

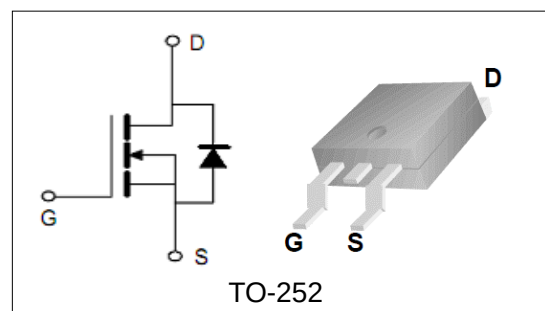
**20V/60A N-Channel Advanced Power MOSFET****Features**

- Improved dv/dt Capability, High Ruggedness.
- Maximum Junction Temperature Range (150°C)
- 100% Avalanche Tested

|                |     |    |
|----------------|-----|----|
| BVDSS          | 20  | V  |
| ID             | 60  | A  |
| RDSON@VGS=4.5V | 4.1 | mΩ |
| RDSON@VGS=2.5V | 5.2 | mΩ |

**Applications**

- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)



TO-252

**Order Information**

| Product   | Package | Marking   | Reel Size | Reel    | Carton   |
|-----------|---------|-----------|-----------|---------|----------|
| PTD60N02B | TO-252  | PTD60N02B | 13inch    | 2500PCS | 50000PCS |

**Absolute Maximum Ratings**

| Symbol                                          | Parameter                                          |          | Rating     | Unit |
|-------------------------------------------------|----------------------------------------------------|----------|------------|------|
| Common Ratings (TC=25°C Unless Otherwise Noted) |                                                    |          |            |      |
| V <sub>(BR)DSS</sub>                            | Drain-Source Breakdown Voltage                     |          | 20         | V    |
| V <sub>GS</sub>                                 | Gate-Source Voltage                                |          | ±12        | V    |
| T <sub>J</sub>                                  | Maximum Junction Temperature                       |          | 150        | °C   |
| T <sub>STG</sub>                                | Storage Temperature Range                          |          | -55 to 150 | °C   |
| I <sub>S</sub>                                  | Diode Continuous Forward Current                   | TC =25°C | 60         | A    |
| Mounted on Large Heat Sink                      |                                                    |          |            |      |
| E <sub>AS</sub>                                 | Single Pulse Avalanche Energy (Note1)              |          | 64         | mJ   |
| I <sub>DM</sub>                                 | Pulse Drain Current Tested (Silicon Limit) (Note2) | TC =25°C | 210        | A    |
| I <sub>D</sub>                                  | Continuous Drain current                           | TC =25°C | 60         | A    |
| P <sub>D</sub>                                  | Maximum Power Dissipation                          | TC =25°C | 57         | W    |
| R <sub>θJc</sub>                                | Thermal Resistance Junction-to-Case (Note3)        |          | 2.2        | °C/W |



## 20V/60A N-Channel Advanced Power MOSFET

| Symbol                                                                                       | Parameter                                | Condition                                     | Min. | Typ. | Max. | Unit |
|----------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------|------|------|------|------|
| Static Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated)          |                                          |                                               |      |      |      |      |
| V <sub>(BR)DSS</sub>                                                                         | Drain- Source Breakdown Voltage          | VGS=0V ID=250μA                               | 20   | --   | --   | V    |
| I <sub>DSS</sub>                                                                             | Zero Gate Voltage Drain current          | VDS=20V,VGS=0V                                | --   | --   | 1    | μA   |
| I <sub>GSS</sub>                                                                             | Gate-Body Leakage Current                | VGS=±12V,VDS=0V                               | --   | --   | ±100 | nA   |
| V <sub>GS(TH)</sub>                                                                          | Gate Threshold Voltage                   | VDS=VGS,ID=250μA                              | 0.5  | 0.65 | 0.9  | V    |
| R <sub>DS(ON)</sub>                                                                          | Drain-Source On-State Resistance (Note4) | VGS=4.5V, ID=25A                              | --   | 4.1  | 5    | mΩ   |
|                                                                                              |                                          | VGS=2.5V, ID=20A                              | --   | 5.2  | 6.5  | mΩ   |
| Dynamic Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated) (Note5) |                                          |                                               |      |      |      |      |
| C <sub>iss</sub>                                                                             | Input Capacitance                        | VDS=10V,<br>VGS=0V,<br>F=1MHz                 | --   | 2000 | --   | pF   |
| C <sub>oss</sub>                                                                             | Output Capacitance                       |                                               | --   | 407  | --   | pF   |
| C <sub>rss</sub>                                                                             | Reverse Transfer Capacitance             |                                               | --   | 218  | --   | pF   |
| Q <sub>g</sub>                                                                               | Total Gate Charge                        | VDS=10V,<br>ID=20A,<br>VGS=10V                | --   | 25   | --   | nC   |
| Q <sub>gs</sub>                                                                              | Gate-Source Charge                       |                                               | --   | 3.3  | --   | nC   |
| Q <sub>gd</sub>                                                                              | Gate-Drain Charge                        |                                               | --   | 7.6  | --   | nC   |
| Switching Characteristics (Note5)                                                            |                                          |                                               |      |      |      |      |
| t <sub>d(on)</sub>                                                                           | Turn-on Delay Time                       | VDD=10V,<br>ID=2A,RL=1Ω<br>VGS=4.5V,<br>RG=3Ω | --   | 6.4  | --   | nS   |
| t <sub>r</sub>                                                                               | Turn-on Rise Time                        |                                               | --   | 17.2 | --   | nS   |
| t <sub>d(off)</sub>                                                                          | Turn-off Delay Time                      |                                               | --   | 29.6 | --   | nS   |
| t <sub>f</sub>                                                                               | Turn-off Fall Time                       |                                               | --   | 16.8 | --   | nS   |
| Source- Drain Diode Characteristics@ T <sub>J</sub> = 25°C (unless otherwise stated)         |                                          |                                               |      |      |      |      |
| V <sub>SD</sub>                                                                              | Forward on voltage                       | IS=10A,VGS=0V                                 | --   | --   | 1.2  | V    |

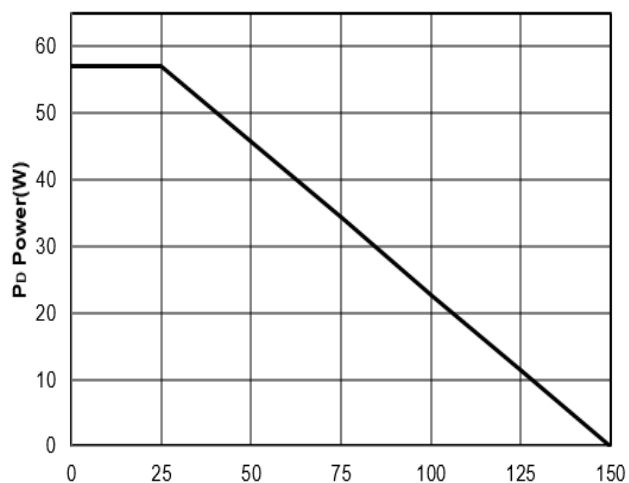
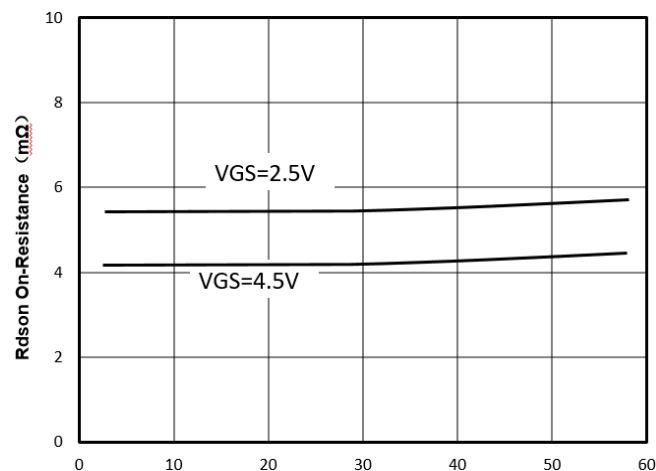
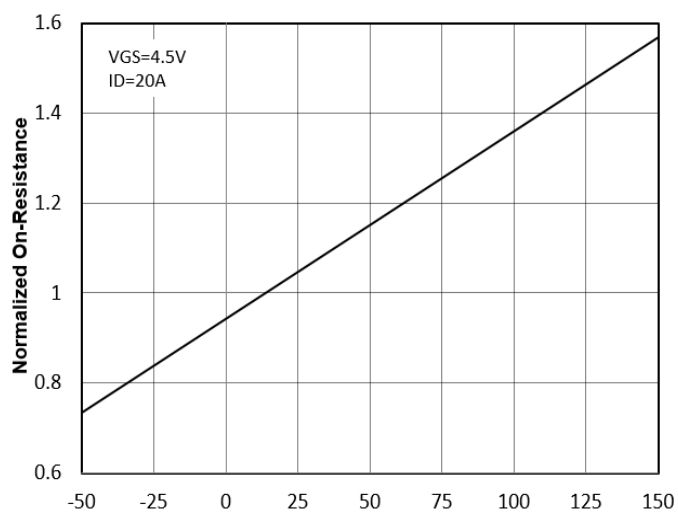
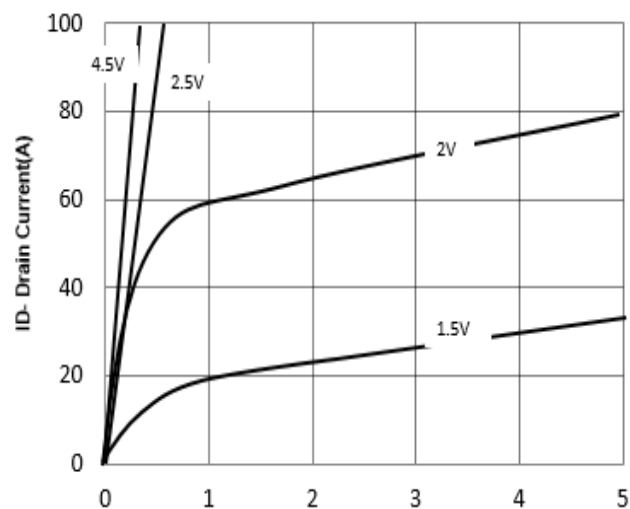
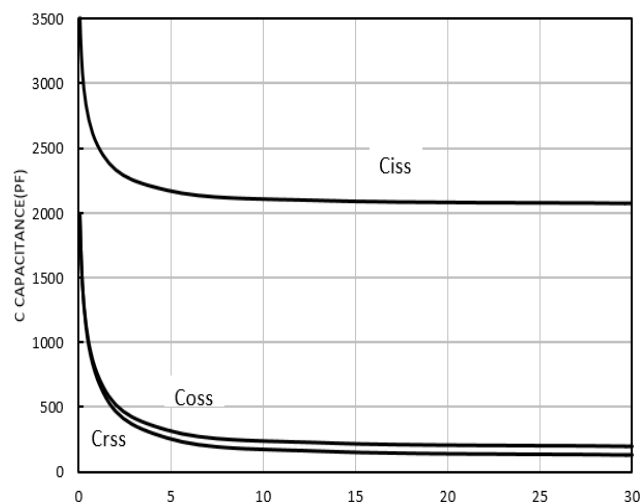
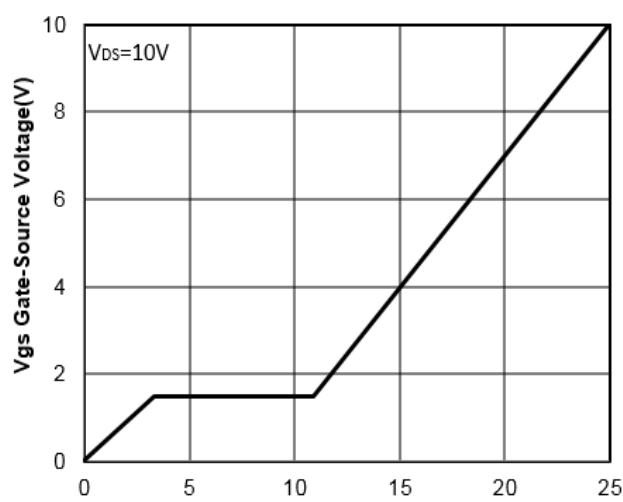
Note:

- Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25° C, RG = 25Ω, VD =10V, VGS =10V. Part not recommended for use above this value.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Pulse Test: pulse width ≤ 300 us, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.



## 20V/60A N-Channel Advanced Power MOSFET

## Typical Characteristics

Figure1: T<sub>J</sub> Junction Temperature (°C)Figure2: I<sub>D</sub> Drain Current (A)Figure3: T<sub>J</sub> Junction Temperature (°C)Figure4: V<sub>DS</sub> Drain-Source Voltage (V)Figure5: V<sub>DS</sub> Drain-Source Voltage (V)Figure6: Q<sub>g</sub> Gate Charge (nC)



20V/60A N-Channel Advanced Power MOSFET

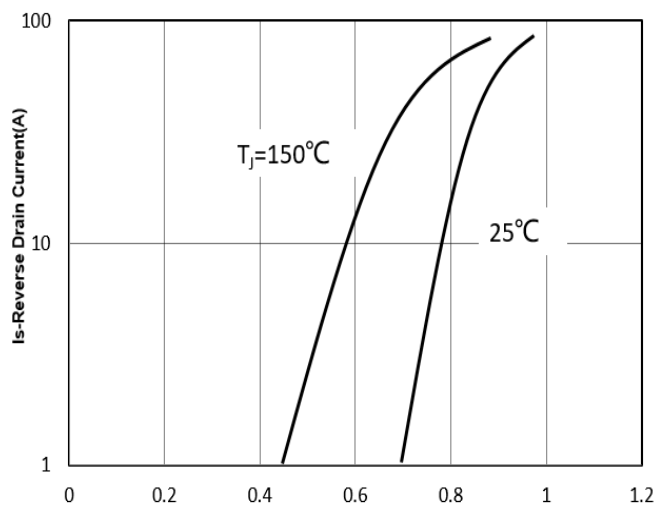


Figure7: Vsd Source-Drain Voltage (V)

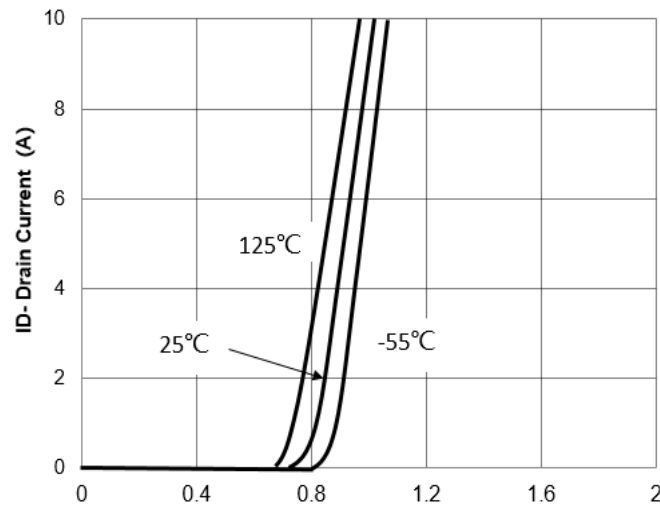


Figure8: Vgs Gate-Source Voltage (V)

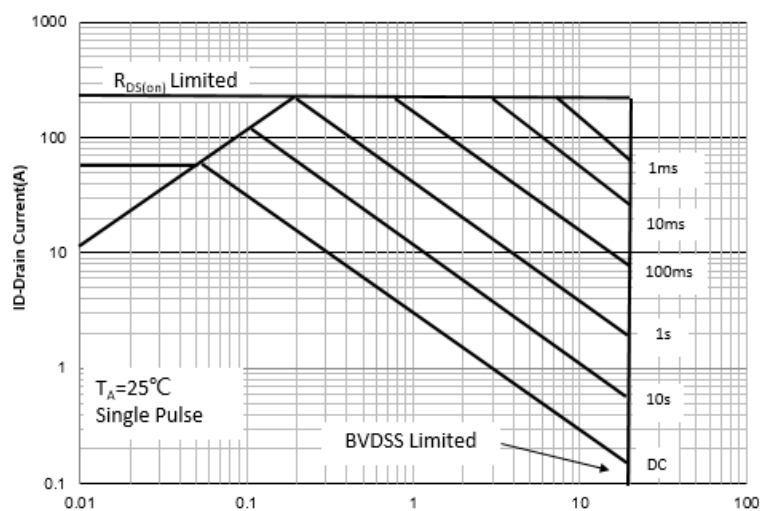


Figure9: Vds -Drain Source Voltage (V)

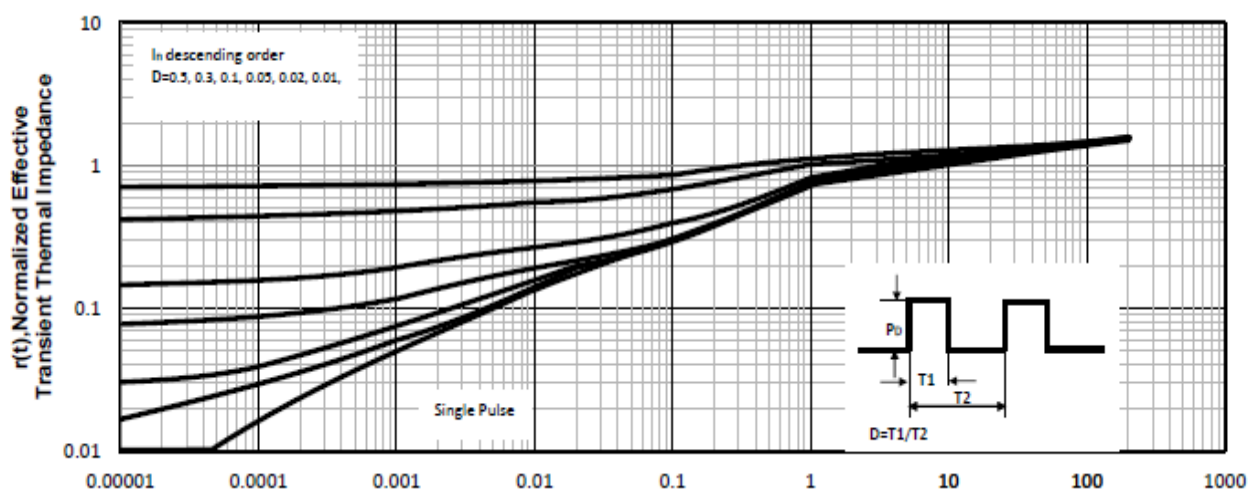
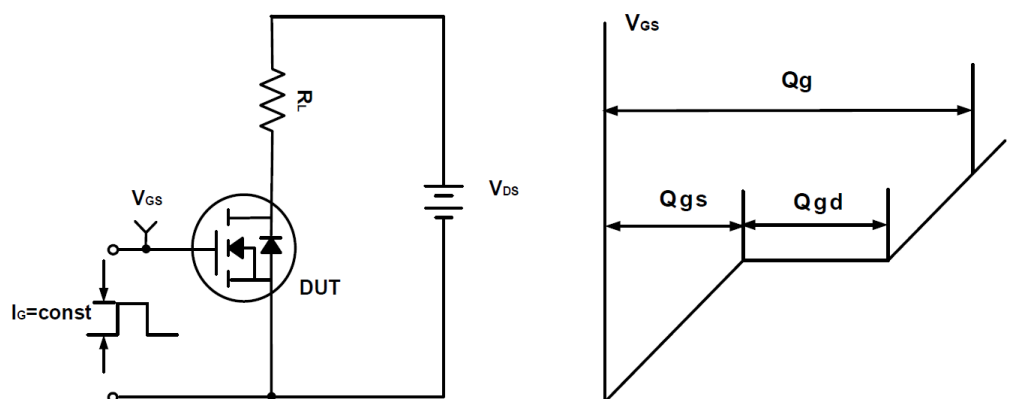
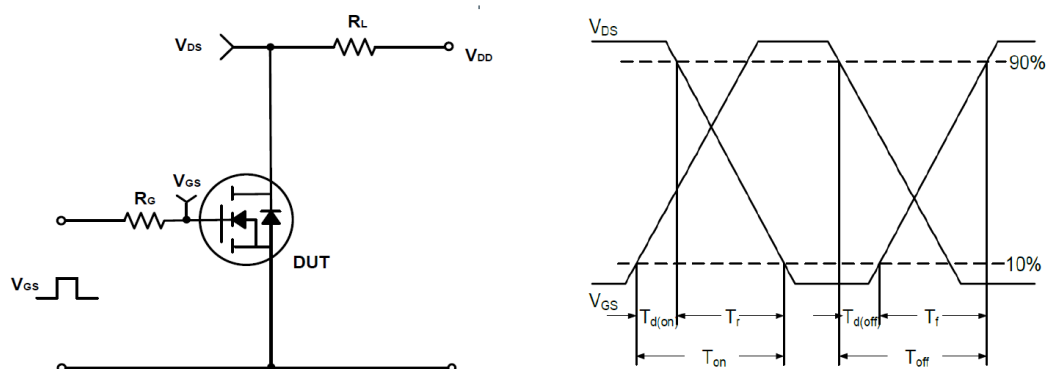
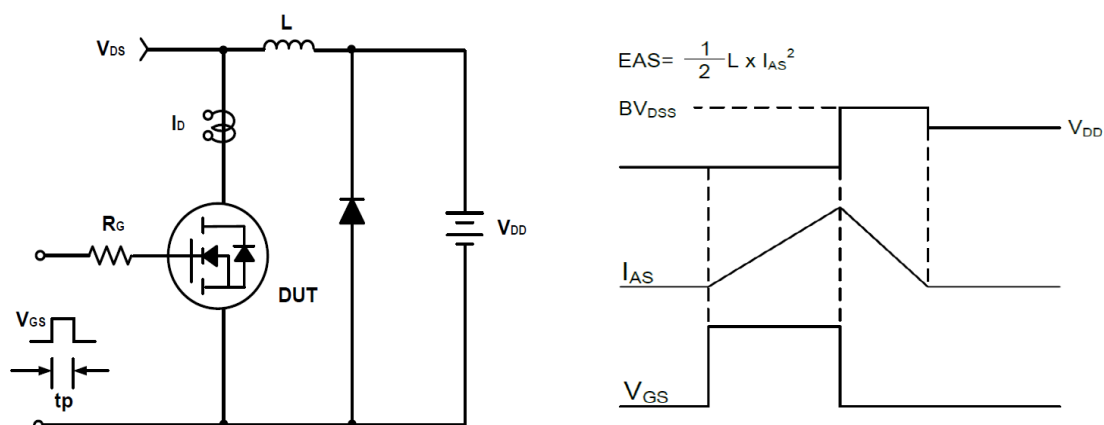
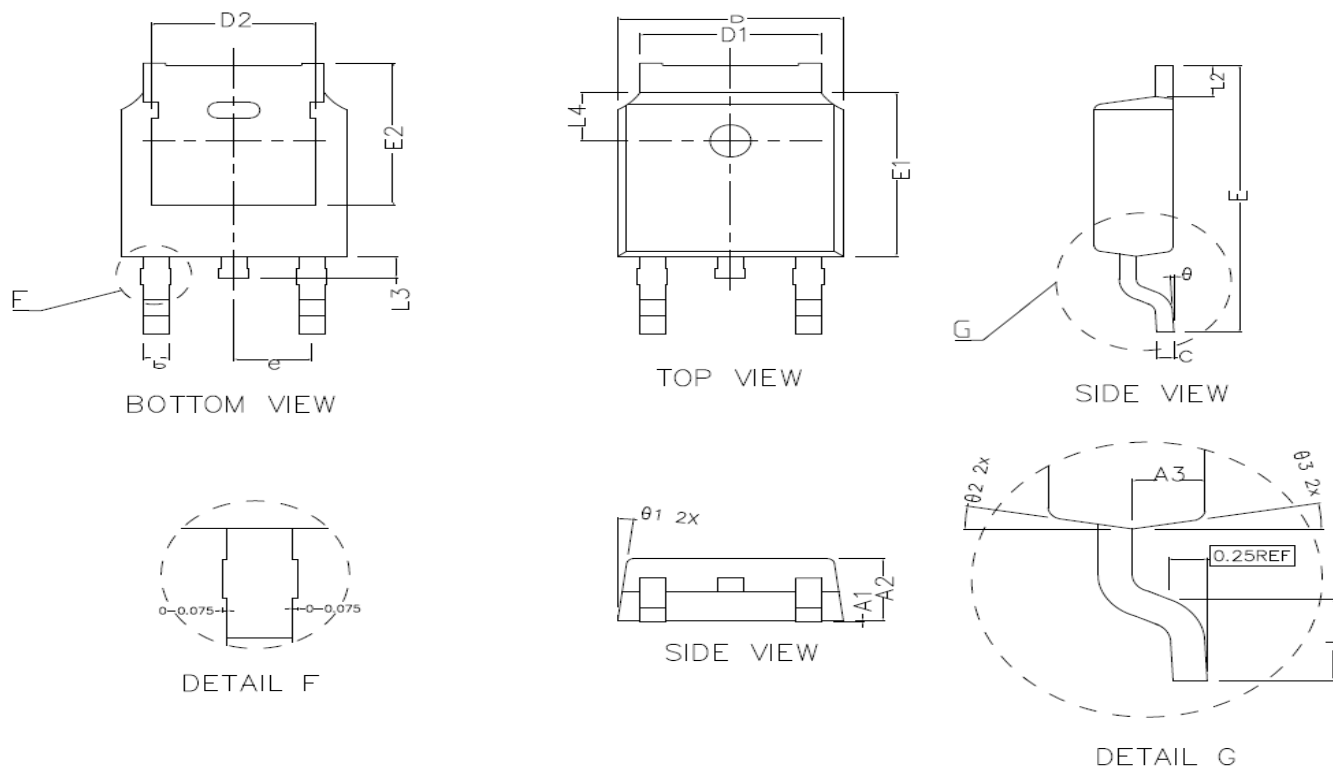


Figure10: Square Wave Pulse Duration (sec)

**Test Circuit and Waveform:****Figure A Gate Charge Test Circuit & Waveforms****Figure B Switching Test Circuit & Waveforms****Figure C Unclamped Inductive Switching Circuit & Waveforms**

**20V/60A N-Channel Advanced Power MOSFET****TO-252 Package Outline Dimensions (Units: mm)**

| COMMON DIMENSIONS<br>(UNITS OF MEASURE IS mm) |           |        |        |
|-----------------------------------------------|-----------|--------|--------|
|                                               | MIN       | NORMAL | MAX    |
| A1                                            | 0.000     | 0.100  | 0.150  |
| A2                                            | 2.200     | 2.300  | 2.400  |
| A3                                            | 1.020     | 1.070  | 1.120  |
| b                                             | 0.710     | 0.760  | 0.810  |
| c                                             | 0.460     | 0.508  | 0.550  |
| D                                             | 6.500     | 6.600  | 6.700  |
| D1                                            | 5.330REF  |        |        |
| D2                                            | 4.830REF  |        |        |
| E                                             | 9.900     | 10.100 | 10.300 |
| E1                                            | 6.000     | 6.100  | 6.200  |
| E2                                            | 5.600REF  |        |        |
| e                                             | 2.286TYPE |        |        |
| L                                             | 1.400     | 1.550  | 1.700  |
| L2                                            | 1.10REF   |        |        |
| L3                                            | 0.80REF   |        |        |
| L4                                            | 1.80REF   |        |        |
| $\theta$                                      | 0~8°      |        |        |
| $\theta 1$                                    | 7° TYPE   |        |        |
| $\theta 2$                                    | 10° TYPE  |        |        |
| $\theta 3$                                    | 10° TYPE  |        |        |