

**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                          | mW    |
|                  |   | 5.0                          | 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 | $V_{CE} = 4.5 \text{ V}, I_C = 2.0 \text{ mA}$ |     |     |  |
|          |                 | <b>2N3390</b>                                  | 400 | 800 |  |
|          |                 | <b>2N3391/A</b>                                | 250 | 500 |  |
|          |                 | <b>2N3392</b>                                  | 150 | 300 |  |
|          |                 | <b>2N3393</b>                                  | 90  | 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>$f = 1.0 \text{ kHz}$  |     |      |    |
|          |                           | <b>2N3390</b>   | 400 | 1250 |    |
|          |                           | <b>2N3391/A</b>   | 250 | 800  |    |
|          |                           | <b>2N3392</b>   | 150 | 500  |    |
|          |                           | <b>2N3393</b>   | 90  | 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  $\leq 2.0\%$

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# 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

### AMMO PACK OPTION

See Fig 3.0 for 2 Ammo Pack Options

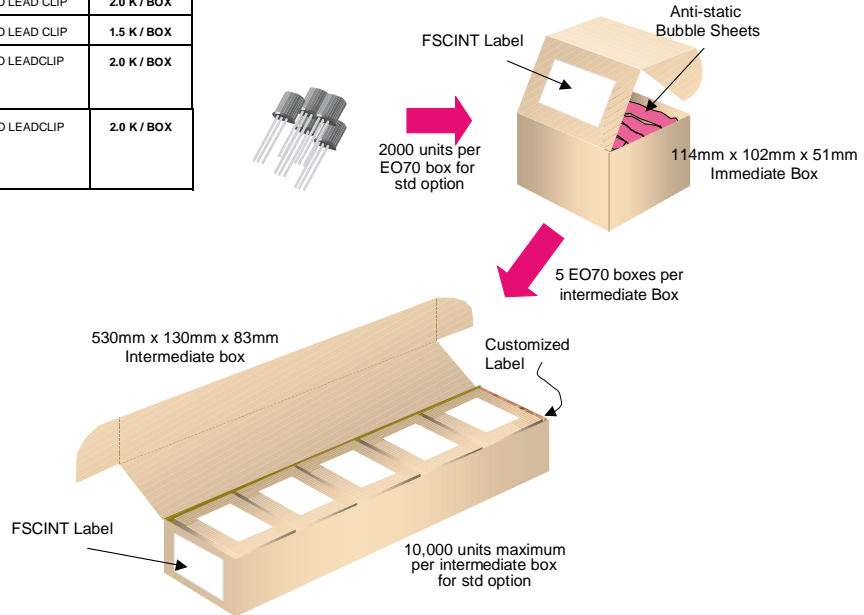


### (TO-92) BULK PACKING INFORMATION

| 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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