

MICRO & SUBMINIATURE LAMPS

INTRODUCTION

We are the biggest Micro & Sub miniature Lamp's manufacturers in Taiwan since 1978. Years of experience, engineering in R & D plus fully automatic equipments ensure our products of high quality. Our capacity exceeds ten million pieces per month. We offer a wide range of indicate lamps for aircrafts, auto panel, radios, Hi-Fi stereos, LCD watches/clocks, camera panel, computers, meters, switches and etc., and serial lamps for decoration and lamps for other industrial and consumptive products.

BULB SIZES : T3/8, T1/2, T3/4, T1, T1-1/4, T1-3/4, T2, T3, T4 and T5 etc.

BULB DIAMETERS from 1.2mm to 15mm. etc.

Other sizes and diameters and various finishes (bulbs in colour coating or colored filter, frosted bulbs, lens bulbs... etc.) are available to meet your specification requirements.

ELECTRIC DATA

Design volts (V) show the voltage at which a lamp is designed for rated ampere, candlepower and laboratory-life characteristics.

Design amperes (mA) are the current flowing through a lamp when operated at its design voltage. It is subject to nominal manufacturing tolerances $\pm 10\%$.

Mean spherical candle power (MSCP) The MSCP is the generally accepted method used to indicate the brightness of miniature lamps; it is the total value emitted from a lamp placed at the center of a circle having a specified diameter. The standard lamp calibrated by National Bureau of Standards is used in determining this value. MSCP can be converted into lumens by multiplying MSCP by 4π ($12,57 \times \text{MSCP} = \text{lumens}$).

Average laboratory life (h) Lifetime indicated is based upon test data recorded under strictly controlled laboratory conditions. Under normal operating conditions, however, lifetime may be shorter due to factors such as voltage fluctuation, shock, vibration, temperature, and other environmental and operation conditions.

MOL (Maximum Overall Length)

MOL is measured from the bottom of the base (or bottom of glass tip for unbased lamps) to the top of the envelope.

MOD (Maximum Outside Dia.)

MOD is a measurement across the largest part of the envelope.

LCL (Light Center Length)

LCL is a measurement from the geometric center of the filament to: Flange Base – top of flange, Grooved Base – center of groove, Bi-Pin Base – flat bottom, Screw Base – bottom of center contact, Bayonet Base – top of base pin, Wedge Base – center of notch, SC or DC Prefocus Base – bottom of indentations on prefocus collar, Wire Terminal – not specified.

Filament Shapes

The filament is the light emitting portion of the lamp. Its configuration is identified by the prefix letter – S for straight, C for coiled and CC for coiled coil (double coil).

QUALITY CONTROL

The lamp features highly reliable design for life-, vibration-, shock-, drop-, vacuum-, and atmospheric resistance- testing to ensure durability.

Life test

Life time of lamps is generally determined by the following equation.

IEC Specification (International Electrical Commission) "Tungsten Filament Lamps for General Use"
 The equivalent life for rated voltage shall be determined in accordance with the following equation.

$$L_o = L \left(\frac{V}{V_o} \right)^n$$

- L_o Life at rated voltage
- L Life at test voltage
- V_o Rated voltage
- V Average voltage during life test
- n = 13 vacuum lamps; 14 gas filled lamps

IES Specification (Illumination Engineering Society)
 "Lighting Hand Book"

$$L_o = L \left(\frac{V}{V_o} \right)^n$$

- n = 13.5 vacuum lamps; 13.1 gas filled lamps

Vibration test

All specification requirements must be met before and after vibration for 30 minutes. The test condition:

- 1) Frequency cycled : 2,000 rpm.
- 2) Amplitude : 2mm.
- 3) Vibration shall be up and down, forward and backward, right and left with the lamps mounted on a horizontal plane.

Shock test

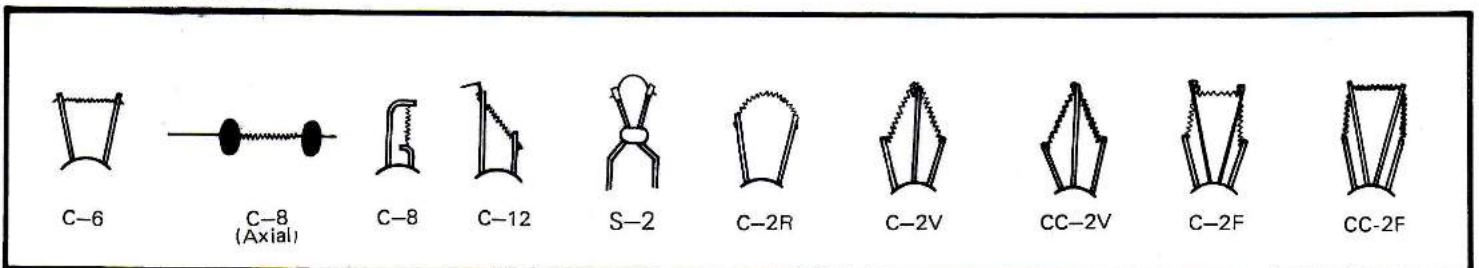
All specification requirements must be met before and after shock test for 3 times. The test condition let the lamp mounted on a board and force the lamp drop from 20cm high onto the bottom board.

Aging

"Aging" is one of the most important and indispensable procedures for stabilizing the quality of the lamps after production.

Each lamp, after being moved away from production line, is continuously lighted for 2-10 hours in design voltage according to its average life and application. This is called "aging". During the first few lighting hours the characteristics of the filament of an incandescent lamp change unstably. All specification requirements must be met by selection after aging of a lamp. Furthermore, aging is an important method to find out short circuit and vacuum leakage, which can not be found within short time of lighting. Only after aging will the filament of a vacuum-deficient lamp evaporate and cause the blackening of the inside bulb glass which can be discerned with naked eyes.

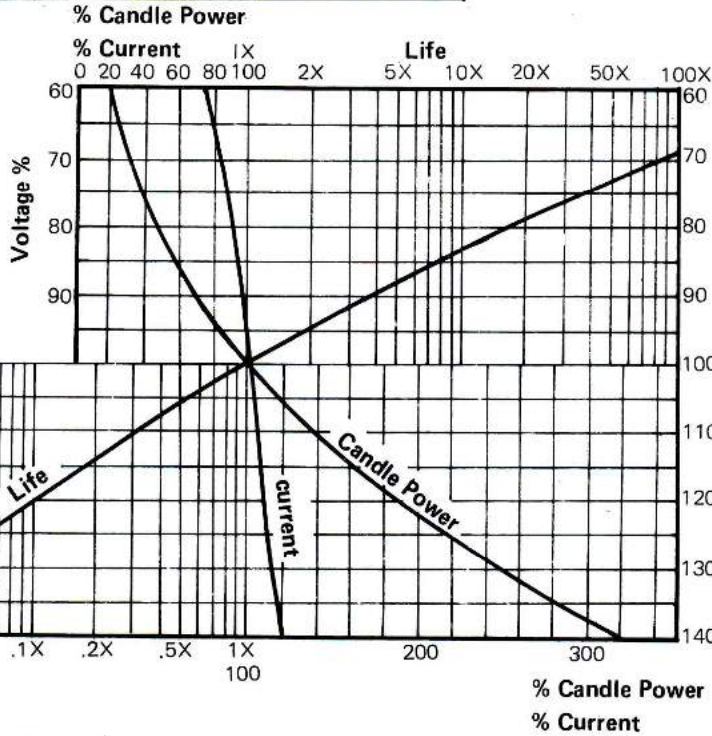
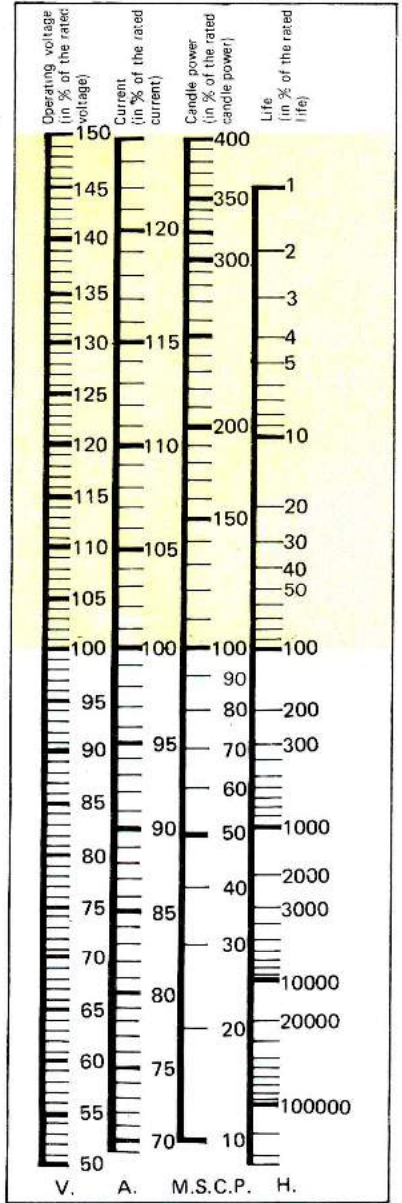
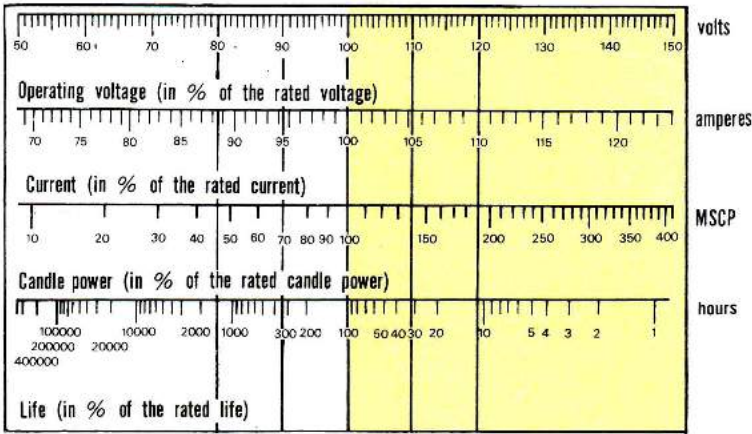
FILAMENT SHAPE



C = coil, CC = coiled-coil (double coil), S = straight

RELATION BETWEEN VOLTAGE, CURRENT, CANDLE POWER AND LIFE

Current, candle power and life in relation to the operating voltage

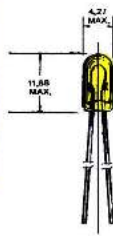


BASE TYPE

Wire Terminal	Bi-Pin T 1/1.27 T1 1/4 T 1/2.54 T1 3/4	Midget Grooved MG 5.7S/g	Midget Screw E5/8	Axial Lead
Micro-Midget Flanged MM3S/6	Midget Bayonet BA 5S BA 7S	Miniature Screw E10/13	SF Type	Snap Type
Sub Midget Flanged SM 4S/4 SM 4S/7	Miniature Bayonet BA9S	Candelabra Screw E12/15	Telephone Slide	Wedge
SM5S/8	S. C. Bayonet BA15S	Mignon Screw E14	Midget Screw E5 with lead wire	
S.C. Midget Flanged MF6S/8	D. C. Bayonet BA15D	Intermediate Screw E17/20		
S.C. Miniature Flanged	D. C. Indexing BAY15D	Special		
Lead Wires without Base	Nylon Resin Base			
Bond-Coated Neck	Metal Base			
Heat Shrinkable Tube	Silicon Rubber Base			

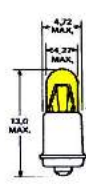
T-1 1/4

4mm (DIAMETER)



A

WIRE TERMINAL



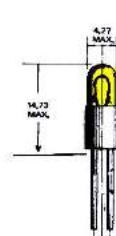
B

SM5S/8 SPECIAL MIDGET FLANGED



C

SPECIAL SCREW



D

BI-PIN



E

INSULATED WIRE LEAD

Voltage (V)	Current (A)	Candle Power (cp)	Life (h)	Filament Shape					
1.3	.030	.006	100	S-2	KH 2135	KH 7302	KH 7303	KH 7306	KH4-013-030-E
1.35	.060	.006	500	C-2R	KH 8631	KH 8636	KH 8641	KH 7636	KH4-0135-060E
1.5	.075	.03	1,000	C-2R	KH4-015-075A	KH4-015-075B	KH4-015-075C	KH4-015-075D	KH4-015-075E
2.5	.100	.10	1,000	C-2R	KH4-025-100A	KH4-025-100B	KH4-025-100C	KH4-025-100D	KH4-025-100E
2.5	.320	.21	5,000	C-2R	KH4-025-320A	KH4-025-320B	KH4-025-320C	KH4-025-320D	KH4-025-320E
2.5	.400	.55	30	C-2R	KH 8655	KH 8656	KH 329	KH 7307	KH4-025-400E
3.0	.190	.25	350	C-2R	KH 324	KH 8637	KH 325	KH 7637	KH4-030-190E
5.0	.060	.03	1,000,000	C-2R	KH 580	KH 3582	KH 3580	KH 7580	KH4-050-060E-1
5.0	.060	.05	100,000	C-2R	KH 583	KH 3585	KH 3583	KH 7583	KH4-050-060E-2
5.0	.115	.15	40,000	C-2R	KH 515	KH 3518	KH 3515	KH 7515	KH4-050-115E
6.0	.030	.035	16,000	C-2R	KH4-060-030A	KH4-060-030B	KH4-060-030C	KH4-060-030D	KH4-060-030E
6.0	.040	.055	16,000	C-2R	KH4-060-040A	KH4-060-040B	KH4-060-040C	KH4-060-040D	KH4-060-040E
6.0	.060	.13	3,000	C-2R	KH 2114	KH 8541	KH 371	KH 7309	KH4-060-060E
6.0	.100	.20	5,000	C-2R	KH4-060-100A	KH4-060-100B	KH4-060-100C	KH4-060-100D	KH4-060-100E
6.0	.120	.20	20,000	C-2R	KH4-060-120A	KH4-060-120B	KH4-060-120C	KH4-060-120D	KH4-060-120E
6.0	.200	.63	1,000	C-2R	KH 634	KH 8628	KH 8645	KH 7628	KH4-060-200E
6.3	.200	.55	5,000	C-2R	KH 8610	KH 8551	KH 8552	KH 7310	KH4-063-200E
8.0	.060	.08	10,000	C-2F	KH4-080-060A	KH4-080-060B	KH4-080-060C	KH4-080-060D	KH4-080-060E
9.0	.040	.075	10,000	C-2V	KH4-090-040A	KH4-090-040B	KH4-090-040C	KH4-090-040D	KH4-090-040E
9.0	.060	.09	10,000	C-2F	KH4-090-060A	KH4-090-060B	KH4-090-060C	KH4-090-060D	KH4-090-060E
10.0	.070	.14	10,000	C-2F	KH4-100-070A	KH4-100-070B	KH4-100-070C	KH4-100-070D	KH4-100-070E
12.0	.040	.09	10,000	C-2F	KH4-120-040A	KH4-120-040B	KH4-120-040C	KH4-120-040D	KH4-120-040E
12.0	.050	.11	16,000	C-2F	KH4-120-050A	KH4-120-050B	KH4-120-050C	KH4-120-050D	KH4-120-050E
12.0	.080	.23	20,000	C-2F	KH4-120-080A	KH4-120-080B	KH4-120-080C	KH4-120-080D	KH4-120-080E
14.0	.080	.50	1,000	C-2F	KH 8640	KH 8646	KH 8644	KH 7646	KH4-140-080E
16.0	.030	.034	25,000	C-2F	KH4-160-030A	KH4-160-030B	KH4-160-030C	KH4-160-030D	KH4-160-030E
18.0	.026	.15	16,000	C-2F	KH4-180-026A	KH4-180-026B	KH4-180-026C	KH4-180-026D	KH4-180-026E
24.0	.040	.17	15,000	C-2F	KH4-240-040A	KH4-240-040B	KH4-240-040C	KH4-240-040D	KH4-240-040E
24.0	.050	.22	10,000	C-2F	KH4-240-050A	KH4-240-050B	KH4-240-050C	KH4-240-050D	KH4-240-050E
28.0	.020	.10	7,000	CC-2F	KH4-280-020A	KH4-280-020B	KH4-280-020C	KH4-280-020D	KH4-280-020E
28.0	.040	.25	25,000	C-2F	KH4-280-040A-1	KH4-280-040B-1	KH4-280-040C-1	KH4-280-040D-1	KH4-280-040E-1
28.0	.040	.30	7,000	C-2F	KH4-280-040A-2	KH4-280-040B-2	KH4-280-040C-2	KH4-280-040D-2	KH4-280-040E-2
28.0	.040	.32	1,000	C-2F	KH 8627	KH 8632	KH 8635	KH 7632	KH4-280-040E-3