

# CMP/CMB/CMI/CMF65R160SD

650V, 147mΩ typ., 25A N-Channel Super Junction Power MOSFET

## General Description

The 65R160SD is power MOSFET using Cmos's advanced super junction technology. The resulting devices provide all benefits of a fast switching super junction MOSFET while offering an extremely fast and robust body diode. This combination of extremely low switching, commutation and conduction losses together with highest robustness make especially resonant switching applications more reliable, more efficient and lighter.

## Features

- Ultra-fast body diode
- Low On-Resistance
- 100% avalanche tested
- RoHS Compliant
- Multi-layer Epitaxial Chip Technology

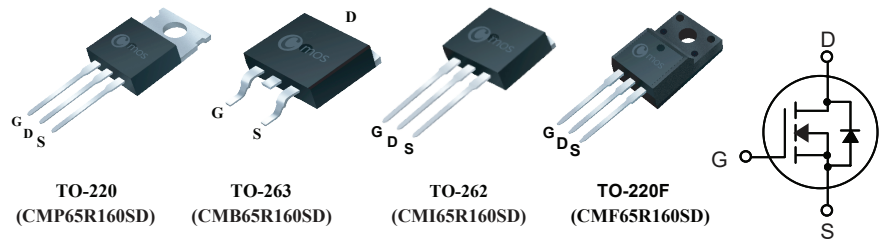
## Product Summary

| BVDSS | R <sub>DS(on)</sub> max. | ID  |
|-------|--------------------------|-----|
| 650V  | 160mΩ                    | 25A |

## Applications

- Charger
- Power Supply

## TO-220/263/262/220F Pin Configuration



## Absolute Maximum Ratings

| Symbol                                | Parameter                              | 220/263/262 | 220F | Units |
|---------------------------------------|----------------------------------------|-------------|------|-------|
| V <sub>DS</sub>                       | Drain-Source Voltage                   | 650         |      | V     |
| V <sub>GS</sub>                       | Gate-Source Voltage                    | ±30         |      | V     |
| I <sub>D</sub> @T <sub>C</sub> =25°C  | Continuous Drain Current               | 25          | 25*  | A     |
| I <sub>D</sub> @T <sub>C</sub> =100°C | Continuous Drain Current               | 16          | 16*  | A     |
| I <sub>DM</sub>                       | Pulsed Drain Current                   | 100         | 100* | A     |
| EAS                                   | Single Pulse Avalanche Energy (Note 1) | 735         |      | mJ    |
| P <sub>D</sub> @T <sub>C</sub> =25°C  | Total Power Dissipation                | 250         | 45   | W     |
| T <sub>STG</sub>                      | Storage Temperature Range              | -55 to 150  |      | °C    |
| T <sub>J</sub>                        | Operating Junction Temperature Range   | -55 to 150  |      | °C    |

\* Drain current limited by maximum junction temperature.

## Thermal Data

| Symbol           | Parameter                                | 220/263/262 | 220F | Unit |
|------------------|------------------------------------------|-------------|------|------|
| R <sub>θJA</sub> | Thermal Resistance Junction-ambient Max. | 65          | 65   | °C/W |
| R <sub>θJC</sub> | Thermal Resistance Junction-case Max.    | 2.5         | 2.78 | °C/W |

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## Electrical Characteristics (T<sub>J</sub>=25°C , unless otherwise noted)

| Symbol              | Parameter                         | Conditions                                                                               | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|------------------------------------------------------------------------------------------|------|------|------|------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage    | V <sub>GS</sub> =0V , I <sub>D</sub> =250uA                                              | 650  | ---  | ---  | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance | V <sub>GS</sub> =10V , I <sub>D</sub> =10A                                               | ---  | 147  | 160  | mΩ   |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA                                 | 3    | ---  | 5    | V    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current      | V <sub>DS</sub> =650V , V <sub>GS</sub> =0V                                              | ---  | ---  | 10   | uA   |
| I <sub>GSS</sub>    | Gate-Source Leakage Current       | V <sub>GS</sub> = ±30V , V <sub>DS</sub> =0V                                             | ---  | ---  | ±100 | nA   |
| g <sub>fs</sub>     | Forward Transconductance          | V <sub>DS</sub> =15V , I <sub>D</sub> = 10A                                              | ---  | 8.6  | ---  | S    |
| R <sub>g</sub>      | Gate Resistance                   | V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz                                       | ---  | 13   | ---  | Ω    |
| Q <sub>g</sub>      | Total Gate Charge                 | V <sub>DD</sub> =480V , I <sub>D</sub> =10A<br>V <sub>GS</sub> =10V                      | ---  | 36   | ---  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge                |                                                                                          | ---  | 10   | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge                 |                                                                                          | ---  | 20   | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time                | V <sub>DS</sub> =400V , I <sub>D</sub> =10A<br>R <sub>G</sub> =5Ω , V <sub>GS</sub> =10V | ---  | 46   | ---  | ns   |
| T <sub>r</sub>      | Rise Time                         |                                                                                          | ---  | 61   | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time               |                                                                                          | ---  | 120  | ---  |      |
| T <sub>f</sub>      | Fall Time                         |                                                                                          | ---  | 34   | ---  |      |
| C <sub>iss</sub>    | Input Capacitance                 | V <sub>DS</sub> =100V , V <sub>GS</sub> =0V , f=1MHz                                     | ---  | 1100 | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance                |                                                                                          | ---  | 60   | ---  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance      |                                                                                          | ---  | 3    | ---  |      |

## Diode Characteristics

| Symbol          | Parameter                 | Conditions                                                       | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|------------------------------------------------------------------|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current               | ---  | ---  | 25   | A    |
| I <sub>SM</sub> | Pulsed Source Current     |                                                                  | ---  | ---  | 100  | A    |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V , I <sub>S</sub> =20A , T <sub>J</sub> =25°C | ---  | 0.99 | 1.2  | V    |
| t <sub>rr</sub> | Reverse Recovery Time     | di/dt = 100A/μs                                                  | ---  | 95   | ---  | ns   |
| Q <sub>rr</sub> | Reverse Recovery Charge   | V <sub>DD</sub> =400V , I <sub>SD</sub> =10A                     | ---  | 0.32 | ---  | μC   |

Note :

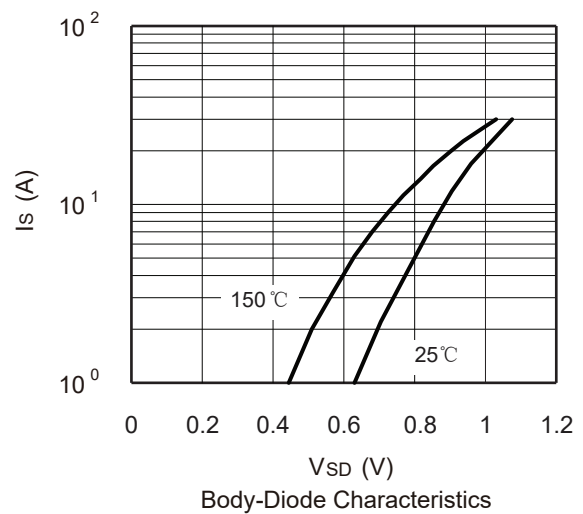
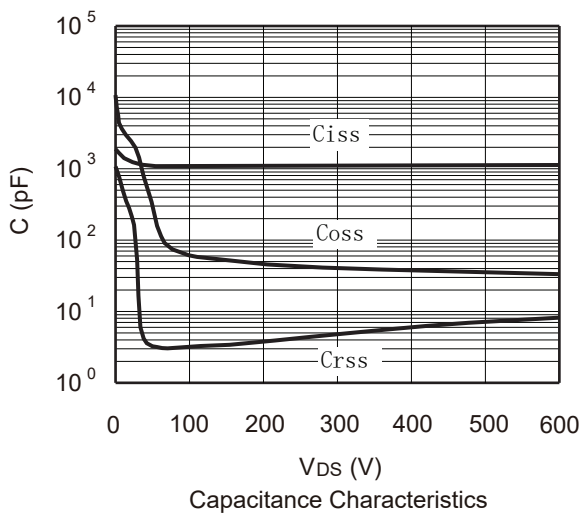
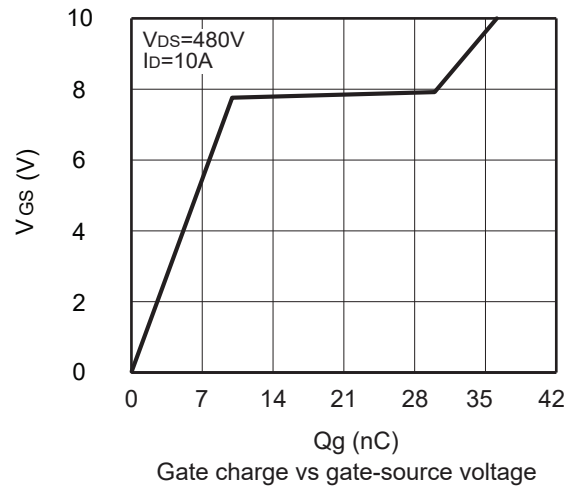
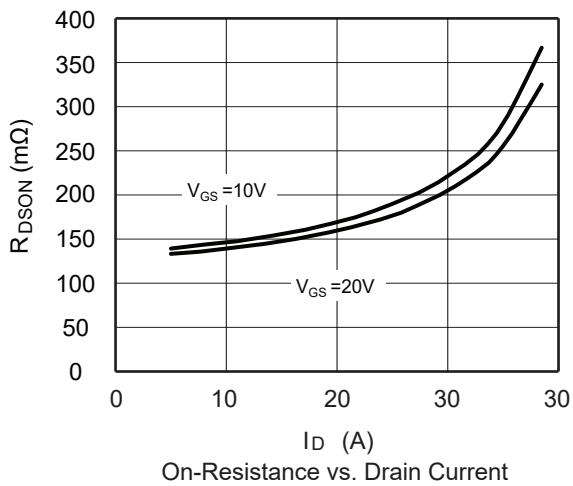
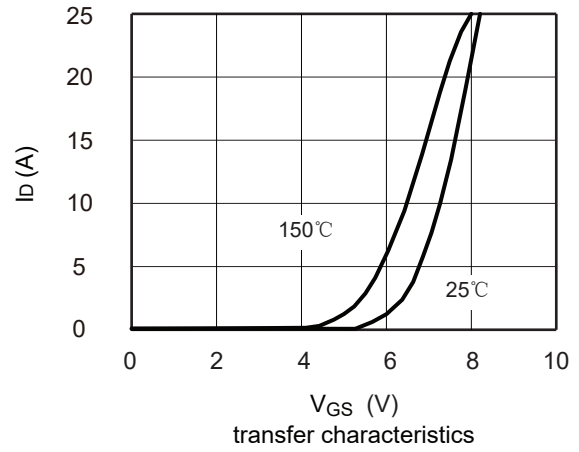
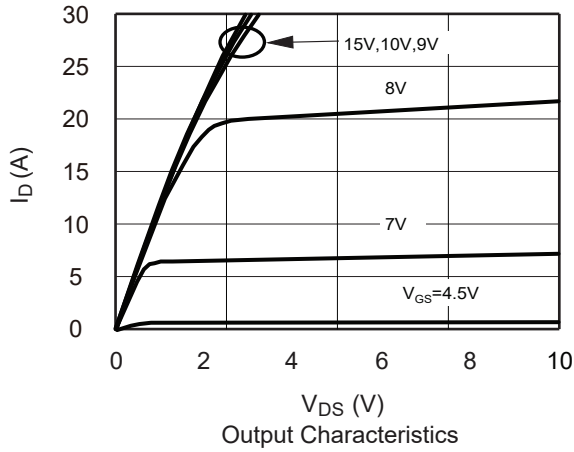
1. The EAS data shows Max. rating .The test condition is V<sub>DS</sub>=100V , V<sub>GS</sub>=10V , L=30mH , I<sub>AS</sub>=7A.

This product has been designed and qualified for the counsumer market.

Cmos assumes no liability for customers' product design or applications.

Cmos reserver the right to improve product design ,functions and reliability wihtout notice.Please refer to the latest version of specification.

### Typical Characteristics



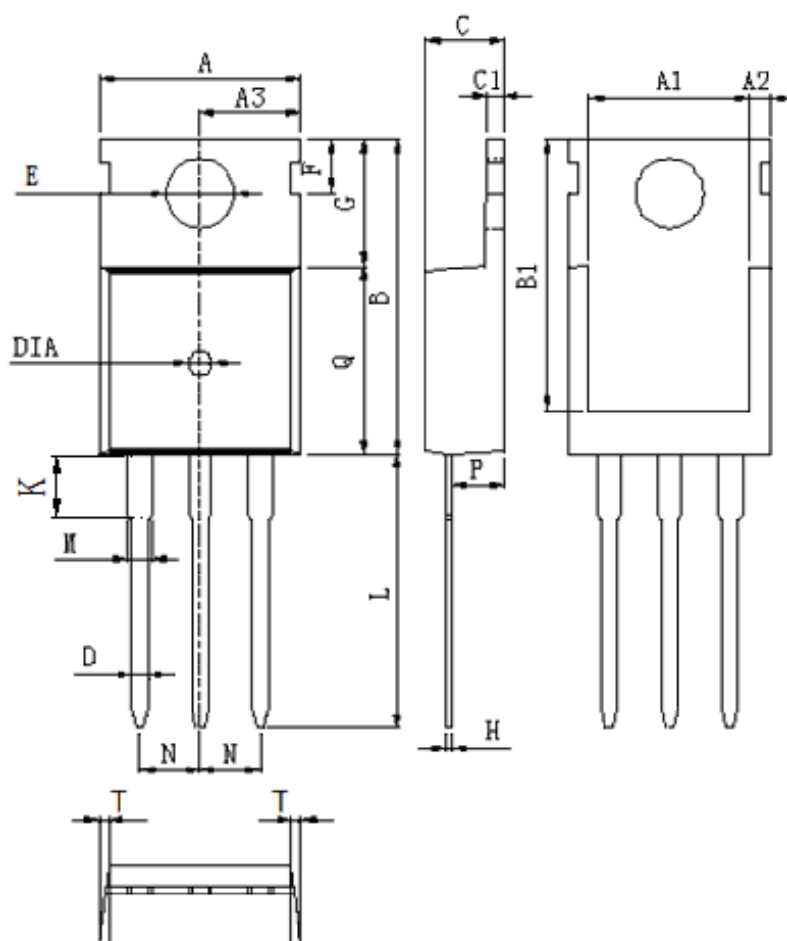
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## Package Dimension

TO-220

Unit :mm



| DIM | MILLIMETERS    |
|-----|----------------|
| A   | 10.0±0.3       |
| A1  | 8.64±0.2       |
| A2  | 1.15±0.1       |
| A3  | 5.0±0.2        |
| B   | 15.8±0.4       |
| B1  | 13.2±0.3       |
| C   | 4.56±0.1       |
| C1  | 1.3±0.2        |
| D   | 0.8±0.2        |
| E   | 3.6±0.2        |
| F   | 2.95±0.3       |
| G   | 6.5±0.3        |
| H   | 0.5±0.1        |
| K   | 3.1±0.2        |
| L   | 13.2±0.4       |
| M   | 1.25±0.1       |
| N   | 2.54±0.1       |
| P   | 2.4±0.3        |
| Q   | 9.0±0.3        |
| T   | W:0.35         |
| DIA | ⊙1.5(deep 0.2) |

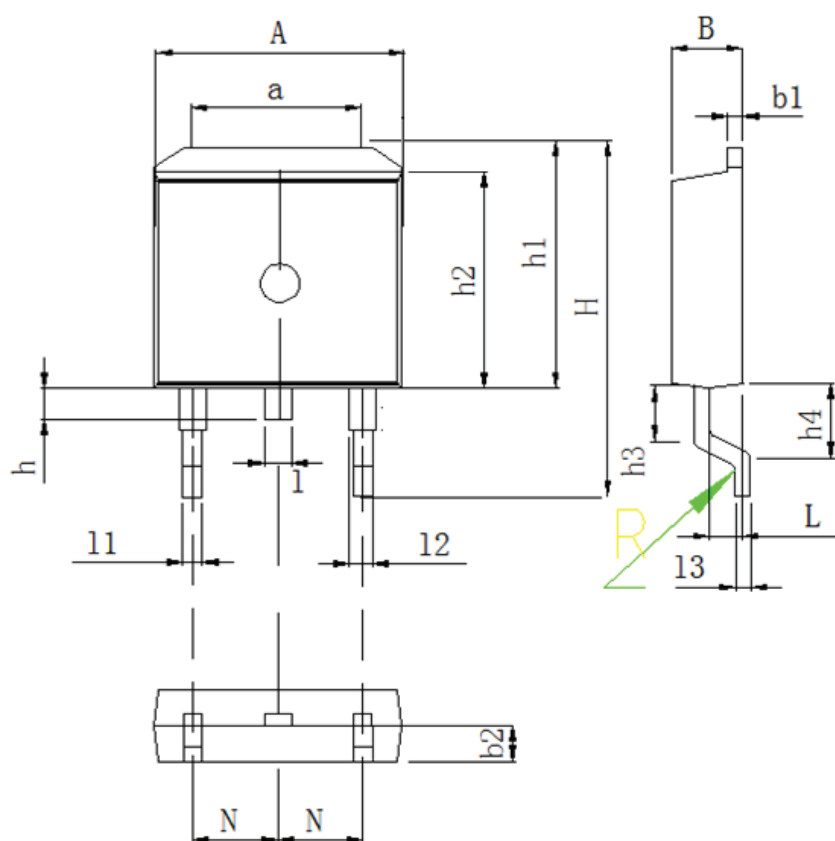
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650V, 147mΩ typ., 25A N-Channel Super Junction Power MOSFET

## Package Dimension

TO-263

Unit :mm



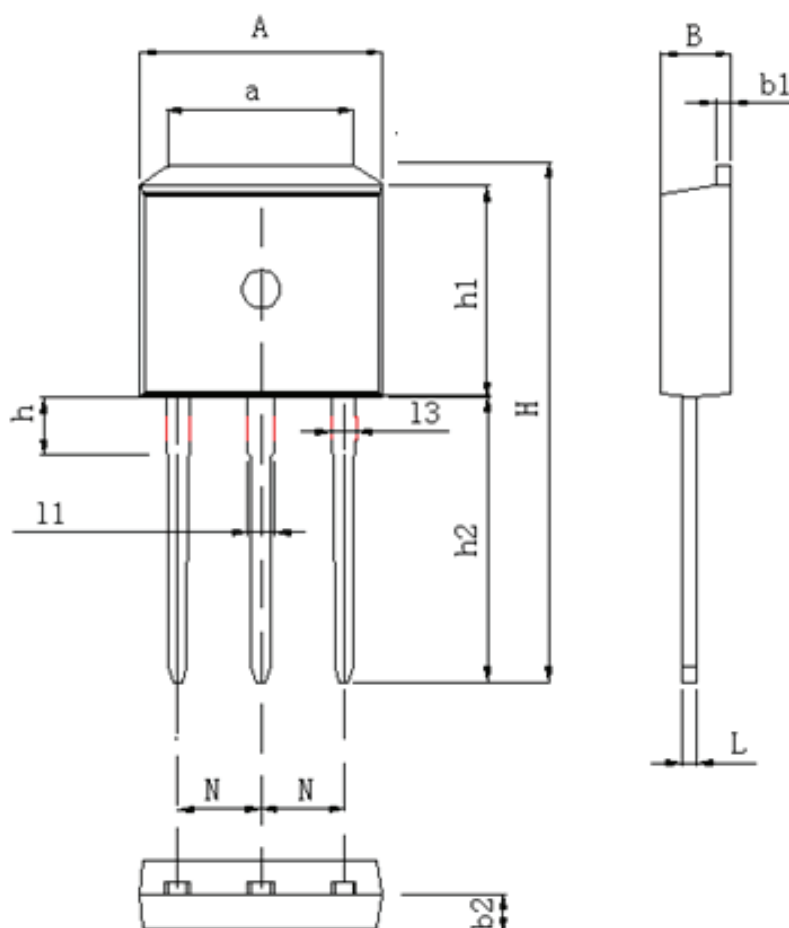
| DIM | MILLIMETERS     |
|-----|-----------------|
| A   | $9.8 \pm 0.2$   |
| a   | $7.4 \pm 0.4$   |
| B   | $4.5 \pm 0.2$   |
| b1  | $1.3 \pm 0.05$  |
| b2  | $2.4 \pm 0.2$   |
| H   | $15.5 \pm 0.3$  |
| h   | $1.54 \pm 0.2$  |
| h1  | $10.5 \pm 0.2$  |
| h2  | $9.2 \pm 0.1$   |
| h3  | $1.54 \pm 0.2$  |
| h4  | $2.7 \pm 0.2$   |
| L   | $2.4 \pm 0.2$   |
| 1   | $1.3 \pm 0.1$   |
| 11  | $0.8 \pm 0.1$   |
| 12  | $1.3 \pm 0.1$   |
| 13  | $0.5 \pm 0.1$   |
| N   | $2.54 \pm 0.1$  |
| R   | $0.5R \pm 0.05$ |

## 650V, 147mΩ typ., 25A N-Channel Super Junction Power MOSFET

## Package Dimension

TO-262

Unit :mm



| DIM | MILLIMETERS    |
|-----|----------------|
| A   | $9.98 \pm 0.2$ |
| a   | $7.4 \pm 0.4$  |
| B   | $4.5 \pm 0.2$  |
| b1  | $1.3 \pm 0.05$ |
| b2  | $2.4 \pm 0.2$  |
| H   | $23.9 \pm 0.3$ |
| h   | $3.1 \pm 0.2$  |
| h1  | $9.16 \pm 0.2$ |
| h2  | $13.2 \pm 0.2$ |
| L   | $0.5 \pm 0.1$  |
| l1  | $1.3 \pm 0.1$  |
| l2  | $0.8 \pm 0.1$  |
| N   | $2.45 \pm 0.1$ |

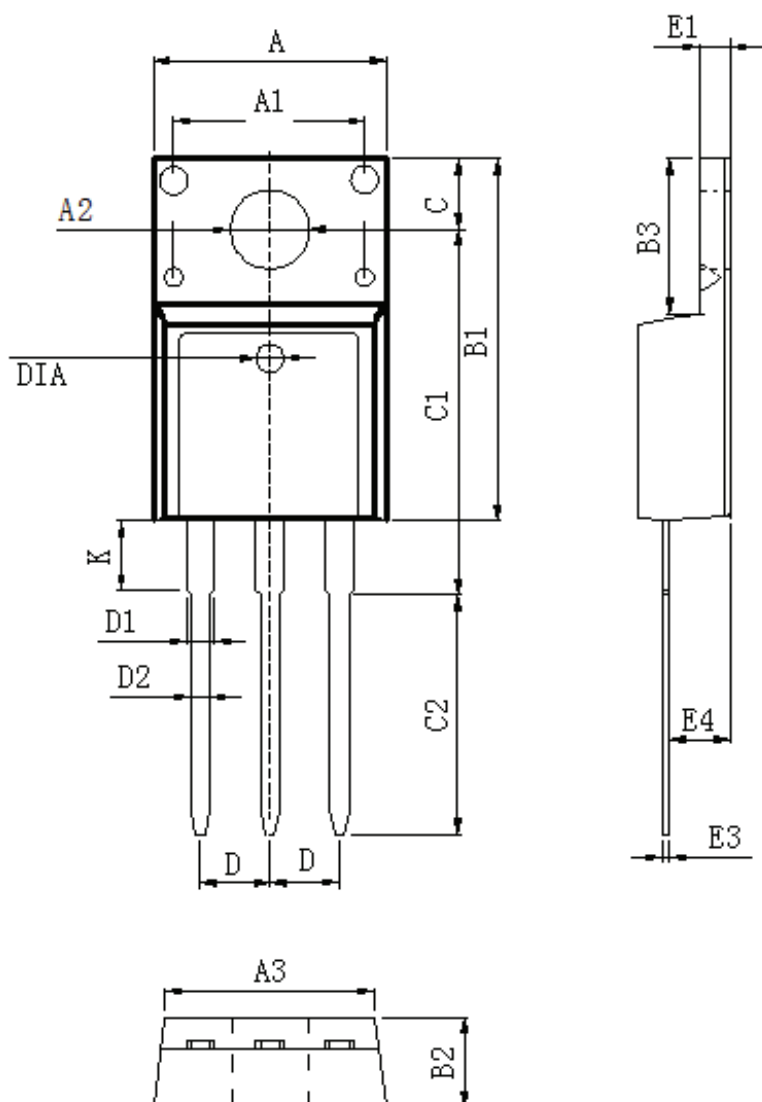
# CMP/CMB/CMI/CMF65R160SD

650V, 147mΩ typ., 25A N-Channel Super Junction Power MOSFET

## Package Dimension

TO-220F

Unit :mm



| DIM | MILLIMETERS     |
|-----|-----------------|
| A   | 10.16±0.3       |
| A1  | 7.00±0.1        |
| A2  | 3.3±0.2         |
| A3  | 9.5±0.2         |
| B1  | 15.87±0.3       |
| B2  | 4.7±0.2         |
| B3  | 6.68±0.4        |
| C   | 3.3±0.2         |
| C1  | 12.57±0.3       |
| C2  | 10.02±0.5       |
| D   | 2.54±0.05       |
| D1  | 1.28±0.2        |
| D2  | 0.8±0.1         |
| K   | 3.1±0.3         |
| E1  | 2.54±0.1        |
| E3  | 0.5±0.1         |
| E4  | 2.76±0.2        |
| DIA | ⌀1.5 (deep 0.2) |