



TP 6820

Digital Camera Solution
(QQVGA/RS232/turn-key solution)

DataSheet

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General Specification

General Description

The TP6820, when collocated with PAS009 CMOS image sensor made by Pixart, provides a total solution for a QQVGA resolution RS232 interface digital camera. It can act as a digital still camera when stand-alone mode, it also can act as a live view camera when connecting to PC through RS232 interface. By adding a SRAM with 128kx8 bits capacity, it can store twelve pictures while snapshot button is pressed. When connecting to PC, user can get the images from this storage through RS232 with "Show Me Cam " software application.

Feature

- Supports PAS 009 sensor interface
- Supports Image processor.
- Supports Image snapshot function.
- Supports auto power saving mode with port wake up function
- Supports RS232 interface, up to 115200bps speed.
- Supports indicator LED.
- Supports warning buzzer
- Supports H/W erase picture function.
- Embedded an 8-bits (80C51) micro controller.
- Embedded 128 bytes of RAM
- Embedded 4K bytes of ROM
- Support wide supply voltage range: from 3.0V to 3.6V
- Operating frequency : 11.0592MHz
- Support SRAM interface with 128 Kbytes capacity

Camera Specifications:

- Sensor: QQ VGA color CMOS sensor. (PAS 009)
- Resolution: 160x120
- Storage: 12 pictures stores.



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- Interface: RS232.
- Indicator: LED and Buzzer.
- Battery: AA x3
- Power Life:
 - 20,000 pictures snap at operation mode
 - Suspend current <10uA
 - Supports self-timer.

Applications

Toy camera



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Pin Configurations and Package Type: 40 COB

Pin NO.	X	Y	Pin NO.	X	Y
Pin1: GND	-55.000,	645.000	Pin21: P1_PAD2	53.550,	-645.000
Pin2: P3_PAD5	-164.950,	645.000	Pin22: P1_PAD3	163.550,	-645.000
Pin3: P3_PAD7	-274.950,	645.000	Pin23: P1_PAD4	273.550,	-645.000
Pin4: P3_PAD6	-384.950,	645.000	Pin24: P1_PAD5	383.550,	-645.000
Pin5: P3_PAD0	-494.950,	645.000	Pin25: P1_PAD6	493.550,	-645.000
Pin6: P3_PAD1	-653.700,	457.300	Pin26: P1_PAD7	603.550,	-645.000
Pin7: P3_PAD2	-653.700,	347.300	Pin27: P2_PAD0	653.700,	-422.700
Pin8: P3_PAD3	-653.700,	237.300	Pin28: P2_PAD1	653.700,	-312.700
Pin9: P3_PAD4	-653.700,	127.300	Pin29: P2_PAD2	653.700,	-202.700
Pin10: RESET	-653.700,	17.250	Pin30: P2_PAD3	653.700,	-92.700
Pin11: P0_PAD0	-653.700,	-92.700	Pin31: P2_PAD4	653.700,	17.300
Pin12: P0_PAD1	-653.700,	-202.700	Pin32: P2_PAD5	653.700,	127.300
Pin13: P0_PAD2	-653.700,	-312.700	Pin33: P2_PAD6	653.700,	237.300
Pin14: P0_PAD3	-653.700,	-422.700	Pin34: P2_PAD7	653.700,	347.300
Pin15: P0_PAD4	-653.700,	-532.700	Pin35: OUTPUT0	653.700,	457.300
Pin16: P0_PAD5	-496.450,	-645.000	Pin36: OUTPUT1	653.700,	567.200
Pin17: P0_PAD6	-386.450,	-645.000	Pin37: OUTPUT2	385.050,	645.000
Pin18: P0_PAD7	-276.450,	-645.000	Pin38: VDD	275.000,	645.000
Pin19: P1_PAD0	-166.450,	-645.000	Pin39: OSCI	165.000,	645.000
Pin20: P1_PAD1	-56.450,	-645.000	Pin40: OSCO	55.000,	645.000

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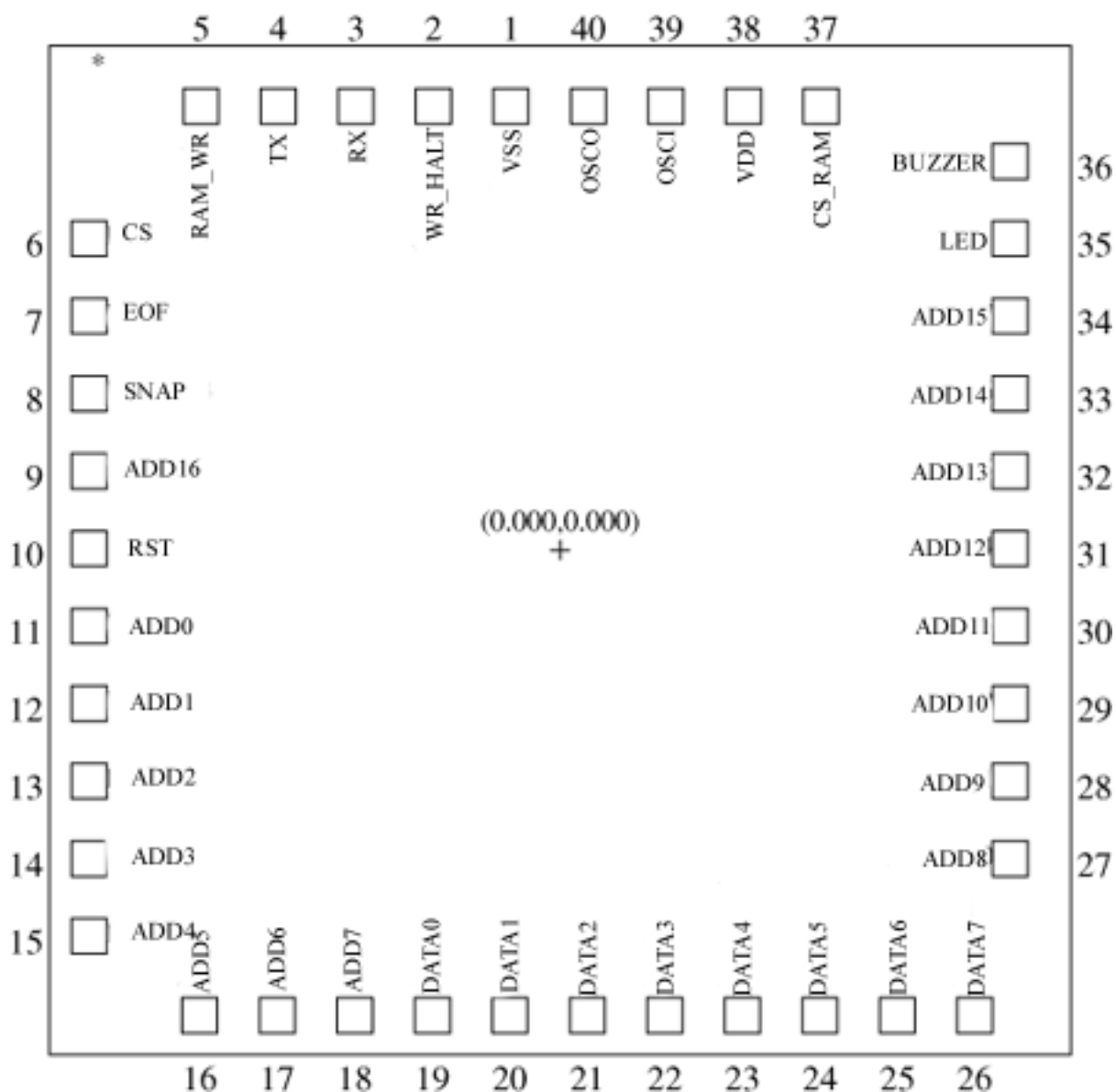
(1) TP NO. TP6820

First Pin: GND

Logo location show as '*'

(2) Pad Configuration

Package type: 40 COB





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Pin Descriptions

SYMBOL	MODE	FUNCTION DESCRIPTION
V _{SS}	I	Circuit GND Potential.
V _{CC}	I	Main Power Supply(+4.5V~+5.5V)
RST	I	A low level input resets the CPU. A small internal pull-up resistor permits power-on reset using only a capacitor connected to GND.
ADD0~ADD16	I/O	Address pins for sram and sensor
DATA0~7	I/O	Connect to data pins of sram and sensor
RX	I	Receive data from pc through RS232 serial interface
TX	O	Transfer data to pc through RS232 serial interface
CS	O	Control PAS009 sensor
EOF	I	Control PAS009 sensor
WR_HALT	O	Control PAS009 sensor
RAM_WR	O	Control sram to read or write
SNAP	I	A low level input will active to snap an image
LED	O	Direct output, connect to a LED
BUZZER	O	Direct output, connect to a buzzer
CS_RAM	O	Direct output, connect to memory chip select CS1.
OSCI	I	Input to inverting oscillator amplifier
OSCO	O	Oscillator output pin

Note: “I” means INPUT function; “O” means OUTPUT function.





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Function Descriptions

SRAM interface

TP6820 can support a SRAM up to 128Kbytes. It can store twelve pictures with 160x120 resolution. By pressing once snapshot button, one picture is stored.

Auto power save

TP6820 also has auto-power-save mode. If it doesn't be used for 10 seconds, TP6820 will change to power save mode and also control the external SRAM and CMOS sensor to power save mode. By receiving any command from PC or pressing snapshot button, it can be waked up and continue to work.

Camera at Portable mode

When camera at portable mode (stand-alone), it acts as a DSC and supports 4 functions: take a picture, erase all pictures, self-timer, and real time wake up.

- Take a picture: user can take a picture by pressing SNAP- key
- ERASE all pictures: user can erase all pictures by pressing SNAP- key and hold more than 6 sec
- Self-timer: TP 6820 will enable auto power saving function to enter suspend mode after 10 sec idle.
- Real-time wake up: TP 6820 will enable camera from suspend mode

Camera at On-Line mode

When connecting to PC through RS232 interface, camera is at on-line mode and can act as a live view camera controlled by either host or camera itself.

- Host Control
 - One Click to see live pictures in Monitor.
 - One Click to take a picture, picture stored in host working area.



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- One Click to **take 12concecutive pictures**, picture stored in host working area.
- One Click to **connect camera and transfer pictures** from camera device to host working area. .
- One Click to **erase all pictures** in camera device
- Device Control
- Press snap key to take a picture, picture stored in camera device.
- Press snap key more than 6 sec to erase all picture in camera device.

Indicator (LED & Buzzer) Descriptions

Two external components, LED and buzzer, should show the status of camera by will work at the same time to device when the snapshot button pressed. Its relationship is showed below.

Camera @Portable Mode	BUZZER	LED
SNAP Mode: press SNAP –KEY to take a picture		
Effective SNAP: Take a picture	One Beep	ON when SNAP processing OFF when SNAP done
LAST SNAP: Take a picture and indicate memory full	One Beep to SNAP One long Beep to indicate memory full	ON when SNAP processing OFF when SNAP done ON-OFF again to indicate memory full
Memory FULL SNAP: Not take a picture	3 Short BEEP	3 FLASH
Invalid SNAP: SNAP during camera busy, not take a picture.	No action	No extra action

ERASE Mode: press SNAP –KEY and hold more than 6 sec to erase all pictures		
Effective ERASE: One Long BEEP in the end to indicate all pictures erased. (There are 3 process when press SNAP-KEY and hold, in the beginning is SNAP function, then warning occurred when hold over 3 sec. Finally One Long BEEP to indicate all pictures erased.)		
SNAP	The same as SNAP mode	The same as SNAP mode
Warning when SNAP-KEY hold over 3 sec	9 Short BEEPS	9 FLASH
Memory EMPTY	One Long BEEP to indicate	One Long ON-OFF to



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	memory empty.	indicate memory empty.
Invalid ERASE: If SNAP-KEY not holds over 6 sec, that is to say, One Long BEEP not occurred, all the pictures still stored in camera device.		



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Absolute Maximum Ratings

Parameter	Rating	Unit
Operating Temperature	0 - +70	
Storage Temperature	-65 - +150	
Voltage on Any Pin	-0.5 - +7	V
Power Dissipation	0.2	W

Note: Stresses above those listed may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

DC Electrical Characteristic

(TA=0°C-70°C, V_{CC}=5±10%, V_{SS}=0V)

Parameter	Symbol	Limit			Unit	Test condition
		Min	typ	Max		
Input Low Voltage	V _{IL}	-0.5		0.2V _{CC} -0.1	V	
Input High Voltage (Except XTAL1, RST, P3.0~P3.2)	V _{IH}	0.2V _{CC} +0.9		V _{CC} +0.5	V	
Input High Voltage (XTAL1, RST)	V _{IH1}	0.9V _{CC}		V _{CC} +0.5	V	
Input High Voltage (P3.0~P3.2)	V _{IH2}	0.2 V _{CC} +2.5		V _{CC} +0.5	V	
Output Low Voltage (Except P3.0~P3.2, LED0~2)	V _{OL}			0.45	V	I _{OL} =1.6mA
Output Low Voltage (P3.0~P3.2, LED0~2)	V _{OL1}			0.7	V	I _{OL} =1.6mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} =-60 μ A
Input Leakage Current (Except P3.6, P3.7)	I _{IL}			-50	μ A	V _{in} =0.45V
Input Leakage Current (Port0)	I _{IL1}			10	μ A	V _{in} = V _{CC}
Input Leakage Current (P3.6, P3.7)	I _{IL2}			-350	μ A	V _{in} =0.45V
Power Supply Current	I _{CC}		15	30	mA	F _{OP} =20MHz
Idle Mode Supply Current	I _{ID}		1.7	5	mA	
Power Down Mode Supply Current	I _{PD}		5	50	μ A	
Capacitance of I/O Buffer	C _{IO}			10	pF	F _{OP} =1MHz
Internal Reset Pull-Up Resistor	R _{RST}	50		150	K Ω	

Notes: (1) All DC electrical characteristics are measured at 25 .

(2) It is suggested that conventional precautions should be taken to avoid applying voltages greater than the absolute maximum ratings.

AC Electrical Characteristic

$T_A = 0$ to $+70$, or $T_A = -40$ to $+85$ / $+125$, $V_{CC} = 5V \pm 10\%$, $V_{SS} = 0V^1$

External Clock							
T_{CHCX}	5	High time ²	20		20	$t_{CLCL} - t_{LOW}$	ns
T_{CLCX}	5	Low time ²	20		20	$t_{CLCL} - t_{HIGH}$	ns
T_{CLCH}	5	Rise time ²		20		10	ns
T_{CHCL}	5	Fall time ²		20		10	ns

Notes: 1. Parameters are valid over operating temperature range unless otherwise specified.

2. These values are characterized but not 100% production tested.

EXPLANATION OF THE AC SYMBOLS

Each timing symbol has five characters. The first character is always "t" (=time). The other characters, depending on their positions, indicate the name of a signal or the logical status of that signal. The designations are:

C - Clock

H - Logic level high

L - Logic level low

t - Time

X - No longer a valid logic level

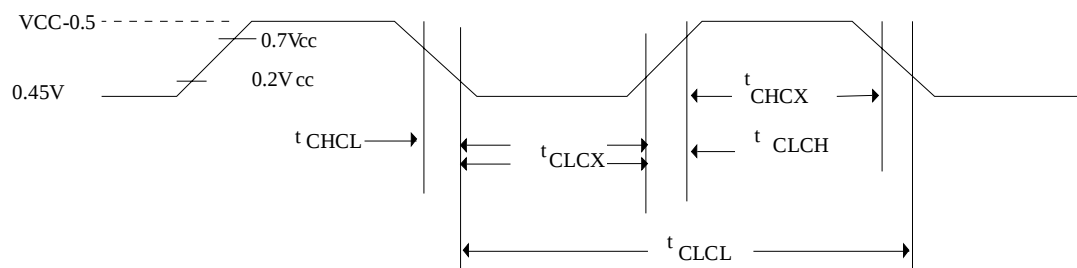


Figure 3. External Clock Drive



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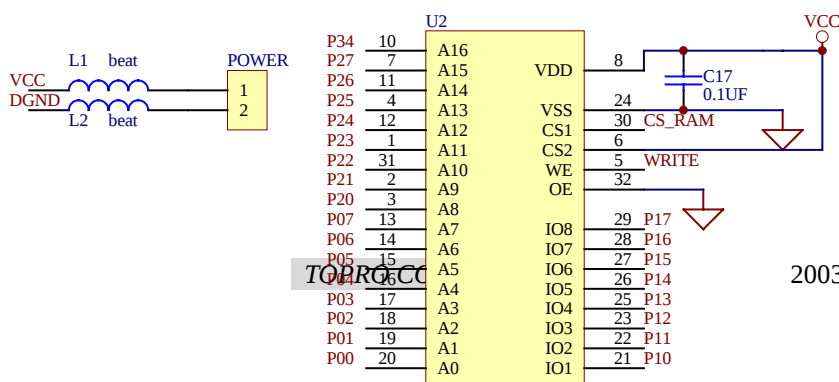
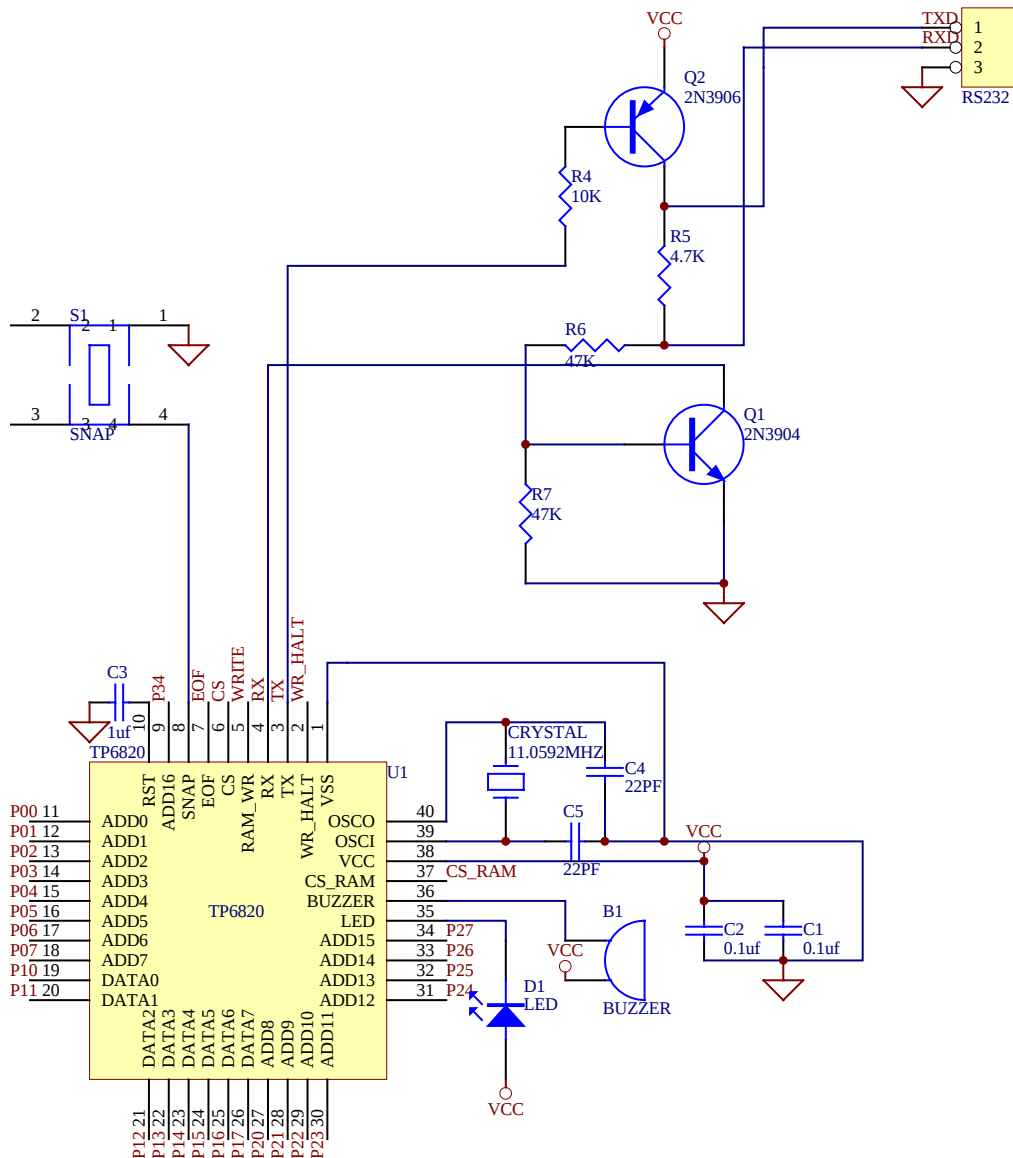
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Application Diagrams

Application circuit

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