

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.

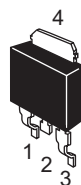
Features

- 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)

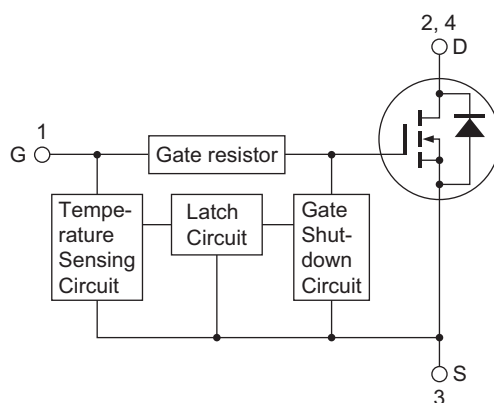
Outline

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 _{DSS}	60	V
Gate to source voltage	V _{GSS}	16	V
	V _{GSS}	-2.5	V
Drain current	I _D	5	A
Drain peak current	I _{D (pulse)} ^{Note 1}	10	A
Body-drain diode reverse drain current	I _{DR}	5	A
Channel dissipation	P _{ch} ^{Note 2}	20	W
Channel temperature	T _{ch}	150	°C
Storage temperature	T _{stg}	-55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%

2. Value at Tc = 25°C

Typical Operation Characteristics

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

Electrical Characteristics

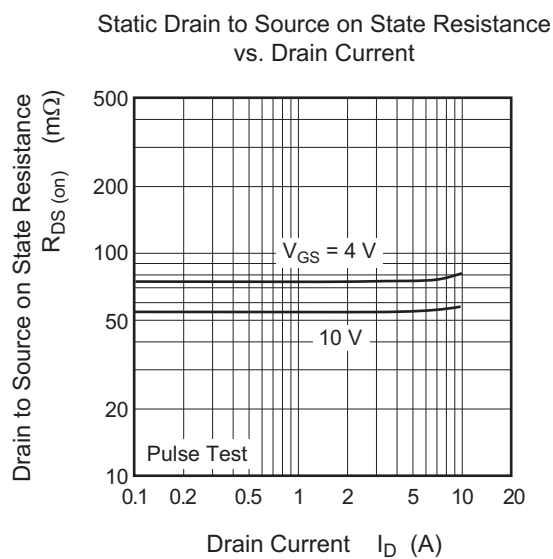
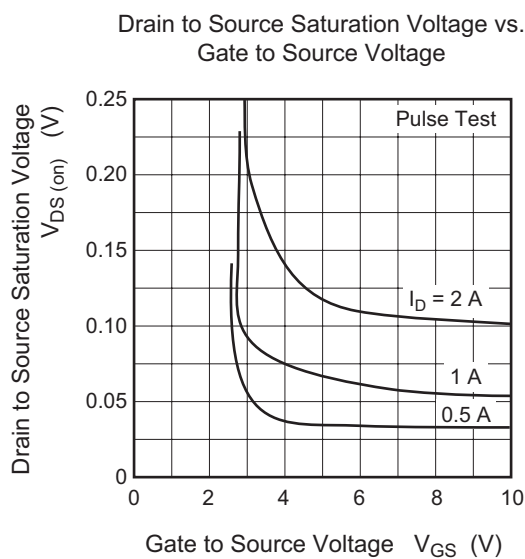
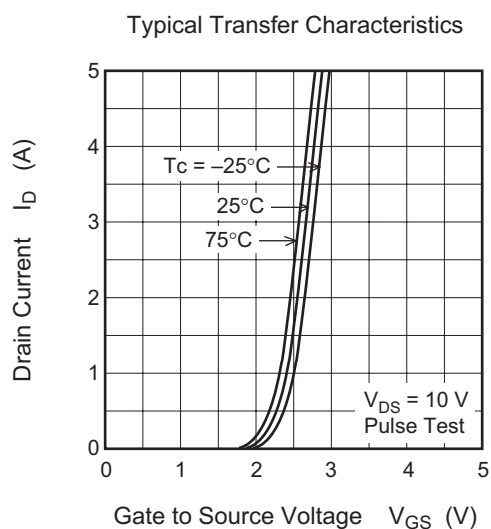
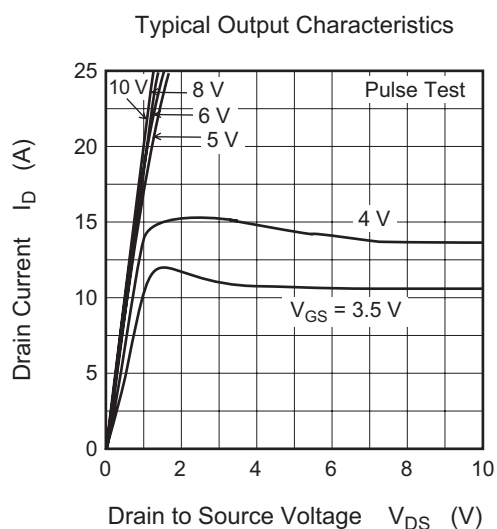
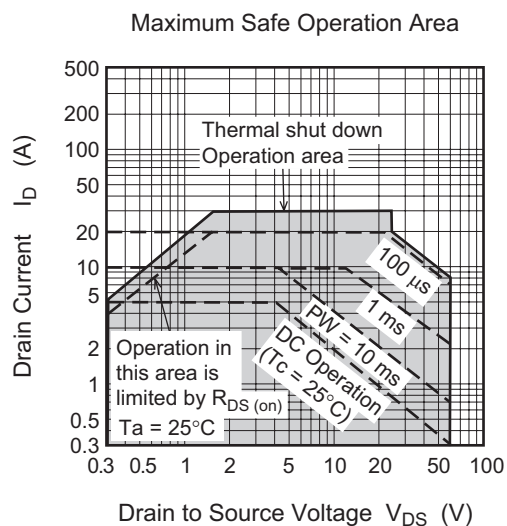
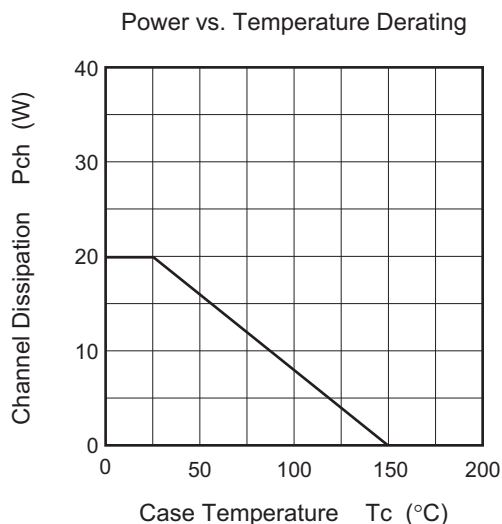
(Ta = 25°C)

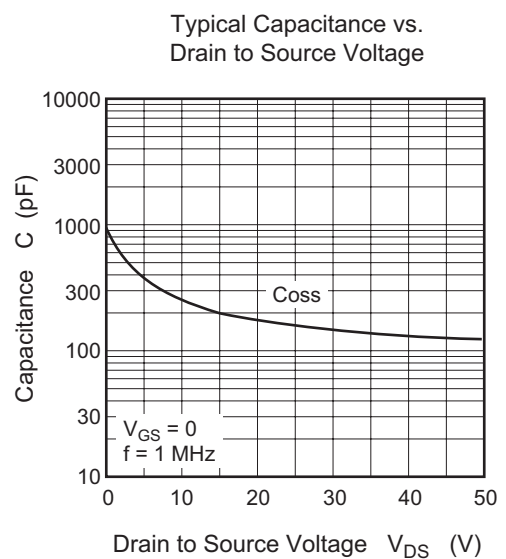
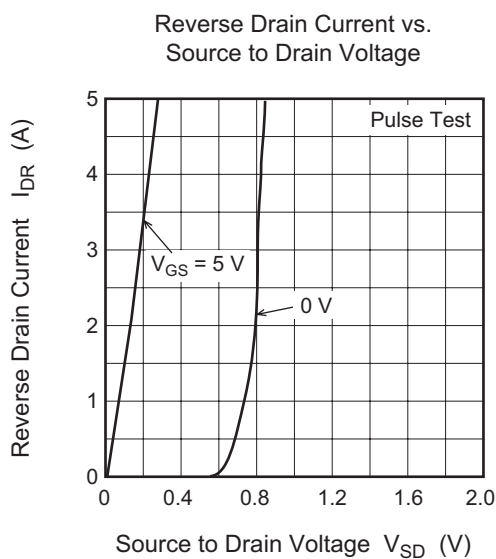
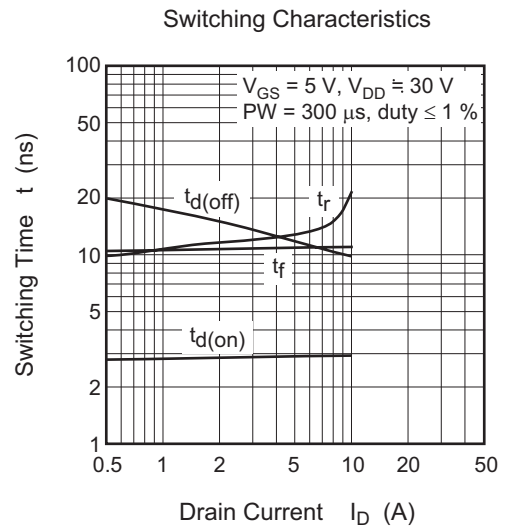
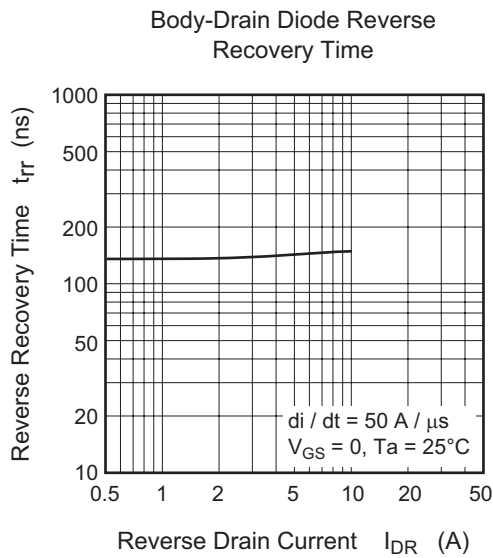
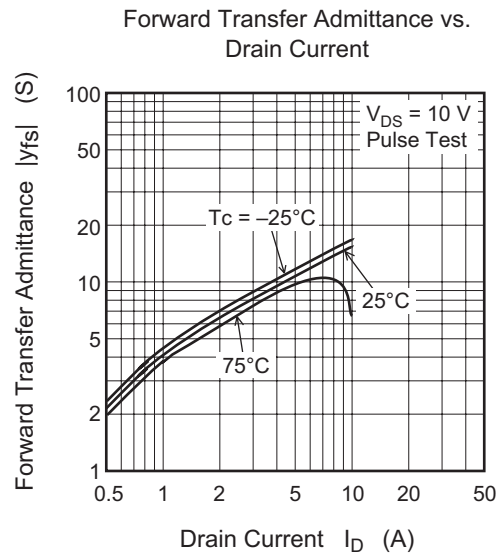
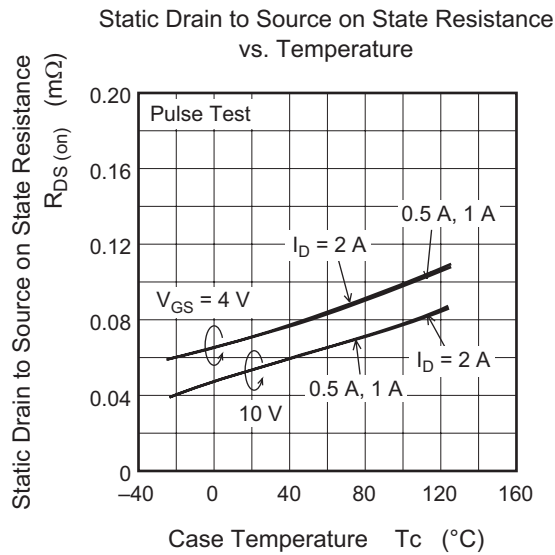
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	4	—	—	A	$V_{GS} = 3.5 \text{ V}$, $V_{DS} = 2 \text{ V}$
	I_{D2}	—	—	10	mA	$V_{GS} = 1.2 \text{ V}$, $V_{DS} = 2 \text{ V}$
Drain to source breakdown voltage	$V_{(BR) DSS}$	60	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown 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	μA	$V_{GS} = 8 \text{ V}$, $V_{DS} = 0$
	I_{GSS2}	—	—	50	μA	$V_{GS} = 3.5 \text{ V}$, $V_{DS} = 0$
	I_{GSS3}	—	—	1	μA	$V_{GS} = 1.2 \text{ V}$, $V_{DS} = 0$
	I_{GSS4}	—	—	-100	μA	$V_{GS} = -2.4 \text{ V}$, $V_{DS} = 0$
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	μA	$V_{DS} = 60 \text{ V}$, $V_{GS} = 0$
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	$I_D = 2.5 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 3}
Static drain to source on state resistance	$R_{DS (on)}$	—	73	120	m Ω	$I_D = 2.5 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note 3}
	$R_{DS (on)}$	—	55	75	m Ω	$I_D = 2.5 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 3}
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	—	μs	$I_D = 2.5 \text{ A}$ $V_{GS} = 5 \text{ V}$ $R_L = 12 \Omega$
Rise time	t_r	—	12.4	—	μs	
Turn-off delay time	$t_{d (off)}$	—	15	—	μs	
Fall time	t_f	—	11	—	μs	
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 ^{Note4}	t_{os1}	—	1.1	—	ms	$V_{GS} = 5 \text{ V}$, $V_{DD} = 16 \text{ V}$
	t_{os2}	—	0.57	—	ms	$V_{GS} = 5 \text{ V}$, $V_{DD} = 24 \text{ V}$

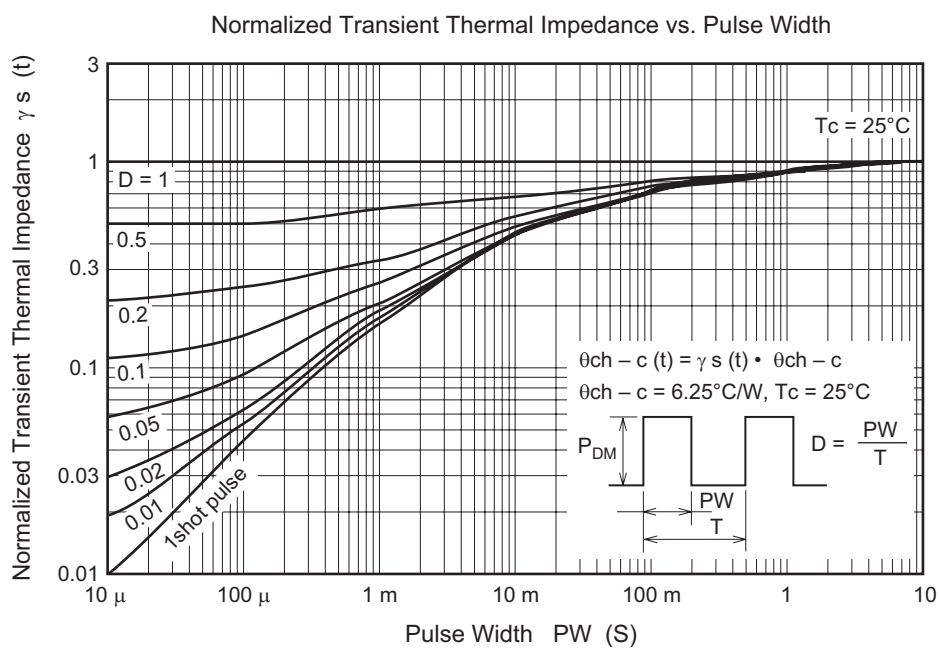
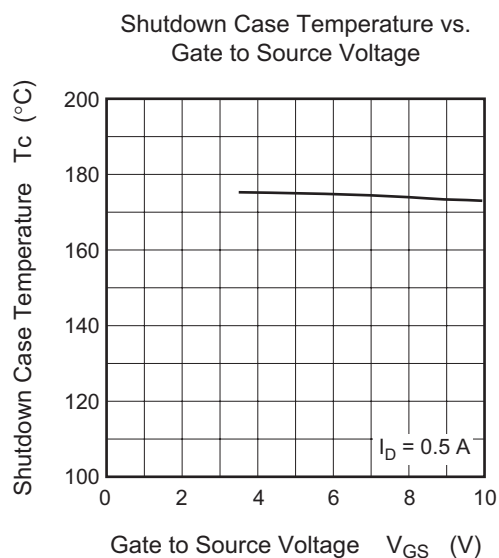
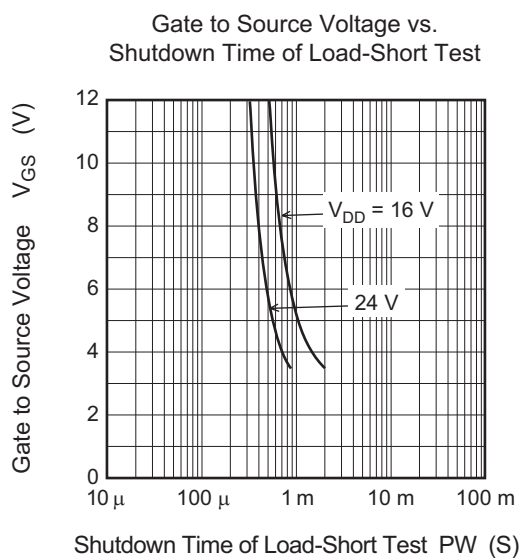
Notes: 3. Pulse test

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

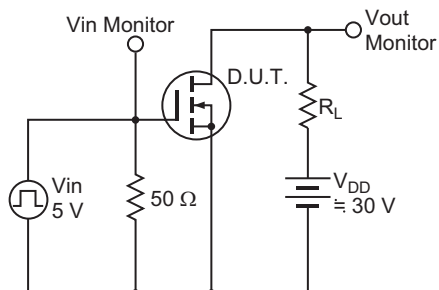
Main Characteristics



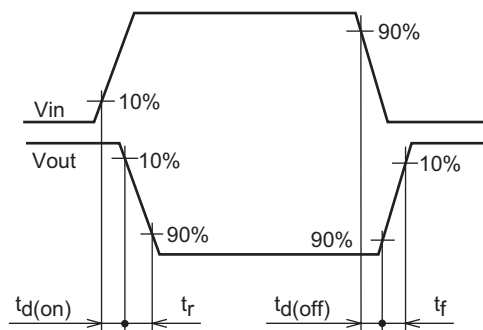




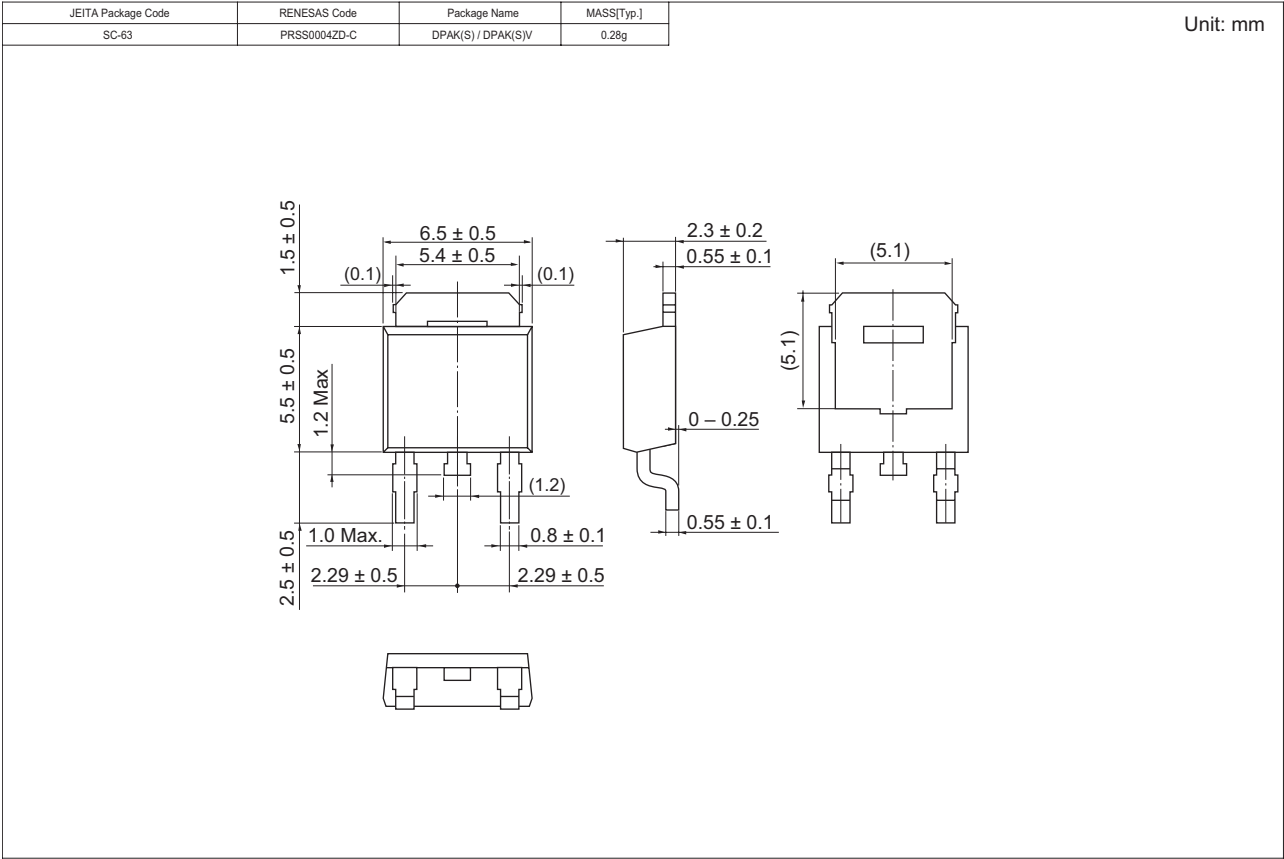
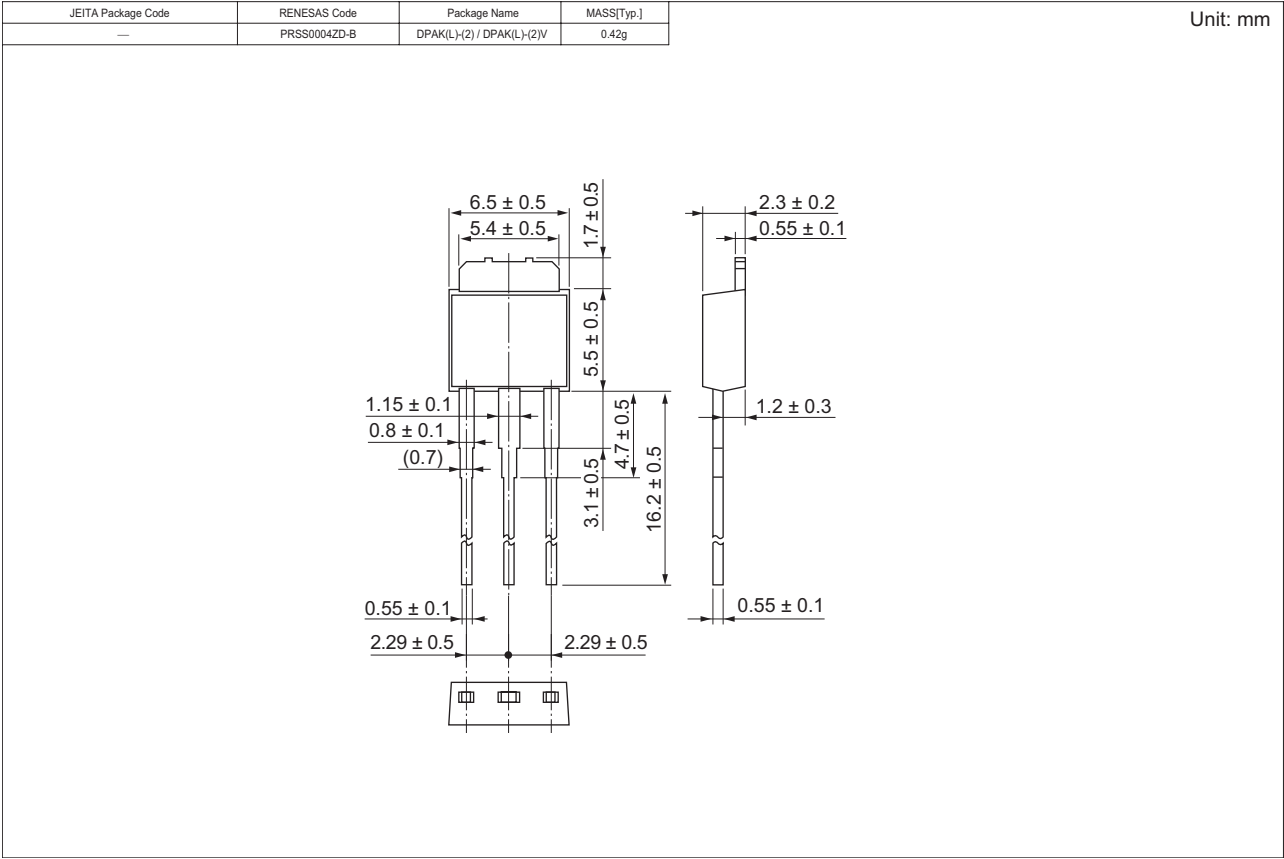
Switching Time Test Circuit



Waveform



Package Dimensions



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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