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# Description

# Variables

## Measured

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| t | seconds | Time since last pulse | – |
| h\_atr\_pulse\_detected | boolean | Pulse detected in atrium | {True, False} |
| h\_vent\_pulse\_detected | boolean | Pulse detected in ventricle | {True, False} |

## Input

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| ATR\_CMP\_DETECT | boolean | Atrial signal voltage higher than threshold | {HIGH, LOW} |
| VENT\_CMP\_DETECT | boolean | Ventricular signal voltage higher than threshold | {HIGH, LOW} |

## Constant

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| p\_mode | mode | Pacemaker operational mode | {AOO,VOO,AAI,VVI} |
| p\_lower\_rate\_limit | ppm | Lowest allowable heart rate | 30–175 ± 8 ms |
| p\_upper\_rate\_limit | ppm | Highest allowable heart rate | 50–175 ± 8ms |
| p\_atr\_pulse\_amplitude | V | Desired amplitude of paced atrial pulses | 0.5–7.0 ± 12% |
| p\_vent\_pulse\_amplitude | V | Desired amplitude of paced ventricular pulses | 0.5–7.0 ± 12% |
| p\_atr\_pulse\_width | ms | Desired pulse width of paced atrial pulses | 0.05–1.9 ± 0.2 ms |
| p\_vent\_pulse\_width | ms | Desired pulse width of paced ventricular pulses | 0.05–1.9 ± 0.2 ms |
| p\_atr\_sensitivity | mV | Threshold voltage for sensing spontaneous atrial pulses | 0.25–10 ± 20% |
| p\_vent\_sensitivity | mV | Threshold voltage for sensing spontaneous atrial pulses | 0.25–10 ± 20% |
| p\_vrp | ms | Ventricular Refractory Period | 150–500 ± 8 ms |
| p\_arp | ms | Atrial Refractory Period | 150–500 ± 8 ms |
| p\_pvarp | ms | Post-Ventricular Atrial Refractory Period | 150–500 ± 8 ms |
| p\_hysteresis\_enable | boolean | Hysteresis mode enabled | {True, False} |
| p\_hysteresis\_rate\_limit | ppm | Hysteresis rate limit | 30–175 ± 8 ms |
| p\_rate\_smoothing\_enable | boolean | Rate smoothing enabled | {True, False} |
| p\_rate\_smoothing\_percent | percent | Maximum allowable pacing rate change | 3–25 ± 1% |

## Controlled

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| c\_start\_pulse | boolean | Commence paced pulse | {True, False} |

## Output

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| PACE\_CHARGE\_CTRL | boolean | PWM connected to primary capacitor | {HIGH, LOW} |
| ATR\_PACE\_CTRL | boolean | Atrial ring connected to primary capacitor | {HIGH, LOW} |
| VENT\_PACE\_CTRL | boolean | Ventricular ring connected to primary capacitor | {HIGH, LOW} |
| ATR\_GND\_CTRL | boolean | Atrial ring connected to ground | {HIGH, LOW} |
| VENT\_GND\_CTRL | boolean | Ventricular ring connected to ground | {HIGH, LOW} |
| PACE\_GND\_CTRL | boolean | Atrial and Ventricular tip connected to blocking capacitor | {HIGH, LOW} |
| Z\_ATR\_CTRL | boolean | Impedance circuit connected to atrial ring | {HIGH, LOW} |
| Z\_VENT\_CTRL | boolean | Impedance circuit connected to ventricular ring | {HIGH, LOW} |
| PACING\_REF\_PWM | PWM | Reference PWM for primary capacitor | 0–100% |
| ATR\_CMP\_REF\_PWM | PWM | Reference PWM for atrial signal comparator | 0–100% |
| VENT\_CMP\_REF\_PWM | PWM | Reference PWM for ventricular signal comparator | 0–100% |

# Modes

## AOO

### Variables

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### Variables

#### Measured

#### Constant

#### Controlled

### Requirements

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## AAI

### Variables

#### Measured

#### Constant

#### Controlled

### Requirements

#### With Hysteresis and Rate Smoothing enabled

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Last Pulse Type | Last Period | t | Spontaneous pulse resets timer | Pace |
| X | X |  | False | False |
| X |  | True | False |
| Sensed |  |  | True |
|  |  | False |
|  | True |
|  |  | False |
|  | True |
| Paced |  |  | False |
|  | True |
|  |  | False |
|  | True |
|  |  | False |
|  | True |

### State Transitions

### Design details

### Testing

## VVI

### Variables

#### Measured

#### Constant

#### Controlled

### Requirements

#### With Hysteresis and Rate Smoothing enabled

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Last Pulse Type | Last Period | t | Spontaneous pulse resets timer | Pace |
| X | X |  | False | False |
| X |  | True | False |
| Sensed |  |  | True |
|  |  | False |
|  | True |
|  |  | False |
|  | True |
| Paced |  |  | False |
|  | True |
|  |  | False |
|  | True |
|  |  | False |
|  | True |

### State Transitions

### Design details

### Testing