

L-band erbium-doped fiber amplifier pumped by 1455 nm laser source for repeaterless transmission systems

ABSTRACT

This experiment was conducted to observe the characteristics of an L-band erbium-doped amplifier (EDFA) to study the gain and noise figure performances under limited pumping power. For this particular experiment, an erbium-doped fiber (EDF) of 12 meters length with an absorption coefficient of 34 dB/m at 1530 nm, an absorption coefficient of 12 dB/m at 1480 nm, a cut-off wavelength at 1400 nm and a numerical aperture of 0.21 was utilized as the amplification medium. An input signal of 1569 nm was supplied by a tunable laser source (TLS) and its power was fixed at -20 dBm and -25 dBm. A 1455 nm laser source was pumped into the erbium-doped fiber through a wavelength selective filter (W1) as shown in figure 1. A second wavelength selective filter (W2) was connected to the end of the erbium-doped fiber to separate the pump light from the sought amplified L-band output. The results obtained from the experiment showed that the gain started to saturate after 52.9 mW pump power for both input signals of -20 dBm and -25 dBm. The gain coefficient was also calculated from the outcome and from our findings; the pump power of 52.9 mW produced the highest gain coefficient values of 0.360 dB/mW for -20 dBm input and 0.364 dB/mW for -25 dBm input.