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WF-1310-10G

Wafer for Fabrication of Temperature Stable High-Speed Lasers at 1240-1320nm

Features:

- Quantum dot (QD) active area
- 1240-1320nm spectral range
- Cooling-free operation of DFB lasers
- Isolator-free operation of DFB lasers

Applications:

- Fabry-Pérot and DFB lasers for
  - FTTx (including EPON, GPON, 10G PON, WDM PON, etc.)
  - Telecom
  - etc.

DATE: 19th Jan 2009

SPECIFICATIONS

Wafer Parameters	Symbol	Min.	Typ.	Max.	Unit
Size			76.2		mm
Surface defect density (0.7-10μm^2 size)			50	100	cm^{-2}
Haze			50	100	ppm
PL peak position (in wafer center)		1295	1300	1305	nm
PL peak homogeneity across a wafer			10	12	nm
Layer thickness tolerance				5	%
Layer composition tolerance				5	%
n-doping homogeneity across the wafer			2	5	%
p-doping homogeneity across the wafer			50	60	%
BA Laser Parameters **Test conditions: 1mm laser length, 100μm laser width, pulse operation, 25°C**					
Threshold current density	j_{th}		550	600	A/cm^2
Differential efficiency	η		0.35		W/A
Lasing wavelength	λ_{las}	1300	1310	1320	nm
Threshold current characteristic temperature (25-85°C)	T_0	300	500		K
Differential efficiency characteristic temperature (25-85°C)	T_1	1000	2000		K
Temperature wavelength shift		0.43	0.5	0.57	nm/K
Serial resistance			0.1	0.2	mΩcm^2
Cut-off voltage			1.15	1.2	V
Far-field (FWHM, fast axis)			50	55	degree

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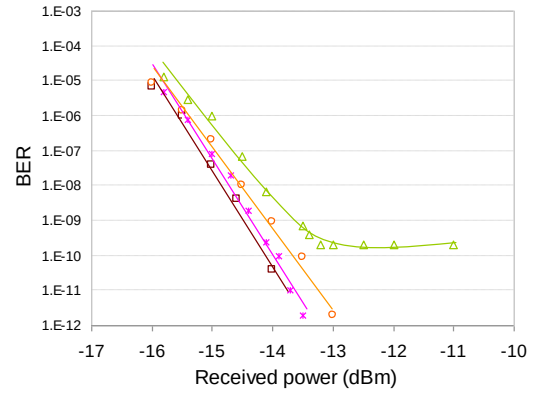
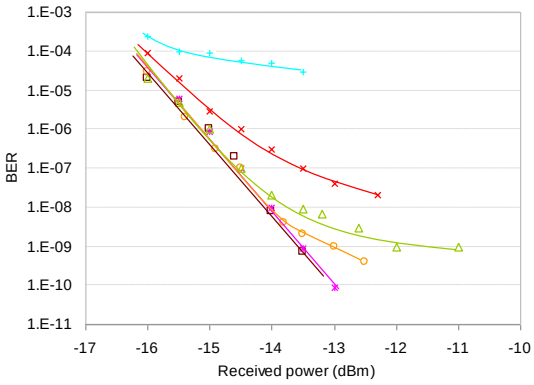
Layer description

Layer	Material	Group	Repeat	Mole fraction (x)		Thickness	Type	Dopant
				start	finish	(nm)		
12	GaAs					200	P	C
11	Al(x)Ga(1-x)As			0.35	0	20	P	C
10	Al(x)Ga(1-x)As			0.35		1000	P	C
9	Al(x)Ga(1-x)As			0.35		500	P	C
8	GaAs	1	10			35		
7	In(x)Ga(1-x)As	1	10	0.15		5		
6	InAs	1	10			0.8		
5	GaAs					35		
4	Al(x)Ga(1-x)As			0.35		500	N	Si
3	Al(x)Ga(1-x)As			0.35		1000	N	Si
2	Al(x)Ga(1-x)As			0	0.35	20	N	Si
1	GaAs					500	N	Si
0	GaAs substrate	N+ GaAs 3 inch						

Typical operation of DFB laser (600μm long) at 10Gbps

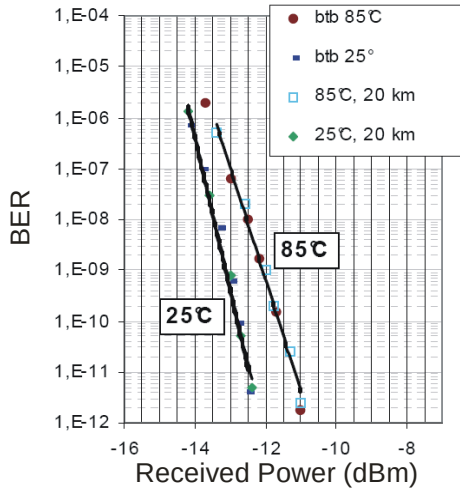


25 °C, btb, without feedback
25 °C, btb, RL= -18 dB
25 °C, btb, RL= -12 dB
25 °C, btb, RL= -10 dB



85 °C, btb, without feedback
85 °C, btb, RL= -19 dB
85 °C, btb, RL= -17 dB
85 °C, btb, RL= -15 dB
85 °C, btb, RL= -14 dB
85 °C, btb, RL= -12 dB

BER as a function of received power in back-to-back at 25°C (top) and 85°C (bottom) under intentional feedback



BER as a function of received power in back-to-back and after 20km fiber conditions