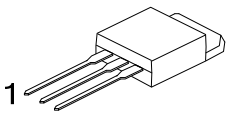
# 3N55-CDQ

**Preliminary** | ***Power MOSFET***

## 3A, 550V N-CHANNEL POWER MOSFET



TO-251

### ■ DESCRIPTION

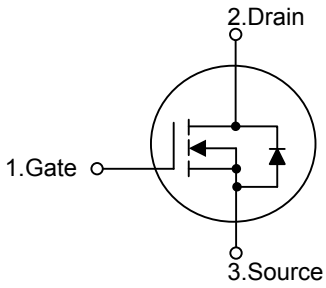
The UTC **3N55-CDQ** is an N-channel power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance and superior switching performance.

The UTC **3N55-CDQ** is generally applied in low power switching mode power appliances and electronic ballast.

### ■ FEATURES

* $R_{DS(ON)} \leq 4.0\ \Omega$ @ $V_{GS}$=10V, $I_D$=1.5A
* High Switching Speed
* 100% Avalanche Tested

### ■ SYMBOL



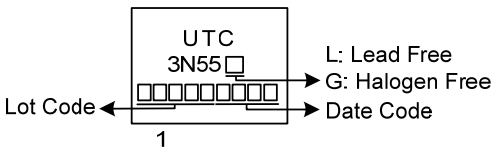

### ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 3N55L-TM3-T | 3N55G-TM3-T | TO-251 | G | D | S | Tube |

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

| | |
|---|---|
| 3N55G-TM3-T<br>(1)Packing Type | (1) T: Tube |
| (2)Package Type | (2) TM3: TO-251 |
| (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 |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 550 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Drain Current | Continuous | $I_D$ | 3 | A |
| | Pulsed (Note 2) | $I_{DM}$ | 6 | A |
| Avalanche Energy | Single Pulsed (Note 3) | $E_{AS}$ | 63 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 5.3 | V/ns |
| Power Dissipation | | $P_D$ | 33 | 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.
3. L = 30mH, $I_{AS}$ = 2.0A, $V_{DD}$ = 50V, $R_G$ = 25Ω, Starting $T_J$ = 25°C
4. $I_{SD}$ ≤ 3.0A, di/dt ≤ 200A/μs, $V_{DD}$ ≤ $BV_{DSS}$, Starting $T_J$ = 25°C

## ■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 110 | °C/W |
| Junction to Case | $\theta_{JC}$ | 3.7 (Note) | °C/W |

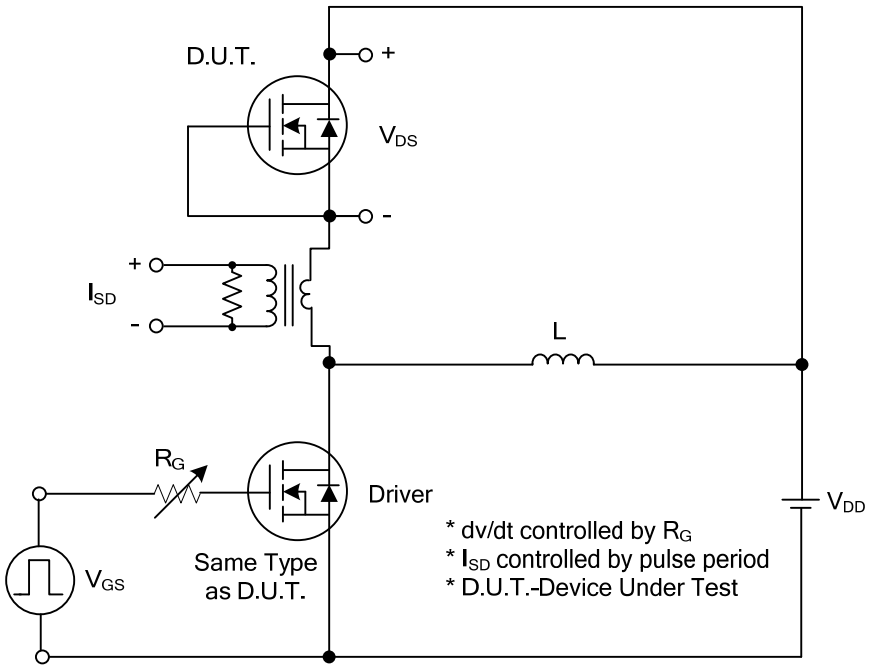
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

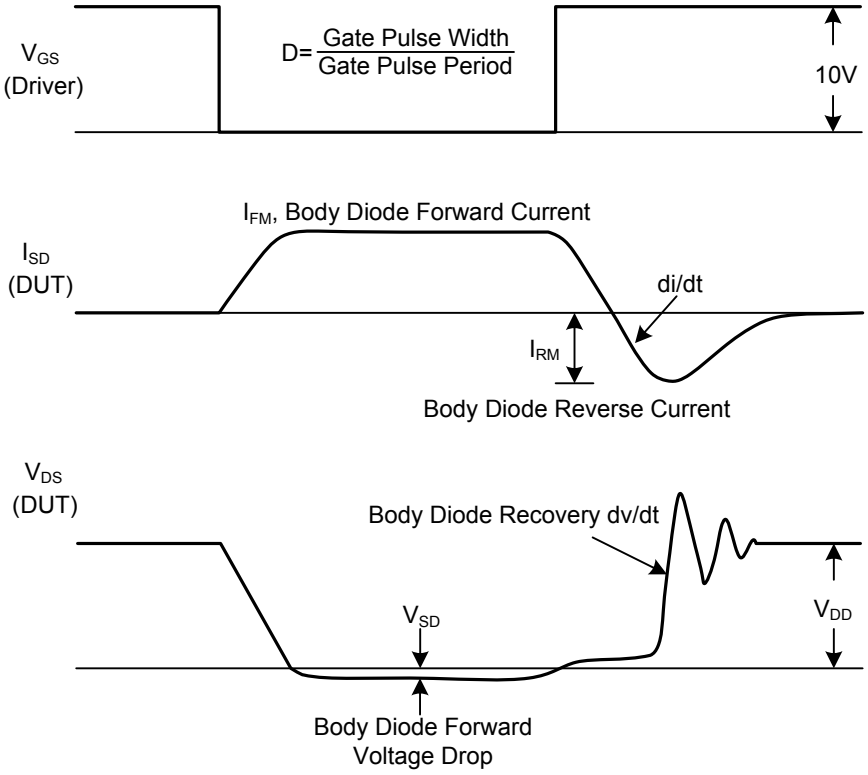
| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 550 | | | V |
| Drain-Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=550V, $V_{GS}$=0V | | | 10 | μA |
| Gate- Source Leakage Current | Forward | $I_{GSS}$ | $V_{GS}$=+30V, $V_{DS}$=0V | | | +100 | nA |
| | Reverse | | $V_{GS}$=-30V, $V_{DS}$=0V | | | -100 | nA |
| **ON CHARACTERISTICS** | | | | | | | |
| Gate Threshold Voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 2.0 | | 4.0 | V |
| Static Drain-Source On-State Resistance | | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=1.5A | | | 4.0 | Ω |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHz | | 272.5 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 32.9 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 2.6 | | pF |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge (Note 1) | | $Q_G$ | $V_{DS}$=440V, $V_{GS}$=10V, $I_D$=3A $I_G$=1mA (Note 1, 2) | | 11.4 | | nC |
| Gate to Source Charge | | $Q_{GS}$ | | | 4.6 | | nC |
| Gate to Drain Charge | | $Q_{GD}$ | | | 1.3 | | nC |
| Turn-ON Delay Time (Note 1) | | $t_{D(ON)}$ | $V_{DD}$=100V, $V_{GS}$=10V, $I_D$=3A, $R_G$ =25Ω (Note 1, 2) | | 3.9 | | ns |
| Rise Time | | $t_R$ | | | 15.8 | | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 16.2 | | ns |
| Fall-Time | | $t_F$ | | | 24.8 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Body-Diode Continuous Current | | $I_S$ | | | | 3 | A |
| Maximum Body-Diode Pulsed Current (Note 1) | | $I_{SM}$ | | | | 6 | A |
| Drain-Source Diode Forward Voltage (Note 1) | | $V_{SD}$ | $I_S$=3A, $V_{GS}$=0V | | | 1.4 | V |
| Body Diode Reverse Recovery Time | | $t_{rr}$ | $I_S$=3A, $V_{GS}$=0V, $dI_F/dt$=100A/μs | | 174 | | ns |
| Body Diode Reverse Recovery Charge | | $Q_{rr}$ | | | 1.47 | | μC |

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

## ■ TEST CIRCUITS AND WAVEFORMS

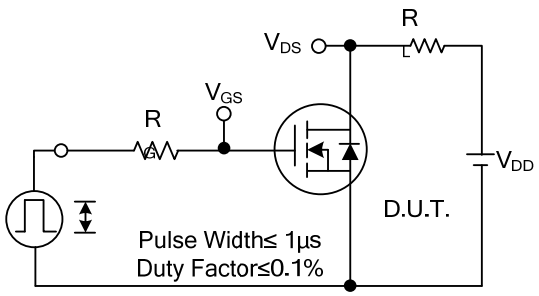



**Peak Diode Recovery dv/dt Test Circuit**

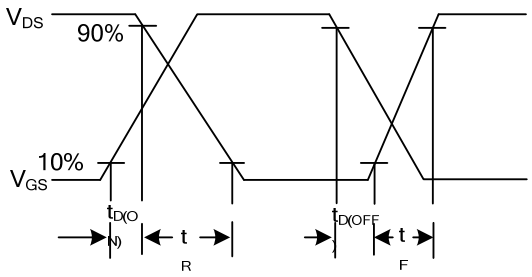



**Peak Diode Recovery dv/dt Waveforms**

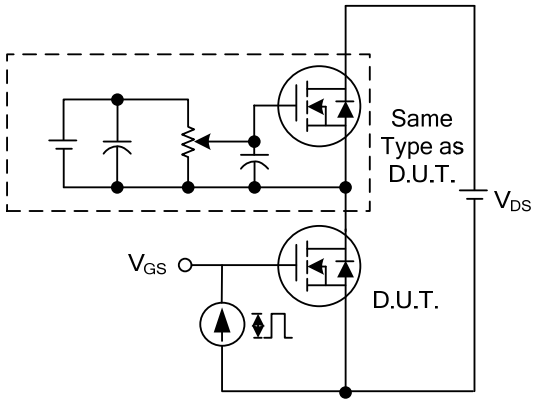
## ■ TEST CIRCUITS AND WAVEFORMS



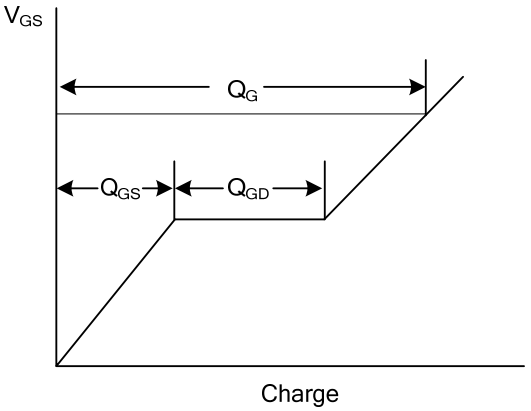

Switching Test Circuit



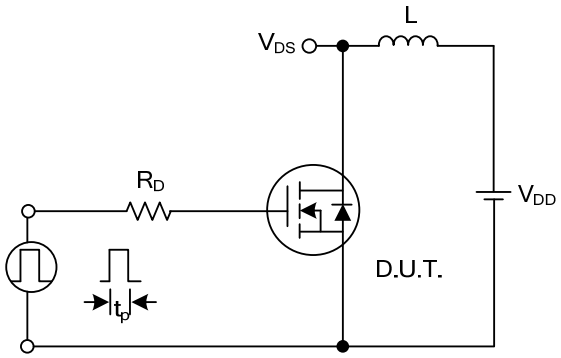

Switching Waveforms



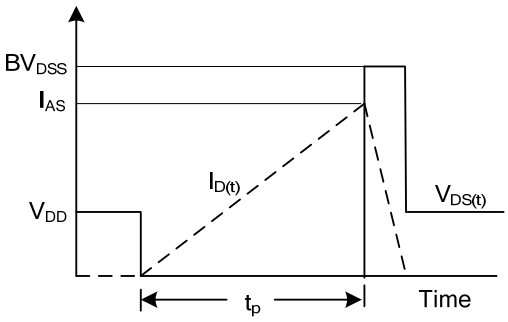

Gate Charge Test Circuit




Gate Charge Waveform




Unclamped Inductive Switching Test Circuit




Unclamped Inductive Switching Waveforms