REASUNOS

# RSM1701K0W

## N-Channel SiC Power MOSFET

| | | |
|---|---|---|
| $V_{DS}$ | = | 1700 V |
| $R_{DS(on)}$ | = | 1.0Ω |
| $I_D$@25℃ | = | 5 A |

### Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive

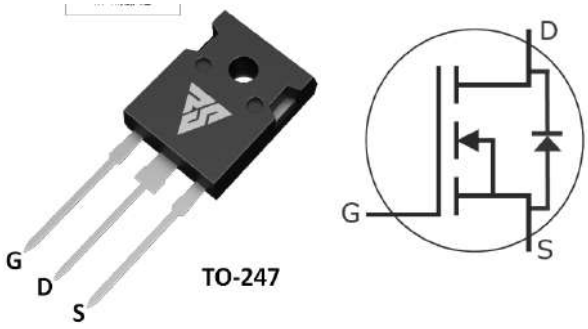
### Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

### Applications

- Auxiliary Power Supplies
- Switch Mode Power Supplies

### Package




| Part Number | Package |
|---|---|
| RSM1701K0W | TO-247-3 |

### Maximum Ratings ($T_C$=25℃ unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|---|---|---|---|---|---|
| $V_{DSmax}$ | Drain-Source Voltage | 1700 | V | $V_{GS}$=0V, $I_D$=100μA | |
| $V_{GSmax}$ | Gate-Source Voltage | -10/+25 | V | Absolute maximum values | |
| $V_{GSop}$ | Gate-Source Voltage | -5/+20 | V | Recommended operational values | |
| $I_D$ | Continuous Drain Current | 5.0 | A | $V_{GS}$=20V, $T_C$=25℃ | |
| | | 3.5 | | $V_{GS}$=20V, $T_C$=100℃ | |
| $I_{D(pulse)}$ | Pulsed Drain Current | 6.0 | A | Pulse width $t_p$ limited by $T_{Jmax}$ | |
| $P_D$ | Power Dissipation | 69 | W | $T_C$=25℃, $T_J$=150℃ | |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature | -55 to +150 | ℃ | | |

## Electrical Characteristics ($T_C$=25℃ unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | 1700 | / | / | V | $V_{GS}$=0V, $I_D$=100μA | |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.5 | 3.0 | 4.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=1mA | |
| | | / | 2.2 | / | | $V_{DS}$=$V_{GS}$, $I_D$=1mA, $T_J$=150℃ | |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | / | 1 | 100 | μA | $V_{DS}$=1700V, $V_{GS}$=0V | |
| $I_{GSS+}$ | Gate-Source Leakage Current | / | / | 250 | nA | $V_{DS}$=0V, $V_{GS}$=25V | |
| $I_{GSS-}$ | Gate-Source Leakage Current | / | / | 250 | nA | $V_{DS}$=0V, $V_{GS}$=-10V | |
| $R_{DS(on)}$ | Drain-Source On-State Resistance | / | 1.0 | 1.3 | Ω | $V_{GS}$=20V, $I_D$=2A | |
| | | / | 1.5 | / | | $V_{GS}$=20V, $I_D$=2A, $T_J$=150℃ | |
| $g_{fs}$ | Transconductance | / | 1.15 | / | S | $V_{DS}$=20V, $I_D$=2 A | |
| | | / | 1.30 | / | | $V_{DS}$=20V, $I_D$=2A, $T_J$=150℃ | |
| $C_{iss}$ | Input Capacitance | / | 186 | / | pF | $V_{GS}$=0V<br>$V_{DS}$=1000V<br>f=1MHz | |
| $C_{oss}$ | Output Capacitance | / | 12 | / | | | |
| $C_{rss}$ | Reverse Transfer Capacitance | / | 1.6 | / | | | |
| $E_{oss}$ | $C_{oss}$Stored Energy | / | 6.2 | / | μJ | $V_{AC}$=25mV | |
| $E_{ON}$ | Turn-On Switching Energy | / | 48 | / | | $V_{DS}$=1200V, $V_{GS}$=-5V/20V<br>$I_D$=2A, $R_{G(ext)}$=2.5Ω,<br>L=1500μH | |
| $E_{OFF}$ | Turn-Off Switching Energy | / | 18 | / | | | |
| $t_{d(on)}$ | Turn-On Delay Time | / | 5.2 | / | ns | $V_{DS}$=1200V, $V_{GS}$=-5V/20V,<br>$I_D$=2A $R_{G(ext)}$=2.5Ω, $R_L$=600Ω | |
| $t_r$ | Rise Time | / | 9.4 | / | | | |
| $t_{d(off)}$ | Turn-Off Delay Time | / | 13.2 | / | | | |
| $t_f$ | Fall Time | / | 22.0 | / | | | |
| RG | Internal Gate Resistance | / | 22 | / | Ω | f=1MHz open drain | |
| $Q_{GS}$ | Gate to Source Charge | / | 5.2 | / | nC | $V_{DS}$=1200V<br>$V_{GS}$=-5V/20V<br>$I_D$=2A | |
| $Q_{GD}$ | Gate to Drain Charge | / | 7.3 | / | | | |
| $Q_G$ | Total Gate Charge | / | 21.8 | / | | | |

## Reverse Diode Characteristics

| Symbol | Paramete r | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Diode Forward Voltage | 4.2 | / | V | $V_{GS}$=-5V, $I_{SD}$=1A | |
| | | 3.9 | / | | $V_{GS}$=-5V, $I_{SD}$=1A, $T_J$=150℃ | |
| $I_S$ | Continuous Diode Forward Current | / | 4 | A | $T_C$=25℃ | |
| $t_{rr}$ | Reverse Recover Time | 25 | / | ns | $V_{GS}$=-5V,$V_R$=1200V, $I_{SD}$=2A | |
| $Q_{rr}$ | Reverse Recovery Charge | 15 | / | nC | | |
| $I_{rrm}$ | Peak Reverse Recovery Current | 2.8 | / | A | | |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 1.8 | 2.0 | ℃/W | | |

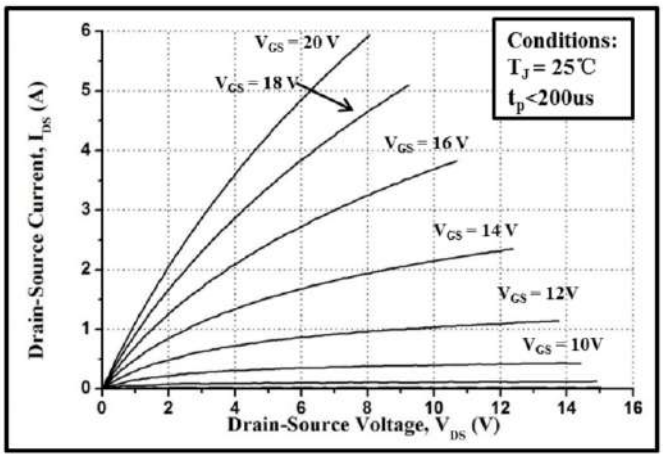



Figure 1. Typical Output Characteristics $T_J$= 25℃

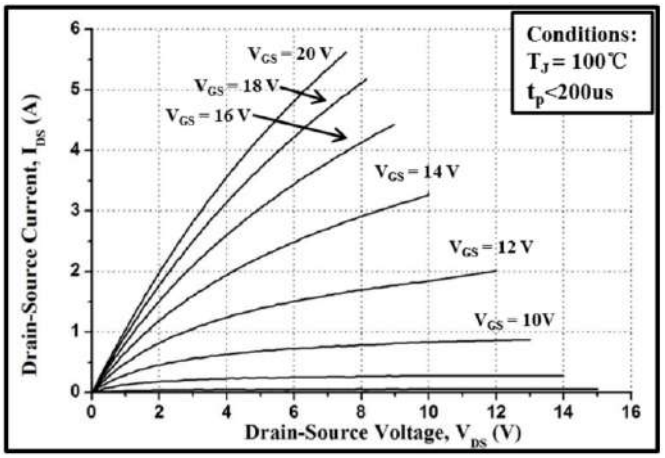



Figure 2. Typical Output Characteristics $T_J$= 100℃

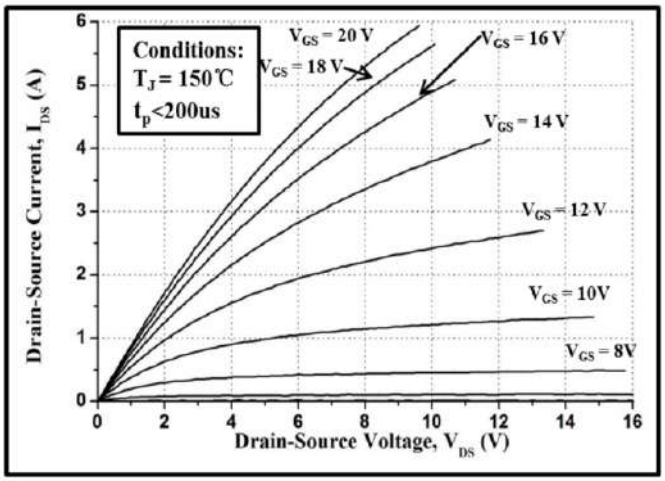



Figure 3. Typical Output Characteristics $T_J$=150℃

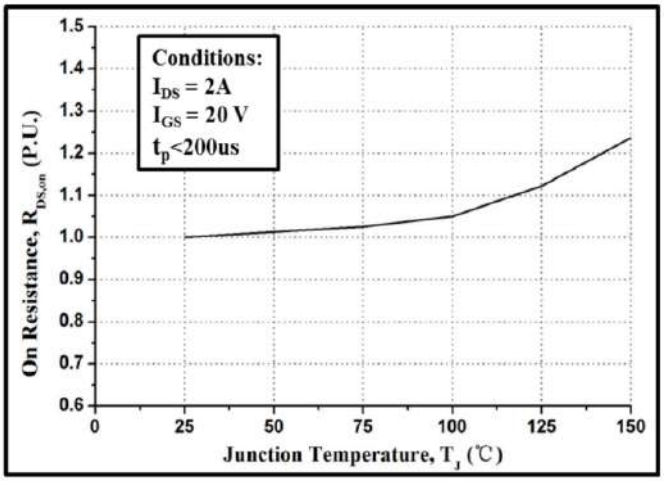



Figure 4. Normalized On-Resistance vs. Temperature

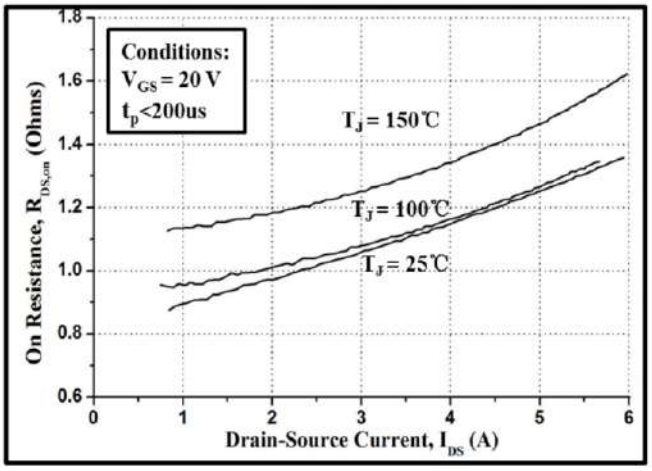



Figure 5. On-Resistance vs. Drain Current

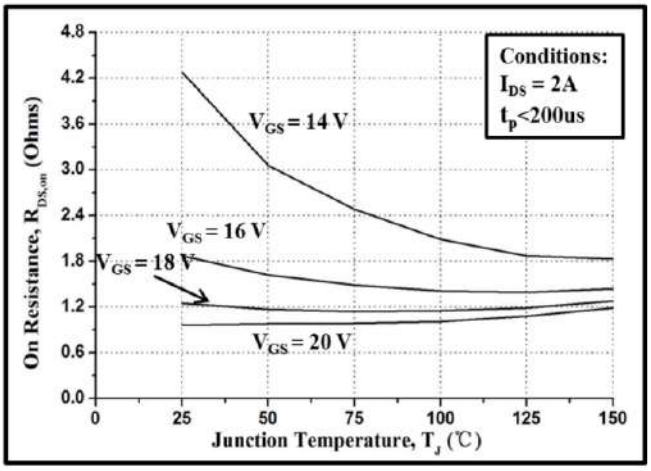



Figure 6. On-Resistance vs. Temperature

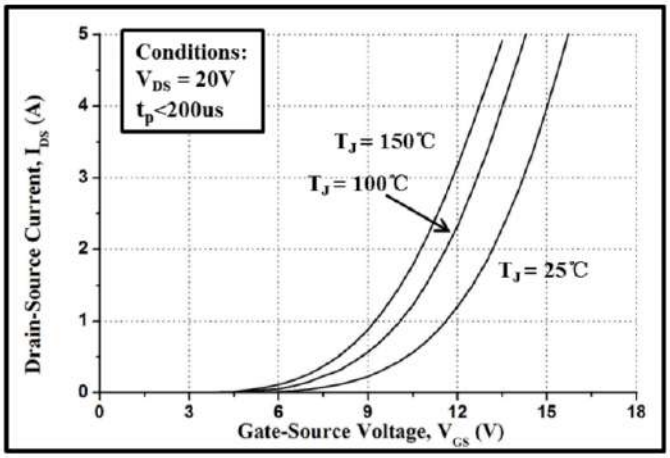



Figure 7. Typical Transfer Characteristics

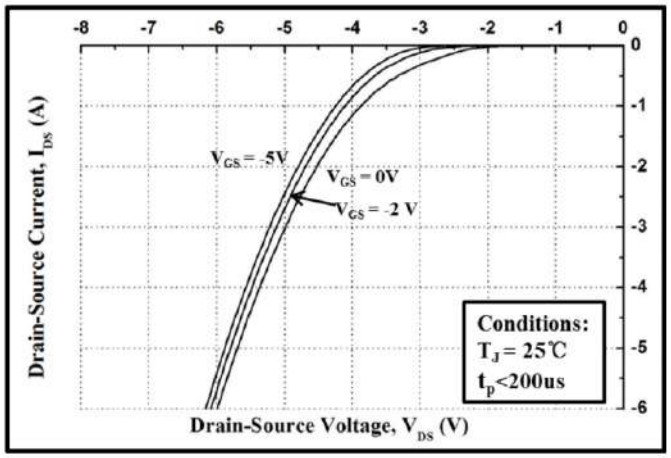



Figure 8. Body Diode Characteristics at 25℃

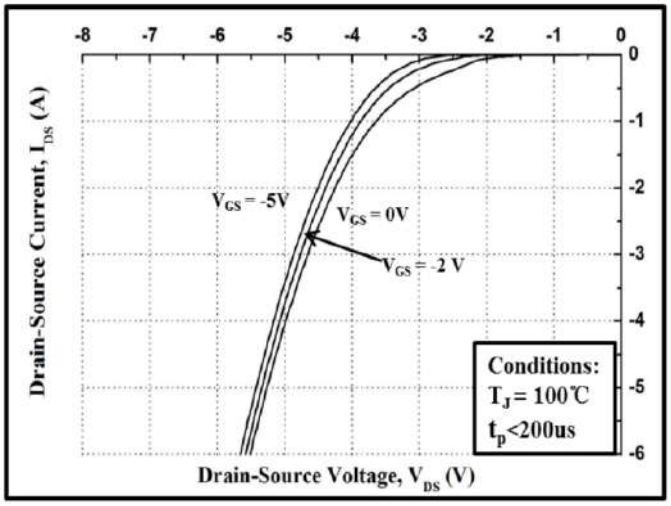



Figure 9. Body Diode Characteristics at 100℃

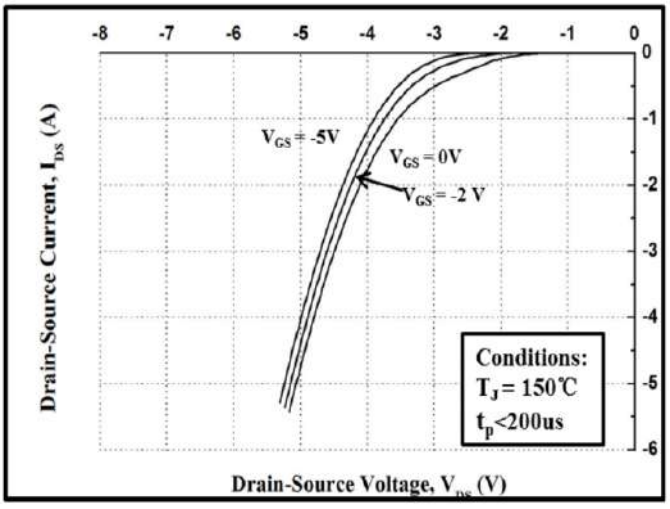



Figure 10. Body Diode Characteristics at 150℃

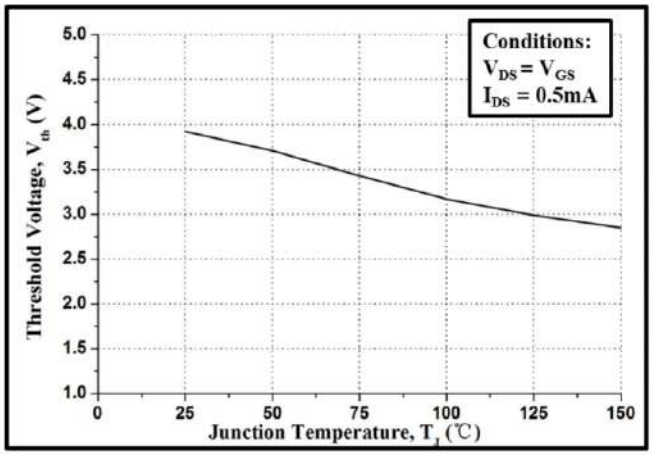



Figure 11. Gate Threshold Voltage vs. Temperature

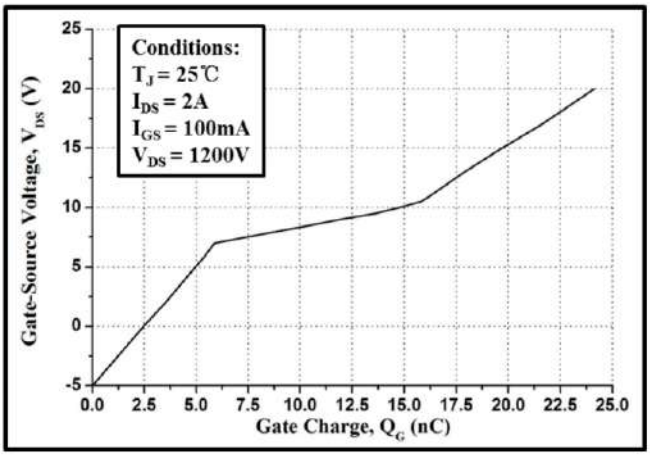



Figure 12. Gate Charge Characteristic

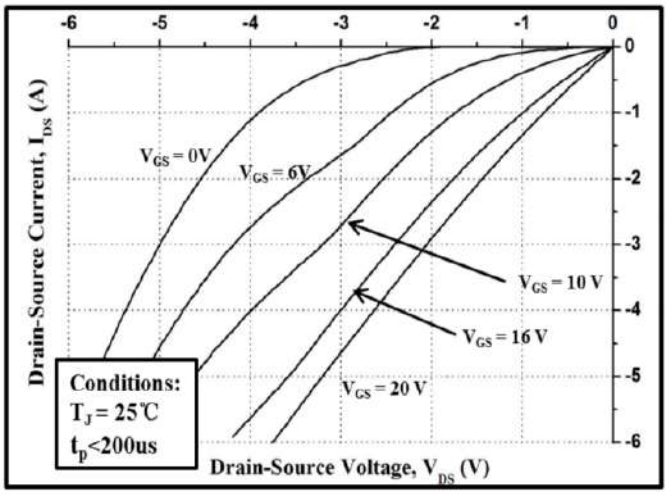



Figure 13. 3rd Quadrant Characteristics at 25℃

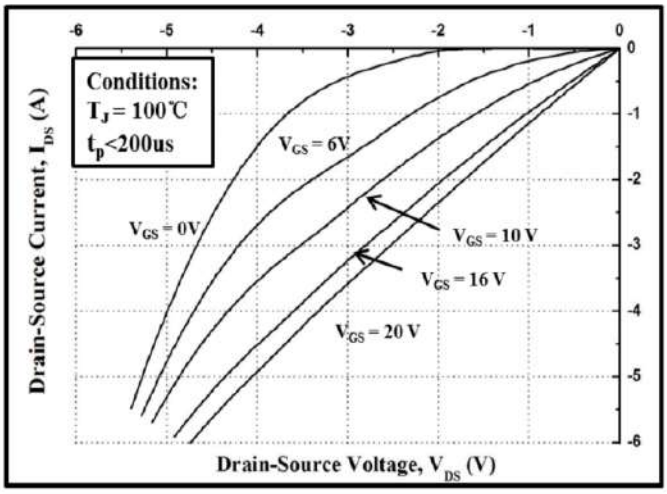



Figure 14. 3rd Quadrant Characteristics at 100℃

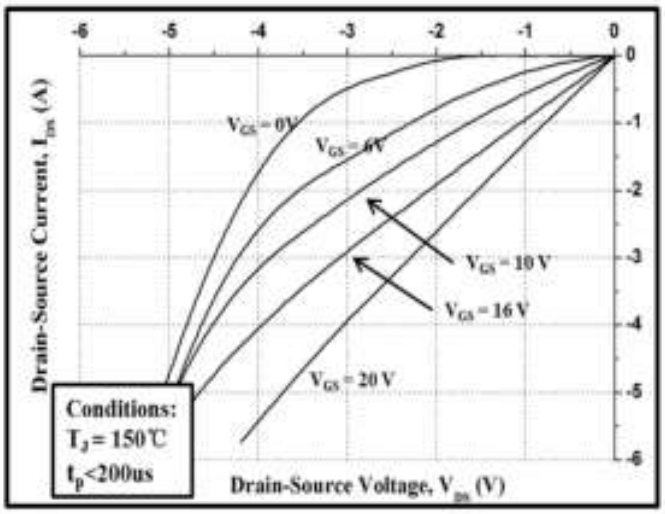



Figure 15. 3rd Quadrant Characteristics at 150℃

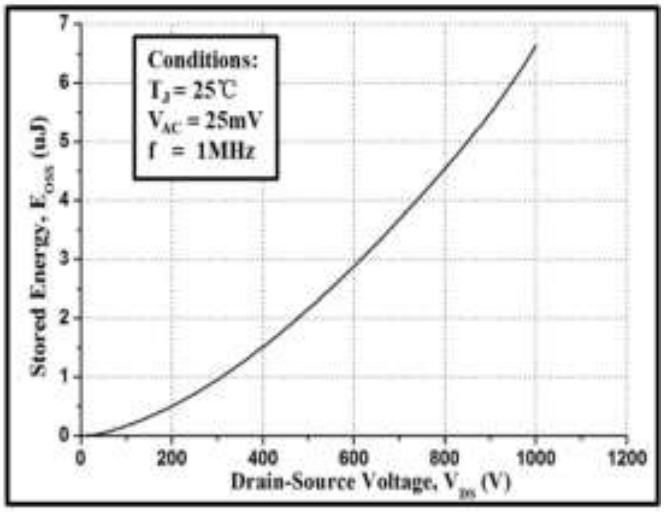



Figure 16. Output Capacitor Stored Energy

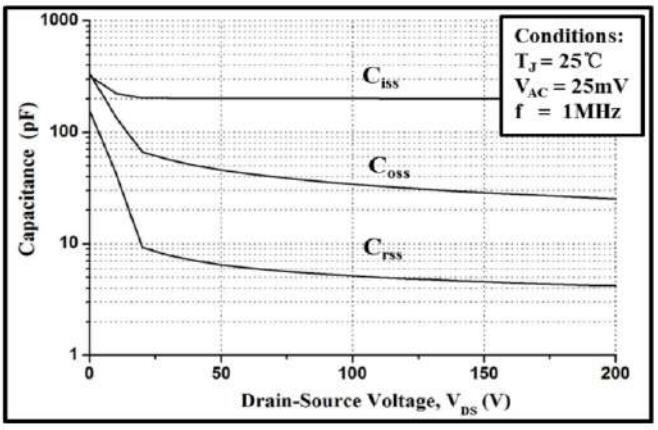



Figure 17. Capactances vs. Drain-Source Voltage

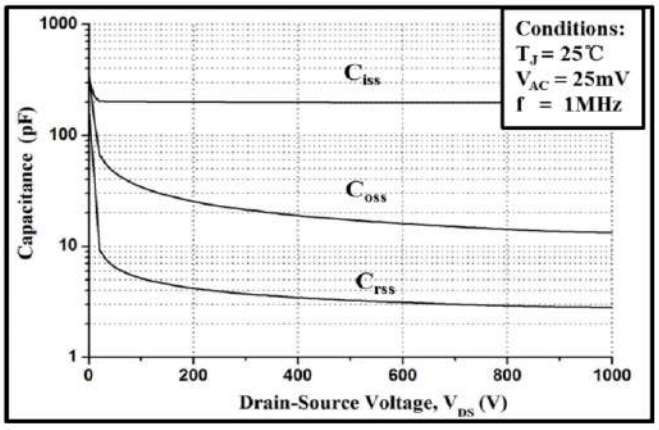
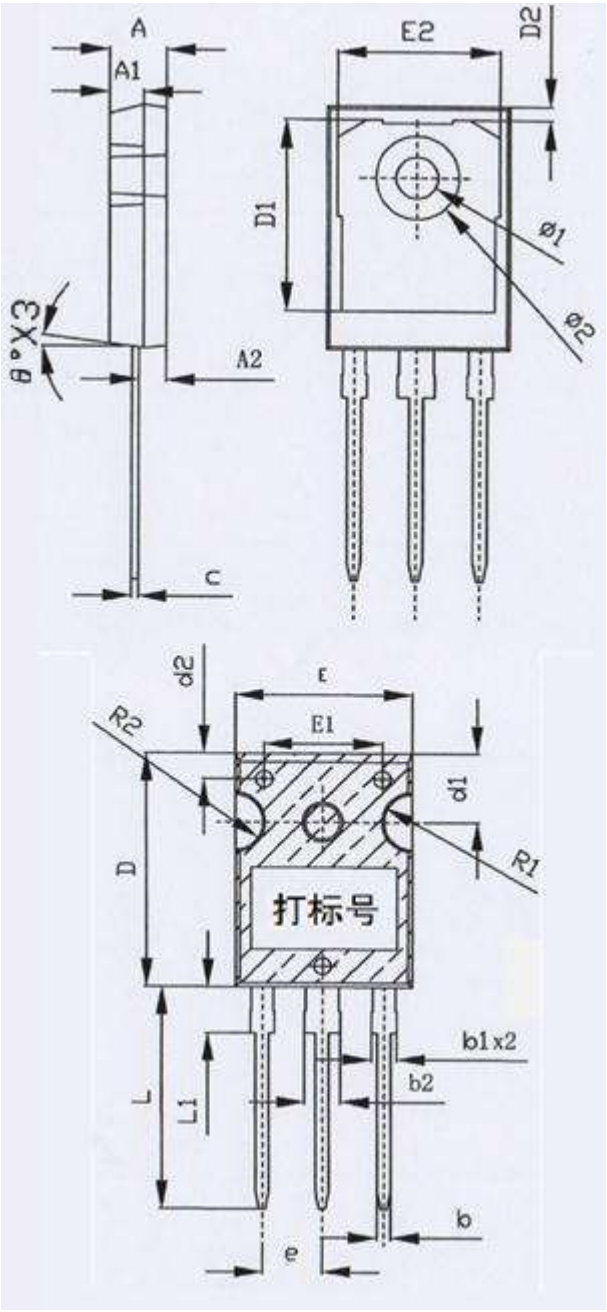



Figure 18. Capactances vs. Drain-Source Voltage

## Package Dimensions

Package TO-247-3




| SYMBOLS | DIMENSIONS IN MILLMETERS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 4.9 | 5 | 5.1 |
| A1 | 2.9 | 3 | 3.1 |
| A2 | 2.31 | 2.36 | 2.41 |
| b | 1.16 | 1.2 | 1.26 |
| b1 | 2.05 | - | 2.2 |
| b2 | 3.05 | - | 3.2 |
| c | 0.58 | 0.6 | 0.66 |
| D | 20.9 | 21 | 21.1 |
| D1 | 16.46 | 16.56 | 16.76 |
| D2 | | 1.17 | |
| d1 | 6.05 | 6.15 | 6.25 |
| d2 | 2.2 | 2.3 | 2.4 |
| E | 15.7 | 15.8 | 15.9 |
| E1 | | 10.5 | |
| E2 | | 14.02 | |
| e | - | 1.27bcs | - |
| L | 19.82 | 19.92 | 20.02 |
| L1 | 1.88 | 1.98 | 2.08 |
| θ | 0° | 7° | 8° |
| R1 | - | 2.7 | - |
| R2 | - | 2.5 | - |
| Φ1 | | 3.6 | |
| Φ2 | - | 7.19 | - |

## Disclaimers:

Reasunos Semiconductor Technology CO.,LTD(Reasunos)reserves the right to make changes without notice in order to improve reliability,function or design and to discontinue any product or service without notice .Customers should obtain the latest relevant information before orders and should verify that such information in current and complete.All products are sold subject to Reasunos's terms and conditions supplied at the time of order acknowledgement.

Reasunos Semiconductor Technology CO.,LTD warrants performance of its hardware products to the speciffications at the time of sale.Testing,reliability and quality control are used to the extene Reasunos deems necessary to support this warrantee. Except where agreed upon by contr-actual agreement,testing of all parameters of each product is not necessarily performed.

Reasunos Semiconductor Technology CO.,LTD does not assume any liability arising from the use of any product or circuit designs described herein.Customers are responsible for their products and applications using Reasunos's components.To minimize risk,customers must provide adequate design and operating safeguards.

Reasunos Semiconductor Technology CO.,LTD does not warrant or convey any license eith-er expressed or implied under its patent rights,nor the rights of others.Reproduction of inform-ation in Reasunos's data sheeets or data books is permissible only if reproduction is without modification oralteration.Reproduction of this information with any alteration is an unfair and deceptive business practice. Reasunos Semiconductor Technology CO.,LTD is not responsi-ble or liable for such altered documentation.

Resale of Reasunos's products with statements different from or beyond the parameters stated by Reasunos Semiconductor Technology CO.,LTD for that product or service voids all exp-ress or implied warrantees for the associated Reasunos's product or service and is unfair and deceptive business practice. Reasunos Semiconductor Technology CO.,LTD is not responsi-ble or liable for such statements.

## Life Support Policy:

Reasunos Semiconductor Technology CO.,LTD's Products are not authorized for use as cri-tical components in life support devices or systems without the expressed written approval of Reasunos Semiconductor Technology CO.,LTD.

As used herein:

1.Life support devices or systems are devices or systems which:
   a.are intended for surgical implant into the human body,
   b.support or sustain life,
   c.whose failuer to when properly used in accordance with instructions for used provided in the laeling,can be reasonably expected to result in significant injury to the user.

2.A critical component is any component of a life support device or system whose failure to system whose failure to perform can be reasonably expected to cause the failure of the life support device or system,or to affect its safety or effectiveness.