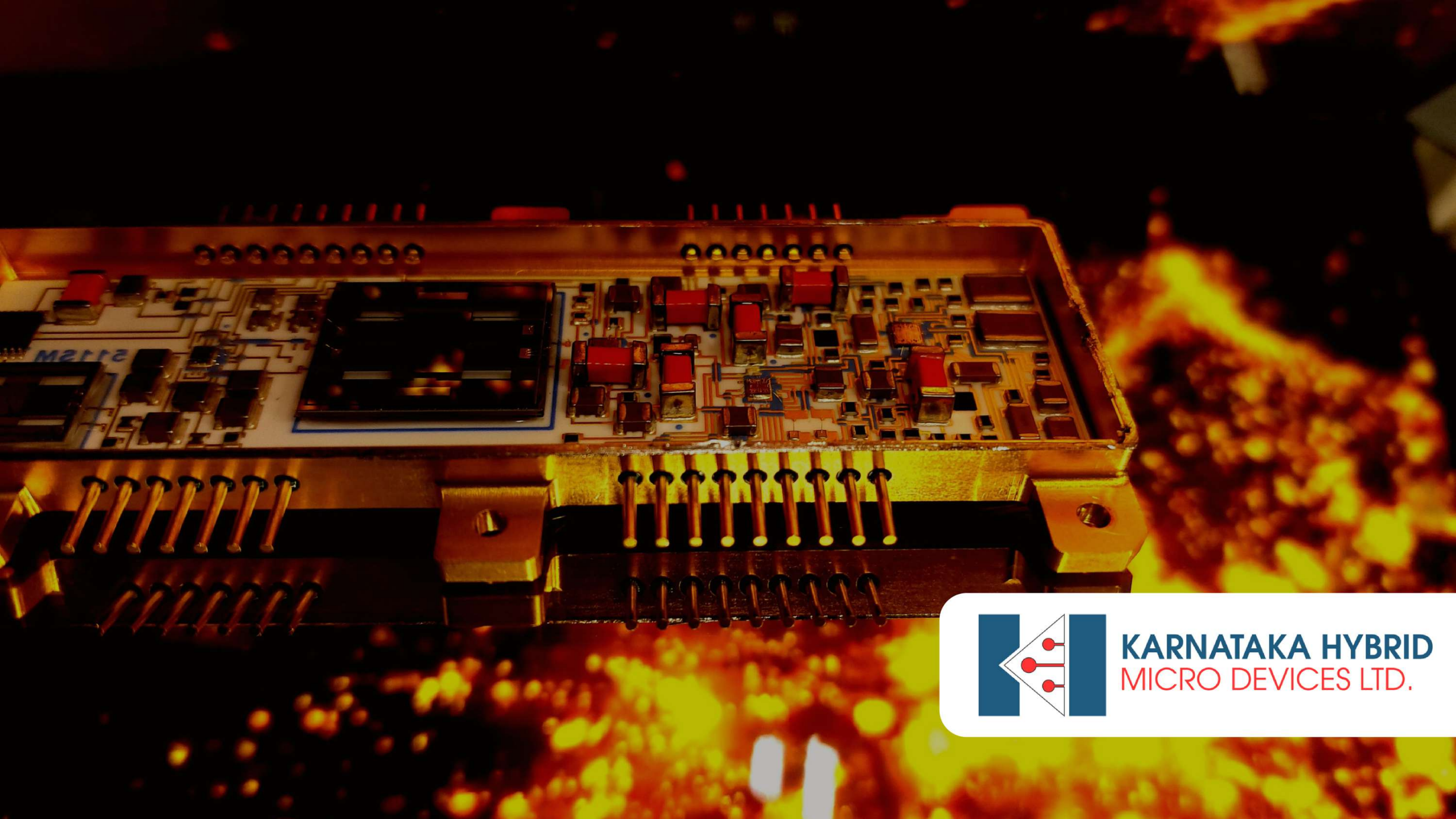


KARNATAKA HYBRID
MICRO DEVICES LTD.

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

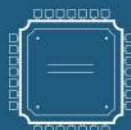
2012

*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*



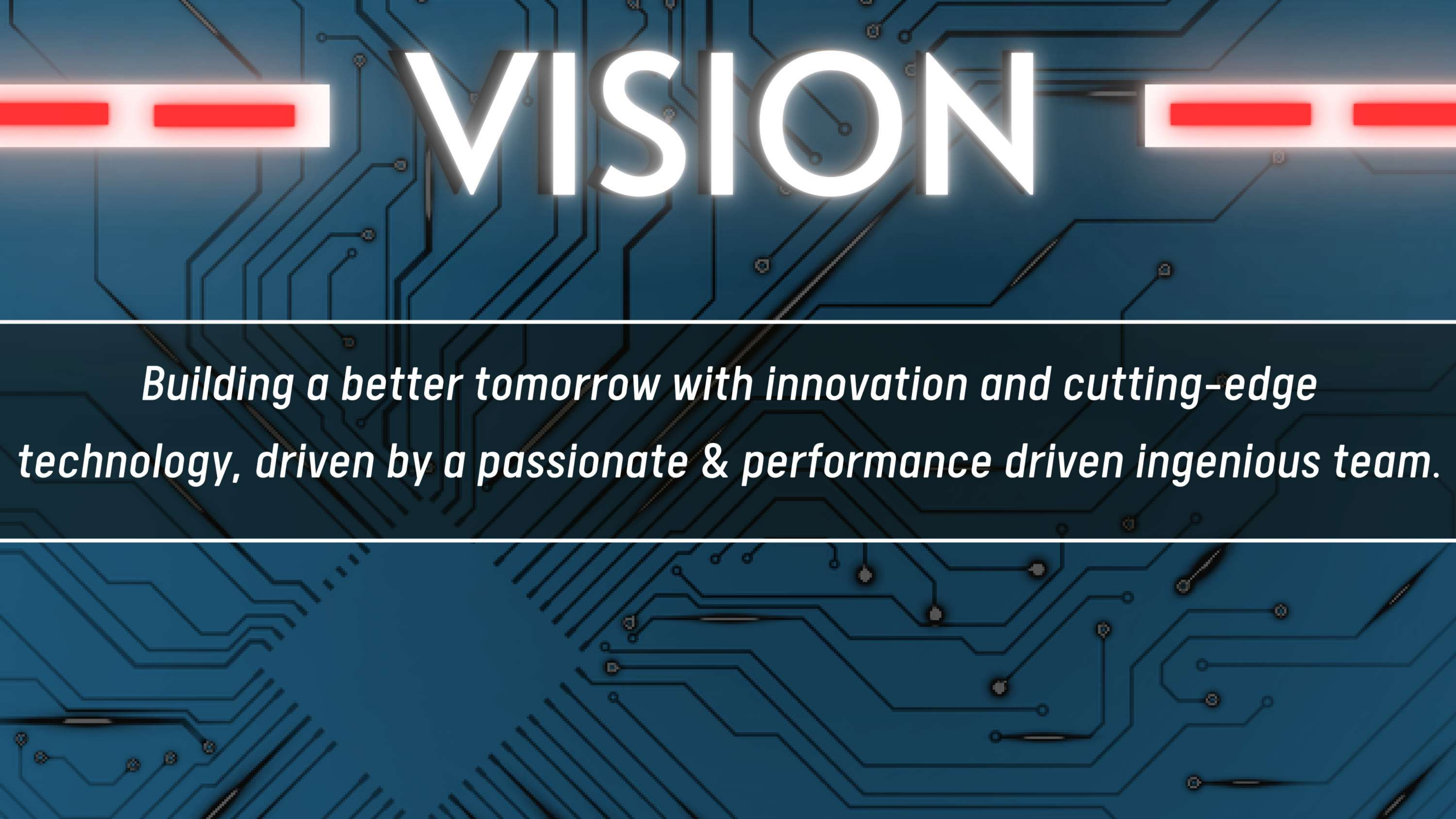
30 MILLION DEVICES DELIVERED



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



CERTIFICATIONS/APPROVALS



SECTORS SERVED

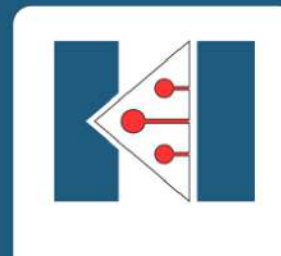


***AEROSPACE
AND DEFENCE***

AUTOMOTIVE

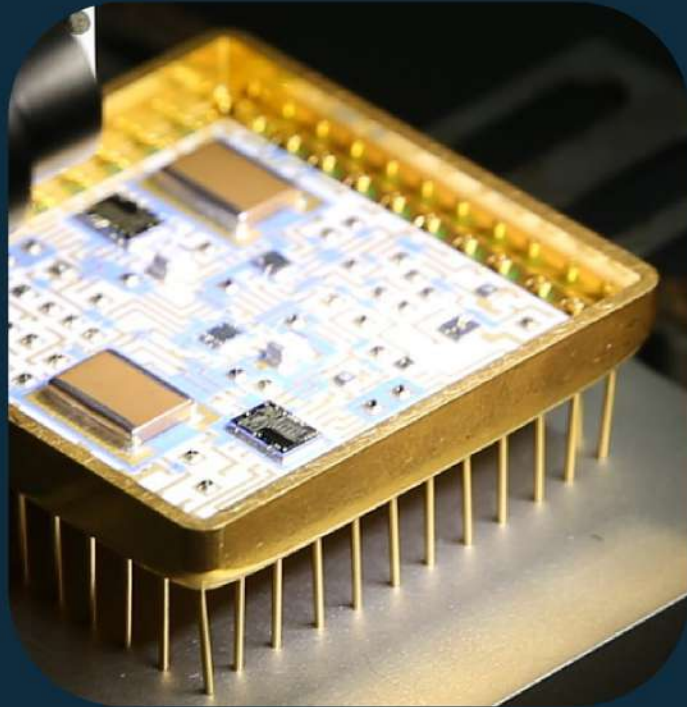
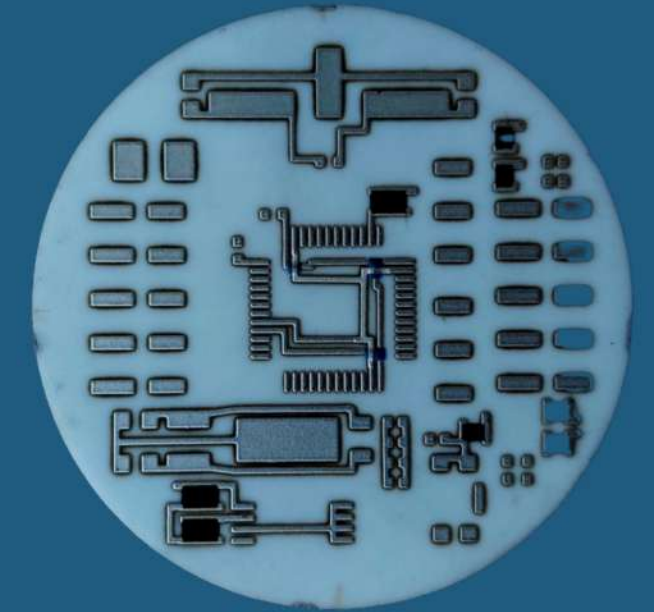
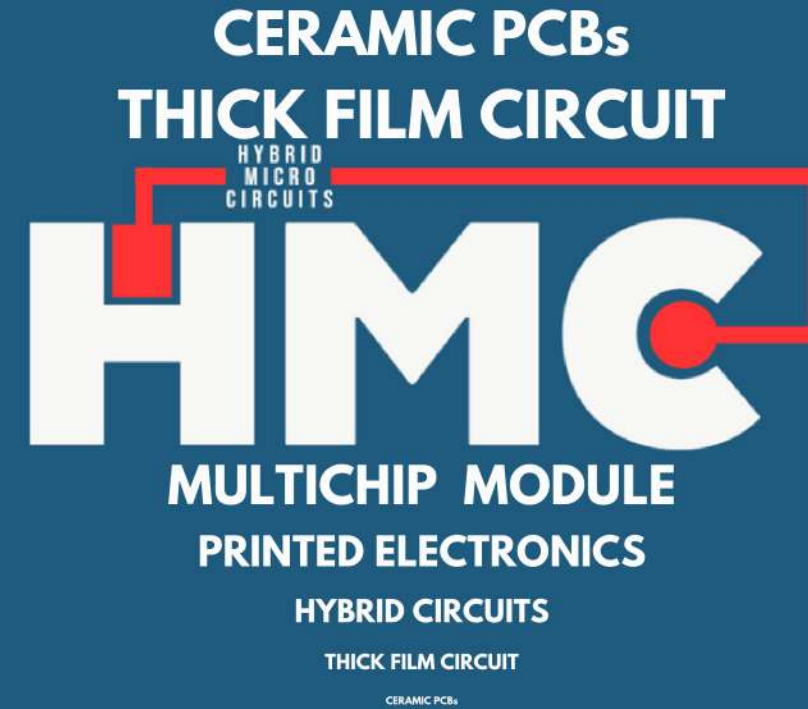
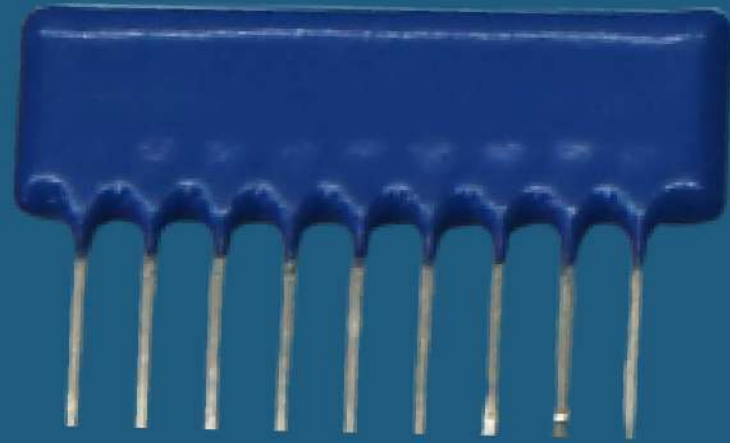
MEDICAL

***POWER
ELECTRONICS***

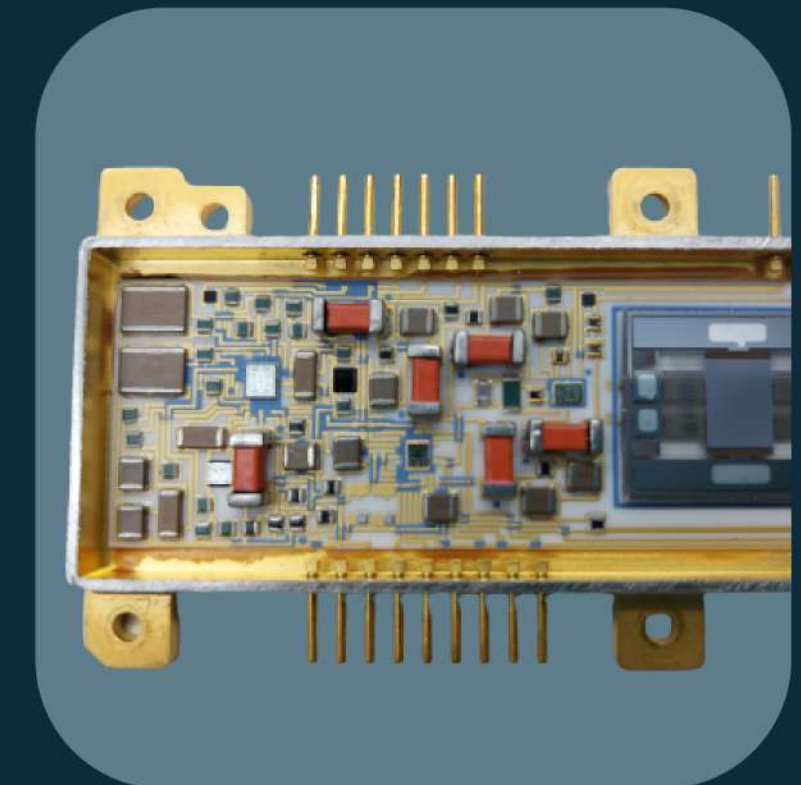


AEROSPACE & DEFENCE

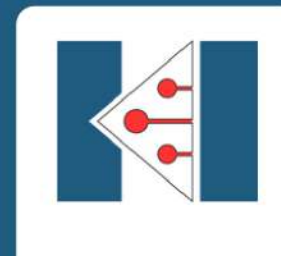




- 20 years of experience in HMCs
- Hermetically sealed HMCs, better than 10^{-9} m³/s leak rate
- Ceramic/Metal Package
- Laser trimming to achieve better than 0.5% tolerance on resistors
- Resistor Network and Resistor Capacitor Network.
- 20 types of HMCs for space
- Complete end to end fabrication facilities in-house



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



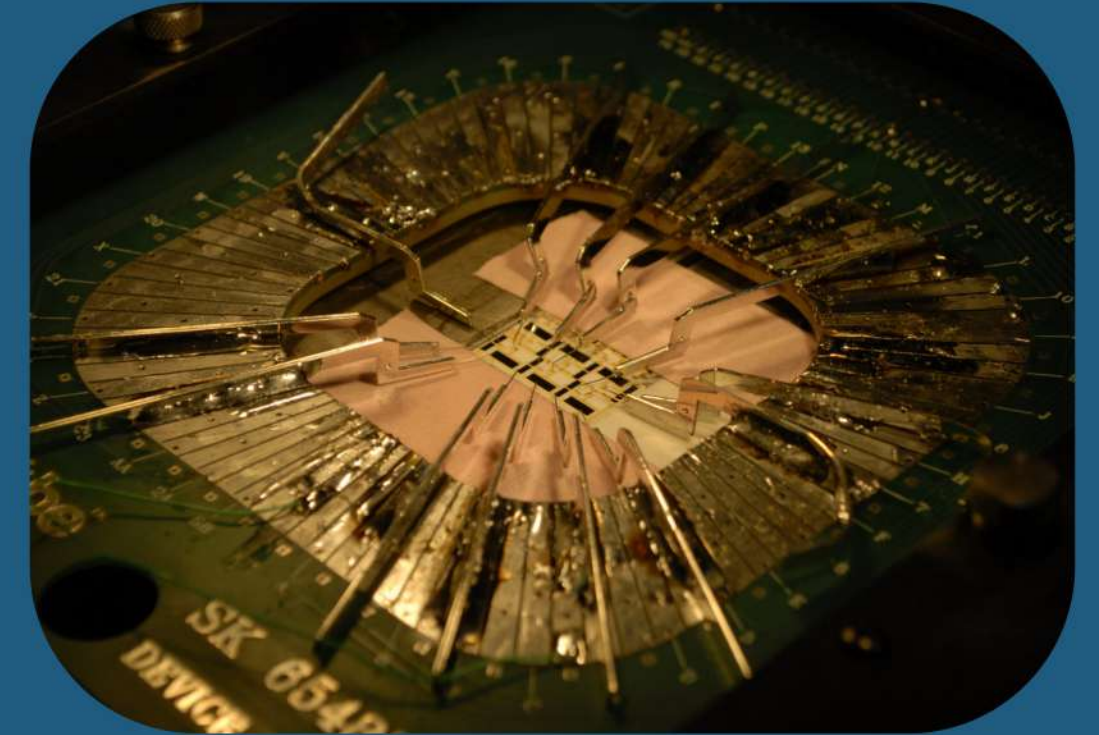
SUBSTRATE PRINTING



FIRING @850°C



LASER TRIMMING



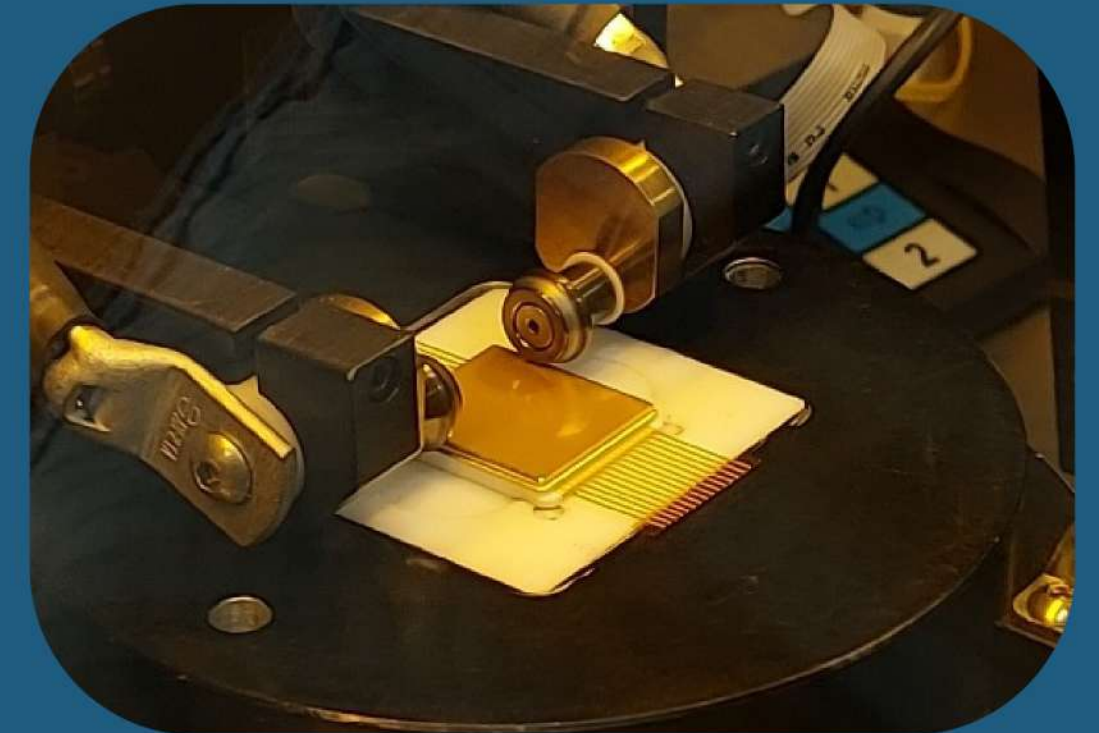
HYBRID MICROCIRCUIT LINE



DIE PLACEMENT



WIRE BONDING



HERMETIC SEALING

SCREENING FACILITIES



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



PIND Tester



Constant Acceleration Tester



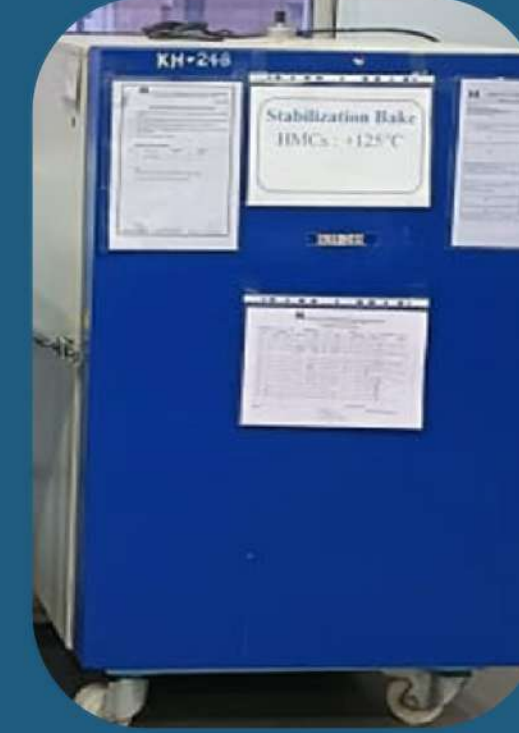
Fine Leak Tester



Microscope



Gross Leak Tester



Oven @ 150°C



Cold Chamber @ -65°C

ELECTRONICS MANUFACTURING SERVICES



**WE HAVE BEEN SUPPLYING
MISSION CRITICAL
PCB ASSEMBLIES FOR
SUKHOI AND JAGUAR AIRCRAFTS
FOR 2 DECADES**

Mission Computers (MC)

Radar Computers (RC)

Display Processors (DP)

Cockpit Display Electronics

Onboard Processors

EMIS

ELECTRONIC MANUFACTURING SERVICES

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

OUR CAPABILITIES

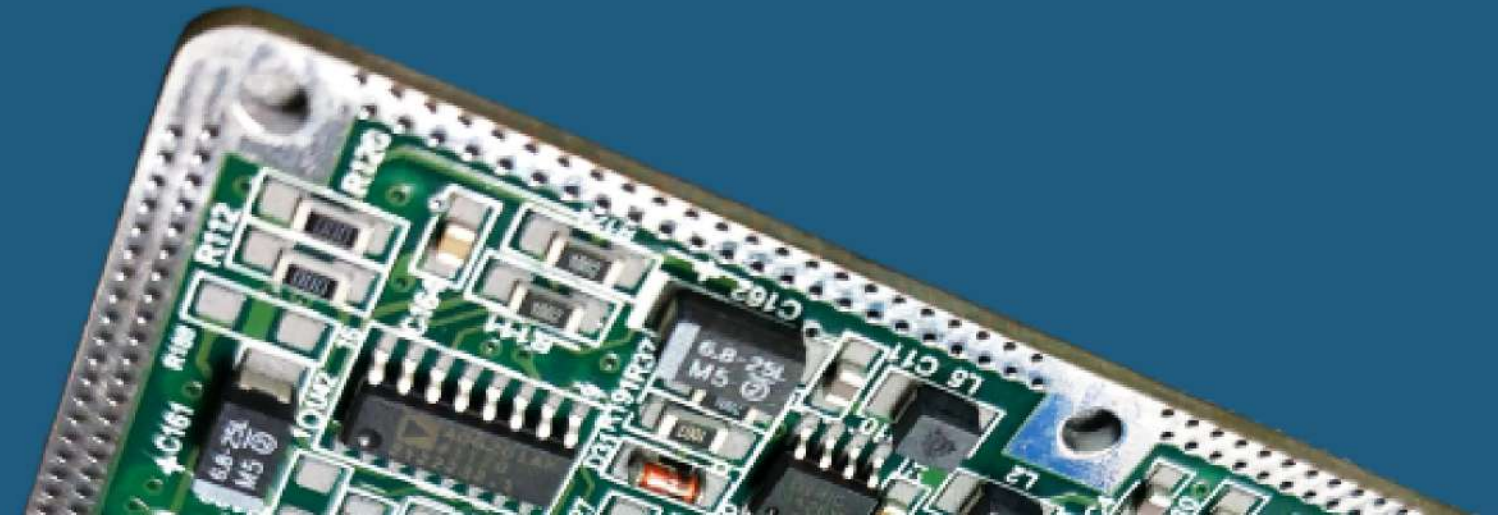
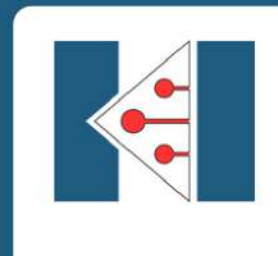
PLACING MINUTE COMPONENTS OF MINIMUM SIZE 0201

PCBA UP TO 30 LAYERS

LEAD FREE PROCESSING CAPABILITY

SEPERATE MANUAL SOLDERING LINE UP TO 0.1MM PITCH.

BGA ASSEMBLY



SOLDER CREAM PRINTING



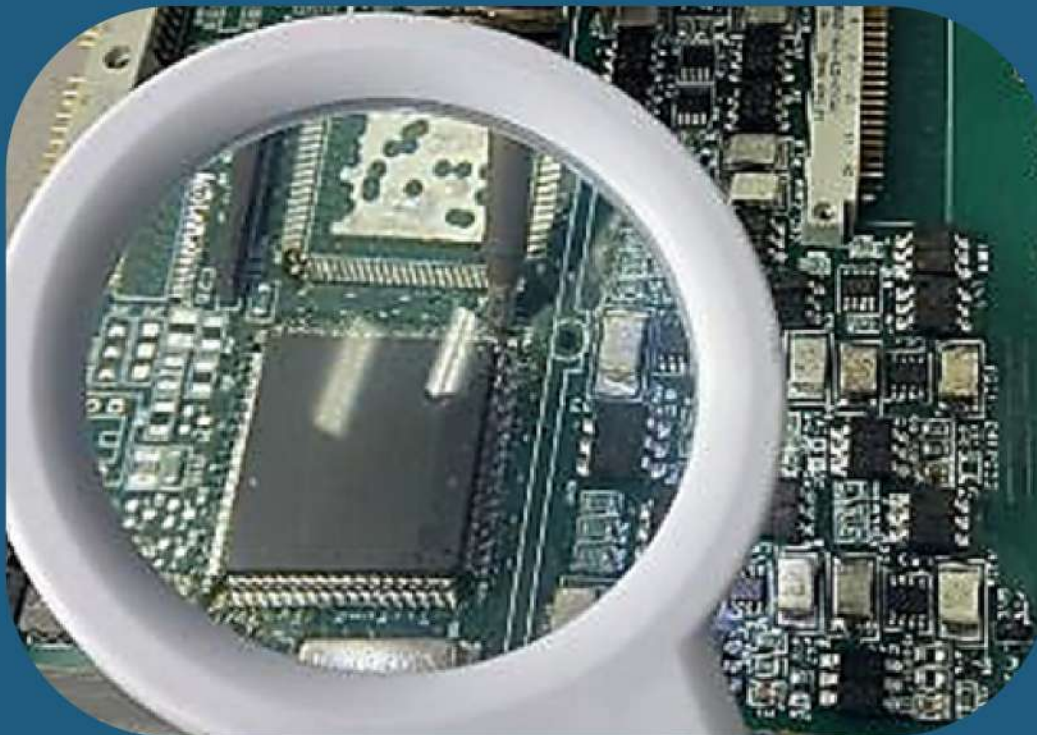
PICK AND PLACE MACHINE



BGA POSITIONING



ELECTRONICS MANUFACTURING SERVICES LINE



MANUAL SOLDERING



REFLOW OVEN

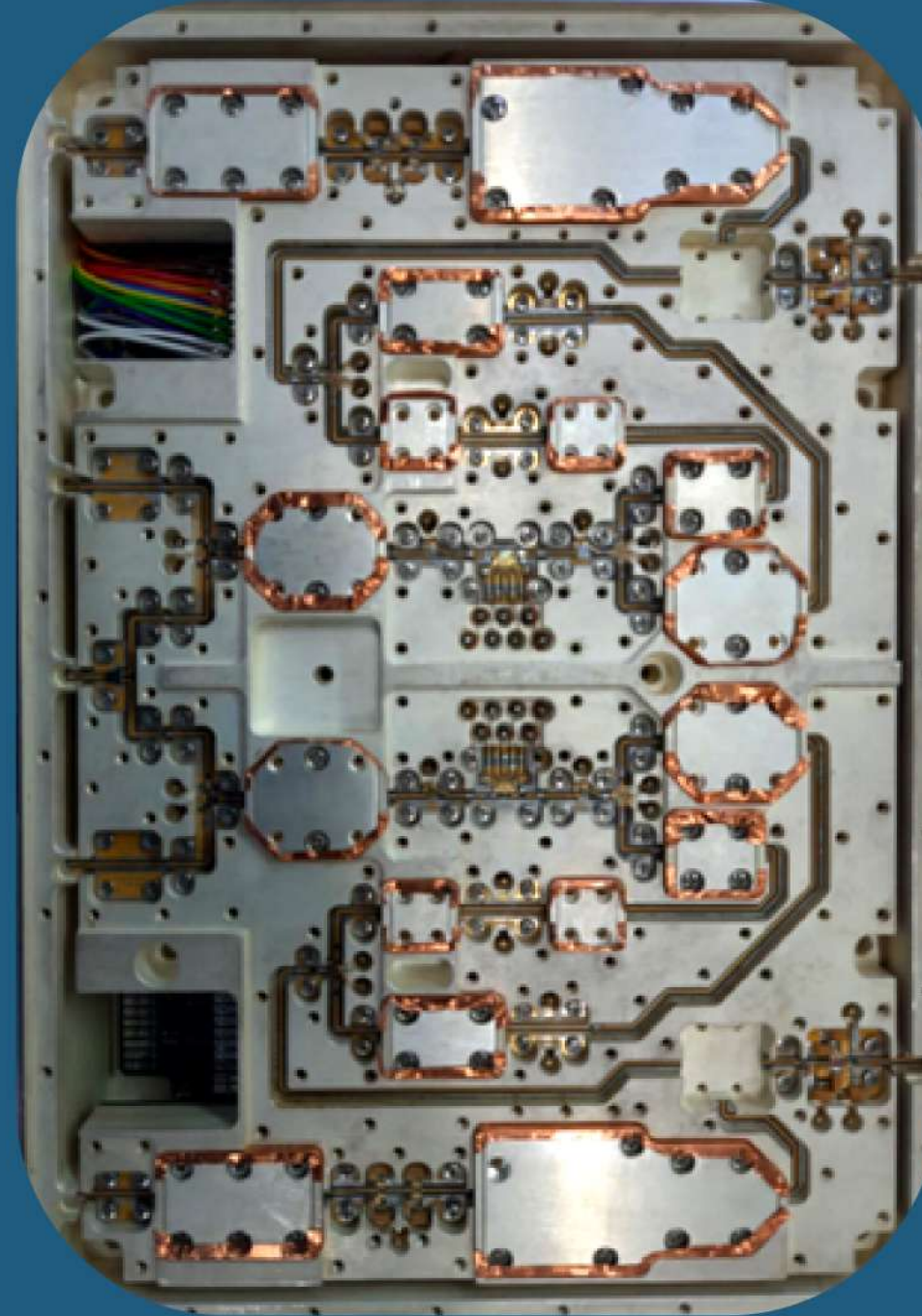


AUTOMATIC OPTICAL INSPECTION (AOI)

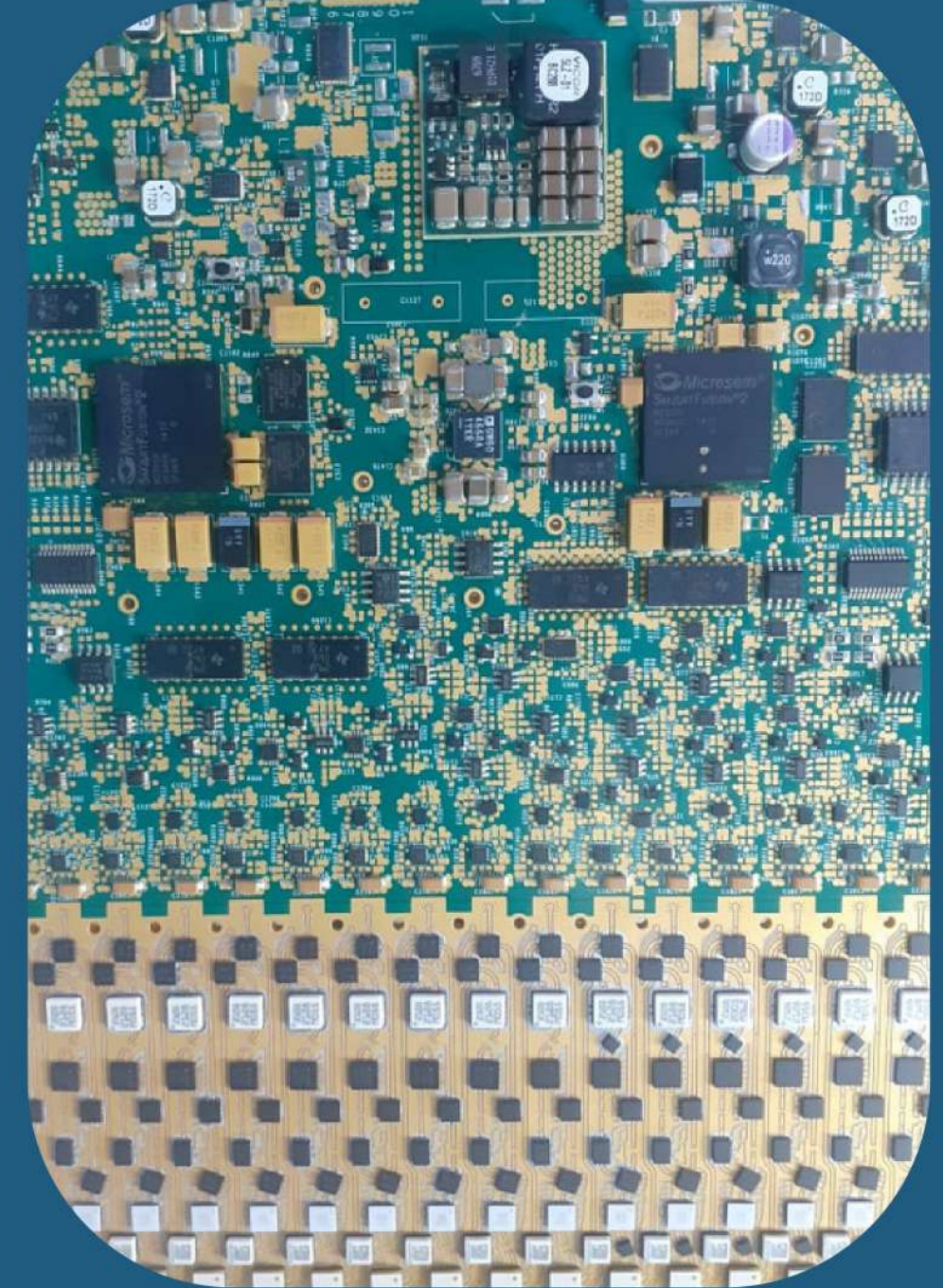
RF SUBSYSTEMS



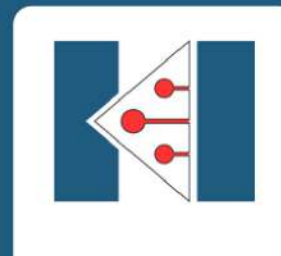
FLAT PANEL ARRAY ANTENNA



18-40 GHZ UP/DOWN CONVERTOR



5-18 GHZ TR MODULE(16 CHANNEL)



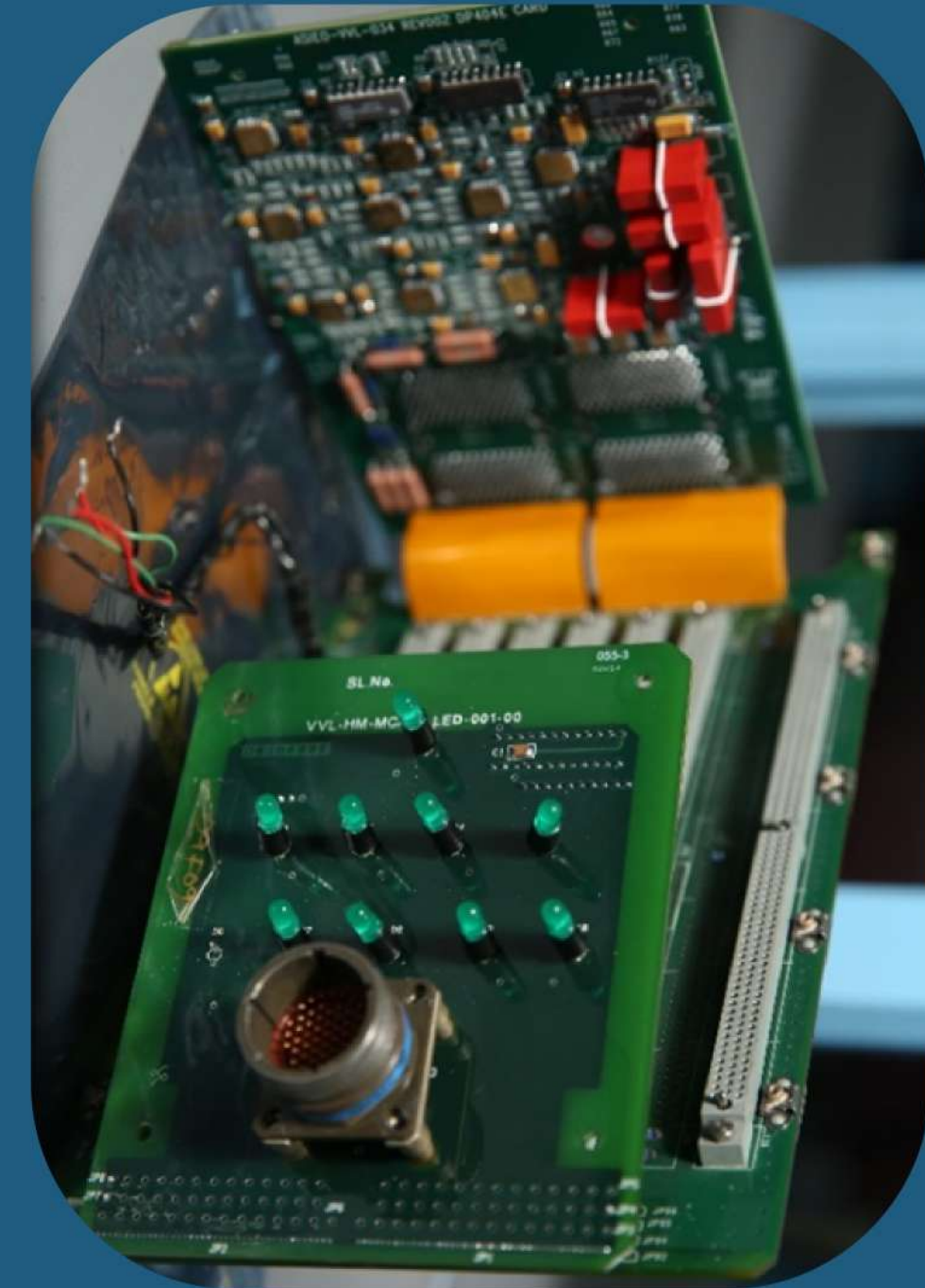
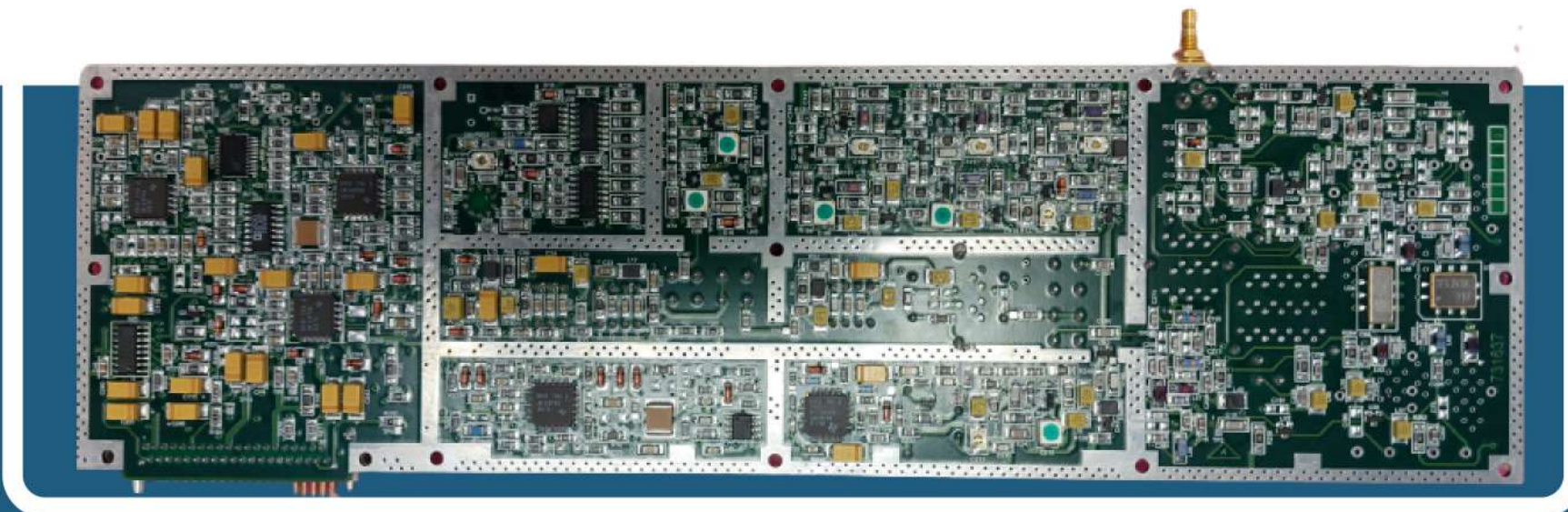
PRODUCTS

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**

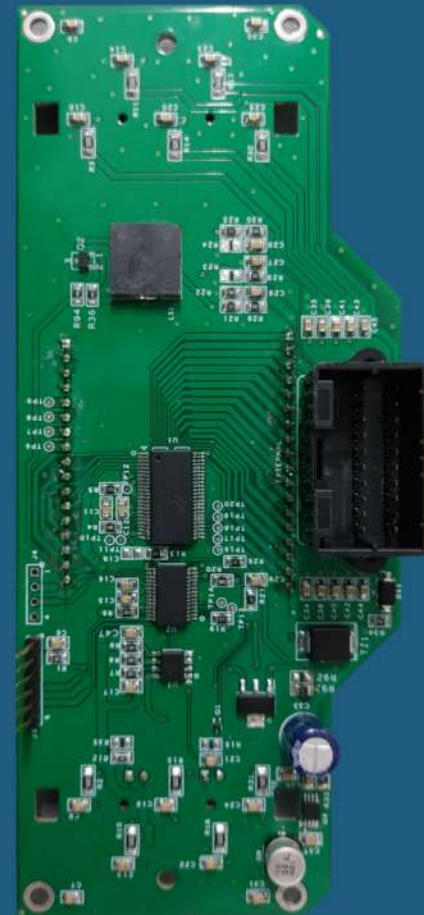
PRODUCTS

AUTOMOTIVE

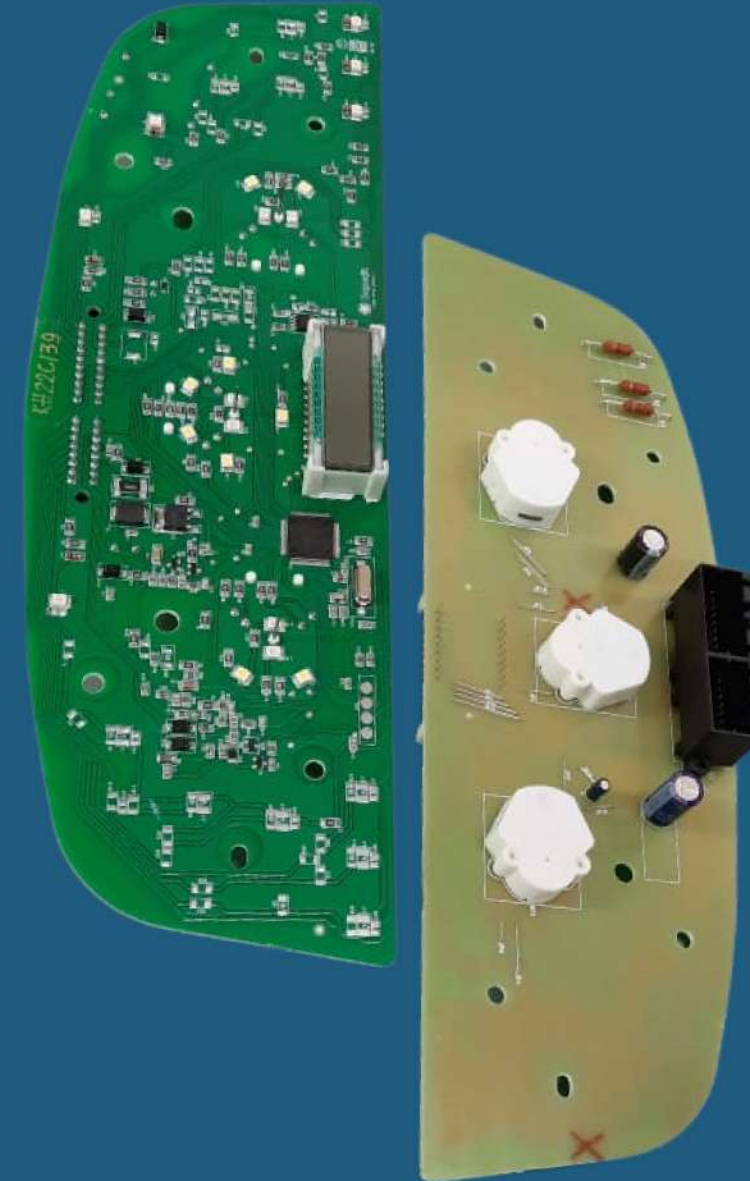
TIT1 PROJECT FOR CLUSTER



EV001



DC003 CLUSTER



VST CLUSTER



AUTOMOTIVE



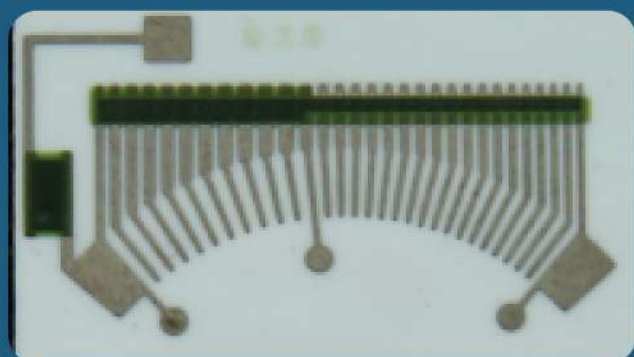
AUTOMOTIVE

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



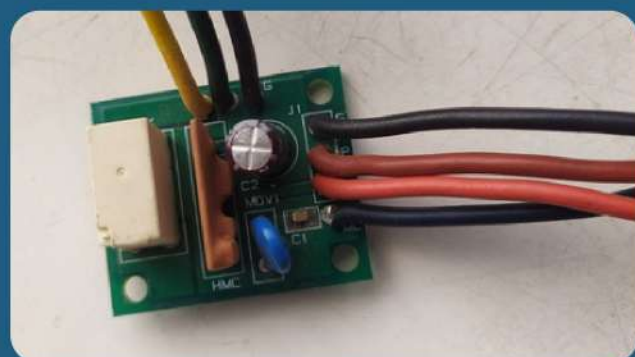
WJ

WINDSHIELD WIPER CONTROLLER

REAR WINDOW WIPER CONTROLLER

Intermediate Single Speed
Controller for Rear Window Wiper

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

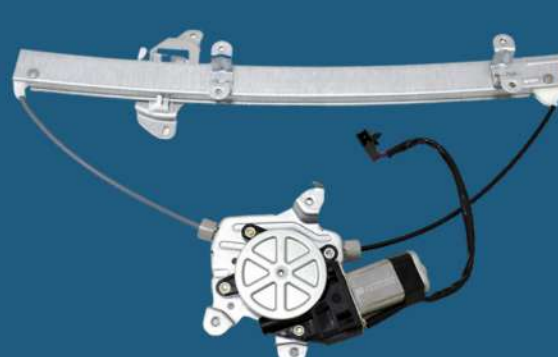


FMVSS 118 STANDARD
**ANTI-PINCH
WINDOW CONTROLLER**

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

$12 \pm 0.2\text{V}$
 $24 \pm 0.2\text{V}$

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



**PRINTED
DEFOGGER
HEATERS**

DEFOGGER MIRRORS

- Heating Temperature: 45°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

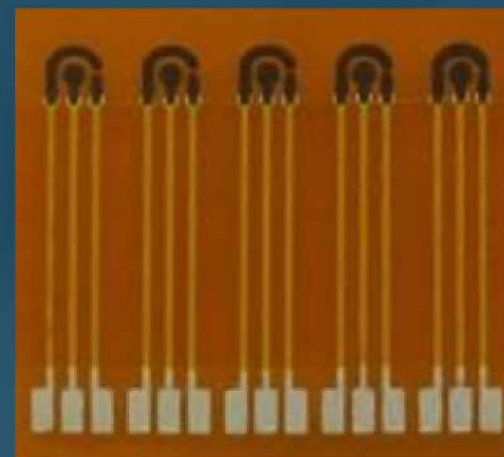
HEATING TIME: 12-15 mins.

SENSORS

ELECTRODES FOR BIO-MEDICAL DIAGNOSTIC APPLICATIONS

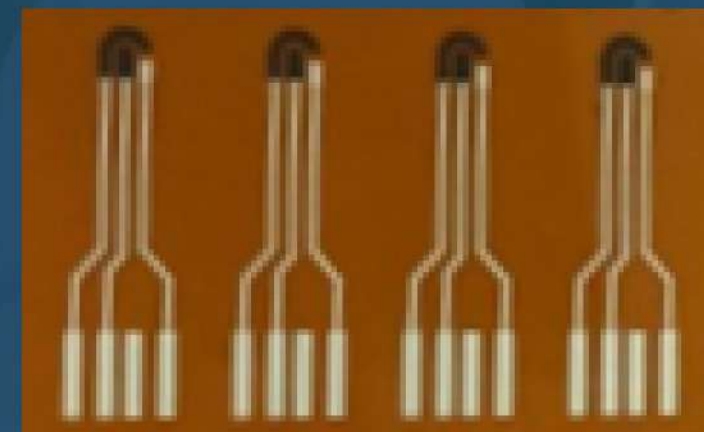


CERAMIC BASED SENSING ELECTRODES

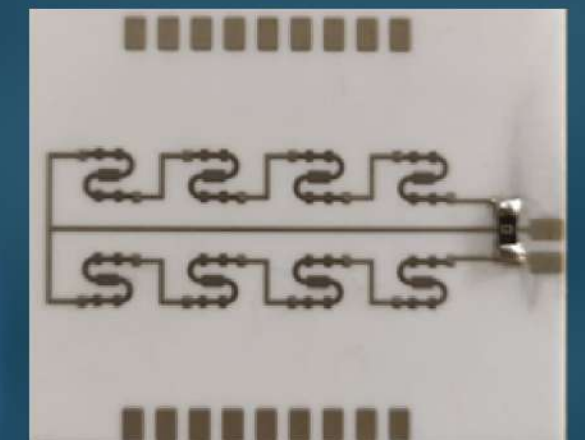


FLEXIBLE SENSING ELECTRODES

ELECTRODES FOR GLUCOMETER



ELECTRODES WITH HEATER



OTHER SERVICES



WIRE BONDING

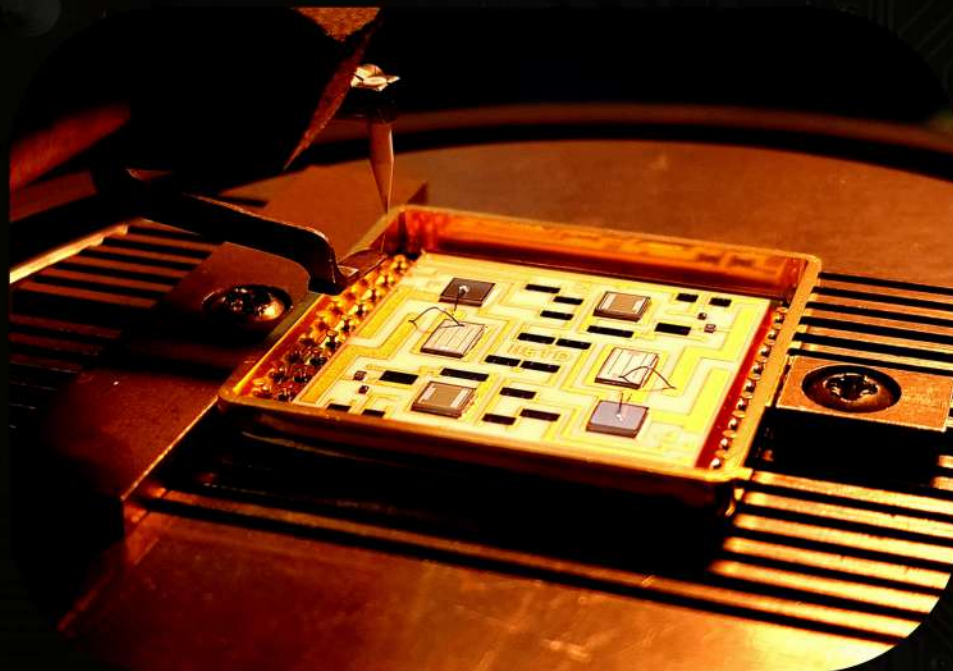
LASER SCRIBING

LASER TRIMMING

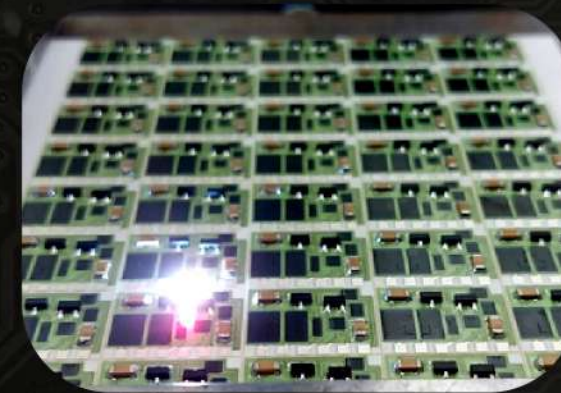
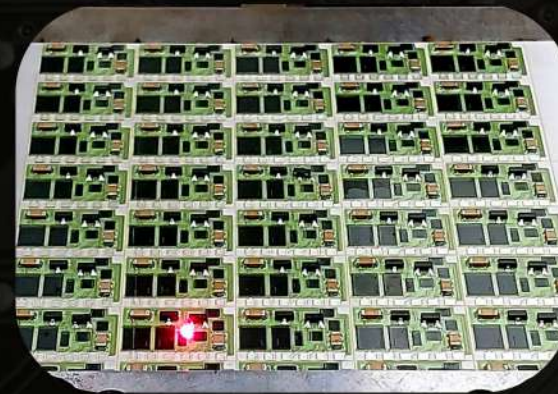
- 1. Gold Wire Bonding (0.7, 1 & 1.5 mil)
- 2. Aluminum Wire Bonding (1, 5 & 8 mil)
- 3. Ribbon Bonding (2 mil Thk & 10 mil Width)
- 4. Semi Auto Wire Bonder

MIL STD 883

ISRO PAS 206



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



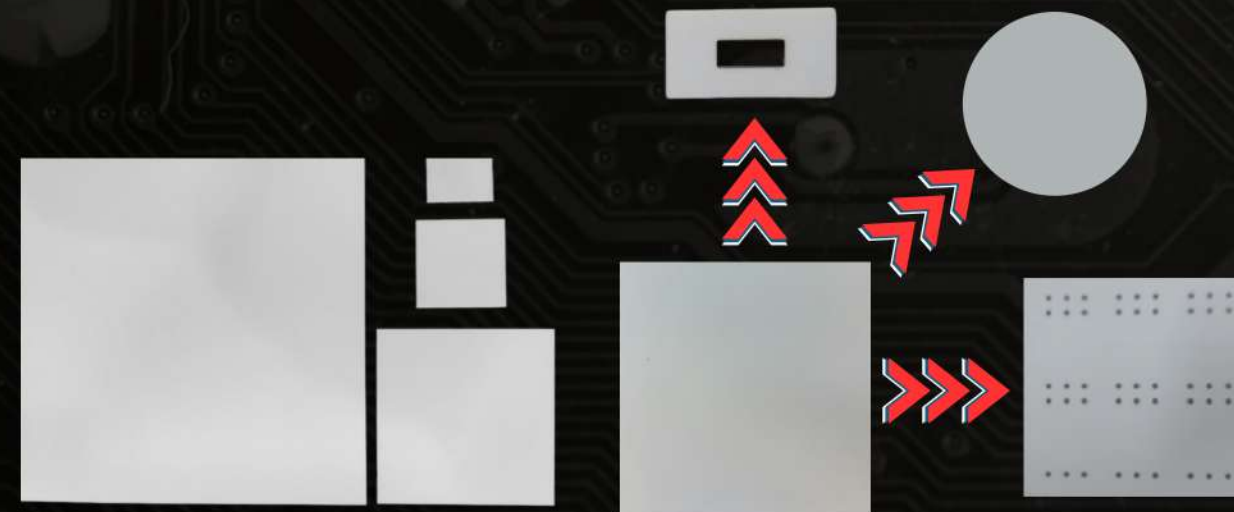
PROGRAMMABLE

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

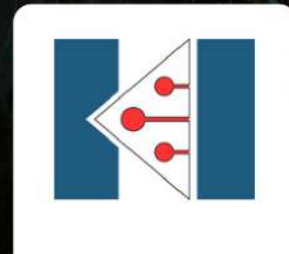
TOLERANCE
< 0.5%

MIL STD 883

ISRO PAS 206



DESIGN AND DEVELOPMENT



DESIGN STRENGTH



***POWER
ELECTRONICS***

***HMC
DESIGN***

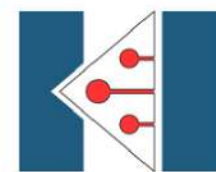
***EMBEDDED
SYSTEMS***

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



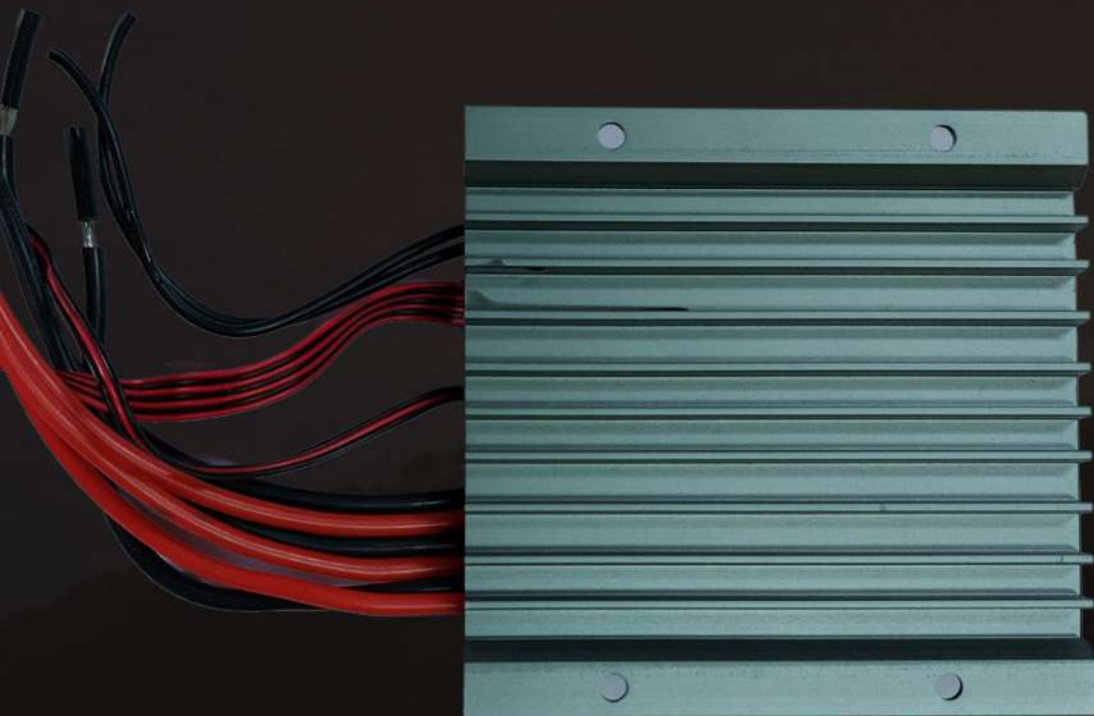
PARASHAKTI

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

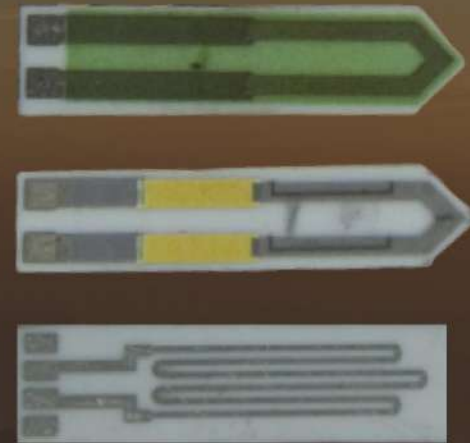
- ELECTRICALLY OPERATED AEROSOL GENERATOR
- VAPOR GENERATOR DEVICE



WATT



TEMPERATURE



SPACE GRADE THERMAL CUTTER



WATT



TEMPERATURE

APPLICATIONS

- CUTTING KEVLAR CORDS IN SPACE

ALUMINA BASED HEATER

APPLICATIONS

- UNIFORM TEMPERATURE DISTRIBUTION
- HIGH TEMPERATURE STABLE CONNECTIONS



WATT



TEMPERATURE



DEFOGGER MIRROR HEATER



WATT



TEMPERATURE

APPLICATIONS

- REMOVES FOG FROM THE REAR VIEW MIRROR

POSITION LIGHT SYSTEM

POSITION LIGHTS

- **Input Voltage:** 28VDC
- **Power Consumption:** $\leq 12W$
- **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

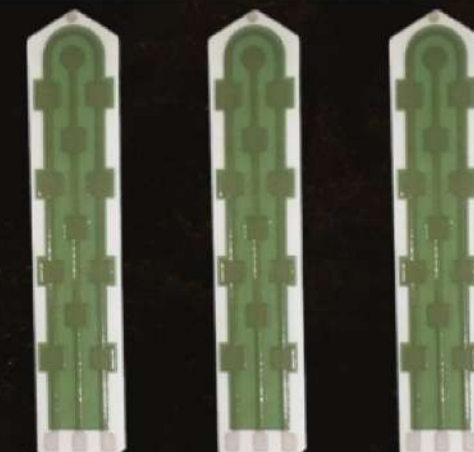
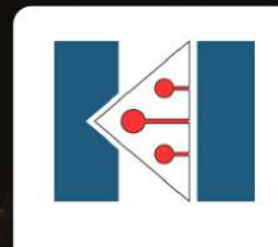
- **LED Based**
- **Color:** Covert IR Stroboscopic IR
- **Flash Rate:** 60FPM
- **Luminous Intensity:** 150 cd
- **Power Supply:** 28VDC
- **Relevant** DO160D



SENSORS

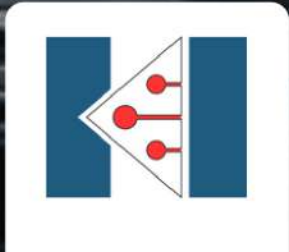
MOISTURE SENSOR

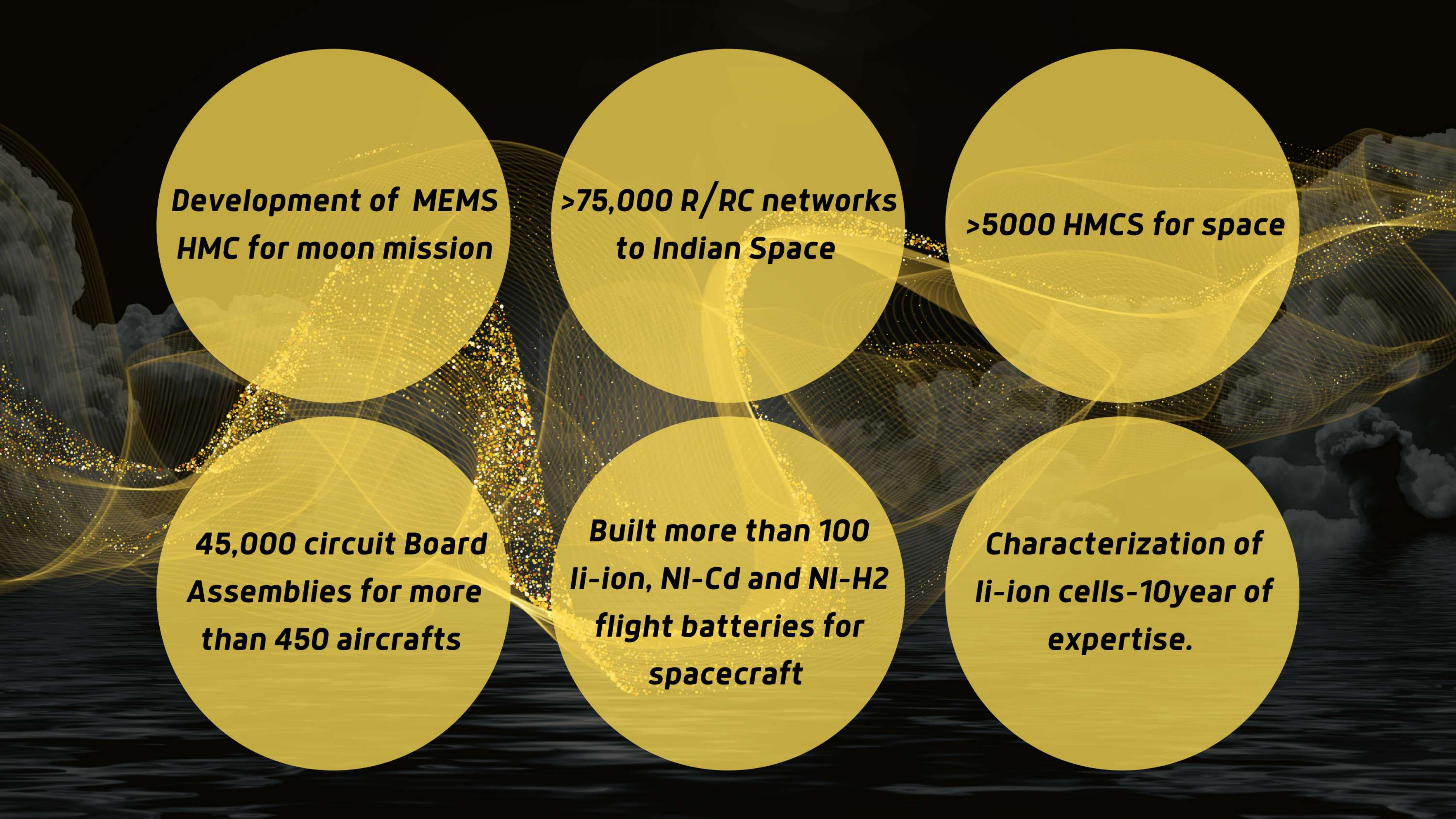
- **Linear**
- **Consistent output/behavior**
- **Corrosion Resistant**
- **Compact**
- **Suitable for automation**





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**

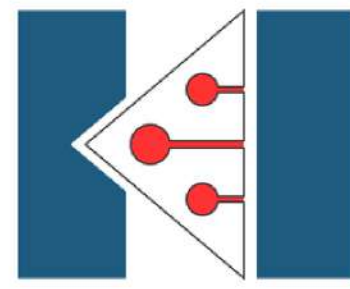
**Built more than 100
li-ion, NI-Cd and NI-H₂
flight batteries for
spacecraft**

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

AWARDS







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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Mobile: +91 9480696635