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(73) 1가 20 2 802
403 105 1001

(72) 1가20 2 802
11 196 - 278

(74)
:

(54)

SNR (SNR) , 가

1a 1e ;
 2 ;
 3a 3d 2 ,
 ;
 4a 4b , 50m 가 2 1
 가 ;
 5 .

1970 1980 , 가
 , (Er - Doped Fiber Amplifier; 'EDFA') 가
 가 (Watt)
 가 ,
 Multiplexing; 'WDM') 가 (Wavelength - Division Mult
 EDFA
 가 (Stimulated Raman Scattering; 'SRS') , 1972
 (all - optical) ,
 EDFA , 3dB 75nm
 가
 , (bit error rate)
 (signal - to - noise ratio; 'SNR') , (Rayleigh scatte
 ring) SNR 가
 , 30dB .
 (amplified spontaneous emission; 'ASE') , DWDM
 (Dense WDM) 가
 , EDFA 3 ASE SNR SNR 2
 가 3dB .

SNR

가 ;
 1 ;
 2 ;
 1 ;
 GeO₂가
 10 %~30 % ;
 2 ;
 1 ;
 (temporal domain) ;
 ifier; 'GDRA' ;
 가 ;
 NRZ(Non - Return to Zero) ; RZ(Return to Zero)
 가 ; ASE ;
 , ASE ;
 ASE ; WDM ;
 2 ;
 man Optical Noise Filter; 'RONF' ;
 1a ; 1064nm ; (Nd) ; 1a ; 1e ; (Ra
 (I_p) ; 가 ; (I_p) ; 1120nm ; 1
 (I_{s1}) ; 1b ; 1 ; (I_{s1}) ;
 1180nm ; 2 ; (I_{s2}) ;
 (I_p), (I_{s1}), (I_{s2}) ;
 , 13THz 5THz ; (shift)
 , 1420nm, 1507 ± 20nm ; 161
 5 ± 22nm, 1453nm, 1555nm 1665nm ;
 가 , 1 ;
 가 ;
 가 ;
 1d 1e 2 ; (I_{s2}) ; 가 ;
 1d 1e , 2 ; (I_{s2})가 ;
 SNR ;

2 GDRA 2 (210)
 (220) (230) (I_p) (220) (I_p) 1064
 (210) 40W, 810nm CW(Continuous Wave) 가 (I_p)
 nm, 10W Nd
 (230) (I_p) (I_{s1}) (I_{s2}) 1 WDM (2
 40) (I_p), (I_{s1}) (I_{s2}) (I_{s2}) (I_{s1})가 2 WDM (230)
 (walk - off) (I_{s1})가 2 WDM (250)
 (nanoseconds) , 1064nm
 가 2ps/nm , 7ns 가 35km ,
 35km (230)
 (I_{s2}) (I_p), 1 (I_{s1}) 2
 (230) (z)
 1 3

1

$$\frac{dI_P}{dz} = -\frac{\omega_P}{\omega_{S1}} g_R I_{S1} I_P - \alpha_P I_P$$

2

$$\frac{dI_{S1}}{dz} = g_R I_{S1} I_P - \frac{\omega_{S1}}{\omega_{S2}} g_P I_{S2} I_{S1} - \alpha_{S1} I_{S1}$$

3

$$\frac{dI_{S2}}{dz} = g_R I_{S2} I_{S1} - \alpha_{S2} I_{S2}$$

, g_R 1064nm (P) , P_P, S1_{S1} S2_{S2} , 1
 , 2 , P_P, S1_{S1} S2_{S2} , 1
 , 2
 (non - polarization maintaining) 1064nm
 4.43 × 10⁻¹² cm/W , (1+80) 가
 GeO2가 20 % (; DX
 - C617 - 0A) , 0.0181 가 , 1.084 × 10⁻¹¹
¹¹ cm/W , 2.6μm, (cutoff wavelength) 980nm, 1064nm
 3.17μm , 4 가
 (P_P) 1064nm
 2.68dB/km , 1 2 (S1_{S1} , S2_{S2})

10W, 1mW 1W (contrast rati
 o)가 100 (inverted) 1 2
 , 1 2
 , 2 1
 가

3a 3d 200m
 P_{S1} (OFF) P_{S2} (OFF) P_{S1} (ON) P_{S2} (ON)
 63m 83m 1 P_{S2} (ON) P_{S2} (OFF)가 0
 1 (P) 90% 1
 가 200m

P_{S2} (ON)가 1W, P_{S2} (OFF)가 10mW 3c 3d
 가 2 1
 가 0 113m 103m 2
 90%
 P_{S1} (ON) P_{S1} (OFF) P_{S2} (OFF)가
 가 P_{S2} 가
 P_{S2} (OFF)가 P_{S2} (ON) P_{S1} (ON) P_{S1} (OFF)가 SNR P_{S2} 가
 가 P_{S1} (ON) SNR
 , 50m 2 가 1
 가 4a 4b SNR 100, P_{S1} (ON)
 1.0mW

4a P_{S2} 가 , P_{S1} (OFF) P_{S1} (ON) 0.222W 6.432W SNR 28.97
 , 1 (inverted) 2 가 4b
 4b P_{S2} 가 , P_{S1} (OFF) P_{S1} (ON) 0.078W 6.328W SNR
 81.13 P_{S2} 가 2.8

5 (I_{S2})
 가 가 5 가 가
 SNR 가 , 2 (I_{S2})가 가 SNR
 가 가 , 2 (I_{S2})가 가 35m
 SNR 가 186.1 , 2
 (I_{S2})가 가 SNR 2.2
 ON) 30dB 1.02W , GDRA P_{S1} (AS
 E 가 가 가 1W
 가 가 1550nm

SNR

가

(57)

1.

, 가

;

;

1

;

1

2

;

1

2.

1

,

가

.

3.

2

, GeO2가

10 %~30 %

.

4.

, 가

;

;

1

;

1

2

;

1

5.

4

,

1

가

,

2

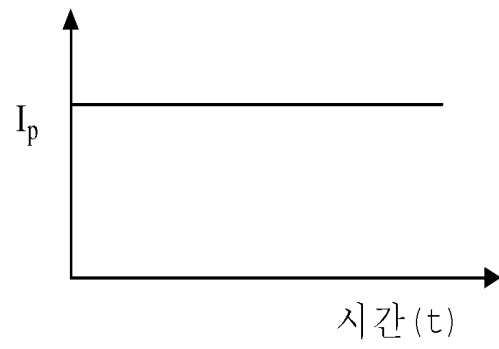
가

1

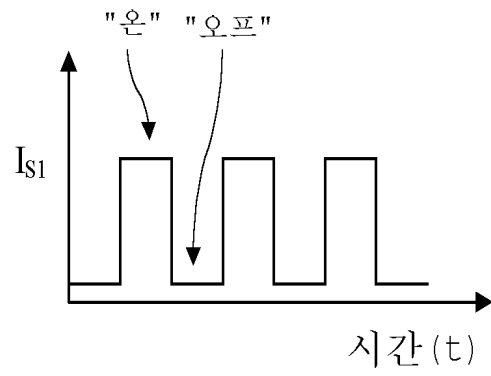
,

.

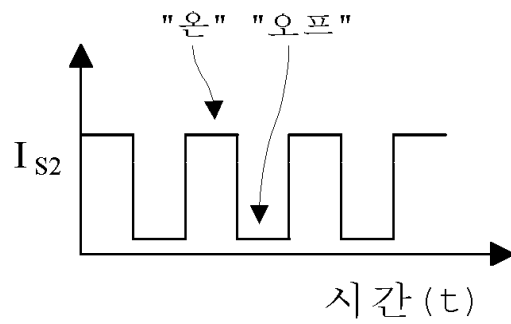
1a



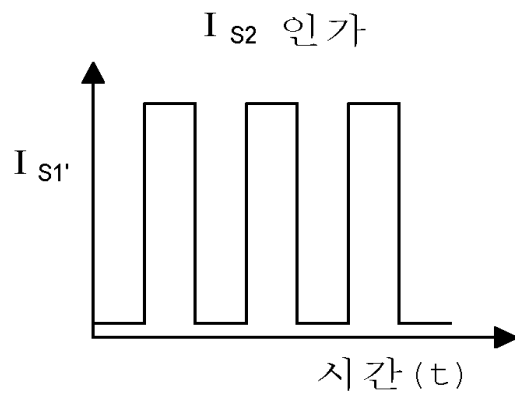
1b



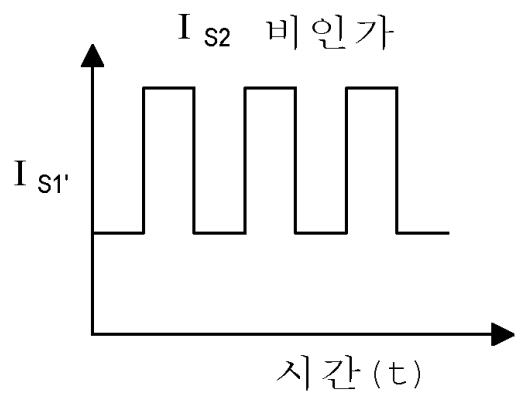
1c



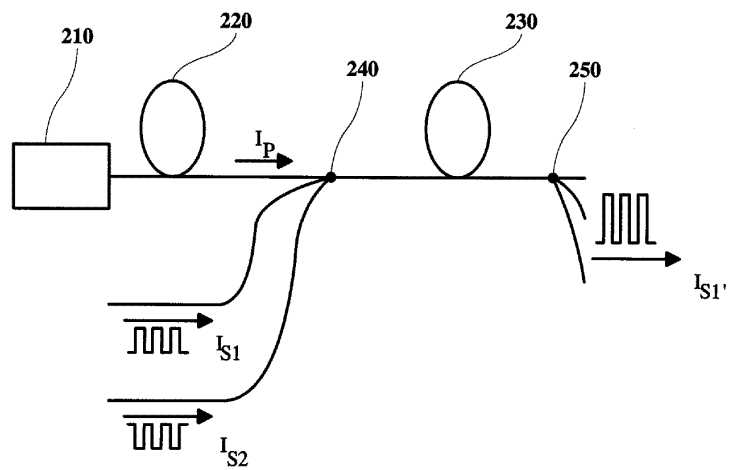
1d



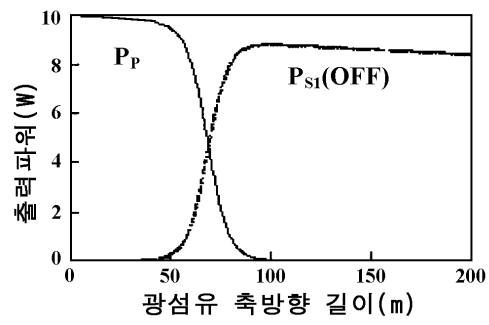
1e



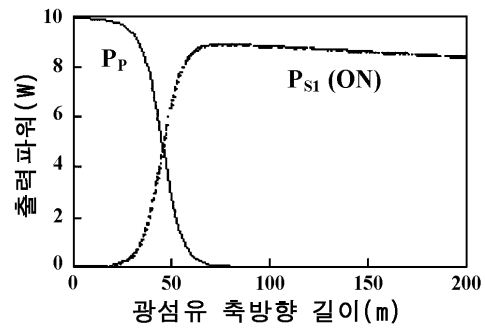
2



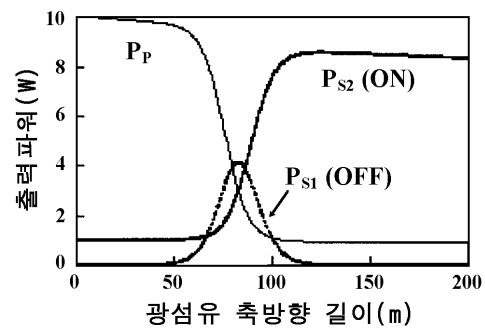
3a



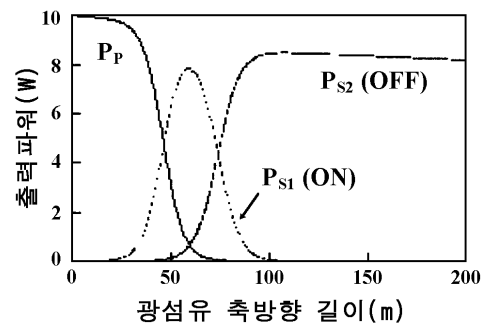
3b



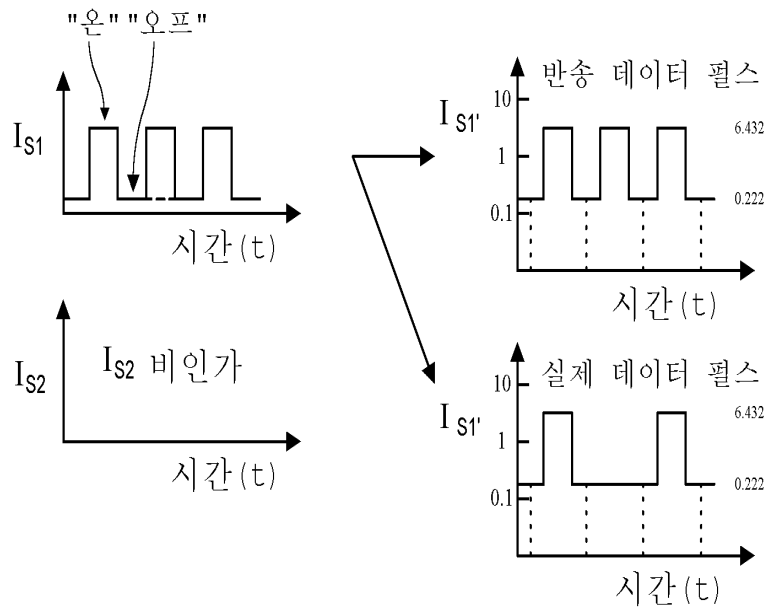
3c



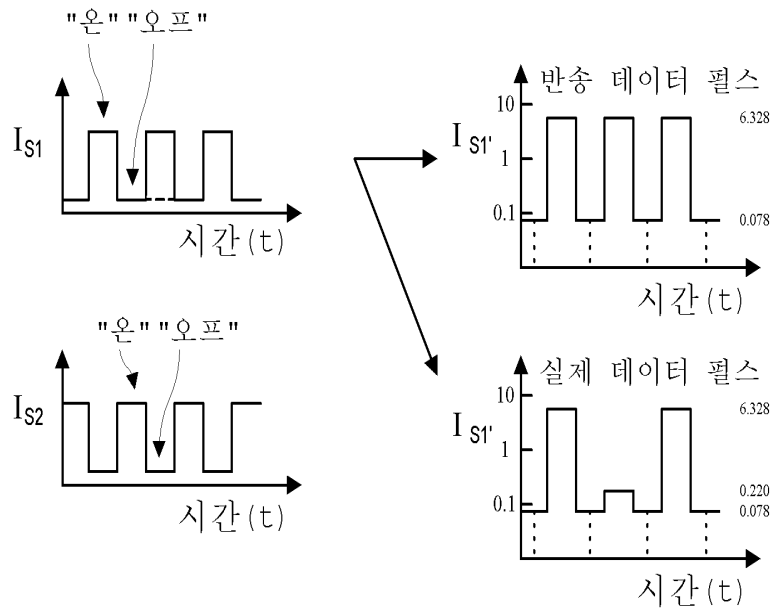
3d



4a



4b



5

