

# Standards

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**UL Standard**

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**BS Standard • CSA Standard**

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# Standards

## UL Standard

### ●Base Material Recognition File No. E80148

Part Number	ANSI	Min. Thickness (mm)	UL 94 Flame Class	TI *		PLC				DSR
				Elec	Mech	HWI*	HAI*	HVTR*	CTI	
MCL-E-67	FR-4.0	0.03	V-0	130	140	0	2	4	3	YES
MCL-E-679	FR-4.0	0.03	V-0	130	140	0	2	3	3	YES
MCL-E-679F	FR-4.0	0.03	V-0	130	140	0	1	0	1	YES
MCL-E-75G	FR-4.1	0.03	V-0,VTM-0	130	140	0	1	-	3	YES
MCL-E-679FG	FR-4.1	0.03	V-0,VTM-0	130	140	0	2	0	0	YES
MCL-HE-679G	FR-4.1	0.03	V-0,VTM-0	130	140	0	0	-	2	YES
MCL-E-78G	FR-4.1	0.03	V-0,VTM-0	130	140	0	0	-	2	YES
MCL-I-671	GPY	0.03	V-0	170	180	0	0	3	4	YES
MCL-E-700G	-	0.02	V-0,VTM-0	180	180	3	0	-	0	YES
MCL-E-770G	-	0.02	V-0,VTM-0	170	140	0	0	-	1	YES
MCL-LW-900G MCL-LW-910G	-	0.05	V-0,VTM-0	160	140	0	1	-	1	YES
MCL-HS100	-	0.05	V-0,VTM-0	160	140	0	1	-	1	YES
TD-002	-	0.04	V-0,VTM-0	50	50	0	1	-	3	YES
E-668T	CEM-3	0.38	V-0	130	140	1	0	-	0	YES
KEL-GEF	FR-4.0	0.10	V-0	130	140	0	1	0	3	YES

\* The data above are based on unclad laminates, and the properties may vary depending on the board thickness.

TI : Temperature Index(°C)  
HWI : Hot Wire Ignition(PLC)

HAI : High Ampare Arc Ignition(PLC)  
HVTR : High-voltage-arc Tracking Rate(PLC)

CTI : Comparative Tracking Index(PLC)

#### Hot Wire Ignition Performance Level Categories

Range - Mean Ignition Time (Sec.)	Assigned PLC
120 $\leq$ IT	0
60 $\leq$ IT < 120	1
30 $\leq$ IT < 60	2
15 $\leq$ IT < 30	3
7 $\leq$ IT < 15	4
0 $\leq$ IT < 7	5

#### High Ampare Arc Ignition Performance Level Categories

Range - Mean Number of Arc to Cause Ignition (NA)	Assigned PLC
120 $\leq$ NA	0
60 $\leq$ NA < 120	1
30 $\leq$ NA < 60	2
15 $\leq$ NA < 30	3
0 $\leq$ NA < 15	4

#### High-voltage Arc-tracking-rate Performance Level Categories

Range - Tracking Rate (mm/min.)	Assigned PLC
0 < TR $\leq$ 10	0
10 < TR $\leq$ 25.4	1
25.4 < TR $\leq$ 80	2
80 < TR $\leq$ 150	3
150 < TR	4

#### Comparative Tracking Performance Level Categories

Range - Tracking Index (Voltage)	Assigned PLC
600 $\leq$ TI	0
400 $\leq$ TI < 600	1
250 $\leq$ TI < 400	2
175 $\leq$ TI < 250	3
100 $\leq$ TI < 175	4
0 $\leq$ TI < 100	5

●MCIL Recognition

File No. E80148

Part Number	ANSI	Min. Thickness (mm)	UL Flame Class	Clad Conductive Thickness(μm)		Max. Area Diameter (mm)	Solder Limit		Max. Operating Temperature (°C)
				Min.	Max.		Temperature(°C)	Time (Sec.)	
MCL-E-67	FR-4.0	0.09	V-0	5	70	50.8	*1		125
		0.20	V-0	5	105	50.8	*1		130
MCL-E-679	FR-4.0	0.12	V-0	5	105	50.8	*1		130
		0.20	V-0	5	105	50.8	*2		130
MCL-E-679F	FR-4.0	0.12	V-0	14.3	35	50.8	*1		110
		0.38	V-0	5	70	50.8	*1		130
MCL-E-679FG	FR-4.1	0.06(*)	V-0	5	105	50.8	*1		110
		0.12	V-0	3	35	50.8	*1		110
		0.20	V-0	5	70	50.8	*1		125
		0.38	V-0	5	70	50.8	*1		130
MCL-E-75G	FR-4.1	0.12	V-0	3	35	50.8	*3		120
		0.20	V-0	3	35	50.8	*3		130
		0.38	V-0	3	70	50.8	*3		130
		0.63	V-0	3	105	50.8	*3		130
MCL-HE-679G	FR-4.1	0.17	V-0	3	35	50.8	*3		120
		0.20	V-0	3	35	50.8	*3		130
		0.38	V-0	3	70	50.8	*3		130
MCL-E-78G	FR-4.1	0.17	V-0	3	35	50.8	*3		120
		0.20	V-0	3	35	50.8	*3		130
		0.38	V-0	3	70	50.8	*3		130
MCL-I-671	GPY	0.20	V-0	5	105	50.8	*2		130
E-668T E-568T	CEM-3	0.38(*)	V-0	12	102	50.8	*6		130

Certified condition may vary depending on the board thickness.

(\*)Double sided.

\*1: 230°C/40Min. + 250°C/40Sec. + 260°C/20Sec.  
 \*2: 230°C/60Min. + 260°C/2Min. + 260°C/20Sec.  
 \*3: 230°C/40Min. + 250°C/2Min. + 288°C/30Sec.

\*4: 260°C/20Sec.  
 \*5: 200°C/30Min. + 250°C/40Sec. + 260°C/40Sec. or 200°C/20Min. + 230°C/2Min. + 260°C/1Min.  
 \*6: 260°C/3Min.

## BS Standard

Certificate No.	Part Number	Flammability category	Min. Thickness(mm)
VC670299	MCL-E-67	V-0	0.10
VC643584	MCL-E-679	V-0	0.10
VC643585	MCL-I-671	V-0	0.10
VC660376	MCL-E-679F	V-0	0.06
VC656656	MCL-E-679FG	V-0	0.06
VC670372	MCL-E-75G	V-0	0.06

## CSA Standard

Part Number	ANSI	Min. Thickness(mm)	Flammability
MCL-E-67	FR-4	0.21	V-0