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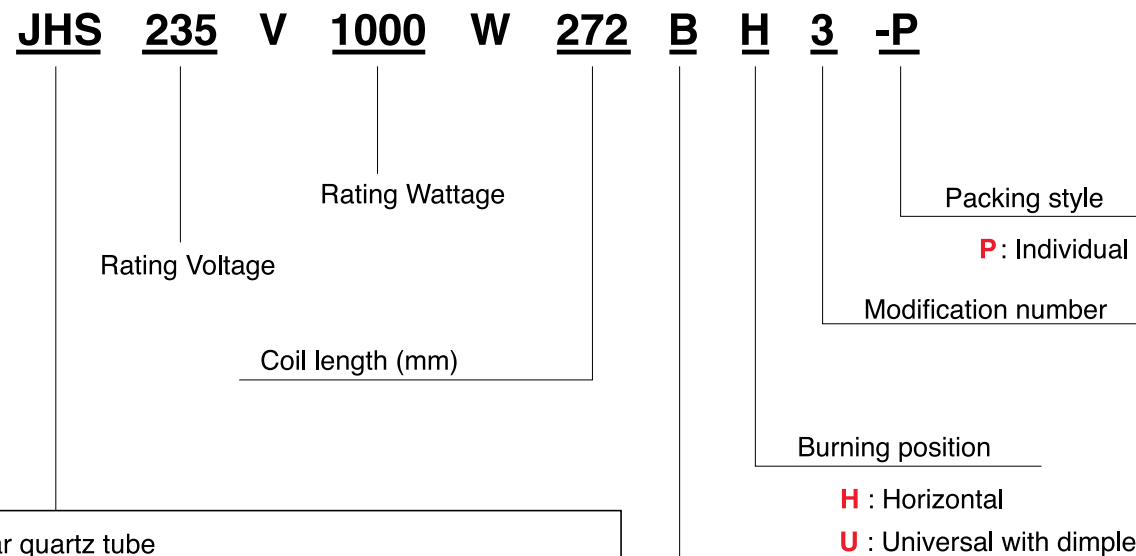
Web site address : www.tecwest.com/lighting

www.harison-toshiba.com



**INFRARED HEAT
FOR SUPERIOR HEATING SOLUTIONS**

Product code of TOSHIBA INFRARED Halogen heater lamps



- JHS** : Clear quartz tube
- JHC** : With Coated reflector
- JHQ** : Slim ruby color quartz tube
- JHD** : Jacketed by clear or ruby quartz
- JHM** : "PULSAR lamps"-Fast medium wave Infrared lamp
- JHB** : "PARYS lamps"-Infrared lamp for space heating

Base type

- B** : Box holder (with cement)
- Bf** : Box holder (without cement)
- J** : Metal clip
- Jc** : Metal sleeve type 1
- M** : Metal sleeve type 2
- T** : Wire harness only
- R** : R7s
- Vj** : R7s for Jacketed lamp

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Product code of TOSHIBA INFRARED Halogen Heater lamps.....Inside front cover

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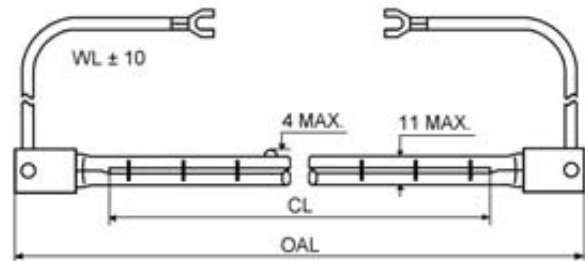
Handling Caution and Instruction..... Inside back cover

Infrared halogen heater lamps ●300WATTS – 1200WATTS

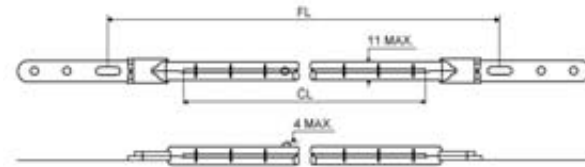
Part list

| Part code | Watts (W) | Volts (V) | Drawing | Wire Length WL(mm) | Overall Length OAL(mm) | Fixation Length FL(mm) | Heating Length CL(mm) | Color temp. CL(K) | Tube | Burning position | Ave. Life | Ordering code | Alternative Designation |
|----------------------------|-----------|-----------|---------|--------------------|------------------------|------------------------|-----------------------|-------------------|-----------|------------------|-----------|---------------|-------------------------------------|
| 300 WATTS | | | | | | | | | | | | | |
| COLOR TEMP.2800KELVIN | | | | | | | | | | | | | |
| JHS 230V 300W 60 RsH | 300 | 230-240 | TYPE 5 | - | - | 117.6±1.5 | 60±5 | 2800 | Clear | Horizontal | 1000 | 2JHS114 | QIR240-300/E 13908R |
| 500 WATTS | | | | | | | | | | | | | |
| COLOR TEMP.2400-2500KELVIN | | | | | | | | | | | | | |
| JHS 240V 500W 160 RsH | 500 | 230-240 | TYPE 5 | - | - | 210±1.5 | 160±5 | 2400 | Clear | Horizontal | 5000 | JHS001 | QIR240-500/E 13169R |
| JHS 235V 500W 165 BH | 500 | 230-240 | TYPE 1 | 210±10 | 226±2 | - | 165±5 | 2500 | Clear | Horizontal | 5000 | EM-323 | QIR240-500/D 13169Z |
| JHS 235V 500W 165 BH | 500 | 230-240 | TYPE 1 | 210±10 | 226±2 | - | 165±5 | 2500 | Reflector | Horizontal | 5000 | EM-324 | QIR240-500/ZD 13169Z/98 |
| 700 WATTS | | | | | | | | | | | | | |
| JHS 240V 700W 150 BH1 | 700 | 230-240 | TYPE 1 | 210±10 | 210±2 | - | 150±5 | 2620 | Clear | Horizontal | 5000 | RZ-209 | - 13842Z |
| 1000 WATTS | | | | | | | | | | | | | |
| JHC 235V 1000W 272 BH | 1000 | 230-240 | TYPE 1 | 210±10 | 352±2 | - | 272±5 | 2400 | Reflector | Horizontal | 5000 | EM-326 | QIR240-1000/ZD 13195Z/98 |
| JHS 235V 1000W 272 JH | 1000 | 230-240 | TYPE 2 | - | - | - | 272±5 | 2400 | Clear | Horizontal | 5000 | 2HS020 | QIR240-1000/B 13195X |
| JHC 235V 1000W 272 JH | 1000 | 230-240 | TYPE 2 | - | - | 370±10 | 272±5 | 2400 | Reflector | Horizontal | 5000 | 2JHC008 | QIR240-1000/ZB 13195X/98 |
| JHS 235V 1000W 272 JU | 1000 | 230-240 | TYPE 2 | - | - | 370±10 | 272±5 | 2400 | Clear | Universal | 5000 | 2JHS056 | QIR240-1000/VB 13713X |
| JHC 235V 1000W 272 JU | 1000 | 230-240 | TYPE 2 | - | - | 370±10 | 272±5 | 2400 | Reflector | Universal | 5000 | EM-028 | QIR240-1000/VZB 13713X/98 |
| JHC 235V 1000W 272 BU | 1000 | 230-240 | TYPE 1 | 210±10 | 352±2 | - | 272±5 | 2400 | Reflector | Universal | 5000 | 2JHC015 | QIR240-1000/VZD 13713Z/98 |
| 1200 WATTS | | | | | | | | | | | | | |
| JHC 144V 1200W 155 JcH | 1200 | 144 | TYPE 6 | 150±10 | 219±2 | - | 155±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC068 | QIR144-1200/S 13561Y/00 QH1200T3/CL |
| JHC 144V 1200W 155 BH | 1200 | 144 | TYPE 1 | 150±10 | 225±2 | - | 155±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC034 | QIR144-1200/ZD - |
| JHC 235V 1200W 155 BH1 | 1200 | 230-240 | TYPE 1 | 150±10 | 225±2 | - | 155±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC067 | QIR240-1200/ZD 14134Z/98 |

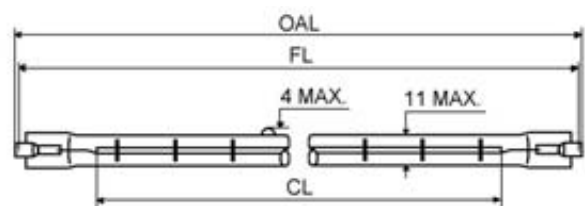
Type 1



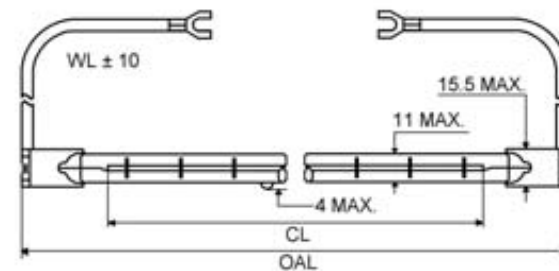
Type 2



Type 5



Type 6



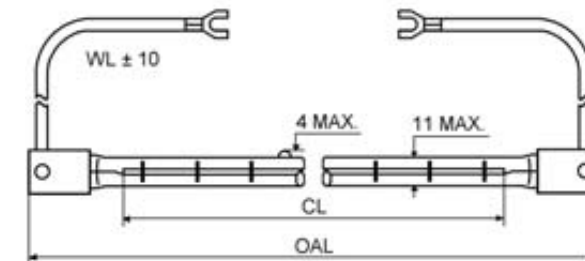
Infrared halogen heater lamps ●1600WATTS – 2200WATTS

Part list

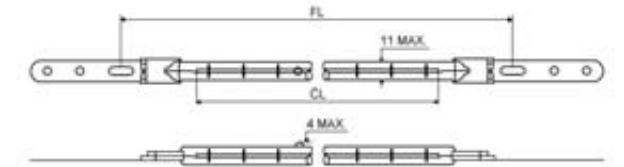
| Part code | Watts (W) | Volts (V) | Drawing | Wire Length WL(mm) | Overall Length OAL(mm) | Fixation Length FL(mm) | Heating Length CL(mm) | Color temp. (K) | Tube | Burning position | Ave. Life | Ordering code | Alternative Designation |
|------------------------|-----------|-----------|---------|--------------------|------------------------|------------------------|-----------------------|-----------------|-----------|------------------|-----------|---------------|--|
| 1600 WATTS | | | | | | | | | | | | | |
| JHC 144V 1600W 155 JcH | 1600 | 144 | TYPE 6 | 150±10 | 219±2 | - | 155±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC060 | QIR144-1600/S 13568Y/00 |
| JHC 144V 1600W 155 BH | 1600 | 144 | TYPE 1 | 150±10 | 225±2 | - | 155±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC035 | QIR144-1600/ZD - |
| JHC 235V 1600W 155 BH1 | 1600 | 230-240 | TYPE 1 | 150±10 | 225±2 | - | 155±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC066 | QIR240-1600/ZD 14134Z/98 |
| JHS 208V 1600W 406 MH | 1600 | 208 | TYPE 7 | 146±5 | 503 MAX | - | 406±5 | 2500 | Clear | Horizontal | 5000 | EM-534 | QIR208-1000/S 1600T3/CL 208V QH1600T3/CL |
| JHS 240V 1600W 406 MH | 1600 | 230-240 | TYPE 7 | 146±5 | 503 MAX | - | 406±5 | 2400 | Clear | Horizontal | 5000 | EM-536 | QIR240-1600/S 1600T3/CL QH1600T3/CL |
| JHS 277V 1600W 406 MH | 1600 | 277 | TYPE 7 | 146±5 | 503 MAX | - | 406±5 | 2500 | Clear | Horizontal | 5000 | EM-538 | QIR277-1600/S 1600T3/CL 277V QH1600T3/CL |
| 2000 WATTS | | | | | | | | | | | | | |
| JHC 235V 2000W 280 BH2 | 2000 | 230-240 | TYPE 1 | 210±10 | 352±2 | - | 280±5 | 2400 | Reflector | Horizontal | 5000 | EM-365 | QIR240-2000/ZD 14103Z/98 |
| JHS 235V 2000W 280 JU | 2000 | 230-240 | TYPE 2 | - | - | 370±10 | 280±5 | 2400 | Clear | Universal | 5000 | 2JHS031 | QIR240-2000/VB 13168X |
| JHC 235V 2000W 280 BU | 2000 | 230-240 | TYPE 1 | 210±10 | 352±2 | - | 280±5 | 2400 | Reflector | Universal | 5000 | 2JHC016 | QIR240-2000/VZD 13168Z/98 |
| JHC 235V 2000W 280 BH4 | 2000 | 230-240 | TYPE 1 | 210±10 | 352±2 | - | 280±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC027 | - - |
| JHS 277V 2000W 254 MH | 2000 | 277 | TYPE 7 | 146±5 | 351 MAX | - | 254±5 | 2450 | Clear | Horizontal | 5000 | EM-544 | QIR277-2000/S - |
| JHC 230V 2000W500 BH | 2000 | 230-240 | TYPE 1 | 210±10 | 658±2 | - | 500±5 | 2400 | Reflector | Horizontal | 5000 | RZ-200 | - 13214Z/98 |
| JHS 400V 2000W 410 JU | 2000 | 400 | TYPE 2 | - | - | 508±10 | 410±5 | 2400 | Clear | Universal | 5000 | 2JHS032 | QIR400-2000/VB 13765X |
| JHS 400V 2000W 410 JU | 2000 | 400 | TYPE 2 | - | - | 508±10 | 410±5 | 2400 | Reflector | Universal | 5000 | EM-206 | QIR400-2000/VZB 13765X/98 |
| 2200 WATTS | | | | | | | | | | | | | |
| JHS 235V 2200W 283 TU1 | 2200 | 230-240 | TYPE 4 | 150±5 | 350±2 | - | 283±5 | 2400 | Clear | Universal | 5000 | EM-082 | - - |

*Wire end is finished by splice

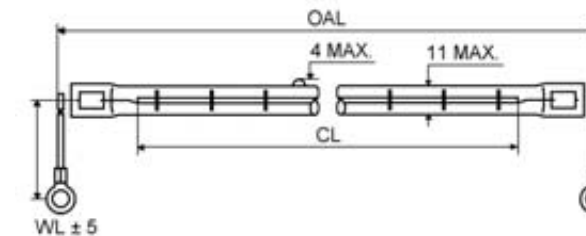
Type 1



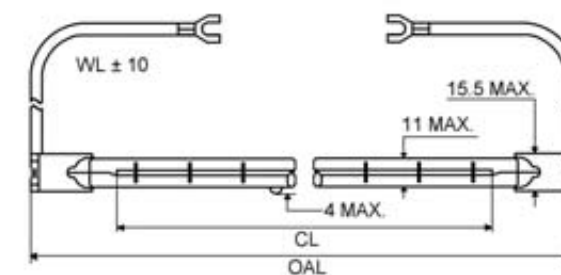
Type 2



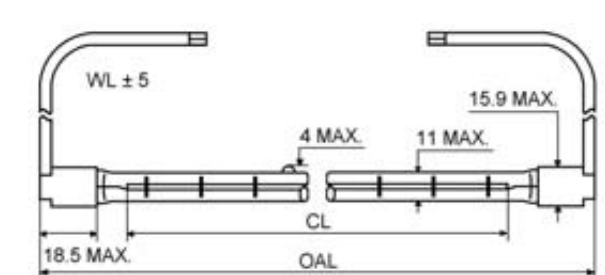
Type 4



Type 6



Type 7



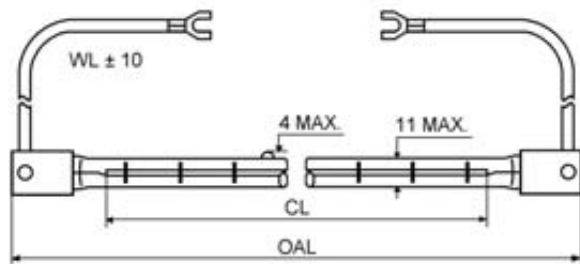
Infrared halogen heater lamps ●3000WATTS – 6000WATTS

Part list

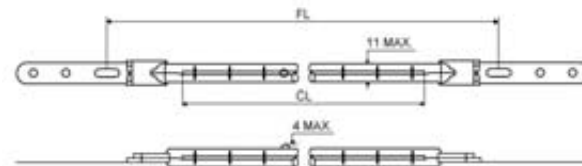
| Part code | Watts (W) | Volts (V) | Drawing | Wire Length WL(mm) | Overall Length OAL(mm) | Fixation Length FL(mm) | Heating Length CL(mm) | Color temp. (K) | Tube | Burning position | Ave. Life | Ordering code | Alternative Designation |
|------------------------|-----------|-----------|---------|--------------------|------------------------|------------------------|-----------------------|-----------------|-----------|------------------|-----------|---------------|----------------------------------|
| 2500 WATTS | | | | | | | | | | | | | |
| JHC 235V 2500W 280 BH1 | 2500 | 230-240 | TYPE 1 | 210±10 | 355±2 | - | 280±5 | 2700 | Reflector | Horizontal | 5000 | EM-480 | - |
| JHC 400V 2500W 280 BH | 2500 | 400 | TYPE 1 | 210±10 | 355±2 | - | 280±5 | 2550 | Reflector | Horizontal | 5000 | EM-341 | 14143Z/98 |
| JHC 400V 2500W 315 BH | 2500 | 400 | TYPE 1 | *230±5 | 378±2 | - | 315±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC036 | 14106Z/98 |
| 3000 WATTS | | | | | | | | | | | | | |
| JHS 400V 3000W 280 JU | 3000 | 400 | TYPE 2 | - | - | 370±10 | 280±5 | 2400 | Clear | Universal | 5000 | 2JHS053 | - |
| JHC 400V 3000W 280 BH | 3000 | 400 | TYPE 1 | 210±10 | 355±2 | - | 280±5 | 2550 | Reflector | Horizontal | 5000 | EM-344 | 14144Z/98 |
| JHC 400V 3000W 315BH | 3000 | 400 | TYPE 1 | *230±5 | 378±2 | - | 315±5 | 2700 | Reflector | Horizontal | 5000 | 2JHC037 | 14111Z/98 |
| JHS 400V 3000W 410 JU | 3000 | 400 | TYPE 2 | - | - | 508±10 | 410±5 | 2400 | Clear | Universal | 5000 | 2JHS072 | - |
| JHS 235V 3000W 700 BH1 | 3000 | 230-240 | TYPE 1 | 150±5 | 787.5±2 | - | 700±5 | 2400 | Reflector | Horizontal | 5000 | 2JHC039 | 14107Z/98 |
| JHS 400V 3000W 700 JU | 3000 | 400 | TYPE 2 | - | - | 798±10 | 700±5 | 2400 | Clear | Universal | 5000 | 2JHS058 | QIR400-3000/VB 13230X |
| JHC 400V 3000W 700 JU | 3000 | 400 | TYPE 2 | - | - | 798±10 | 700±5 | 2400 | Reflector | Universal | 5000 | EM-030 | QIR400-3000/VZB 13230X/98 |
| 3200 WATTS | | | | | | | | | | | | | |
| JHS 240V 3200W 813 MH | 3200 | 230-240 | TYPE 7 | 146±5 | 1062MAX | - | 813±5 | 2450 | Clear | Horizontal | 5000 | EM-545 | 3200T3/CL |
| JHS 277V 3200W 813 MH | 3200 | 277 | TYPE 7 | 146±5 | 1062MAX | - | 813±5 | 2450 | Clear | Horizontal | 5000 | EM-547 | 3200T3/CL 277V |
| 3800 WATTS | | | | | | | | | | | | | |
| JHS 570V 3800W 965 MH | 3800 | 570 | TYPE 7 | 146±5 | 1062MAX | - | 965±5 | 2500 | Clear | Horizontal | 5000 | EM-540 | QIR570-3800/S 3800T3 QH3800T3/CL |
| 4600 WATTS | | | | | | | | | | | | | |
| JHS 480V 4600W 235 TH | 4600 | 480 | TYPE 3 | 155±5 | 290±2 | - | 235±5 | 3000 | Clear | Horizontal | 1000 | 2JHS079 | 13136V |
| 6000 WATTS | | | | | | | | | | | | | |
| JHS 480V 6000W 290 TH | 6000 | 480 | TYPE 4 | 35±5 | 350±2 | - | 290±5 | 3000 | Clear | Horizontal | 1000 | EM-288 | 13170V |

*Wire end is finished by splice

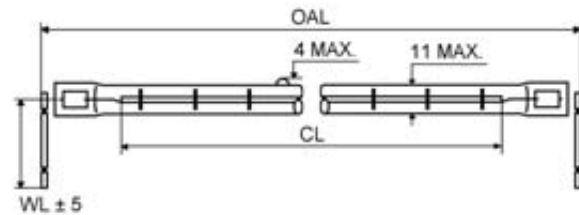
Type 1



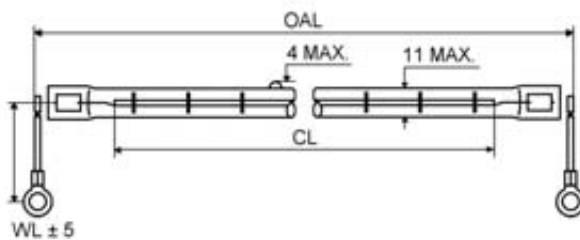
Type 2



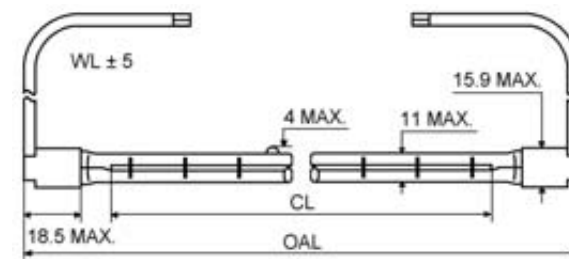
Type 3



Type 4



Type 7

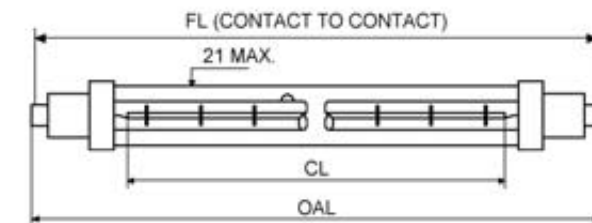


Jacketed Infrared halogen heater lamps ●300WATTS – 500WATTS

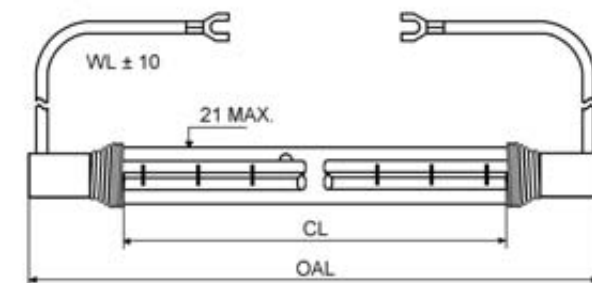
Part list

| Part code | Watts (W) | Volts (V) | Drawing | Wire Length WL(mm) | Overall Length OAL(mm) | Fixation Length FL(mm) | Heating Length CL(mm) | Jacket | Burning position | Ave. Life | Ordering code |
|------------------------|-----------|-----------|---------|--------------------|------------------------|------------------------|-----------------------|--------|------------------|-----------|---------------|
| 300 WATTS | | | | | | | | | | | |
| JHDS 230V 300W 60 VJH | 300 | 230-240 | TYPE 1 | - | (118) | 114.2±1 | 60 | Clear | Horizontal | 5000 | 2JHD022 |
| JHDS 240V 300W 160 VJH | 300 | 230-240 | TYPE 1 | - | (220) | 216±1 | 160 | Clear | Horizontal | 5000 | JHD001 |
| JHDS 240V 300W 160 BH | 300 | 230-240 | TYPE 2 | 200±10 | 217±2 | - | 160 | Clear | Horizontal | 5000 | EM-250 |
| 500 WATTS | | | | | | | | | | | |
| JHDS 240V 500W 160 VJU | 500 | 230-240 | TYPE 1 | - | (220) | 216±1 | 160 | Clear | Universal | 5000 | 2JHD021 |
| JHDS 240V 500W 160 BH | 500 | 230-240 | TYPE 2 | 200±10 | 217±2 | - | 160 | Clear | Horizontal | 5000 | 2JHD001 |

Type 1 (PUSH-IN R7s contact)



Type 2

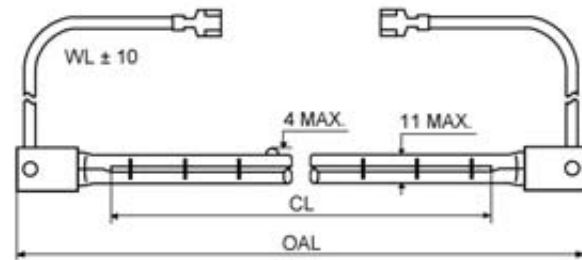


Infrared Ruby SLIM lamps ●1000WATTS – 3000WATTS

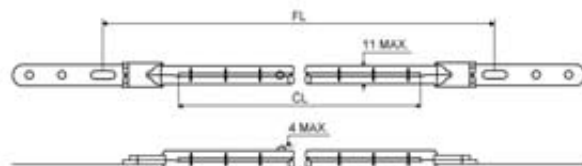
Part list

| Part code | Watts (W) | Volts (V) | Drawing | Wire Length WL(mm) | Overall Length OAL(mm) | Fixation Length FL(mm) | Heating Length CL(mm) | Tube | Burning position | Ave. Life | Ordering code |
|------------------------|-----------|-----------|---------|--------------------|------------------------|------------------------|-----------------------|------|------------------|-----------|---------------|
| 1000 WATTS | | | | | | | | | | | |
| JHQ 235V 1000W 280 BH | 1000 | 230-240 | TYPE 1 | 300±10 | 352±2 | - | 280 | Ruby | Horizontal | 5000 | 2JHQ018 |
| JHQ 235V 1000W 272 JU | 1000 | 230-240 | TYPE 2 | - | - | 370±10 | 280 | Ruby | Universal | 5000 | 2JHQ051 |
| 1500 WATTS | | | | | | | | | | | |
| JHQ 235V 1500W 280 BH | 1500 | 230-240 | TYPE 1 | 300±10 | 352±2 | - | 280 | Ruby | Horizontal | 5000 | 2JHQ019 |
| 2000 WATTS | | | | | | | | | | | |
| JHQ 235V 2000W 280 BH | 2000 | 230-240 | TYPE 1 | 300±10 | 352±2 | - | 280 | Ruby | Horizontal | 5000 | 2JHQ046 |
| JHQ 235V 2000W 280 JU2 | 2000 | 230-240 | TYPE 2 | - | - | 370±10 | 280 | Ruby | Universal | 5000 | 2JHQ072 |
| JHQ 400V 2000W 410 JU1 | 2000 | 400 | TYPE 2 | - | - | 508±10 | 410 | Ruby | Universal | 5000 | 2JHQ070 |
| 3000 WATTS | | | | | | | | | | | |
| JHQ 400V 3000W 700 JU | 3000 | 400 | TYPE 2 | - | - | 798±10 | 700 | Ruby | Universal | 5000 | 2JHQ052 |

Type 1 *Wire harness is protected by insulation tube



Type 2



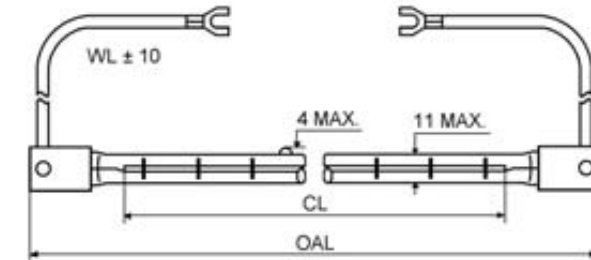
“PULSAR lamps” - Fast medium wave Infrared heater lamps ●1000WATTS – 3000WATTS

Part list

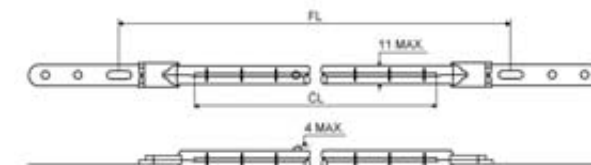
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|------------------------|-----------|-----------|---------|--------------------|------------------------|------------------------|-----------------------|-------|------------------|-----------|---------------|
| 1000 WATTS | | | | | | | | | | | |
| JHM 235V 1000W 272 BIU | 1000 | 230-240 | TYPE 1 | NOTE | 352±2 | - | 272 | Clear | Universal | 5000 | 2JHM003 |
| JHM 235V 1000W 272 JU | 1000 | 230-240 | TYPE 2 | - | - | 370±10 | 272 | Clear | Universal | 5000 | 2JHM010 |
| 1500 WATTS | | | | | | | | | | | |
| JHM 235V 1500W 280 BIU | 1500 | 230-240 | TYPE 1 | NOTE | 352±2 | - | 280 | Clear | Universal | 5000 | EM-519 |
| JHM 235V 1500W 280 JU | 1500 | 230-240 | TYPE 2 | - | - | 370±10 | 280 | Clear | Universal | 5000 | 2JHM011 |
| 2000 WATTS | | | | | | | | | | | |
| JHM 400V 2000W 410 JU | 2000 | 400 | TYPE 2 | - | - | 508±10 | 410 | Clear | Universal | 5000 | 2JHM001 |
| 3000 WATTS | | | | | | | | | | | |
| JHM 400V 3000W 700 BIU | 3000 | 400 | TYPE 1 | 210±10 | 787.5±2 | - | 700 | Clear | Universal | 5000 | EM-574 |
| JHM 400V 3000W 700 JU | 3000 | 400 | TYPE 2 | - | - | 798±10 | 700 | Clear | Universal | 5000 | EM-647 |

NOTE: 230mm ± 10 with spliced-terminal

Type 1



Type 2



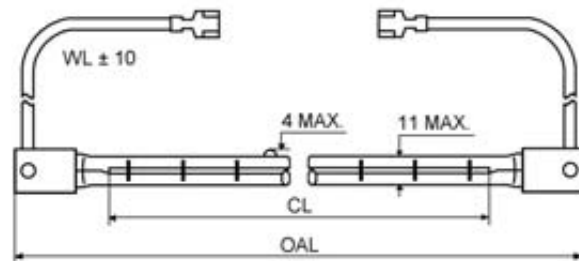
“PARYS lamps” – Excellent color and low glare for space heating ●1000WATTS – 3000WATTS

Part list

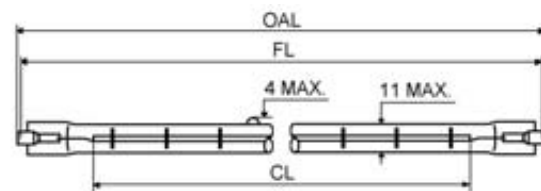
| Part code | Watts (W) | Volts (V) | Drawing | Wire Length WL(mm) | Overall Length OAL(mm) | Fixation Length FL(mm) | Heating Length CL(mm) | Tube | Burning position | Ave. Life | Ordering code |
|------------------------|-----------|-----------|---------|--------------------|------------------------|------------------------|-----------------------|-----------------|------------------|-----------|---------------|
| 1000 WATTS | | | | | | | | | | | |
| JHB 235V 1000W 280 BIH | 1000 | 230-240 | TYPE 1 | *300±10 | 352±2 | - | 280 | Special coating | Horizontal | 5000 | 2JHB008 |
| 1300 WATTS | | | | | | | | | | | |
| JHB 235V 1300W 185 RSH | 1300 | 230-240 | TYPE 2 | - | 254.1 Max. | 250.7±1.5 | 185 | Special coating | Horizontal | 5000 | 2JHB006 |
| 1500 WATTS | | | | | | | | | | | |
| JHB 235V 1500W 280 BIH | 1500 | 230-240 | TYPE 1 | 300±10 | 352±2 | - | 280 | Special coating | Horizontal | 5000 | 2JHB001 |
| 2000 WATTS | | | | | | | | | | | |
| JHB 235V 2000W 280 BIH | 2000 | 230-240 | TYPE 1 | 300±10 | 352±2 | - | 280 | Special coating | Horizontal | 5000 | 2JHB002 |

*Wire end is finished by splice, No additional 250°C insulating tube on wire

Type 1 *Wire harness is protected by insulation tube



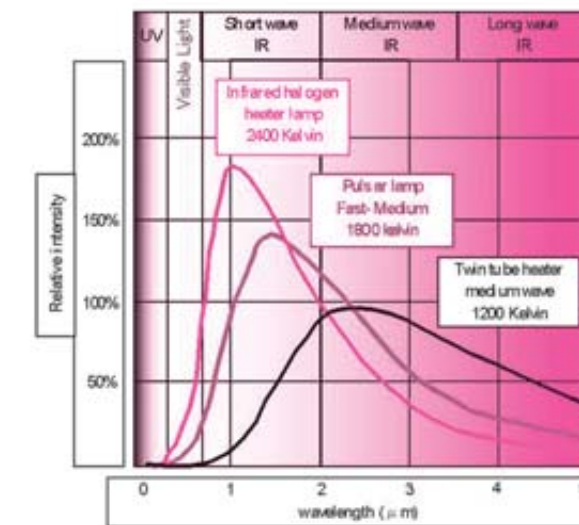
Type 2



Infrared halogen heater lamps for industry

TOSHIBA infrared halogen heater lamps are powerful heat sources comprising a finely coiled tungsten filament surrounded by high-purity tubular quartz glass and a kind of halogen gas-filled lamp. Halogen cycle ensures constant infrared efficiency all the lifetime with preventing the quartz glass tube from blackening. TOSHIBA infrared halogen heater lamps match to numerous kinds of industrial process with benefits of instant & contact-less heat, clean, odorless, compact, high-power, and long-life.

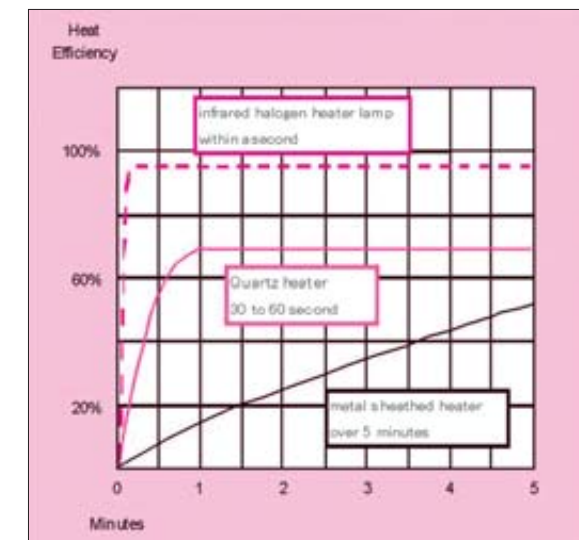
Spectrum (Fig.1)



Benefits and features

- **Long life:** 5000h on average..
- **High speed:** within a second to switch on.
- **High efficiency:** more than 85% heat efficiency of full power
- **High controllability:** neither ballast nor special circuits are necessary for basic usage.
- **No air draughts:** because of radiation (the same as solar energy)
- **Clean and odorless:** no risk of contamination over environment or target object to be heated.
- **Extensive assortment:** many types of voltage, wattage, length, base, wire-harnesses and horizontal or universal burning position are available.
- **Flexible:** special lamp designing service on demand is available.

Response speed (Fig.2)



Application area

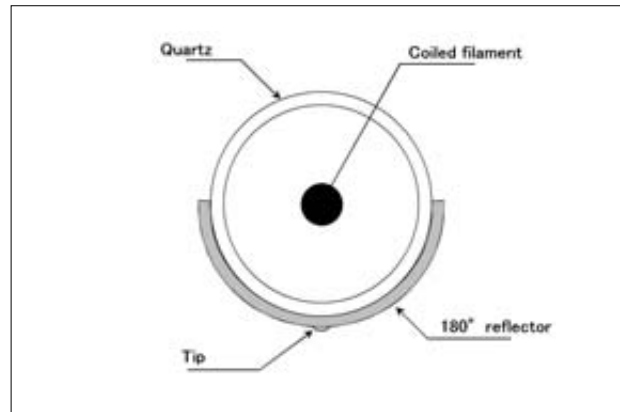
- Paint drying
- Pre-heating of PET perform
- Silicon wafer manufacturing process in Semiconductor
- Drying process in paper mill
- Plastics thermoforming
- Fusing printing ink

And various kind of drying processes

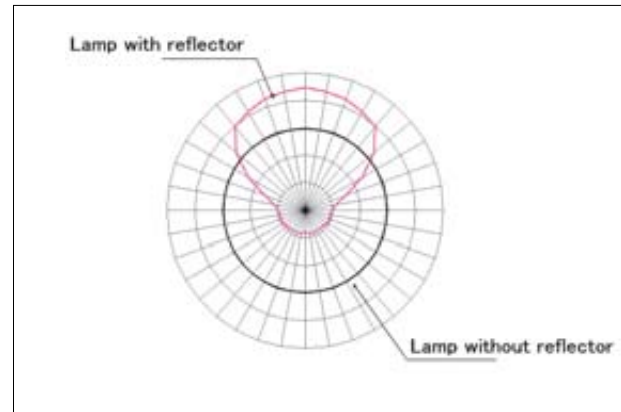
Infrared halogen heater lamps with coated reflector (JHC type)

TOSHIBA Premium white-coated reflector is plated over half of lamp (- see Fig. 1) circumstance to provide a unidirectional beam of infrared heat, and this coating technology substantially boosting infrared heat (- see Fig. 2) is affordable prices in comparison with that of golden color coating technology.

Cross-section of lamp with reflector (Fig.1)



Efficiency of reflector (Fig.2)



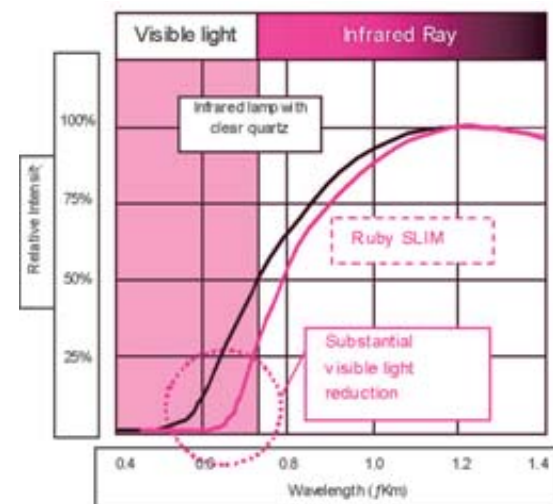
Jacketed Infrared halogen heater lamps (JHD type)

- For anti-scattering protection against quartz piece by accidental break of heater inside.
- To avoid chemical attacks over heater tubes to maintain good performance.
- To protect the infrared lamps from unexpected thermal shock such as splashed water or foods

Infrared Ruby SLIM lamps (JHQ type)

TOSHIBA new infrared Ruby SLIM lamps comprise finely coiled tungsten filament surrounded directly by 10mm diameter Ruby quartz tube. Thanks to the narrower diameter (10mm) than that of classical Ruby sleeve (20mm) type, size of your reflector and/or module can be more compactly designed and infrared heat is more efficiently transferred, whilst reducing visible glare (- see Fig 1). As no coating on surface of the glass tube, this lamp brings you no peeling trouble to realize unchangeable low glare over lifetime.

Visible light reduction (Fig.1)



“PULSAR lamp” - Fast Medium wave Infrared heater lamps (JHM type)

TOSHIBA new PULSAR lamps are the fast-response medium wave infrared heater and can be switched on and off within few seconds, converting more than 85% of input power into infrared heat to meet the voice of professional users. Medium wave infrared is particularly matched to drying process for surface and/or thin materials in plastics, textile, automotive, printing industry and numerous industrial processes.

TOSHIBA PULSAR lamp is state of the art and comprises finely coiled tungsten filament surrounded by a sealed quartz tube. Thanks to halogen gas cycle inside sealed quartz tube, PULSAR realizes:

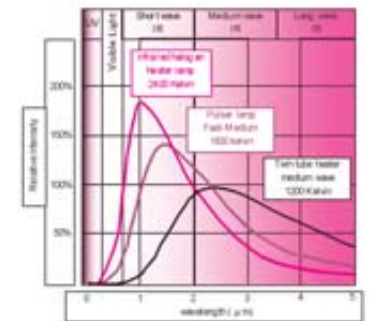
- Long life 5000h on average
- Medium color temperature around 1800 Kelvin (around 1500°C) -see Fig.1
- Emitting medium infrared waveband at 1.6_μm peak wavelength - see Fig.1

TOSHIBA PULSAR lamp gives more than 85% of full power into infrared heat as it is a halogen lamp, whilst 60 to 70% by a classical quartz heater and less than 50% by a metal-sheathed heater. PULSAR gives also instant heat and can switched on within few seconds. -see Fig.2

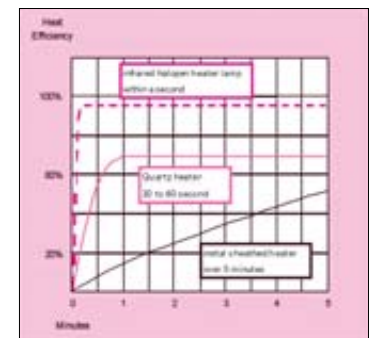
Hence benefits of PULSAR lamp are:

- High speed = within few seconds.
- High power density up to 53W/cm
- High efficiency = more than 85% of input power into infrared heat.
Long life = 5000h.

Spectrum (Fig.1)



Response speed (Fig.2)



“PARYS lamp” - Excellent color and low glare for space heating (JHB type)

TOSHIBA new PARYS lamp is the best infrared heater lamp for space heating. The lamps comprise finely coiled tungsten surrounded by high-purity quartz tube with silky color coating. No pink colors appear and steady low glare constantly maintains during lamp life thanks to the highly durable coating technology. TOSHIBA new PARYS lamp is no wonder the best infrared heater lamp for space heating application where increasingly sensitively you need to think about better color rendering with low glare and substantial infrared heat. PARYS lamp will certainly create new business chance with benefits of;

Benefits

- Excellent color rendering. NO PINK AND RED COLOR!
- Highly durable coating technology (almost no peeling problem)
- Steady low glare - thanks to the highly durable coating
- No air draughts because of radiant infrared heat
- Noise and odor free
- Long life 5000h on average

Application area

- Space heating in:
- Restaurants and café
 - Religious buildings (Churches, Mosques, Temples etc)
 - Sports hall and exhibition halls
 - Workshops, warehouses and factories
 - De-icing
- And various kinds of place where you need comfortable heat.

What's halogen lamp?

A halogen lamp is a kind of gas-filled tungsten filament lamp. Its gas consists of not only inert gas which is commonly used in gas-filled lamp technology, but also small trace of halogen material. Conventional incandescent lamps lose their light flux gradually during the operation, due to tungsten vapor accumulation on inner bulb surfaces (blackening phenomenon). Halogen lamps do not have this slow deterioration thanks to a chemical process that is called "halogen cycle".

Halogen cycle

The appendix 1 illustrates chemical reaction inside a halogen lamp. Tungsten atoms W which have evaporated from the filament combine with halogen vapor to form WX₂, which traverse towards the quartz glass wall. If the temperature at the quartz glass is above 250 °C, which is over the condensation temperature of WX₂, the molecules can not condensate themselves on the wall, therefore circulate back towards the filament. Since the temperature near the filament exceeds 2000°C, WX₂ is disintegrated to W and Xs again. The free tungsten atom W can deposit itself onto a cold portion of the filament, but the X remains floated in the gas, repeating the process over and over. In order to achieve good halogen cycle, halogen lamps have generally much compact bodies (made of quartz to withstand the high temperature) compared with conventional lamps. This results in building up higher gas pressure inside, suppressing tungsten vaporization, thus achieving long life as well as better lumen maintenance performance as shown in the appendix 2.

Spectrum vs. Color temperature (Kelvin)

See the appendix 3. Higher filament temperature will increase the ratio of visible light, which belongs to rather short wavelength band of emission from a halogen lamp. Light produced with a higher temperature filament has more bluish spectrum, which gives an impression of whiter light to human eyes.

Appendix 3: Planck's law

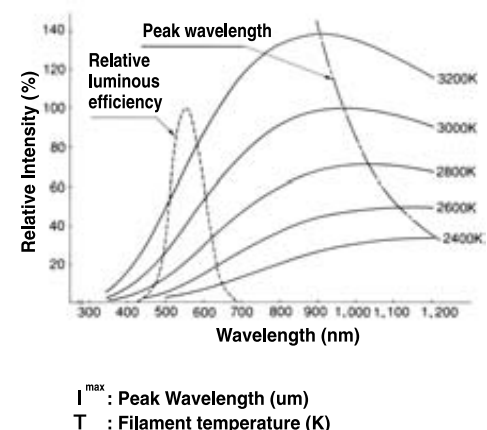
Planck's law

$$M_e(\lambda, T) = \frac{C_1}{\lambda^5 \{ \exp(C_2 / \lambda T) - 1 \}}$$

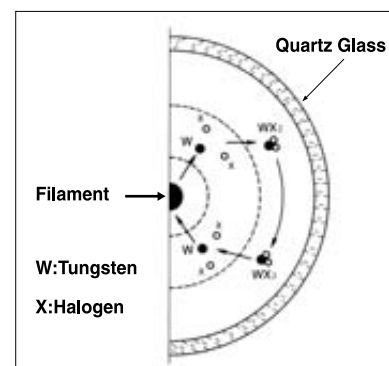
M_e : Energy spectrum
λ : Wave length (μm)
T : Absolute temperature (K)
C₁ : 3,7415 × 10⁻¹⁶ (Wm²)
C₂ : 1,4388 × 10⁴ (mK)

Equation to estimate peak wavelength and filament

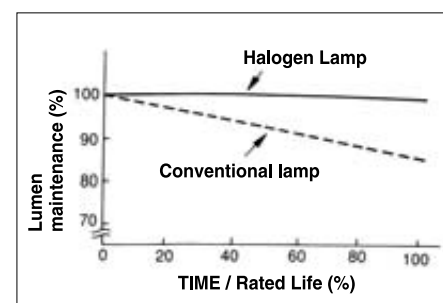
$$\lambda_{max} T = 2898 [\mu m \cdot K]$$



Appendix 1: Inside halogen lamp



Appendix 2: Halogen cycle (radiation maintenance of halogen in comparison with conventional lamp)



Lamp voltage vs. Characteristics

Some important characteristics can be estimated with the equation illustrated in the appendix 4. Luminous flux refers visible light using clear quartz glass tube.

Appendix 4 : Voltage vs. Variation of Factors

F : Value to be estimated
F₀ : Value at the rated voltage V₀
V : Lamp Voltage
V₀ : Rated Lamp Voltage

$$\frac{F}{F_0} = \left(\frac{V}{V_0} \right)^k$$

| F | Current | Power | *Efficiency | Light Flux | Color Temperature |
|---|---------|-------|-------------|------------|-------------------|
| K | 0.54 | 1.54 | 1.84 | 3.38 | 0.42 |

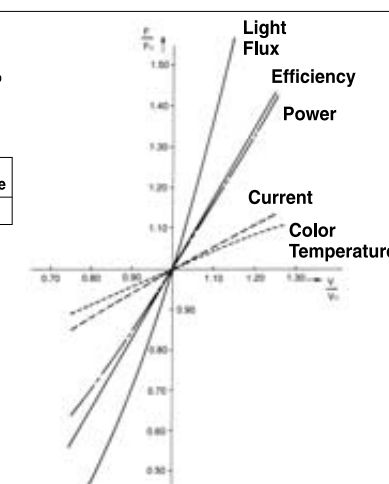
EX) Power consumption of a 500w lamp at 105% input voltage

$$\frac{\text{Power}}{500} = \left[\frac{105}{100} \right]^{1.54}$$

$$= 1.078$$

Therefore,
 Power = 539W

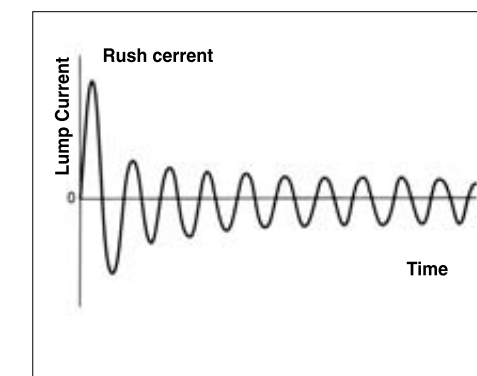
*note) Efficiency is given as visible light flux output/input power, not as IR radiation efficiency.



Rush current

Resistance of filament changes dramatically by its working temperature. For example, a tungsten filament designed to operate at 2727°C (with a resistivity of 90,4 × 10⁻⁶) decreases its resistivity down to its mere 6% (5,65 × 10⁻⁶) at a room temperature. Theoretically, since the filament design is based on its operating temperature, the cold start rush current becomes 13 to 17 times larger than the rated current. In actual applications, the impedance of power supply networks helps to suppress the current to a certain degree, but still 7 to 10 times larger current will be experienced usually. Power supply capacity should be taken into consideration before installation to protect from halogen lamp rush current. Especially, halogen lamp heater applications, which have rather long time constant, often require big enough margins to power supply capacity and/or current controller capacity.

Appendix 5: Rush current



Sealing part temperature

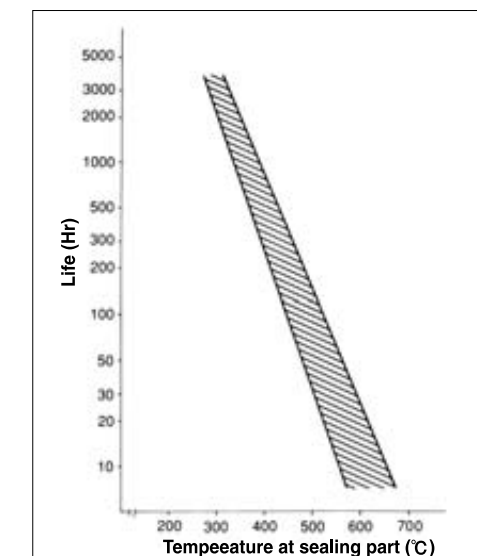
Temperature at the lamp seal must be kept lower than 350°C, because of the following reasons:

- High temperature accelerates the oxidation on molybdenum foil to damage its electrical conductivity.
- Thermal expansion may create a slow-leak path between the foil and the glass.
- Excessive thermal stress creates unbearable mechanical stress in the glass

The temperature at sealing part is thus important but not very easy to be controlled. Power consumption, lamp current, distance to the nearest coiling element, glass tube diameter, base holding method and other factors affect this temperature.

Upon customer's request, TOSHIBA offers a sample of infrared halogen heater lamp with thermocouples to measure important temperatures (including lamp sealing) in your modules.

Appendix 6: Lamp life vs. Sealing part



Lamp life vs. Lamp voltage

Lamp voltage has a big impact on lamp life. An approximate equation is known as:

$$\frac{L}{L_0} = \left(\frac{V}{V_0}\right)^{10-14}$$

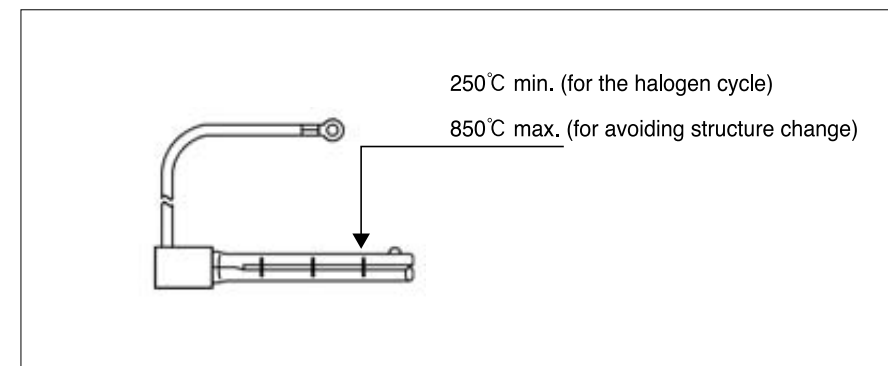
L : Life to be estimated
L₀ : Life as the rated voltage V₀
V : Lamp voltage
V₀ : Rated lamp voltage

This is rather a general rule to understand filament life. Actual lamp life may vary depending on many design parameters. For example, this equation estimates that additional 10% of lamp voltage will accelerate the filament cut by 70%. Practically, before this filament failure, light flux drop may be experienced because of the blackening effect caused by halogen shortage with more active tungsten vapor production.

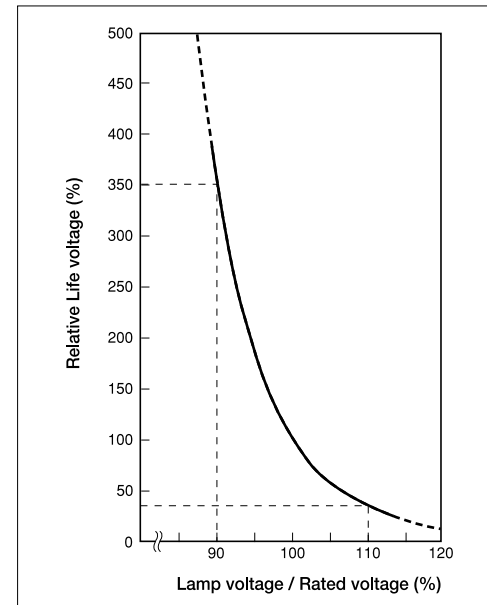
IMPORTANT

Operating lamp at a higher than nominal voltage causes a blackening on inner wall of glass tube by excess tungsten vapor. Paradoxically however operating lamp at a lower voltage leads to insufficient temperature of optimum value for the filament, and excess gas may damage the filament. Such operations may therefore result to shorten lamp life.

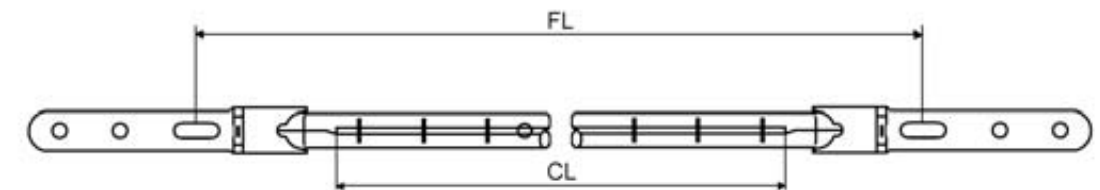
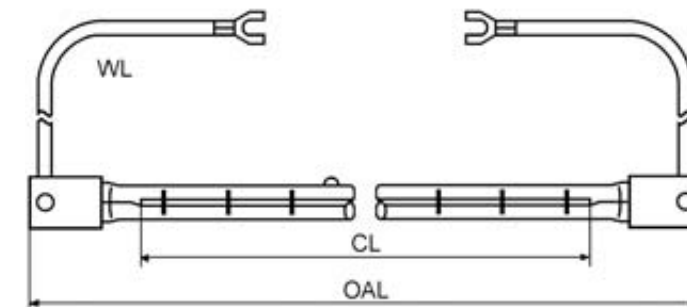
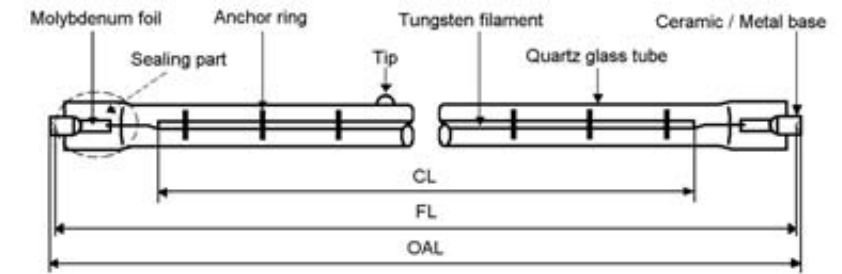
Appendix8 : Allowable temperature for lamp operation



Appendix7 : Lamp life vs. Lamp voltage



Infrared Halogen Heater Lamp Structure



CL : Coiled filament length
FL : Fixation length
OAL : Overall length
WL : Wire harness length

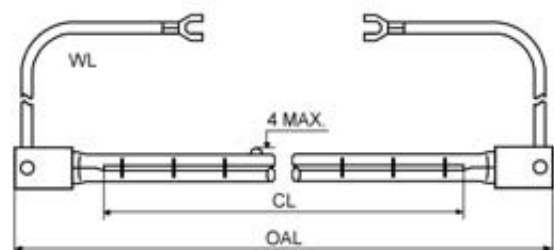
Halogen Heater Lamp OEM SHEET

Performance

Rated Voltage _____ V
 Rated Wattage _____ W
 Color Temp. _____ Kelvin
 Burning position Horizontal / Universal

Dimensions

OAL (Overall length) _____ mm
 FL (Fixation length) _____ mm
 CL (Coil length) _____ mm
 WL (Wire length) _____ mm
 Terminal _____



Quartz Glass Tube

- JHS : Clear quartz tube
- JHC : With Coated reflector
- JHQ : Slim ruby color quartz tube
- JHD : Jacketed by clear or ruby quartz
- JHM : Fast medium wave Infrared lamp
- JHB : Infrared lamp for space heating
- Others (_____)

Base Type

- B : Box holder (with cement)
- Bf : Box holder (without cement)
- J : Metal clip
- Jc : Metal sleeve type 1
- M : Metal sleeve type
- T : Wire harness only
- R : R7s
- Vj : R7s for Jacketed lamp
- Others (_____)

Project information

Start of production _____
 Estimated annual usage _____ / Year
 Application _____

Requester's information

Surname _____ Phone _____
 First name _____ FAX _____
 Company _____ E-Mail _____
 Activity _____ Website _____



Handling Caution and Instruction



- Infrared heater(s) becomes extraordinarily hot to emit strong infrared radiations around their environment during operation. Ensure safety before the start of the operation.
- Operate the infrared heater(s) inside the rating voltage and maximum wattage density instructed (cause of short lifetime)
- Use infrared heater(s) with approved appliances with safety devices, avoiding over voltage situation (cause of short lifetime and fire)
- Do not use the infrared heater(s) which is (are) not explosion-proof product(s) under flammable gas or organic solvent environment (cause of explosion, ignition and fire).
- Follow the infrared heater(s) burning orientation strictly in its specifications (cause of short lifetime and fire)
- Never touch infrared heater(s) in operation or even just after being operated (cause of skin burn).
- Ensure the power supply is disconnected before accessing the infrared heater(s) in appliances (cause of electric shock)
- Do not use the infrared heater(s) under water, high humidity or corrosive environment (cause of short lifetime).
- In case of an infrared heater(s) being broken, do not handle scattered glass fragments with bare hand (cause of injury).
- Do not exceed 350°C on the sealing part locating the both end of lamp (cause of short lifetime).
- Don't gaze an operating infrared heater(s) (cause of eye damage)
- In order to keep the quartz tube in good condition, do not handle infrared heater(s) tubes with bare hands. Use clean cloth impregnated with ethyl alcohol to wipe spot gently, if necessary (cause of short lifetime).
- Do not drop, hit, and stress infrared heater(s) and its wire-harnesses mounted with excessive force or vibration, and do not scratch infrared heater glasses (cause of injury, breakage and short-circuit)
- Do not cover an infrared heater(s). Do not place an operating infrared heater(s) close to flammable materials (cause of fire).
- Infrared heater(s) shall be fixed and retained firmly inside appliances (cause of drop and breakage)
- Make sure the wire-harness temperature over its permissible temperature (cause of electrical shock and short-circuit).
- Used infrared heater(s) shall be disposed as an industrial waste on the user's responsibility.

The manufacturer will not bear any liability for personal injury (ies) or damage to property (ies) which may result from inadequate use of the heat sources and/or combination with improper appliances(s). Heat appliance designer should contact to the infrared heater manufacturer to obtain the latest technical information especially including safety issue.