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## IT-170GRA1 Electrical Properties

High Tg and Low Loss Halogen Free Multifunctional Filled Epoxy Resin and Phenolic-Cured Laminate & Prepreg

Core		IT-170GRA1 TC										
Laminate			Dk ±5%					Df ≤10%				
Imperial units Thickness (in)	Metric system Thickness (mm)	Standard Constructions	1 MHz	1 GHz	2 GHz	5 GHz	10 GHz	1MHz	1 GHz	2 GHz	5 GHz	10 GHz
0.0020	0.051	106x1	3.63	3.60	3.56	3.52	3.42	0.0082	0.0085	0.0088	0.0092	0.0098
0.0023	0.058	1067x1	3.66	3.63	3.60	3.55	3.46	0.0081	0.0084	0.0087	0.0091	0.0097
0.0025	0.064	1078x1	3.86	3.83	3.79	3.75	3.67	0.0077	0.0079	0.0082	0.0085	0.0090
0.0030	0.076	1086x1	3.85	3.82	3.78	3.74	3.66	0.0077	0.0079	0.0082	0.0085	0.0091
0.0035	0.089	3313x1	4.00	3.97	3.93	3.89	3.82	0.0074	0.0076	0.0079	0.0081	0.0087
0.0035	0.089	2113x1	3.98	3.95	3.91	3.87	3.80	0.0075	0.0077	0.0080	0.0082	0.0087
0.0035	0.089	106x2	3.70	3.67	3.63	3.59	3.50	0.0080	0.0083	0.0086	0.0090	0.0096
0.0035	0.089	1037x2	3.63	3.60	3.56	3.52	3.42	0.0082	0.0085	0.0088	0.0092	0.0098
0.0040	0.102	2116x1	4.09	4.05	4.02	3.98	3.91	0.0073	0.0075	0.0078	0.0079	0.0085
0.0040	0.102	106x2	3.63	3.60	3.56	3.52	3.42	0.0082	0.0085	0.0088	0.0092	0.0098
0.0045	0.114	2116x1	4.02	3.98	3.95	3.91	3.83	0.0074	0.0076	0.0079	0.0081	0.0086
0.0045	0.114	1067x2	3.66	3.63	3.60	3.55	3.46	0.0081	0.0084	0.0087	0.0091	0.0097
0.0050	0.127	2116x1	3.94	3.90	3.87	3.82	3.75	0.0075	0.0078	0.0081	0.0083	0.0088
0.0050	0.127	1080x2	3.86	3.83	3.79	3.75	3.67	0.0077	0.0079	0.0082	0.0085	0.0090
0.0060	0.152	1506x1	4.20	4.16	4.13	4.09	4.03	0.0071	0.0073	0.0076	0.0077	0.0082
0.0060	0.152	1086x2	3.85	3.82	3.78	3.74	3.66	0.0077	0.0079	0.0082	0.0085	0.0091
0.0080	0.203	7628x1	4.14	4.10	4.07	4.03	3.96	0.0072	0.0074	0.0077	0.0078	0.0084
0.0080	0.203	2116x2	4.09	4.05	4.02	3.98	3.91	0.0073	0.0075	0.0078	0.0079	0.0085
0.0100	0.254	2116x2	3.94	3.90	3.87	3.82	3.75	0.0075	0.0078	0.0081	0.0083	0.0088
0.0120	0.305	1506x2	4.20	4.16	4.13	4.09	4.03	0.0071	0.0073	0.0076	0.0077	0.0082
0.0140	0.356	7628x2	4.24	4.20	4.17	4.13	4.07	0.0071	0.0073	0.0075	0.0076	0.0082
0.0150	0.381	7628x2	4.20	4.16	4.13	4.09	4.03	0.0071	0.0073	0.0076	0.0077	0.0082
0.0160	0.406	7628x2	4.13	4.09	4.05	4.01	3.95	0.0072	0.0074	0.0077	0.0078	0.0084
0.0180	0.457	7628x2+2116x1	4.21	4.17	4.14	4.10	4.04	0.0071	0.0073	0.0076	0.0077	0.0082
0.0180	0.457	7628x2+1080x1	3.99	3.96	3.92	3.88	3.81	0.0074	0.0077	0.0080	0.0081	0.0087
0.0200	0.508	7628x2+2116x1	4.11	4.07	4.03	3.99	3.93	0.0073	0.0075	0.0078	0.0079	0.0084
0.0210	0.533	7628x3	4.28	4.24	4.20	4.16	4.11	0.0070	0.0072	0.0075	0.0076	0.0081
0.0240	0.610	7628x3	4.13	4.09	4.05	4.01	3.95	0.0072	0.0074	0.0077	0.0078	0.0084
0.0280	0.711	7628x4	4.28	4.24	4.20	4.16	4.11	0.0070	0.0072	0.0075	0.0076	0.0081
0.0310	0.787	7628x4	4.13	4.09	4.05	4.01	3.95	0.0072	0.0074	0.0077	0.0078	0.0084
0.0350	0.889	7628x5	4.28	4.24	4.20	4.16	4.11	0.0070	0.0072	0.0075	0.0076	0.0081
0.0390	0.991	7628x5	4.13	4.09	4.05	4.01	3.95	0.0072	0.0074	0.0077	0.0078	0.0084

Prepreg		IT-170GRA1 BS										
Laminated Prepreg			Dk ±5%					Df ≤10%				
Prepreg Type	Thickness (mil)	Resin Content (%)	1 MHz	1 GHz	2 GHz	5 GHz	10 GHz	1MHz	1 GHz	2 GHz	5 GHz	10 GHz
7628	7.1	43.0	4.20	4.16	4.13	4.09	4.03	0.0071	0.0073	0.0076	0.0077	0.0082
	7.8	46.0	4.12	4.09	4.05	4.01	3.94	0.0072	0.0074	0.0077	0.0079	0.0084
	8.1	47.5	4.08	4.05	4.01	3.97	3.90	0.0073	0.0075	0.0078	0.0079	0.0085
1506	6.5	48.0	4.07	4.04	4.00	3.96	3.89	0.0073	0.0075	0.0078	0.0080	0.0085
	6.8	50.0	4.02	3.99	3.95	3.91	3.84	0.0074	0.0076	0.0079	0.0081	0.0086
2116	4.6	53.0	3.95	3.92	3.88	3.84	3.77	0.0075	0.0077	0.0080	0.0082	0.0088
	4.9	55.0	3.91	3.88	3.84	3.80	3.72	0.0076	0.0078	0.0081	0.0083	0.0089
	5.1	57.0	3.87	3.84	3.80	3.76	3.68	0.0077	0.0079	0.0082	0.0084	0.0090
3313	3.9	56.0	3.89	3.86	3.82	3.78	3.70	0.0076	0.0078	0.0082	0.0084	0.0090
	4.1	58.0	3.85	3.82	3.78	3.74	3.65	0.0077	0.0079	0.0083	0.0085	0.0091
	4.3	60.0	3.81	3.78	3.74	3.70	3.61	0.0078	0.0080	0.0083	0.0086	0.0092
2113	3.8	56.0	3.89	3.86	3.82	3.78	3.70	0.0076	0.0078	0.0082	0.0084	0.0090
	4.0	58.0	3.85	3.82	3.78	3.74	3.65	0.0077	0.0079	0.0083	0.0085	0.0091
	4.2	60.0	3.81	3.78	3.74	3.70	3.61	0.0078	0.0080	0.0083	0.0086	0.0092
1086	3.0	61.0	3.79	3.76	3.72	3.68	3.59	0.0078	0.0081	0.0084	0.0087	0.0093
	3.4	65.0	3.71	3.68	3.65	3.60	3.51	0.0080	0.0082	0.0086	0.0089	0.0095
	3.8	68.0	3.66	3.63	3.59	3.55	3.46	0.0081	0.0084	0.0087	0.0091	0.0097
1080	2.8	62.0	3.77	3.74	3.70	3.66	3.57	0.0079	0.0081	0.0084	0.0087	0.0093
	3.1	65.0	3.71	3.68	3.65	3.60	3.51	0.0080	0.0082	0.0086	0.0089	0.0095
	3.4	68.0	3.66	3.63	3.59	3.55	3.46	0.0081	0.0084	0.0087	0.0091	0.0097
1078	2.7	62.0	3.77	3.74	3.70	3.66	3.57	0.0079	0.0081	0.0084	0.0087	0.0093
	3.0	65.0	3.71	3.68	3.65	3.60	3.51	0.0080	0.0082	0.0086	0.0089	0.0095
	3.3	68.0	3.66	3.63	3.59	3.55	3.46	0.0081	0.0084	0.0087	0.0091	0.0097
1067	2.4	71.5	3.60	3.57	3.54	3.49	3.39	0.0083	0.0085	0.0089	0.0093	0.0099
	2.6	73.0	3.58	3.55	3.51	3.47	3.37	0.0083	0.0086	0.0090	0.0094	0.0100
	2.8	75.0	3.54	3.52	3.48	3.43	3.33	0.0084	0.0087	0.0091	0.0095	0.0102
106	2.0	71.5	3.60	3.57	3.54	3.49	3.39	0.0083	0.0085	0.0089	0.0093	0.0099
	2.2	73.0	3.58	3.55	3.51	3.47	3.37	0.0083	0.0086	0.0090	0.0094	0.0100
	2.3	75.0	3.54	3.52	3.48	3.43	3.33	0.0084	0.0087	0.0091	0.0095	0.0102

Test methods: 1GHz by RF impedance/material analyzer HP4291B (IPC 2.5.5.9);  
2GHz, 5GHz, 10GHz by Resonator Cavity (IPC 2.5.5.13)  
Note: Dk value should be subtracted 0.3 to be target data for impedance calculation

The above data and fabrication guide provide designers and PCB shop for their reference. We truly believe that these information are accurate, moreover, test methods and specification must be consider interiorly. The effective sale is in accordance with the specification, and ITEQ maintains the authority of revision to keep the best suitability for users.