

## TO-92MOD Plastic-Encapsulate Transistors

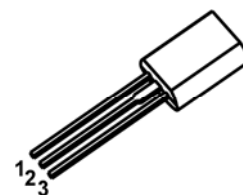
### 2SA1160 TRANSISTOR (PNP)

#### FEATURES

- High DC Current Gain and Excellent  $h_{FE}$  Linearity
- Low Saturation Voltage

#### TO – 92MOD

1. EMITTER
2. COLLECTOR
3. BASE



#### MAXIMUM RATINGS ( $T_a=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage	-20	V
$V_{CEO}$	Collector-Emitter Voltage	-10	V
$V_{EBO}$	Emitter-Base Voltage	-6	V
$I_C$	Collector Current	-2	A
$P_C$	Collector Power Dissipation	900	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	139	$^{\circ}\text{C}/\text{W}$
$T_j$	Junction Temperature	150	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature	-55~+150	$^{\circ}\text{C}$

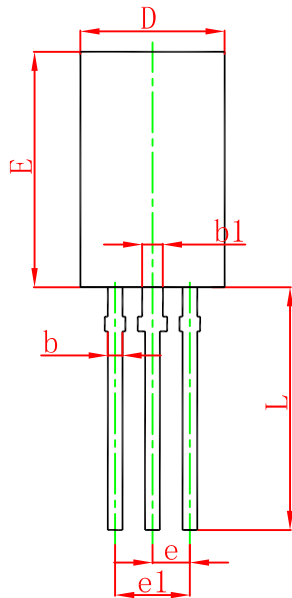
#### ELECTRICAL CHARACTERISTICS ( $T_a=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = -1\text{mA}, I_E = 0$	-20			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -10\text{mA}, I_B = 0$	-10			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = -1\text{mA}, I_C = 0$	-6			V
Collector cut-off current	$I_{CBO}$	$V_{CB} = -20\text{V}, I_E = 0$			-0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -6\text{V}, I_C = 0$			-0.1	$\mu\text{A}$
DC current gain	$h_{FE(1)}$	$V_{CE} = -1\text{V}, I_C = -0.5\text{A}$	140		600	
	$h_{FE(2)}$	$V_{CE} = -1\text{V}, I_C = -4\text{A}$	60			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -2\text{A}, I_B = -0.05\text{A}$			-0.5	V
Base-emitter voltage	$V_{BE}$	$V_{CE} = -1\text{V}, I_C = -2\text{A}$			-1.5	V
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{V}, I_E = 0, f = 1\text{MHz}$		50		pF
Transition frequency	$f_T$	$V_{CE} = -1\text{V}, I_C = -0.5\text{A}$		140		MHz

#### CLASSIFICATION OF $h_{FE(1)}$

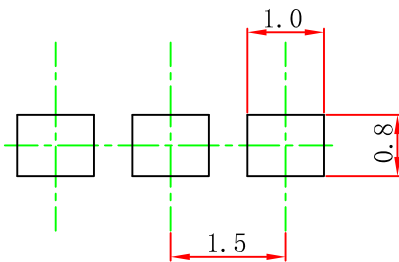
RANK	A	B	C
RANGE	140-280	200-400	300-600

## TO-92MOD Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.000	0.189	0.197
A1	1.730	2.030	0.068	0.080
b	0.440	0.600	0.017	0.024
b1	0.940	1.100	0.037	0.043
c	0.350	0.450	0.014	0.018
D	5.900	6.100	0.232	0.240
D1	4.000		0.157	
E	8.500	8.700	0.335	0.343
e	1.500 TYP.		0.059 TYP.	
e1	2.900	3.100	0.114	0.122
L	13.800	14.200	0.543	0.559
$\Phi$		1.600		0.063
h	0.000	0.380	0.000	0.015

## TO-92MOD Suggested Pad Layout



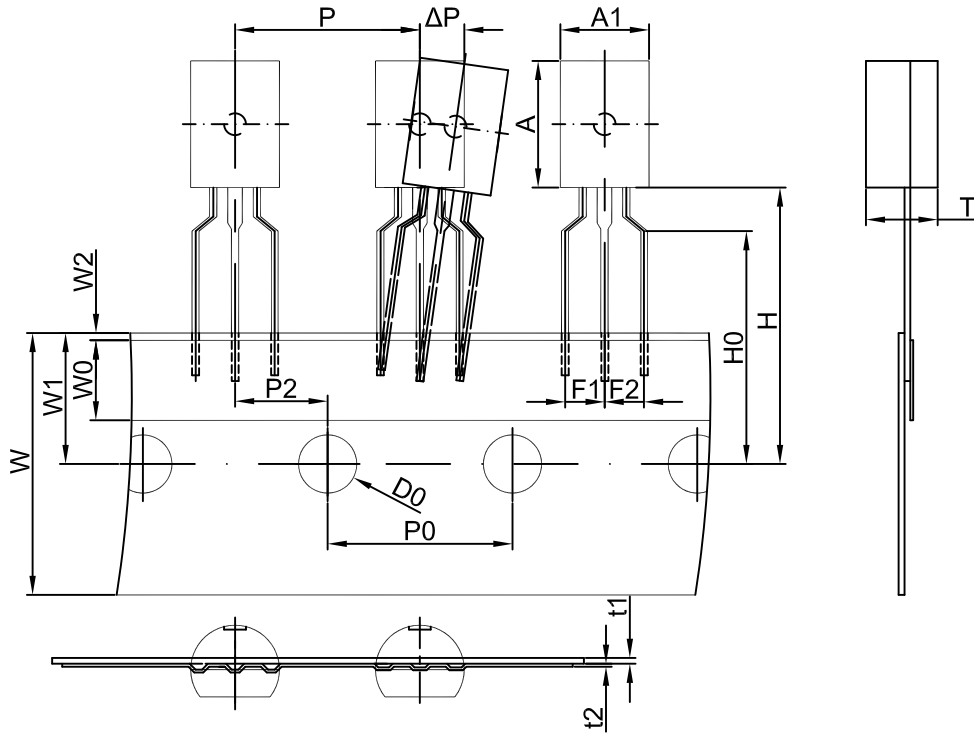
Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05$ mm.
3. The pad layout is for reference purposes only.

### NOTICE

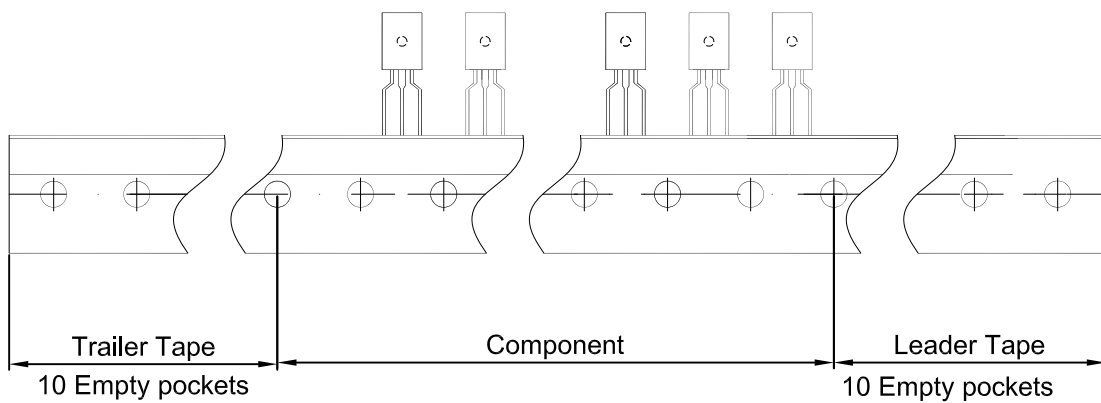
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# TO-92MOD PACKAGE TAPEING DIMENSION



Dimensions are in millimeter

A1	A	T	P	P0	P2	F1	F2	W
6.0	8.6	4.9	12.7	12.7	6.35	2.5	2.5	18.0
W0	W1	W2	H	H0	D0	t1	t2	ΔP
6.0	9.0	1.0	19.0	16.0	4.0	0.4	0.2	0



Package	Box	Box Size(mm)	Carton	Carton Size(mm)
TO-92MOD	2000 pcs	333×245×43	20,000 pcs	573×404×266