

# 2SK3911

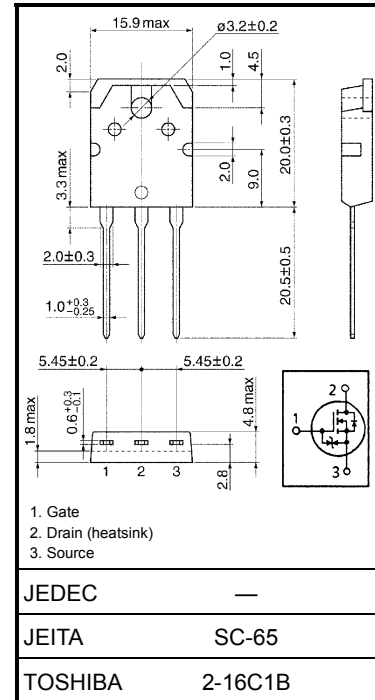
## Switching Regulator Applications

Unit: mm

- Small gate charge:  $Q_g = 60 \text{ nC}$  (typ.)
- Low drain-source ON resistance:  $R_{DS}(\text{ON}) = 0.22 \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 11 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = 500 \mu\text{A}$  ( $V_{DS} = 600 \text{ V}$ )
- Enhancement model:  $V_{th} = 2.0 \sim 4.0 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

## Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

| Characteristic                                       |                | Symbol    | Rating         | Unit             |
|--|----------------|-----------|----------------|------------------|
| Drain-source voltage                                 |                | $V_{DSS}$ | 600            | V                |
| Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ ) |                | $V_{DGR}$ | 600            | V                |
| Gate-source voltage                                  |                | $V_{GSS}$ | $\pm 30$       | V                |
| Drain current  | DC (Note 1)    | $I_D$     | 20             | A                |
|  | Pulse (Note 1) | $I_{DP}$  | 80             |                  |
| Drain power dissipation ( $T_c = 25^\circ\text{C}$ ) |                | $P_D$     | 150            | W                |
| Single pulse avalanche energy (Note 2)               |                | $E_{AS}$  | 792            | mJ               |
| Avalanche current                                    |                | $I_{AR}$  | 20             | A                |
| Repetitive avalanche energy (Note 3)                 |                | $E_{AR}$  | 15             | mJ               |
| Channel temperature                                  |                | $T_{ch}$  | 150            | $^\circ\text{C}$ |
| Storage temperature range                            |                | $T_{stg}$ | $-55 \sim 150$ | $^\circ\text{C}$ |



Weight: 4.6 g (typ.)

## Thermal Characteristics

| Characteristic                         | Symbol         | Max   | Unit               |
|--|----------------|-------|--------------------|
| Thermal resistance, channel to case    | $R_{th(ch-c)}$ | 0.833 | $^\circ\text{C/W}$ |
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 50    | $^\circ\text{C/W}$ |

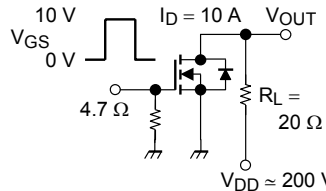
Note 1: Ensure that the channel temperature does not exceed  $150^\circ\text{C}$  during use of the device.

Note 2:  $V_{DD} = 90 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 3.46 \text{ mH}$ ,  $I_{AR} = 20 \text{ A}$ ,  $R_G = 25 \Omega$

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

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

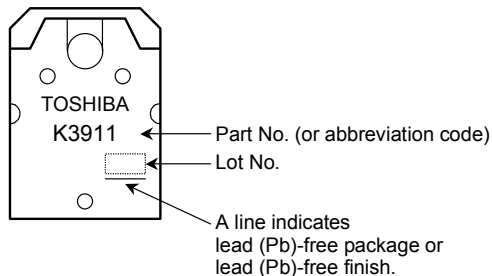
## Electrical Characteristics (Ta = 25°C)

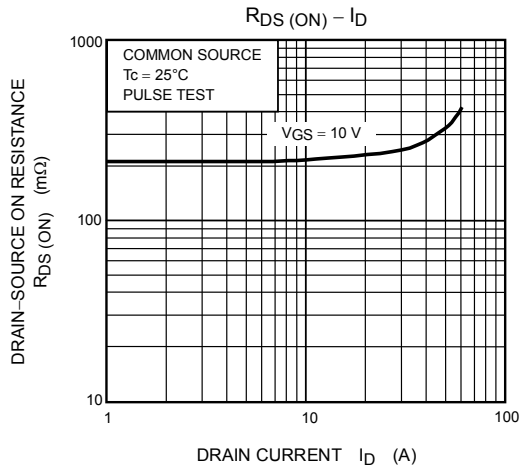
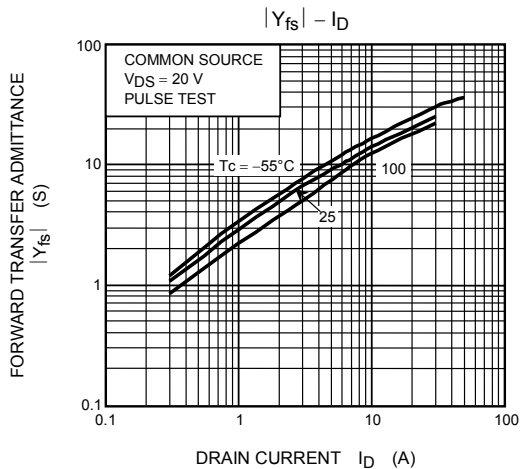
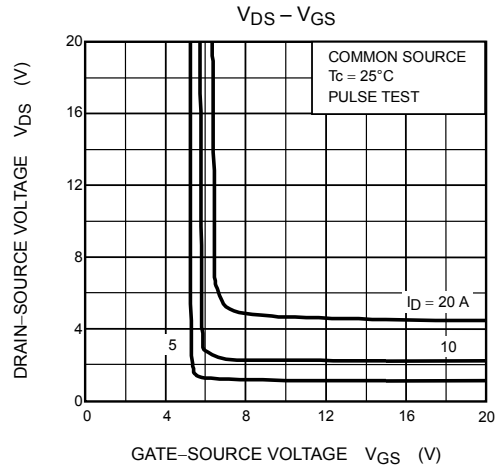
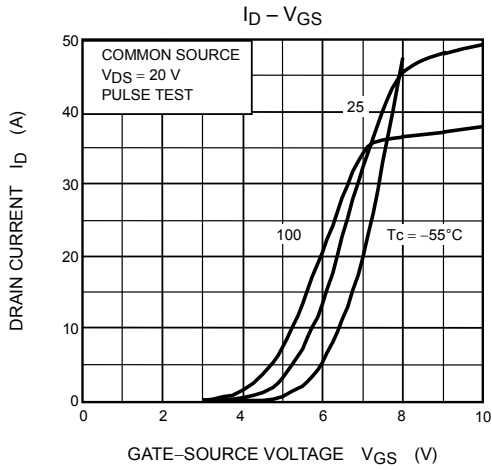
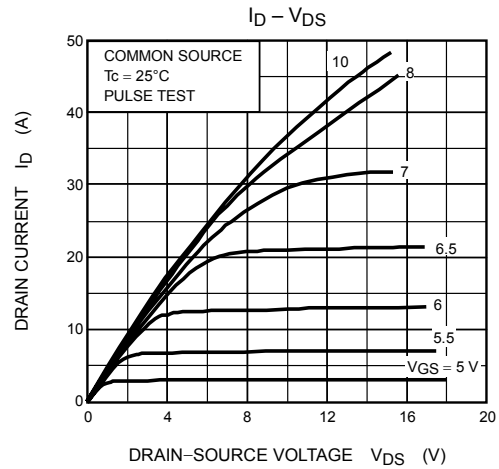
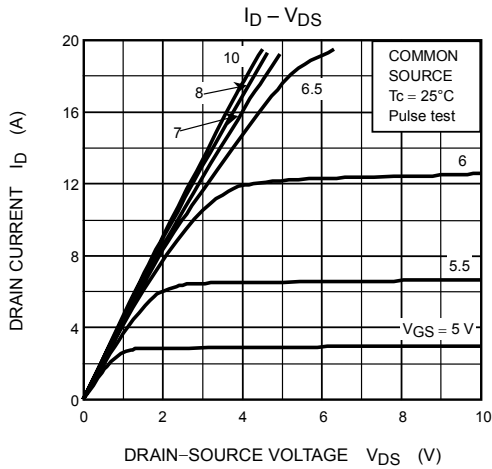
| Characteristic                 |               | Symbol        | Test Condition   | Min      | Typ. | Max      | Unit          |
|--------------------------------|---------------|---------------|--|----------|------|----------|---------------|
| Gate leakage current           |               | $I_{GSS}$     | $V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$                                  | —        | —    | $\pm 10$ | $\mu\text{A}$ |
| Gate-source breakdown voltage  |               | $V_{(BR)GSS}$ | $I_D = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$                                   | $\pm 30$ | —    | —        | V             |
| Drain cutoff current           |               | $I_{DSS}$     | $V_{DS} = 600 \text{ V}, V_{GS} = 0 \text{ V}$                                     | —        | —    | 500      | $\mu\text{A}$ |
| Drain-source breakdown voltage |               | $V_{(BR)DSS}$ | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$  | 600      | —    | —        | V             |
| Gate threshold voltage         |               | $V_{th}$      | $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$  | 2.0      | —    | 4.0      | V             |
| Drain-source ON resistance     |               | $R_{DS(ON)}$  | $V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$  | —        | 0.22 | 0.32     | $\Omega$      |
| Forward transfer admittance    |               | $ Y_{fs} $    | $V_{DS} = 10 \text{ V}, I_D = 10 \text{ A}$  | 3.0      | 11   | —        | S             |
| Input capacitance              |               | $C_{iss}$     | $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$                   | —        | 4250 | —        | pF            |
| Reverse transfer capacitance   |               | $C_{rss}$     |  | —        | 10   | —        |               |
| Output capacitance             |               | $C_{oss}$     |  | —        | 420  | —        |               |
| Switching time                 | Rise time     | $t_r$         |  | —        | 12   | —        | ns            |
|                                | Turn-on time  | $t_{on}$      |  | —        | 45   | —        |               |
|                                | Fall time     | $t_f$         |  | —        | 12   | —        |               |
|                                | Turn-off time | $t_{off}$     |  | —        | 80   | —        |               |
| Total gate charge              |               | $Q_g$         | $V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$          | —        | 60   | —        | nC            |
| Gate-source charge             |               | $Q_{gs}$      |  | —        | 50   | —        |               |
| Gate-drain charge              |               | $Q_{gd}$      |  | —        | 10   | —        |               |

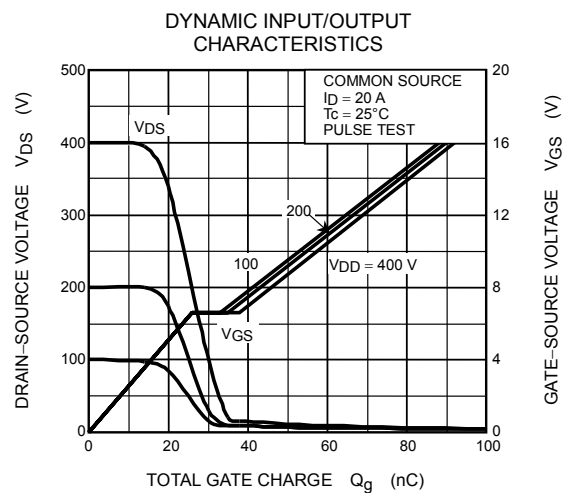
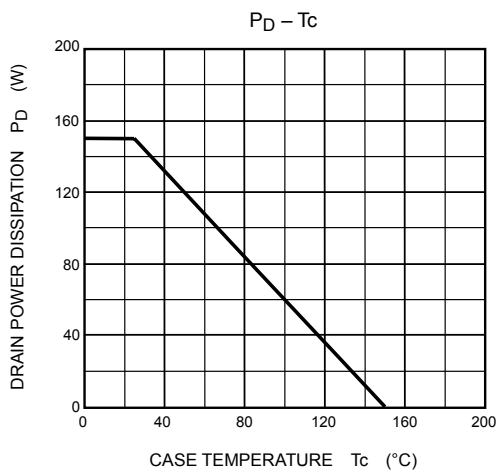
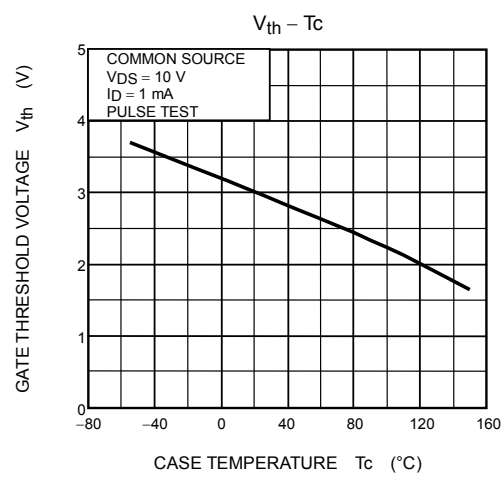
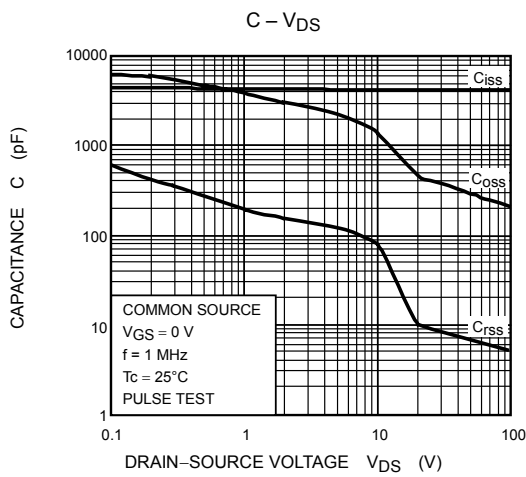
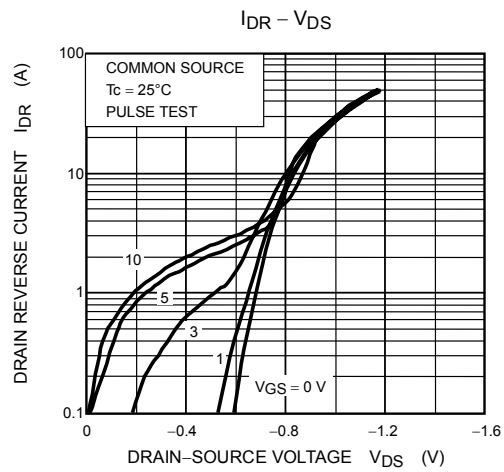
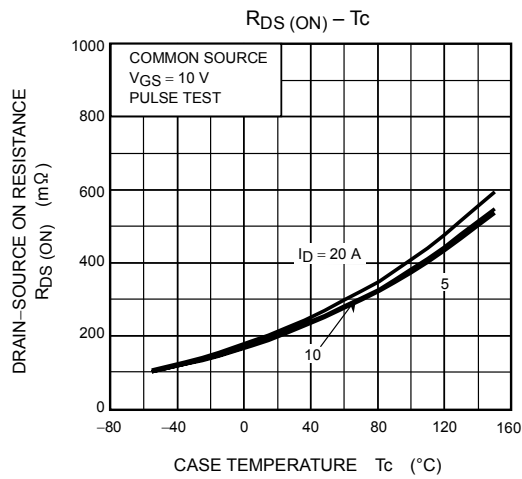
## Source-Drain Ratings and Characteristics (Ta = 25°C)

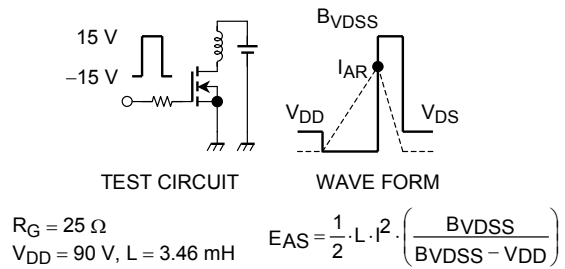
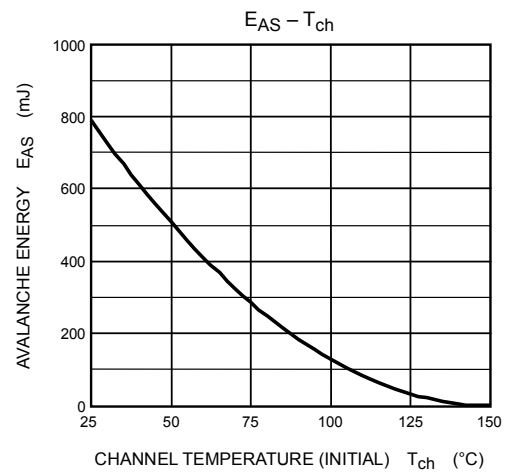
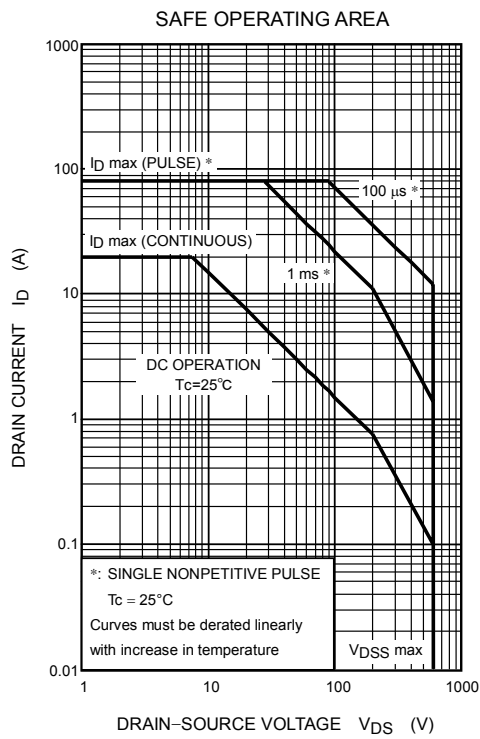
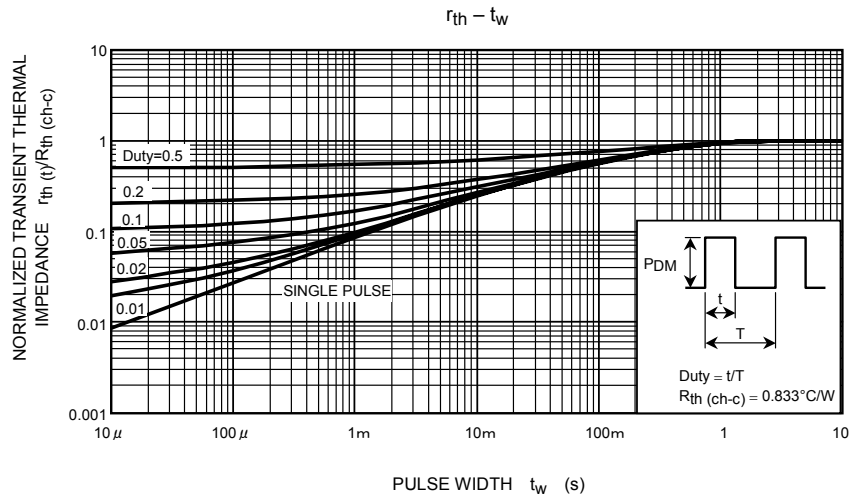
| Characteristic                               | Symbol    | Test Condition   | Min | Typ. | Max  | Unit          |
|--|-----------|--|-----|------|------|---------------|
| Continuous drain reverse current<br>(Note 1) | $I_{DR}$  | —  | —   | —    | 20   | A             |
| Pulse drain reverse current<br>(Note 1)      | $I_{DRP}$ | —  | —   | —    | 80   | A             |
| Forward voltage (diode)                      | $V_{DSF}$ | $I_{DR} = 20 \text{ A}, V_{GS} = 0 \text{ V}$  | —   | —    | -1.7 | V             |
| Reverse recovery time                        | $t_{rr}$  | $I_{DR} = 20 \text{ A}, V_{GS} = 0 \text{ V},$<br>$dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$ | —   | 1350 | —    | ns            |
| Reverse recovery charge                      | $Q_{rr}$  |  | —   | 24   | —    | $\mu\text{C}$ |

## Marking









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