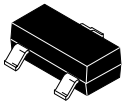
MMBT5088LT1G, SMMBT5088LT1G, MMBT5089LT1G, SMMBT5089LT1G

Low Noise Transistors

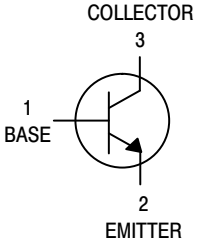
NPN Silicon

ON Semiconductor®

http://onsemi.com



SOT−23 (TO−236)
CASE 318
STYLE 6



Features

- AEC−Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector − Emitter Voltage MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	V_{CEO}	 30 25	Vdc
Collector − Base Voltage MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	V_{CBO}	 35 30	Vdc
Emitter − Base Voltage	V_{EBO}	4.5	Vdc
Collector Current − Continuous	I_C	50	mAdc

THERMAL CHARACTERISTICS

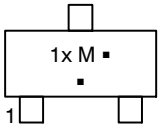
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR−5 Board, (Note 1) T_A = 25°C Derate above 25°C	P_D	 225 1.8	 mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate, (Note 2) T_A = 25°C Derate above 25°C	P_D	 300 2.4	 mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature	T_J, T_{stg}	−55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR−5 = 1.0 x 0.75 x 0.062 in.
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

MARKING DIAGRAM



1x = Device Code
x = Q for MMBT5088L
SMMBT5088L
x = R for MMBT5089L
SMMBT5089L
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
MMBT5088LT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SMMBT5088LT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
MMBT5089LT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SMMBT5089LT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	$V_{(BR)CEO}$	 30 25	 – –	Vdc
Collector – Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	$V_{(BR)CBO}$	 35 30	 – –	Vdc
Collector Cutoff Current (V_{CB} = 20 Vdc, I_E = 0) (V_{CB} = 15 Vdc, I_E = 0)	MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	I_{CBO}	 – –	 50 50	nAdc
Emitter Cutoff Current ($V_{EB(off)}$ = 3.0 Vdc, I_C = 0) ($V_{EB(off)}$ = 4.5 Vdc, I_C = 0)	MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	I_{EBO}	 – –	 50 100	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 100 μAdc, V_{CE} = 5.0 Vdc) (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc) (I_C = 10 mAdc, V_{CE} = 5.0 Vdc)	MMBT5088, SMMBT5088 MMBT5089, SMMBT5089 MMBT5088, SMMBT5088 MMBT5089, SMMBT5089 MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	h_{FE}	 300 400 350 450 300 400	 900 1200 – – – –	–
Collector – Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc)		$V_{CE(sat)}$	–	0.5	Vdc
Base – Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc)		$V_{BE(sat)}$	–	0.8	Vdc
SMALL–SIGNAL CHARACTERISTICS					
Current – Gain — Bandwidth Product (I_C = 500 μAdc, V_{CE} = 5.0 Vdc, f = 20 MHz)		f_T	50	–	MHz
Collector–Base Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz emitter guarded)		C_{cb}	–	4.0	pF
Emitter–Base Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz collector guarded)		C_{eb}	–	10	pF
Small Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	h_{fe}	350 450	1400 1800	–
Noise Figure (I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 10 kΩ, f = 1.0 kHz)	MMBT5088, SMMBT5088 MMBT5089, SMMBT5089	NF	– –	3.0 2.0	dB

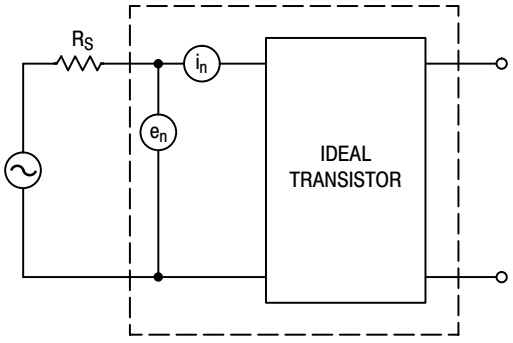


Figure 1. Transistor Noise Model

NOISE CHARACTERISTICS

(V_{CE} = 5.0 Vdc, T_A = 25°C)

NOISE VOLTAGE

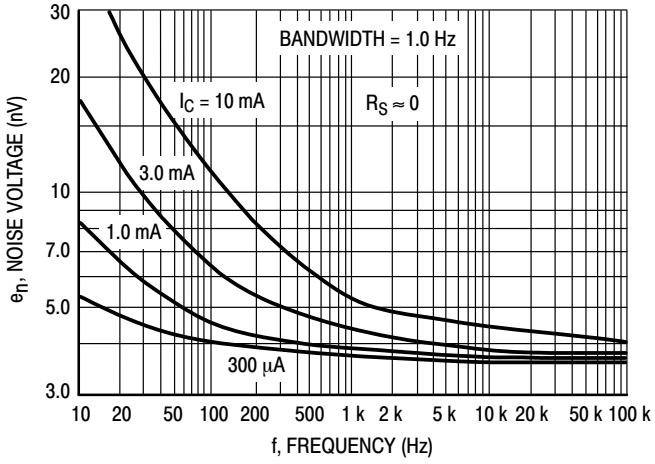


Figure 2. Effects of Frequency

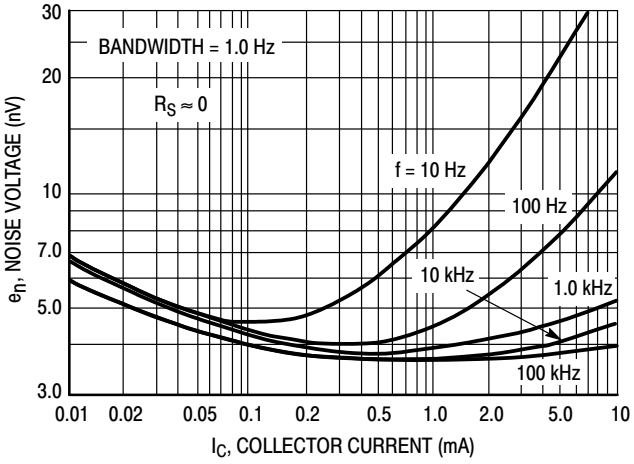


Figure 3. Effects of Collector Current

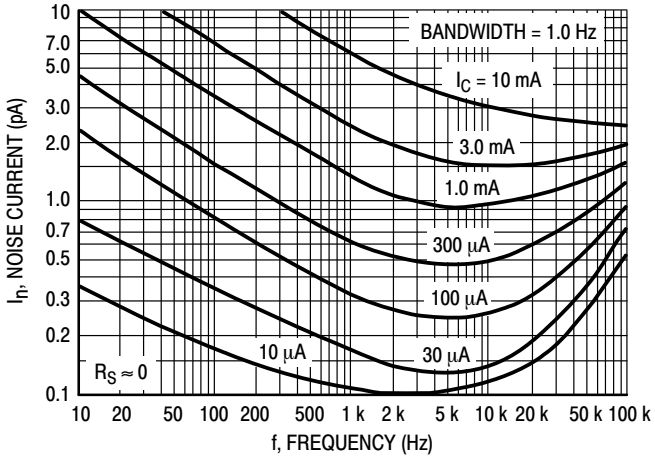


Figure 4. Noise Current

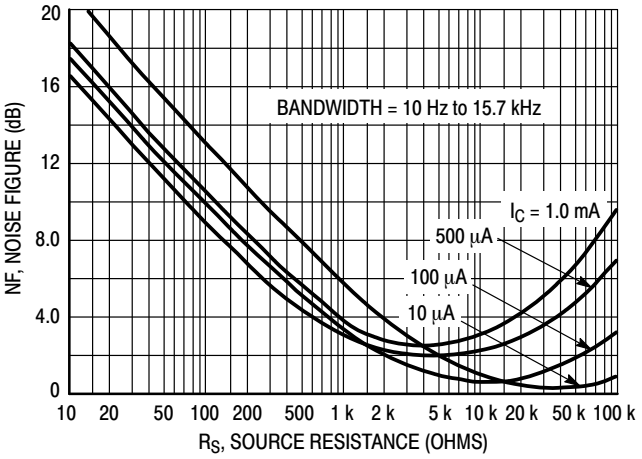


Figure 5. Wideband Noise Figure

100 Hz NOISE DATA

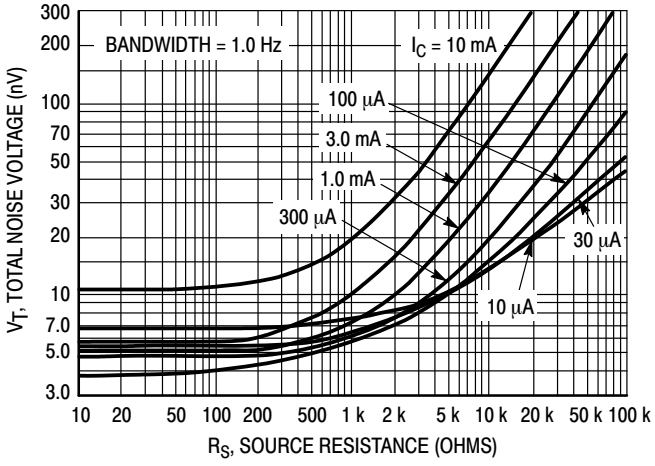


Figure 6. Total Noise Voltage

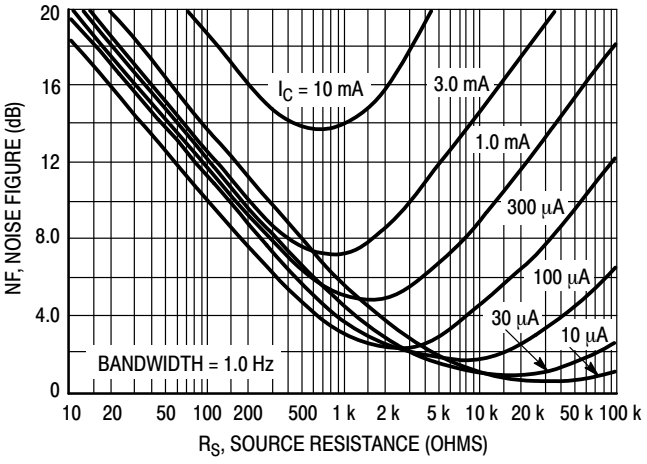


Figure 7. Noise Figure

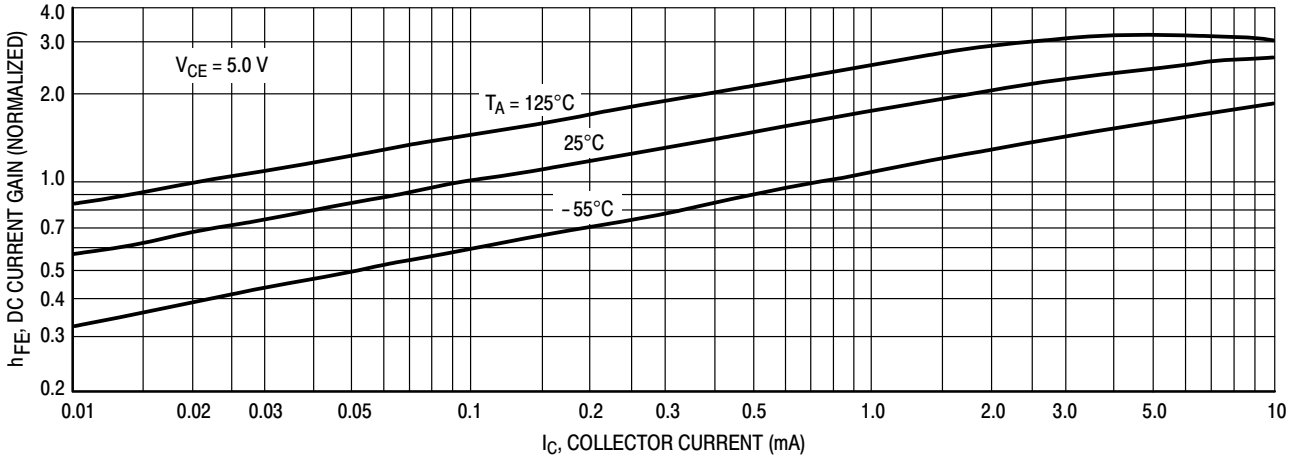


Figure 8. DC Current Gain

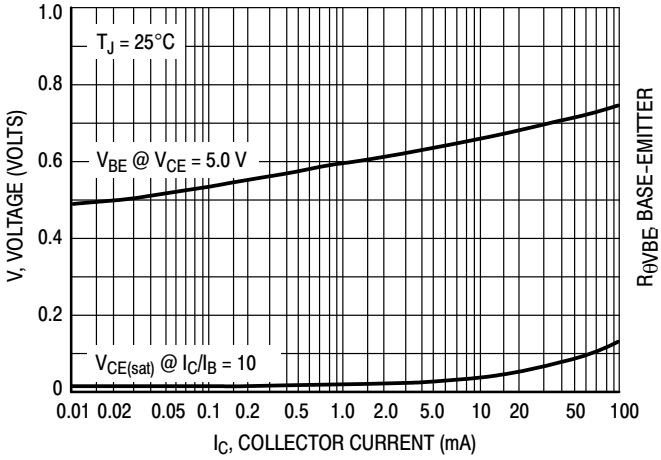


Figure 11. “On” Voltages

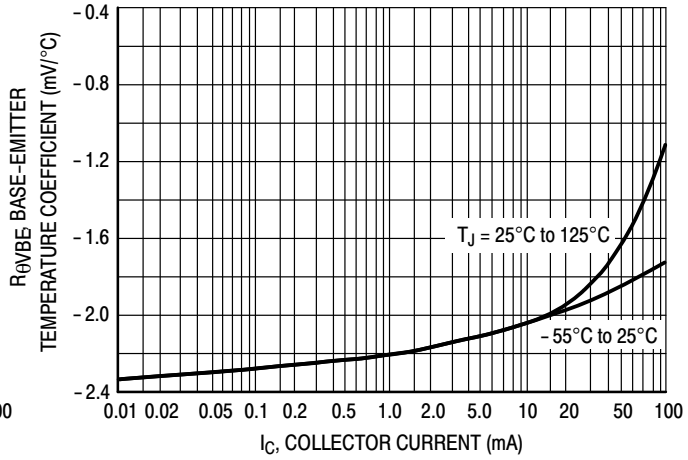


Figure 9. Temperature Coefficients

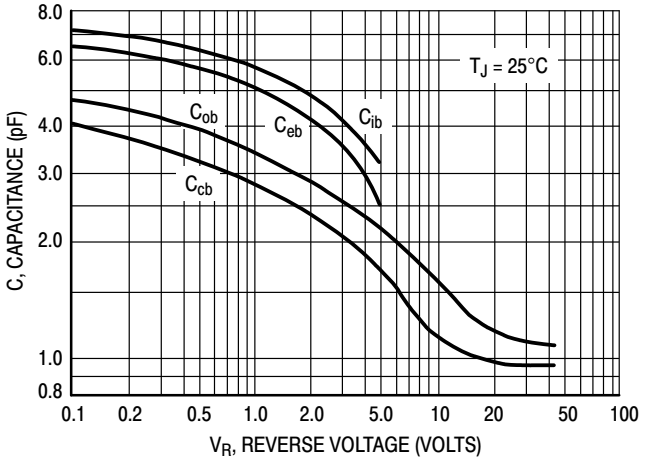


Figure 12. Capacitance

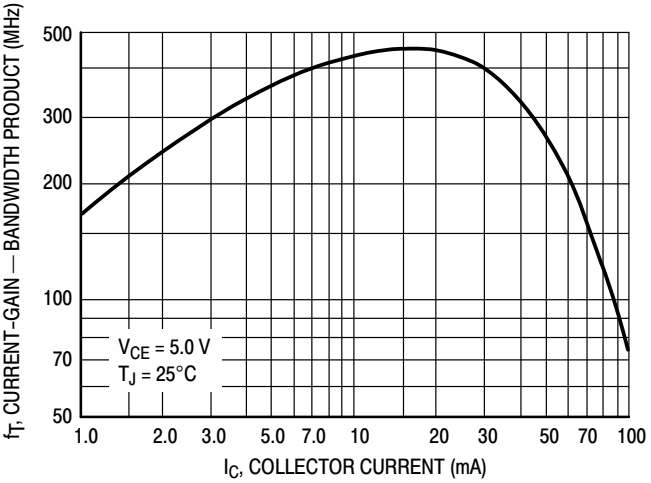
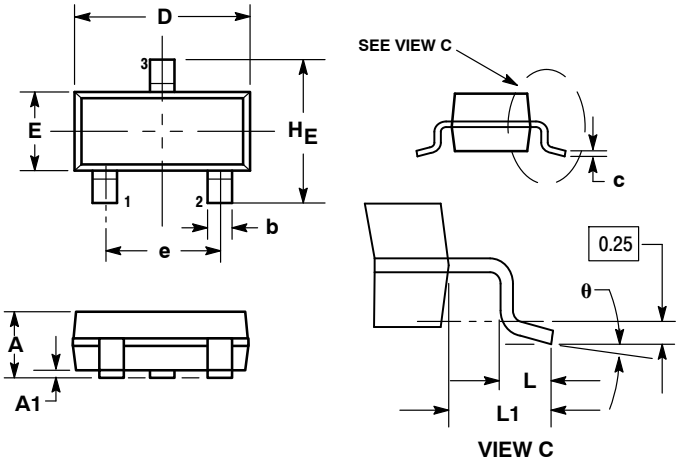


Figure 10. Current−Gain — Bandwidth Product

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AP

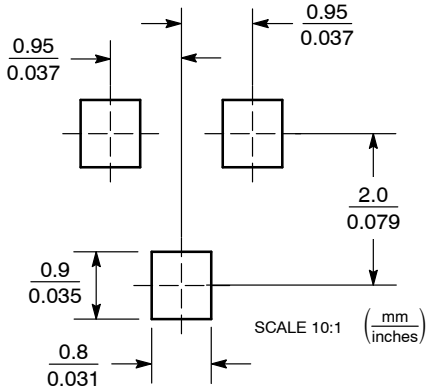


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	−−−	10°	0°	−−−	10°

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT



PUBLICATION ORDERING INFORMATION

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MMBT5088LT1/D

LifeElectronics
Живое партнерство

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ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

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