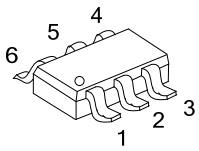
# 300mA, 30V DUAL N-CHANNEL ENHANCEMENT MODE POWER MOSFET




SOT-363

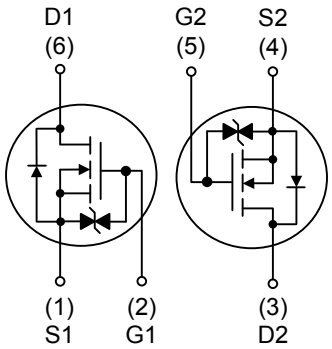
## ■ DESCRIPTION

The UTC **UT03NN03Z** is a dual N-Channel enhancement mode power MOSFET, minimize the on-state resistance (RDS(ON)) yet maintain superior switching performance, making it ideal for high efficiency power management applications, provides designer with fast switching speed, ruggedized device design, low on-resistance and cost-effectiveness.

## ■ FEATURES

* $R_{DS(ON)} \leq 1.2\ \Omega$ @ $V_{GS}$=4.5V, $I_D$=300mA
  $R_{DS(ON)} \leq 1.6\ \Omega$ @ $V_{GS}$=2.5V, $I_D$=200mA
  $R_{DS(ON)} \leq 3.0\ \Omega$ @ $V_{GS}$=1.8V, $I_D$=100mA
  $R_{DS(ON)} \leq 5.0\ \Omega$ @ $V_{GS}$=1.5V, $I_D$=50mA
* Fast Switching Speed
* Simple Drive Requirement
* Specially Designed for Relay Driver, Speed Line Drive, etc.
* Advanced Trench Process Technology

## ■ SYMBOL




## ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | | | | Packing |
|---|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | |
| UT03NN03ZL-AL6-R | UT03NN03ZG-AL6-R | SOT-363 | S1 | G1 | D2 | S2 | G2 | D1 | Tape Reel |

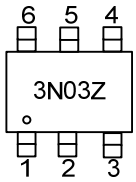
Note: Pin Assignment: G: Gate D: Drain S: Source

UT03NN03ZG-AL6-R

(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) AL6: SOT-363
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



## ■ ABSOLUTE MAXIMUM RATINGS ($T_A$=25°C unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±10 | V |
| Drain Current | Continuous | $I_D$ | 300 | mA |
| | Pulsed(Note 2) | $I_{DM}$ | 600 | mA |
| Power Dissipation | | $P_D$ | 0.35 | W |
| Junction Temperature | | $T_J$ | +150 | °C |
| Storage Temperature | | $T_{STG}$ | -55 ~ +150 | °C |

Notes: 1. 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.
2. Repetitive Rating : Pulse width limited by maximum junction temperature.

## ■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 357 | °C/W |

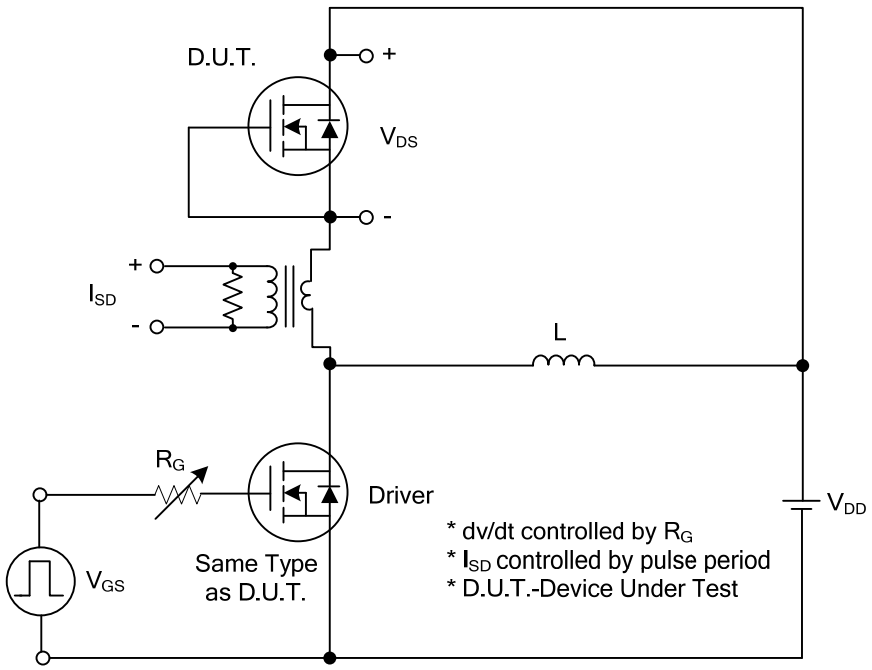
Note: Device mounted on FR-4 substrate $P_C$ board, 2oz copper, with 1inch square copper plate.

## ■ ELECTRICAL CHARACTERISTICS ($T_J$=25°C, unless otherwise specified)

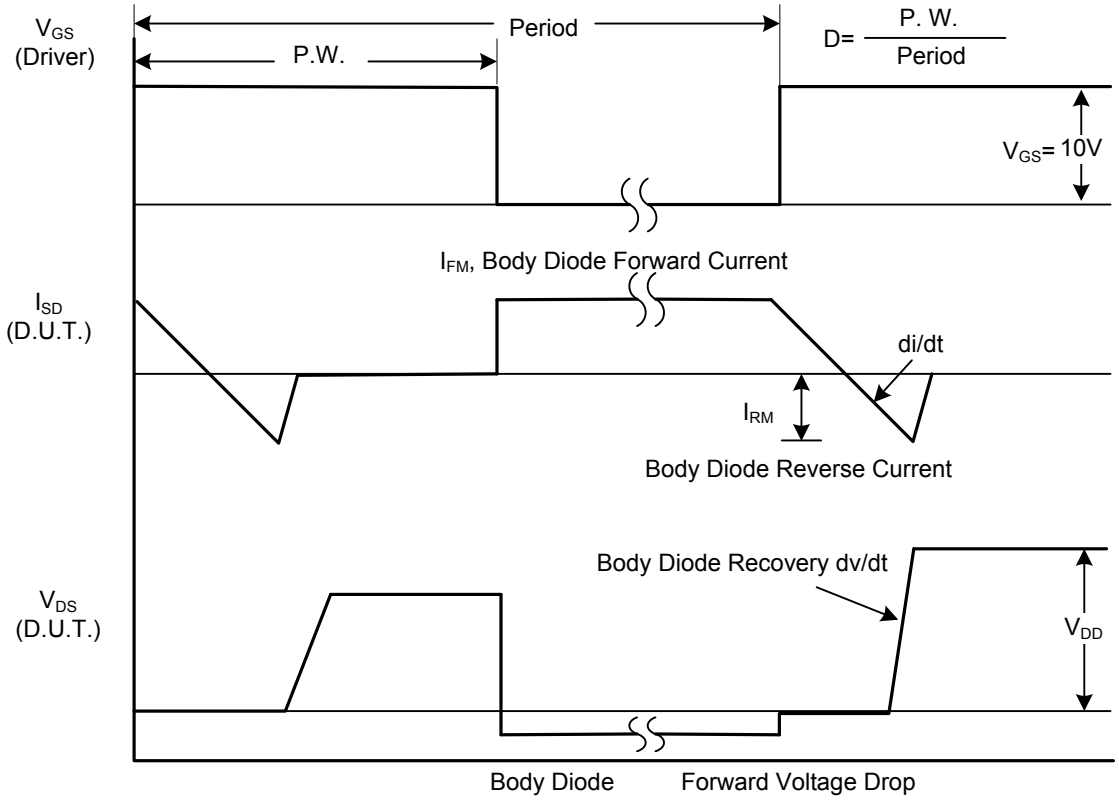
| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 30 | | | V |
| Drain-Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=30V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Source Leakage Current | Forward | $I_{GSS}$ | $V_{DS}$=0V ,$V_{GS}$=8.0V | | | 10 | μA |
| | Reverse | | $V_{DS}$=0V ,$V_{GS}$=-8.0V | | | -10 | μA |
| **ON CHARACTERISTICS** | | | | | | | |
| Gate Threshold Voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.4 | | 1.0 | V |
| Drain-Source On-State Resistance (Note 1) | | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=300mA | | | 1.2 | Ω |
| | | | $V_{GS}$=2.5V, $I_D$=200mA | | | 1.6 | Ω |
| | | | $V_{GS}$=1.8V, $I_D$=100mA | | | 3 | Ω |
| | | | $V_{GS}$=1.5V, $I_D$=50mA | | | 5 | Ω |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{DS}$=10V, $V_{GS}$=0V, f=1.0MHz | | 20 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 9 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 5 | | pF |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge (Note 1) | | $Q_G$ | $V_{DS}$=24V, $V_{GS}$=4.5V, $I_D$=300mA (Note 1, 2) | | 3.5 | | nC |
| Gate-Source Charge | | $Q_{GS}$ | | | 0.8 | | nC |
| Gate-Drain Charge | | $Q_{GD}$ | | | 0.4 | | nC |
| Turn-ON Delay Time (Note 1) | | $t_{D(ON)}$ | $V_{DS}$=15V, $V_{GS}$=4V, $I_D$=300mA, $R_G$=10Ω (Note 1, 2) | | 2 | | ns |
| Turn-ON Rise Time | | $t_R$ | | | 16 | | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 9 | | ns |
| Turn-OFF Fall Time | | $t_F$ | | | 18 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | | $I_S$ | | | | 0.3 | A |
| Drain-Source Diode Forward Voltage (Note 1) | | $V_{SD}$ | $I_S$ =300mA, $V_{GS}$=0V | | | 1.3 | V |

Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

## ■ TEST CIRCUITS AND WAVEFORMS

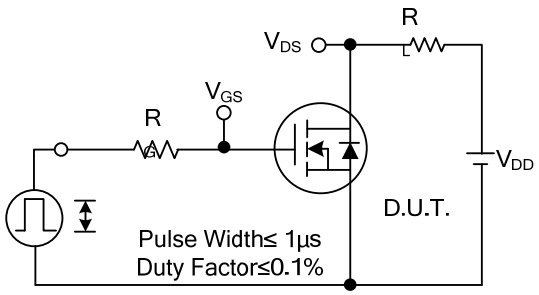



**Peak Diode Recovery dv/dt Test Circuit**

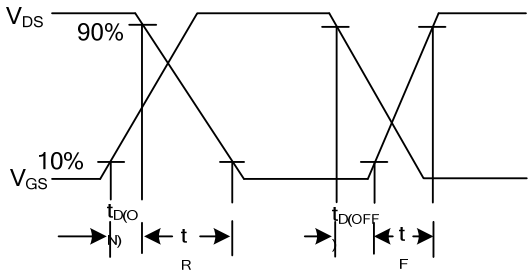



**Peak Diode Recovery dv/dt Waveforms**

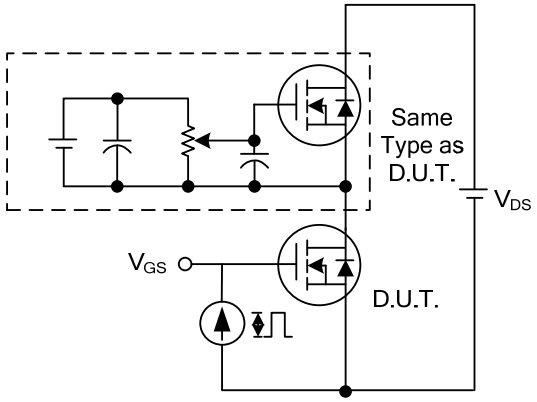
## ■ TEST CIRCUITS AND WAVEFORMS



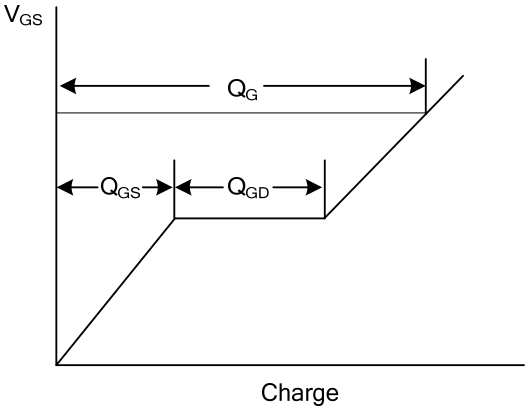

Switching Test Circuit



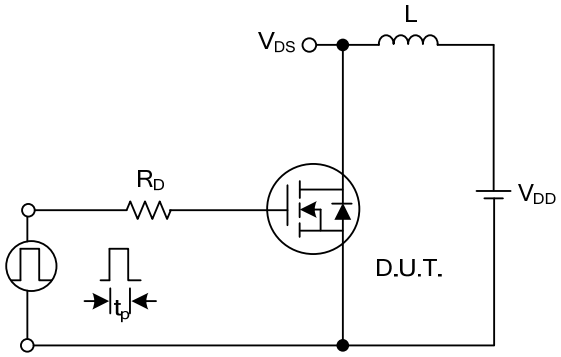

Switching Waveforms



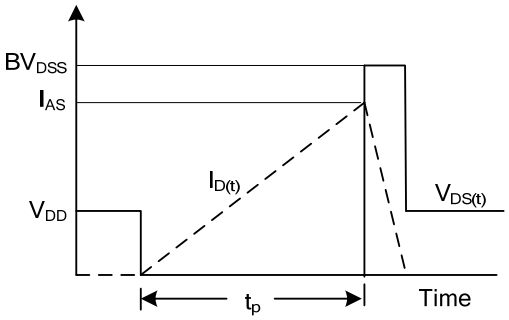

Gate Charge Test Circuit




Gate Charge Waveform




Unclamped Inductive Switching Test Circuit




Unclamped Inductive Switching Waveforms