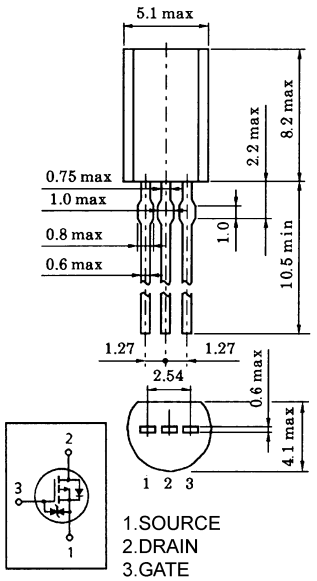
TOSHIBA Field Effect Transistor Silicon P Channel MOS Type ($L^2$−π−MOSVI)

# 2SJ537

Chopper Regulator, DC−DC Converter and Motor Drive Applications

- Low drain−source ON resistance : $R_{DS\ (ON)}$ = 0.16 Ω (typ.)
- High forward transfer admittance : $|Y_{fs}|$ = 3.5 S (typ.)
- Low leakage current : $I_{DSS}$ = −100 μA ($V_{DS}$ = −50 V)
- Enhancement mode : $V_{th}$ = −0.8 to −2.0 V ($V_{DS}$ = −10 V, $I_D$ = −1 mA)

Unit: mm




| | |
|---|---|
| JEDEC | TO-92MOD |
| JEITA | — |
| TOSHIBA | 2-5J1C |

Weight: 0.36 g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain−source voltage | | $V_{DSS}$ | −50 | V |
| Drain−gate voltage ($R_{GS}$ = 20 kΩ) | | $V_{DGR}$ | −50 | V |
| Gate−source voltage | | $V_{GSS}$ | ±20 | V |
| Drain current | DC (Note 1) | $I_D$ | −5 | A |
| | Pulse (Note 1) | $I_{DP}$ | −15 | A |
| Drain power dissipation | | $P_D$ | 0.9 | W |
| 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).

## Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|---|---|---|---|
| Thermal resistance, channel to ambient | $R_{th\ (ch-a)}$ | 138 | °C / W |

Note 1: Please use devices on condition that the channel temperature is below 150°C.

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



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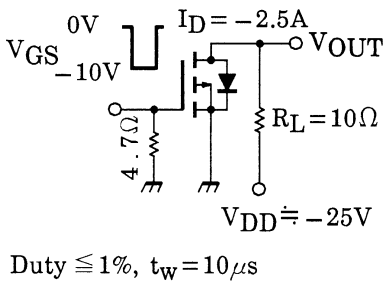
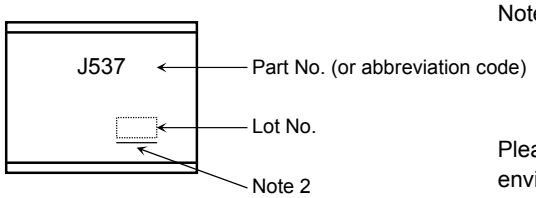
## Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Gate leakage current | | $I_{GSS}$ | $V_{GS}$ = ±16 V, $V_{DS}$ = 0 V | — | — | ±10 | μA |
| Drain cut−off current | | $I_{DSS}$ | $V_{DS}$ = −50 V, $V_{GS}$ = 0 V | — | — | −100 | μA |
| Drain−source breakdown voltage | | $V_{(BR)\ DSS}$ | $I_D$ = −10 mA, $V_{GS}$ = 0 V | −50 | — | — | V |
| Gate threshold voltage | | $V_{th}$ | $V_{DS}$ = −10 V, $I_D$ = −1 mA | −0.8 | — | −2.0 | V |
| Drain−source ON resistance | | $R_{DS\ (ON)}$ | $V_{GS}$ = −4 V, $I_D$ = −1.3 A | — | 0.27 | 0.34 | Ω |
| | | | $V_{GS}$ = −10 V, $I_D$ = −2.5 A | — | 0.16 | 0.19 | |
| Forward transfer admittance | | $\|Y_{fs}\|$ | $V_{DS}$ = −10 V, $I_D$ = −2.5 A | 1.5 | 3.5 | — | S |
| Input capacitance | | $C_{iss}$ | $V_{DS}$ = −10 V, $V_{GS}$ = 0 V, f = 1 MHz | — | 470 | — | pF |
| Reverse transfer capacitance | | $C_{rss}$ | | — | 60 | — | |
| Output capacitance | | $C_{oss}$ | | — | 210 | — | |
| Switching time | Rise time | $t_r$ |   | — | 25 | — | ns |
| | Turn−on time | $t_{on}$ | | — | 35 | — | |
| | Fall time | $t_f$ | | — | 20 | — | |
| | Turn−off time | $t_{off}$ | | — | 120 | — | |
| Total gate charge (Gate−source plus gate−drain) | | $Q_g$ | $V_{DD}$ ≈ −40 V, $V_{GS}$ = −10 V, $I_D$ = −5 A | — | 18 | — | nC |
| Gate−source charge | | $Q_{gs}$ | | — | 13 | — | |
| Gate−drain (“miller”) charge | | $Q_{gd}$ | | — | 5 | — | |

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

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Continuous drain reverse current (Note 1) | $I_{DR}$ | — | — | — | −5 | A |
| Pulse drain reverse current (Note 1) | $I_{DRP}$ | — | — | — | −15 | A |
| Forward voltage (diode) | $V_{DSF}$ | $I_{DR}$ = −5 A, $V_{GS}$ = 0 V | — | — | 1.5 | V |

## Marking




Note 2: A line under a Lot No. identifies the indication of product Labels.
Not underlined: [[Pb]]/INCLUDES > MCV
Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.



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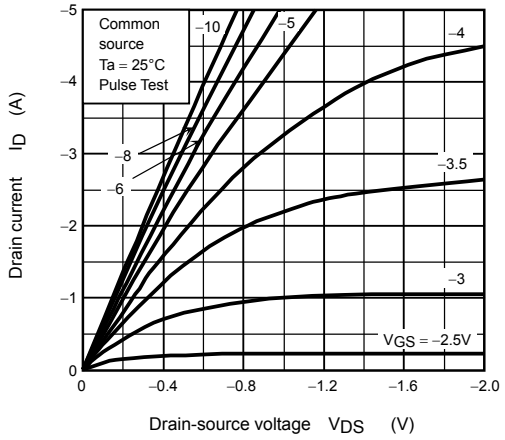
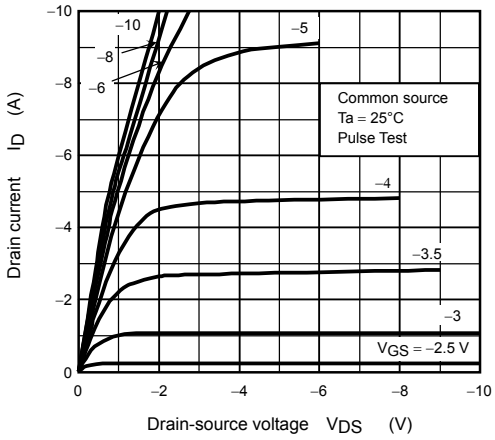
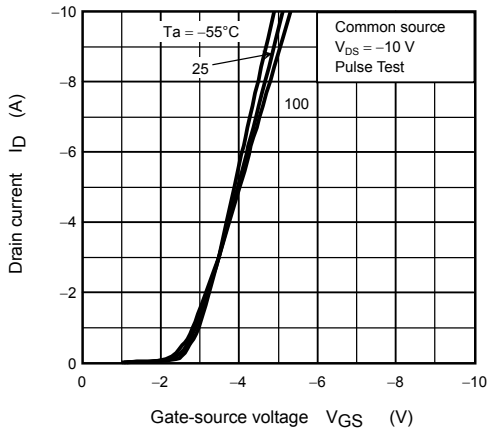
$I_D - V_{DS}$



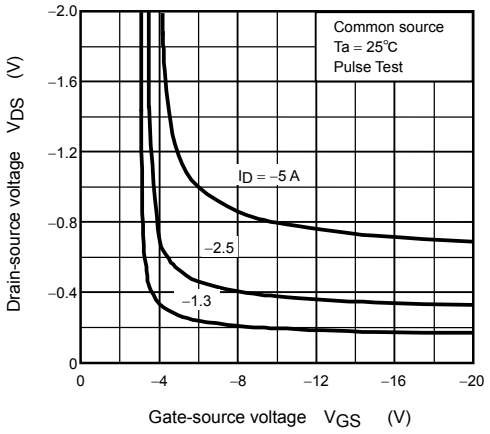

$I_D - V_{DS}$



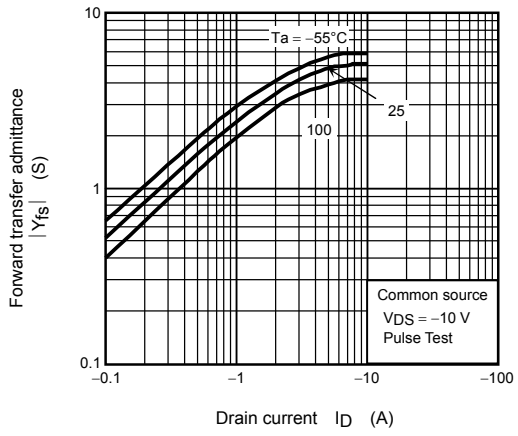

$I_D - V_{GS}$



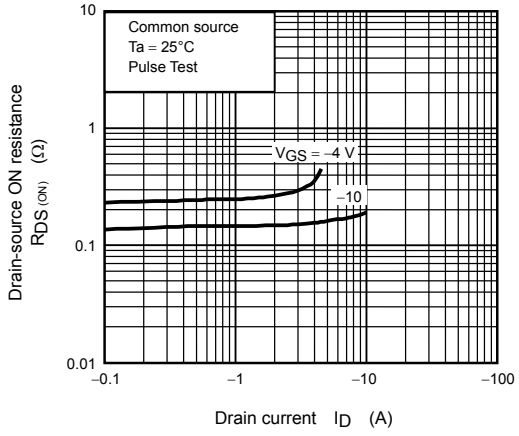

$V_{DS} - V_{GS}$




$|Y_{fs}| - I_D$




$R_{DS\ (ON)} - I_D$



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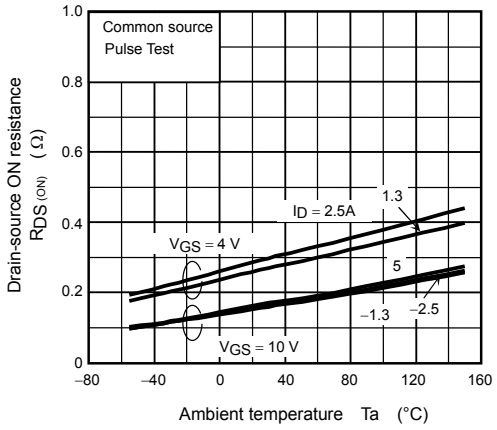
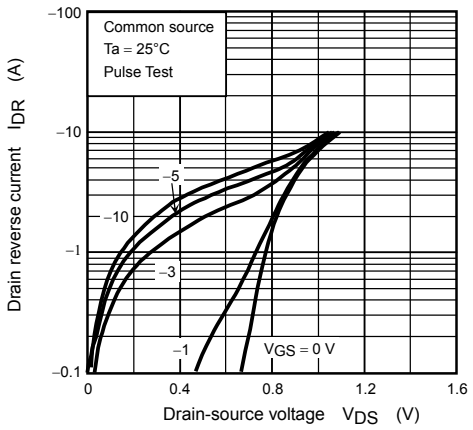
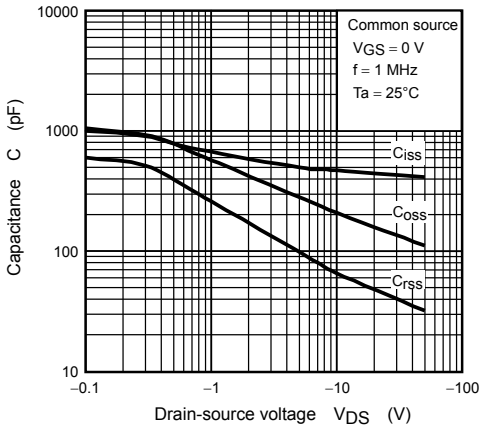
$R_{DS\ (ON)}$ – Ta



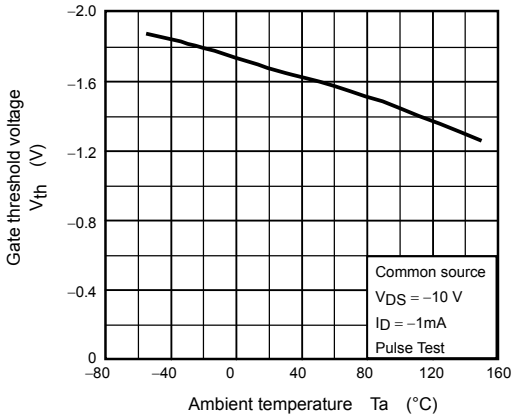

$I_{DR}$ – $V_{DS}$



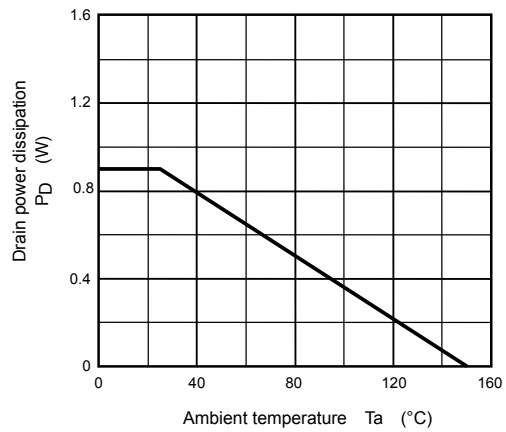

Capacitance – $V_{DS}$



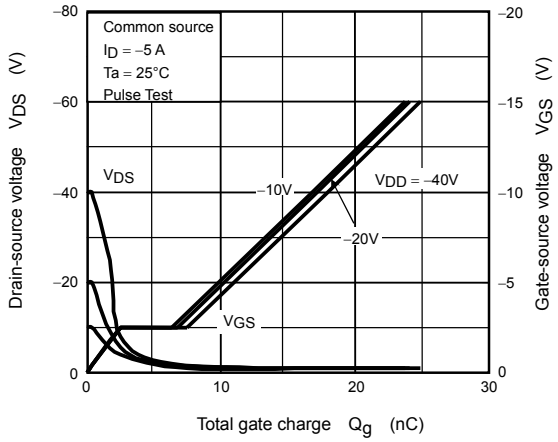

$V_{th}$ – Ta




$P_D$ – Ta




Dynamic input / output characteristics



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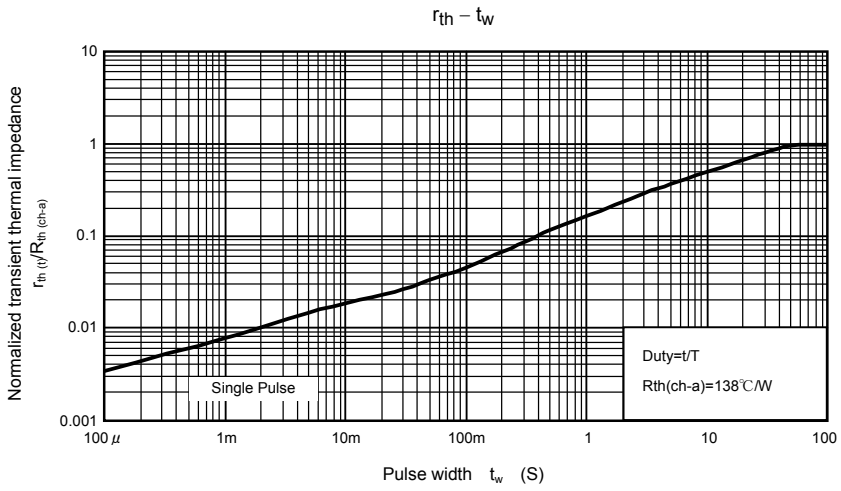


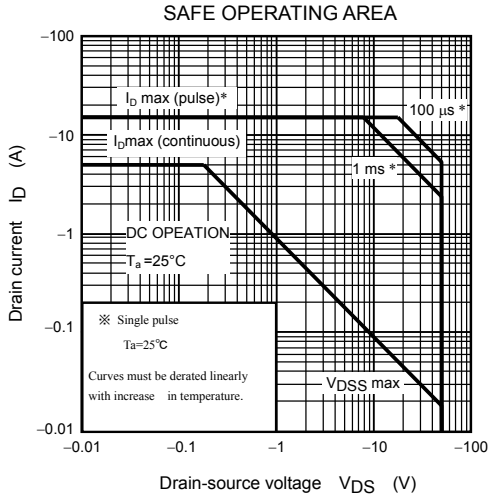




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