

HAT2038R, HAT2038RJ

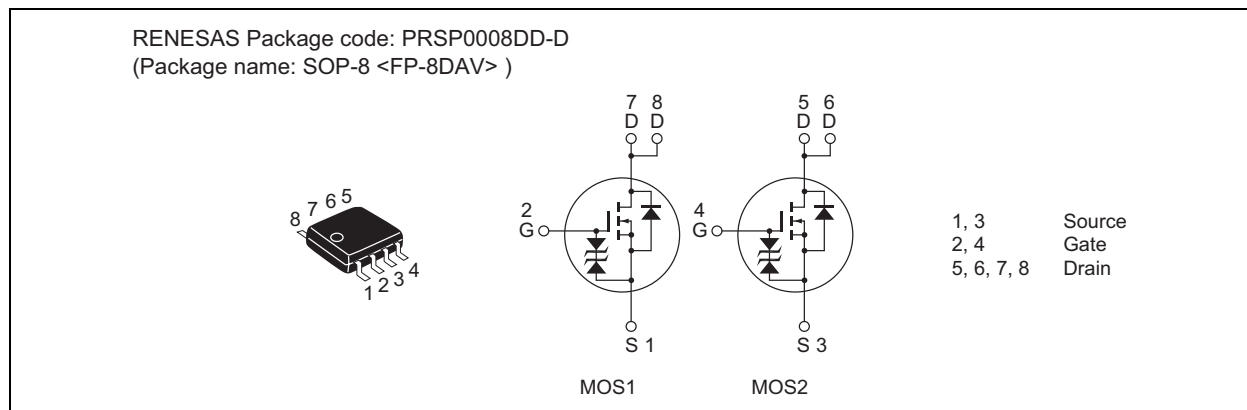
Silicon N Channel Power MOS FET
High Speed Power Switching

REJ03G1167-0500
(Previous: ADE-208-666C)
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



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DSS}	60	V
Gate to source voltage	V_{GSS}	± 20	V
Drain current	I_D	5	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	40	A
Body-drain diode reverse drain current	I_{DR}	5	A
Avalanche current	HAT2038R	—	—
	HAT2038RJ	5	A
Avalanche energy	HAT2038R	—	—
	HAT2038RJ	2.14	mJ
Channel dissipation	P_{ch} ^{Note 2}	2	W
Channel dissipation	P_{ch} ^{Note 3}	3	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. 1 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), $PW \leq 10 s$ 3. 2 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), $PW \leq 10 s$ 4. Value at $T_{ch} = 25^\circ C$, $R_g \geq 50 \Omega$

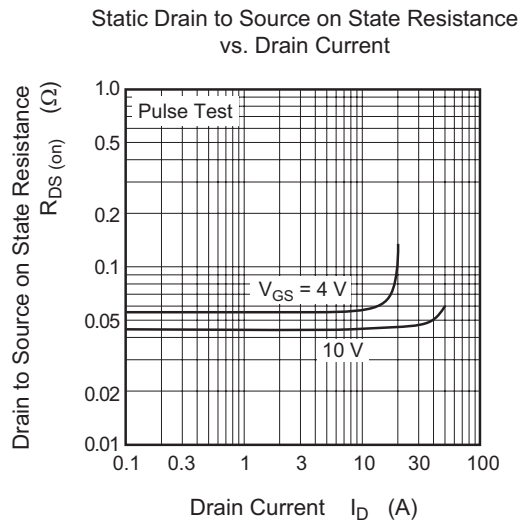
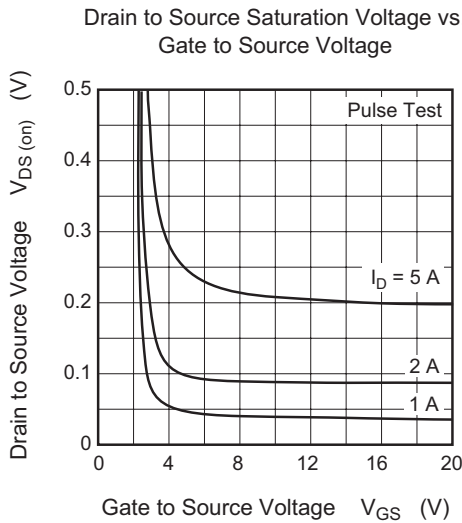
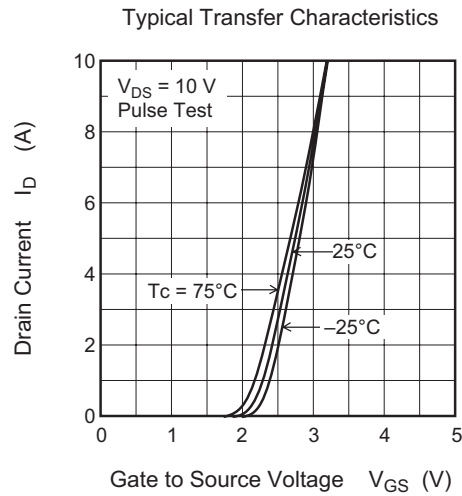
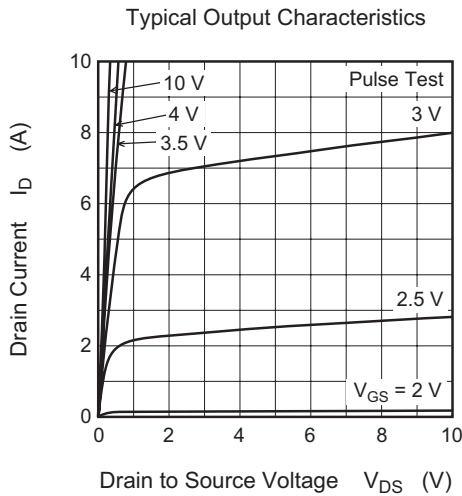
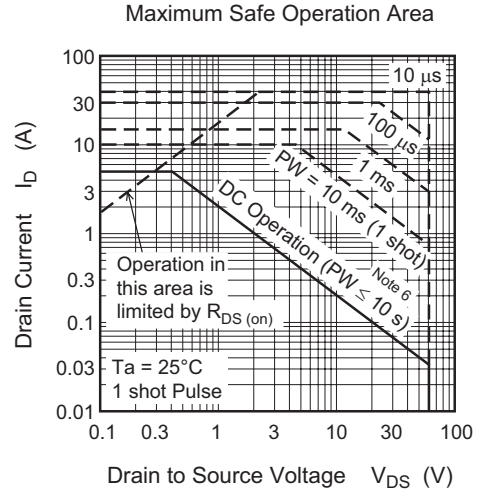
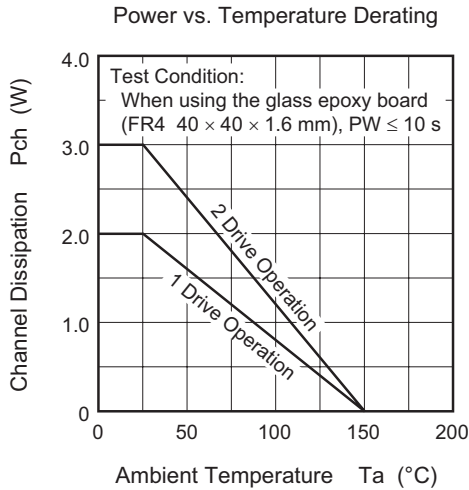
Electrical Characteristics

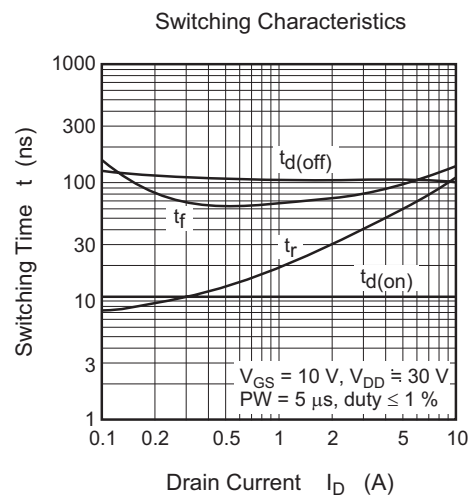
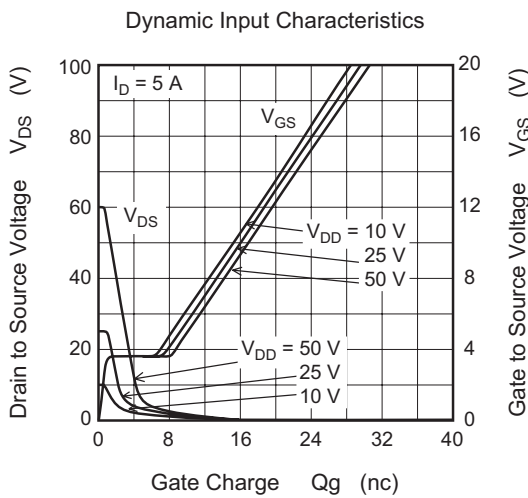
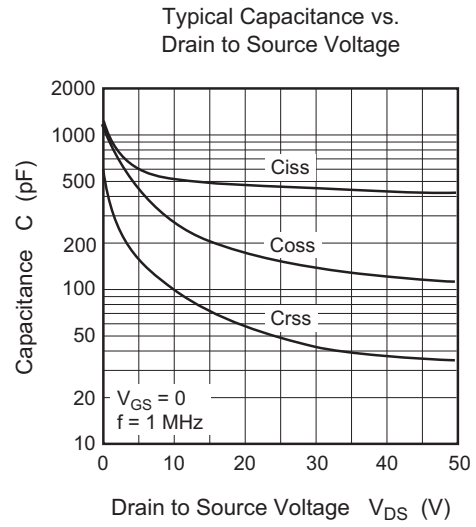
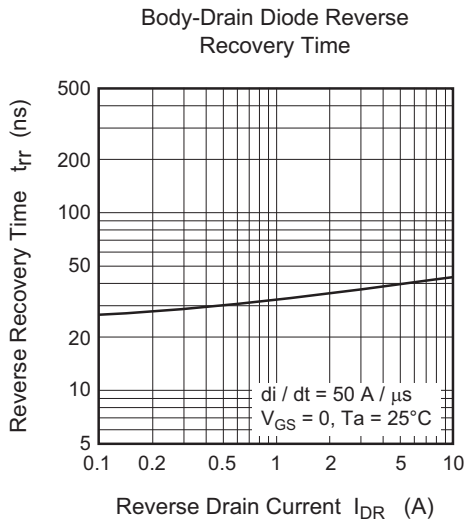
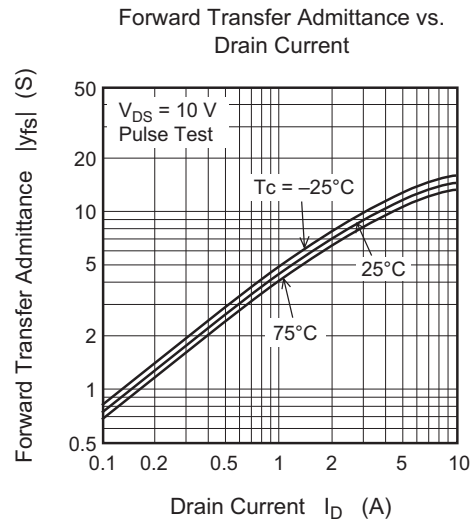
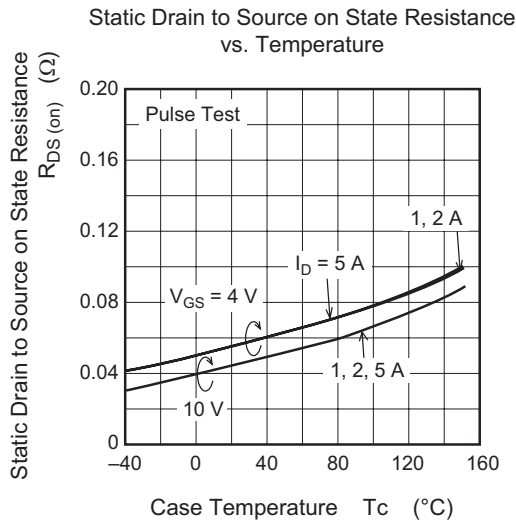
(Ta = 25°C)

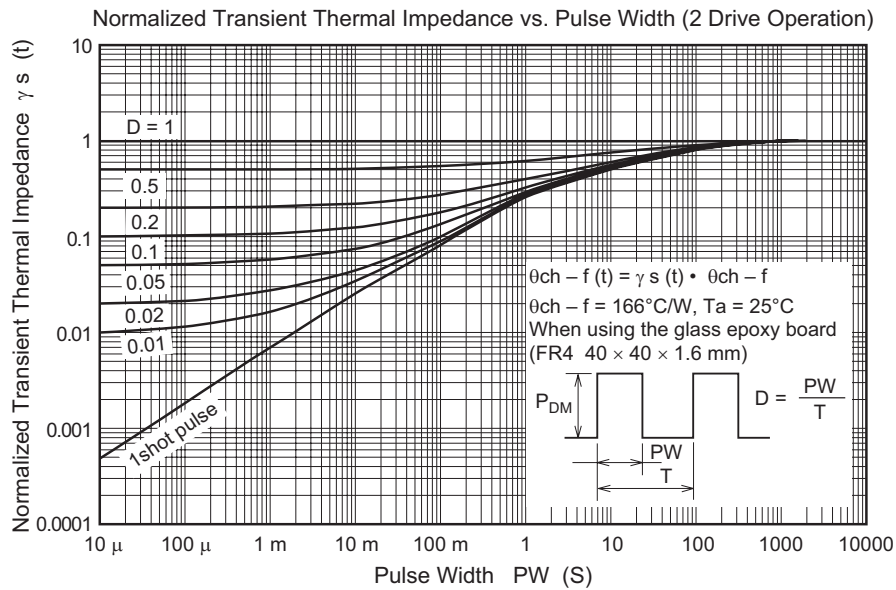
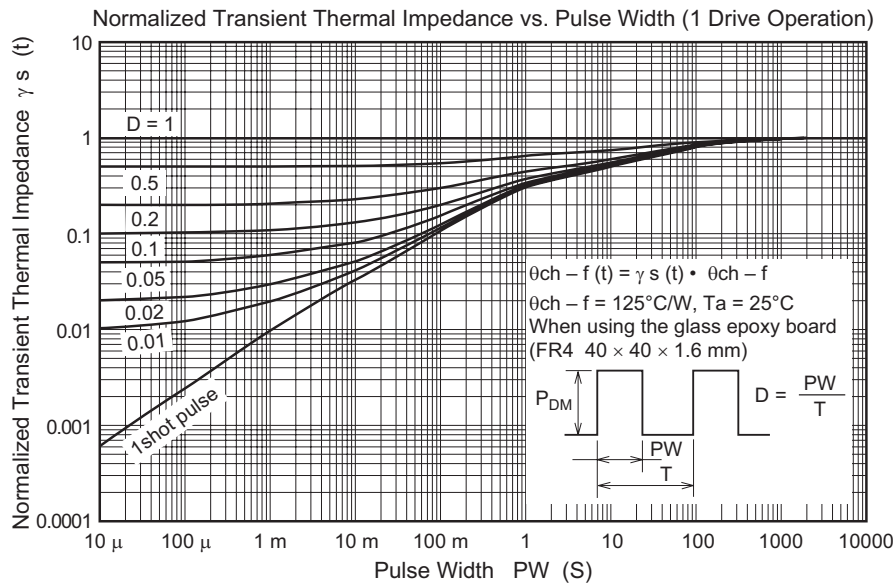
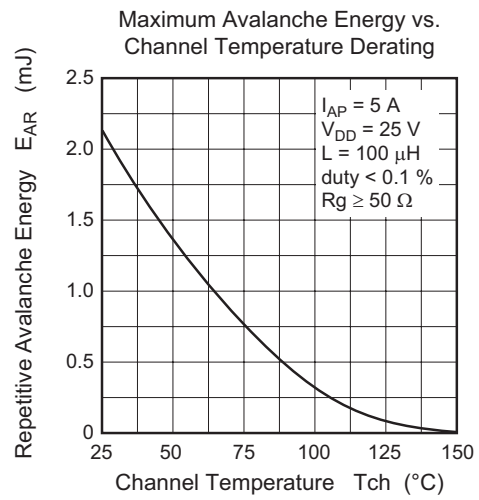
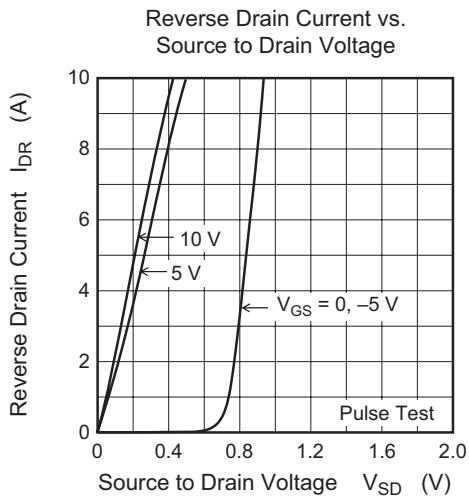
Item	Symbol	Min	Typ	Max	Unit	Test Conditions	
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$	
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \mu A$, $V_{DS} = 0$	
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$	
Zero gate voltage drain current	HAT2038R	I_{DSS}	—	—	1	μA	$V_{DS} = 60 \text{ V}$, $V_{GS} = 0$
	HAT2038RJ	I_{DSS}	—	—	0.1	μA	
Zero gate voltage drain current	HAT2038R	I_{DSS}	—	—	—	μA	$V_{DS} = 48 \text{ V}$, $V_{GS} = 0$ $T_a = 125^\circ C$
	HAT2038RJ	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	$R_{DS(on)}$	—	0.043	0.058	Ω	$I_D = 3 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 5}	
	$R_{DS(on)}$	—	0.056	0.084	Ω	$I_D = 3 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note 5}	
Forward transfer admittance	$ y_{fs} $	6	9	—	S	$I_D = 3 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 5}	
Input capacitance	C_{iss}	—	520	—	pF	$V_{DS} = 10 \text{ V}$	
Output capacitance	C_{oss}	—	270	—	pF	$V_{GS} = 0$	
Reverse transfer capacitance	C_{rss}	—	100	—	pF	$f = 1 \text{ MHz}$	
Turn-on delay time	$t_{d(on)}$	—	11	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 3 \text{ A}$, $V_{DD} \cong 30 \text{ V}$	
Rise time	t_r	—	40	—	ns		
Turn-off delay time	$t_{d(off)}$	—	110	—	ns		
Fall time	t_f	—	80	—	ns		
Body-drain diode forward voltage	V_{DF}	—	0.84	1.1	V	$I_F = 5 \text{ A}$, $V_{GS} = 0$ ^{Note 5}	
Body-drain diode reverse recovery time	t_{rr}	—	40	—	ns	$I_F = 5 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu s$	

Note: 5. Pulse test

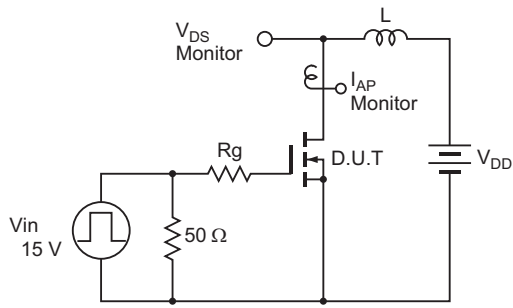
Main Characteristics





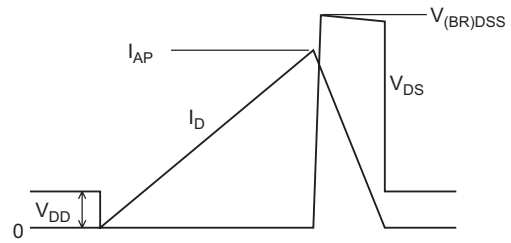


Avalanche Test Circuit

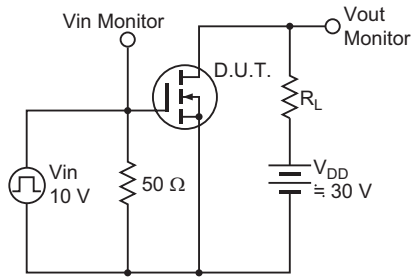


Avalanche Waveform

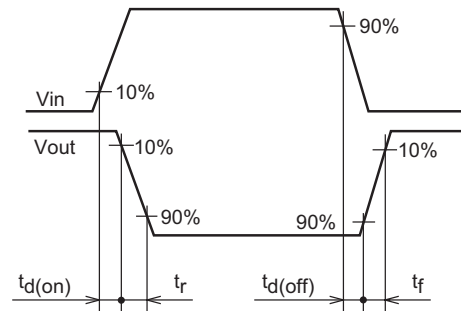
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



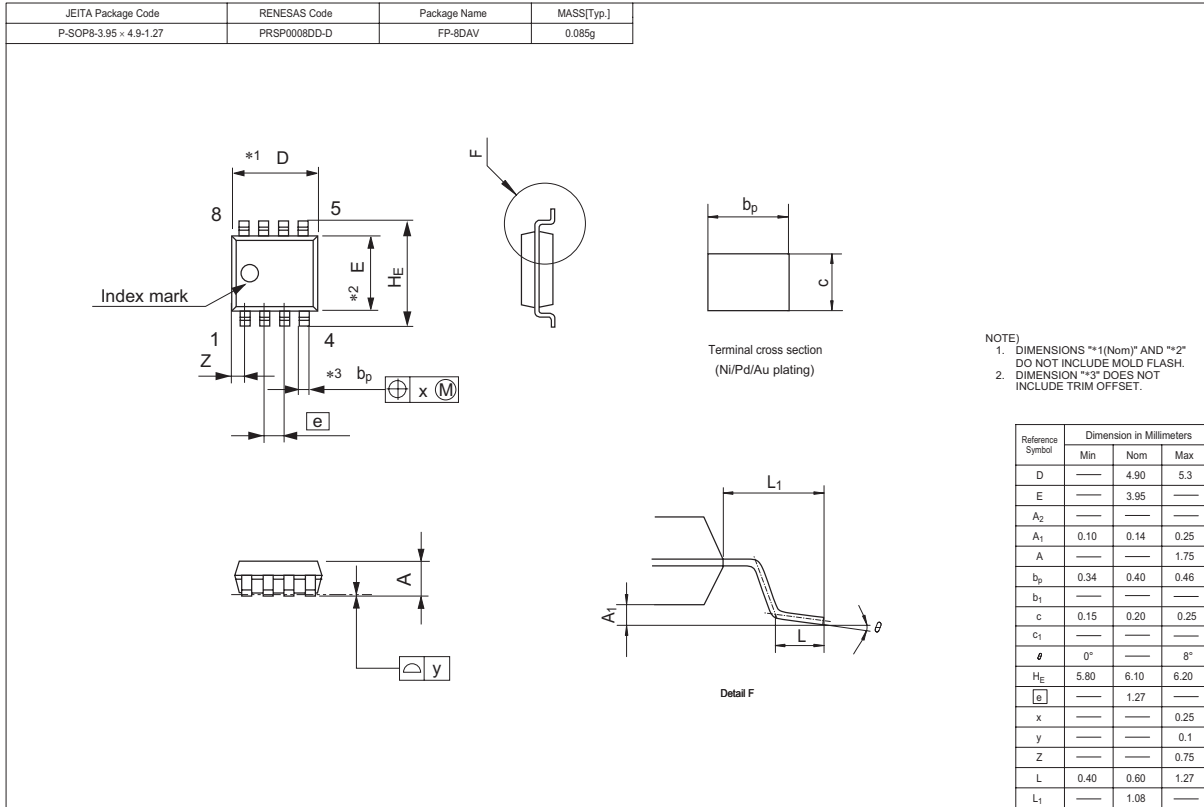
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAT2038R-EL-E	2500 pcs	Taping
HAT2038RJ-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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