

# HAT1139H

## Silicon P Channel Power MOS FET Power Switching

REJ03G1244-0200

Rev.2.00

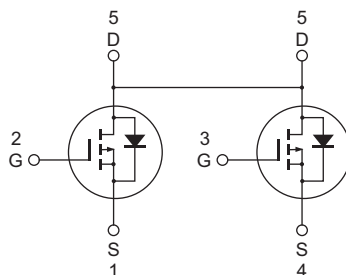
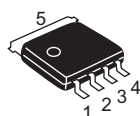
Jun.22.2005

### Features

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

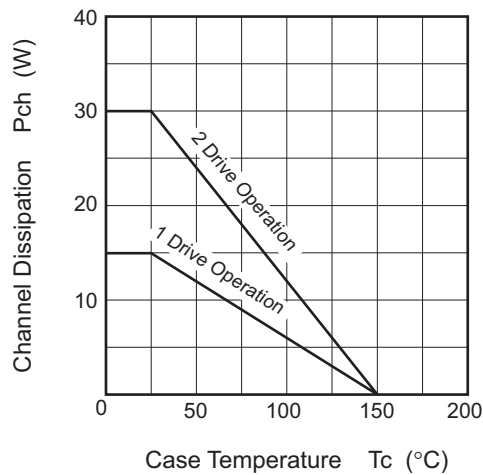
(Ta = 25°C)

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	$I_F = -30 \text{ A}$ , $V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$

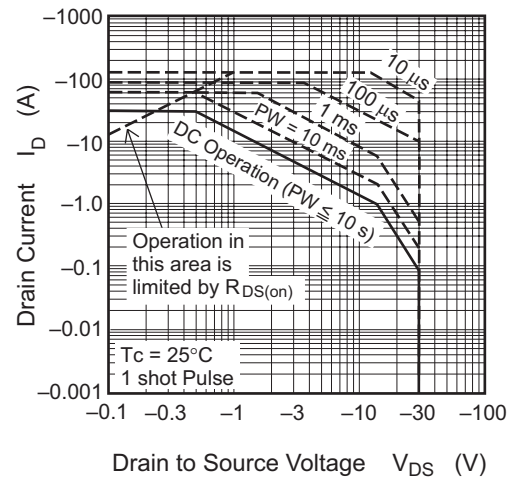
Notes: 4. Pulse test

## Main Characteristics

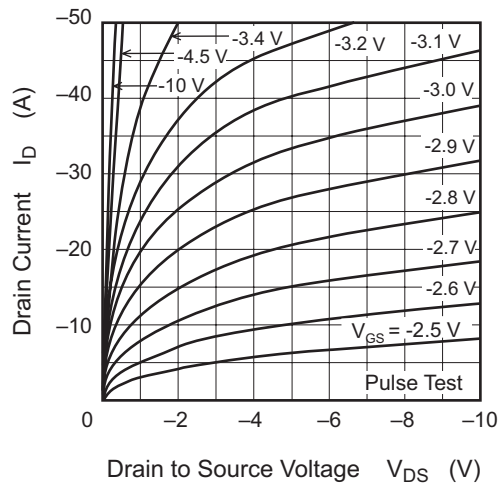
Power vs. Temperature Derating



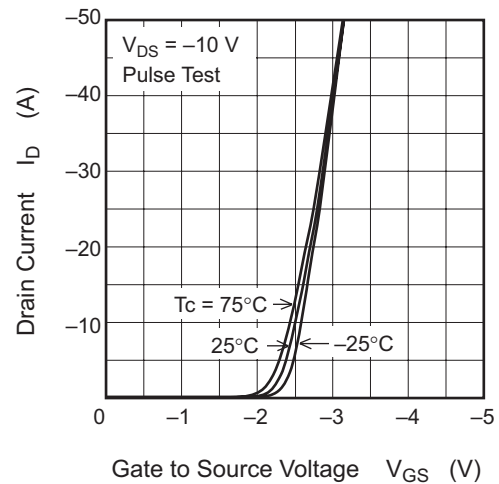
Maximum Safe Operation Area



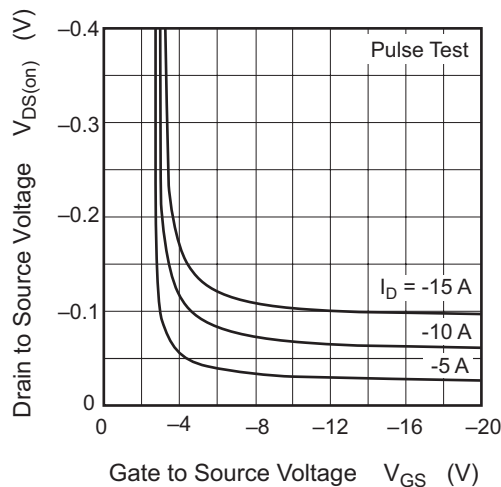
Typical Output Characteristics



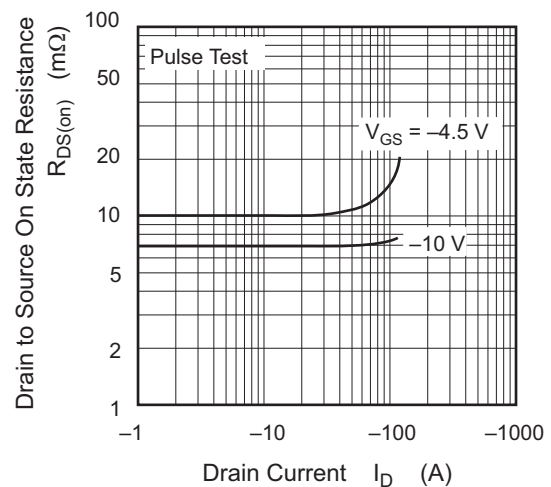
Typical Transfer Characteristics

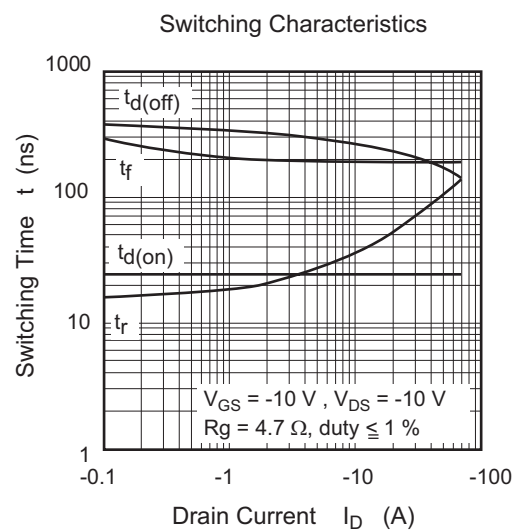
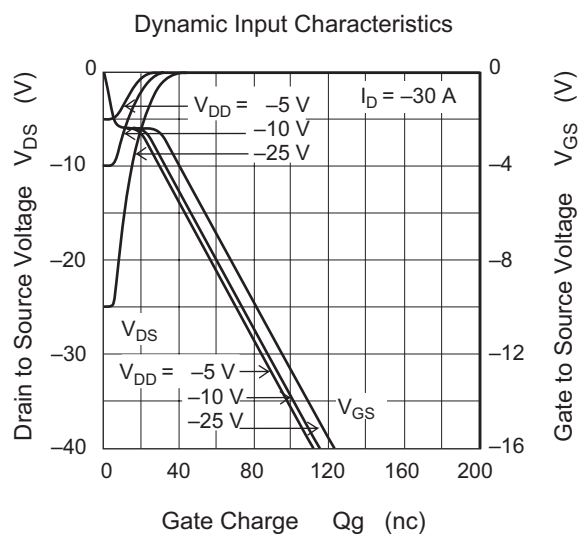
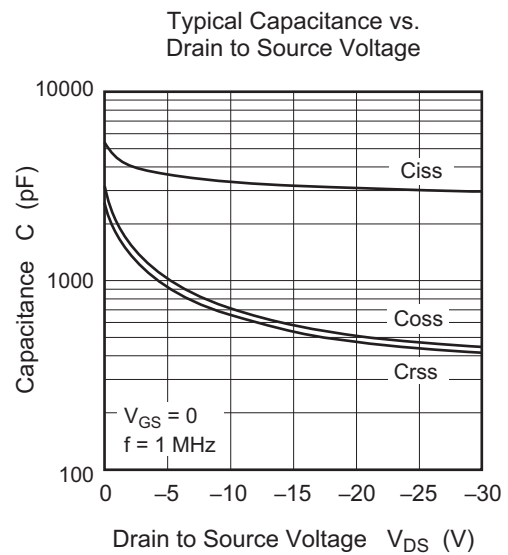
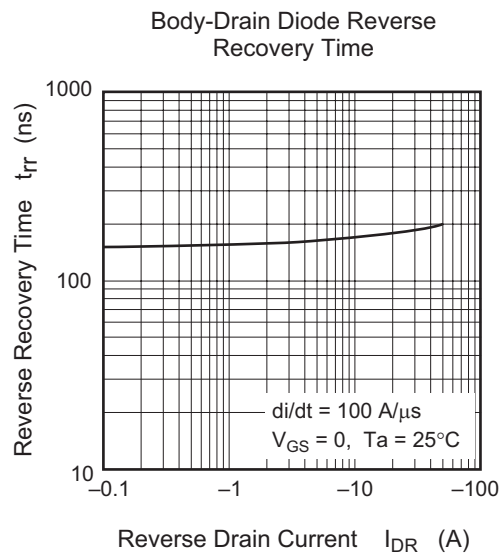
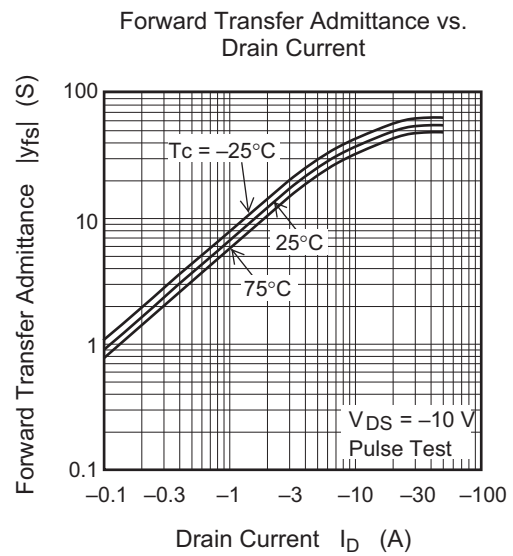
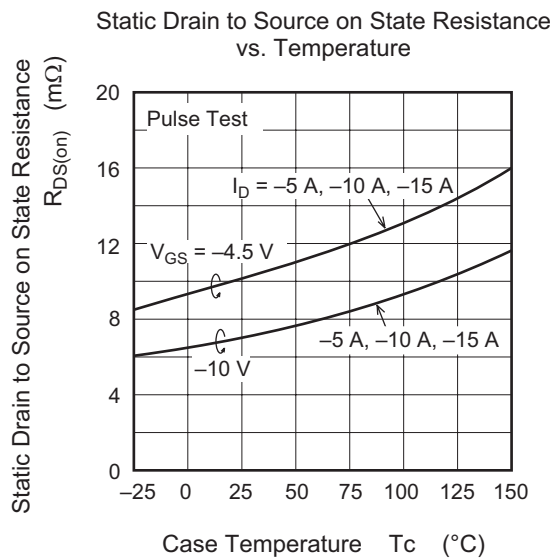


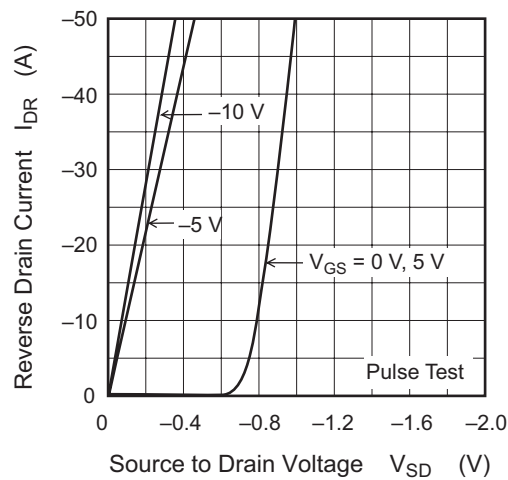
Drain to Source Saturation Voltage vs. Gate to Source Voltage



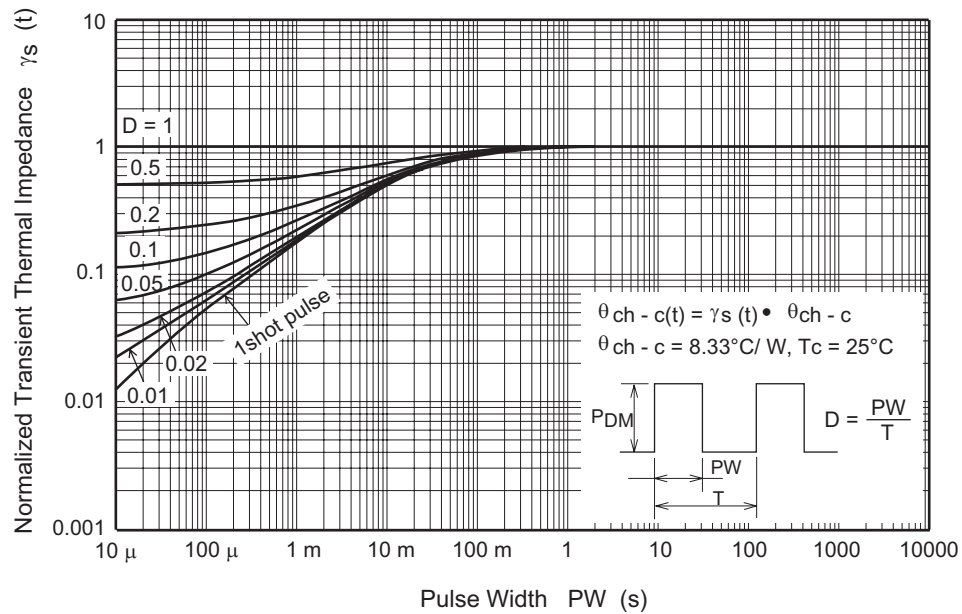
Static Drain to Source on State Resistance vs. Drain Current



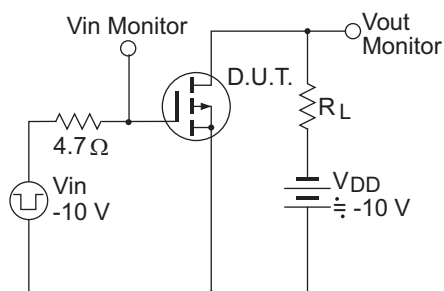


Reverse Drain Current vs.  
Source to Drain Voltage

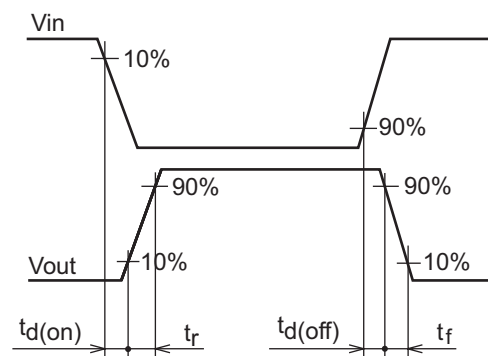
Normalized Transient Thermal Impedance vs. Pulse Width



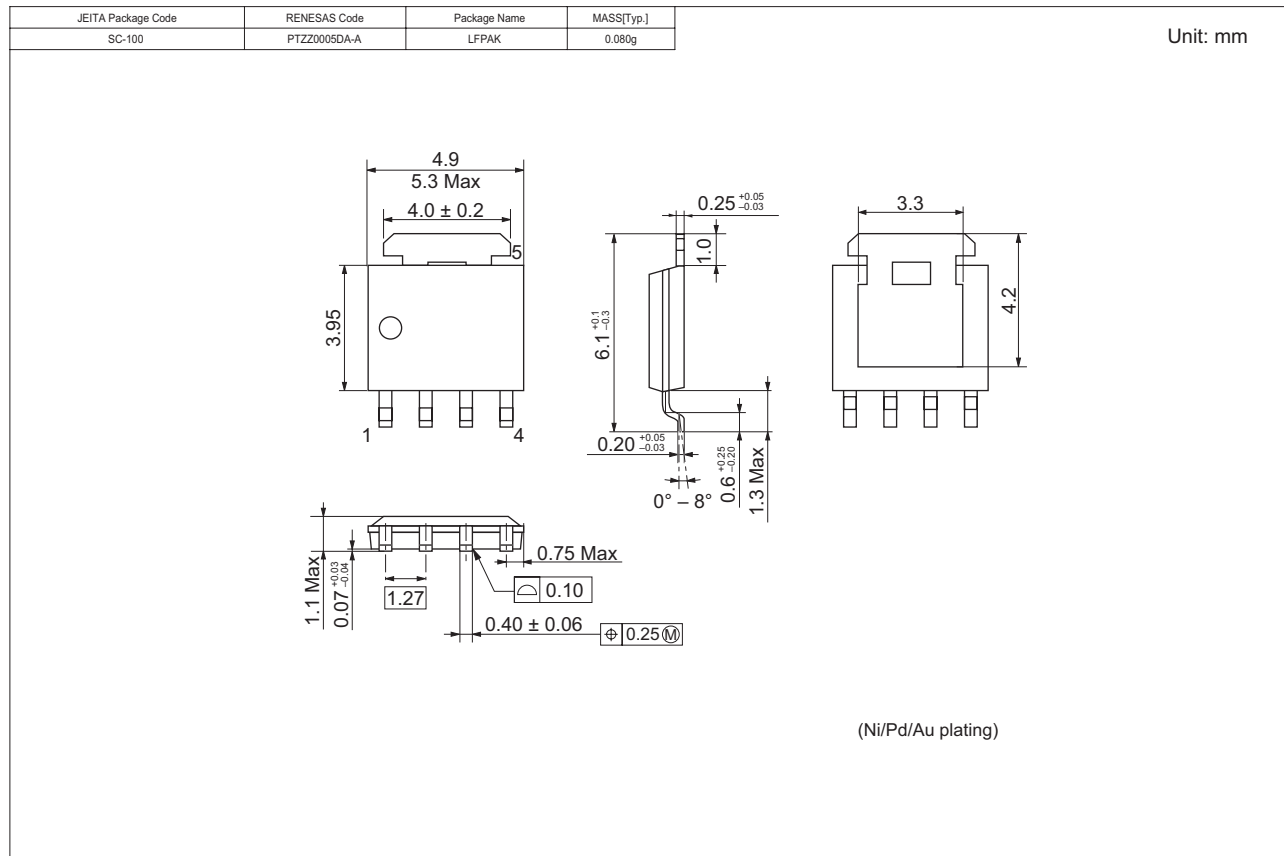
Switching Time Test Circuit



Waveform



## Package Dimensions



## Ordering Information

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

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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