

HAF1010RJ

Silicon P Channel MOS FET Series Power Switching

REJ03G0573-0100

Rev.1.00

Mar.03.2005

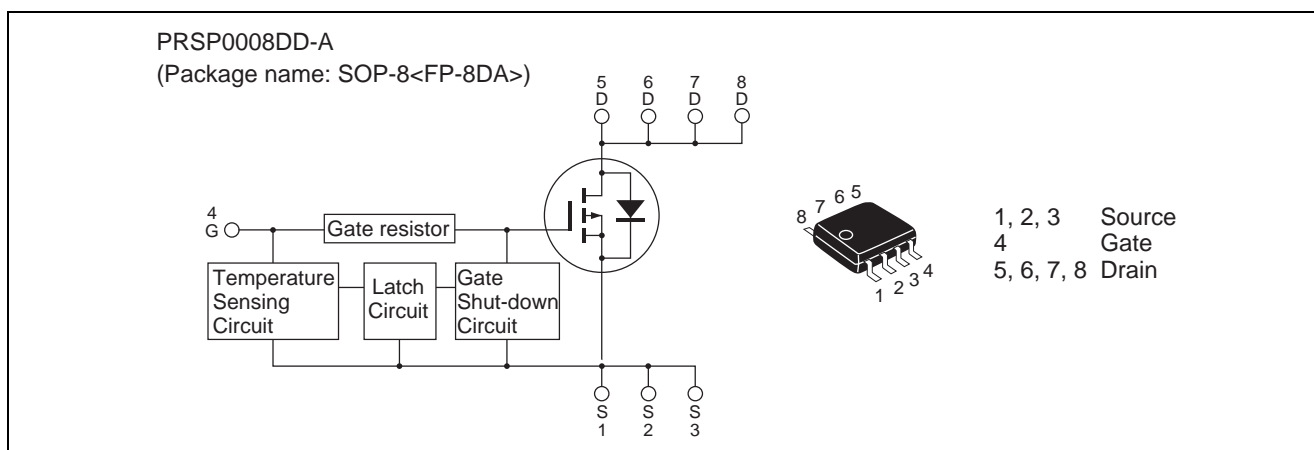
Description

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 to (–4 to –6 V Gate drive)
- Built-in the over temperature shut-down circuit
- High endurance capability against to the shut-down circuit
- Latch type shut down operation (need 0 voltage recovery)
- High density mounting

Outline



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	–60	V
Gate to source voltage	V_{GS}	–16	V
Gate to source voltage	V_{GS}	2.5	V
Drain current	I_D	–5	A
Drain peak current	$I_{D(pulse)}$ ^{Note1}	–10	A
Body-drain diode reverse drain current	I_{DR}	–5	A
Channel dissipation	P_{ch} ^{Note2}	2.5	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	–55 to +150	°C

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

2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10s$

Typical Operation Characteristics

(Ta = 25°C)

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 = -8V, V _{DS} = 0
	I _{IH2}	—	—	-50	μA	V _i = -3.5V, V _{DS} = 0
	I _{IL}	—	—	-1	μA	V _i = -1.2V, V _{DS} = 0
Input current (Gate shut down)	I _{IH(sd)1}	—	-0.8	—	mA	V _i = -8V, V _{DS} = 0
	I _{IH(sd)2}	—	-0.35	—	mA	V _i = -3.5V, V _{DS} = 0
Shut down temperature	T _{sd}	—	175	—	°C	Channel temperature
Gate operation voltage	V _{op}	-3.5	—	-12	V	

Electrical Characteristics

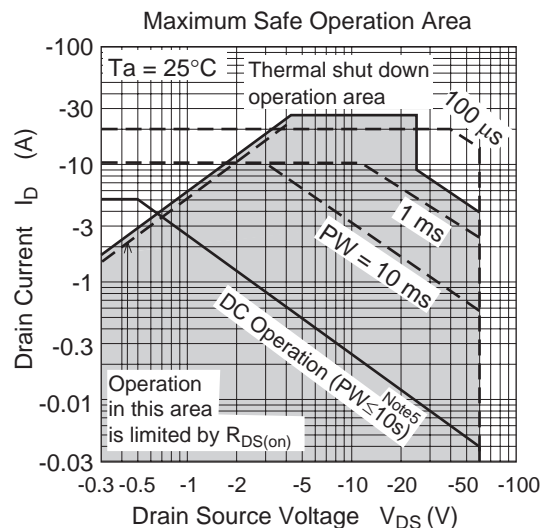
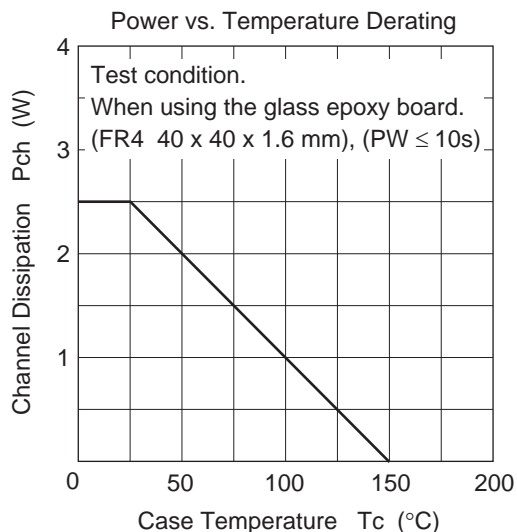
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I _{D1}	-1.5	—	—	A	V _{GS} = -3.5 V, V _{DS} = -2 V
Drain current	I _{D2}	—	—	-10	mA	V _{GS} = -1.2 V, V _{DS} = -2 V
Drain to source breakdown voltage	V _{(BR)DSS}	-60	—	—	V	I _D = -10 mA, V _{GS} = 0
Gate to source breakdown voltage	V _{(BR)GSS}	-16	—	—	V	I _G = -800 μA, V _{DS} = 0
Gate to source breakdown voltage	V _{(BR)GSS}	2.5	—	—	V	I _G = 100 μA, V _{DS} = 0
Gate to source leak current	I _{GSS1}	—	—	-100	μA	V _{GS} = -8 V, V _{DS} = 0
	I _{GSS2}	—	—	-50	μA	V _{GS} = -3.5 V, V _{DS} = 0
	I _{GSS3}	—	—	-1	μA	V _{GS} = -1.2 V, V _{DS} = 0
	I _{GSS4}	—	—	100	μA	V _{GS} = 2.4 V, V _{DS} = 0
Input current (shut down)	I _{GS(OP)1}	—	-0.8	—	mA	V _{GS} = -8 V, V _{DS} = 0
	I _{GS(OP)2}	—	-0.35	—	mA	V _{GS} = -3.5 V, V _{DS} = 0
Zero gate voltage drain current	I _{DSS}	—	—	-10	μA	V _{DS} = -60 V, V _{GS} = 0
Gate to source cut off voltage	V _{GS(off)}	-1.1	—	-2.25	V	V _{DS} = -10 V, I _D = -1 mA
Forward transfer admittance	y _{fs}	2	4	—	S	I _D = -2.5 A, V _{DS} = -10 V ^{note3}
Static drain to source on state resistance	R _{DS(on)}	—	200	340	mΩ	I _D = -2.5 A, V _{GS} = -4 V ^{note3}
	R _{DS(on)}	—	140	200	mΩ	I _D = -2.5 A, V _{GS} = -10 V ^{note3}
Output capacitance	C _{oss}	—	326	—	pF	V _{DS} = -10 V, V _{GS} = 0, f = 1 MHz
Turn-on delay time	t _{d(on)}	—	2	—	μs	V _{GS} = -5 V, I _D = -2.5 A, R _L = 12 Ω
Rise time	t _r	—	7.6	—	μs	
Turn off delay time	t _{d(off)}	—	3.2	—	μs	
Fall time	t _f	—	3.2	—	μs	
Body-drain diode forward voltage	V _{DF}	—	-0.9	—	V	I _F = -5 A, V _{GS} = 0
Body-drain diode reverse recovery time	t _{rr}	—	77	—	ns	I _F = -5 A, V _{GS} = 0 diF/dt = 50 A/μs
Over load shut down operation time ^{note4}	t _{os1}	—	4.4	—	ms	V _{GS} = -5 V, V _{DD} = -16 V
	t _{os2}	—	2	—	ms	V _{GS} = -5 V, V _{DD} = -24 V

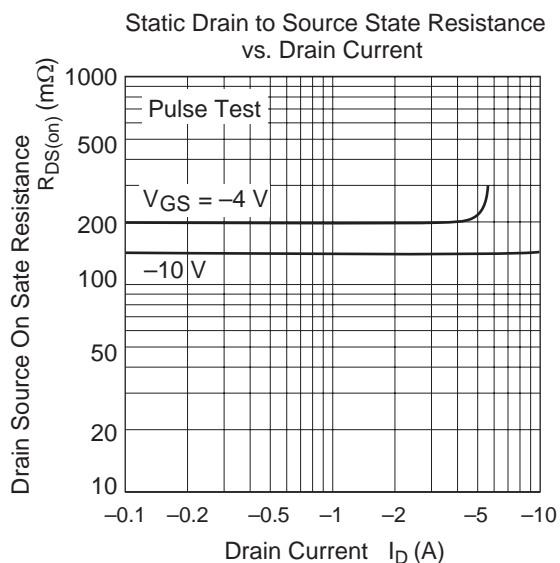
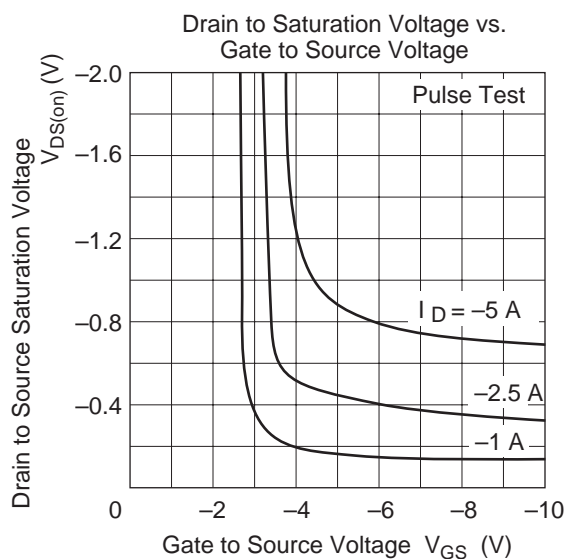
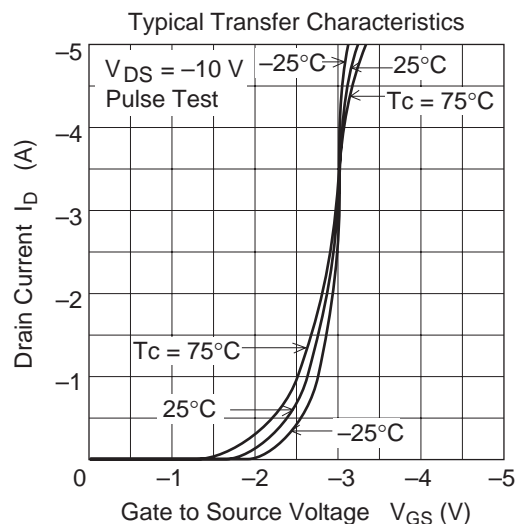
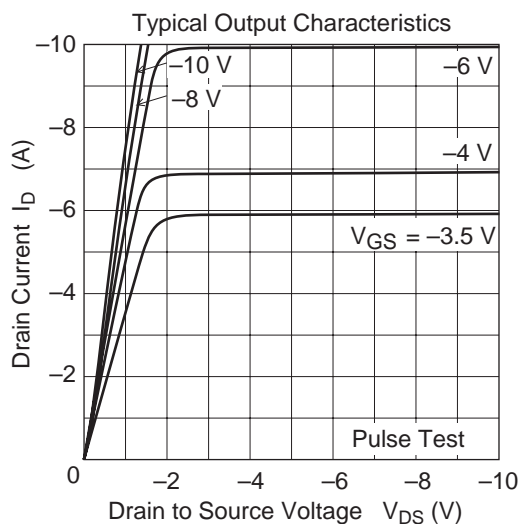
Notes: 3. Pulse test

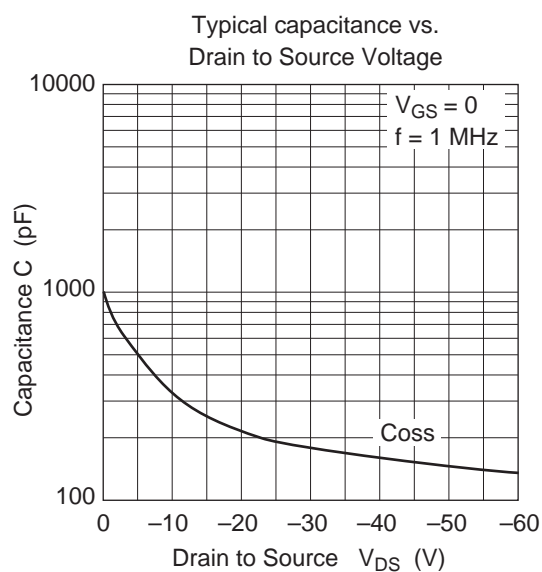
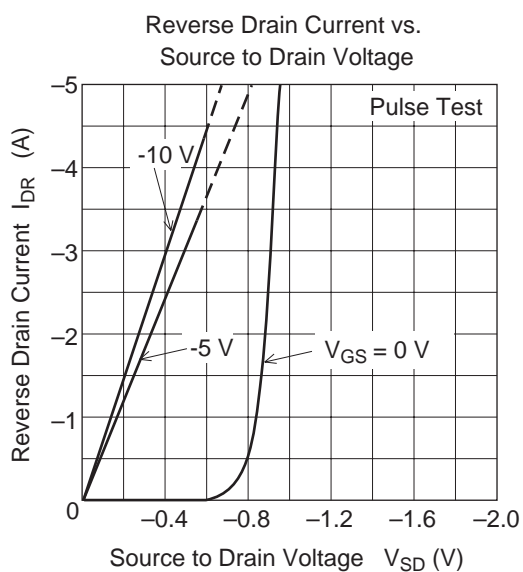
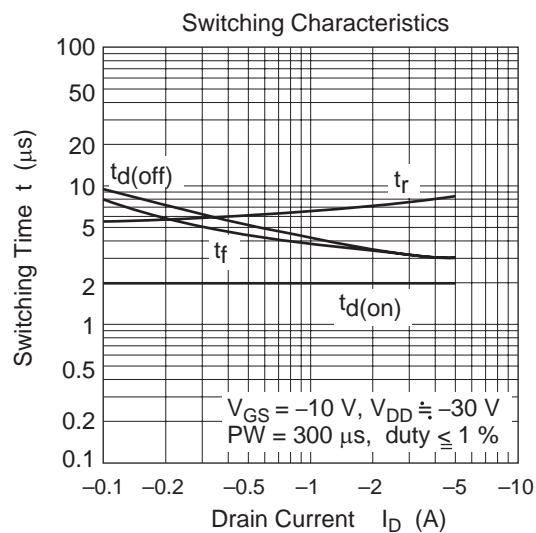
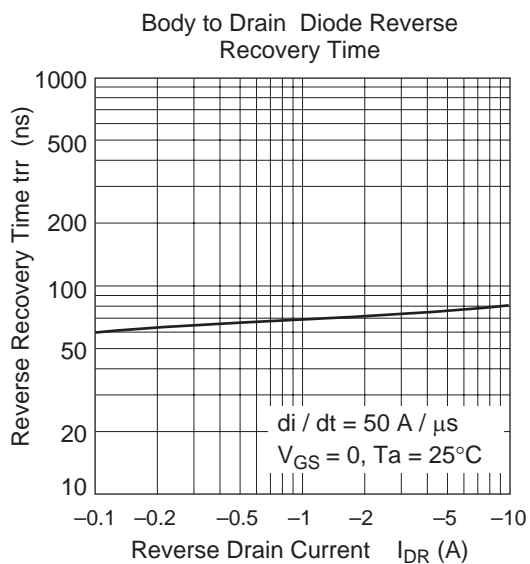
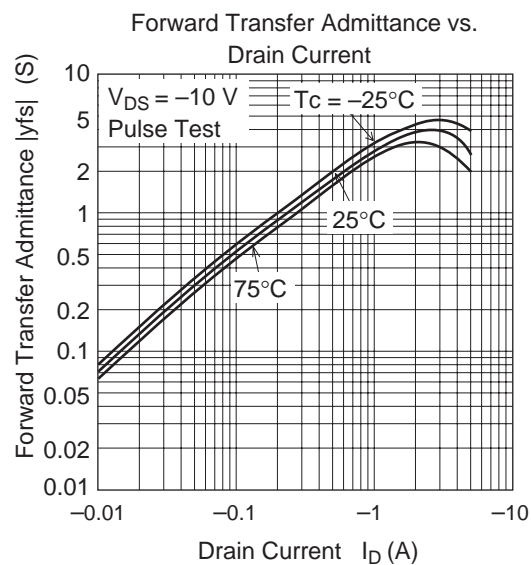
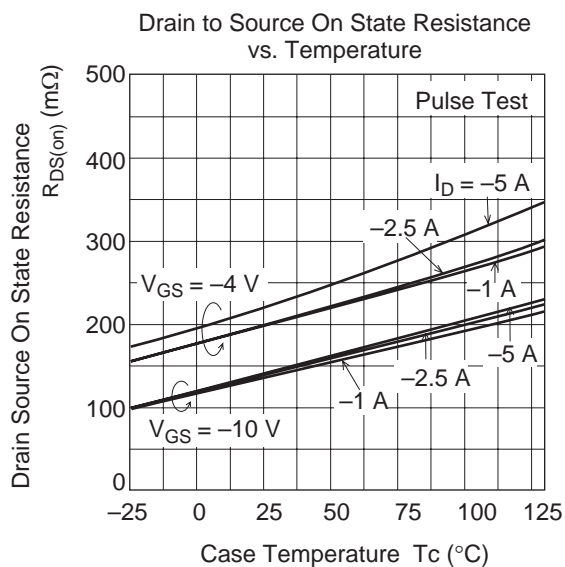
4. Including the junction temperature rise of the loded condition

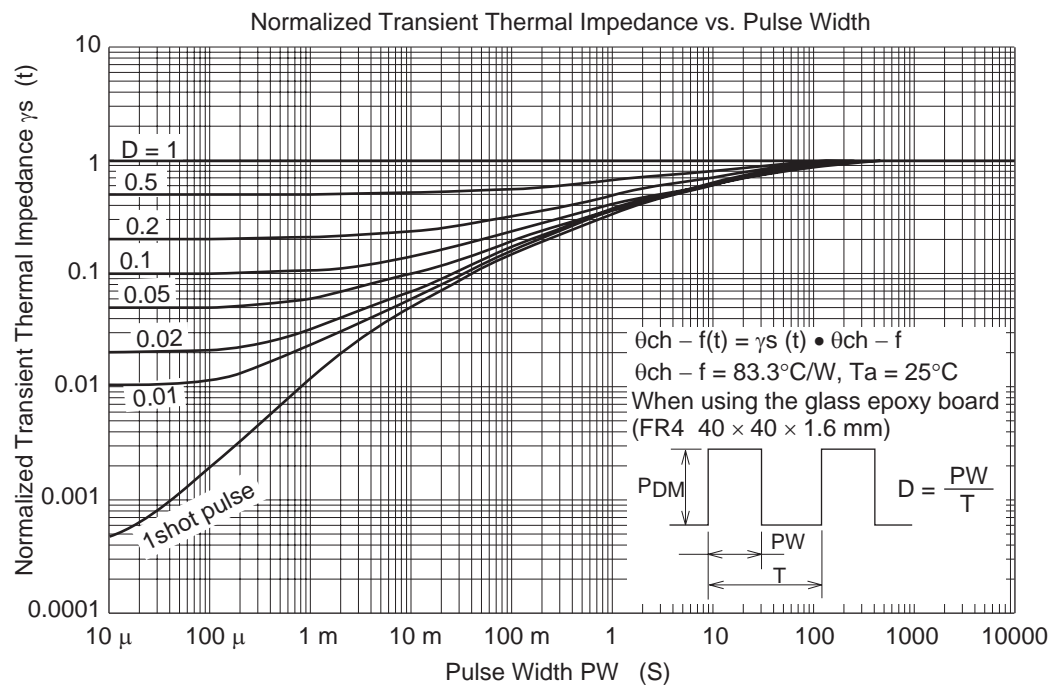
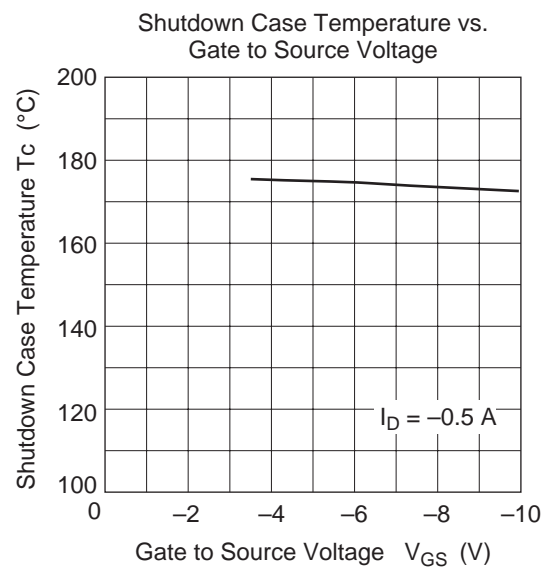
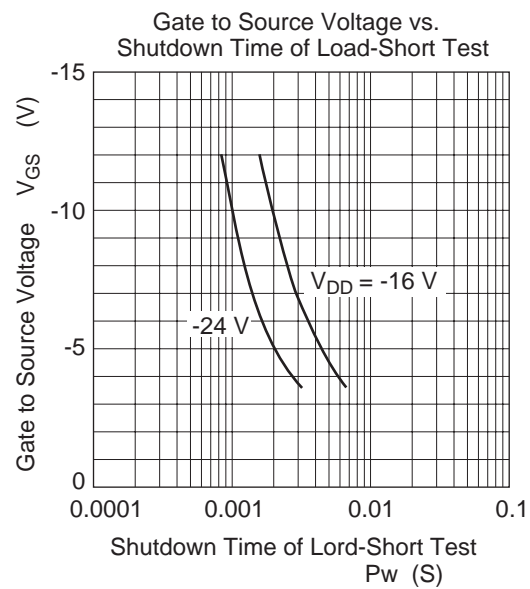
Main Characteristics



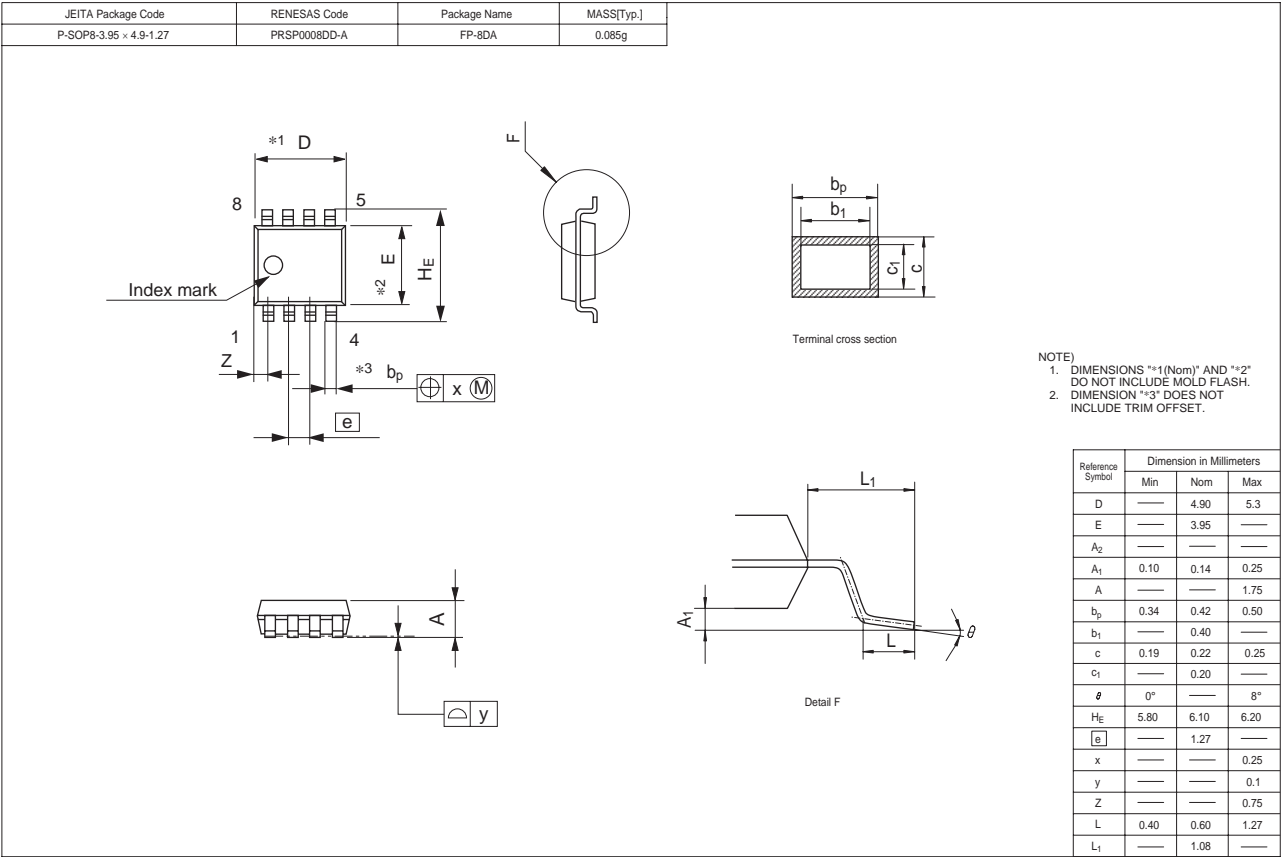
Note 5:

When using the glass epoxy board.
(FR4 40 x 40 x 1.6 mm)





Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAF1010RJ	2500 pcs/ Reel	Embossed tape (Reel)

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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