Resistors

High Surge Film Surface Mount Metal Glaze[™]

HSF Series

- 150°C maximum operating temperature
- RoHS compatible components available
- Up to triple the surge rating of the rugged CHP1
- Replaces costly surface-mount wirewound resistors





All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

Industry Footprint	Туре	Maximum Power Rating	Working Voltage	Resistance Range (Ω)	Tolerance (±%)	TCR (ppm/°C)	Product Category
2512	HSF-1	1W @ 70°C	350	5R9, 6R8, 11R, 27R, 12R, 68R, 270R	10	±200 ¹	High Surge
3612	HSF-2	2W @ 25°C	500	8R2, 22R, 300R	10	±200 ¹	High Surge

Note 1 – Standard TCR is ±200ppm/°C. TCR of ±100ppm/°C is available at selected values on request.

Environmental Data

Characteristics Maximum Change		Test Method			
Temperature Coefficient	As specified	MIL-R-55342H Par 4.7.9 (-55°C +125°C)			
Thermal Shock	±0.5% +0.01 ohm	MIL-R-55342H Par 4.7.3 (-65°C +150°C, 5 cycles)			
Low Temperature Operation	±0.25% +0.01 ohm	MIL-R-55342H Par 4.7.4 (-65°C @ working voltage)			
Short Time Overload	±0.5% +0.01 ohm	MIL-R-55342H Par 4.7.5 2.5 x $\sqrt{P \times R}$ for 5 seconds			
High Temperature Exposure ±0.5% +0.01 ohm		MIL-R-55342H Par 4.7.6 (+150°C for 100 hours)			
Resistance to Bonding Exposure±0.25% +0.01 o		MIL-R-55342H Par 4.7.7 (reflow soldered to board at 260°C for 10 seconds)			
Solderability 95% min. coverage		MIL-STD-202, Method 208 (245°C for 5 seconds)			
Moisture Resistance	±0.5% +0.01 ohm	MIL-R-55342H Par 4.7.8 (10 cycles, total 240 hours)			
Life Test ±0.5% +0.01		MIL-R-55342H Par 4.7.10 (2000 hours at 70°C intermittent)			
Terminal Adhesion Strength±1% +0.01 ohm no mechanical damage		1200 gram push from underside of mounted chip for 60 seconds			
Resistance to Board bending ±1% +0.01 ohm no mechanical dam		Chip mounted in center of 90mm long board, deflected 5mm so as to exert pull on chip contacts for 10 seconds			

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.



Physical Data



Recommended Solder Pad Dimensions (Reflow):



Industry Footprint								
		Α	В	С	D	E	F	
HSF 1	2512	0.121 (3.07)	0.126 (3.20)	0.127 (3.23)	0.183 (4.65)	0.040 (1.02)	0.369 (9.37)	
HSF 2	3610	0.17 (4.32)	0.16 (4.06)	0.213 (5.41)	0.273 (6.93)	0.044 (1.12)	0.553 (14.05)	

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

www.ttelectronics.com/resistors

HSF Series



IRC Solder Reflow Recommendations



* Based on Industry Standards and IPC recommendations

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up rate $(T_{smax} \text{ to } T_p)$	3°C / second max.	3°C / second max.
Preheat - Temperature Min (T _{smin}) - Temperature Max (T _{smax}) - Time (T _{smin} to T _{smax}) (ts)	100°C 150°C 60 -120 seconds	150°C 200°C 60 -180 seconds
Time maintained above - Temperature (T _L) - Time (t _L)	183°C 60 - 150 seconds	217°C 60 - 150 seconds
Peak Temperature (T _P)	See Table 1	See Table 2
Time within 5°C of actual Peak Temperature (tp) ²	10 - 30 seconds	20 - 40 seconds
Ramp-down Rate	6°C / second max.	6°C / second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Note 1: All temperatures refer to topside of the package, measured on the package body surface.

Note 2: Time within 5 °C of actual peak temperature (tp) specified for the reflow profiles is a "supplier" minimum and a "user" maximum.

Tabel 1: SnPb Eutectic Process - Package Peak Reflow Temperatures					
Package Thickness	Volume mm ³ < 350	Volume mm ³ ≥ 350			
< 2.5 mm	240 +0/-5°C	225 +0/-5°C			
≥ 2.5 mm	225 +0/-5°C	225 +0/-5°C			

Tabel 2: Pb-free Process - Package Peak Reflow Temperatures						
Package Thickness	Volume mm ³ < 350	Volume mm ³ 350 - 2000	Volume mm ³ > 2000			
< 1.6 mm	260°C *	260°C *	260°C *			
1.6 mm - 2.5 mm	260°C *	250°C *	245°C *			
≥ 2.5 mm	250°C *	245°C *	245°C *			

* Tolerance: The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature at the rated MSL level. **Note 1**: Package volume excludes external terminals (balls, bumps, lands, leads) and/or non-integral heat sinks.

Note 2: The maximum component temperature reached during reflow depends on package thickness and volume. The use of convection reflow processess reduces the thermal gradients between packages. However, thermal gradients due to differences in thermal mass of SMD packages may still exist.

Note 3: Components intended for use in "leadfree" assembly process shall be evaluated using the "lead-free" peak temperature and profiles defined in Table 1, 2 and reflow profile whether or not lead-free.

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.



Surge Capability Data



Ordering Data

Sample Part No	0 1	1R0	К	LF	13
Type HSF-1 or HSF-2					
Temperature Coefficient 200 = ±200ppm/°C (standard) Note – Standard TCR is ±200ppm/°C. TCR of ±100ppm/°C is available at selected values on request.			•		•
Resistance Value					
Tolerance	••••	••••			•
Lead-Free Construction · · · · · · · · · · · · · · · · · · ·	••••	•••	••••		•
Packaging Code · · · · · · · · · · · · · · · · · · ·	••••	• • •	••••	• • • •	•••

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

TT Electronics:

 HSF11002700K7
 HSF11006R80K7
 HSF110068R0K7
 HSF110027R0K7
 HSF110027R0K7LF
 HSF11006R80K7LF

 HSF11009R10K7LF
 HSF110012R0K7LF
 HSF11005R90K7LF
 HSF110011R0K7LF
 HSF11002700K7LF

 HSF110068R0K7LF
 HSF11005R90K7LF
 HSF110011R0K7LF
 HSF11002700K7LF

 HSF110068R0K7LF
 HSF110012R0K7LF
 HSF110012R0K7LF