Comparison between F-RAM I2C processor companion devices

About this document

Scope and purpose

AN405 discusses the key differences between the F-RAM I^2C processor companion devices FM31256/FM3164/ FM31278/FM31276/FM31L278/FM31L276.

Associated part family

FM31256, FM3164, FM31278, FM31276, FM31L278, FM31L276

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1 Description

The FM31256 and the FM3164 are the wide operating voltage F-RAM I^2C processor companion devices. The FM31278 and the FM31276 are 5 V devices while the FM31L278 and the FM31L276 are the 3 V devices. This application note discusses the key differences between the F-RAM I^2C processor companion devices FM31256/ FM3164/FM31278/FM31276/FM31L278/FM31L276.

2 Compatibility

From the software point of view these families are compatible. From the hardware point of view, the families are similar in many ways; however there are a few key differences. The FM31256/FM3164 devices operate over a wide voltage range of 2.7 V to 5.5 V. The FM31278/FM31276 and FM31L278/FM31L276 are split into 5 V and 3 V versions, respectively. The interface features are the same between the devices. The key differences are in operating voltage range, trickle charger currents, and RTC crystal as shown in Table 1.

Table 1 Comparison between F-RAM I²C processor companion devices

	Wide Operating Voltage Family	**5V Family**	**3V Family**	**Comments**
	FM31256/FM3164	**FM31278/FM31276**	**FM31L278/ FM31L276**	
Density	256-Kbit/64-Kbit	256-Kbit/64-Kbit	256-Kbit/64-Kbit	
Operating Voltage Range	2.7 V to 5.5 V	4.0 V to 5.5 V	2.7 V to 3.6 V	
Voltage Detect Trip Points	2.6 V, 2.9 V, 3.9 V, 4.4 V	3.9 V, 4.4 V	2.6 V, 2.9 V	FM31256/FM3164 have two VTP bits in Register 0Bh (Table 2) while the FM31278/ FM31276/FM31L278/ FM31L276 devices have one VTP bit (Table 3)
RTC Crystal Load Capacitance	6 pF	12.5 pF		12.5 pF is a more commonly available crystal
Trickle Charger (min - max range)	5 µA - 25 µA	50 µA - 120 µA, FC=0 200 µA - 2500 µA, FC=1		Increased current on standard setting. Additional Fast Charge mode is available in FM31278/ FM31276/FM31L278/ FM31L276 devices (Register 0Bh, bit 5 shown in Table 3)

3 Operating voltage range

The FM31256/FM3164 devices operate from 2.7 V to 5.5 V and require 2 bits to select one of four VTP trip points, namely, 2.6 V, 2.9 V, 3.9 V and 4.4 V. Table 2 gives the Register 0Bh for FM31256/FM3164. The FM31278/FM31276 devices operate from 4.0 V to 5.5 V and require only one bit to detect one of two VTP trip points, namely, 3.9 V and 4.4 V. Similarly the FM31L278/FM31L276 devices operate from 2.7 V to 3.6 V and also require only one bit to select one of two VTP trip points, namely, 2.6 V and 2.9 V. Table 3 gives the Register 0Bh for FM31278/FM31276/FM31L278/FM31L276.

Table 2 Register 0Bh in FM31256/FM3164

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SNL	-	-	WP1	WP0	VBC	VTP1	VTP0

Table 3 Register 0Bh in FM31278/FM31276/FM31L278/FM31L276

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SNL	-	FC	WP1	WP0	VBC	-	VTP

4 Trickle charger current

The FM31278/FM31276/FM31L278/FM31L276 have a higher trickle charger current for the base setting (FC = 0) compared to the FM31256/FM3164 devices. They also have a new Fast Charge mode (FC = 1) that is user-selectable. This Fast Charge mode allows super capacitor to be charged typically ten times faster than the base setting (FC = 0).

5 RTC Crystal

The FM31278/FM31276/FM31L278/FM31L276 devices require use of a 12.5 pF crystal, while FM31256/FM3164 devices require use of a 6 pF crystal.

All other specifications are the same among the processor companion devices. However system designers are recommended to review the detailed datasheets when using a new part.

6 Conclusion

AN405 discusses the key differences between the F-RAM I^2C processor companion devices FM31256/FM3164/ FM31278/FM31276/FM31L278/FM31L276.

Revision history

Document version	Date of release	Description of changes
**	2013-03-26	New Spec
*A	2014-03-05	Updated to Infineon template
*B	2026-07-17	Template update; no content update.

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