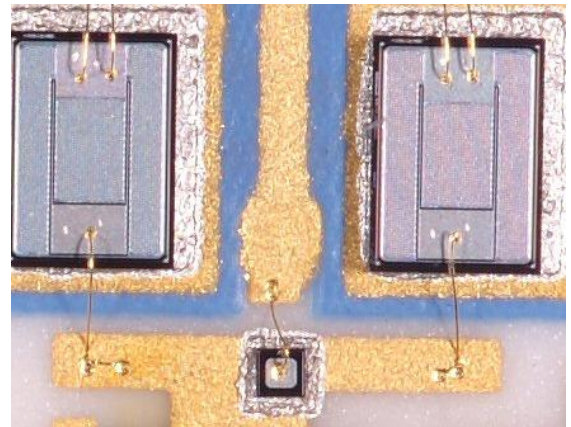


CERAMIC MULTI-CHIP MODULES

- Signal frequencies up to 5GHZ
- Excellent thermal matching between chips
- Risk of cracks in chips eliminated
- Simple reliable construction
- Small developments costs
- The quality system correspond to ISO 9001

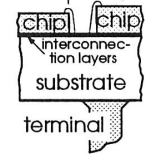
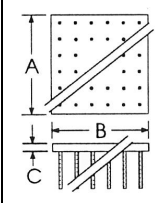
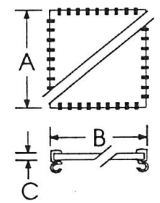
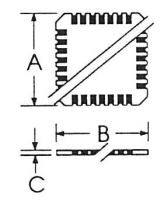


Electrical Data

Substrate and insulation layers			Notes
Dielectric constant		3.0	Modules with 2-3 interconnection layers
Dielectric strength	Volt/mm	800	
Insulation resistance	Ohm/mm	1T	
Thermal conductivity	Watt/mm°C	0.017	

Finished module			Notes
Attached chips			Consult chip manufacturers for data
Signal frequency	GHz	Up to 5	Achieved by impedance matching
Operating temperature range	°C	-55 to 150	Special modules up to 250 °C

Physical Data

Type	Dimension (mm)					Number of terminals		Typical chip position 10:1 0.5mm 	Terminal arrangement		
	A		B		C	Max	Min		PGA	PLCC	LCC
PGA	Max	Min	Max	Min	Nom	Max	Min				
PLCC	30.5	7.6	30.5	7.6	0.8	84	20				
LCC	30.5	7.6	30.5	7.6	0.6	84	20				

Construction

The interconnections are screen printed on the substrate and fired at 850 °C. The chips are picked from wafer or wafer and are glued or soldered on top of the interconnection layers. The module is then plasma cleaned before the wire bonding takes place. The module is then either covered with a ceramic top or coated. Finally terminals are attached.

Terminations

Bonding: Gold wire.

Terminals of module:

PGA: Tinned heat retardant wire

PLCC, LCC: Tinned stamped brass contact

Marking

The circuits are marked with manufacturing reference, type number and manufacturing code.

Solvent Resistance

Circuit and marking withstand all standard industrial cleaning fluids

Flammability

The module will not burn or emit particles

Performance Data

Bonding operation	Minimum	Typical	Notes
Pulling force gram	2.0	8.0	Measured on each batch

Finished module	Drift from encapsulation	Drift from chips	Notes
Load life stability	No drift	Consult chip manufacturers for data	1,000 hours at 70 °C with load
Long-term stability	No drift		Shelf life in one year
Long term damp heat	No drift		40°C/93%RH/56 days
Temperature cycling	No drift		5 cycles -55 to 155°C in 5 hours
Resistance to solder heat	No drift		260°C in 10 seconds
Vibration	No drift		20G in 2 hours

Application Notes

With an inexpensive multilayer screen printing technology a dielectric constant as low as 0.3 can be reached. As the stray capacitance is very low, good impedance matching can be achieved. Input and output signals and signals between the chips can reach frequencies up to 5 GHz. The multilayer technology provides also possibility for ground plane and supply voltage layers which will improve the performance at a modest cost.

The mechanical expansion coefficient of the substrate is only 7ppm/°C. This corresponds with the chips and eliminates any risk of crack.

The thermal conductivity of ceramic substrates is 60 times higher than printed board material. This will ensure the best possible thermal matching between the chips. In power circuits the ceramic substrate can also be glued directly to a heat sink and provide a strong cooling.

Jedec style dimension on the packages are preferred, but any mechanical size and number of terminals within the range are offered on request.

Testing

Destructive and non-destructive pull test is made on all batches'.

All circuits are 100% tested for all relevant functions either on pc-based test system or by specially made go no-go test boxes.

Quality

All procedure from design to final inspection and shipment are described and monitored. The quality system correspond to ISO 9001

Packaging

The modules are anti-statically handled and packed in cardboard or plastic boxes. The quantity per box depends on the size of the circuits.

The chip circuits can be supplied on tape and reel. Size of tape and quantity per reel depend on the size of the circuits.

Ordering procedure

Specify all dimension, the circuit diagram, the requested terminal style and positions and the test specification.

First-orders will have a tooling charge.

When reordering, please specify the manufacturing reference C-number of your circuit.

Any quantity can be ordered, but the cost of production start will make small quantities expensive