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[54] **MICROCONTROLLER WAKE-UP FUNCTION HAVING AN INTERLEAVING PRIORITY SCHEME FOR SAMPLING A PLURALITY OF ANALOG INPUT SIGNALS**

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[*] Notice: This patent is subject to a terminal disclaimer.

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Related U.S. Application Data

[63] Continuation-in-part of application No. 08/530,752, Sep. 19, 1995, abandoned.

[51] **Int. Cl.**[7] **G06F 1/32**; G06F 3/05

[52] **U.S. Cl.** **713/324**; 713/323; 713/502; 341/141

[58] **Field of Search** 710/18, 60, 300, 710/323, 324, 502; 341/141, 164, 169, 48

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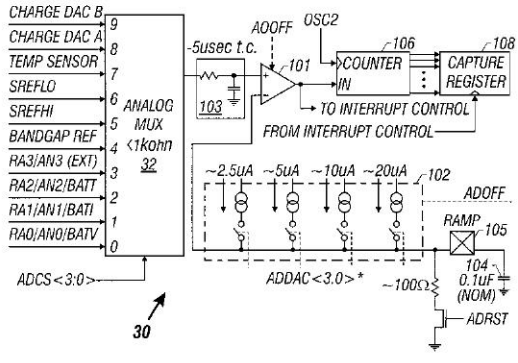
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[57] **ABSTRACT**

A semiconductor device for receiving analog input signals includes a microprocessor for processing signal information. The microprocessor is put in a sleep mode when not called upon to process signal information, and is either left in that mode or awakened depending on the level of a continuously variable analog input signal relative to a programmed threshold level. If the relative levels of the analog input signal and the programmed threshold level result in the microprocessor being awakened, information contained in the analog input signal is processed to initiate a selected action. In typical applications, the semiconductor device performs a control function, such as to control the operation of an external circuit in response to information from at least one continuously variable analog input signal derived from the external circuit. The microprocessor, when awakened, assists in controlling the external circuit to restore that analog input signal to a predetermined level distinct from the threshold level. In some applications, such as for battery charging and monitoring, the device is responsive to a plurality of different continuously variable analog input signals derived from the external circuit and indicative of a specified circuit function thereof. These signals are applied to the device in interleaved sequence according to a priority that depends on their respective rates of variation. The specified circuit function of the external circuit such as the level of charge on a battery is monitored, and the degree of control exercised by the device over the external circuit such as halting a charging of the battery based on level of charge, is a function of the designated priority of the plurality of analog input signals.

13 Claims, 19 Drawing Sheets



CONV #	t_{rel}	t_{obs}	INTERLEAVE CHANNEL	A/Q CHANNEL
0	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
1	16mS	mS	RUN SEQUENCE ON V_{refhi} CHANNEL	V_{refhi}
2	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
3	16mS	mS	RUN SEQUENCE ON V_{refio} CHANNEL	V_{refio}
4	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
5	16mS	mS	RUN SEQUENCE ON BANDGAP CHANNEL	V_{bg}
6	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
7	16mS	mS	RUN SEQUENCE ON V_{in} CHANNEL	$VBof_{in}$
8	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
9	16mS	mS	RUN SEQUENCE ON CURRENT ZERO CHANNEL	I_{zero}
10	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
11	16mS	mS	RUN SEQUENCE ON THERMISTOR CHANNEL	T_{int}
12	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
13	16mS	mS	RUN SEQUENCE ON EXTERNAL THERMISTOR CHANNEL	T_{ext}
14	16mS	mS	RUN SEQUENCE ON CURRENT INPUT CHANNEL	$Boff_{in}$
15	16mS	mS	RUN SEQUENCE ON V_{in} CHANNEL	$BofV_{in}$