

英飞凌IGBT驱动IC

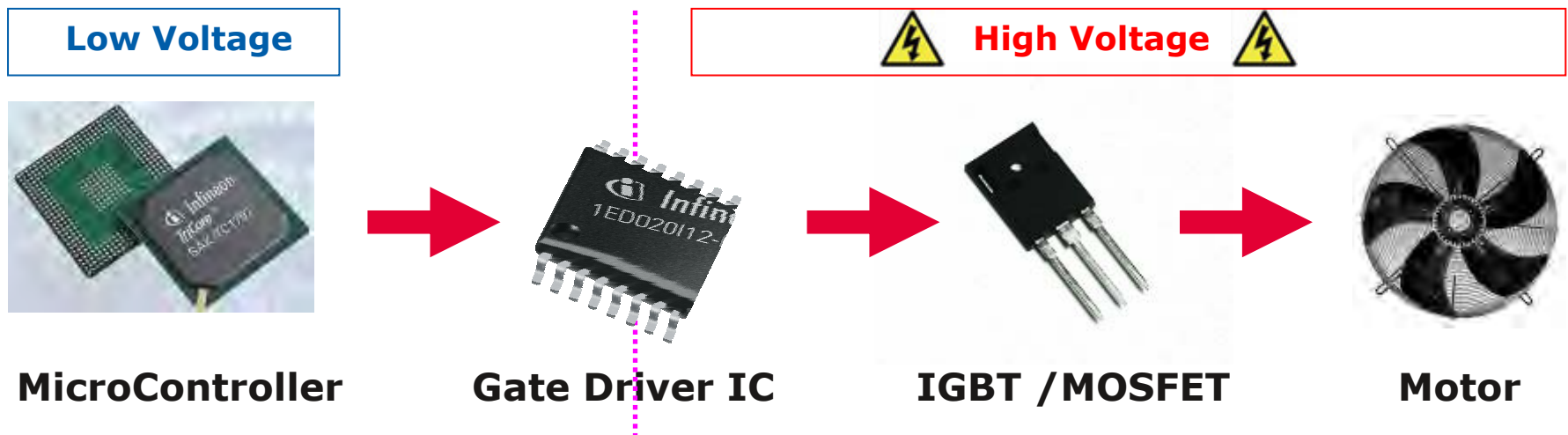
- 6ED003L06-F
- 2ED020I12-FI
- 1ED020I12-F



Never stop thinking

驱动器的基本概念

- **门极驱动**: 输出足够大的瞬时推/挽电流, 足够快地对IGBT门极电容 (及米勒电容) 充/放电, 以足够快地开通/关断IGBT。
- **电位隔离下的信号传输**:
 - 1) 把控制器产生的低电位信号传输到高电位电路;
 - 2) 把控制器产生的共地信号传输到非共地电路 (如: 半桥中两个IGBT的门极)。
- **耐压能力**: 能承受IGBT的工作电压 (如直流母线电压)
- **驱动IC的通道数**: 能驱动的IGBT的数目
- 耐dv/dt能力
- 保护功能: 短路、欠压, 直通互锁等



EiceDRIVER™ 器件型号定义



EiceDRIVER™ 6 ED 003 L 06 - F

绝缘等级

F = 功能性隔离
S = 安全隔离

电压等级

06 = 600V
12 = 1200V
17 = 1700V

驱动器类型

I = IC (无核变压器技术)
L = IC (电平转换技术)

峰值输出电流

003 = 300mA
020 = 2A

功能

ED = IGBT/MOSFET驱动器

驱动器通道数

1 = 单管驱动器
2 = 半桥驱动器
6 = 三相全桥驱动器

EiceDRIVER™ 2 ED 020 I 12 - F I

绿色 / 增强版本

I = 有自锁功能

C = 无自锁功能

绝缘等级

F = 功能性隔离

S = 安全隔离

ST = 安全隔离/机车拖动应用

电压等级

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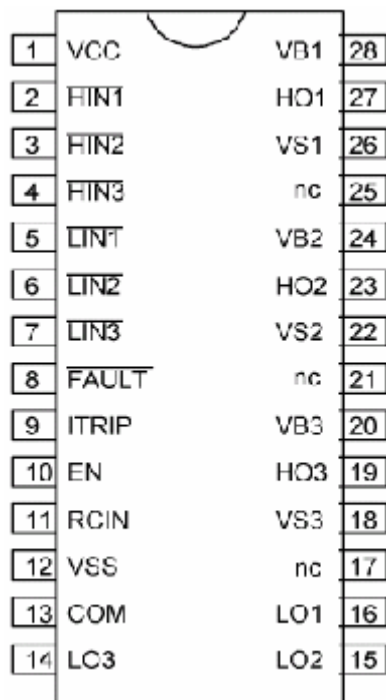
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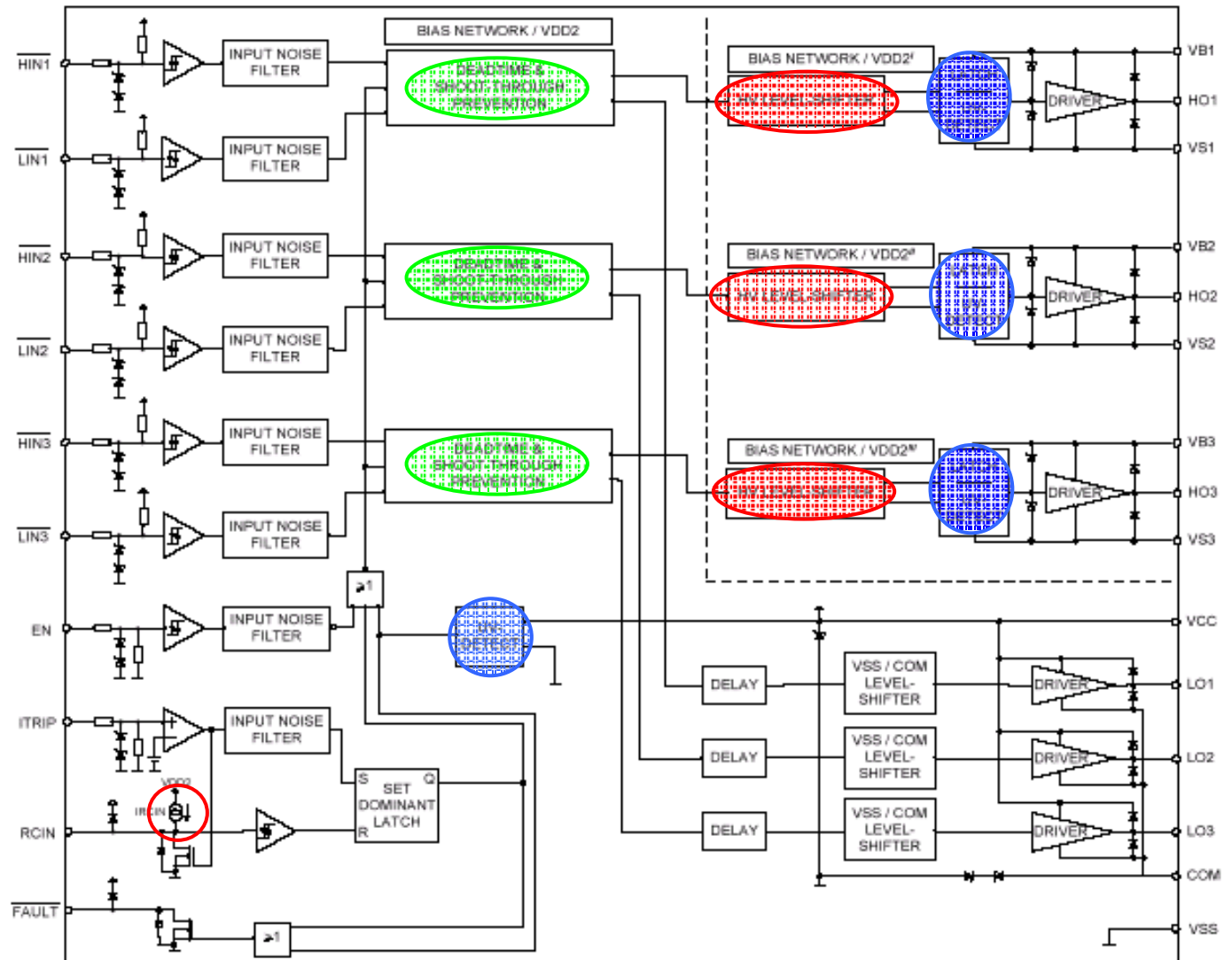


- 基于薄膜SOI 技术
- 600V/0.3A 三相全桥IGBT驱动器
- 三通道的电平转换
- SO-28 SMD 封装 (符合RoHS标准)
- VCC/VBS工作电源: 13V-17.5V
- UVLO (欠压锁定): 典型值10.3V (欠压清除电平典型值12V)
- PWM 输入: 低电平有效, 兼容3.3V/5V的 TTL逻辑
- 输入信号互锁功能
- 使能和 I Trip输入
- 报警 (故障) 信号输出 (OC门)
- 可编程故障恢复时间
- 电流源为RCIN电容充电
- 在管脚以及逻辑功能上和 IR2136S完全兼容
- 能承受瞬间负电压冲击达-50V!

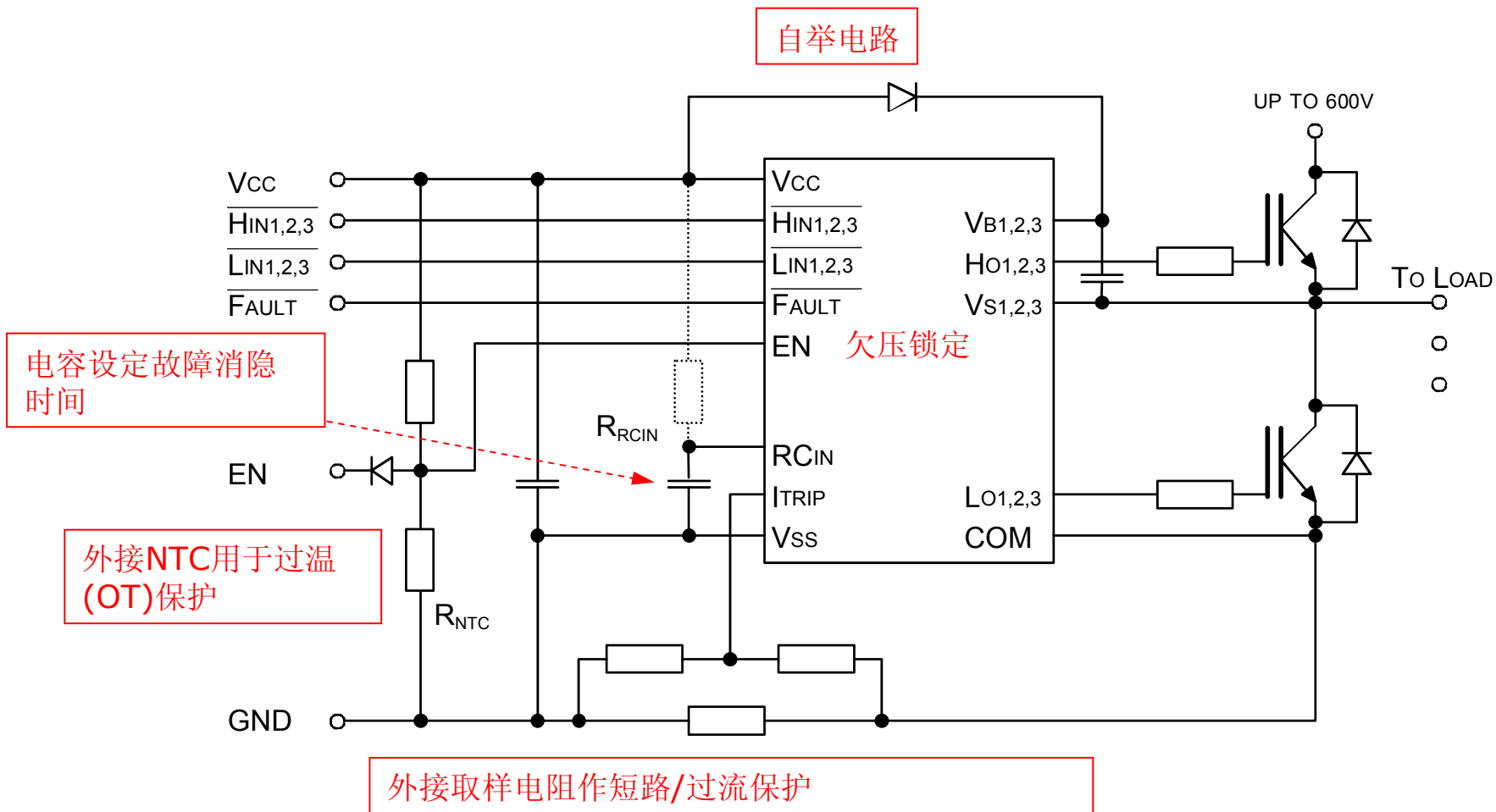
6ED003L06-F: 内部功能框架图

- 600V/0.3A
- 电平转换
- CMOS/LSTTL 输入
- 低电平输入逻辑
- EN, RCIN & ITrip
- 报警信号输出
- 互锁功能, 欠压封锁

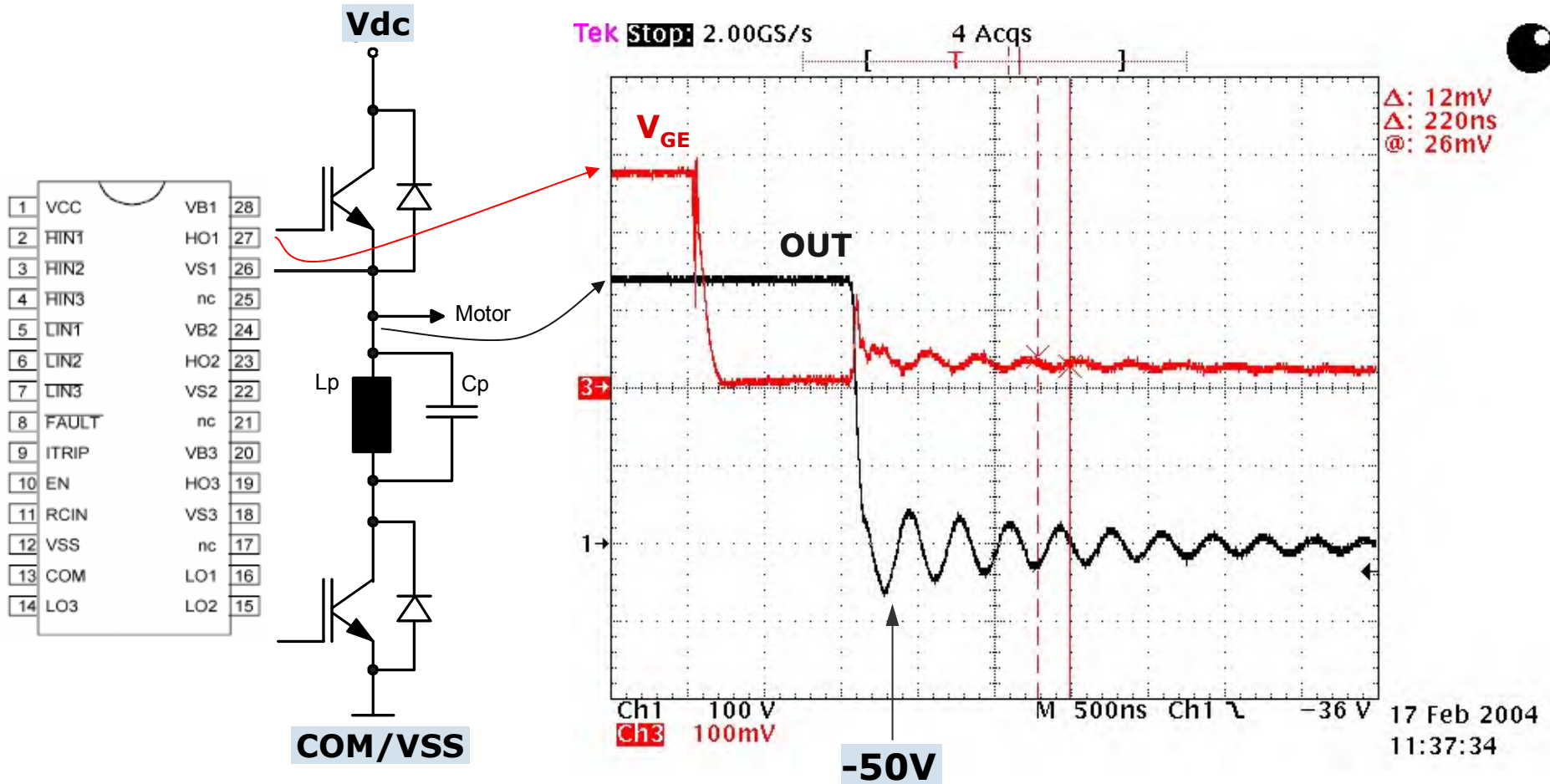
1	VCC	VB1	28
2	HIN1	HO1	27
3	HIN2	VS1	26
4	HIN3	nc	25
5	LIN1	VB2	24
6	LIN2	HO2	23
7	LIN3	VS2	22
8	FAULT	nc	21
9	ITrip	VB3	20
10	EN	HO3	19
11	RCIN	VS3	18
12	VSS	nc	17
13	COM	LO1	16
14	LO3	LO2	15



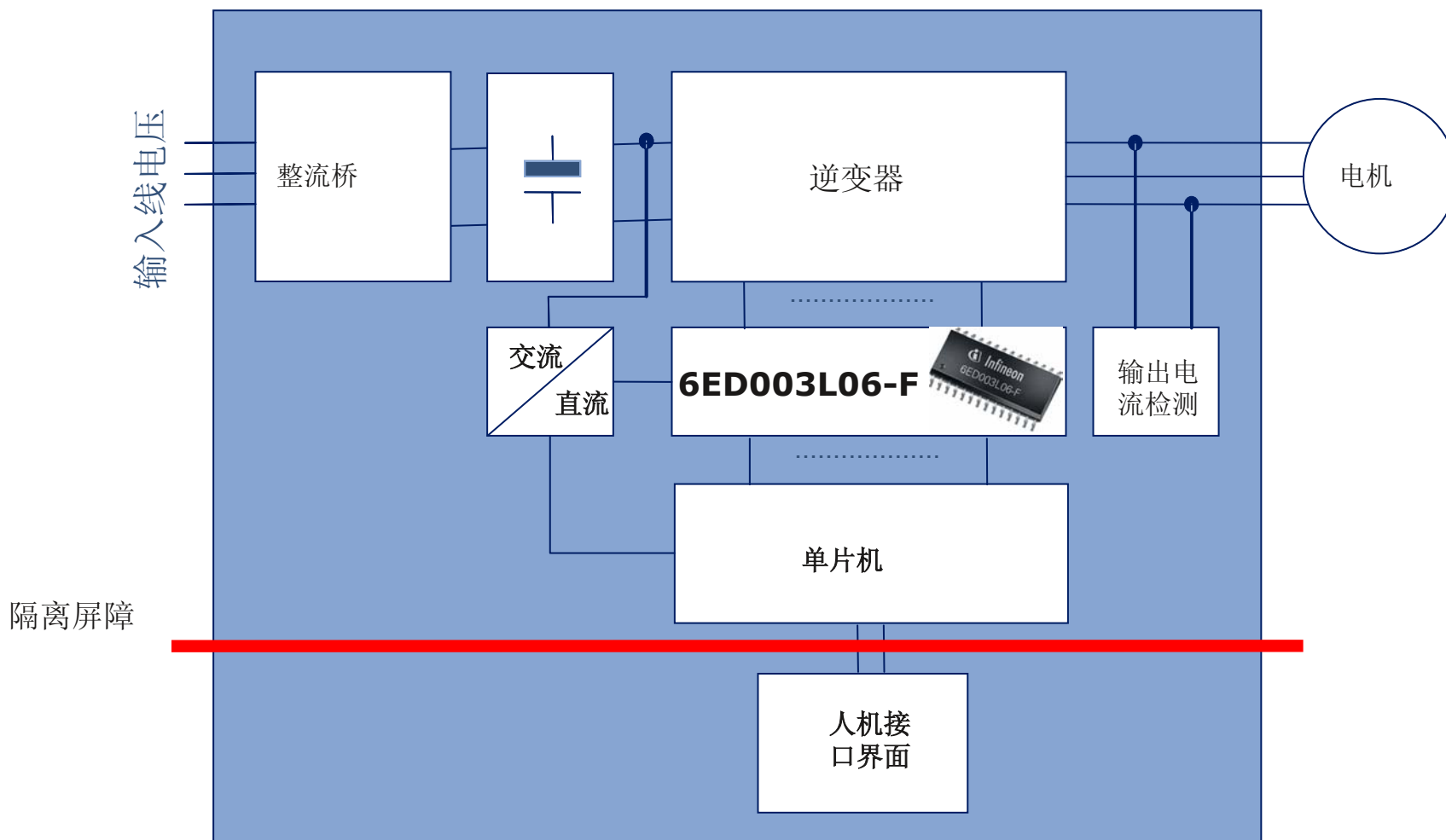
典型应用：小功率的工业和家电驱动



测试负电压承受能力（电机负载）

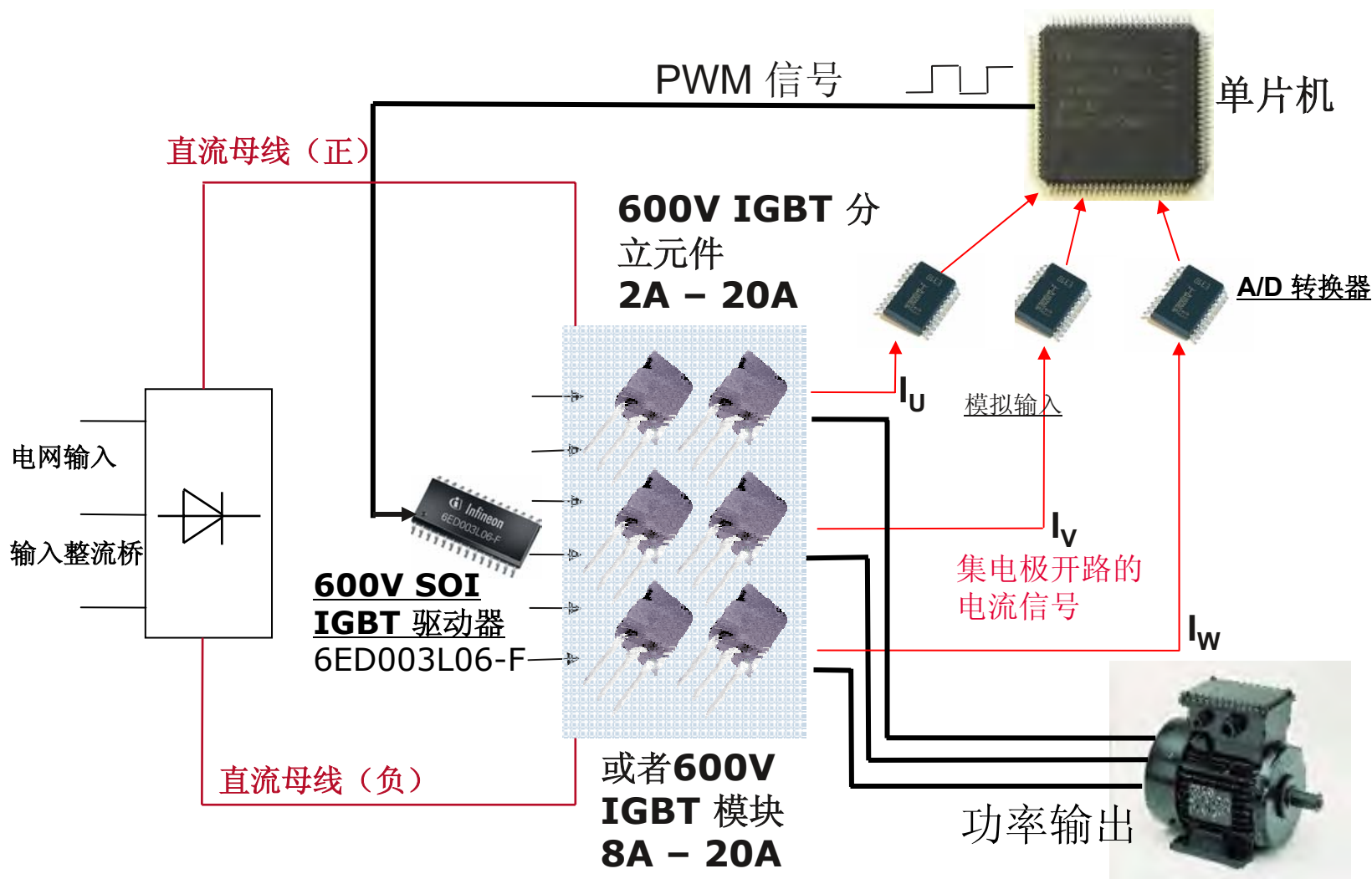


6ED003L06-F: 系统隔离要求



电平移位技术实现上下桥臂的电位隔离，但不提供输入与输出之间的电气隔离。

6ED003L06-F: 系统解决方案

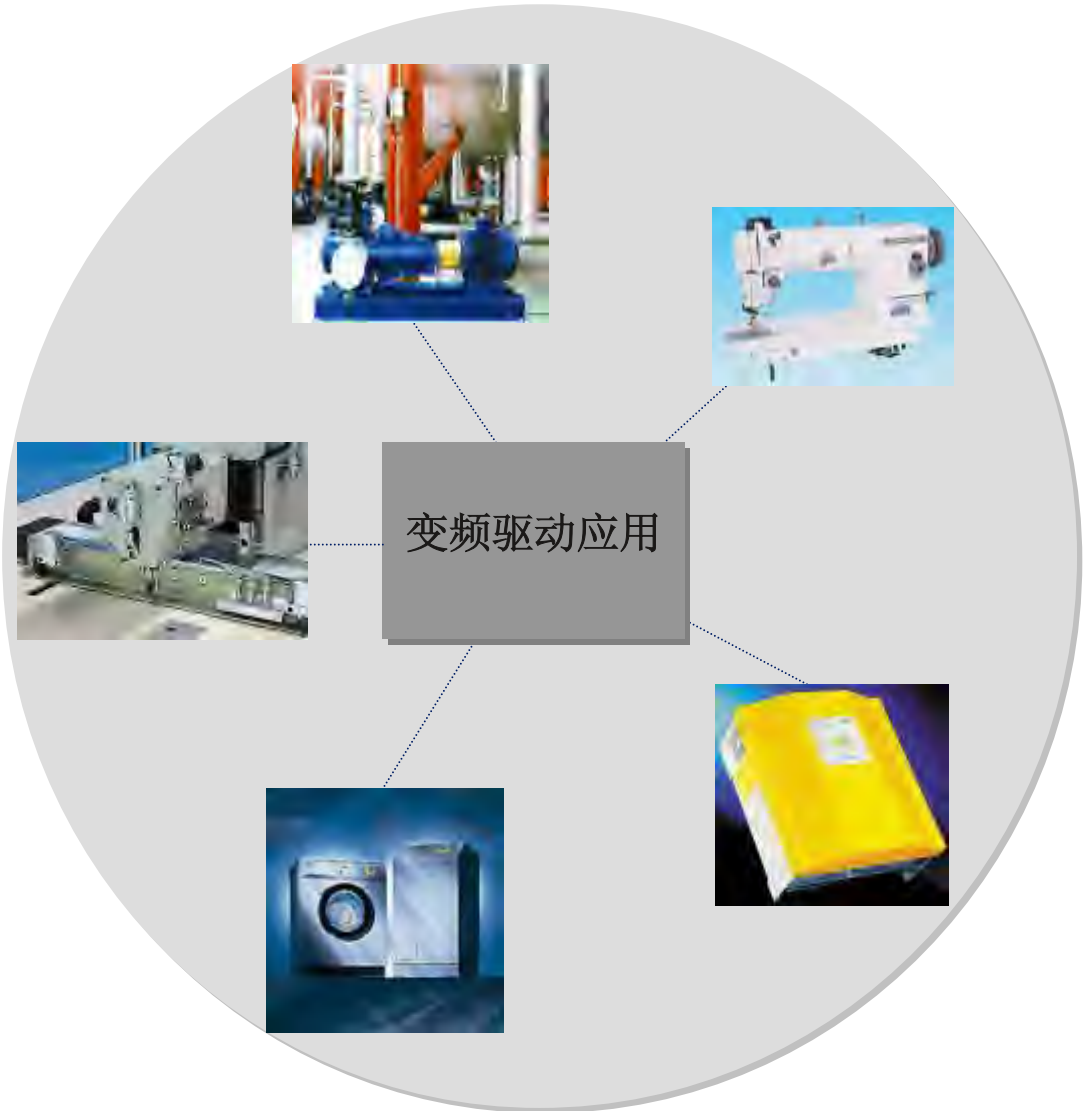


英飞凌 IGBT + 英飞凌 IGBT驱动器 + 英飞凌 单片机

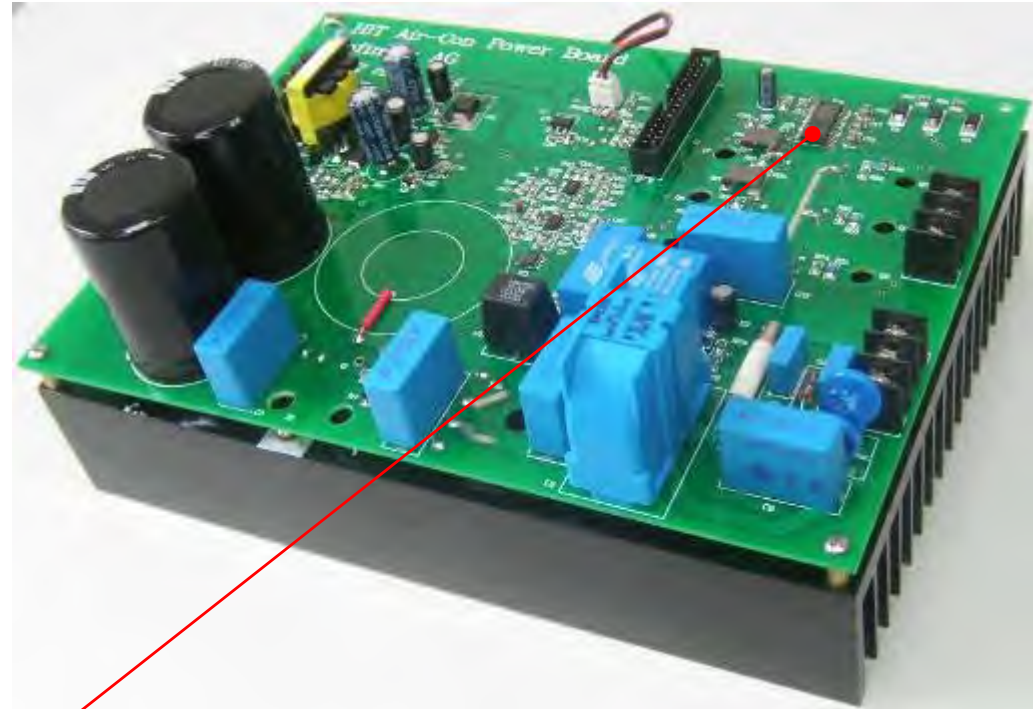
6ED003L06-F: 主要应用领域

应用领域

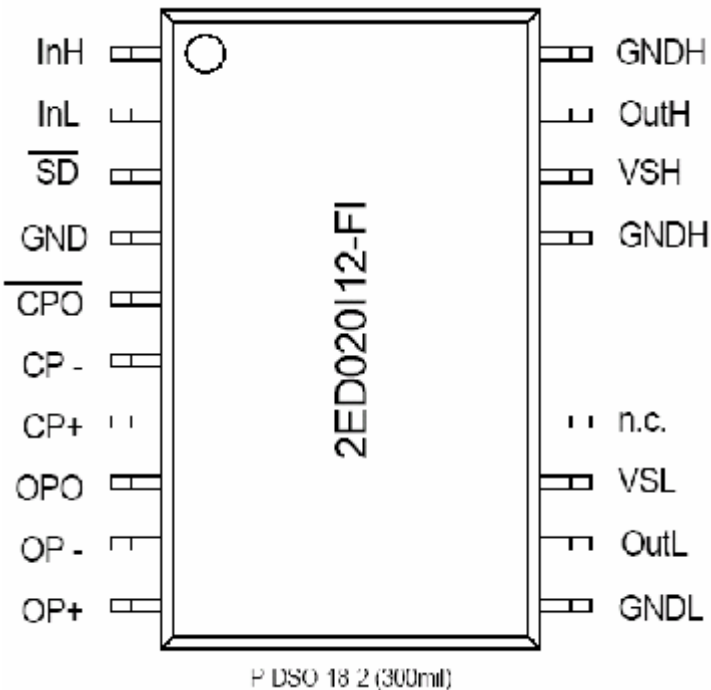
- 家电驱动: 洗衣机, 空调, 冰箱, 冷柜以及洗碗机
- 工业缝纫机
- 小功率工业驱动, 如风机
- **UPS** 以及电源应用
- 太阳能发电



6ED003L06-F: 演示评估板, 参考设计

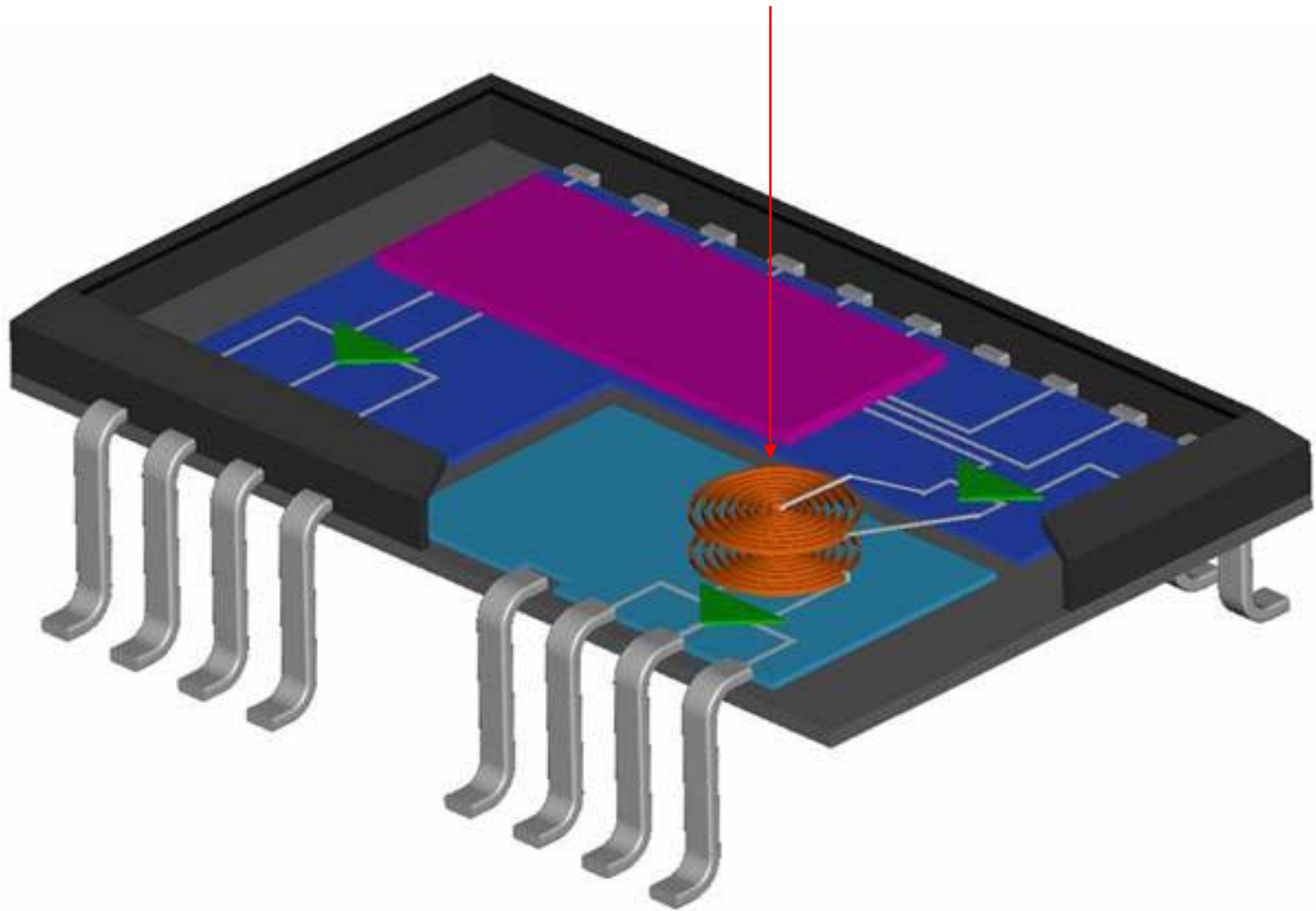


2ED020I12-FI



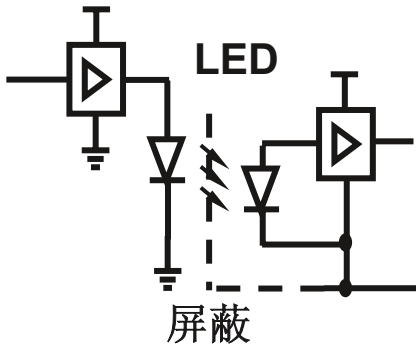
- 基于 **CLT** 技术
- 1200V, +1A/-2A 半桥驱动器
- SO-18-2 SMD 封装 (符合RoHS标准)
- VCC / VSH: 14V-18V
- 欠压锁定 (UVLO) : 典型值 11V (欠压清除电平典型值12V)
- PWM 输入: 高电平有效, 兼容3.3V/5V TTL逻辑
- 输入互锁功能
- 关断(SD)输入
- 通用运算放大器和比较器
- VGNDH: 最大可达 $\pm 1200V!$
- 传输延迟典型值85ns, 上下管传输延迟相差 $\pm 25ns$
- 符合并通过IEC61000-4-4标准等级4

CLT: 无磁芯变压器

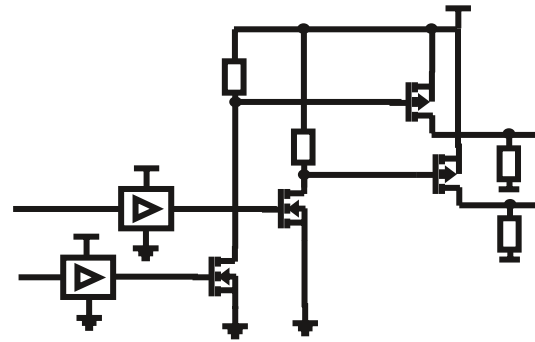


2ED020I12-FI: CLT-无磁芯变压器技术

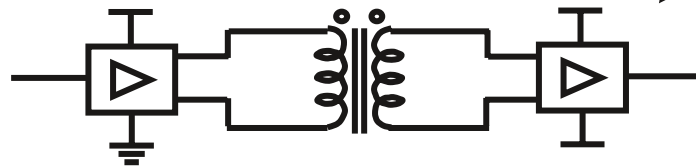
目前的驱动技术:



光偶
成本高
随着使用寿命的增加
可靠性下降

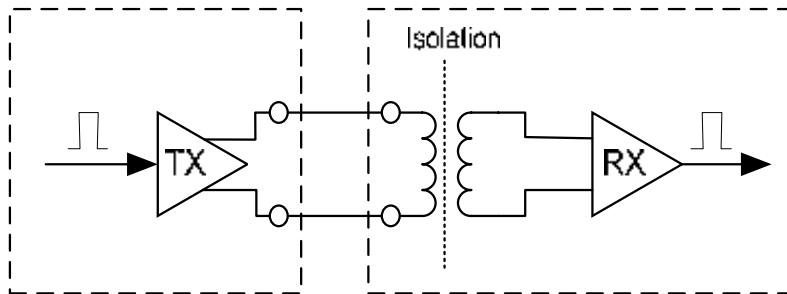
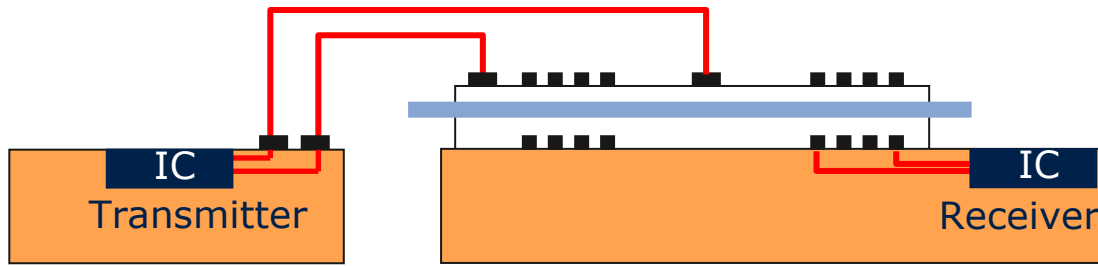


电平转换器
需要额外的器件才能达
到所需的绝缘水平



新的解决方案替代集成驱动器:
分立的磁性变压器

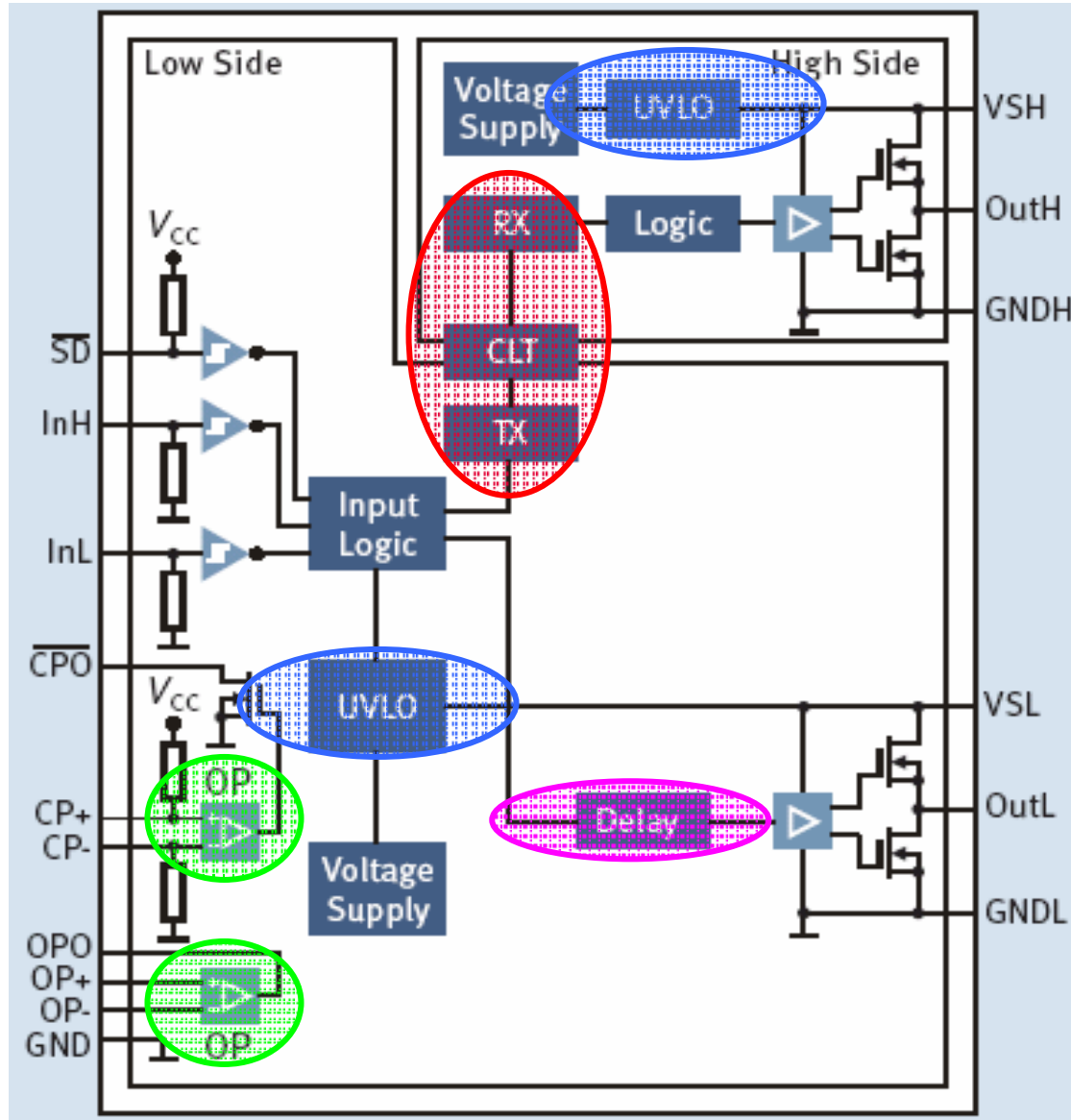
2ED020I12-FI: CLT-无磁芯变压器技术



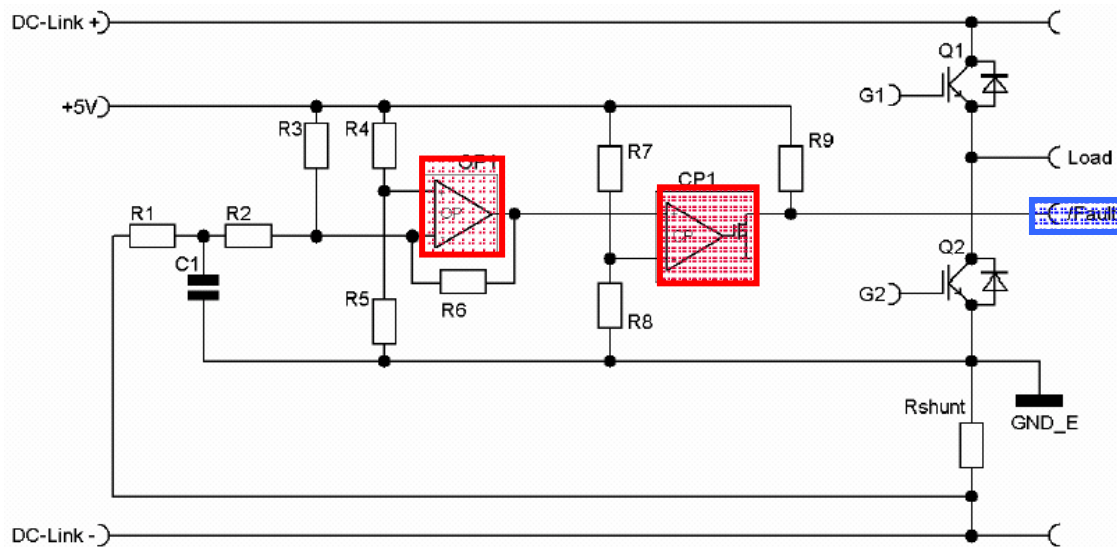
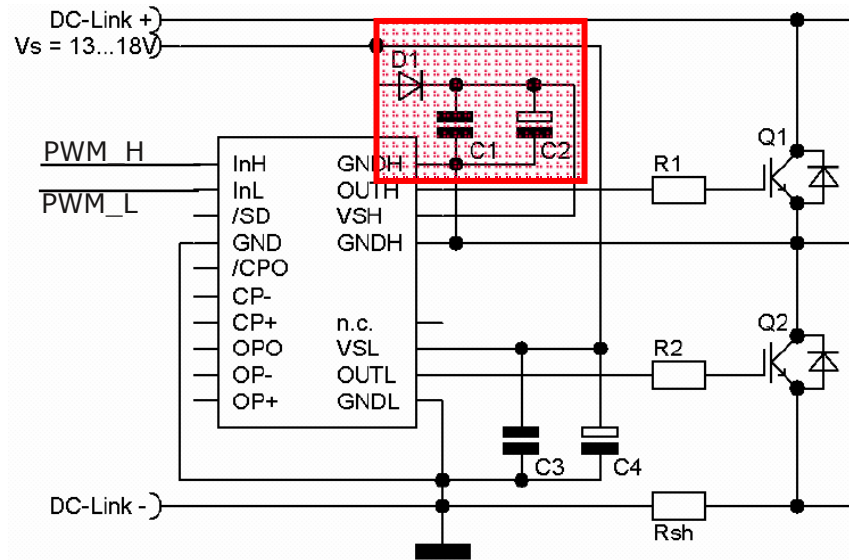
CLT 技术 优点

- 安全隔离
- 极快的信号传输速度
- 非常短的延迟匹配时间
- 性能不随寿命增加而降低
- 增加可靠性
- 长寿命
- 高温工作范围
- 低功耗

2ED020I12-FI: 内部功能框架图

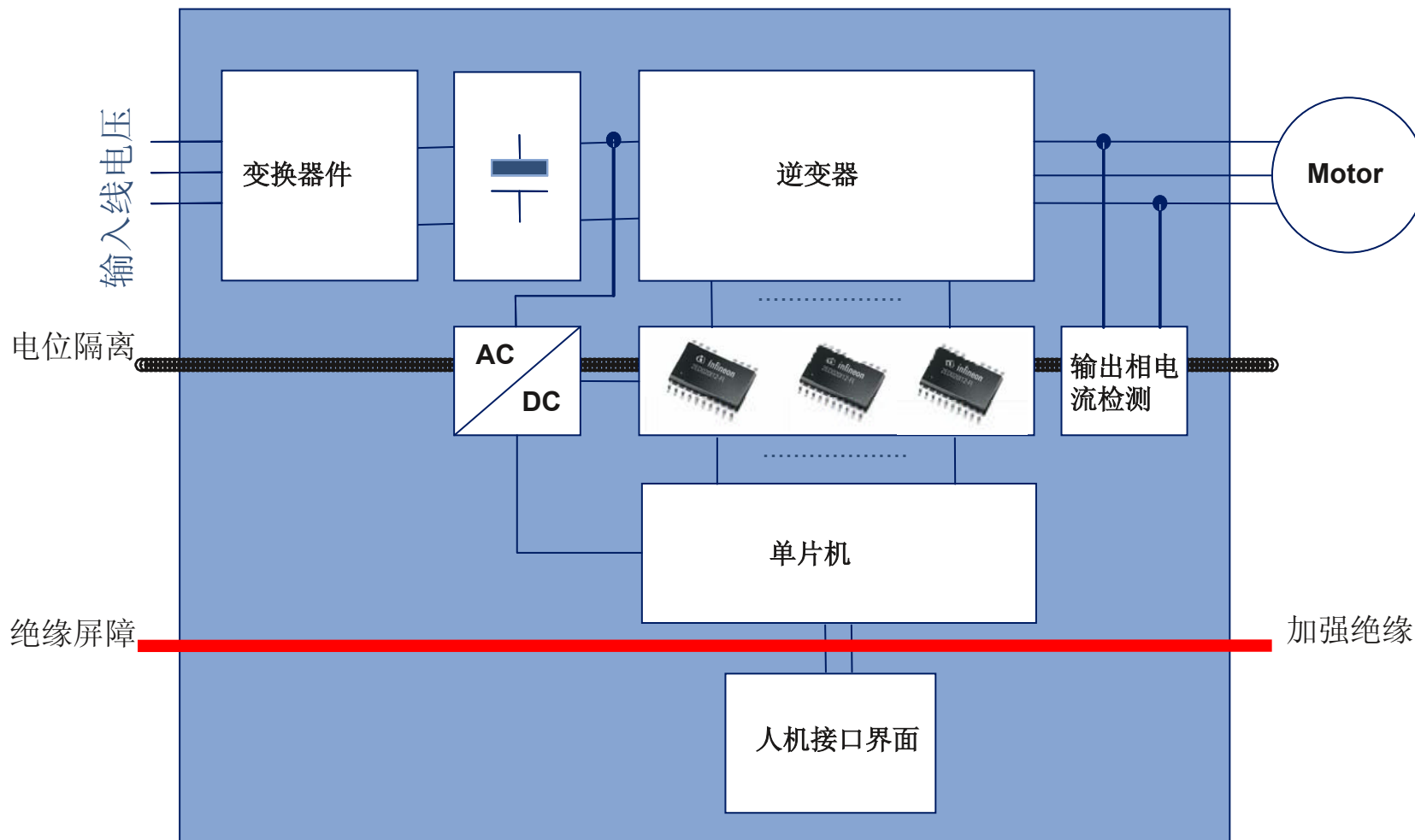


2ED020I12-FI: 典型应用



2ED020I12-FI系统隔离要求

典型变频应用 @ Pout 1KW - 10KW

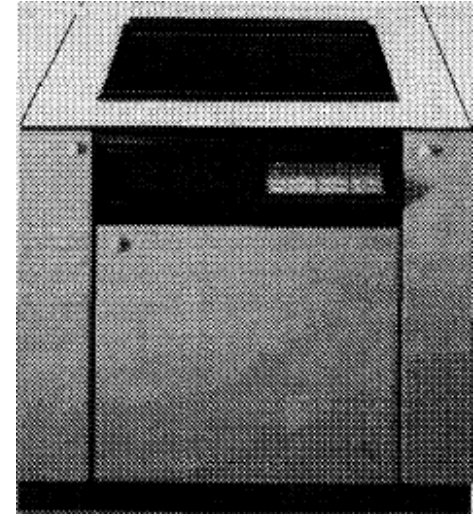


2ED用一个CLT实现上下桥臂的电位隔离，但其输入与输出之间未用CLT作电气隔离。

2ED020I12-FI: 应用领域

应用领域

- 高频开关电源
- 应急电源
- 太阳能电源
- 工业电磁炉
- 小功率工业驱动
- 医疗设备



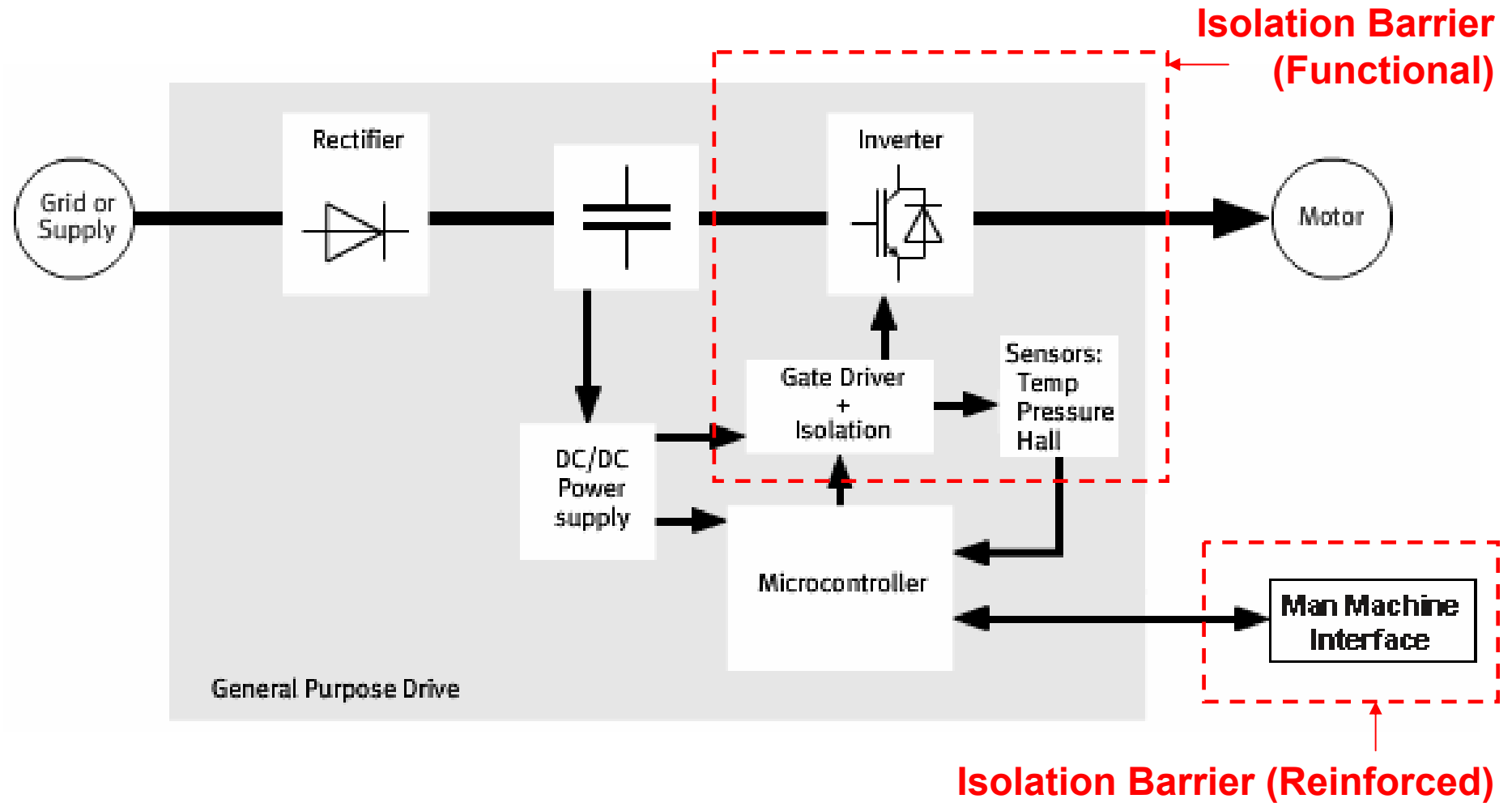
EiceDriver[™] - 1ED020I12-F

- Single Channel Gate Driver IC
- Galvanic Isolation
- Coreless Transformer Technology
- Driving IGBT/MOSFET up to 100A (1200V)



**Gate Driver IC with integrated
Galvanic Isolation!**

Typical Inverter System



1ED020I12-F provides Basic Isolation

Isoaltion Definitions



VDE 0884-10 Approved

UL1577 Pending

Functional Insulation:

Insulation between conductive parts which is necessary only for the proper functioning of the equipment.

Basic Insulation:

Insulation applied to live parts to provide basic protection against electric shock.

Supplementary Insulation:

Independent insulation applied in addition to basic insulation, in order to provide protection against shock in the event of a failure of basic insulation.

Double Insulation:

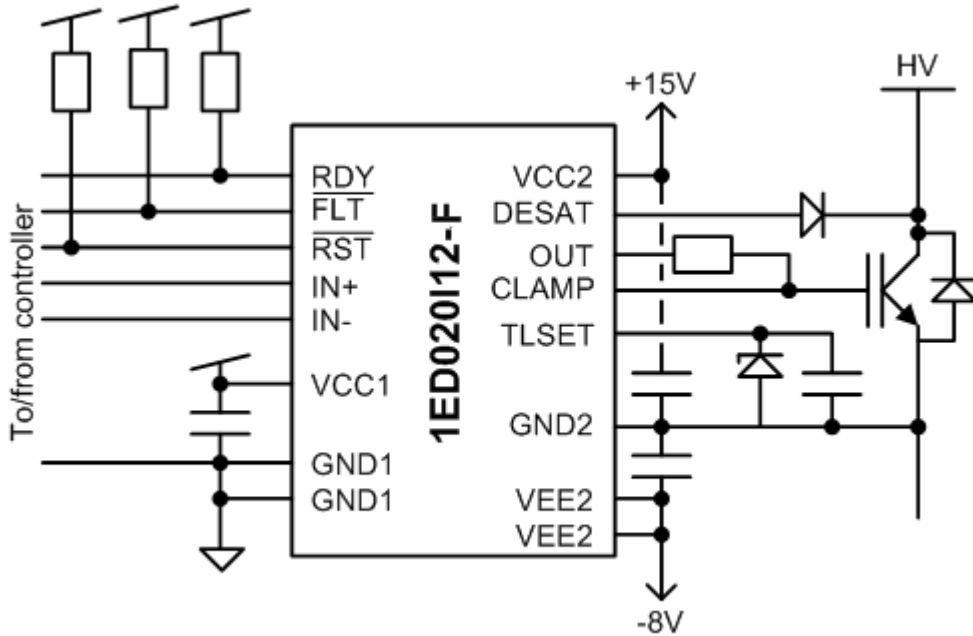
Insulation comprising both basic insulation and supplementary insulation.

Reinforced Insulation:

A single Insulation applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation

(To be Provided by **1ED020I12-S**)

1ED020I12-F Features



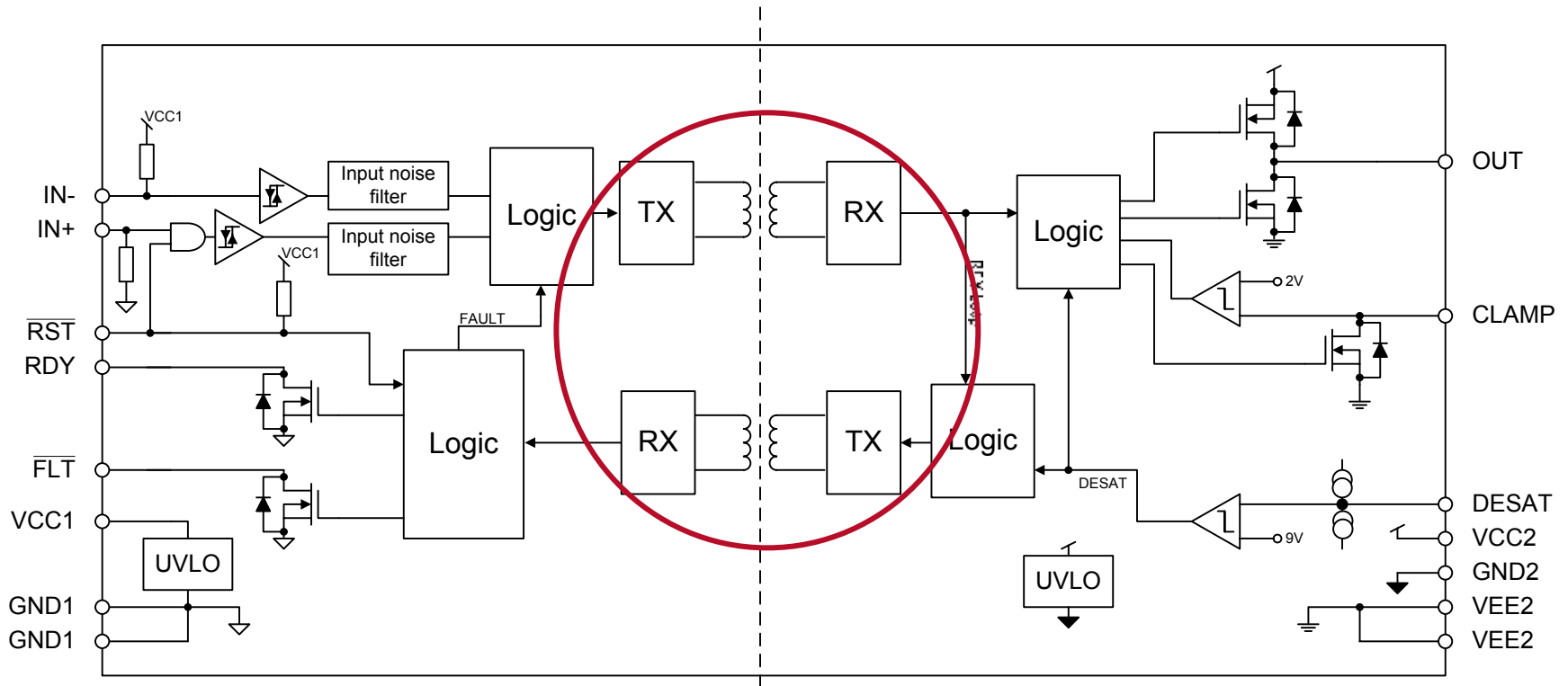
- Undervoltage lockout
- 5V CMOS compatible LV I/Os
- Fault feedback
- Inverting/non-inverting IN
- Enable/Shutdown function
- Negative drive
- Active Miller Clamp
- IGBT Desaturation detection
- Rail-to-rail +/-2A output

Very low propagation delay (typ 200ns)

- **T_j(max)**
- **SO-16 package**
- **Higher reliability**
- **Lower losses**
- **Higher Performance**
- **Higher compatibility**
- **150 °C**
- **compact**
- **no ageing**
- **low power consumption**
- **high speed, no temperature drift**
- **5V CMOS inputs**

Block Diagram

- Bi-directional signal transmission
- Fault reporting to logic ground level

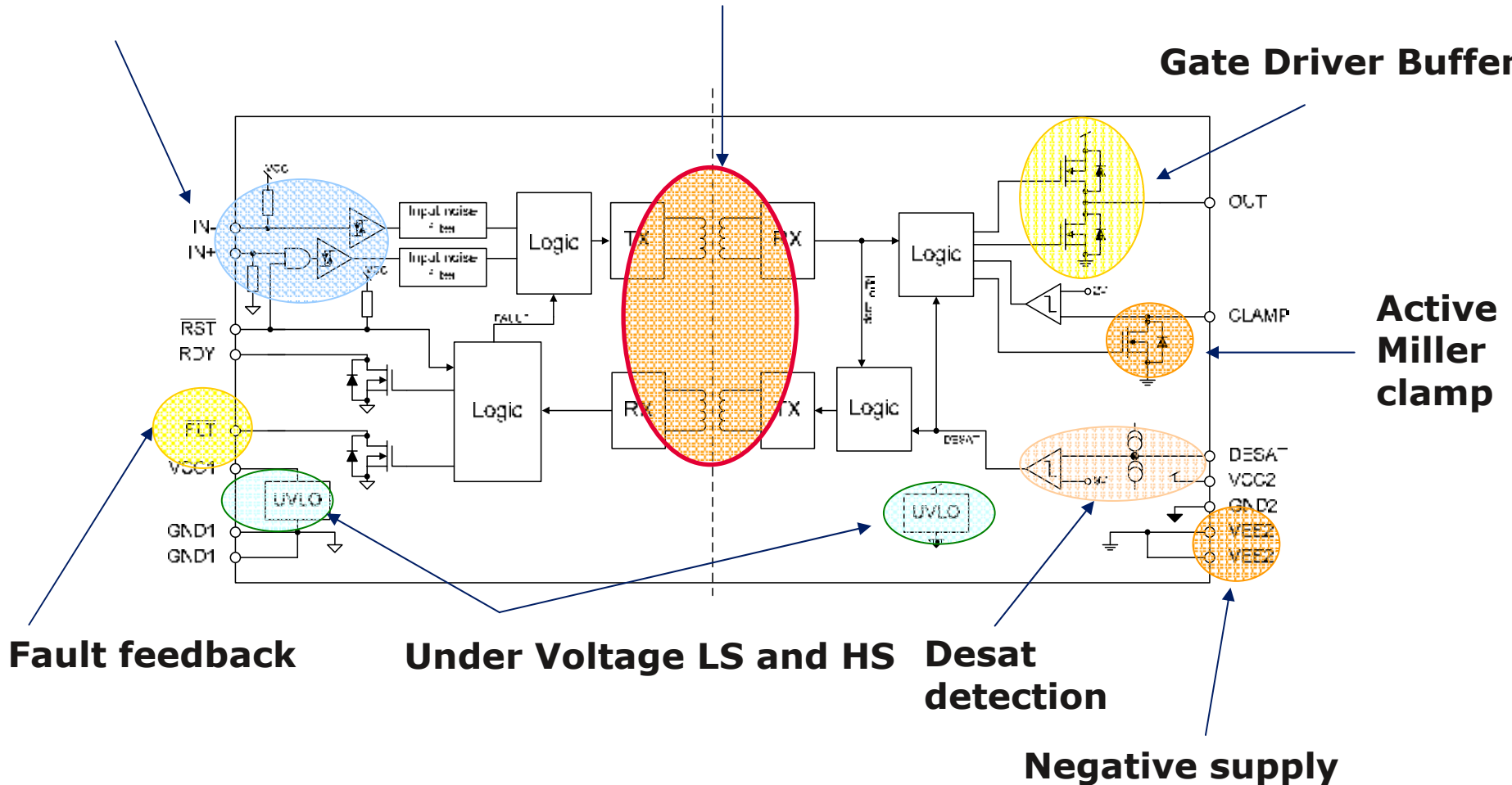


Block Diagram (detailed)

HS/LS Inputs

Coreless Transformer

Gate Driver Buffer



Active Miller clamp

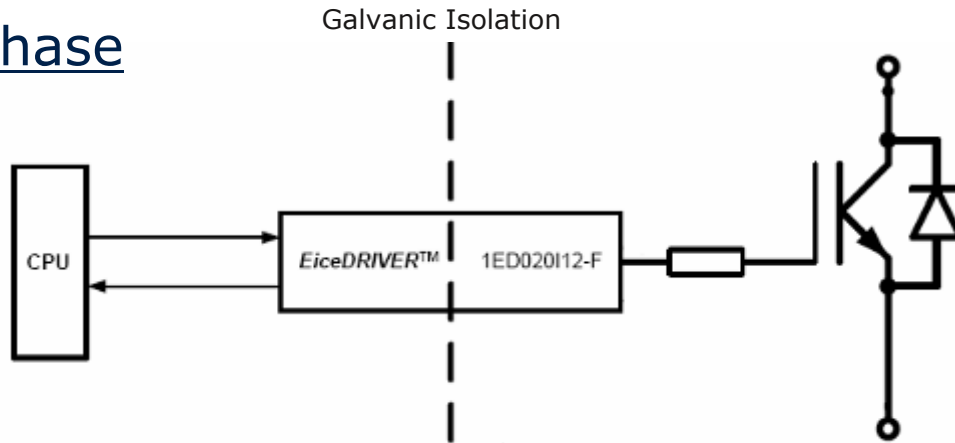
Fault feedback

Under Voltage LS and HS

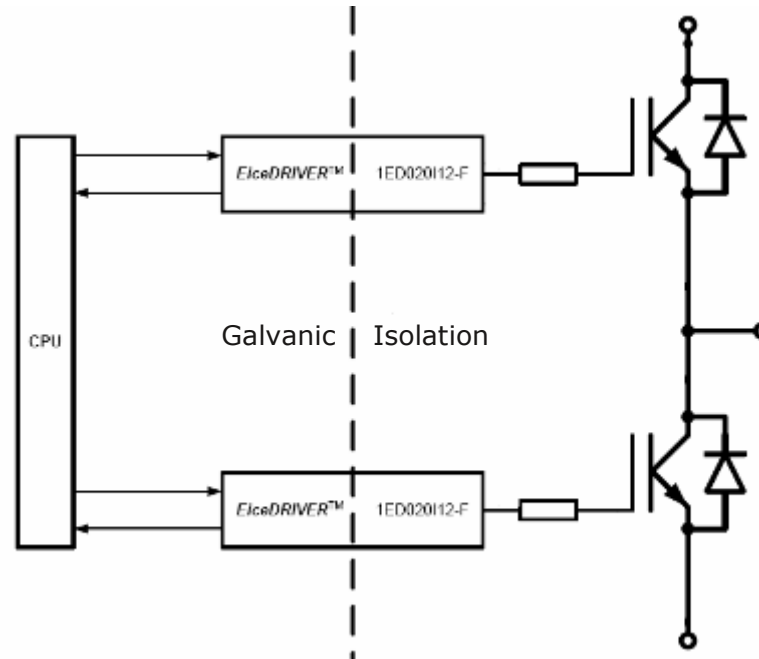
Desat detection

Negative supply

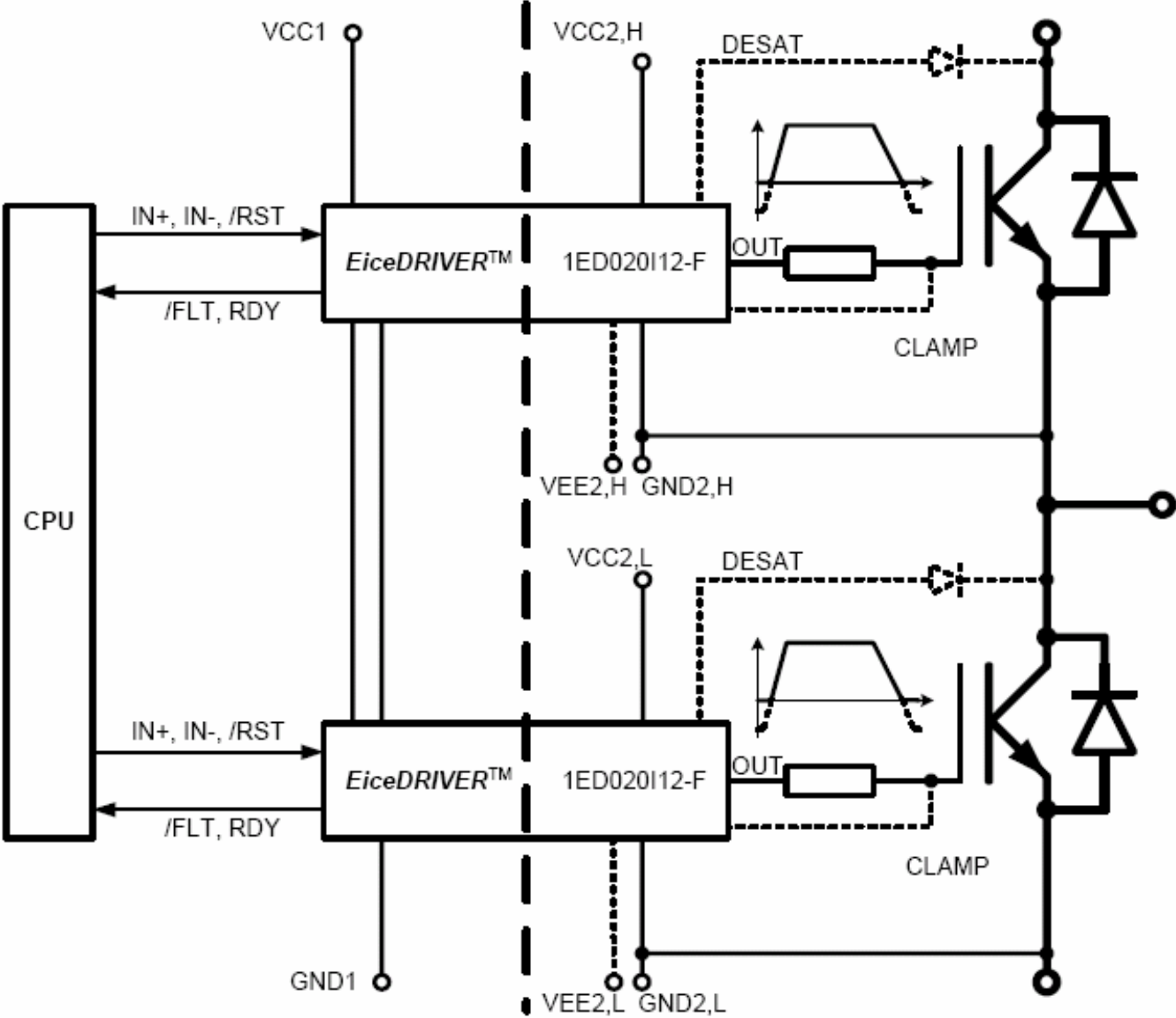
■ Single Phase



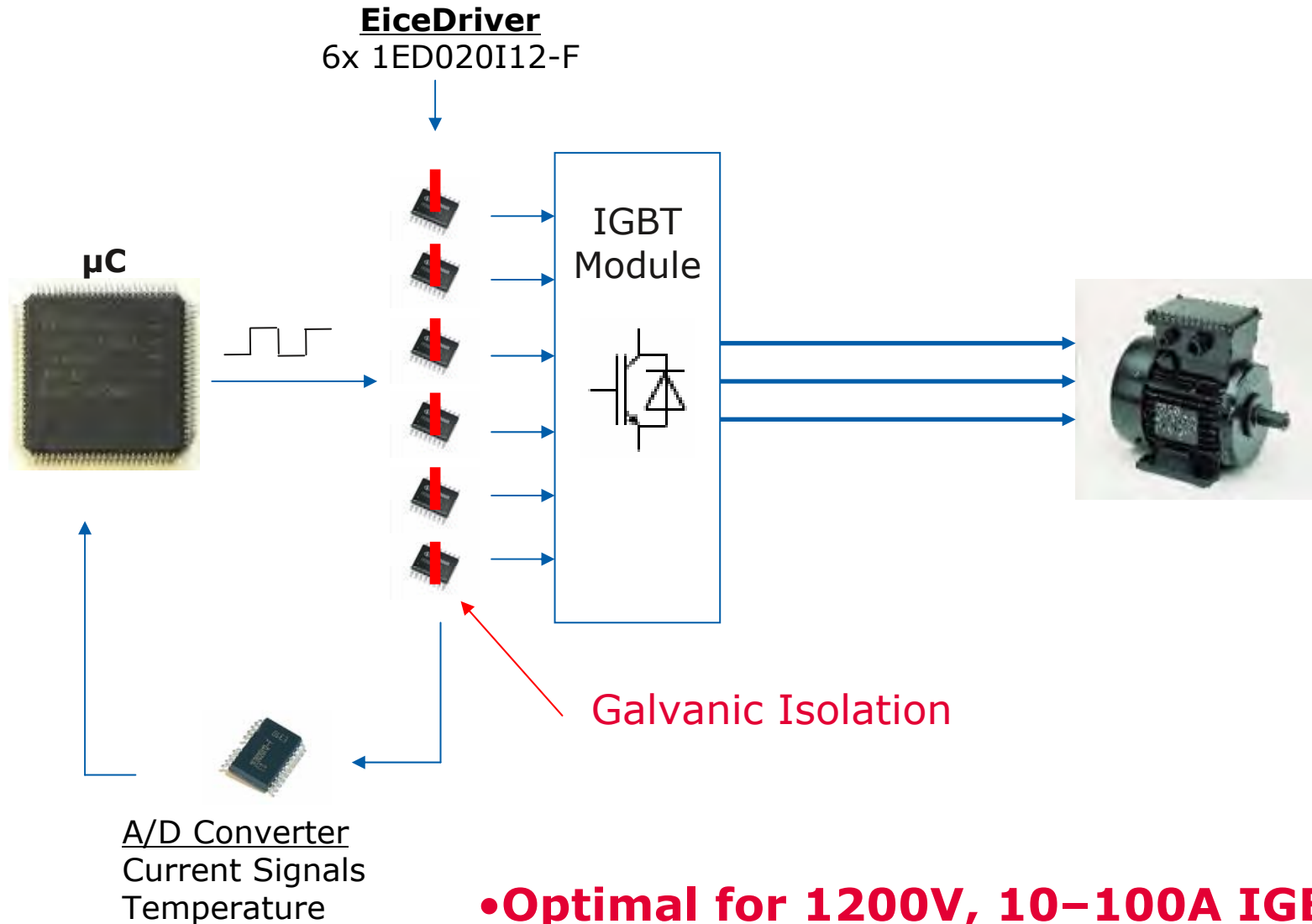
■ Dual / Half-Bridge



Application Diagram



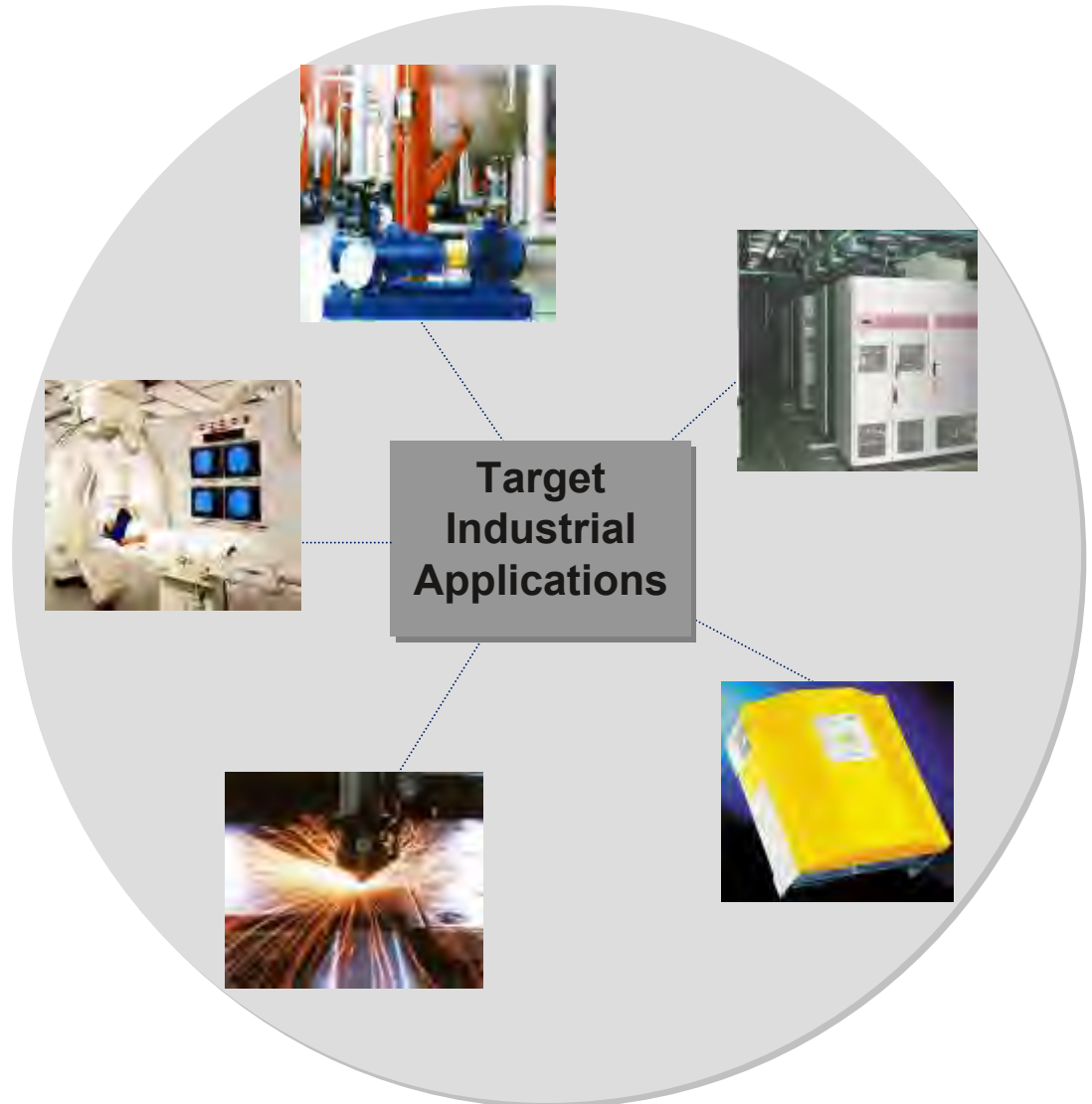
Inverter Block Diagram






•Optimal for 1200V, 10–100A IGBT's

Applications

- Medium and High power industrial drives
- UPS systems and other power supplies
- Medical technologies
- Welding equipment
- Solar inverter



Evaluation Boards

Promoted Components	Eval Board #	Description	Picture
<p>FS450R12KE3 (EconoPACK™+)</p> <p>1ED020I12-F (EiceDRIVER™)</p>	<p>6ED100E12-S</p>	<ul style="list-style-type: none"> ■ Plug & Play ■ SMPS included ■ Driver Stage ■ Independent channels ■ Suitable for 600V & 1200V 	
<p>FF450R12ME3 (EconoDual™3)</p> <p>1ED020I12-F (EiceDRIVER™)</p>	<p>2ED100E12-S</p>	<ul style="list-style-type: none"> ■ Plug & Play ■ SMPS included ■ Driver Stage ■ Independent channels ■ Suitable for 600V & 1200V 	
<p>FF450R12ME3 (EconoDual™3)</p> <p>1ED020I12F (EiceDRIVER™)</p>	<p>2ED250E12-S</p>	<ul style="list-style-type: none"> ■ Evaluation Driver Board for 1200V PrimePACK™ modules 	

Company	Part Number
Avago (formerly Agilent)	HP316J, HP3120
International Rectifier	IR2106, IR2136, IR2112, IR2113, IR2213
ST Micro	TD350, L6384 – 6388
Toshiba	TLP Series
Sharp	PC929

Competitive Analysis



	1ED020I12-F	TD350	HCPL-316J	PC929
Manufacturer	Infineon	STM	Avago	Sharp
Package	SO-16 wide	SO-16 wide	SO-16 wide	14-Pin SMD GW
Tj(max)	150° C	150° C	125° C	125° C
Vsupply (max)	28V	28V	35V	35V
VCC(start)	12.6V	11V	12.3V	---
Io+/-	2A / 2A	1.5A / 2.3A	2A / 2A	0.4A / 0.4A
UVLO	10.4V	10V	11.1V	---
Min PW IN, typ.	40ns	540ns min.	100ns	500ns
Prop Delay LH / HL	200ns	---	---	300ns / 300ns
High Level output (VOH)	VCC-0.3V	VH-2.5V	VCC-2.0V	VCC-2.0V
Low Level output (VOL)	VEE+0.03V	VL+0.35V	0.17V	1.2V
DESAT Protection	YES	YES	YES	YES
DESAT Vref	9V	7.2V	7V	VCC-6V
Charging Current (min/max)	225 / 275µA	250µA typ.	130 / 330 µA	---
Total Charging Current	+/-10%	---	25 / -52%	---
Rail-to-Rail Output	YES	NO	NO	NO
Active Miller Clamp	YES	YES	NO	NO
Clamping Current	2A	0.5A	---	---
Active Shutdown	YES	NO	NO	NO
Input Signal Compatibility	5V CMOS	TTL	TTL	TTL



We commit.
We innovate.
We partner.
We create value.



Never stop thinking