



5N25Z

Preliminary

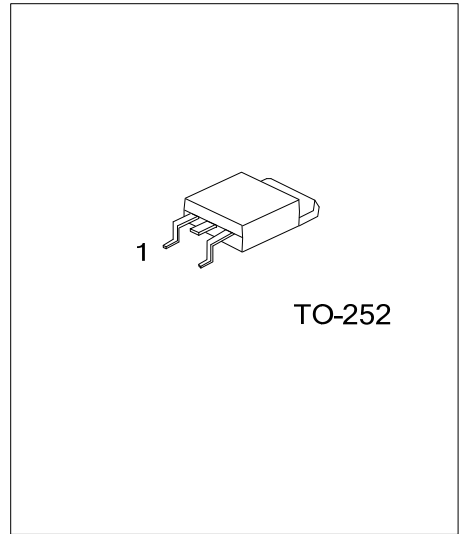
Power MOSFET

3.8A, 250V N-CHANNEL MOSFET

■ DESCRIPTION

The UTC **5N25Z** is an N-Channel enhancement MOSFET, it uses UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed and low gate charge. It can also withstand high energy pulse in the avalanche and commutation modes.

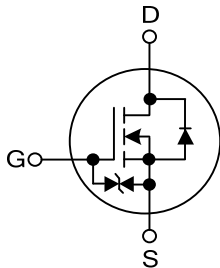
The UTC **5N25Z** is suitable for high efficiency switching DC/DC converter, motor control and switch mode power supply.



■ FEATURES

- * $R_{DS(ON)} < 1.2\Omega @ V_{GS}=10V$
- * Low gate charge (Typ=14nC)
- * Low C_{RSS} (Typ=6.0pF)
- * High switching speed
- * ESD Capability

■ SYMBOL



■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|--------------|---------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 5N25ZL-TN3-T | 5N25ZG-TN3-T | TO-252 | G | D | S | Tube |
| 5N25ZL-TN3-R | 5N25ZG-TN3-R | TO-252 | G | D | S | Tape Reel |

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

| | |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <p>5N25ZL-TN3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p> | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free</p> |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|

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

| PARAMETER SYMBOL | | | RATINGS | UNIT |
|------------------------------------|---------------------------------|-----------|----------|---------------------|
| Drain-Source Voltage | | V_{DSS} | 250 | V |
| Gate-Source Voltage | | V_{GSS} | ± 20 | V |
| Drain Current | Continuous I | I_D | 3.8 | A |
| | Pulsed (Note 2) | I_{DM} | 9 | A |
| Avalanche Current (Note 2) | | I_{AR} | 3.8 | A |
| Avalanche Energy | Single Pulsed (Note 3) | E_{AS} | 60 | mJ |
| | Repetitive (Note 2) | E_{AR} | 3.7 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 5.5 | V/ns |
| Power Dissipation | $T_A=25^\circ\text{C}$ | P_D | 2.5 W | |
| | $T_C=25^\circ\text{C}$ | | 37 | W |
| | Derate above 25°C | | 0.29 | W/ $^\circ\text{C}$ |
| Junction Temperature | | T_J | -55~+150 | $^\circ\text{C}$ |
| Storage Temperature Range | | T_{STG} | -55~+150 | $^\circ\text{C}$ |

Note: 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. $L=6.2\text{mH}$, $I_{AS}=3.8\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.

4. $I_{SD}\leq 4.5\text{A}$, $di/dt\leq 300\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

■ THERMAL CHARACTERISTICS

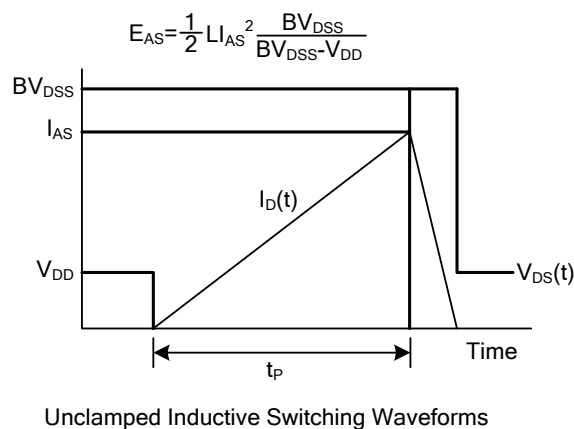
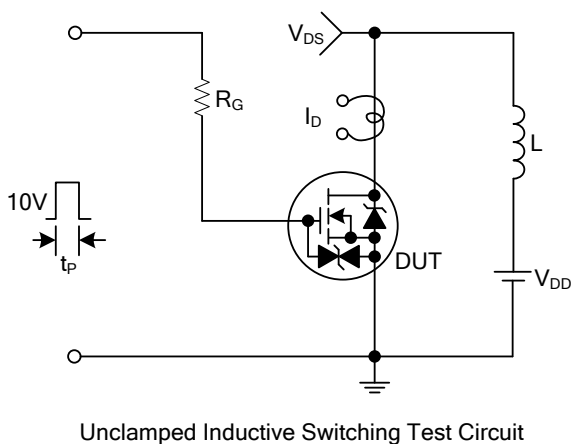
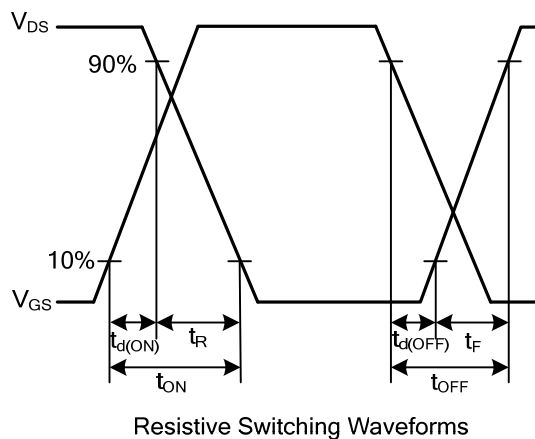
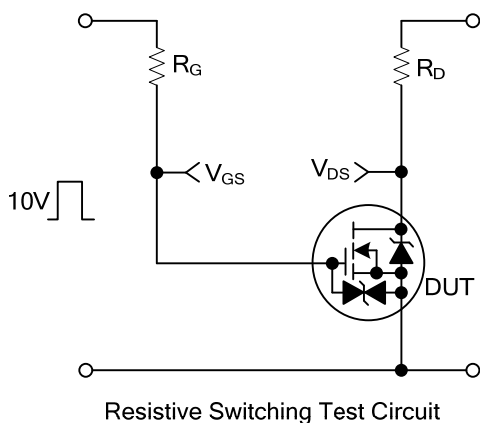
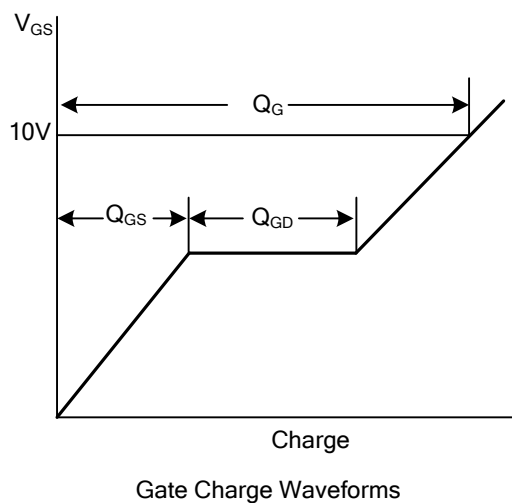
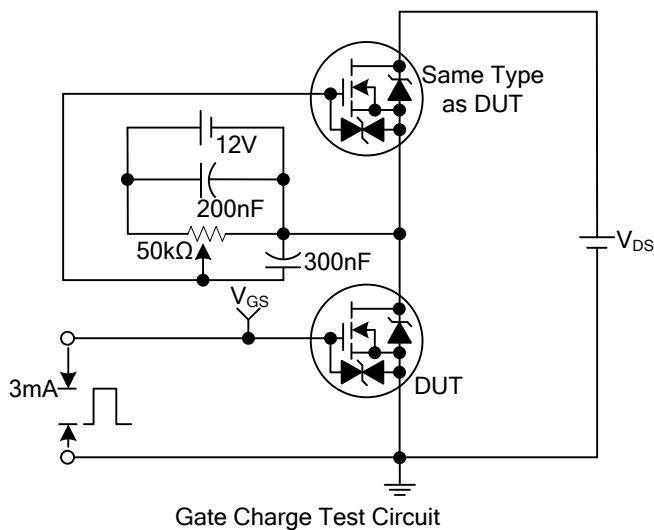
| PARAMETER SYMBOL | | | RATINGS | UNIT |
|---------------------|--|---------------|---------|---------------------------|
| Junction to Ambient | | θ_{JA} | 110 | $^\circ\text{C}/\text{W}$ |
| Junction to Case | | θ_{JC} | 3.4 | $^\circ\text{C}/\text{W}$ |

■ ELECTRICAL CHARACTERISTICS (T_c=25°C, unless otherwise noted)

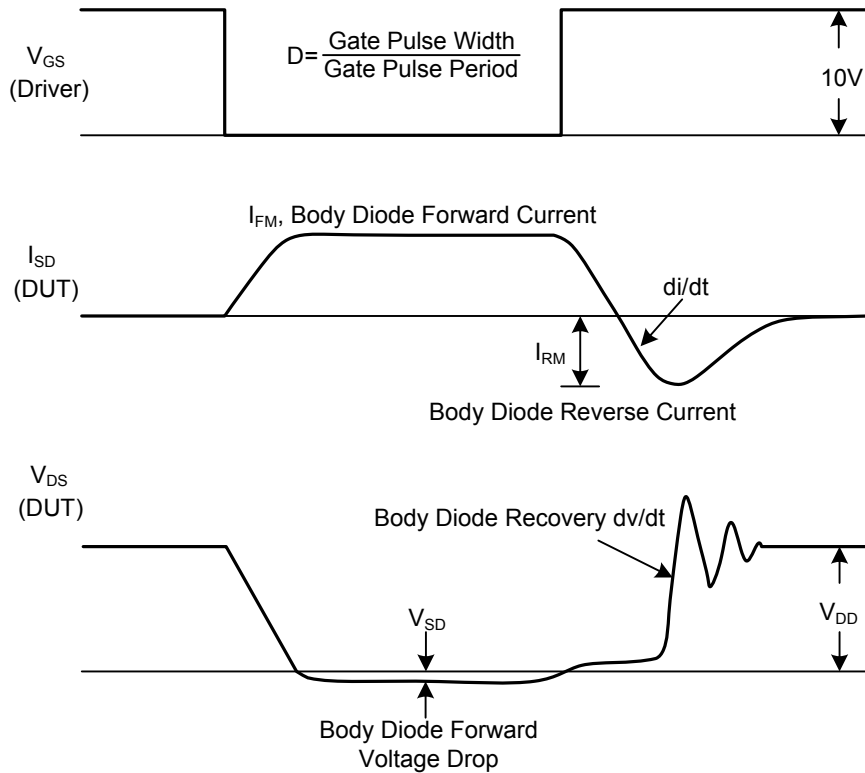
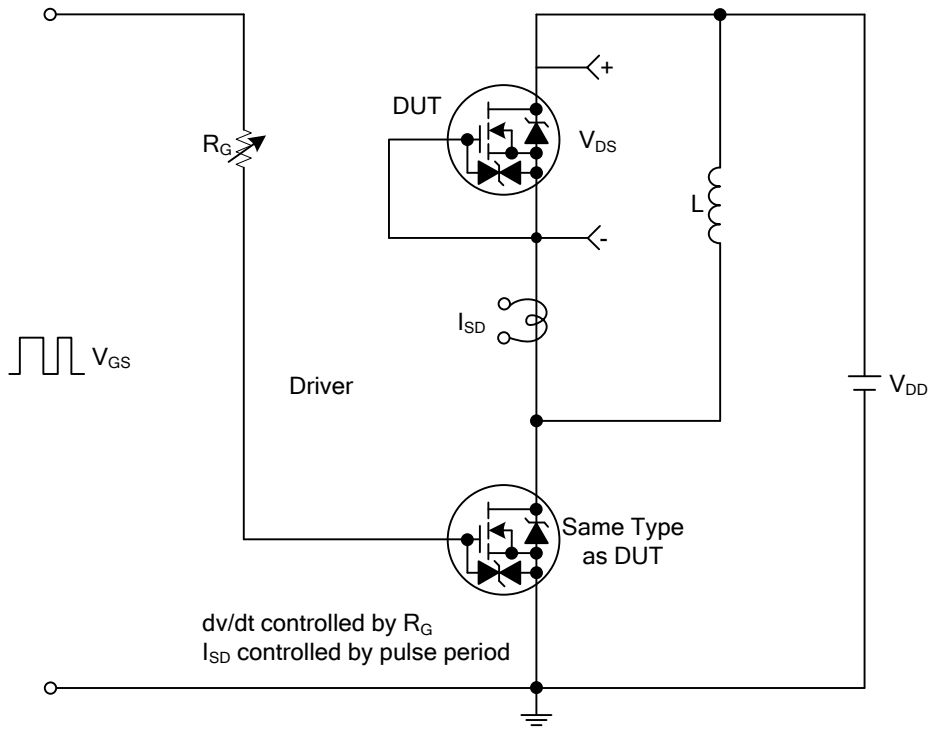
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------|-----|------|------|------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | I _D =250μA, V _{GS} =0V 250 | | | | V |
| Breakdown Voltage Temperature Coefficient | ΔBV _{DSS} /ΔT _J | Reference to 25°C, I _D =250μA | | 0.18 | | V/°C |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =250V, V _{GS} =0V | | | 1 | μA |
| Gate-Source Leakage Current | Forward | V _{GS} =+20V, V _{DS} =0V | | | +10 | μA |
| | Reverse | V _{GS} =-20V, V _{DS} =0V | | | -10 | μA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | V _{DS} =V _{GS} , I _D =250μA 2 | | | 4 | V |
| Static Drain-Source On-State Resistance (Note 1) | R _{DS(ON)} | V _{GS} =10V, I _D =1.9A | | 0.78 | 1.2 | Ω |
| | | V _{GS} =5V, I _D =1.9A | | 0.92 | 1.25 | Ω |
| Forward Transconductance | g _{FS} | V _{DS} =30V, I _D =1.9A | | 3.35 | | S |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C _{ISS} | V _{GS} =0V, V _{DS} =25V, f=1.0MHz | 250 | | 325 | pF |
| Output Capacitance | C _{OSS} | | 40 | | 50 | pF |
| Reverse Transfer Capacitance | C _{RSS} | | 6 | | 8 | pF |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q _G | V _{GS} =10V, V _{DS} =30V, I _D =1.3A, I _G =100μA (Note 1, 2) | 14 | | 20 | nC |
| Gate to Source Charge | Q _{GS} | | 4 | | | nC |
| Gate to Drain Charge | Q _{GD} | | 2.7 | | | nC |
| Turn-ON Delay Time | t _{D(ON)} | V _{DD} =30V, I _D =0.5A, R _G =25Ω, V _{GS} =10V (Note 1, 2) | 30 | | 35 | ns |
| Rise Time | t _R | | 26 | | 40 | ns |
| Turn-OFF Delay Time | t _{D(OFF)} | | 90 | | 110 | ns |
| Fall-Time | t _F | | 27 | | 40 | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body-Diode Continuous Current | I _S | | | | 3.8 | A |
| Maximum Body-Diode Pulsed Current | I _{SM} | | | | 9 | A |
| Drain-Source Diode Forward Voltage | V _{SD} | I _S =3.8A, V _{GS} =0V | | | 1.5 | V |
| Body Diode Reverse Recovery Time | t _{RR} | I _S =4.5A, V _{GS} =0V, di _F /dt=100A/μs (Note 1) | 95 | | | ns |
| Body Diode Reverse Recovery Charge | Q _{RR} | | 0.3 | | | μC |

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

■ TEST CIRCUITS AND WAVEFORMS



■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit and Waveforms

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