Requirements from user

* 16 ports
* Isolated port
* Differential frequency out (0 to 10 kHz)
* Analog voltage out (0 to 10 V)
* Serial Communication (RS422)
* Current out (4 to 20 mA)
* Software programmable
* Identical port PCB for modular approach
* Differential frequency read (0 to 10 kHz) (future scope)
* Analog Voltage read (0 to 10 V) (future scope)
* Current read (4 to 20 mA) (future scope)

Requirement from developer

* Microcontroller
* Single to differential frequency IC
* External DAC with range upto 10 V
* RS232 to RS422 transreceiver IC
* Isolation ICs for digital and analog domains
* Every IC on the port PCB must have an Enable Pin

Component selection/literature review – one para for every component and why

1. SMCJ24A - TVS Diode with reverse breakdown voltage as 24V and peak pulse current of 38.6A
2. LSM115JE3\_TR13 - ­­­­­­­Schottky Diode with fwd voltage drop as 0.29V at 1A
3. BZX84C3V3 - Zener Diode with reverse breakdown voltage of 3.3V
4. V15P45S-M3\_86A - Schottky Diode with fwd voltage drop as 0.31V at 5A
5. 47346-0001 - USB Connector type micro B
6. 103308-5 - Jtag Connector
7. TEN\_60-1222N - +12V to ±12V Isolated supply
8. 2N7002 - NMOS
9. PMOS - PMOS
10. TDD01H0SB1R - Single Pole Dual Throw Switch
11. LL3301NF065QG - Push Button Switch
12. NE555PW - 555 Timer IC
13. ADM2587EBRWZ - RS422 Transceivers IC
14. ADUM1401CRWZ - Digital Isolator IC
15. AQY282GSX - Solid State Relay IC
16. ISO124U - Isolation Amplifier IC
17. VOM618A-1T - Opto Isolator IC
18. LM2940IMP-10\_NOPB - 12V to 10V Precision LDO
19. LTC2688HUJ-16-TRPBF - DAC IC
20. LMZ31707RVQR - 12V , 5V to 3.3V SMPS
21. NUP4202W1T2G - ESD Protection IC
22. MMBT5087LT3G - PNP Transistor
23. XTR111AIDRCR - Precision Voltage to current converter
24. SN74LVC32AD - OR Gate
25. SN74LVC06AD\_1 - Inverter IC
26. SN74HCS237PWR - 3 to 8 decoder
27. ABL-25.000MHz-B1UB - 25MHz Clock Signal
28. AB26TRQ-32.768KHZ-T - 32.768kHz Clock Signal

Microcontroller selection – take ss from datasheet or ref manual

Description of schematic – take ss from schematic