



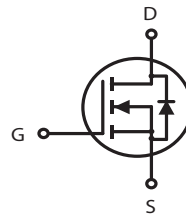
STU/D4530NLS

N-Channel Logic Level Enhancement Mode Field Effect Transistor

| PRODUCT SUMMARY | | |
|-----------------|----------------|------------------------------|
| V _{DS} | I _D | R _{DS(ON)} (mΩ) Typ |
| 35V | 53A | 8 @ V _{GS} = 10V |
| | | 10 @ V _{GS} = 4.5V |

FEATURES

- Super high dense cell design for low R_{DS(ON)}.
- Rugged and reliable.
- TO-252 and TO-251 Package.



ABSOLUTE MAXIMUM RATINGS (T_a=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|-----------------------------------|------------|------|
| Drain-Source Voltage Rating | V _{spike (c)} | 40 | V |
| Drain-Source Voltage | V _{DS} | 35 | V |
| Gate-Source Voltage | V _{GS} | ±20 | V |
| Drain Current-Continuous @ T _c =25°C -Pulsed ^a | I _D | 53 | A |
| | I _{DM} | 100 | A |
| Drain-Source Diode Forward Current | I _S | 20 | A |
| Maximum Power Dissipation @ T _c =25°C | P _D | 50 | W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to 175 | °C |

THERMAL CHARACTERISTICS

| | | | |
|---|------------------|----|------|
| Thermal Resistance, Junction-to-Case | R _{θJC} | 3 | °C/W |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 50 | °C/W |

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ELECTRICAL CHARACTERISTICS (T_c=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ ^c | Max | Unit |
|--|---------------------|--|-----|------------------|------|-------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} = 0V, I _D = 250uA | 35 | | | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 28V, V _{GS} = 0V | | | 1 | uA |
| Gate-Body Leakage | I _{GSS} | V _{GS} = ±20V, V _{DS} = 0V | | | ±100 | nA |
| ON CHARACTERISTICS^a | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250uA | 1 | 1.7 | 3 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} = 10V, I _D = 10A | | 8 | 10 | m ohm |
| | | V _{GS} = 4.5V, I _D = 5A | | 10 | 12 | m ohm |
| On-State Drain Current | I _{D(ON)} | V _{DS} = 10V, V _{GS} = 10V | 53 | | | A |
| Forward Transconductance | g _{FS} | V _{DS} = 10V, I _D = 10A | | 26 | | S |
| DYNAMIC CHARACTERISTICS^b | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} = 15V, V _{GS} = 0V f = 1.0MHz | | 1620 | | pF |
| Output Capacitance | C _{OSS} | | | 280 | | pF |
| Reverse Transfer Capacitance | C _{RSS} | | | 155 | | pF |
| Gate resistance | R _g | V _{GS} = 0V, V _{DS} = 0V, f = 1.0MHz | | 0.3 | | ohm |
| SWITCHING CHARACTERISTICS^b | | | | | | |
| Turn-On Delay Time | t _{D(ON)} | V _{DD} = 15V I _D = 1 A V _{GS} = 10V R _{GEN} = 6 ohm | | 20 | | ns |
| Rise Time | t _r | | | 22 | | ns |
| Turn-Off Delay Time | t _{D(OFF)} | | | 55 | | ns |
| Fall Time | t _f | | | 17 | | ns |
| Total Gate Charge | Q _g | V _{DS} = 15V, I _D = 10A, V _{GS} = 10V | | 33.5 | | nC |
| | | V _{DS} = 15V, I _D = 10A, V _{GS} = 4.5V | | 16 | | nC |
| Gate-Source Charge | Q _{gs} | V _{DS} = 15V, I _D = 10A | | 3.7 | | nC |
| Gate-Drain Charge | Q _{gd} | V _{GS} = 10V | | 7.5 | | nC |

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ELECTRICAL CHARACTERISTICS ($T_c=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|--|----------|--------------------------|-----|------|-----|------|
| DRAIN-SOURCE DIODE CHARACTERISTICS ^a | | | | | | |
| Diode Forward Voltage | V_{SD} | $V_{GS} = 0V, I_s = 20A$ | | 0.95 | 1.3 | V |

Notes

- a. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.
- c. Guaranteed when external $R_g=6\text{ ohm}$ and $t_f < t_{f\text{ max}}$

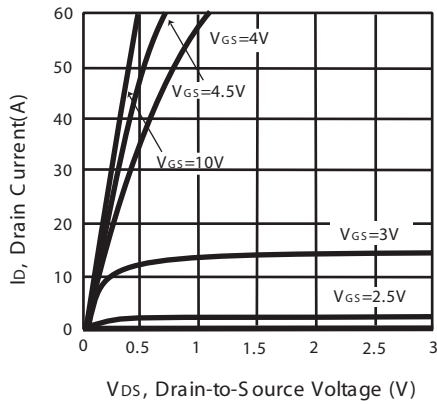


Figure 1. Output Characteristics

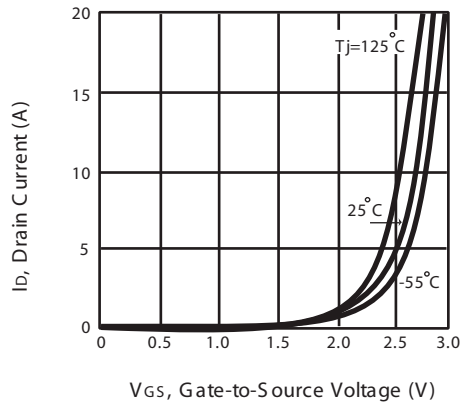


Figure 2. Transfer Characteristics

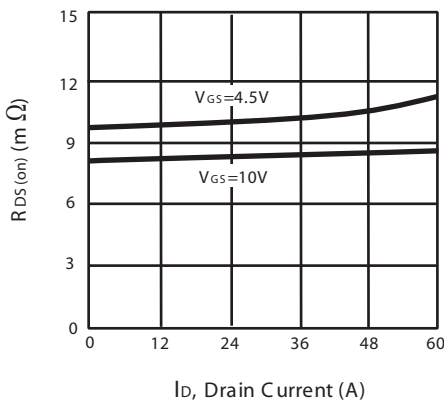


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

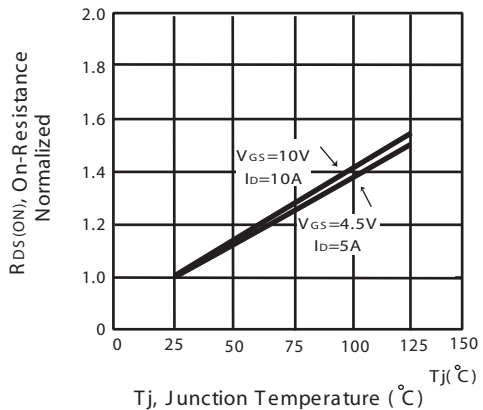


Figure 4. On-Resistance Variation with Drain Current and Temperature

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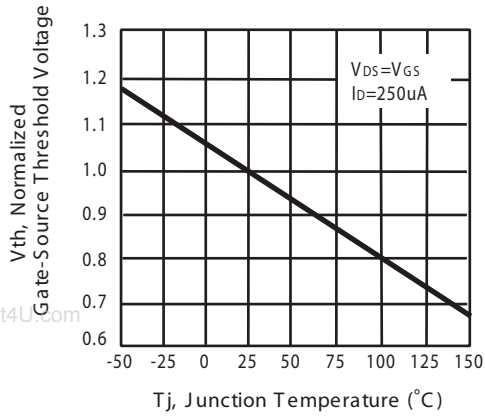


Figure 5. Gate Threshold Variation with Temperature

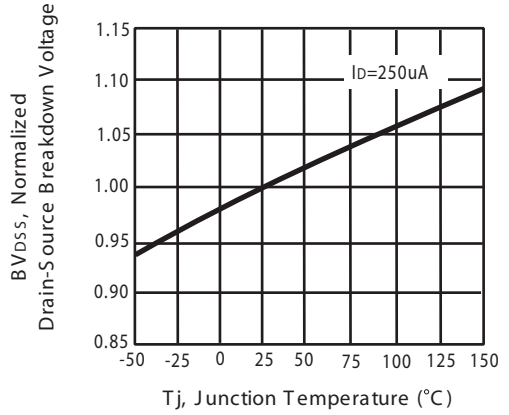


Figure 6. Breakdown Voltage Variation with Temperature

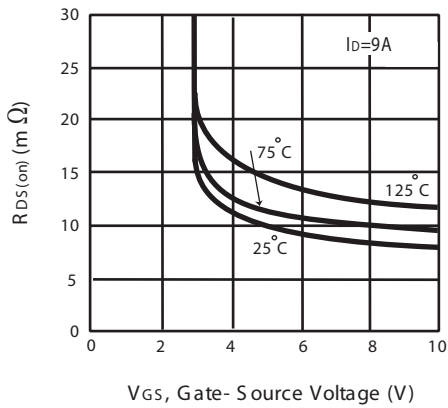


Figure 7. On-Resistance vs. Gate-Source Voltage

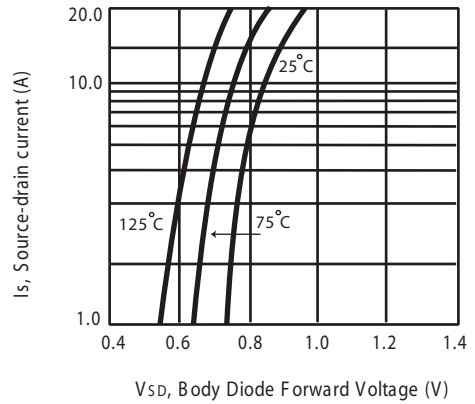


Figure 8. Body Diode Forward Voltage Variation with Source Current

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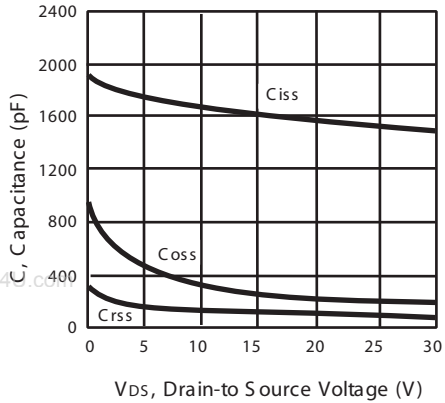


Figure 9. Capacitance

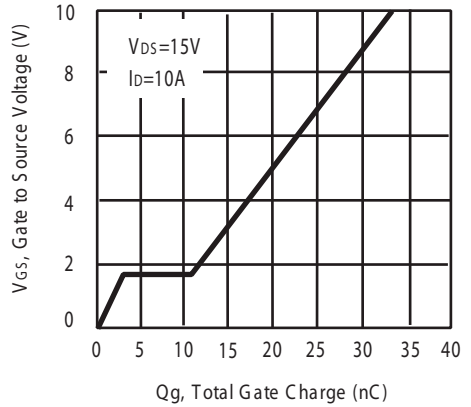


Figure 10. Gate Charge

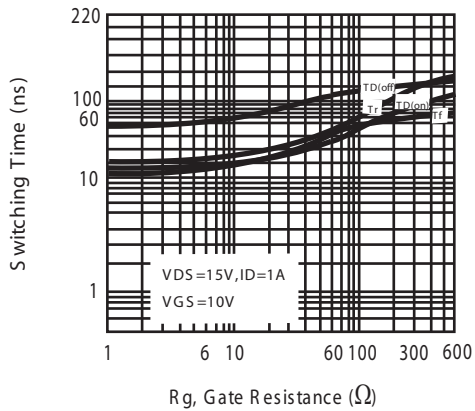


Figure 11. switching characteristics

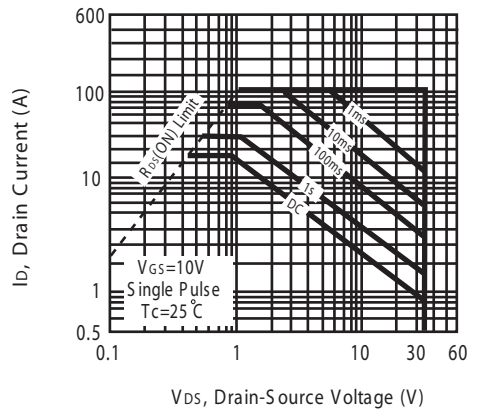


Figure 12. Maximum Safe Operating Area

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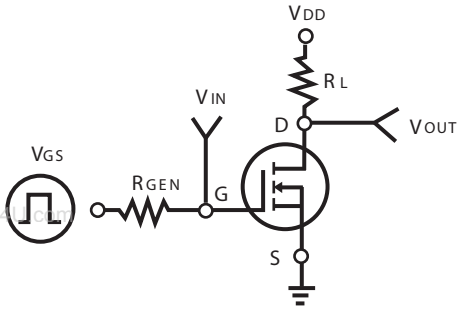


Figure 13. Switching Test Circuit

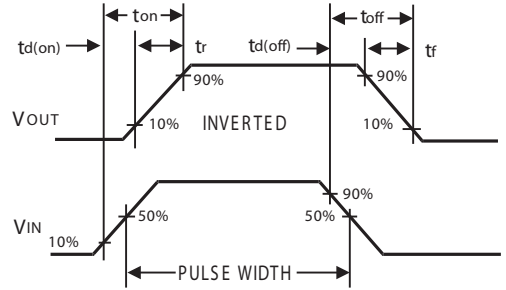


Figure 14. Switching Waveforms

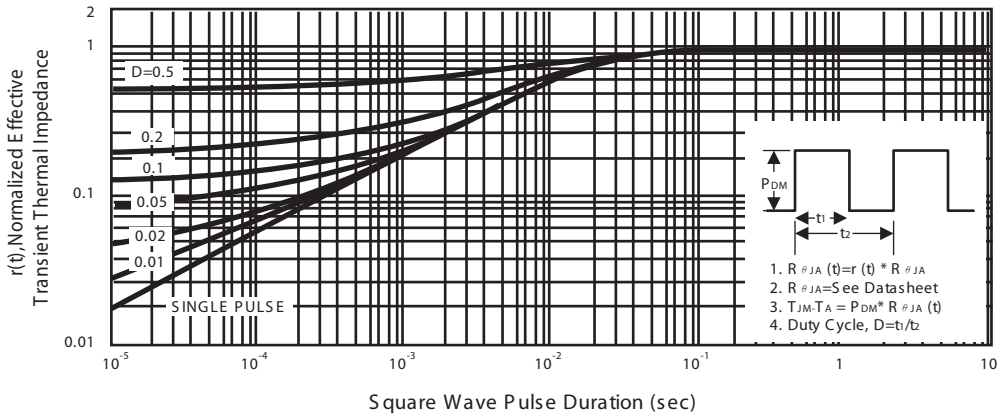
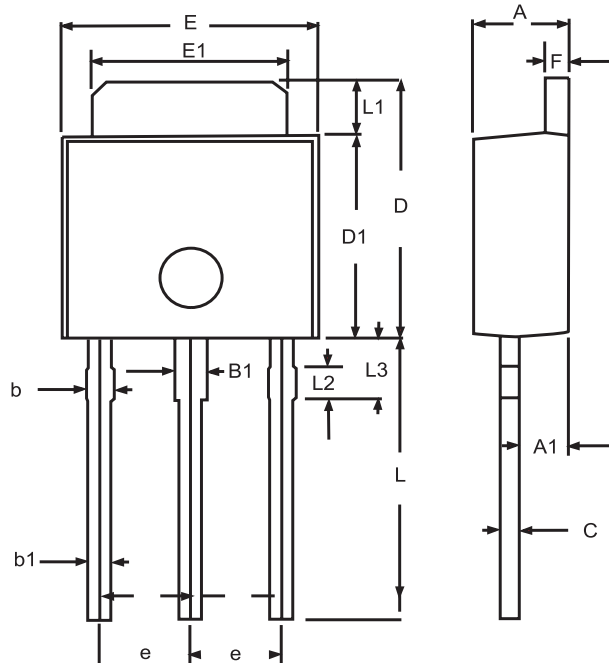


Figure 15. Normalized Thermal Transient Impedance Curve

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PACKAGE OUTLINE DIMENSIONS

TO-251

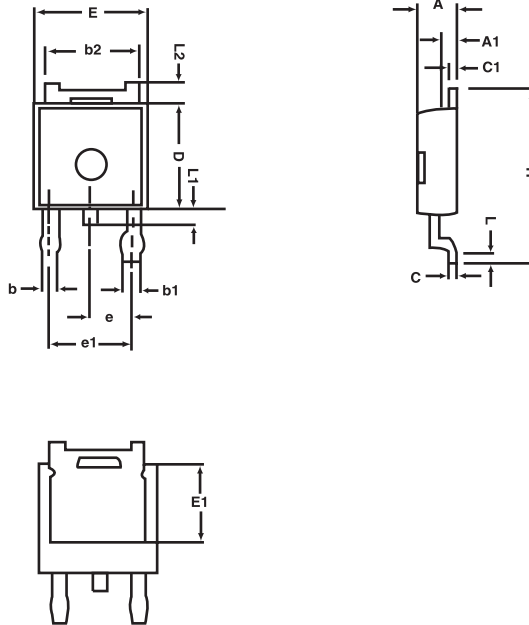


| SYMBOLS | MILLIMETERS | | INCHES | |
|---------|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 2.20 | 2.40 | 0.087 | 0.095 |
| A1 | 1.100 | 1.300 | 0.043 | 0.051 |
| B1 | 0.650 | 1.050 | 0.026 | 0.041 |
| b | 0.500 | 0.900 | 0.020 | 0.035 |
| b1 | 0.400 | 0.800 | 0.016 | 0.32 |
| C | 0.400 | 0.600 | 0.016 | 0.024 |
| D | 6.700 | 7.300 | 0.264 | 0.287 |
| D1 | 5.400 | 5.650 | 0.213 | 0.222 |
| E | 6.40 | 6.650 | 0.252 | 0.262 |
| e | 2.100 | 2.500 | 0.083 | 0.098 |
| F | 0.400 | 0.600 | 0.016 | 0.024 |
| L | 7.000 | 8.000 | 0.276 | 0.315 |
| L1 | 1.300 | 1.700 | 0.051 | 0.067 |
| L2 | 0.700 | 0.900 | 0.028 | 0.035 |
| L3 | 1.400 | 1.800 | 0.055 | 0.071 |

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PACKAGE OUTLINE DIMENSIONS

TO-252

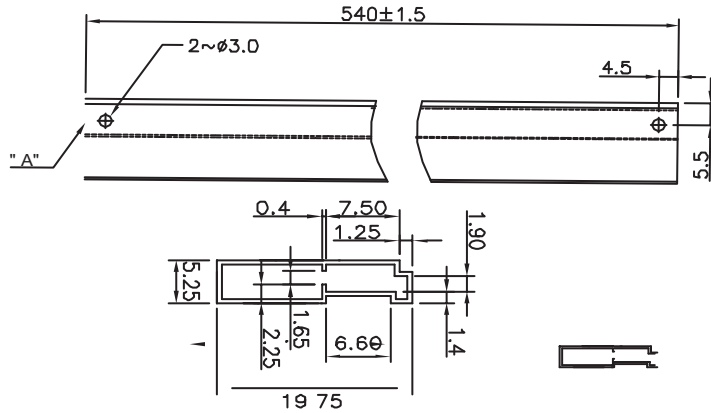


| SYMBOLS | MILLIMETERS | | INCHES | |
|---------|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 2.25 | 2.35 | 0.089 | 0.093 |
| A1 | 0.95 | 1.05 | 0.037 | 0.041 |
| b | 0.77 | 0.85 | 0.030 | 0.033 |
| b1 | 0.84 | 0.94 | 0.033 | 0.037 |
| b2 | 5.30 | 5.45 | 0.209 | 0.215 |
| C | 0.49 | 0.53 | 0.019 | 0.021 |
| D | 6.00 | 6.20 | 0.236 | 0.244 |
| E | 6.40 | 6.60 | 0.252 | 0.260 |
| E1 | 3.18 | 3.67 | 0.125 | 0.145 |
| e | 2.29 | BSC | 0.090 | BSC |
| H | 9.70 | 10.10 | 0.382 | 0.398 |
| L | 1.425 | 1.625 | 0.056 | 0.064 |
| L1 | 0.650 | 0.850 | 0.026 | 0.033 |
| L2 | 0.600 | REF. | 0.024 | REF. |

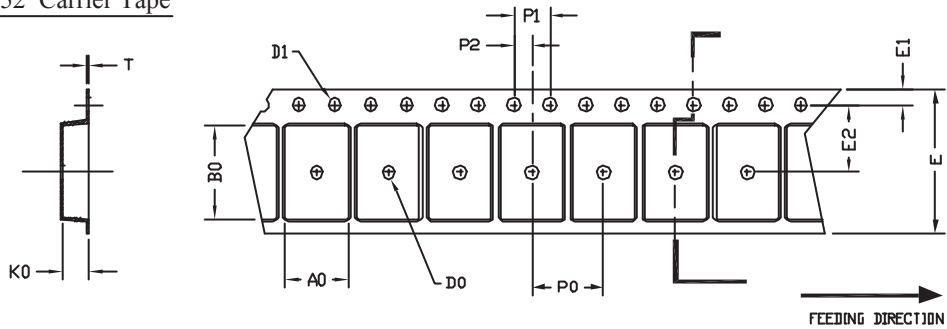
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TO251 Tube/TO-252 Tape and Reel Data

TO-251 Tube



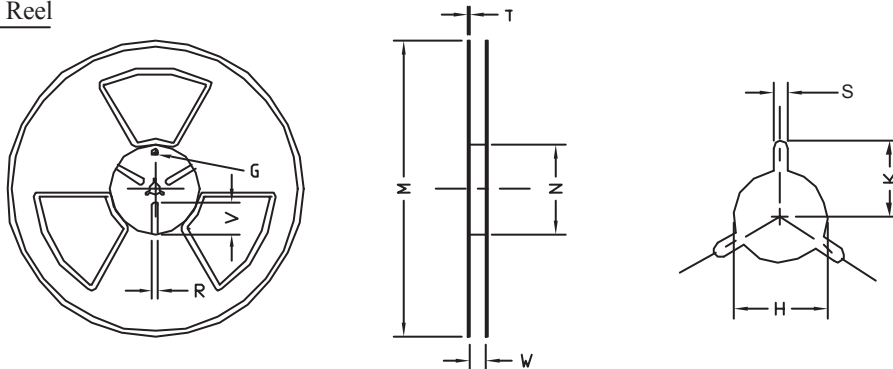
TO-252 Carrier Tape



UNIT:mm

| PACKAGE | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|-------------------|--------------|--------------|--------------|----|-----------------------|--------------|--------------|--------------|-------------|-------------|--------------|--------------|
| TO-252 (16 mm) | 6.80 ±0.1 | 10.3 ±0.1 | 2.50 ±0.1 | φ2 | φ 1.5 + 0.1 - 0 | 16.0 0.3± | 1.75 0.1± | 7.5 ±0.15 | 8.0 ±0.1 | 4.0 ±0.1 | 2.0 ±0.15 | 0.3 ±0.05 |

TO-252 Reel



UNIT:mm

| TAPE SIZE | REEL SIZE | M | N | W | T | H | K | S | G | R | V |
|-----------|-----------|----------------|---------------|----------------------|-----|--------------------------|------|-------------|-----|-----|-----|
| 16 mm | φ 330 | φ 330 ± 0.5 | φ 97 ± 1.0 | 17.0 + 1.5 - 0 | 2.2 | φ 13.0 + 0.5 - 0.2 | 10.6 | 2.0 ±0.5 | --- | --- | --- |