

HAF2015RJ

Silicon N Channel MOS FET Series Power Switching

REJ03G1141-0300

Rev.3.00

Aug 27, 2007

Description

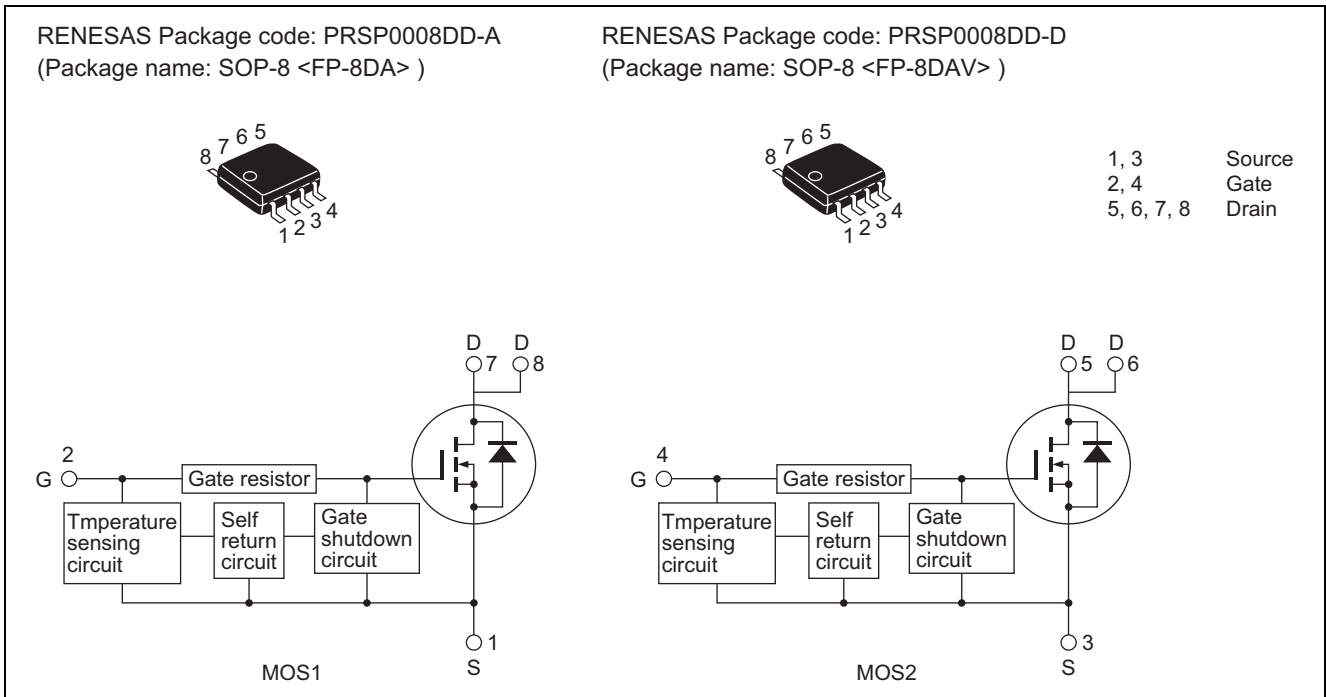
This FET has the over temperature shut-down capability sensing to the junction temperature.

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)
- High endurance capability against to the short circuit
- Built-in the over temperature shut-down circuit
- Temperature hysteresis type.
- High density mounting.

Outline



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	2	A
Drain peak current	I _{D (pulse)} ^{Note 1}	4	A
Body-drain diode reverse drain current	I _{DR}	2	A
Avalanche current	I _{AP} ^{Note 4}	0.54	A
Avalanche energy	E _{AR} ^{Note 4}	25	mJ
Channel dissipation	P _{ch} ^{Note 2}	2	W
Channel dissipation	P _{ch} ^{Note 3}	1.5	W
Channel temperature	T _{ch}	150	°C
Storage temperature	T _{stg}	-55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%

2. 1 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

3. 2 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

4. T_{ch} = 25°C, R_g > 50 Ω

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 = 5 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}	—	0.53	—	mA	V _i = 8 V, V _{DS} = 0
	I _{IH (sd) 2}	—	0.2	—	mA	V _i = 3.5 V, V _{DS} = 0
Shut down temperature	T _{sd}	—	175	—	°C	Channel temperature
Hysteresis temperature	T _{hr}	—	120	—	°C	Channel temperature
Gate operation voltage	V _{OP}	3.5	—	12	V	

Electrical Characteristics

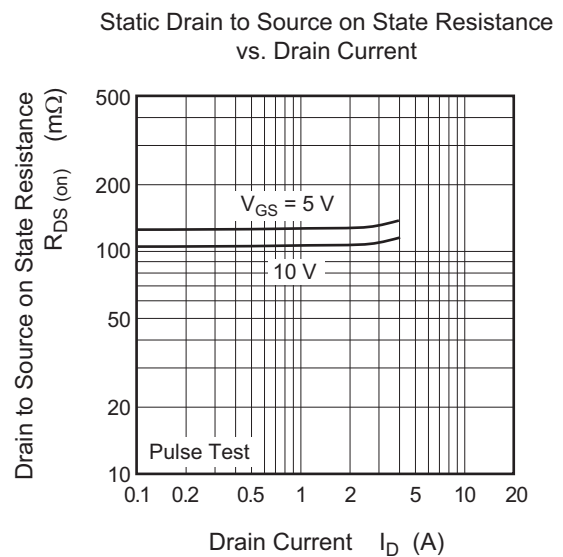
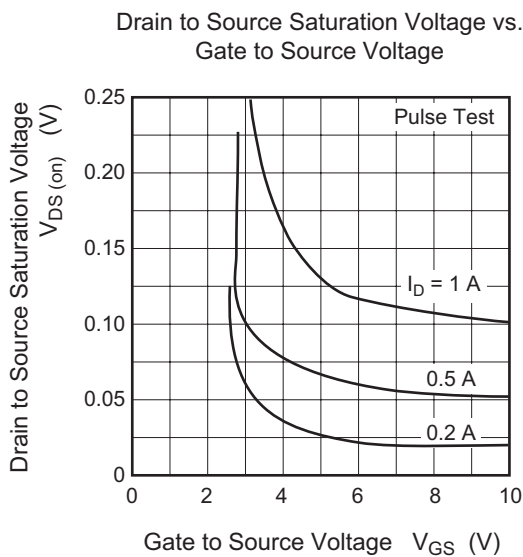
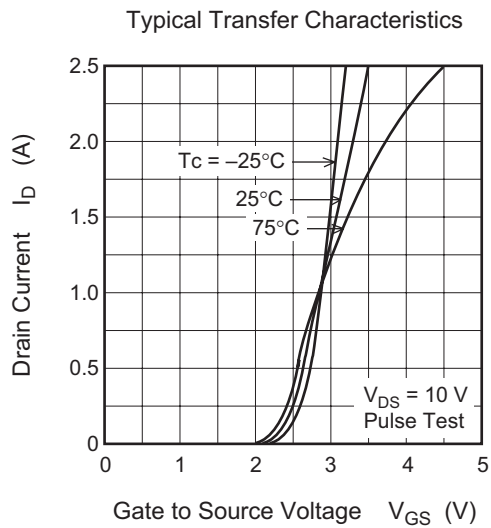
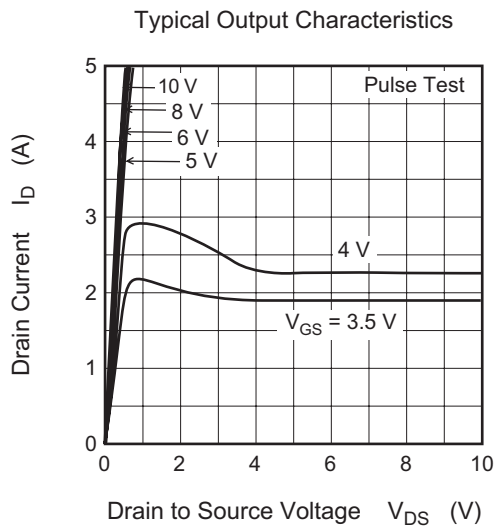
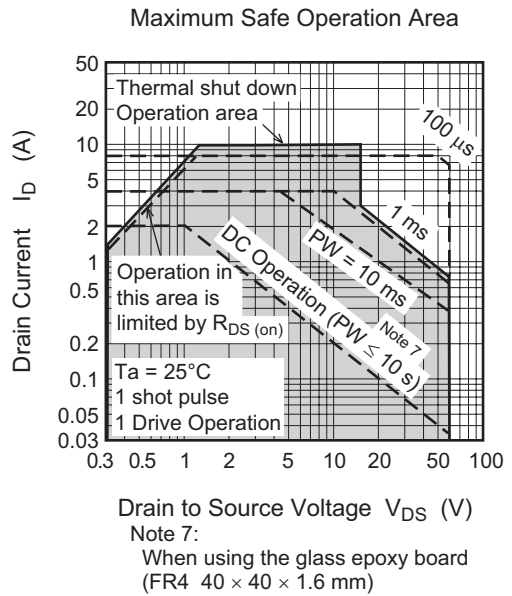
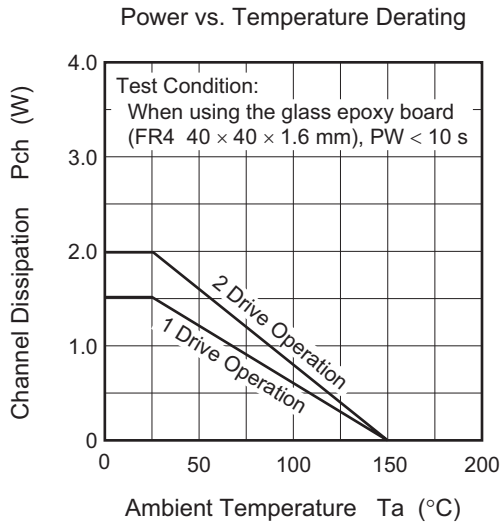
(Ta = 25°C)

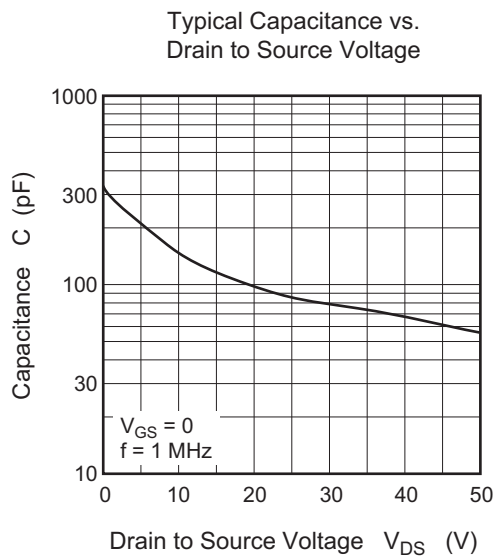
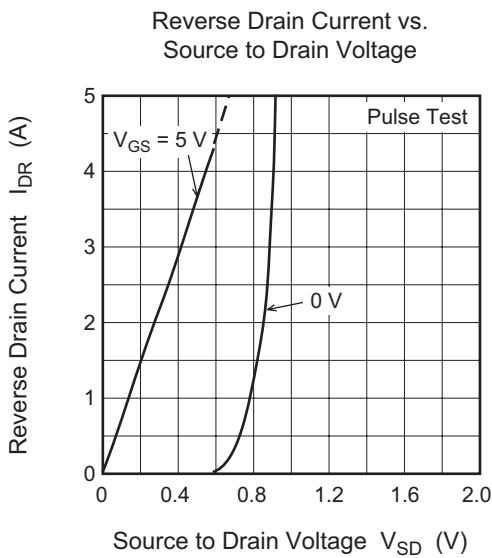
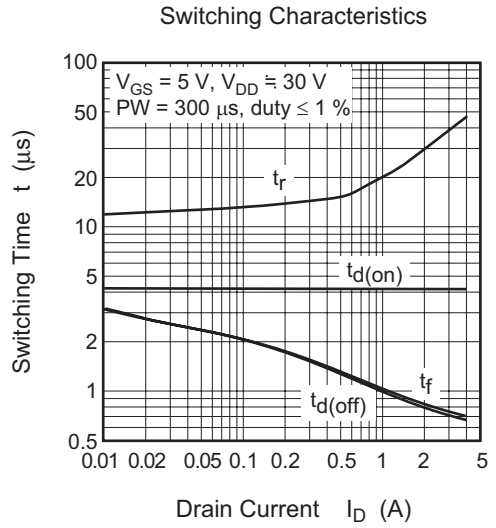
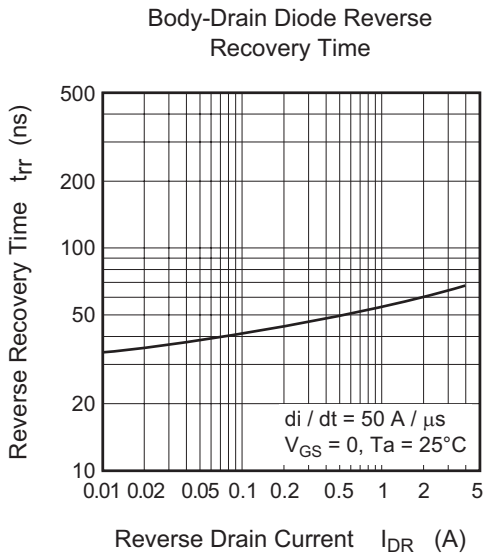
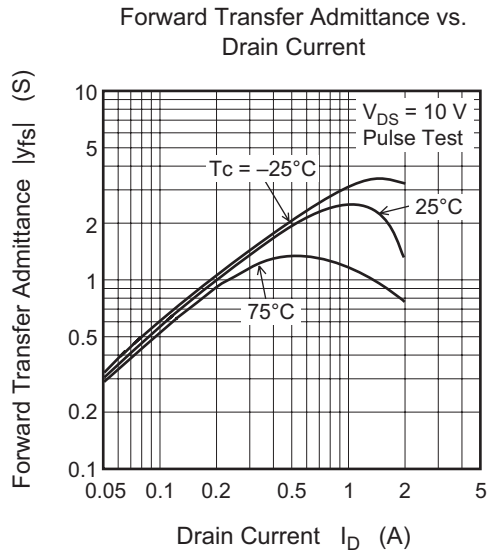
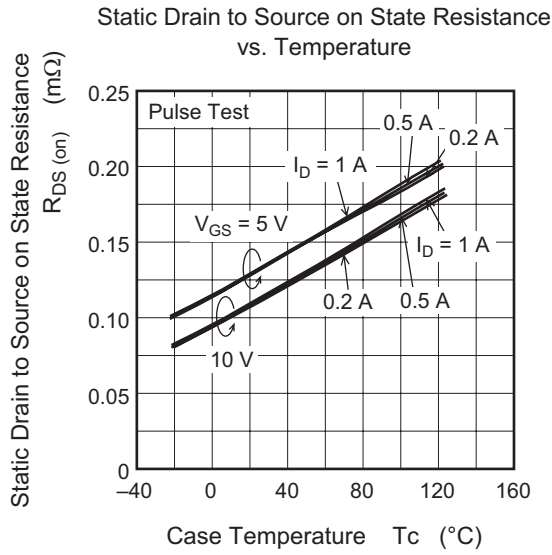
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	0.7	—	—	A	$V_{GS} = 3.5 \text{ V}, V_{DS} = 2 \text{ V}$
	I_{D2}	—	—	10	mA	$V_{GS} = 1.2 \text{ V}, V_{DS} = 2 \text{ V}$
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	16	—	—	V	$I_G = 500 \mu\text{A}, V_{DS} = 0$
	$V_{(BR)GSS}$	-2.5	—	—	V	$I_G = -100 \mu\text{A}, V_{DS} = 0$
Gate to source leak current	I_{GSS1}	—	—	100	μA	$V_{GS} = 5 \text{ V}, V_{DS} = 0$
	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	$V_{GS} = 8 \text{ V}, V_{DS} = 0$
	$I_{GS(op)2}$	—	0.2	—	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 cutoff voltage	$V_{GS(off)}$	1.4	—	2.5	V	$I_D = 1 \text{ mA}, V_{DS} = 10 \text{ V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	130	200	m Ω	$I_D = 1 \text{ A}, V_{GS} = 5 \text{ V}$ ^{Note 5}
	$R_{DS(on)}$	—	110	160	m Ω	$I_D = 1 \text{ A}, V_{GS} = 10 \text{ V}$ ^{Note 5}
Forward transfer admittance	$ y_{fs} $	0.5	2.5	—	S	$I_D = 1 \text{ A}, V_{DS} = 10 \text{ V}$ ^{Note 5}
Output capacitance	C_{OSS}	—	139	—	pF	$V_{DS} = 10 \text{ V}, V_{GS} = 0$ $f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	4.2	—	μs	$I_D = 1 \text{ A}$ $V_{GS} = 5 \text{ V}$ $R_L = 30 \Omega$
Rise time	t_r	—	20	—	μs	
Turn-off delay time	$t_{d(off)}$	—	1	—	μs	
Fall time	t_f	—	1	—	μs	
Body-drain diode forward voltage	V_{DF}	—	0.82	—	V	$I_F = 2 \text{ A}, V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	55	—	ns	$I_F = 2 \text{ A}, V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu\text{s}$
Over load shut down operation time ^{Note6}	t_{os1}	—	15	—	ms	$V_{GS} = 5 \text{ V}, V_{DD} = 16 \text{ V}$

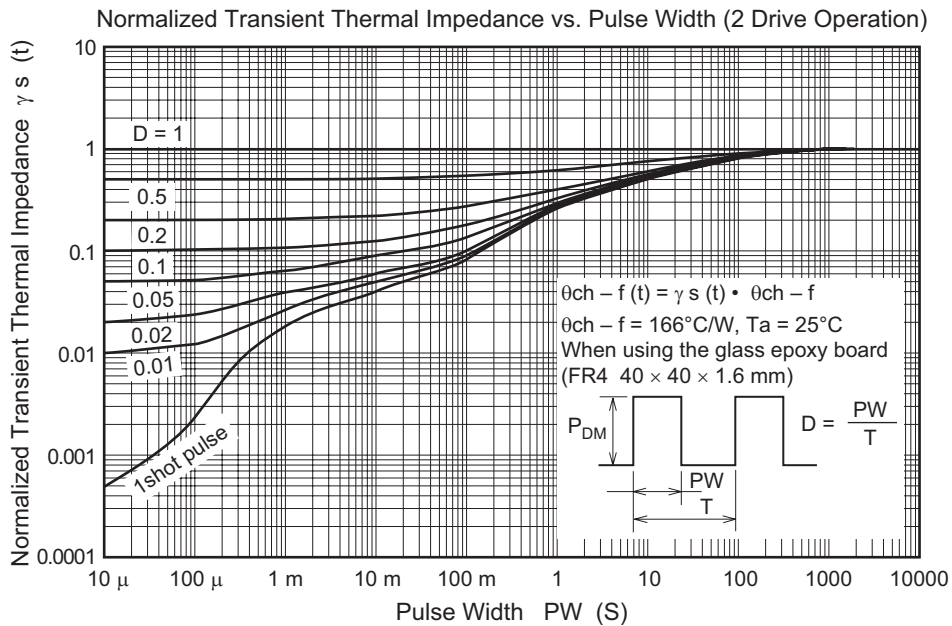
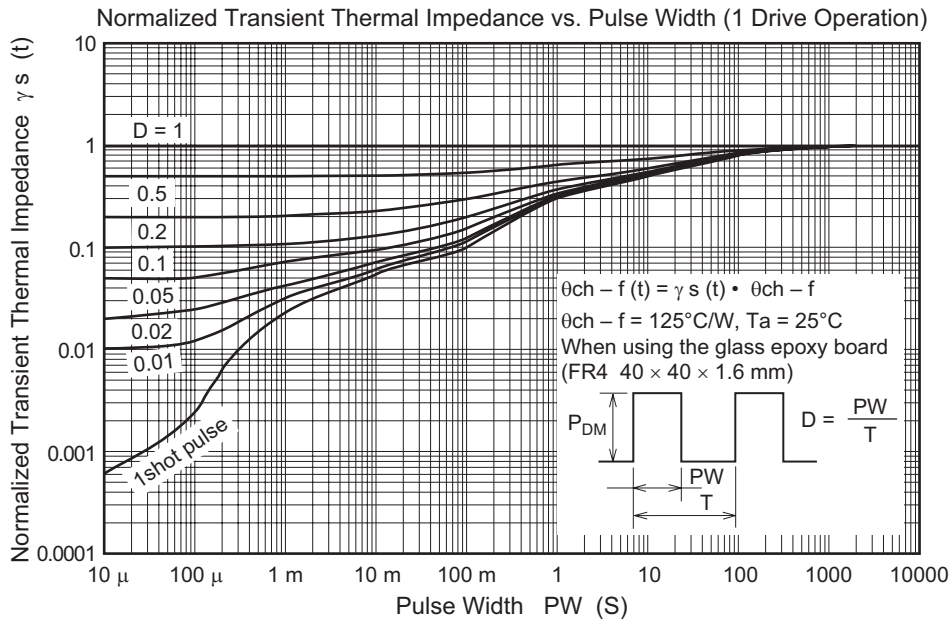
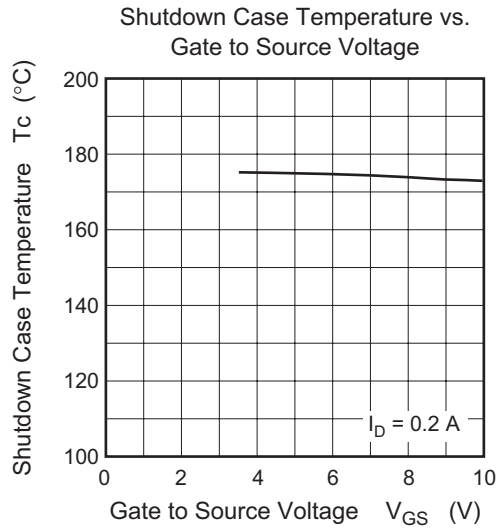
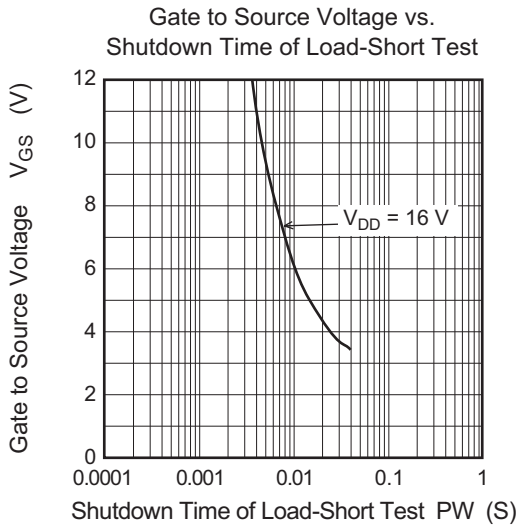
Notes: 5. Pulse test

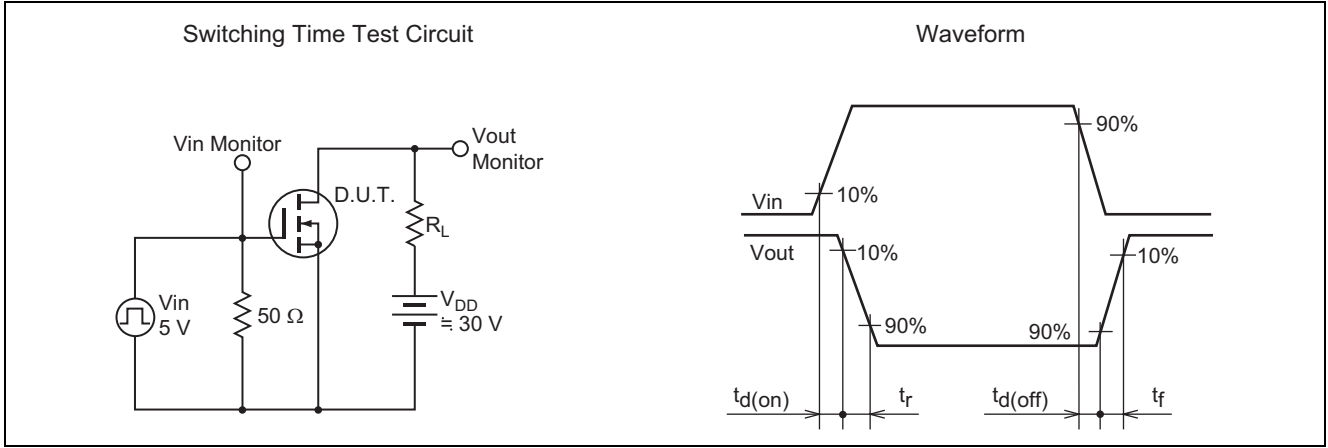
6. Including the junction temperature rise of the over loaded condition.

Main Characteristics



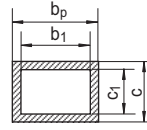
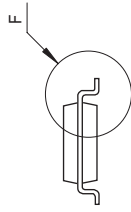
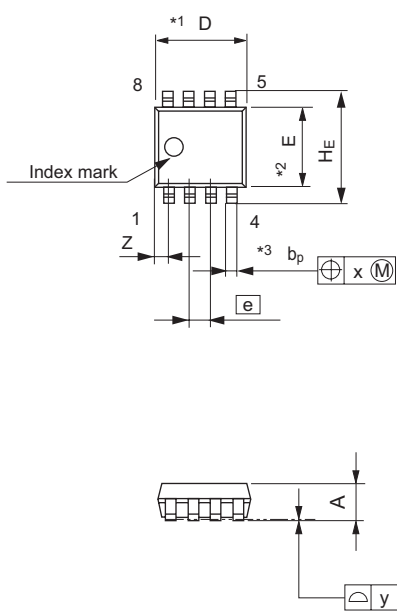




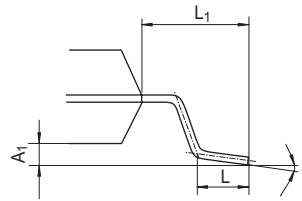


Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
SOP-8	P-SOP8-3.95 × 4.9-1.27	PRSP0008DD-A	FP-8DA	0.085g



Terminal cross section

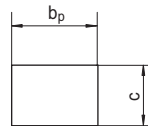
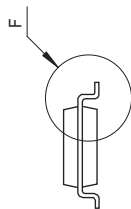
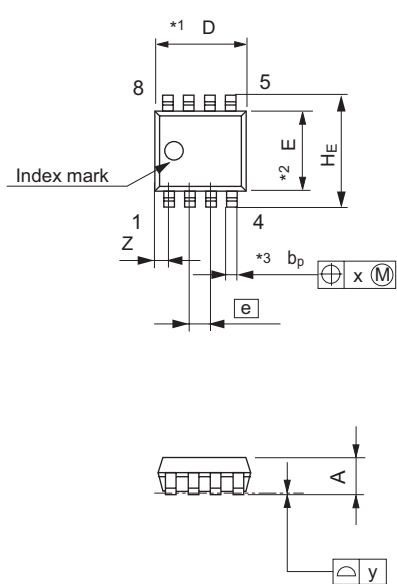


Detail F

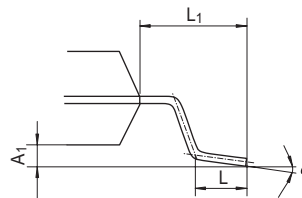
NOTE)
 1. DIMENSIONS **1(Nom)** AND **2** DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION **3** DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.90	5.3
E	—	3.95	—
A ₂	—	—	—
A ₁	0.10	0.14	0.25
A	—	—	1.75
b _p	0.34	0.42	0.50
b ₁	—	0.40	—
c	0.19	0.22	0.25
c ₁	—	0.20	—
θ	0°	—	8°
H _E	5.80	6.10	6.20
Ⓜ	—	1.27	—
x	—	—	0.25
y	—	—	0.1
Z	—	—	0.75
L	0.40	0.60	1.27
L ₁	—	1.08	—

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
SOP-8	P-SOP8-3.95 × 4.9-1.27	PRSP0008DD-D	FP-8DAV	0.085g



Terminal cross section
(Ni/Pd/Au plating)



Detail F

NOTE)
 1. DIMENSIONS **1(Nom)** AND **2** DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION **3** DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.90	5.3
E	—	3.95	—
A ₂	—	—	—
A ₁	0.10	0.14	0.25
A	—	—	1.75
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	5.80	6.10	6.20
Ⓜ	—	1.27	—
x	—	—	0.25
y	—	—	0.1
Z	—	—	0.75
L	0.40	0.60	1.27
L ₁	—	1.08	—

Ordering Information

Part No.	Quantity	Shipping Container
HAF2015RJ-EL	2500 pcs/Reel	Embossed tape

Notes:

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