

Energy Harvesting NFC Forum Type 2 Tag with field detection pin and I2C interface----GT23SC6699-1/2

1 General Description

The GTAG I2C is the first product of Giantec's GTAG family offering both contactless and contact interfaces. In addition to the passive NFC Forum compliant contactless interface, the IC features an I2C contact interface, which can communicate with a microcontroller if the GTAG I2C is powered from an external power supply. An additional externally powered SRAM mapped into the memory allows a fast data transfer between the RF and I2C interfaces and vice versa, without the write cycle limitations of the EEPROM memory.

The GTAG I2C product features a configurable field detection pin, which provides a trigger to an external device depending on the activities at the RF interface.

The GTAG I2C product can also supply power to external (low power) devices (e.g. a micro controller) via the embedded energy harvesting circuitry.

2 Features

2.1 Key features

- RF interface NFC Forum Type 2 Tag compliant
- I2C slave interface supports Standard(100KHz) and Fast (up to 400 kHz) mode and Super Fast (up to 848KHz) mode.
- Configurable field detection pin based on open drain implementation that can be triggered upon following events:
 - ◆ RF field presence
 - ◆ First start of communication
 - ◆ Selection of the tag only
- 64 byte SRAM buffer for fast transfer of data (Pass-through mode) between the RF and the I2C interfaces located outside the User Memory
- Wake up signal at the field detect pin when:
 - ◆ New data has arrived from one interface
 - ◆ Data has been read by the receiving interface
- Clear arbitration between RF and I2C interfaces:
 - ◆ First come, first serve strategy
 - ◆ Status flag bits to signal if one interface is busy writing to or reading data from the EEPROM
- Energy harvesting functionality to power external devices (e.g. microcontroller)
- FAST READ command for faster data reading
- The mapping of the SRAM inside the User Memory buffer allows dynamic update of NDEF message content.
- SDA/SCL/FD pin voltage up to 5.5V
- Watchdog timer with configurable timeout value.

2.2 RF interface

- Contactless transmission of data
- NFC Forum Type 2 Tag compliant
- Operating frequency of 13.56 MHz
- Data transfer of 106 kbit/s
- 4 bytes (one page) written including all overhead in 4.5ms via EEPROM or 0.8 ms via SRAM (Pass-through mode)
- Data integrity of 16-bit CRC, parity, bit coding, bit counting
- Operating distance of up to 100 mm (depending on various parameters, such as field strength and antenna geometry)
- True anticollision
- Unique 7 byte serial number (cascade level 2 according to ISO/IEC 14443-3)
- 50pF input capacitance

2.3 Memory

- 1904 bytes freely available with User Read/Write area (476 pages with 4 bytes per pages) for the GTAG I2C 2k version
- 888 bytes freely available with User Read/Write area (222 pages with 4 bytes per pages) for the GTAG I2C 1k version
- Field programmable RF read-only locking function with static and dynamic lock bits
- configurable from both I2C and NFC interfaces

- 64 bytes SRAM volatile memory without write endurance limitation
- Data retention time of 25 years
- Write endurance 500,000 cycles

2.4 I2C interface

- I2C slave interface supports Standard (100 kHz), Fast (up to 400 kHz) mode and Super Fast (up to 848KHz) mode.
- 16 bytes (one block) written in 4.5 ms (EEPROM) or 0.4 ms (SRAM - Pass-through mode) including all overhead
- RFID chip can be used as standard I2C EEPROM

2.5 Security

- Manufacturer-programmed 7-byte UID for each device
- Capability container with one time programmable bits
- Field programmable read-only locking function per page for first 12 pages and per 16 (1k version) or 32 (2k version) pages for the extended memory section

2.6 Key benefits

- The Pass-through mode allows fast download and upload of data from RF to I2C and vice versa without the cycling limitation of EEPROM
- NDEF message storage up to 1904 bytes (2k version) or up to 888 bytes (1k version)
- The mapping of the SRAM inside the User Memory buffer allows dynamic update of NDEF message content

3 Applications

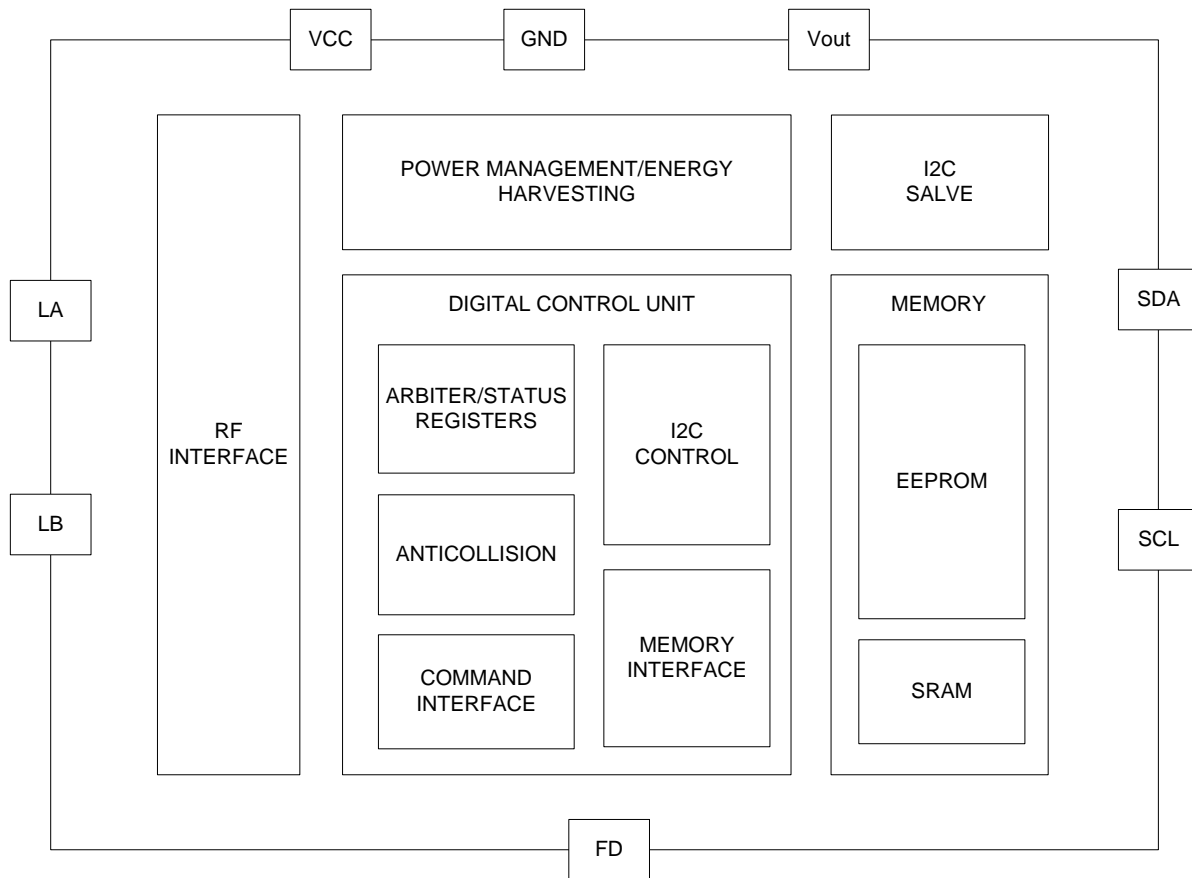
With all its integrated features and functions the GTAG I2C is the ideal solution to enable a contactless communication via an NFC device (e.g., NFC enabled mobile phone) to an electronic device for:

- Zero power configuration (late customization)
- Smart customer interaction (e.g., easier after sales service, such as firmware update)
- Advanced pairing (for e.g., WiFi or Blue tooth) for dynamic generation of sessions keys

Easier product customization and customer experience for the following applications:

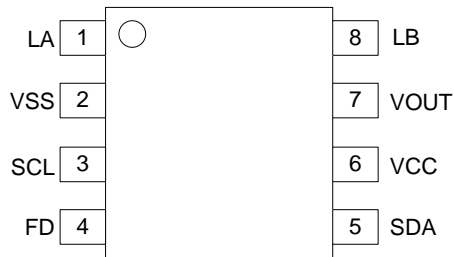
- Home automation
- Home appliances
- Consumer electronics
- Healthcare
- Printers
- Smart meters

4 Block diagram

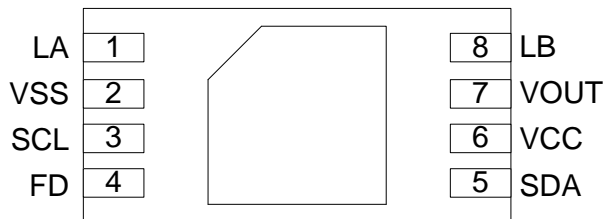


5 Pinning information

5.1 TSSOP8



5.2 UDFN8



5.3 Pin description

PIN Number	PIN Name	Discription
PIN1	LA	Antenna connection LA
PIN2	Vss	GND
PIN3	SCL	Serial Clock I2C
PIN4	FD	Field detection
PIN5	SDA	Serial data I2C
PIN6	VCC	VCC in connection(external power supply)
PIN7	VOUT	Voltage out(energy harvesting)
PIN8	LB	Antenna connection LB

6 Limiting Values

PARAMETER	CONDITIONS	Min	Max	Unit
Input current LA-LB		-	40	mA
Storage temperature		-55	+125	°C
ESD	Measured on pin LA-LB	8	-	kV
ESD	Pins except LA, LB	6	-	kV
VFD	Voltage on the FD pin		5.5	V
VSDA	Voltage on the SDA line		5.5	V
VSCL	Voltage on the SCL line		5.5	V

7 Electrical Characteristics

PARAMETER	CONDITIONS	Min	Typ	Max	Unit
Input capacitance	LA – LB	44	50	56	pF
Input frequency			13.56M		MHz
Operating temperature(T_{amp})		-40		+85	
Voltage generated at Vout pin				3.2	V
I2C supply voltage		1.8		5.5	V
I2C supply current			155		uA
Retention time	$T_{amp} = 22^{\circ}\text{C}$		25		Year
Write endurance	$T_{amp} = 22^{\circ}\text{C}$		500000		Cycle

8 Package outline

