

RJE0623JSP

–60V, –1.5A, P Channel Thermal FET
Power Switching

R07DS1470EJ0100
Rev.1.00
Jan 30, 2020

Description

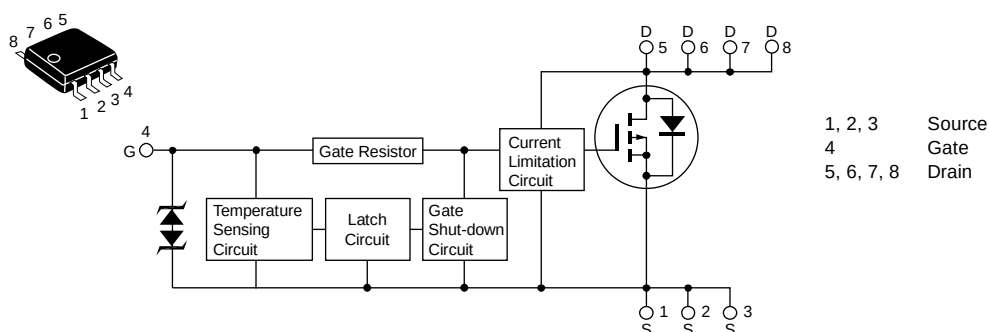
This FET has the over temperature shut-down capability sensing to the junction temperature. This FET has the built-in over temperature shut-down circuit in the gate area. And this circuit operation to shut-down the gate voltage in case of high junction temperature like applying over power consumption,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

Features

- Logic level operation (3 V Gate drive).
- Built-in the over temperature shut-down circuit.
- High endurance capability against to the short circuit.
- Hysteresis type shut down operation.
- High density mounting.
- Built-in the current limitation circuit.
- Power supply voltage applies 12 V.
- AEC-Q101compliant.

Outline

RENESAS Package code: PRSP0008DD-D
(Package name: SOP-8)



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 Note 3	–1.5	A
Body-drain diode reverse drain current	I_{DR}	–1.5	A
Avalanche current	I_{AP} Note 2	–1.5	A
Avalanche energy	E_{AR} Note 2	9.6	mJ
Channel dissipation	P_{ch} Note 1	1	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	–55 to +150	°C

Notes: 1. When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), $PW \leq 10$ s

2. $T_{ch} = 25^\circ\text{C}$, $R_g \geq 50 \Omega$

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	—	—	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}	—	—	-10	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
Return temperature	T _{hr}	—	105	—	°C	Channel temperature
Gate operation voltage	V _{op}	-3	—	-12	V	
Drain current (Current limitation value)	I _{D limit}	-1.5	—	—	A	V _{GS} = -12 V, V _{DS} = -10 V ^{Note 4}

Notes; 4. Pulse test

Electrical Characteristics

(Ta = 25°C)

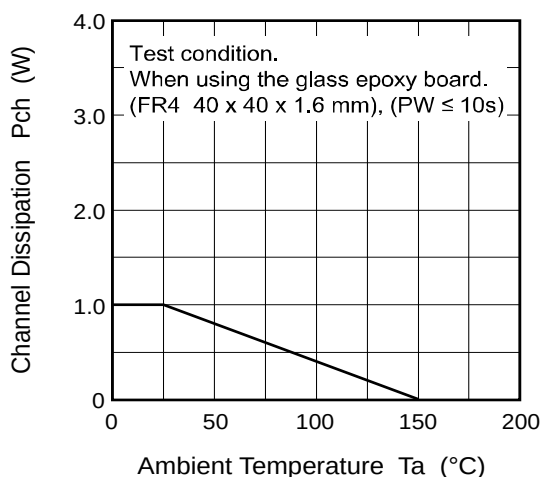
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I _D	-1.5	—	-12	A	V _{GS} = -3.5 V, V _{DS} = -10 V ^{Note 5}
	I _D	—	—	-40	mA	V _{GS} = -1.2 V, V _{DS} = -10 V
	I _D	-1.5	—	—	A	V _{GS} = -12 V, V _{DS} = -10 V ^{Note 5}
	I _D	-0.8	—	—	A	V _{GS} = -3 V, V _{DS} = -10 V ^{Note 5}
Drain to source 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
	V _{(BR)GSS}	2.5	—	—	V	I _G = 100 μA, V _{DS} = 0
Gate to source leak current	I _{GSS}	—	—	-100	μA	V _{GS} = -8 V, V _{DS} = 0
	I _{GSS}	—	—	-50	μA	V _{GS} = -3.5 V, V _{DS} = 0
	I _{GSS}	—	—	-10	μA	V _{GS} = -1.2 V, V _{DS} = 0
	I _{GSS}	—	—	100	μA	V _{GS} = 2.4 V, V _{DS} = 0
Input current (shut down)	I _{GS(OP)}	—	-0.8	—	mA	V _{GS} = -8 V, V _{DS} = 0
	I _{GS(OP)}	—	-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
	I _{DSS}	—	—	-10	μA	V _{DS} = -48 V, V _{GS} = 0 Ta = 125°C
Gate to source cutoff voltage	V _{GS(off)}	-0.9	—	-2.1	V	V _{DS} = -10 V, I _D = -1 mA
Forward transfer admittance	y _{fs}	1.5	2.7	—	S	I _D = -0.75 A, V _{GS} = -10 V ^{Note 5}
Static drain to source on state resistance	R _{DS(on)}	—	445	800	mΩ	I _D = -0.4 A, V _{GS} = -3V ^{Note 5}
	R _{DS(on)}	—	363	425	mΩ	I _D = -0.75 A, V _{GS} = -4 V ^{Note 5}
	R _{DS(on)}	—	272	350	mΩ	I _D = -0.75 A, V _{GS} = -10 V ^{Note 5}
Output capacitance	C _{oss}	—	213	—	pF	V _{DS} = -10 V, V _{GS} = 0, f = 1MHz
Turn-on delay time	t _{d(on)}	—	0.9	—	μs	V _{GS} = -10 V, I _D = -0.75 A, R _L = 40 Ω
Rise time	t _r	—	3.4	—	μs	
Turn-off delay time	t _{d(off)}	—	3.2	—	μs	
Fall time	t _f	—	6.3	—	μs	
Body-drain diode forward voltage	V _{DF}	—	-0.8	—	V	I _F = -1.5 A, V _{GS} = 0
Body-drain diode reverse recovery time	t _{rr}	—	70	—	ns	I _F = -1.5 A, V _{GS} = 0 di _F /dt = 50 A/μs
Over load shut down operation time ^{Note 6}	t _{os}	—	5.4	—	ms	V _{GS} = -5 V, V _{DD} = -16 V

Notes: 5. Pulse test

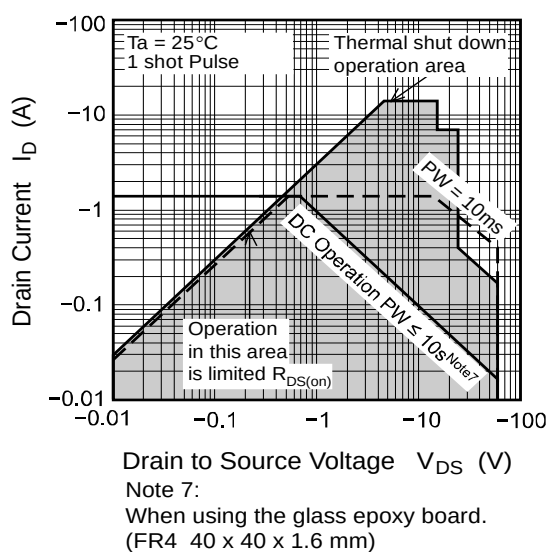
6. Including the junction temperature rise of the over loaded condition.

Main Characteristics

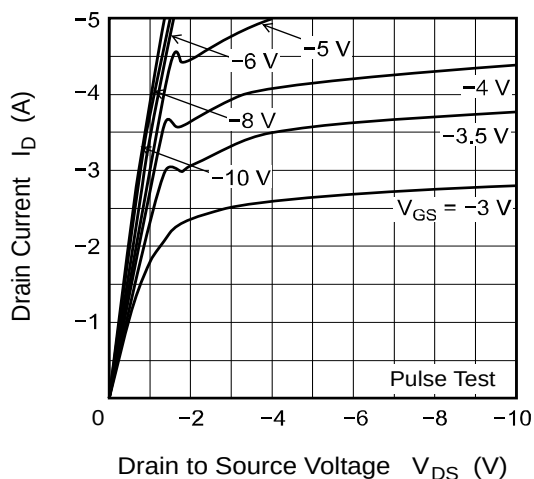
Power vs. Temperature Derating



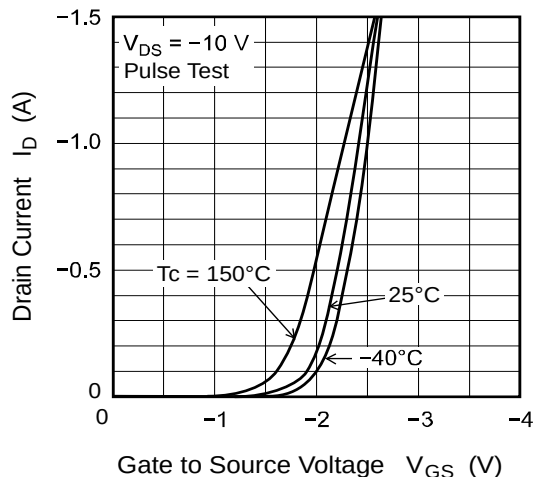
Maximum Safe Operation Area



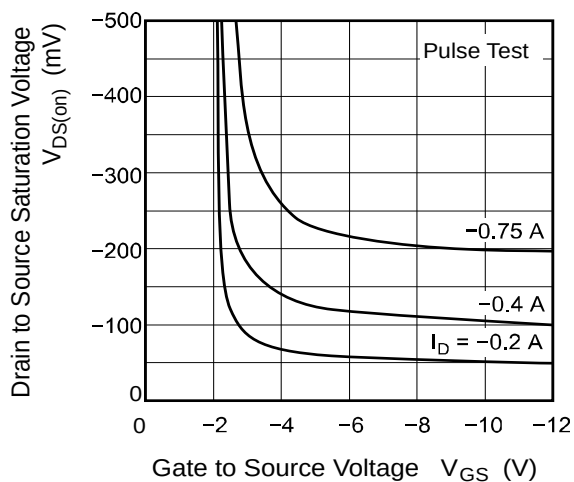
Typical Output Characteristics



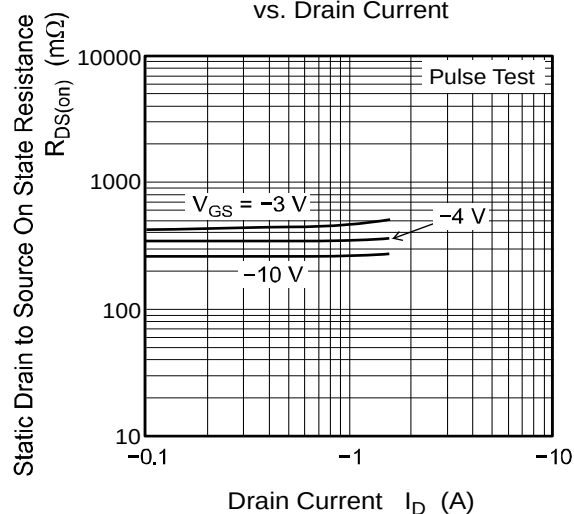
Typical Transfer Characteristics

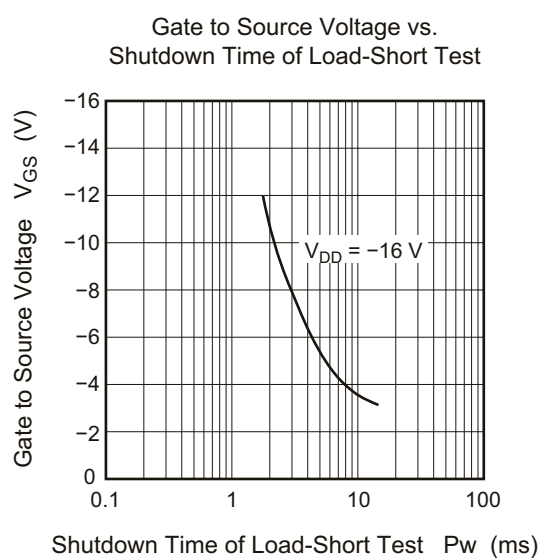
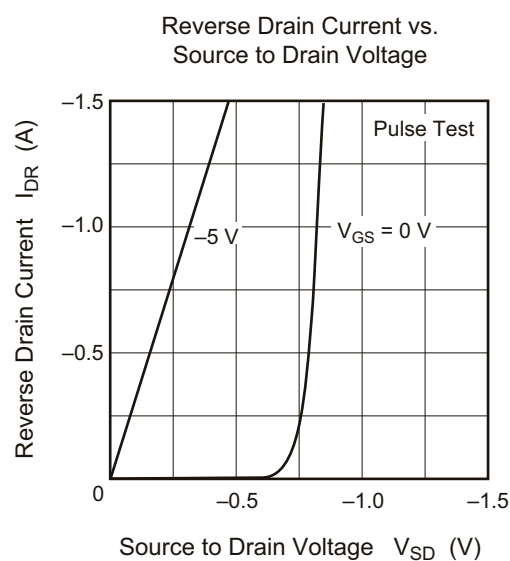
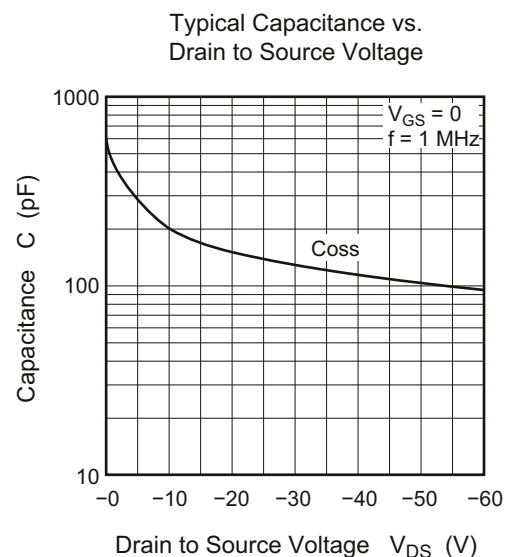
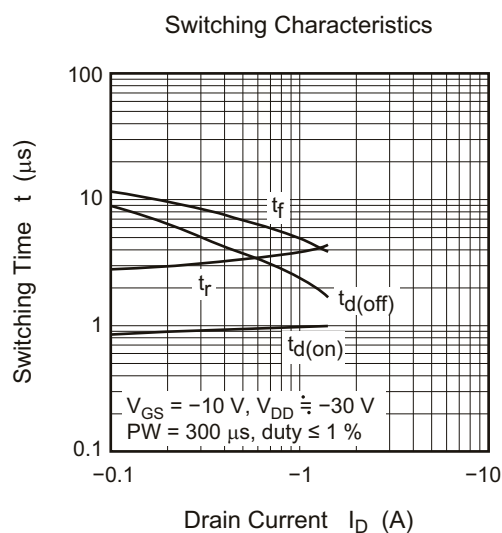
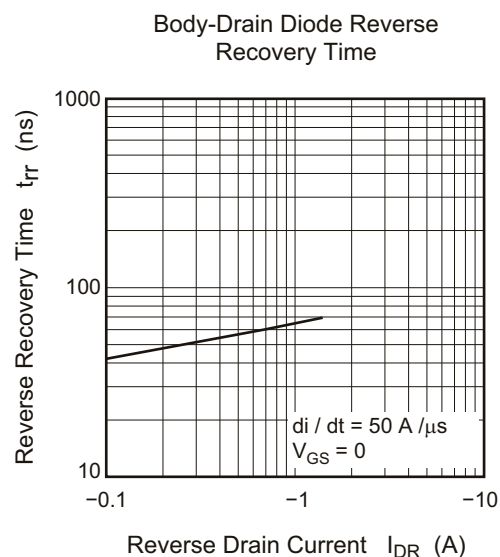
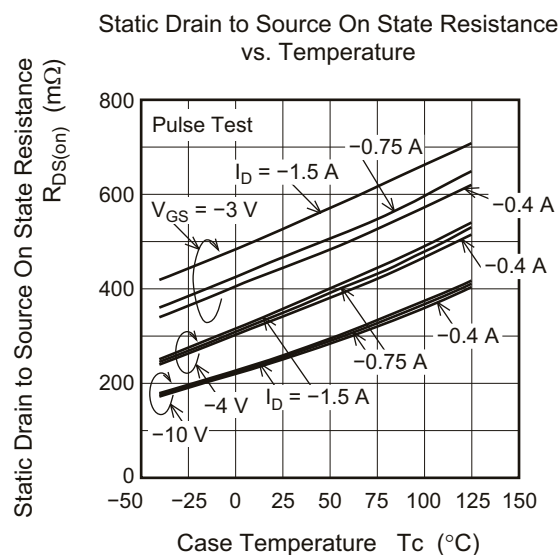


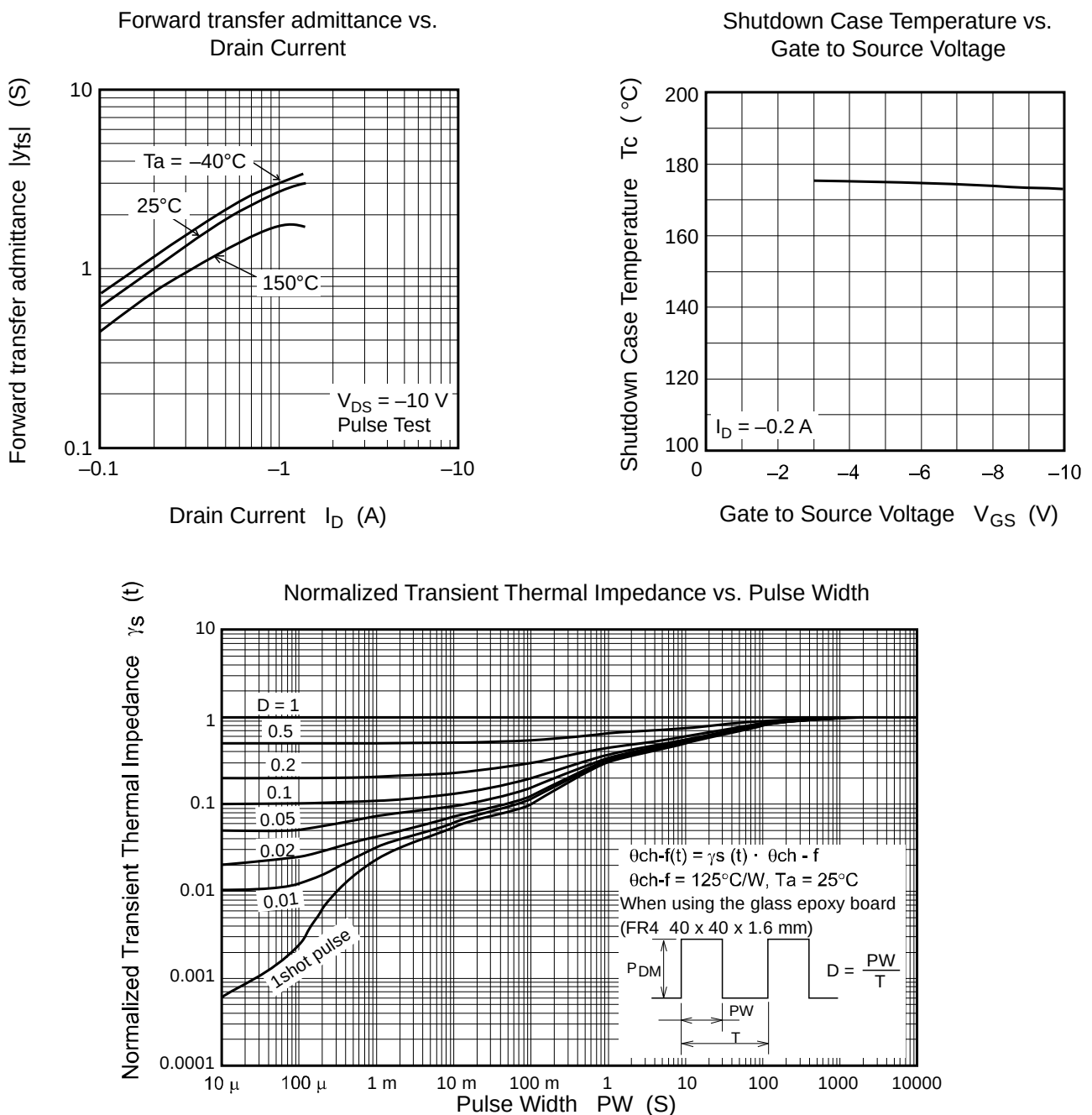
Drain Source Saturation Voltage vs. Gate to Source Voltage



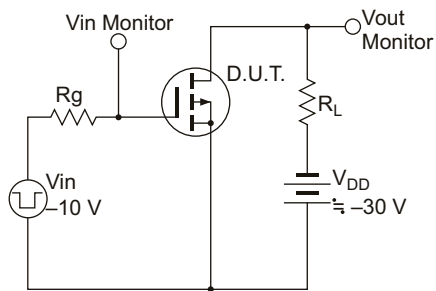
Static Drain to Source On State Resistance vs. Drain Current



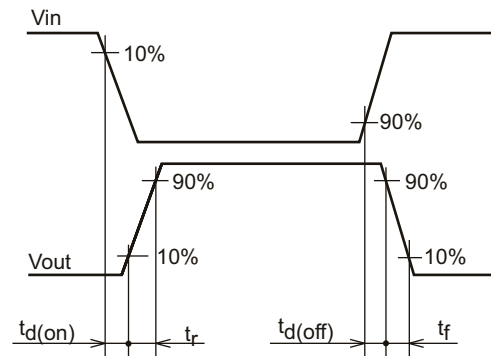




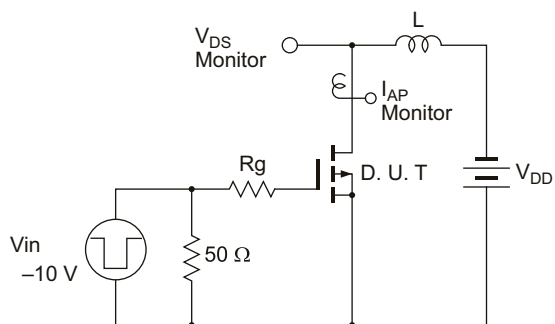
Switching Time Test Circuit



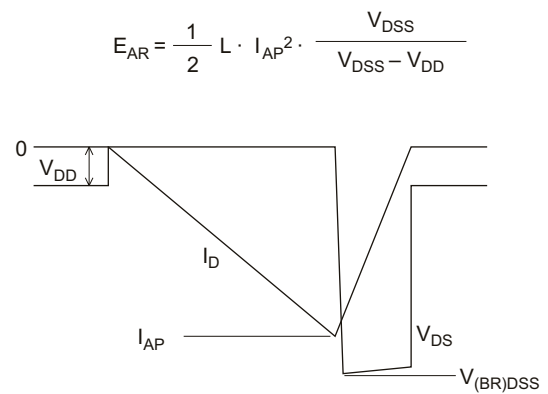
Waveform



Avalanche Test Circuit

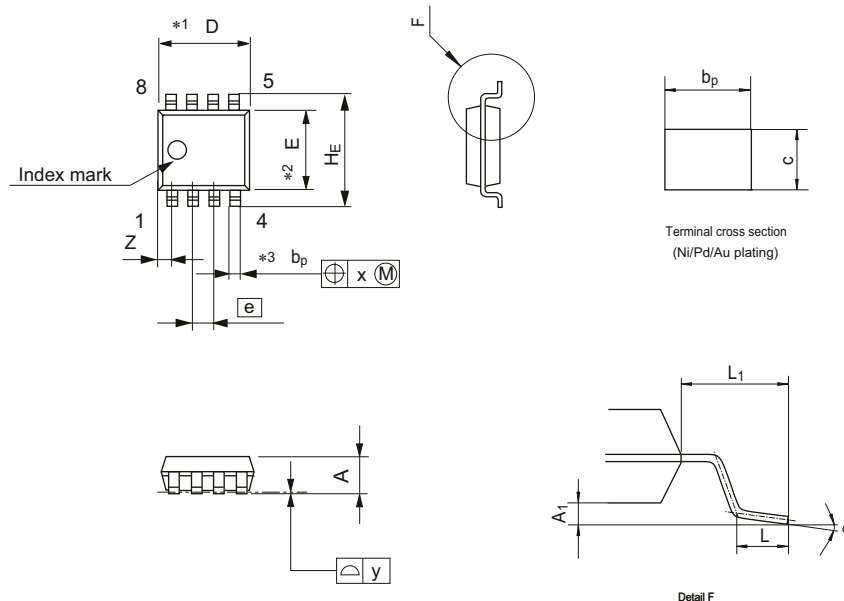


Avalanche Waveform



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
$\bar{e}$	—	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
RJE0623JSP-00-J0	2500 pcs/reel	Taping

Note: The symbol of 2nd "-" is occasionally presented as "#".

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(Rev.4.0-1 November 2017)



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Renesas Electronics Corporation
TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 101-T01, Floor 1, Building 7, Yard No. 7, 8th Street, Shangdi, Haidian District, Beijing 100085, China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai 200333, China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit No 3A-1 Level 3A Tower 8 UOA Business Park, No 1 Jalan Pengaturcara U1/51A, Seksyen U1, 40150 Shah Alam, Selangor, Malaysia
Tel: +60-3-5022-1288, Fax: +60-3-5022-1290

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338