



# HAF2007(L), HAF2007(S)

## Silicon N Channel MOS FET Series Power Switching

REJ03G1137-0400  
(Previous: ADE-208-706B)  
Rev.4.00  
Sep 07, 2005

### Description

This FET has the over temperature shut-down capability sensing to the junction temperature.

This FET has the built-in over temperature shut-down circuit in the gate area. And this circuit operation to shut-down the gate voltage in case of high junction temperature like applying over power consumption, over current etc.

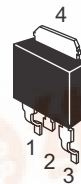
### Features

- Logic level operation (4 to 6 V Gate drive)
- High endurance capability against to the short circuit
- Built-in the over temperature shut-down circuit
- Latch type shut-down operation (Need 0 voltage recovery)

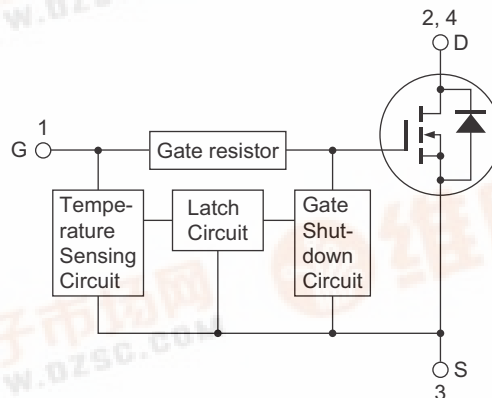
### Outline

RENESAS Package code: PRSS0004ZD-B  
(Package name: DPAK (L)-(2) )

RENESAS Package code: PRSS0004ZD-C  
(Package name: DPAK (S) )



1. Gate
2. Drain
3. Source
4. Drain



## Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V <sub>DSS</sub>	60	V
Gate to source voltage	V <sub>GSS</sub>	16	V
	V <sub>GSS</sub>	-2.5	V
Drain current	I <sub>D</sub>	5	A
Drain peak current	I <sub>D (pulse)</sub> <sup>Note 1</sup>	10	A
Body-drain diode reverse drain current	I <sub>DR</sub>	5	A
Channel dissipation	P <sub>ch</sub> <sup>Note 2</sup>	20	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. Value at T<sub>c</sub> = 25°C

## Typical Operation Characteristics

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input voltage	V <sub>IH</sub>	3.5	—	—	V	
	V <sub>IL</sub>	—	—	1.2	V	
Input current (Gate non shut down)	I <sub>IH1</sub>	—	—	100	μA	V <sub>i</sub> = 8 V, V <sub>DS</sub> = 0
	I <sub>IH2</sub>	—	—	50	μA	V <sub>i</sub> = 3.5 V, V <sub>DS</sub> = 0
	I <sub>IL</sub>	—	—	1	μA	V <sub>i</sub> = 1.2 V, V <sub>DS</sub> = 0
Input current (Gate shut down)	I <sub>IH (sd) 1</sub>	—	0.8	—	mA	V <sub>i</sub> = 8 V, V <sub>DS</sub> = 0
	I <sub>IH (sd) 2</sub>	—	0.35	—	mA	V <sub>i</sub> = 3.5 V, V <sub>DS</sub> = 0
Shut down temperature	T <sub>sd</sub>	—	175	—	°C	Channel temperature
Gate operation voltage	V <sub>OP</sub>	3.5	—	12	V	

## Electrical Characteristics

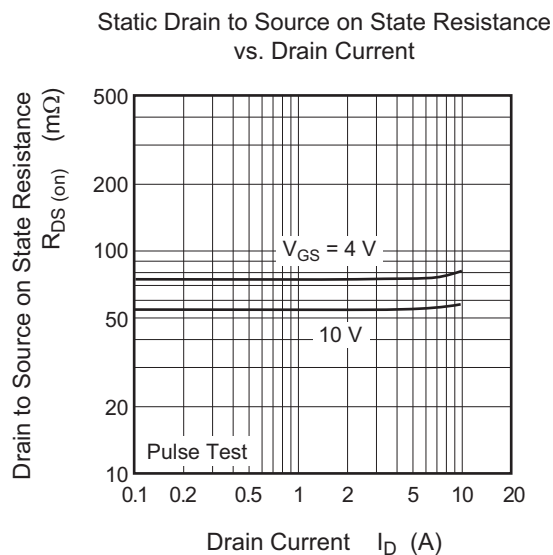
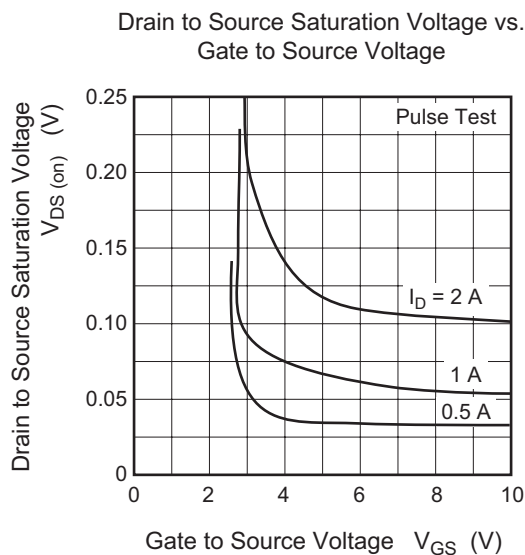
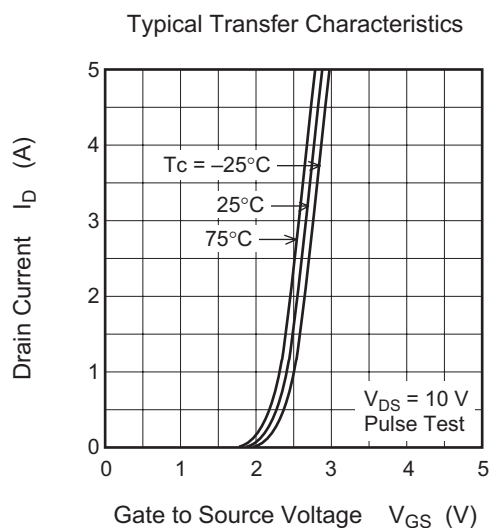
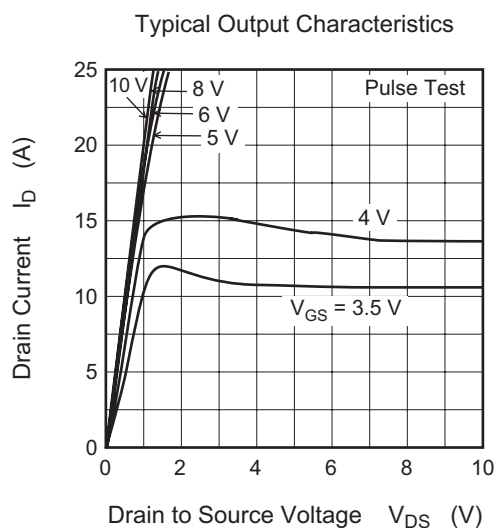
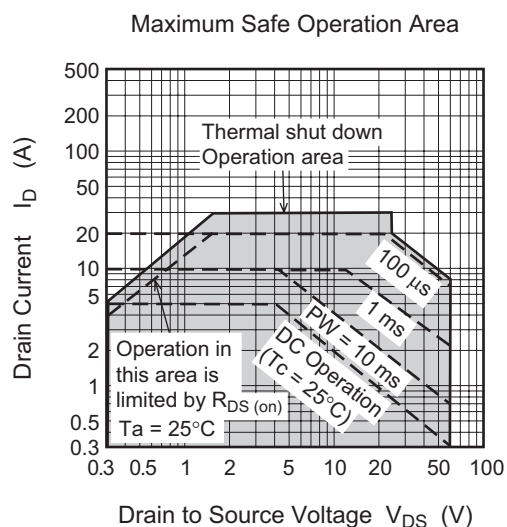
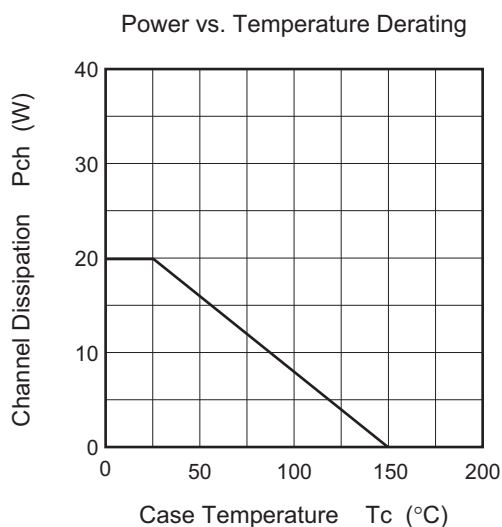
(Ta = 25°C)

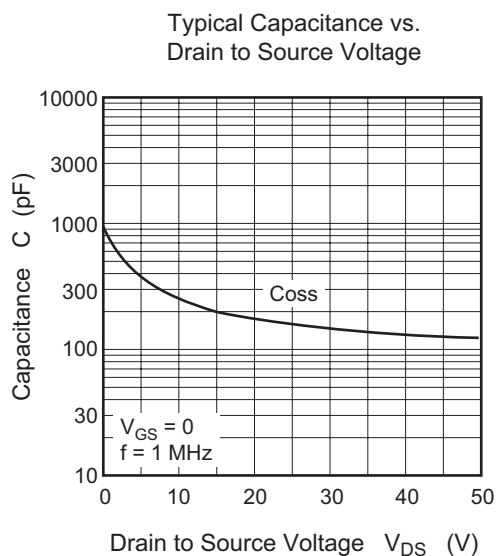
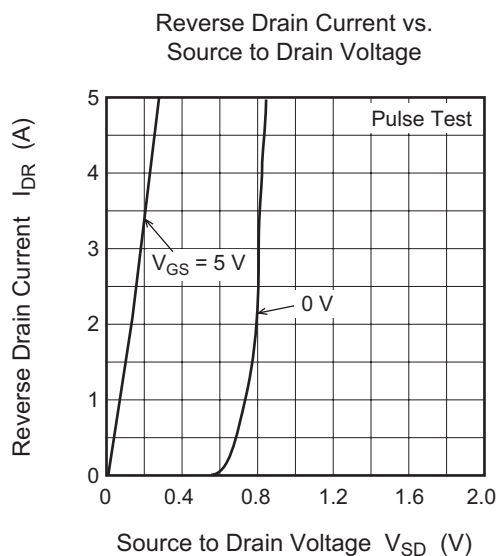
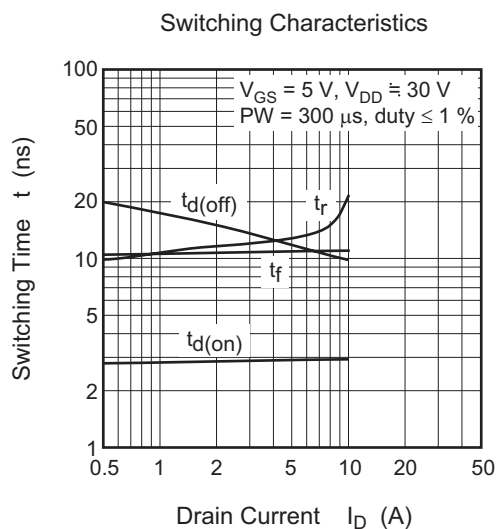
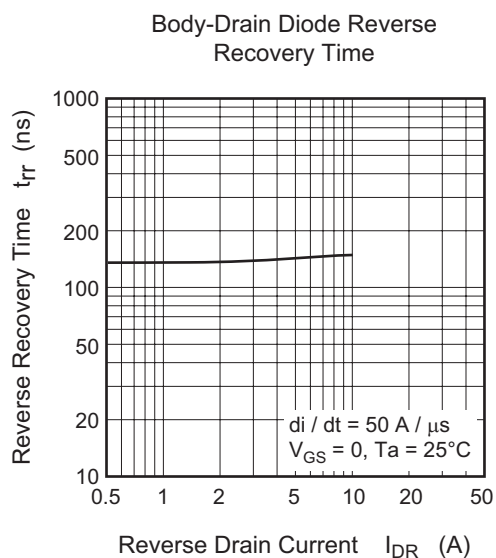
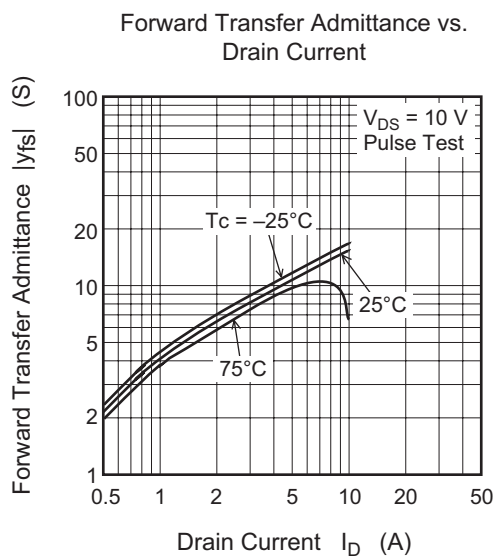
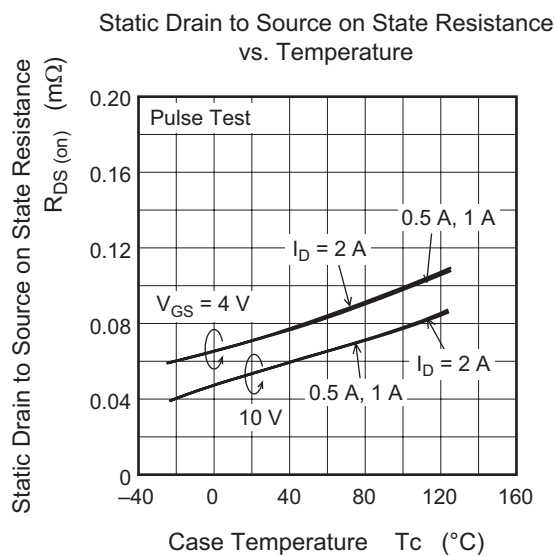
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	$I_{D1}$	4	—	—	A	$V_{GS} = 3.5 \text{ V}$ , $V_{DS} = 2 \text{ V}$
	$I_{D2}$	—	—	10	mA	$V_{GS} = 1.2 \text{ V}$ , $V_{DS} = 2 \text{ V}$
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	16	—	—	V	$I_G = 300 \mu\text{A}$ , $V_{DS} = 0$
	$V_{(BR)GSS}$	-2.5	—	—	V	$I_G = -100 \mu\text{A}$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS1}$	—	—	100	$\mu\text{A}$	$V_{GS} = 8 \text{ V}$ , $V_{DS} = 0$
	$I_{GSS2}$	—	—	50	$\mu\text{A}$	$V_{GS} = 3.5 \text{ V}$ , $V_{DS} = 0$
	$I_{GSS3}$	—	—	1	$\mu\text{A}$	$V_{GS} = 1.2 \text{ V}$ , $V_{DS} = 0$
	$I_{GSS4}$	—	—	-100	$\mu\text{A}$	$V_{GS} = -2.4 \text{ V}$ , $V_{DS} = 0$
Input current (shut down)	$I_{GS (op) 1}$	—	0.8	—	mA	$V_{GS} = 8 \text{ V}$ , $V_{DS} = 0$
	$I_{GS (op) 2}$	—	0.35	—	mA	$V_{GS} = 3.5 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	$\mu\text{A}$	$V_{DS} = 60 \text{ V}$ , $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS (off)}$	1.0	—	2.25	V	$I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	4	7.5	—	S	$I_D = 2.5 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note 3</sup>
Static drain to source on state resistance	$R_{DS (on)}$	—	73	120	$\text{m}\Omega$	$I_D = 2.5 \text{ A}$ , $V_{GS} = 4 \text{ V}$ <sup>Note 3</sup>
	$R_{DS (on)}$	—	55	75	$\text{m}\Omega$	$I_D = 2.5 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note 3</sup>
Output capacitance	$C_{oss}$	—	270	—	pF	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ $f = 1 \text{ MHz}$
Turn-on delay time	$t_{d (on)}$	—	2.8	—	$\mu\text{s}$	$I_D = 2.5 \text{ A}$ $V_{GS} = 5 \text{ V}$ $R_L = 12 \Omega$
Rise time	$t_r$	—	12.4	—	$\mu\text{s}$	
Turn-off delay time	$t_{d (off)}$	—	15	—	$\mu\text{s}$	
Fall time	$t_f$	—	11	—	$\mu\text{s}$	
Body-drain diode forward voltage	$V_{DF}$	—	0.9	—	V	$I_F = 5 \text{ A}$ , $V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	140	—	ns	$I_F = 5 \text{ A}$ , $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu\text{s}$
Over load shut down operation time <sup>Note4</sup>	$t_{os1}$	—	1.1	—	ms	$V_{GS} = 5 \text{ V}$ , $V_{DD} = 16 \text{ V}$
	$t_{os2}$	—	0.57	—	ms	$V_{GS} = 5 \text{ V}$ , $V_{DD} = 24 \text{ V}$

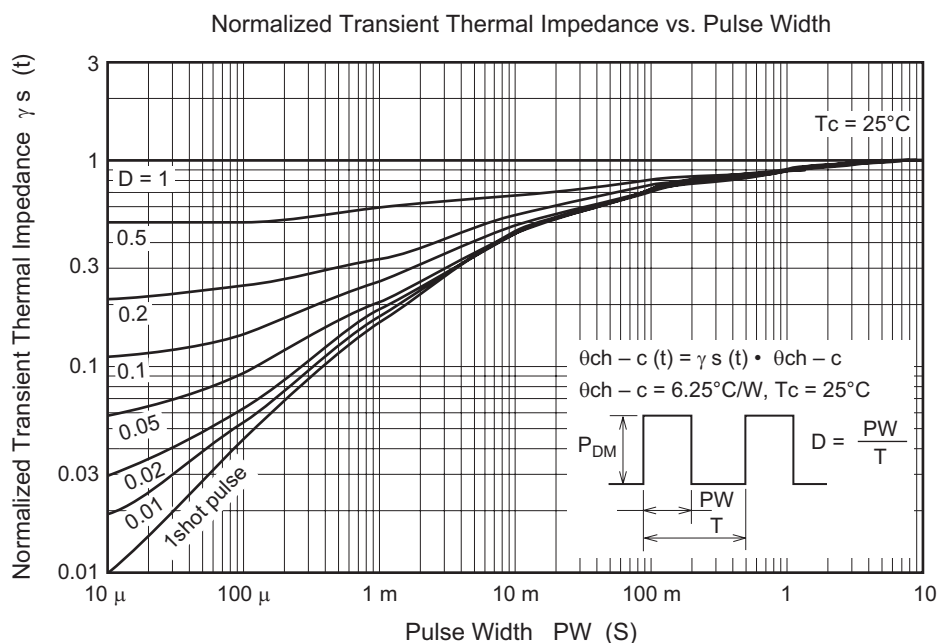
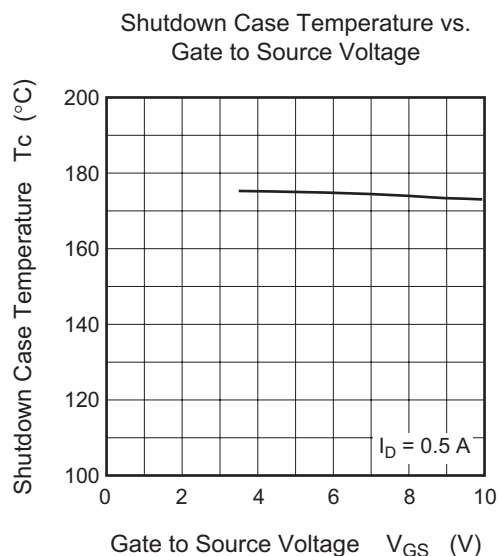
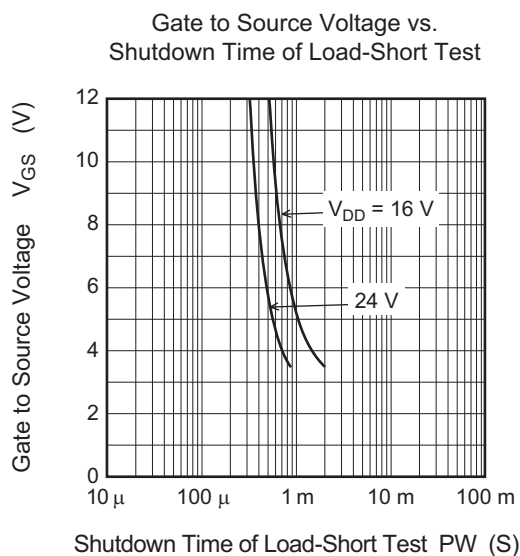
Notes: 3. Pulse test

4. Including the junction temperature rise of the over loaded condition.

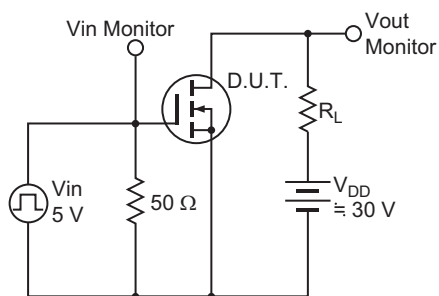
## Main Characteristics



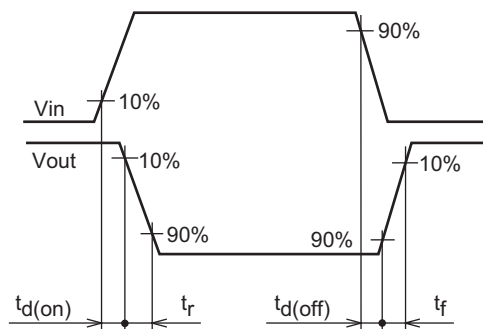




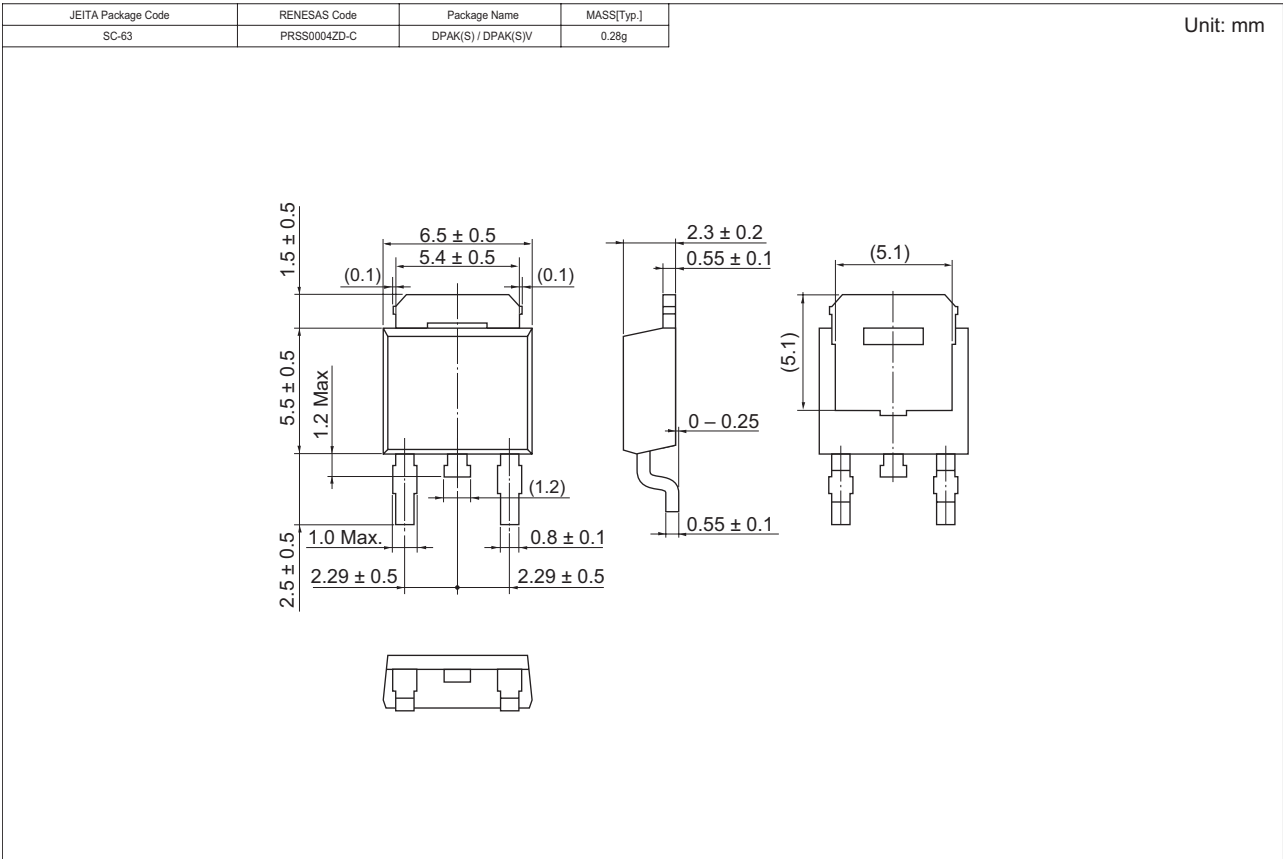
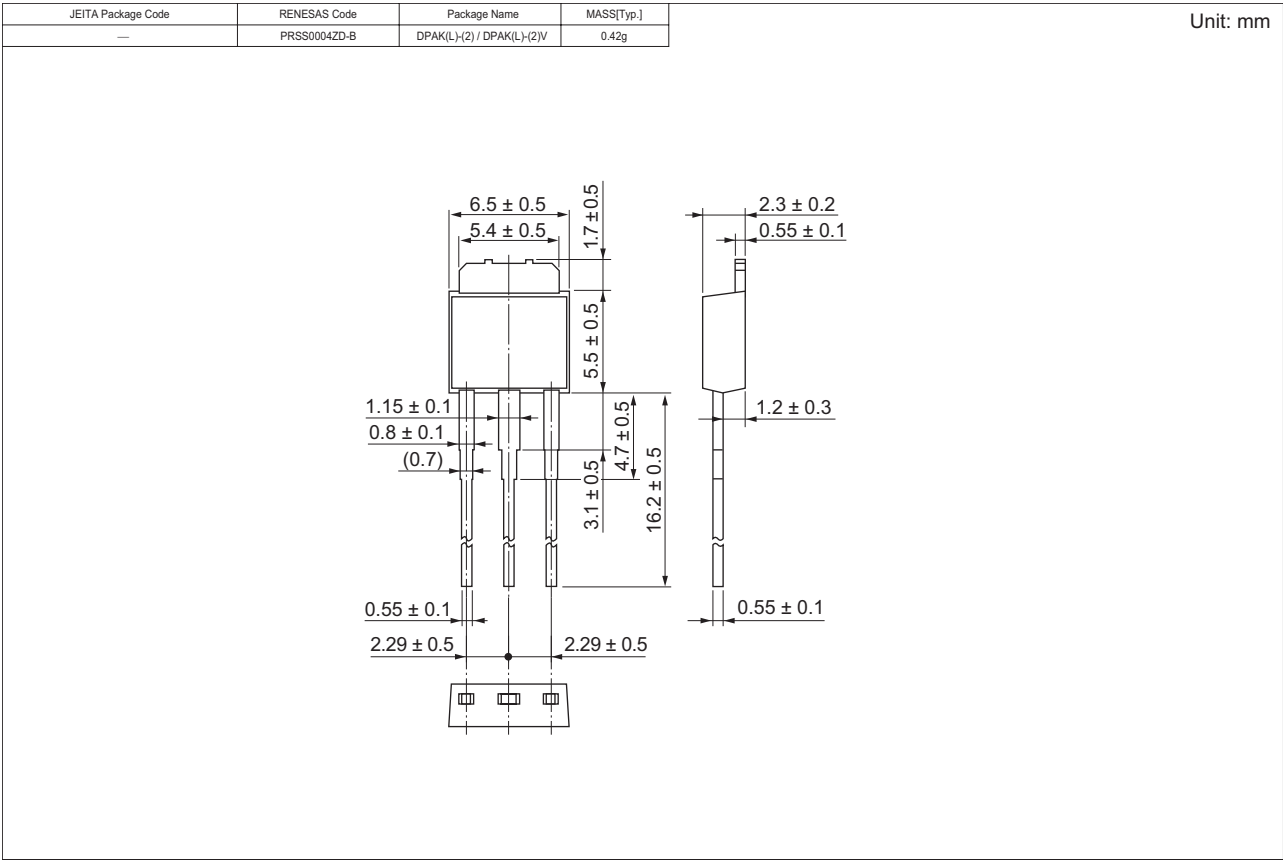
Switching Time Test Circuit



Waveform



Package Dimensions



## HAF2007(L), HAF2007(S)

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### Ordering Information

Part Name	Quantity	Shipping Container
HAF2007-90L	Max: 100 pcs/sack	Sack
HAF2007-90S	Max: 100 pcs/sack	Sack
HAF2007-90STL	3000 pcs/Reel	Embossed tape
HAF2007-90STR	3000 pcs/Reel	Embossed tape

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