



MMIC packaging



MMIC packaging

Contents

1. Introduction	Page 2	5. Package layout design guidelines	Page 4
2. Data Interface	Page 2	6. Package styles	Page 5
3. Microwave package design requirement	Page 3	7. Package features	Page 5
4. Materials	Page 3	8. Assembly & test	Page 5

1. Introduction

Labtech Microwave has developed an innovative low cost custom packaging solution combining our established microwave printed circuit board techniques with the use of low cost organic materials for single chip & MCM applications. We have also developed a cavity package that demonstrates excellent high frequency, thermal and electrical characteristics by raising the MMIC in a precisely machined, fully copper plated cavity. The resultant optimisation of short bond wire lengths ensures minimal loss of chip performance.

Our low cost package technique offers significant flexibility, enabling us to adapt solutions for a wide range of MMIC designs, cavity dimensions and flexible footprint options. The total microwave package is complimented with our specialist in-house design, assembly and test capabilities.

Single chip & MCM solutions

- Competitive pricing for high and low volume quantities
- Excellent thermal performance
- Excellent RF performance at Ka band
- Low cost tooling and short lead times for new designs
- Perfect for auto assembly process
- Available as SMD, Flip Chip, BGA, drop in and flange configurations
- Flexible footprint and cavity changes available

2. Data interface

Data submittal methods

Email: ptfe@labtech.ltd.uk
FTP: Contact technical sales
Post: 3.5" Disc/ CD Rom / Hard copy drawings / Photography masters

Data formats

PCB design data:

- Gerber / Extended Gerber (RS-274X)
- Graphiccode workfile
- Autocad DWG / DXF
- Excellon / Sieb & Mayer NC Data
- ODB++ / Mania Barco DPF

3D mechanical design:

- Autocad DWG / DXF
- IGES

Please note PCB design data submitted in Autocad DWG / DXF format will require approval plots following translation.

3. Microwave package design requirement

In-house microwave design capability using Microwave Office

Information required:

- Physical format including I/O's
- MMIC and internal decoupling component
- Operating frequency range
- Expected return loss
- Expected isolation
- Power handling / dissipation

(NB The I/O transitions can be characterised)

Delivery format:

- Single packages (waffle trays or discrete)
- Single packages (tape and reel)
- Arrays for assembly (partially profiled)

4. Materials

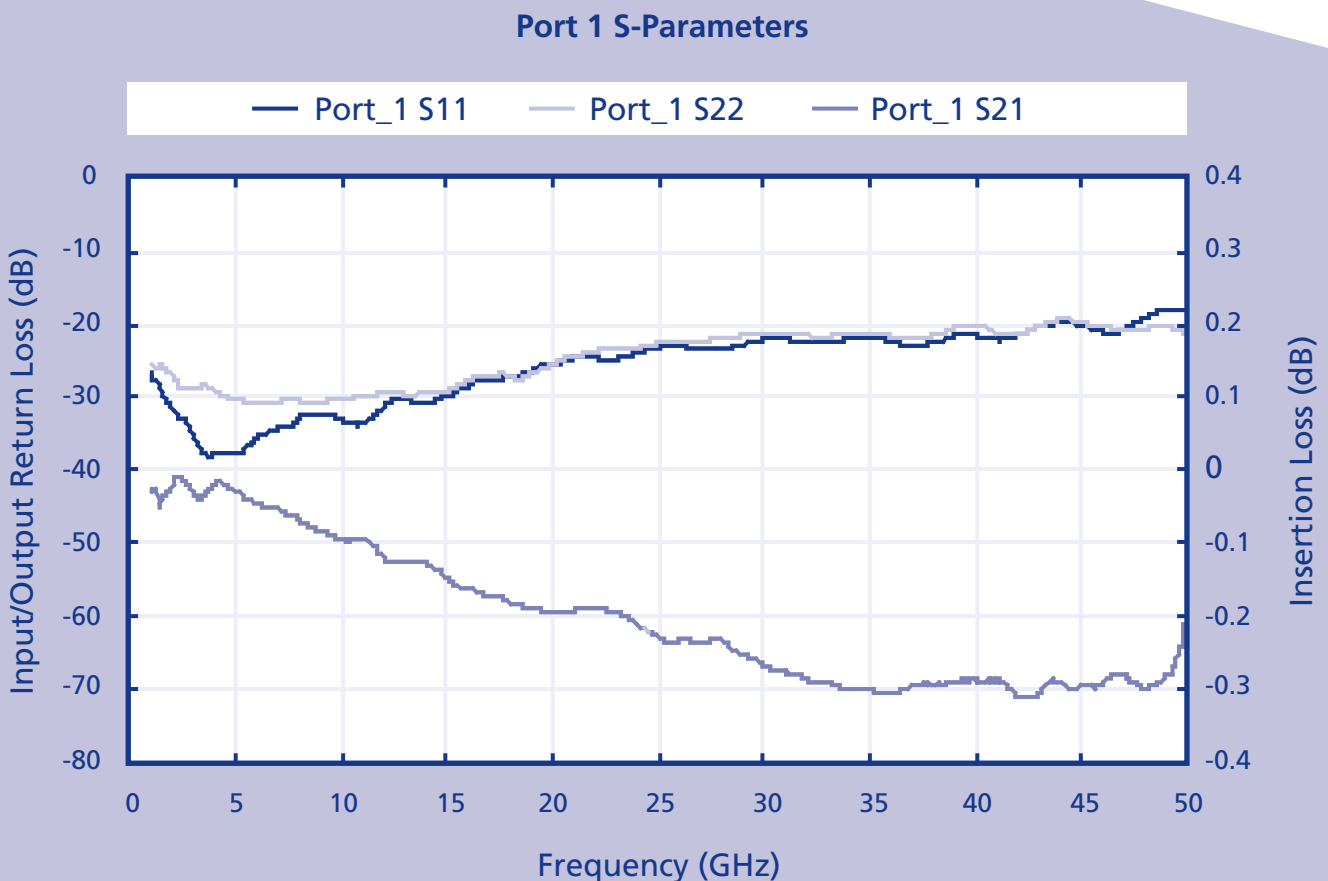
LCP is preferred choice:

- DK 2.9
- Loss tangent 0.0025
- Typical loss 1.5 dB / cm @ 60 GHz
- Near hermetic performance: He leak rate meets MIL-STD 883
- LIDs manufactured from RO4003 optional gold plated lids to improve hermeticity

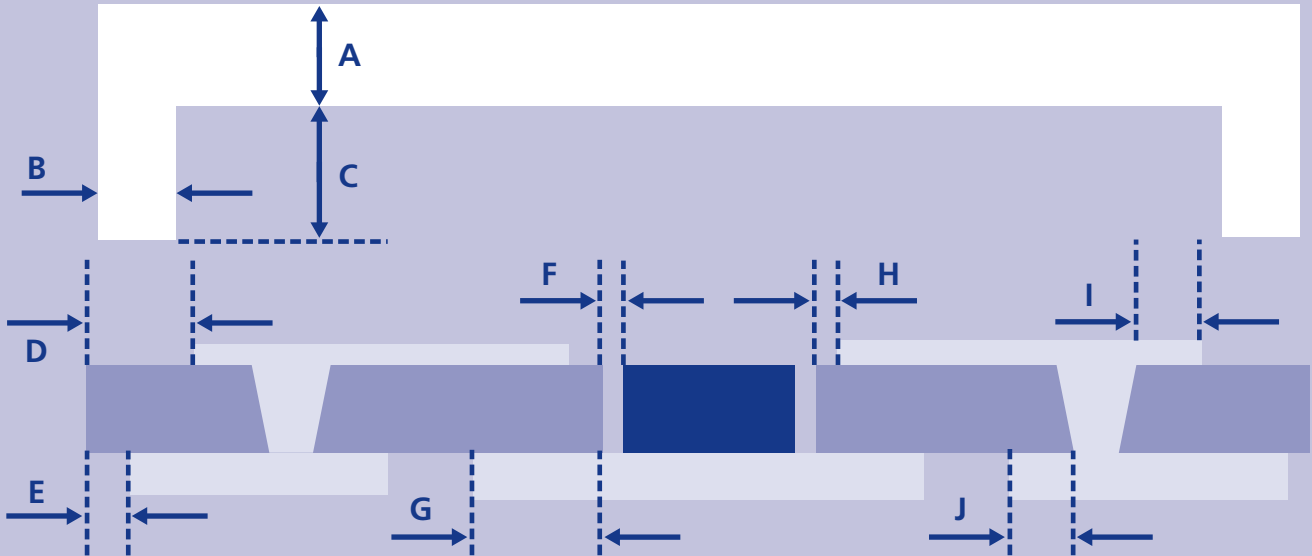
Alternative materials include:

- Rogers 3000 series
- Rogers 6000 series
- Rogers 4000 series

Example of measured results



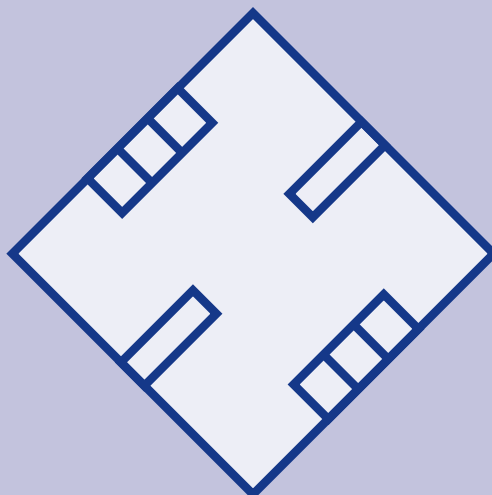
5. Package layout design guidelines



The minimum dimensions of A to J should be as follows: -

A) 0.5mm	B) 0.3mm	C) 1.0mm
D) 0.5mm	E) 0.1mm	F) 0.05mm
G) 0.2mm	H) 0.05mm	I) 0.2mm
J) 0.2mm		

- LCP substrate thickness typically 0.1mm (tolerance +/-10%)
- Laser blind via diameter 0.2mm (at top)
- Base copper thickness 80um to 100um or 30um Cu + 20um Ni + 30um Cu
- Top copper 35um to 50um
- Copper thickness in laser via holes 20um to 30um
- Minimum trace size and spacing on base 150um +/-30um
- Minimum trace size and spacing on top 100um +/- 20um
- Surface finish 3um to 6um Ni + 0.3um to 0.5um Pd + 0.01um to 0.05um Au
- General mechanical tolerances (excluding thickness) +/-0.05mm
- MMIC cavity dimensional tolerance +/-25um



6. Package styles

- Drop-in
- SMD
- BGA
- Single-chip
- Multi-chip
- Multilayer / Mixed dielectric
- Metal cored

7. Package features

Finishes:

- Electroless nickel / electroless palladium / immersion gold
- Other finishes possible upon request

Thermal Resistance:

- Low thermal resistance – typically 0.3 °C / W from base of die to base of package

Lead free:

- Labtech packages are compatible with lead free soldering and are ROHS compliant

8. Assembly & test

Manual or full automatic assembly.

Testing to customers specification including vector network analysis, noise and power.
(Suitable test fixtures may be required).

Labtech Microwave
Broadaxe Business Park
Presteigne
Powys
LD8 2UH
UK

Tel: +44 (0) 1544 260093
Fax: +44 (0) 1544 260310

Email: sales@labtech.ltd.uk
www.labtechmicrowave.com