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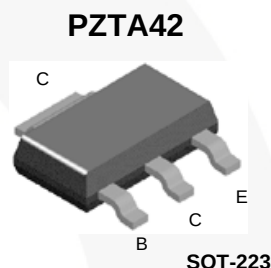
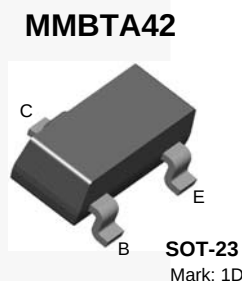
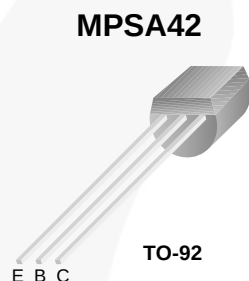
October 2014

# MPSA42 / MMBTA42 / PZTA42

## NPN High-Voltage Amplifier

### Features

- This device is designed for application as a video output and other high-voltage applications.
- Sourced from process 48.



### Ordering Information

| Part Number | Top Mark | Package    | Packing Method |
|-------------|----------|------------|----------------|
| MPSA42      | MPSA42   | TO-92 3L   | Bulk           |
| MMBTA42     | 1D       | SOT-23 3L  | Tape and Reel  |
| PZTA42      | A42      | 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             |
|----------------|--------------------------------------------------|-------------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 300         | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | 300         | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | 6           | 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                      |
|-----------------|-----------------------------------------|--------|------------------------|-----------------------|---------------------------|
|                 |                                         | MPSA42 | MMBTA42 <sup>(3)</sup> | PZTA42 <sup>(4)</sup> |                           |
| $P_D$           | Total Device Dissipation                | 625    | 240                    | 1000                  | mW                        |
|                 | Derate Above $25^\circ\text{C}$         | 5.00   | 1.92                   | 8.00                  | mW/ $^\circ\text{C}$      |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 83.3   |                        |                       | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 200    | 515                    | 125                   | $^\circ\text{C}/\text{W}$ |

### Notes:

3. Device is mounted on FR-4 PCB 1.6 inch x 1.6 inch x 0.06 inch.

4. Device is mounted on FR-4 PCB 36 mm x 18 mm x 1.5 mm, mounting pad for the collector lead minimum 6 cm<sup>2</sup>.

## Electrical Characteristics

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

| Symbol                                  | Parameter                                          | Conditions                                                          | Min. | Max. | Unit          |
|-----------------------------------------|----------------------------------------------------|---------------------------------------------------------------------|------|------|---------------|
| <b>Off Characteristics</b>              |                                                    |                                                                     |      |      |               |
| $V_{(BR)CEO}$                           | Collector-Emitter Breakdown Voltage <sup>(5)</sup> | $I_C = 1.0\text{ mA}, I_B = 0$                                      | 300  |      | V             |
| $V_{(BR)CBO}$                           | Collector-Base Breakdown Voltage                   | $I_C = 100\text{ }\mu\text{A}, I_E = 0$                             | 300  |      | V             |
| $V_{(BR)EBO}$                           | Emitter-Base Breakdown Voltage                     | $I_E = 100\text{ }\mu\text{A}, I_C = 0$                             | 6    |      | V             |
| $I_{CBO}$                               | Collector Cut-Off Current                          | $V_{CB} = 200\text{ V}, I_E = 0$                                    |      | 0.1  | $\mu\text{A}$ |
| $I_{EBO}$                               | Emitter Cut-Off Current                            | $V_{EB} = 6\text{ V}, I_C = 0$                                      |      | 0.1  | $\mu\text{A}$ |
| <b>On Characteristics<sup>(5)</sup></b> |                                                    |                                                                     |      |      |               |
| $h_{FE}$                                | DC Current Gain                                    | $V_{CE} = 10\text{ V}, I_C = 1.0\text{ mA}$                         | 25   |      |               |
|                                         |                                                    | $V_{CE} = 10\text{ V}, I_C = 10\text{ mA}$                          | 40   |      |               |
|                                         |                                                    | $V_{CE} = 10\text{ V}, I_C = 30\text{ mA}$                          | 40   |      |               |
| $V_{CE(sat)}$                           | Collector-Emitter Saturation Voltage               | $I_C = 20\text{ mA}, I_B = 2.0\text{ mA}$                           |      | 0.5  | V             |
| $V_{BE(sat)}$                           | Base-Emitter Saturation Voltage                    | $I_C = 20\text{ mA}, I_B = 2.0\text{ mA}$                           |      | 0.9  | V             |
| <b>Small Signal Characteristics</b>     |                                                    |                                                                     |      |      |               |
| $f_T$                                   | Current Gain - Bandwidth Product                   | $I_C = 10\text{ mA}, V_{CE} = 20\text{ V},$<br>$f = 100\text{ MHz}$ | 50   |      | MHz           |
| $C_{cb}$                                | Collector-Base Capacitance                         | $V_{CB} = 20\text{ V}, I_E = 0,$<br>$f = 1.0\text{ MHz}$            |      | 3.0  | pF            |

### Notes:

5. Pulse test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

# Typical Performance Characteristics

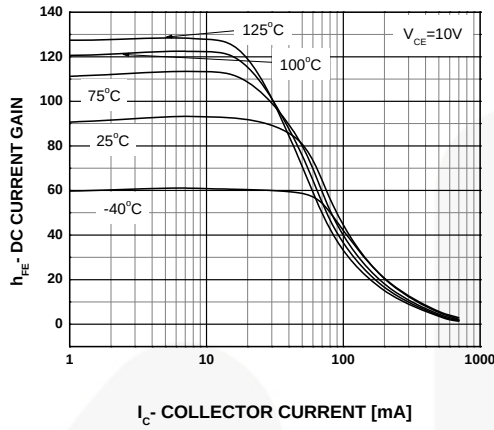


Figure 1. DC Current Gain vs. Collector Current

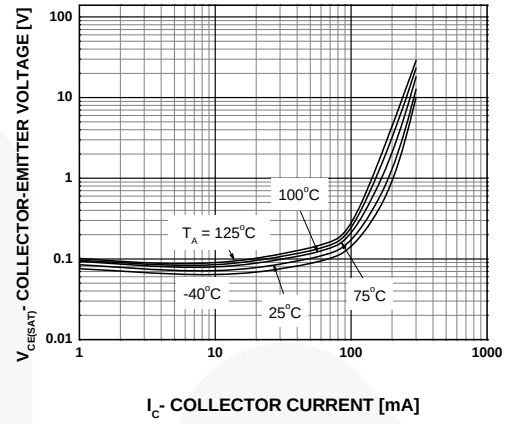


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

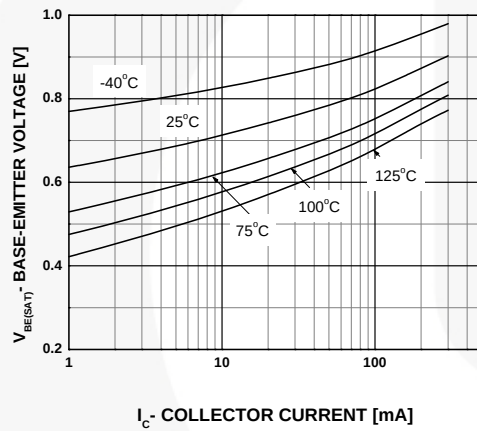


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

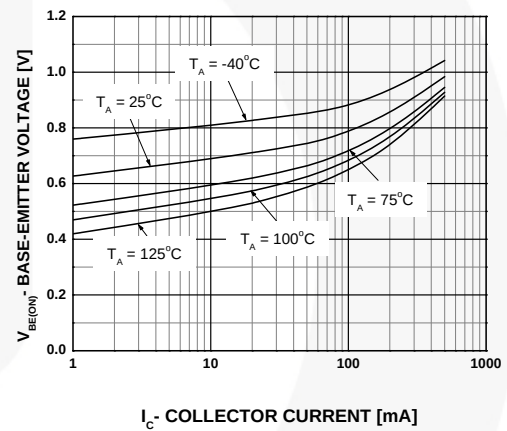


Figure 4. Base-Emitter On Voltage vs. Collector Current

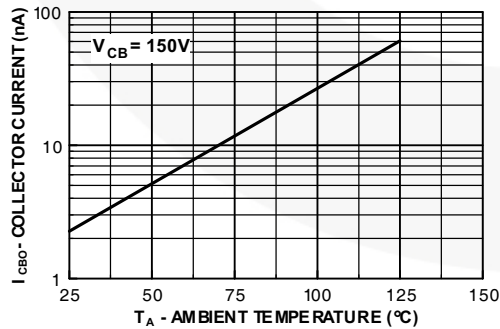


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

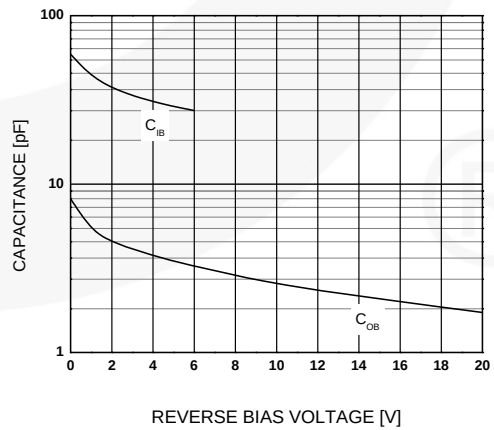


Figure 6. Collector-Base and Emitter-Base Capacitance vs. Reverse-Bias Voltage

## Typical Performance Characteristics (Continued)

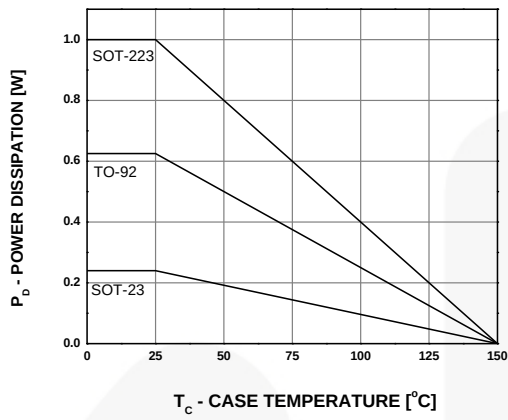
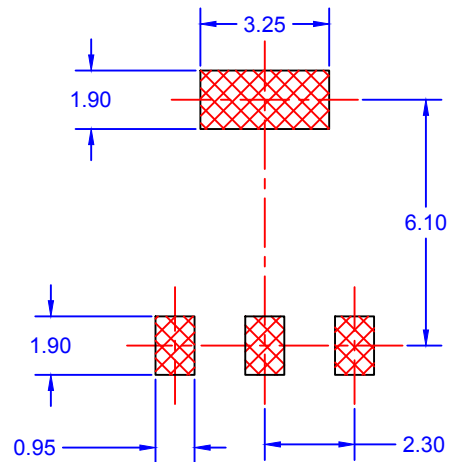
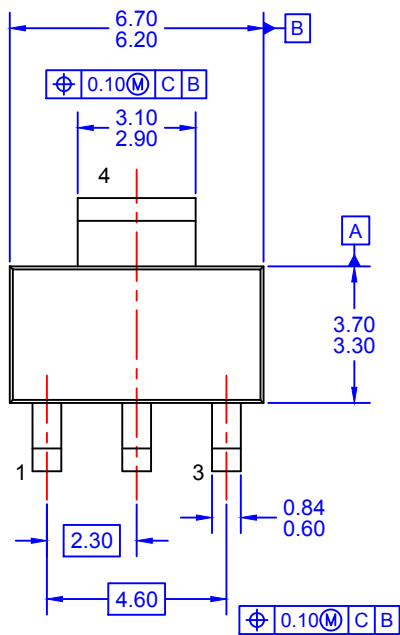
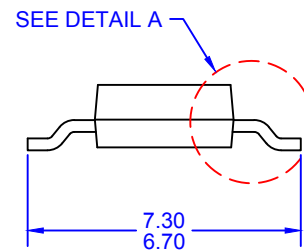
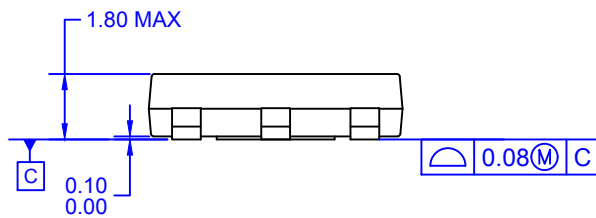


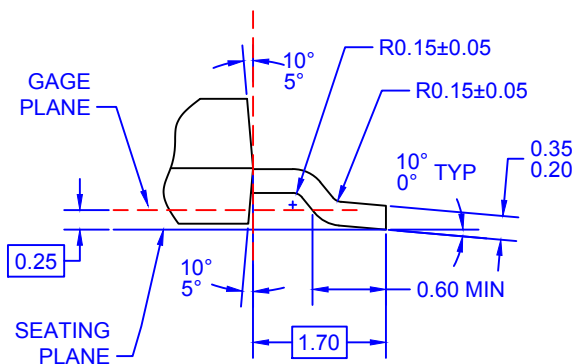
Figure 7. Power Dissipation vs. Ambient Temperature



LAND PATTERN RECOMMENDATION

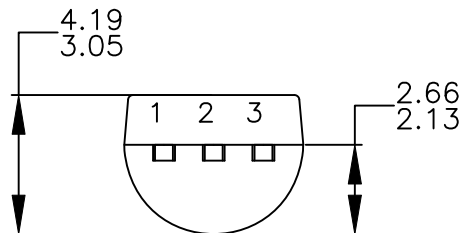
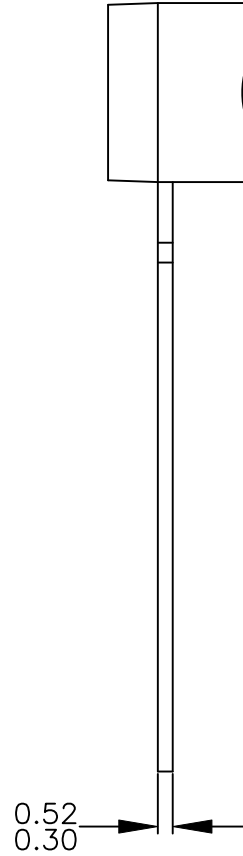
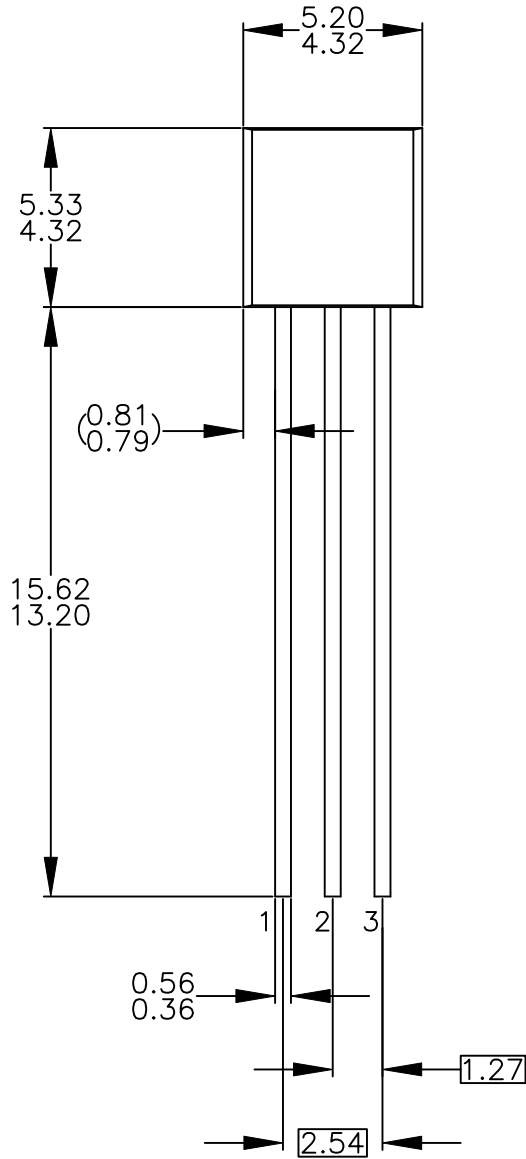


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 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.  
 D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.  
 E) LANDPATTERN NAME: SOT230P700X180-4BN  
 F) DRAWING FILENAME: MKT-MA04AREV3



DETAIL A  
 SCALE: 2:1

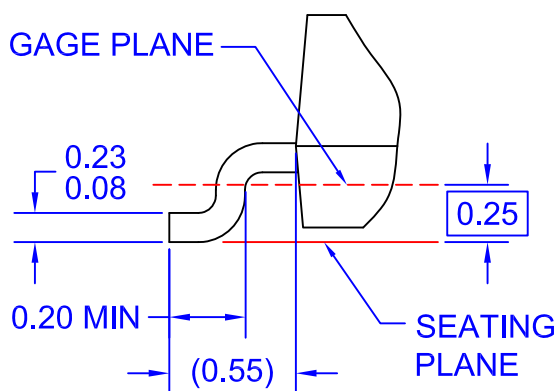
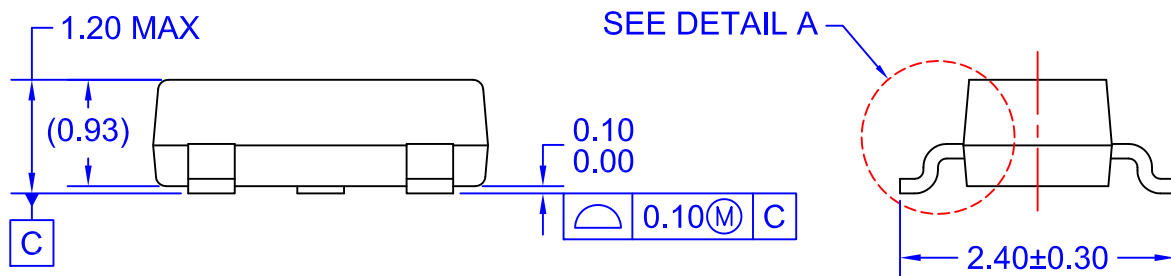
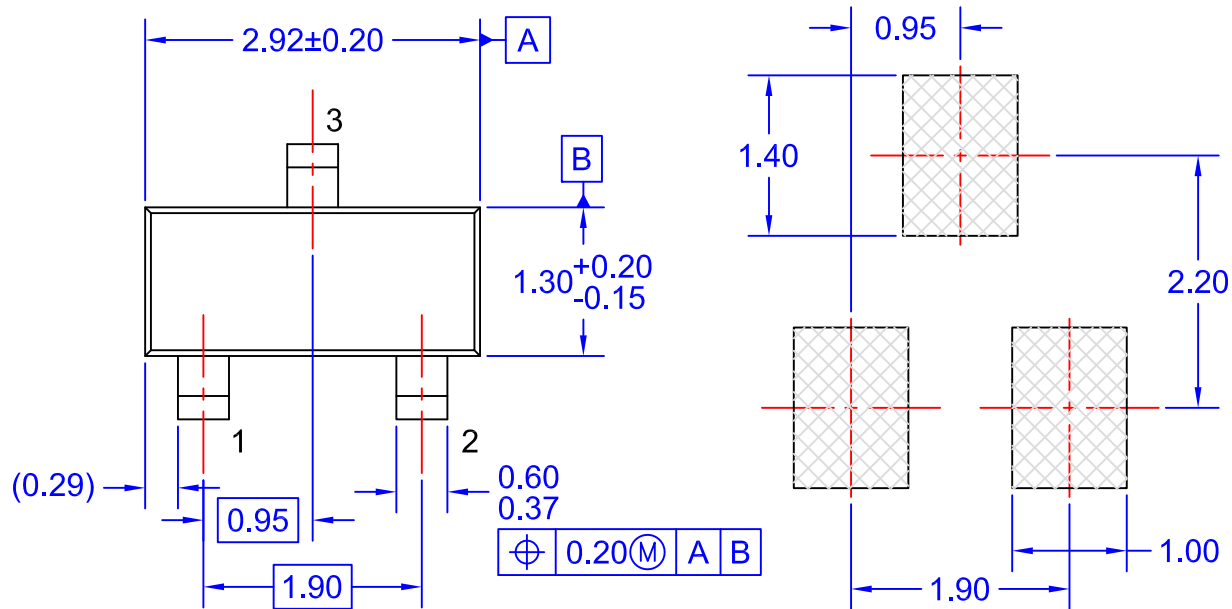




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**DETAIL A**  
SCALE: 2X

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- E) DRAWING FILE NAME: MA03DREV12





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