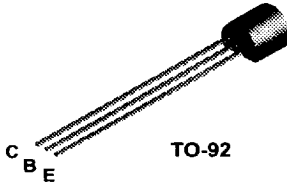
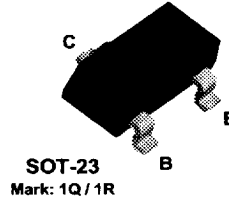




2N5088
2N5089



MMBT5088
MMBT5089



NPN General Purpose Amplifier

This device is designed for low noise, high gain, general purpose amplifier applications at collector currents from 1µA to 50 mA. Sourced from Process 07.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V _{CE0}	Collector-Emitter Voltage	2N5088	30 V
		2N5089	25 V
V _{CB0}	Collector-Base Voltage	2N5088	35 V
		2N5089	30 V
V _{EB0}	Emitter-Base Voltage	4.5	V
I _C	Collector Current - Continuous	100	mA
T _J , T _{stg}	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
		2N5088 2N5089	*MMBT5088 *MMBT5089	
P _D	Total Device Dissipation Derate above 25°C	625	350	mW
		5.0	2.8	mW/°C
R _{θJC}	Thermal Resistance, Junction to Case	83.3		°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	200	357	°C/W

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

NPN General Purpose Amplifier

(continued)

2N5088 / MMBT5088 / 2N5089 / MMBT5089

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Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
V _{IBRICEO}	Collector-Emitter Breakdown Voltage*	I _C = 1.0 mA, I _B = 0	2N5088	30	V
			2N5089	25	V
V _{IBRICBO}	Collector-Base Breakdown Voltage	I _C = 100 μA, I _E = 0	2N5088	35	V
			2N5089	30	V
I _{CBO}	Collector Cutoff Current	V _{CB} = 20 V, I _E = 0	2N5088	50	nA
		V _{CB} = 15 V, I _E = 0	2N5089	50	nA
I _{EBO}	Emitter Cutoff Current	V _{EB} = 3.0 V, I _C = 0		50	nA
		V _{EB} = 4.5 V, I _C = 0		100	nA

ON CHARACTERISTICS

h _{FE}	DC Current Gain	I _C = 100 μA, V _{CE} = 5.0 V	2N5088	300	900	
			2N5089	400	1200	
		I _C = 1.0 mA, V _{CE} = 5.0 V	2N5088	350		
			2N5089	450		
		I _C = 10 mA, V _{CE} = 5.0 V*	2N5088	300		
			2N5089	400		
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C = 10 mA, I _B = 1.0 mA		0.5	V	
V _{BE(on)}	Base-Emitter On Voltage	I _C = 10 mA, V _{CE} = 5.0 V		0.8	V	

SMALL SIGNAL CHARACTERISTICS

f _T	Current Gain - Bandwidth Product	I _C = 500 μA, V _{CE} = 5.0 mA, f = 20 MHz		50		MHz
C _{cb}	Collector-Base Capacitance	V _{CB} = 5.0 V, I _E = 0, f = 100 kHz			4.0	pF
C _{eb}	Emitter-Base Capacitance	V _{BE} = 0.5 V, I _C = 0, f = 100 kHz			10	pF
h _{fe}	Small-Signal Current Gain	I _C = 1.0 mA, V _{CE} = 5.0 V,	2N5088	350	1400	
		f = 1.0 kHz	2N5089	450	1800	
NF	Noise Figure	I _C = 100 μA, V _{CE} = 5.0 V,	2N5088		3.0	dB
		R _s = 10 kΩ, f = 10 Hz to 15.7 kHz	2N5089		2.0	dB

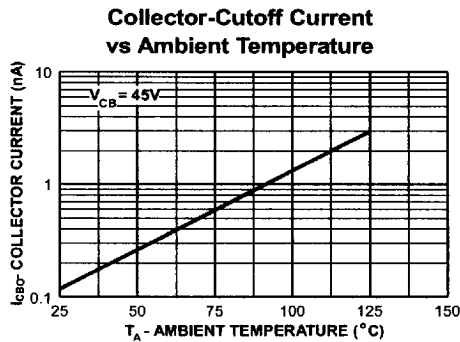
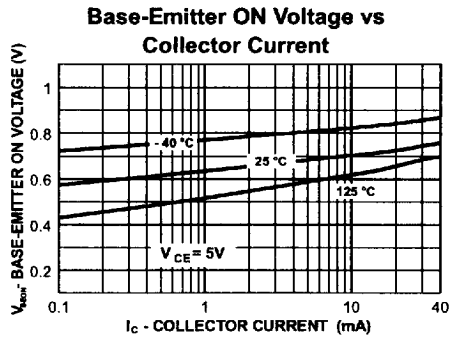
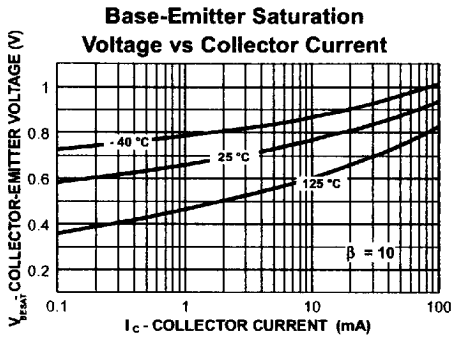
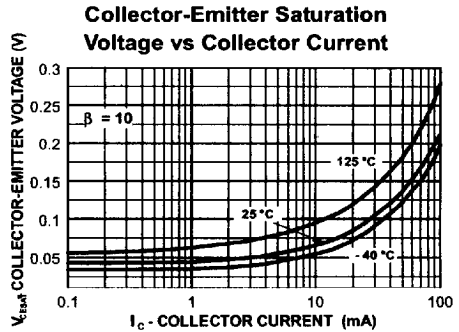
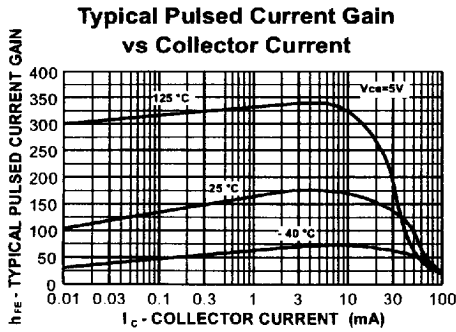
* Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

Spice Model

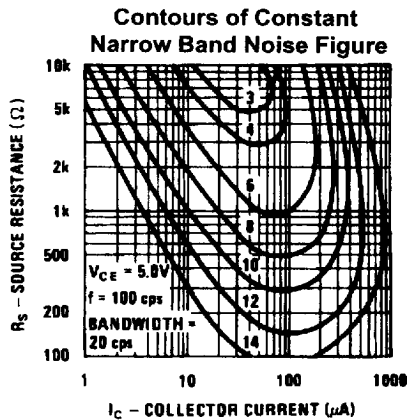
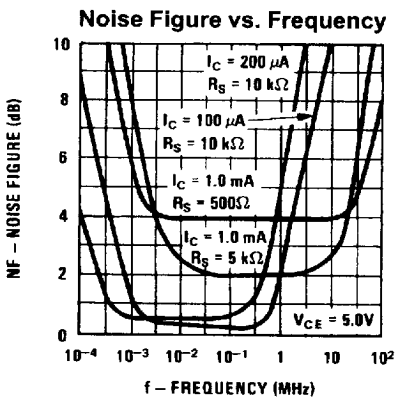
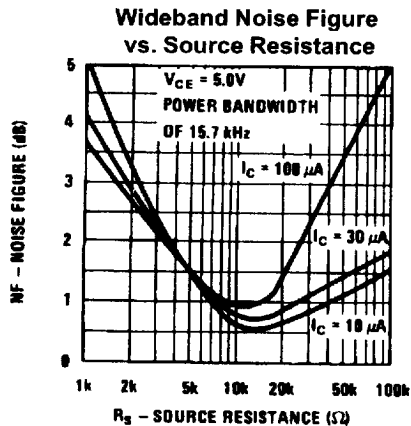
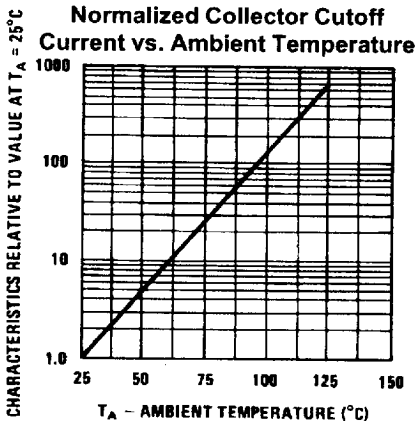
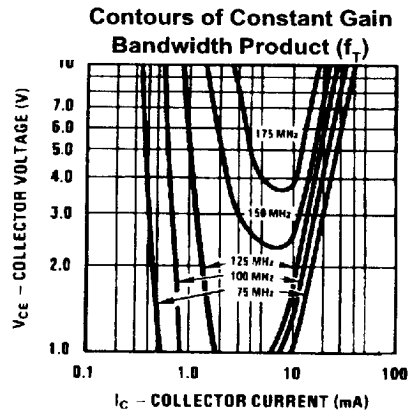
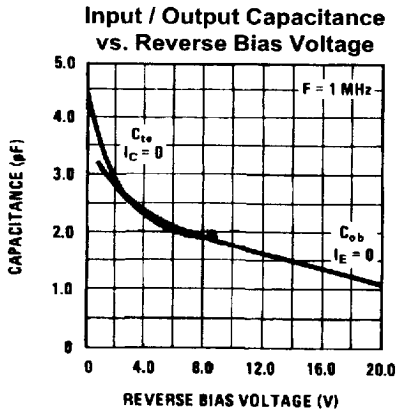
NPN (Is=5.911f Xti=3 Eg=1.11 Vaf=62.37 Bf=1.122K Ne=1.394 Ise=5.911f Ikf=14.92m Xtb=1.5 Br=1.271 Nc=2 Isc=0 Ikr=0 Rc=1.61 Cjc=4.017p Mjc=.3174 Vjc=.75 Fc=.5 Cje=4.973p Mje=.4146 Vje=.75 Tr=4.673n Tf=821.7p Itf=.35 Vtf=4 Xtf=7 Rb=10)

NPN General Purpose Amplifier
(continued)

DC Typical Characteristics



AC Typical Characteristics



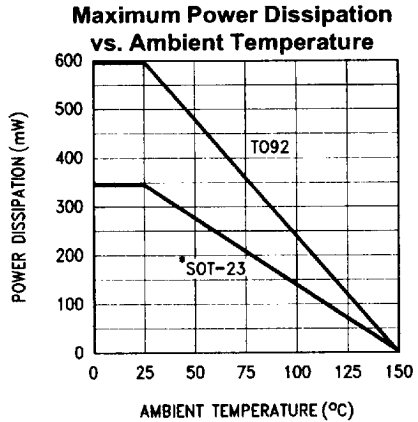
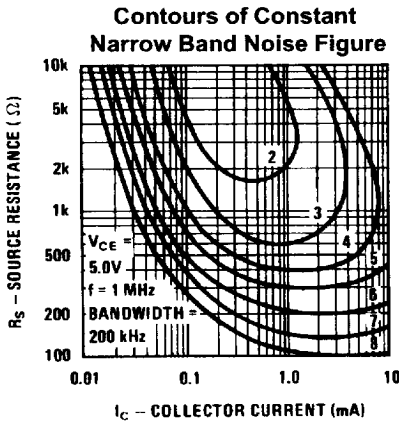
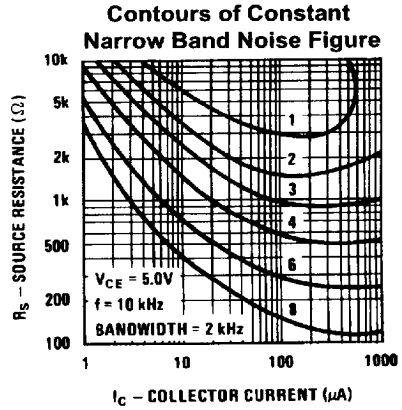
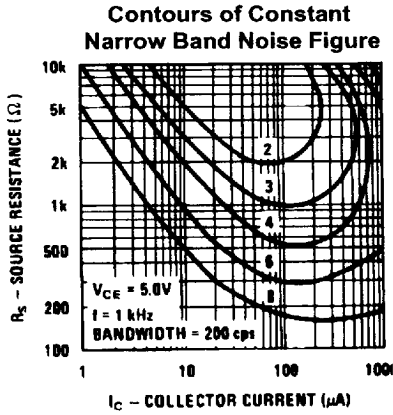
2N5088 / MMBT5088 / 2N5089 / MMBT5089

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NPN General Purpose Amplifier

(continued)

AC Typical Characteristics (continued)



Typical Common Emitter Characteristics (f = 1.0 kHz)

