

## ■ FEATURE

- ◆ -30V/-4.3A,  $R_{DS(ON)}=44m\Omega$  (typ.)@ $V_{GS}=-10V$
- ◆ -30V/-3.5A,  $R_{DS(ON)}=50m\Omega$  (typ.)@ $V_{GS}=-4.5V$
- ◆ -30V/-2.5A,  $R_{DS(ON)}=65m\Omega$  (typ.)@ $V_{GS}=-2.5V$
- ◆ Super high design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and Maximum DC current capability
- ◆ Full RoHS compliance
- ◆ SOT23-3 package design

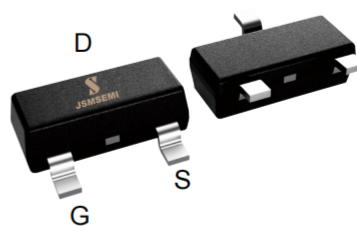
## ■ DESCRIPTION

The CES2331 is the P-Channel logic enhancement mode power field effect transistor is produced using high cell density advanced trench technology..

This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application, and low in-line power loss are needed in a very small outline surface mount package.

## ■ APPLICATIONS

- ◆ Power Management
- ◆ Portable Equipment
- ◆ DC/DC Converter
- ◆ Load Switch
- ◆ DSC
- ◆ LCD Display inverter



TOP VIEW  
SOT-23

## ■ ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ Unless otherwise noted )

| Symbol           | Parameter                                      |                       | Typical  | Unit |
|------------------|------------------------------------------------|-----------------------|----------|------|
| V <sub>DSS</sub> | Drain-Source Voltage                           |                       | -30      | V    |
| V <sub>GSS</sub> | Gate-Source Voltage                            |                       | ±12      | V    |
| I <sub>D</sub>   | Continuous Drain Current (T <sub>C</sub> =25℃) | V <sub>GS</sub> =-10V | -4.3     | A    |
|                  | Continuous Drain Current (T <sub>J</sub> =70℃) |                       | -4.0     |      |
| I <sub>DM</sub>  | Pulsed Drain Current                           |                       | -20      | A    |
| I <sub>S</sub>   | Continuous Source Current (Diode Conduction)   |                       | -1.5     | A    |
| P <sub>D</sub>   | Power Dissipation                              | T <sub>A</sub> =25℃   | 1.5      | W    |
|                  |                                                | T <sub>A</sub> =70℃   | 0.9      |      |
| T <sub>J</sub>   | Operation Junction Temperature                 |                       | 150      | ℃    |
| T <sub>STG</sub> | Storage Temperature Range                      |                       | -55~+150 | ℃    |
| R <sub>θJA</sub> | Thermal Resistance Junction to Ambient         |                       | 120      | ℃/W  |

**Note:** Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress rating only and functional device operation is not implied

**ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  Unless otherwise noted)

| Symbol             | Parameter                       | Condition                                                       | Min  | Typ  | Max       | Unit       |
|--------------------|---------------------------------|-----------------------------------------------------------------|------|------|-----------|------------|
| Static Parameters  |                                 |                                                                 |      |      |           |            |
| $V_{(BR)DSS}$      | Drain-Source Breakdown Voltage  | $V_{GS}=0V, I_D=-250\mu A$                                      | -30  |      |           | V          |
| $V_{GS(th)}$       | Gate Threshold Voltage          | $V_{DS}=V_{GS}, I_D=-250\mu A$                                  | -0.6 |      | -1.2      | V          |
| $I_{GSS}$          | Gate Leakage Current            | $V_{DS}=0V, V_{GS}=\pm 12V$                                     |      |      | $\pm 100$ | nA         |
| $I_{DSS}$          | Zero Gate Voltage Drain Current | $V_{DS}=-24V, V_{GS}=0$                                         |      |      | -1        | $\mu A$    |
|                    |                                 | $V_{DS}=-24V, V_{GS}=0$<br>$T_J=55^{\circ}C$                    |      |      | -5        |            |
| $R_{DS(ON)}$       | Drain-Source On-Resistance      | $V_{GS}=-10V, I_D=-4.3A$                                        |      | 44   | 52        | m $\Omega$ |
|                    |                                 | $V_{GS}=-4.5V, I_D=-3.5A$                                       |      | 50   | 58        |            |
|                    |                                 | $V_{GS}=-2.5V, I_D=-2.5A$                                       |      | 65   | 78        |            |
| Source-Drain Diode |                                 |                                                                 |      |      |           |            |
| $V_{SD}$           | Diode Forward Voltage           | $I_S=-1.0A, V_{GS}=0V$                                          |      | -0.7 | -1.0      | V          |
| Dynamic Parameters |                                 |                                                                 |      |      |           |            |
| $Q_g$              | Total Gate Charge               | $V_{DS}=-20V$<br>$V_{GS}=-4.5V$<br>$I_D=-4.0A$                  |      | 6.2  |           | nC         |
| $Q_{gs}$           | Gate-Source Charge              |                                                                 |      | 2.8  |           |            |
| $Q_{gd}$           | Gate-Drain Charge               |                                                                 |      | 3.0  |           |            |
| $C_{iss}$          | Input Capacitance               | $V_{DS}=-12V$<br>$V_{GS}=0V$<br>$f=1MHz$                        |      | 672  |           | pF         |
| $C_{oss}$          | Output Capacitance              |                                                                 |      | 280  |           |            |
| $C_{rss}$          | Reverse Transfer Capacitance    |                                                                 |      | 102  |           |            |
| $T_{d(on)}$        | Turn-On Time                    | $V_{DS}=-12V$<br>$I_D=-4A$<br>$V_{GEN}=-10V$<br>$R_G=3.3\Omega$ |      | 9    |           | nS         |
| $T_r$              |                                 |                                                                 |      | 15   |           |            |
| $T_{d(off)}$       | Turn-Off Time                   |                                                                 |      | 23   |           |            |
| $T_f$              |                                 |                                                                 |      | 21   |           |            |

**Note: 1. Pulse test: pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$**

**2. Static parameters are based on package level with recommended wire bonding**

■ **TYPICAL CHARACTERISTICS** (25 °C Unless Note)



■ **TYPICAL CHARACTERISTICS** (continuous)



## Package Information

SOT-23-3



**DIMENSIONS** ( unit : mm )

| Symbol         | Min  | Typ  | Max  | Symbol         | Min  | Typ  | Max  |
|----------------|------|------|------|----------------|------|------|------|
| A              | 0.90 | 1.01 | 1.15 | A <sub>1</sub> | 0.01 | 0.05 | 0.10 |
| b <sub>p</sub> | 0.30 | 0.42 | 0.50 | c              | 0.08 | 0.13 | 0.15 |
| D              | 2.80 | 2.92 | 3.00 | E              | 1.20 | 1.33 | 1.40 |
| e              | --   | 1.90 | --   | e <sub>1</sub> | --   | 0.95 | --   |
| H <sub>E</sub> | 2.25 | 2.40 | 2.55 | L <sub>p</sub> | 0.30 | 0.42 | 0.50 |
| Q              | 0.45 | 0.49 | 0.55 | v              | --   | 0.20 | --   |
| w              | --   | 0.10 | --   |                |      |      |      |