

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) Silicon NPN Epitaxial Type (PCT Process)

## HN4B06J

Audio Frequency General Purpose Amplifier Applications

Unit: mm

Q1:

- High voltage :  $V_{CEO} = -120V$
- High  $h_{FE}$  :  $h_{FE} = 200\sim700$
- Excellent  $h_{FE}$  linearity  
:  $h_{FE}(I_C = -0.1mA) / h_{FE}(I_C = -2mA) = 0.95$  (typ.)

Q2:

- High voltage :  $V_{CEO} = 120V$
- High  $h_{FE}$  :  $h_{FE} = 200\sim700$
- Excellent  $h_{FE}$  linearity  
:  $h_{FE}(I_C = 0.1mA) / h_{FE}(I_C = 2mA) = 0.95$  (typ.)

### Q1 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	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

### Q2 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	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

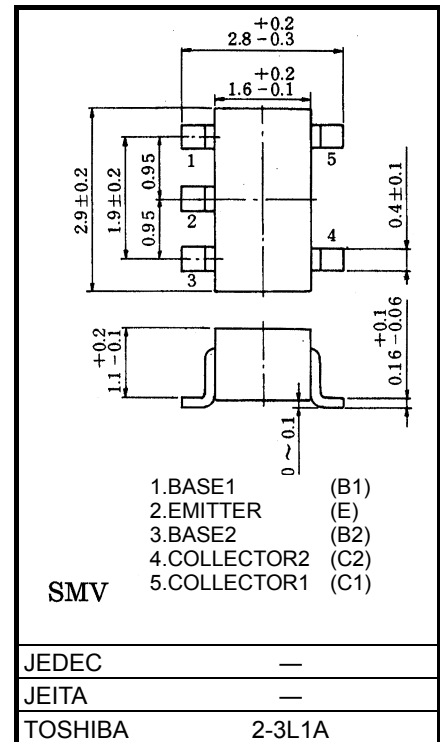
### Q1,Q2 Common Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector power dissipation	$P_C^*$	300	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°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.

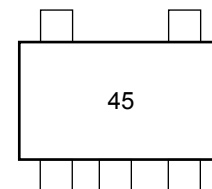
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\* Total rating. Power dissipation per element should not exceed 200mW

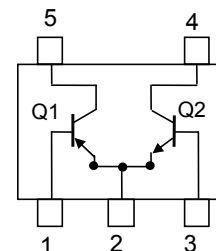


Weight: 0.044g (typ.)

Marking



Equivalent Circuit (Top View)



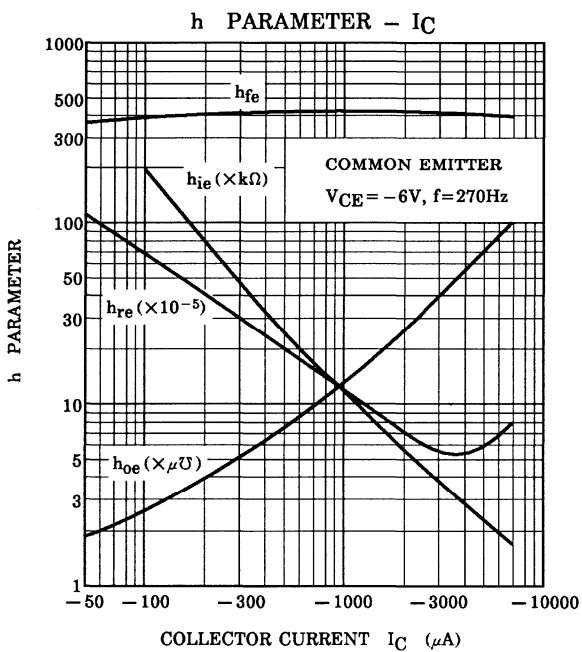
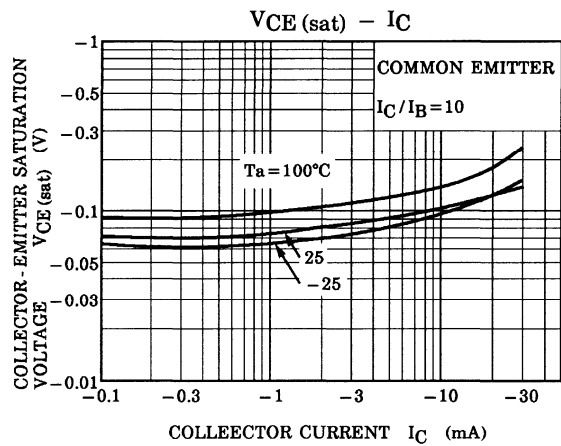
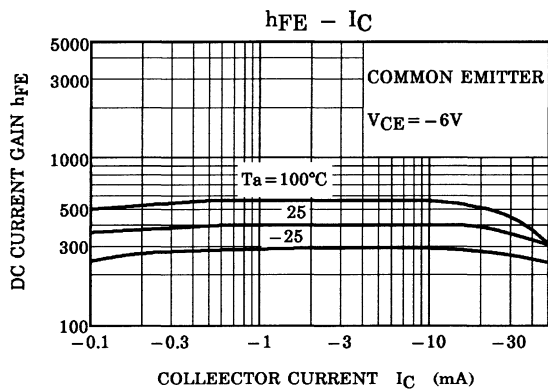
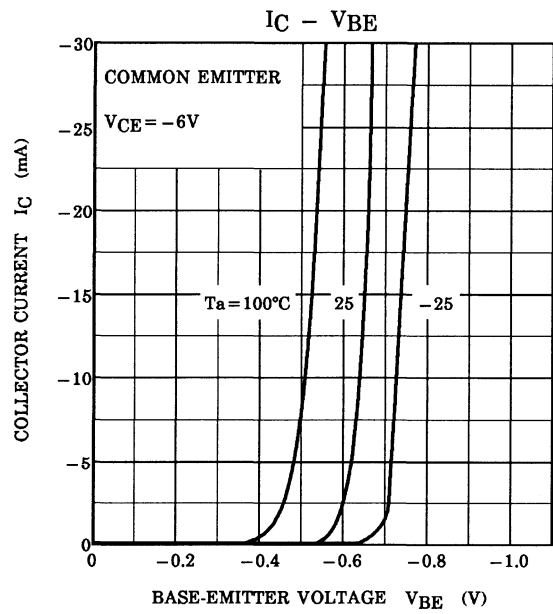
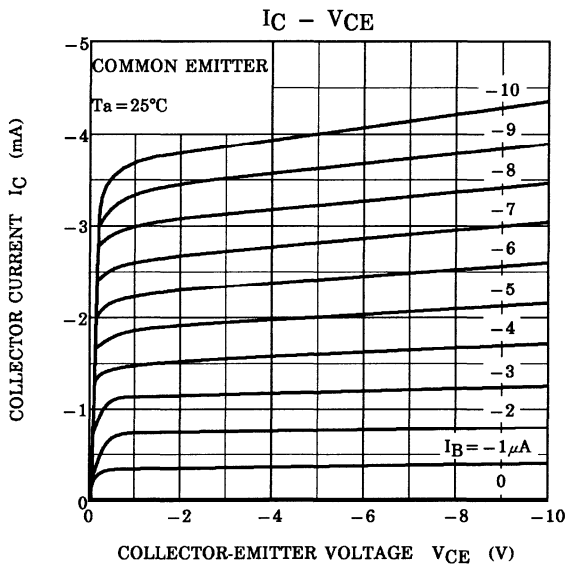
## Q1 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	—	$V_{CB} = -120V, I_E = 0$	—	—	-0.1	$\mu A$
Emitter cut-off current	$I_{EBO}$	—	$V_{EB} = -5V, I_C = 0$	—	—	-0.1	$\mu A$
DC current gain	$h_{FE}$	—	$V_{CE} = -6V, I_C = -2mA$	200	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	$I_C = -10mA, I_B = -1mA$	—	—	-0.3	V
Transition frequency	$f_T$	—	$V_{CE} = -6V, I_C = -1mA$	—	100	—	MHz
Collector output capacitance	$C_{ob}$	—	$V_{CB} = -10V, I_E = 0, f = 1MHz$	—	4.0	—	pF
Noise figure	NF	—	$V_{CE} = 6V, I_C = 0.1mA$ $f = 1kHz, R_G = 10k\Omega$	—	1.0	—	dB

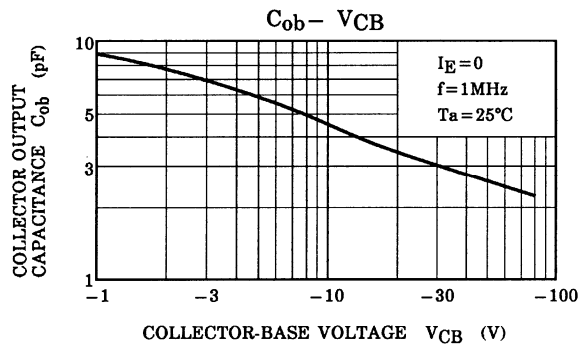
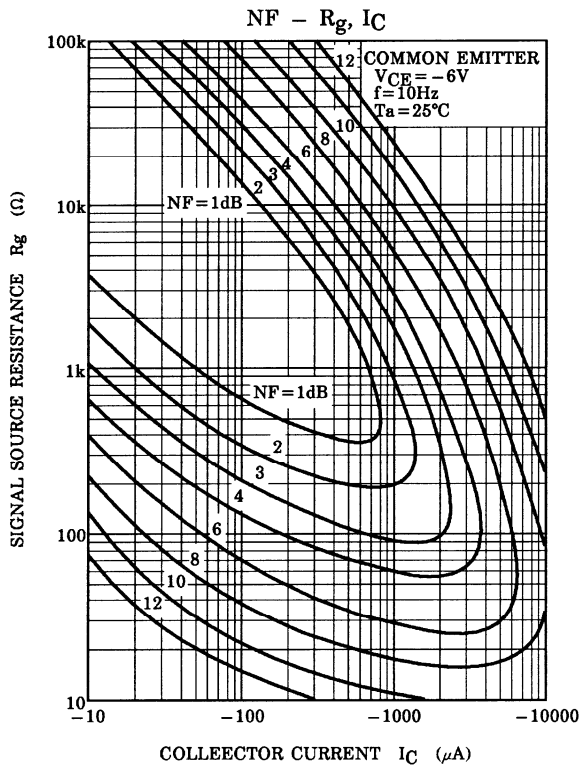
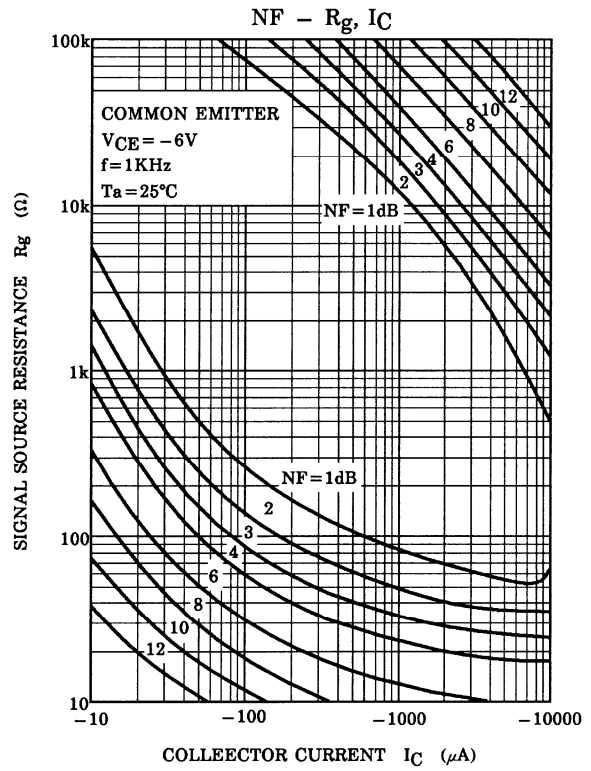
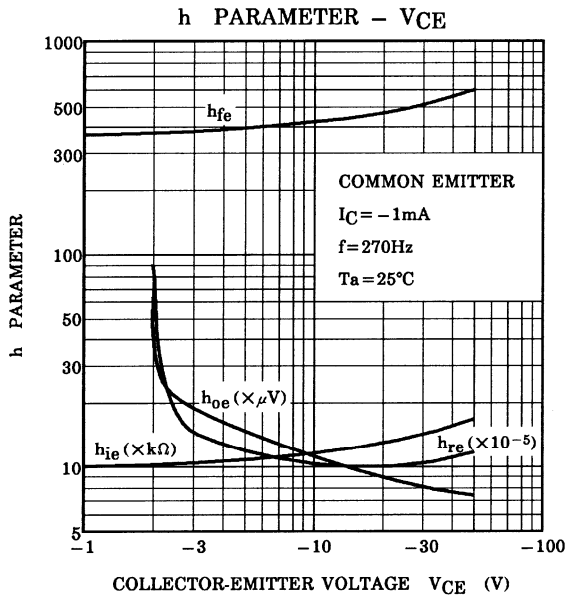
## Q2 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	—	$V_{CB} = 120V, I_E = 0$	—	—	0.1	$\mu A$
Emitter cut-off current	$I_{EBO}$	—	$V_{EB} = 5V, I_C = 0$	—	—	0.1	$\mu A$
DC current gain	$h_{FE}$	—	$V_{CE} = 6V, I_C = 2mA$	200	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	$I_C = 10mA, I_B = 1mA$	—	—	0.3	V
Transition frequency	$f_T$	—	$V_{CE} = 6V, I_C = 1mA$	—	100	—	MHz
Collector output capacitance	$C_{ob}$	—	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	3.0	—	pF
Noise figure	NF	—	$V_{CE} = 6V, I_C = 0.1mA$ $f = 1kHz, R_G = 10k\Omega$	—	1.0	—	dB

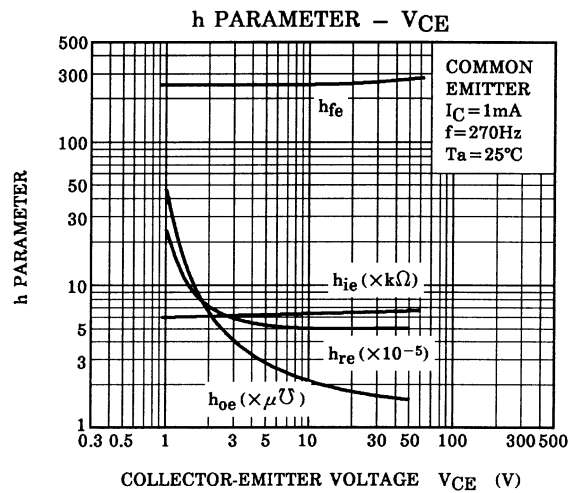
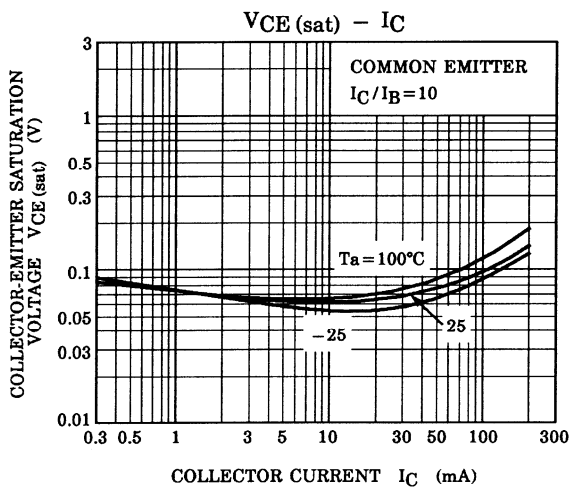
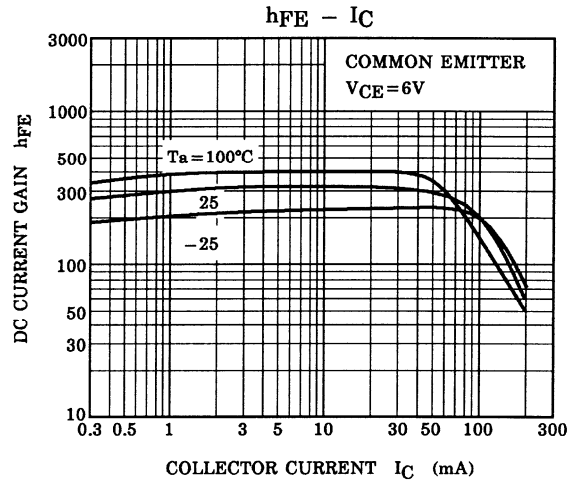
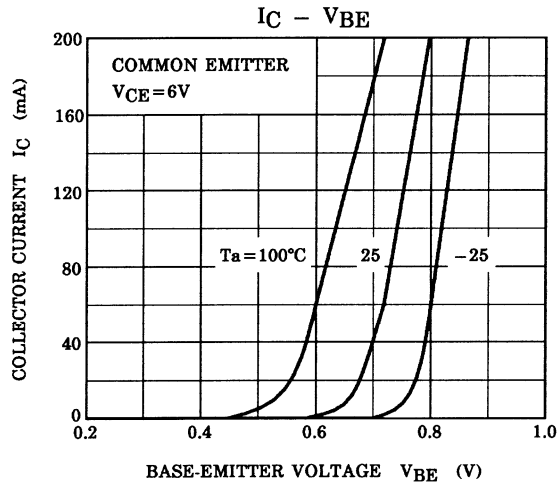
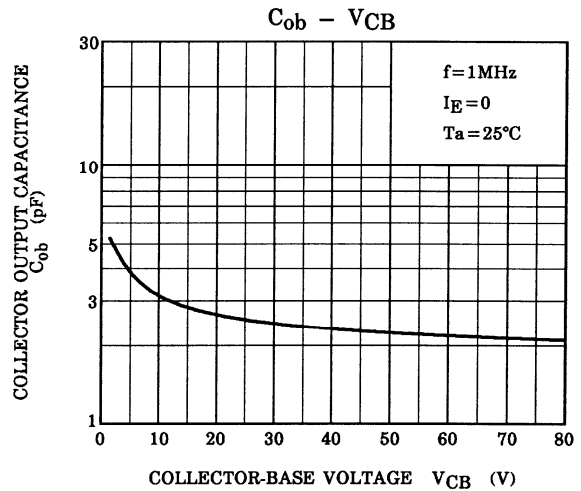
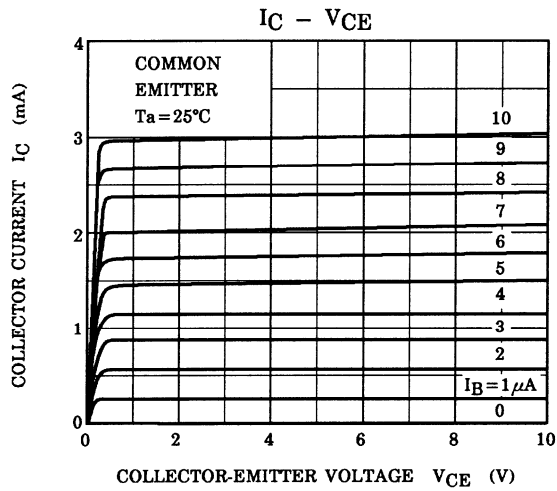
**Q1 (PNP transistor)**



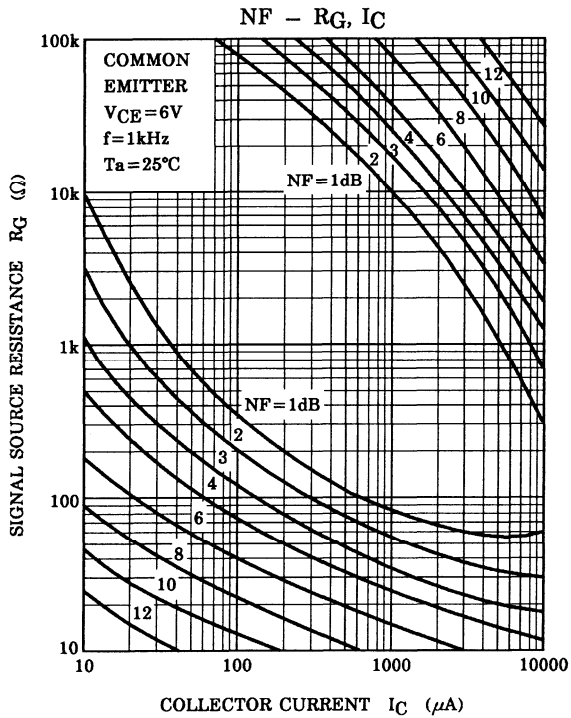
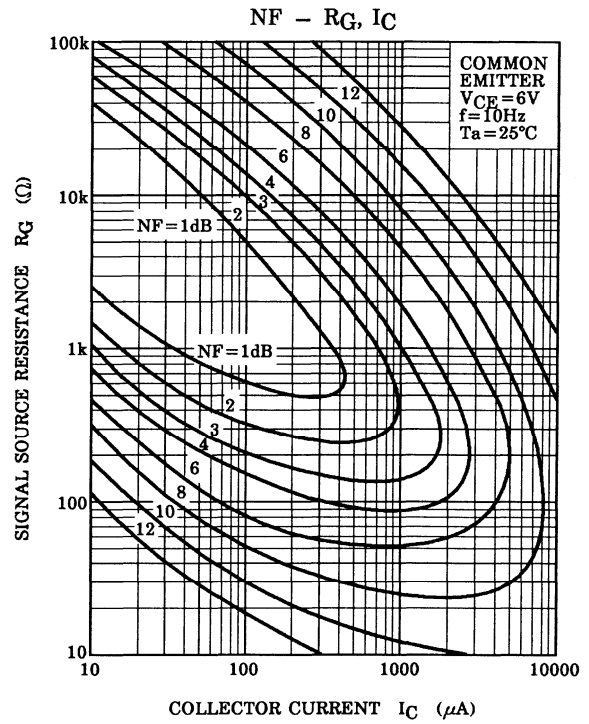
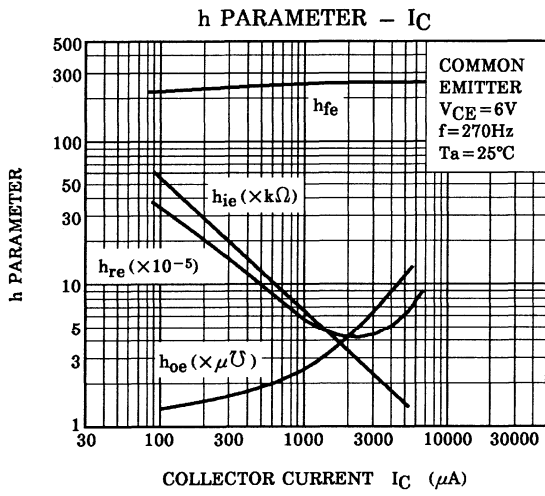
## Q1(PNP transistor)



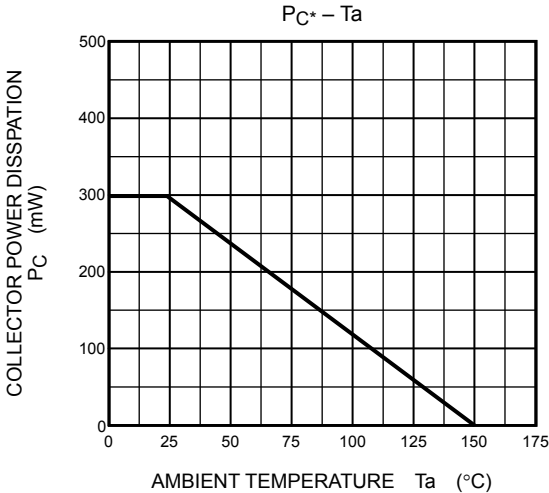
**Q2 (NPN transistor)**



## Q2(NPN transistor)



(Q1, Q2 Common)



\*: Total Rating

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