GeniPS2™ UR3HCGNP-001
IC Converts PS/2 Data to USB

HID & SYSTEM MANAGEMENT PRODUCTS, PROTOCOL INTERPRETER FAMILY

DESCRIPTION

The GeniPS2™ UR3HCGNP-001 is a single IC that converts PS/2 keyboard and mouse data to USB.

The GeniPS2™ is ideal for system legacy support, enabling seamless connection of standard PS/2 devices (mice or keyboards) to USB.

The IC offers two hot-pluggable and hot-swappable PS/2 ports; either port can accept a mouse or a keyboard. In addition, the GeniPS2™ auto-detects and transparently supports mice with MouseWheel functionality. Internal and external mouse and keyboard data are streamed and appear to the system as if coming from a single source.

The GeniPS2™ supports remote wake-up function via either mouse or keyboard, if the BIOS of the host machine is configured in this manner.

In addition, the GeniPS2™ supports a multitude of languages, including Korean and Japanese.

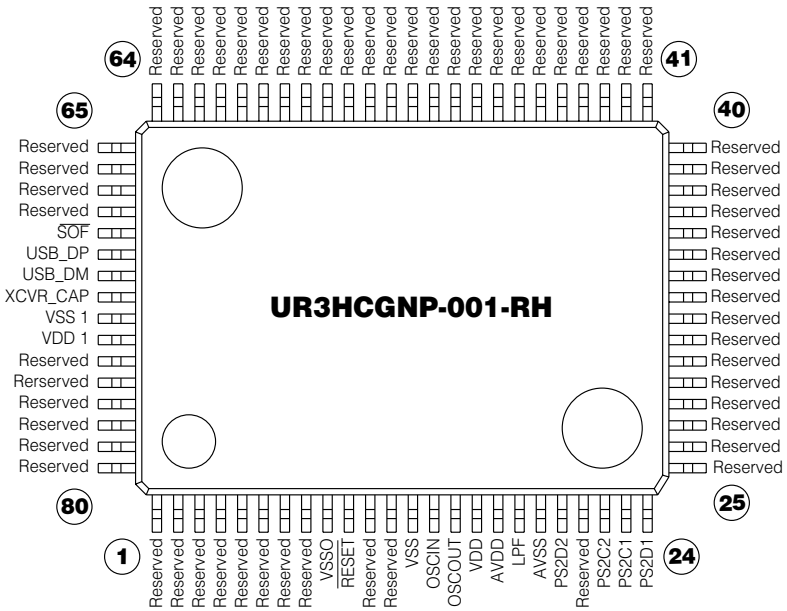
FEATURES

- Interfaces PS/2 devices to USB
- Devices are hot-pluggable
- Provides two PS/2 ports
- PS/2 ports support MouseWheel functionality
- PS/2 ports are auto-selectable and hot-swappable – the mouse or keyboard can be used in either port
- Works with standard Windows 98 keyboard and mouse drivers
- Easy to implement
- Few external components required

APPLICATIONS

- System Legacy Support

PIN ASSIGNMENTS

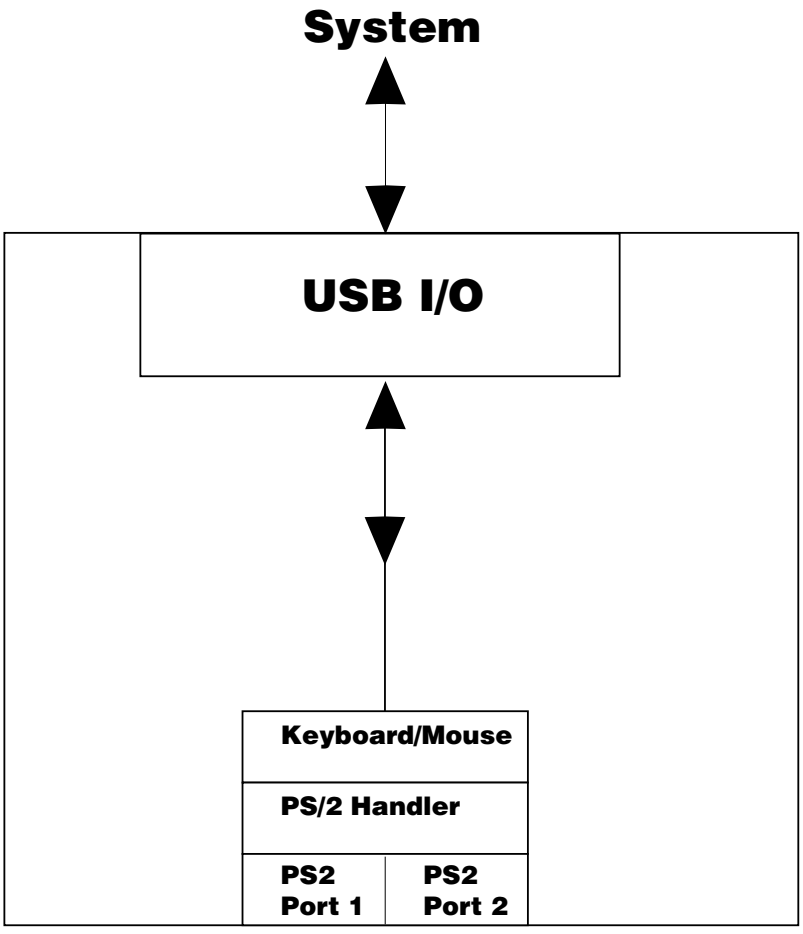


ORDERING CODE

Package options	Pitch in mm's	TA = -20°C to +85°C
80-pin, PQFP	0.8	UR3HCGNP-001-RH

Other Materials	Type	Order number
GeniPS2™ Eval Kit	Evaluation Kit	EVK3-GNP-001-XXX

BLOCK DIAGRAM



USB FUNCTIONALITY

The GeniPS2™ is a full-speed composite USB device that interfaces PS/2.

The PS/2 interface supports legacy Human Input Devices (HID)-class specification and uses two interrupt endpoints for the PS/2 devices.

The GeniPS2™ handles the merging of all this data, and sends the data to the system. Data can come from either of the two PS/2 ports. Internal and external mouse and keyboard data are streamed and appear to the system as if coming from a single source.

PIN DEFINITIONS

Mnemonic	QFP	Type	Name and Function
Power Supply			
VDD	16	PWR	**Positive supply voltage**
VDD1	74	PWR	**Positive supply voltage**
AVDD	17	PWR	**Positive analog** reference voltage
AVSS	19	PWR	**Ground:** analog signal
VSS	13	PWR	**Ground:** negative supply voltage
VSS0	9	PWR	**Ground:** negative supply voltage
VSS1	73	PWR	**Ground:** negative supply voltage
XCVRCAP	72	PWR	Bypass line
Reset			
_RESET	10	I	**Controller hardware reset pin:** Active-low reset line
Oscillator pins			
OSCIN	14	I	**Oscillator input:** input signal from oscillator
OSCOUT	15	O	**Oscillator output:** output signal to oscillator
LPF	18	O	**Loop filter** for frequency synthesizer
USB			
_SOF	69	O	**USB _SOF signal**
USB_DP	70	I/O	**USB D+ line**
USB-DM	71	I/O	**USB D- line**
PS/2			
PS2D2	20	I/O	**Data line** for PS/2 port 2
PS2C2	22	I/O	**Clock line** for PS/2 port 2
PS2C1	23	I/O	**Clock line** for PS/2 port 1
PS2D1	24	I/O	**Data line** for PS/2 port 1
Reserved			
Reserved	1-8 25-40 41-69 75-80	N/U	**Not used**; keep open; reserved for future functions

SEMTECH

PS/2 PORTS

The two PS/2 ports allow the user to connect legacy PS/2 devices to the USB host system. Standard 104-key keyboards and PS/2 mice, with support for MouseWheel functionality, can be hot-plugged at either of the PS/2 ports and immediately begin communicating with the host.

USB DESCRIPTORS

Offset	Field	Size	Value	Description
Device Descriptor				
0	bLength	1	12	Descriptor length (18 bytes)
1	bDescriptorType	1	01	Descriptor type
2	bcdUSB	2	0101	USB release
4	bDeviceClass	1	00	Specified in interfaces
5	bDeviceSubClass	1	00	Specified in interfaces
6	bDeviceProtocol	1	00	No protocols on the device basis
7	bMaxPacketSize0	1	08	Maximum packet length (bytes) for endpoint 0 is 8
8	idVendor	2	047A	Vendor ID (USAR)
10	idProduct	2	0101	Product ID
12	bcdDevice	2	0100	Firmware revision 1.0
14	iManufacturer	1	04	Index for manufacturer string descriptor
15	iProduct	1	1E	Index for product string descriptor
16	iSerialNumber	1	00	Index for serial number string descriptor
17	bNumConfigurations	1	01	Number of configurations
Configuration Descriptor				
0	bLength	1	09	Configuration Descriptor length
1	bDescriptorType	1	02	Configuration Descriptor
2	bTotalLength	2	003B	Total length of descriptors returned with this one
4	bNumInterfaces	1	02	Number of interfaces supported
5	bConfigurationValue	1	01	Value associated with this configuration
6	iConfiguration	1	00	Index for configuration string descriptor – none
7	bmAttributes	1	A0	Configuration Characteristics Bit 7: Reserved (set to one) 1 Bit 6: Self-powered 0 Bit 5: Remote wake-up 1
8	MaxPower	1	32	Maximum Power consumed is 100 mA
String Descriptor				
0	bLength	1	04	Length of language ID
1	bDescriptorType	1	03	Descriptor type (=String)
2	bString	2	0904	Array of Language ID code (=English)
4	bLength	1	1A	Length of Manufacture String
5	bDescriptionType	1	03	Descriptor Type (=String)
6	bString	24		Manufacturer name
30	bLength	1	2A	Length of product string
31	bDescriptorType	1	03	Descriptor Type (= String)
32	bString	40		Geni PS2 Product Name

USB DESCRIPTORS, (CON'T)

Offset	Field	Size	Value	Description
HID Interface Descriptor (Keyboard)				
0	bLength	1	09	Interface Descriptor length
1	bDescriptorType	1	04	Interface Descriptor
2	bInterfaceNumber	1	00	Index for HID interface
3	bAlternateSetting	1	00	Alternate Setting index
4	bNumEndpoints	1	01	Number of endpoints in this interface. This includes one interrupt endpoint
5	bInterfaceClass	1	03	USB HID class
6	bInterfaceSubClass	1	01	Keyboard subclass
7	bInterfaceProtocol	1	01	Boot protocol
8	iInterface	1	00	Index for interface string descriptor – none
HID Class Descriptor (Keyboard)				
0	bLength	1	09	HID Descriptor length
1	bDescriptorType	1	21	HID Descriptor
2	bcdHID	2	0101	HID Specification Release (1.01)
4	bCountryCode	1	00	Country Code (not supported)
5	bNumDescriptors	1	01	Number of class descriptors. The one descriptor is the report descriptor
6	bDescriptorType	1	22	Report Descriptor
7	wDescriptorLength	2	0040	Length of Report Descriptor
EndPoint Descriptor (Keyboard)				
0	bLength	1	07	Endpoint Descriptor Length
1	bDescriptor type	1	05	Endpoint Descriptor
2	bEndpointAddress	1	83	Address:Endpoint3.IN
3	bmAttributes	1	03	Endpoint Attributes: interrupt
4	wMaxPacketSize	2	0008	Maximum Packet Size: 8 bytes
6	bInterval	1	04	Polling Interval

USB DESCRIPTORS : REPORT DESCRIPTORS (KEYBOARD)

Byte #	Data	Mnemonic	Value
0	Usage Page	05 01	Generic Desktop Control
2	Usage	09 06	Keyboard
4	Collection	A1 01	Application
6	Usage Page	05 07	Keyboard/Keypad Keys
8	Usage Minimum	19 E0	224
10	Usage Maximum	29 E7	231
12	Logical Minimum	15 00	0
14	Logical Maximum	25 01	1
16	Report Size	75 01	1
18	Report Count	95 08	8
20	Input	81 02	Data, Variable, Absolute
22	Report Size	75 01	1
24	Report Count	95 08	8
26	Input	81 03	Constant
28	Report Count	95 06	6
30	Report Size	75 01	1
32	Usage Page	05 08	LED
34	Usage Minimum	19 01	1
38	Usage Maximum	29 06	6
40	Output	91 02	Data, Variable, Absolute
42	Report Count	95 01	1
44	Report Size	75 02	2
46	Output	91 03	Constant
48	Report Count	95 06	6
50	Report Size	75 08	8
52	Logical Minimum	15 00	0
54	Logical Maximum	26 FF 00	255
56	Usage Page	05 07	Keyboard/Keypad Keys
58	Usage Minimum	19 00	0
60	Usage Maximum	29 FF	255
62	Input	81 00	Data, Array, Absolute
64	End Collection	C0	

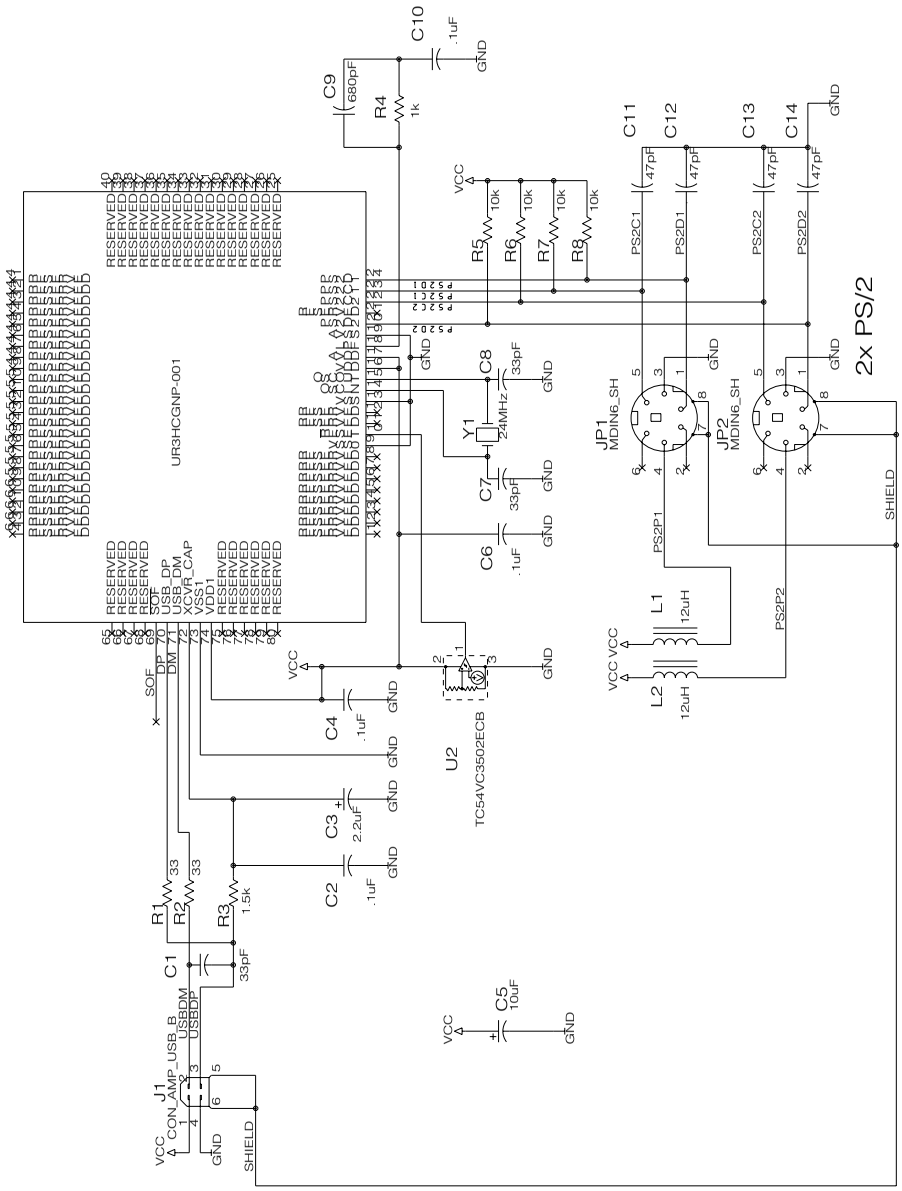
USB DESCRIPTORS, (CON'T)

Offset	Field	Size	Value	Description
HID Interface Descriptor (Mouse)				
0	bLength	1	09	Interface Descriptor length
1	bDescriptorType	1	04	Interface Descriptor
2	bInterfaceNumber	1	01	Index for HID interface
3	bAlternateSetting	1	00	Alternate Setting index
4	bNumEndpoints	1	01	Number of endpoints in this interface. This includes one interrupt endpoint
5	bInterfaceClass	1	03	USB HID class
6	bInterfaceSubClass	1	01	Keyboard subclass
7	bInterfaceProtocol	1	02	Boot protocol
8	iInterface	1	00	Index for interface string descriptor – none
HID Class Descriptor (Mouse)				
0	bLength	1	09	HID Descriptor length
1	bDescriptorType	1	21	HID Descriptor
2	bcdHID	2	0101	HID Specification Release (1.01)
4	bCountryCode	1	00	Country Code (not supported)
5	bNumDescriptors	1	01	Number of class descriptors. The one descriptor is the report descriptor
6	bDescriptorType	1	22	Report Descriptor
7	wDescriptorLength	2	0034	Length of Report Descriptor
EndPoint Descriptor (Mouse)				
0	bLength	1	07	Endpoint Descriptor Length
1	bDescriptor type	1	05	Endpoint Descriptor
2	bEndpointAddress	1	84	Address:Endpoint4.IN
3	bmAttributes	1	03	Endpoint Attributes: interrupt
4	wMaxPacketSize	2	0004	Maximum Packet Size: 8 bytes
6	bInterval	1	04	Polling Interval

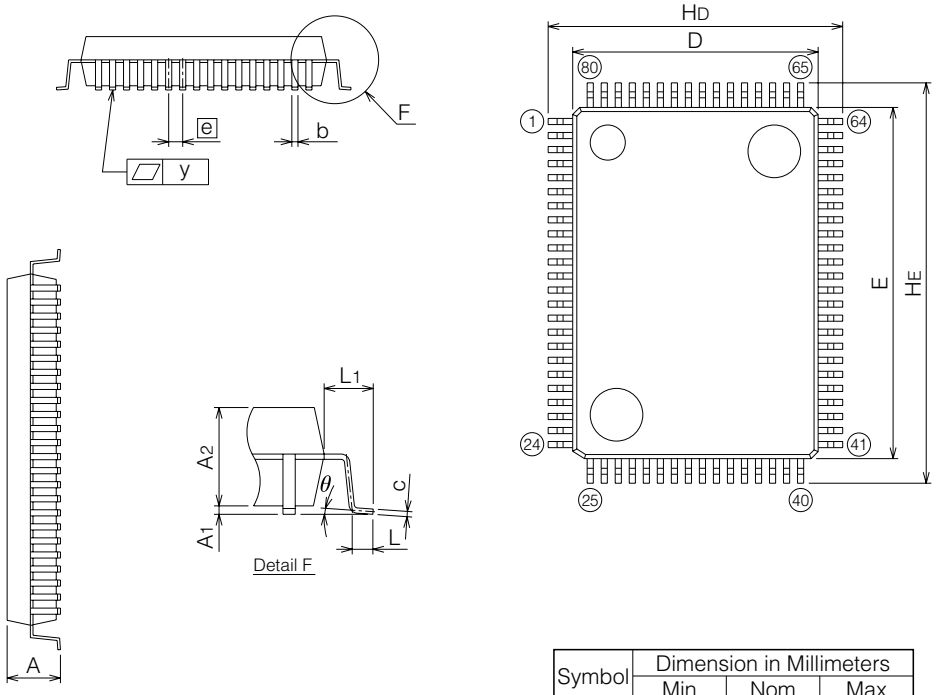
USB DESCRIPTORS : REPORT DESCRIPTORS (MOUSE)

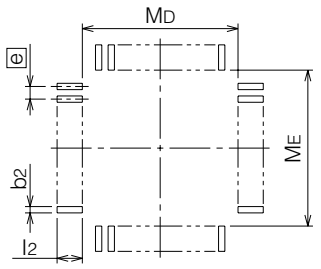
Byte #	Data	Mnemonic	Value
0	Usage Page	05 01	Generic Desktop Control
2	Usage	09 02	Mouse
4	Collection	A1 01	Application
6	Usage	09 01	Pointer
8	Collection	A1 00	Physical
10	Usage Page	05 09	Button
12	Usage Minimum	19 01	1
14	Usage Maximum	29 03	3
16	Logical Minimum	15 00	0
18	Logical Maximum	25 01	1
20	Report Count	95 03	3
22	Report Size	75 01	1
24	Input	81 02	Data, Variable, Absolute
26	Report Count	95 01	1
28	Report Size	75 05	5
30	Input	81 01	Constant
32	Usage Page	05 01	Generic Desktop Control
34	Logical Minimum	15 81	-127
36	Logical Maximum	25 7F	127
38	Report Size	75 08	8
40	Report Count	95 03	3
42	Usage	09 30	X
44	Usage	09 31	Y
46	Usage	09 38	Wheel
48	Input	81 06	Data, Variable, Relative
50	End Collection	C0	
52	End Collection	C0	

SUGGESTED INTERFACING FOR THE GENIPS2™



MECHANICAL INFORMATION FOR THE UR3HCGNP-001 PACKAGE





Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	–	–	3.05
A_1	0	0.1	0.2
A_2	–	2.8	–
b	0.3	0.35	0.45
c	0.13	0.15	0.2
D	13.8	14.0	14.2
E	19.8	20.0	20.2
e	–	0.8	–
H_D	16.5	16.8	17.1
H_E	22.5	22.8	23.1
L	0.4	0.6	0.8
L_1	–	1.4	–
y	–	–	0.1
θ	0_i	–	10_i
b_2	–	0.5	–
l_2	1.3	–	–
M_D	–	14.6	–
M_E	–	20.6	–

ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings

Ratings	Symbol	Value	Unit
Supply Voltage	Vdd	-0.3 to 7.0	V
Input Voltage	Vin	Vss -0.3 to Vdd +0.3	V
Input Voltage USB D+, D-	Vin USB	-0.5 to +3.8	V
Operating Temperature	Ta	T low to T high	° C
UR3HCGNP-001-RH		-20 to +85	° C
Storage Temperature Range	Tstg	-40 to +125	° C

DC Electrical Characteristics, Temperature range=T low to T high unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Supply Voltage	Vdd	+4.15	+5	+5.25	V
Input High Voltage	Vih	0.8Vdd			V
Input Low Voltage	Vil			0.2Vdd	V
Peak Output Current	Io	-10		+10	mA
Average Output Current	Io (avg)	-5		+5	mA
Output Voltage (Ioh = -10mA)	Voh	Vdd-2.0			
(Iol = 10 mA)	Vol			2.0	V
Input Current	Iin	-5		+5	µA
Supply Current (Vdd=5.0 Vdc+/-10%, Vss=0, USB operating)	Idd		70	90	mA
Supply Current (Vdd=5.0 Vdc+/-10%, Vss=0, USB suspended)	Idd		200	250	µA

Control Timing (Vdd=5.0 Vdc +/-10%, Vss=0 Vdc, Temperature range=T low to T high unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Frequency of Operation	fosc				MHz
■ Crystal Option			24.0		
■ External Clock Option			24.0		

GENIPS2™ BILL OF MATERIALS FOR PAGE 9 SCHEMATIC

UR3HCGNP-001-XX BOM

Description	Quantity	Manufacturer	Part#	Description
Capacitors:				
C1, C7, C8	3	Generic	Any	33pF, Ceramic, NPO/C0G
C2,C4, C6, C10	4	Generic	Any	.1uF, Ceramic, X7R
C3	1	Generic	Any	2.2uF, Tantalum
C5	1	Generic	Any	10uF, Tantalum
C9	1	Generic	Any	680pF, Ceramic, NP0/C0G
C11,C12,C13,C14	4	Generic	Any	47pF, Ceramic, NP0/C0G
ICs:				
U1	1	Semtech	UR3GNP-001	GeniPS2™ IC
U2	1	Generic	TC54VC3502ECB	
Resistors:				
R1,R2	2	Generic	Any	33, 5%, 1/16W
R3	1	Generic	Any	1.5k, 5%, 1/16W
R4	1	Generic	Any	1.0k, 5%, 1/16W
R5, R6, R7, R8	4	Generic	Any	10k, 5%, 1/16W
Resonator:				
Y1	1	Generic	Any	24MHz
Transistor:				
Q1	1	Zetex	BSS84ZXCT	MOSFET_P Transistor, SMT, SOT-23
Connector:				
J1	1	Generic	Any	Con_AMP_USB_B
Inductor:				
L1, L2	2	Generic	Any	12uH

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SEMTECH

For sales information and product literature, contact:

HID & System Mgmt Division
Semtech Corporation
568 Broadway
New York, NY 10012
hidinfo@semtech.com
http://www.semtech.com
212 226 2042 Telephone
212 226 3215 Telefax

Semtech Western Regional Sales
805-498-2111 Telephone
805-498-3804 Telefax

Semtech Central Regional Sales
972-437-0380 Telephone
972-437-0381 Telefax

Semtech Eastern Regional Sales
203-964-1766 Telephone
203-964-1755 Telefax

Semtech Asia-Pacific Sales Office
+886-2-2748-3380 Telephone
+886-2-2748-3390 Telefax

Semtech Japan Sales Office
+81-45-948-5925 Telephone
+81-45-948-5930 Telefax

Semtech Korea Sales Sales
+82-2-527-4377 Telephone
+82-2-527-4376 Telefax

Northern European Sales Office
+44 (0)2380-769008 Telephone
+44 (0)2380-768612 Telefax

Southern European Sales Office
+33 (0)1 69-28-22-00 Telephone
+33 (0)1 69-28-12-98 Telefax

Central European Sales Office
+49 (0)8161 140 123 Telephone
+49 (0)8161 140 124 Telefax