



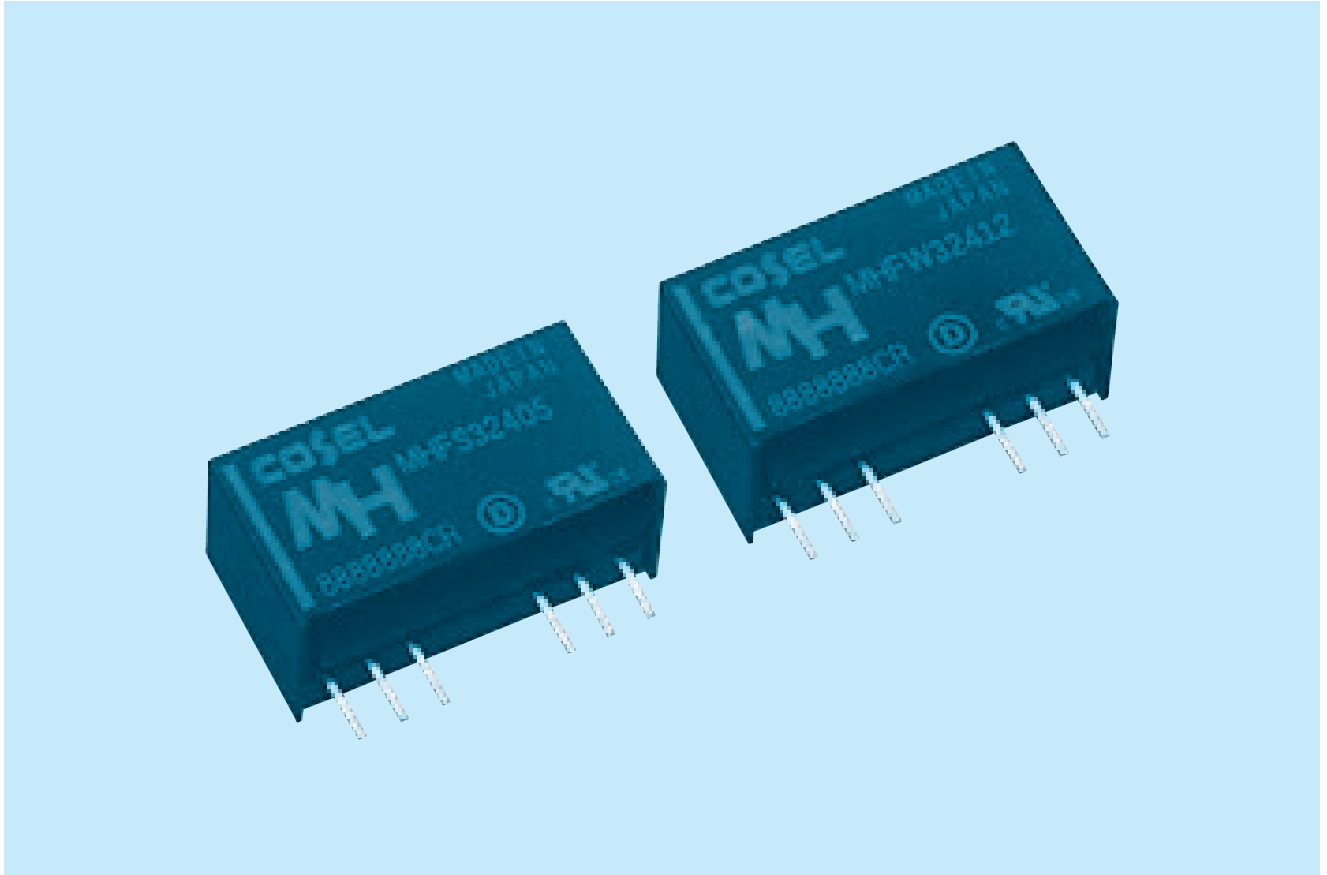
Isolated

Safety
Approvals

OCP

Remote
ON/OFFWide 4 :1
input

MH-series



Feature

Industry Standard SIP8
Wide input range DC4.5-18V/DC9-36V//DC18-76V
I/O isolation voltage AC3,000V (1 minute), DC4,200V (1 minute)
Build-in overcurrent protection circuits (recovers automatically)

CE marking

Low voltage Directive
RoHS Directive

Safety agency approvals

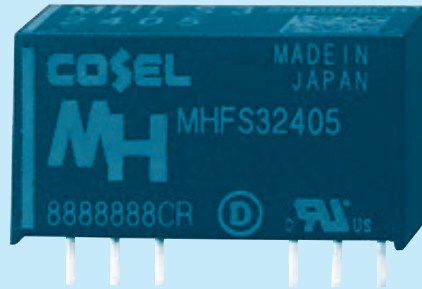
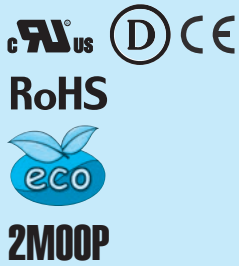
UL62368-1, EN62368-1, c-UL (equivalent to CAN/CSA-C22.2 No.62368-1),
ANSI/AAMI ES60601-1, EN60601-1 3rd, c-UL (equivalent to CAN/CSA-C22.2 No.60601-1)

5-years warranty

MHFS3

MHF S 3 24 05

① ② ③ ④ ⑤



- ① Series name
② Single output
③ Output wattage
④ Input voltage
⑤ Output voltage

MODEL	MHFS3123R3	MHFS31205	MHFS31209	MHFS31212	MHFS31215	MHFS3243R3	MHFS32405	MHFS32409	MHFS32412	MHFS32415
MAX OUTPUT WATTAGE[W]	2.64	3.00	2.97	3.00	3.00	2.64	3.00	2.97	3.00	3.00
DC OUTPUT	VOLTAGE[V]	3.3	5	9	12	15	3.3	5	9	12
	CURRENT[A]	0.8	0.6	0.33	0.25	0.2	0.8	0.6	0.33	0.2

SPECIFICATIONS

	MODEL	MHFS3123R3	MHFS31205	MHFS31209	MHFS31212	MHFS31215	MHFS3243R3	MHFS32405	MHFS32409	MHFS32412	MHFS32415
INPUT	VOLTAGE[V]	DC4.5 - 18 (Surge voltage 25V, 100ms max)					DC9 - 36 (Surge voltage 50V, 100ms max)				
	CURRENT[A]	*1 0.29typ	0.32typ	0.31typ	0.31typ	0.31typ	0.15typ	0.16typ	0.16typ	0.16typ	0.16typ
	EFFICIENCY[%]	*1 77typ	79typ	81typ	82typ	81.5typ	77.5typ	79typ	81.5typ	82typ	81typ
OUTPUT	VOLTAGE[V]	3.3	5	9	12	15	3.3	5	9	12	15
	CURRENT[A]	0.8	0.6	0.33	0.25	0.2	0.8	0.6	0.33	0.25	0.2
	LINE REGULATION[mV]	20max	20max	40max	48max	60max	20max	20max	40max	48max	60max
	LOAD REGULATION[mV]	20max	20max	40max	48max	60max	20max	20max	40max	48max	60max
	RIPPLE[mVp-p]	*2 120max	120max	150max	150max	150max	120max	120max	150max	150max	150max
	RIPPLE NOISE[mVp-p]	*2 200max	200max	200max	200max	200max	200max	200max	200max	200max	200max
	TEMPERATURE	-20 to +65°C	50max	50max	100max	150max	180max	50max	50max	100max	180max
	REGULATION[mV]	-40 to +65°C	80max	80max	160max	240max	290max	80max	80max	160max	240max
	DRIFT[mV]	*3 20max	20max	40max	48max	60max	20max	20max	40max	48max	60max
	START-UP TIME[ms]	30max (Minimum input, I _o =100%)									
	OUTPUT VOLTAGE ADJUSTMENT RANGE	Fixed (TRM pin open) Available to adjust by external variable resistor -5%/+10% -5%/+20% -5%/+20% -5%/+20% -5%/+20% -5%/+10% -5%/+20% -5%/+20% -5%/+20% -5%/+20%									
	OUTPUT VOLTAGE SETTING[V]	3.21 - 3.42	4.90 - 5.21	8.73 - 9.27	11.64 - 12.36	14.55 - 15.45	3.21 - 3.42	4.90 - 5.21	8.73 - 9.27	11.64 - 12.36	14.55 - 15.45
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically									
	REMOTE ON/OFF	Provided (Negative logic L:ON, H:OFF)									

MODEL	MHFS3483R3	MHFS34805	MHFS34809	MHFS34812	MHFS34815
MAX OUTPUT WATTAGE[W]	2.64	3.00	2.97	3.00	3.00
DC OUTPUT	VOLTAGE[V]	3.3	5	9	12
	CURRENT[A]	0.8	0.6	0.33	0.25

SPECIFICATIONS

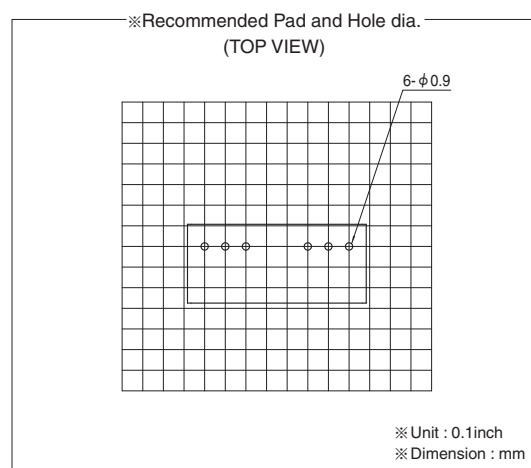
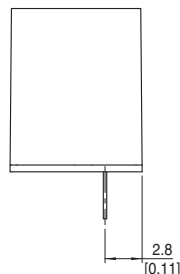
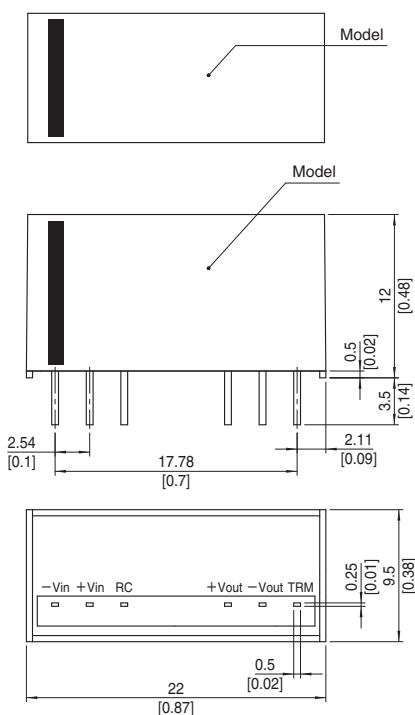
	MODEL	MHFS3483R3	MHFS34805	MHFS34809	MHFS34812	MHFS34815
INPUT	VOLTAGE[V]	DC18 - 76 (Surge voltage 100V, 100ms max)				
	CURRENT[A]	*1 0.072typ	0.080typ	0.076typ	0.076typ	0.077typ
	EFFICIENCY[%]	*1 77typ	79typ	82typ	82.5typ	81.5typ
OUTPUT	VOLTAGE[V]	3.3	5	9	12	15
	CURRENT[A]	0.8	0.6	0.33	0.25	0.2
	LINE REGULATION[mV]	20max	20max	40max	48max	60max
	LOAD REGULATION[mV]	20max	20max	40max	48max	60max
	RIPPLE[mVp-p]	*2 120max	120max	150max	150max	150max
	RIPPLE NOISE[mVp-p]	*2 200max	200max	200max	200max	200max
	TEMPERATURE	-20 to +65°C	50max	50max	100max	150max
	REGULATION[mV]	-40 to +65°C	80max	80max	160max	240max
	DRIFT[mV]	*3 20max	20max	40max	48max	60max
	START-UP TIME[ms]	30max (Minimum input, I _o =100%)				
	OUTPUT VOLTAGE ADJUSTMENT RANGE	Fixed (TRM pin open) Available to adjust by external variable resistor -5%/+10% -5%/+20% -5%/+20% -5%/+20% -5%/+20%				
	OUTPUT VOLTAGE SETTING[V]	3.21 - 3.42	4.90 - 5.21	8.73 - 9.27	11.64 - 12.36	14.55 - 15.45
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically				
	REMOTE ON/OFF	Provided (Negative logic L:ON, H:OFF)				

GENERAL SPECIFICATIONS

ISOLATION	INPUT-OUTPUT	AC3,000V 1minute Cutoff current=1mA, DC4,200 1minute Cutoff current=1mA, DC500V 1,000M Ω (20 $\pm$ 15°C) 2MOOP (AC250V, 4,000m max)
ISOLATION CAPACITANCE	INPUT-OUTPUT	20pFmax
ENVIRONMENT	OPERATING TEMP., HUMID. AND ALTITUDE	-40 to +85°C, 20 to 95%RH (Non condensing) (Required derating)
	STORAGE TEMP., HUMID. AND ALTITUDE	-40 to +100°C, 20 to 95%RH (Non condensing)
	VIBRATION	10 - 55Hz 98.0m/s ² (10G), 3minute period, 60minutes each along X, Y and Z axis
	IMPACT	490.3m/s ² (50G) 11ms, once each along X, Y and Z axis
SAFETY	AGENCY APPROVALS	UL62368-1, EN62368-1, c-UL (equivalent to CAN/CSA-C22.2 No.62368-1), ANSI/AAMI ES60601-1, EN60601-1 3rd, c-UL (equivalent to CAN/CSA-C22.2 No.60601-1)
OTHERS	CASE SIZE/WEIGHT	22.0 $\times$ 12.0 $\times$ 9.5mm [0.87 $\times$ 0.48 $\times$ 0.38 inches] (W $\times$ H $\times$ D) / 7g max
	COOLING METHOD	Convection/Forced air

- *1 Rated input 12V, 24V or 48V DC Io=100%
- *2 Ripple and ripple noise is measured by using test board with ceramic capacitor 0.1 μ F at 50mm from output pins.
- *3 Drift is the DC output accuracy for eight hours period after a half-hour warm-up at 25°C.
- * Parallel operation with other model is not possible.
- * MHFW3xx12/MHFW3xx15 is available as single output, +24V/+30V

External view



- ※ Tolerance ± 0.5 [± 0.02]
- ※ Dimensions in mm, []= inches
- ※ Pin terminal material : Copper
- ※ Plating treatment of terminal : Lead free plating
- ※ Case material : PBT
- ※ Weight 7g max

MHFW3

MHF W 3 24 12

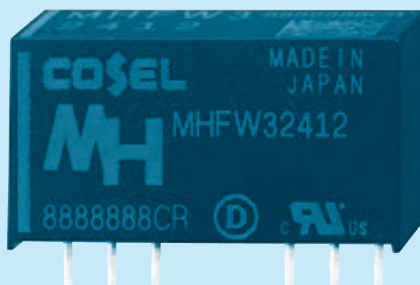
① ② ③ ④ ⑤



RoHS



2MOOP



- ① Series name
② Dual output
③ Output wattage
④ Input voltage
⑤ Output voltage

MODEL	MHFW31212	MHFW31215	MHFW32412	MHFW32415	MHFW34812	MHFW34815
MAX OUTPUT WATTAGE[W]	3.12	3.00	3.12	3.00	3.12	3.00
DC OUTPUT	VOLTAGE[V] *1	±12 or +24	±15 or +30	±12 or +24	±15 or +30	±12 or +24
	CURRENT[A]	0.13	0.1	0.13	0.1	0.13

SPECIFICATIONS

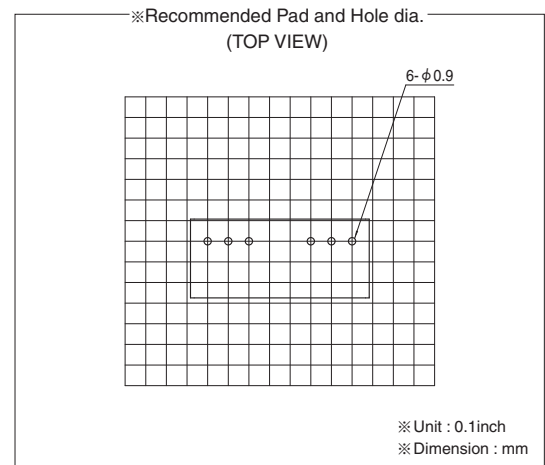
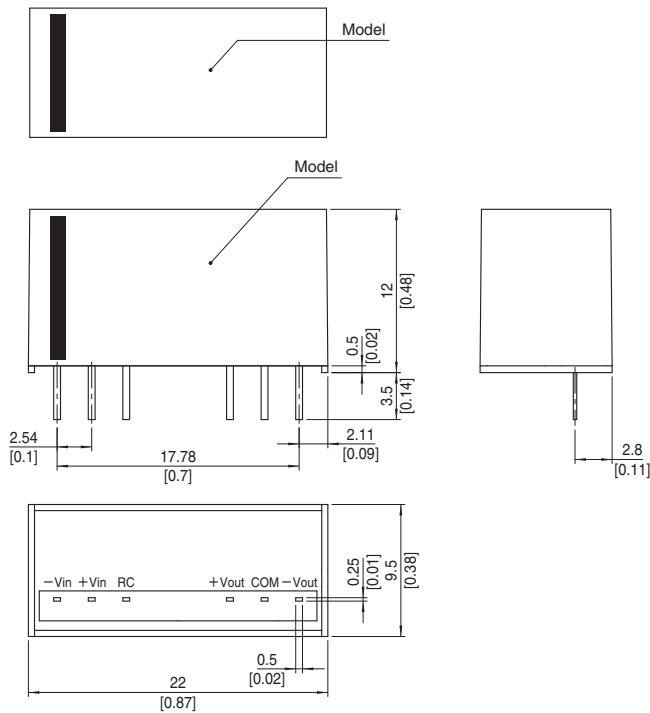
	MODEL	MHFW31212	MHFW31215	MHFW32412	MHFW32415	MHFW34812	MHFW34815
INPUT	VOLTAGE[V]	DC4.5 - 18 (Surge voltage 25V, 100ms max)		DC9 - 36 (Surge voltage 50V, 100ms max)		DC18 - 76 (Surge voltage 100V, 100ms max)	
	CURRENT[A] *2	0.32typ	0.31typ	0.16typ	0.16typ	0.081typ	0.079typ
	EFFICIENCY[%] *2	80.5typ	80typ	80typ	79typ	81typ	80typ
OUTPUT	VOLTAGE[V]	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)
	CURRENT[A]	0.13	0.1	0.13	0.1	0.13	0.1
	LINE REGULATION[mV]	60max	75max	60max	75max	60max	75max
	LOAD REGULATION[mV] *3	480max	600max	480max	600max	480max	600max
	REGULATION[mV] *4	600max	750max	600max	750max	600max	750max
	RIPPLE[mVp-p] *5	180max	180max	180max	180max	180max	180max
	RIPPLE NOISE[mVp-p] *5	210max	210max	210max	210max	210max	210max
	TEMPERATURE REGULATION[mV] -20 to +65°C	180max	220max	180max	220max	180max	220max
	REGULATION[mV] -40 to +65°C	290max	340max	290max	340max	290max	340max
	DRIFT[mV] *6	48max	60max	48max	60max	48max	60max
PROTECTION CIRCUIT AND OTHERS	START-UP TIME[ms]	30max (Minimum input, I _o =100%)					
	OUTPUT VOLTAGE SETTING[V]	11.64 - 12.36	14.55 - 15.45	11.64 - 12.36	14.55 - 15.45	11.64 - 12.36	14.55 - 15.45
	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically					
	REMOTE ON/OFF	Provided (Negative logic L:ON, H:OFF)					

GENERAL SPECIFICATIONS

ISOLATION	INPUT-OUTPUT	AC3,000V 1minute Cutoff current=1mA, DC4,200 1minute Cutoff current=1mA, DC500V 1,000M Ω (20 $\pm$ 15°C) 2MOOP (AC250V, 4,000m max)
ISOLATION CAPACITANCE	INPUT-OUTPUT	20pFmax
ENVIRONMENT	OPERATING TEMP., HUMID. AND ALTITUDE	-40 to +85°C, 20 to 95%RH (Non condensing) (Required derating)
	STORAGE TEMP., HUMID. AND ALTITUDE	-40 to +100°C, 20 to 95%RH (Non condensing)
	VIBRATION	10 - 55Hz 98.0m/s ² (10G), 3minute period, 60minutes each along X, Y and Z axis
	IMPACT	490.3m/s ² (50G) 11ms, once each along X, Y and Z axis
SAFETY	AGENCY APPROVALS	UL62368-1, EN62368-1, c-UL (equivalent to CAN/CSA-C22.2 No.62368-1), ANSI/AAMI ES60601-1, EN60601-1 3rd, c-UL (equivalent to CAN/CSA-C22.2 No.60601-1)
OTHERS	CASE SIZE/WEIGHT	22.0 $\times$ 12.0 $\times$ 9.5mm [0.87 $\times$ 0.48 $\times$ 0.38 inches] (W $\times$ H $\times$ D) / 7g max
	COOLING METHOD	Convection/Forced air

- *1 Single output +24V, +30V with no use of COM.
- *2 Rated input 12V or 24V or 48V DC Io=100%
- *3 Symmetrical loading from 20% to 100%.
- *4 Symmetrical loading from 0% to 100%.
- *5 Ripple and Ripple Noise is measured by using test board with ceramic capacitor 0.1 μ F at 50mm from output pins.
- *6 Drift is the DC output accuracy for eight hours period after a half-hour warm-up at 25°C.
- * Parallel operation with other model is not possible.

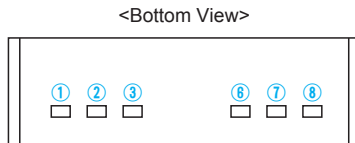
External view



- ※ Tolerance ± 0.5 [± 0.02]
- ※ Dimensions in mm, []= inches
- ※ Pin terminal material : Copper
- ※ Planting treatment of terminal : Lead free plating
- ※ Case material : PBT
- ※ Weight 7g max

Pin Connection

●MH3 Single Output, Dual Output



Pin No.	Pin Name	Function
①	-Vin	-DC Input
②	+Vin	+DC Input
③	RC	Remote ON/OFF
⑥	+Vout	+DC Output
⑦	-Vout	-DC Output (for Single Output)
	COM	GND of Output Voltage (for Dual Output)
⑧	TRM	Output Voltage Adjustment (for Single Output)
	-Vout	-DC Output (for Dual Output)

Assembling and Installation Method

Installation

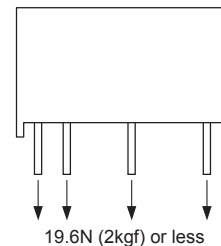
- When two or more power supplies are used side by side, position them with proper intervals to allow enough air ventilation. Ambient temperature around each power supply should not exceed the temperature range shown in "Derating".
- Avoid placing the DC input line pattern layout underneath the unit. It will increase the line conducted noise. Make sure to leave an ample distance between the line pattern layout and the unit. Also avoid placing the DC output line pattern underneath the unit because it may increase the output noise. Lay out the pattern away from the unit.
- Avoid placing the signal line pattern layout underneath the unit because the power supply might become unstable. Lay out the pattern away from the unit.

Soldering Conditions

- (1) Flow Soldering : 260°C 15 seconds or less
- (2) Soldering Iron : maximum 360°C 5 seconds or less

Stress to Pin

- Applying excessive stress to the input or output pins of the power module may damage internal connections. Avoid applying stress in excess of that shown in right figure.
- Input/output pin are soldered to the PCB internally.
Do not pull or bend a lead powerfully.
- If it is expected that stress is applied to the input/output pin due to vibration or impact, reduce the stress to the pin by taking such measures as fixing the unit to the PCB by silicone rubber, etc.
- Due to prevent failure, PS should not be pulled after soldering with PCB.



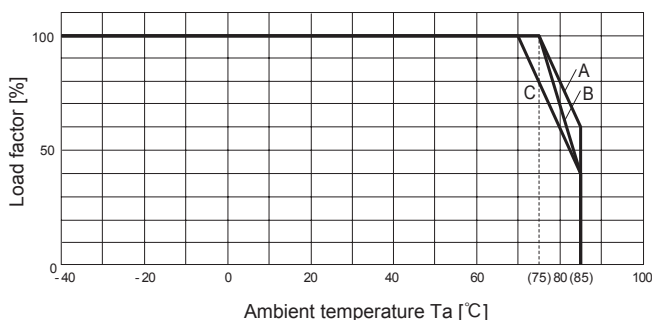
Derating

Ambient temperature derating curve

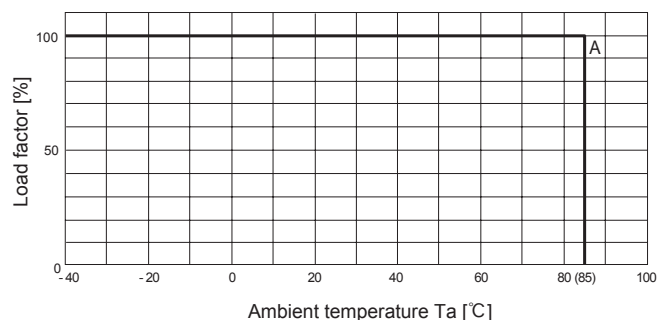
- It is necessary to note thermal fatigue life by power cycle. Please reduce the temperature fluctuation range as much as possible when the up and down of temperature are frequently generated.
- In case of forced air, ventilation must keep the temperature of point below the temperatures shown in Instruction Manual 7.

●MHFS3/MHFW3 (Rated Input Voltage)

(1) In the case of Convection Cooling (Reference)



(2) In the case of Forced Air Cooling (1.0m/s) (Reference)



Output Voltage Input Voltage	3.3	5	9	12	15	±12	±15
5 - 12	B	B	A	A	A	C	C
12 - 24	A	B	B	B	B	C	C
24 - 48	A	B	A	A	B	C	C

Output Voltage Input Voltage	3.3	5	9	12	15	±12	±15
5 - 12	A	A	A	A	A	A	A
12 - 24	A	A	A	A	A	A	A
24 - 48	A	A	A	A	A	A	A

Instruction Manual

- ◆ It is necessary to read the "Instruction Manual" and "Before using our product" before you use our product.

Instruction Manual <https://en.cosel.co.jp/product/powersupply/MH/>
 Before using our product <https://en.cosel.co.jp/technical/caution/index.html>

MHF



NOTICE



Basic Characteristics Data

Model	Circuit method	Switching frequency [kHz] (reference)	Input current [A]	Inrush current protection	PCB/Pattern			Series/Redundancy operation availability	
					Material	Single sided	Double sided	Series operation	Redundancy operation
MHF3	Flyback converter	200-1500 *3	*1	-	glass fabric base,epoxy resin		Yes	Yes	*2

*1 Refer to Specification.

*2 Refer to Instruction Manual.

*3 The value changes depending on input and load.



Макро Групп – это:

- дистрибьютор электронных компонентов с 1994 года
- контрактный производитель электроники с 2007 года с собственным производством в Санкт-Петербурге (компания Макро ЕМС, входит в ГК Макро Групп)
- поставщик полупроводниковых материалов
- комплексный поставщик электронных компонентов
- моделирование и производство полупроводниковых эпитаксиальных гетероструктур для задач оптоэлектроники

Головной офис расположен в Санкт-Петербурге. Собственные представительства в крупных промышленных городах России и стран СНГ.

Преимущества для наших заказчиков:

- работа по тендерам с 2012 года
- оформление банковских гарантий
- отсрочки платежей
- поставка электронных компонентов по проектным ценам
- инженерная поддержка проектов заказчиков
- сертификат системы менеджмента качества ISO 9001-2015
- необходимые сертификаты и лицензии

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