User Manual

RT7800 Host Board Manual v1.1

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1. Host Board Overview



RT7800 Host Board VH2

- The Richtek RT7800 Host board is a versatile tool for testing USB type-C PD systems (like RT(Q)7880, RT7202, RT7207) that support Power Delivery (PD), Programmable Power Supply (PPS) and legacy charging modes like QC2.0/3.0. The Host board acts as a USB PD Sink, and allows the user to select various Power Profiles in PD, PPS and QC2.0/3.0 modes.
- Ideal for debugging, EMI testing and thermal testing of USB PD systems.

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2. Support Feature



3. Support Feature Brief

Protocol Selection

- ► PD
- ► PPS
- ▶ QC2.0 & QC3.0

General Mode

- ▶ PD : Request different PD profile by button.
- ▶ PPS : Request different PPS profile by button.
- ▶ QC2.0 & QC3.0 : Request different QC voltage by button.



4. Protocol Selection

Protocol S	Selection	General Mode	
ON 1 2	1 Off 2 Off	PD	
ON 1 2	1 Off 2 On	PPD	
ON 1 2	1 On 2 On	QC	SW2
ON 1 2	1 On 2 Off	Reserved	

• Note : It is recommended that the Host board power is OFF and USB cable is disconnected when making changes to the switches.

5. Power On/Off of Testing Jig



- SW1 Hi position Jig power is Off.
- SW1 Lo position Jig power is On.



6. Testing Jig Power Source

Testing Jig Pow	er Source	General Mode
ULDAD JP2	JP2 close	Testing Jig Power Source taken form Type-C VBUS (Only for VBUS 5V or lager)
ULDAD JP2 Ext 5V	JP2 open	Testing Jig Power Source taken form Micro-B VBUS or external 5V supply connected to 5V and GND pins

When the source power is taken from Type-C VBUS, too low VBUS conditions may cause RT7800B undervoltage protection (~4V). When testing VBUS at 5V with high load or PPS mode with low VBUS voltage, you must use "JP2 open" setting and use external power from Mirco-B USB or external power connected to 5V pin to avoid RT7800B undervoltage protection trigger.

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7. Typical Test Setup



• Above setup shows the host board with external power source for testing PPS and low VBUS condition without risk of Host board undervoltage.

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8. General Mode

Protocol	PD	PPS	QC
Button #1	PD profile 1	Entry PPS (3.3V) Or PPS Profile Down	QC 2.0 5V
Button #2	PD profile 2	Entry PPS (3.3V) Or PPS Profile Up	QC 2.0 9V
Button #3	PD profile 3	Step Up (+20mV)	QC 2.0 12V
Button #4	PD profile 4	Step Down (–20mV)	QC 2.0 20V (If supported)
Button #5	PD profile 5	Step Up (+50mA)	Enable QC3.0
Button #6	PD profile 6	Step Down (–50mA)	QC 3.0 (+200mV)
Button #7	PD profile 7	Current PPS Profile (Max Voltage & Max Current)	QC 3.0 (-200mV)
Button #8	Enable/Disable Idle mode (if supported)	Current PPS Profile (Min Voltage & Max Current)	Reserved

USB-C PD power profiles depend on the maximum output power of the supply : $Po \le 15W : 5V/3A$; $Po \le 27W : 5V/3A$, 9V/3A; $Po \le 45W : 5V/3A$, 9V/3A, 15V/3A; $Po \le 60W : 5V/3A$, 9V/3A, 15V/3A, 20V/3A; $Po \le 100W$: 5V/3A, 9V/3A, 15V/3A, 20V/5A; additional profiles like 12V/3A or 20V/2.25A for 45W are optional.

USB-C PPS profiles also depend on maximum output power: Po \leq 15W : 3.3V to 5.9V/3A; Po \leq 27W : 3.3V to 11V/3A; Po \leq 45W : 3.3V to 16V/3A; Po \leq 60W : 3.3V to 21V/3A; Po \leq 100W : 3.3V to 21V/5A;

PPS 50mA current step-up/down will increase or reduce the maximum current limit where constant current mode is activated.

QC2.0 output voltages : 5V/2A, 9V/2A, 12V/1.6A (and 20V/0.9A optional)

QC3.0 output voltage can be adjusted between 3.6V and 12V (up to 20V optional). Output limited to 3A or 18W.



** Button #1 will not request PPS profile

when on first PPS profile.

Button #1 request previous

Button #1 request previous

Current PPS profile

Example 2

PPS profile.

PPS profile.

9. General Mode of PPS

Button #1 and #2 function

Function 1 : Entry PPS (starts in 3.3V mode).

Function 2 : User can choose PPS profile by button #1 or #2 after Entry PPS.

Button #1 or #2 will request that PPS profile max voltage and current.

* This example has 3 PPS profiles

PDO Type	Prog Power Supply	Augmented
Augmented	0	3.00V to 5.90V Max 3.00A
PDO Type	Prog Power Supply	Augmented
Augmented	0	3.00V to 11.00V Max 3.00A
	Prog Power	

PDO Type	Prog Power Supply	Augmented
Augmented	0	3.00V to 15.00V Max 3.00A

Example 1

Current PPS profile

Button #2 request next PPS profile.

Button #2 request next PPS profile.

** Button #2 will not request PPS profile when on last PPS profile.

*** Some models will only have 1 PPS profile.

Button #3 or #4 increase or decrease DUT output voltage

Button #3 increase 20mV to reach max voltage of PPS profile.

Button #4 decrease 20mV to reach min voltage of PPS profile.

Button #5 or #6 increase or decrease DUT output current limit.

Button #5 increase 50mA to reach Max current of PPS profile.

Button #6 decrease 50mA to reach 0A.

Button #7 and #8 function

Button #7 request max voltage and current of PPS profile. Button #8 request min voltage and current of PPS profile (3.3V).

* Note : If the Source does not support PPS, the PPS function will not work correctly.

RICHTEK your power partner.

10. General Mode of QC

Button #1, #2, #3, #4, #5, #6, #7 function

Button #1 requests QC2.0 and starts 5V profile (communicated via D+/D- voltage level) Button #2 requests QC2.0 9V profile (communicated via D+/D- voltage level) Button #3 requests QC2.0 12V profile (communicated via D+/D- voltage level) Button #4 requests QC2.0 20V profile (if supported) (communicated via D+/D- voltage level) Button #5 enables QC3.0, and starts from the last chosen QC2.0 profile (communicated via D+/D- voltage level) Button #6 increases the QC3.0 profile with 200mV (communicated via D+/D- pulses) Button #7 decreases the QC3.0 profile with 200mV (communicated via D+/D- pulses)

* Note : If the Source does not support QC2.0/3.0, this function will not work correctly.



11. Firmware Update of RT7800 Host board

The RT7800 Host board can simply be updated via the mico-USB cable connected to the USB port of a NB or PC.



Step of firmware update

Step1. Download and install RT bridge board driver http://www.richtek.com/shareEVB/RTBridgeboardUtilitiesV137.exe

Step2. Open " RT7800 MTP Programming.exe" (version 0.6.1)





Step3. Update firmware according to the following steps of figure below :

RT7800 MTP Programming		Contraction of the lateral		
File1 Function Help				
2 Connect MCU				
RICHTEK	tichtek Technology Corpo	oration		
Configure	Main Area Test Area Trim Tab	le Reserved Table Test/Manual		
TEST ENABLE		5. Choose the .bin file	firmware file	
Slave Address (Hex)		that will be written in	nto the RT7800.	
Slave address1 : 1D	Source Data	Load Binary File	Device (Size= 16384	Bytes, Save Device Data
Slave address2: 1B				
Online update slave: 1C				
ONLINE UPDATE				
Device ID (Hex)				
READ ID 7800				
Program Mode				
8 Bits 32 Bits				
Program Area (Hex) Main Area Address				
Start: 0000				
End: OFFF				
– Test Area Address				
Start: 0000				
End: 01F7				
Trim Table Area Address				
Start: 01F8	Checksum (Hex): 0	6 Write To Device	Checksum (Hex): 0	Read From Device
End: 01FB	CRC8 (Hex): 0	. <u></u>	CRC8 (Hex): 0	
Reserved Area Address				Verify
Start: 01FC				
End: 01FF				
MCU Connect OK	I2C OK			

Step4. Cycle power to make the new firmware active.

le Fu	nction	Help								
RIC	снт	EK	Richtek Te	echnology	Corporat	ion				
onfigure TE	OT DUADI		Main Area	Test Area T	rim Table F	Reserved	Table Test / Manual			
16	OI ENADL	-6								
slave Add	ress (Hex)					_				
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Slave addi	ress2:	1B	OF OF	00 10 11 0F	00 10 13 0	F 00 10	15 0E 00 10 A	0F 0F 00 10 11 0F 00 10 13 0F	00 10 15 0E 00 10 A	
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· · 10	a)		10 E9	0E 00 10 EE	0E 00 10 F	-3 0E 00	0 10 F5 0E	10 E9 0E 00 10 EB 0E 00 10 F	3 0E 00 10 F5 0E	
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rogram M	ode		00 10	C7 29 00 10	47 2A 00 1	0 D7 0F	00 10 37 22	00 10 C7 29 00 10 47 2A 00 10	D7 0F 00 10 37 22	
8 Bits	C) 32 Bits	00 10	9B 22 00 10	07 23 00 1	0 00 00	00 00 00 00	00 10 9B 22 00 10 07 23 00 10	00 00 00 00 00 00 00	
h memory	rea (Hev)		000	RT7800 MTP	Programm	ni		00 00 00 00 00 00 00 00 00 00 00	00 00 00 00 00 00 00	
Main Are:	a Address		1B (0 10 73	1B 00 10 ED 21 00 10 33 22 0	0 10 F1 1D 00 10 73	
Start-	6	0000	20 0				0 10 35	20 00 10 DF 2A 00 10 00 00 00	00 3D 1E 00 10 35	
io ioa i.		0000	20 0	Write MTP	and Verity	OK!	0 10 31	20 00 10 EF 1E 00 10 FB 1F 00	0 10 2F 22 00 10 31	
End:	1	OFFF	22 0				10 3D	22 00 10 00 00 00 00 00 00 00	00 5F 28 00 10 3D	
			25 0				10 1F	25 00 10 25 28 00 10 E9 23 00	10 5B 28 00 10 1F	
Test Area	Address		28 0			確定	10 00	28 00 10 E1 0F 00 10 00 00 00	00 25 09 00 10 00	
Start:		0000	000				0 10	00 00 00 00 08 00 20 C1 02 00	10 C9 02 00 10	
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Start:		0148	Chec	ksum (Hex):	1186EF		Write To Device	Checksum (Hex): 1186EF	Read From Device	
End:		01FB	CRC8	(Hex): 1B				CRC8 (Hex): 1B		
Reserved	Area Addre	\$\$			Ļ				Verify	
Start:	Ĩ	01FC	The	v qu-qoq e	vindow d	isplav	s "Write MTP a	nd Verify OK!"		
End:	Ĩ	01FF	afte	er finishing	the writi	ing firm	nware process.			



More Information

For more information, please find the related datasheet or application notes from Richtek website http://www.richtek.com.

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