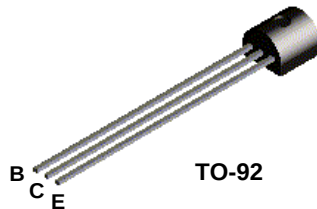


**2N3390  
2N3391  
2N3391A  
2N3392  
2N3393**



## NPN General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 300 mA. Sourced from Process 10. See PN100A for characteristics.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

| Symbol                            | Parameter                                        | Value       | Units |
|-----------------------------------|--------------------------------------------------|-------------|-------|
| V <sub>CEO</sub>                  | Collector-Emitter Voltage                        | 25          | V     |
| V <sub>CBO</sub>                  | Collector-Base Voltage                           | 25          | V     |
| V <sub>EBO</sub>                  | Emitter-Base Voltage                             | 5.0         | V     |
| I <sub>C</sub>                    | Collector Current - Continuous                   | 500         | mA    |
| T <sub>J</sub> , T <sub>stg</sub> | 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       |
|------------------|-----------------------------------------------|------------------------------|-------------|
|                  |                                               | 2N3390 / 3391A / 3392 / 3393 |             |
| P <sub>D</sub>   | Total Device Dissipation<br>Derate above 25°C | 625<br>5.0                   | mW<br>mW/°C |
| R <sub>θJC</sub> | Thermal Resistance, Junction to Case          | 83.3                         | °C/W        |
| R <sub>θJA</sub> | Thermal Resistance, Junction to Ambient       | 200                          | °C/W        |

# NPN General Purpose Amplifier (continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

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

### OFF CHARACTERISTICS

|               |                                      |                                           |     |     |    |
|---------------|--------------------------------------|-------------------------------------------|-----|-----|----|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage* | $I_C = 10\text{ mA}$ , $I_B = 0$          | 25  |     | V  |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage     | $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ | 25  |     | V  |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage       | $I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$ | 5.0 |     | V  |
| $I_{CBO}$     | Collector-Cutoff Current             | $V_{CB} = 18\text{ V}$ , $I_E = 0$        |     | 100 | nA |
| $I_{EBO}$     | Emitter-Cutoff Current               | $V_{EB} = 5.0\text{ V}$ , $I_C = 0$       |     | 100 | nA |

### ON CHARACTERISTICS\*

|          |                 |                                                                                                                       |                         |                          |  |
|----------|-----------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------|--|
| $h_{FE}$ | DC Current Gain | $V_{CE} = 4.5\text{ V}$ , $I_C = 2.0\text{ mA}$<br><b>2N3390</b><br><b>2N3391/A</b><br><b>2N3392</b><br><b>2N3393</b> | 400<br>250<br>150<br>90 | 800<br>500<br>300<br>180 |  |
|----------|-----------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------|--|

### SMALL SIGNAL CHARACTERISTICS

|          |                           |                                                                                                                                                 |                         |                           |    |
|----------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------|----|
| $C_{ob}$ | Output Capacitance        | $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$                                                                                                   | 2.0                     | 10                        | pF |
| $h_{fe}$ | Small-Signal Current Gain | $I_C = 2.0\text{ mA}$ , $V_{CE} = 4.5\text{ V}$ ,<br>$f = 1.0\text{ kHz}$<br><b>2N3390</b><br><b>2N3391/A</b><br><b>2N3392</b><br><b>2N3393</b> | 400<br>250<br>150<br>90 | 1250<br>800<br>500<br>400 |    |
| NF       | Noise Figure              | $V_{CE} = 4.5\text{ V}$ , $I_C = 100\text{ }\mu\text{A}$ ,<br>$R_G = 500\text{ }\Omega$ , <b>2N3391A only</b><br>$B_W = 15.7\text{ kHz}$        |                         | 5.0                       | dB |

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

2N3390 / 2N3391 / 2N3391A / 2N3392 / 2N3393

## TO-92 Tape and Reel Data

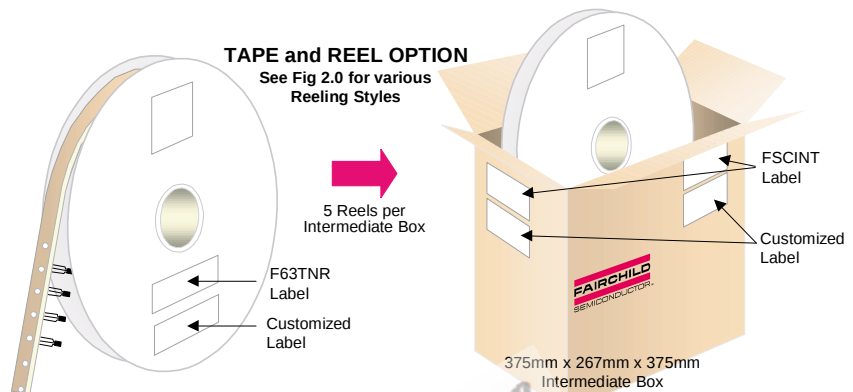
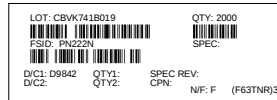


### TO-92 Packaging Configuration: Figure 1.0

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     |

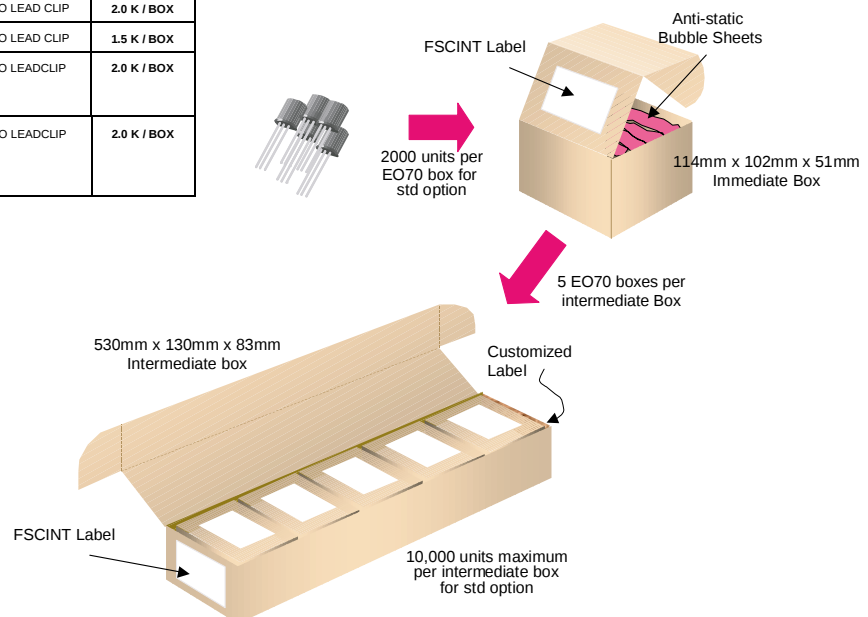
Unit weight = 0.22 gm  
Reel weight with components = 1.04 kg  
Ammo weight with components = 1.02 kg  
Max quantity per intermediate box = 10,000 units



#### (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

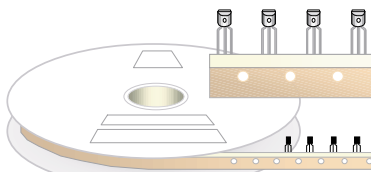


## TO-92 Tape and Reel Data, continued

### TO-92 Reeling Style

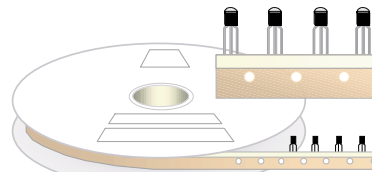
Configuration: Figure 2.0

#### Machine Option "A" (H)



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

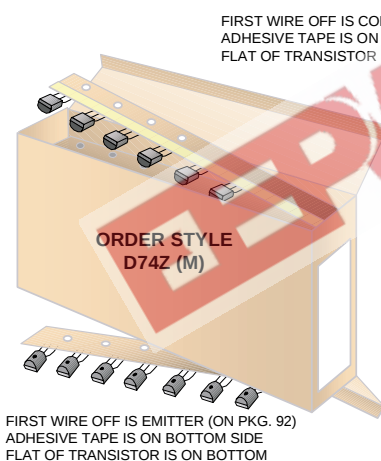
#### Machine Option "E" (J)



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

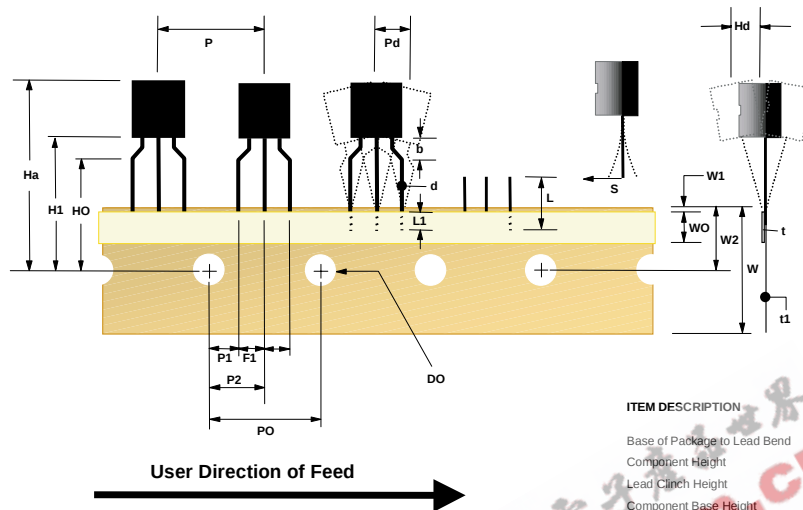
### TO-92 Radial Ammo Packaging

Configuration: Figure 3.0



# TO-92 Tape and Reel Data, continued

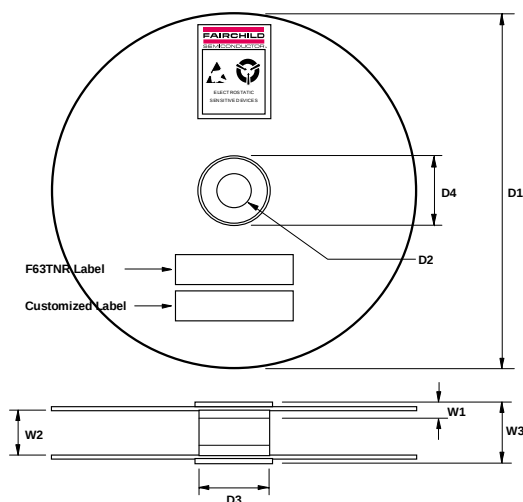
## TO-92 Tape and Reel Taping Dimension Configuration: Figure 4.0



| 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



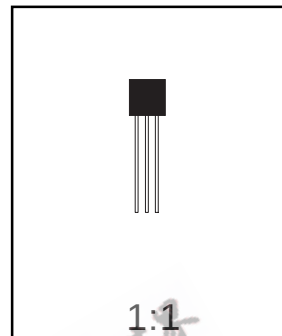
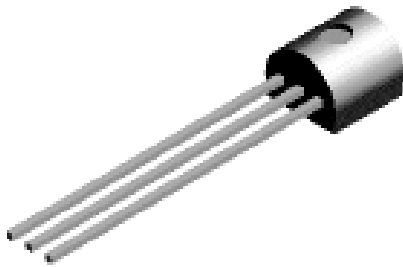
| ITEM DESCRIPTION               | SYMBOL | MINIMUM | MAXIMUM |
|--------------------------------|--------|---------|---------|
| Reel Diameter                  | D1     | 13.975  | 14.025  |
| Arbor Hole Diameter (Standard) | D2     | 1.160   | 1.200   |
| (Small Hole)                   | D2     | 0.650   | 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 inches

## TO-92 Package Dimensions



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



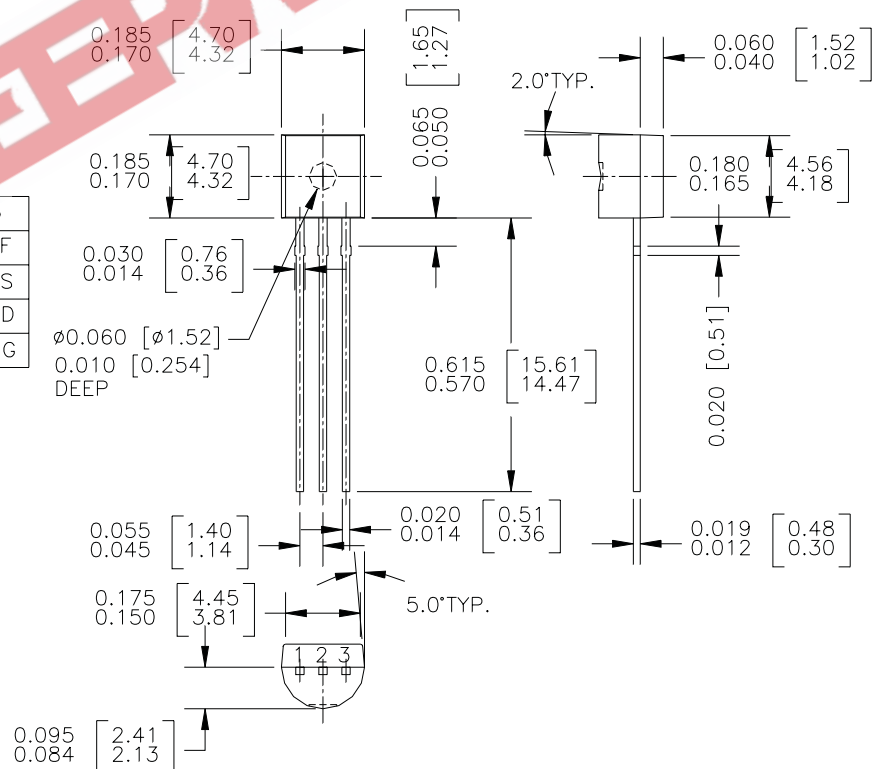
Scale 1:1 on letter size paper

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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