

**PRODUCT  
DATASHEET**



**CLM1612P2412 Device(Preliminary)**

## CLM1612P2412 Device

### Description

Current Limiting Module (CLM) is a chip type surface mountable device that can protect against both overcurrent and overcharging. It comprises a fuse element to ensure stable operation under normal electrical current and to cut off the current when overcurrent occurs. It also comprises a resistive heating element that could be used in combination with a voltage detecting means, such as IC and FET. When overvoltage is detected, the heating element is electrically excited to generate heat to blow the fuse element to achieve overvoltage protection.

### Features

- Halogen-free
- Surface mountable
- Overcharging protection
- Fast response time
- Overcurrent protection

### Application



- Notebook
- Tablet PC
- Cell phone
- Automotive applications
- Camera
- Printer
- Ultrabook
- Security systems



### Agency Approval and Environmental Compliance

Agency	File Number	Regulation	Standard
	E331807		IEC 61249-2-21:2003
	TA 50428400		

### Electrical Specifications

Part Number	I <sub>rated</sub> (A)	Cells in series	V <sub>max</sub> (V <sub>DC</sub> )	I <sub>break</sub> (A)	V <sub>OP</sub> (V)	Resistance		Agency Approval	
						R <sub>heater</sub> (Ω)	R <sub>fuse</sub> (mΩ)		
CLM1612P2412	12	6	36	50	18.0 ~ 27.0	24.0 ~ 54.0	1.5 ~ 3.5		
								✓	✓

## CLM1612P2412 Device

### Electrical Characteristics

Current Capacity	100% x $I_{rated}$ No Melting
Cut Time	200% x $I_{rated}$ < 1 min
Interrupting Current	5 x $I_{rated}$ , power on 5 ms, power off 995 ms, 10000 cycles No Melting
Over Voltage Operation	In operation voltage range, the fusing time is <1min.

### Note on Electrical Specifications & Characteristics

#### ■ Vocabulary

- $I_{rated}$  = Current carrying capacity that is measured at 40°C thermal equilibrium condition.  
 $I_{break}$  = The current that the fuse element is able to interrupt.  
 $V_{max}$  = The maximum voltage that can be cut off by fuse.  
 $R_{heater}$  = The resistance of the heating element.  
 $R_{fuse}$  = The resistance of the fuse element.  
 Cells in series = Number of battery cells connected in series in the circuit for CLM device to protect.

- Value specified is determined by using the PWB with 2mm\*2oz copper traces, AWG18 covered wire, and 0.6mm glass epoxy PCB.
- Specifications are subject to change without notice.

### **⚠ WARNING**

#### ■ General

- Before and after mounted, the ultrasonic-cleaning or immersion-cleaning must not be done to CLM device. The flux on element would flow, and it would not be satisfied its specification when cleaning is done. In addition, a similar influence happens when the product comes in contact with cleaning-solution. These products after cleaning will not be guaranteed.
- Silicone-based oils, oils, solvents, gels, electrolytes, fuels, acids, and the like will adversely affect the properties of CLM devices, and shall not be used or applied.
- Please Do Not reuse the CLM device removed by the soldering process.
- CLM devices are secondary protection devices and are used solely for sporadic, accidental over-current or over-temperature error condition, and shall NOT be used if or when constant or repeated fault conditions (such fault conditions may be caused by, among others, incorrect pin-connection of a connector) or over-extensive trip events may occur.
- Operation over the maximum rating or other forms of improper use may cause failure, arcing, flame and/or other damage to the CLM devices.
- The performance of CLM devices will be adversely affected if they are improperly used under electronic, thermal and/or mechanical procedures and/or conditions non-conformant to those recommended by manufacturer.
- Customers shall be responsible for determining whether it is necessary to have back-up, failsafe and/or fool-proof protection to avoid or minimize damage that may result from extra-ordinary, irregular function or failure of CLM devices.
- There should be minimum of 0.1mm spacing between CLM and surrounding compounds, to maintain the product characteristics and avoid damage other surrounding compounds.
- This product is designed and manufactured only for general-use of electronics devices. We do not recommend that it is used for the applications Military, Medical and so on which may cause direct damages on life, bodies or properties.

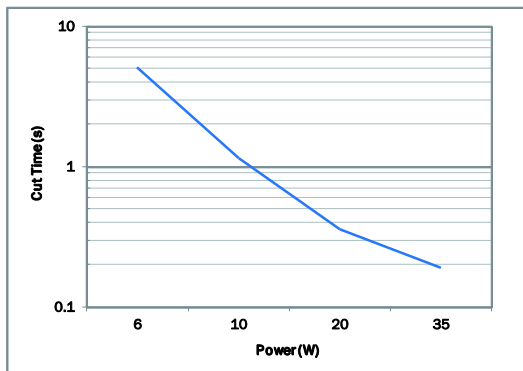
## CLM1612P2412 Device

### Thermal Derating Characteristics

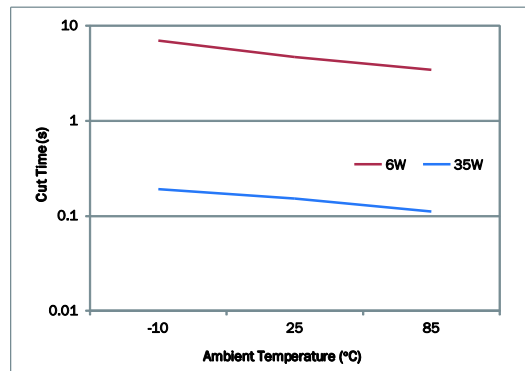
Ambient Temperature (°C)	25	40	60
Recommend Rated Current (A)	13.5	12.0	10.0

### Cut Time by Heater Operation

■ Various heater wattage at 25°C ambient temperature.

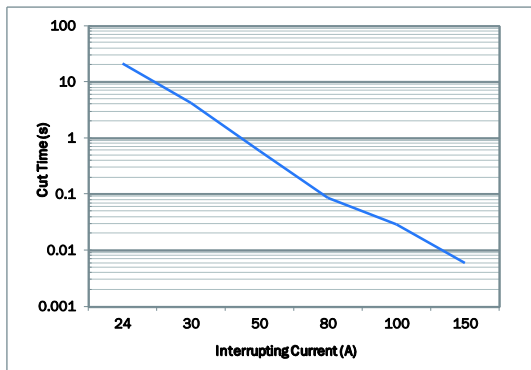


■ Constant heater wattage at various ambient temperature.

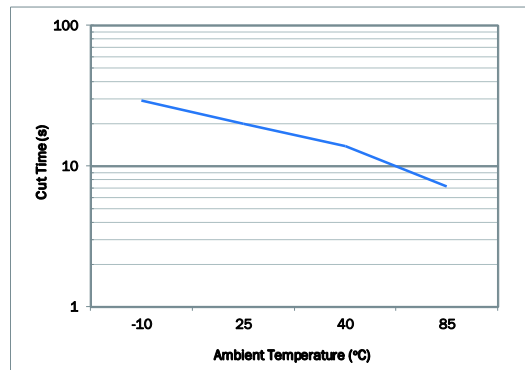


### Cut Time by Current Operation

■ Various interrupting current at 25°C ambient temperature.

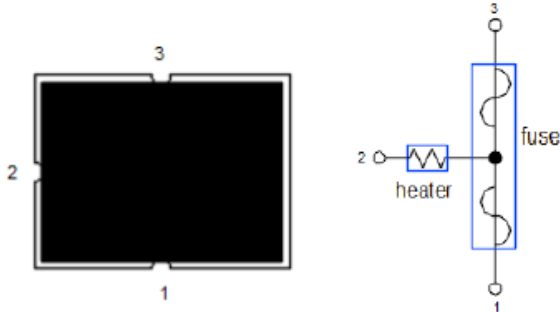


■ Constant 2x rated current at various ambient temperature.

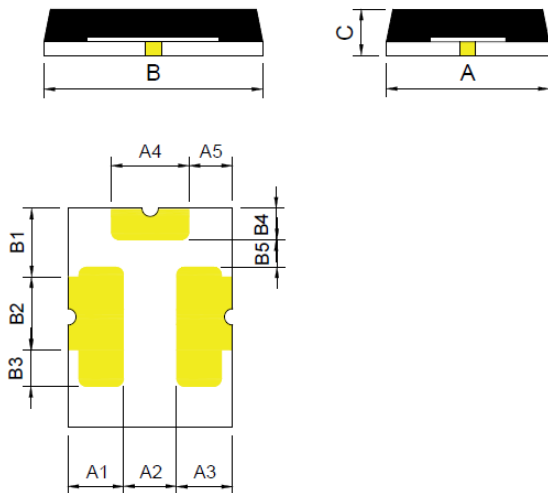


## CLM1612P2412 Device

### Device Circuit



### Physical Dimensions (mm.)



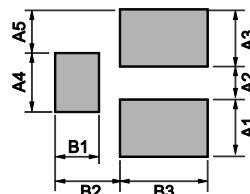
A	3.00 ± 0.2
B	4.00 ± 0.3
C	0.90 max
A1	1.03 ± 0.1
A2	0.96 ± 0.1
A3	1.03 ± 0.1
A4	1.44 ± 0.1
A5	0.80 ± 0.1

B1	1.26 ± 0.1
B2	1.35 ± 0.1
B3	0.67 ± 0.1
B4	0.58 ± 0.1
B5	0.50 ± 0.1

### Environmental Specifications

Operating/Storage Temperature	-10°C to +65 °C / 0~35°C, ≤ 70%RH 3 months after shipment
Hot Passive Aging	100±5°C, 250 hours No structural damage and functional failure
Humidity Aging	60°C±2°C, 90~95%R.H. 250 hours No structural damage and functional failure
Cold Passive Aging	-20±3°C, 500 hours No structural damage and functional failure
Thermal Shock	MIL-STD-202 Method 107G +125°C / -55°C, 100 times No structural damage and functional failure
Solvent Resistance	MIL-STD-202, Method 215
Vibration	MIL-STD-883C, Method 2007.1, Condition A No structural damage and functional failure
Moisture Level Sensitivity	Level 1, J-STD-020C

### Board and Solder Layout Recommend (mm)



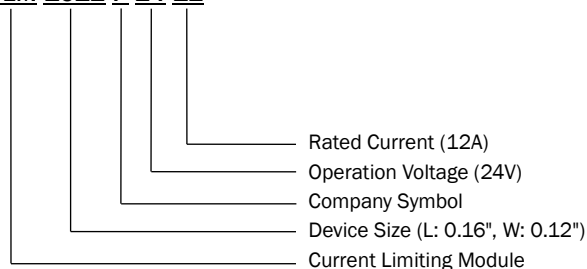
Material	Glass Epoxy PCB
Base Thickness	0.6mm
Copper Thickness	0.07mm
Covered Wire	AWG18

A1	1.55 ± 0.1
A2	0.90 ± 0.1
A3	1.55 ± 0.1
A4	1.60 ± 0.1
A5	1.20 ± 0.1

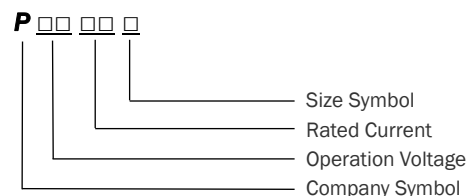
B1	1.20 ± 0.1
B2	1.55 ± 0.1
B3	2.40 ± 0.1

### Part Number System

#### CLM 1612 P 24 12

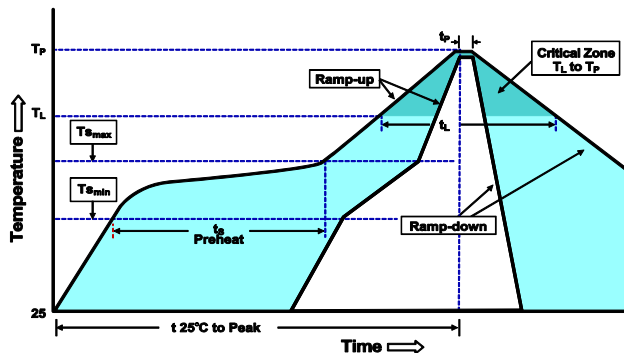


### Part Marking System



## CLM1612P2412 Device

### Soldering Parameters



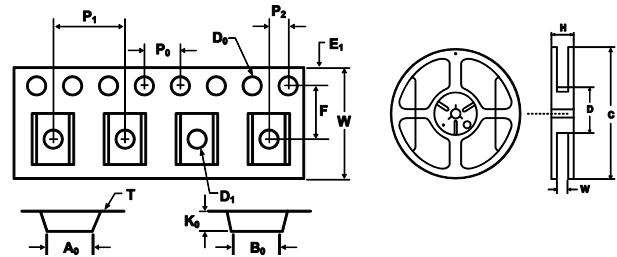
Average Ramp-Up Rate ( $T_{smax}$ to $T_P$ )	3°C/second max.
Preheat	
-Temperature Min ( $T_{smin}$ )	150°C
-Temperature Max ( $T_{smax}$ )	200°C
-Time ( $T_{smin}$ to $T_{smax}$ )	60-120 seconds
Time maintained above:	
-Temperature ( $T_L$ )	217°C
-Time ( $t_L$ )	60-105 seconds
Peak Temperature ( $T_P$ )	255°C
Time within 5°C of actual Peak Temperature ( $t_P$ )	5 seconds max.
Ramp-Down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.
Storage Condition	0°C ~35°C, $\leq$ 70%RH

Note 1: The temperature shown above is the top-side surface temperature of the device.

Note 2: If the soldering temperature profile deviates from the recommended profile, devices may not meet the performance requirements

### Tape & Reel Specification (mm.)

Devices are packaged per EIA481 and EIA-2 standard



W	12.0 $\pm$ 0.30
F	5.50 $\pm$ 0.05
E1	1.75 $\pm$ 0.10
D0	1.55 $\pm$ 0.05
D1	1.50 $\pm$ 0.10
P0	4.00 $\pm$ 0.10
P1	8.00 $\pm$ 0.10
P2	2.00 $\pm$ 0.10
A0	3.32 $\pm$ 0.10
B0	4.32 $\pm$ 0.10
T	0.23 $\pm$ 0.05
K0	1.3 $\pm$ 0.10

H	16.5 $\pm$ 0.1
W	12.5 $\pm$ 1.5
D	$\varnothing$ 62.5 $\pm$ 0.5
C	$\varnothing$ 330 $\pm$ 1.0

### Packaging Quantity

Part Number	Tape & Reel Quantity
CLM1612P2412	5000