

HAF2026RJ

Silicon N Channel Power MOS FET Power Switching

REJ03G1255-0200

Rev.2.00

Jun 02, 2006

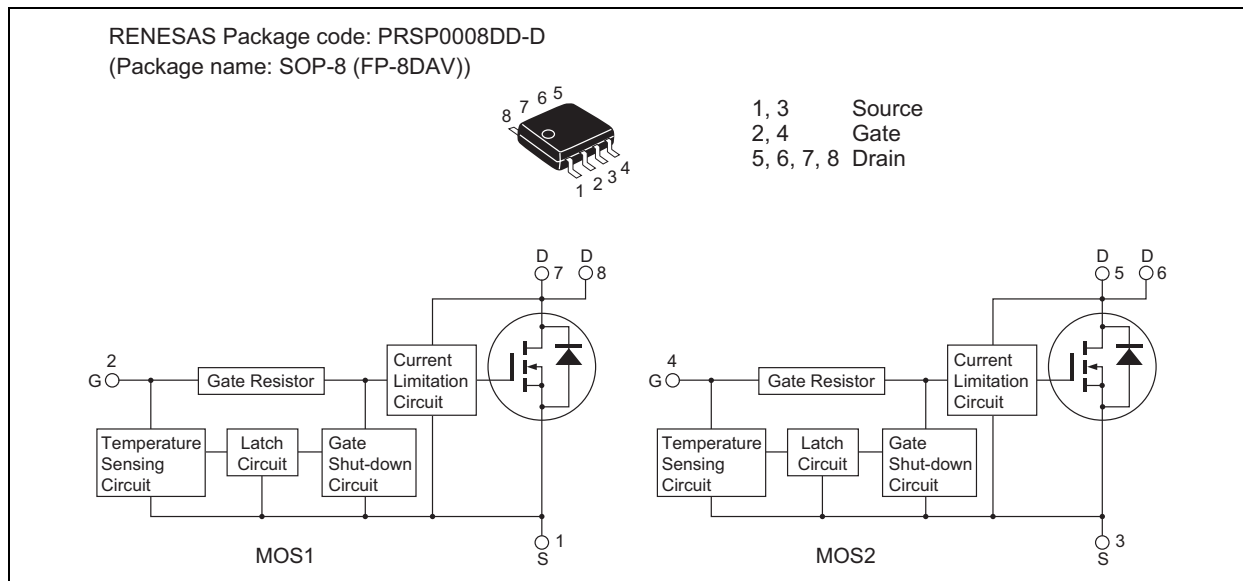
Description

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 (5 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)
- Built-in the current limitation circuit

Outline



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	60	V
Gate to source voltage	V_{GSS}	16	V
Gate to source voltage	V_{GSS}	-2.5	V
Drain current	I_D	0.6	A
Body-drain diode reverse drain current	I_{DR}	1	A
Avalanche current	I_{AP} ^{Note3}	0.6	A
Avalanche energy	E_{AR} ^{Note3}	1.54	mJ
Channel dissipation	P_{ch} ^{Note1}	1	W
Channel dissipation	P_{ch} ^{Note2}	1.5	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Notes: 1. 1 Drive operation: When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10s
 2. 2 Drive operation: When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10s
 3. Tc = 25°C, Rg ≥ 50 Ω

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	$V_i = 8\text{ V}, V_{DS} = 0$
	I_{IH2}	—	—	50	μA	$V_i = 3.5\text{ V}, V_{DS} = 0$
	I_{IL}	—	—	1	μA	$V_i = 1.2\text{ V}, V_{DS} = 0$
Input current (Gate shut down)	$I_{IH(sd)1}$	—	0.53	—	mA	$V_i = 8\text{ V}, V_{DS} = 0$
	$I_{IH(sd)2}$	—	0.23	—	mA	$V_i = 3.5\text{ V}, V_{DS} = 0$
Shut down temperature	T_{sd}	—	175	—	°C	Channel temperature
Gate operation voltage	V_{op}	3.5	—	12	V	
Drain current (Current limitation)	$I_{D\text{ limit}}$	0.6	—	1.0	A	$V_i = 5\text{ V}, V_{DS} = 3\text{ V}$

Electrical Characteristics

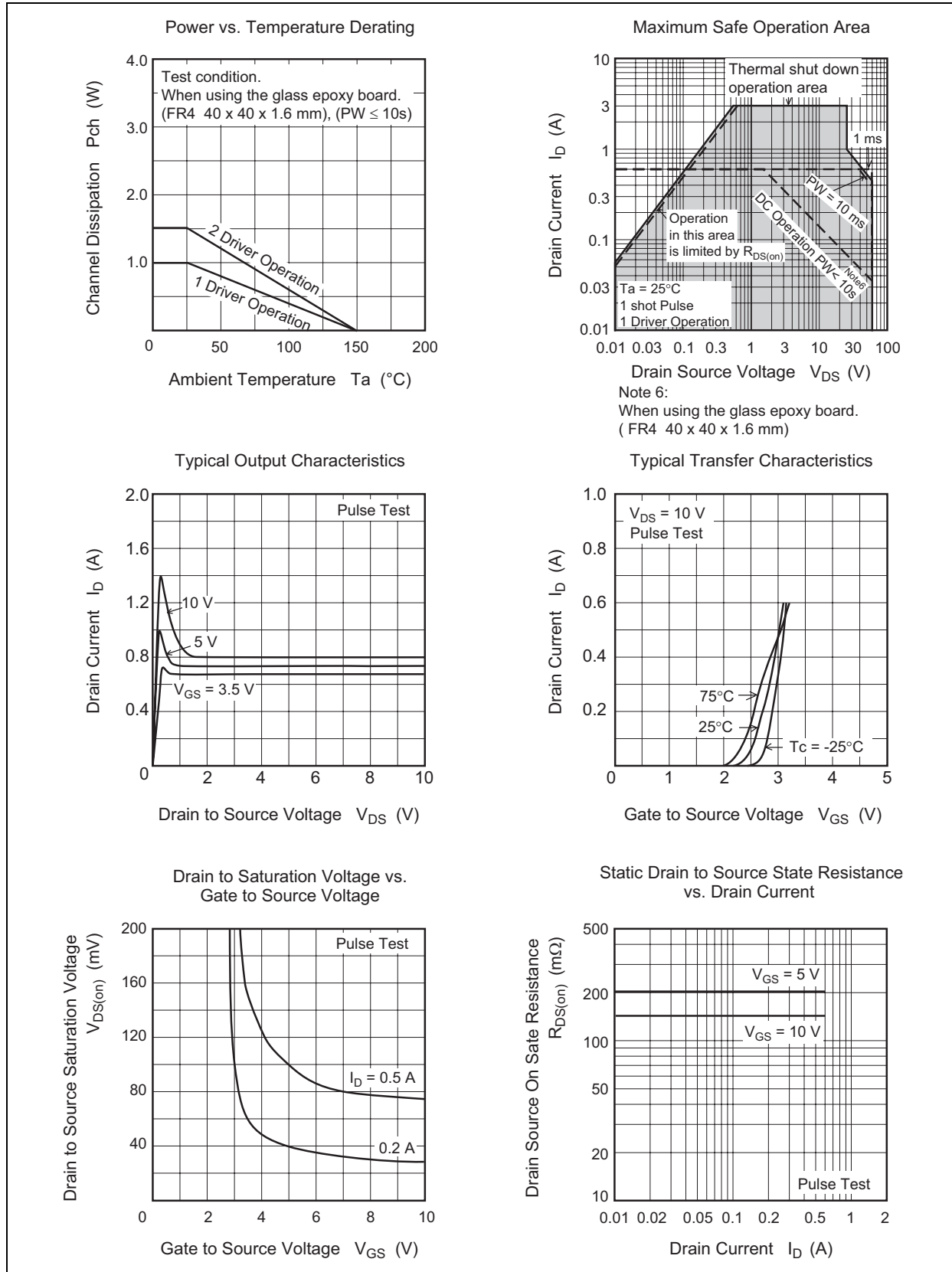
(Ta = 25°C)

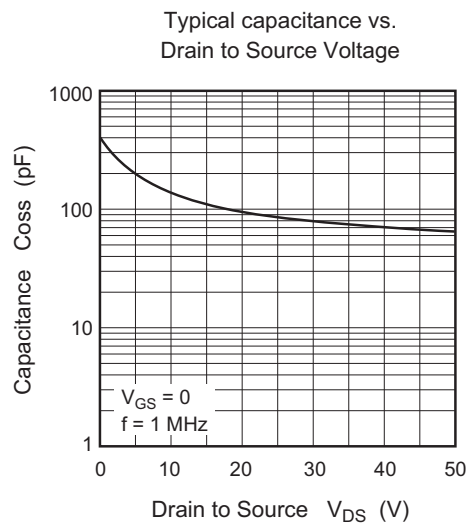
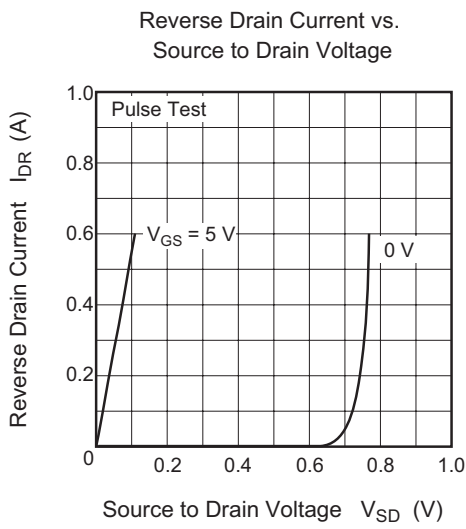
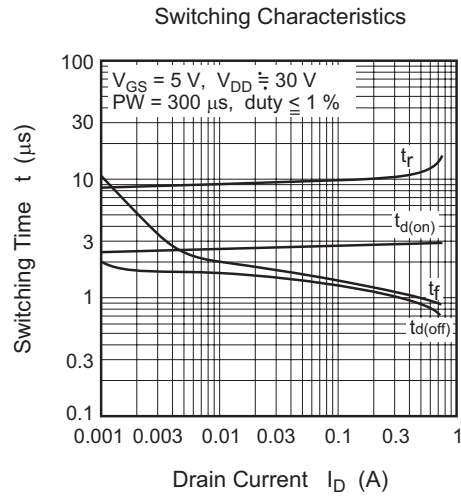
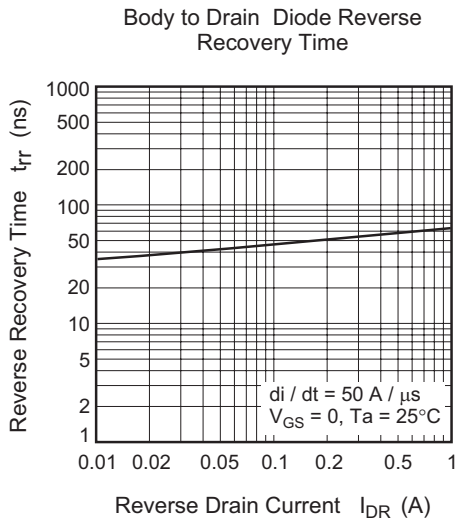
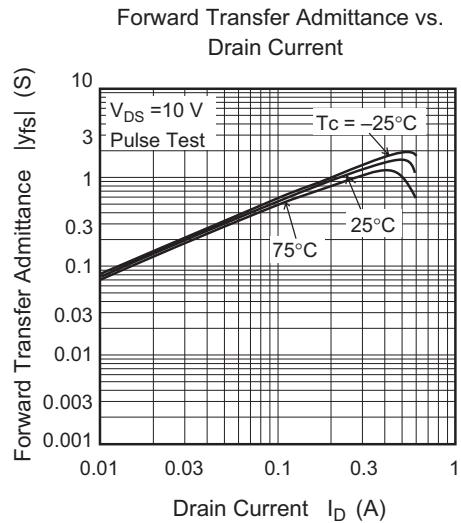
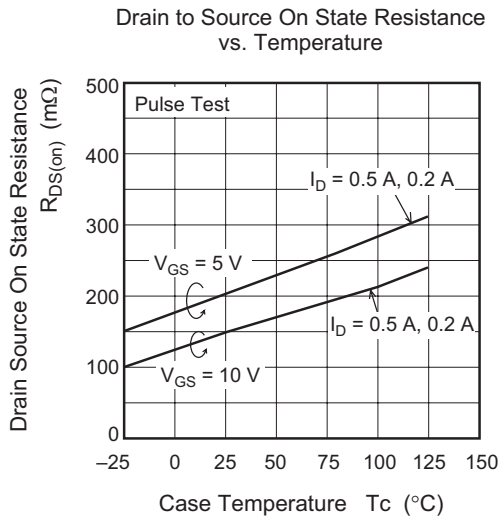
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	0.25	—	—	A	$V_{GS} = 3.5 \text{ V}, V_{DS} = 2 \text{ V}$
	I_{D2}	—	—	10	mA	$V_{GS} = 1.2 \text{ V}, V_{DS} = 2 \text{ V}$
	I_{D3}	0.6	—	1.0	A	$V_{GS} = 5 \text{ V}, V_{DS} = 3 \text{ V}$
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	16	—	—	V	$I_G = 800 \mu\text{A}, V_{DS} = 0$
	$V_{(BR)GSS}$	-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)	$I_{GS(OP)1}$	—	0.53	—	mA	$V_{GS} = 8 \text{ V}, V_{DS} = 0$
	$I_{GS(OP)2}$	—	0.23	—	mA	$V_{GS} = 3.5 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS1}	—	—	10	μA	$V_{DS} = 60 \text{ V}, V_{GS} = 0$
	I_{DSS2}	—	—	10	μA	$V_{DS} = 48 \text{ V}, V_{GS} = 0, T_a = 125^\circ\text{C}$
Gate to source cut off voltage	$V_{GS(off)}$	1.4	—	2.5	V	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$
Forward transfer admittance	$ y_{fs} $	0.26	1.3	—	S	$I_D = 0.5 \text{ A}, V_{DS} = 10 \text{ V}^{\text{Note4}}$
Static drain to source on state resistance	$R_{DS(on)}$	—	200	300	$\text{m}\Omega$	$I_D = 0.5 \text{ A}, V_{GS} = 5 \text{ V}^{\text{Note4}}$
	$R_{DS(on)}$	—	150	210	$\text{m}\Omega$	$I_D = 0.5 \text{ A}, V_{GS} = 10 \text{ V}^{\text{Note4}}$
Output capacitance	C_{oss}	—	140	—	pF	$V_{DS} = 10 \text{ V}, V_{GS} = 0, f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	2.9	—	μs	$V_{GS} = 5 \text{ V}, I_D = 0.5 \text{ A}, R_L = 60 \Omega$
Rise time	t_r	—	11	—	μs	
Turn off delay time	$t_{d(off)}$	—	0.9	—	μs	
Fall time	t_f	—	1	—	μs	
Body-drain diode forward voltage	V_{DF}	—	0.9	—	V	$I_F = 1 \text{ A}, V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	61	—	ns	$I_F = 1 \text{ A}, V_{GS} = 0, di_F/dt = 50 \text{ A}/\mu\text{s}$
Over load shut down operation time ^{note5}	t_{os1}	—	85	—	ms	$V_{GS} = 5 \text{ V}, V_{DD} = 16 \text{ V}$
	t_{os2}	—	30	—	ms	$V_{GS} = 5 \text{ V}, V_{DD} = 24 \text{ V}$

Notes: 4. Pulse test

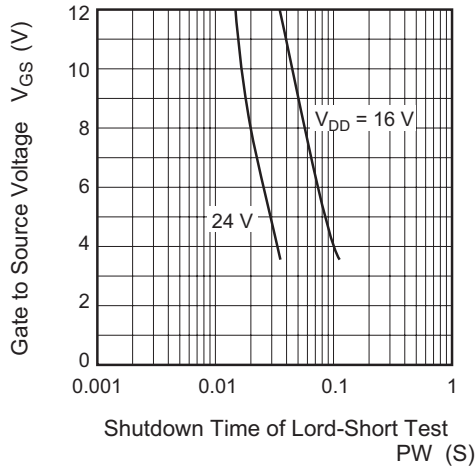
5. Including the junction temperature rise of the over loded condition.

Main Characteristics

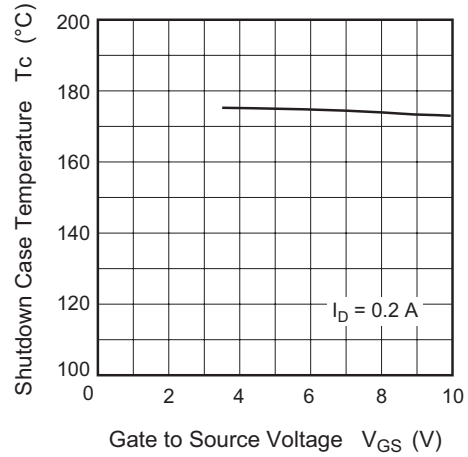




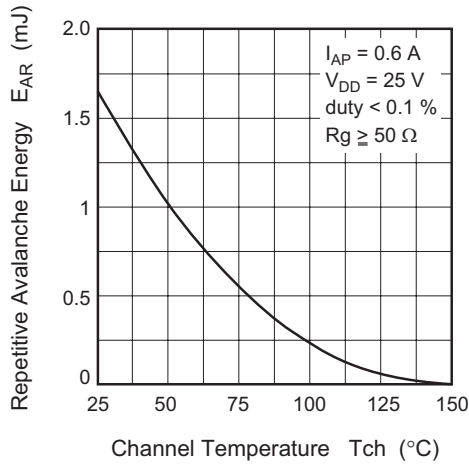
Gate to Source Voltage vs. Shutdown Time of Load-Short Test



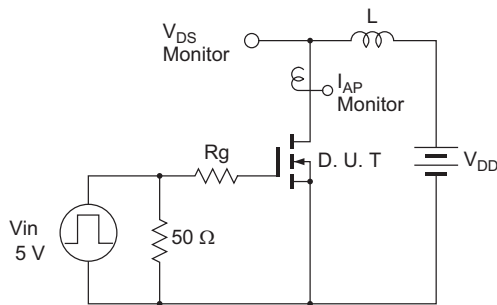
Shutdown Case Temperature vs. Gate to Source Voltage



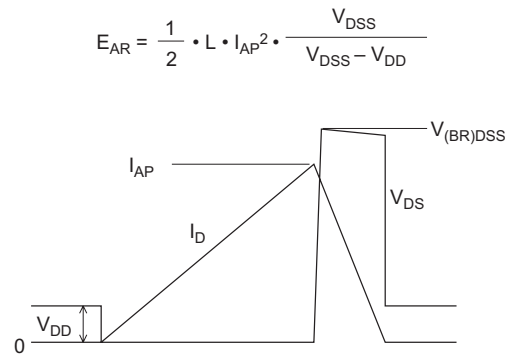
Avalanche Energy vs. Channel Temperature Derating

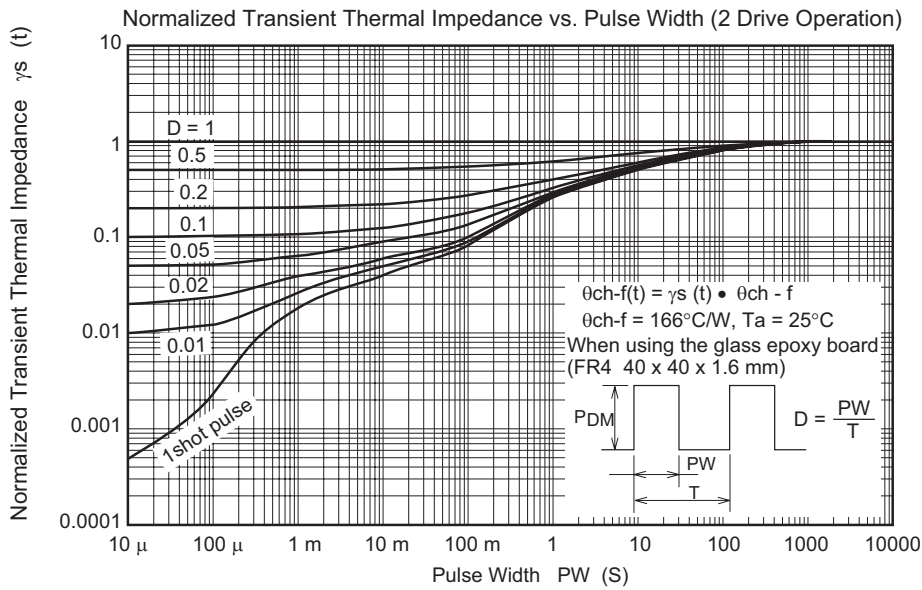
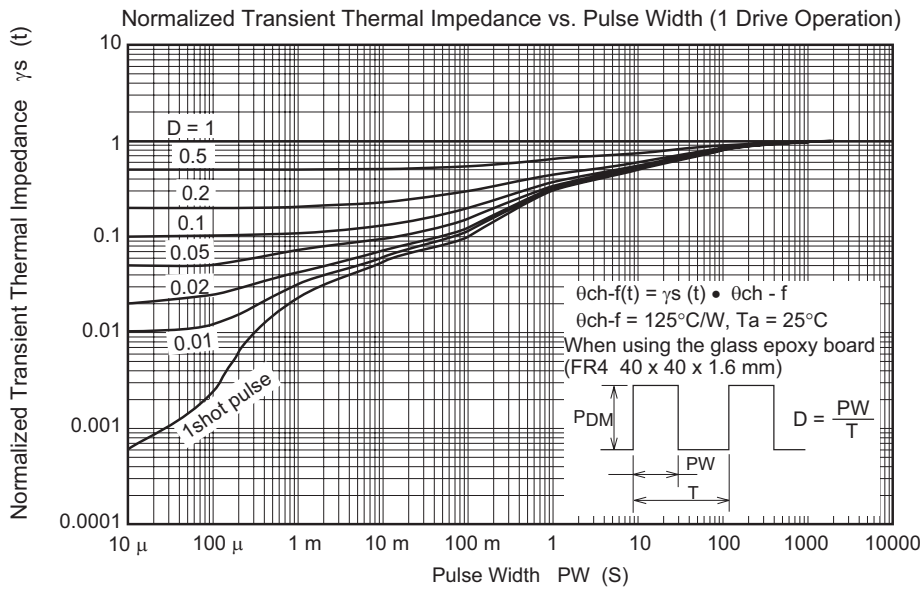


Avalanche Test Circuit

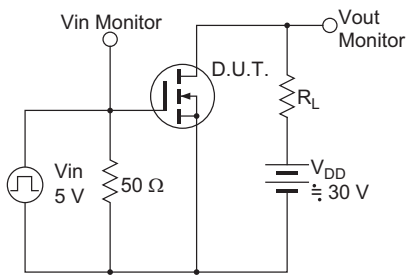


Avalanche Waveform

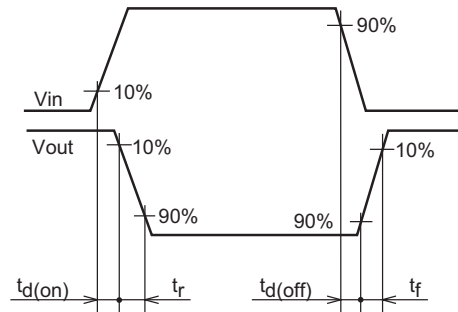




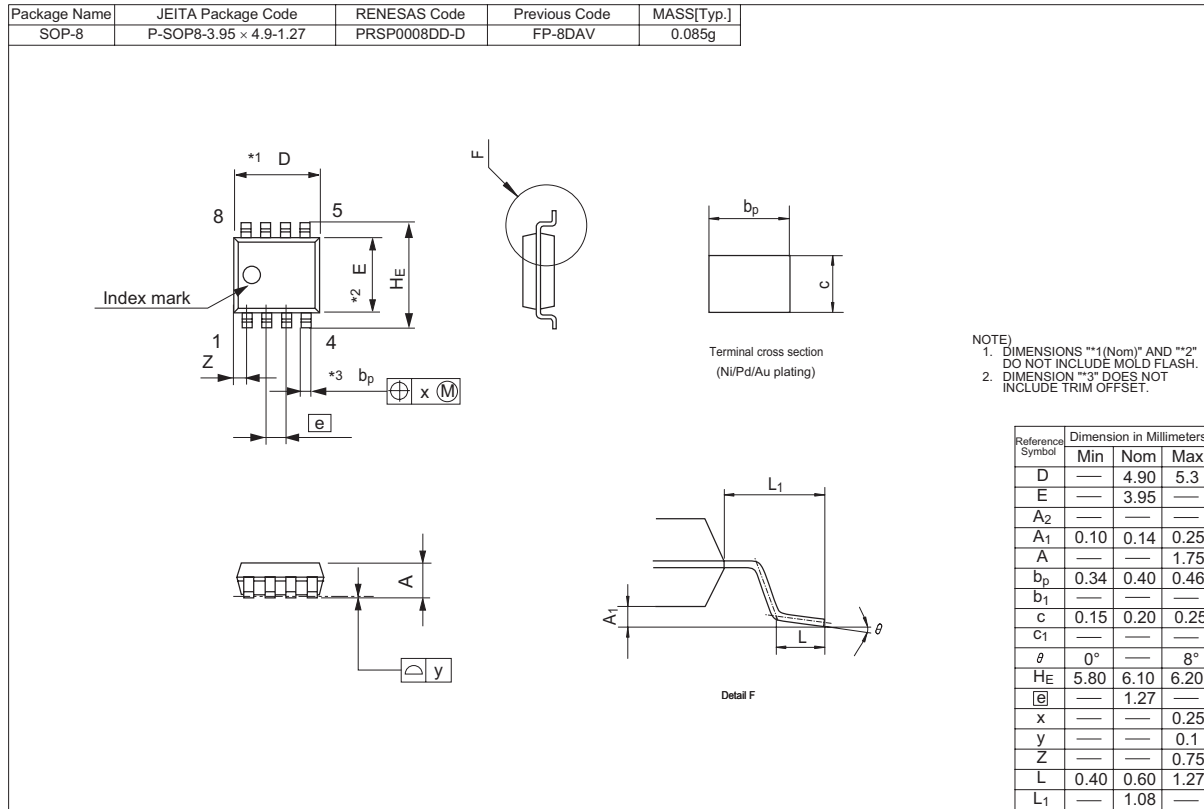
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAF2026RJ-EL-E	2500 pcs	Taping

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