SQ-SEN & MIN-200

ULTRA LOW POWER OPERATION, 50 NA (0.05 UA)

APPLICATION NOTE

HIGHLIGHTS

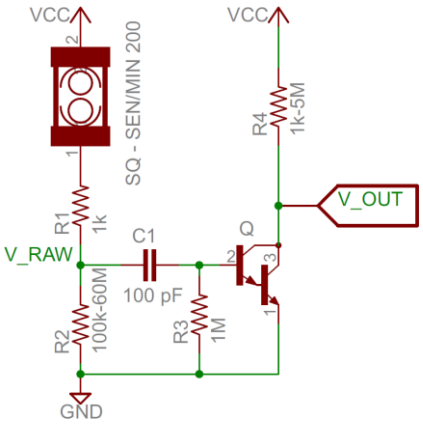
- Ultra low power ***50 nA*** at rest
- Deterministic output always settles high regardless of whether sensor settles open or closed
- Reliably detects vehicle / animal movement
- ***Low voltage operation (operates down to Vcc of 1.2V)***
- Superior performance detecting faint motion
- Passives cost ~$0.04 at 10K

APPLICATIONS

- RFID and GPS wake up
- Vehicle movement detection
- Motor activity monitor
- Person or animal monitor

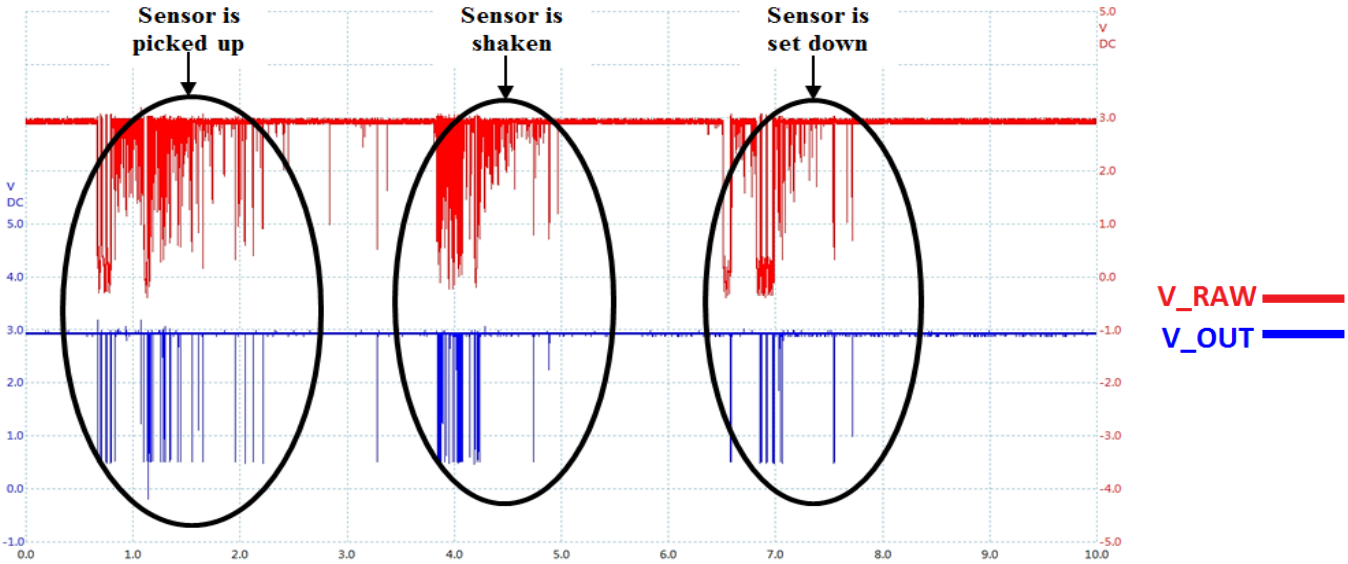
Application Circuit #1: NPN Darlington Transistor			
Component	**Description**	**Manufacturer**	**Manufacturer P/N**
R1	1k, 1/16W, 0402	Yageo	RC0402JR-071KL
R2*	30M, 1/8W, 0805	Rohm Semiconductor	KTR10EZPJ306
R3	1M, 1/16W, 0402	Yageo	RC0402JR-071ML
R4	10k, 1/16W, 0402 5.1M, 1/10W, 0603	Yageo	RC0402JR-0710KL RC0603JR-075M1L
C1	100 pF	Yageo	CC0402JRNPO9BN101
Q	NPN Transistor	ON Semiconductor	MMBT6427LT1G
* Two 30M ohm resistors can be used to create an equivalent 60M ohm resistor in place of R2. See the table below for other possible values for R2.			
** Supply Voltage: Vcc from 5.5V down to 1.2V			

R2 VALUES VS. CURRENT DRAW		
VCC ** (Volts)	**R2 Value (Ohms)**	**Current Draw (uA)**
3	100k	29.70
3	500k	5.99
3	1M	3.00
3	10M	0.30
3	60M	0.05 (50 nA)



SUMMARY

This circuit enables ultra-low power (50 nA) motion wake up using the SQ-SEN or MIN-200. An added benefit is that the circuit "AC couples" the sensor which produces a high output regardless of the open or closed resting state of the sensor. The graph below shows the circuit is highly sensitive to movement and will produce a falling edge output at the low impedance node labeled "V_OUT". The designer can pick an R4 value to suit the input impedance of the application circuit. Since the circuit always comes to rest with the transistor "off", no current flows through Q when the devise is at rest.



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SQ-SEN & MIN-200

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APPLICATION NOTE

HIGHLIGHTS

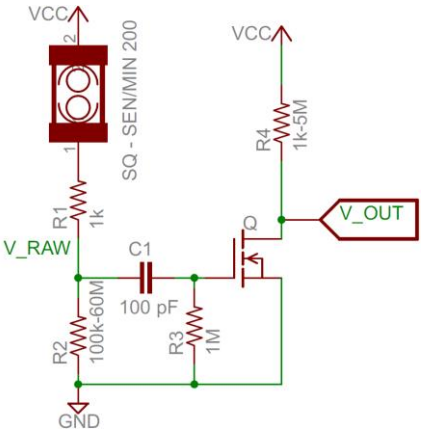
- Ultra low power ***50 nA*** at rest
- Deterministic output always settles high regardless of whether sensor settles open or closed
- Reliably detects vehicle / animal movement
- ***Full voltage swing on V_Out (0 V to Vcc)***
- Superior performance detecting faint motion
- Passives cost ~$0.04 at 10K

APPLICATIONS

- RFID and GPS wake up
- Vehicle movement detection
- Motor activity monitor
- Person or animal monitor

Application Circuit #2: MOSFET Transistor			
Component	**Description**	**Manufacturer**	**Manufacturer P/N**
R1	1k, 1/16W, 0402	Yageo	RC0402JR-071KL
R2*	30M, 1/8W, 0805	Rohm Semiconductor	KTR10EZPJ306
R3	1M, 1/16W, 0402	Yageo	RC0402JR-071ML
R4	10k, 1/16W, 0402 5.1M, 1/10W, 0603	Yageo	RC0402JR-0710KL RC0603JR-075M1L
C1	100 pF	Yageo	CC0402JRNPO9BN101
Q	MOSFET N-Channel	Fairchild Semiconductor	BSS138
* Two 30M ohm resistors can be used to create an equivalent 60M ohm resistor in place of R2. See the table below for other possible values for R2.			
** Supply Voltage: Vcc from 5.5V down to 2.5V			

R2 VALUES VS. CURRENT DRAW		
VCC ** (V)	**R2 Value (Ohms)**	**Current Draw (uA)**
3	100k	29.70
3	500k	5.99
3	1M	3.00
3	10M	0.30
3	60M	0.05 (50 nA)



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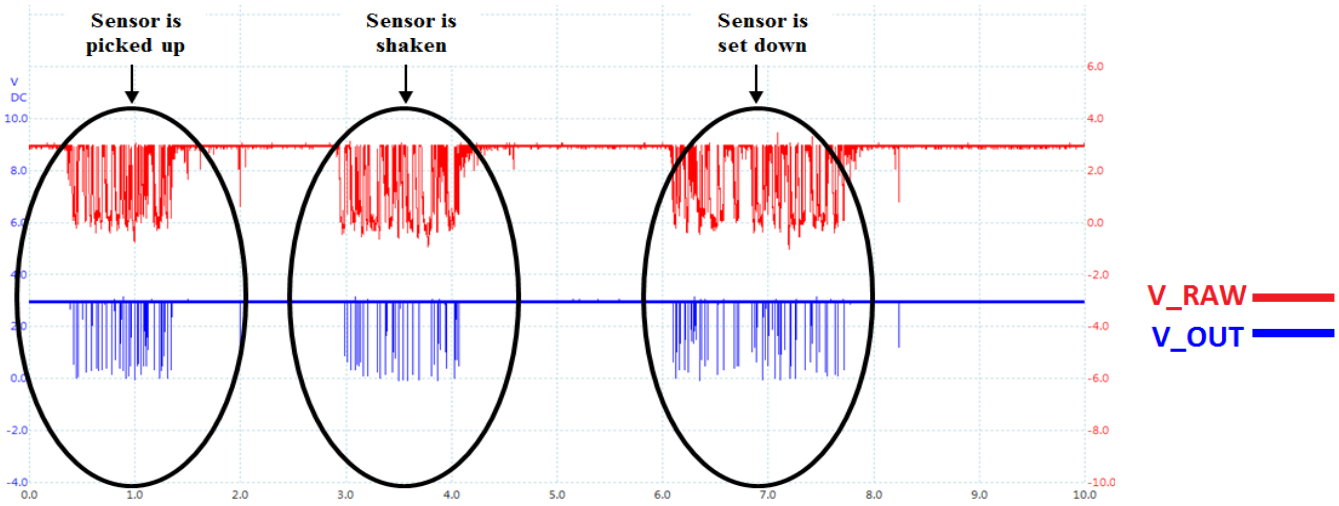

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