

## Intelligent 221-Bit EEPROM Counter for > 20000 Units with Security Logic and High Security Authentication

### Features

- ❑ 221 bit EEPROM and 16 bit mask-programmable ROM
- 104 bit user memory fully compatible with IZ4406:
  - 64 bit Identification Area
  - 40 bit Counter Area including 1 bit for personalization
  - 133 bit additional memory for advanced features
  - 4 bit Counter Backup (anti-tearing flags)
  - 1 bit Initiation Flag for Authentication Key.2
  - 16 bit Data Area 1 for free user access
  - 48 bit Authentication Key.1
  - either 64 bit Data Area 2 for user defined data or 48 bit Authentication Key.2
- ❑ Counter with up to 33352 count units fully compatible with IZ4406
  - Due to testing purposes a maximum of 21064 count units is guaranteed
- ❑ Counter tearing protection
  - Backup feature activated at choice
- ❑ High security **authentication module**
  - Random number as challenge
  - Individual secret Authentication Key.1
  - Optional individual secret Authentication Key.2
  - Calculation of up to 16 bit response
  - Calculation of a 16 bit response within 30 ms at a clock frequency of 100 kHz
- ❑ **Transport Code protection for delivery**
- ❑ **Chip layout of security relevant areas protected against physical / electrical signal analysis**
- ❑ **Supply voltage 5 V ± 10%**
- ❑ **Supply current < 5 mA**
- ❑ **EEPROM programming time 5 ms**
- ❑ **ESD protection 4000 V**
- ❑ **Endurance minimum of 10<sup>5</sup> write / erase cycles per bit**
- ❑ **Data retention for minimum of 10 years**

### Pin Definitions and Functions

Parameter	Symbol	Test Condition
C1	VCC	Supply voltage
C2	RST	Control input (reset)
C3	CLC	Clock input
C5	GND	Ground
C6	N.C.	Not connected
C7	I/O	Bidirectional data line (open drain)

IZE4406 comes as an M3 wire-bonded module for embedding in plastic cards and as a die for customer packaging.

## Electrical Characteristics

### Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Comments
		Min.	Max.		
Supply voltage	$V_{CC}$	-0.35	7.0	V	-
Input voltage	$V_I$	-0.35	7.0	V	-
Storage temperature	$T_{stg}$	-40	125	°C	
Power dissipation	$P_{tot}$		40	mW	-
ESD protection			4000	V	

### Operating range

Parameter	Symbol	Limit Values			Unit	Test Condition
		Min.	Typ.	Max.		
Supply voltage	$V_{CC}$	4.5	5.0	5.5	V	
Supply current	$I_{CC}$		2.5	5.0	mA	$V_{CC}=5\text{ V}$
Ambient temperature	$T_A$	-35		80	°C	

### DC Characteristics

Parameter	Symbol	Limit Values			Unit	Test Condition
		Min.	Typ.	Max.		
H-Input voltage (I/O, CLC, RST)	$V_{IH}$	3.5	-	$V_{CC}$	V	-
L-Input voltage (I/O, CLC, RST)	$V_{IL}$	0	-	0.8	V	-
L-output voltage	$V_{OL}$	-	-	0.5	V	$I_{OL}=0.5\text{ mA}$ (open drain)
H-leakage current	$I_{OH}$	-	-	10	$\mu\text{A}$	$V_{OH}=V_{CC}$ (open drain)

### AC Characteristics

Parameter	Symbol	Limit Values			Unit	Test Condition
		Min.	Typ.	Max.		
CLC H-level (set address)	$t_H$	5	-	-	$\mu\text{s}$	-
CLC L-level (set address)	$t_L$	5	-	-	$\mu\text{s}$	-
CLC H-level (write)	$t_{HW}$	5	-	-	ms	$V_{CC} \geq 4.5\text{ V}$ $5\text{ V} \leq V_{CC} \leq 5/5\text{ V}$
	$t_{HW}$	3	-	-	ms	