

RJE0617JSP

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

R07DS1070EJ0500

Rev.5.00

Jan 31, 2020

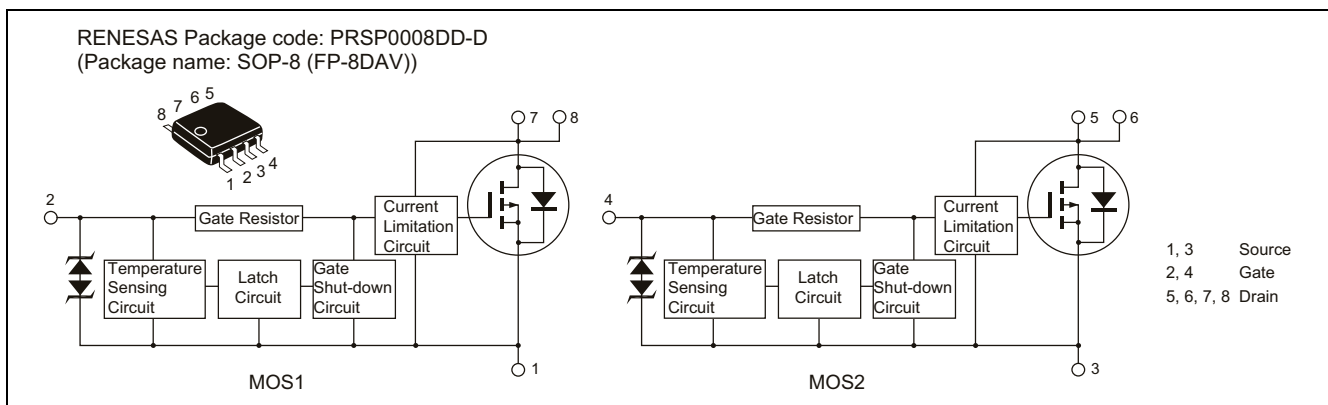
Description

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



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 4} | -1.5 | A |
| Body-drain diode reverse drain current | I _{DR} | -1.5 | A |
| Avalanche current | I _{AF} ^{Note 3} | -1.5 | A |
| Avalanche energy | E _{AR} ^{Note 3} | 9.6 | mJ |
| Channel dissipation | P _{ch} ^{Note 1} | 1 | W |
| Channel dissipation | P _{ch} ^{Note 2} | 1.5 | W |
| Channel temperature | T _{ch} | 150 | °C |
| Storage temperature | T _{stg} | -55 to +150 | °C |

Notes: 1. 1 Drive operation : When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

2. 2 Drive operation : When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

3. T_{ch} = 25°C, R_g ≥ 50 Ω

4. 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 | Thr | — | 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 5} |

Notes; 5. Pulse test

Electrical Characteristics

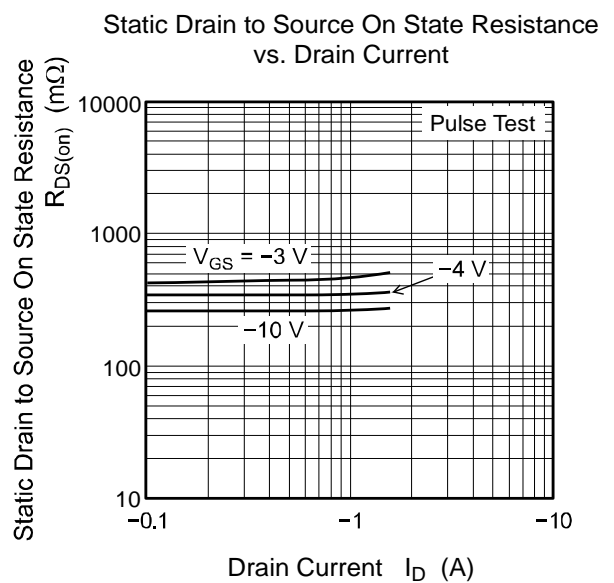
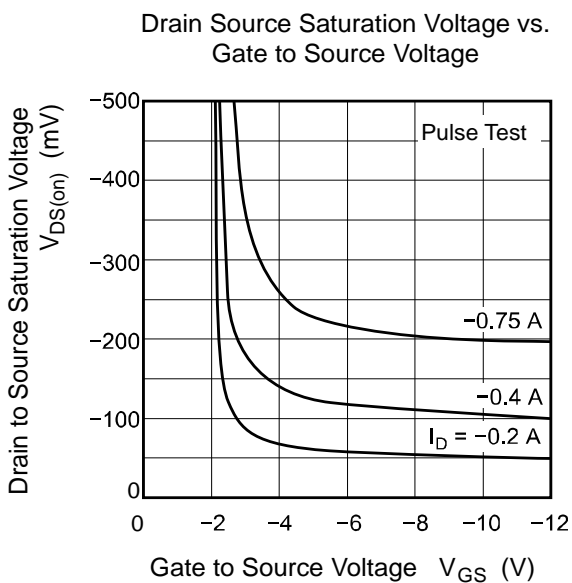
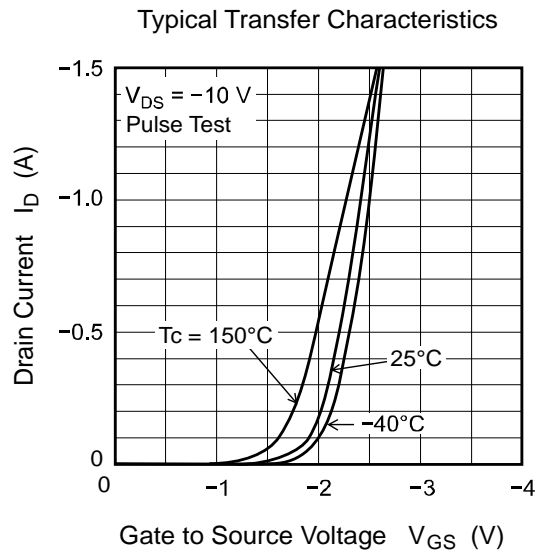
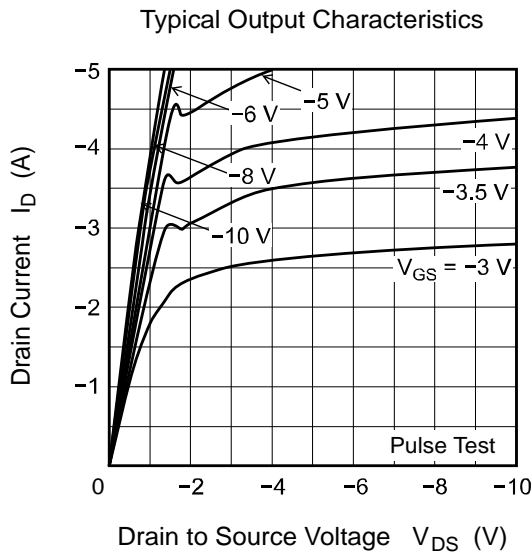
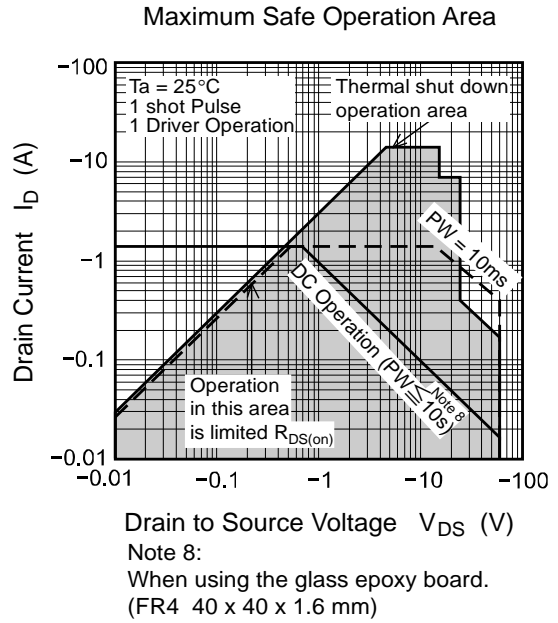
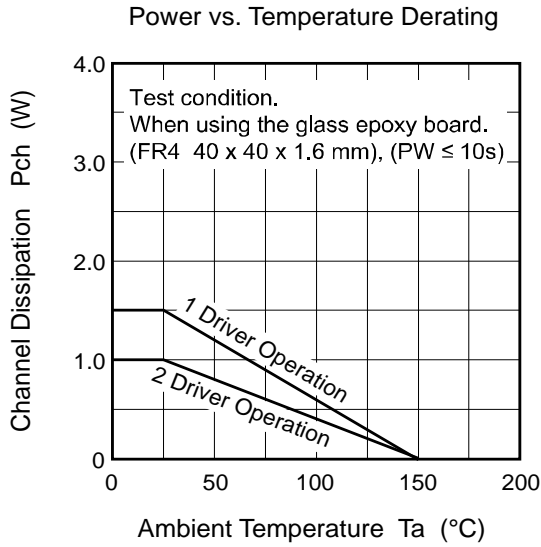
(Ta = 25°C)

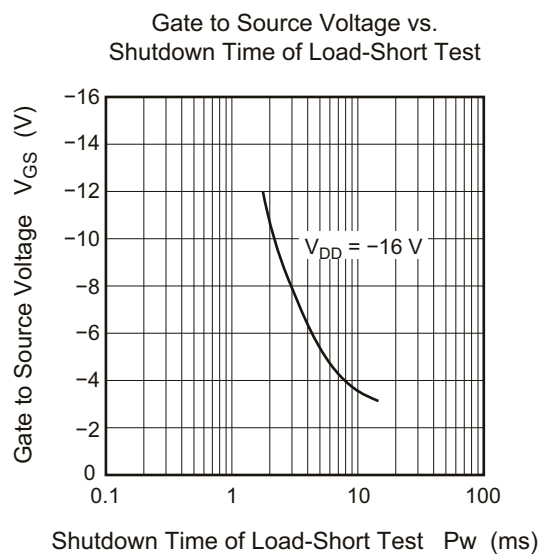
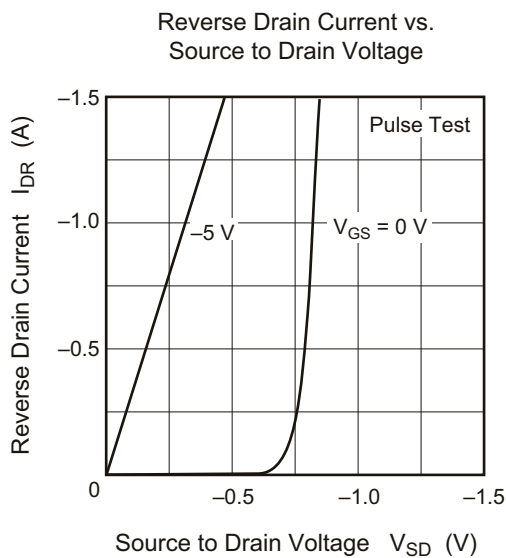
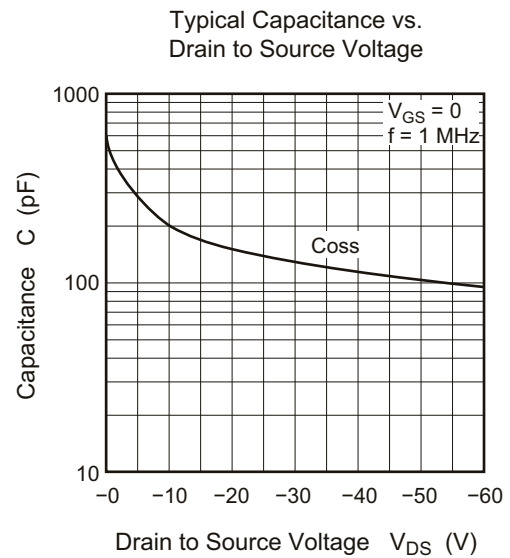
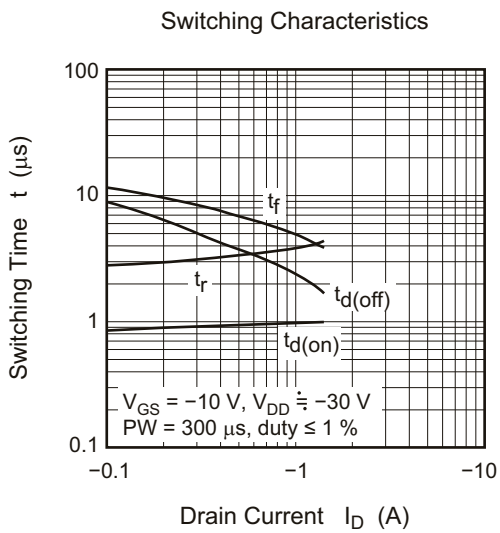
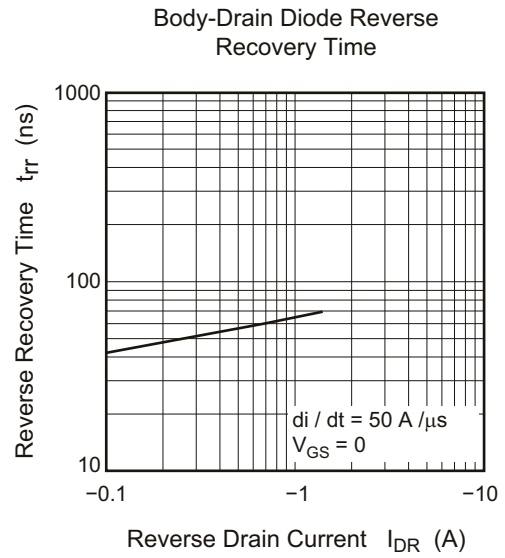
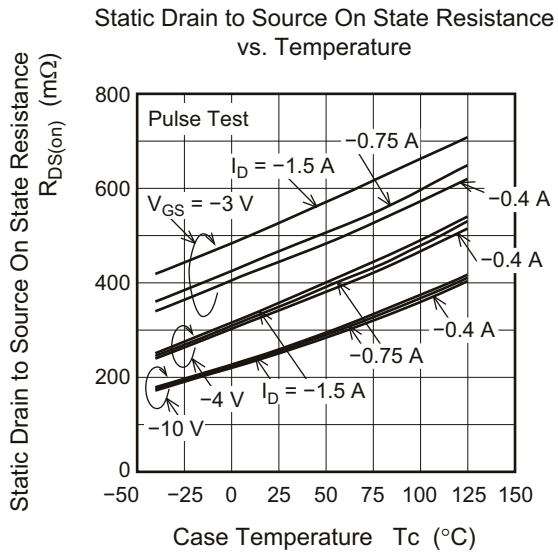
| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|--|----------------------|------|-------|------|------|---|
| Drain current | I _D | -1.5 | — | -12 | A | V _{GS} = -3.5 V, V _{DS} = -10 V ^{Note 6} |
| | I _D | — | — | -40 | mA | V _{GS} = -1.2 V, V _{DS} = -10 V |
| | I _D | -1.5 | — | — | A | V _{GS} = -12 V, V _{DS} = -10 V ^{Note 6} |
| | I _D | -0.8 | — | — | A | V _{GS} = -3 V, V _{DS} = -10 V ^{Note 6} |
| 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 6} |
| Static drain to source on state resistance | R _{DS(on)} | — | 445 | 800 | mΩ | I _D = -0.4 A, V _{GS} = -3V ^{Note 6} |
| | R _{DS(on)} | — | 363 | 425 | mΩ | I _D = -0.75 A, V _{GS} = -4 V ^{Note 6} |
| | R _{DS(on)} | — | 272 | 350 | mΩ | I _D = -0.75 A, V _{GS} = -10 V ^{Note 6} |
| 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 7} | t _{os} | — | 5.4 | — | ms | V _{GS} = -5 V, V _{DD} = -16 V |

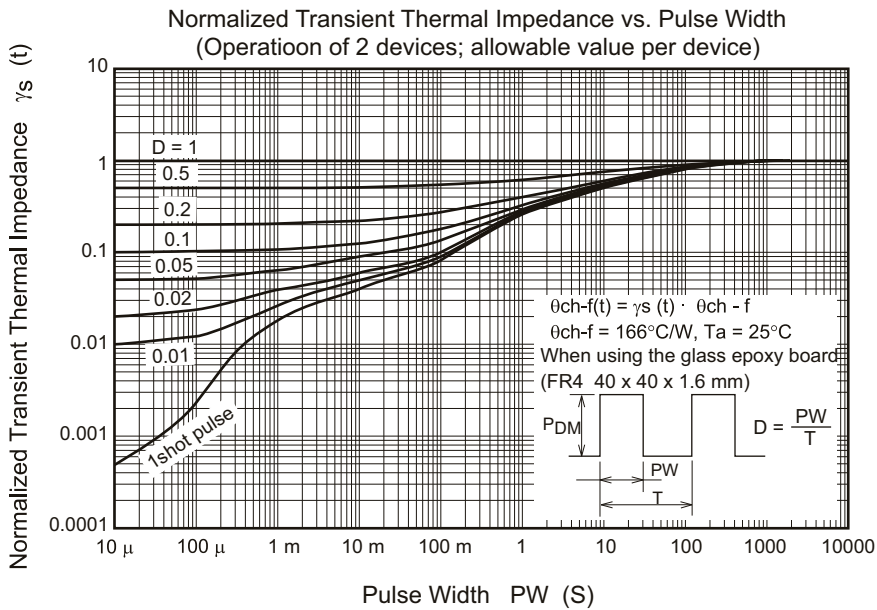
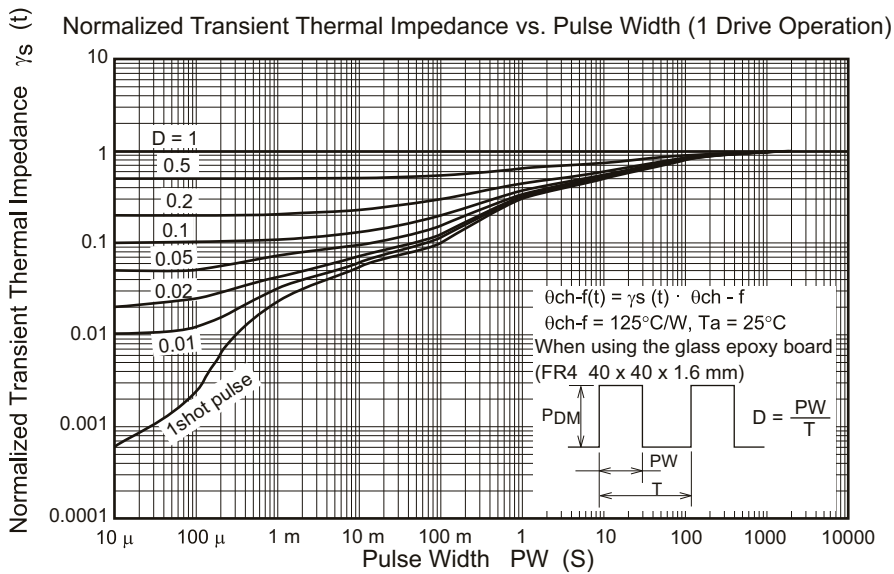
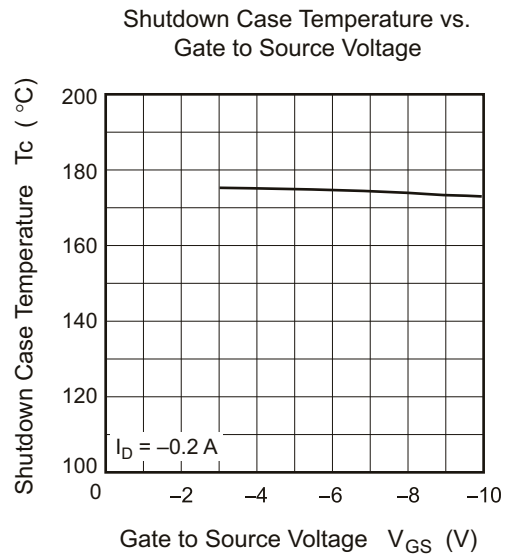
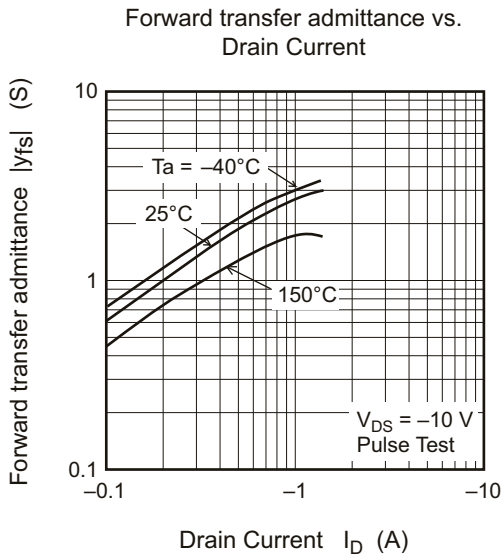
Notes: 6. Pulse test

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

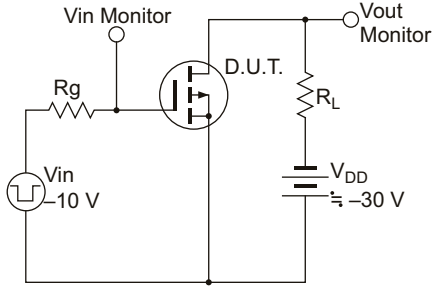
Main Characteristics



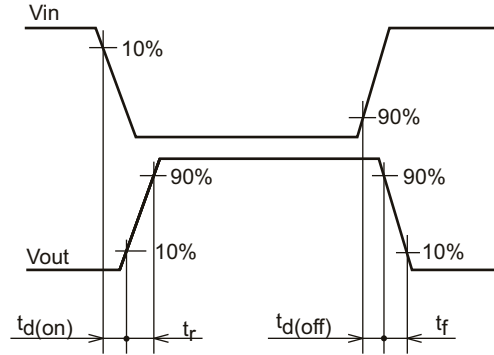




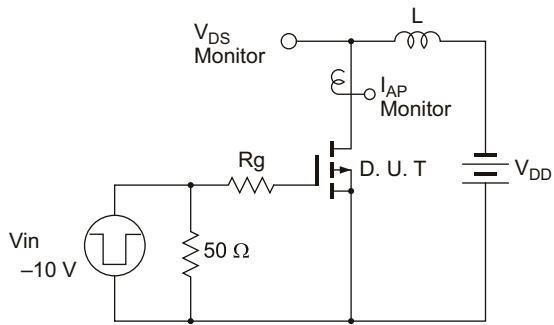
Switching Time Test Circuit



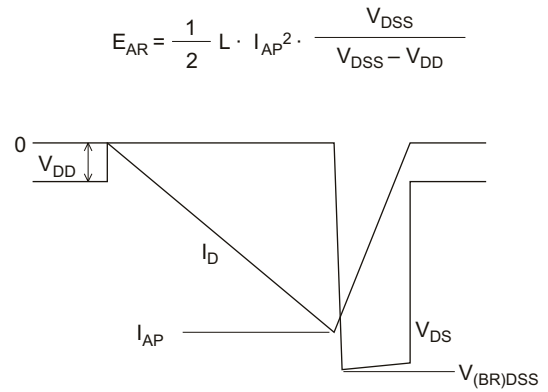
Waveform



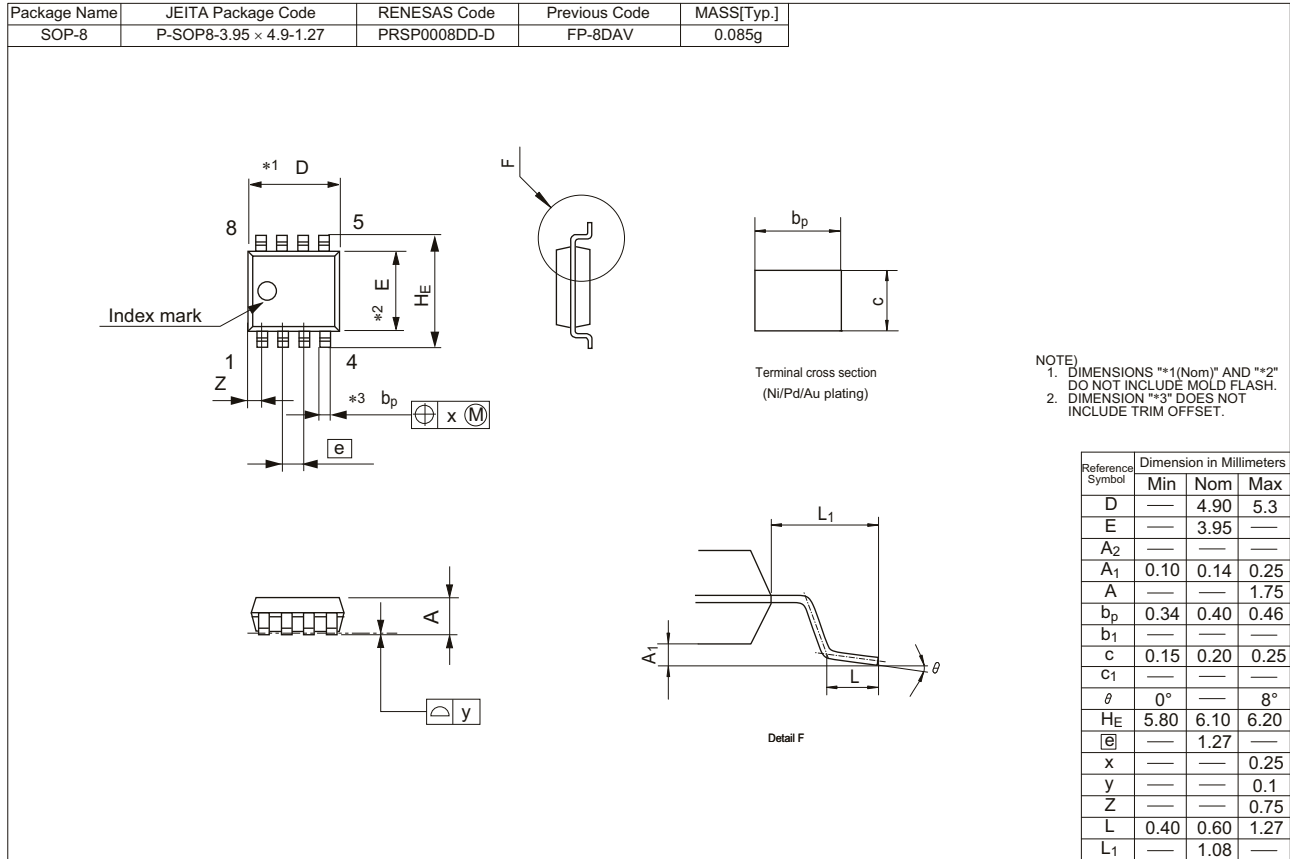
Avalanche Test Circuit



Avalanche Waveform



Package Dimensions



Ordering Information

| Orderable Part Number | Quantity | Shipping Container |
|-----------------------|---------------|--------------------|
| RJE0617JSP-00-J0 | 2500 pcs/reel | Taping |

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

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