

# HAT2043R

Silicon N Channel Power MOS FET  
High Speed Power Switching

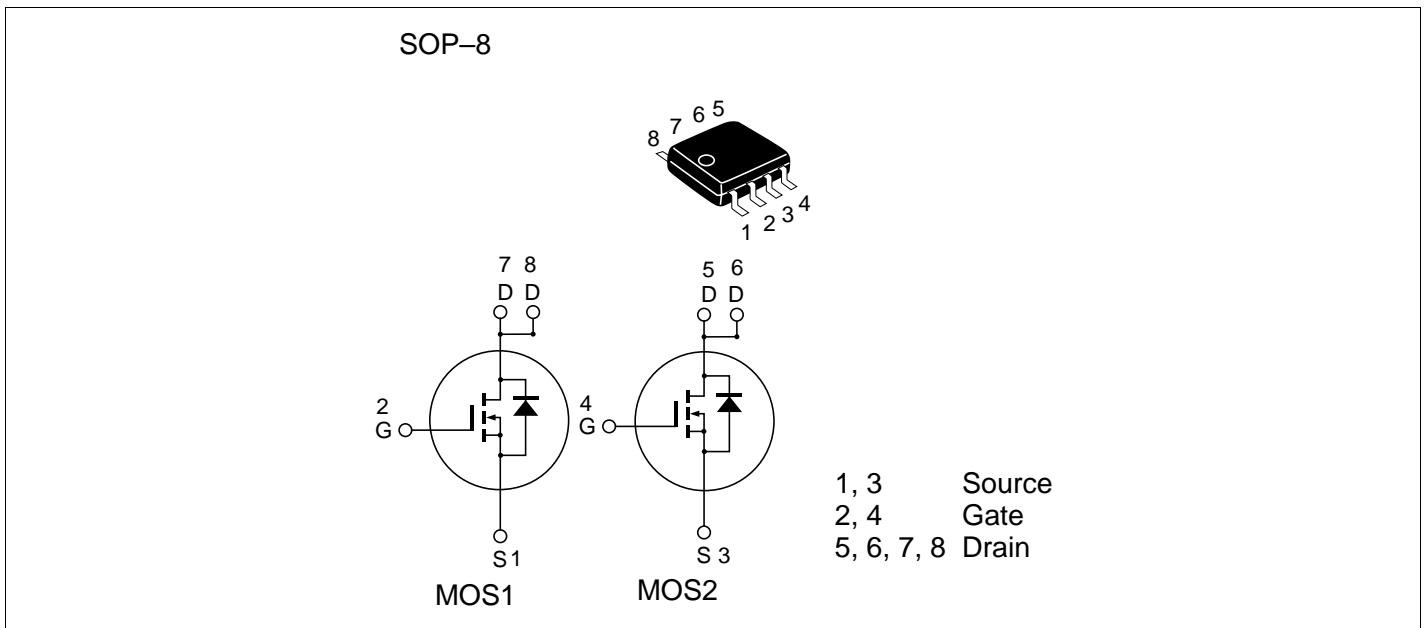
# HITACHI

ADE-208-668D (Z)  
5th. Edition  
February 1999

## Features

- Low on-resistance
- Capable of 4 V gate drive
- Low drive current
- High density mounting

## Outline



## Absolute Maximum Ratings (Ta = 25°C)

| Item                                   | Symbol                          | Ratings       | Unit |
|--|---------------------------------|---------------|------|
| Drain to source voltage                | $V_{DSS}$                       | 30            | 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    |
| Channel dissipation                    | $P_{ch}$ <sup>Note2</sup>       | 2.0           | W    |
| Channel dissipation                    | $P_{ch}$ <sup>Note3</sup>       | 3.0           | W    |
| Channel temperature                    | $T_{ch}$                        | 150           | °C   |
| Storage temperature                    | $T_{stg}$                       | - 55 to + 150 | °C   |

Note: 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1\%$

2. 1 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$

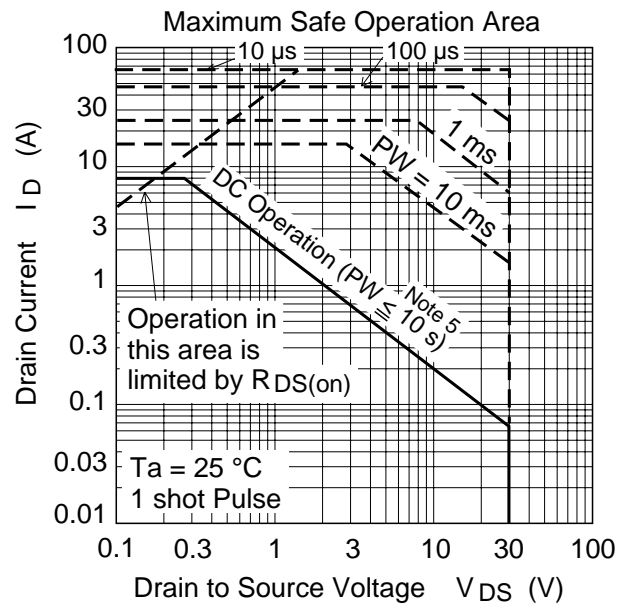
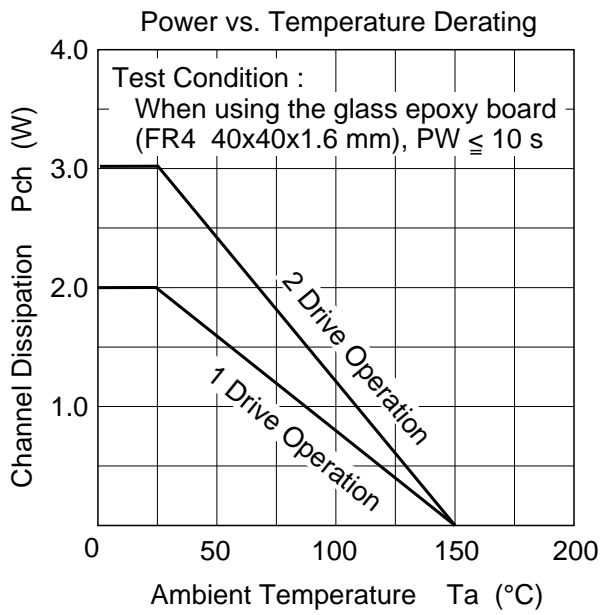
3. 2 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$

## Electrical Characteristics (Ta = 25°C)

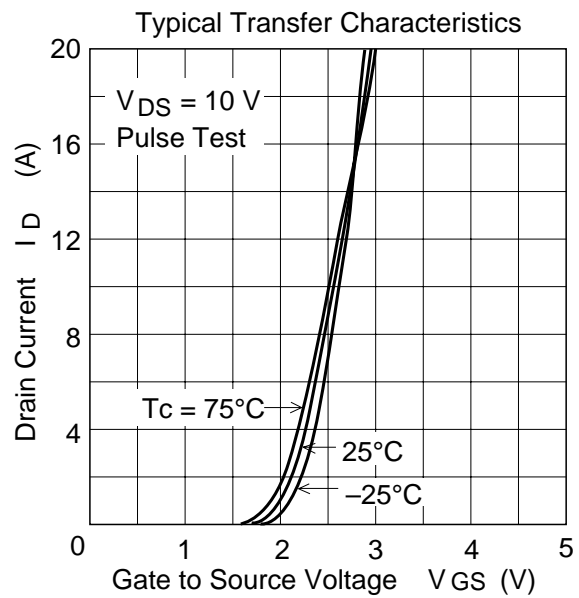
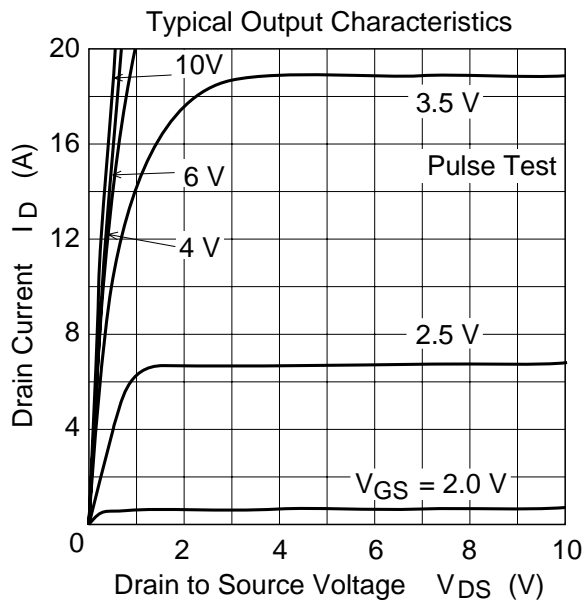
| Item                                       | Symbol        | Min | Typ   | Max   | Unit | Test Conditions  |
|--|---------------|-----|-------|-------|------|--|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 30  | —     | —     | V    | $I_D = 10 \text{ mA}$ , $V_{GS} = 0$                                 |
| 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   | $V_{DS} = 30 \text{ V}$ , $V_{GS} = 0$                               |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 1.0 | —     | 2.5   | V    | $V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$                       |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 0.016 | 0.022 | Ω    | $I_D = 4 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note4</sup>       |
|  | $R_{DS(on)}$  | —   | 0.022 | 0.029 | Ω    | $I_D = 4 \text{ A}$ , $V_{GS} = 4 \text{ V}$ <sup>Note4</sup>        |
| Forward transfer admittance                | $ y_{fs} $    | 9   | 14    | —     | S    | $I_D = 4 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note4</sup>       |
| Input capacitance                          | $C_{iss}$     | —   | 1170  | —     | pF   | $V_{DS} = 10 \text{ V}$  |
| Output capacitance                         | $C_{oss}$     | —   | 390   | —     | pF   | $V_{GS} = 0$   |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 240   | —     | pF   | $f = 1 \text{ MHz}$  |
| Total gate charge                          | $Q_g$         | —   | 32    | —     | nc   | $V_{DD} = 10 \text{ V}$  |
| Gate to source charge                      | $Q_{gs}$      | —   | 22    | —     | nc   | $V_{GS} = 10 \text{ V}$  |
| Gate to drain charge                       | $Q_{gd}$      | —   | 10    | —     | nc   | $I_D = 8 \text{ A}$  |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 32    | —     | ns   | $V_{GS} = 4 \text{ V}$ , $I_D = 4 \text{ A}$                         |
| Rise time                                  | $t_r$         | —   | 190   | —     | ns   | $V_{DD} \cong 10 \text{ V}$  |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 85    | —     | ns   |  |
| Fall time                                  | $t_f$         | —   | 110   | —     | ns   |  |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.84  | 1.09  | V    | $I_F = 8 \text{ A}$ , $V_{GS} = 0$ <sup>Note4</sup>                  |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 35    | —     | ns   | $I_F = 8 \text{ A}$ , $V_{GS} = 0$<br>$di_F/dt = 20 \text{ A}/\mu s$ |

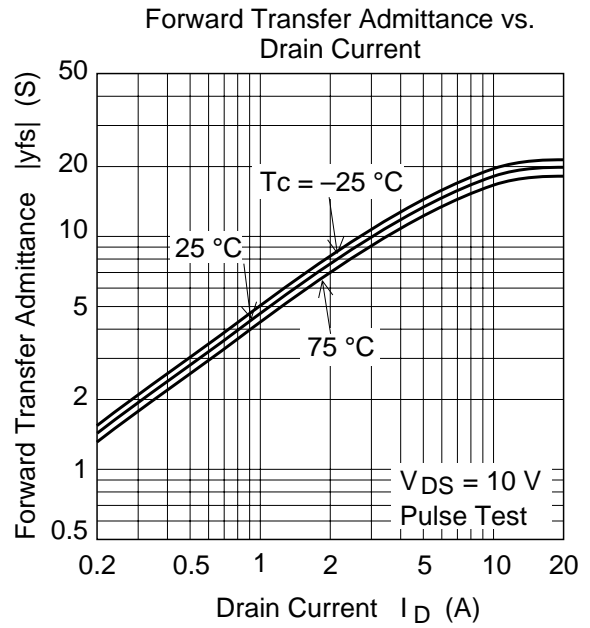
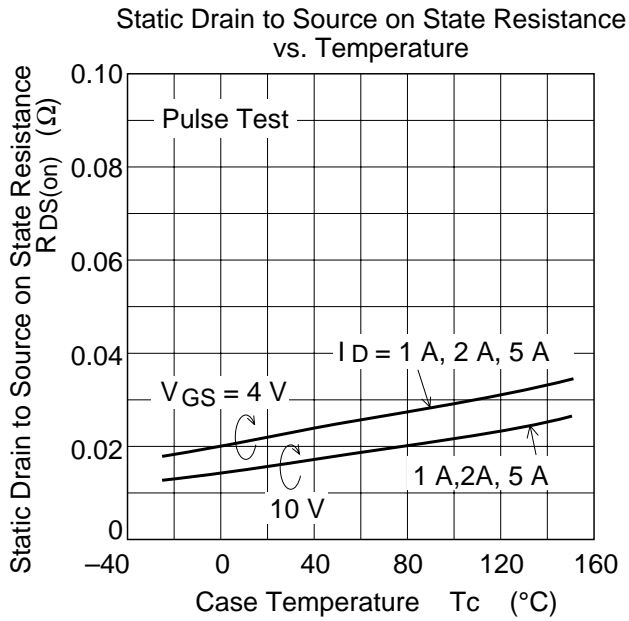
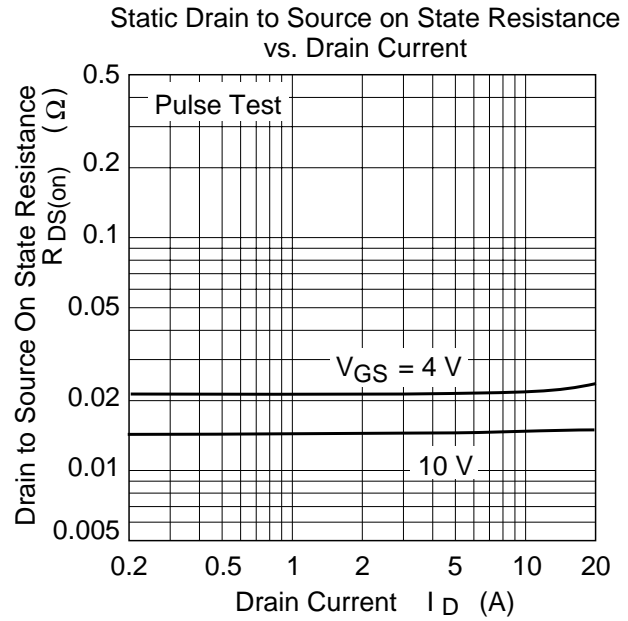
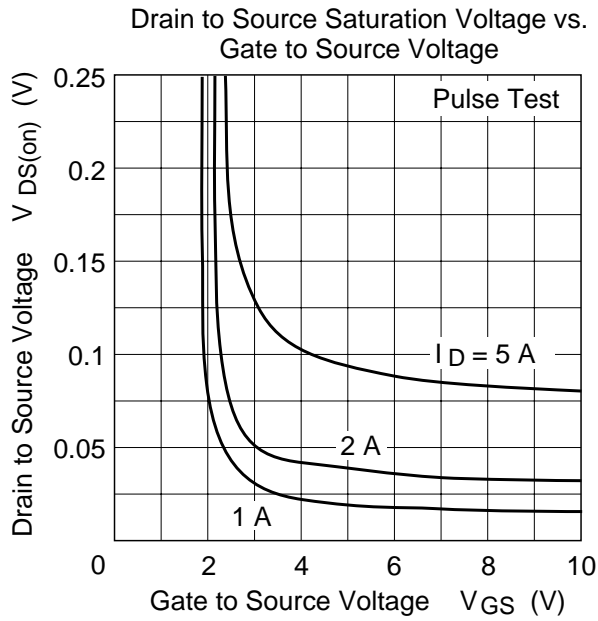
Note: 4. Pulse test

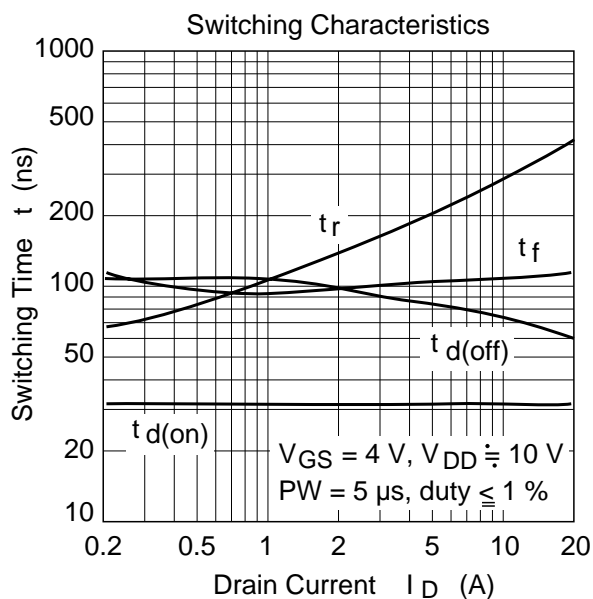
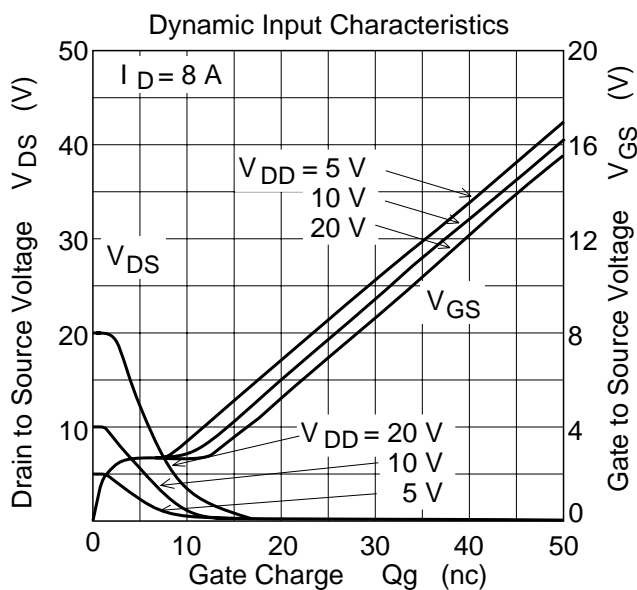
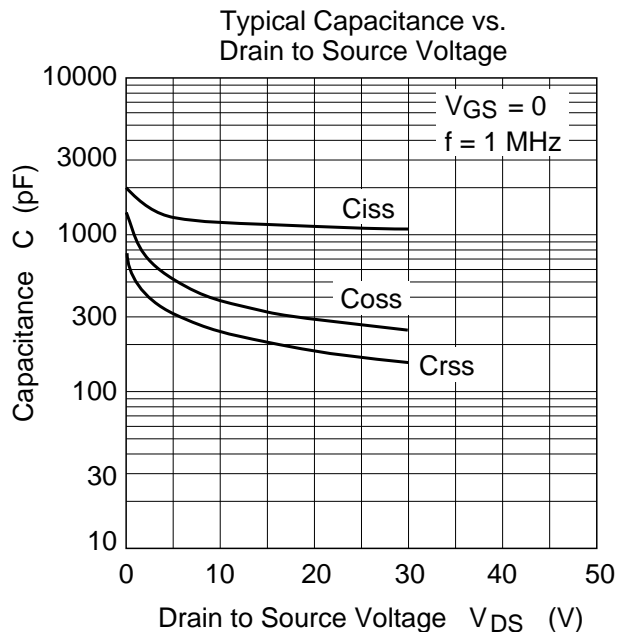
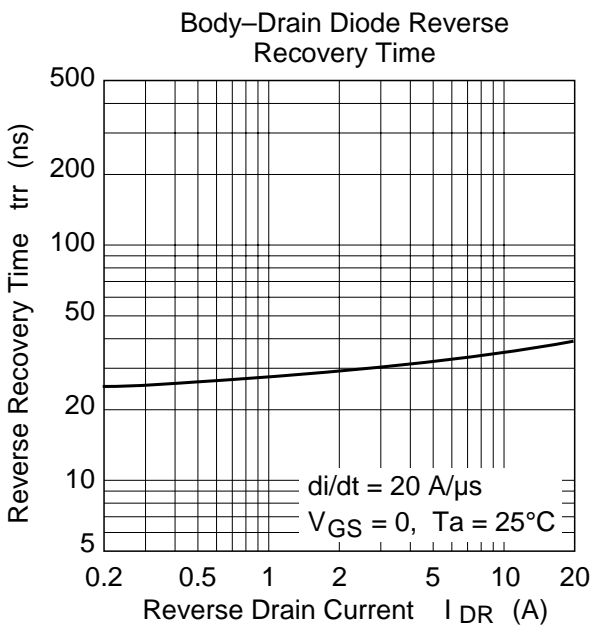
Main Characteristics

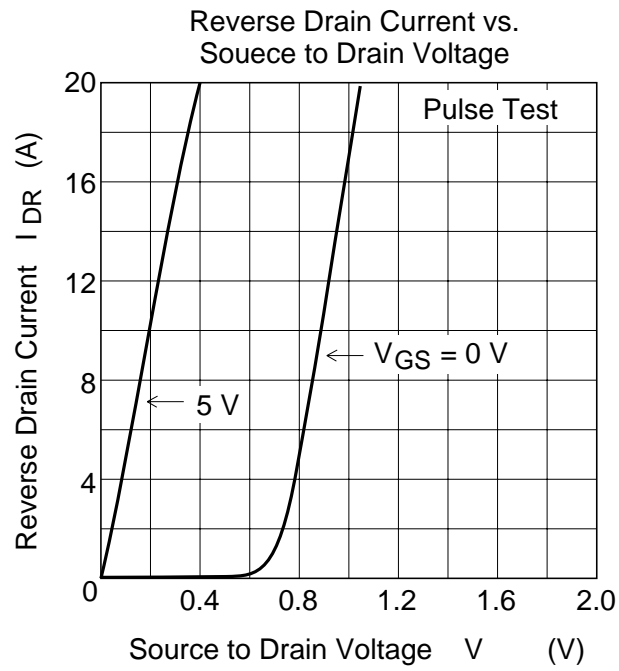


Note 5 :  
When using the glass epoxy board  
(FR4 40x40x1.6 mm)

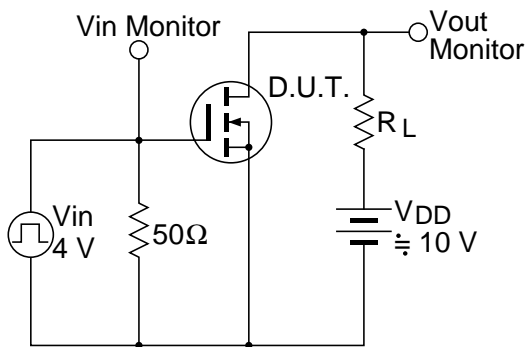




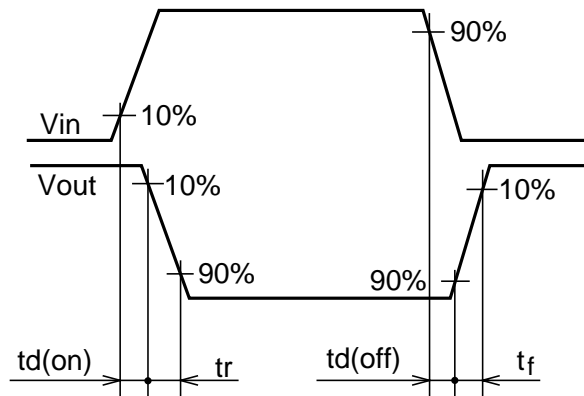


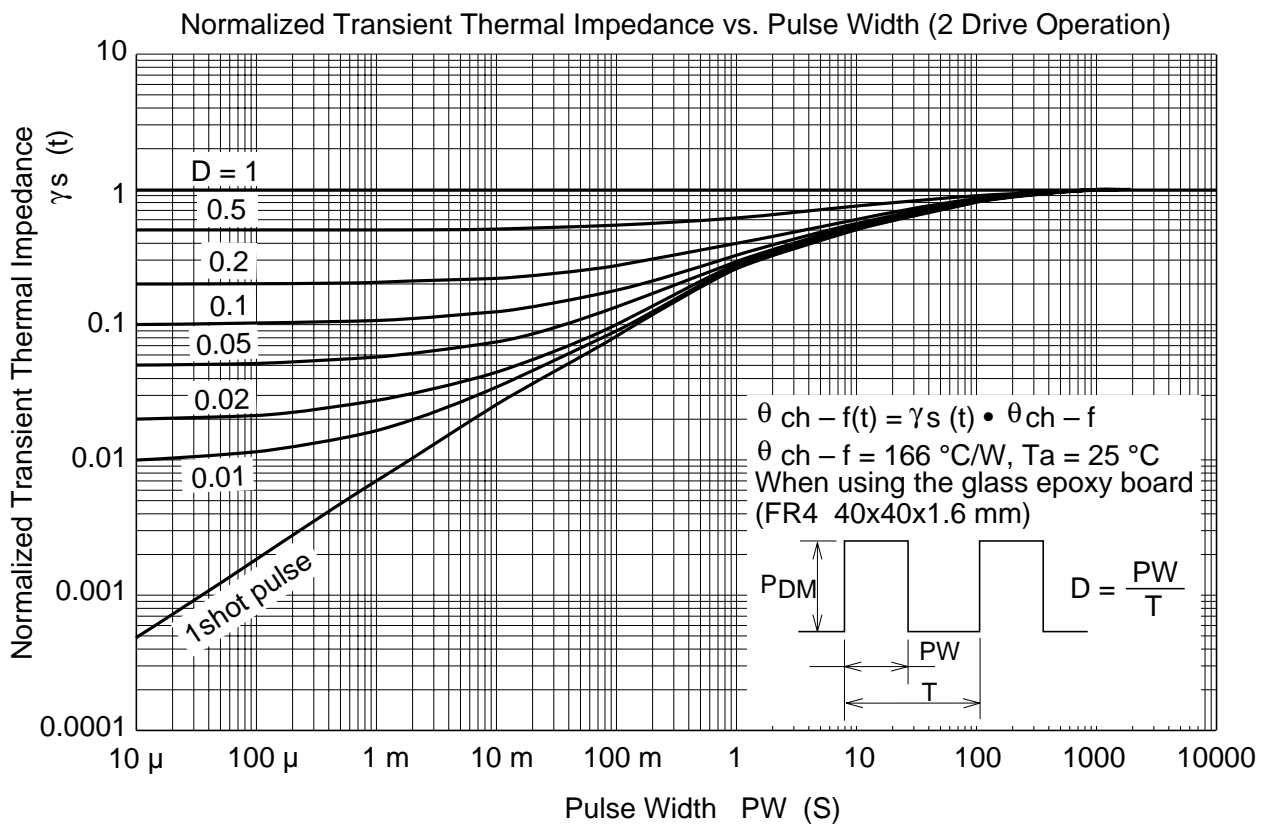
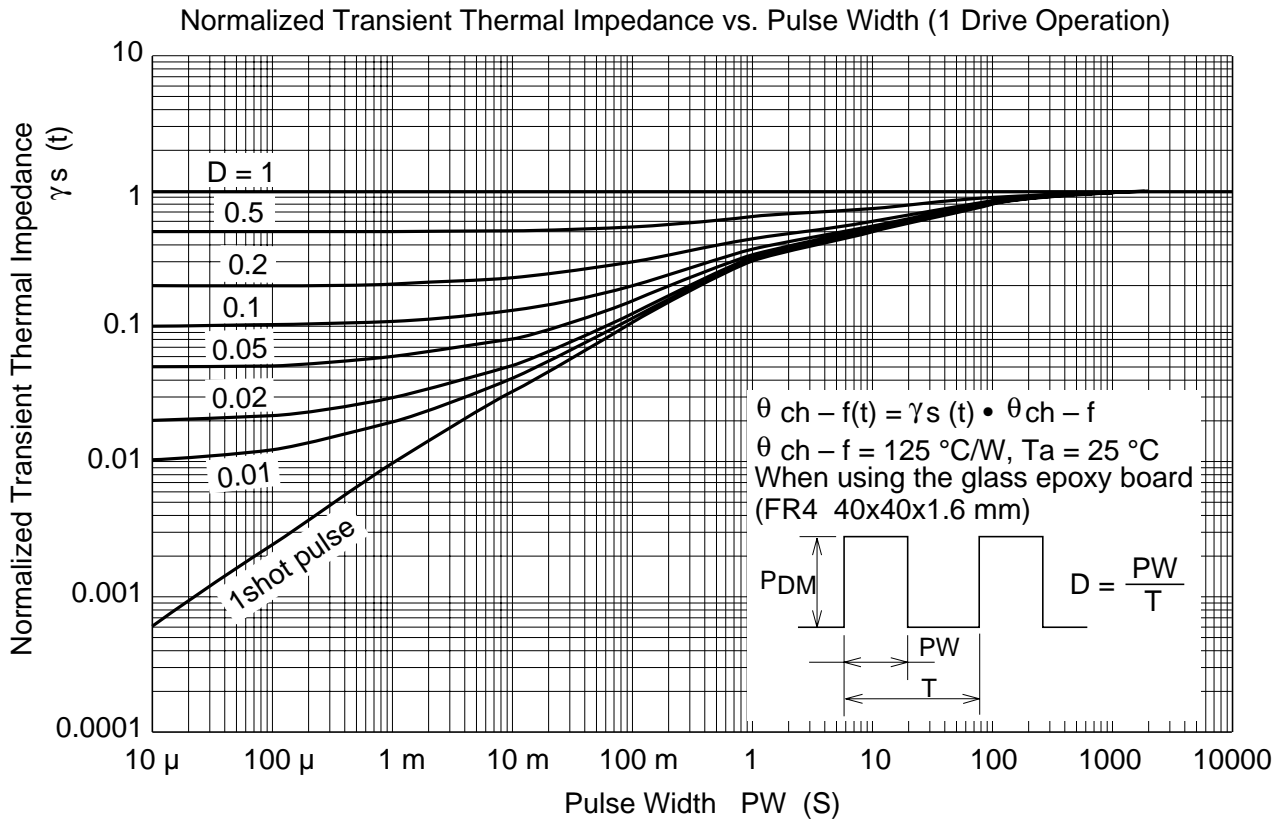


Switching Time Test Circuit



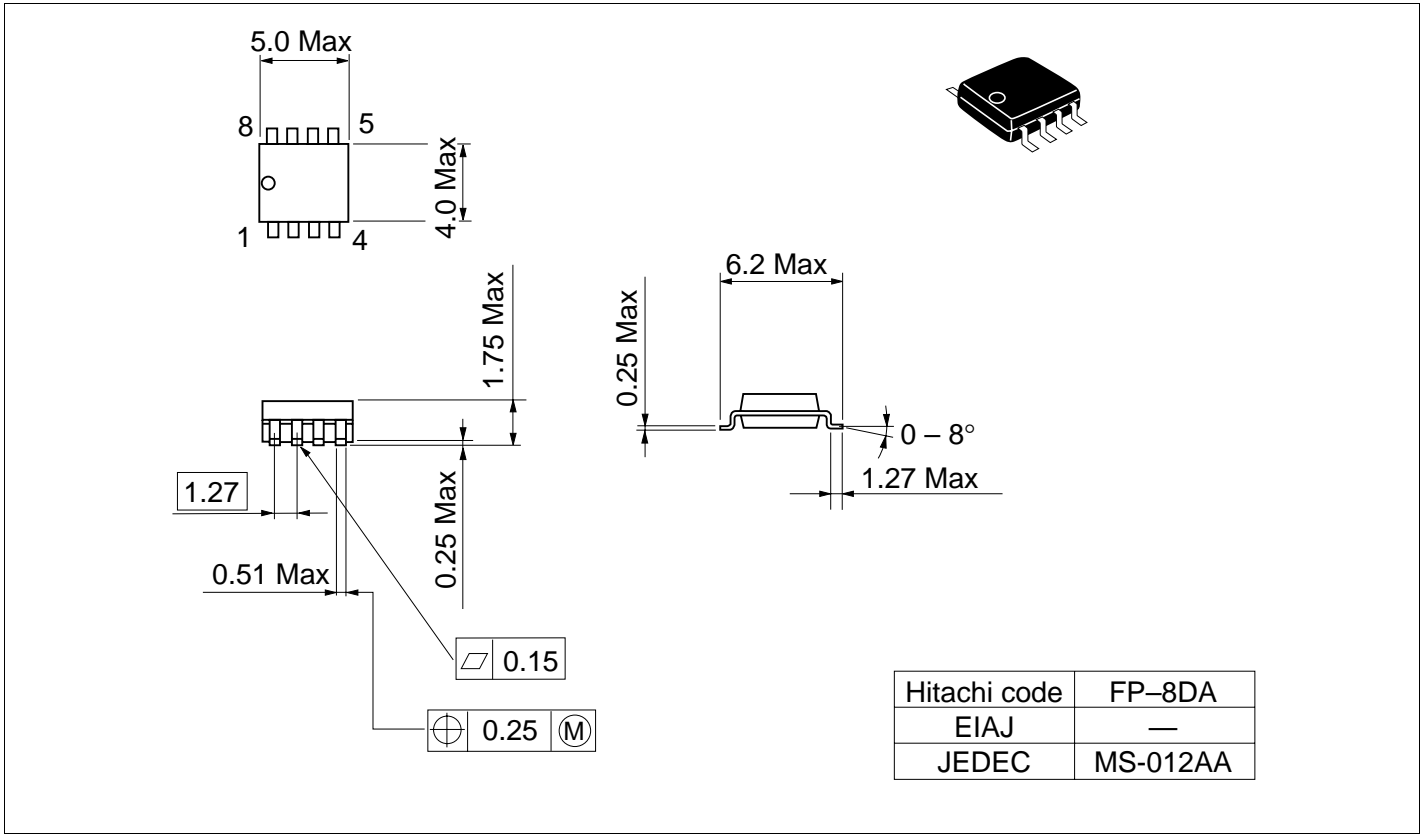
Switching Time Waveform





## Package Dimensions

Unit: mm





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