

# HAT2200R

Silicon N Channel Power MOS FET  
Power Switching

REJ03G0232-0201Z

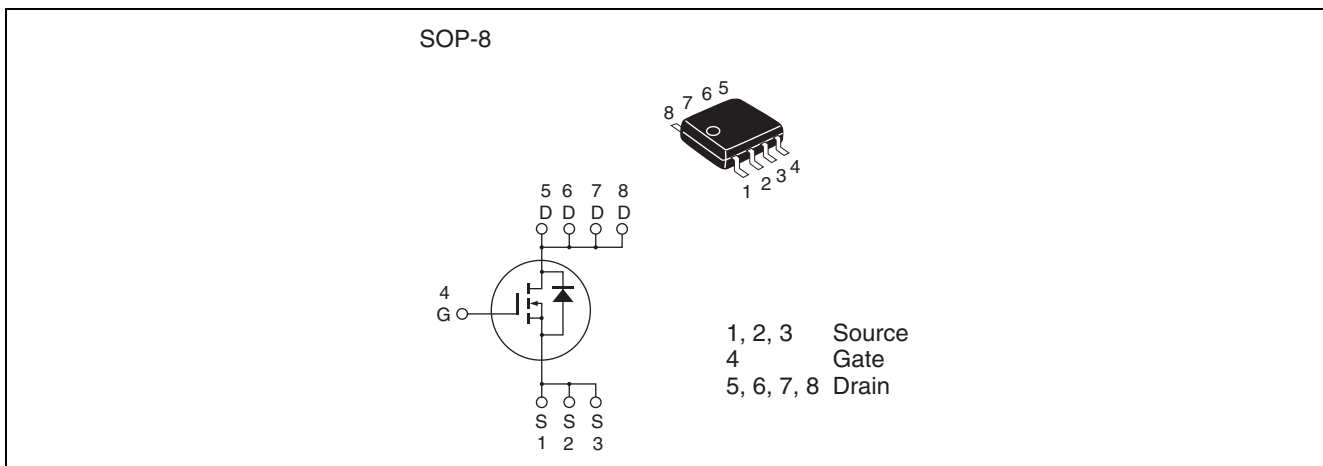
Rev.2.01

Nov.29.2016

## Features

- Capable of 8 V gate drive
- Low drive current
- High density mounting
- Low on-resistance  
 $R_{DS(on)} = 22 \text{ m}\Omega$  typ. (at  $V_{GS} = 10 \text{ V}$ )

## Outline



## Absolute Maximum Ratings

(Ta = 25°C)

| Item                                   | Symbol                           | Ratings     | Unit |
|----------------------------------------|----------------------------------|-------------|------|
| Drain to source voltage                | $V_{DSS}$                        | 100         | V    |
| Gate to source voltage                 | $V_{GSS}$                        | ±20         | V    |
| Drain current                          | $I_D$                            | 8           | A    |
| Drain peak current                     | $I_{D(pulse)}$ <sup>Note1</sup>  | 64          | A    |
| Body-drain diode reverse drain current | $I_{DR}$                         | 8           | A    |
| Avalanche current                      | $I_{AP}$ <sup>Note 2</sup>       | 8           | A    |
| Avalanche energy                       | $E_{AR}$ <sup>Note 2</sup>       | 6.4         | mJ   |
| Channel dissipation                    | $P_{ch}$ <sup>Note3</sup>        | 2.5         | W    |
| Channel to Ambient Thermal Impedance   | $\theta_{ch-a}$ <sup>Note3</sup> | 50          | °C/W |
| Channel temperature                    | Tch                              | 150         | °C   |
| Storage temperature                    | Tstg                             | -55 to +150 | °C   |

Notes: 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1\%$ 2. Value at Tch = 25°C,  $R_g \geq 50 \Omega$ 3. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$ 

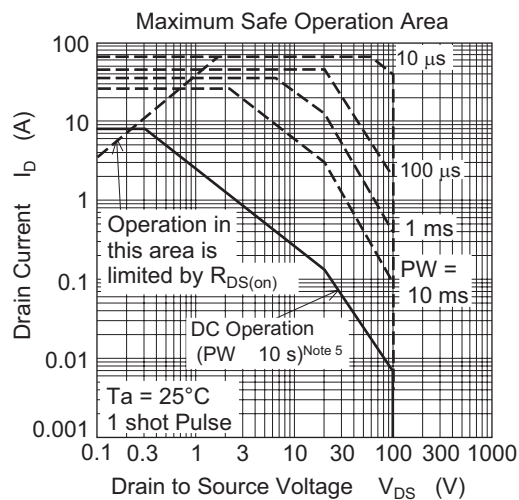
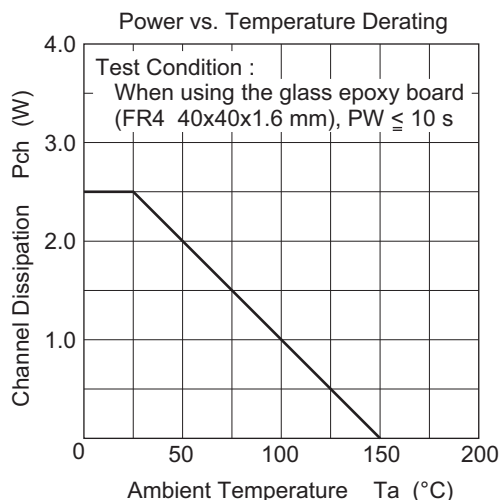
## Electrical Characteristics

(Ta = 25°C)

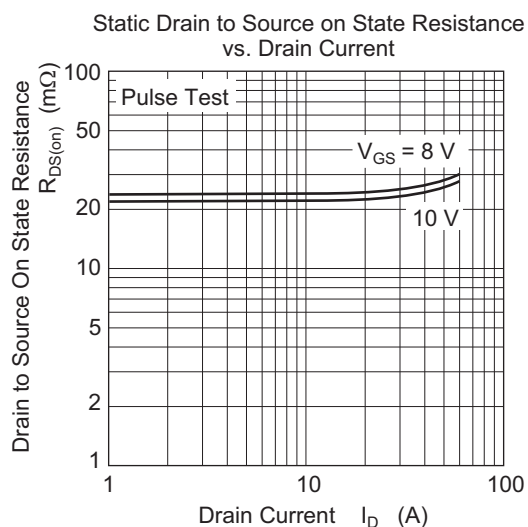
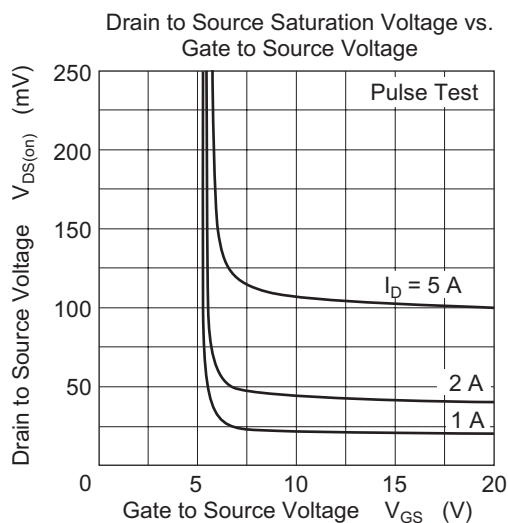
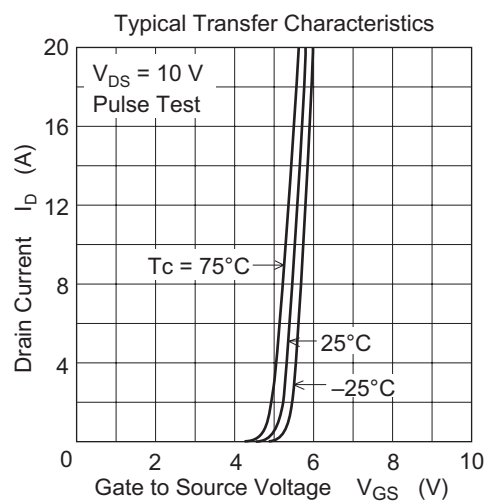
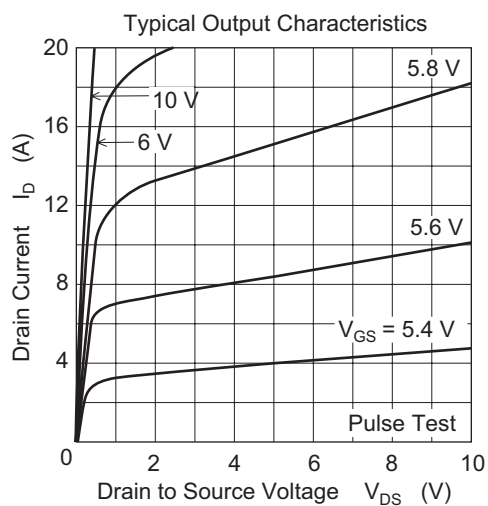
| Item                                       | Symbol        | Min | Typ  | Max   | Unit | Test Conditions                                                      |
|--------------------------------------------|---------------|-----|------|-------|------|----------------------------------------------------------------------|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 100 | —    | —     | V    | $I_D = 10 \text{ mA}$ , $V_{GS} = 0$                                 |
| Gate to source leak current                | $I_{GSS}$     | —   | —    | ± 0.1 | μA   | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0$                           |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —    | 1     | μA   | $V_{DS} = 100 \text{ V}$ , $V_{GS} = 0$                              |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 3.5 | —    | 5.0   | V    | $V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$                       |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 22   | 28    | mΩ   | $I_D = 4 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note4</sup>       |
|                                            | $R_{DS(on)}$  | —   | 23   | 33    | mΩ   | $I_D = 4 \text{ A}$ , $V_{GS} = 8 \text{ V}$ <sup>Note4</sup>        |
| Forward transfer admittance                | $ y_{fs} $    | 8   | 14   | —     | S    | $I_D = 4 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note4</sup>       |
| Input capacitance                          | $C_{iss}$     | —   | 2300 | —     | pF   | $V_{DS} = 10 \text{ V}$                                              |
| Output capacitance                         | $C_{oss}$     | —   | 280  | —     | pF   | $V_{GS} = 0$                                                         |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 90   | —     | pF   | $f = 1 \text{ MHz}$                                                  |
| Gate Resistance                            | $R_g$         | —   | 1.3  | —     | Ω    |                                                                      |
| Total gate charge                          | $Q_g$         | —   | 32   | —     | nC   | $V_{DD} = 50 \text{ V}$                                              |
| Gate to source charge                      | $Q_{gs}$      | —   | 12   | —     | nC   | $V_{GS} = 10 \text{ V}$                                              |
| Gate to drain charge                       | $Q_{gd}$      | —   | 8    | —     | nC   | $I_D = 8 \text{ A}$                                                  |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 16   | —     | ns   | $V_{GS} = 10 \text{ V}$ , $I_D = 4 \text{ A}$                        |
| Rise time                                  | $t_r$         | —   | 4    | —     | ns   | $V_{DD} \cong 30 \text{ V}$                                          |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 32   | —     | ns   | $R_L = 7.5 \Omega$                                                   |
| Fall time                                  | $t_f$         | —   | 4.5  | —     | ns   | $R_g = 4.7 \Omega$                                                   |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.79 | 1.03  | V    | $I_F = 8 \text{ A}$ , $V_{GS} = 0$ <sup>Note4</sup>                  |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 45   | —     | ns   | $I_F = 8 \text{ A}$ , $V_{GS} = 0$<br>$diF/dt = 100 \text{ A}/\mu s$ |

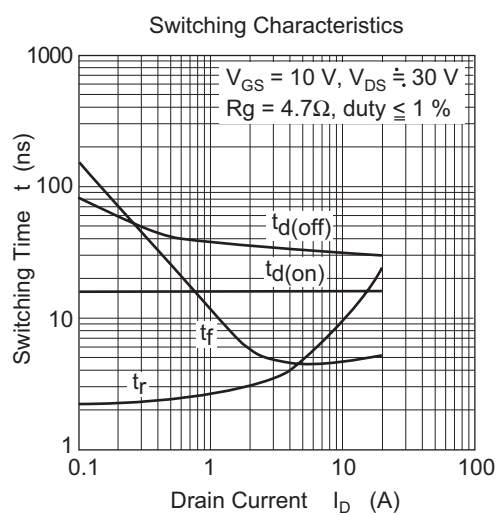
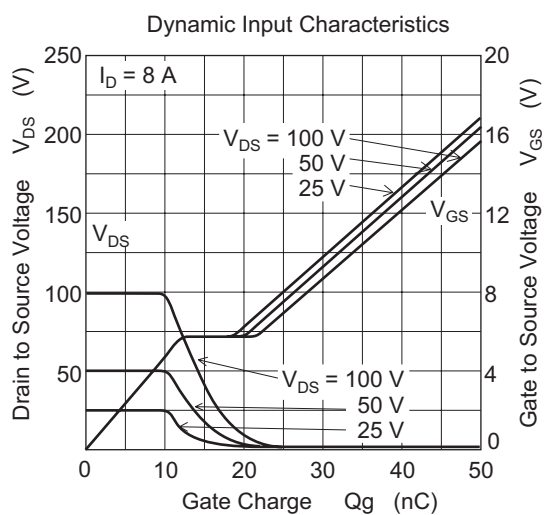
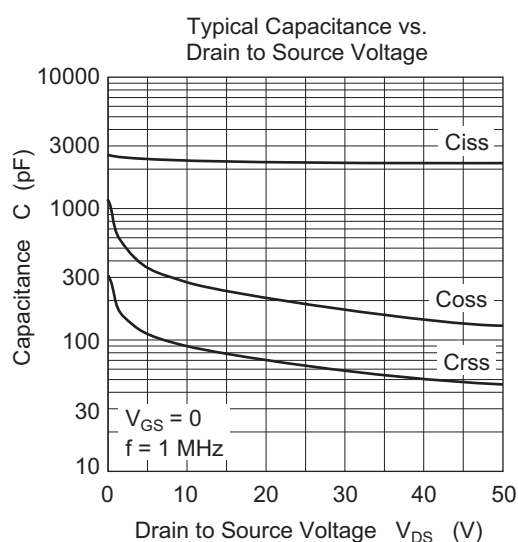
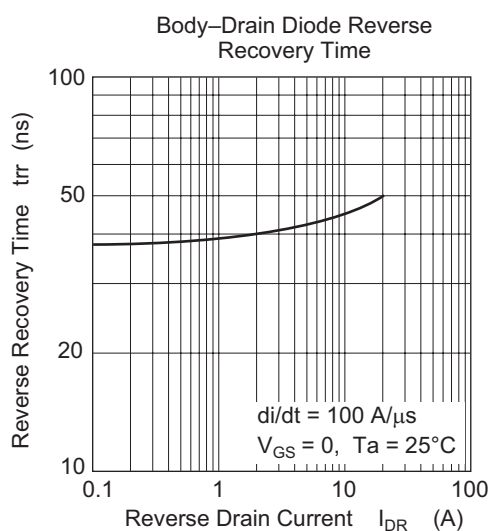
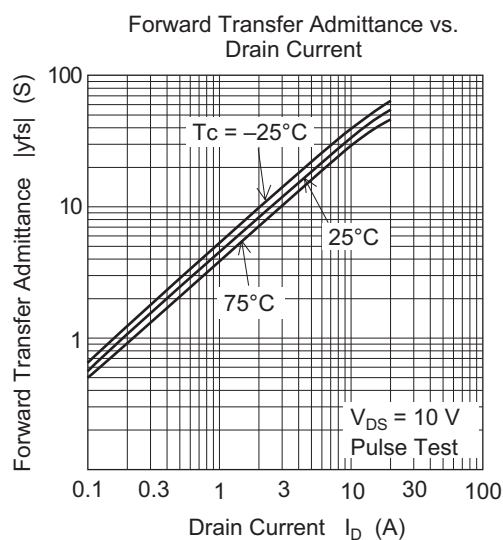
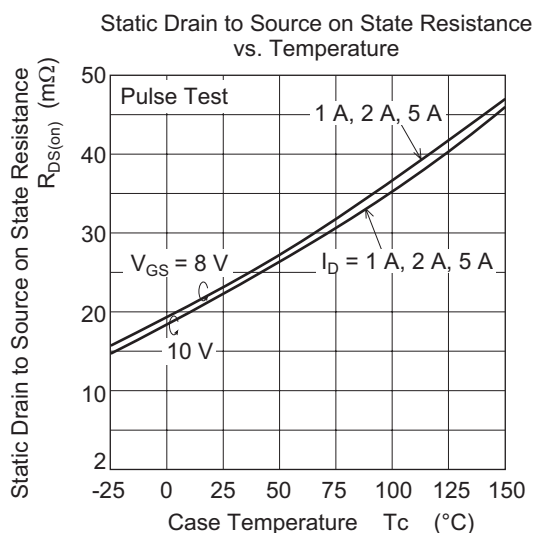
Notes: 4. Pulse test

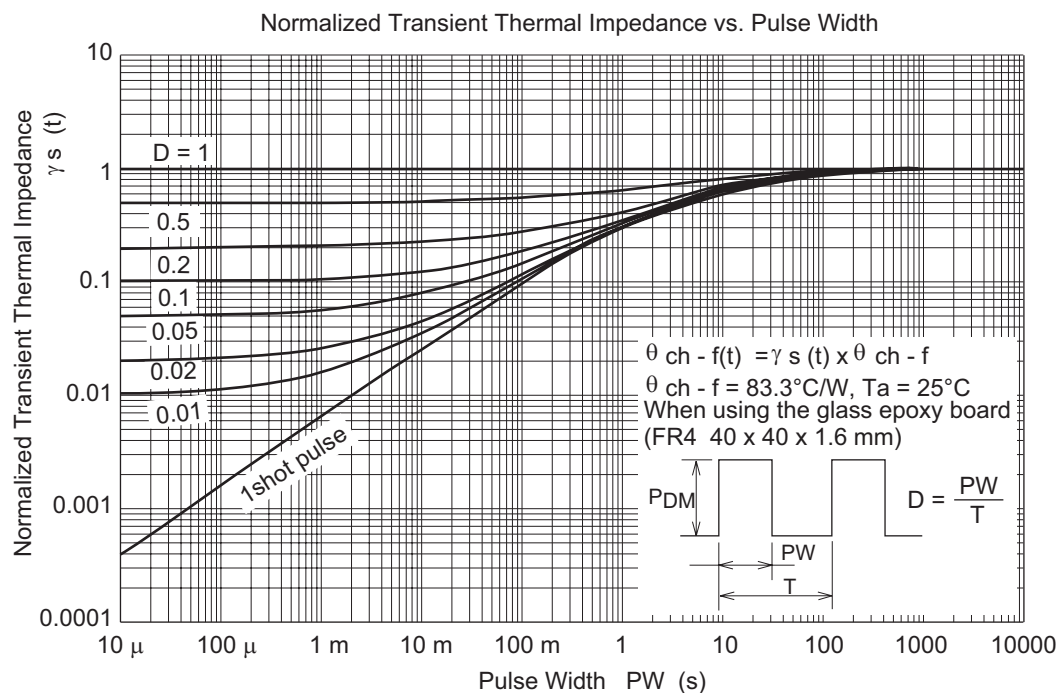
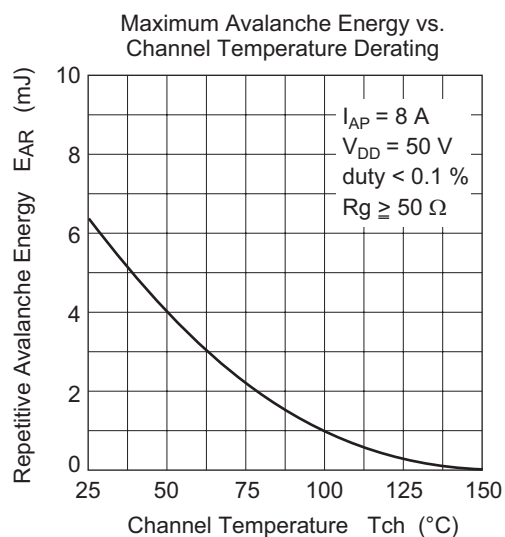
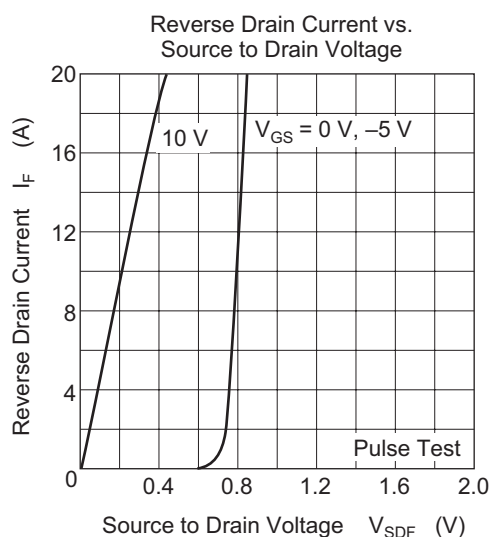
## Main Characteristics



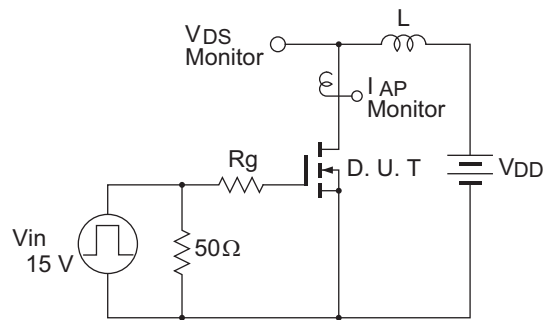
Note 5 :

When using the glass epoxy board  
(FR4 40x40x1.6 mm)

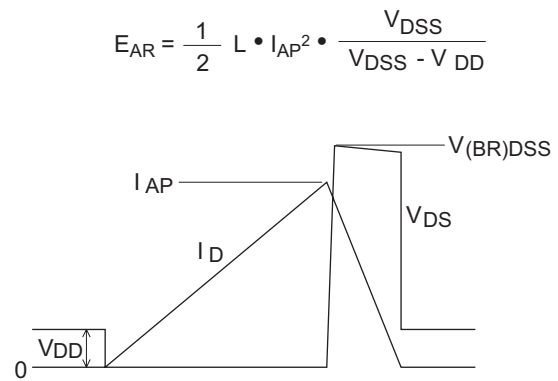




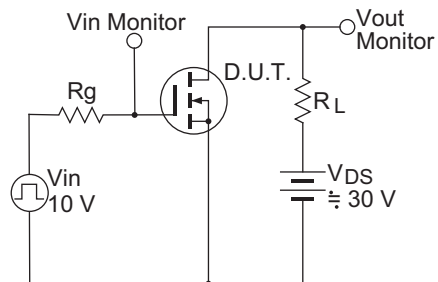
Avalanche Test Circuit



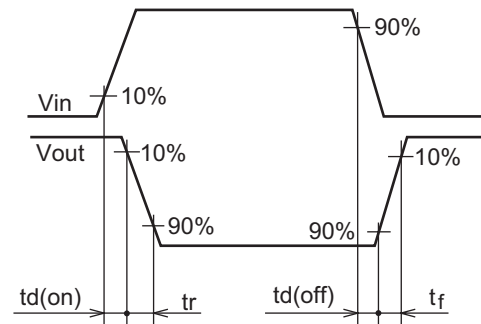
Avalanche Waveform



Switching Time Test Circuit

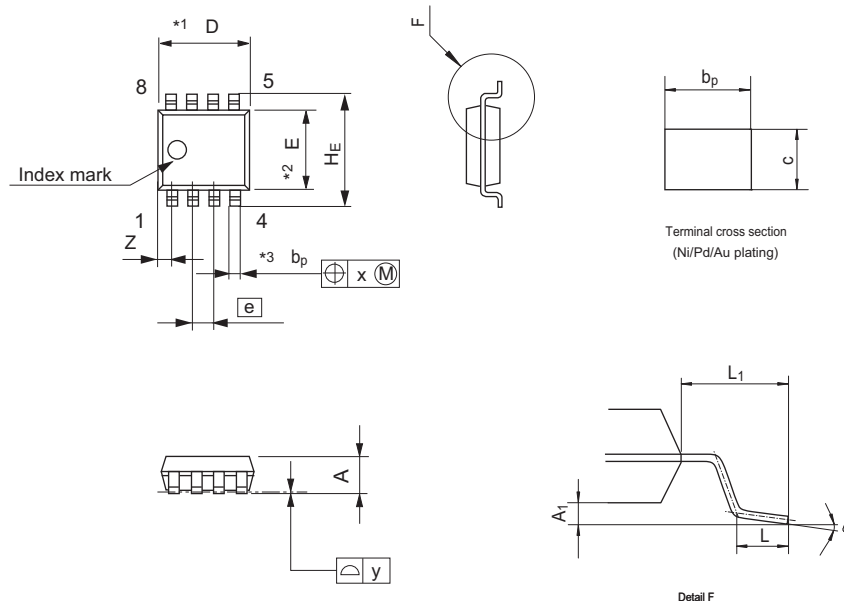


Switching Time Waveform



## Package Dimensions

| Package Name | JEITA Package Code     | RENESAS Code | Previous Code | MASS[Typ.] |
|--------------|------------------------|--------------|---------------|------------|
| SOP-8        | P-SOP8-3.95 × 4.9-1.27 | PRSP0008DD-D | FP-8DAV       | 0.085g     |



NOTE)  
 1. DIMENSIONS \*\*1(Nom)" AND \*\*2"  
 DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION \*\*3" DOES NOT  
 INCLUDE TRIM OFFSET.

| Reference<br>Symbol | Dimension in Millimeters |      |      |
|---------------------|--------------------------|------|------|
|                     | Min                      | Nom  | Max  |
| D                   | —                        | 4.90 | 5.3  |
| E                   | —                        | 3.95 | —    |
| A <sub>2</sub>      | —                        | —    | —    |
| A <sub>1</sub>      | 0.10                     | 0.14 | 0.25 |
| A                   | —                        | —    | 1.75 |
| b <sub>p</sub>      | 0.34                     | 0.40 | 0.46 |
| b <sub>1</sub>      | —                        | —    | —    |
| c                   | 0.15                     | 0.20 | 0.25 |
| c <sub>1</sub>      | —                        | —    | —    |
| $\theta$            | 0°                       | —    | 8°   |
| H <sub>E</sub>      | 5.80                     | 6.10 | 6.20 |
| $\phi$              | —                        | 1.27 | —    |
| x                   | —                        | —    | 0.25 |
| y                   | —                        | —    | 0.1  |
| z                   | —                        | —    | 0.75 |
| L                   | 0.40                     | 0.60 | 1.27 |
| L <sub>1</sub>      | —                        | 1.08 | —    |

## Ordering Information

| Orderable Part Number | Quantity | Shipping Container |
|-----------------------|----------|--------------------|
| HAT2200R-EL-E         | 2500 pcs | Taping             |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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