

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 \pm 10%

Supply current < 5 mA

EEPROM programming time 5 ms

ESD protection 4000 V

Endurance minimum of 10⁵ 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)

IZ4406 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	μA	$V_{OH}=V_{CC}$ (open drain)

AC Characteristics

Parameter	Symbol	Limit Values			Unit	Test Condition
		Min.	Typ.	Max.		
CLC H-level (set address)	t_H	5	-	-	μs	-
CLC L-level (set address)	t_L	5	-	-	μs	-
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	