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# **73M1966B Demo Board User Manual**

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# 1 Introduction

The 73M1966B Demo Board can be used with the 73M1966/1866 Demo Motherboard or in target applications where it is connected either by the appropriate connector or “blue wired” into the system that is will be used with. The active circuitry is identical to the 73M1866B Keychain Board other than including a connector for the GUI interface cable. The GUI cable is included in the 73M1966B Evaluation Kit and the Demo Board kit if it has been specifically ordered.

## 1.1 Package Contents

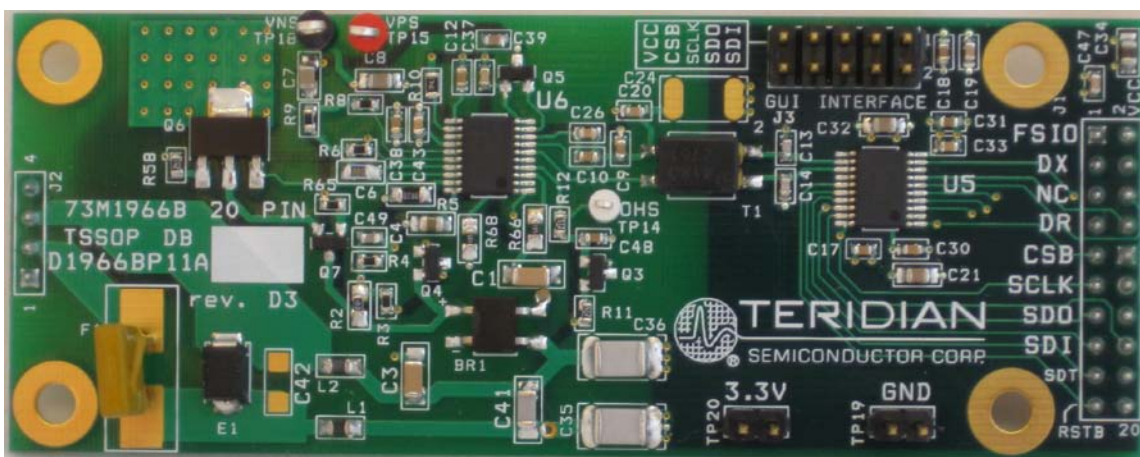


Figure 1: 73M1966B Demo Board

The 73M1966B Demo Board Kit includes:

- A 73M1966B Demo Board (Rev. D3)
- GUI Interface Cable (included with 73M1966B-EVM and 73M1966B-DB-C)
- The following documents on CD:
  - *73M1966B Demo Board User Manual* (this document)
  - *73M1866B/73M1966B Data Sheet*
  - *73M1966B GUI User Guide* (included with 73M1966B-EVM and 73M1966B-DB-C)
  - *73M1966 Layout Guidelines*
  - *73M1x66 Worldwide Design Guide*
  - *PCM Connectivity Application Note*

## 1.2 Safety and ESD Notes

Connecting live voltages to the 73M1966 Demo Board system will result in potentially hazardous voltages on the boards.



**Extreme caution should be taken when handling the 73M1966B Demo Board after connection to live voltages!**



**The 73M1966B Demo Board is ESD sensitive! ESD precautions should be taken when handling this board!**

## 2 Connectors

This section describes the 73M1966B Demo Board connectors. All the digital signals and power supply connections are made through a 20-pin header connector. The audio monitor is also brought out on this connector. Table 1 describes the pins for the J1 connector. For convenience, most digital signals are grouped with the PCM signals on the odd pins from pin 1 to pin 7, and the PCM CLKI pin is on pin 8. The SPI signals can be found on the odd pins 9 through 17. Reset is on pin 19. The interrupt output is on pin 16. There are two power pins on pins 2 and 4 and two ground pins on pins 18 and 20. The audio monitor output can be found on pin 10. There is also a CLKO pin that can be used for the rare case where the 73M1866B is used in the master mode.

**Table 1: J1 Pin Descriptions**

| Pin | Pin Name | Function                                    | Pin | Pin Name | Function                    |
|-----|----------|---------------------------------------------|-----|----------|-----------------------------|
| 1   | FSIO     | PCM Bidirectional Frame Sync                | 2   | VCC      | 3.3V power in               |
| 3   | DX       | PCM Receive Digital Data Output             | 4   | VCC      | 3.3V power in               |
| 5   | N/C      | No Connect                                  | 6   | CLKO     | PCM Highway Clock Output    |
| 7   | DR       | PCM Transmit Digital Data Input             | 8   | CLKI     | PCM Highway Clock Input     |
| 9   | CSB      | Chip Select - low true                      | 10  | AUDIO    | Audio output for speaker    |
| 11  | SCLK     | SPI Clock                                   | 12  | N/C      | No Connect                  |
| 13  | SDO      | Serial Control Data Out                     | 14  | N/C      | No Connect                  |
| 15  | SDI      | Serial Control Data In                      | 16  | INTB     | Interrupt Output - low true |
| 17  | SDT      | Serial Data Thru – used in Daisy Chain Mode | 18  | GND      | Ground                      |
| 19  | RSTB     | Reset - low true                            | 20  | GND      | Ground                      |

Table 2 describes the J2 connector pins. These are the bi-directional PSTN network connections that pass the audio signals to and from the FXO.

**Table 2: J2 Pin Descriptions**

| Pin | Name | Function                       |
|-----|------|--------------------------------|
| 1   | N/C  | No Connect                     |
| 2   | TIP  | Bidirectional Analog Signaling |
| 3   | RING | Bidirectional Analog Signaling |
| 4   | N/C  | No Connect                     |

The signals on the TIP and RING pins should also have a DC current that would normally come from the PSTN. This current will usually be in the range of 20 to 100 mA, but typically about 40 mA. This current is necessary for the FXO to operate normally. The FXO will not operate if the current drops below approximately 13 mA.

Table 5 describes the J3 connector pins. J3 is used to connect a host PC to the Demo Board to provide GUI control.

**Table 3: J3 Pin Descriptions**

| Pin | Pin Name | Function                | Pin | Pin Name | Function   |
|-----|----------|-------------------------|-----|----------|------------|
| 1   | SDI      | Serial Control Data In  | 2   | N/C      | No Connect |
| 3   | SDO      | Serial Control Data Out | 4   | GND      |            |
| 5   | SCLK     | Serial Clock            | 6   | GND      |            |
| 7   | CSB      | Chip Select - low true  | 8   | GND      |            |
| 9   | VCC      |                         | 10  | N/C      | No Connect |

### 3 Connecting the Demo Board into an Existing System

The 73M1966B Keychain Demo Board is designed to be easily connected to an existing system that has access to a PCM and SPI interface. Table 1 provides the pin and signal names. Further detail is provided in the *73M1866B/73M1966B Data Sheet*. If connectivity between the Keychain Demo Board and the system is provided by 'blue-wire', we recommend that 30 AWG wire be used as a minimum and that the maximum length of these wires should not exceed 8 inches (20 cm). It is also recommended that the ground have at least two 30 AWG wires connecting the 73M1966B Demo Board to the host board.

Once connected, the user should check for the integrity of appropriate clock and control signals. Ensure the signals have minimal over-shoot and under-shoot on the signal transitions. Consult the *73M1866B/1966B Data Sheet* for information on the signal timing and ensure the host SPI conforms to these requirements.

The 73M1966B Demo Board is also designed to plug into the 73M1966B EVM Motherboard. This board supports the connection of a PCM test device such as the Wandel and Goltermann PCM-4. See the *73M1966B-EVM User Manual* for more information.

In order for the 73M1966B Demo Board to operate correctly it needs to be configured by software. Teridian provided Reference Driver Software and Linux based Command Line application can be used to configure and control the 73M1966B. Contact Teridian Sales for more information on the available software.

If 73M1966B-DB-C has been provided, a cable is included that connects the GUI Interface J3 to a Windows PC with a parallel port. This, along with the GUI software, will allow a user to configure the 73M1966B without the need to provide any embedded software. Refer to the *73M1966B GUI User Guide* for more information on using the Teridian provided GUI software.

If a 73M1966B Motherboard Evaluation Kit (73M1966B-EVM) is being used, the 73M1966B Demo Board is inserted into the appropriate socket. For further details on operating this system, refer to the *73M1966B EVM User Manual*.

## 4 Connecting the Demo Board Directly to a PCM Test Set

The 73M1966B Demo Motherboard conveniently provides a power connector, a power switch, PCM interface connectors, and clock connectors. However, it is not necessary to utilize the Motherboard when evaluating the device set. In some applications, it might be better to directly connect the 73M1966B Demo Board to the PCM channel test set. Even without the Motherboard, the 73M1966B can be used with the GUI and a channel test set.

If only the 73M1966B Demo Board is used, the two-row J1 connector has all the necessary signals to connect to the digital signals of the channel test set and 3.3 V power as shown in Figure 2. Other PCM highway test sets should also require only the 73M1966B Demo Board to perform similar tests.

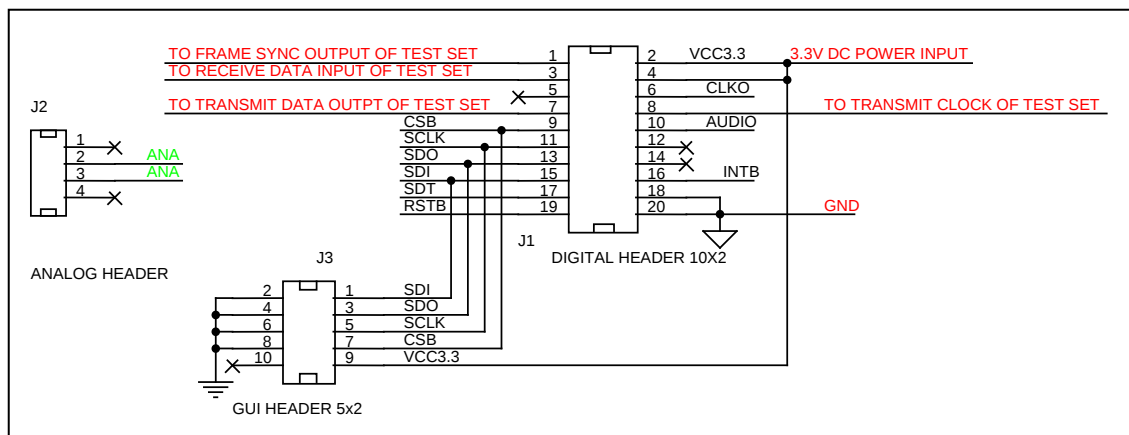


Figure 2: Connecting the 73M1966B Demo Board Directly to a PCM Test Set

## 5 73M1966B Demo Board Schematics, PCB Layouts and Bill of Materials

### 5.1 Schematics

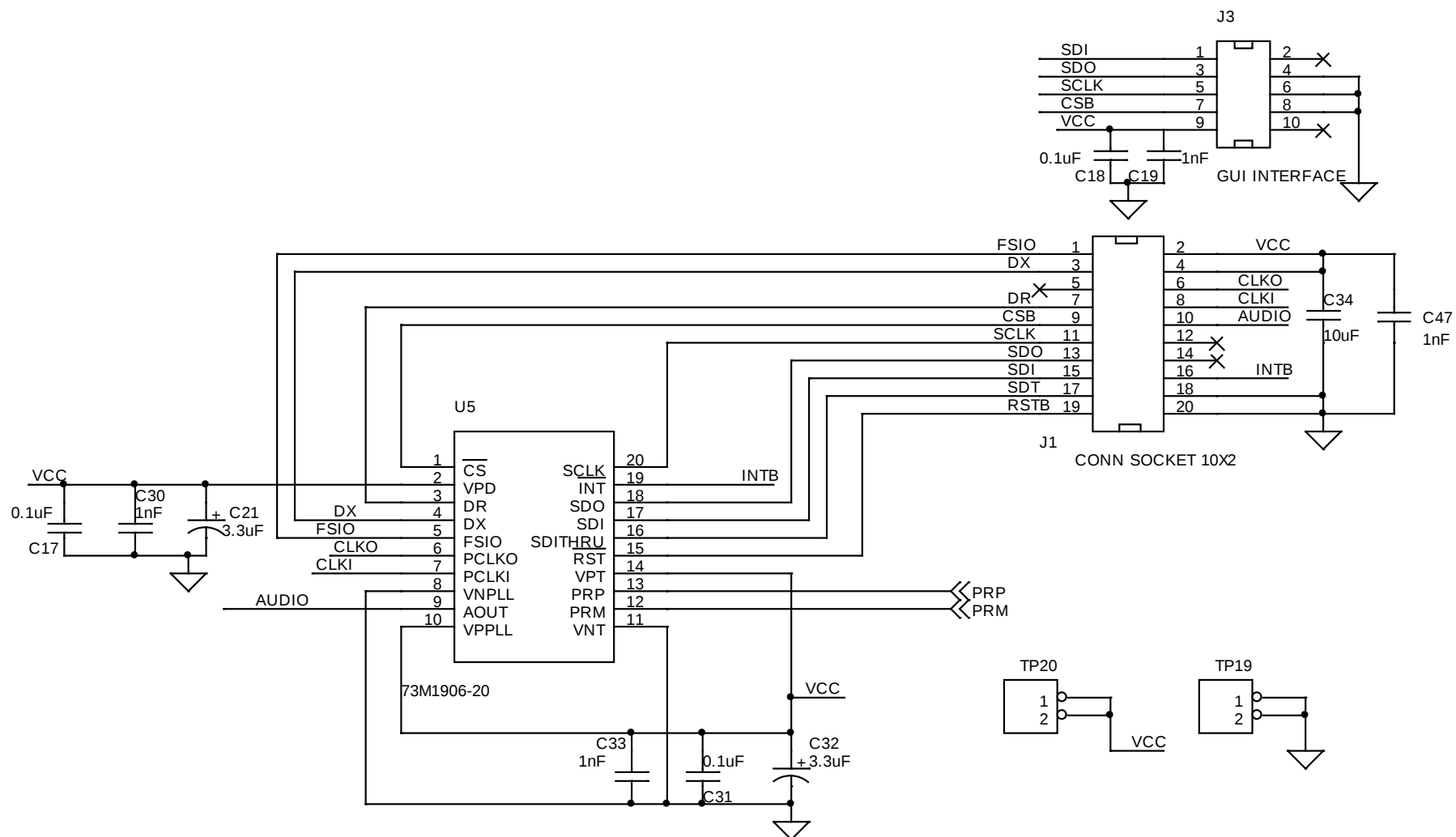


Figure 3 : 73M1966B 20-Pin TSSOP Demo Board Schematic Diagram Host Interface

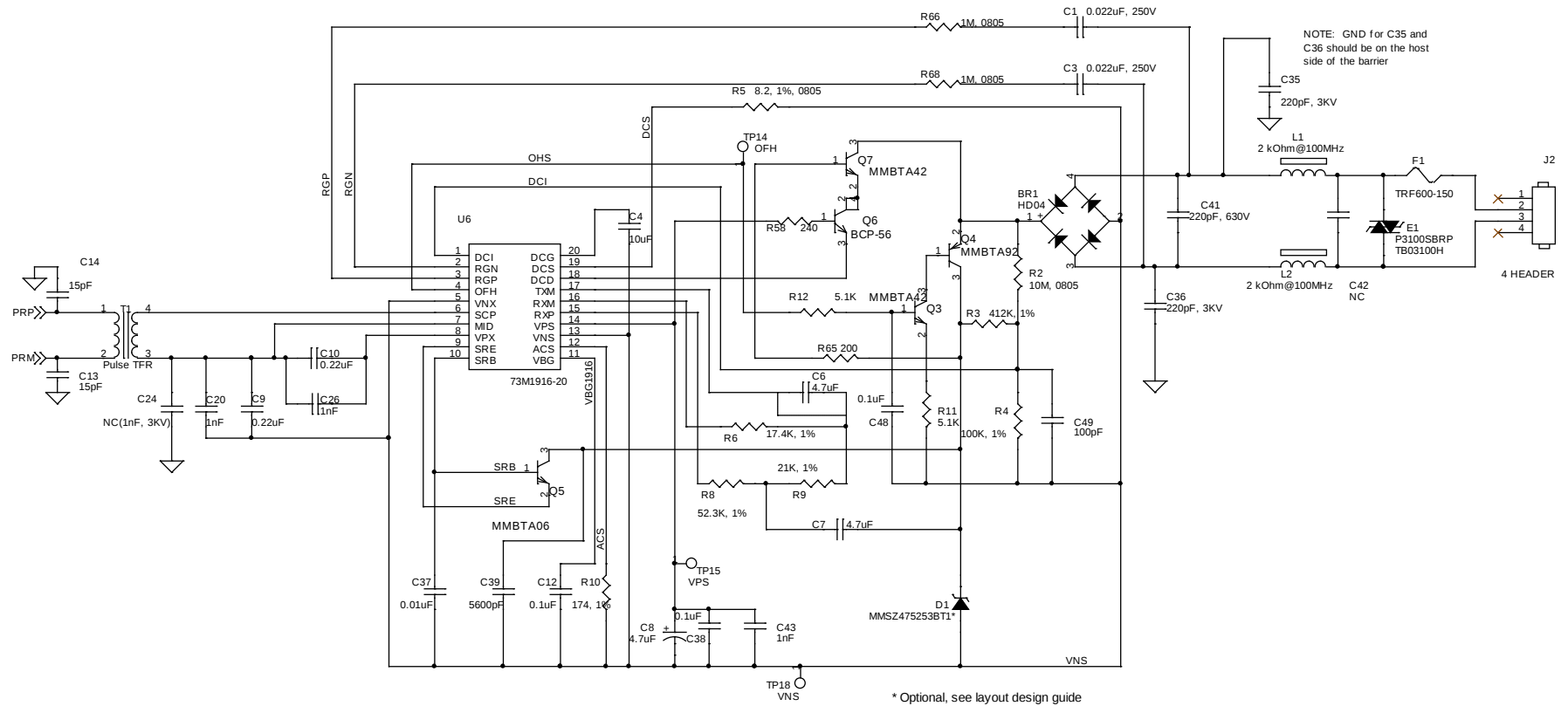


Figure 4 : 73M1966B 20-Pin TSSOP Demo Board Schematic Diagram Line Interface

## 5.2 PCB Layouts

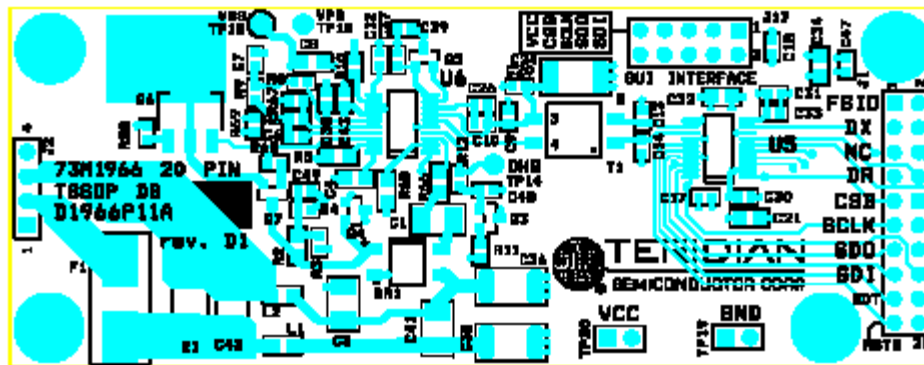


Figure 5: 73M1966B Demo Board Top Layer



Figure 6: 73M1966B Demo Board Bottom Layer



Figure 7 : 73M1966B 20-Pin TSSOP Demo Board: Ground Plane Layer

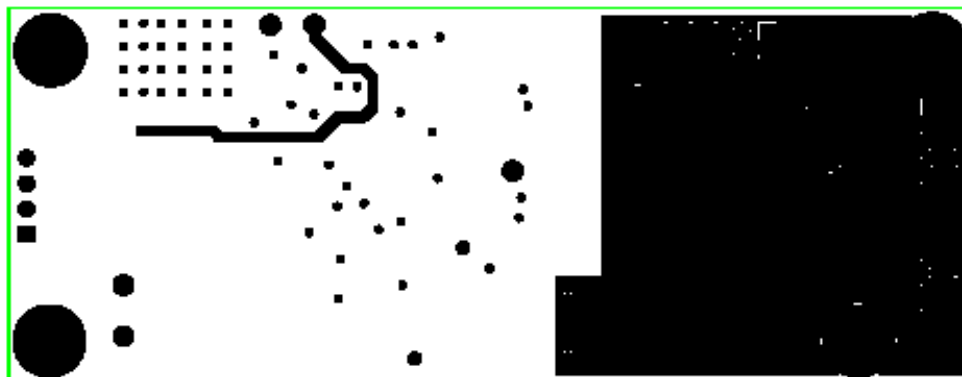


Figure 8 : 73M1966B 20-Pin TSSOP Demo Board: Power Plane Layer

### 5.3 Bill of Materials

Table 4 provides the bill of materials for the 73M1966B Demo Board schematic provided in Figure 3 and Figure 4.

**Table 4: 73M1966B Demo Board Bill of Materials**

| Qty | Reference                         | Part Description                     | Source                              | Example MFR P/N                |
|-----|-----------------------------------|--------------------------------------|-------------------------------------|--------------------------------|
| 1   | BR1                               | HD04 rectifier bridge, 0.8A, 400V    | Diodes Inc.                         | HD04-T                         |
| 2   | C1, C3                            | 0.022 $\mu$ F, 250V                  | TDK                                 | C3216X7R2E223K                 |
| 2   | C4, C34                           | 10 $\mu$ F                           | AVX, Panasonic                      | TCP0J106M8RA                   |
| 3   | C6, C7, C8                        | 4.7 $\mu$ F 25V, X5R, 0805           | AVX, Panasonic                      | 08053D475KAT2A                 |
| 2   | C9, C10                           | 0.22 $\mu$ F 16V, X7R, ceramic, 0603 | Panasonic                           | C0603C224K8RACTU               |
| 6   | C12, C17, C18, C31, C38, C48      | 0.1 $\mu$ F 16V, X7R, ceramic, 0603  | Panasonic, Kemet                    | C0603C104K8RACTU               |
| 2   | C13, C14                          | 15pF 50V, ceramic, 0603              | Panasonic                           | ECJ-1VC1H150J                  |
| 7   | C19, C20, C26, C30, C33, C43, C47 | 1nF 10V, X7R, ceramic, 0603          | Panasonic                           | C0603C102K8RACTU               |
| 2   | C21, C32                          | 3.3 $\mu$ F 6.3V, tantalum, 0805     | Rohm                                | TCP0J335M8R                    |
| 2   | C35, C36                          | 220pF, 3KV                           | Kemet                               | C1812C102KHRCTU                |
| 2   | C37, C39                          | 0.01 $\mu$ F 50V, X7R, ceramic, 0603 | AVX, Panasonic                      | 06035C103KAT2A                 |
| 1   | C41                               | 220pF, 630V                          | TDK                                 | C3216COG2J221J                 |
| 1   | C49                               | 100pF                                | Panasonic                           | ECJ-1CV1H101J                  |
| 1   | E1                                | P3100SBRP                            | Teccor                              | P3100SBLRP                     |
| 1   | F1                                | TRF600-150                           | Raychem                             | TRF600-150                     |
| 1   | J1                                | Header                               | Sullins                             | 10 X 2                         |
| 1   | J2                                | Header                               | Sullins                             | 4 X 1                          |
| 1   | J3                                | Header                               | Sullins                             | 5 X 2                          |
| 2   | L1, L2                            | 2000 Ohm                             | TDK                                 | MPZ2012S601A                   |
| 1   | Q5                                | MMBTA06, NPN 80 V transistor SOT23   | Diodes, Fairchild, Central, On Semi | MMBTA06LT1G                    |
| 1   | Q4                                | MMBTA92, PNP 300 V transistor SOT23  | Diodes, Fairchild, Central, On Semi | MMBTA92LT1G                    |
| 2   | Q3, Q7                            | MMBTA42, NPN 300 V transistor SOT23  | Diodes, Fairchild, Central, On Semi | MMBTA42LT1G                    |
| 1   | Q6                                | NPN 80 V transistor SOT223           | Fairchild, On Semi                  | BCP56                          |
| 1   | R2                                | 10M, 5%, 1/8W resistor 0805          | Yageo                               | RC0805JR-0710ML                |
| 1   | R3                                | 412K, 1%, 1/10W resistor 0603        | Yageo                               | RC0603FR-07412KL               |
| 1   | R4                                | 100K, 1%, 1/10W resistor 0603        | Yageo                               | RC0603FR-07100KL               |
| 1   | R5                                | 8.2, 5%, 1/8W resistor 0805          | Yageo                               | RC0805JR-078R2L                |
| 1   | R6                                | 17.4K, 1%, 1/10W resistor 0603       | Yageo                               | RC0603FR-0717K4L               |
| 1   | R8                                | 52.3K, 1%, 1/10W resistor 0603       | Yageo                               | RC0603FR-0752K3L               |
| 1   | R9                                | 21K, 1%, 1/10W resistor 0603         | Yageo                               | RC0603FR-0721KL                |
| 1   | R10                               | 174, 1%, 1/10W resistor 0603         | Yageo                               | RC0603FR-07174RL               |
| 1   | R11                               | 3K, 5%, 1/10W resistor 0603          | Yageo                               | RC0603JR-073K0L                |
| 1   | R12                               | 5.1 K, 5%, 1/10W resistor 0603       | Yageo                               | RC0603JR-075K1L                |
| 1   | R58                               | 240, 5%, 1/10W resistor 0603         | Yageo                               | RC0603JR-07240RL               |
| 1   | R65                               | 200, 5%, 1/10W resistor 0603         | Yageo                               | RC0603JR-07200RL               |
| 2   | R66, R68                          | 1 M, 5%, 1/8W resistor 0805          | Yageo                               | RC0603JR-071ML                 |
| 1   | T1                                | Pulse transformer                    | UMEC, Sumida, Midcom                | UBT0154, ESMIT 4180, 750110001 |

## 6 Ordering Information

Table 5 lists the order numbers and packaging marks used to identify 73M1966B and 73M1866B Demo Boards.

**Table 5: Order Numbers and Packaging Marks**

| Part Description                                          | Order Number      | Packaging Mark        |
|-----------------------------------------------------------|-------------------|-----------------------|
| 73M1966B 20-Pin TSSOP Motherboard and Standard Demo Board | 73M1966B-EVM      | 73M1916-M<br>73M1906B |
| 73M1966B 20-Pin TSSOP Demo Board                          | 73M1966B-DB       | 73M1966B-IM           |
| 73M1966B 20-Pin TSSOP Demo Board with GUI cable           | 73M1966B-DB-C     | 73M1966B-IM           |
| 73M1866B 20-Pin TSSOP Keychain Demo Board                 | 73M1866B-Keychain |                       |

## 7 Related Documentation

The following 73M1x66B documents are available from Teridian Semiconductor Corporation:

*73M1866B/73M1966B Data Sheet*  
*73M1866B/73M1966B Layout Guidelines*  
*73M1x66 Worldwide Design Guide*  
*73M1x66 PCM Connectivity Application Note*  
*73M1966B-EVM User Manual*  
*73M1966B GUI User Guide*  
*73M1866B/73M1966B FXOCTL Application User Guide*

## 8 Contact Information

For more information about Teridian Semiconductor products or to check the availability of the 73M1966B, contact us at:

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**Revision History**

| <b>Revision</b> | <b>Date</b> | <b>Description</b>                                                                             |
|-----------------|-------------|------------------------------------------------------------------------------------------------|
| 1.0             | 11/21/2008  | First publication.                                                                             |
| 1.1             | 9/14/2009   | Added Section 4, Connecting the Demo Board Directly to a PCM Test Set.<br>Re-ordered sections. |
| 1.2             | 1/22/2010   | In Figure 4, added a Zener diode to the schematic.                                             |

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