Pin Description

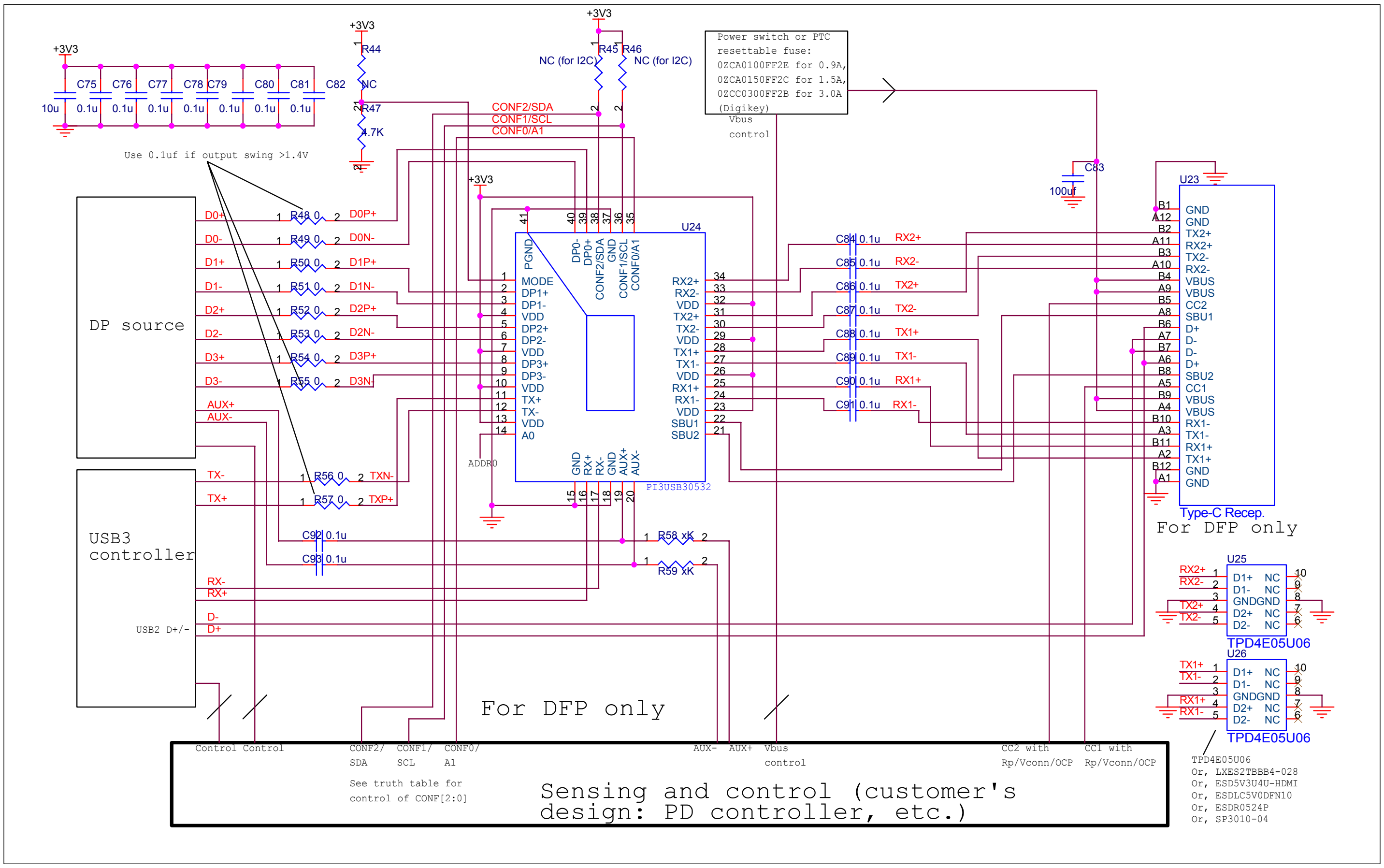
Pin#	Pin Name	Type	Description
4, 7, 10, 13, 23, 26, 29, 32	VDD	Power	3.0V - 3.6V power supply.
11, 12	TX+, TX-	I/O	Differential USB3.0 Transmit signal. Connected internally with 100Kohm pulldown to ground.
16, 17	RX+, RX-	I/O	Differential USB3.0 Receive signal. Connected internally with 100Kohm pulldown to ground.
39, 40	DP0+, DP0-	I/O	Differential DP0 signal. Connected internally with 100Kohm pulldown to ground.
2, 3	DP1+, DP1-	I/O	Differential DP1 signal. Connected internally with 100Kohm pulldown to ground.
5, 6	DP2+, DP2-	I/O	Differential DP2 signal. Connected internally with 100Kohm pulldown to ground.
8, 9	DP3+, DP3-	I/O	Differential DP3 signal. Connected internally with 100Kohm pulldown to ground.
19, 20	AUX+, AUX-	I/O	Differential Auxiliary signal for DP.
22, 21	SBU1, SBU2	I/O	Side Band signal at Type C connector.
25, 24	RX1+, RX1-	I/O	Differential Receive signal 1 at Type C connector.
28, 27	TX1+, TX1-	I/O	Differential Transmit signal 1 at Type C connector.
31, 30	TX2+, TX2-	I/O	Differential Transmit signal 2 at Type C connector.
34, 33	RX2+, RX2-	I/O	Differential Receive signal 2 at Type C connector.
1	MODE	I	Control mode selection MODE = 1, I2C control = 0, pin control through CONF[2:0]
35, 36, 38	CONF[2:0]	I	Switch configuration selection pin when MODE = 0, please refer to 'switch selection truth tanle' for detail, When MODE = 1, these pins are part of the I2C interface as SDA/SCL/A1.
38	SDA	I/O	Serial in data of I2C when MODE = 1.
36	SCL	I	I2C clock input pin when MODE = 1.
35	A1	I	A[1] of A[1:0] I2C selectable address when MODE = 1.
14	A0	I	A[0] of A[1:0] I2C selectable address when MODE = 1.
15, 18, 37, Center Pad	GND	Power	Ground supply.

Configuration Table

Switch	Open	Open	4 lane of DP1.2	4 lane of DP1.2 Swap	USB3	USB3 Swap	USB3 +2 lane of DP1.2	USB3 +2 lane of DP1.2 Swap
Conf[2:0]	000	001	010	011	100	101	110	111
TX	x	x	x	x	TX1	TX2	TX1	TX2
RX	x	x	x	x	RX1	RX2	RX1	RX2
DP0	x	x	RX2	RX1	x	x	RX2	RX1
DP1	x	x	TX2	TX1	x	x	TX2	TX1
DP2	x	x	TX1	TX2	x	x	x	x
DP3	x	x	RX1	RX2	x	x	x	x
AUX+	x	x	SBU1	SBU2	x	x	SBU1	SBU2
AUX-	x	x	SBU2	SBU1	x	x	SBU2	SBU1

000 = switch open with power down

001 = switch open only, no power down



PI3USB30532 Application Diagram

Maximum Ratings

(Above which useful life may be impaired. For user guidelines, not tested.)

Supply Voltage to Ground Potential, V_{DD} = 3.3V	-0.3V to 4.3V
Control DC input	-0.3V to V_{DD}+0.3V
Ambient Operating Temperature	-40 to +85°C
Storage Temperature	-65 to +150°C
Junction Temperature	150°C
Soldering Temperature	260°C
Channel DC input for USB, DP	-0.3V to 1.2V
Channel DC input for AUX	-0.35V to VDD

Note: Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operation Conditions

Parameter	Min.	Typ.	Max.	Unit
Ambient Operating Temperature	-40		+85	°C
Power Supply Voltage (measured in respect to GND)	3.0	3.3	3.6	V

Static Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{DD}	Supply Voltage		3.0	3.3	3.6	V
I_{DD}	VDD Supply Current	VDD = 3.3V all Conf[2:0] states except [000]		300	350	µA
		VDD = 3.3V Conf[2:0] = 000		10	30	µA
I_{OFF}	I/O leakage when power is off	VDD = 0V VIO(usb3) = 0V VIO(dp1.2) = 0V VIO(aux) = 0V VIO(sbu) = 0V			50	nA
Control/I2C pin (MODE, A0, A1, SDA, SCL)						
I_{IH}	High level digital input current	VIH = VDD VDD = 3.6V			5	µA
I_{IL}	Low level digital input current	VIL = GND VDD = 3.6V			5	µA
V_{IH}	High level digital input voltage	VDD = 3.0V-3.6V	0.75 *VDD			V
V_{IL}	Low level digital input voltage	VDD = 3.0V-3.6V			0.6	V
Control pin (CONF [2:0])						
I_{IH}	High level digital input current	VIH = VDD VDD = 3.6V			5	µA

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{IL}	Low level digital input current	VIL = GND VDD = 3.6V			5	µA
V_{IH}	High level digital input voltage	VDD = 3.0V-3.6V	1.2			V
V_{IL}	Low level digital input voltage	VDD = 3.0V-3.6V			0.4	V
I/O pin (TX+, TX-, RX+, RX-, TX1+, TX1-, RX1+, RX1-, TX2+, TX2-, RX2+, RX2-DP0+, DP0-, DP1+, DP1-, DP2+, DP2-, DP3+, DP3-) **(AUX+, AUX-, SBU1, SBU2)**						
C_{OFF}	USB3/DP1.2 switch OFF capacitance	VIO = GND f = 1MHz		1.2		pF
C_{ON}	USB3/DP1.2 switch ON capacitance	VIO = GND f = 1MHz		2.3		pF
C_{OFF}	AUX+/AUX- switch OFF capacitance	VIO = GND f = 1MHz		4.0		pF
C_{ON}	AUX+/AUX- switch ON capacitance	VIO = GND f = 1MHz		7.0		pF
I_{OZL}	I/O leakage for TX_to_TX1/TX2, RX_to_RX1/RX2 DPx_to_TX/RX(x = 0, 1, 2, 3) AUX_to_SBUy(y = 1, 2)	VDD = 3.6V, VIO (usb3) = 0V, VIO (dp1.2) = 0V, VIO (aux) = 0V		1	5	µA
I_{OZH}	I/O leakage for TX_to_TX1/TX2, RX_to_RX1/RX2 DPx_to_TX/RX(x = 0, 1, 2, 3) AUX_to_SBUy(y = 1, 2)	VDD = 3.6V, VIO (usb3) = 1.2V, VIO (dp1.2) = 1.2V, VIO (aux) = 4.0V		1	15	µA
Linear region for Analog switch						
Vp_IO	Linear region for analog switch TX_to_TX1/TX2, RX_to_RX1/RX2 DPx_to_TX/RX(x = 0, 1, 2, 3)	VDD = 3.3V, Ipass = 10mA	1.4	1.6		V
Vp_IOSB	Linear region for analog switch AUX_to_SBUx(x = 1, 2)	VDD = 3.3V, Ipass = 10mA	4.0	4.2		V

Dynamic Characteristics

Min and Max apply for T_A between -40°C to 85°C Typical values are referenced to T_A = 25°C

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
tstartup	Startup time	Supply voltage valid or (*) the device is powered up & channel is turn on to its specified characteristics VDD = 3V		10	20	µs
trcfg	Reconfiguration time	Conf[2:0] change to channel specified operating characteristics		1	2	
tpd	Propagation delay 1	From input port to output port USB/DP		80		ps
tpd	Propagation delay 2	From input port to output port AUX		150		ps
tsk	Skew time 1	From input port to output USB/DP Bit to bit skew		10		ps
tsk	Skew time 2	From input port to output AUX Bit to bit skew		20		ps
VI_sub_dp	USB/DP input signal	USB/DP switch analog signal	-0.3		1.2	V
VI_aux	AUX+/AUX- input signal	AUX switch analog signal	-0.35		VDD	V

* Conf[2:0] changes from [000] to [001]/[010]/[011]/[100]/[101]/[110]/[111]

Switch AC Electrical Characteristics

Min and Max apply for T_A between -40°C to 85°C and T_J up to +125°C (unless otherwise noted). Typical values are referenced to T_A = +25°C, V_{DD} = 3.3V

Symbol	Parameter	Frequency/Vcom		Typ.	Units
BW_usb	-3dB bandwidth of USB3	-		6.0	GHz
I_L	Differential Insertion Loss	2.5/2.7GHz/0V		-1.2/-1.3	dB
R_L	Differential Return Loss	2.5/2.7GHz/0V		-21/ -20	dB
Xtalk	Differential Crosstalk	2.5/2.7GHz/0V	USB	-38/-37	dB
			DP	-25/-24	
Xoff	Off Isolation	2.5/2.7GHz/0V		-23/-22	dB

I^{2}C AC Electrical Characteristics

Symbol	Parameter	Fast Mode (400kHz)		Units
		Min.	Max.	
f_{SCL}	SCL Clock Frequency	0	400	kHz
t_{HDSTA}	Hold Time (Repeated) START Condition	0.6	-	µs
t_{LOW}	LOW Period of SCL Clock	1.3	-	µs
t_{HIGH}	HIGH Period of SCL Clock	0.6	-	µs
t_{SETSTA}	Set-up Time for Repeated START Condition	0.6	-	µs
t_{HDDAT}	Data Hold Time	0	0.9	µs
t_{SETDAT}	Data Set-up Time	100	-	µs
t_r	Rise Time of SDA and SCL Signals	$20+0.1C_b$	300	ns
t_f	Fall Time of SDA and SCL Signals	$20+0.1C_b$	300	
t_{SETSTO}	Set-up Time for STOP Condition	0.6	-	µs

I2C Control

** **I2C function reference:**

" *THE I2C-BUS SPECIFICATION, VERSION 2.1*"

I2C Control register:

	Register Bits							
	Bit7	**Bit6**	**Bit5**	**Bit4**	**Bit3**	**Bit2**	**Bit1**	**Bit0**
Slave address (First byte is slave address)	1	0	1	0	1	A1	A0	0/1 (W/R)
Vendor ID (Second byte is vendor ID, read only)	0	0	0	0	0	0	0	0
Selection control (Third byte is for selection control, read/write)	0	0	0	0	0	conf[2]	conf[1]	conf[0]

Note:

1. Bit7 - Bit3 = Version ID (00000) in (01H)
2. Bit2 - Bit0 = Pericom Vendor ID (000) in (01H)
3. A0, A1 are hardware selectable (pin35, pin36)
4. conf[2]/conf[1]/conf[0] are written into the register by the master PI3USB30532 will decode Bit2 - Bit0 in (02h) for I2C control (Pin1/MODE = 1). Default powerup state is 000.

Bus Transactions

Data teansfers follow the format shown in Fig.A1 After the START condition (S), a slave address is sent. This address is 7 bits long followed by an eighth bit which is a data direction bit (R/W) - a 'zero' indicates a transmission (WRITE), a 'one' indicates a request for data (READ). A data transfer is always terminated by a STOP condition (P) generate by the master. However, if a master still wishes to communicate on the bus, it can generate a repeated START condition (S) and address another slave without first generating a STOP condition. Various combinations of read/write formats are then possible within such a transfer.

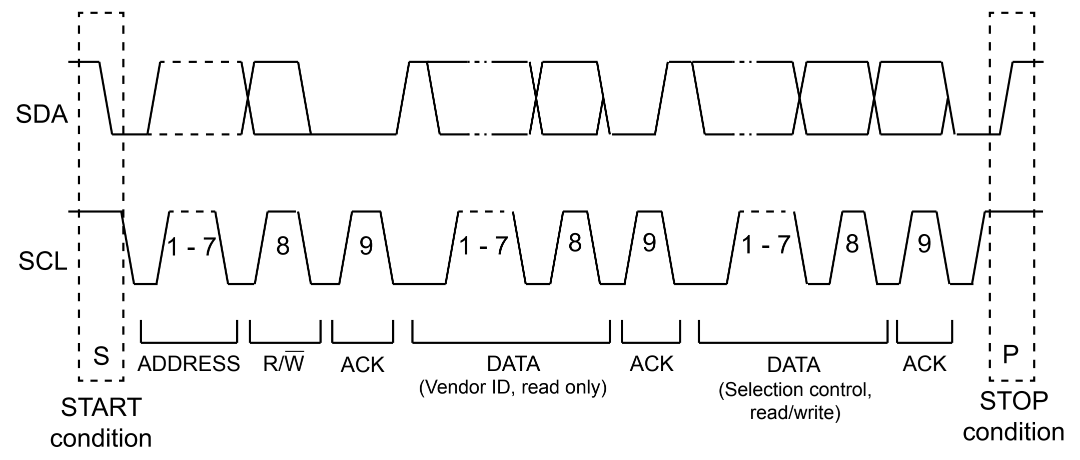


Figure A1: A Complete Data Transfer

Data is transmitted to the PI3USB30532 registers using the Write mode as shown in Figure 2. Data is read from the PI3USB30532 registers using the Read mode as shown in Figure A2.

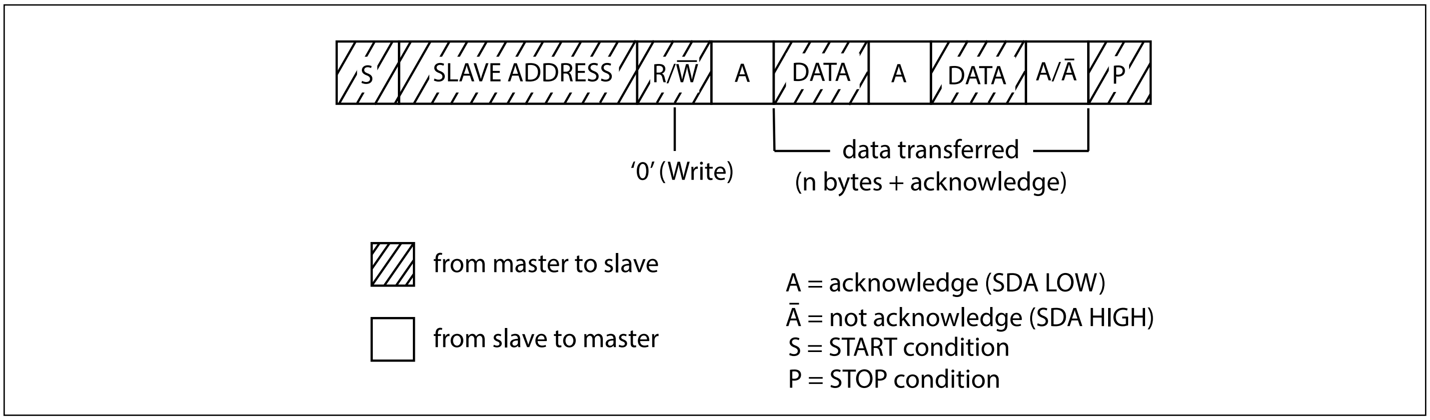


Figure 2: Write to Control Register

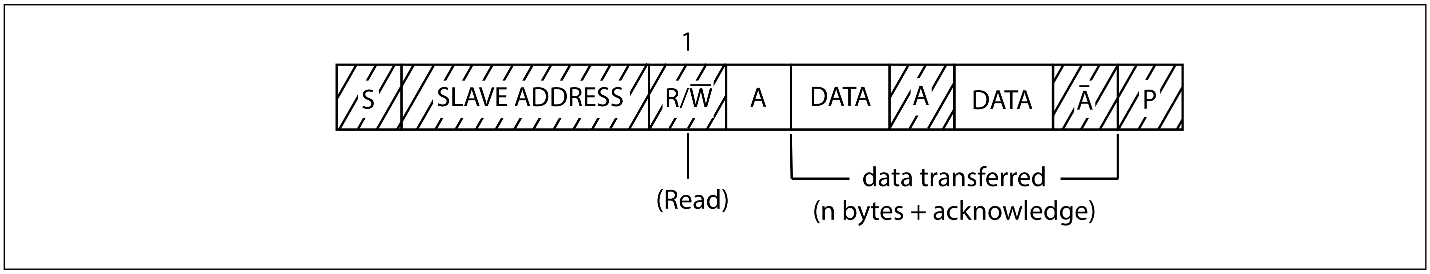
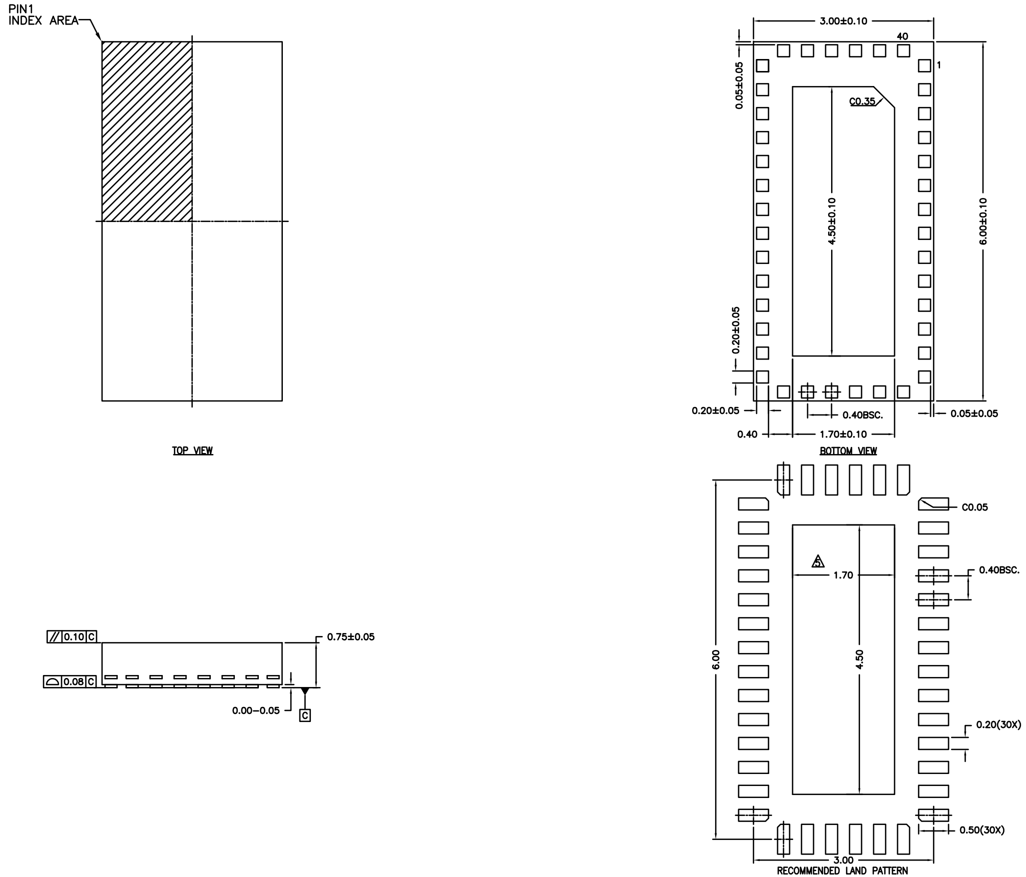


Figure A2: Read to Control Register

Packaging Mechanical: 40-Pin TQFN



NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES
2. COPLANARITY APPLIES TO THE EXPOSED THERMAL PAD AS WELL AS THE TERMINALS
3. REFER JEDEC MO-220
4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY
5. THERMAL PAD SOLDERING AREA (MESH STENCIL DESIGN IS RECOMMENDED)

Enabling Serial Connectivity

DATE: 02/10/15

DESCRIPTION: 40-Pin, TQFN 3X6mm

PACKAGE CODE: ZL (ZL40)

DOCUMENT CONTROL #: PD-2165 **REVISION: A**

Note: For latest package info, please check: http://www.pericom.com/support/packaging/packaging-mechanicals-and-thermal-characteristics/

Ordering Information

Ordering Code	Packaging Code	Package Description
PI3USB30532ZLE	ZL	40-contact, 3x6mm (TQFN)

NOTES:

1. Thermal characteristics can be found on the company web site at www.pericom.com/package
2. E = Pb-free and Green
3. Adding an X suffix = Tape/Reel