

# DATA SHEET

# NEC

## NPN SILICON RF TWIN TRANSISTOR

# μPA863TS

### NPN SILICON RF TRANSISTOR (WITH 2 DIFFERENT ELEMENTS) IN A 6-PIN SUPER LEAD-LESS MINIMOLD

#### FEATURES

- Low voltage operation
- 2 different built-in transistors (2SC5436, 2SC5800)
  - Q1: Built-in high gain transistor  
 $f_T = 12.0 \text{ GHz TYP.}, |S_{21e}|^2 = 9.0 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 10 \text{ mA, } f = 2 \text{ GHz}$
  - Q2: Built-in low phase distortion transistor suited for OSC applications  
 $f_T = 4.5 \text{ GHz TYP.}, |S_{21e}|^2 = 4.0 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 5 \text{ mA, } f = 2 \text{ GHz}$
- 6-pin super lead-less minimold package

#### BUILT-IN TRANSISTORS

	Q1	Q2
Flat-lead 3-pin thin-type ultra super minimold part No.	2SC5436	2SC5800

#### ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA863TS	50 pcs (Non reel)	<ul style="list-style-type: none"> <li>• 8 mm wide embossed taping</li> <li>• Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape</li> </ul>
μPA863TS-T3	10 kpcs/reel	

**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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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

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

Parameter	Symbol	Ratings		Unit
		Q1	Q2	
Collector to Base Voltage	V <sub>CBO</sub>	5	9	V
Collector to Emitter Voltage	V <sub>CEO</sub>	3	5.5	V
Emitter to Base Voltage	V <sub>EBO</sub>	2	1.5	V
Collector Current	I <sub>c</sub>	30	100	mA
Total Power Dissipation	P <sub>tot</sub> <sup>Note</sup>	90	110	mW
		130 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)**

**(1) Q1**

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> = 1 V, I <sub>C</sub> = 10 mA	70	110	140	–
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz	10.0	12.0	–	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz	7.0	9.0	–	dB
Noise Figure	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>opt</sub>	–	1.5	2.0	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 0.5 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.4	0.7	pF

**(2) Q2**

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	–	–	600	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0 mA	–	–	600	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA	100	120	145	–
Gain Bandwidth Product (1)	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA, f = 2 GHz	3.0	4.5	–	GHz
Gain Bandwidth Product (2)	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 15 mA, f = 2 GHz	5.0	6.5	–	GHz
Insertion Power Gain (1)	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA, f = 2 GHz	3.0	4.0	–	dB
Insertion Power Gain (2)	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 15 mA, f = 2 GHz	4.5	5.5	–	dB
Noise Figure	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>opt</sub>	–	1.9	2.5	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 0.5 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.6	0.8	pF

**Notes 1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

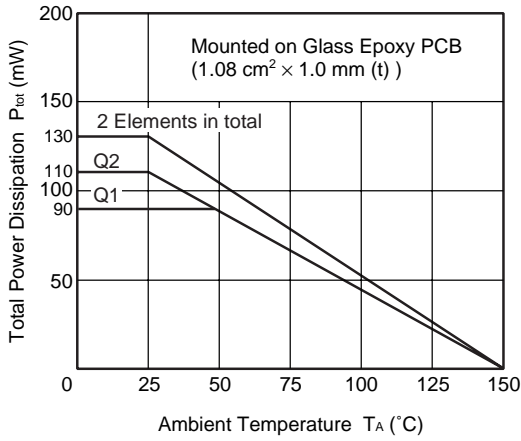
**2.** Collector to base capacitance when the emitter grounded

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

Rank	FB
Marking	xC
h <sub>FE</sub> Value of Q1	70 to 140
h <sub>FE</sub> Value of Q2	100 to 145

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

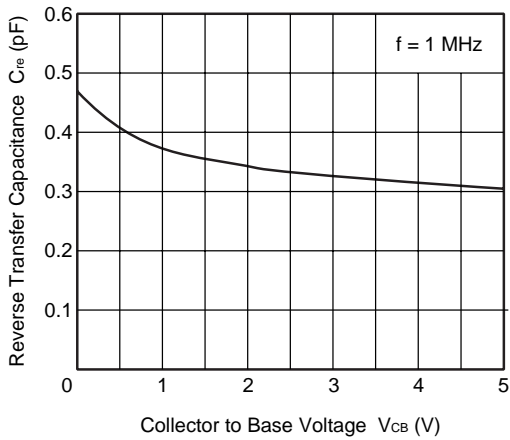
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



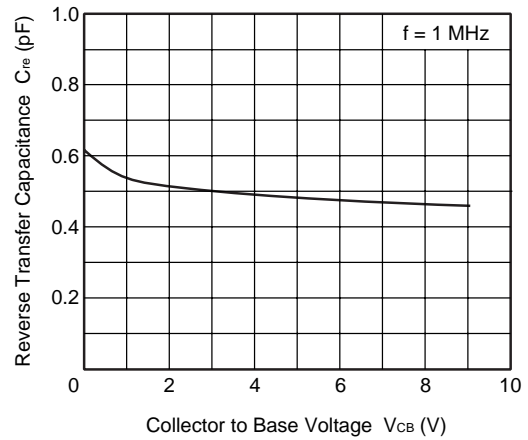
Q1

Q2

REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



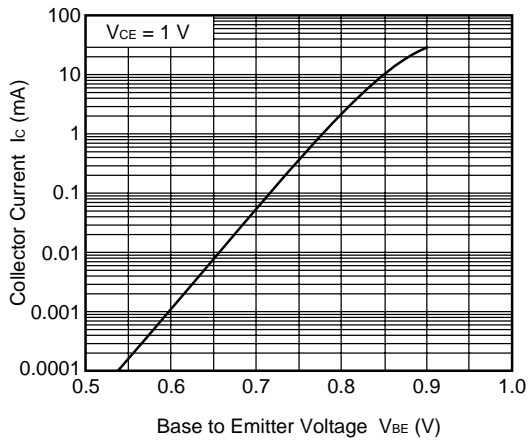
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



**Remark** The graphs indicate nominal characteristics.

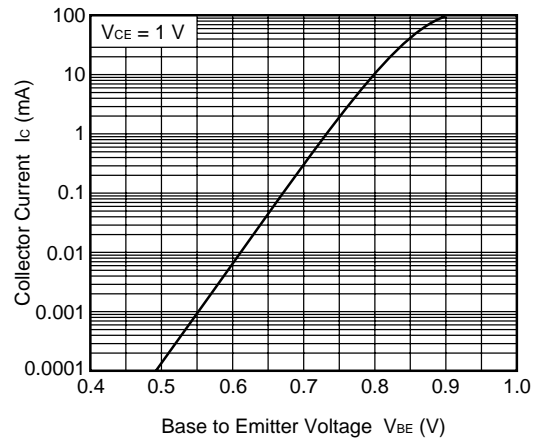
Q1

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

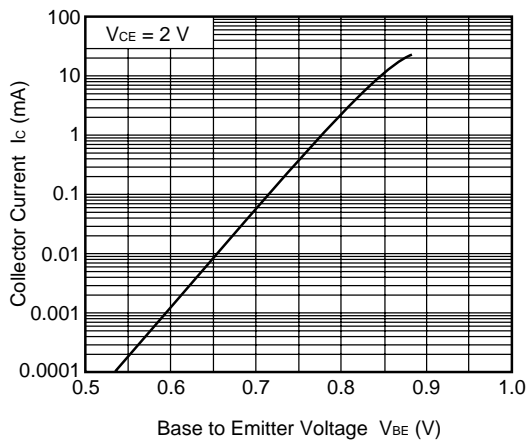


Q2

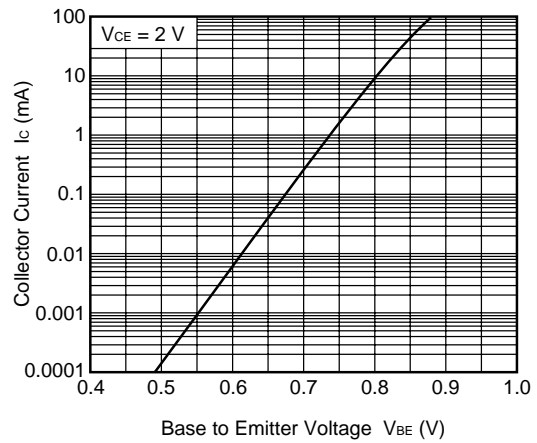
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



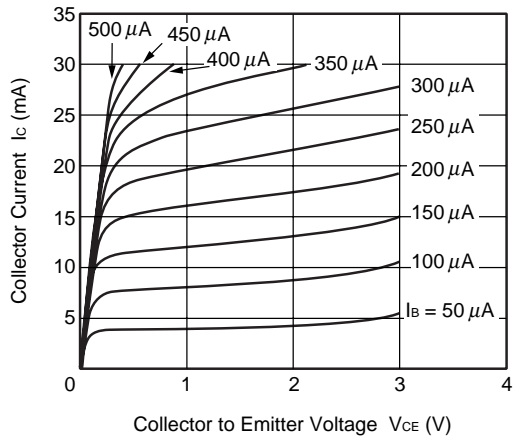
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



**Remark** The graphs indicate nominal characteristics.

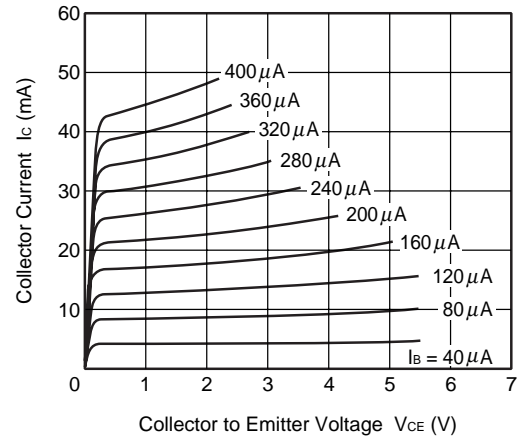
Q1

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



Q2

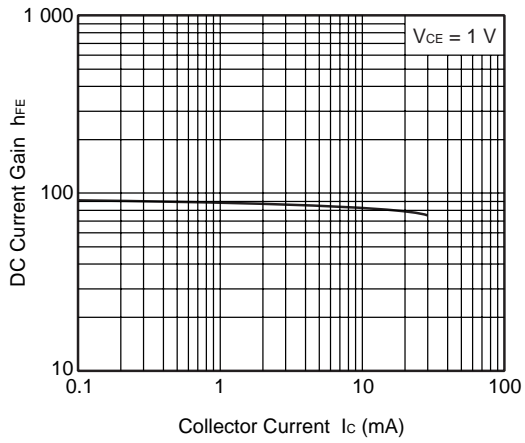
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



**Remark** The graphs indicate nominal characteristics.

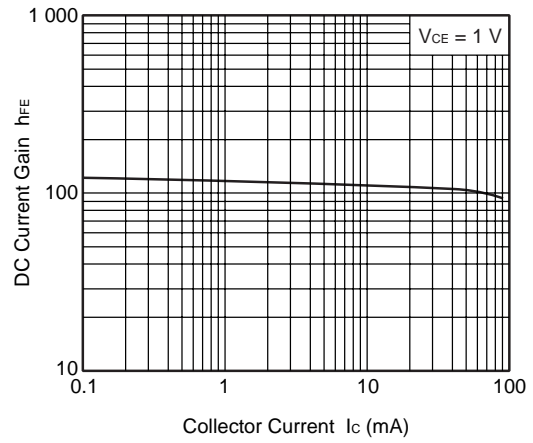
Q1

DC CURRENT GAIN vs.  
COLLECTOR CURRENT

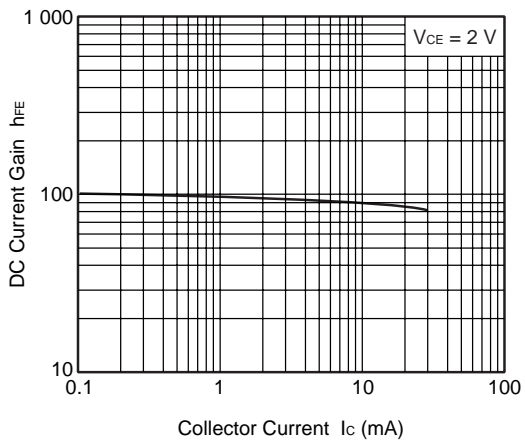


Q2

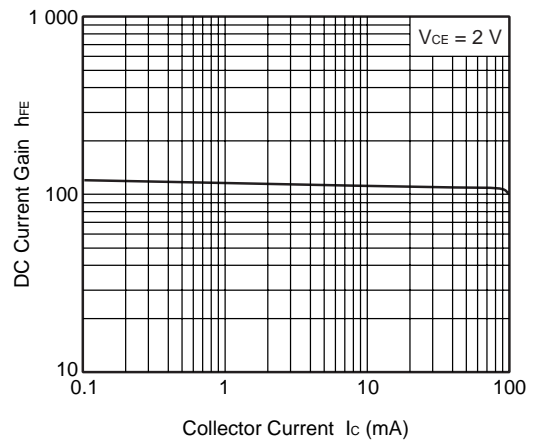
DC CURRENT GAIN vs.  
COLLECTOR CURRENT



DC CURRENT GAIN vs.  
COLLECTOR CURRENT



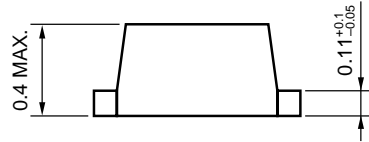
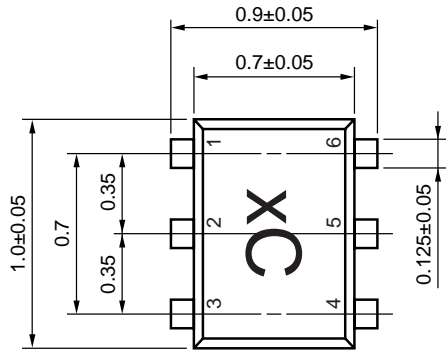
DC CURRENT GAIN vs.  
COLLECTOR CURRENT



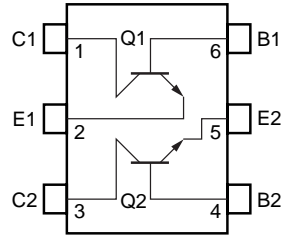
**Remark** The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN SUPER LEAD-LESS MINIMOLD (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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