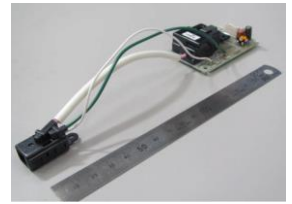


### 1. Features

- Murata Active oxygen ( Ozonizer ) module can create large ozone efficiently with original device structure.
- Ozone density will be controlled duty cycle by intermittent operation.
- Intermittent operation can save power consumption of Active oxygen module.
- Active oxygen module can be longer life in high humidity compare with Needle type and MHM500 series.
- Murata Active oxygen module is used high voltage technology cultivated by high voltage.

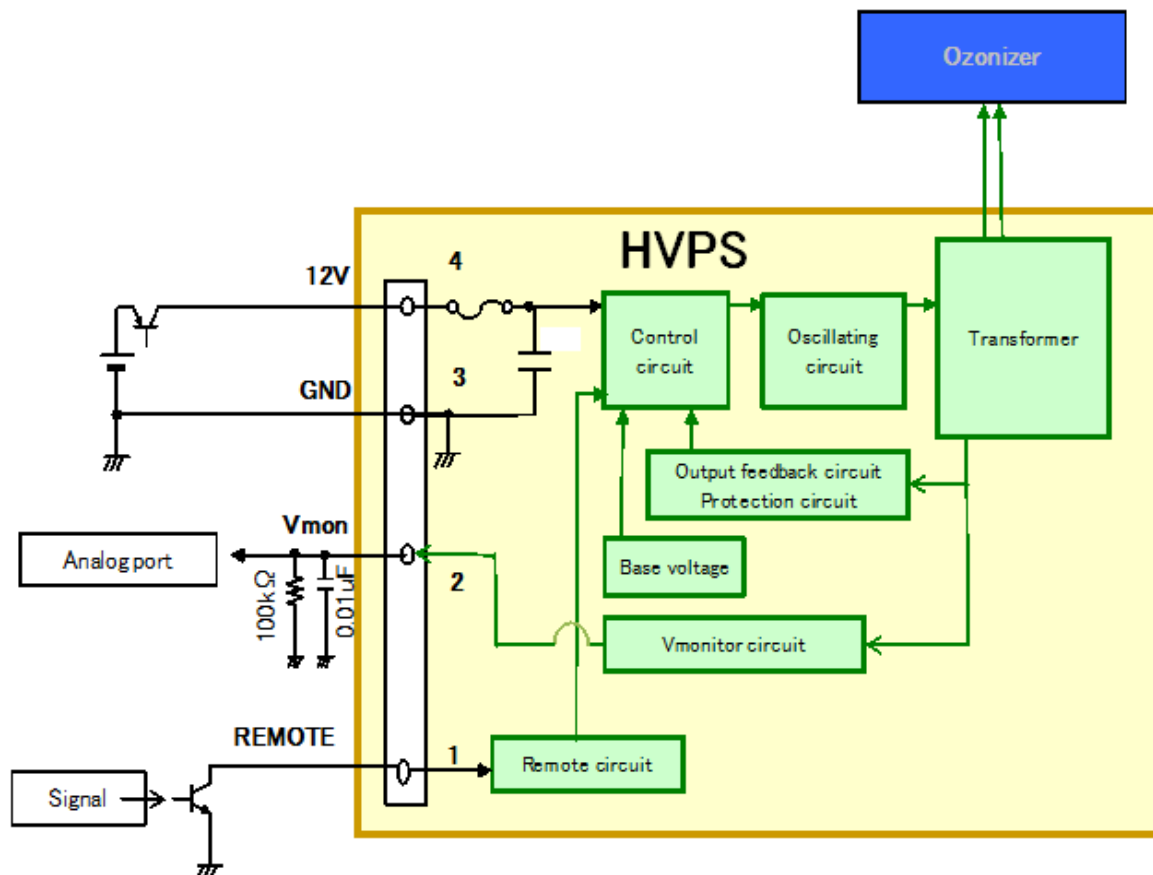


### 2. Description

The MHM501 Series is effective for applications such as refrigerator, dishwasher, air purification and deodorization by generating a large ozone density. The MHM501 features an integrated high voltage power supply integrated with the Ozone element. All these features are packaged in an elegant and compact form factor, able to fit most application environments.

### 3. Circuit & dimension

#### 3.1 Typical Application Circuit



-Required Remote of Transistor character

L (On) : The saturated volatge is less than 1.0V. The sink current is more than 10mA.

H (Off) : The withstand voltage is more than 13.2V. The leakage current is less than 100uA.

#### 3.2 Mechanical demension

- Please see as Fig.1 of the structure of Active oxygen ( Ozonizer ) module

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#### 4. Rating

##### 4.1 Operating temperature ( Ambient )

Ionizer part : -10°C~+70°C

High Voltage Power Supply (HVPS) part : -10°C~+50°C

##### 4.2 Operating humidity

Ionizer part : 20%RH~95%RH ( no dew deposit )

High Voltage Power Supply (HVPS) part : 20%RH~80%RH ( no dew deposit )

The value of the ion amount and Ozone amount will decrease at the low temperature and high humidity. Therefore, the value of the current will be specified at 25±2°C and 50±10%RH.

##### 4.3 Part number : MHM501-00

##### 4.4 Pin Function ( Input connector )

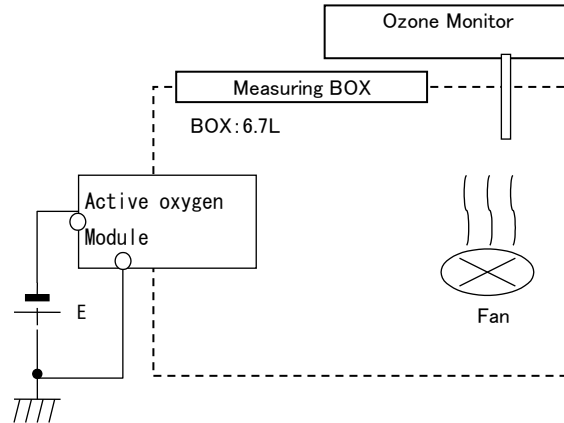
Connector No.	Connector	Pin number	Signal
CN1	B04B-XASK-1 (JST)	1	Remote terminal for On/Off(Open/corrector)
		2	Monitor voltage Vmon
		3	GND
		4	Vin

##### 4.5 Rating

Items	Min.	Typ.	Max.	Unit
Input voltage range	+10.8	+12.0	+13.2	Vdc
Input current		75	380	mA
On Duty	0	-	30	%
Value of Ozone density Duty : 100% ( Reference data ) ( Please see note1 )	1.4	3.0	5.7	mg/h
Value of Ozone density Duty : 30% ( Please see 4.6.2 & note1 )	0.42	0.9	1.71	mg/h

(Note1) MHM501-00 connected as per Fig.1b, with fan and Teflon tube for air sampling using an ozone dosimeter in (approx. 6.7L). The input voltage E (12.0V) will be loaded between Pins 3 and 4 of connector CN1. Remote terminal connect GND. Under this condition, ozone density will be measure by the instrument after 3min. generation.

《 Fig.1b 》 Ozone Measurement



### 4.6 Caution of Pin terminal

#### 4.6.1 Remote terminal( ON/OFF )

リモート端子(1番ピン)により HVPS を ON/OFF することができます。リモート端子の操作にはオープンコレクタのトランジスタを使用してください。リモート端子は内部でプルアップされています。高圧電源はリモート端子が論理的に Low で動作し、論理的に High(open) で停止します。

The terminal of REM (pin1) can be used to turn the HVPS on / off. It should be used an open collector transistor to drive the REM (pin1). The terminal of REM (pin1) will be pulled up internally. The HVPS turns on when the REM pin is at logic low and turns off when it is at logic high (open).

リモート端子(1番ピン)に接続するデバイスの仕様  
Specifications of the device driving the REM pin (pin1)

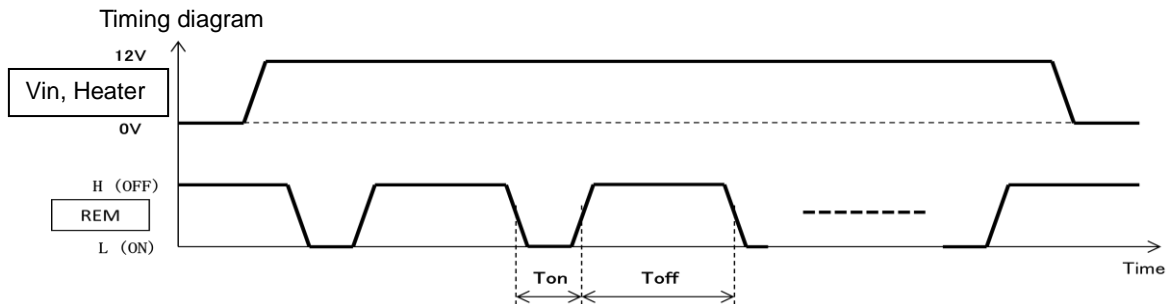
信号 Signal	仕様 Specifications
LOW	V(sat)=1.0V max. I(sink)= 10mA min.
HIGH	I(leak)= 100uA max. Vce= 13.2V min.

#### 4.6.2 Vin, Heater

Vin の電圧が立ち上がり、定常状態に達してから、REM を ON にしてください。REM が OFF の状態で、Vin を OFF してください。Vin の電圧印加に合わせて発生子部ヒーターが過熱し始めます。十分温まってからの On/Off 動作お願いします(目安 3-5分)。

After the voltage of "Vin" has raised up and reached steady state, "REM" should be turned on.

"Vin" should be turned off when "REM" is turned off. The heater inside ozonizer unit shall be started by Vin applying. Please operate On/Off after rising unit temperature enough(Ex.3-5min.)



#### Ton, Toff

Ton, off は下記条件を満たしてください

"Ton" and "Toff" should satisfy the following conditions.

- ( i )  $500ms \leq Ton \leq 3s$
- ( ii )  $Duty = Ton / (Ton + Toff) \leq 30\%$

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### 5. 取り付け上の注意 Caution in setting (Ion Element)

- 1) このカタログは、オゾナイザモジュール単体での仕様であり、使用環境や取り付け状態、取り付け部周辺の構造、材料などにより、オゾン発生量がカタログを満足しない場合があります。  
This datasheet is representative of typical application conditions. If used outside of our specification, Ozone amount may not meet same performance levels.
- 2) ご使用の際には機器にオゾナイザモジュールを取り付け、オゾンの発生量をご確認ください。  
Please make sure the ozone generation in your end product has been evaluated in view of your specifications with our product being mounted appropriately.
- 3) 特に、開口部周辺に金属体やプラスチックが存在しますと、発生したオゾンが吸収される場合があります。  
Please note that some metal or plastic parts located near the Ozone element can affect the amount of ozone amount. Please follow the clearance/spacing recommendations on section 7.1

Δ

### 6. 警告 warning

発生直近では高濃度のオゾンが発生します。高濃度のオゾンを長時間吸い続けると、人体に悪影響を及ぼす恐れがありますので、通電中は高濃度オゾンを吸引しないよう人体から距離を取ってご使用願います。  
High-density ozone will be generated closest to the Ozone element. Exposure to high-density ozone for prolonged periods can be harmful to the human body. Please maintain appropriate distance from the human body so as not to breathe high-density ozone while the Ozonizer is operational (input voltage applied).

Δ

### 7. 使用上の注意 Caution in using (High Voltage)

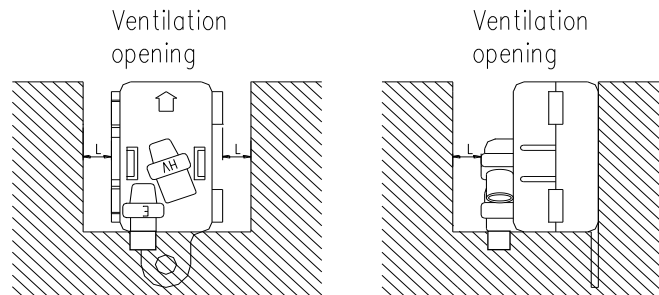
- 7.1 オゾナイザモジュールは高圧部品ですので取り扱いを誤ると、放電および発煙の危険性がありますので、下記の項目を厳守下さい。

Ozonizer module is a high voltage device and may cause discharging or combustion with mishandling. Please observe following items.

- 7.1.1 発生子と駆動電源のセット配置に際しては、高圧部品であることを考慮していただき、信頼性向上の為、低電位部（シャーシ等）との距離を下図の範囲以上確保し取り付けして下さい。ただし、絶縁部材を配置した場合を除きます。

万一、低電位部との距離が不十分な場合は、低電位部とオゾナイザモジュールとの間で放電し、発煙・発火の原因となることがあります。(下記は、オゾナイザモジュールを高圧部品と考えた場合の絶縁距離を示したものです。オゾン発生には、これ以上の距離確保を必要とすることがあります。)

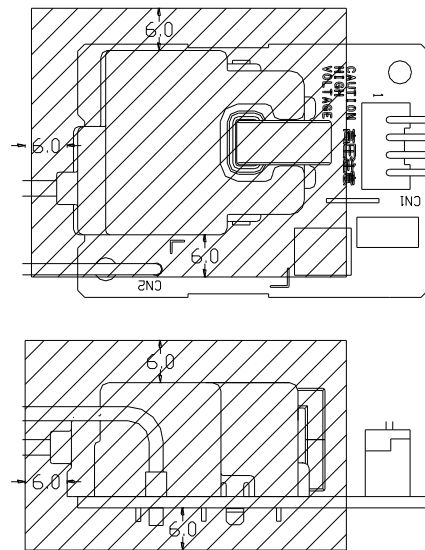
Don't place other electrodes ( metal chassis wires. electronic parts. etc.) or conductive materials within Keep distance for 6.5mm or more of the high voltage portion of Ozonizer and power supply.  
If the distance between Ozonizer module and the other low potential electrode is insufficient, sparking may occur and it may cause smoking and combustion.



確保距離  $L(\text{mm}) = \text{定格電圧: } 6.5(\text{kV}) \times 1(\text{mm/kV})$

Recommended distance  $L(\text{mm}) = \text{Rated Voltage: } 6.5(\text{kV}) \times 1(\text{mm/kV})$

DIM : ( mm )



DIM : (mm)

高圧電源の周辺に導電体（金属、電線、部品等）を近接配置する場合は、6.5mm以上離してください。斜線部に配線を近接しないでください。

Keep distance for 6.5mm or more, when location the electric conductor (Metal, wire or components, etc.) around this high voltage power supply. There is no wire cable at shadow area.

- 7.1.2 発生子と高圧電源の配線である高圧線と GND 線は十分に距離を確保して配置ください。結束したり、交差することが無いように配置ください。また、高圧線とセットの導体部との距離も十分に確保してください。

Please keep the distance enough between HV wire and GND wire which connected Ozonizer and HVPS. Don't hand together or crossing both wire. Also please keep the distance between HV wire and conductive part of set.

- 7.1.3 ハロゲン化炭水化合物（4塩化炭素、フロン等）、芳香族炭水化合物（トルエン等）、脂肪族炭水化合物、その他発生子のケース材料など絶縁材料を膨潤、溶解する危険性がある溶剤、接着剤、グリス及び油類は、絶縁劣化をひき起こす危険性がありますので、上記物質、またはそれに類するものは使用しないで下さい。

Don't contact the Ionizer with homogenized hydrocarbon (Carbon tetrachloride, Freon, etc.) or with aromatic hydrocarbon (Toluene, etc.). These solvents cause crack or damage to Ozonizer parts. Don't use any organic solvent, adhesive agent, grease or oil, which include above bad solvents or sparking may occur and it may cause smoking and combustion.

- 7.1.4 固定用ビス、手袋、治工具類に油類が付着しないようにして下さい。油類の付着によりケース材料が侵され、絶縁劣化を引き起こす危険性があります。

When handling this module, make sure not to apply any oil to screws, gloves or tools. These oils may affect the insulation materials for housing of Ozonizer to cause the insulation deterioration..

7.1.5 次のような環境条件では絶縁劣化をひきおこす危険性がありますのでご使用いただけません。  
Under following circumstances, this device can't be used. If device will be used under such circumstances, dielectric strength may be down and sparking may occur.

- ①腐食性ガス雰囲気 (CL<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x2</sub> 等)  
Corrosive gas atmosphere (CL<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub> etc.)
- ②水、油、有機溶剤等の液体がかかる所  
Cannot be splashed with water, oil, organic solvent
- ③塵埃の多い所 (清浄度: class 100K 以上)  
Dusty atmosphere (Cleanness: more class than 100K)
- ④高湿度雰囲気 (湿度: 95%RH 以上)  
high moist atmosphere (Humidity: more than 95%RH)
- ⑤潮風の直接あたる所  
Sea breeze atmosphere
- ⑥その他上記の①~⑤に準ずる所  
Other atmosphere corresponding ①~⑤

7.1.6 オゾナイザモジュールに過度の衝撃(0.5N・m 以上)を与えると、ケースおよび樹脂等の絶縁材料にクラックが生じ、絶縁劣化をひきおこす危険性がありますので、輸送及び取り扱い時に、衝撃を与えないで下さい。  
電源部のコアはワレモノのため、落下等の衝撃を絶対与えないで下さい。落下させた場合は絶対に使用しないで下さい。  
Don't subject the device to a shock (more than 0.5N・m) during handling or transport. If device will be given a hard shock, dielectric material (case, molding resin, etc.) may crack and dielectric strength may be damaged.  
Do not apply impact to the transformer core such as dropping since it is fragile. Should the Ozonizer module be dropped by accident, absolutely do not use it.

7.1.7 オゾナイザジュールは高圧部品であり、感電する危険性がありますので、通電中にオゾナイザモジュール本体に触れないで下さい。  
This device has a high voltage portion. Please apply appropriate safety precautions to prevent from receiving an electrical shock..

7.1.8 完成品においても、使用者がオゾナイザモジュールに触れられない位置に取り付ける、もしくは触れないよう危険性についての表示をおこなってください。  
Please locate the Ozonizer module in an area where users can't touch easily and also indicate "Danger for high voltage" marking on your products.

7.2 搬送には、同時に発生子と電源部分をお持ち下さい。  
リード線や、オゾナイザ接触端子に負荷が掛かり接触不良に発展する可能性があります。  
During handling, please hold the Ozonizer element and power supply portion at the same time in to avoid damage to the wire or terminal connections.

7.3 リード線挿入後の製品において、リード線の回転、引っ張りを繰り返しますと、抜去力が低下しますので注意ください。また、リード線挿入部に一度挿入されたリード線を抜去した場合、クリップ端子の変形、リード線クズ等により品質が低下いたします。リード線抜去を行った製品は、再使用しないで下さい。  
Do not attempt to remove and reconnect any of the factory installed wire connections. Pull force decreases when the rotation and the pull of the lead wire are repeated.  
Do not to use the Ozonizer if the lead wire was inserted and pulled out. The Ozonizer quality and performance will likely be decreased due to this customer induced action.

7.4 使用環境によっては、オゾナイザモジュール放電部の汚損状態によりオゾン発生量が変動いたします。  
In a dusty environment, ozone amount will be decreased until environmental air quality improves.

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- 7.5 オゾンは高い腐食性を持ちます。周辺機器、部材を酸化、腐食させる恐れがありますので、実機での評価 確認の上、ご使用をお願い致します。  
Ozone has a high corrosive effect. Ozone is likely to make peripherals and material oxidize and corrode. Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- 7.6 低分子シロキサン(ジメチルポリシロキサン)含有率の高いシリコンゴム、シリコンボンド等の使用により、ポリウムやポテンションメータ摺動子やスイッチ類の接点接触不良が発生する場合があります。低分子シロキサン含有量は 0.1% 以下のものをご使用ください。  
The use of silicone rubber or silicone bond which contain a high percentage of diethylpolysiloxane may trigger the contact failure of variable resistors, potentiometers or switches. Make sure to use silicone with the percentage of dimethylpolysiloxan 0.1 or less %.
- 7.7 組み込み取り扱いは、組み込み環境条件に放置し、なじませた上で常温常湿にて行ってください。(急激な環境変化による結露が発生している状態等での組み立て及び取り扱いは行わないで下さい。)  
Prior to assembling this module to your unit, leave it under the environment for assembling for a while so that the module may get harmonized with the environment. Then assemble to your main unit under the environment at normal temperature and humidity. (Do not assemble or handle the module under high humidity conditions.)
- 7.8 本カタログに定められている範囲外の入力電圧を投入した際は、製品破損の危険性があります。  
Exceeding the specifications of this datasheet may cause product damage. Application of excessive input voltage can especially damage electrolytic capacitors.
- 7.9 本カタログに定められている最大出力電流値を超える過電流値での使用は絶対に避けてください。製品破損の危険性があります。また、部品の劣化を生じ、寿命が短くなります。  
Do not exceed the maximum output current value as defined on this product datasheet. Such use will damage or deteriorate components and shorten the life of the unit.

#### 7.10 用途の限定

当製品について、その故障や誤動作が人命または財産に危害を及ぼす恐れがある等の理由により、高信頼性が要求される以下の用途でのご使用をご検討の場合は、必ず事前に当社までご連絡下さい。  
Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

- ①航空機器 Aircraft equipment
- ②宇宙機器 Aerospace equipment
- ③海底機器 Undersea equipment
- ④発電所制御機器 Power plant control equipment
- ⑤医療機器 Medical equipment
- ⑥輸送機器 (自動車、列車、船舶等) Transportation equipment (automobiles, trains, ships, etc.)
- ⑦交通信号機器 Traffic signal equipment
- ⑧防災/防犯機器 Disaster prevention / crime prevention equipment
- ⑨情報処理機器 Data-processing equipment
- ⑩その他上記機器と同等の機器

Applications of similar complexity or with reliability requirements comparable to the applications listed in above.

4

### 8.お願い

8.1 ご使用に際しては、貴社製品に実装された状態で必ず評価して下さい。

Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

8.2 当製品を当カタログの記載内容を逸脱して使用しないで下さい。

You are requested not to use our product deviating from the agreed specifications.

8.3 フェールセーフ機能の付加

当製品に万が一異常や不具合が生じた場合でも、二次災害防止のために完成品にもしくは最終セットに適切なフェールセーフ機能を必ず付加して下さい。

Be sure to provide an appropriate fail-safe function on your product that will prevent secondary damage that may be caused by the abnormal function or the failure of our product.



