


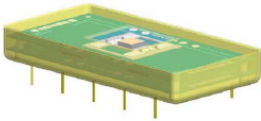
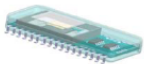
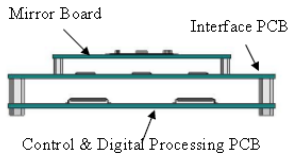
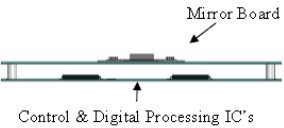
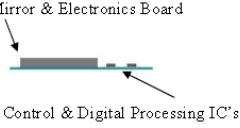


## MEMScan™ Scanning Mirror: Program Information and Mirror Specifications

### Mirror Program

LightTime is currently developing a MEMScan Scanning Mirror designed for the Medium-Range MEMScan Ladar Sensor. The mirror design can be reconfigured for other application ranges. The prototype stage of the mirror is scheduled to be testing in Q2 2011. The prototype, a micro-machined mirror/actuation design with PCB-based electronics, will a) provide a platform for customer engineering evaluation and b) will become a low-volume product for applications where form factor is less of an issue. The GEN 1 version is projected to be available by Q4 2011. This micro-machined version will have a reduced form factor, largely due to the reduction of electronics into IC's. GEN 1 will be suitable for low to medium volume applications and provide a compact form factor. For high volume applications, GEN 2 can be developed based on full Silicon MEMS fab. This would further reduce the form factor and unit-cost in high volumes. The described MEMScan Mirror product development sequence details are shown in the table below.

**MEMScan Mirror System Product Development Sequence**

<b>Prototype</b> Unconstrained Assy, PCB's Only	<b>Gen 1</b> (non-Si MEMS) Low to Medium Volume Product	<b>Gen 2</b> (Si MEMS) High Volume Product
Scale 1:2 	Scale 1:1 	Scale 1:1 
		
Mirror (mm): 4x4 Length (in): 5 Width (in): 3.5 Height (in): 1 Volume (cc): 307 Weight (g): NA	Mirror (mm): 4x4 Length (in): 2 Width (in): 1 Height (in): 0.3 Volume (cc): 10.2 Weight (g): TBD	Mirror (mm): 4x4 Length (in): 0.8 Width (in): 0.4 Height (in): 0.12 Volume (cc): 0.6 Weight (g): TBD

### Top-Level Preliminary Scanning Mirror Specifications

The following specifications, for the MEMScan mirror designed for the Medium-Range Ladar, are preliminary and provided for guidance. Details are available.

<i>Parameter</i>	<i>Specifications</i>
Type	2D
Mirror size:	4x4 mm (square shape)
Fast axis frequency:	~ 2 kHz
Slow axis frequency:	~10 Hz
Max <i>mechanical</i> tilt in each axis:	≤ 8° (±8°)