

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 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)

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	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	