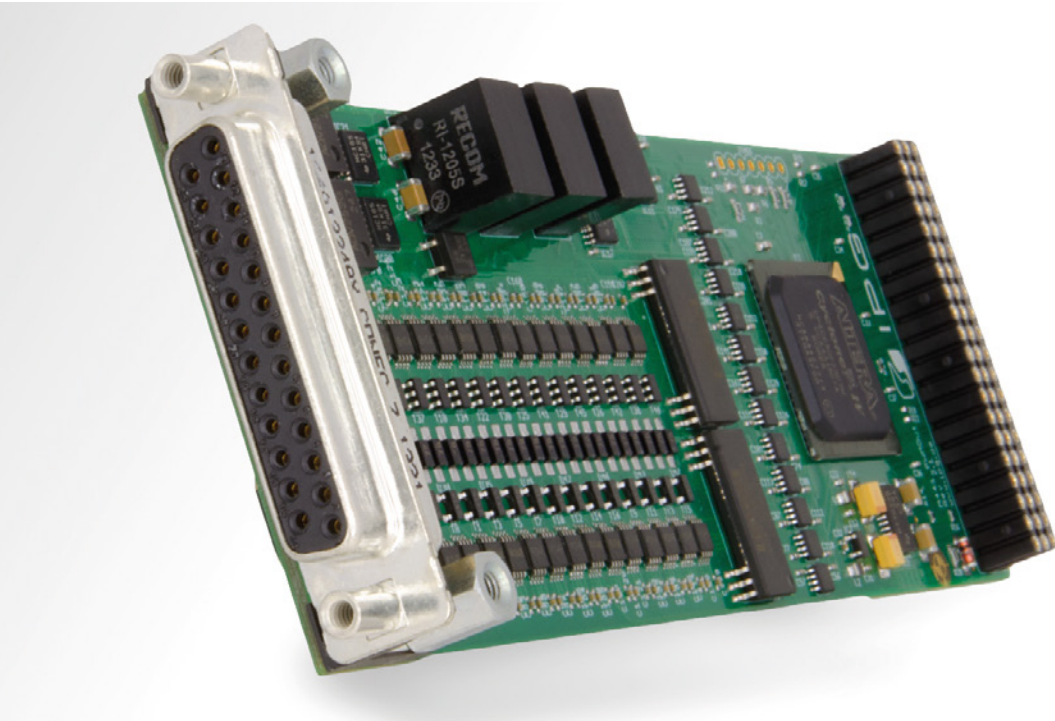# M441 – Universal Digital Output (PWM / Square Wave / Multipulse)
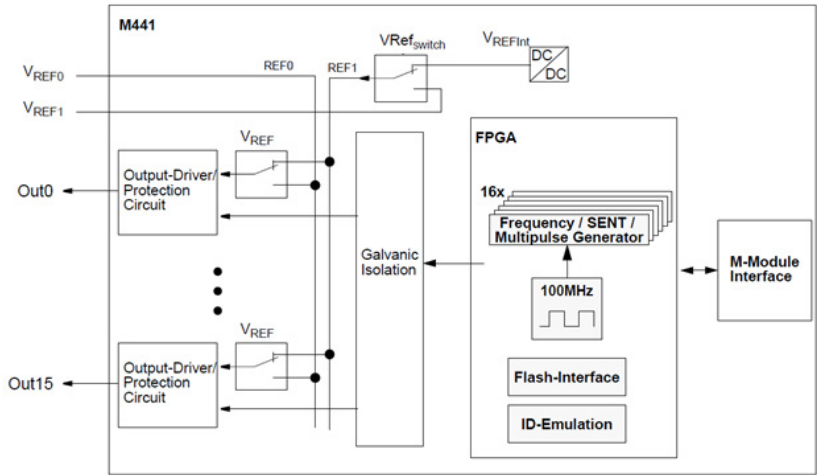

Block Diagram

Features

- 16 Output channels, each separately configurable:
  - Square wave or PWM generator
  - Binary output
  - SENT signal generator (SAE J2716, channel 0..7 only)
  - Multi pulse signal generator for up to 63 pulses
- 2 external or 1 internal voltage references configurable per channel
- Voltage range of the external references: 3.3 .. 60V
- Up to 180mA per channel
- Galvanic isolation against system supply
- Output stage can be configured as:
  - Push-pull-driver
  - Open emitter
  - Open collector
  - High-impedance output
- Continuous frequency range from 0 .. 1MHz
- Overload and short circuit protected
- In the field hardware upgrade by updating the FPGA

Use Cases

- Emulating active sensors with PWM outputs in automotive or process automation applications
- Generating binary coded outputs to emulate µC compatible sensor signals
- Emulating SENT based sensor messages

Technical Data

Output channels	16 output channels
Reference voltages	• 2 External reference inputs • 1 Internal reference
Reference voltage range	• External: 3.3V .. 60V • Internal: 5V
Low level output voltage	GND + 0.3V at 180mA
High level output voltage	VRef - 0.3V at 180mA
Maximum output current with external reference	• 180mA per channel • Overcurrent protected
Maximum output current with internal reference	• Up to 180mA per channel • 400mA for all channels together
Frequency range	0 .. 1MHz
Frequency resolution	• < 390kHz: 0,00024Hz • >= 390kHz: 0,01552Hz
Pulse width resolution	• Pulse-duty factor mode: better than 2×10^{-10} • Fixed pulse width mode: 1 digit=10ns
Jitter	10ns
Address space	• A08D16 or A24D32 • SENT is only available in the A24D32 address space
Connectors	25 pin SUBD receptacle connector , female

Order Information

Order Number	IO-M441

Alternatives

M27/M28/M66	For basic binary outputs
M409	For digital and analog GPIO