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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Top Mark</th>
<th>Package</th>
<th>Packing Method</th>
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<tbody>
<tr>
<td>MPSA42</td>
<td>MPSA42</td>
<td>TO-92 3L</td>
<td>Bulk</td>
</tr>
<tr>
<td>MMBTA42</td>
<td>1D</td>
<td>SOT-23 3L</td>
<td>Tape and Reel</td>
</tr>
<tr>
<td>PZTA42</td>
<td>A42</td>
<td>SOT-223 4L</td>
<td>Tape and Reel</td>
</tr>
</tbody>
</table>

Absolute Maximum Ratings\(^{(1), (2)}\)

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 \(T_A = 25°C\) unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{CEO})</td>
<td>Collector-Emitter Voltage</td>
<td>300</td>
<td>V</td>
</tr>
<tr>
<td>(V_{CBO})</td>
<td>Collector-Base Voltage</td>
<td>300</td>
<td>V</td>
</tr>
<tr>
<td>(V_{EBO})</td>
<td>Emitter-Base Voltage</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>(I_C)</td>
<td>Collector Current - Continuous</td>
<td>500</td>
<td>mA</td>
</tr>
<tr>
<td>(T_J, T_{STG})</td>
<td>Operating and Storage Junction Temperature Range</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes:

1. These ratings are based on a maximum junction temperature of 150°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 $T_A = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>MPSA42</th>
<th>MMBTA42</th>
<th>PZTA42</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_D$</td>
<td>Total Device Dissipation</td>
<td>625</td>
<td>240</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>Derate Above 25°C</td>
<td>5.00</td>
<td>1.92</td>
<td>8.00</td>
</tr>
<tr>
<td>$R_{JRC}$</td>
<td>Thermal Resistance, Junction-to-Case</td>
<td>83.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_{JRA}$</td>
<td>Thermal Resistance, Junction-to-Ambient</td>
<td>200</td>
<td>515</td>
<td>125</td>
</tr>
</tbody>
</table>

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 cm².

Electrical Characteristics
Values are at $T_A = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions 1</th>
<th>Conditions 2</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{(BR)CEO}$</td>
<td>Collector-Emitter Breakdown Voltage 5</td>
<td>$I_C = 1.0 \text{ mA}, I_B = 0$</td>
<td>$I_C = 100 \mu\text{A}, I_E = 0$</td>
<td>300</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$V_{(BR)CBO}$</td>
<td>Collector-Base Breakdown Voltage</td>
<td>$I_C = 1.0 \text{ mA}, I_B = 0$</td>
<td>$I_C = 100 \mu\text{A}, I_E = 0$</td>
<td>300</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$V_{(BR)EBO}$</td>
<td>Emitter-Base Breakdown Voltage</td>
<td>$I_E = 1.0 \text{ mA}, I_C = 0$</td>
<td>$I_E = 100 \mu\text{A}, I_C = 0$</td>
<td>6</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$I_{CBO}$</td>
<td>Collector Cut-Off Current</td>
<td>$V_{CB} = 200 \text{ V}, I_E = 0$</td>
<td>$V_{CB} = 200 \text{ V}, I_C = 0$</td>
<td>0.1</td>
<td></td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td>$I_{EBO}$</td>
<td>Emitter Cut-Off Current</td>
<td>$V_{EB} = 6 \text{ V}, I_C = 0$</td>
<td>$V_{EB} = 6 \text{ V}, I_E = 0$</td>
<td>0.1</td>
<td></td>
<td>$\mu\text{A}$</td>
</tr>
</tbody>
</table>

On Characteristics 5

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions 1</th>
<th>Conditions 2</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$h_{FE}$</td>
<td>DC Current Gain</td>
<td>$V_{CE} = 10 \text{ V}, I_C = 1.0 \text{ mA}$</td>
<td>$V_{CE} = 10 \text{ V}, I_C = 10 \text{ mA}$</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE} = 10 \text{ V}, I_C = 30 \text{ mA}$</td>
<td>$V_{CE} = 10 \text{ V}, I_C = 30 \text{ mA}$</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{CEO(sat)}$</td>
<td>Collector-Emitter Saturation Voltage</td>
<td>$I_C = 20 \text{ mA}, I_B = 2.0 \text{ mA}$</td>
<td>$I_C = 20 \text{ mA}, I_B = 2.0 \text{ mA}$</td>
<td>0.5</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$V_{BE(sat)}$</td>
<td>Base-Emitter Saturation Voltage</td>
<td>$I_C = 20 \text{ mA}, I_B = 20 \text{ mA}$</td>
<td>$I_C = 20 \text{ mA}, I_B = 2.0 \text{ mA}$</td>
<td>0.9</td>
<td></td>
<td>V</td>
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</table>

Small Signal Characteristics

<table>
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<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions 1</th>
<th>Conditions 2</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f_T$</td>
<td>Current Gain - Bandwidth Product</td>
<td>$I_C = 10 \text{ mA}, V_{CE} = 20 \text{ V}$, $f = 100 \text{ MHz}$</td>
<td>$I_C = 20 \text{ mA}, V_{CE} = 10 \text{ V}$, $f = 2.0 \text{ MHz}$</td>
<td>50</td>
<td></td>
<td>MHz</td>
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<tr>
<td>$C_{cb}$</td>
<td>Collector-Base Capacitance</td>
<td>$V_{CB} = 20 \text{ V}, I_E = 0$, $f = 1.0 \text{ MHz}$</td>
<td>$V_{CB} = 20 \text{ V}, I_E = 0$, $f = 1.0 \text{ MHz}$</td>
<td>3.0</td>
<td></td>
<td>pF</td>
</tr>
</tbody>
</table>

Notes:
5. Pulse test: pulse width $\leq 300 \mu\text{s}$, 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)

![Graph showing power dissipation vs. ambient temperature for different packages](image)

Figure 7. Power Dissipation vs. Ambient Temperature
NOTES: UNLESS OTHERWISE SPECIFIED

A) REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUE H.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
E) DRAWING FILE NAME: MA03DREV10
NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DRAWING CONFORMS TO ASME Y14.5M-1994.
D) TO-92 (92, 94, 96, 97, 98) PIN CONFIGURATION:

<table>
<thead>
<tr>
<th>PIN</th>
<th>92</th>
<th>94</th>
<th>96</th>
<th>97</th>
<th>98</th>
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<tbody>
<tr>
<td>P</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>P</td>
</tr>
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<td>1</td>
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<td>D</td>
<td>G</td>
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<tr>
<td>3</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

LEGEND:
P = BIPOLAR
E = EMITTER
D = DRAIN
F = JFET
B = BASE
S = SOURCE
M = DMOS
C = COLLECTOR
G = GATE

E) FOR PACKAGE 92, 94, 96, 97 AND 98:
PIN CONFIGURATION DRAIN "D" AND SOURCE "S"
ARE INTERCHANGEABLE AT JFET "F" OPTION.
F) DRAWING FILENAME: MKT-ZA03DREV3.
NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING BASED ON JEDEC REGISTRATION TO-261, VARIATION AA.

B) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

C) ALL DIMENSIONS ARE IN MILLIMETERS.

D) DRAWING CONFORMS TO ASME Y14.5M-1994.

E) LANDPATTERN NAME: SOT230P700X180-4BN

F) DRAWING FILENAME: MKT-MA04AREV2
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**Xtens™**

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**Definition of Terms**

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<thead>
<tr>
<th>Datasheet Identification</th>
<th>Product Status</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Advance Information</td>
<td>Formative / In Design</td>
<td>Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
</tr>
<tr>
<td>Preliminary</td>
<td>First Production</td>
<td>Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.</td>
</tr>
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<td>Full Production</td>
<td>Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.</td>
</tr>
<tr>
<td>Obsolete</td>
<td>Not In Production</td>
<td>Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.</td>
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