

# HAT2020R

Silicon N Channel Power MOS FET  
High Speed Power Switching

# HITACHI

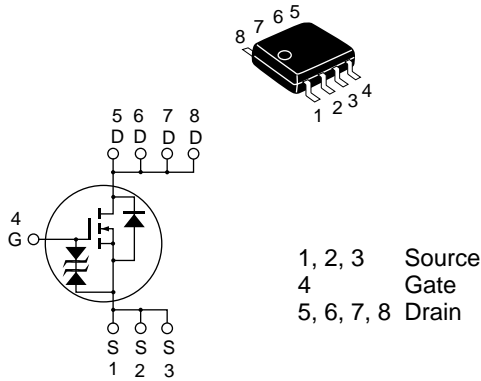
ADE-208-439 J (Z)  
11th. Edition  
February 1999

## Features

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

## Outline

SOP-8



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

| Item                                   | Symbol                          | Ratings       | Unit |
|--|---------------------------------|---------------|------|
| Drain to source voltage                | $V_{DSS}$                       | 30            | V    |
| Gate to source voltage                 | $V_{GSS}$                       | $\pm 20$      | 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                    | Pch <sup>Note2</sup>            | 2.5           | W    |
| Channel temperature                    | Tch                             | 150           | °C   |
| Storage temperature                    | Tstg                            | - 55 to + 150 | °C   |

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

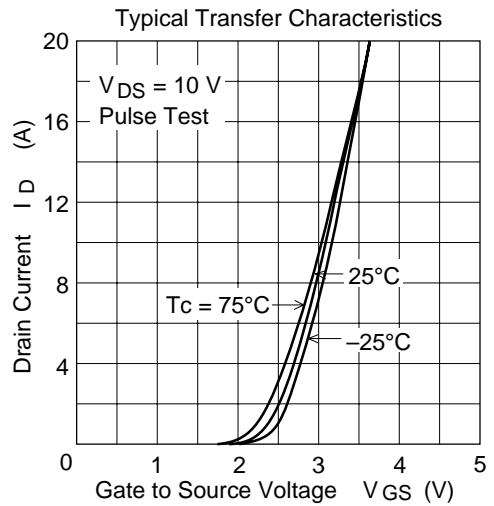
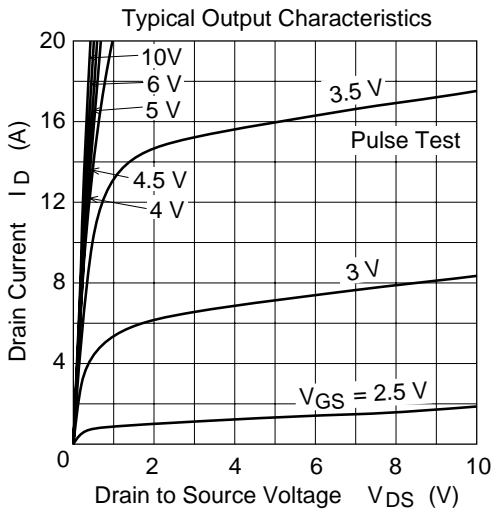
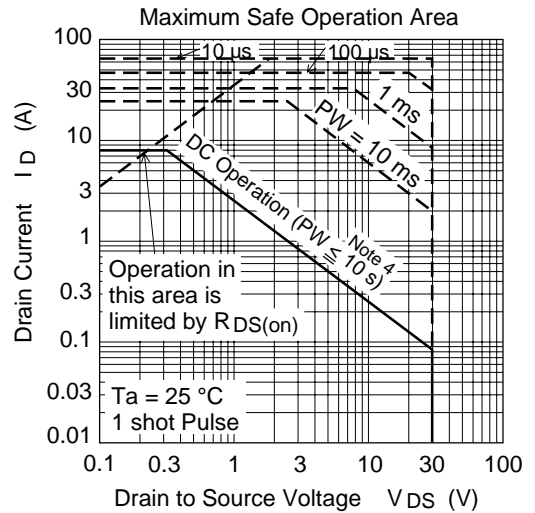
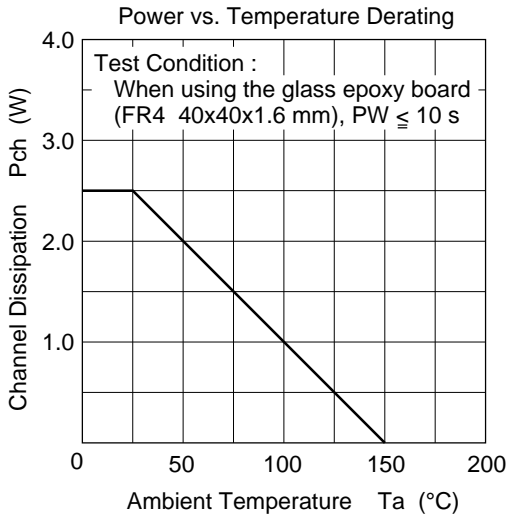
2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$

## Electrical Characteristics (Ta = 25°C)

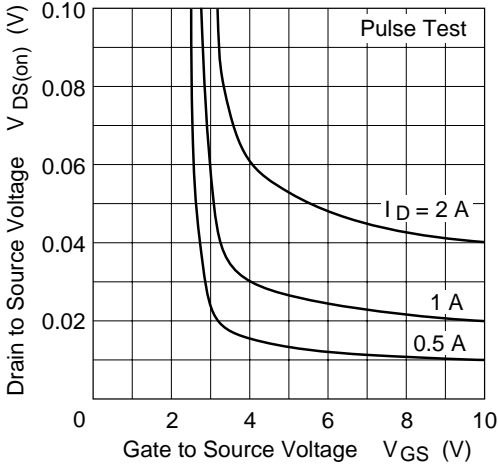
| Item                                       | Symbol        | Min      | Typ   | Max      | Unit     | Test Conditions  |
|--|---------------|----------|-------|----------|----------|--|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 30       | —     | —        | V        | $I_D = 10\text{ mA}$ , $V_{GS} = 0$                          |
| Gate to source breakdown voltage           | $V_{(BR)GSS}$ | $\pm 20$ | —     | —        | V        | $I_G = \pm 100\ \mu A$ , $V_{DS} = 0$                        |
| Gate to source leak current                | $I_{GSS}$     | —        | —     | $\pm 10$ | $\mu A$  | $V_{GS} = \pm 16\text{ V}$ , $V_{DS} = 0$                    |
| Zero gate voltage drain current            | $I_{DSS}$     | —        | —     | 10       | $\mu A$  | $V_{DS} = 30\text{ V}$ , $V_{GS} = 0$                        |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 1.0      | —     | 2.0      | V        | $V_{DS} = 10\text{ V}$ , $I_D = 1\text{ mA}$                 |
| Static drain to source on state resistance | $R_{DS(on)}$  | —        | 0.020 | 0.028    | $\Omega$ | $I_D = 4\text{ A}$ , $V_{GS} = 10\text{ V}$ <sup>Note3</sup> |
|  | $R_{DS(on)}$  | —        | 0.030 | 0.050    | $\Omega$ | $I_D = 4\text{ A}$ , $V_{GS} = 4\text{ V}$ <sup>Note3</sup>  |
| Forward transfer admittance                | $ y_{fs} $    | 7        | 11    | —        | S        | $I_D = 4\text{ A}$ , $V_{DS} = 10\text{ V}$ <sup>Note3</sup> |
| Input capacitance                          | Ciss          | —        | 780   | —        | pF       | $V_{DS} = 10\text{ V}$                                       |
| Output capacitance                         | Coss          | —        | 560   | —        | pF       | $V_{GS} = 0$   |
| Reverse transfer capacitance               | Crss          | —        | 240   | —        | pF       | f = 1MHz   |
| Turn-on delay time                         | $t_{d(on)}$   | —        | 35    | —        | ns       | $V_{GS} = 4\text{ V}$ , $I_D = 4\text{ A}$                   |
| Rise time                                  | $t_r$         | —        | 240   | —        | ns       | $V_{DD} \cong 10\text{ V}$                                   |
| Turn-off delay time                        | $t_{d(off)}$  | —        | 50    | —        | ns       |  |
| Fall time                                  | $t_f$         | —        | 100   | —        | ns       |  |
| Body–drain diode forward voltage           | $V_{DF}$      | —        | 0.8   | 1.3      | V        | IF = 8 A, $V_{GS} = 0$ <sup>Note3</sup>                      |
| Body–drain diode reverse recovery time     | $t_{rr}$      | —        | 55    | —        | ns       | IF = 8 A, $V_{GS} = 0$<br>diF/ dt = 20 A/ $\mu s$            |

Note: 3. Pulse test

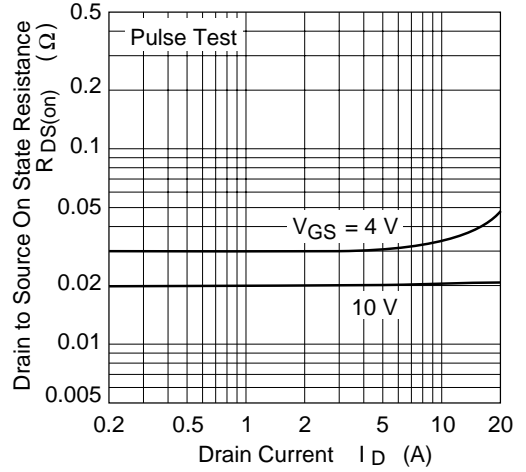
Main Characteristics



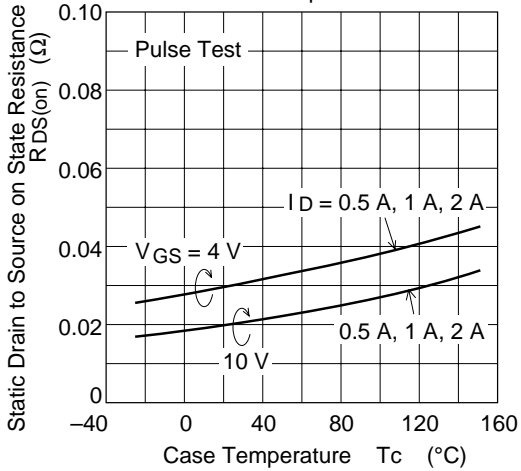
Drain to Source Saturation Voltage vs. Gate to Source Voltage



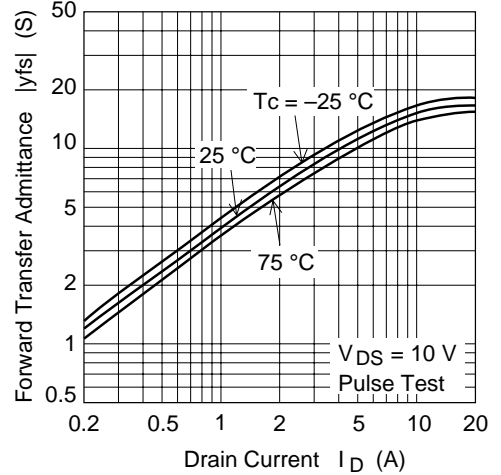
Static Drain to Source on State Resistance vs. Drain Current

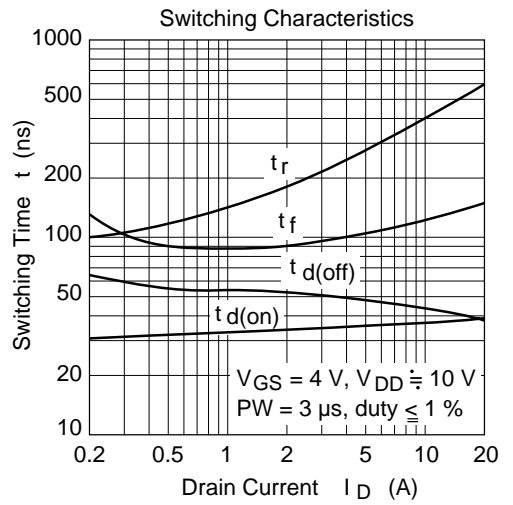
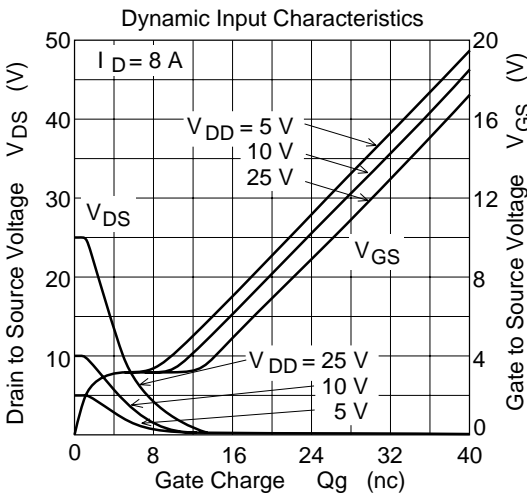
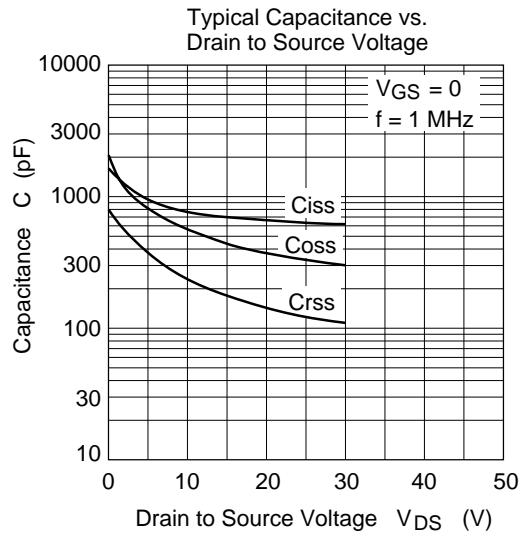
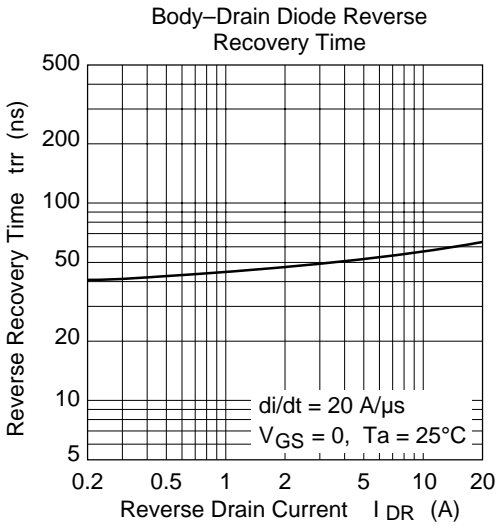


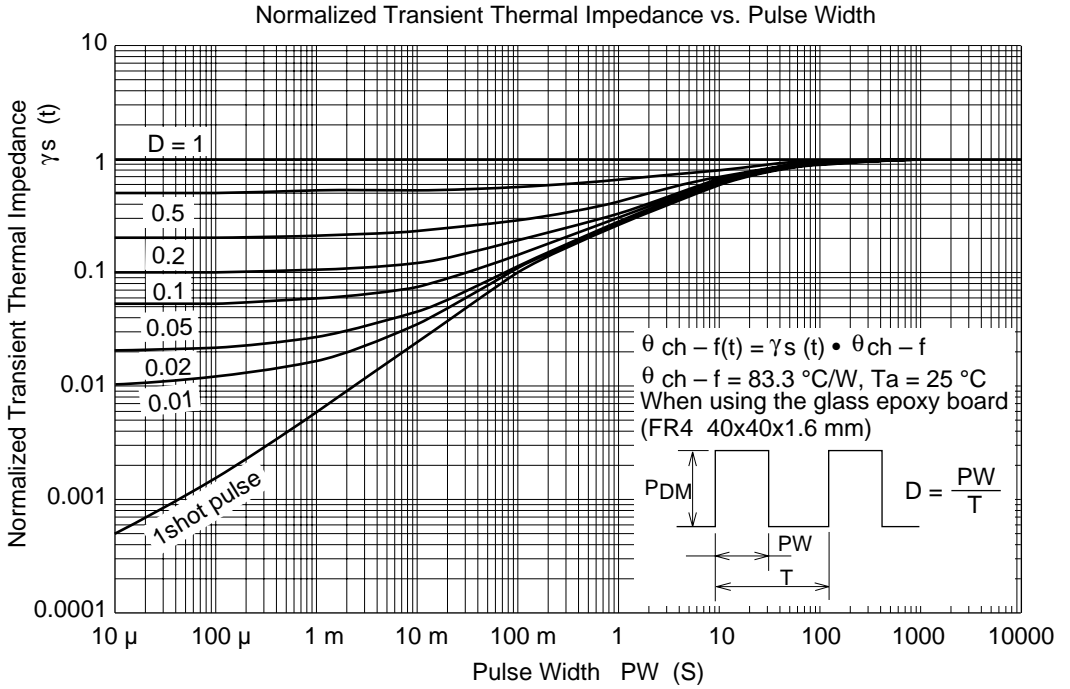
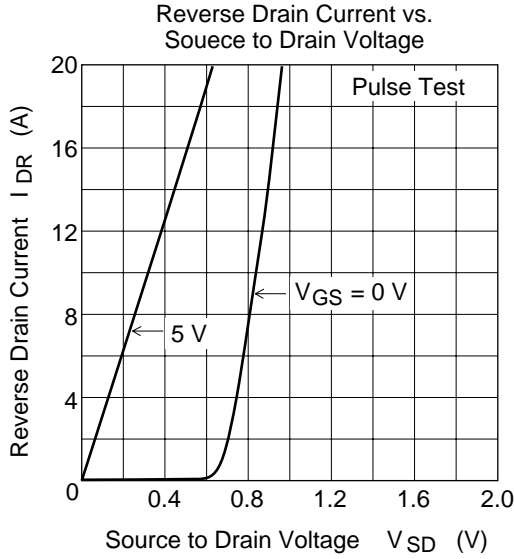
Static Drain to Source on State Resistance vs. Temperature



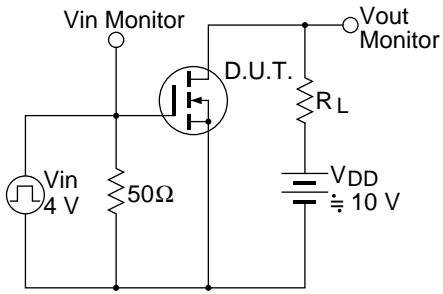
Forward Transfer Admittance vs. Drain Current



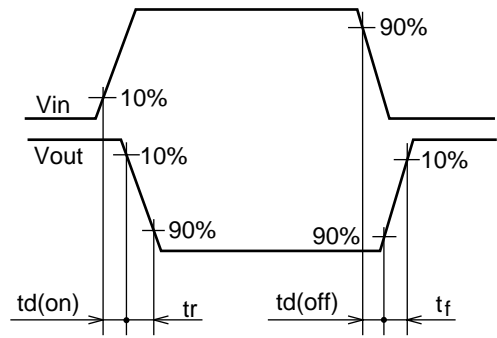




Switching Time Test Circuit

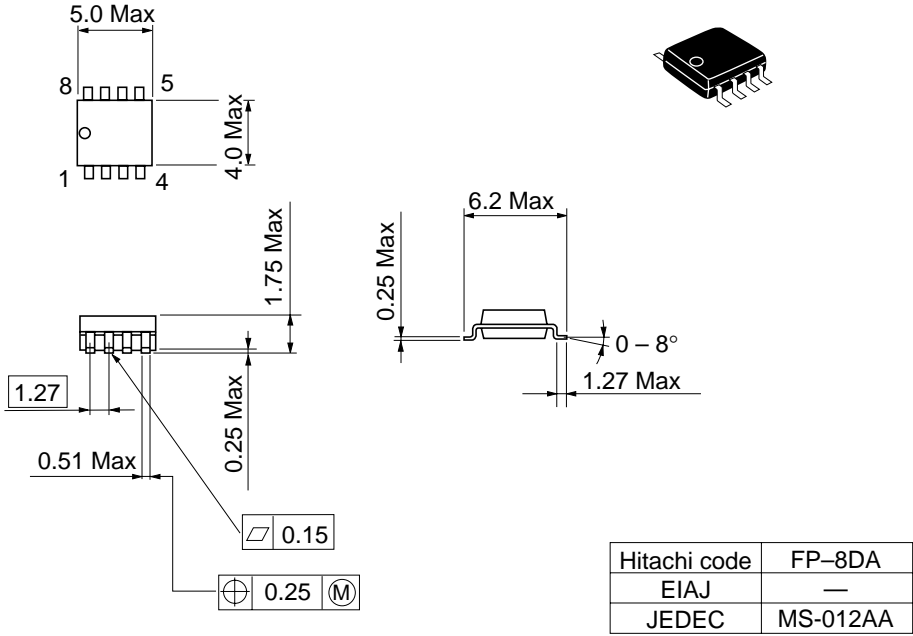


Switching Time Waveform



## Package Dimensions

Unit: mm





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