

2SJ619

Switching Regulator and DC-DC Converter Applications
Motor Drive Applications

- 4-V gate drive
- Low drain-source ON resistance: $R_{DS(ON)} = 0.15 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 7.7 S$ (typ.)
- Low leakage current: $I_{DSS} = -100 \mu A$ (max) ($V_{DS} = -100 V$)
- Enhancement mode: $V_{th} = -0.8$ to $-2.0 V$ ($V_{DS} = -10 V$, $I_D = -1 mA$)

Absolute Maximum Ratings ($T_a = 25^\circ C$)

| Characteristics | | Symbol | Rating | Unit |
|--|----------------|-----------|------------|------------|
| Drain-source voltage | | V_{DSS} | -100 | V |
| Drain-gate voltage ($R_{GS} = 20 k\Omega$) | | V_{DGR} | -100 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | -16 | A |
| | Pulse (Note 1) | I_{DP} | -64 | |
| Drain power dissipation ($T_c = 25^\circ C$) | | P_D | 75 | W |
| Single pulse avalanche energy (Note 2) | | E_{AS} | 292 | mJ |
| Avalanche current | | I_{AR} | -16 | A |
| Repetitive avalanche energy (Note 3) | | E_{AR} | 7.5 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ C$ |
| Storage temperature range | | T_{stg} | -55 to 150 | $^\circ C$ |

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).

Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|-------------------------------------|----------------|------|--------------|
| Thermal resistance, channel to case | $R_{th(ch-c)}$ | 1.67 | $^\circ C/W$ |

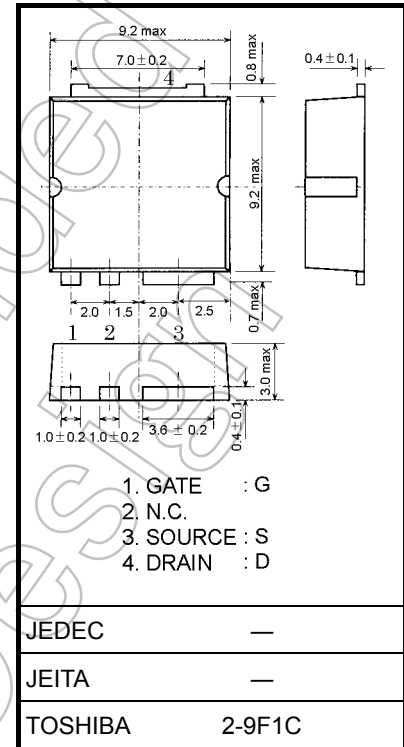
Note 1: Ensure that the channel temperature does not exceed $150^\circ C$.

Note 2: $V_{DD} = -25 V$, $T_{ch} = 25^\circ C$ (initial), $L = 1.84 mH$, $R_G = 25 \Omega$, $I_{AR} = -16 A$

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

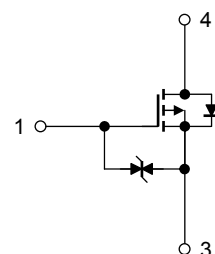
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm

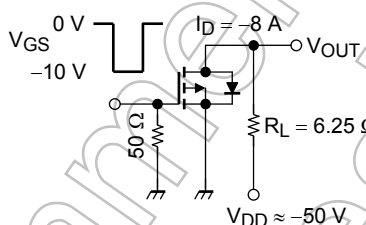


Weight: 0.74 g (typ.)

Circuit Configuration



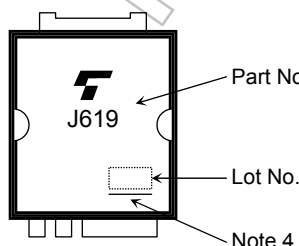
Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|----------------|--|------|------|----------|---------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$ | — | — | ± 10 | μA |
| Drain cut-OFF current | | I_{DSS} | $V_{DS} = -100 \text{ V}, V_{GS} = 0 \text{ V}$ | — | — | -100 | μA |
| Drain-source breakdown voltage | | $V_{(BR) DSS}$ | $I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$ | -100 | — | — | V |
| Gate threshold voltage | | V_{th} | $V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$ | -0.8 | — | -2.0 | V |
| Drain-source ON resistance | | $R_{DS(ON)}$ | $V_{GS} = -4 \text{ V}, I_D = -6 \text{ A}$ | — | 0.25 | 0.32 | Ω |
| | | | $V_{GS} = -10 \text{ V}, I_D = -6 \text{ A}$ | — | 0.15 | 0.21 | |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = -10 \text{ V}, I_D = -6 \text{ A}$ | 4.5 | 7.7 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 1100 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 210 | — | |
| Output capacitance | | C_{oss} | | — | 440 | — | |
| Switching time | Rise time | t_r |  <p>$V_{GS} = 0 \text{ V}, -10 \text{ V}$ $I_D = -8 \text{ A}$ $R_L = 6.25 \Omega$ $V_{DD} \approx -50 \text{ V}$ 50Ω V_{OUT} $Duty \leq 1\%, t_w = 10 \mu\text{s}$</p> | — | 18 | — | ns |
| | Turn-ON time | t_{on} | | — | 30 | — | |
| | Fall time | t_f | | — | 18 | — | |
| | Turn-OFF time | t_{off} | | — | 65 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} \approx -80 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -16 \text{ A}$ | — | 48 | — | nC |
| Gate-source charge | | Q_{gs} | | — | 29 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 19 | — | |

Source-Drain Ratings and Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|---|-----|------|-----|------|
| Continuous drain reverse current (Note 1) | I_{DR} | — | — | — | -16 | A |
| Pulse drain reverse current (Note 1) | I_{DRP} | — | — | — | -64 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = -16 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | 1.7 | V |
| Reverse recovery time | t_{rr} | $I_{DR} = -16 \text{ A}, V_{GS} = 0 \text{ V},$ | — | 160 | — | ns |
| Reverse recovery charge | Q_{rr} | $dI_{DR}/dt = 50 \text{ A}/\mu\text{s}$ | — | 0.5 | — | nC |

Marking

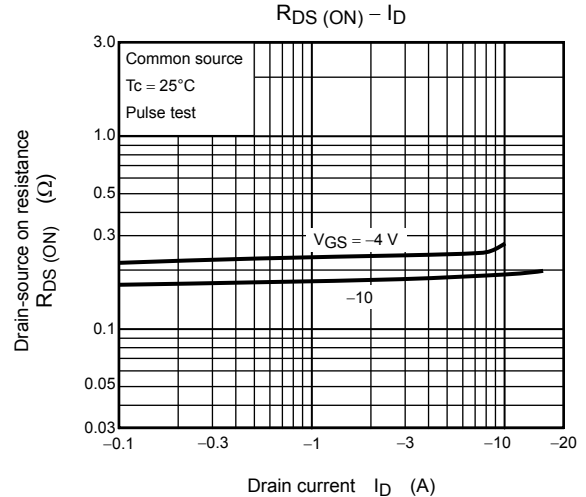
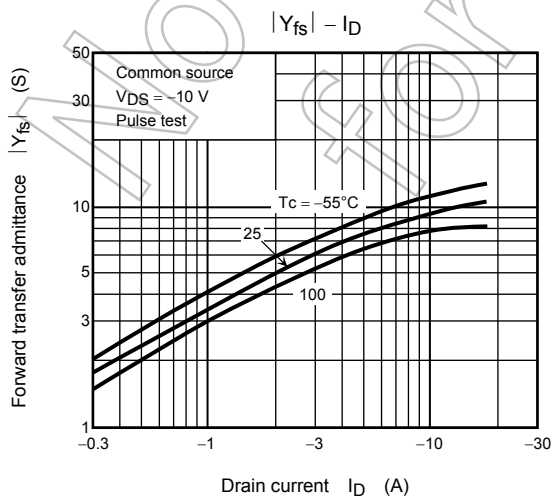
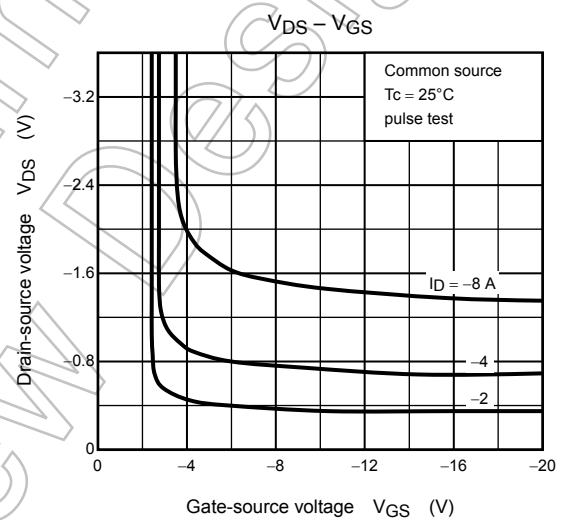
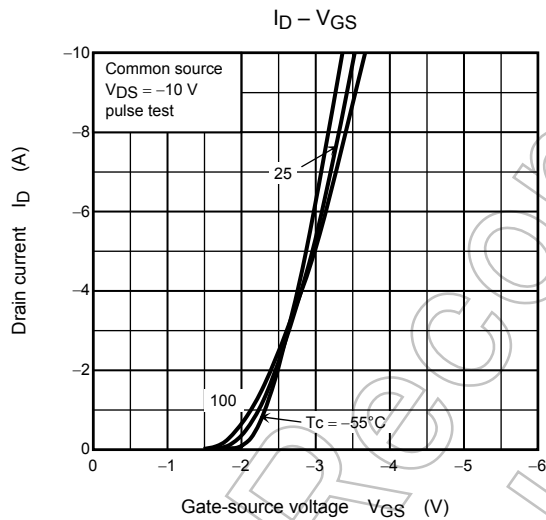
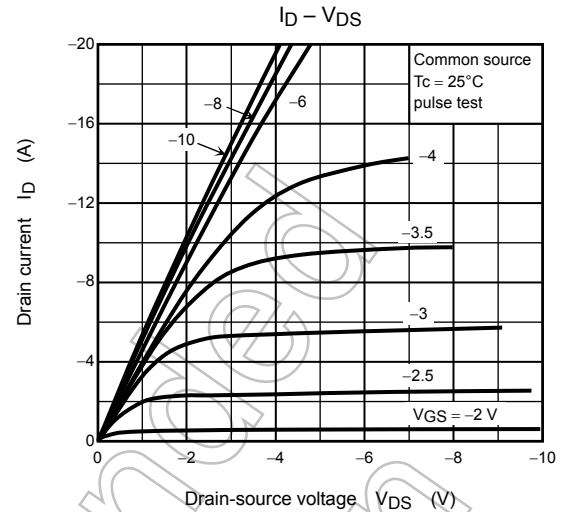
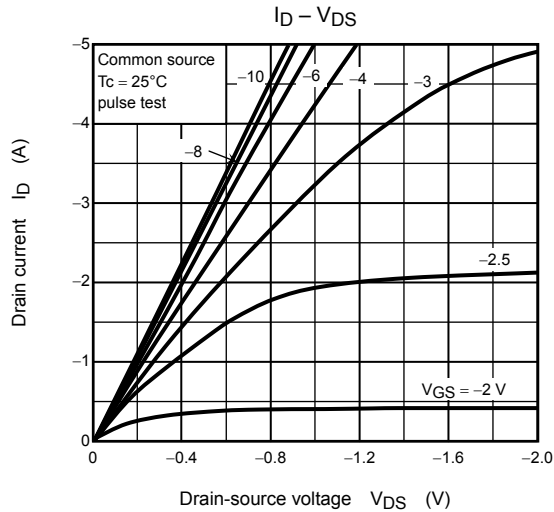


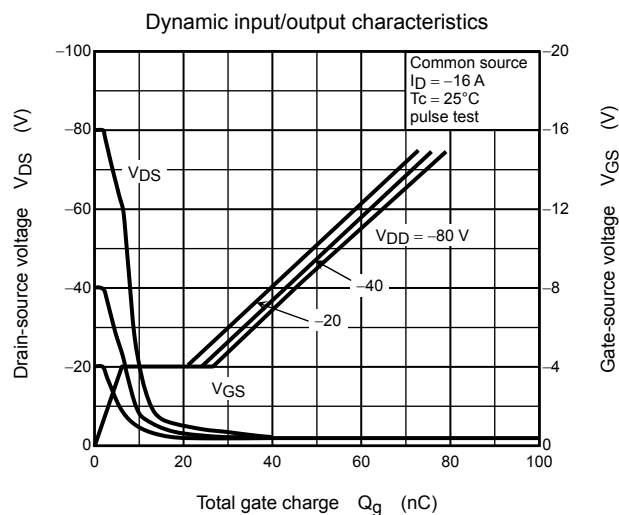
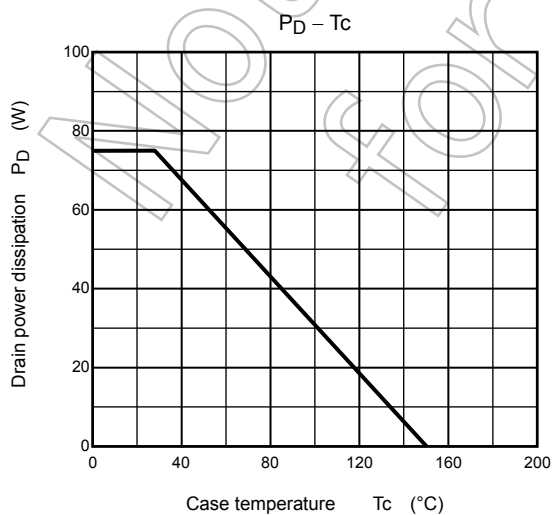
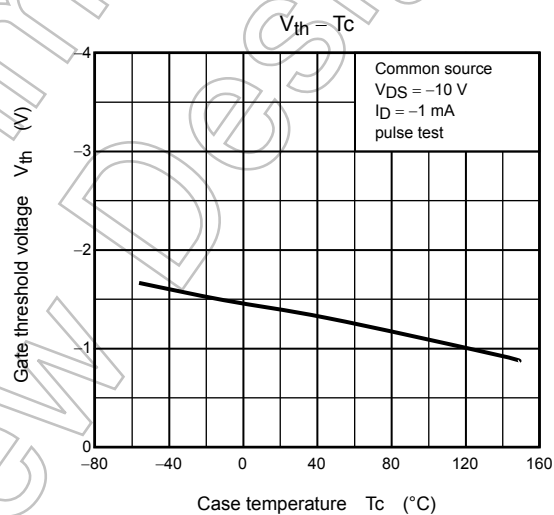
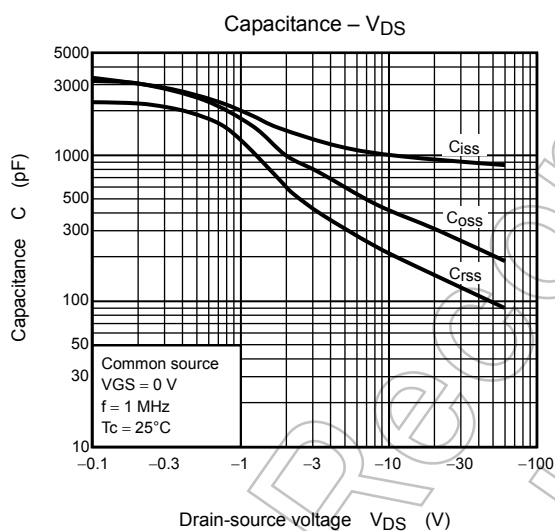
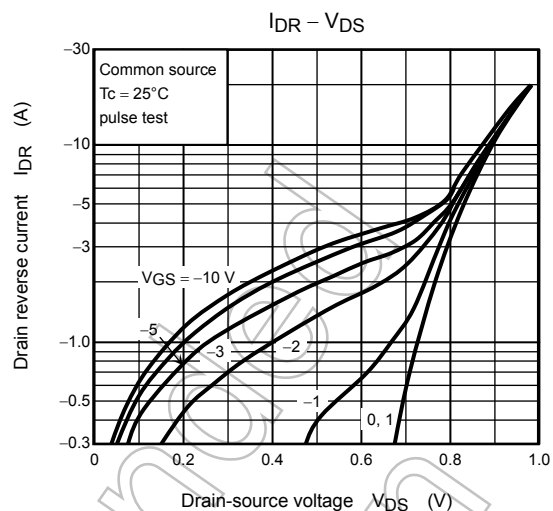
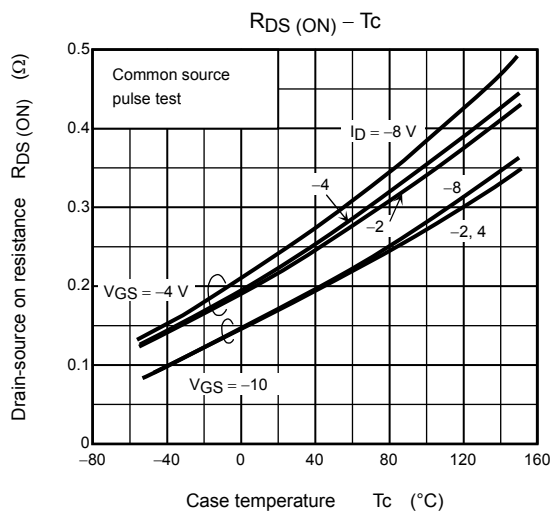
Note 4: A line under a Lot No. identifies the indication of product Labels.

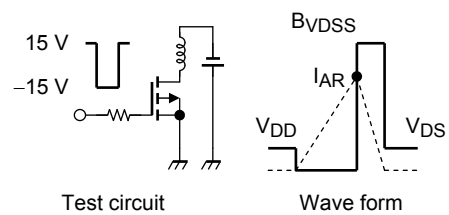
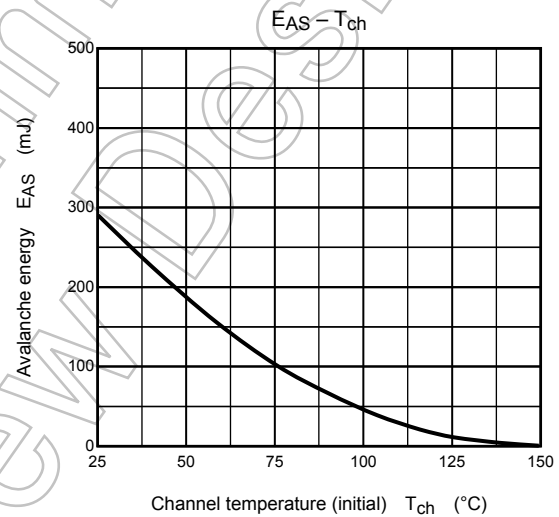
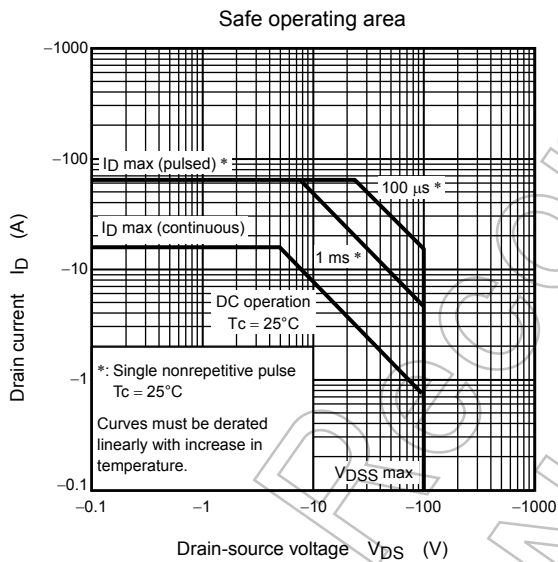
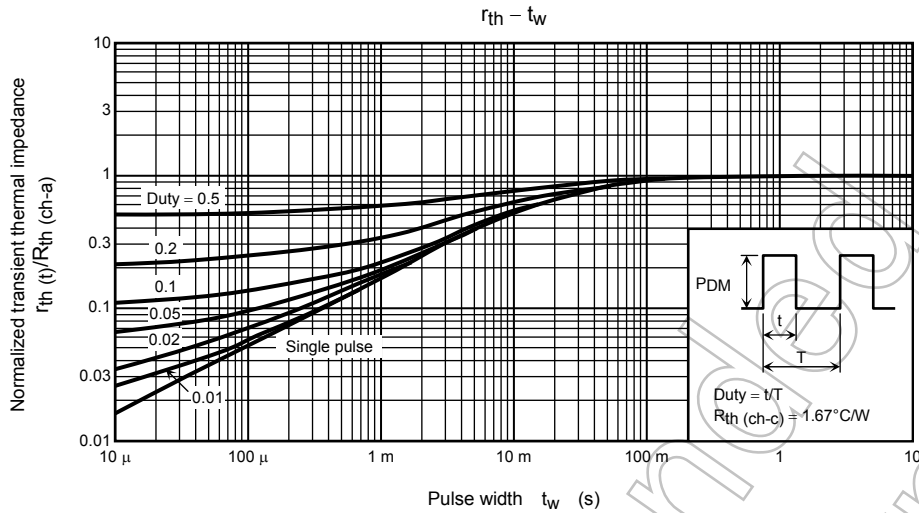
Not underlined: $[[Pb]]/INCLUDES > MCV$

Underlined: $[[G]]/RoHS \text{ COMPATIBLE}$ or $[[G]]/RoHS [[Pb]]$

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$$R_G = 25 \, \Omega$$

$$V_{DD} = -25 \, \text{V}, L = 1.84 \, \text{mH}$$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AR}^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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