

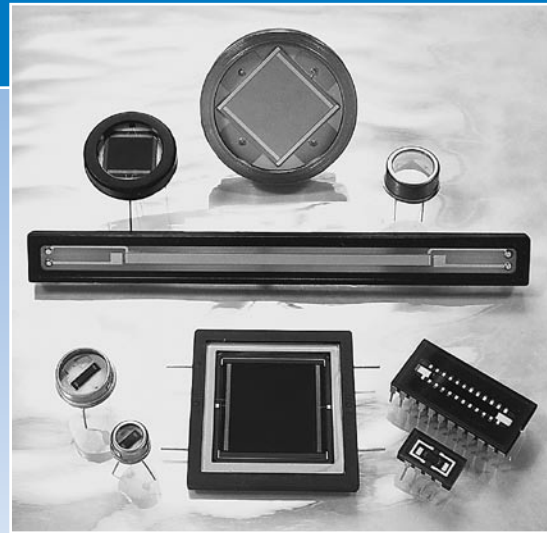
## ■ Duo-Lateral, Super Linear PSD's

### Position Sensing Detectors (PSD)

The Super Linear Position Sensors feature state of the art duo-lateral technology to provide a continuous analog output proportional to the displacement of the centroid of a light spot from the center, on the active area. As continuous position sensors, these detectors are unparalleled; offering position accuracies of 99% over 64% of the sensing area. These accuracies are achieved by duo-lateral technology, manufacturing the detectors with two separate resistive layer, one located on the top and the other at the bottom of the chip. One or two dimensional position measurements can be obtained using these sensors.

A reverse bias should be applied to these detectors to achieve optimum current linearity at high light levels. For position calculations and further details on circuit set up, refer to the "Photodiode Characteristics" section of the catalog.

The maximum recommended power density incident on the duo lateral PSDs are  $1 \text{ mW} / \text{cm}^2$ . For optimum performance, incident beam should be perpendicular to the active area with spot size less than 1mm in diameter.



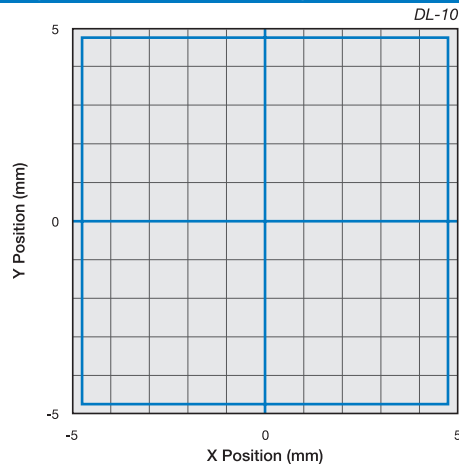
### ■ APPLICATIONS

- Beam Alignment
- Position Sensing
- Angle Measurement
- Surface Profiling
- Height Measurements
- Targeting
- Guidance System
- Motion Analysis

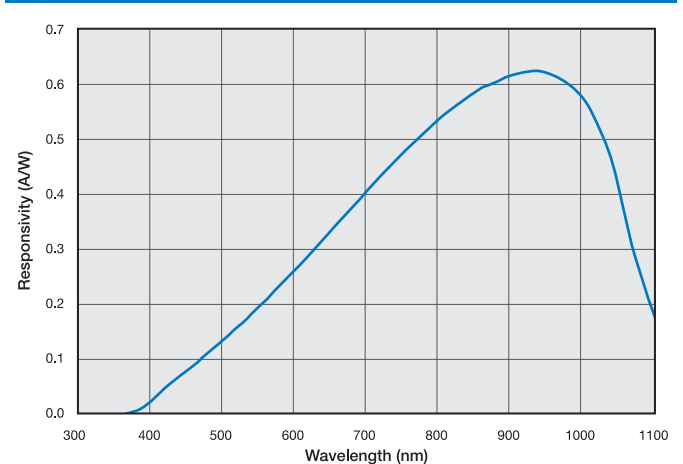
### ■ FEATURES

- Super Linear
- Ultra High Accuracy
- Wide Dynamic Range
- High Reliability
- Duo Lateral Structure

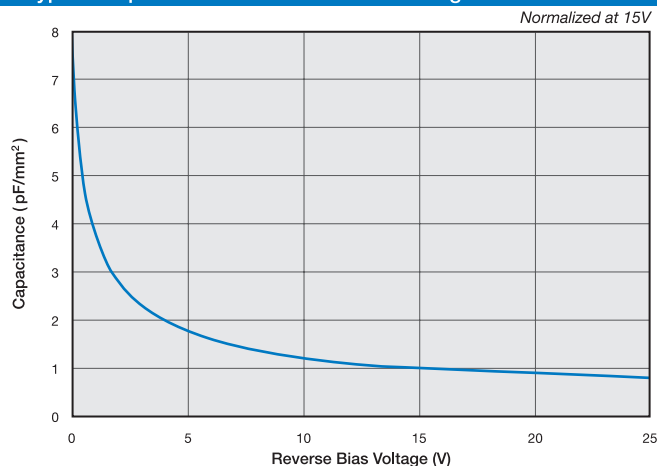
### ■ Typical Position Detectability



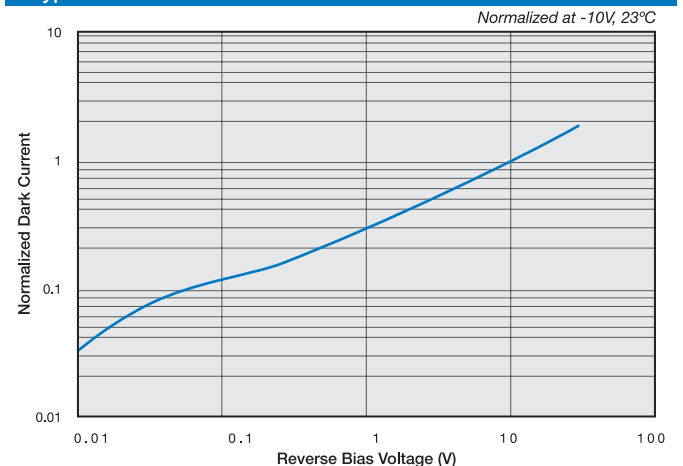
### ■ Typical Spectral Response



### ■ Typical Capacitance vs. Reverse Bias Voltage



### ■ Typical Dark Current vs. Reverse Bias



# ■ Duo-Lateral Super Linear PSD's

Typical Electro-Optical Specifications at  $T_A=23^{\circ}\text{C}$

Model Number	Position Sensing Area		Responsivity (A/W)		Position Detection Error ( $\mu\text{m}$ )	Dark Current (nA)		Capacitance (pF)		Rise Time ( $\mu\text{s}$ )	Position Detection Drift † ( $\mu\text{m} / ^{\circ}\text{C}$ )	Inter-electrode Resistance (k $\Omega$ )		Temp Range ( $^{\circ}\text{C}$ )		Package Style ¶
	Area (mm <sup>2</sup> )	Dimension (mm)	670 nm		Over 80% of Length 64% of Sensing Area	-15 V, SL Series -5 V, DL Series		-15 V, SL Series -5 V, DL Series		670 nm 50 $\Omega$		min.	max.	Operating	Storage	
			min.	typ.		typ.	typ.	max.	typ.							
<b>One-Dimensional Series, Metal Package (<math>V_{\text{BIAS}}=-15\text{V}</math>)</b>																
SL3-1	3	3 x 1	0.3	0.4	3	5	50	3	7	0.04	0.06	15	80	-10 ~ +60	-20 ~ +80	41 / TO-5
SL5-1	5	5 x 1			5	10	100	5	9	0.10	0.10	20	100			42 / TO-8
<b>One-Dimensional Series, Ceramic Package (<math>V_{\text{BIAS}}=-15\text{V}</math>)</b>																
SL3-2	3	3 x 1	0.3	0.4	3	5	50	3	7	0.04	0.06	15	80	-10 ~ +60	-20 ~ +80	48 / 8-pin DIP
SL5-2	5	5 x 1			5	10	100	5	9	0.10	0.10	20	100			55 / 14-pin DIP
SL10-1	20	10 x 2			10	200	500	20	30	0.40	0.10	40	250			49 / 24-pin DIP
SL15	15	15 x 1			15	150	300	15	25	0.60	0.1	60	300			51 / Ceramic
SL30	120	30 x 4			30	150	1000	125	150	1.0	0.6	40	80			50 / Special
SL76-1	190	76 x 2.5			76	100	1000	190	250	14.0	1.4	120	600			
<b>Two-Dimensional Series, Metal Package § (<math>V_{\text{BIAS}}=-5\text{V}</math>)</b>																
DL-2	4	2 sq	0.3	0.4	30	30	600	10	30	0.025	0.20	5	25	-10 ~ +60	-20 ~ +80	37 / TO-8
DLS-2						10	175	8	14		0.40					75 / TO-25
DLS-2S						50	1000	35	60		0.25					37 / TO-8
DL-4	16	4 sq			50	25	300	30	40	0.08	0.30					
DLS-4					100	500	5000	175	375	0.20	0.60					34 / Special
DL-10	100	10 sq			200	2000	12000	600	1500	1.00	1.0					35 / Special
DL-20	400	20 sq														
<b>Two-Dimensional Series, Ceramic Package §¶ (<math>V_{\text{BIAS}}=-5\text{V}</math>)</b>																
DLS-10	100	10 sq	0.3	0.4	100	50	400	160	200	0.20	0.70	5	25	-10 ~ +60	-20 ~ +80	36 / Ceramic
DLS-20	400	20 sq			200	100	1000	580	725	1.00	1.2					
<b>Two-Dimensional Series, Low-Cost Ceramic Package (<math>V_{\text{BIAS}}=-5\text{V}</math>)</b>																
DL-10C	100	10 sq	0.3	0.4	100	500	5000	175	375	0.20	0.60	5	25	-10 ~ +60	-20 ~ +80	38 / Ceramic
DL-20C	400	20 sq			200	2000	12000	600	1500	1.00	1.0					39 / Ceramic

† The position temperature drift specifications are for the die mounted on a copper plate without a window and the beam at the electrical center of the sensing area.

§ The DLS Series are packaged with A/R coated windows and have a lower dark current than the DL series.

‡ Also available in the same package as DL-10 or DL-20. Specify either DLS-10-1 or DLS-20-1.

¶ For mechanical drawings please refer to pages 58 thru 69.

\* Non-Condensing temperature and Storage Range, Non-Condensing Environment.

**NOTES:**

- DL(S) series are available with removable windows.
- Chip centering within  $\pm 0.010^{\circ}$ .

## 1. Parameter Definitions:

A = Distance from top of chip to top of glass.

a = Photodiode Anode.

B = Distance from top of glass to bottom of case.

c = Photodiode Cathode

(Note: cathode is common to case in metal package products unless otherwise noted).

W = Window Diameter.

F.O.V. = Field of View (see definition below).

## 2. Dimensions are in inches (1 inch = 25.4 mm).

## 3. Pin diameters are 0.018 ± 0.002" unless otherwise specified.

## 4. Tolerances (unless otherwise noted)

General: 0.XX ±0.01"

0.XXX ±0.005"

Chip Centering: ±0.010"

Dimension 'A': ±0.015"

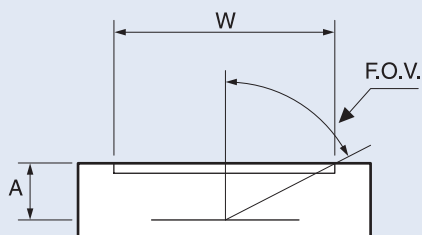
## 5. Windows

All '**UV**' Enhanced products are provided with QUARTZ glass windows, 0.027 ± 0.002" thick.

All '**XUV**' products are provided with removable windows.

All '**DLS**' PSD products are provided with A/R coated glass windows.

All '**FIL**' photoconductive and photovoltaic products are epoxy filled instead of glass windows.



$$F.O.V. = \tan^{-1} \left( \frac{W}{2A} \right)$$



For Further Assistance  
Please Call One of Our Experienced  
Sales and Applications Engineers

**310-978-0516**



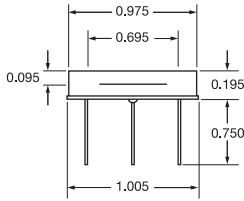
- Or -  
On the Internet at

**www.osioptoelectronics.com**

## 34 Special

Products:

DL-10



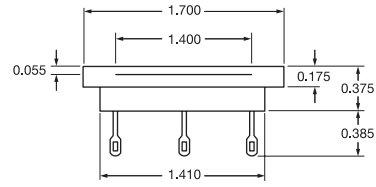
Pin Circle Dia.=0.730  
Bottom View

Anode contacts are on the top of the detector.

## 35 Special

Products:

DL-20



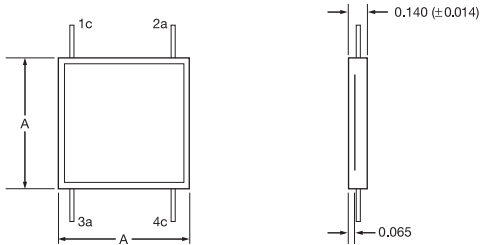
Pin Dia.=0.040  
Pin Circle Dia.=1.110  
Bottom View

Anode contacts are on the top of the detector.

## 36 Special Ceramic

Products:

DLS-10  
DLS-20



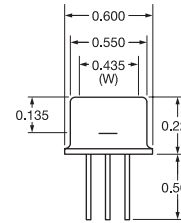
Pin Dia.=0.028 Typ.  
Pin Length.=0.250 Typ.

P/N	A
DLS-10	1.000
DLS-20	1.500

## 37 TO-8

Products:

DL-2  
DLS-2  
DL-4  
DLS-4

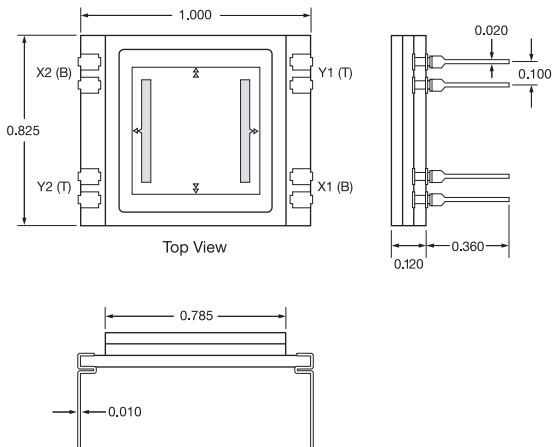


Pin Circle Dia.=0.400  
Bottom View

## 38 Low Cost Ceramic

Products:

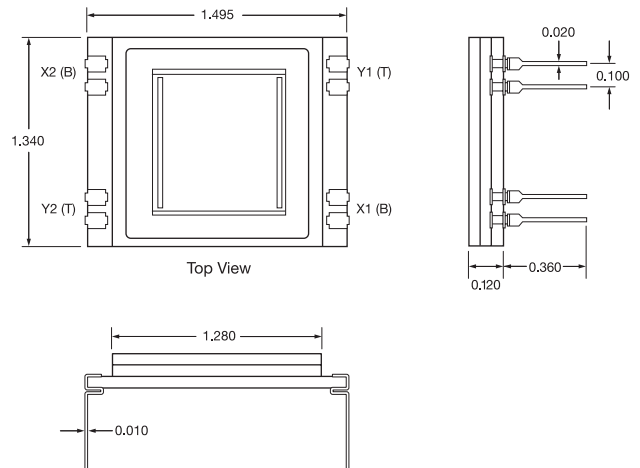
DL-10C



## 39 Low Cost Ceramic

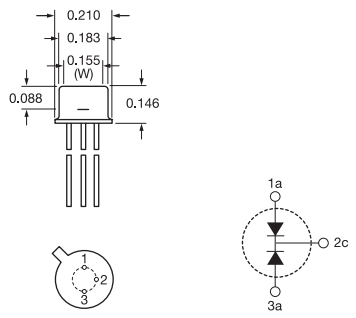
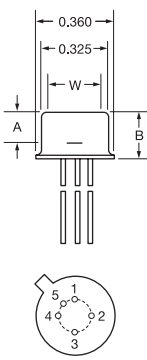
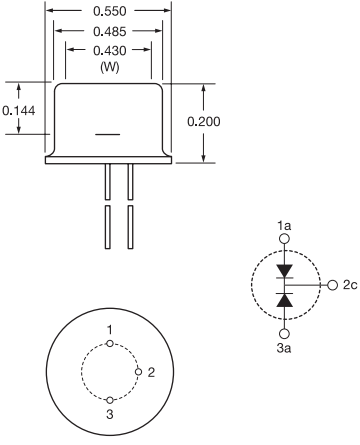
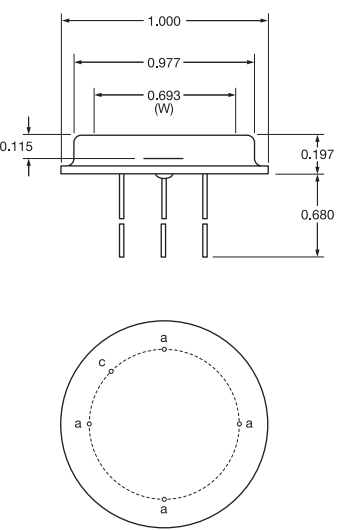
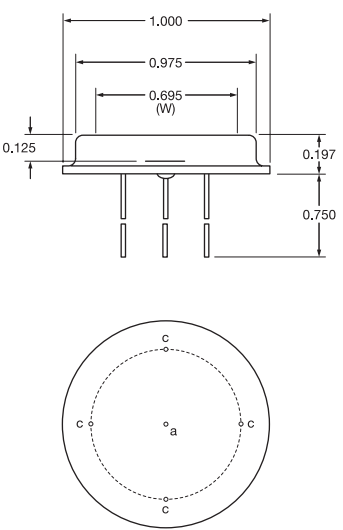
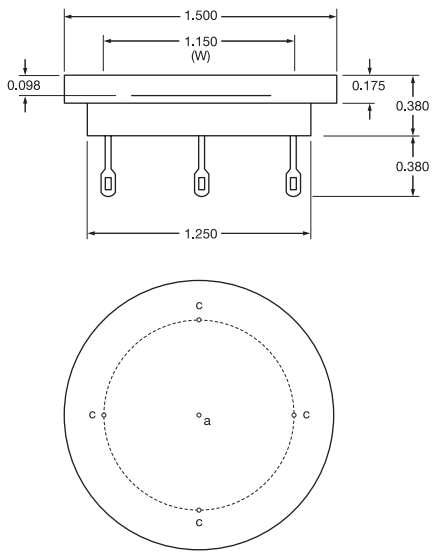
Products:

DL-20C



# Mechanical Specifications

All units in inches. Pinouts are bottom view.

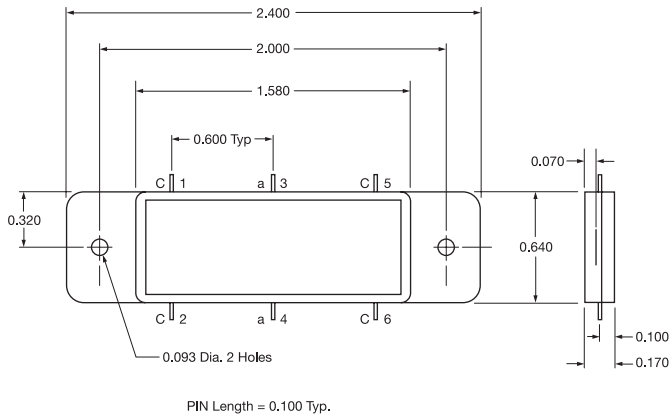
40 TO-18	41 TO-5	42 TO-8																																																																																										
Products:	Products:	Products:																																																																																										
<p data-bbox="430 247 516 268"><b>SPOT-2DMI</b></p>  <p data-bbox="194 651 349 672">Pin Circle Dia.=0.100</p>	<p data-bbox="909 247 998 420"><b>SC-4D SL3-1 SPOT-2D SPOT-3D SPOT-4D SPOT-4DMI SPOT-4DUV QD7-0</b></p>  <p data-bbox="649 630 803 651">Pin Circle Dia.=0.200</p> <table border="1" data-bbox="592 682 1031 913"> <caption>Dimensions</caption> <thead> <tr> <th>P/N</th> <th>A</th> <th>B</th> <th>W</th> </tr> </thead> <tbody> <tr> <td>SC-4D</td> <td>0.071</td> <td>0.142</td> <td>0.240</td> </tr> <tr> <td>SL3-1</td> <td>0.106</td> <td>0.195</td> <td>0.217</td> </tr> <tr> <td>SPOT-2D</td> <td>0.063</td> <td>0.114</td> <td>0.240</td> </tr> <tr> <td>SPOT-3D</td> <td>0.104</td> <td>0.138</td> <td>0.240</td> </tr> <tr> <td>SPOT-4D</td> <td>0.063</td> <td>0.142</td> <td>0.240</td> </tr> <tr> <td>SPOT-4DMI</td> <td>0.063</td> <td>0.142</td> <td>0.240</td> </tr> <tr> <td>SPOT-4DUV</td> <td>0.063</td> <td>0.142</td> <td>0.240</td> </tr> <tr> <td>QD7-0</td> <td>0.050</td> <td>0.130</td> <td>0.230</td> </tr> </tbody> </table> <table border="1" data-bbox="592 934 1031 1176"> <caption>Pinouts</caption> <thead> <tr> <th>P/N</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>SC-4D</td> <td>c</td> <td>c</td> <td>c</td> <td>c</td> <td>a</td> </tr> <tr> <td>SL3-1</td> <td>a</td> <td>c</td> <td>a</td> <td>--</td> <td>--</td> </tr> <tr> <td>SPOT-2D</td> <td>a</td> <td>c</td> <td>a</td> <td>--</td> <td>--</td> </tr> <tr> <td>SPOT-3D</td> <td>a</td> <td>c</td> <td>a</td> <td>--</td> <td>--</td> </tr> <tr> <td>SPOT-4D</td> <td>a</td> <td>a</td> <td>a</td> <td>a</td> <td>c</td> </tr> <tr> <td>SPOT-4DMI</td> <td>a</td> <td>a</td> <td>a</td> <td>a</td> <td>c</td> </tr> <tr> <td>SPOT-4DUV</td> <td>a</td> <td>a</td> <td>a</td> <td>a</td> <td>c</td> </tr> <tr> <td>QD7-0</td> <td>a</td> <td>a</td> <td>a</td> <td>a</td> <td>c</td> </tr> </tbody> </table>	P/N	A	B	W	SC-4D	0.071	0.142	0.240	SL3-1	0.106	0.195	0.217	SPOT-2D	0.063	0.114	0.240	SPOT-3D	0.104	0.138	0.240	SPOT-4D	0.063	0.142	0.240	SPOT-4DMI	0.063	0.142	0.240	SPOT-4DUV	0.063	0.142	0.240	QD7-0	0.050	0.130	0.230	P/N	1	2	3	4	5	SC-4D	c	c	c	c	a	SL3-1	a	c	a	--	--	SPOT-2D	a	c	a	--	--	SPOT-3D	a	c	a	--	--	SPOT-4D	a	a	a	a	c	SPOT-4DMI	a	a	a	a	c	SPOT-4DUV	a	a	a	a	c	QD7-0	a	a	a	a	c	<p data-bbox="1388 247 1437 268"><b>SL5-1</b></p>  <p data-bbox="1161 735 1307 756">Pin Circle Dia.=0.300</p>
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SPOT-4DUV	a	a	a	a	c																																																																																							
QD7-0	a	a	a	a	c																																																																																							
<p data-bbox="105 1207 267 1228"><b>43 Low Profile</b></p> <p data-bbox="430 1239 516 1312"><b>SPOT-9D SPOT-9DMI</b></p>  <p data-bbox="235 1858 397 1879">Pin Circle Dia.=0.730</p>	<p data-bbox="584 1207 706 1228"><b>44 Special</b></p> <p data-bbox="909 1270 974 1291"><b>SC-10D</b></p>  <p data-bbox="722 1858 885 1879">Pin Circle Dia.=0.730</p>	<p data-bbox="1063 1207 1185 1228"><b>45 Special</b></p> <p data-bbox="1388 1270 1453 1291"><b>SC-25D</b></p>  <p data-bbox="1193 1890 1356 1911">Pin Circle Dia.=0.950</p>																																																																																										

All units in inches.

## 46 Plastic

Products:

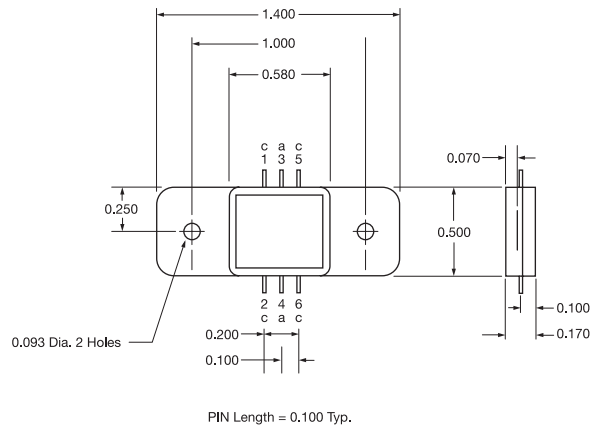
LSC-30D



## 47 Plastic

Products:

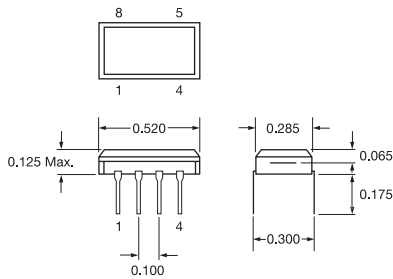
LSC-5D



## 48 8-PIN DIP

Products:

SL3-2  
SL5-2



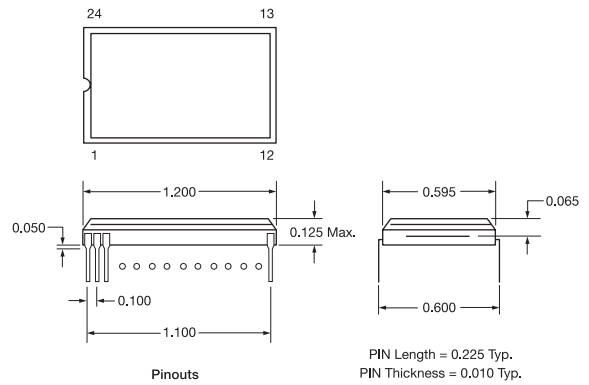
Pinouts

2, 7	Anode 1
1, 4, 5, 8	Common Cathode
3, 6	Anode 2

## 49 24-PIN DIP

Products:

SL-15



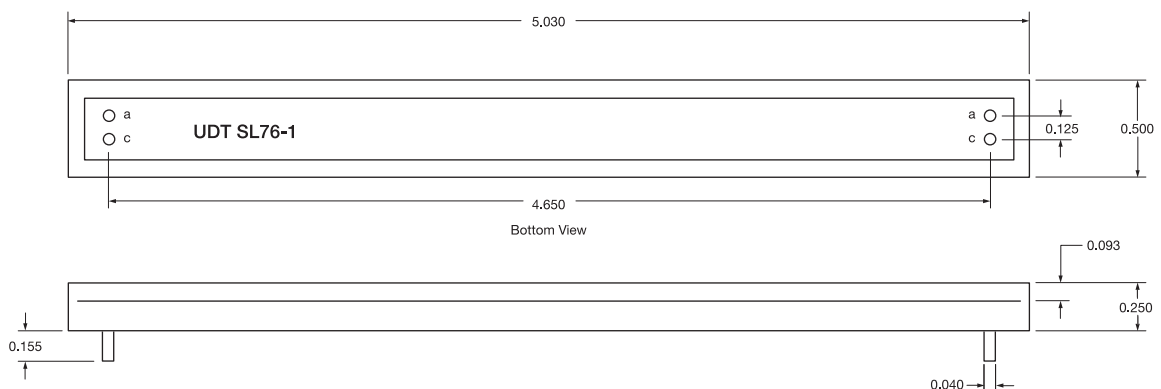
Pinouts

11	Anode 1
12, 24	Common Cathode
23	Anode 2
All Other Pins NOT CONNECTED	

## 50 Special

Products:

SL76-1



# Mechanical Specifications

All units in inches. Pinouts are top view.

51 Low Cost Ceramic	52 Special	53 Special																					
<p><b>Products:</b></p> <p><b>SL-30</b></p>	<p><b>Products:</b></p> <p><b>A2V-76</b></p>	<p><b>Products:</b></p> <p><b>A2V-16</b></p> <table border="1"> <thead> <tr> <th colspan="7">Dimensions</th> </tr> <tr> <th>P/N</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>A2V-16</td> <td>1</td> <td>0.1</td> <td>0.212</td> <td>0.2</td> <td>0.062</td> <td>0.06</td> </tr> </tbody> </table>	Dimensions							P/N	A	B	C	D	E	F	A2V-16	1	0.1	0.212	0.2	0.062	0.06
Dimensions																							
P/N	A	B	C	D	E	F																	
A2V-16	1	0.1	0.212	0.2	0.062	0.06																	

54 40-PIN-DIP	55 14-PIN DIP																																																																																																																																																																																
<p><b>Products:</b></p> <p><b>A5V-35UV</b> <b>A5C-35, A5C-38</b> <b>A5V-35, A5V-38</b></p> <table border="1"> <thead> <tr> <th colspan="4">35 Element Array</th> </tr> <tr> <th>Pin Number</th> <th>Element Number</th> <th>Pin Number</th> <th>Element Number</th> </tr> </thead> <tbody> <tr><td>1</td><td>C</td><td>21</td><td>C</td></tr> <tr><td>2</td><td>2</td><td>22</td><td>35</td></tr> <tr><td>3</td><td>4</td><td>23</td><td>33</td></tr> <tr><td>4</td><td>6</td><td>24</td><td>31</td></tr> <tr><td>5</td><td>8</td><td>25</td><td>29</td></tr> <tr><td>6</td><td>10</td><td>26</td><td>27</td></tr> <tr><td>7</td><td>12</td><td>27</td><td>25</td></tr> <tr><td>8</td><td>14</td><td>28</td><td>23</td></tr> <tr><td>9</td><td>16</td><td>29</td><td>21</td></tr> <tr><td>10</td><td>18</td><td>30</td><td>19</td></tr> <tr><td>11</td><td>--</td><td>31</td><td>17</td></tr> <tr><td>12</td><td>20</td><td>32</td><td>15</td></tr> <tr><td>13</td><td>22</td><td>33</td><td>13</td></tr> <tr><td>14</td><td>24</td><td>34</td><td>11</td></tr> <tr><td>15</td><td>26</td><td>35</td><td>9</td></tr> <tr><td>16</td><td>28</td><td>36</td><td>7</td></tr> <tr><td>17</td><td>30</td><td>37</td><td>5</td></tr> <tr><td>18</td><td>32</td><td>38</td><td>3</td></tr> <tr><td>19</td><td>34</td><td>39</td><td>1</td></tr> <tr><td>20</td><td>C</td><td>40</td><td>C</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">38 Element Array</th> </tr> <tr> <th>Pin Number</th> <th>Element Number</th> <th>Pin Number</th> <th>Element Number</th> </tr> </thead> <tbody> <tr><td>1</td><td>C</td><td>21</td><td>C</td></tr> <tr><td>2</td><td>2</td><td>22</td><td>37</td></tr> <tr><td>3</td><td>4</td><td>23</td><td>35</td></tr> <tr><td>4</td><td>6</td><td>24</td><td>33</td></tr> <tr><td>5</td><td>8</td><td>25</td><td>31</td></tr> <tr><td>6</td><td>10</td><td>26</td><td>29</td></tr> <tr><td>7</td><td>12</td><td>27</td><td>27</td></tr> <tr><td>8</td><td>14</td><td>28</td><td>25</td></tr> <tr><td>9</td><td>16</td><td>29</td><td>23</td></tr> <tr><td>10</td><td>18</td><td>30</td><td>21</td></tr> <tr><td>11</td><td>20</td><td>31</td><td>19</td></tr> <tr><td>12</td><td>22</td><td>32</td><td>17</td></tr> <tr><td>13</td><td>24</td><td>33</td><td>15</td></tr> <tr><td>14</td><td>26</td><td>34</td><td>13</td></tr> <tr><td>15</td><td>28</td><td>35</td><td>11</td></tr> <tr><td>16</td><td>30</td><td>36</td><td>9</td></tr> <tr><td>17</td><td>32</td><td>37</td><td>7</td></tr> <tr><td>18</td><td>34</td><td>38</td><td>5</td></tr> <tr><td>19</td><td>36</td><td>39</td><td>3</td></tr> <tr><td>20</td><td>38</td><td>40</td><td>1</td></tr> </tbody> </table>	35 Element Array				Pin Number	Element Number	Pin Number	Element Number	1	C	21	C	2	2	22	35	3	4	23	33	4	6	24	31	5	8	25	29	6	10	26	27	7	12	27	25	8	14	28	23	9	16	29	21	10	18	30	19	11	--	31	17	12	20	32	15	13	22	33	13	14	24	34	11	15	26	35	9	16	28	36	7	17	30	37	5	18	32	38	3	19	34	39	1	20	C	40	C	38 Element Array				Pin Number	Element Number	Pin Number	Element Number	1	C	21	C	2	2	22	37	3	4	23	35	4	6	24	33	5	8	25	31	6	10	26	29	7	12	27	27	8	14	28	25	9	16	29	23	10	18	30	21	11	20	31	19	12	22	32	17	13	24	33	15	14	26	34	13	15	28	35	11	16	30	36	9	17	32	37	7	18	34	38	5	19	36	39	3	20	38	40	1	<p><b>Products:</b></p> <p><b>SL-10-1</b></p> <p>Pin 1 = Cathode Pin 6, 13 = Anode</p>
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# Mechanical Specifications

All units in inches. Pinouts are bottom view.

68 TO-18	69 TO-18	70 TO-5
<p><b>Products:</b> APD-300 APD-500</p> <p>Pin Circle Dia.=0.100</p>	<p><b>Products:</b> APD-300L APD-500L</p> <p>Pin Circle Dia.=0.100</p>	<p><b>Products:</b> APD-900 APD-1500 APD-3000</p> <p>Pin Circle Dia.=0.200</p>
71 Plastic	72 TO-8	73 TO-8
<p><b>Products:</b> CD-1705</p> <p>ANODE CATHODE</p>	<p><b>Products:</b> OSD-60-0</p> <p>CATHODE &amp; CASE ANODE</p>	<p><b>Products:</b> QD50-0</p> <p>CATHODE &amp; CASE Q4 Q3 Q2 Q1 QUADRANT ANODE 1</p>
74 Special	75 TO-5	76 Plastic Molded
<p><b>Products:</b> OSD100-0A OSD100-5TA</p> <p>RED DOT INDICATES CATHODE LEAD</p>	<p><b>Products:</b> DLS-2S</p> <p>Pin Circle Dia.= 0.200 Bottom View</p>	<p><b>Products:</b> OS-P200</p> <p>OPTICAL C</p>