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

HN4B06J

Audio Frequency General Purpose Amplifier Applications

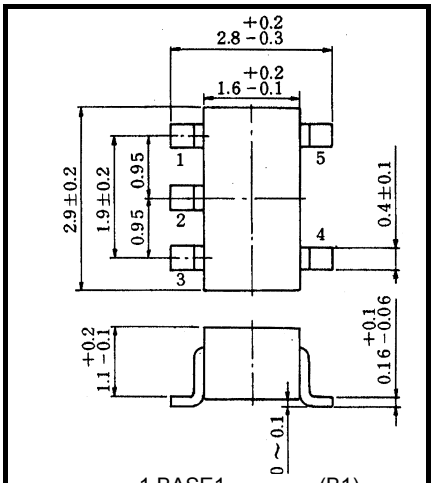
Q1:

- High voltage : V_{CEO} = −120V
- High h_{FE} : h_{FE} = 200 to 700
- 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 to 700
- Excellent h_{FE} linearity
  : h_{FE} (I_C = 0.1mA) / h_{FE} (I_C = 2mA) = 0.95 (typ.)

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-3L1A

Weight: 0.014g (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

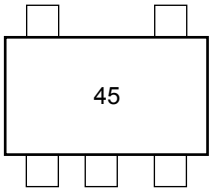
Q2 Absolute Maximum Ratings (Ta = 25°C)

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

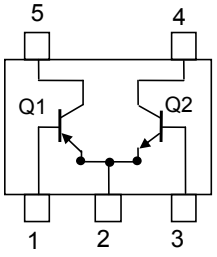
Q1,Q2 Common Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector power dissipation	P_C*	300	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55 to 150	°C

Marking



Equivalent Circuit (Top View)



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

Start of commercial production
2002-03

Q1 Electrical Characteristics (Ta = 25°C)

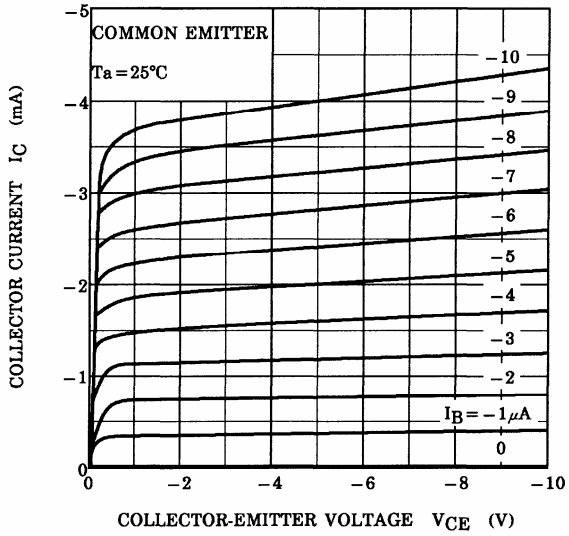
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	V_{CB} = −120V, I_E = 0	—	—	−0.1	μA
Emitter cut-off current	I_{EBO}	—	V_{EB} = −5V, I_C = 0	—	—	−0.1	μA
DC current gain	h_{FE}	—	V_{CE} = −6V, I_C = −2mA	200	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	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} = 6 V, I_C = 0.1 mA f = 1 kHz, R_G = 10 kΩ	—	1.0	—	dB

Q2 Electrical Characteristics (Ta = 25°C)

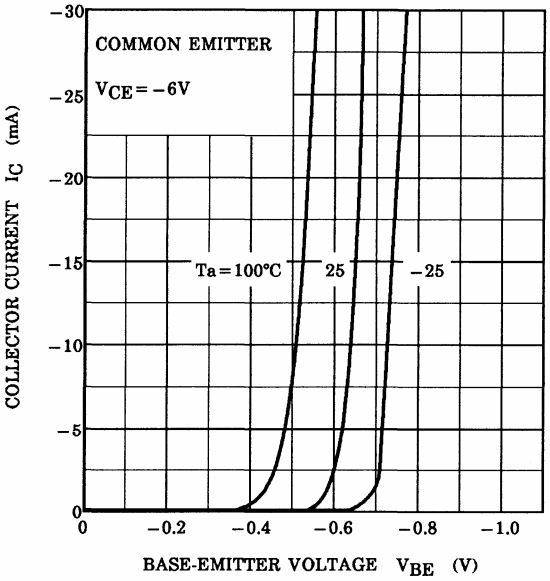
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	V_{CB} =120V, I_E = 0	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	—	V_{EB} = 5V, I_C = 0	—	—	0.1	μA
DC current gain	h_{FE}	—	V_{CE} = 6V, I_C = 2mA	200	—	700	
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	—	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} = 6 V, I_C = 0.1 mA f = 1 kHz, R_G = 10 kΩ	—	1.0	—	dB

Q1 (PNP transistor)

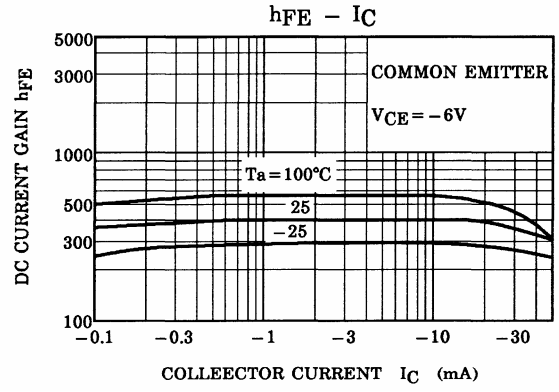
I_C – V_{CE}



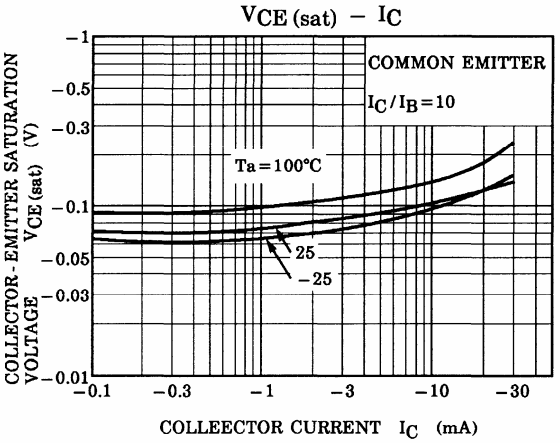
I_C – V_{BE}



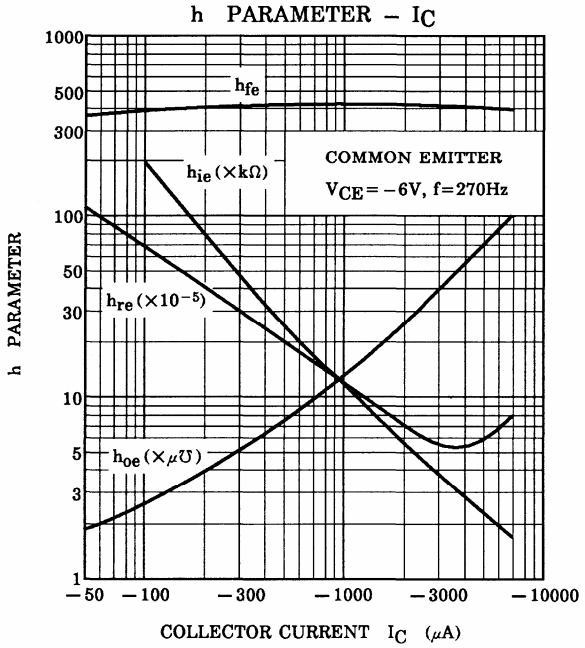
h_{FE} – I_C



$V_{CE\,(sat)}$ – I_C

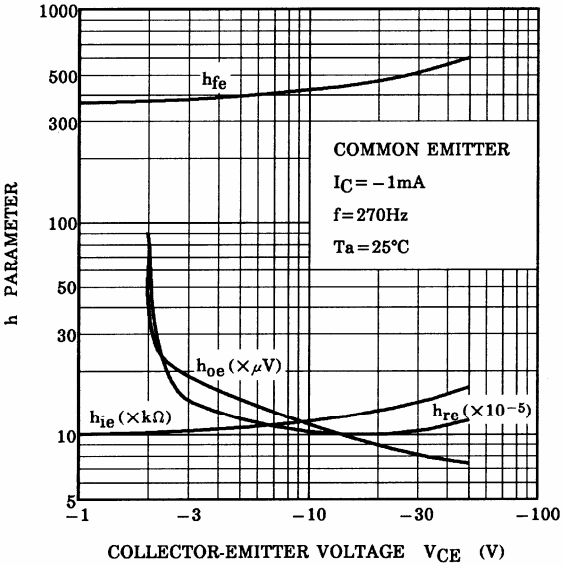


h PARAMETER – I_C

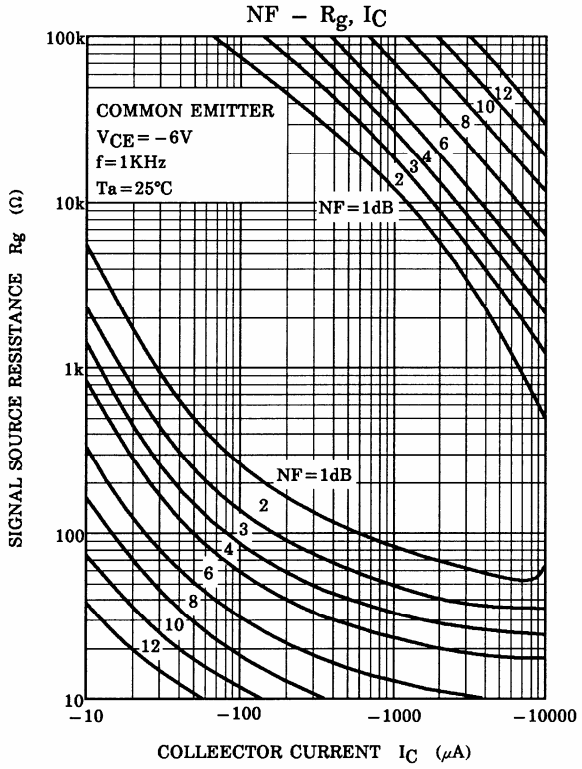


Q1(PNP transistor)

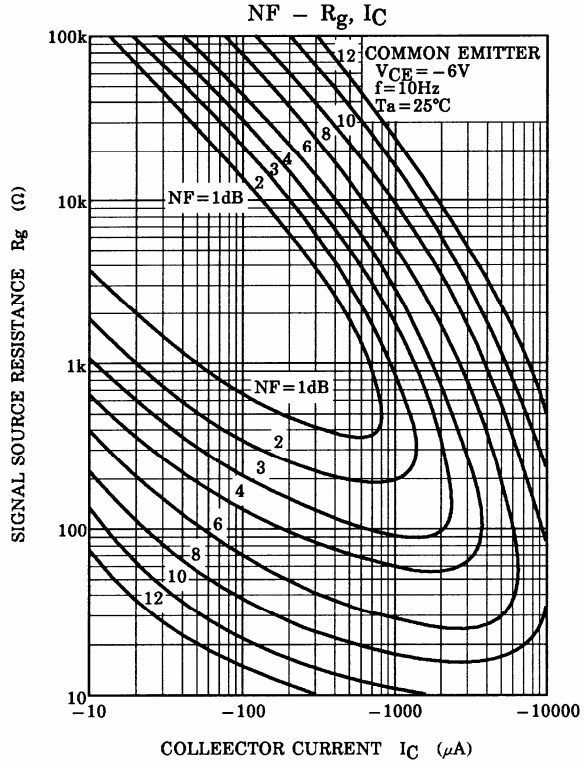
h PARAMETER – V_{CE}



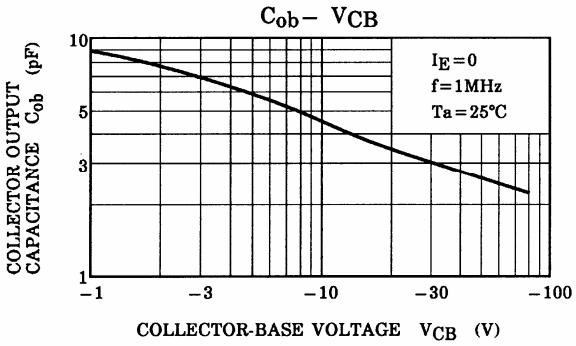
NF – R_g, I_C



NF – R_g, I_C

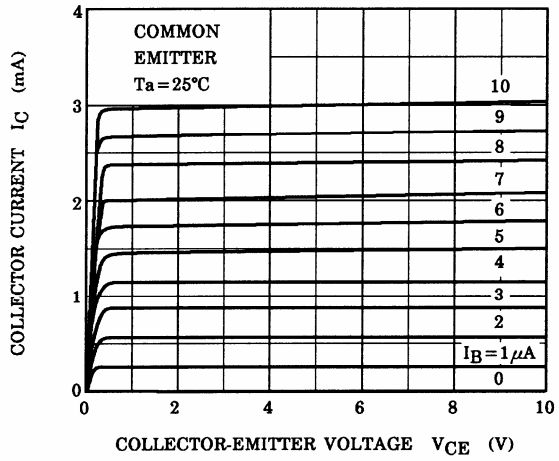


C_{ob} – V_{CB}

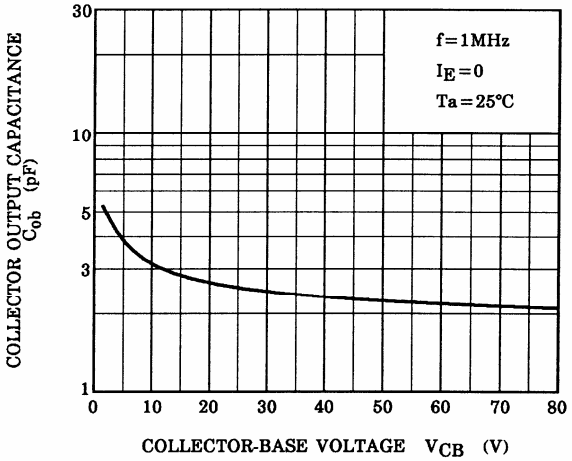


Q2 (NPN transistor)

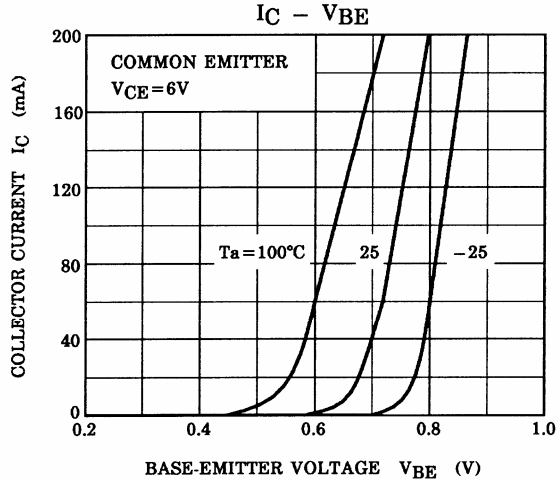
I_C – V_{CE}



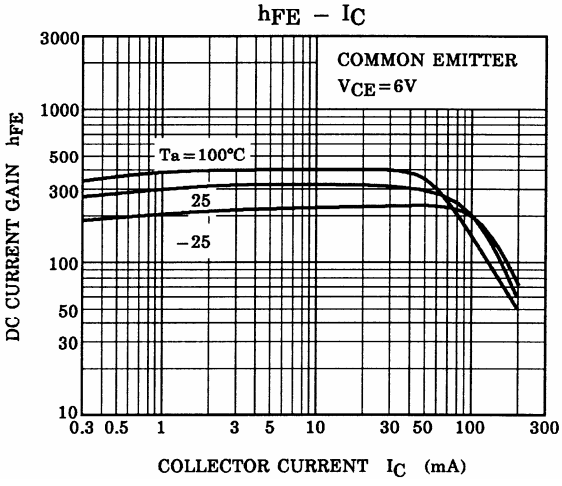
C_{ob} – V_{CB}



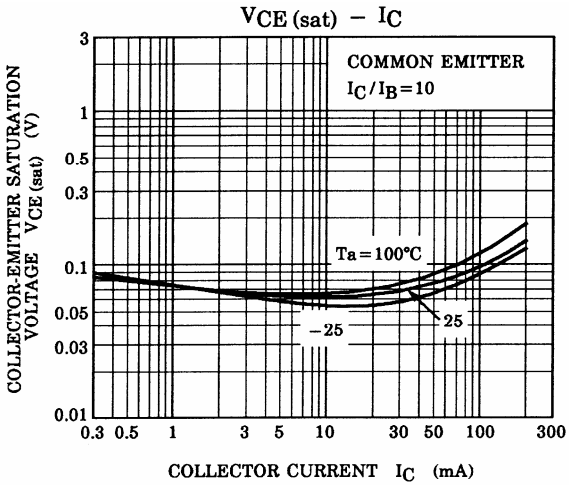
I_C – V_{BE}



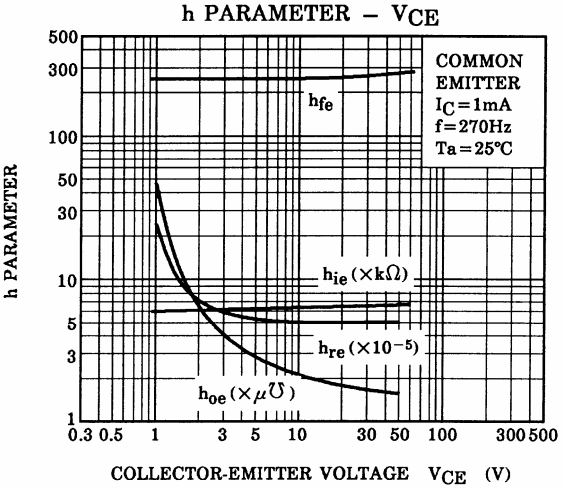
h_{FE} – I_C



$V_{CE\,(sat)}$ – I_C

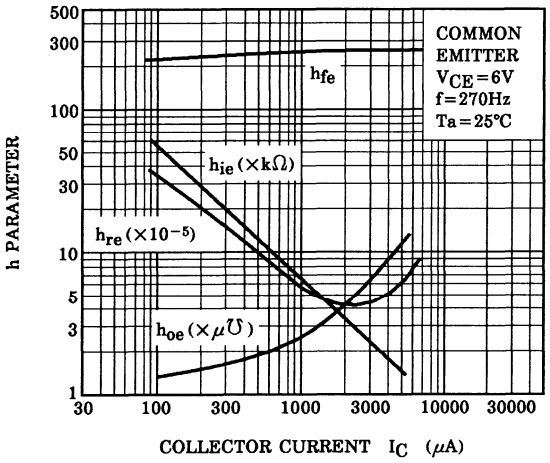


h PARAMETER – V_{CE}

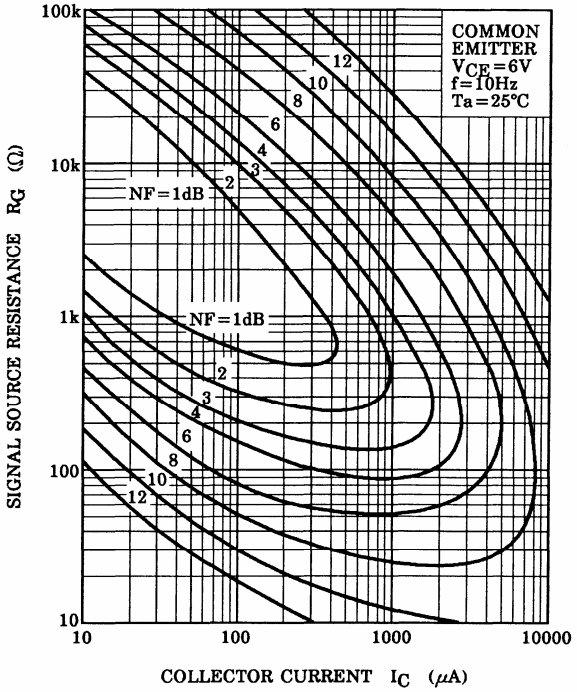


Q2(NPN transistor)

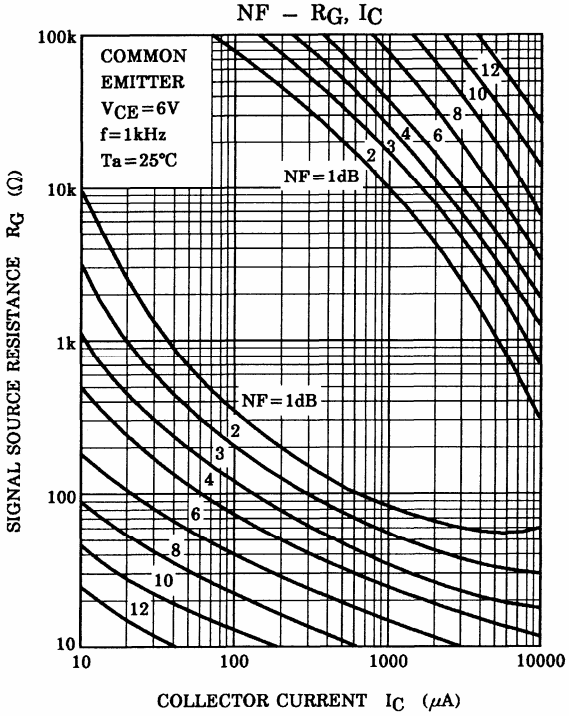
h PARAMETER – I_C



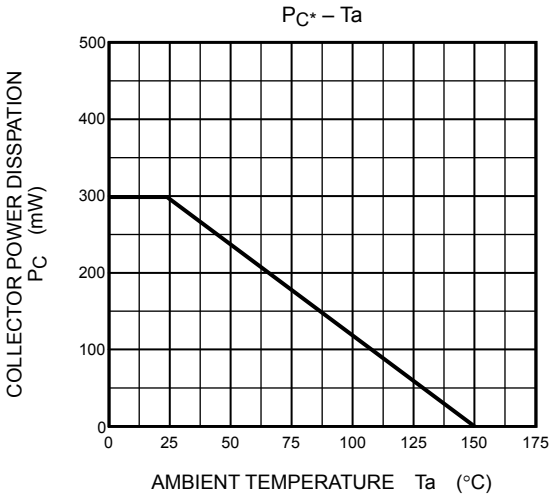
NF – R_G, I_C



NF – R_G, I_C



(Q1, Q2 Common)



*: Total Rating

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