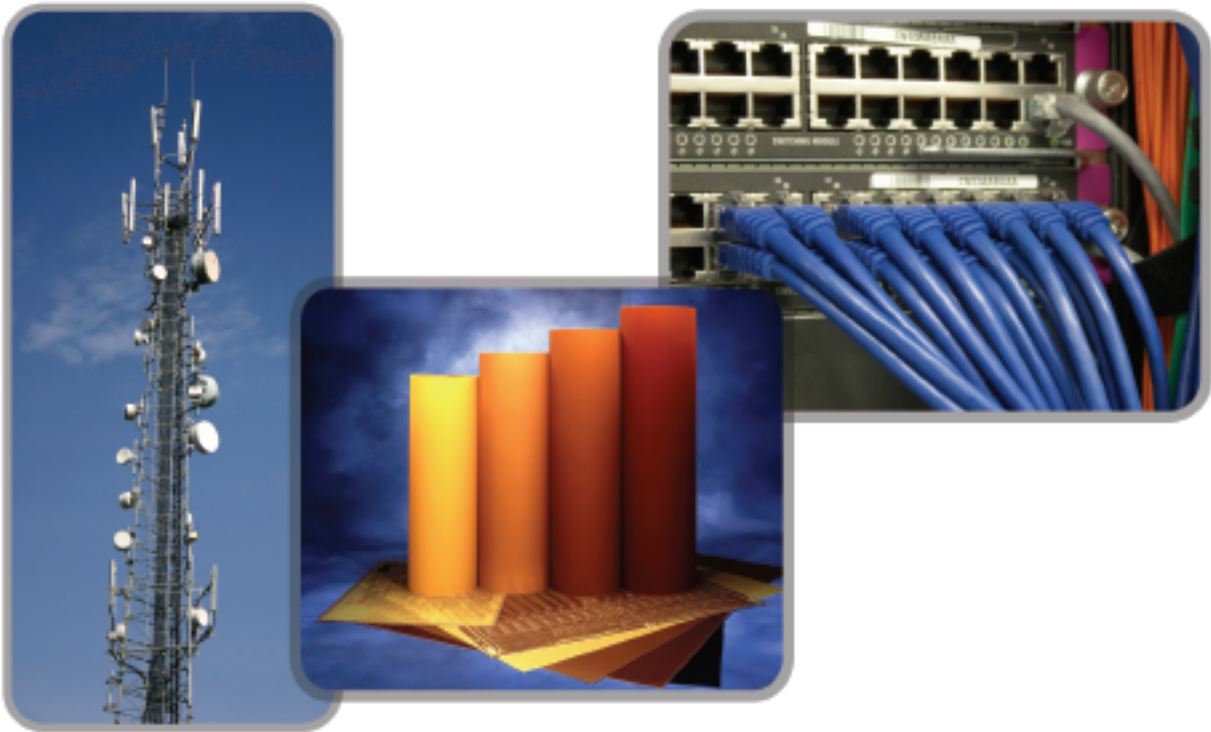




# Nelco® Materials Selection Guide



Park Electrochemical Corp. is a global advanced materials company which develops and manufactures high-technology digital and RF/microwave printed circuit materials (the Nelco® product line) and advanced composite materials (the Nelcote™ product line) principally for the telecommunications and internet infrastructure, high-end computing and aerospace markets. Nelco® materials are offered worldwide with manufacturing locations in North America, Europe and Asia.

Park provides a full range of prepreg and laminate systems providing superior thermal, mechanical and electrical performance in high layer count digital designs and RF / microwave applications. All Nelco® electronic materials are RoHS compliant and include:

- Materials for high-temperature lead-free assembly (up to 260°C reflow),
- Modified epoxies for high temperature and increased reliability applications,
- High speed / low loss materials for digital applications,
- BT, polyimide, cyanate ester substrates, and
- Specialized RF / Microwave dielectric substrates that operate at frequencies up to 77 GHz.



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FR-4 Substrates	Description	High Temp Lead-Free <sup>2</sup> Assembly Compatible	CAF <sup>3</sup> Resistant	T <sub>g</sub> °C (DSC)	Dielectric <sup>1</sup> Constant (Dk)		Dissipation <sup>1</sup> Factor (Df)
					1 MHz	1 GHz	1 MHz
N4000-2	Multifunctional Epoxy	-	-	140	4.3	4.1	0.023
N4000-6	High Tg Multifunctional Epoxy	-	-	175	4.3	4.1	0.023
N4000-6 FC	Fast-Cure, High Tg Multifunctional Epoxy	-	-	175	4.3	4.1	0.023
N4000-7	Low CTE Multifunctional Epoxy	Yes	Yes	155	4.5	4.0	0.018
N4000-7 SI <sup>®</sup>	Low CTE Multifunctional Epoxy	Yes	Yes	155	4.0	3.6	0.016
N4000-7 EF <sup>®</sup>	165°C Tg Halogen-Free Epoxy	Yes	Yes	165	4.1	4.0	0.013
N4000-11	Low CTE, High Tg Multifunctional Epoxy	Yes	Yes	175	4.3	4.1	0.012
N4000-29	Lead Free, High Tg Multifunctional Epoxy	Yes	Yes	185	4.5	4.3	0.016

High Performance					1 GHz	10 GHz	10 GHz
N4000-12	High Speed, Low Loss, CAF Resistant System	Yes	Yes	190	3.7	3.6	0.008
N4000-13	High Speed, Low Loss Epoxy	Yes	Yes	210	3.7	3.6	0.008
N4000-13 SI <sup>®</sup>	High Speed, Low Loss Epoxy	Yes	Yes	210	3.2	3.2	0.007
N4000-13 EP <sup>™</sup>	High Speed, Low Loss Epoxy	Yes	Yes	210	3.7	3.6	0.008
N4350-13 RF	Microwave Performance, Modified Epoxy	Yes	-	210	-	3.5	0.0065
N4380-13 RF	Microwave Performance, Modified Epoxy	Yes	-	210	-	3.8	0.007
N5000	BT Epoxy	Yes	Yes	185	3.6	3.6	0.010
N5000-30 & 32	Chip Packaging BT Epoxy (not available in Asia)	Yes	-	205	-	-	-
N7000-1	non-MDA Polyimide	Yes	-	260	3.9	3.8	0.008
N7000-2 HT / -3	non-MDA Toughened Polyimide	Yes	-	260	3.5	3.5	0.009
N7000-2 V0	UL 94 V-0 Toughened Polyimide	Yes	-	250	3.8	3.8	0.010
N8000	Cyanate Ester	Yes	-	250	3.6	3.5	0.007
N8000Q	Cyanate Ester with Quartz Fabric	Yes	-	250	3.3	3.2	0.006
N9000-13 RF	PTFE Blended Laminate	Yes	-	220	-	3.00-3.50	0.0040-0.0055
NH9000	Woven, Glass / Ceramic Loaded PTFE	Yes	-	-	-	2.94-4.50	0.0022-0.0030
NX9000	Woven, Glass-Reinforced PTFE	Yes	-	-	-	2.40-3.20	0.0016-0.0024
NY9000	Woven, Glass-Reinforced PTFE	Yes	-	-	-	2.08-2.33	0.0006-0.0011

### Buried Capacitance™ (BC<sup>®</sup>) Materials

BC<sup>®</sup> materials are designed for smaller, more reliable assemblies. The following Nelco materials are available as a BC<sup>®</sup> option:

- o N4000-6 and N4000-6 FC
- o N4000-11 and N4000-29
- o N4000-12
- o N4000-13 and N4000-13 EP<sup>™</sup>

### Laser Drillable Materials

LD<sup>®</sup> materials enhanced for optimal laser ablation. The following Nelco materials typically manufactured with the LD<sup>®</sup> option:

- o N4000-2
- o N4000-6 and N4000-6 FC

<sup>1</sup> Dk and Df numbers provided are typical values calculated at 50% resin content except where noted. RF/Microwave material Dk and Df values are based on actual constructions.

<sup>2</sup> High-temperature lead free assembly compatibility is based on T<sub>d</sub>, T<sub>260</sub> and 245°C / 260°C reflow testing. Actual results will vary based on assembly and board construction conditions.

<sup>3</sup> CAF resistance testing is based on specific coupon design and test protocols.

For details on this or other material testing, please visit [www.parkelco.com](http://www.parkelco.com) or contact your local Nelco representative.

All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a technical representative directly. Park reserves the right to change these typical values as a natural process of refining our testing equipment and techniques. Park does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights nor the rights of others. This disclaimer of warranty is in lieu of all warranties whether expressed, implied or statutory, including implied warranties of merchantability or fitness for a particular purpose.

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