Ordering number : ENA1141D

# EMH2407

## N-Channel Power MOSFET
## 20V, 6A, 25mΩ, Dual EMH8

ON Semiconductor®
http://onsemi.com

### Features

- Low ON-resistance
- Best suited for LiB charging and discharging switch
- Common-drain type
- 2.5V drive
- Protection diode in

### Specifications

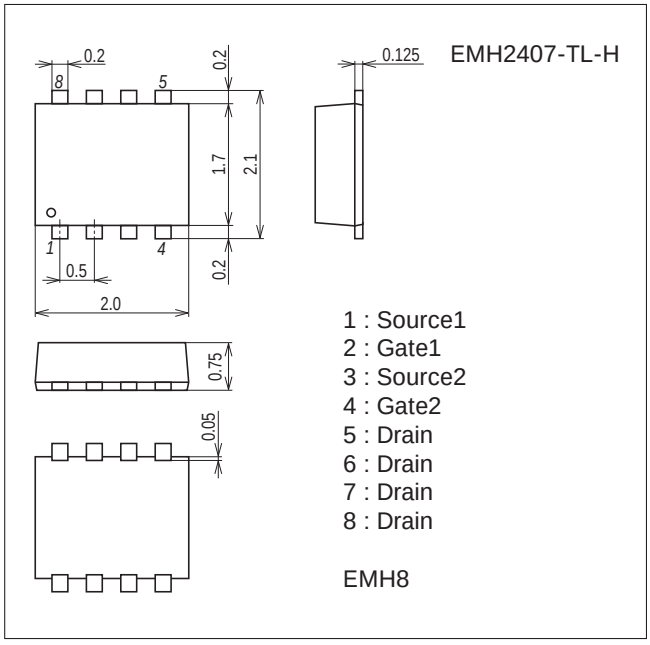
**Absolute Maximum Ratings** at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Drain-to-Source Voltage | $V_{DSS}$ | | 20 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | | ±12 | V |
| Drain Current (DC) | $I_D$ | | 6 | A |
| Drain Current (Pulse) | $I_{DP}$ | PW≤10μs, duty cycle≤1% | 40 | A |
| Allowable Power Dissipation | $P_D$ | When mounted on ceramic substrate (900mm²×0.8mm) 1unit | 1.3 | W |
| Total Dissipation | $P_T$ | When mounted on ceramic substrate (900mm²×0.8mm) | 1.4 | W |
| Channel Temperature | Tch | | 150 | °C |
| Storage Temperature | Tstg | | −55 to +150 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

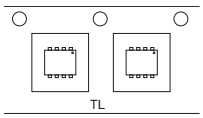
unit : mm (typ)
7045-006



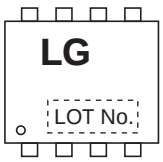

### Product & Package Information

- Package : EMH8
- JEITA, JEDEC : -
- Minimum Packing Quantity : 3,000 pcs./reel

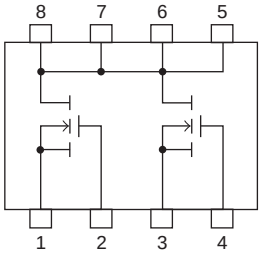
### Packing Type : TL




### Marking



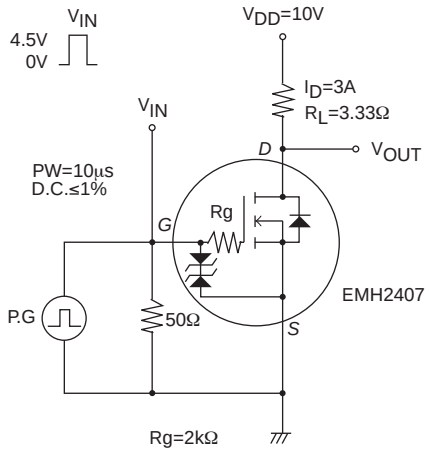

### Electrical Connection



## Electrical Characteristics at Ta=25°C

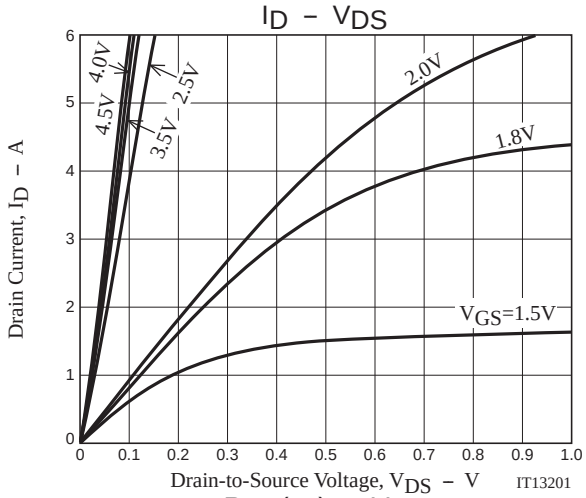
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=1mA, $V_{GS}$=0V | 20 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$=0V | | | 1 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±8V, $V_{DS}$=0V | | | ±10 | μA |
| Cutoff Voltage | $V_{GS}$(off) | $V_{DS}$=10V, $I_D$=1mA | 0.5 | | 1.3 | V |
| Forward Transfer Admittance | \| yfs \| | $V_{DS}$=10V, $I_D$=3A | 3 | 5 | | S |
| Static Drain-to-Source On-State Resistance | $R_{DS}$(on)1 | $I_D$=3A, $V_{GS}$=4.5V | 13 | 19 | 25 | mΩ |
| | $R_{DS}$(on)2 | $I_D$=3A, $V_{GS}$=4V | 14 | 20 | 26 | mΩ |
| | $R_{DS}$(on)3 | $I_D$=1.5A, $V_{GS}$=2.5V | 16 | 28 | 39 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=10V, f=1MHz | | 580 | | pF |
| Output Capacitance | Coss | | | 95 | | pF |
| Reverse Transfer Capacitance | Crss | | | 75 | | pF |
| Turn-ON Delay Time | $t_{d}$(on) | See specified Test Circuit. | | 310 | | ns |
| Rise Time | $t_r$ | | | 1020 | | ns |
| Turn-OFF Delay Time | $t_{d}$(off) | | | 3000 | | ns |
| Fall Time | $t_f$ | | | 2250 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=10V, $V_{GS}$=4.5V, $I_D$=6A | | 6.3 | | nC |
| Gate-to-Source Charge | Qgs | | | 0.83 | | nC |
| Gate-to-Drain “Miller” Charge | Qgd | | | 1.9 | | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=6A, $V_{GS}$=0V | | 0.78 | 1.2 | V |

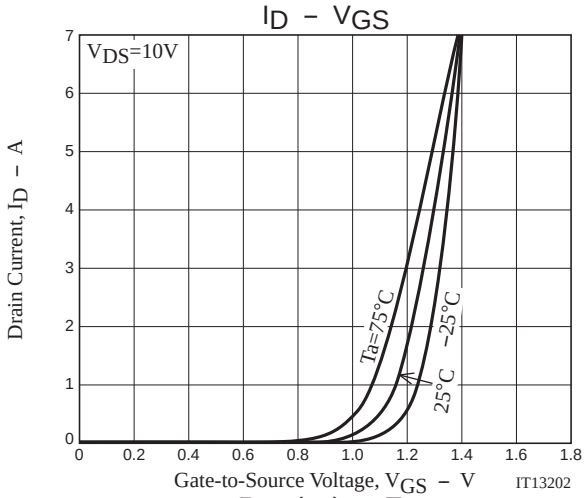
## Switching Time Test Circuit

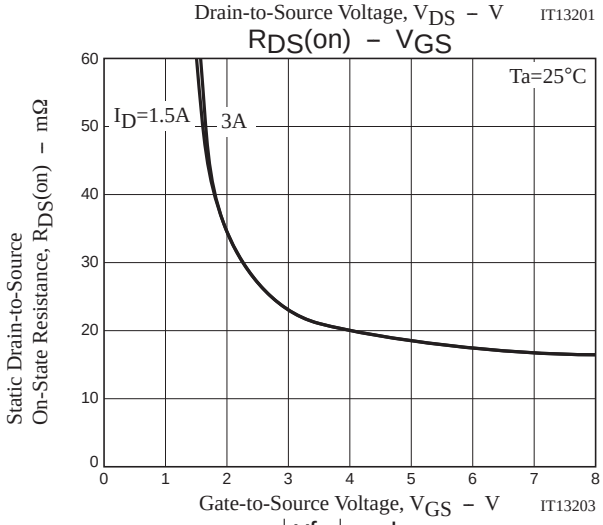


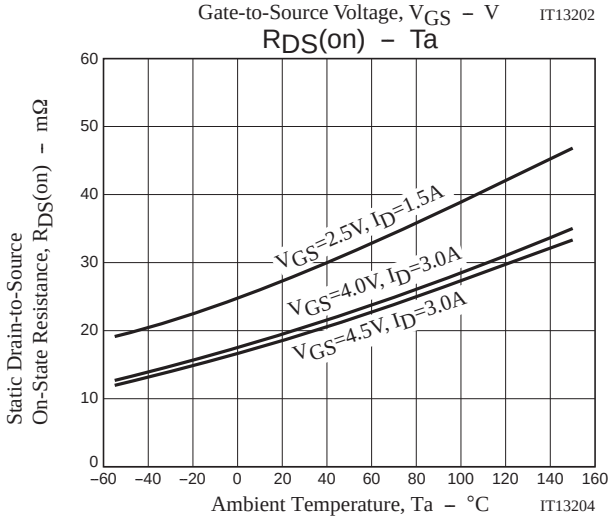

## Ordering Information

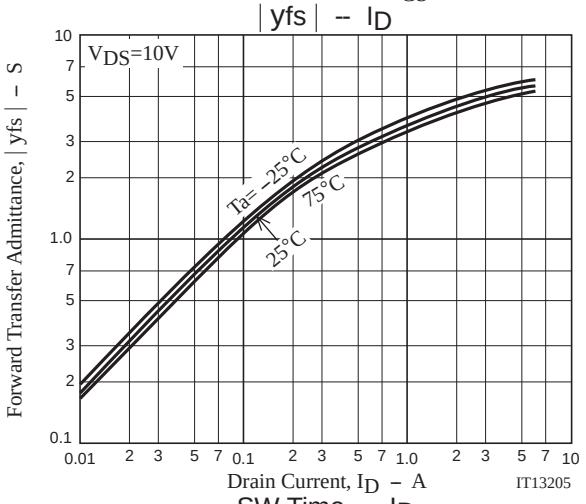
| Device | Package | Shipping | memo |
|---|---|---|---|
| EMH2407-TL-H | EMH8 | 3,000pcs./reel | Pb Free and Halogen Free |

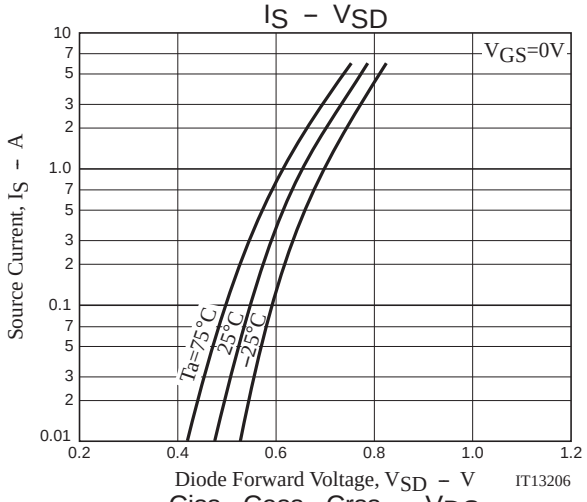

ID – VDS
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT13201
4.0V
4.5V
3.5V
2.5V
2.0V
1.8V
VGS=1.5V

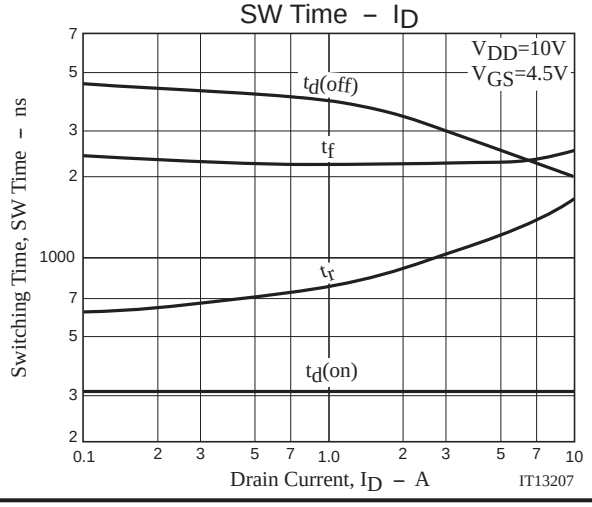

ID – VGS
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT13202
VDS=10V
Ta=75°C
25°C
–25°C

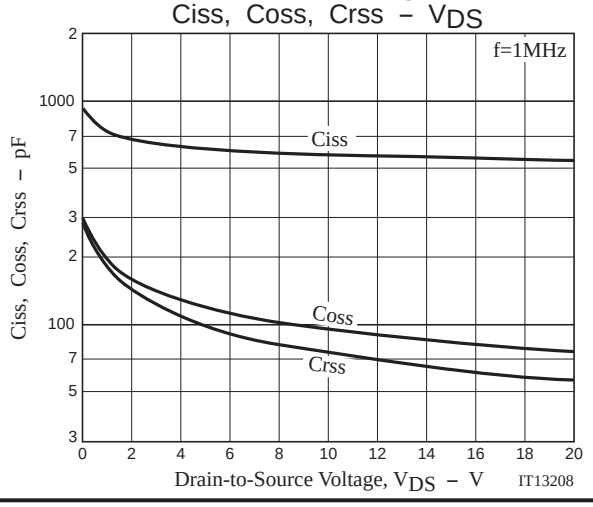

RDS(on) – VGS
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT13203
Ta=25°C
ID=1.5A
3A

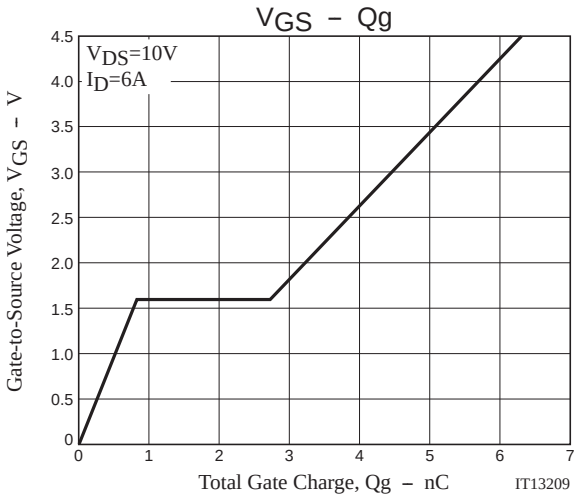

RDS(on) – Ta
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT13204
VGS=2.5V, ID=1.5A
VGS=4.0V, ID=3.0A
VGS=4.5V, ID=3.0A

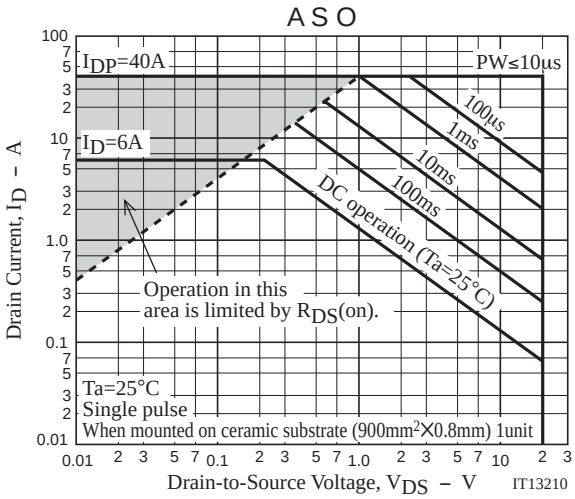

| yfs | – ID
Forward Transfer Admittance, | yfs | – S
Drain Current, ID – A
IT13205
VDS=10V
Ta= –25°C
75°C
25°C

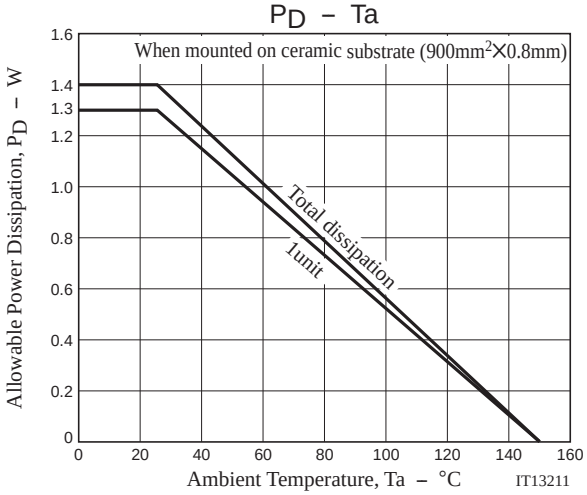

IS – VSD
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT13206
VGS=0V
Ta=75°C
25°C
–25°C


SW Time – ID
Switching Time, SW Time – ns
Drain Current, ID – A
IT13207
VDD=10V
VGS=4.5V
td(off)
tf
tr
td(on)


Ciss, Coss, Crss – VDS
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT13208
f=1MHz
Ciss
Coss
Crss


VGS – Qg
VDS=10V
ID=6A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT13209


A S O
IDP=40A
PW≤10μs
ID=6A
100μs
1ms
10ms
100ms
DC operation (Ta=25°C)
Operation in this
area is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm2×0.8mm) 1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT13210


PD – Ta
When mounted on ceramic substrate (900mm2×0.8mm)
Total dissipation
1unit
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT13211

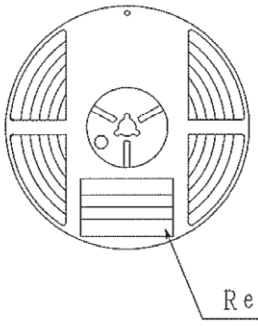
**Embossed Taping Specification**

EMH2407-TL-H

## 1. Packing Format

| Package Name | Carrier Tape Type | Maximum Number of devices contained (pcs) | | | Packing format | |
|---|---|---|---|---|---|---|
| | | Reel | Inner box | Outer box | Inner BOX (C-1) | Outer BOX (A-7) |
| EMH8 | MCP4 | 3,000 | 15,000 | 90,000 | 5 reels contained<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimensions:mm (external)<br>440×195×210 |

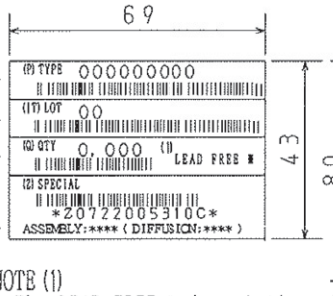
Packing method



Reel label

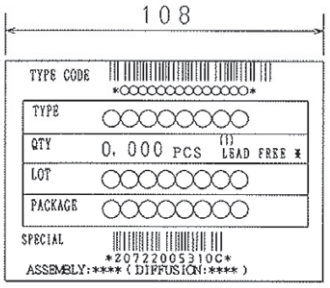
Reel label, Inner box label

(unit:mm)




Outer box label

It is a label at the time of factory shipments. The form of a label may change in physical distribution process.

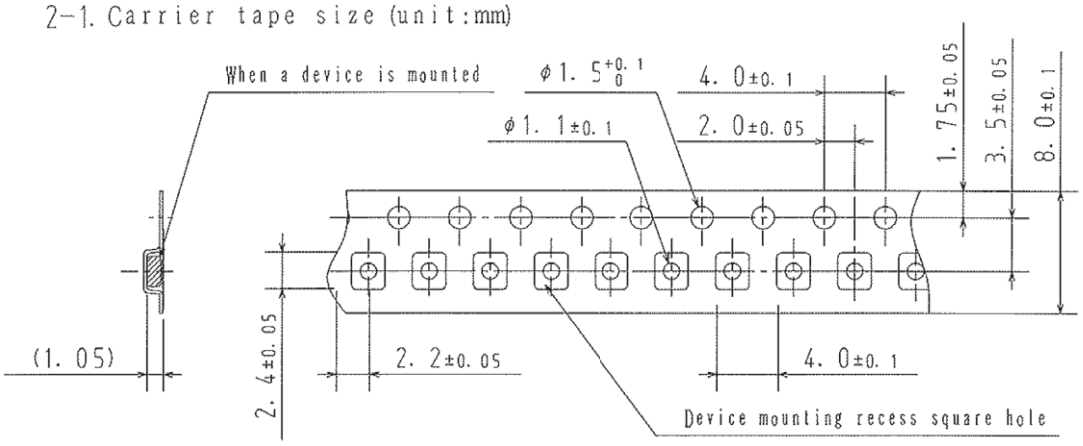



NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

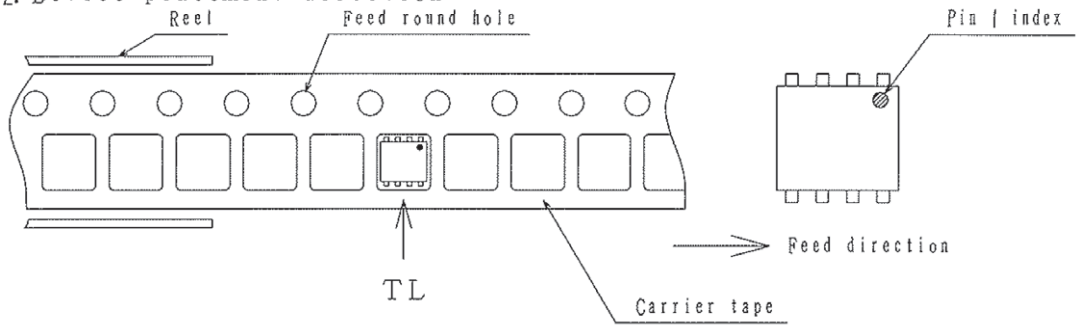
| Label | JEITA Phase |
|---|---|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3 |

## 2. Taping configuration

### 2-1. Carrier tape size (unit:mm)



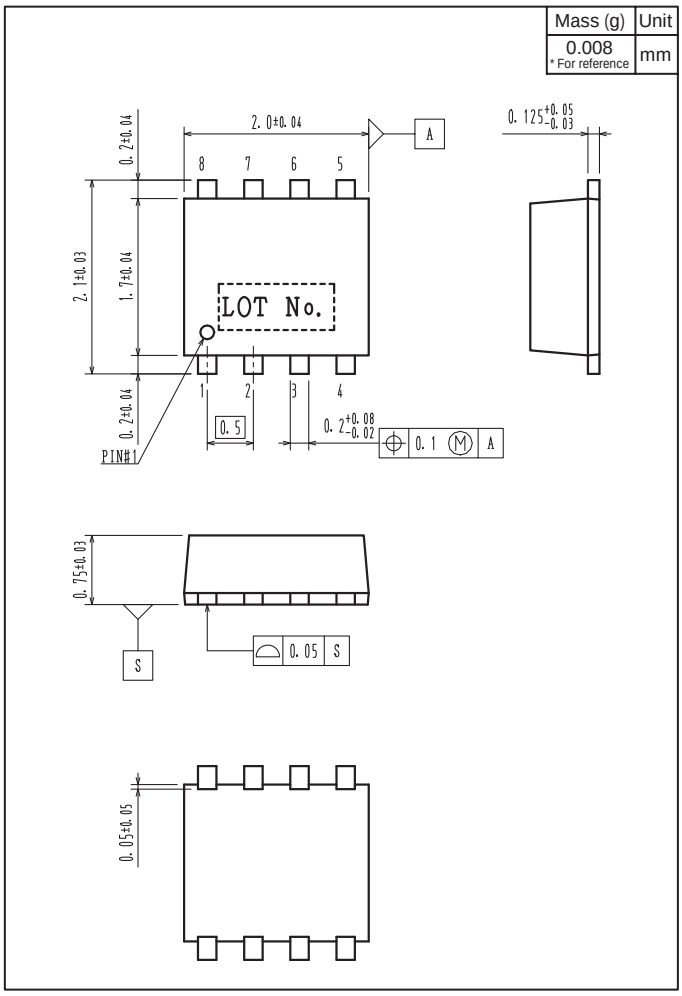

### 2-2. Device placement direction



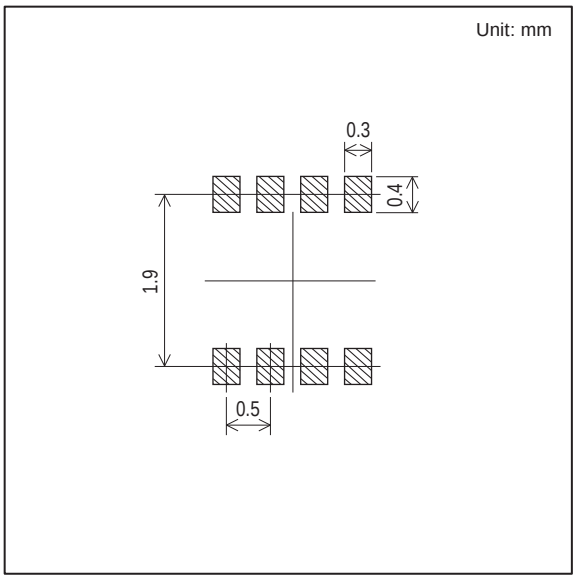

Those with pin 1 index on the feed hole side·····TL

## Outline Drawing

EMH2407-TL-H




## Land Pattern Example



Note on usage : Since the EMH2407 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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