# CMP20N60/CMB20N60/CMI20N60/CMF20N60

**600V N-Channel MOSFET**

## General Description

The 20N60 have been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications.These parts can be adopted quickly into new and existing offline power supply designs.

## Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 600V | 0.37Ω | 20A |

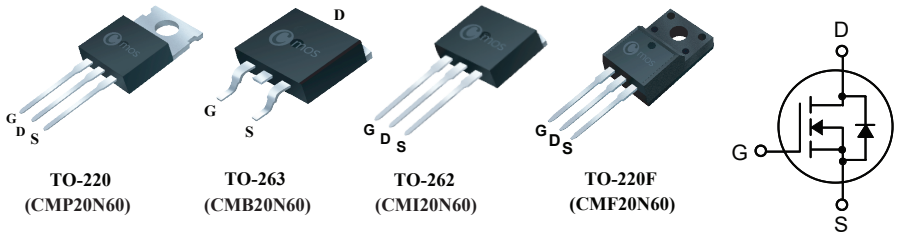
## Applications

- Charger
- Adaptor
- Power Supply

## Features

- Fast switching
- 100% avalanche tested
- RoHS Compliant

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




TO-220 (CMP20N60) | TO-263 (CMB20N60) | TO-262 (CMI20N60) | TO-220F (CMF20N60)

## Absolute Maximum Ratings

| Symbol | Parameter | | 220/263/262 | 220F | Units |
|---|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | | 600 | | V |
| $V_{GS}$ | Gate-Source Voltage | | ±30 | | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current | | 20 | 20* | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current | | 11.5 | 11.5* | A |
| $I_{DM}$ | Pulsed Drain Current | (Note 1) | 80 | 80* | A |
| EAS | Single Pulse Avalanche Energy | (Note 2) | 880 | | mJ |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | | 400 | 45 | W |
| $T_{STG}$ | Storage Temperature Range | | -55 to 150 | | ℃ |
| $T_J$ | Operating Junction Temperature Range | | -55 to 150 | | ℃ |

* Drain current limited by maximum junction temperature.

## Thermal Data

| Symbol | Parameter | | 220/263/262 | 220F | Unit |
|---|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient | (Note 3,4) | 65 | 65 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-case | | 0.3 | 2.5 | ℃/W |

## Electrical Characteristics ($T_J$=25℃ , unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 600 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=9A | --- | --- | 0.37 | Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 3 | --- | 5 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=600V , $V_{GS}$=0V | --- | --- | 1 | uA |
| | | $V_{DS}$=480V , $T_C$=125℃ | --- | --- | 10 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=± 30V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=10V , $I_D$=15A | --- | 30 | --- | S |
| $Q_g$ | Total Gate Charge | $I_D$=20A<br>$V_{DS}$=480V<br>$V_{GS}$=10V | --- | 56 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 22 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 20 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=300V<br>$V_{GS}$=10V<br>$I_D$=18A<br>$R_G$=25Ω | --- | 200 | --- | ns |
| $T_r$ | Rise Time | | --- | 145 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 430 | --- | |
| $T_f$ | Fall Time | | --- | 80 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=25V , $V_{GS}$=0V , f=1MHz | --- | 4000 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 260 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 24 | --- | |

## Diode Characteristics

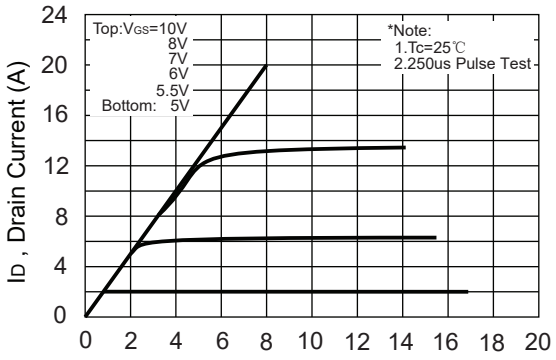
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 20 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 80 | A |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=20A<br>dI/dt=100A/μs | --- | 435 | --- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 4.1 | --- | nC |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=15A | --- | --- | 1.2 | V |

Notes:

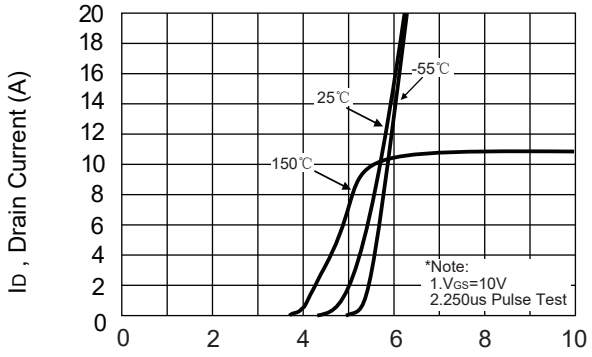
1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. L=4.4mH, $I_{AS}$=20A, $V_{DD}$=50V, $R_G$=25Ω, Starting $T_J$=25℃.
3. The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A$=25℃.
4. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

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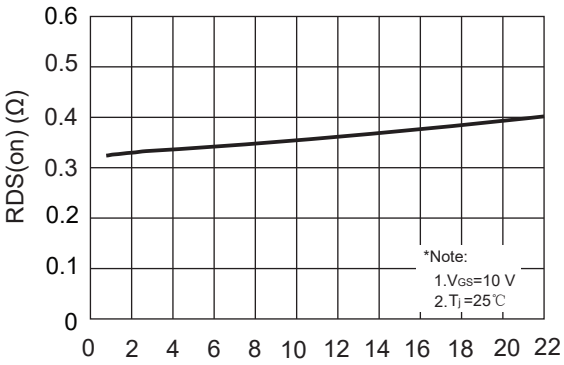
## Typical Characteristics



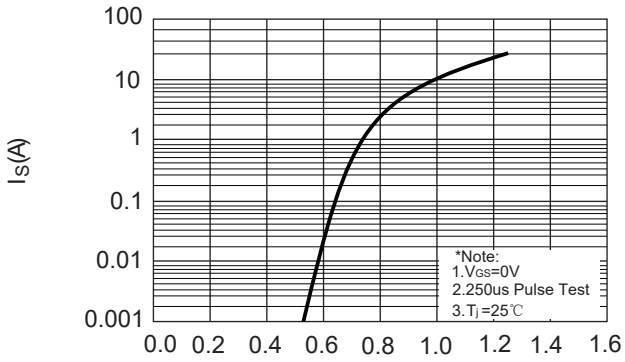

VDS , Drain-to-Source Voltage (V)
Output Characteristics



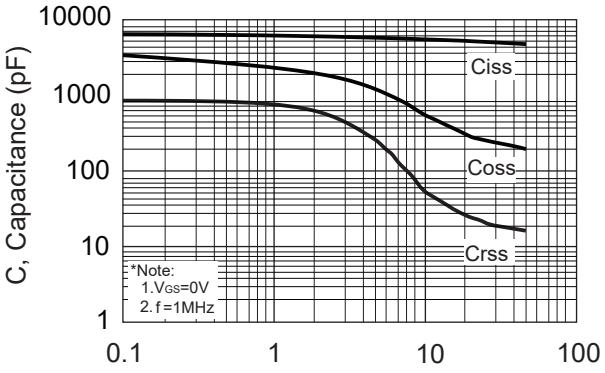

VGS , Gate-to-Source Voltage (V)
Transfer Characteristics



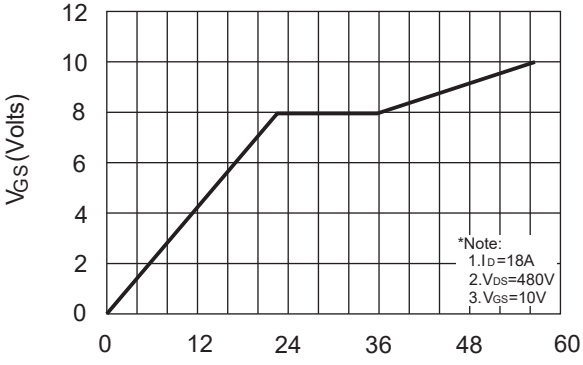

ID(A)
On-Resistance vs. Drain Current and Gate Voltage




VSD(Volts)
Body-Diode Characteristics

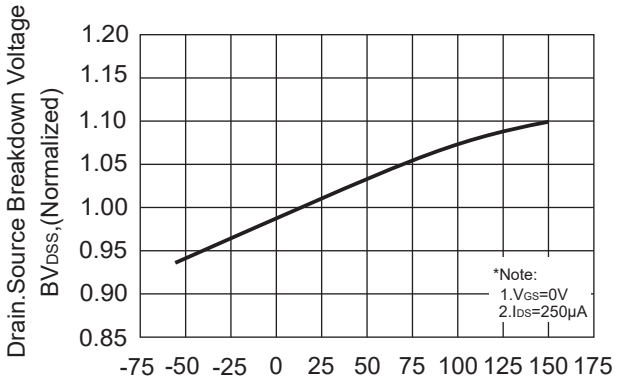



VDS (Volts)
Capacitance Characteristics

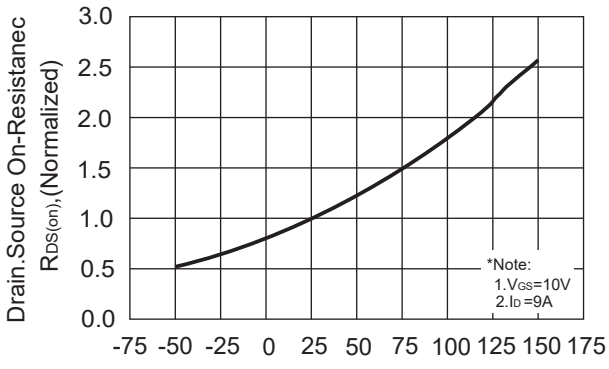



Qg(nC)
Gate-Charge Characteristics

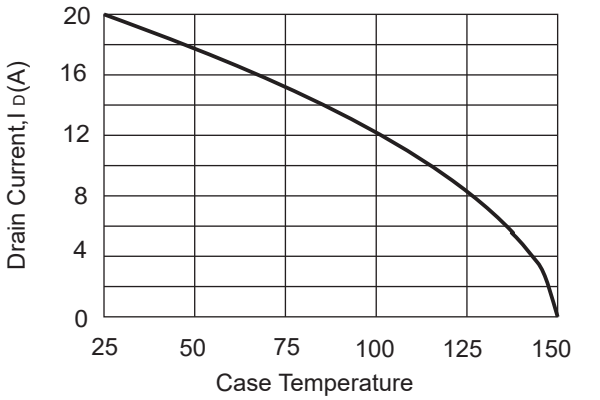
## Typical Characteristics



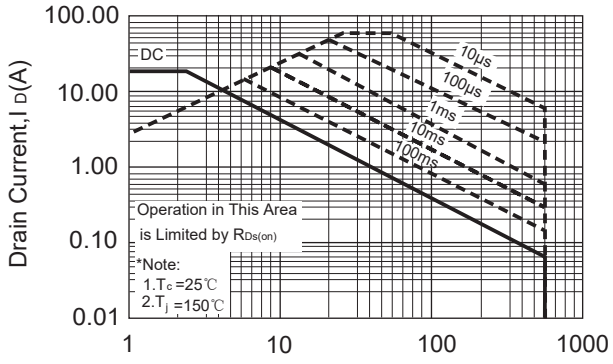

Breakdown Voltage Variation vs, Temperature



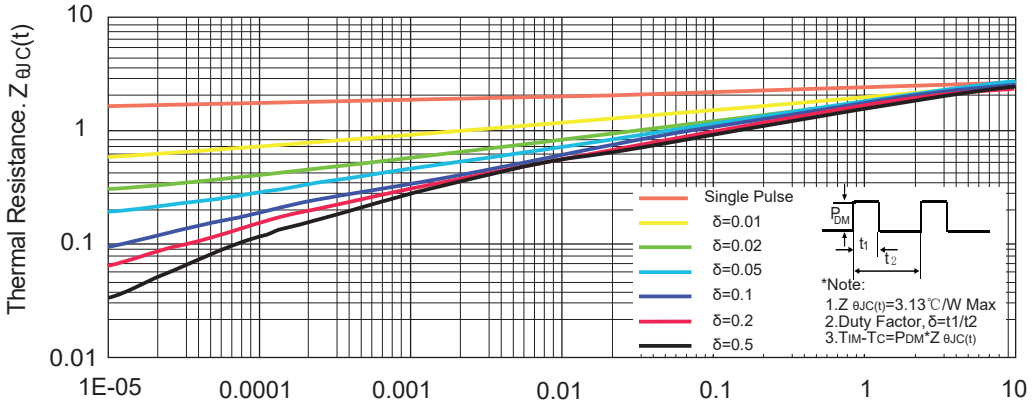

On-Resistance Variation vs. Temperature




Maximum Drain Current vs.Case Temperature




Maximum Safe Operating Area




Transient Thermal Impedance