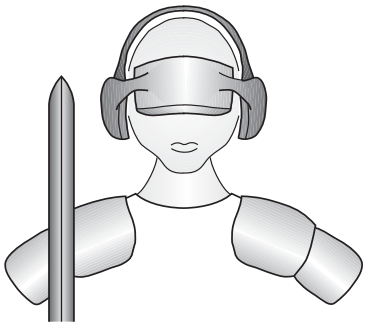
KeyWarrior WUSB

Wireless keyboard, mouse, and keyboard/mouse combo chipset at 2.4GHz



Code Mercenaries

1. Features

- 2.4GHz DSSS (Direct Sequence Spread Spectrum) signalling
- High noise immunity
- Coexistence with WLAN and BlueTooth
- Range up to 50m (open area)
- 78 frequency channels and 8 pseudo random codes for coexistence of dozens or hundreds of units
- USB and PS/2 interfaces on receiver
- Auto detects active interface
- Supports up to 128 keys in 16x8 matrix
- USB V1.1/2.0 compliant low speed device
- USB HID 1.1 compliance
- MF2 compatible with AT or PS/2 interface
- Supports diodes in the key matrix
- User defineable matrix
- In system programmable keymap
- Supports 47 macros with up to 31 codes each
- Assignable function shift keys to switch to a second and third matrix table
- Low external component count
- Direct drive for caps lock, num lock and scroll lock LEDs on the receiver chip
- Optional mouse function
- Up to three mouse buttons
- Separate PS/2 port for mouse function
- Low Batt alert input on transmitter
- Available in DIL24 or SOIC24 (receiver) and SSOP48 (transmitter)
- RF part based on Cypress CYWUSB6935

1.1 Variants

KeyWarrior WUSB is currently available as a keyboard/mouse combo transmitter supporting optically encoded trackballs and up to 16x8 keys.
Keyboard only and mouse only transmitters and combo versions with other mouse sensors are planned.

1.2 Macro capability

The KeyWarrior WUSB chips offer the macro capability of the KeyWarrior Commander chips. An external EEPROM is used to store the keycode table on the receiver side, it allows to assign one of 47 macros to any key.
Each of the macros can be up to 31 keys long and allows any combination of keycodes to shortcut typing or generate special characters.

2. Functional Overview

KeyWarrior WUSB is a chip family consisting of a receiver chip with USB and PS/2 interfaces that is capable of handling either a keyboard/mouse combo transmitter chip or separate keyboard and mouse transmitter chips (discrete transmitter chips not yet available).
The key matrix data is stored in an external EEPROM connected to the receiver chip, which allows easy programmability of the keyboard layout via USB.

2.1 RF Design

The RF part is based on a Cypress CYWUSB6935 chip. It has a low external component count and can be used with a PCB trace antenna.
The RF design can be significantly simplified by using pretested modules available from Cypress. The modules are preapproved and save a major part of the compliance testing for USA, Canada and the EU. If properly applied the modular approval does make RF testing unnecessary for several countries. For details please refer to the documentation of the Cypress part CYWM6935.

2.2 RF Licensing

KeyWarriorWUSB uses a license free ISM band. That means manufacturers and end users do not have to pay license fees for the use of the frequency band. But it does not mean there are no regulations and no certification. The device still has to pass compliance tests for RF and EMC.

2.3 Product Selection Matrix

Type	Matrix	FN-Keys	Mouse	ext. EEPROM	Codes per key	DIL24	SOIC24	SSOP48
KeyWarrior WUSB RX	-*	2	-	24C16	1**	√	√	-
KeyWarrior WUSB TX CO	16x8	-*	√	-	-*	-	-	√
KeyWarrior WUSB TX 16	16x8	-*	-	-	-*	tbd	tbd	tbd
KeyWarrior WUSB TX MO	-*	-*	√	-	-*	tbd	tbd	tbd

*) Key codes are generated in the receiver unit, so the number of codes per key and the number of FN keys is dependent on the receiver chip, not the transmitter.

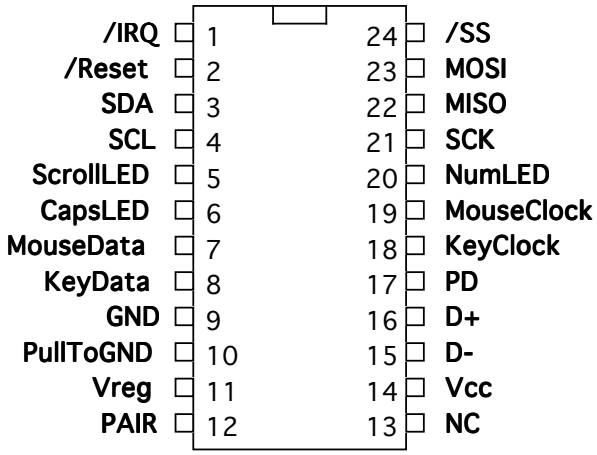
**) Supports 47 macros with 31 codes each which can be assigned to any key.

KeyWarriorWUSB TX 16 and KeyWarriorWUSB TX MO are future products and not yet finally specified.

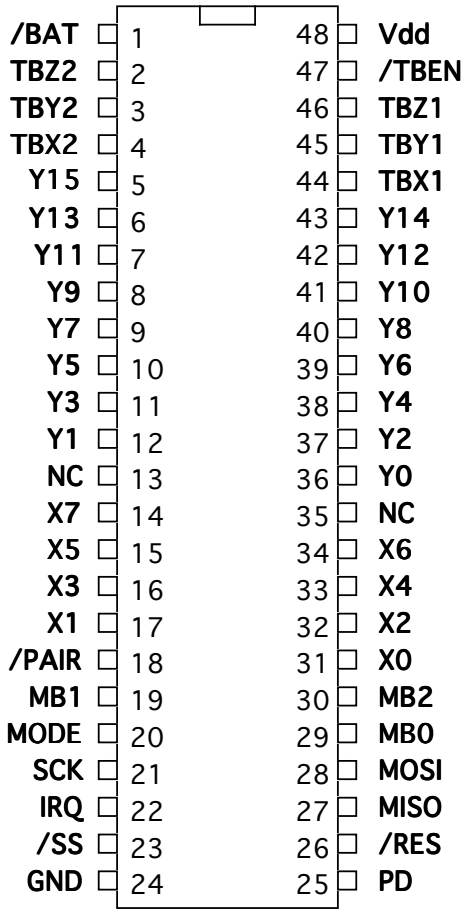
KeyWarrior WUSB

3.0 Pin Configurations

KeyWarriorWUSB RX-P
KeyWarriorWUSB RX-S
24 Pin PDIP or SOIC24



KeyWarrior WUSB TX CO-S
48 Pin SSOP



All drawings: TOP VIEW!

4.0 Pin Descriptions KeyWarrior WUSB RX

Name	I/O	Type	Pins	Description
D+, D-	I/O	special	16, 15	USB differential data lines
PAIR	I	internal Pull Down	12	Pulling this pin high initiates a binding procedure
KeyClock	I/O	OD, internal Pull Up	18	PS/2 and AT interface clock line for keyboard
KeyData	I/O	OD, internal Pull Up	8	PS/2 and AT interface data line for keyboard
MouseClock	I/O	OD, internal Pull Up	19	PS/2 interface clock line for mouse
MouseData	I/O	OD, internal Pull Up	7	PS/2 interface data line for mouse
VREG	O	special	11	Power for USB pull up resistor
CapsLED	O	OD, 25mA	6	Drives Caps Lock LED, active low
NumLED	O	OD, 25mA	20	Drives Num Lock LED, active low
ScrollLED	O	OD, 25mA	5	Drives Scroll Lock LED, active low
PD, SCK, MISO, MOSI, /SS, /Reset, /IRQ	I/O	various	17, 21, 22, 23, 24, 2, 1	Connect to CYWUSB6935
SCL	O	OD, internal Pull Up	4	SCL line for external EEPROM
SDA	I/O	OD, internal Pull Up	3	SDA line for external EEPROM
NC	-	-	13	Unused pin, do not connect
PullToGND	I		10	Used during manufacturing, connect to GND
GND		Power supply	9	Ground
Vcc		Power supply	14	Supply voltage

4.1 Pin Descriptions KeyWarrior WUSB TX CO

Name	I/O	Type	Pins	Description
/BAT	I	high impedance	1	A low on this pin enables the low battery indicator
TBZ2	I	internal Pull up/down	2	Z2 mouse signal
TBZ1	I	internal Pull up/down	46	Z1 mouse signal
TBY2	I	internal Pull up/down	3	Y2 mouse signal
TBY1	I	internal Pull up/down	45	Y1 mouse signal
TBX2	I	internal Pull up/down	4	X2 mouse signal
TBX1	I	internal Pull up/down	44	X1 mouse signal
/TBEN	O	strong low drive	47	Enable line for mouse encoder, capable of sinking sufficient current to power the LEDs of a low power trackball.
X[7:0]	I	input, internal Pull Ups	14, 34, 15, 33, 16, 32, 17, 31	Matrix row lines. Inputs to controller
Y[15:0]	O	OD	5, 43, 6, 42, 7, 41, 8, 40, 9, 39, 10, 38, 11, 37, 12, 36	Matrix column lines. Periodically driven to low by the controller to scan the matrix.
NC	-	-	13, 35	Unused pin, do not connect
/PAIR	I/O	OD, internal Pull Up	18	Pulling this line olow initiates the pairing process. The pin also drives the pairing and low battery LED
MB2	I	internal Pull up	30	Center mouse button
MB1	I	internal Pull up	19	Right mouse button
MB0	I	internal Pull up	29	Left mouse button
MODE	I	internal Pull up	20	Selects pull up or pull down on encoder inputs
SCK	O		21	Connect to CYWUSB6935
MOSI	O		28	Connect to CYWUSB6935
MISO	I	Hi-Z	27	Connect to CYWUSB6935
IRQ	I	internal Pull up	22	Connect to CYWUSB6935
/RES	O		26	Connect to CYWUSB6935
/SS	O		23	Connect to CYWUSB6935
/PD	O		25	Connect to CYWUSB6935
GND		Power supply	24	Ground
Vcc		Power supply	48	Supply voltage

4.3 Pin Descriptions KW WUSB RX

D+, D-
Differential data lines of USB. Connect these signals direct to the USB cable or type B plug.

KeyClock, KeyData
These two lines are the AT or PS/2 keyboard interface. Connect these signals to the keyboard interface of the host computer. Internal pull up resistors are activated on device reset.
If PS/2 is not used leave these pins unconnected.

MouseClock, MouseData
These two lines are the PS/2 mouse interface. Connect these lines to the mouse interface of the host computer. Internal pull up resistors are activated on device reset.
If PS/2 is not used leave these pins unconnected.

CapsLED, NumLED, ScrollLED
Open drain LED driver outputs. Each of these pins is capable of sinking 25mA max. to directly drive a LED indicating the Caps Lock, Number Lock and Scroll Lock status. Connect LEDs with appropriate resistors to +5V.
While in bind mode all three LEDs will flash constantly.

SCL, SDA
IIC signals to connect a 24C16 EEPROM chip. The EEPROM is required to store the matrix data as well as pairing information.

PD, SCK, MISO, MOSI, /SS, /Reset, /IRQ
Control signals for the CYWUSB6935 radio chip. connect these lines direct to the CYWUSB6935.

PAIR
Pulling this pin high initiates the pairing process to pair the transmitter and receiver.
Internal weak pull down resistor. Adding an external pull down resistor is recommended to improve noise immunity.

VREG
Supply for the USB D- pull up resistor. Connect a 1K3 resistor between this pin and D- of the USB.

/Pull to GND
This pin is used during production of the KeyWarrior chips, connect to GND.

GND
Power supply ground.

Vcc
Supply voltage.

4.4 Pin Descriptions KW WUSB TX CO

X[0:7]
Matrix horizontal inputs. These eight lines are read by KeyWarrior to detect pressed keys. Internal pull up resistors are activated on device reset.

Y[0:15]
Vertical matrix outputs. These open drain outputs are periodically pulled low to detect pressed keys. No internal or external pull up resistors.

TBX1, TBX2, TBY1, TBY2, TBZ1, TBZ2
Inputs for optical quadrature encoded trackball or mouse mechanism. TBX1 falling edge leads TBX2 falling edge for right movement. TBY1 falling edge leads TBY2 falling edge for up movement. TBZ1 falling edge leads TBZ2 falling edge for scrolling upwards.
The inputs can be selected to have internal pull up or pull down resistors by setting the MODE pin.

MODE
Selects pull up or pull down resistors for the mouse encoder inputs. Pulling high selects pull up, pulling low selects pull down. The selected resistor configuration will be enabled when power is applied.
High impedance input.

/TBEn
Enable signal for the LEDs of the optical quadrature encoder. Open drain output, may require external drivers for sufficient power to drive the LEDs, depending on the trackball.

/BAT
Low battery indicator input. If the logic level on this pin is low the KWWUSBTXCO will start flashing the pairing LED to indicate a low battery status.
LED flashing will pause when the KWWUSBTXCO goes into deep sleep mode.
If the battery warning is not required this pin should be pulled to Vcc.
High impedance input.

/PAIR
Input for the pairing button and output for the pairing indicator LED.
Pulling this pin low externally will initiate a pairing procedure with the transmitter selecting a new channel and pseudo random code. While in the pairing mode the pin will be also used to flash a LED indicating that pairing mode is active.
The LED will also be used to indicate a low battery status.

MB0, MB1, MB2
Mouse button inputs. Internal pull up resistors, active low. Connect switches closing to GND.

SCK, MOSI, MISO, IRQ, /RES, /SS, PD
Interface signals to control the CYWUSB6935 radio chip. Connect direct to the radio chip.

GND
Power supply ground.

Vcc
Supply voltage. Typical supply voltage is 3.3V.

5. Device Operation

The KeyWarriorWUSB chipset consists of one or more transmitters and one receiver. The receiver is connected to a computer via USB or PS/2.
On powering up the KeyWarriorWUSBRX first determines if it is connectd to USB or PS/2. No jumpers etc. are needed for this, KeyWarrior can autodetect the active interface.

5.1 RF Connection

KeyWarriorWUSB uses a unidirectional RF connection. Using a unidirectional versus a bidirectional connection does significantly reduce the power use on the transmitter side. Though it does not allow a handshaking between transmitter and receiver to acknowledge data transfer.
In environments with RF interference or over longer distances this can cause a loss of data packets. But since the KeyWarriorWUSB is used for the human-machine-interface there always is a direct feedback to the user if data is not coming through and the distance between the operator and the system is limited by the requirement of the operator being able to see the data screen of the system.

5.2 RF Pairing

To allow the coexistence of multiple KeyWarriorWUSB based units in close proximity a number of channels and encoding keys are used. The combination of 78 channels and 8 codes allows a theoretical maximum of 624 KeyWarriorWUSB based devices to be operated within RF range of each other.
Transmitters and receivers must be paired, so they both use the same channel and code. This is done by first pressing the "Pair" button on the receiver, which will result in a constant flashing of the Caps, Num, Scroll LEDs. Then press the "Pair" button on the transmitter. The transmitter will then randomly select a channel/code combination and send this information to the receiver. To force the selection of a channel/code pair hold down a key on the transmitter when pressing the "Pair" key. Holding down the same key always results in the use of the same channel/code pair.
The end of the pairing mode will be signaled by the LEDs on the transmitter and recevier stopping to flash, this can take about 30sec. Do not press the "pair" key again during the pairing mode, this will stop the pairing mode and return the device to the former channel/code pair.

5.3 RF Security

There is no security feature implemented in KeyWarriorWUSB. The data transmitted via RF can be theoretically intercepted by another KeyWarriorWUSBRX chip. Though this would require to first successfully perform a pairing to the same channel/code combination as the transmitter/ receiver pair that is to be spied on.
Some additional security measures may be implemented on request, however without a bidirectional communication and a heavy duty encryption no useful security can be implemented for a wireless connection, both of which would reduce battery run times.

5.4 Power Saving Modes

KeyWarriorWUSB TXCO uses different modes to reduce the energy use and extend the battery life. KeyWarriorWUSB TXCO always shuts down as much of its functions as possible.
After 90 seconds of no trackball and keyboard activity KeyWarriorWUSB TXCO goes into deep sleep mode from which it will wake on the press of any key, trackball moves can not wake it from deep sleep. The keypress waking up KeyWarriorWUSB TXCO is also transmitted to the computer, so the reactivation from deep sleep is transparent to the user.

5.5 Key Rollover

Up to 8 keys in the matrix may be pressed at the same time without KeyWarriorWUSB missing any code. However due to the phantom key effect it can not be guaranteed that combinations of many keys are properly reported (see 5.4.1).
USB has a limitation on how many keys can be reported at the same time. On USB any six keys plus all eight modifiers (GUI, Ctrl, Alt, Shift) may be pressed at the same time. If more than six ordinary keys are pressed an error state is reported.

5.5.1 Phantom Keys

Phantom keys do occur when three or more keys are pressed in a combination that leads to the matrix reading like a fourth key has been pressed.
To avoid phantom keys diodes may be added to the keys. If diodes are used they have to be put in series with the key switches. The kathodes have to be connected to the Y lines and anodes to X lines.
It is highly recommended to place all modifier keys on a single row or column and put diodes on all of them.

5.6 Protocol Details: USB

KeyWarrior works as a HID compliant keyboard using boot protocol. The country code is 0 for not localized hardware, which allows to use a single version of the chip for all international keyboard layouts. Usage codes are defined for 0 to 164, which include the Power key and the = sign in the keypad.

5.7 Protocol Details: PS/2

KeyWarrior is a functional equivalent to a MF2 keyboard. It does implement code sets 1, 2 and 3.
All MF2 commands are implemented with the exception of the mode set commands $F7-$FD.
Codeset 3 is not fully implemented, it does always send make/break codes for all keys. This works for most applications.

5.8 Mouse Function

The mouse function can either be integrated in the KWWUSBTX chip, or it can reside in a separate chip. In either case the mouse data is received by the KWWUSBRX chip and passed along to the host computer via the active interface.

5.9 Mouse on USB

If used on the USB KeyWarriorWUSBRX identifies as a composite device with two functions. The mouse function is the second function and works as a HID compliant three button mouse with scroll wheel.

5.10 Mouse on PS/2

The mouse function has a separate PS/2 interface. It does work as a standard three button mouse and is compatible with standard system drivers of Windows.
The scroll wheel is not available via PS/2!
The mouse function defaults to the PS/2 port when the keyboard PS/2 port becomes active and no active mouse port is identified within 2 seconds after this. In this case the mouse function is enabled with the PS/2 port active, no reset identification is send. This will work for hot plugging of the PS/2 mouse port in most cases.

6. Custom Scancode Tables

KeyWarrior uses a single table to translate the matrix coordinates to USB usage codes.
If running on PS/2 the USB usage codes are translated to the PS/2 scancodes by fixed tables.
The table that does the translation from matrix coordinates to USB usage codes is customer specified. This table is called the "Master Translation Table". KeyWarriorWUSBRX always stores the Master Translation Table in an external EEPROM, there is no factory programmed version of KeyWarriorWUSBRX.
For information on generating the Master Translation Table please refer to the document "Creating Custom KeyWarrior Scancode Tables".

6.1 Function Shift Keys

KeyWarriorWUSB allows the definition of two function shift keys. If one of these keys is pressed KeyWarrior uses a second or third translation table to convert matrix coordinates to USB usage codes.
This allows a small keyboard to generate all functions of a full sized keyboard.
The function shift keys may be on any coordinate in the matrix, they are assigned by placing a special code in the corresponding table position.

6.2 Mouse Buttons

Mouse buttons on KeyWarriorWUSB are handled separate from the keyboard keys and need no programming

6.3 Programming the KeyWarrior Controller

KeyWarriorWUSBRX controllers can be programmed via the USB from a Macintosh or Windows PC. A utility program reads the assembly source file of a Master Translation Table and transmits it to the KeyWarriorWUSB RX controller.
Alternatively the external EEPROM may be programmed in any appropriate device programmer and then inserted into the circuit.
KeyWarriorWUSB RX is not intended for applications which provide keyboard function programming options for the end user. The programmability is available only via the USB and it is intended for factory programming only.

6.4 KeyWarrior Commander Key Definitions

KeyWarrior Commander controllers do use a Master translation Table with a single byte per key, just like the KeyWarrior Flex.
A range of special codes ($B0-$DF) does allow to assign one of 47 macros to any key. Each of these macros may have up to 31 codes and can be used in one of two modes.
If the mode byte of a macro is $00 then the macro will work like those of KeyWarrior Operator. No repeat use of the same code is possible and all keycodes will be send as make codes on key down and break codes on key up. This mode is called "static mode".
A $01 in the mode byte does activate the "typing mode" which does send a break code immediately after each make code, except for modifier keys (Ctrl, Alt, Shift, GUI). A break code for modifiers is sent either on a special break code in the macro or on release of the key.
Contrary to other KeyWarrior variants all Commander chips with 16x8 matrixes do support two FN keys allowing three function levels for every key.

7. Design Considerations

The design of KeyWarriorWUSB TXCO is optimized for operation at 3.3V. While it can be used with up to 5.25V the current consumption will increase due to the higher voltage and problems with the signals to the RF part are likely.

7.1 Trackball Requirements

The trackball is the most power intensive part of the KeyWarriorWUSB TXCO based keyboard/ mouse combo transmitter.
When selecting a trackball mechanism for your wireless keyboard/mouse combo make sure to use one with low power requirements and compatibility to the 3.3V power supply.
The power supply to the trackball must be enabled with the /TBEN signal of the KeyWarriorWUSB TXCO. If the trackball can function with less than 25mA /TBEN can be used direct for the ground connection of the trackball LEDs.

7.2 Battery Management

While not required it is recommended to implement some form of battery management, at least to notify the user of a low battery condition. KeyWarriorWUSB TXCO implements a signalling mechanism for low battery. If the /BAT pin is pulled low the LED which is also used to indicate the pairing mode starts flashing.
To prevent the signal LED from worsening the situation of an already low battery the flashing is done in very short pulses and is paused when the keyboard enters the sleep state.
In our application circuit we use a switch mode regulator to supply the keyboard/mouse combo off a single 1.5V AA battery. The comparator monitoring the battery is pulling the /BAT signal low when the battery voltage drops below 0.7V.
The required battery management and low battery monitoring depends on your specific power supply implementation.

8. Absolute Maximum Ratings - KeyWarriorWUSB RX

Storage Temperature	-65°C to +150°C
Ambient Operating Temperature	0°C to +70°C
Supply Voltage on Vcc relative to Vss	-0.5V to +7.0V
DC Input Voltage	-0.5V + Vcc + 0.5V
Max. Output Current into any Pin	60mA
Power Dissipation	300mW
Static Discharge Voltage	>2000V
Latch-up Current	>200mA

8.1 Absolute Maximum Ratings - KeyWarriorWUSB TXCO

Storage Temperature	-55°C to +100°C
Ambient Operating Temperature	-40°C to +85°C
Supply Voltage on Vcc relative to Vss	-0.5V to +6V
DC Input Voltage	-0.5V + Vcc + 0.5V
Max. Output Current into any Pin	±25mA
Static Discharge Voltage	>2000V
Latch-up Current	>200mA

8.2 DC Characteristics - KeyWarriorWUSB RX

	Parameter	Min	Max	Units	Remarks
V_{cc}	Operating Voltage	4.35	5.25	V	
I_{cc}	Operating Supply Current		20	mA	
I_{sb}	Suspend mode current		25	μA	Oscillator off
I_{ol}	Max sink current on output pins		70	mA	Cummulative across all ports
I_{ol}	Sink current on output pins		2	mA	Vout =0.4V
R_{up}	Pull-up Resistance	8	24	kΩ	
V_{ith}	Input threshold voltage	40%	60%	V_{cc}	All ports, low to high edge
V_H	Input hysteresis voltage	3%	10%	V_{cc}	
	USB Interface				
V_{oh}	Static output high	2.8	3.6	V	15kΩ±5% to GND
V_{ol}	Static output low		0.3	V	
V_{di}	Differential Input sensitivity	0.2		V	|(D+)-(D-)|
V_{cm}	Differential Input common Mode Range	0.8	2.5	V	
V_{se}	Single Ended Transceiver Threshold	0.8	2.0	V	
C_{in}	Transceiver capacitance		20	pF	
I_{io}	Hi-Z State Data Line Leakage	-10	10	μA	0V < Vin < 3.3V, Hi-Z State
R_{pu}	Bus Pull-up resistance	1.274	15.75	kΩ	1.3kΩ±2% to Vreg
R_{pd}	Bus Pull-down resístance	14.25	15.75	kΩ	15kΩ±5%

8.3 AC Characteristics - KeyWarriorWUSB RX

	Parameter	Min	Max	Units	Remarks
	clock accuracy	-1.5	+1.5	%	Derived from USB signal
	USB Driver Characteristics				
t_r	Transition rise time	75		ns	CLoad = 200pF
t_r	Transition rise time		300	ns	CLoad = 600pF
t_f	Transition fall time	75		ns	CLoad = 200pF
t_f	Transition fall time		300	ns	CLoad = 600pF
t_{rfm}	Rise/Fall Time matching	80	125	%	
V_{crs}	Output signal crossover voltage	1.3	2.0	V	
	USB Data Timing				
t_{drate}	Low Speed Data Rate	1.4775	1.5225	MBit/s	
t_{djr1}	Receiver data jitter tolerance	-75	75	ns	To next transition
t_{djr2}	Receiver data jitter tolerance	-45	45	ns	For paired transitions
t_{deop}	Differential to EOP transition skew	-40	100	ns	
t_{eopr2}	EOP width at reeiver	670		ns	Accepts as EOP
t_{eopt}	Source EOP width	1.25	1.50	μs	
t_{udj1}	Differential driver jitter	-95	95	ns	To next transition
t_{udj2}	Differential driver jitter	-150	150	ns	To paired transition

8.4 DC Characteristics - KeyWarriorWUSB TXCO

	Parameter	Min	Max	Units	Remarks
V_{cc}	Operating Voltage	3.00	5.25	V	3.3V recommended
I_{cc}	Operating Supply Current		8	mA	
I_{sb}	Deep sleep mode current		6.5	μA	Oscillator off, $T_A \leq 55°C$
I_{sb}	Deep sleep mode current		25	μA	Oscillator off, $T_A > 55°C$
I_{ol}	Max sink current on output pins		70	mA	Cummulative across all ports
I_{ol}	Sink current on output pins		10	mA	Vout = 0.75V
I_{ot}	Sink current on /TBEN pin		25	mA	Vout = 0.75V
R_{up}	Pull-up Resistance	8	24	kΩ	
V_{il}	Input low voltage		0.8	V	Vcc = 3.00 to 5.25V
V_{ih}	Input high voltage	2.1		V	Vcc = 3.00 to 5.25V
V_H	Input hysteresis voltage	60 (typ.)		mV	
I_L	Input Leakage	1 (typ.)		nA	

8.5 AC Characteristics - KeyWarriorWUSB TXCO

	Parameter	Typ.	Max	Units	Remarks
t_{scan}	Key matrix scanning frequency	1		kHz	
t_{track}	Trackball scanning frequency	4		kHz	
t_{sleep}	Time to sleep	90		s	

9. Ordering Information

Partname	Order Code	Description	Package
KeyWarrior WUSB RX	KWWUSBRX-P	KWWUSB receiver controller	PDIP24
KeyWarrior WUSB RX	KWWUSBRX-S	KWWUSB receiver controller	SOIC24
KeyWarrior WUSB TX CO	KWWUSBTXCO-S	KWWUSB transmitter, keyboard mouse combo	SSOP48

There is no version of KWWUSBRX with a factory programmed keyboard Master Translation Table available, all KWWUSBRX chips are standard parts.

9.1 Shipping info

DIL24 chips do come in tubes of 16 each, SOIC24 in tubes of 31. SSOP48 chips come in tubes of 30 each.
To assure the safest handling we recommed that you order in multiples of full tubes.

9.2 USB VendorID and ProductID

By default all KeyWarrior chips are shipped with the USB VendorID of Code Mercenaries ($7C0 or decimal 1984).
KeyWarriorWUSB RX chips are always shipped with a fixed ProductID and the Code Mercenaries VendorID.
On request chips can be equipped with the customers VendorID and ProductID. VendorIDs can be obtained from the USB Implementers Forum <www.usb.org>

Following are the ProductIDs:
KeyWarrior WUSB RX $0170

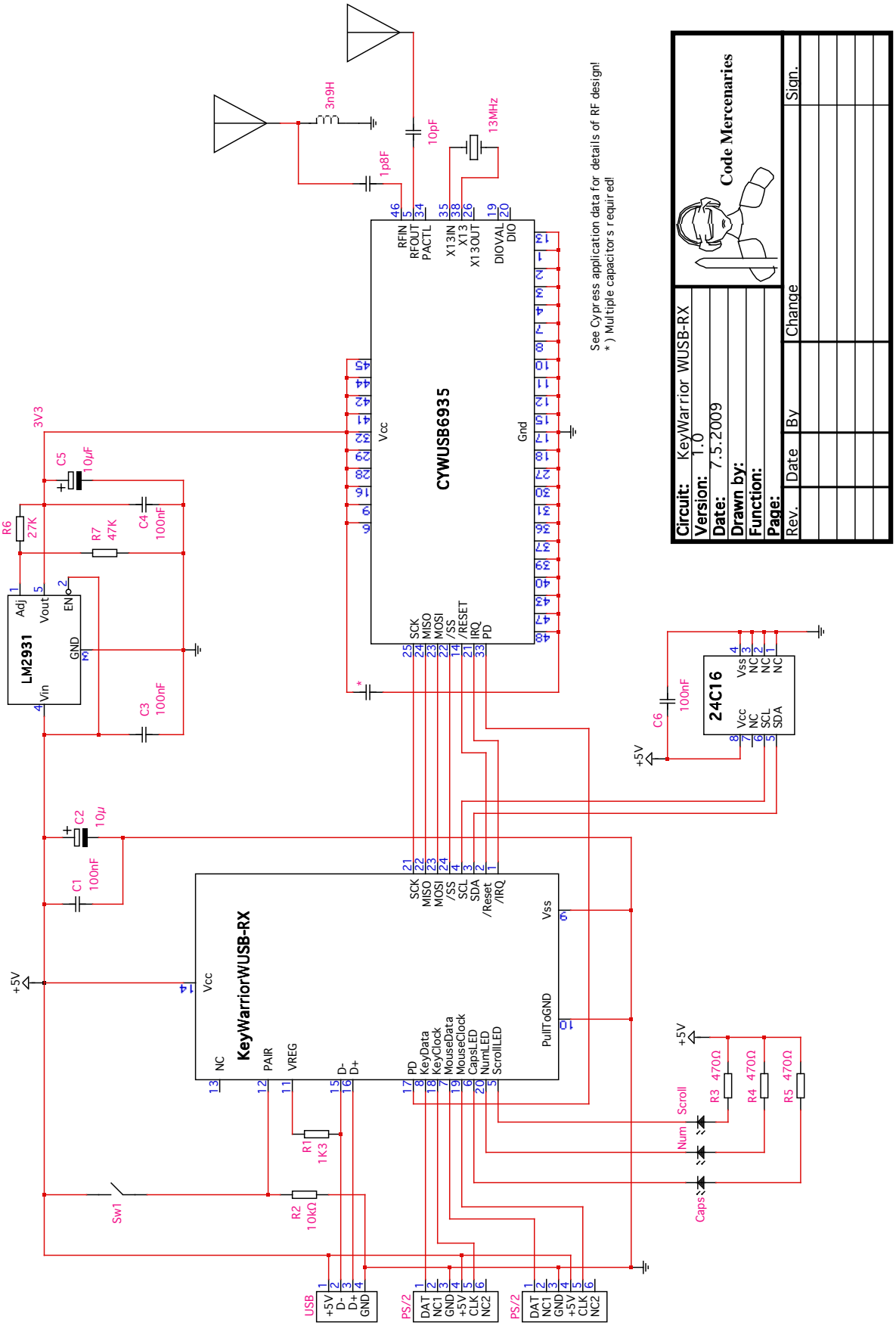
ProductIDs are independent of the package type.

9.3 Shipping versions

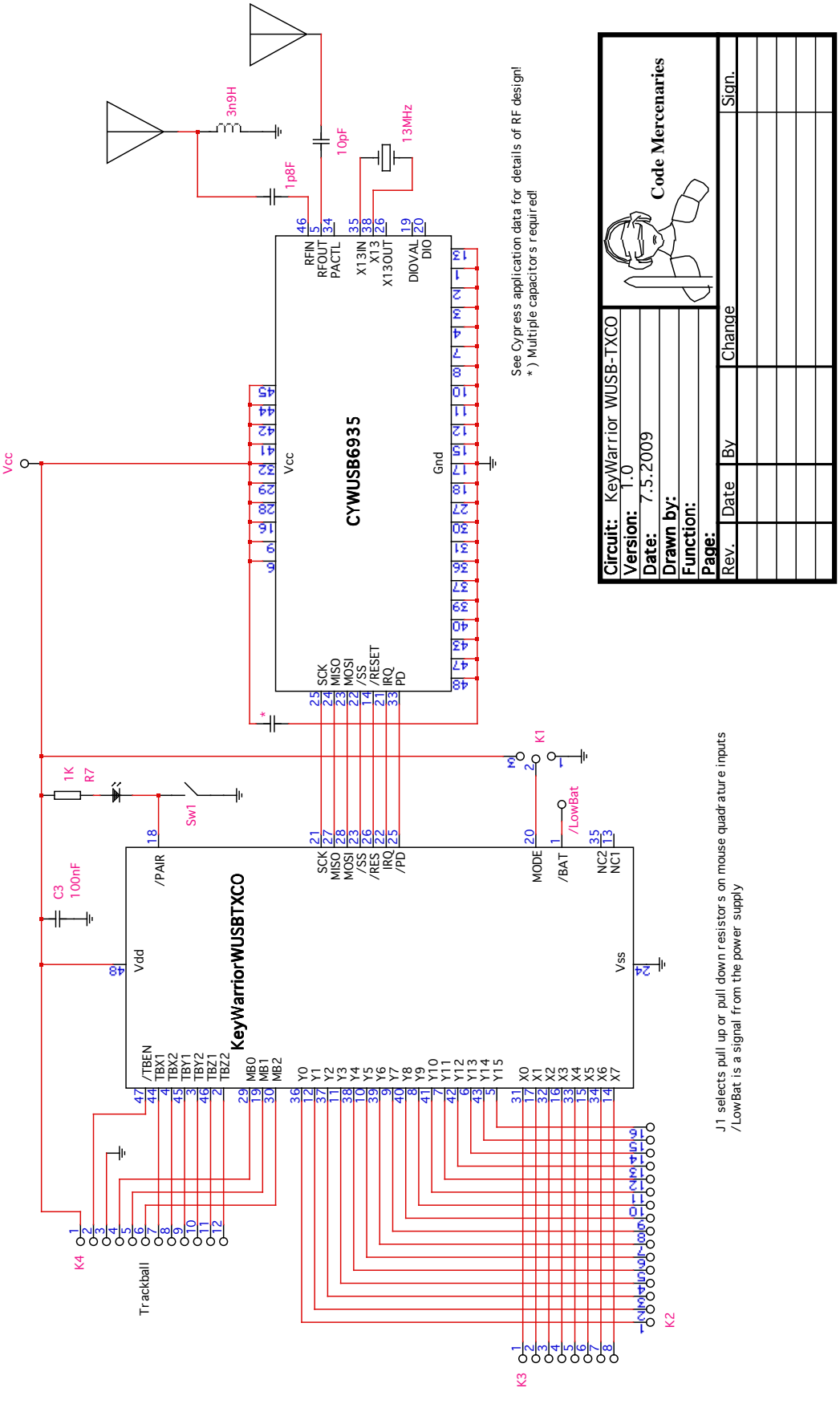
Currently the following versions are shipping:
KWWUSBRX V1.1.0.C
KWWUSBTXCO V1.0.0.3

KeyWarrior WUSB

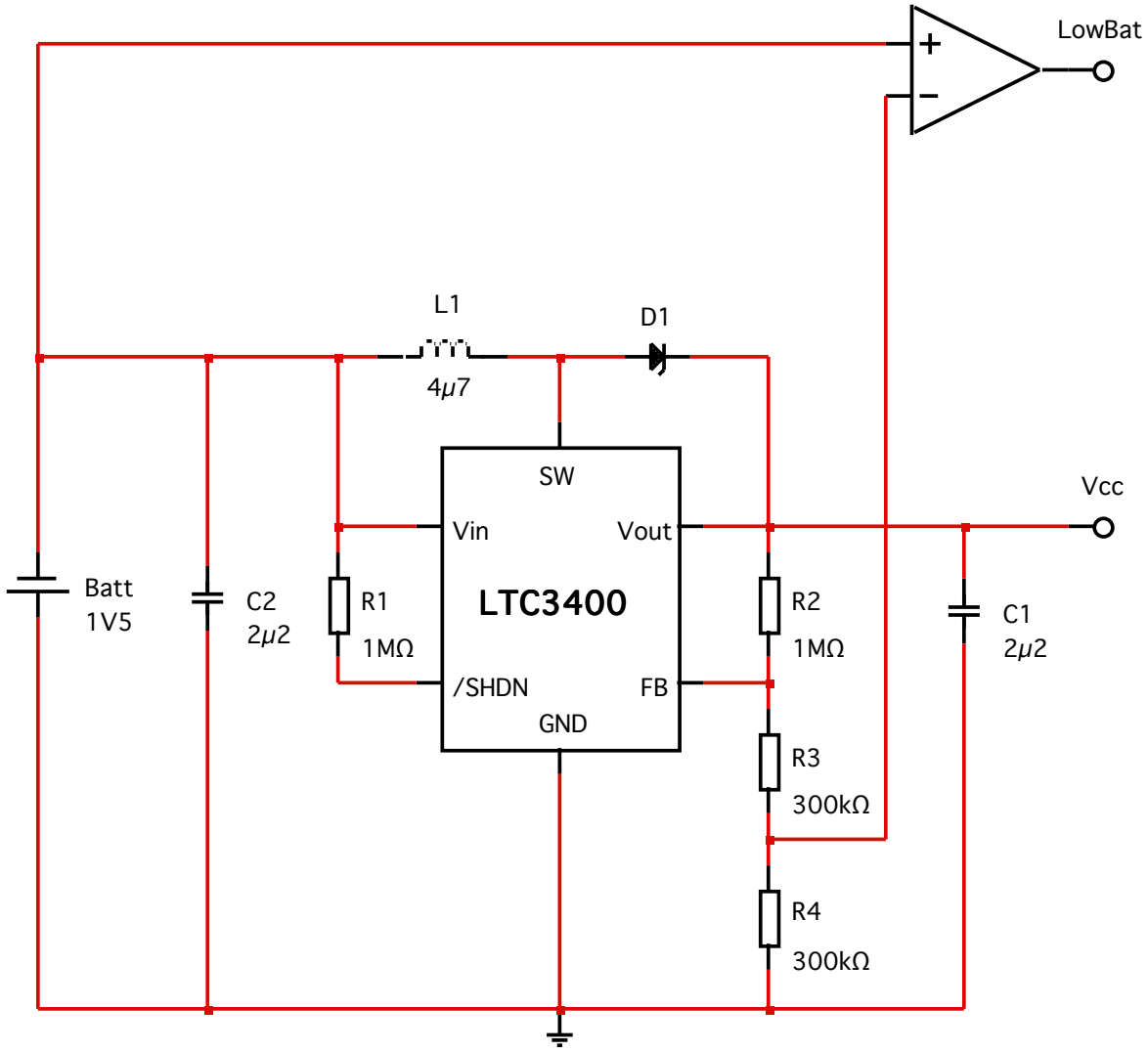
10. Typical Application for KeyWarrior WUSB RX Receiver



10.1 Typical Application for KeyWarrior WUSB TX CO



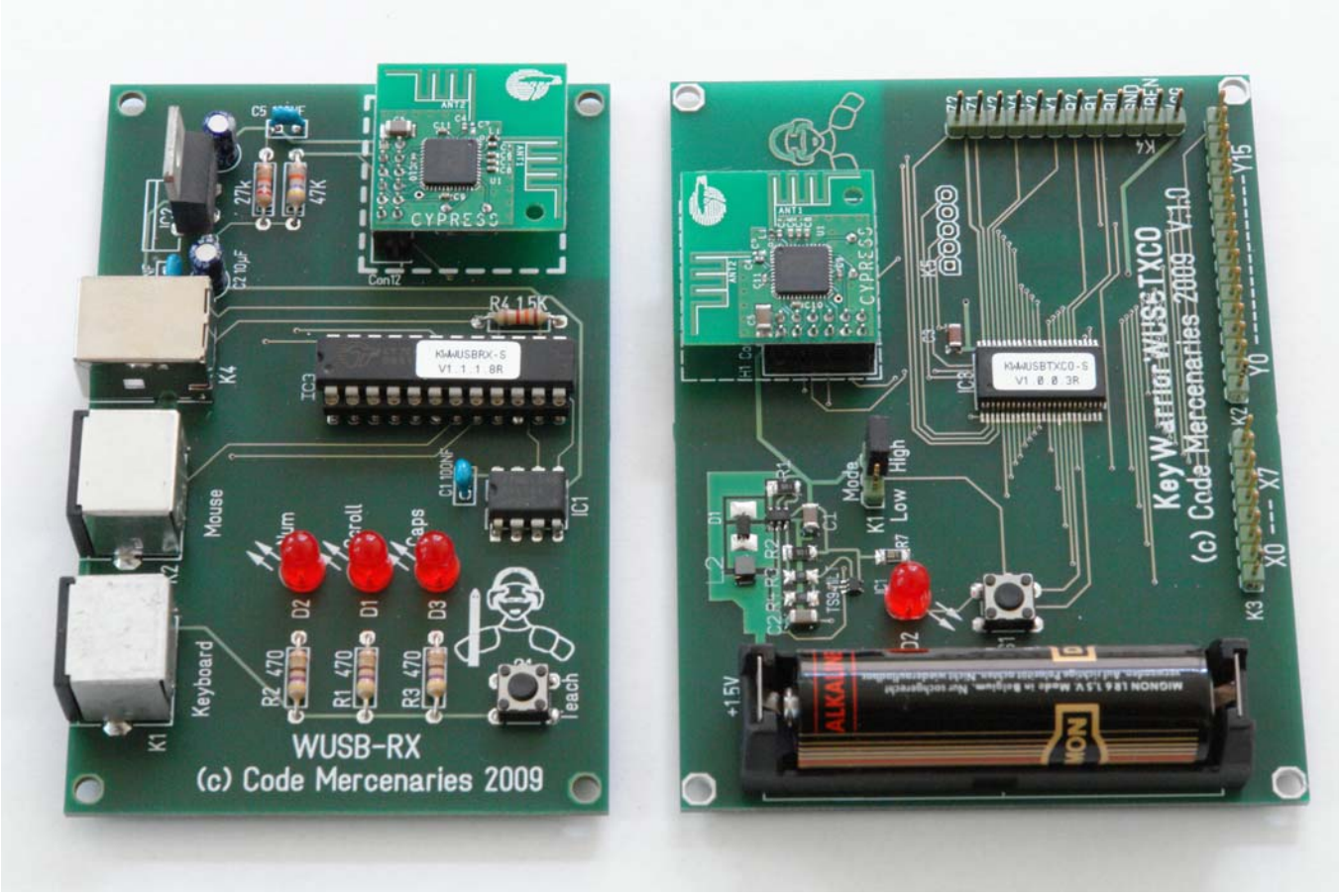
10.2 Battery Management for Transmitter



Use a micropower rail to rail opamp for the battery monitor

Application circuits are the actual circuits of the KWWUSB evaluation kit.

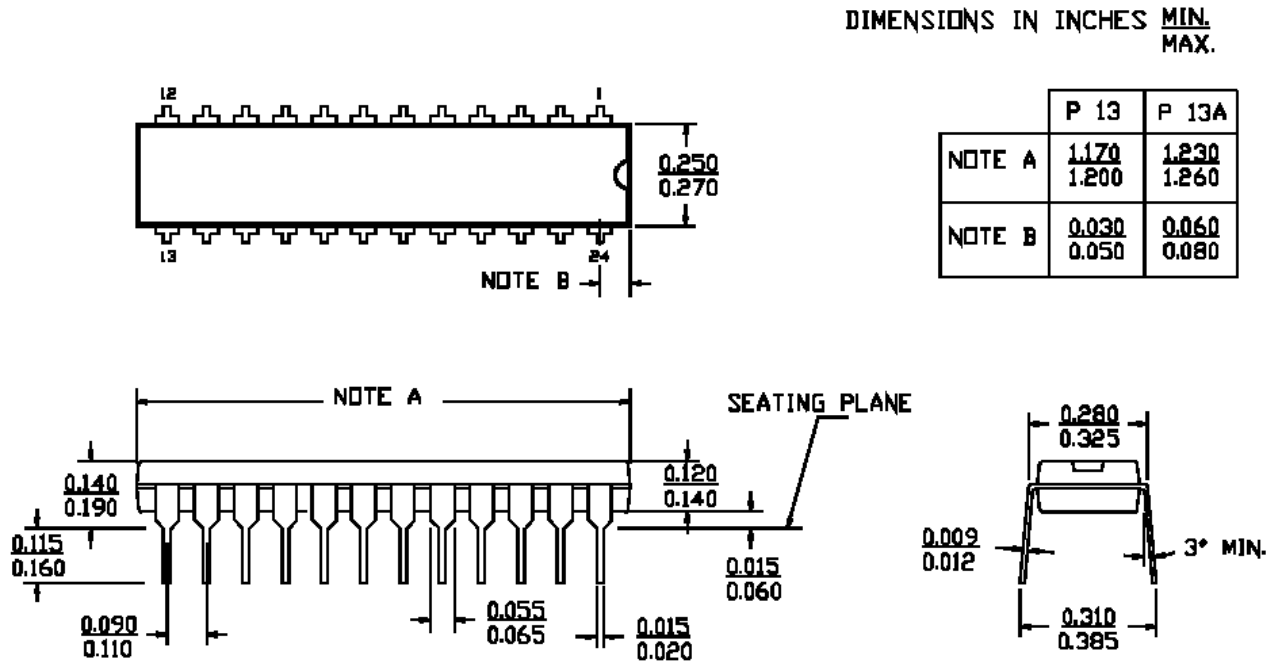
10.3 The evaluation kit



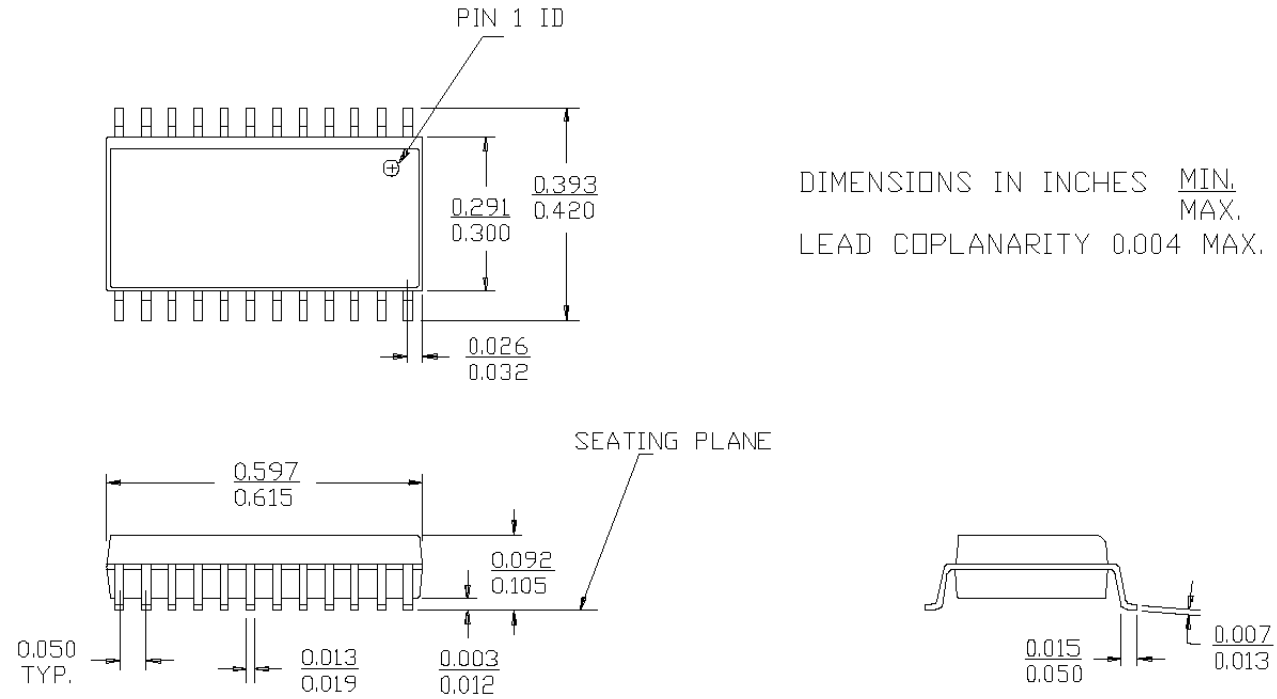
The KeyWarriorWUSBCO Evaluation kit consists of a receiver board (left) with USB and PS/2 ports and the transmitter board including battery management to allow powering off a single AA cell. The evaluation kit circuit is identical to the application circuit.

11. Package Dimensions

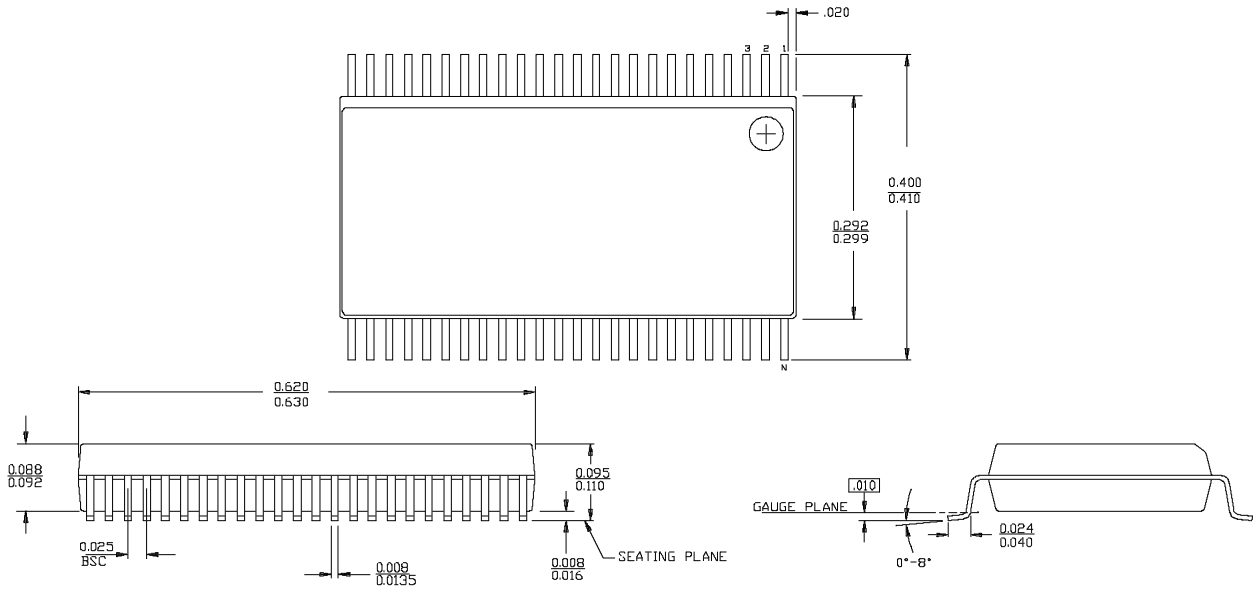
24 Pin DIP



24 Pin SOIC



48 Pin SSOP


.020
3 2 1
0.400
0.410
0.292
0.299
N
0.620
0.630
0.088
0.092
0.095
0.110
0.025
BSC
0.008
0.0135
0.008
0.016
SEATING PLANE
.010
GAUGE PLANE
0.024
0.040
0°-8°

12. ESD Considerations

KeyWarrior has an internal ESD protection to withstand discharges of more than 2000V without permanent damage. However ESD may disrupt normal operation of the chip and cause it to exhibit erratic behaviour.
For the typical office environment the 2000V protection is normally sufficient. Though for industrial use additional measures may be necessary.
When adding ESD protection to the signals special care must be taken on the USB signal lines. The USB has very low tolerance for additional resistance or capacitance introduced on the USB differential signals.
The PS/2, serial and ADB lines are less critical. Series resistors of 27Ω and signal to ground capacitors of 27pF may be used alone or in addition to some kind of suppressor device.

12.1 EMC Considerations

KeyWarrior uses relatively low power levels and so it causes few EMC problems.
To avoid any EMC problems the following rules should followed:

- Put a 100nF ceramic capacitor right next to the power supply pins and make sure the PCB traces between the chips power pins and the capacitor are as short as possible.
- Run the power supply lines first to the capacitor, then to the chip.
- Make the matrix lines only as long as absolutely necessary.

Adding a ferrite bead to the +5V power supply lines is advisable. Use separate beads for the USB and PS/2 power supply lines.

12.2 RF Regulations Compliance

The KWWUSB chipset utilizes a radio data connection. As such it is regarded a RF system that needs official certification.
The exact regulations depend on the country where the final product is to be deployed. Testing for compliance and applying for approval can only be done by the manufacturer of the final product.

13. Revision History

Revisions for the transmitter and receiver chips are different since they come from separate source code bases. For the revision information on the KWWUSBRX chips please refer to the main KeyWarrior data sheet, V1.1.1.8 was the initial shipping version of KWWUSBRX.

The revisions of the KWWUSBTX chips are as follows:

V1.0.0.3
Initial shipping version.

Legal Stuff

Code Mercenaries
Hard- und Software GmbH
Karl-Marx-Str. 147a
12529 Schönefeld
Germany
Tel: +49-3379-20509-20
Fax: +49-33790-20509-30
Mail: support@codemercs.com
Web: www.codemercs.com

HRB 9868 CB
Geschäftsführer: Guido Körber, Christian Lucht