

# NEC

## NPN SILICON EPITAXIAL TWIN TRANSISTOR

### UPA839TF

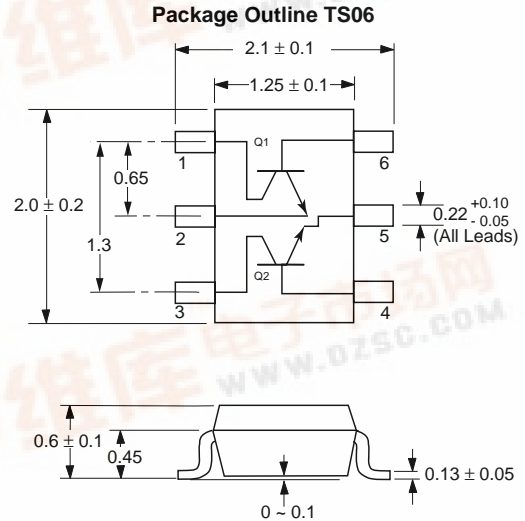
### FEATURES

- **SMALL PACKAGE OUTLINE:**  
SOT-363 package measures just 2.0 mm x 1.25 mm
- **LOW HEIGHT PROFILE:**  
Just 0.60 mm high
- **TWO DIFFERENT DIE TYPES:**  
Q1 - Ideal oscillator transistor  
Q2 - Ideal buffer amplifier transistor

### DESCRIPTION

The UPA839TF contains one NE680 and one NE856 NPN high frequency silicon bipolar chip. NEC's new low profile TF package is ideal for all portable wireless applications where reducing component height is a prime consideration. Each transistor chip is independently mounted and easily configured for oscillator/buffer amplifier and other applications.

### OUTLINE DIMENSIONS (Units in mm)



#### PIN CONNECTIONS

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

Note: Pin 1 is the lower left most pin as the package lettering is oriented and read left to right.

### ELECTRICAL CHARACTERISTICS (TA = 25°C)

| PART NUMBER<br>PACKAGE OUTLINE |                    |   |       | UPA839TF<br>TS06 |     |     |
|--------------------------------|--------------------|---|-------|------------------|-----|-----|
|                                | SYMBOLS            | PARAMETERS AND CONDITIONS   | UNITS | MIN              | TYP | MAX |
| Q1                             | ICBO               | Collector Cutoff Current at VCB = 10 V, IE = 0                    | μA    |                  |     | 1.0 |
|                                | IEBO               | Emitter Cutoff Current at VEB = 1 V, IC = 0                       | μA    |                  |     | 1.0 |
|                                | hFE                | DC Current Gain <sup>1</sup> at VCE = 3 V, IC = 5 mA              |       | 80               | 120 | 200 |
|                                | ft                 | Gain Bandwidth at VCE = 3 V, IC = 5 mA                            | GHz   | 5.5              | 8.0 |     |
|                                | Cre                | Feedback Capacitance <sup>2</sup> at VCB = 3 V, IE = 0, f = 1 MHz | pF    |                  | 0.3 | 0.7 |
|                                | S21E  <sup>2</sup> | Insertion Power Gain at VCE = 3 V, IC = 5 mA, f = 2 GHz           | dB    | 5.5              | 7.5 |     |
|                                | NF                 | Noise Figure at VCE = 3 V, IC = 5 mA, f = 2 GHz                   | dB    |                  | 1.9 | 3.2 |
| Q2                             | ICBO               | Collector Cutoff Current at VCB = 10 V, IE = 0                    | μA    |                  |     | 1.0 |
|                                | IEBO               | Emitter Cutoff Current at VEB = 1 V, IC = 0                       | μA    |                  |     | 1.0 |
|                                | hFE                | DC Current Gain <sup>1</sup> at VCE = 3 V, IC = 7 mA              |       | 100              |     | 145 |
|                                | ft                 | Gain Bandwidth at VCE = 3 V, IC = 7 mA, f = 1 GHz                 | GHz   | 3.0              | 4.5 |     |
|                                | Cre                | Feedback Capacitance <sup>2</sup> at VCB = 3 V, IE = 0, f = 1 MHz | pF    |                  | 0.7 | 1.5 |
|                                | S21E  <sup>2</sup> | Insertion Power Gain at VCE = 3 V, IC = 7 mA, f = 1 GHz           | dB    | 7                | 9   |     |
|                                | NF                 | Noise Figure at VCE = 3 V, IC = 7 mA, f = 1 GHz                   | dB    |                  | 1.2 | 2.5 |

- Notes: 1. Pulsed measurement, pulse width ≤ 350 μs, duty cycle ≤ 2%.  
2. Collector to base capacitance when measured with capacitance meter (automatic balanced bridge method), with emitter connected to guard pin of capacitances meter.

## UPA839TF

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### ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

| SYMBOLS          | PARAMETERS                   | UNITS | RATINGS     |     |
|------------------|------------------------------|-------|-------------|-----|
|                  |                              |       | Q1          | Q2  |
| V <sub>CB0</sub> | Collector to Base Voltage    | V     | 20          | 20  |
| V <sub>CEO</sub> | Collector to Emitter Voltage | V     | 10          | 12  |
| V <sub>EB0</sub> | Emitter to Base Voltage      | V     | 1.5         | 3   |
| I <sub>c</sub>   | Collector Current            | mA    | 35          | 100 |
| P <sub>T</sub>   | Total Power Dissipation      | mW    | 110         | 110 |
|                  |                              |       | 200         |     |
| T <sub>J</sub>   | Junction Temperature         | °C    | 150         | 150 |
| T <sub>STG</sub> | Storage Temperature          | °C    | -65 to +150 |     |

Note: 1. Operation in excess of any one of these parameters may result in permanent damage.

### ORDERING INFORMATION

| PART NUMBER | QUANTITY | PACKAGING   |
|-------------|----------|-------------|
| UPA839TF-T1 | 3000     | Tape & Reel |