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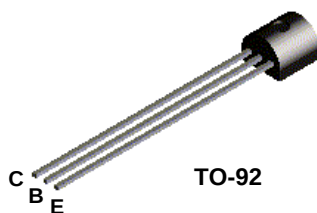


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2N7052



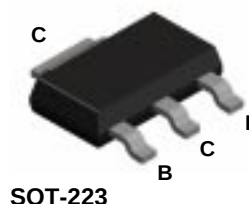
TO-92

2N7053



TO-226

NZT7053



SOT-223

NPN Darlington Transistor

This device is designed for applications requiring extremely high gain at collector currents to 1.0 A and high breakdown voltage. Sourced from Process 06.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V _{CEO}	Collector-Emitter Voltage	100	V
V _{CBO}	Collector-Base Voltage	100	V
V _{EBO}	Emitter-Base Voltage	12	V
I _C	Collector Current - Continuous	1.5	A
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
		2N7052	2N7053	*NZT7053	
P _D	Total Device Dissipation	625	1,000	1,000	mW
	Derate above 25°C	5.0	8.0	8.0	mW/°C
R _{θJC}	Thermal Resistance, Junction to Case	83.3	125		°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	200	50	125	°C/W

*Device mounted on FR-4 PCB 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead min. 6 cm².

NPN Darlington Transistor
(continued)

Electrical Characteristics TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	$I_C = 1.0\text{ mA}, I_B = 0$	100		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100\text{ }\mu\text{A}, I_E = 0$	100		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 1.0\text{ mA}, I_C = 0$	12		V
I_{CBO}	Collector-Cutoff Current	$V_{CB} = 80\text{ V}, I_E = 0$		0.1	μA
I_{CES}	Collector-Cutoff Current	$V_{CE} = 80\text{ V}, I_E = 0$		0.2	μA
I_{EBO}	Emitter-Cutoff Current	$V_{EB} = 7.0\text{ V}, I_C = 0$		0.1	μA

ON CHARACTERISTICS*

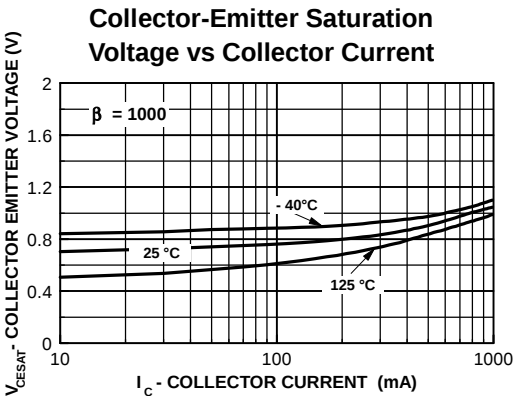
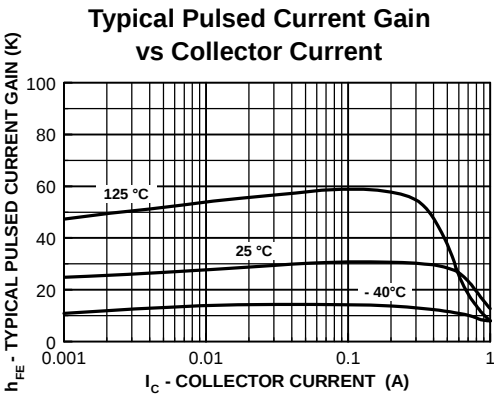
h_{FE}	DC Current Gain	$I_C = 100\text{ mA}, V_{CE} = 5.0\text{ V}$ $I_C = 1.0\text{ A}, V_{CE} = 5.0\text{ V}$	10,000 1,000	20,000	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 100\text{ mA}, I_B = 0.1\text{ mA}$		1.5	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 100\text{ mA}, V_{BE} = 5.0\text{ V}$		2.0	V

SMALL SIGNAL CHARACTERISTICS

F_T	Transition Frequency	$I_C = 100\text{ mA}, V_{CE} = 5.0\text{ V},$	200		MHz
C_{cb}	Collector-Base Capacitance	$V_{CB} = 10\text{ V}, f = 1.0\text{ MHz}$ 2N7052 2N7053		10 8.0	pF

*Pulse Test: Pulse Width $\leq 300\text{ ms}$, Duty Cycle $\leq 1.0\%$

Typical Characteristics

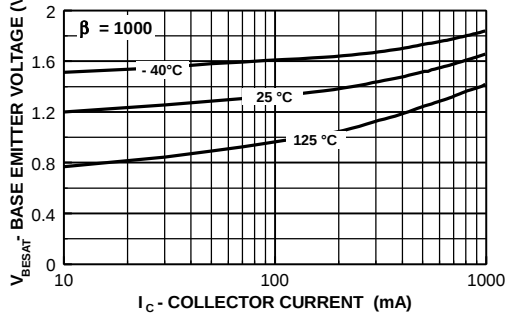


NPN Darlington Transistor (continued)

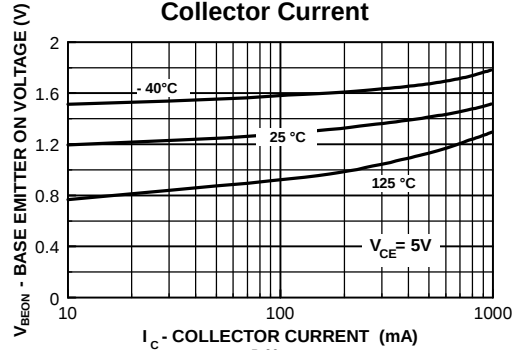
2N7052 / 2N7053 / NZT7053

Typical Characteristics (continued)

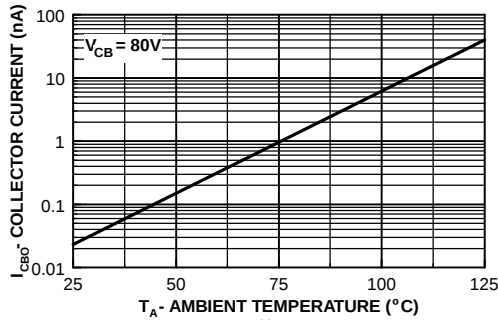
Base-Emitter Saturation Voltage vs Collector Current



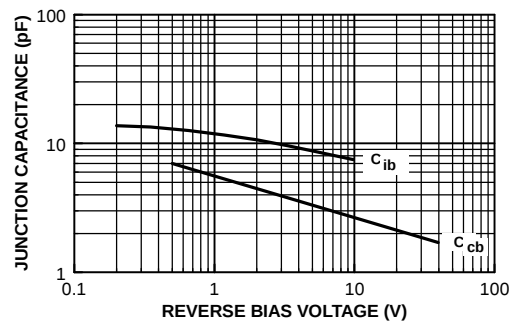
Base Emitter ON Voltage vs Collector Current



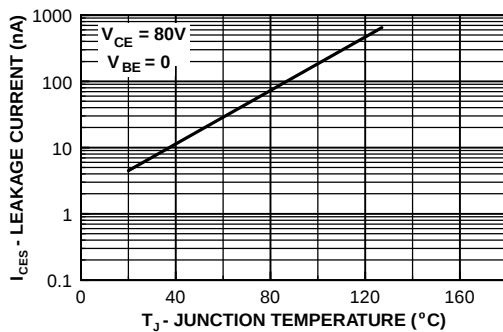
Collector-Cutoff Current vs. Ambient Temperature



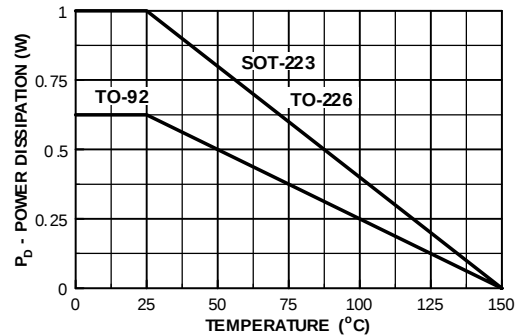
Junction Capacitance vs Reverse Bias Voltage



Typical Collector-Emitter Leakage Current vs Temperature



Power Dissipation vs Ambient Temperature



TO-92 Tape and Reel Data



TO-92 Packaging Configuration: Figure 1.0

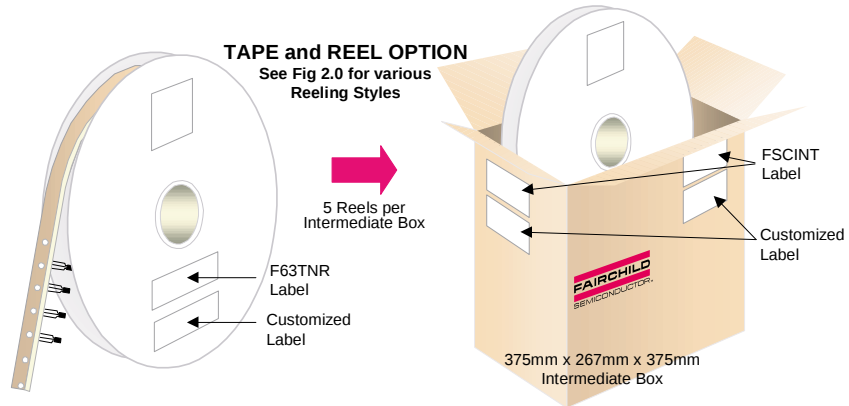
FSCINT Label sample



F63TNR Label sample



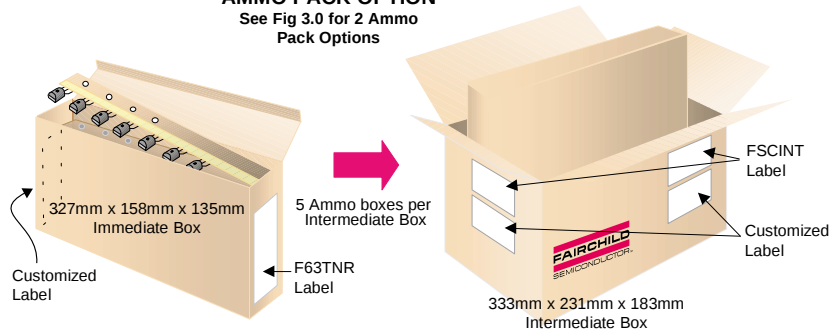
TAPE and REEL OPTION See Fig 2.0 for various Reeling Styles



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			

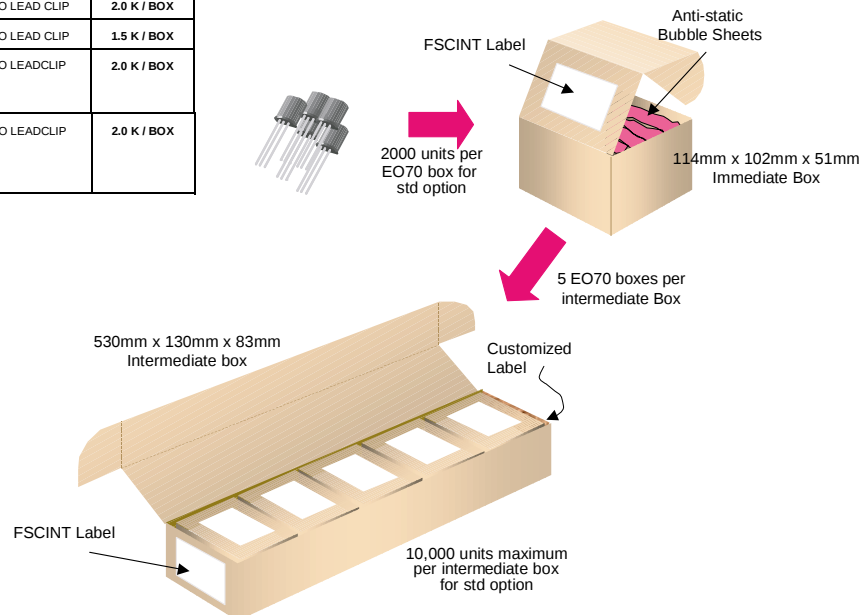
AMMO PACK OPTION See Fig 3.0 for 2 Ammo Pack Options



(TO-92) BULK PACKING INFORMATION

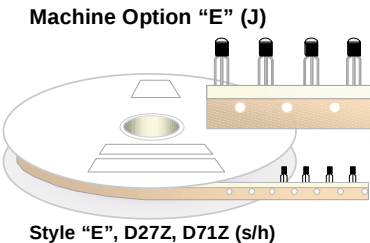
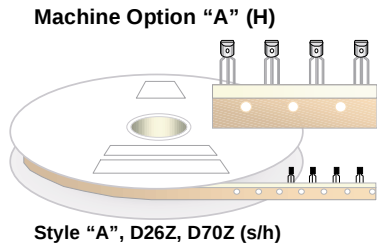
EOL CODE	DESCRIPTION	LEADCLIP DIMENSION	QUANTITY
J18Z	TO-18 OPTION STD	NO LEAD CLIP	2.0 K / BOX
J05Z	TO-5 OPTION STD	NO LEAD CLIP	1.5 K / BOX
NO EOL CODE	TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (NON PROELECTRON SERIES), 96	NO LEADCLIP	2.0 K / BOX
L34Z	TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON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

BULK OPTION See Bulk Packing Information table

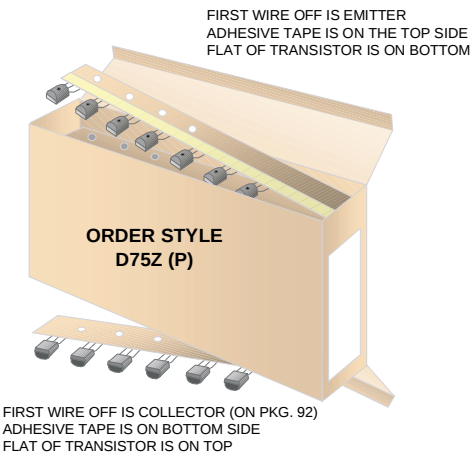
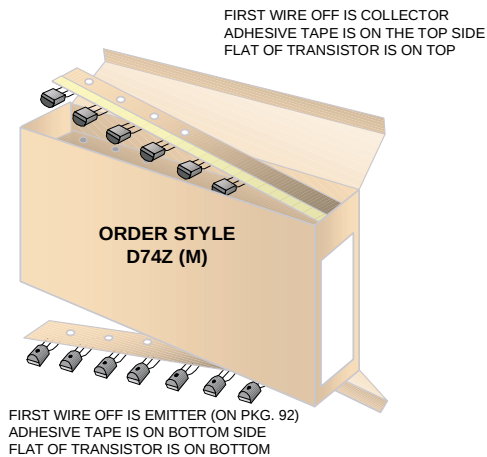


TO-92 Tape and Reel Data, continued

TO-92 Reeling Style Configuration: Figure 2.0

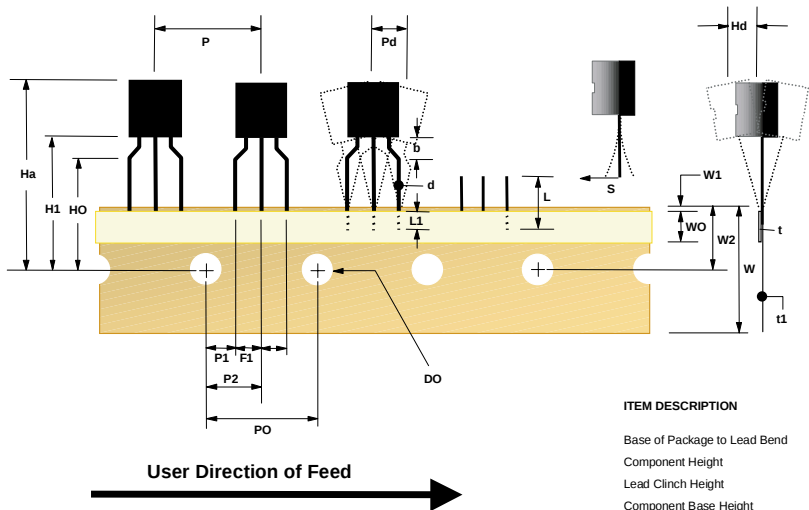


TO-92 Radial Ammo Packaging Configuration: Figure 3.0



TO-92 Tape and Reel Data, continued

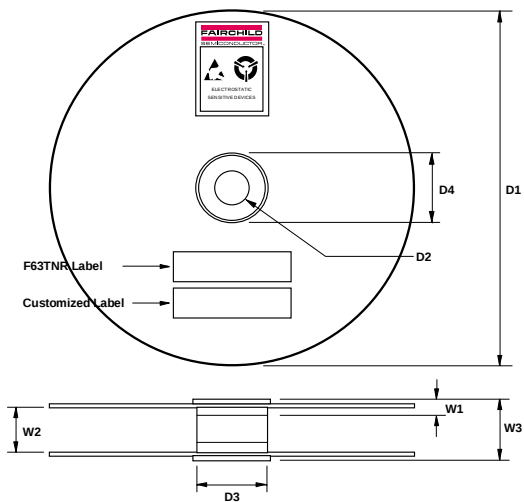
TO-92 Tape and Reel Taping
Dimension Configuration: Figure 4.0



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)



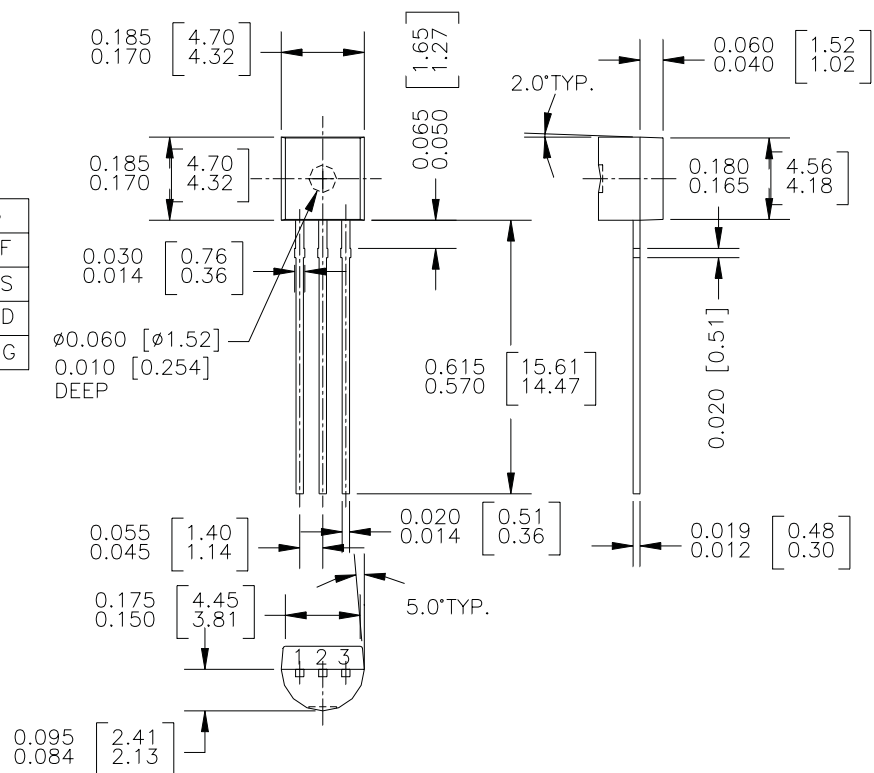
Scale 1:1 on letter size paper

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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