

# UMZ1NT1

## Complementary Dual General Purpose Amplifier Transistor

### PNP and NPN Surface Mount



ON Semiconductor®

<http://onsemi.com>

#### Features

- High Voltage and High Current:  $V_{CEO} = 50\text{ V}$ ,  $I_C = 200\text{ mA}$
- High  $h_{FE}$ :  $h_{FE} = 200 \sim 400$
- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: 3A  
– Machine Model: C
- Pb-Free Package is Available

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

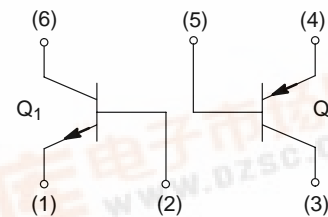
Rating	Symbol	Value	Unit
Collector-Base Voltage	$V_{(BR)CBO}$	60	Vdc
Collector-Emitter Voltage	$V_{(BR)CEO}$	50	Vdc
Emitter-Base Voltage	$V_{(BR)EBO}$	7.0	Vdc
Collector Current – Continuous	$I_C$	200	mAdc

#### THERMAL CHARACTERISTICS

Characteristic (One Junction Heated)	Symbol	Max	Unit
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	187 (Note 1) 256 (Note 2) 1.5 (Note 1) 2.0 (Note 2)	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	670 (Note 1) 490 (Note 2)	$^\circ\text{C/W}$
Characteristic (Both Junctions Heated)	Symbol	Max	Unit
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	250 (Note 1) 385 (Note 2) 2.0 (Note 1) 3.0 (Note 2)	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	493 (Note 1) 325 (Note 2)	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Lead	$R_{\theta JL}$	188 (Note 1) 208 (Note 2)	$^\circ\text{C/W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

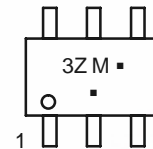
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0 x 1.0 inch Pad



SC-88  
CASE 419B

#### MARKING DIAGRAM



3Z = Device Code  
M = Date Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device*	Package	Shipping†
UMZ1NT1	SC-88	3000 / Tape & Reel
UMZ1NT1G	SC-88 (Pb-Free)	3000 / Tape & Reel

\*The "T1" suffix refers to a 7 inch 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.



## UMZ1NT1

### Q1: NPN

#### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Collector–Emitter Breakdown Voltage ( $I_C = 2.0\text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	50	–	–	Vdc
Collector–Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{Adc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	60	–	–	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10\text{ }\mu\text{Adc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	7.0	–	–	Vdc
Collector–Base Cutoff Current ( $V_{CB} = 45\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	–	0.1	$\mu\text{Adc}$
Collector–Emitter Cutoff Current ( $V_{CE} = 10\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ )	$I_{CEO}$	– – –	– – –	0.1 2.0 1.0	$\mu\text{Adc}$ $\mu\text{Adc}$ mAdc
DC Current Gain (Note 3) ( $V_{CE} = 6.0\text{ Vdc}$ , $I_C = 2.0\text{ mAdc}$ )	$h_{FE}$	200	–	400	–
Collector–Emitter Saturation Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )	$V_{CE(sat)}$	0.15	–	0.25	Vdc
Transistor Frequency	$f_T$	–	114	–	MHz

3. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , D.C.  $\leq 2\%$ .

### Q2: PNP

#### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Collector–Emitter Breakdown Voltage ( $I_C = 2.0\text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	–50	–	–	Vdc
Collector–Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{Adc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	–60	–	–	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10\text{ }\mu\text{Adc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	–7.0	–	–	Vdc
Collector–Base Cutoff Current ( $V_{CB} = 45\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	–	–0.1	$\mu\text{Adc}$
Collector–Emitter Cutoff Current ( $V_{CE} = 10\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ )	$I_{CEO}$	– – –	– – –	–0.1 –2.0 –1.0	$\mu\text{Adc}$ $\mu\text{Adc}$ mAdc
DC Current Gain (Note 3) ( $V_{CE} = 6.0\text{ Vdc}$ , $I_C = 2.0\text{ mAdc}$ )	$h_{FE}$	–200	–	–400	–
Collector–Emitter Saturation Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )	$V_{CE(sat)}$	–0.15	–	–0.3	Vdc
Transistor Frequency	$f_T$	–	142	–	MHz

# UMZ1NT1

## Typical Electrical Characteristics: PNP Transistor

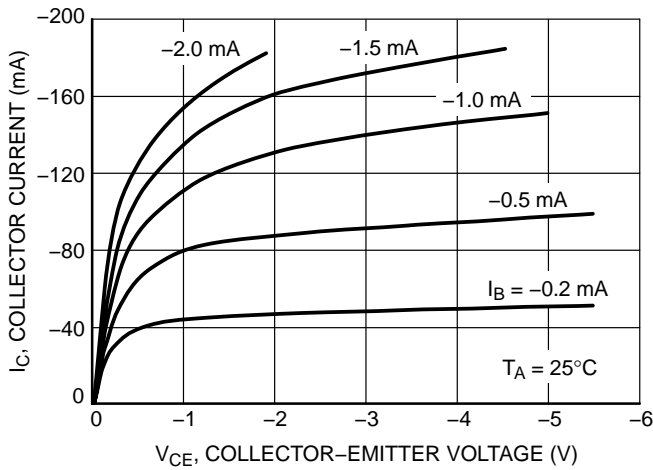


Figure 1. Collector Saturation Region

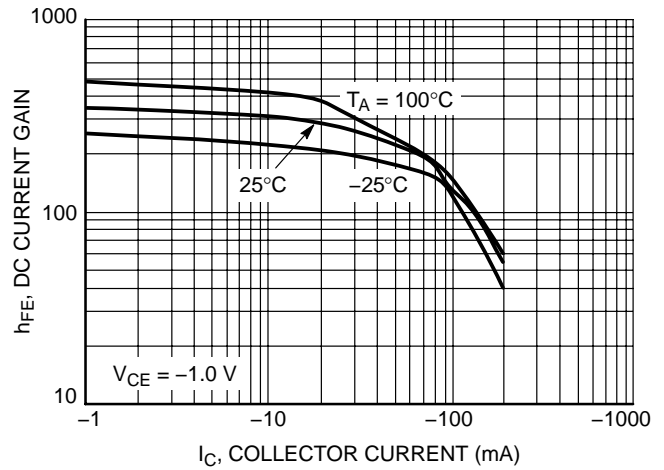


Figure 2. DC Current Gain

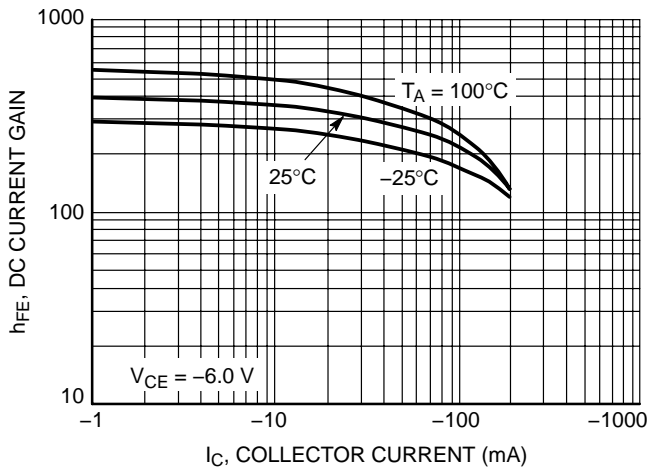


Figure 3. DC Current Gain

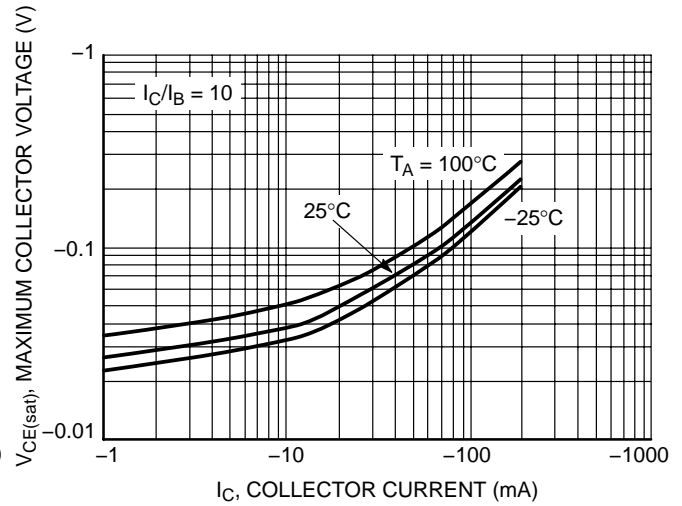


Figure 4.  $V_{CE(sat)}$  versus  $I_C$

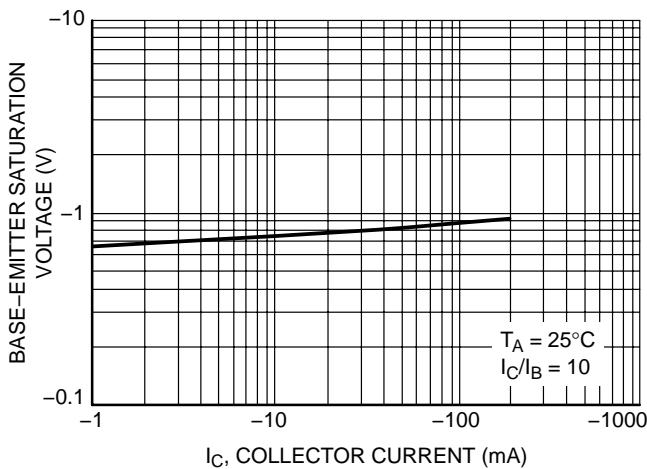


Figure 5.  $V_{BE(sat)}$  versus  $I_C$

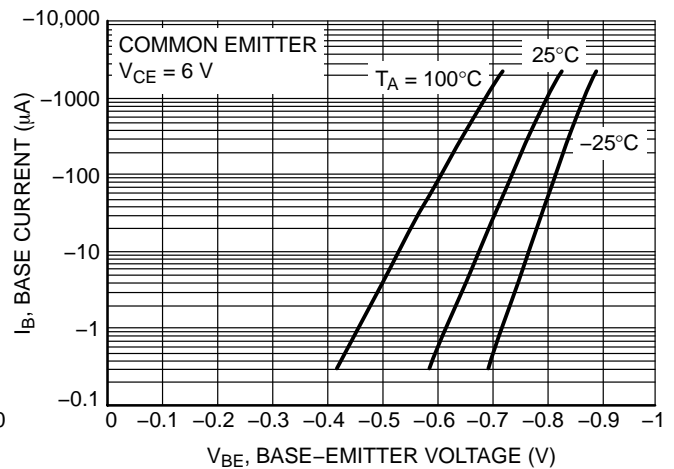


Figure 6. Base-Emitter Voltage

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## Typical Electrical Characteristics: NPN Transistor

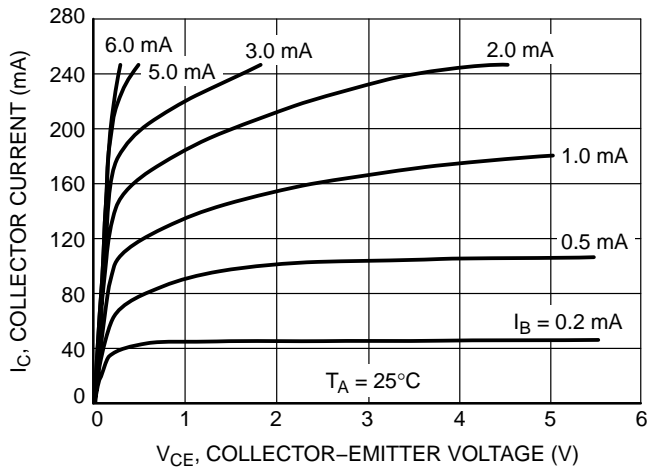


Figure 7. Collector Saturation Voltage

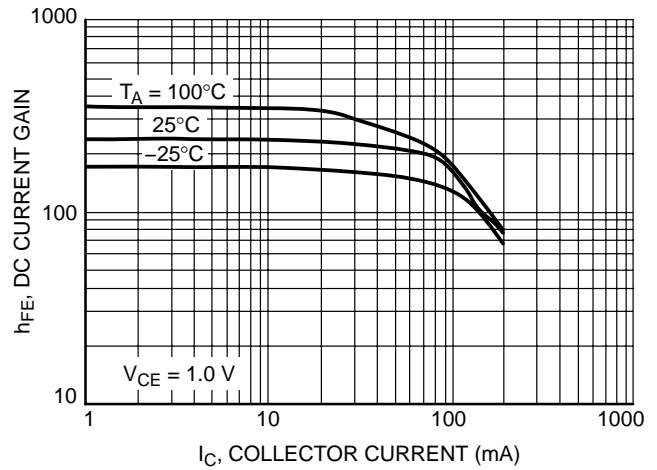


Figure 8. DC Current Gain

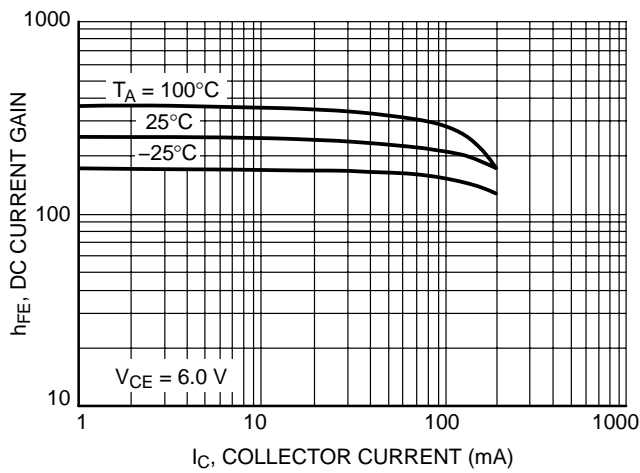


Figure 9. DC Current Gain

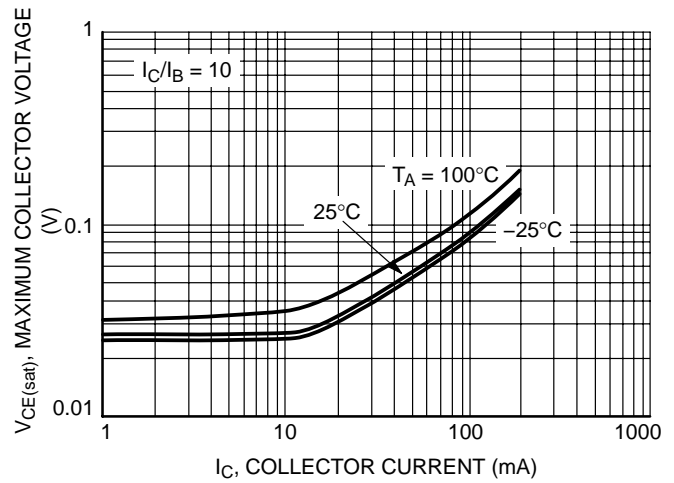


Figure 10.  $V_{CE(sat)}$  versus  $I_C$

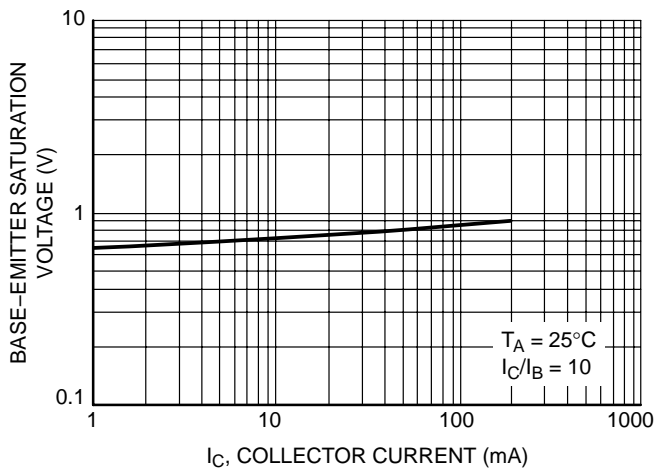


Figure 11.  $V_{BE(sat)}$  versus  $I_C$

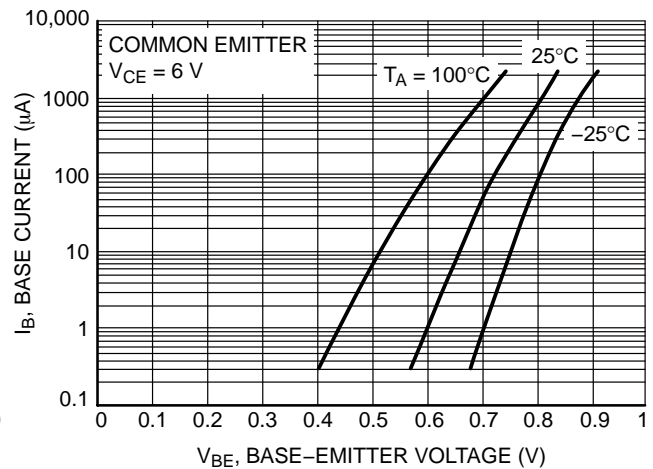
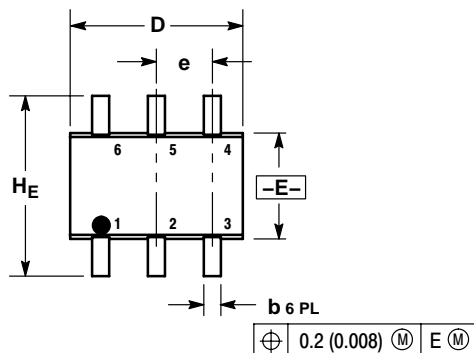


Figure 12. Base-Emitter Voltage

# UMZ1NT1

## PACKAGE DIMENSIONS

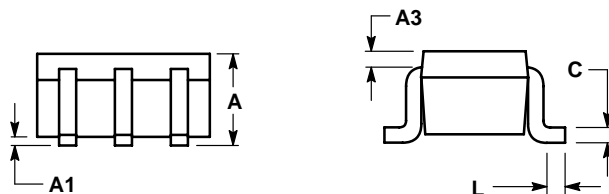
SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W



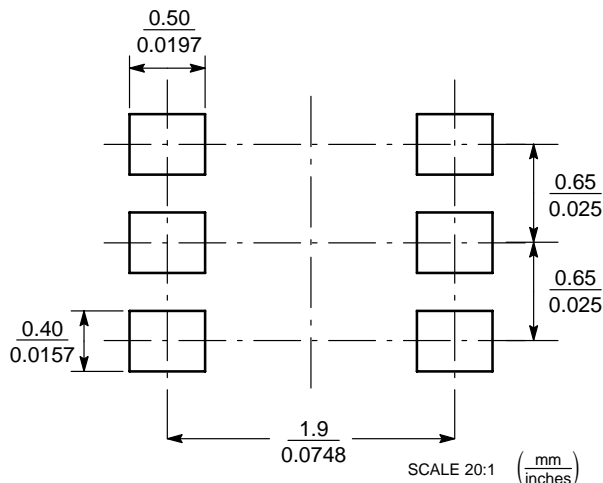
### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H <sub>E</sub>	2.00	2.10	2.20	0.078	0.082	0.086



## SOLDERING 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.

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