LSI/CSI

LS6525
LS6526

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BATTERY POWERED LOW-POWER PIR SENSOR INTERFACE

FEATURES:

- Power derived from 3.0V Lithium battery
- V_{DD} operating range 2.3V to 3.6V
- 25µA maximum quiescent current (LS6525)
- 30µA maximum quiescent current (LS6526)
- Direct interface with PIR sensor
- Analog signal and digital interrupt signal outputs for interfacing with a MCU
- 2.175V regulated output
- Low battery indicator output (LS6526)
- LS6525 (DIP), LS6525-S (SOIC)
  LS6526 (DIP), LS6526-S (SOIC)

APPLICATIONS:

The low operating voltage and low current drain make the LS6525 / LS6526 ideal for microcontroller based portable applications such as battery operated motion detectors and photographic equipment, automatic doors, intrusion detection, and anywhere electric outlets are not available.

DESCRIPTION:

The LS6525 / LS6526 is a CMOS integrated circuit designed for detecting motion from a PIR sensor and is micro controller interface ready. It uses a 3.0V Li battery as a source of energy for its operation. The detailed description of the functional blocks is as follows (refer to Figure 2).

AMPLIFIERS

The input PIR preamplifier, AMP1, has a nominal gain set at 29V/V using internal resistors. An internal bias is used so that AMP1O output has a quiescent voltage of 1.1V. The output of the PIR amplifier is AC coupled to a second amplifier (AMP2) which uses external components to set the gain. This second stage is internally biased and applied to a window comparator which has lower and higher trip levels set with respect to that bias. External components are used to set a typical gain of 22V/V. Amplified signals greater in magnitude than the trip levels will cause an interrupt signal to be generated at the $\overline{INT}$ open drain output, pin 12. The $\overline{INT}$ output can be pulled to a voltage higher than V_{DD} (pin 13).

The output of the PIR amplifier is also AC coupled to an additional amplifier (MCU amplifier) which uses external components to set the gain. An internal bias set the MCO output at 0.5V and external resistors set a typical gain = 10V/V, the MCO output signal can be applied to a microcontroller input for processing.

PIN ASSIGNMENT

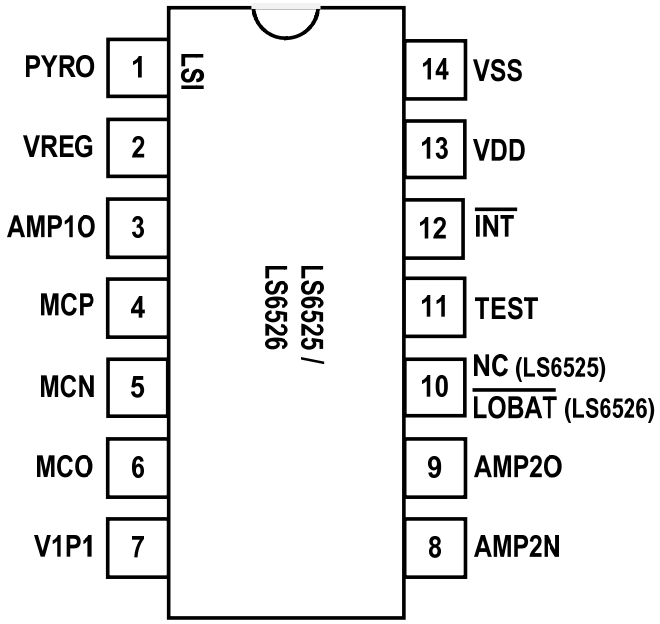


Figure 1

INPUT / OUTPUT DESCRIPTION

PIN1 – PYRO Input – Non-inverting input of PIR amplifier AC coupled to source of PIR signal.

PIN2 – VREG Output – This output provides power to the PIR Sensor circuit and for all the internal amplifier circuitry.

PIN3 – AMP1O Output – Output terminal of the PIR amplifier

PIN4 – MCP – 0.5V internal bias. (Internal use only. No external components.)

PIN5 – MCN Input – Inverting input to the MCU amplifier.

PIN6 – MCO Output – Output of the MCU amplifier.

PIN7 – V1P1 – Internally biased to 1.1V and applied to non-inverting input of AMP2. Requires an external bypass capacitor.

PIN8 – AMP2N – Inverting input of AMP2 amplifier.

PIN9 – AMP2O – Output of the AMP2 amplifier.

PIN10 – NC – For LS6525.

PIN10 – $\overline{\text{LOBAT}}$ Output – For LS6526 only. Open drain output requiring an external pull-up resistor to a power-supply that can be higher than V_{DD}. An active low at the output signifies that a low battery condition exists.

PIN11 – TEST – This pin is not used and must be tied to ground.

PIN12 – $\overline{\text{INT}}$ Output – Open drain output requiring an external pull-up resistor to a power supply that can be higher than V_{DD}. A recognized Interrupt signal will be an active low at this output.

PIN13 – VDD – Power Supply Voltage

PIN14 – VSS – Power Supply Ground

ABSOLUTE MAXIMUM RATINGS:

PARAMETER	SYMBOL	VALUE	UNIT
DC Supply Voltage	V_{DD}	+7	V
Input Voltage	V_{IN}	V_{SS} - 0.3 to V_{DD} + 0.3	V
Operating Temperature	T_A	-40 to +70	°C
Storage Temperature	T_{STG}	-65 to +150	°C

ELECTRICAL CHARACTERISTICS:

(All voltages referenced to V_{SS}, T_A = 25°C, V_{DD} = 2.3V - 3.6V, unless otherwise specified.)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
SUPPLY CURRENT:						
V_{DD} = 2.3V – 3.6V	I_{DD}	-	-	25	µA	LS6525, No Load@VREG
	I_{DD}			30	µA	LS6526, No Load@VREG
REGULATOR:						
Voltage V	$_R$ 2.13		2.175	2.22	V	
Source Current Capability	I_R	-	-	25	µA	
AMPLIFIERS:						
PIR Amplifier						
Gain G	$_P$ 28		29.5	32	V/V	$Vi_{/p}$ 1mV_{P-P}, 10Hz R_L = No Load to 3MΩ
Input Impedance	R_P		2		MΩ	
MCU amplifier / AMP2						
Open Loop Gain	G_M 70				dB	
MCO Output Quiescent Voltage	V_Q	0.48 0.5		0.52	V	
AMP2 Internal Reference	V_{IR}		1.1		V	
Window -Comparator amplifier						
Input Sensitivity to $\overline{INT}$ Output	V_S 120				μV_P	AMP1 and AMP2 cascaded for net gain = 675V/V
Comparator	$V_{LO, THRESHOLD}$		1.02		V	
	$V_{HI, THRESHOLD}$	1.18			V	
$\overline{INT}$ Output	$V_{OL, \overline{INT}}$			0.1	V	$R_{PULL-UP}$ = 2MΩ, $V_{PULL-UP}$ = 3.6V
	$V_{PULL-UP}$			5.5	V	
$\overline{Lobat}$						
Trip Voltage	V_{TRIP}	2.45			V	
Hysteresis	Hys	0.1			V	
	$V_{OL, \overline{LOBAT}}$			0.1	V	$R_{PULL-UP}$ = 2MΩ, $V_{PULL-UP}$ = 3.6V
	$V_{PULL-UP}$			5.5	V	

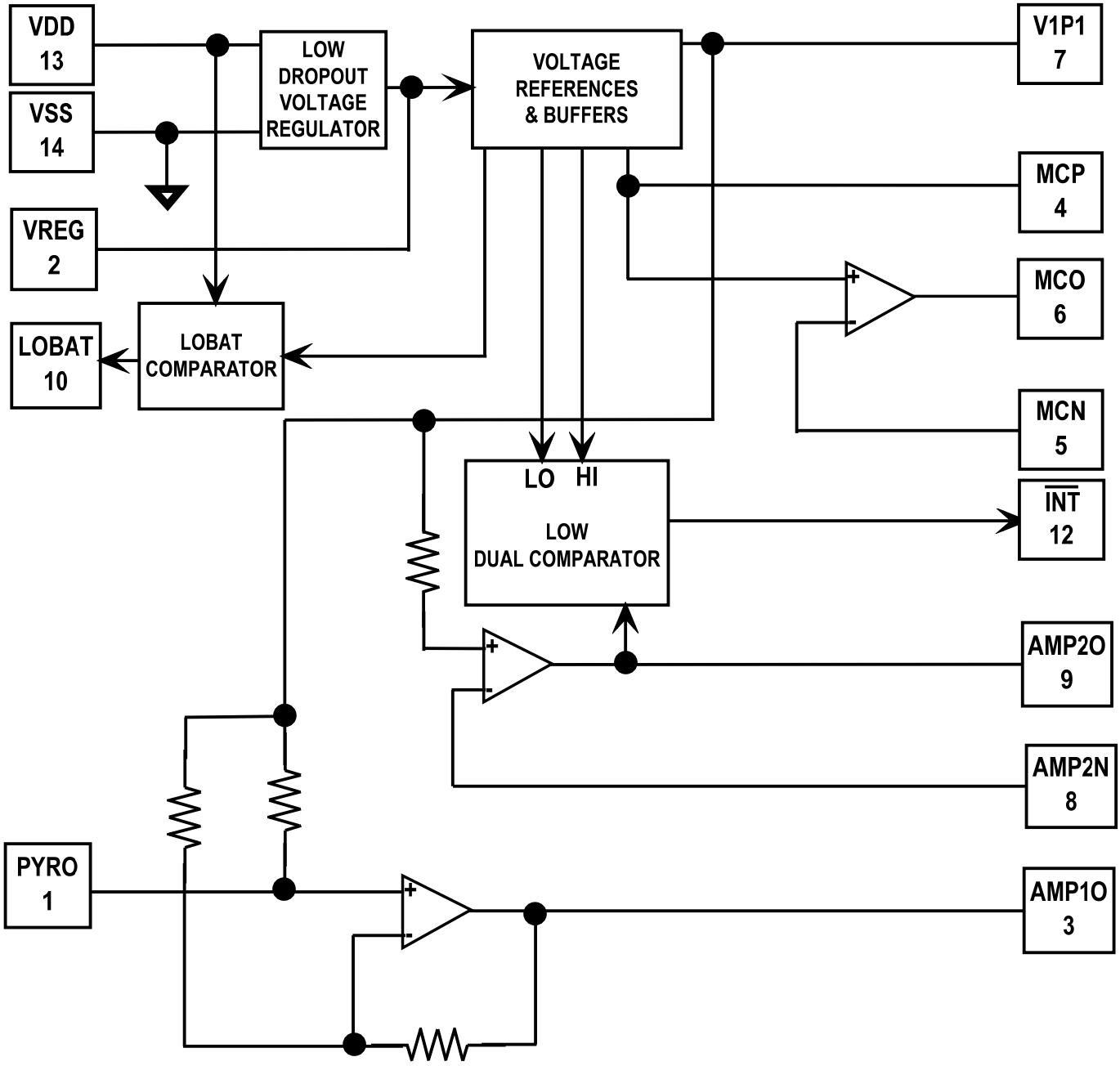
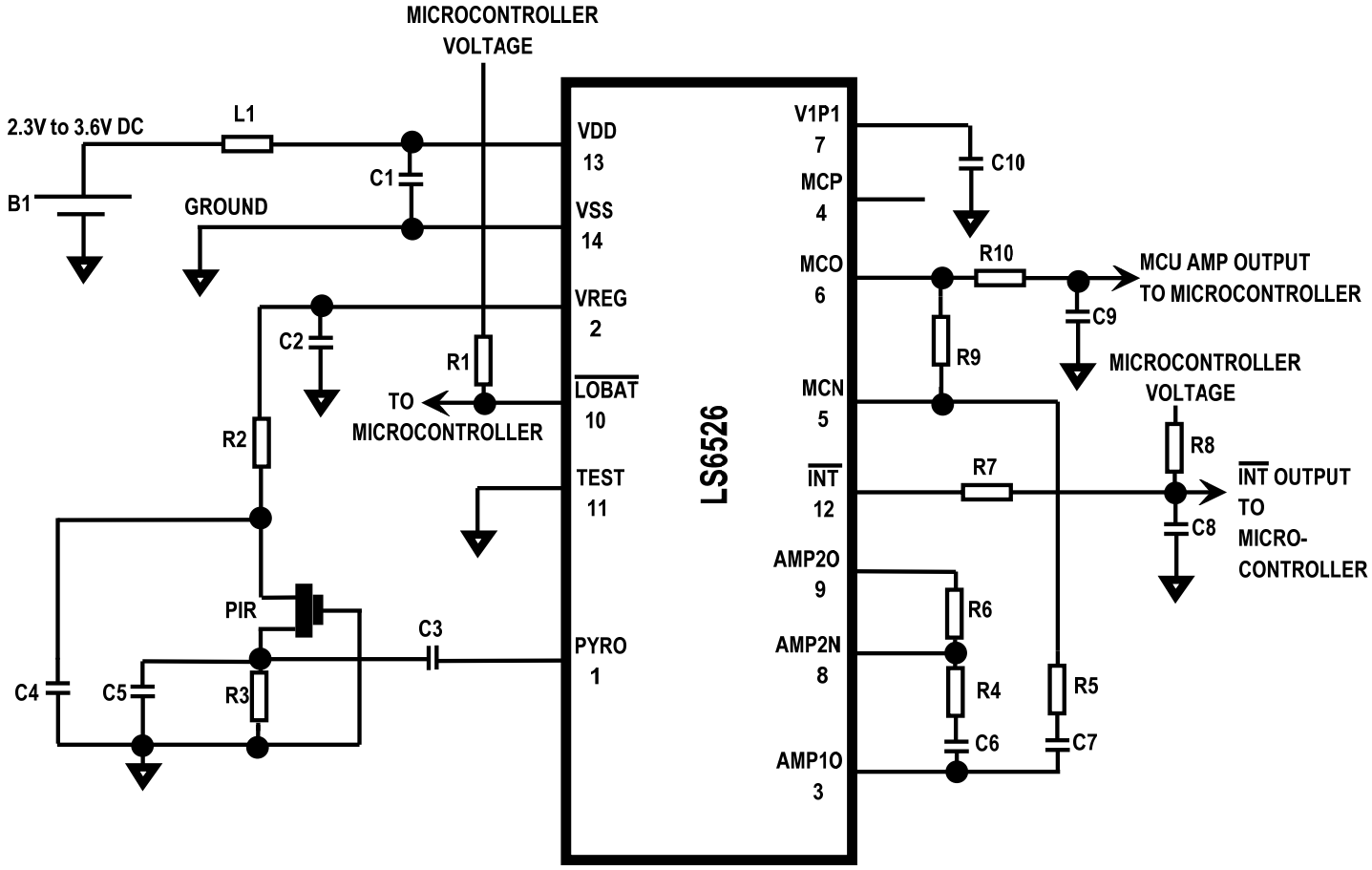


Figure 2 Block Diagram



C

L1	68nH	C1	1µF
		2	1µF
R1	2MΩ	C3	1µF
R2	10kΩ	C4	47pF
R3	4.7MΩ	C5	47pF
R4	442kΩ	C6	3.3µF
R5	1MΩ	C7	1µF
R6	10MΩ	C8	3.3nF
R7	100kΩ	C9	0.16µF
R8	2MΩ	C10	10µF
R9	10MΩ		
R10	100kΩ	B1	Typical battery used: 3V CR123A Lithium
		PIR	Excelitas LHI968 Pyro (Typical)

Figure 3 Application schematic for LS6526.

For the LS6525, pin 10 has no connection. The gain of AMP2 is set using R6 and R4 to a nominal gain of 22V/V. The MCU amplifier gain is set to 10V/V using R9 and R5. R10-C9 and R7-C8 are additional filter stages for the MCO and $\overline{INT}$ outputs when applied to the microcontroller.