

### 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

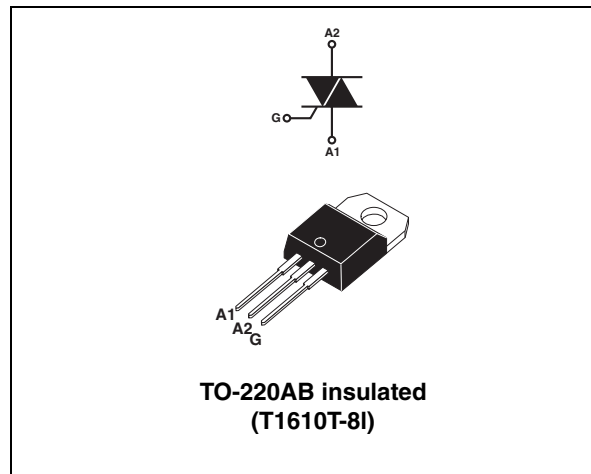
- General purpose AC line load switching
- Home appliances:
  - Fan
  - Pump
  - Solenoid
- Lighting
- Heaters
- Inrush current limiting circuits
- Overvoltage crowbar protection circuits

### 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 ( $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified)**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state rms current (full sine wave)		$T_c = 108\text{ }^\circ\text{C}$	16	A
			$T_c = 119\text{ }^\circ\text{C}$	12	
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ }^\circ\text{C}$ )	$F = 50\text{ Hz}$	$t = 20\text{ ms}$	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	$\text{A}^2\text{s}$
$V_{DRM}, V_{RRM}$	Repetitive peak off-state voltage, gate open		$T_j = 150\text{ }^\circ\text{C}$	600	V
			$T_j = 125\text{ }^\circ\text{C}$	800	
$V_{DSM}, V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$	$T_j = 25\text{ }^\circ\text{C}$	900	V
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$		$F = 100\text{ Hz}$	100	$\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current		$t_p = 20\text{ }\mu\text{s}$	4	A
$P_{G(AV)}$	Average gate power dissipation			1	W
$T_{stg}, T_j$	Storage junction temperature range			-40 to +150	$^\circ\text{C}$
	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	$^\circ\text{C}$
$V_{ins}(\text{rms})$	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)

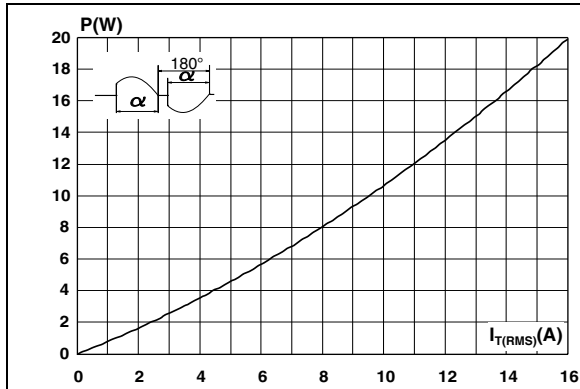


Figure 2. On-state rms current versus case temperature (full cycle)

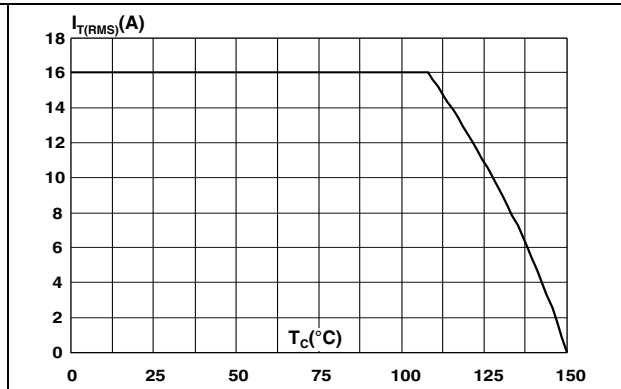


Figure 3. On-state rms current versus ambient temperature (free air convection)

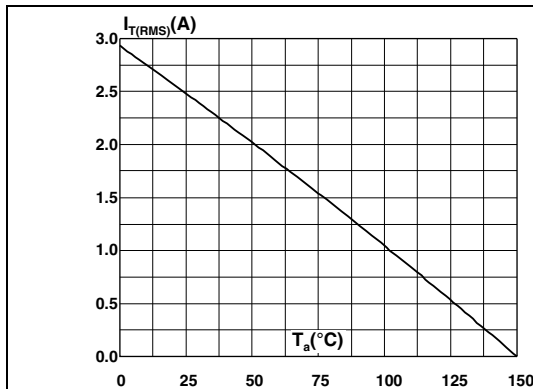


Figure 4. Relative variation of thermal impedance versus pulse duration

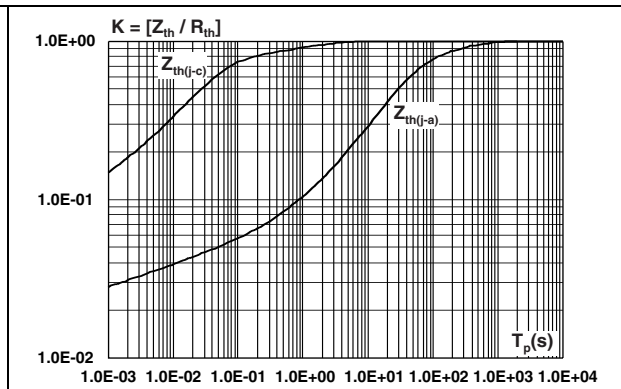


Figure 5. On-state characteristics (maximum values)

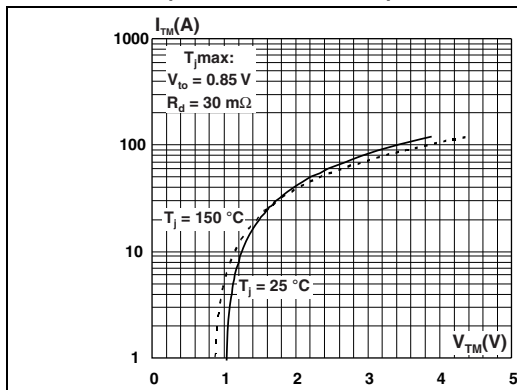
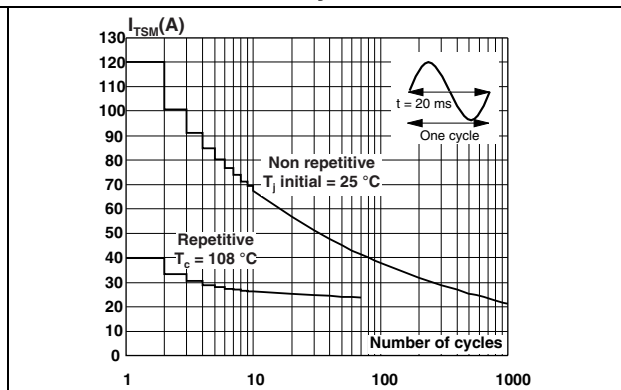
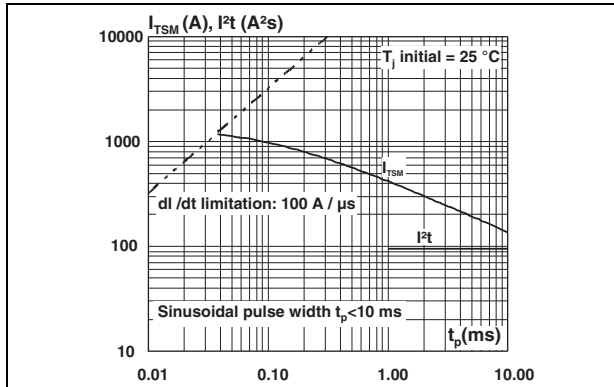


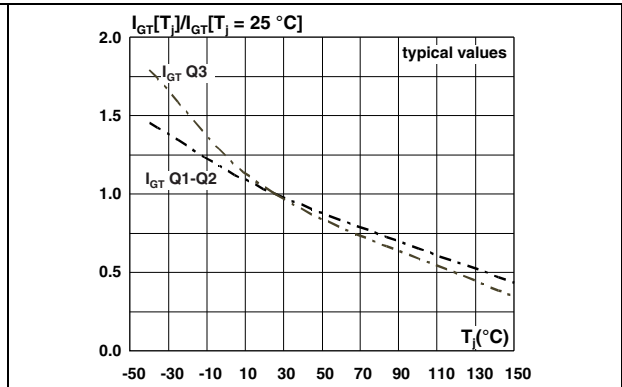
Figure 6. Surge peak on-state current versus number of cycles



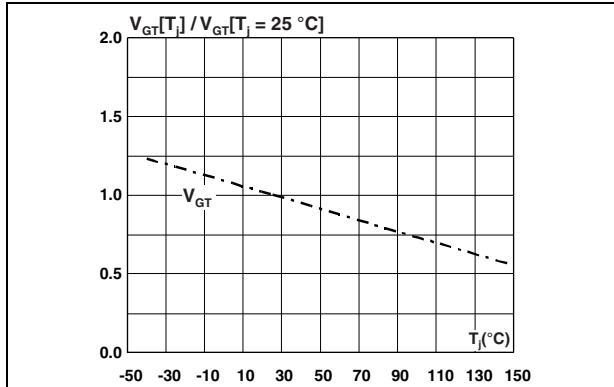
**Figure 7. Non repetitive surge peak on-state current and corresponding values of  $I^2t$**



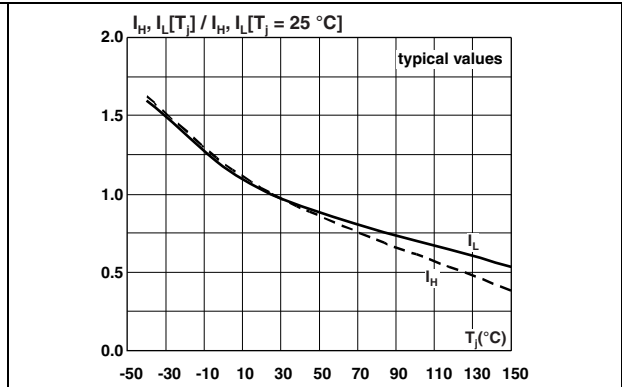
**Figure 8. Relative variation of gate trigger current versus junction temperature (typical values)**



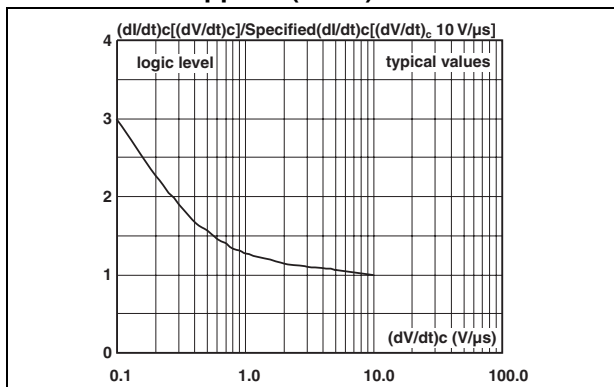
**Figure 9. Relative variation of gate trigger voltage versus junction temperature (typical values)**



**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**

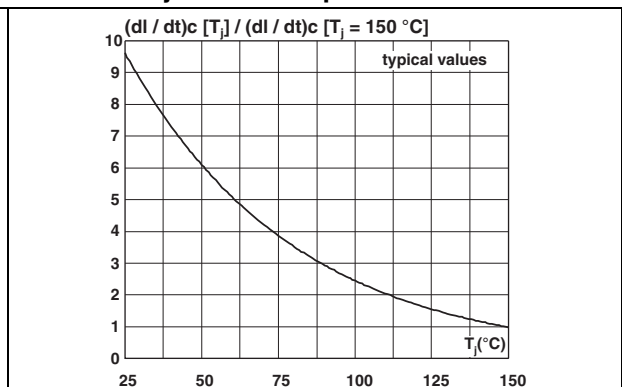


Figure 13. Relative variation of static dV/dt immunity versus junction temperature

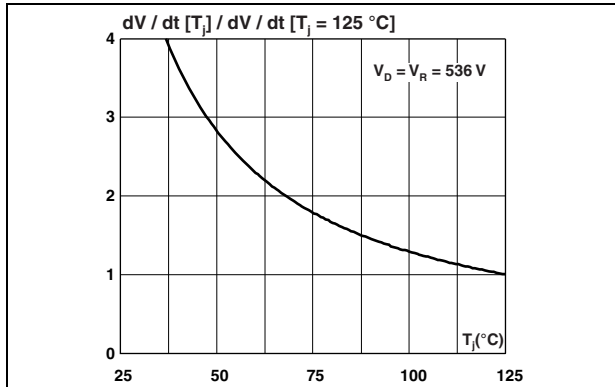


Figure 14. Relative variation of static dV/dt immunity versus junction temperature

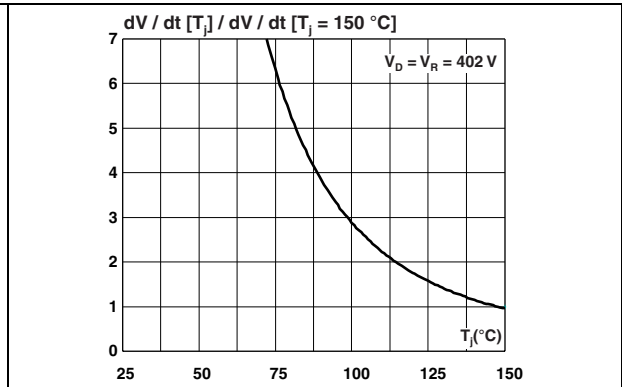
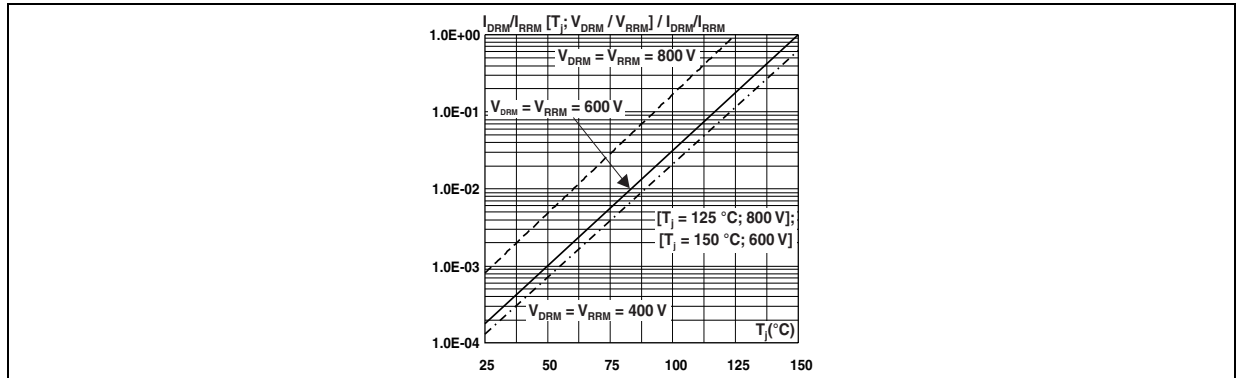


Figure 15. Relative variation of leakage current versus junction temperature for different values of blocking voltage



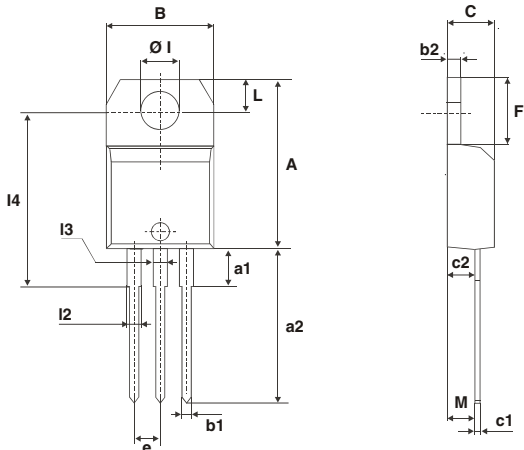
## 2 Package information

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

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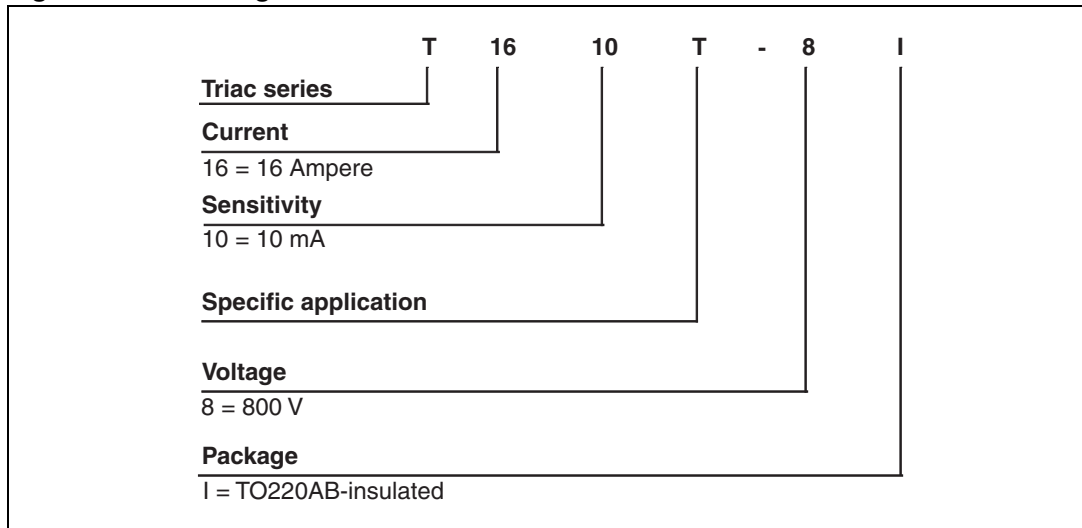
**Table 6. TO-220AB insulated dimensions**

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.

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