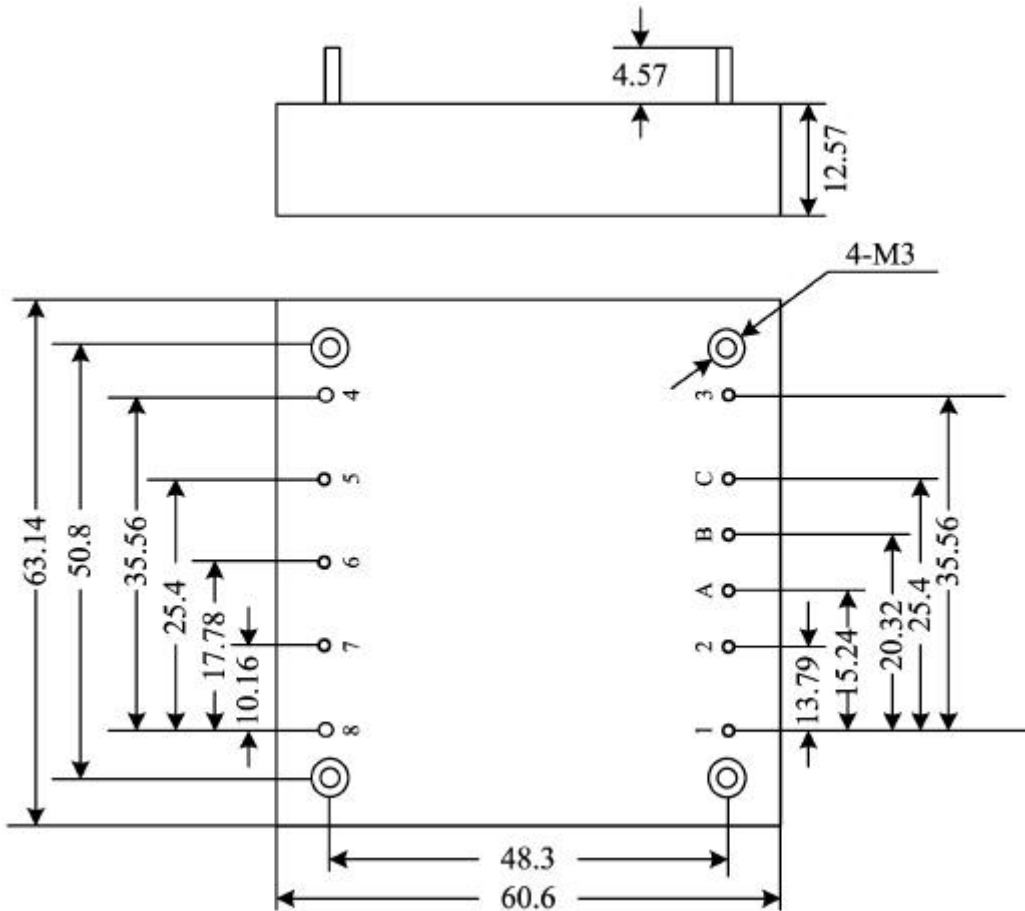


Diagram 13: MI-270-48-HT-N-M-F Package outline drawing

11 Ordering Information

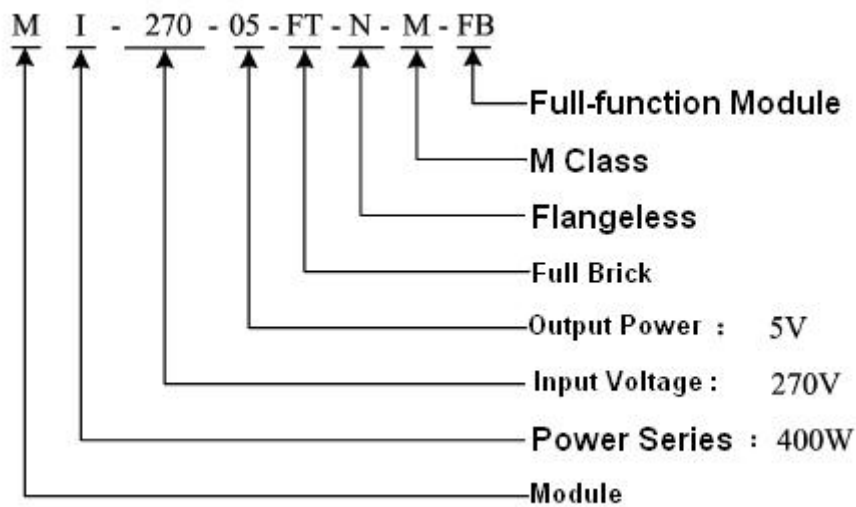


Diagram 14: Ordering Information

Application Notes:

- ☆ The influence of external disturbance on the test accuracy should be avoided.
- ☆ The voltage detection point should be kept at the root of the pin of the testing product.
- ☆ Do not plug the product with electricity.
- ☆ Before power the testing product, you must confirm the polarity of the power supply to avoid damaging products by misconnection. At the same time, please ensure that the power supply voltage and load current does not exceed using limitation of the testing product.
- ☆ Package temperature can not exceed the specified temperature in use, otherwise the heat sink should be needed.
- ☆ When ordering this device , the detailed electrical specifications shall be based on relevant standards..