

TJ70A06J3

Chopper Regulator, DC-DC Converter Applications
Motor Drive Applications

- 4.5-V gate drive
- Low drain-source ON resistance: $R_{DS(ON)} = 5.6 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 75 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -100 \text{ }\mu\text{A}$ (max) ($V_{DS} = -60 \text{ V}$)
- Enhancement-model: $V_{th} = -0.8 \text{ to } -2.0 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|--|----------------|-----------|------------|------------------|
| Drain-source voltage | | V_{DSS} | -60 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | | V_{DGR} | -60 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | -70 | A |
| | Pulse (Note 1) | I_{DP} | -280 | |
| Drain power dissipation ($T_c = 25^\circ\text{C}$) | | P_D | 54 | W |
| Single pulse avalanche energy (Note 2) | | E_{AS} | 355 | mJ |
| Avalanche current | | I_{AR} | -70 | A |
| Repetitive avalanche energy (Note 3) | | E_{AR} | 5.4 | mJ |
| Channel temperature (Note 4) | | T_{ch} | 175 | $^\circ\text{C}$ |
| Storage temperature range (Note 4) | | T_{stg} | -55 to 175 | $^\circ\text{C}$ |

Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|--|----------------|------|--------------------|
| Thermal resistance, channel to case | $R_{th(ch-c)}$ | 2.78 | $^\circ\text{C/W}$ |
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 125 | $^\circ\text{C/W}$ |

Note 1: Please use devices on condition that the channel temperature is below 175 °C.

Note 2: $V_{DD} = -25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$, $L = 98 \text{ }\mu\text{H}$, $R_G = 25 \text{ }\Omega$, $I_{AR} = -70 \text{ A}$

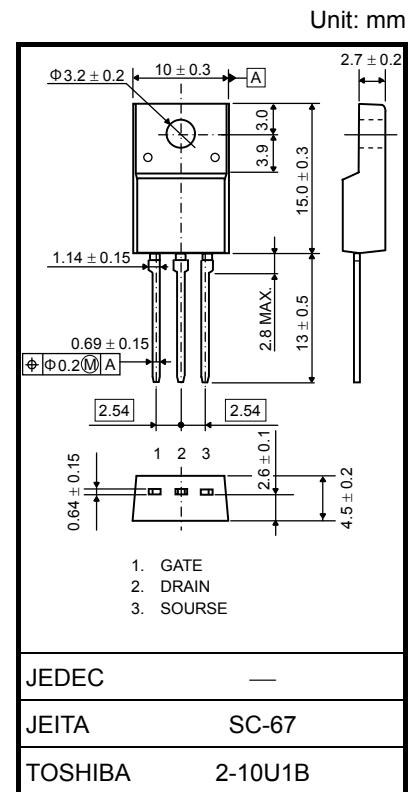
Note 3: Repetitive rating; pulse width limited by maximum channel temperature.

Note 4: The definitions of the absolute maximum channel temperature and storage temperatures are based on AEC-Q101.

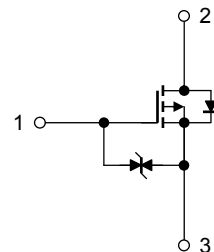
Note 5: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

This transistor is an electrostatic sensitive device. Please handle with caution.



Weight: 1.7 g (typ.)



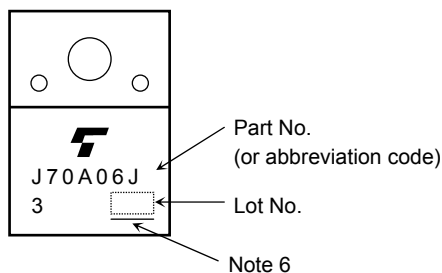
Electrical Characteristics (Ta = 25°C)

| 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} | $V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}$ | — | — | -10 | μA |
| Drain-source breakdown voltage | | $V_{(BR) DSS}$ | $I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$ | -60 | — | — | V |
| | | $V_{(BR) DSX}$ | $I_D = -10 \text{ mA}, V_{GS} = 20 \text{ V}$ | -35 | — | — | |
| Gate threshold voltage | | V_{th} | $V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$ | -0.8 | — | -2.0 | V |
| Drain-source ON resistance | | $R_{DS(ON)}$ | $V_{GS} = -4.5 \text{ V}, I_D = -35 \text{ A}$ | — | 7.0 | 10 | $\text{m}\Omega$ |
| | | | $V_{GS} = -10 \text{ V}, I_D = -35 \text{ A}$ | — | 5.6 | 8.0 | |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = -10 \text{ V}, I_D = -35 \text{ A}$ | 38 | 75 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 9810 | — | pF |
| Reverse transfer capacitance | | C_{rSS} | | — | 1130 | — | |
| Output capacitance | | C_{oss} | | — | 1500 | — | |
| Switching time | Rise time | t_r | <p>$V_{GS} = 0 \text{ V}, -10 \text{ V}$ $I_D = -35 \text{ A}$ V_{OUT} 4.7Ω 0.86Ω $V_{DD} \approx -30 \text{ V}$ Duty $\leq 1 \%$, $t_w = 10 \mu\text{s}$</p> | — | 16 | — | ns |
| | Turn-ON time | t_{on} | | — | 33 | — | |
| | Fall time | t_f | | — | 120 | — | |
| | Turn-OFF time | t_{off} | | — | 400 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} \approx -48 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -70 \text{ A}$ | — | 246 | — | nC |
| Gate-source charge | | Q_{gs} | | — | 71 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 87 | — | |

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

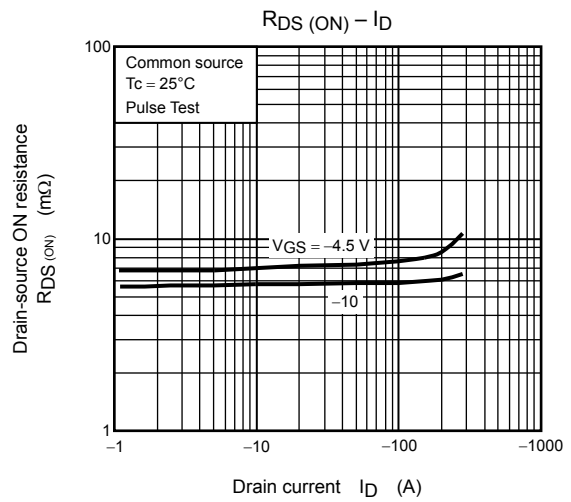
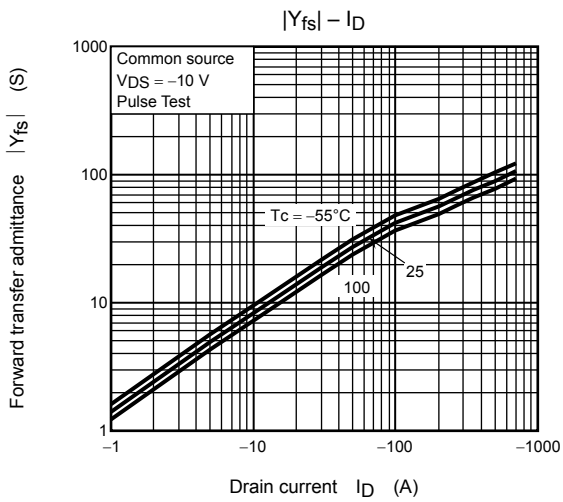
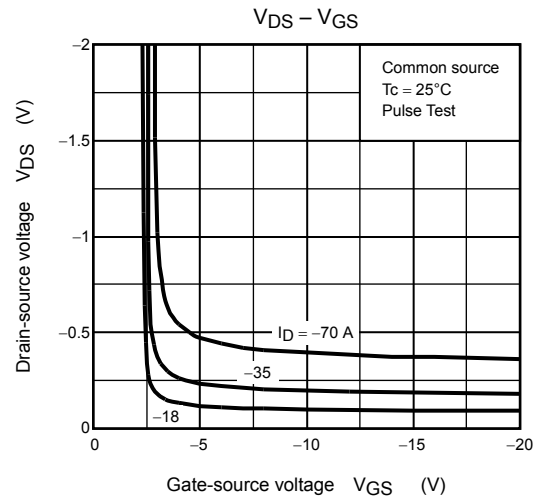
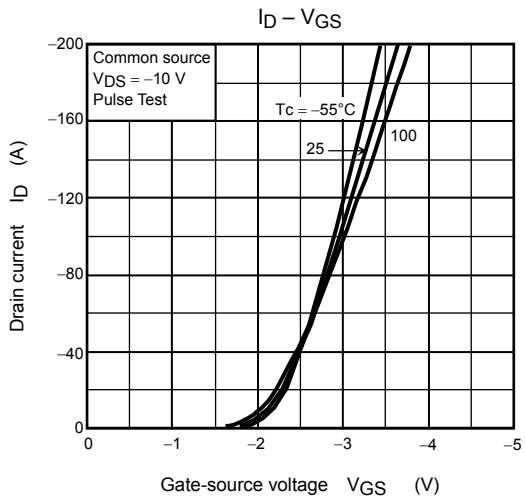
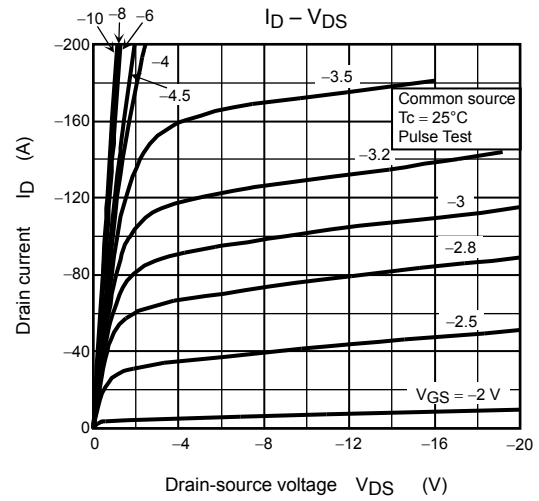
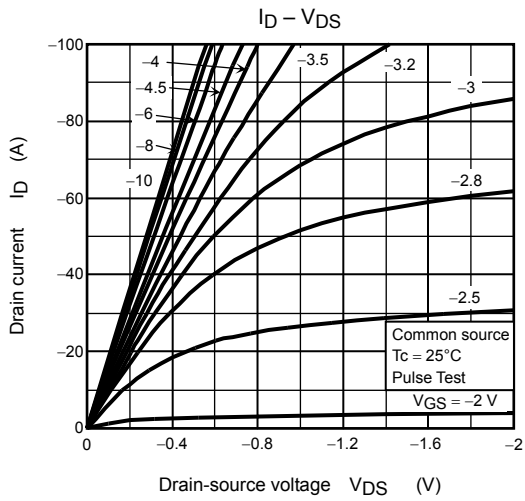
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|--|-----|------|-----|------|
| Continuous drain reverse current (Note 1) | I_{DR} | — | — | — | 70 | A |
| Pulse drain reverse current (Note 1) | I_{DRP} | — | — | — | 280 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = -70 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | 1.2 | V |
| Reverse recovery time | t_{rr} | $I_{DR} = -70 \text{ A}, V_{GS} = 0 \text{ V}$, | — | 70 | — | ns |
| Reverse recovery charge | Q_{rr} | $dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$ | — | 53 | — | nC |

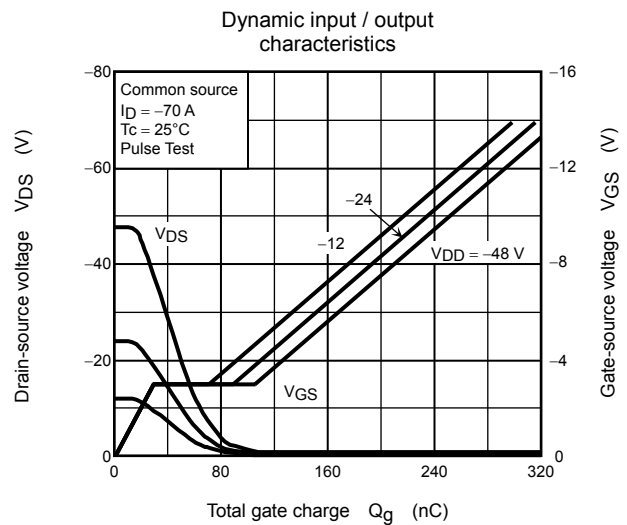
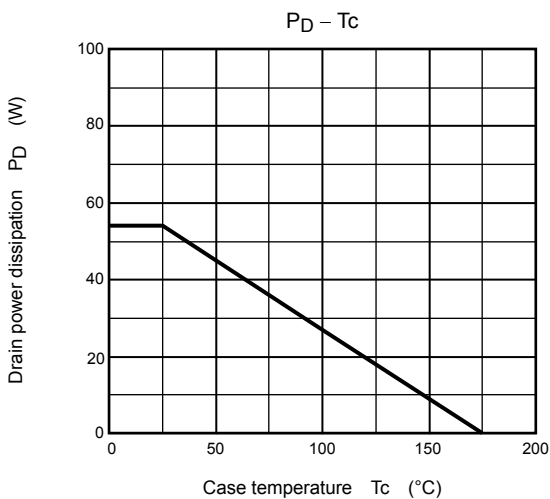
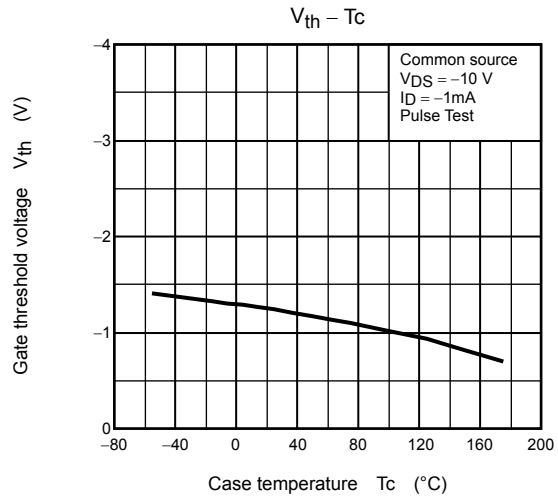
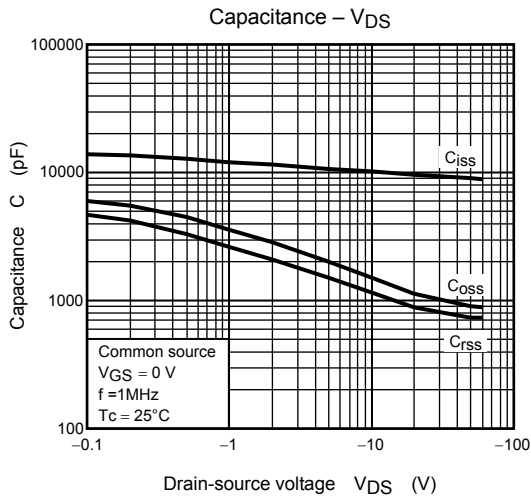
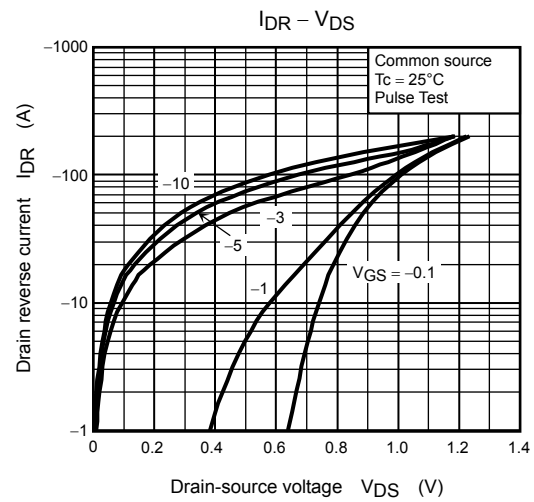
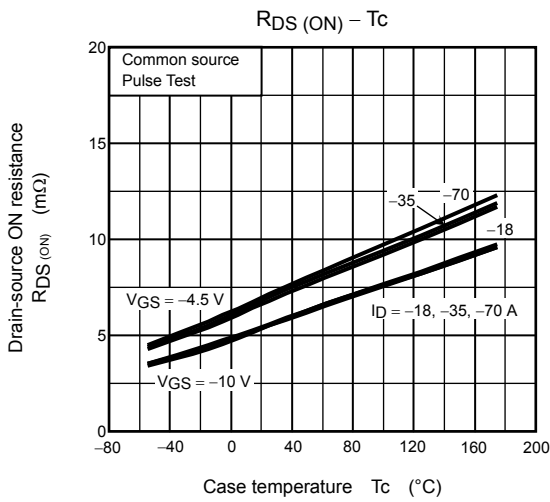
Marking

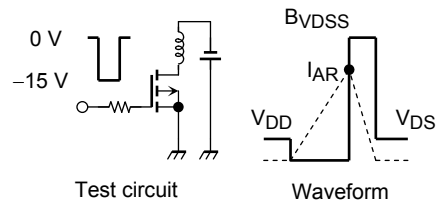
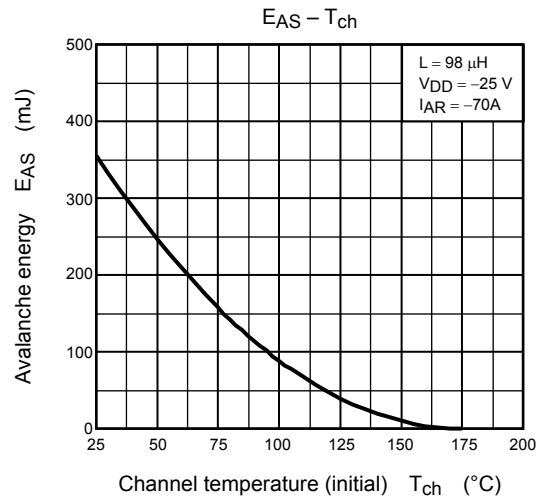
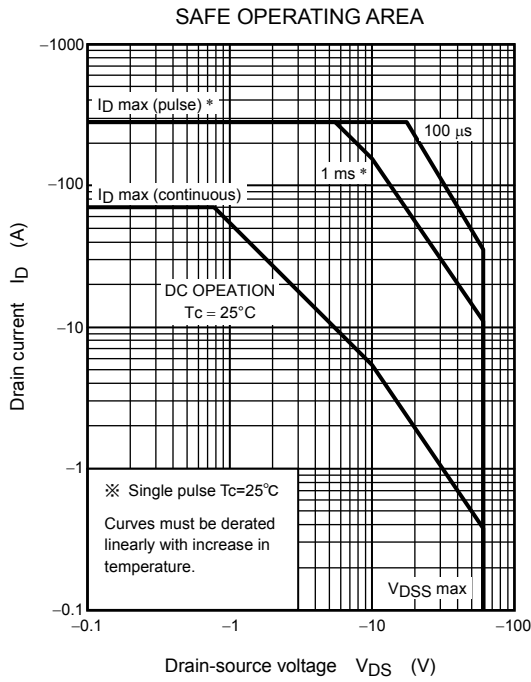
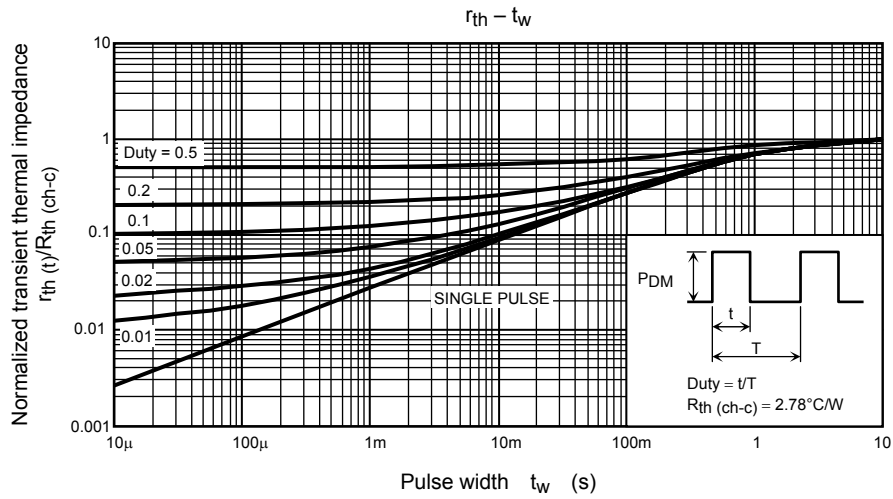


Note 6: A line under a Lot No. identifies the indication of product Labels [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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$R_G = 25 \Omega$
 $V_{DD} = -25 V, L = 98 \mu H$

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

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