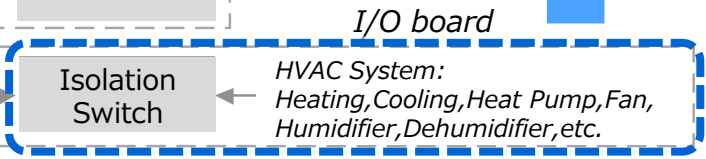
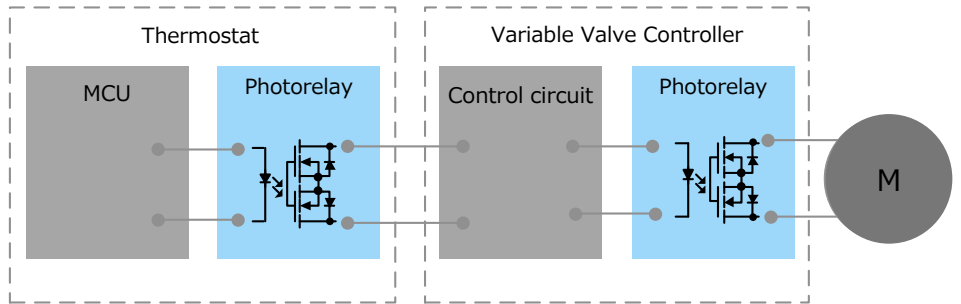
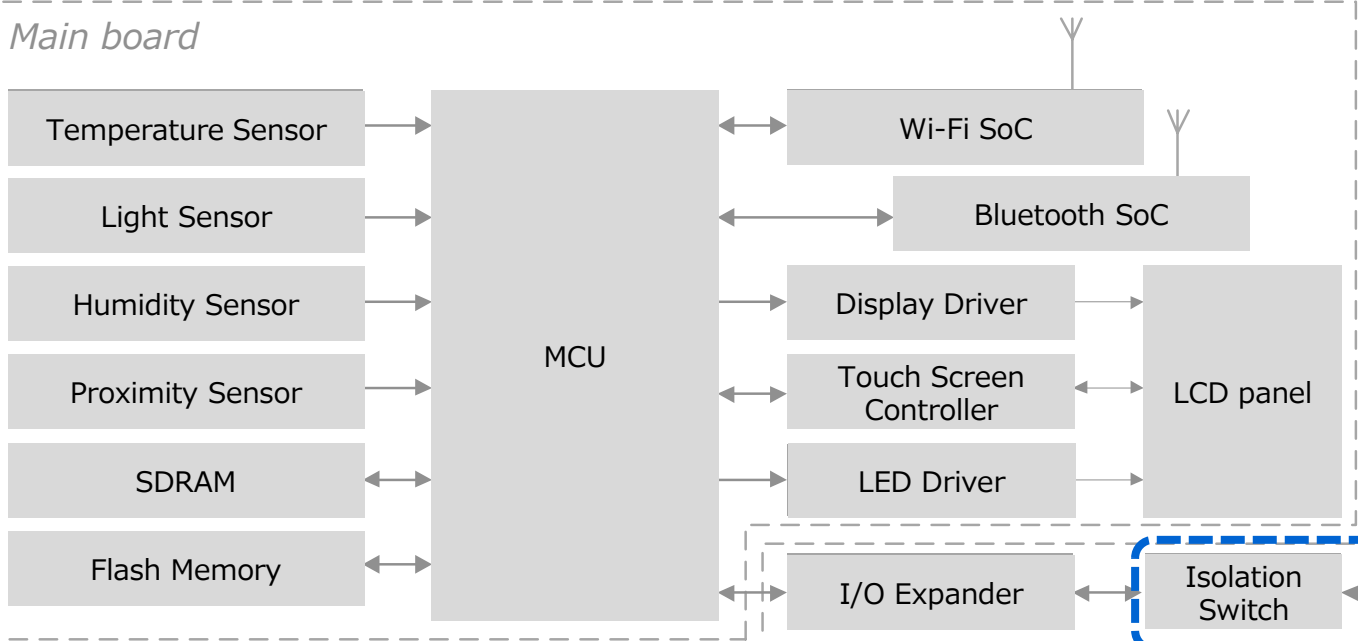
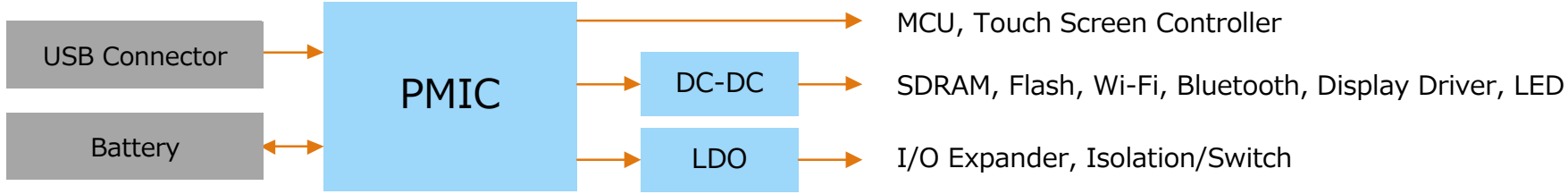


**TOSHIBA**

# Application example of photorelay, replacing from Mechanical relay (Thermostat)

2019-04  
Rev. 1.0

# Block Diagram for Thermostat



# Device solution for customer's problems

Regarding to design thermostat, there are important point of "Space saving", "Long life time, Maintenance free", "Low power consumption", we will propose 3 solutions from our point of view.

Space saving



High reliability



Low power consumption



# Mechanical relay common specifications for Thermostats

	Mechanical Relay specification
Package Size	10 x 6 x 5.7 mm ~ 16 x 10 x 8 mm
Coil voltage range	1.5 ~ 48 VDC
Contact arrangement	DPDT (2 form C) or SPDT (1 form C)
Initial contact resistance	<100 mΩ
Normal operating current	~ 5.0 VDC, 40.0 mA
Max. switching power	60 W, 62.5 VA
Max. switching voltage	250 VAC, 220 VDC
Max. switching current	3 A
Operate time [Set time]	~ 5 ms
Release time [Reset time]	~ 5 ms
Ambient temperature	-40°C to +85°C

# Recommendation for Mechanical Relay Replacement

Characteristics	TLP3103	TLP3107	TLP3109	TLP3555A	TLP3556A	TLP3823	TLP3825
Package	2.54SOP6 (6.3 × 7.0 × 2.1 mm)			DIP4 (4.58 × 7.62 × 3.65 mm)		DIP8 (9.66x7.62x3.65 mm)	
Forward voltage @IF = 10mA	1.18 V(min), 1.33 V(typ), 1.48 V(max)			1.5 V(min), 1.64 V(typ), 1.8 V(max)		1.5 V(min), 1.64 V(typ), 1.8 V(max)	
Contact arrangement	1a						
On-state resistance (RON)	70 mΩ	60 mΩ	70 mΩ	100 mΩ	200 mΩ	150 mΩ	500 mΩ
Diode power dissipation (PD)	50 mW						
Off-state output terminal voltage (VOFF)	60 V		100 V	60 V	100 V	100 V	200 V
On-state current (ION/IONP)	2.3 A/7 A	3.3 A/10 A	2 A/6 A	3 A/9 A	2 A/6 A	3 A/9 A	1.5 A/4.5 A
Turn-ON time (tON)	Max. 5.0 ms			Max. 2.0 ms		Max. 5.0 ms	
Turn-OFF time (tOFF)	Max 1.0 ms			Max 1.0 ms	Max 0.5 ms	Max 1.0 ms	
Operating temperature (Topr)	-40°C to +85°C			-40°C to +110°C		-40°C to +110°C	
Comment	<ul style="list-style-type: none"> <li>■ TOSHIBA photo relays (VOFF = 90 to 600 VDC) are recommended for thermostats mechanical relay replacement.</li> <li>■ Space savings can be achieved using DIP4, 2.54SOP6 package.</li> <li>■ Photo relays are more reliable and last longer than mechanical relays.</li> </ul>						

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