

700V 10A 0.88Ω N-ch Power MOSFET

Description

WMOST[™] D1 is Wayon's 1st generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

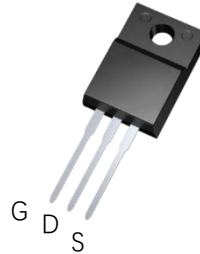
Features

- Typ. $R_{DS(on)}=0.88\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

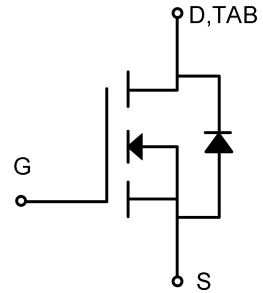
Applications

- SMPS
- Charger
- DC-DC

TO-220F



TO-252



Absolute Maximum Ratings (T_c=25°C)

| Parameter | Symbol | WML10N70D1 | WMO10N70D1 | Unit |
|----------------------------------|---------------------|------------|------------|------|
| Drain-source voltage | V _{DSS} | 700 | | V |
| Gate-source voltage | V _{GS} | ±30 | | V |
| Continuous drain current | I _D | 10 | | A |
| Pulsed drain current | I _{DM} | 40 | | A |
| Avalanche energy, single pulse | E _{AS} | 400 | | mJ |
| Power dissipation | P _D | 62.5 | 156 | W |
| Derate above 25°C | | 0.5 | 1.25 | W/°C |
| Operating junction temperature | T _j | -55~150 | | °C |
| Storage temperature | T _{stg} | -55~150 | | °C |
| Continuous diode forward current | I _S | 10 | | A |
| Diode pulse current | I _{Spulse} | 40 | | A |

Thermal Characteristic

| | | | | |
|--|------------------|------|----------------------------|------|
| Thermal resistance,junction-to-case | R _{θJC} | 2 | 0.8 | °C/W |
| Thermal resistance,junction-to-ambient | R _{θJA} | 62.5 | 30 (R _{thJ-PCB}) | °C/W |

Electrical Characteristics of MOSFET

| | | | | Min. | Typ. | Max. | |
|-------------------------------------|--------------|-------------------------------|-------------------|------|------|------|----------|
| Drain-source break down voltage | BV_{DSS} | $I_D=250\mu A, V_{GS}=0V$ | $T_C=25^\circ C$ | 700 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $I_D=250\mu A, V_{DS}=V_{GS}$ | $T_J=25^\circ C$ | 2.5 | 3.5 | 4.5 | V |
| Drain-source leakage current | I_{DSS} | $V_{DS}=700V, V_{GS}=0V$ | $T_J=25^\circ C$ | - | - | 1 | μA |
| | | $V_{DS}=560V, V_{GS}=0V$ | $T_J=125^\circ C$ | - | - | 400 | μA |
| Gate-source leakage current,forward | I_{GSSF} | $V_{DS}=0V, V_{GS}=30V$ | $T_J=25^\circ C$ | - | - | 100 | nA |
| Gate-source leakage current,reverse | I_{GSSR} | $V_{DS}=0V, V_{GS}=-30V$ | $T_J=25^\circ C$ | - | - | -100 | nA |
| Drain-source on-state resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=5A$ | $T_J=25^\circ C$ | - | 0.88 | 1.05 | Ω |
| Transconductance | G_{fs} | $V_{DS}=20V$ | $T_J=25^\circ C$ | - | 9.3 | - | S |

Dynamic Characteristics of MOSFET ($T_C=25^\circ C$)

| | | | | Min. | Typ. | Max. | |
|------------------------------|-----------|---------------------------------|--|------|------|------|----|
| Input capacitance | C_{iss} | $f=1MHz, V_{DS}=25V, V_{GS}=0V$ | | - | 1530 | - | pF |
| Output capacitance | C_{oss} | | | - | 120 | - | pF |
| Reverse transfer capacitance | C_{rss} | | | - | 4.8 | - | pF |
| Gate to source charge | Q_{gs} | $V_{DD}=400V$ | | - | 8.2 | - | nC |
| Gate to drain charge | Q_{gd} | $I_D=10A$ | | - | 4.8 | - | nC |
| Total gate charge | Q_g | $V_{GS}=0$ to 10V | | - | 25 | - | nC |

Switching Characteristics of MOSFET ($T_C=25^\circ C$)

| | | | | Min. | Typ. | Max. | |
|---------------------|-------------|---|--|------|------|------|----|
| Turn-on delay time | $t_{d on}$ | $V_{DS}=400V, I_D=10A, R_G=25\Omega, V_{GS}=0$ to 10V | | - | 30 | - | ns |
| Rise time | t_r | | | - | 41 | - | ns |
| Turn-off delay time | $t_{d off}$ | | | - | 64 | - | ns |
| Fall time | t_f | | | - | 36 | - | ns |

Characteristics of Body Diode ($T_C=25^\circ C$)

| | | | | Min. | Typ. | Max. | |
|--------------------------|----------|---|--|------|------|------|---------|
| Forward voltage | V_{SD} | $I_{SD}=10A, V_{GS}=0V$ | | - | - | 1.5 | V |
| Reverse recovery time | t_{rr} | $V_{DS}=400V, I_S=10A, V_{GS}=10V$ $-di/dt=100A/\mu s$ | | - | 410 | - | ns |
| Reverse recovery current | I_{rr} | | | - | 17 | - | A |
| Recovery charge | Q_{rr} | | | - | 3.5 | - | μC |

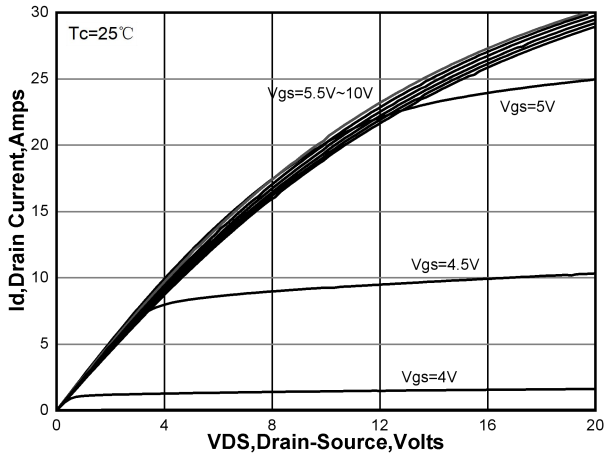


Figure 1. On-Region Characteristics

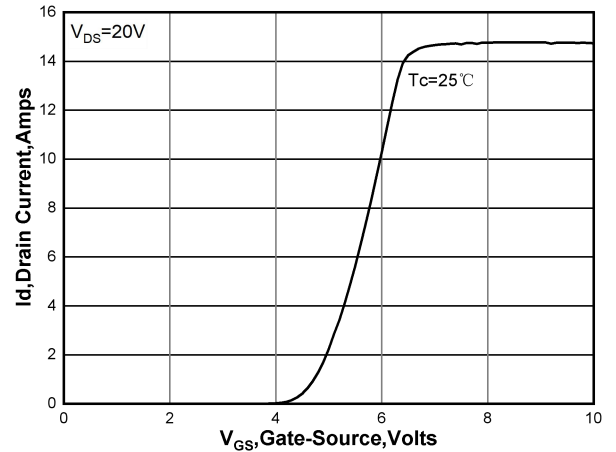


Figure 2. Transfer Characteristics

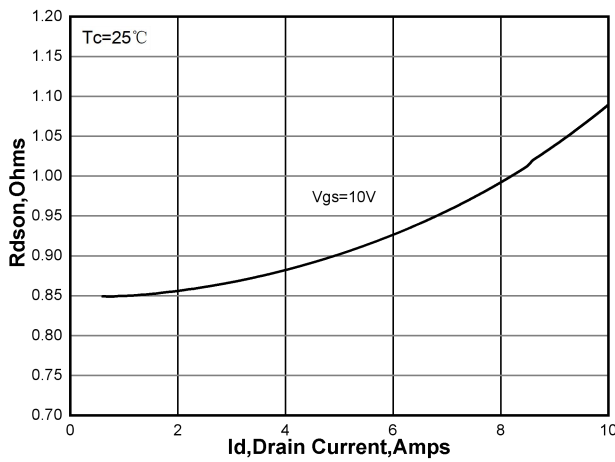


Figure 3. Static Drain-Source On Resistance

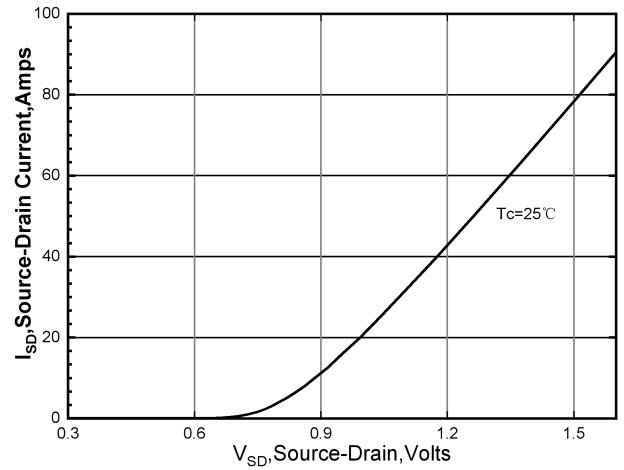


Figure 3. Typical Body Diode Transfer Characteristics

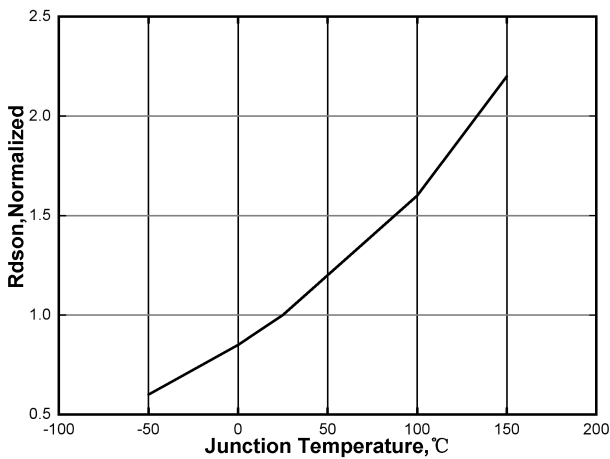


Figure 5. Normalized $R_{DS(on)}$ vs Temperature

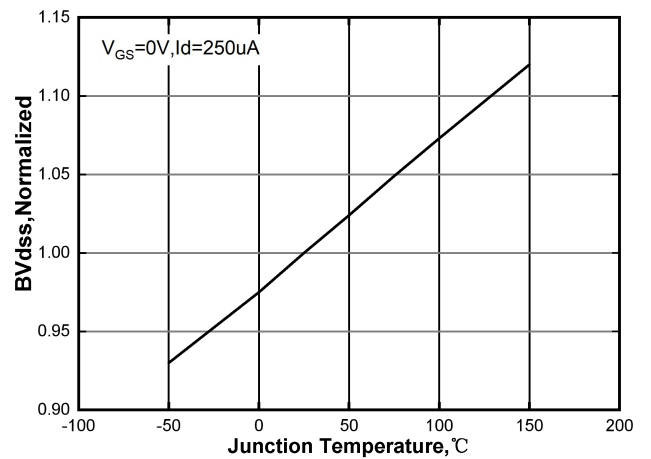


Figure 6. Normalized BV_{DSS} vs Temperature

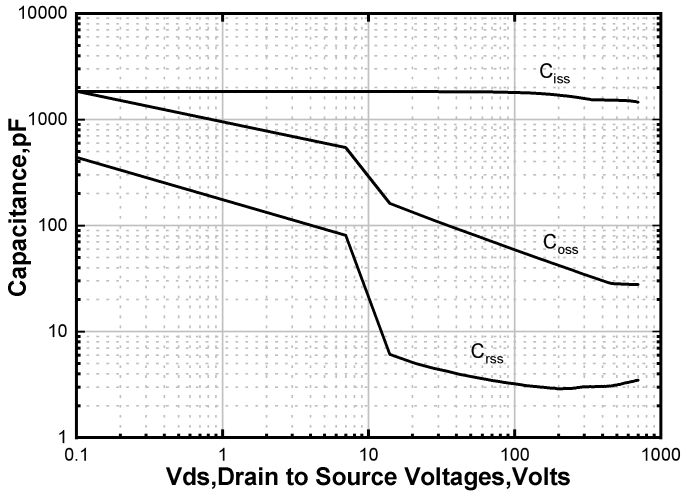


Figure 7. Capacitance Characteristics

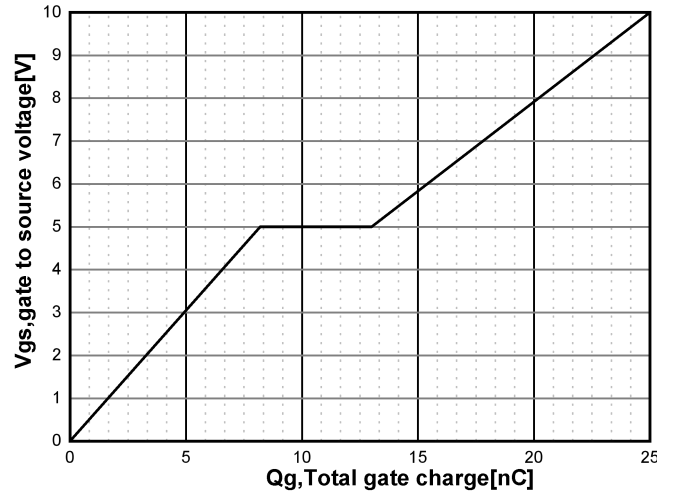


Figure 8. Gate Charge Characteristics

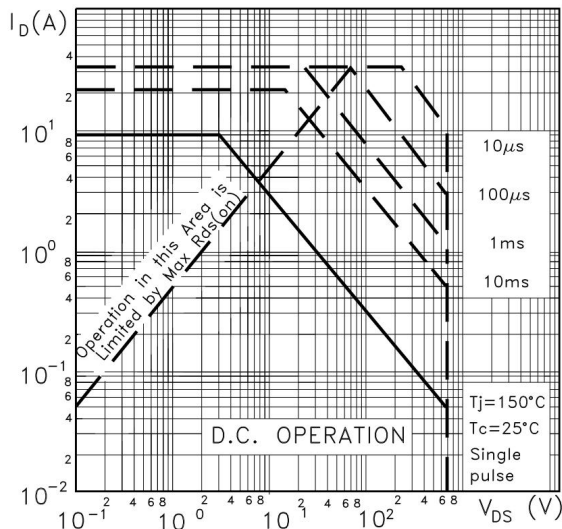


Figure 9. Maximum Safe Operating Area (TO-220F)

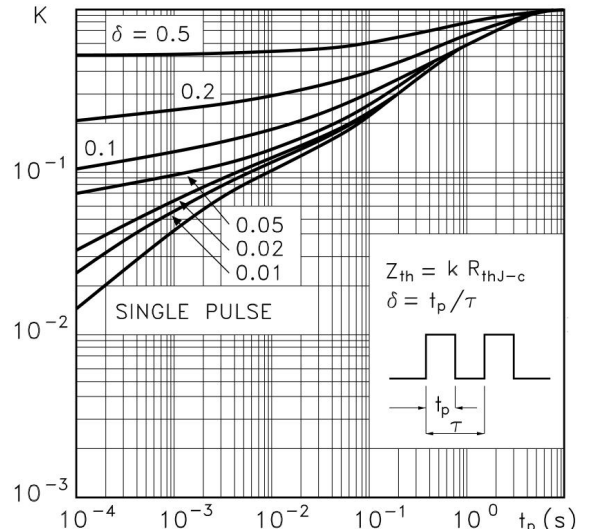


Figure 10. Transient Thermal Response Curve (TO-220F)

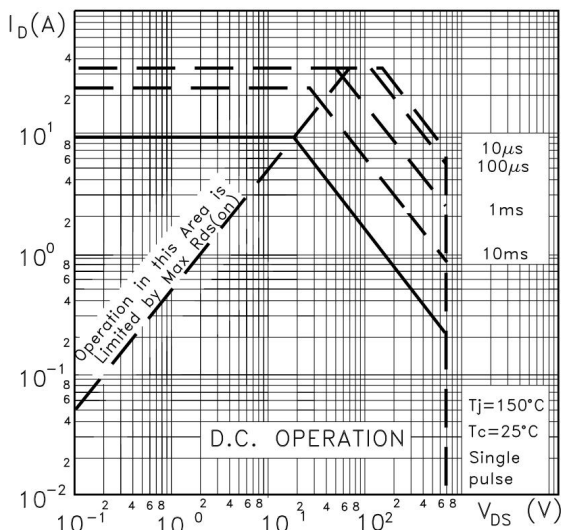


Figure 13. Maximum Safe Operating Area (TO-252)

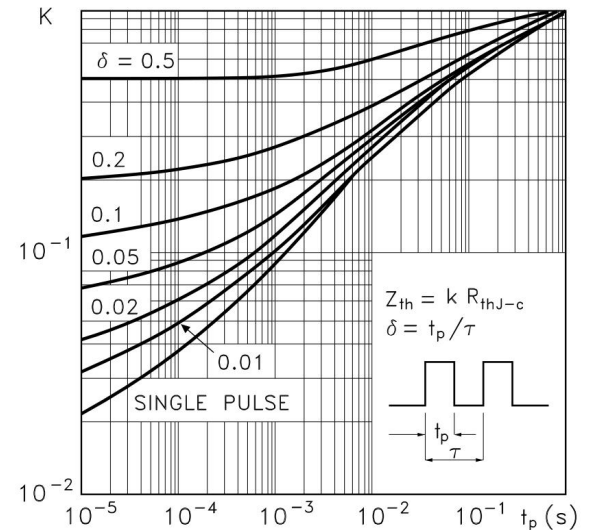
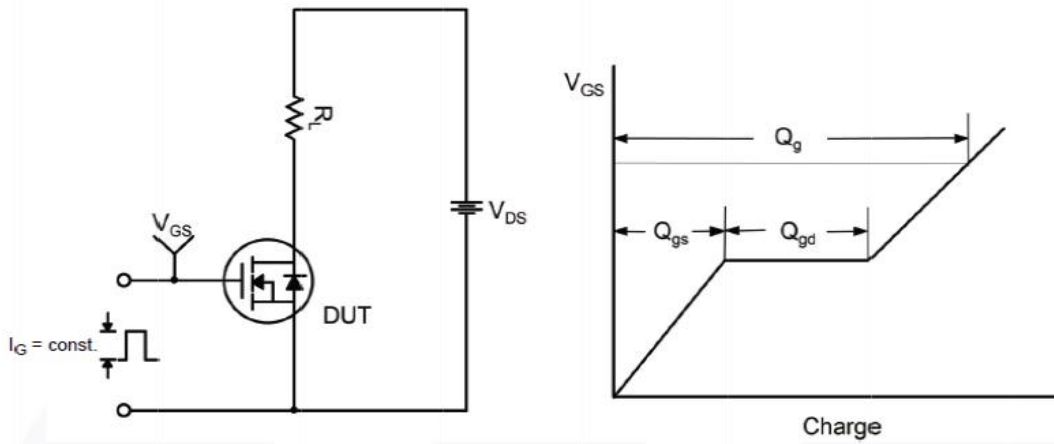
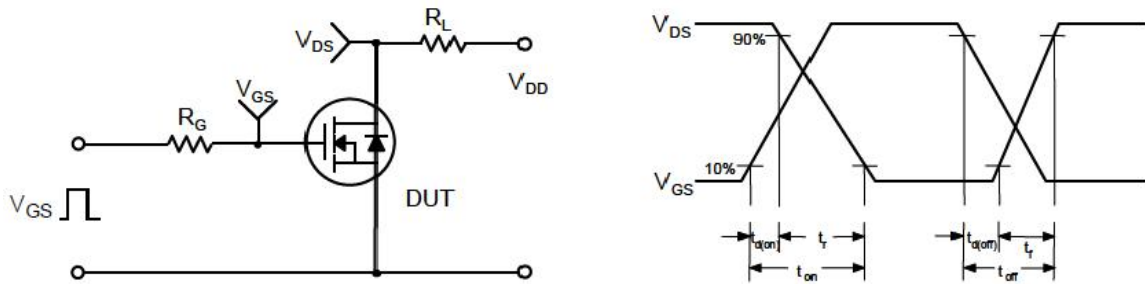


Figure 14. Transient Thermal Response Curve (TO-252)

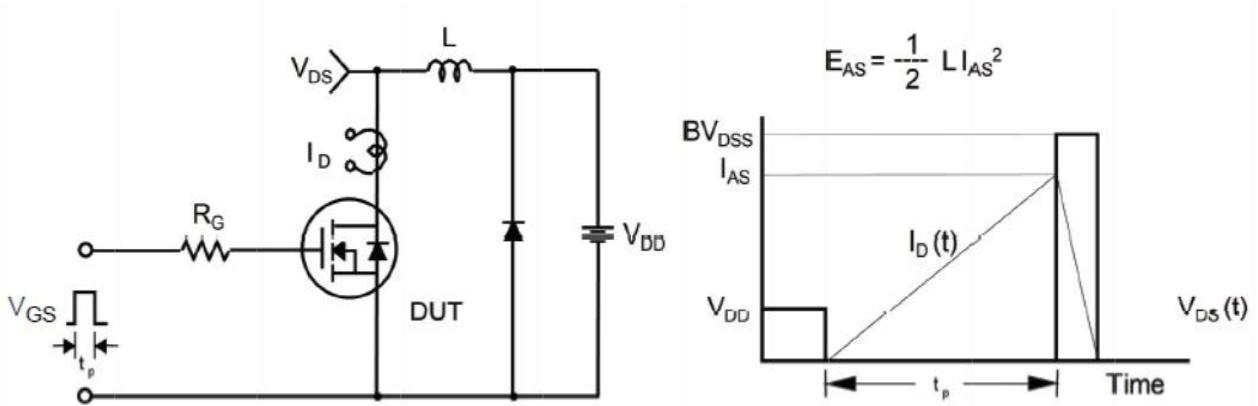
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

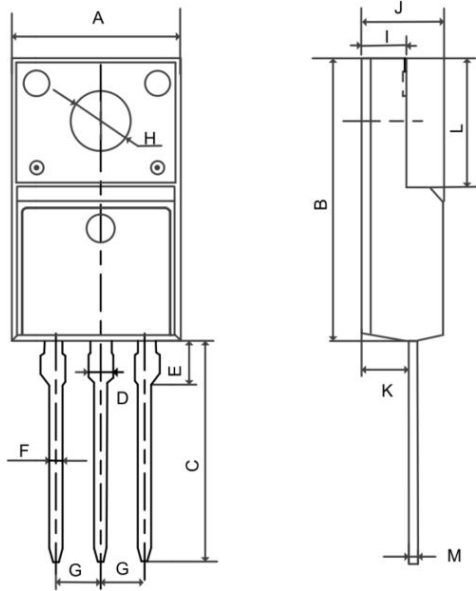


Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO-220F

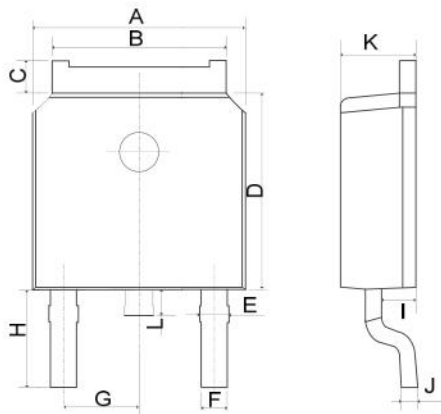
COMMON DIMENSIONS



| SYMBOL | MM | |
|--------|-------|-------|
| | MIN | MAX |
| A | 9.96 | 10.36 |
| B | 15.67 | 16.07 |
| C | 12.70 | 13.30 |
| D | 1.12 | 1.32 |
| E | 1.85 | 2.15 |
| F | 0.59 | 0.79 |
| G | 2.39 | 2.69 |
| H | 3.08 | 3.29 |
| I | 2.34 | 2.74 |
| J | 4.50 | 4.90 |
| K | 2.61 | 2.91 |
| L | 6.50 | 6.90 |
| M | 0.40 | 0.60 |

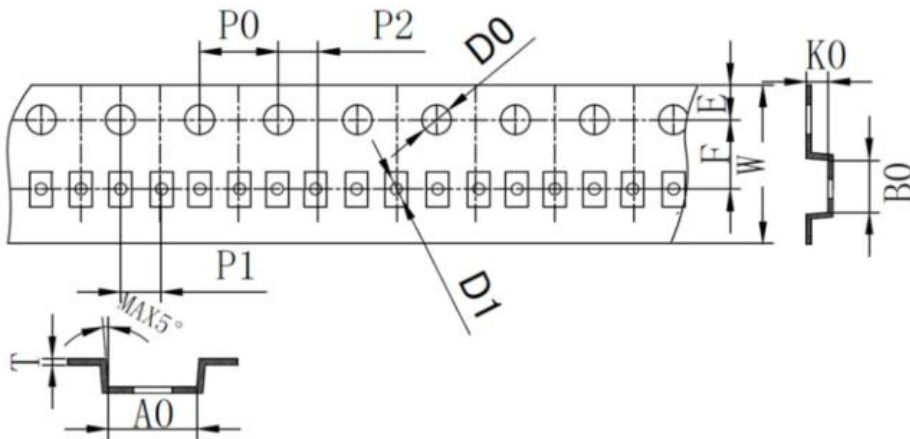
Mechanical Dimensions for TO-252

COMMON DIMENSIONS



| SYMBOL | MM | |
|--------|---------|------|
| | MIN | MAX |
| A | 6.40 | 6.80 |
| B | 5.13 | 5.50 |
| C | 0.88 | 1.28 |
| D | 5.90 | 6.22 |
| E | 0.68 | 1.10 |
| F | 0.68 | 0.91 |
| G | 2.29REF | |
| H | 2.90REF | |
| I | 0.85 | 1.17 |
| J | 0.51REF | |
| K | 2.10 | 2.50 |
| L | 0.40 | 1.00 |

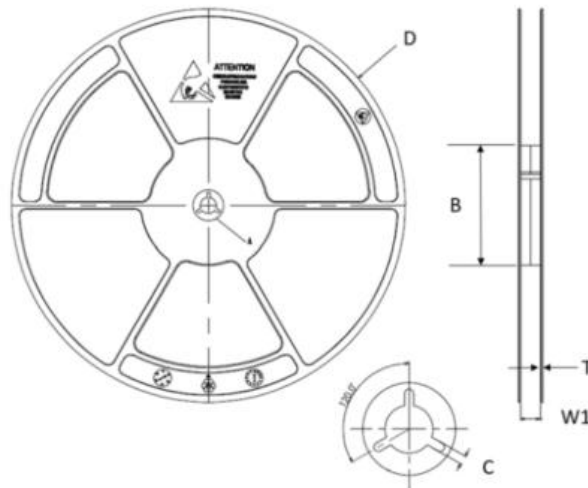
Packaging mechanical data(Tape for TO-252)



单位: mm

| | | | | | |
|-----------|------------|-------------|-----------|-----------|-----------|
| A0 | B0 | K0 | D0 | D1 | P0 |
| 6.80~7.00 | 10.4~10.85 | 2.55~2.95 | 1.45~1.65 | 1.40~1.60 | 3.90~4.10 |
| P1 | P2 | W | T | E | F |
| 7.90~8.10 | 1.90~2.10 | 15.70~16.30 | 0.25~0.35 | 1.65~1.85 | 7.40~7.60 |

Packaging mechanical data(Reel for TO-252)



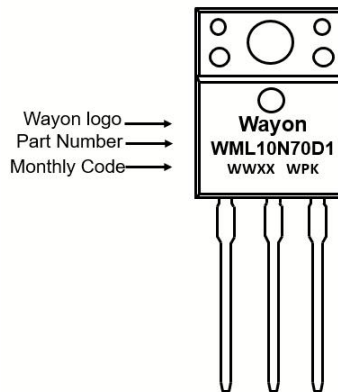
单位: mm

| | | | | |
|-------------|--------------|-----------|-------------|-----------|
| D (卷盘直径) | W1 (卷盘宽度) | T (厚度) | B (内圈直径) | C 卡槽宽度 |
| 328~332 | 16.4~18.4 | 1.5~3.1 | 98~102 | 1.8~3.6 |

Ordering Information

| Part | Package | Marking | Packing method |
|------------|---------|------------|----------------|
| WML10N70D1 | TO-220F | WML10N70D1 | Tube |
| WMO10N70D1 | TO-252 | WMO10N70D1 | Tube |

Marking Information



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