Innolume GmbH
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Packing List

TO:

Australian National University Res Sch Physical Sciences & Eng Floor G Building 58, Store West End of Garran Road Canberra ACT 0200 Australia	Contact person: **Harris Mark (RSPE Business Office)** TEL : 061 02 6125 2433 FAX : 061 02 6125 0749 Email: purchasing@physics.anu.edu.au

Packing List #	Customer order #	INL assigned order #	Packing Date	Insurance	Prepared by
P15275	**RSPSE-0000014686**	**A15192**	**21 August 2015**	**Yes**	**I. Krestnikov**

Packing description:

Pos	Product name	Device ID	Q'ty, pcs	Description	Comment
1	GM-1060-150-PM-250	DO3762c-q4-Bo8-A01	1	Gain-module, 1060 nm central wavelength of tuning range, 150 nm tunability, 250 mW output power, PM980 fiber.	

This product meets the defined specification in all respects:	Dr. Igor Krestnikov (Product Manager)
The reported data has been qualitatively checked:	Dr. Daniil Livshits (Quality Control)
The delivery is complete and may be shipped out:	Guido Vogel (Customer Service)

General Manager
Guido Vogel

Registered office
Amtsgericht Dortmund
HRB 15659

Sales tax identification nr
DE 225 038 980

Bank details
Sparkasse Dortmund
BLZ : 440 501 99
Konto: 001 154 664

Innolume GmbH
Konrad-Adenauer-Allee 11
44263 Dortmund / Germany
sales tax identification number:
DE 225 038 980

Invoice

invoice to:	
Australian National University Res Sch of Physical Sciences & Engineering Accounts Payable Shared Services Chancelry Building 10 c Canberra ACT 0200, Australia	
VAT number:	
customer order number:	RSPSE-0000014686
contact person:	Harris Mark (RSPE Business Office)
shipment information:	DHL account: 967820091

invoice no:	2526-2015
invoice date:	25.08.2015
ex-works date:	25.08.2015
payment terms:	30 net
gross weight:	0,500 kg
shipping terms:	EXW
Innolume reference:	A15192

comment:	P15275

product name:	product description:	quantity:	price per unit:	line total:
GM-1060-150-PM-250	Gain-module, 1060 nm central wavelength of tuning range, 150 nm tunability, 250 mW output power, PM980 fiber.	1	2.975,00 €	2.975,00 €

Country of Origin: Germany

"preferential origin: the exporter of the products covered by this document declares that, except where otherwise clearly indicated, these products are of preferential origin and the country of origin of the goods is GERMANY."

net total:	2.975,00 €
VAT (19%):	
gross total:	2.975,00 €
currency:	EURO

Innolume rejects any outside purchasing Terms and Conditions, Innolume GmbH General Terms & Conditions of Sale and Delivery should apply, details see: http://www.innolume.com/legal_notice/terms_conditions.htm

Petra Schillings - Thomas Neubauer

Signature (If you receive this form electronically, name of Innolume representatitve is printed instead!)

benificiary: Innolume GmbH, bank name: Sparkasse Dortmund, bank zip code: 44139,
address city: Dortmund, bank country: Germany, bank number: 440 501 99,
account number: 001154664, IBAN: DE73 4405 0199 0001 154664, BIC/SWIFT CODE: DORTDE33XXX

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TEST REPORT for 10-pin butterfly Gain-module

Part number:	**GM-1060-150-PM-250**	Issued:	21-Aug-15	I. Bakshaev
Device ID:	DO3762c-q4-Bo8-A01	Approved:	21-Aug-15	I. Krestnikov

RECOMMENDED OPERATING POINT

Parameters	Value	Unit
Current	600	mA
Forward voltage	2.0	V
Thermistor temperature	25	°C

TESTED PARAMETERS

@ CW, recommended operating point, amplified spontaneous emission (ASE), without feedback

Parameter	Value	Unit
Optical power ex fiber	2.31	mW
Optical power ex facet	136.7	mW
Mean wavelength	1026.4	nm
Bandwidth @ -3dB*	33.6	nm
Fast axis beam divergence @ -3dB, ex facet	16.3	deg
Slow axis beam divergence @ -3dB, ex facet	6.6	deg
Ripples (RMS)	0.10	dB

CHIP PARAMETERS

Parameter	Value	Unit
Chip length	3	mm
Stripe width	3	um
Back reflectivity of straight stripe facet	10	%
Back reflectivity of tilted stripe facet	<0.001	%

EXPECTED TUNABILITY PARAMETERS

@ CW, recommended operating point, external cavity in Littrow configuration with ≈50% feedback

Parameter	Min	Typical	Max	Unit
Wavelength of maximum power (λ_{MP})	1090	1100	1110	nm
Optical output power ex fiber @ λ_{MP}		280		mW
Central wavelength of tuning range	1050	1060	1070	nm
Tuning range width		150		nm

ABSOLUTE MAXIMUM RATINGS

Parameter	Min.	Max.	Unit
Wire soldering temperature		250 (5 sec.)	°C
TEC voltage		4	V
TEC current		3	A
Reverse voltage		2.0	V
Forward current		800	mA
Storage temperature range (in originally sealed plastic bag)*	15	60	°C
Operating temperature range*	20	30	°C

*The case must be firmly fixed and have good thermal contact to the heatsink at full area of the case bottom. Device storage (after opening of original packing) and operation must be at dust protected atmosphere and at temperature above dew point.

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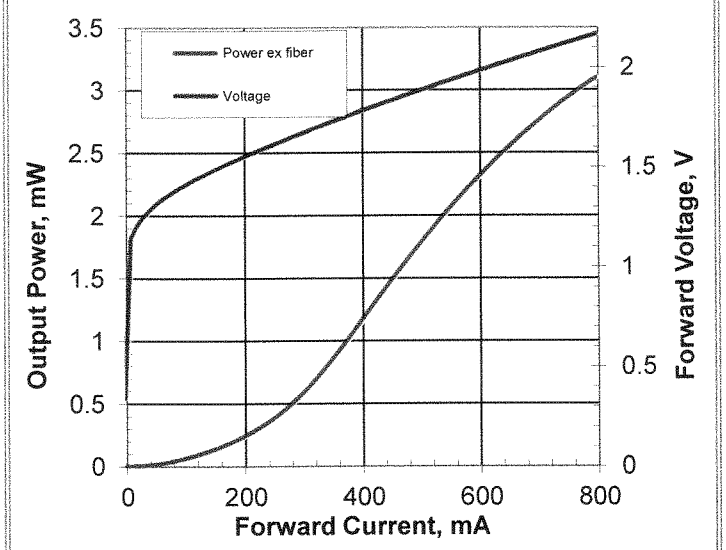
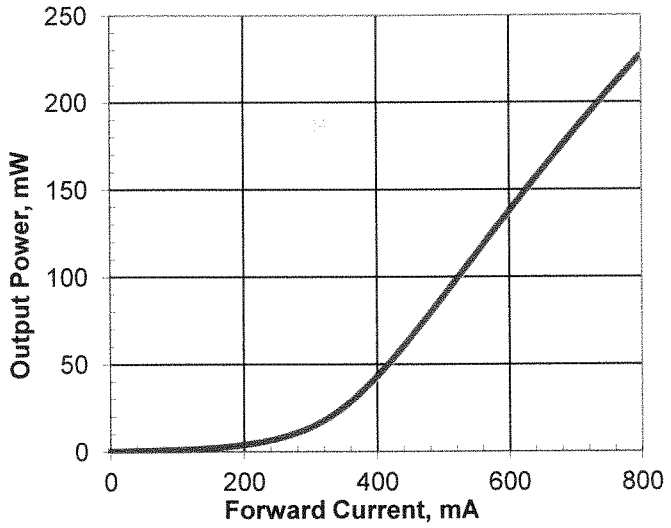
ASE ex FIBER L-I-V CURVE

Test conditions: CW operation, 25°C thermistor temperature



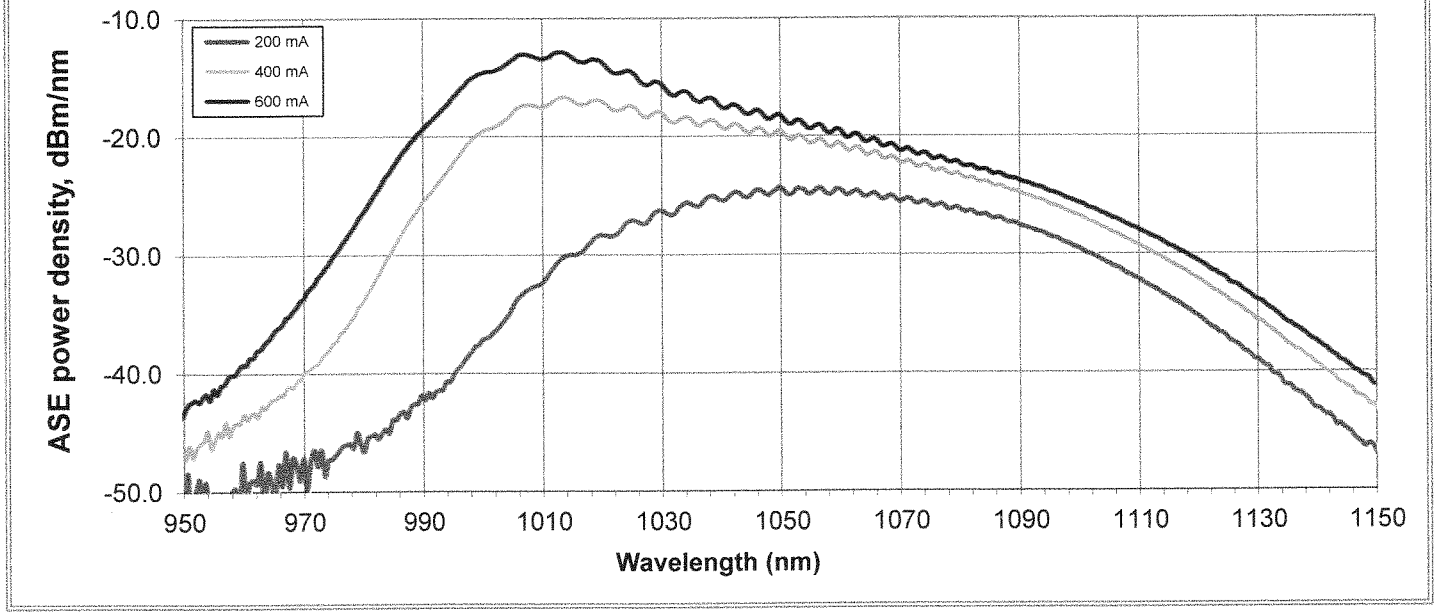
ASE ex FACET L-I CURVE

Test conditions: CW operation, 25°C thermistor temperature



ASE SPECTRA ex fiber

Test conditions: CW operation, recommended operating point, ex fiber



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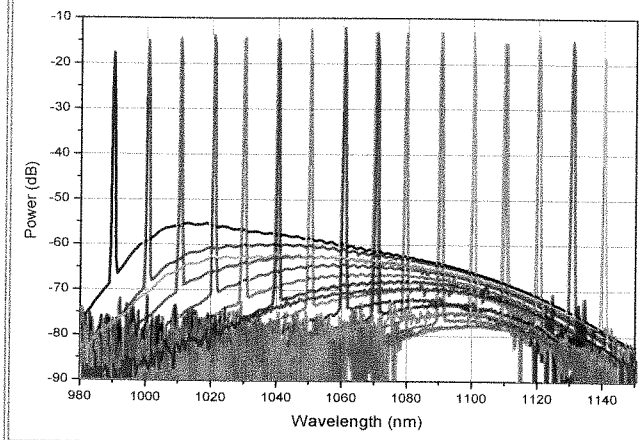
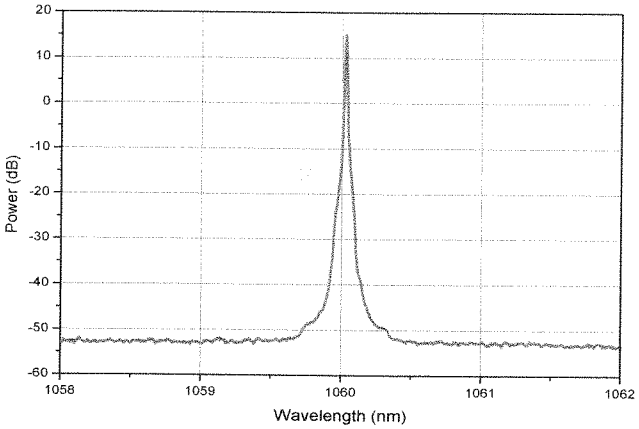
TYPICAL PERFORMANCE IN EXTERNAL CAVITY

@ 25 °C thermistor temperature, recommended operating point. Littrow configuration with ~30% feedback. Thorlabs GR-25-1208 grating

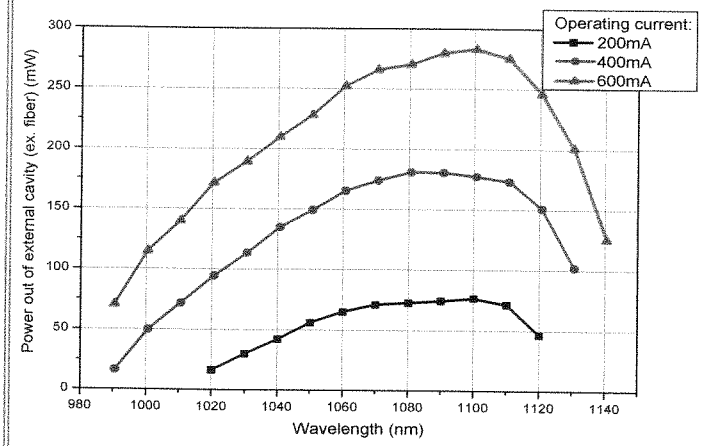
Optical spectra @ 600mA (res. 0.5 nm)



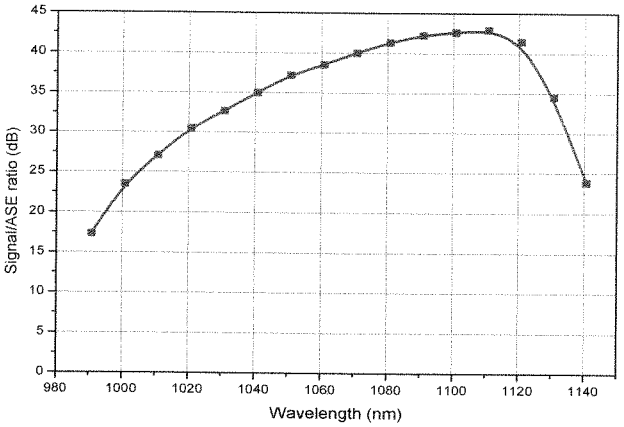
Optical spectrum @ 600mA (res. 10 pm)



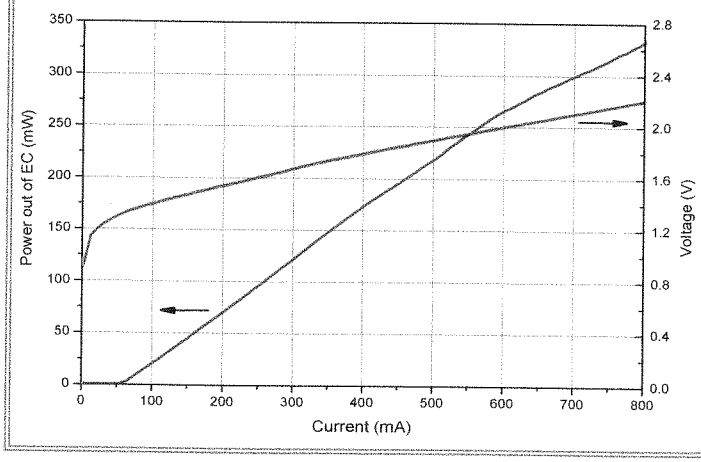
Power spectra



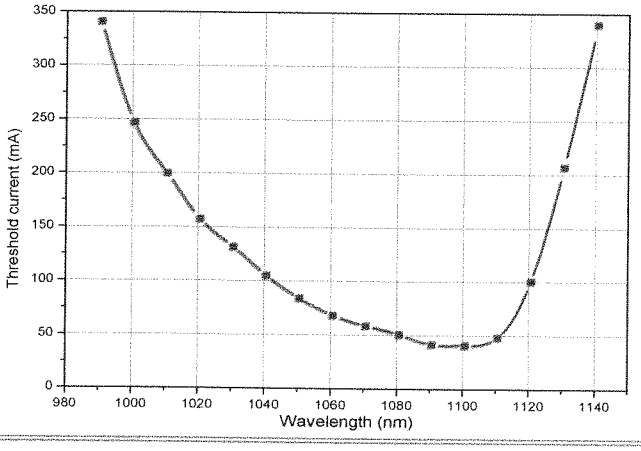
Signal/ASE ratio @ 600mA



Power ex fiber @ 1060nm



Threshold current



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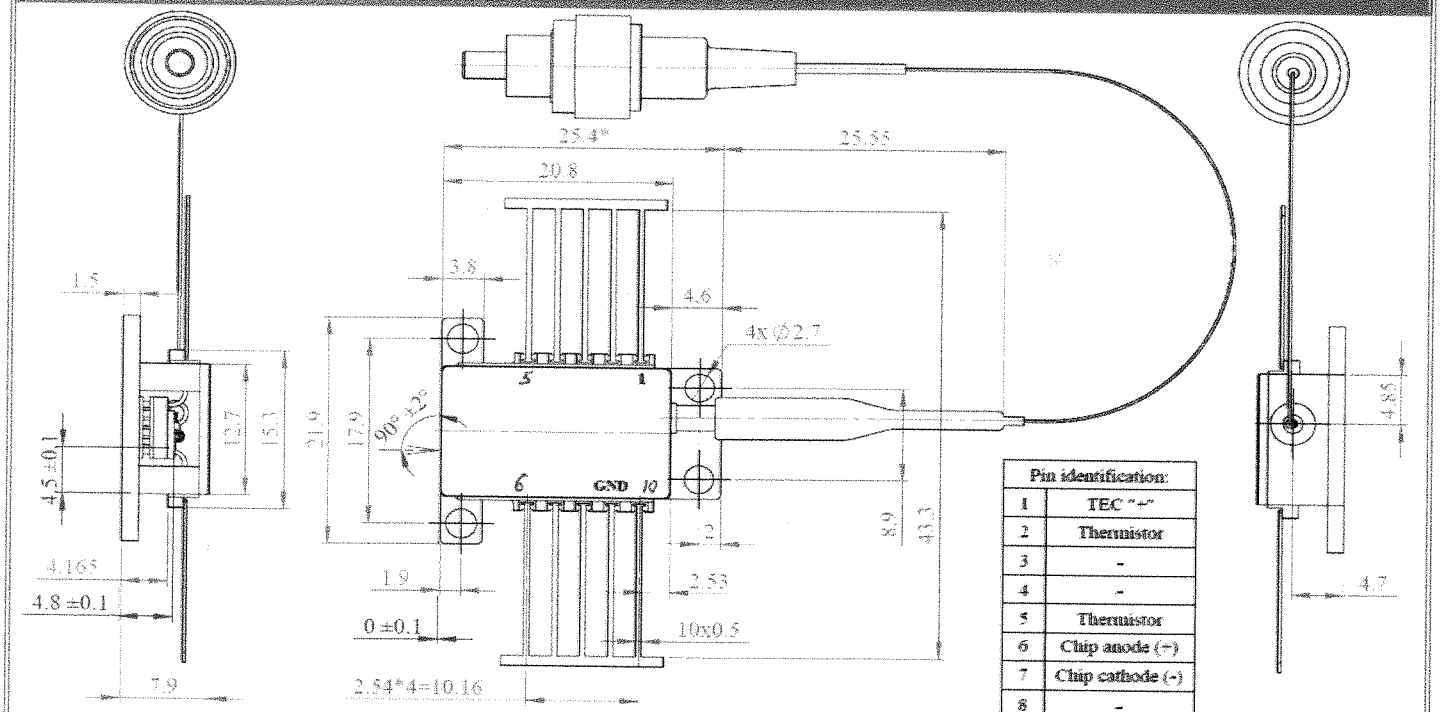
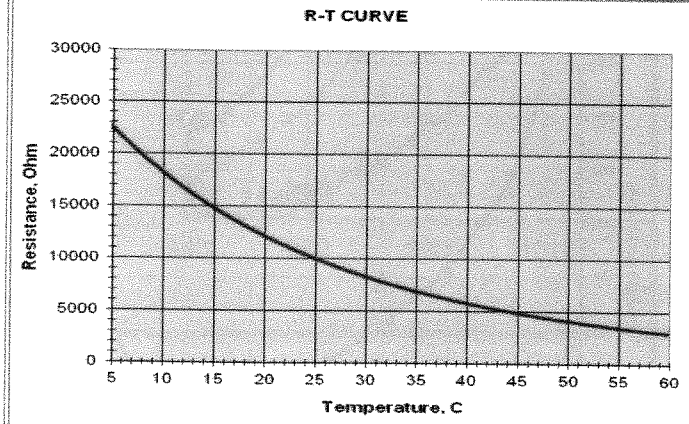
DIMENSIONS



Pin identification:	
1	TEC "+"
2	Thermistor
3	-
4	-
5	Thermistor
6	Chip anode (+)
7	Chip cathode (-)
8	-
9	Case ground
10	TEC "-"

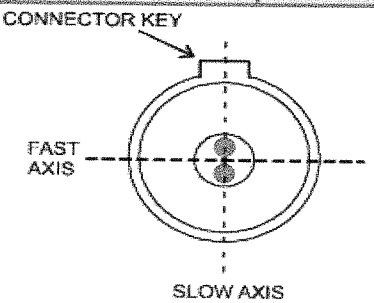
THERMISTOR SPECIFICATION

Parameters	Value	Unit
Thermistor type	NTC	
Resistance @25°C	10000	Ohm
Resistance Tol. ±	1	%
Beta 25-50°C	3375	K



FIBER SPECIFICATION

Parameters	Value	Unit
Type	PANDA PM980	
Connector type	FC/APC	
Length	1-1.2	m
Mode-field diameter	6.2	µm
Cladding diameter	125	µm
Coating diameter	245	µm
Jacket	-	µm
NA	0.11	



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SAFETY AND OPERATING INSTRUCTIONS

The laser light emitted from this device is invisible and can be dangerous to the human eye. Avoid looking directly into the fiber output or into the collimated beam along its optical axis when the device is in operation. Proper laser safety eyewear must be worn during operation.

Absolute Maximum Ratings may be applied to the device for short period of time only. Exposure to maximum ratings for extended period of time or exposure above one or more max ratings may cause damage or affect the reliability of the device.
Operating the product outside of its maximum ratings may cause device failure or a safety hazard. Power supplies used with the device must be employed such that the maximum peak optical power cannot be exceeded. A proper heatsink for the device on thermal radiator is required, sufficient heat dissipation and thermal conductance to the heatsink must be ensured.

The device is an open-heatsink laser diode; it may be operated in cleanroom atmosphere or dust-protected housing only. Operating temperature and relative humidity must be controlled to avoid water condensation on the laser facets. Any contamination or contact of the laser facet must be avoided.

ESD PROTECTION – Electrostatic discharge is the primary cause of unexpected product failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces and rigorous antistatic techniques when handling the product.