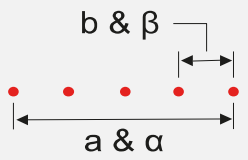
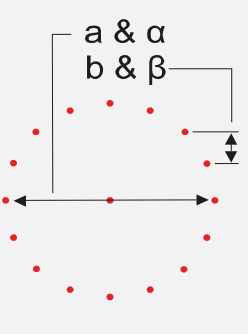


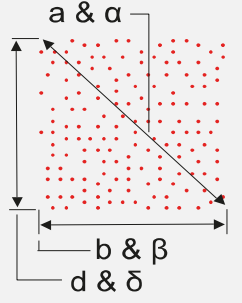
Standard Diffractive Optical Elements - Polymer

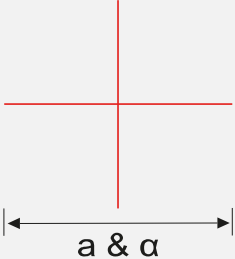
| Multi Lines | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | | | | Pattern Angles (@ Design Wavelength) | | | | Recommended Wavelength Range |
|-------------|-----------------------|------------------------|-------------------|--|-------|------|-------|--------------------------------------|---------|----------|------------|------------------------------|
| | | | | a | b | c | d | α | β | γ | δ | |
| | DE-R 198 | 31 Lines (Square) | 450 nm | 72.8 | 51.5 | 1.7 | 51.5 | 40.0° | 28.9° | 0.96° | 28.9° | 425-490 nm |
| | DE-R 213 | 11 Lines (Square) | 635 nm | 76.7 | 54.4 | 5.4 | 54.4 | 42.0° | 30.4° | 3.0° | 30.4° | 530-670 nm |
| | DE-R 233 | 7 Lines (Square) | 635 nm | 54.0 | 38.2 | 6.4 | 38.2 | 30.2° | 21.6° | 3.6° | 21.6° | 530-670 nm |
| | DE-R 250 | 5 Lines (Rectangular) | 660 nm | 55.0 | 10.9 | 2.7 | 53.9 | 30.8° | 6.2° | 1.6° | 30.2° | 590-670 nm |
| | DE-R 251 | 7 Lines (Rectangular) | 650 nm | 15.5 | 9.0 | 1.5 | 12.6 | 8.9° | 5.2° | 0.8° | 7.2° | 590-730 nm |
| | DE-R 252 | 5 Lines (Square) | 635 nm | 42.7 | 30.2 | 7.5 | 30.2 | 24.1° | 17.2° | 4.3° | 17.2° | 530-670 nm |
| | DE-R 253 | 11 Lines (Square) | 635 nm | 76.4 | 54.0 | 5.4 | 54.0 | 41.8° | 30.2° | 3.0° | 30.2° | 550-700 nm |
| | DE-R 254 | 25 Lines (Square) | 660 nm | 68.4 | 48.3 | 2.0 | 48.3 | 37.7° | 27.2° | 1.1° | 27.2° | 530-670 nm |
| | DE-R 255 | 65 Lines (Square) | 660 nm | 45.6 | 32.2 | 0.5 | 32.2 | 25.7° | 18.3° | 0.3° | 18.3° | 530-670 nm |
| | DE-R 284 | 41 Lines (Rectangular) | 660 nm | 133.4 | 104.0 | 2.6 | 78.0 | 67.4° | 54.9° | 1.4° | 42.6° | 600-700 nm |
| | DE-R 348 | 10 Lines (Rectangular) | 650 nm | 125.5 | 90.0 | 10.0 | 87.5 | 64.2° | 48.5° | 5.4° | 47.3° | 600-700 nm |
| | DE-R 350 | 15 Lines (Rectangular) | 520 nm | 65.5 | 42.1 | 3.0 | 50.2 | 36.3° | 23.8° | 1.7° | 28.2° | 480-550 nm |
| | DE-R 381 | 11 Lines (Rectangular) | 850 nm | 155.6 | 41.5 | 4.15 | 150 | 75.8° | 23.5° | 2.3° | 74.0° | 830-880 nm |
| | DE-R 386 | 3 Lines (Rectangular) | 520 nm | 50.7 | 8.0 | 4.0 | 50.0 | 28.4° | 4.6° | 2.3° | 28.1° | 490-550 nm |
| | DE-R 387 | 5 Lines (Rectangular) | 520 nm | 50.7 | 8.0 | 2.0 | 50.0 | 28.4° | 1.15° | 3.1° | 28.1° | 490-550 nm |
| | DE-R 391 | 81 Lines (Rectangular) | 650 nm | 156.0 | 128.8 | 1.6 | 93.6 | 75.9° | 63.9° | 0.8° | 50.2° | 600-700 nm |
| DE-R 392 | 3 Lines (Rectangular) | 660 nm | 54.7 | 10.8 | 5.4 | 53.6 | 30.6° | 6.2° | 3.1° | 30.0° | 600-700 nm | |


| Dot Matrix | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | | | | Pattern Angles (@ Design Wavelength) | | | | Recommended Wavelength Range |
|------------|------------|----------------|-------------------|--|------|------|------|--------------------------------------|---------|----------|----------|------------------------------|
| | | | | a | b | c | d | α | β | γ | δ | |
| | DE-R 206 | 17 x 17 Dots | 660 nm | 38.0 | 26.6 | 1.7 | 26.6 | 21.5° | 15.2° | 0.9° | 15.2° | 590-730 nm |
| | DE-R 223 | 2 x 2 + 1 Dots | 635 nm | 28.3 | 19.9 | 19.9 | 19.9 | 16.1° | 11.4° | 11.4° | 11.4° | 635 & 405 nm |
| | DE-R 231 | 101 x 101 Dots | 660 nm | 12.8 | 9.1 | 0.1 | 9.1 | 7.4° | 5.2° | 0.05° | 5.2° | 635-680 nm |
| | DE-R 241 | 21 x 21 Dots | 635 nm | 11.9 | 8.4 | 0.4 | 8.4 | 6.8° | 4.8° | 0.2° | 4.8° | 590-730 nm |
| | DE-R 242 | 16 x 16 Dots | 635 nm | 12.4 | 8.8 | 0.6 | 8.8 | 7.1° | 5.0° | 0.3° | 5.0° | 590-730 nm |
| | DE-R 243 | 17 x 17 Dots | 635 nm | 12.4 | 8.8 | 0.5 | 8.8 | 7.1° | 5.0° | 0.3° | 5.0° | 550-720 nm |
| | DE-R 244 | 13 x 13 Dots | 635 nm | 7.4 | 5.3 | 0.4 | 5.3 | 4.3° | 3.0° | 0.3° | 3.0° | 590-670 nm |
| | DE-R 257 | 51 x 51 Dots | 660 nm* | 56.9 | 40.3 | 0.8 | 40.3 | 31.8° | 22.8° | 0.5° | 22.8° | 560-720 nm |
| | DE-R 258 | 11 x 11 Dots | 635 nm* | 71.2 | 50.3 | 5.0 | 50.3 | 39.2° | 28.2° | 2.8° | 28.2° | 590-690 nm |
| | DE-R 339 | 6 x 6 Dots | 635 nm | 16.6 | 11.7 | 2.3 | 11.7 | 9.5° | 6.7° | 1.3° | 6.7° | 590-690 nm |
| | DE-R 351 | 10 x 10 Dots | 532 nm | 21.1 | 14.9 | 3.3 | 14.9 | 23.8° | 17.0° | 1.9° | 17.0° | 510-600 nm |
| | DE-R 352 | 4 x 6 Dots | 532 nm | 26.6 | 13.7 | 4.6 | 22.8 | 15.1° | 7.8° | 2.6° | 13.6° | 500-580 nm |
| | DE-R 353 | 5 x 5 Dots | 690 nm | 1.1 | 0.75 | 0.19 | 0.75 | 0.61° | 0.43° | 0.11° | 0.43° | 630-750 nm |
| | DE-R 388 | 51 x 51 Dots | 532 nm* | 46.8 | 33.1 | 0.66 | 33.1 | 26.4° | 18.8° | 0.38° | 18.8° | 500-560 nm |
| | DE-R 389 | 21 x 21 Dots | 520 nm* | 46.8 | 33.1 | 1.66 | 33.1 | 26.4° | 18.8° | 0.95° | 18.8° | 480-600 nm |

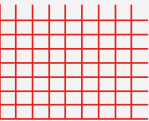
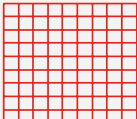
| Lines & Dot Lines | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | | Pattern Angles (@ Design Wavelength) | | Recommended Wavelength Range |
|---|------------|----------------|-------------------|--|-----|--------------------------------------|---------|------------------------------|
| | | | | a | b | α | β | |
|  | DE-R 199 | QC-Line-45@450 | 450 nm | 84 | — | 45° | — | 440-480 nm |
| | DE-R 263 | 1:5 Dot Line | 635 nm | 10.5 | 2.6 | 6° | 1.5° | 630-780 nm |
| | DE-R 264 | 1:9 Dot Line | 670 nm | 1.6 | 0.2 | 0.9° | 0.1° | 630-780 nm |
| | DE-R 265 | 1:19 Dot Line | 650 nm | 24 | 1.3 | 13.7° | 0.8° | 500-540 nm / 630-690 nm |
| | DE-R 266 | QC-Line-5@633 | 633 nm | 8.7 | — | 5° | — | 630-690 nm |
| | DE-R 267 | QC-Line-30@532 | 532 nm | 53.8 | — | 30.1° | — | 560-570 nm |
| | DE-R 281 | 1:11 Dot Line | 650 nm | 28.9 | 2.9 | 16.5° | 1.6° | 440-490 nm / 600-730 nm |
| | DE-R 282 | 1:99 Dot Line | 660 nm | 33.7 | 0.3 | 19.1° | 0.2° | 600-700 nm |
| | DE-R 283 | QC-Line-20@633 | 633 nm | 35.2 | — | 20° | — | 630-670 nm |
| | DE-R 286 | QC-Line-30@660 | 660 nm | 54.6 | — | 30.5° | — | 600-700 nm |
| | DE-R 287 | QC-Line-45@660 | 660 nm | 83.9 | — | 45.5° | — | 600-700 nm |
| | DE-R 337 | 1:99 Dot Line | 635 nm | 49.3 | 0.5 | 27.7° | 0.3° | 600-700 nm |
| | DE-R 364 | QC-Line-45@940 | 940 nm | 83.0 | — | 45.0° | — | 850-1050 nm |
| | DE-R 369 | QC-Line-36@640 | 639 nm | 65.0 | — | 36.0° | — | 600-700 nm |
| | DE-R 383 | QC-Line-51@840 | 840 nm | 95.0 | — | 50.6° | — | 790-880 nm |

| Circles & Dot Circles | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | | Pattern Angles (@ Design Wavelength) | | Recommended Wavelength Range |
|---|------------|-------------------|-------------------|--|---------|--------------------------------------|---------|------------------------------|
| | | | | a | b | α | β | |
|  | DE-R 219 | Solid Line Circle | 592 nm | 55.8 mm | — | 31.2° | — | 480-600 nm |
| | DE-R 220 | 1 : 16 Dot Circle | 515 nm | 81.9 mm | 16.1 mm | 44.5° | 9.2° | 480-532 nm |
| | DE-R 221 | 1:72 Dot Circle | 532 nm | 36.9 mm | 1.6 mm | 20.9° | 0.9° | 400-570 nm |
| | DE-R 229 | 1:36 Dot Circle | 532 nm | 6.1 mm | 0.5 mm | 3.5° | 0.3° | 480-560 nm |
| | DE-R 238 | Solid Line Circle | 520 nm | 6.0 mm | — | 3.4° | — | 520-532 nm |
| | DE-R 240 | 1:16 Dot Circle | 635 nm | 18.9 mm | 3.7 mm | 10.8° | 2.1° | 530-700 nm |
| | DE-R 268 | Solid Line Circle | 488 nm | 77.0 mm | — | 42.1° | — | 488-532 nm |

| Random Dot Patterns | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | | | Pattern Angles (@ Design Wavelength) | | | Recommended Wavelength Range |
|---|------------|-------------------------|-------------------|--|-------|-------|--------------------------------------|---------|----------|------------------------------|
| | | | | a | b | c | α | β | γ | |
|  | DE-R 332 | 33000-Dot Pseudo-Random | 830 nm* | 136.9 | 114.6 | 76.3 | 68.8° | 59.6° | 41.7° | 820-850 nm |
| | DE-R 335 | 33000-Dot Pseudo-Random | 645 nm* | 101.3 | 84.8 | 56.4 | 53.7° | 45.9° | 31.5° | 630-660 nm |
| | DE-R 372 | 40100-Dot Pseudo-Random | 850 nm* | 135.6 | 114.9 | 72.0 | 68.3° | 59.7° | 39.6° | 825-870 nm |
| | DE-R 373 | 31806-Dot Truly-Random | 830 nm* | 146.9 | 118.5 | 86.9 | 72.6° | 61.3° | 47.0° | 820-860 nm |
| | DE-R 374 | 47708-Dot Truly-Random | 830 nm* | 146.9 | 118.5 | 86.9 | 72.6° | 61.3° | 47.0° | 820-860 nm |
| | DE-R 375 | 29594-Dot Pseudo-Random | 830 nm* | 146.7 | 118.5 | 86.5 | 72.5° | 61.3° | 46.8° | 810-850 nm |
| | DE-R 384 | 51978-Dot Truly-Random | 640 nm* | 162.8 | 97.5 | 130.4 | 78.3° | 52.0° | 66.2° | 610-660 nm |
| | DE-R 385 | 101050-Dot Truly-Random | 640 nm* | 167.4 | 100.4 | 133.9 | 79.9° | 53.3° | 67.6° | 610-660 nm |

| Crosshair | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | | Recommended Wavelength Range |
|---|----------------|---|-------------------|--|------------|------------------------------|
| | | | | a | α | |
|  | DE-R 197 | Cross – 45@450 | 450 nm | 83 | 45° | 425-590 nm |
| | DE-R 205 | Cross – 5@650 | 650 nm | 8.7 | 5° | 580-660 nm |
| | DE-R 212 | Cross – 25@532 | 532 nm | 45.1 | 25.4° | 500-640 nm |
| | DE-R 214 | Cross – 2@645 | 650 nm | 3.4 | 2.0° | 600-645 nm |
| | DE-R 218 | Cross – 15@640 | 640 nm | 26.3 | 15.0° | 500-640 nm |
| | DE-R 239 | Cross – 5@520 | 520 nm | 8.7 | 5.0° | 488-600 nm |
| | DE-R 245 | Cross – 10@633 | 633 nm | 17.5 | 10.0° | 570-690 nm |
| | DE-R 246 | Cross with surrounding high contrast area -@633 | 633 nm | 17.5 | 10.0° | 530-670 nm |
| | DE-R 247 | Cross – 25@645 | 645 nm | 44.3 | 25.0° | 600-800 nm |
| | DE-R 248 | Cross – 37@645 | 645 nm | 66.8 | 37.0° | 630-700 nm |
| | DE-R 249 | Cross – 45@633 | 633 nm | 83.0 | 45.0° | 620-700 nm |
| | DE-R 270 | Cross – 30@640 | 640 nm | 53.6 | 30.0° | 590-690 nm |
| | DE-R 280 | Cross – 60@635 | 635 nm | 115.5 | 60.0° | 580-690 nm |
| | DE-R 289 | Cross – 15@520 | 520 nm | 26.4 | 15.0° | 480-550 nm |
| | DE-R 299 | Cross – 75@650 | 650 nm | 153.5 | 75.0° | 580-690 nm |
| | DE-R 340 | Cross – 60@450 | 450 nm | 116.1 | 60.3° | 420-520 nm |
| | DE-R 342 | Cross – 52@515 | 515 nm | 97.6 | 52.0° | 440-540 nm |
| DE-R 382 | Cross – 30@450 | 450 nm | 53.6 | 30.0° | 440-480 nm | |

| Viewfinder | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | Pattern Angles (@ Design Wavelength) | Recommended Wavelength Range |
|---|------------|---------------------------------|-------------------|--|---|------------------------------|
|  | DE-R 215 | Viewfinder | 645 nm | Width (=b): 27mm Height (=c): 17.7 mm Diagonal (=a): 32 mm | Width (=β): 15.5° Height (=γ): 10.1° Diagonal (=α): 18.2° | 570-750 nm |
|  | DE-R 234 | Viewfinder (Lines Square) | 633 nm* | Width (=b): 61 mm Height: 61 mm Diagonal (=a): 86 mm | Width (=β): 34° Height: 34° Diagonal (=α): 47° | 590-730 nm |
|  | DE-R 260 | Viewfinder (Circle + Cross) | 645 nm | Width Cross (=a): 37 mm Circle Ø (=b): 18.3 mm | Width Cross (=α): 21° Circle Ø (=β): 10.5° | 570-750 nm |
|  | DE-R 261 | Viewfinder (Dot Circle + Cross) | 635 nm | Width Cross (=a): 11 mm Circle Ø (=b): 8.8 mm Dot Spacing (=c): 1.1 mm | Width Cross (=α): 6.3° Circle Ø (=β): 5° Angle betw. Dots (=γ): 0.63° | 570 -750 nm |
|  | DE-R 262 | Viewfinder (Dot Square) | 532 nm | Width (=b): 12.3 mm Height (=c): 12.3 mm Diagonal (=a): 17.4 mm Dot Spacing: 0.5 mm | Width: 7.0° Height: 7.0° Diagonal: 10.0° Angle betw. Dots: 0.3° | 480-670 nm |
|  | DE-R 288 | Viewfinder | 650 nm | Width: 83.0 mm Height: 53.7 mm Diagonal: 98.9 mm | Width: 43.7° Height: 27.9° Diagonal: 52.6° | 590-730 nm |
|  | DE-R 345 | Viewfinder (Circle + Cross) | 520 nm | Width Cross: 49.9 mm Circle Ø: 24.6 mm | Width Cross: 28.0° Circle Ø: 14.0° | 500-540 nm |
|  | DE-R 394 | Viewfinder | 520 nm | Width: 65.9 mm Height: 65.9 mm Diagonal: 93.2 mm | Width: 36.5° Height: 36.5° Diagonal: 50.0° | 500-540 nm |

| Special Pattern | DOE Item # | Description | Design Wavelength | Pattern Size @ 100 mm Distance, Values: mm | Pattern Angles (@ Design Wavelength) | Recommended Wavelength Range |
|---|------------|---------------------------|-------------------|---|---|------------------------------|
|  | DE-R 236 | Solid Line Square | 633* nm | Width: 60.2 mm Height: 60.2 mm Diagonal: 85 mm | Width: 33.5° Height: 33.5° Diagonal: 46° | 530-650 nm |
|  | DE-R 256 | Square Grid 51 x 51 Lines | 660 nm* | Width: 39 mm Height: 39 mm Diagonal: 55 mm Line Spacing: 0.77 mm | Width: 22° Height: 22° Diagonal: 31° Angle betw. Lines: 0.44° | 530-660 nm |
|  | DE-R 259 | 5 Rings | 645 nm | Width: 51 mm Line Spacing: 5.1 mm | Width: 29° Lines Spacing: 2.8° | 530-700 nm |
|  | DE-R 269 | 10 Rings | 515 nm | Width: 96.2 mm Line Spacing: 4.8 mm | Width: 51.4° Lines Spacing: 2.6° | 488-532 nm |
|  | DE-R 285 | Hexagon | 780 nm | Width: 13.1 mm | Width: 7.5° | 520-800 nm |
|  | DE-R 354 | Square Grid 10x10 Lines | 658 nm | Width: 72.8 mm Height: 72.8 mm Diagonal: 102.9 mm Line Spacing: 8.1 mm | Width: 40.0° Height: 40.0° Diagonal: 51.4° Angle betw. Lines: 4° | 620-680 nm |
|  | DE-R 396 | 21x11 Hexagonal Array | 660 nm* | Width: 61.1 mm Height: 35.3 mm Diagonal: 70.5 mm Dot Spacing: 3.5 mm | Width: 34.0° Height: 20.0° Diagonal: 38.8° Angle betw. Lines: 2.0° | 600-730 nm |
|  | DE-R 397 | 11x10 Hexagonal Array | 660 nm* | Width: 44.4 mm Height: 46.2 mm Diagonal: 64.1 mm Dot Spacing: 5.1 mm | Width: 25.1° Height: 26.0° Diagonal: 35.5° Angle betw. Lines: 2.9° | 600-730 nm |



DE-R 399

5 Rings

450 nm

Width: 51 mm
Line Spacing: 7.3 mm

Width: 40.0°
Line Spacing: 4.0°

400-500 nm