

## SOT-23 Plastic-Encapsulate MOSFETS

### Features

- $V_{DS} = -20V$
- $I_D = -5.6A$
- $R_{DS(on)}@V_{GS} = -4.5V < 42m\Omega$
- $R_{DS(on)}@V_{GS} = -2.5V < 55m\Omega$
- Trench Power MV MOSFET technology
- Voltage controlled small signal switch
- Fast Switching Speed

### Applications

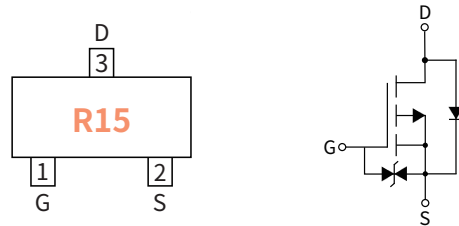
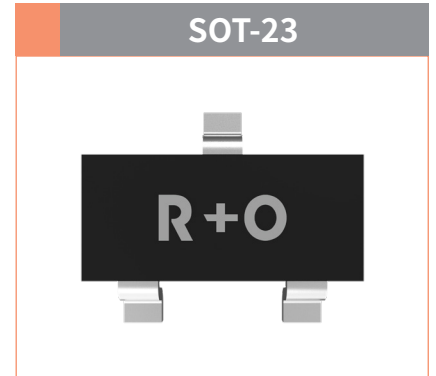
- Battery operated systems
- Solid-state relays
- Direct logic-level interface: TTL/CMOS

### Mechanical Data

- Case: SOT-23  
Molding compound meets UL 94V-0 flammability rating, RoHS-compliant, halogen-free
- Terminals: Solder plated, solderable per MIL-STD-750, Method 2026

### Reference News

**Drain-source Voltage**  
-20 V  
**Drain Current**  
-5.6 Ampere



### Maximum Ratings (Ta=25°C Unless otherwise specified)

| PARAMETER  | SYMBOL          | UNIT   | VALUE      |
|--|-----------------|--------|------------|
| Drain-source Voltage   | $V_{DS}$        | V      | -20        |
| Gate-source Voltage  | $V_{GS}$        | V      | $\pm 12$   |
| Drain Current  | $I_D$           | A      | -5.6       |
| T <sub>A</sub> =25°C @ Steady State                                  |                 |        |            |
| Pulsed Drain Current <sup>(1)</sup>                                  | $I_{DM}$        | A      | -23        |
| Total Power Dissipation @ T <sub>A</sub> =25°C                       | $P_D$           | W      | 1.3        |
| Thermal Resistance Junction-to-Ambient @ Steady State <sup>(2)</sup> | $R_{\theta JA}$ | °C / W | 98         |
| Junction and Storage Temperature Range                               | $T_J, T_{STG}$  | °C     | -55 ~ +150 |

Note:

(1) The power dissipation PD is based on T<sub>J(MAX)</sub>=150° C, using  $\leq 10s$  junction-to-ambient thermal resistance.

### Ordering Information

| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---------|--------------|----------------|-----------|----------|-------------|---------------|
| SOT-23  | R1           | 0.008          | 3000      | 45000    | 180000      | 7"            |

● **Static Parameter Characteristics** (Ta=25°C Unless otherwise specified)

| PARAMETER                         | SYMBOL       | Condition                     | UNIT       | Min  | Typ   | Max      |
|-----------------------------------|--------------|-------------------------------|------------|------|-------|----------|
| Drain-Source Breakdown Voltage    | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$    | V          | -20  | —     | —        |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS}=-20V, V_{GS}=0V$      | $\mu A$    | —    | —     | -1.0     |
| Gate-Body Leakage Current         | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$   | $\mu A$    | —    | —     | $\pm 15$ |
| Gate Threshold Voltage            | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | V          | -0.4 | -0.62 | -1.0     |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-5.0A$     | m $\Omega$ | —    | 31    | 42       |
|                                   |              | $V_{GS}=-2.5V, I_D=-4.0A$     |            | —    | 41    | 55       |
| Forward Transconductance          | $g_{fs}$     | $V_{DS}=-5.0V, I_D=-4.0A$     | S          | —    | 20    | —        |
| Diode Forward Voltage             | $V_{SD}$     | $I_S=-5.0A, V_{GS}=0V$        | V          | —    | —     | -1.2     |

● **Dynamic Parameters** (Ta=25°C Unless otherwise specified)

| PARAMETER                    | SYMBOL    | Condition                                | UNIT | Min | Typ  | Max |
|------------------------------|-----------|--|------|-----|------|-----|
| Input Capacitance            | $C_{iss}$ | $V_{DS}=0V$<br>$V_{GS}=-10V$<br>$f=1MHz$ | pF   | —   | 1180 | —   |
| Output Capacitance           | $C_{oss}$ |  |      | —   | 125  | —   |
| Reverse Transfer Capacitance | $C_{rss}$ |  |      | —   | 88   | —   |

● **Switching Parameters** (Ta=25°C Unless otherwise specified)

| PARAMETER               | SYMBOL       | Condition   | UNIT | Min | Typ  | Max |
|-------------------------|--------------|---|------|-----|------|-----|
| Total Gate Charge       | $Q_g$        | $V_{GS}=-4.5V$<br>$V_{DS}=-10V$<br>$I_D=-4.0A$                        | nC   | —   | 11   | —   |
| Gate-Source Charge      | $Q_{gs}$     |   |      | —   | 2.0  | —   |
| Gate-Drain Charge       | $Q_{gd}$     |   |      | —   | 3.0  | —   |
| Reverse Recovery Charge | $Q_{rr}$     | $I_F=-4.0A$<br>$di/dt=100A/us$  |      | —   | 13.8 | —   |
| Reverse Recovery Time   | $t_{rr}$     |   |      | —   | 31   | —   |
| Turn-on Delay Time      | $t_{D(on)}$  | $V_{GS}=-4.5V$<br>$V_{DS}=-10V$<br>$I_D=-1.0A$<br>$R_{GEN}=3.0\Omega$ | ns   | —   | 14   | —   |
| Turn-on Rise Time       | $t_r$        |   |      | —   | 10   | —   |
| Turn-off Delay Time     | $t_{D(off)}$ |   |      | —   | 20   | —   |
| Turn-off fall Time      | $t_f$        |   |      | —   | 30   | —   |

● Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)

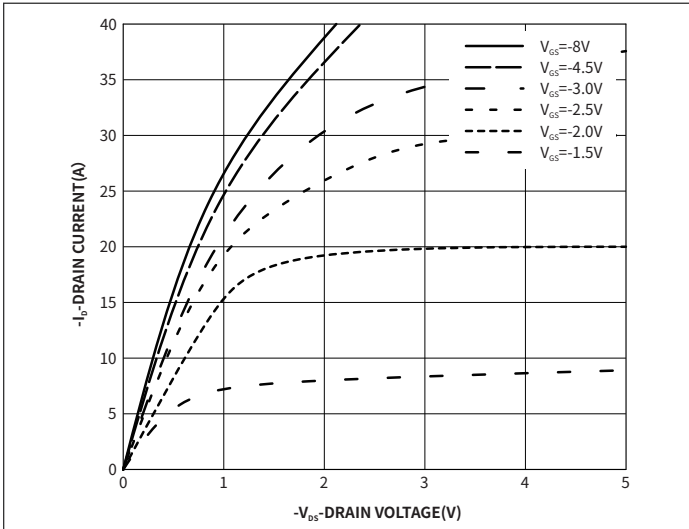


Fig.1 Output Characteristics

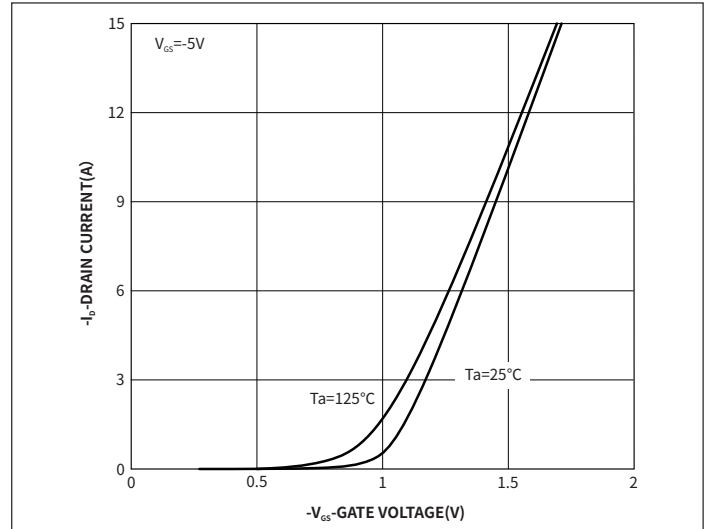


Fig.2 Transfer Characteristics

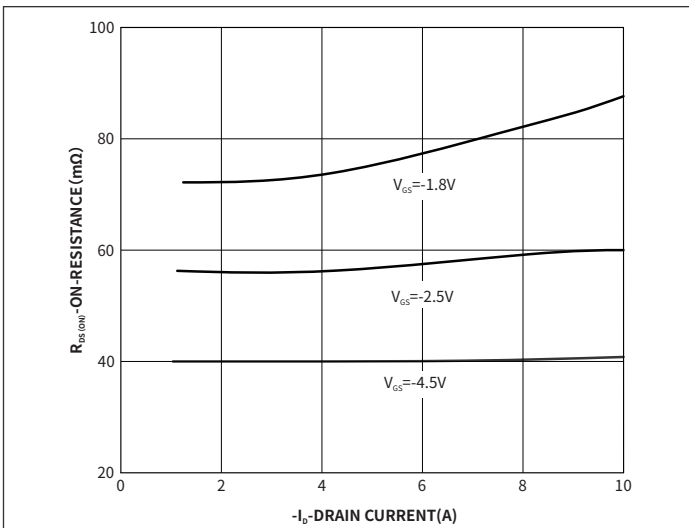


Fig.3 On-Resistance vs. Drain Current and Gate Voltage

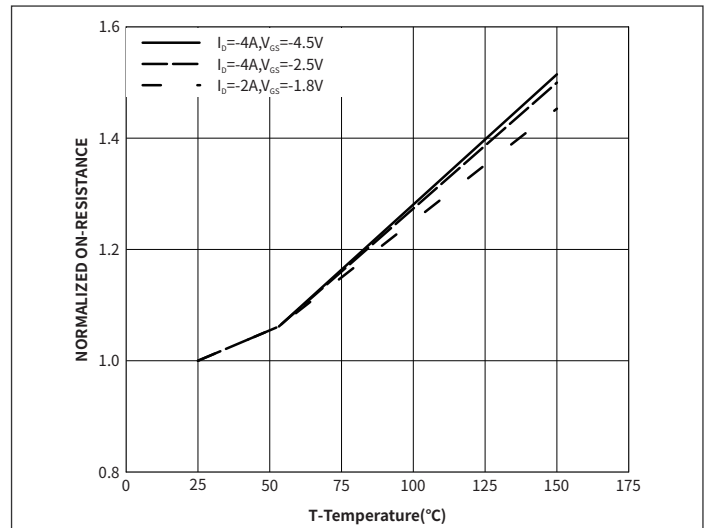


Fig.4 On-Resistance vs. Junction Temperature

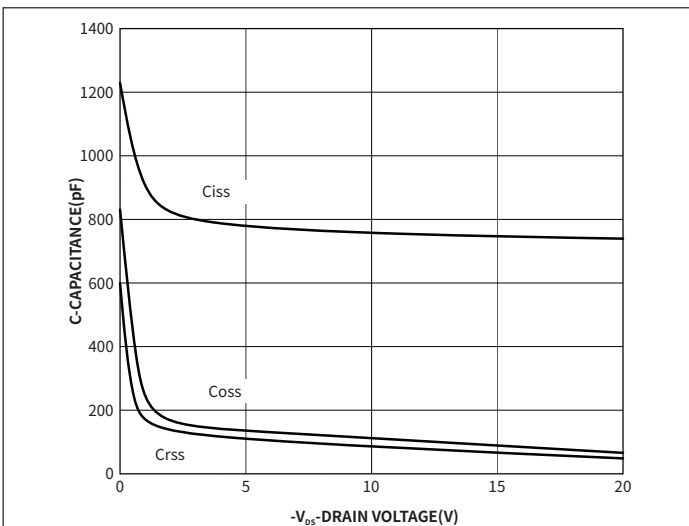


Fig.5 Capacitance Characteristics

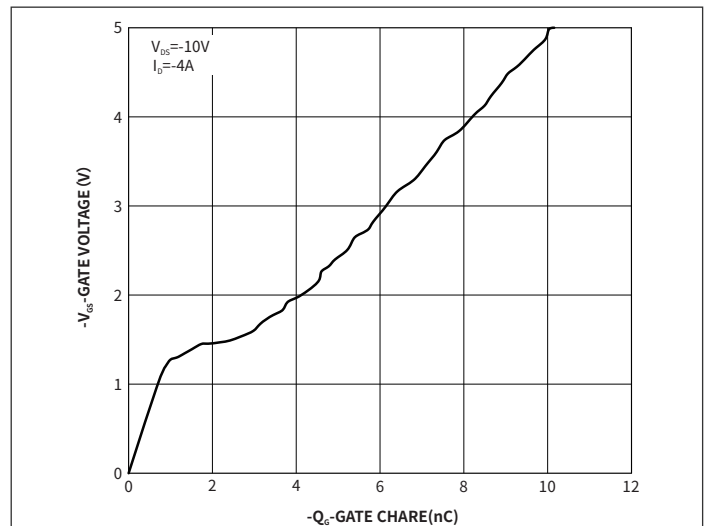
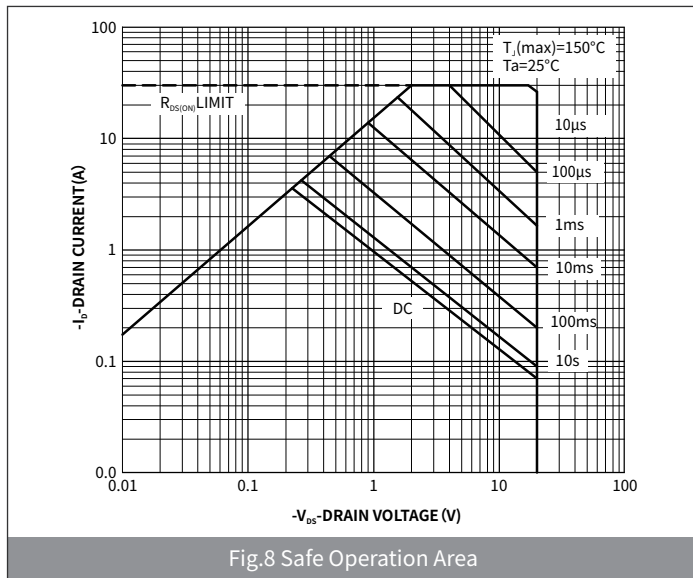
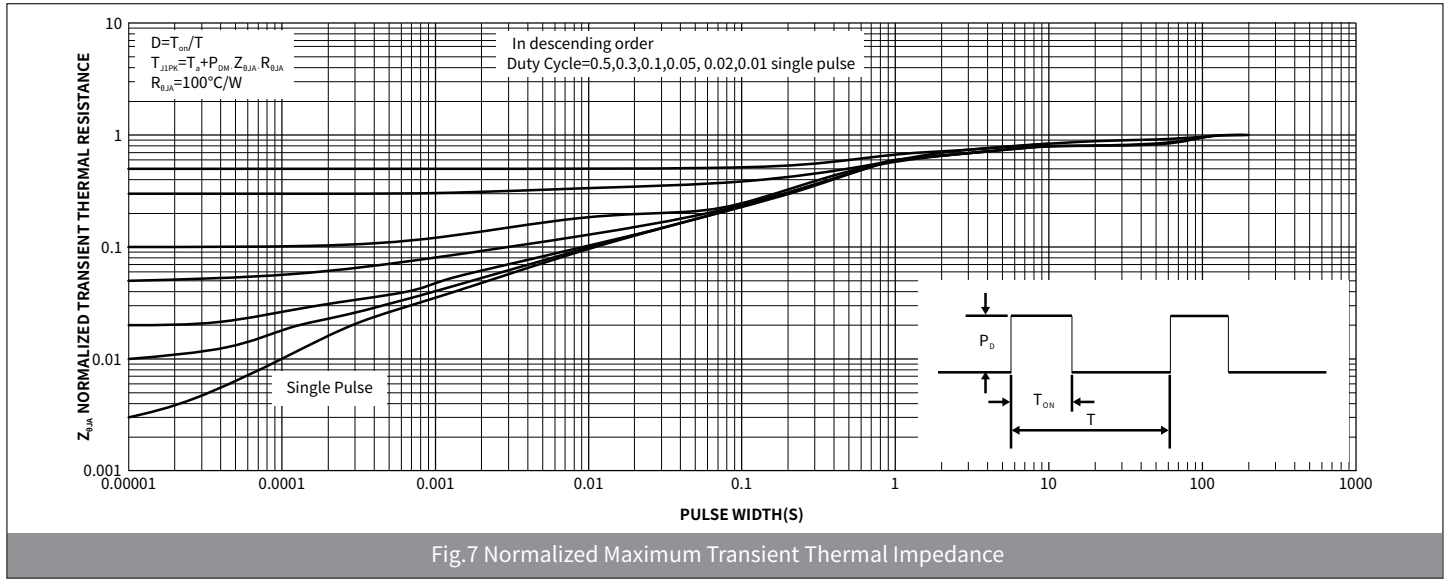


Fig.6 Gate Charge

● Ratings And Characteristics Curves ( $T_a=25^\circ\text{C}$  Unless otherwise specified)



## ● Package Outline Dimensions (SOT-23)

| Symbol   | Dimensions  |      |          |       |
|----------|-------------|------|----------|-------|
|          | Millimeters |      | Inches   |       |
|          | Min.        | Max. | Min.     | Max.  |
| A        | 0.90        | 1.15 | 0.035    | 0.045 |
| A1       | -           | 0.10 | -        | 0.004 |
| A2       | 0.90        | 1.05 | 0.035    | 0.041 |
| b        | 0.30        | 0.50 | 0.012    | 0.020 |
| c        | 0.10        | 0.20 | 0.004    | 0.008 |
| D        | 2.80        | 3.00 | 0.110    | 0.118 |
| E        | 1.20        | 1.40 | 0.047    | 0.055 |
| E1       | 2.25        | 2.55 | 0.089    | 0.100 |
| e        | 0.950TYP    |      | 0.037TYP |       |
| e1       | 1.80        | 2.00 | 0.071    | 0.079 |
| L        | 0.550REF    |      | 0.022REF |       |
| L1       | 0.30        | 0.50 | 0.012    | 0.020 |
| $\theta$ | -           | 8°   | -        | 8°    |

## ● Suggested Pad Layout

| Symbol | Dimensions  |      |        |       |
|--------|-------------|------|--------|-------|
|        | Millimeters |      | Inches |       |
|        | Min.        | Max. | Min.   | Max.  |
| J      | 0.80        | -    | 0.031  | -     |
| K      | -           | 0.90 | -      | 0.035 |
| M      | 2.00        | -    | 0.078  | -     |
| N      | -           | 1.90 | -      | 0.074 |

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