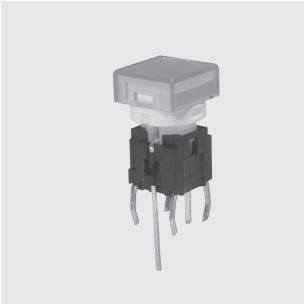
LTR1·2 & LTM1·2

Ultra-Miniature Illuminated Pushbutton Switches



RoHS Compliant

■Series

Conductive Rubber Contact (LTR type)
Metal Contact (LTM type)

■Features

1. Full Surface Illumination (LTM2, LTMG2, LTR2 Series
   Miniature, low-cost switch with full surface illumination by LED. Buttons available in square shape (7.5/10mm sq.) and round shape (7.5/10mm dia.) in 3 colors (Red, Green, Yellow). Non-illuminated switches also available (LTM1, LTMG1, LTR1 series).
2. Two Types of Contacts
   LTR series: Conductive rubber contact for soft tactile feel. LTM/LTMG series: Metal contact for sharp tactile feel.
3. PC Board Mount
   Terminal pitch is in inches (multiples of 2.54 mm) for all models. The unique terminal shape prevents the terminals from coming loose from the PC board during dip soldering.
4. Enhanced Resistance to Soldering Heat
   Improved terminal structure protects the contacts from soldering heat. In addition, each pole has two terminals which can be used as a jumper wire.

■Specifications

Rating	**LTR**：10 mA 12 VDC Max. 10 μA Min.
	LTM：1 VA Max. (50 mA Max. 48 VDC Max) 0.5 mA Min.
	LTMG：1 VA Max. (50 mA Max. 48 VDC Max.) 10 μA Min.
Initial Contact Resistance	**LTR**：500 Ω Max. (1mA 2 VDC at 1.47 N {150 gf})
	LTM：100 mΩ max. (1.5 mA 200 μVAC at 1.96 N {200 gf})
Dielectric Strength	250 VAC 1 minute
Insulation Resistance	100 MΩ Min. (100 VDC)
Electrical Life	**LTR**：100,000 operations
	LTM：300,000 operations
Contact Bounce	**LTR**：3 msec. Max. (Initial value)
	LTM：10 msec. Max. (Initial value)
Travel	**LTR**：1 mm
	LTM：0.25 mm
Operating Force (at peak force)	**LTR**：0.98±0.39 N
	LTM：1.37±0.39 N
Operating Temperature Range	−25～+70℃
Storage Temperature Range	−40～+70℃

■Part Numbering

LT M G 2 – 01 – L2

- LT: Series Code
- M: Type of Contact
- G: Contact Plating
- 2: Structure
- 01: LED luminance
- L2: LED Color

■Type of Contacts and Contact Plating

Code	Type of Contact	Contact Plating
R	Conductive rubber contact	Gold plated
M	Metal contact	Silver plated
MG	Metal contact	Gold plated

Note : The contacts of LTR series are all gold-plated.

■Structure

Fig.	1	2
Structure	 Without LED (Non-illuminated)	 With LED

■LED Specifications

LTR2 • LTM2 • LTMG2

Code	Color	Luminance	Forward Current (I_F)	Forward V (V_F)		Reverse Voltage (V_R)
				nom.	max.	
L2	Red	Normal	30mA	2.0V	2.5V	DC5V
L5	Green		25mA	2.2V	2.5V	DC5V
L8	Yellow		30mA	2.1V	2.5V	DC5V
L2	Red	High	25mA	2.0V	2.6V	DC5V
L5	Green		25mA	3.2V	3.8V	DC5V
L8	Yellow		25mA	2.0V	2.6V	DC5V

■Operating Force vs. Stroke Characteristics

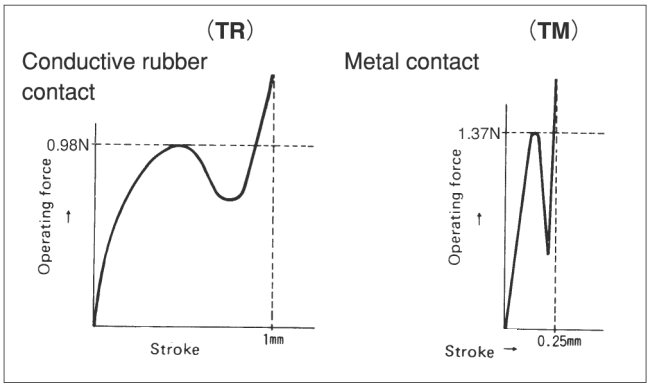
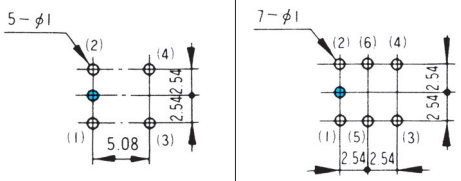


Fig.**A**

■PC Hole Layouts

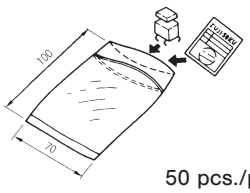
Type	LTR1/LTM1	LTR2/LTM2
Dimensions (Top view)	● : For positioning boss 	

■LED liminance

Symbol	LED luminance
01	Normal luminance
31	High luminance

■Packaging Specifications

Zipper Plastic Bag



50 pcs./pack

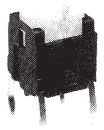
■Table of Part Numbers

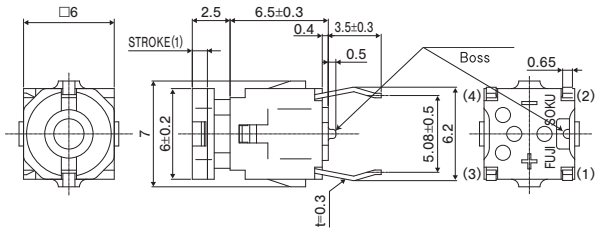
Series		LTM			LTR	
Contact plating		Silver Plated		Gold Plated	Gold Plated	
Non-illuminated		**LTM1–01**	–	**LTMG1–01**	**LTR1–01**	–
LED color	Red	**LTM2–01–L2**	**LTM2–31–L2**	**★LTMG2–01–L2**	**LTR2–01–L2**	**LTR2–31–L2**
	Green	**LTM2–01–L5**	**LTM2–31–L5**	**★LTMG2–01–L5**	**LTR2–01–L5**	**LTR2–31–L5**
	Yellow	**LTM2–01–L8**	**LTM2–31–L8**	**★LTMG2–01–L8**	**LTR2–01–L8**	**LTR2–31–L8**

★ : Made to order products.

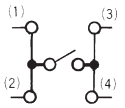
LTR1

SPST
Without LED (Non-illuminated)



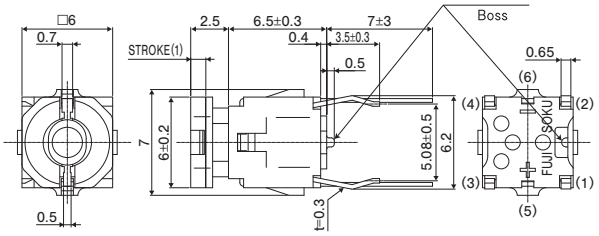


Terminal numbers are not shown on the switch.

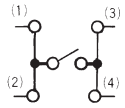
Part No.	Switching function		Circuit diagrams
		↓Push	
LTR1-01	OFF	(ON)	
Connecting terminals	—	1 — 3 2 4	

LTR2

SPST
With LED



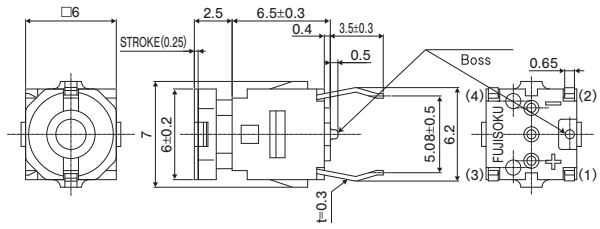
Terminal numbers are not shown on the switch.

Part No.	Switching function		Circuit diagrams
		↓Push	
LTR2-01-L■ **LTR2-31-L■**	OFF	(ON)	
Connecting terminals	—	1 — 3 2 4	
LED circuit			

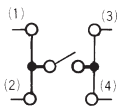
LTM (Metal Contact)

LTM1

SPST
Without LED (Non-illuminated)

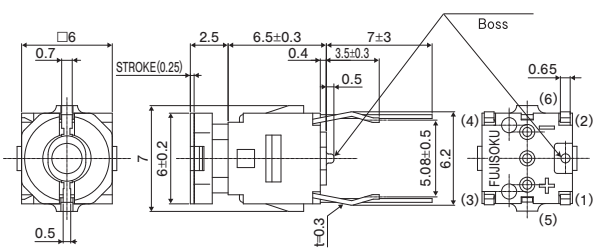


Terminal numbers are not shown on the switch.

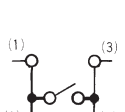
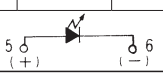
Part No.	Switching function		Circuit diagrams
		↓Push	
LTM1-01 **LTMG1-01**	OFF	(ON)	
Connecting terminals	—	1 — 3 2 4	

LTM2

SPST
With LED



Terminal numbers are not shown on the switch.

Part No.	Switching function		Circuit diagrams
		↓Push	
LTM2-01-L■ **LTMG2-01-L■** **LTM2-31-L■**	OFF	(ON)	
Connecting terminals	—	1 — 3 2 4	
LED circuit			

((ON) : Momentary　　LED color to be specified in ■.　　■ : Refer to "Table of Part Numbers"

■Soldering

Series	LTM	LTR
Manual soldering	380℃ Max. 3sec. Max.	380℃ Max. 3sec. Max.
Auto soldering	275℃ Max. 6sec. Max.	265℃ Max. 6sec. Max.

- Preheating in the flow line should be 80~120℃ , 120 sec. max.

● Do not dip solder the switches with color buttons or mounting frames attached. Soldering heat may deform the accessories or cause ingress of flux.

■Flux Cleaning

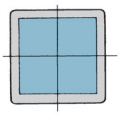
(1)Solvents : Fluorine or Alcohl type

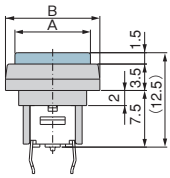
(2)LTM and LTR series are not washable. To wash the PC board, clean the soldering surface of the PC board with a brush so that the switch is not exposed to the cleaning solution.

(3)After soldering, wait until the temperature of the terminals cool down to 90℃ or below or until the parts are exposed to room temperature for more than 5 min. before washing.

■Dimensions of Assembled Switch

Button	size A	size B
10mm sq.	10mm sq.	12.5mm sq.
10mm dia.	10mm dia.	12.5mm dia.
7.5mm sq.	7.5mm sq.	10mm sq.
7.5mm dia.	7.5mm dia.	10mm dia.





■Ambient Conditions

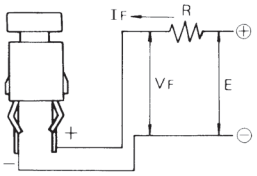
(1)In case of switches with silver-plated contacts, do not use in an environment where there is corrosive gas such as sulfuric or ammonia gas which may affect the silver plating.

(2)LTM and LTR series are open-structure switches and should not be used in a dusty environment.

■Precautions

LED circuit

Current to be applied to the LED must be lower than the forward current (IF) indicated in the LED Specifications of each switches. Resistance value R should be calculated using the formula on the right.



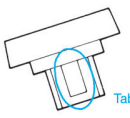
Example : E=5V,

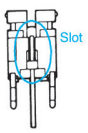
I_F=10mA

$$R=\frac{E-V_F}{I_F} \quad R=\frac{5-2.0}{0.01} \quad =300\Omega$$

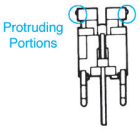
Use V_F=2.0V to calculate.

Accessories mounting





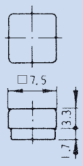
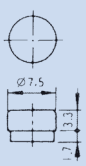
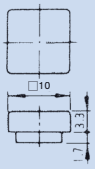
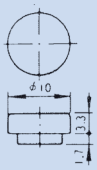
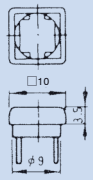
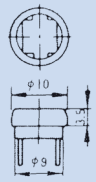
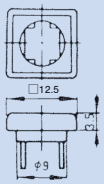
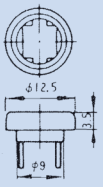
1.Installing the Mounting Frame
Install the mounting frame so that the tab on the frame is in the same direction as the slot on the switch.



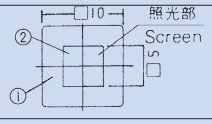
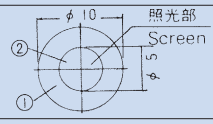
2. Installing the Button
Install the button so that the protrusions on the switch fit into the square holes on the button.
The mounting frame cannot be installed with the switch button installed.

■Optional Accessories

《Sold separately》

Part Name		Color Button			
Dimensions					
Non-illuminated type	Dark gray	**140007480168**	**140007480178**	**140007480188**	**140007480198**
	Gray	**140007480169**	**140007480179**	**140007480189**	**140007480199**
	Light gray	**140007480170**	**140007480180**	**140007480190**	**140007480200**
	Ivory	**140007480171**	**140007480181**	**140007480191**	—
	Red	**140007480172**	—	**140007480192**	**140007480202**
	Green	**140007480174**	—	**140007480194**	**140007480204**
	Blue	**140007480173**	—	**140007480193**	**140007480203**
Illuminated type (Normal luminance)	Clear	**140007480422**	**140007480451**	**140007480505**	**140007480506**
	Red clear	**140007480205**	**140007480208**	**140007480211**	**140007480214**
	Green clear	**140007480206**	**140007480209**	**140007480212**	**140007480215**
	Yellow clear	**140007480207**	—	**140007480213**	—
Illuminated type (High luminance)	Clear	**140007480554**	—	—	—
	Green clear	**140007480552**	—	**140007480560**	—
	Yellow clear	**140007480553**	—	**140007480561**	—
Part Name		Mounting Frame			
Dimensions					
Dark gray		**140000340170**	**140000340171**	**140000340168**	**140000340169**
Gray		**140000340179**	**140000340182**	**140000340173**	**140000340176**
Light gray		**140000340180**	**140000340183**	**140000340174**	**140000340177**
Ivory		**140000340181**	—	**140000340175**	**140000340178**

Mounting frame is common to both illuminated and non-illuminated switches.

Part Name		Color Button	
Dimensions			
Illuminated type	LED luminance	Normal luminance	Normal luminance
	②Screen color / ①Color	Clear	Clear
	Dark gray	—	**140007480459**
	Gray	**140007480453**	**140007480460**
	Light gray	**140007480454**	**140007480461**

■Switch Operation

(1) Operating force should be 9.8 N or less.

(2) Do not operate the switch right after soldering.

(3) Do not solder the switch with the actuator pressed down.

Mouser Electronics

Authorized Distributor

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Nidec:

LTR1-01