Introduction _____

Microsemi introduces a LED stream feature designed to support power port status LEDs for Microsemi products based on PD69100 MCU, operating in the Enhanced mode. The LED stream is a serial bit stream interface between PoE Controller and application's Host side (see Figure 1). The interface on the Host side comprises shift registers, extracting the ports LEDs status out of the stream. This feature supports up to 48 ports applications.
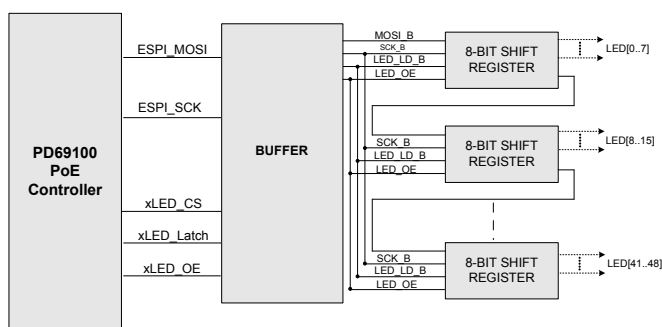

Figure 1: Led Interface Application

General Description_____

The LED Stream feature is software configurable. The software comprises three LED's parameters:

1. **LED Stream Type**: selects one of the three serial Stream Types:
   - "**0**" **– enable stream** – port indication is disabled.
   - "**1**" **– Unicolor LED Stream** – port indication is transmitted via a single per port LED.
   - "**2**" **– Bicolor LED Stream** – port indication is transmitted for two per port LEDs – this type is more suitable for 4-pair systems.
2. **Send via SPI LSB First**: selects the desired order of the serial data stream as follow:
   - 0 – MSB bit is sent first
   - 1 – LSB bit is sent first
3. **High/Low Level LED Activation**: selects whether port indication is lit by high level or low level as follow.
   - 0 – High level in the bit stream turns the LED on.

- 1 – Low level in the bit stream turns the LED on.

The following command modifies LED stream Type:

Set Individual Mask

1	2	3	4	5	6	7	8
KEY	ECHO	DATA	DATA	DATA	DATA	DATA	DATA
Command (0x00)	##	Global (0x07)	Individual_ Mask (0x56)	Mask Key# (0x16)	Data	N	N

9	10	11	12	13	14	15	
DATA	DATA	DATA	DATA	DATA	CSum H	CSum L	
N	N	N	N	N	##	##	

Mask Key# determines the variable to be modified:

- 0x16 = LED Stream Type
- 0x18 = Send via SPI LSB first
- 0x19 = High/Low Level LED Activation

When configuring LED Stream type (0x16), the 'DATA' bits determine the Stream type as follow:

- DATA = "0"– Led streaming is disabled.
- DATA = "1" – Unicolor LED Stream
- DATA = "2" – Bicolor LED Stream

For detailed command description, refer to

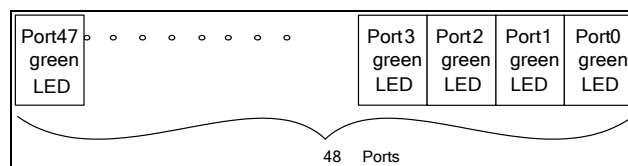Communication Protocol.

LED Stream Operational Modes

The serial bit of the LED Stream interface has two operation modes configured via the LED Stream type parameter.

The modes are as follows:

Uni-Colored Indication Mode

Port status is indicated by a single green per port LED.
The LED stream communication data structure is as follow:

The stream data contains 48 bits – a single per port bit. Port#47 data is transmitted first and port #0 data is transmitted last.
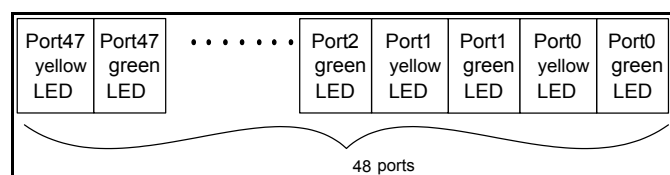
LEDs indication, corresponding to the channel status, is described in the table below:

PORT Uni-Colored LED	Channel Status
LED Off	1. Main Power Supply is out of range. 2. No-Load is present on the port output lines. **Port power is not activated**
Green LED Blinking at 1Hz rate	Overload or short circuit is detected on port output lines. **Port power is not activated**
Green LED On	Valid PoE load is detected on port output lines. **Port power is activated**
Green LED Blinking at 0.5Hz rate	Power management mode: A valid POE load is connected to port output lines, but PSE has no sufficient power for supplying the required load power **Port power is not activated**

Bi Colored Indication Mode:

Port status is indicated by Bi-colored (green and Yellow) LEDs per port.
The LED stream serial data structure is as follows:

Port47 yellow LED	Port47 green LED	· · · · · · ·	Port2 green LED	Port1 yellow LED	Port1 green LED	Port0 yellow LED	Port0 green LED

48 ports

The serial LED stream supports 48 ports. The ports LEDs state is sent sequentially to all ports, two bits per port, giving a total of 96 bits. Port #47 data is transmitted first and port #0 data is transmitted last.

LEDs indication, corresponding to the channel status, is described in the table below:

PORT Bi-Colored LED	Channel Status
LEDs Off	1. Main Power Supply is out of range. 2. No-Load is present on the port output lines. **Port power is not activated**
Yellow LED On	Voltage supplied over one of the 2-pairs (data or spare) **Port power is activated**
Green LED On	Voltage supplied over 4-pairs **Port power is activated**
Green LED Blinking at 1Hz rate	Overload or short circuit is detected on port output lines **Port power is not activated**
Green LED Blinking at 0.5Hz rate	Power management mode: A valid POE load is connected to port output lines, but PSE has no sufficient power for supplying the required load power **Port power is not activated**

Detailed schematics

Figure 2 describes the detailed schematics of the LED stream application. The schematic is based on the block diagram shown in Figure 1.

Figure 2 describes an application for Uni-colored indication with 24 ports, or Bi-colored indication with 12 ports.
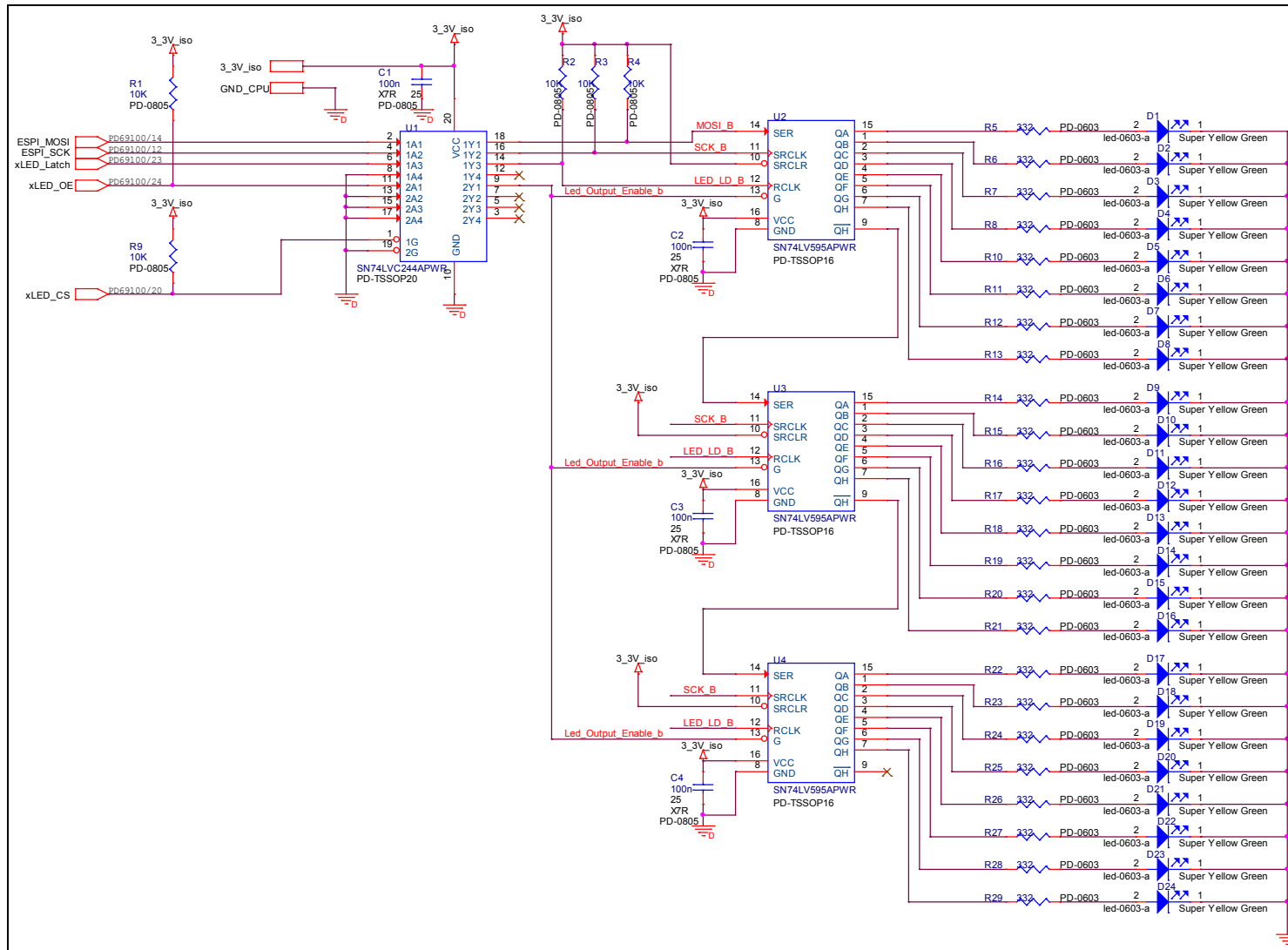
Figure 2: LED Stream Interface - Detailed Schematic Diagram

Copyright © 2013
Rev 0.1 / 30 June 2013

Microsemi
Analog Mixed Signal Group
1 Enterprise, Aliso Viejo, CA 92656, USA: (800) 713-4113, Outside the USA: (949) 221-7100 Fax: (949) 756-0308

Page 3

Bill of Material for LED Stream Interface

Qty	Reference	Footprint	Description	Manufacturer	Manufacture P/N
4	C1, C2, C3, C4	PD-0805	CAP CRM 100nF 25V 5%++X7R 0805 SMT	AVX	08053C104JAT2A
12	D1, D3, D5, D7, D9, D11, D13, D15, D17, D19, D21, D23	LED-0603	LED SuperYelGrn 100-130o 20-40mcd h=1 0603 SMD	Everlight	19-21-SYGCS530E3TR8
12	D2, D4, D6, D8, D10, D12, D14, D16, D18, D20, D22, D24 *	LED-0603	LED SuperYellow 100-130o 30-80mcd h=1 0603 SMD	Everlight	19-21UYC/S530-A2/TR8
5	R1, R2, R3, R4, R9	PD-0805	RES 10K 125mW 1%++0805 SMT MTL FLM	EPCOS	B54102-A2103-F60
24	R5, R6, R7, R8, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29	PD-0805	RES 332R 62.5mW 1%0603 SMT MTL FLM	Vishay	CRCW0603 332RFKEA
1	U1	PD-TSSOP20	IC DRV bufferTri state 3.3V TSSOP-20 SMT	Texas Instruments	SN74LVC244APWR
3	U2, U3, U4	PD-TSSOP16	IC 8-BIT SHFT REG TRI-ST16-TSSOP	Texas Instruments	SN74LV595APWR

In Uni-color mode – these leds should be 19-21-SYGCS530E3TR8

Copyright © 2013
Rev 0.1 / 30 June 2013

Microsemi
Analog Mixed Signal Group
1 Enterprise, Aliso Viejo, CA 92656, USA: (800) 713-4113, Outside the USA: (949) 221-7100 Fax: (949) 756-0308

Page 4

Revision History

Revision Level / Date	Para. Affected	Description
0.1 / 30 June 2013	-	Initial Release