

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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## HAT2137H

### Silicon N Channel Power MOS FET Power Switching

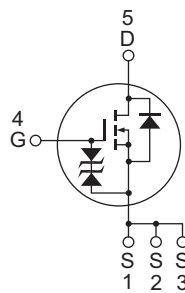
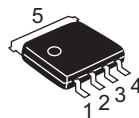
REJ03G1191-0400  
(Previous: ADE-208-1579B)  
Rev.4.00  
Sep 07, 2005

#### Features

- Capable of 7 V gate drive
- Low drive current
- High density mounting
- Low on-resistance  
 $R_{DS(on)} = 3.8 \text{ m}\Omega$  typ. (at  $V_{GS} = 10 \text{ V}$ )

#### Outline

RENESAS Package code: PTZZ0005DA-A  
(Package name: LFAK)



1, 2, 3 Source  
4 Gate  
5 Drain

## Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V <sub>DSS</sub>	40	V
Gate to source voltage	V <sub>GSS</sub>	±20	V
Drain current	I <sub>D</sub>	45	A
Drain peak current	I <sub>D (pulse)</sub> <sup>Note 1</sup>	180	A
Body-drain diode reverse drain current	I <sub>DR</sub>	45	A
Avalanche current	I <sub>AP</sub> <sup>Note 3</sup>	30	A
Avalanche energy	E <sub>AR</sub> <sup>Note 3</sup>	72	mJ
Channel dissipation	P <sub>ch</sub> <sup>Note 2</sup>	30	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. T<sub>c</sub> = 25 °C  
 3. Value at T<sub>ch</sub> = 25°C, R<sub>g</sub> ≥ 50 Ω

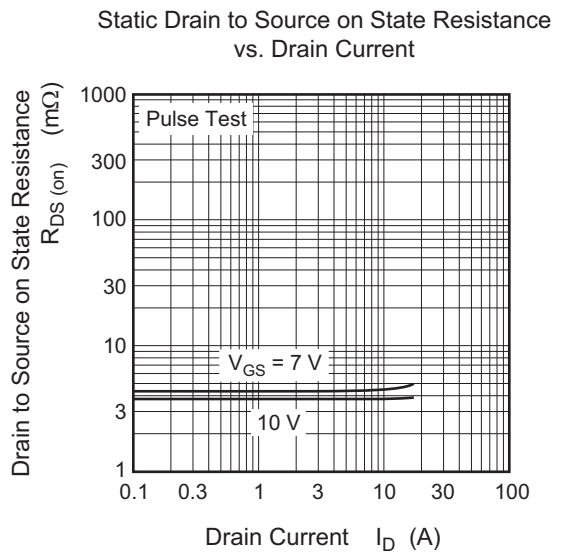
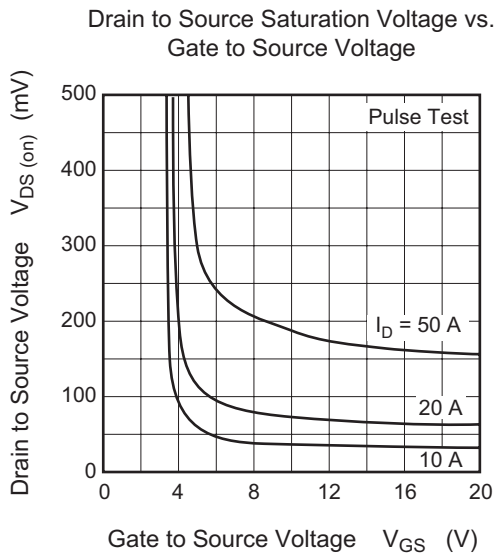
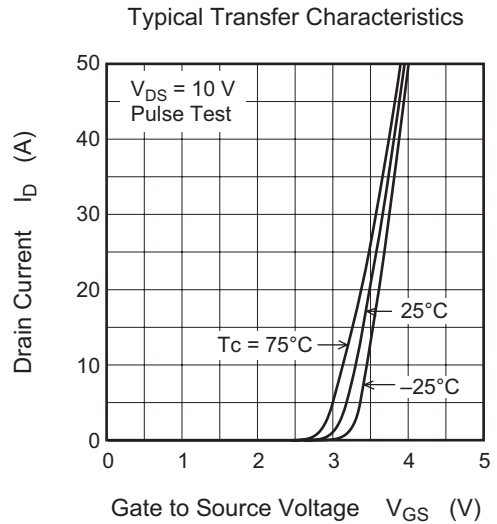
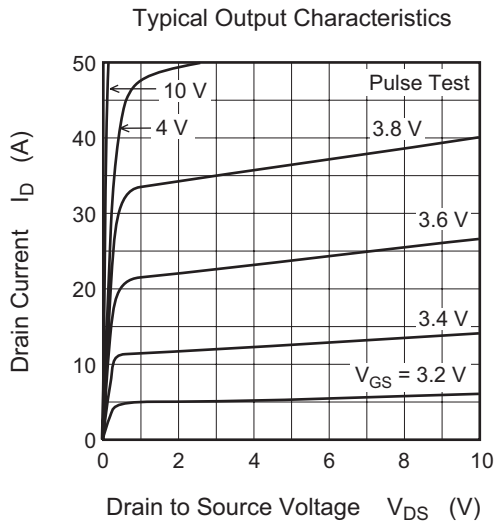
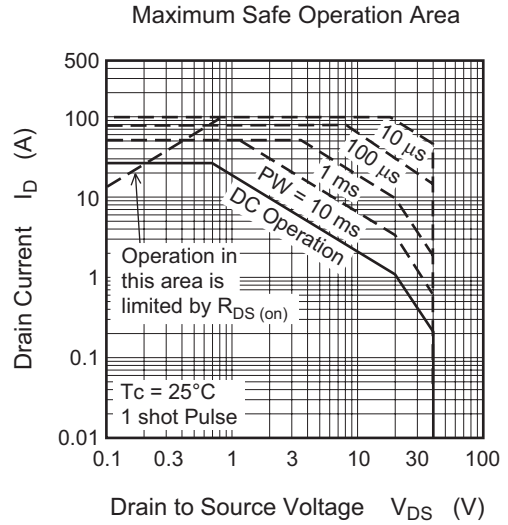
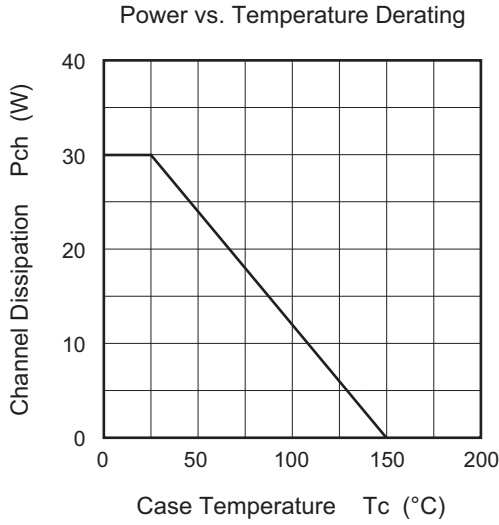
## Electrical Characteristics

(Ta = 25°C)

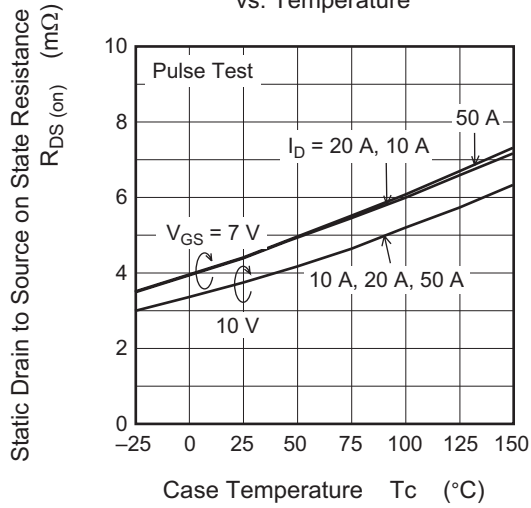
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	V <sub>(BR) DSS</sub>	40	—	—	V	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0
Gate to source breakdown voltage	V <sub>(BR) GSS</sub>	±20	—	—	V	I <sub>G</sub> = ±100 μA, V <sub>DS</sub> = 0
Gate to source leak current	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0
Zero gate voltage drain current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0
Gate to source cutoff voltage	V <sub>GS (off)</sub>	2.0	—	3.5	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>	—	3.8	4.8	mΩ	I <sub>D</sub> = 22.5 A, V <sub>GS</sub> = 10 V <sup>Note 4</sup>
	R <sub>DS (on)</sub>	—	4.4	6.0	mΩ	I <sub>D</sub> = 22.5 A, V <sub>GS</sub> = 7 V <sup>Note 4</sup>
Forward transfer admittance	y <sub>fs</sub>	38	64	—	S	I <sub>D</sub> = 22.5 A, V <sub>DS</sub> = 10 V <sup>Note 4</sup>
Input capacitance	C <sub>iss</sub>	—	6200	—	pF	V <sub>DS</sub> = 10 V
Output capacitance	C <sub>oss</sub>	—	780	—	pF	V <sub>GS</sub> = 0
Reverse transfer capacitance	C <sub>rss</sub>	—	410	—	pF	f = 1 MHz
Total gate charge	Q <sub>g</sub>	—	95	—	nC	V <sub>DD</sub> = 10 V
Gate to source charge	Q <sub>gs</sub>	—	24	—	nC	V <sub>GS</sub> = 10 V
Gate to drain charge	Q <sub>gd</sub>	—	14	—	nC	I <sub>D</sub> = 45 A
Turn-on delay time	t <sub>d (on)</sub>	—	27	—	ns	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 22.5 A
Rise time	t <sub>r</sub>	—	50	—	ns	V <sub>DD</sub> ≅ 10 V
Turn-off delay time	t <sub>d (off)</sub>	—	90	—	ns	R <sub>L</sub> = 0.44 Ω
Fall time	t <sub>f</sub>	—	14	—	ns	R <sub>g</sub> = 4.7 Ω
Body-drain diode forward voltage	V <sub>DF</sub>	—	0.84	1.10	V	I <sub>F</sub> = 45 A, V <sub>GS</sub> = 0 <sup>Note 4</sup>
Body-drain diode reverse recovery time	t <sub>rr</sub>	—	40	—	ns	I <sub>F</sub> = 45 A, V <sub>GS</sub> = 0 di <sub>F</sub> /dt = 100 A/μs

Note: 4. Pulse test

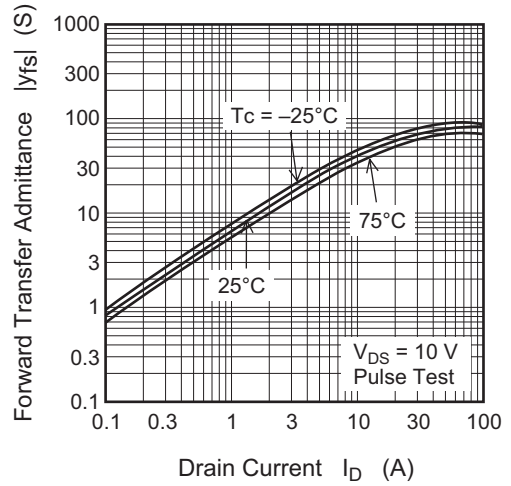
Main Characteristics



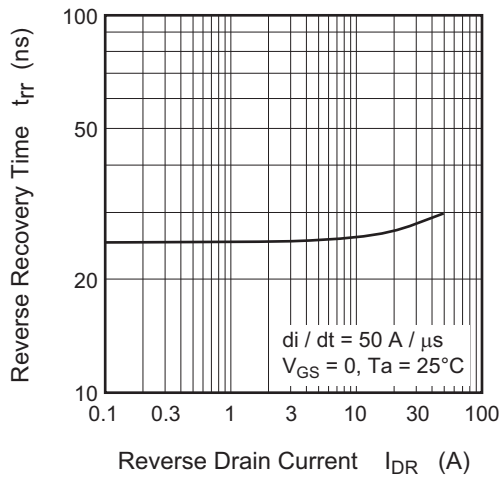
Static Drain to Source on State Resistance vs. Temperature



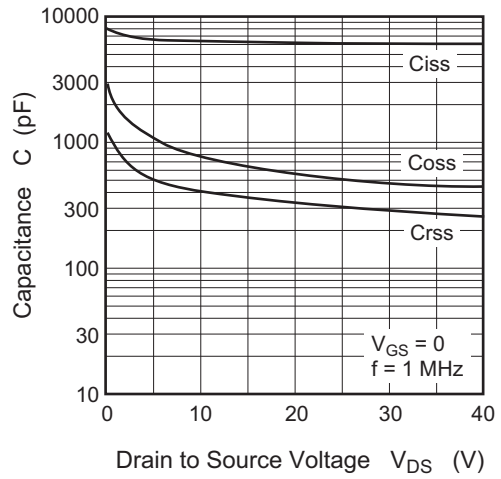
Forward Transfer Admittance vs. Drain Current



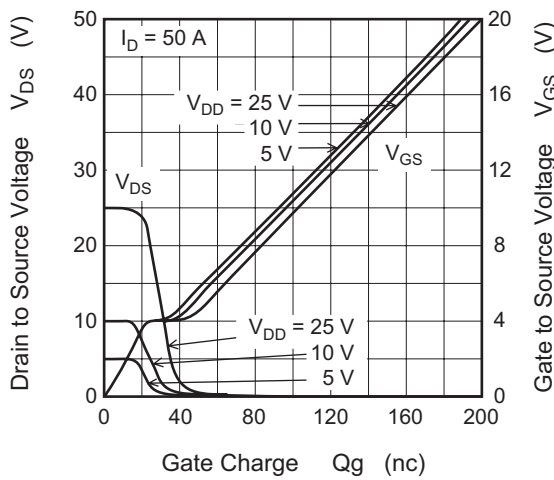
Body-Drain Diode Reverse Recovery Time



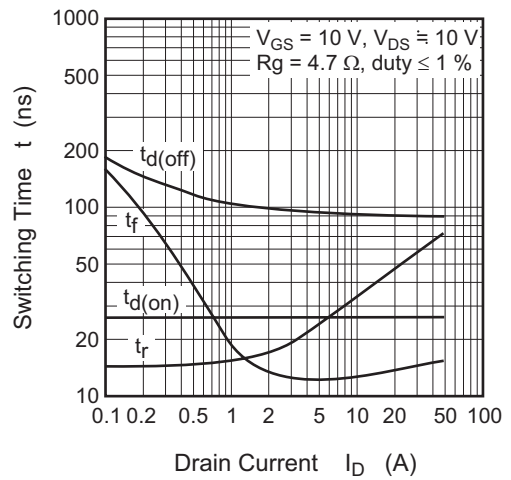
Typical Capacitance vs. Drain to Source Voltage

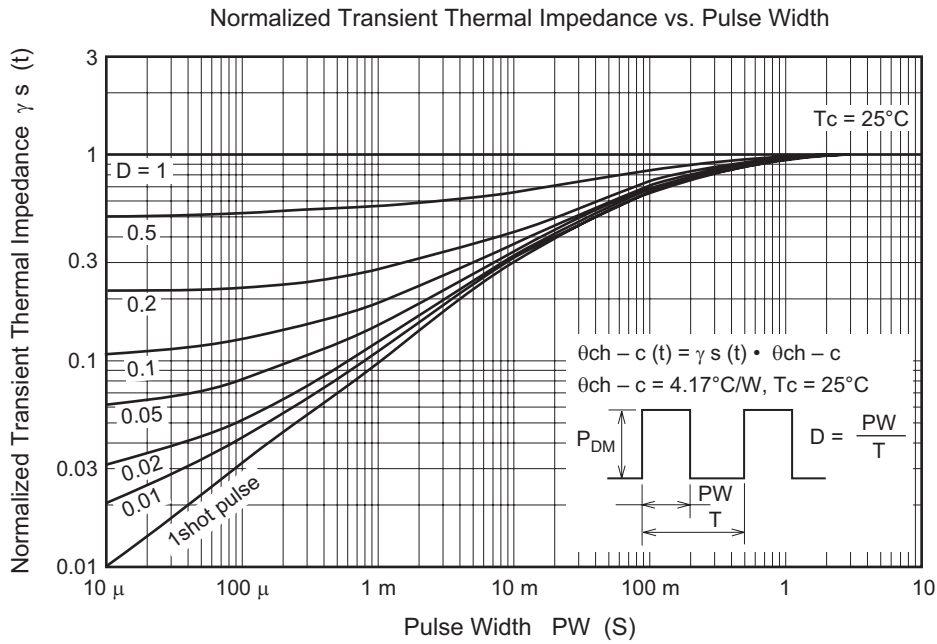
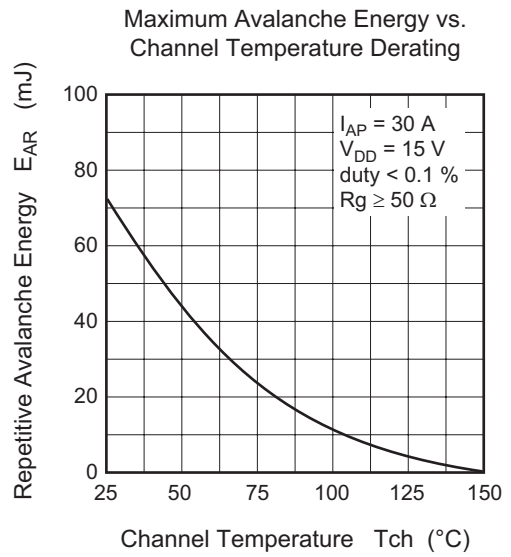
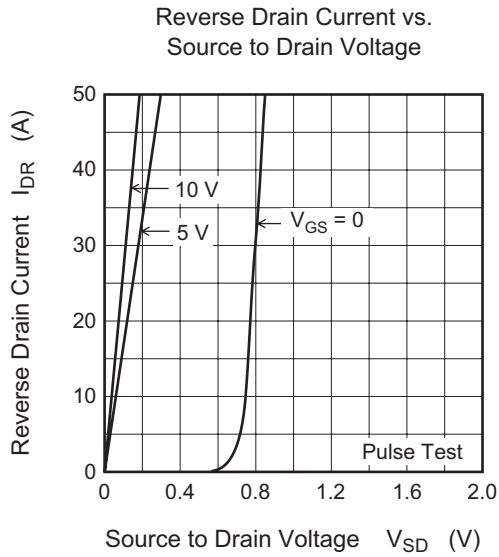


Dynamic Input Characteristics

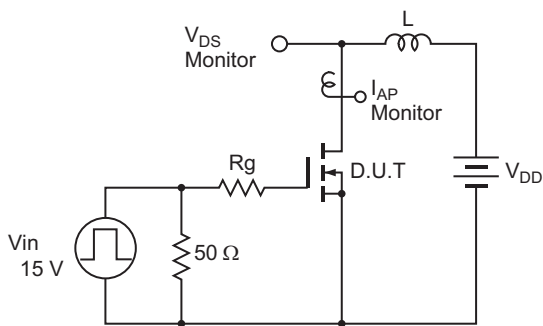


Switching Characteristics



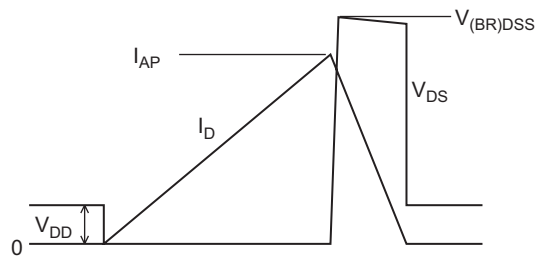


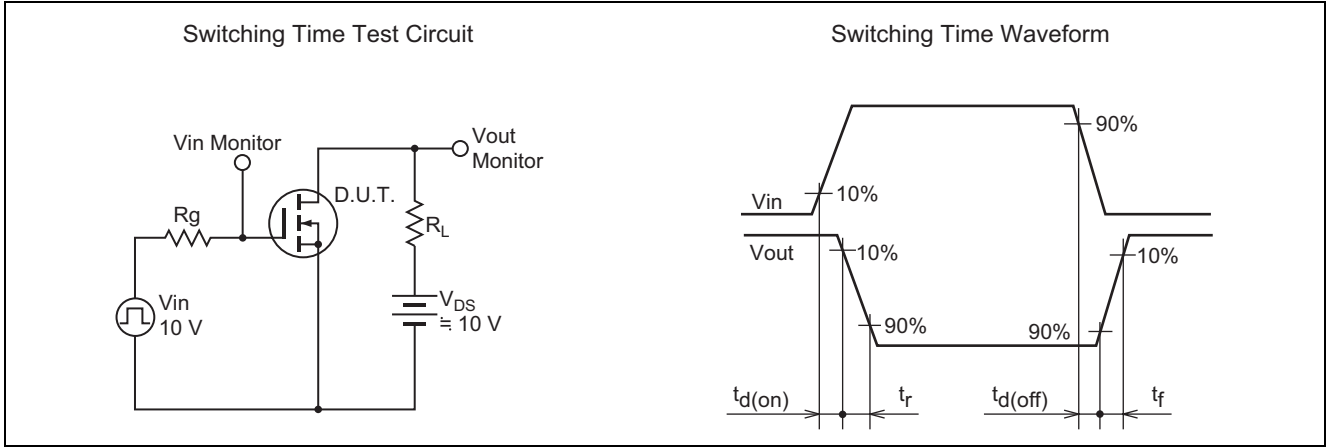
Avalanche Test Circuit



Avalanche Waveform

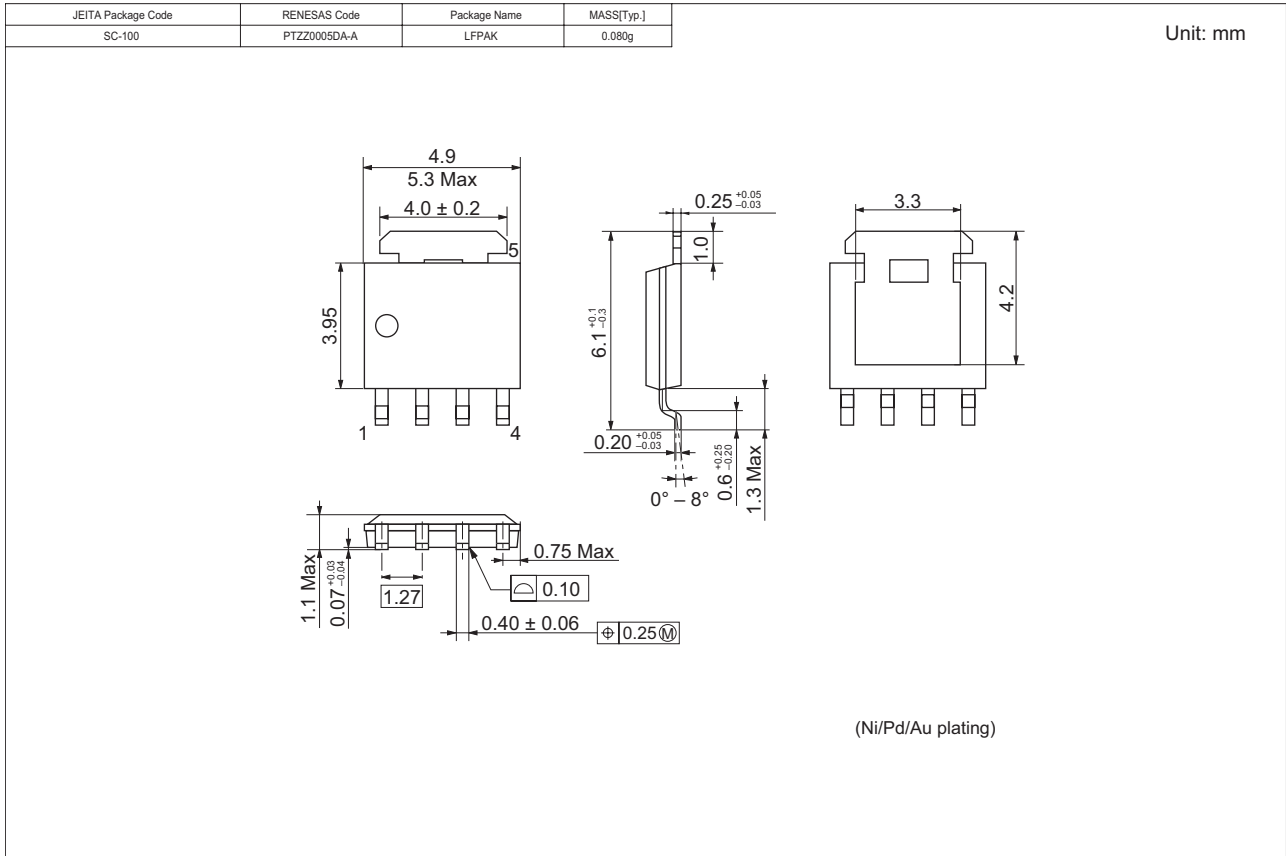
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$







Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAT2137H-EL-E	2500 pcs	Taping

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