

## OVERVIEW

PMC thin-film technology offers comprehensive materials and processes combinations allowing electronic designers superior space saving, tolerance and signal integrity for semi custom designs in the MHz to GHz spectrum.

## BENEFITS

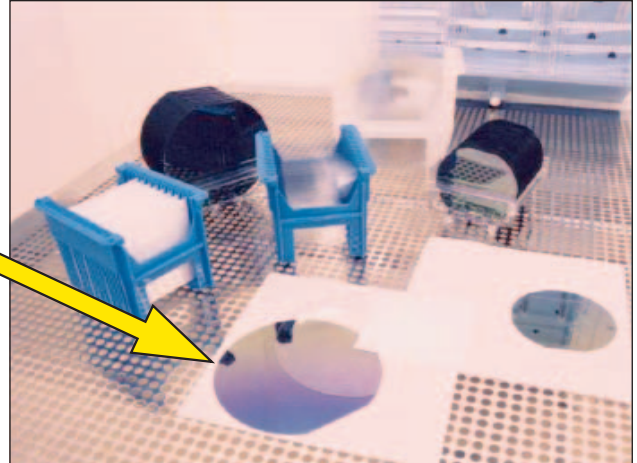
- **Precision:** 0.05% tolerance or match
- **Integration:** controlled parasitic ESR and ESL
- **Miniaturization:** 4µm line widths
- **Materials:** substrates, conductors, dielectrics and resistors
- **Device laser trimming and tuning:** die and wafer level
- **Inductors:** multi level and turn,  $\leq 40\text{nH}$ ,  $Q \leq 80$
- **Termination options:** BGA, LGA, or wire bond

## TYPICAL MATERIALS AND DESIGNS OFFERED

Passive	Resistors		Capacitors				Inductors
	TaN	SiCr	SiON	SiO <sub>2</sub>	BCB	X7R	Cu
Minimum Chip Size mm (in)	0.5 x 0.5 (0.020 x 0.020)	0.5 x 0.5 (0.020 x 0.020)	0.25 x 0.25 (0.010 x 0.010)	0.25 x 0.25 (0.010 x 0.010)	0.5 x 0.5 (0.020 x 0.020)	0.5 x 0.5 (0.020 x 0.020)	1.0 x 0.5 (0.039 x 0.020)
Range	0.47-1M Ohm	47-20M Ohm	1-500pF	1-500pF	1-50pF	2.2pF-400nF	0.5-40nH
Trimable	Yes	Yes	Yes	No	Yes	No	No
Tolerance; <i>NOTE value dependent</i>	0.05%	0.05%	$\geq 0.5\%$ ; or $\geq 0.05\text{pF}$	$\geq 0.5\%$ ; or $\geq 0.05\text{pF}$	$\geq 0.5\%$ ; or $\geq 0.05\text{pF}$	5%	5%
Performance; <i>NOTE TCR in ppm/°C</i>	TCR -100 to -150	TCR $\pm 25$ ; $\pm 250$	K 5.8; TCC 60	K 4; TCC 30	K 2.7; TCC 42	K 1000	$Q \leq 80$
I/O Type	BGA (Ball Grid Array), LGA (Land Grid Array), and gold or aluminum wire bond						

- **SUBSTRATE SELECTION**

- 6 inch Silicon, Ceramic, Glass and Quartz



- **RESISTORS**

- SiCr and TaN

- **CAPACITORS**

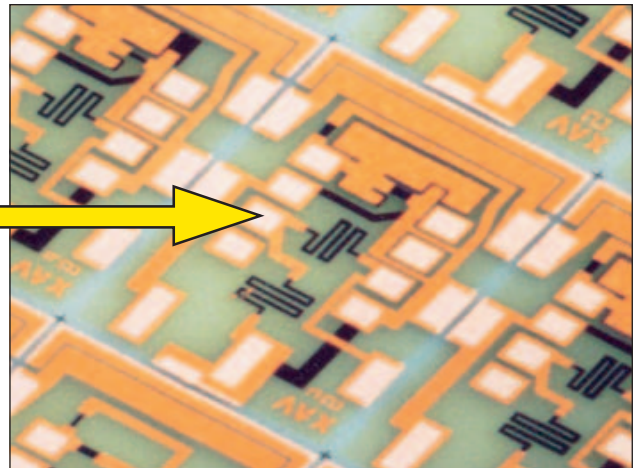
- NP0 and X7R

- **INDUCTORS**

- Cu 1 $\mu$ m to 20 $\mu$ m thick

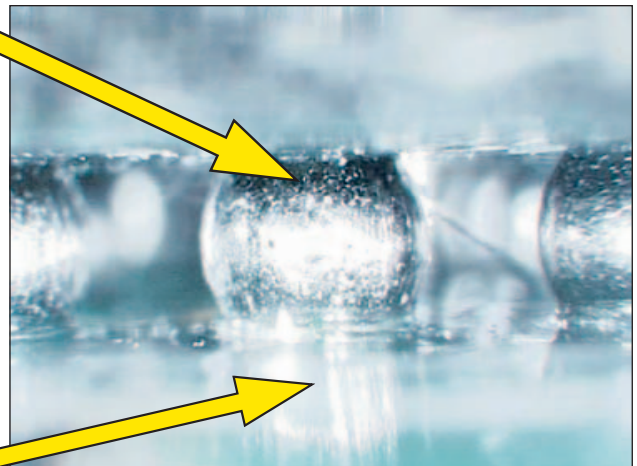
- **PASSIVATION**

- BCB / SiN



- **TERMINATION**

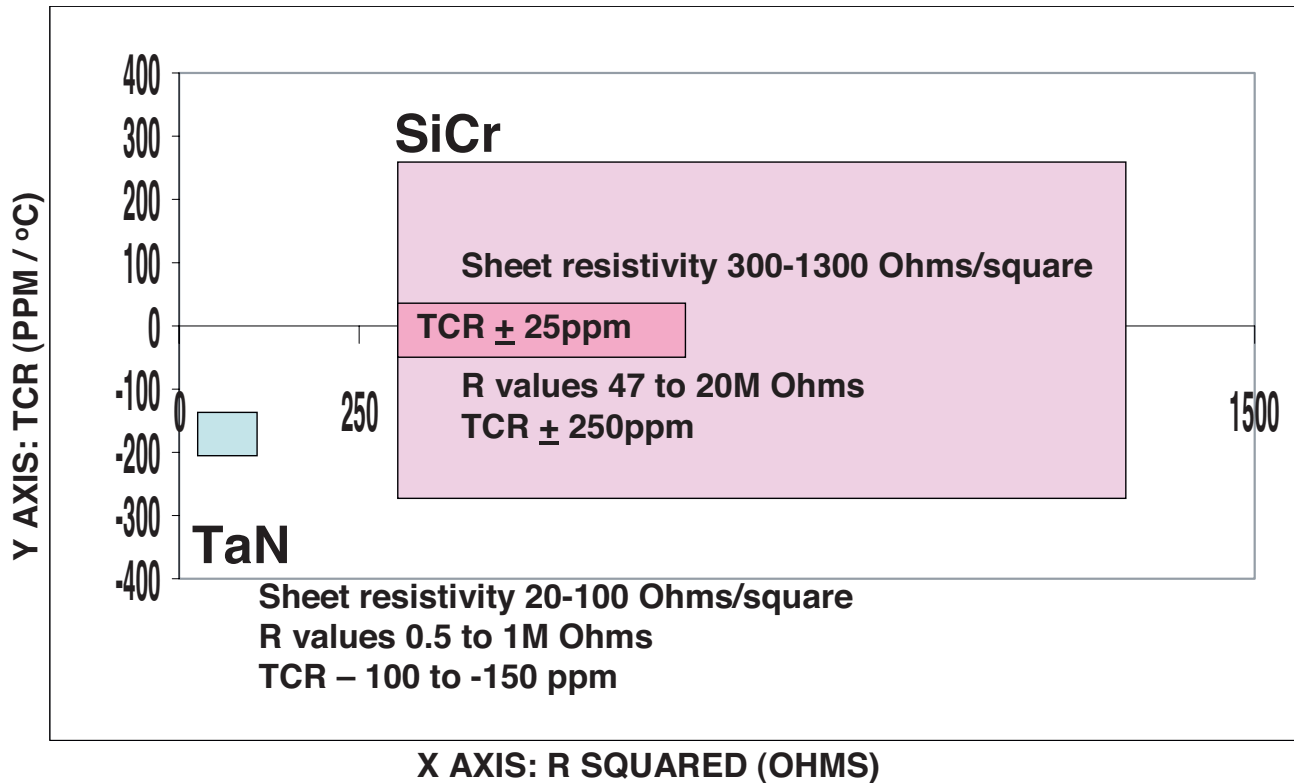
- BGA (Ball Grid Array) diameter from 60 to 300 $\mu$ m
- LGA (Land Grid Array)
- WB (Wire Bond) gold or aluminum



- **UBM**

- TiW Ni Cu or TiW Cu

## RESISTOR MATERIAL CAPABILITIES



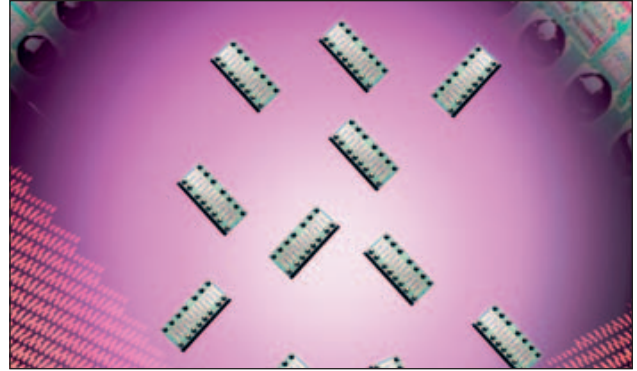
## CAPACITOR MATERIAL CAPABILITIES

Material	X7R	SiON	SiO <sub>2</sub>	BCB
pF / mm <sup>2</sup> Typical	8000 @ 5V, up to 25000 @ 3V*	55	35	25
Stability	-55 to +125 $\pm$ 15%	$\pm$ 60 ppm/°C	$\pm$ 30 ppm/°C	$\pm$ 42 ppm/°C
Rated Voltage	3 - 5	$\leq$ 100	$\leq$ 100	$\leq$ 25
BDV (V/ $\mu$ m)	100	600	1000	300
DF	$\leq$ 8%	$\leq$ 0.1%	$\leq$ 0.1%	$\leq$ 0.1%
Voltage Stability	Less 1.25% per volt from 0 to 5 volts	Independent	Independent	Independent
Frequency Range	$\leq$ 10 GHz	$\leq$ 40 GHz	$\leq$ 40 GHz	$\leq$ 75 GHz

\*Based on dielectric thickness of 0.25 $\mu$ m @ 3V, and 0.5 $\mu$ m @5V

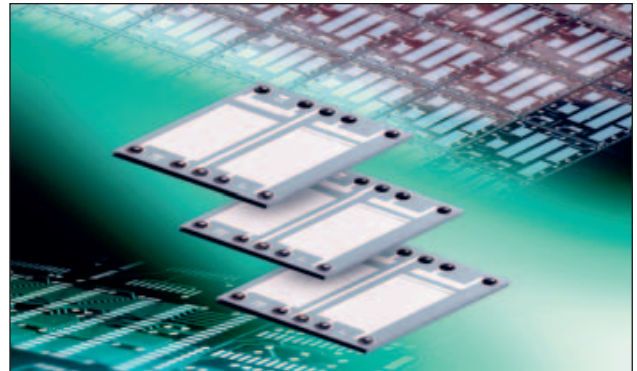
- **RESISTORS**

- Industry leading high Ohmic, laser trimmable low TCR and leakage high or low voltage designs



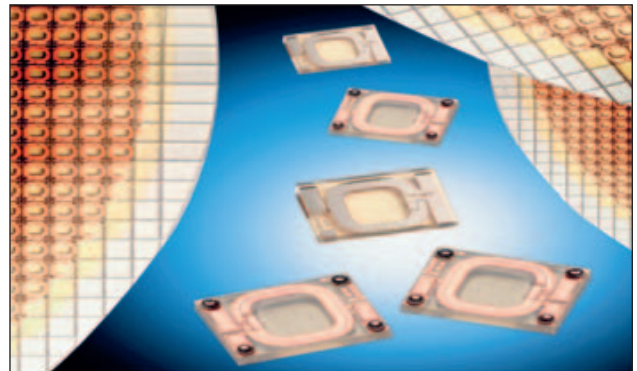
- **CAPACITORS**

- MIS, MOS, or MIM style SLCs
- Precision laser trimmed NP0 capacitor arrays



- **INDUCTORS**

- 3 turn 2 level designs
- Q up to 80
- Up to 40 nH
- Copper construction



- **FILTERS**

- LCs, LRs, and RCs
- Low & High Pass
- Band Pass
- Band Rejection

