

Contents

Notice Of Disclaimer	iii
List of Tables	ix
1 INTRODUCTION	
1.1 Purpose and Scope	1-1
1.2 Reason for Conversion from Technical Advisory	1-1
1.3 Organization	1-1
1.4 Levels of System Characteristics	1-2
2 GENERAL REQUIREMENTS	
2.1 General Design Requirements	2-1
2.1.1 (R) Fail-Safe Design	2-1
2.2 Engineering, Installation, and Maintenance	2-1
2.2.1 (R) Code Compliance	2-1
2.2.2 (R) Fire Resistance	2-2
2.2.3 (R) Environmental Requirements	2-2
2.2.4 (R) Electromagnetic Interference (EMI)	2-2
2.2.5 (R) Ground System	2-2
2.2.6 (R) Electrostatic Discharge (ESD)	2-3
2.2.7 (R) Electrical Isolation	2-3
2.2.8 (R) Frame Current	2-3
2.2.9 (R) Shipping Temperature and Humidity	2-4
2.2.10 (O) Acoustical Noise	2-4
2.2.11 (R) Safety and Hazards	2-4
2.2.12 (R) Toxic Materials	2-4
2.2.13 (R) Marking of Components	2-5
2.2.14 (O) Sparing	2-5
2.2.15 (R) Nameplate	2-5
3 ELECTRICAL REQUIREMENTS	
3.1 (R) Input Voltage Limits	3-1
3.2 (R) Low Input Voltage Protection	3-1
3.3 (R) Surge Voltages	3-1
3.4 (O) Inrush Current	3-1
3.5 (O) Hold-Up Time	3-2
3.6 (O) Voltage Output	3-2
3.7 (O) Output Voltage Regulation	3-2
3.8 (O) Voltage/Temperature Coefficient	3-3
3.9 (O) Warm-Up Time	3-3
3.10 (O) Voltage Drift	3-3
3.11 (O) Current Limit	3-3
3.12 (O) Stability	3-4

3.13 (O) Dynamic Response	3-4
3.14 (R) Output Protection	3-4
3.15 (O) Wideband Output Noise	3-4
3.16 (O) Efficiency	3-5
3.17 (O) Soft Start	3-5
3.18 (R) Discharge of Capacitors	3-6
3.19 (R) Induced Frame Current	3-6

4 PHYSICAL DESIGN

4.1 (R) Enclosure	4-1
4.2 (R) Shock and Vibration	4-1
4.3 (R) Earthquake	4-1
4.4 (O) Paint	4-1
4.5 (R) Cooling	4-1
4.6 (R) Materials	4-1
4.7 (O) Handling	4-2

5 CONVERTER INTERFACES AND ALARMS

5.1 (R) Converter Alarms	5-1
5.2 (R) Internal Over-Voltage Shutdown	5-1
5.3 (R) Internal Protection	5-1
5.4 (O) Test Points	5-2
5.5 (R) Converter Reliability and Maintainability	5-2
5.6 (R) PWB Nesting	5-2
5.7 (OPT) Jacks	5-2

6 COMPONENTS

6.1 (R) Transformers and Magnetic Coils	6-1
6.2 (R) Hook-Up Wire	6-1
6.3 (R) Power Conductors	6-2
6.4 (R) Electrical and Mechanical Hardware	6-3
6.5 (R) Electrical Power Wire Terminations	6-3
6.6 (R) Resistors	6-4
6.7 (R) Electrolytic Capacitors	6-4
6.8 (R) Non-Electrolytic Capacitors	6-4
6.9 (R) Semiconductors	6-5
6.10 (R) Fuses	6-5
6.11 (R) Relays	6-5
6.12 (R) Switches	6-6
6.13 (R) Printed Wire Boards	6-6

7 QUALITY ASSURANCE, DOCUMENTATION AND TRAINING

7.1 (O) Hardware Quality Assurance Plan	7-1
7.2 (O) Documentation	7-1
7.3 (O) Training Requirements	7-2

8 PERFORMANCE VERIFICATION AND TEST PROCEDURES

8.1	General Tests and Inspections for Section 2	8-1
8.1.1	(R) Fire Resistance (Section 2.2.2†)	8-1
8.1.2	(R) Environmental Requirements (Section 2.2.3†)	8-1
8.1.3	(R) Electromagnetic Interference (EMI) (Section 2.2.4†)	8-2
8.1.4	(R) Ground System (Section 2.2.5)	8-2
8.1.5	(R) Electrostatic Discharge (Section 2.2.6†)	8-2
8.1.6	(R) Electrical Isolation (Section 2.2.7†)	8-2
8.1.7	(R) Frame Current (Section 2.2.8†)	8-2
8.1.8	(R) Shipping Temperature and Humidity (Section 2.2.9†)	8-3
8.1.9	(O) Acoustical Noise (Section 2.2.10†)	8-3
8.1.10	(R) Safety and Hazards (Section 2.2.11†)	8-3
8.1.11	(R) Toxic Materials (Section 2.2.12†)	8-3
8.1.12	(R) Marking of Components (Section 2.2.13†)	8-3
8.1.13	(O) Sparing (Section 2.2.14†)	8-3
8.1.14	(R) Nameplate (Section 2.2.15†)	8-3
8.2	Electrical Tests for Section 3	8-3
8.2.1	(R) Input Voltage Limits (Section 3.1†)	8-4
8.2.2	(R) Low Input Voltage Protection (Section 3.2†)	8-4
8.2.3	(R) Surge Voltages (Section 3.3†)	8-4
8.2.4	(O) Inrush Current (Section 3.4†)	8-4
8.2.5	(O) Hold-Up Time (Section 3.5†)	8-5
8.2.6	(O) Voltage Output (Section 3.6†)	8-5
8.2.7	(O) Output Voltage Regulation (Section 3.7†)	8-5
8.2.8	(O) Voltage/Temperature Coefficient (Section 3.8†)	8-5
8.2.9	(O) Warm-Up Time (Section 3.9†)	8-5
8.2.10	(O) Voltage Drift (Section 3.10†)	8-6
8.2.11	(O) Current Limit (Section 3.11†)	8-6
8.2.12	(O) Stability (Section 3.12†)	8-6
8.2.13	(O) Dynamic Response (Section 3.13†)	8-6
8.2.14	(R) Output Protection (Section 3.14†)	8-7
8.2.15	(O) Wideband Output Noise (Section 3.15†)	8-7
8.2.16	(O) Efficiency (Section 3.16†)	8-7
8.2.17	(O) Soft Start (Section 3.17†)	8-7
8.2.18	(R) Discharge of Capacitors (Section 3.18†)	8-7
8.2.19	(R) Induced Frame Current (Section 3.19†)	8-7
8.3	Physical Design Tests and Inspections for Section 4	8-8
8.3.1	(R) Enclosure (Section 4.1†)	8-8
8.3.2	(R) Shock and Vibration (Section 4.2†)	8-8
8.3.3	(R) Earthquake (Section 4.3†)	8-8
8.3.4	(O) Paint (Section 4.4†)	8-8
8.3.5	(R) Cooling (Section 4.5†)	8-8
8.3.6	(R) Materials (Section 4.6†)	8-8
8.3.7	(O) Handling (Section 4.7†)	8-8
8.4	Electrical Tests for Section 5	8-9
8.4.1	(R) Internal Over-Voltage Shutdown (Section 5.2)	8-9

8.4.2 (R) Internal Protection (Section 5.3†)	8-9
8.4.3 (O) Test Points (Section 5.4†)	8-9
8.4.4 (R) Converter Reliability and Maintainability (Section 5.5†)	8-9
8.4.5 (R) PWB Nesting (Section 5.6†)	8-9
8.4.6 (OPT) Jacks (Section 5.7†)	8-9
8.5 Components Tests and Inspections for Section 6	8-9
8.5.1 (R) Transformers and Magnetic Coils (Section 6.1†)	8-10
8.5.2 Hook-Up Wire (Section 6.2†)	8-10
8.5.3 (R) Power Conductors (Section 6.3†)	8-10
8.5.4 (R) Electrical and Mechanical Hardware (Section 6.4†)	8-10
8.5.5 (R) Electrical Power Wire Terminations (Section 6.5†)	8-10
8.5.6 (R) Resistors (Section 6.6†)	8-11
8.5.7 (R) Electrolytic Capacitors (Section 6.7†)	8-11
8.5.8 (R) Non-Electrolytic Capacitors (Section 6.8†)	8-11
8.5.9 (R) Semiconductors (Section 6.9†)	8-11
8.5.10 (R) Fuses (Section 6.10†)	8-11
8.5.11 (R) Relays (Section 6.11†)	8-11
8.5.12 (R) Switches (Section 6.12†)	8-11
8.5.13 (R) Printed Wire Boards (Section 6.13†)	8-11
8.6 (O) Documentation Tests and Inspections (Section 7.2†)	8-12

Appendix A: REFERENCES

List of Tables

Table 2-1	Isolation Test Voltages	2-3
Table 3-1	Input Voltage Range	3-1
Table 3-2	Output Voltage Limits	3-2
Table 3-3	Noise Levels	3-4
Table 3-4	Desired Converter Efficiency	3-5
Table 5-1	Interface Connection	5-1
Table 6-1	Maximum Allowable Temperature	6-1
Table 6-2	Maximum Permissible Current	6-2
Table 6-3	Maximum Operating Voltage and Temperature	6-2
Table 6-4	Suggested Torques, Clamping Load, and Electrical Current Rating	6-3
Table 6-5	Semiconductor Torque Limits	6-5
Table 6-6	Allowable Temperatures For Switches and Contacts	6-6
Table 8-1	Test Equipment	8-3