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APPLICATION NOTE 4888

DS1876 Quick Reference Guide for the DS1876 SFP Controller

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Abstract: The DS1876 SFP controller with dual LDD interface allows various programming options required to configure the alarms, warnings, look-up tables (LUTs), and other functions. This customization necessitates a large register memory map. The application note provides an alternate view of the register map, which is convenient when programming the device.

Memory Map of the DS1876

The Main Device located at A2h is used for overall device configuration and transmitter 1 control, calibration, alarms, warnings, and monitoring.

- **Lower Memory, A2h** 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, A2h** primarily contains user EEPROM (with PW1 level access) as well as alarm and warning enable bytes.
- **Table 02h, A2h/B2h** is a multifunction space that contains configuration registers, scaling and offset values, passwords, interrupt registers as well as other miscellaneous control bytes. All functions and status can be written and read from either A2h or B2h addresses.
- **Table 04h, A2h** contains a temperature-indexed look-up table (LUT) for control of the MOD1 voltage. The MOD1 LUT can be programmed in 2°C increments over the -40°C to +102°C range. This table also contains a temperature-indexed LUT for the MOD1 offsets.
- **Table 05h, A2h** 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, A2h** contains a temperature-indexed LUT for control of the APC1 voltage. The APC1 LUT can be programmed in 2°C increments over the -40°C to +102°C range. This also contains a temperature-indexed LUT for the APC1 offsets.

The Main Device located at B2h is used for transmitter 2 control, calibration, alarms, warnings, and monitoring.

- **Lower Memory, B2h** 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, B2h** contains alarm and warning enable bytes.
- **Table 04h, B2h** contains a temperature-indexed LUT for control of the MOD2 voltage. The MOD2 LUT can be programmed in 2°C increments over the -40°C to +102°C range. This table also contains a temperature-indexed LUT for the MOD2 offsets.
- **Table 05h, B2h** 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, B2h** contains a temperature-indexed LUT for control of the APC2 voltage. The APC2 LUT can be programmed in 2°C increments over the -40°C to +102°C range. This also contains a temperature-indexed LUT for the APC2 offsets.
- **Auxiliary memory (Device A0h)** contains 256 bytes of EE memory accessible from address 00h–FFh. It is selected with the device address of A0h.

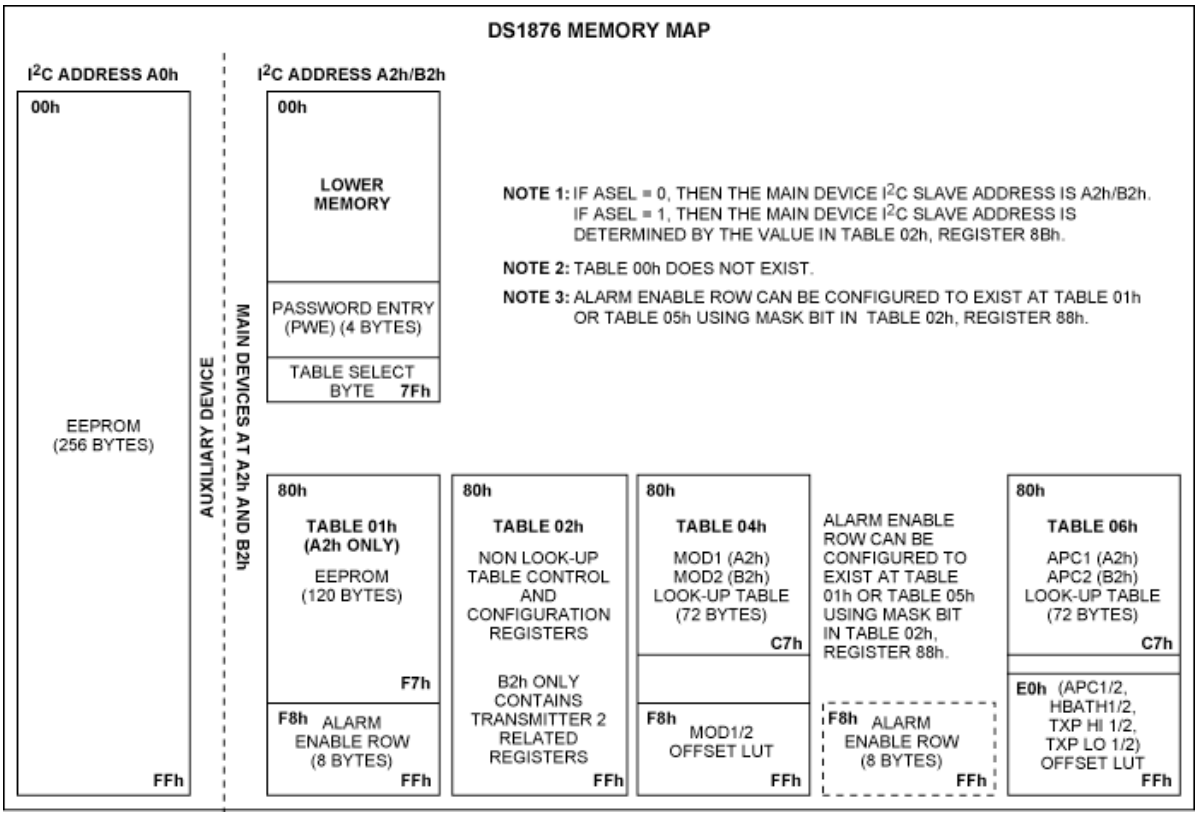
Refer to the tables below for a more complete detail of each byte's function, as well as for Read/Write permissions for each Byte.

Shadowed EEPROM

Many nonvolatile (NV) memory locations (listed in the Register references section below) are actually Shadowed EEPROM and are controlled by the SEEB bit in Table 02h, Register 80h.

The DS1876 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 which allow an infinite number of write cycles without concern for wearing out the EEPROM. This functionality also eliminates the requirement for the EEPROM write time, t_{WR}. 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, thus helping to reduce the number of times that EEPROM is written. The memory map description indicates which locations are Shadowed EEPROM.

DS1876 Memory Map



Register Reference

The following tables provide an easy reference to the Lower Memory and Tables 00h, 01h and 02h. For a description of the functionality for 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, thus, not included here. Please refer to the data sheet for detailed information about these tables. Rows with values that are common to the A2h and B2h device address are marked in green. Those rows with values that are different for A2h and B2h device address are marked in red. Rows that are mixed A2h and B2h accessible are marked in yellow.

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	00, 04	S	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
TEMP WARN HI	01, 05	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}
TEMP ALARM LO	02, 06	S	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
TEMP WARN LO	03, 07	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}
V_{CC} ALARM HI	08, 0C	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
V_{CC} WARN HI	09, 0D	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
BMON ALARM HI	10, 14, 18, 1C	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
PMON ALARM HI BMON WARN HI PMON WARN HI	11, 15, 19, 1D	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
V_{CC} ALARM LO	0A, 0E	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
V_{CC} WARN LO	0B, 0F	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
BMON ALARM LO	12, 16, 1A, 1E	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
PMON ALARM LO BMON WARN LO PMON WARN LO	13, 17, 1B, 1F	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
PW2 EE	20–47	EE	EE	EE	EE	EE	EE	EE	EE
PW2 EE	48–57	EE	EE	EE	EE	EE	EE	EE	EE
PW2 EE	58–5F	EE	EE	EE	EE	EE	EE	EE	EE
TEMP VALUE	60	S	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
	61	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}
V_{CC} VALUE	62	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
	63	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
BMON VALUE	64, 66	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
PMON VALUE	65, 67	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
RESERVED	68–6D	0	0	0	0	0	0	0	0
STATUS	6E	<D>TXDS	<D>TXDC	<C>IN1S	<C>RSELS	<C>RSELC	<D>TXFS	<D>RAM	<C>RDYB
UPDATE	6F	TEMP RDY	V_{CC} RDY	BMON RDY	PMON RDY	RSVD	RSVD	RSVD	RSVD
$ALARM_3$	70	TEMP HI	TEMP LO	V_{CC} HI	V_{CC} LO	BMON HI	BMON LO	PMON HI	PMON LO
$ALARM_2$	71	RSVD	RSVD	RSVD	RSVD	RSVD	TXFOUTS	FETG	TXFINT
$ALARM_1$	72	RSVD	RSVD	RSVD	RSVD	HBAL	RSVD	TXP HI	TXP LO
RESERVED	73	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
$WARN_3$	74	TEMP HI	TEMP	V_{CC} HI	V_{CC} LO	BMON HI	BMON LO	PMON	PMON

			LO					HI	LO
RESERVED	75	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
RESERVED	76–7A	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
PASSWORD ENTRY	7B	2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}
	7C	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}
	7D	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
	7E	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
TABLE SELECT	7F	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}

Table 01h

Register Name	Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
EEPROM	80–F7	EE	EE	EE	EE	EE	EE	EE	EE
ALARM EN_3	F8	<C>TEMP HI	<C>TEMP LO	<C>V_{CC} HI	<C>V_{CC} LO	<D>BMON HI	<D>BMON LO	<D>PMON HI	<D>PMON LO
RESERVED	F9	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
ALARM EN_1	FA	RSVD	RSVD	RSVD	RSVD	HBAL	RSVD	TXP HI	TXP LO
RESERVED	FB	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
WARN EN_3	FC	<C>TEMP HI	<C>TEMP LO	<C>V_{CC} HI	<C>V_{CC} LO	<D>BMON HI	<D>BMON LO	<D>PMON HI	<D>PMON LO
RESERVED	FD–FF	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD

Table 02h

Register Name	Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
MODE	80H	SEEB	MOD2 EN	QT2 EN	APC2 EN	AEN	MOD1 EN	QT1 EN	APC1 EN
T INDEX	81h	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
RESERVED	82–85	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
DEVICE ID	86	0	1	1	1	0	0	1	1
DEVICE VER	87	DEVICE VERSION							
CNFGA	88	QTHEXT2	QTHEXT1	RSVD	ASEL	MASK	INVRSOUT	INVTXFOUT2	INVTXFOUT1
CNFGB	89	IN1C	INVOUT1	ALATCH2	QTLATCH2	WLATCH2	ALATCH1	QTLATCH1	WLATCH1
CNFGC	8A	TXDFG2	TXDFLT2	TXDIO2	TXDFG1	TXDFLT1	TXDIO1	RSVD	RSVD
DEVICE ADDR	8B	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
$RANGING_2$	8C	RSVD	$HBIAS2_2$	$HBIAS2_1$	$HBIAS2_0$	RSVD	$TXP2_2$	$TXP2_1$	$TXP2_0$
$RANGING_1$	8D	RSVD	$HBIAS1_2$	$HBIAS1_1$	$HBIAS1_0$	RSVD	$TXP1_2$	$TXP1_1$	$TXP1_0$
RIGHT $SHIFT_2$	8E	RSVD	$BMON2_2$	$BMON2_1$	$BMON2_0$	RSVD	$PMON2_2$	$PMON2_1$	$PMON2_0$
RIGHT $SHIFT_2$	8F	RSVD	$BMON1_2$	$BMON1_1$	$BMON1_0$	RSVD	$PMON1_2$	$PMON1_1$	$PMON1_0$
RESERVED	90–91	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
V_{CC} SCALE BMON2 SCALE	92, 98, 9A, 9C, 9E	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
PMON2 SCALE BMON1 SCALE	93, 99, 9B, 9D,	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}

PMON1 SCALE	9F								
RESERVED	94–97	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
INTERNAL TEMP OFFSET	A0	S	2^8	2^7	2^6	2^5	2^4	2^3	2^2
	A1	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}
V_{CC} OFFSET BMON2 OFFSET PMON2 OFFSET BMON1 OFFSET PMON1 OFFSET	A2, A8, AA, AC, AE	S	S	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}
	A3, A9, AB, AD, AF	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2
RESERVED	A4–A7	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
PW1	B0	2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}
	B1	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}
	B2	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
	B3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
PW2	B4	2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}
	B5	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}
	B6	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
	B7	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
RESERVED	B8	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
HBIAS2 DAC	B9	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
HTXP2 DAC	BA	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
LTXP2 DAC	BB	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
RESERVED	BC	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
HBIAS1 DAC	BD	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
HTXP1 DAC	BE	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
LTXP1 DAC	BF	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
PW_ENA	C0	RSVD	RWTBL1C	RWTBL2	RWTBL1A	RWTBL1B	WLOWER	WAUXA	WAUXB
PW_ENB	C1	RWTBL46	RTBL1C	RTBL2	RTBL1A	RTBL1B	WPW1	WAUXAU	WAUXBU
RESERVED	C2–C5	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
POLARITY	C6	RSVD	RSVD	RSVD	RSVD	MOD2P	APC2P	MOD1P	APC1P
TBLSELPON	C7	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
MOD2 DAC	C8	0	0	0	0	0	0	2^9	2^8
	C9	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
APC2 DAC	CA	0	0	0	0	0	0	2^9	2^8
	CB	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
MOD1 DAC	CC	0	0	0	0	0	0	2^9	2^8
	CD	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
APC1 DAC	CE	0	0	0	0	0	0	2^9	2^8
	CF	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

EMPTY	D0–FF	EMPTY

Related Parts		
DS1876	SFP Controller with Dual LDD Interface	Free Samples

More Information
For Technical Support: http://www.maximintegrated.com/support
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