

# RJF0611DPE

Silicon N Channel MOS FET Series  
Power Switching

R07DS0717EJ0100  
Rev.1.00  
Apr 17, 2012

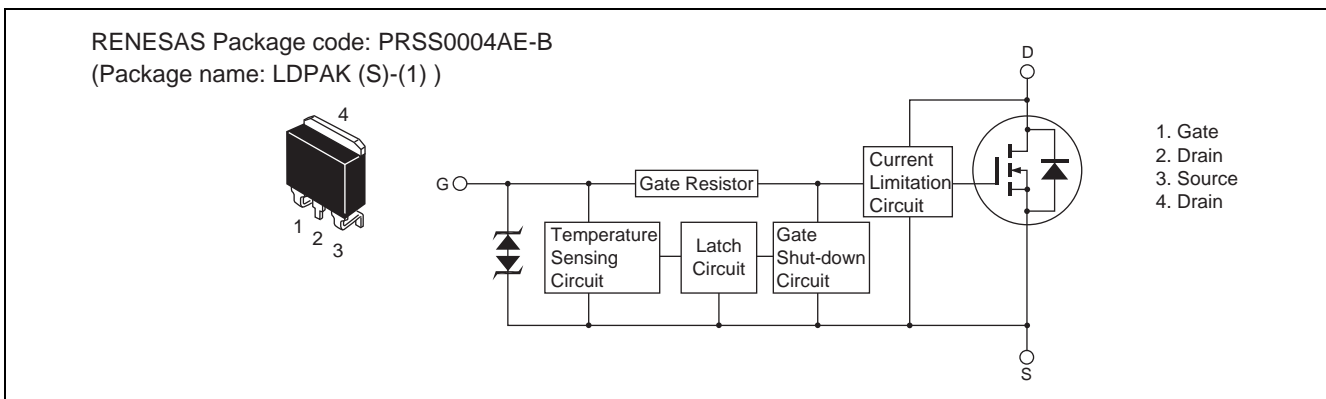
## Description

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.
- For Industrial applications

## 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	$I_D$ <sup>Note 3</sup>	30	A
Body-drain diode reverse drain current	$I_{DR}$	30	A
Avalanche current	$I_{AP}$ <sup>Note 2</sup>	6.7	A
Avalanche energy	$E_{AR}$ <sup>Note 2</sup>	192	mJ
Channel dissipation	$P_{ch}$ <sup>Note 1</sup>	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 <sub>IH</sub>	3.5	—	—	V	
	V <sub>IL</sub>	—	—	1.2	V	
Input current (Gate non shut down)	I <sub>IH1</sub>	—	—	100	μA	V <sub>i</sub> = 8 V, V <sub>DS</sub> = 0
	I <sub>IH2</sub>	—	—	50	μA	V <sub>i</sub> = 3.5 V, V <sub>DS</sub> = 0
	I <sub>IL</sub>	—	—	1	μA	V <sub>i</sub> = 1.2 V, V <sub>DS</sub> = 0
Input current (Gate shut down)	I <sub>IH(sd)1</sub>	—	0.8	—	mA	V <sub>i</sub> = 8 V, V <sub>DS</sub> = 0
	I <sub>IH(sd)2</sub>	—	0.35	—	mA	V <sub>i</sub> = 3.5 V, V <sub>DS</sub> = 0
Shut down temperature	T <sub>sd</sub>	—	175	—	°C	Channel temperature
Gate operation voltage	V <sub>op</sub>	3.5	—	12	V	
Drain current (Current limitation value)	I <sub>D limit</sub>	30	—	—	A	V <sub>GS</sub> = 5 V, V <sub>DS</sub> = 10 V <sup>Note 4</sup>

Note; 4. Pulse test

## Electrical Characteristics

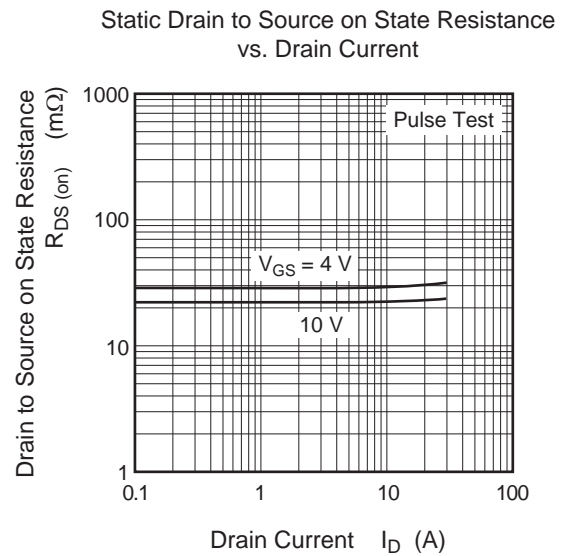
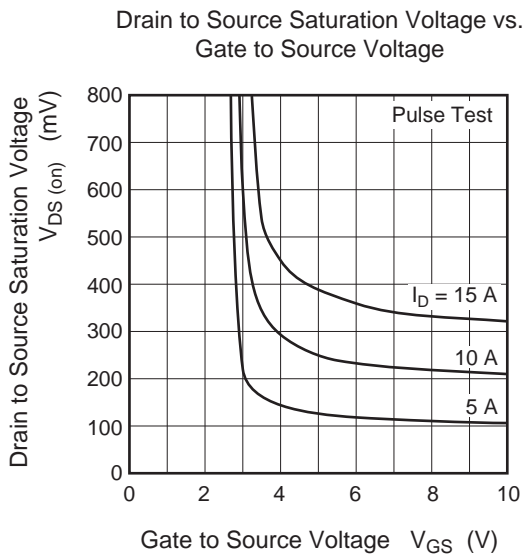
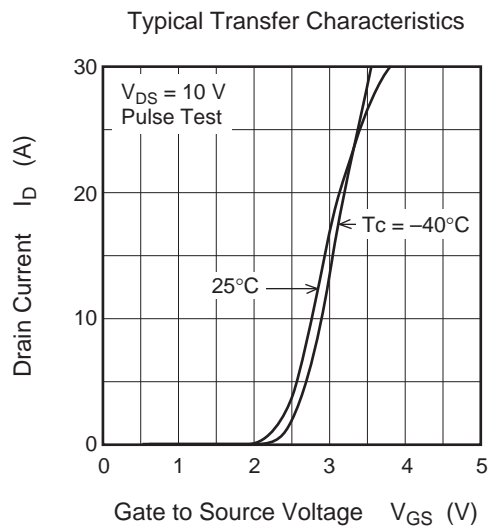
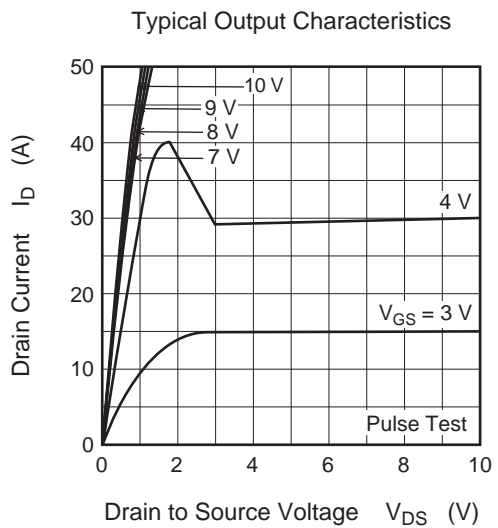
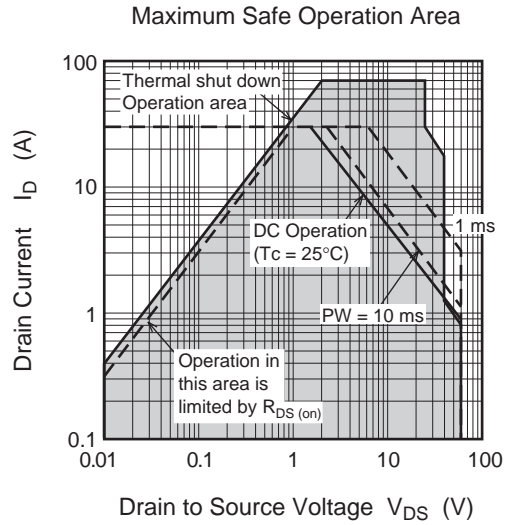
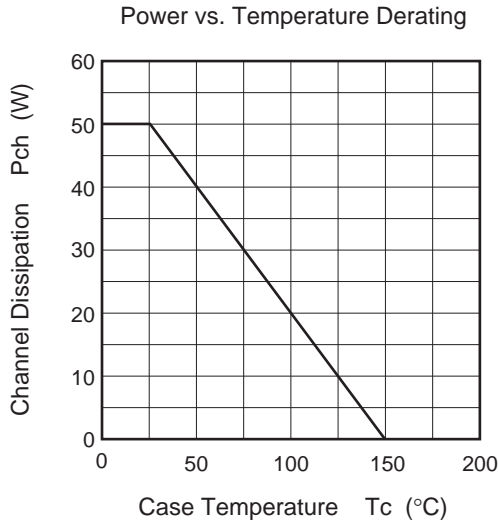
(Ta = 25°C)

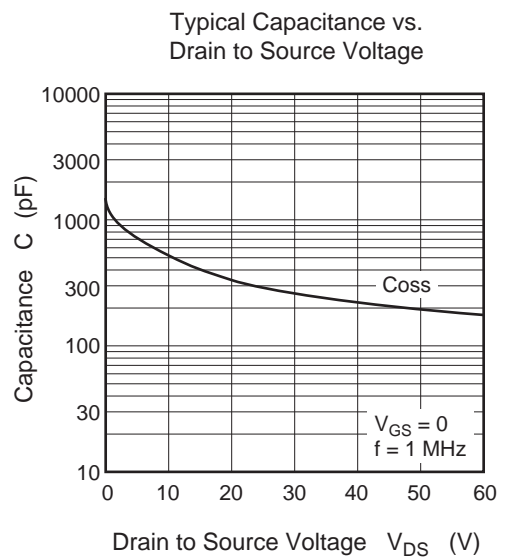
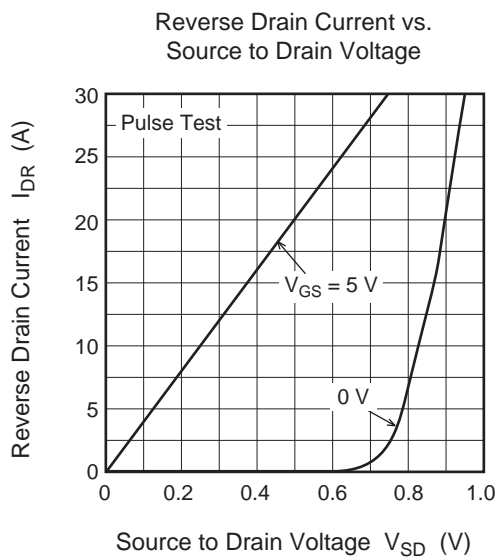
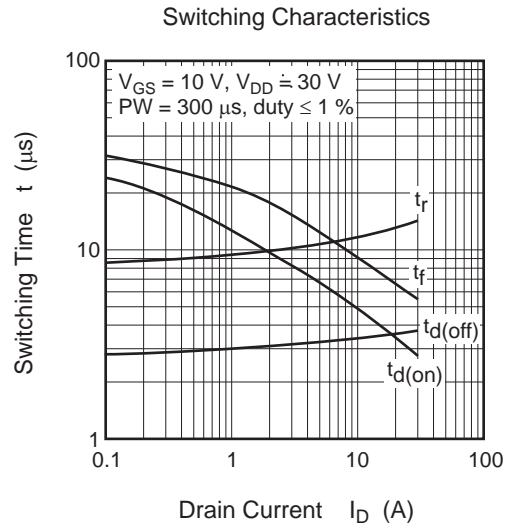
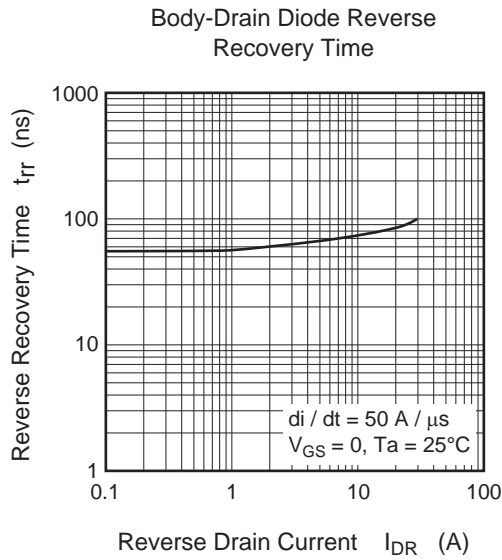
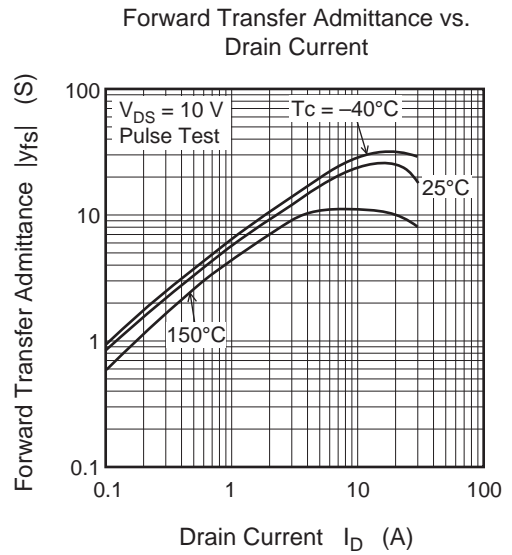
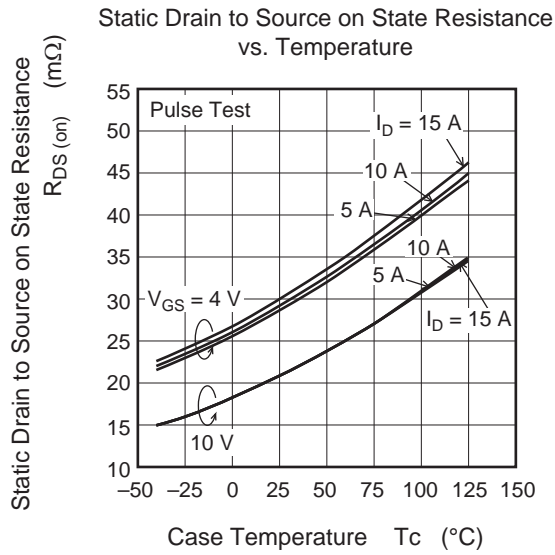
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I <sub>D1</sub>	—	—	45	A	V <sub>GS</sub> = 3.5 V, V <sub>DS</sub> = 10 V <sup>Note 5</sup>
	I <sub>D2</sub>	—	—	10	mA	V <sub>GS</sub> = 1.2 V, V <sub>DS</sub> = 10 V
	I <sub>D3</sub>	30	—	—	A	V <sub>GS</sub> = 5 V, V <sub>DS</sub> = 10 V <sup>Note 5</sup>
Drain to source breakdown voltage	V <sub>(BR)DSS</sub>	60	—	—	V	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0
Gate to source breakdown voltage	V <sub>(BR)GSS</sub>	16	—	—	V	I <sub>G</sub> = 800 μA, V <sub>DS</sub> = 0
	V <sub>(BR)GSS</sub>	-2.5	—	—	V	I <sub>G</sub> = -100 μA, V <sub>DS</sub> = 0
Gate to source leak current	I <sub>GSS1</sub>	—	—	100	μA	V <sub>GS</sub> = 8 V, V <sub>DS</sub> = 0
	I <sub>GSS2</sub>	—	—	50	μA	V <sub>GS</sub> = 3.5 V, V <sub>DS</sub> = 0
	I <sub>GSS3</sub>	—	—	1	μA	V <sub>GS</sub> = 1.2 V, V <sub>DS</sub> = 0
	I <sub>GSS4</sub>	—	—	-100	μA	V <sub>GS</sub> = -2.4 V, V <sub>DS</sub> = 0
Input current (shut down)	I <sub>GS(OP)1</sub>	—	0.8	—	mA	V <sub>GS</sub> = 8 V, V <sub>DS</sub> = 0
	I <sub>GS(OP)2</sub>	—	0.35	—	mA	V <sub>GS</sub> = 3.5 V, V <sub>DS</sub> = 0
Zero gate voltage drain current	I <sub>DSS</sub>	—	—	10	μA	V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0
Gate to source cutoff voltage	V <sub>GS(off)</sub>	1.1	—	2.1	V	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA
Forward transfer admittance	y <sub>fs</sub>	12	27	—	S	I <sub>D</sub> = 15 A, V <sub>DS</sub> = 10 V <sup>Note 5</sup>
Static drain to source on state resistance	R <sub>DS(on)</sub>	—	30	40	mΩ	I <sub>D</sub> = 15 A, V <sub>GS</sub> = 4 V <sup>Note 5</sup>
	R <sub>DS(on)</sub>	—	21	30	mΩ	I <sub>D</sub> = 15 A, V <sub>GS</sub> = 10 V <sup>Note 5</sup>
Output capacitance	C <sub>oss</sub>	—	523	—	pF	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0, f = 1MHz
Turn-on delay time	t <sub>d(on)</sub>	—	3.8	—	μs	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A, R <sub>L</sub> = 2 Ω
Rise time	t <sub>r</sub>	—	13.5	—	μs	
Turn-off delay time	t <sub>d(off)</sub>	—	4.1	—	μs	
Fall time	t <sub>f</sub>	—	7.3	—	μs	
Body-drain diode forward voltage	V <sub>DF</sub>	—	0.9	—	V	I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0
Body-drain diode reverse recovery time	t <sub>rr</sub>	—	110	—	ns	I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0 di <sub>F</sub> /dt = 50 A/μs
Over load shut down operation time <sup>Note 6</sup>	t <sub>os1</sub>	—	0.34	—	ms	V <sub>GS</sub> = 5 V, V <sub>DD</sub> = 16 V
	t <sub>os2</sub>	—	0.23	—	ms	V <sub>GS</sub> = 5 V, V <sub>DD</sub> = 24 V

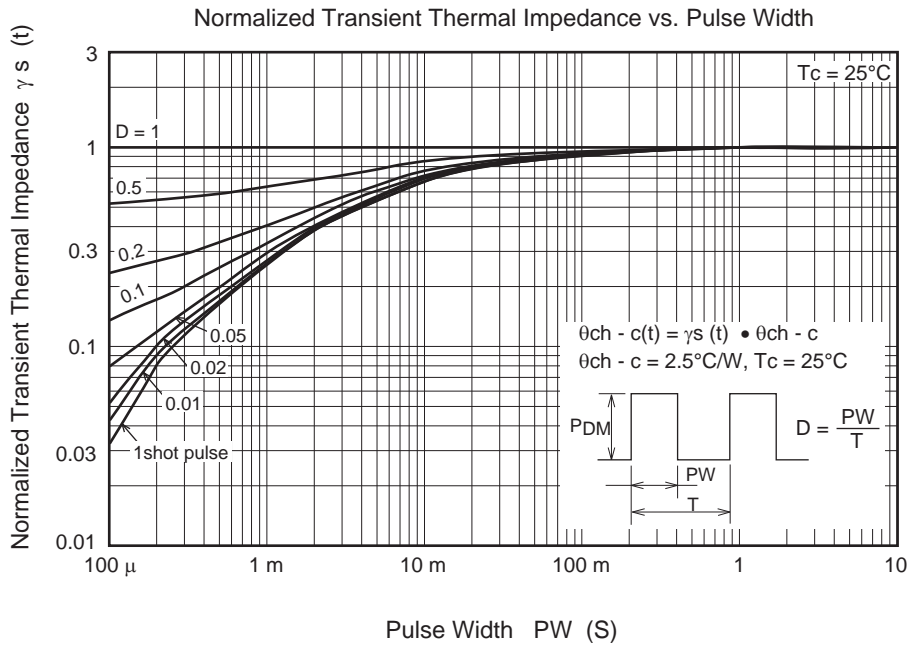
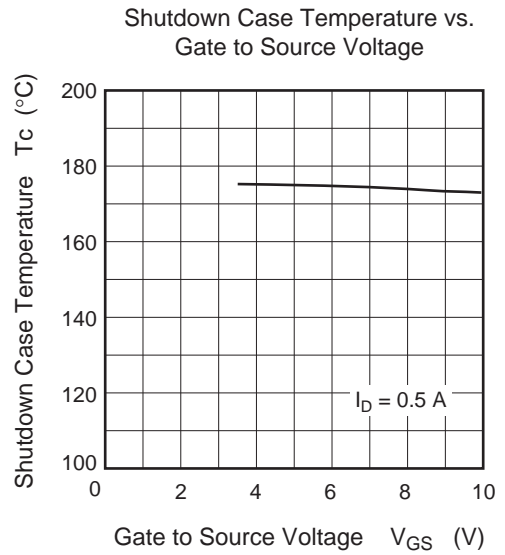
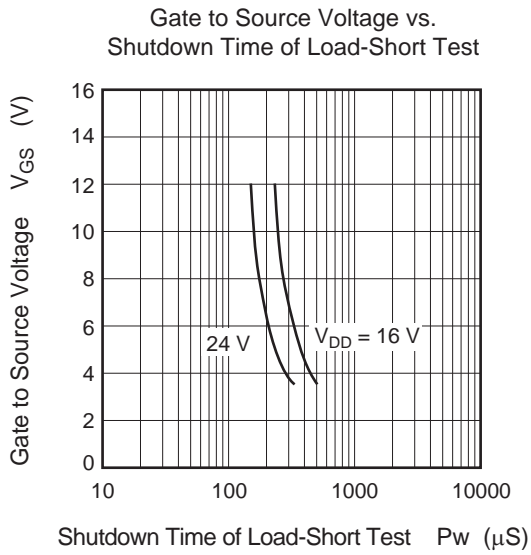
Notes: 5. Pulse test

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

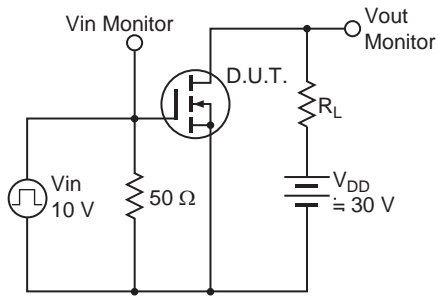
### Main Characteristics



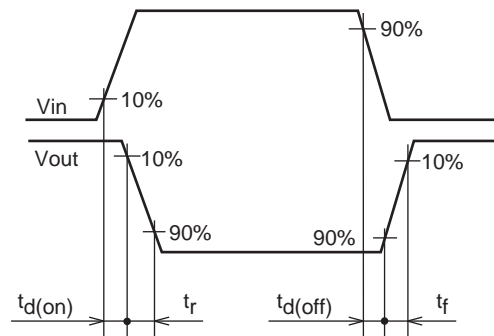




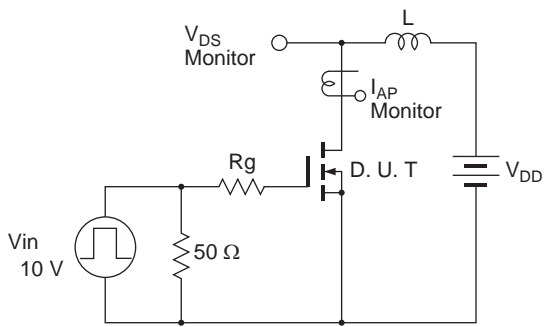
Switching Time Test Circuit



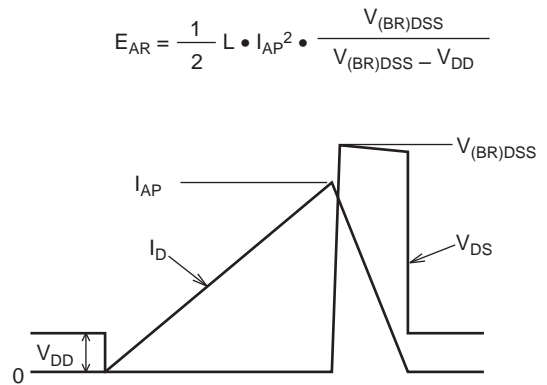
Waveform



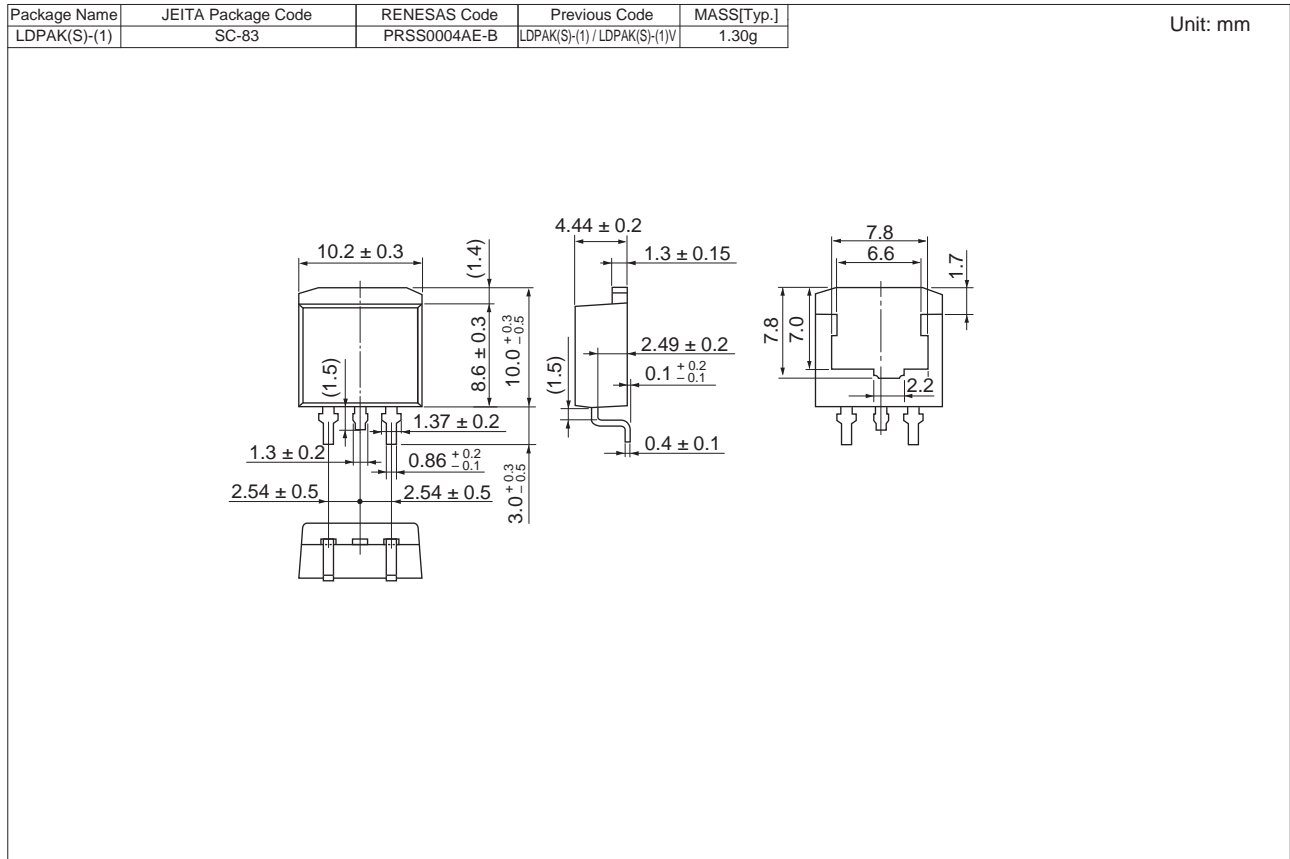
Avalanche Test Circuit



Avalanche Waveform



### Package Dimensions



### Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJF0611DPE-00-J3	1000 pcs	Taping

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

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