

## **Product Datasheet - Technical Specifications**



More information in our Web-Shop at > www.meilhaus.com and in our download section.

## Your contact

Technical and commercial sales, price information, quotations, demo/test equipment, consulting:

Tel.:	+49 - 81 41 - 52 71-0
FAX:	+49 - 81 41 - 52 71-129
E-Mail:	sales@meilhaus.com
Downlo	ads:

www.meilhaus.com/en/infos/download.htm

Meilhaus Electronic GmbHTel.Am Sonnenlicht 2Fax82239 Alling/GermanyE-Mat

 Tel.
 +49 - 81 41 - 52 71-0

 Fax
 +49 - 81 41 - 52 71-129

 E-Mail
 sales@meilhaus.com

Mentioned company and product names may be registered trademarks of the respective companies. Prices in Euro plus VAT. Errors and omissions excepted. © Meilhaus Electronic.

## www.meilhaus.de

## 1480A USB Protocol Analyzer Software Manual

The 1480A USB Protocol Analyzer software is very easy to use. After having executed the software you'll see the below screen. This is the main screen which in the example below shows that the USB Analyzer is disconnected. Once you plug the 1480A USB analyzer to your PC and install the drivers (available on the installation CD) the status changes to 'USB Analyzer Connected'. If no 1480A USB Analyzer hardware is connected the software will still be able to display the enclosed pre-captured .usb files.

File Search View Capture Help							
pen Save Setup Print Search Filter	Fart Stop Updates About						
ltem	Device Endpoint Interface S	tatus Speed	F	Payload		Time (min.sec:ms:us	(ins)
		hem	Count	Current	Previous	Next	1
	🔹 🔽 Data Pi	ltem	Count	Current 0	Previous Goto Previous	Next Goto Next	1
	⊛ 🎾 Data Pi ⊛ → Token	ltem sckets Packets	Count 0 0	Current 0	Previous Goto Previous Goto Previous	Next Goto Next Goto Next	1
	⊛ 🎾 Data P ⊛ → Token ⊛ 🎆 Bus Ev	ltem ackets Packets ents	Count 0 0	Current 0 0	Previous Goto Previous Goto Previous Goto Previous	Next Goto Next Goto Next Goto Next	
	€ → Data P B → Token B ﷺ Bus Ev B ﷺ Handst	Item ackets Packets ents nake Packets	Count 0 0 0 0	Current 0 0 0	Previous Goto Previous Goto Previous Goto Previous Goto Previous	Next Goto Next Goto Next Goto Next Goto Next	
	€ <sup>+</sup> Data P ⊛ + Token ⊛ ﷺ Bus Ev ⊛ <sup>+</sup> Handst ⊛ <sup>+</sup> Transa	Item ackets Packets ents nake Packets ctions	Count 0 0 0 0 0	Current 0 0 0 0 0	Previous Goto Previous Goto Previous Goto Previous Goto Previous Goto Previous	Next Goto Next Goto Next Goto Next Goto Next Goto Next	
	€ → Data P ⊕ → Token ⊕ 100 Ev ⊕	Item ackets Packets ents nake Packets ctions Requests	Count 0 0 0 0 0 0 0 0	Current 0 0 0 0 0 0 0	Previous Goto Previous Goto Previous Goto Previous Goto Previous Goto Previous Goto Previous	Next Goto Next Goto Next Goto Next Goto Next Goto Next Goto Next Goto Next	
	€ Sty Data P B + Token B MM Bus Ev B Sty Handst B ⇒ Transa B B Device ? Invalid	Item ackets Packets ents nake Packets ctions Requests Packets	Count 0 0 0 0 0 0 0 0 0 0 0 0	Current 0 0 0 0 0 0 0 0 0 0	Previous Goto Previous Goto Previous Goto Previous Goto Previous Goto Previous Goto Previous	Next Gato Next Gato Next Gato Next Gato Next Gato Next Gato Next Gato Next	

To view pre-captures files, simply select 'Open' from the 'File' menu. The USB Analyzer software ships with multiple pre-captured files:

- dvd\_rw\_drive.usb: External DVD R/W drive on HS bus (HS Device).
- fs\_floppy.usb: External Floppy drive on HS bus (FS Device).
- fs\_serial\_dongle.usb: USB Serial port USB dongle on HS bus (FS Device).
- fs\_serial\_dongle\_via\_hub.usb: Serial port USB dongle (FS Device south of HS hub). Demonstrates SPLIT Packet decoding.
- hs\_flash\_key.usb: SanDisk Flash key (HS device).
- hs\_harddisk.usb: External USB Harddisk (HS Device).
- hs\_harddisk\_(on\_fs\_controller).usb: External USB Harddisk (HS Device on FS Host Controller).

- Is\_usb\_mouse.usb: USB Mouse (LS device). Demonstrates Keep-Alive strobe decoding.
- ls\_usb\_mouse\_via\_hub(on\_fs\_controller).usb: USB Mouse (LS device).
   Demonstrates PRE Packet decoding.
- otg\_fs\_hnp.usb, otg\_hs\_hnp.usb: Demonstrates FS and HS OTG Host Negotion Protocol decoding.
- otg\_fs\_srp.usb: Demonstrates OTG Session Request Protocol decoding.
- otg\_venus\_gogo\_b\_device.usb: Demonstrates decoding of the OTG Descriptor.

The below image shows the connection sequence for the HS flash key device. Note that the LS and FS connection sequence is somewhat different due to the different nature of LS and FS devices (i.e. only HS devices go through the Chirp sequence). Note that the lower left 'details pane' displays information about the protocol node currently selected in the tree view (in this case 'Device Chirp').

Den Save Setup Print Search Filter S	tart Stop	Polates A	2) bout								
l ltem	Device	Endpoint	Interface	Status	Speed	1		Payload		Time (min.sec:ms:us:ns)	
Device Connection	0			OK	FS	1				00.07:720:522:216	
Device Reset (25 us, 900 ns)										00.07:965:725:950	
P Device Chirp	0			ОК	HS					00.07:965:728:200	
Device Reset (20 us. 500 ns)	1								1	00.07:957:746:300	1
Host Chirp	0			OK	HS					00.07:967:748:483	
Start of Frame Packets (1,374)					HS	928.0 -> 1.10	0.3			00.08:043:989:616	
Device Request (Get Descriptor: Device)	0	0	0	OK	HS	18 bytes (12	01 0	0 02 00 00	00 40 81 07	00.08:215:749.633	
Start of Frame Packets (2)					HS	1,100.5 -> 1.	100.6	1		00.08:215:881:283	
HS Idle										00.08:219:006:450	
L Device Chirp	0			ОК	HS					00.08:219:106:716	
Host Chirp	0			OK	HS					00.08:221:259.666	
<ul> <li></li></ul>					HS	1,178.0 -> 1,2	287.7	S.		00.08:294:013:866	
Device Request (Set Address: 1)	0	0	0	ок	HS	No data				00.08:403:240.066	
Device Chirp				Iten	1	Co	unt	Current	Previous	Next	-
Device Chirp detected (HS Device)			B 140	ata Packets			1425	1	Goto Previous	Goto Next	_
			$\odot \rightarrow T$	oken Packe	s	6	2332	1	Goto Previous	Goto Next	
The device generated a device chirp sequence, in	dicating to the	•		us Events			8	1	Goto Previous	Goto Next	
lost that it is a HS device.		1	3 % H	andshake P	ackets	1	5297	1	Goto Previous	Goto Next	
Excerpt from the Universal Serial Bus Specifica	tion Revision	2.0.	🗷 🏓 T	ransactions			5297	1	Goto Previous	Goto Next	
ection 7.1.7.5 Reset Signaling:			E 🔂 0	evice Reque	ests		20	1	Goto Previous	Goto Next	
. The high-speed device leaves the D+ pull-up r	sistor connec	ted, 🛫	? Ir	walid Packe	ts		0	0	Goto Previous	Goto Next	
C Dutch Van A3 Search Results			To Mad	- Ender 9	Pavload	View Last M	esar	ne Menu			

As can be seen in the above screenshot, the software decodes and displays the device connection, device chirp and host chirp sequence as the HS device is connected. Each event item in the display is timestamped with a 16.666 ns resolution (data is captured from the low-level PHY with a 60MHz clock which results in a 16.666ns resolution).

Consecutive, identical tree nodes (transactions or packets) are grouped together to make it easier to find the relevant information in the tree view. The image below shows how 1,374 SOF (Start of Frame) packets have been grouped into a single top-level node in the tree view. Note that the SOF packet details are displayed in the details view down to the left. Also note that the frame and micro-frame numbers are displayed in the Payload column. The Node Filter view down to the right allows you to easily locate Protocol Elements within the capture.

File Search V	New Capture Help	100.0		2)								
Open Save Setu	p Print Search Filter Sta	rt Stop U	pdates A	bout								
џ.	ltem	Device	Endpoint	Interface	Status	Speed	1		Payload		Time (min.sec:ms:us:ns)	
Device Reset	(20 us, 500 ns)		-				-				00.07:967:746:300	
Host Chirp		0			OK	HS					00.07:967:748:483	
Start of Frame	Packets (1,374)					HS	928.0 -	> 1,100.3			00.08:043:989.616	
To Start of Fr	ame Packet					HS	928.0				00.08:043:989:616	
To Start of Fr	ame Packet					HS	928.1				00.08:044:114:633	
O Start of Fr	ame Packet					HS	929.0				00.08:044:239:650	
🐻 Start of Fr	ame Packet					HS	929.1				00.08.044.364.650	
	ame Packet				_	HS	929.2				00.08:044:489:665	
Start of Fr	ame Packet					HS	929.3				00.08:044:614:683	
	ame Packet					HS	929.4				00.08:044:739:700	
Start of Fr	ame Packet					HS	929.5				00.08:044:864:700	
	ame Packet					HS	929.6				00.08:044:989:716	
Start of Fr	ame Packet					HS	929.7				00.08:045:114:733	
1	Start of Frame Packet Details				Iten	1		Count	Current	Previous	Next	
Name	Value	Dec	Hex	$\Xi \rightarrow T$	oken Packe	ts		62332	1	Goto Previous	Goto Next	-8
PID	SOF 1	65	15	-	IN Packel	s		5671	1	Goto Previous	Goto Next	
Frame number	929	29	841		OUT Pac	kets		270	1	Goto Previous	Goto Next	5
cos r				-	PING Pac	:kets		336	1	Goto Previous	Goto Next	
CHUS	Vaid 2	1	5		SETUP P	ackets		20	1	Goto Previous	<u>Goto Next</u>	1
				Č (	🖞 SOF Pac	kets		56035		Goto Previous	Goto Next	
				312	<ul> <li>SPLIT Pa</li> </ul>	ckets		0	0	Goto Previous	s Goto Next	
				-	+ PRE Pack	kets	_	0	0	Goto Previous	Goto Next	-
🔎 Details View 🗿	A Search Results			E Node	e Finder 1	Payload	View a	Messag	e View			
									and the second			

Continuing walking through the data captured during the HS device connection sequence, we see that the host retrieves the Device Descriptor from the device. This sequence is displayed in the below screenshot. Note how the Device Descriptor retrieved from the device is fully decoded in the Details View (titled 'Device Descriptor Details'). We see that the device descriptor is 18 bytes in length. We also see that the device is a 'SanDisk Corporation' device. Note how the default device (0) and control endpoint (0) are addressed (this is because all devices by default only respond to device ID 0 until their address is set via a SET ADDRESS device request. This is shown later in the trace). Also note how the payload of Device Requests, Transactions and Packets are displayed in the Payload View down to the right in the main window.

File Search V	lew Capture Help			-					
Dpen Save Setur	p Print Search Filter	Start	Stop U	lpdates A	3) bout				
1	İtem		Device	Endpoint	Interface	Status	Speed	Payload	Time (min.sec:ms:us:ns)
Ma Device Reset	(20 us, 500 ns)		-	1	-				00.07:967:746:300
Host Chirp			0			OK	HS		00.07:967:748:483
Start of Frame	Packets (1,374)						HS	928.0 -> 1,100.3	00.08:043:989:616
🛙 🔂 Device Reque	st (Get Descriptor: Device)		0	0	0	ОК	HS	18 bytes (12 01 00 02 00 00 00 40 81 07.	00.08:215:749-633
🖻 🏓 SETUP Tr	ansaction		0	0	0	ACK	HS	8 bytes (80 06 00 01 00 00 40 00)	00.08:215:749:633
→ SETUR	P Packet		0	0	0		HS		00.08:215:749:633
- DATA	0 Packet						HS	8 bytes (80 06 00 01 00 00 40 00)	00.08:215:749.966
+ ACKP	acket					ACK	HS		00.08:215:750:533
Start of Fra     Start of Fra	ame Packet						HS	1,100.4	00.08:215:756:283
🕀 🕂 IN Transad	ctions (5)		0	0	0	NAK	HS	No data	00.08:215:759:950
🕀 🕂 IN Transad	ction		0	0	0	ACK	HS	18 bytes (12 01 00 02 00 00 00 40 81 07	00.08:215:781:650
🕀 😝 OUT Trans	saction		0	0	0	NAK	HS	No data	00.08:215:789:266
🕀 🔁 PING Tran	sactions (7)		0	0	0	NAK	HS	No data	00.08:215:793.800
	Device Descriptor Deta	oils .		22.1	Addr	Data			ASCII
Name	Value	Dec	He	· ·	0000	12 01 00	02 00 0	0 00 40 81 07 51 51 10 00 01 02	?@QQ
bLength	Valid		12	=	10010				
bDescriptorType	DEVICE	1	01		11				
bcdUSB	2.0.0	512	020	D	11				
bDeviceClass	Device Class defined	0	00						
bDeviceSubClass	0	0	00						
hDeviceProtocol	0	0	00	+					
🔎 Details View 🗿	Search Results				I Nod	e Finder 01	Payload	View 📑 Message View	

A Device Descriptor retrieval is done via a number of transactions. First a SETUP Transaction is sent to the device to let it know that the host will later retrieve the device descriptor data via an IN Transaction. The device in our case (see screenshot below) NAKs five times because it takes some time before it has the device descriptor available. The sixth IN Transaction succeeds (OK status) and the 18 bytes in the Device Descriptor is returned to the host. The below image shows how the SETUP Transaction is decoded in the Details View when clicked upon in the top tree view. The Details View (titled 'SETUP Transaction Details') shows the decoded information in the 8-byte SETUP Transaction that starts the 'Get Device'/'Get Descriptor' request (all control transfers are 8 bytes long).

pen Save Setup	Print Search Fi	v   ⊧ lter Start	Stop L	Jpdates A	3) bout							
1	İtem		Device	Endpoint	Interface	Status	Speed			Payload	Time (min.sec:ms:us:ns)	
Device Request (	Get Descriptor: Devi	ce)	0	0	0	OK	HS	18 b	ytes (12	01 00 02 00 00 00 40 81 07	00.08:215:749:633	
😑 🍅 SETUP Trans	action		0	0	0	ACK	HS	8 byt	tes (80 0	5 00 01 00 00 40 00)	00.08:215.749.633	
→ SETUP P	acket		0	0	0		HS				00.08:215:749:633	
→ DATA0 P	acket						HS	8 byt	tes (80 04	5 00 01 00 00 40 00)	00.08:215:749:965	
+ ACK Pack	ket					ACK	HS				00.08:215:750:533	
⑦ Start of Frame	e Packet		61	100	-20	100000	HS	1,100	0.4		00.08:215:756:283	
🗄 🕂 IN Transactio	ns (5)		0	0	0	NAK	HS	Nod	ata		00.08:215:759:950	
🗈 🔶 IN Transa	ection		0	0	0	NAK	HS	No d	ata		00.08:215:759:950	
🕀 🔶 IN Transa	action		0	0	0	NAK	HS	Nod	ata		00.08:215:764:316	
E + IN Transa	iction		0	0	0	NAK	HS	Nod	ata		00.08:215:768:650	
	sction		0	0	0	NAK	HS	Nod	lata		00.08:215:773:000	
E + IN Transactio	n		0	0	0	ACK	HS	18 b	ytes (12	01 00 02 00 00 00 40 81 07	00.08:215:781:650	
	SETUR Transaction	Details		1	Time (m	le seconeur			Data	Decoded in	formation 1	1
Nama	Value	Dec	Цw			0-016-001-00	2 0	lata	AC	Decoded in	Tormation	4
Norre	Value	Dec	rne.	<u> </u>	00.00	8-215-631-20	0 0	lata	04			1
Request Type Recipient	Device	U	00		00.00	8-215-749-50	0 By	Cmd	00	A VEUS VED DATAD		
Request Type. Type	Standard	0	00	10	00.00	8-215-749-56	6 Rx	Cmd	10	RxActive A VBUS VLD D	DATAD	
RequestType.Direction	Device to host	1	01		00.0	3.215.749.63	3 D	lata	20			ü
Request	Get Descriptor	6	06	100	00.00	8:215:749 65	0 0	lata	.00			1
Value	Device	256	010	0	00.00	8:215:749:66	6 D	lata	10			
ndex	0	0	000	0 -	00.00	8:215:749.83	3 Rx	Cmd	0D	A_VBUS_VLD DATAD		
Details View 18	Search Results				I Nod	e Finder   %	Payload	View	R Me	essage View		

The above screenshot also shows how all the details of SETUP transactions are fully decoded in the details pane.

The below screenshot shows the IN Transaction that contains the DATA1 Packet that transfers the actual Device Descriptor data from the device. Note how the details pane decodes packet details when a packet is clicked upon in the main Protocol View. Also note that the Message View shows the actual low level messages as they are received from the Link Under Test.

File	Search View Ca	pture Help											
Open S	Save Setup Print	A ♥ ▶ Search Filter Start	Stop L	Podates A	3) bout								
џ	İter	n.	Device	Endpoint	Interface	Status	Speed			Payload		Time (min.sec:ms:us:ns)	
	→ DATA0 Packet						HS	8 by	tes (80 04	6 00 01 00 00 4	\$0 OO)	00.08:215:749:966	
	+ ACK Packet					ACK	HS					00.08:215:750:533	
G	Start of Frame Packe	t i					HS	1,10	0.4			00.08:215:756:283	
= +	IN Transactions (5)		0	0	0	NAK	HS	Nod	ata			00.08:215:759:950	
B	🛛 🕂 IN Transaction		0	0	0	NAK	HS	No d	ata			00.08:215:759:950	
B	🛛 🗲 IN Transaction		0	0	0	NAK	HS	No d	ata			00.08:215:764:316	
B	🛛 🗧 IN Transaction		0	0	0	NAK	HS	No d	ata			00.08:215:768:650	
8	🛛 🗧 IN Transaction		0	0	0	NAK	HS	No d	ata			00.08:215:773:000	
8	🛛 🕂 IN Transaction		0	0	0	NAK	HS	No d	lata			00.08:215:777:333	
-	IN Transaction		0	0	0	ACK	HS	18 b	ytes (12	01 00 02 00 0	0 00 40 81 07	00.08:215:781:650	
	→ IN Packet		0	0	0	massan	HS	dia.		and the second second	Souther West	00.08:215:781:650	100
	DATA1 Packet						HS	18 b	ytes (12	01 00 02 00 0	0 00 40 81 07.	00.08:215:782:100	
	→ ACK Packet					ACK	HS					00.08:215:782:783	
3	DA	TA1 Packet Details			Time (m	in sec:ms:us	:ns) It	em	Data	1	Decoded Inf	formation	
Name	Valu	e Dec	н	lex	00.08	3:215:781:66	6 C	lata	00				
PID	DAT	A1 75	41		00.00	8:215:781:68	3 0	lata	10				
Data	19 4	4ce 12 h	100 00	12 hutae	00.08	3:215:781:98	3 Rx	Cmd	00	A_VBUS_VL	D DATAO		
and in	100		ines ut	TL Dytes	00.08	3:215:782:03	3 Rx	Cmd	1D	RxActive A	VBUS_VLD D	ATAD	
CHC-16	Vald	33,3,	38 82	3A	00.08	8:215:782:10	0 C	lata	4B				
					00.00	3:215:782:11	6 C	ata	12				
					00.08	3:215:782:13	3 0	lata	01				
					00.00	3:215:782:15	0 0	lata	00				-
Det	ails View 👫 Search	Results			Node	e Finder 18	Payload	View	A Me	esage View			
		messeall			A CONTRACTOR		den antes de la compañía de la compañía de la compañía de la compañía de la compañía de la compañía de la comp		and the second				

Later in the trace (at timestamp 00:08:403:240:066) the host is doing a 'Set Address' Device Request which assigns the device address 1. See the below screenshot for this Device Request. Note that the details pane decodes the 'Set Address' Device Request and that the 'Value' field is 'Address 1'. Note how the 'Set Address' Device Request is terminated when an (empty) IN Transaction successfully is ACKed:

🖉 🖬 🔯	Q.   #	7	A.,	•	٢							
pen Save Setup	Item	iter   start	Device	Endpoint	Interface	Status	Speed	r -		Payload	Time (min.sec:ms:us:ns)	Ē
Host Chirp			0			ОК	HS	1			00.08:221:259:666	-
E T Start of Frame Pa	ckets (874)						HS	1.178	0-> 1,2	87.7	00.08:294:013:866	
Device Request (	Set Address: 1)		0	0	0	OK	HS	No da	ata		00.08:403:240:066	
😑 🏓 SETUP Trans	action		0	0	0	AGK	HS	8 byte	es (00 05	5 01 00 00 00 00 00)	00.08.403.240-066	
SETUP P	acket		0	0	0		HS				00.08:403:240:066	
→ DATAD P	acket						HS	8 byte	es (00 05	5 01 00 00 00 00 00)	00.08:403:240:400	
+ ACK Pack	ket					ACK	HS				00.08:403:240:983	
🌐 🕂 IN Transactio	ns (5)		0	0	0	NAK	HS	No da	ata		00.08:403:246:866	
😑 🗲 IN Transactio	n		0	0	0	ACK	HS	No da	ata		00.08:403:268:500	
→ IN Packel			0	0	0		HS				00.08:403:268:500	
+ DATA1 P	acket						HS	No da	ata		00.08;403.268:950	
-+ ACK Paci	ket					ACK	HS				00.08:403:269:333	
O Start of Frame Pa	ckets (500)						HS	1,288	1.0 -> 1.3	50.3	00.08:403:274:466	
	SETUP Transaction	Details		2	Time (m	in secimsius	ns) Ite	em	Data	Decoded	Information	k
Name	Value	Dec	He	x ^	00.00	8:403:149:46	6 D	ata	07			1
RequestType Recipient	Device	0	00		00.00	8:403:149:48	3 D	ata	E5			
Request Type, Type	Standard	0	00		00.08	8:403:239:93	3 Rod	Cmd	0D	A_VBUS_VLD DATA0		
Request Type Direction	Unet to device	0	00		00.08	8:403:240:00	0 Rxi	Cmd	10	RxActive A_VBUS_VLD	DATAD	
Descent	Cat Addams	e	00	_	00.08	3:403:240.06	6 D	ata	20			4
nequest	Set Address	2	US		00.00	3:403:240:08	3 D	ata	00			
Value	Address 1	1	000	1	00.08	5:403:240:10		ata	10			
Index	0	0	000	0 -	00.00	5:403:240:26	e Foo	Lmd	00	A_VEUS_VLD DATAD		_
Details View 313	Search Results				Node	e Finder 10	Y Payload	New	Me Me	esage View		

Most of the connection sequence continues in the same fashion; Descriptors are being retrieved in the following order: Device, Configuration 0, String 0, 3, Configuration 0, String 0, 2 etc. Each of these descriptors is being decoded and displayed in the Details View. The below screenshot shows how the 2nd string descriptor tells us that the device connected is a Cruzer Micro (a Flash Key). Also note that all packets after the 'Set Address' Device Request are now addressed to Device 1 (same device but new address). Note that the payload view shows the Unicode string in both binary and ASCII format.

File Search V	iew Capture Help			-					
Dpen Save Setur	Print Search Filte	r Start	Stop L	Ipdates A	3 bout				
L.	İtem		Device	Endpoint	Interface	Status	Speed	Payload	Time (min.sec:ms:us:ns)
Device Reque	st (Get Descriptor: Configu	ration 0)	1	0	0	OK	HS	32 bytes (09 02 20 00 01 01 00 80 64 09	00.08:466:910:250
Start of Frame	Packets (2)						HS	1.351.6 -> 1.351.7	00.08:467:030:650
Device Reques	st (Get Descriptor: String 0	0	1	0	0	OK	HS	4 bytes (04 03 09 04)	00.08:467:275:250
Start of Frame	Packets (2)						HS	1.352.1 -> 1.352.2	00.08:457:405:683
Device Reque	st (Get Descriptor: String 2		1		0	ОК	HS	26 bytes (1A 03 43 00 72 00 75 00 7A 00	00.08.467.535.383
🗷 🏓 SETUP Tra	ansaction		1	0	0	ACK	HS	8 bytes (80 06 02 03 09 04 FF 00)	00.08:467:535:383
🕀 🕂 IN Transad	tions (6)		1	0	0	NAK	HS	No data	00.08:467:542:450
🖻 🕂 IN Transac	tion		1	0	0	ACK	HS	26 bytes (1A 03 43 00 72 00 75 00 7A 00	00.08:467:568:433
IN Pac	ket		1	0	0		HS		00.08:467:568:433
+ DATA	Packet						HS	26 bytes (1A 03 43 00 72 00 75 00 7A 00	00.08:467:568:883
- ACK P	acket					ACK	HS		00.08:467:569:700
😟 🍰 OUT Trans	action		1	0	0	NAK	HS	No data	00.08:467:576:216
🗄 🤁 PING Tran	sactions (4)		1	0	0	NAK	HS	No data	00.08:467:580:750
	String Descriptor Det	ails			Addr	Data			ASCII
Name	Value	Dec		Hex	0000	1a 03 43	00 72 0	0 75 00 7a 00 65 00 72 00 20 0	0C.r.u.z.e.r
bLength	26	26		IA	0010	40 00 69	00 65 0	0 72 00 61 00	M. I. C. F. O.
bDescriptorType	STRING	3		03	11				
h Storig	Cruzer Micro				11				
entral and a second sec	Constant Antonial			_	11				
					11				
					11				
🕐 Datala Maur 🗍	A Search Results				1 Nod	e Finder 93	? Pavload	View St Message View	

When scrolling down in the trace to timestamp 00:08:731:463:283, we see a Class-Specific Device Request being displayed. The 1480A USB Analyzer software does not yet decode the meaning of class-specific device requests but the raw transactions and packets are displayed and hence, the meaning can be decoded 'by hand' by using the classspecification for the device used. Class-decoders will be available soon in our web store and you will be able to plug them in to the USB analyzer software without any hardware upgrades. At this time we have a target price of \$199 per class-decoder (although this price might vary somewhat depending on the complexity of some class-decoders). See below screenshot for the class-specific Device Request without having to manually find it in the trace.

en Save Setup	Print Search Fil	ter Start	Stop L	lpdates A	<ul> <li>bout</li> </ul>								
	ltem		Device	Endpoint	Interface	Status	Speed		3	Payload		Time (min.sec:ms:us:ns)	T
Start of Frame Pa     Start of Frame	cket	_	-	1			HS	1,370.6				00.08:486:032.483	
Device Request (	Get Descriptor: String	13)	1	0	0	OK	HS	42 byte:	s (2A 03 3	2 00 30 00	30 00 34 00_	00.08:486:153:100	
Start of Frame Pa	ckets (2)						HS	1,371.0	-> 1,371.1			00.08:486:282:516	
Device Request (	Set Configuration 1)		1	0	0	OK	HS	No data				00.08:486:410:400	
Start of Frame Pa	ckets (1,960)						HS	1,371.2	-> 1,616.1			00.08:486:532:533	
Device Request (	Class-specific)		1	0	0	OK	HS	1 byte (I	00)			00.08:731:463:283	1
😐 🎽 SETUP Trans	action		1	0	0	ACK	HS	8 bytes	(A1 FE 00	00 00 00 0	1 00)	00,08:731.463.283	
🗈 🕂 IN Transactio	ins (2)		1	0	0	NAK	HS	No data				00.08:731:472:900	
🕀 🗲 IN Transactio	n		1	0	0	ACK	HS	1 byte (I	00)			00.08:731:486.616	
🗷 🍃 OUT Transac	tion		1	0	0	NAK	HS	No data				00.08:731:496:083	
🗄 🔁 PING Transa	ctions (2)		1	0	0	NAK	HS	No data				00.08:731:502:850	
PING Transa	ction		1	0	0	ACK	HS	No data				00.08:731:515:750	
OUT Transac	tion		1	0	0	ACK	HS	No data				00.08:731:522:300	
	SETUP Transaction	Details		22	1	Iten	n		Count	Current	Previous	Next	
Name	Value	Dec	He	x ^	8 📷 0	evice Requi	ests		20	1	Goto Previous	s Goto Next	
equestType Recipient	Interface				6	🕺 Class-Sp	ecific Dev	ceRe.			Goto Previous	Goto Next	
equestType.Type	Class	1	01		6	Vendor-S	pecific De	vice R.	0	0	Goto Previous	s Goto Next	
an ant Tune Direction	Davies to hast	4	01		6	Get Statu	s Device	Reque.	0	0	Goto Previou	Goto Next	
equest type.chiecaun	Device to most	1	VI			Clear Fea	ature Devid	ce Req	0	0	Goto Previous	s Goto Next	
equest	254	254	FE		6	Set Featu	are Device	Requ.	0	0	Goto Previous	Goto Next	
alue	0	0	000	0	0	Set Addre	ess Device	Requ.	1	1	Goto Previous	s Goto Next	
dev	0	0	000	0 -	6	Get Desc	riptor Devi	ce Re.	17	1	Goto Previous	s Goto Next	_

The USB Analyzer software decodes and checks all DATA packet CRCs. Normally, this will always be valid unless you have data integrity problems or if your device calculates the CRC in firmware and you have a firmware bug in your device. Note the CRC-16 verified 'Valid' in the Details View down to the left.

Dpen Save S	Detup Print Search F	Y   ≱ ilter Start	Stop L	lpdates A	3) bout				
1	İtem		Device	Endpoint	Interface	Status	Speed	Payload	Time (min.sec:ms:us:ns)
🛛 🕂 IN Transa	ction		1	1	0	ACK	HS	36 bytes (00 80 02 02 1F 00 00 00 53 61	00.08:731:933:500
Start of France	ame Packet						HS	1,616,6	00.08:732:056:350
9 🕂 IN Transa	ction		1	1	0	ACK	HS	13 bytes (55 53 42 53 98 CA 88 81 00 00	00.08:732:081:400
The Start of Fr	ame Packet						HS	1,616.7	00.08;732:181:366
🛿 🎲 PING Tran	isaction		1	1	0	ACK	HS	No data	00.08:732:208:600
🛛 🗦 OUT Tran	saction		1	1	0	NYET	HS	31 bytes (55 53 42 43 98 CA 88 81 FC 0	00.08:732:211:166
+ OUT F	Packet		1	1	0		HS		00.08:732:211:166
🔹 data	1 Packet						HS	31 bytes (55 53 42 43 98 CA 88 81 FC 0.	00.08.732.211.500
+ NYET	Packet					NYET	HS		00.08:732:212:466
O Start of Fr	ame Packet						HS	1,617.0	00.08:732:306:383
🛛 🗲 IN Transa	ction		1	1	0	ACK	HS	12 bytes (00 00 00 08 00 1E 8B DF 03 00	00.08:732:332.850
O Start of Fr	ame Packets (2)						HS	1,617.1 -> 1,617.2	00.08:732:431:383
E 🗧 IN Transa	ction		1	1	0	ACK	HS	13 bytes (55 53 42 53 98 CA 88 81 F0 00	00.08:732:558:583
	DATA1 Packet D	Vetails			Addr	Data			ASCII
Name	Value	Dec	H	lex	0000	55 53 42	43 98 0	a 8b 81 fc 00 00 00 80 00 0a 23	058C#
PID	DATA1	75	41		0010	00 00 00	00 00 0		
Data	31 bytes	31 byte	es OC	1F bytes	11				
CBC-16	Vald	72 346	57	4A					
		)			The Med	Ender 01		Manage May	

The 1480A USB Protocol Analyzer software also includes a powerful Protocol Filtering feature that allows you to hide frequently repeated Protocol Items from the main tree view. The below screenshot shows the 'Filter Protocol Items' dialog box in which Tree node objects can be hidden based on type, device ID or endpoint numbers. Both live and previously captured data can filtered in real-time. The data captured from the 1480A USB Analyzer is always stored to disk unfiltered, only the various Protocol Elements are hidden from view. This allows the full details of all captures to be analyzed at a later time regardless of the filter settings at capture time.

Dpen Save Setup Print Search Filte	r Start Stop	Updates About					
D Item	Device	Endpoint Interface	Status	Speed	Payload		Time (min.sec:ms:us:ns)
Start of Frame Packet     Start of Frame Packet     Start of Frame Packets (2)     Start of Frame Packets (2)     Start of Frame Packets (41)     Š Start of Frame Packet     Š Š Š Š Š Š Š Š Š Š Š Š Š Š Š Š Š	Filter Protocol Transaction Filte Hide Top-lev Hide NAKed Hide Incomp Hide NAKed Hide NAKed Hide NAKed Hide NAKed Hide PING 1 Hide SPLIT	Items Is In Items Items Is In Items In Items In Items In Items In Items In Items In Items In Items In Items	Device Hic Hic Hic Hic Bus Ev Hid Hid Hid Hid	e Request Filters le all Device Rec le Class-Specific le Incomplete De ent Filters e Connect/Disct e Host/Device C e Device Reset e Keep-alive stro	quests Device Requests ic Device Requests trice Requests price Requests price Requests price Pequests price Pequests	88 DF 03 00.	00.08:732:306:383 00.08:732:332:850 00.08:732:431:383 00.08:732:558:583 00.08:732:558:583 00.08:732:681:416 00.08:732:806.433 00.08:732:931:433 00.08:733:056.450 00.08:733:056.450 00.08:733:306.466 00.08:733:431:483
	Packet Filters		Hide tr	affic to/from devi	ces with		00.00.135.550.500
Consecutive SOF Pac Consecutive Start of Frame Packets Multiple SOF-packets have been collapsed Expand to see the individual SOF-packets.	Hide Start of Hide Invalid Deactivat	Frame Packets Packets a all Protocol Filters	Device Endpo	NDs 1-2, 4, 5, Ints 1-5, 15	30, 30-127		ASCII
Details View 🐴 Search Results		Ten Node	Finder 10	? Payload View	📌 Message View		

The 1480A USB Protocol Analyzer software also allows you to print the Protocol Tree. With the Adobe PDF Writer software you can easily output information to file and edit it later. The below screenshow shows the Print Preview dialog.

Dpen Save Setup	Print Search Filter	∲ Start	Stop Up	edates A	About								
	ltem		Device	Endpoint	Interface	Status	Speed		Payload	4	T	ime (m	in.sec:ms:us:ns)
Device Reset (31	ms, 87 us)	-D D.								14	- 10	1	850.928.066
Device Chirp		and pr	Int preview		<b>m an</b> 11/2					11	00	114	850.930.316
Device Disconne	cted	es >				ose					Page	1	861:933:000
Device Connection	on akata (C2)				Item			Device	Endpoint	Interface	Status	1	82:017:533
Start of Frame Page	Get Descriptor: Device)		Der Der	vice Conr	nection			0			OK		144-607-992
SETURITIES	Get Descriptor, Device)		Den Den	vice Rese	et (4 us, 416 i	ns)							44,607,883
-> SETUP P	acket		L Den	vice Chirp	p			0			Timeout	=	44-607-883
+ DATAO P	acket		Den Den	vice Rese	et (78 ms, 12	วับธ)							44.611.050
+ ACK Pac	ket		Den Den	vice Disc	onnected						19859		44.619.633
To Start of Fram	e Packet		Den	vice Conr	nection			0			OK		45.595.633
🕀 🕂 IN Transactio	n		De	VICE Hest	et (31 ms. 87	us)		0			-		45:610:716
Start of Fram     Star	e Packet		Disc Day	vice Chirp	opported.			0			Timeout		46:595:783
alter and the second se			Pt De	vice Coor	connected			0			OK		
News	SETUP Transaction Det		The Constant	rt of Fran	ne Packets (F	3)					On		Next
Name	value			vice Reg	uest (Get Des	criptor: De	vice)	0	0	0	ок		to Next
Request type. Recipient	Device		8 3	SETUP	Transaction			0	0	0	ACK	+	to Next
RequestType.Type	Standard				HI.								to Next
Request Type Direction	Device to host	-	01	1.01	I ⊞ → Tra	insactions			160	1 Goto	revious	(	Soto Next
Request	Get Descriptor	6	06	100	3 10 De	vice Reque	sts		29	1 Goto	Previous	5	Soto Next
/alue	Device	256	0100		? Inv	alid Packe	5		0	0 Goto	Previous	\$	Soto Next
ndex	0	0	0000	+									
Index	0 Search Results	0	0000	*	* 010 B + 132 B M + 14								

Version 3.1 of the 1480A Protocol Analyzer software introduces a high-performance Payload Search feature that allows searches for Unicode and ASCII strings as well as binary data in the data packet payload. The below screen shot shows how the Unicode string 'MITSUMI' is being searched for in the 'fs\_floppy.usb' sample capture. Note that strings can be searched for in a case-sensitive as well as case-insensitive way.

pen Save Setup Print Search Filter Start	Stop Updates A	3) bout							
ltem	Device Endpoint	Interface S	Status Sp	eed		Payload		Time (min.sec:ms:us:ns)	
Device Connection	0	ОК	FS					00.10.616.929.666	
Device Reset (4 us, 416 ns)								00.10:866:493:600	
L Device Chirp	H Search Payload I	Data						00.10:866:495:850	
Device Reset (78 ms, 125 us)								00.10:856:498:116	
Est Device Disconnected	Search For:							00.10:877:498:533	
Price Connection	MITSUM				•			00.10:944:625:766	
Device Reset (31 ms, 87 us)								00.11:350.928.066	
C Device Chirp	Search Options							00.11:350:930:316	
Est Device Disconnected	Unicode String	(example: "This	is a Unicode	string")				00.11:361:933.000	
Device Connection	ASCII String (e)	xample: "This is a	an ASCII strin	a")				00.11:382:017:633	
To Start of Frame Packets (63)	C Hay Commerce	(	h ad atin					00.11:382:585:300	
Device Request (Get Descriptor: Device)	Thex Sequence	e (example: 63 a	b cd er )			1 00 00 00	(80 (	00.11:444:607:883	
Start of Frame Packet	Case-Insensitiv	re search						00.11:454:597:100	
Device Connection	Note: Quotes are n	not needed in the	search expre	ssion.		Current	Previous	Next	
A FS or HS device was connected						1	Goto Previous	Goto Next	
	Gear Search R	esuts View	Ok	Cano	d	1	Goto Previous	Goto Next	
All FS and HS devices connect as FS devices. After			1	2		1	Goto Previous	Goto Next	
uccession completed the chirp sequence, an HS-ca-		🗄 🏹 Hands	hake Packet	5	157	1	Goto Previous	Goto Next	
an enter any altraction of		🗷 🄃 Transi	actions		160	1	Goto Previous	Goto Next	
scerpt from the Universal Serial Bus Specification	Revision 2.0.	E B Device Requests 2			29	1	Goto Previous	Goto Next	
ection 7.1.7.3 Connect and Disconnect Signaling:		? Invalio	d Packets		0	0	Goto Previous	Goto Next	
Details View A Search Results		10 Node Find	der 101 Pay	ioad View   🚅	Messag	e View			_

The results of all searches are displayed in the 'Search Results' View shown in the below screenshot. When clicking on a search result the main Protocol Tree View selects the node that contains the payload. Click the 'Goto Previous' and 'Goto Next' links to navigate through the matches found. The 'Payload View' also high-lights the data that matches the search. Search results can be cleared one at a time or all at once via a right-click pop-up menu or via the 'Search Payload Data' dialog (shown in the above screen shot).

n Save Setup Print Search Filter Start	Stop Upda	stes A	3) bout				
ltem	Device E	ndpoint	Interface	Status	Speed	Payload	Time (min.sec:ms:us:ns)
Device Request (Get Descriptor: String 0)	2 0		0	OK	FS	4 bytes (04 03 09 04)	00.11:831:671:300
Start of Frame Packets (2)					FS	1.858 -> 1.859	00.11:836:659:700
Device Request (Get Descriptor: String 2)	2 0		0	OK	FS	34 bytes (22 03 4D 00 49 00 54 00 53 00	00.11:837:671:200
D Start of Frame Packets (4,497)					FS	1.868 -> 220	00.11:846:661:350
Device Request (Get Descriptor: String 0)	2 0		0	OK	FS	4 bytes (04 03 09 04)	00.16:343:409.966
Start of Frame Packet.					FS	224	00.16:347:399:116
Device Request (Get Descriptor: String 2)	2 0		0	OK.	FS	34 bytes (22 03 4D 00 49 00 54 00 53 00.	00.16:347:410.800
Start of Frame Packet					FS	232	00.16:355:400:433
Device Request (Get Descriptor: String 0)	2 0		0	OK	FS	4 bytes (04 03 09 04)	00.16:355:412:683
Start of Frame Packets (2)					FS	236 -> 237	00.16:359:401:100
Device Request (Get Descriptor: String 2)	2 0		0	OK	FS	34 bytes (22 03 4D 00 49 00 54 00 53 00.	00.16:360.414.600
Start of Frame Packets (11)					FS	245 -> 255	00.16:368:402:566
Device Request (Get Descriptor: Device)	2 0		0	ок	FS	18 bytes (12 01 10 01 00 00 00 08 EE 03	00.16:378:418:133
Item Matches Current Previous	Next		Addr	Data		A STATE OF A STATE OF A STATE	ASCII
TSUMI" (Unicode) 4 3. <u>Goto Previou</u>	s Goto Ne	<u>∎</u>  }}	0000 0010 0020	22 03 4d 20 00 55 20 00	00 49 0 00 53 0	0 54 00 53 00 55 00 4d 00 49 00 0 42 00 20 00 46 00 44 00 44 00	) ".M.I.T.S.U.M.I. U.S.BF.D.D.
			Notice Notice	e Finder 010	Produced	Manager Manager	

Versions 3.2 and 3.3 introduced relative and absolute timestamps as well as Set/Clear Time Reference commands. When selecting 'Relative Timestamps' from either the main menu or from one of the pop-up menus through out the application the timestamps indicate the time difference from the previous packet. The below screen shot illustrates this.

Open Save Setur	Print Search Filter	Start S	top U	e pdates A	3) bout							
р.	ltem		Device	Endpoint	Interface	Status	Speed	1		Payload	Time (min.sec:ms:us:ns)	
Device Connec	tion	(	)			OK	FS	i			00.00:000:000:000	
Device Reset	10 us. 816 ns)										00.00:109:152:933	
L Device Chirp		(	3			OK	HS				00.00:000:002:250	
Device Reset	46 us, 100 ns)										00.00:001:103:883	
12 Host Chirp		(	0			OK	HS				00.00:000:002:183	
	Packets (801)						HS	840.0	)-> 940.4	4	00.00:059:112:083	
🛚 🔂 Device Reque	st (Get Descriptor: Device)			0		OK	HS	18 by	rtes (12	01 00 02 00 00 00 40 E3 05.	00.00.000.037.766	
Start of Frame     Start     Start of Frame     Start     St	e Packet					HS	940.6	5		00.00:000:058:950		
HS Idle											00.00:003:000:150	
2 Device Chirp		(	)			OK	HS				00.00:000:100:266	
Host Chirp		(	)		542	OK	HS				00.00.001:212:333	
Start of Frame	Packets (641)						HS	1,000.0 -> 1,080.6	80.6	00.00:055:688:250		
E Device Reques	st (Set Address: 1)	(	)	0	0	ок	HS	No da	ata		00.00:000:037:750	
	Device Descriptor Deta	pils		10	Time (m	in sectmstus	:ns) Ite	em	Data	Decoded In	formation	
Name	Value	Dec	Heo	· ·	00.0	0:000:000:00	16 Da	ata	AC		-	11
bLength	Valid	18	112	_	00.0	0.000.000.00	16 Da	ata	1B			
bDescriptorType	DEVICE	1	01		00.0	00:000:037:6	16 Rx0	Cmd	0D	A_VBUS_VLD DATA0		
L-JUCD	0.00		000		00.0	0:000:000:00	50 Rx(	Cmd	1D	RxActive A_VBUS_VLD D	DATAD	
DCOUSE	2.0.0	212	020	·	00.0	0000:000:00	66 Da	ata	20			
bDeviceClass	Device Class defined	0	00		00.0	0.000.000.00	16 Da	ata	00			
bDeviceSubClass	0	0	00		00.0	0:000:000:00	16 Da	ata	10			
hDeviceProtocol	0	0	00	+	00.0	00:000:000:2	00 Rx0	Cmd	0D	A_VBUS_VLD DATAD		-
🔎 Details View 🗿	Search Results   - Mar	kers View			1 Nod	e Finder 18	Payload	View	Ne Me	ssage View		

Note that all timestamps in the above screen-shot now display relative timestamps. When setting the time reference to a certain tree node, all timestamps are calculated as a time offset from the reference time stamp. The below screen-shots illustrate how this works.

Dpen Save Setup	Print Search Filter	Start St	p U	e pdates A	Dout								
1	ltem	1	evice	Endpoint	Interface	Status	Speed	1		Payload		Time (min.sec:ms:us:ns)	
P+ Device Conner	tion	0				ОК	FS	10				02.04:341:699:883	L
Device Reset	10 us. 816 ns)											02.04:450:852:816	
L Device Chirp		0				OK	HS					02.04:450:855:066	
Device Reset	(46 us, 100 ns)											02.04:451:958:950	
Host Chirp		0				OK	HS					02.04:451:961:133	
To Start of Frame	Packets (801)						HS	840.0	0-> 940.4	4		02.04:511:073:216	
🖬 Device Reque	st (Get Descriptor: Device)			- AL	al de Tier			18 by	ytes (12	01 00 02 00 00	0 00 40 E3 05	02.04.611:112.666	
The Start of Frame	Packet			AD AD	solute I Im	lestamps		940.6	5			02.04:611:324:900	
HS Idle				Rel	ative Time	estamps						02.04:614:325:050	
L Device Chirp		0		T. Set	Time Refe	erence N						02.04:614:425:316	
Host Chirp		0			Time D	63					02.04:615:637:650		
)      Start of Frame	Packets (641)			As CIE	ar rime io	elerence		1,000	0.0 -> 1,0	80.6		02.04:671:325:900	
Device Reque	st (Set Address: 1)	0		+ Ad	d Marker			No data			02.04:751:365:000		
1	Device Descriptor Deta	nils	1	e Edi	t Marker		Ite	em	Data	1	Decoded Inf	formation	
Name	Value	Dec	Hex	× Cle	ar Marker		Da	ata	AC				1
blenath	Valid	18	012		02.0	04:611:074:93	33 Da	ata	1B				
h Deservator Turne	DEWCE	1	01		02.0	4:611:112:58	50 Rx0	Cmd	0D	A_VBUS_VL	D DATAD		
b bescriptor type		1			02.0	4:611:112:60	00 Rx0	Cmd	10	RxActive A	VBUS_VLD D	ATAD	
bodUSB	2.0.0	512	0200		02.0	04:611:112:60	56 Da	ata	20				
bDeviceClass	Device Class defined	0	00		02.0	4.611:112:6	33 Da	ata	00	11			
b Device SubClass	0	0	00		02.0	04:611:112:70	00 Da	ata	10				
hDeviceProtocol	0	0	00	+	02.0	04:611:112:90	00 Rx0	Cmd	0D	A_VBUS_VLI	D DATAD		-
Details View	Search Results   - Man	cers View			1= Nod	e Finder   989	Pavload	View	. R Me	esage Vew			

File Search V	iew Markers Captur	e Help										
Open Save Setup	Print Search Filter	Start :	itop U	pdates A	3) bout							
р.	ltem		Device	Endpoint	Interface	Status	Speed	1		Payload	Time (min.sec:ms:us:ns)	
Device Connec	tion		0			OK	FS	1 d			- 00.00:269:412:783	
Device Reset (	10 us, 816 ns)										- 00.00:160:259:850	
L Device Chirp			0			OK	HS				- 00.00:160:257.600	
Device Reset (	46 us, 100 ns)										- 00.00:159:153:716	
Host Chirp			0			OK	HS				- 00.00:159:151:533	
E T Start of Frame	Packets (801)						HS	840.0	-> 940.4	1	- 00.00:100:039:450	
🛊 🙀 Device Reques	t (Get Descriptor: Device)		0	0	0	OK	HS	18 by	tes (12	01 00 02 00 00 00 40 E3 05.	00.000.000.000.000	
The Start of Frame	Packet						HS	940.6			00.00:000:212:233	
HS Idle											00.00:003:212:383	
12 Device Chirp			0			ОК	HS				00.00:003:312:650	
Host Chirp			0			OK	HS				00.00.004:524:983	
	Packets (641)						HS	1,000	.0 -> 1,0	80.6	00.00:060:213:233	
E 📆 Device Reques	t (Set Address: 1)		0	0	0	OK	HS	No da	ta		00.00.140.252.333	
	Device Descriptor Deta	sils		22	Time (m	in sec ms:us	s:ns) Ite	em	Data	Decoded In	formation	
Name	Value	Dec	Heo	· ·	- 00.0	00:000:037:7	50 Da	ata	AC			11
bLength	Valid	18	012		- 00.0	00:000:037:7	33 Da	ata	1B			
bDescriptorTune	DEVICE	1	01	10	- 00.0	00:000:000:1	16 Rx0	Cmd	0D	A_VBUS_VLD DATA0		
L uses				-	- 00.0	0.000:000:00	66 Rx(	Cmd	1D	RxActive A_VBUS_VLD I	DATAD	
DC003R	2.0.0	512	020		00.0	00 000 000 0	00 Da	ata	20			
bDeviceClass	Device Class defined	0	00		00.0	0:000:000:00	16 Di	ata	00			
bDeviceSubClass	0	0	00		00.0	0:000:000:00	33 Di	ata	10			
hDeviceProtocol	0	0	00	+	00.0	00:000:000:2	33 Rx(	Cmd	CD	A_VBUS_VLD DATAD		-
🔎 Details View 👫	Search Results   Mar	kers View			1 Nod	e Finder   18	Payload	View	Ne Me	ssage View		

In order to measure time between two locations in the trace, cursors are commonly used. Also, bookmarks are also commonly used to insert arbitrary comments into the trace for later review. The cursor and bookmark concepts have in the 1480A Software been merged into a simple 'Marker' concept. A marker is inserted into the trace by right-clicking on a tree node in the main Protocol View and selecting 'Add Marker' from the pop-up menu. This is shown in the below screen-shots.

Dpen Save Setup	Print Search Filter	Þ Start	Stop U	e pdates Al	Dout								
1	Item		Device	Endpoint	Interface	Status	Speed	1		Payload		Time (min.sec:ms:us:ns)	$\square$
2+ Device Connec	stion		0			OK	FS	12-				- 00.00:269:412:783	
Device Reset (	10 us. 816 ns)											- 00.00:160:259:850	
L Device Chirp			0			OK	HS					- 00.00:160:257.600	
Device Reset (	(46 us, 100 ns)											- 00.00:159:153:716	
EE Host Chirp			0			OK	HS					- 00.00:159:151:533	
To Start of Frame	Packets (801)						HS	840.0	)-> 940.4	4		- 00.00:100:039:450	
r 🔂 Device Reque	st (Get Descriptor: Device)	dina di		•		OK	HS	18 by	rtes (12	01 00 02 00 0	0 00 40 E3 05	00.00.000.000.000	
	Packet		Absolute I	imestamp	)S		HS	940.6	5			00.00:000:212:233	
HS Idle			Relative Ti	mestamps								00.00:003:212:383	
L Device Chirp		T	Set Time R	eference		ОК	HS					00.00:003:312:650	
Host Chirp		3	Class Time	Defense		OK	HS					00.00.004:524:983	
Start of Frame	Packets (641)	1	Clear Time	e Keference	5		HS	1,000	0.0 -> 1,0	80.6		00.00:060:213:233	
Device Reques	st (Set Address: 1)	+	Add Marke	er	N	OK	HS	No da	ata			00.00.140:252:333	
	Device Descriptor Deta	7 16	Edit Marke	ir.	13	in secims:us	ins) Ite	em	Data	10	Decoded In	formation	1
Name	Value	- 12	Clear Mark	ter	t	00:000:037:7	50 D	ata	AC				Ť
hlengh	Velet	18	112		- 00	00:000:037:7	33 D	ata	18				
h Deservator Turns	DEVICE	4	01		- 00.	00:000:000:1	16 Rxd	Cmd	0D	A_VBUS_VL	D DATAO		
b Descriptor Type	DEVICE	P.C.	01		- 00.	00.000.000.00	66 Rx4	Cmd	1D	RxActive A	VBUS_VLD D	DATAD	
bcdUSB	2.0.0	512	0200		00.	00 000 000 0	30 D	ata	20				Ð,
bDeviceClass	Device Class defined	0	00		00.	00.000-000-0	16 D	ata	.00				1
bDeviceSubClass	0	0	00		00.	0:000:000:00	33 Di	ata	10				
hDeviceProtocol	0	0	00	+	00.	00:000:000:2	33 Rx(	Cmd	CD	A_VBUS_VL	D DATAO		
Dataile Manu 4	Search Results   Mark	ers View	1		Nod	le Finder   98	Pavload	View	R Me	well anese			

Doon Save Setup Print Search Filter Start	Stop 1	Q Jodates Al	2) bout						
1 Item	Device	Endpoint	Interface	Status	Speed		Payload	Time (min.sec:ms:us:ns)	Ē
Device Reset (46 us, 100 ns)								- 00.00:159:153:716	-
Host Chirp	0			OK .	HS			- 00.00:159:151:533	
0 0 Start of Frame Packets (801)					HS 8	340.0 -> 940.	4	- 00.00:100:039:450	
Device Request (Get Descriptor: Device)	0	0	0	OK	HS	8 bytes (12	01 00 02 00 00 00 40 E3 05	00.00:000:000:000	
O Start of Frame Packet	-	17.00		1997 C	ue e	NAC	-	00.00.000:212:233	
INIE HS Idle	+ A	dd Marker						00.00:003:212:383	
C Device Chirp	0					-		00.00:003:312:650	
Host Chirp	0 Ma	arker text (use	e CTRL-Ent	er to insert lir	e-breaks):		-	00.00:004:524:983	
To Start of Frame Packets (641)	T	his is the first	set address	device requ	est. Notice h	now all	0.6	00.00:060:213:233	
B Device Request (Set Address: 1)	0	arkers added	are placed	in the below	markers vie	w1		00.00.140.252.333	
3 Tart of Frame Packets (319)							0.6	00.00.140:464:583	
Request (Get Descriptor: Device)	1						00 02 00 00 00 40 E3 05	00.00:180:290:750	
Start of Frame Packet								00.00.180.465.266	
ltem Marker Text Time (	nin.	1	Ok	Car	cel		Decoded	Information	I,
Device Request (G. This is the first devi. UV			00.0	0:140:214:6	16 Dat	a AC			1
			00.0	0:140:252:2	16 RxCr	nd OD	A_VBUS_VLD DATA0		
			00.0	0.140:252:2	66 RxCr	nd 1D	RxActive A_VBUS_VLD	DATA0	
			00.0	0.140:252:3	33 Dat	a 20			II.
			00.0	0.140:252:3	50 Dat	a 00			1
			00.0	0:140:252:3	66 Dat	a 10			
		1.0	00.0	0.140:252:5	66 RxCr	nd 00	A_VBUS_VLD DATAD		
0 0 4 1 W 4 2 C 1 0 2	51		T- Made	Ender   00	Dauland W				_

Note how the Protocol Item row has been set to a yellow color. This indicates that the row has been 'marked' by a marker. The 'Markers View' down to the left in the window displays all active markers. When clicking on a marker in the markers view, the main Protocol View will scroll to and high-light the marked Protocol View row. Markers can also be edited and cleared from the context-menu displayed when right-clicking in the markers view. The below screen shot shows this.

oen Save Setup Print Search Filter Start	Stop U	lpdates A	2) bout						
Item	Device	Endpoint	Interface	Status	Speed	1		Payload	Time (min.sec:ms:us:ns)
Device Request (Get Descriptor: Device)	0	0	0	OK	HS	18 by	/tes (12	01 00 02 00 00 00 40 E3 05	5 00.00:000:000:000
Start of Frame Packet					HS	940.6	5		00.00:000:212:233
HS Idle									00.00:003:212:383
C Device Chirp	0			OK	HS				00.00:003:312:650
Host Chirp	0			OK	HS				00.00.004:524:983
Start of Frame Packets (641)					HS	1,000	0.0 -> 1.0	80.6	00.00:060:213:233
Device Request (Set Address: 1)	0	0	0	OK.	HS	No da	ata		00.00 140 252 333
Start of Frame Packets (319)					HS	1.081	1.0 -> 1.1	20.6	00.00:140:464:583
Device Request (Get Descriptor: Device)	1	0	0	OK	HS	18 by	/tes (12	01 00 02 00 00 00 40 E3 05	00.00:180:290.750
Start of Frame Packet					HS	1.121	1.0		00.00:180:465:266
Device Request (Get Descriptor: Configuration 0)	1	0	0	OK	HS	9 byte	es (09 02	2 20 00 01 01 00 C0 30)	00.00:180:572:366
Start of Frame Packets (2)					HS	1,121	1.3-> 1.1	21.4	00.00:180:840:266
Device Request (Get Descriptor: Configuration 0)	1	0	0	ок	HS	32 by	rtes (09	02 20 00 01 01 00 C0 30 05	00.00.181:030:600
Item Marker Text Time (m	in.sec:ms:	us:ns)	Time (mi	in secimsius	:ns) Ite	m	Data	Decoded	Information
Device Request (G., This is the first devi., 00.0	0:000:000:	000	00.0	0:140:214:6	00 D	ata	38		-
Device Request (Se. This is the first set. 00-0	0.1 (0.353	222	00.0	140:214:6	16 D.	ata	AC		
	E Edit M	Marker		40:252:2	16 Rod	Cmd	00	A_VBUS_VLD DATA0	
	Clear	Marker	6400	40:252:2	66 Rx4	Cmd	1D	RxActive A_VBUS_VLD	DATAD
	Class	All Marchae	6	40:252:3	33 D	ata	20		
	× Clear	All Marker	s	140:252:3	50 D	ata	00		
-	Set Ti	ime Refere	nce	40:252:3	66 Di	ata	10		
	Clear	Time Refe	rence	40:252:5	56 Rx(	Cmd	0D	A VEUS VLD DATAD	
10. T 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6 crear	Time nere	Terree .	00	Destand	Marriel	-		

When hovering with the mouse over a marker a pop-up tool-tip displays the entered marker text. This is shown in the below screen shots.

Open Save Setup Print Search Filter Start	Stop L	Ipdates A	bout							
9 İtem	Device	Endpoint	Interface	Status	Speed			Payload	Time (min.sec:ms:us:ns)	Γ
🛛 🙀 Device Request (Get Descriptor: Device)	0	0	0	OK.	HS	18 by	tes (12	01 00 02 00 00 00 40 E3 05.	00.00:000:000:000	
Start of Frame Packet					HS	940.6			00.00:000:212:233	
HS Idle									00.00:003:212:383	
L Device Chirp	0			OK	HS				00.00:003:312:650	
Host Chirp	0			OK	HS				00.00:004:524:983	
<ul> <li></li></ul>				2005.52	HS	1,000	0 -> 1.0	80.6	00.00:060:213:233	
Revice Request (Set Address: 1)				OK		No da	ita 🛛		00.00:140:252:333	
<ul> <li></li></ul>					HS	1.081	.0 -> 1,1	20.6	00.00:140:464:583	
Device Request (Get Descriptor: Device)	1	0	0	OK	HS	18 by	tes (12	01 00 02 00 00 00 40 E3 05.	00.00.180:290.750	
Start of Frame Packet					HS	1,121	.0		00.00:180:465:266	
E Device Request (Get Descriptor: Configuration 0)	1	0	0	OK	HS	9 byte	es (09 02	2 20 00 01 01 00 C0 30)	00.00.180:572:366	
3 Start of Frame Packets (2)					HS	1,121	.3 -> 1,1	21.4	00.00:180:840:266	
Experimentary (Get Descriptor: Configuration 0)	1	0	0	ок	HS	32 by	tes (09	02 20 00 01 01 00 C0 30 09.	00.00:181:030:600	
Item x Marker Text Time (m	in.sec:ms:	us:ns)	Time (m	in sec:ms:us	ins) It	em	Data	Decoded In	formation	ī
🔂 Device Request (G. This is the first devi. 00.0	0:000:000:	000	00.0	00:140:214:6	00 D	ata	38			Π
Device Request (G. This is the first stri 00.0	0.182:184:	233	00.0	00.140.214:6	16 D	ata	AC			
🔂 Device Request (Se. This is the first set. 🛛 00.0	avice Request (G. This is the first devi. 00.00.000:000:00 evice Request (G. This is the first stri. 00.00.182:184:23 avice Request Se. This is the first set. 00.00.140:252:33		00.0	00:140:252:2	16 Rx	Cmd	00	A_VBUS_VLD DATA0		
			00.0	00.140:252:2	66 Rx	Cmd	1D	RxActive A_VBUS_VLD D	DATAO	
Device Request (Set Address: 1)	6		00.0	00.140:252:3	33 D	ata	20			
			00.0	00-140:252:3	50 D	ata	00			
			00.0	00:140:252:3	66 D	ata	10			
			00.0	00:140:252:5	66 Rx	Cmd	0D	A_VBUS_VLD DATAD		
C			See Mad	Dandard   Off	0 Davidand	Marriel	100			

File Search View Markers Capture Hel	p	in cot anothe	interna 14	ANT OUT PIC	ACCOLOGICAL	ary cert	aro_in_	and and all	( <b>1</b>	
Open Save Setup Print Search Filter Start	Stop L	Jpdates A	3) bout							
p İtem	Device	Endpoint	Interface	Status	Speed	1		Payload	Time (min.sec:ms:us:ns)	
Device Request (Get Descriptor: Device)	0	0	0	OK	HS	18 by	ytes (12	01 00 02 00 00 00 40 E3 05.	00.00:000:000:000	
Start of Frame Packet					HS	940.6	5		00.00:000:212:233	
HS Idle									00.00:003:212:383	
C Device Chirp	0			OK	HS				00.00:003:312:650	
Host Chirp	0			ОК	HS				00.00:004:524:983	
				59935	HS	1,000	0.0 -> 1.0	80.6	00.00:060:213:233	
Device Request (Set Address: 1)	0	0	0	OK	HS	Ned	ata		00.00 140 252 333	100
	he first set	address de	vice reque	st. Notice h	ow all ma	1,121	added a	e placed in the below mark	kers view. 00.00:180:290:750 00.00:180:465:266	
Device Request (Get Descriptor: Configuration 0)	1	0	0	OK	HS	9 byt	es (09 02	20 00 01 01 00 C0 30)	00.00:180:572:366	
To Start of Frame Packets (2)	1.01				HS	1,121	1.3 -> 1.1	21.4	00.00:180:840:266	
Device Request (Get Descriptor: Configuration 0)	1	0	0	ок	HS	32 by	ytes (09	02 20 00 01 01 00 C0 30 09.	00.00:181:030:600	
Item A Marker Text Time (n	nin.sec:ms:	us:ns)	Time (m	in sectmstus	ins) It	em	Data	Decoded In	formation	1
Device Request (G This is the first devi 00.	00:000:000	:000	00.0	00:140:214:6	00 D	ata	38		-	11
Device Request (G. This is the first stri. 00.	00.182:184:	233	00.0	00:140:214:6	16 D	ata	AC			
🔂 Device Request (Se., This is the first set., 00.	00.140.252	333	00.0	00:140:252:2	16 Rx	Cmd	0D	A_VBUS_VLD DATAD		
			00.0	00.140:252:2	66 Rx	Cmd	1D	RxActive A_VBUS_VLD I	DATAD	
			00.0	00:140:252:3	33 D	ata	20			
			00.0	00-140-252-3	50 D	ata	00			-11
			00.0	00 140:252:3	66 D	ata	10			
			00.0	00.140.252.5	66 Rx	Cmd	00	A VEUS VLD DATAD		
🔎 Details View 👫 Search Results 📒 Markers View	1		Nod	e Finder   18	Payload	View	📌 Me	ssage Vew		
	all a		And a second second second				Contraction in the second	Description of the		_

Note that when clicking one of the 'Item', 'Marker Text' and 'Time' columns in the 'Markers View', the markers view will be sorted (ascending or descending) accordingly to the information in the markers view. For instance, the above screen-shot shows the Markers View sorted accordingly to the 'Item' column (indicated by a little icon in the header for the 'Item' column). This marker sort feature makes it easy to find any marker in the trace.

Version 3.4 of the 1480A Software introduced USB On-The-Go (OTG) Analysis. All OTG features are analyzed by the 1480A software including Session Request Protocol (SRP), Host Negotiation Protocol (HNP), VBus monitoring as well as decoding of the OTG Descriptor. The below screenshot shows the OTG Descriptor captured to the 'otg\_venus\_gogo\_b\_device.usb' sample file. As can be seen, the OTG Descriptor shows that this device supports both OTG HNP and SRP.

Dpen Save Setup	Print Search Fi	iter Start	Stop L	Q Jpdates A	3) bout							
L	ltem		Device	Endpoint	Interface	Status	Speed		Payload		Time (min.sec:ms:us:ns)	
Start of Frame Pa	cket						HS	213.5			00.09:135:689:183	
Device Request (	Get Descriptor: Confi	guration 0)	1	0	0	OK	HS	9 bytes (09 02 2	3 00 01 01 00	0 C0 00)	00.09:135:781:033	
Start of Frame Pa	ckets (2)						HS	214.0 -> 214.1			00.09:136:064:233	
Device Request (	Get Descriptor: String	<b>1</b> 0)	1	0	0	OK	HS	4 bytes (04 03 0	9 04)		00.09:136:306:466	
Device Request (	Get Descriptor: String	(2)	1	0	0	ок	HS	42 bytes (2A 03	30 00 30 00	30 00 30 00_	00.09:136:558:300	
O Start of Frame Pa	ckets (2)	and and the second stress	PE		-	141.04	HS	215.0 -> 215.1		- NATION PROPERTY OF TAXABLE	00.09:137:064:400	
Device Request (	Get Descriptor: Confi	guration 0)	1	0	0	ОК	HS	35 bytes (09 02	23 00 01 01	00 CO 00 03.	00.09:137:194.066	
O Start of Frame Pa	ckets (2)						HS	215.4 -> 215.5			00.09:137:564:466	
Device Request (	Get Descriptor: String	;0)	1	0	0	ок	HS	4 bytes (04 03 0	9 04)		00.09:137:808:016	
Attributes.MaxPower	0 mA	0	00			Iten	1	Count	Current	Previous	Next	
	12222000000000000	622			B 🚧 D	坛 Data Packets		288	2 1	Goto Previous	s Goto Next	
	OTG Descriptor Det	ols			⊕ Token Pack		5	5459	2 1	Goto Previous	Goto Next	
Name	Value	Dec	He	x	🕀 🎇 B	lus Events		1	6 1	Goto Previous	ous Goto Next	
Length	Valid			튁	€ + H	landshake P	ackets	4569	7 1	Goto Previous	Goto Next	
DescriptorType	OTG	9	09			ransactions		4570	3 1	Goto Previous	s <u>Goto Next</u>	
Attributes Reserved	00	0	00		🕀 🔯 D	levice Requi	sts	2	3 1	Goto Previous	Goto Next	
Attale day UND Support	Suggested	1	1	_	? Ir	walid Packe	ls	1	0 0	Goto Previous	s Goto Next	
Autoutes. Hitr Support	Supporteu	-	1	_	DIE C	In-The-Go E	vents		1 1	Goto Previous	s Goto Next	
Attributes.SHP Support	Supported	1	1									
	Interface Descriptor D	atala										
Name	Value	Dee	He									
Ivame A4	vaue	Dec	He	x		05	0.00.00	and the second				_

The next screenshot shows how OTG Events are listed in the Node Finder view. This makes it easy to find OTG events in the main Protocol View. Note how the the OTG Host role just has been changed when the B-device disconnected while being suspended. Sample files for HNP are available for both FS and HS devices.

	.ip	-								
Dpen Save Setup Print Search Filter Star	t Stop U	pdates A	bout				N			
ltem	Device	Endpoint	Interface	Status	Speed	1	Payload		Time (min.sec:ms:us:ns)	011
? Invalid Packet				Invalid		1 byte (10)			00.06:859:796:583	
Device Connection	0			OK	FS				00.06:859:796:716	
0 0 Start of Frame Packets (50)					FS	1 -> 50			00.06:860:795:850	
Device Disconnected									00.07:042:782:816	
OTG HNP (Host-role changed)									00.07:042:782:833	
P+ Device Connection	0			OK	FS				00.07:044:287:616	
Device Reset (11 ms, 4 us)									00.07:338:851:450	
12 Device Chirp	0			Timeout	FS				00.07:338:853:716	
Est Device Disconnected									00.07:349:856:400	
OTG Host Negotiation Protocol				Iten	1	Count	Current	Previous	Next	
OTG Host Negotiation Protocol (Host-role changed) The OTG Host role has been changed from the A-device to the B-		*	🗉 🐪 D	ata Packets		C	) 0	Goto Previous	s Goto Next	
			€ → T	oken Packet	s	2573	1	Goto Previous	Goto Next	
		B-	😠 🎬 Bus Events			11	1	Goto Previous	s Goto Next	
device or vice versa.			⊕ + H	andshake P	ackets	C	0 (	Goto Previous	Goto Next	
excerpt from On-The-Go Supplement to the USB 2.	0 Specificat	tion,	🗷 🏓 T	ransactions		C	0 (	Goto Previous	s Goto Next	
section 6.3:			🕀 🔂 D	evice Requi	ests	0	) 0	Goto Previous	Goto Next	
				valid Packe	ts	2	1	Goto Previous	s Goto Next	
HNP is used to transfer control of a connection from the default Host (A-device) to the default Peripheral (B-device). This is accomplished by having the A-device condition the B-			😑 ота 🖸	n-The-Go E	vents	3	1	Goto Previous	s Goto Next	
			0	OTG SRF	Events	C	0 (	Goto Previous	s Goto Next	
			5	TE OTG VBu	s Changes	s 2	1	Goto Previous	s Goto Next	
device to be able to take control of the bus, and then having the A-device present an opportunity for the B-device to take control				👫 ОТС НИ	P Events	1	1	Goto Previous	e <u>Goto Next</u>	
control.										

The 1480A software also displays Session Request Protocol interactions as a device uses D+ and VBus pulsing to tell the host device to turn on VBus and initiate a new session. The below screen shot shows how an "OTG Session Request" tree node displays an SRP event in the trace.

🖌 🛛 🚨 🖉 🖉	A.	•	٢							
Ipen Save Setup Print Search Filter Start	Stop U Device	Endpoint	Interface	Status	Speed		Payload		Time (min sec:ms:us:r	ns)
Start of Frame Packets (50)					FS	1-> 50			00.03:972:473:566	
TTE Session End (VB SESS END <= VBus < VB SE.									00.04:021:652:950	
exet Device Disconnected									00.04:021:831:433	
VBus Off (VBus < VB_SESS_END)									00.04:025:571:366	
TG Session Request		_							00.05:021:728:350	
TTS Session Start (VB_SESS_VLD <= VBus < VA_VB_									00.05:026:727:950	
Device Reset (2 us, 533 ns)									00.05:026:730:033	
VBus On (VBus >= VA_VBUS_VLD)									00.05:026:732:566	
BTE Session End (VB_SESS_END <= VBus < VB_SE.									00.05:031:881:000	R
OTG Session Request				ltem	N	Count	Current	Previous	Next	1
OTG Session Request			🗉 🔽 Da	ta Packets	13	C	0	Goto Previous	Goto Next	
						100	1	Goto Previous	Goto Next	
The B-Device is requesting via data line and VBus line pulsing that the A-device turns on VBus and restores communication.						13	1	Goto Previous	s Goto Next	
						C	0	Goto Previous	Goto Next	
Excerpt from On-The-Go Supplement to the USB 2.0	Specificat	tion,	🗷 🏓 Tra	ansactions		C	0	Goto Previous	Goto Next	
section 5.3.1:				vice Reques	sts	C	0	Goto Previous	Goto Next	
				alid Packets	8	2	1	Goto Previous	Goto Next	
In order to conserve power, an A-device is allowed to leave VBUS turned off when the bus is not being used. If the B-device wants to use the bus when VBUS is turned off, then it requires some way of requesting the A-device to supply power on VBUS. For this reason,			😑 DTS On-The-Go Events 12					Goto Previous	Goto Next	
			DTG	OTG SRP	Events	1		Goto Previous	Goto Next	
			DTG VBus Changes			s 11	1	Goto Previous	Goto Next	
the Session Request Protocol (SRP) has been defined.				OTG HNP	Events	C	0	Goto Previous	Goto Next	
			10.22.2							

As also can be seen around the above "OTG Session Request" tree node, the 1480A OTG additions also display OTG VBus events. The displayed VBus events are; Session Start, Session End, VBus On and VBus Off. The bus voltage is continuously monitored by the 1480A hardware and is, in real-time, stored together with the rest of the captured protocol

data. This allows you to know if the bus voltage for some reason falls below the valid levels during device operation (useful particularly for bus-powered devices). The Vbus voltage is monitored for all devices, not only for OTG devices.

Since OTG events can clutter the rest of the protocol trace (especially true for the VBus events), all OTG events can selectively be turned off via the "Filter Protocol Items" dialog. The below screen shot shows the result of this for the 'otg\_fs\_srp.usb' sample trace previously shown above.

Open Save Setup Print Search Filt	V Filter Protocol Items			
	Transaction Filters Hide Top-level OUT Transactions Hide NAKed OUT Transactions Hide Incomplete OUT Transactions Hide Top-level IN Transactions Hide NAKed IN Transactions Hide NAKed IN Transactions Hide PING Transactions Hide SPLIT Transactions	Device Request Filters Hide all Device Requests Hide Class-Specific Device Requests Hide Vendor-Specific Device Requests Hide Incomplete Device Requests Bus Event Filters Hide Connect/Disconnect/Idle Events Hide Host/Device Onip Events Hide Device Reset Events		Time (min.sec:ms:us:ns) 00.03:971:474:283 00.03:971:474:416 00.03:972:473:566 00.04:021:831:433 00.05:021:728:350 00.05:026:730:033 00.05:031:946:683 00.05:031:992:066 00.05:031:994:333
OTG Session Requ		Hide Keep-alive Strobes	Previous	Next
OTC Session Request The B-Device is requesting via data line an the A-device tums on VBus and restores c	Packet Hiters Hide Start of Frame Packets Hide Invalid Packets	Hide VBus Events     Hide HNP Events     Hide SRP Events	Goto Previous Goto Previous Goto Previous Goto Previous	Goto Next Goto Next Goto Next Goto Next
Excerpt from On-The-Go Supplement to th section 5.3.1: In order to conserve power, an A-device is turned off when the bus is not being used. use the bus when VBUS is turned off, then i requesting the A-device to supply power o the Session Request Protocol (SRP) has be	Deactivate all Protocol Filters	Hide traffic to/from devices with Device IDs Endpoints Ok Cancel	Goto Previous Goto Previous Goto Previous Goto Previous	Goto Next Goto Next Goto Next Goto Next

Version 3.5 of the 1480A software introduced a 'Discovered Devices' View (see below image). The Discovered Devices View will display information for all devices discovered in the captured data trace. The more detail that is available in the trace about devices, the more details will be shown in the Discovered Devices View. Normally, when a Device Descriptor is retrieved from a device, the Host Computer will learn the Vendor and Product IDs of the device and therefore uniquely can identify the device. The 1480A software uses the same method to identify a device in the Discovered Devices View.

Dpen Save Setup	Print Search Filter	Start	Stop 1	Jpdates A	3) bout						
7	İtem		Device	Endpoint	Interface	Status	Speed	Paylor	sd .	Time (min.sec:ms:us:ns)	
Host Chirp			0			ок	HS			00.04:677:201:016	
Start of Frame F	Packets (875)						HS	638.0 -> 747.5		00.04:749:278:150	
Device Request	t (Set Address: 1)		0	0	0	OK	HS	No data		00.04:858:566:516	
O Start of Frame F	Packets (499)	_	-	10.00	1000	1000	HS	747.7 -> 810.1		00.04:858:795:366	
· [] Device Reques	(Get Descriptor: Device)		1	0	0	ок	HS	18 bytes (12 01 00 02 0	9 00 01 40 E3 05	00.04.921.094.316	
() Start of Frame F	acket	6 m				OV	HS	810.7	01 00 50 000	00.04:921:805:266	
Device Request	(Get Descriptor: Configura	ation U)	1	V	U.	UK	HS	9 bytes (09 02 19 00 01	0100 E0 32)	00.04(921(923)783	
Generative rackets (3)     Start of Frame rackets (3)     Sector (3)		ation ()	1	0	0	ок	HS	25 bytes (09 02 19 00 0	01 00 E0 32 09.	00.04:922:470.466	
	Device Descriptor Det	alls			Device		Ve	rodor		Product	_
Name	e Value Dec Hex		x A	0	05E3 (Gen	esys Logic	, Inc.)	0660 (Unknown)	TODUCI		
bLength	Valid	18	12		1	05E3 (Gen	esys Logic	, Inc.)	0660 (US82.0 Hub)		
bDescriptor Type	DEVICE	1	01		2	0000 (Unkr	nown)	15	0000 (Unknown)		
bodUSB	2.0.0	512	020	0 m							
bDeviceClass	Device Class defined	9	09								
bDeviceSubClass	0	0	00								
bDeviceProtocol	1	1	01								
bMaxPacketSize0	64	64	40								
IdVendor	Genesys Logic, Inc.	1,507	058	3							
idProduct	0660	1,632	066	- 0							

When selecting a row in the Discovered Devices View the first 'Device Descriptor' Device Request for that device is selected in the main Protocol View. If no Device Descriptor has been requested for a particular device in the trace then the first Token Packet addressed to the device is instead selected in the main Protocol View.

This concludes this overview of the capabilities of the USB Analyzer software. Please compare the data presentation and decoding capabilities with other USB Bus Analyzers and we are confident that our software will rank high in any comparison with much more expensive USB bus Analyzers.

Copyright © 2015 International Test Instruments. All rights reserved.