To all our customers

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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# HAT2050T

Silicon N Channel Power MOS FET
High Speed Power Switching

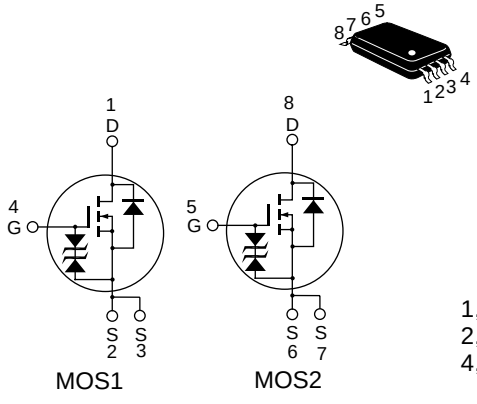
ADE-208-660A (Z)
2nd. Edition
Feb. 1999

## Features

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

## Outline

TSSOP–8




| | |
|---|---|
| 1, 8 | Drain |
| 2, 3, 6, 7 | Source |
| 4, 5 | Gate |

## 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 | $I_D$ | 1 | A |
| Drain peak current | $I_{D(pulse)}$ Note1 | 4 | A |
| Body-drain diode reverse drain current | $I_{DR}$ | 1 | A |
| Channel dissipation | Pch Note2 | 1.0 | W |
| Channel dissipation | Pch Note3 | 1.5 | W |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | – 55 to + 150 | °C |

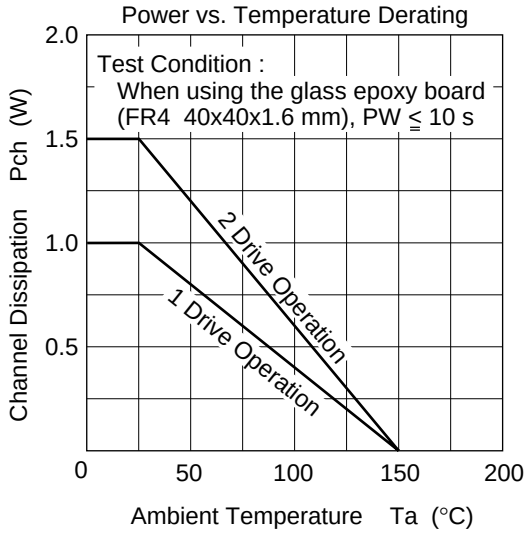
Note: 1. PW ≤ 10µs, duty cycle ≤ 1 %
2. 1 Drive operation : When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW≤ 10s
3. 2 Drive operation : When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW≤ 10s

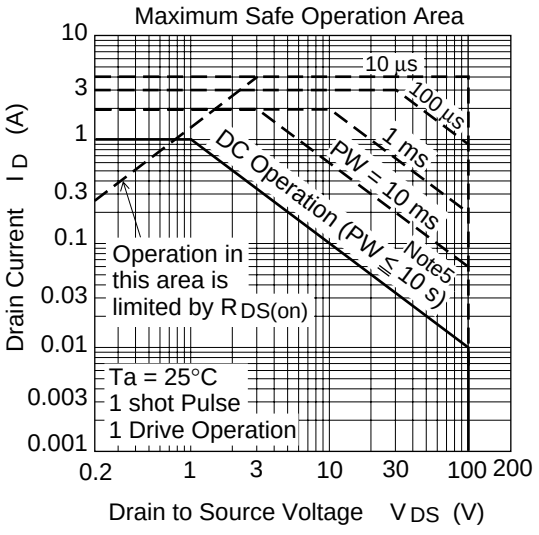
## Electrical Characteristics (Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 100 | — | — | V | $I_D$ = 10 mA, $V_{GS}$ = 0 |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ± 20 | — | — | V | $I_G$ = ± 100 µA, $V_{DS}$ = 0 |
| Gate to source leak current | $I_{GSS}$ | — | — | ± 10 | µA | $V_{GS}$ = ± 16 V, $V_{DS}$ = 0 |
| Zero gate voltege drain current | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 100 V, $V_{GS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.3 | — | 2.3 | V | $V_{DS}$ = 10 V, $I_D$ = 1 mA |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.56 | 0.75 | Ω | $I_D$ = 0.5 A, $V_{GS}$ = 10 V Note4 |
| | $R_{DS(on)}$ | — | 0.72 | 1.0 | Ω | $I_D$ = 0.5 A, $V_{GS}$ = 4 V Note4 |
| Forward transfer admittance | $\|y_{fs}\|$ | 0.7 | 1.1 | — | S | $I_D$ = 0.5 A, $V_{DS}$ = 10 V Note4 |
| Input capacitance | Ciss | — | 90 | — | pF | $V_{DS}$ = 10 V |
| Output capacitance | Coss | — | 42 | — | pF | $V_{GS}$ = 0 |
| Reverse transfer capacitance | Crss | — | 20 | — | pF | f = 1MHz |
| Turn-on delay time | $t_{d(on)}$ | — | 11 | — | ns | $V_{GS}$ = 4 V, $I_D$ = 0.5 A |
| Rise time | $t_r$ | — | 24 | — | ns | $V_{DD}$ ≅ 10 V |
| Turn-off delay time | $t_{d(off)}$ | — | 14 | — | ns | |
| Fall time | $t_f$ | — | 11 | — | ns | |
| Body–drain diode forward voltage | $V_{DF}$ | — | 0.84 | 1.1 | V | $I_F$ = 1 A, $V_{GS}$ = 0 Note4 |
| Body–drain diode reverse recovery time | $t_{rr}$ | — | 85 | — | ns | $I_F$ = 1 A, $V_{GS}$ = 0<br>diF/ dt = 20 A/µs |

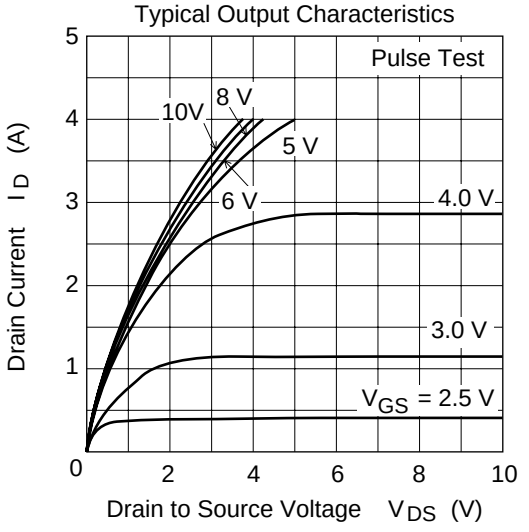
Note: 4. Pulse test

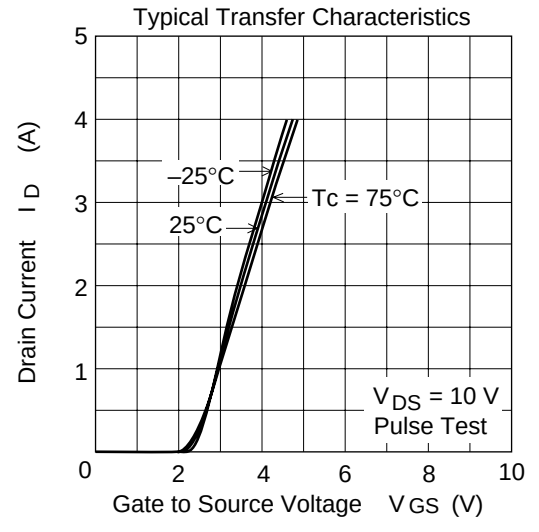
## Main Characteristics



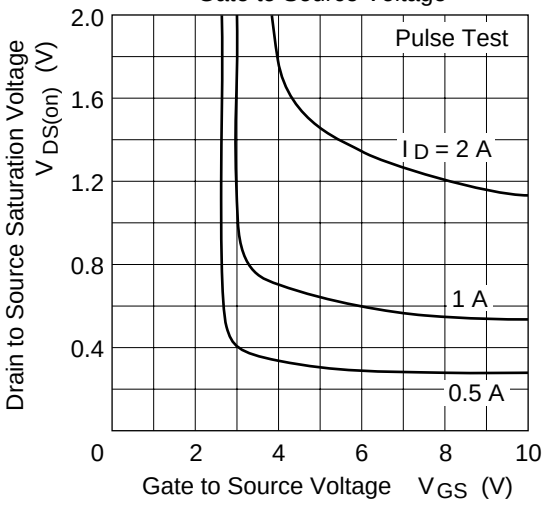




Note 5 :
When using the glass epoxy board
(FR4 40x40x1.6 mm)

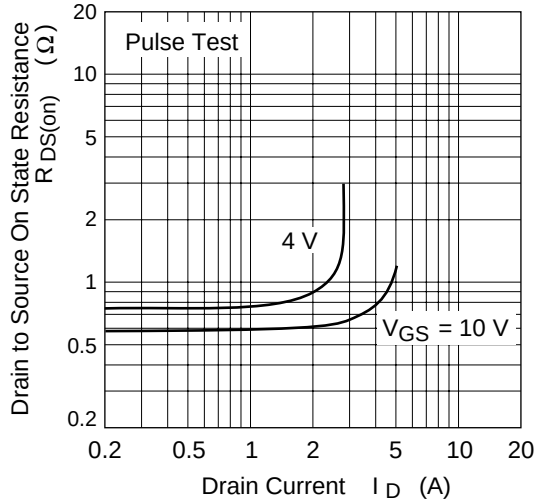


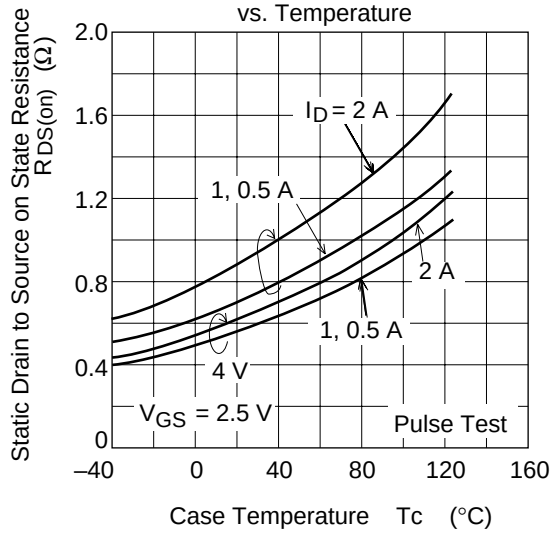
Drain to Source Saturation Voltage vs. Gate to Source Voltage



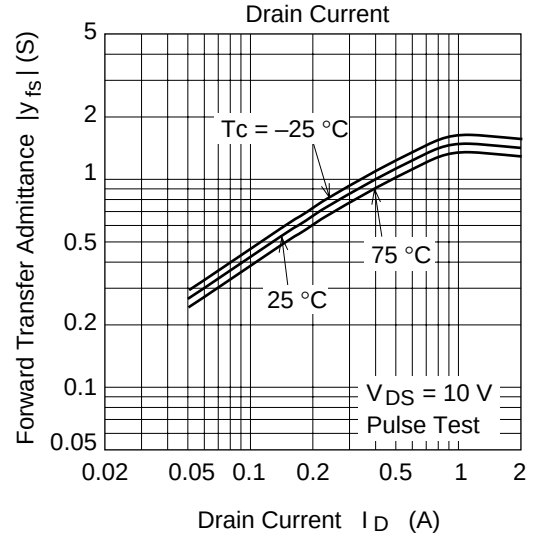

Static Drain to Source on State Resistance vs. Drain Current



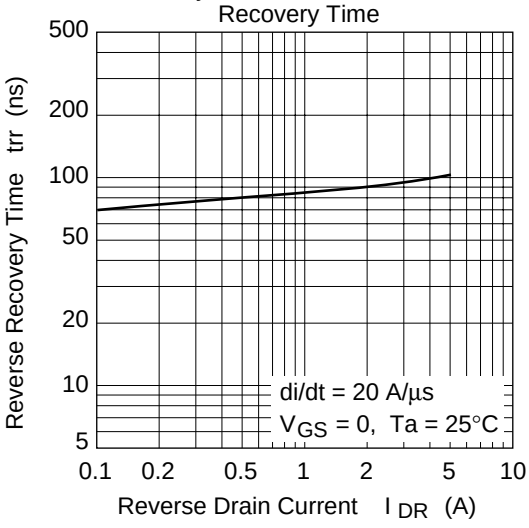

Static Drain to Source on State Resistance vs. Temperature



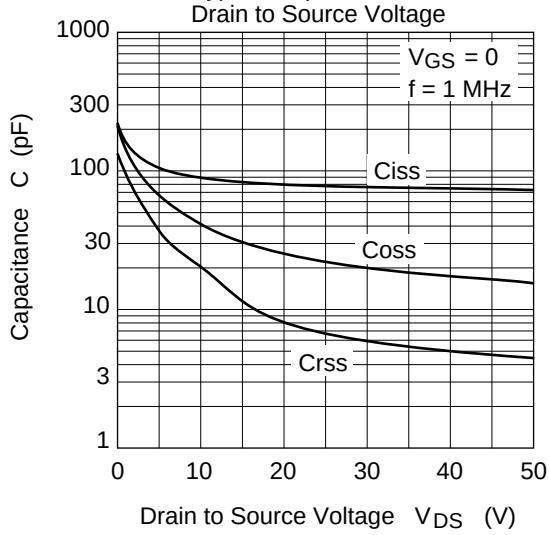

Forward Transfer Admittance vs. Drain Current



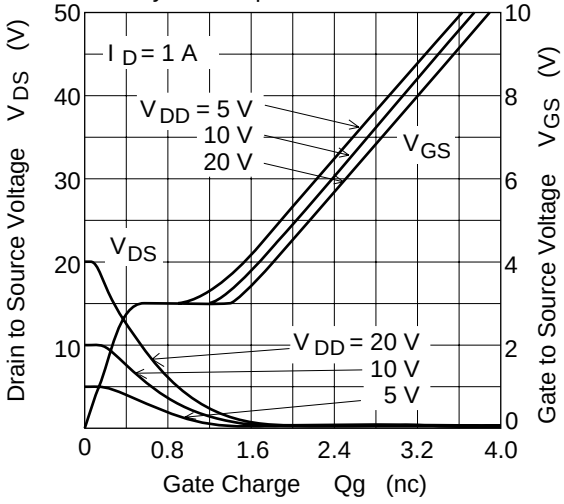
Body–Drain Diode Reverse Recovery Time



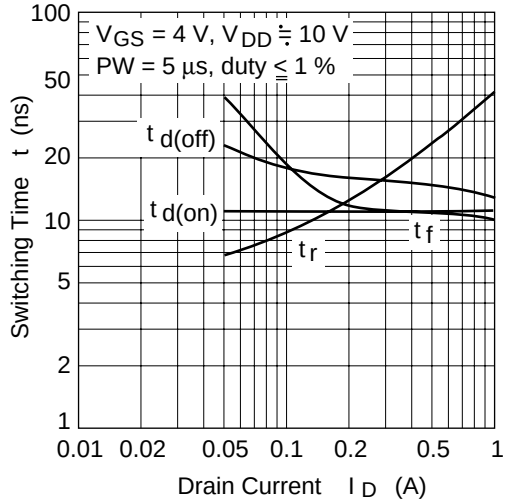

Typical Capacitance vs. Drain to Source Voltage



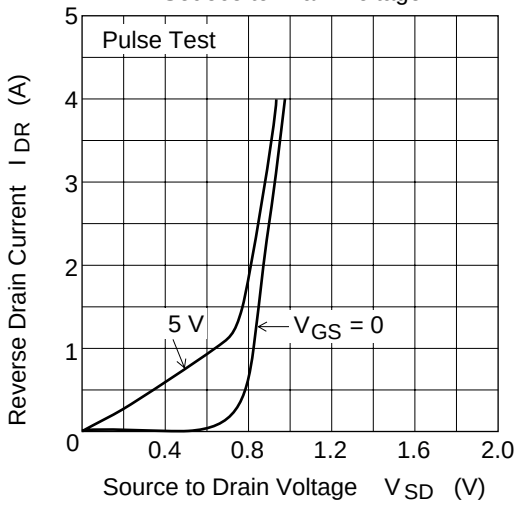

Dynamic Input Characteristics



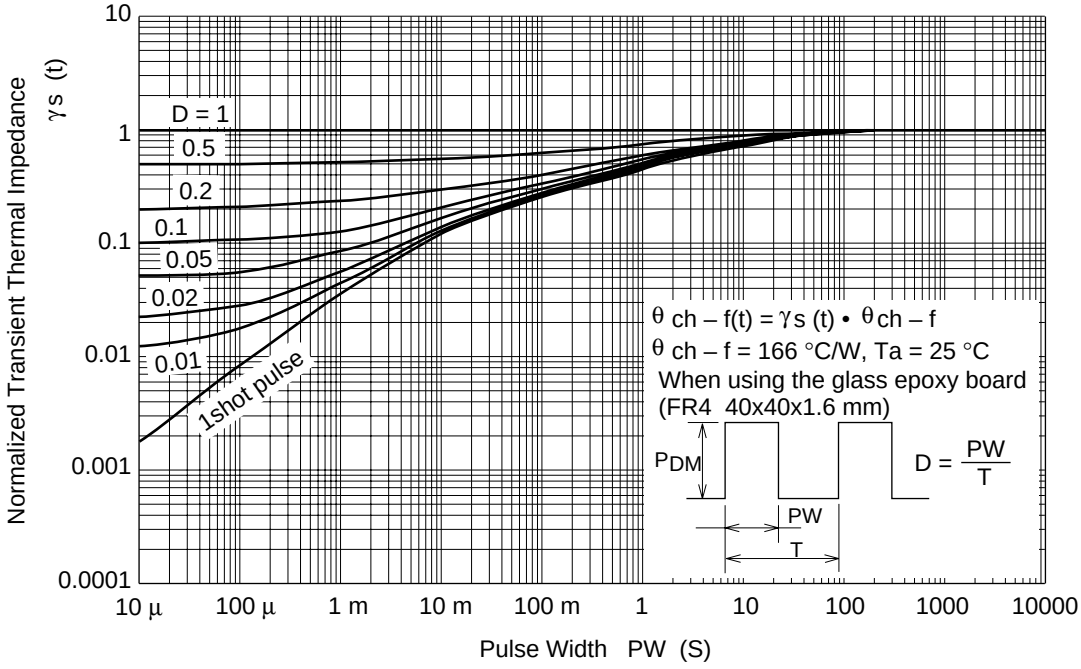

Switching Characteristics



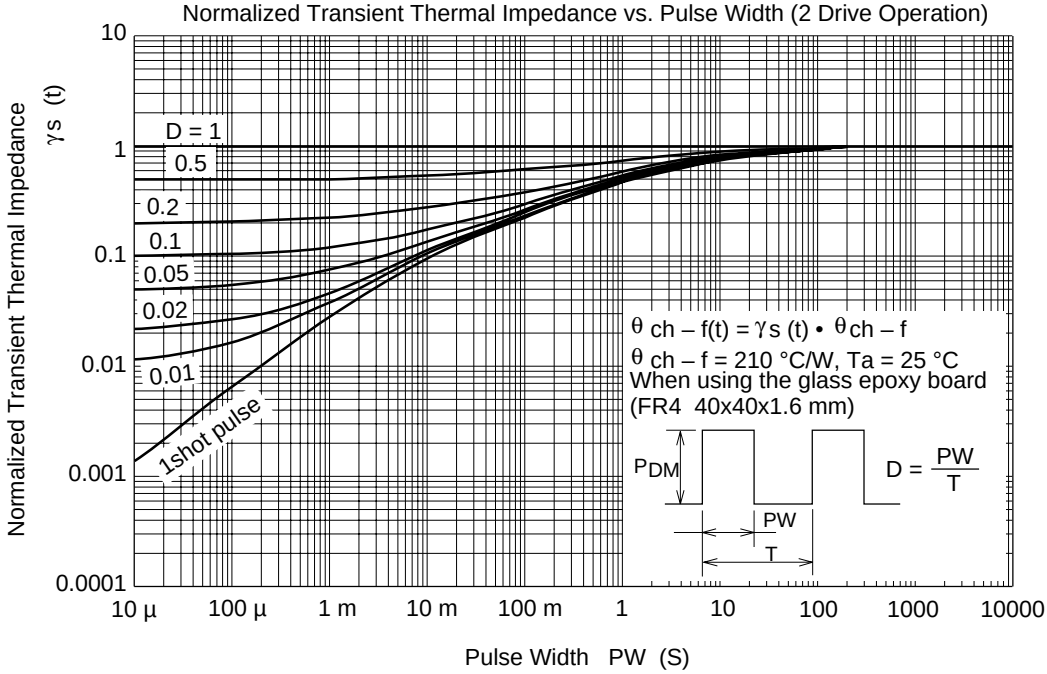
Reverse Drain Current vs.
Souece to Drain Voltage



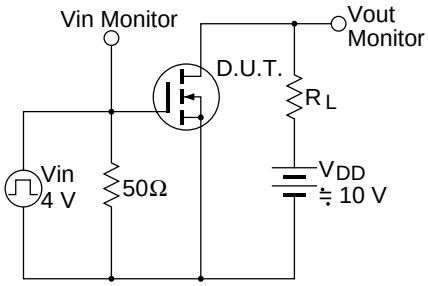

Normalized Transient Thermal Impedance vs. Pulse Width (1 Drive Operation)



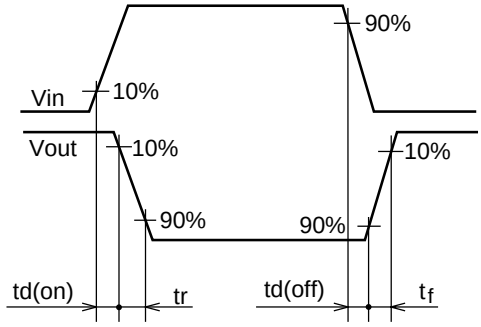
Normalized Transient Thermal Impedance vs. Pulse Width (2 Drive Operation)




Switching Time Test Circuit



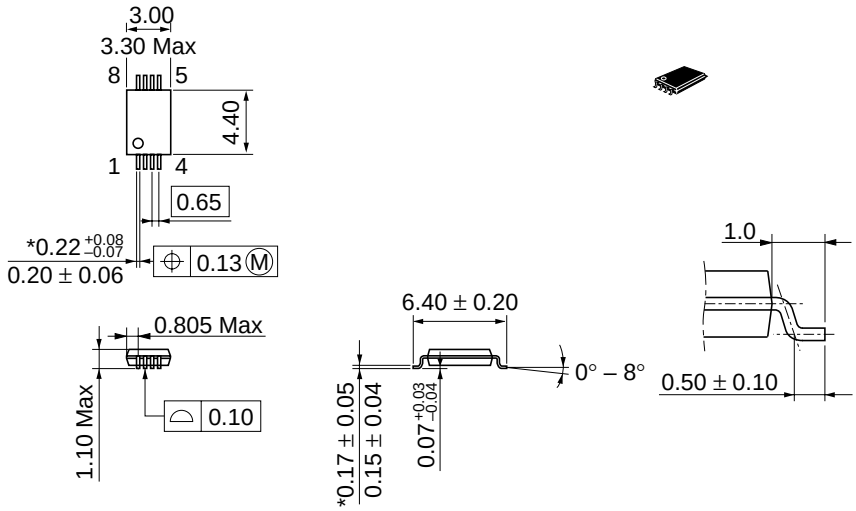

Switching Time Waveform



## Package Dimensions

As of January, 2001

Unit: mm




| | |
|---|---|
| Hitachi Code | TTP-8D |
| JEDEC | — |
| EIAJ | — |
| Mass (reference value) | — |

*Dimension including the plating thickness
Base material dimension

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