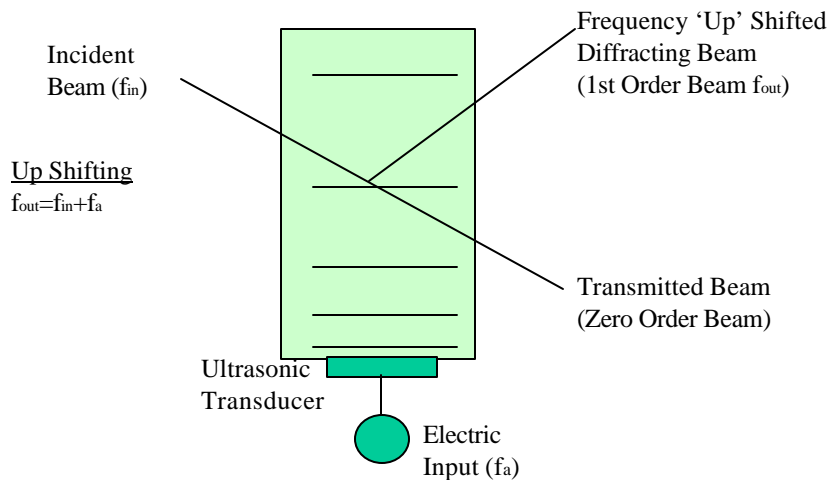
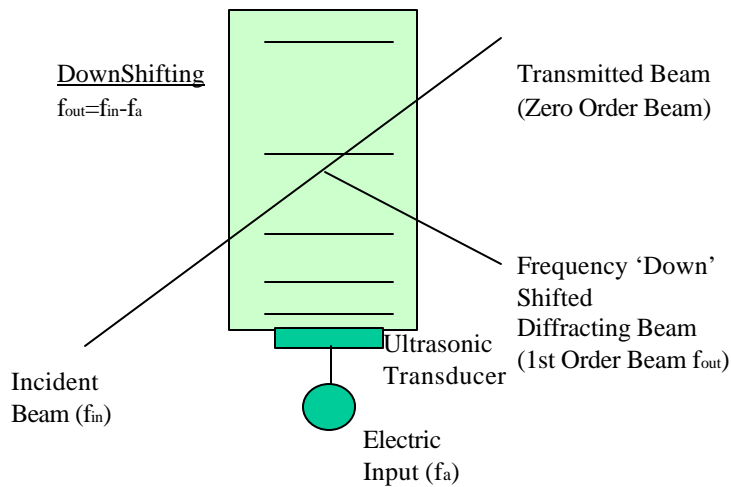




## Acousto-Optic Frequency Shifter

The diffracted beam of the AOM and AOD is also shifted in frequency (wavelength), by the the acoustic beam. This is called the Doppler shift. If the incident acoustic wave is introduced in the direction of the incident optical wave, the laser frequency shifts towards the higher side. If the incident acoustic wave is introduced in the apposite direction of the incident optical wave, the laser shifts towards the lower frequency side



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## Frequency Shifter Model Table

| Model Number  | Driver Number | Spectral Range (nm) | DE % | Shift MHz | Active Aperture (nm) | Material |
|---------------|---------------|---------------------|------|-----------|----------------------|----------|
| AMF-90-2-2.1  | FFF-90        | 1000-2200           | 15   | 90        | 1.00                 | AM       |
| AMF-55-1.3    | FFF-55        | 1000-2200           | 80   | 55        | 2.00                 | AM       |
| AMF-100-1.3   | FFF-100       | 1000-2200           | 80   | 100       | 2.00                 | AM       |
| GEF-40-10     | FFF-40        | 2000-12000          | 75   | 40        | 2.00                 | Ce       |
| GEF-60-1.5    | FFF-60        | 2000-12000          | 75   | 60        | 1.5                  | Ce       |
| GEF-80-20     | FFF-80        | 2000-12000          | 70   | 80        | 1.00                 | Ce       |
| GPF-250-100   | FFF-250       | 590-1000            | 60   | 250       | 0.75                 | GaP      |
| GPF-650-225   | FFF-250       | 590-1000            | 50   | 650       | 0.18                 | GaP      |
| GPF-1000-500  | FFF-1000      | 590-1000            | 40   | 1000      | 0.076                | GaP      |
| GPF-1500-1000 | FFF-1500      | 590-1000            | 10   | 1500      | 0.076                | GaP      |
| GPF-1700-500  | FFF-1700      | 590-1000            | 30   | 1700      | 0.076                | GaP      |
| IPF-200-50    | FFF-200       | 1000-1600           | 40   | 200       | 0.75                 | InP      |
| IPF-400-200   | FFF-400       | 1000-1600           | 35   | 400       | 0.5                  | InP      |
| IPF-600-200   | FFF-600       | 1000-1600           | 30   | 600       | 0.18                 | InP      |
| IPF-800-300   | FFF-800       | 1000-1600           | 20   | 800       | 0.076                | InP      |
| IPF-1000-350  | FFF-1000      | 1000-1600           | 15   | 1000      | 0.076                | InP      |
| IPF-1300-400  | FFF-1300      | 1000-1600           | 10   | 1300      | 0.076                | InP      |

| Model Number  | Driver Number | Spectral Range (nm) | DE % | Shift MHz | Active Aperture (nm) | Material |
|---------------|---------------|---------------------|------|-----------|----------------------|----------|
| LNF-2500-1000 | FFF-2500      | 630/830             | 20   | 2500      | 0.076                | LiNBO3   |
| LNF-3500-1000 | FFF-3500      | 630                 | 5    | 3500      | 0.076                | LiNBO3   |
| QZF-80-20     | FFF-80        | 200-4500            | 75   | 80        | 1.0                  | SiO2     |
| QZF-150-30    | FFF-150       | 200-4500            | 75   | 150       | 0.75                 | SiO2     |
| QZF-210-40    | FFF-210       | 200-4500            | 75   | 210       | 0.50                 | SiO2     |
| TEF-200-50    | FFF-200       | 400-840             | 60   | 200       | 0.75                 | TEO2     |
| TEF-270-100   | FFF-270       | 400-840             | 60   | 270       | 0.75                 | TEO2     |
| TEF-540-200   | FFF-540       | 400-840             | 40   | 540       | 0.18                 | TEO2     |
| TEF-600-400   | FFF-600       | 400-800             | 40   | 600       | 0.18                 | TEO2     |
| TEF-1000-300  | FFF-1000      | 400-840             | 40   | 1000      | 0.076                | TEO2     |
| TEF-1700-350  | FFF-1700      | 400-480             | 15   | 1700      | 0.076                | TEO2     |



## IR Frequency Shifter (1 to 2.5 mm)

| Specifications                 | AMF-55-1.3          | AMF-100-1.3         | AMF-90-20-2.1       |
|--------------------------------|---------------------|---------------------|---------------------|
| Optical Wavelength             | 1300 nm             | 1300 nm             | 2100 nm             |
| Optical Power Density          | 3 W/mm <sup>2</sup> | 3 W/mm <sup>2</sup> | 3 W/mm <sup>2</sup> |
| Bandwidth (3dB)                | 55 MHz              | 100 MHz             | 20 MHz              |
| Active Aperture                | 2 mm                | 2 mm                | 1.00 x 5.0 mm       |
| Frequency Shift                | 55 MHz              | 100 MHz             | 90 MHz              |
| Optical Transmission           | > 95 %              | > 95 %              | > 66 % (uncoated)   |
| Maximum Diffraction Efficiency | 80 %                | 80 %                | 15 %                |
| Wave Front Distortion          | $\lambda/10$        | $\lambda/10$        | $\lambda/10$        |
| Acoustic Velocity              | 25 mrad             | 25 mrad             | 37.5 mrad           |
| Maximum RF Power               | 50 mrad             | 50 mrad             | 75 mrad             |
| Input Impedance                | 2.52E+3 m/sec       | 2.52E+3 m/sec       | 2.52E+3 m/sec       |
| V.S.W.R.                       | ~1 W                | ~1 W                | ~1 W                |
| Optical Polarization           | 50 ohms             | 50 ohms             | 50 ohms             |
| Case Type                      | 2:1                 | 2:1                 | 2:1                 |
|                                | Any                 | Any                 | Linear              |
|                                | Air Cooled          | Air Cooled          | Air Cooled          |

## IR Frequency Shifter (2 to 11 mm)

| Item                           | Unit      | GEF-40-10    | GEF-60-1.5   | GEF-80-20    |
|--------------------------------|-----------|--------------|--------------|--------------|
| Laser Wavelength               | um        | 10.6         | 10.6         | 10.6         |
| Active Aperture                | mm        | 2.0          | 1.5          | 1.0          |
| Frequency Shift                | MHz       | 40           | 60           | 80           |
| Bandwidth (3dB)                | MHz       | 10           | 15           | 20           |
| Optical Transmission           | %         | >85          | >85          | >85          |
| Maximum Diffraction Efficiency | % @ watts | 75 @ 35      | 75 @ 35      | 75 @ 30      |
| Acoustic Mode                  | -         | Longitudinal | Longitudinal | Longitudinal |
| Acoustic Velocity              | m/sec     | 5.5 E+3      | 5.5 E+3      | 5.5 E+3      |
| Maximum Electric Input         | watts     | 50           | 50           | 50           |
| Input Impedance                | ohms      | 50           | 50           | 50           |
| V.S.W.R.                       | -         | 2.0:1        | 2.0:1        | 2.0:1        |
| Optical Polarization           |           | Linear       | Linear       | Linear       |
| Case Type                      |           | G            | G            | G            |

\*-the exact RF power requirement will be defined during final test of fabricated device.



## High Speed VIS-NIR Frequency Shifter (.6-1.6 mm)

| Item                       | Unit  | GPF-250-100  | GPF-650-225  | GPF-1000-500 |
|----------------------------|-------|--------------|--------------|--------------|
| Laser Wavelength           | nm    | 633          | 633          | 633          |
| Active Aperture            | mm    | 0.75         | 0.18         | 0.076        |
| Frequency Shift            | MHz   | 250          | 650          | 1000         |
| Bandwidth (3dB)            | MHz   | 100          | 225          | 500          |
| Optical Transmission       | %     | 80           | 80           | 80           |
| Maximum Diffraction Effic. | %     | 60           | 50           | 60           |
| Acoustic Mode              | -     | Longitudinal | Longitudinal | Longitudinal |
| Acoustic Velocity          | m/sec | 6.31E+3      | 6.31E+3      | 6.31E+3      |
| Maximum Electric Input     | watts | 1            | 1            | 1            |
| Input Impedance            | ohms  | 50           | 50           | 50           |
| V.S.W.R.                   | -     | 2.0:1        | 2.0:1        | 2.0:1        |
| Optical Polarization       | -     | Linear       | Linear       | Linear       |
| Case Type                  |       | A            | A            | A            |

## High Speed VIS-NIR Frequency Shifter (.6-1.6 mm)

| Item                       | Unit  | GPF-1500-100 | GPF-1700-500 |
|----------------------------|-------|--------------|--------------|
| Laser Wavelength           | nm    | 633          | 633          |
| Active Aperture            | mm    | 0.076        | 0.076        |
| Frequency Shift            | MHz   | 1500         | 1700         |
| Bandwidth (3dB)            | MHz   | 1000         | 500          |
| Optical Transmission       | %     | 80           | 80           |
| Maximum Diffraction Effic. | %     | 20           | 50           |
| Acoustic Mode              | -     | Longitudinal | Longitudinal |
| Acoustic Velocity          | m/sec | 6.31E+3      | 6.31E+3      |
| Maximum Electric Input     | watts | 1            | 1            |
| Input Impedance            | ohms  | 50           | 50           |
| V.S.W.R.                   | -     | 2.0:1        | 2.0:1        |
| Optical Polarization       | -     | Linear       | Linear       |
| Case Type                  |       | A            | A            |

\* - the required optical polarization direction is parallel to the sound direction (horizontal).

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## High Speed IR Frequency Shifter (1.0-1.6 mm)

| Item                      | Unit  | IPF-200-50   | IPF-400-200  | IPF-600-200  |
|---------------------------|-------|--------------|--------------|--------------|
| Laser Wavelength          | nm    | 1150         | 1150         | 1150         |
| Active Aperture           | mm    | 0.75         | 0.5          | 0.18         |
| Frequency Shift           | MHz   | 200          | 400          | 600          |
| Bandwidth (3dB)           | MHz   | 50           | 200          | 200          |
| Optical Transmission      | %     | 90           | 90           | 90           |
| Maximum Diffraction Effc. | %     | 40-50        | 35           | 30           |
| Acoustic Mode             | -     | Longitudinal | Longitudinal | Longitudinal |
| Acoustic Velocity         | m/sec | 5.1E+3       | 5.1E+3       | 5.1E+3       |
| Maximum Electric Input    | watts | 1            | 1            | 1            |
| Input Impedance           | ohms  | 50           | 50           | 50           |
| V.S.W.R.                  | -     | 2.0:1        | 2.0:1        | 2.0:1        |
| Optical Polarization      | -     | Linear       | Linear       | Linear       |
| Case Type                 |       | A            | A            | A            |

## High Speed IR Frequency Shifter (1.0-1.6 mm)

| Item                      | Unit  | IPF-800-300  | IPF-1000-350 | IPF-1300-400 |
|---------------------------|-------|--------------|--------------|--------------|
| Laser Wavelength          | nm    | 1150         | 1150         | 1150         |
| Active Aperture           | mm    | 0.076        | 0.076        | 0.076        |
| Frequency Shift           | MHz   | 800          | 1000         | 1300         |
| Bandwidth (3dB)           | MHz   | 300          | 350          | 400          |
| Optical Transmission      | %     | 90           | 90           | 90           |
| Maximum Diffraction Effc. | %     | 20           | 15           | 10           |
| Acoustic Mode             | -     | Longitudinal | Longitudinal | Longitudinal |
| Acoustic Velocity         | m/sec | 5.1E+3       | 5.1E+3       | 5.1E+3       |
| Maximum Electric Input    | watts | 1            | 1            | 1            |
| Input Impedance           | ohms  | 50           | 50           | 50           |
| V.S.W.R.                  | -     | 2.0:1        | 2.0:1        | 2.0:1        |
| Optical Polarization      | -     | Linear       | Linear       | Linear       |
| Case Type                 |       | A            | A            | A            |

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## High Bandwidth VIS-IR Frequency Shifter (.6-1.6 mm)

| Item                      | Unit  | LNF-2500-1000 | LNF-3500-1000 |
|---------------------------|-------|---------------|---------------|
| Laser Wavelength          | nm    | 830           | 830           |
| Active Aperture           | mm    | 0.076         | 0.076         |
| Frequency Shift           | MHz   | 2500          | 3500          |
| Bandwidth (3dB)           | MHz   | 1000          | 1000          |
| Optical Transmission      | %     | >95           | >95           |
| Maximum Diffraction Effc. | %     | 15            | 5             |
| Acoustic Mode             | -     | Shear         | Shear         |
| Acoustic Velocity         | m/sec | 4.7E+3        | 4.7E+3        |
| Maximum Electric Input    | watts | 0.2           | 0.2           |
| Input Impedance           | ohms  | 50            | 50            |
| V.S.W.R.                  | -     | 2.1:1         | 2.1:1         |
| Optical Polarization      | -     | Linear        | Linear        |
| Case Type                 |       | A             | A             |

## UV-VIS-IR Frequency Shifter (.2-4.5 mm)

| Item                      | Unit      | QZF-80-20    | QZF-150-30   | QZF-210-40   |
|---------------------------|-----------|--------------|--------------|--------------|
| Laser Wavelength          | nm        | 488          | 488          | 488          |
| Active Aperture           | mm        | 1.0          | 0.75         | 0.5          |
| Frequency Shift           | MHz       | 80           | 150          | 210          |
| Bandwidth (3dB)           | MHz       | 20           | 30           | 40           |
| Optical Transmission      | %         | >98          | >98          | >98          |
| Maximum Diffraction Effc. | % @ watts | 75 @ 10      | 75 @ 10      | 75 @ 10      |
| Acoustic Mode             | -         | Longitudinal | Longitudinal | Longitudinal |
| Acoustic Velocity         | m/sec     | 5.72E+3      | 5.72E+3      | 5.72E+3      |
| Maximum Electric Input    | watts     | 10           | 10           | 10           |
| Input Impedance           | ohms      | 50           | 50           | 50           |
| V.S.W.R.                  | -         | 2.0:1        | 2.0:1        | 2.0:1        |
| Optical Polarization      | -         | Linear       | Linear       | Linear       |
| Case Type                 | -         | -            | -            | -            |

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## High Speed UV-VIS-IR Frequency Shifter (.4-5 mm)

| Item                      | Unit  | TEF-200-50   | TEF-270-100  | TEF-540-200  |
|---------------------------|-------|--------------|--------------|--------------|
| Laser Wavelength          | nm    | 630          | 630          | 630          |
| Active Aperture           | mm    | 0.75         | 0.75         | 0.18         |
| Frequency Shift           | MHz   | 200          | 270          | 540          |
| Bandwidth (3dB)           | MHz   | 50           | 100          | 200          |
| Optical Transmission      | %     | >95          | >95          | >95          |
| Maximum Diffraction Effc. | %     | >75          | >70          | 40           |
| Acoustic Mode             | -     | Longitudinal | Longitudinal | Longitudinal |
| Acoustic Velocity         | m/sec | 4.2E+3       | 4.2E+3       | 4.2E+3       |
| Maximum Electric Input    | watts | 1            | 1            | 1            |
| Input Impedance           | ohms  | 50           | 50           | 50           |
| V.S.W.R.                  | -     | 2.0:1        | 2.0:1        | 2.0:1        |
| Optical Polarization      | -     | Linear       | Linear       | Linear       |
| Case Type                 | -     | -            | -            | -            |

| Item                      | Unit  | TEF-600-200  | TEF-1000-300 | TEF-1700-350 |
|---------------------------|-------|--------------|--------------|--------------|
| Laser Wavelength          | nm    | 630          | 630          | 630          |
| Active Aperture           | mm    | 0.18         | 0.076        | 0.076        |
| Frequency Shift           | MHz   | 600          | 1000         | 1700         |
| Bandwidth (3dB)           | MHz   | 200          | 300          | 350          |
| Optical Transmission      | %     | >95          | >95          | >95          |
| Maximum Diffraction Effc. | %     | 40           | 40           | 20           |
| Acoustic Mode             | -     | Longitudinal | Longitudinal | Longitudinal |
| Acoustic Velocity         | m/sec | 4.2E+3       | 4.2E+3       | 4.2E+3       |
| Maximum Electric Input    | watts | 1            | 1            | 1            |
| Input Impedance           | ohms  | 50           | 50           | 50           |
| V.S.W.R.                  | -     | 2.0:1        | 2.0:1        | 2.0:1        |
| Optical Polarization      | -     | Linear       | Linear       | Linear       |
| Case Type                 | -     | -            | -            | -            |





## Instructions for RF Drivers

Brimrose offers a large variety of RF Drivers compatible with our Acousto-Optic components. The following instructions will help you choose and pick the proper driver for your application. If there are any questions please contact Brimrose Corporation of America.

### Fixed Frequency Driver Guide

