

Flex PCB Considerations for ME0, GE2/1

Jason Gilmore
Texas A&M University

CMS Muon Upgrade Workshop
Texas A&M University
9-11 April 2018

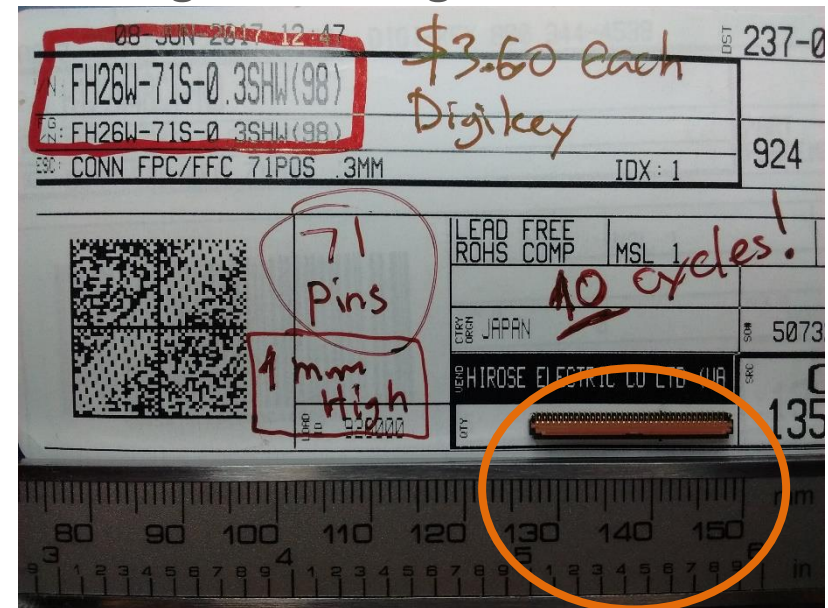
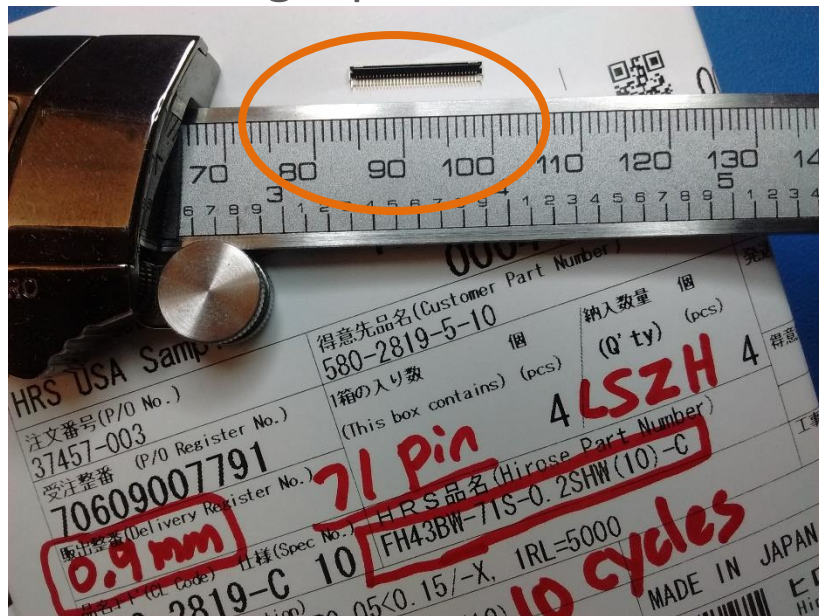


About Flex PCBs and Flex Flat Cables

- Flex Flat Cable vs Flex Printed Circuit
 - FFC https://en.wikipedia.org/wiki/Flexible_flat_cable
 - FFC is a miniaturized form of ribbon cable, which is also flat and flexible. The cable usually consists of a flat and flexible plastic film base, with multiple metallic conductors bonded to one surface
 - FFCs are usually straight connections without any components
 - Often, each end of the cable is reinforced with a stiffener to make insertion easier.
 - FPC https://en.wikipedia.org/wiki/Flexible_electronics
 - Sometimes inaccurately used for any type of FFC
 - This is more accurately used to describe circuits that incorporate components and are built onto a flexible material
 - <https://www.sfcircuits.com/pcb-production-capabilities/flex-pcbs>
 - Rigid-Flex PCB <http://www.bestfpc.com/products/rigid-flex.htm>
- What's needed for GEM? Assume FFC will carry analog signals.
 - Shielded layers or impedance control? Likely needed for signal quality.
 - Spacing signal lines farther apart? Helps to reduce cross talk.
 - All this requires more layers: more layers means less flexibility
 - From 1-8 layers in flex area, up to 10 layers in the rigid area
 - <http://www.bestfpc.com/products/multi-layer-fpc.htm>

Connector Ideas for Flex PCB on ROB or GEB

- Hirose has a number of very low profile flex connectors
 - Halogen-free available
 - 0.9 mm and 1.0 mm high, mount nicely on ROB and GEB
 - FH43B series and FH26W series both have 71 pin models
 - <https://www.hirose.com/product/en/products/FH43B/>
 - » https://www.mouser.com/datasheet/2/185/FH43B_catalog-939243.pdf
 - <https://www.hirose.com/product/en/products/FH26/>
 - » https://www.mouser.com/datasheet/2/185/FH26_catalog-939414.pdf
 - They are low enough to sit on ROB outside the chimney if we like
 - Using 2 per VFAT could work well, allowing for extra ground contacts



Relative Sizes of FH43B and FH26W

3) The term "storage" refers to the long-term storage condition of unused products before PCB mounting. Electro-activation state after PCB mounting, the operating temperature and humidity are applied.

Materials

Product	Color/Finish	Remarks
Insulator	Beige	UL94V-0
Contacts	FH43B Series: Deep brown	UL94V-0
	FH43BW Series: Black	UL94HB
Metal fittings	Gold plating	—
	Pure tin reflow plating	—

Product Number: **FH 43B W - 51S - 0.2 SHW (10)**

Handwritten notes: $71 = 15.8 \text{ mm wide}$, $5,000 \text{ qty}$, $99 \text{ for } 500 \text{ qty}$.

1 Series Name: FH	6 Terminal Type
2 Series No.: 43B	SHW -- SMT horizontal staggered row mounting type
3 Blank: Standard	7 Specifications
W: Halogen-free product	(10): Nickel barrier gold plating, 5,000 pieces per reel
4 No. of Contacts: 21~71	(99): Nickel barrier gold plating 500 pieces per reel
5 Contact Pitch: 0.2 mm	

Handwritten note: $\rightarrow \$4.25 \text{ for } 500$. * 5000 (non-Halogen) are \$1.01 each

Color: Black

Phosphor bronze

Pure tin reflow plating

Structure

Handwritten notes: $71 = 22.8 \text{ mm wide}$, 50 , 30 , 2 Mon , 5 each , 5 dozen , 144 .

Product Number: **FH 26W - 51S - 0.3 SHW**

1 Series name: FH	5 Termination type SHW: SMT
2 Series No.: 26W	6 Specifications
3 Number of Contacts: 13 to 71	(60)...Gold plating with nickel
4 Contact pitch: 0.3mm	(97)...Gold plating with nickel

Handwritten note: $144 \text{ In stock @ Digikey: } \$3.60 \text{ each for } 500$, $\$5.40 \text{ each for } < 10$, $\$1.45 \text{ each for } 5000!$

Product Number: **FH 43B W - 51S**

Handwritten notes: 71 , 71 pin .

Product Number: **FH 26W**

Handwritten notes: 71 pin .