

SSM6J08FU

Power Management Switch
DC-DC Converter

- Small Package
- Low on Resistance : $R_{on} = 0.18 \Omega$ (max) (@ $V_{GS} = -4 V$)
: $R_{on} = 0.26 \Omega$ (max) (@ $V_{GS} = -2.5 V$)
- Low Gate Threshold Voltage

Absolute Maximum Ratings (Ta = 25°C)

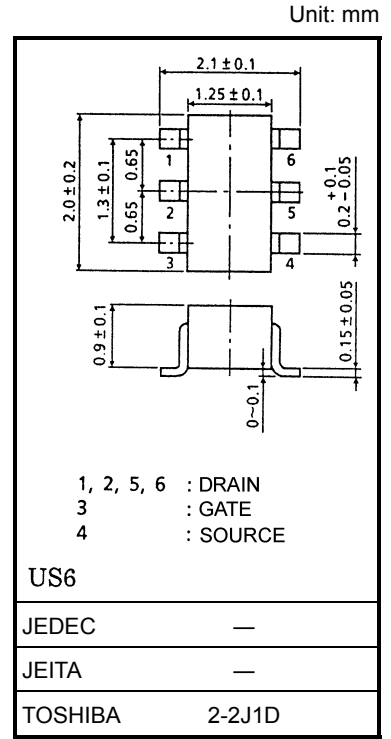
| Characteristics | Symbol | Rating | Unit |
|---------------------------|----------------|-------------------|------|
| Drain-Source voltage | V_{DS} | -20 | V |
| Gate-Source voltage | V_{GSS} | ± 12 | V |
| Drain current | DC | I_D | -1.3 |
| | Pulse | I_{DP} (Note 2) | -2.6 |
| Drain power dissipation | P_D (Note 1) | 300 | mW |
| Channel temperature | T_{ch} | 150 | °C |
| Storage temperature range | T_{stg} | -55~150 | °C |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

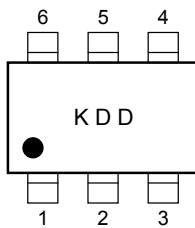
Note 1: Mounted on FR4 board
(25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 0.32 mm² × 6) Fig: 1.

Note 2: The pulse width limited by max channel temperature.



Weight: 6.8 mg (typ.)

Marking



Equivalent Circuit

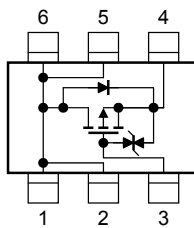
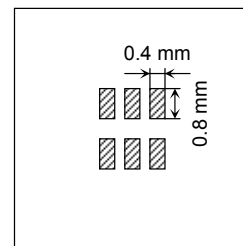


Fig 1: 25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 0.32 mm² × 6



Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

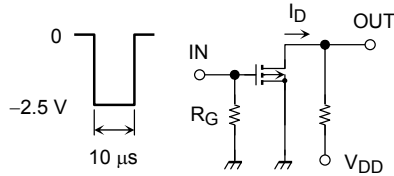
Electrical Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------|---------------|---|------|------|---------|---------------|
| Gate leakage current | I_{GSS} | $V_{GS} = \pm 12\text{ V}, V_{DS} = 0$ | — | — | ± 1 | μA |
| Drain-Source breakdown voltage | $V_{(BR)DSS}$ | $I_D = -1\text{ mA}, V_{GS} = 0$ | -20 | — | — | V |
| | $V_{(BR)DSX}$ | $I_D = -1\text{ mA}, V_{GS} = 12\text{ V}$ | -8 | — | — | |
| Drain Cut-off current | I_{DSS} | $V_{DS} = -20\text{ V}, V_{GS} = 0$ | — | — | -1 | μA |
| Gate threshold voltage | V_{th} | $V_{DS} = -3\text{ V}, I_D = -0.1\text{ mA}$ | -0.5 | — | -1.1 | V |
| Forward transfer admittance | $ Y_{fs} $ | $V_{DS} = -3\text{ V}, I_D = -0.65\text{ A}$ (Note 3) | 1.3 | 2.7 | — | S |
| Drain-Source ON resistance | $R_{DS(ON)}$ | $I_D = -0.65\text{ A}, V_{GS} = -4\text{ V}$ (Note 3) | — | 140 | 180 | m Ω |
| | | $I_D = -0.65\text{ A}, V_{GS} = -2.5\text{ V}$ (Note 3) | — | 200 | 260 | |
| | | $I_D = -0.65\text{ A}, V_{GS} = -2.0\text{ V}$ (Note 3) | — | 260 | 460 | |
| Input capacitance | C_{iss} | $V_{DS} = -10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | — | 370 | — | pF |
| Reverse transfer capacitance | C_{rss} | $V_{DS} = -10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | — | 73 | — | pF |
| Output capacitance | C_{oss} | $V_{DS} = -10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | — | 116 | — | pF |
| Switching time | Turn-on time | t_{on} | — | 33 | — | ns |
| | Turn-off time | t_{off} | | 47 | | |

Note 3: Pulse test

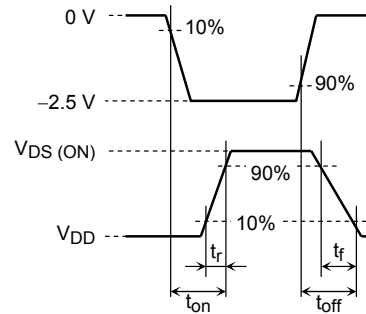
Switching Time Test Circuit

(a) Test circuit



$V_{DD} = -10\text{ V}$
 $R_G = 4.7\ \Omega$
 D.U. $\leq 1\%$
 V_{IN} : $t_r, t_f < 5\text{ ns}$
 COMMON SOURCE
 $T_a = 25^\circ\text{C}$

(b) V_{IN}



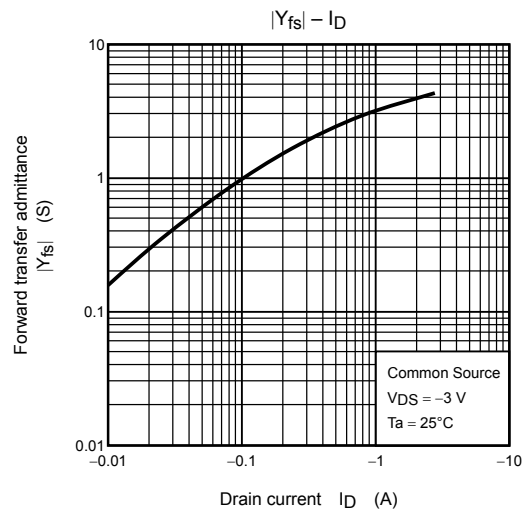
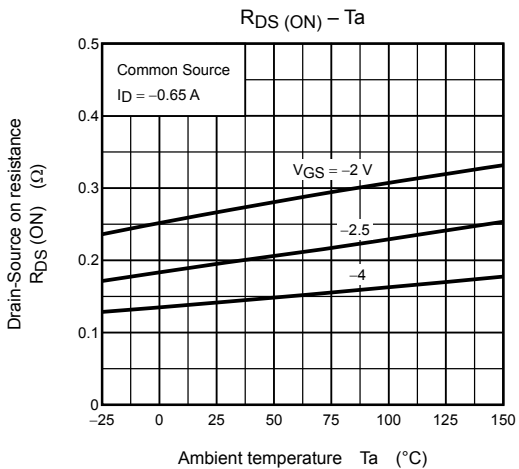
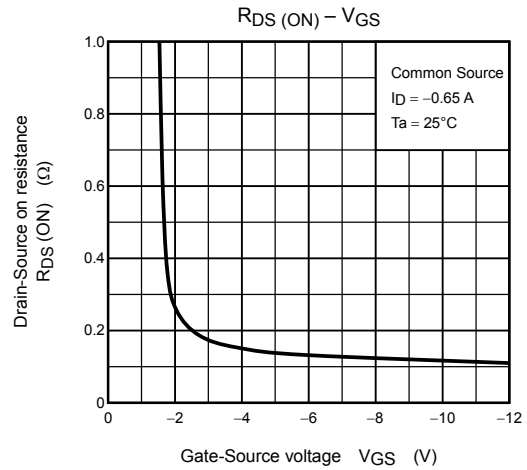
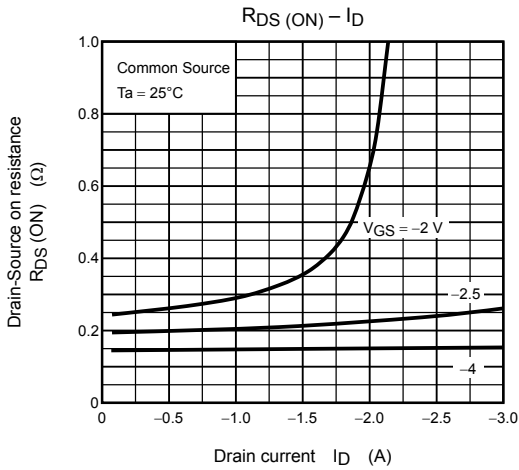
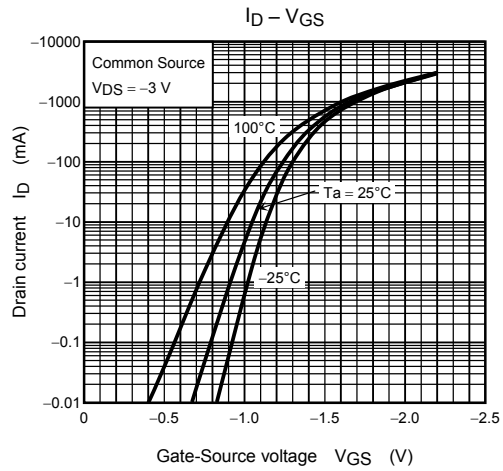
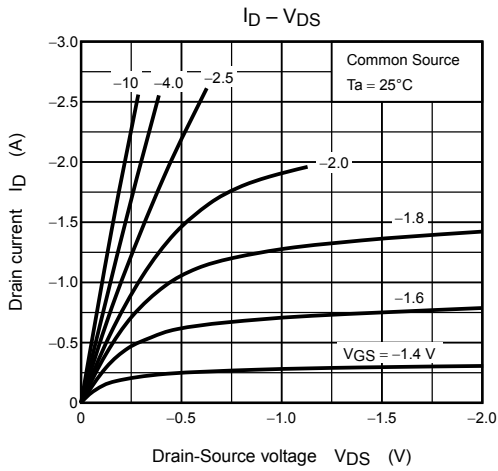
(c) V_{OUT}

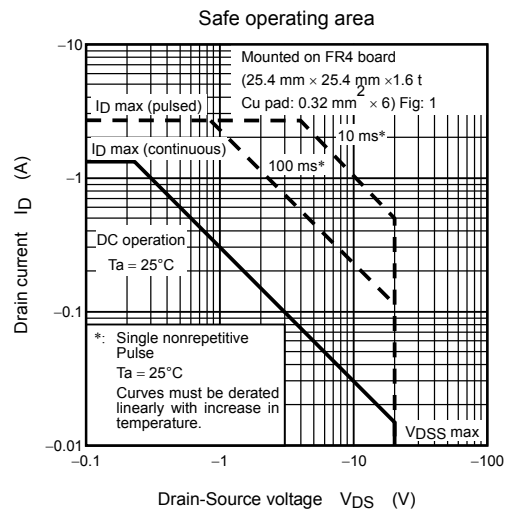
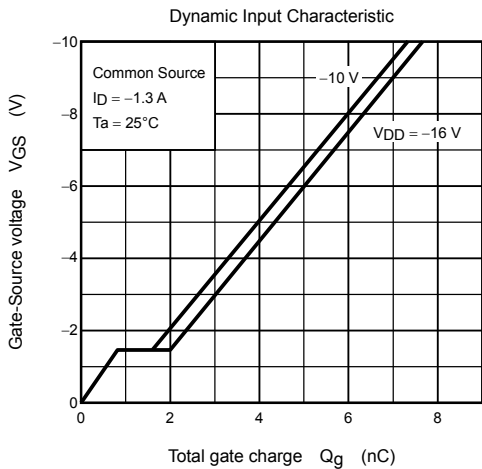
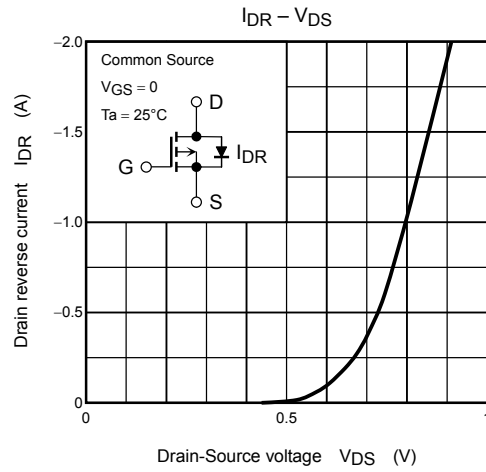
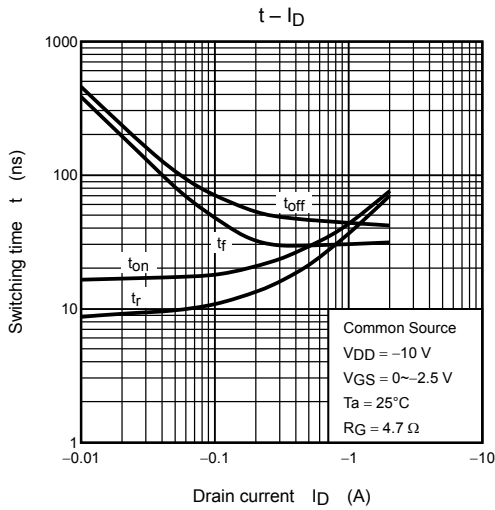
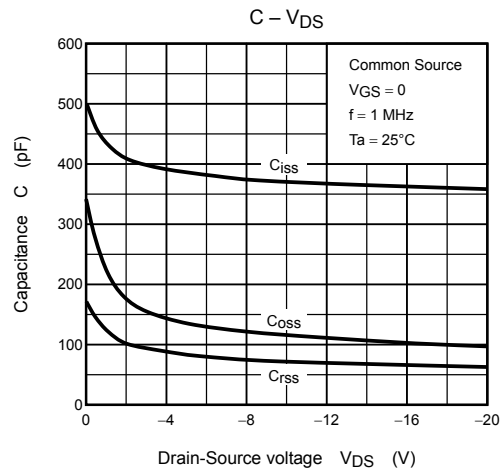
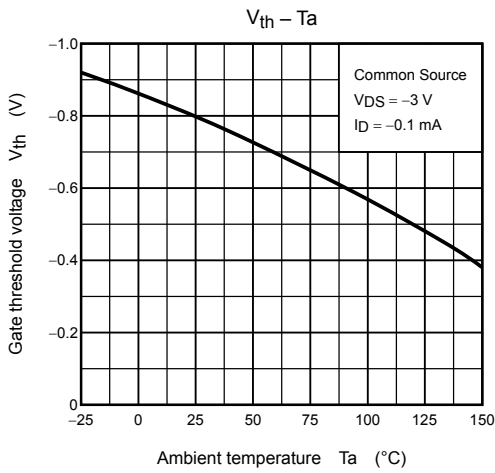
Precaution

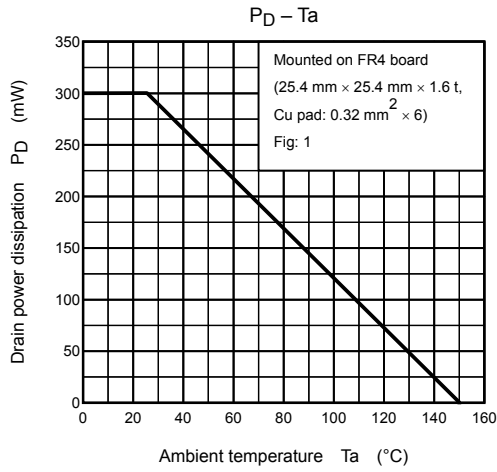
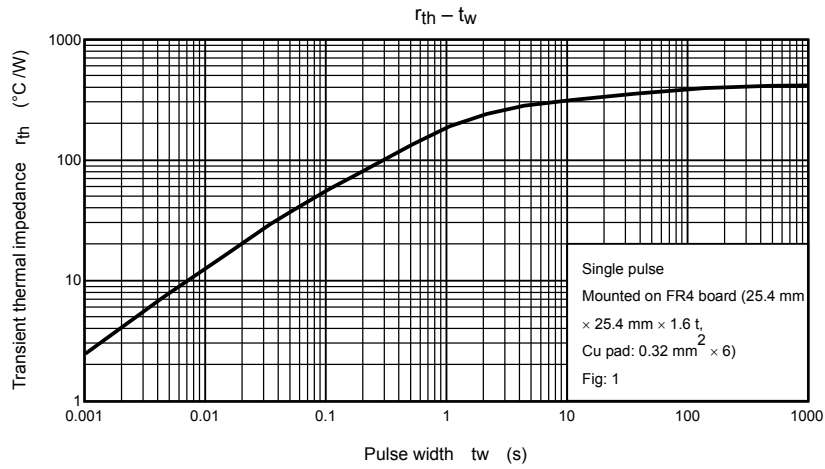
V_{th} can be expressed as voltage between gate and source when low operating current value is $I_D = -100\ \mu\text{A}$ for this product. For normal switching operation, $V_{GS(on)}$ requires higher voltage than V_{th} and $V_{GS(off)}$ requires lower voltage than V_{th} .

(relationship can be established as follows: $V_{GS(off)} < V_{th} < V_{GS(on)}$)

Please take this into consideration for using the device.







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