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# **RTL8188CUS / RTL8188RU**

## **1x1 EEPROM Content**

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# 1. EEPROM (eFuse) Contents

The RTL8188CUS/RTL8188RU is embedded an internal 512-byte non-volatile memory called eFuse. Values in the eFuse allow default fields in PCI configuration space and I/O space to be overridden following an internal power on reset, or software eFuse auto-load command. The RTL8188CUS/RTL8188RU will auto-load values from the eFuse to these fields in configuration space and I/O space.

The eFuse emulates the structure of a usual EEPROM such as 93C46. We will describe the content and its addressing of the eFuse as we did in 93C46 and will mix the terms of EEPROM and eFuse in the following text,. After the initial power on or auto-load command to the eFuse, the RTL8188CUS/RTL8188RU performs a series of EEPROM read operations from the EEPROM addresses 00h to 7Fh. The definition of each EEPROM byte is shown as the below.

*Note: It is suggested to obtain Realtek approval before any change on the default settings of the EEPROM.*

**Table 1. EEPROM (eFuse) Contents**

Bytes	Contents	Description	Value for 8188CUS	Value for 8188RU
00h	29h	These 2 bytes contain the ID code for the RTL8188CUS / RTL8188RU. If the ID is 8129h, the Vendor ID and Product ID are determined from the EEPROM offset 0Ah~0Bh and 0Ch~0Dh. If the ID is not 8129h, the Vendor ID and Product ID are 0BDAh and 8191h.	29h	29h
01h	81h		81h	81h
02h		Reserved for Realtek. Do not change this field without Realtek's approval.	00h	00h
03h		Reserved for Realtek. Do not change this field without Realtek's approval.	74h	74h
04h		Reserved for Realtek. Do not change this field without Realtek's approval.	CDh	CDh
05h		Reserved for Realtek. Do not change this field without Realtek's approval.	00h	00h
06h		Reserved for Realtek. Do not change this field without Realtek's approval.	00h	00h
07h	DBG_SEL	Debug Mode Selection.	00h	00h
08h	Rsvd0	Reserved for Realtek. Do not change this field without Realtek's approval.	FFh,	FFh,
09h		Reserved for Realtek. Do not change this field without Realtek's approval.	00h	00h
0Ah~0Bh	VID	USB Vender ID	DAh, 0Bh	DAh, 0Bh
0Ch~0Dh	PID	USB Product ID 0x8176: USB Dongle 0x8170: WiFi solo-mCard (RTL8188CE-VAU) 0x817A: USB solo-Slim module 0x817B: USB combo-Slim module 0x817D: USB Dongle with high power PA (RTL8188RU)	76h, 81h	7Dh, 81h
0Eh	USB optional 1	USB optional function. Bit [1] USB remote wakeup function 0 : Do not support 1 : support ( if support Selective Suspend )	01h	01h

Bytes	Contents	Description	Value for 8188CUS	Value for 8188RU
0Fh~11h	EP setting	For USB EP setting For dongle application, this setting must be 003241h. For AP application, this setting must be 053241h.	41h, 32h, 00h,	41h, 32h, 00h,
12h~15h	USB phy para 1	Reserved for Realtek. Do not change this field without Realtek's approval.	85h, 62h, 9Eh, ADh,	85h, 62h, 9Eh, ADh,
16h~1Bh	MAC Address	MAC Address. After the auto-load command or the hardware reset, the RTL8188CUS/RTL8188RU loads MAC Addresses to MACID of the I/O registers of the RTL8188CUS/RTL8188RU.		
1Ch~4Fh	Manufacture String & Product String	Manufacture String and Product String: Those bits specify both manufacturer's information and device's information for the USB standard request. Manufacture String Max: 32bytes. Product String Max: 32bytes. But the total length of Manufacture and Product String should be less than 52Bytes. (Product String should be at even position)		
50h~57h	Reserved			
58h	USB optional 2	USB optional function. Bit[0] : Link Power Management(LPM) support 0 : Disable 1 : Enable Bit[7:1] : Reserved	06h	06h
59h	Reserved			
5Ah~5Fh	CCK TX Power Index (Absolute Value)	Offset 5Ah: Path A CCK lower channel index for channel 1~3, Range 0~63. Offset 5Bh: Path A CCK middle channel index for channel 4~9, Range 0~63. Offset 5Ch: Path A CCK higher channel index for channel 10~14, Range 0~63. Offset 5Dh~5Fh: reserved		
60h~65h	HT40-1S Tx Power Index (Absolute Value)	Offset 60h: Path A HT40-1S lower channel index for channel 1~3, Range 0~63. Offset 61h: Path A HT40-1S middle channel index for channel 4~9, Range 0~63. Offset 62h: Path A HT40-1S higher channel index for channel 10~14, Range 0~63. Offset 63h~65h: reserved		
66h~68h	-	Reserved		
69h~6Bh	HT20 Tx Power Index Difference	Offset 69h: Difference between HT20 and HT40-1S for channel 1~3. Bit[3:0]: Path A offset, Bit[7:4]: reserved. Range -8~7. Offset 6Ah: Difference between HT20 and HT40-1S for channel 4~9. Bit[3:0]: Path A offset, Bit[7:4]: reserved. Range -8~7. Offset 6Bh: Difference between HT20 and HT40-1S for channel 10~14. Bit[3:0]: Path A offset, Bit[7:4]: reserved. Range -8~7.	00h	00h
6Ch~6Eh	OFDM Tx Power Index Difference	Offset 6Ch: Difference between OFDM and HT40-1S for channel 1~3. Bit[3:0]: Path A offset, Bit[7:4]: reserved Offset 6Dh: Difference between OFDM and HT40-1S for channel 4~9. Bit[3:0]: Path A offset, Bit[7:4]: reserved Offset 6Eh: Difference between OFDM and HT40-1S for channel 10~14. Bit[3:0]: Path A offset, Bit[7:4]: reserved	22h	22h

Bytes	Contents	Description	Value for 8188CUS	Value for 8188RU
6Fh~71h	HT40 maximum power offset for “power increment by rate”	Offset 6Fh: define HT40 maximum power offset for channel 1~3. Bit[3:0]: Path A offset limit, Bit[7:4]: reserved Offset 70h: define HT40 maximum power offset for channel 4~9. Bit[3:0]: Path A offset limit, Bit[7:4]: reserved Offset 71h: define HT40 maximum power offset for channel 10~14. Bit[3:0]: Path A offset limit, Bit[7:4]: reserved	00h	00h
72h~74h	HT20 maximum power offset for “power increment by rate”	Offset 72h: define HT20 and Legacy20 maximum power offset for channel 1~3. Bit[3:0]: Path A offset limit, Bit[7:4]: reserved Offset 73h: define HT20 and Legacy20 maximum power offset for channel 4~9. Bit[3:0]: Path A offset limit, Bit[7:4]: reserved Offset 74h: define HT20 and Legacy20 maximum power offset for channel 10~14. Bit[3:0]: Path A offset limit, Bit[7:4]: reserved	00h	00h
75h	ChannelPlan	Bit[7]: Software configure mode 0h: Enable software configure 1h: Disable software configure  Bit[6:0]: Channel Plan 0h: FCC{ 1,2,3,4,5,6,7,8,9,10,11,36,40,44,48,52,56,60,64,149,153,157,161,165} 1h: IC{ 1,2,3,4,5,6,7,8,9,10,11} 2h: ETSI{ 1,2,3,4,5,6,7,8,9,10,11,12,13,36,40,44,48,52,56,60,64} 3h: SPAIN{ 1,2,3,4,5,6,7,8,9,10,11,12,13} 4h: FRANCE{ 1,2,3,4,5,6,7,8,9,10,11,12,13} 5h: MKK{ 1,2,3,4,5,6,7,8,9,10,11,12,13,14,36,40,44,48,52,56,60,64} 6h: MKK1{ 1,2,3,4,5,6,7,8,9,10,11,12,13,14,36,40,44,48,52,56,60,64} 7h: ISRAEL{ 1,2,3,4,5,6,7,8,9,10,11,12,13} 8h: TELECOM{ 1,2,3,4,5,6,7,8,9,10,11,12,13,14,36,40,44,48,52,56,60,64} 9h: Global domain{active scan: 1,2,3,4,5,6,7,8,9,10,11; passive scan: 12,13,14} Ah: WORLD WIDE 13{ 1,2,3,4,5,6,7,8,9,10,11; passive scan: 12,13}	0Ah	0Ah
76h	HPA_TSSI A	Bit[0:5]: Path-A TSSI value. If external high power PA is used, record TSSI value of path A for tx-power-tracking reference.  Bit[6]: Path-A Internal/External PA 0h: Internal PA 1h: External PA  Bit[7]: Path-A TX Power Tracking mechanism 0h: by thermal meter 1h: by TSSI	00h	40h
77h	-	Reserved		
78h	ThermalMeter	Thermal Meter Default Value System maker will calibrate a value and save it in EEPROM. Bit[4:0]: Thermal Meter Value Bit[7:5]: Reserved for XTAL_K	10h	10h

Bytes	Contents	Description	Value for 8188CUS	Value for 8188RU																				
79h	RF Option 1	Bit[2:0]: reserved (default: 0h)  Bit[4:3]: Enable/Disable Antenna Diversity 0h: Disable Antenna Diversity 1h: Enable Antenna Diversity  Bit[7:5]: Board Type (USB) 0h: USB dongle 1h: USB dongle with high power PA (RTL8188RU) 2h: WiFi solo-mCard (RTL8188CE-VAU) 3h: USB solo-Slim module 4h: USB combo-Slim module 5~7h: reserved	00h	20h																				
7Ah	RF Option 2	Bit[2:0]: path-A external LNA Gain, used to modify DIG mechanism 0h~7h: External LNA, 8~22dB with 2dB/step  Bit[3]: Path-A Internal/External LNA 0h: Internal LNA 1h: External LNA  Bit[7:4]: reserved	00h	0Ch																				
7Bh	RF Option 3	Bit[1:0]: function configuration of pin_LED0 and pin_LED1 <table border="1" data-bbox="438 993 1261 1163"> <thead> <tr> <th>Config. Pin</th><th>0h</th><th>1h</th><th>2h</th><th>3h</th></tr> </thead> <tbody> <tr> <td>LED0</td><td>ANT_SEL_P</td><td>TX/RX</td><td>Link-TX/RX</td><td>TX/RX</td></tr> <tr> <td>LED1</td><td>ANT_SEL_N</td><td>TSSI1</td><td>TSSI1</td><td>Link-TX/RX</td></tr> <tr> <td>LED2/GPIO8</td><td>Link-TX/RX</td><td>Link-TX/RX</td><td>TX/RX</td><td>Link-TX/RX</td></tr> </tbody> </table> Note: if path-B external PA is selected and do TX Power tracking by TSSI, then pin_LED1 must be used as TSSI1.  Bit[3:2]: Link Speed shown in OS 0h: Current Tx PHY Rate 1h: Current Rx PHY Rate 2h: Maximum RX PHY Rate 3h: reserved  Bit[4]: power down mode selection 0: normal radio off mode. 1: power down mode. Device will disappear when radio off.  Bit[5]: Enable bluetooth coexistence (skip this setting and refer to setting of offset 0x7C[3:1] if board type is combo-Slim module) 0: Disable 1: Enable  Bit[7:6]: Reserved	Config. Pin	0h	1h	2h	3h	LED0	ANT_SEL_P	TX/RX	Link-TX/RX	TX/RX	LED1	ANT_SEL_N	TSSI1	TSSI1	Link-TX/RX	LED2/GPIO8	Link-TX/RX	Link-TX/RX	TX/RX	Link-TX/RX	00h	00h
Config. Pin	0h	1h	2h	3h																				
LED0	ANT_SEL_P	TX/RX	Link-TX/RX	TX/RX																				
LED1	ANT_SEL_N	TSSI1	TSSI1	Link-TX/RX																				
LED2/GPIO8	Link-TX/RX	Link-TX/RX	TX/RX	Link-TX/RX																				

Bytes	Contents	Description	Value for 8188CUS	Value for 8188RU
7Ch	RF Option 4	Bit[0]: Antenna number for co-existence 0: 2-Antenna (default) 1: 1-Antenna  Bit[4:1]: Reserved  Bit[5]: Radio on/off type 0: combine with WiFi, 1:individual  Bit[7:6]: reserved	36h	36h
7Dh	RF Option 5	reserved	00h	00h
7Eh	Version	The EEPROM content version.	00h	00h
7Fh	Customer ID	Customer ID (0x00 and 0xFF are reserved for Realtek)	00h	00h