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APPLICATION NOTE 4638

DS1874 Quick Reference Guide

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Abstract: This reference guide provides an alternate view of the register map for the DS1874 SFP+ controller with digital LDD interface. The register information is convenient when programming the device.

Introduction

The **DS1874** SFP+ controller with digital LDD interface allows programming of various options required to configure the alarms, warnings, lookup tables (LUTs), etc. This programmability necessitates a large register memory map. This application note provides an alternate view of the register map, which is convenient during programming.

Memory Map of the DS1874

The DS1874 features nine separate memory tables that are internally organized into eight-byte rows.

The **Lower memory** is addressed from 00h to 7Fh and contains alarm and warning thresholds, flags, masks, several control registers, password entry area (PWE), and the Table Select byte.

Table 01h primarily contains user EEPROM (with PW1 level access) as well as alarm and warning-enable bytes.

Table 02h is a multifunction space that contains configuration registers, scaling and offset values, passwords, interrupt registers, and miscellaneous control bytes.

Table 04h contains a temperature-indexed LUT for controlling the modulation voltage. The modulation LUT can be programmed in 2°C increments over the -40°C to +102°C range.

Table 05h is empty by default. It can be configured to contain the alarm and warning-enable bytes from Table 01h, Registers F8h-FFh with the MASK bit enabled (Table 02h, Register 89h). In this case Table 01h will be empty.

Table 06h contains a temperature-indexed LUT that allows the APC set point to change as a function of temperature to compensate for Tracking Error (TE). The APC LUT has 36 entries that determine the APC setting in 4°C windows between -40°C and +100°C.

Table 07h contains a temperature-indexed LUT for control of DAC1. The LUT has 36 entries that determine the DAC setting in 4°C windows between -40°C and +100°C.

Table 08h contains a temperature-indexed LUT for control of DAC2. The LUT has 36 entries that determine the DAC setting in 4°C windows between -40°C and +100°C.

Auxiliary memory (device A0h) contains 256 bytes of EE memory accessible from address 00h to FFh. It is selected with the device address of A0h.

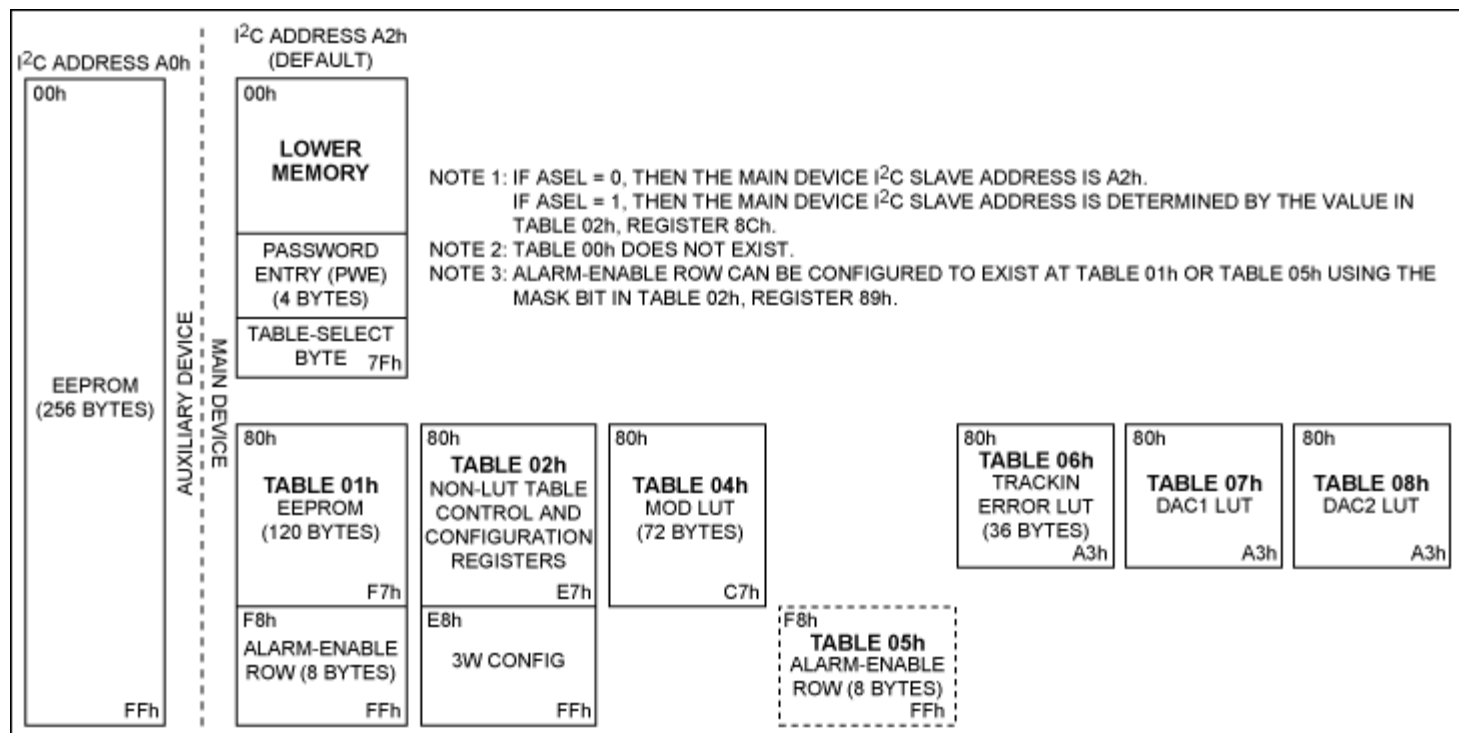
Refer to the tables below for a more complete detail of each byte's function, as well as for read/write permissions for each Byte.

Shadowed EEPROM

Many nonvolatile memory locations (listed within the *Register reference* section below) are actually shadowed EEPROM and are controlled by the SEEB bit in Table 02h, Register 80h.

The DS1874 incorporates shadowed EEPROM memory locations for key memory addresses that can be written many times. By default the shadowed EEPROM bit, SEEB, is not set and these locations act as ordinary EEPROM. By setting SEEB, these locations function like SRAM cells. This allows an infinite number of write cycles without concern of wearing out the EEPROM, and it eliminates the requirement for the EEPROM write time. Because changes made with SEEB enabled do not affect the EEPROM, these changes are not retained through power cycles. The power-on value is the last value written with SEEB disabled. This function can be used to limit the number of EEPROM writes during calibration, or to change the monitor thresholds periodically during normal operation. This monitoring helps to reduce the number of times that EEPROM is written. The memory map description indicates which locations are shadowed EEPROM.

DS1874 Memory Map



Register Reference

The following tables provide an easy reference to the Lower memory and Tables 01h and 02h. For a description of the functionality of each bit, please refer to the corresponding register in the data sheet. Tables 04h through 08h are LUTs that do not require a separate reference and, hence, are not included here. Please refer to the data sheet for detailed

information about these tables.

Note: RSVD is used as an acronym for reserved.

Lower Memory

REGISTER NAME	REGISTER ADDR (h)	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
TEMP ALARM HI	00h, 04h	S	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
TEMP WARN HI	01h, 05h	2 ⁻¹	2 ⁻²	2 ⁻³	2 ⁻⁴	2 ⁻⁵	2 ⁻⁶	2 ⁻⁷	2 ⁻⁸
TEMP ALARM LO	02h, 06h	S	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
TEMP WARN LO	03h, 07h	2 ⁻¹	2 ⁻²	2 ⁻³	2 ⁻⁴	2 ⁻⁵	2 ⁻⁶	2 ⁻⁷	2 ⁻⁸
V _{CC} ALARM HI V _{CC} WARN HI	08, 0C, 10, 14, 18, 1C, 20, 24, 28, 2Ch	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸
MON1-4 ALARM HI MON1-4 WARN HI	09, 0D, 11, 15, 19, 1D, 21, 25, 29, 2Dh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
V _{CC} ALARM LO V _{CC} WARN LO	0A, 0E, 12, 16, 1A, 1E, 22, 26, 2A, 2Eh	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸
MON1-4 ALARM LO MON1-4 WARN LO	0B, 0F, 13, 17, 1B, 1F, 23, 27, 2B, 2Fh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
PW2 EE	30h-5Fh	EE	EE	EE	EE	EE	EE	EE	EE
TEMP VALUE	60h	S	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
	61h	2 ⁻¹	2 ⁻²	2 ⁻³	2 ⁻⁴	2 ⁻⁵	2 ⁻⁶	2 ⁻⁷	2 ⁻⁸
V _{CC} VALUE MON1-4 VALUE	62, 64, 66, 68, 6Ah	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸
	63, 65, 67, 69, 6Bh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
RESERVED	6C, 6Dh	0	0	0	0	0	0	0	0
STATUS	6Eh	TXDS	TXDC	IN1S	RSELS	RSELC	TXF	RXL	RDYB
UPDATE	6Fh	TEMP RDY	V _{CC} RDY	MON1 RDY	MON2 RDY	MON3 RDY	MON4 RDY	RESERVED	RSSIR
ALARM ₃	70h	TEMP HI	TEMP LO	V _{CC} HI	V _{CC} LO	MON1 HI	MON1 LO	MON2 HI	MON2 LO
ALARM ₂	71h	MON3 HI	MON3 LO	MON4 HI	MON4 LO	RSVD	RSVD	RSVD	TXFINT
ALARM ₁	72h	RSVD	RSVD	RSVD	RSVD	HBAL	RSVD	TXP HI	TXP LO
ALARM ₀	73h	LOS HI	LOS LO	RSVD	RSVD	BIAS MAX	RSVD	RSVD	RSVD

WARN ₃	74h	TEMP HI	TEMP LO	V _{CC} HI	V _{CC} LO	MON1 HI	MON1 LO	MON2 HI	MON2 LO
WARN ₂	75h	MON3 HI	MON3 LO	MON4 HI	MON4 LO	RSVD	RSVD	RSVD	RSVD
RESERVED	76h-7Ah	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
PASSWORD ENTRY	7Bh	2 ³¹	2 ³⁰	2 ²⁹	2 ²⁸	2 ²⁷	2 ²⁶	2 ²⁵	2 ²⁴
	7Ch	2 ²³	2 ²²	2 ²¹	2 ²⁰	2 ¹⁹	2 ¹⁸	2 ¹⁷	2 ¹⁶
	7Dh	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸
	7Eh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
TABLE SELECT	7Fh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰

Table 01h

REGISTER NAME	ADDR (h)	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PW1 EEPROM	80h-BFh	EE	EE	EE	EE	EE	EE	EE	EE
PW2 EEPROM	C0h-F7h	EE	EE	EE	EE	EE	EE	EE	EE
ALARM ₃	F8h	TEMP HI	TEMP LO	V _{CC} HI	V _{CC} LO	MON1 HI	MON1 LO	MON2 HI	MON2 LO
ALARM ₂	F9h	MON3 HI	MON3 LO	MON4 HI	MON4 LO	RSVD	RSVD	RSVD	RSVD
ALARM ₁	FAh	RSVD	RSVD	RSVD	RSVD	HBAL	RSVD	TXP HI	TXP LO
ALARM ₀	FBh	LOS HI	LOS LO	RSVD	RSVD	BIAS MAX	RSVD	RSVD	RSVD
WARN ₃	FCh	TEMP HI	TEMP LO	V _{CC} HI	V _{CC} LO	MON1 HI	MON1 LO	MON2 HI	MON2 LO
WARN ₂	FDh	MON3 HI	MON3 LO	MON4 HI	MON4 LO	RSVD	RSVD	RSVD	RSVD
RESERVED	FEh-FFh	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD

Table 02h

REGISTER NAME	ADDR (h)	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
MODE	80h	SEEB	RSVD	DAC1 EN	DAC2 EN	AEN	MOD EN	APC EN	BIAS EN
TINDEX	81h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
MODULATION REGISTER	82h	0	0	0	0	0	0	0	2 ⁸
	83h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
DAC1 VALUE	84h	0	0	0	0	0	0	0	2 ⁸
	85h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
DAC2 VALUE	86h	0	0	0	0	0	0	0	2 ⁸
	87h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
SAMPLE RATE	88h	SEE	SEE	SEE	SEE	SEE	APC_SR ₂	APC_SR ₁	APC_SR ₀
CNFGA	89h	LOSC	RSVD	INV LOS	ASEL	MASK	INVR SOUT	RSVD	RSVD
CNFGB	8Ah	IN1C	INVOUT1	RSVD	RSVD	RSVD	ALATCH	QTLATCH	WLATCH
CNFGC	8Bh	RSVD	RSVD	TXDM34	TXDFG	TXDFLT	TXDIO	RSSI_FC	RSSI_FF
		7	6	5	4	3	2	1	0

DEVICE ADDR	8Ch	2	2	2	2	2	2	2	2
RESERVED	8Dh	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
RIGHT SHIFT ₁	8Eh	RSVD	MON1 ₂	MON1 ₁	MON1 ₀	RSVD	MON2 ₂	MON2 ₁	MON2 ₀
RIGHT SHIFT ₀	8Fh	RSVD	MON3 ₂	MON3 ₁	MON3 ₀	RSVD	MON4 ₂	MON4 ₁	MON4 ₀
RESERVED	90h-91h	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
V _{CC} SCALE MON1-2 SCALE MON3 F SCALE MON4 SCALE MON3 C SCALE	92, 94, 96, 98, 9A, 9Ch	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸
	93, 95, 97, 99, 9B, 9Dh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
RESERVED	9Eh-A1h	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
V _{CC} OFFSET MON1-2 OFFSET MON3 F OFFSET MON4 OFFSET MON3 C OFFSET	A2, A4, A6, A8, AA, ACh	S	S	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰
	A3, A5, A7, A9, AB, ADh	2 ⁹	2 ⁸	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²
INTERNAL TEMP OFFSET	A Eh	S	2 ⁸	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²
	A Fh	2 ¹	2 ⁰	2 ⁻¹	2 ⁻²	2 ⁻³	2 ⁻⁴	2 ⁻⁵	2 ⁻⁶
PW1	B0h	2 ³¹	2 ³⁰	2 ²⁹	2 ²⁸	2 ²⁷	2 ²⁶	2 ²⁵	2 ²⁴
	B1h	2 ²³	2 ²²	2 ²¹	2 ²⁰	2 ¹⁹	2 ¹⁸	2 ¹⁷	2 ¹⁶
	B2h	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸
	B3h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
PW2	B4h	2 ³¹	2 ³⁰	2 ²⁹	2 ²⁸	2 ²⁷	2 ²⁶	2 ²⁵	2 ²⁴
	B5h	2 ²³	2 ²²	2 ²¹	2 ²⁰	2 ¹⁹	2 ¹⁸	2 ¹⁷	2 ¹⁶
	B6h	2 ¹⁵	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸
	B7h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
LOS RANGING	B8h	RSVD	HLOS ₂	HLOS ₁	HLOS ₀	RSVD	LLOS ₂	LLOS ₁	LLOS ₀
COMP RANGING	B9h	RSVD	BIAS ₂	BIAS ₁	BIAS ₀	RSVD	APC ₂	APC ₁	APC ₀
RESERVED	BAh	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
ISTEP	BBh	2 ⁸	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹
HTXP	BCh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
LTXP	BDh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
HLOS	BEh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
LLOS	BFh	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
PW_ENA	C0h	RWTBL78	RWTBL1C	RWTBL2	RWTBL1A	RWTBL1B	WLOWER	WAUXA	WAUXB
PW_ENB	C1h	RWTBL46	RTBL1C	RTBL2	RTBL1A	RTBL1B	WPW1	WAUXAU	WAUXBU
MODTI	C2h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
DAC1TI	C3h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
DAC2TI	C4h	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
RESERVED	C5h	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD

LUTTC	C6h	MODTC	DAC1TC	DAC2TC	RSVD	RSVD	RSVD	RSVD	RSVD
TBLSELPON	C7h	27	26	25	24	23	22	21	20
MAN BIAS	C8h	0	0	0	0	0	0	0	28
	C9h	27	26	25	24	23	22	21	20
MAN CNTL	CAh	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	MAN_CLK
BIAS REGISTER	CBh	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	28
	CCh	27	26	25	24	23	22	21	20
APC DAC	CDh	27	26	25	24	23	22	21	20
DEVICE ID	CEh	0	1	1	1	0	1	0	0
DEVICE VER	CFh	DEVICE VERSION							
HBATH	D0h-D7h	27	26	25	24	23	22	21	20
EMPTY	D8h-E7h	EMPTY							
RXCNTL1	E8h	27	26	25	24	23	22	21	20
RXCNTL2	E9h	27	26	25	24	23	22	21	20
SETCML	EAh	27	26	25	24	23	22	21	20
SETLOS	EBh	27	26	25	24	23	22	21	20
TXCTRL	ECh	27	26	25	24	23	22	21	20
IMODMAX	EDh	27	26	25	24	23	22	21	20
IBIASMAX	EEh	27	26	25	24	23	22	21	20
SETPWCTRL	EFh	27	26	25	24	23	22	21	20
SETTXDE	F0h	27	26	25	24	23	22	21	20
RESERVED	F1h-F7h	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
3WCTRL	F8h	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	3WRW	3WDIS
ADDRESS	F9h	27	26	25	24	23	22	21	20
WRITE	FAh	27	26	25	24	23	22	21	20
READ	FBh	27	26	25	24	23	22	21	20
TXSTAT1	FCh	27	26	25	24	23	22	21	20
TXSTAT2	FDh	27	26	25	24	23	22	21	20
RESERVED	FEh-FFh	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD

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