



SANYO Semiconductors

DATA SHEET

# EMH2301 — General-Purpose Switching Device Applications

P-Channel Silicon MOSFET

## Features

- The EMH2301 incorporates a P-channel MOSFET that feature low ON-resistance and ultrahigh-speed switching, thereby enabling high-density mounting.
- 1.8V drive.

## Specifications

Absolute Maximum Ratings at  $T_a=25^\circ\text{C}$ 

| Parameter                   | Symbol    | Conditions                                                   | P-channel   | Unit             |
|-----------------------------|-----------|--------------------------------------------------------------|-------------|------------------|
| Drain-to-Source Voltage     | $V_{DSS}$ |                                                              | -20         | V                |
| Gate-to-Source Voltage      | $V_{GSS}$ |                                                              | $\pm 12$    | V                |
| Drain Current (DC)          | $I_D$     |                                                              | -2          | A                |
| Drain Current (Pulse)       | $I_{DP}$  | $PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$              | -8          | A                |
| Allowable Power Dissipation | $P_D$     | Mounted on a ceramic board (900mm <sup>2</sup> ×0.8mm) 1unit | 1.0         | W                |
| Total Dissipation           | $P_T$     | Mounted on a ceramic board (900mm <sup>2</sup> ×0.8mm)       | 1.2         | W                |
| Channel Temperature         | $T_{ch}$  |                                                              | 150         | $^\circ\text{C}$ |
| Storage Temperature         | $T_{stg}$ |                                                              | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics at  $T_a=25^\circ\text{C}$ 

| Parameter                                  | Symbol               | Conditions                                  | Ratings |      |          | Unit             |
|--------------------------------------------|----------------------|---------------------------------------------|---------|------|----------|------------------|
|                                            |                      |                                             | min     | typ  | max      |                  |
| Drain-to-Source Breakdown Voltage          | $V_{(BR)DSS}$        | $I_D=-1\text{mA}$ , $V_{GS}=0\text{V}$      | -20     |      |          | V                |
| Zero-Gate Voltage Drain Current            | $I_{DSS}$            | $V_{DS}=-20\text{V}$ , $V_{GS}=0\text{V}$   |         |      | -1       | $\mu\text{A}$    |
| Gate-to-Source Leakage Current             | $I_{GSS}$            | $V_{GS}=\pm 8\text{V}$ , $V_{DS}=0\text{V}$ |         |      | $\pm 10$ | $\mu\text{A}$    |
| Cutoff Voltage                             | $V_{GS(\text{off})}$ | $V_{DS}=-10\text{V}$ , $I_D=-1\text{mA}$    | -0.4    |      | -1.4     | V                |
| Forward Transfer Admittance                | $ y_{fs} $           | $V_{DS}=-10\text{V}$ , $I_D=-1\text{A}$     | 1.9     | 3.2  |          | S                |
| Static Drain-to-Source On-State Resistance | $R_{DS(\text{on})1}$ | $I_D=-1\text{A}$ , $V_{GS}=-4\text{V}$      |         | 115  | 150      | $\text{m}\Omega$ |
|                                            | $R_{DS(\text{on})2}$ | $I_D=-0.5\text{A}$ , $V_{GS}=-2.5\text{V}$  |         | 165  | 235      | $\text{m}\Omega$ |
|                                            | $R_{DS(\text{on})3}$ | $I_D=-0.3\text{A}$ , $V_{GS}=-1.8\text{V}$  |         | 260  | 520      | $\text{m}\Omega$ |
| Input Capacitance                          | $C_{iss}$            | $V_{DS}=-10\text{V}$ , $f=1\text{MHz}$      |         | 420  |          | $\text{pF}$      |
| Output Capacitance                         | $C_{oss}$            | $V_{DS}=-10\text{V}$ , $f=1\text{MHz}$      |         | 73   |          | $\text{pF}$      |
| Reverse Transfer Capacitance               | $C_{rss}$            | $V_{DS}=-10\text{V}$ , $f=1\text{MHz}$      |         | 60   |          | $\text{pF}$      |
| Turn-ON Delay Time                         | $t_{d(\text{on})}$   | See specified Test Circuit.                 |         | 11.8 |          | ns               |
| Rise Time                                  | $t_r$                | See specified Test Circuit.                 |         | 33   |          | ns               |
| Turn-OFF Delay Time                        | $t_{d(\text{off})}$  | See specified Test Circuit.                 |         | 48   |          | ns               |
| Fall Time                                  | $t_f$                | See specified Test Circuit.                 |         | 43   |          | ns               |

Marking : MA

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# EMH2301

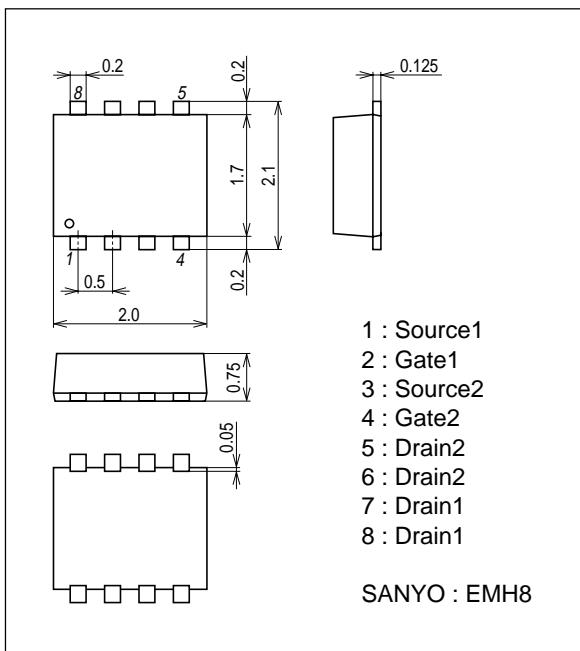
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| Parameter                     | Symbol   | Conditions                         | Ratings |       |      | Unit |
|-------------------------------|----------|------------------------------------|---------|-------|------|------|
|                               |          |                                    | min     | typ   | max  |      |
| Total Gate Charge             | Qg       | $V_{DS}=-10V, V_{GS}=-4V, I_D=-2A$ |         | 4.7   |      | nC   |
| Gate-to-Source Charge         | Qgs      | $V_{DS}=-10V, V_{GS}=-4V, I_D=-2A$ |         | 0.75  |      | nC   |
| Gate-to-Drain "Miller" Charge | Qgd      | $V_{DS}=-10V, V_{GS}=-4V, I_D=-2A$ |         | 1.6   |      | nC   |
| Diode Forward Voltage         | $V_{SD}$ | $I_S=-2A, V_{GS}=0V$               |         | -0.83 | -1.2 | V    |

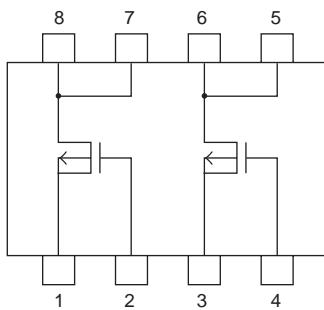
## Package Dimensions

unit : mm (typ)

7045-002

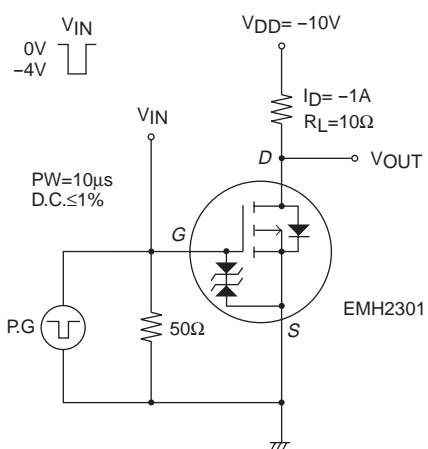


## Electrical Connection

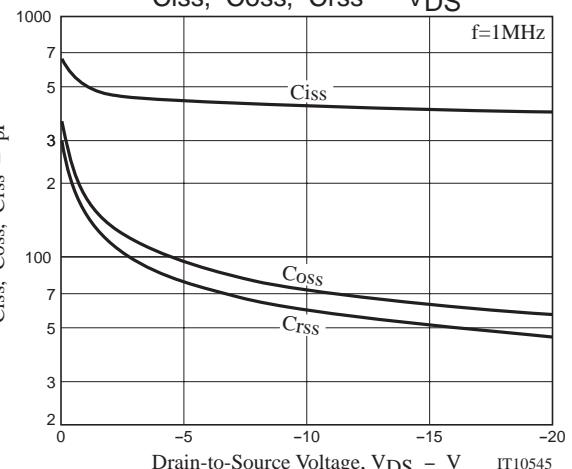
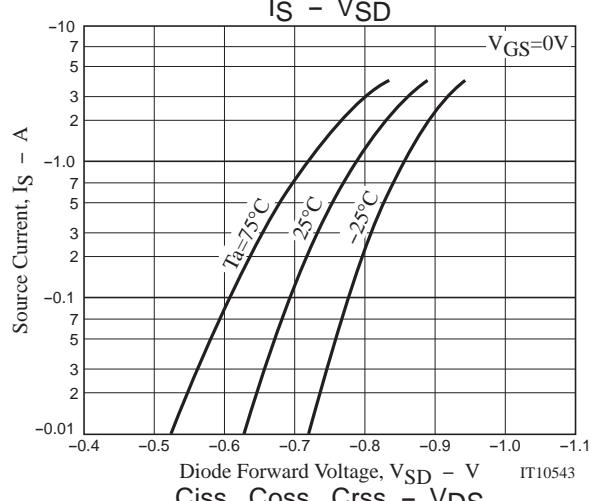
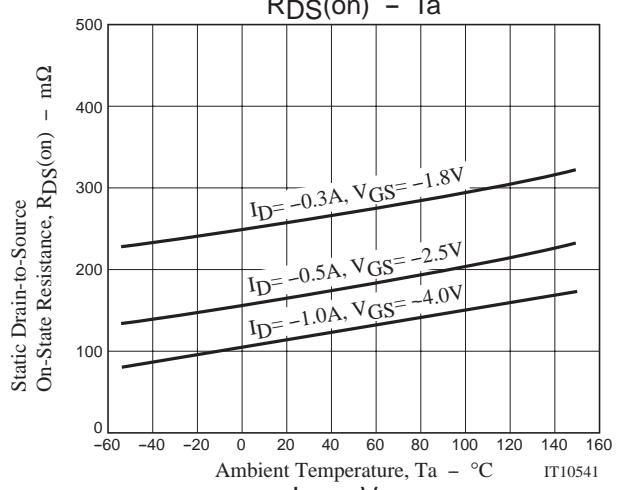
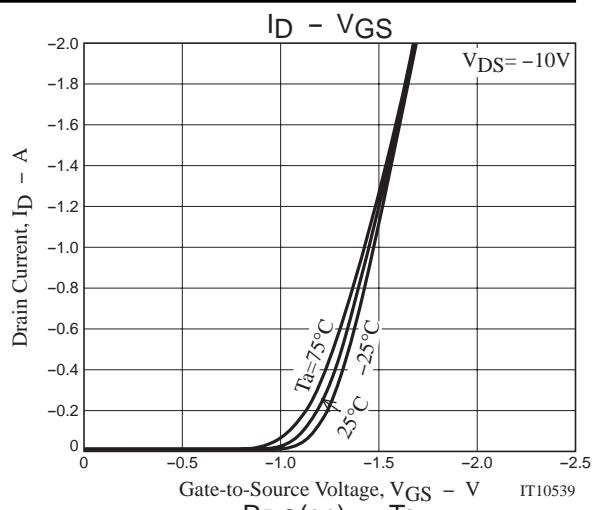
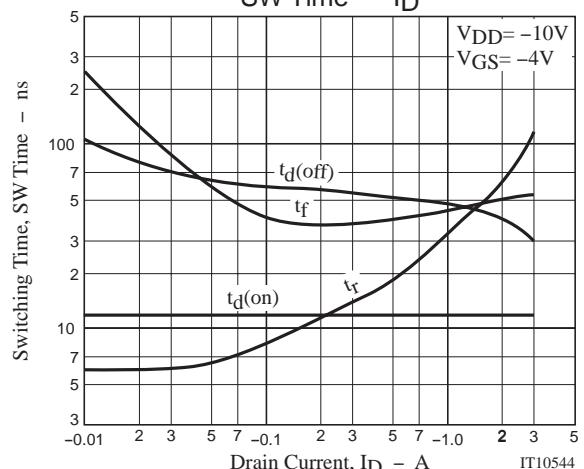
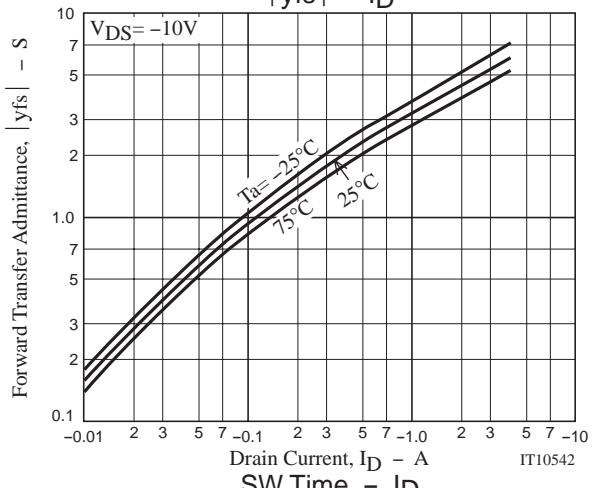
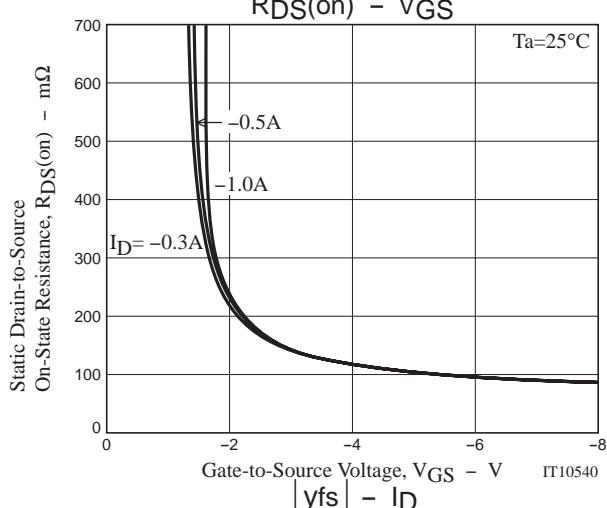
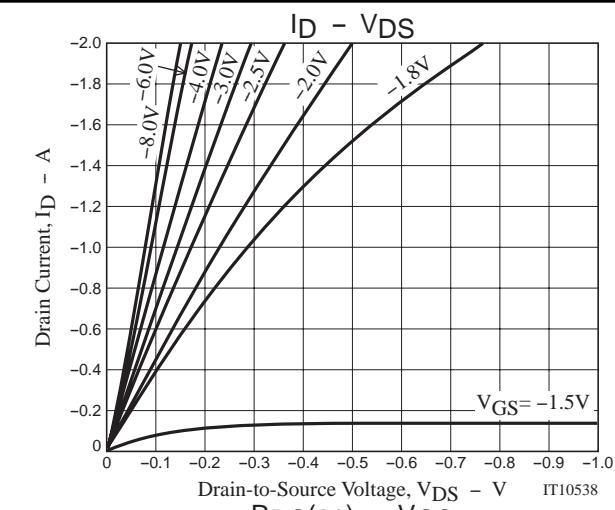


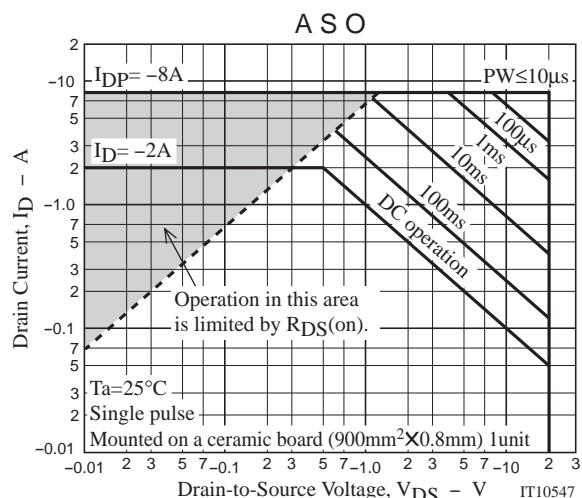
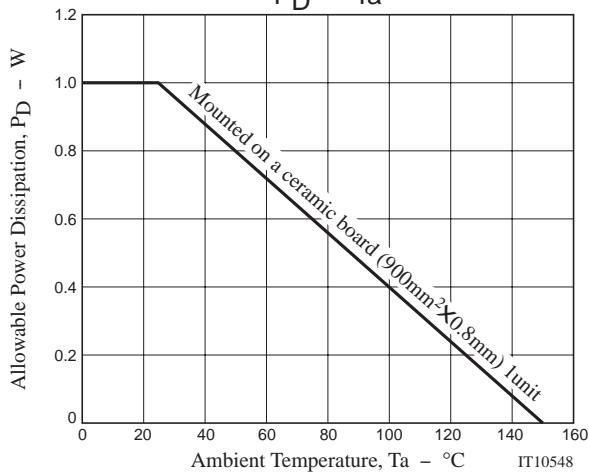
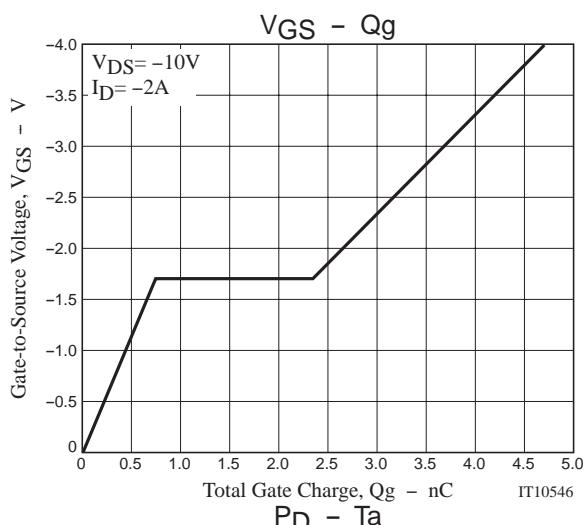
1 : Source1  
 2 : Gate1  
 3 : Source2  
 4 : Gate2  
 5 : Drain2  
 6 : Drain2  
 7 : Drain1  
 8 : Drain1  
 Top view

## Switching Time Test Circuit



## EMH2301





**Note on usage :** Since the EMH2301 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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