



11N40K-MT

Power MOSFET

11.4A, 400V N-CHANNEL POWER MOSFET

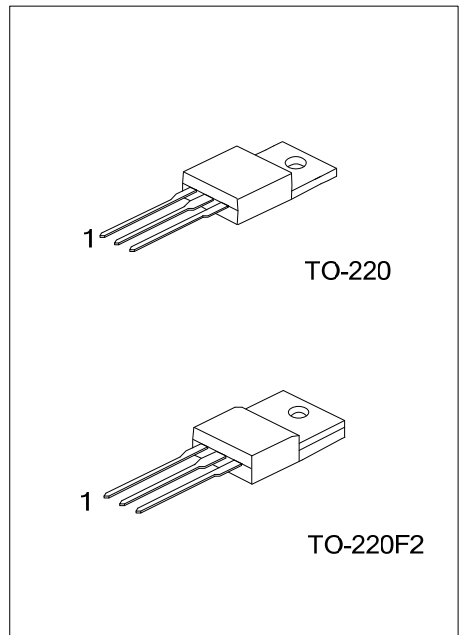
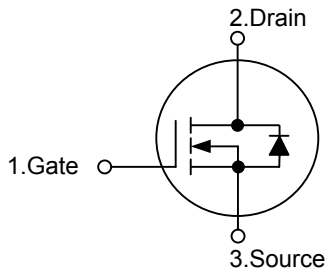
DESCRIPTION

The **11N40K-MT** uses UTC's advanced proprietary, planar stripe, DMOS technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

FEATURES

- * $R_{DS(ON)} < 0.52\Omega @ V_{GS} = 10V, I_D = 5.7A$
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

SYMBOL



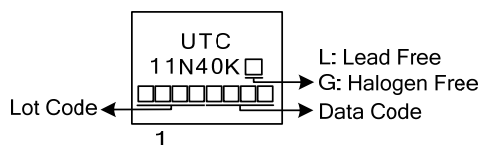
ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|---------------|----------|----------------|---|---|---------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 11N40KL-TA3-T | 11N40KG-TA3-T | TO-220 | G | D | S | Tube |
| 11N40KL-TF2-T | 11N40KG-TF2-T | TO-220F2 | G | D | S | Tube |

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

| | |
|--|---|
| <p>11N40KL-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p> | <p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF2: TO-220F2</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p> |
|--|---|

MARKING



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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|-----------------------|-----------|------------|---------------------------|
| Drain-Source Voltage | | V_{DSS} | 400 | V |
| Gate-Source Voltage | | V_{GSS} | ± 30 | V |
| Continuous Drain Current ($T_C = 25^\circ\text{C}$) | | I_D | 11.4 | A |
| Pulsed Drain Current (Note 2) | | I_{DM} | 46 | A |
| Avalanche Current (Note 2) | | I_{AR} | 11.4 | A |
| Avalanche Energy | Single Pulsed(Note 3) | E_{AS} | 454 | mJ |
| | Repetitive(Note 2) | E_{AR} | 14.7 | |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 4.5 | V/ns |
| Power Dissipation | TO-220 | P_D | 147 | W |
| | TO-220F2 | | 35 | W |
| Derate above 25°C | TO-220 | | 1.176 | $\text{W}/^\circ\text{C}$ |
| | TO-220F2 | | 0.28 | $\text{W}/^\circ\text{C}$ |
| 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. $L=7\text{mH}$, $I_{AS}=11.4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 11.4\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------|----------|---------------|---------|---------------------------|
| Junction to Ambient | | θ_{JA} | 62.5 | $^\circ\text{C}/\text{W}$ |
| Junction to Case | TO-220 | θ_{JC} | 0.85 | $^\circ\text{C}/\text{W}$ |
| | TO-220F2 | | 3.86 | $^\circ\text{C}/\text{W}$ |

■ 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} | V _{GS} = 0 V, I _D = 250 μA | 400 | | | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 400V, V _{GS} = 0 V | | | 1 | μA |
| | | V _{DS} = 320V, T _C = 125°C | | | 10 | |
| Gate-Body Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±30 V | | | ±100 | nA |
| Breakdown Voltage Temperature Coefficient | ΔBV _{DSS} /ΔT _J | I _D = 250 μA, Referenced to 25°C | | 0.42 | | mV/°C |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | V _{DS} = V _{GS} , I _D = 250 μA | 2.0 | | 4.0 | V |
| Static Drain-Source On-Resistance | R _{DS(ON)} | V _{GS} = 10 V, I _D = 5.7 A | | 0.37 | 0.52 | Ω |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} = 25V, V _{GS} = 0V, f = 1MHz | | 670 | 970 | pF |
| Output Capacitance | C _{OSS} | | | 135 | 195 | |
| Reverse Transfer Capacitance | C _{RSS} | | | 8.9 | 15 | |
| SWITCHING PARAMETERS | | | | | | |
| Turn-ON Delay Time | t _{D(ON)} | V _{DD} = 30V, I _D = 0.5A, R _{GEN} = 25Ω (Note 1, 2) | | 60 | | ns |
| Turn-ON Rise Time | t _R | | | 88 | | |
| Turn-OFF Delay Time | t _{D(OFF)} | | | 150 | | |
| Turn-OFF Fall-Time | t _F | | | 85 | | |
| Total Gate Charge | Q _G | V _{DS} = 50V, V _{GS} = 10V, I _D = 1.3A (Note 1, 2) | | 27 | 35 | nC |
| Gate Source Charge | Q _{GS} | | | 8.9 | | |
| Gate Drain Charge | Q _{GD} | | | 6.6 | | |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Drain-Source Diode Forward Voltage | V _{SD} | I _S = 11.4 A, V _{GS} = 0V | | | 1.5 | V |
| Maximum Body-Diode Continuous Current | I _S | | | | 11.4 | A |
| Maximum Body-Diode Pulsed Current | I _{SM} | | | | 46 | A |

Notes: 1. Pulse Test: Pulse Width ≤ 300 s, Duty Cycle ≤ 2%
 2. Independent of operating temperature

TEST CIRCUIT

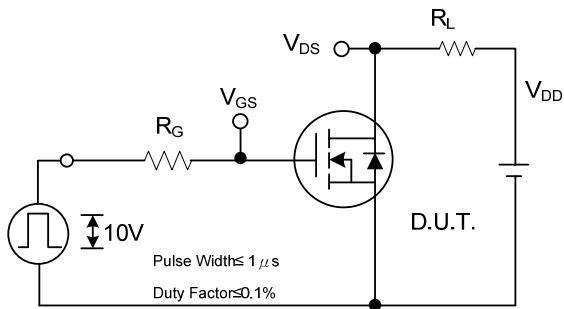


Fig. 2A Switching Test Circuit

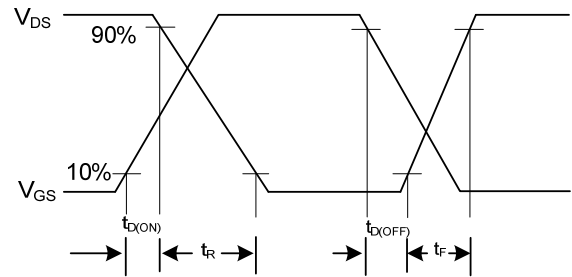


Fig. 2B Switching Waveforms

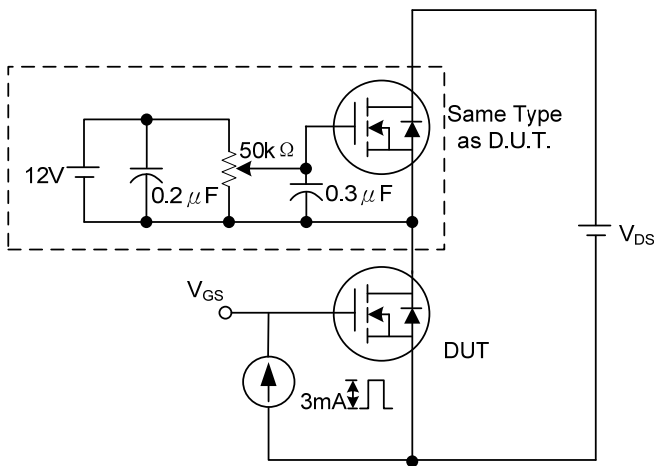


Fig. 3A Gate Charge Test Circuit

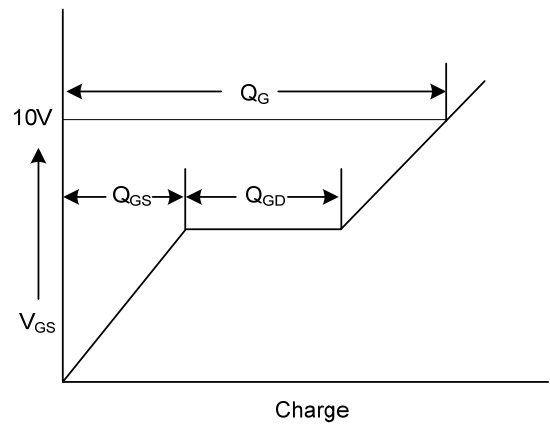


Fig. 3B Gate Charge Waveform

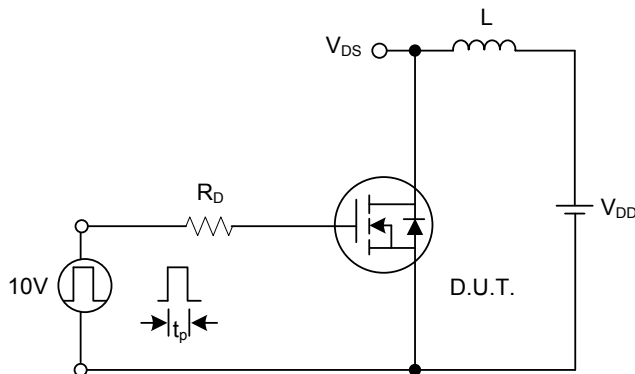


Fig. 4A Unclamped Inductive Switching Test Circuit

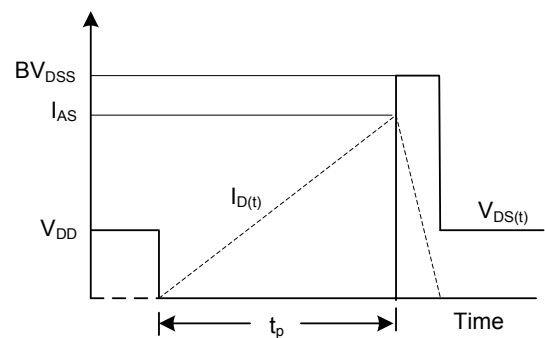


Fig. 4B Unclamped Inductive Switching Waveforms

TEST CIRCUIT(Cont.)

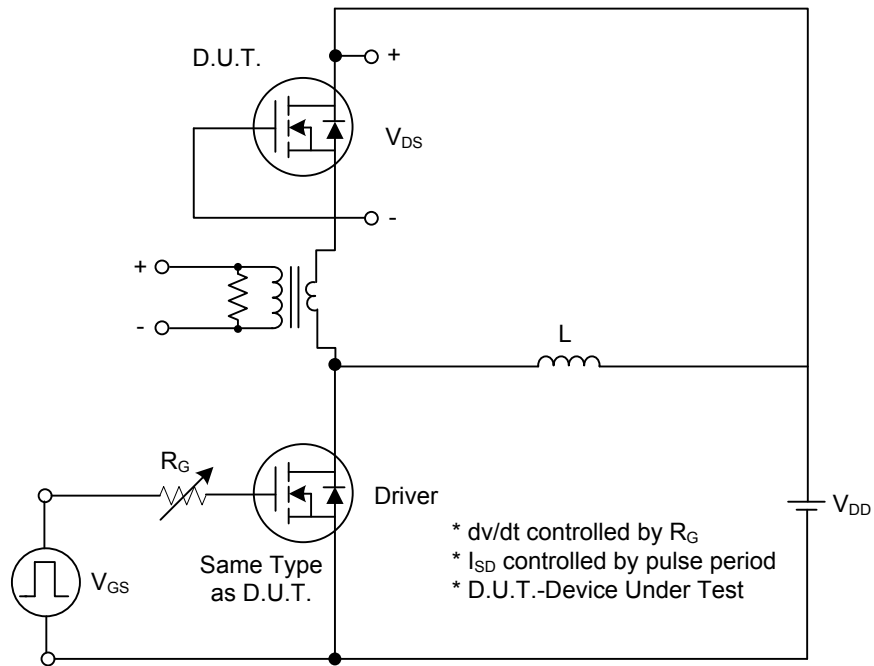
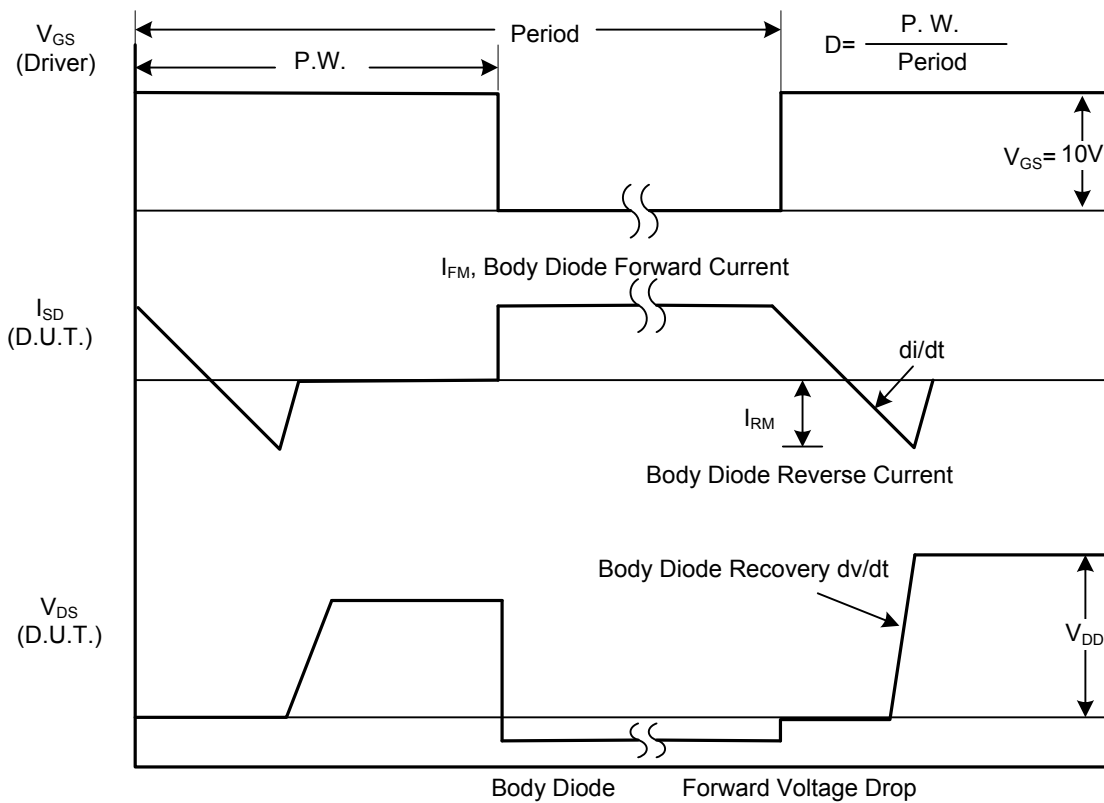
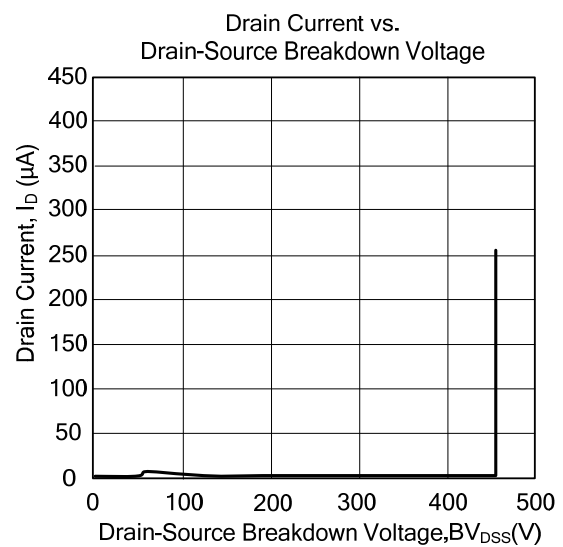
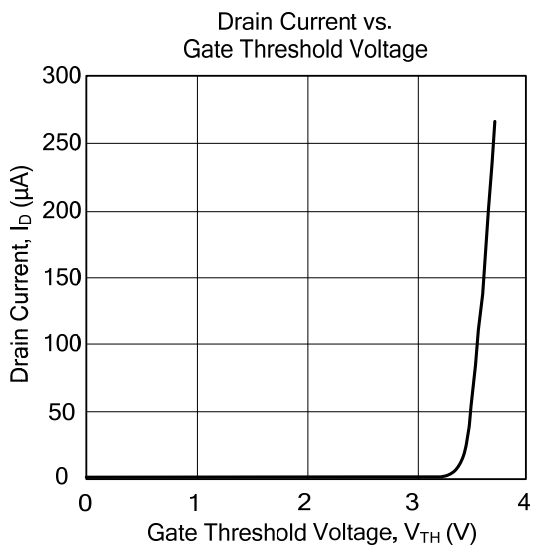
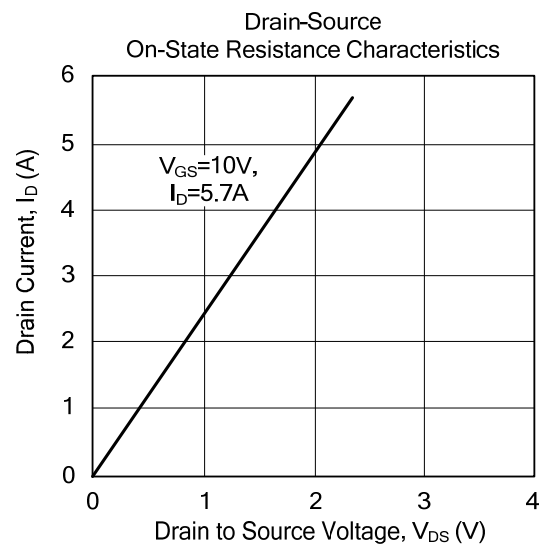
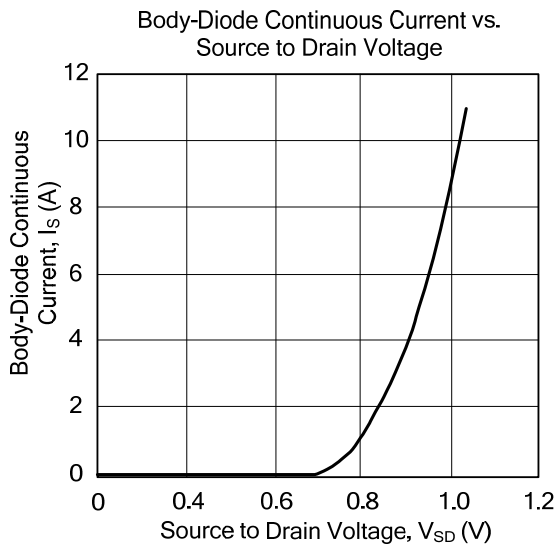


Fig. 1A Peak Diode Recovery dv/dt Test Circuit



TYPICAL CHARACTERISTICS



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