

### Features

- High static and dynamic commutation
- Three quadrants
- Logic level (direct microcontroller driven)
- Package is RoHS (2002/95/EC) compliant
- Tab insulated, voltage = 2500 V rms
- UL certified (ref. file E81734)

### Applications

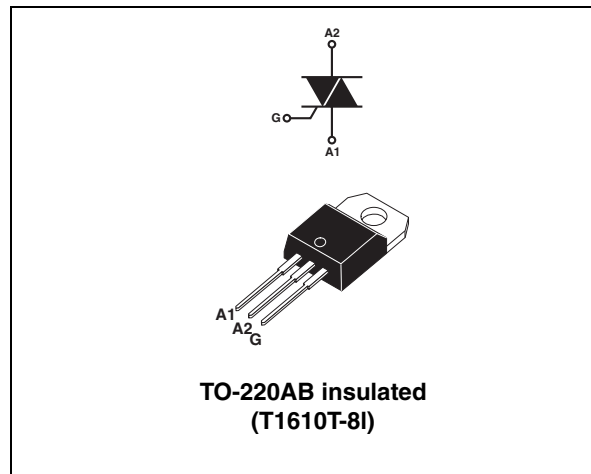
- General purpose AC line load switching
- Home appliances:
  - Fan
  - Pump
  - Solenoid
- Lighting
- Heaters
- Inrush current limiting circuits
- Overvoltage crowbar protection circuits

### Description

Available in TO220AB-Insulated (ceramic insulated), the T1610T-8I series of Triac can be used in an on/off or phase angle control function in general purpose AC switching.

T1610T-8I can be directly driven through a microcontroller allowing usage of small capacitive or resistive power supplies.

Provides insulation rated at 2500 V rms (TO-220AB insulated package).



**Table 1. Device summary**

Order code	Quadrants	Value $I_{GT}$ (mA)
T1610T-8I	I - II - III	10

# 1 Characteristics

**Table 2. Absolute maximum rating ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state rms current (full sine wave)		$T_c = 108\text{ °C}$	16	A
			$T_c = 119\text{ °C}$	12	
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ °C}$ )	$F = 50\text{ Hz}$	$t = 20\text{ ms}$	120	A
		$F = 60\text{ Hz}$	$t = 16.7\text{ ms}$	126	
$I^2t$	$I^2t$ Value for fusing		$t_p = 10\text{ ms}$	95	$A^2s$
$V_{DRM}, V_{RRM}$	Repetitive peak off-state voltage, gate open		$T_j = 150\text{ °C}$	600	V
			$T_j = 125\text{ °C}$	800	
$V_{DSM}, V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	900	V
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$		$F = 100\text{ Hz}$	100	$A/\mu s$
$I_{GM}$	Peak gate current		$t_p = 20\text{ }\mu s$	4	A
$P_{G(AV)}$	Average gate power dissipation			1	W
$T_{stg}, T_j$	Storage junction temperature range			-40 to +150	$^{\circ}C$
	Operating junction temperature range			-40 to +150	
$T_L$	Lead temperature for soldering during 10 s (at 4 mm from case for TO220AB-ins.)			260	$^{\circ}C$
$V_{ins} (rms)$	Insulation rms voltage, 1 minute, TO220AB ceramic insulated			2500	V

**Table 3. Electrical characteristics ( $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified)**

Symbol	Test conditions		Quadrant		Value	Unit
$I_{GT}^{(1)}$	$V_D = 12\text{ V}, R_L = 30\ \Omega$		I - II - III	MIN.	0.5	mA
			I - II - III	MAX.	10	mA
$V_{GT}$	$V_D = 12\text{ V}, R_L = 30\ \Omega$		All	MAX.	1.3	V
$V_{GD}$	$V_D = 800\text{ V}, R_L = 3.3\text{ k}\Omega, T_j = 125\text{ }^\circ\text{C}$		All	MIN.	0.2	V
$I_H^{(1)}$	$I_T = 500\text{ mA}$			MAX.	25	mA
$I_L$	$I_G = 1.2 I_{GT}$		I - III	MAX.	20	mA
			II		30	
$dV/dt^{(1)}$	$V_D = 67\% \times 800\text{ V gate open}$	$T_j = 125\text{ }^\circ\text{C}$		MIN.	100	V/ $\mu\text{s}$
	$V_D = 67\% \times 600\text{ V gate open}$	$T_j = 150\text{ }^\circ\text{C}$			50	
$(dI/dt)_c^{(1)}$	$(dV/dt)_c = 0.1\text{ V}/\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$		MIN.	9	A/ms
	$(dV/dt)_c = 10\text{ V}/\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$			3	
	$(dV/dt)_c = 0.1\text{ V}/\mu\text{s}$	$T_j = 150\text{ }^\circ\text{C}$			5.4	
	$(dV/dt)_c = 10\text{ V}/\mu\text{s}$	$T_j = 150\text{ }^\circ\text{C}$			1.8	
$t_{GT}$	gate controlled turn on time $I_{TM} = 13\text{ A}, V_D = 400\text{ V}, I_G = 100\text{ mA}, dI_G/dt = 100\text{ mA}/\mu\text{s}, R_L = 30\ \Omega$		I - II - III	TYP.	2	$\mu\text{s}$

1. For both polarities of A2 referenced to A1

**Table 4. Static characteristics**

Symbol	Test conditions			Value	Unit
$V_{TM}^{(1)}$	$I_{TM} = 22.6\text{ A}, t_p = 380\ \mu\text{s}$	$T_j = 25\text{ }^\circ\text{C}$	MAX.	1.55	V
$V_{to}^{(1)}$	Threshold voltage	$T_j = 150\text{ }^\circ\text{C}$	MAX.	0.85	V
$R_d^{(1)}$	Dynamic resistance	$T_j = 150\text{ }^\circ\text{C}$	MAX.	30	$\text{m}\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM} = 800\text{ V}$	$T_j = 25\text{ }^\circ\text{C}$	MAX.	5	$\mu\text{A}$
		$T_j = 125\text{ }^\circ\text{C}$		1	mA
	$V_{DRM} = V_{RRM} = 600\text{ V}$	$T_j = 150\text{ }^\circ\text{C}$		3.6	

1. for both polarities of A2 referenced to A1

**Table 5. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	2.1	$^\circ\text{C}/\text{W}$
$R_{th(j-a)}$	Junction to ambient	60	$^\circ\text{C}/\text{W}$

Figure 1. Maximum power dissipation versus on-state rms current (full cycle)

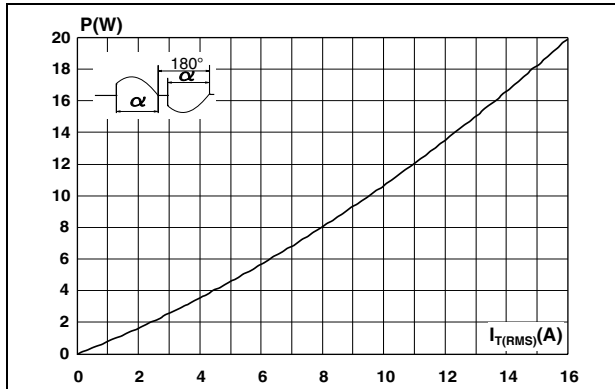


Figure 2. On-state rms current versus case temperature (full cycle)

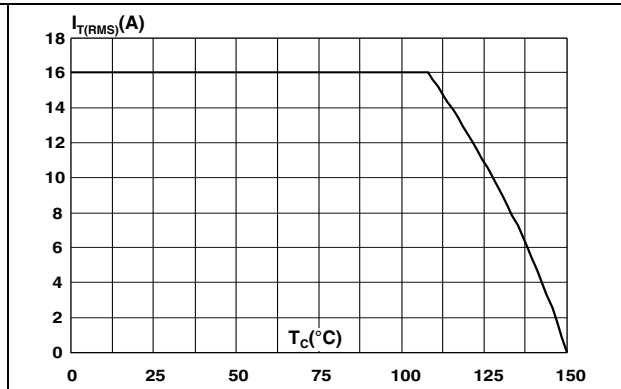


Figure 3. On-state rms current versus ambient temperature (free air convection)

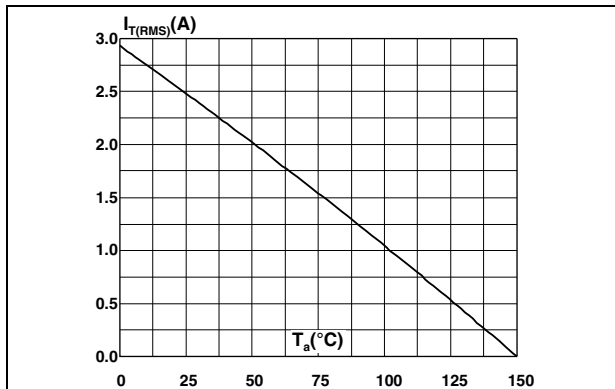


Figure 4. Relative variation of thermal impedance versus pulse duration

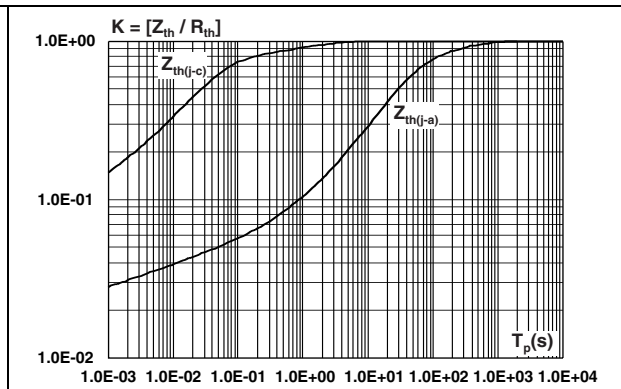


Figure 5. On-state characteristics (maximum values)

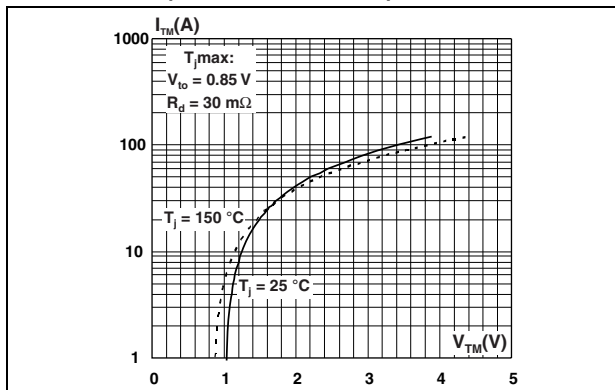


Figure 6. Surge peak on-state current versus number of cycles

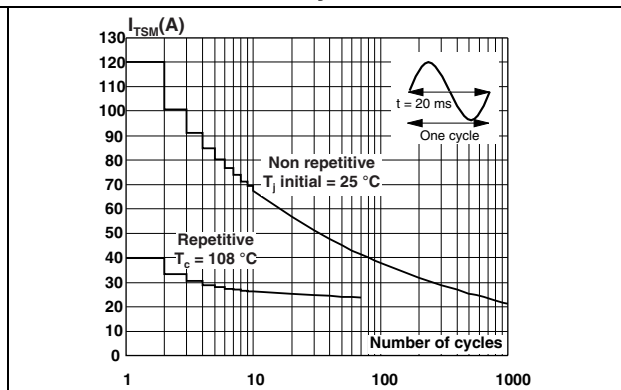


Figure 7. Non repetitive surge peak on-state current and corresponding values of  $I^2t$

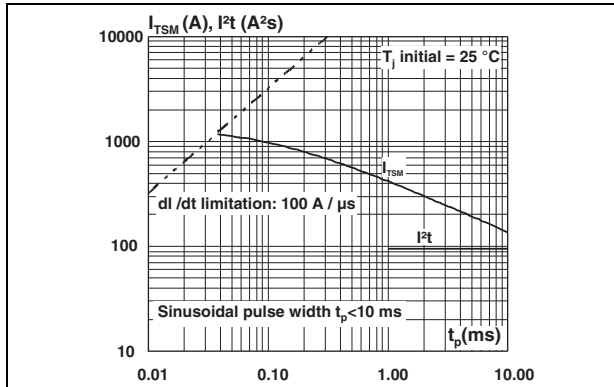


Figure 8. Relative variation of gate trigger current versus junction temperature (typical values)

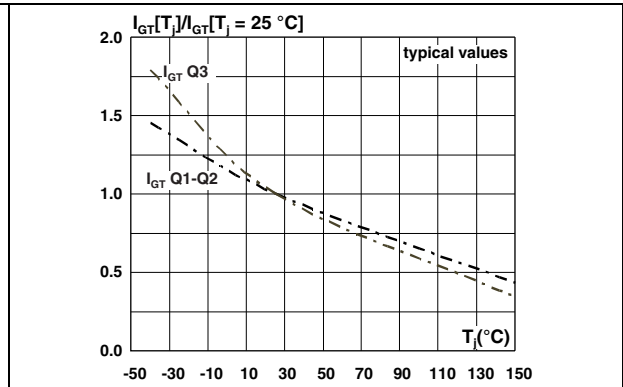


Figure 9. Relative variation of gate trigger voltage versus junction temperature (typical values)

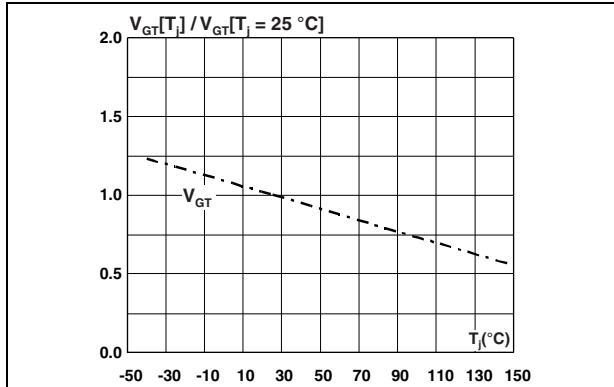


Figure 10. Relative variation of holding current and latching current versus junction temperature

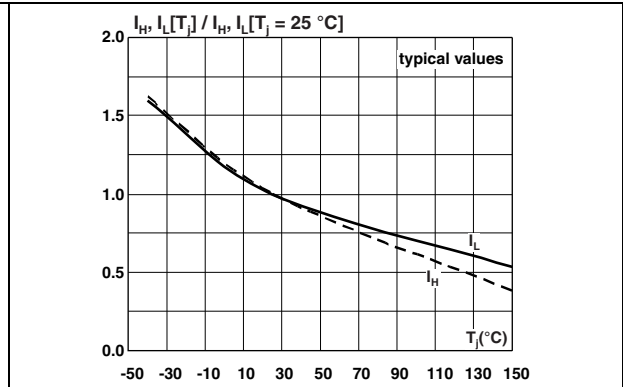


Figure 11. Relative variation of critical rate of decrease of current (dl/dt)<sub>c</sub> versus reapplied (dV/dt)<sub>c</sub>

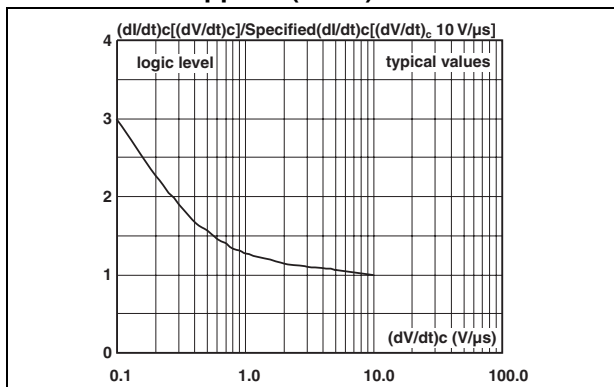


Figure 12. Relative variation of critical rate of decrease of current (dl/dt)<sub>c</sub> versus junction temperature

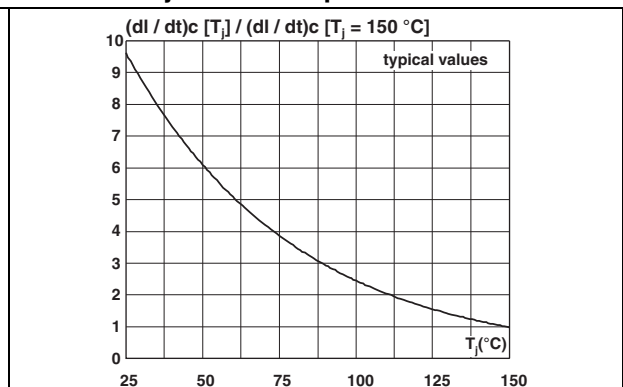


Figure 13. Relative variation of static dV/dt immunity versus junction temperature

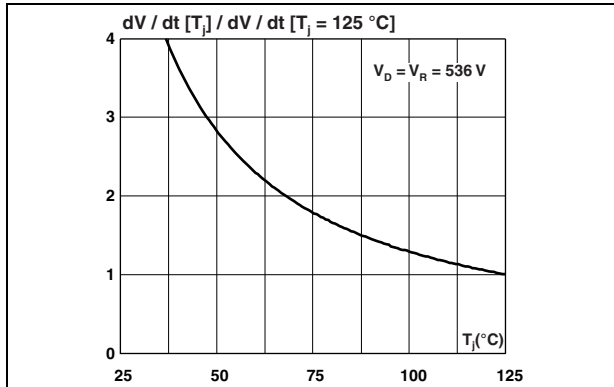


Figure 14. Relative variation of static dV/dt immunity versus junction temperature

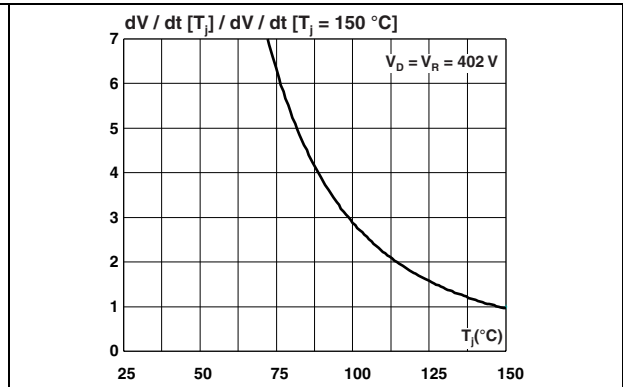
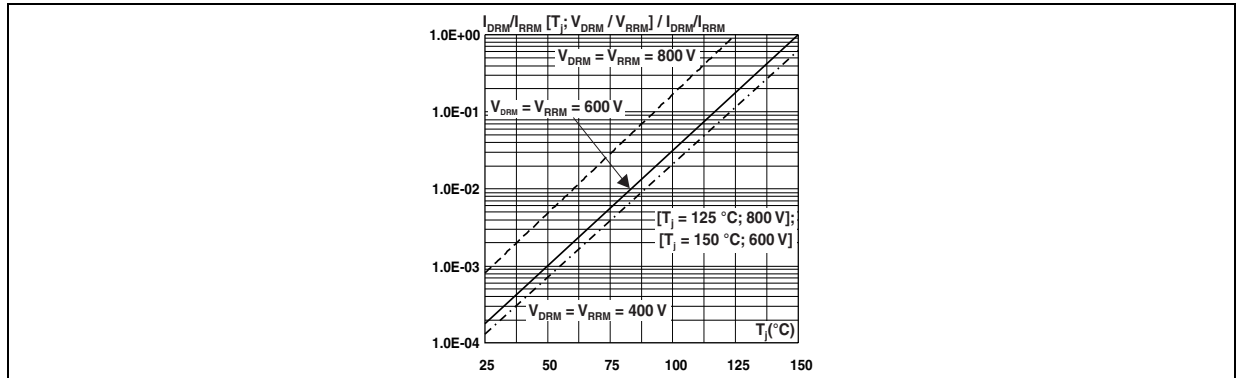


Figure 15. Relative variation of leakage current versus junction temperature for different values of blocking voltage



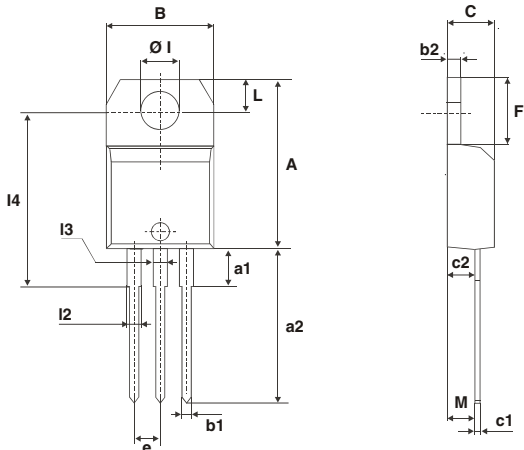
## 2 Package information

- Epoxy meets UL94, V0
- Recommended torque value: 0.4 to 0.6 N-m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

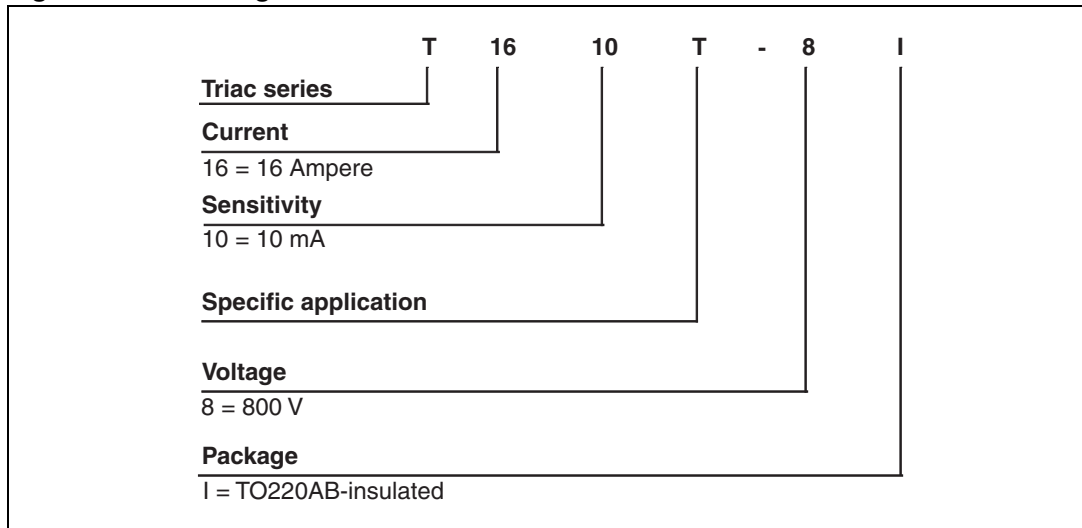
**Table 6. TO-220AB insulated dimensions**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
I3	1.14		1.70	0.044		0.066
M		2.60			0.102	



### 3 Ordering information scheme

Figure 16. Ordering information scheme





## 4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
T1610T-8I	T1610T-8I	TO-220AB insulated	2.3	50	Tube

## 5 Revision history

Table 8. Document revision history

Date	Revision	Changes
08-Aug-2011	1	First issue.
20-Jan-2012	2	Corrected subscripting error in <a href="#">Table 3</a> .
25-Apr-2012	3	Updated UL certification.