

# DATA SHEET

# NEC

## NPN SILICON RF TWIN TRANSISTOR

# μPA828TD

### NPN SILICON RF TRANSISTOR (WITH 2 ELEMENTS) IN A 6-PIN LEAD-LESS MINIMOLD (M16, 1208 PACKAGE)

#### FEATURES

- Built-in low phase distortion transistor suited for OSC applications  
 $f_T = 9.0 \text{ GHz TYP.}$ ,  $|S_{21e}|^2 = 7.5 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_c = 10 \text{ mA, } f = 2 \text{ GHz}$   
 $NF = 1.3 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_c = 3 \text{ mA, } f = 2 \text{ GHz}$
- Built-in 2 transistors (2 × 2SC5436)
- 6-pin lead-less minimold (M16, 1208 package)

#### BUILT-IN TRANSISTORS

	Q1, Q2
3-pin thin-type ultra super minimold part No.	2SC5436

#### ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA828TD	50 pcs (Non reel)	• 8 mm wide embossed taping
μPA828TD-T3	10 kpcs/reel	• Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape

**Remark** To order evaluation samples, contact your nearby sales office.  
The unit sample quantity is 50 pcs.

**Caution** Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C)**

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V <sub>CBO</sub>	5	V
Collector to Emitter Voltage	V <sub>CEO</sub>	3	V
Emitter to Base Voltage	V <sub>EBO</sub>	2	V
Collector Current	I <sub>C</sub>	30	mA
Total Power Dissipation	P <sub>tot</sub> <sup>Note</sup>	90 in 1 element	mW
		180 in 2 elements	
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

**Note** Mounted on 1.08 cm<sup>2</sup> × 1.0 mm (t) glass epoxy PCB

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25°C)**

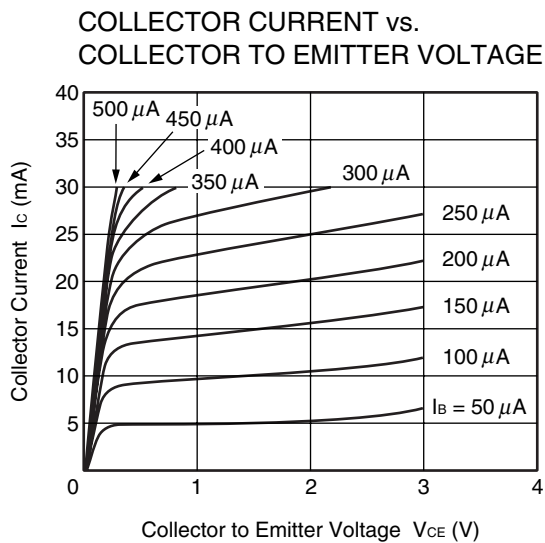
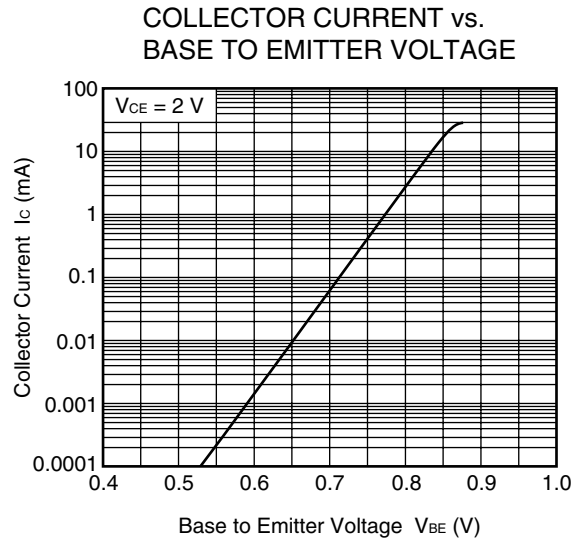
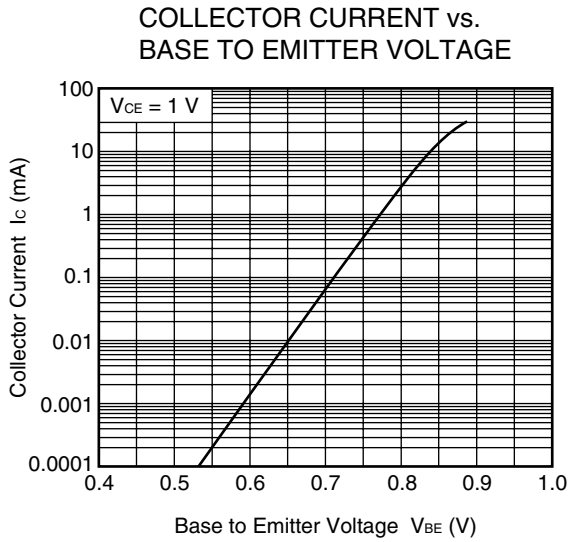
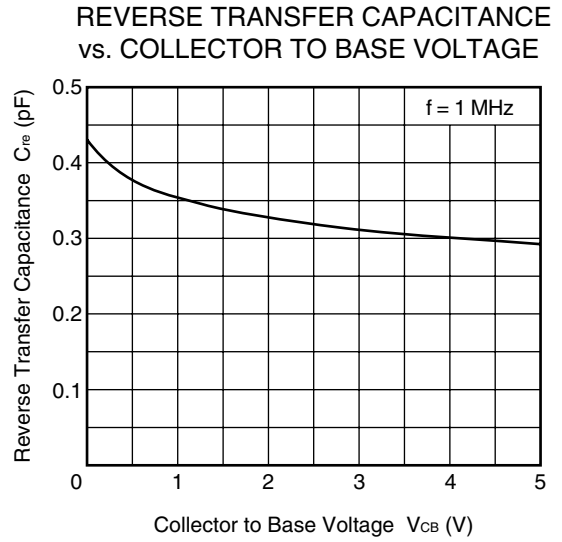
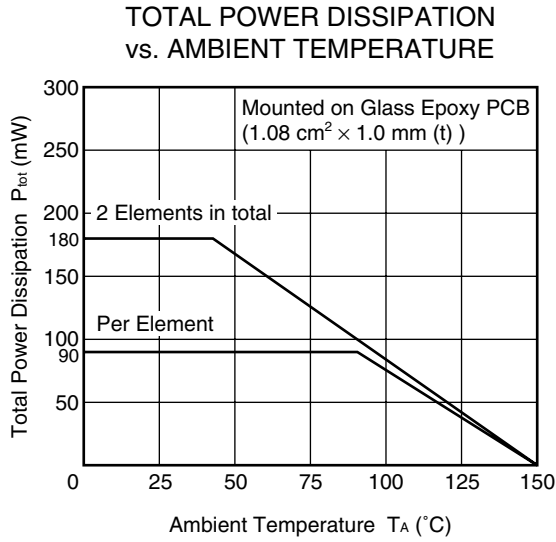
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0 mA	–	–	100	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0 mA	–	–	100	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA	70	–	140	–
Gain Bandwidth Product (1)	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz	7.0	9.0	–	GHz
Gain Bandwidth Product (2)	f <sub>T</sub>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA, f = 2 GHz	9.0	11.0	–	GHz
Insertion Power Gain (1)	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz	6.0	7.5	–	dB
Insertion Power Gain (2)	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA, f = 2 GHz	7.0	8.5	–	dB
Noise Figure (1)	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>opt</sub>	–	1.3	2.0	dB
Noise Figure (2)	NF	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 3 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>opt</sub>	–	1.3	2.0	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 2 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.4	0.8	pF
h <sub>FE</sub> Ratio	f <sub>T</sub>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA, h <sub>FE1</sub> : Smaller value of Q1 and Q2, h <sub>FE2</sub> : Larger value of Q1 and Q2	0.85	–	–	–

- Notes** 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%  
 2. Collector to base capacitance when the emitter grounded

**h<sub>FE</sub> CLASSIFICATION**

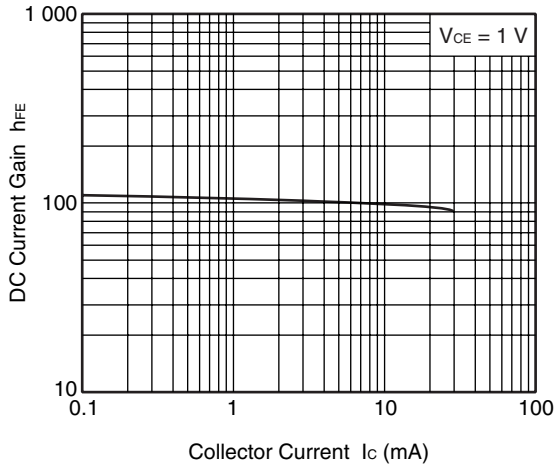
Rank	FB
Marking	kL
h <sub>FE</sub> Value	70 to 140

★ TYPICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise specified)

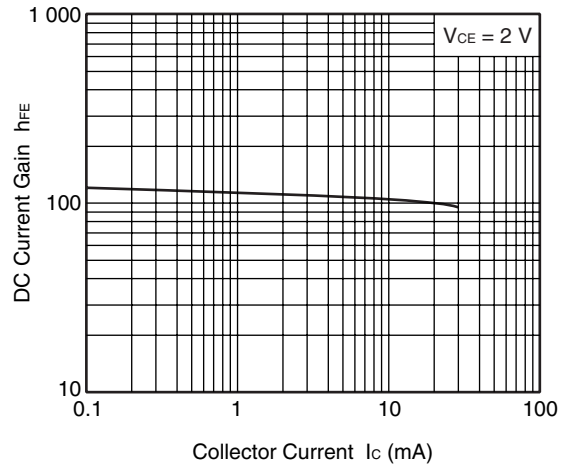


**Remark** The graphs indicate nominal characteristics.

DC CURRENT GAIN vs.  
COLLECTOR CURRENT



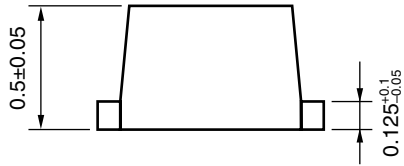
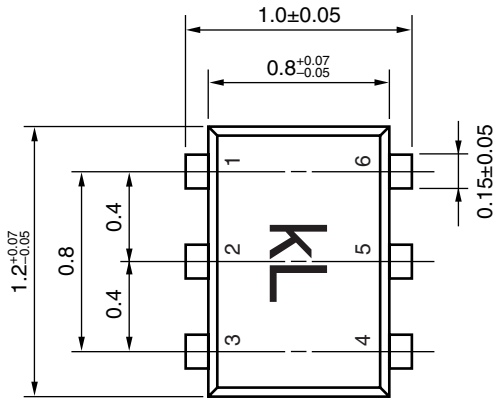
DC CURRENT GAIN vs.  
COLLECTOR CURRENT



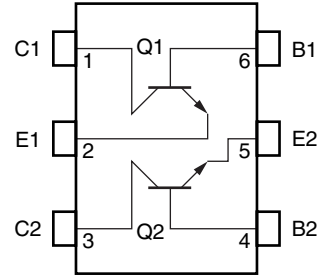
**Remark** The graphs indicate nominal characteristics.

**PACKAGE DIMENSIONS**

**6-PIN LEAD-LESS MINIMOLD (M16, 1208 PACKAGE) (UNIT: mm)**



**(Top View)**



**PIN CONNECTIONS**

- 1. Collector (Q1)
- 2. Emitter (Q1)
- 3. Collector (Q2)
- 4. Base (Q2)
- 5. Emitter (Q2)
- 6. Base (Q1)

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