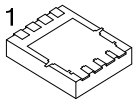
# UNA10R160M

**POWER MOSFET**

## 60A, 100V N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET




DFN5060-8

### ■ DESCRIPTION

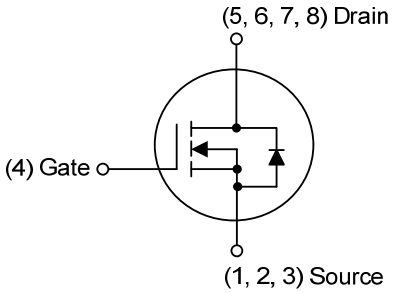
The UTC **UNA10R160M** is N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with high switching speed, a extremely low $R_{DS(ON)}$ and low gate charge.

The UTC **UNA10R160M** is suitable for high frequency Point -of-Load Synchronous, Networking DC-DC System, CCFL Back-light Inverter, etc.

### ■ FEATURES

* $R_{DS(ON)}$ < 16 mΩ @ $V_{GS}$=10V, $I_D$=25A
  $R_{DS(ON)}$ < 18 mΩ @ $V_{GS}$=4.5V, $I_D$=12A
* Green Device Available
* Low Gate Charge
* Surface mount package

### ■ SYMBOL




### ■ ORDERING INFORMATION

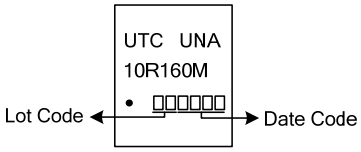
| Ordering Number | | Package | Pin Assignment | | | | | | | | Packing |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| UNA10R160ML-K08-5060-R | UNA10R160MG-K08-5060-R | DFN5060-8 | S | S | S | G | D | D | D | D | Tape Reel |

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

UNA10R160MG-K08-5060-R

| | |
|---|---|
| (1)Packing Type | (1) R: Tape Reel |
| (2)Package Type | (2) K08-5060: DFN5060-8 |
| (3)Green Package | (3) G: Halogen Free and Lead Free, L: Lead Free |

## ■ MARKING



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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 100 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Drain Current | Continuous | $I_D$ | 60 | A |
| | Pulsed (Note 2) | $I_{DM}$ | 240 | A |
| Avalanche Energy (Note 3) | | $E_{AS}$ | 63 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 1.6 | V/ns |
| Power Dissipation | | $P_D$ | 88 | W |
| Junction Temperature | | $T_J$ | +150 | °C |
| Storage Temperature Range | | $T_{STG}$ | -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. Pulse width limited by safe operating area.
3. L=0.1mH, $I_{AS}$=35.5A, $V_{DD}$=20V, $R_G$=25Ω, Starting $T_J$ = 25°C
4. $I_{SD}$≤30A, di/dt≤200A/μs, $V_{DD}$ ≤ $BV_{DSS}$, Starting $T_J$ = 25°C

## ■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 40.3 | °C/W |
| Junction to Case | $\theta_{JC}$ | 1.4 | °C/W |

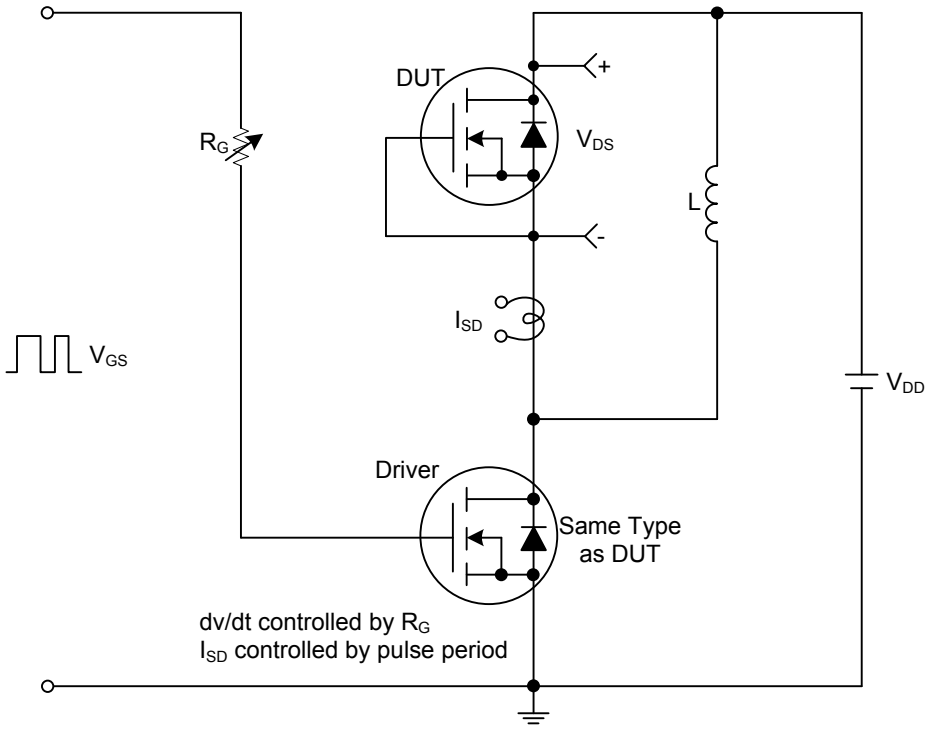
Note: The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2 oz copper.

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

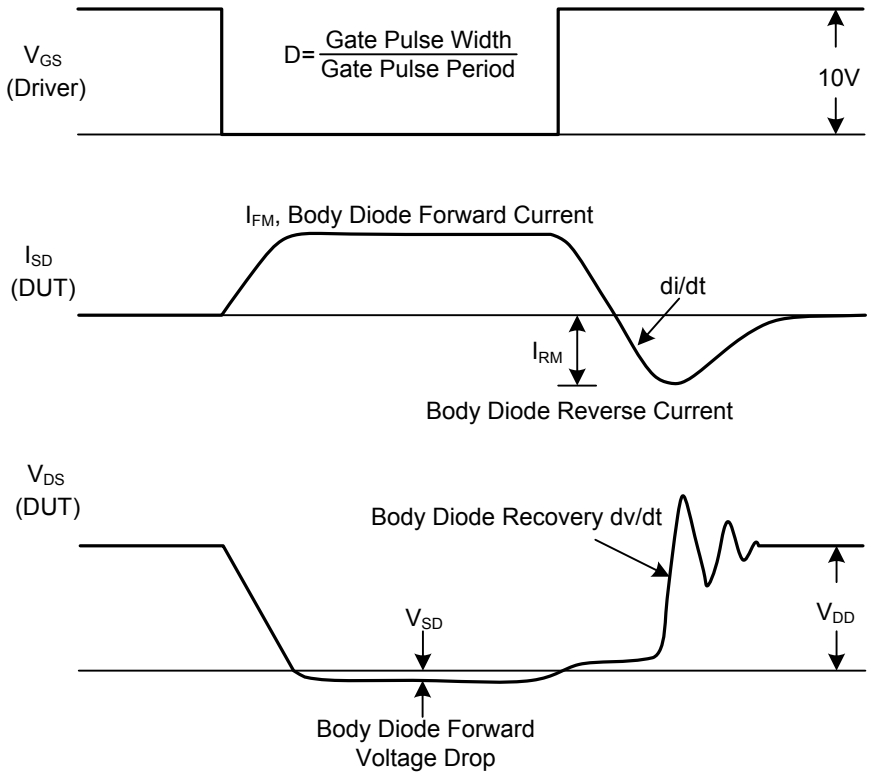
| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 100 | | | V |
| Drain-Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=100V, $V_{GS}$=0V,$T_J$=25°C | | | 1 | 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 | 1.0 | | 3.0 | V |
| Static Drain-Source On-State Resistance | | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=25A | | | 16 | mΩ |
| | | | $V_{GS}$=4.5V, $I_D$=12A | | | 18 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHz | | 6800 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 320 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 190 | | pF |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge (Note 1) | | $Q_G$ | $V_{DS}$=80V, $V_{GS}$=10V, $I_D$=50A $I_G$=1mA (Note1, 2) | | 82 | | nC |
| Gate to Source Charge | | $Q_{GS}$ | | | 32 | | nC |
| Gate to Drain Charge | | $Q_{GD}$ | | | 8 | | nC |
| Turn-on Delay Time (Note 1) | | $t_{D(ON)}$ | $V_{DS}$=50V, $V_{GS}$=10V, $I_D$=28A, $R_G$=25Ω (Note1, 2) | | 31.6 | | ns |
| Rise Time | | $t_R$ | | | 13.4 | | ns |
| Turn-off Delay Time | | $t_{D(OFF)}$ | | | 56 | | ns |
| Fall-Time | | $t_F$ | | | 10 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Body-Diode Continuous Current | | $I_S$ | | | | 60 | A |
| Maximum Body-Diode Pulsed Current | | $I_{SM}$ | | | | 240 | A |
| Forward On Voltage (Note 1) | | $V_{SD}$ | $I_S$=50A, $V_{GS}$=0V | | | 1.2 | V |
| Reverse Recovery Time (Note 1) | | $t_{rr}$ | $I_S$=30A, $V_{GS}$=0V, dI/dt=100A/μs | | 52 | | ns |
| Reverse Recovery Charge | | $Q_{rr}$ | | | 110 | | nC |

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

## ■ TEST CIRCUITS AND WAVEFORMS



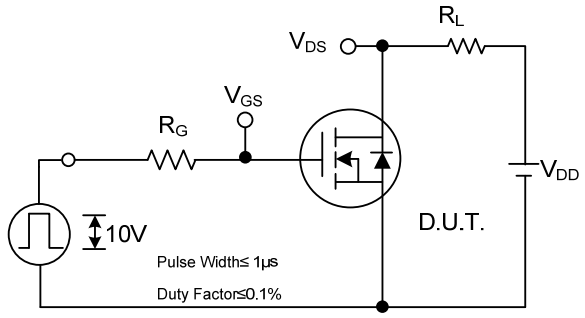

**Peak Diode Recovery dv/dt Test Circuit**



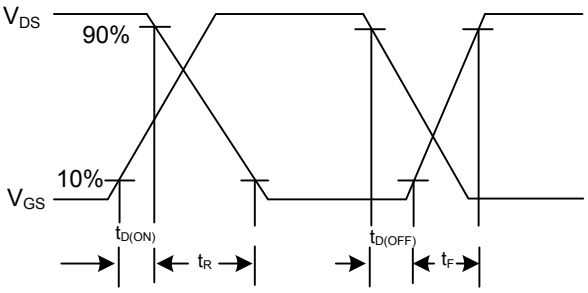

Peak Diode Recovery dv/dt Test Circuit and Waveforms

**Peak Diode Recovery dv/dt Waveforms**

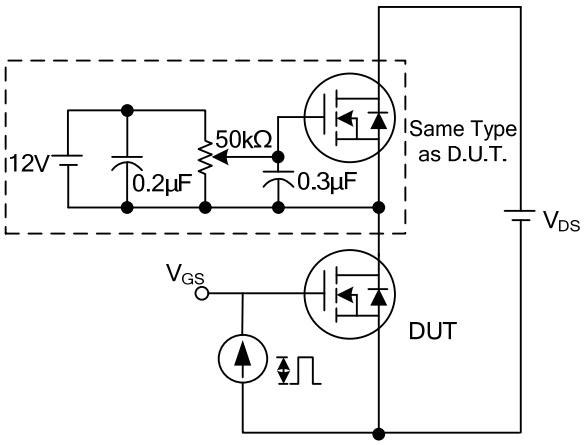
## ■ TEST CIRCUITS AND WAVEFORMS



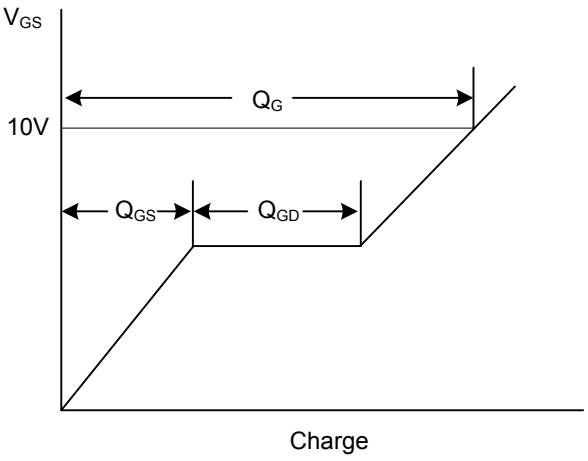

**Switching Test Circuit**



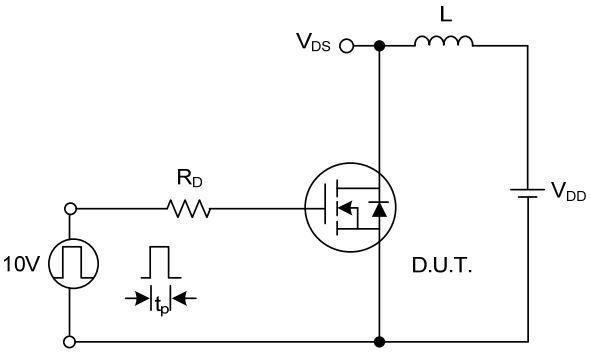

**Switching Waveforms**



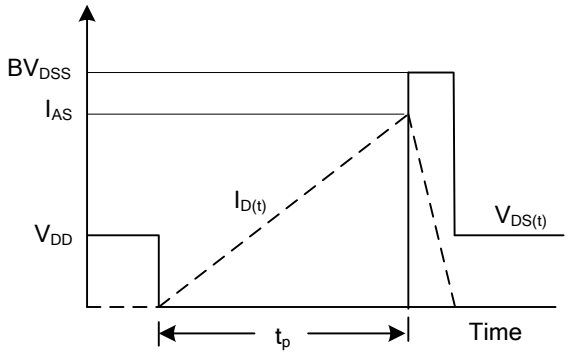

**Gate Charge Test Circuit**




**Gate Charge Waveform**



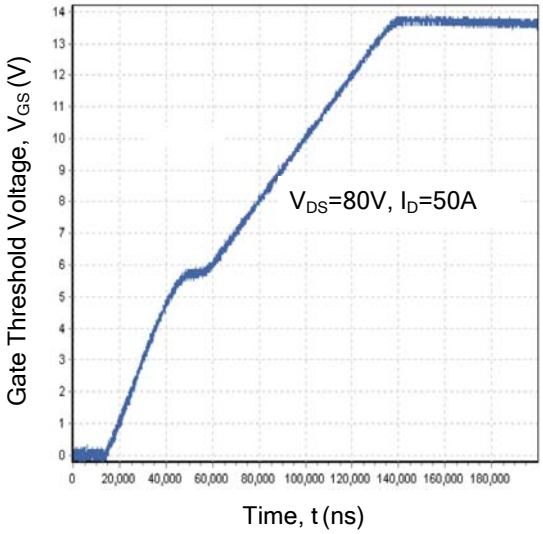

**Unclamped Inductive Switching Test Circuit**




**Unclamped Inductive Switching Waveforms**

## ■ TYPICAL CHARACTERISTICS

Gate-Charge Characteristics




Capacitance Characteristics