

# HAT2028R, HAT2028RJ

Silicon N Channel Power MOS FET  
High Speed Power Switching

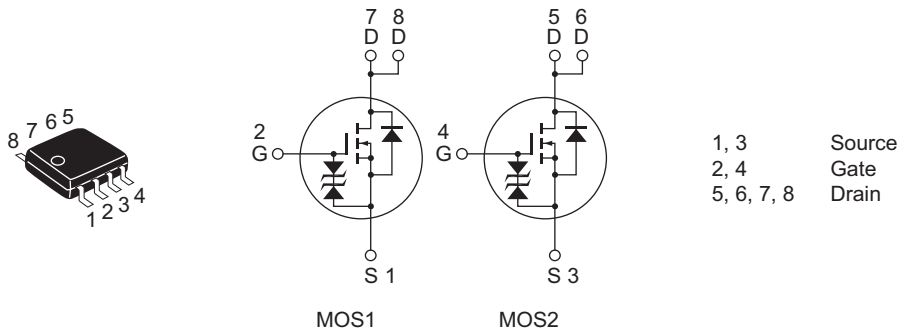
REJ03G1163-0500  
(Previous: ADE-208-524C)  
Rev.5.00  
Sep 07, 2005

## 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 <sub>DSS</sub>	60	V
Gate to source voltage	V <sub>GSS</sub>	±20	V
Drain current	I <sub>D</sub>	4	A
Drain peak current	I <sub>D (pulse)</sub> <sup>Note 1</sup>	32	A
Body-drain diode reverse drain current	I <sub>DR</sub>	4	A
Avalanche current	HAT2028R	—	—
	HAT2028RJ	4	A
Avalanche energy	HAT2028R	—	—
	HAT2028RJ	1.37	mJ
Channel dissipation	P <sub>ch</sub> <sup>Note 2</sup>	2	W
Channel dissipation	P <sub>ch</sub> <sup>Note 3</sup>	3	W
Channel temperature	T <sub>ch</sub>	150	°C
Storage temperature	T <sub>stg</sub>	−55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%

2. 1 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

3. 2 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

4. Value at T<sub>ch</sub> = 25°C, R<sub>g</sub> ≥ 50 Ω

## Electrical Characteristics

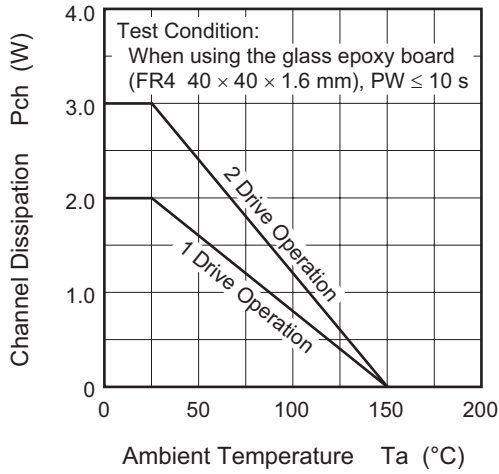
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	V <sub>(BR) DSS</sub>	60	—	—	V	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0
Gate to source breakdown voltage	V <sub>(BR) GSS</sub>	±20	—	—	V	I <sub>G</sub> = ±100 μA, V <sub>DS</sub> = 0
Gate to source leak current	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0
Zero gate voltage drain current	HAT2028R	I <sub>DSS</sub>	—	1	μA	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0
	HAT2028RJ	I <sub>DSS</sub>	—	0.1	μA	
Zero gate voltage drain current	HAT2028R	I <sub>DSS</sub>	—	—	μA	V <sub>DS</sub> = 48 V, V <sub>GS</sub> = 0 Ta = 125°C
	HAT2028RJ	I <sub>DSS</sub>	—	10	μA	
Gate to source cutoff voltage	V <sub>GS (off)</sub>	1.3	—	2.3	V	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA
Static drain to source on state resistance	R <sub>DS (on)</sub>	—	0.08	0.1	Ω	I <sub>D</sub> = 2 A, V <sub>GS</sub> = 10 V <sup>Note 5</sup> I <sub>D</sub> = 2 A, V <sub>GS</sub> = 4 V <sup>Note 5</sup>
	R <sub>DS (on)</sub>	—	0.12	0.16	Ω	
Forward transfer admittance	y <sub>fs</sub>	3.3	5	—	S	I <sub>D</sub> = 2 A, V <sub>DS</sub> = 10 V <sup>Note 5</sup>
Input capacitance	C <sub>iss</sub>	—	280	—	pF	V <sub>DS</sub> = 10 V V <sub>GS</sub> = 0 f = 1 MHz
Output capacitance	C <sub>oss</sub>	—	150	—	pF	
Reverse transfer capacitance	C <sub>rss</sub>	—	55	—	pF	
Turn-on delay time	t <sub>d (on)</sub>	—	15	—	ns	V <sub>GS</sub> = 4 V, I <sub>D</sub> = 2 A, V <sub>DD</sub> ≅ 30 V
Rise time	t <sub>r</sub>	—	100	—	ns	
Turn-off delay time	t <sub>d (off)</sub>	—	35	—	ns	
Fall time	t <sub>f</sub>	—	45	—	ns	
Body-drain diode forward voltage	V <sub>DF</sub>	—	0.88	1.15	V	I <sub>F</sub> = 4 A, V <sub>GS</sub> = 0 <sup>Note 5</sup>
Body-drain diode reverse recovery time	t <sub>rr</sub>	—	40	—	ns	I <sub>F</sub> = 4 A, V <sub>GS</sub> = 0 di <sub>F</sub> /dt = 50 A/μs

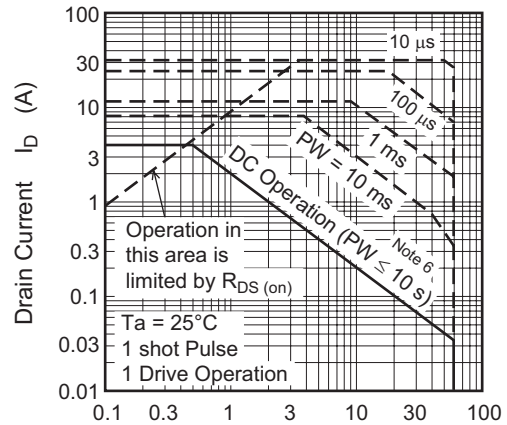
Note: 5. Pulse test

Main Characteristics

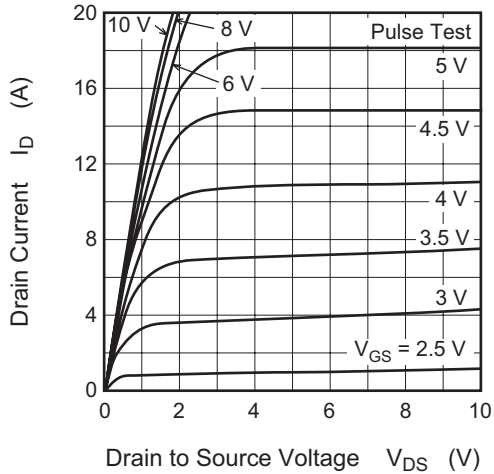
Power vs. Temperature Derating



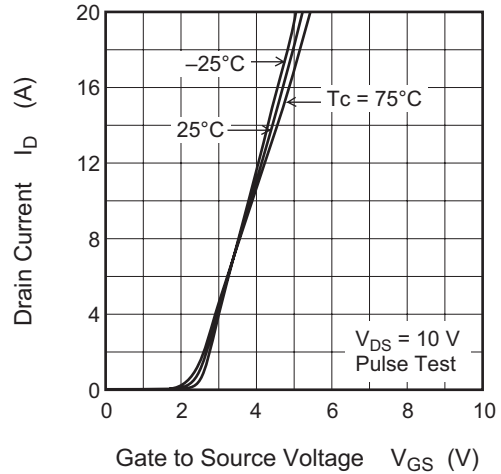
Maximum Safe Operation Area



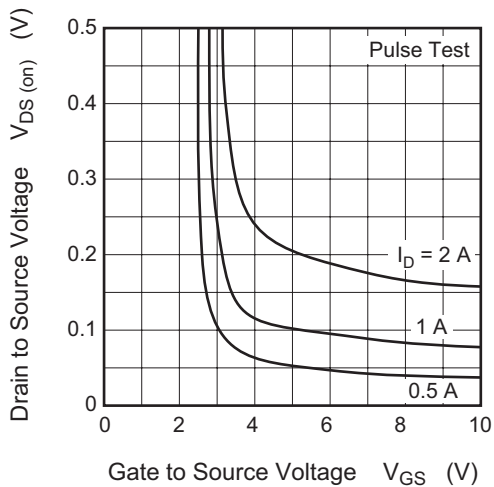
Typical Output Characteristics



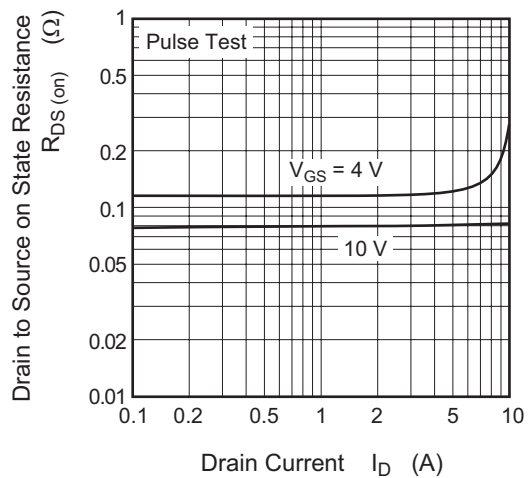
Typical Transfer Characteristics

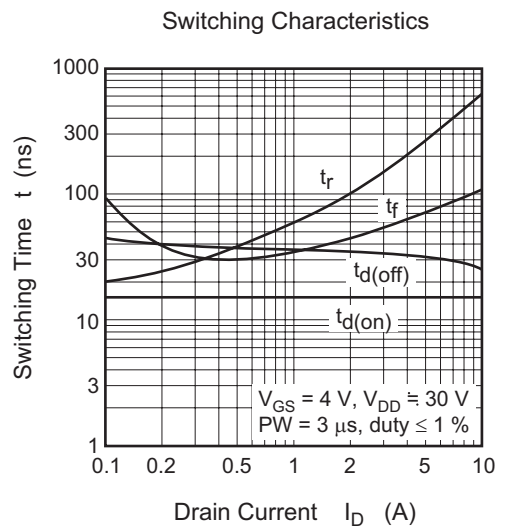
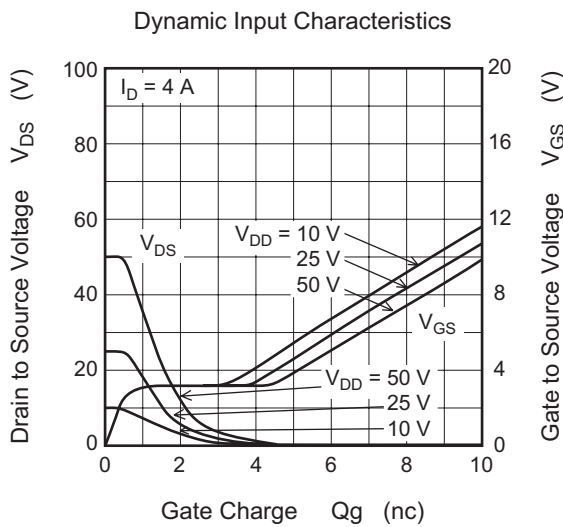
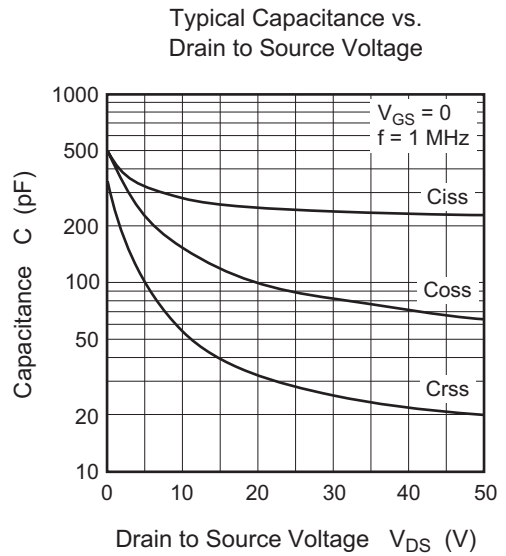
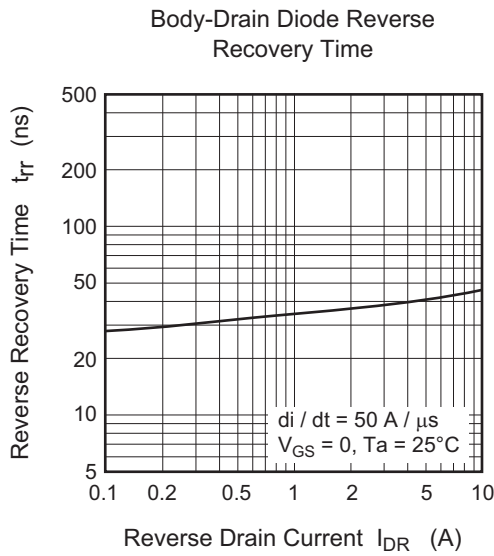
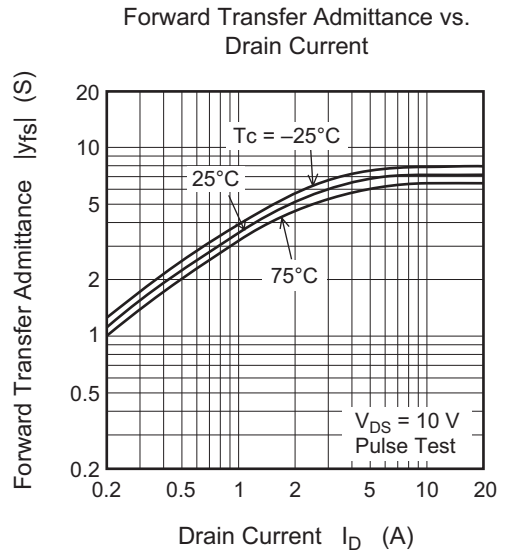
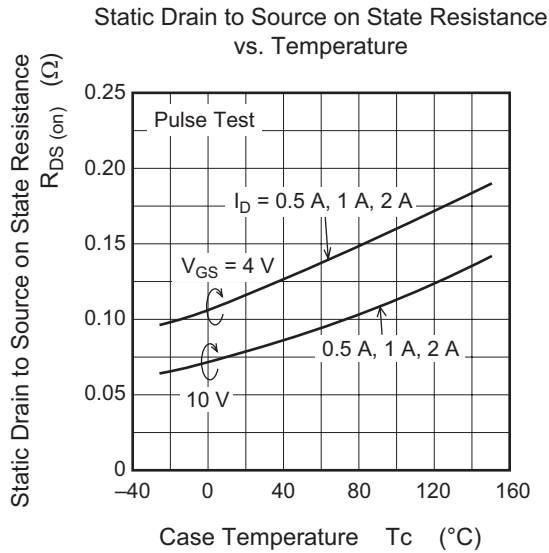


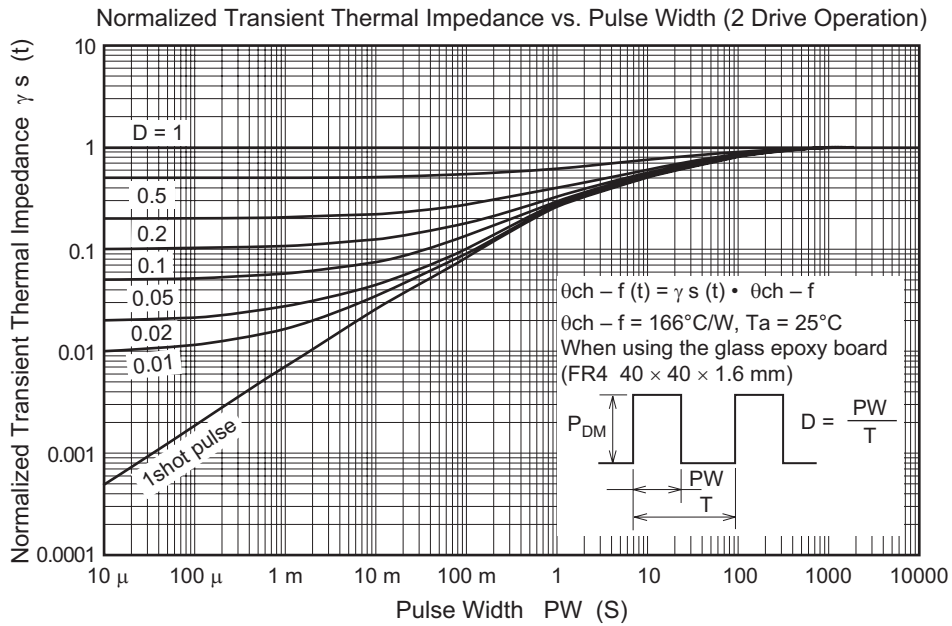
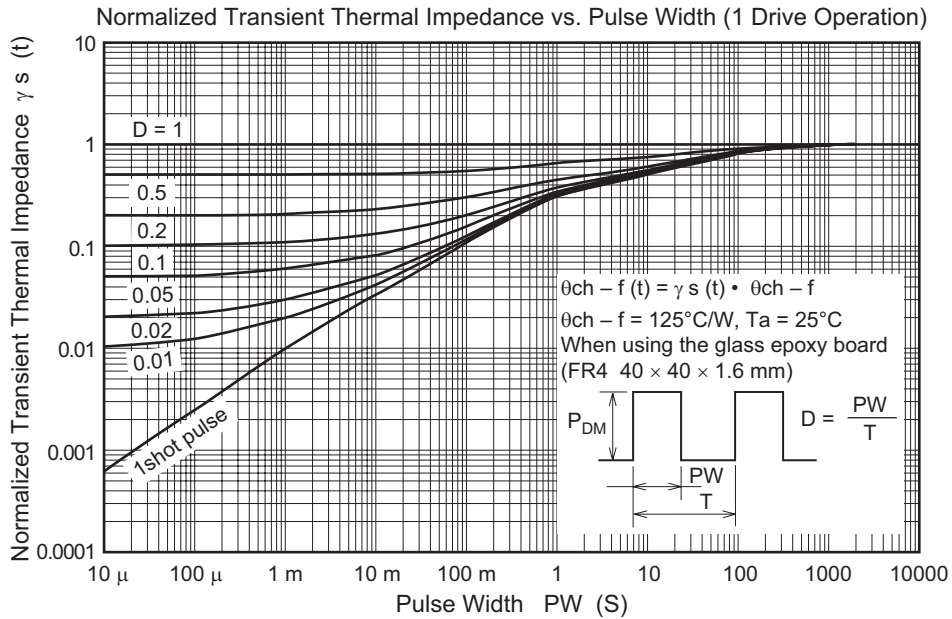
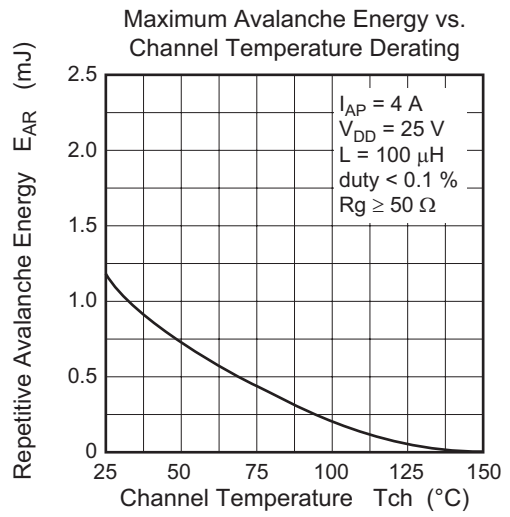
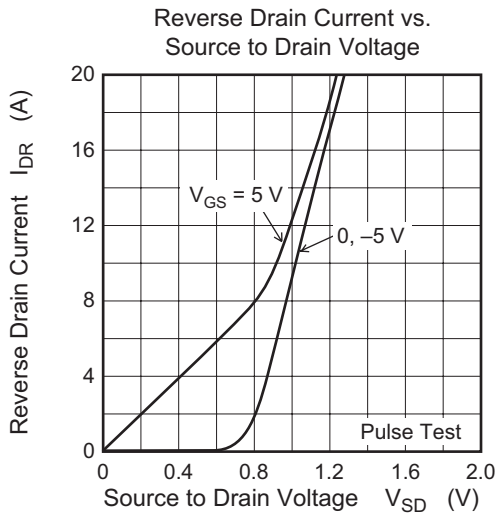
Drain to Source Saturation Voltage vs. Gate to Source Voltage



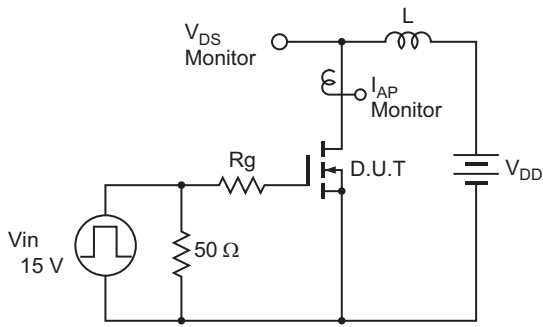
Static Drain to Source on State Resistance vs. Drain Current



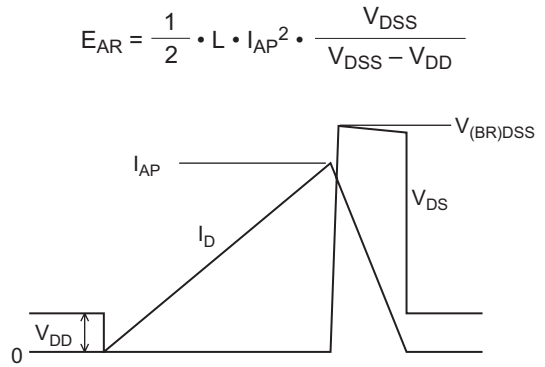




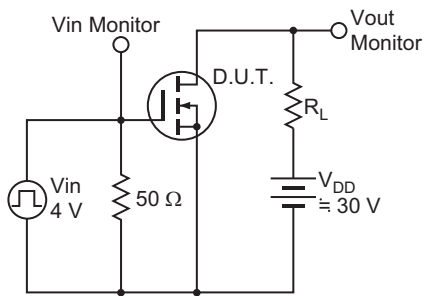
Avalanche Test Circuit



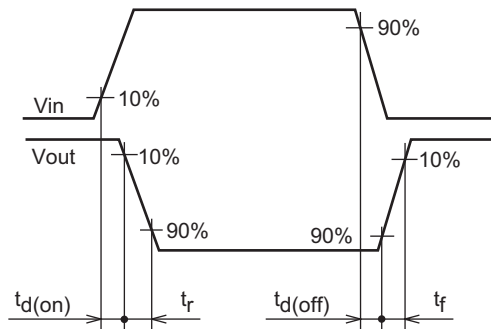
Avalanche Waveform



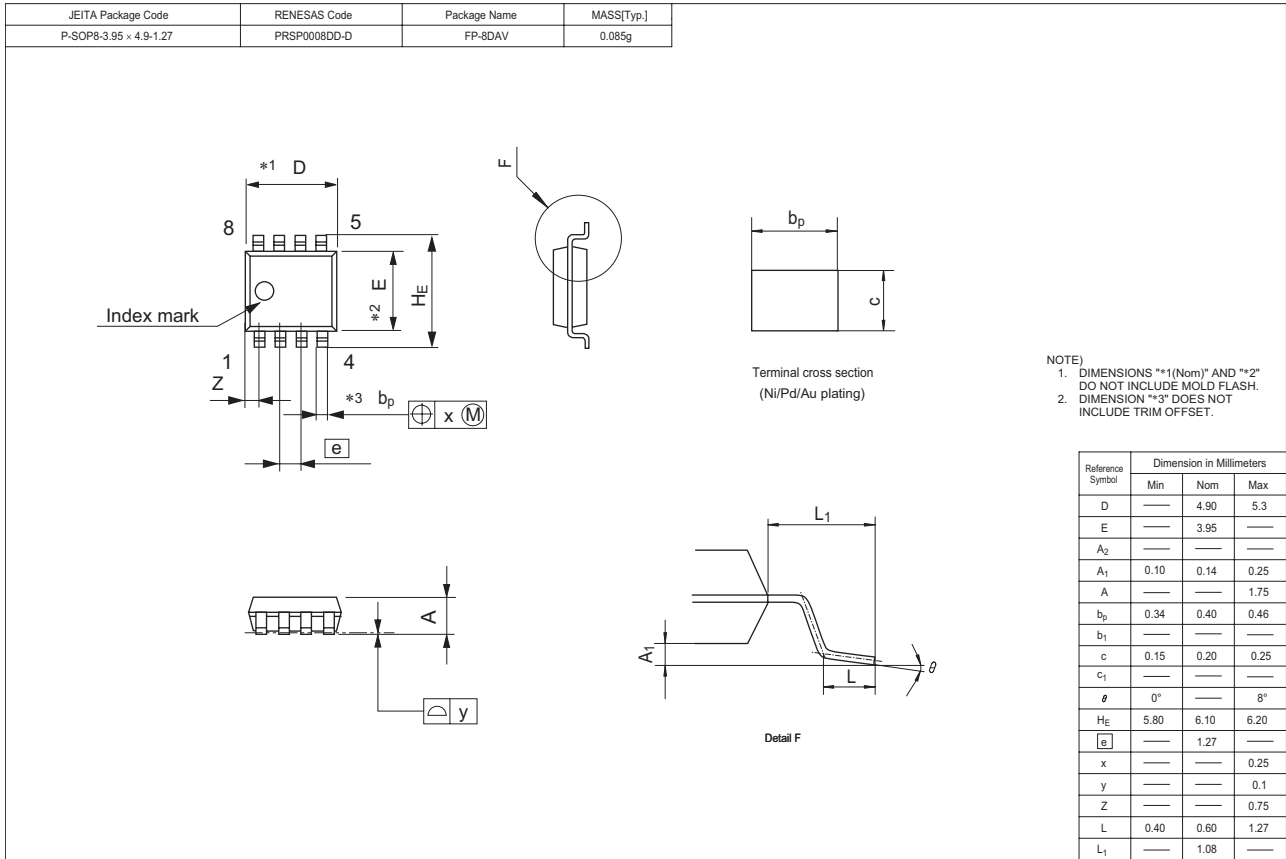
Switching Time Test Circuit



Switching Time Waveform



### Package Dimensions



### Ordering Information

Part Name	Quantity	Shipping Container
HAT2028R-EL-E	2500 pcs	Taping
HAT2028RJ-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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