RJE0625JPV

P Channel Thermal FET Series
Power Switching

R07DS1529EJ0100
Rev.1.00
Mar 30, 2023

Description

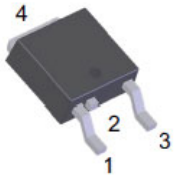
This FET has the over temperature shut-down capability sensing to the junction temperature. This FET has the built-in over temperature shut-down circuit in the gate area. And this circuit operation to shut-down the gate voltage in case of high junction temperature like applying over power consumption,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

Features

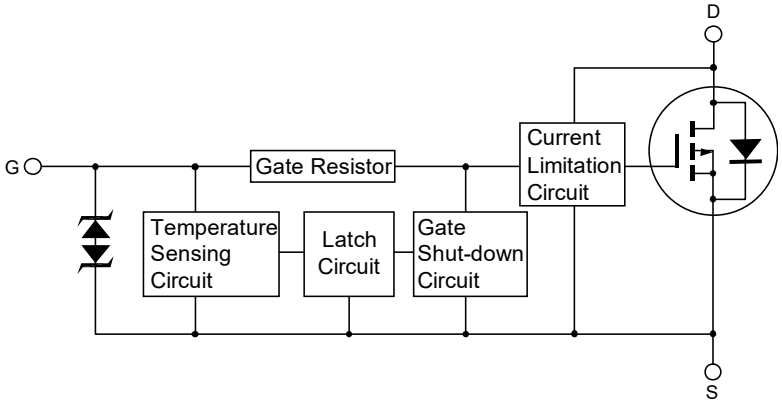
- Logic level operation (–6 V Gate drive).
- Built-in the over temperature shut-down circuit.
- High endurance capability against to the short circuit.
- Latch type shut down operation (need 0 voltage recovery).
- Built-in the current limitation circuit.
- AEC-Q101 Rev-E Compliant

Outline

RENESAS Package code: PRSS0004ZP-A
(Package name: MP-3ZP)



1. Gate
2. Drain
3. Source
4. Fin (Drain)



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	–17	A
Body-drain diode reverse drain current	I_{DR}	–17	A
Avalanche current	I_{AP} Note 2	–8	A
Avalanche energy	E_{AR} Note 2	274	mJ
Channel dissipation	Pch Note 1	50	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55～+150	°C

Notes: 1. Value at Tc = 25°C
2. Tch = 25°C, Rg ≥ 50 Ω
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 (dv/dt V_{GS} ≥ 500 V/ms)
Gate operation voltage	Vop	–3.5	—	–12	V	
Drain current (Current limitation value)	$I_{D\ limt}$	–17	—	—	A	V_{GS} = –12 V, V_{DS} = –10 V Note 4

Notes; 4. Pulse test

Electrical Characteristics

(Ta = 25°C)

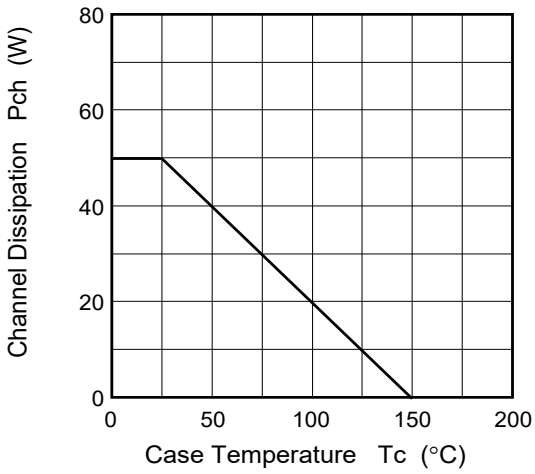
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	—	—	–12	A	V_{GS} = –3.5 V, V_{DS} = –10 V Note 5
	I_{D2}	—	—	–10	mA	V_{GS} = –1.2 V, V_{DS} = –10 V
	I_{D3}	–17	—	—	A	V_{GS} = –12 V, V_{DS} = –10 V Note 5
Drain to source breakdown voltage	$V_{(BR)DSS}$	–60	—	—	V	I_D = –10 mA, V_{GS} = 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} = –60 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–2.2	—	–3.4	V	V_{DS} = –10 V, I_D = –1 mA
Forward transfer admittance	$\|y_{fs}\|$	8.4	14.9	—	S	I_D = –10 A, V_{DS} = –10 V Note 5
Static drain to source on state resistance	$R_{DS(on)}$	—	46.6	61	mΩ	I_D = –10 A, V_{GS} = –6 V Note 5
	$R_{DS(on)}$	—	36.8	45	mΩ	I_D = –10 A, V_{GS} = –10 V Note 5
Output capacitance	Coss	—	515	—	pF	V_{DS} = –10 V, V_{GS} = 0, f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	6.48	—	μs	V_{GS} = -10 V, I_D= –10 A, R_L = 3 Ω
Rise time	t_r	—	7.09	—	μs	
Turn-off delay time	$t_{d(off)}$	—	2.06	—	μs	
Fall time	t_f	—	2.07	—	μs	
Body-drain diode forward voltage	V_{DF}	—	–0.9	—	V	I_F = –17 A, V_{GS} = 0
Body-drain diode reverse recovery time	t_{rr}	—	91.1	—	ns	I_F = –17 A, V_{GS} = 0 di_F/dt = 50 A/μs
Over load shut down operation time Note 6	t_{os1}	—	1.7	—	ms	V_{GS} = –6 V, V_{DD} = –16 V

Notes: 5. Pulse test

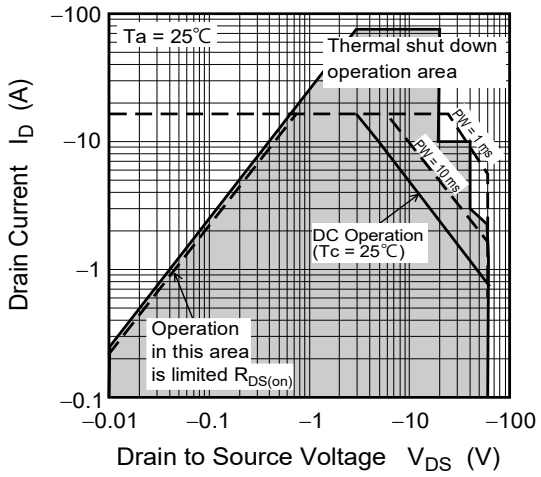
6. Including the junction temperature rise of the over loaded condition.

Main Characteristics

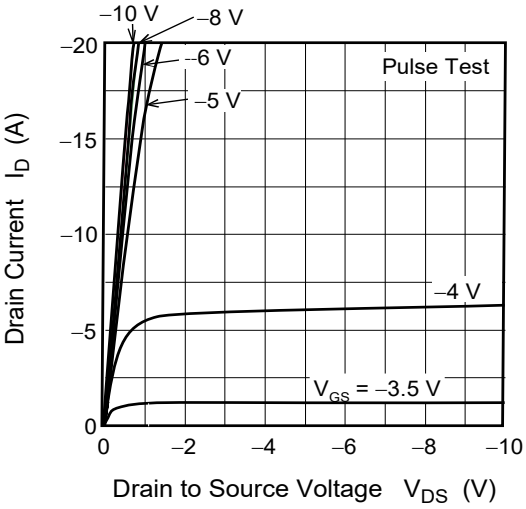
Power vs. Temperature Derating



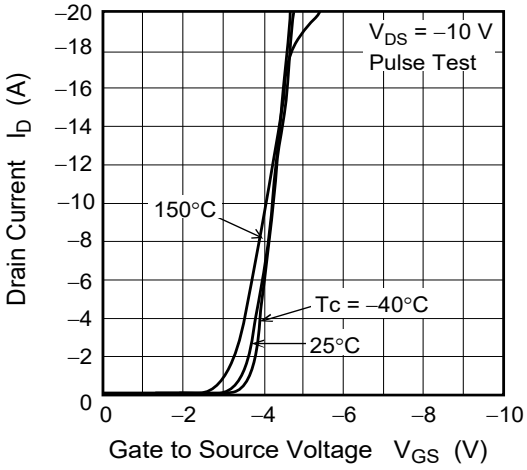
Maximum Safe Operation Area



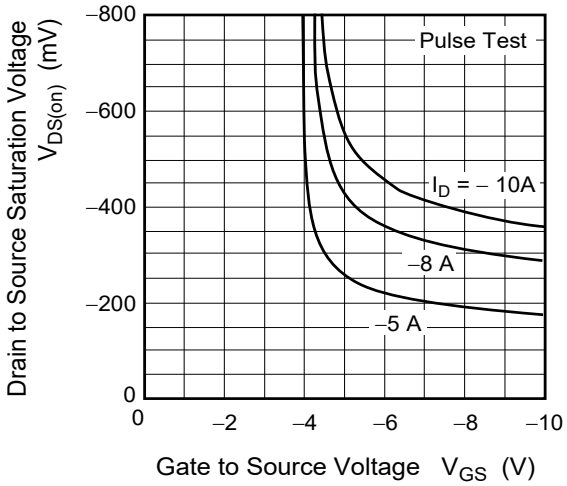
Typical Output Characteristics



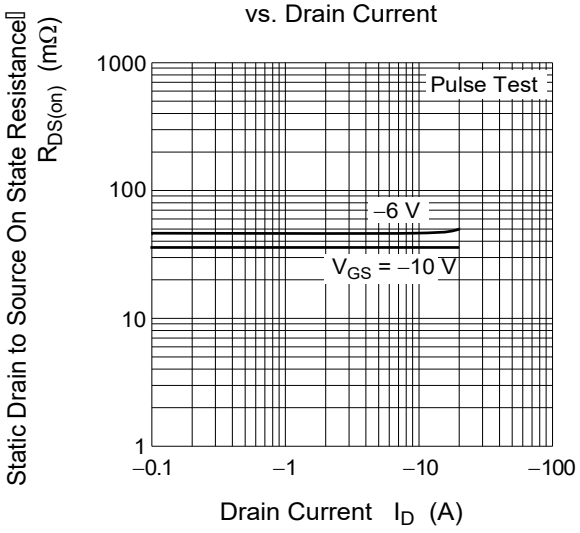
Typical Transfer Characteristics



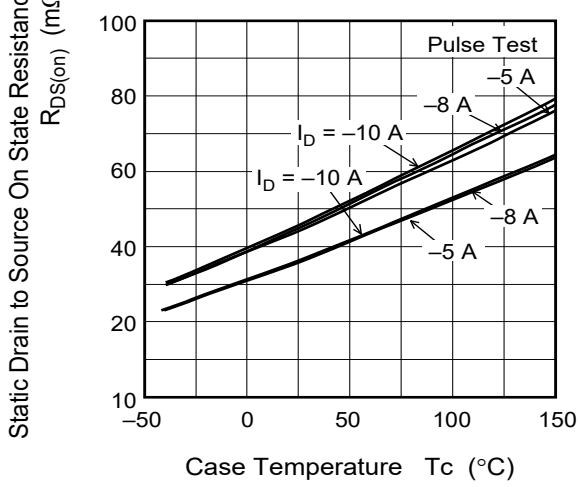
Drain Source Saturation Voltage vs. Gate to Source Voltage



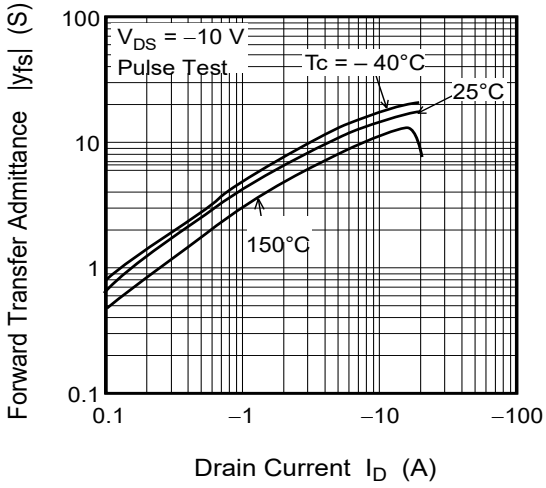
Static Drain to Source On State Resistance vs. Drain Current



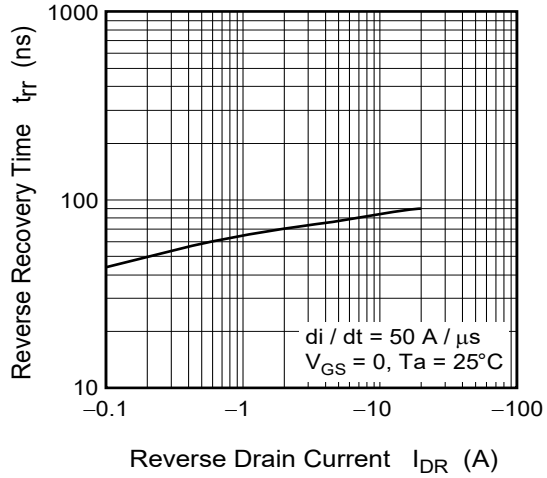
Static Drain to Source On State Resistance vs. Temperature



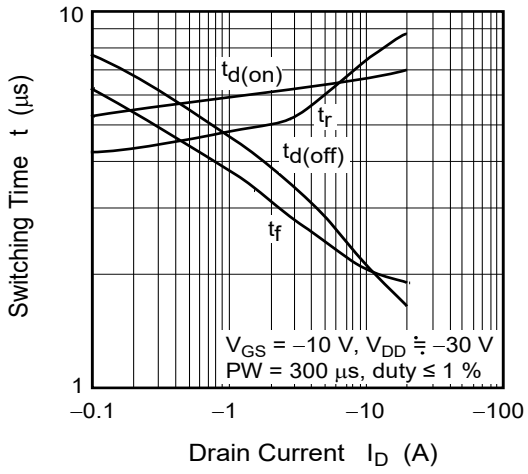
Forward Transfer Admittance vs. Drain Current



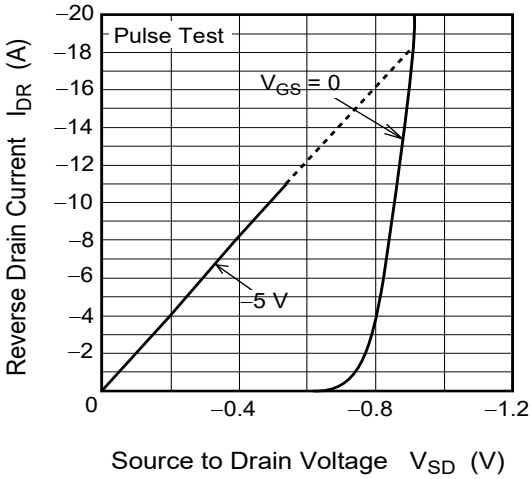
Body-Drain Diode Reverse Recovery Time



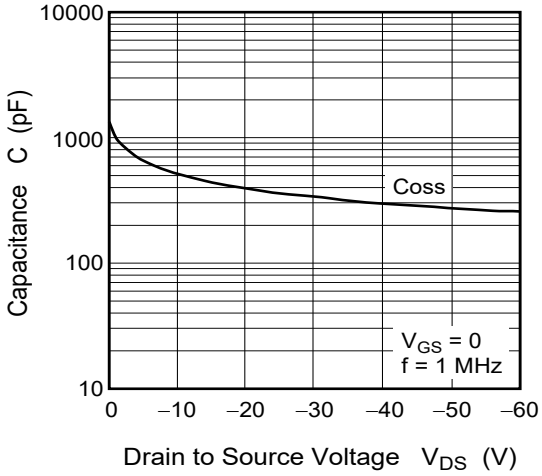
Switching Characteristics



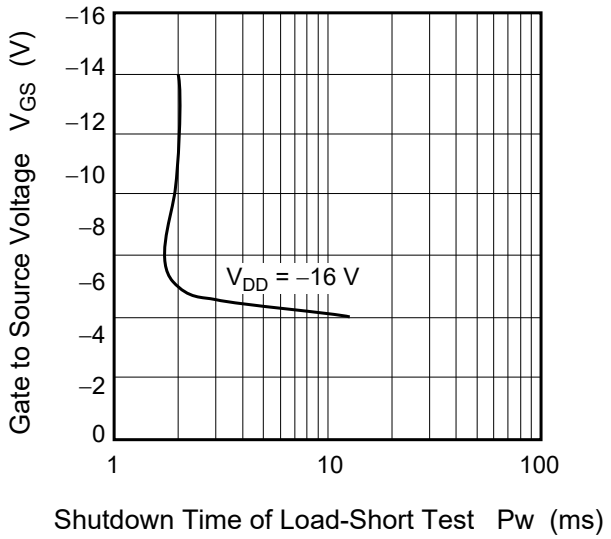
Reverse Drain Current vs. Source to Drain Voltage



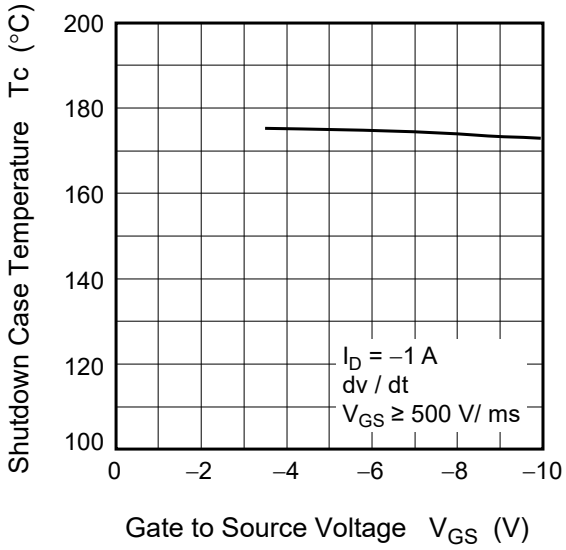
Typical Capacitance vs. Drain to Source Voltage



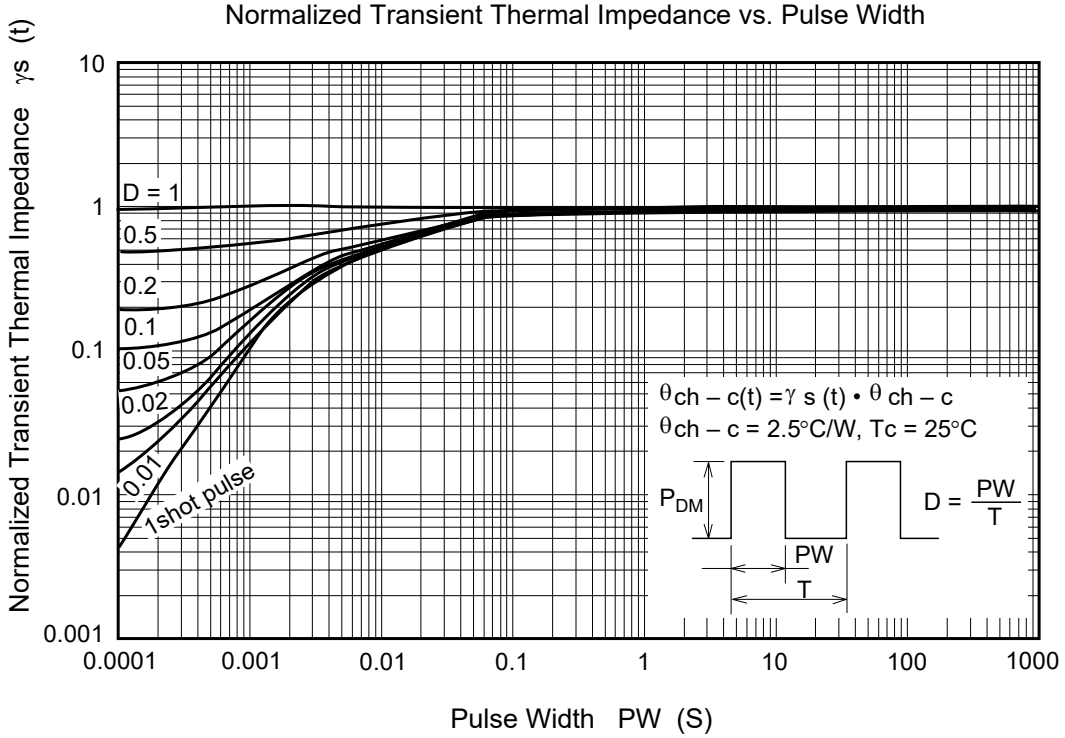
Gate to Source Voltage vs.
Shutdown Time of Load-Short Test



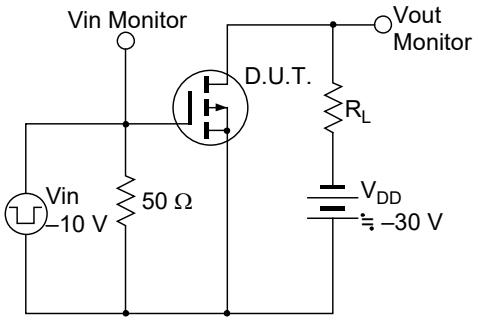
Shutdown Case Temperature vs.
Gate to Source Voltage



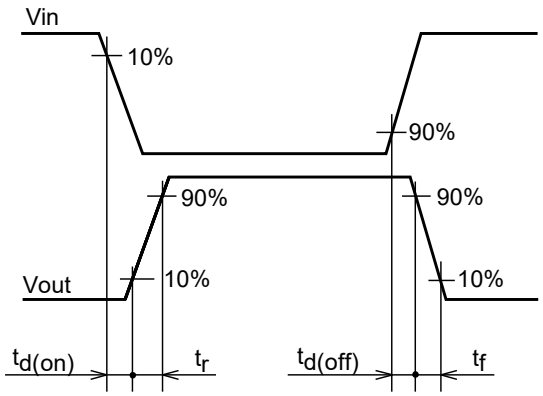
Normalized Transient Thermal Impedance vs. Pulse Width



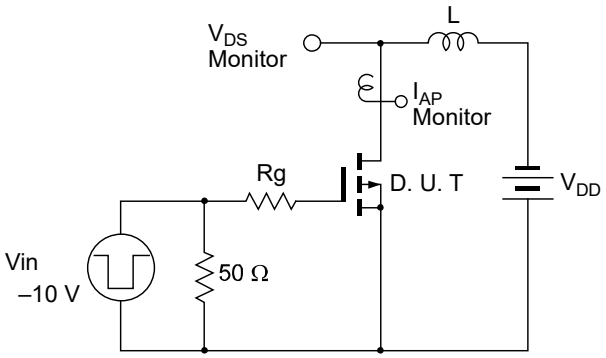
Switching Time Test Circuit



Waveform

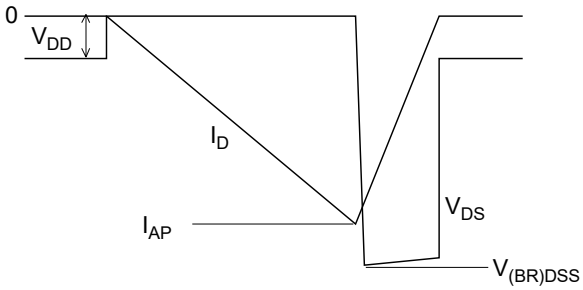


Avalanche Test Circuit

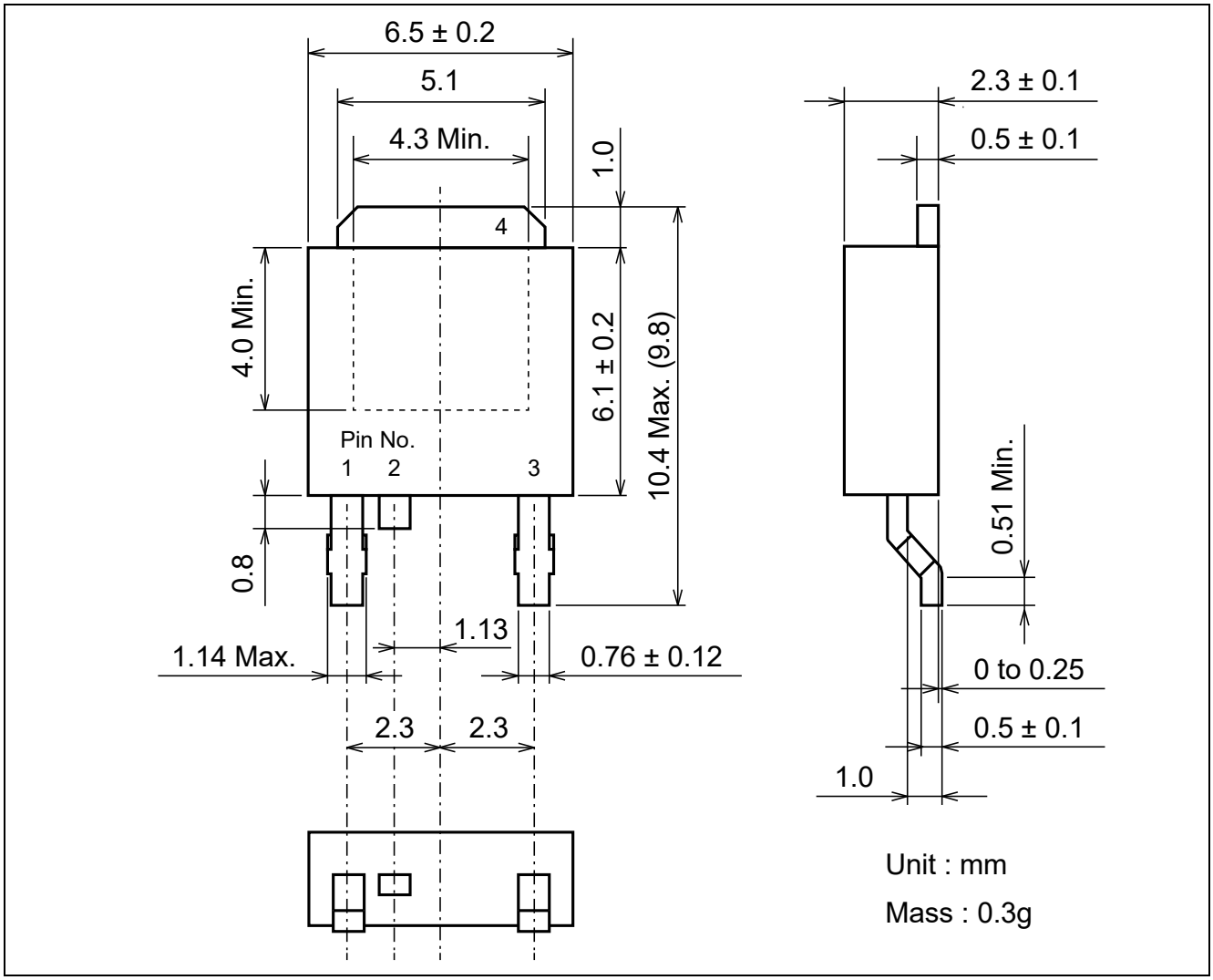


Avalanche Waveform

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



Package Dimensions



Ordering Information

Part No.	Quantity	Shipping Container
RJE0625JPV-00-Q7	2500 pcs	Taping (Sinistrorse)

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