

## RJK0348DSP

Silicon N Channel Power MOS FET  
Power Switching

REJ03G1644-0201

Rev.2.01

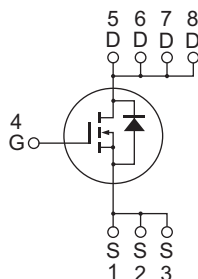
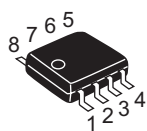
Apr 24, 2008

### Features

- Capable of 4.5 V gate drive
- Low drive current
- High density mounting
- Low on-resistance  
 $R_{DS(on)} = 2.6 \text{ m}\Omega$  typ. (at  $V_{GS} = 10 \text{ V}$ )
- Pb-free

### Outline

RENESAS Package code: PRSP0008DD-D  
(Package name: SOP-8<FP-8DAV>)



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

### Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

| Item                                   | Symbol                           | Ratings     | Unit               |
|----------------------------------------|----------------------------------|-------------|--------------------|
| Drain to source voltage                | $V_{DSS}$                        | 30          | V                  |
| Gate to source voltage                 | $V_{GSS}$                        | $\pm 20$    | V                  |
| Drain current                          | $I_D$                            | 22          | A                  |
| Drain peak current                     | $I_{D(pulse)}$ <sup>Note1</sup>  | 176         | A                  |
| Body-drain diode reverse drain current | $I_{DR}$                         | 22          | A                  |
| Avalanche current                      | $I_{AP}$ <sup>Note 2</sup>       | 22          | A                  |
| Avalanche energy                       | $E_{AR}$ <sup>Note 2</sup>       | 48.4        | mJ                 |
| Channel dissipation                    | $P_{ch}$ <sup>Note3</sup>        | 2.5         | W                  |
| Channel to ambient thermal impedance   | $\theta_{ch-a}$ <sup>Note3</sup> | 50          | $^\circ\text{C/W}$ |
| Channel temperature                    | $T_{ch}$                         | 150         | $^\circ\text{C}$   |
| Storage temperature                    | $T_{stg}$                        | -55 to +150 | $^\circ\text{C}$   |

Notes: 1.  $PW \leq 10 \mu\text{s}$ , duty cycle  $\leq 1\%$

2. Value at  $T_{ch} = 25^\circ\text{C}$ ,  $R_g \geq 50 \Omega$

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

## Electrical Characteristics

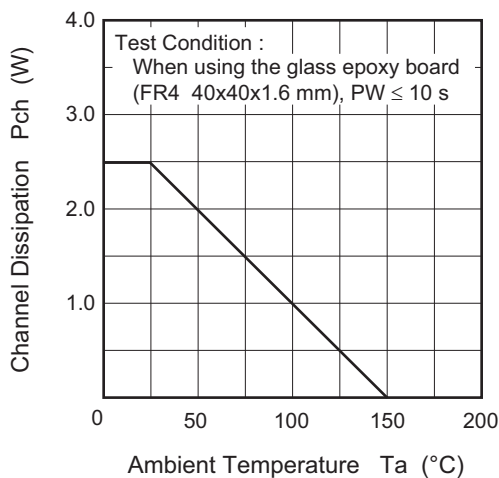
(Ta = 25°C)

| 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                | $I_{GSS}$     | —   | —    | $\pm 0.1$ | $\mu\text{A}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0$                                   |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —    | 1         | $\mu\text{A}$    | $V_{DS} = 30 \text{ V}$ , $V_{GS} = 0$                                       |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 1.2 | —    | 2.5       | V                | $V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$                               |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 2.6  | 3.4       | $\text{m}\Omega$ | $I_D = 11 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note4</sup>              |
|                                            | $R_{DS(on)}$  | —   | 3.2  | 4.5       | $\text{m}\Omega$ | $I_D = 11 \text{ A}$ , $V_{GS} = 4.5 \text{ V}$ <sup>Note4</sup>             |
| Forward transfer admittance                | $ y_{fs} $    | —   | 60   | —         | S                | $I_D = 11 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note4</sup>              |
| Input capacitance                          | $C_{iss}$     | —   | 5100 | —         | pF               | $V_{DS} = 10 \text{ V}$                                                      |
| Output capacitance                         | $C_{oss}$     | —   | 980  | —         | pF               | $V_{GS} = 0$                                                                 |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 315  | —         | pF               | $f = 1 \text{ MHz}$                                                          |
| Gate Resistance                            | $R_g$         | —   | 1.4  | —         | $\Omega$         |                                                                              |
| Total gate charge                          | $Q_g$         | —   | 34   | —         | nC               | $V_{DD} = 10 \text{ V}$                                                      |
| Gate to source charge                      | $Q_{gs}$      | —   | 12.5 | —         | nC               | $V_{GS} = 4.5 \text{ V}$                                                     |
| Gate to drain charge                       | $Q_{gd}$      | —   | 7.0  | —         | nC               | $I_D = 22 \text{ A}$                                                         |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 13   | —         | ns               | $V_{GS} = 10 \text{ V}$ , $I_D = 11 \text{ A}$                               |
| Rise time                                  | $t_r$         | —   | 5.8  | —         | ns               | $V_{DD} \cong 10 \text{ V}$                                                  |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 69   | —         | ns               | $R_L = 0.91 \Omega$                                                          |
| Fall time                                  | $t_f$         | —   | 10   | —         | ns               | $R_g = 4.7 \Omega$                                                           |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.78 | 1.02      | V                | $I_F = 22 \text{ A}$ , $V_{GS} = 0$ <sup>Note4</sup>                         |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 35   | —         | ns               | $I_F = 22 \text{ A}$ , $V_{GS} = 0$<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$ |

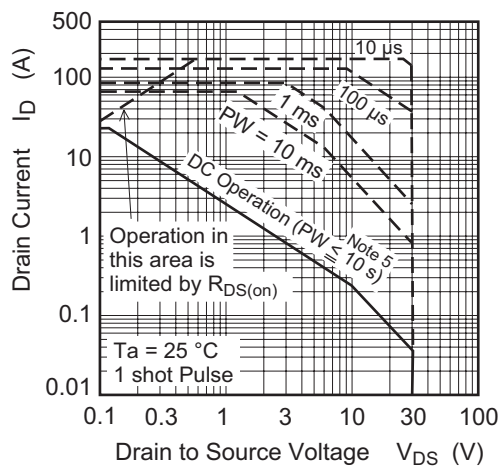
Notes: 4. Pulse test

## Main Characteristics

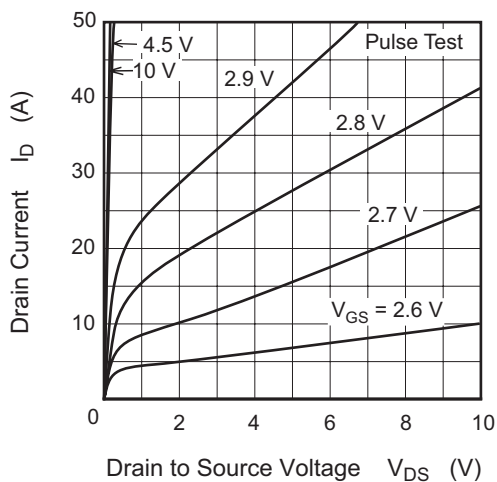
Power vs. Temperature Derating



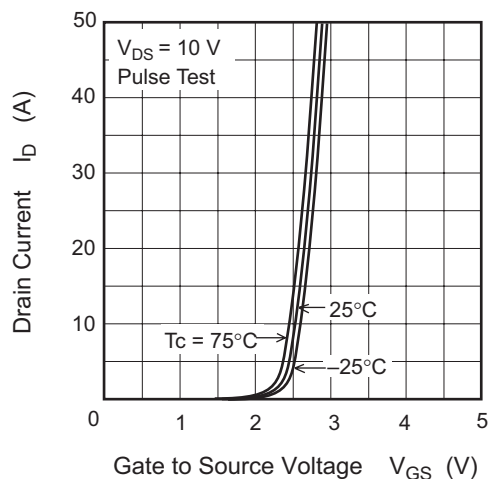
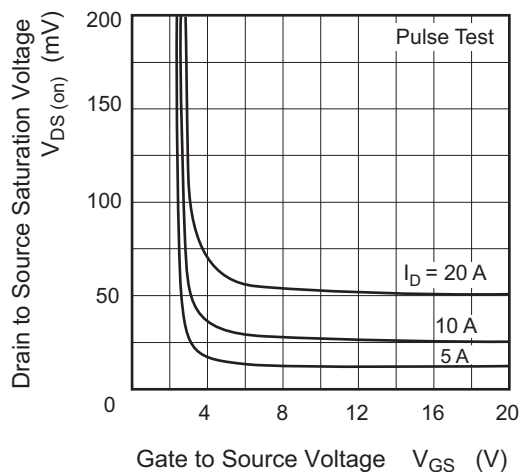
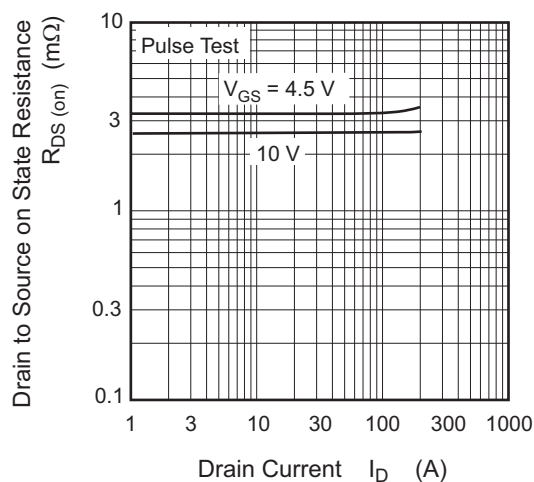
Maximum Safe Operation Area



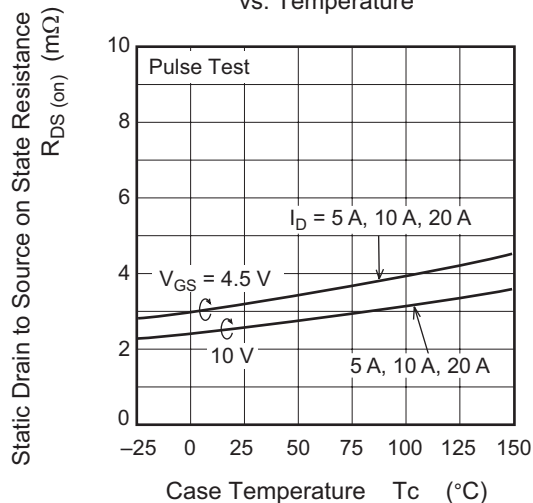
Typical Output Characteristics



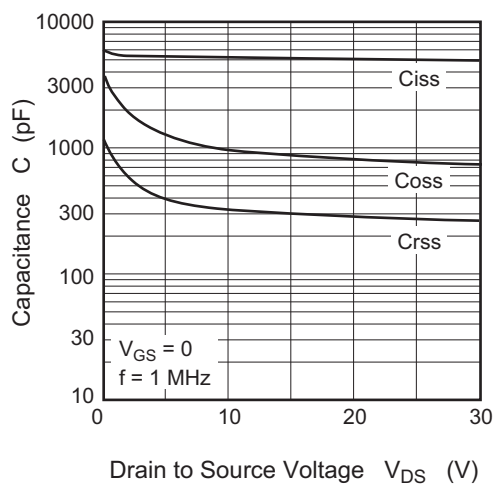
Typical Transfer Characteristics

Drain to Source Saturation Voltage vs.  
Gate to Source VoltageStatic Drain to Source on State Resistance  
vs. Drain Current

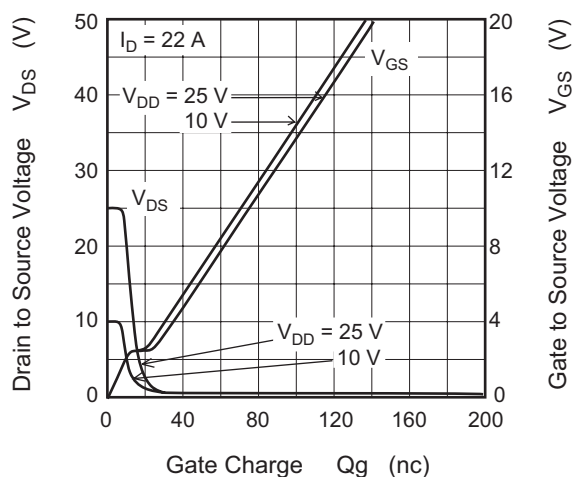
Static Drain to Source on State Resistance vs. Temperature



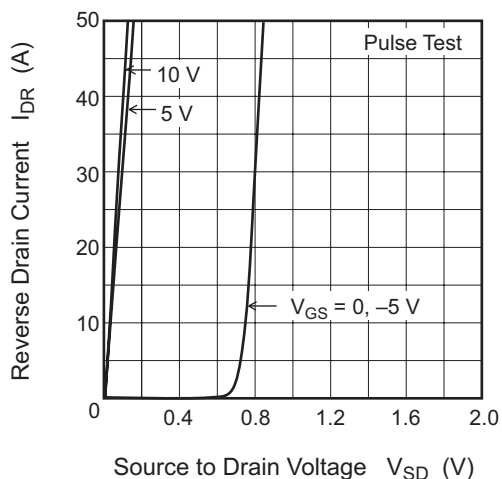
Typical Capacitance vs. Drain to Source Voltage



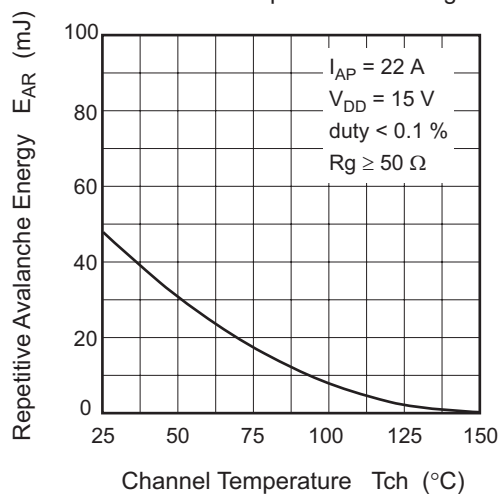
Dynamic Input Characteristics

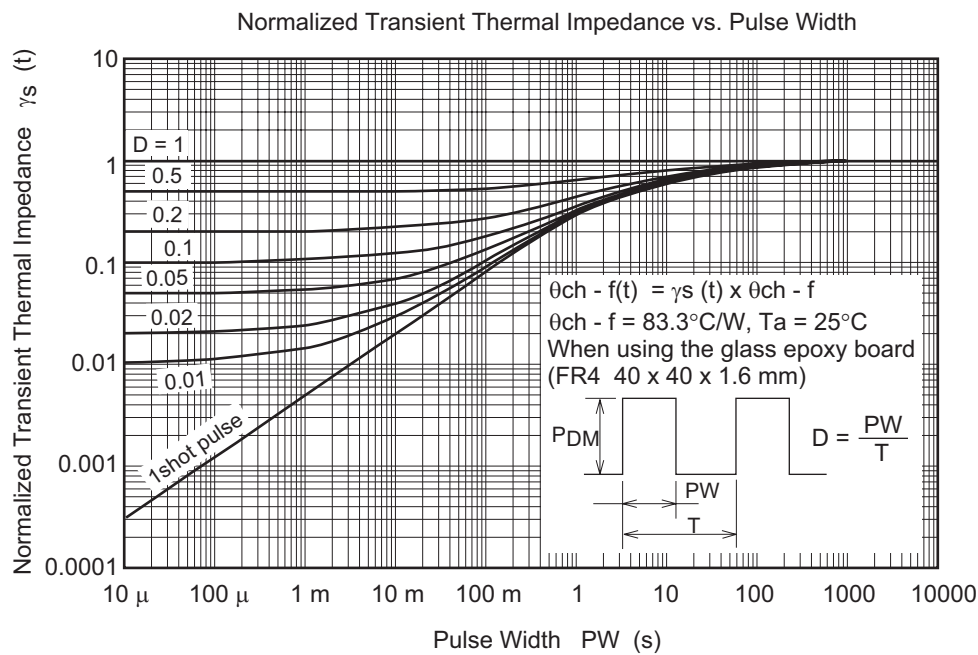


Reverse Drain Current vs. Source to Drain Voltage

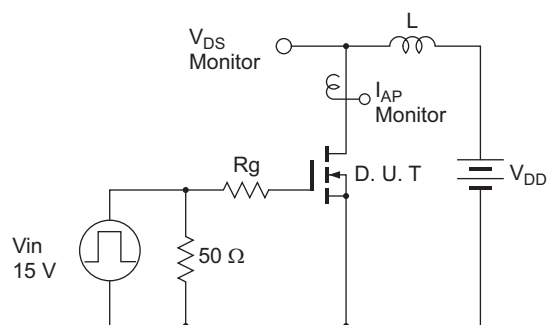


Maximum Avalanche Energy vs. Channel Temperature Derating

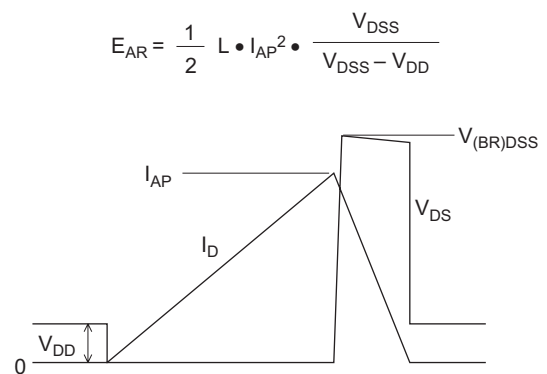




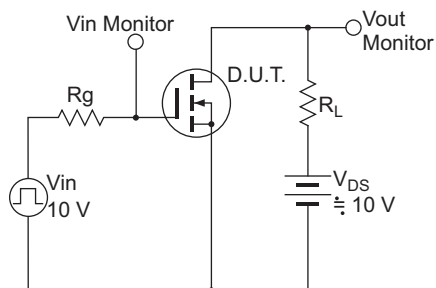
Avalanche Test Circuit



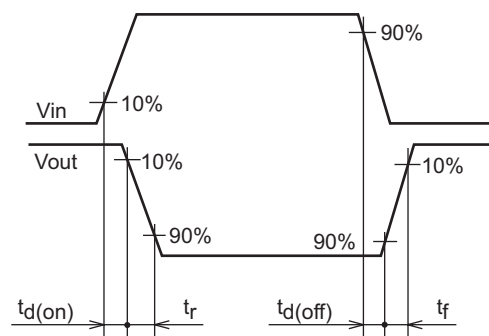
Avalanche Waveform



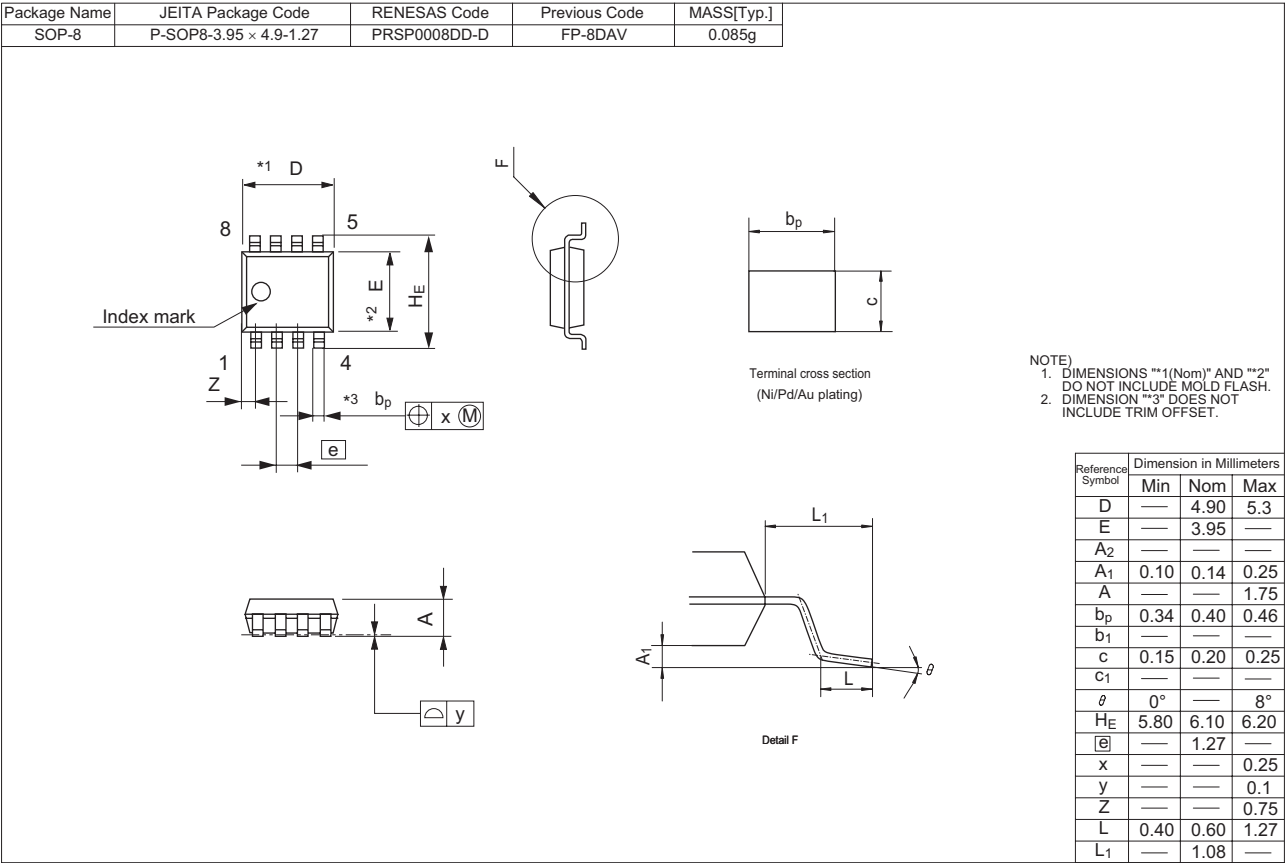
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

| Part No.         | Quantity | Shipping Container |
|------------------|----------|--------------------|
| RJK0348DSP-00-J0 | 2500 pcs | Taping             |

Notes:

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Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

**Renesas Technology Europe Limited**  
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

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Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120  
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7858/7898

**Renesas Technology Hong Kong Ltd.**  
7th Floor, North Tower, World Finance Centre, Harbour City, Canton Road, Tsimshatsui, Kowloon, Hong Kong  
Tel: <852> 2265-6688, Fax: <852> 2377-3473

**Renesas Technology Taiwan Co., Ltd.**  
10th Floor, No.99, Fushing North Road, Taipei, Taiwan  
Tel: <886> (2) 2715-2888, Fax: <886> (2) 3518-3399

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1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632  
Tel: <65> 6213-0200, Fax: <65> 6278-8001

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Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

**Renesas Technology Malaysia Sdn. Bhd**  
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia  
Tel: <603> 7955-9390, Fax: <603> 7955-9510