

TO-92 Plastic-Encapsulate Transistors

Low Noise Audio Amplifier Applications

The 2SC2240 is a transistor for low frequency and low noise applications. This device is designed to lower noise figure in the region of low signal source impedance, and to lower the pulse noise. This is recommended for the first stages of Equalizer amplifiers.

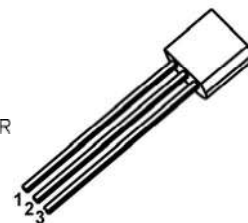
- Low noise: $NF = 4\text{dB}$ (typ.) $R_G = 100\ \Omega$, $V_{CE} = 6\text{ V}$, $I_C = 100\ \mu\text{A}$,
 $f = 1\text{ kHz}$
 $: NF = 0.5\text{dB}$ (typ.) $R_G = 1\text{ k}\Omega$, $V_{CE} = 6\text{ V}$, $I_C = 100\ \mu\text{A}$,
 $f = 1\text{ kHz}$
- Low pulse noise: Low $1/f$ noise
- High DC current gain: $h_{FE} = 200\sim 700$
- High breakdown voltage: $V_{CEO} = 120\text{ V}$

TO-92

1.EMITTER

2.COLLECTOR

3.BASE



Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	120	V
Collector-emitter voltage	V_{CEO}	120	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	100	mA
Base current	I_B	20	mA
Collector power dissipation	P_C	300	mW
Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~125	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

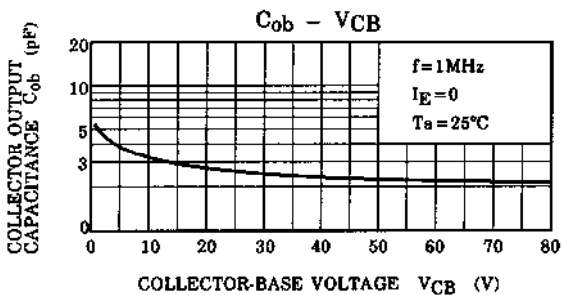
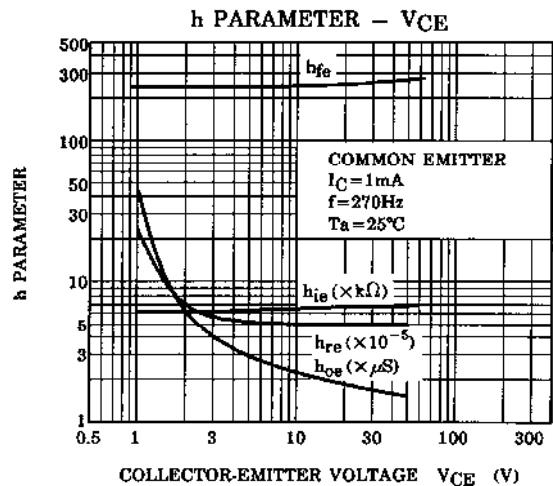
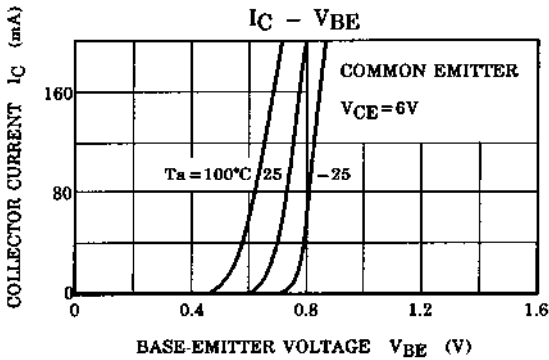
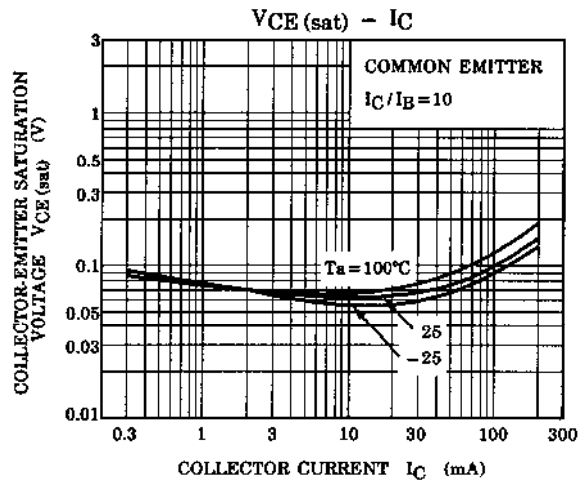
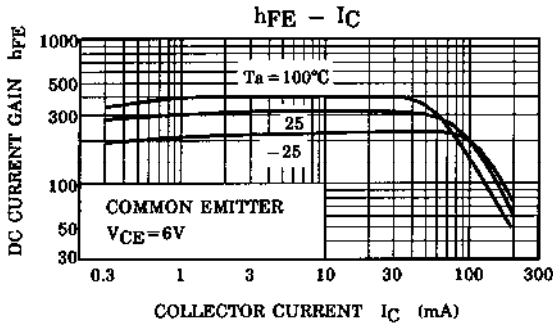
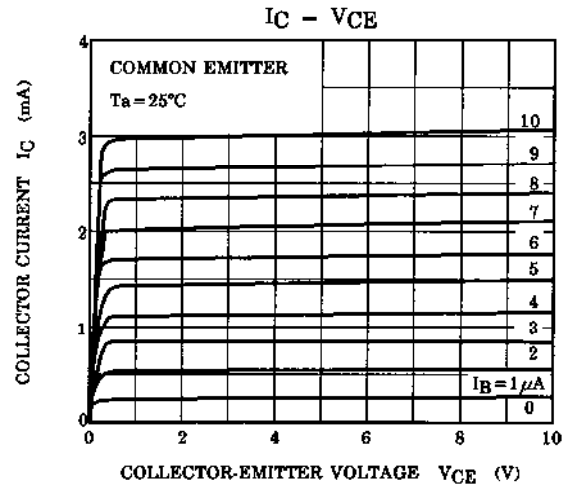
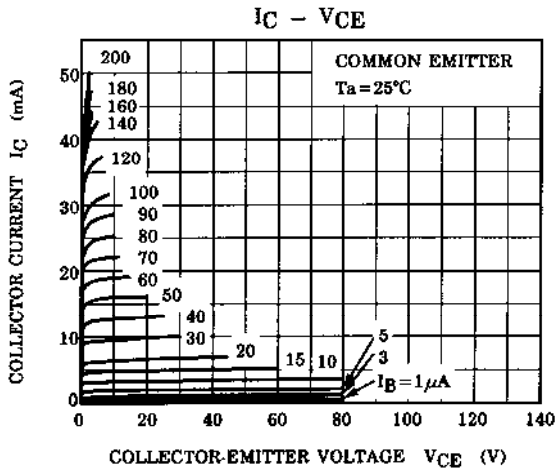
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Electrical Characteristics (Ta = 25°C)

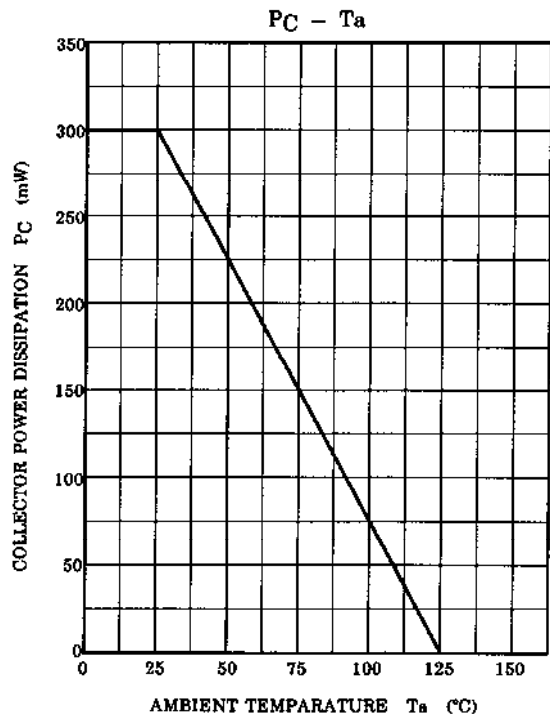
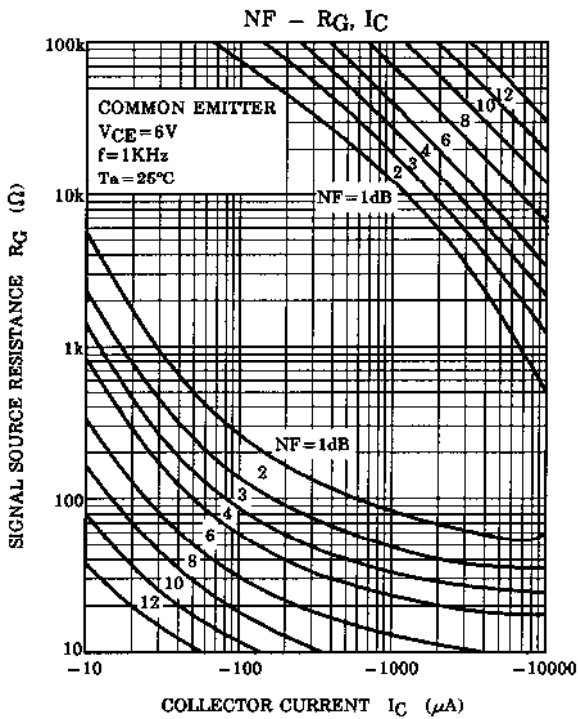
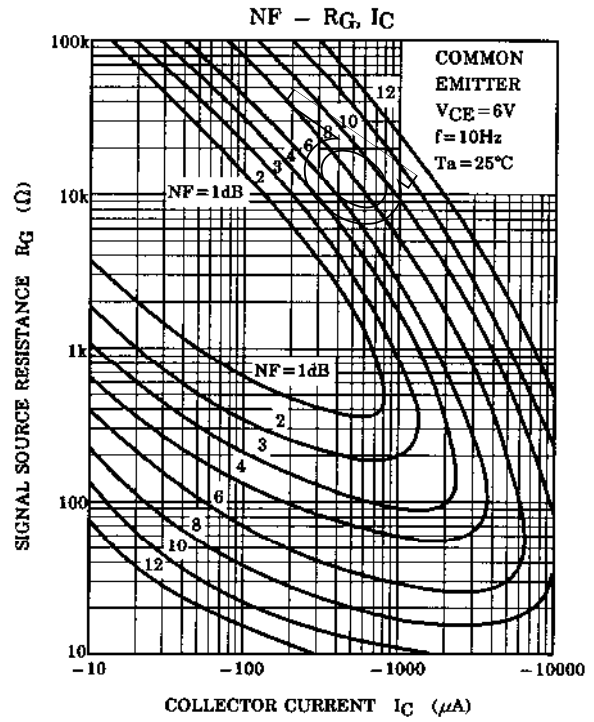
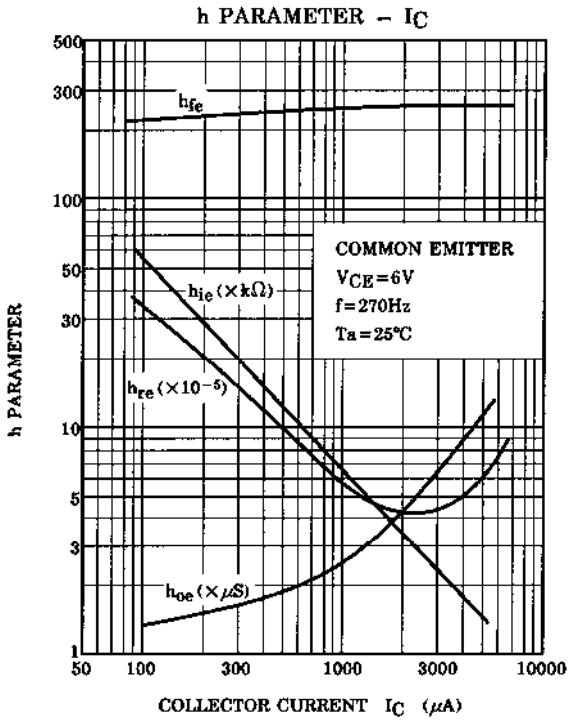
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 120\text{ V}, I_E = 0$	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 5\text{ V}, I_C = 0$	—	—	0.1	μA
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1\text{ mA}, I_B = 0$	120	—	—	V
DC current gain	h_{FE} (Note)	$V_{CE} = 6\text{ V}, I_C = 2\text{ mA}$	200	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 10\text{ mA}, I_B = 1\text{ mA}$	—	—	0.3	V
Base-emitter voltage	V_{BE}	$V_{CE} = 6\text{ V}, I_C = 2\text{ mA}$	—	0.65	—	V
Transition frequency	f_T	$V_{CE} = 6\text{ V}, I_C = 1\text{ mA}$	—	100	—	MHz
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3.0	—	pF
Noise figure	NF	$V_{CE} = 6\text{ V}, I_C = 0.1\text{ mA}, f = 10\text{ Hz}, R_G = 10\text{ k}\Omega$	—	—	6	dB
		$V_{CE} = 6\text{ V}, I_C = 0.1\text{ mA}, f = 1\text{ kHz}, R_G = 10\text{ k}\Omega$	—	—	2	
		$V_{CE} = 6\text{ V}, I_C = 0.1\text{ mA}, f = 1\text{ kHz}, R_G = 100\ \Omega$	—	4	—	

Note: h_{FE} classification GR: 200~400, BL: 350~700

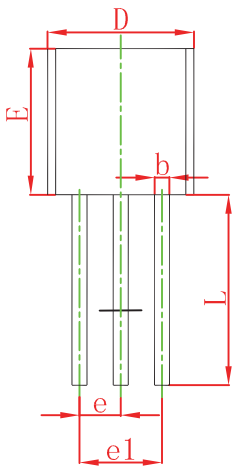
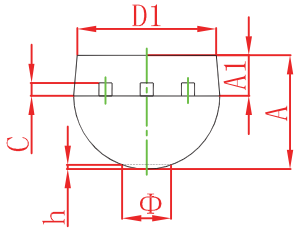
Typical Characteristics



Typical Characteristics

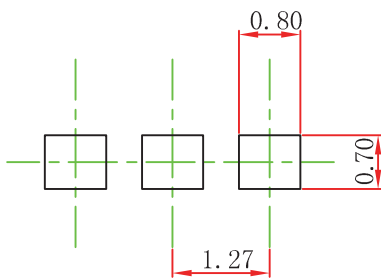


TO-92 Package Outline Dimensions



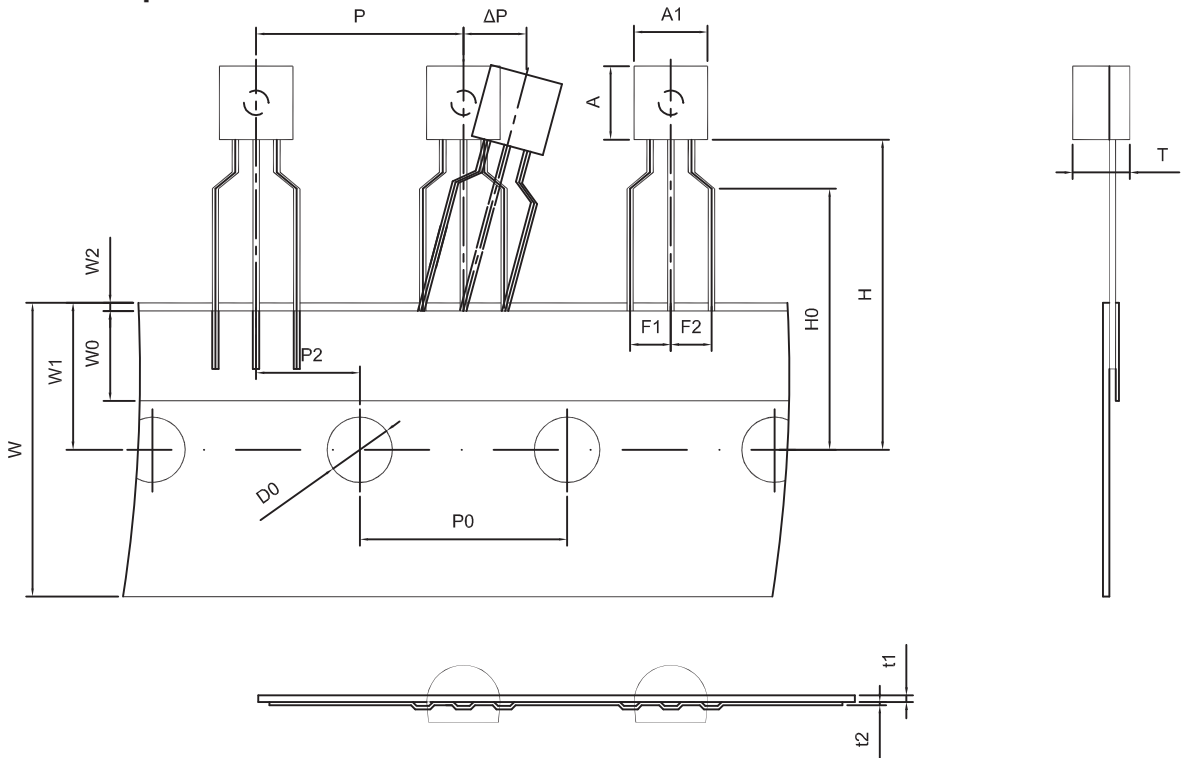
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

TO-92 Suggested Pad Layout

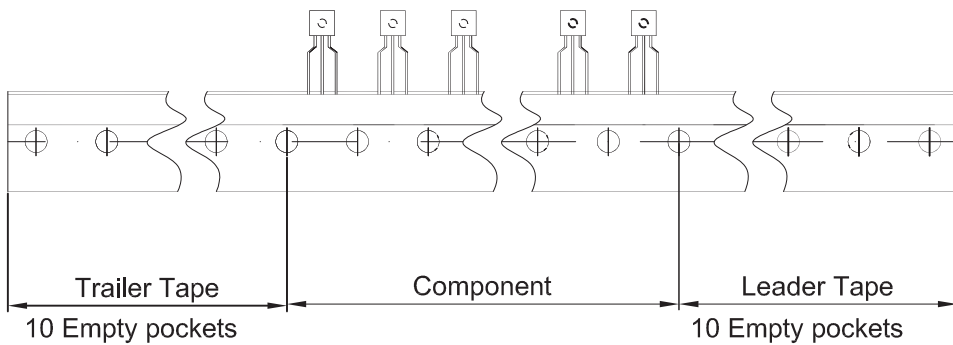


- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: ± 0.05mm.
 3. The pad layout is for reference purposes only.

TO-92 Tape



Dimensions are in millimeter								
A1	A	T	P	P0	P2	F1	F2	W
4.5	4.5	3.5	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 MAX.	19.0	16.0	4.0	0.4	0.2	0



Package	Box	Box Size(mm)	Carton	Carton Size(mm)
TO-92	2000 pcs	333×162×43	20,000 pcs	350×340×250