

TS3A226E Evaluation Board

This user guide describes the TS3A226E evaluation module (EVM) usage. This guide contains the EVM schematics, evaluation examples, and bill of materials to evaluate the performance of the TS3A226E device.

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1 Introduction

The TS3A226E is an audio headset switch that detects 3- or 4-pole 3.5mm accessories. For a 4-pole accessory with a microphone, the TS3A226E also detects the MIC location and routes the microphone and ground signals automatically. The ground signal is routed through a pair of low-impedance ground FETs (60mΩ typical), resulting minimal impact on audio cross-talk performance. The autonomous detection feature allows end users to plug in accessories with different audio pole configurations into the mobile device and have them operate properly with no added software control and complexity. The ground FETs of the device are designed to allow FM signal pass-through, making it possible to use the ground line of the headset as an FM antenna in mobile audio application.

The TS3A226E EVM is an evaluation module for the Texas Instruments TS3A226E switch and it provides the basic functionality evaluation for the device.

2 EVM Setup

2.1 Boards

One TS3A226E Evaluation board is provided per EVM kit:

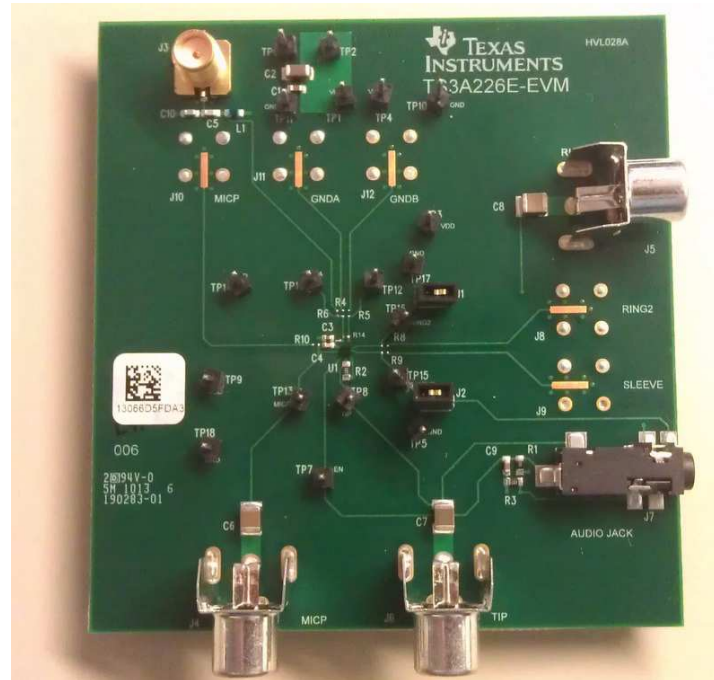


Figure 1. TS3A226E Evaluation board

Table 1. TS3A226E Evaluation Module Signal Connections

	Type	Description	Purpose
J3	SMA Connector	FM signal output	If GND is used for FM signal transmission, FM receiver can be connected to this connector for sensitivity test.
J4	RCA Connector	For MIC signal output	Can be connected to Codec for microphone testing.
J5	RCA Connector	RING1 connection	Can be connected to Audio Amplifier (right channel) output for audio testing.
J6	RCA Connector	TIP connection	Can be connected to Audio Amplifier (left channel) output for audio testing.
J7	Audio Jack Connector	Audio Jack for Headset plug in	Plug in different Headset for TS3A226E function verification

Test Point headers are placed throughout the board to provide testing capability for each pin of the device and are labeled with the corresponding pin name beside the header pins.

2.2 Setup Procedure

2.2.1 Equipment Required

- Power supply which can provide 2.6V to 4.7V
- Multi-meter

2.2.2 Power up

To provide the VDD to the TS3A226E. Add the jumper for J1 and J2.

External power supply input are supplied to the VDD test point (TP6) for VDD and GND test points (TP12) for GND.

3 Evaluating TS3A226E

3.1 Test with Different Types of Headsets

To evaluate the capability of headset detection for TS3A226E, plug in different types of headsets (4-pole standard, 4-pole OMTP, or regular TRS) to the headset jack J7, and check the detection result.

(1) 4-Pole Standard/ North American Headsets:



If a 4-pole standard/North American headset is plugged-in, below table can be used to check the detection result by measuring the resistor through the hand multi-meter.

	Negative Pole	Positive Pole	Measured Value(Ω)
TEST POINTS	TP13(MICP)	TP15(SLEEVE)	≤ 10
	TP13(MICP)	TP16(RING2)	$> 1K$
	TP21(GNDA)	TP15(SLEEVE)	$> 1K$
	TP12(GNDB)	TP16(RING2)	≤ 2

(2) 4-Pole OMTP Headsets:



If a 4-pole OMTP headset is plugged-in, below table can be used to check the detection result by measuring the resistor through the hand multi-meter.

	Negative Pole	Positive Pole	Measured Value(Ω)
TEST POINTS	TP13(MICP)	TP15(SLEEVE)	$> 1K$
	TP13(MICP)	TP16(RING2)	≤ 10
	TP21(GNDA)	TP15(SLEEVE)	≤ 2
	TP12(GNDB)	TP16(RING2)	$> 1K$

(3) RS Audio Headset:



If a regular TRS headset without integrated microphone is plugged-in, below table can be used to check the detection result by measuring the resistor through the hand multi-meter.

	Negative Pole	Positive Pole	Measured Value(Ω)
TEST POINTS	TP13(MICP)	TP15(SLEEVE)	$> 1K$
	TP13(MICP)	TP16(RING2)	$> 1K$
	TP21(GNDA)	TP15(SLEEVE)	≤ 2
	TP12(GNDB)	TP16(RING2)	≤ 2

Note: These measured resistor values cannot be used to check the Switch R_{ON} since the multi-meter has the internal output resistor.

4 EVM Schematics

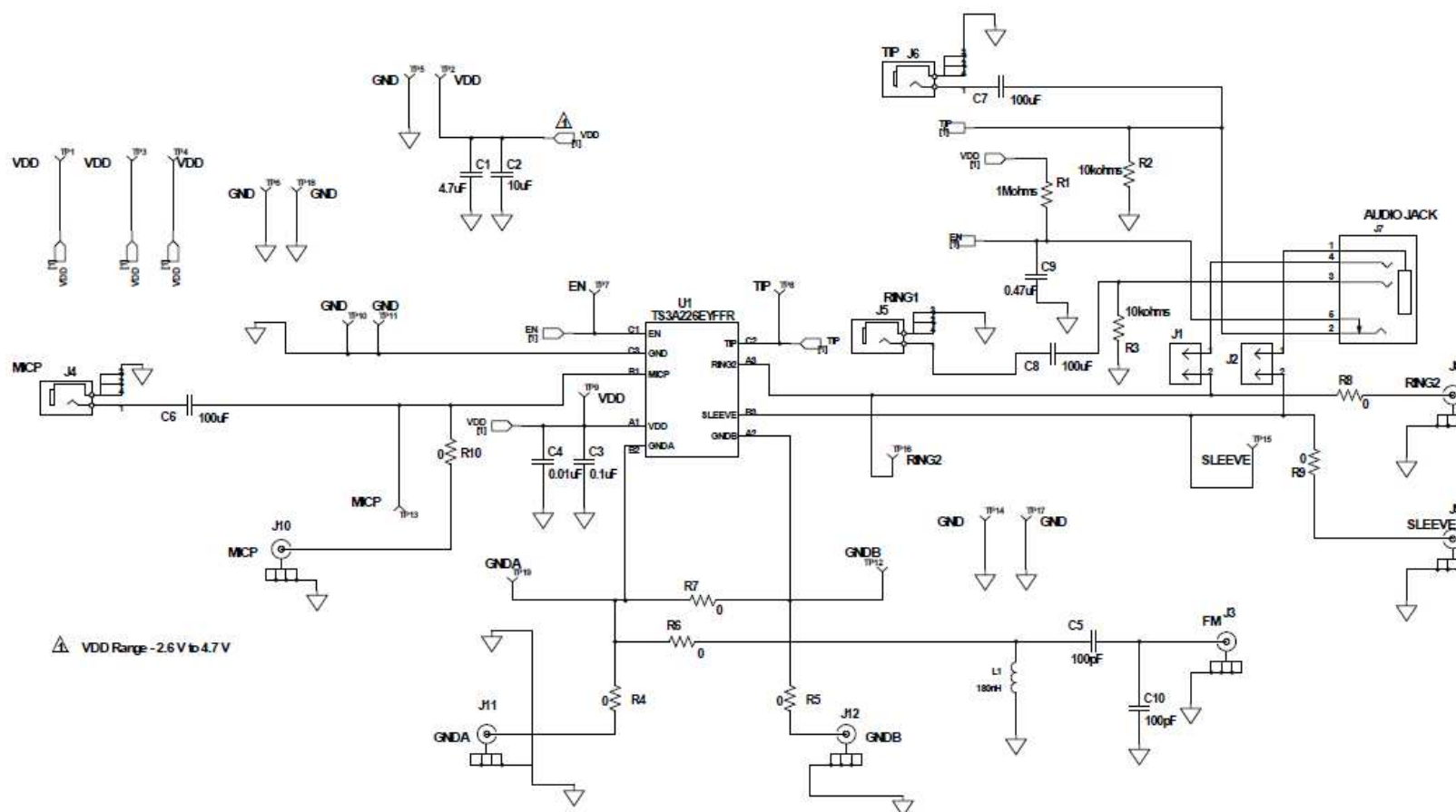


Figure 2. TS3A226E EVM Schematic

5 Bill of Materials

Table 2. Bill of Materials

Count	RefDes	Value	Description	Size	Part Number
1	C1	4.7 μ F	Capacitor, Ceramic,Chip,16V, X7R, $\pm$ 10%	603	STD
1	C2	10 μ F	Capacitor, Ceramic Chip, 16V,X7R, $\pm$ 10%	1206	STD
1	C3	0.1 μ F	Capacitor, Ceramic Chip,16V, X7R, $\pm$ 10%	402	STD
1	C4	0.01 μ F	Capacitor, Ceramic Chip,16V, X7R, $\pm$ 10%	402	STD
2	C5, C10	100pF	Capacitor, Ceramic, Chip,10V, X7R, $\pm$ 10%	603	STD
3	C6, C7, C8	100 μ F	Capacitor, Ceramic Chip, 10V,X5R, $\pm$ 10%	1210	STD
1	C9	0.47 μ F	Capacitor, Ceramic,Chip,10V, X7R, $\pm$ 10%	603	STD
2	J1, J2	PEC02SAAN	Header, Male 2-pin, 100mil spacing,	0.100 inch x 2	PEC02SAAN
1	J3	32K141-40ML5	Connector, SMA, Straight, 50 Ohm, DC to 12.4 GHz	7.6X7.6 mm	32K141-40ML5
3	J4, J5, J6	RCA,161-0350-E	Connector, Phono Jack 3.6 mm, Right Angle	0.571 x 0.471 inch	161-0350-E
1	J7	SJ-43515TS-SMT	Connector, Audio Stereo Jack 3.5 mm	5x17.5 mm	SJ-43515TS-SMT
0 ⁽¹⁾	J8, J9, J10, J11, J12	32K141-40ML5	Connector, SMA, Straight, 50 Ohm, DC to 12.4 GHz	7.6X7.6 mm	32K141-40ML5
1	L1	180 nH	Inductor, SMT, 180nH,5%,140mA,2.2ohms, 100MHz 25Q-Factor,SRF with 1300MHz	603	LQW18ANR18J00D
1	R1	1 Mohms	Resistor, Chip, 1/16W, $\pm$ 5%	603	STD
2	R2, R3	10 kohms	Resistor, Chip, 1/16W, $\pm$ 5%	603	STD
0 ⁽¹⁾	R4, R5, R8, R9, R10	0	Resistor, Chip, 1/16W, $\pm$ 5%	201	STD
2	R6, R7	0	Resistor, Chip, 1/16W, $\pm$ 5%	201	STD
19	TP1-TP19	PEC01SAAN	CONN HEADER .100 SINGL STR 1POS	0.100 inch x 1	PEC01SAAN

⁽¹⁾ The count with '0' means no assembly.

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As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

Caution

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs including detachable antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

Concernant les EVMs avec appareils radio

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

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This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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