

**KARNATAKA HYBRID**  
MICRO DEVICES LTD.

# INDEX

**ABOUT US**

**SECTORS SERVED**

**PRODUCTS AND SERVICES**

**DESIGN AND DEVELOPMENT**

**ACHIEVEMENTS**

# ABOUT KHMDL

KHMDL has been a pioneer in Thick-film technology specializing in design, development and large-scale manufacture of hybrid microcircuits for over two decades. It has emerged as an industry leader in the domain servicing automotive, space, aerospace & defense and other industries requiring highreliability applications.

*Incorporation  
of KHMDL*

1992

*Qualification of HMC for space*

2000

*Indigenization  
of automotive hybrids*

2002

*Development of  
TFR*

2008

*Development of  
Seismometer HMC for  
Moon mission.*

2019

1998

*Qualification of  
networks for space*

2001

*Restructuring of KHMDL*

2003

*EMS line Qualification by HAL*

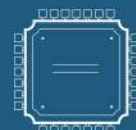
2012

*Establishment of  
screening facility*

2022

*Printed Heater  
Development*

*Every Spacecraft Built By Indian Space Research Organization Including Mars and Lunar  
Missions and a Third Of Automobiles On The Road Incorporates a KHMDL  
Micro-electronics Product*



30 MILLION DEVICES DELIVERED



60,000 Sq. ft.



210 EMPLOYEES

# VISION

*Building a better tomorrow with innovation and cutting-edge technology, driven by a passionate & performance driven ingenious team.*

# OUR CLIENTS

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# CERTIFICATIONS/APPROVALS

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# SECTORS SERVED



***AEROSPACE  
AND DEFENCE***

***AUTOMOTIVE***

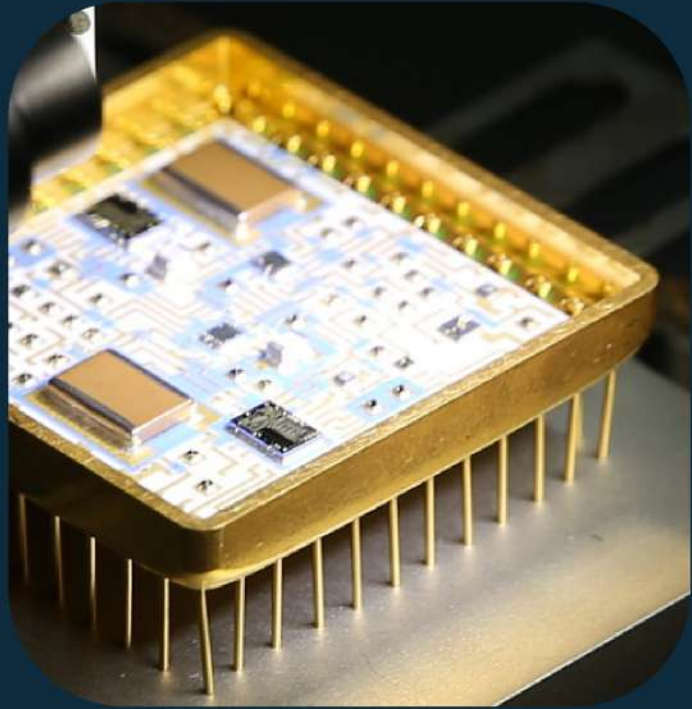
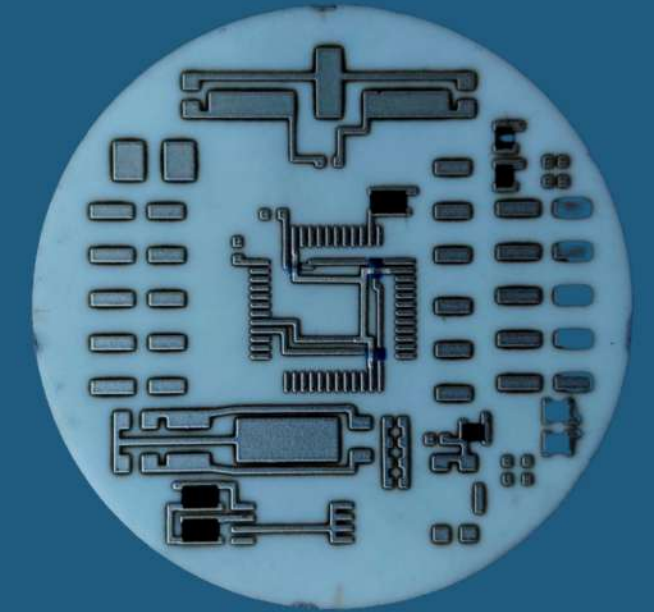
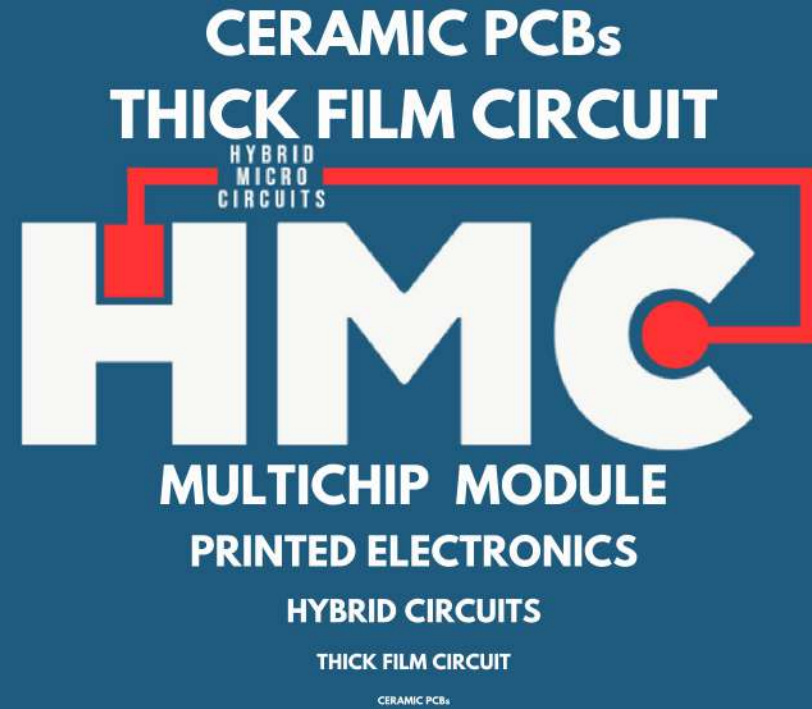
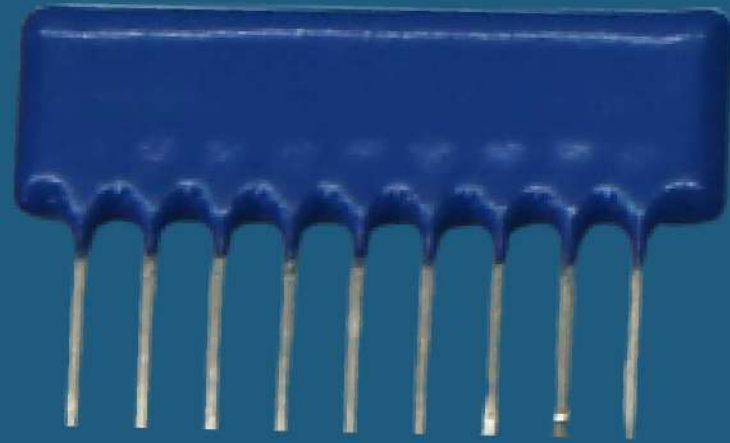
***MEDICAL***

***POWER  
ELECTRONICS***

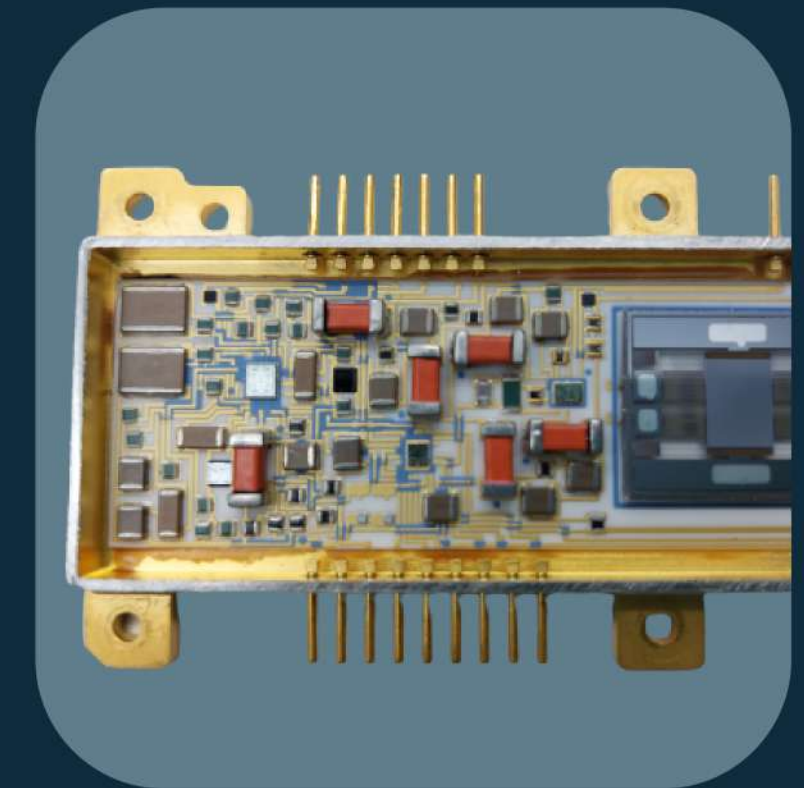


# AEROSPACE & DEFENCE

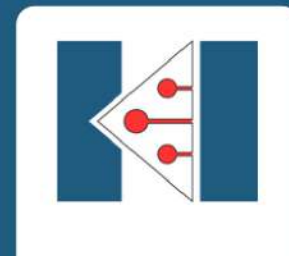




- 20 years of experience in HMCs
- Hermetically sealed HMCs, better than  $10^{-9}$  m<sup>3</sup>/s leak rate
- Ceramic/Metal Package
- Laser trimming to achieve better than 0.5% tolerance on resistors
- Resistor Network and Resistor Capacitor Network.
- 20 types of HMCs for space
- Complete end to end fabrication facilities in-house



**Every satellite built in India has our Hybrid Micro Circuit on-board from past 20 years**



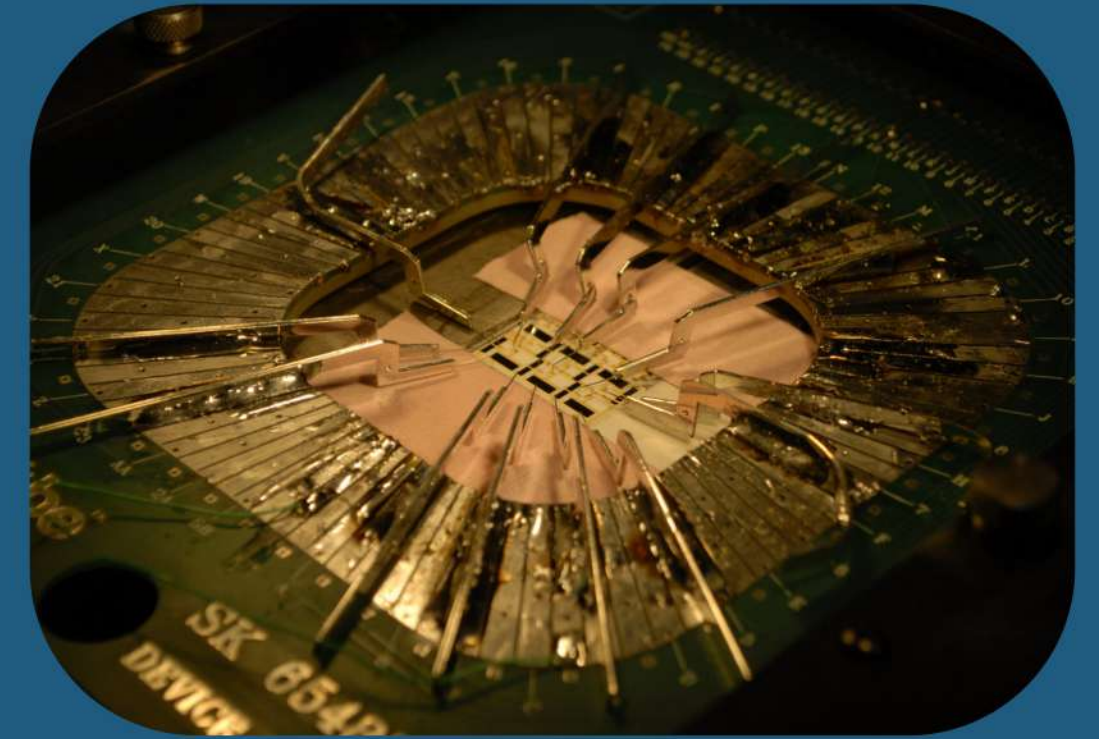
SUBSTRATE PRINTING



FIRING @850°C



LASER TRIMMING



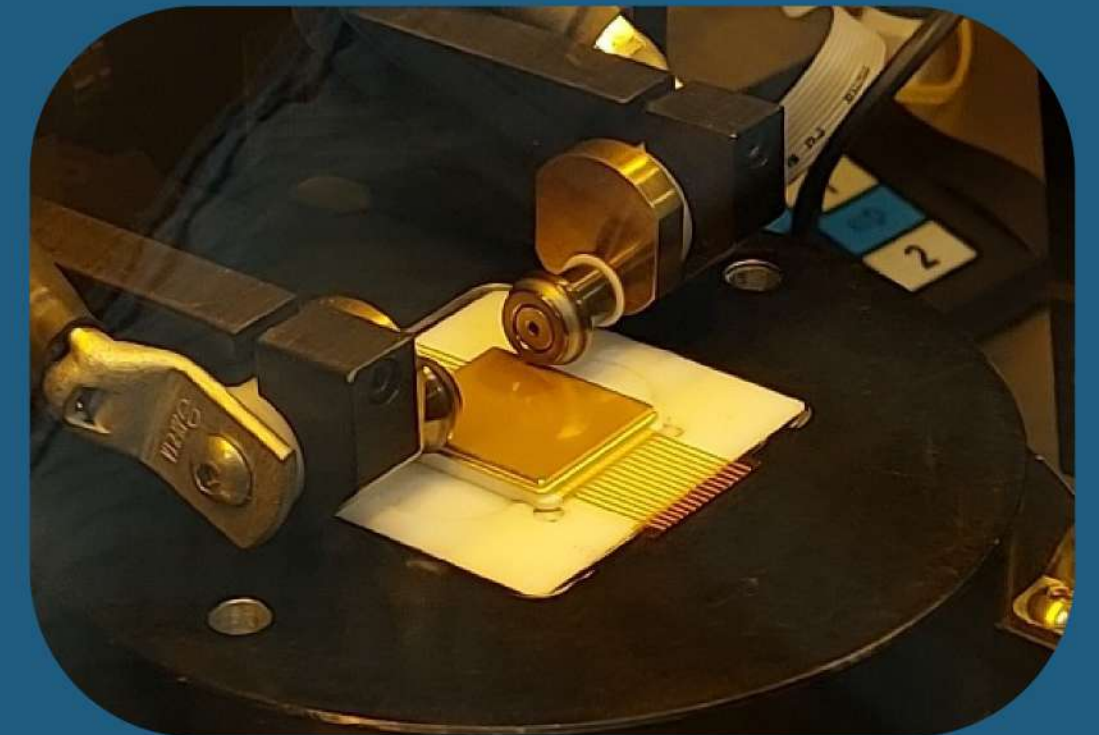
## HYBRID MICROCIRCUIT LINE



DIE PLACEMENT

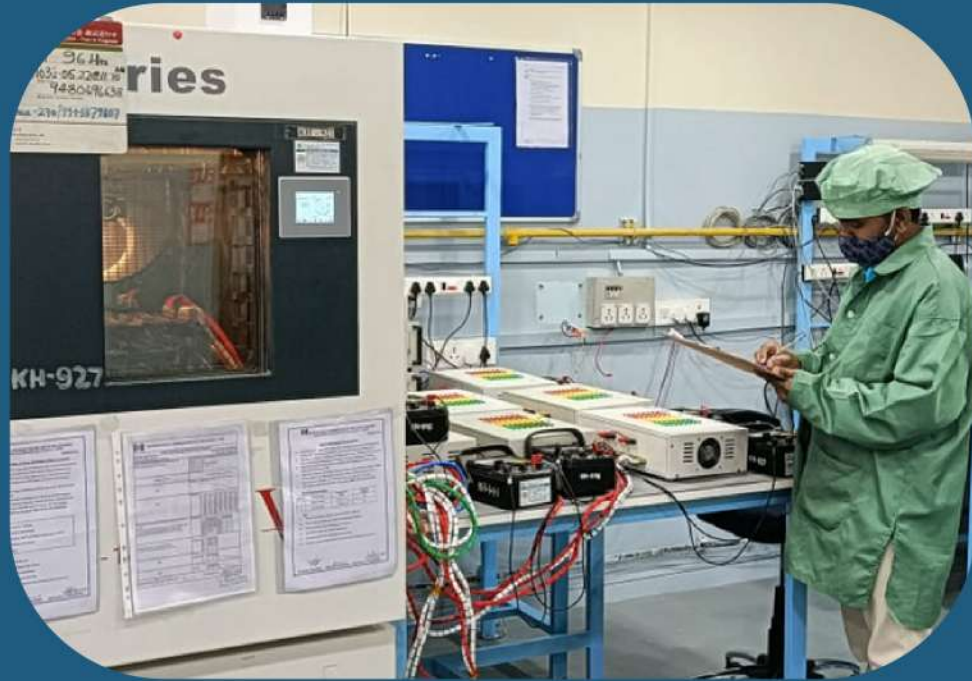


WIRE BONDING



HERMETIC SEALING

# SCREENING FACILITIES



Burn-In & ATC Chambers:  $-40^{\circ}\text{C}$  to  $+180^{\circ}\text{C}$



PIND Tester



Constant Acceleration Tester



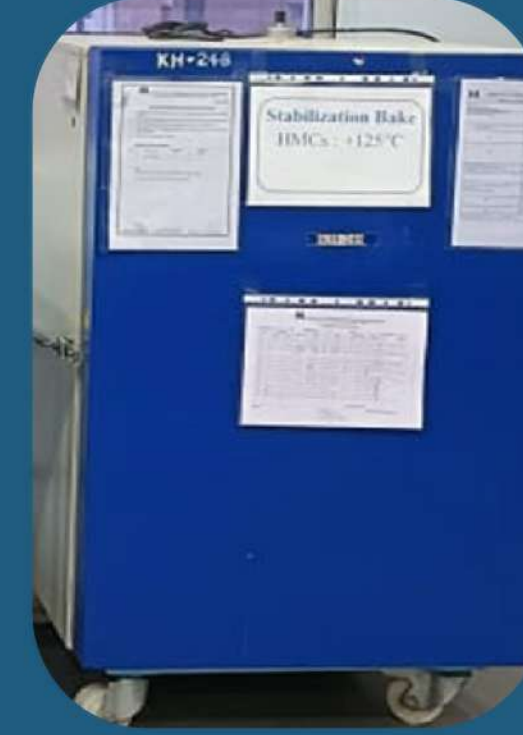
Fine Leak Tester



Microscope



Gross Leak Tester



Oven @  $150^{\circ}\text{C}$



Cold Chamber @  $-65^{\circ}\text{C}$

# ELECTRONICS MANUFACTURING SERVICES



**WE HAVE BEEN SUPPLYING  
MISSION CRITICAL  
PCB ASSEMBLIES FOR**

**SUKHOI AND JAGUAR AIRCRAFTS  
FOR 2 DECADES**

# EMMS

ELECTRONIC MANUFACTURING SERVICES

*KHMDL has two decades of experience in providing highly complex electronic manufacturing services (EMS) to Aerospace and Defense Industries.*

## OUR CAPABILITIES

**PLACING MINUTE COMPONENTS OF MINIMUM SIZE 0201**

**PCBA UP TO 30 LAYERS**

**LEAD FREE PROCESSING CAPABILITY**

**SEPERATE MANUAL SOLDERING LINE UP TO 0.1MM PITCH.**

**BGA ASSEMBLY**

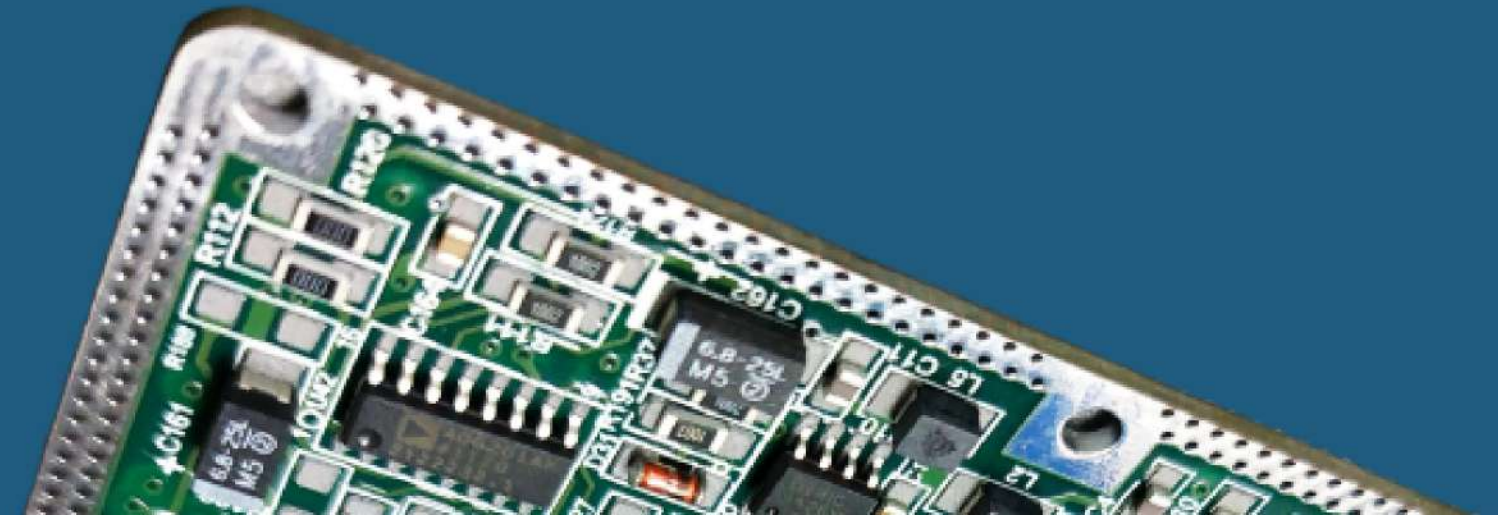
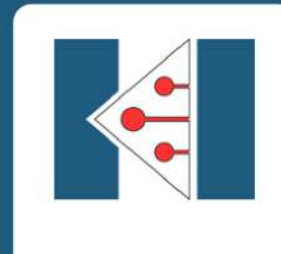
*Mission Computers (MC)*

*Radar Computers (RC)*

*Display Processors (DP)*

*Cockpit Display Electronics*

*Onboard Processors*



SOLDER CREAM PRINTING



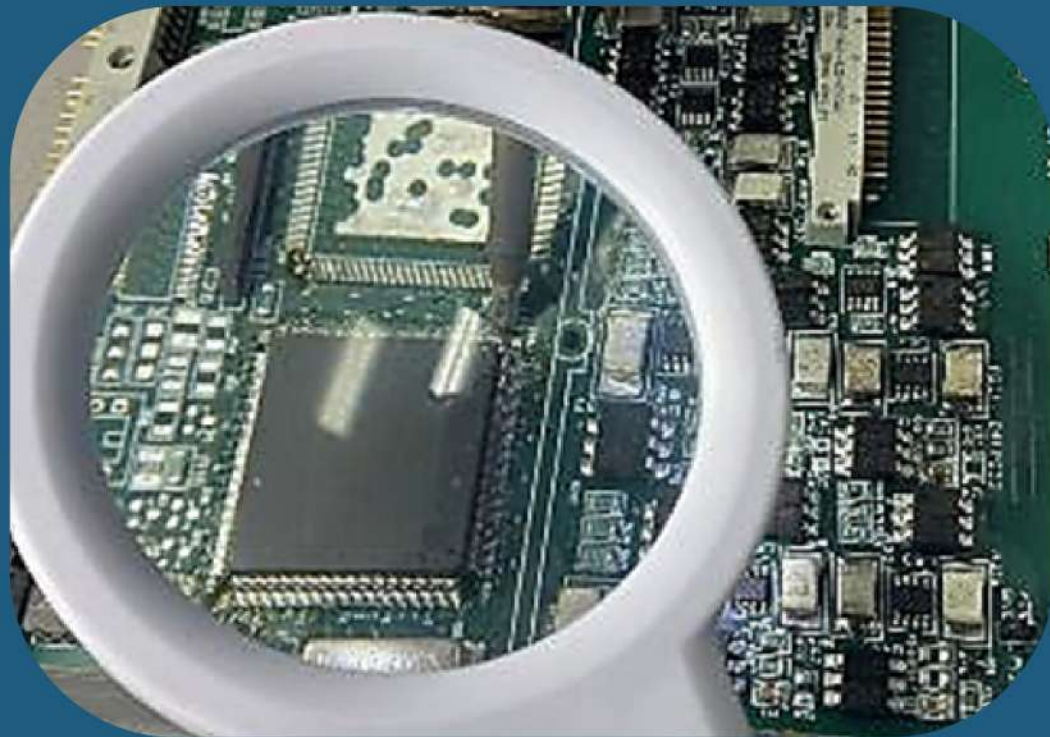
PICK AND PLACE MACHINE



BGA POSITIONING



## ELECTRONICS MANUFACTURING SERVICES LINE



MANUAL SOLDERING



REFLOW OVEN

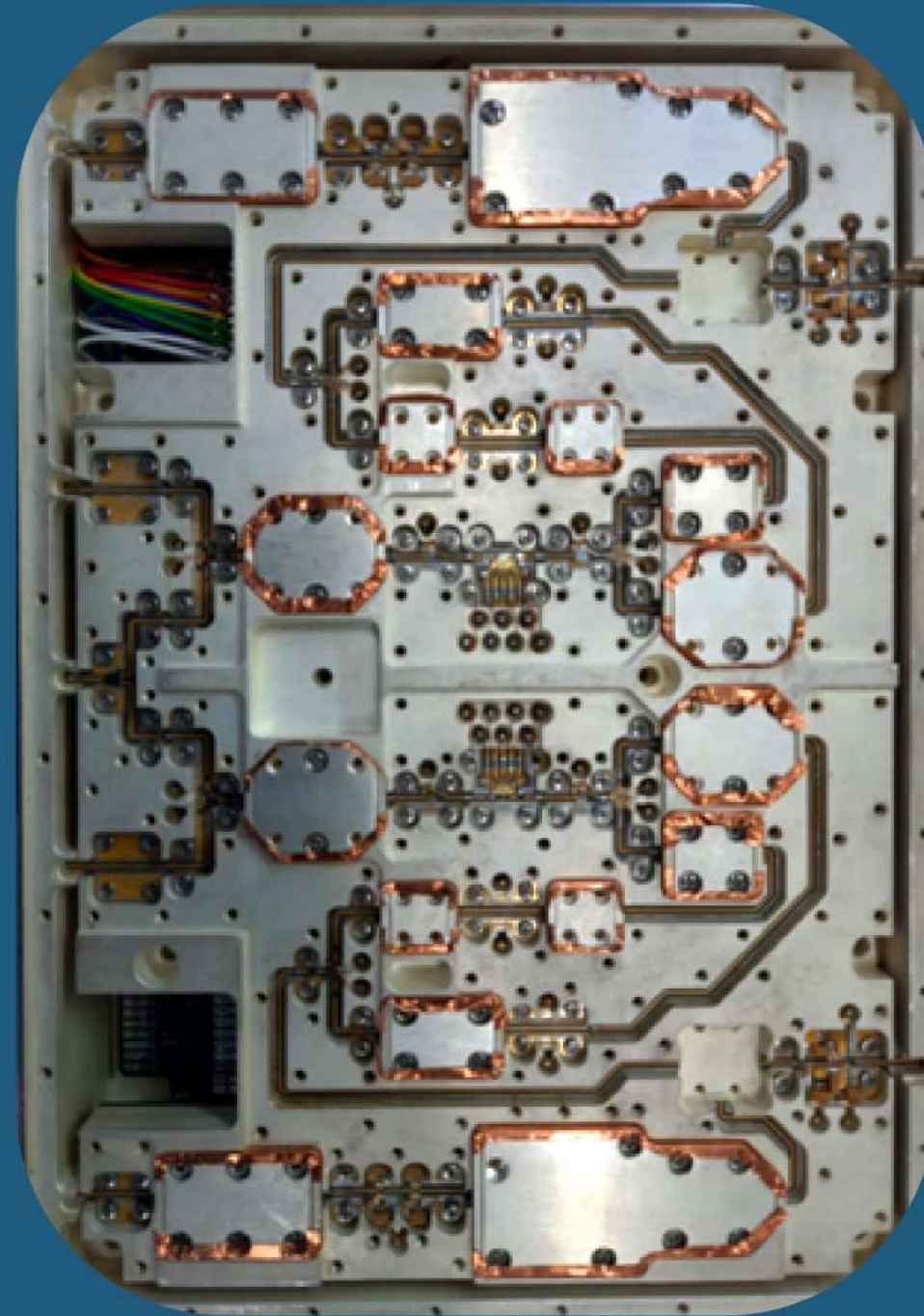


AUTOMATIC OPTICAL INSPECTION (AOI)

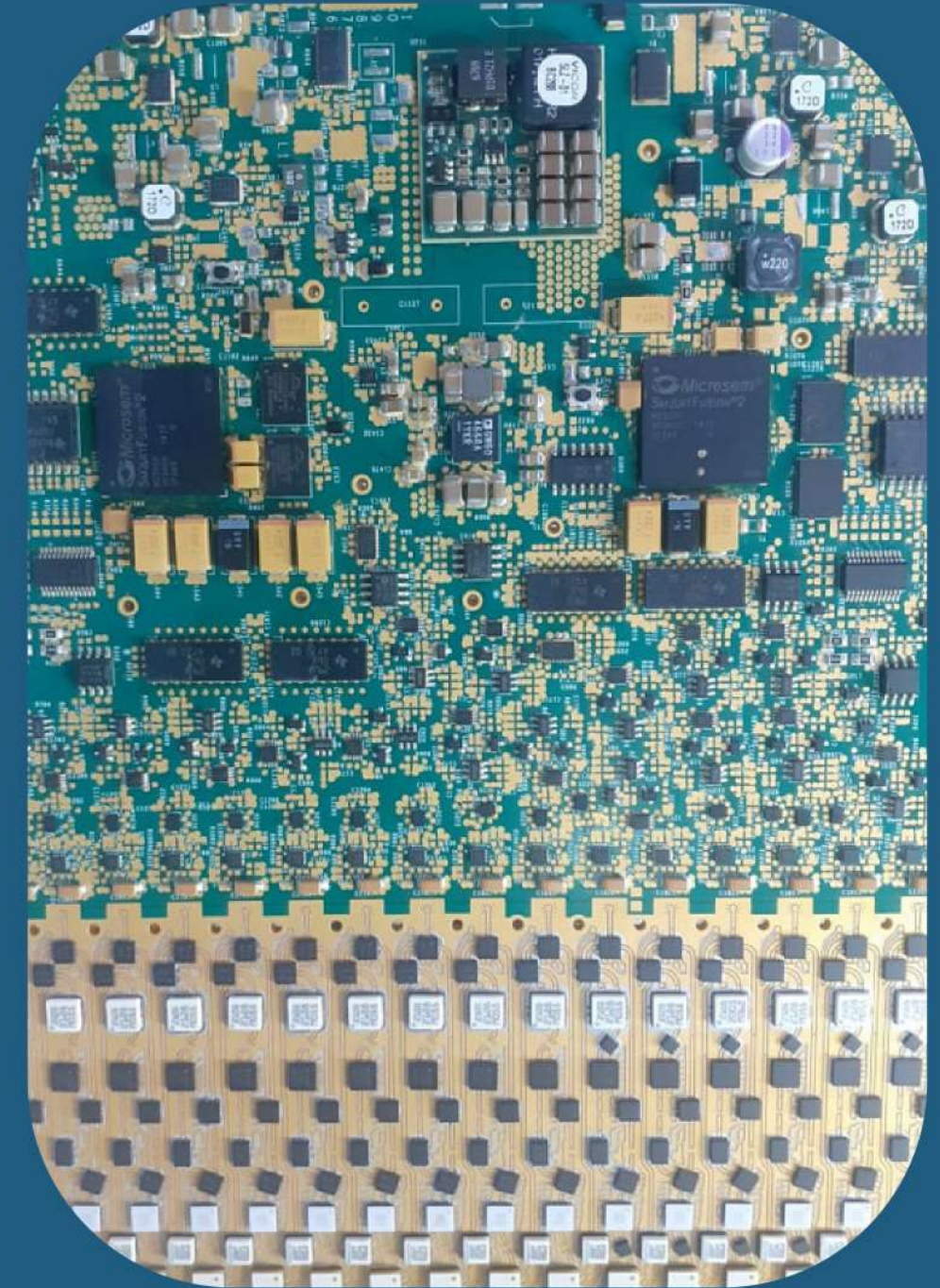
# RF SUBSYSTEMS



**FLAT PANEL ARRAY ANTENNA**



**18-40 GHz UP/DOWN CONVERTOR**



**5-18 GHz TR MODULE (16 CHANNEL)**



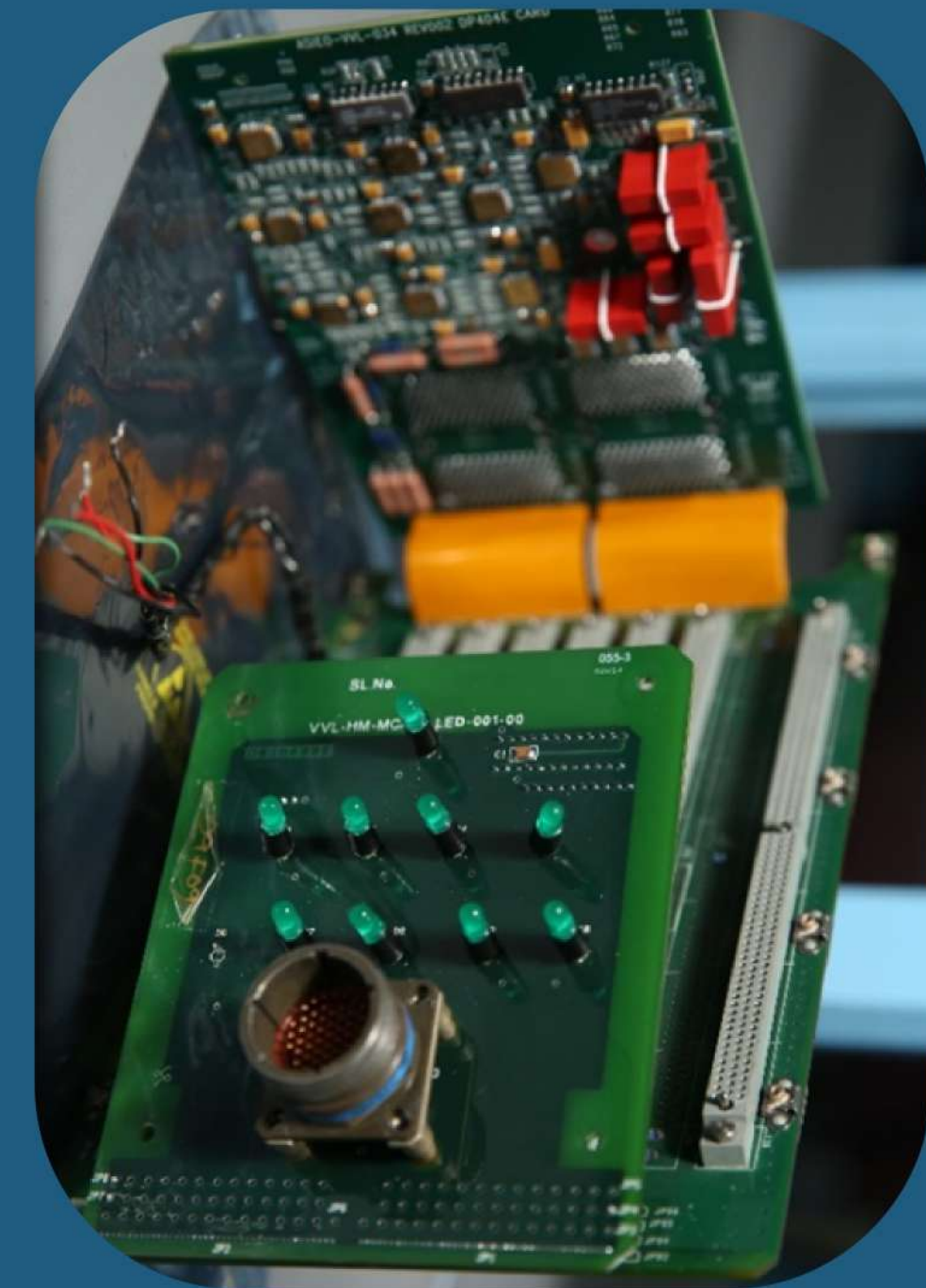
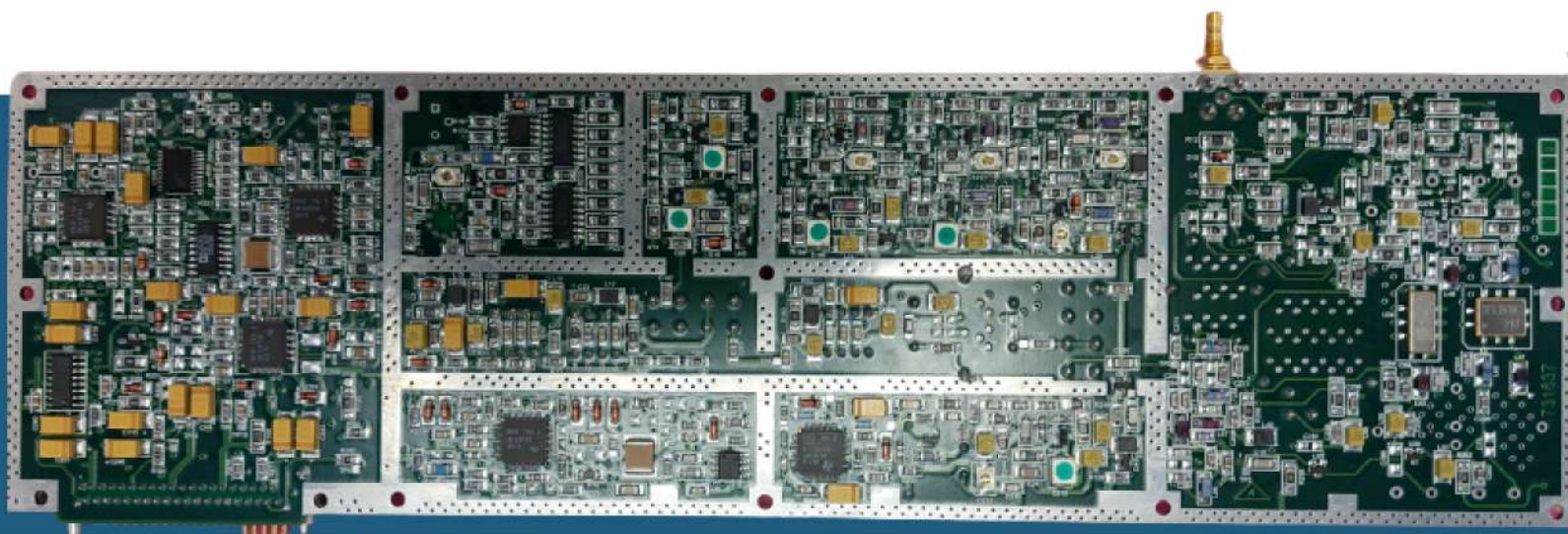
# PRODUCTS

AEROSPACE AND DEFENCE

**MISSION COMPUTERS/DISPLAY PROCESSORS  
(SU30 PROJECT)**

**RADAR COMPUTERS/JAGUAR  
(SU30 PROJECT)**

**ADVANCED COMMUNICATION CARDS**



**MOTHER BOARD ASSEMBLY  
MC/DP OF SU30 PROJECT**

# PRODUCTS

## AUTOMOTIVE

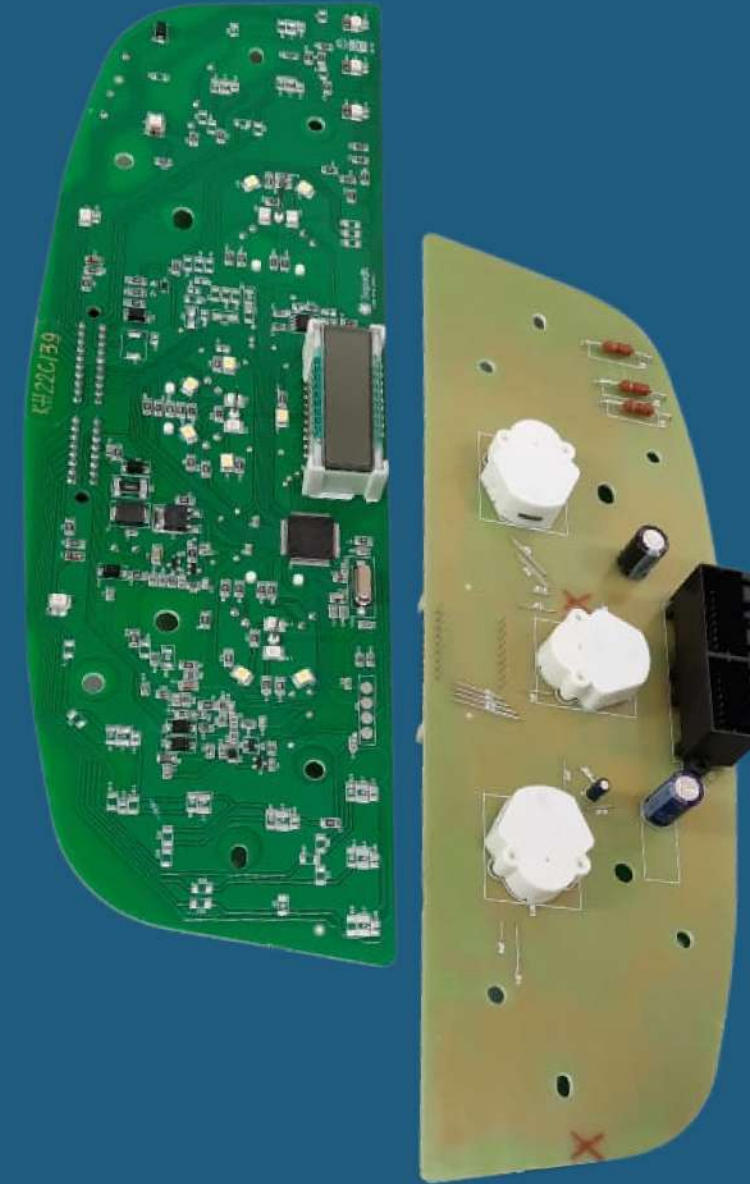
TIT1 PROJECT FOR CLUSTER



EV001



DC003 CLUSTER



VST CLUSTER



# AUTOMOTIVE



# AUTOMOTIVE

## TFR

### FUEL SENSOR HYBRID TILES

Resistance  
0 to 280Ω

- Inhouse Design & Testing Capability
- Tested for more than 5 million operations
- Precision laser trimming
- Capacity for large volume manufacturing

## WJ

WINDSHIELD WIPER CONTROLLER

### REAR WINDOW WIPER CONTROLLER

Intermediate Single Speed  
Controller for Rear Window Wiper

- Operating Voltage :  $12 \pm 0.5VDC$
- No of Wiping/Minute : 45 Wipes
- Customizable as per OEM specification
- Motor Current rating (Max) : 20A
- Operating temperature :  $-40^{\circ}C$  to  $+85^{\circ}C$

FMVSS 118 STANDARD

## ANTI-PINCH WINDOW CONTROLLER

### ANTI PINCH POWER WINDOW CONTROLLER

Electronics For Window  
Regulator/CONTROLLER

- Operating Voltage Range : 10 V to 15 V
- Idle Current :  $< 0.5\text{ mA}$
- Operating Mode Current (No Load) :  $< 7\text{ mA}$
- Motor Current rating (Max) : 20Amps

## VOLTAGE REGULATOR

### MONOFUNCTION

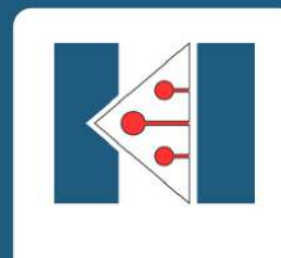
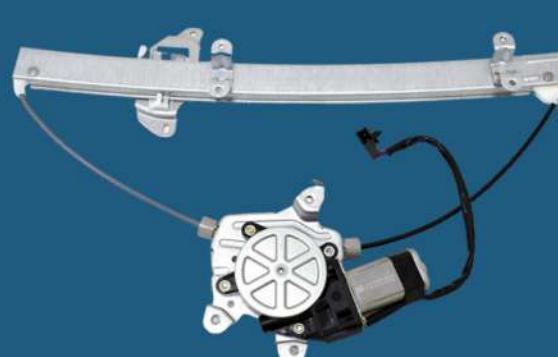
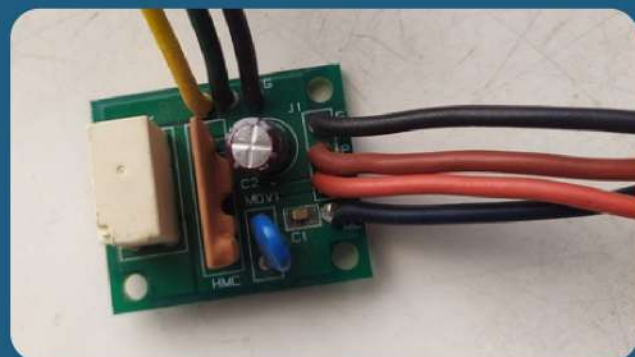
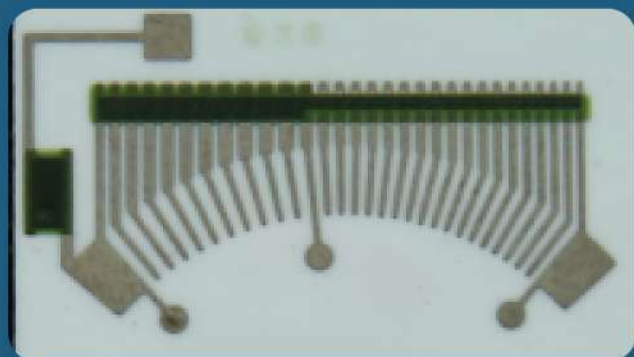
$12 \pm 0.2V$   
 $24 \pm 0.2V$

- Cut In Speed : 1200 to 1400 (configurable)
- Speed Regulation : 2000 RPM to 6000 RPM
- Load Regulation : 10% to 95%
- Temperature Coefficient :  $10\text{ mV/ }^{\circ}C$

## PRINTED DEFOGGER HEATERS

### DEFOGGER MIRRORS

- Heating Temperature:  $45^{\circ}C$
- Supply Voltage: 24V
- Power: Up to 16W
- Defrost Time: 2-4 Minutes  
(In Ambient Conditions)



# MEDICAL



# RTPCR TEST EQUIPMENTS

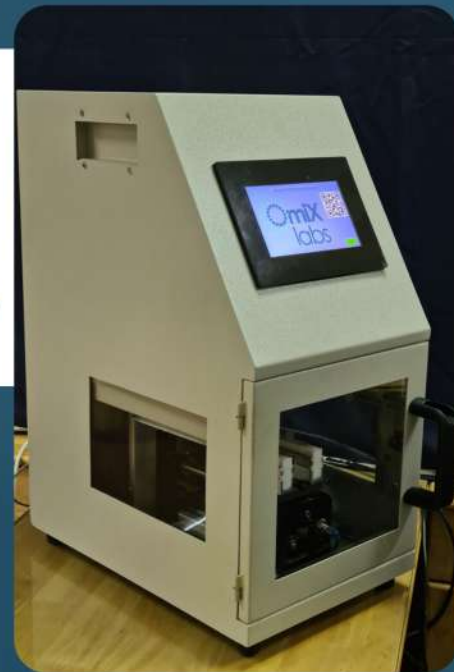
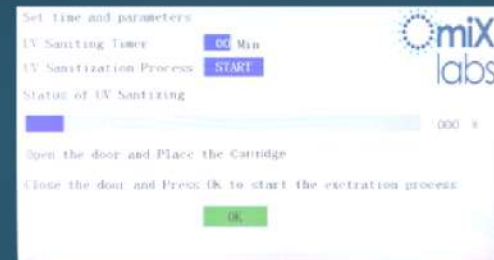
DESIGNED AND DEVELOPED BY KHMDL

## DNA EXTRACTOR



**CONFIGURABLE TIME**  
**WASHING MIXING DRYING**

**USES ELECTROMAGNETIC ELECTRODES**  
**SANITISATION USING UVC**



## DRY BATH INCUBATOR



**TOP PLATE TEMPERATURE: SET TO 100 °C**  
**BOTTOM PLATE TEMPERATURE: SET TO 65 °C.**

**LOW POWER CONSUMPTION DUE TO THICK FILM TECHNOLOGY**

**HEATING TIME: 12-15 mins.**

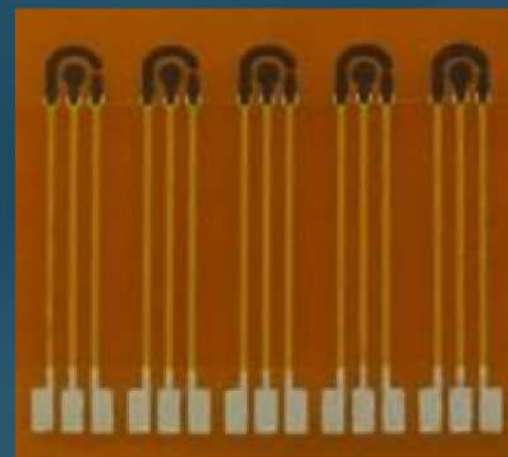
# SENSORS

## ELECTRODES FOR BIO-MEDICAL DIAGNOSTIC APPLICATIONS



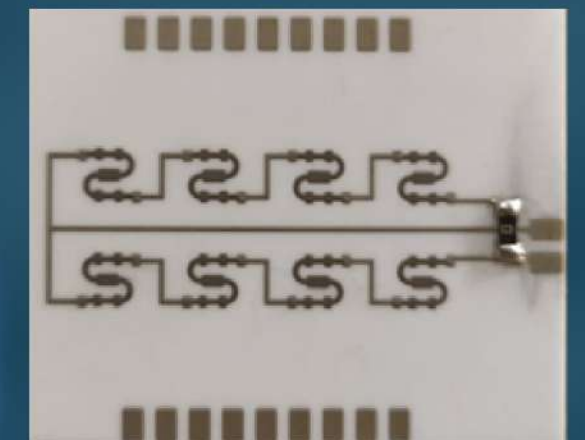
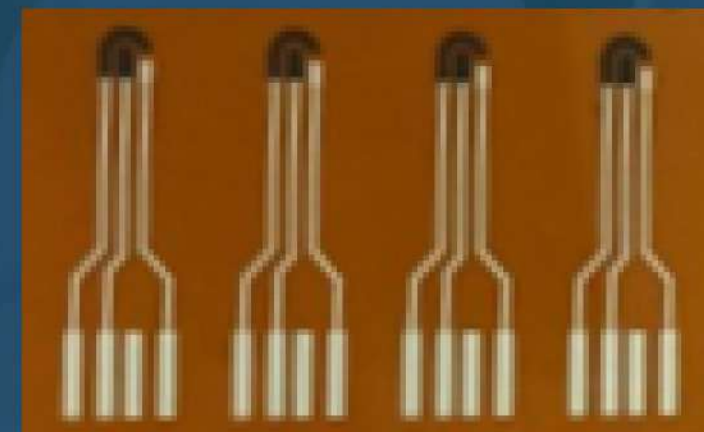
CERAMIC BASED SENSING ELECTRODES

## ELECTRODES FOR GLUCOMETER



FLEXIBLE SENSING ELECTRODES

## ELECTRODES WITH HEATER



# OTHER SERVICES



# WIRE BONDING

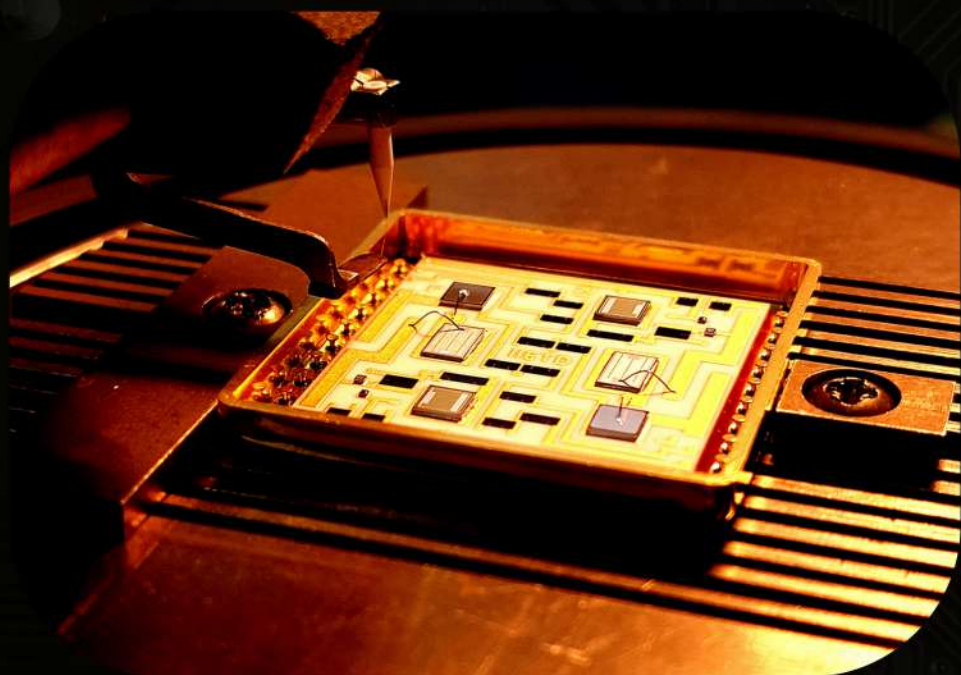
# LASER SCRIBING

# LASER TRIMMING

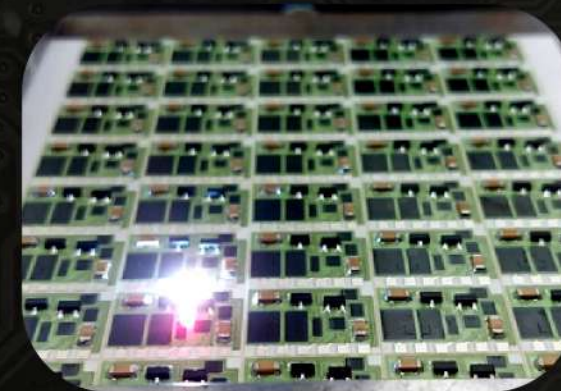
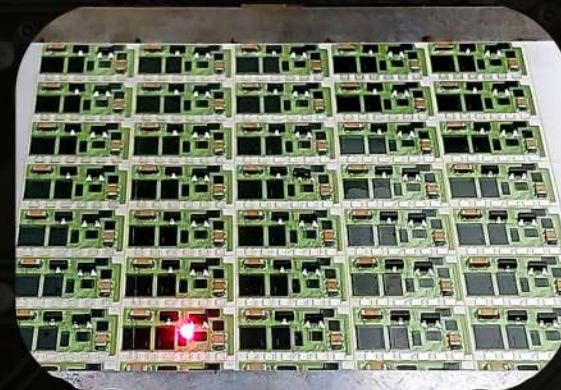
- 1. Gold Wire Bonding (0.7, 1 & 1.5 mil)
- 2. Aluminum Wire Bonding (1, 5 & 8 mil)
- 3. Ribbon Bonding (2 mil Thk & 10 mil Width)
- 4. Semi Auto Wire Bonder

MIL STD 883

ISRO PAS 206



**FIBER LASER**  
Power: 100 W  
Size: 5x5 inches  
Accuracy: 50μ  
Cutting Width: 50μ



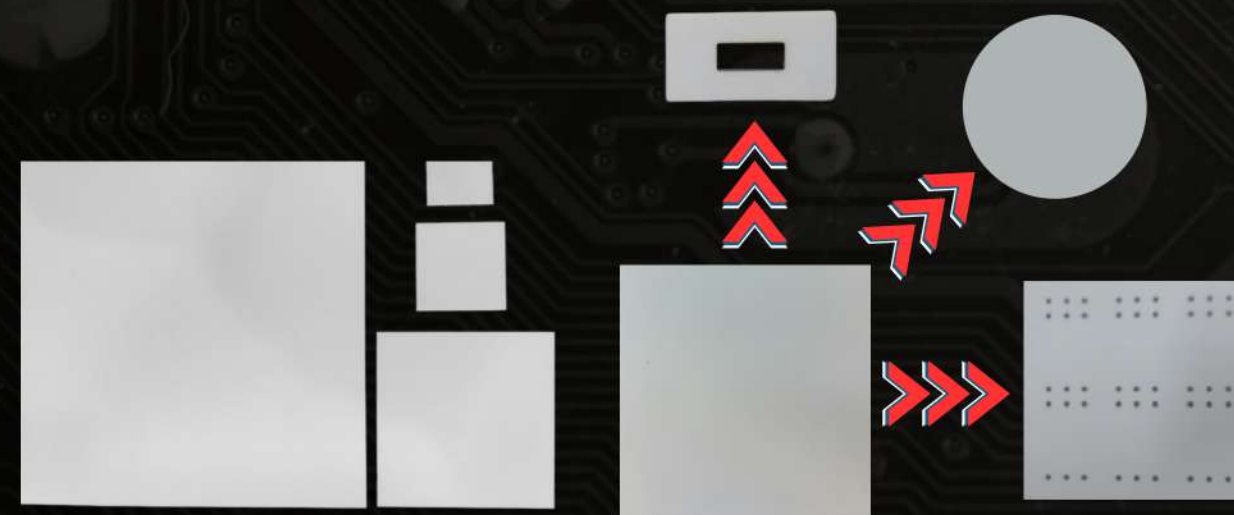
## PROGRAMMABLE

SCRIBING

CUTTING

DRILL

CUSTOM SHAPE CUT



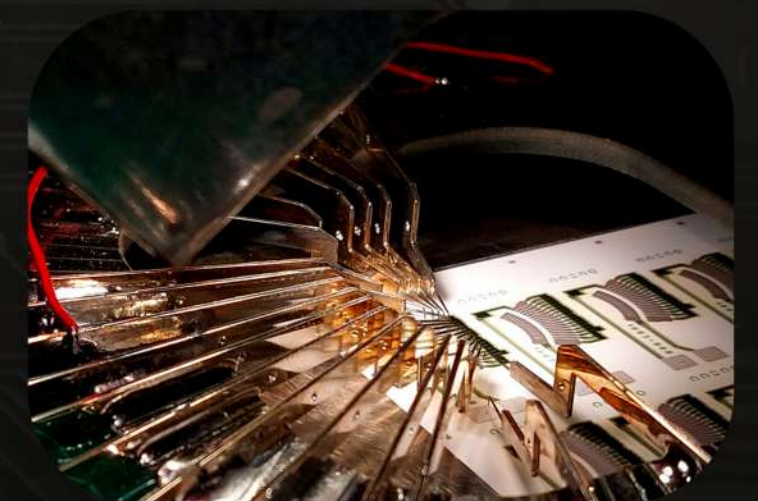
## TYPES OF CUTS

- 1. L Cut
- 2. Straight (Plunge) Cut
- 3. Scan Cut
- 4. Box Cut
- 5. Serpentine Cut

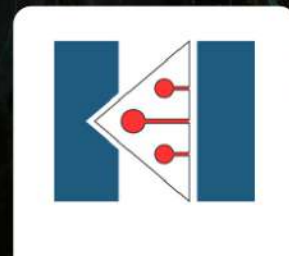
**TOLERANCE**  
< 0.5%

MIL STD 883

ISRO PAS 206



# DESIGN AND DEVELOPMENT



# ***DESIGN STRENGTH***



***POWER  
ELECTRONICS***

***HMC  
DESIGN***

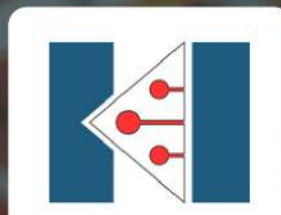
***EMBEDDED  
SYSTEMS***

## ***SOFTWARE TOOLS AVAILABLE***

- Solidworks
- OrCad
- AutoCAD
- Thermal Analysis
- NI Multisim
- Arduino IDE
- Code Composer Studio

## ***ENGINEER WORKFORCE***

8 with 2 external experts as consultants



# POWER ELECTRONICS



**PARASHAKTI**

M.P.P.T

## SOLAR LIGHT CHARGE CONTROLLER

WITH LED DRIVER

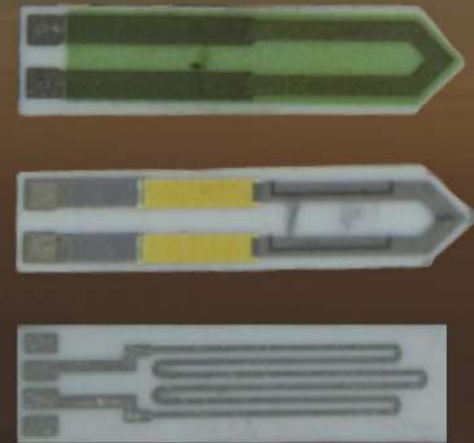
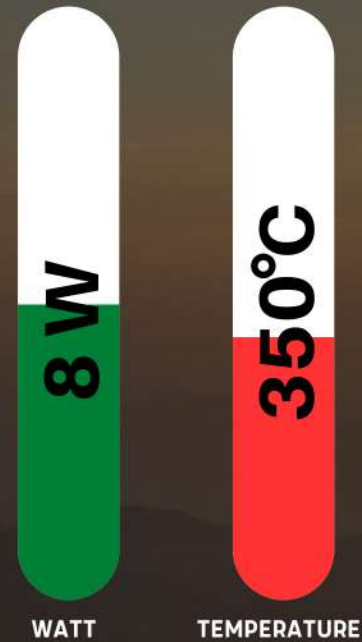
- **30W/60W OUTPUT**
- **10A CHARGING**
- **WITH AUTOMATIC DUSK TO DAWN DETECTION**
- **PROGRAMMABLE LED INTENSITY**



# PRINTED HEATERS

## AEROSOL HEATERS

WITH PRINTED TEMPERATURE SENSOR



### APPLICATIONS

- ELECTRICALLY OPERATED AEROSOL GENERATOR
- VAPOR GENERATOR DEVICE

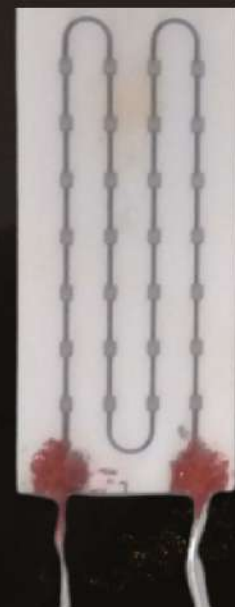
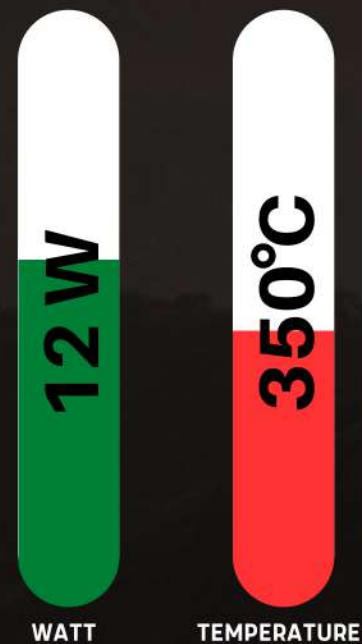
## SPACE GRADE THERMAL CUTTER



### APPLICATIONS

- CUTTING KEVLAR CORDS IN SPACE

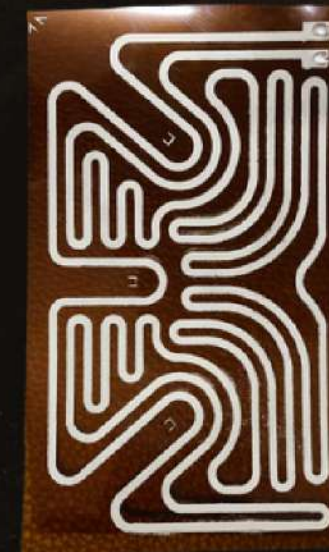
## ALUMINA BASED HEATER



### APPLICATIONS

- UNIFORM TEMPERATURE DISTRIBUTION
- HIGH TEMPERATURE STABLE CONNECTIONS

## DEFOGGER MIRROR HEATER



### APPLICATIONS

- REMOVES FOG FROM THE REAR VIEW MIRROR

# POSITION LIGHT SYSTEM

## POSITION LIGHTS

- **Input Voltage: 28VDC**
- **Power Consumption: <= 12W**
- **Compliant to RC/LUH/EL/TS/103**
- **Weight 550 gms**
- **Compliant to FAR 27/DEF STAN 00-970**
- **Chapter 110/MIL STD 3009**



Forward Mounting



RED



GREEN

Rear Mounting



WHITE

# ANTI-COLLISION LIGHT

## ANTI COLLISION LIGHT SYSTEM

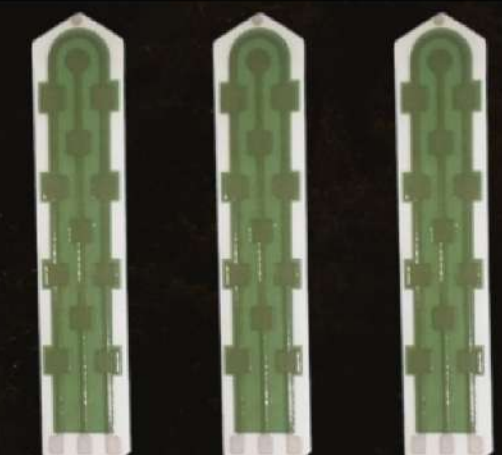
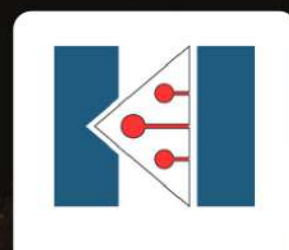
- **LED Based**
- **Color: Covert IR Stroboscopic IR**
- **Flash Rate : 60FPM**
- **Luminous Intensity : 150 cd**
- **Power Supply : 28VDC**
- **Relevant DO160D**



# SENSORS

## MOISTURE SENSOR

- **Linear**
- **Consistent output/behavior**
- **Corrosion Resistant**
- **Compact**
- **Suitable for automation**





# OUR ACHIEVEMENTS



**Development of MEMS  
HMC for moon mission**

**>75,000 R/RC networks  
to Indian Space**

**>5000 HMCS for space**

**45,000 circuit Board  
Assemblies for more  
than 450 aircrafts**

**Built more than 100  
li-ion, NI-Cd and NI-H2  
flight batteries for  
spacecraft**

**Characterization of  
li-ion cells-10year of  
expertise.**

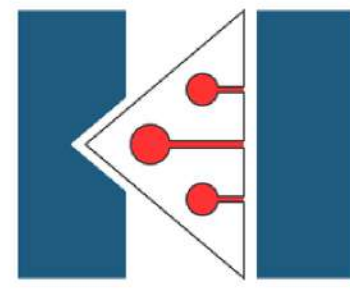
# AWARDS



# INDIA 100 Awards

INDIA SME FORUM KARNATAKA HYBRID MICRO DEVICES LTD. ASS BANK





**KARNATAKA HYBRID**  
MICRO DEVICES LTD.

# THANK YOU.

*Karnataka Hybrid Micro Devices Ltd.*

Plot 103, 4th Cross Rd, Electronics City Phase 1,  
Electronic City, Bengaluru, Karnataka 560100

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