RJF0624JSP

60 V 3 A N Channel MOS FET
Power Switching

R07DS1527EJ0100
Rev.1.00
Sep. 27, 2022

Description

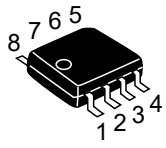
This FET has the over temperature shut-down capability sensing to the junction temperature. This FET has the built-in over temperature shut-down circuit in the gate area. And this circuit operation to shut-down the gate voltage in case of high junction temperature like applying over power consumption,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

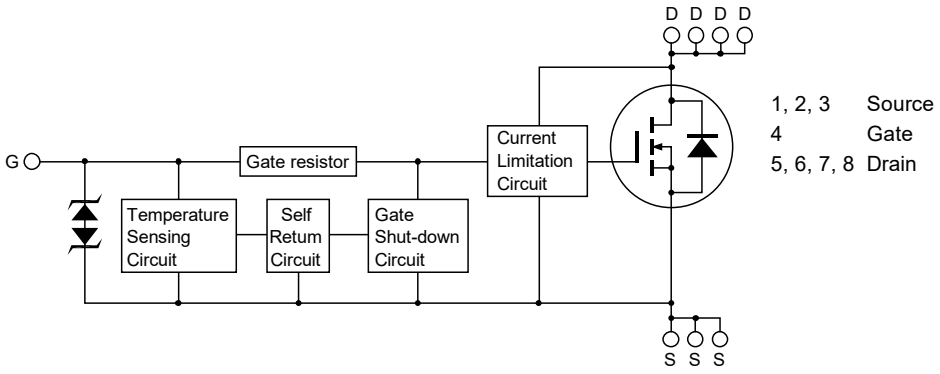
Features

- Logic level operation.
- Built-in the over temperature shut-down circuit and current limitation circuit.
- High endurance capability against to the short circuit.
- Temperature hysteresis type.
- High density mounting
- Power supply voltage applies 12 V and 24 V.
- AEC-Q101VerD Compliant
- Use RJF0622JSP Chip

Outline

RENESAS Package code: PRSP0008DD-D
(Package name: SOP-8 <FP-8DAV>)





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 Note3	3.0	A
Body-drain diode reverse drain current	I_{DR}	3.0	A
Avalanche current	I_{AP} Note 2	0.9	A
Avalanche energy	E_{AR} Note 2	69.4	mJ
Channel dissipation	Pch Note 1	2	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10s
2. Tch = 25°C, Rg ≥ 50 Ω , L=100mH
3. It provides by the current limitation lower bound value.

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	Vi = 8 V, V_{DS} = 0
	I_{IH2}	—	—	50	μA	Vi = 3.5 V, V_{DS} = 0
	I_{IL}	—	—	1	μA	Vi = 1.2 V, V_{DS} = 0
Input current (Gate shut down)	$I_{IH(sd)1}$	—	0.8	—	mA	Vi = 8 V, V_{DS} = 0
	$I_{IH(sd)2}$	—	0.35	—	mA	Vi = 3.5 V, V_{DS} = 0
Shut down temperature	Tsd	—	175	—	°C	Channel temperature
Return temperature	Thr	—	120	—	°C	Channel temperature
Gate operation voltage	Vop	3.5	—	12	V	
Drain current (Current limitation value)	$I_{D\ limt}$	3.0	—	—	A	V_{GS} = 5 V, V_{DS} = 10 V Note 4
Load short-circuit voltage	V_{DD}	—	—	32	V	V_{GS} = 5 V, RL = 0

Note: 4. Pulse test

Electrical Characteristics

(Ta = 25°C)

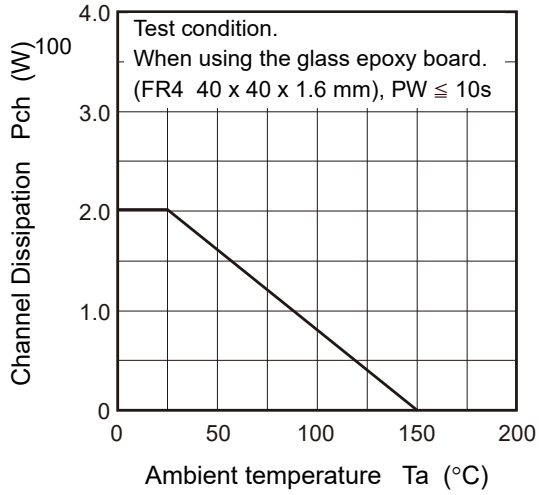
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	—	—	10	A	V_{GS} = 1.2 V, V_{DS} = 10 V
	I_{D2}	3.0	—	10	mA	V_{GS} = 5 V, V_{DS} = 10 V Note 5
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	80	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	16	—	—	V	I_G = 800 μA, V_{DS} = 0
	$V_{(BR)GSS}$	–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} = 32 V, V_{GS} = 0, Ta = 125°C
Gate to source cutoff voltage	$V_{GS(off)}$	1.1	—	2.1	V	V_{DS} = 10 V, I_D = 1 mA
Static drain to source on state resistance	$R_{DS(on)}$	—	159	180	mΩ	I_D = 2.5 A, V_{GS} = 5 V Note 5
	$R_{DS(on)}$	—	139	160	mΩ	I_D = 2.5 A, V_{GS} = 10 V Note 5
Forward transfer admittance	$\|y_{fs}\|$	3.3	5.4	—	S	I_D = 2.5 A, V_{DS} = 10 V Note 5
Output capacitance	Coss	—	154	—	pF	V_{DS} = 10 V, V_{GS} = 0, f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	1.9	—	μs	I_D= 2.5 A, V_{GS} = 5 V, R_L = 12 Ω
Rise time	t_r	—	11	—	μs	
Turn-off delay time	$t_{d(off)}$	—	1.1	—	μs	
Fall time	t_f	—	3.0	—	μs	
Body-drain diode forward voltage	V_{DF}	—	0.91	—	V	I_F = 5 A, V_{GS} = 0
Body-drain diode reverse recovery time	t_{rr}	—	662	—	ns	I_F = 3 A, V_{GS} = 0 di_F/dt = 50 A/μs
Over load shut down operation time Note 6	t_{os1}	—	0.29	—	ms	V_{GS} = 5 V, V_{DD} = 16 V
	t_{os2}	—	0.18	—	ms	V_{GS} = 5 V, V_{DD} = 24 V

Notes: 5. Pulse test

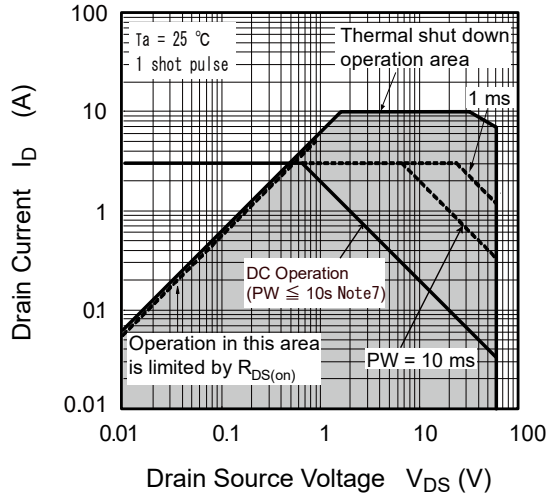
6. Including the junction temperature rise of the over loaded condition.

Main Characteristics

Power vs. Temperature Derating

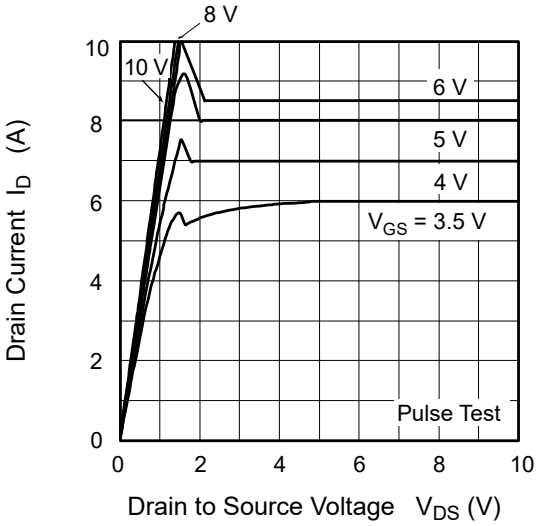


Maximum Safe Operation Area

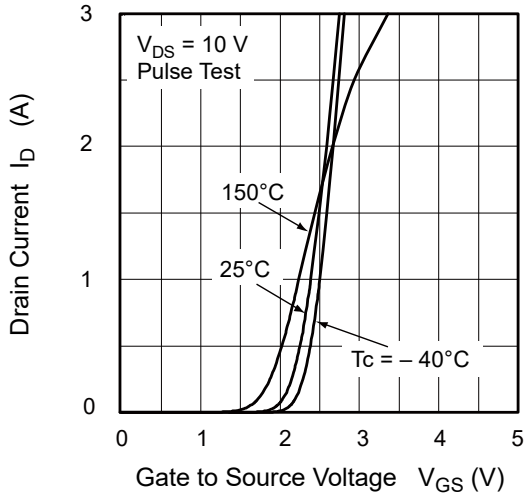


Note 7: When using the glass epoxy board.
(FR4 40 x 40 x 1.6 mm)

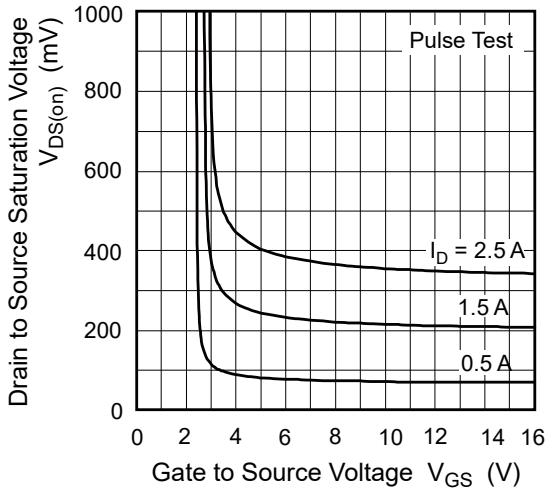
Typical Output Characteristics



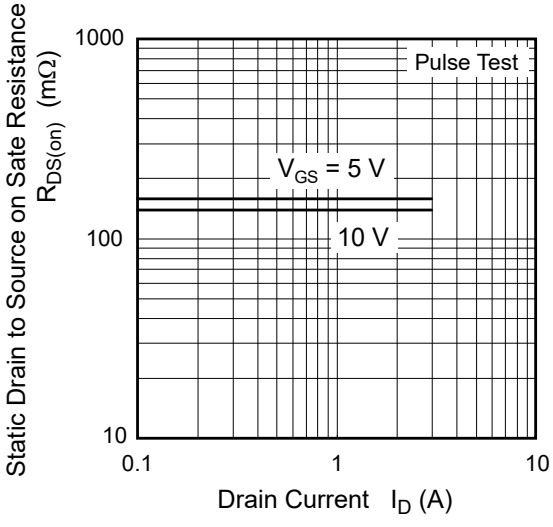
Typical Transfer Characteristics



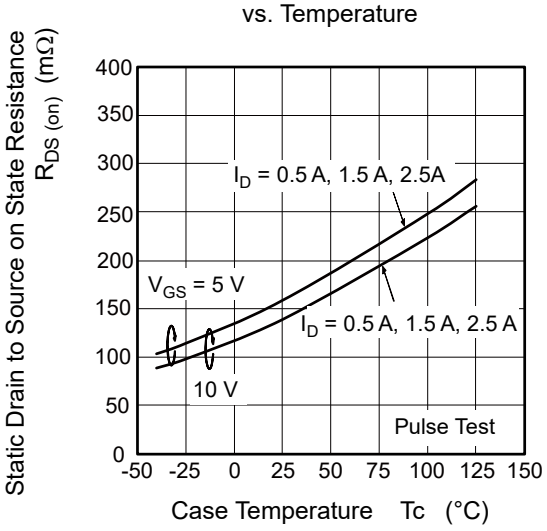
Drain to Source Saturation Voltage vs. Gate to Source Voltage



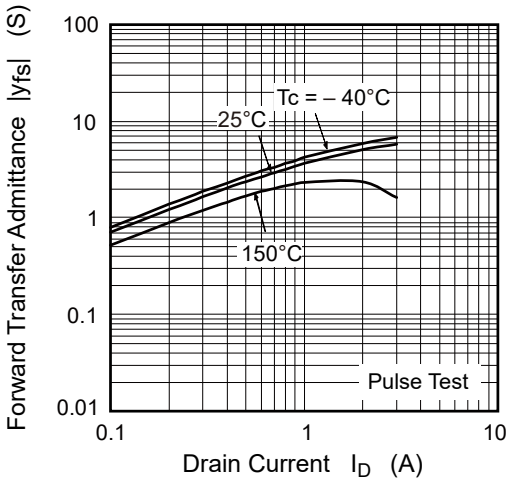
Static Drain to Source on State Resistance vs. Drain Current



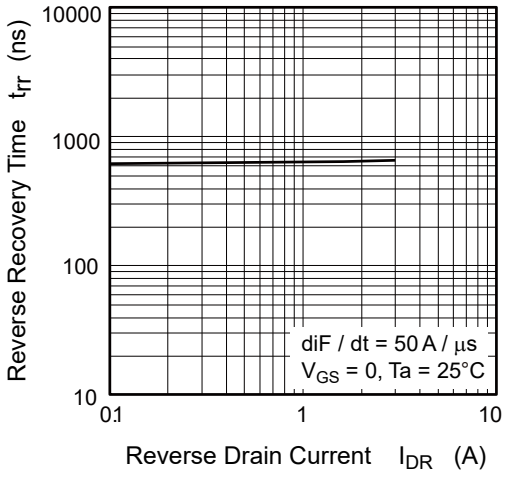
Static Drain to Source on State Resistance vs. Temperature



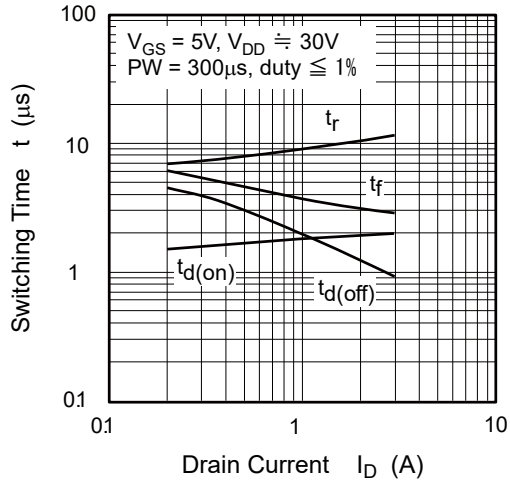
Forward Transfer Admittance vs. Drain Current



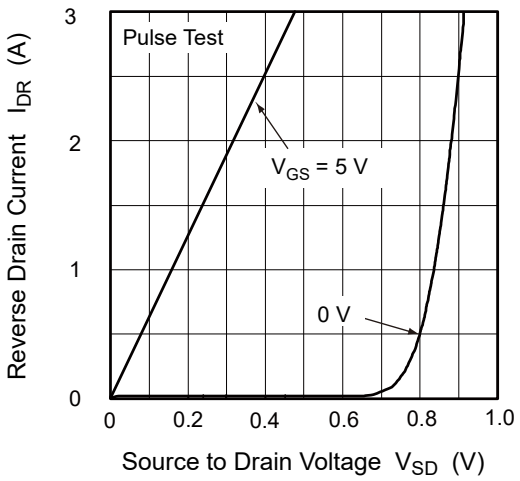
Body-Drain Diode Reverse Recovery Time



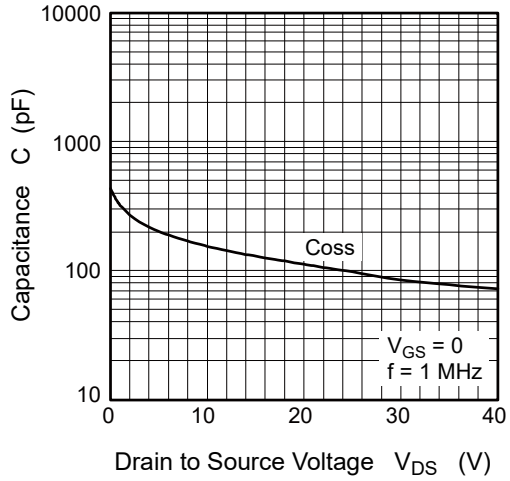
Switching Characteristics



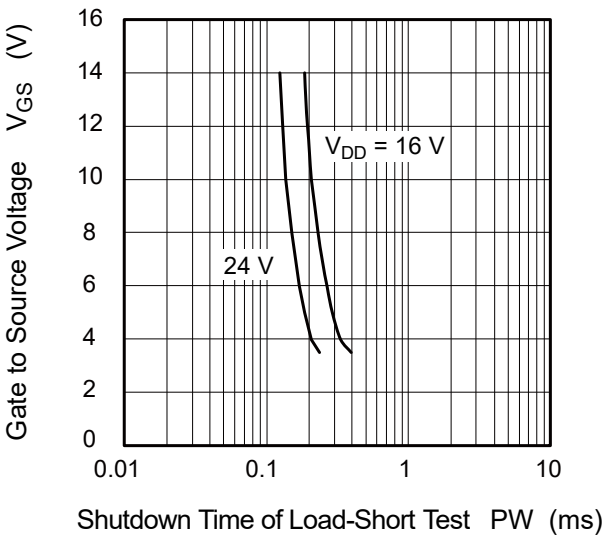
Reverse Drain Current vs. Source to Drain Voltage



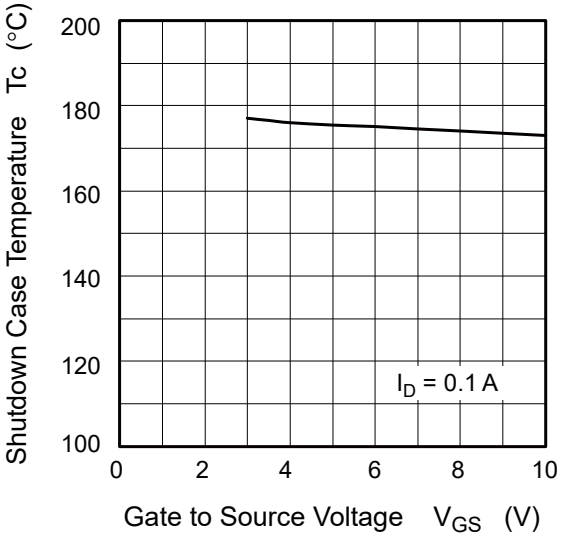
Typical Capacitance vs. Drain to Source Voltage



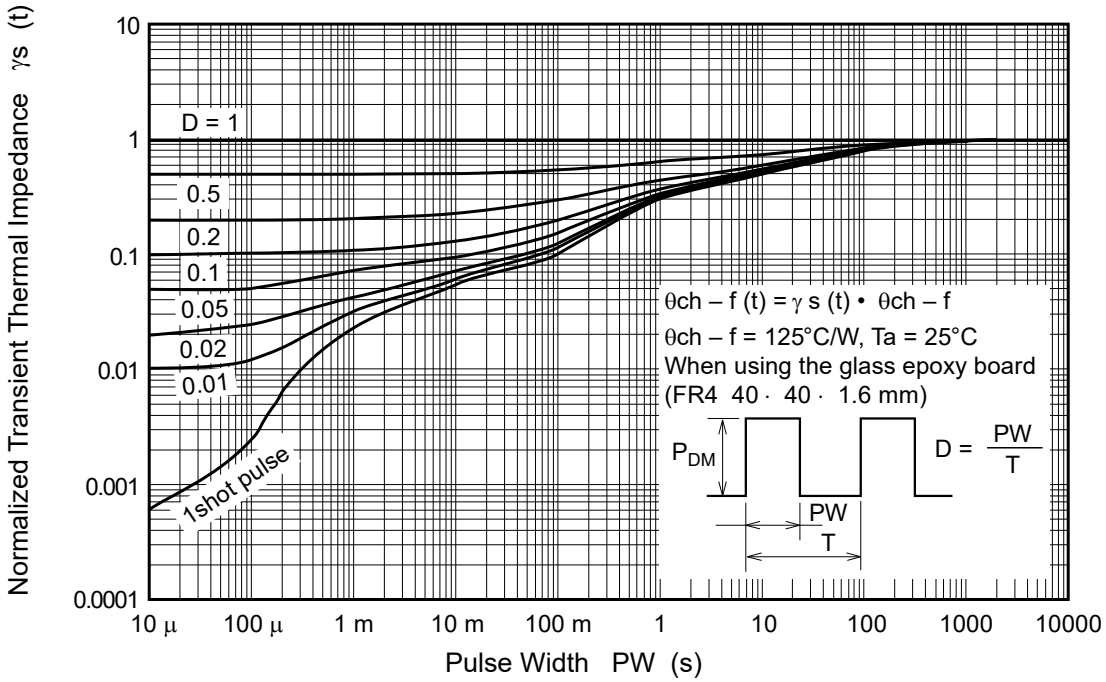
Gate to Source Voltage vs.
Shutdown Time of Load-Short Test



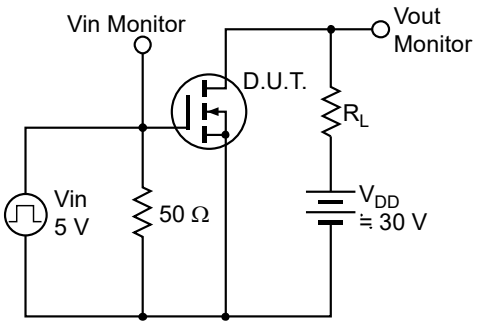
Shutdown Case Temperature vs.
Gate to Source Voltage



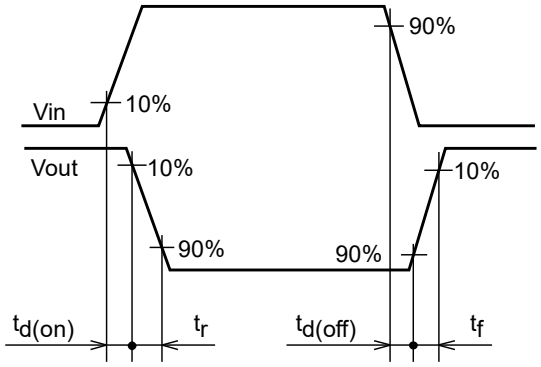
Normalized Transient Thermal Impedance vs. Pulse Width



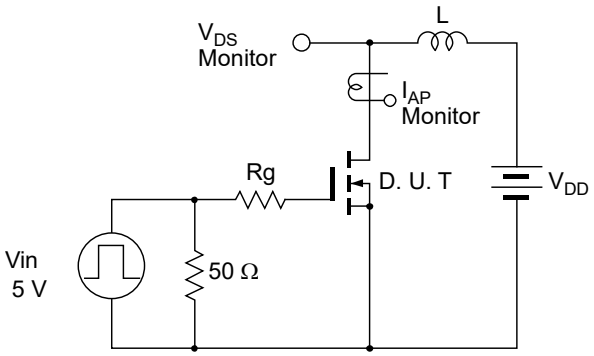
Switching Time Test Circuit



Waveform

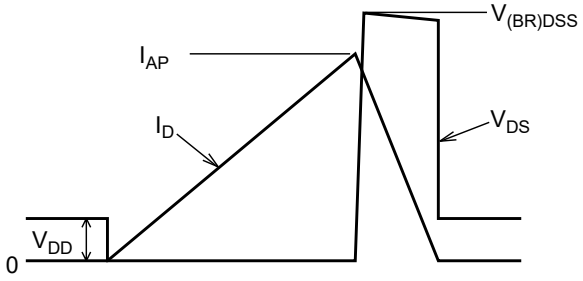


Avalanche Test Circuit



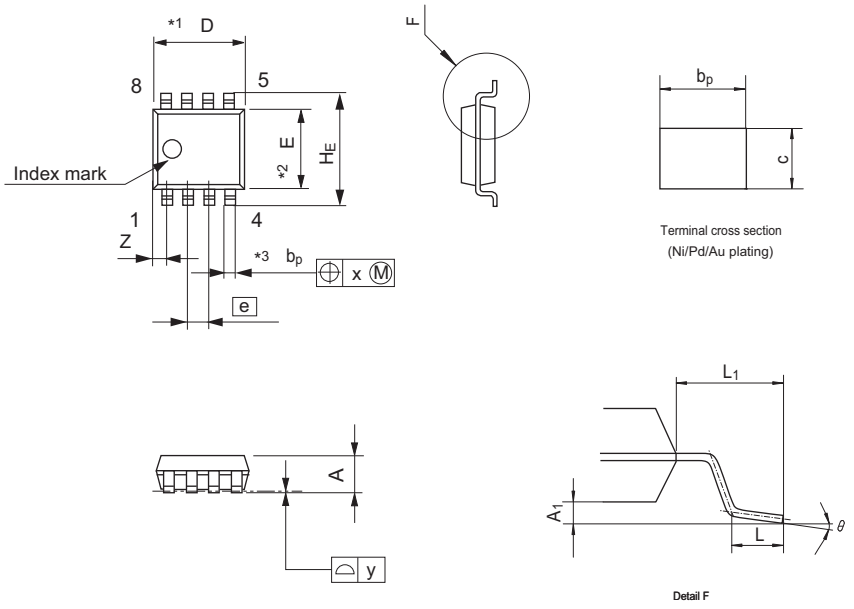
Avalanche Waveform

$$E_{AR} = \frac{1}{2} L \cdot I_{AP}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$



Package Dimensions

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



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
e	—	1.27	—
x	—	—	0.25
y	—	—	0.1
Z	—	—	0.75
L	0.40	0.60	1.27
L_1	—	1.08	—

Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJF0624JSP-00-J0	2500 pcs	Taping