

Optimizing Micro Inverter Systems Using Logic and Translation



Functional Block Diagram

Figure 1 shows a simplified micro inverter block diagram to illustrate the logic and translation use cases. Each red block has an associated use-case document. Links are provided in Table 1 and Table 2. For a more complete block diagram, see the [interactive online end equipment reference diagram for micro inverters](#).

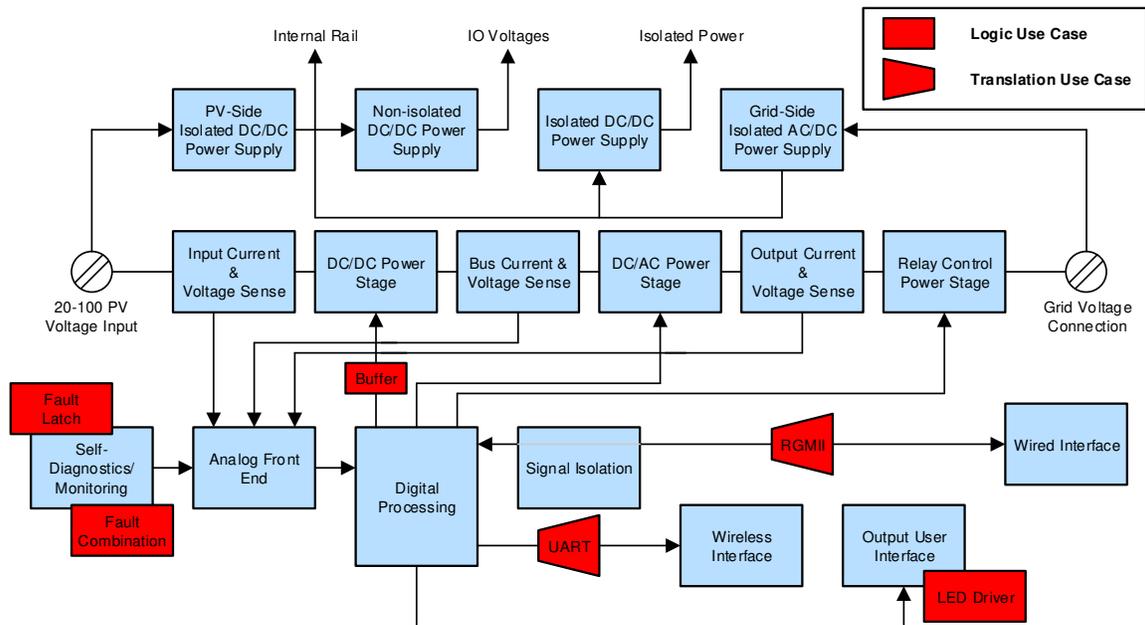


Figure 1. Simplified Block Diagram for Micro Inverters

Logic and Translation Use Cases

Each use case links to a separate document that provides additional details including a block diagram, design tips, and part recommendations. The nearest block and use-case identifiers are listed to match up exactly to the use cases shown in the provided [simplified block diagram](#).

Table 1. Logic Use Cases

Nearest Block	Use-Case Identifier	Use Case
Self-Diagnostics/Monitoring	Fault Latch	Catch a Digital Pulse
	Fault Combination	Use Fewer Inputs to Monitor Error Signals
Digital Processing	Buffer	Redrive Digital Signals
Output User Interface	LED Driver	Drive Indicator LEDs

Table 2. Translation Use Cases

Nearest Block	Use-Case Identifier	Use Case
Wireless Interface	UART	Voltage Translation for Wireless Interface Modules
Wired Interface	RGMI	Translate Voltages for RGMI

Voltage Translation for Wireless Interface Modules

It is common to see micro inverters utilizing wireless interface modules to communicate due to their distributed nature. These modules often use UART for internal communication, and commonly are operating at a different logic voltage level from the primary system controller. The addition of a voltage level translator protects low-power system controllers and ensures accurate communication to the peripheral module.

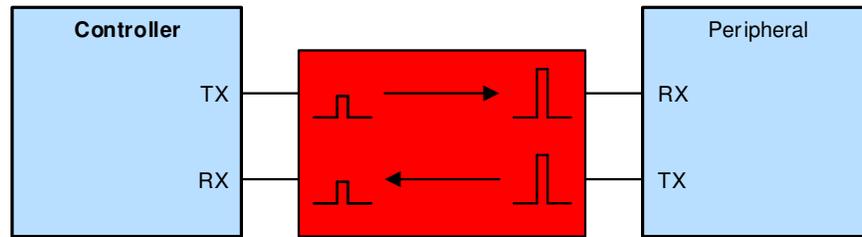


Figure 2. Example Two-Wire UART Voltage Translation Block Diagram

See more about this use case in the *Logic Minute* video [Voltage Level Translation for UART Interface](#)

- Some devices support up to 5 Mbps UART communication; most are limited to 115 kbps or less
- Translators enable communication when devices have mismatched logic voltage levels
- Prevent damage to devices that cannot support higher voltage inputs
- Improve data rates over discrete translation solutions
- Protect controller while peripheral is not connected
- [\[FAQ\] How does a slow or floating input affect a CMOS device?](#)
- Need additional assistance? Ask our engineers a question on the [TI E2E™ Logic Support Forum](#)

Table 3. Recommended Parts

Part Number	Automotive Qualified	Voltage Translation Range	Features
SN74AXC2T245-Q1	✓	0.65 V to 3.6 V	Glitch-free power supply sequencing Outputs are disabled when either supply is 0 V Active translation architecture
SN74AXC2T245			
TXB0102		1.2 V to 3.6 V to 1.65 V to 5.5 V	Auto-bidirectional Active translation architecture
TXS0102-Q1	✓	1.2 V to 3.6 V to 1.65 V to 5.5 V	Auto-bidirectional Internal pull-up resistors Passive translation architecture

For more devices, browse through the [online parametric tool](#) where you can sort by desired voltage, channel numbers, and other features.

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