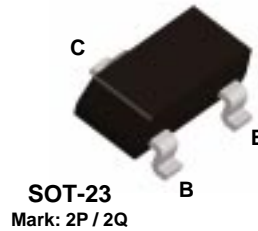
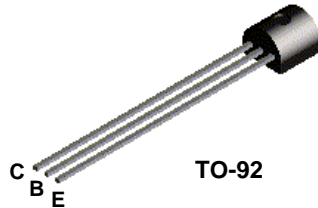


**2N5086  
2N5087**

**MMBT5086  
MMBT5087**



## PNP General Purpose Amplifier

This device is designed for low level, high gain, low noise general purpose amplifier applications at collector currents to 50 mA. Sourced from Process 62.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	50	V
V <sub>CBO</sub>	Collector-Base Voltage	50	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	100	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		2N5086 2N5086	*MMBT5086 *MMBT5087	
P <sub>D</sub>	Total Device Dissipation	625	350	mW
	Derate above 25°C	5.0	2.8	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3		°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	357	°C/W

\*Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

## PNP General Purpose Amplifier (continued)

### Electrical Characteristics

TA= 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
<b>OFF CHARACTERISTICS</b>					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	$I_C = 1.0 \text{ mA}, I_B = 0$	50		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \mu\text{A}, I_E = 0$	50		V
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = 10 \text{ V}, I_E = 0$ $V_{CB} = 35 \text{ V}, I_E = 0$		10 50	nA nA
$I_{EBO}$	Emitter Cutoff Current	$V_{EB} = 3.0 \text{ V}, I_C = 0$		50	nA

### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 100 \mu\text{A}, V_{CE} = 5.0 \text{ V}$ <b>2N5086</b> <b>2N5087</b> $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$ <b>2N5086</b> <b>2N5087</b> $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}$ <b>2N5086</b> <b>2N5087</b>	150 250 150 250 150 250	500 800	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$		0.3	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$		0.85	V

### SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 500 \mu\text{A}, V_{CE} = 5.0 \text{ V}, f = 20 \text{ MHz}$	40		MHz
$C_{cb}$	Collector-Base Capacitance	$V_{CB} = 5.0 \text{ V}, I_E = 0, f = 100 \text{ kHz}$		4.0	pF
$h_{fe}$	Small-Signal Current Gain	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0,$ <b>2N5086</b> <b>2N5087</b> $f = 1.0 \text{ kHz}$	150 250	600 900	
NF	Noise Figure	$I_C = 100 \mu\text{A}, V_{CE} = 5.0 \text{ V},$ <b>2N5086</b> <b>2N5087</b> $R_S = 3.0 \text{ k}\Omega, f = 1.0 \text{ kHz}$		3.0 2.0	dB dB
		$I_C = 20 \mu\text{A}, V_{CE} = 5.0 \text{ V},$ <b>2N5086</b> <b>2N5087</b> $R_S = 10 \text{ k}\Omega,$ $f = 10 \text{ Hz to } 15.7 \text{ kHz}$		3.0 2.0	dB dB

\*Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

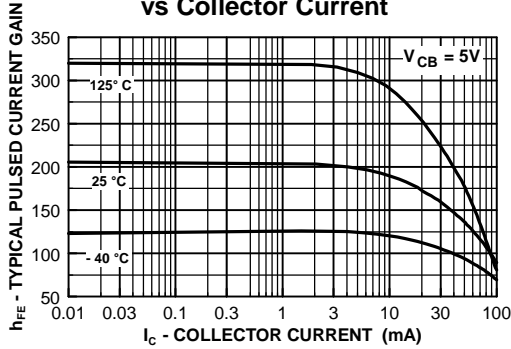
### Spice Model

PNP (Is=6.734f Xti=3 Eg=1.11 Vaf=45.7 Bf=254.1 Ne=1.741 Ise=6.734f Ikf=.1962 Xtb=1.5 Br=2.683 Nc=2  
Isc=0 Ikr=0 Rc=1.67 Cjc=6.2p Mjc=.301 Vjc=.75 Fc=.5 Cje=7.5p Mje=.2861 Vje=.75 Tr=10.1n Tf=467.8p  
Ilf=.17 Vtf=5 Xtf=8 Rb=10)

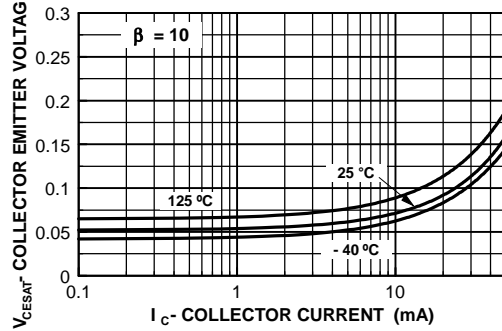
2N5086 / MMBT5086 / 2N5087 / MMBT5087

Typical Characteristics

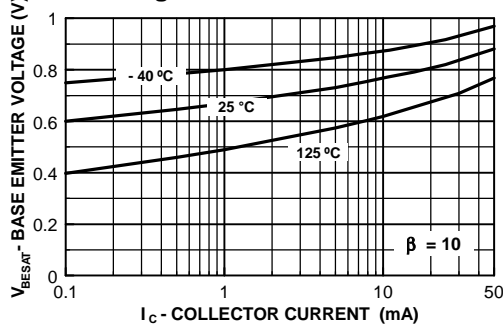
Typical Pulsed Current Gain vs Collector Current



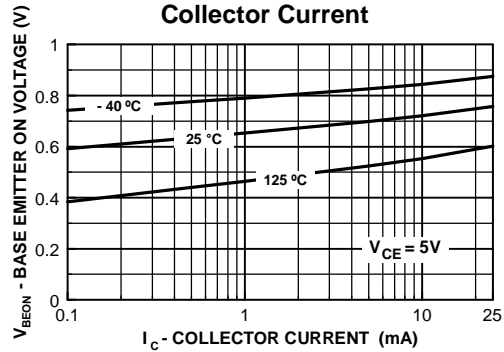
Collector-Emitter Saturation Voltage vs Collector Current



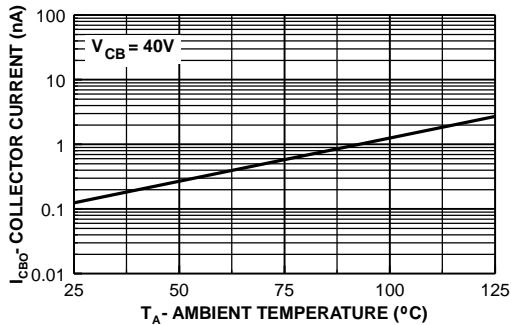
Base-Emitter Saturation Voltage vs Collector Current



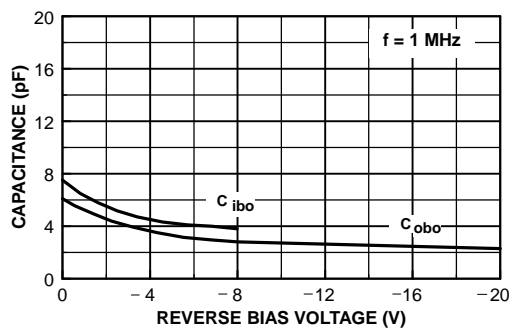
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs. Ambient Temperature

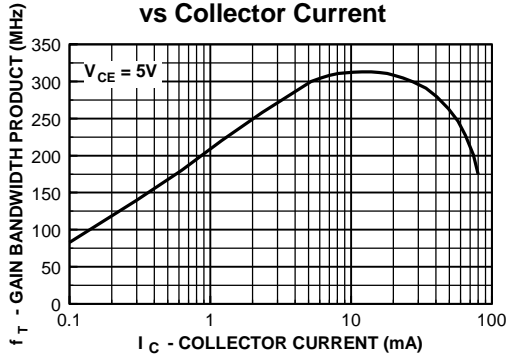


Input and Output Capacitance vs Reverse Bias Voltage

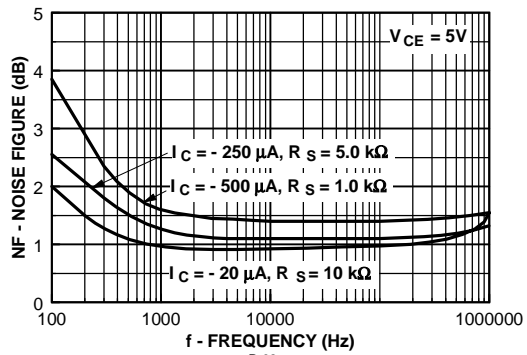


Typical Characteristics (continued)

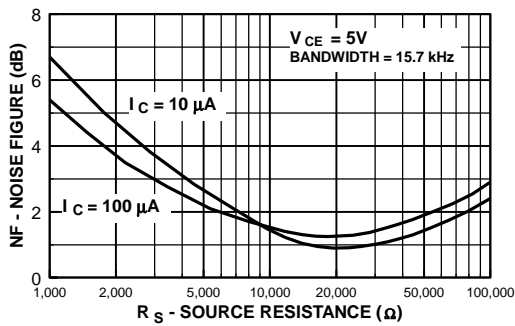
Gain Bandwidth Product vs Collector Current



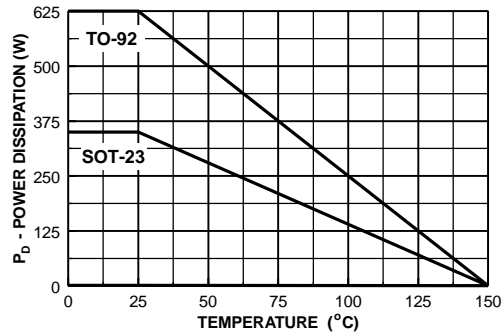
Noise Figure vs Frequency



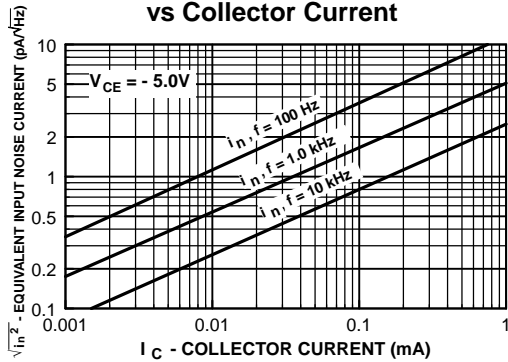
Wideband Noise Frequency vs Source Resistance



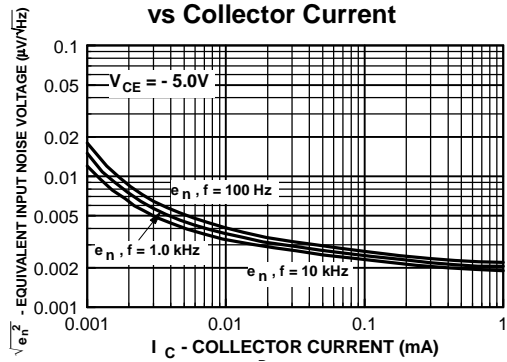
Power Dissipation vs Ambient Temperature



Equivalent Input Noise Current vs Collector Current

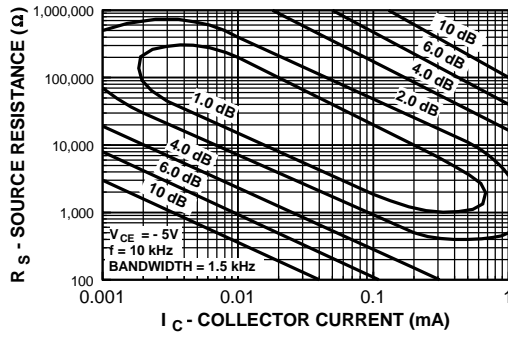


Equivalent Input Noise Voltage vs Collector Current

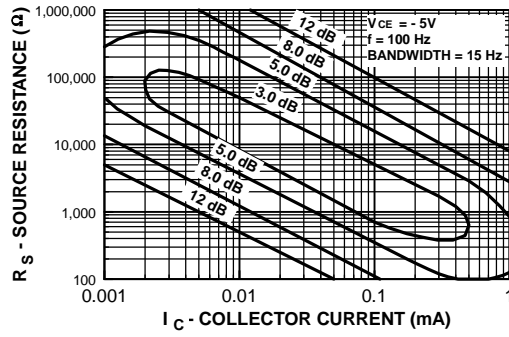


Typical Characteristics (continued)

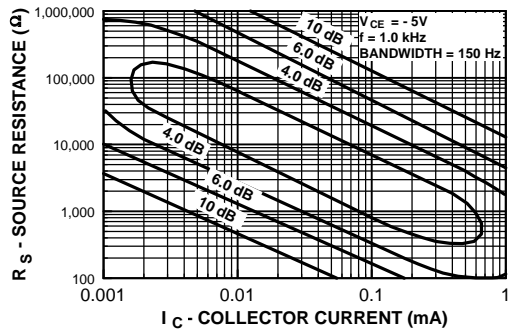
Contours of Constant  
Narrow Band Noise Figure



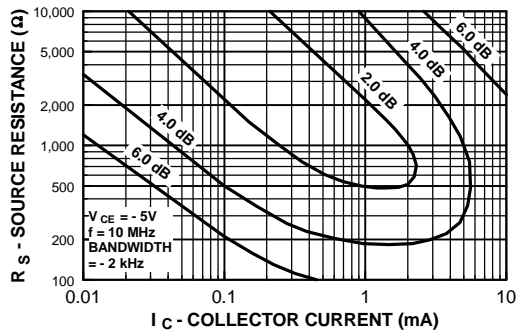
Contours of Constant  
Narrow Band Noise Figure



Contours of Constant  
Narrow Band Noise Figure



Contours of Constant  
Narrow Band Noise Figure



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