

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSII.5)**2SK1858**

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS.

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS.

- Low Drain-Source ON Resistance :  $R_{DS(ON)}=4.3\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}|=1.7S$  (Typ.)
- Low Leakage Current :  $I_{DSS}=100\mu A$  (Max.) ( $V_{DS}=640V$ )
- Enhancement-Mode :  $V_{th}=1.5\sim 3.5V$   
( $V_{DS}=10V$ ,  $I_D=1mA$ )

MAXIMUM RATINGS ( $T_a=25^\circ C$ )

| CHARACTERISTIC                               |       | SYMBOL    | RATING        | UNIT       |
|----------------------------------------------|-------|-----------|---------------|------------|
| Drain-Source Voltage                         |       | $V_{DSS}$ | 800           | V          |
| Drain-Gate Voltage ( $R_{GS}=20k\Omega$ )    |       | $V_{DGR}$ | 800           | V          |
| Gate-Source Voltage                          |       | $V_{GSS}$ | $\pm 30$      | V          |
| Drain Current                                | DC    | $I_D$     | 3             | A          |
|                                              | Pulse | $I_{DP}$  | 9             |            |
| Drain Power Dissipation ( $T_c=25^\circ C$ ) |       | $P_D$     | 60            | W          |
| Channel Temperature                          |       | $T_{ch}$  | 150           | $^\circ C$ |
| Storage Temperature Range                    |       | $T_{stg}$ | $-55\sim 150$ | $^\circ C$ |

THERMAL CHARACTERISTICS

| CHARACTERISTIC                         | SYMBOL         | MAX. | UNIT         |
|----------------------------------------|----------------|------|--------------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 2.08 | $^\circ C/W$ |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 83.3 | $^\circ C/W$ |

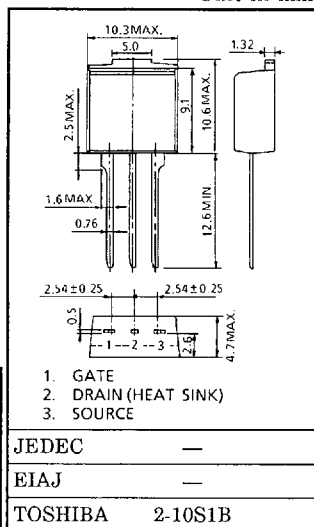
THIS TRANSISTOR IS AN ELECTROSTATIC SENSITIVE DEVICE.

PLEASE HANDLE WITH CAUTION.

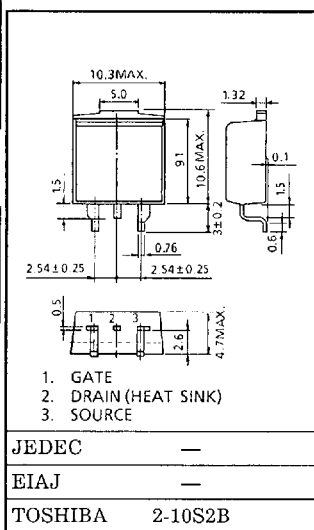
INDUSTRIAL APPLICATIONS

TO-220FL

Unit in mm



TO-220SM

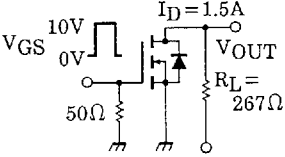


Weight : 1.5g

961001EAA2

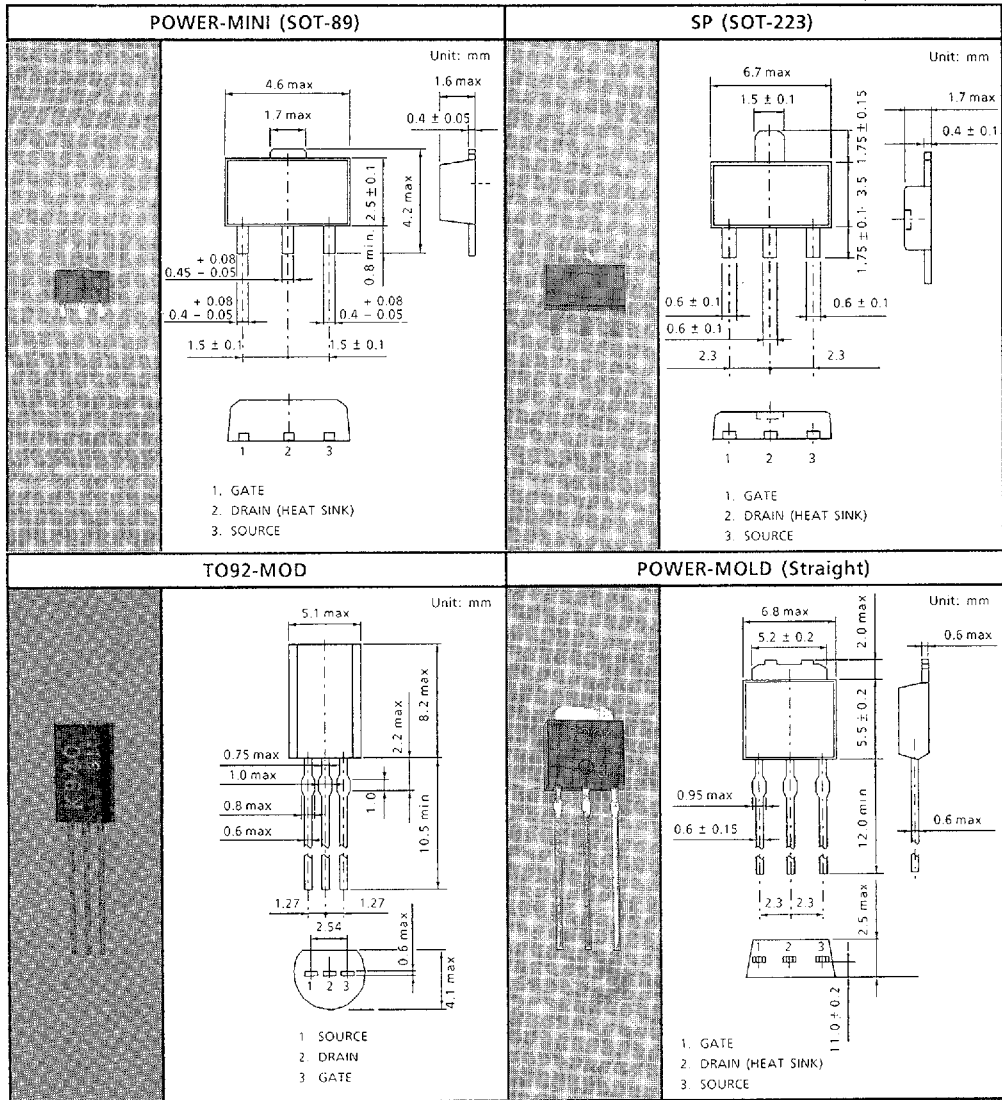
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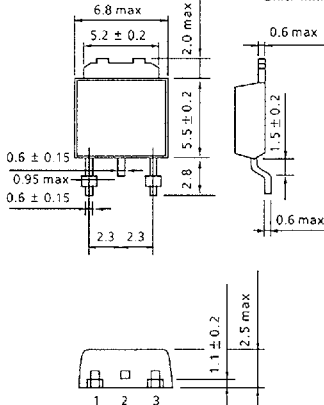
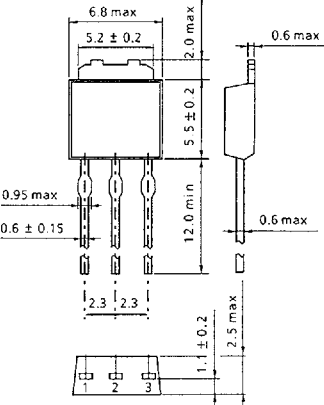
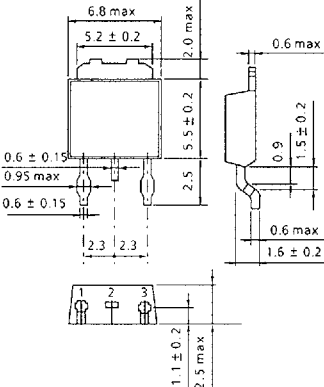
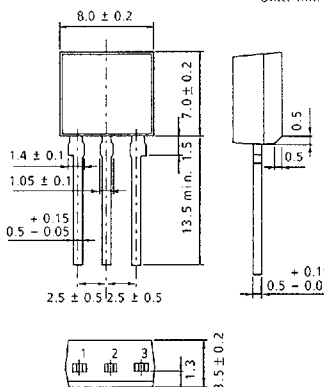
ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

| CHARACTERISTIC                                  |               | SYMBOL        | TEST CONDITION                                                                                                                                                                                                                                                | MIN. | TYP. | MAX.      | UNIT          |
|-------------------------------------------------|---------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----------|---------------|
| Gate Leakage Current                            |               | $I_{GSS}$     | $V_{GS} = \pm 25\text{V}$ , $V_{DS} = 0\text{V}$                                                                                                                                                                                                              | —    | —    | $\pm 100$ | nA            |
| Drain Cut-off Current                           |               | $I_{DSS}$     | $V_{DS} = 640\text{V}$ , $V_{GS} = 0\text{V}$                                                                                                                                                                                                                 | —    | —    | 100       | $\mu\text{A}$ |
| Drain-Source Breakdown Voltage                  |               | $V_{(BR)DSS}$ | $I_D = 10\text{mA}$ , $V_{GS} = 0\text{V}$                                                                                                                                                                                                                    | 800  | —    | —         | V             |
| Gate Threshold Voltage                          |               | $V_{th}$      | $V_{DS} = 10\text{V}$ , $I_D = 1\text{mA}$                                                                                                                                                                                                                    | 1.5  | —    | 3.5       | V             |
| Drain-Source ON Resistance                      |               | $R_{DS(ON)}$  | $I_D = 1.5\text{A}$ , $V_{GS} = 10\text{V}$                                                                                                                                                                                                                   | —    | 4.3  | 5.0       | $\Omega$      |
| Forward Transfer Admittance                     |               | $ Y_{fs} $    | $V_{DS} = 20\text{V}$ , $I_D = 1.5\text{A}$                                                                                                                                                                                                                   | 1.0  | 1.7  | —         | S             |
| Input Capacitance                               |               | $C_{iss}$     | $V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ ,<br>$f = 1\text{MHz}$                                                                                                                                                                                           | —    | 360  | —         | pF            |
| Reverse Transfer Capacitance                    |               | $C_{rss}$     |                                                                                                                                                                                                                                                               | —    | 30   | —         |               |
| Output Capacitance                              |               | $C_{oss}$     |                                                                                                                                                                                                                                                               | —    | 60   | —         |               |
| Switching Time                                  | Rise Time     | $t_r$         |  <p><math>V_{DD} \doteq 400\text{V}</math><br/> <math>V_{IN} : t_r, t_f &lt; 5\text{ns}</math>,<br/> <math>\text{Duty} \leq 1\%</math>, <math>t_w = 10\mu\text{s}</math></p> | —    | 25   | —         | ns            |
|                                                 | Turn-on Time  | $t_{on}$      |                                                                                                                                                                                                                                                               | —    | 40   | —         |               |
|                                                 | Fall Time     | $t_f$         |                                                                                                                                                                                                                                                               | —    | 40   | —         |               |
|                                                 | Turn-off Time | $t_{off}$     |                                                                                                                                                                                                                                                               | —    | 150  | —         |               |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | $Q_g$         | $V_{DD} \doteq 400\text{V}$ , $V_{GS} = 10\text{V}$ ,<br>$I_D = 3\text{A}$                                                                                                                                                                                    | —    | 26   | —         | nC            |
| Gate-Source Charge                              |               | $Q_{gs}$      |                                                                                                                                                                                                                                                               | —    | 16   | —         |               |
| Gate-Drain ("Miller") Charge                    |               | $Q_{gd}$      |                                                                                                                                                                                                                                                               | —    | 10   | —         |               |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

| CHARACTERISTIC                   | SYMBOL    | TEST CONDITION                              | MIN. | TYP. | MAX. | UNIT          |
|----------------------------------|-----------|---------------------------------------------|------|------|------|---------------|
| Continuous Drain Reverse Current | $I_{DR}$  | —                                           | —    | —    | 3    | A             |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —                                           | —    | —    | 9    | A             |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 3\text{A}$ , $V_{GS} = 0\text{V}$ | —    | —    | -2.0 | V             |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 3\text{A}$ , $V_{GS} = 0\text{V}$ | —    | 600  | —    | ns            |
| Reverse Recovered Charge         | $Q_{rr}$  | $dI_{DR} / dt = 100\text{A} / \mu\text{s}$  | —    | 12   | —    | $\mu\text{C}$ |



| POWER-MOLD (Lead Formed)                                                                                                                                                                                                                  | DP (Straight)                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   <p>Unit: mm</p> <p>1. GATE<br/>2. DRAIN (HEAT SINK)<br/>3. SOURCE</p> |   <p>1. GATE<br/>2. DRAIN (HEAT SINK)<br/>3. SOURCE</p>       |
| DP (Lead Forming)                                                                                                                                                                                                                         | TPS                                                                                                                                                                                                                              |
|   <p>1. GATE<br/>2. DRAIN (HEAT SINK)<br/>3. SOURCE</p>               |   <p>Unit: mm</p> <p>1. SOURCE<br/>2. DRAIN<br/>3. GATE</p> |

