

# UNISONIC TECHNOLOGIES CO., LTD

2N80 **Power MOSFET** 

# 2.4A, 800V N-CHANNEL **POWER MOSFET**

#### **DESCRIPTION**

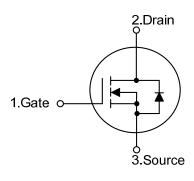
The UTC 2N80 is an N-channel mode power MOSFET using UTC's advanced technology to provide costumers planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

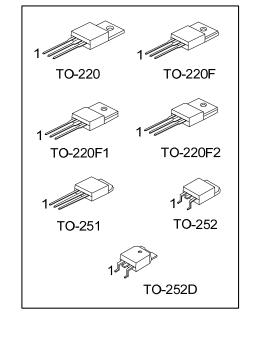
The UTC 2N80 is universally applied in high efficiency switch mode power supply.

### **FEATURES**

- \*  $R_{DS(on)}$  < 6.3 $\Omega$  @  $V_{GS}$ =10V,  $I_{D}$ =1.2A
- \* High switching speed

#### **SYMBOL**

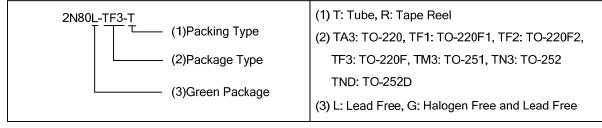




#### ORDERING INFORMATION

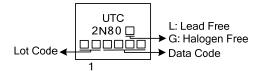
| Ordering Number |              | Daakaga  | Pin Assignment |   |   | Packing   |  |
|-----------------|--------------|----------|----------------|---|---|-----------|--|
| Lead Free       | Halogen Free | Package  | 1              | 2 | 3 | Facking   |  |
| 2N80L-TA3-T     | 2N80G-TA3-T  | TO-220   | G              | D | S | Tube      |  |
| 2N80L-TF1-T     | 2N80G-TF1-T  | TO-220F1 | G              | D | S | Tube      |  |
| 2N80L-TF2-T     | 2N80G-TF2-T  | TO-220F2 | G              | D | S | Tube      |  |
| 2N80L-TF3-T     | 2N80G-TF3-T  | TO-220F  | G              | D | S | Tube      |  |
| 2N80L-TM3-R     | 2N80G-TM3-R  | TO-251   | G              | D | S | Tube      |  |
| 2N80L-TN3-R     | 2N80G-TN3-R  | TO-252   | G              | D | S | Tape Reel |  |
| 2N80L-TND-R     | 2N80G-TND-R  | TO-252D  | G              | D | S | Tape Reel |  |

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



www.unisonic.com.tw 1 of 7

# ■ MARKING



# ■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C, unless otherwise specified)

| PARAMETER              |                              | SYMBOL  | RATINGS            | UNIT |  |
|------------------------|------------------------------|---|--------------------|------|--|
| Drain-Source Voltage   | -Source Voltage              |   | 800                | V    |  |
| Gate-Source Voltage    |                              | V <sub>DSS</sub> 800           V <sub>GSS</sub> ±30 |                    | V    |  |
| Avalanche Current (Not | e 2)                         | $I_{AR}$  | 2.4                | Α    |  |
| Drain Current          | Continuous                   | Ι <sub>D</sub>                                      | 2.4                | Α    |  |
| Drain Current          | Pulsed (Note 2)              | I <sub>DM</sub>                                     | 9.6                | Α    |  |
| Avalonaha Enavev       | Single Pulsed (Note 3)       | E <sub>AS</sub>                                     | 180                | mJ   |  |
| Avalanche Energy       | Repetitive (Note 2)          | E <sub>AR</sub>                                     | 8.5                | mJ   |  |
| Peak Diode Recovery d  | v/dt (Note 4)                | dv/dt   | 4.0                | V/ns |  |
|                        | TO-220                       |   | 85                 |      |  |
| Power Dissipation      | TO-220F/TO-220F1<br>TO-220F2 | $P_{D}$   | 24                 | W    |  |
|                        | TO-251/TO-252<br>TO-252D     |   | 43                 |      |  |
| Junction Temperature   | unction Temperature          |   | +150               | °C   |  |
| Storage Temperature    | Storage Temperature          |   | -55 ~ <b>+</b> 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 = 59mH,  $I_{AS}$  = 2.4A,  $V_{DD}$  = 50V,  $R_{G}$  = 25  $\Omega$ , Starting  $T_{J}$  = 25°C
- 4.  $I_{SD} \le 2.4 A$ , di/dt  $\le 200 A/\mu s$ ,  $V_{DD} \le BV_{DSS}$ , Starting  $T_J = 25 ^{\circ}C$

### **■ THERMAL DATA**

| PARAMETER           |                                      | SYMBOL           | RATINGS | UNIT   |  |
|---------------------|--------------------------------------|------------------|---------|--------|--|
| Junction to Ambient | TO-220/ TO-220F<br>TO-220F1/TO-220F2 |                  | 62.5    | °0.004 |  |
|                     | TO-251/TO-252<br>TO-252D             | $	heta_{JA}$     | 110     | °C/W   |  |
|                     | TO-220                               |                  | 1.47    |        |  |
| Junction to Case    | TO-220F/TO-220F1<br>TO-220F2         | $\theta_{ m JC}$ | 5.2     | °C/W   |  |
|                     | TO-251/TO-252<br>TO-252D             |                  | 2.85    |        |  |

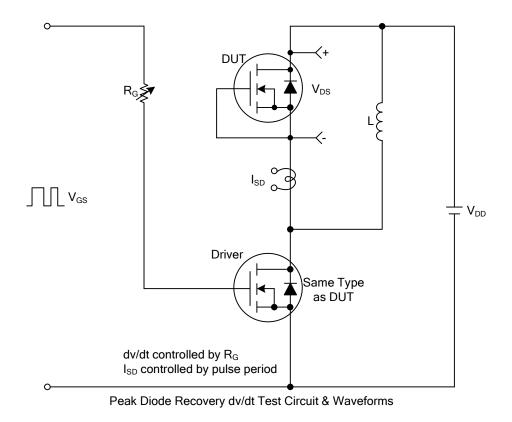
# ■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise specified)

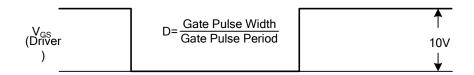
| Drain-Source Leakage Current   I <sub>DSS</sub>   V <sub>DS</sub> =800V, V <sub>GS</sub> =0V   100   μA  | PARAMETER                        |            | SYMBOL              | TEST CONDITIONS                             | MIN | TYP  | MAX | UNIT |
|--|----------------------------------|------------|---------------------|---|-----|------|-----|------|
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $  | OFF CHARACTERISTICS              |            |                     |   | •   |      |     |      |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                                  |            | BV <sub>DSS</sub>   | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V  | 800 |      |     | V    |
| $ \begin{array}{ c c c c } \hline \text{Cate-Source Leakage Current} & \hline \text{I}_{DSS} & \hline V_{DS}=640V, T_{C}=125^{\circ}C & 100 & \mu A \\ \hline \text{Gate-Source Leakage Current} & \hline \text{Forward} & \hline \text{Reverse} & \hline \text{I}_{GSS} & \hline V_{GS}=430V, V_{DS}=0V & +100 & nA \\ \hline \textbf{ON CHARACTERISTICS} & \hline \text{Gate Threshold Voltage} & \hline V_{GS(TH)} & \hline V_{DS}=V_{GS}, \ I_{D}=250\mu A & 3.0 & 5.0 & V \\ \hline \text{Static Drain-Source On-State Resistance} & \hline R_{DS(ON)} & \hline V_{SS}=10V, \ I_{D}=1.2A & 4.8 & 6.3 & \Omega \\ \hline \text{Forward Transconductance (Note 1)} & \hline \text{g}_{FS} & \hline V_{DS}=50V, \ I_{D}=1.2A & 2.65 & S \\ \hline \textbf{DYNAMIC PARAMETERS} & \hline \hline \text{Input Capacitance} & \hline \text{C}_{ISS} & \hline V_{SS}=50V, \ I_{D}=1.2A & 5.0 & 0.5 \\ \hline \textbf{Output Capacitance} & \hline \text{C}_{CSS} & \hline \text{COSS} & \hline \text{F1.0MHz} & 7 & 9 & pF \\ \hline \textbf{SWITCHING PARAMETERS} & \hline \hline \text{Turn-ON Delay Time} & \hline \text{t}_{D(ON)} & \hline \text{Rise Time} & \hline \text{t}_{R} & \hline \text{I}_{D}=0.5A, \ R_{G}=25\Omega & 80 & ns \\ \hline \text{Fall-Time} & \hline \text{t}_{F} & \hline \text{Input Capacitance} & \hline \text{C}_{GSS} & \hline \text{Input Capacitance} & \hline \text{C}_{SS} & \hline \text{Input Capacitance} & \hline \text{C}_{SS} & \hline \text{Input Capacitance} & \hline \text{C}_{SS} & \hline \text{SOURCE-Darage} & \hline \text{Q}_{GS} & \hline \text{Input Capacitance} & \hline \text{C}_{SS} & \hline \text{SOURCE-Darameters} & \hline \text{Input Capacitance} & \hline \text{C}_{SS} & \hline \text{Input Capacitance} & \hline \text{Input Capacitance} & \hline \text{C}_{SS} & \hline \text{Input Capacitance} & \hline Input C$ |                                  |            |                     | 1   |     | 0.9  |     | V/°C |
|  | Drain-Source Leakage Current     |            | I <sub>DSS</sub>    |   |     |      |     | μΑ   |
| ON CHARACTERISTICS   Gate Threshold Voltage   V_{GS(TH)}   V_{DS}=V_{GS}, I_D=250 μA   3.0   5.0   V   Static Drain-Source On-State Resistance   R_{DS(ON)}   V_{GS}=10V, I_D=1.2A   4.8   6.3   Ω   Forward Transconductance (Note 1)   g <sub>FS</sub>   V_{DS}=50V, I_D=1.2A   2.65   S   DYNAMIC PARAMETERS  | Gate- Source Leakage Current     |            | I <sub>GSS</sub>    | V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V  |     |      |     |      |
| Static Drain-Source On-State Resistance   R <sub>DS(ON)</sub>   V <sub>GS</sub> =10V, I <sub>D</sub> =1.2A   4.8   6.3   Ω   | ON CHARACTERISTICS               | •          | •                   | , 50  | · · |      |     |      |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Gate Threshold Voltage           |            | $V_{GS(TH)}$        | $V_{DS}=V_{GS}$ , $I_{D}=250\mu A$          | 3.0 |      | 5.0 | V    |
| Forward Transconductance (Note 1)   g <sub>FS</sub>   V <sub>DS</sub> =50V, I <sub>D</sub> =1.2A   2.65   S  | Static Drain-Source On-State Re  | sistance   |                     | V <sub>GS</sub> =10V, I <sub>D</sub> =1.2A  |     | 4.8  | 6.3 | Ω    |
| $ \begin{array}{ c c c c c } \hline \text{Input Capacitance} & C_{ISS} \\ \hline \text{Output Capacitance} & C_{OSS} \\ \hline \text{Reverse Transfer Capacitance} & C_{RSS} \\ \hline \hline \text{Reverse Transfer Capacitance} & C_{RSS} \\ \hline \hline \text{Turn-ON Delay Time} & t_{D(ON)} \\ \hline \text{Rise Time} & t_{R} \\ \hline \text{Turn-OFF Delay Time} & t_{D(OFF)} \\ \hline \text{Fall-Time} & t_{F} \\ \hline \text{Cate to Source Charge} & Q_{G} \\ \hline \text{Gate to Drain Charge} & Q_{GD} \\ \hline \text{Maximum Pulsed Drain-Source Diode} \\ \hline \text{Forward Current} \\ \hline \text{Drain-Source Diode Forward Voltage} & V_{SD} \\ \hline \text{Reverse Recovery Time (Note 1)} \\ \hline \end{array}$   | Forward Transconductance (Note   | e 1)       |                     | $V_{DS}$ =50V, $I_{D}$ =1.2A                |     | 2.65 |     | S    |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | DYNAMIC PARAMETERS               |            |                     |   |     |      |     |      |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Input Capacitance                |            | C <sub>ISS</sub>    | \/ -0\/ \/ -25\/                            |     | 550  | 650 | pF   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Output Capacitance               |            |                     |   |     | 45   | 60  | pF   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Reverse Transfer Capacitance     |            | C <sub>RSS</sub>    | 1-1.0IVII 12                                |     | 7    | 9   | pF   |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | SWITCHING PARAMETERS             |            |                     |   |     |      |     |      |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Turn-ON Delay Time               |            | t <sub>D(ON)</sub>  |   |     | 50   |     | ns   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                                  |            | t <sub>R</sub>      |   |     | 60   |     | ns   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Turn-OFF Delay Time              |            | t <sub>D(OFF)</sub> |   |     | 80   |     | ns   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Fall-Time                        | II-Time    |                     | (14010-1,2)                                 |     | 40   |     | ns   |
| Gate to Drain Charge         Q <sub>GD</sub> (Note 1,2)         5         nC           SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS           Maximum Continuous Drain-Source Diode Forward Current         I <sub>S</sub> 2.4         A           Maximum Pulsed Drain-Source Diode Forward Current         I <sub>SM</sub> 9.6         A           Drain-Source Diode Forward Voltage         V <sub>SD</sub> I <sub>S</sub> =2.4A, V <sub>GS</sub> =0V         1.4         V           Reverse Recovery Time (Note 1)         t <sub>RR</sub> I <sub>S</sub> =2.4A, V <sub>GS</sub> =0V,         480         ns  | Total Gate Charge                |            | $Q_G$               | $V_{GS}$ =10V, $V_{DS}$ =50V,               |     | 18   | 28  | nC   |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS           Maximum Continuous Drain-Source Diode Forward Current         Is         2.4         A           Maximum Pulsed Drain-Source Diode Forward Current         Is         9.6         A           Drain-Source Diode Forward Voltage         VsD         Is=2.4A, Vs=0V         1.4         V           Reverse Recovery Time (Note 1)         trans         Is=2.4A, Vs=0V         480         ns   | Gate to Source Charge            |            | $Q_GS$              | I <sub>D</sub> =1.3A, I <sub>G</sub> =100μA |     | 6    |     | nC   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Gate to Drain Charge             |            | $Q_GD$              | (Note 1,2)                                  |     | 5    |     | nC   |
| Forward Current         Is         2.4         A           Maximum Pulsed Drain-Source Diode Forward Current         Ism         9.6         A           Drain-Source Diode Forward Voltage         VsD         Is=2.4A, Vs=0V         1.4         V           Reverse Recovery Time (Note 1)         truly Is=2.4A, Vs=0V         480         ns  | SOURCE- DRAIN DIODE RATII        | NGS AND CH | ARACTERISTIC        | S   |     |      |     |      |
| Forward Current $I_{SM}$ $9.6$ A Drain-Source Diode Forward Voltage $V_{SD}$ $I_{S}$ =2.4A, $V_{GS}$ =0V $1.4$ V Reverse Recovery Time (Note 1) $I_{RR}$ $I_{S}$ =2.4A, $V_{GS}$ =0V, $I_{S}$   |                                  |            | Is                  |   |     |      | 2.4 | Α    |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                                  | Diode      | I <sub>SM</sub>     |   |     |      | 9.6 | Α    |
| Reverse Recovery Time (Note 1) t <sub>RR</sub> I <sub>S</sub> =2.4A, V <sub>GS</sub> =0V, 480 ns   |                                  |            | $V_{SD}$            | I <sub>S</sub> =2.4A, V <sub>GS</sub> =0V   |     |      | 1.4 | V    |
|  |                                  |            |                     |   |     | 480  |     | ns   |
| reverse Recovery Charge (Note 1) $  Q_{RR}     q_{IF}/q_{I} = 100A/\mu s$ $  2.0   \mu C$  | Reverse Recovery Charge (Note 1) |            | Q <sub>RR</sub>     | dI <sub>F</sub> /dt=100A/μs                 |     | 2.0  |     | μC   |

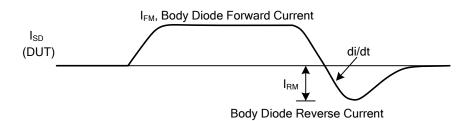
Notes: 1. Pulse Test: Pulse width ≤ 300µs, Duty cycle ≤ 2%

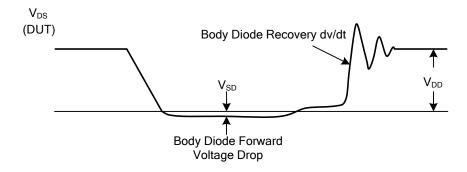
2. Essentially independent of operating temperature

# ■ TEST CIRCUITS AND WAVEFORMS

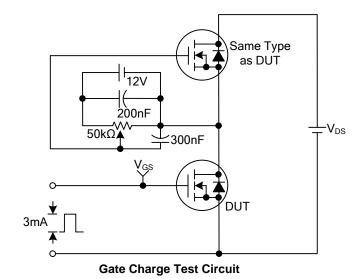


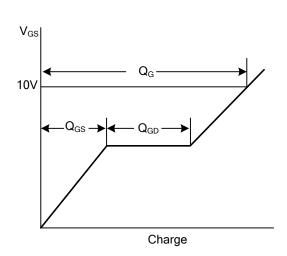




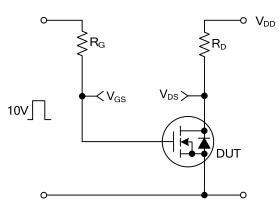


# ■ TEST CIRCUITS AND WAVEFORMS(Cont.)

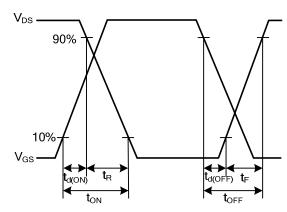




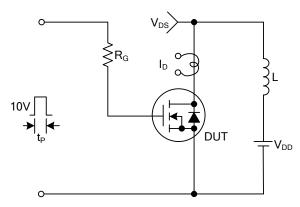
**Gate Charge Waveforms** 



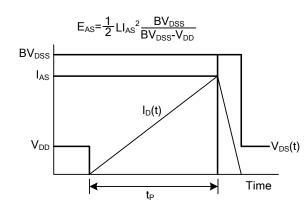




**Resistive Switching Waveforms** 



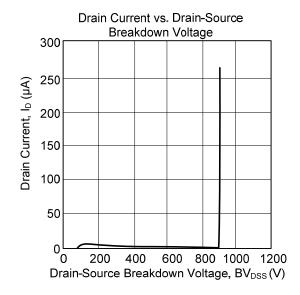
**Unclamped Inductive Switching Test Circuit** 

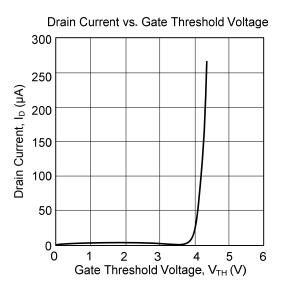


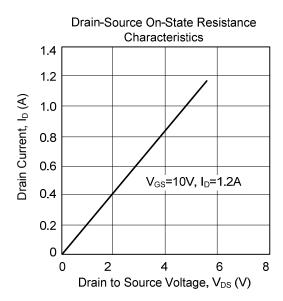
**Unclamped Inductive Switching Waveforms** 

2N80 Power MOSFET

#### **■ TYPICAL CHARACTERISTICS**







UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.

单击下面可查看定价,库存,交付和生命周期等信息

>>UTC(友顺)