

# CMP20N65B/CMB20N65B/CMI20N65B/CMF20N65B

650V, 380mΩ typ., 20A N-Channel MOSFET

## General Description

These Power MOSFETs are produced using Cmos's proprietary, planar stripe, DMOS technology. These devices are well suited for active power factor correction and switching mode power supplies.

## Product Summary

| BVDSS | R <sub>DS(on)</sub> max. | ID  |
|-------|--------------------------|-----|
| 650V  | 430mΩ                    | 20A |

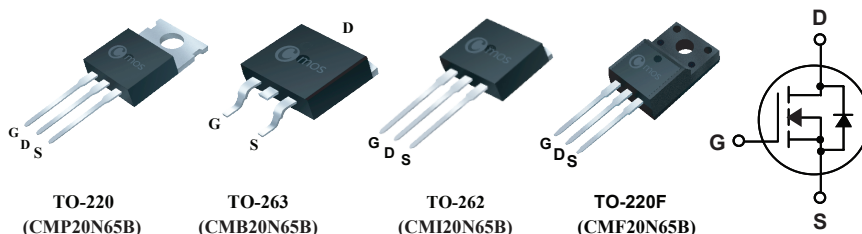
## Applications

- PFC
- Power Supply

## Features

- 100% avalanche tested
- Improved dv/dt capability
- RoHS Compliant

## 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               | 20          | 20*   | A     |
| I <sub>D</sub> @T <sub>C</sub> =100°C | Continuous Drain Current               | 12.8        | 12.8* | A     |
| I <sub>DM</sub>                       | Pulsed Drain Current                   | 80          | 80*   | A     |
| EAS                                   | Single Pulse Avalanche Energy (Note 1) | 1201        |       | mJ    |
| P <sub>D</sub> @T <sub>C</sub> =25°C  | Total Power Dissipation                | 250         | 65    | 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. | 62.5        | 62.5 | °C/W |
| R <sub>θJC</sub> | Thermal Resistance Junction-case Max.    | 0.50        | 1.92 | °C/W |

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## Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)

| Symbol       | Parameter                         | Conditions                                   | Min. | Typ. | Max. | Unit |
|--------------|-----------------------------------|----------------------------------------------|------|------|------|------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage    | $V_{GS}=0V$ , $I_D=250\mu A$                 | 650  | ---  | ---  | V    |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V$ , $I_D=10A$                     | ---  | 380  | 430  | mΩ   |
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{GS}=V_{DS}$ , $I_D=250\mu A$             | 2.0  | ---  | 4.0  | V    |
| $I_{DSS}$    | Drain-Source Leakage Current      | $V_{DS}=650V$ , $V_{GS}=0V$                  | ---  | ---  | 1    | μA   |
| $I_{GSS}$    | Gate-Source Leakage Current       | $V_{GS}=\pm 30V$ , $V_{DS}=0V$               | ---  | ---  | ±100 | nA   |
| $g_{fs}$     | Forward Transconductance          | $V_{DS}=15V$ , $I_D=10A$                     | ---  | 20   | ---  | S    |
| $R_g$        | Gate Resistance                   | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1\text{MHz}$  | ---  | 2.3  | ---  | Ω    |
| $Q_g$        | Total Gate Charge                 | $I_D=20A$                                    | ---  | 80   | ---  | nC   |
| $Q_{gs}$     | Gate-Source Charge                | $V_{DD}=520V$                                | ---  | 17   | ---  |      |
| $Q_{gd}$     | Gate-Drain Charge                 | $V_{GS}=10V$ (Note 2)                        | ---  | 36   | ---  |      |
| $T_{d(on)}$  | Turn-On Delay Time                | $V_{DD}=325V$                                | ---  | 65   | ---  | ns   |
| $T_r$        | Rise Time                         | $I_D=20A$                                    | ---  | 150  | ---  |      |
| $T_{d(off)}$ | Turn-Off Delay Time               | $R_{GEN}=25\Omega$ (Note 2)                  | ---  | 240  | ---  |      |
| $T_f$        | Fall Time                         | $V_{GS}=10V$                                 | ---  | 70   | ---  |      |
| $C_{iss}$    | Input Capacitance                 | $V_{DS}=25V$ , $V_{GS}=0V$ , $f=1\text{MHz}$ | ---  | 4000 | ---  | pF   |
| $C_{oss}$    | Output Capacitance                |                                              | ---  | 250  | ---  |      |
| $C_{rss}$    | Reverse Transfer Capacitance      |                                              | ---  | 15   | ---  |      |

## Diode Characteristics

| Symbol   | Parameter                 | Conditions                                         | Min. | Typ. | Max. | Unit |
|----------|---------------------------|----------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current | $V_G=V_D=0V$ , Force Current                       | ---  | ---  | 20   | A    |
| $I_{SM}$ | Pulsed Source Current     |                                                    | ---  | ---  | 80   | A    |
| $V_{SD}$ | Diode Forward Voltage     | $V_{GS}=0V$ , $I_S=20A$ , $T_J=25^{\circ}\text{C}$ | ---  | 0.91 | 1.5  | V    |

Note :

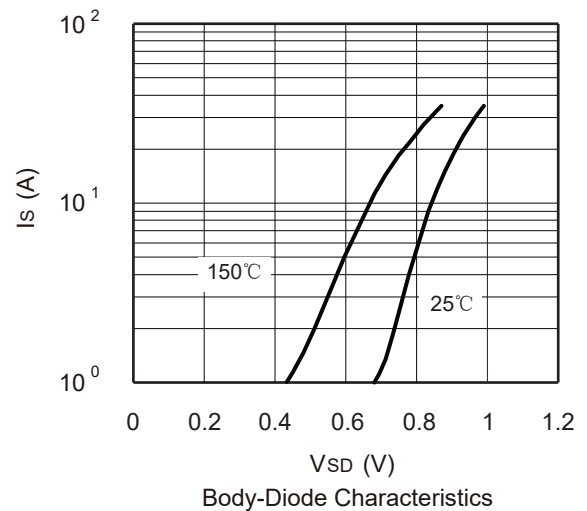
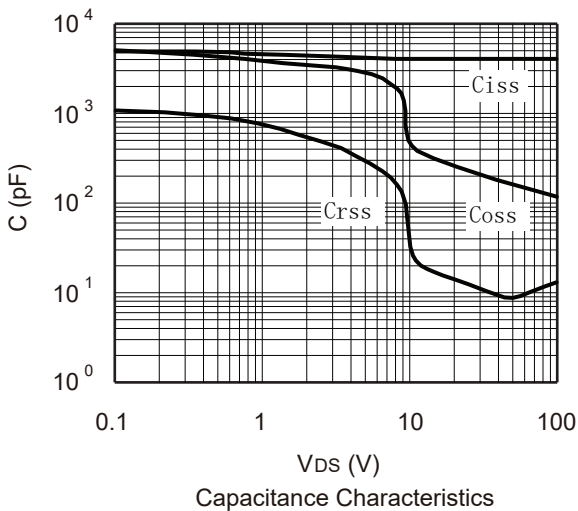
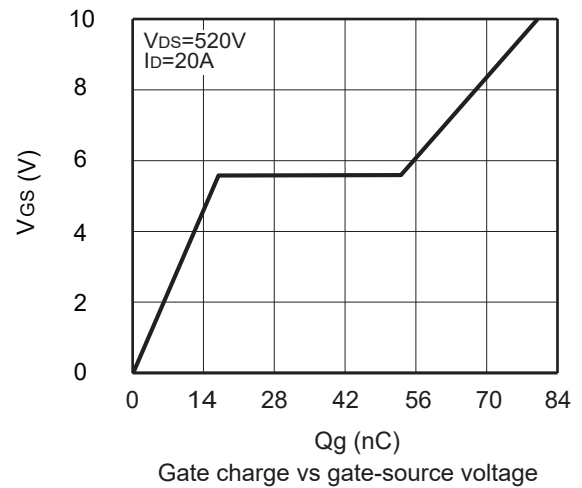
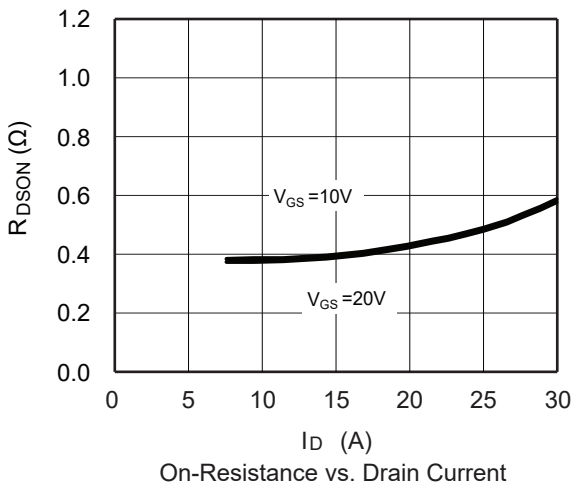
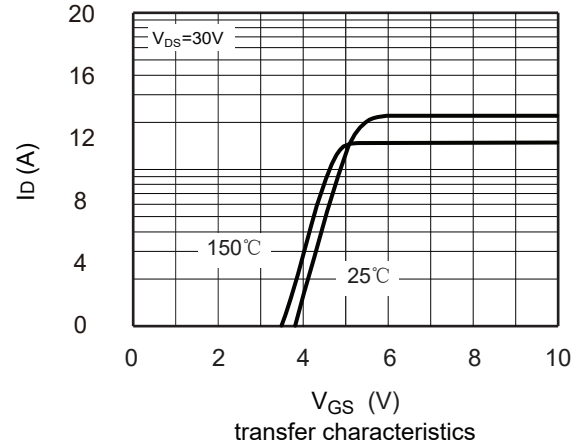
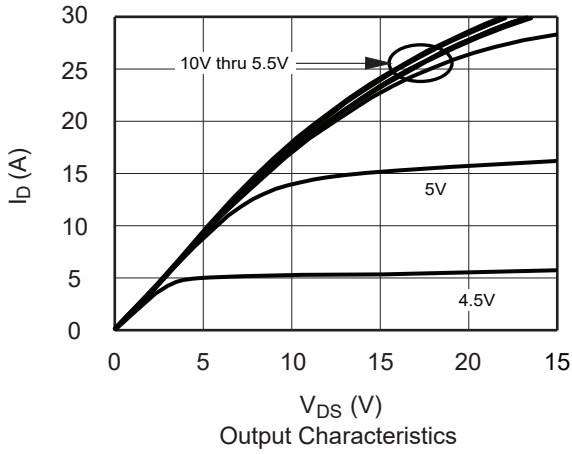
- 1.The EAS data shows Max. rating . The test condition is  $V_{DD}=80V$  ,  $V_{GS}=10V$  ,  $L=10\text{mH}$  ,  $I_{AS}=15.5A$ .
- 2.Guaranteed by design, not subject to production testing.

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

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

Cmos reserves the right to improve product design ,functions and reliability without notice.Please refer to the latest version of specification.

### Typical Characteristics



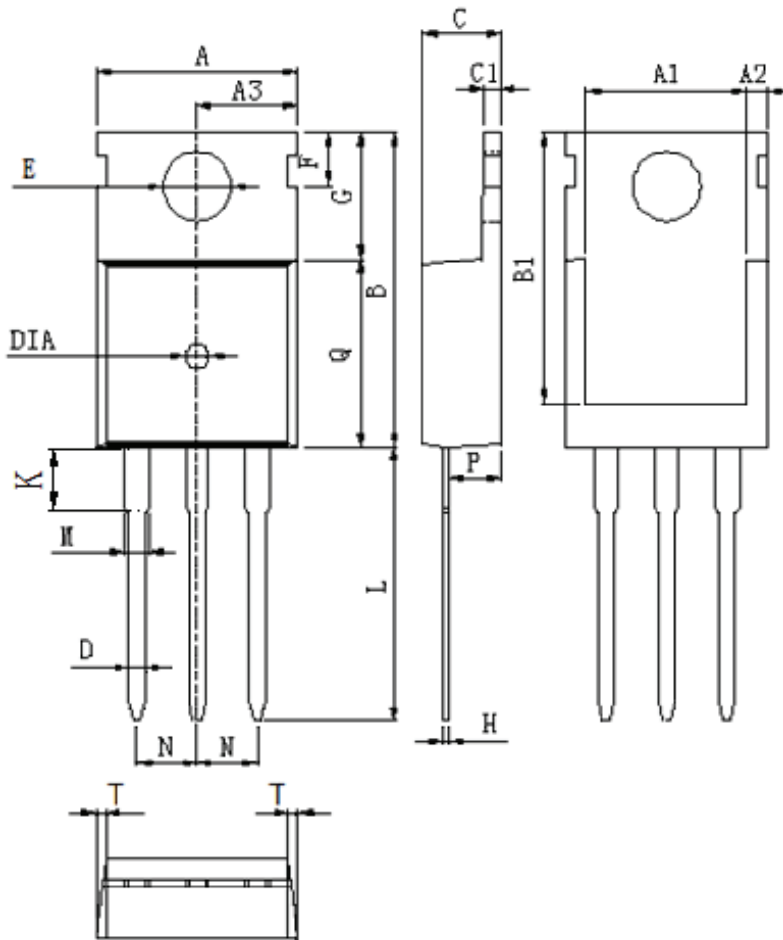
# CMP20N65B/CMB20N65B/CMI20N65B/CMF20N65B

650V, 380mΩ typ., 20A N-Channel MOSFET

## 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) |

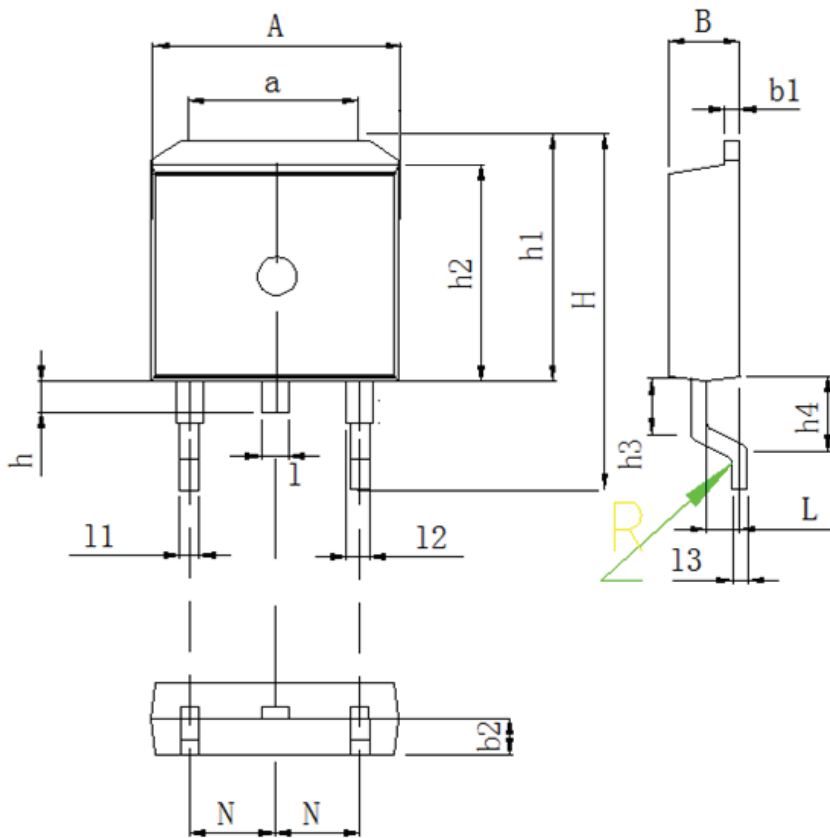
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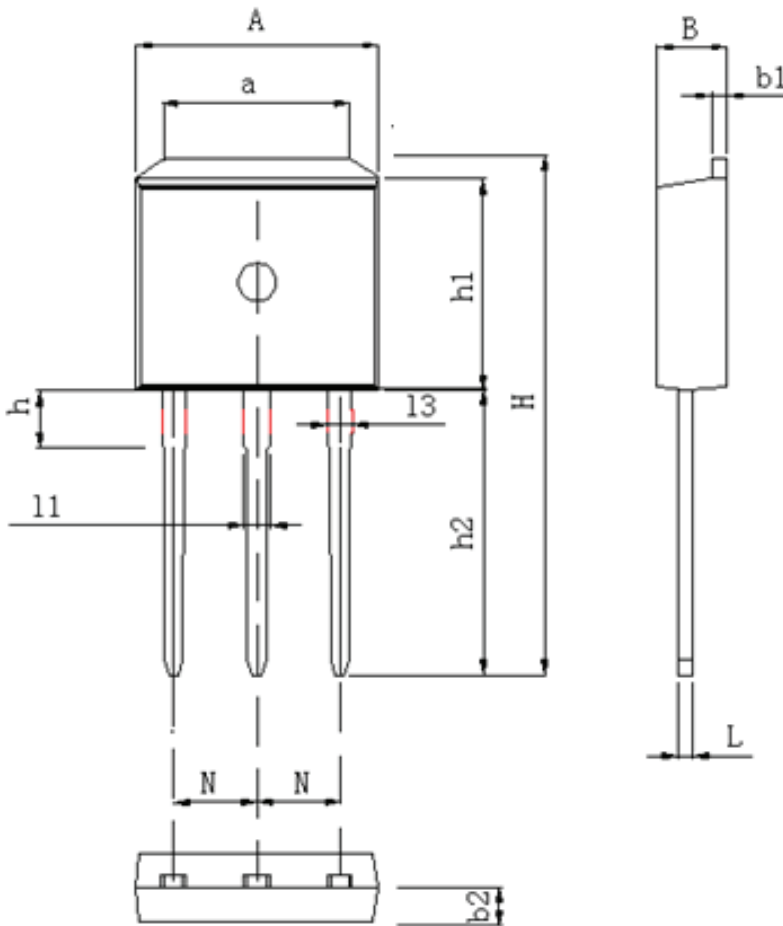
## Package Dimension

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   | $0.5R \pm 0.05$ |

**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   | $2.45 \pm 0.1$ |

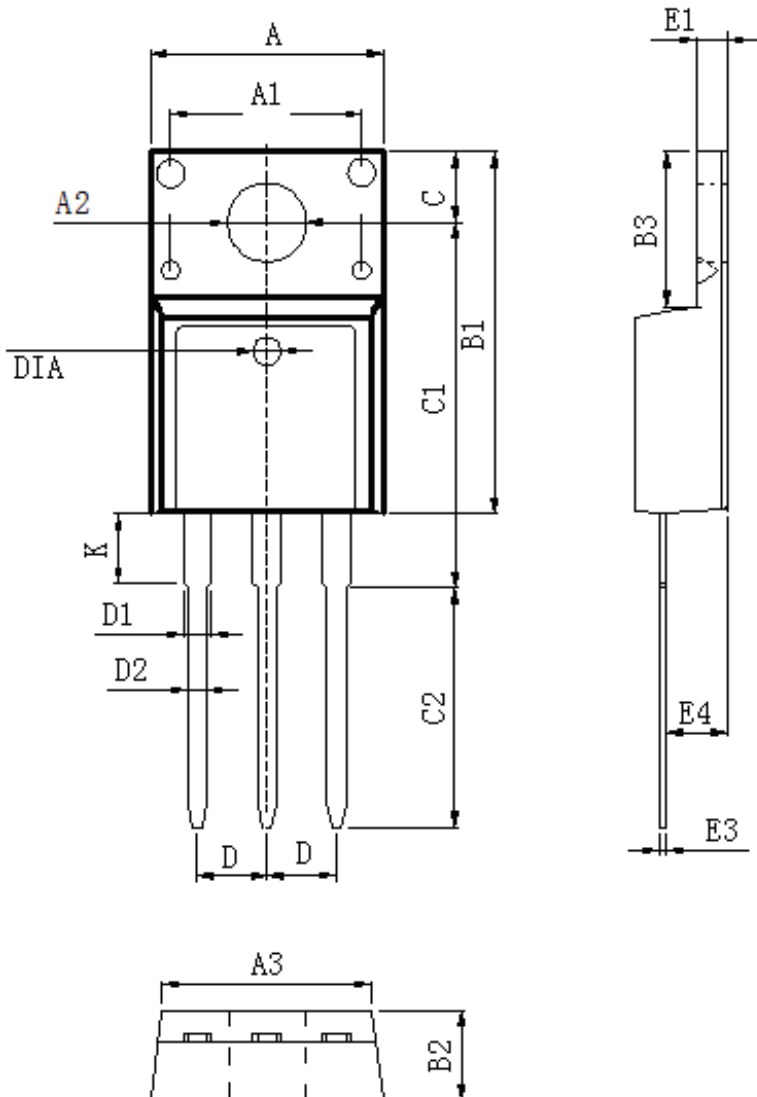
# CMP20N65B/CMB20N65B/CMI20N65B/CMF20N65B

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## Package Dimension

TO-220F

Unit :mm



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