MMBT6428LT1G, MMBT6429LT1G, NSVMMBT6429LT1G

Amplifier Transistors

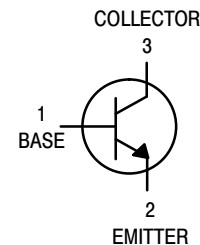## NPN Silicon

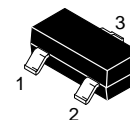**ON Semiconductor®**

Features

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

COLLECTOR
3

1
BASE

2
EMITTER

3
1
2

SOT–23 (TO–236)
CASE 318
STYLE 6

MAXIMUM RATINGS

Rating	Symbol	6428LT1	6429LT1	Unit
Collector–Emitter Voltage	V_{CEO}	50	45	Vdc
Collector–Base Voltage	V_{CBO}	60	55	Vdc
Emitter–Base Voltage	V_{EBO}	6.0		Vdc
Collector Current – Continuous	I_C	200		mAdc

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Total Device Dissipation FR–5 Board (Note 1) T_A = 25°C	P_D	225	mW
Derate above 25°C		1.8	mW/°C
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate, (Note 2) T_A = 25°C	P_D	300	mW
Derate above 25°C		2.4	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

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

MARKING DIAGRAM

XXX M■
■

1
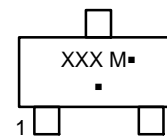
XXX = Specific Device Code
  MMBT6428LT1 – 1KM
  NSV/MMBT6429LT1 – M1L
M   = Date Code*
■   = Pb–Free Package

(Note: Microdot may be in either location)

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

ORDERING INFORMATION

Device	Package	Shipping[†]
MMBT6428LT1G	SOT–23 (Pb–Free)	3000 Tape & Reel
MMBT6429LT1G	SOT–23 (Pb–Free)	3000 Tape & Reel
NSVMMBT6429LT1G	SOT–23 (Pb–Free)	3000 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, $I_B = 0$) MMBT6428 ($I_C = 1.0$ mAdc, $I_B = 0$) MMBT6429 / NSVMMBT6429	$V_{(BR)CEO}$	50 45	– –	Vdc
Collector – Base Breakdown Voltage ($I_C = 0.1$ mAdc, $I_E = 0$) MMBT6428 ($I_C = 0.1$ mAdc, $I_E = 0$) MMBT6429 / NSVMMBT6429	$V_{(BR)CBO}$	60 55	– –	Vdc
Collector Cutoff Current ($V_{CE} = 30$ Vdc)	I_{CES}	–	0.1	µAdc
Collector Cutoff Current ($V_{CB} = 30$ Vdc, $I_E = 0$)	I_{CBO}	–	0.01	µAdc
Emitter Cutoff Current ($V_{EB} = 5.0$ Vdc, $I_C = 0$)	I_{EBO}	–	0.01	µAdc
ON CHARACTERISTICS				

DC Current Gain
($I_C = 0.01$ mAdc, $V_{CE} = 5.0$ Vdc)   MMBT6428
                         MMBT6429 / NSVMMBT6429
 	
($I_C = 0.1$ mAdc, $V_{CE} = 5.0$ Vdc)   MMBT6428
                         MMBT6429 / NSVMMBT6429
 	
($I_C = 1.0$ mAdc, $V_{CE} = 5.0$ Vdc)   MMBT6428
                         MMBT6429 / NSVMMBT6429
 	
($I_C = 10$ mAdc, $V_{CE} = 5.0$ Vdc)   MMBT6428
                         MMBT6429 / NSVMMBT6429
	h_{FE}	250
		500
		
		250
		500
		
		250
		500
		
		250
		500
			–
			–
			
			650
			1250
			
			–
			–
			
			–
			–
				–

Collector – Emitter Saturation Voltage ($I_C = 10$ mAdc, $I_B = 0.5$ mAdc) ($I_C = 100$ mAdc, $I_B = 5.0$ mAdc)	$V_{CE(sat)}$	– –	0.2 0.6	Vdc
Base – Emitter On Voltage ($I_C = 1.0$ mAdc, $V_{CE} = 5.0$ Vdc)	$V_{BE(on)}$	0.56	0.66	Vdc
SMALL – SIGNAL CHARACTERISTICS				
Current – Gain – Bandwidth Product ($I_C = 1.0$ mAdc, $V_{CE} = 5.0$ Vdc, $f = 100$ MHz)	f_T	100	700	MHz
Output Capacitance ($V_{CB} = 10$ Vdc, $I_E = 0$, $f = 1.0$ MHz)	C_{obo}	–	3.0	pF
Input Capacitance ($V_{EB} = 0.5$ Vdc, $I_C = 0$, $f = 1.0$ MHz)	C_{ibo}	–	8.0	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
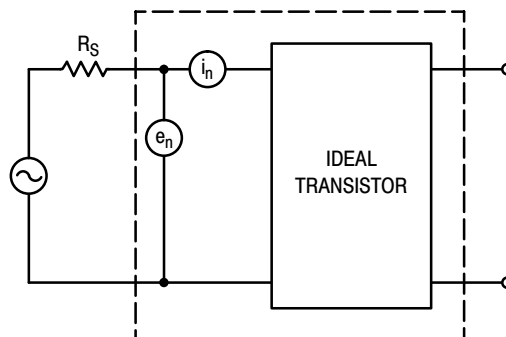

Figure 1. Transistor Noise Model

MMBT6428LT1G, MMBT6429LT1G, NSVMMBT6429LT1G

NOISE CHARACTERISTICS
(V_{CE} = 5.0 Vdc, T_A = 25°C)
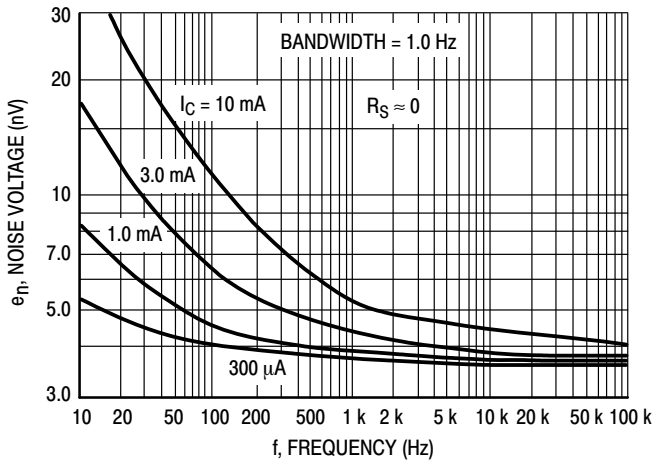
NOISE VOLTAGE
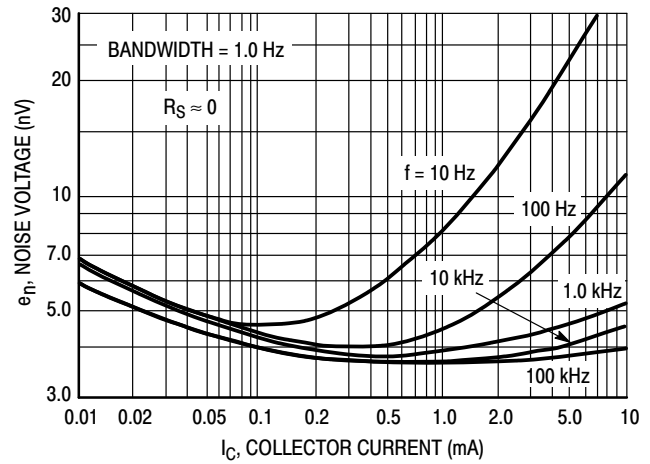

Figure 2. Effects of Frequency
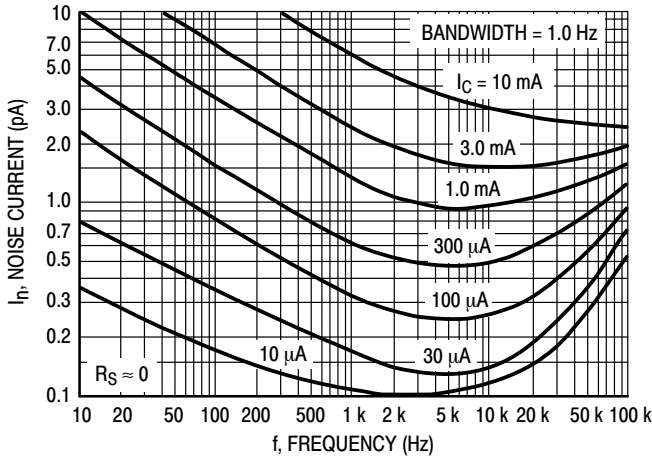

Figure 3. Effects of Collector Current

Figure 4. Noise Current
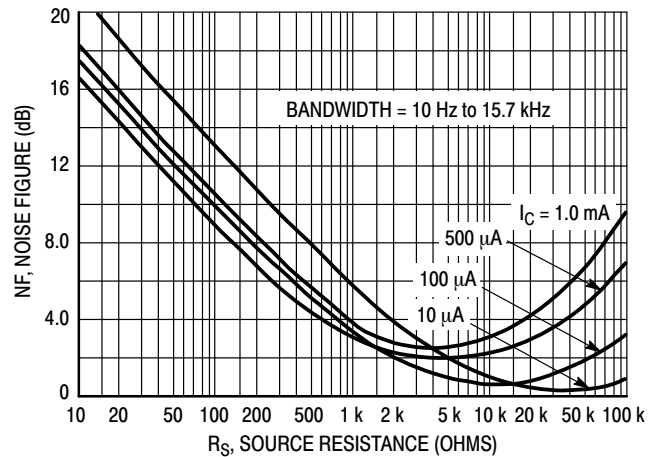
Figure 5. Wideband Noise Figure

100 Hz NOISE DATA
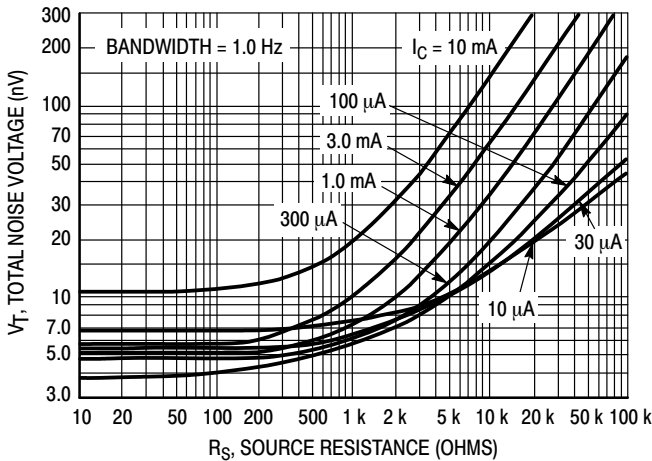
Figure 6. Total Noise Voltage
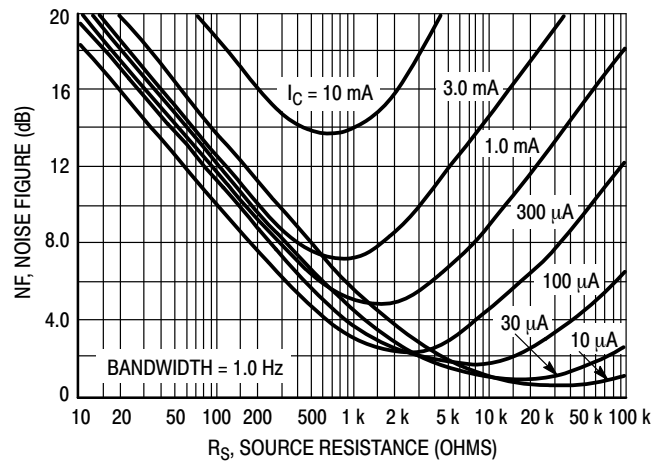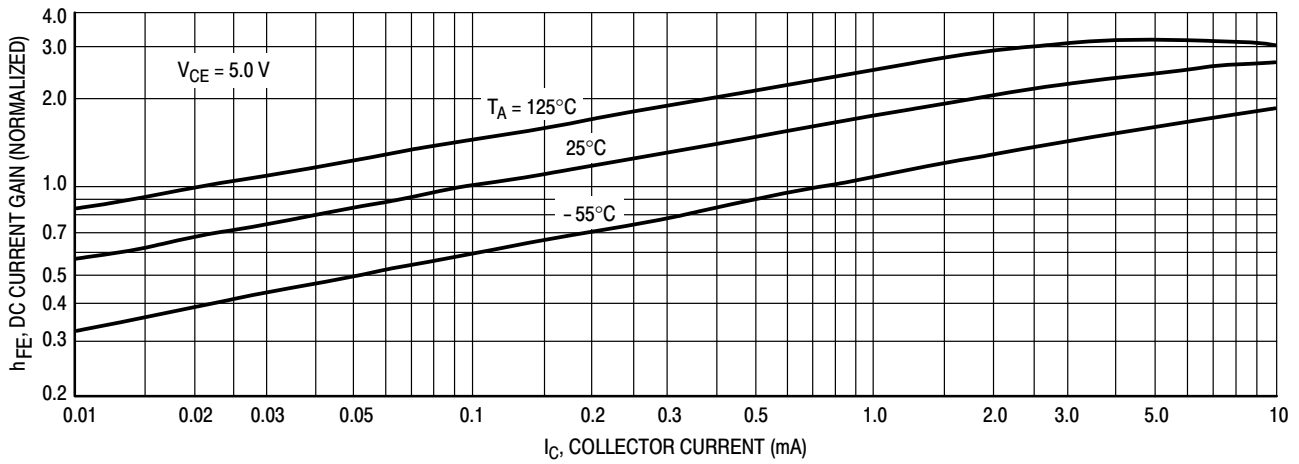

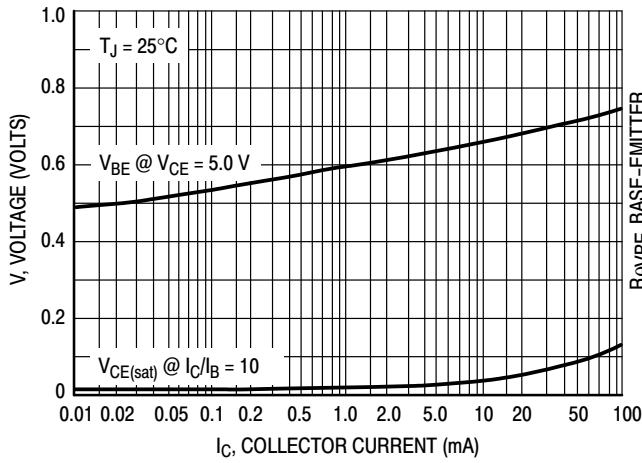Figure 7. Noise Figure

Figure 8. DC Current Gain

Figure 9. "On" Voltages
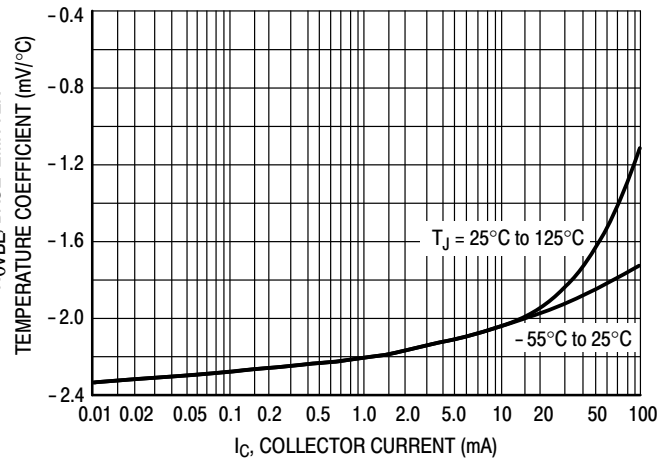
Figure 10. Temperature Coefficients
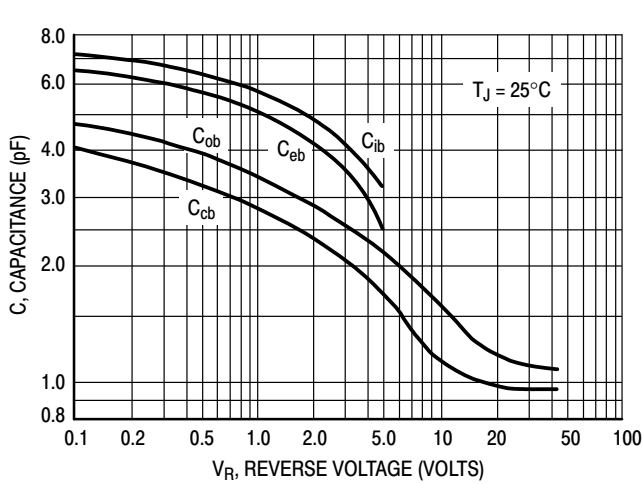
Figure 11. Capacitance
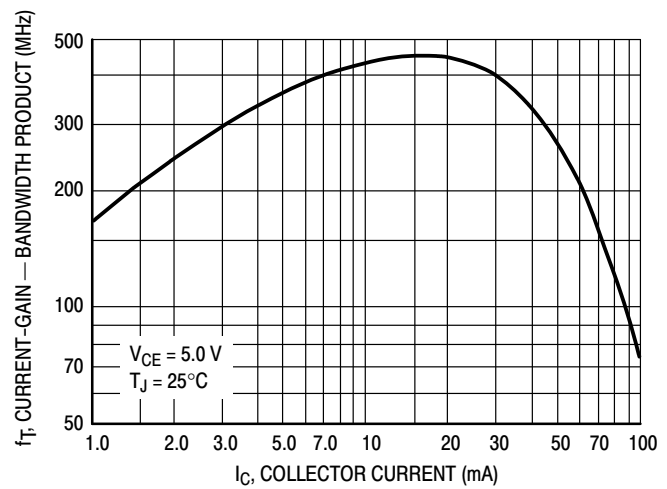
Figure 12. Current–Gain — Bandwidth Product

SOT−23 (TO−236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

SCALE 4:1

TOP VIEW

DETAIL A

SIDE VIEW

DETAIL A

END VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.

2. CONTROLLING DIMENSION: MILLIMETERS

3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
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	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H$_E$	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

**GENERIC
MARKING DIAGRAM***

XXXM▪

1

XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

2.90

3X
0.95

3X 0.56

0.95

PITCH

RECOMMENDED
MOUNTING FOOTPRINT

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

STYLES ON PAGE 2

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DESCRIPTION:	SOT−23 (TO−236)	PAGE 1 OF 2

SOT−23 (TO−236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

STYLE 1 THRU 5:
CANCELLED

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

STYLE 7:
PIN 1. EMITTER
  2. BASE
  3. COLLECTOR

STYLE 8:
PIN 1. ANODE
  2. NO CONNECTION
  3. CATHODE

STYLE 9:
PIN 1. ANODE
  2. ANODE
  3. CATHODE

STYLE 10:
PIN 1. DRAIN
  2. SOURCE
  3. GATE

STYLE 11:
PIN 1. ANODE
  2. CATHODE
  3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
  2. CATHODE
  3. ANODE

STYLE 13:
PIN 1. SOURCE
  2. DRAIN
  3. GATE

STYLE 14:
PIN 1. CATHODE
  2. GATE
  3. ANODE

STYLE 15:
PIN 1. GATE
  2. CATHODE
  3. ANODE

STYLE 16:
PIN 1. ANODE
  2. CATHODE
  3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
  2. ANODE
  3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
  2. CATHODE
  3. ANODE

STYLE 19:
PIN 1. CATHODE
  2. ANODE
  3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
  2. ANODE
  3. GATE

STYLE 21:
PIN 1. GATE
  2. SOURCE
  3. DRAIN

STYLE 22:
PIN 1. RETURN
  2. OUTPUT
  3. INPUT

STYLE 23:
PIN 1. ANODE
  2. ANODE
  3. CATHODE

STYLE 24:
PIN 1. GATE
  2. DRAIN
  3. SOURCE

STYLE 25:
PIN 1. ANODE
  2. CATHODE
  3. GATE

STYLE 26:
PIN 1. CATHODE
  2. ANODE
  3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
  2. CATHODE
  3. CATHODE

STYLE 28:
PIN 1. ANODE
  2. ANODE
  3. ANODE

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ADDITIONAL INFORMATION

◊