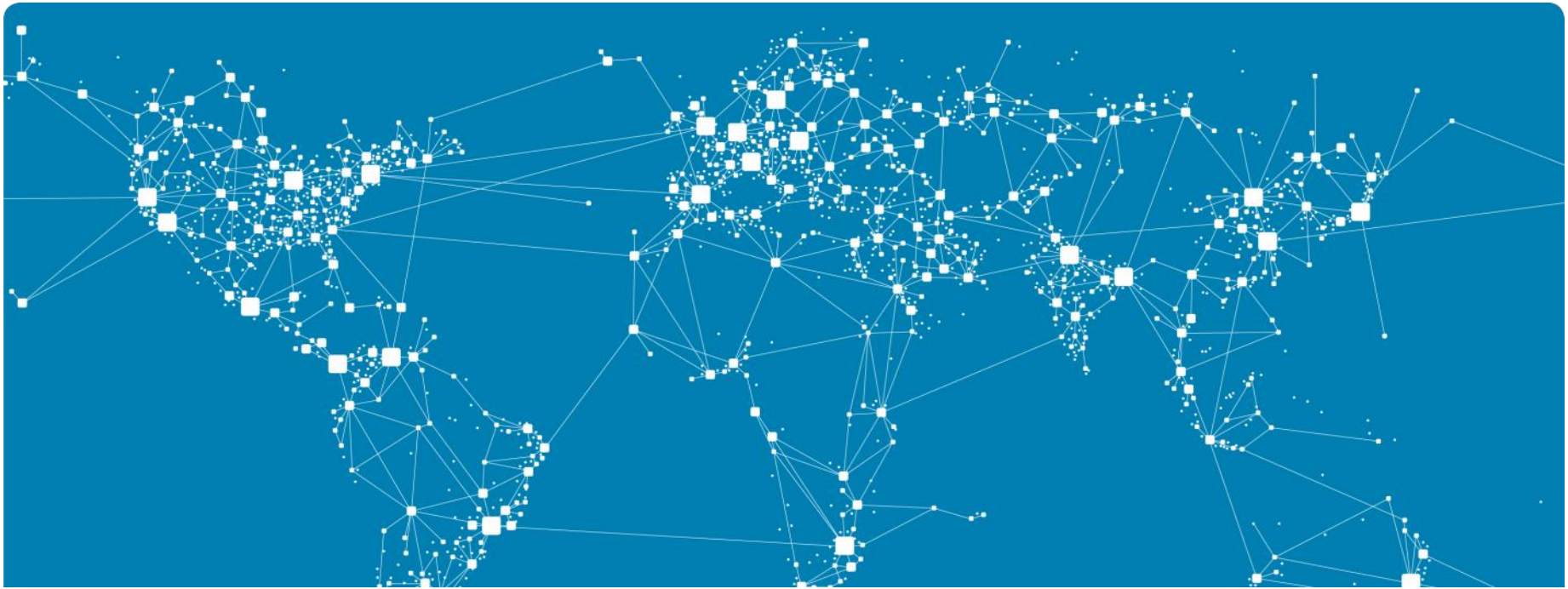
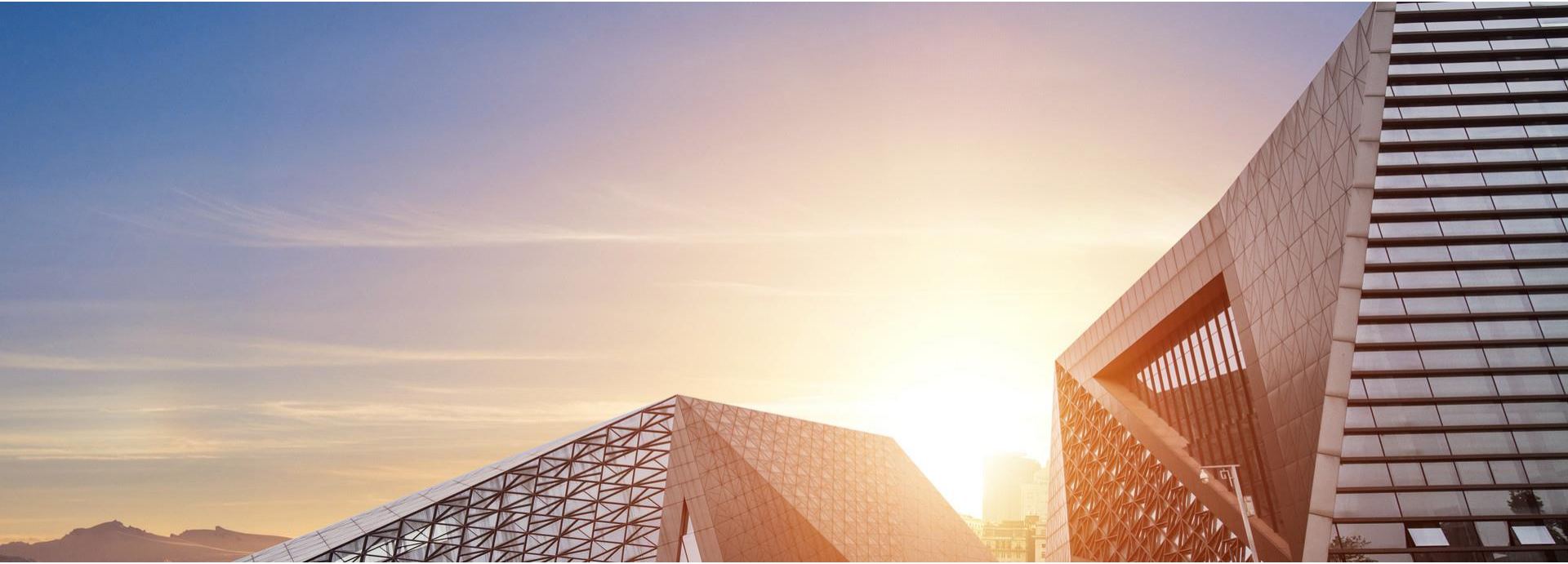


荣湃
2PAI SEMICONDUCTOR

2PAI SEMICONDUCTOR
COMPANY AND PRODUCT INTRODUCTION



ABOUT US

PRODUCT ROADMAP

PRODUCT APPLICATION SCENARIOS

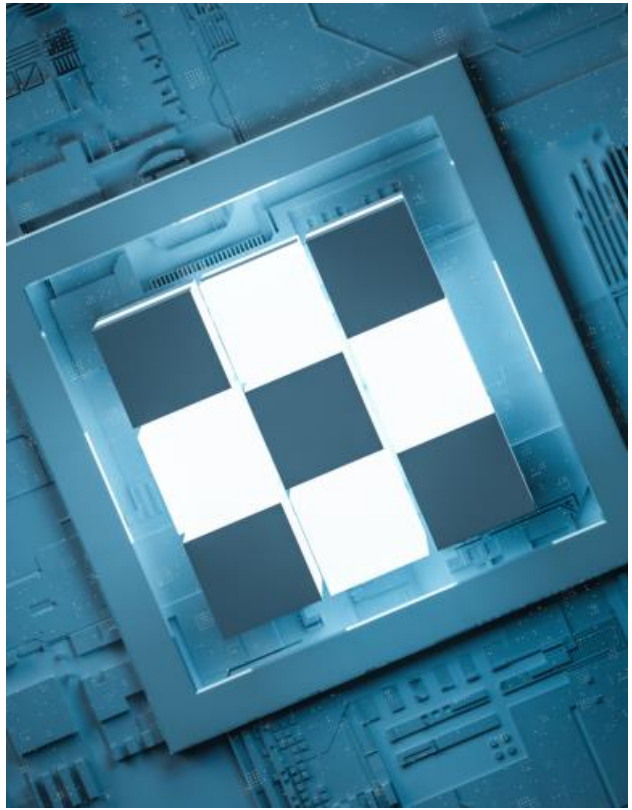
Company Profile

Founded in 2017, 2PAI Semiconductor (Shanghai) Co., Ltd. (hereinafter referred to as “2PAI Semiconductor” or the “company”) is specialized in the design and development of high-performance and high-quality analog chips, with the commitment to becoming the world’s leading supplier of high-performance analog integrated circuits.

The company’s products including digital isolator, drive (MOSFET IGBT driver), interface (CAN, RS485), sample (amplifier, ADC), compatible optocoupler, etc are widely used in electric vehicles, industrial control, digital power, intelligent appliances and other fields, delivering performance and quality comparable to similar products of world-class analogue integrated circuit manufacturers, and even some superior key performance indicators. Relying on original capacitive voltage dividing technology (iDivider), we have been granted a great number of invention patents in isolation field, achieving the breakthrough of isolation chips made in China.

The R&D team of 2PAI Semiconductor brings together a large number of domestic and foreign analog chip field elites who boast advanced experience in analog integrated circuit design, process, testing technology, etc. Since its founding, the company has always been adhering to the guiding principle of “**chips create new value**”. We start from the nature of problems, explore new ways for troubleshooting, pay close attention to the change of market demand, attach great importance to innovation, provide high-quality and high-performance products to customers, spare no effort to promote the R&D and production of Chinese analog chips, propose new ideas to technical innovation of Chinese semiconductor industry, and create new value for the society.

Chips create new value



High-performance analog chip supplier

Chips create new value

Company positioning

With products widely used in industrial control, new energy vehicles, digital power supply, intelligent appliances and other fields, we are committed to guiding the industrial upgrading and becoming the world's leading analog integrated circuit provider

1

Technical innovation

2

With the proprietary iDivider technology and based on capacitive voltage dividing principle, transmit voltage signals from one side of capacitor to another side without RF signal and modem. Compared with other isolation technologies (Opto-Coupler, iCoupler, OOK, etc,) , this isolated signal transmission technology is more essential and concise.

Product positioning

3

Bring in digital isolation to replace opto-isolators, drive conversion to products made in China; make greater efforts in developing “isolation+” products while extending to non-isolated cost-effective analog products.

Technical advantages

4

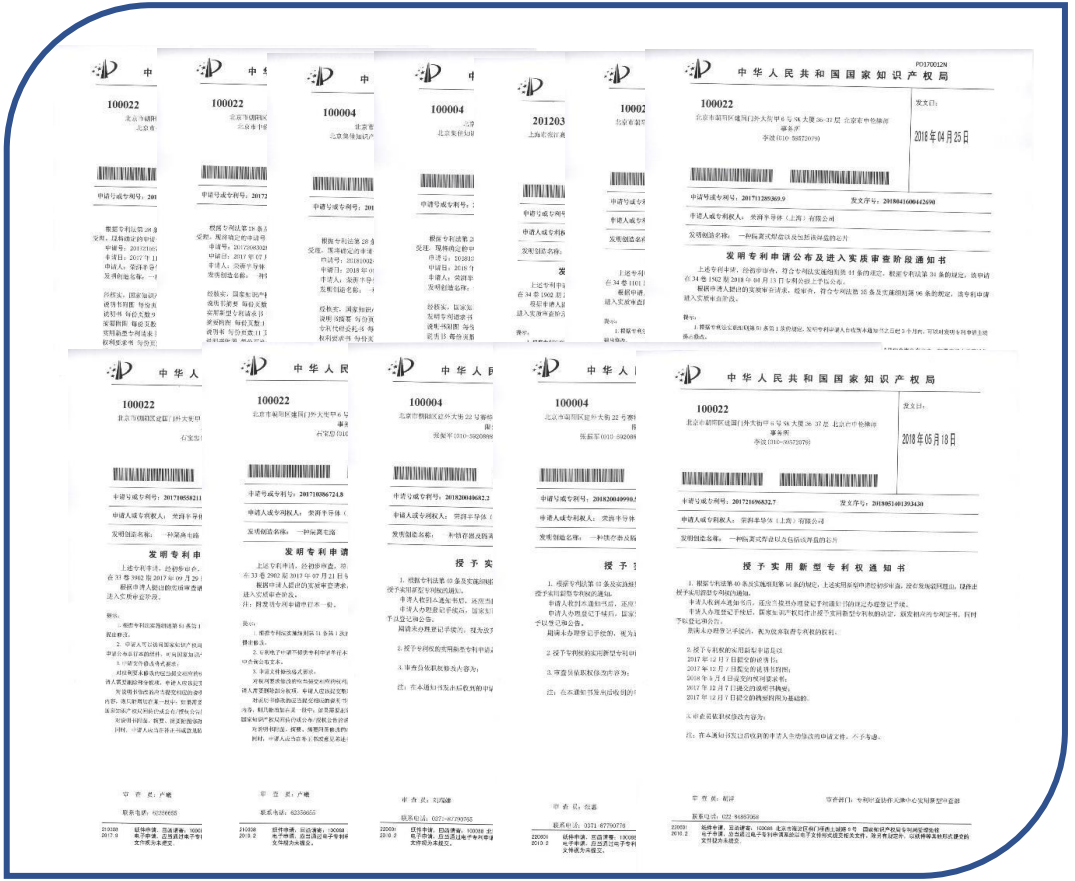
- The circuit is simplified greatly with lower power consumption and higher speed
- Better anti-interference ability and lower noise
- Lower cost, higher cost effectiveness

Independent R&D
promoting the new development of industry

Chips create new value

Company's original self-developed intelligent voltage dividing technology-iDivider™

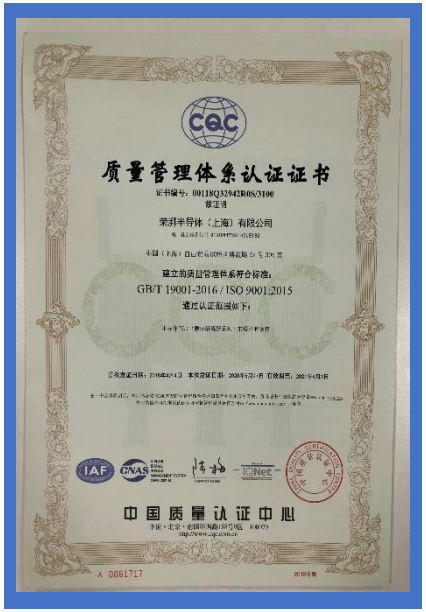
- 22 domestic and 11 international invention patents
- No intellectual property conflict with any company or individual in the world



Certificate

Chips create new value

ISO9001



Date of obtaining the certificate for the first time: 4/4/2018

VDE Certificate

Date of obtaining the certificate for the first time: 3/20/2018

UL Certificate

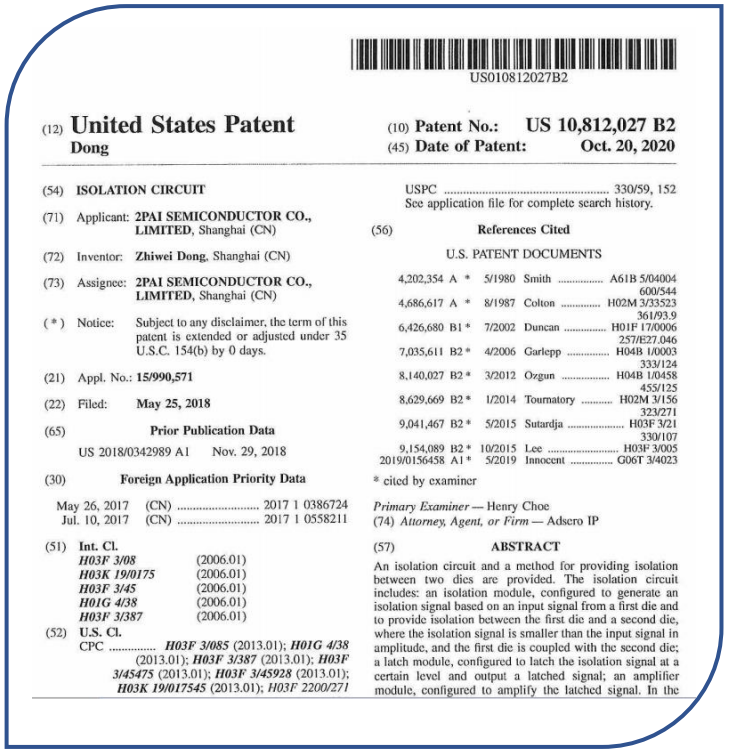
Date of obtaining the certificate: 10/26/2017

CQC Certificate

Date of obtaining the certificate:4/23/2021

Invention Patent of 2PAI Intelligent Voltage Dividing Technology-iDivider

Chips create new value



US010812027B2

(12) **United States Patent**
Dong

(10) **Patent No.: US 10,812,027 B2**
(45) **Date of Patent: Oct. 20, 2020**

(54) **ISOLATION CIRCUIT**

(71) Applicant: **2PAI SEMICONDUCTOR CO., LIMITED**, Shanghai (CN)

(72) Inventor: **Zhiwei Dong**, Shanghai (CN)

(73) Assignee: **2PAI SEMICONDUCTOR CO., LIMITED**, Shanghai (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/990,571**

(22) Filed: **May 25, 2018**

(65) **Prior Publication Data**

US 2018/0342989 A1 Nov. 29, 2018

(30) **Foreign Application Priority Data**

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Jul. 10, 2017 (CN) 2017 1 0558211

(51) **Int. Cl.**
H03F 3/08 (2006.01)
H03K 19/0175 (2006.01)
H03F 3/45 (2006.01)
H01G 4/38 (2006.01)
H03F 3/387 (2006.01)

(52) **U.S. Cl.**
CPC ***H03F 3/085*** (2013.01); ***H01G 4/38*** (2013.01); ***H03F 3/387*** (2013.01); ***H03F 3/45475*** (2013.01); ***H03F 3/45928*** (2013.01); ***H03K 19/017545*** (2013.01); *H03F 2200/271*

USPC 330/59, 152
See application file for complete search history.

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Primary Examiner — Henry Choe
(74) *Attorney, Agent, or Firm* — Adsero IP

(57) **ABSTRACT**

An isolation circuit and a method for providing isolation between two dies are provided. The isolation circuit includes: an isolation module, configured to generate an isolation signal based on an input signal from a first die and to provide isolation between the first die and a second die, where the isolation signal is smaller than the input signal in amplitude, and the first die is coupled with the second die; a latch module, configured to latch the isolation signal at a certain level and output a latched signal; an amplifier module, configured to amplify the latched signal. In the

证书号第3541302号 / 证书号第39541 / 证书号第3920155 / 证书号第3419842 / 证书号第3746703号

发明专利证书

发明名称：一种信息检测电路及方法

发明人：董志伟

专利号：ZL 2017 1 1284421.1

专利申请日：2017年12月07日

专利权人：荣湃半导体（上海）有限公司

地址：201203 上海市浦东新区中国（上海）自由贸易试验区郭守敬路498号8幢19307室

授权公告日：2020年04月07日　　授权公告号：CN 108020792 B

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局长
申长雨

第1页（共2页）

Company Management

Dong Zhiwei
CEO

Texas Instruments · Silicon Labs · Qualcomm

Chips create new value

Liu Qingguang
Independent partner

Applied Materials · Cypress · Micron

Feng Xuwei
Director of Operations

通宝微電 · LUMILEDS · ST life.augmented

Dong Shuangbing
Director of Technology

Texas Instruments · UAES

Cui Shize
Director of Finance

RSM · Earth-Panda 大地熊 · FUDAR 福达 股票代码:603045 合金

Texas Instruments · maxim integrated

Hu Yongjun
Vice President of Sales

VeriSilicon

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Qualcomm · freescale

Shi Yiya
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Coca-Cola · COOVR 酷维阿科技

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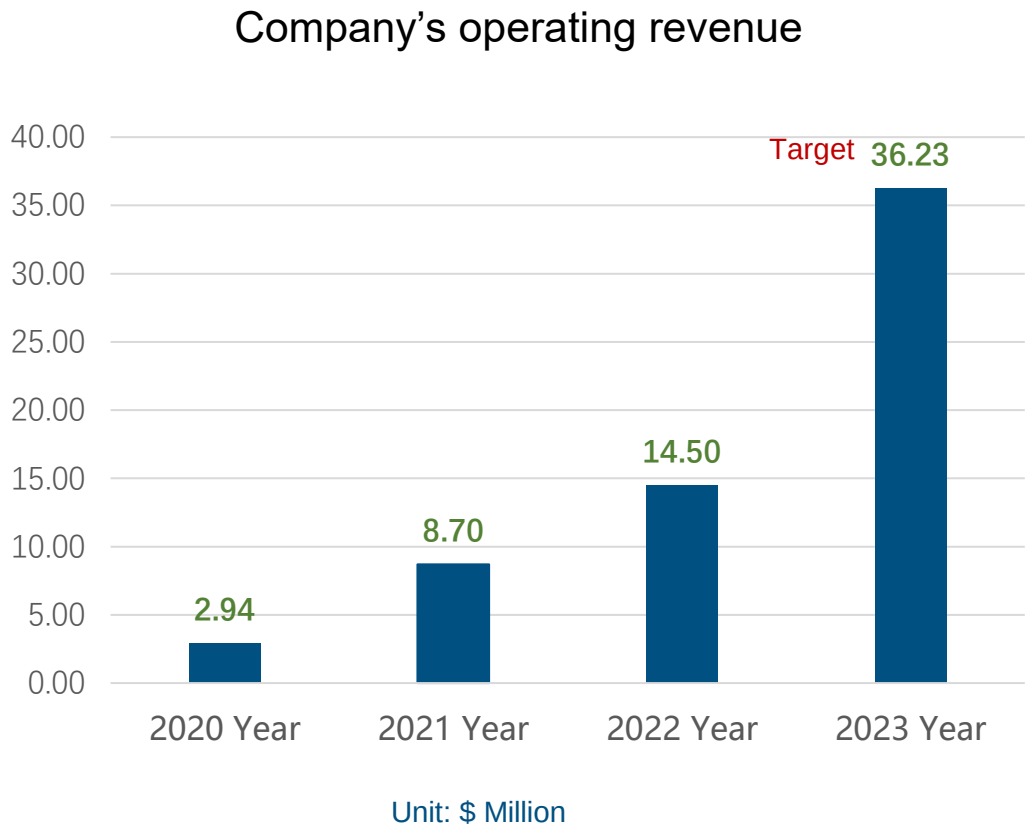
CEO Assistant
Director of General Affairs

Operation



35% of operating revenue is from electric vehicle customers

Cooperate with China's top manufacturers to create quality and reliable products

Wafer tape-out

世界先進 VIS

(TSMC subsidiary)

KEY FOUNDRY

华虹宏力

Package test

华天科技

通富微電 TONGFU MICROELECTRONICS CO., LTD.

JCET 长电科技

Sufficient production capacity
8-12 week delivery cycle

Performance advantages of isolation products

Low power consumption

A major concern to customers of battery management system, instrument and apparatus

U series cost-effective product (150Kbps)

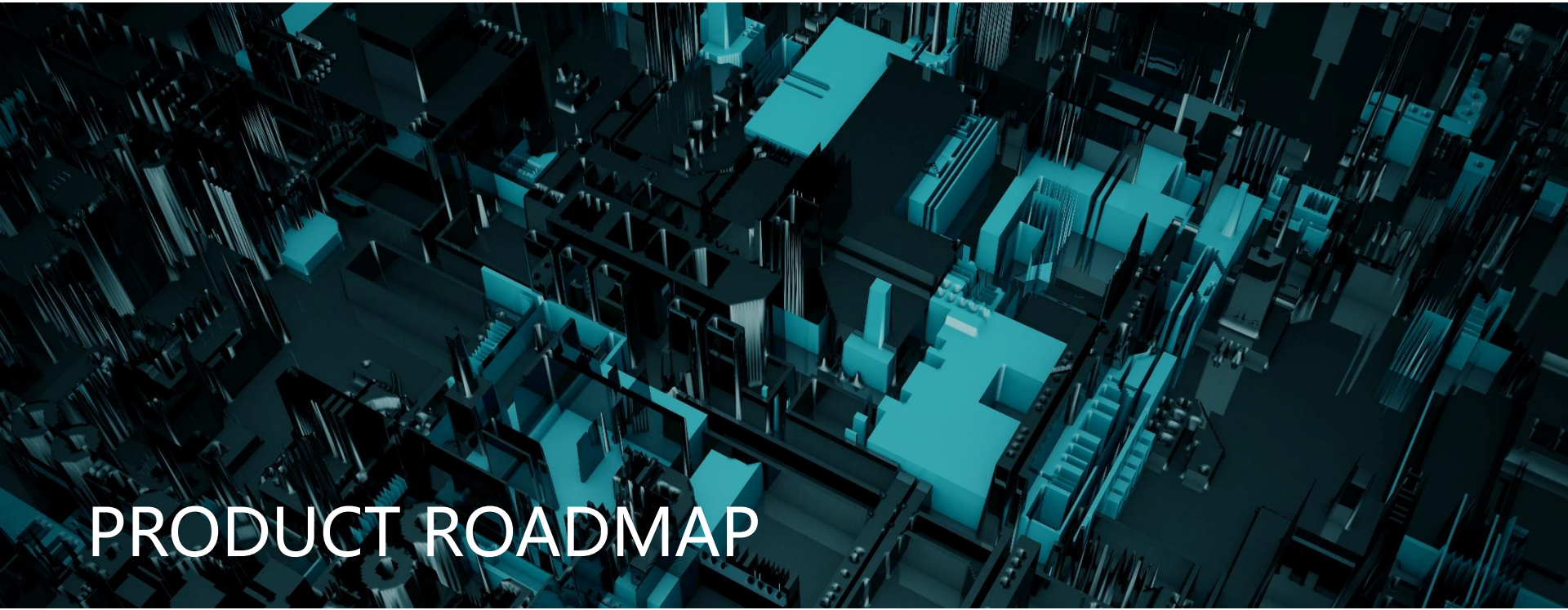
A major concern to low-rate and cost-valuing customers

Low latency and low pulse width distortion

A major concern to customers of digital power/motor drive

PIN TO PIN compatible with foreign mainstream isolation products

Prevent customers from redrawing PCB



PRODUCT ROADMAP

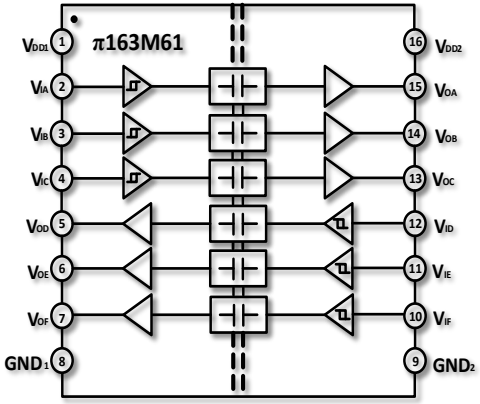
Product Roadmap

Chips create new value

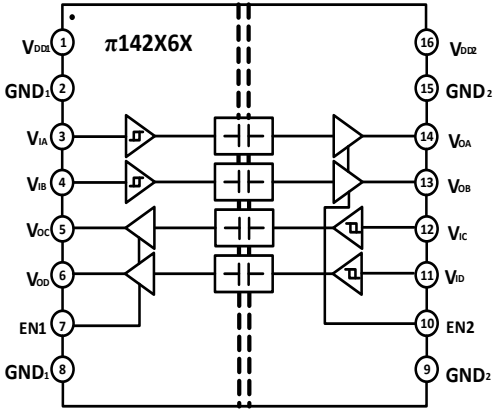
Standard Digital Isolation	Optocoupler replacement	Interface	Drive	Sampling	Power Drive
1-6 channels standard digital isolation	Digital optocoupler	I²C Isolation	Single-channel isolated driver	Isolation amplifier	Ideal diode
Ultra-high withstand voltage standard digital isolation	High-speed optocoupler PTP products	485 Isolation	Dual-channel isolated driver	ADC Isolation	High and low side drivers
Digital isolation with isolated power supply	Optical MOS	CAN Isolation	Non-isolated half-bridge driver	Voltage reference	Integrated GaN power module
	Optocoupler driven	CAN Non-isolated	Intelligent isolated drives		
		With isolated power supply 485/CAN Isolate	Intelligent isolated drive with functional safety		

Mass production stage Sample stage R&D phase Conceptual phase

Standard Digital Isolator



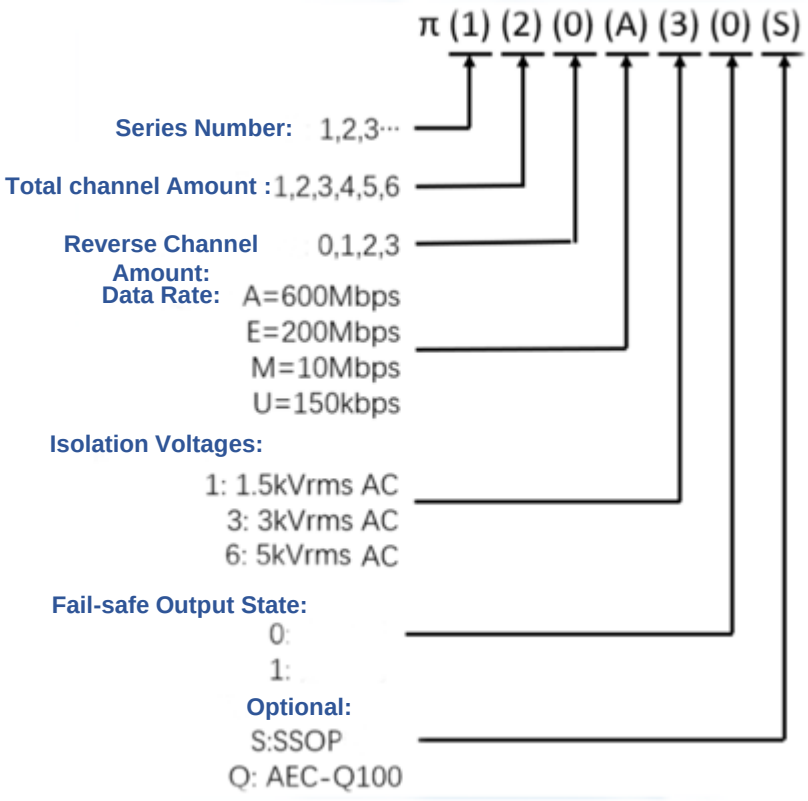
Channel Amount:6



Channel Amount:4

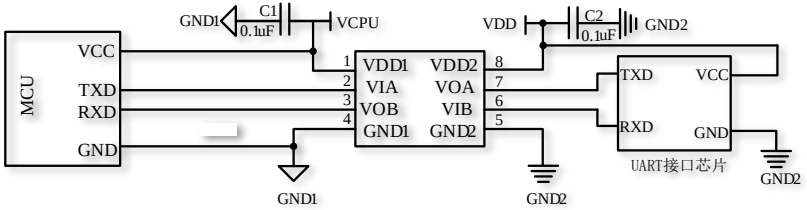
The main parameters	category
Total channel Amount	1,2,3,4,6
Reverse Channel Amount	Reverse Channel Amount：1~3
Data Rate	A(600Mbps);E(200Mbps);M(10Mbps);U(150Kbps)
Isolation Voltages	1.5KV(1); 3KV(3); 5KVrms(6)
Fail-safe Output State	Logic High(1);Logic Low(0)

Chips create new value

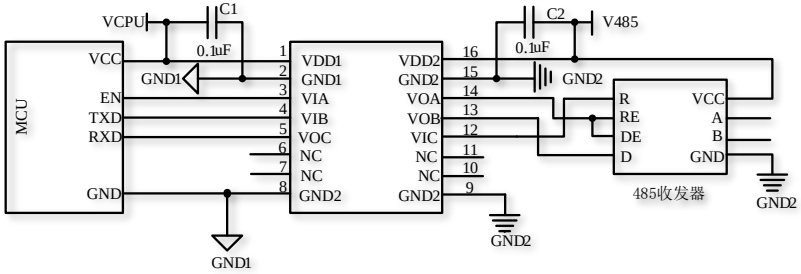


Standard Digital Isolators Typical Applications

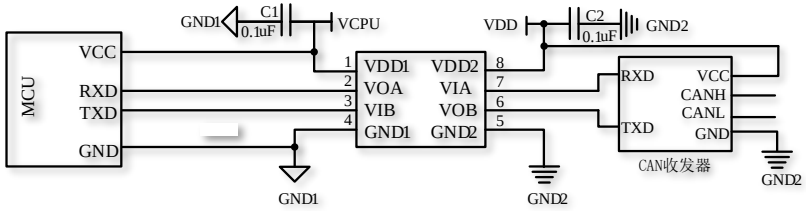
Chips create new value



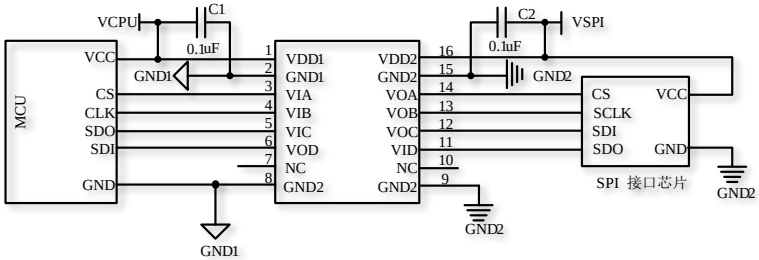
UART/RS232 Communication isolation - π122M31/π122M61



RS485 Communication isolation - π131M31/π131M61



CAN Communication isolation -π122M31/π122M61

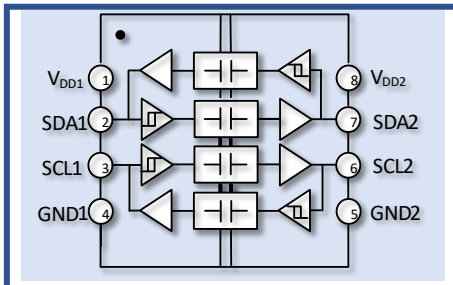


SPI Communication isolation - π141M31/π141M61

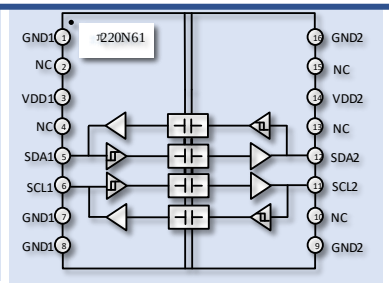
I2C Isolator

Chips create new value

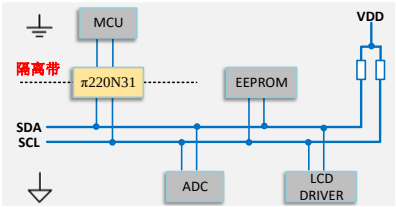
PN.	Max Data Rate	Isolation Voltages ACrms	SDA Channel	SCLChannel	Operating voltage	Operating temperature range	Package	AEC-Q100	Hot Selling Models
π220N31	2MHZ	3KV	Bidirectional	Bidirectional	3-5.5V	-40℃~125℃	SOP-8	yes	✓
π220N61	2MHZ	5KV	Bidirectional	Bidirectional	3-5.5V	-40℃~125℃	WSOP-16	yes	✓



π220N31



π220N61



I²C Isolator system application diagram

Naming conventions

π (2) (2) (0) (N) (3) (1) (Q)

- The serial number : 1, 2, 3. . .
- The interface type: N=2 I²C Interface
- Channel type : N=0 SCL; N=1 SCL
- Data Rate : N=2MHZ
- Isolation Voltages : N=3 3KVrms AC, SOP8; N=6 5KVrms AC, WSOP16
- Output type: N=1 Open-drain
- Optional: Q=AEC-Q 100 认证

DFN Encapsulation & Automotive Grade Products

Chips create new value

AEC-Q100 Automotive-grade digital isolators and key applications

- Electric drive electronic control
- BMS
- OBS
- In-vehicle DC-DC

The world's smallest package of digital isolators and key applications

Digital Isolator
8-P-DFN

- Secondary power supply
- 5G communication
- GaN PD power supply
- New energy power supply

- The full range of transmission rates up to 200Mbps
- AEC-Q100 Grade1 certified
- Production line for automotive grade products that meets IATF16949
- Additional quality control in fab, device packaging, and final assembly

PN:

- **П 110x1x**
- **П 120x1 x**
- **П 122x1 x**

Size: 2mm *3mm

Optocoupler-compatible Isolated Product

Optocoupler-compatible isolator Pai6xxx	product material number 2Pai Part Number	Competitor information Benchmarking Products
Optocoupler compatible isolated drive	Pai8201	Silicon Labs Si8261BBD-C-IS TI UCC23513
Optocoupler Compatible Isolator	Pai85136/7	6N137
Optocoupler compatible with solid-state relays	Pai8558EQ	Broadcom ASSR-601Jx Toshiba TLX9160T

Optocoupler Compatible Isolated Driver： Pai8201E

Chips create new value

Features

- Single-channel isolated driver output (5A Peak source current , 5A peak sink current)
- Drive side 13V UVLO, power supply range 15V~25V
- Logic side optocoupler compatible
- WB SO6 package (8mm creepage distance)
- Isolation performance: 5.0kVrms for 1 minute
- CMTI TYP: 100KV/us
- Pulse width distortion is less than 35ns

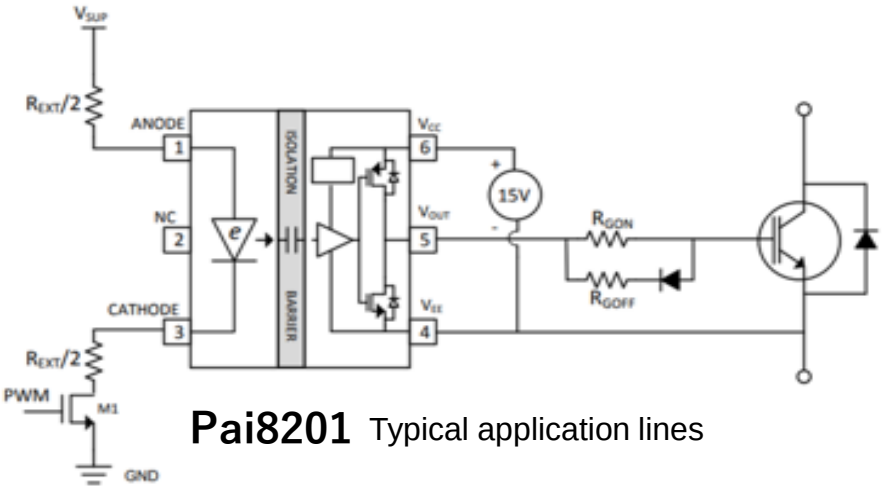
Benefits

- PIN TO PIN
- Optocoupler Compatible Input
- Drive peak current up to 5A
- Wide body 6-pin package

Applications

Samples: Q1, 2023

- Inverter
- UPS and PSU
- Isolated DCDC power supply
- EV/HEV Power Module



Pai8201 Typical application lines

Optocoupler Compatible Isolator: Pai85136/Pai85137

Chips create new value

Features

- Pin-compatible with popular high-speed optocouplers
- 4.5V to 30V output supply voltage
- Higher common-mode transient immunity: >50 kV/μs typical
- PCB footprint compatible with optocoupler packaging
- Single/Dual channel diode emulator input
- Data rates dc 1Mbps/10Mbps
- Propagation delay 75 ns
- Operating junction temperature,: –40°C to +125°C
- Safety-related certifications:
- – 5.0kVRMS isolation for 1 minute per UL 1577

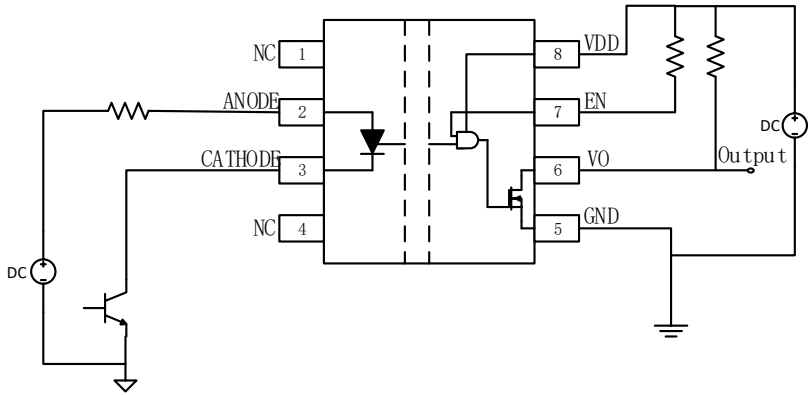
Benefits

- Pin-compatible, drop in upgrade for popular high-speed digital optocouplers

Applications

Samples Available

- Industrial automation
- Motor controls and drives
- Isolated switch mode power supplies
- Isolated data acquisition
- Test and measurement equipment



Optocoupler Input Compatible 1500V PhotoMos Pai8558E

Chips create new value

Features

- Diode emulator input compatible with PhotoMOS
- AEC-Q100 grade 1 qualified
- Breakdown voltage: min. 1500V at IDSS=100μA
- Avalanche rated bidirectional MOSFETs
- On-resistance, RDS(ON)<300Ω at ILOAD=20mA
- Off-state leakage, IOFF<1 μA at VDS = 1500V, Ta=25℃
- Creepage and clearance ≥ 8 mm (input-output)
- Package: 300 mil SO-12
- Safety and regulatory approvals:
- 5000 VRMS for 1 minute per UL1577
- 6250 VPEAK surge voltage per VDE0884-11
- Maximum working insulation voltage 1414 VPEAK

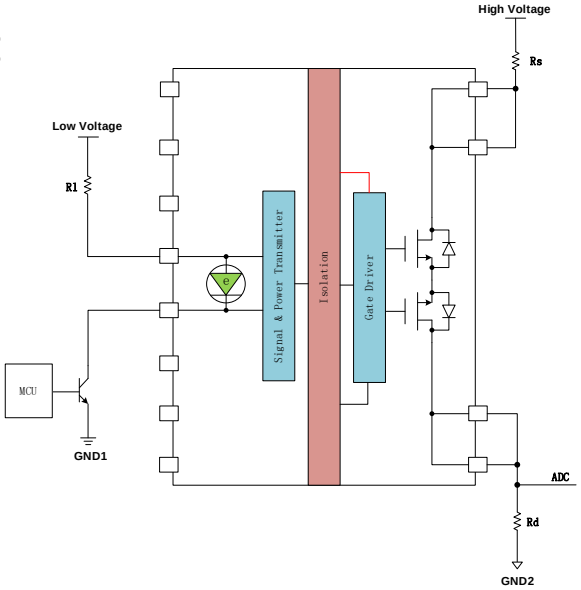
Benefits

- PhotoMOS replacement without any application circuit change as it is pin-to-pin compatible
- Robust design with high reliability and long life time

Applications

Samples Available

- Insulation resistance measurement/leakage detection
- Leakage current blocking switch in series with high voltage measurement resistor ladder



Benchmarking Products

Broadcom: QCPL-A58JV

Toshiba:TLX9160T

Sampling

Sampling Pai5xxx	2Pai Part Number	Benchmarking Products
Current Sense Isolated Amplifier	Pai8300	TI AMC1300B
Current Sense Isolated Amplifier	Pai8311	TI AMC1311
Voltage Reference	Paixxxx	TI REF50xx

Current Sensing Isolated Amplifiers: Pai8300

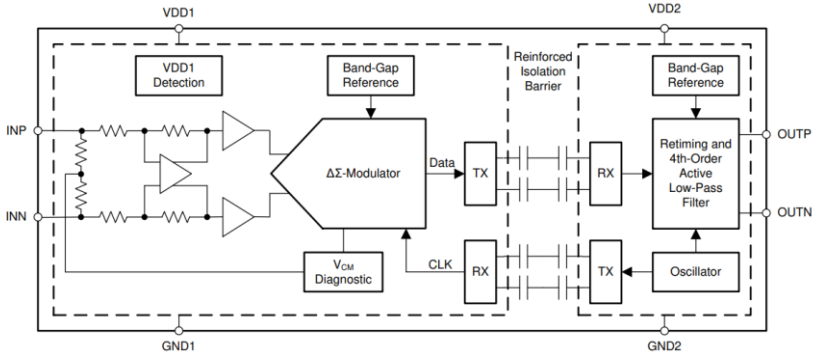
Chips create new value

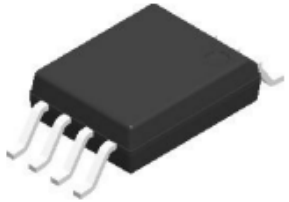
Feature

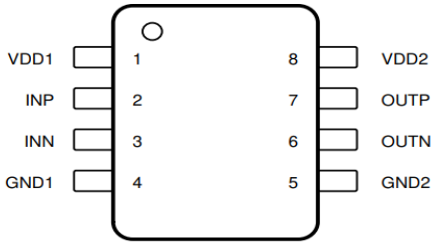
- ±250-mV input voltage range optimized for current measurement using shunt resistors
- Low offset error and drift: ±0.2 mV (max), ±3 μV/°C (max)
- Fixed gain: 8.2
- Very low gain error and drift: ±0.3% (max), ±50 ppm/°C (max)
- Low nonlinearity and drift: 0.03%, 1 ppm/°C (typ)
- 3.3-V operation on high-side
- Safety-related certifications:
- – 7071-VPK reinforced isolation per DIN VDE V 0884-11: 2017-01
- – 5000-VRMS isolation for 1 minute per UL1577
- High CMTI : 140 kV/μs (MIN)

Function Diagram and Package

Sample: Sept, 2022







WB SOIC-8

High Precision Voltage Reference

Chips create new value

Features

- Qualified for Automotive Applications
- Low Temperature Drift
  - ✓ Excellent Grade: 3 ppm/°C(max)
  - ✓ Standard Grade: 8 ppm/°C(max)
- High Accuracy
  - ✓ Excellent Grade: 0.05% (max)
  - ✓ Standard Grade: 0.1% (max)
- Low Noise: 3 uVpp/V
- Excellent Long-Term Stability
  - ✓ 5 ppm/1000 hr (typ) after 1000 hours
- High Output Current: ±10 mA
- Temperature Range: –40°C to 125°C

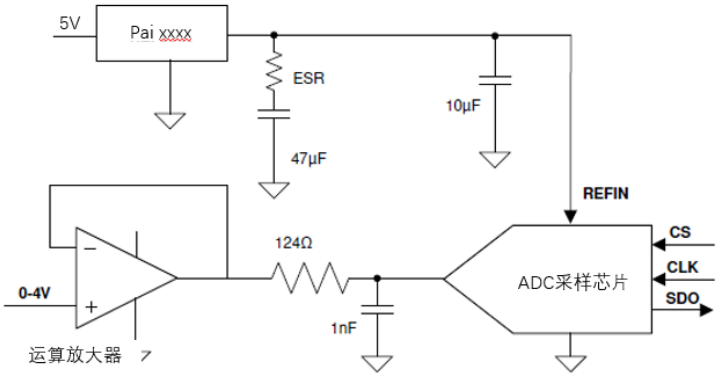
Benefits

- Pin-to-Pin compatible with mainstream products in the market
- Replacement can be performed without any application circuit change

Applications

In Concept

- High Resolution Data Acquisition Systems
- Precision Instrumentation
- Industrial Process Control
- Optical Control Systems



Benchmarking Products	
TI	REF50xx
Maxim	MAX607x

Drivers

Drivers Pai8xxx	2Pai Part Number	Benchmarking Products
Single Channel Isolated Gate Driver	Pai8211A Pai8211C	TI UCC5350SB
Dual Channel Isolated Gate Driver	Pai823XX	Silicon Labs Si8233 TI UCC21520
Optocoupler Compatible Isolated Gate Driver	Pai8201E	Silicon Labs Si8261BBD-C-IS TI UCC23513
High Voltage Half Bridge Gate Driver	Pai8131A Pai8171A	IR IR2103(S) IR2104S
Intelligent Isolated Gate Driver	Pai6861C	Toshiba TLP5214A Broadcom ACPL-333J
	Pai8361AQ	TI UCC21750Q

Single-channel isolated driver: Pai8211A

Chips create new value

Features

- Single-channel isolated driver output (6A Peak source current , 6A peak sink current)
- Drive side 8V UVLO, power supply range 9.5V~33V Logic side power supply range 2.5V~5.5V
- NB SOIC-8 package (4mm creepage distance)
- WB SOIC-8 package (8mm creepage distance)
- Isolation performance: 3.75kVrms or 5kVrms for 1 minute
- CMTI TYP: 150KV/us
- Pulse width distortion less than 10ns

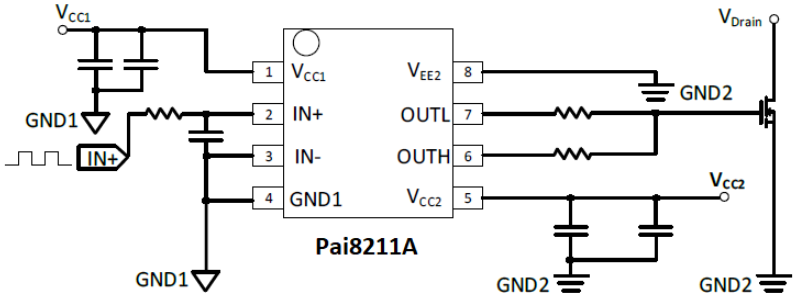
Benefits

- PIN TO PIN
- Separate output, flexible EMI debugging
- CMOS input, support 2.5V power supply
- Drive peak current up to 10A, power supply supports 33V
- Isolation withstand voltage up to 3.75kVrms or 5kVrms

Applications

Available

- Inverter
- UPS and PSU
- Isolated DCDC power supply
- EV/HEV Power Module



Single-channel isolated driver: Pai8211C

Chips create new value

Features

- Single-channel isolated driver output (6A Peak source current , 6A peak sink current)
- Drive side 12V UVLO, power supply range 13V~33V
- Logic side power supply range 2.5V~5.5V
- NB SOIC-8 package (4mm creepage distance)
- WB SOIC-8 package (8mm creepage distance)
- Isolation performance: 3.75kVrms or 5kVrms for 1 minute
- CMTI TYP: 150KV/us
- Pulse width distortion less than 10ns

Benefits

- PIN TO PIN
- With Miller Clamp Protection
- CMOS input, support 2.5V power supply
- Drive peak current up to 10A, power supply supports 33V
- Isolation withstand voltage up to 3.75kVrms or 5kVrms

Applications

Available

- switching power supply
- UPS and PSU
- Solar inverters
- EV/HEV Power Module

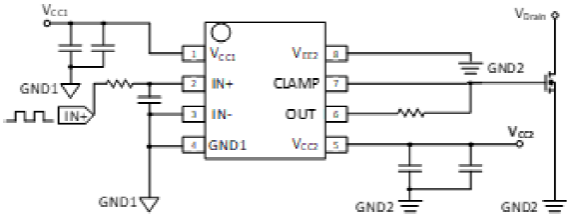


Figure22A. typical application circuit-IN+ Input

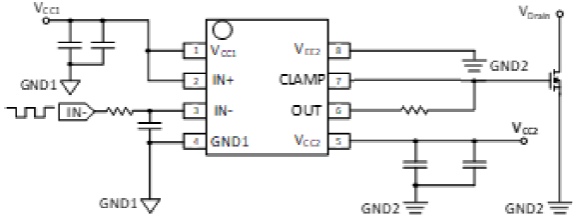


Figure22B. typical application circuit-IN- Input

Dual isolated driver: Pai823xx

Chips create new value

Features

- Dual isolated drive outputs (4A Peak source current , 8A peak sink current)
- Drive side UVLO 6V, 9V, 13V optional, power supply range 9.5V~25V
- WB SOIC-14 Wide Body Package (Original and Secondary Creepage Distance 8mm)
- NB SOIC-16 package (primary and secondary creepage distance 4mm)
- Isolation: 5.0kVrms or 3kVrms, 8KV surge
- CMTI: >100KV/us
- Pulse width distortion is less than 5ns

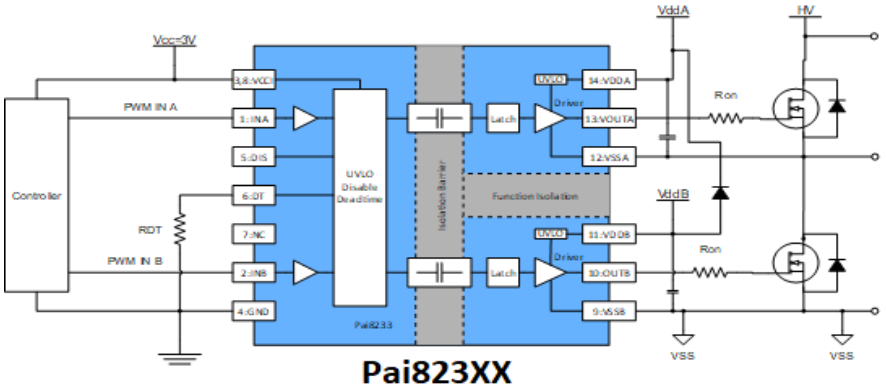
Benefits

- PIN TO PIN
- 6V, 9V, 13V UVLO optional
- TTL input
- Drive peak current up to 5A
- Dead time adjustable

Applications

Available

- Motor Control System
- Isolated DCDC power supply
- PV inverter
- Inverter



Typical application circuit

Intelligent isolated driver: Pai8265AQ

Chips create new value

Features

- ±10A maximum peak output current
- 4A active Miller Clamp.
- Desaturation Detection
- Under Voltage Lock-Out Protection (UVLO) with Hysteresis
- Open Collector Isolated fault feedback
- “Soft” Turn-off
- Automatic Fault Reset after fixed mute time , typical 26us
- High CMTI >100KV/us
- Safety and regulatory approvals:
  - 5700 VRMS for 1 minute per UL1577
  - 6250 VPEAK surge voltage per VDE0884-11
  - Maximum working insulation voltage 2121 VPEAK

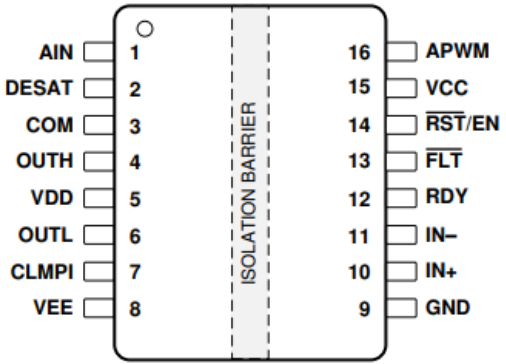
Benefits

- Pin-to-Pin compatible with mainstream products in the market
- Replacement can be performed without any application circuit change

Applications

Sample: Q1, 2023

- Isolated IGBT/Power MOSFET gate drive
- AC and brushless DC motor drives
- Solar Inverters
- HEV and EV Power Modules



Pin Configuration

Benchmarking Products	
TI	UCC21750

Smart High Side Driver

Chips create new value

Features

- Quad channel smart high-side driver with MultiSense analog feedback
- Very low standby current
- Compatible with 3 V and 5 V CMOS outputs
- Multiplexed analog feedback of: load current with high precision proportional current mirror
- Undervoltage shutdown
- Overvoltage clamp
- Load current limitation
- Self limiting of fast thermal transients
- Configurable latch-off on overtemperature or power limitation with dedicated fault reset pin

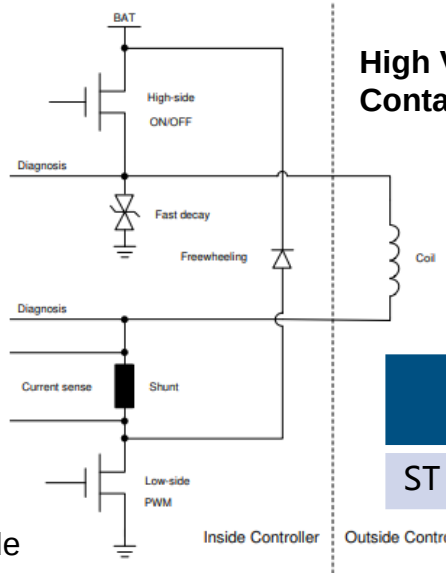
Benefits

- Pin-to-Pin compatible with mainstream products in the market
- Meets automotive ISO7637 transient requirements without TVS Diode

Applications

Sample: Q2, 2023

- All types of automotive resistive, inductive and capacitive loads
- Specially intended for automotive signal lamps (up to R10W or LED Rear Combinations)



High Voltage Contactor Control

Benchmarking Products	
ST	VNQ7140

Ideal Diode Controller

Chips create new value

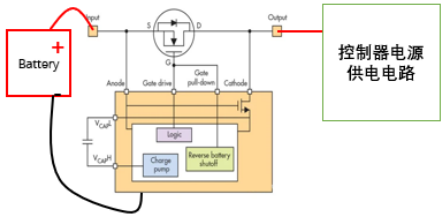
Features

- AEC-Q100 qualified with the following results
  - Device temperature grade 1:
    40°C to +125°C ambient operating temperature range
  - Device HBM ESD classification level 2
  - Device CDM ESD classification level C4B
- 3.2 V to 65 V input range (3.9-V start up)
- -40 V reverse voltage rating
- 5-μA shutdown current (EN=Low)
- 80-μA (With Cap)/200-uA(Without Cap) quiescent current Charge pump for external N-Channel MOSFET
- Available in 6-pin, 8-pin SOT-23 Package 2.90mm × 1.60 mm; 8-TDFN Package 2mm x 3mm

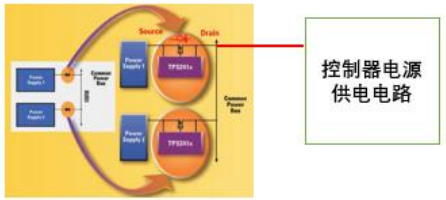
Applications

Sample: Q1, 2023

- Active ORing for redundant power
- Automotive ADAS systems – camera
- Enterprise power supplies
- Automotive infotainment systems



防电池反接应用



冗余供电应用

Benefits

- Pin-to-Pin compatible with mainstream products in the market
- Meets automotive ISO7637 transient requirements without TVS Diode

Benchmarking Products	
TI	LM7470x
ADI	MAX16171

Isolated interface

Isolated interface：Pai8xxx	2Pai Part Number	Benchmarking Products
Isolated RS-485 Transceiver	Pai8485 (half duplex) Pai8486 (full duplex)	TI ISO1412 TI ISO1432
Isolated CAN Transceiver	Pai8450	TI ISO1050(TI)

Pai8485-W1R&Pai8486-W1R –Isolated 485

Chips create new value

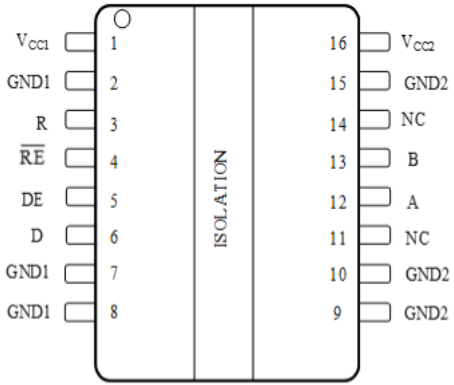
Features

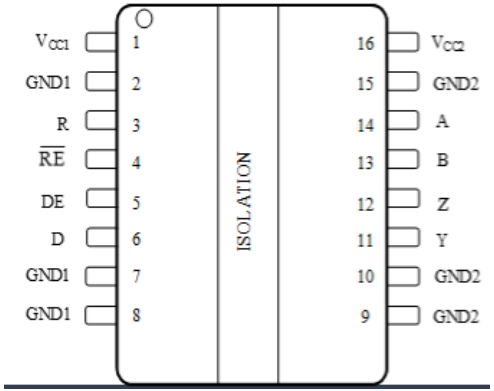
- Up to 5000Vrms Insulation voltage.
- VDD1 supply voltage: 2.5V to 5.5V.
- Bus side power supply voltage: 4.5V to 5.5V.
- Low-EMI 500-kbps Data Rate for Pai2485.
- 16Mbps Data Rate for Pai2486.
- High CMTI: +100kV/us.
- High system level EMC performance:
  -Bus Pins meet IEC61000-4-2 t10kV ESD.
- Fail-safe protection receiver.
- 1/8 Unit load up to 256 nodes on bus.
- Operation temperature: -40C ~ 105C.
- RoHS-compliant, Wide-body SOIC-16 package.
- Pin compatible to most isolated RS - 485 transceivers.
- Safety-related certifications: (Pending).

Functional Block Diagram

Sampling: Oct, 2022

- Factory Automation & Control
- Isolated RS-485 communication
- Smart electric meter and water meter
- Security and protection monitoring





Benchmarking Products	
ISO1412	ISO3082

Pai8450-Isolated CAN

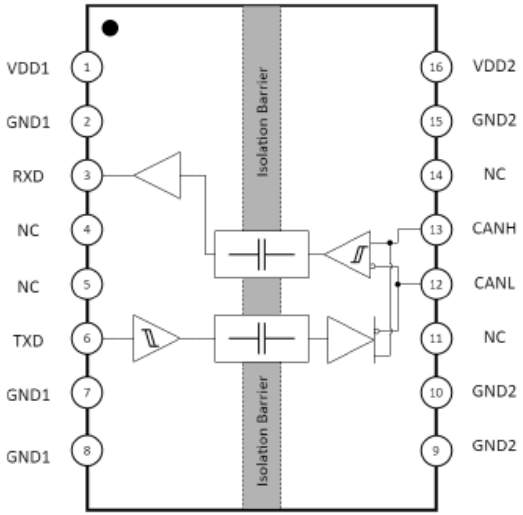
Chips create new value

Features

- Up to 5000Vrms Insulation voltage
- VDD1 supply voltage: 3.0V to 5.5V
- Bus side power supply voltage: 4.5V to 5.5V
- 16Mbps Data Rate
- High CMTI: ±100kV/us
- Up to 110 transceivers on the bus
- Driver (TXD) Dominant Time- out Function Bus- Fault Protectionof -27 V to 40 V
- Operation temperature: -40°C ~125°C RoHS- compliant packages: WB SOIC16

Functional Block Diagram

Sampling: Oct, 2022



Benefits

- Highly integrated isolated Transcevier
- Supports 3.3V and 5V Microprocessors

Benchmarking Products

ISO1050

PRODUCT APPLICATION SCENARIOS

Application Scenarios

Chips create new value


New Energy


UAV

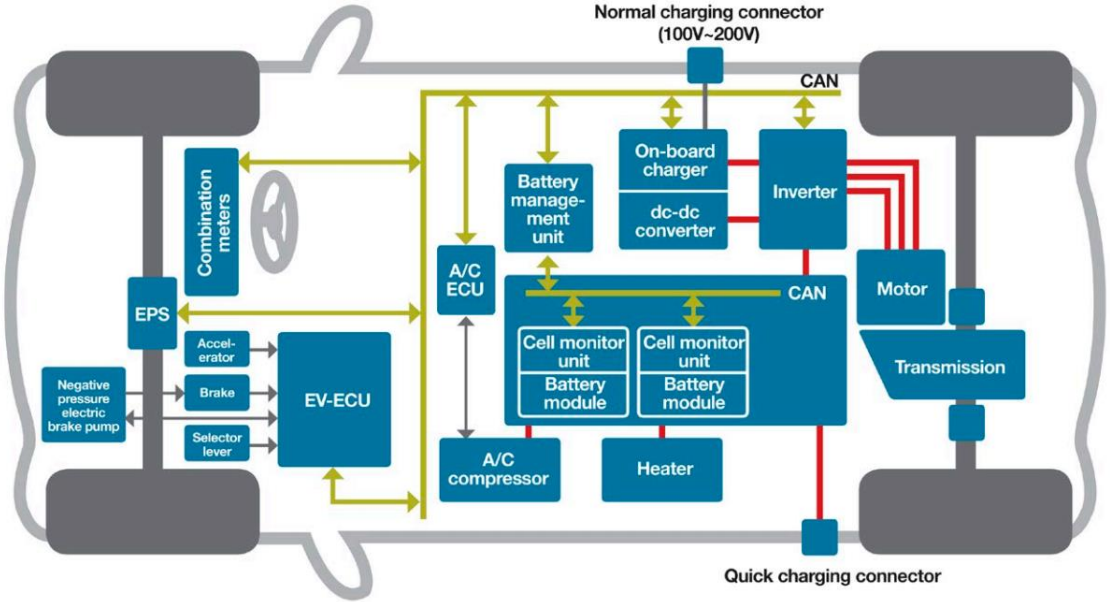

Intelligent AI robot


Smart Appliances


Electric vehicle


Smart Meters

Applications in Electric Vehicles



Key Applications

OBC/DC-DC

- OBC(On-Board Charger)
- DC-DC Converter，Convert high (200~800V) voltage to low voltage

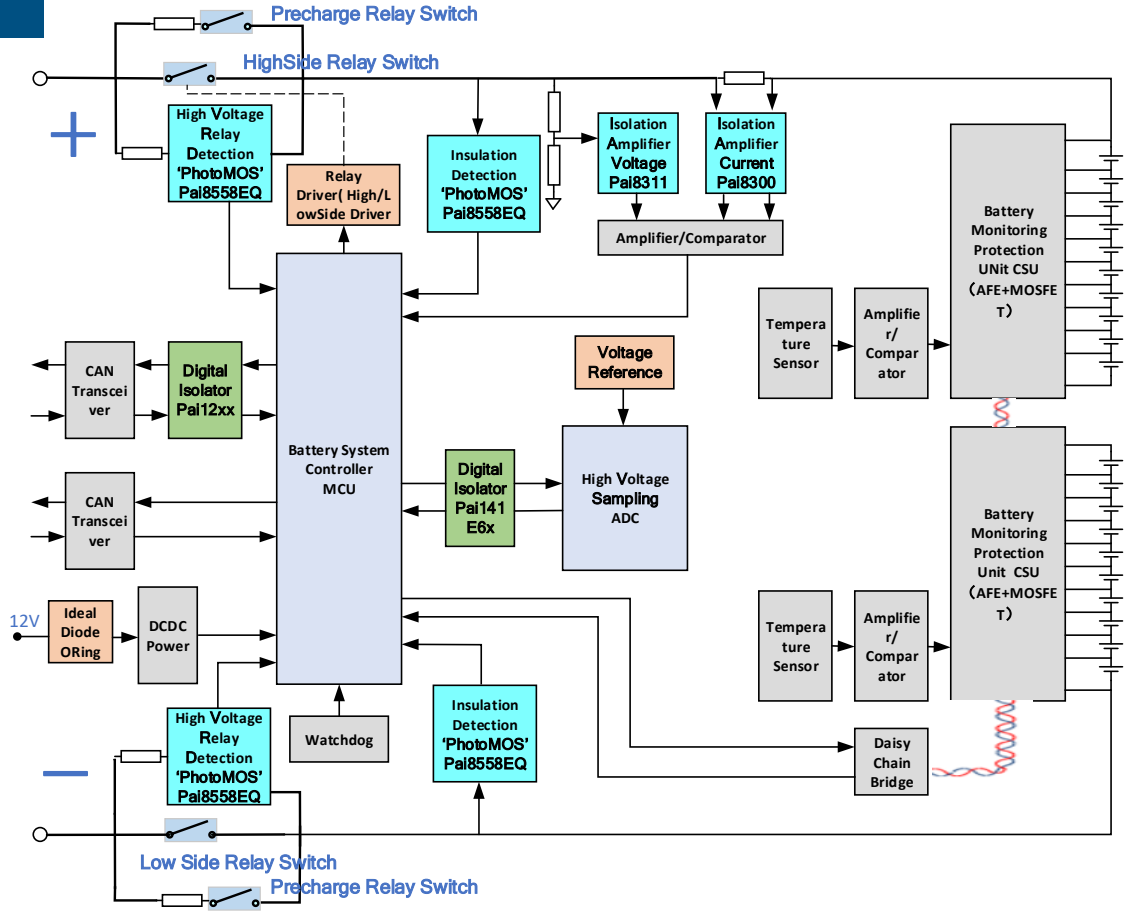
BMS(Battery Management System)

- BMS Monitor and manage battery cells

Inverter(motor driver)

Air conditioners and Heaters(thermal management)

Main Products in BMS



Chips create new value

SPI Communication Isolation-Digital Isolator：Pai141E60Q/ Pai141E61Q (Compatible With TI ISO774x/F)

BMS Insulation detection: Pai8558EQ (Compatible With QCPL-A58J, TLX9160T)

Current Sampling: Pai8300 (Compatible With TI-AMC1301/ AMC1300)

Voltage Sensing: Pai8311 (Compatible With TI-AMC1311)

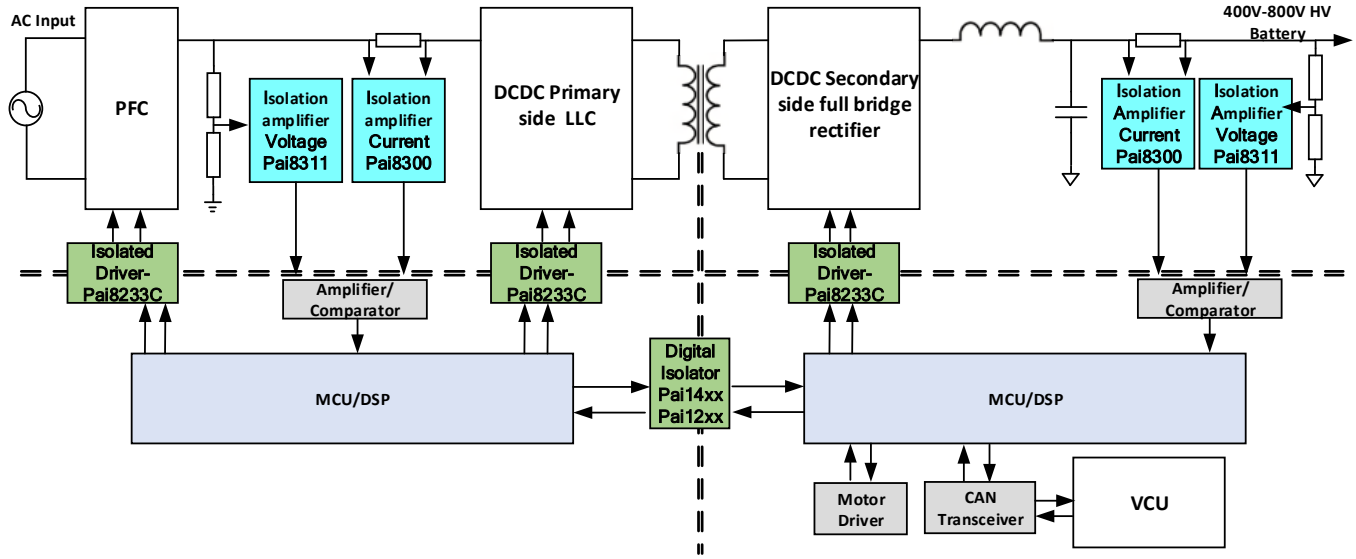
Redundant Power Supply：ideal diode(Compatible With TI-LM7470x，ADI-MAX16171)

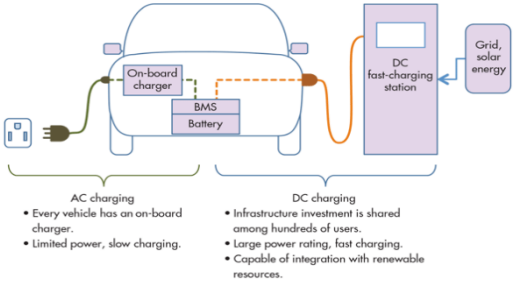
Relay driver(Compatible With ST-VNQ7140，VNQ7050)

High Precision ADC Sampling: High Precision Voltage Reference (Compatible With TI-REF50xx)

Electric Vehicle Applications - OBC

Chips create new value





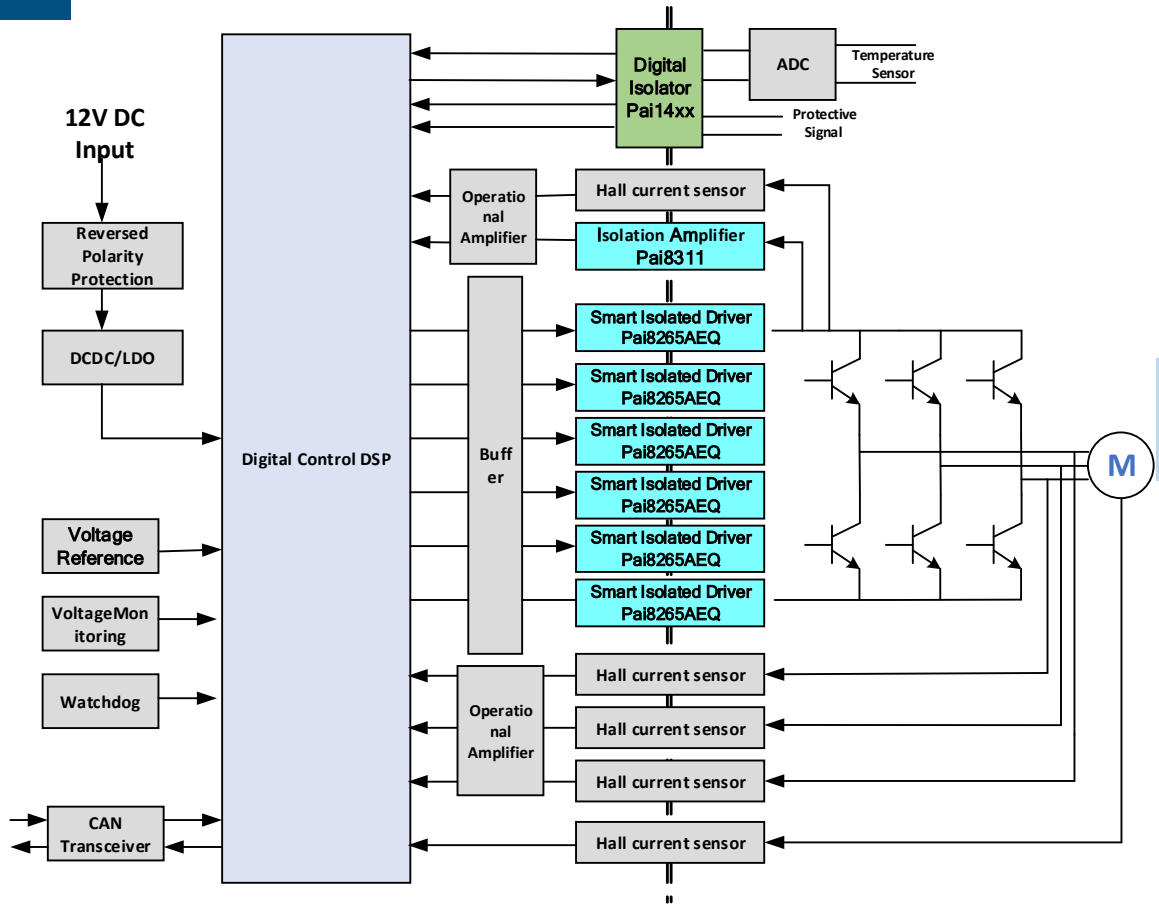
Driver Signal Isolation - Pai8233CQ， (Compatible With：TI-UCC21520，Silabs-Si8233)

Communication Isolation - Pai14xx/12xxQ，(Compatible With TI-ISO774x/772x)

Current Sensing: Pai8300 (Compatible With TI-AMC1301/AMC1300)

Voltage Sensing: Pai8311 (Compatible With TI-AMC1311)

Electric Vehicle Applications – Inverter



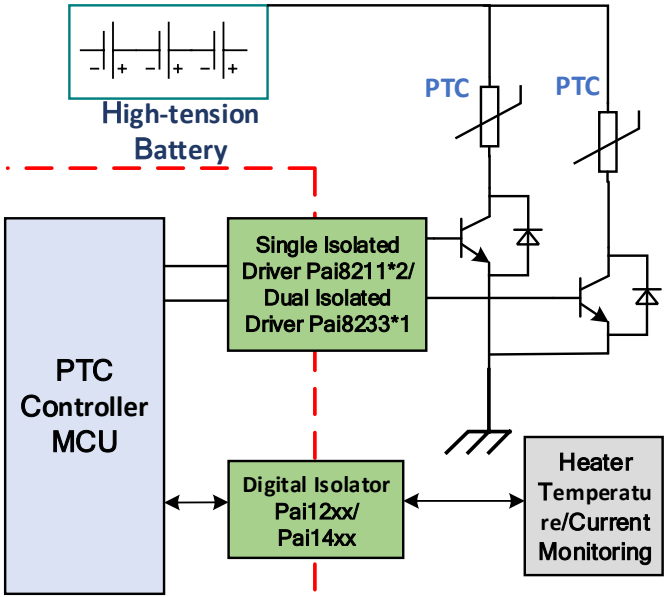
Communication Isolation： Pai14xx
(Compatible With： TI-ISO774x)

IGBT Driver Signal Isolation：Pai8265AEQ
(Compatible With： TI-UCC21750)

Bus Voltage Sampling: Isolated Amplifier：Pai8311Q (Compatible With：TI-AMC1311)

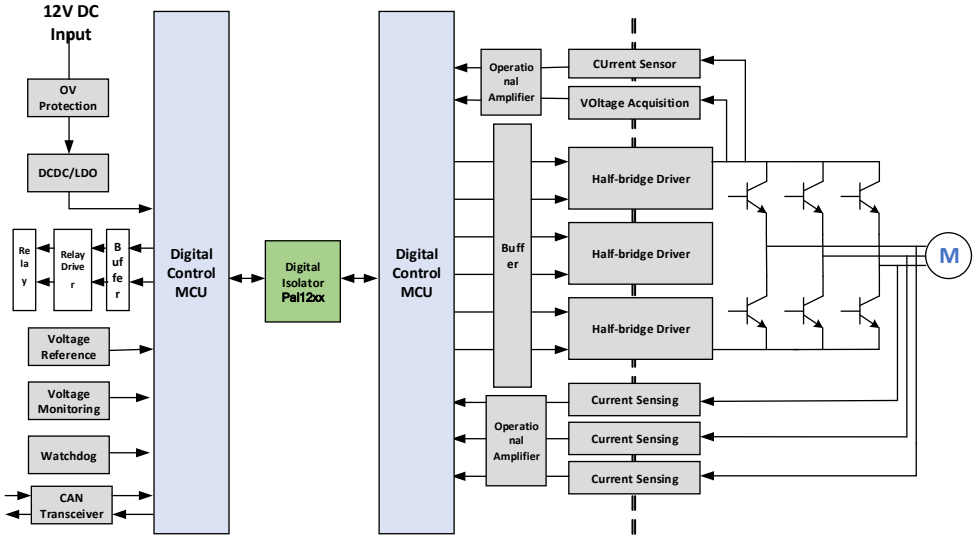
Electric Vehicle Applications - Air Conditioning & Heaters

PTC Heater



- Communication Isolation： Pai12xx/14xx (Compatible With： TI-ISO774x/772x)
- IGBT Driver Signal Isolation：
  Pai8211*2(Compatible With： TI-UCC5350)。
  Pai8233*1(Compatible With： TI-UCC21520)

Air conditioner compressor controller



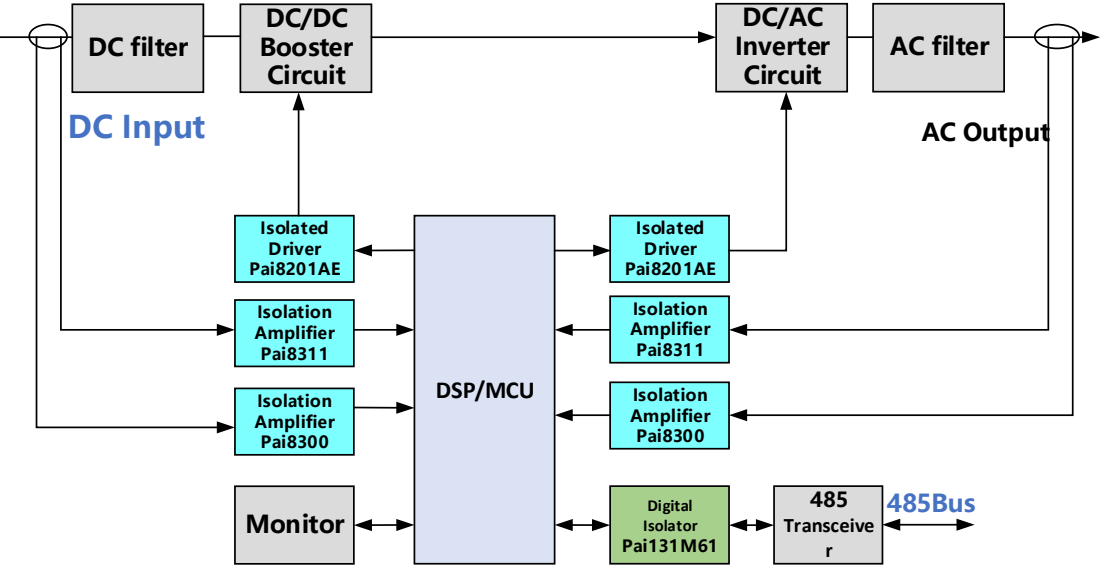
- IGBT Driver Signal Isolation： Pai8233*3 (Compatible With： TI-UCC21520)。Or：Pai12xx*3+ Non-isolated Driver。
- Current & Voltage Sampling：Pai8300/Pai8311。

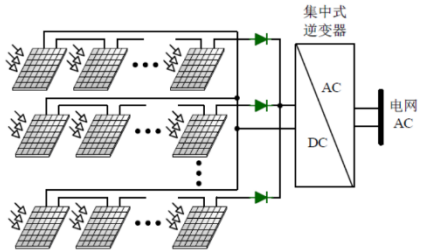
Typical Cooperative Customers of New Energy Vehicles

Chips create new value

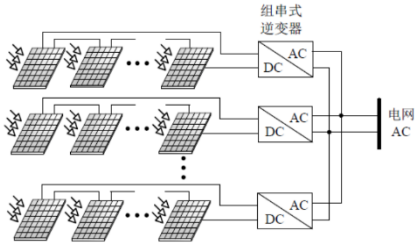
Photovoltaic Inverter

Photovoltaic (pv) panel

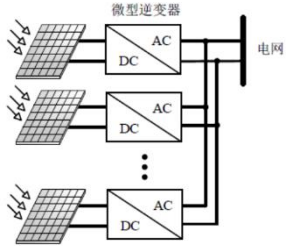




Centralization inverter



String inverter



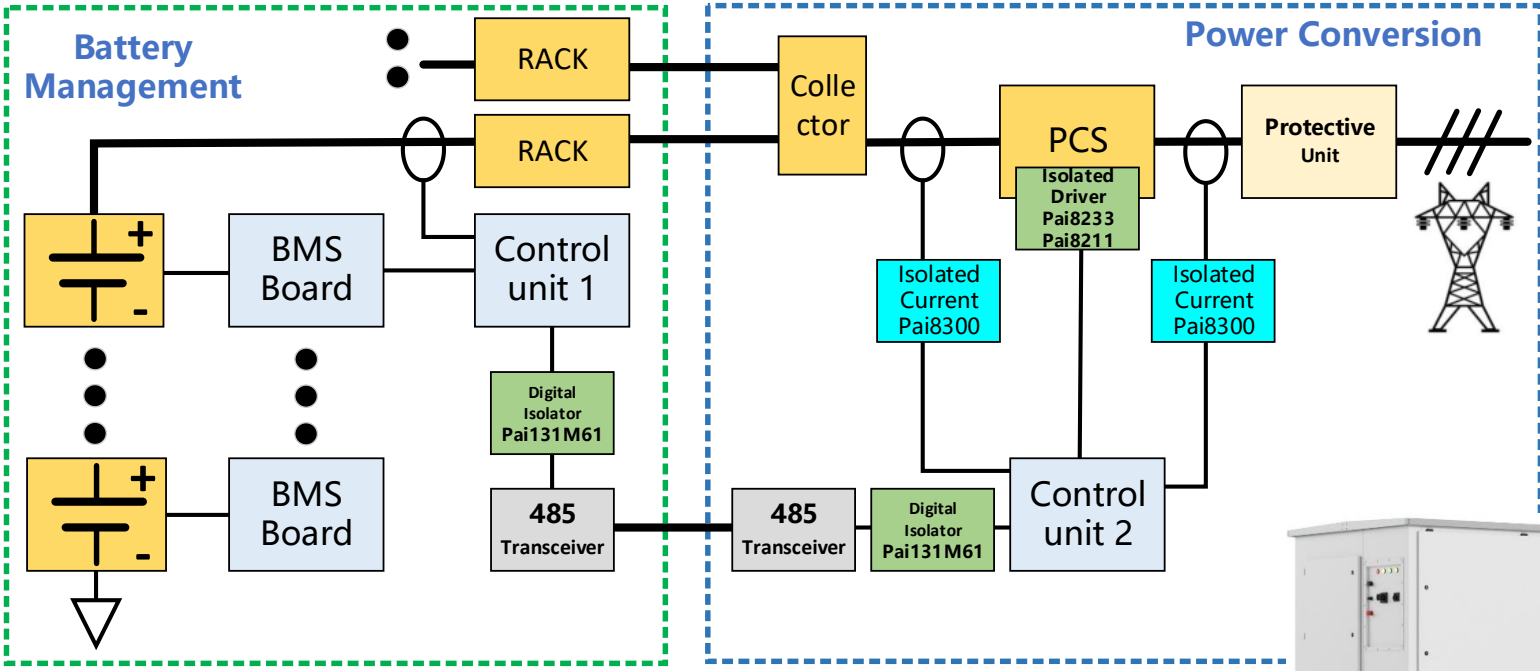
Micro inverter

Centralized inverter

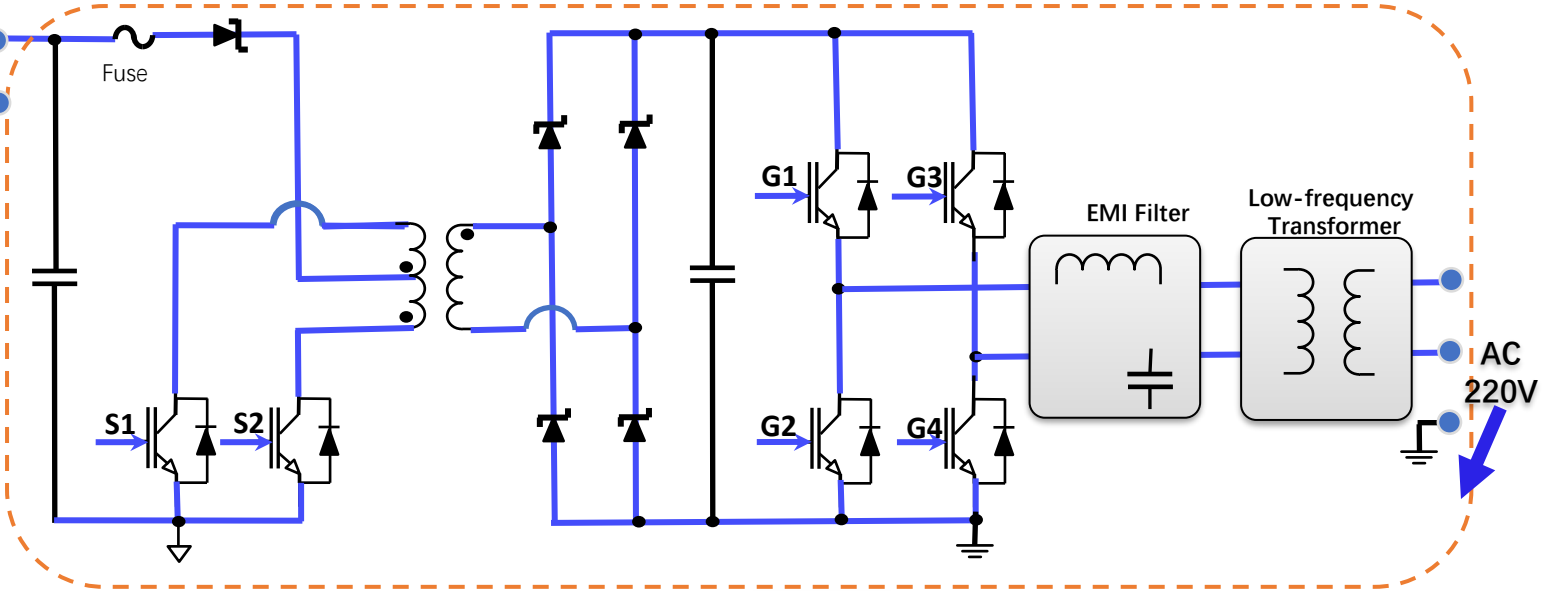
String inverter

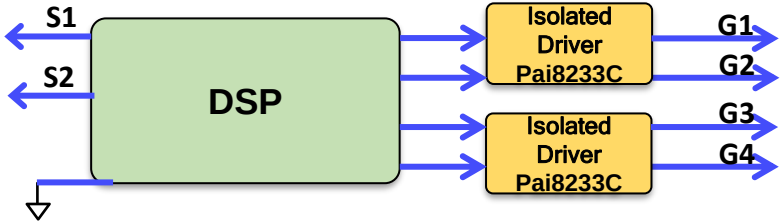
Micro inverter

Centralized Energy Storage



Portable Energy Storage Products





DC/AC

Power Supply：AC/DC、DC/DC

Chips create new value

Commonly Used Models

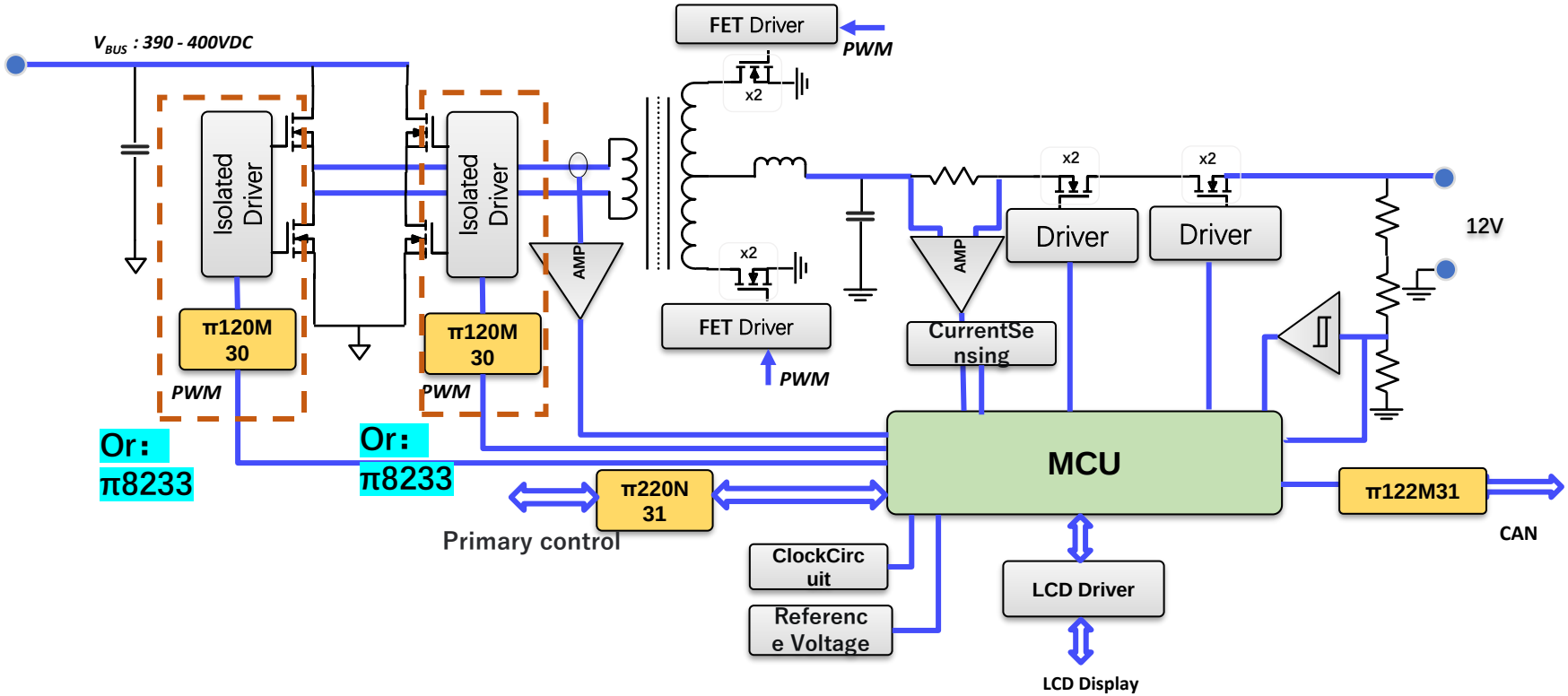
π120M30　　π122M30　　π220N31　　π122M61

Compatible models:
SI8641BD，SI8622，SI8600，ISO7720，ISO1540，6N137

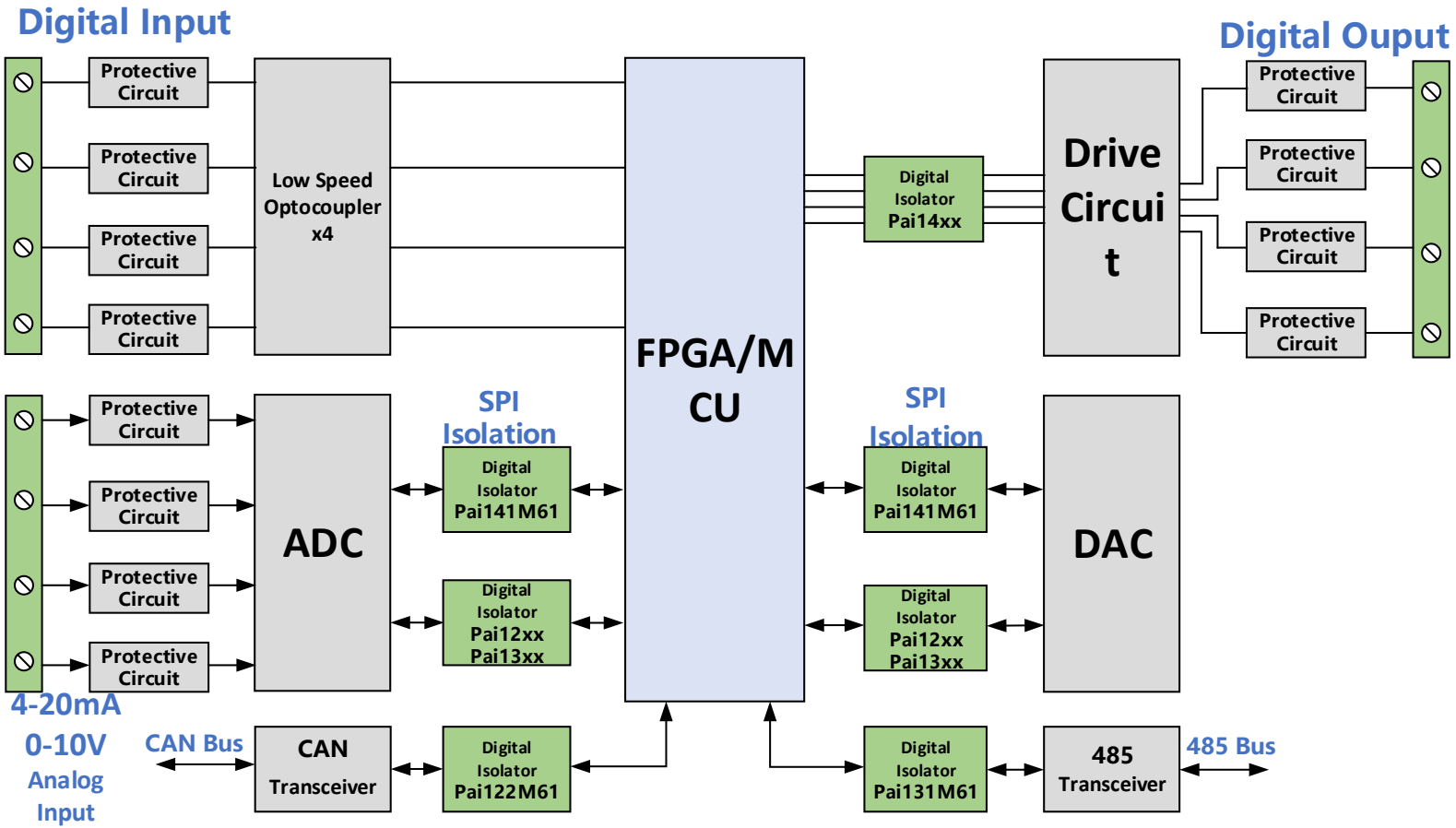
Successful Cases

Great Wall 长城 品质铸就长城
航嘉 Huntkey
VAPEL
SUPLET® 雷能电源
INCREASE
Union SEMICONDUCTOR 上海英联电子
动力源
洛仑兹
INJET 英杰电气

Power Supply: Isolated Phase Shifted Full Bridge DC/DC Convertor



Industrial Control：PLC



Industrial Control：Servo Motor Controller

Chips create new value

Door
Motor
Controller

Successful Cases

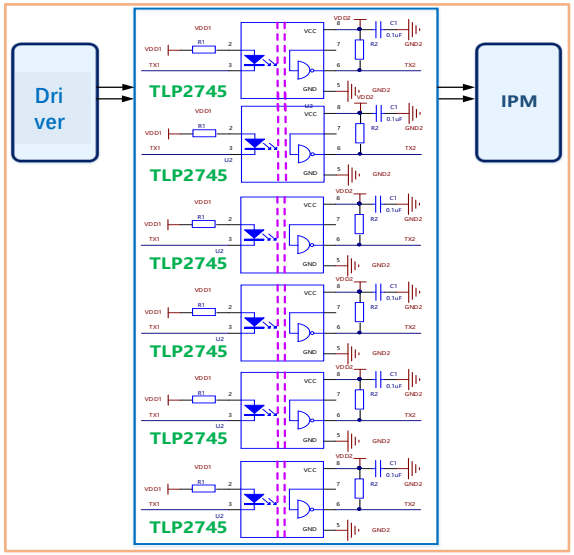
Recommended Model:

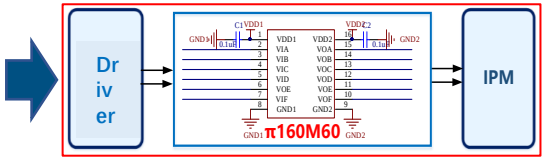
Pai160M60　Pai122M31　Pai131M31　Pai160M30

Industrial Control：Servo Motor Controller

Chips create new value

Item	Transmission Rate(PWD<10ns)	Transmission Delay	Power Consumption	Working Temperature	CMTI	PCB Area
TLP2745*6	2Mbps	40ns	10mA*6	-40℃~85℃	25kV/us	1000mm²
π160M60	25Mbps	11ns	3mA	-40℃~125℃	120kV/us	190mm²

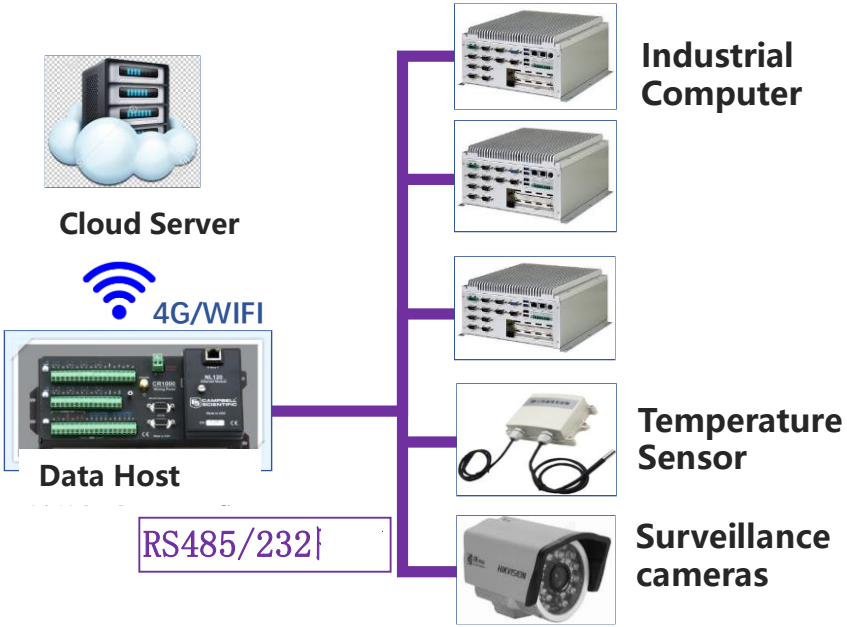




USE：Driver Signal Isolation

TLP2745 Design			π160M60 Design		
Item	Qty	Price (¥)	Item	Qty	Price (¥)
TLP2745	6	12	π160M60	1	<8
Cap 0.1uF	6	0.3	Cap 0.1uF	2	0.05
Resistance	12	0.1			
SMT Fee		0.4	SMT Fee		0.12
Total:	**24**	**12.8(¥)**		**3**	**<8.17 (¥)**

Industrial Control：Data Collection System



Successful Case

研祥智能股份 EVOC INTELLIGENT TECHNOLOGY

麦斯杰

中兴力维

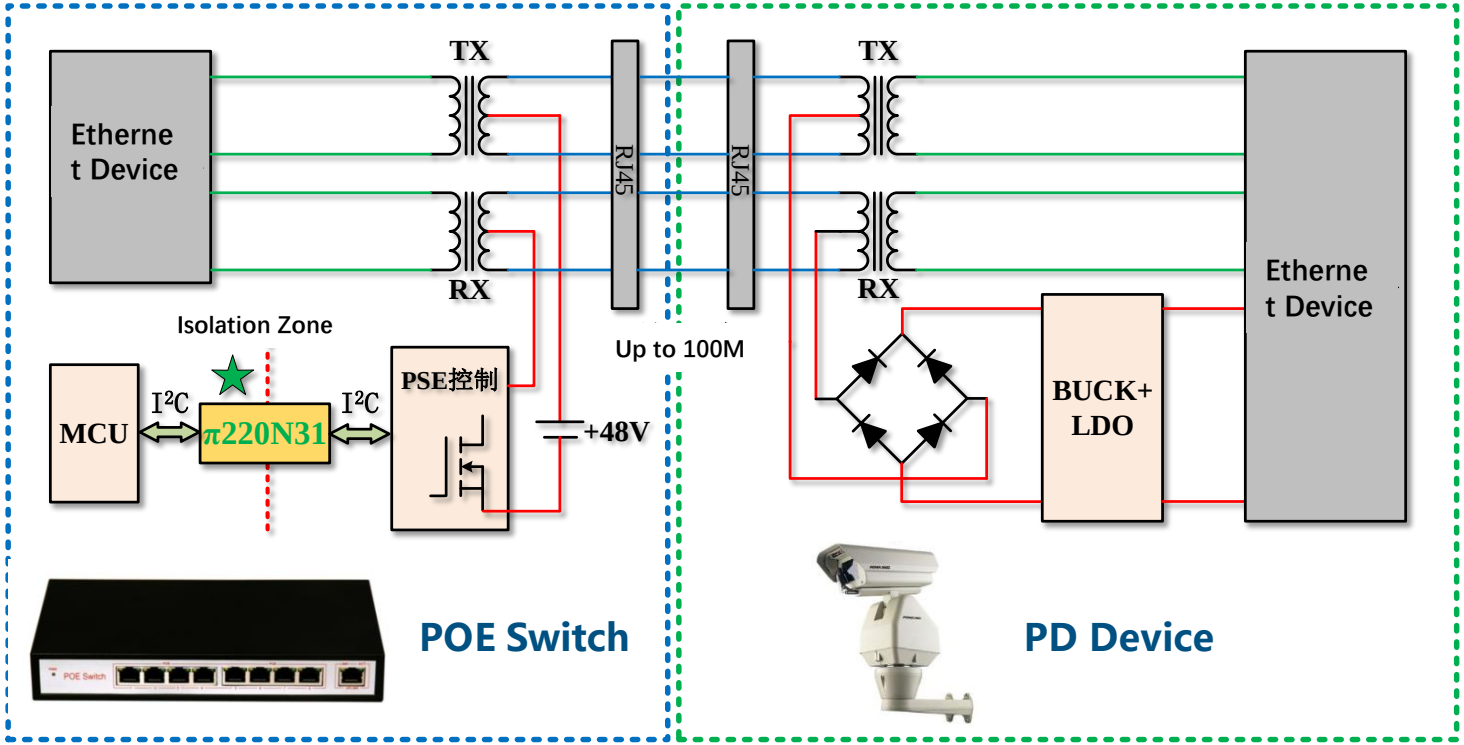
赛尔通信 SAIERCOM CORPORATION

Comba 京信通信

Recommended Model:

RS485: π131M31　　RS232: π122M31

POE Switch



The role of isolator： Isolated I2C communication between MCU and PSE

POE Switch

Chips create new value

Main Market:	Benchmarking Products	Recommended Model:
POE Switch： H3C NVR：HIKVISION，DAHUA	ADI，TI，Silicon labs-I2C ADI，TI，Silicon labs-SPI Low Speed Optocoupler-UART	Pai220N31(I2C Isolation) Pai141M61(SPI Isolation) Pai122U31 （UART Isolation）

Successful Cases

NETGEAR Everybody's connecting. 美国网件公司

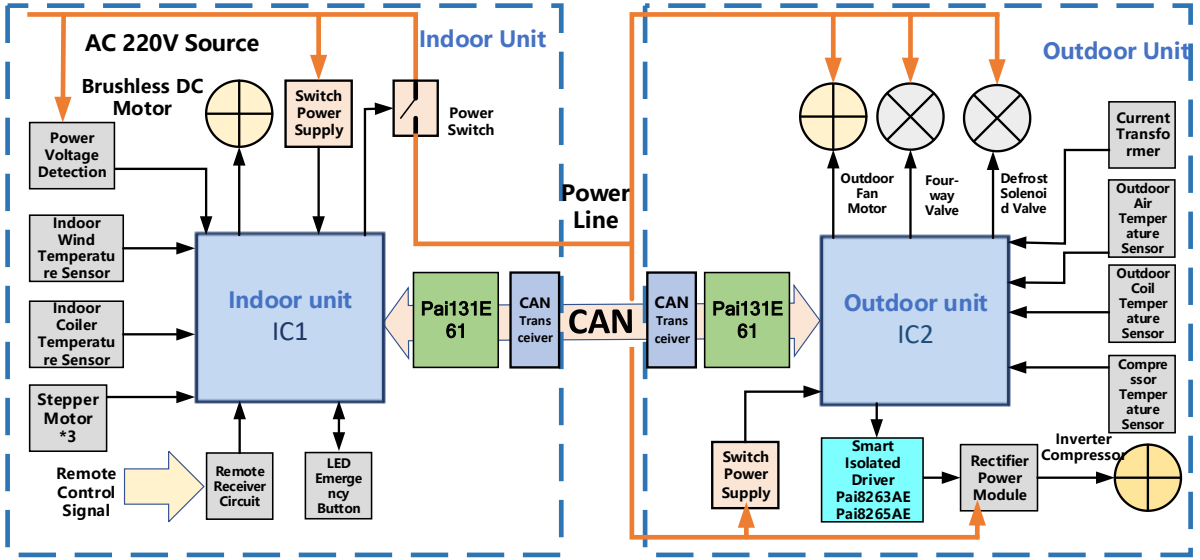
T&W

IOTEK

UNIPOE 优力普

3onedata 让网络通信更可靠

Home Appliances： Commercial Air Conditioner



2Pai：π131E61
Compatible With：
① ADI：ADuM1301
② TI：ISO7731

1. IGBT Driver Signal Isolation： Pai8263AE/8265QE (Compatible With： TLP5214A)

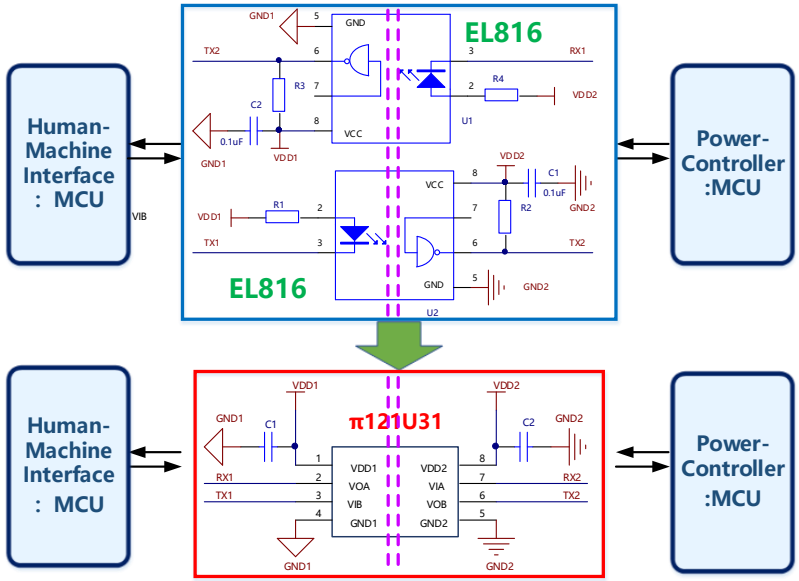
2. CAN Bus Isolation：Pai131E61

Home Appliances： Kitchen Ventilator

Chips create new value

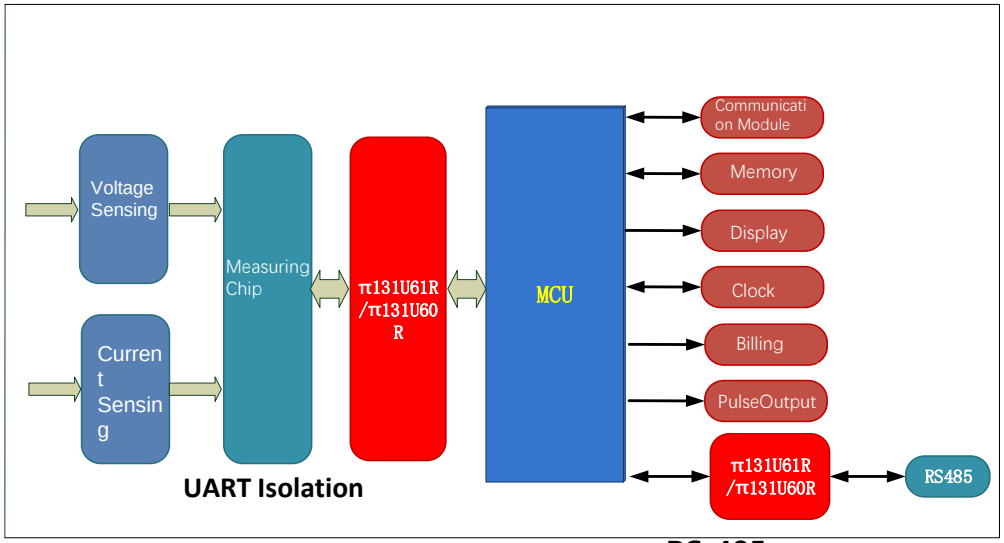
Item	Maximum data rate	Power	Temperature Drift	Working Temperature	CMTI	PCB Area
EL816*2	<30Kbps	7.5mA*2	CTR change with temperature	-40℃~85℃	<25kV/us	360mm²
π121U31	150Kbps	1.3mA	No CTR, Eliminates temperature drift	-40℃~125℃	200kV/us	120mm²

The role of isolator： Isolated UART communication between HMI and Power Controller.



Smart Meter

Chips create new value



The role of π131U61R/ π131U60R：UART Isolation、485 Isolation

1. Using mature CMOS technology， having good consistency, reducing debugging costs during development .
2. Under the premise of ensuring the insulation performance , patented iDivider technology， can significantly reduce the overall cost of the chip. Even compared with ordinary optocouplers, π131U61R’ s cost remains competitive.
3. The service life can be more than twice that of ordinary optocouplers .