Richtek E-Marker Write Board User Manual

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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

neral Cable VDO 1 Cable VDO 2 SVIDs		
PD Version PD2 PD3 PD3 PD4 Product Type Passive Cable USB Vendor ID (Hex) 0 0 0 0 Cert Stat VD0 XID (Hex)	Over temperature Setting OT Detection Level OT Protection handling ● No OT Protection (No thermal flag assert) ○ Send Hard Reset ○ Thermal flag set only Customer / Part Number 答戶名額 / 料號 Mass Production (0000 - Customer Name 1 Configure	Write setting 燒錄設定 E-Mark ④ Single / 單一
0 0 0 0 0 0 0 Product VDO USB Product ID (Hex) 0 <td< td=""><td></td><td></td></td<>		



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

) Version and Product Type	Cable VDO1 (Part 2)		Cable VDO1 (Part 3) (Only for Active Cable)
Version and Product Type PD Version PD2 Product Type Passive Cable Product Type Passive Cable Product Type Passive Cable Product Type Passive Cable Product Type Product Type Passive Cable Product Type Pass	Cable VDO1 (Part 2) VBUS Current Handling Capability VBUS not through cable 3 A 5 A SuperSpeed Support (Only for PD2 C G USB 2.0 Only USB 3.2 Gen1 USB 3.2 Gen1 USB 3.2 Gen1 and Gen2 PD3 only fields Maximum VBUS Voltage G 20 V 30 V	USB Type-C Default Current Cable PD3 Passive Cable)	Cable VDO 1 (Part 3) (Only for Active Cable) SOP" Controller Present SOP" controller present SOP" controller present SBU Supported (Only for PD3 Active Cable) Not Supported Passive Active
Type-A (PD2 only) Type-C Type-B (PD2 only) Captive	PD2 fields (Only for PD3)		
Cable Termination Type Both ends Passive, VCONN not required Both ends Passive, VCONN required One end Active, one end passive, VCONN required Both ends Active, VCONN required		SRX2 DIR Ornfigured SSRX2 DIR Ornfigured	

ral Cable VDO 1 Cable VDO 2 SVIDs		
PD Version PD Version PD 2 PD 3	USB 2.0 Support	
Product Type Passive Cable	Support USB 2.0	
able VDO2 (Only for PD3 Active Cable)	USB 2.0 Hub Hops Consumed 0 v	
Already select 60°C in General page)	SuperSpeed Support	
Maximum Operating Temperature (Dec) 0	Support SuperSpeed (USB 3.2)	
Shutdown Temperature (Dec) 0	SuperSpeed Lane Supported	
12	One Lane Two Lanes	
JS power > 10 m/v *	SuperSpeed Signaling	
© U3 to U0 direct) Gen 1 () Gen 2	
O U3 to U0 through U3S		



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

🔅 RT1745 Engineer Setting		
File / 檔案 Device / 裝置 Setting / 設定 Permission Cou	int / 燒錄板計數	
General Cable VDO 1 Cable VDO 2 SVIDs		
Custom 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	
	TBT Cable Gen (Only for active cable)	
	◎ 3rd Gen	
SVID 2 (Hex)	🔘 4th Gen	
	Cable Speed	
Mode 2 (Hex)	(i) USB3.1 gen1 cable	
	10Gb/s	
	10Gb/s and 20Gb/s	
	Active Cable Plug Link Training	
	(a) Active with bi-directional LSRX communication	
	\bigcirc Active with uni-directional LSRX communication	
PD Command Discover ID (PD2)	PD command Discover All PD Cmd	Read OTP Write OTP

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

C	ustomer / Part Numberr	客戶名稱 / 料號	
	0A15 - Kuma	•	
	0000 - Apple		
	0A15 - Kuma 29CE - Richtek		
	ESCI REPORT		1





🔅 RT1745 Engineer Setting	
File / 檔案 Device / 裝置	Setting / 設定 Permission Count / 燒錄板計數
General Cable VDO 1 Cat	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
ID Header VDO	OT Prote OT Prote OT Prote Save to file / 储存現在資訊到檔案
Product Type Passiv	re Cable Cand Hard Decat

• 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



CH2 CH1



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Ö.	RT1745	Engineer	Settino

PD Version PD2 PD3 ID Header VD0 Product Type Passive Cable USB Vendor ID (Hex) 0 0 0 0 Cert Stat VD0 XID (Hex) 0 0 0 0 0 0 0	Over temperature Setting OT Detection Level 60 °C OT Protection handling	Write setting 燒錄設定 E-Mark ④ Single / 單一 ① Double / 兩個 Single channel write/verify 單燈 寫入,餘證 ④ No ① Yes Production line setting 產線設置 □ Rewritable / 可重複寫入 ▼
Product VDO USB Product ID (Hex) 0 0 0 0 Device Version by Cable Vendor (Hex) 0 0 0 0 PD Command Discover ID (PD2)	Send PD command Discover All PD Cmd	Read OTP Write OTP

- 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 / 烤	\$ 錄板設定	
Cable VDO PD Version PD2	2 🔻	Super Speed Suppor	t
File / 檔案 Device / 裝置 Load / 載入 →	Setting / 設定		
Save / 儲存 →	Setting File / 設定檔	-	
Cable VDO	Write Board Setting / 燒銅	^{缘板設定}	
PD Version	USB Vender Info / 供應商	資訊 USB 2.0 Only	O USB
Hardware Version (Hex)	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
Conoral Ciga	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	就起始值	▼ Set Timestamp / 設定燒錄板時	
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
 - V_{CONN} over-current detected
 - May have low impedance at V_{CONN}
- Low impedance detected at CC
 - Low impedance at V_{CONN}

eMarkerEngineerTool	eMarkerEngineerTool	eMarkerEngineerTool
Unexpected CC connection (should be Ra/Rd or Ra/Open)	Vconn OC occurred. May have low impedance at Vconn	Low impedance detected at CC.
確定	確定	確定



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 eMarker Mi	PTool (RT1745:PD20)	- 1	File Name	(Chip ID	: PD Revis	sion)	×
File 檔案 Setting 設定	Account 帳號			1		-	
	1745_	_sin	igle_chan	nel (RT1	.745:PD2	.0)	
0 - 250	1 - 115 🔶	Ma	achine ID				
	000000000 +	Ca	ble Numb	er			
ок	NoCable					Statu	us Box
NoCable	eMarkerNG						
Summary 摘要 Rewritable (支援) Single channel wr Single E-Mark (單	重複寫入) ite/verify (單邊 寫入/驗證) E-Mark)		Message 前L思、 Detect 2 device(s) Load " D:\桌面\?45_si Machine 1-115 cable a Machine 1-115 eMark (Serial Numbu Machine 0-250 cable a	ngle_channel.bin " succe attached erIC is RT1710 er: 2019-04-19 11:2 attached	xsfully 7:05 1-115 00000000	00)	◎ Manual / 手動 ◉ Auto / 自動
Customer Name Produce Type Vendor ID	0000 - Customer Name1 Passive Cable 0x29CF		Machine 0-250 write 8 (Serial Numbo	& verity successfully er: 2019-04-19 11:2	7:05 0-250 00000028	37)	Write / 寫入
Cable Plug					Α	ction	Reresh
VBUS Current	³ Summary	•				Log	Keresh



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• Two channel write / verify

➢ Richtek eMarker MPTool (RT1745:PD20 File 檔案 Setting 設定 Account 帳號	o) F	le Name (C	chip ID : I	PD Revisio	on)	
	1745_tw	o_channe	el (RT174	45:PD20)	
0 - 250 1 - 115 0000000000	← Ma ← Cab	chine ID le Number	•			
NoCable NoCable					Stat	us Box
Summary 摘要 Rewritable (支援重複寫入) Two channel write/verify (一邊寫入 Single E-Mark (單 E-Mark) Customer Name 0000 - Custor Produce Type Passive Cable Vendor ID 0x29CF Product ID 0x29CF Product ID 0x2222 Cable Plug USB Type	, 另一邊驗證 mer Name1 le mary	essage 訊息. Detect 2 device(s) Load " D:\桌面\(745_sing) Machine 1-115 cable attr Machine 1-115 eMarkerI (Serial Number: Machine 0-250 No Empty (Serial Number: Machine 0-250 cable det Detect 2 device(s) Load " D:\桌面\(745_two_	e_channel.bin " successf ached C is RT1710 2019-04-18 18:28: ached / Bank 2019-04-18 18:28: ached ached channel.bin " successful	fully 21 1-115 000000000 21 0-250 000000286 ^{Ily} Act L()) i) tion	 ● 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
 - V_{CONN} over-current detected
 - May have low impedance at VCONN



- Low impedance detected at CC
 - Low impedance at V_{CONN}

Message 訊.應.	
Detect 1 device(s)	
Load " D:\県面Vemp\1731_single_rewritable.bin " successfully	
Machine 1-128 cable attached	
Machine 1-128 Low impedance detected at CC	
(Serial Number: 2020-03-12 15:47:18 1-128 000000054)	



4. Standalone Mode

Write the cable automatically when the writer board is powered by DC.

- 1. Connect to Dedicated Charging Port (DCP).
- i. This mode will not be entered when the writer board is connected to PC.
- 2. The data written is from the command "Save Writer Board Setting" in Engineer Tool.
- 3. 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

eMarker Quality Control	_ 6	eMarker Quality Control	
File 個条 Device 装置 Setting 改定	F	ile 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	E
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

File 檔案 Device 裝置 Setting 設定	
Channel 2 - Unexp	ected CC Status
General Infomation	
General Infomation EMark IC:	
General Infomation EMark IC: PD Version:	1
General Infomation EMark IC: PD Version: Vendor ID:	

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

ile 檔案	Device 裝置 Setting 設定	
	Channel 2 (PD) - Vconn Over Current	
	General Infomation	
-	General Infomation EMark IC:	
	Seneral Infomation EMark IC: PD Version:	
-	General Infomation EMark IC: PD Version: Vendor ID:	

- Low impedance detected at CC
 - Low impedance at V_{CONN}

🖗 eMarke	er Quality Con	TOL OCCUP	rea
File 檔案	Device 裝置	Setting 設定	
	Chan	nel 2 (PD) - Low Impedance At C	С
			*



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

		Mode (F:)	• \$	搜尋 Exte	BootMode (F:)	22 O
	組合管理▼ 共用對象▼ 月	新増資料夾			•	0
		名稱	修改日期	類型	大小	\
CFW_Binary.bin	 ▲ 電腦 ▲ 本機磁碟 (C:) → 本機磁碟 (D:) ⇒ ExtBootMode (F:) ⇒ pub (\\192.168.10.144 ⇒ temp (\\192.168.10.14 Ξ ④ 網路 	Cfw_0316.bin	2018/3/16 下午 0	BIN 檔案		58 KB
	1個項目	•	m			•

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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 / righ	nt 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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