KSP44/45
NPN Epitaxial Silicon Transistor

Features
- High-Voltage Transistor
- Collector-Emitter Voltage: $V_{CEO} =$ KSP44: 400V  
  KSP45: 350V
- Collector Power Dissipation: $P_C(\text{max}) = 625\,\text{mW}$

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>KSP44BU</td>
<td>KSP44</td>
<td>TO-92 3L</td>
<td>Bulk</td>
</tr>
<tr>
<td>KSP44TA</td>
<td>KSP44</td>
<td>TO-92 3L</td>
<td>Ammo</td>
</tr>
<tr>
<td>KSP44TF</td>
<td>KSP44</td>
<td>TO-92 3L</td>
<td>Tape and Reel</td>
</tr>
<tr>
<td>KSP45TA</td>
<td>KSP45</td>
<td>TO-92 3L</td>
<td>Ammo</td>
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</tbody>
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Absolute Maximum Ratings

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.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>$V_{CBO}$</td>
<td>Collector-Base Voltage : KSP44 400 : KSP45 500</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$V_{CEO}$</td>
<td>Collector-Emitter Voltage : KSP44 350 : KSP45 400</td>
<td></td>
<td>V</td>
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<tr>
<td>$V_{EBO}$</td>
<td>Emitter-Base Voltage</td>
<td>6</td>
<td>V</td>
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<tr>
<td>$I_C$</td>
<td>Collector Current</td>
<td>300</td>
<td>mA</td>
</tr>
<tr>
<td>$T_J$</td>
<td>Junction Temperature</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{STG}$</td>
<td>Storage Temperature</td>
<td>-55 to 150</td>
<td>°C</td>
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Thermal Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_C$</td>
<td>Collector Power Dissipation ($T_A = 25^\circ\text{C}$)</td>
<td>625</td>
<td>mW</td>
</tr>
<tr>
<td>$P_C$</td>
<td>Collector Power Dissipation ($T_C = 25^\circ\text{C}$)</td>
<td>1.5</td>
<td>W</td>
</tr>
<tr>
<td>$R_{JUC}$</td>
<td>Thermal Resistance, Junction to Case</td>
<td>83.3</td>
<td>°C/W</td>
</tr>
<tr>
<td>$R_{JUA}$</td>
<td>Thermal Resistance, Junction to Ambient</td>
<td>200</td>
<td>°C/W</td>
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## Electrical Characteristics

Values are at $T_a = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>$BV_{CBO}$</td>
<td>Collector-Base Breakdown Voltage</td>
<td>$I_C = 100\mu A, I_B = 0$</td>
<td>500</td>
<td>400</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>: KSP44 : KSP45</td>
<td>$I_C = 100\mu A, I_B = 0$</td>
<td>400</td>
<td>350</td>
<td>V</td>
</tr>
<tr>
<td>$BV_{CEO}$</td>
<td>Collector -Emitter Breakdown Voltage</td>
<td>$I_C = 1mA, I_B = 0$</td>
<td>400</td>
<td>350</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>: KSP44 : KSP45</td>
<td>$I_C = 1mA, I_B = 0$</td>
<td>400</td>
<td>350</td>
<td>V</td>
</tr>
<tr>
<td>$BV_{EBO}$</td>
<td>Emitter-Base Breakdown Voltage</td>
<td>$I_E = 100\mu A, I_C = 0$</td>
<td>6</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$ICBO$</td>
<td>Collector Cut-off Current</td>
<td>$V_{CB} = 400V, I_E = 0$</td>
<td>0.1</td>
<td>0.1</td>
<td>$\mu A$</td>
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<tr>
<td></td>
<td>: KSP44 : KSP45</td>
<td>$V_{CB} = 320V, I_E = 0$</td>
<td>0.1</td>
<td>0.1</td>
<td>$\mu A$</td>
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<tr>
<td>$ICES$</td>
<td>Collector Cut-off Current</td>
<td>$V_{CE} = 400V, I_B = 0$</td>
<td>0.5</td>
<td>0.5</td>
<td>$\mu A$</td>
</tr>
<tr>
<td></td>
<td>: KSP44 : KSP45</td>
<td>$V_{CE} = 320V, I_B = 0$</td>
<td>0.5</td>
<td>0.5</td>
<td>$\mu A$</td>
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<tr>
<td>$IEBO$</td>
<td>Emitter Cut-off Current</td>
<td>$V_{EB} = 4V, I_C = 0$</td>
<td>0.1</td>
<td></td>
<td>$\mu A$</td>
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<tr>
<td>$hFE$</td>
<td>DC Current Gain</td>
<td>$V_{CE} = 10V, I_C = 1mA$</td>
<td>40</td>
<td>50</td>
<td>200</td>
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<tr>
<td></td>
<td>: KSP44 : KSP45</td>
<td>$V_{CE} = 10V, I_C = 10mA$</td>
<td>40</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>$V_{CE\ (sat)}$</td>
<td>Collector-Emitter Saturation Voltage</td>
<td>$I_C = 1mA, I_B = 0.1mA$</td>
<td>0.4</td>
<td>0.5</td>
<td>V</td>
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<tr>
<td></td>
<td>: KSP44 : KSP45</td>
<td>$I_C = 10mA, I_B = 1mA$</td>
<td>0.4</td>
<td>0.5</td>
<td>V</td>
</tr>
<tr>
<td>$V_{BE\ (sat)}$</td>
<td>Base-Emitter Saturation Voltage</td>
<td>$I_C = 10mA, I_B = 1mA$</td>
<td>0.75</td>
<td></td>
<td>V</td>
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<tr>
<td>$C_{ob}$</td>
<td>Output Capacitance</td>
<td>$V_{CB} = 20V, I_E = 0, f = 1MHz$</td>
<td>7</td>
<td></td>
<td>pF</td>
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</table>

**Note:**
1. Pulse Test: $PW \leq 300\mu s$, Duty Cycle $\leq 2\%$. 
Typical Performance Characteristics

Figure 1. DC Current Gain

Figure 2. Turn-On Switching Times

Figure 3. Turn-Off Switching Times

Figure 4. Capacitance

Figure 5. On Voltage

Figure 6. Collector Saturation Region
Typical Performance Characteristics (Continued)

Figure 7. High-Frequency Current Gain

![Graph showing high-frequency current gain](image1)

$I_C$ [mA], Collector Current

$V_{CE} = 10$ V

$f = 10$ MHz

$T_a = 25$ °C

Figure 8. Safe Operating Area

![Graph showing safe operating area](image2)

$V_{CE}$ [V], Collector-Emitter Voltage

$I_C$ [mA], Collector Current

Valid for Duty Cycle ≤ 10%

$T_a = 25$ °C

MSPA44
Physical Dimensions

Figure 9. 3-Lead, TO-92, Molded, Standard Straight Lead, Bulk Type

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Figure 10. 3-Lead, TO-92, Molded, 0.2 In Line Spacing Lead Form, Ammo, Tape and Reel Type

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<th>Datasheet Identification</th>
<th>Product Status</th>
<th>Definition</th>
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