TUSB7320/TUSB7340 EVM User's Guide

User's Guide

Literature Number: SLLU146C
May 2011–Revised May 2014

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This guide is intended to describe the necessary information needed to operate either the TUSB7320 DEMO EVM REVB or TUSB7340 DEMO EVM REVB boards. In this document you will find how to setup and use the EVM boards. The schematics and bill of materials are also detailed at the end of the document.

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Introduction

The TUSB7340 is a USB 3.0 xHCI 0.96 compliant host controller that supports up to four downstream ports. The TUSB7320 supports up to two downstream ports. The TUSB73x0 interfaces to the host system via a PCIe x1 Gen 2 interface and provides SuperSpeed, High-speed, Full-speed, or Low-speed connections on the downstream USB ports.

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EVM Board

1 TUSB7320 and TUSB7340 DEMO Boards

The TUSB7320 and TUSB7340 DEMO boards are both PCI Express X1 Standard Height cards. The dimensions of both boards are 4.376 inches by 2.571 inches. The two figures below depict how the boards look.

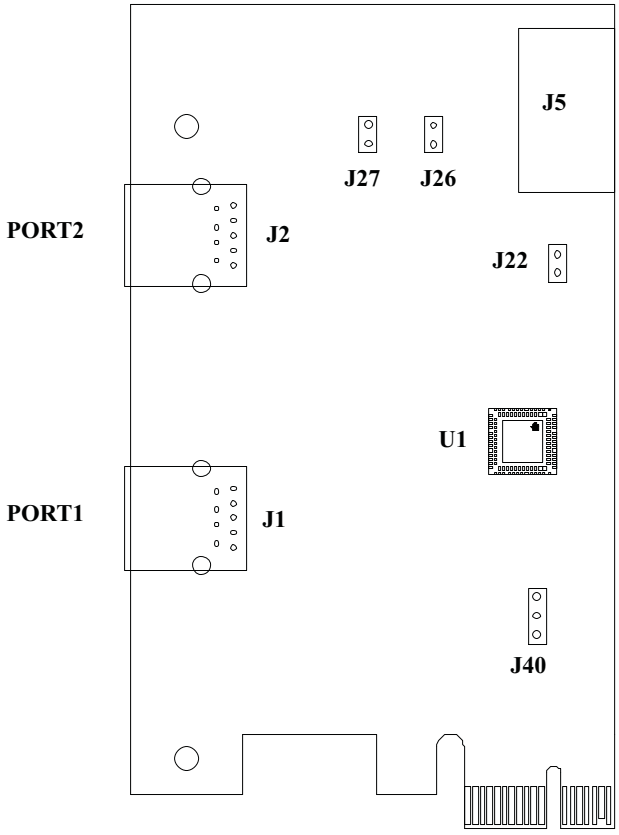

Figure 1. TUSB7320 DEMO EVM REVB

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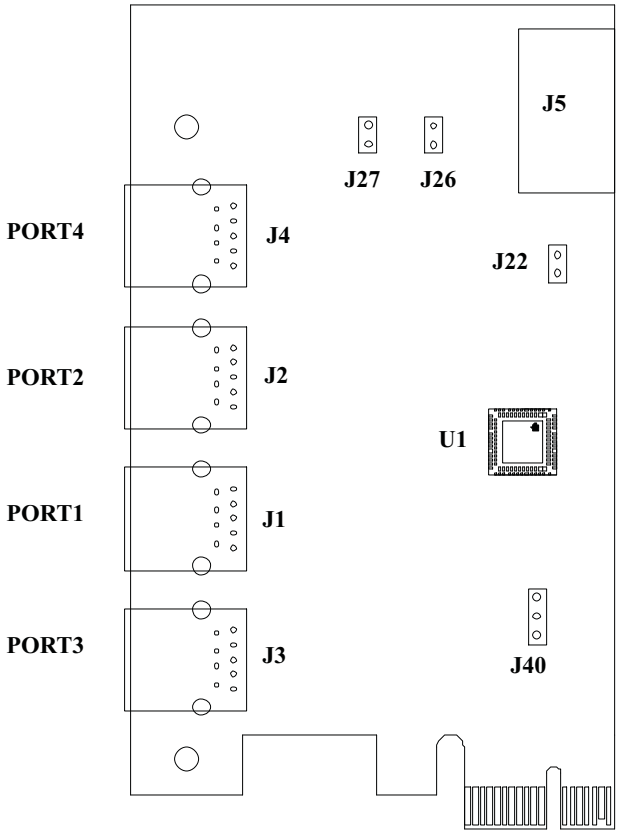

Figure 2. TUSB7340 DEMO EVM REVB

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2 Hardware Setup

2.1 Headers

The EVM boards are populated with three headers: J22, J26, and J40.

J22 header is used to change the state of AUX_DET signal to the TUSB73XX. By default, this header is not shorted and therefore AUX_DET will be high. If a jumper shunt is placed over J22, the AUX_DET will be low.

The J26 header is used to route 5 V from the IDE Power Connector (J5) to the Texas Instruments TPS2560 USB power switch. This header should always have a Jumper Shunt populated. For more information on the Texas Instruments TPS2560, please visit www.ti.com.

J40 header is used to select the 3.3-V power source for the TUSB73X0. By default, a Jumper Shunt should be populated across pins 1 and 2 of J40. When in this position, the 3.3-V power from the PCI Express slot is routed to the TUSB73X0. If the Jumper Shunt is moved to pins 2 and 3, then the 3.3-V VAUX power from the PCI Express slot is routed to the TUSB73X0. The Jumper Shunt should only be moved to positions 2 and 3 if wake testing is required. Otherwise the jumper should be left in the default position of 1 and 2.

NOTE: The 3.3-V VAUX power supply has a limited current capability. According to the PCI Express Electromechanical Spec, the 3.3-V VAUX will have a maximum current of 375 mA. Because of the limited current of 3.3-V VAUX, it is recommended to plug only one device into the TUSB73X0. If the Jumper Shunt is left on pins 1 and 2 of J40, this current limitation does not exist and therefore all ports of the TUSB73X0 can be used.

2.2 VBUS

VBUS for all of the USB ports comes from the IDE Power Connector (J5).

2.3 PCI Express Slot Options

Because the TUSB73X0 EVM boards are PCI Express X1, they can be used in any PCI Express Slot (X1, X4, X8, or X16) on a typical motherboard. The boards can be used in either a PCI Express Gen1 (2.5 Gbps) or Gen2 (5 Gbps) slot. Because of the speed of USB3 (5 Gbps), if used in a PCI Express Gen1 slot, the performance of the TUSB7320 or TUSB7340 will be negatively impacted. For this reason, it is recommended to always insert the EVM board into a PCI Express Gen2 slot.

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Bringup

Below are the steps to bring up the EVM board in a typical system:

1. Remove the power plug from the PC power supply.
2. Make sure the Jumper Shunts are populated on J26 and J40.
3. Insert the EVM board into a PCI Express slot. It is recommended to use a PCI Express Gen2 slot if one is available.
4. Insert an IDE Power Connector into J5 of the EVM board.
5. Insert the power plug into the PC power supply.
6. Turn the PC on. Once the PC is turned on, all of the green LEDs should be ON. If LED D5 is not active, please check to make sure the jumper shunt on J40 is populated. If none of the green LEDs (D1 thru D4) for each USB Port are active, please check to make sure the Jumper Shunt on J26 is populated and an IDE Power connector is plugged into J5.
7. Once the PC has booted into Windows 7, you will need to install the TI xHCI driver. If the driver has already been installed on your PC, then you can proceed step 8. Otherwise, you will need to install the xHCI driver by running the TI xHCI driver setup utility.
8. You can now insert devices into the USB ports.

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WAKE Testing Setup

The EVM board can be used to test the WAKE functionality of the TUSB73X0. By default, the EVM is not configured to support wake testing. Please configure the EVM according to the following if WAKE is required:

1. Move the Jumper Shunt on J40 to pins 2 and 3.
2. Make sure there is no Jumper Shunt on J22.
3. Use a dedicated 5-V power supply for VBUS. Do NOT use the IDE Power connector provided from the system power supply. The reason for not using the IDE power from system power supply is when the system is put in a sleep or hibernate state, the power on the IDE Power connector will be turned off.

NOTE: For some motherboards, WAKE from a PCIe slot is not supported or is only supported on PCIE X1 slots. Please make sure to use a motherboard that supports WAKE from any PCIe slot.

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SMI Support

The SMI pin from the TUSB7320 is brought out to a header labeled SMI. This header is located to the left of J22.

The SMI pin from the TUSB7340 is brought out to a via located on the bottom of board near U1. The via is located between C10 and C34 and just above C31.

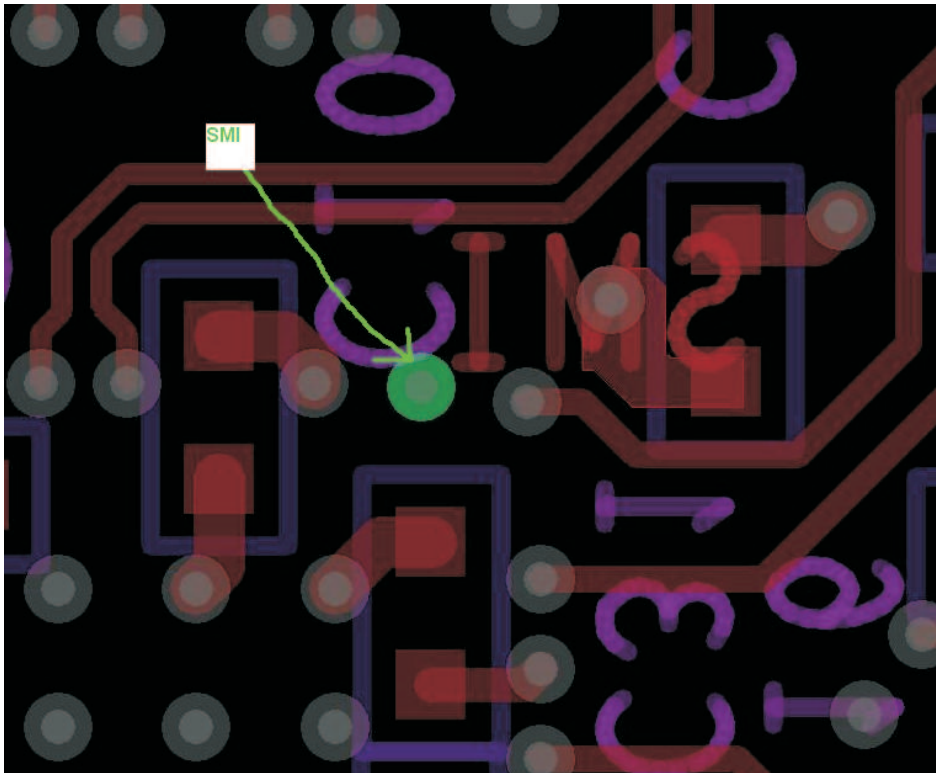

Figure 3. SMI via Location for TUSB7340 DEMO EVM REVB

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Schematics

The following pages contain schematics for the TUSB7320 and TUSB7340.

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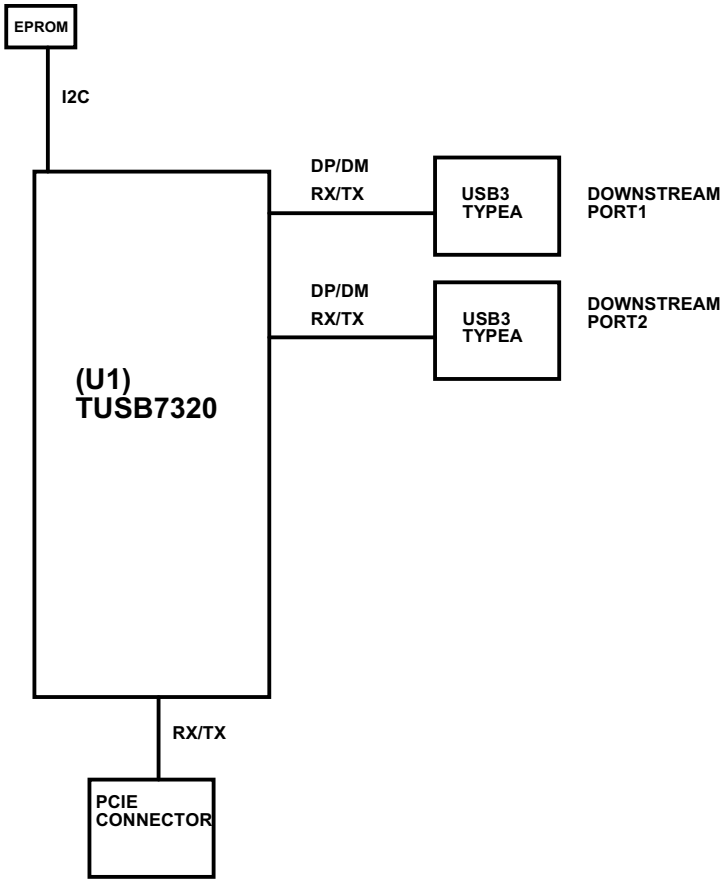
1 TUSB7320 DEMO EVM REVB Schematics



VIA AND TRACE REQUIREMENTS:
- MIN VIA PAD SIZE 20mils
- MIN spacing between trace and pad is 5mils
- MIN spacing between VIA and pad is 5mils
- MIN width of trace is 4mils

IMPEDANCE REQUIREMENTS:
- USB_DP/M must be 90-ohm differential (+/-15%)
- USB_SSTXP/N must be 90-ohms differential (+/-15%)
- USB_SSRXP/N must be 90-ohms differential (+/-15%)
- PCIE_TXP/N must be 100-ohms differential (+/-10%)
- PCIE_RXP/N must be 100-ohms differential (+/-10%)
- PCIE_REFCLKP/N must be 100-ohms differential (+/-10%)

LENGTH MATCHING REQUIREMENTS:
- USB_DP/M within 25mils.
- USB_SSTXP/N within 5mils
- USB_SSRXP/N within 5mils
- PCIE_TXP/N within 5mils
- PCIE_RXP/N within 5mils
- PCIE_REFCLKP/N within 25mils.

TEXAS INSTRUMENTS		
TUSB7320 DEMO REVB_48		
SIZE B	DWG NO:	
SCALE: NONE	Friday, May 09, 2014	Sheet 1 of 4

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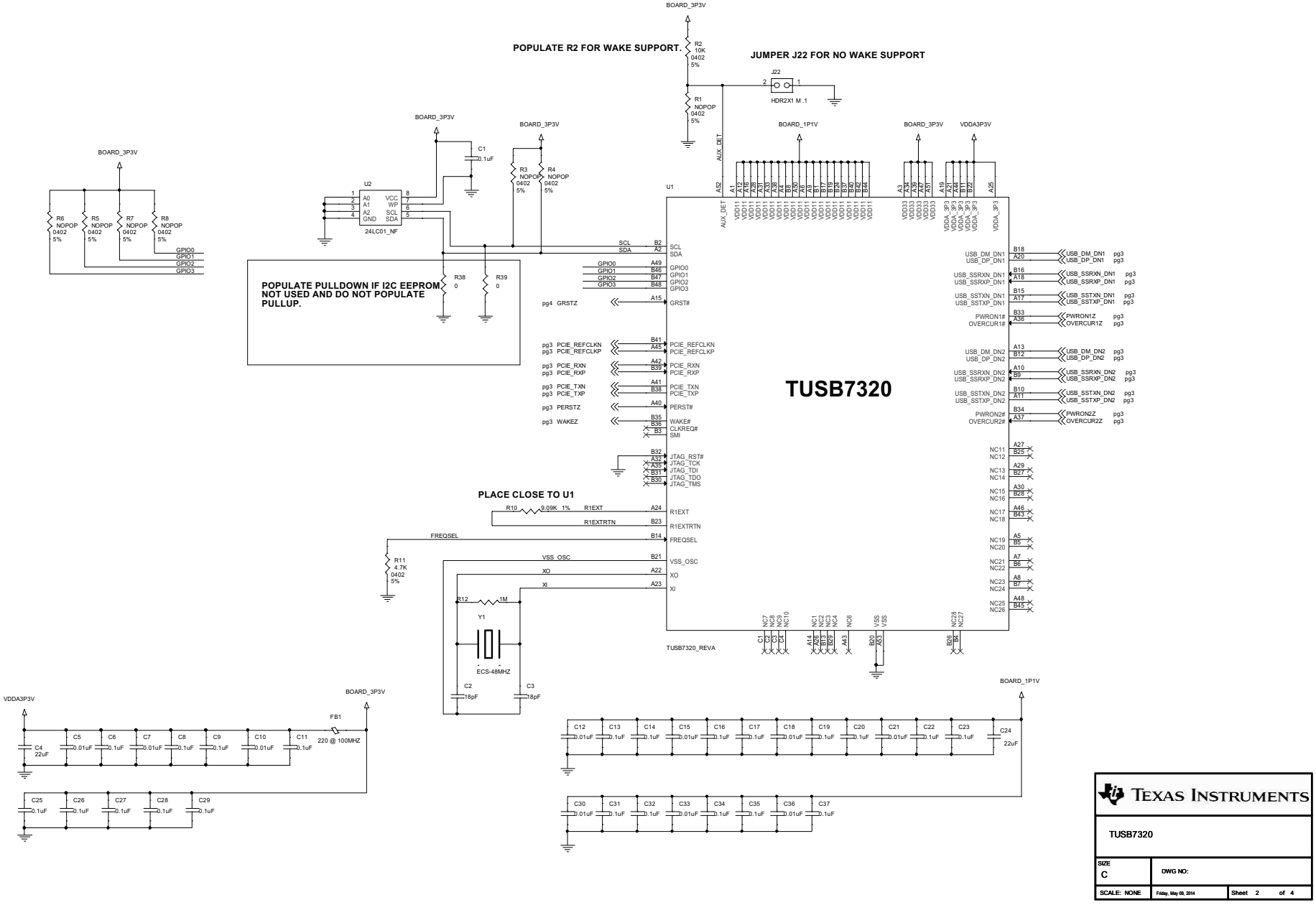

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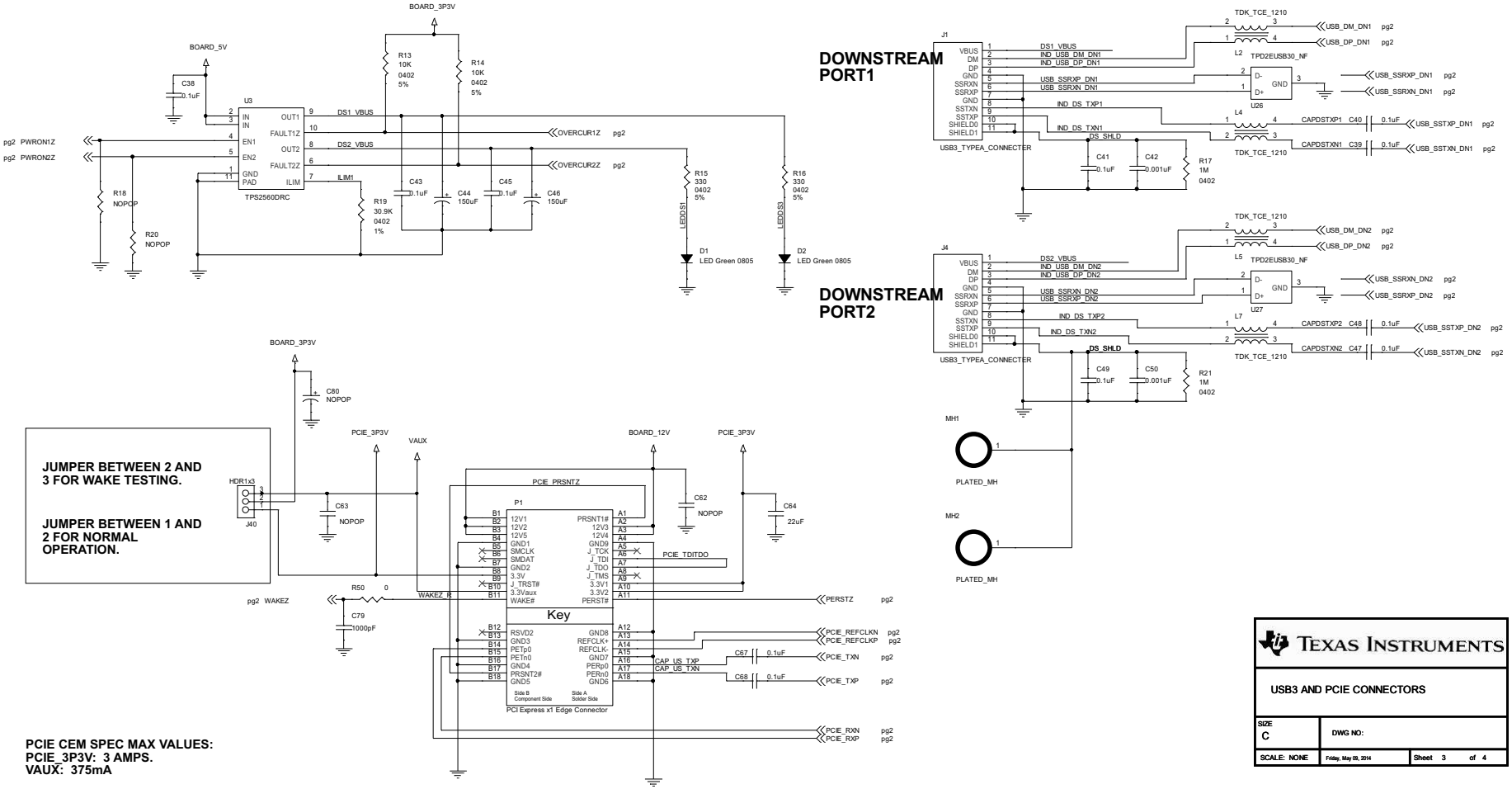

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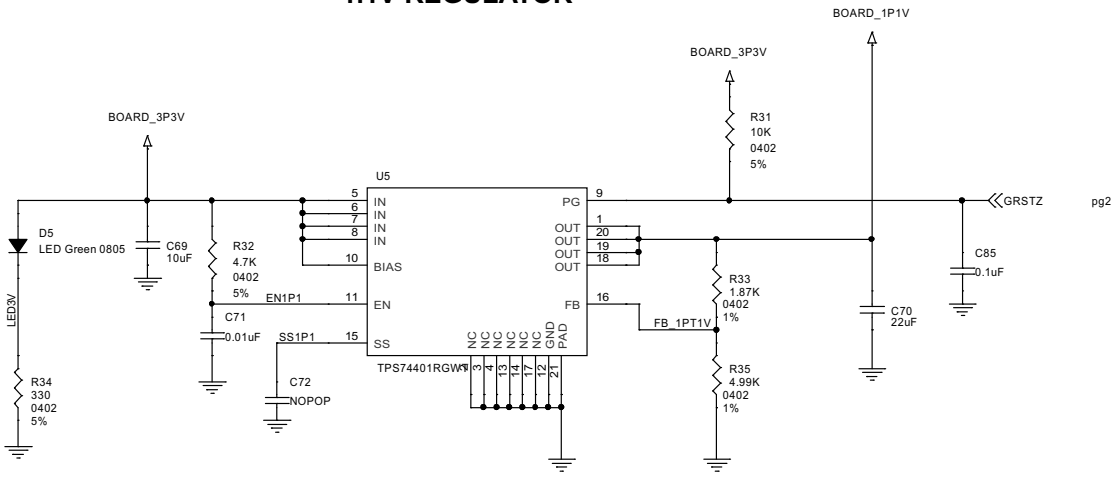
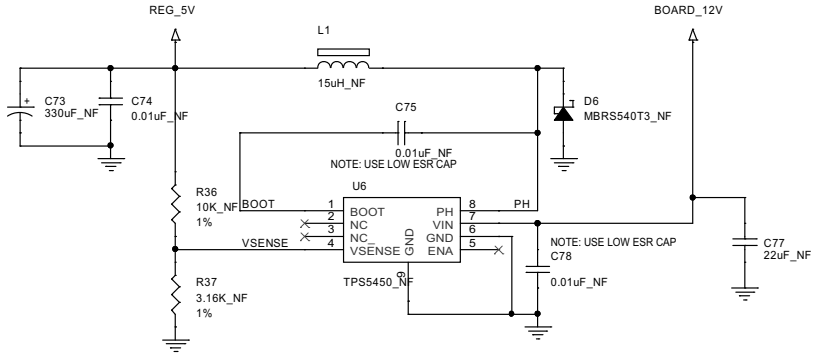
1.1V REGULATOR



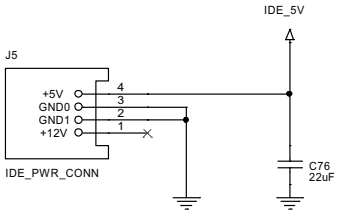
R33	R35	OUTPUT
1.13K	4.53K	1.0V
1.37K	4.42K	1.05V
1.87K	4.99K	1.1V (DEFAULT)
2.49K	4.99K	1.2V

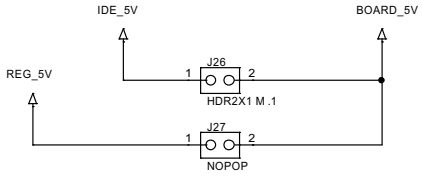
5V VBUS OPTIONS

OPTION 1: 5V REGULATOR



OPTION 2: 5V FROM IDE CONNECTOR





NOTE: ONLY POPULATE ONE OPTION

TEXAS INSTRUMENTS		
POWER		
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SCALE: NONE	Friday, May 09, 2014	Sheet 4 of 4

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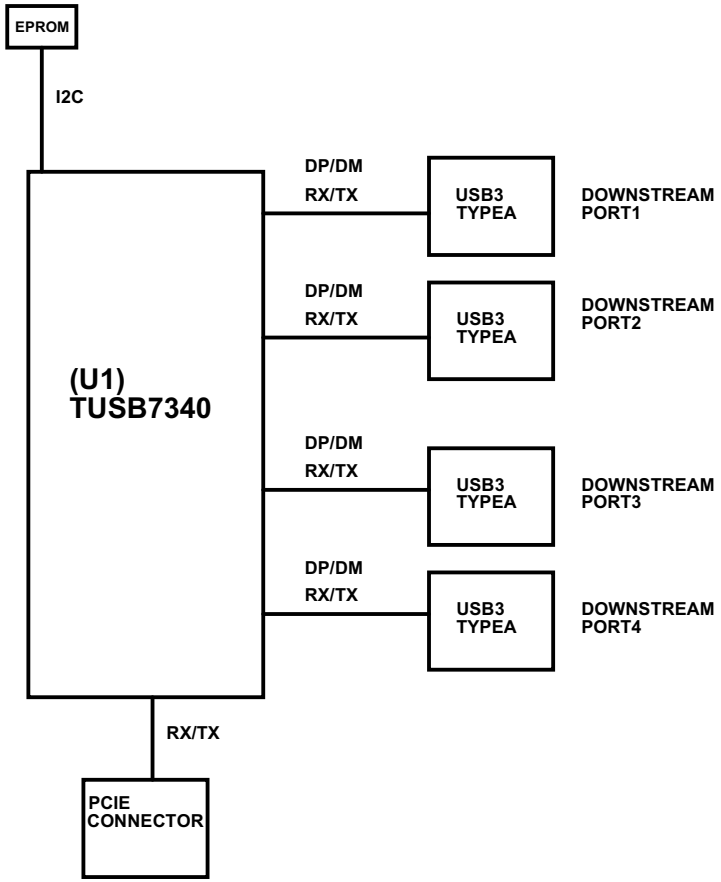
2 TUSB7340 DEMO EVM REVB Schematics



VIA AND TRACE REQUIREMENTS:
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- MIN spacing between VIA and pad is 5mils
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IMPEDANCE REQUIREMENTS:
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- PCIE_REFCLKP/N must be 100-ohms differential (+/-10%)

LENGTH MATCHING REQUIREMENTS:
- USB_DP/M within 25mils.
- USB_SSTXP/N within 5mils
- USB_SSRXP/N within 5mils
- PCIE_TXP/N within 5mils
- PCIE_RXP/N within 5mils
- PCIE_REFCLKP/N within 25mils.

TEXAS INSTRUMENTS		
TUSB7340_DEMO_REVB_48		
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SCALE: NONE	Friday, May 09, 2014	Sheet 1 of 4

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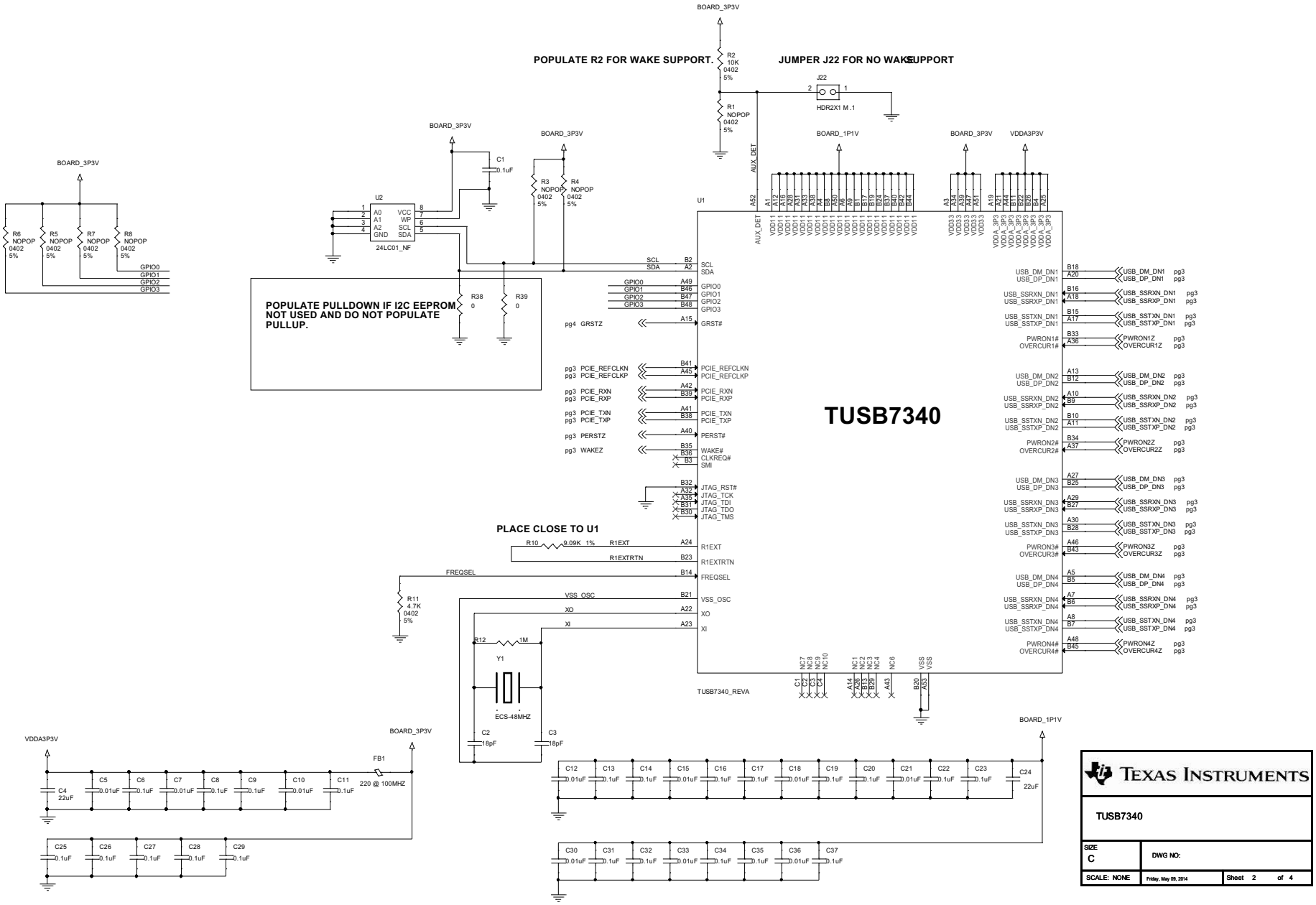

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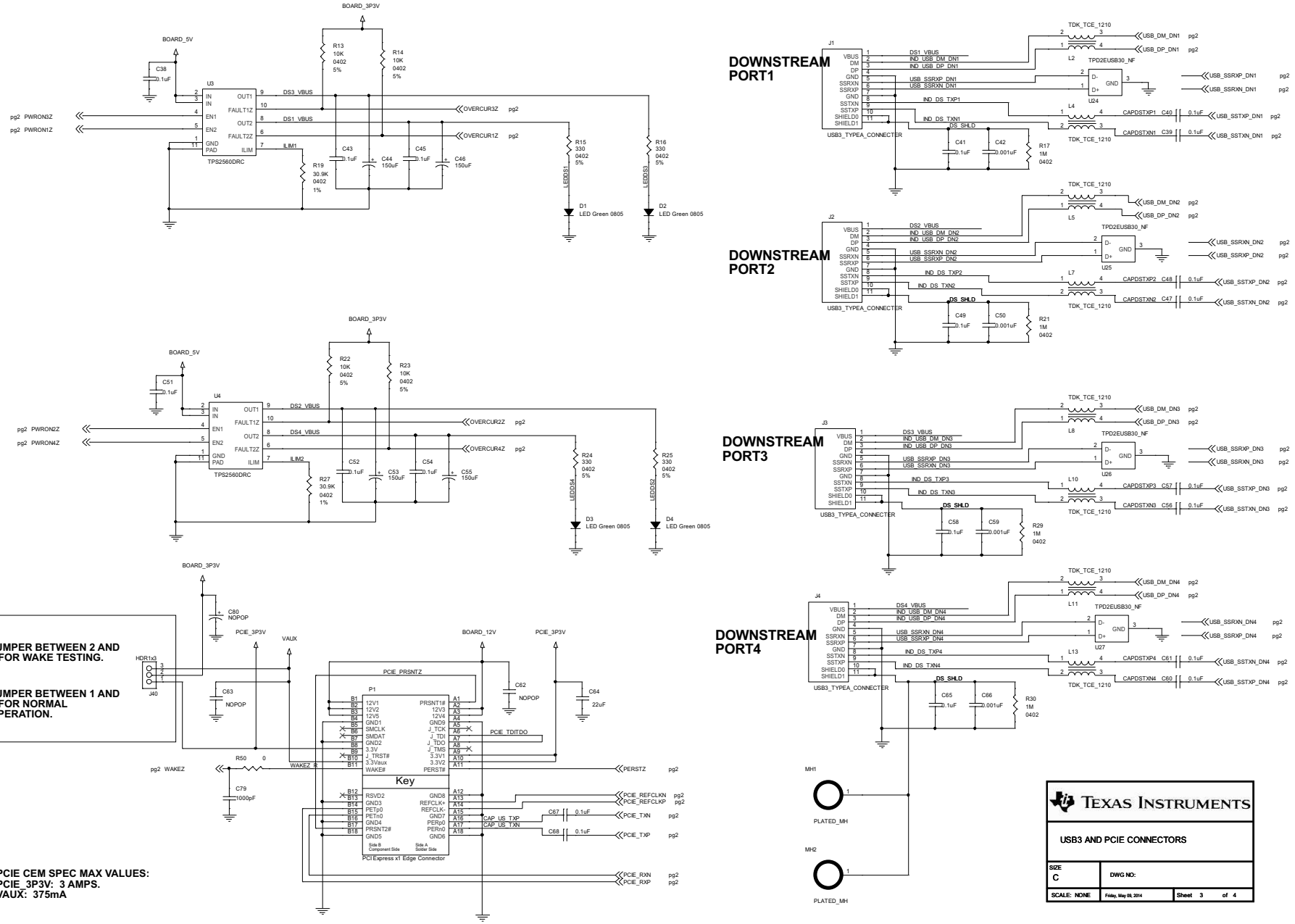

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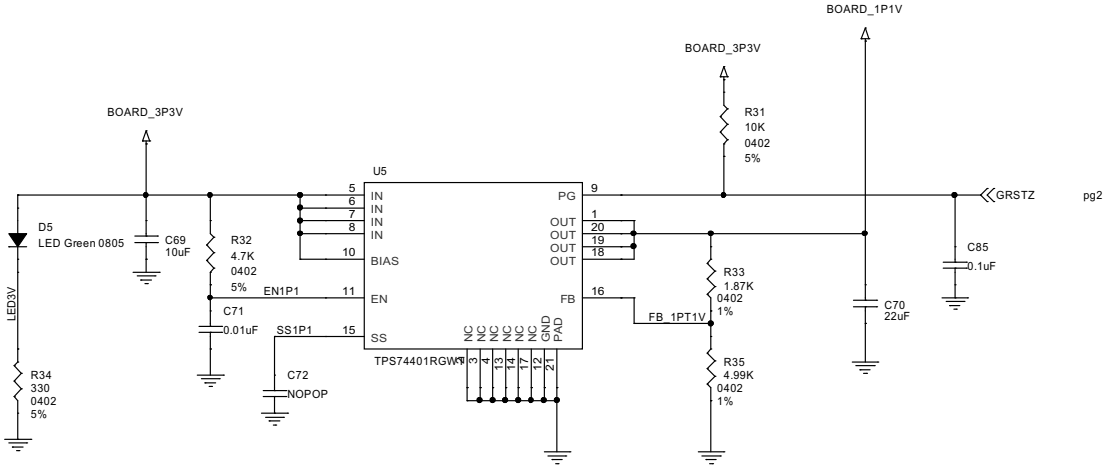
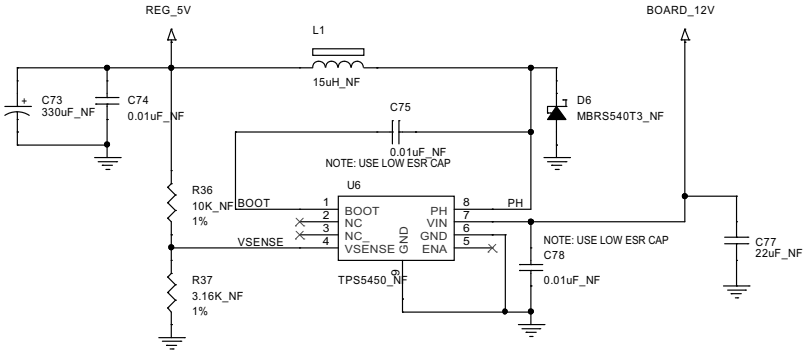
1.1V REGULATOR



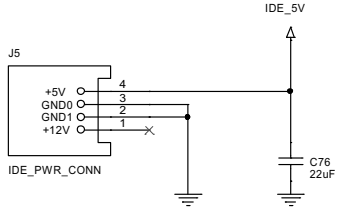
R33	R35	OUTPUT
1.13K	4.53K	1.0V
1.37K	4.42K	1.05V
1.87K	4.99K	1.1V (DEFAULT)
2.49K	4.99K	1.2V

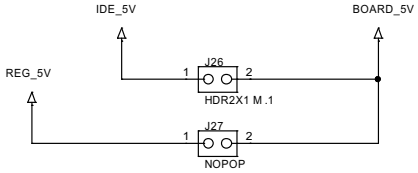
5V VBUS OPTIONS

OPTION 1: 5V REGULATOR



OPTION 2: 5V FROM IDE CONNECTOR





NOTE: ONLY POPULATE ONE OPTION

TEXAS INSTRUMENTS		
POWER		
SIZE B	DWG NO:	
SCALE: NONE	Friday, May 09, 2014	Sheet 4 of 4

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Appendix A Bill of Materials

The below table is the bill of materials for the TUSB7320 DEMO EVM REVB board. The rows marked in yellow are components that are not populated on the EVM board.

Table 1. TUSB7320 DEMO REVB BOM

Item	Quantity	Reference	Part	Footprint	Tolerance	Manufacturer	Manufacturer PN
1	35	C1,C6,C8,C9,C11,C13, C14,C16,C17,C19,C20, C22,C23,C25,C26,C27, C28,C29,C31,C32,C34, C35,C37,C38,C39,C40, C41,C43,C45,C47,C48, C49,C67,C68,C85	0.1µF	402			
2	2	C2,C3	18pF	402			
3	3	C4,C24,C70	22µF	805			
4	11	C5,C7,C10,C12,C15, C18,C21,C30,C33,C36, C71	0.01µF	402			
5	2	C42,C50	0.001µF	402			
6	2	C44,C46	150µF	CASE_D		Panasonic	EEEFP1A151AP
7	1	C62	NOPOP	1210			
8	1	C63	NOPOP	805			
9	2	C64,C76	22µF	1210			
10	1	C69	10µF	805			
11	1	C72	NOPOP	402			
12	1	C73	330µF_NF	THCAP_2P5MM		Panasonic	ECA-1CM331
13	3	C74,C75,C78	0.01µF_NF	402			
14	1	C77	22µF_NF	1210			
15	1	C79	1000pF	402			
16	1	C80	NOPOP	7343			
17	3	D1,D2,D5	LED Green 0805	805		Lumex	SML-LX0805GC-TR
18	1	D6	MBRS540T3_NF	DIODE_SMC		On Semiconductor	MBRS540T3G
19	1	FB1	220 @ 100MHZ	603		MuRata	BLM18EG221SN1D
20	2	J1,J4	USB3_TYPEA	USB3_TYPEA		MainSuper	AK2SA009K1
21	1	J5	IDE_PWR_CONN	IDEPWR		Molex	15-24-4441
22	2	J22,J26	HDR2X1 M .1	HDR_2X1			
23	1	J27	NOPOP	HDR_2X1			
24	1	J40	HDR1x3	berg1x3			
25	1	L1	15µH_NF	DR127		Coiltronics	DR127-150-R
26	4	L2,L4,L5,L7	TDK_TCE_1210	TDK_TCE_1210		TDK	TCE_1210_900_ 2P_T
27	2	MH1,MH2	PLATED_MH	MH_125mil			
28	1	P1	PCIe x1 Edge	PCIe_X1			
29	10	R1,R3,R4,R5,R6,R7, R8,R9, R18,R20	NOPOP	402	5%		
30	4	R2,R13,R14,R31	10K	402	5%		
31	1	R10	9.09K	402	1%		
32	2	R11,R32	4.7K	402	5%		
33	3	R12,R17,R21	1M	402	5%		
34	3	R15,R16,R34	330	402	5%		
35	1	R19	30.9K	402	1%		
36	1	R33	1.87K	402	1%		
37	1	R35	4.99K	402	1%		
38	1	R36	10K_NF	402	1%		
39	1	R37	3.16K_NF	402	1%		

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Table 1. TUSB7320 DEMO REVB BOM (continued)

Item	Quantity	Reference	Part	Footprint	Tolerance	Manufacturer	Manufacturer PN
40	3	R38,R39,R50	0	402	5%		
41	1	U1	TUSB7320QFN	100_QFN		TI	TUSB7320QFN
42	1	U2	24LC01_NF	8_SOIC		MicroChip Tech	24LC01BT-I/SN
43	1	U3	TPS2560DRC	10_DRC		TI	TPS2560DRC
44	1	U5	TPS74401RGWT	20_RGW		TI	TPS74401RGWT
45	1	U6	TPS5450_NF	DDA		TI	TPS5450DDAR
46	2	U26,U27	TPD2EUSB30	DRT_sot23		TI	TPD2EUSB30DRT
47	1	Y1	ECS-48MHZ	ECX-53B		Abracon	ABM3B-48.000MHZ-B2-T
48	2		4-40x1/4 Machine Screw Phillips			Digikey	H342-ND
49	1		PCI Bracket			General Stamping & Manufacturing Corp.	ME-440-2AT-BB
50	1	J26,J40	Jump Shunt			Tyco	881545-2

The below table is the bill of materials for the TUSB7340 DEMO EVM REVB board. The rows marked in yellow are components that are not populated on the EVM board.

Table 2. TUSB7340 DEMO REVB BOM

Item	Quantity	Reference	Part	Footprint	Tolerance	Manufacturer	Manufacturer PN
1	44	C1,C6,C8,C9,C11,C13, C14,C16,C17,C19,C20, C22,C23,C25,C26,C27, C28,C29,C31,C32,C34, C35,C37,C38,C39,C40, C41,C43,C45,C47,C48, C49,C51,C52,C54,C56, C57,C58,C60,C61,C65, C67,C68, C85	0.1µF	402			
2	2	C2,C3	18pF	402			
3	3	C4,C24,C70	22µF	805			
4	11	C5,C7,C10,C12,C15, C18,C21,C30,C33,C36, C71	0.01µF	402			
5	4	C42,C50,C59,C66	0.001µF	402			
6	4	C44,C46,C53,C55	150µF	CASE_D		Panasonic	EEEFP1A151AP
7	1	C62	NOPOP	1210			
8	1	C63	NOPOP	805			
9	2	C64,C76	22µF	1210			
10	1	C69	10µF	805			
11	1	C72	NOPOP	402			
12	1	C73	330µF_NF	THCAP_2P5MM		Panasonic	ECA-1CM331
13	3	C74,C75,C78	0.01µF_NF	402			
14	1	C77	22µF_NF	1210			
15	1	C79	1000pF	402			
16	1	C80	NOPOP	7343		XX	XX
17	5	D1,D2,D3,D4,D5	LED Green 0805	805		Lumex	SML-LX0805GC-TR
18	1	D6	MBRS540T3_NF	DIODE_SMC		On Semiconductor	MBRS540T3G
19	1	FB1	220 @ 100MHZ	603		MuRata	BLM18EG221SN1D
20	4	J1,J2,J3,J4	USB3_TYPEA	USB3_TYPEA		MainSuper	AK2SA009K1
21	1	J5	IDE_PWR_CONN	IDEPWR		Molex	15-24-4441
22	2	J22,J26	HDR2X1 M .1	HDR_2X1			
23	1	J27	NOPOP	HDR_2X1			
24	1	J40	HDR1x3	berg1x3			

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Table 2. TUSB7340 DEMO REVB BOM (continued)

Item	Quantity	Reference	Part	Footprint	Tolerance	Manufacturer	Manufacturer PN
25	1	L1	15µH_NF	DR127		Coiltronics	DR127-150-R
26	8	L2,L4,L5,L7,L8,L10, L11, L13	TDK_TCE_1210	TDK_TCE_1210		TDK	TCE_1210_900_ 2P_T
27	2	MH1,MH2	PLATED_MH	MH_125mil			
28	1	P1	PCI Express x1 Edge	PCIe_X1			
29	8	R1,R3,R4,R5,R6,R7, R8,R9	NOPOP	402	5%		
30	6	R2,R13,R14,R22,R23, R31	10K	402	5%		
31	1	R10	9.09K	402	1%		
32	2	R11,R32	4.7K	402	5%		
33	5	R12,R17,R21,R29,R30	1M	402	5%		
34	5	R15,R16,R24,R25,R34	330	402	5%		
35	2	R19,R27	30.9K	402	1%		
36	1	R33	1.87K	402	1%		
37	1	R35	4.99K	402	1%		
38	1	R36	10K_NF	402	1%		
39	1	R37	3.16K_NF	402	1%		
40	3	R38,R39,R50	0	402	5%		
41	1	U1	TUSB7340QFN	100_QFN		TI	TUSB7340QFN
42	1	U2	24LC01_NF	8_SOIC		MicroChip Tech	24LC01BT-I/SN
43	2	U3,U4	TPS2560DRC	10_DRC		TI	TPS2560DRC
44	1	U5	TPS74401RGWT	20_RGW		TI	TPS74401RGWT
45	1	U6	TPS5450_NF	DDA		TI	TPS5450DDAR
46	4	U24,U25,U26,U27	TPD2EUSB30	DRT_sot23		TI	TPD2EUSB30DRT
47	1	Y1	ECS-48MHZ	ECX-53B		Abracon	ABM3B-48.000MHZ-B2-T
48	2		4-40x1/4 Machine Screw Phillips			Digikey	H342-ND
49	1		PCI Bracket			General Stamping & Manufacturing Corp.	ME-440-2AT-BB
50	2	J26,J40	Jump Shunt			Tyco	881545-2

Revision History

Changes from B Revision (August 2012) to C Revision **Page**

- Changed entire contents of *Chapter 6: Schematics* with Rev. B_48 12

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U.S. Federal Communications Commission Compliance

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 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 its 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.

Industry Canada Compliance (English)

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.

Canada Industry Canada Compliance (French)

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.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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Important Notice for Users of EVMs Considered "Radio Frequency Products" in Japan

EVMs entering Japan are NOT certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If user uses EVMs in Japan, user is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs 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 EVMs only after user obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after user obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless user gives the same notice above to the transferee. Please note that if user does not follow the instructions above, user will be subject to penalties of Radio Law of Japan.

http://www.tij.co.jp

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