



Resistors Product Change Notification

PCN Number	PCN-2018-RBU14
PCN Title	PFC 0603 & 1206 PFC Process Upgrade
PCN Date	21 December 2018
Type of Change	<input type="checkbox"/> End of Life Notification <input checked="" type="checkbox"/> Material Change <input checked="" type="checkbox"/> Manufacturing Facility Change or Addition <input checked="" type="checkbox"/> Process Change <input checked="" type="checkbox"/> Datasheet Specification Change <input checked="" type="checkbox"/> Design Change <input type="checkbox"/> Other:
Manufacturing Location(s) Affected	Corpus Christi (USA)
Date of Change Implementation	<p>Phased Implementation by case size: (1) 0603 (Orders placed beginning week commencing 01 April 2019) (2) 1206 (Orders placed beginning week commencing 01 April 2019)</p> <p>Existing orders at the time of implementation will be supported by either the current or new design product.</p> <p>Product with new and old construction will be supplied until inventories are consumed</p>

Products Affected		
Product Series	Product Type(s)	Datasheet Link
PFC	PFC-W0603LF PFC-W1206LF	<p>Commercial products covered by this PCN are described at https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/Datasheets/PFC.pdf. The datasheet is also attached to the end of this announcement for convenience.</p> <p>Special products (tight tolerance / TCR / Sn-Pb, etc) outside scope of this PCN but previously included in the PFC datasheet, are addressed in a separate datasheet, available at https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/Datasheets/PFC-S.pdf.</p> <p>If these hyperlinks to datasheets do not function directly, please copy and paste the address into your browser.</p>

Change Detail	
Description of Change	<p>(1) No change to part number or form/fit/function. Updated product will solder reliably to industry standard solder pads but minor tolerance changes have been made (summarized in “Additional Information”) to account for pre- and post-PCN product shipments during inventory consumption.</p> <p>(2) Termination modified to align with modern design rules and process techniques,</p>

	<p>see details below:</p> <ul style="list-style-type: none"> a. Simplified termination stack incorporating thick film conductor inks (Ag / Au) that replace sputtered precious metals in the current design b. NiCr sputtered wraparound edges c. Outer plated layers are unchanged <p>(3) Introduce state of the art trimming methods as a replacement to photolithography to achieve resistor pattern</p> <p>(4) Switch from diced to scribed ceramics</p> <p>(5) Employ electrical overload screening to 100% of product to remove non typical components from shipped product</p> <p>(6) Introduce digital marking</p> <p>(7) Package product on paper tape for improved pocket definition.</p> <p>(8) New Product is easily distinguished from legacy product by packaging tape (white punched paper tape instead of embossed black plastic) and top coat protection color – black instead of blue, and presence of digital marking on updated product.</p> <div style="display: flex; justify-content: space-around;">   </div> <p>(9) MOQ is 5000 pieces on all sizes. Standard packaging will be 5K per reel. 1K reel sizes will be available for quotation.</p>
<p>Reason for Change</p>	<p>Changes implemented will provide stable cost basis to support market expectations. Establish capacity increase for PFC using modern manufacturing techniques, materials, and equipment.</p>
<p>Implementation Plan</p>	<p>(1) Included product</p> <ul style="list-style-type: none"> a. Case size 0603, 1206 b. TCR Codes: <ul style="list-style-type: none"> i. -01: 100 ppm ii. -02: 50 ppm iii. -03: 25 ppm iv. -11: 15 ppm v. -12: 10 ppm c. Tolerance: <ul style="list-style-type: none"> i. -B ($\pm 0.1\%$) ii. -C ($\pm 0.25\%$) iii. -D ($\pm 0.5\%$) iv. -F ($\pm 1\%$) v. -G ($\pm 2\%$) vi. -J ($\pm 5\%$) d. R values: <ul style="list-style-type: none"> i. 0603: 5R0 – 100K ii. 1206: 5R0 – 1M <p>(2) Notify all potentially affected customer, notification to include 2 yr usage, PNs</p>
<p>Customer Impact</p>	<p>(1) No change to form / fit / function.</p> <p>(2) Product encapsulation color will change from blue to black; potential impact on PCB automated inspection processes.</p> <p>(3) Reel size change to 5K SPQ will reduce frequency of reel changes in PCB assembly processes.</p>

Recommendations	Change MRP Systems: <ul style="list-style-type: none"> • MOQ: 5000 pieces • Country of Origin: Taiwan
Availability of Previously Manufactured Product	Previously manufactured product will ship until inventory is exhausted.
Availability of Approval Samples	Product functions identically in for purposes of Form / Fit / Function. Sample requests will be considered individually, will be subject to product lead time.
Sales Contacts	Americas: Kevin Marzano kevin.marzano@ttelelectronics.com Asia: Janson Chuen janson.chuen@ttelelectronics.com Europe (EMEA): Peter Bauer peter.bauer@ttelelectronics.com Distribution (Global): David Burns david.burns@ttelelectronics.com http://www.ttelelectronics.com/resistors

Approval			
	Name	Title	Date
Issued by	David Winkler	Product Line Manager, Thin Film Products	21 Dec 2018
Approved by	Barry Peters	VP, Product Management & Engineering	21 st Dec 2018
Approved by	David Kertes	VP, Global Sales and Marketing	21 Dec 2018
Approved by	Guy Millard	Vice President & General Manager, Resistors Business Unit	7th Jan 2019

Additional Information

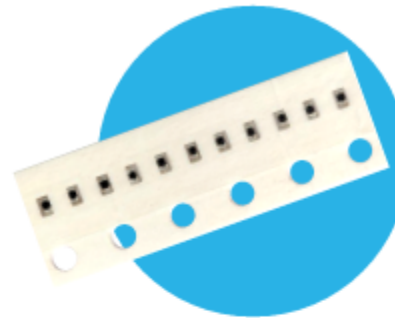
Minor Modifications to dimensional tolerances: dimensional nominal values are unchanged, but some insignificant changes to the dimensional tolerances are in place. The PCN-affected part will solder reliably to existing EIA-standard landing pads with no need for design changes.

Resistors

Precision Thin Film Chip Resistors

PFC Commercial Series

- High stability tantalum nitride film
- Available in 0402, 0603, 0805 and 1206
- AEC-Q200 qualified
- Absolute TCR to $\pm 10\text{ppm}/^\circ\text{C}$
- Sulfur resistant to ASTM B809-95



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

PFC chip resistor series provides the high precision and ultra stable performance of tantalum nitride resistive film system in 0402, 0603, 0805 and 1206 sizes. The unique characteristics of the passivated tantalum nitride film ensure long term life stability and reliability in most environments.

Qualified for resistance to sulfur bearing gases, the PFC series is an excellent solution for automotive and heavy equipment applications where precision, exceptional reliability with anti-sulfuration characteristics is imperative.

Electrical Data

Model	Power Rating (70°C)	Max Voltage Rating ($\leq \sqrt{P \times R}$)	Temperature Range	ESD Sensitivity	Noise	Termination	Substrate
W0402	50mW	75V	-65°C to +150°C	2KV to 4KV (HBM)	<-25dB	100% matte tin (RoHS compliant) plated over nickel barrier	96.5% Alumina
W0603	100mW	75V					
W0805	250mW	100V					
W1206	333mW	200V					

Environmental Data

Environmental Test	Test Method	Performance	
		Typical	Maximum
Sulfuration Test	ASTM B809-95 humid vapor	$\pm 0.02\%$	$\pm 0.05\%$
Thermal Shock	MIL-PRF-55342	$\pm 0.02\%$	$\pm 0.10\%$
Low Temperature Operation	MIL-PRF-55342	$\pm 0.01\%$	$\pm 0.05\%$
Short Time Overload	MIL-PRF-55342	$\pm 0.01\%$	$\pm 0.05\%$
High Temperature Exposure	MIL-PRF-55342	$\pm 0.03\%$	$\pm 0.10\%$
Effects of Solder	MIL-PRF-55342	$\pm 0.01\%$	$\pm 0.10\%$
Moisture Resistance	MIL-PRF-55342	$\pm 0.03\%$	$\pm 0.10\%$
Life	MIL-PRF-55342	$\pm 0.03\%$	$\pm 0.10\%$

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.

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Precision Thin Film
Chip Resistors

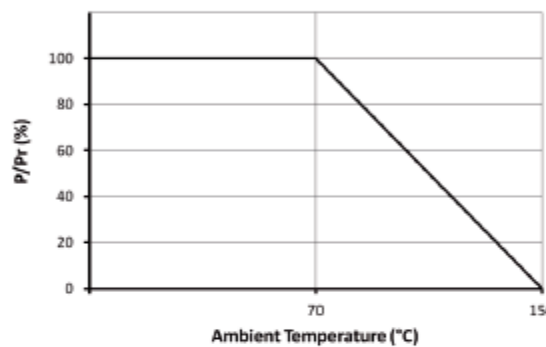
PFC Commercial Series



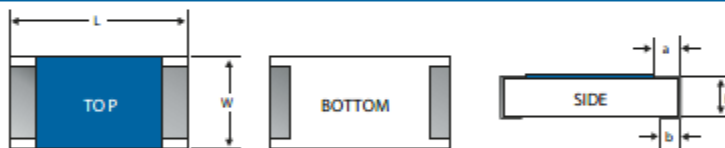
Manufacturing Capabilities Data

TCR ppm/°C	Tolerance 0.1% to 5%			
	W0402	W0603	W0805	W1206
10	100Ω-16kΩ	100Ω-50kΩ	100Ω-100kΩ	100Ω-400kΩ
15	50Ω-16kΩ	50Ω-50kΩ	50Ω-100kΩ	50Ω-400kΩ
25	15Ω-30kΩ	10Ω-100kΩ	10Ω-267kΩ	10Ω-1MΩ
50, 100	15Ω-30kΩ	5Ω-100kΩ	5Ω-267kΩ	5Ω-1MΩ

Power Derating Curve



Physical Data



Model	L	W	H	a	b
W0402	0.04 ±0.003 (1.02 ±0.07)	0.021 ±0.005 (0.53 ±0.12)	0.012 ±0.003 (0.3 ±0.08)	0.008 -0.004, +0.008 (0.2 -0.1/+0.2)	0.01 ±0.006 (0.25 ±0.15)
W0603	0.063 ±0.004 (1.6 ±0.1)	0.031 ±0.004 (0.79 ±0.11)	0.02 ±0.004 (0.51 ±0.11)	0.012 ±0.008 (0.3 ±0.2)	0.015 ±0.009 (0.38 ±0.23)
W0805	0.081 ±0.006 (2.06 ±0.16)	0.05 ±0.007 (1.27 ±0.18)	0.02 ±0.006 (0.51 ±0.14)	0.015 ±0.009 (0.38 ±0.23)	0.016 ±0.008 (0.41 ±0.21)
W1206	0.126 ±0.008 (3.2 ±0.2)	0.063 ±0.004 (1.6 ±0.1)	0.024 ±0.006 (0.61 ±0.16)	0.025 ±0.017 (0.64 ±0.44)	0.025 ±0.017 (0.64 ±0.44)

For PCB mounting pad recommendations see

<http://www.ttelectronics.com/sites/default/files/resistors/TN006%20-%20Recommended%20Layouts%20for%20SMD%20Resistors.pdf>

Construction

Conductors and tantalum nitride resistive element are applied to an alumina substrate. The product is laser trimmed to value, and a protective black epoxy coat is applied. The product is then metallized and plated to provide a wrap-around solderable termination with a 100% matte tin finish on a nickel barrier layer. It is 100% tested and provided on standard paper carrier tape.

Marking

The 0402 chips are not marked. 3 digit marking is used on the 0603 size and 4 digit marking on larger sizes and E96 values.

Special Variants

For PFC resistors with tighter tolerances, SnPb terminations or MIL screening, refer to the separate PFC Special Series datasheet.

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Precision Thin Film
Chip Resistors



PFC Commercial Series

Ordering Procedure

This product has two valid part numbers:

European (Welwyn) Part Number: W1206R-01-1K0BI (1206, 100ppm/°C, 1 kilohm ±0.1%, Pb-free)

W	1	2	0	6	R	-	0	1	-	1	K	0	B	I
1	2		3		4		5		6					

1	2	3	4	5	6
Type	Size	TCR	Value	Tolerance	Termination & Packing
W=PFC	0402	R-12 = ±10ppm/°C	E24 = 3/4 characters	B = ±0.1%	I = Pb-free, Standard pack
	0603	R-11 = ±15ppm/°C	E96 = 3/4 characters	D = ±0.5%	All sizes 5000/reel*
	0805	R = ±25ppm/°C	R = ohms	F = ±1%	
	1206	R-02 = ±50ppm/°C	K = kilohms	G = ±2%	
		R-01 = ±100ppm/°C	M = megohms	J = ±5%	

USA (IRC) Commercial Part Number: PFC-W1206LF-01-1001-B (1206, 100ppm/°C, 1 kilohm ±0.1%, Pb-free)

P	F	C	-	W	1	2	0	6	L	F	-	0	1	-	1	0	0	1	-	B
1	2		3		4		5		6											

1	2	3	4	5	6	Packing	
Family	Model	Termination	TCR	Value	Tolerance	All sizes	5000/reel
PFC	W0402	LF = Pb-free (100%Sn)	12 = ±10ppm/°C	3 digits + multiplier	B = ±0.1%	All sizes	5000/reel
	W060		11 = ±15ppm/°C	R = ohms for	D = ±0.5%		
	W0805		03 = ±25ppm/°C	values <100 ohms	F = ±1%		
	W1206		02 = ±50ppm/°C		G = ±2%		
			01 = ±100ppm/°C		J = ±5%		

* Non-standard pack quantity 1000/reel may be available by special request – contact factory.

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