Dual-Input Smart Push-Button Reset IC

Features

- Operating Range: 1.6V~5.5V
- Supply Current in standby: < 1µA (V_{DD} = 4V)
- Output Delay time (RST0 & 1 input pin): 10s Typ.
- Reset Pulse Time (SRO, nSRO Output): 400ms Typ.
- ESD Protection
  - Human Body Model: 2kV
  - Charged Device Model: 1.5kV
- Over-Temperature Protection
- -40°C to +85°C Temperature Range

Applications

- Mobile Phones & Tablets
- Wearable Devices
- Portable Instruments
- Remote Controls
- Gaming
- DSC, DVR, GPS

Brief Description

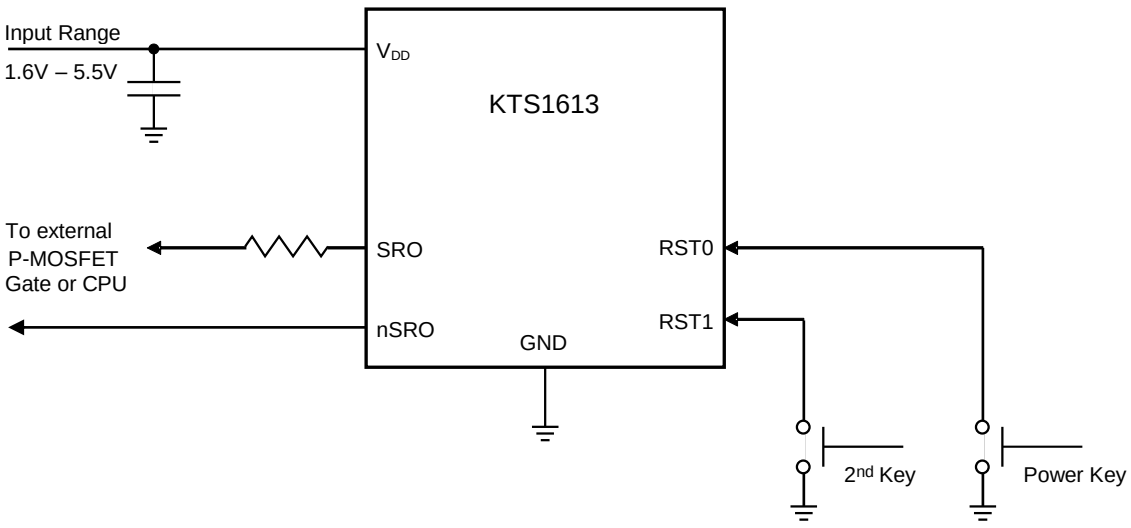
The KTS1613 is a two input, two output Smart Push-Button Reset IC. A reset pulse is generated for a fixed discharge time (400ms typ) after both manual reset inputs have been held low for the reset request time of 10s.

The KTS1613 operates over the 1.6 V to 5.5V supply voltage range, consuming less than 10µA of supply current at 4V.

The KTS1613 has 2 digital output pins, nSRO and SRO. nSRO is an active-low open-drain output pin. SRO is an active-high push-pull output which can be used to control a P-channel MOSFET battery disconnect switch. It features a soft turn on and turn off feature to reduce VBAT rising and falling overshoot.

The KTS1613 is available in lead-free, fully green compliant, small 10-pin UQFN 2.0mm x 1.5mm package.

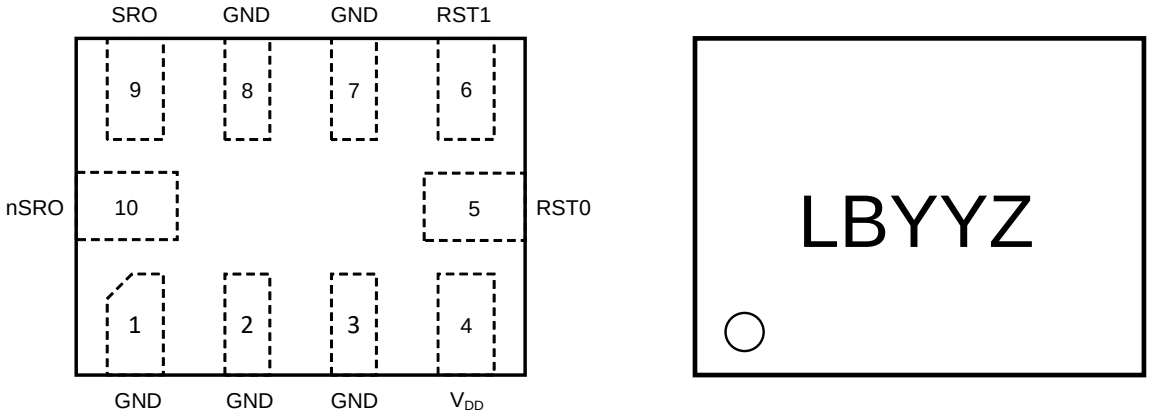
Typical Application



Pin Descriptions

Pin #	Name	Function	IO Characteristics
1, 2, 3, 7, 8	GND	Ground connection.	-
4	V_{DD}	Power supply input.	-
5	RST0	Reset signal input 0.	Internal pull down (8MΩ)
6	RST1	Reset signal input 1.	No internal pull up resistor
9	SRO	Digital output. Active HIGH (V_{DD})	Push-Pull
10	nSRO	Digital output, Active LOW	Open-drain

UQFN2.0x1.5-10
(Top View)



10-Lead 2.0mm x 1.50mm x 0.55mm
UQFN Package

Top Mark
LB = Device ID Code, YY = Date Code, Z = Assembly Code

Absolute Maximum Ratings[1]

(T_A = 25°C unless otherwise noted)

Symbol	Description	Value	Units
V_{DD}	Power supply input.	-0.3 to +12 (DC)	V
RST0, RST1, SRO, nSRO	Reset inputs, Digital outputs.	-0.3 to +6	V
T_J	Maximum Junction Temperature Range	-40 to 150	°C
T_S	Storage Temperature Range	-65 to 150	
T_{LEAD}	Maximum Soldering Temperature (at leads, 10sec)	300	

Thermal Capabilities[2]

Symbol	Description	Value	Units
θ_{JA}	Thermal Resistance – Junction to Ambient	73	°C/W
P_D	Maximum Power Dissipation at $T_A \leq 25°C$	1712	mW
$\Delta P_D/°C$	Derating Factor Above T_A = 25°C	13.7	mW/°C

Ordering Information

Part Number	Marking[3]	Operating Temperature	Package
KTS1613EQU-TR	LBYYZ	-40°C to +85°C	UQFN2.0x1.5-10

Recommended Operating Range[4]

Description	Value
V_{DD}	-0.3V to 5.5V
RST0, RST1 SRO, nSRO	-0.3V to 5V

1. Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. Functional operation at conditions other than the operating conditions specified is not implied. Only one Absolute Maximum rating should be applied at any one time.
2. Junction to Ambient thermal resistance is highly dependent on PCB layout. Values are based on thermal properties of the device when soldered to a PCB board.
3. "LBYYZ" is the device code, date code and assembly code respectively.
4. The device is not guaranteed to function outside of recommended operating condition.

Electrical Characteristics[5]

The *Min* and *Max* specs are applied over the full operation temperature range of -40°C to +85°C, V_{IN} = 1.6V to 5.5V unless otherwise noted, while *Typ* values are specified at V_{DD} = 4.0V and room temperature (T_A = 25°C) unless otherwise noted**.**

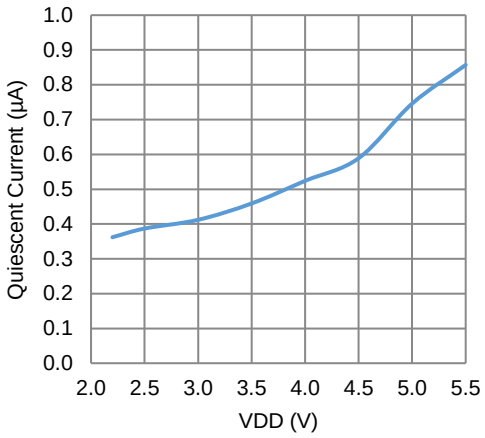
Symbol	Description	Conditions	Min	Typ	Max	Units
Basic Operation						
V_{DD}	Input Voltage Range		1.6		5.5	V
I_Q	Quiescent supply current	Standby (Exclude pull up/down resistor, Internal oscillator is off, V_{DD} = 4V)			1	µA
I_{SS}	Operation current	Active (Before reset signal output, Internal oscillator is on, V_{DD} = 4V)			10	µA
Digital IO						
V_{IL}	Digital input logic low level	RST0, RST1 pins V_{DD} = 2.5V to 4.6V			0.4	V
V_{IH}	Digital input logic high level		1.0			V
V_{OL}	Digital output logic low level	SRO pin, I = 1.2µA (V_{DD} = 4V)			0.3	V
V_{OH}	Digital output logic high level		0.85*V_{DD}	V_{DD}		V
I_L	RST0/RST1 input leakage current		-	-	1	µA
V_{OL}	Digital output logic low level	nSRO, Io = 2mA			0.3	V
RESET						
T_R	Reset request time	V_{DD} = 4V	8.5	10	11.5	s
T_D	Reset pulse time			400		ms
ESD PROTECTION						
V_{ESD}	Human Body Model (HBM)	All pins		±2		kV
	IEC61000-4-2 Contact discharge	V_{DD} pin		±8		kV
	IEC61000-4-2 Air gap discharge	V_{DD} pin		±15		kV

5. All specifications are 100% production tested at T_A = +25°C, unless otherwise noted. Specifications are over -40°C to +85°C and are guaranteed by design.

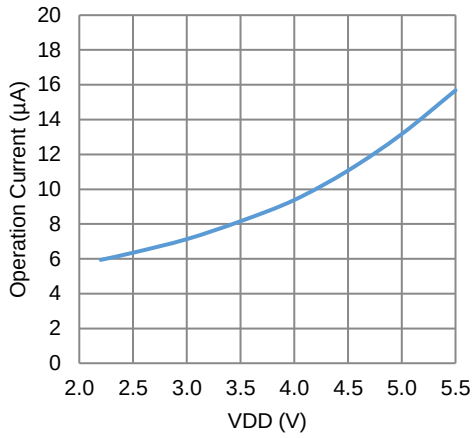
Typical Characteristics

V_{DD} = 4V, T_A = 25°C unless otherwise specified.

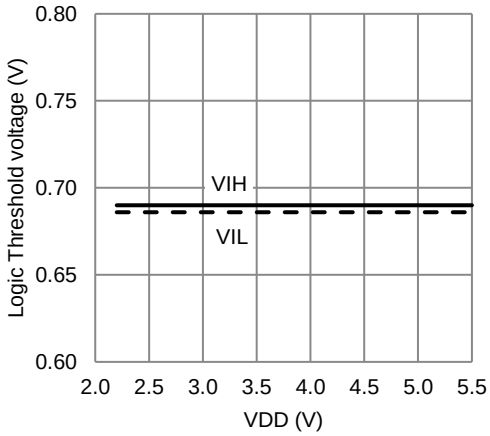
Quiescent Current vs. VDD



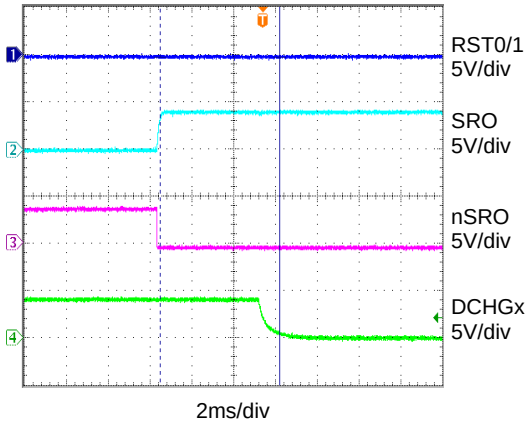
Operation Current vs. VDD (before Reset pulse)



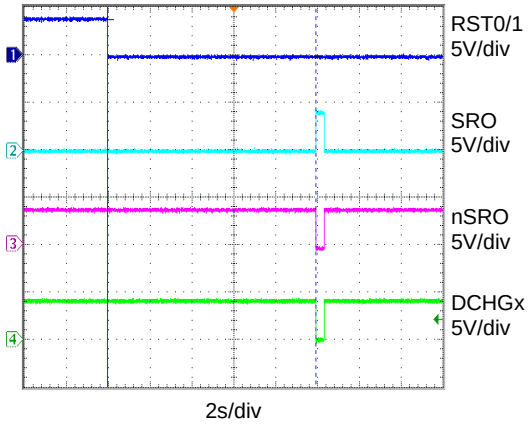
RST0/RST1 Digital Input Logic Threshold Vs. VDD



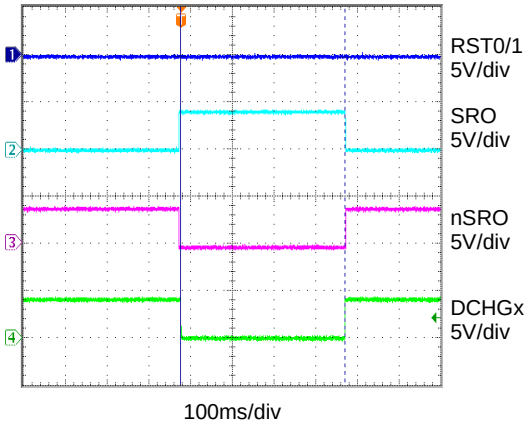
Reset Mode Trigger



Enter Reset Mode



Reset Mode Pulse



Function Description

Reset Timing

Reset occurs only after both RST0 and RST1 stay low for Tr duration, SRO output goes high for Td = 400ms, then SRO output goes low.

If RST0 & RST1 stay low indefinitely, KTS1613 only resets one time.

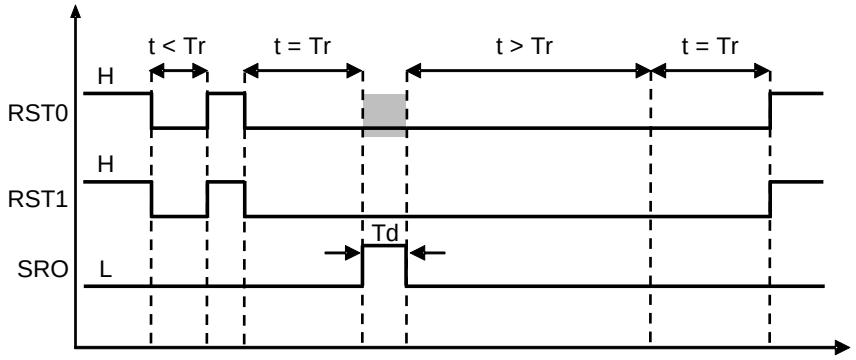


Figure 1. Reset Timing

Soft Turn ON and OFF

SRO output has soft turn on and turn off feature in order to reduce VBAT rising and falling overshoot. The output rising and falling time equal to 2ms typical.

nSRO is an open-drain output pin, there is no soft turn on & off feature for nSRO. The timing of SRO and nSRO is shown in Figure 4.

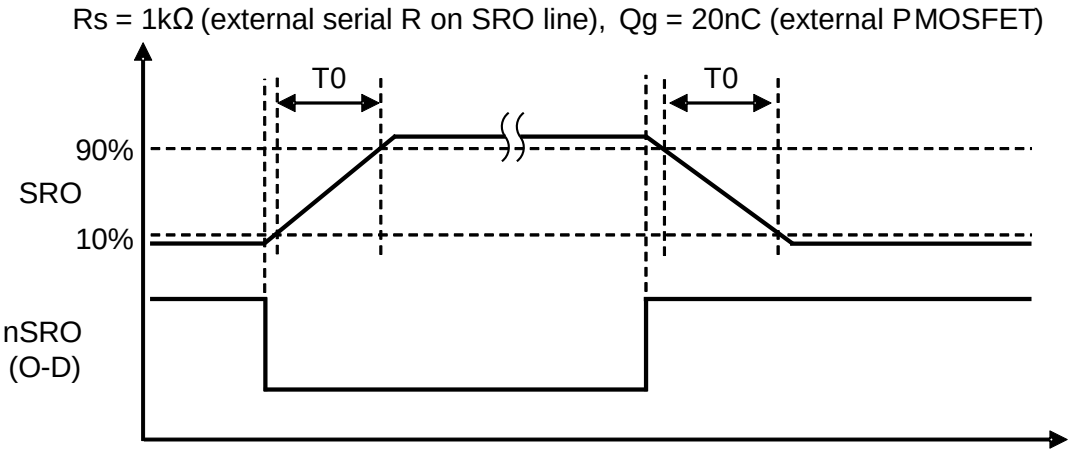


Figure 2. SRO Soft Turn ON and OFF Timing

Functional Block Diagram

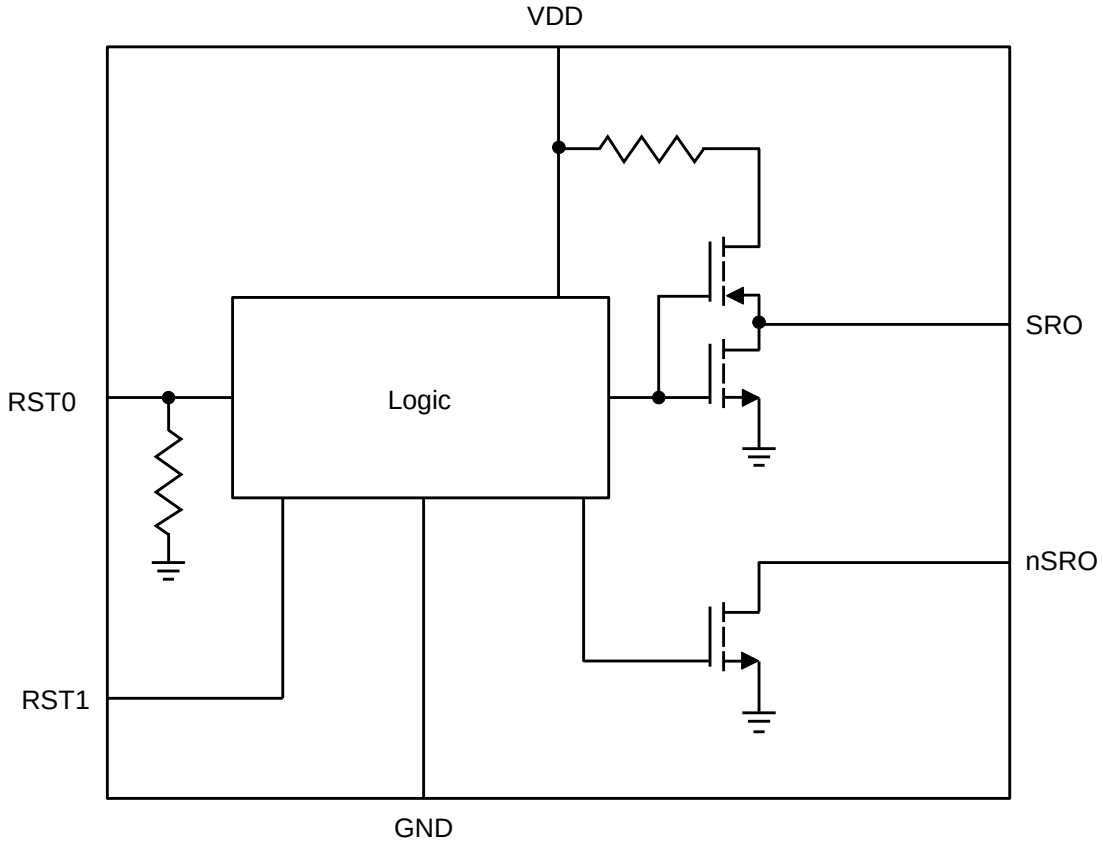


Figure 3. Block Diagram

Application Circuit

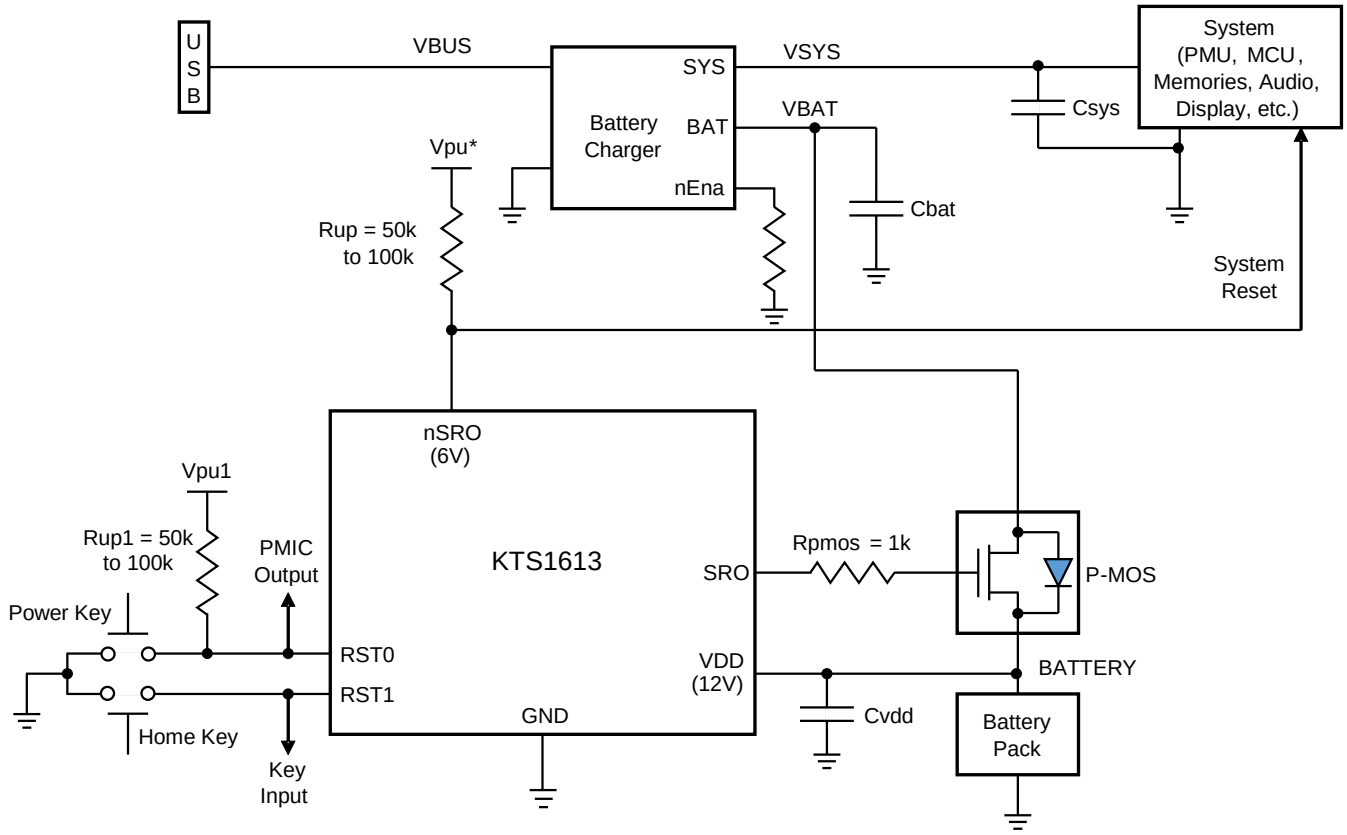


Figure 4. Application Circuit