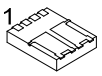
# 30V DUAL MIDDLE POWER MOSFET (N-CHANNEL/P-CHANNEL)



DFN3030-8

## ■ DESCRIPTION

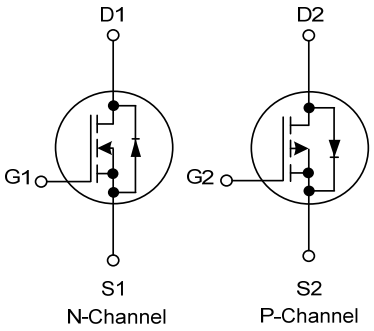
The UTC **UTT12NP03** incorporates an N-channel MOSFET and a P-channel MOSFET，it uses UTC's advanced technology to provide customers a minimum on-state resistance and high-speed switching, thereby enabling high-density mounting.

The UTC **UTT12NP03** is universally applied in high-speed switching, motor driver.

## ■ FEATURES

* N-Channel
  $R_{DS(on)}$ <30mΩ @$V_{GS}$ = 10V, $I_D$=5.8A
  $R_{DS(on)}$ <35mΩ @$V_{GS}$ =4.5V, $I_D$=5.0A
* P-Channel
  $R_{DS(on)}$ <50mΩ @$V_{GS}$ =-10V, $I_D$=-5.0A
  $R_{DS(on)}$ <70mΩ @$V_{GS}$ = -4.5V, $I_D$=-2.0A
* High switching speed

## ■ SYMBOL




## ■ ORDERING INFORMATION

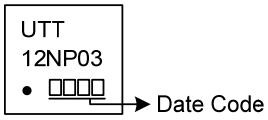
| Ordering Number | | Package | Pin Assignment | | | | | | | | Packing |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| UTT12NP03L-K08-3030-R | UTT12NP03G-K08-3030-R | DFN3030-8 | S1 | G1 | S2 | G2 | D2 | D2 | D1 | D1 | Tape Reel |

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

UTT12NP03G-K08-3030-R

| | |
|---|---|
| (1)Packing Type | (1) R: Tape Reel |
| (2)Package Type | (2) K08-3030: DFN3030-8 |
| (3)Green Package | (3) G: Halogen Free and Lead Free, L: Lead Free |

## ■ MARKING



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

| PARAMETER | | | SYMBOL | RATINGS | | UNIT |
|---|---|---|---|---|---|---|
| | | | | N-CH | P-CH | |
| Drain-Source Voltage | | | $V_{DSS}$ | 30 | -30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±10 | ±10 | V |
| Drain Current | Continuous | $T_C$=25°C | $I_D$ | 12 | -8 | A |
| | | $T_C$=100°C | | 7.2 | -4.8 | A |
| | Pulsed | | $I_{DM}$ | 36 | -24 | A |
| Avalanche Current | | | $I_{AS}$ | 17.5 | -17 | A |
| Avalanche Energy, Single Pulse | | | $E_{AS}$ | 15.3 | 14.5 | mJ |
| Power Dissipation | | | $P_D$ | 20 | | W |
| Junction Temperature | | | $T_J$ | +150 | | °C |
| Range of 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.
3. N-Channel: L=0.1mH, $V_{DD}$=15V, $R_G$=25Ω, Starting $T_J$=25°C
P-Channel: L=0.1mH, $V_{DD}$=-15V, $R_G$=25Ω, Starting $T_J$=25°C

## ■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 62.5 | °C/W |
| Junction to Case | $\theta_{JC}$ | 6.25 | °C/W |

Note: The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.

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

**N-CHANNEL**

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $I_D$=1mA, $V_{GS}$=0V | 30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±10V, $V_{DS}$=0V | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250mA | 0.5 | | 2.0 | V |
| Static Drain-Source On-State Resistance (Pulsed) | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=5.8A | | | 30 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=5.0A | | | 35 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=15V, f=1.0MHz | | 970 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 100 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 90 | | pF |
| **SWITCHING PARAMETERS** | | | | | | |
| Total Gate Charge (Pulsed) | $Q_G$ | $V_{GS}$=10V, $V_{DD}$=15V, $I_D$=10A (Note 1, 2) | | 27 | | nC |
| Gate to Source Charge (Pulsed) | $Q_{GS}$ | | | 4 | | nC |
| Gate to Drain Charge (Pulsed) | $Q_{GD}$ | | | 3 | | nC |
| Turn-ON Delay Time (Pulsed) | $t_{D(ON)}$ | $V_{DD}$=15V, $V_{GS}$=10V, $I_D$=10A, $R_G$=10Ω (Note 1, 2) | | 13 | | ns |
| Rise Time (Pulsed) | $t_R$ | | | 17 | | ns |
| Turn-OFF Delay Time (Pulsed) | $t_{D(OFF)}$ | | | 52 | | ns |
| Fall-Time (Pulsed) | $t_F$ | | | 13 | | ns |
| **SOURCE TO DRAIN DIODE SPECIFICATIONS** | | | | | | |
| Maximum Body-Diode Continuous Current | $I_S$ | | | | 12 | A |
| Maximum Body-Diode Pulsed Current | $I_{SM}$ | | | | 24 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=1.0A,$V_{GS}$=0V | | | 1 | V |

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

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

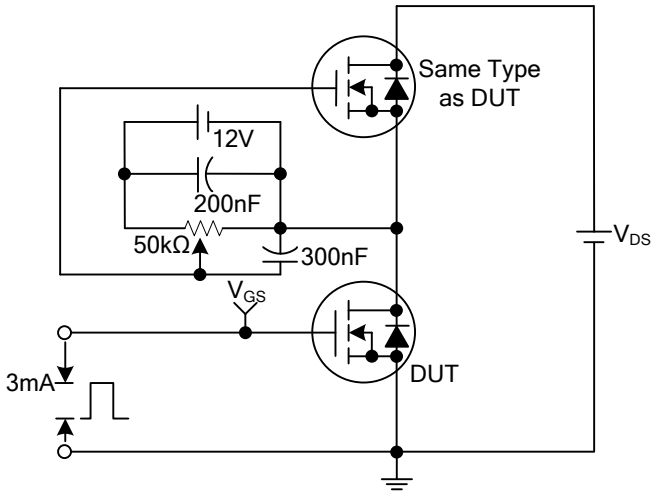
**P-CHANNEL**

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $I_D$=-1mA, $V_{GS}$=0V | -30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | | | -1 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±10V, $V_{DS}$=0V | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250mA | -0.5 | | -2.0 | V |
| Static Drain-Source On-State Resistance (Pulsed) | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-5.0A | | | 50 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-2.0A | | | 70 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=-15V, f=1.0MHz | | 895 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 125 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 100 | | pF |
| **SWITCHING PARAMETERS** | | | | | | |
| Total Gate Charge (Pulsed) | $Q_G$ | $V_{GS}$=-10V, $V_{DD}$=-15V, $I_D$=-2A (Note 1, 2) | | 125 | | nC |
| Gate to Source Charge (Pulsed) | $Q_{GS}$ | | | 17 | | nC |
| Gate to Drain Charge (Pulsed) | $Q_{GD}$ | | | 21 | | nC |
| Turn-ON Delay Time (Pulsed) | $t_{D(ON)}$ | $V_{DD}$=-15V, $V_{GS}$=-10V, $I_D$=-2A, $R_G$=10Ω (Note 1, 2) | | 12 | | ns |
| Rise Time (Pulsed) | $t_R$ | | | 16 | | ns |
| Turn-OFF Delay Time (Pulsed) | $t_{D(OFF)}$ | | | 120 | | ns |
| Fall-Time (Pulsed) | $t_F$ | | | 60 | | ns |
| **SOURCE TO DRAIN DIODE SPECIFICATIONS** | | | | | | |
| Maximum Body-Diode Continuous Current | $I_S$ | | | | -8 | A |
| Maximum Body-Diode Pulsed Current | $I_{SM}$ | | | | -16 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=-1.0A,$V_{GS}$=0V | | | -1 | V |

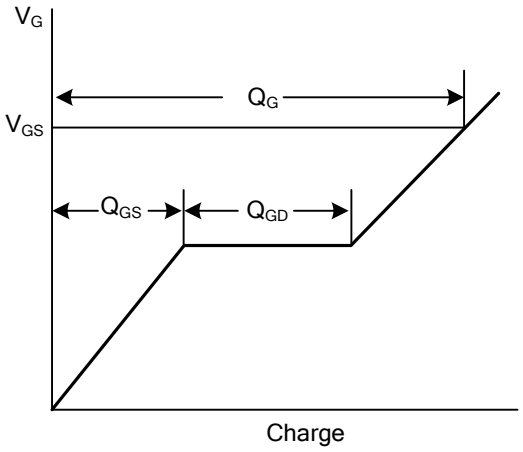
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

## ■ TEST CIRCUITS AND WAVEFORMS

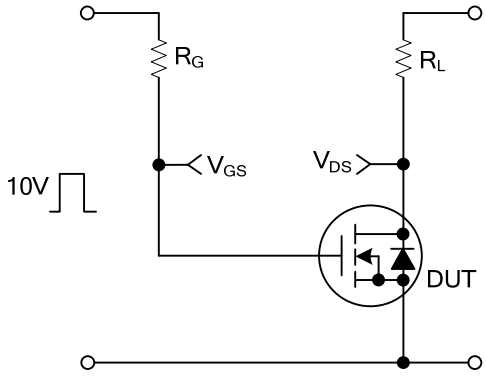
**N-CHANNEL**



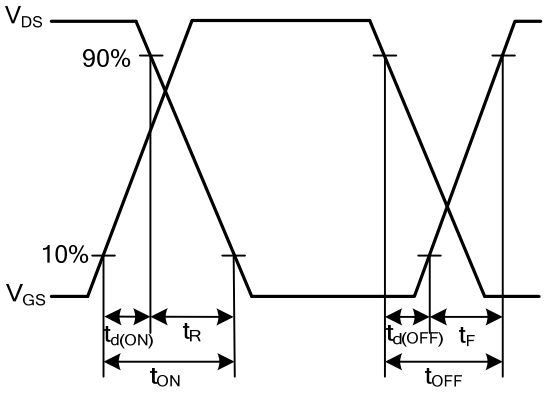

Gate Charge Test Circuit



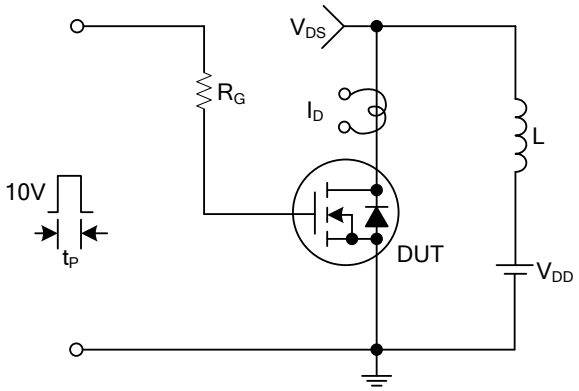

Gate Charge Waveforms



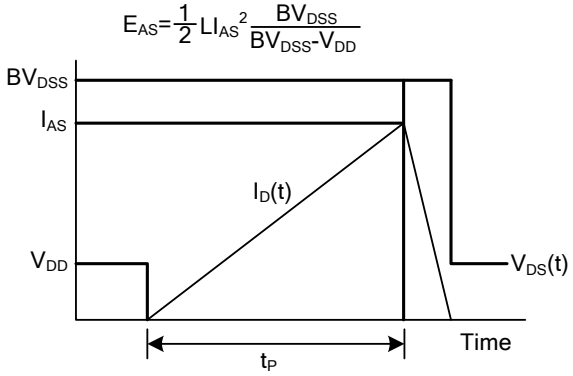

Resistive Switching Test Circuit




Resistive Switching Waveforms



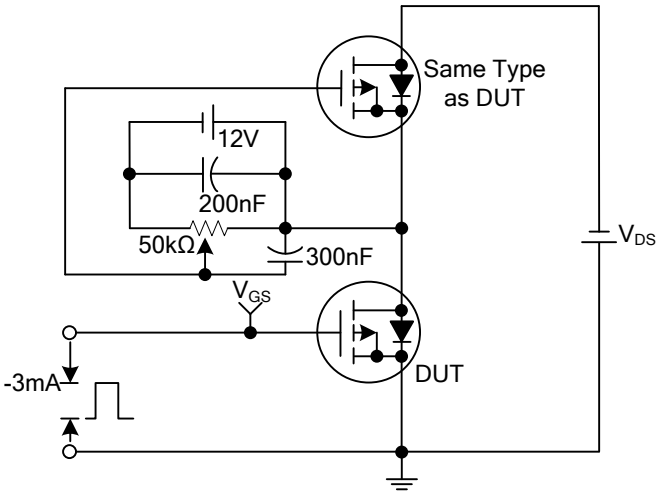

Unclamped Inductive Switching Test Circuit



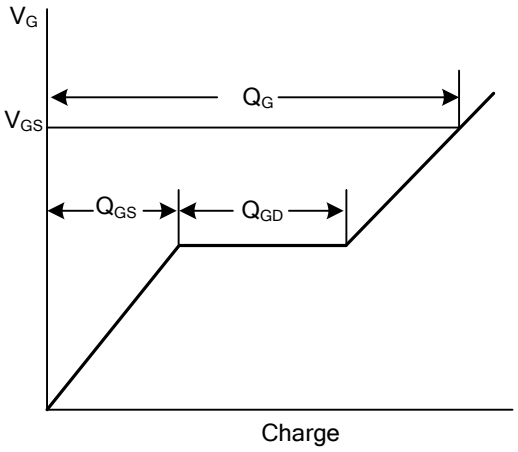

Unclamped Inductive Switching Waveforms

## ■ TEST CIRCUITS AND WAVEFORMS (Cont.)

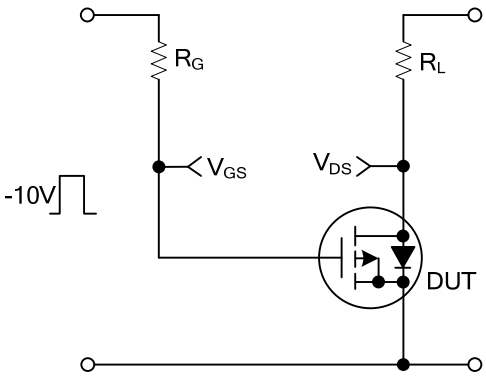
**P-CHANNEL**



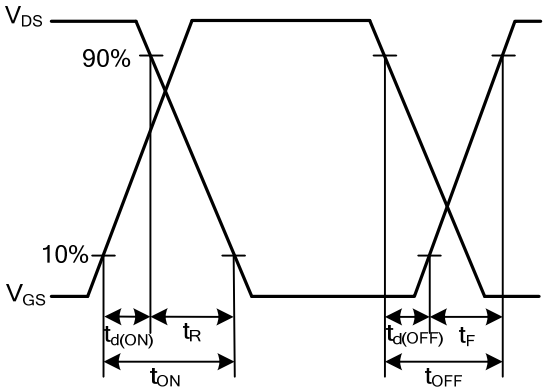

Gate Charge Test Circuit



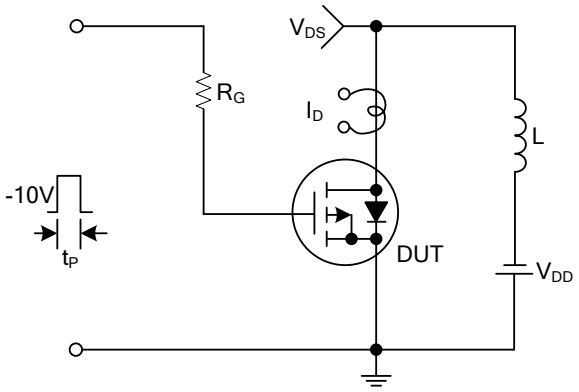

Gate Charge Waveforms



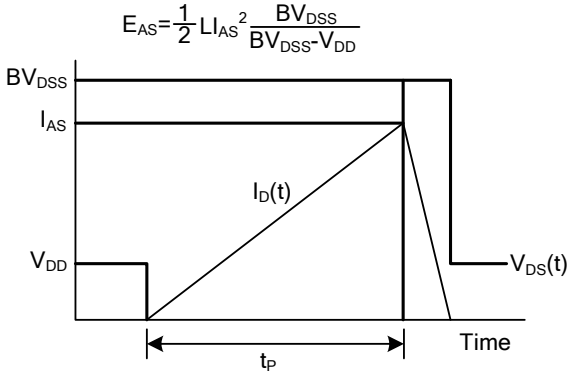

Resistive Switching Test Circuit




Resistive Switching Waveforms




Unclamped Inductive Switching Test Circuit




Unclamped Inductive Switching Waveforms