INCH-POUND

MIL-PRF-22885/91C
1 March 2001
SUPERSEDING
MIL-S-22885/91B
27 February 1985

PERFORMANCE SPECIFICATION SHEET

SWITCH, PUSHBUTTON, ILLUMINATED, ROCKER, PADDLE, SOLID STATE HALL EFFECT, UNSEALED

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the switches described herein shall consist of this specification and MIL-PRF-22885.

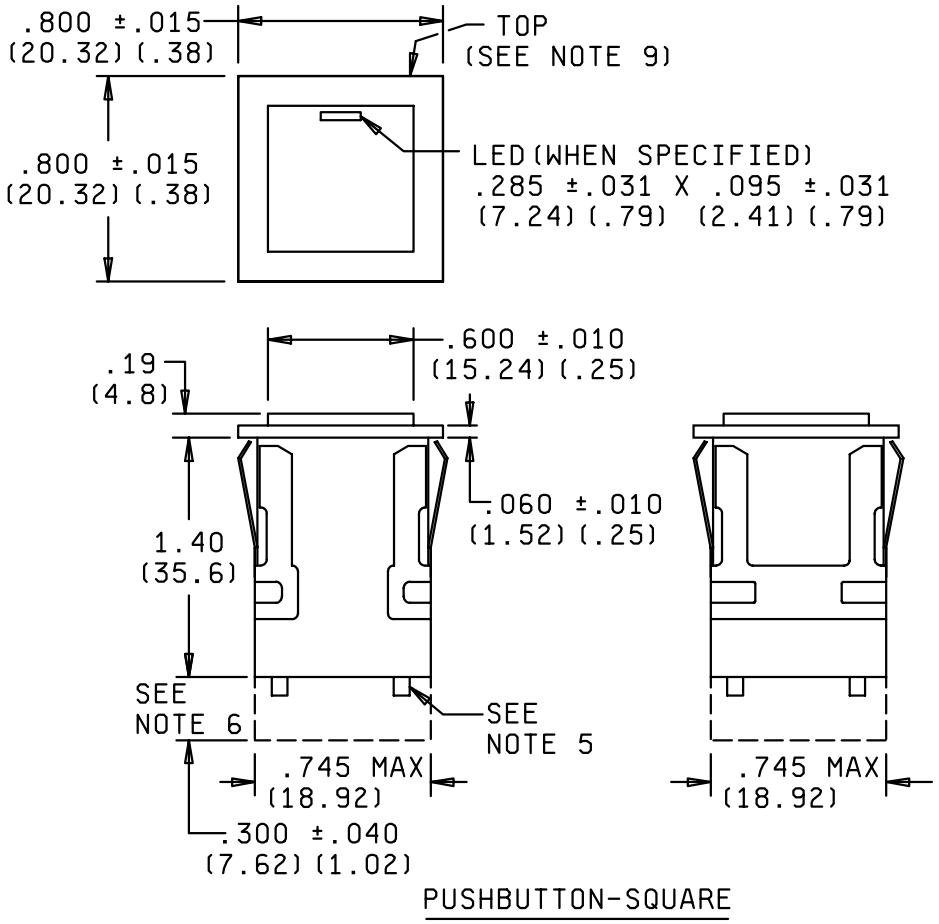


FIGURE 1. Configurations and dimensions.

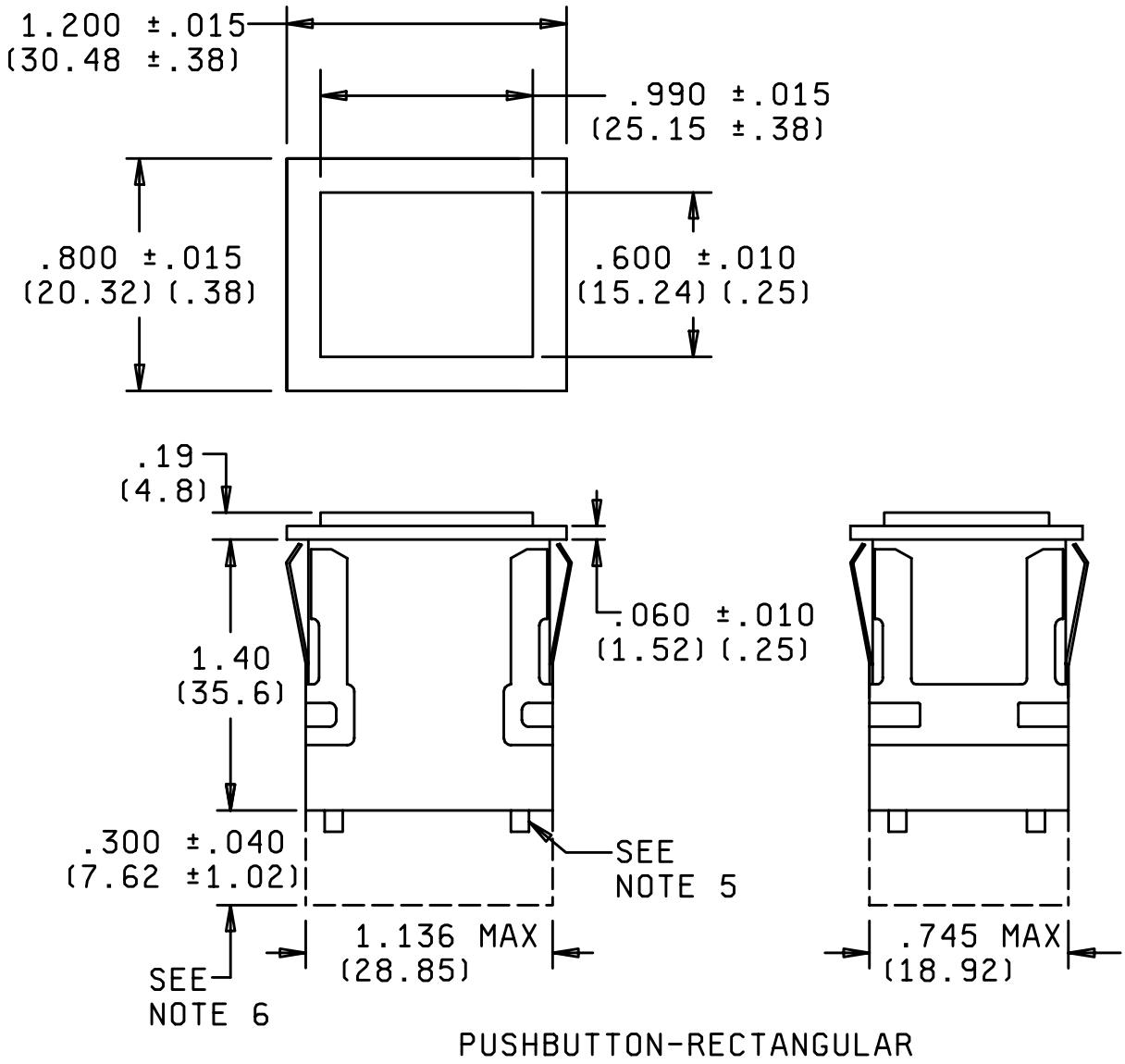


FIGURE 1. Configurations and dimensions - Continued.

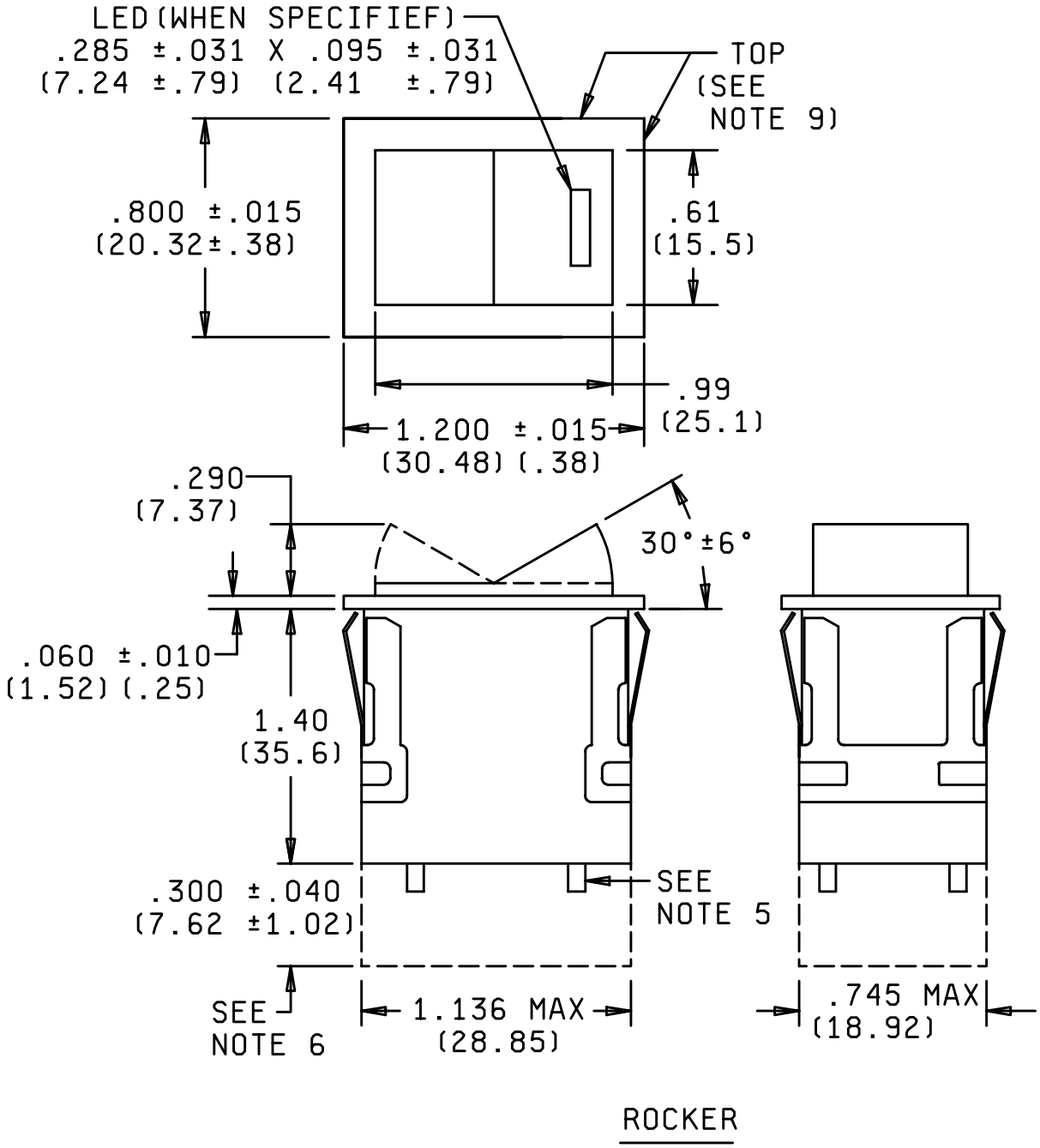
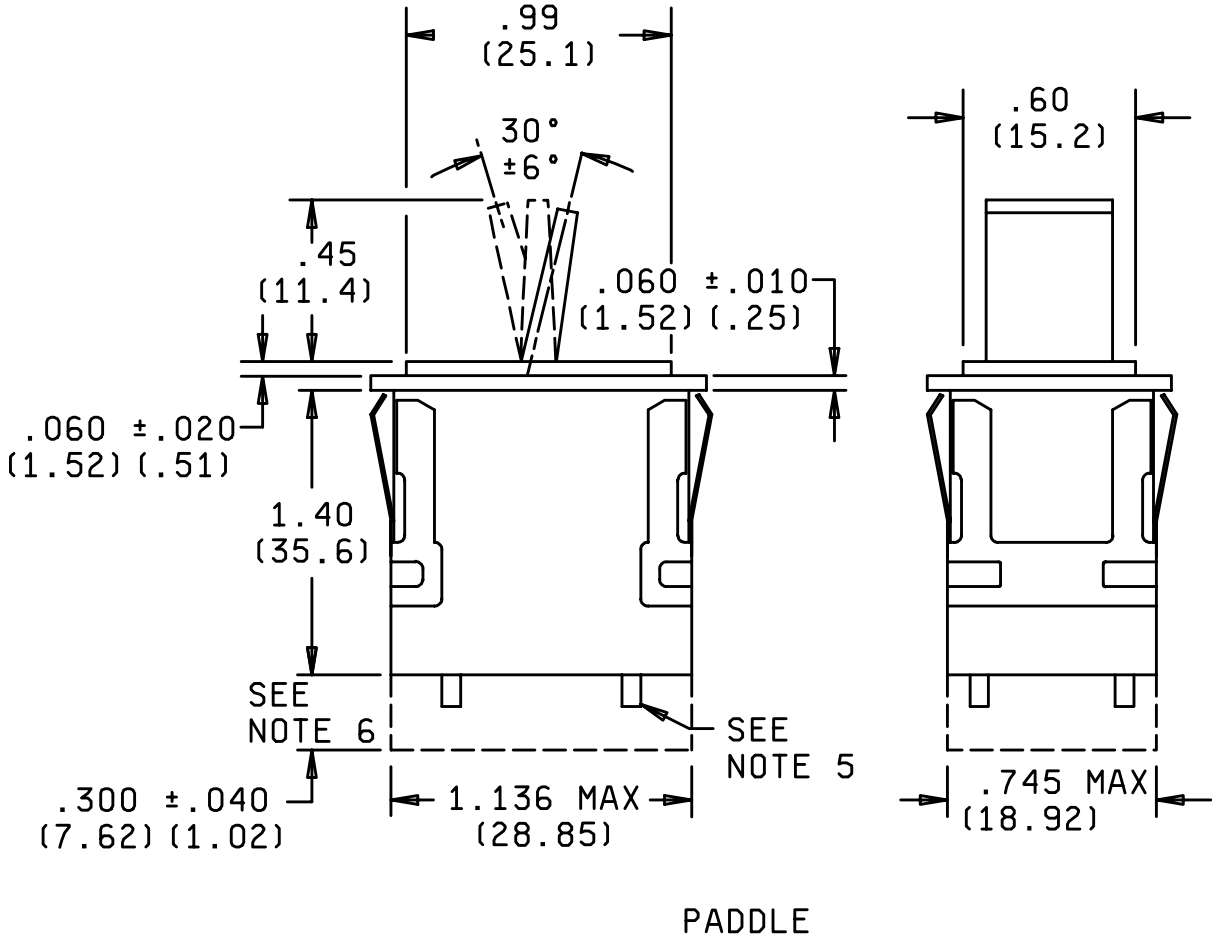


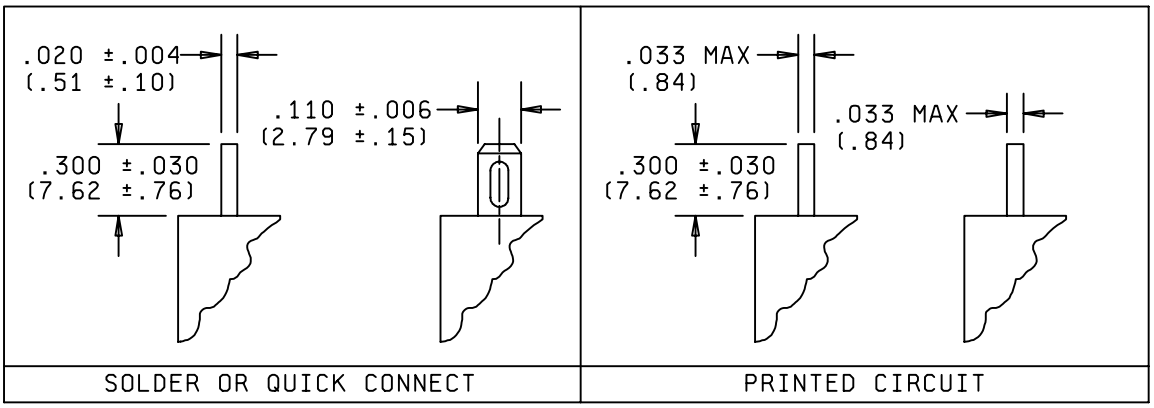
FIGURE 1. Configurations and dimensions - Continued.



NOTES

1. Dimensions are in inches.
2. Tolerances are ±.031 (±0.79 mm) unless otherwise specified.
3. Switches shall mount on .060-.187 (1.52-4.75 mm) panel thickness.
4. The design configuration is optional within envelope dimensions shown.
5. .059 ±.015 (1.50 ±0.38 mm) high x .065 ±.021 (1.65 ±.0.53 mm) diameter standoffs are provided.
6. See figures 2, 3, and 4 for terminal size and location.
7. Metric equivalents are given for general information only.
8. Metric equivalents are in parentheses.
9. Top side(s) of switch is shown to insure proper legend orientation (see figures 3 and 4). See application information.

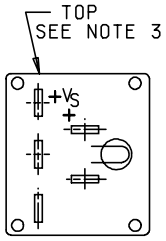
FIGURE 1. Configurations and dimensions - Continued.



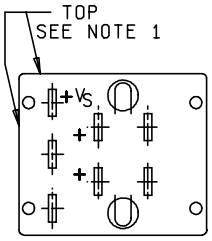
Solder or quick connect - Solder hole will accept two #22 AWG stranded conductor

Printed circuit - See figure 6 for printed circuit board mounting information.

FIGURE 2. Terminal types.

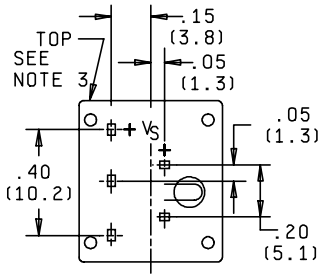


Square configuration

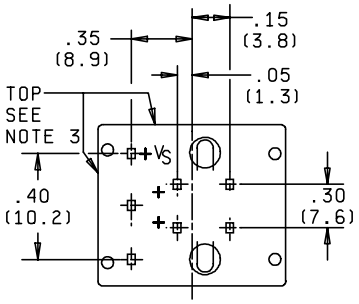


Rectangular configuration

Printed circuit material



Square configuration

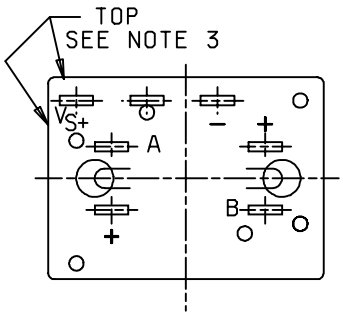


Rectangular configuration

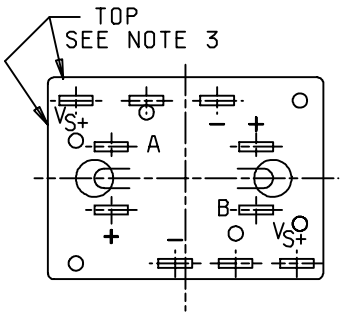
Illuminated devices shown.
For nonilluminated devices
lamp terminals not provided.

NOTES:
1. Dimensions are in inches.
2. Tolerances are ±.031 (±0.79 mm).
3. Top side(s) of switch is shown to insure proper legend orientation. See application information.
4. Metric equivalents are given for general information only.
5. Metric equivalents are in parentheses.
6. Solder terminals. Minimum spacing between terminals, and minimum distance to edge of housing is .045 inch.

FIGURE 3. Terminal location - pushbuttons.

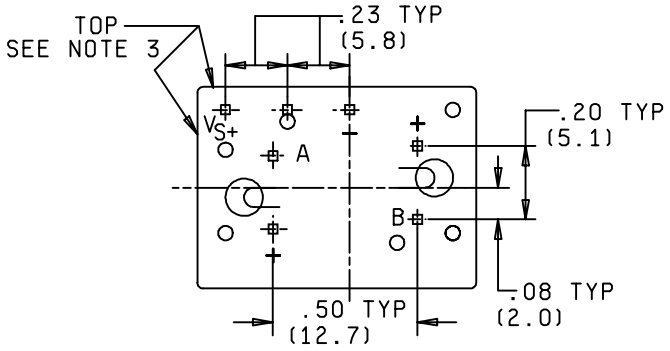


One integrated circuit

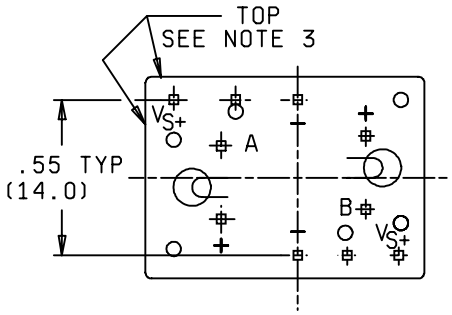


Two integrated circuits

Printed circuit terminal



One integrated circuit

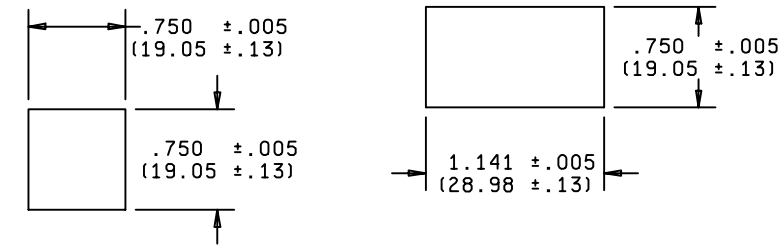


Two integrated circuits

Illuminated devices shown.
For nonilluminated devices
lamp terminals not provided.

NOTES:
1. Dimensions are in inches.
2. Tolerances are ±.031 (±0.79 mm).
3. Top side(s) of switch is shown to insure proper legend orientation. See application information.
4. Metric equivalents are given for general information only.
5. Metric equivalents are in parentheses.
6. Solder terminals. Minimum spacing between terminals, and minimum distance to edge of housing is .045 inch.

FIGURE 4. Terminal location - paddles and rockers.



STRIP MOUNTING

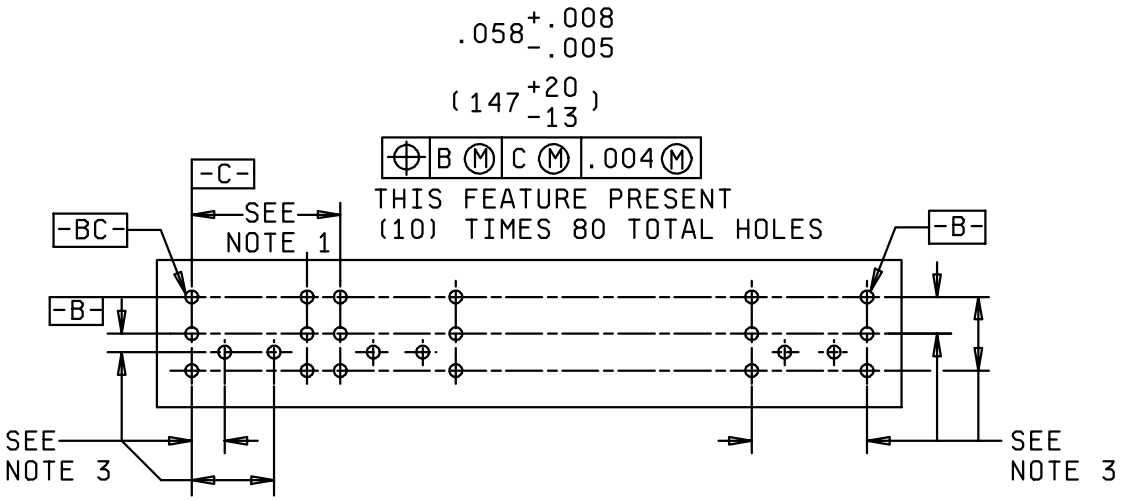
Station	1	2	3	4	5	6	7	8	9	10	11	12
X Square	.750 ±.005	1.570 ±.010	2.370 ±.010	3.170 ±.010	3.970 ±.010	4.770 ±.010	5.570 ±.010	6.370 ±.010	7.170 ±.010	7.970 ±.010	8.770 ±.010	9.570 ±.010
X Rec-tangular	1.141 ±.005	2.370 ±.010	3.570 ±.010	4.770 ±.010	5.970 ±.010	7.170 ±.010	8.370 ±.010	9.570 ±.010	10.770 ±.010	11.970 ±.010	13.170 ±.010	14.370 ±.010
Y Rec-tangular	.750 ±.005	1.570 ±.010	2.370 ±.010	3.170 ±.010	3.970 ±.010	4.770 ±.010	5.570 ±.010	6.370 ±.010	7.170 ±.010	7.970 ±.010	8.770 ±.010	9.570 ±.010

X = .750 ±.005 Y = 1.141 ±.005

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Metric equivalents are in parentheses.
4. See application information for strip mounting information.

FIGURE 5. Panel cutouts.

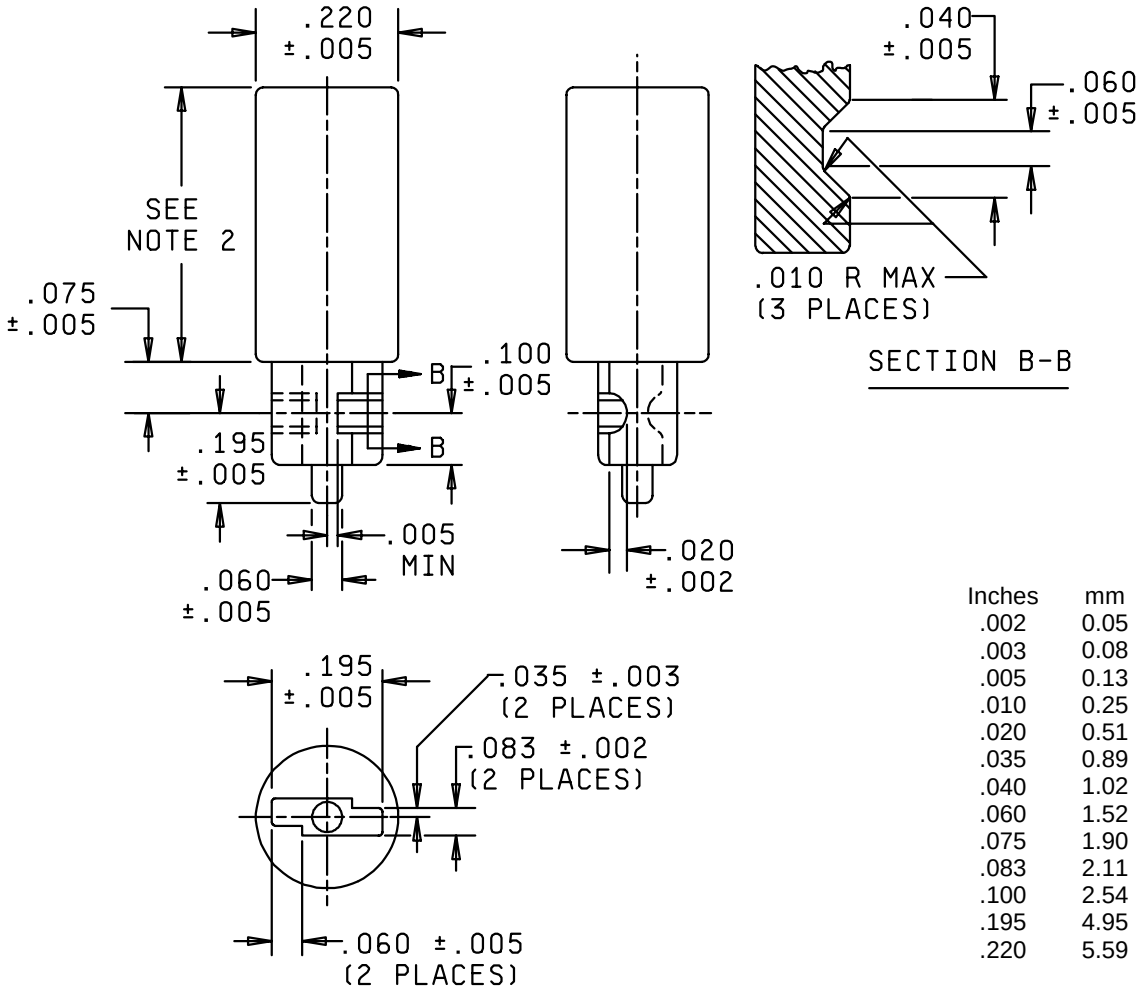
Basic dimensions for strip mounting are .800 (20.32 mm) for square units. .800 (20.32 mm) and 1.200 (30.48 mm) for the rectangular units.



NOTES:

1. Dimensions for square: .800 (20.32 mm) typ.
   Dimensions for rectangular: 1.200 (30.48 mm) typ (horizontal.
   800 (20.32 mm) typ (vertical).
2. Component side shown.
3. Basic dimensions for each component hole pattern spacing are the nominal dimensions as shown on figures 3 and 4 for printed circuit terminals.
4. Dimensions are in inches.
5. Metric equivalents are given for general information only.
6. Metric equivalents are in parentheses.

FIGURE 6. Printed circuit board dimensions for strip mount.



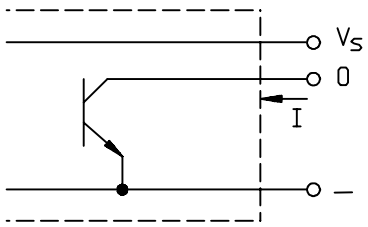
Inches	mm
.002	0.05
.003	0.08
.005	0.13
.010	0.25
.020	0.51
.035	0.89
.040	1.02
.060	1.52
.075	1.90
.083	2.11
.100	2.54
.195	4.95
.220	5.59

NOTES:

1. All radii .030 ±.015 (0.76 ±0.38 mm) unless otherwise specified.
2. This dimension shall be adjusted to provide a total weight of 5 +1, -0 gram.
3. May be of multi-piece construction.
4. May be suitably plated to resist corrosion.
5. Dimensions are in inches.
6. Metric equivalents are given for general information only.

FIGURE 7. 11-3/4 wedge base lamp retention plug.

TABLE I. Circuitries.

<table>
<tr><td colspan="7">HALL EFFECT INTEGRATED CIRCUIT</td></tr>
<tr><td colspan="7"> 
</td></tr>
<tr><td colspan="7">CIRCUIR OUTPUT STATES</td></tr>
<tr><td colspan="7">PUSHBUTTON
ONE INTEGRATED CIRCUIT ONLY</td></tr>
<tr><td colspan="3">BUTTION POSITION</td><td colspan="4">CIRCUIT CONDITION</td></tr>
<tr><td colspan="3">FREE POSITION</td><td colspan="4">CIRCUIT RELEASED</td></tr>
<tr><td colspan="3">FULL OVERTRAVEL OR 2nd
LEVEL ALTERNATE ACTION</td><td colspan="4">CIRCUIT OPERATED</td></tr>
<tr><td colspan="7">PADDLE AND ROCKER</td></tr>
<tr><td rowspan="2">CIRCUITRY</td><td colspan="3">2 POSITION
1 OR 2
INTEGRATED CIRCUITS</td><td colspan="3">3 POSITION
2 INTEGRATED CIRCUITS ONLY</td></tr>
<tr><td colspan="2"> 
</td><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td rowspan="2">ONE
CIRCUIT</td><td>CIRCUIT
A</td><td>RELASED</td><td>OPERATED</td><td colspan="3" rowspan="2"></td></tr>
<tr><td>CIRCUIT
B</td><td>NONE</td><td>NONE</td></tr>
<tr><td rowspan="2">TWO
CIRCUITS</td><td>CIRCUIT
A</td><td>RELASED</td><td>OPERATED</td><td>OPERATED</td><td>RELASED</td><td>RELASED</td></tr>
<tr><td>CIRCUIT
B</td><td>RELASED</td><td>OPERATED</td><td>RELASED</td><td>OPERATED</td><td>OPERATED</td></tr>
</table>

NOTE: Top side located on this side of housing (see figure 4). See application information.

REQUIREMENTS:

Dimensions and configuration: See figures 1 through 5, and 7, and table I.

Complete switch shall consist of:

Switch housing - The switch housing shall include mounting clips.

Actuation and display - Unassembled, when furnished.

Pushbutton actuation:

Transmitted color - (One translucent colored button is furnished when specified).

Projected color - (One white translucent cap and a transparent color insert is furnished when specified).

Hidden color - (One black appearing cap and a translucent color insert is furnished when specified).

Nonilluminated - (One translucent colored button is furnished when specified).

LED illumination - (The LED is an integral part of the switch which extends through a window in the translucent colored button to extend flush with the top of the button surface).

Rocker actuation: Same features as detailed for the pushbutton actuation except the rocker operator can be provided as a one piece full rocker or two piece rocker for contrasting color selection.

Paddle actuation: Same features as detailed for the pushbutton actuation except paddle cover is provided as a two piece cover.

Lamps: Not furnished. Illuminated devices will accept T-1 3/4 subminiature wedge base incandescent lamps (Industry Lamp No. 73 (14 volt), No. 85 (28 volt), and No. 86 (6.3 volt)).

Enclosure design: 1 (unsealed).

Operating temperature: 0°C to +55°C.

Materials:

Solid state and LED circuitry: Ferrous materials may be used for current carrying parts. The dissimilar metals and compatible couples requirements are not applicable.

Polycarbonate: May be used for light display and actuator materials only providing it meets UL94V-2 or better.

Printed circuit terminals: Printed circuit terminals shall be treated to facilitate soldering.

Weight: See table II.

TABLE II. Weight.

Configuration type	Weight
	Max grams
Square pushbutton	21
Rectangular pushbutton	28
Rocker	32
Paddle	32

Explosion: Not applicable.

Vibration: Grade 2 (10-500 Hz). During the entire vibration schedule, the specified supply voltage shall be applied to the input terminal and the output circuit shall be monitored for change in state. The output circuit shall show no evidence of change of state in excess of 10 microseconds.

Shock (specified pulse): MIL-STD-202, method 213, test condition A (50 G's). During the test, the specified supply voltage shall be applied to the input terminal and the output circuit shall be monitored. The output circuit shall show no evidence of change of state in excess of 10 microseconds.

TABLE III. Electrical characteristics.

Integrated circuit type	Parameter	Min.	Nom.	Max.	Conditions
Electrical characteristic code A					
5 V dc sinking	Supply voltage	4.5 V dc	5.0 V dc	5.5 V dc	0°C to 55°C
	Supply current released	---	---	.0040A	Circuit released excludes load current supply voltage 4.5 to 5.5 V dc
	Supply current released	---	---	.009A	Circuit operated excludes load current supply voltage 4.5 to 5.5 V dc
	Output voltage operated	---	---	+ .4 V dc	Circuit operated load current = .008 A supply voltage 4.5 to 5.5 V dc
	Output leakage	---	---	20.0 micro-amperes	Output terminated to +10.0 V dc supply voltage 4.5 to 5.5 V dc circuit released
	Fall time	---	---	1.0 micro-amperes	Supply voltage 4.5 to 5.5 V dc 90% to 10% of the output voltage swing when sinking .008A (see figure 9)
	Rise time	---	---	1.0 micro-second	Supply voltage 4.5 to 5.5 V dc 10% to 90% of the output voltage swing when sinking .008A (see figure 9)
Absolute maximum ratings (beyond which damage may occur)					
5 V dc sinking	Ambient voltage	-40°C	---	-65°C	Storage
		0°C	---	-55°C	Operating
	Supply voltage	-.5 V dc	---	+7.0 V dc	0°C to -55°C
	Externally applied output voltage	-.5 V dc	---	+15.0 V dc	Circuit released
	Sinking output current	---	---	.020 A	Circuit operated.

TABLE III. Electrical characteristics - Continued.

Integrated circuit type	Parameter	Min.	Nom.	Max.	Conditions
Electrical characteristic code B					
6-16 V dc sinking	Supply voltage	6.0 V dc	12.0 V dc	16.0 V dc	0°C to 55°C
	Supply current released	---	---	.007 A at 6 V dc .0115 A at 16 V dc	Circuit released excludes load current
	Supply current operated	---	---	.0105 A at 6 V dc .015 A at 16 V dc	Circuit operated excludes load current
	Output voltage operated	---	---	+4 kV dc	Circuit operated load current - .020 A supply voltage 6 to 16 V dc
	Output leakage	---	---	20.0 micro-amperes	Output terminated to +16 V dc supply voltage 6 to 16 V dc circuit released
	Fall time	---	---	1.0 micro-second	Supply voltage 6-16 V dc 90% to 10% of the output voltage swing when sinking .020A (see figure 9)
	Rise time	---	---	1.5 micro-seconds	Supply voltage 6 to 16 V dc 10% to 90% of the output voltage swing when sinking .020A (see figure 9)
Absolute maximum ratings (beyond which damage may occur)					
6-16 V dc sinking	Ambient voltage	-40°C	---	-65°C	Storage
		0°C	---	-55°C	Operating
	Supply voltage	-.5 V dc	---	+20.0 V dc	0°C to -55°C
	Externally applied output voltage	-.5 V dc	---	+20.0 V dc	Circuit released
	Sinking output current	---	---	.040 A	Circuit operated.

Moisture resistance: Polarization voltage not applicable. The insulation resistance shall be not less than 1.0 megohm when tested in the wet condition. At the end of the drying period, the insulation resistance shall be not less than 100 megohms.

Insulation resistance: Switches shall be tested in accordance with method 302 of MIL-STD-202. The following details shall apply:

Test condition - A.

Test voltage - 100 V dc.

Points of application - The terminals shall be connected together.

Voltage shall be applied between those connected terminals and the metal mounting clips (also connected together). The insulation resistance shall be not less than 100 megohms.

Dielectric withstanding voltage: Switches shall be tested at atmospheric pressure in accordance with method 301 of MIL-STD-202. The following details shall apply.

Test voltage - 120 V rms.

Points of application - The terminals shall be connected together.

Voltage shall be applied between those connected terminals and the metal mounting clips (also connected together).

Operating characteristics: See table IV.

TABLE IV. Operating characteristics.

Configuration type	Characteristics	Value
Pushbutton Rocker Paddle	Total actuator travel	.180 inch min 30° ±6° 30° ±6°

Contact resistance:

Switch: Not applicable.

Lamp: Not applicable to LED. Lamp circuit resistance test plug in accordance with figure 8.

Terminal strength: Direction of pull to be parallel to the long axis of the terminal only.

Strength of actuating means:

Rocker actuation - The static load shall be gradually applied to the rocker surface when that surface is parallel to the mounting surface.

Paddle actuation - With the paddle in the extreme position, a static load of 15 pounds shall be gradually applied perpendicular to the paddle axis and parallel to the direction of paddle travel.

Thermal shock: Temperature extremes shall be -40°C to +65°C.

Field of view: For paddle configuration, obstruction of view by the paddle shall not be cause for failure.

Lamp contacts: Contacts for incandescent lamps shall be designed to accept T-1 3/4 wedge base lamps.

LED: Shall not be damaged by the application of reverse polarity voltage.

Lens: The lens design shall permit application of hot stamp legends.

Supply current - With the specified supply voltage applied, the supply current shall not exceed the specified values in table III for each of the following conditions:

Circuit released (OFF)

Circuit operated (ON) and output sinking rated load current (circuit operate current does not include load current).

Supply voltage (absolute max): With the specified absolute maximum supply voltage applied to the switch and the output connected to a load impedance of 750 ohms ±5 percent (resistive) for 5 V devices, or 510 ohms ±5 percent (resistive) for 6-16 V devices; the switch shall operate in the circuit operated condition for 30 minutes (see table III).

The test shall be repeated with the switch in the circuit released condition. At the completion of the test, there shall be no evidence of damage.

Output voltage and current: With a suitable load impedance connected to the output terminal, the voltage shall be measured as follows; with the switch in the circuit operated condition, the specified minimum rated supply voltage shall be applied to the switch. The load impedance shall be adjusted for the specified rated (sinking) current flow, and the voltage at the output terminal shall be measured. The output voltage shall be as specified in table III.

Output rise and fall time: With the specified minimum supply voltage applied to the switch and the output connected to a suitable impedance adjusted for the specified maximum output current for the circuit operated condition, the switch shall be actuated and deactuated. The voltage waveform at the output terminal shall be observed and the rise and fall time measured. The output rise and fall time shall be as specified in table III (see figure 9).

Electrical endurance: With the specified supply voltage connected to the switch and the output sinking the rated load current, the switch shall be cycled at a rate not to exceed 120 cycles per minute for the maximum number of cycles specified (see table V). The duty cycle shall be approximately 50 percent. Eighty percent of the operating cycles shall be evenly divided between operation at the specified maximum and minimum operating temperatures. The remaining cycles shall be performed at room ambient. Switches with momentary actuator positions shall be returned from their momentary position solely by their internal mechanism. During this test, the output voltage shall be monitored for proper operations and the lighted displays shall be energized at their maximum rating.

TABLE V. Electrical endurance.

Type	Action	Cycles
Pushbuttons	Alternate	100,000
	Momentary	1,000,000
Rockers and Paddles	All	100,000

Color and luminance: See tables VI and VII.

Group A inspection: See table VIII.

Qualification inspection: See table IX.

TABLE VI. Illuminated chromaticity limits incandescent. 1/2/

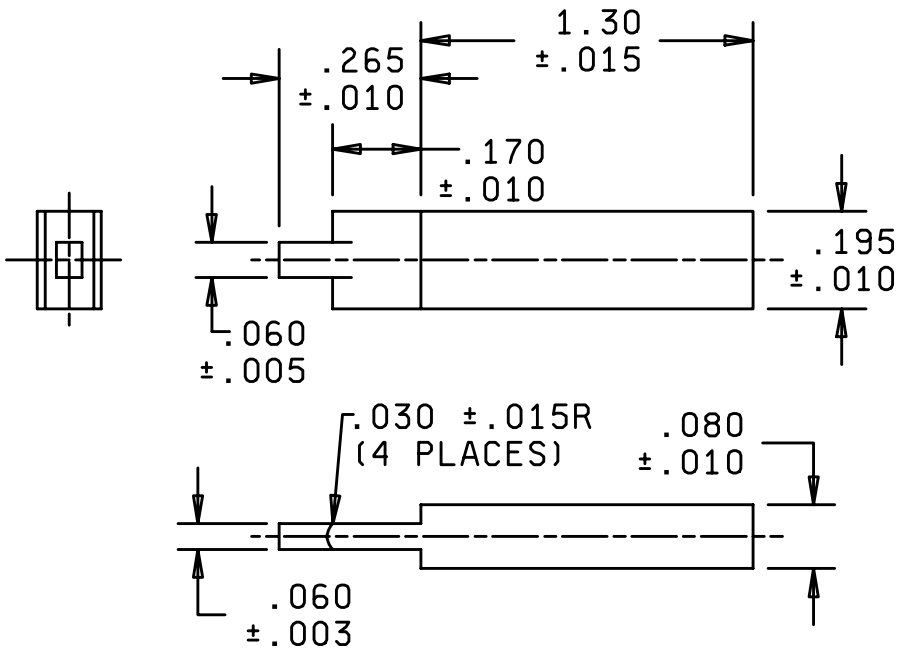
Chromaticity coordinates						
Color	Projected color		Transmitted color		Hidden color	
	"X"	"Y"	"X"	"Y"	"X"	"Y"
Blue	.275	.525	.325	.475	.275	.475
	.275	.450	.250	.475	.225	.475
	.200	.425	.250	.400	.200	.400
	.200	.525	.325	.400	.275	.350
Green	.415	.495	.290	.610	.275	.650
	.375	.450	.255	.525	.195	.595
	.300	.525	.180	.610	.325	.500
	.355	.585	.180	.695	.375	.550
Red	.695	.285	.695	.285	.695	.285
	.710	.290	.710	.290	.710	.290
	.655	.320	.655	.320	.655	.320
	.660	.340	.660	.340	.660	.340
White	.550	.395	.475	.435	.570	.395
	.530	.435	.475	.395	.530	.435
	.460	.435	.530	.435	.460	.435
	.460	.385	.545	.395	.460	.395
Yellow	.580	.400	.580	.400	.580	.400
	.590	.410	.590	.410	.590	.410
	.515	.450	.515	.450	.515	.450
	.525	.475	.525	.475	.525	.475

1/ Measured at 2100° Kelvin using 1 rectangular pushbutton indicator housing plus 2 lens of each color.
2/ Illuminated chromaticity limits shall be established by the spectroradiometric method for incandescent lamps.

TABLE VII. Brightness - incandescent push-button switch, rockers, and paddles.

Brightness foot-lambert minimum average						
Color	Pushbutton switches 1/					
	Square configuration			Rectangular configuration		
	Projected	Transmitted	Hidden	Projected	Transmitted	Hidden
Blue	21	18	3	32	15	2
Green	34	16	3	60	26	4
Red	36	28	6	68	51	11
White	90	91	16	146	159	41
Yellow	92	114	19	142	193	49
Rockers and paddles						
Color	Rocker configurations 2/			Paddle configurations 2/		
	Projected	Transmitted	Hidden	Projected	Transmitted	Hidden
Blue	22	12	4	22	12	4
Green	36	17	4	36	17	4
Red	38	34	8	38	34	8
White	98	98	17	98	98	17
Yellow	108	123	20	108	123	20

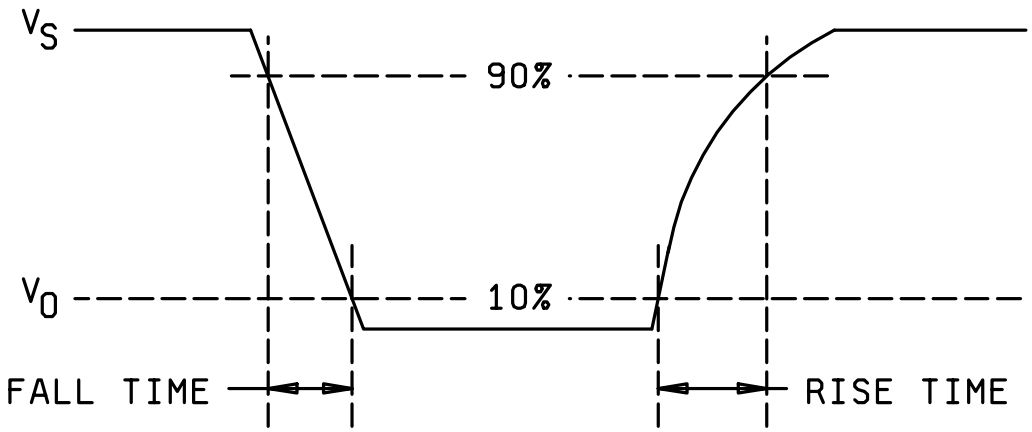
1/ Tested with one lamp for square configuration and two lamps for rectangular configuration, using one housing plus two lens of each color.
2/ Tested using one rocker configuration housing plus two lens of each color.
3/ Tested using one lamp.



NOTES:
1. Dimensions are in inches.
2. Material shall be one-half hard brass.
3. May be suitably plated to resist corrosion.
4. Metric equivalents are given for general information only.

Inches	mm
.003	0.08
.005	0.13
.010	0.25
.015	0.38
.030	0.76
.060	1.52
.080	2.03
.170	4.32
.195	4.95
.265	6.73
1.30	33.0

FIGURE 8. TI-3/4 wedge base lamp circuit resistance test plug.



V_S = Supply voltage
V_O = Output voltage

FIGURE 9. Output rise and fall time.

TABLE VIII. Group A inspection.

Inspection	Sampling plan	
	Major	Minor
Visual and mechanical inspection	1.10 1/	4.0
Operating characteristics	1.10	---
Output voltage and current	.65	---
Dielectric withstanding voltage	.65	---

1/ At the option of the contractor, in-process inspection may be used to meet the materials and design and construction requirements provided they meet the acceptable quality level and all the contractor's in-process control data on these tests are made available to the Government upon request.

TABLE IX. Qualification (group submission).

Inspection	Samples 4/	Extent of approval
Group I Visual and mechanical 1/ Solderability 2/ Resistance to solder heat 2/ Lamp contact resistance Operating characteristics Supply current Output voltage and current Output leakage	All samples	All
Group II Terminal strength 2/ Strength of actuator 3/ Lamp retention Thermal shock Vibration Shock (specified pulse) Moisture resistance Dielectric withstanding voltage Operating characteristics Supply current Output voltage and current Output leakage	M22885/91-EAA3EW (4 samples) M22885/91-CEB2DW (4 samples) M22885/91-JAA63LWW (4 samples) M22885/91-HEA51JWW (4 samples)	
Group III Supply voltage (absolute max) Output rise and fall time Salt spray (corrosion)	M22885/91-EAA3W (2 samples) M22885/91-CEB2DW (2 samples) M22885/91-LEA51RWW (2 samples)	
Group IV Electrical endurance Lamp contact resistance Dielectric withstanding voltage Operating characteristics Supply current Output voltage and current Output leakage	M22885/91-EAA3EW (2 samples) M22885/91-EAA4EW (2 samples)	

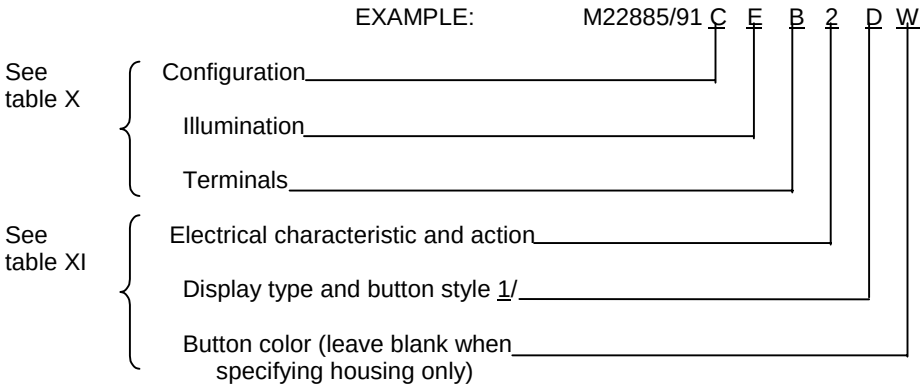
See footnotes at the end of table.

TABLE IX. Qualification (group submission) - Continued.

Inspection	Samples 4/	Extent of approval
Group V Color Luminance Field of view	Chromaticity and brightness samples to be tested as defined by the applicable tables of this specification sheet. Two samples of each configuration are tested for field of view.	All

1/ Two samples of each configuration type for physical dimensions.
2/ Two samples of each terminal type.
3/ Two samples of each actuator type.
4/ Samples shall have Industry Lamp No. 85 installed for those tests requiring the lamps to be energized.

Part or Identifying Number (PIN) for pushbutton switches:



1/ For acquisition of government spares, code letters J shall be used.

TABLE X. Configuration, illumination, and terminal codes for pushbutton switches.

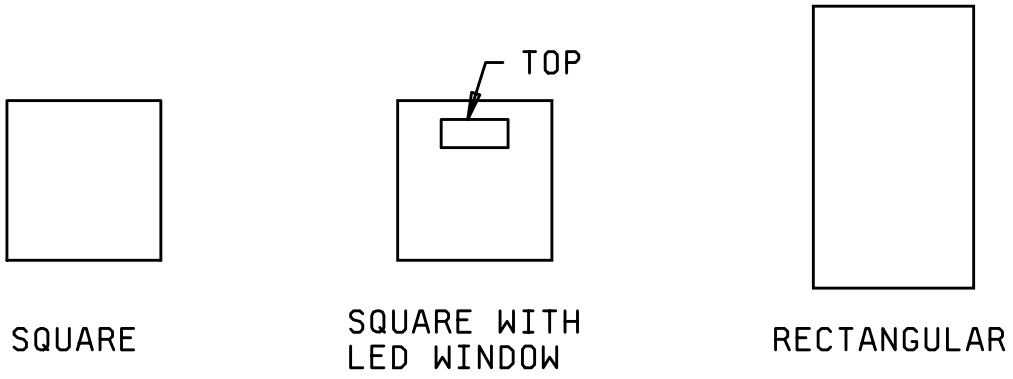
Configuration	Illumination	Terminals
A - Square, nonilluminated B - Square, 1 lamp ckt C - Square, 1 LED D - Rectangular, nonilluminated E - Rectangular, 2 lamp ckts	A - Nonilluminated or incandescent (no lamp installed) B - *V Red LED C - 5.0 V Red LED D - 10.0 V Red LED E - 15.0 V Red LED F - *V Yellow LED G - 5.0 V Yellow LED H - 10.0 V Yellow LED J - 15.0 V Yellow LED K - *V Green LED L - 5.0 V Green LED M - 10.0 V Green LED N - 15.0 V Green LED * Refer to application information for nonresistor	A - Solder or quick connect B - Printed circuit

TABLE XI. Electrical characteristic, action, display, and button style for pushbutton switches.

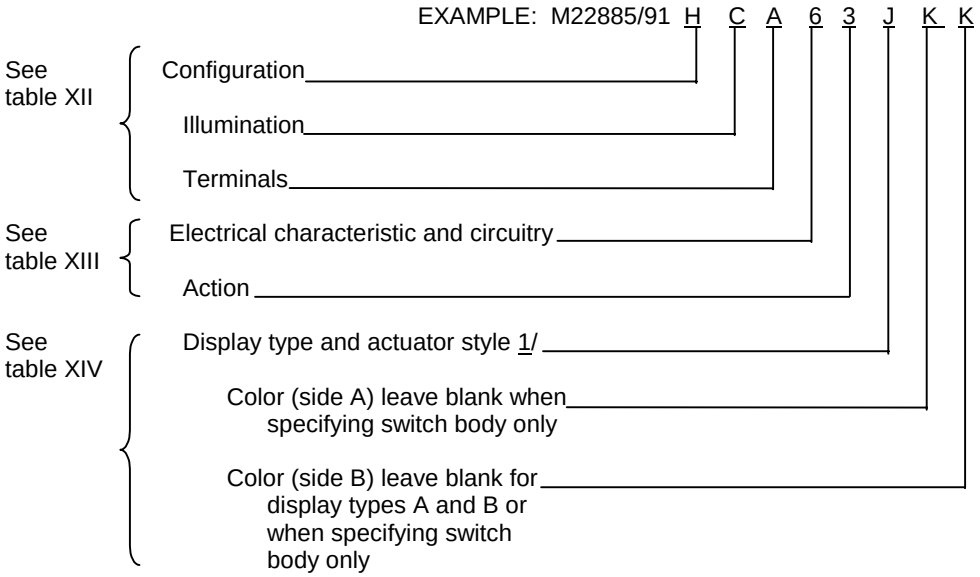
Electrical characteristic/action	Display type/button style 1/ 2/	Button color
1 - 5 V dc/momentary 2 - 6 to 16 V dc/momentary 3 - 5 V dc/alternate 4 - 6 to 16 V dc/alternate	A - transmitted color - square B - Projected color - square C - Hidden color - square D - LED window - square E - Transmitted color - rectangular F - Projected color - rectangular G - Hidden color - rectangular J - Switch body only. No button, caps, or color inserts supplied. Acquire separately from source listed on sampling plan.	R - Red Y - Yellow G - Green B - Blue W - White K - Black ** L - Gray ** ** For non-illuminated and LED configuration types only

1/ For nonilluminated switches , use code A, E, or J as required. For LED illuminated switches, use code D or J as required.

2/ Button styles are shown as viewed from the front of the panel. Top side of switch is shown to insure proper legend orientation (see figure 3):



PIN for rocker and paddle switches:



B 1/ For acquisition of government spares, code letter S shall be used.

TABLE XII. Configuration, illumination, and terminal codes for rocker and paddle switches.

Configuration	Illumination	Terminals
F - Rocker, nonilluminated G - Rocker, 2 lamp circuits H - Rocker, 1 LED J - Paddle, nonilluminated K - Paddle, 2 lamp circuits L - Paddle, 1 LED	A - Nonilluminated or incandescent (no lamp installed) B - *V Red LED C - 5.0 V Red LED D - 10.0 V Red LED E - 15.0 V Red LED F - *V Yellow LED G - 5.0 V Yellow LED H - 10.0 V Yellow LED J - 15.0 V Yellow LED K - *V Green LED L - 5.0 V Green LED M - 10.0 V Green LED N - 15.0 V Green LED * Refer to application information for non-resistor	A - Solder or quick-connect B - Printed circuit

TABLE XIII. Electrical characteristic, circuitry and action codes for rocker and paddle switch.

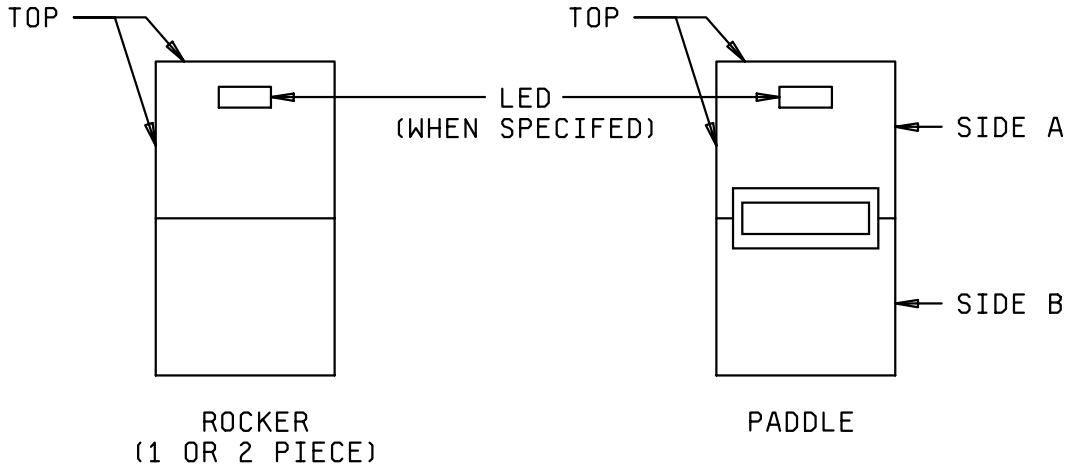
ELECTRICAL CHARACTERISTIC/ CIRCUITRY		ACTION CODE			 SEE NOTE
			2 - POSITION		
5	5 Vdc/1 CIRCUIT	1	MAIN.	(NONE)	MAIN.
6	6 Vdc/2 CIRCUIT	2	MOM.	(NONE)	MAIN.
7	6 TO 16 Vdc/1 CIRCUITS	3	MAIN.	(NONE)	MOM.
8	6 TO 16 Vdc/2 CIRCUITS		3 - POSITION 2/		
		4	MAIN.	MAIN.	MAIN.
		5	MOM.	MAIN.	MOM.
		6	MAIN.	MAIN.	MOM.
		7	MOM.	MAIN.	MAIN.

NOTES:
1. Circuit action is shown with the switch positioned such that the top side located in figure 4 is on this side of the switch. See application information.
2. Available with 2 circuit units only.

TABLE XIV. Display type/actuator style and color for rocker and paddle switches.

Display type/actuator style 1/ 2/	Color (rockers, covers, and inserts)	
	Side A	Side B
A - Nonilluminated/ 1 piece rocker (one color selection only) B - Transmitted color/ 1 piece rocker (one color inspection only) C - Projected color/ 1 piece rocker D - Hidden color/ 1 piece rocker E - Nonilluminated/ 2 piece rocker F - Transmitted color/ 2 piece rocker G - Projected color/ 2 piece rocker H - Hidden color/ 2 piece rocker J - 1 LED window/ 2 piece rocker L - Nonilluminated/ 2 piece paddle cover M - Transmitted color/ 2 piece paddle cover N - Projected color/ 2 piece paddle cover P - Hidden color/ 2 piece paddle cover R - 1 LED window/ 2 piece paddle cover S - Switch color only. No rockers, covers, or color inserts supplied. Acquire separately from a source listed on the sampling plan.	R - Red Y - Yellow G - Green B - Blue W - White K - Black ** L - Gray **	R - Red Y - Yellow G - Green B - Blue W - White K - Black ** L - Gray **
	** For nonilluminated and LED configuration only.	

1/ For nonilluminated switches, use code A, E, L, or S as required. For LED illuminated switches, use code J, R, or S as required.
2/ Button styles are shown as viewed from front of the panel. Top sides of switch are shown below to insure proper legend orientation (see figure 4). See application information.



APPLICATION INFORMATION

LED APPLICATION INFORMATION

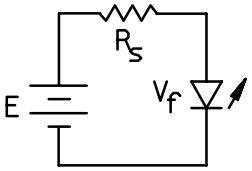
Internal resistors control the LED current to a nominal 20 mA on 5 and 15 V dc devices.

For those devices without internal current limiting resistors, suitable external control of the LED current must be provided. It is recommended that a minimum of 5 V dc open circuit voltage with an appropriate series resistance be used to drive LED devices. This minimizes the effect of temperature (current variation) on forward voltage of the LED.

The example illustrates a simple dc drive circuit and the equation used to determine the value of the series resistance.

TYPICAL LED CHARACTERISTICS

Color	Forward voltage .020 mA V	Intensity .020 mA wcd	Dominant Wave-length nm
Red	2.4	1.5	626
Yellow	2.4	1.4	585
Green	2.4	1.2	570



$$R_S = \frac{E - V_f}{I_f}$$

Where: R_S = Series resistance
E = Supply voltage
V_f = Forward voltage of LED
I_f = Circuit current

For example: For E - 5 V
V_f = 2.4 V
I_f = .020 A

$$R_S = \frac{5.0 - 2.4}{.020} = 130\Omega$$

If a diode is added in series for reverse polarity protection, then:

$$R_S = \frac{E - V_f - V_{PD}}{I_f}$$

Where: V_{PD} = Forward voltage of protection diode

For the 5 V dc example above, the required resistance is then:

$$R_S = \frac{5 - 2.4 - 0.7}{.020} = 95\Omega$$

APPLICATION INFORMATION - Continued.

RECOMMENDED STRIP-MOUNTING ORIENTATION:

SQUARE PUSHBUTTON. Housings have "panel holding" mounting clips located on the top side and on the opposite side. These clips should be compressed against the edges of the mounting slot when strip mounting. The clips on the other two sides may have a lower profile to allow units to be horizontally strip-mounted with bezels touching. (No more than three square housings can be mounted in a vertical strip with the bezel touching.)

RECTANGULAR PUSHBUTTON. "Panel holding" mounting clips are on the long sides. Only horizontal strip mounting with the long sides adjacent the panel edges is recommended. (No more than three units can be strip-mounted with the long bezel sides touching.)

ROCKER AND PADDLE. "Panel holding" mounting clips are located on the short sides. This permits horizontal strip mounting with the long sides of the bezel touching. (No more than three rocker or paddle switches can be strip-mounted with the short sides of the bezel touching.)

Custodians:
Army - CR
Navy - EC
Air Force -11
DLA - CC

Preparing activity:
DLA - CC

(Project 5930-1716-18)