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# 2SJ652

## P-Channel Power MOSFET -60V, -28A, 38mΩ, TO-220F-3SG

### Features

- ON-resistance  $R_{DS(on)1}=28.5\text{m}\Omega(\text{typ.})$
- Input capacitance  $C_{iss}=4360\text{pF}(\text{typ.})$
- 4V drive

### Specifications

Absolute Maximum Ratings at  $T_a=25^\circ\text{C}$ 

| Parameter                          | Symbol    | Conditions                                      | Ratings     | Unit             |
|------------------------------------|-----------|-------------------------------------------------|-------------|------------------|
| Drain-to-Source Voltage            | $V_{DS}$  |                                                 | -60         | V                |
| Gate-to-Source Voltage             | $V_{GS}$  |                                                 | $\pm 20$    | V                |
| Drain Current (DC)                 | $I_D$     |                                                 | -28         | A                |
| Drain Current (Pulse)              | $I_{DP}$  | $PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$ | -112        | A                |
| Allowable Power Dissipation        | $P_D$     |                                                 | 2.0         | W                |
|                                    |           | $T_c=25^\circ\text{C}$                          | 30          | W                |
| Channel Temperature                | $T_{ch}$  |                                                 | 150         | $^\circ\text{C}$ |
| Storage Temperature                | $T_{stg}$ |                                                 | -55 to +150 | $^\circ\text{C}$ |
| Avalanche Energy (Single Pulse) *1 | $E_{AS}$  |                                                 | 343         | mJ               |
| Avalanche Current *2               | $I_{AV}$  |                                                 | -28         | A                |

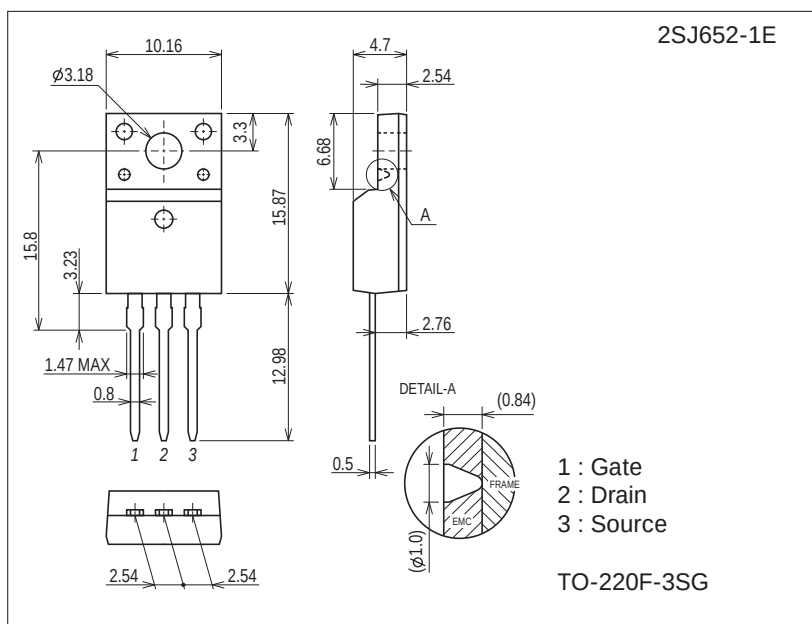
Note : \*1  $V_{DD}=-30\text{V}$ ,  $L=500\mu\text{H}$ ,  $I_{AV}=-28\text{A}$  (Fig.1)\*2  $L \leq 500\mu\text{H}$ , single pulse

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

unit : mm (typ)

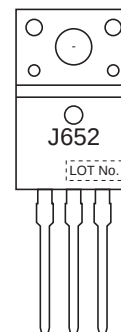
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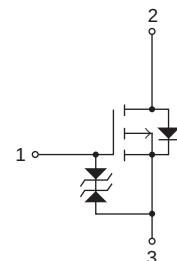
### Product & Package Information

- Package : TO-220F-3SG
- JEITA, JEDEC : SC-67
- Minimum Packing Quantity : 50 pcs./magazine

### Marking



### Electrical Connection



2SJ652

Electrical Characteristics at Ta=25°C

| Parameter                                  | Symbol        | Conditions                                 | Ratings |       |          | Unit      |
|--------------------------------------------|---------------|--------------------------------------------|---------|-------|----------|-----------|
|                                            |               |                                            | min     | typ   | max      |           |
| Drain-to-Source Breakdown Voltage          | $V_{(BR)DSS}$ | $I_D = -1mA, V_{GS} = 0V$                  | -60     |       |          | V         |
| Zero-Gate Voltage Drain Current            | $I_{DSS}$     | $V_{DS} = -60V, V_{GS} = 0V$               |         |       | -1       | $\mu A$   |
| Gate-to-Source Leakage Current             | $I_{GSS}$     | $V_{GS} = \pm 16V, V_{DS} = 0V$            |         |       | $\pm 10$ | $\mu A$   |
| Cutoff Voltage                             | $V_{GS(off)}$ | $V_{DS} = -10V, I_D = -1mA$                | -1.2    |       | -2.6     | V         |
| Forward Transfer Admittance                | $ y_{fs} $    | $V_{DS} = -10V, I_D = -14A$                | 18      | 26    |          | S         |
| Static Drain-to-Source On-State Resistance | $R_{DS(on)1}$ | $I_D = -14A, V_{GS} = -10V$                |         | 28.5  | 38       | $m\Omega$ |
|                                            | $R_{DS(on)2}$ | $I_D = -14A, V_{GS} = -4V$                 |         | 39    | 55.5     | $m\Omega$ |
| Input Capacitance                          | $C_{iss}$     | $V_{DS} = -20V, f = 1MHz$                  |         | 4360  |          | pF        |
| Output Capacitance                         | $C_{oss}$     |                                            |         | 470   |          | pF        |
| Reverse Transfer Capacitance               | $C_{rss}$     |                                            |         | 335   |          | pF        |
| Turn-ON Delay Time                         | $t_{d(on)}$   | See Fig.2                                  |         | 33    |          | ns        |
| Rise Time                                  | $t_r$         |                                            |         | 210   |          | ns        |
| Turn-OFF Delay Time                        | $t_{d(off)}$  |                                            |         | 310   |          | ns        |
| Fall Time                                  | $t_f$         |                                            |         | 180   |          | ns        |
| Total Gate Charge                          | $Q_g$         | $V_{DS} = -30V, V_{GS} = -10V, I_D = -28A$ |         | 80    |          | nC        |
| Gate-to-Source Charge                      | $Q_{gs}$      |                                            |         | 15    |          | nC        |
| Gate-to-Drain "Miller" Charge              | $Q_{gd}$      |                                            |         | 12    |          | nC        |
| Diode Forward Voltage                      | $V_{SD}$      | $I_S = -28A, V_{GS} = 0V$                  |         | -0.96 | -1.2     | V         |

Fig.1 Avalanche Resistance Test Circuit

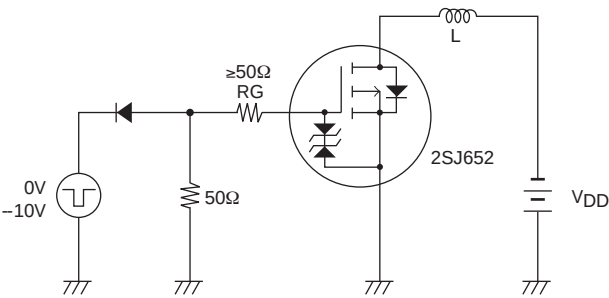
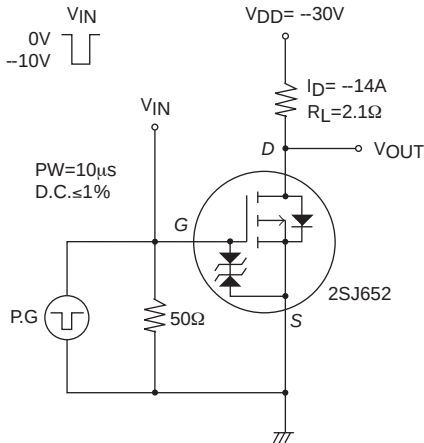
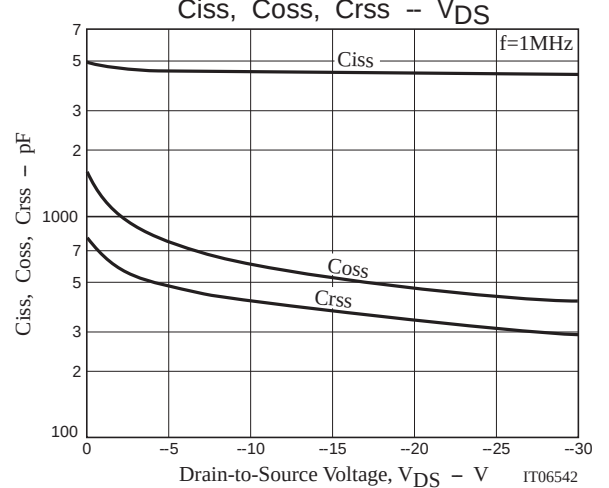
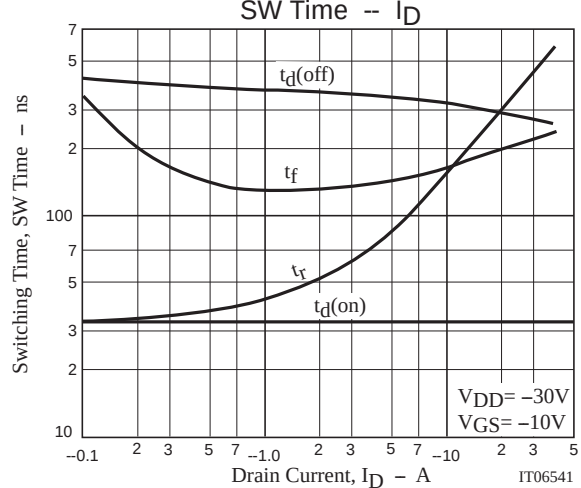
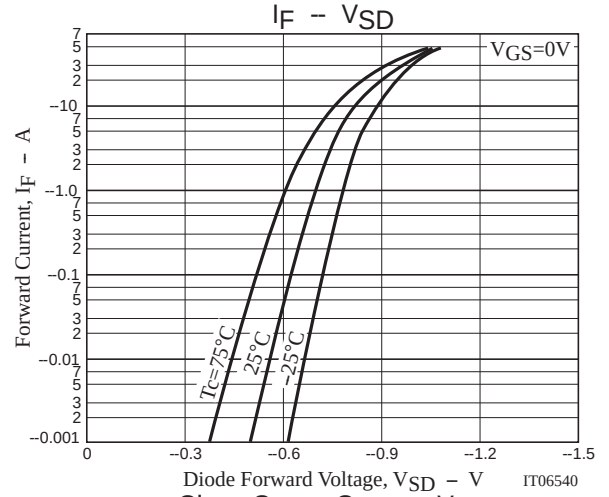
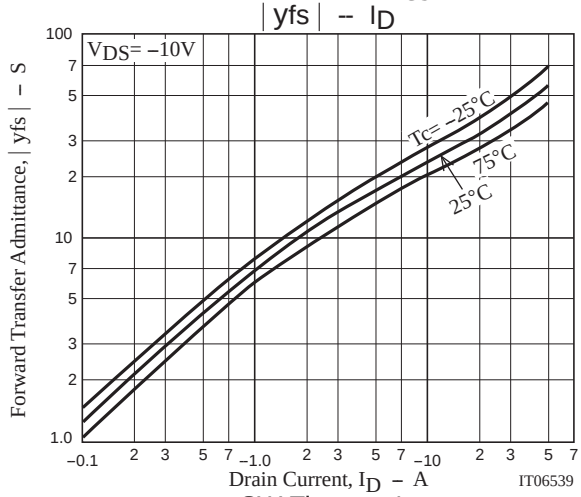
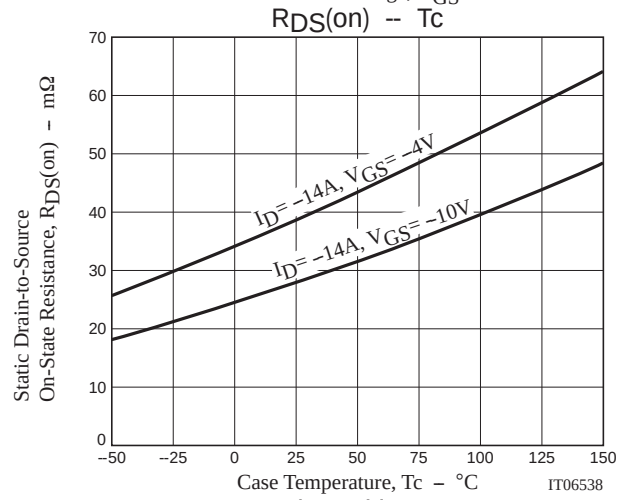
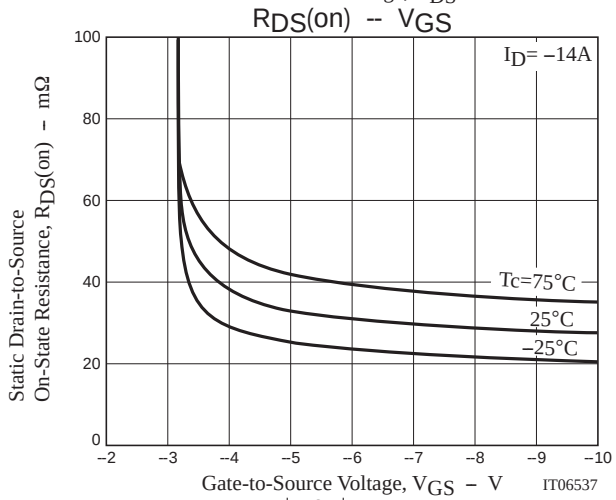
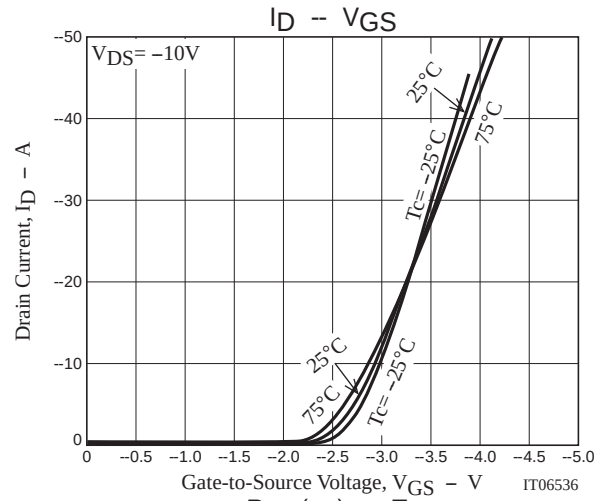
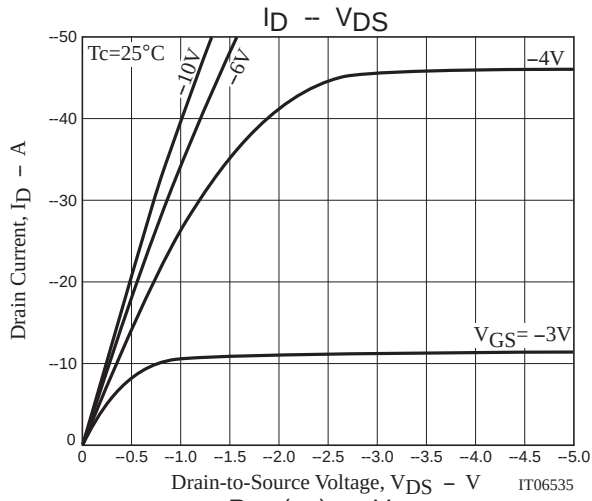


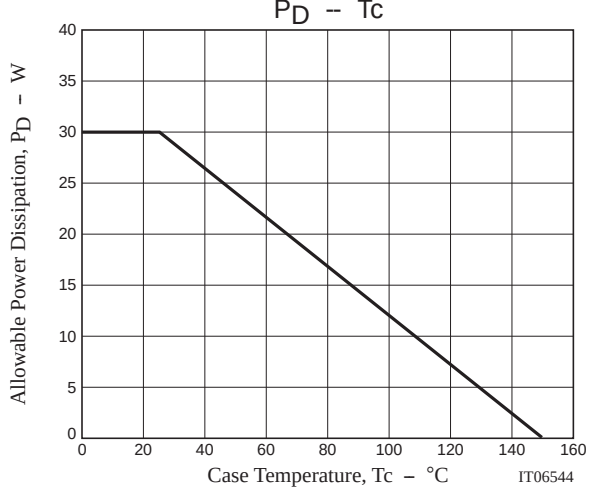
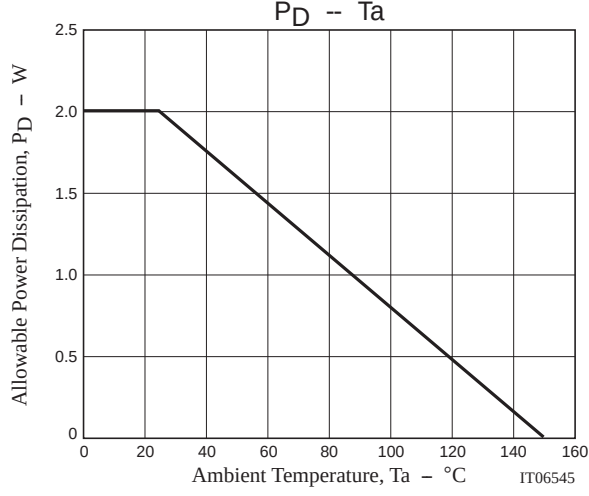
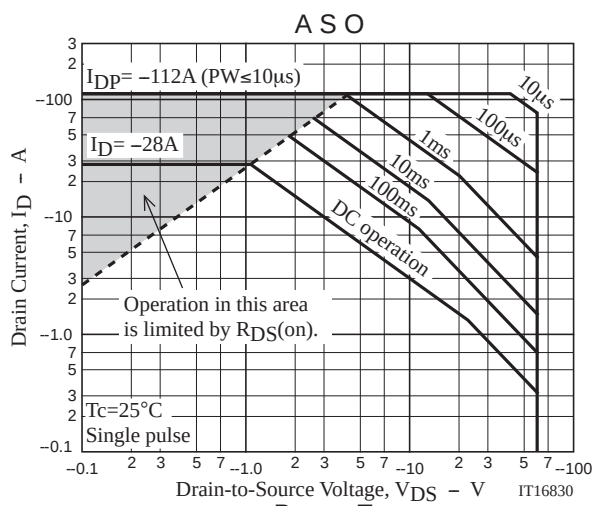
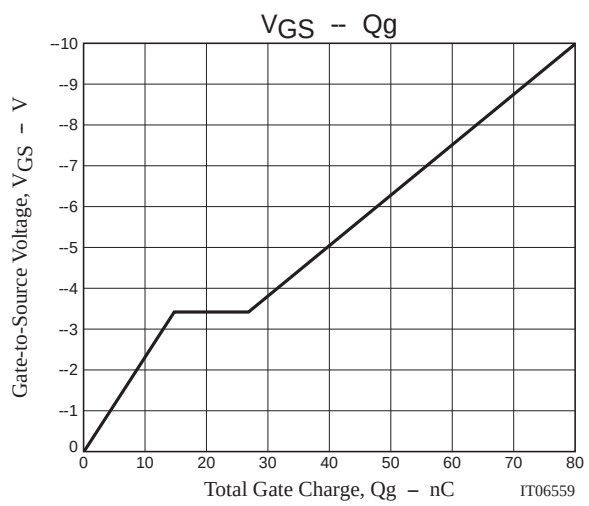
Fig.2 Switching Time Test Circuit



Ordering Information

| Device    | Package     | Shipping        | memo    |
|-----------|-------------|-----------------|---------|
| 2SJ652-1E | TO-220F-3SG | 50pcs./magazine | Pb Free |





## Magazine Specification

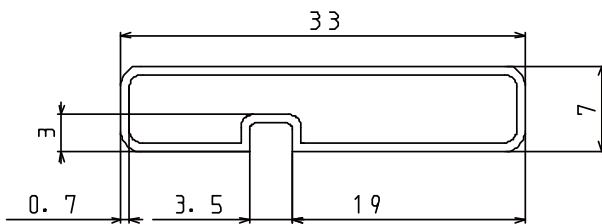
2SJ652-1E

## 1. Packing Format

| Package Name | Magazine Name | Maximum Number of devices contained (pcs) |           |           | Packing format                                                                 |                                                                                  |
|--------------|---------------|-------------------------------------------|-----------|-----------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|              |               | Magazine                                  | Inner box | Outer box | Inner BOX                                                                      | Outer BOX                                                                        |
| TO-220F-3SG  | TO-220F       | 50                                        | 1,000     | 4,000     | SPD-0V0001<br>20 magazines contained<br>Dimensions:mm {external}<br>568×150×55 | SPT-081029<br>4 inner boxes contained<br>Dimensions:mm {external}<br>590×225×178 |

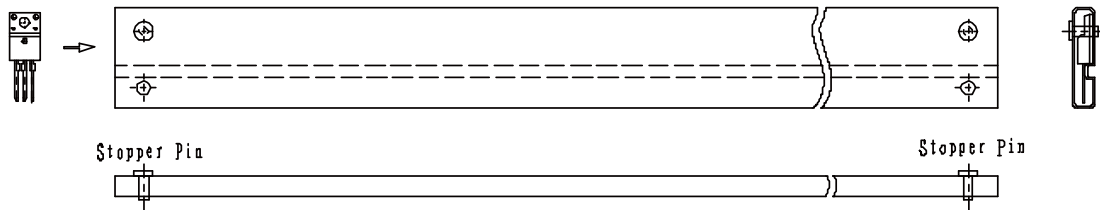
## 2. Magazine dimensions

(unit:mm)



Tolerance=±0.3mm  
 Thickness=0.7±0.2mm  
 Length =532.5±2mm  
 Material =PVC (Antistatic treatment)

## 3. Storage method to magazine



## 4. Inner box label (unit:mm)

|          |   |                                                              |
|----------|---|--------------------------------------------------------------|
| Type No. | → | TYPE 0000000000                                              |
| LOT No.  | → | LOT 00                                                       |
| Quantity | → | QTY 0,000 (1) LEAD FREE *                                    |
| Origin   | → | SPECIAL *20722005310C*<br>ASSEMBLY:***** ( DIFFUSION:***** ) |

## 5. Outer box label (unit:mm)

It is a label at the time of factory shipments.  
 The form of a label may change in physical  
 distribution process.

|           |                                                      |
|-----------|------------------------------------------------------|
| TYPE CODE | TYPE 0000000000                                      |
| QTY       | QTY 0,000 PCS (1) LEAD FREE *                        |
| LOT       | LOT 00                                               |
| PACKAGE   | PACKAGE 00000000                                     |
| SPECIAL   | *20722005310C*<br>ASSEMBLY:***** ( DIFFUSION:***** ) |

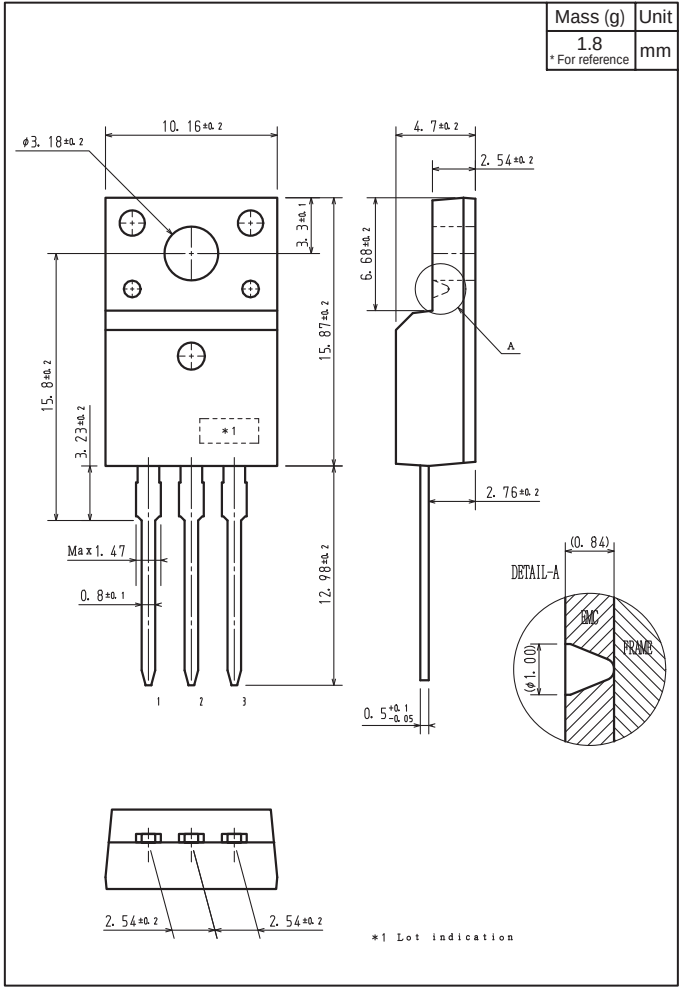
## NOTE (1)

The LEAD FREE \* description shows that the  
 surface treatment of the terminal is lead free.

| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |

Outline Drawing

2SJ652-1E



Note on usage : Since the 2SJ652 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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