



**UT6354**

Preliminary

**Power MOSFET**

**-4.0A, -60V P-CHANNEL SILICON MOSFET**

■ DESCRIPTION

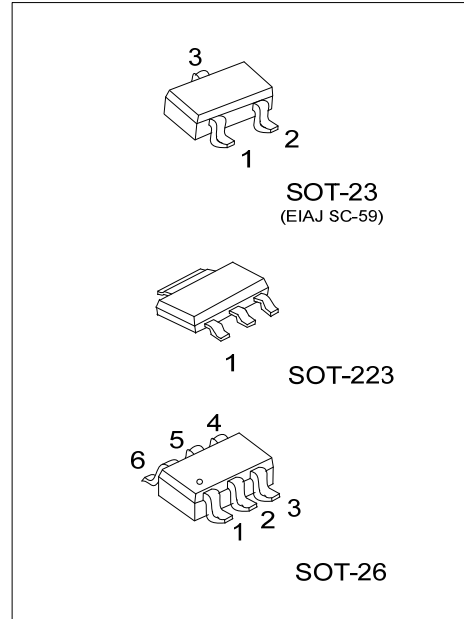
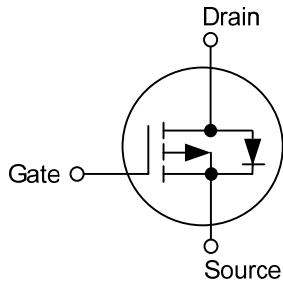
The UTC **UT6354** is a P-Channel Silicon MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance and low gate charge, etc.

The UTC **UT6354** is suitable for general-purpose switching device applications.

■ FEATURES

- \*  $R_{DS(ON)} \leq 105 \text{ m}\Omega @ V_{GS}=-10V, I_D=-2.0A$
- $R_{DS(ON)} \leq 145 \text{ m}\Omega @ V_{GS}=-4.5V, I_D=-1.0A$
- \* Low gate charge

■ SYMBOL



■ ORDERING INFORMATION

| Ordering Number |               | Package | Pin Assignment |   |   |   |   |   | Packing   |
|-----------------|---------------|---------|----------------|---|---|---|---|---|-----------|
| Lead Free       | Halogen Free  |         | 1              | 2 | 3 | 4 | 5 | 6 |           |
| UT6354L-AA3-R   | UT6354G-AA3-R | SOT-223 | G              | D | S | - | - | - | Tape Reel |
| UT6354L-AE3-R   | UT6354G-AE3-R | SOT-23  | G              | S | D | - | - | - | Tape Reel |
| UT6354L-AG6-R   | UT6354G-AG6-R | SOT-26  | D              | D | G | S | D | D | Tape Reel |

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

|  |   |
|--|---|
| <p>UT6354G-AA3-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul> | <ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) AA3: SOT-223, AE3: SOT-23, AG6: SOT-26</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul> |
|--|---|

■ MARKING

| SOT-223  | SOT-23   | SOT-26   |
|--|--|--|
| <p>UT6354 □<br/>□□□□<br/>1</p> <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p> | <p>354 □<br/>□ □</p> <p>L: Lead Free<br/>G: Halogen Free</p> | <p>6 5 4<br/>354 □<br/>□ □ □<br/>1 2 3</p> <p>L: Lead Free<br/>G: Halogen Free</p> |

■ ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                          |                        | SYMBOL    | RATINGS    | UNIT             |
|------------------------------------|------------------------|-----------|------------|------------------|
| Drain-Source Voltage               |                        | $V_{DSS}$ | -60        | V                |
| Gate-Source Voltage                |                        | $V_{GSS}$ | $\pm 20$   | V                |
| Drain Current                      | Continuous             | $I_D$     | -4         | A                |
|                                    | Pulsed (Note 2)        | $I_{DM}$  | -16        | A                |
| Avalanche Energy                   | Single Pulsed (Note 3) | $E_{AS}$  | 11.25      | mJ               |
| Peak Diode Recovery dv/dt (Note 4) |                        | dv/dt     | 2.6        | V/ns             |
| Power Dissipation                  | SOT-223                | $P_D$     | 1.5        | W                |
|                                    | SOT-23/SOT-26          |           | 1          | W                |
| Junction Temperature               |                        | $T_J$     | +150       | $^\circ\text{C}$ |
| Storage Temperature                |                        | $T_{STG}$ | -55 ~ +150 | $^\circ\text{C}$ |

- 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.  $L = 0.1\text{mH}$ ,  $I_{AS} = -15\text{A}$ ,  $V_{DD} = -50\text{V}$ ,  $R_G = 25\ \Omega$  Starting  $T_J = 25^\circ\text{C}$   
 4.  $I_{SD} \leq -4.0\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

| PARAMETER           |               | SYMBOL        | RATINGS | UNIT                      |
|---------------------|---------------|---------------|---------|---------------------------|
| Junction to Ambient | SOT-223       | $\theta_{JA}$ | 83      | $^\circ\text{C}/\text{W}$ |
|                     | SOT-23/SOT-26 |               | 125     | $^\circ\text{C}/\text{W}$ |

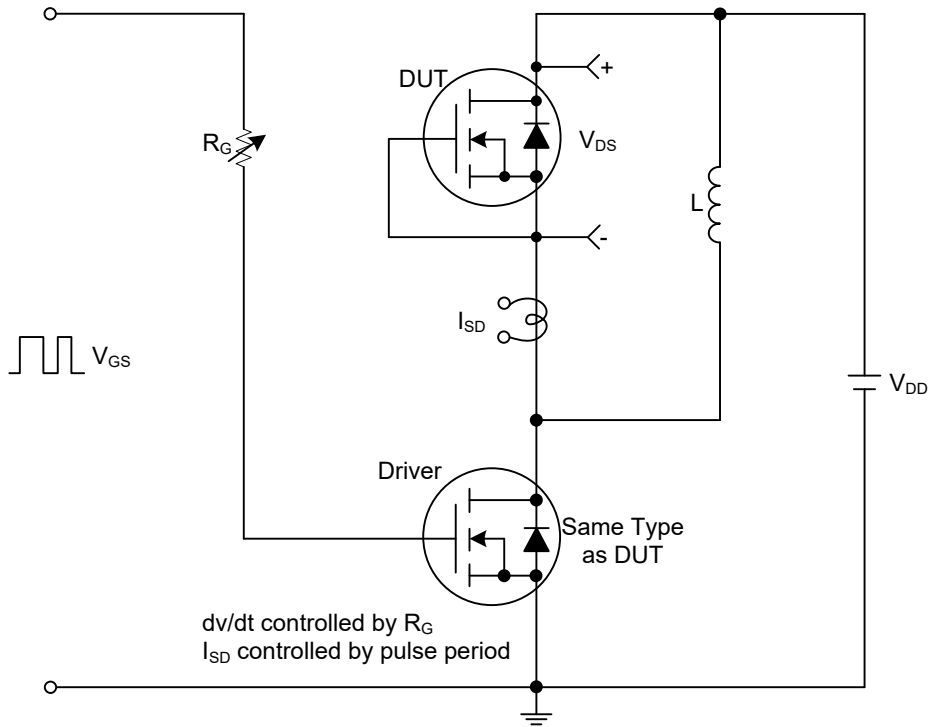
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate,  $t \leq 10$  sec.

■ ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

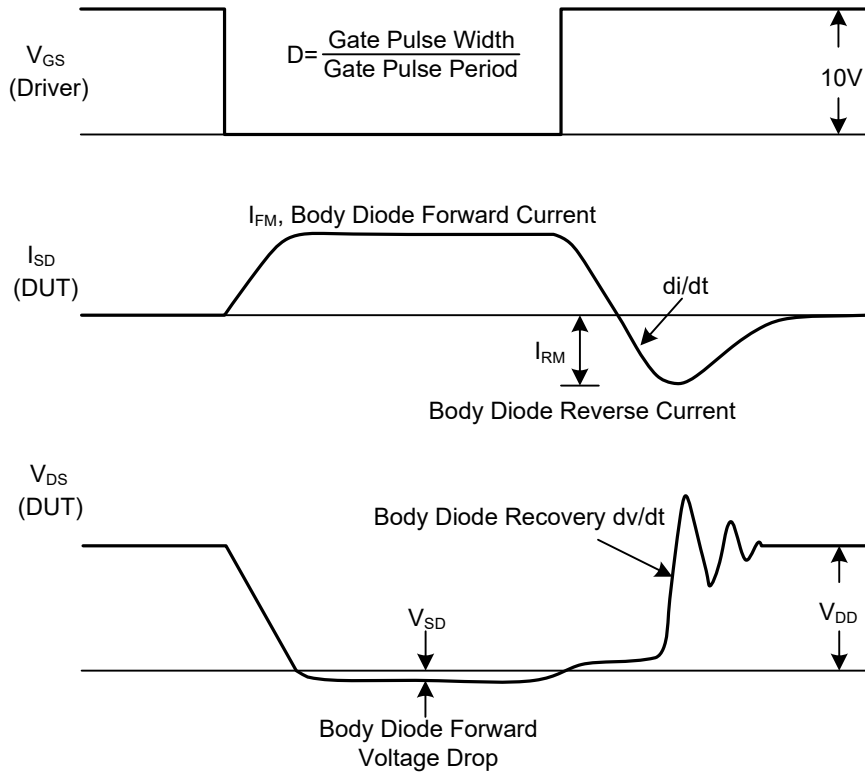
| PARAMETER  | SYMBOL       | TEST CONDITIONS   | MIN  | TYP  | MAX       | UNIT             |
|--|--------------|---|------|------|-----------|------------------|
| <b>OFF CHARACTERISTICS</b>                             |              |   |      |      |           |                  |
| Drain-Source Breakdown Voltage                         | $BV_{DSS}$   | $I_D = -1\text{mA}$ , $V_{GS} = 0\text{V}$  | -60  |      |           | V                |
| Zero Gate Voltage Drain Current                        | $I_{DSS}$    | $V_{DS} = -60\text{V}$ , $V_{GS} = 0\text{V}$   |      |      | -1        | $\mu\text{A}$    |
| Gate-to-Source Leakage Current                         | $I_{GSS}$    | $V_{GS} = \pm 16\text{V}$ , $V_{DS} = 0\text{V}$  |      |      | $\pm 100$ | nA               |
| <b>ON CHARACTERISTICS</b>                              |              |   |      |      |           |                  |
| Cutoff Voltage   | $V_{GS(TH)}$ | $V_{DS} = V_{GS}$ , $I_D = -250\mu\text{A}$   | -1.0 |      | -2.5      | V                |
| Static Drain-Source On-State Resistance                | $R_{DS(ON)}$ | $V_{GS} = -10\text{V}$ , $I_D = -2.0\text{A}$   |      | 90   | 105       | $\text{m}\Omega$ |
|  |              | $V_{GS} = -4.5\text{V}$ , $I_D = -1.0\text{A}$  |      | 125  | 145       | $\text{m}\Omega$ |
| <b>DYNAMIC PARAMETERS</b>                              |              |   |      |      |           |                  |
| Input Capacitance                                      | $C_{ISS}$    | $V_{DS} = -20\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1.0\text{MHz}$                             |      | 800  |           | pF               |
| Output Capacitance                                     | $C_{OSS}$    |   |      | 60   |           | pF               |
| Reverse Transfer Capacitance                           | $C_{RSS}$    |   |      | 45   |           | pF               |
| <b>SWITCHING PARAMETERS</b>                            |              |   |      |      |           |                  |
| Total Gate Charge                                      | $Q_G$        | $V_{DS} = -48\text{V}$ , $V_{GS} = -10\text{V}$ , $I_D = -4.0\text{A}$ ,<br>$I_G = -1\text{mA}$ |      | 20   |           | nC               |
| Gate to Source Charge                                  | $Q_{GS}$     |   |      | 3.3  |           | nC               |
| Gate to Drain Charge                                   | $Q_{GD}$     |   |      | 5    |           | nC               |
| Turn-ON Delay Time                                     | $t_{D(ON)}$  | $V_{DS} = -30\text{V}$ , $V_{GS} = -10\text{V}$ , $I_D = -4.0\text{A}$ ,<br>$R_G = 3\Omega$     |      | 6    |           | ns               |
| Rise Time  | $t_R$        |   |      | 16   |           | ns               |
| Turn-OFF Delay Time                                    | $t_{D(OFF)}$ |   |      | 30   |           | ns               |
| Fall-Time  | $t_F$        |   |      | 18   |           | ns               |
| <b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b> |              |   |      |      |           |                  |
| Diode Forward Voltage                                  | $V_{SD}$     | $I_S = -4.0\text{A}$ , $V_{GS} = 0\text{V}$   |      | -0.9 | -1.4      | V                |
| Body Diode Reverse Recovery Time                       | $t_{rr}$     | $I_S = -4.0\text{A}$ , $V_{GS} = 0\text{V}$ ,   |      | 25   |           | ns               |
| Reverse Recovery Charge                                | $Q_{rr}$     | $di_F/dt = 100\text{A}/\mu\text{s}$ (Note 1)  |      | 18   |           | ns               |

- Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .  
 2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



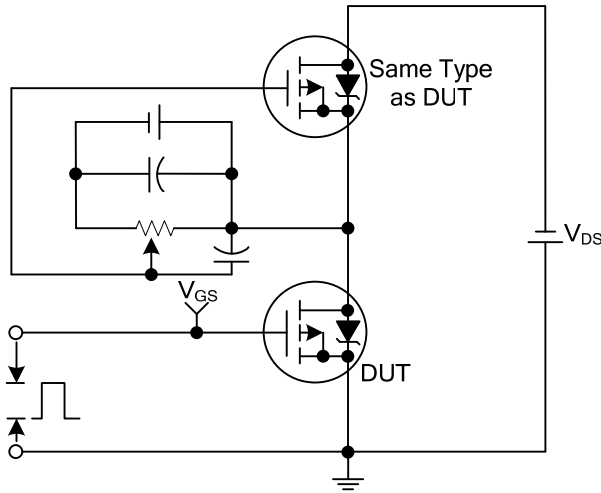
Peak Diode Recovery dv/dt Test Circuit



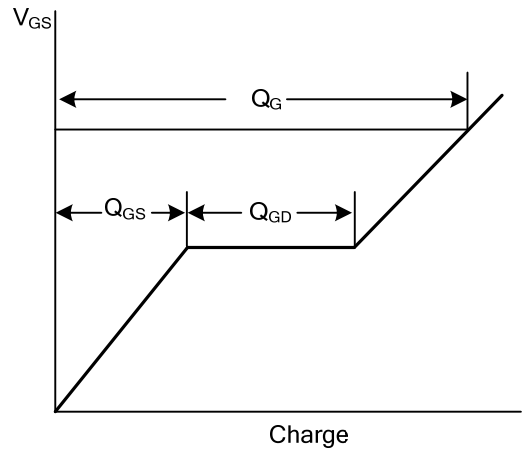
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

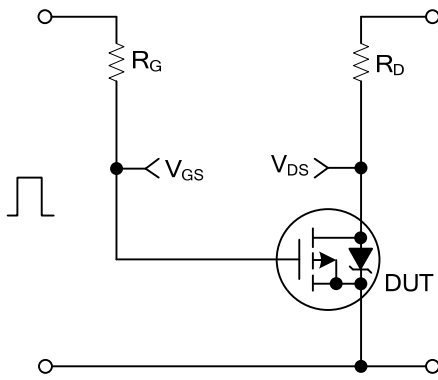
■ TEST CIRCUITS AND WAVEFORMS



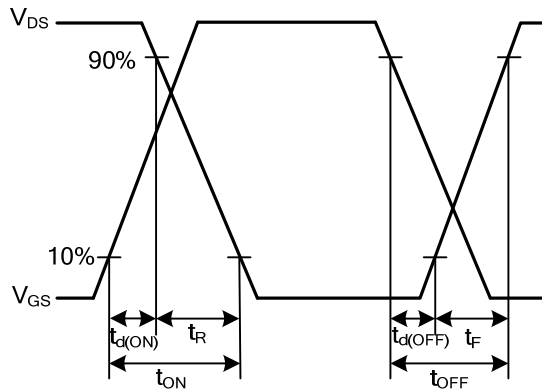
Gate Charge Test Circuit



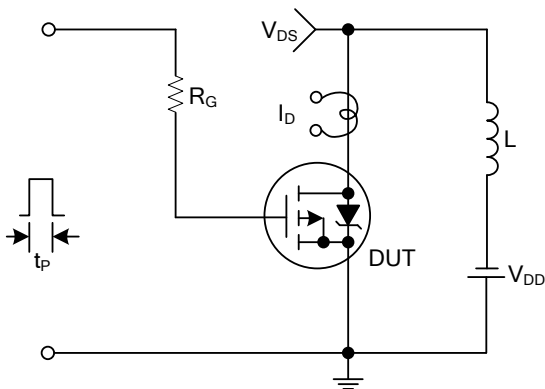
Gate Charge Waveforms



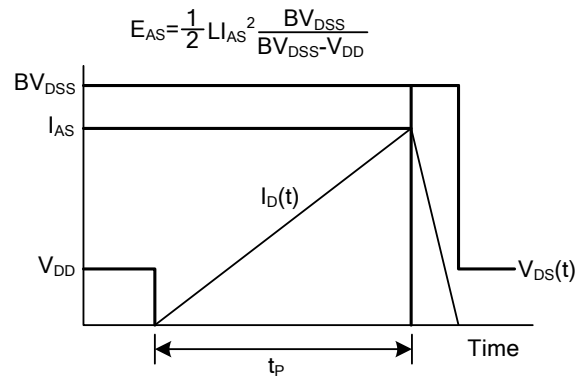
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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