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February 2015

# MMBTA56 / PZTA56

## PNP General-Purpose Amplifier

### Description

This device is designed for general-purpose amplifier applications at collector currents to 300 mA. Sourced from process 73.

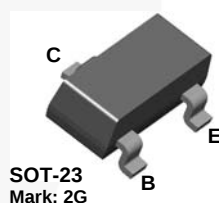


Figure 1. MMBTA56 Device Package

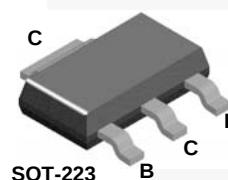


Figure 2. PZTA56 Device Package

### Ordering Information

| Part Number | Marking | Package    | Packing Method |
|-------------|---------|------------|----------------|
| MMBTA56     | 2G      | SOT-23 3L  | Tape and Reel  |
| PZTA56      | A56     | SOT-223 4L | Tape and Reel  |

### Absolute Maximum Ratings<sup>(1),(2)</sup>

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol         | Parameter                                        | Value       | Unit             |
|----------------|--------------------------------------------------|-------------|------------------|
| $V_{CES}$      | Collector-Emitter Voltage                        | -80         | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | -80         | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | -4.0        | V                |
| $I_C$          | Collector Current - Continuous                   | -500        | mA               |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | $^\circ\text{C}$ |

#### Notes:

1. These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

## Thermal Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol          | Parameter                               | Max.                   |                       | Unit                      |
|-----------------|-----------------------------------------|------------------------|-----------------------|---------------------------|
|                 |                                         | MMBTA56 <sup>(3)</sup> | PZTA56 <sup>(4)</sup> |                           |
| $P_D$           | Total Device Dissipation                | 350                    | 1000                  | mW                        |
|                 | Derate Above $25^\circ\text{C}$         | 2.8                    | 8.0                   | mW/ $^\circ\text{C}$      |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 357                    | 125                   | $^\circ\text{C}/\text{W}$ |

### Notes:

- Device mounted on FR-4 PCB 36mm × 18mm × 1.5mm; mounting pad for the collector lead minimum 6cm<sup>2</sup>.
- PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

## Electrical Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol        | Parameter                                          | Conditions                                                                  | Min. | Max.  | Unit          |
|---------------|----------------------------------------------------|-----------------------------------------------------------------------------|------|-------|---------------|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage <sup>(5)</sup> | $I_C = -1.0\text{ mA}$ , $I_B = 0$                                          | -80  |       | V             |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage                   | $I_C = -100\text{ }\mu\text{A}$ , $I_E = 0$                                 | -60  |       | V             |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage                     | $I_E = -100\text{ }\mu\text{A}$ , $I_C = 0$                                 | -4.0 |       | V             |
| $I_{CEO}$     | Collector Cut-Off Current                          | $V_{CE} = -60\text{ V}$ , $I_B = 0$                                         |      | -0.1  | $\mu\text{A}$ |
| $I_{CBO}$     | Collector Cut-Off Current                          | $V_{CB} = -80\text{ V}$ , $I_E = 0$                                         |      | -0.1  | $\mu\text{A}$ |
| $h_{FE}$      | DC Current Gain                                    | $I_C = -10\text{ mA}$ , $V_{CE} = -1.0\text{ V}$                            | 100  |       |               |
|               |                                                    | $I_C = -100\text{ mA}$ , $V_{CE} = -1.0\text{ V}$                           | 100  |       |               |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage               | $I_C = -100\text{ mA}$ , $I_B = -10\text{ mA}$                              |      | -0.25 | V             |
| $V_{BE(on)}$  | Base-Emitter On Voltage                            | $I_C = -100\text{ mA}$ , $V_{CE} = -1.0\text{ V}$                           |      | -1.2  | V             |
| $f_T$         | Current Gain - Bandwidth Product                   | $I_C = -100\text{ mA}$ , $V_{CE} = -1.0\text{ V}$ ,<br>$f = 100\text{ MHz}$ | 50   |       | MHz           |

### Note:

- Pulse test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2.0\%$ .

## Typical Performance Characteristics

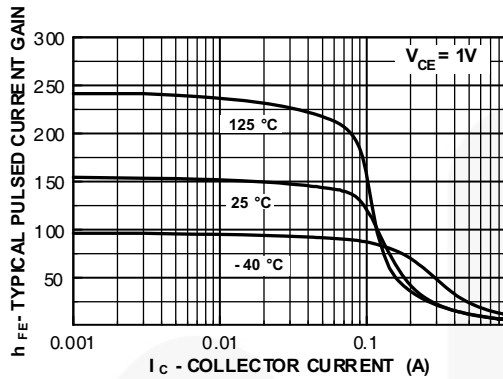


Figure 3. Typical Pulsed Current Gain vs. Collector Current

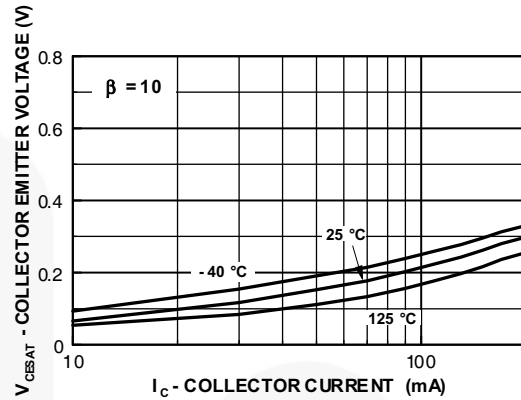


Figure 4. Collector-Emitter Saturation Voltage vs. Collector Current

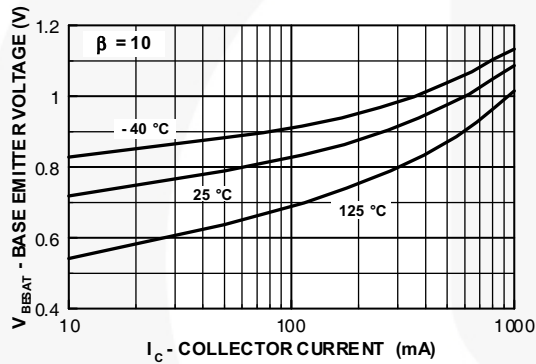


Figure 5. Base-Emitter Saturation Voltage vs. Collector Current

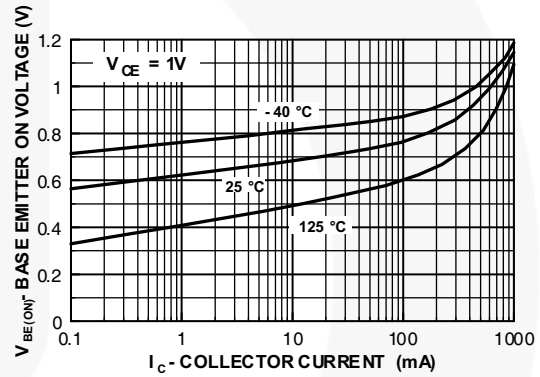


Figure 6. Base-Emitter On Voltage vs. Collector Current

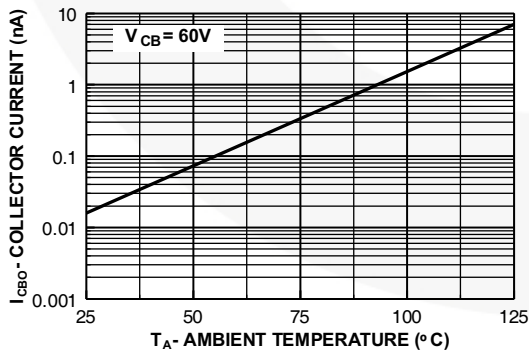


Figure 7. Collector Cut-Off Current vs. Ambient Temperature

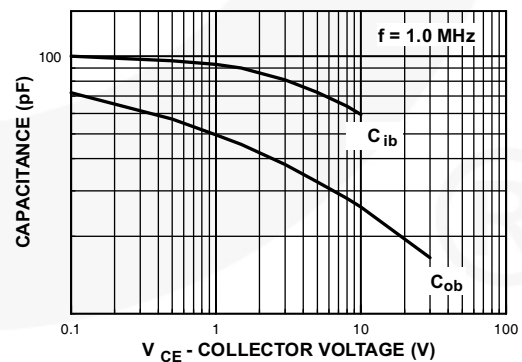


Figure 8. Input and Output Capacitance vs. Reverse Voltage

## Typical Performance Characteristics (Continued)

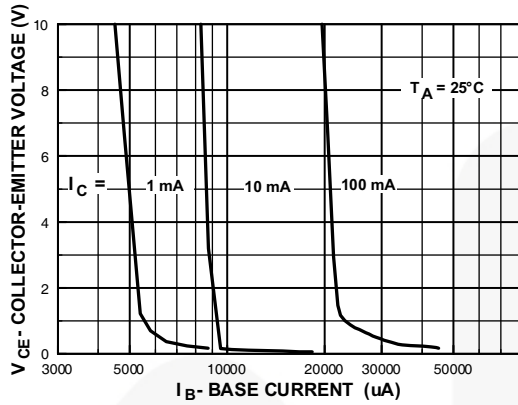


Figure 9. Collector Saturation Region

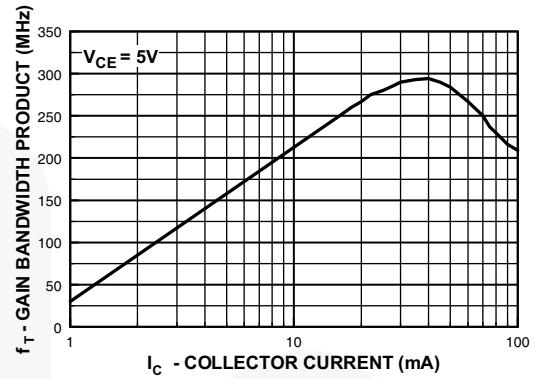


Figure 10. Gain Bandwidth Product vs. Collector Current

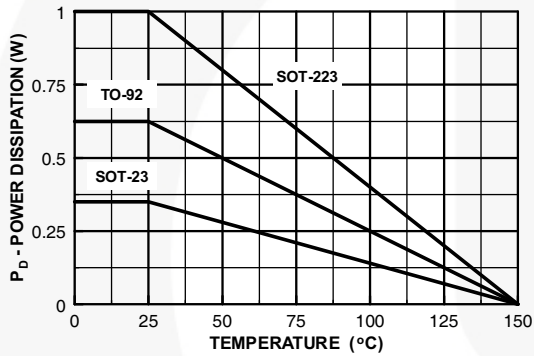


Figure 11. Power Dissipation vs. Ambient Temperature

## Physical Dimensions

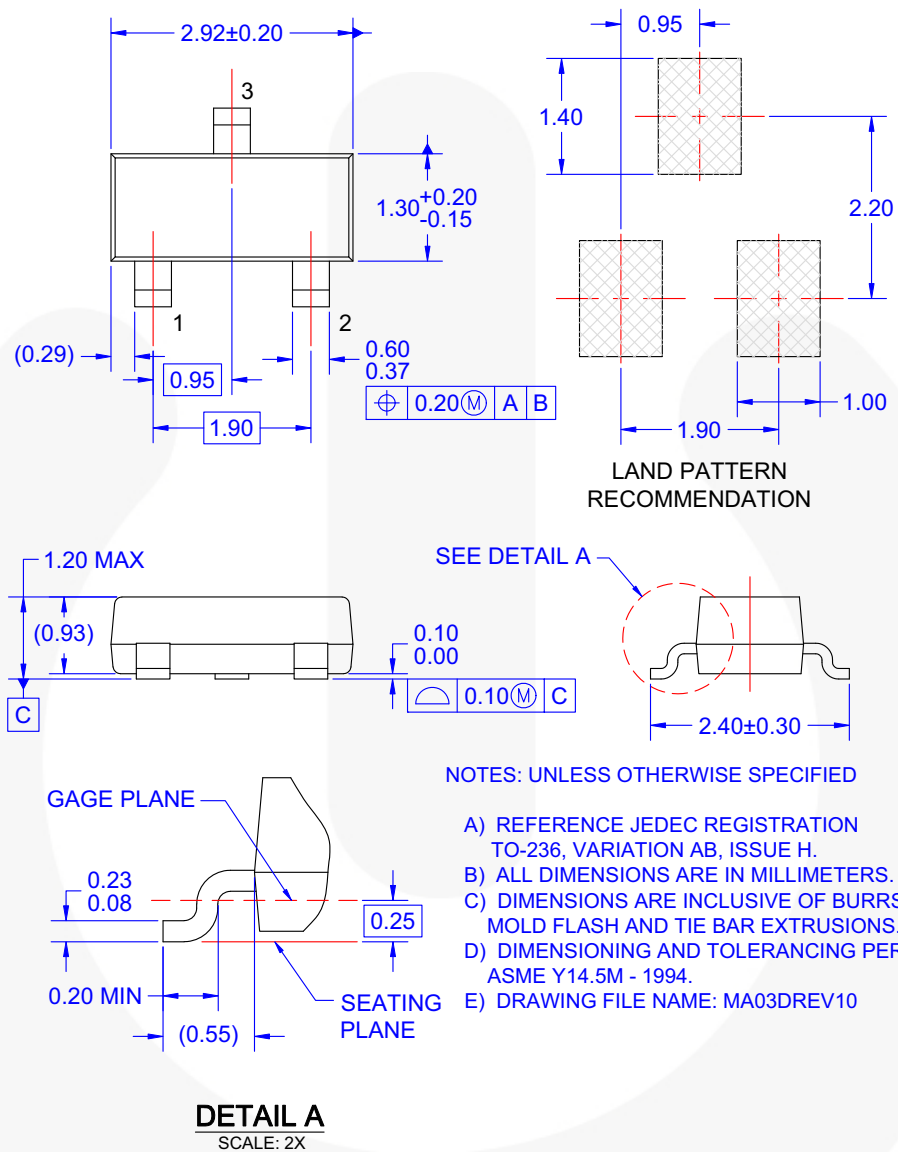


Figure 12. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE

## Physical Dimensions (Continued)

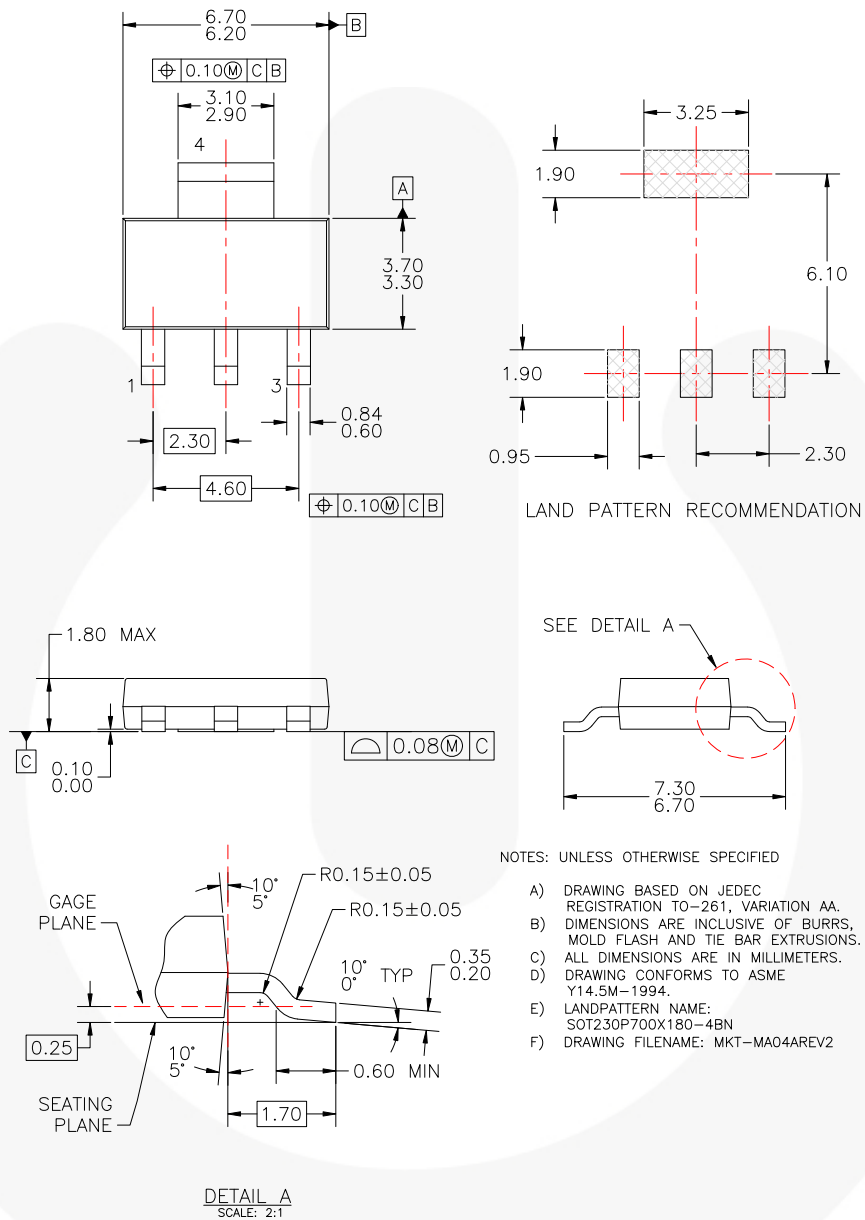


Figure 13. MOLDED PACKAGING, SOT-223, 4-LEAD



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