



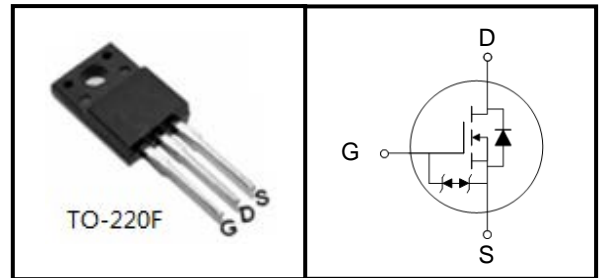
## 550V N-Channel MOSFET

### FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- ESD protection between Gate and Source

### APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



| Device Marking and Package Information |         |         |
|--|---------|---------|
| Device                                 | Package | Marking |
| TMA6N55HE                              | TO-220F | A6N55HE |

| Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted |                |          |                  |
|--|----------------|----------|------------------|
| Parameter  | Symbol         | Value    | Unit             |
| Drain-Source Voltage ( $V_{GS} = 0\text{V}$ )                              | $V_{DSS}$      | 550      | V                |
| Continuous Drain Current   | $I_D$          | 6        | A                |
| Pulsed Drain Current (note1)   | $I_{DM}$       | 24       | A                |
| Gate-Source Voltage  | $V_{GSS}$      | $\pm 20$ | V                |
| Single Pulse Avalanche Energy (note2)                                      | $E_{AS}$       | 176      | mJ               |
| Avalanche Current (note1)  | $I_{AR}$       | 4.2      | A                |
| Repetitive Avalanche Energy (note1)  | $E_{AR}$       | 35       | mJ               |
| Power Dissipation ( $T_C = 25^\circ\text{C}$ )                             | $P_D$          | 54       | W                |
| Operating Junction and Storage Temperature Range                           | $T_J, T_{stg}$ | -55~+150 | $^\circ\text{C}$ |

| Thermal Resistance                      |            |       |                           |
|---|------------|-------|---------------------------|
| Parameter                               | Symbol     | Value | Unit                      |
| Thermal Resistance, Junction-to-Case    | $R_{thJC}$ | 2.3   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 62.5  |                           |



| Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted |               |  |       |      |          |               |
|--|---------------|--|-------|------|----------|---------------|
| Parameter  | Symbol        | Test Conditions  | Value |      |          | Unit          |
|  |               |  | Min.  | Typ. | Max.     |               |
| <b>Static</b>  |               |  |       |      |          |               |
| Drain-Source Breakdown Voltage                                   | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu\text{A}$                      | 550   | --   | --       | V             |
| Zero Gate Voltage Drain Current                                  | $I_{DSS}$     | $V_{DS} = 550V, V_{GS} = 0V, T_J = 25^\circ\text{C}$     | --    | --   | 1        | $\mu\text{A}$ |
| Gate-Source Leakage  | $I_{GSS}$     | $V_{GS} = \pm 20V$                                       | --    | --   | $\pm 20$ | $\mu\text{A}$ |
| Gate-Source Threshold Voltage                                    | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$                  | 3.0   | --   | 4.0      | V             |
| Drain-Source On-Resistance (Note3)                               | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 3A$                                 | --    | 1.1  | 1.35     | $\Omega$      |
| <b>Dynamic</b>   |               |  |       |      |          |               |
| Input Capacitance  | $C_{iss}$     | $V_{GS} = 0V,$<br>$V_{DS} = 25V,$<br>$f = 1.0\text{MHz}$ | --    | 700  | --       | pF            |
| Output Capacitance   | $C_{oss}$     |  | --    | 94   | --       |               |
| Reverse Transfer Capacitance                                     | $C_{rss}$     |  | --    | 12   | --       |               |
| Total Gate Charge  | $Q_g$         | $V_{DD} = 440V, I_D = 6A,$<br>$V_{GS} = 10V$             | --    | 19   | --       | nC            |
| Gate-Source Charge   | $Q_{gs}$      |  | --    | 3.7  | --       |               |
| Gate-Drain Charge  | $Q_{gd}$      |  | --    | 11   | --       |               |
| Turn-on Delay Time   | $t_{d(on)}$   | $V_{DD} = 275V, I_D = 6A,$<br>$R_G = 25\Omega$           | --    | 13   | --       | ns            |
| Turn-on Rise Time  | $t_r$         |  | --    | 20   | --       |               |
| Turn-off Delay Time  | $t_{d(off)}$  |  | --    | 76   | --       |               |
| Turn-off Fall Time   | $t_f$         |  | --    | 40   | --       |               |
| <b>Drain-Source Body Diode Characteristics</b>                   |               |  |       |      |          |               |
| Continuous Body Diode Current                                    | $I_S$         | $T_C = 25^\circ\text{C}$                                 | --    | --   | 6        | A             |
| Pulsed Diode Forward Current                                     | $I_{SM}$      |  | --    | --   | 24       |               |
| Body Diode Voltage   | $V_{SD}$      | $T_J = 25^\circ\text{C}, I_{SD} = 6A, V_{GS} = 0V$       | --    | --   | 1.4      | V             |
| Reverse Recovery Time  | $t_{rr}$      | $V_{GS} = 0V, I_S = 6A,$<br>$di_F/dt = 100A/\mu\text{s}$ | --    | 87   | --       | ns            |
| Reverse Recovery Charge  | $Q_{rr}$      |  | --    | 0.42 | --       | $\mu\text{C}$ |

**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $I_{AS} = 4.2A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 1\%$



Figure A: Gate Charge Test Circuit and Waveform

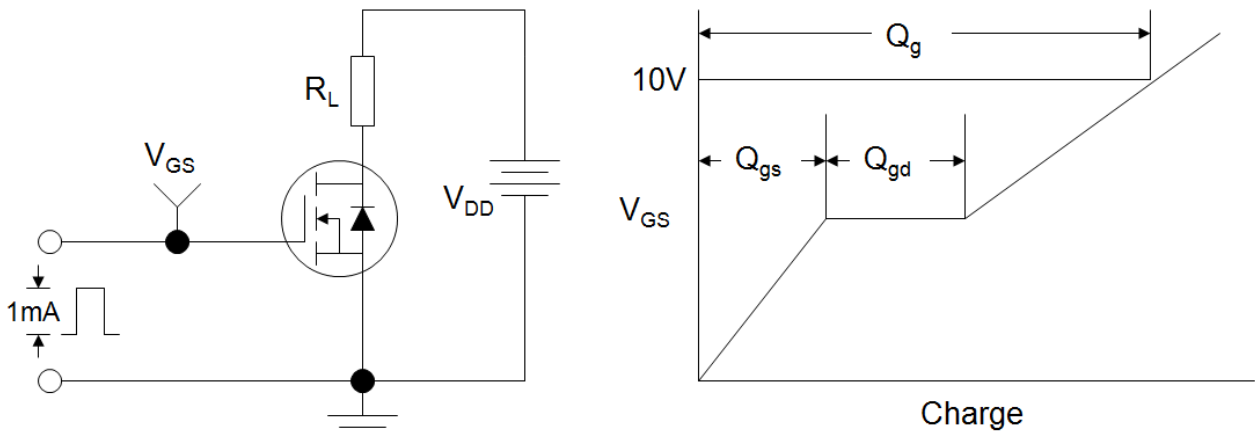
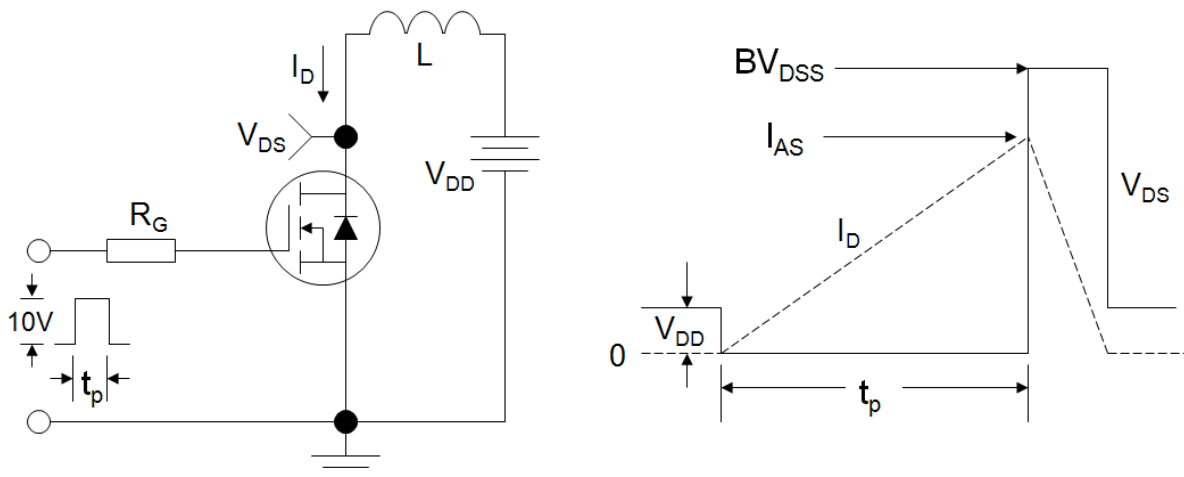


Figure B: Resistive Switching Test Circuit and Waveform

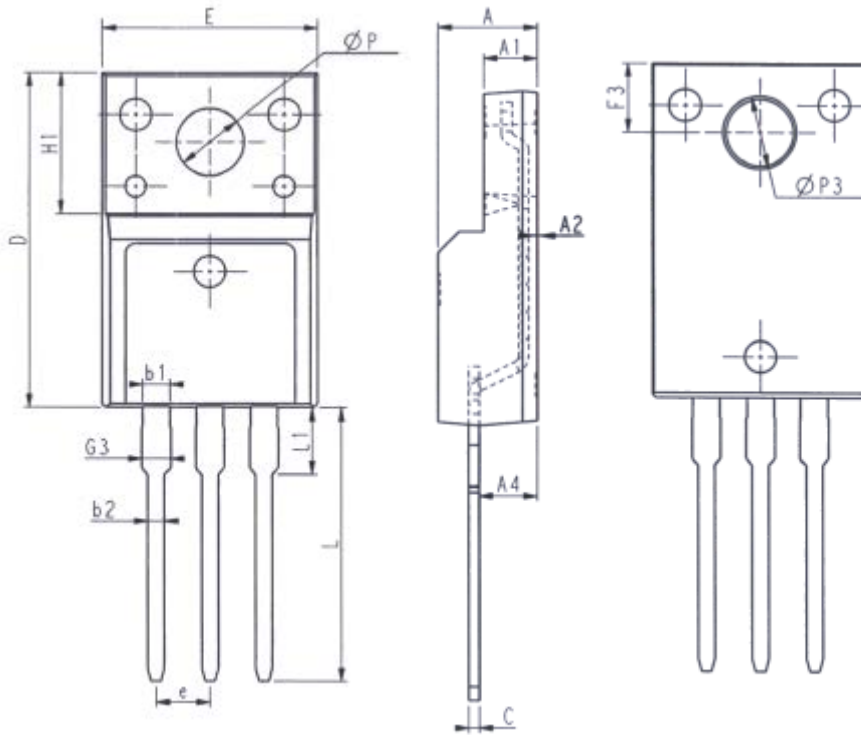


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





### TO-220F



| Unit: mm |         |       | Unit: mm |       |       |
|----------|---------|-------|----------|-------|-------|
| Symbol   | Min.    | Max.  | Symbol   | Min.  | Max.  |
| E        | 9.96    | 10.36 | L        | 12.68 | 13.28 |
| A        | 4.50    | 4.90  | L1       | 2.93  | 3.13  |
| A1       | 2.34    | 2.74  | P        | 3.03  | 3.38  |
| A2       | 0.30    | 0.60  | P3       | 3.15  | 3.65  |
| A4       | 2.56    | 2.96  | F3       | 3.15  | 3.45  |
| c        | 0.40    | 0.65  | G3       | 1.25  | 1.55  |
| D        | 15.57   | 16.17 | b1       | 1.18  | 1.43  |
| H1       | 6.70REF |       | b2       | 0.70  | 0.95  |
| e        | 2.54BSC |       |          |       |       |



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