# UNISONIC TECHNOLOGIES CO., LTD

## UT2312 *Power MOSFET*

# 20V N-CHANNEL ENHANCEMENT MODE MOSFET

■ **DESCRIPTION**

The **UT2312** uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ **FEATURES**

* $R_{DS(ON)}$ = 33 mΩ @$V_{GS}$ = 4.5 V
* $R_{DS(ON)}$ = 40 mΩ @$V_{GS}$ = 2.5 V
* Advanced trench process technology
* Excellent thermal and electrical capabilities
* High density cell design for ultra low on-resistance



SOT-23

■ **SYMBOL**



3.Drain

2.Gate

1.Source
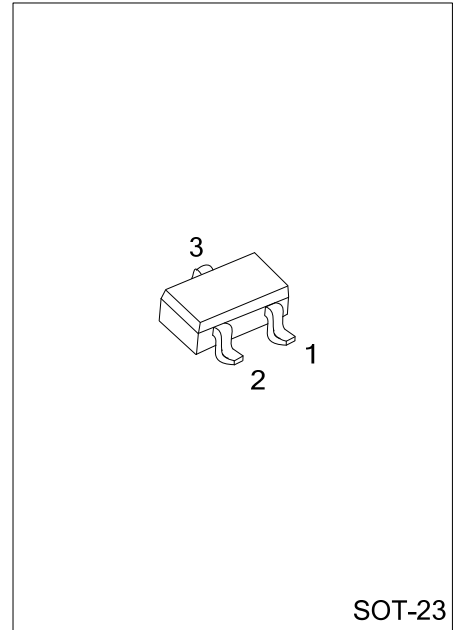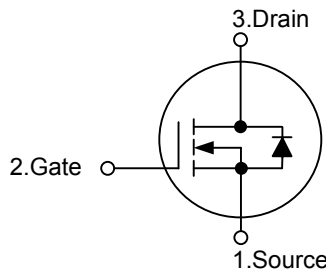
■ **ORDERING INFORMATION**

| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UT2312L-AE3-R | UT2312G-AE3-R | SOT-23 | S | G | D | Tape Reel |

UT2312L-AE3-R

(1)Packing Type    (1) R: Tape Reel

(2)Package Type    (2) AE3: SOT-23

(3)Lead Plating    (3) G: Halogen Free, L: Lead Free

■ **MARKING**



23N□

L: Lead Free
G: Halogen Free
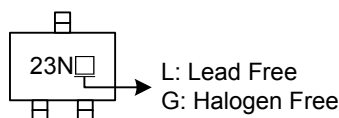
■ **ABSOLUTE MAXIMUM RATINGS** (Ta =25°C, unless otherwise specified)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±8 | V |
| Continuous Drain Current | $I_D$ | 5 | A |
| Pulsed Drain Current | $I_{DM}$ | 15 | A |
| Power Dissipation (Ta =25°C) | $P_D$ | 1.25 | W |
| Junction Temperature | $T_J$ | +150 | °C |
| Storage Temperature | $T_{STG}$ | -55 ~ +150 | °C |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.
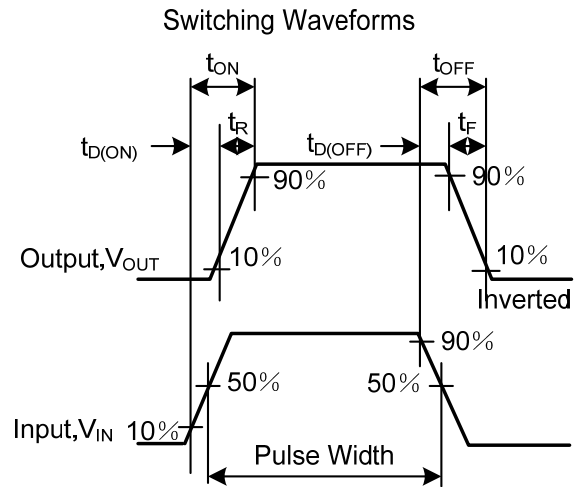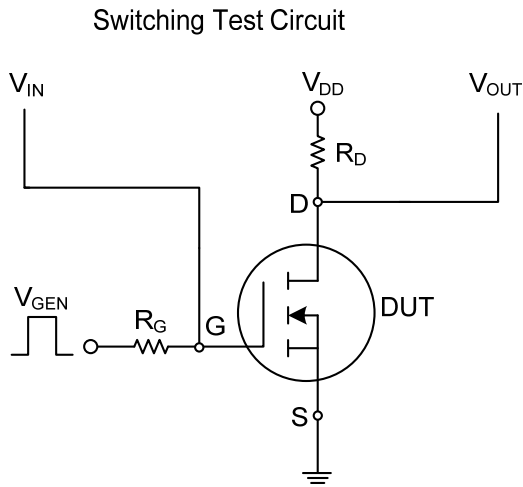
■ **THERMAL DATA**

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| Junction to    Ambient | $\theta_{JA}$ | | | 100 | °C/W |

■ **ELECTRICAL CHARACTERISTICS** (Ta =25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ =0V, $I_D$ =250 µA | 20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ =20 V, $V_{GS}$ =0 V | | | 1.0 | µA |
| Gate–Body Leakage, Forward | $I_{GSS}$ | $V_{GS}$ =±8V, $V_{DS}$ = 0 V | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| Gate-Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250 µA | 0.45 | | | V |
| Static Drain–Source On–Resistance | $R_{DS(ON)}$ | $V_{GS}$ =4.5V, $I_D$ =5.0 A | | 25 | 33 | mΩ |
| | | $V_{GS}$ =2.5 V, $I_D$ =4.0 A | | 35 | 40 | mΩ |
| On-State Drain Current | $I_{D(ON)}$ | $V_{DS}$≥10 V, $V_{GS}$ = 4.5 V | 15 | | | A |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 5V, $I_D$ = 5.0 A | | 20 | | S |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ =10V, $V_{GS}$ =0V, f=1.0MHz | | 900 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 140 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 100 | | pF |
| **SWITCHING PARAMETERS** | | | | | | |
| Total Gate Charge | $Q_G$ | $V_{DS}$ =10V, $V_{GS}$ =4.5V, $I_D$ =3.6A | | 11 | 14 | nC |
| Gate Source Charge | $Q_{GS}$ | | | 1.4 | | nC |
| Gate Drain Charge | $Q_{GD}$ | | | 2.2 | | nC |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{DD}$=10V, $I_D$ =1A, $R_L$ =10Ω $V_{GEN}$ =4.5V, $R_G$ =6Ω | | 15 | 25 | ns |
| Turn-ON Rise Time | $t_R$ | | | 40 | 60 | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 48 | 70 | ns |
| Turn-OFF Fall-Time | $t_F$ | | | 31 | 45 | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | |
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $I_S$=1.0 A,$V_{GS}$=0 V | | 0.75 | 1.2 | V |
| Max. Diode Forward Current | $I_S$ | | | | 1.6 | A |

Notes: Pulse test; pulse width ≤300µs, duty cycle≤2%

■ **TEST CIRCUIT AND WAVEFORM**

Switching Test Circuit

Switching Waveforms