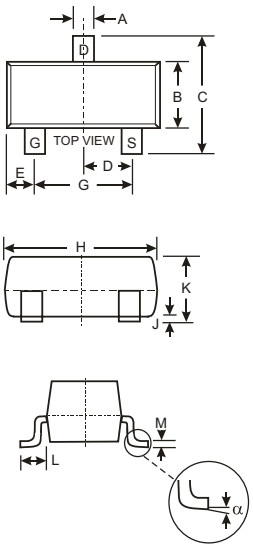
# HC2301A

## P-CHANNEL ENHANCEMENT MODE MOSFET

## Features

- $V_{DS}$=20V.
- Super high density cell design for extremely low $R_{DS(ON)}$.
- Exceptional on-resistance and maximum DC current capability.
- We declare that the material of product compliance with RoHS requirements.



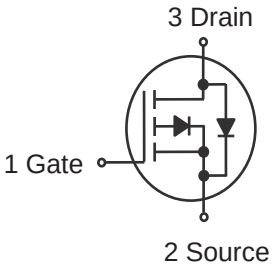

| SOT-23 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 0.37 | 0.51 |
| **B** | 1.20 | 1.40 |
| **C** | 2.30 | 2.50 |
| **D** | 0.89 | 1.03 |
| **E** | 0.45 | 0.60 |
| **G** | 1.78 | 2.05 |
| **H** | 2.80 | 3.00 |
| **J** | 0.013 | 0.10 |
| **K** | 0.903 | 1.10 |
| **L** | 0.45 | 0.61 |
| **M** | 0.085 | 0.180 |
| α | 0° | 8° |
| **All Dimensions in mm** | | |

## APPLICATIONS

- Power Management in Notebook.
- Portable equipment.
- Battery powered system.
- Load switch.
- Marking Code:2301 OR A1SHB.

## Maximum Ratings @ $T_A$ = 25°C unless otherwise specified

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Drain Current | $I_D$ | -2.8 | A |
| Peak Drain Current [1] | $I_{DM}$ | -10 | A |
| Power Dissipation $T_A$ = 25℃<br>$T_A$ = 75℃ | $P_{tot}$ | 0.80<br>0.50 | W |
| Thermal Resistance from Juntion to Ambient (PCB mounted) [2] | $R_{\theta JA}$ | 156 | ℃/W |
| Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature Range | $T_{stg}$ | - 55 to + 150 | ℃ |




[1] Repetitive Rating: Pulse width limited by the Maximum junction temperation.

[2] 1 $in^2$ 2oz Cu PCB board.

## Electrical Characteristics @ $T_A$ = 25°C unless otherwise specified

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =-250μA | -20 | | | V |
| Gate-source threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =-250μA | -0.4 | -0.7 | -1.0 | |
| Gate-source leakage | $I_{GSS}$ | $V_{DS}$ =0V, $V_{GS}$ =±12V | | | ±100 | nA |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =-20V, $V_{GS}$ =0V | | | -1 | μA |
| Drain-source on-state resistance [a] | $R_{DS(on)}$ | $V_{GS}$ =-4.5V, $I_D$ =-2.8A | | 80 | 100 | mΩ |
| | | $V_{GS}$ =-2.5V, $I_D$ =-2.0A | | 100 | 130 | |
| Forward transconductance [a] | $g_{fs}$ | $V_{DS}$ =-5V, $I_D$ =-2.8A | | 5.5 | | S |
| **Dynamic**[b] | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{DS}$ =-10V,$V_{GS}$ =0V,f =1MHz | | 360 | | pF |
| Output capacitance | $C_{oss}$ | | | 67 | | |
| Reverse transfer capacitance | $C_{rss}$ | | | 51 | | |
| Total gate charge | $Q_g$ | $V_{DS}$ =-10V,$V_{GS}$ =-4.5V,$I_D$ =-2.8A | | 5.5 | | nC |
| | | $V_{DS}$ =-10V,$V_{GS}$ =-2.5V,$I_D$ =-2.0A | | 3.3 | | |
| Gate-source charge | $Q_{gs}$ | | | 0.7 | | |
| Gate-drain charge | $Q_{gd}$ | | | 1.3 | | |
| Gate resistance | $R_g$ | f =1MHz | | 6.0 | | Ω |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-10V, $R_L$=10Ω, $I_D$ =-1A, $V_{GEN}$=-4.5V,Rg=1Ω | | 11 | | ns |
| Rise time | $t_r$ | | | 35 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 30 | | |
| Fall time | $t_f$ | | | 10 | | |
| **Drain-source body diode characteristics** | | | | | | |
| Continuous source-drain diode current | $I_S$ | $T_C$=25℃ | | | -3 | A |
| Pulse diode forward current [a] | $I_{SM}$ | | | | -10 | |
| Body diode voltage | $V_{SD}$ | $I_S$=-0.7A | | -0.8 | -1.2 | V |

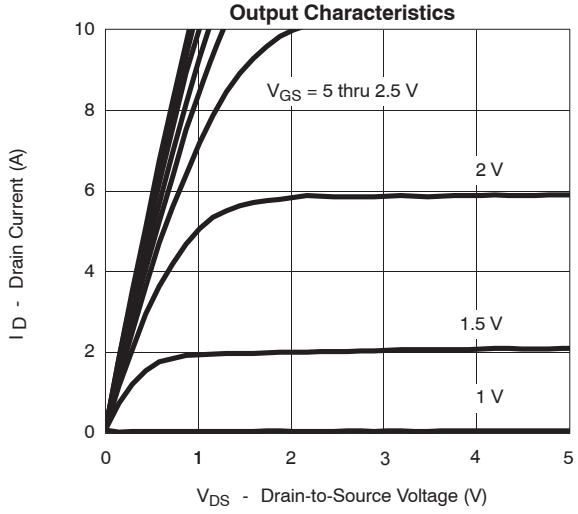
**Notes :**

a.Pulse Test : Pulse Width < 300μs, Duty Cycle ≤2%.

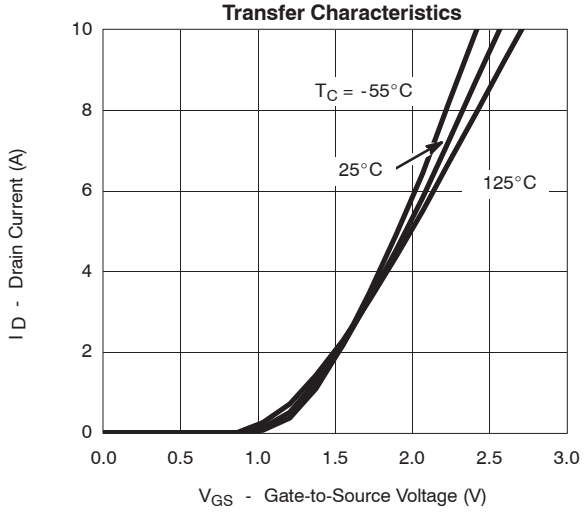
b.Guaranteed by design, not subject to production testing.

## TYPICAL TRANSIENT CHARACTERISTICS

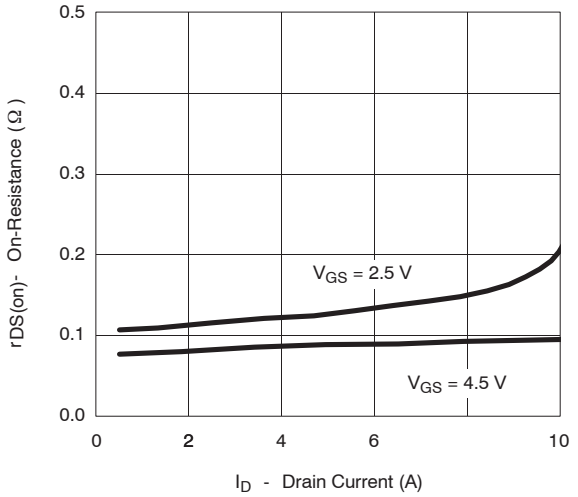
**Output Characteristics**



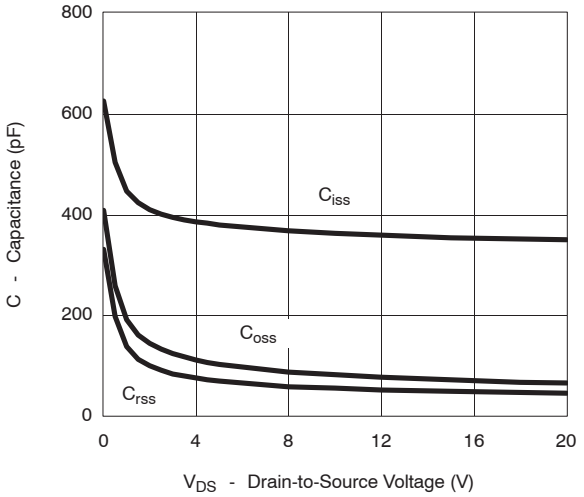

**Transfer Characteristics**



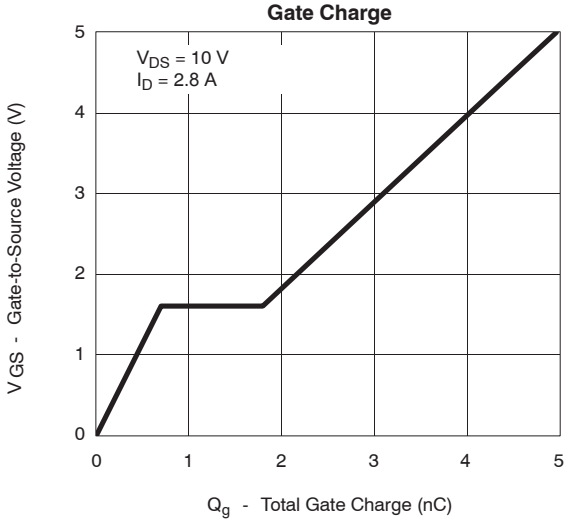

**On-Resistance vs. Drain Current**



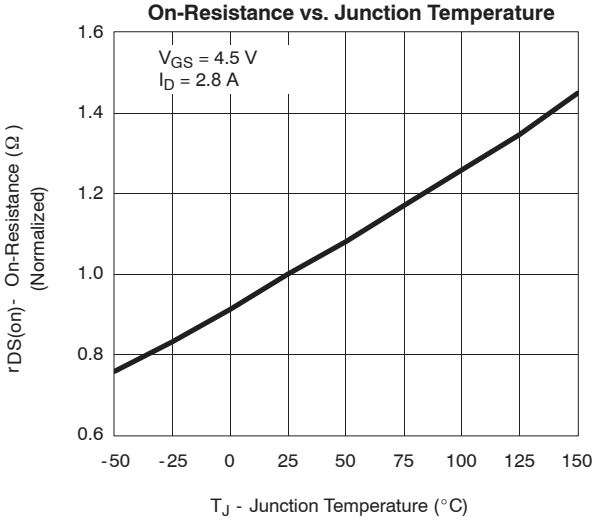

**Capacitance**




**Gate Charge**

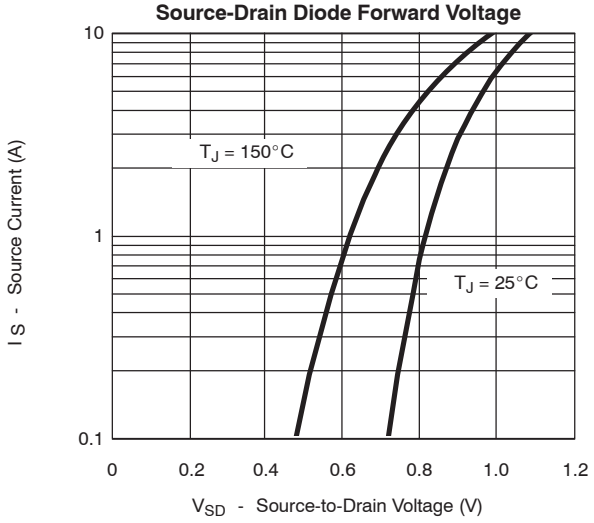



**On-Resistance vs. Junction Temperature**

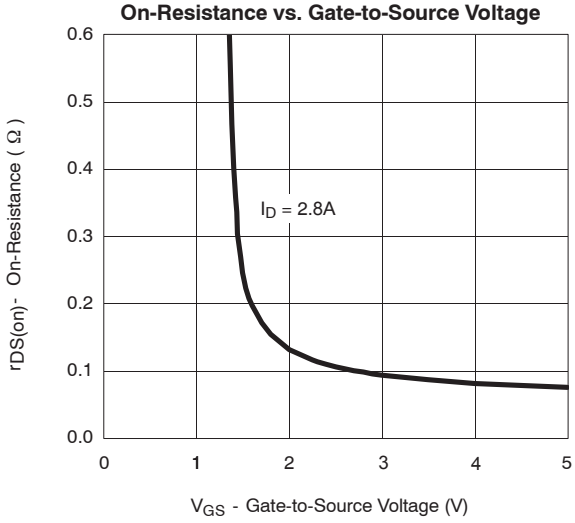


## TYPICAL TRANSIENT CHARACTERISTICS

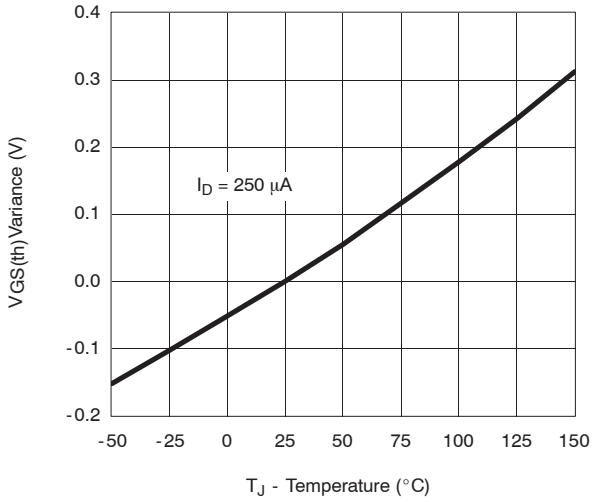
Source-Drain Diode Forward Voltage



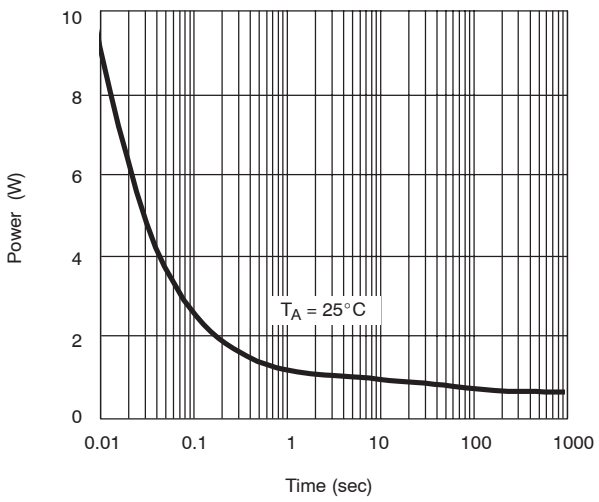

On-Resistance vs. Gate-to-Source Voltage



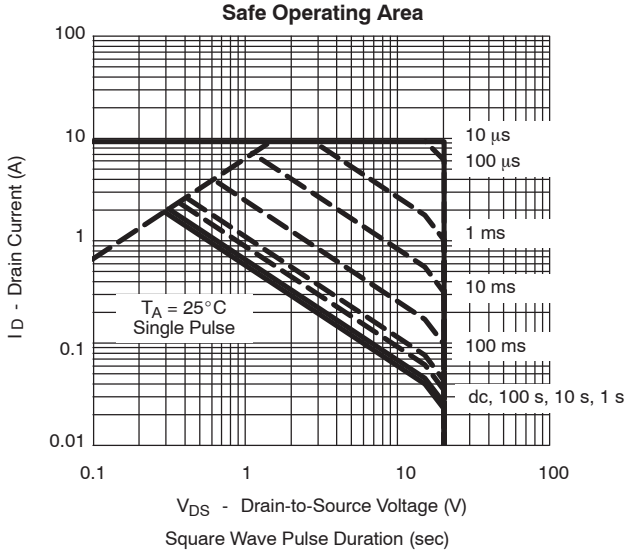

Threshold Voltage




Single Pulse Power




Safe Operating Area



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