

## CES2342-VB Datasheet

## N-Channel 30-V (D-S) MOSFET

| PRODUCT SUMMARY     |                                     |                                 |                       |  |  |  |
|---------------------|-------------------------------------|---------------------------------|-----------------------|--|--|--|
| V <sub>DS</sub> (V) | $R_{DS(on)}(\Omega)$                | I <sub>D</sub> (A) <sup>a</sup> | Q <sub>g</sub> (Typ.) |  |  |  |
| 30                  | 0.030 at V <sub>GS</sub> = 10 V     | 6.5                             | 4.5 nC                |  |  |  |
|                     | $0.033$ at $V_{GS} = 4.5 \text{ V}$ | 6.0                             | 4.5 110               |  |  |  |

### **FEATURES**

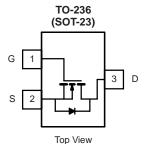
- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- 100 % R<sub>g</sub> Tested
- Compliant to RoHS Directive 2002/95/EC

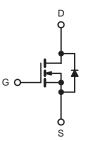


ROHS COMPLIANT HALOGEN FREE

#### **APPLICATIONS**

DC/DC Converter





N-Channel MOSFET

| <b>ABSOLUTE MAXIMUM RATINGS</b> T <sub>A</sub> = 25 °C, unless otherwise noted |                        |                                   |                     |      |  |  |
|--|------------------------|-----------------------------------|---------------------|------|--|--|
| Parameter  |                        | Symbol                            | Limit               | Unit |  |  |
| Drain-Source Voltage   |                        | $V_{DS}$                          | 30                  | V    |  |  |
| Gate-Source Voltage  |                        | $V_{GS}$                          | ± 20                |      |  |  |
|  | T <sub>C</sub> = 25 °C |                                   | 6.5 <sup>a</sup>    |      |  |  |
| Continuous Drain Current (T <sub>.1</sub> = 150 °C)                            | T <sub>C</sub> = 70 °C | l <sub>D</sub>                    | 6.0                 |      |  |  |
| Continuous Brain Carron (1) = 100 C)   | T <sub>A</sub> = 25 °C |                                   | 5.3                 |      |  |  |
|  | T <sub>A</sub> = 70 °C |                                   | 5.0                 | Α    |  |  |
| Pulsed Drain Current   |                        | I <sub>DM</sub>                   | 25                  |      |  |  |
|  | T <sub>C</sub> = 25 °C |                                   | 1.4                 |      |  |  |
| Continuous Source-Drain Diode Current  | T <sub>A</sub> = 25 °C | I <sub>S</sub>                    | 0.9 <sup>b, c</sup> |      |  |  |
|  | T <sub>C</sub> = 25 °C |                                   | 1.7                 |      |  |  |
| Maximum Power Dissipation  | $T_C = 70  ^{\circ}C$  | P <sub>D</sub>                    | 1.1                 | w    |  |  |
| Maximum rower bissipation  | $T_A = 25  ^{\circ}C$  |                                   | 1.1 <sup>b, c</sup> |      |  |  |
|  | T <sub>A</sub> = 70 °C |                                   | 0.7 <sup>b, c</sup> |      |  |  |
| Operating Junction and Storage Temperature Range                               |                        | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 150         | °C   |  |  |
| Soldering Recommendations (Peak Tempera  | ture) <sup>d, e</sup>  |                                   | 260                 |      |  |  |

| THERMAL RESISTANCE RATINGS                  |              |            |         |         |      |  |
|---|--------------|------------|---------|---------|------|--|
| Parameter                                   |              | Symbol     | Typical | Maximum | Unit |  |
| Maximum Junction-to-Ambient <sup>b, d</sup> | t ≤ 5 s      | $R_{thJA}$ | 90      | 115     | °C/W |  |
| Maximum Junction-to-Foot (Drain)            | Steady State | $R_{thJF}$ | 60      | 75      | 0/11 |  |

#### Notes:

- a. Package limited
- b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 5 s.
- d. Maximum under steady state conditions is 130 °C/W.



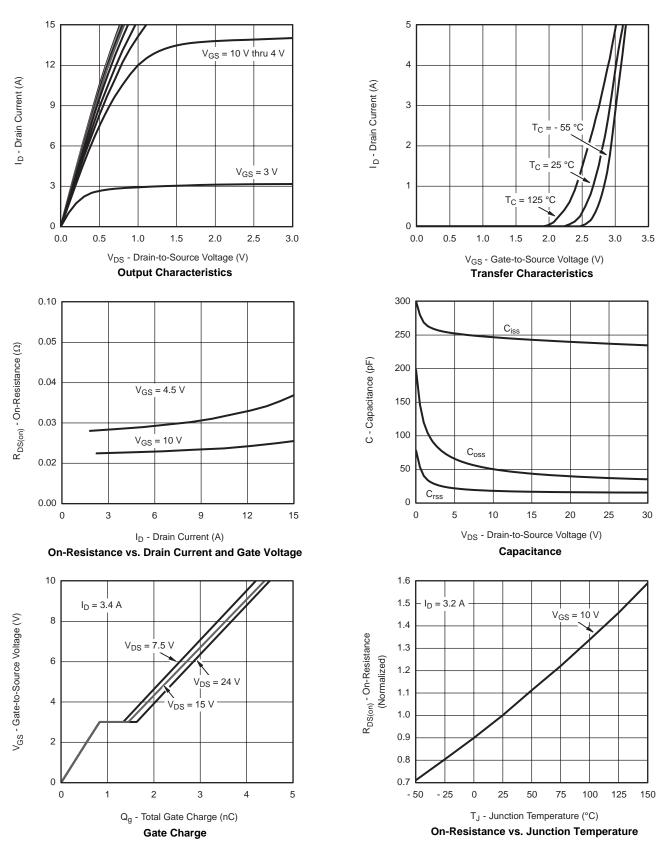
| Parameter                                     | Symbol                  | Test Conditions   | Min. | Тур.  | Max.  | Unit  |
|---|-------------------------|---|------|-------|-------|-------|
| Static  |                         |   |      |       | L     |       |
| Drain-Source Breakdown Voltage                | V <sub>DS</sub>         | $V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$   | 30   |       |       | V     |
| V <sub>DS</sub> Temperature Coefficient       | $\Delta V_{DS}/T_{J}$   | I 250 · · A   |      | 31    |       | mV/°C |
| V <sub>GS(th)</sub> Temperature Coefficient   | $\Delta V_{GS(th)}/T_J$ | I <sub>D</sub> = 250 μA   |      | - 5   |       |       |
| Gate-Source Threshold Voltage                 | V <sub>GS(th)</sub>     | $V_{DS} = V_{GS}$ , $I_D = 250 \mu A$   | 0.7  | 1.1   | 2.0   | V     |
| Gate-Source Leakage                           | I <sub>GSS</sub>        | $V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$                                     |      |       | ± 100 | nA    |
| Zana Oata Valtana Bua'a Oamaat                | I <sub>DSS</sub>        | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$   |      |       | 1     | μA    |
| Zero Gate Voltage Drain Current               |                         | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$            |      |       | 10    |       |
| On-State Drain Current <sup>a</sup>           | I <sub>D(on)</sub>      | $V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$                                       | 10   |       |       | Α     |
|   |                         | $V_{GS} = 10 \text{ V}, I_D = 3.2 \text{ A}$  |      | 0.030 |       | Ω     |
| Drain-Source On-State Resistance <sup>a</sup> | R <sub>DS(on)</sub>     | $V_{GS} = 4.5 \text{ V}, I_{D} = 2.8 \text{ A}$                                       |      | 0.033 |       |       |
| Forward Transconductance <sup>a</sup>         | 9 <sub>fs</sub>         | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 4.8 A  |      | 11    |       | S     |
| Dynamic <sup>b</sup>                          |                         |   |      |       |       |       |
| Input Capacitance                             | C <sub>iss</sub>        |   |      | 335   |       | pF    |
| Output Capacitance                            | C <sub>oss</sub>        | $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$                      |      | 45    |       |       |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>        |   |      | 17    |       |       |
| ·   |                         | $V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 3.4 \text{ A}$                 | 4.5  | 6.7   |       |       |
| Total Gate Charge                             | Qg                      |   |      | 2.1   | 3.2   | nC    |
| Gate-Source Charge                            | Q <sub>gs</sub>         | $V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 3.4 \text{ A}$                  |      | 0.85  |       |       |
| Gate-Drain Charge                             | $Q_{gd}$                |   |      | 0.65  |       |       |
| Gate Resistance                               | $R_g$                   | f = 1 MHz   | 0.8  | 4.4   | 8.8   | Ω     |
| Turn-On Delay Time                            | t <sub>d(on)</sub>      |   |      | 12    | 20    |       |
| Rise Time                                     | t <sub>r</sub>          | $V_{DD}$ = 15 V, $R_L$ = 5.6 $\Omega$   |      | 50    | 75    |       |
| Turn-Off Delay Time                           | t <sub>d(off)</sub>     | $I_D\cong$ 2.7 A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 $\Omega$                               |      | 12    | 20    |       |
| Fall Time                                     | t <sub>f</sub>          |   |      | 22    | 35    | ]     |
| Turn-On Delay Time                            | t <sub>d(on)</sub>      |   |      | 5     | 10    | ns    |
| Rise Time                                     | t <sub>r</sub>          | $V_{DD}$ = 15 V, $R_L$ = 5.6 $\Omega$   |      | 12    | 20    |       |
| Turn-Off Delay Time                           | t <sub>d(off)</sub>     | $I_D\cong$ 2.7 A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$                                |      | 10    | 15    |       |
| Fall Time                                     | t <sub>f</sub>          |   |      | 5     | 10    |       |
| <b>Drain-Source Body Diode Characteristic</b> | cs                      |   |      |       |       |       |
| Continuous Source-Drain Diode Current         | I <sub>S</sub>          | T <sub>C</sub> = 25 °C  |      |       | 1.4   | Δ     |
| Pulse Diode Forward Current                   | I <sub>SM</sub>         |   |      |       | 15    | A     |
| Body Diode Voltage                            | V <sub>SD</sub>         | $I_S = 2.7 \text{ A}, V_{GS} = 0 \text{ V}$   |      | 0.8   | 1.2   | V     |
| Body Diode Reverse Recovery Time              | t <sub>rr</sub>         |   |      | 10    | 20    | ns    |
| Body Diode Reverse Recovery Charge            | Q <sub>rr</sub>         | $I_F = 2.7 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, T_J = 25 \text{ °C}$ |      | 5     | 10    | nC    |
| Reverse Recovery Fall Time                    | t <sub>a</sub>          | 1 <sub>F</sub> = 2.7 A, αι/αι = 100 A/μs, 1 <sub>J</sub> = 25 °C                      |      | 6     |       |       |
| everse Recovery Rise Time t <sub>b</sub>      |                         |   |      | 4     |       | ns    |

#### Notes:

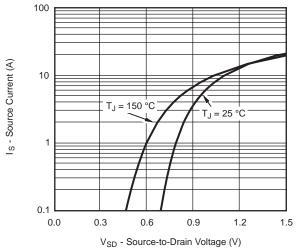
- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%$
- b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

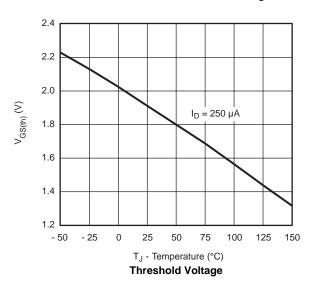


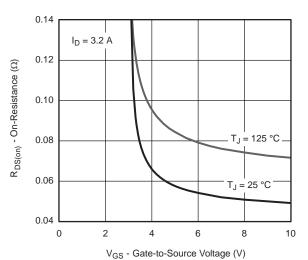












On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power



 $^{\star}$  V<sub>GS</sub> > minimum V<sub>GS</sub> at which R<sub>DS(on)</sub> is specified

Safe Operating Area, Junction-to-Ambient

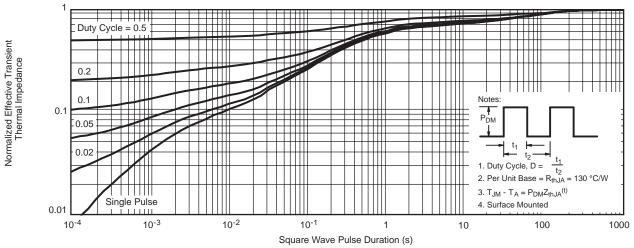






<sup>\*</sup> The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





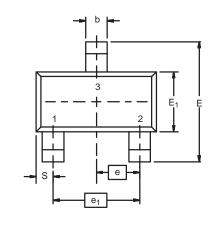
#### Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



## SOT-23 (TO-236): 3-LEAD





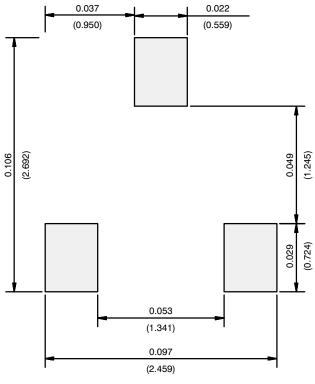


| Dim                      | MILLIM   | IETERS | INCHES     |       |  |
|--------------------------|----------|--------|------------|-------|--|
|                          | Min      | Max    | Min        | Max   |  |
| Α                        | 0.89     | 1.12   | 0.035      | 0.044 |  |
| A <sub>1</sub>           | 0.01     | 0.10   | 0.0004     | 0.004 |  |
| A <sub>2</sub>           | 0.88     | 1.02   | 0.0346     | 0.040 |  |
| b                        | 0.35     | 0.50   | 0.014      | 0.020 |  |
| С                        | 0.085    | 0.18   | 0.003      | 0.007 |  |
| D                        | 2.80     | 3.04   | 0.110      | 0.120 |  |
| E                        | 2.10     | 2.64   | 0.083      | 0.104 |  |
| E <sub>1</sub>           | 1.20     | 1.40   | 0.047      | 0.055 |  |
| е                        | 0.95 BSC |        | 0.0374 Ref |       |  |
| e <sub>1</sub>           | 1.90 BSC |        | 0.0748 Ref |       |  |
| L                        | 0.40     | 0.60   | 0.016      | 0.024 |  |
| L <sub>1</sub>           | 0.64 Ref |        | 0.025 Ref  |       |  |
| S                        | 0.50 Ref |        | 0.020 Ref  |       |  |
| q                        | 3°       | 8°     | 3°         | 8°    |  |
| ECN: S-03946-Rev. K. 09- | Jul-01   |        |            |       |  |

DWG: 5479



### **RECOMMENDED MINIMUM PADS FOR SOT-23**



Recommended Minimum Pads Dimensions in Inches/(mm)

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