# Fast Steering Mirrors

CTEC Commercial off-the-shelf FSM

## Reference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Technology</th>
<th>Actuator Type</th>
<th>Position Sensors</th>
<th>Angular Range</th>
<th>Res. Freq. (4)</th>
<th>Mirror Substrate</th>
<th>Mirror Coating</th>
<th>Reflectivity</th>
<th>RWE (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pico-FSM35XS-Al-8mm</td>
<td>Piezoelectric</td>
<td>APA®</td>
<td>Strain gauges</td>
<td>+/- 6.5 mrad</td>
<td>1800 Hz</td>
<td>Aluminum Φ8mm</td>
<td>Aluminum</td>
<td>&gt; 85% [300nm to 700nm]</td>
<td>λ/10</td>
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<tr>
<td>P-FSM35XS-SiO2-15mm</td>
<td>Piezoelectric</td>
<td>APA®</td>
<td>Strain gauges</td>
<td>+/- 2.5 mrad</td>
<td>1200 Hz</td>
<td>SiO2 Φ15mm</td>
<td>Aluminum</td>
<td>&gt; 85% [300nm to 700nm]</td>
<td>λ/10</td>
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<tr>
<td>P-FSM35XS-SiC-17mm</td>
<td>Piezoelectric</td>
<td>APA®</td>
<td>Strain gauges</td>
<td>+/- 2.5 mrad</td>
<td>1240 Hz</td>
<td>SiC Φ17mm</td>
<td>Silver or Gold</td>
<td>&gt; 95% [450nm to 2300nm]</td>
<td>λ/20</td>
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<tr>
<td>P-FSM35XS-SiC-30mm</td>
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<td>Strain gauges</td>
<td>+/- 2.5 mrad</td>
<td>1270 Hz</td>
<td>SiC Φ30mm</td>
<td>Silver or Gold</td>
<td>&gt; 95% [450nm to 2300nm]</td>
<td>λ/20</td>
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<tr>
<td>P-FSM60SM-SiO2-15mm</td>
<td>Piezoelectric</td>
<td>APA®</td>
<td>Strain gauges</td>
<td>+/- 6 mrad</td>
<td>1350 Hz</td>
<td>SiO2 Φ15mm</td>
<td>Aluminum</td>
<td>&gt; 85% [300nm to 700nm]</td>
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<td>1440 Hz</td>
<td>SiC Φ17mm</td>
<td>Silver or Gold</td>
<td>&gt; 95% [450nm to 2300nm]</td>
<td>λ/20</td>
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<tr>
<td>P-FSM150S-SiO2-15mm</td>
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<td>APA®</td>
<td>Strain gauges</td>
<td>+/- 9 mrad</td>
<td>750 Hz</td>
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<td>Aluminum</td>
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<td>λ/10</td>
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<td>P-FSM150S-SiC-17mm</td>
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<td>Strain gauges</td>
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<td>750 Hz</td>
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<td>M-FSM45-SiO2-15mm</td>
<td>Magnetic</td>
<td>MICA™</td>
<td>Eddy currents</td>
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<td>100 Hz</td>
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<td>Aluminum</td>
<td>&gt; 85% [300nm to 700nm]</td>
<td>λ/10</td>
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<td>100 Hz</td>
<td>SiC Φ17mm</td>
<td>Silver or Gold</td>
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<td>λ/20</td>
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<td>100 Hz</td>
<td>SiC Φ17mm</td>
<td>Dielectric</td>
<td>&gt; 99.5% at 1064 nm</td>
<td>λ/20</td>
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<td>MICA™</td>
<td>Eddy currents</td>
<td>+/- 5° (2)</td>
<td>90 Hz</td>
<td>SiC Φ30mm</td>
<td>Silver</td>
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<td>λ/20</td>
</tr>
</tbody>
</table>

(1) Reflected Wave Front Error, measure at λ =633nm and 0° angle of incidence at mirror manufacturing

(2) Limited to +/- 2.5° with internal ECS sensors option

(3) Space constellation version available for optical communication

(4) Actuation resonance frequency

> Related drive electronics

Fig.3: CCBU20  
Fig.4: CCBU40  
Fig.5: MCSA480  
Fig.6: MCLA18  
Fig.7: ECS 45  
Fig.8: CMAµ10