

MOSFET Silicon N-Channel MOS



1. Applications

Single-ended flyback or two-transistor forward topologies.
PC power, PD Adaptor, LCD & PDP TV and LED lighting.

2. Features

Low drain-source on-resistance: $R_{DS(ON)} = 0.113\Omega$ (typ.)
Easy to control Gate switching
Enhancement mode: $V_{th} = 2.5$ to 3.5 V

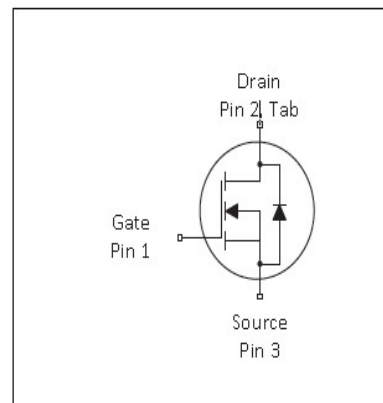
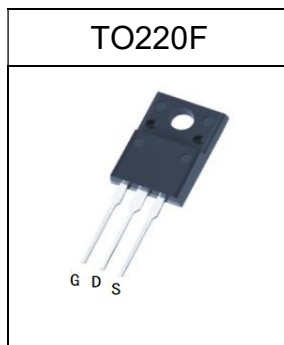


Table 1 Key Performance Parameters

| Parameter | Value | Unit |
|----------------------|-------|------------|
| $V_{DS} @ T_{j,max}$ | 550 | V |
| $R_{DS(on),max}$ | 130 | m Ω |
| $Q_{g,typ}$ | 32.6 | nC |
| $I_{D,pulse}$ | 70 | A |

3. Packaging and Internal Circuit

| Part Name | Package | Marking |
|------------|---------|------------|
| ASA50R130E | T0220F | ASA50R130E |



1 Maximum ratings

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 2 Maximum ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|---------------|--------|------|------|------------------|---|
| | | Min. | Typ. | Max. | | |
| Continuous drain current ¹⁾ | I_D | | - | 29 | A | $T_C=25^\circ\text{C}$ |
| Pulsed drain current ²⁾ | $I_{D,pulse}$ | - | - | 70 | A | $T_C=25^\circ\text{C}$ |
| Avalanche energy, single pulse | E_{AS} | - | - | 414 | mJ | $T_C=25^\circ\text{C}, V_{DD}=50\text{V}, I_D=9.1\text{A}, L = 10\text{mH}, R_G=25\Omega$ |
| Avalanche current, single pulse | I_{AR} | - | - | 9.1 | A | $T_C=25^\circ\text{C}, V_{DD}=50\text{V}, L=10\text{mH}, R_G=25\Omega$ |
| Gate source voltage (static) | V_{GS} | -30 | - | 30 | V | static; |
| Power dissipation | P_{tot} | - | - | 76 | W | $T_C=25^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 | - | 150 | $^\circ\text{C}$ | |
| Operating junction temperature | T_j | -55 | - | 150 | $^\circ\text{C}$ | |
| MOSFET dv/dt ruggedness | dv/dt | - | - | 12.3 | V/ns | $V_{ds}=0-400\text{v}$ |
| Reverse diode dv/dt | dv/dt | - | - | 199 | V/ns | $V_{ds}=0-400\text{v}, I_F=7.7\text{A}$ |

¹⁾Limited by $T_{j,max}$. Maximum Duty Cycle $D = 0.50$

²⁾ Pulse width t_p limited by $T_{j,max}$

³⁾ Identical low side and high side switch with identical R_G

2 Thermal characteristics

Table 3 Thermal characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|------------|--------|------|------|------|----------------------------------|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case | R_{thJC} | - | - | 3.62 | °C/W | - |
| Thermal resistance, junction - ambient | R_{thJA} | - | - | 78 | °C/W | device on PCB, minimal footprint |

3 Electrical characteristics

at $T_j=25^{\circ}\text{C}$, unless otherwise specified

Table 4 Static characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------------------|---------------|--------|-------|-------|----------|--|
| | | Min. | Typ. | Max. | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 500 | - | - | V | $V_{GS}=0V, I_D=250\mu A$ |
| Gate threshold voltage | $V_{(GS)th}$ | 2.5 | | 3.5 | V | $V_{DS}=V_{GS}, I_D=250\mu A$ |
| Zero gate voltage drain current | I_{DSS} | - | - | 1 | μA | $V_{DS}=500V, V_{GS}=0V, T_j=25^{\circ}\text{C}$ |
| Gate-source leakage current | I_{GSS} | - | - | 100 | nA | $V_{GS}=30V, V_{DS}=0V$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 0.113 | 0.130 | Ω | $V_{GS}=10V, I_D=10A, T_j=25^{\circ}\text{C}$ |
| Gate resistance (Intrinsic) | R_G | - | 24.2 | - | Ω | $f=1\text{MHz}$, open drain |

Table 5 Dynamic characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|------------------------------|--------------|--------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Input capacitance | C_{iss} | - | 1446 | - | pF | $V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$ |
| Output capacitance | C_{oss} | - | 79 | - | pF | $V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$ |
| Reverse transfer capacitance | C_{rss} | - | 1.31 | - | pF | $V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$ |
| Turn-on delay time | $t_{d(on)}$ | - | 20 | - | ns | $V_{DD}=400V, V_{GS}=13V, I_D=7.7A, R_G=3.4\Omega$ |
| Rise time | t_r | - | 13 | - | ns | $V_{DD}=400V, V_{GS}=13V, I_D=7.7A, R_G=3.4\Omega$ |
| Turn-off delay time | $t_{d(off)}$ | - | 144 | - | ns | $V_{DD}=400V, V_{GS}=13V, I_D=7.7A, R_G=3.4\Omega$ |
| Fall time | t_f | - | 25 | - | ns | $V_{DD}=400V, V_{GS}=13V, I_D=7.7A, R_G=3.4\Omega$ |

Table 6 Gate charge characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|-----------------------|----------|--------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Gate to source charge | Q_{gs} | - | 6.5 | - | nC | $V_{DD}=400V, I_D=7.7A, V_{GS}=0$ to 10V |
| Gate to drain charge | Q_{gd} | - | 11.4 | - | nC | $V_{DD}=400V, I_D=7.7A, V_{GS}=0$ to 10V |
| Gate charge total | Q_g | - | 32.9 | - | nC | $V_{DD}=400V, I_D=7.7A, V_{GS}=0$ to 10V |

Table 7 Reverse diode characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|-------------------------------|-----------|--------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Diode forward voltage | V_{SD} | - | 0.7 | - | V | $V_{GS}=0V, I_F=1A, T_j=25^{\circ}C$ |
| Reverse recovery time | t_{rr} | - | 205 | - | ns | $V_R=400V, I_F=7.7A, di_F/dt=100A/\mu s$ |
| Reverse recovery charge | Q_{rr} | - | 2.0 | - | uC | $V_R=400V, I_F=7.7A, di_F/dt=100A/\mu s$ |
| Peak reverse recovery current | I_{rrm} | - | 20.3 | - | A | $V_R=400V, I_F=7.7A, di_F/dt=100A/\mu s$ |

4 Test Circuits

Table 8 Diode characteristics

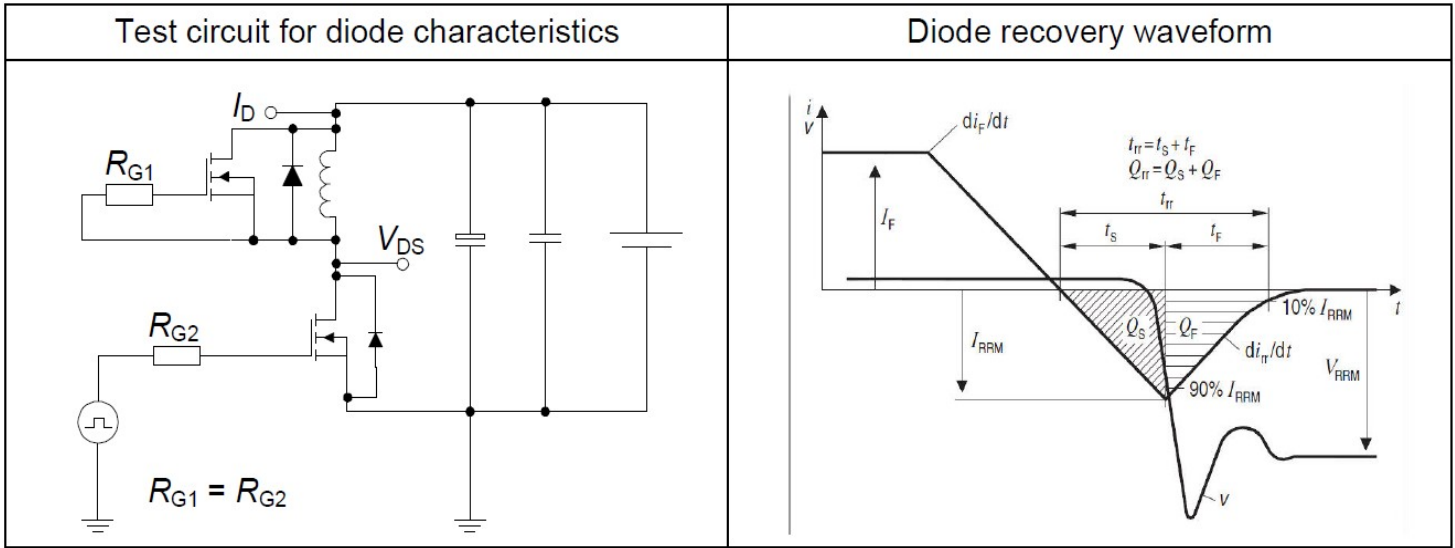


Table 9 Switching times

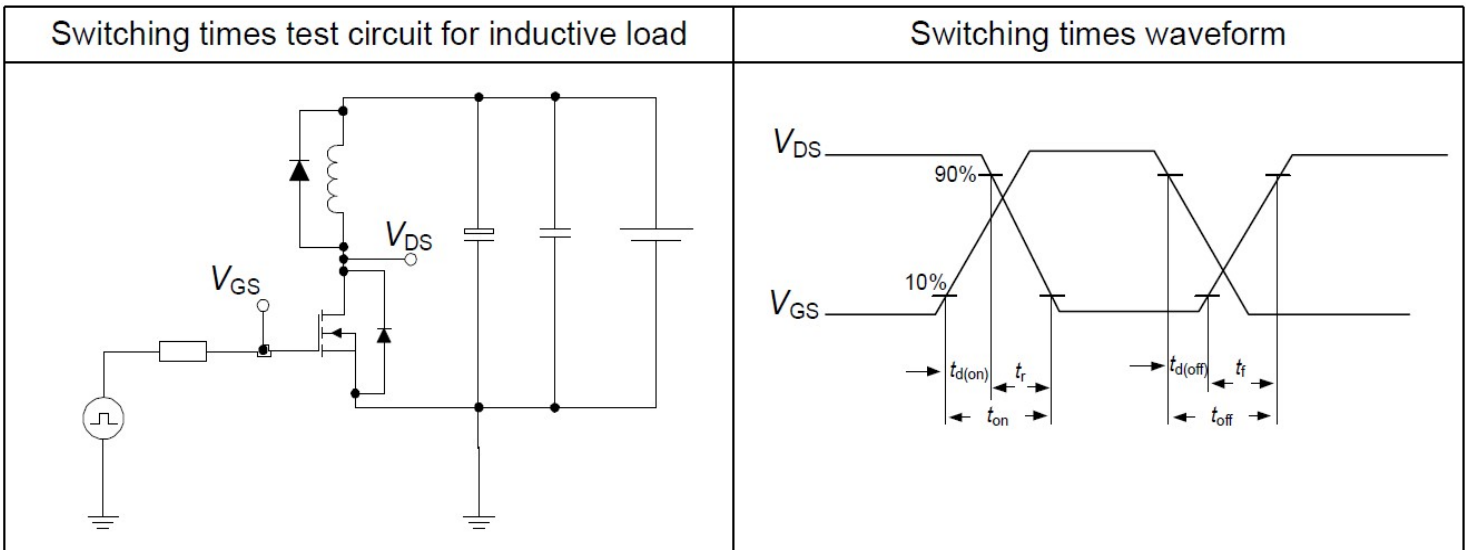
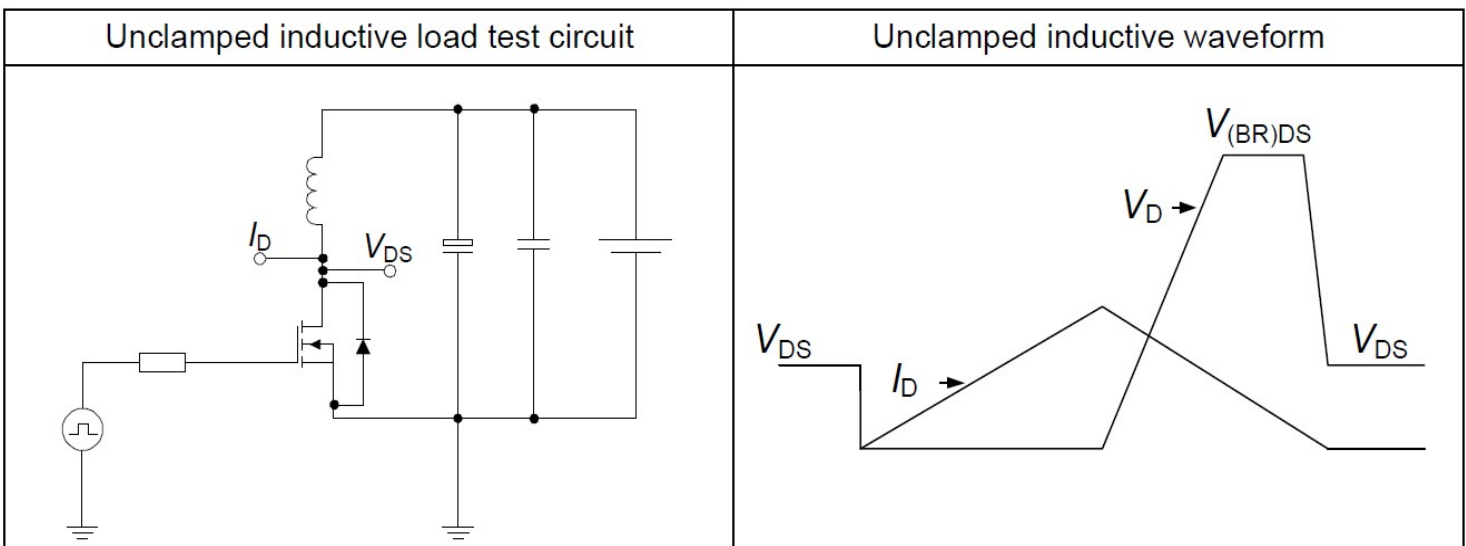


Table 10 Unclamped inductive load



5 Package Outlines

TO-220F

单位: mm

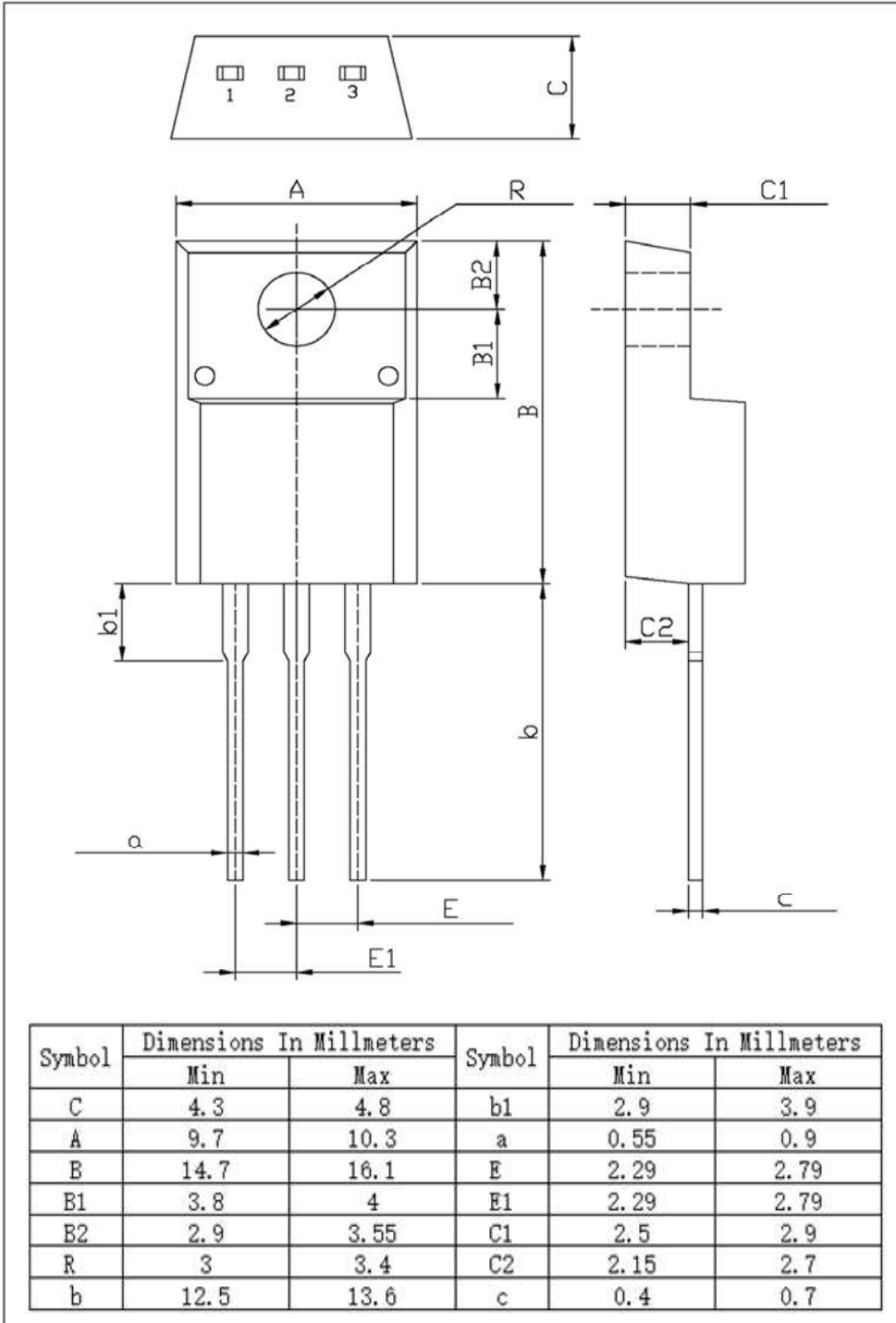


Figure1: Outline PG-TO220F

Revision History

| Revision | Date | Subjects (major changes since last revision) |
|----------|------------|--|
| 1.0 | 2021-10-27 | Preliminary version |

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