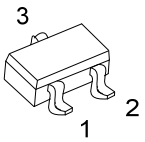
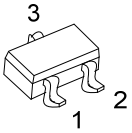
# UTR4502

**Power MOSFET**

## -1.95A, -30V P-CHANNEL POWER MOSFET




SOT-23
(EIAJ SC-59)




SOT-23-3
(JEDEC TO-236)

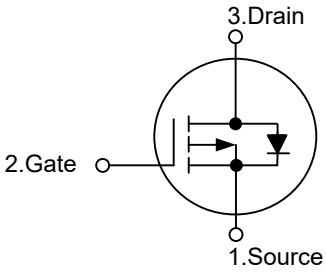
### ■ DESCRIPTION

The **UTR4502** uses UTC advanced 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

* $R_{DS(ON)}$ ≤ 200 mΩ @ $V_{GS}$=-10V, $I_D$=-1.95A
* $R_{DS(ON)}$ ≤ 350 mΩ @ $V_{GS}$=-4.5V, $I_D$=-1.5A
* Low capacitance
* Optimized gate charge
* Fast switching capability
* Avalanche energy specified

### ■ SYMBOL



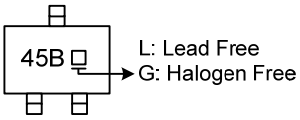

### ■ ORDERING INFORMATION

| Order Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UTR4502L-AE2-R | UTR4502G-AE2-R | SOT-23-3 | G | S | D | Tape Reel |
| UTR4502L-AE3-R | UTR4502G-AE3-R | SOT-23 | G | S | D | Tape Reel |

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

| | |
|---|---|
| UTR4502G-AE2-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) R: Tape Reel<br>(2) AE2: SOT-23-3, AE3: SOT-23<br>(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 | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current | | $I_D$ | -1.13 | A |
| Pulsed Drain Current (Note 1, 2) | | $I_{DM}$ | -6.8 | A |
| Power Dissipation | SOT-23 | $P_D$ | 0.6 | W |
| | SOT-23-3 | | 0.5 | 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 | SOT-23 | $\theta_{JA}$ | 208 | °C/W |
| | SOT-23-3 | | 250 | °C/W |

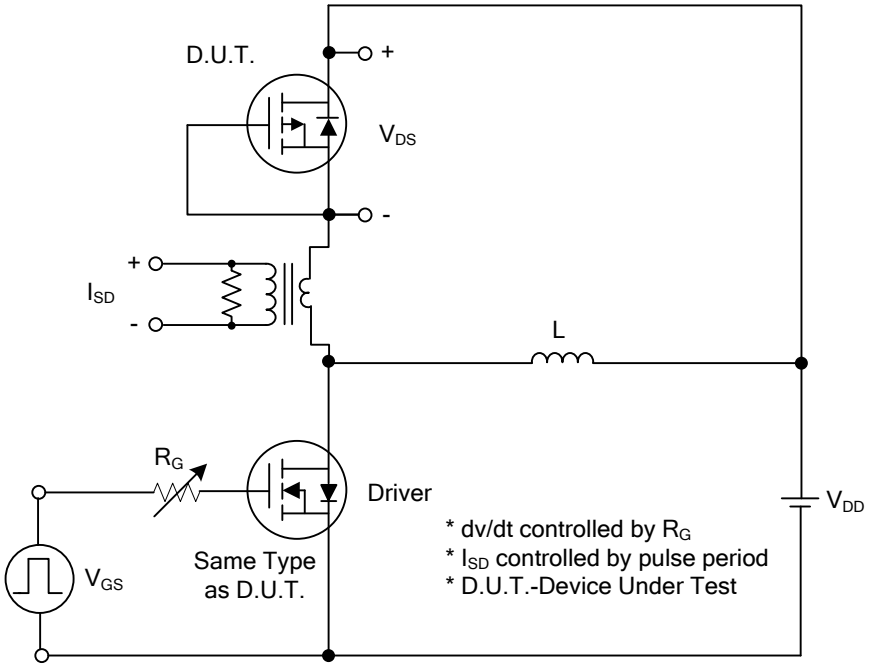
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

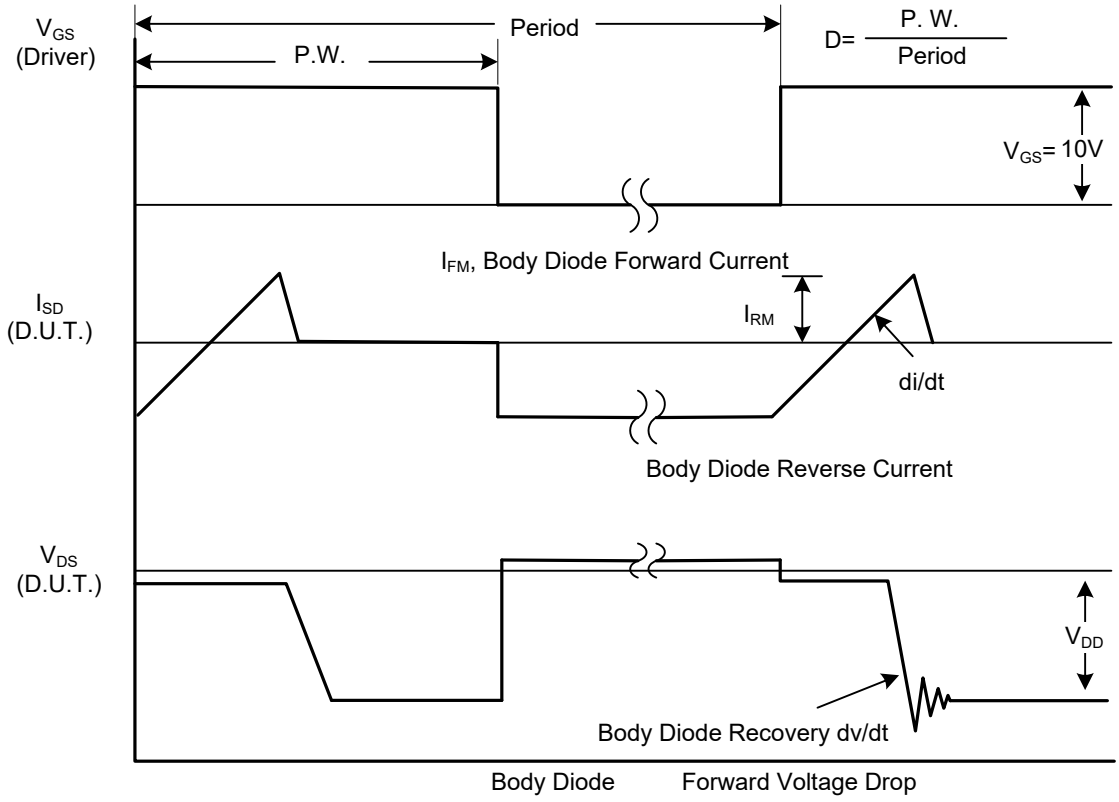
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0 V, $I_D$=-250μA | -30 | | | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | | | -1 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±20V | | | ±100 | nA |
| **ON CHARACTERISTICS** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -1.0 | | -3.0 | V |
| Static Drain-Source On-Resistance (Note 2) | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-1.95A | | | 200 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-1.5A | | | 350 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$=-15V, $V_{GS}$=0V, f=1MHz | | 165 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 38 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 25 | | pF |
| **SWITCHING PARAMETERS** (Note 4) | | | | | | |
| Total Gate Charge | $Q_G$ | $V_{DS}$=-24V, $V_{GS}$=-10V, $I_D$ =-1.13A | | 8 | | nC |
| Gate Source Charge | $Q_{GS}$ | | | 2.2 | | nC |
| Gate Drain Charge | $Q_{GD}$ | | | 0.8 | | nC |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{DS}$=-15V, $V_{GS}$=-10V, $I_D$=-1.13A, $R_G$=6Ω | | 4 | | ns |
| Turn-ON Rise Time | $t_R$ | | | 15 | | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 8 | | ns |
| Turn-OFF Fall-Time | $t_F$ | | | 18 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** (Note 3) | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | | | -1.13 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | | | -6.8 | A |
| Drain-Source Diode Forward Voltage(Note2) | $V_{SD}$ | $I_S$=-1.25A, $V_{GS}$=0V | | | -1.2 | V |

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse width ≤ 300us, duty cycle ≤ 2%.

## ■ TEST CIRCUITS AND WAVEFORMS

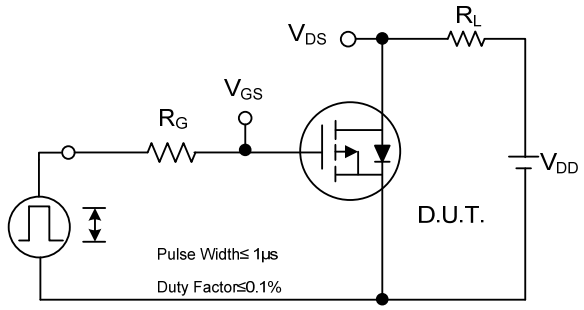



**Peak Diode Recovery dv/dt Test Circuit**

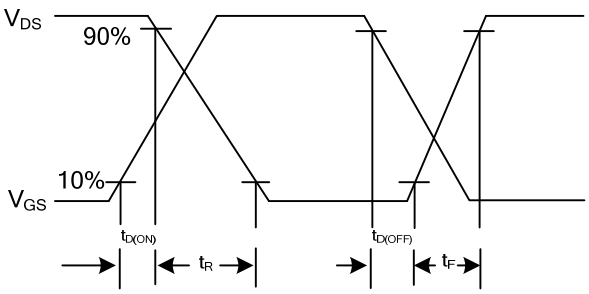



**Peak Diode Recovery dv/dt Waveforms**

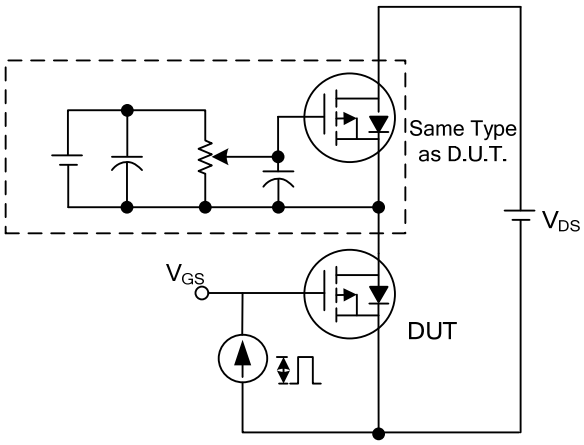
## ■ TEST CIRCUITS AND WAVEFORMS



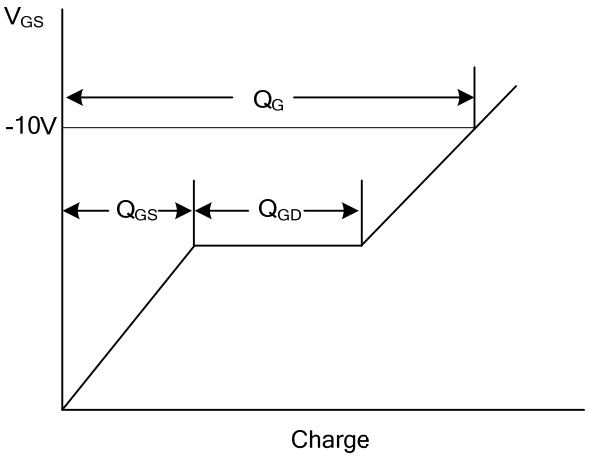

**Switching Test Circuit**



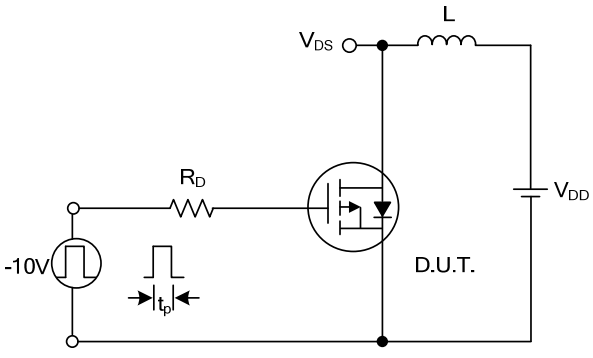

**Switching Waveforms**



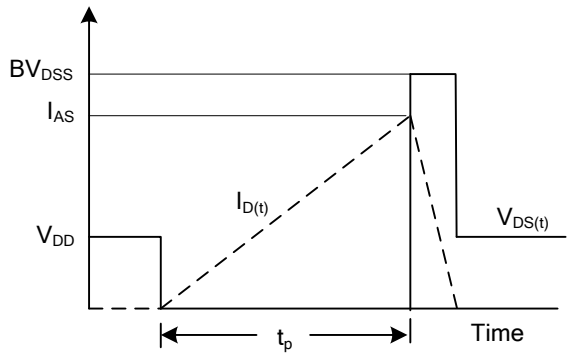

**Gate Charge Test Circuit**




**Gate Charge Waveform**




**Unclamped Inductive Switching Test Circuit**




**Unclamped Inductive Switching Waveforms**