

HAT2028R, HAT2028RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

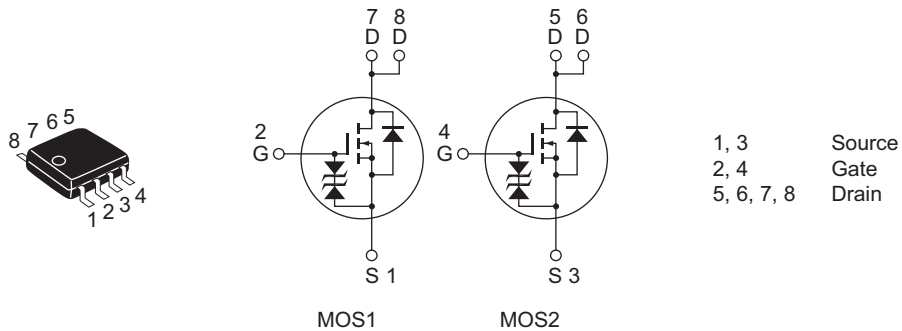
REJ03G1163-0500
(Previous: ADE-208-524C)
Rev.5.00
Sep 07, 2005

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_{DS}	60	V
Gate to source voltage	V_{GS}	±20	V
Drain current	I_D	4	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	32	A
Body-drain diode reverse drain current	I_{DR}	4	A
Avalanche current	I_{AP} ^{Note 4}	—	—
		4	A
Avalanche energy	E_{AR} ^{Note 4}	—	—
		1.37	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

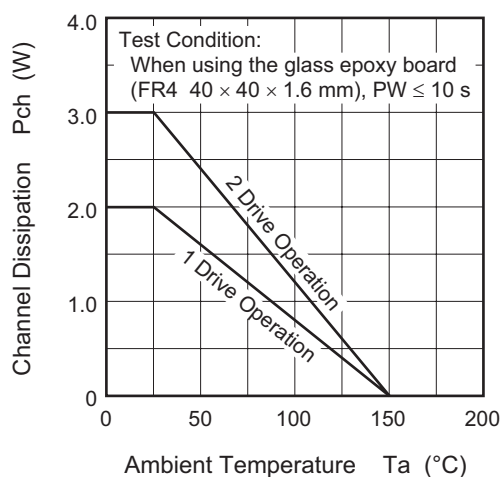
(Ta = 25°C)

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	HAT2028R I_{DSS}	—	—	1	μA	$V_{DS} = 60 \text{ V}$, $V_{GS} = 0$
	HAT2028RJ I_{DSS}	—	—	0.1	μA	
Zero gate voltage drain current	HAT2028R I_{DSS}	—	—	—	μA	$V_{DS} = 48 \text{ V}$, $V_{GS} = 0$ $T_a = 125^\circ C$
	HAT2028RJ I_{DSS}	—	—	10	μA	
Gate to source cutoff voltage	$V_{GS(off)}$	1.3	—	2.3	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.08	0.1	Ω	$I_D = 2 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 5}
	$R_{DS(on)}$	—	0.12	0.16	Ω	$I_D = 2 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note 5}
Forward transfer admittance	$ y_{fs} $	3.3	5	—	S	$I_D = 2 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 5}
Input capacitance	C_{iss}	—	280	—	pF	$V_{DS} = 10 \text{ V}$ $V_{GS} = 0$ $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	150	—	pF	
Reverse transfer capacitance	C_{rss}	—	55	—	pF	
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	$V_{GS} = 4 \text{ V}$, $I_D = 2 \text{ A}$, $V_{DD} \approx 30 \text{ V}$
Rise time	t_r	—	100	—	ns	
Turn-off delay time	$t_{d(off)}$	—	35	—	ns	
Fall time	t_f	—	45	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.88	1.15	V	$I_F = 4 \text{ A}$, $V_{GS} = 0$ ^{Note 5}
Body-drain diode reverse recovery time	t_{rr}	—	40	—	ns	$I_F = 4 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu s$

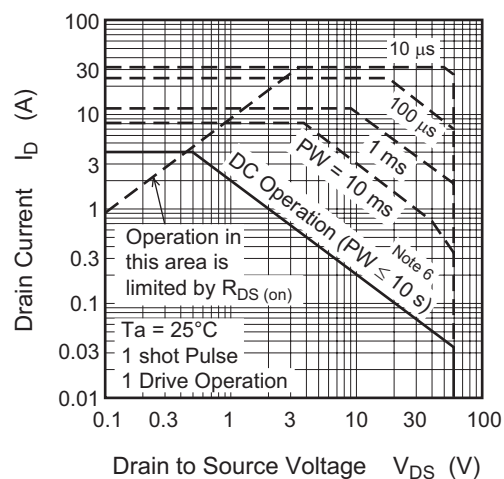
Note: 5. Pulse test

Main Characteristics

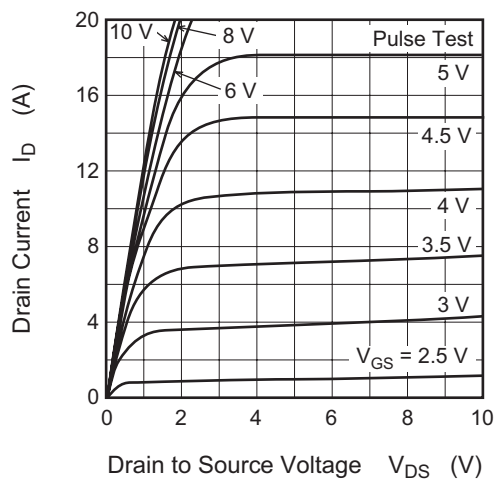
Power vs. Temperature Derating



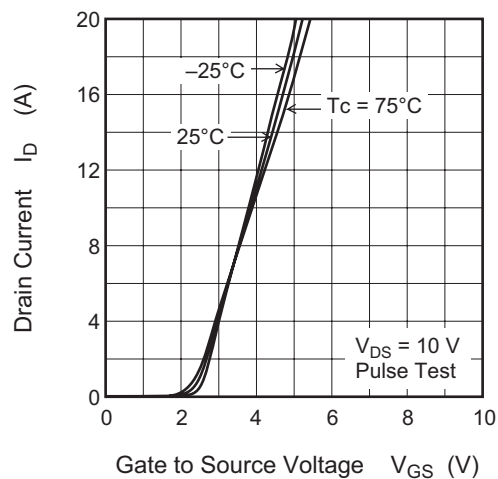
Maximum Safe Operation Area



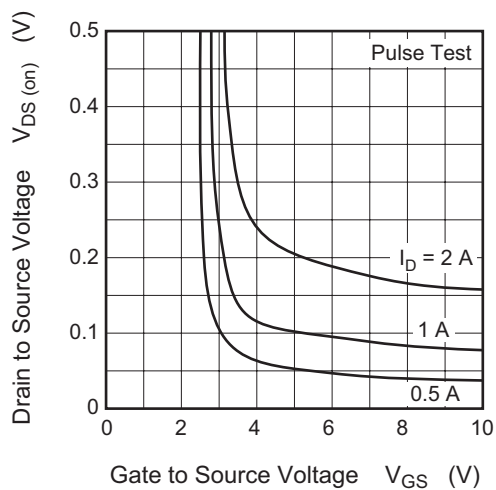
Typical Output Characteristics



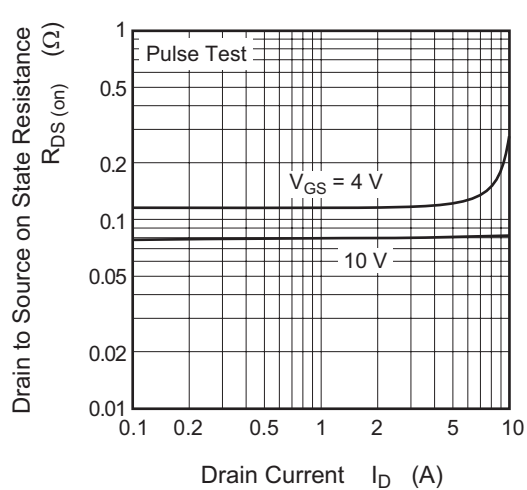
Typical Transfer Characteristics

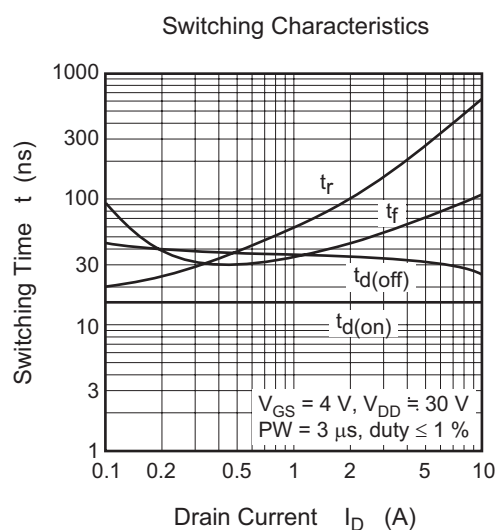
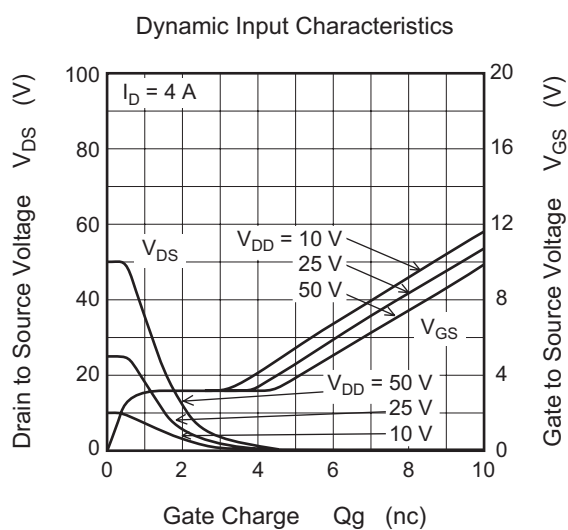
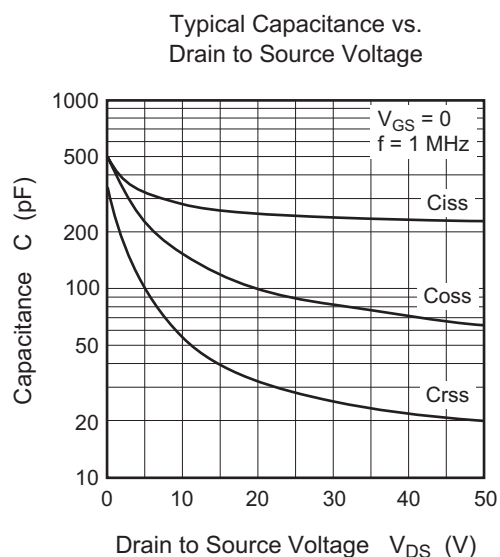
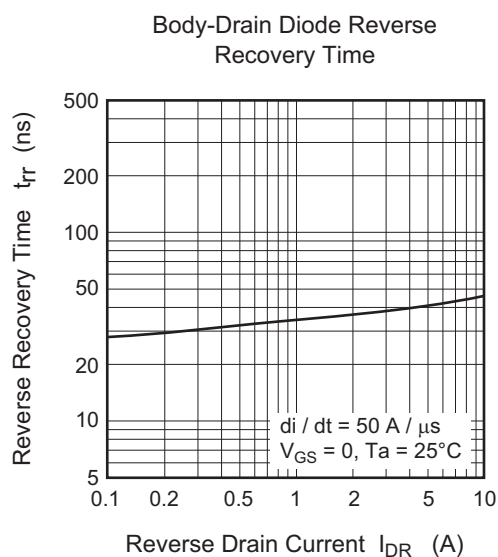
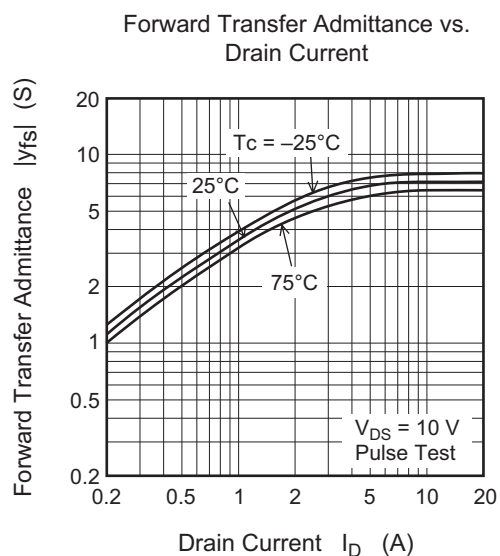
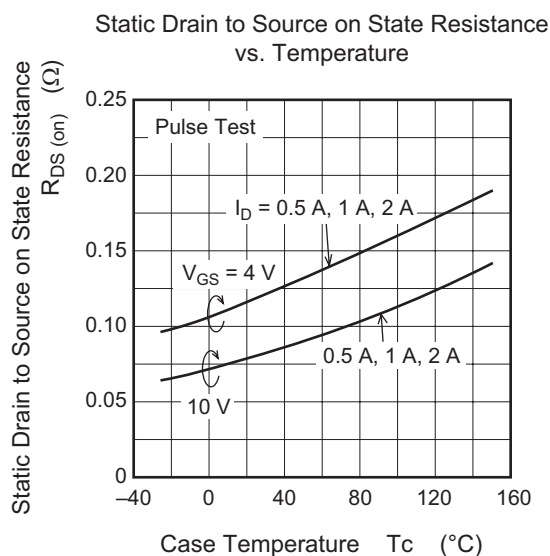


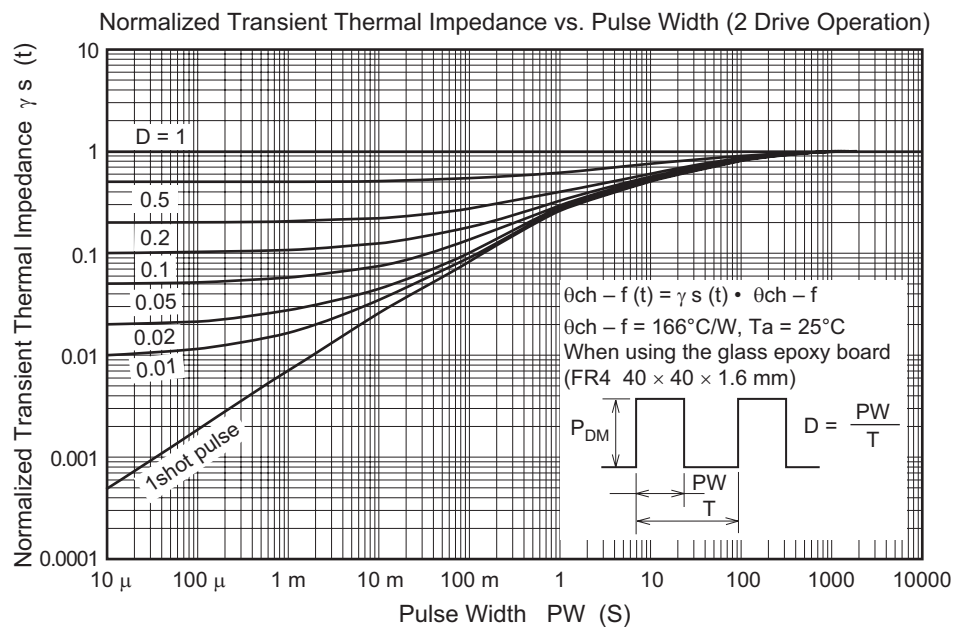
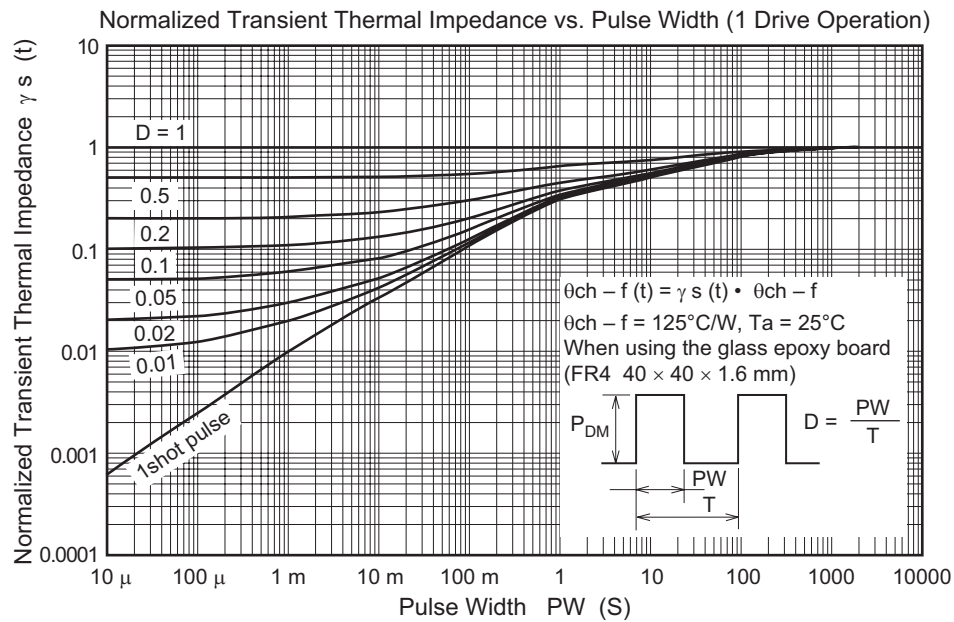
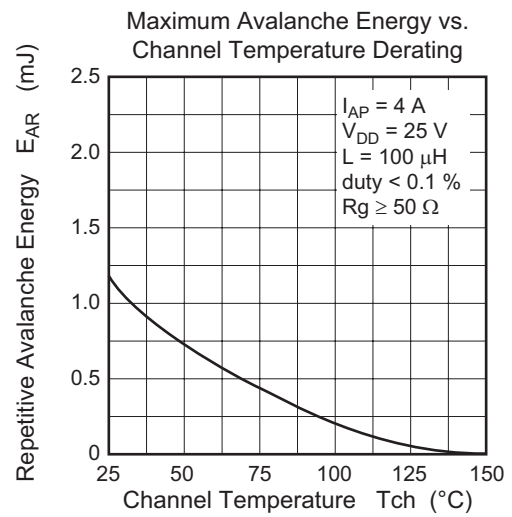
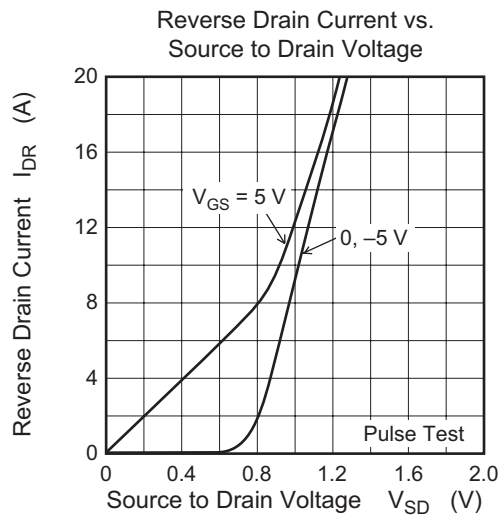
Drain to Source Saturation Voltage vs. Gate to Source Voltage



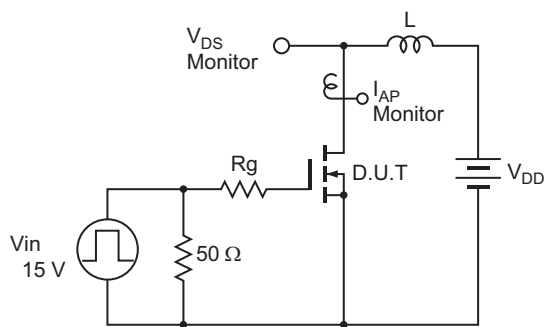
Static Drain to Source on State Resistance vs. Drain Current



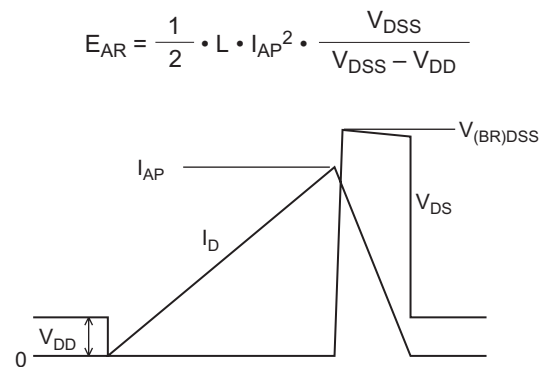




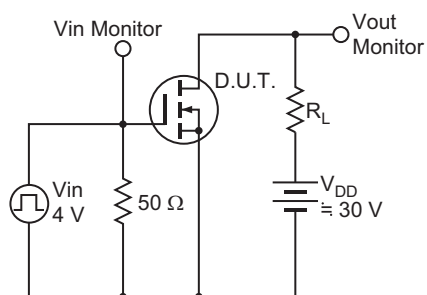
Avalanche Test Circuit



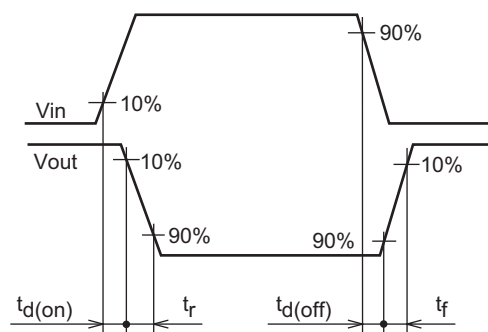
Avalanche Waveform



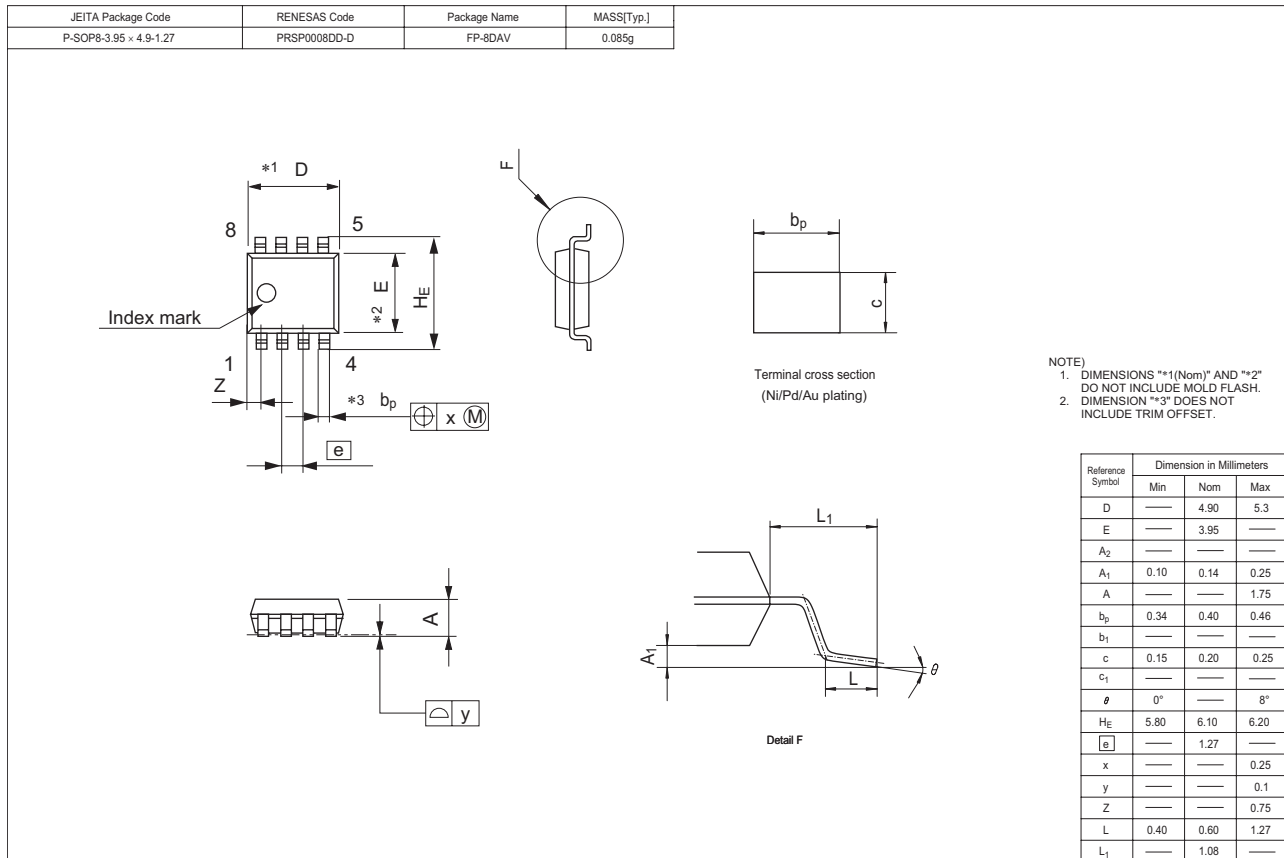
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

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

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