Richtek E-Marker Write Board User Manual

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www.richtek.com





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1. Solution Overview

- E-Marker write board can program E-Marker IC along with Richtek's future products
- E-Marker write board provides LED to indicate system status
 - Please refer to the appendix for more information
- The production can be managed from cable setting to quality control with the software tools
- PD protocol version support
 - PD2 passive
 - PD2 active cable
 - ► PD3 passive
 - PD3 active cable (PD3 Version 1.1, where Cable VDO version = 1.2)
 - Without supporting VbusCurrent = USB Type-C Default Current





2. Engineer Tool

2.1 Overview

- Read the E-Marker IC data from cable
- Write the E-Marker IC data with
 - Cable VDM data setting
 - Writer board setting
- Save / Load all setting into / from binary file
- Save / Load setting to writer board
 - ► For the standalone mode
- Set vendor production information
 - Customer id (can be defined by the customer)
 - Date and time
 - Cable serial number
- Execute VDM command to check the correctness
- Save the setting to Vendor Information File (VIF file)
 - ▶ The file can be open with "USB Vendor Info File Generator" provided by USB-IF
- Set the cable VDM data and writing page in the first tab

PD Version	Quar temperatura Catting	White action (本名学)
PD2 PD3 ID Header VDO Product Type Passive Cable USB Vendor ID (Hex)	OT Detection Level OT Protection handling OT Protection (No thermal flag assert) O Send Hard Reset Thermal flag set only	E-Mark ④ Single / 單一
Cert Stat VDO XID (Hex) 0 0 0 0 0 0 0	Customer / Part Number 客戶名稱 / 料號 Mass Production 0000 - Customer Name 1 Configure	 Rewritable / 可重複寫入 Support stand alone / 支援燒錄板獨立運作
Product VDO USB Product ID (Hex)		
Device Version by Cable Vendor (Hex)		



• The Cable VDO1 and Cable VDO2 Setting is in the 2nd and 3rd tab

Number and Band at Tax	C-11-1001 (0-1-2)		
Version and Product Type	Cable VDO1 (Part 2)		Cable VDO1 (Part 3) (Only for Active Cable)
PD Version PD 2 PD 3	VBUS Current Handling Capability		SOP" Controller Present
roduct Type Passive Cable	O VBUS not through cable O	USB Type-C Default Current	O No SOP" controller present
	🔘 3 A 🛛 💿 5 A		SOP" controller present
ble VDO1 (Part 1)	SuperSpeed Support (Only for PD2 (Cable PD3 Passive Cable)	SBU Supported (Only for PD3 Active Cable)
lardware Version (Hex) 0	USB 2.0 Only		Not Supported Passive Active
	© USB 3.2 Gen1		
Irmware version (Hex)	O LICE 2 2 Con 1 and Con 2		
DO Version 1.0	USB 3.2 Gen1 and Gen2		
	PD3 only fields		
able Latency < 10 ns (~1 m) 🔻	Maximum VBUS Voltage		
vpe-C to Type-A/B/C	@ 20 V 🛛 🔿 30 V	🔘 40 V 👘 50 V	
Type-A (PD2 only) C Type-C			
Type-B (PD2 only)	PD2 fields (Only for PD3)		
() () copure	SSTX1 DIR	SSRX1 DIR	
able Termination Type	Fixed Configured	④ Fixed Configured	
Both ends Passive, VCONN not required	SSTX2 DIR	SSRX2 DIR	
Both ends Passive, VCONN required		Fixed Configured	
One end Active, one end passive, VCONN required	C	Characterization	
Both ends Active, VCONN required			

/ 備菜 Device / 裝直 Setting / 設定 Permission	Count / 開動板計劃	
Teable VDO 1 Cable VDO 2 SVIDs PD Version and Product Type PD Version PD 2 PD 3 Product Type Passive Cable • • Cable VDO2 (Only for PD3 Active Cable) • • • (Already select 60°C in General page) • • • Maximum Operating Temperature (Dec) • • • U3 power > 10 mW • • U3 to U0 transition mode • • •	Cable VDO2 (Only for PD3 Active Cable) USB 2.0 Support Support USB 2.0 USB 2.0 Hub Hops Consumed SuperSpeed Support SuperSpeed Support One Lane Two Lanes SuperSpeed Signaling One Lane Core 3	
(© U3 to U0 direct () U3 to U0 through U3S	end PD command Discover All PD Cmd	Read OTP Write OTP



• The Cable VDO1 and Cable VDO2 Setting is in the 2nd and 3rd tab

ustom SVID / Mode	Thunderbolt Setting (Only for USB 3.1 and USB 3.2)	
Custom SVIDs N/A	Support Thunderbolt	
SVID 1 (Hex)	Cable Type	
0 0 0 0	Non-Optical Cable	
	Optical Cable	
Mode 1 (Hex)		
	TBT Cable Gen (Only for active cable)	
SVID 2 (Hex)	(9) 3rd Gen (7) 4th Gen	
0 0 0 0	- Contraction	
	Cable Speed	
Mode 2 (Hex)	③ USB3, 1 gen 1 cable	
	O 10Gb/s	
	O 10Gb/s and 20Gb/s	
	Active Cable Plug Link Training	
	Active with bi-directional LSRX communication Active with bi-directional LSRX Active with bi-directional L	
	C Active with uni-directional LSRX communication	

Open and edit the CustomerList.lst

- ► File path: "MyDocument\Richtek\E-MarkerIC\CustomerList.Ist"
- ► Format : Customer_ID(4 hexadecimal digits) Customer_Name
- It is able to open this file through the engineer tool menu

• Customer ID will be programmed in the cable

▶ When this cable is read by quality control tool, the correspond name is shown

-0	Customer / Part Numberr 客戶名稱 / 料號	
	0A15 - Kuma	•
	0000 - Apple	
	0A15 - Kuma	
_	29CF - Richtek	





le / 檔案 Device / 裝置	Setting / 設定 Permission Count / #	義板	计數
General Cable VDO 1 Cal	Cable Number / 線材編號 Timestamp / 燒錄板時間 Error Tone / 錯誤提示		ature Setting
PD2	Customer List / 客戶料號檔案	•	Edit with Notepad / 開啟記事本編輯
ID Header VDO	0	T Prote	Load from file / 從檔案重新請取 Save to file / 儲存現在資訊到檔案

Write operation setting

- ► Single / double e-mart
- Rewritable
 - Can overwrite the original data to a written cable
- Support stand alone
 - The binary file can generated can used in standalone mode
 - This option does no effect on the Mass Production Tool





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Ø.	RT174	5 Engin	eer Settin	c

0 Version PD2 PD3 0 Header VD0 Product Type Passive Cable V USB Vendor ID (Hex) 0 0 0	Over temperature Setting OT Detection Level 60.°C OT Protection handling Ot Protection (No thermal flag assert) Send Hard Reset Thermal flag set only Customer / Part Number 客戶名稱 / 料號	Write setting 燒錄設定 E-Mark ④ Single / 單一 〇 Double / 兩個 Single channel write/verify 單邊 寫入/驗證 ④ No
XID (Hex) 0 0 0 0 0 0 0 Product VDO USB Product ID (Hex) 0 0 0 0 0 0 Device Version by Cable Vendor (Hex) 0 0 0 0 0	0000 - Customer Name 1	▼ Support stand alone / 支援燒錄板獨立運作

- Setting file
 - Save / Load all setting into / from binary file
 - Mass production tool will load this setting file

File / 檔案 Device / 裝	置 Setting / 設定	
Load / 載入 🔶	Setting File / 設定檔	
Save / 儲存 ▶	Write Board Setting / 燒錄板設定	
Cable VDO PD Version	PD2 Super Speed Support USB 2.0 Only USB	3.1
File / 檔案 Device / 裝置 Load / 載入 →	置 Setting / 設定	
Save / 儲存 →	Setting File / 設定檔	
Cable VDO	Write Board Setting / 燒錄板設定	
PD Version	USB Vender Info / 供應商資訊 USB 2.0 Only 〇 USB	
Hardware Version (He	ex) 0 VBUS Current Handling Capability	

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Writer board setting

- ► For standalone mode
 - Program data
 - Timestamp
 - Serial number (cable number)
- Please terminate it by close button to ensure the correctness of cable number
- > This number is the next serial number written to cable

File / 檔案 Device / 裝置	Setting / 設定
	Cable Number / 線材編號
General SVIDS and PA	Timestamp / 燒錄板時間
Cable VDO	Error Tone / 錯誤提示
PD Version PD	Customer List / 客戶料號檔案
	USB 2.0 Only

Set Cable Number / 設定線材編	號起始值 🗾 🔀 🖌	▼ Set Timestamp / 設定燒錄板時	間
Cable Number / 線材編號	0	PC Time / 電腦時間 Board Time / 燒錄板時間	2018/02/ 2 - 10:29:07 2018/01/26 - 05:55:18
	OK Cancel	Refresh	Sync PC Timestamp Cancel

Error message

- Unexpected CC detected
 - Maybe following condition
 - EVB CC pin short to ground
 - IC CC pin damaged
- VCONN OC occurred
 - VCONN over-current detected
 - May have low impedance at V_{CONN}





3. Mass Production Tool

- Load the setting file that generated by engineering tool, and start to write E-Marker cables
- When the application is turned on, it will automatically try to load the last opened setting file
- All of actions will be recorded in log file, the actions about writing will be recorded in production record
- Please terminate it by close button to ensure the correctness of cable number
- Program layout
 - Single channel write / verify

🔛 Richtek el	Richtek eMarker MPTool (RT1745:PD20) File Name (Chip ID : PD Revision)								
File 檔案 Se	etting 設定	Account 帳號				1			
	1745_sir					nel (RT1	L745:PD	20)	
0 - 2	250	1 - 115		Mad	chine ID				
	•	000000000		Cab	le Numbe	er][
O	к	NoCable						Stat	us Box
NoCa	able	eMarkerNG							
Summary Rewritab Single ch Single E-	摘要 ole (支援重 nannel write Mark (單 E	複寫入) e/verify (單邊 寫入 -Mark)	/驗證)		ssage 計息。 etect 2 device(s) oad " D:\桌面\?45_si fachine 1-115 cable a fachine 1-115 eMarka (Serial Numbo fachine 0-250 cable a	ngle_channel.bin " succ tttached erIC is RT1710 er: 2019-04-19 11:2 tttached	essfully 27:05 1-115 000000	0000)	◎ Manual / 手動 ◉ Auto / 自動
Custome Produce Vendor I	Customer Name 0000 - Customer Name1 Produce Type Passive Cable Vendor ID 0x29CF						Write / 寫入		
Product I Cable Plu	ID	0x2222	e					Action	Device
VBUS Cu	Cable Plug USB Type CILE Action Reresh						Keresn		



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Two channel write / verify

🔛 Richtek eMarker MPTool (I	RT1745:PD20)	File Name (Cl	hip ID : PD Re	vision)	×
File 檔案 Setting 設定 Acc	ount 帳號				
	1745_t	wo_channel	(RT1745:PI	020)	
0 - 250	1-115 M	achine ID			
00	00000000 <u>— Ca</u>	<u>ble Number</u>			
NoCable N	oCable			Stat	us Box
Summary 摘要 Rewritable (支援重複寫 Two channel write/verify Single E-Mark (單 E-Mark Customer Name 0 Produce Type P Vendor ID 0 Product ID 0 Cable Plug U VBUS Current 3	(一邊寫入, 另一邊驗諸 k) 2000 - Customer Name1 2assive Cable bx29CF bx2222 JSB Type Cile Summary	Message 訊息、 Detect 2 device(s) Load " D:\桌面\1745_single_d Machine 1-115 cable attack Machine 1-115 eMarkerIC i (Serial Number: 21 Machine 0-250 cable attack Machine 0-250 cable attack (Serial Number: 22 Machine 0-250 cable detack Machine 1-115 cable detack Detect 2 device(s) Load " D:\桌面\1745_two_chi	channel.bin " successfully hed is RT1710 019-04-18 18:28:21 1-115 000 hed ank 019-04-18 18:28:21 0-250 000 hed hed annel.bin " successfully	0000000) 00000286) Action Log	 ● Manual / 手動 ● Auto / 自動 Write / 寫入 Reresh

Field Description

- Machine ID
 - The identification of write board
- Cable Number ►
 - The cable number will increase if the machine write successfully
- Record
 - Machine ID and Cable Number will be recorded in the E-Marker and local file
- Load setting file
 - Default password : Richtek
 - Change the password in Menu : Account
- ► Log file
 - MyDocument\Richtek\E-MarkerIC\xxxxx.log
- Production record
 - MyDocument\Richtek\E-MarkerIC\ProductionRecord_x_x_xxxxx.csv
- Status Box
 - ◆ NO CABLE :
 - There is no cable that is ready for write
 - READY
 - The machine is ready for write
 - Writing & Verifying



- The machine is writing or verifying
- OK
 - The machine has written and verified successfully
- NG
 - The machine wrote or verified failed, or E-Marker IC had been written by another vendor
- Unavailable
 - The cable had been written and setting file does not declare rewritable
- E-MarkerNG
 - The E-Marker in the cable is different from the setting file
- Unexpected CC detected
 - Maybe following condition
 - 1. EVB CC pin short to ground
 - 2. IC CC pin damaged



- VCONN OC occurred
 - VCONN over-current detected
 - May have low impedance at VCONN

Message 訊息.	
Detect 1 device(s) Load " D:\桌面\vernp\1731_single.bin " successfully Machine 0-250 cable attached	
Machine 0-250 Vconn OC occurred. May have low impedance at CC (Serial Number: 2019-07-17 19:47:00 0-250 0000000294)	
	NG

RICHTEK your power partner.

4. Standalone Mode

- Write the cable automatically when the writer board is powered by DC
 - This mode will not be entered when the writer board is connected to PC
 - ► The data written is from the command "Save Writer Board Setting" in Engineer Tool
 - Notice that there is no production record saved with this mode





5. Quality Control Tool

- Read the cable information
 - Via reading OTP with engineering mode
 - ► Via VDM Commands (Discover ID, ...)
- Read the data from CH1 and CH2 automatically
 - ► The output data is show in the screen simultaneously
- Compare with setting file generated by engineer tool
 - ► The different fields will be shown in the color red
- E-Marker verification
 - Verify by OTP comparison in default
 - ► Check "Force using VDM discovery" to verify with VDM commands, the status bar will show "PD"
- Comparison with binary setting
 - ► Load binary by File -> Load Setting File
 - ▶ If verification is failed, the different fields are shown in red

im Ce Quality Control im Device 裝置 Setting 設定		eMarker Quality Control le 檔案 Device 裝置 Setting 設定	
Channel 2 - Compare Failed		Channel 2 - OK	
General Infomation		General Infomation	
EMark IC: : RT1731		EMark IC: : RT1731	
PD Version: : PD3	=	PD Version: : PD3	
Vendor ID: : 0x1241 (Unknown)		Vendor ID: : 0x1234 (Unknown)	
Product ID: : 0x1234		Product ID: : 0x5672	
Mass Production Information		Mass Production Information	
Date: : 2018 / 03 / 01		Date: : 2018 / 03 / 05	
Time: : 16 : 51 : 27		Time: : 11 : 45 : 30	



Unexpected CC detected

- Maybe following condition
 - 1. EVB CC pin short to ground
 - 2. IC CC pin damaged

ile 檔案 Device 裝置 Setting 設定	
Channel 2	- Unexpected CC Status
General Infomation	
General Infomation EMark IC:	
General Infomation EMark IC: PD Version:	
General Infomation EMark IC: PD Version: Vendor ID:	

- VCONN OC occurred
 - V_{CONN} over-current detected
 - May have low impedance at V_{CONN}

e 檔案 Devic	e 裝置 Setting 設定	
	Channel 2 (PD) - Vconn O	ver Current
General I	nfomation	
General I EMark IC	nfomation	
General I EMark IC PD Versio	nfomation : n:	
General I EMark IC PD Versio Vendor II	nfomation : n: D:	



6. Report

• Report can be grouped by

Writer board machine id



Cable setting file





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• File structure



- Instructions
 - Create the folder "ReportData" in Document/Richtek/E-MarkerIC
 - Create the filter folder in E-MarkerIC, and move the production report from Document/Richtek/E-MarkerIC to the filter folder
 - For example, create the folder Machine250, and move the ProductionRecord_0_250_201803.csv into the Document/Richtek/E-MarkerIC/Machine250
 - Open E-Marker Production Report and select the parsing folders and set date filters and some other filters by clicking Options
 - Click Generate Report



7. FW Update Steps

• When the tools remind to update FW, please update the FW of the board by the FW binary file provided



- Steps 1
 - a. Connect the bridgeboard and PC
 - b. Pull up the switch 1 to On side
 - c. Press the button





• Steps 2

- a. Open the Drive of bridge board
- b. Delete the file in this drive



• Steps 3

Copy the FW binary into this drive

	🚱 🌍 🗕 🥪 隆謐 🕨 ExtBootMode (F:))	ロ 回 XX 教 授尊 ExtBootMode (F:) の
	組合管理▼ 共用對象▼ 新增資料以	×	8 · 🗌 📀
	- <u>- 名稱</u> - 名稱	修改日期	類型大小
CFW_Binary.bin	▲ 電腦 cfw ▲ 本機磁碟 (C:) → 本機磁碟 (D:)	v_0316.bin 2018/3/16下午 0.	BIN 檔案 58 KB
	 ExtBootMode (F:) pub (\\192.168.10.144 temp (\\192.168.10.14 		
	 ④ 網路 ▼ < 	Ш	•
	1個項目		



- Steps 4
 - a. Pull down the switch 1 to number side
 - b. Press the button to restart bridgeboard





8. Appendix

• LED

Code	Meaning	LED Status	Description				
Status LED : (Left / right 2 LED for left / right port)							
eLED_DETECTING	Detecting	Red and green LED flash staggered	No cable detected				
eLED_DETECTED	Detected	Green LED flash	Cable detected				
eLED_OK	Burn Success	Green LED keep on	Burn / read command succeed				
eLED_NG	Burn Fail	Red LED keep on	Burn / read command failed				
eLED_UNEXPECTED	Unexpected Device detected	Red LED flash	Unexpected device detected or cable CC pin damaged				



More Information

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

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