

HAT2033R, HAT2033RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

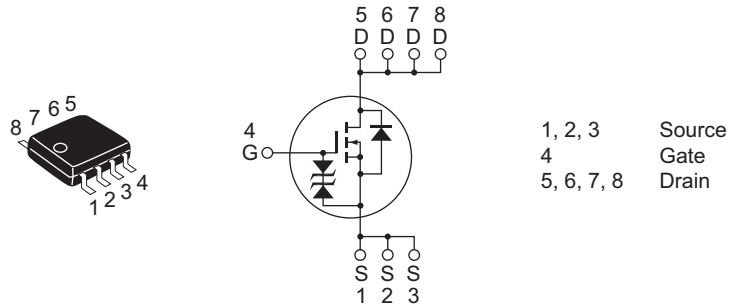
REJ03G1165-0400
(Previous: ADE-208-664B)
Rev.4.00
Sep 07, 2005

Features

- For Automotive Application (at Type Code "J")
- Low on-resistance
- Capable of 4 V gate drive
- High density mounting

Outline

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



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DS}	60	V
Gate to source voltage	V_{GS}	±20	V
Drain current	I_D	7	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	56	A
Body-drain diode reverse drain current	I_{DR}	7	A
Avalanche current	I_{AP} ^{Note 4}	—	—
		7	A
Avalanche energy	E_{AR} ^{Note 4}	—	—
		4.2	mJ
Channel dissipation	P_{ch} ^{Note 2}	2.5	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	−55 to +150	°C

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$ 2. When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), $PW \leq 10 s$ 3. Value at $T_{ch} = 25^\circ C$, $R_g \geq 50 \Omega$

Electrical Characteristics

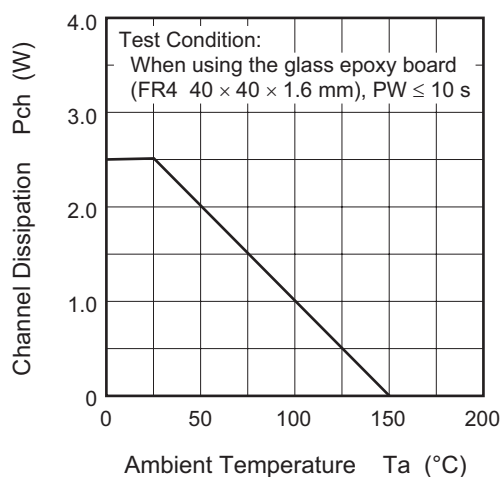
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	$I_G = \pm 100 \mu A$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	±10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	HAT2033R	I_{DSS}	—	1	μA	$V_{DS} = 60 \text{ V}$, $V_{GS} = 0$
	HAT2033RJ	I_{DSS}	—	0.1	μA	
Zero gate voltage drain current	HAT2033R	I_{DSS}	—	—	μA	$V_{DS} = 48 \text{ V}$, $V_{GS} = 0$ $T_a = 125^\circ C$
	HAT2033RJ	I_{DSS}	—	10	μA	
Gate to source cutoff voltage	$V_{GS(off)}$	1.2	—	2.2	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.03	0.038	Ω	$I_D = 4 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 4}
	$R_{DS(on)}$	—	0.04	0.053	Ω	$I_D = 4 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note 4}
Forward transfer admittance	$ y_{fs} $	6.5	10	—	S	$I_D = 4 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 4}
Input capacitance	C_{iss}	—	740	—	pF	$V_{DS} = 10 \text{ V}$ $V_{GS} = 0$ $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	370	—	pF	
Reverse transfer capacitance	C_{rss}	—	130	—	pF	
Turn-on delay time	$t_{d(on)}$	—	13	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 4 \text{ A}$, $V_{DD} \cong 30 \text{ V}$
Rise time	t_r	—	55	—	ns	
Turn-off delay time	$t_{d(off)}$	—	140	—	ns	
Fall time	t_f	—	95	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.82	1.07	V	$I_F = 7 \text{ A}$, $V_{GS} = 0$ ^{Note 4}
Body-drain diode reverse recovery time	t_{rr}	—	45	—	ns	$I_F = 7 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu s$

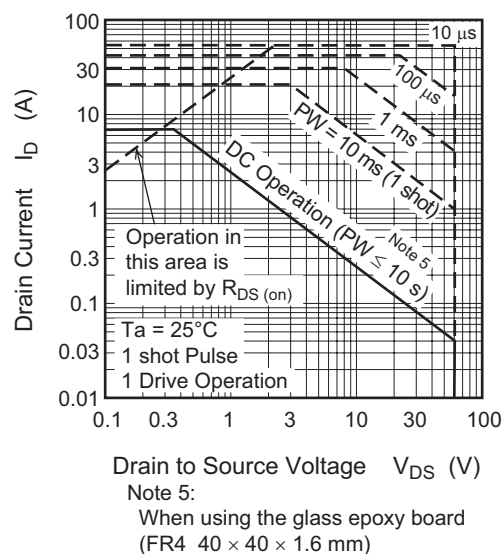
Note: 4. Pulse test

Main Characteristics

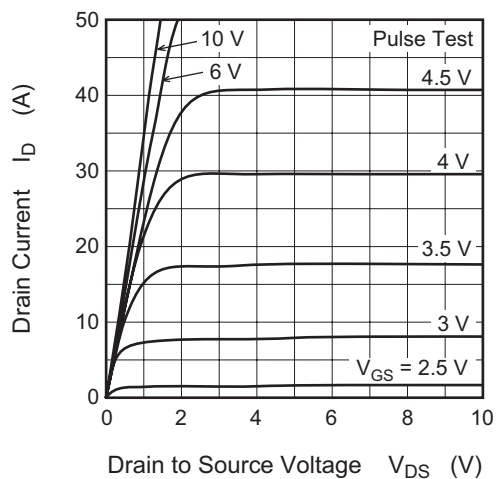
Power vs. Temperature Derating



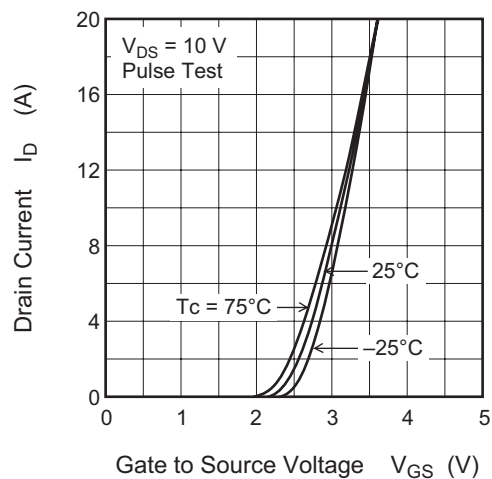
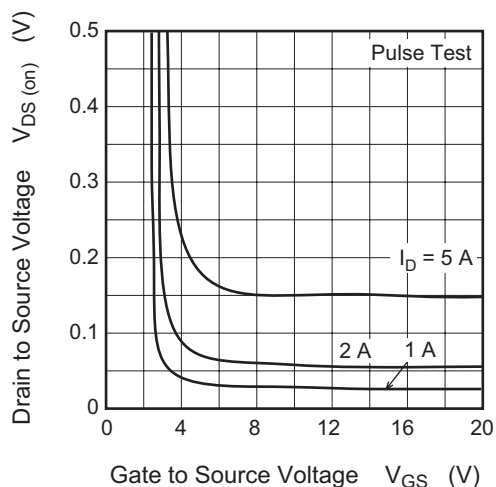
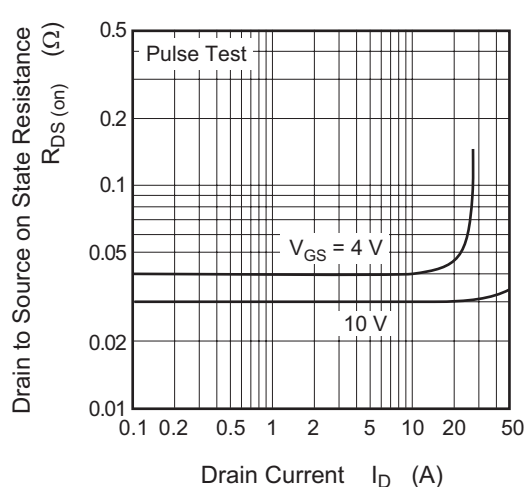
Maximum Safe Operation Area

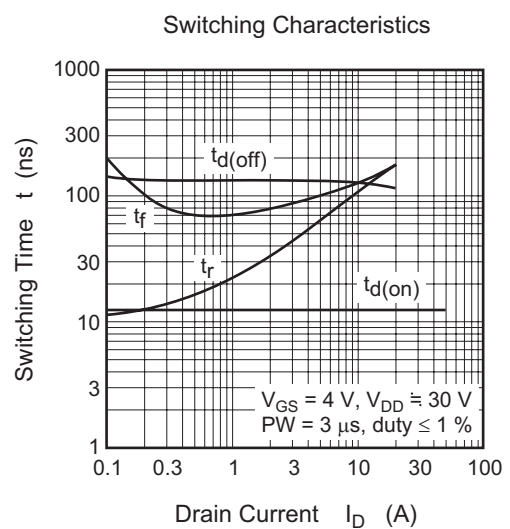
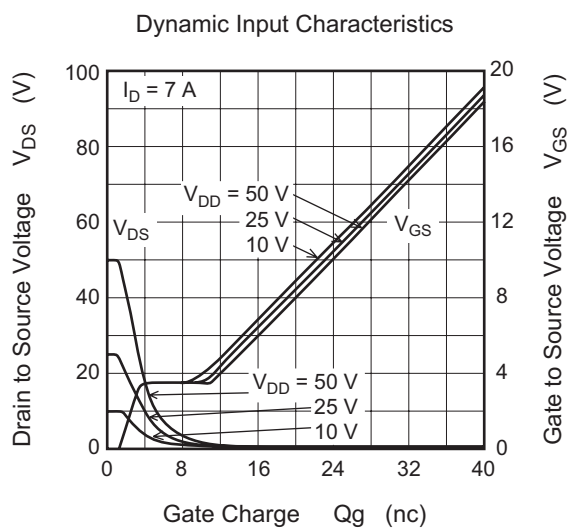
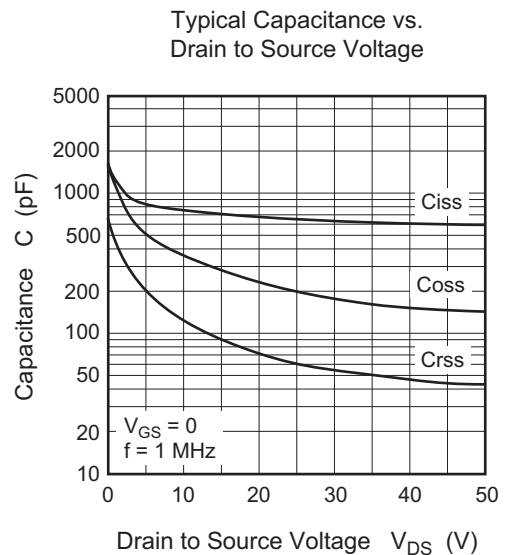
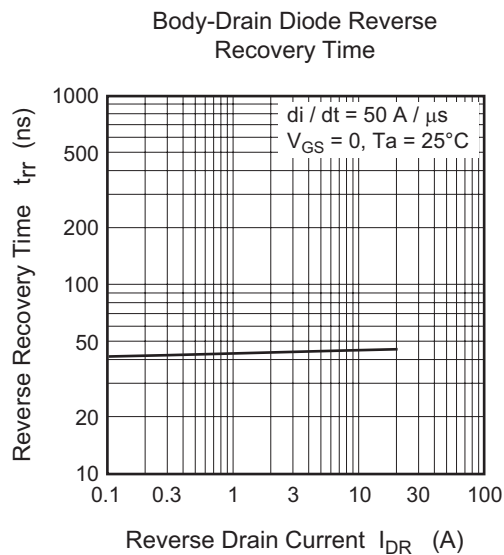
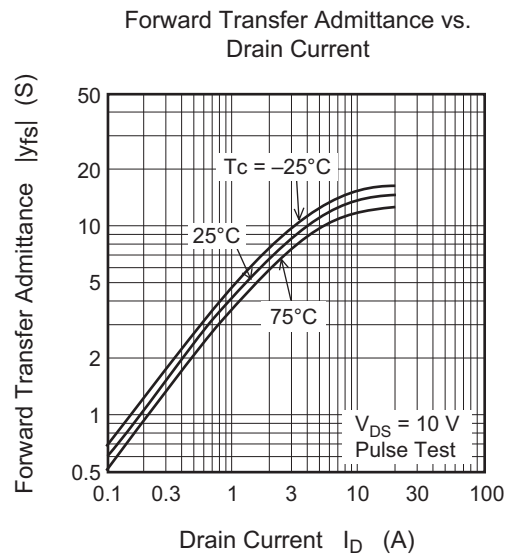
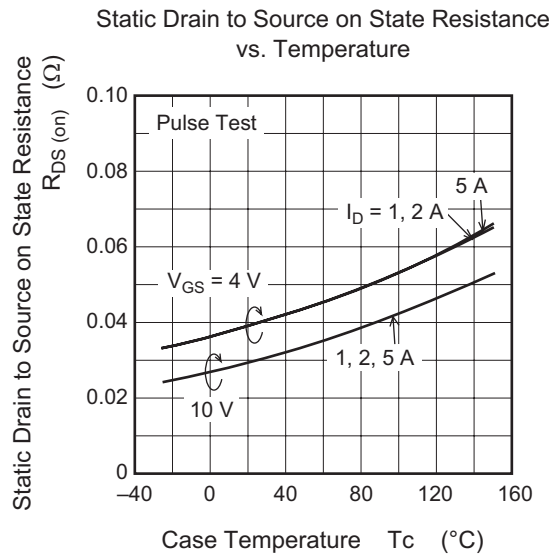


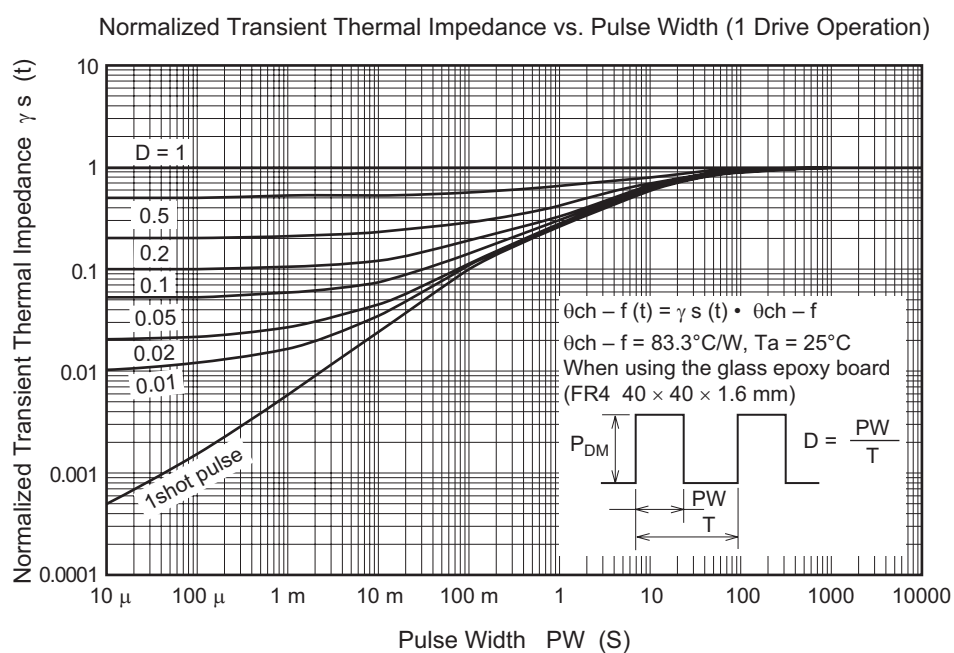
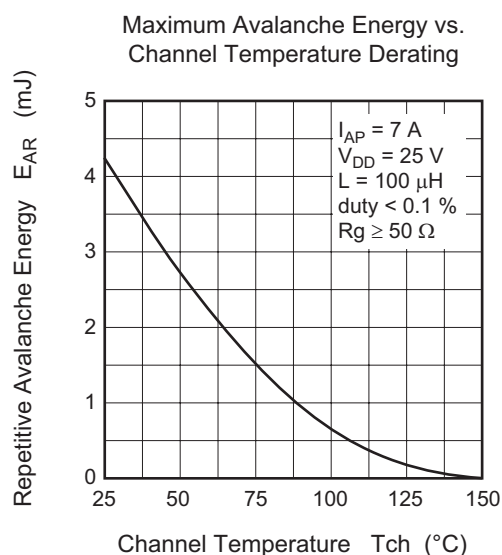
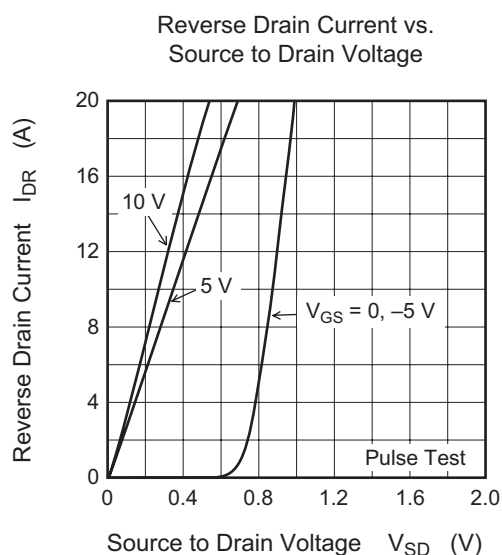
Typical Output Characteristics



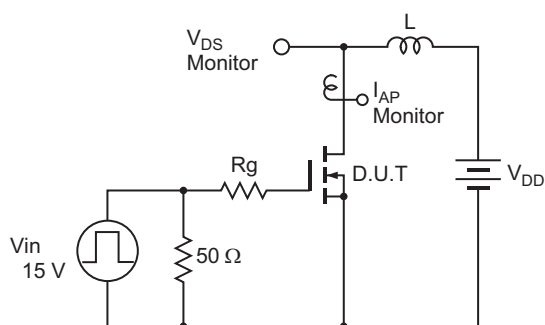
Typical Transfer Characteristics

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



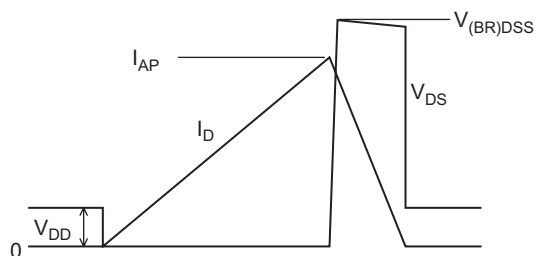


Avalanche Test Circuit

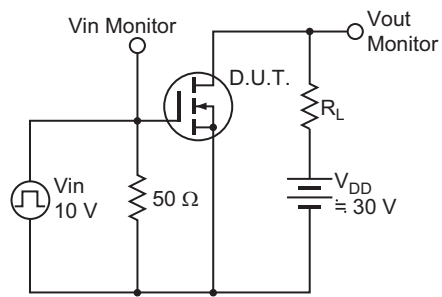


Avalanche Waveform

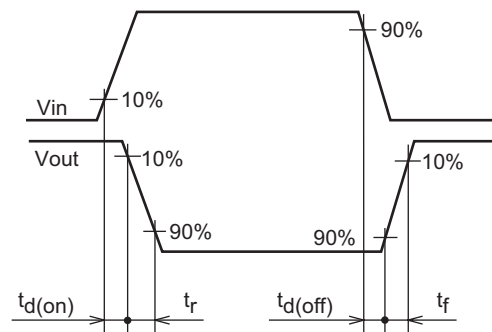
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



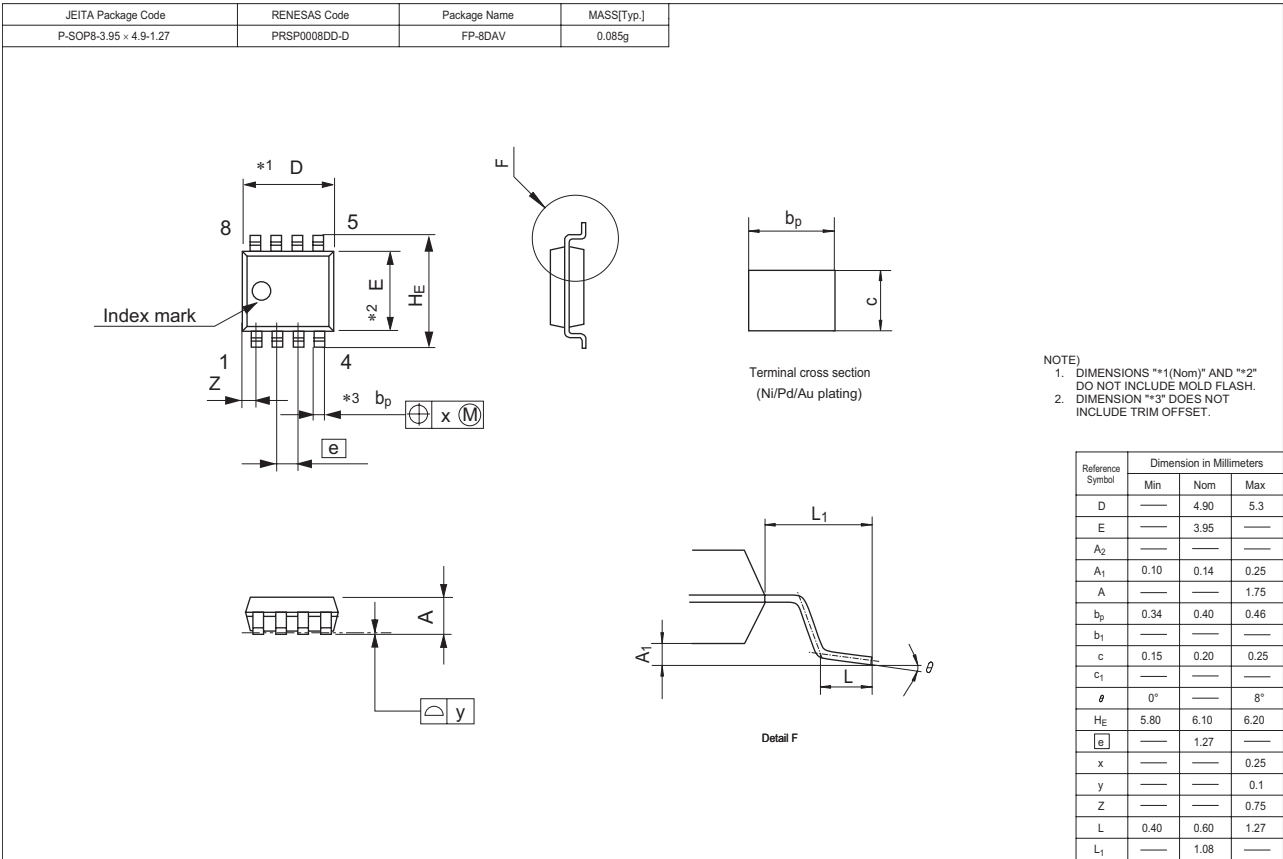
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAT2033R-EL-E	2500 pcs	Taping
HAT2033RJ-EL-E	2500 pcs	Taping

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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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.
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Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.

Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.

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

Renesas Technology Korea Co., Ltd.

Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
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, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510