SERIES 14
Sealed SMT Key Switch

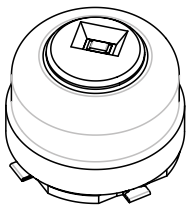
FEATURES
- IP64 Dynamic Seal
- Bright LED illumination
- Excellent tactile feel
- High reliability / long life
- SMT lead free solder process compatible

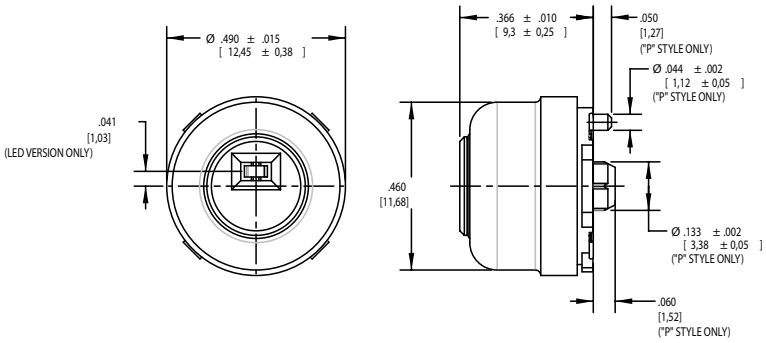
APPLICATIONS
- Multi-function handgrip or joysticks in open or closed cab work vehicles
- Handheld remote controllers for robotics & unmanned vehicles
- Portable medical electronics such as defibrillators
- Bellybox (remote control transmitter)
- Marine & motorcycles

DIMENSIONS in inches [and millimeters]

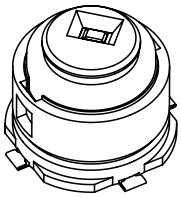
(Unless otherwise noted, standard tolerances are +/- .015 [0, 38])

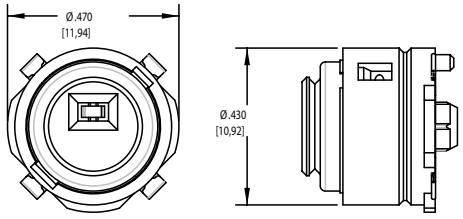
SEALED VERSION





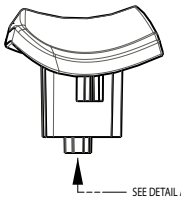
UNSEALED VERSION
(REFER TO SEALED VERSION FOR DIMENSIONS NOT SHOWN)

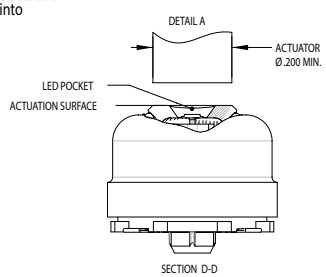


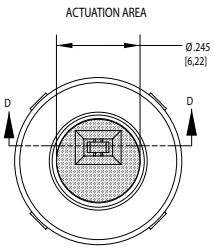


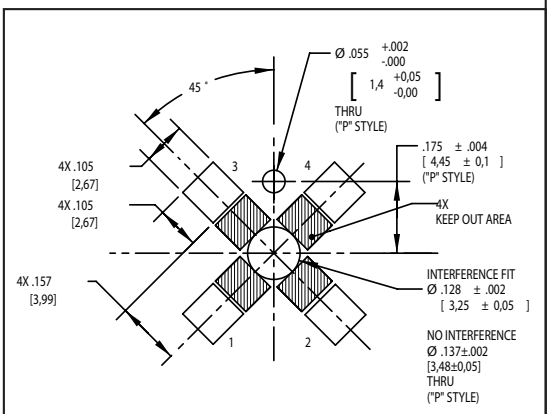
RECOMMENDED ACTUATOR DESIGN

- Axis of actuator to be aligned within Ø .030" of the center of actuation area.
- Actuator must make contact with the actuation surface only and must not protrude into LED pocket.









RECOMMENDED PCB LAYOUT
(THRU HOLES CAN BE OMITTED FOR SWITCH VERSIONS WITHOUT POSTS)

RATINGS

- **Operating Temperature Range:** -40C° to 85°C
- **Storage Temperature Range:** -40°C to 100°C (bulk), -20°C to 60°C (tape)
- **Tactile Feedback Life Span:** 14oz: 1,000,000 cycles 21oz: 200,000 cycles 32oz: 100,000 cycles (All versions have a functional life of 1M cycles)
- **Mechanical Shock:** Medium Impact: Contact openings/closings <10µs, Method I, shock type M, per MIL-STD-202, Method 213
- **Vibration:** 10-500Hz (10g peak), Contact openings/closings <10µs, Per MIL-STD-202, Method 204, test condition A
- **Weight:** 1.16 grams (14SP-L1)
- **Seal* (Rubber Booth & Switch):** Static: IP 67 Dynamic: IP 64

ELECTRICAL & MECHANICAL SPECIFICATIONS

- **Contact Resistance**: Initial: 50 milliohms maximum After life: 250 milliohms maximum
- **Insulation Resistance**:10,000 megohms minimum
- **Dielectric Withstanding Voltage**: At atmospheric pressure: 500Vac min (50Hz, 60s)
- **Actuation Force**: 14oz, 21oz, 32oz (4N, 6N, 9N)
- **Minimum ESD withstanding** (LED Versions): 2KV
- **Travel**: Total: .06" (1,5 mm)
- **Rated Loads**: Min: 10 mA, 2VDC Resistive Max: 100 mA, 30VDC Resistive
- **Switch Bounce**: 5ms max throughout life

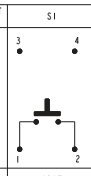
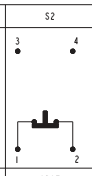
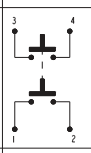
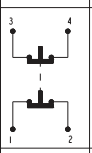
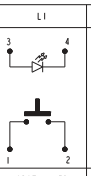
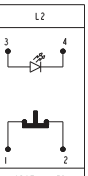
MATERIALS & FINISHES

- **Base:** High temp thermoplastic
- **Button:** High temp thermoplastic
- **Contacts/Leads:** Beryllium copper, gold plated
- **Seal:** Silicone
- **ROHS:** Compliant

REFLOW SOLDERING PROFILE

- Lead free solder process compatible (See www.grayhill.com/products/pushbutton-switches)

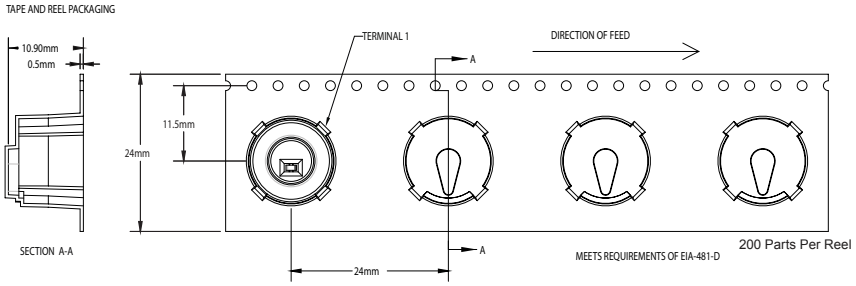
CIRCUITRY

CIRCUIT/CONTACT CONFIGURATION	S1	S2	D1	D2	L1	L2
DIAGRAM						
CIRCUIT	SPST	SPST	DPST	DPST	SPST W/LED	SPST W/LED
CONTACTS	NORMALLY OPEN	NORMALLY CLOSED	NORMALLY OPEN	NORMALLY CLOSED	NORMALLY OPEN	NORMALLY CLOSED

LED CHARACTERISTICS (@T=25°C)

COLOR	WAVELENGTH	LUMINOUS INTENSITY (mcd)	FORWARD VOLTAGE (V)	FORWARD CURRENT (mA)
RED	630nm	55 MIN, 110 TYP, I = 20mA	2.0 TYP, 2.5 MAX.	20 [30 MAX.]
ORANGE	605nm	55 MIN, 100 TYP, I = 20mA	2.0 TYP, 2.5 MAX.	20 [30 MAX.]
YELLOW	590nm	55 MIN, 120 TYP, I = 20mA	2.0 TYP, 2.5 MAX.	20 [30 MAX.]
GREEN	530nm	71 MIN, 280 MAX, I = 5mA	2.85 TYP, 3.00 MAX.	5 [15 MAX.]
BLUE	470nm	14 MIN, 45 MAX, I = 5mA	2.85 TYP, 3.20 MAX.	5 [15 MAX.]
WHITE	CTR = 8200K	90 MIN, 180 MAX, I = 5mA	2.85 TYP, 3.10 MAX.	5 [15 MAX.]

TAPE AND REEL PACKAGING



ORDERING INFORMATION

Available from your local Grayhill Distributor.

For prices and discounts, contact a local sales office, an authorized local distributor or Grayhill.

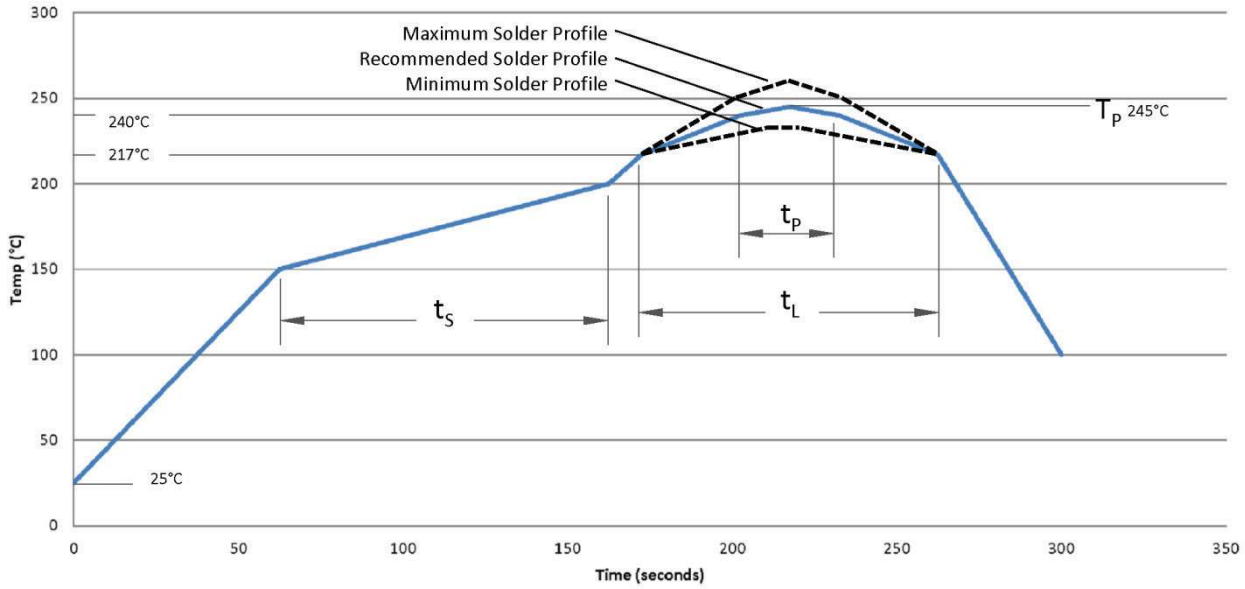
Parts packaged in tape and reel, 200 parts per reel. Orders greater than 200 must be in increments of 200.

14SP-L1-02-B

- 14 Series
- STYLE: A = Unsealed; AP = Unsealed with Posts; S = Sealed; SP = Sealed with Posts
- CIRCUIT: S = SPST; D = DPST; L = SPST with LED
- CONTACTS: 1 = Normally Open; 2 = Normally Closed
- OPERATING FORCE: 01 = 14 oz (Low tactile version); 02 = 21 oz; 03 = 32 oz
- LED COLOR: R = Red; O = Orange; Y = Yellow/Amber; G = Green; B = Blue; W = White; (Leave blank for no LED)

14 Series Reflow Soldering Profile

Reflow soldering profile



	Symbol	Minimum	Recommended	Maximum	Unit
Ramp up rate to T_{Smin}			2	3	°C/s
Soak Time T_{Smin} to T_{Smax}	t_s	60	100	120	s
Ramp up rate T_{Smax} to T_P			2	3	°C/s
Liquidus Temperature	T_L		217		°C
Time above Liquidus	t_L		80	100	s
Peak Temperature	T_P	235	245	260	°C
Time within 5°C of T_P	t_P	10	20	30	s
Ramp down rate T_P to 100°C			3	6	°C/s
Time 25°C to T_P				480	s

Hand Soldering: Soldering iron temp 350°C for 5 seconds