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Date: 2005/04/04  
 Subscriber: 911747001  
 File No: E70742  
 Project No: 05CA10837  
 PD No: 05M15506  
 Type: R  
 PO Number:

Subject: Procedure And/Or Report Material

The following material resulting from the investigation under the above numbers is enclosed.

**Issue**

<u>Date</u>	<u>Vol</u>	<u>Sec</u>	<u>Pages</u>	<u>Revised Date</u>
1979/05/07	1	1	Revised Description Page(s) 4, 4-1	2005/03/15
1979/05/07	1		New Test Record 33	2005/03/15
1979/05/07	1		Revised Test Record 32	2005/03/15
1996/03/05	1	3	Revised Description Page(s) 7	2005/03/15
1996/03/05	1		New Test Record 8	2005/03/15

Inspections at your plant will be conducted under the supervision of Ron Payne, Area Manager, 1101 Sylvan Avenue, Suite C-101, Modesto, CA 95350. PHONE: 1-209-527-0626; FAX: 1-209-527-0947; E-MAIL: Ronald.T.Payne@us.ul.com.

Please file revised pages and illustrations in place of material of like identity. New material should be filed in its proper numerical order.

NOTE: Follow-Up Service Procedure revisions DO NOT include Cover Pages, Test Records and Conclusion Pages. Report revisions DO NOT include Authorization Pages, Indices, Section General Pages and Appendixes.

Please review this material and report any inaccuracies to our Customer Service Professional, PHONE: 1-877-ULHELPS (1-877-854-3577), referring to the above Project and/or PD Numbers.

SCL File

UL INSPECTION CENTER 844



TABLE II

Type	Base Material &			Min. Thk. (in.)	Min. Copper Thk. (mils)	SS/ DS®	Mfg. Process	Meets UL 796 DSR	CTI (V) (PLC)
	UL/ ANSI Grade	Mfr +	Grade						
1	FR-4	D	DS-7405, DS-7405\$\$	0.025	1.34	DS	A	Yes	250 (2)
	FR-4	G	11635C(++), 11635E(++), 11635F(++), 11635G(++), 11635M(++)	0.025	1.34	DS	A	Yes	270 (2)
	FR-4	G	PC-75AC(++), PC-75AE(++), PC-75AF(++), PC-75AG(++)	0.025	1.34	DS	A	Yes	220 (3)
	CEM-1	I	65M62	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	I	%	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	I	FR404	0.025	1.34	DS	A	Yes	100 (4)
	FR-4	IT	IT-140TC	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	M	EG-818T#	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	NE	N-4105##	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	NY	FR-4-86	0.025	1.34	DS	A	Yes	(3)
	FR-4	V	VT-41RD, VT-42RD	0.025	1.34	DS	A	Yes	(3)

& - Recognized Component, (QMTS2)

@ - SS: Single Sided; DS: Double Sided or Single Sided

+ - D: Doosan (E103670); G: General Electric (E35132); I: Isola GMBH (E41625);  
IT: ITEQ (E178114); M: Mica Ava (E101253); NE: Nelco (E169552); NY: Nan  
Ya (E98983); V: Ventec (E214381)

# - Acceptable substitutes are EG-810T, -844T, -868T, -883T, -899T

% - Isola laminate family grades Duraver E-Cu#104, ED130UV, IS402, FR402, FR-  
4, FR4-74, IS410, IS410BC, FR406

TABLE II

Type	Base Material &			Min. Thk. (in.)	Min. Copper Thk. (mils)	SS/ DS <sup>®</sup>	Mfg. Process	Meets UL 796 DSR	CTI (V) (PLC)
	UL/ ANSI Grade	Mfr +	Grade						
1A	FR-4	D	DS-7405, DS-7405\$\$	0.025	0.67	DS	A	Yes	250 (2)
	FR-4	G	11635C(++), 11635E(++), 11635F(++), 11635G(++), 11635M(++)	0.025	0.67	DS	A	Yes	270 (2)
	FR-4	G	PC-75AC(++), PC-75AE(++), PC-75AF(++), PC-75AG(++)	0.025	0.67	DS	A	Yes	220 (3)
	CEM-1	I	65M62	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	I	%	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	IT	IT-140TC	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	M	EG-818T#	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	NE	N-4105##	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	NY	FR-4-86	0.025	0.67	DS	A	Yes	(3)
	FR-4	V	VT-41RD, VT-42RD	0.025	0.67	DS	A	Yes	(3)

& - Recognized Component, (QMTS2)

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\*

+ - D: Doosan (E103670); G: General Electric (E35132); I: Isola GMBH (E41625);  
IT: ITEQ (E178114); M: Mica Ava (E101253); NE: Nelco (E169552); NY: Nan Ya  
(E98983); V: Ventec (E214381)

# - Acceptable substitutes are EG-810T, -844T, -868T, -883T, -899T

% - Isola laminate family grades Duraver E-Cu#104, ED130UV, IS402, FR402, FR-  
4, FR4-74, IS410, IS410BC, FR406

TABLE II

Type	Base Material $\phi$											PWB Mfg. Proc.		
	Individual Laminate Matl.			Individual Bonding Sheet Matl.			Total Build- Up Thk. (in.)	Con- ductor Thk.# (mils)	Meets UL 796 Dir. Sup.	CTI (V) (PLC)				
	UL/ ANSI Grade	Mfr. +	Grade	Min. Thk. (mils)	Grade	Min. Thk. (mils)								
4	FR-4	I	%		FR-4	I	%	1.5		0.015	E: 0.3 I: 1.34	Yes	175 (3)	B
*														
5	FR-4	I	%		FR-4	I	%	1.5		0.015	E: 0.3 I: 2.67	Yes	175 (3)	B
*														
*														
8	FR-4	IT	IT-140TC	4.0	FR-4	IT	IT-140BS	2.0		0.015	E: 0.67 I: 4.05	Yes	215 (3)	B
	FR-4	N	N4105##	2.0	FR-4	N	N4205##	2.0		0.015	E: 0.67 I: 5.40	Yes	175 (3)	B
9	FR-4	IT	IT-180TC	4.0	FR-4	IT	IT-180BS	2.0		0.015	E: 0.3 I: 1.34	Yes	250 (2)	B

 $\phi$  - Recognized Component - Industrial Laminates (QMTS2)

+ - Epoxy-Glass Laminate only with or without flame retardant additive

@ - I: Isola GMBH (E41625); IT: Iteq (E178114); N: Nelco (E169552)

# - I: Maximum internal thickness

E: Minimum external thickness

% - Isola GMBH Duraver E-Cu#104ML, FR-4, FR4-74, ED130UV, IS410, IS410BC, FR402, IS402, FR406

% - Isola GMBH Duraver E#104ML, FR-4+++ , ED-###, IS410++++, IS402++, FR402-B15, FR406+++

TABLE II

Type	Base Material &			Min. Thk. (in.)	Min. Copper Thk. (mils)	SS/ DS®	Mfg. Process	Meets UL 796 DSR	CTI (V) (PLC)
	UL/ ANSI Grade	Mfr +	Grade						
1	FR-4	D	DS-7405, DS-7405\$\$	0.025	1.34	DS	A	Yes	250 (2)
	FR-4	G	11635C(++), 11635E(++), 11635F(++), 11635G(++), 11635M(++)	0.025	1.34	DS	A	Yes	270 (2)
	FR-4	G	PC-75AC(++), PC-75AE(++), PC-75AF(++), PC-75AG(++)	0.025	1.34	DS	A	Yes	220 (3)
	CEM-1	I	65M62	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	I	%	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	I	FR404	0.025	1.34	DS	A	Yes	100 (4)
	FR-4	IT	IT-140TC	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	M	EG-818T#	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	NE	N-4105##	0.025	1.34	DS	A	Yes	175 (3)
	FR-4	NY	FR-4-86	0.025	1.34	DS	A	Yes	(3)
	FR-4	V	VT-41RD, VT-42RD	0.025	1.34	DS	A	Yes	(3)

& - Recognized Component, (QMTS2)

@ - SS: Single Sided; DS: Double Sided or Single Sided

+ - D: Doosan (E103670); G: General Electric (E35132); I: Isola GMBH (E41625);  
IT: ITEQ (E178114); M: Mica Ava (E101253); NE: Nelco (E169552); NY: Nan  
Ya (E98983); V: Ventec (E214381)

# - Acceptable substitutes are EG-810T, -844T, -868T, -883T, -899T

% - Isola laminate family grades Duraver E-Cu#104, ED130UV, IS402, FR402, FR-  
4, FR4-74, IS410, IS410BC, FR406

TABLE II

Type	Base Material &			Min. Thk. (in.)	Min. Copper Thk. (mils)	SS/ DS®	Mfg. Process	Meets UL 796 DSR	CTI (V) (PLC)
	UL/ ANSI Grade	Mfr +	Grade						
1A	FR-4	D	DS-7405, DS-7405\$\$	0.025	0.67	DS	A	Yes	250 (2)
	FR-4	G	11635C(++), 11635E(++), 11635F(++), 11635G(++), 11635M(++)	0.025	0.67	DS	A	Yes	270 (2)
	FR-4	G	PC-75AC(++), PC-75AE(++), PC-75AF(++), PC-75AG(++)	0.025	0.67	DS	A	Yes	220 (3)
	CEM-1	I	65M62	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	I	%	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	IT	IT-140TC	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	M	EG-818T#	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	NE	N-4105##	0.025	0.67	DS	A	Yes	175 (3)
	FR-4	NY	FR-4-86	0.025	0.67	DS	A	Yes	(3)
	FR-4	V	VT-41RD, VT-42RD	0.025	0.67	DS	A	Yes	(3)

& - Recognized Component, (QMTS2)

@ - SS: Single Sided; DS: Double Sided or Single Sided

\*

+ - D: Doosan (E103670); G: General Electric (E35132); I: Isola GMBH (E41625);  
IT: ITEQ (E178114); M: Mica Ava (E101253); NE: Nelco (E169552); NY: Nan Ya  
(E98983); V: Ventec (E214381)

# - Acceptable substitutes are EG-810T, -844T, -868T, -883T, -899T

% - Isola laminate family grades Duraver E-Cu#104, ED130UV, IS402, FR402, FR-  
4, FR4-74, IS410, IS410BC, FR406

TEST RECORD NO. 32

## NAME/GRADE CHANGE:

No tests were considered necessary to change the manufacturer's name and grade designation of materials in this Report as outlined in the Table below.

<u>Old Mfr and Grade Designation</u>	<u>New Mfr and Grade Designation</u>
Isola (E41625) Duraver E-Cu#114, MLF-21, MLF-31, MLF-170, ED130, ED130P, ED130UV, FR402, FR405, FR406, FR406BC, FR406N, FR4-74, IS402, Duraver E-Cu#104, Duraver-E-Cu#117	Isola GMBH (E41625) Duraver E-Cu#104, ED130UV, IS402, FR402, FR-4, FR4-74, IS410, IS410BC, FR406+++

## Test Record No. 32 Summary:

The results of this investigation indicate that the samples evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

## Test Record by:

Deanna Dean  
Senior Engineering Associate  
Conformity Assessment Services  
Section 3011BCAM

## Reviewed by:

Michelle D. Courier  
Senior Project Engineer  
Conformity Assessment Services  
Section 3015TSCL

TEST RECORD NO. 33

SAMPLES:

No tests were necessary on the new Types tabulated below based on:

1. Recognition of laminate as suitable Copper-Clad Industrial Laminate (CCIL), and
3. Previous Recognition of this manufacturer's boards on laminates of the same ANSI grade as tabulated below:

NEW BOARD		REFERENCED BOARD	
Type	Laminate Material	Type	Laminate Material
1	Ventec VT-41RD, VT-42RD	1	Isola GMBH 65M62
1A	Ventec VT-41RD, VT-42RD	1A	Isola GMBH 65M62

DIRECT SUPPORT EVALUATION:

No tests were considered necessary on the following Printed Wiring Board Types using the laminates indicated below which comply with the Direct Support requirements per UL 796, Standard for Printed Wiring Boards, Section 22.

PWB Type	Mass Laminate Package
1	Ventec VT-41RD, VT-42RD
1A	Ventec VT-41RD, VT-42RD

Test Record Summary:

The results of this investigation indicate that the sample(s) evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Cheryl Causey  
Senior Project Handler  
Conformity Assessment Services

Reviewed by:

John Marke  
Senior Project Engineer  
Conformity Assessment Services

TABLE II

Type	Base Material†										PWB Mfg. Proc.						
	Individual Laminate Matl.		Individual Bonding Sheet Matl.			Total Build- Up Thk. (in.)	Con- ductor Thk.# (mils)	Meets UL 796 Dir. Sup.	CTI (V) (PLC)								
	UL/ ANSI Grade	Mfr. +	Grade	Min. Thk. (mils)	UL/ ANSI Grade							Mfr. +	Grade	Min. Thk. (mils)			
4	FR-4	I	%	FR-4	I	%	FR-4	I	1.5	FR-4	I	%	0.015	E: 0.3 I: 1.34	Yes	175 (3)	B
*																	
5	FR-4	I	%	FR-4	I	%	FR-4	I	1.5	FR-4	I	%	0.015	E: 0.3 I: 2.67	Yes	175 (3)	B
*																	
*																	
8	FR-4	IT	IT-140TC	FR-4	IT	IT-140BS	FR-4	IT	2.0	FR-4	IT	IT-140BS	0.015	E: 0.67 I: 4.05	Yes	215 (3)	B
	FR-4	N	N4105##	FR-4	N	N4205##	FR-4	N	2.0	FR-4	N	N4205##	0.015	E: 0.67 I: 5.40	Yes	175 (3)	B
9	FR-4	IT	IT-180TC	FR-4	IT	IT-180BS	FR-4	IT	2.0	FR-4	IT	IT-180BS	0.015	E: 0.3 I: 1.34	Yes	250 (2)	B

† - Recognized Component - Industrial Laminates (QMTS2)

+ - Epoxy-Glass Laminate only with or without flame retardant additive

@ - I: Isola GMBH (E41625); IT: Iteq (E178114); N: Nelco (E169552)

# - I: Maximum internal thickness

E: Minimum external thickness

% - Isola GMBH Duraver E-Cu#104ML, FR-4, FR4-74, ED130UV, IS410, IS410BC, FR402, IS402, FR406

%# - Isola GMBH Duraver E#104ML, FR-4+++ , ED-###, IS410++++, FR402-B15, FR406+++

TEST RECORD NO. 8

## NAME/GRADE CHANGE:

No tests were considered necessary to change the manufacturer's name and grade designation of materials in this Report as outlined in the Table below.

<u>Old Mfr and Grade Designation</u>	<u>New Mfr and Grade Designation</u>
Isola laminate MLF-21, MLF-31, MLF-170	Isola GMBH laminate Duraver E-Cu#104ML, FR-4, FR4-74, ED130UV, IS410, IS410BC, FR402, IS402
Isola prepreg MLFR-21, MLFR-31, MLFR-170	Isola GMBH prepreg Duraver E#104ML, FR-4+++ , ED-###, IS410++++, IS402++, FR402- B15,FR406+++

## Test Record No. 8 Summary:

The results of this investigation indicate that the samples evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Deanna Dean  
Senior Engineering Associate  
Conformity Assessment Services  
Section 3011BCAM

Reviewed by:

Michelle D. Courier  
Senior Project Engineer  
Conformity Assessment Services  
Section 3015TSCL