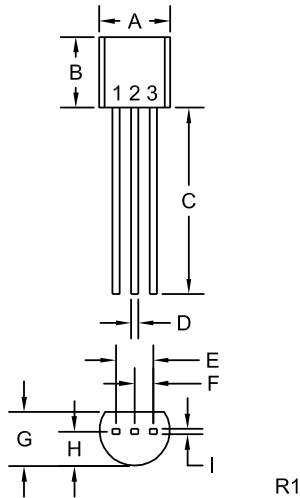


# Package Details

## TO-92 Case



### Mechanical Drawing



R1

SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A (DIA)	0.175	0.205	4.45	5.21
B	0.170	0.210	4.32	5.33
C	0.500	-	12.70	-
D	0.016	0.022	0.41	0.56
E	0.100		2.54	
F	0.050		1.27	
G	0.125	0.165	3.18	4.19
H	0.080	0.105	2.03	2.67
I	0.015		0.38	

TO-92 (REV: R1)

### Lead Code:

#### SCR\*

1) Anode	or	1) Cathode
2) Gate		2) Gate
3) Cathode		3) Anode

#### FET\*

1) Drain	or	1) Drain
2) Source		2) Gate
3) Gate		3) Source
1) Gate		1) Source
2) Source		2) Drain
3) Drain		3) Gate

#### PUT

1) Anode
2) Gate
3) Cathode

#### TRIAC

1) MT1
2) Gate
3) MT2

#### TRANSISTOR\*

1) Emitter	or	1) Emitter
2) Base		2) Collector
3) Collector		3) Base
1) Collector		1) Base
2) Base		2) Emitter
3) Emitter		3) Collector

\* Note: See individual device datasheet for pinout information.

### Packing Options

#### Bulk:

White corrugated box with static shielded bags

**Bulk Packing Quantity:** 2,500

#### Tape and Reel / Ammo Pack:

Radial taped in accordance with EIA-468-C

**Packing Quantity:** 2,000

Also available in the following lead form options

TO-92-5F, TO-92-5T, TO-92-5T1, TO-92-18F, TO-92-18R

R1 (8-September 2015)

# Package Details - TO-92 TR

## Tape and Reel Specifications

### 1.0. Purpose:

This specification defines the tape and reel packaging requirements for TO-92 devices. Devices supplied to this specification are taped in accordance with Electronic Industries Association Standard EIA-468-C.

### 2.0 Requirements:

- 2.1 Tape and Reel Requirements: Devices to be taped and reeled in accordance with Figures 2 and 3.
- 2.2 Style Type: A suffix is added to part number to indicate Style Type. Example: CS92B TRE (CS92B taped and reeled in accordance with STYLE E). Note: STYLE E is preferred.
- 2.3 Packaging Base: Devices to be taped 2000 pieces per reel.

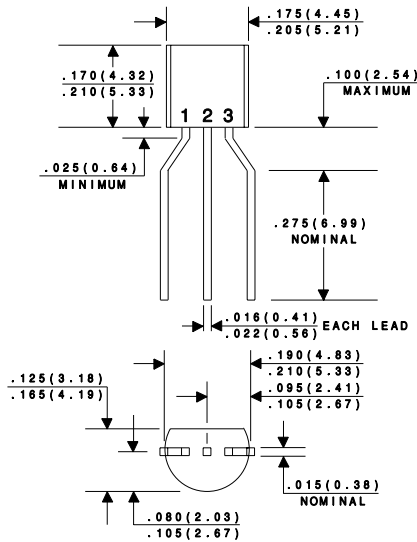


FIGURE 1. PHYSICAL DIMENSIONS  
ALL DIMENSIONS IN INCHES (mm).

# Package Details - TO-92 TR

## Tape and Reel Specifications (Continued)

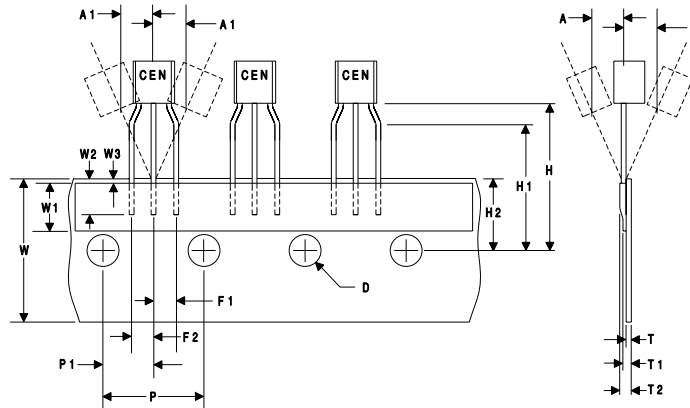


FIGURE 2. TAPING SPECIFICATIONS

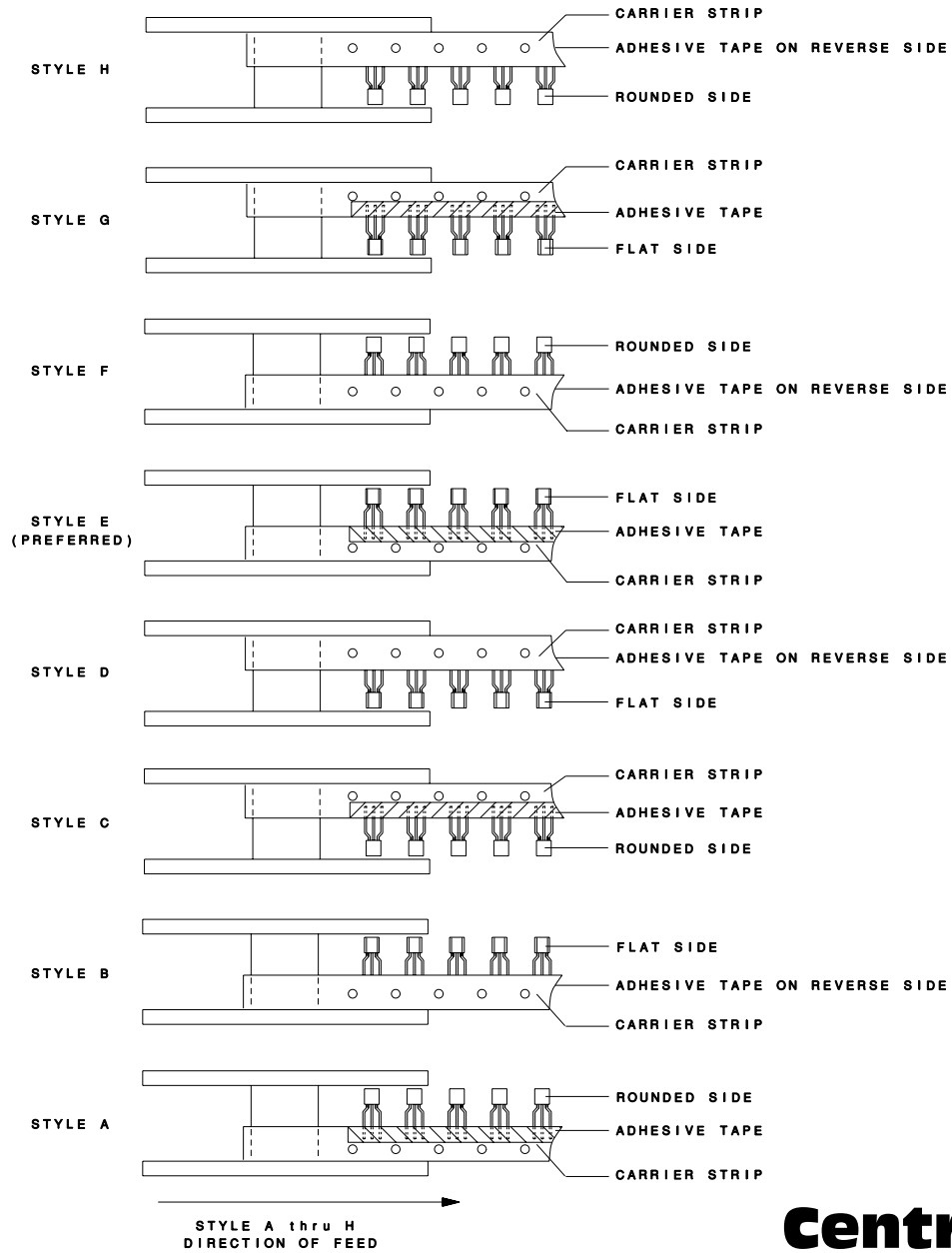
SYMBOL	DESCRIPTION	INCHES		MM		NOTE
		MIN	MAX	MIN	MAX	
A	FRONT TO REAR DEFLECTION	---	0.039	---	1.0	1
A1	LEFT TO RIGHT DEFLECTION	---	0.039	---	1.0	
D	FEED HOLE DIAMETER	0.15	0.17	3.8	4.2	
F1	COMPONENT LEAD PITCH	0.09	0.11	2.4	2.9	6
F2	COMPONENT LEAD PITCH	0.09	0.11	2.4	2.9	6
H	FEED HOLE TO BOTTOM OF COMPONENT	0.75	0.79	19.0	20.0	
H1	HEIGHT OF SEATING PLANE	0.61	0.65	15.5	16.5	2
H2	HEIGHT OF FEED HOLE LOCATION	0.33	0.37	8.5	9.5	7,8
P	FEED HOLE PITCH	0.49	0.51	12.5	12.9	3
P1	CENTER OF SEATING PLANE LOCATION	0.23	0.26	5.95	6.75	
T	CARRIER TAPE THICKNESS	0.015	0.027	0.38	0.68	4
T1	OVERALL TAPE THICKNESS	0.020	0.035	0.50	0.90	
T2	TOTAL TAPED PACKAGE THICKNESS	---	0.057	---	1.44	4
W	CARRIER TAPE WIDTH	0.69	0.75	17.5	19.0	
W1	ADHESIVE TAPE WIDTH	0.20	0.28	5.0	7.0	5
W2	LEAD ENCLOSURE	0.18	---	4.5	---	
W3	ADHESIVE TAPE POSITION	---	0.020	---	0.5	5

- NOTES:
- 1) MAXIMUM ALIGNMENT DEVIATION BETWEEN LEADS NOT TO BE GREATER THAN 0.2mm.
  - 2) AS ILLUSTRATED, THE CLEARANCE TO THE LEAD STANDOFF FORM SHALL BE DEFINED TO THE POINT OF RADIUS FOR THE STANDOFF FORM.
  - 3) MAXIMUM CUMULATIVE VARIATION BETWEEN TAPE FEED HOLES SHALL NOT EXCEED 1.0mm IN 20 PITCHES.
  - 4) OVERALL TAPED PACKAGE THICKNESS, INCLUDING COMPONENT LEADS AND TAPE SPLICES SHALL NOT EXCEED 1.44mm.
  - 5) HOLDDOWN TAPE NOT TO EXTEND BEYOND THE EDGES OF CARRIER TAPE AND THERE SHALL BE NO EXPOSURE OF ADHESIVE.
  - 6) NO MORE THAN 0.1% MISSING AND NO CONSECUTIVE MISSING COMPONENTS PER REEL IS PERMITTED.
  - 7) A TAPE LEADER AND TRAILER, HAVING AT LEAST 3 SPROCKET HOLES IS REQUIRED.
  - 8) NO MORE THAN 10 SPLICES PER REEL IS PERMITTED AND SPLICES SHALL NOT INTERFERE WITH SPROCKET FEED HOLES.

# Package Details - TO-92 TR

## Tape and Reel Specifications (Continued)

FIGURE 3. TAPING STYLE



# Package Details - TO-92 AP

## Ammopack

### Specifications

#### 1.0. PURPOSE:

This specification defines the TO-92 Ammpack requirements. Devices supplied to this specification are taped in accordance with Electronic Industries Association Standard EIA-468-C.

#### 2.0 REQUIREMENTS:

- 2.1 Tape Requirements: Devices to be taped in accordance with Figure 2.
- 2.2 Style Type: STYLE M (PREFERRED) or STYLE P (See Figures 3 and 4).
- 2.3 Ordering Info: Add suffix to part number to indicate Style Type .  
Suffix APM For STYLE M (Equivalent to reel pack STYLE E).  
Example: CS92B APM (CS92B SCR, Ammpack STYLE M).  
or  
Suffix APP For STYLE P (Equivalent to reel pack STYLE A).  
Example: CS92B APP (CS92B SCR, Ammpack STYLE P).
- 2.4 Packaging Base: Devices to be taped 2000 pieces per Ammpack.

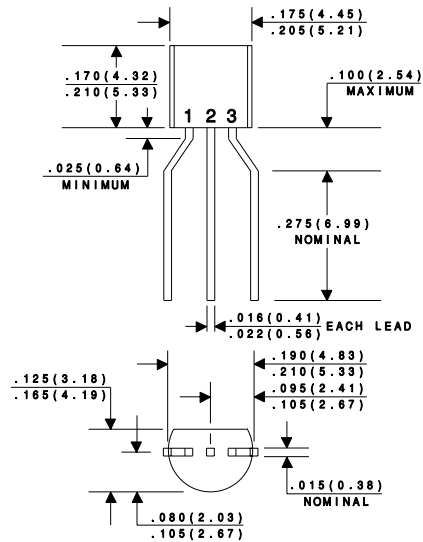


FIGURE 1. PHYSICAL DIMENSIONS  
All Dimensions in Inches (mm)

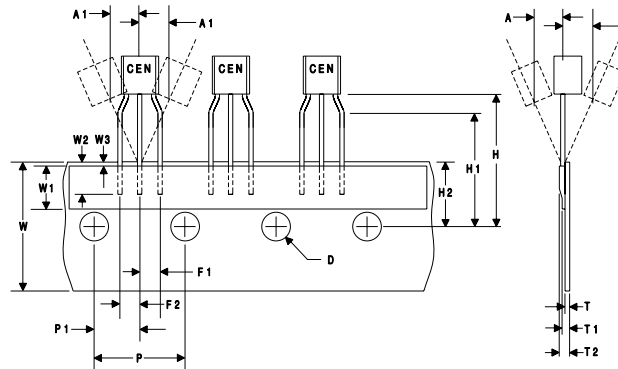
# Package Details - TO-92 AP

## TO-92 Ammopack

### Specifications

(Continued)

FIGURE 2. (TAPING SPECIFICATIONS)



SYMBOL	DESCRIPTION	INCHES		MM		NOTE
		MIN	MAX	MIN	MAX	
A	FRONT TO REAR DEFLECTION	---	0.039	---	1.0	1
A1	LEFT TO RIGHT DEFLECTION	---	0.039	---	1.0	
D	FEED HOLE DIAMETER	0.15	0.17	3.8	4.2	
F1	COMPONENT LEAD PITCH	0.09	0.11	2.4	2.9	6
F2	COMPONENT LEAD PITCH	0.09	0.11	2.4	2.9	6
H	FEED HOLE TO BOTTOM OF COMPONENT	0.75	0.79	19.0	20.0	
H1	HEIGHT OF SEATING PLANE	0.61	0.65	15.5	16.5	2
H2	HEIGHT OF FEED HOLE LOCATION	0.33	0.37	8.5	9.5	7,8
P	FEED HOLE PITCH	0.49	0.51	12.5	12.9	3
P1	CENTER OF SEATING PLANE LOCATION	0.23	0.26	5.95	6.75	
T	CARRIER TAPE THICKNESS	0.015	0.027	0.38	0.68	4
T1	OVERALL TAPE THICKNESS	0.020	0.035	0.50	0.90	
T2	TOTAL TAPED PACKAGE THICKNESS	---	0.057	---	1.44	4
W	CARRIER TAPE WIDTH	0.69	0.75	17.5	19.0	
W1	ADHESIVE TAPE WIDTH	0.20	0.28	5.0	7.0	5
W2	LEAD ENCLOSURE	0.18	---	4.5	---	
W3	ADHESIVE TAPE POSITION	---	0.020	---	0.5	5

- NOTES:
- 1) MAXIMUM ALIGNMENT DEVIATION BETWEEN LEADS NOT TO BE GREATER THAN 0.2mm.
  - 2) AS ILLUSTRATED, THE CLEARANCE TO THE LEAD STANDOFF FORM SHALL BE DEFINED TO THE POINT OF RADIUS FOR THE STANDOFF FORM.
  - 3) MAXIMUM CUMULATIVE VARIATION BETWEEN TAPE FEED HOLES SHALL NOT EXCEED 1.0mm IN 20 PITCHES.
  - 4) OVERALL TAPED PACKAGE THICKNESS, INCLUDING COMPONENT LEADS AND TAPE SPLICES SHALL NOT EXCEED 1.44mm.
  - 5) HOLDDOWN TAPE NOT TO EXTEND BEYOND THE EDGES OF CARRIER TAPE AND THERE SHALL BE NO EXPOSURE OF ADHESIVE.
  - 6) NO MORE THAN 0.1% MISSING AND NO CONSECUTIVE MISSING COMPONENTS PER REEL IS PERMITTED.
  - 7) A TAPE LEADER AND TRAILER, HAVING AT LEAST 3 SPROCKET HOLES IS REQUIRED.
  - 8) NO MORE THAN 10 SPLICES PER REEL IS PERMITTED AND SPLICES SHALL NOT INTERFERE WITH SPROCKET FEED HOLES.

# Package Details - TO-92 AP

## Ammopack Specifications (Continued)

FIGURE 3. STYLE M (PREFERRED)

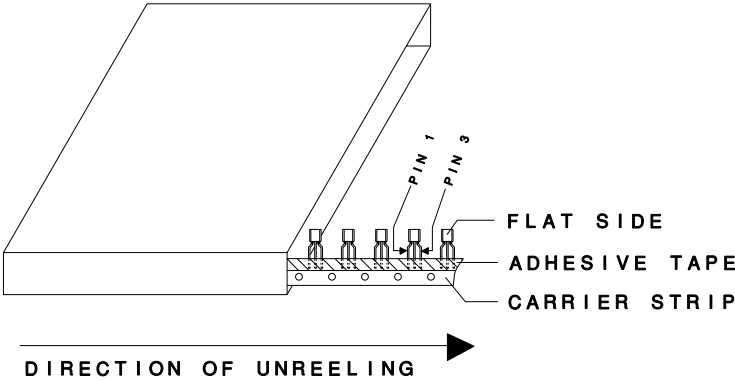
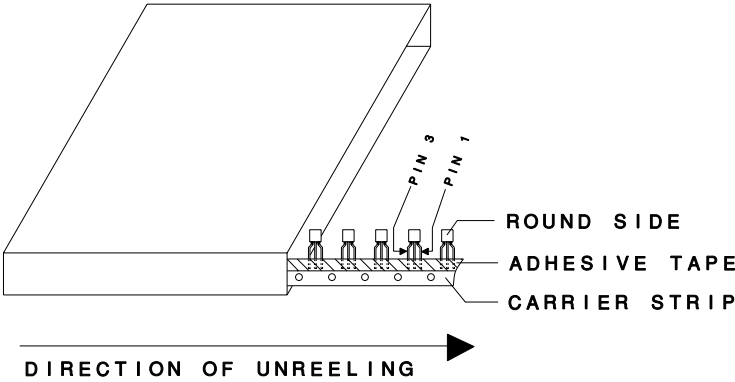


FIGURE 4. STYLE P



Note: The box is accessible from either side depending upon whether PIN 1 or PIN 3 is required at the leading edge.

# Material Composition Specification

## TO-92 Case



### Eutectic Die Attach

Device average mass . . . . . 206 mg (+/-10%)

Component	Material	Material		Substance	CAS No.	Substance		
		(%wt)	(mg)			(%wt)	(mg)	(ppm)
active device	doped Si	0.034%	0.07	Si	7440-21-3	0.034%	0.07	340
bond wire	gold or copper	0.016%	0.032	Au	7440-57-5	0.016%	0.032	155
				Cu	7440-50-8			
leadframe	Cu alloy w/ silver plating	44.824%	92.338	Cu	7440-50-8	44.641%	91.96	446,408
				Fe	7439-89-6	0.045%	0.092	447
				P	7723-14-0	0.016%	0.032	155
				Ag	7440-22-4	0.123%	0.254	1,233
				silica	7631-86-9	40.694%	83.83	406,942
encapsulation*	EMC	52.286%	107.71	epoxy resin	29690-82-2	5.267%	10.85	52,670
				phenol resin	9003-35-4	4.748%	9.78	47,476
				carbon black	1333-86-4	0.149%	0.306	1,485
				Sb <sub>2</sub> O <sub>3</sub>	1309-64-4	1.146%	2.36	11,456
				TBBA	79-94-7	0.283%	0.584	2,835
	EMC GREEN	52.286%	107.71	silica	7631-86-9	38.816%	79.96	388,155
				epoxy resin	29690-82-2	5.024%	10.35	50,243
				phenol resin	9003-35-4	4.529%	9.33	45,291
				carbon black	1333-86-4	0.568%	1.17	5,680
				metal hydroxide	1309-42-8	3.35%	6.9	33,495
plating**	tin/lead process	2.84%	5.85	Sn	7440-31-5	2.282%	4.7	22,816
				Pb	7439-92-1	0.558%	1.15	5,583
	matte tin	2.84%	5.85	Sn	7440-31-5	2.84%	5.85	28,398

### Epoxy Die Attach

Device average mass . . . . . 206 mg (+/-10%)

Component	Material	Material		Substance	CAS No.	Substance		
		(%wt)	(mg)			(%wt)	(mg)	(ppm)
active device	doped Si	0.035%	0.07	Si	7440-21-3	0.035%	0.073	354
bond wire	gold or copper	0.016%	0.032	Au	7440-57-5	0.016%	0.032	155
				Cu	7440-50-8			
leadframe	Cu alloy w/ silver plating	44.82%	92.34	Cu	7440-50-8	44.64%	91.96	446,408
				Fe	7439-89-6	0.045%	0.092	447
				P	7723-14-0	0.016%	0.032	155
				Ag	7440-22-4	0.123%	0.254	1,233
				Pb	7439-92-1	0.113%	0.232	1,126
die attach	silver epoxy	0.121%	0.25	Sn	7440-31-5	0.006%	0.012	58
encapsulation*	EMC	52.16%	107.46	Ag	7440-22-4	0.003%	0.006	29
				silica	7631-86-9	40.6%	83.64	406,019
				epoxy resin	29690-82-2	5.25%	10.82	52,524
				phenol resin	9003-35-4	4.74%	9.76	47,379
				carbon black	1333-86-4	0.148%	0.305	1,481
	EMC GREEN	52.16%	107.46	Sb <sub>2</sub> O <sub>3</sub>	1309-64-4	1.14%	2.35	11,408
				TBBA	79-94-7	0.283%	0.582	2,825
				silica	7631-86-9	38.72%	79.77	387,233
				epoxy resin	29690-82-2	5.015%	10.33	50,146
				phenol resin	9003-35-4	4.519%	9.31	45,194
plating**	tin/lead process	2.84%	5.85	carbon black	1333-86-4	0.567%	1.167	5,665
				metal hydroxide	1309-42-8	3.34%	6.88	33,398
	matte tin	2.84%	5.85	Sn	7440-31-5	2.282%	4.7	22,816
				Pb	7439-92-1	0.558%	1.15	5,583
				Sn	7440-31-5	2.84%	5.85	28,398

\*EMC GREEN molding compound is Halogen-Free.

\*\*For Lead Free plating, add suffix "PB FREE" to part number.

For Tin/Lead plating, add suffix "TIN/LEAD" to part number.

No suffix designation allows for the supply of either lead-free or tin/lead plated product depending on availability.

#### Disclaimer

The information provided in this Material Composition data sheet is, to the best of our knowledge, correct. However, there is no guarantee to completeness or accuracy, as some information is derived from data sources outside the company.

R7 (27-February 2020)