PART NUMBER ISV850

COMPONENT SPECIFICATION Issue 2 (July 2018)

Component Specification for Hermetically Sealed Radiation Hard VCSEL Laser Diode

Features	Applications
▪ 10's of Watts of Peak Power ▪ Intended for pulsed applications ▪ Pulse widths of <10ηs ▪ Duty Cycle <1% ▪ Gaussian Beam profile ▪ Narrow Beam Divergence ▪ Stable wavelength over Temperature ▪ High Efficiency ▪ Several package styles available	▪ Gesture Recognition ▪ 3D IR Imaging ▪ LIDAR

DESCRIPTION

ISOCOM has developed a 2D VCSEL array TO based component that is specifically targeted towards use in gesture recognition and 3D camera applications. Our 2D VCSEL is capable of delivering more than 500mW of CW power at room temperature.

The ISV850 series is available in several package styles, including TO-46 & TO-18 metal cans, as well as LCC-3 for surface mounting. Solder dip option is available for all package styles.

The intended use is with short electrical pulses (<10ns) and low duty cycle (<1%) where peak powers can reach 10W. In pulsed operation, the 2D array emits a Gaussian shaped optical beam and is capable of rise and fall times less than 1ηs. Please contact ISOCOM for more information about applications for this device.

M1077 & E1280/F GB15/92780 0005

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STANDARDS

The following specifications have been complied with in the manufacturing of this product:

Aerospace Compliance Standards

AS9100D / ISO 9001:2015 – Design & Manufacture of Electronic and Optoelectronic Components *(Ref GB15/92780)*
IECQ Approved Process Manufacturer *(Ref M1077)*
IECQ Qualification *(Ref E1280/F)*

Military Compliance Specifications

MIL-PRF-19500 – General Specification for Discrete Semiconductor Devices

Military Compliance Standards

MIL-STD-202 – Test Method Standard Electronic and Electrical Component Parts
MIL-STD-883 – Test Method Standard Microcircuits
MIL-STD-750 – Test Methods for Semiconductor Devices

AMENDMENT RECORD

Issue No.	Date	Description
1	May 2018	First issue
2	July 2018	More package styles added

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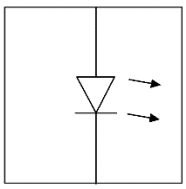
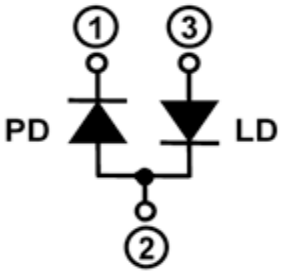
SELECTION GUIDE PACKAGE STYLES AND CONFIGURATION OPTIONS

ISOCOM Part Number and Options				
Package		TO-46	LCC-3	TO-18
Channels		1		
Commercial	4mW	ISV850-004	ISV850L-004	–
	100mW	–	–	ISV850-100
	200mW	–	–	ISV850-200
	450mW	–	–	ISV850-450
Defense Screen Level (/L2)		ISV850-004/L2	ISV850L-004/L2	–
		–	–	ISV850-100/L2
		–	–	ISV850-200/L2
		–	–	ISV850-450/L2
Space Screen Level (/L2S)		ISV850-004/L2S	ISV850L-004/L2S	–
		–	–	ISV850-100/L2S
		–	–	ISV850-200/L2S
		–	–	ISV850-450/L2S
Standard Finish		Gold Plating		
Solder Dipped		Option #20		

FUNCTIONAL DIAGRAMS

ISV850
TO-46, LCC-3 & TO-18
1 Channel



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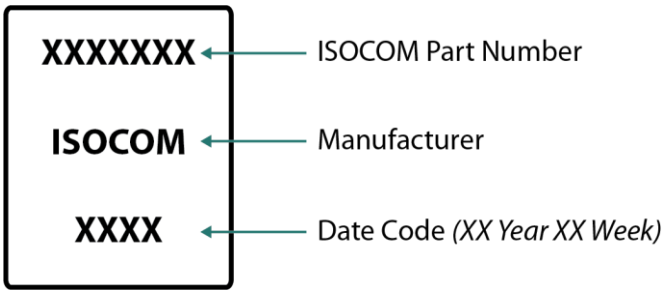
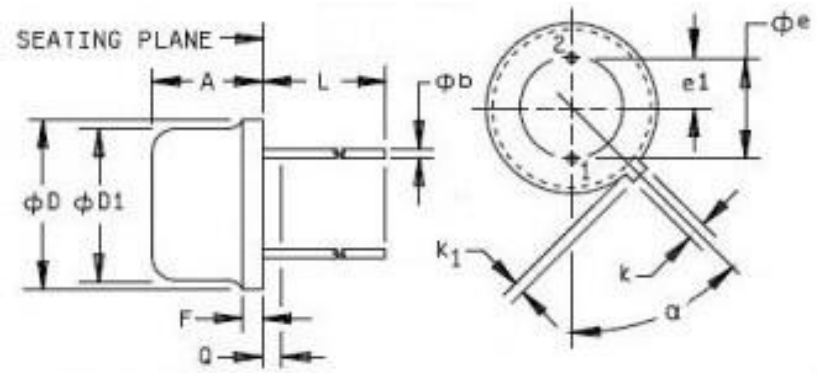
DEVICE MARKING



PACKAGE STYLES AND OUTLINE DRAWINGS

TO-46	LCC-3	TO-18
		

TO-46



Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A	.080	.105	2.03	2.67
ϕb	.016	.019	0.41	0.48
ϕD	.209	.219	5.31	5.56
ϕD1	.178	.195	4.52	4.95
ϕe	---	.100	---	2.54
e1	---	.050	---	1.27
F	---	.030	---	0.76
k	.036	.046	0.91	1.17
k1	.028	.048	0.71	1.22
L	.500	---	12.70	---
Q	---	.025	---	0.64
α	45° BSC		45° BSC	

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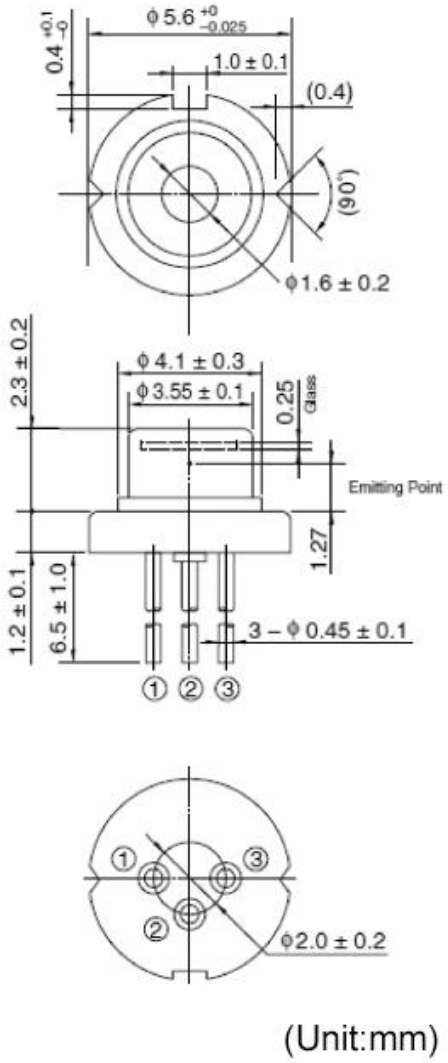
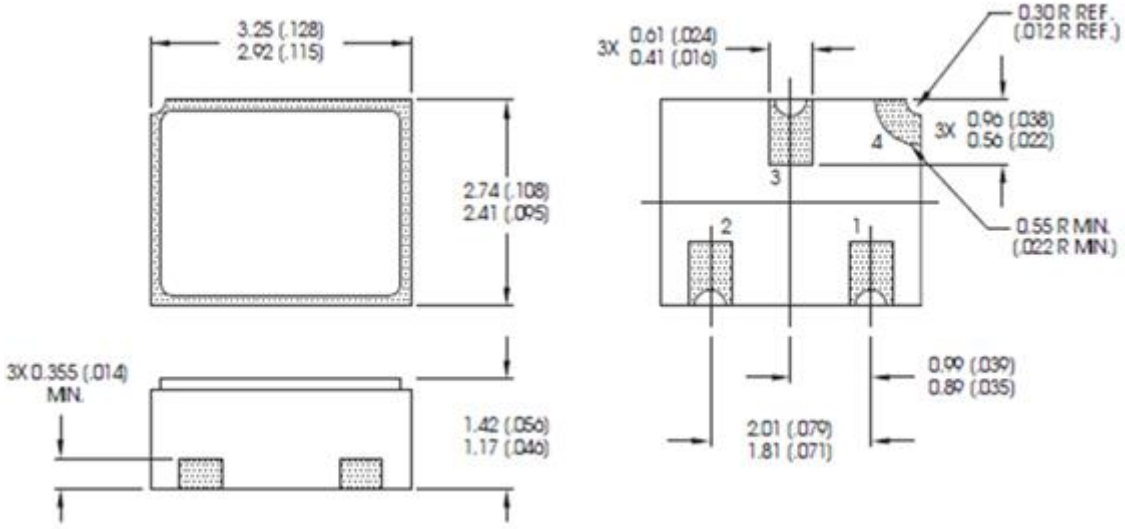
TO-18 PACKAGE



(Unit:mm)

LCC-3 PACKAGE



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ABSOLUTE MAXIMUM RATINGS

T_A = 25°C U.O.S.

Storage Temperature	-40°C to +85°C
Case Operating Temperature	-10°C to +60°C
Lead Soldering Temperature	260°C, 10 sec
Reverse Voltage	5V
Max continuous forward current	1.75A
Max peak forward current (<100ηs, DC<1%)	20A
ESD Exposure (Human Body Model)	500V

OPTICAL & ELECTRICAL CHARACTERISTICS

T_A = 25°C U.O.S.

Parameter	Test Condition		Min	Typ	Max	Units
CW Optical Power	IF = 1.5A	ISV850-004	4	–	–	mW
		ISV850-100	100	–	–	
		ISV850-200	200	–	–	
		ISV850-500	450	–	–	
Peak Optical Power	I_{PULSE} = 10A, T_{PULSE} = 10ns, DC = 0.1%		7	–	–	W
Threshold Current	I_{TH}		–	500	–	mA
Slope Efficiency	I_F = 1-1.5A		–	0.8	–	mW/mA
Slope Efficiency Temperature variation	T_A = 0-70°C		–	-3,000	–	ppm/°C
Peak Wavelength	I_F = 1.5A		840	860	870	nm
ΔP Temperature Variation	I_F = 1.5A		–	0.06	–	nm/°C
Spectral Bandwidth, RMS	I_F = 1.5A		–	0.25	1	nm
Laser Forward Voltage	I_F = 1.5A		–	–	3.0	V
Rise and Fall Times	I_F = 1.5A		–	1	–	ns
Series Resistance	I_F = 1-1.5A		–	–	1	Ω
Beam Divergence	I_{PULSE} = 10A, T_{PULSE} = 10ns, DC = 0.1%		10	16	25	°

Notes

1. For the purpose of these tests, I_F is DC current. The TO metal can must be attached to a heat sink and held at 25°C.
2. I_{PULSE} is defined as the peak current with a pulse width of T_{PULSE} and a duty cycle (DC) defined as the ratio of pulse width to pulse repetition time. For a 10ns pulse, the pulse interval is 10µs for a 0.1% DC.
3. Slope efficiency is defined as $\Delta P_O/\Delta I_F$.
4. To compute the value of Slope Efficiency at a temperature T, use the following equation:
5. Rise and fall time specifications are 20-80%. Rise and fall times are sensitive to drive electronics and a small pre bias current (~10mA) may be needed for optimal performance.
6. Beam divergence is defined as the total included angle between the 1/e2 intensity points.

NOTICE

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation to equipment, take normal ESD precautions when handling this product

Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operations section for extended periods of time may affect reliability.

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100% SCREENING to MIL-STD-750

TEST	MIL-STD-750	READ & RECORD
Internal Visual	2072	
Sealing		
Fine Leak	1071, Condition H1	
Gross Leak	1071, Condition C	
Temp Cycling	1051, Condition B-55/+125°C, 20 Cycles	
Const. Acceler	2006, 5000G, Y1 only	
PIND	2052, Condition A	
Radiography	2076	
Initial Electrical	125°C, -55°C, 25°C	R & R
HTRB	1039	
Interim Electrical	25°C only	R & R
Burn-In	1039	
Final Electrical	125°C, -55°C, 25°C	R & R
PDA	Max. 5%, pre/post B1 electrical and delta at RT only	Calculate & R
Fine Leak	1071, Condition H1	
Gross Leak	1071, Condition C	
Solder Dip		
Fine Leak	1071, Condition H1	
Gross Leak	1071, Condition C	

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GROUP TESTING to MIL-STD-750

GROUP	TEST	MIL-STD-750	READ & RECORD
Group A			
SG1	Visual inspection & mechanical dimensions	Method 2071	
SG2	DC static test at 25°C		yes
SG3	DC static test at 125°C and -55°C		yes
SG4	Dynamic test at 25°C		yes
Group B			
SG 1	Physical dimensions	Method 2066	
SG 2	Solderability	Method 2026	
	Resistance to solvents	Method 1022	
SG 3	Thermal Shock	Method 1056 Cond. B, 25 cycles	
	Temperature cycling	Method 1051, -55/+125°C	
	Hermetic seal fine and gross leak	Method 1071, Cond. H (fine), Cond. C (gross)	
	Electrical measurement	pre and post	yes
	Decap internal visual inspection	2075	
	Bond strength	Method 2037, Cond. D	yes
	Die shear	Method 2017	yes
SG 4	Intermittent operation life	Method 1037, 1042, Cond D, Tab.5-5	
	Hermetic seal fine and gross leak	Method 1071, Cond. H (fine), Cond. C (gross)	
	Electrical measurement	pre and post	yes
	Bond strength	Method 2037, Cond. D	yes
SG 5	Acc. steady-state operation life	Method 1027	
	Electrical measurement	pre and post	yes
	Bond strength	Method 2037, Cond. D	yes
Group C			
SG 2	Thermal Shock	Method 1056, Cond. B, 25 shocks	
	Temperature cycling	Method 1051, Cond. C, -55/+125°C , 25 cycles (total 45 cycles including screening)	
	Hermetic seal fine and gross leak	Method 1071, Cond. H (fine), Cond. C (gross)	
	Moisture resistance	Method 1021	
	Electrical measurement	pre and post	yes
SG 3	Mechanical shock	Method 2016, non-operating, 1500 G, 0.5 ms, 5 blows in each orientation (X1,Y1,Z1)	
	Vibration	Method 2056	
	Constant acceleration	Method 2006, at a peak level of 5000 G	
	Electrical measurement	pre and post	yes
SG 6	Steady state operating life Not required as B5 is available on same lot		

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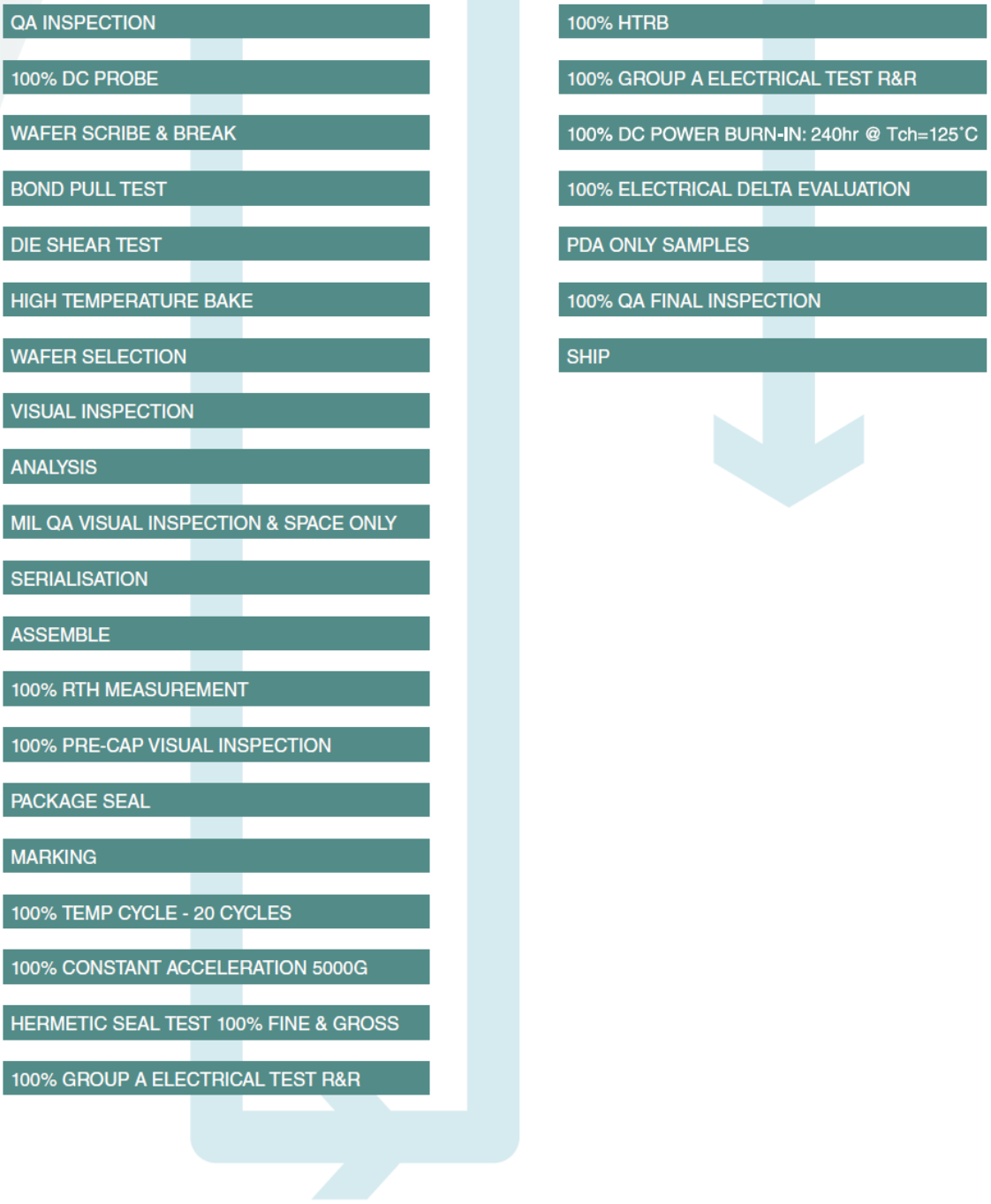
Space Qualification

PROCESS FLOW CHART FOR PACKAGED DEVICES



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Space Qualification

PROCESS FLOW CHART FOR PACKAGED DEVICES

Group B Testing	*MIL-STD-883	*MIL-STD-750
Physical Dimensions	Method 2016	Method 2066
Solderability	Method 2003	Method 2023
Resistance to Solvents	Method 2015	Method 1022
Temperature Cycling	Method 1010	Method 1051
• *Military Grade*	25 cycles	25 cycles
• *Space Grade*	50 cycles	50 cycles
Steady State Life (Tch 175°C / 340hr minimum)	Method 1005	Method 1027
DPA	*MIL-STD-1580A	*MIL-STD-1580A
	*Unless otherwise indicated	*Unless otherwise indicated

Environmental & Mechanical Testing Specifications		
	*MIL-STD-883	*MIL-STD-750
Hermetic Seal Test	Method 1014	Method 1071
• *Fine Leak*	Condition A1	Condition G or H
• *Gross Leak*	Condition C	Method 1051
Temperature Cycle *(Standard Military Level)*	Method 1010, Condition C	Method 1051, Condition C
Temperature Cycle *(Standard Space Level)*	Method 1010, Condition C	Method 1051, Condition C
Constant Acceleration	Method 2001	Method 2006
PIND Test	Method 2020	Method 2052, Condition A
RTH Measurement	Method 1012	
HTRB *(High Temperature Reverse Bias)*	Method 1015, Condition A	Method 1042, Condition B
DPA	*MIL-STD-1580A	*MIL-STD-1580A
	*Unless otherwise indicated	*Unless otherwise indicated

Inspection Table		
COMMERCIAL	**MILITARY**	**HI-REL / SPACE**
AQL Sampling Plan	MIL-STD-883, Method 2010, Class Level B	MIL-STD-883, Method 2010, Class Level S
Isocom Internal Specifications	MIL-STD-750, Method 2070, 2071,2072	MIL-STD-750, Method 2070, 2071,2072

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