Application note

Minimal migration path from ST25DVxxK to ST25DVxxKC

Introduction

ST25DVxxKC is an evolution of ST25DVxxK introducing a set of new features when keeping a high backward compatibility.

Migrating from ST25DVxxK to ST25DVxxKC requires some adaptations in the microcontroller's firmware and in the RF application software, but no hardware modification.

Two migration paths are possible:

- Minimal migration, using the same feature set as ST25DVxxK.
- Full migration, benefiting from ST25DVxxKC new feature set.

This document describes the minimal migration path, providing a constant feature set between ST25DVxxK and ST25DVxxKC.

Refer to application note AN5633 "Migrating from ST25DVxxK to ST25DVxxKC" for a full migration path and more detailed comparison between the two products.

This document covers the devices listed in the table below.

Table 1. Applicable products

Type	Part number
ST25DVxxK	ST25DV04K ST25DV16K ST25DV64K
ST25DVxxKC	ST25DV04KC ST25DV16KC ST25DV64KC

1 Hardware considerations

ST25DVxxK can be replaced by ST25DVxxKC without any hardware change.

PCB layout

ST25DVxxK and ST25DVxxKC are pin-to-pin compatible. They are available in the same packages and in the same pinout. The migration requires no PCB modification.

Antenna design

ST25DVxxK and ST25DVxxKC share the same tuning capacitance. The migration requires no antenna modification.

Life cycle and operating conditions

Cycling, data retention and operating temperature ranges are identical between ST25DVxxK and ST25DVxxKC. The migration has no impact on life cycle and operating conditions.

2 Migration at constant feature set

Only three points need to be considered for a migration with a constant feature set:

- GPO configuration
- Fast transfer mode configuration
- Product identification

New features specific to the ST25DVxxKC are disabled by default and can be ignored for a migration with a constant feature set.

Possibly, if the application requires tightly controlled EEPROM programming timings, differences in programming speed from the I²C interface may also be considered.

2.1 GPO configuration

ST25DVxxKC embed additional interrupts capabilities on the GPO pin on top of interrupts already available in the ST25DVxxK.

If the GPO interrupts feature is used in the application, adaptations are required in the MCU's firmware, and in the RF software to obtain the same GPO output behavior.

Below tables summarize respectively the memory addresses and bits that are different for GPO configuration and that shall be considered for the migration.

Table 2. Differences in GPO configuration and control memory addresses

RF access/address	I2C address	Function in ST25DVxxK	Function in ST25DVxxKC
Read/Write configuration 00h	0000h (E2=1)	GPO	GPO1
Read/Write configuration 01h	0001h (E2=1)	IT_TIME	GPO2
Read/Write dynamic configuration 00h	2000h (E2=0)	GPO_CTRL_Dyn	GPO_CTRL_Dyn

Table 3. ST25DVxxK GPO versus ST25DVxxKC GPO1 configuration bits

Bits	ST25DVxxK GPO	ST25DVxxKC GPO1
b0	RF_USER_EN	GPO_EN
b1	RF_ACTIVITY_EN	RF_USER_EN
b2	RF_INTERRUPT_EN	RF_ACTIVITY_EN
b3	FIELD_CHANGE_EN	RF_INTERRUPT_EN
b4	RF_PUT_MSG_EN	FIELD_CHANGE_EN
b5	RF_GET_MSG_EN	RF_PUT_MSG_EN
b6	RF_WRITE_EN	RF_GET_MSG_EN
b7	GPO_EN	RF_WRITE_EN

Table 4. ST25DVxxK IT_TIME versus ST25DVxxKC GPO2 configuration bits

Bits	ST25DVxxK IT_TIME	ST25DVxxKC GPO2
b0	IT_TIME	I2C_WRITE_EN(1)
b1		I2C_RF_OFF_EN(1)
b2		IT_TIME
b3	RFU	
b4	RFU	
b5	RFU	RFU
b6	RFU	RFU
b7	RFU	RFU

1. *Disabled by default. Not to be used with a constant feature set.*

Table 5. ST25DVxxK GPO_CTRL_Dyn versus ST25DVxxKC GPO_CTRL_Dyn register bits

Bits	ST25DVxxK GPO_CTRL_Dyn	ST25DVxxKC GPO_CTRL_Dyn
b0	RF_USER_EN	GPO_EN
b1	RF_ACTIVITY_EN	RFU
b2	RF_INTERRUPT_EN	RFU
b3	FIELD_CHANGE_EN	RFU
b4	RF_PUT_MSG_EN	RFU
b5	RF_GET_MSG_EN	RFU
b6	RF_WRITE_EN	RFU
b7	GPO_EN	RFU

2.2 Fast transfer mode configuration

The fast transfer mode feature is unchanged in ST25DVxxKC. Nevertheless, the configuration addresses have been modified.

If FTM feature is used in the application, adaptations are required in the MCU's firmware and the RF software to configure it correctly.

Below tables summarize respectively the memory addresses and bits that are different for FTM configuration and that shall be considered for the migration.

Table 6. Differences in FTM configuration and control memory addresses

RF access/address	I2C address	Function in ST25DVxxK	Function in ST25DVxxKC
Read/Write configuration 0Dh	000Dh (E2=1)	MB_MODE	FTM
Read/Write configuration 0Eh	000Eh (E2=1)	MB_WDG	I2C_CFG

Table 7. **ST25DVxxK MB_MODE versus ST25DVxxKC FTM configuration bits**

Bits	ST25DVxxK MB_MODE	ST25DVxxKC FTM
b0	MB_MODE	MB_MODE
b1	RFU	MB_WDG
b2	RFU	
b3	RFU	
b4	RFU	RFU
b5	RFU	RFU
b6	RFU	RFU
b7	RFU	RFU

Table 8. **ST25DVxxK MB_WDG versus ST25DVxxKC I2C_CFG configuration bits**

Bits	ST25DVxxK MB_WDG	ST25DVxxKC I2C_CFG
b0	MB_WDG	I2C_DEV_CODE(1)
b1		
b2		
b3	RFU	
b4	RFU	I2C_E0(1)
b5	RFU	I2C_RF_SWOFF_EN(2)
b6	RFU	RFU
b7	RFU	RFU

1. *The default values configure the same I2C slave address as ST25DVxxK.*
2. *Disabled by default.*

2.3 Product identification

ST25DVxxKC has different product identification bytes values than ST25DVxxK.

Adaptations are required in the MCU's firmware and the RF software to correctly identify the ST25DVxxKC.

Below tables summarize respectively the memory addresses and bits that are different for product identification and that shall be considered for the migration.

Table 9. **Differences in product identification memory addresses**

RF access/address	I2C address	Function in ST25DVxxK	Function in ST25DVxxKC
Get system information	0017h (E2=1)	IC_REF	IC_REF
Inventory	001Dh (E2=1)	UID byte 5 (product code)	UID byte 5 (product code)
No access	0020h (E2=1)	IC_REV	IC_REV

Table 10. ST25DVxxK IC_REF versus ST25DVxxKC IC_REF values

Bits	ST25DVxxK IC_REF	ST25DVxxKC IC_REF
b0		
b1	ST25DV04K-IE: 24h	ST25DV04KC-IE: 50h
b2	ST25DV16K-IE: 26h	ST25DV16KC-IE: 51h
b3	ST25DV64K-IE: 26h	ST25DV64KC-IE: 51h
b4	ST25DV04K-JF: 24h	ST25DV04KC-JF: 50h
b5	ST25DV16K-JF: 26h	ST25DV16KC-JF: 51h
b6	ST25DV64K-JF: 26h	ST25DV64KC-JF: 51h
b7		

Table 11. ST25DVxxK UID byte 5 versus ST25DVxxKC UID byte 5 values

Bits	ST25DVxxK UID byte 5	ST25DVxxKC UID byte 5
b0		
b1	ST25DV04K-IE: 24h	ST25DV04KC-IE: 50h
b2	ST25DV16K-IE: 26h	ST25DV16KC-IE: 51h
b3	ST25DV64K-IE: 26h	ST25DV64KC-IE: 51h
b4	ST25DV04K-JF: 25h	ST25DV04KC-JF: 52h
b5	ST25DV16K-JF: 27h	ST25DV16KC-JF: 53h
b6	ST25DV64K-JF: 27h	ST25DV64KC-JF: 53h
b7		

2.4 Summary of memory map changes to consider for minimal migration

Table 12. Summary of memory map changes to consider for minimal migration

RF access/address	I2C address	Function in ST25DVxxK	Function in ST25DVxxKC
Read/Write configuration 00h	0000h (E2=1)	GPO	GPO1
Read/Write configuration 01h	0001h (E2=1)	IT_TIME	GPO2
…	…	…	…
Read/Write configuration 0Dh	000Dh (E2=1)	MB_MODE	FTM
Read/Write configuration 0Eh	000Eh (E2=1)	MB_WDG	I2C_CFG
…	…	…	…
Get system information	0017h (E2=1)	IC_REF	IC_REF
Inventory	001Dh (E2=1)	UID byte 5 (product code)	UID byte 5 (product code)
No access	0020h (E2=1)	IC_REV	IC_REV
…	…	…	…
Read/Write dynamic cfg 00h	2000h (E2=0)	GPO_CTRL_Dyn	GPO_CTRL_Dyn
…	…	…	…

2.5 I2C EEPROM programming speed

ST25DVxxKC I2C programming speed has been improved up to a factor four compared to ST25DVxxK:

- ST25DVxxK: I2C can program EEPROM by rows of 4 bytes in t_W (~5ms).
- ST25DVxxKC: I2C can program EEPROM by rows of 16 bytes in t_W (~5ms).

Therefore, depending on data organization, replacing a ST25DVxxK with the ST25DVxxKC may lead to faster I2C write time at application level (which is usually not a problem).

Note: In both devices, it is still possible to write 1 up to 256 bytes in a single I2C command.

Table 13. ST25DVxxK EEPROM memory organization from I2C perspective

I2C address	Byte 0	Byte 1	Byte 2	Byte 3
0000h	-	-	-	-
0004h	Row programmed in t_W (~5ms)			
0008h	-	-	-	-
000Ch	-	-	-	-
…	-	-	-	-

Table 14. ST25DVxxKC EEPROM memory organization from I²C perspective

I2C address	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15
0000h	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0010h	Row programmed in tw (~5ms)															
…	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Revision history

Table 15. **Document revision history**

Date	Revision	Changes
11-Jan-2023	1	Initial release.

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