

# 50W TO220 High Power Resistors

**OBSOLETE**

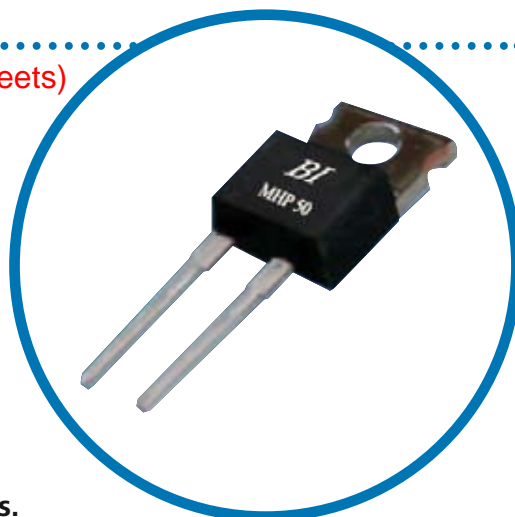
MHP 50

(Combined BI & IRC Datasheets)

- Non-inductive, thin film technology.
- Thermally enhanced Industry standard TO220 package.
- RoHS compliant.
- Low thermal resistance, 2.3 °C/W resistor hot spot to metal tab.
- Complete thermal flow design available for easy implementation.
- Superior vibration durability.
- Small thin package for high density PCB installation.

## Applications

- High frequency circuits and wide band / linear amplifiers.
- Switch mode and industrial RF power sources.
- AC motor control, electronic load and drive circuits.
- Automotive.
- Industrial PC modules (IPM) and measurement systems.



## Specifications

Items	Specification			Conditions
Power Rating	50 Watts			@ Tab Temp < 25°C
Power Rating	1 Watts			Free air.
Thermal Resistance	2.3°C/W			From hot spot to tab.
Resistance Range	0.01-0.09 Ω	0.1-9.1 Ω	10-220 Ω	Extended resistance range to 51KΩ available
Nominal Resistance Series	E6	E24	E24	Additional 2.0Ω and 5.0 Ω also avail available
TCR	250 ppm/°C	100 ppm/°C	50 ppm/°C	For -55 to +155°C
Tolerance	+/-5%	+/- 5% and 1%	+/- 1%	
Operating Temp. Range	-55 to +155 °C			
Max. Operating Voltage.	500V or √ P.R			
Dielectric Withstand Voltage	2000 Volts DC			60 seconds. between terminals and flange
Load Life	ΔR +/- (1.0 % + 0.05 Ω)			25°C, 90 min. ON, 30 min. OFF, 1000 hours.
Temp. Cycle	ΔR +/- (0.25 % + 0.05 Ω)			-55 °C, 30 min., +155 °C, 30 min., 5 cycles
Humidity	ΔR +/- (1.0 % + 0.05 Ω)			40°C, 90-95% RH, DC 0.1W, 1000 hours.
Soldering Heat (Max)	ΔR +/- (1.0 % + 0.05 Ω)			250+/-5°C, 3 seconds,
Solderability	Min 95% coverage			230+/-5°C, 3 seconds.
Insulation Resistance	Over 1000 MΩ			Between terminals and metal back plate.
Vibration	ΔR +/- (0.25 % Ω)			

Note:

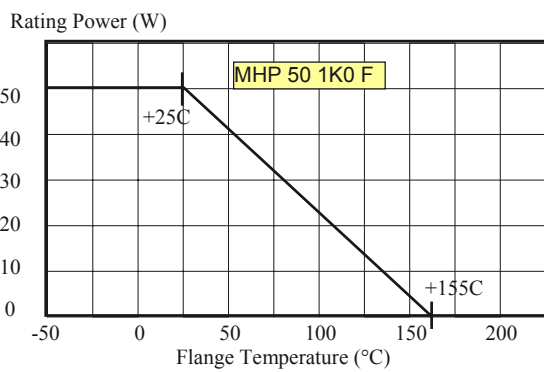
1. For resistances from 220 to 51k Ω the power rating shall be restricted to 30W.

### General Note

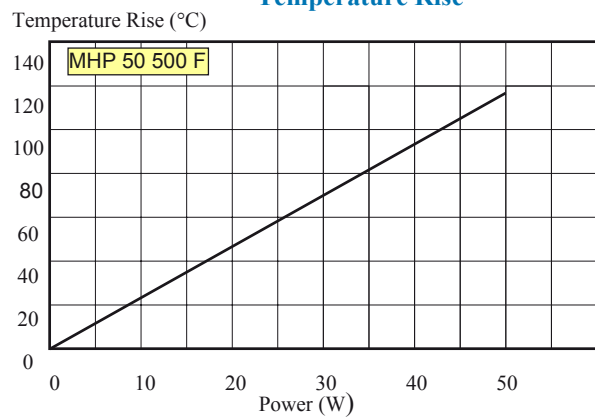
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### Electrical Performance

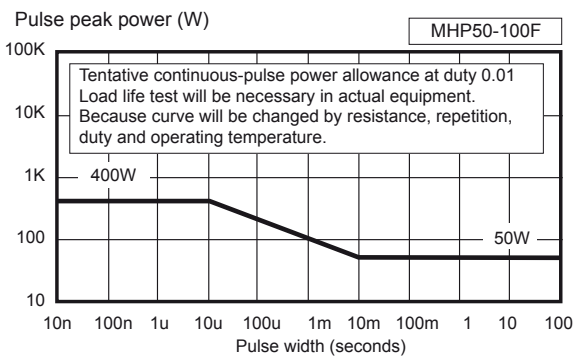
#### Derating



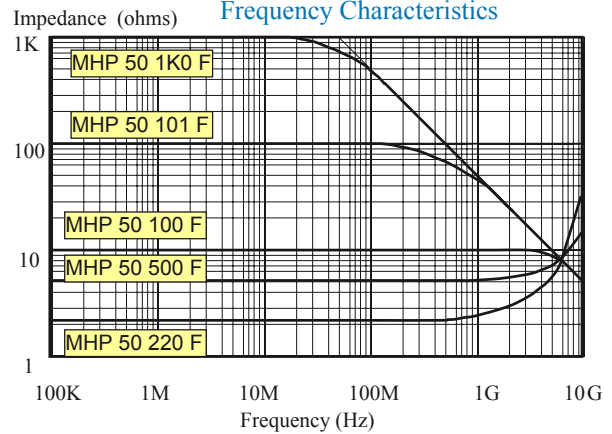
#### Temperature Rise



#### Pulse Energy Durability



#### Frequency Characteristics



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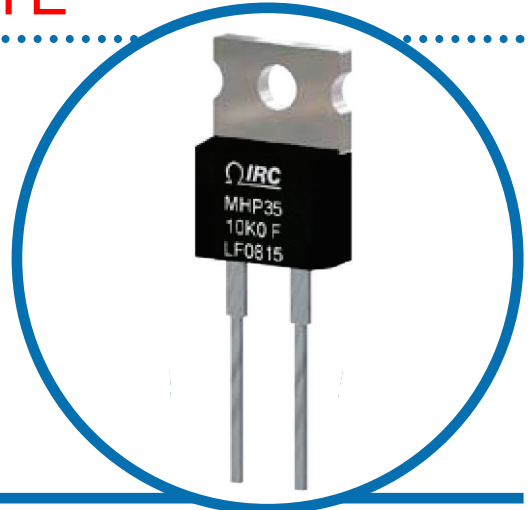


# MHP TO-220 Series

## Power Resistor **OBSOLETE**

MHP Series

- TO-220 housing
- Low inductance and capacitance for high frequency circuits
- Available in 20W, 35W, or 50W
- High stability film resistance elements
- RoHS compliant
- Approved to DSCC drawings 07017 and 07018



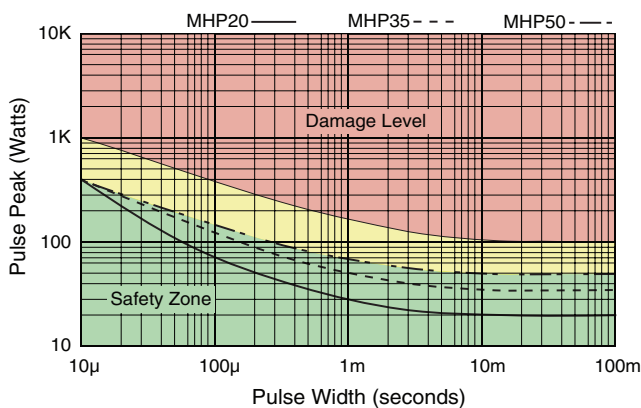
IRC's MHP series resistors satisfy demanding applications for accurate and stable power resistors housed in the convenient TO-220 case. The resistance element is isolated from the mounting tab by an alumina ceramic layer, providing very low thermal resistance and ensuring high insulation resistance between terminals and tab. The non-inductive design makes these products especially useful in high frequency and high speed pulse applications.

### Electrical Data

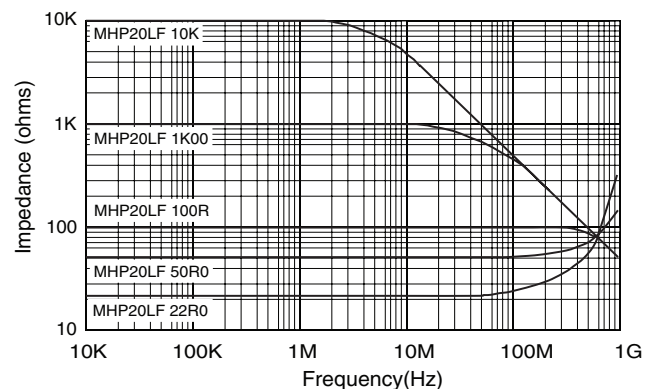
Type	Power Rating <sup>1</sup>		Voltage Rating <sup>4</sup>	Thermal Resistance	Resistance Range		Tolerances	Nominal Resistance Series <sup>5</sup>	Typ. TCR (ppm/°C)	Inductance	Capacitance
	Heatsink <sup>2</sup>	Free Air <sup>3</sup>			Min	Max					
MHP-20	20W	2.25W	500V	5.9°C/W	0.01Ω	0.09Ω	±1%, ±5%	E24 Includes 2.5 & 5.0 multiplier	See Chart	<9nH	<2pF
					0.1Ω	9.1Ω					
					10Ω	51KΩ					
MHP-35	35W	2.25W	500V	3.3°C/W	0.01Ω	0.09Ω	±1%, ±5%	E24 Includes 2.5 & 5.0 multiplier	See Chart	<9nH	<2pF
					0.1Ω	9.1Ω					
					10Ω	51KΩ					
MHP-50	50W	2.25W	500V	2.3°C/W	0.01Ω	0.09Ω	±1%, ±5%	E24 Includes 2.5 & 5.0 multiplier	See Chart	<10nH	<2pF
					0.1Ω	9.1Ω					
					10Ω	51KΩ					

<sup>1</sup>Maximum current 25 amps  
<sup>2</sup>Power rating based on 25°C tab temperature  
<sup>3</sup>Power rating based on 25°C ambient temperature  
<sup>4</sup>Maximum voltage 500V or  $\sqrt{P \times R}$   
<sup>5</sup>Contact factory for availability of resistance or tolerance values outside this range

### Pulse Energy Durability



### Frequency Characteristics



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## Physical Data

Note: Metal tab is electrically isolated.		Dim	in (nom)	mm
		<b>A</b>	0.398	10.1 ±.2
		<b>B</b>	0.591	15.0 ±0.2
		<b>C</b>	0.177	4.5 ±0.2
		<b>ØD</b>	0.142	3.6 ±0.1
		<b>E</b>	0.610	15.5 ±1.0
		<b>F</b>	0.158	4.0 ±0.5
		<b>G</b>	0.118	3.0 ±0.2
		<b>H</b>	0.108	2.75 ±0.2
		<b>J</b>	0.020	0.5 ±0.05
		<b>K</b>	0.030	0.75 ±0.05
		<b>L</b>	0.059	1.5 ±0.05
		<b>M</b>	0.200	5.08 ±0.1
		<b>N</b>	0.059	1.5 ±0.05
		<b>P</b>	0.630	16.0 ±0.1
<b>Lead Material</b>	Tin Plated Copper			
<b>Tab Material</b>	Nickel Plated Copper			

## Environmental Data

Test	Method	Specification - Performance
<b>Thermal Shock</b>	MIL-STD-202 Method 107 Condition F	±0.30% + 50mΩ
<b>Moisture Resistance</b>	MIL-STD-202 Method 106	±1.0% + 50mΩ
<b>Vibration</b>	MIL-STD-202 Method 204 Condition D	±0.25% + 50mΩ
<b>Load Life</b>	MIL-STD-202 Method 108 1,000 Hours	±1.0% + 50mΩ
<b>Resistance to Solder Heat</b>	MIL-STD-202 Method 210 Condition B	±0.25% + 50mΩ
<b>Dielectric Withstanding Voltage</b>	MIL-STD-202 Method 301	2200 volts DC or 1500 volts AC; 60 seconds
<b>Insulation Resistance (between terminal and tab)</b>	MIL-STD-202 Method 302	>1000MΩ
<b>Solderability</b>	MIL-STD-202 Method 208	>95% coverage
<b>Operating Temperature Range</b>		-55°C to +155°C

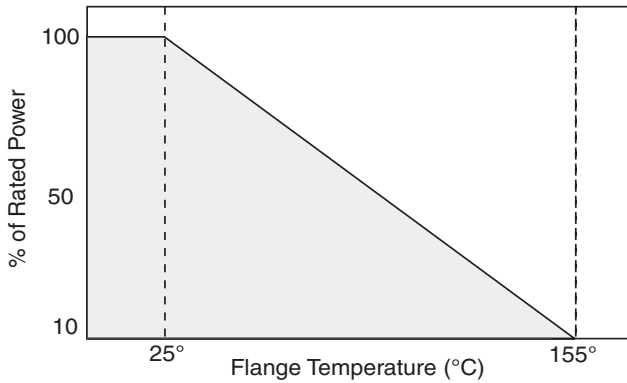
\* During soldering, the soldering temperature profile must not cause the metal tab of this device to exceed 220°C.

### General Note

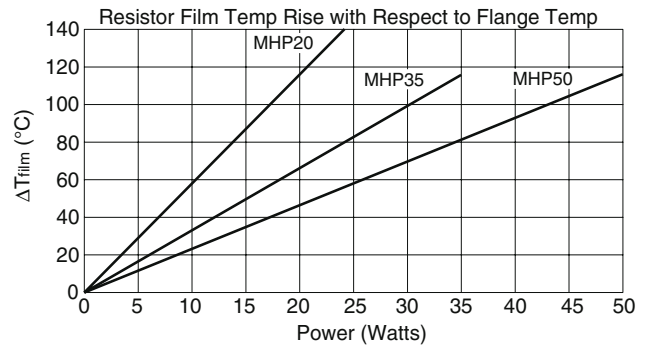
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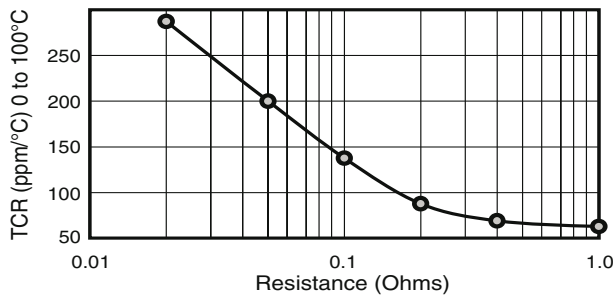
### Power Derating Data



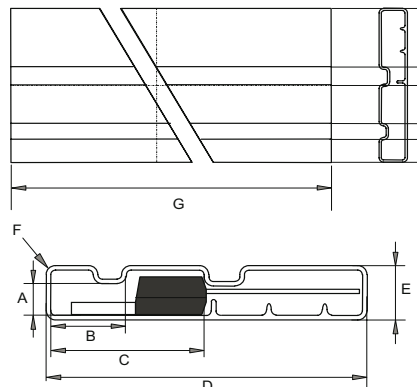
### Temperature Rise Data



### Typical TCR For Low Values



### Tube Packaging Data



Tube Dimensions		
Dim	Nom. (mm)	Tol. (mm)
A	3.25	0.15
B	8.0	0.15
C	16.25	0.15
D	34.4	(34.0)
E	6.4	(6.0)
F	R0.7	(R0.5)
G	535.0	1.0

### Ordering Data

Prefix ..... **TFP** - **MHP20LF** - **1R50** - **J** - **L04**

**Style** .....  
 MHP20LF = 20W, TO-220 style power resistor  
 MHP35LF = 35W, TO-220 style power resistor  
 07017 = DSCC drawing (07017) ver. of above  
 MHP50LF = 50W, TO-220 style power resistor  
 07018 = DSCC drawing (07018) ver. of above

**Resistance Code** .....  
 4-digit resistance code.  
 Ex: 10R0 = 10Ω, 1K00 = 1KΩ

**Absolute Tolerance Code** .....  
 J = ±5%; F = ±1%

**Standard Packaging** .....  
 L04 = RoHS compliant tube (50 pcs per tube)

For additional information or to discuss your specific requirements, please contact our Applications Team using the contact details below.

### Application Notes:

1. Insulating material is unnecessary between the heat sink and the tab, as the resistor film is isolated by the internal alumina substrate.
2. When mounting with a fastener, thermal grease is recommended.
3. Thermal design should satisfy the following equation: Tab Temperature ( $T_T$ ) + [Thermal Resistance ( $R_{\theta JT}$ ) x Power applied (Watts)]  $\leq$  155°C over the full operating temperature of the application.
4. Resistor film temperature is not to exceed 155°C during operation.
5. This product is RoHS compliant by exemption according to RoHS directive 2002/95/EC exemptions 5 & 7, as they apply to lead in glass and internal solder connections.

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