

UV50N60Q  
600V 47A N-Channel Mosfet

## General Description

The UV50N60Q has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge

### Features

Enhancement Mode

100% Avalanche Tested

|                              |     |           |
|------------------------------|-----|-----------|
| $V_{DS}$                     | 600 | V         |
| $R_{DS(on)\ TYP}@V_{GS}=10V$ | 60  | $m\Omega$ |
| $I_D$                        | 47  | A         |

## Applications

Power switching application

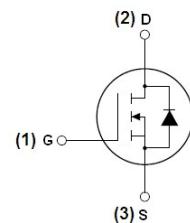
Hard Switched and High Frequency Circuits

Uninterruptible Power Supply

Isolated DC/DC Converters in Telecom and Industrial



TO-247-3L Top view



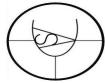
Schematic diagram

## Package Marking And Ordering Information

| Part ID  | Package Type | Marking  | Tape and Reel information |
|----------|--------------|----------|---------------------------|
| UV50N60Q | TO-247-3L    | UV50N60Q | 30pcs/Tube                |

## Maximum ratings, at $T_j=25^\circ C$ , unless otherwise specified

| Symbol         | Parameter                               | Rating            | Unit |
|----------------|---|-------------------|------|
| $V_{(BR)DSS}$  | Drain –Source breakdown voltage         | 600               | V    |
| $I_S$          | Diode continuous forward current        | $T_c=25^\circ C$  | A    |
| $I_D$          | Continuous drain current @ $V_{gs}=10V$ | $T_c=25^\circ C$  | A    |
|                |   | $T_c=100^\circ C$ | A    |
| $I_{DM}$       | Pulse drain current tested①             | $T_c=25^\circ C$  | A    |
| $E_{AS}$       | Avalanche energy, single pulsed②        | 1130              | mJ   |
| $P_D$          | Maximum power dissipation               | $T_c=25^\circ C$  | W    |
| $V_{GS}$       | Gate-Source voltage                     | $\pm 30$          | V    |
| $T_{STG}\ T_J$ | Storage and operating temperature range | -55 to 175        | °C   |



## Thermal Characteristic

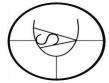
| Symbol    | Parameter                              | Typical | Unit |
|-----------|--|---------|------|
| $R_{QJC}$ | Thermal Resistance-Junction to Case    | 0.43    | °C/W |
| $R_{QJA}$ | Thermal Resistance-Junction to Ambient | 62.5    | °C/W |

## Typical Characteristics

| Symbol  | Parameter  | Condition  | Min | Type | Max       | Unit          |
|---|--|--|-----|------|-----------|---------------|
| Static Electrical Characteristics @ $T_j=25^\circ\text{C}$ ( unless otherwise stated)   |  |  |     |      |           |               |
| $V_{(\text{BR})DSS}$  | Drain-Source Breakdown Voltage                             | $V_{GS}=0\text{V}$ $I_D=250\mu\text{A}$  | 600 |      |           | V             |
| $I_{DSS}$   | Zero Gate Voltage Drain Current                            | $V_{DS}=480\text{V}$ , $V_{GS}=0\text{V}$  |     |      | 10        | $\mu\text{A}$ |
|   | Zero Gate Voltage Drain Current( $T_j=125^\circ\text{C}$ ) | $V_{DS}=480\text{V}$ , $V_{GS}=0\text{V}$  |     |      | 500       | $\mu\text{A}$ |
| $I_{GSS}$   | Gate-Body Leakage Current                                  | $V_{GS}=\pm 30\text{V}$ , $V_{DS}=0\text{V}$   |     |      | $\pm 150$ | nA            |
| $V_{GS(\text{TH})}$   | Gate Threshold Voltage                                     | $V_{DS}=VGS$ , $I_D=250\mu\text{A}$  | 3   |      | 5         | V             |
| $R_{DS(\text{ON})}$   | Drain-Source On-State Resistance③                          | $V_{GS}=10\text{V}$ , $I_D=20\text{A}$   |     | 0.06 | 0.072     | $\Omega$      |
| Dynamic Electrical Characteristics @ $T_j=25^\circ\text{C}$ ( unless otherwise stated ) |  |  |     |      |           |               |
| $C_{iss}$   | Input Capacitance  | $V_{DS}=200\text{V}$ ,<br>$V_{GS}=0\text{V}$ ,<br>$f=1\text{MHz}$                                      |     | 4655 |           | PF            |
| $C_{oss}$   | Output Capacitance   |  |     | 185  |           | PF            |
| $C_{rss}$   | Reverse Transfer Capacitance                               |  |     | 5.1  |           | PF            |
| $R_g$   | Gate Resistance  | $f=1\text{MHz}$  |     | 2    |           | $\Omega$      |
| $Q_g$   | Total Gate Charge  | $V_{DS}=480\text{V}$ ,<br>$I_D=24\text{A}$ ,<br>$V_{GS}=10\text{V}$                                    |     | 104  | 130       | nC            |
| $Q_{gs}$  | Gate-Source Charge   |  |     | 30   |           | nC            |
| $Q_{gd}$  | Gate-Drain Charge  |  |     | 34   |           | nC            |
| Switching Characteristics   |  |  |     |      |           |               |
| $t_{d(on)}$   | Turn-on Delay time   | $V_{DD}=380\text{V}$ ,<br>$I_D=24\text{A}$ ,<br>$R_G=25\ \Omega$ ,<br>$V_{GS}=10\text{V}$              |     | 34   |           | nS            |
| $t_r$   | Turn-on Rise time  |  |     | 31   |           | nS            |
| $t_{d(off)}$  | Turn-off Delay time  |  |     | 80   |           | nS            |
| $t_f$   | Turn-off Fall time   |  |     | 26   |           | nS            |
| Source-Drain Diode Characteristics  |  |  |     |      |           |               |
| $V_{SD}$  | Forward on voltage   | $I_{SD}=24\text{A}$ , $V_{GS}=0\text{V}$   |     | 0.9  | 1.3       | V             |
| $t_{rr}$  | Reverse Recovery Time                                      | $T_j=25^\circ\text{C}$ , $I_{SD}=24\text{A}$ ,<br>$V_{GS}=0\text{V}$ , $di/dt=100\text{A}/\mu\text{s}$ |     | 230  | 320       | nS            |
| $Q_{rr}$  | Reverse Recovery Charge                                    |  |     | 2.7  | 5         | nC            |

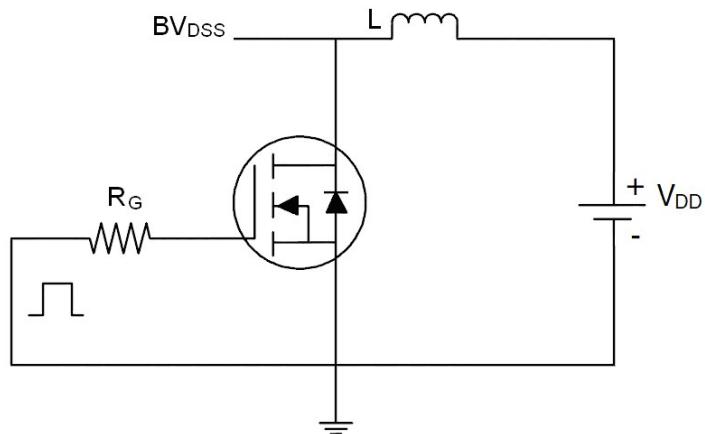
Note:

- ① Repetitive rating; pulse width limited by max, junction temperature.
- ② Limited by  $T_j$ max, starting  $T_j=25^\circ\text{C}$ ,  $L=20\text{mH}$ ,  $R_G=25\ \Omega$ ,  $I_{AS}=9\text{A}$ ,  $V_{GS}=10\text{V}$ , Part not recommended for use above this value
- ③ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$

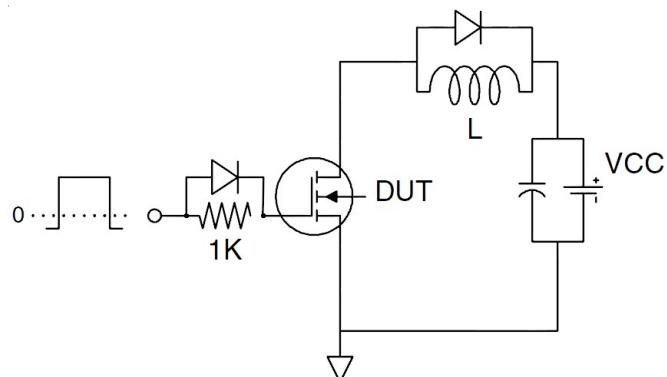


## Test circuit

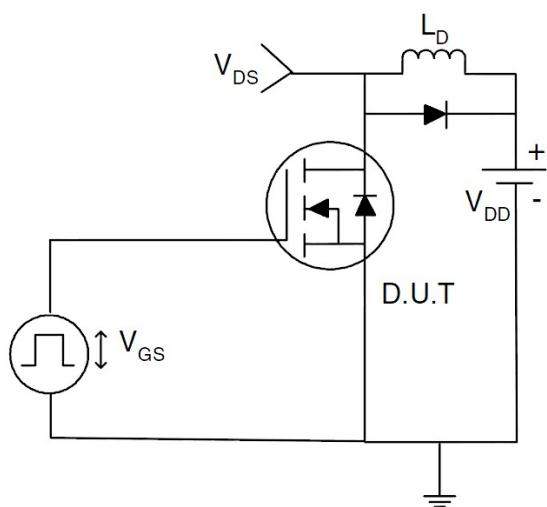
### (1) $E_{AS}$ test circuits

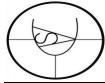


### (2) Gate charge test circuit

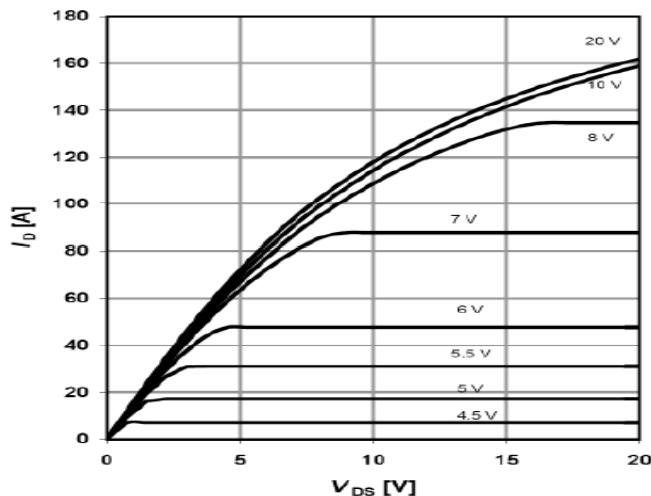


### (3) Switch time test circuit

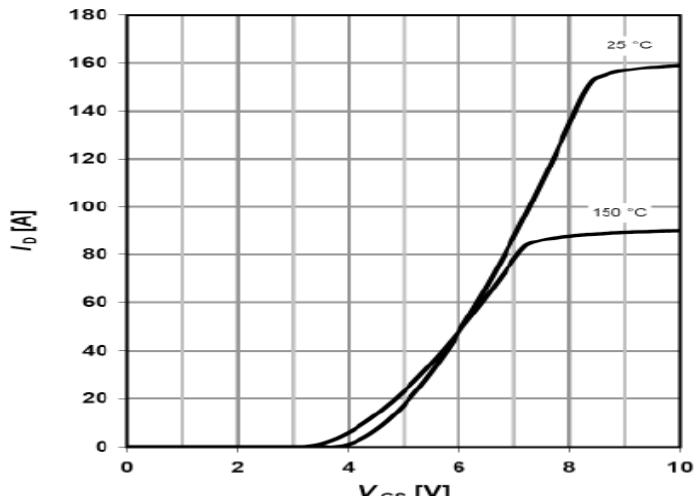




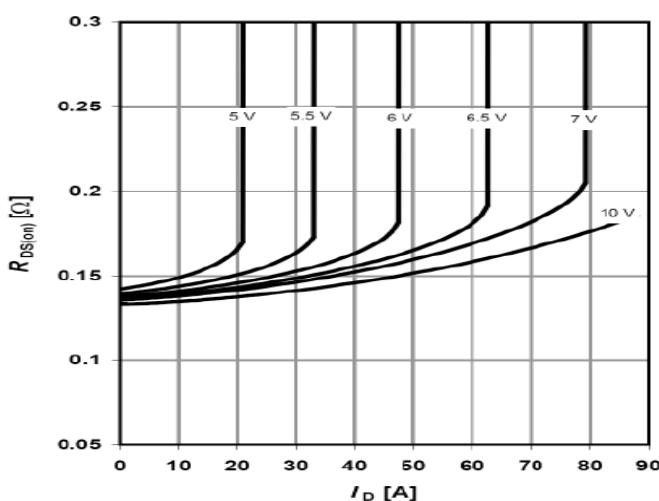
## CHARACTERISTICS CURVE



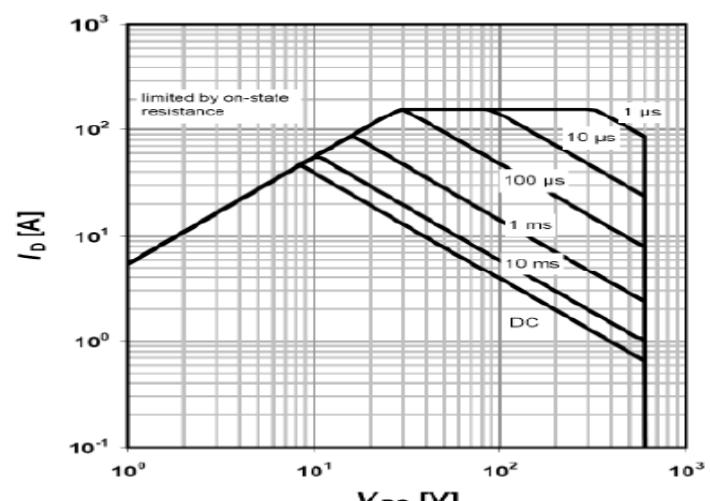
Output Characteristic



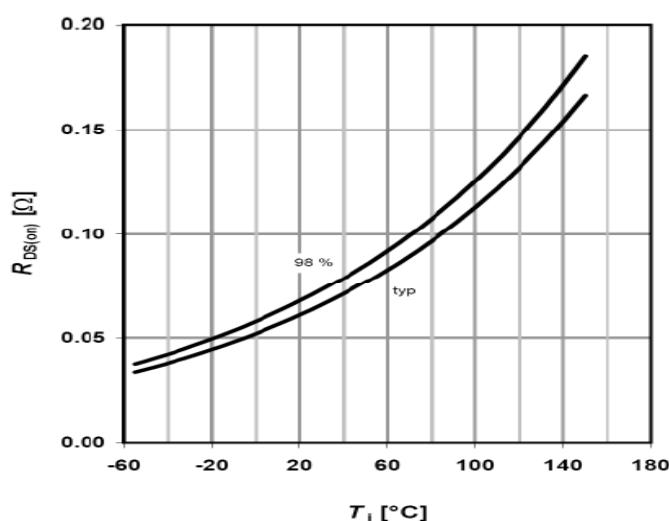
Transfer Characteristic



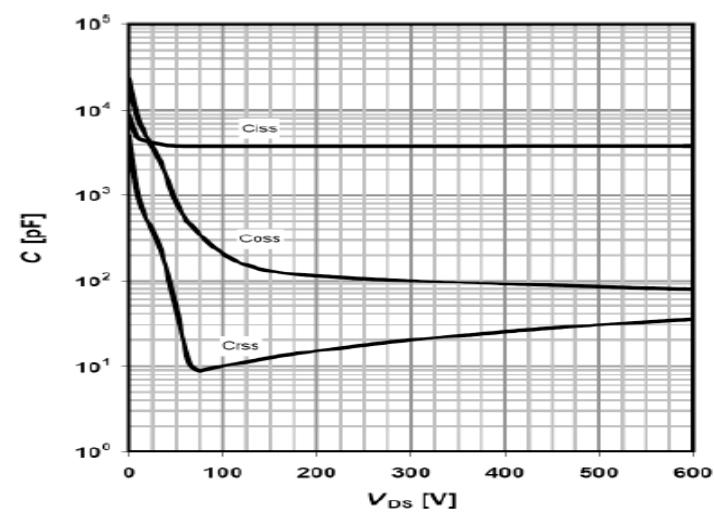
On Resistance Vs Drain Current



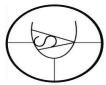
Safe Operating Area



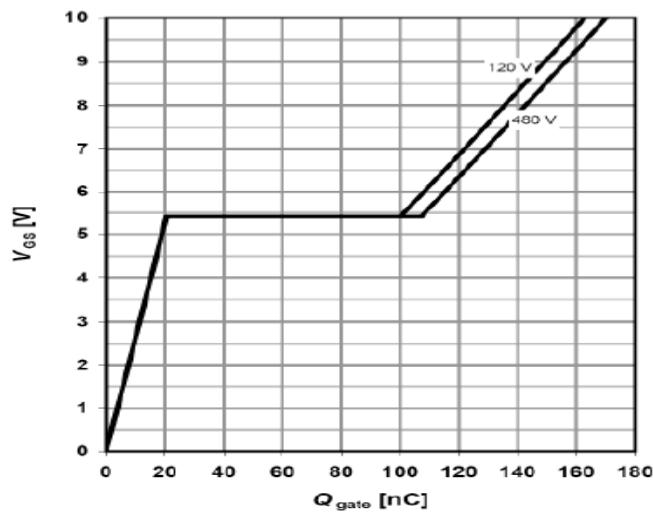
On Resistance Vs Junction Temperature



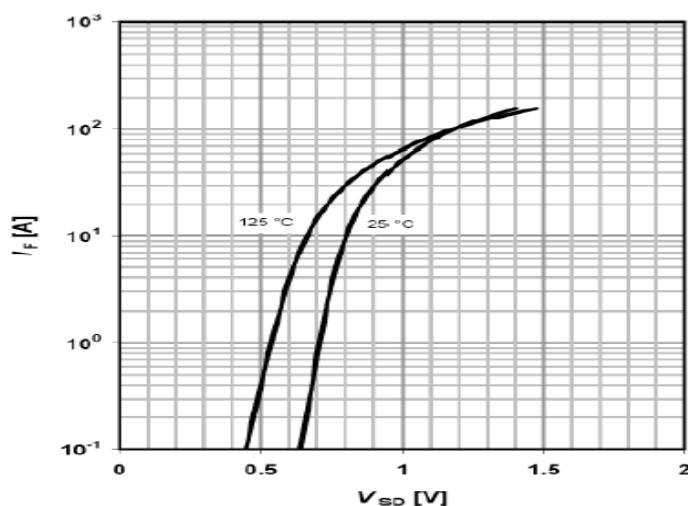
Capacitance



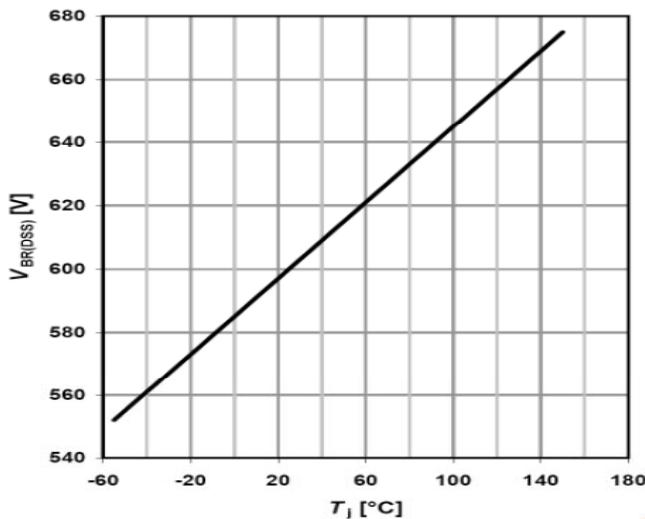
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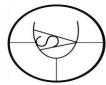
Gate Charge Waveform



Source-Drain Diode Forward Voltage



Breakdown Voltage Vs Junction  
Temperature



## Package Information

### TO-247-3L

