UHF PK8 Tag Chip Datasheet

General description

   The PK8 product adopts a flexible and efficient anti-collision algorithm to ensure rapid identification of multiple tags, customized based on EPCgen2 (V2.0) and ISO/IEC18000-6C protocols. The Pk8 tag can be widely applied in the following fields: asset management, logistics, product identification, fixed asset inventory and tracking, anti-counterfeiting tracking of alcohol, and book/file management.

Features and benefits

● Frequency: 840MHz - 960MHz
● Read sensitivity: -23 dBm
● Write sensitivity: -18 dBm
● RFU, EPC, and TID zones
● Lower cost, no USER area
● Total storage space is 384-bit
● 32-bit kill password，32-bit access password
● 128-bit EPC
● 96-bit TID, of which 48-bit serves as a unique serial number
● Wide operating temperature range: -40 ℃ to +85 ℃
● Endurance of at least 100,000 write cycles
● All mandatory commands of the EPCglobal Gen2v2.0 specification have been implemented, including:
    - Kill Command
● The following optional commands are implemented according to the EPC specification:
    - Block Write (2 words, 32 bits)
● Adaptive adjustment function for automatically optimizing tag performance

Applications

Target market
● Retail
    - Brick and mortar
    - E-commerce
    - Omnichannel
● Supply chain management
● baggage tracking

Applications
● Highly accurate and fast inventory management, enabling omnichannel retail processes
● Tracking along the supply chain from source to store
● High-speed store checkout process, bringing convenience to the customer
● Loss prevention
● After sales operations: return and warranty management
Apart from the applications mentioned above, please contact us for support.

Ordering information

Part No	Package	IC type	Description
PK8FUD2/HAP	Wafer	PK8	Die on sawn 8 inch 120μm wafer 10μm Polyimide spacer with Large Pads, Plasma Diced

Block diagram

The PK8 integrated circuit comprises three primary modules:
● The PK8 chip includes an RF analog interface
● Digital control
● EEPROM memory

   The RF analog interface comprises a clock generation module, power-on reset, rectifier, demodulator, and modulator. The rectifier provides a stable power output for the chip. The demodulator demodulates the signals sent by the reader and provides them to the digital control module. The digital control module parses the commands sent by the reader, initiates the internal state machine to execute these commands one by one, and completes read and write operations on the memory.
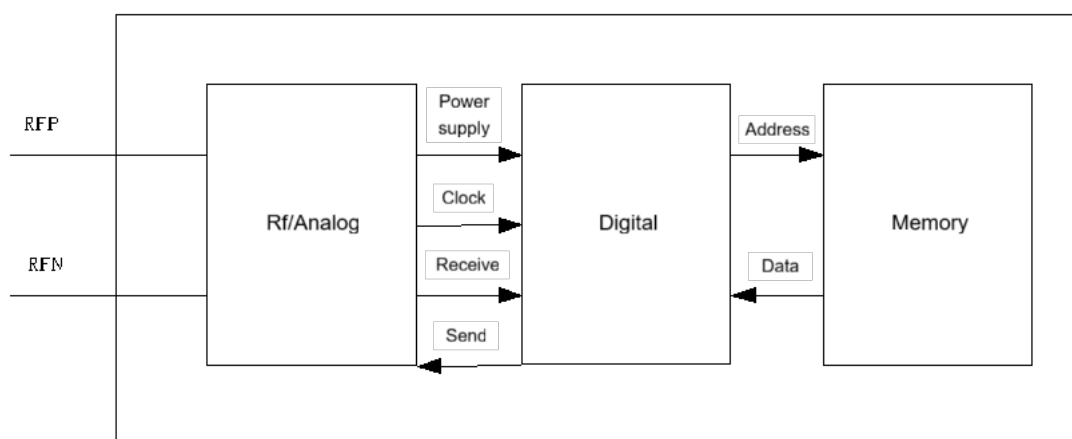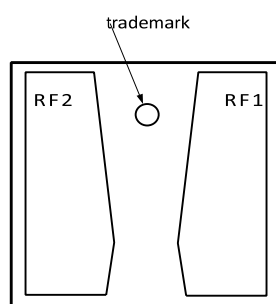

Figure 1. Block diagram of PK8

Pinning information

Figure 2. Pinning bare die

Symbol	Description
RF1	antenna connector 1
RF2	antenna connector 2

Electrical Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
T_{stg}	storage temperature		-40		+125	°C
V_{esd}	ESD	HBM	2K			V
T_{op}	work temperature		-40		85	
P	Minimum operating power		-23			dBm
T_{data}	Data retention time			10		Year

Mechanical Characteristics

Wafe	data
Designation	each wafer is scribed with batch number and wafer number
Diameter	200 mm (8") unsawn
Thickness	120 μm ± 15 μm
Number of pads	2
Pad location	non-diagonal / placed in chip corners
Process	CMOS 0.13 μm
Batch size	25 wafers
Net printed dies per wafer	150000
Wafer backside	

Material	Si
Treatment	ground and stress release
Roughness	R_a max. 0.5 µm, R_t max. 5 µm
Chip dimensions	
Die size excluding scribe	0.4 mm × 0.4 mm = 0.16 mm2
Scribe line width:	x-dimension = 15 µm
	y-dimension = 15 µm
Passivation on front	
Type	Sandwich structure
Material	PE-Oxidee (on top)
Thickness	2.25 µm total thickness of passivation
Polyimide spacer	10 µm ± 2 µm
Au pads	
Pad material	> 99.9 % pure Au
Pad hardness	35 – 80 HV 0.005
Pad shear strength	> 70 MPa
Pad height	3 µm

Memery

The storage capacity of PK8 is 384 bits, divided into three partitions: Reserved, EPC, and TID.

The storage area is based on 16 bits (one word) as the basic unit, and the card reader reads some or all of the contents of each storage area in units of words. The write command can write 16 bits (one word) at a time.

● TID area

The length is 96 bits, which includes a fixed 48 bit TID prefix header and a 48 bit unique serial number.

● EPC area

Contains 16 bit CRC code, 16 bit PC code, and 128 bit EPC code (expandable to 496 bits).

The length of the EPC code is determined by the first five digits of the protocol control word (PC code). The protocol control word (PC code) occupies the storage space of addresses 10h to 1Fh (HEX) in the EPC area.

Bank	Bank Content	Bank Address Assignment	Physical Address	DATA0	DATA1	DATA2	DATA3
	Kill password	00-0f	00	Kill password0			
		10-1f	01	Kill password1			

RFU(00)	access password	20-2f	02	Access password0			
		30-3f	03	Access password1			
	Configure	40-4f	04	Configure0			
		50-5f	05	Configure1			
		60-6f	06	Configure2			
		70-7f	07	Configure3			
TID(10)	E2+MID	00-0f	08				
	MID+Model	10-1f	09				
	Extended TID	20-2f	0a				
	TID3	30-3f	0b				
	TID4	40-4f	0c				
	TID5	50-5f	0d				
EPC(01)	CRC	00-0f	0e	CRC			
	PC	10-1f	0f	PC			
	EPC0	20-2f	10				
	EPC1	30-3f	11				
	EPC2	40-4f	12				
	EPC3	50-5f	13				
	EPC4	60-6f	14				
	EPC5	70-7f	15				
	EPC6	80-8f	16				
	EPC7	90-9f	17				

Default

The factory status of PK8 is:

● The protocol control bit (PC) is 4000h (corresponding to a 128 bit EPC code length)

● The EPC area is blank, and corresponding data can be written through digital PAD during factory initialization according to user needs. (Data can be customized)

● TID area, with a unique TID code written at the factory and cannot be changed

Special Instructions

The company reserves the right of final interpretation of this specification.

Version Change Description

Version：V1.0	Author：	Time：
Modify the record：		
1. Editio princeps		

Statement

The information in the usage specification is correct at the time of publication, Shanghai Siproin Microelectronics Co.,Ltd. has the right to change and interpret the specification, and reserves the right to modify the product without prior notice. Users can obtain the latest version information from our official website or other effective channels before confirmation, and verify whether the relevant information is complete and up to date.

With any semiconductor product, there is a certain possibility of failure or failure under certain conditions. The buyer is responsible for complying with safety standards and taking safety measures when using the product for system design and complete machine manufacturing. The product is not authorized to be used as a critical component in life-saving or life-sustaining products or systems, in order to avoid potential failure risks that may cause personal injury or property loss.