20V N-Channel MOSFET

## General Description

The 2300 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

## Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 20V | 23mΩ | 30A |

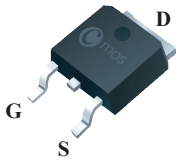
## Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

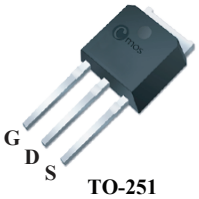
## Features

- Simple Drive Requirement
- Ultra low On-Resistance.
- RoHS Compliant

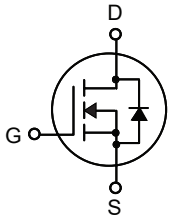
## TO-252/251 Pin Configuration




TO-252
(CMD2300)




TO-251
(CMU2300)




## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 20 | V |
| $V_{GS}$ | Gate-Source Voltage | ±10 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current | 30 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current | 20 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | 120 | A |
| EAS | Avalanche energy[2] | 12 | mJ |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 40 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient [3] | --- | 50 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction -Case | --- | 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 | 20 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=4.5V , $I_D$=3.5A | --- | 19 | 23 | mΩ |
| | | $V_{GS}$=2.5V , $I_D$=2.6A | --- | 26 | 35 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 0.5 | 0.6 | 1.2 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=20V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$ = ±10V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=5V, $I_D$ =3.5A | --- | 8 | --- | S |
| $Q_g$ | Total Gate Charge | $V_{DS}$=10V , $V_{GS}$=4.5V, $I_D$=12.8A | --- | 15 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 5.4 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 3 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=10V , $V_{GEN}$ =4.5V, $R_G$ =6Ω $I_D$ =1A , $R_L$ =10Ω | --- | 25 | --- | ns |
| $T_r$ | Rise Time | | --- | 21 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 65 | --- | |
| $T_f$ | Fall Time | | --- | 35 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=10V , $V_{GS}$=0V , f=1MHz | --- | 400 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 80 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 70 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$= 1A | --- | --- | 1.2 | V |

Note :

1.Pulse width limited by maximum junction temperature.

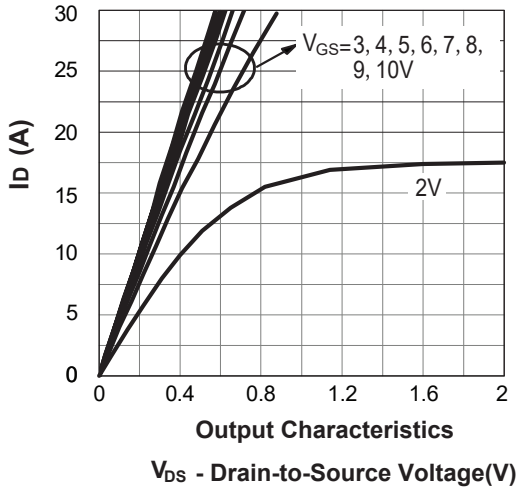
2.The EAS data shows Max. rating . The test condition is $V_{DD}$=15V,$V_{GS}$=10V,L=0.5mH,$I_D$=7A

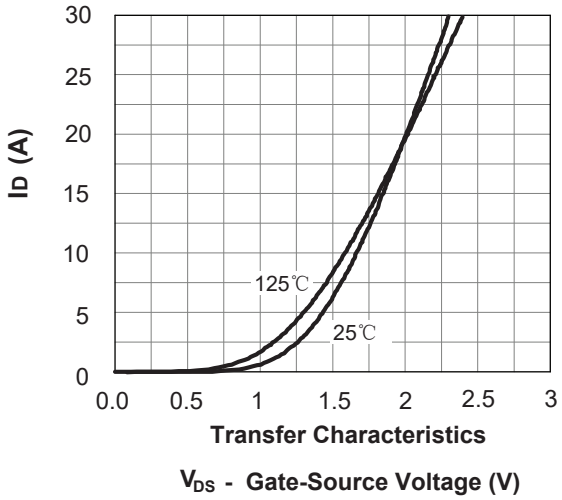
3.Mounted on PCB of 1in$^2$ Pad Area

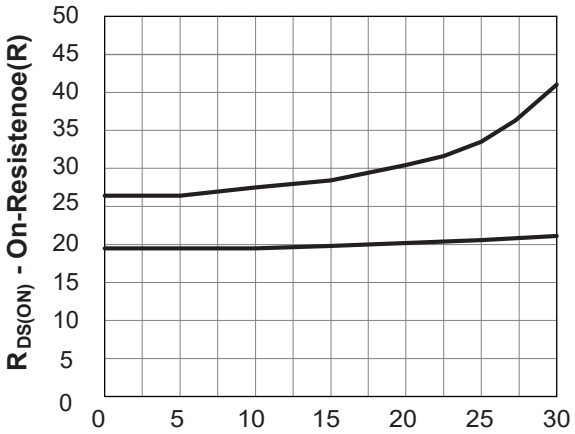
This product has been designed and qualified for the counsumer market.

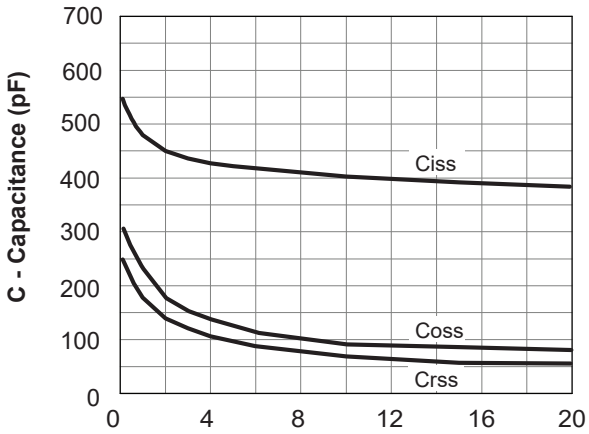
Cmos assumes no liability for customers' product design or applications.

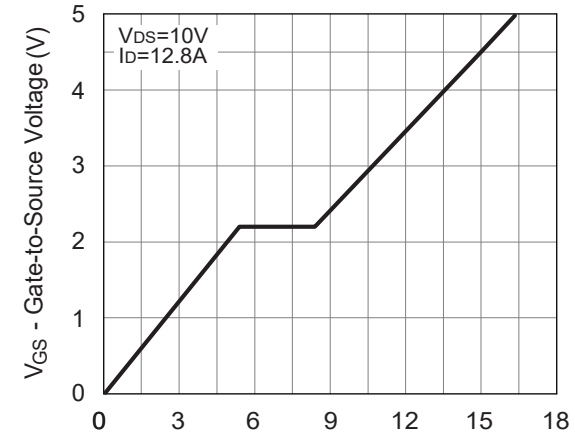
Cmos reserver the right to improve product design ,functions and reliability wihtout notice.

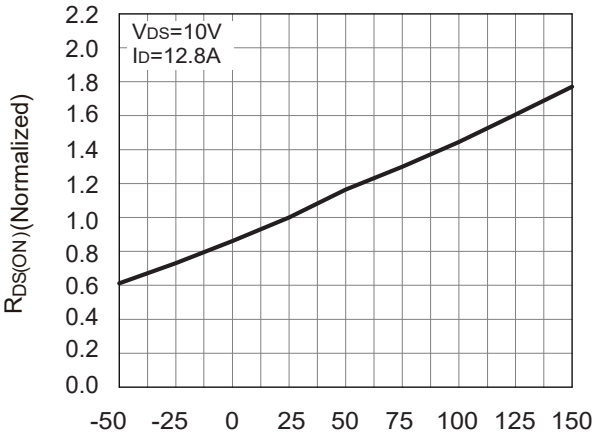

30
25
20
15
10
5
0
ID (A)
VGS=3, 4, 5, 6, 7, 8, 9, 10V
2V
0
0.4
0.8
1.2
1.6
2
Output Characteristics
VDS - Drain-to-Source Voltage(V)


30
25
20
15
10
5
0
ID (A)
125℃
25℃
0.0
0.5
1
1.5
2
2.5
3
Transfer Characteristics
VDS - Gate-Source Voltage (V)


50
45
40
35
30
25
20
15
10
5
0
RDS(ON) - On-Resistenoe(R)
0
5
10
15
20
25
30
ID(A) - Drain Current(A)
On-Resistance vs. Drain Current


700
600
500
400
300
200
100
0
C - Capacitance (pF)
Ciss
Coss
Crss
0
4
8
12
16
20
VDS(Volts)
Capacitance Characteristics


5
4
3
2
1
0
VGS - Gate-to-Source Voltage (V)
VDS=10V
ID=12.8A
0
3
6
9
12
15
18
Qg - Total Fate Charge(nC)


2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
RDS(ON)(Normalized)
VDS=10V
ID=12.8A
-50
-25
0
25
50
75
100
125
150
Temperature (°C)
On-Resistance vs. Junction Temperature