



HAT2033R, HAT2033RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

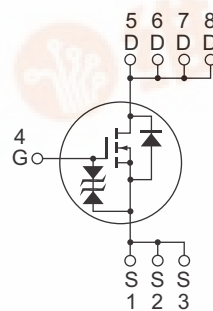
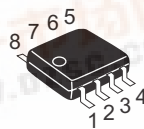
REJ03G1165-0400
(Previous: ADE-208-664B)
Rev.4.00
Sep 07, 2005

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>)



1, 2, 3 Source
4 Gate
5, 6, 7, 8 Drain

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	7	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	56	A
Body-drain diode reverse drain current	I_{DR}	7	A
Avalanche current	HAT2033R	I_{AP} ^{Note 4}	—
	HAT2033RJ		7
Avalanche energy	HAT2033R	E_{AR} ^{Note 4}	—
	HAT2033RJ		4.2
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

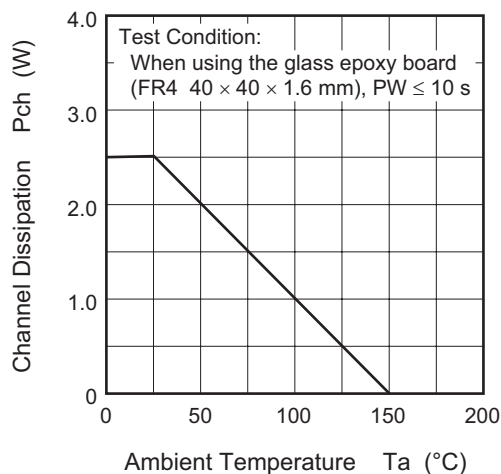
(Ta = 25°C)

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	
Rise time	t_r	—	55	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 4 \text{ A}$, $V_{DD} \cong 30 \text{ V}$
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	$I_F = 7 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu s$

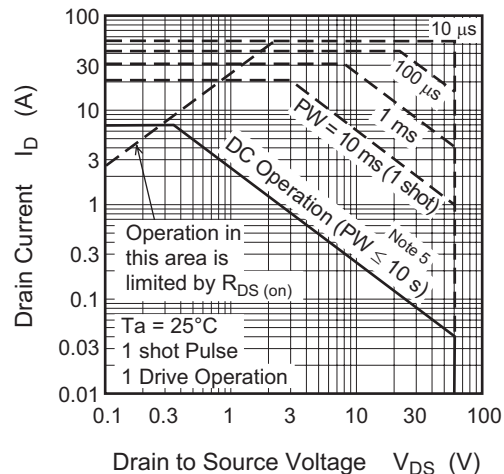
Note: 4. Pulse test

Main Characteristics

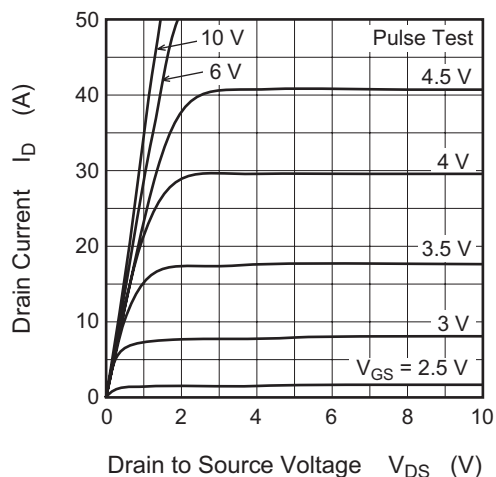
Power vs. Temperature Derating



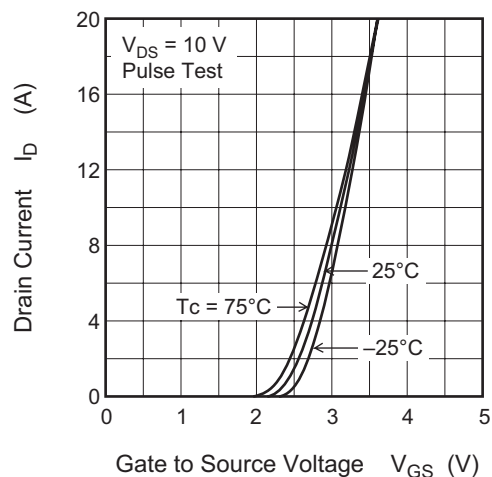
Maximum Safe Operation Area



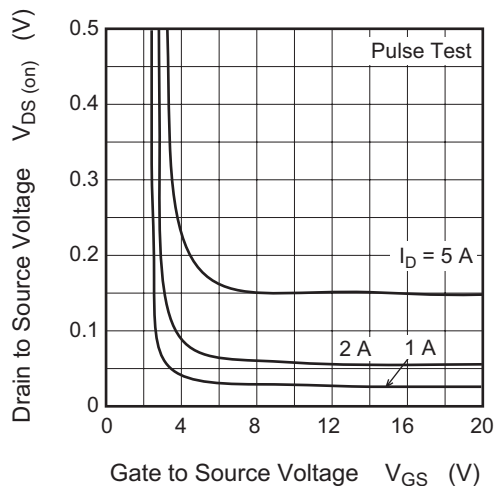
Typical Output Characteristics



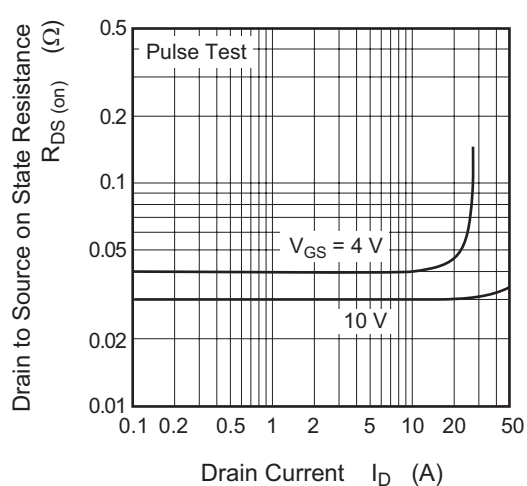
Typical Transfer Characteristics

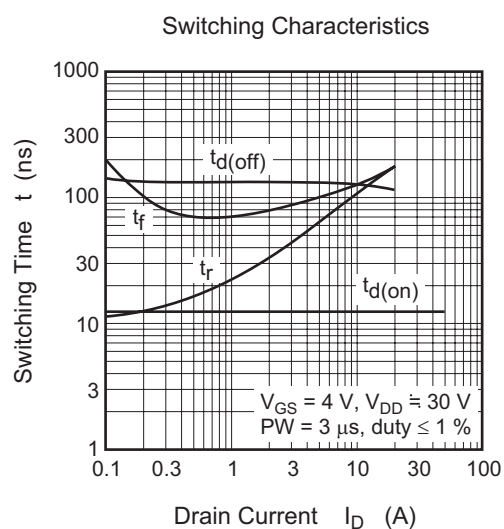
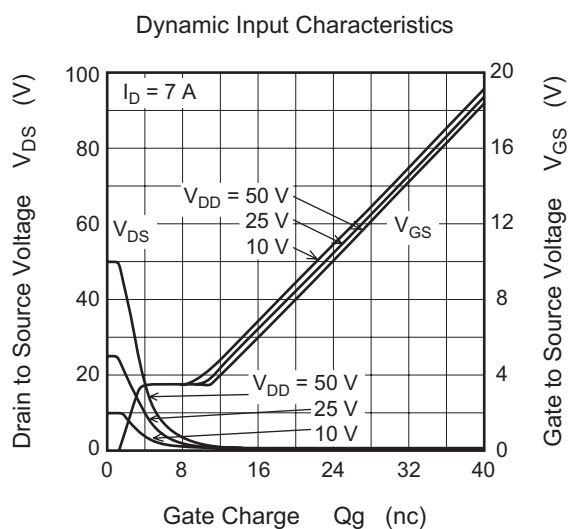
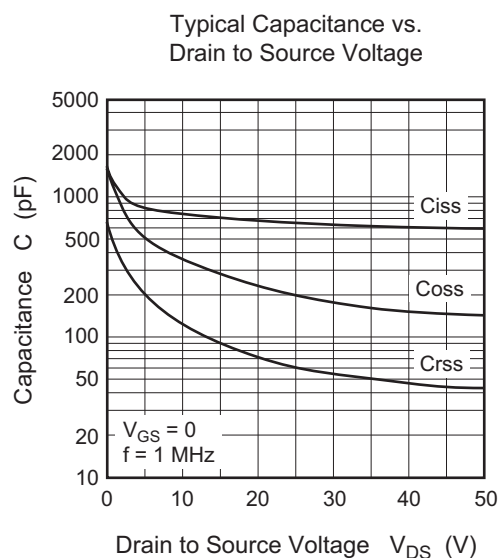
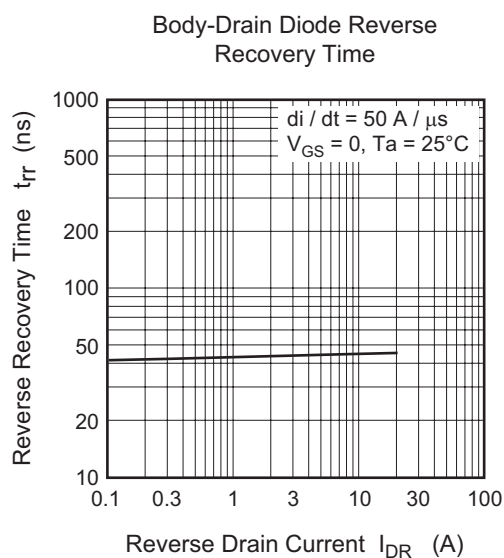
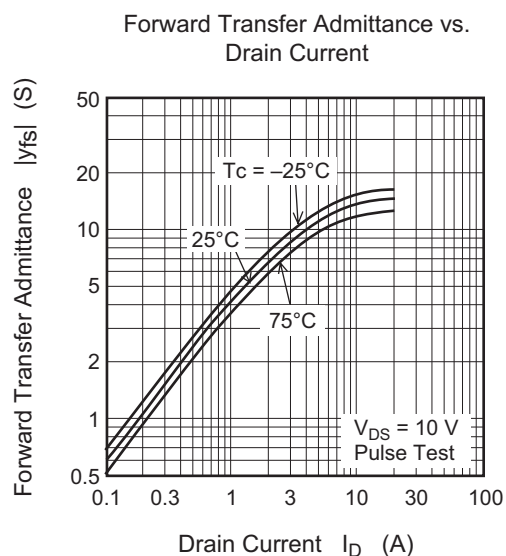
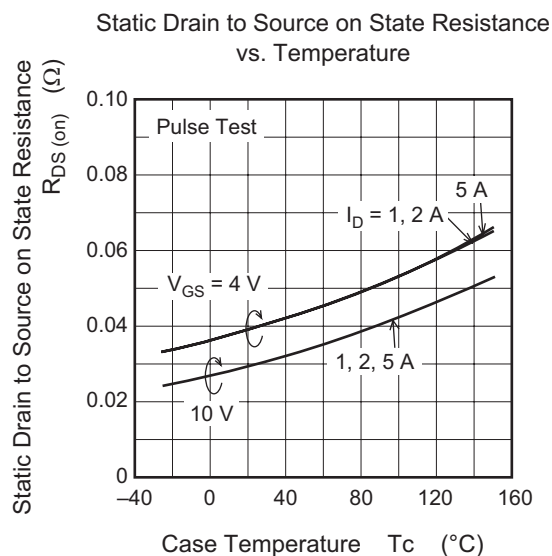


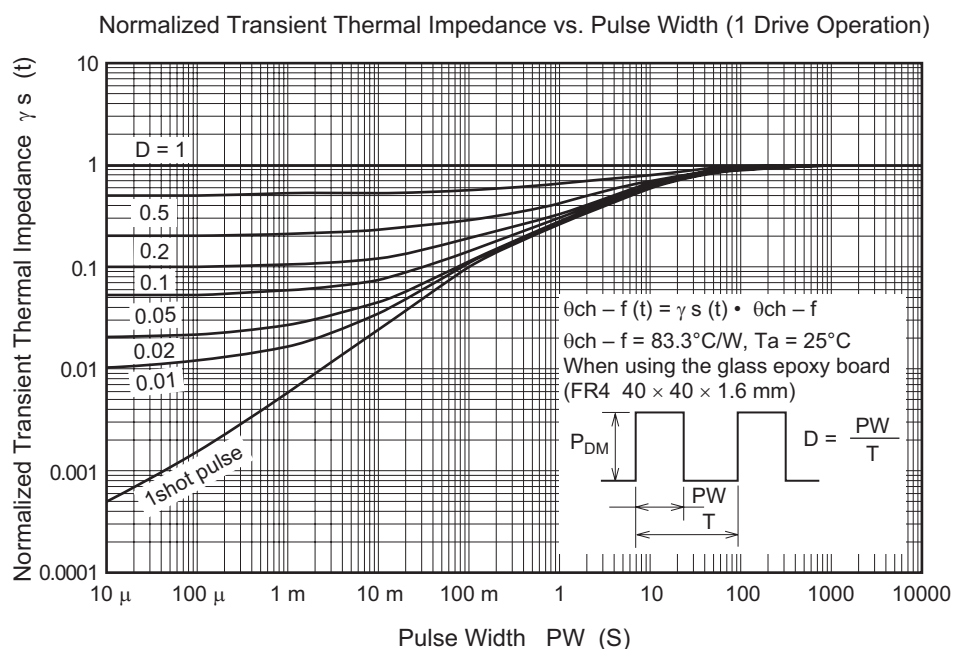
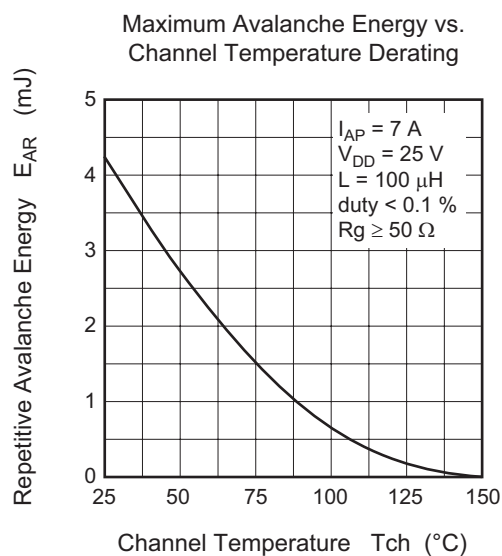
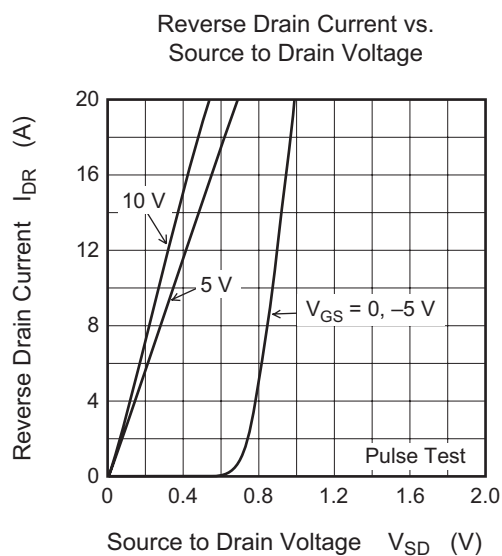
Drain to Source Saturation Voltage vs. Gate to Source Voltage



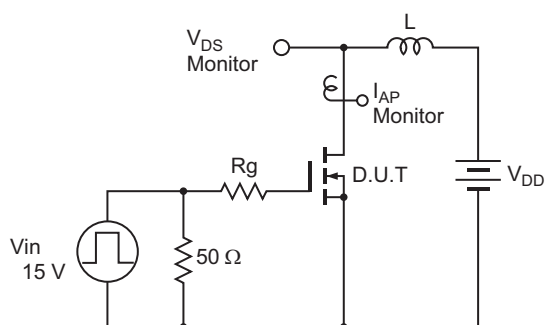
Static Drain to Source on State Resistance vs. Drain Current





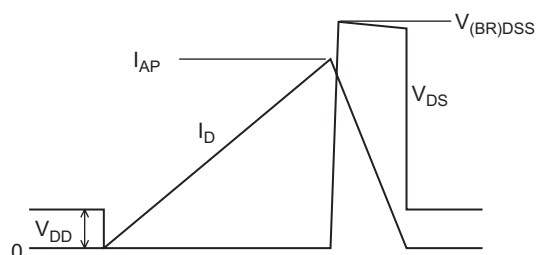


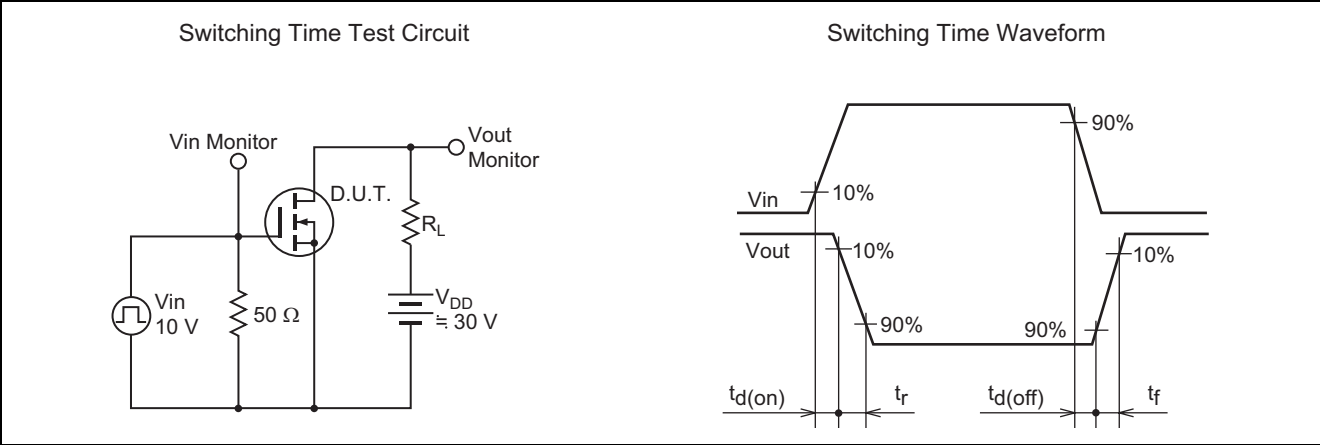
Avalanche Test Circuit



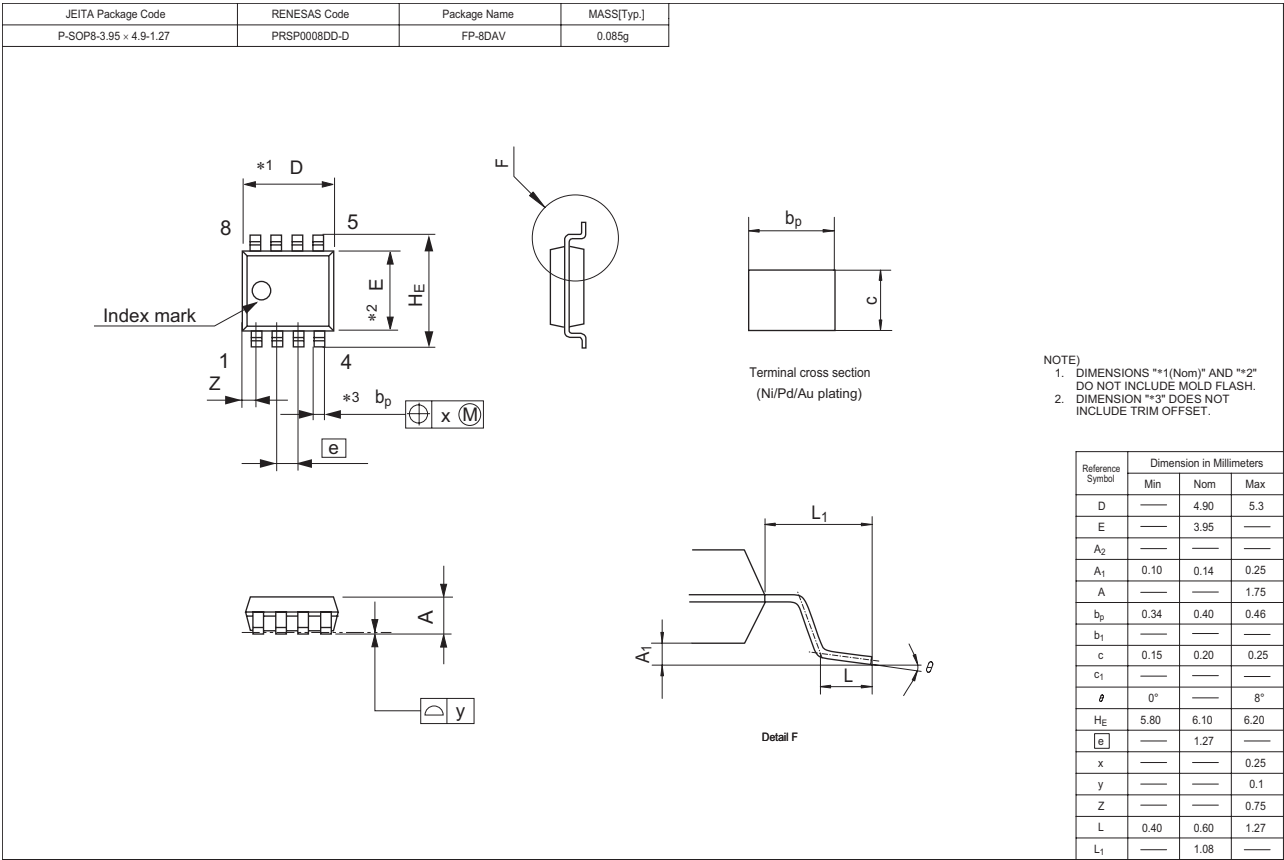
Avalanche Waveform

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





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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