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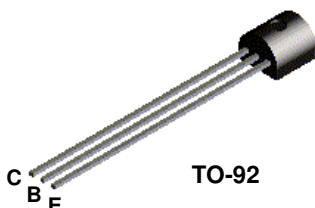
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2N5961



NPN General Purpose Amplifier

This device is designed for use as low noise, high gain, general purpose amplifiers requiring collector currents to 50 mA. Sourced from Process 07. See 2N5088 for characteristics.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

| Symbol | Parameter | Val60ue | Units |
|-----------------------------------|--|-------------|-------|
| V _{CEO} | Collector-Emitter Voltage | 60 | V |
| V _{CB0} | Collector-Base Voltage | 60 | V |
| V _{EBO} | Emitter-Base Voltage | 8.0 | V |
| I _C | Collector Current - Continuous | 100 | mA |
| T _J , T _{stg} | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics

TA = 25°C unless otherwise noted

| Symbol | Characteristic | Max | Units |
|------------------|---|--------|-------|
| | | 2N5961 | |
| P _D | Total Device Dissipation Derate above 25°C | 625 | mW |
| | | 5.0 | mW/°C |
| R _{θJC} | Thermal Resistance, Junction to Case | 83.3 | °C/W |
| R _{θJA} | Thermal Resistance, Junction to Ambient | 200 | °C/W |

NPN General Purpose Amplifier

(continued)

2N5961

Electrical Characteristics

TA = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Max | Units |
|--------|-----------|-----------------|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-------|

OFF CHARACTERISTICS

| | | | | | |
|---------------|--------------------------------------|---|-----|-----------|----------|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage* | $I_C = 5.0 \text{ mA}, I_B = 0$ | 60 | | V |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage | $I_C = 10 \text{ } \mu\text{A}, I_E = 0$ | 60 | | V |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage | $I_E = 10 \text{ } \mu\text{A}, I_C = 0$ | 8.0 | | V |
| I_{CBO} | Collector Cutoff Current | $V_{CB} = 45 \text{ V}, I_E = 0$ $V_{CB} = 45 \text{ V}, I_E = 0, T_A = 65 \text{ }^\circ\text{C}$ | | 2.0 50 | nA nA |
| I_{EBO} | Emitter Cutoff Current | $V_{EB} = 5.0 \text{ V}, I_C = 0$ | | 1.0 | nA |

ON CHARACTERISTICS*

| | | | | | |
|---------------|--------------------------------------|--|--------------------------|------------|--------|
| η_{FE} | DC Current Gain | $V_{CE} = 5.0 \text{ V}, I_C = 10 \text{ } \mu\text{A}$ $V_{CE} = 5.0 \text{ V}, I_C = 100 \text{ } \mu\text{A}$ $V_{CE} = 5.0 \text{ V}, I_C = 1.0 \text{ mA}$ $V_{CE} = 5.0 \text{ V}, I_C = 10 \text{ mA}$ | 100 120 135 150 | 700 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$ $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ | | 0.2 0.2 | V V |
| $V_{BE(on)}$ | Base-Emitter On Voltage | $V_{CE} = 5.0 \text{ V}, I_C = 1.0 \text{ mA}$ | 0.5 | 0.7 | V |

SMALL SIGNAL CHARACTERISTICS

| | | | | | |
|-------------|----------------------------|---|------------|-------------------|----------------|
| C_{cb} | Collector-Base Capacitance | $V_{CB} = 5.0 \text{ V}, f = 1.0 \text{ MHz}$ | | 4.0 | pF |
| C_{eb} | Emitter-Base Capacitance | $V_{EB} = 0.5 \text{ V}, f = 1.0 \text{ MHz}$ | | 6.0 | pF |
| η_{fe} | Small-Signal Current Gain | $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $f = 1.0 \text{ kHz}$ $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $f = 100 \text{ MHz}$ | 150 1.0 | 1000 | |
| NF | Noise Figure | $V_{CE} = 5.0 \text{ V}, I_C = 10 \text{ } \mu\text{A},$ $R_S = 10 \text{ k}\Omega, f = 1.0 \text{ kHz},$ $B_W = 400 \text{ Hz}$ $V_{CE} = 5.0 \text{ V}, I_C = 10 \text{ } \mu\text{A},$ $R_S = 10 \text{ k}\Omega, f = 10 \text{ Hz} - 10 \text{ kHz}$ $B_W = 15.7 \text{ kHz}$ $V_{CE} = 5.0 \text{ V}, I_C = 100 \text{ } \mu\text{A},$ $R_S = 1.0 \text{ k}\Omega, f = 1.0 \text{ kHz}$ $B_W = 400 \text{ Hz}$ | | 3.0 3.0 6.0 | dB dB dB |

*Pulse Test: Pulse Width $\leq 300 \text{ } \mu\text{s}$, Duty Cycle $\leq 2.0\%$

TO-92 Tape and Reel Data

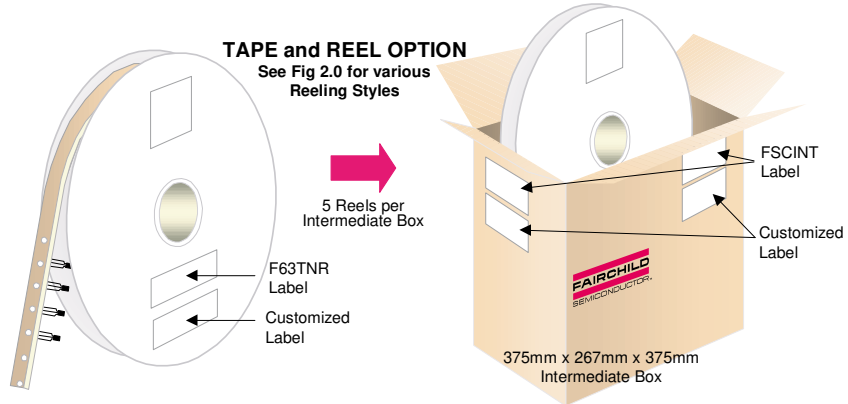


TO-92 Packaging Configuration: Figure 1.0

FSCINT Label sample



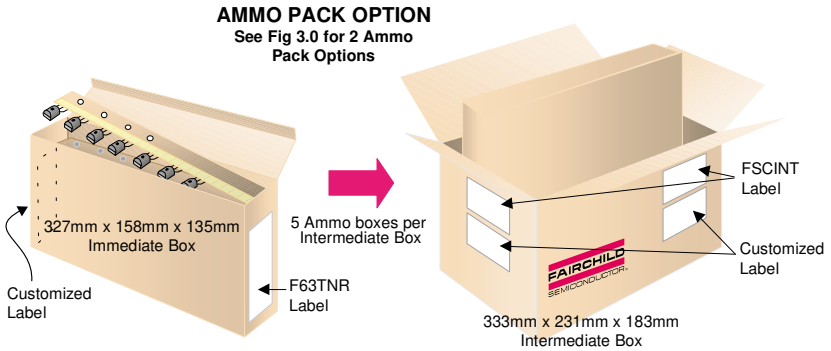
F63TNR Label sample



TO-92 TNR/AMMO PACKING INFORMATION

| Packing | Style | Quantity | EOL code |
|---------|-------|----------|----------|
| Reel | A | 2,000 | D26Z |
| | E | 2,000 | D27Z |
| Ammo | M | 2,000 | D74Z |
| | P | 2,000 | D75Z |

Unit weight = 0.22 gm
 Reel weight with components = 1.04 kg
 Ammo weight with components = 1.02 kg
 Max quantity per intermediate box = 10,000 units

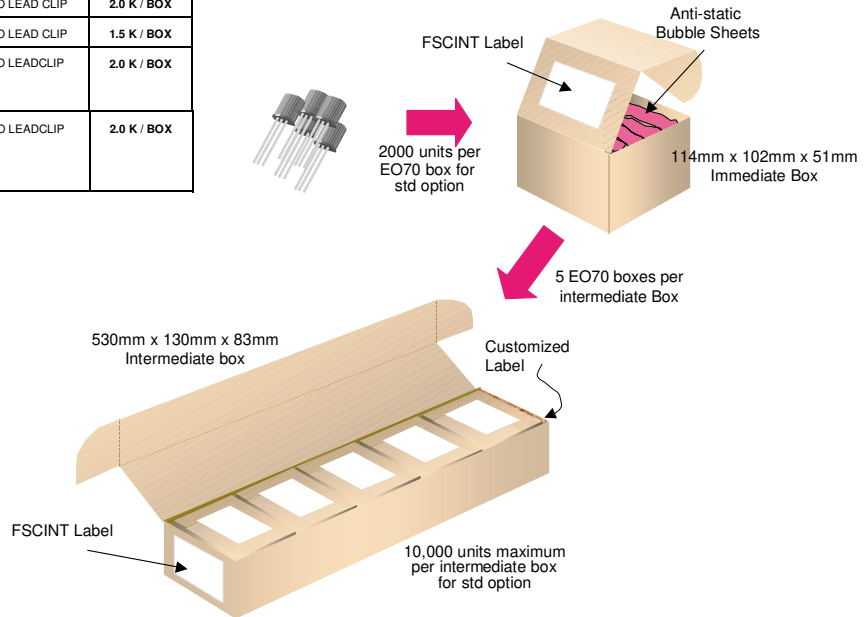


(TO-92) BULK PACKING INFORMATION

| EOL CODE | DESCRIPTION | LEADCLIP DIMENSION | QUANTITY |
|-------------|---|--------------------|-------------|
| J18Z | TO-18 OPTION STD | NO LEAD CLIP | 2.0 K / BOX |
| J05Z | TO-5 OPTION STD | NO LEAD CLIP | 1.5 K / BOX |
| NO EOL CODE | TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (NON PROELECTRON SERIES), 96 | NO LEADCLIP | 2.0 K / BOX |
| L34Z | TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON SERIES BCXXX, BFXXX, BSRXXX), 97, 98 | NO LEADCLIP | 2.0 K / BOX |

BULK OPTION

See Bulk Packing Information table

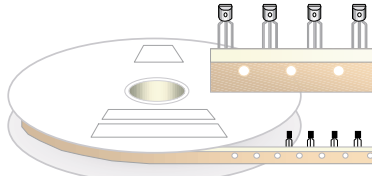


TO-92 Tape and Reel Data, continued

TO-92 Reeling Style

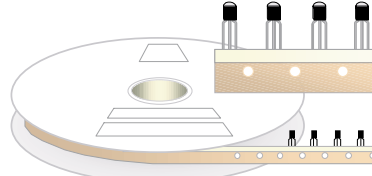
Configuration: Figure 2.0

Machine Option "A" (H)



Style "A", D26Z, D70Z (s/h)

Machine Option "E" (J)

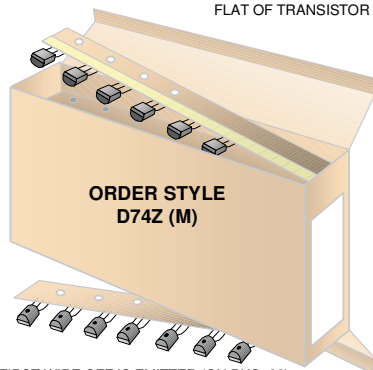


Style "E", D27Z, D71Z (s/h)

TO-92 Radial Ammo Packaging

Configuration: Figure 3.0

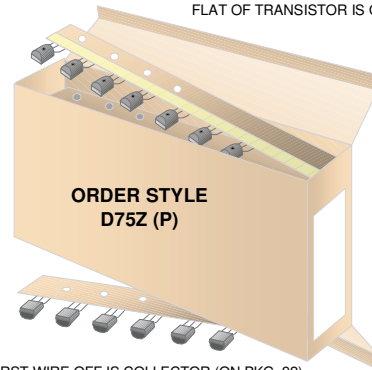
FIRST WIRE OFF IS COLLECTOR
ADHESIVE TAPE IS ON THE TOP SIDE
FLAT OF TRANSISTOR IS ON TOP



ORDER STYLE
D74Z (M)

FIRST WIRE OFF IS EMITTER (ON PKG. 92)
ADHESIVE TAPE IS ON BOTTOM SIDE
FLAT OF TRANSISTOR IS ON BOTTOM

FIRST WIRE OFF IS EMITTER
ADHESIVE TAPE IS ON THE TOP SIDE
FLAT OF TRANSISTOR IS ON BOTTOM

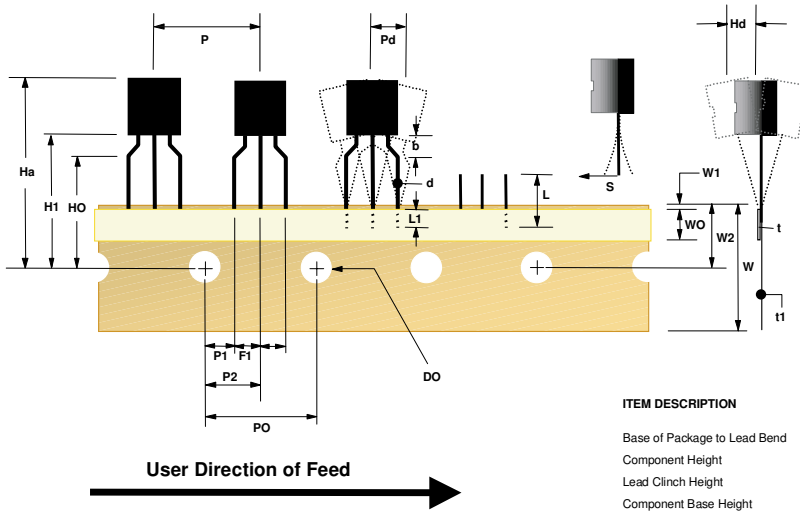


ORDER STYLE
D75Z (P)

FIRST WIRE OFF IS COLLECTOR (ON PKG. 92)
ADHESIVE TAPE IS ON BOTTOM SIDE
FLAT OF TRANSISTOR IS ON TOP

TO-92 Tape and Reel Data, continued

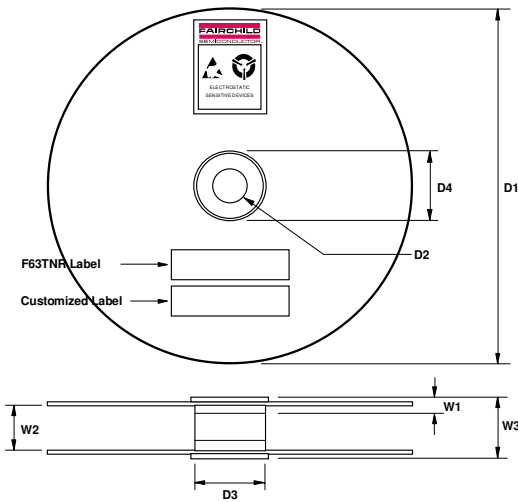
**TO-92 Tape and Reel Taping
Dimension Configuration: Figure 4.0**



| ITEM DESCRIPTION | SYMBOL | DIMENSION |
|------------------------------------|--------|------------------------|
| Base of Package to Lead Bend | b | 0.098 (max) |
| Component Height | Ha | 0.928 (+/- 0.025) |
| Lead Clinch Height | HO | 0.630 (+/- 0.020) |
| Component Base Height | H1 | 0.748 (+/- 0.020) |
| Component Alignment (side/side) | Pd | 0.040 (max) |
| Component Alignment (front/back) | Hd | 0.031 (max) |
| Component Pitch | P | 0.500 (+/- 0.020) |
| Feed Hole Pitch | PO | 0.500 (+/- 0.008) |
| Hole Center to First Lead | P1 | 0.150 (+0.009, -0.010) |
| Hole Center to Component Center | P2 | 0.247 (+/- 0.007) |
| Lead Spread | F1/F2 | 0.104 (+/- 0.010) |
| Lead Thickness | d | 0.018 (+0.002, -0.003) |
| Cut Lead Length | L | 0.429 (max) |
| Taped Lead Length | L1 | 0.209 (+0.051, -0.052) |
| Taped Lead Thickness | t | 0.032 (+/- 0.006) |
| Carrier Tape Thickness | t1 | 0.021 (+/- 0.006) |
| Carrier Tape Width | W | 0.708 (+0.020, -0.019) |
| Hold - down Tape Width | WO | 0.236 (+/- 0.012) |
| Hold - down Tape position | W1 | 0.035 (max) |
| Feed Hole Position | W2 | 0.360 (+/- 0.025) |
| Sprocket Hole Diameter | DO | 0.157 (+0.008, -0.007) |
| Lead Spring Out | S | 0.004 (max) |

Note : All dimensions are in inches.

**TO-92 Reel
Configuration: Figure 5.0**



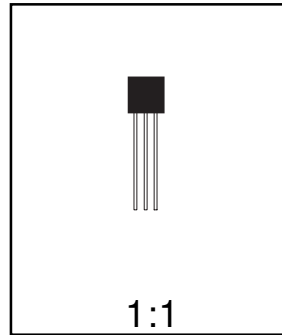
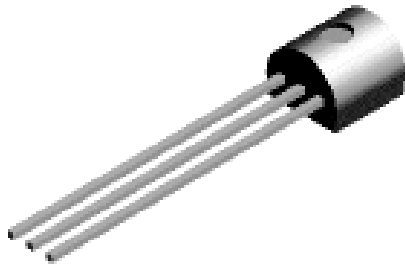
| ITEM DESCRIPTION | SYMBOL | MINIMUM | MAXIMUM |
|--------------------------------|--------|---------|---------|
| Reel Diameter | D1 | 13.975 | 14.025 |
| Arbor Hole Diameter (Standard) | D2 | 1.160 | 1.200 |
| (Small Hole) | D2 | 0.650 | 0.700 |
| Core Diameter | D3 | 3.100 | 3.300 |
| Hub Recess Inner Diameter | D4 | 2.700 | 3.100 |
| Hub Recess Depth | W1 | 0.370 | 0.570 |
| Flange to Flange Inner Width | W2 | 1.630 | 1.690 |
| Hub to Hub Center Width | W3 | | 2.090 |

Note: All dimensions are in inches

TO-92 Package Dimensions



TO-92 (FS PKG Code 92, 94, 96)



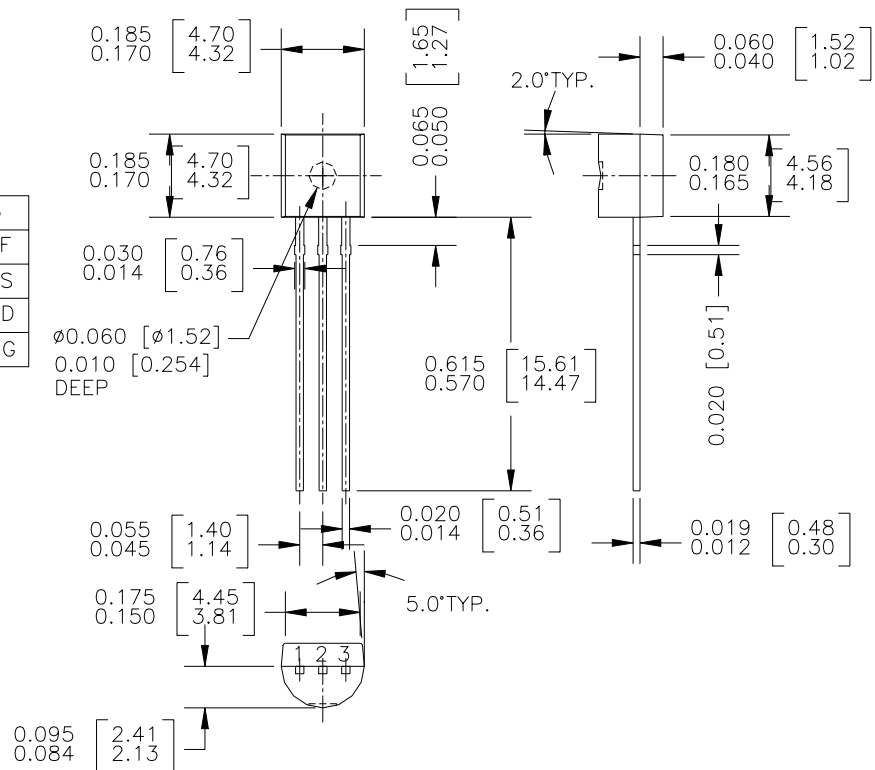
Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.1977

TO-92 (92,94,96)

| PIN | 92 | | 94 | | 96 | |
|-----|----|---|----|---|----|---|
| | B | F | B | F | B | F |
| 1 | E | D | E | D | B | S |
| 2 | B | S | C | G | E | D |
| 3 | C | G | B | S | C | G |



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