Smart Phone Battery Switch Controller

Description

CAT874 is a switch controller designed to start/shut-off smart phones with the push button input or by phone microcontroller unit.

CAT874 monitors two inputs and outputs an active high output after PWR_ON input has been active (logic low) for a factory preset minimum time. Releasing input from its active state before the minimum timeout period resets the internal timer and must return to being active before the timer will restart with a fresh count down. The output remains high until the next PWR_ON high-to-low or V_{CHG} low-to-high transition.

CAT874's push pull output is capable of sinking up to 3 mA of current.

Features

- Operate on 1.8 V to 5.5 V Power Supplies
- Ultra Low Quiescent Current: 100 nA (typical)
- Schmitt Trigger Inputs
- Small µLLGA-6 Package: 1.45 x 1.0 x 0.4 mm
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Mobile Phones
- PDAs
- MP3 Players
- Personal Navigation Devices

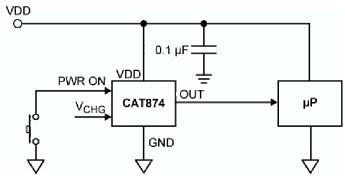


Figure 1. Application Schematic



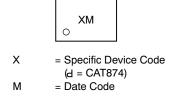
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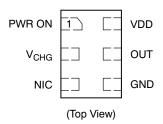






"P" written at 180° clockwise rotation





ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

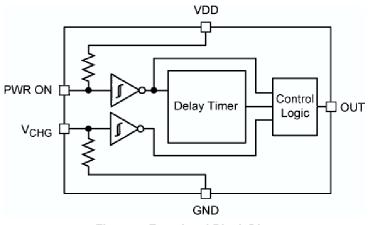


Figure 2. Functional Block Diagram

Table 1. PIN FUNCTION DESCRIPTION

Pin No.	Pin Name	Description
1	PWR_ON	Power ON, CMOS input.
2	V _{CHG}	Charger IN, CMOS input.
3	NIC	No Internal Connection. A voltage or signal applied to this pin will have no effect on device operation.
4	GND	System Ground.
5	OUT	Drive Output. Active-high push-pull output.
6	VDD	Positive Power Supply.

Table 2. ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Voltage Range	V _{DD}	-0.3 to 6	V
Output Voltage Range	V _{OUT}	-0.3 to 6 or (V _{DD} + 0.3), whichever is lower	V
Input Voltage; PWR_ON, V _{CHG}	V _{IN}	-0.3 to 6 or (V _{DD} + 0.3), whichever is lower	V
Maximum Junction Temperature	T _{J(max)}	150	°C
Output Current; OUT	I _{OUT}	10	mA
Storage Temperature Range	T _{STG}	-65 to 150	°C
ESD Capability, Human Body Model (Note 1)	ESD _{HBM}	2	kV
ESD Capability, Machine Model (Note 2)	ESD _{MM}	150	V
Lead Temperature Soldering Reflow (SMD Styles Only), Pb-Free Versions (Note 2)	T _{SLD}	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. This device series incorporates ESD protection and is tested by the following methods:

ESD Human Body Model tested per AEC-Q100-002 (EIA/JESD22-A114) ESD Machine Model tested per AEC-Q100-003 (EIA/JESD22-A115)

Latch-up Current Maximum Rating: ≤150 mA per JEDEC standard: JESD78

2. For information, please refer to our Soldering and Mounting Techniques Reference Manual, SOLDERRM/D

Table 3. RECOMMENDED OPERATING CONDITIONS

Rating	Symbol	Min	Мах	Unit
Input Voltage; VDD	V _{DD}	1.8	5.5	V
Input Voltage; PWR_ON, V _{CHG}	V _{IN}	0	V _{DD}	V
Output Current; OUT	I _{OUT}	0	3	mA
Ambient Temperature	T _A	-40	85	°C

Table 4. ELECTRICAL OPERATING CHARACTERISTICS $(V_{DD} = 1.8 \text{ V to } 5.5 \text{ V}.$ For typical values $T_A = 25^{\circ}$ C, for min/max values $T_A = -40^{\circ}$ C to $+85^{\circ}$ C unless otherwise noted.)

Parameter	Test Conditions	Symbol	Min	Тур	Max	Unit
POWER	•		-			
V _{DD} Supply Voltage		V _{DD}	1.8		5.5	V
Quiescent Supply Current	PWR_ON = VDD, V _{CHG} = 0 V	I _{DD}		100	1000	nA
Operating Supply Current	$\begin{array}{c} PWR_ON = 0 \text{ V}, \text{ V}_{CHG} = 0 \text{ V} \\ \text{Measured during setup period.} \\ \text{Measurement includes current} \\ \text{through internal } 200 \text{ k}\Omega \text{ pull-up} \\ \text{resistor on } PWR_ON \end{array}$				50	μΑ
LOGIC INPUTS AND OUTPUTS						
Input Voltage; HIGH	PWR_ON, V _{CHG}	V _{IH}	0.7 x V _{DD}			V

Input Voltage; HIGH	PWR_ON, V _{CHG}	V _{IH}	0.7 x V _{DD}			V
Input Voltage; LOW	PWR_ON, V _{CHG}	VIL			0.25 x V _{DD}	V
Hysteresis		V _{HYS}		250		mV
Input Current V _{CHG}	V _{CHG} = 0 V; V _{DD} = 5 V (internal pull–down)	I _{IL1}		50	300	nA
Input Current V _{CHG}	V _{CHG} = 5 V; V _{DD} = 5 V (internal pull–down)	I _{IH1}		25		μA
Input Current PWR_ON	$\begin{array}{l} PWR_ON = 0 \ V; \ V_{DD} = 5 \ V \\ (internal \ 200 \ k\Omega \ pull-up \ resistor) \end{array}$	I _{IL2}		25		μA
Input Current PWR_ON	$PWR_ON = 5 V; V_{DD} = 5 V$ (internal 200 k Ω pull-up resistor)	I _{IH2}		50	300	nA
Output Voltage; HIGH	I _{SOURCE} = -0.1 mA, V _{DD} = 1.8 V	V _{OH}	V _{DD} – 0.2			V
Output Voltage; LOW	I _{SINK} = 3 mA, V _{DD} = 1.8 V	V _{OL}		0.1	0.4	V

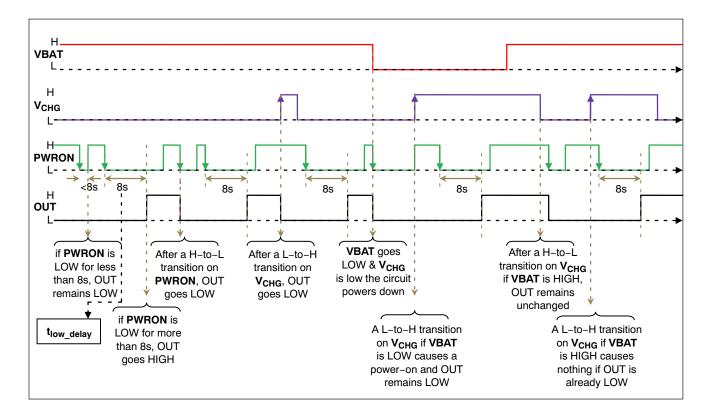
TIMING

Input Delay PWR_ON	T _A = 25°C t _{low_dela}		6.56	8.00	9.44	s
	$T_A = -40^{\circ}C$ to $+85^{\circ}C$		6.00		10.00	

TEST MODE (V_{DD} = 5 V, T_A = 25°C) (Note 3)

Start TEST Window		t _{ST}			35	μs
Test Mode Delay	$\rm PWR_ON$ = 0 V, $\rm V_{CHG} \rightarrow 7$ cycles, delay measured after 8th rising edge of $\rm V_{CHG}$ clock pulse	t _D		250		μs
Test Mode Clock Frequency	Clock applied to V _{CHG}	f _{tm}		1		MHz
PWR_ON Test Mode Clock Setup Time	Measured from PWR_ON falling edge to first falling edge of V _{CHG}	t _P	1			μs
V _{CHG} Input Voltage; LOW	V _{CHG} , Test Mode Operation	V _{IL_TM}			0.2 x V _{DD}	V
V _{CHG} Pulse Width		t _{pw}		500		ns

3. "Test Mode" parameters are not tested in production.



TIMING WAVEFORMS

Figure 3. Timing Waveforms

SYSTEM DESCRIPTION AND APPLICATIONS INFORMATION

General

CAT874 is designed for the manual switching of microprocessors and microcontrollers. To prevent accidental resets, CAT874 requires PWR_ON input be held low for a prescribed period before an Active high output is issued to the system processor.

PWR_ON and V_{CHG} Inputs

PWR_ON and V_{CHG} are Schmitt trigger CMOS inputs. PWR_ON must go low and stay low for a predetermined period (t_{LOW_DELAY}) to generate an Active high on the output.

 V_{CHG} is a standard CMOS input with internal pull down resistor 200 k Ω to keep the input low when charger is not plugged in and PWR_ON is also a CMOS input with an internal 200 k Ω pull-up resistor, thus PWR_ON can be left floating. When PWR_ON goes low, an internal timing cycle is initiated. If it goes high before the countdown timer has concluded its cycle, the timer will reset and will restart from the beginning when PWR_ON returns to being low.

Output (OUT)

CAT874 provides an active-high push pull output. This output will sink up to 3 mA.

Delay Timer Testing:

A user test mode is provided to reduce the system test time after the CAT874 is mounted on the board. Instead of waiting t_{LOW} DELAY for the output to go active.

The user brings PWR_ON low, and sends seven positive edges on the V_{CHG} pin in a window of time t_{ST} . After a delay t_D , the device output will change state from low to high, and will return to the low state only when there is a high-to-low transition on PWR_ON.

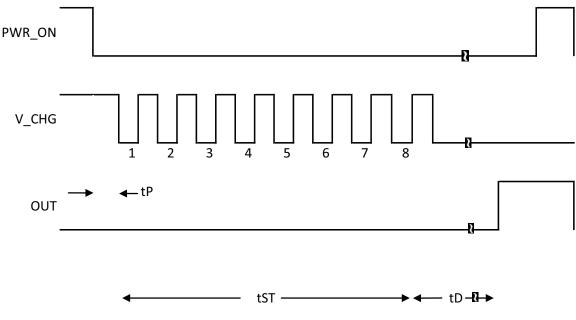


Figure 4. TOC Mode

APPLICATION INFORMATION

Output Operation

System with Two Different Power Supply Voltages

When both V_{CHG} and VBAT are present, the following application can be adapted. Schottky diodes D1 and D2 can be used to isolate the two sources. The higher source will supply the VDD power.

If V_{CHG} is not present then drop across D2 should be low enough to turn off Q1. If both V_{CHG} and VBAT are present, the timing waveforms should be used as shown in Figure 4. An external resistor 1M should be used OUT, to discharge the output when both sources turn off.

Operation with Low VDD Voltage and Brownout Condition

The CAT874 requires a minimum supply voltage VDD of 1.8 V to guarantee the normal operation within the specification. To prevent small VDD supply glitch, a small ceramic capacitor can be added between the VDD pin and GND.

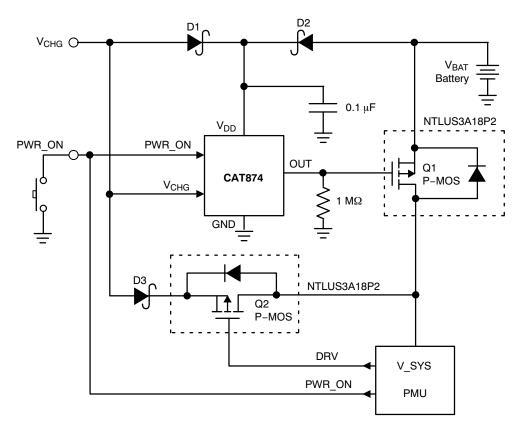


Figure 5. Application Schematic in Dual Supply System

PACKAGE DIMENSIONS

ULLGA6, 1.45x1.0, 0.5P CASE 613AF-01

ISSUE A

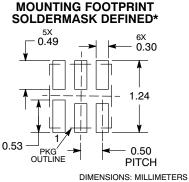
D Α В PIN ONE REFERENCE E □ 0.10 C TOP VIEW □ 0.10 C // 0.05 C Δ SEATING PLANE 0.05 C 6X SIDE VIEW A1 С е 5X L NOTE 4 L1 1 6X b 0.10 CAB \oplus C NOTE 3 0.05

BOTTOM VIEW

NOTES

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 3.
- 0.30 mm FROM THE TERMINAL TIP. A MAXIMUM OF 0.05 PULL BACK OF THE 4.
- PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS				
DIM	MIN	MAX			
Α		0.40			
A1	0.00	0.05			
b	0.15	0.25			
D	1.45 BSC				
Е	1.00 BSC				
е	0.50	BSC			
L	0.25	0.35			
L1	0.30	0.40			



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

Table 5. ORDERING INFORMATION

Device	Timeout (s)	Marking	Package	Shipping (Note 4)
CAT874-80ULGT3	8	d M "P" written at 180° clockwise rotation	μLLGA–6	3,000 / Tape & Reel

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging 4. Specifications Brochure, BRD8011/D.

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