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# EFC4621R

## Power MOSFET 24V, 9A, 18mΩ N-Channel Dual EFCP

### Features

- 2.5V drive
- Common-drain type
- 2KV ESD HBM
- Protection diode in
- Halogen free compliance

### Applications

- Lithium-ion battery charging and discharging switch

### Specifications

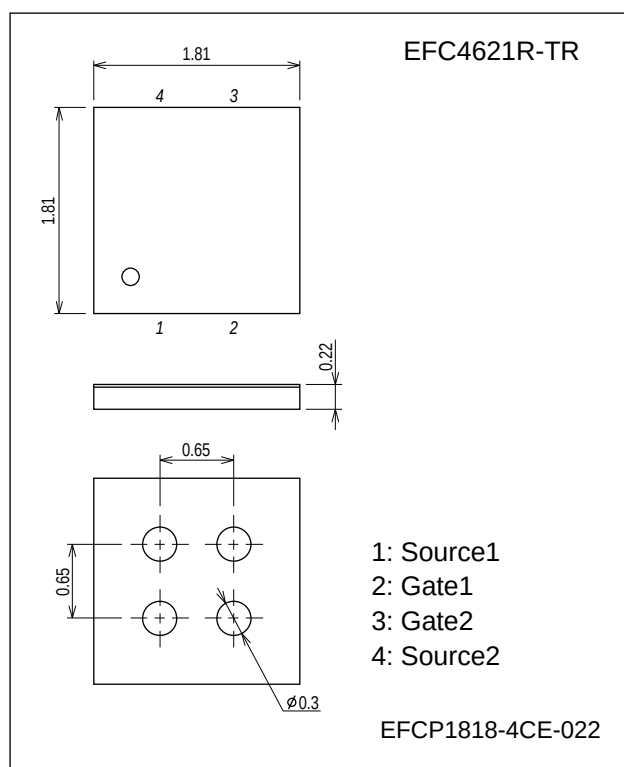
Absolute Maximum Ratings at  $T_a = 25^\circ\text{C}$ 

| Parameter                | Symbol    | Conditions                                                                  | Ratings     | Unit             |
|--------------------------|-----------|-----------------------------------------------------------------------------|-------------|------------------|
| Source to Source Voltage | $V_{SSS}$ |                                                                             | 24          | V                |
| Gate to Source Voltage   | $V_{GSS}$ |                                                                             | $\pm 12$    | V                |
| Source Current (DC)      | $I_S$     |                                                                             | 9           | A                |
| Source Current (Pulse)   | $I_{SP}$  | $PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$                             | 60          | A                |
| Total Dissipation        | $P_T$     | When mounted on ceramic substrate ( $5000\text{mm}^2 \times 0.8\text{mm}$ ) | 1.6         | W                |
| Channel Temperature      | $T_{ch}$  |                                                                             | 150         | $^\circ\text{C}$ |
| Storage Temperature      | $T_{stg}$ |                                                                             | -55 to +150 | $^\circ\text{C}$ |

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

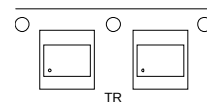
unit : mm (typ)



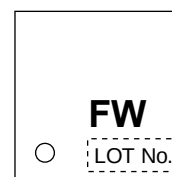
### Ordering & Package Information

| Device      | Package | Shipping         | note                     |
|-------------|---------|------------------|--------------------------|
| EFC4621R-TR | EFCP    | 5000 pcs. / reel | Pb-Free and Halogen-Free |

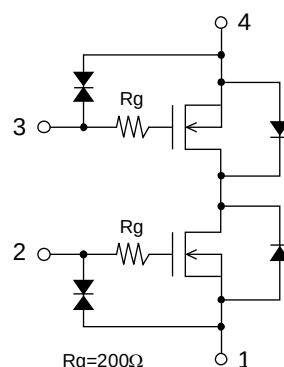
### Packing Type: TR



### Marking



### Electrical Connection



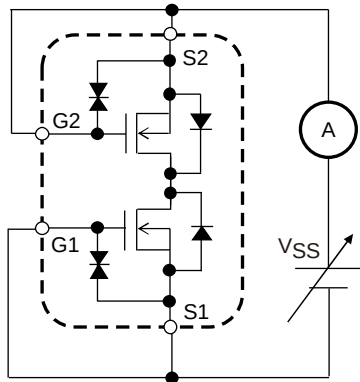
# EFC4621R

## Electrical Characteristics at $T_a = 25^{\circ}\text{C}$

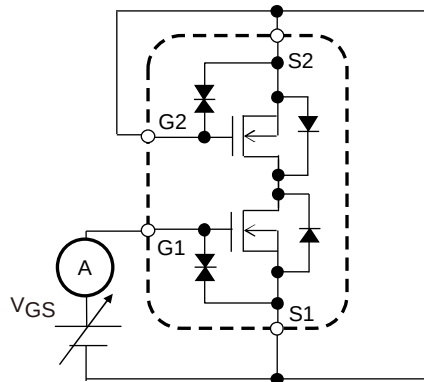
| Parameter                                   | Symbol        | Conditions                                                                  | Ratings |       |         | Unit             |
|---------------------------------------------|---------------|-----------------------------------------------------------------------------|---------|-------|---------|------------------|
|                                             |               |                                                                             | min     | typ   | max     |                  |
| Source to Source Breakdown Voltage          | $V_{(BR)SSS}$ | $I_S=1\text{mA}$ , $V_{GS}=0\text{V}$ Test Circuit 1                        | 24      |       |         | V                |
| Zero-Gate Voltage Source Current            | $I_{SSS}$     | $V_{SS}=20\text{V}$ , $V_{GS}=0\text{V}$ Test Circuit 1                     |         |       | 1       | $\mu\text{A}$    |
| Gate to Source Leakage Current              | $I_{GSS}$     | $V_{GS}=\pm 8\text{V}$ , $V_{SS}=0\text{V}$ Test Circuit 2                  |         |       | $\pm 1$ | $\mu\text{A}$    |
| Cutoff Voltage                              | $V_{GS(off)}$ | $V_{SS}=10\text{V}$ , $I_S=1\text{mA}$ Test Circuit 3                       | 0.5     |       | 1.3     | V                |
| Forward Transfer Admittance                 | $ y_{fs} $    | $V_{SS}=10\text{V}$ , $I_S=3\text{A}$ Test Circuit 4                        |         | 7.3   |         | S                |
| Static Source to Source On-State Resistance | $R_{SS(on)1}$ | $I_S=3\text{A}$ , $V_{GS}=4.5\text{V}$ Test Circuit 5                       | 10.8    | 15.5  | 18      | $\text{m}\Omega$ |
|                                             | $R_{SS(on)2}$ | $I_S=3\text{A}$ , $V_{GS}=4.0\text{V}$ Test Circuit 5                       | 11.1    | 16    | 19      | $\text{m}\Omega$ |
|                                             | $R_{SS(on)3}$ | $I_S=3\text{A}$ , $V_{GS}=3.7\text{V}$ Test Circuit 5                       | 11.5    | 16.5  | 20      | $\text{m}\Omega$ |
|                                             | $R_{SS(on)4}$ | $I_S=3\text{A}$ , $V_{GS}=3.1\text{V}$ Test Circuit 5                       | 12.5    | 18    | 23.5    | $\text{m}\Omega$ |
|                                             | $R_{SS(on)5}$ | $I_S=3\text{A}$ , $V_{GS}=2.5\text{V}$ Test Circuit 5                       | 14.9    | 23    | 30      | $\text{m}\Omega$ |
| Turn-ON Delay Time                          | $t_d(on)$     | $V_{SS}=10\text{V}$ , $V_{GS}=4.5\text{V}$ , $I_S=3\text{A}$ Test Circuit 7 |         | 340   |         | ns               |
| Rise Time                                   | $t_r$         |                                                                             |         | 600   |         | ns               |
| Turn-OFF Delay Time                         | $t_d(off)$    |                                                                             |         | 26000 |         | ns               |
| Fall Time                                   | $t_f$         |                                                                             |         | 28000 |         | ns               |
| Total Gate Charge                           | $Q_g$         | $V_{SS}=10\text{V}$ , $V_{GS}=4.5\text{V}$ , $I_S=9\text{A}$ Test Circuit 8 |         | 29    |         | nC               |
| Forward Source to Source Voltage            | $V_{F(S-S)}$  | $I_S=3\text{A}$ , $V_{GS}=0\text{V}$ Test Circuit 6                         |         | 0.77  | 1.2     | V                |

Test circuits are example of measuring FET1 side

Test Circuit 1  
 $I_{SS}$

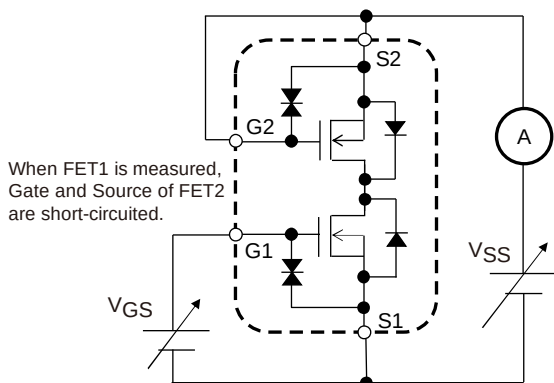


Test Circuit 2  
 $I_{GSS}$

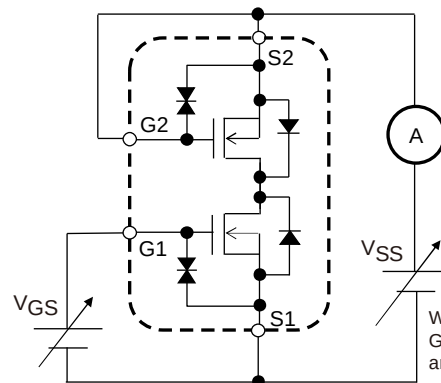


When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 3  
 $V_{GS(off)}$

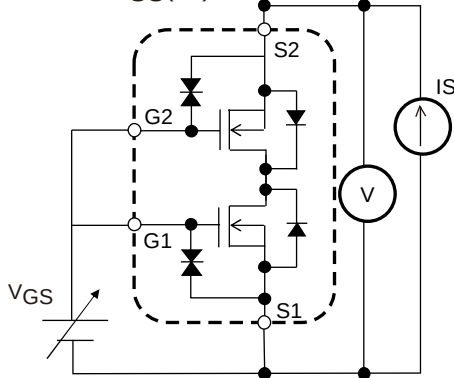


Test Circuit 4  
 $|y_{fs}|$

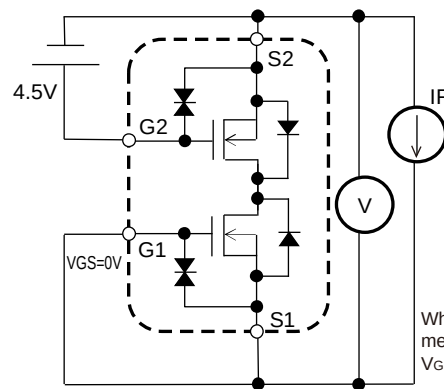


When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 5  
 $R_{SS(on)}$

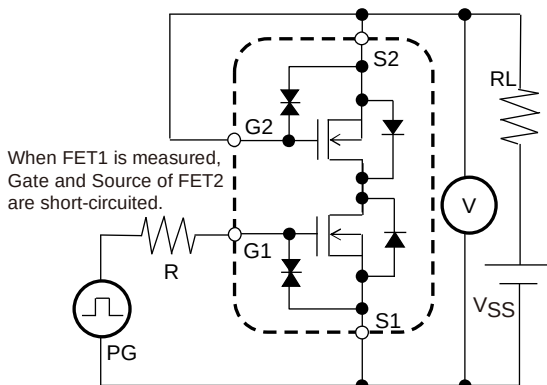


Test Circuit 6  
 $V_F(S-S)$

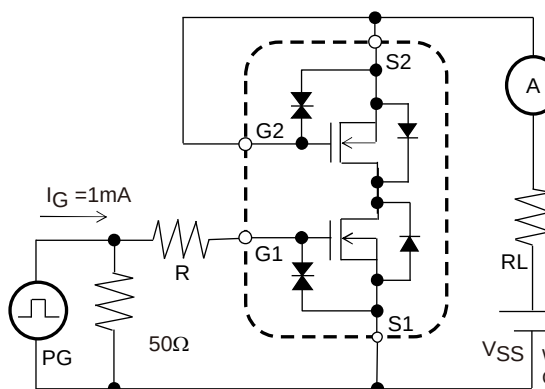


When FET1 is measured, +4.5V is added to  $V_{GS}$  of FET2.

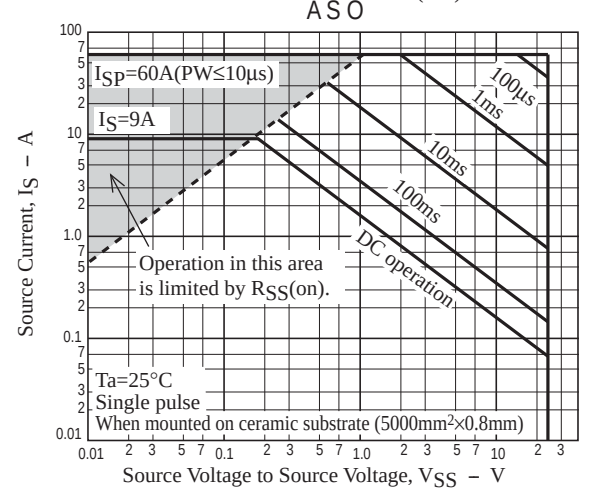
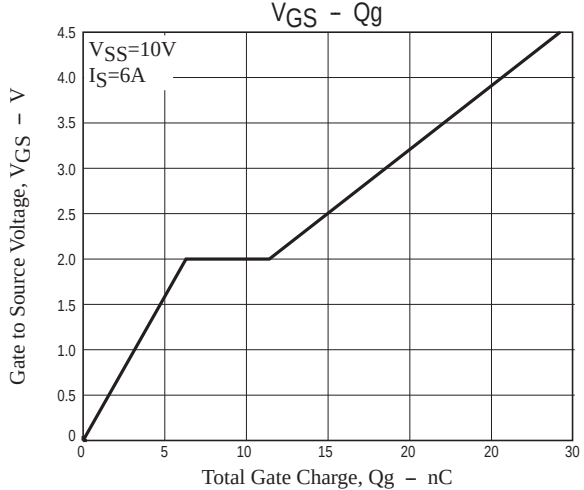
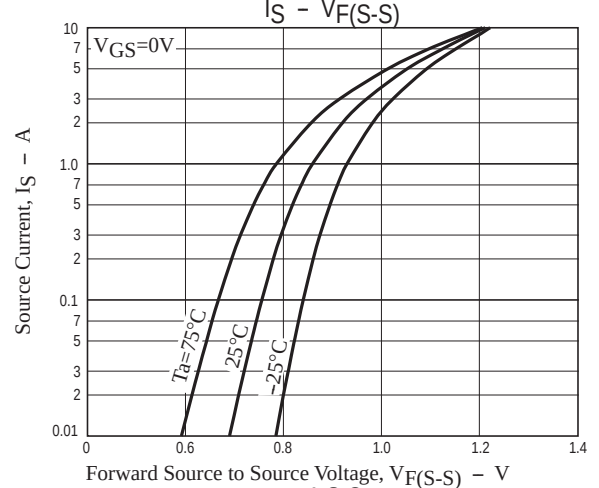
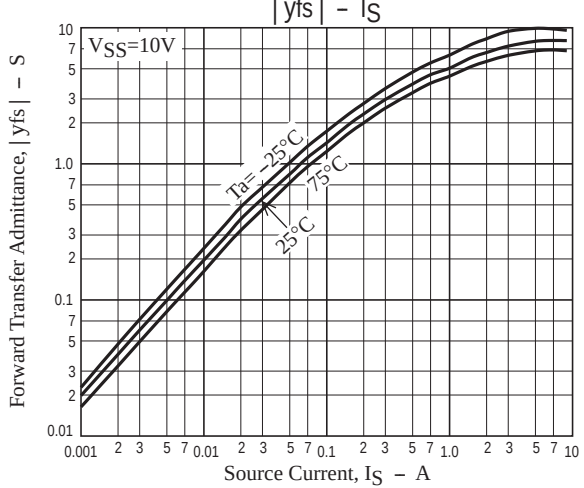
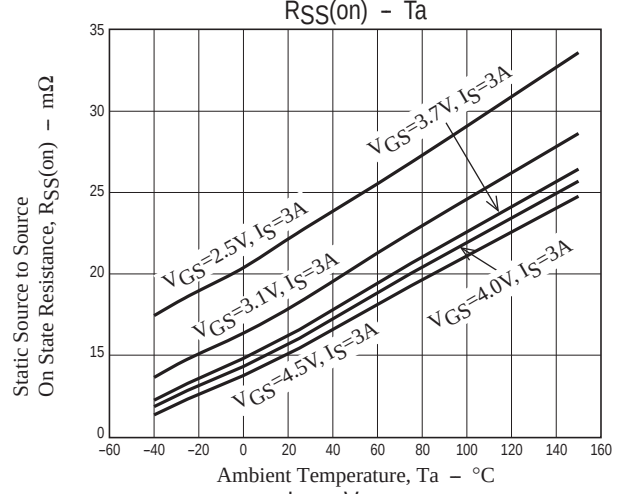
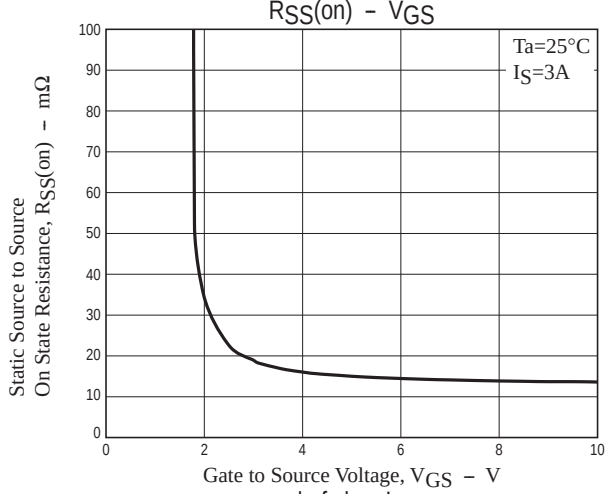
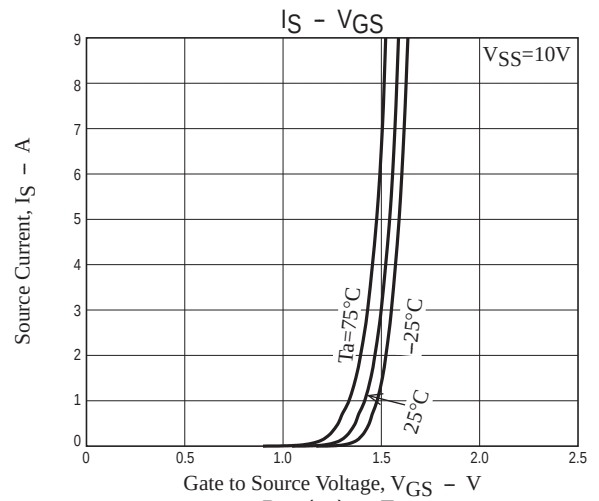
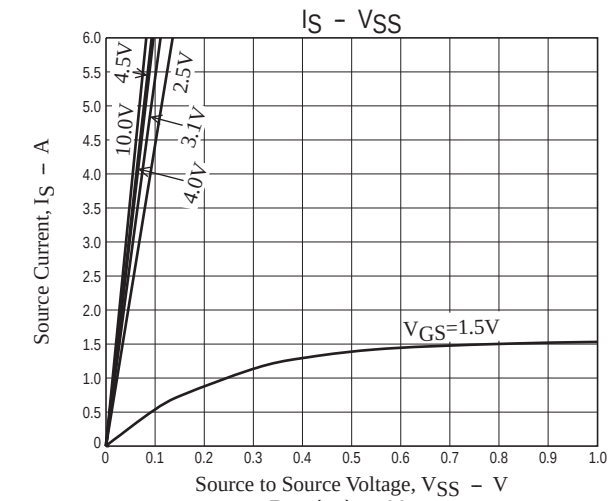
Test Circuit 7  
 $t_d(on)$ ,  $t_r$ ,  $t_d(off)$ ,  $t_f$

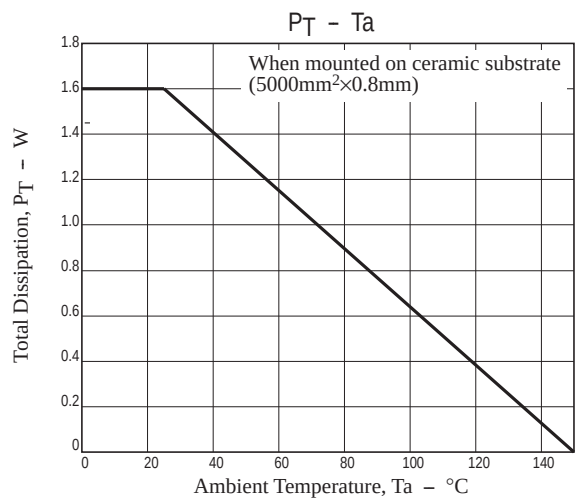


Test Circuit 8  
 $Q_g$



When FET1 is measured, Gate and Source of FET2 are short-circuited.



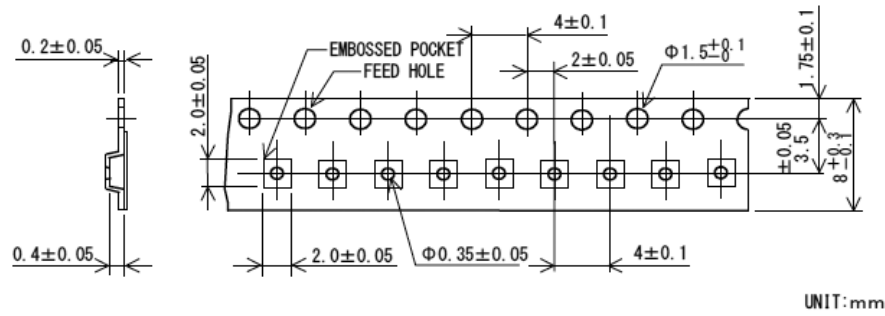


Taping Specification

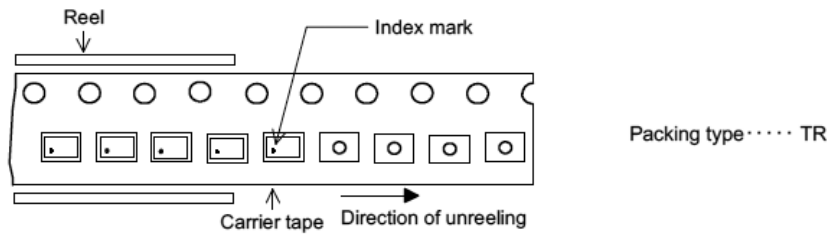
EFC4621R-TR

1.Taping Configuration

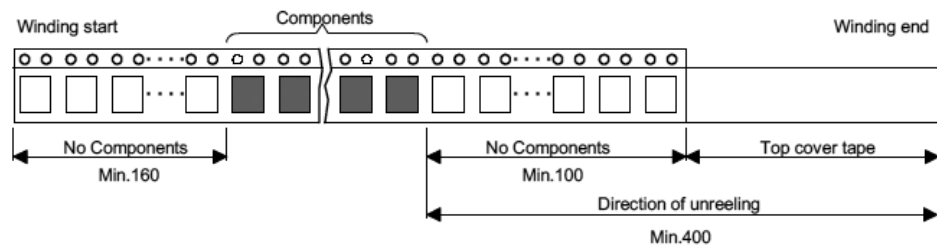
1- 1 .Carrier Tape Size (unit:mm)



1- 2 .Device Placement Direction



1- 3 .Leader portion and Trailer portion (unit:mm)

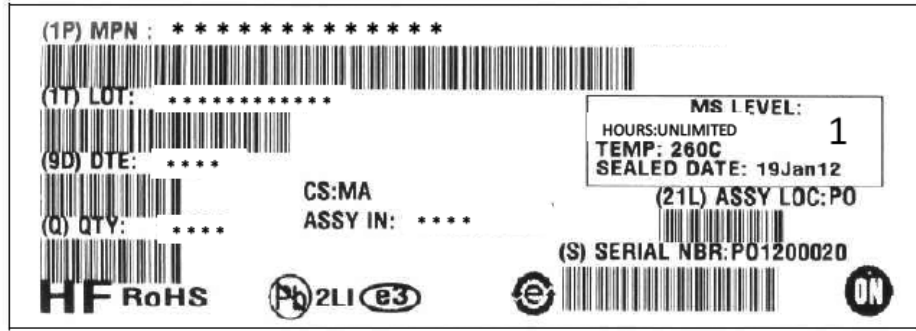


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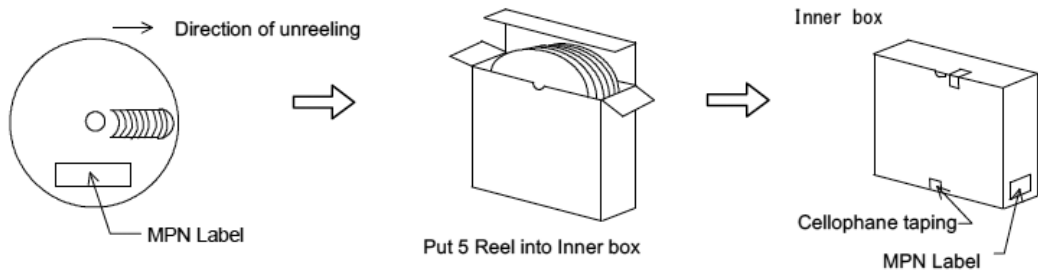
Packing Format

| Carrier Tape code | Package code     | Maximum Number of devices contained. (pcs.) |           |  | Packing Format                                   |  |
|-------------------|------------------|---------------------------------------------|-----------|--|--------------------------------------------------|--|
|                   |                  | Reel                                        | Inner box |  | Inner box BOX(C-1)                               |  |
| 2020X04           | EFCP1818-4CE-022 | 5,000                                       | 25,000    |  | 5reels contained.<br>Dimensions:mm<br>183×72×185 |  |

MPN Label



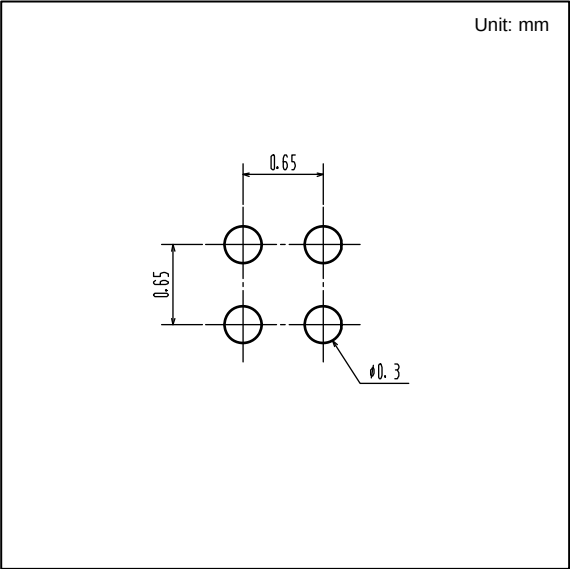
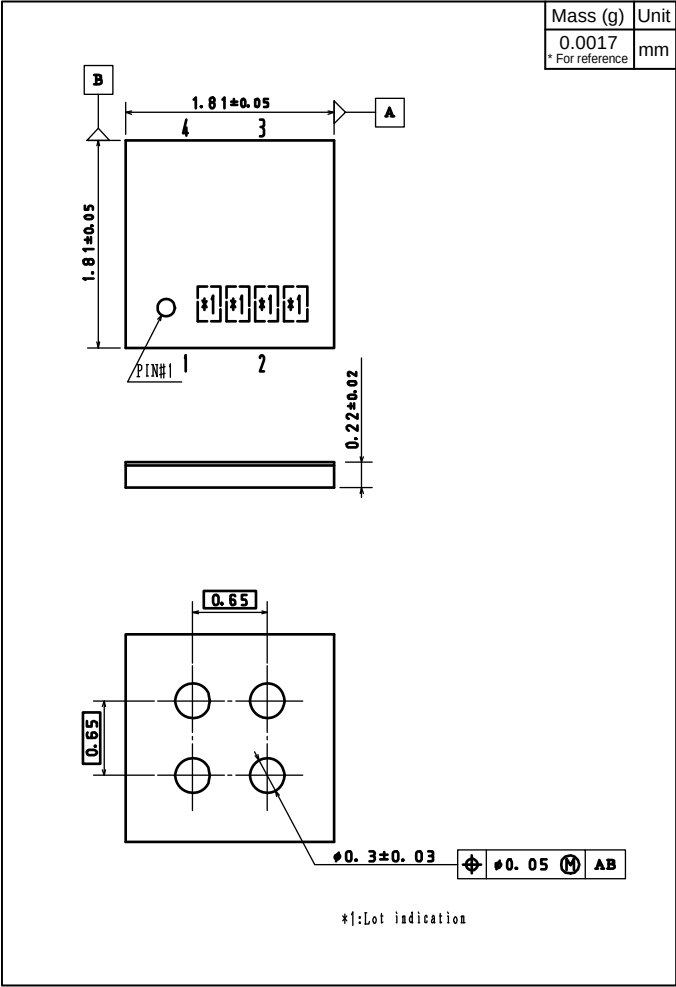
Packing Method



Outline Drawing

EFC4621R-TR

Land Pattern Example





Note on usage : Since the EFC4621R is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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