

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

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

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# HAT1139H

## Silicon P Channel Power MOS FET Power Switching

REJ03G1244-0200

Rev.2.00

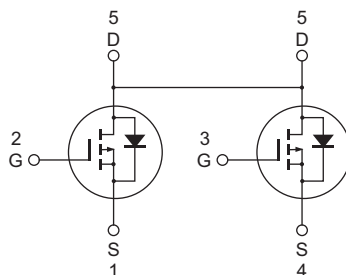
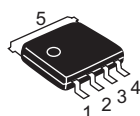
Jun.22.2005

### Features

- Capable of  $-4.5\text{ V}$  gate drive
- Low drive current
- High density mounting
- Low on-resistance  
 $R_{DS(on)} = 7.0\text{ m}\Omega$  typ. (at  $V_{GS} = -10\text{ V}$ )

### Outline

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



1, 4 Source  
2, 3 Gate  
5 Drain

### Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	-30	V
Gate to source voltage	$V_{GSS}$	-25 / +20	V
Drain current	$I_D$	-30	A
Drain peak current	$I_{D(pulse)}$ <sup>Note1</sup>	-120	A
Body-drain diode reverse drain current	$I_{DR}$	-30	A
Channel dissipation	$P_{ch}$ <sup>Note2</sup>	15	W
Channel dissipation	$P_{ch}$ <sup>Note3</sup>	30	W
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

Notes: 1.  $PW \leq 10\ \mu\text{s}$ , duty cycle  $\leq 1\%$

2. 1 Drive operation :  $T_c = 25^\circ\text{C}$

3. 2 Drive operation :  $T_c = 25^\circ\text{C}$

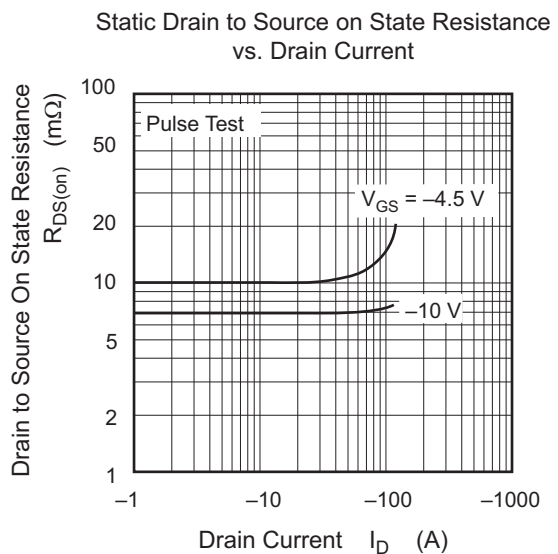
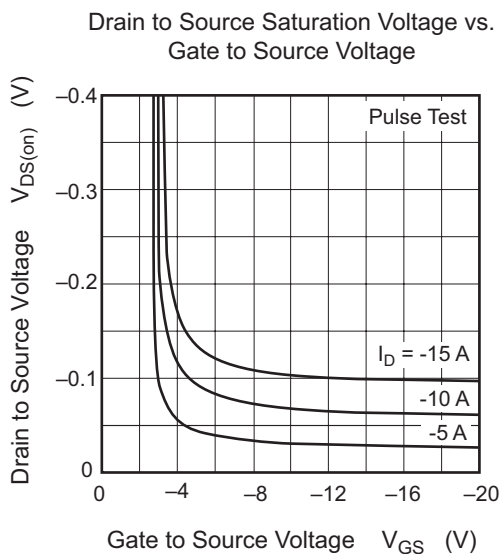
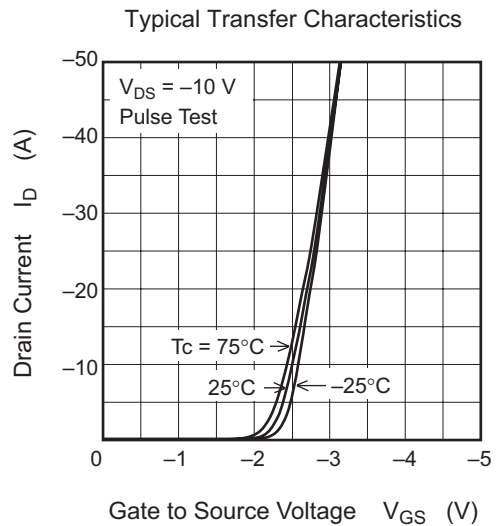
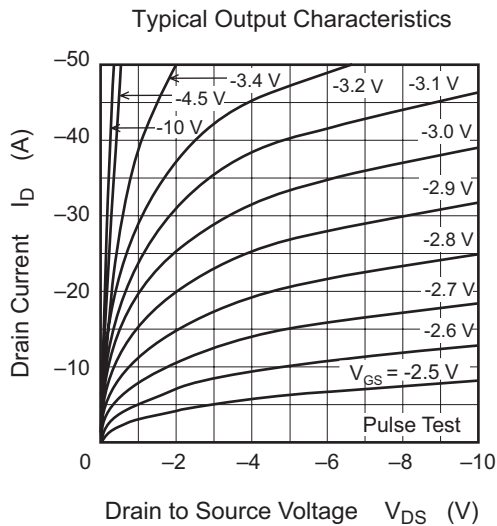
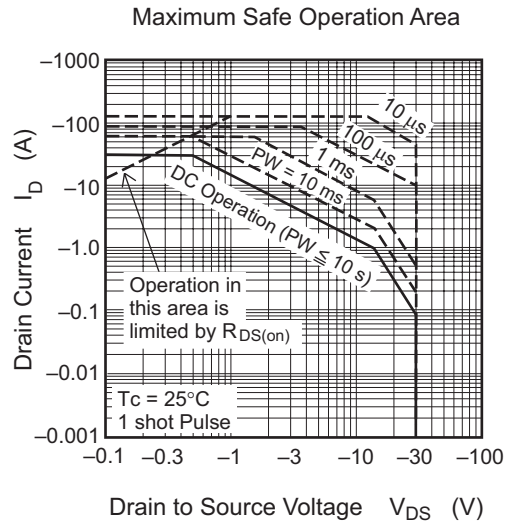
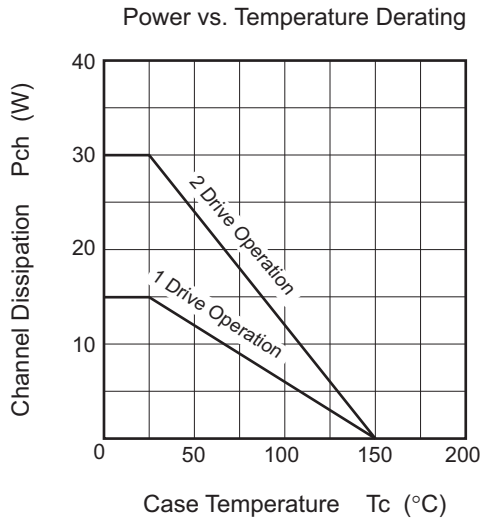
## Electrical Characteristics

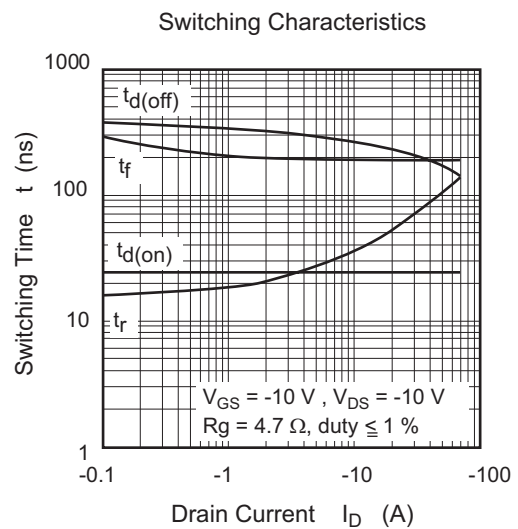
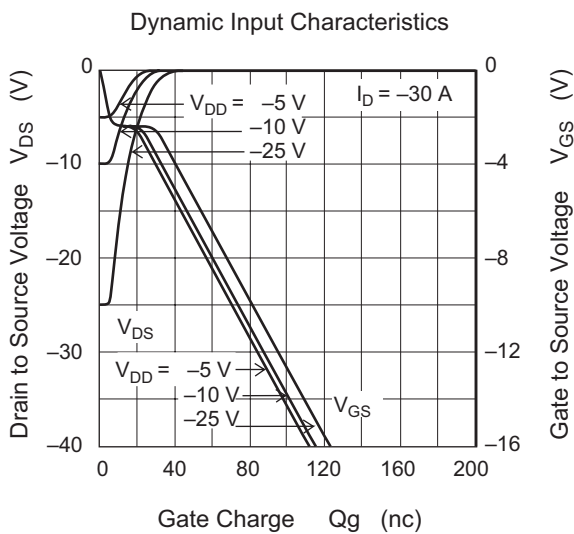
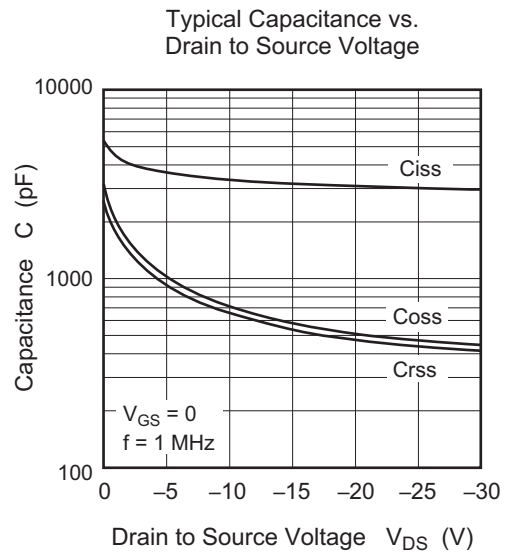
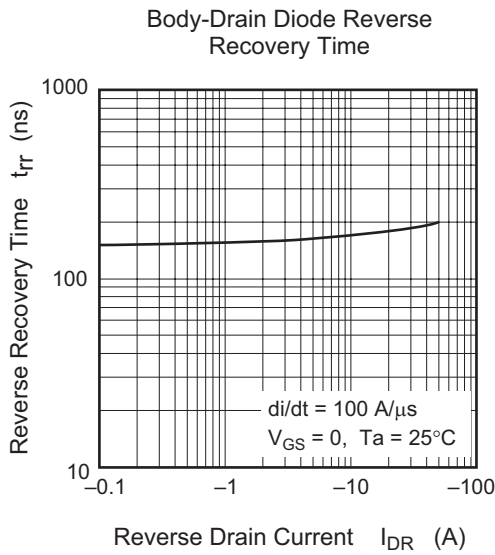
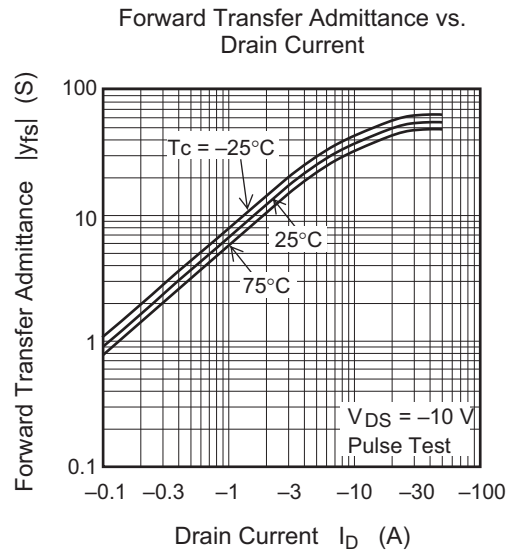
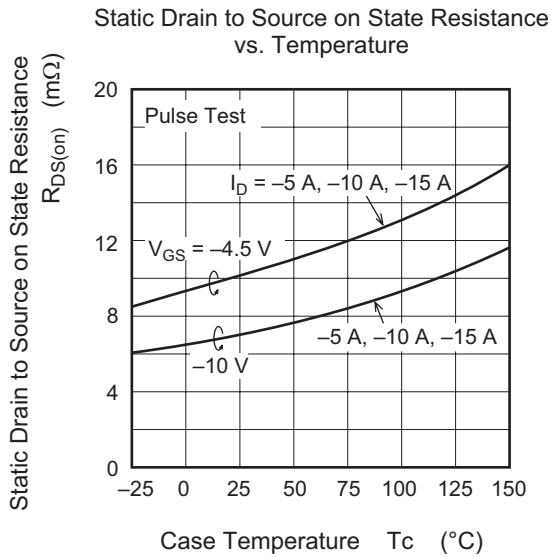
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-30	—	—	V	$I_D = -10 \text{ mA}, V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = -20/+10 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -30 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	-1.0	—	-2.5	V	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	7.0	9.0	$\text{m}\Omega$	$I_D = -15 \text{ A}, V_{GS} = -10 \text{ V}$ <sup>Note4</sup>
	$R_{DS(on)}$	—	10.0	14.5	$\text{m}\Omega$	$I_D = -15 \text{ A}, V_{GS} = -4.5 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	27	45	—	S	$I_D = -15 \text{ A}, V_{DS} = -10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	3200	—	pF	$V_{DS} = -10 \text{ V}, V_{GS} = 0,$ $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	720	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	550	—	pF	
Total gate charge	$Q_g$	—	73	—	nc	$V_{DD} = -10 \text{ V}, V_{GS} = -10 \text{ V},$ $I_D = -30 \text{ A}$
Gate to source charge	$Q_{gs}$	—	8	—	nc	
Gate to drain charge	$Q_{gd}$	—	14	—	nc	
Turn-on delay time	$t_{d(on)}$	—	23	—	ns	$V_{GS} = -10 \text{ V}, I_D = -15 \text{ A},$ $V_{DD} \cong -10 \text{ V}, R_L = 0.67 \Omega,$ $R_g = 4.7 \Omega$
Rise time	$t_r$	—	48	—	ns	
Turn-off delay time	$t_{d(off)}$	—	247	—	ns	
Fall time	$t_f$	—	186	—	ns	
Body-drain diode forward voltage	$V_{DF}$	—	-0.91	-1.19	V	$I_F = -30 \text{ A}, V_{GS} = 0$ <sup>Note4</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	185	—	ns	$I_F = -30 \text{ A}, V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$

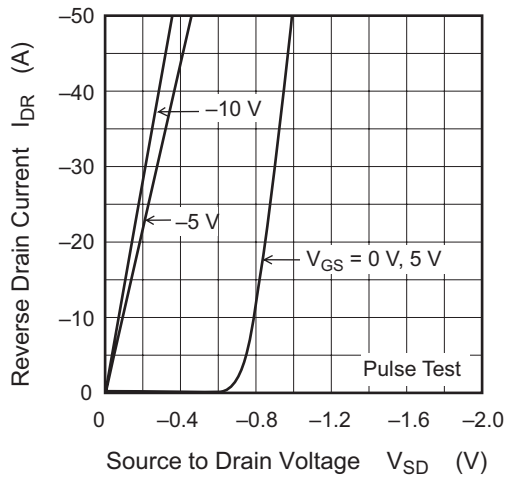
Notes: 4. Pulse test

### Main Characteristics

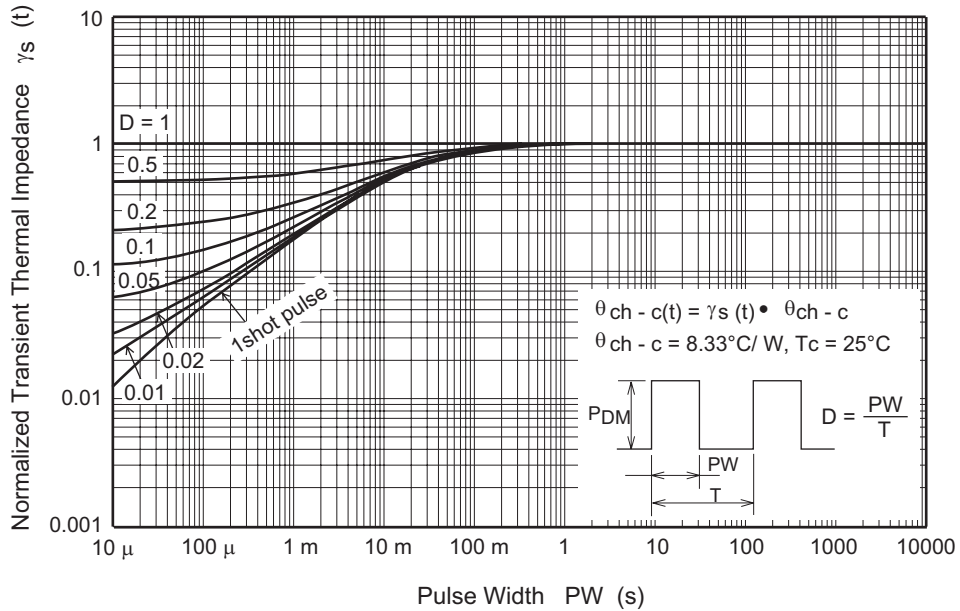




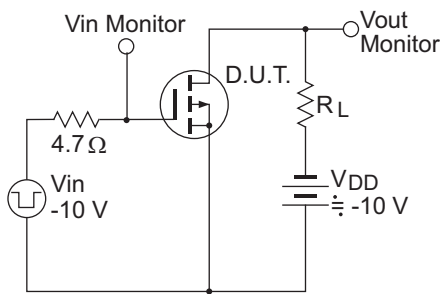
Reverse Drain Current vs. Source to Drain Voltage



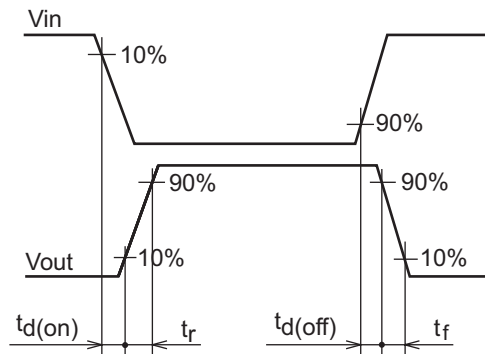
Normalized Transient Thermal Impedance vs. Pulse Width



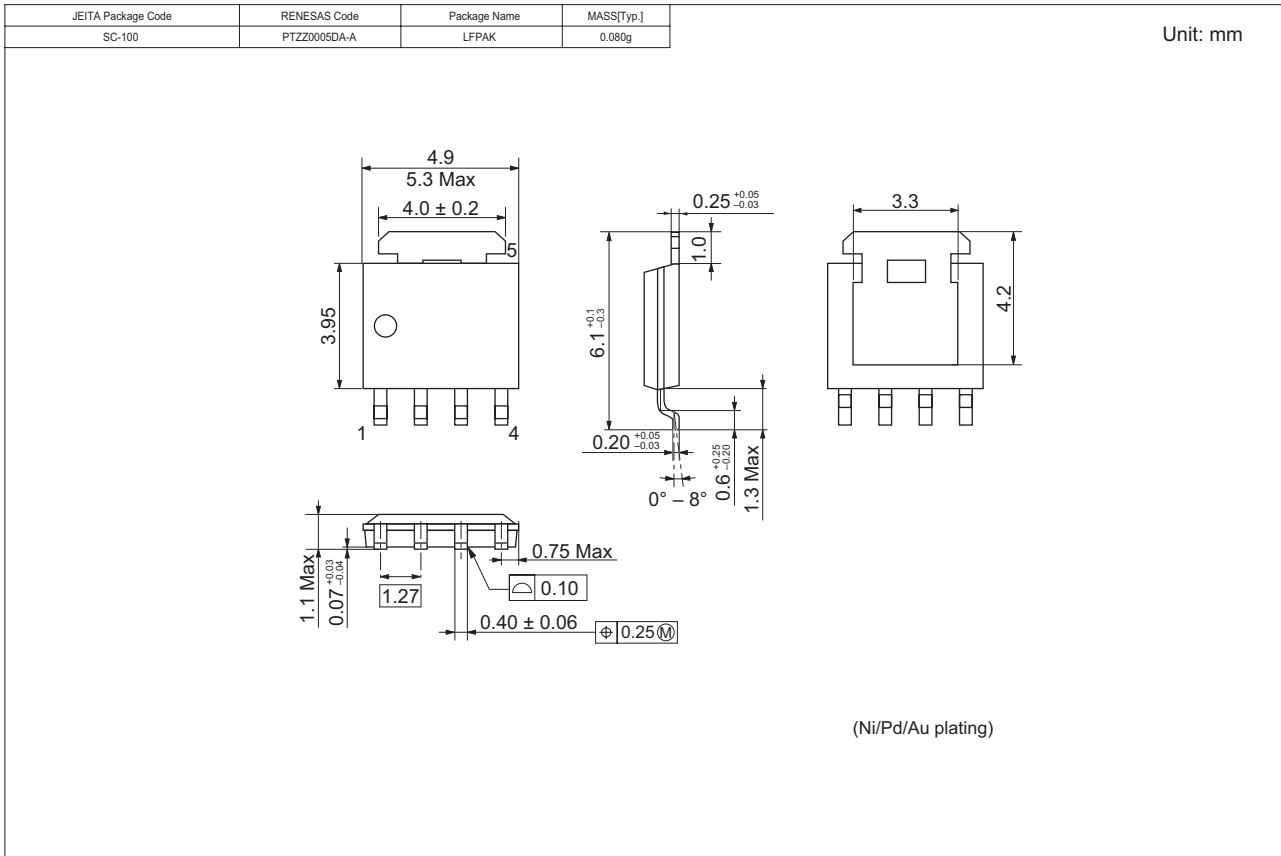
Switching Time Test Circuit



Waveform



### Package Dimensions



### Ordering Information

Part Name	Quantity	Shipping Container
HAT1139H-EL-E	2500 pcs	Taping

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