

Functional Flat Fiber (FFF)

Reinventing LGP: Functional Flat Fiber (FFF) With Microprismatic Exfractors™

In cooperation with one of its manufacturing partners Visus has developed unique 0.1-0.2mm FFF lightguides (also referred as LGF – lightguiding film), which will fundamentally change backlighting technology by producing BLU with a thickness of a customary optical film. These new BLU are ideally suited for LED lamps undergoing rapid miniaturization.

FFF multilayer lightguide is basically different from a common PMMA plate. It represents a planar analog of a well-known cylindrical optical fibers used in telecommunications and some lighting applications. It has a number of key practical benefits:

- **With a thickness of just 0.1 – 0.4 mm FFF can be effectively coupled to the latest HB ultra-compact SMT LEDs and reduce device profile & weight. Customary compression molding is relatively slow and cannot produce less than 0.4 – 0.6 mm thick LGP.**
- **FFF with a light Extraction micro-array is manufactured by a continuous (roll to roll) high performance microreplication methods (5 – 50 m/s) drastically reducing manufacturing cost & time. Millions FFF can be produced within a few shifts.**
- **Higher collimation around Line-Of-Sight.**
- **Flexible. Can be used in future flexible LCDs.**
- **FFF can be directly bonded or laminated to any metal or plastic substrate of any color including BLACK without seriously degrading its optical performance. Can simplify mechanical mounting directly on walls, doors etc.**
- **Enhanced handling & scratch & dust & humidity & UV resistance. Any scratches, dust deposition, water drops produce uncontrollable leakage of light reducing BLU luminance. Our FFF is free of all mentioned shortcomings, as the light propagates inside an optically protected “core”.**
- **Ideal for outdoor applications – no degradation under rain, strong UV radiation.**



Figure 16. Enlarged image of 0.2mm FFF with uniform luminance. Dot size 30-50um.



Figure 17. FFF with letter "T" for EXIT sign with directional microlens extractors.