

RJF0618JPE

60V-40A Silicon N Channel Thermal FET
Power Switching

R07DS1069EJ0101
Rev.1.01
Dec 25, 2013

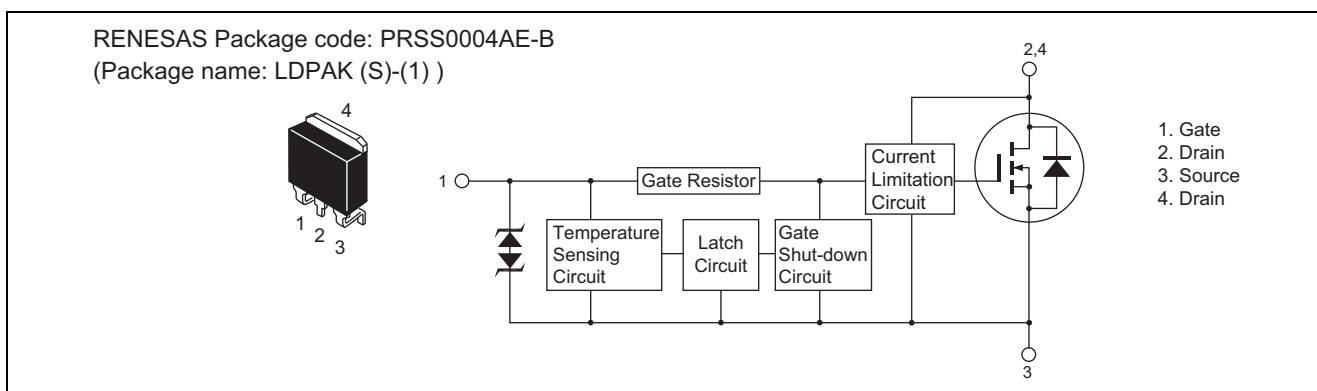
Description

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 (4 V Gate drive).
- Built-in the over temperature shut-down circuit.
- High endurance capability against to the short circuit.
- Latch type shut down operation (need 0 voltage recovery).
- Built-in the current limitation circuit.
- Power supply voltage applies 12 V and 24 V.
- AEC-Q101 Compliant
- High endurance capability against to ESD.

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 ^{Note 3}	40	A
Body-drain diode reverse drain current	I_{DR}	40	A
Avalanche current	I_{AP} ^{Note 2}	12	A
Avalanche energy	E_{AR} ^{Note 2}	617	mJ
Channel dissipation	P_{ch} ^{Note 1}	50	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Notes: 1. Value at $T_c = 25^\circ\text{C}$
 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}	3.5	—	—	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}	—	—	1	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
Gate operation voltage	V _{op}	3.5	—	12	V	
Drain current (Current limitation value)	I _{D limit}	40	—	—	A	V _{GS} = 5 V, V _{DS} = 10 V ^{Note 4}

Note; 4. Pulse test

Electrical Characteristics

(Ta = 25°C)

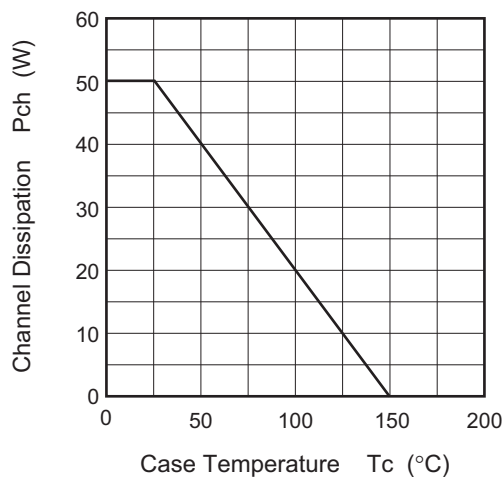
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I _{D1}	—	—	67	A	V _{GS} = 3.5 V, V _{DS} = 10 V ^{Note 5}
	I _{D2}	—	—	10	mA	V _{GS} = 1.2 V, V _{DS} = 10 V
	I _{D3}	40	—	—	A	V _{GS} = 5 V, V _{DS} = 10 V ^{Note 5}
Drain to source breakdown voltage	V _{(BR)DSS}	60	—	—	V	I _D = 10 mA, V _{GS} = 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 _{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, T _c = 110°C
Gate to source cutoff voltage	V _{GS(off)}	1.1	—	2.1	V	V _{DS} = 10 V, I _D = 1 mA
Forward transfer admittance	y _{fs}	20	41	—	S	I _D = 20 A, V _{DS} = 10 V ^{Note 5}
Static drain to source on state resistance	R _{DS(on)}	—	17	25	mΩ	I _D = 20 A, V _{GS} = 4 V ^{Note 5}
	R _{DS(on)}	—	12	19	mΩ	I _D = 20 A, V _{GS} = 10 V ^{Note 5}
Output capacitance	C _{oss}	—	795	—	pF	V _{DS} = 10 V, V _{GS} = 0, f = 1MHz
Turn-on delay time	t _{d(on)}	—	6	—	μs	V _{GS} = 10 V, I _D = 20 A, R _L = 1.5 Ω
Rise time	t _r	—	21.6	—	μs	
Turn-off delay time	t _{d(off)}	—	7.2	—	μs	
Fall time	t _f	—	12.5	—	μs	
Body-drain diode forward voltage	V _{DF}	—	0.9	—	V	I _F = 40 A, V _{GS} = 0 ^{Note 5}
Body-drain diode reverse recovery time	t _{rr}	—	113	—	ns	I _F = 40 A, V _{GS} = 0 di/dt = 50 A/μs
Over load shut down operation time ^{Note 6}	t _{os1}	—	0.48	—	ms	V _{GS} = 5 V, V _{DD} = 16 V
	t _{os1}	—	0.31	—	ms	V _{GS} = 5 V, V _{DD} = 24 V

Notes: 5. Pulse test

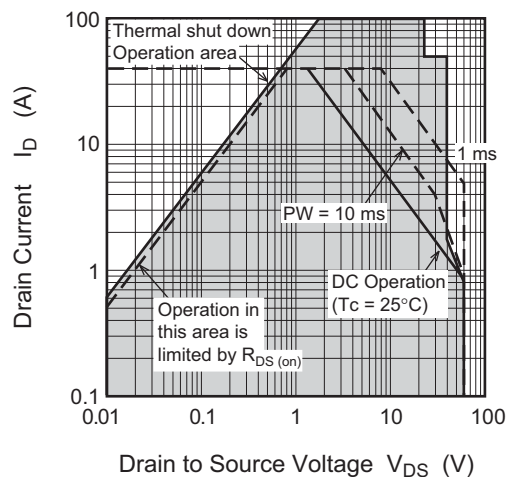
6. Including the junction temperature rise of the over loaded condition.

Main Characteristics

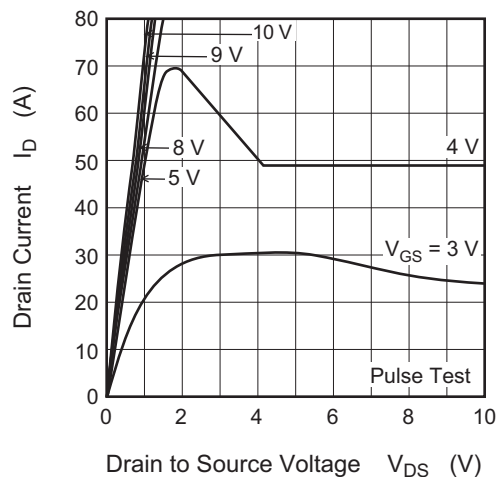
Power vs. Temperature Derating



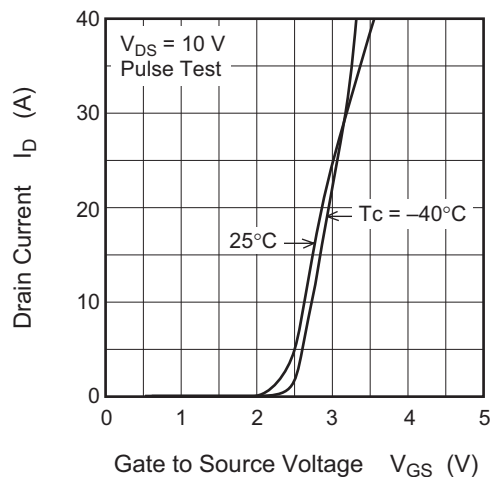
Maximum Safe Operation Area



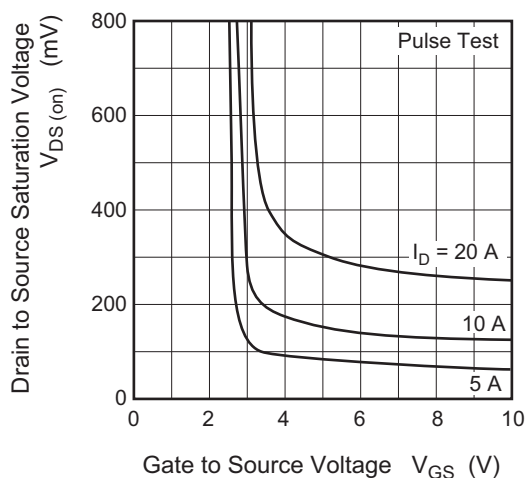
Typical Output Characteristics



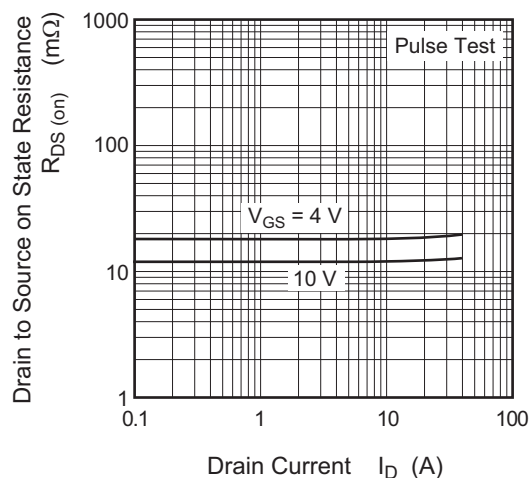
Typical Transfer Characteristics

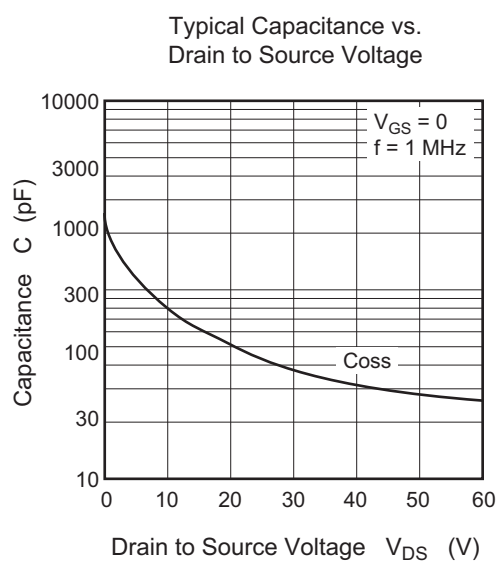
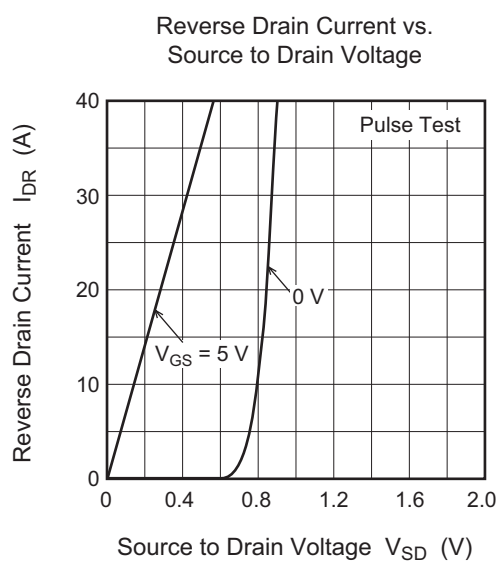
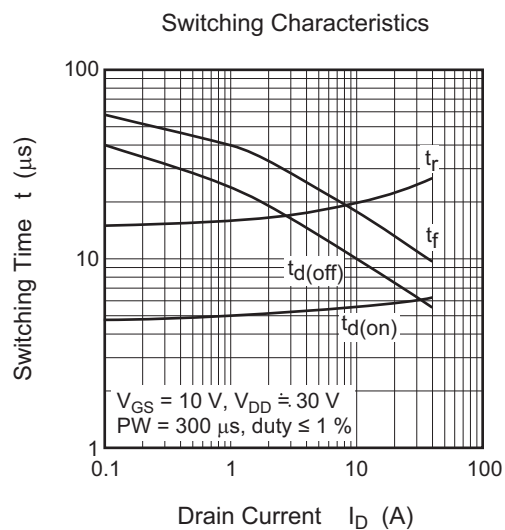
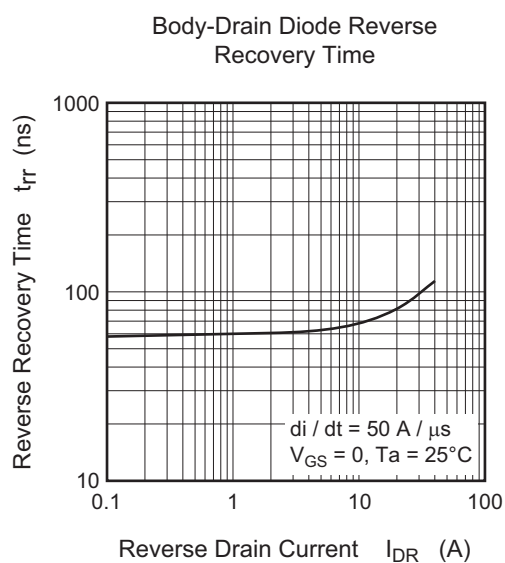
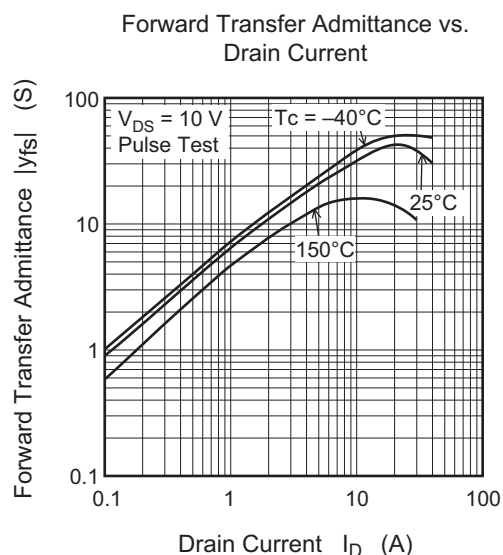
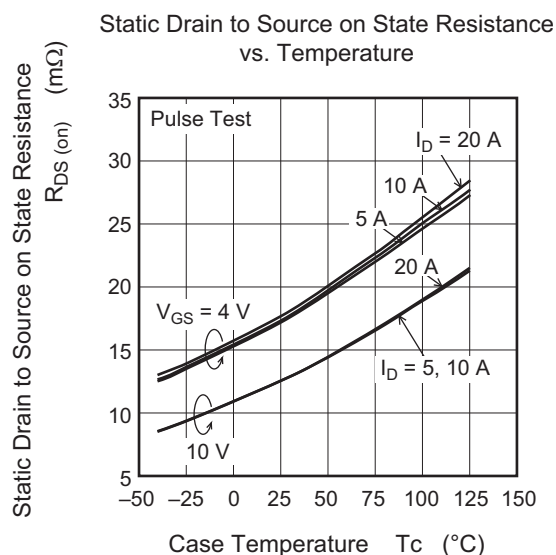


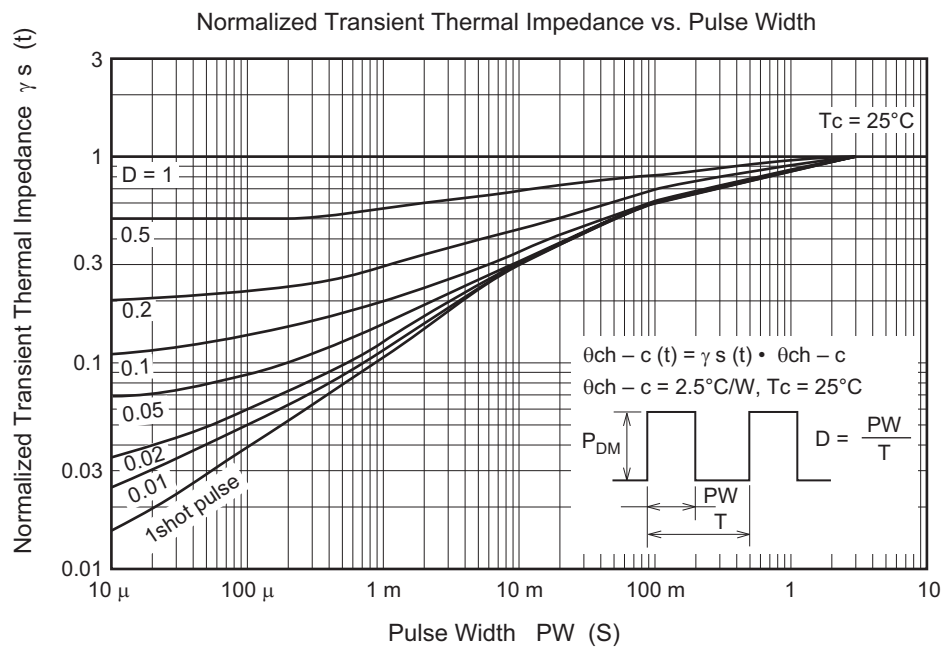
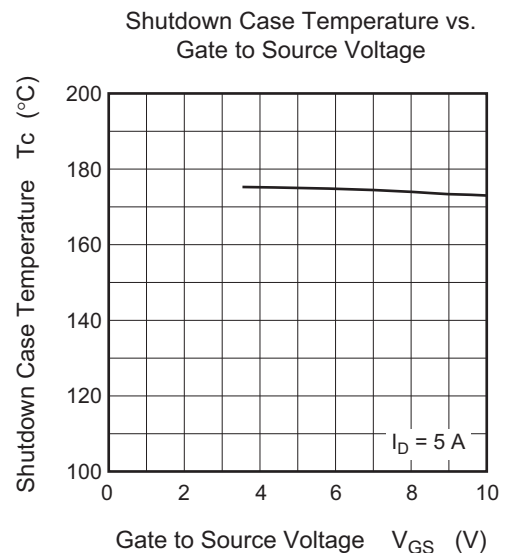
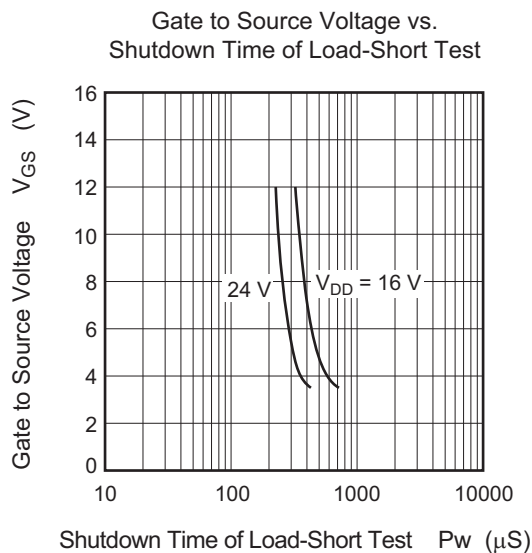
Drain to Source Saturation Voltage vs. Gate to Source Voltage



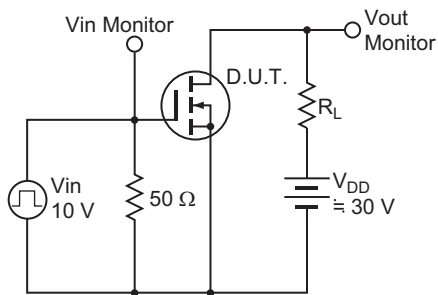
Static Drain to Source on State Resistance vs. Drain Current



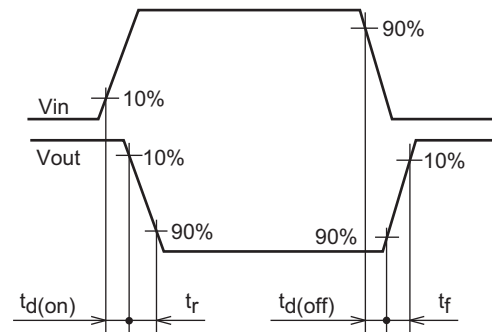




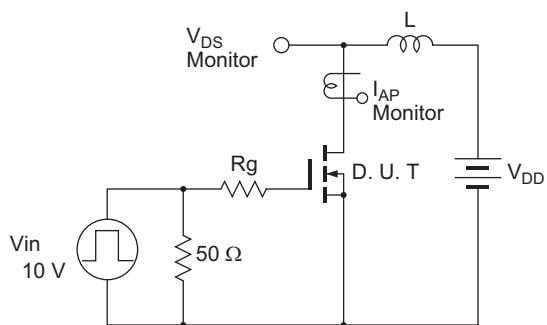
Switching Time Test Circuit



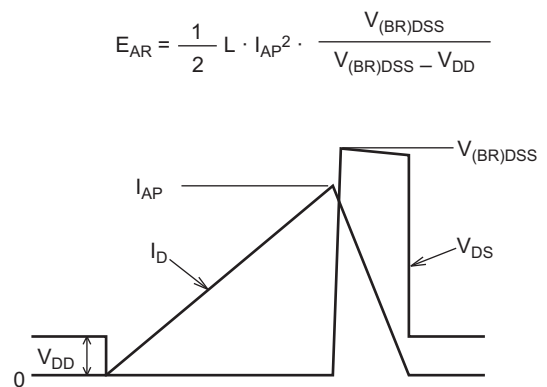
Waveform



Avalanche Test Circuit



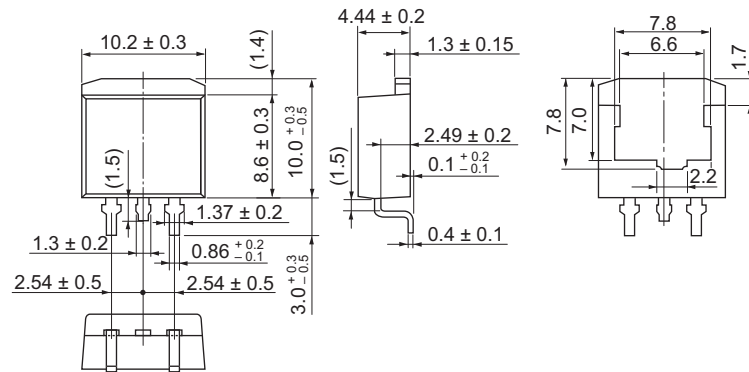
Avalanche Waveform



Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
LDBAK(S)-(1)	SC-83	PRSS0004AE-B	LDBAK(S)-(1) / LDBAK(S)-(1)V	1.30g

Unit: mm



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJF0618JPE-00-J3	1000 pcs	Taping

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

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Renesas Electronics America Inc.

2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited

1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH

Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.

7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.

Unit 301, Tower A, Central Towers, 555 LanGao Rd., Putuo District, Shanghai, China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited

Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.

13F, No. 363, Fu Shing North Road, Taipei, 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 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.

12F., 234 Teheran-ro, Gangnam-Gu, Seoul, 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141