



## RedRock® RR121 (RR122) Product Specification Comparisons

REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR RR121-1A23-311/312 vs. RR122-1A22(23)-511/512			
Absolute Environmental Ratings*			
Parameters	Units	Min	Typ
Operating Temperature (Ta)	°C	-40	-30
Operating Temperature (Ta) RR122-1A22(23)-511/512	°C	-40	80
Storage Temperature (Tstg)	°C	-40	100
Humidity (RH)	%	0	100
Switching Frequency (fsw)	Hz	1	200
I/O Level (Human Body Model per IEC61000-4-2)	V	+4.000	0.000
Surge-to-Ground Common Mode (IEC61000-4-4)	V	±2.000	0.000
Surge-to-Input Thermal Resistance (SOT-23)	°C/mW	275	—
Magnetic Field Exposure	A/m	—	2000
Absolute Electrical Ratings*			
Parameters	Units	Min	Typ
Supply Voltage (Vs)	V	0.5	0.4-0.6
Power and Output Current (Isat/Isat)	V	0.5	0.4-0.6
Input and Output Current (Iout)	mA	10	10
Operating Electrical Characteristics*			
Parameters	Units	Min	Typ
Supply Voltage (Vs)	V	2.7 (2.7)	1.6 (1.6)
Power On Time (tOn) = 2.7V	μs	100 (100)	75
Peak Power-on Current	mA	—	1.4
Output Voltage (Vs=2.7V)	V	0.995 Vs	0.995 Vs
Output Voltage (Vs=1.6V)	V	0.77 (0.77)	0.76 (0.76)
Output Voltage Lockout Threshold Rising (Vs Lockout)	V	1.9 (1.9)	2.0 (2.0)
Output Voltage Lockout Threshold Falling (Vs Lockout)	V	1.9 (1.9)	2.0 (2.0)
Output Voltage Lockout Hysteresis (Vs Lockout)	mA	—	50
Average Supply Current (Vs=2.7V, tOn=2.7 μs)	mA	—	75
Notes:			
1. Sustained Absolute polarity may cause permanent damage to the device. Sustaining at the maximum rated conditions for extended periods of time may also effect device reliability.			
2. See "Magnetic Fields, Output Delay" for more details.			
3. This specification is valid for devices which have not been damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.			
Operating Characteristics*			
Parameters	Units	Min	Typ
Supply Voltage Current (Isat)*	mA	—	230 (230)
Switching Frequency (fsw)	Hz	2	10
Output Frequency (fsw)	Hz	—	10
Idle Mode Time (tidle)	μs	—	100
Open State Pulse (topen)	μs	—	10
Closed State Pulse (tclosed)	μs	—	10
Release Point (trel)	μs	3	5
Release Point (trel)	μs	7	5
Release Point (trel)	μs	—	3
Output Response vs. Magnetic Flux			
The two sensor series also have the same magnetic flux performance relative x, y and z behavior.			
The two sensor series also have nearly the same behavior relative to their output response vs. magnetic flux.			
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- RR121-1A23-311/312 vs. [RR122-1A22\(23\)-511/512](#)
- RR121-1A53-311 vs. [RR122-1A52\(53\)-511](#)
- RR121-1B13-311/312 vs. [RR122-1B12\(13\)-511/512](#)
- RR121-1B53-311 vs. [RR122-1B52\(53\)-511](#)
- RR121-1B93-312 vs. [RR122-1B92\(93\)-511/512](#)
- RR121-1E73-311 vs. [RR122-1E72\(73\)-511](#)
- RR121-1F23-311 vs. [RR122-1F22\(23\)-511](#)
- RR121-3C63-311 vs. [RR122-3C62\(63\)-511](#)
- RR121-3C73-311 vs. [RR122-3C72\(73\)-511/512](#)
- RR131-1B13-351 vs. [RR132-1B12\(13\)-551/552](#)
- RR131-2E22(23)-351 vs. [RR132-2E22\(23\)-551](#)



# New RR122 Series TMR Sensor Comparison Reference

## REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR

**RR121-1A23-311/312 vs. RR122-1A23-511/512 and RR122-1A22-511/512**

[Download RR121-1A23-311/312 Datasheet](#)

[Download RR122-1A23-511/512 Datasheet](#)

### Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <b>RR122-1A23-511/512</b>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <b>RR122-1A22-511/512</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_j$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{sol}$ )	°C			260
ESD Level Human Body Model per JEDEC2-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JEDEC-C1010</b>	V	<b>±500</b>		
<b>Junction-to-Ambient Thermal Resistance (LGA-4)</b>	°C/W		<b>165</b>	
<b>Junction-to-Ambient Thermal Resistance (SOT-23)</b>	°C/W		<b>202</b>	
Magnetic Field Exposure	G			2000 ( <b>±600</b> )

### Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

### Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{on}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	mA			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RISE}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{sw}=10</math> Hz(<math>I_{dd\_AVG}</math>)<sup>2</sup></b>	nA		<b>70</b>	<b>900</b>
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{sw}=10$ Hz( $I_{dd\_AVG}$ ) <sup>2</sup>	nA		230 ( <b>85</b> )	700 ( <b>900</b> )

#### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

### Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{sw}$ )	Hz	7 ( <b>6</b> )	10	13 ( <b>14</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time ( $t_{idle}$ )	ms	<b>71</b>	100	<b>166</b>
Operate Point ( $B_{OPN}$ )	G	8 ( <b>7</b> )	9	12
Operate Point ( $B_{OPS}$ )	G	-12	-9	-8 ( <b>-7</b> )
Release Point ( $B_{RPN}$ )	G	3	5	7
Release Point ( $B_{RPS}$ )	G	-7	-5	-3
Hysteresis ( $B_{HYST}$ ) <sup>3</sup>	G	3	4	

#### Notes:

1. Unless otherwise specified,  $V_{DD} = 2.7$  V to 3.6 V (**1.7 V to 5.5 V**),  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$  (**1A22**),  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$  (**1A23**). Typical values are  $V_{DD} = 3.0$  V and  $T_A = +25^\circ\text{C}$ .

2. Conditions:  $t = 10$  seconds

3. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

### Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.



# New RR122 Series TMR Sensor Comparison Reference

**REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR  
RR121-1A53-311 vs. RR122-1A53-511 and RR122-1A52-511**

[Download RR121-1A53-311 Datasheet](#)

[Download RR122-1A52\(53\)-511 Datasheet](#)

## Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <b>RR122-1A53-511</b>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <b>RR122-1A52-511</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	<b>V</b>	<b>±500</b>		
<b>Junction-to Ambient Thermal Resistance (SOT-23)</b>	<b>°C/W</b>		<b>202</b>	
Magnetic Field Exposure	G			2000 ( <b>±600</b> )

## Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD} + 0.3$
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

## Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{on}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	<b>mA</b>			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RIS}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V		1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50 ( <b>70</b> )	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{sw}=250</math> Hz(<math>I_{dd,Avg}</math>)<sup>2</sup></b>	<b>μA</b>		<b>0.9</b>	<b>2.5</b>
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{sw}=250$ Hz( $I_{dd,Avg}$ ) <sup>2</sup>	μA		1.1	2.5 ( <b>3.0</b> )

### Notes:

- Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.
- Unless otherwise specified, all characteristics are measured at 25°C.

3. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

## Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{sw}$ )	Hz	165 ( <b>150</b> )	250	300 ( <b>350</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time @ $f_{sw}=250$ Hz ( $t_{IDLE}$ )	ms	3.3 ( <b>2.8</b> )	4.0	6.0 ( <b>6.7</b> )
Operate Point ( $B_{OPH}$ )	G	8 ( <b>7</b> )	9	12
Operate Point ( $B_{OPS}$ )	G	-12	-9	-8 ( <b>-7</b> )
Release Point ( $B_{RPN}$ )	G	3	5	7
Release Point ( $B_{RPS}$ )	G	-7	-5	-3
Hysteresis ( $B_{HYST}$ ) <sup>3</sup>	G	3	4	

### Notes:

- Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (1A52)**, -40°C to +125°C (1A53). Typical values are VDD = 3.0 V and TA = +25°C
- Conditions: t=10 seconds.

3. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

## Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

## REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR

**RR121-1B13-311/312 vs. RR122-1B13-511/512 and RR122-1B12-511/512**

[Download RR121-1B13-311/312 Datasheet](#)

[Download RR122-1B13-511/512 Datasheet](#)

### Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <b>RR122-1B13-511/512</b>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <b>RR122-1B12-511/512</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	V	<b>±500</b>		
<b>Junction-to-Ambient Thermal Resistance (LGA-4)</b>	°C/W		<b>165</b>	
<b>Junction-to-Ambient Thermal Resistance (SOT-23)</b>	°C/W		<b>202</b>	
Magnetic Field Exposure	G			2000

### Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

### Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{PO}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	mA			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RISE}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{sw}=2\text{ Hz}(Id_{AVG})^2</math></b>	nA		<b>50</b>	<b>900</b>
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{sw}=2\text{ Hz}(Id_{AVG})^2$	nA		200 ( <b>60</b> )	700 ( <b>900</b> )

#### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

### Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{sw}$ )	Hz	1	2	4
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time ( $t_{idle}$ )	ms	<b>250</b>	500	<b>1000</b>
Operate Point ( $B_{OPN}$ )	G	27 ( <b>23</b> )	30	38
Operate Point ( $B_{OPS}$ )	G	-38	-30	-27 ( <b>-23</b> )
Release Point ( $B_{RPN}$ )	G	18 ( <b>14</b> )	20	27
Release Point ( $B_{RPS}$ )	G	-27	-20	-18 ( <b>-14</b> )
Hysteresis ( $B_{HYST}$ ) <sup>3</sup>	G	5	10	

#### Notes:

1. Unless otherwise specified,  $V_{DD} = 2.7V$  to  $3.6V$  (**1.7 V to 5.5 V**),  $TA = -40^\circ C$  to  $+85^\circ C$  (**1B12**),  $-40^\circ C$  to  $+125^\circ C$  (**1B13**). Typical values are  $V_{DD} = 3.0V$  and  $TA = +25^\circ C$ .

2. Conditions:  $t = 10$  seconds

3. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

### Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

**REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR  
RR121-1B53-311 vs. RR122-1B53-511 and RR122-1B52-511**

[Download RR121-1B53-311 Datasheet](#)  
[Download RR122-1B53-511 Datasheet](#)

## Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{OP}$ ) <b>RR122-1B53-511</b>	°C	-40		125
Operating Temperature ( $T_{OP}$ ) <b>RR122-1B52-511</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	<b>V</b>	<b>±500</b>		
<b>Junction-to Ambient Thermal Resistance (SOT-23)</b>	<b>°C/W</b>		<b>202</b>	
Magnetic Field Exposure	G			2000

## Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

## Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{ON}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	<b>mA</b>			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RISE}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{SW}=250\text{ Hz}(Id_{AVG})^2</math></b>	<b>μA</b>		<b>0.9</b>	<b>2.5</b>
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{SW}=250\text{ Hz}(Id_{AVG})^2$	μA		1.4 ( <b>1.1</b> )	2.5 ( <b>3.0</b> )

### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

## Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{SW}$ )	Hz	165 ( <b>150</b> )	250	300 ( <b>350</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time ( $t_{IDLE}$ )	ms	<b>2.8</b>	4.0	<b>6.7</b>
Operate Point ( $B_{OPN}$ )	G	27 ( <b>23</b> )	30	38
Operate Point ( $B_{OPS}$ )	G	-38	-30	-27 ( <b>-23</b> )
Release Point ( $B_{RPN}$ )	G	18 ( <b>14</b> )	20	27
Release Point ( $B_{RPS}$ )	G	-27	-20	-18 ( <b>-14</b> )
Hysteresis ( $B_{HYST}$ ) <sup>3</sup>	G	5	10	

### Notes:

1. Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (1B52)**, -40°C to +125°C (1B53). Typical values are VDD = 3.0 V and TA = +25°C

2. Conditions: t = 10 seconds

3. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

## Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

## REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR

**RR121-1B93-312 vs. RR122-1B93-511/512 and RR122-1B92-511/512**

[Download RR121-1B93-312 Datasheet](#)

[Download RR122-1B92\(93\)-511/512 Datasheet](#)

### Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <b>RR122-1B93-511/512</b>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <b>RR122-1B92-511/512</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	<b>V</b>	<b>±500</b>		
<b>Junction-to Ambient Thermal Resistance (LGA-4)</b>	<b>°C/W</b>		<b>165</b>	
<b>Junction-to Ambient Thermal Resistance (SOT-23)</b>	<b>°C/W</b>		<b>202</b>	
Magnetic Field Exposure	G			2000

### Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$ <b>+0.3</b>
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

### Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{PO}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	<b>mA</b>			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RISE}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50 ( <b>70</b> )	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{sw}=10\text{ kHz}</math>(<math>I_{dd\_Avg}</math>)<sup>2</sup></b>	<b>μA</b>		<b>45</b>	
Average Supply Current @ $V_{dd} = 3.0V$ $f_{sw}=10\text{ kHz}$ ( $I_{dd\_Avg}$ ) <sup>2</sup>	μA		36 ( <b>50</b> )	

#### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be

taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

### Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{sw}$ )	kHz	7 ( <b>6</b> )	10	13 ( <b>14</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time @ $f_{sw}=10\text{ kHz}$ ( $t_{idle}$ )	μs	77 ( <b>71</b> )	100	143 ( <b>167</b> )
Operate Point ( $B_{OPN}$ )	G	27 ( <b>23</b> )	30	38
Operate Point ( $B_{OPS}$ )	G	-38	-30	-27 ( <b>-23</b> )
Release Point ( $B_{RPN}$ )	G	18 ( <b>14</b> )	20	27
Release Point ( $B_{RPS}$ )	G	-27	-20	-18 ( <b>-14</b> )
Hysteresis ( $B_{HYST}$ ) <sup>3</sup>	G	5	10	

#### Notes:

1. Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (1B92)**, -40°C to +125°C (1B93). Typical values are VDD = 3.0 V and TA = +25°C

2. Conditions: t=10 seconds.

3. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

### Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

## REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR RR121-1E73-311 vs. RR122-1E73-511 and RR122-1E72-511

[Download RR121-1E73-311 Datasheet](#)

[Download RR122-1E73-511 Datasheet](#)

### Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{OP}$ ) <b>RR122-1E73-511</b>	°C	-40		125
Operating Temperature ( $T_{OP}$ ) <b>RR122-1E72-511</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	<b>V</b>	<b>±500</b>		
<b>Junction-to Ambient Thermal Resistance (SOT-23)</b>	<b>°C/W</b>		<b>202</b>	
Magnetic Field Exposure	G			2000

### Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

### Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{ON}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	<b>mA</b>			<b>1.4</b>
Output Voltage (High) <sub>3</sub> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sub>3</sub> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RISE}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{SW}=2500</math> Hz(<math>I_{DD\_AVG}</math>)<sup>2</sup></b>	<b>μA</b>		<b>9</b>	
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{SW}=2500$ Hz( $I_{DD\_AVG}$ ) <sup>2</sup>	μA		8 ( <b>11.5</b> )	13 ( <b>N/A</b> )

#### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

### Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{SW}$ )	Hz	1630 ( <b>1500</b> )	2500	3250 ( <b>3500</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time ( $t_{IDLE}$ )	μs	308 ( <b>285</b> )	400	614 ( <b>667</b> )
Operate Point ( $B_{OPN}$ )	G	13 ( <b>11</b> )	15	18
Operate Point ( $B_{OPS}$ )	G	-18	-15	-13 ( <b>-11</b> )
Release Point ( $B_{RPN}$ )	G	8 ( <b>6</b> )	10	13
Release Point ( $B_{RPS}$ )	G	-13	-10	-8 ( <b>-6</b> )
Hysteresis ( $B_{HYST}$ ) <sup>3</sup>	G	3	5	

#### Notes:

1. Unless otherwise specified,  $V_{DD} = 2.7V$  to  $3.6V$  (**1.7 V to 5.5 V**),  $TA = -40^{\circ}C$  to  $+85^{\circ}C$  (**1E72**),  $-40^{\circ}C$  to  $+125^{\circ}C$  (**1E73**). Typical values are  $V_{DD} = 3.0V$  and  $TA = +25^{\circ}C$ .

2. Conditions:  $t = 10$  seconds

3. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

### Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.



# New RR122 Series TMR Sensor Comparison Reference

**REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR  
RR121-1F23-311 vs. RR122-1F23-511 and RR122-1F22-511**

[Download RR121-1F23-311 Datasheet](#)  
[Download RR122-1F22\(23\)-511 Datasheet](#)

## Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <b>RR122-1F23-511</b>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <b>RR122-1F22-511</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	<b>V</b>	<b>±500</b>		
<b>Junction-to Ambient Thermal Resistance (SOT-23)</b>	<b>°C/W</b>		<b>202</b>	
Magnetic Field Exposure	G			2000

## Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$ <b>+0.3</b>
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

## Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{PO}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	<b>mA</b>			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RIS}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50 ( <b>70</b> )	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{sw}=10</math> Hz(<math>I_{ddAVG}</math>)<sup>2</sup></b>	<b>nA</b>		<b>70</b>	<b>900</b>
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{sw}=10$ Hz( $I_{ddAVG}$ ) <sup>2</sup>	nA		230 ( <b>85</b> )	700 ( <b>900</b> )

### Notes:

- Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.
  - Unless otherwise specified, all characteristics are measured at 25°C.
  - See "Magnetic Field vs. Output Status" for more details.
- ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

## Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{sw}$ )	Hz	7 ( <b>6</b> )	10	13 ( <b>14</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time @ $f_{sw}=10$ Hz ( $t_{idle}$ )	ms	77 ( <b>71</b> )	100	143 ( <b>166</b> )
Operate Point ( $B_{OPH}$ )	G	<b>62</b>	70	<b>78</b>
Operate Point ( $B_{OPS}$ )	G	<b>-78</b>	-70	<b>-62</b>
Release Point ( $B_{RPN}$ )	G	<b>42</b>	50	<b>60</b>
Release Point ( $B_{RPS}$ )	G	<b>-60</b>	-50	<b>-42</b>
Hysteresis ( $B_{HYST}$ ) <sup>3</sup>	G	<b>12</b>	20	

### Notes:

- Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (1F22)**, -40°C to +125°C (1F23). Typical values are VDD = 3.0 V and TA = +25°C
- Conditions: t=10 seconds.
- Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

## Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.  
The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

## REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR RR121-3C63-311 vs. RR122-3C63-511 and RR122-3C62-511

[Download RR121-3C63-311 Datasheet](#)  
[Download RR122-3C63-511 Datasheet](#)

### Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{OP}$ ) <b>RR122-3C63-511</b>	°C	-40		125
Operating Temperature ( $T_{OP}$ ) <b>RR122-3C62-511</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	V	±500		
<b>Junction-to Ambient Thermal Resistance (SOT-23)</b>	°C/W		215	
Magnetic Field Exposure	G			2000 ( <b>±600</b> )

### Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

### Operating Electrical Characteristics<sup>4</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{ON}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	mA			<b>1.4</b>
Output Voltage (High) ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RISE}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{SW}=500</math> Hz(<math>I_{DD\_AVG}</math>)<sup>2</sup></b>	μA		<b>2.1</b>	
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{SW}=500$ Hz( $I_{DD\_AVG}$ ) <sup>2</sup>	μA		1.7 ( <b>2.4</b> )	3.3 ( <b>N/A</b> )

#### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. Conditions: t = 10 seconds

4. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

### Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{SW}$ )	Hz	325 ( <b>300</b> )	500	600 ( <b>700</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time ( $t_{IDLE}$ )	ms	<b>1.4</b>	2	<b>3.3</b>
Operate Point ( $B_{OP}$ )	G	-14 ( <b>-13</b> )	-10	-8 ( <b>-7</b> )
Release Point ( $B_{RPN}$ )	G	8 ( <b>7</b> )	10	14 ( <b>13</b> )

#### Notes:

1. Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (3C62)**, -40°C to +125°C (3C63). Typical values are VDD = 3.0 V and TA = +25°C

2. Conditions: t = 10 seconds

3. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

### Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

**REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR**  
**RR121-3C73-311 vs. RR122-3C73-511/512 and RR122-3C72-511/512**

[Download RR121-3C73-311 Datasheet](#)

[Download RR122-3C73-511/512 Datasheet](#)

## Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <a href="#">RR122-3C73-511/512</a>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <a href="#">RR122-3C72-511/512</a>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	±4000		
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	<b>V</b>	<b>±500</b>		
Junction-to Ambient Thermal Resistance (LGA-4)	°C/W		<b>165</b>	
Junction-to Ambient Thermal Resistance (SOT-23)	°C/W		<b>202</b>	
Magnetic Field Exposure	G			2000 ( <b>±600</b> )

## Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Push-pull Output (Active Low) ( $V_{OUT\_PP}$ )	V	-0.3		$V_{DD}$
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	-10 ( <b>N/A</b> )		10 ( <b>±20</b> )

## Operating Electrical Characteristics<sup>4</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{PO}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	<b>mA</b>			<b>1.4</b>
Output Voltage (High) ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RIS}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FAL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50	
<b>Average Supply Current @ <math>V_{dd} = 1.7V</math>, <math>f_{sw}=2500</math> Hz(<math>I_{ddAVG}</math>)<sup>2</sup></b>	<b>μA</b>		<b>9</b>	
Average Supply Current @ $V_{dd} = 3.0V$ , $f_{sw}=2500$ Hz( $I_{ddAVG}$ ) <sup>2</sup>	μA		8 ( <b>11.5</b> )	13 ( <b>N/A</b> )

### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. Conditions: t = 10 seconds

4. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

## Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{sw}$ )	Hz	1630 ( <b>1500</b> )	2500	3250 ( <b>3500</b> )
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time ( $t_{idle}$ )	μs	308 ( <b>285</b> )	400	614 ( <b>667</b> )
Operate Point ( $B_{OP}$ )	G	-14 ( <b>-13</b> )	-10	-8 ( <b>-7</b> )
Release Point ( $B_{RP}$ )	G	8 ( <b>7</b> )	10	14 ( <b>13</b> )

### Notes:

1. Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (3C73)**, -40°C to +125°C (3C72). Typical values are VDD = 3.0 V and TA = +25°C

## Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

**REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR**  
**RR131-1B13-351 vs. RR132-1B13-551/552 and RR132-1B12-551/552**

[Download RR131-1B13-351 Datasheet](#)  
[Download RR132-1B12\(13\)-551/552 Datasheet](#)

## Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <b>RR132-1B13-551/552</b>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <b>RR132-1B12-551/552</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_j$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	<b>±4000</b>		±4000 ( <b>N/A</b> )
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	V	<b>±500</b>		
Junction-to Ambient Thermal Resistance (LGA-4)	°C/W		<b>165</b>	
Junction-to Ambient Thermal Resistance (SOT-23-3)	°C/W		<b>202</b>	
<b>Maximum Magnetic Field Exposure (B<sub>MAX</sub>)</b>	G			<b>±2000</b>

## Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Open Drain Output Voltage (Active Low) ( $V_{OUT\_OO}$ )	V	-0.3		5.5 ( <b>6.0</b> )
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA	<b>-20</b>		10 ( <b>±20</b> )

## Operating Electrical Characteristics<sup>4</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{PO}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	mA			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RISE}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50	
<b>Average Supply Current @ <math>V_{DD} = 1.7V</math>, <math>f_{SW}=2\text{ Hz}(I_{DD\_AVG})^2</math></b>	nA		<b>50</b>	<b>900</b>
Average Supply Current @ $V_{DD} = 3.0V$ , $f_{SW}=2\text{ Hz}(I_{DD\_AVG})^2$	nA		200 ( <b>70</b> )	700 ( <b>900</b> )

### Notes:

1. Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.

2. Unless otherwise specified, all characteristics are measured at 25°C.

3. Conditions: t = 10 seconds

4. See "Magnetic Field vs. Output Status" for more details.

**ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

## Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{SW}$ )	Hz	1	2	4
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time @ $f_{SW}=2\text{ Hz}$ ( $t_{IDLE}$ )	ms	<b>250</b>	500	<b>1000</b>
Operate Point ( $B_{OPN}$ )	G	27 ( <b>23</b> )	30	38
Operate Point ( $B_{OPS}$ )	G	-38	-30	-27 ( <b>-23</b> )
Release Point ( $B_{RPN}$ )	G	18 ( <b>14</b> )	20	27
Release Point ( $B_{RPS}$ )	G	-27	-20	-18 ( <b>-14</b> )
Hysteresis ( $B_{HYST}$ ) <sup>2</sup>	G	5	10	

### Notes:

1. Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (1B12)**, -40°C to +125°C (1B13). Typical values are VDD = 3.0 V and TA = +25°C

2. Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

## Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.

The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.





# New RR122 Series TMR Sensor Comparison Reference

**REDROCK® TMR DIGITAL PUSH-PULL MAGNETIC SENSOR  
RR131-2E23-351 vs. RR132-2E23-551 and RR132-2E22-551**

[Download RR131-2E23-351 Datasheet](#)  
[Download RR132-2E22\(23\)-551 Datasheet](#)

## Absolute Environmental Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Operating Temperature ( $T_{op}$ ) <b>RR132-2E23-551</b>	°C	-40		125
Operating Temperature ( $T_{op}$ ) <b>RR132-2E22-551</b>	°C	-40		<b>85</b>
Storage Temperature ( $T_{STG}$ )	°C	-65		150
Junction Temperature ( $T_J$ )	°C			150
Soldering Temperature (3 cycles, 1 min.) ( $T_{SOL}$ )	°C			260
ESD Level Human Body Model per JESD22-A114	V	<b>±4000</b>		±4000 ( <b>N/A</b> )
<b>ESD Level Charged Device Model (CDM) per JESD22-C1010</b>	V	<b>±500</b>		
<b>Junction-to Ambient Thermal Resistance (SOT-23-3)</b>	°C/W		<b>202</b>	
<b>Maximum Magnetic Field Exposure (B<sub>MAX</sub>)</b>	G			<b>±2000</b>

## Absolute Electrical Ratings<sup>1,2</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	-0.3		4.0 ( <b>6.0</b> )
Open Drain Output Voltage (Active Low) ( $V_{OUT\_OO}$ )	V	-0.3		5.5 ( <b>6.0</b> )
Input and Output Current ( $I_{IN}/I_{OUT}$ )	mA			10 ( <b>±20</b> )

## Operating Electrical Characteristics<sup>3</sup>

Parameters	Units	Min	Typ	Max
Supply Voltage ( $V_{DD}$ )	V	2.7 ( <b>1.7</b> )	3.0	3.6 ( <b>5.5</b> )
Power-On Time ( $t_{PO}$ ) ( $V_{DD} > 2.7V$ )	μs		500 ( <b>50</b> )	<b>75</b>
<b>Peak Power-On Current</b>	mA			<b>1.4</b>
Output Voltage (High) <sup>3</sup> ( $V_{OUTH}$ )	V	90% $V_{DD}$		
Output Voltage (Low) <sup>3</sup> ( $V_{OUTL}$ )	V			10% $V_{DD}$
Under-Voltage Lockout Threshold Rising $V_{DD}$ ( $V_{UVLO\_RIS}$ )	V		2.20 ( <b>1.60</b> )	2.60 ( <b>1.64</b> )
Under-Voltage Lockout Threshold Falling $V_{DD}$ ( $V_{UVLO\_FALL}$ )	V	1.90 ( <b>1.44</b> )	2.15 ( <b>1.53</b> )	
Under-Voltage Lockout Hysteresis ( $V_{UV\_HYST}$ )	mV		50 ( <b>70</b> )	
<b>Average Supply Current @ <math>V_{DD} = 1.7V</math>, <math>f_{SW}=10</math> Hz(<math>I_{DD\_AVG}</math>)<sup>2</sup></b>	nA		<b>70</b>	<b>900</b>
Average Supply Current @ $V_{DD} = 3.0V$ , $f_{SW}=10$ Hz( $I_{DD\_AVG}$ ) <sup>2</sup>	nA		230 ( <b>85</b> )	700 ( <b>900</b> )

### Notes:

- Exceeding Absolute Ratings may cause permanent damage to the device. Exposure at the maximum rated conditions for extended periods of time may also affect device reliability.
  - Unless otherwise specified, all characteristics are measured at 25°C.
  - See "Magnetic Field vs. Output Status" for more details.
- ESD Note:** This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, proper ESD precautions should be taken to avoid performance degradation or loss of functionality. Damage due to inappropriate handling is not covered under warranty.

## Operating Characteristics<sup>1</sup>

Parameters	Units	Min	Typ	Max
Switching Frequency ( $f_{SW}$ )	Hz	6	10	14
Active Mode Time ( $t_{ACT}$ )	μs		1.4 ( <b>2.6</b> )	
Idle Mode Time @ $f_{SW}=2$ Hz ( $t_{IDLE}$ )	ms	71	100	167 ( <b>166</b> )
Operate Point ( $B_{OP}$ )	G	-18 ( <b>-19</b> )	-15	-13 ( <b>-11</b> )
Release Point ( $B_{RP}$ )	G	-13 ( <b>-14</b> )	-10	-8 ( <b>-6</b> )
Hysteresis ( $B_{HYST}$ ) <sup>2</sup>	G	3	5	

### Notes:

- Unless otherwise specified, VDD = 2.7 V to 3.6 V (**1.7 V to 5.5 V**), TA = **-40°C to +85°C (2E22)**, -40°C to +125°C (2E23). Typical values are VDD = 3.0 V and TA = +25°C
- Conditions:  $B_{HYST} = |B_{OP} - B_{RP}|$

## Output Response vs. Magnetic Flux

The two sensor series also have the same magnetic lobe performance relative x, y and z behavior.  
The two sensor series have exactly the same behavior relative to their output response vs. magnetic flux.

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