

APIC's Direct Modulated DFB Laser Performance

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Direct Modulated DFB Laser Design Specs (chip performance)

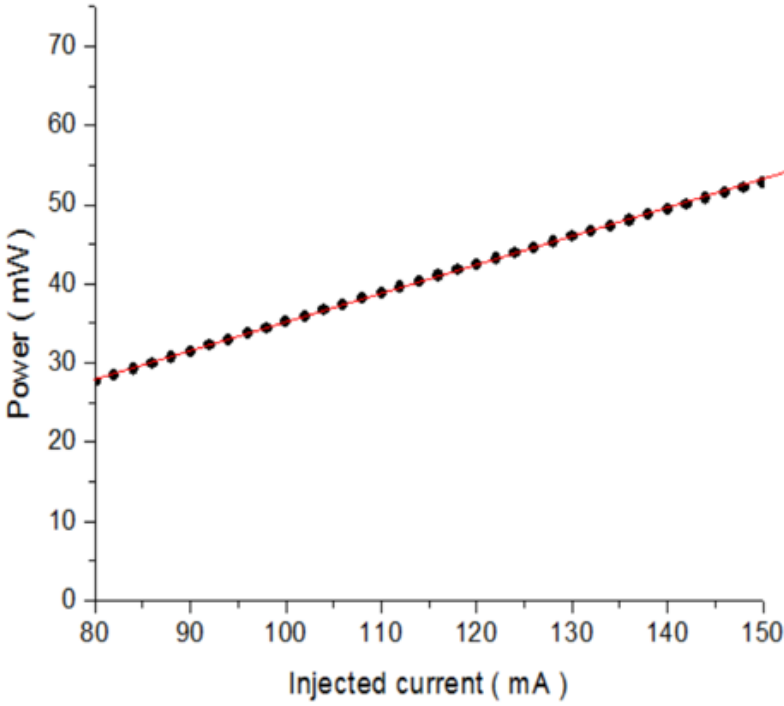
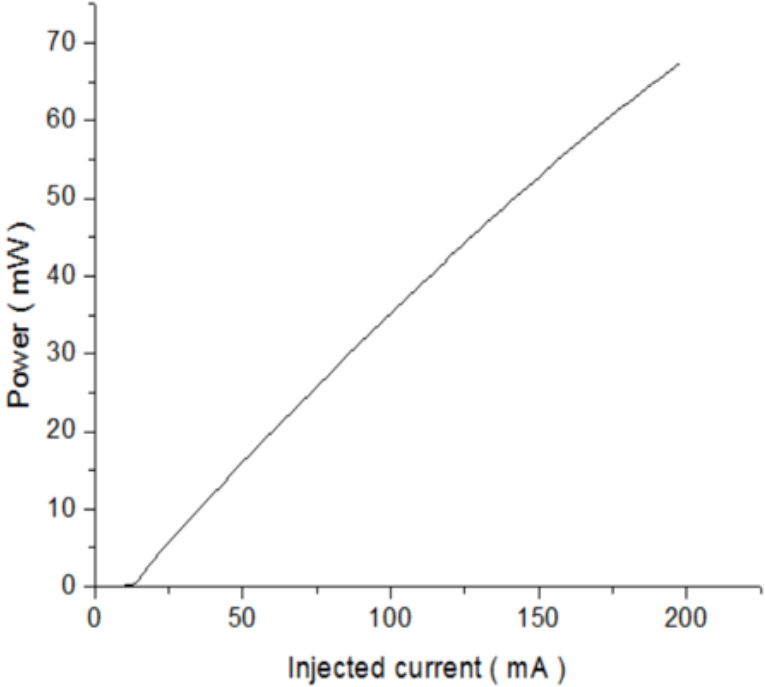


| Main Parameters | Symbol | Min. | Typ. | Max. | Units |
|-----------------------------|-----------|------|------|------|------------------------|
| Wavelength λ | λ | 1530 | 1550 | 1565 | nm |
| Output power | P | 50 | 60 | 70 | mW |
| Threshold current | I_{th} | 9 | 10 | 12 | mA |
| Relative intensity noise | RIN | | -160 | -150 | dB/Hz |
| Side-mode suppression ratio | SMSR | 35 | 50 | | dB |
| 3 dB band width f_{3dB} | f_{3dB} | | 10 | | GHz |
| Third order intercept point | IIP3 | 35 | 40 | | dBm |
| Spurious-free dynamic range | SFDR | | 119 | | dB • Hz ^{2/3} |

Measured Laser P-I and Linear Range



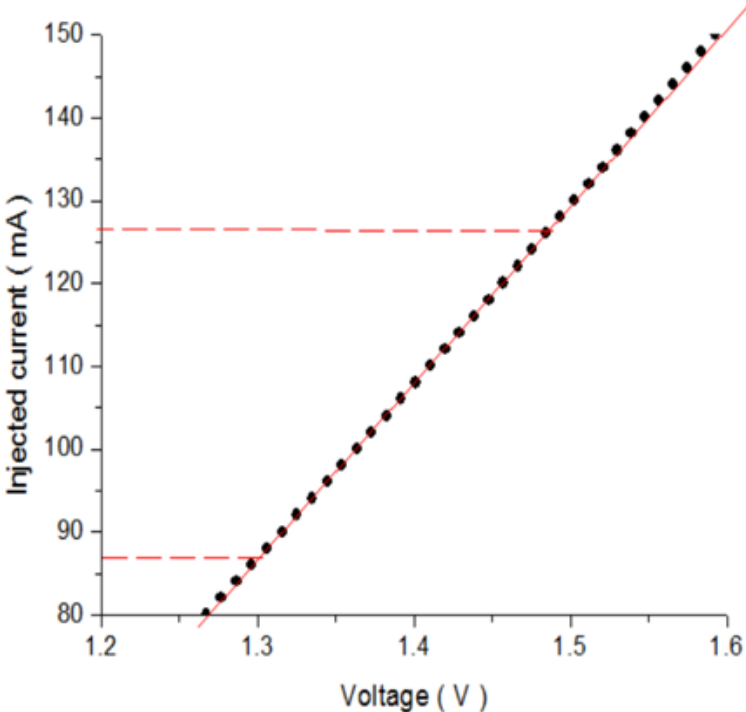
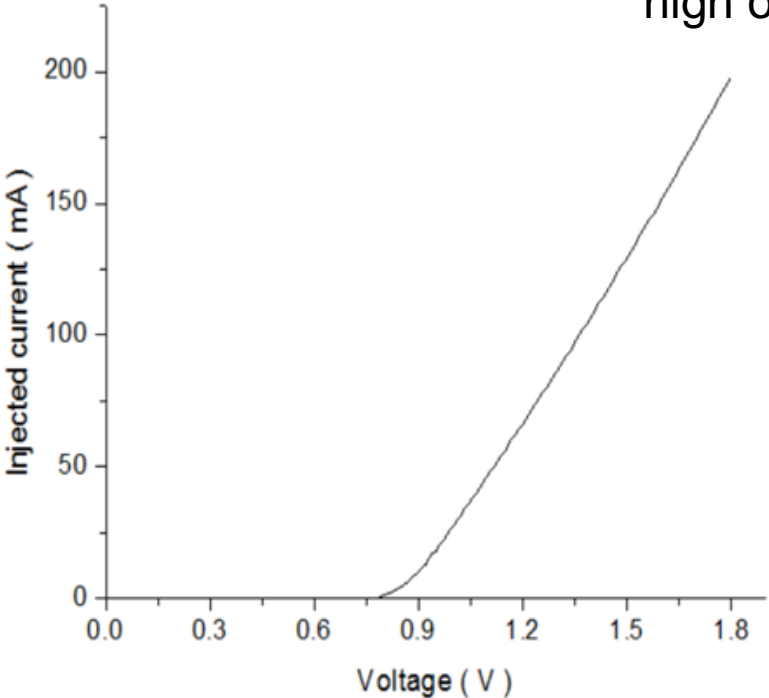
High linearity enables a high IIP3 and supports high order modulation; good for QAM



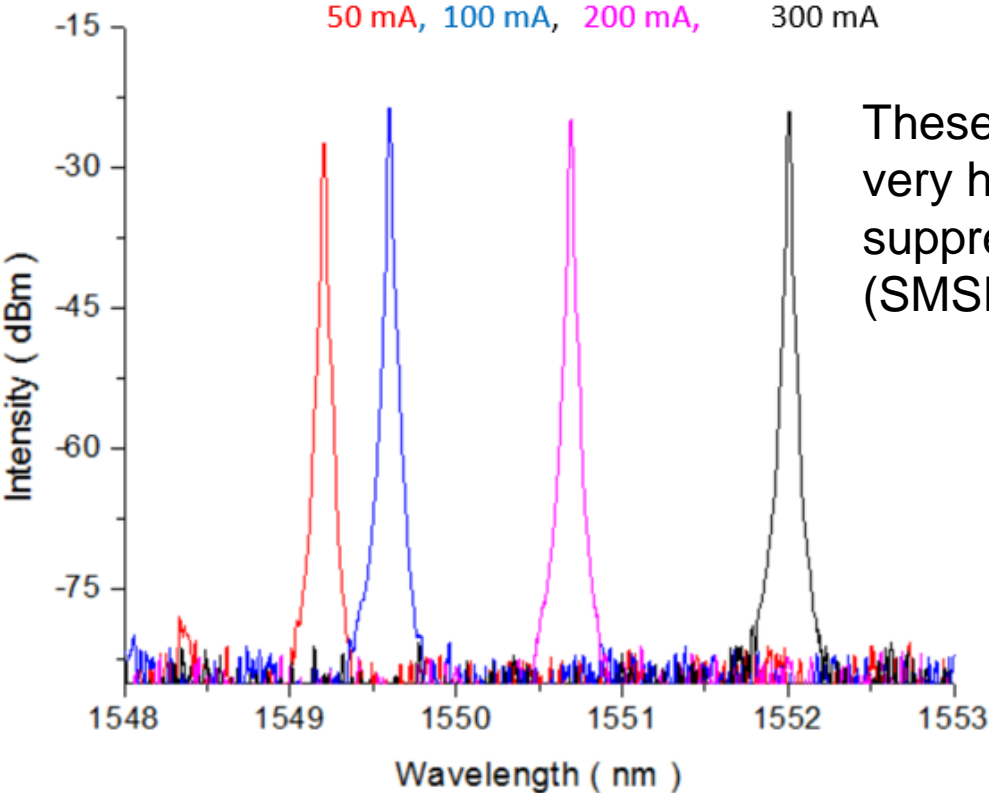
Measured Laser I-V and Linear Range



High linearity enables a high IIP3 and supports high order modulation; good for QAM



Measured Test Laser Spectrum



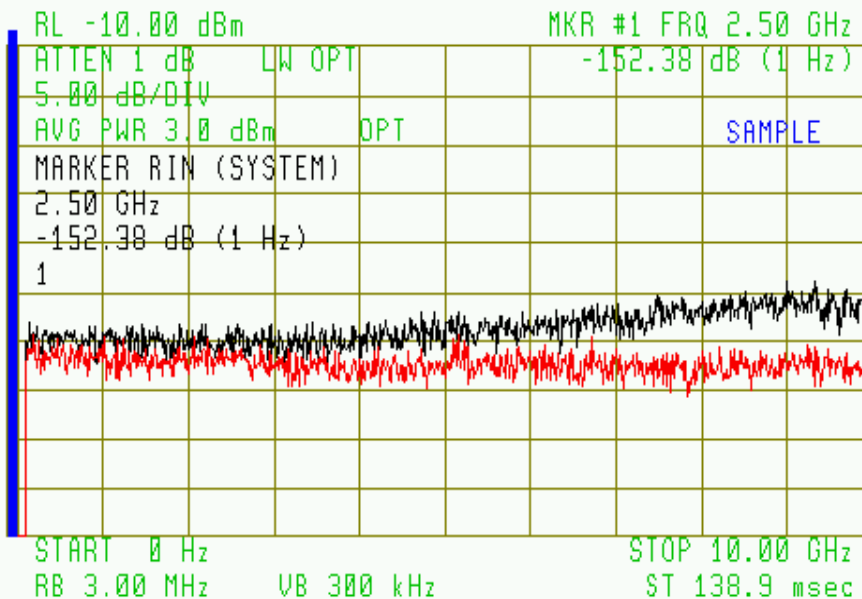
These lasers exhibit very high side mode suppression ratio (SMSR)

Measured Laser RIN at Bias of 150 mA



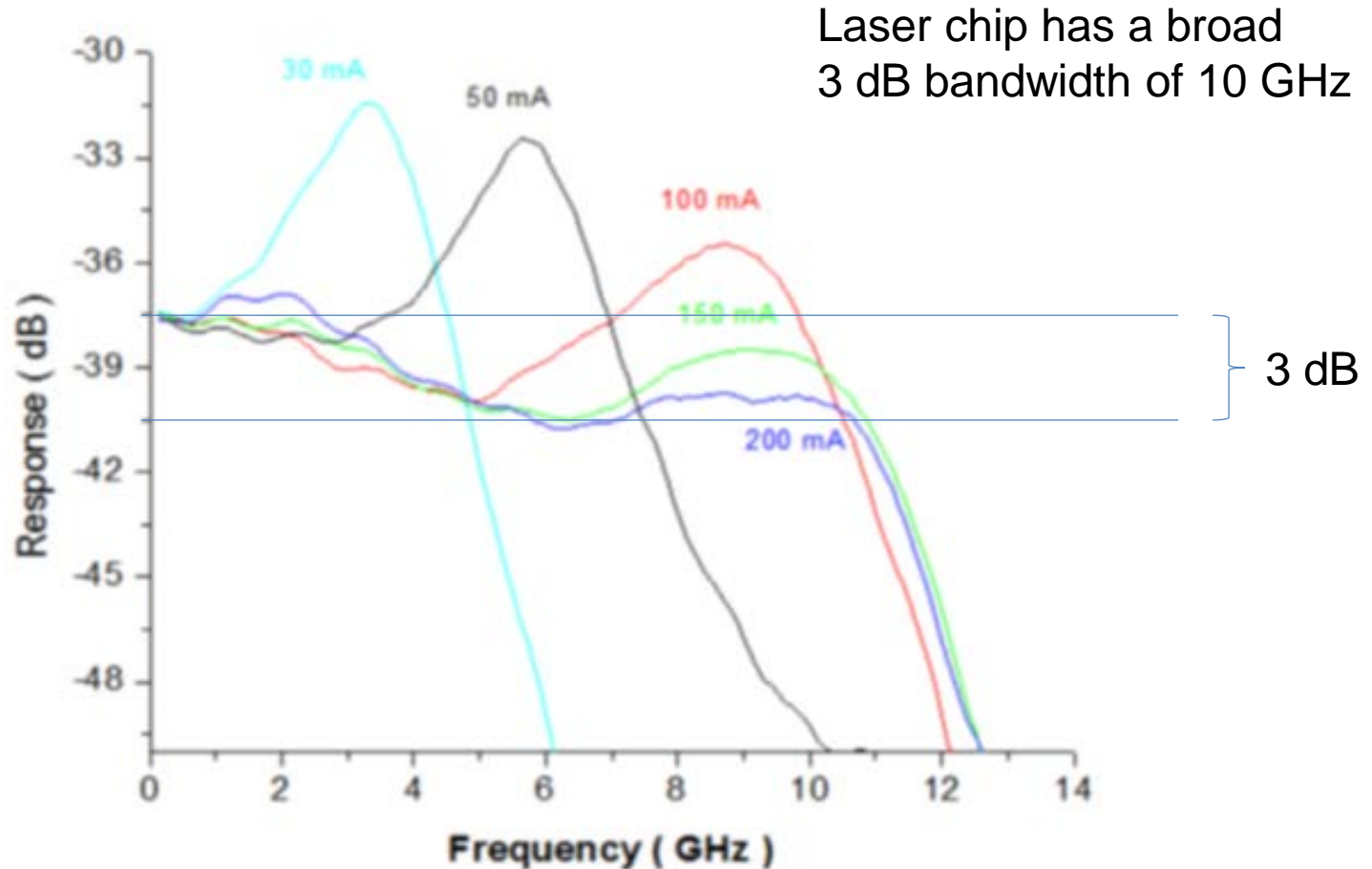
11:13:55 MAR 31, 2017

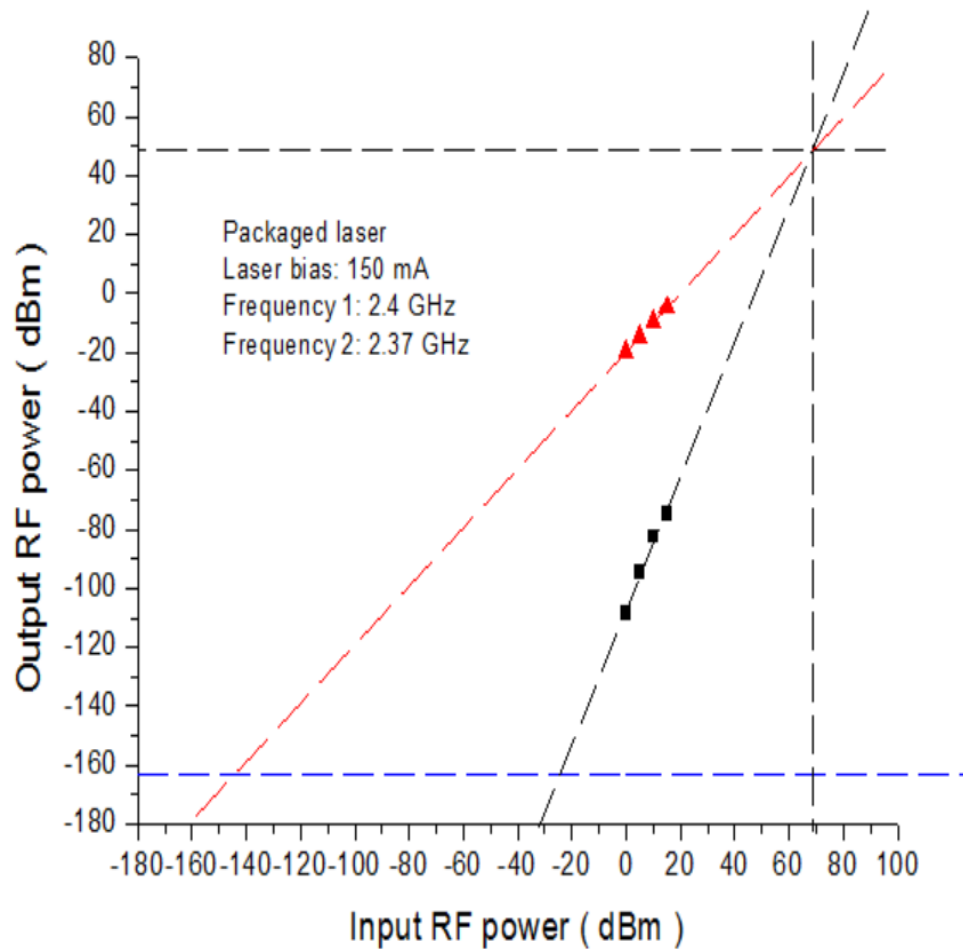
| | | |
|----------------------|---|---------------|
| RIN (Laser) | = | -162.86 dB/Hz |
| — RIN (System) | = | -152.39 dB/Hz |
| — Thermal Noise Term | = | -155.55 dB/Hz |
| — Shot Noise Term | = | -156.08 dB/Hz |



These lasers have very low relative intensity noise which contributes to a low noise figure (NF) and high dynamic range

Measured Frequency Response at Different Biases





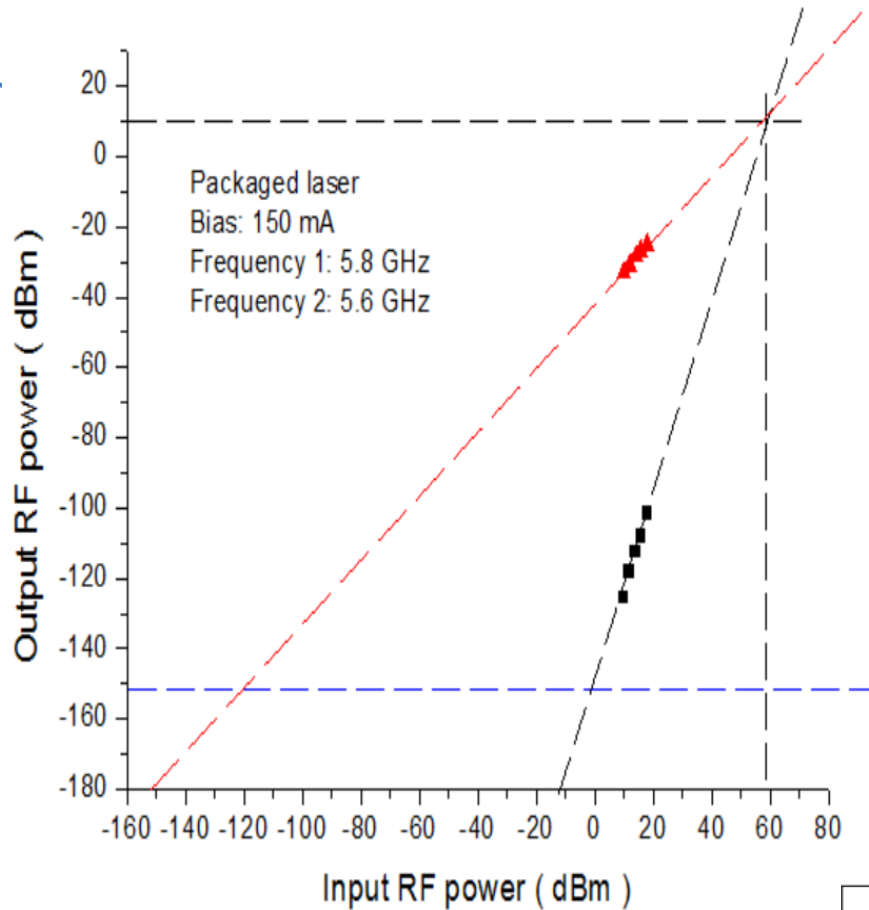
Fundamental and IMD3 RF output powers as a function of input RF power at 2.4 GHz

IIP3=68 dBm
 OIP3=48 dBm
 SFDR=120 dB • Hz^{2/3}

Exceptional performance for numerous applications such as high order modulation signal transmission (QAM) and high fidelity analog RF over fiber

Test data

| RF power | 2.4 GHz | | 2.37 GHz | | | Ave. RF power | Ave. 1 st power | Ave. 3 st power |
|----------|-----------------------|-----------------------|----------|-----------------------|-----------------------|---------------|----------------------------|----------------------------|
| | 1 st power | 3 st power | RF power | 1 st power | 3 st power | | | |
| 0 | -19.4 | -108 | 0 | -19.8 | -109 | 0 | -19.6 | -108.5 |
| 5 | -14.5 | -94 | 5 | -14.5 | -95 | 5 | -14.5 | -94.5 |
| 10 | -9.3 | -83 | 10 | -9.4 | -82 | 10 | -9.35 | -82.5 |
| 15 | -4.56 | -76.4 | 15 | -4.68 | -73 | 15 | -4.62 | -74.7 |



Fundamental and IMD3 RF output powers as a function of input RF power at 5.8 GHz

IIP3=58 dBm
 OIP3=10 dBm
 SFDR=119 dB • Hz^{2/3}

Test data

| RF power | 5.8 GHz | | 5.6 GHz | | | Ave. RF power | Ave. 1 st power | Ave. 3 st power |
|----------|-----------------------|-----------------------|----------|-----------------------|-----------------------|---------------|----------------------------|----------------------------|
| | 1 st power | 3 st power | RF power | 1 st power | 3 st power | | | |
| 10 | -33 | -126 | 10 | -33 | -125 | 10 | -33 | -125.5 |
| 12 | -31 | -118 | 12 | -31 | -118 | 12 | -31 | -118 |
| 14 | -28.5 | -113 | 14 | -28.5 | -112 | 14 | -28.5 | -112.5 |
| 16 | -26.7 | -109 | 16 | -27 | -107 | 16 | -26.85 | -108 |
| 18 | -25 | -103 | 18 | -25 | -100 | 18 | -25 | -101.5 |

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