

# KNOWLES FLEX CIRCUITS AND COUPONS FOR TESTING



To facilitate testing, Knowles uses common interface. We have standardized pinouts and dimensions for the flex circuits and coupons (FR4 PCBs) used in testing. These circuit boards work with the test fixtures used for microphone characterization. They are used with Knowles evaluation boards and suitable for inclusion in reference designs and testing by Knowles' customers. This document shows flex and coupon specifications, independent of microphone model. Included are dimensions, pinout definitions, and examples.

## MICROPHONE TEST FLEXES, PCBS AND ADAPTERS

Knowles utilizes flexes and PCBs (also called "coupons") when testing microphones. We have a common size and interface such that flexes and coupons from any microphone can be used in various test fixtures. The only difference between the test boards of different microphones is the pinout and pad configuration.

Once microphones are mounted on flex circuits or coupons, it is much easier to access the microphone signals. Testing a larger sample size of devices is facilitated if the flexes and coupons are inserted into connectors (as opposed to soldering or other permanent connections).

This document describes the flexes and coupons along with connectors that can be used to interface with them. Details include pinouts and size information for proper implementation and usage.

## DESIGN DETAILS

The flex circuits for each microphone model do not have an associated datasheet. This application note, however, describes the dimensions, pinouts, and connectors associated with the flexes and flex adapters. For the flex circuit of some microphone models, Knowles can provide Gerber files as needed. Contact our sales office for further details.

The flex circuit mates with an 8 position 0.5mm Kyocera connector (MPN 046288008000846+, DigiKey PN 478-5454-1-ND). This is the connector on the KCB2734 flex adapter. The FR4 coupons and flex adapter mate with a 2x3 Sullins connector (MPN EBM03DSEN-S243, DigiKey PN EBM03DSEN-S243-ND). Both are shown below.

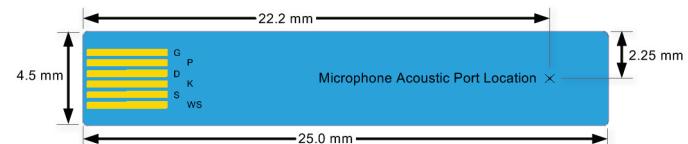
*8-position Kyocera (flex) and Sullins (coupon) connectors—not to scale*



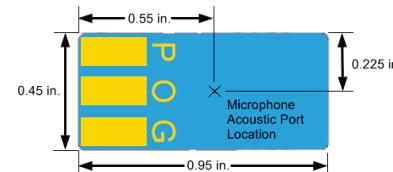
All flex circuits will have the same dimensions. They will also locate the microphone land pattern such that the acoustic port hole is in

the same location, whether the microphone is top- or bottom-ported. This provides consistent performance within test fixtures.

### Flex Circuit Dimensions



### Coupon Dimensions



The silkscreens on flexes and PCB coupons show the letter designations of the signals, but the pinouts are shown in the following sections.

## FLEX CIRCUIT PINOUTS

The table below shows the pinouts for the flex connector. The same connector can be used for all microphone flexes, regardless of port orientation or electrical interface.

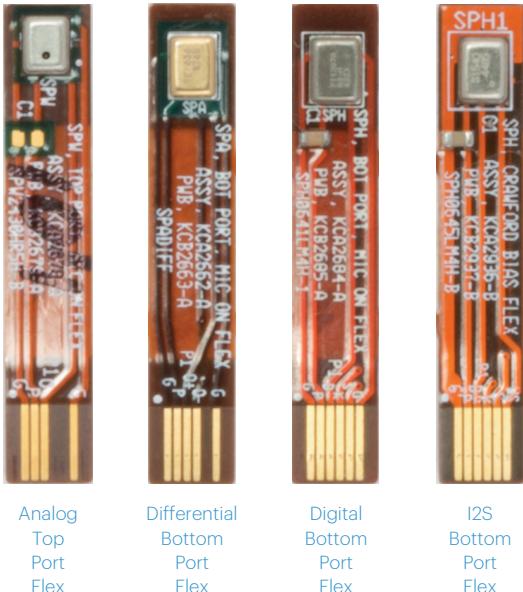
### Flex and mating 8-pin connector Pinouts:

Pin #	Signal	Analog Flex	Differential Flex	Digital Flex	I2S Flex
0	NC	-	-	-	-
1	Ground	G	G	G	G
2	Power	P	P	P	P
3	Data	O	O+	D	D
4	Bit Clock	-	O-	K	K
5	Select	-	-	S	S
6	Word Strobe	G	G	G	WS
7	NC	-	-	-	-



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Example Flex Circuits



## FR4 COUPON PINOUTS

The pinout definitions for FR4 coupons are shown in the table below. The KCA2733 Flex Adapter has the same pinout.

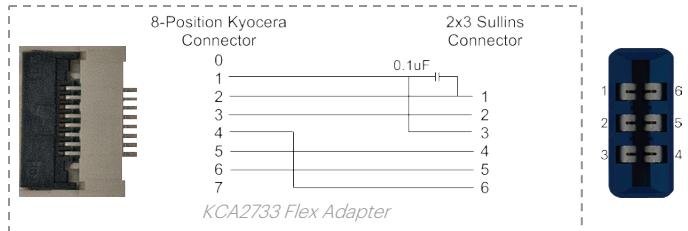
Flex Adapter/Coupon 6-pin connector Pinouts:

Pin #	Signal	Analog Coupon	Differential Coupon	Digital Coupon	I2S Coupon
1	Power	P	P	P	P
2	Data	O	O+	O	O
3	Ground	G	G	G	G
4	Select	-	-	LR	LR
5	Word Strobe	-	-	-	WS
6	Bit Clock	-	O-	K	K

## FLEX-TO-COUPON ADAPTER

Knowles uses an adapter to be able to use flex circuits with the Kyocera or Sullins connector. This adapter is effectively a coupon with the microphone replaced with the 8-pin flex connector. The schematics for the KCA2733 Flex Adapter is shown below. Schematics for the actual flexes and coupons can be easily derived using the corresponding microphone signals.

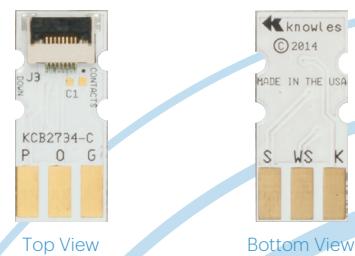
Flex Adapter Schematics



Example FR4 Coupons



KCA2733 Flex-to-Coupon Adapter



Note that the image above for the KCA2733 Flex-to-Coupon Adapter shows a KCB2734-C number on the silk screen. Clarifying the two different part numbers, KCB2734 represents the unpopulated PCB; KCA2733 is the part number of the assembly. The KCA2733 assembly consists of one KCB2734 PCB, one 046288008000846+ 8-pin flex connector, and one  $0.1\mu F$  bypass capacitor.

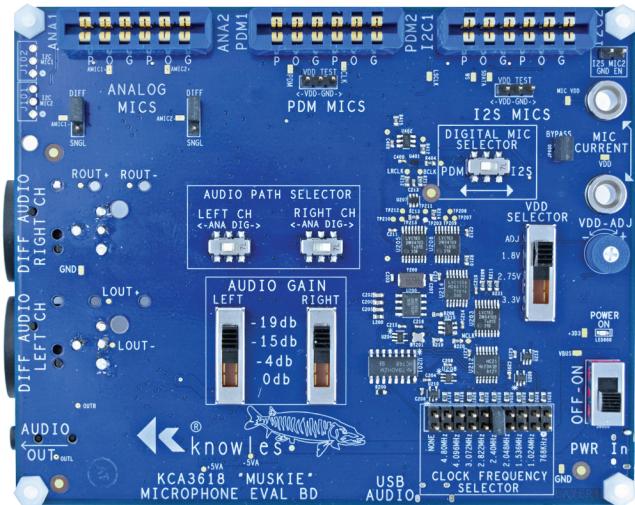


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## EVALUATION BOARD EXAMPLE

The following figure shows the KC10134-A01 "Muskie" microphone evaluation kit. This implements dual 6-pin Sullins connectors for stereo pairs of Analog/Differential microphones, Digital microphones, or I2S microphones. These are the blue 12-pin connectors on the top of the board.

KC10134-A01 Board showing Sullins Connectors for Adapters or Coupons



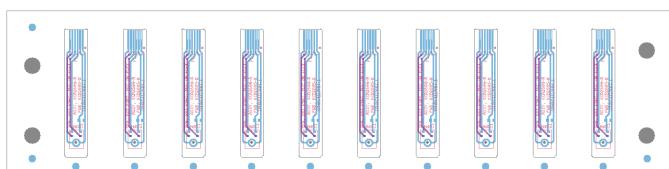
## EXAMPLE GERBER FILES

Good design practices are always recommended. For flex and coupon designs, this includes the use of bypass capacitors and good ground layout. Acoustic apertures, land patterns and stencils should follow the guidance in the microphone datasheets.

For the coupons and flex circuits of some microphone models, Knowles can provide Gerber files for flexes and coupons. Contact our sales office for further details.

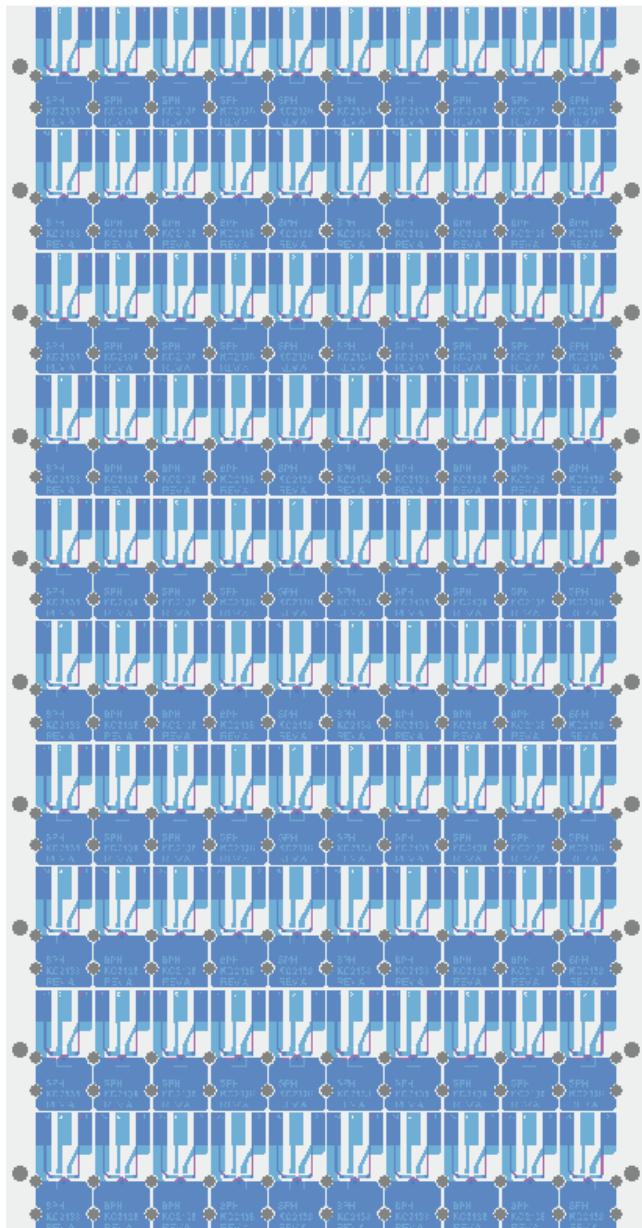
A partial Gerber file example for one sheet of ten (10) SPH0644LM4H-1 (Cornell) microphone flexes is shown below. This will work with any footprint compatible digital bottom-ported microphone.

Example Flex Sheet Gerber File



The flex design shows a panel of 10 flexes; coupons typically come in panels of 60 to 100, which are pre-scored so they can be easily singulated by hand. An example is show below.

Example Coupon Panel Gerber File



## REVISION HISTORY

Revision	Description	Date
1	Initial Release	8/10/18

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