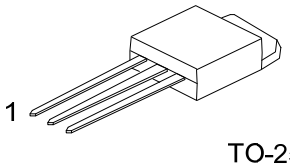
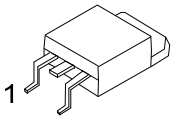
# 20N15-HC

**Power MOSFET**

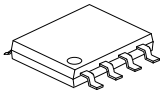
## 20A, 150V N-CHANNEL POWER MOSFET




TO-251




TO-252



SOP-8

### ■ DESCRIPTION

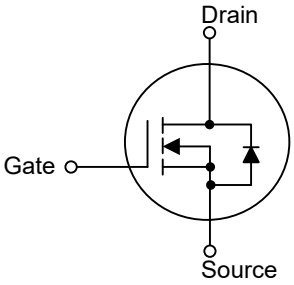
The UTC **20N15-HC** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$, high switching speed, high current capacity and low gate charge.

The UTC **20N15-HC** is universally applied in low voltage such as automotive, high efficiency switching for AC/DC converters and DC motor control, etc.

### ■ FEATURES

* $R_{DS(ON)} \leq 0.105\ \Omega$ @ $V_{GS}$=10V, $I_D$=10A
* High Switching Speed

### ■ SYMBOL



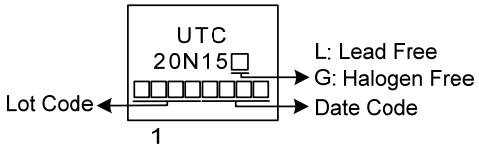
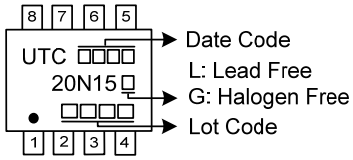

### ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | | | | | | Packing |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| 20N15L-TM3-T | 20N15G-TM3-T | TO-251 | G | D | S | - | - | - | - | - | Tube |
| 20N15L-TN3-R | 20N15G-TN3-R | TO-252 | G | D | S | - | - | - | - | - | Tape Reel |
| 20N15L-S08-R | 20N15G-S08-R | SOP-8 | S | S | S | G | D | D | D | D | Tape Reel |

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

| | |
|---|---|
| 20N15G-TM3-T<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) R: Tape Reel<br>(2) TM3: TO-251, TN3: TO-252, S08: SOP-8<br>(3) G: Halogen Free and Lead Free, L: Lead Free |

## ■ MARKING

| TO-251 / TO-252 | SOP-8 |
|---|---|
|  |  |

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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 150 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current | Continuous | $I_D$ | 20 | A |
| | Pulsed | $I_{DM}$ | 40 | A |
| Single Pulsed Avalanche Current | | $I_{AS}$ | 6 | A |
| Single Pulsed Avalanche Energy | | $E_{AS}$ | 541.8 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 4.7 | V/ns |
| Power Dissipation | TO-251<br>TO-252 | $P_D$ | 46 | W |
| | SOP-8 | | 5.5 | 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.
3. L=30mH, $I_{AS}$=6.0A, $V_{DD}$=50V, $R_G$=25Ω, Starting $T_J$ = 25°C
4. $I_{SD}$≤20A, di/dt≤200A/μs, $V_{DD}$ ≤ $BV_{DSS}$, Starting $T_J$ = 25°C

## ■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Ambient (Note) | TO-251<br>TO-252 | $\theta_{JA}$ | 50 | °C/W |
| | SOP-8 | | 90 | °C/W |
| Junction to Case (Note) | TO-251<br>TO-252 | $\theta_{JC}$ | 2.7 | °C/W |
| | SOP-8 | | 22.7 | °C/W |

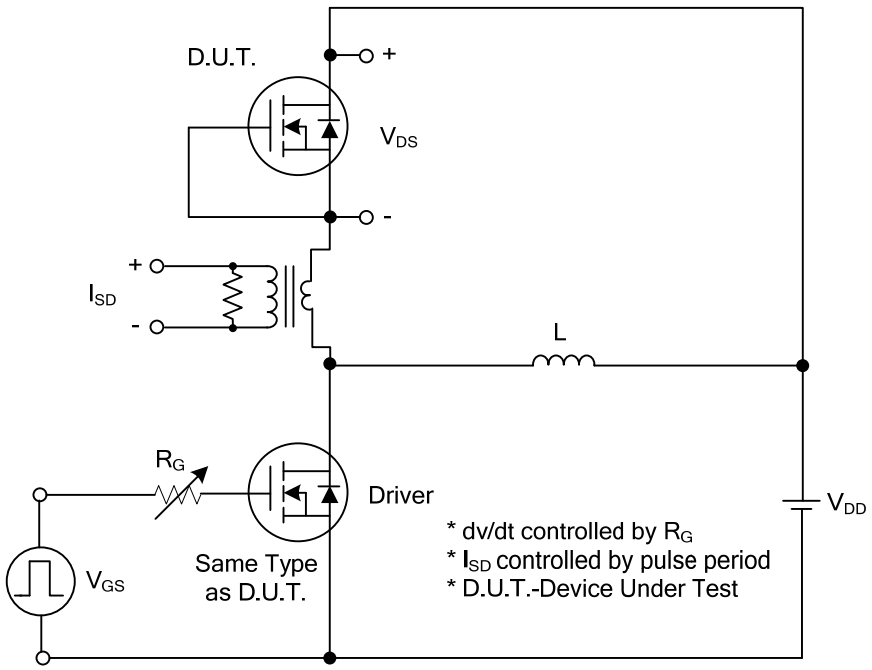
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

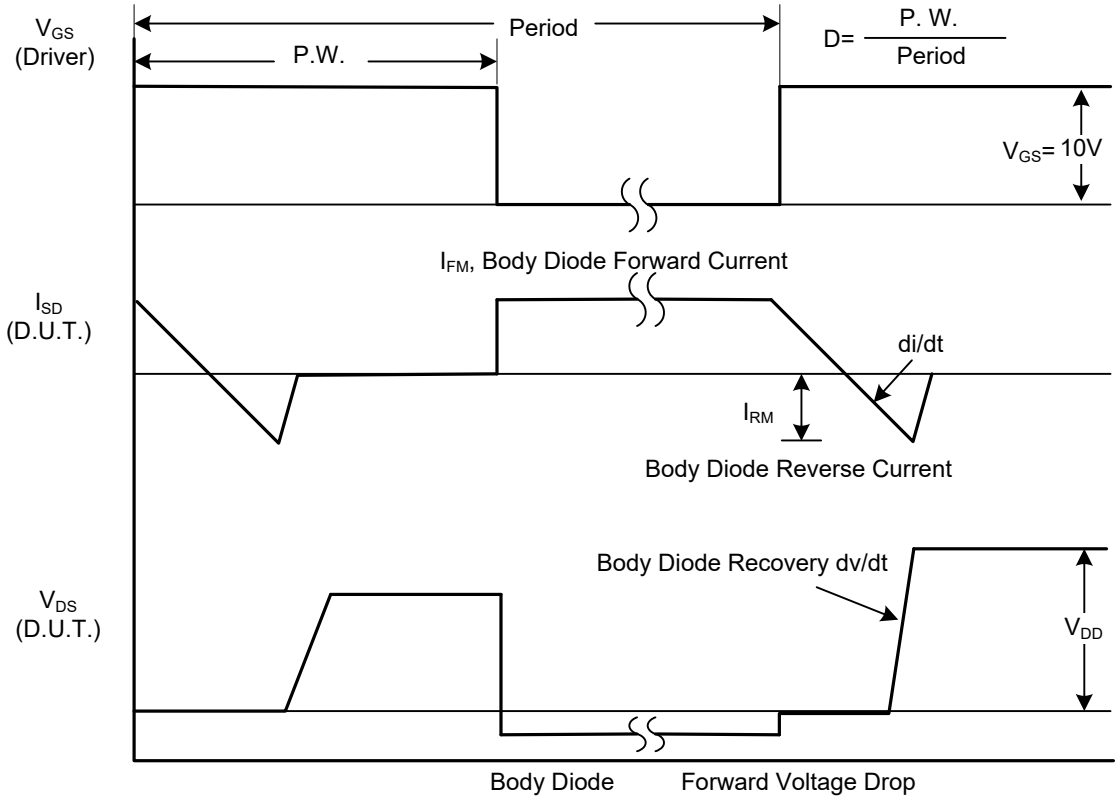
| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 150 | | | V |
| Drain-Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=150V, $V_{GS}$=0V | | | 10 | μA |
| Gate-Source Leakage Current | Forward | $I_{GSS}$ | $V_{GS}$=+20V, $V_{DS}$=0V | | | +100 | nA |
| | Reverse | | $V_{GS}$=-20V, $V_{DS}$=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, $I_D$=10A | | | 0.105 | Ω |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHz | | 864.7 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 185.6 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 13.4 | | pF |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge | | $Q_G$ | $V_{DS}$=120V, $V_{GS}$=10V, $I_D$=20A $I_G$=1mA (Note 1, 2) | | 21.6 | | nC |
| Gate to Source Charge | | $Q_{GS}$ | | | 8.2 | | nC |
| Gate to Drain Charge | | $Q_{GD}$ | | | 4.1 | | nC |
| Turn-ON Delay Time | | $t_{D(ON)}$ | $V_{DD}$=100V, $V_{GS}$=10V, $I_D$=20A, $R_G$=25Ω (Note 1, 2) | | 7.8 | | ns |
| Rise Time | | $t_R$ | | | 17.4 | | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 18 | | ns |
| Fall-Time | | $t_F$ | | | 17.5 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Body-Diode Continuous Current | | $I_S$ | | | | 20 | A |
| Maximum Body-Diode Pulsed Current | | $I_{SM}$ | | | | 40 | A |
| Drain-Source Diode Forward Voltage | | $V_{SD}$ | $I_S$=20A, $V_{GS}$=0V | | | 1.4 | V |
| Body Diode Reverse Recovery Time | | $t_{rr}$ | $I_S$=20A, $V_{GS}$=0V, $dI_F/dt$=100A/μs (Note 1) | | 95 | | ns |
| Reverse Recovery Charge | | $Q_{rr}$ | | | 0.6 | | μC |

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

## ■ TEST CIRCUITS AND WAVEFORMS

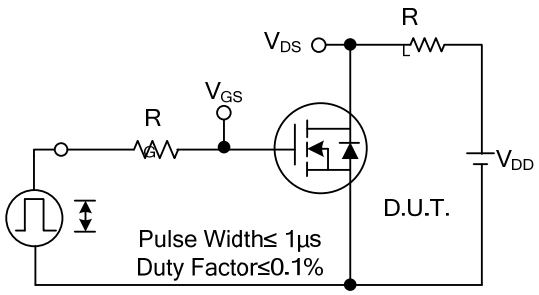



**Peak Diode Recovery dv/dt Test Circuit**

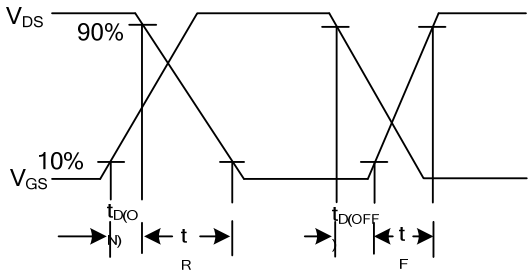



**Peak Diode Recovery dv/dt Waveforms**

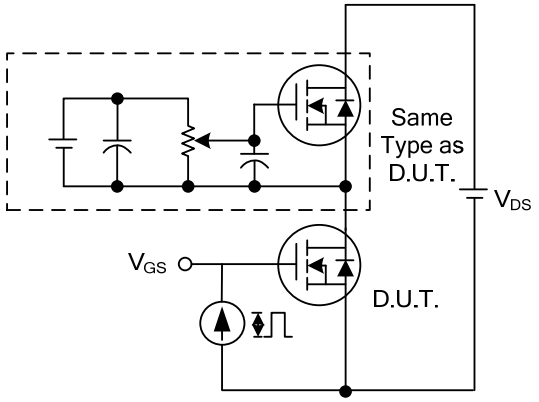
## ■ TEST CIRCUITS AND WAVEFORMS



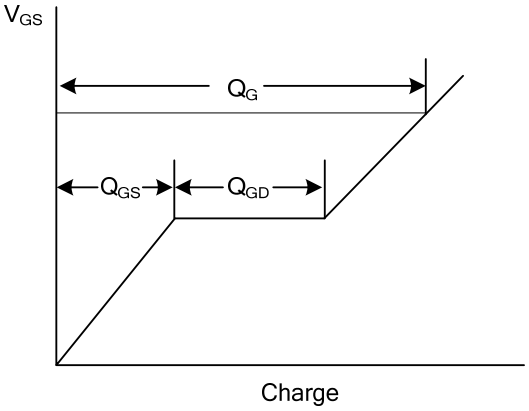

Switching Test Circuit



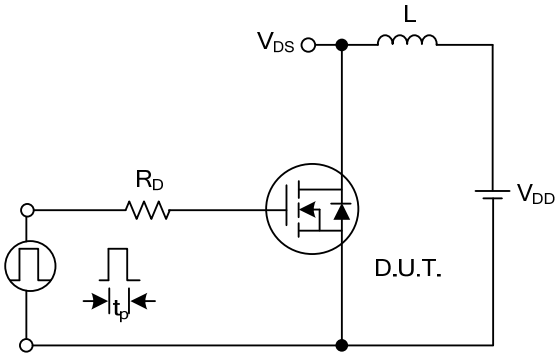

Switching Waveforms



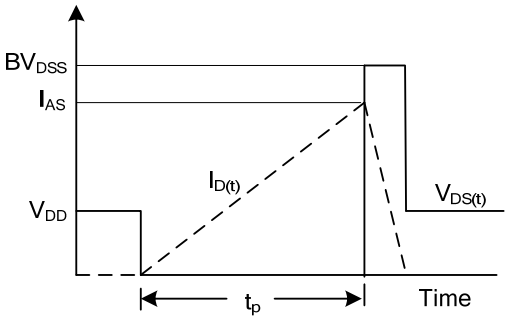

Gate Charge Test Circuit




Gate Charge Waveform




Unclamped Inductive Switching Test Circuit




Unclamped Inductive Switching Waveforms