RTL8189ES EEPROM Content

Realtek

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1. EEPROM (eFuse) Contents

The RTL8189ES is embedded an internal 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 RTL8189ES 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 RTL8189ES 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 **RTL8189ES SDIO EEPROM and eFuse CONTENTS**

Bytes	Contents	Description	Default
00h	29h	These 2 bytes contain the ID code word for the RTL8189ES. The RTL8189ES will load the contents of the EEPROM into the corresponding location if the ID word is correct.	29h
01h	81h		81h
02h ~ 0Fh	Reserved	Reserved for Realtek. Do not change this field without Realtek's approval.	--
10h	Path A 2.4G CCK-1TX Power Index (Absolute Value) Path A 2.4G BW40-1S TX Power Index (Absolute Value)	Path A CCK Power Index for Ch 1, 2, Range 0~63.	26h
11h		Path A CCK Power Index for Ch 3, 4, 5, Range 0~63.	26h
12h		Path A CCK Power Index for Ch 6, 7, 8, Range 0~63.	26h
13h		Path A CCK Power Index for Ch 9, 10, 11, Range 0~63.	26h
14h		Path A CCK Power Index for Ch 12, 13, Range 0~63.	26h
15h		Path A CCK Power Index for Ch 14, Range 0~63.	26h
16h	Path A 2.4G BW40-1S TX Power Index (Absolute Value) Path A 2.4G	Path A 2G BW40-1S Power Index for Ch 1, 2, Range 0~63.	28h
17h		Path A 2G BW40-1S Power Index for Ch 3, 4, 5, Range 0~63.	28h
18h		Path A 2G BW40-1S Power Index for Ch 6, 7, 8, Range 0~63.	28h
19h		Path A 2G BW40-1S Power Index for Ch 9, 10, 11, Range 0~63.	28h
1Ah		Path A 2G BW40-1S Power Index for Ch 12, 13, 14 Range 0~63.	28h

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<table>
<tr><td>1Bh</td><td>BW20-1S
TX Power Index Difference
OFDM-1
TX Power Index Difference</td><td>Power Index Difference between BW20-1S and BW40-1S.
Bit[7:4] : Path A 2G Offset, Range –8~7.
Power Index Difference between OFDM-1Tx and BW40-1S.
Bit[3:0] : Path A 2G Offset, Range –8~7.</td><td>24h</td></tr>
<tr><td>1Ch ~ B7h</td><td>Reserve</td><td>-</td><td>-</td></tr>
<tr><td>B8h</td><td>Channel Plan</td><td>Bit[7]: Software configure mode
0h: Enable software configure(refer to Channel Plane Domain Code)
1h: Disable software configure(can't change Channel Plan Setting)
Bit[6:0]: Channel Plan

<table><tr><th>Domain Code</th><th>eFuse Value</th><th>Channels</th><th>Description</th></tr><tr><td>2G_WORLD</td><td>20h</td><td>1~13</td><td>Worldwird 13</td></tr><tr><td>2G_ETSI1</td><td>21h</td><td>1~13</td><td>Europe 2G</td></tr><tr><td>2G_FCC1</td><td>22h</td><td>1~11</td><td>US 2G</td></tr><tr><td>2G_MKK1</td><td>23h</td><td>1~13, 14</td><td>Japan 2G</td></tr><tr><td>2G_ETSI2</td><td>24h</td><td>10~13</td><td>France 2G</td></tr><tr><td>2G_Global</td><td>41h</td><td>1~13, 14</td><td>Global domain</td></tr></table></td><td>20h</td></tr>
<tr><td>B9h</td><td>Crystal Calibration</td><td>XTAL_K Value
Bit[5:0], Xi=Xo Range 0~3F h.
Bit[7:6]: reserved
FF h = 00 h</td><td>20h</td></tr>
<tr><td>BAh</td><td>Thermal Meter</td><td>Thermal Meter Default Value
System maker will calibrate a value and save it in EEPROM.
Bit[7:0]: Thermal Meter Value</td><td>1Ah</td></tr>
<tr><td>BBh</td><td>Reserve</td><td>Reserved for Realtek. Do not change this field without Realtek’s approval.</td><td>00h</td></tr>
<tr><td>BCh</td><td>2G PA Type</td><td>2G PA
Bit[7]: Reserved
Bit[4]: Path-A Internal/External PA
0h: Internal PA
1h: External PA
Bit[3:0]: Reserved</td><td>00h</td></tr>
<tr><td>BDh</td><td>2G LNA Type and Gain Selection</td><td>Bit[2:0]: 2G path-A external LNA Gain, used to modify DIG mechanism
0h~7h: External LNA, 8~22dB with 2dB/step

Bit[3]: 2G Path-A Internal/External LNA
0h: Internal LNA
1h: External LNA

Bit[7:4]: Reserved</td><td>00h</td></tr>
<tr><td>BEh ~ C0h</td><td>Reserve</td><td>-</td><td>-</td></tr>
</table>

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C1h	Board Options	Bit[2:0]: reserved Bit[3]: Non-interrupt Antenna Diversity 0: disable 1: enable Bit[4]: Reserved Bit[7:5]: Board Type (SDIO) 0h: WiFi solo-mCard 1h: WiFi+BT combo-mCard 2h: PCIe Card 3h~7h: Reserved.	00h
C2h	Feature Options	Bit[1:0]: function configuration of pin_LED0 and pin_LED1 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: radio off 1: power down Bit[5]: Enable bluetooth coexistence 0: Disable 1: Enable Bit[6]: Enable WoWLAN 0: Disable 1: Enable Bit[7]: Enable WAPI support 0: Disable 1: Enable	00h
C3h	BT Setting	Bit[0]: Total antenna number 0: 2-Antenna (default) 1: 1-Antenna Bit[7:1]: Reserved	10h
C4h	Version	The EEPROM content version.	00h
C5h	Customer ID	Customer ID (0x00 and 0xFF are reserved for Realtek)	00h
C6h	Reserved	Reserved for Realtek. Do not change this field without Realtek's approval.	00h
C7h	Reserved	-	-
C8h	Reserved	Reserved for Realtek. Do not change this field without Realtek's approval.	00h

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C9h	T/Rx Antenna Options	Bit[7:0] 00 h : reserved 01 h : for RTL8189ES, 1Tx and 1RxCG are diversity.(2 Ant with SPDT) 02 h : for RTL8189ES, 1Tx and 2Rx are diversity.(2 Ant, Tx and RxCG are both on aux port, RxCS is on main port) 03 h : for RTL8189ES, 1Tx and 1RxCG are fixed.(1Ant, Tx and RxCG are both on aux port) 04 h ~ FE h : Reserved FF h : (default) not use.	01h
CAh ~ CFh	Reserved	-	-
Byte D0h	CCCR	Bit[0]: SCSI Bit[1]: SDC Bit[2]: SMB Bit[3]: S4MI Bit[4]: SMPC Bit[5]: SHS Bit[6]: SSDR50 Bit[7]: SSDR104	3Fh
Byte D1h	CCCR	Bit[0]: SDDR50 Bit[1]: SDTA Bit[2]: SDTC Bit[3]: SDTD Bit[4]: SAI Bit[5]: Init_skip Bit[6]: Operating Voltage Bit[7]: RESV	00h
Byte D2h	FBR	Bit[0]: SPS Bit[3:1]: Reserved Bit[7:4]: PS3	01h
Byte D3h	CCCR	Bit[3:0]: CCCR[3:0] Bit[7:4]: Reserved	02h
Byte D4h	CCCR	Bit[3:0]: SDx Bit[7:4]: SDIOx	32h
Byte D5h	OCR	OCR[7:0]	00h
Byte D6h	OCR	OCR[15:8]	00h
Byte D7h	OCR	OCR[23:16]	FCh
Byte D8h	Common CIS Data		20h
Byte D9h	Common CIS Data		04h
Byte DAh	Common CIS Data		4Ch
Byte DBh	Common CIS Data		02h
Byte DCh	Common CIS Data		79h
Byte DDh	Common CIS Data		81h

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Byte DEh	Common CIS Data		21h
Byte DFh	Common CIS Data		02h
Byte E0h	Common CIS Data		0Ch
Byte E1h	Common CIS Data		00h
Byte E2h	Common CIS Data		22h
Byte E3h	Common CIS Data		04h
Byte E4h	Common CIS Data		00h
Byte E5h	Common CIS Data		08h
Byte E6h	Common CIS Data		00h
Byte E7h	Common CIS Data		32h
Byte E8h	Common CIS Data		FFh
Byte E9h	Function 1 CIS Data		21h
Byte EAh	Function 1 CIS Data		02h
Byte EBh	Function 1 CIS Data		0Ch
Byte ECh	Function 1 CIS Data		00h
Byte EDh	Function 1 CIS Data		22h
Byte EEh	Function 1 CIS Data		2Ah
Byte EFh	Function 1 CIS Data		01h
Byte F0h	Function 1 CIS Data		01h
Byte F1h	Function 1 CIS Data		00h
Byte F2h	Function 1 CIS Data		00h
Byte F3h	Function 1 CIS Data		00h
Byte F4h	Function 1 CIS Data		00h
Byte F5h	Function 1 CIS Data		00h
Byte F6h	Function 1 CIS Data		00h
Byte F7h	Function 1 CIS Data		00h

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Byte F8h	Function 1 CIS Data		00h
Byte F9h	Function 1 CIS Data		00h
Byte FAh	Function 1 CIS Data		00h
Byte FBh	Function 1 CIS Data		00h
Byte FCh	Function 1 CIS Data		02h
Byte FDh	Function 1 CIS Data		00h
Byte FEh	Function 1 CIS Data		FFh
Byte FFh	Function 1 CIS Data		FFh
Byte 100h	Function 1 CIS Data		00h
Byte 101h	Function 1 CIS Data		00h
Byte 102h	Function 1 CIS Data		00h
Byte 103h	Function 1 CIS Data		00h
Byte 104h	Function 1 CIS Data		00h
Byte 105h	Function 1 CIS Data		00h
Byte 106h	Function 1 CIS Data		00h
Byte 107h	Function 1 CIS Data		00h
Byte 108h	Function 1 CIS Data		00h
Byte 109h	Function 1 CIS Data		00h
Byte 10Ah	Function 1 CIS Data		00h
Byte 10Bh	Function 1 CIS Data		00h
Byte 10Ch	Function 1 CIS Data		00h
Byte 10Dh	Function 1 CIS Data		00h
Byte 10Eh	Function 1 CIS Data		00h
Byte 10Fh	Function 1 CIS Data		00h
Byte 110h	Function 1 CIS Data		00h
Byte 111h	Function 1 CIS Data		EBh

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Byte 112h	Function 1 CIS Data		00h
Byte 113h	Function 1 CIS Data		6Eh
Byte 114h	Function 1 CIS Data		01h
Byte 115h	Function 1 CIS Data		00h
Byte 116h	Function 1 CIS Data		00h
Byte 117h	Function 1 CIS Data		00h
Byte 118h	Function 1 CIS Data		00h
Byte 119h	Function 1 CIS Data		FFh
Byte 11Ah	MAC Address	MAC Address : [7:0]	-
Byte 11Bh	MAC Address	MAC Address : [15:8]	-
Byte 11Ch	MAC Address	MAC Address : [23:16]	-
Byte 11Dh	MAC Address	MAC Address : [31:24]	-
Byte 11Eh	MAC Address	MAC Address : [39:32]	-
Byte 11Fh	MAC Address	MAC Address : [47:40]	-
Byte 120h-12Fh	Reserved		-

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Revision history

Revision	Editor	Release Date	Description
R00	KaiYuan	2012/3/15	First release
R01	KaiYuan	2012/3/26	Modify default value
R02	KaiYuan	2012/4/20	Modify SDIO Driving value
R02	Mike	2012/6/12	Add “2G_Global” option for channel plan defined in B8h

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