# 20V P-Channel Trench Power MOSFET

## General Description

The SJA2305C uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as -2.5V. This device is suitable for use as a wide variety of applications.

## Features

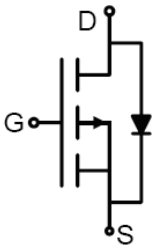
- Low Gate Charge
- High Power and current handing capability
- Lead free product is acquired

## Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

## Key Performance Parametes

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | -20 | V |
| $R_{DS(ON)\_TYP}$ | 29.6 | mΩ |
| $I_D$ | -5.1 | A |
| $Q_G$ | 8 | nC |




Schematic Diagram


SOT-23-3L top view

RoHS

## Package Marking and Ordering Information

| Device/Ordering Code | Marking | Package | Packing | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|---|
| SJA2305C | 2305C | SOT-23-3L | Tape | \ | \ | 3000 Pcs |

## Table 1. Absolute Maximum Ratings ($T_A$=25℃ unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage ($V_{GS}$=0V) | -20 | V |
| $V_{GS}$ | Gate-Source Voltage ($V_{DS}$=0V) | ±12 | V |
| $I_D$ | Drain Current-Continuous($T_A$=25℃) | -5.1 | A |
| | Drain Current-Continuous($T_A$=100℃) | -3.2 | A |
| $I_{DM\ (pluse)}$ | Drain Current-Continuous@ Current-Pulsed (Note 1) | -20.4 | A |
| $P_D$ | Maximum Power Dissipation($T_A$=25℃) | 1.4 | W |
| | Maximum Power Dissipation($T_A$=100℃) | 0.56 | W |
| $E_{AS}$ | Avalanche energy (Note 2) | 25 | mJ |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 To 150 | ℃ |

## Table 2. Thermal Characteristic

| Symbol | Parameter | Typ | Max | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | | 89 | ℃/W |

## Table 3. Electrical Characteristics ($T_J$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **On/Off States** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V $I_D$=-250μA | -20 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-20V, $V_{GS}$=0V $T_J$=25℃ | | | -1 | μA |
| | | $V_{DS}$=-20V, $V_{GS}$=0V $T_J$=125℃ | | | -100 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±12V, $V_{DS}$=0V | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | -0.5 | | -1 | V |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=-5V, $I_D$=-3A | | 11 | | S |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=-4.5V, $I_D$=-3A $T_J$=25℃ | | 29.6 | 37 | mΩ |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=-2.5V, $I_D$=-2A $T_J$=25℃ | | 37.7 | 50.1 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-10V,$V_{GS}$=0V, f=1.0MHz | | 872 | | pF |
| $C_{oss}$ | Output Capacitance | | | 103 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 87 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1.0MHz | | 6 | | Ω |
| **Switching Parameters** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{GS}$=-4.5V, $V_{DS}$=-10V, $R_L$=3.3Ω, $R_{GEN}$=3Ω | | 26 | | nS |
| $t_r$ | Turn-on Rise Time | | | 45 | | nS |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 70 | | nS |
| $t_f$ | Turn-Off Fall Time | | | 58 | | nS |
| $Q_g$ | Total Gate Charge | $V_{GS}$=-4.5V, $V_{DS}$=-10V, $I_D$=-3A | | 8 | | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 1.4 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 1.6 | | nC |
| **Source-Drain Diode Characteristics** | | | | | | |
| $I_{SD}$ | Source-Drain Current (Body Diode) | | | | -5.1 | A |
| $V_{SD}$ | Forward on Voltage (Note 3) | $V_{GS}$=0V, $I_S$=-3A | | | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=-3A, dI/dt=100A/μs | | 17 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | $I_F$=-3A, dI/dt=100A/μs | | 7 | | nC |

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.$E_{AS}$ condition: $T_J$=25℃,$V_{DD}$=-20V,$V_G$=-10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

## Typical Electrical And Thermal Characteristics (Curves)

**Figure 1. Output Characteristics**

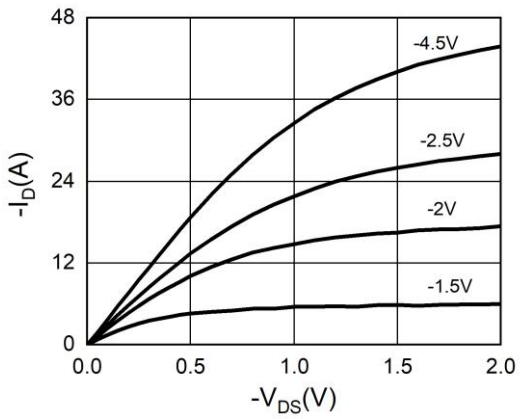



**Figure 2. Transfer Characteristics**

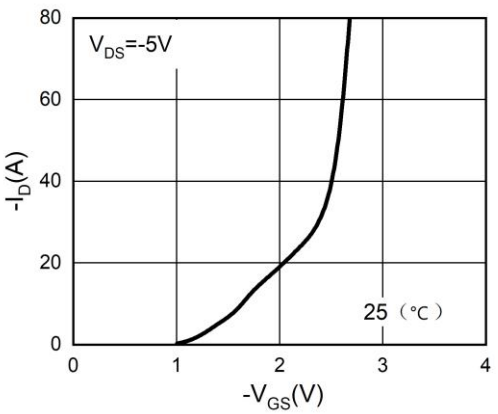



**Figure 3. Power Dissipation**

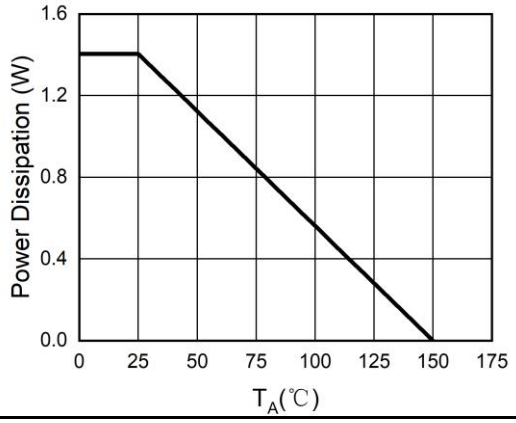



**Figure 4. Drain Current**

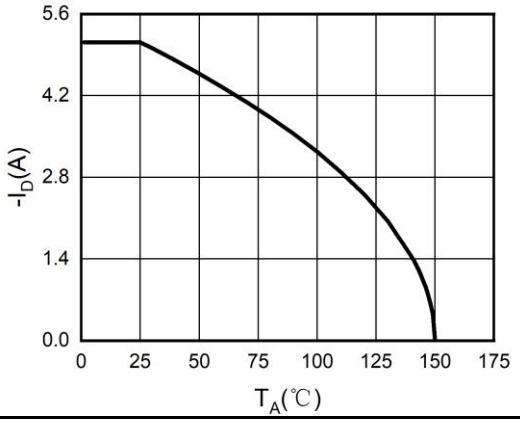



**Figure 5. $BV_{DSS}$ vs Junction Temperature**

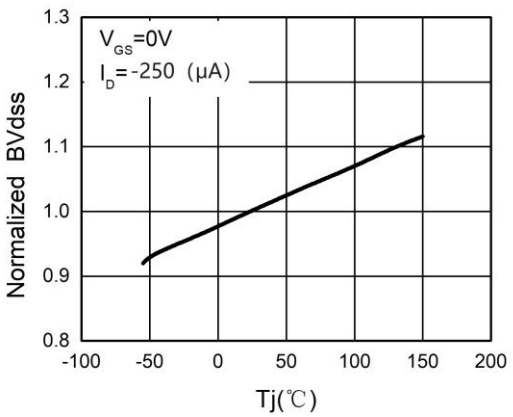
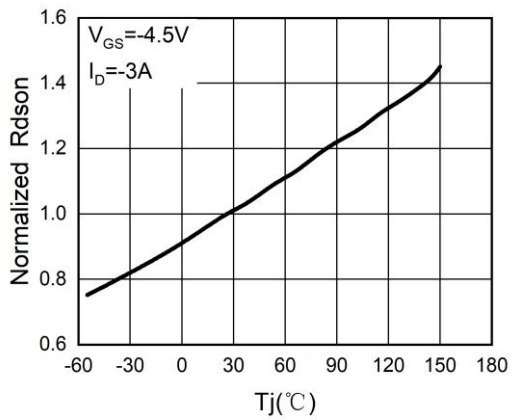



**Figure 6. $R_{DS(ON)}$ vs Junction Temperature**



## Typical Electrical And Thermal Characteristics (Curves)

**Figure 7. Gate Charge Waveforms**

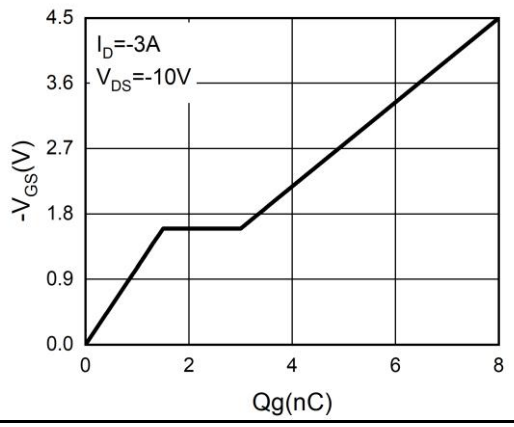



**Figure 8. Capacitance**

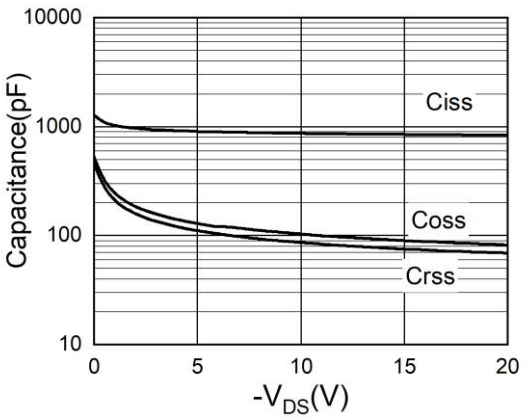



**Figure 9. Body-Diode Characteristics**

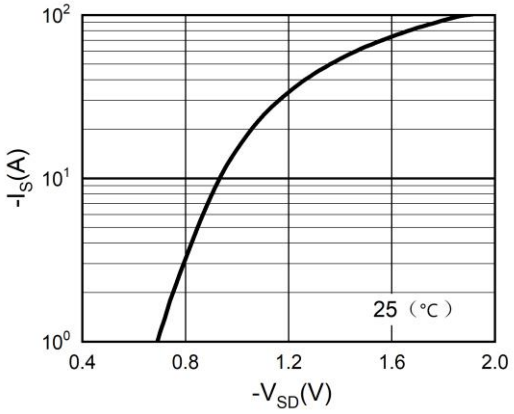
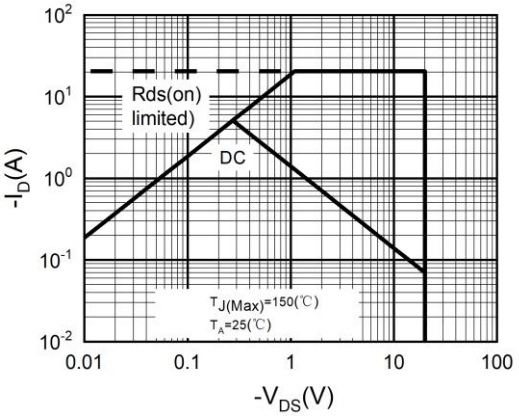
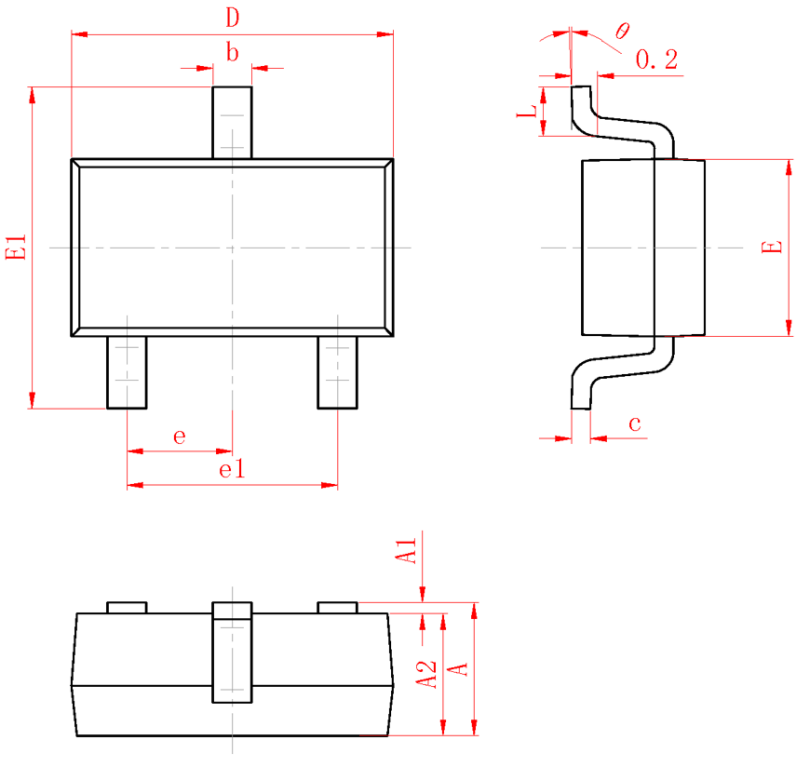



**Figure 10. Maximum Safe Operating Area**



## SOT-23-3L Package Information




| SYMBOL | MILLIMETER | |
|---|---|---|
| | MIN | MAX |
| A | 1.050 | 1.250 |
| A1 | 0.000 | 0.100 |
| A2 | 1.050 | 1.150 |
| b | 0.250 | 0.450 |
| c | 0.100 | 0.200 |
| D | 2.820 | 3.020 |
| E | 1.500 | 1.700 |
| E1 | 2.650 | 2.950 |
| e | 0.950(BSC) | |
| e1 | 1.800 | 2.000 |
| L | 0.300 | 0.500 |
| θ | 0° | 8° |

| Symbol | Dimensions In Millimeters | |
|---|---|---|
| | Min. | Max. |
| A | 1.050 | 1.250 |
| A1 | 0.000 | 0.100 |
| A2 | 1.050 | 1.150 |
| b | 0.250 | 0.450 |
| c | 0.100 | 0.200 |
| D | 2.820 | 3.020 |
| E | 1.500 | 1.700 |
| E1 | 2.650 | 2.950 |
| e | 0.950(BSC) | |
| e 1 | 1.800 | 2.000 |
| L | 0.300 | 0.500 |
| θ | 0° | 8° |

## Attention

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