

09-04-2020

This document is for the sole use of APCT only. Copy or distribution of this document is prohibited without written permission from APCT.

Manufacturer	Product	Type	IPC-4101E	Lead Free Process Compatible	Halogen Free	APCT UL Approved	Flammability UL94	Glass Transition Temp Tg Celcius	Decomposition Temp by TGA Celcius	Dk 1 GHz	Dk 2-3 GHz	Dk 10-12 GHz	Df 1 GHz	Df 2-3 GHz	Df 10-12 GHz	Moisture Absorption (%)	CTE Z Axis (ppm/C) Pre Tg	% CTE Z Axis (50-200C)	Highest of CTE X, Y Axis (PPM/C) Pre Tg	Number of lamination cycles	Material Considered
EMC	EM-827	High Tg Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	175	350	4.2			0.019			0.12%	45	2.6%	15		Lead Free FR4
Isola	370HR	High Tg Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	180	340	4.17	4.04	3.92	0.0161	0.021	0.025	0.15%	45	2.8%	14	3 to 4	
Isola	185HR	High Tg Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	180	340	4.04	4.01	3.88	0.0192	0.0200	0.0236	0.15%	40	2.7%	14	3 to 4	
Isola	IS415	High Tg Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	200	370		3.70	3.68		0.0135	0.0138	0.15%	65	2.8%	13		
Nan ya	NP-140TL	Mid Tg Epoxy	/21	Yes	No	Yes	V-0	140	310	3.9			0.013			0.20-0.30%	50-70				
Panasonic	HIPER V R-1755V /R-1650V	High Tg Epoxy	/97 /98 /99 /101 /126	Yes	No	Yes	V-0	173	350	4.4			0.016			0.12%	44		15		
ITEQ	ITEQ180A	High Tg Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	180	345		4.30	4.10		0.015	0.016	0.12%			10/13	3 to 4	
Ventec	VT47	High Tg Epoxy	/97 /98 /99 /101 /126	Yes	No	Yes	V-0	180	345	4.3	4.20		0.016	0.017		0.13%	35	3.0%	13		
Grace	GA-170-LL	High Tg Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	170	340	4.38			0.0154			0.20%	43	2.7%	16		
Nelco	N4000-29	High Tg Epoxy	/98 /99 /126 /129	Yes	No	Yes	V-0	185	350	4.3		4.00		0.015	0.017	0.15%	55	3.0%	17		
Kingboard	KB6167	High Tg Epoxy	/126	Yes	No	Yes	V-0	175	350	4.5(1MHz)			0.017(1MHz)			0.080%	49	2.7%	15		
Shengyi	S1000-2	High Tg Epoxy	/126	Yes	No	Yes	V-0	170	345	4.8(1MHz)			0.013(1MHz)			0.10%	45	2.8%			
EMC	EM-370(D)	Halogen Free High Tg Epoxy	/127 /128 /130	Yes	Yes	Yes	V-0	175	385	4.1		4.00	0.011		0.015	0.10%	40	2.2%	15	7	
EMC	EM-370(Z)	Halogen Free High Tg Epoxy	/127 /128 /130	Yes	Yes	in process	V-0	180	390	4.0		3.80	0.012		0.015	0.14%	35-40	1.8%	11/13		
Panasonic	R-1566W / R-1551W	Halogen Free High Tg Epoxy	/127 /128	Yes	Yes	Yes	V-0	148	350	4.6			0.010			0.14%	40		15		
Panasonic	Meg2 (R-1577 / R-1570)	Halogen Free High Tg Epoxy	/127 /128 /130	Yes	Yes	Yes	V-0	170	380	4.1			0.010			0.14%	34		16		
Nan ya	NPG-150N	Halogen Free Mid Tg Epoxy	/127 /128	Yes	Yes	Yes	V-0	150	310	4.2			0.012			0.05-0.10%	50-70				
Nan ya	NPG-170N	Halogen Free Mid Tg Epoxy	/127 /128	Yes	Yes	Yes	V-0	170	360	4.2			0.013			0.25%	30-50		13		
Isola	I-Speed	Modified Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	180	360	3.65	3.64	3.63	0.0058	0.006	0.0071	0.061%	60	2.7%	16	4 to 5	
Isola	FR408HR	Modified Epoxy	/98 /99 /101 /126	Yes	No	Yes	V-0	180	360	3.69	3.68	3.65	0.0091	0.0092	0.0095	0.15%	60	3.5%	14	3 to 4	
Panasonic	Meg4 (R-5725 /R-5620)	Modified Epoxy	/91 /102	Yes	No	Yes	V-0	176	360	3.8			0.005			0.14%	35		15	2	
Panasonic	Meg4S (R-5725S /R-5620S)	Modified Epoxy	/91 /102	Yes	No	Yes	V-0	200	360	3.8			0.005			0.14%	32		12-15		
ITEQ	IT-170GRA1	Modified Epoxy	/127 /128 /130	Yes	Yes	No	V-0	180	380	4.0	3.90	3.90	0.009	0.009	0.010	<0.10%	45	2.4%	11/13		
EMC	EM-888	Modified Epoxy	/127 /128 /130	Yes	Yes	Yes	V-0	170	380	3.9		3.80	0.006		0.008	0.05%	50	2.6%	15	1	
EMC	EM-888(S)	Modified Epoxy	/127 /128 /130	Yes	Yes	Yes	V-0	170	380	3.9		3.80	0.006		0.008	0.05%	45	2.4%	15	2 to 3	
EMC	EM-888(K)	Modified Epoxy	/127 /128 /130	Yes	Yes	Yes	V-0	170	380	3.3		3.20	0.005		0.006	0.05%	50	2.6%	15	2 to 3	
Nelco	N4000-13EP	Modified Epoxy	/29	Yes	No	Yes	V-0	210	350	3.7	3.70	3.60		0.009	0.009	0.10%	65	3.4%	14	2	
Nelco	N4000-13EPSI	Modified Epoxy	/29	Yes	No	Yes	V-0	210	350	3.4	3.20	3.20		0.008	0.008	0.10%	65	3.4%	13	2	
Isola	I-Tera MT40 / RF	PPE Blend	/102 & IPC-4103 /17	Yes	No	Yes	V-0	200	360		3.45	3.45	0.0031	0.0031	0.0031	0.10%	55	2.8%	12	10	
Isola	Tachyon-100G	PPE Blend	/102 & IPC-4103 /17	Yes	No	Yes	V-0	200	380		3.04	3.02		0.0021	0.0021	0.05%	45	2.5%	15	10	
Panasonic	Meg7 (R-5785/R-5680)	Modified Epoxy	/91/102	Yes	No	in process	V-0	200	400	3.63		3.61	0.002		0.003	0.06%	42		14-16		
Panasonic	Meg7N (R-5785N/R-5680N)	Modified Epoxy	/91/102	Yes	No	in process	V-0	200	400	3.37		3.35	0.001		0.002	0.06%	42		14-16		
Panasonic	Meg6 (R-5775/R-5670)	Modified Epoxy	/91/102	Yes	No	Yes	V-0	185	410	3.71		3.61	0.002		0.004	0.14%	45		16	10	
Rogers	RO4450F	Hydrocarbon/Ceramic	IPC-4103A/11 /240	Yes	No	Yes	V-0	>280				3.52			0.004	0.05%		19	2		
Rogers	RO4350B	Hydrocarbon/Ceramic	IPC-4103A/11 /240	Yes	No	Yes	V-0	280				3.48		0.0031	0.0037	0.05%	35		16	2	
Rogers	RO4360G2	Hydrocarbon/Ceramic	IPC-4103A/11 /240	Yes	No	No	V-0	>280	>350			6.15		0.003	0.0038	0.08%	28		14	2	
Rogers	RO4835	Hydrocarbon/Ceramic	IPC-4103 /11	Yes	No	No	V-0	>280				3.48			0.0037	0.05%	26		11	2	
Rogers	RO4003	Hydrocarbon/Ceramic	IPC-4103 /10	Yes	No	No	V-0	280				3.38			0.0027	0.04%	46		11	2	
Rogers	RO4533	Hydrocarbon/Ceramic		Yes	No	No	V-0	280				3.30		0.0020	0.0025	0.02%				2	
ITEQ	IT-968	Modified Epoxy	/102	Yes	Yes	Yes	V-0	185	400	3.77	3.76	3.66	0.0032	0.0039	0.0050	<0.1%	45	2.2%	12/14		
ITEQ	IT-968 SE	Modified Epoxy	/102	Yes	Yes	Yes	V-0	175	400	3.44	3.44	3.34	0.0027	0.0030	0.0038	0.12%	45	2.3%	12/14		
ITEQ	IT-988G	Modified Epoxy	/96	Yes	Yes	No	V-0	190	405	3.63	3.63	3.63	0.0029	0.0029	0.0029	0.31%	58	2.95%	15/16		
ITEQ	IT-988G SE	Modified Epoxy	/96	Yes	Yes	No	V-0	190	405	3.24	3.24	3.24	0.0013	0.0014	0.0014	0.26%	58	2.95%	15/16		
EMC	EM-528K	Modified Epoxy		Yes	Yes	in process	V-0	220	420	3.5/3.3		3.4/3.2	0.0031/0.0032		0.0041/0.0042	0.11%	25-30	1.4%	9/10		
EMC	EM-890K	Modified Epoxy	/134	Yes	Yes	Yes	V-0	170	430	3.1/2.9		3.0/2.8	0.0019/0.0018		0.0022/0.0021	0.07%	45-50	2.2%	12/13		
TUC	TU-883	Modified Epoxy		Yes	Yes	No	V-0	170	420	3.6		3.57	0.0030		0.0046	0.08%	35	2.5%			
TUC	TU-883SP	Modified Epoxy		Yes	Yes	No	V-0	170	420	3.22		3.22			0.0029	0.08%	35	2.5%			
Doosan	DS-7409DV(N)	Modified Epoxy	/91 /102	Yes	No	No	V-0	180	400	3.35		3.26	0.001		0.0025	0.12%	45	2.8%	16		
Nelco	N4350-13-RF	Modified Epoxy	/29	Yes	No	No	V-0	210	350			3.50			0.0065	0.10%		3.50%	14	2	
Nelco	Meteorwave 2000	Modified Epoxy	/91 /102	Yes	No	No	V-0	215	390		3.40	3.40		0.0030	0.0040	0.12%	55	1.9%	10-14		
Taconic	TLX	PTFE / Glass		Yes	No	No	V-0					2.50		0.0019	0.0019	0.02%				1	
Taconic	TLY-5	PTFE / Glass		Yes	No	No	V-0					2.20			0.0009	0.02%	217			1	
Taconic	RF35	Ceramic / PTFE		Yes	No	No	V-0				3.50			0.0018		0.02%	64		24	1	
Taconic	RF35TC	Ceramic / PTFE		Yes	No	No	V-0				3.50			0.0011		0.05%	34		13	1	
Taconic	TSM-DS3	Ceramic / PTFE		Yes	No	No	V-0		526			3.00			0.0011	0.07%	23		16	1	
Isola	Astra MT77	PPE Blend	IPC-4103 /17	Yes	No	Yes	V-0	200	360		3.00	3.00		0.0017	0.0017	0.10%	50-70		12	10	
Isola	Astra MT77 Pre-Preg	PPE Blend	IPC-4103 /17	Yes	No	Yes	V-0	200	360		3.00	3.00		0.0017	0.0017	0.10%	50-70		12	10	
Rogers	RT/Duroid 5870	PTFE / Glass		Yes	No	No	V-0		500			2.33	0.0005(1MHz)		0.0012	0.02%	173		28	1	
Rogers	RT/Duroid 5880	PTFE / Glass		Yes	No	No	V-0		500			2.20	0.0004(1MHz)		0.0009	0.02%	237		48	1	
Rogers	RT/Duroid 6002	Ceramic / PTFE		Yes	No	No	V-0		500			2.94			0.0012	0.02%	24		16	1	
Rogers	RT/Duroid 6006	Ceramic / PTFE		Yes	No	No	V-0		500			6.15			0.0027	0.05%	117		47	1	
Rogers	RT/Duroid 6010	Ceramic / PTFE		Yes	No	No	V-0		500			10.2			0.0023	0.01%	47		24	1	
Rogers	RT/Duroid 6202	Ceramic / PTFE		Yes	No	No	V-0		500			2.90			0.0015	0.04%	30		15	1	
Rogers	RO3203	Ceramic / PTFE		Yes	No	No	V-0		500			3.02			0.0016	<0.1%	58		13	1	
Rogers	RO3003	Ceramic / PTFE		Yes	No	No	V-0		500			3.00			0.0010	<0.1%	25		17	1	
Rogers	TMM-3	Ceramic thermoset polymer		Yes	No	No	V-0		425			3.27			0.0020	0.06-0.12%	23		15	1	
Rogers	TMM-10	Ceramic thermoset polymer		Yes	No	No	V-0		425			9.20			0.0022	0.09-0.20%	20		21	1	
Isola	P95	Polyimide	/40 /41	Yes	Yes	No	HB	260	416	3.78	3.76	3.73	0.0172	0.0179		0.5%			14	2	
Isola	P96	Polyimide	/40 /41	Yes	No	Yes	V-0	260	396	3.78	3.76	3.73	0.0172	0.0179	0.021	0.5%		13/14	2		
Ventec	VT901	Polyimide	/40 /41	Yes	No	No	V-0	250	395	4.05			0.012			0.2%	50	1.4%	11 to 12	2	
Arlon	85N	Polyimide	/40 /41 /42	Yes	Yes	No	HB	250	407	4.0			0.010(1MHz)			0.27%	55	1.2%	16	2	
Arlon	85HP	Polyimide	/40 /41	Yes	Yes	No	HB	250	430	4.0(1MHz)			0.008(1MHz)			0.32%	45	1.0%	17		
Faradflex	MC12M	Buried Capacitance	IPC-4821	Yes	No	Yes															