

# CMD30NP06

60V, 24mΩ typ., 30A N-Channel MOSFET and -60V, 33mΩ typ., -26A P-Channel MOSFET

## General Description

The CMD30NP06 uses advanced trench technology MOSFETs to provide excellent RDS(ON).

The complementary MOSFETs may be used in H-bridge, Inverters and other applications.

## Features

- Dual N- and P-Channel MOSFET
- Low On-Resistance
- 100% avalanche tested
- RoHS Compliant

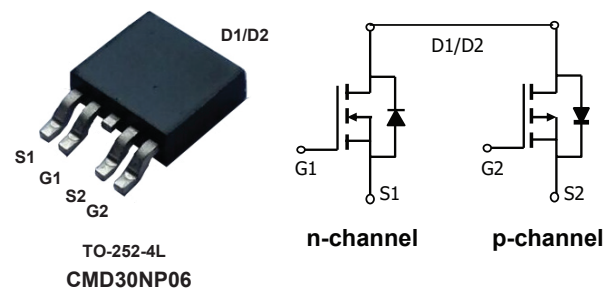
## Product Summary

|           | BVDSS | R <sub>DS(on)</sub> max. | ID   |
|-----------|-------|--------------------------|------|
| N-Channel | 60V   | 28mΩ                     | 30A  |
| P-Channel | -60V  | 38mΩ                     | -26A |

## Applications

- Power Management
- Load Switch
- DC/DC Converter

## TO-252-4L Pin Configuration



## Absolute Maximum Ratings

| Symbol                                | Parameter                                  | Max n-ch   | Max p-ch   | Units |
|---------------------------------------|--------------------------------------------|------------|------------|-------|
| V <sub>DS</sub>                       | Drain-Source Voltage                       | 60         | -60        | V     |
| V <sub>GS</sub>                       | Gate-Source Voltage                        | ±20        | ±20        | V     |
| I <sub>D</sub> @T <sub>C</sub> =25°C  | Continuous Drain Current                   | 30         | -26        | A     |
| I <sub>D</sub> @T <sub>C</sub> =100°C | Continuous Drain Current                   | 21         | -16        | A     |
| I <sub>DM</sub>                       | Pulsed Drain Current                       | 120        | -104       | A     |
| EAS                                   | Single Pulse Avalanche Energy <sup>1</sup> | 50         | 162        | mJ    |
| P <sub>D</sub> @T <sub>C</sub> =25°C  | Total Power Dissipation                    | 55         | 50         | W     |
| T <sub>STG</sub>                      | Storage Temperature Range                  | -55 to 150 | -55 to 150 | °C    |
| T <sub>J</sub>                        | Operating Junction Temperature Range       | -55 to 150 | -55 to 150 | °C    |

## Thermal Characteristics: n-channel

| Symbol           | Parameter                           | Typ. | Max. | Unit |
|------------------|-------------------------------------|------|------|------|
| R <sub>θJA</sub> | Thermal Resistance Junction-ambient | ---  | 62   | °C/W |
| R <sub>θJC</sub> | Thermal Resistance Junction-case    | ---  | 2.27 | °C/W |

# CMD30NP06

60V, 24mΩ typ., 30A N-Channel MOSFET and -60V, 33mΩ typ., -26A P-Channel MOSFET

## Thermal Characteristics: p-channel

| Symbol          | Parameter                           | Typ. | Max. | Unit |
|-----------------|-------------------------------------|------|------|------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient | ---  | 50   | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction -Case   | ---  | 2.5  | °C/W |

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

| Symbol       | Parameter                         | Conditions                                                 | Min. | Typ. | Max. | Unit |
|--------------|-----------------------------------|------------------------------------------------------------|------|------|------|------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage    | $V_{GS}=0V$ , $I_D=250\mu A$                               | 60   | ---  | ---  | V    |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V$ , $I_D=15A$                                   | ---  | 24   | 28   | mΩ   |
|              |                                   | $V_{GS}=4.5V$ , $I_D=10A$                                  | ---  | 29   | 36   |      |
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                           | 1    | ---  | 3    | V    |
| $I_{DSS}$    | Drain-Source Leakage Current      | $V_{DS}=60V$ , $V_{GS}=0V$                                 | ---  | ---  | 1    | uA   |
| $I_{GSS}$    | Gate-Source Leakage Current       | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                             | ---  | ---  | ±100 | nA   |
| $g_{fs}$     | Forward Transconductance          | $V_{DS}=5V$ , $I_D=15A$                                    | ---  | 17.5 | ---  | S    |
| $Q_g$        | Total Gate Charge                 | $V_{DS}=48V$ , $V_{GS}=0$ to $10V$ , $I_D=25A$             | ---  | 13   | ---  | nC   |
| $Q_{gs}$     | Gate-Source Charge                |                                                            | ---  | 3.9  | ---  |      |
| $Q_{gd}$     | Gate-Drain Charge                 |                                                            | ---  | 1.6  | ---  |      |
| $T_{d(on)}$  | Turn-On Delay Time                | $V_{DD}=30V$ , $V_{GS}=10V$ , $I_D=25A$<br>$R_G=3.5\Omega$ | ---  | 6    | ---  | ns   |
| $T_r$        | Rise Time                         |                                                            | ---  | 1    | ---  |      |
| $T_{d(off)}$ | Turn-Off Delay Time               |                                                            | ---  | 15   | ---  |      |
| $T_f$        | Fall Time                         |                                                            | ---  | 2    | ---  |      |
| $C_{iss}$    | Input Capacitance                 | $V_{DS}=25V$ , $V_{GS}=0V$ , $f=1MHz$                      | ---  | 1020 | ---  | pF   |
| $C_{oss}$    | Output Capacitance                |                                                            | ---  | 65   | ---  |      |
| $C_{rss}$    | Reverse Transfer Capacitance      |                                                            | ---  | 55   | ---  |      |

## Diode Characteristics

| Symbol   | Parameter                 | Conditions                                 | Min. | Typ. | Max. | Unit |
|----------|---------------------------|--------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current | $V_G=V_D=0V$ , Force Current               | ---  | ---  | 30   | A    |
| $I_{SM}$ | Pulsed Source Current     |                                            | ---  | ---  | 120  | A    |
| $V_{SD}$ | Diode Forward Voltage     | $V_{GS}=0V$ , $I_F=15A$ , $T_J=25^\circ C$ | ---  | 0.91 | 1.3  | V    |

### P Channel 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> =-250μA                                                | -60  | ---  | ---  | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance | V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A                                                | ---  | 33   | 38   | mΩ   |
|                     |                                   | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A                                               | ---  | 38   | 47   |      |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250μA                                  | -1   | ---  | -3   | V    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current      | V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V                                                 | ---  | ---  | -1   | uA   |
| I <sub>GSS</sub>    | Gate-Source Leakage Current       | V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V                                                | ---  | ---  | ±100 | nA   |
| g <sub>fs</sub>     | Forward Transconductance          | V <sub>DS</sub> =-5V, I <sub>D</sub> =-15A                                                 | ---  | 20   | ---  | S    |
| Q <sub>g</sub>      | Total Gate Charge                 | V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A                         | ---  | 32   | ---  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge                |                                                                                            | ---  | 6    | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge                 |                                                                                            | ---  | 5.5  | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time                | V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A<br>R <sub>GEN</sub> =3Ω | ---  | 15   | ---  | ns   |
| T <sub>r</sub>      | Rise Time                         |                                                                                            | ---  | 4    | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time               |                                                                                            | ---  | 47   | ---  |      |
| T <sub>f</sub>      | Fall Time                         |                                                                                            | ---  | 11   | ---  |      |
| C <sub>iss</sub>    | Input Capacitance                 | V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1MHz                                         | ---  | 900  | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance                |                                                                                            | ---  | 140  | ---  |      |
| 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               | ---  | ---   | -26  | A    |
| I <sub>SM</sub> | Pulsed Source Current     |                                                                 | ---  | ---   | -104 | A    |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V, I <sub>F</sub> =-15A, T <sub>J</sub> =25°C | ---  | -0.91 | -1.2 | V    |

Note:

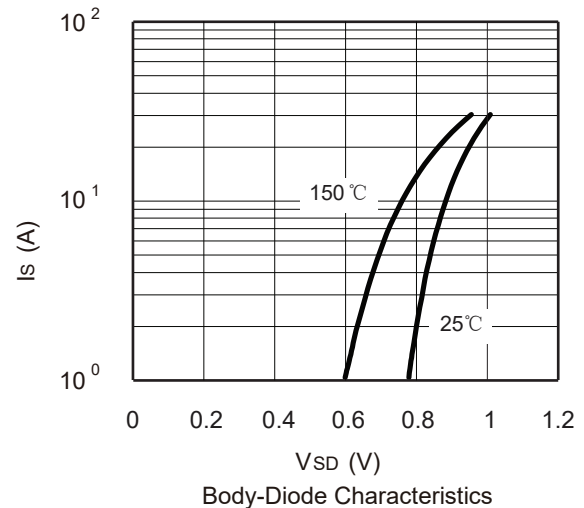
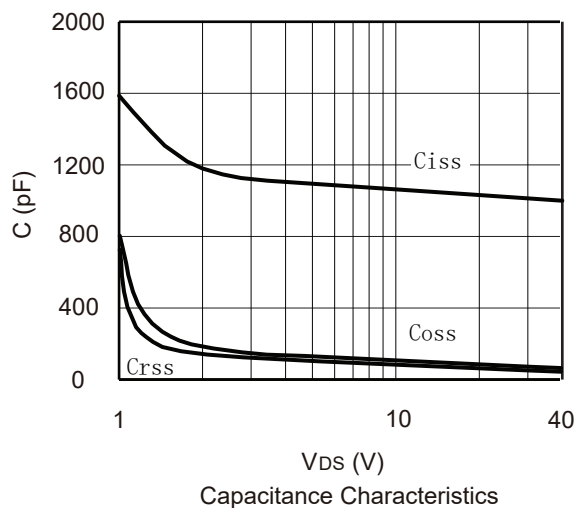
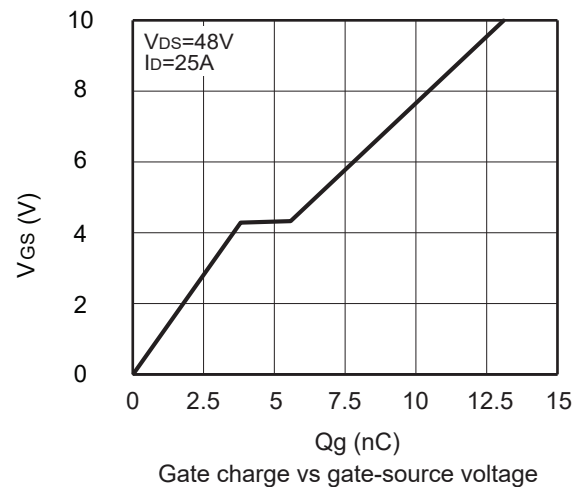
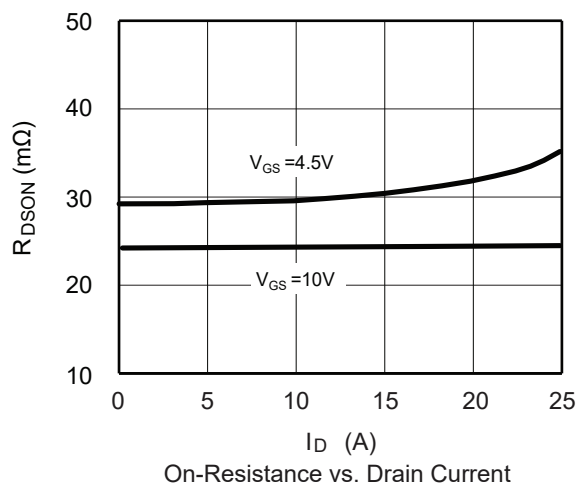
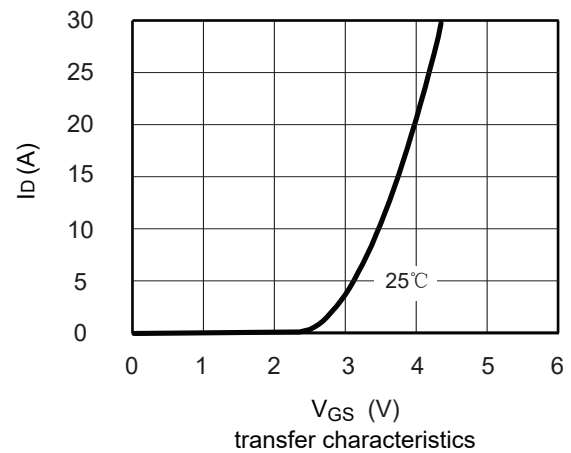
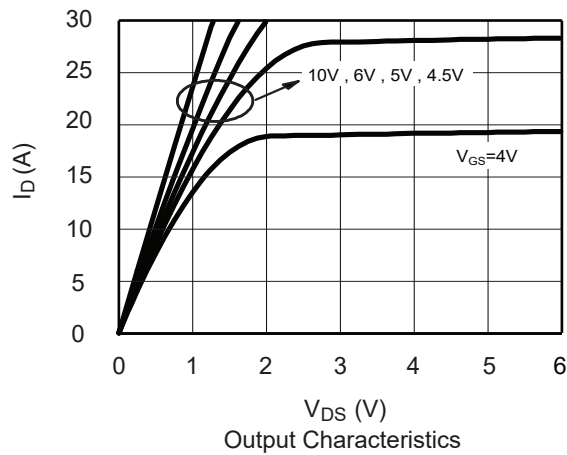
- The EAS data shows Max. rating . The N-Channel test condition is V<sub>DD</sub>=30V, V<sub>GS</sub>=10V, L=1mH, I<sub>AS</sub>=10A.  
The P-Channel test condition is V<sub>DD</sub>=-30V, V<sub>GS</sub>=-10V, L=1mH, I<sub>AS</sub>=-18A.

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

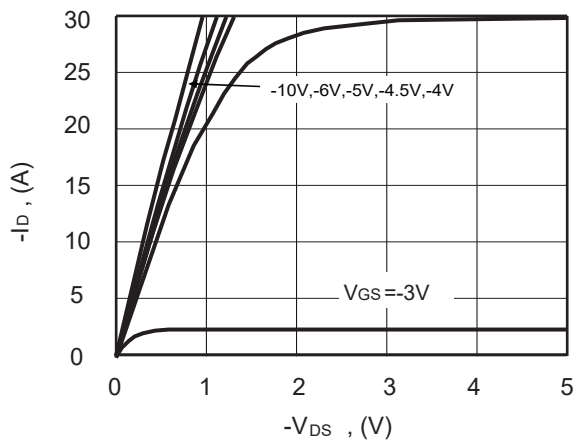
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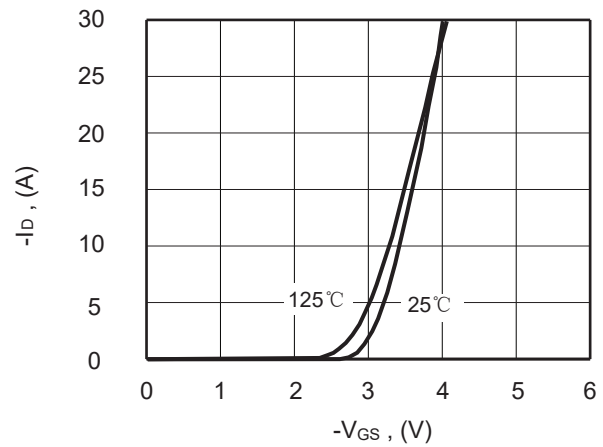
## N-Channel: Typical Characteristics



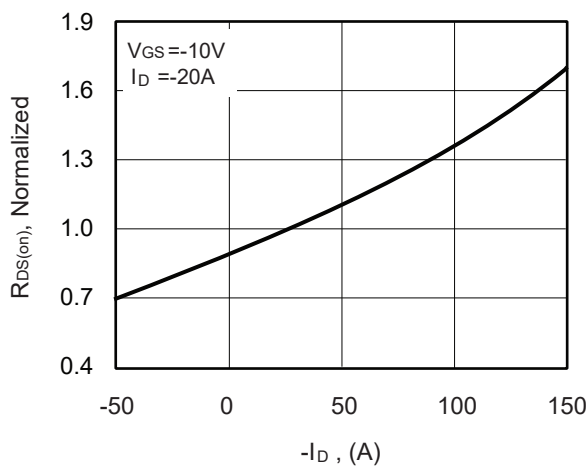
## P-Channel: Typical Characteristics



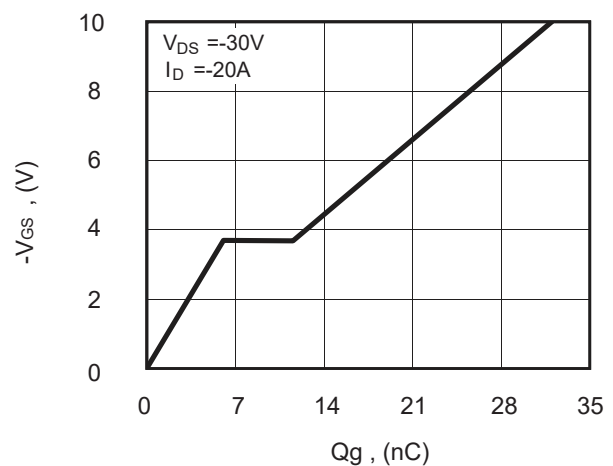
Output Characteristics



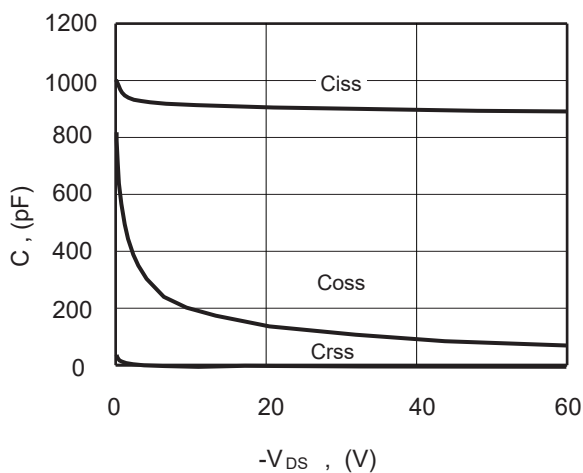
transfer characteristics



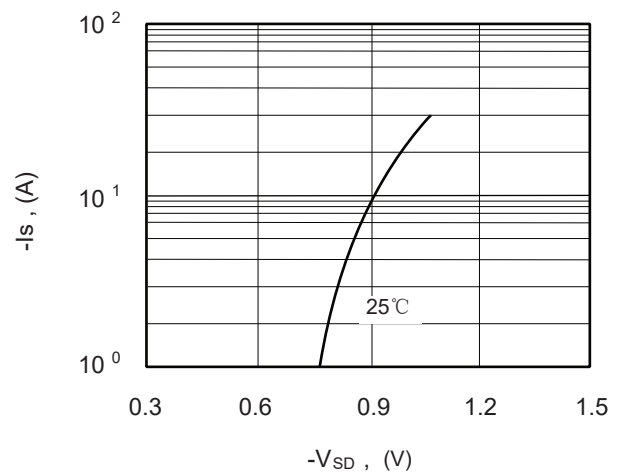
On-Resistance vs. Drain Current



Gate Charge Characteristics



Capacitance Characteristics



Body-Diode Characteristics

# CMD30NP06

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## Package Dimension

TO-252-4L

Unit :mm

