

REDROCK® TMR DIGITAL MAGNETIC SENSORS

	Coto Part Number	Sensitivity Operate/Release (G)	Frequency (Hz)	I _{AVG} @3V (nA)	Temp Rating (°C)	Supply Voltage (V _{DD})	Output Response	Package
OMNIPOLAR	RR122-1A22-511 / 512	± 9/5	10	150	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-1A23-511 / 512	± 9/5	10	150	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-1A52-511	± 9/5	250	1100	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-1A53-511	± 9/5	250	1100	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR122-1B12-511 / 512	± 30/20	2	100	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-1B13-511 / 512	± 30/20	2	100	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-1B52-511	± 30/20	250	1100	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-1B53-511	± 30/20	250	1100	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR122-1B92-511 / 512	± 30/20	10000	44000	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-1B93-511 / 512	± 30/20	10000	44000	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-1E72-511	± 15/10	2500	11000	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-1E73-511	± 15/10	2500	11000	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR122-1F22-511	± 70/50	10	150	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-1F23-511	± 70/50	10	150	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR132-1B12-551 / 552	± 30/20	2	100	-40 to +85	1.7 to 5.5	Open Drain	SOT-23-3 / LGA-4
	RR132-1B13-551 / 552	± 30/20	2	100	-40 to +125	1.7 to 5.5	Open Drain	SOT-23-3 / LGA-4
	RR142-1L12-542 / 545 Digital + Analog	± 30/20	Digital: 2 Analog: 100	Digital: 100 Analog: 500	-40 to +85	1.7 to 5.5	Active Low + Analog on Wakeup	LGA-4 / SOT-23-5
	RR142-1L13-542 / 545 Digital + Analog	± 30/20	Digital: 2 Analog: 100	Digital: 100 Analog: 500	-40 to +125	1.7 to 5.5	Active Low + Analog on Wakeup	LGA-4 / SOT-23-5
BIPOLAR	RR122-3C62-511	-10/10	500	2300	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-3C63-511	-10/10	500	2300	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR122-3C72-511 / 512	-10/10	2500	11000	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-3C73-511 / 512	-10/10	2500	11000	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3 / LGA-4
	RR122-3CU2-515 + Turbo	-10/10	100 + Turbo	500	-40 to +85	1.7 to 5.5	Active Low	SOT-23-5
	RR122-3CU3-515 + Turbo	-10/10	100 + Turbo	500	-40 to +125	1.7 to 5.5	Active Low	SOT-23-5
UNIPOLAR	RR122-2B22-511	30/20	10	150	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-2B23-511	30/20	10	150	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR122-2E22-511	15/10	10	150	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-2E23-511	15/10	10	150	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR122-2E32-511	15/10	20	200	-40 to +85	1.7 to 5.5	Active Low	SOT-23-3
	RR122-2E33-511	15/10	20	200	-40 to +125	1.7 to 5.5	Active Low	SOT-23-3
	RR132-2E22-551	15/10	10	150	-40 to +85	1.7 to 5.5	Open Drain	SOT-23-3
	RR132-2E23-551	15/10	10	150	-40 to +125	1.7 to 5.5	Open Drain	SOT-23-3
	RR132-2E32-551	15/10	20	200	-40 to +85	1.7 to 5.5	Open Drain	SOT-23-3
	RR132-2E33-551	15/10	20	200	-40 to +125	1.7 to 5.5	Open Drain	SOT-23-3

REDROCK® TMR ANALOG MAGNETIC SENSORS

	Coto Part Number	Magnetic Sensitivity Range Min/Max(G)	Frequency (Hz)	I _{AVG} (µA)	Temp Rating (°C)	Supply Voltage (V _{DD})	Output Response	Package
OMNIPOLAR	RR112-1G43-531 / 532	± 80	100	0.5	-40 to +85	1.7 to 5.5	Analog Voltage	SOT-23-3 / LGA-4
	RR112-1G43-531 / 532	± 80	100	0.5	-40 to +125	1.7 to 5.5	Analog Voltage	SOT-23-3 / LGA-4

Note: The "Axis of Sensitivity" within RedRock® TMR sensors is the X Axis.

APPLICATION SITUATIONS				
RedRock® Sensor Function	Typical Application	About the End Product	Customer Requirements	Recommended RedRock® Product
<ul style="list-style-type: none"> • Signaling • Wake Up • Turn-On or Change Mode using an external magnet 	<ul style="list-style-type: none"> • Wearables • Implantables • Ingestibles • Hearing aids • IoT devices 	Small-size, ingress-protected, battery-powered. May stay in sleep mode for long periods of time.	<p>Need: Foolproof means to conserve battery by powering device only when needed.</p> <p>RedRock® Solution: Very low power magnetic sensor w/external magnet. Remove unit/device containing sensor from package containing the magnet to power circuit via μC wake-up or a simple MOSFET to power entire circuit.</p> <ul style="list-style-type: none"> • Contactless Activation - Small/Sealed unlike mechanical switch • Low-power unlike wireless 	RR122-1A22-511, 10Hz, 9/5G, SOT, 120nA* RR122-1A22-512, 10Hz, 9/5G, LGA, 120nA* RR122-1B12-511, 2Hz, 30/20G, SOT, 70nA* RR122-1B12-512, 2Hz, 30/20G, LGA, 70nA* *I _{DD} @1.7V
Rotation Counting	<ul style="list-style-type: none"> • Metering (water, gas, electric) • Any with a rotating element 	Used with a rotating element - shaft, impeller, wheel where sensor needs to count rotation, speed and direction accurately.	<p>Need: Count rotations/speed and/or direction of a rotating element.</p> <p>RedRock® Solution: Sensor counts by detecting magnet on rotating element.</p> <ul style="list-style-type: none"> • Use two sensors to also determine direction of rotation. • The sensor frequency must be at least 2x the product of the rotations per second and the number of magnet pole pairs 	RR122-3C62-511* RR122-3C72-511* RR122-3CU2-515* *Available in industrial temp (+85°C) and wide temp range (+125°C)
Tamper Detection	<ul style="list-style-type: none"> • Door security • Gas Meter • Water Meter • Electric Meter 	Hermetically sealed, operates for years on a battery using a magnetic field to perform normal function but can be influenced by application of an external magnet.	<p>Need: Detect illegitimate magnetic fields introduced as an attempt to tamper with an existing magnetic sensing function.</p> <p>RedRock® Solution: Use a digital sensor matched to a field higher than legitimate field, or use an analog sensor to sense a wide field range.</p>	RR122-1A22-511 RR112-1G42-531/532† †when not battery powered
Level/Linear Distance Sensing	<ul style="list-style-type: none"> • Any with fluid tank/reservoir • Linear motion elements 	Any product with a tank or fluid reservoir. Any product with a mechanical element that moves on a rail.	<p>Need: Determine position of element along a fixed path with high-accuracy.</p> <p>RedRock® Solution: Place sensors with strategic spacing along the plane of magnet travel.</p> <ul style="list-style-type: none"> • Sensors need sufficient sensitivity with excellent part-to-part accuracy. • Sensors can be digital or analog output. • Very low power and fast start-up time are often required to reduce battery consumption. 	RR122-1B12-511/512* RR122-1F22-511* RR122-2B22-511* RR122-2E22-511* RR132-1B12-551/552* RR132-2E22-551* RR132-2E32-551* RR112-1G42-531/532* *Available in industrial temp (+85°C) and wide temp range (+125°C)
Proximity Sensing	Numerous consumer, industrial, medical and commercial products	Any product with a moving mechanical element with magnet attached where proximity of the moving element needs to be sensing relative to a fixed element; e.g., lid or cover open/close detection	<p>Need: Determine if element is within range or in position.</p> <p>RedRock® Solution: Use one or more digital sensors or use an analog sensor (field strength = distance).</p> <ul style="list-style-type: none"> • Tight sensitivity limits (min/max) to improve consistency between units. • Low current consumption enabled battery operation. • Use multiple digital sensors or an analog sensor to detect multiple positions 	RR122-1A22-511/512* RR122-1B52-511* RR122-1F22-511* RR112-1G42-531/532* *Available in industrial temp (+85°C) and wide temp range (+125°C)

COMPETITIVE TECHNOLOGY SITUATIONS				
Technology	Typical Application	Strength/Weakness	RedRock® TMR Advantage	Recommended RedRock® Product
Reed Switch	Battery-Powered Door and Window Security Sensors Level Sensors	(+) Incumbent, default switch for forty years (ain't broke, why fix it). Zero power consumed, 2-wires (-) Limited in size, 5mm switch (RedRock® Sensors are 1.4mm) is \$0.90; potentially between 1-2% field failures over time	<ul style="list-style-type: none"> • Much higher reliability (far more resistant to shock and vibration) • Smaller size (5mm vs. 1.4mm) • Faster response time (nanosecs) • Clean actuation - No need for debounce circuitry • Available in Unipolar, Omnipolar or Bipolar polarity • Far more compatible to pick and place processes 	RR122-1A22-511/512 RR122-1B12-511/512 Open Drain options for closed loop systems RR132-1B12-551/552* *Available in industrial temp (+85°C) and wide temp range (+125°C)
Hall Effect	Smart Door Locks Consumer Products	(+) Incumbent, default magnetic IC sensor. Well respected in Automotive industry (-) Single, z-axis response only. Consumes at least 100x more current than RedRock® sensor	<ul style="list-style-type: none"> • Higher sensitivity (RedRock® is 2x-3x more sensitive) • Lower power consumption (100 x lower) • Wider sensitivity lobe • Flexible for different magnet position design 	RR122-1A22-511/512* RR122-1B12-511/512* *Available in industrial temp (+85°C) and wide temp range (+125°C)
AMR or GMR	Smart Door Locks	(+) AMR has uni-axis sensitivity lobe, sensitivity in the range around 20 Gauss (-) Current consumption is 4x higher (-) Some available AMR products perform up to 85°C, TMR up to 125C (-) AMR has wider min/max sensitivity limits (+/-) Depending on application: AMR has a much narrower sensitivity lobe than TMR	<ul style="list-style-type: none"> • Much lower current (70nA RedRock® vs. 400nA GMR) • Same sensing axis as AMR and GMR • Tighter Bop/Brp limits than AMR • Better temperature performance than AMR • Wider sensitivity lobes than AMR 	RR122-1A22-511/512* *Available in industrial temp (+85°C) and wide temp range (+125°C)
TMR	Various	(+) One notable TMR manufacturer's sensor consumes lower power at higher frequencies (-) It also is known to have lower ESD protection and lower overall quality	<ul style="list-style-type: none"> • Coto ESD protection is considerably higher than most TMR competitors 	Various options, Contact Coto Applications