

RJK0331DPB-01

Silicon N Channel Power MOS FET Power Switching

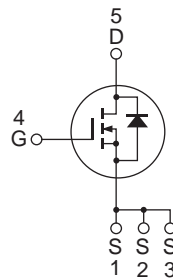
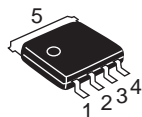
R07DS0267EJ0500
(Previous: REJ03G1640-0400)
Rev.5.00
Mar 01, 2011

Features

- High speed switching
- 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
- Halogen-free

Outline

RENESAS Package code: PTZZ0005DA-A
(Package name: LFPAK)



1, 2, 3 Source
4 Gate
5 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}	± 20	V
Drain current	I_D	40	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	160	A
Body-drain diode reverse drain current	I_{DR}	40	A
Avalanche current	I_{AP} ^{Note 2}	20	A
Avalanche energy	E_{AR} ^{Note 2}	40	mJ
Channel dissipation	P_{ch} ^{Note 3}	50	W
Channel to case thermal resistance	θ_{ch-c} ^{Note 3}	2.5	$^\circ\text{C}/\text{W}$
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. $T_c = 25^\circ\text{C}$

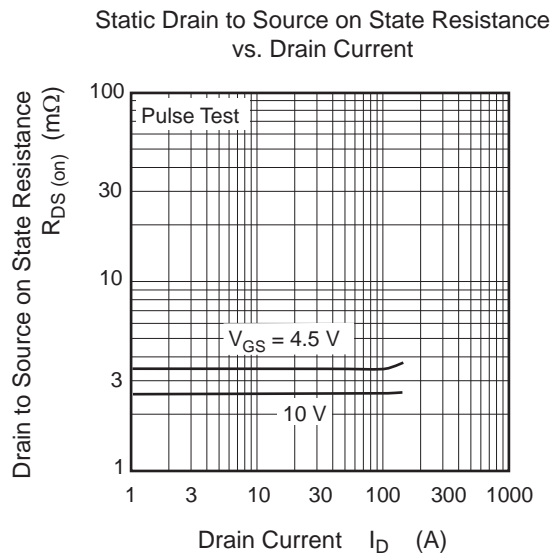
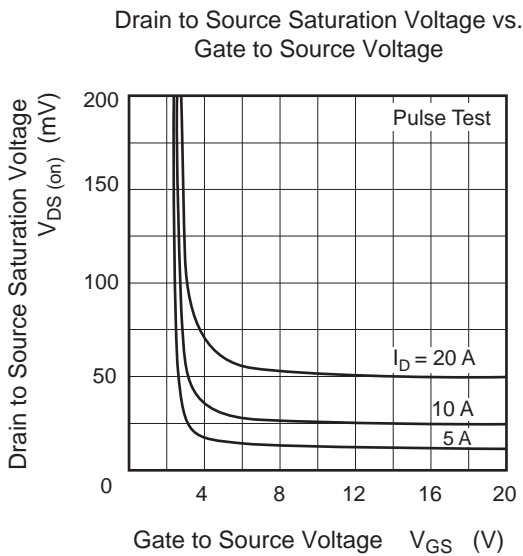
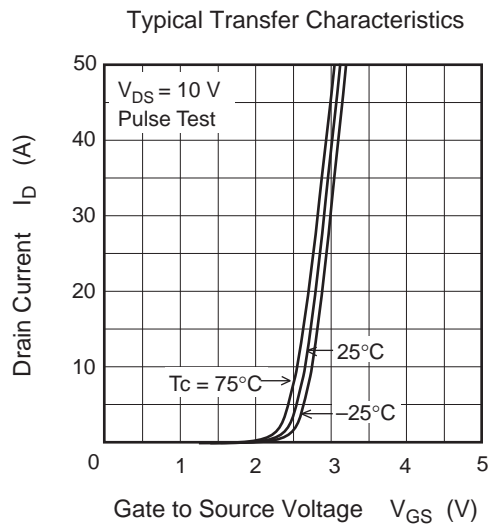
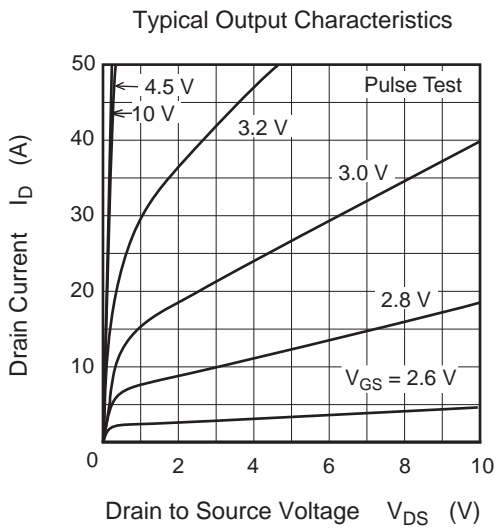
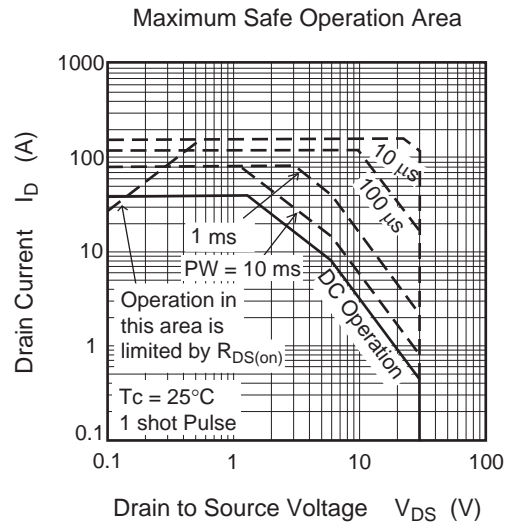
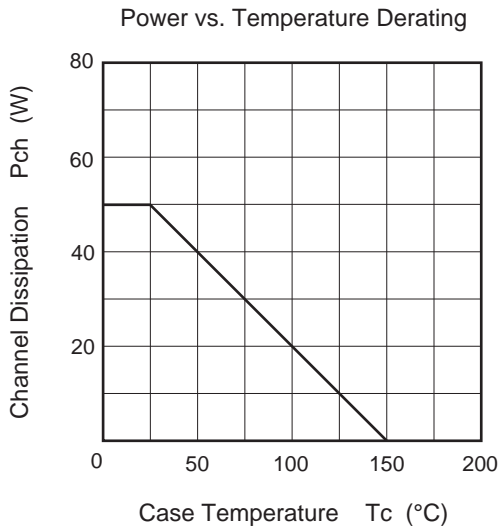
Electrical Characteristics

(Ta = 25°C)

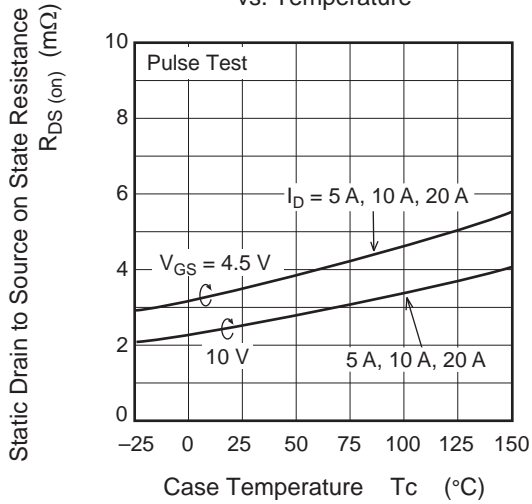
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 0.1	μA	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 30 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.2	—	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	$\text{m}\Omega$	$I_D = 20 \text{ A}, V_{GS} = 10 \text{ V}$ ^{Note4}
	$R_{DS(on)}$	—	3.5	4.9	$\text{m}\Omega$	$I_D = 20 \text{ A}, V_{GS} = 4.5 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	—	80	—	S	$I_D = 20 \text{ A}, V_{DS} = 10 \text{ V}$ ^{Note4}
Input capacitance	C_{iss}	—	3380	—	pF	$V_{DS} = 10 \text{ V}, V_{GS} = 0,$ $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	660	—	pF	
Reverse transfer capacitance	C_{rss}	—	190	—	pF	
Gate Resistance	R_g	—	0.6	—	Ω	
Total gate charge	Q_g	—	22	—	nC	$V_{DD} = 10 \text{ V}, V_{GS} = 4.5 \text{ V},$ $I_D = 40 \text{ A}$
Gate to source charge	Q_{gs}	—	7.8	—	nC	
Gate to drain charge	Q_{gd}	—	4.8	—	nC	
Turn-on delay time	$t_{d(on)}$	—	5.8	—	ns	$V_{GS} = 10 \text{ V}, I_D = 20 \text{ A},$ $V_{DD} \cong 10 \text{ V}, R_L = 0.5 \Omega,$ $R_g = 4.7 \Omega$
Rise time	t_r	—	3.9	—	ns	
Turn-off delay time	$t_{d(off)}$	—	45	—	ns	
Fall time	t_f	—	4.6	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.82	1.07	V	$I_F = 40 \text{ A}, V_{GS} = 0$ ^{Note4}
Body-drain diode reverse recovery time	t_{rr}	—	30	—	ns	$I_F = 40 \text{ A}, V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$
Body-drain diode reverse recovery charge	Q_{rr}	—	26	—	nC	

Notes: 4. Pulse test

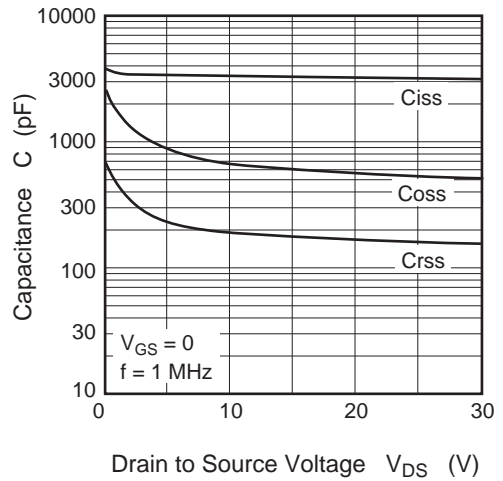
Main Characteristics



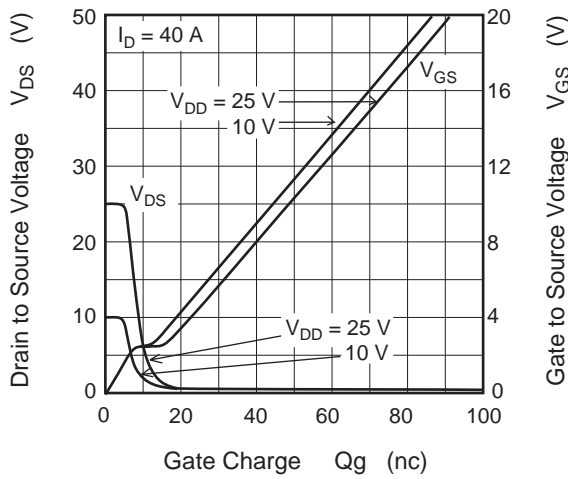
Static Drain to Source on State Resistance vs. Temperature



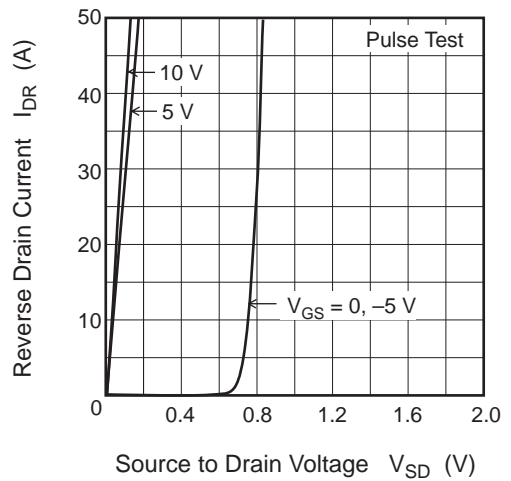
Typical Capacitance vs. Drain to Source Voltage



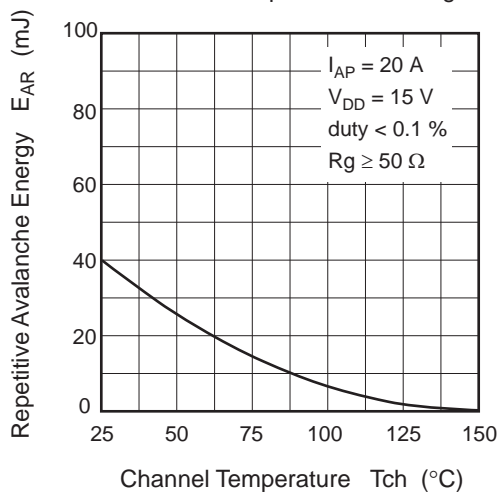
Dynamic Input Characteristics



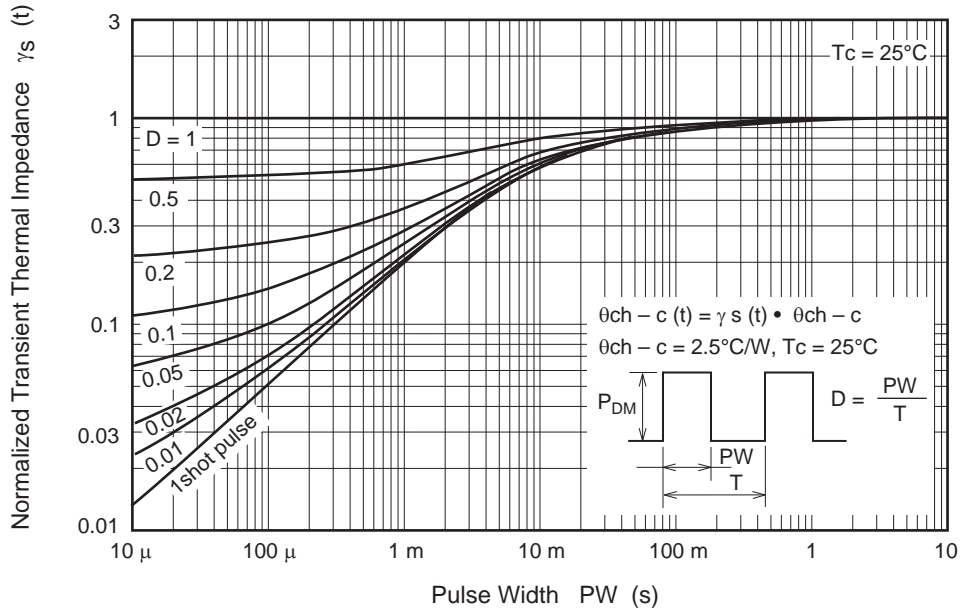
Reverse Drain Current vs. Source to Drain Voltage



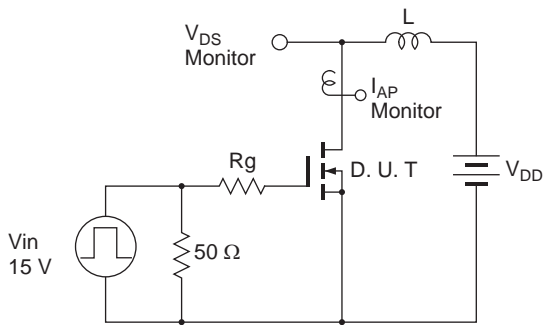
Maximum Avalanche Energy vs. Channel Temperature Derating



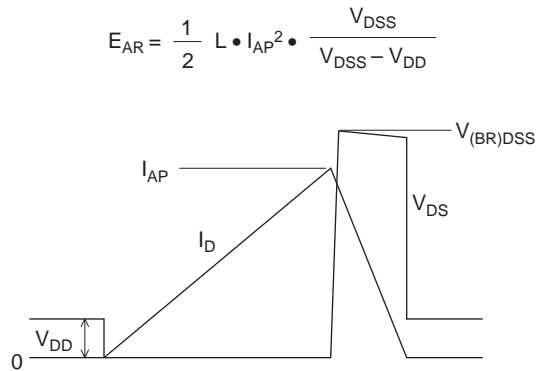
Normalized Transient Thermal Impedance vs. Pulse Width



Avalanche Test Circuit

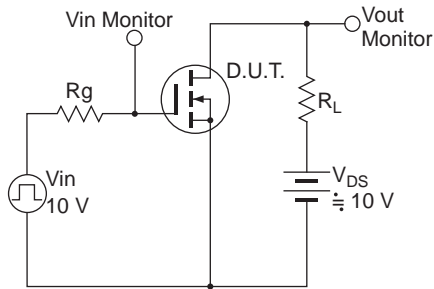


Avalanche Waveform

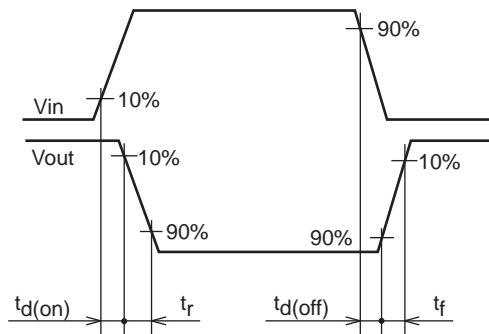


$$E_{AR} = \frac{1}{2} L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

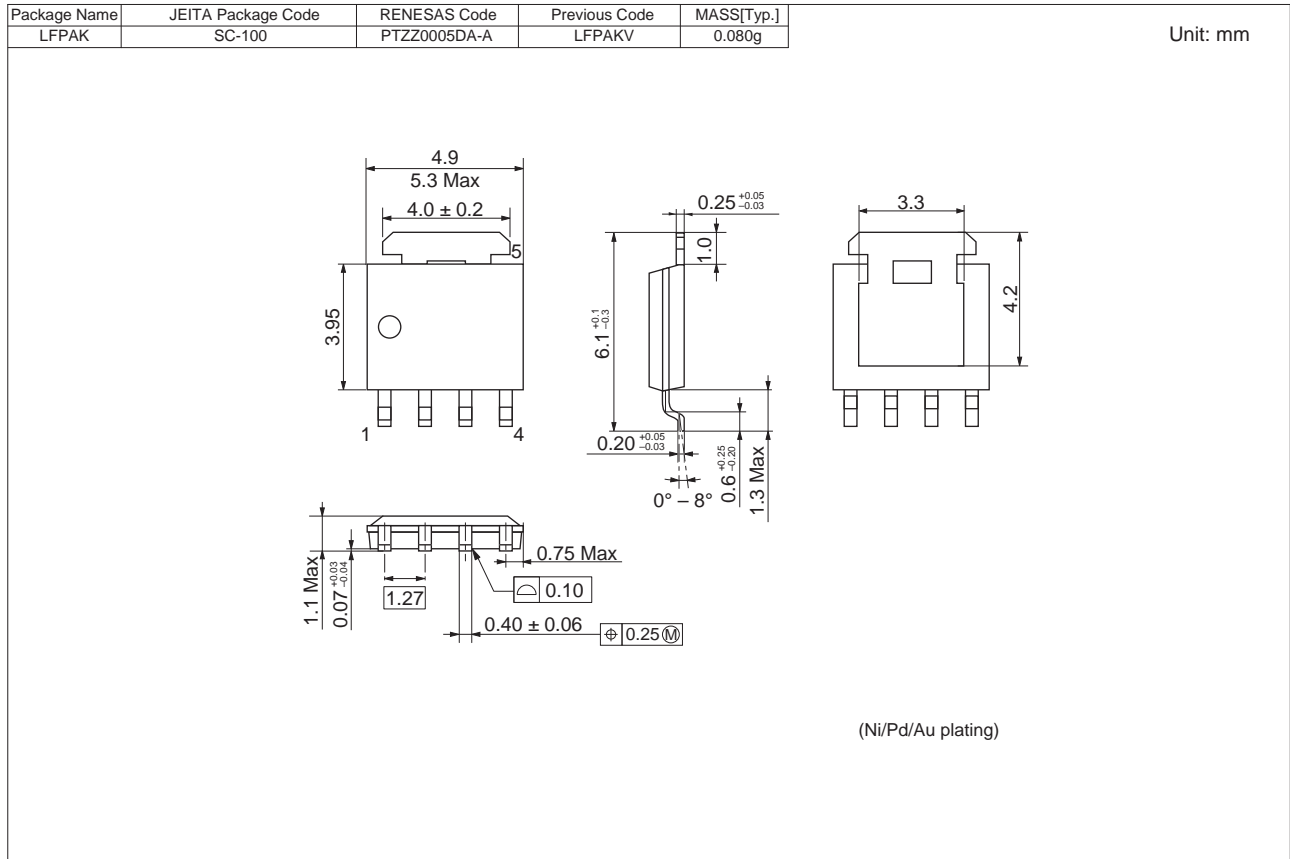
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Part No.	Quantity	Shipping Container
RJK0331DPB-01-J0	2500 pcs	Taping

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

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

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6278-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jin Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141