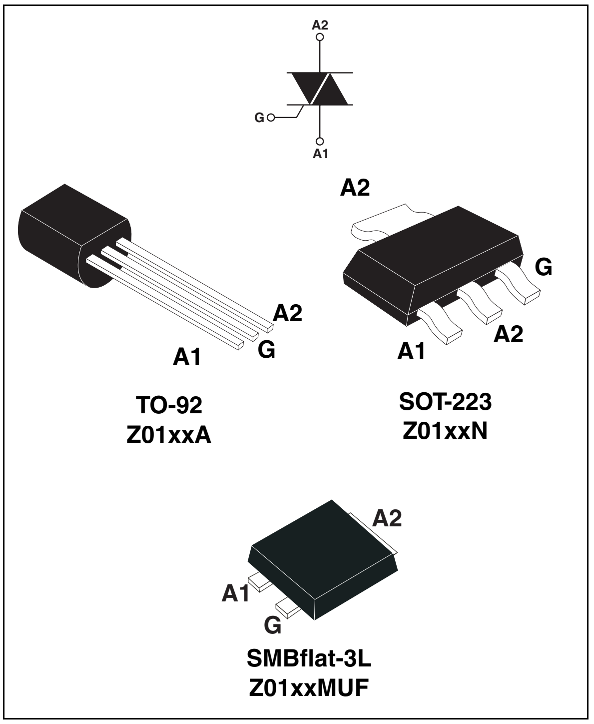
Z01

Standard 1A Triacs

Features

- On-state rms current, $I_{T(RMS)}$ 1 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 or 800 V
- Triggering gate current, $I_{GT\ (Q1)}$ 3 to 25 mA



Description

The Z01 series is suitable for general purpose AC switching applications. These devices are typically used in applications such as home appliances (electrovalve, pump, door lock, small lamp control), fan speed controllers,...

Different gate current sensitivities are available, allowing optimized performance when driven directly through microcontrollers.

1 Characteristics

Table 1. Absolute maximum ratings

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state rms current (full sine wave)	SOT-223	T_{tab} = 90 °C	1	A
		TO-92	T_L = 50 °C		
		SMBflat-3L	T_{tab} = 107 °C		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C)	F = 50 Hz	t = 20 ms	8	A
		F = 60 Hz	t = 16.7 ms	8.5	
I^2t	I^2t Value for fusing	t_p = 10 ms		0.35	A^2s
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100$ ns	F = 120 Hz	T_j = 125 °C	20	A/µs
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	1	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	1	W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C

Table 2. Electrical characteristics (T_j = 25 °C, unless otherwise specified)

Symbol	Test conditions	Quadrant		Z01 03	Z01 07	Z01 09	Z01 10	Unit
I_{GT} (1)	V_D = 12 V, R_L = 30 Ω	I - II - III	MAX.	3	5	10	25	mA
		IV		5	7	10	25	
V_{GT}		ALL	MAX.	1.3				V
V_{GD}	$V_D = V_{DRM}$, R_L = 3.3 kΩ, T_j = 125 °C	ALL	MIN.	0.2				V
I_H (2)	I_T = 50 mA		MAX.	7	10	10	25	mA
I_L	$I_G = 1.2\ I_{GT}$	I - III - IV	MAX.	7	10	15	25	mA
		II		15	20	25	50	
dV/dt (2)	V_D = 67% V_{DRM} gate open T_j = 110 °C		MIN.	10	20	50	100	V/µs
$(dV/dt)_c$ (2)	$(dI/dt)_c$ = 0.44 A/ms, T_j = 110 °C		MIN.	0.5	1	2	5	V/µs

1. Minimum I_{GT} is guaranteed at 5% of I_{GT} max.
2. For both polarities of A2 referenced to A1.

Table 3. Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM} (1)	I_{TM} = 1.4 A, t_p = 380 µs	T_j = 25 °C	MAX.	1.6	V
V_{to} (1)	Threshold voltage	T_j = 125 °C	MAX.	0.95	V
R_d (1)	Dynamic resistance	T_j = 125 °C	MAX.	400	mΩ
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$	T_j = 25 °C	MAX.	5	µA
		T_j = 125 °C		0.5	mA

1. For both polarities of A2 referenced to A1.

Table 4. Thermal resistances

Symbol	Parameter				Value	Unit
$R_{th(j-t)}$	Junction to tab (AC)		SOT-223	MAX.	25	°C/W
$R_{th(j-t)}$	Junction to tab (AC)		SMBflat-3L		14	
$R_{th(j-l)}$	Junction to lead (AC)		TO-92		60	
$R_{th(j-a)}$	Junction to ambient	$S^{(1)}$ = 5 cm^2	SOT-223		60	
			SMBflat-3L		75	
			TO-92		150	

1. S = copper surface under tab.

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

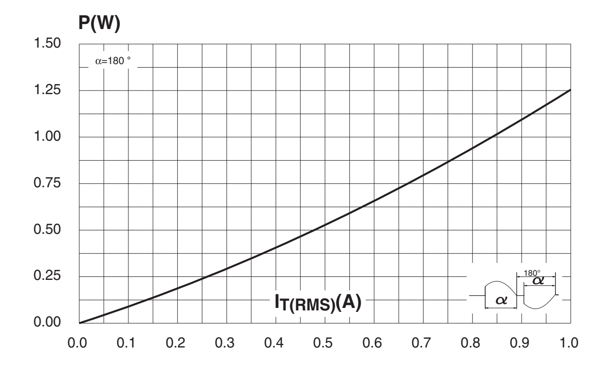


Figure 2. On-state rms current versus lead (TO-92) or tab (SOT-223, SMBflat-3L) temperature (full cycle)

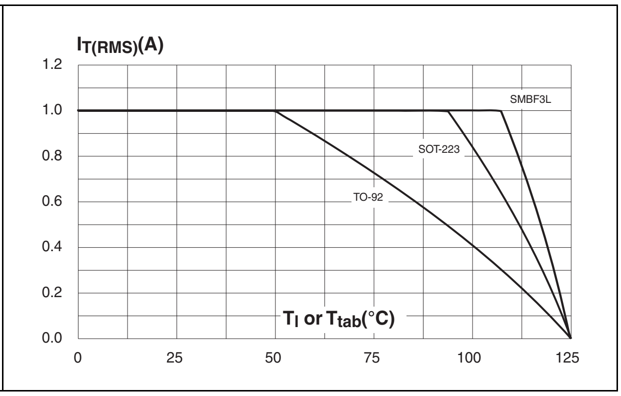


Figure 3. On-state rms current versus ambient temperature (free air convection full cycle)

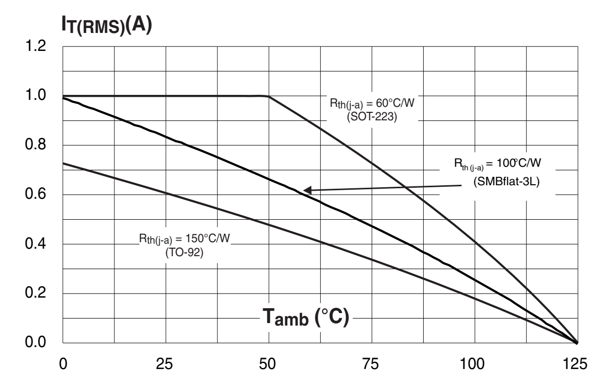


Figure 4. Relative variation of thermal impedance versus pulse duration ($Z_{th(j-a)}$)

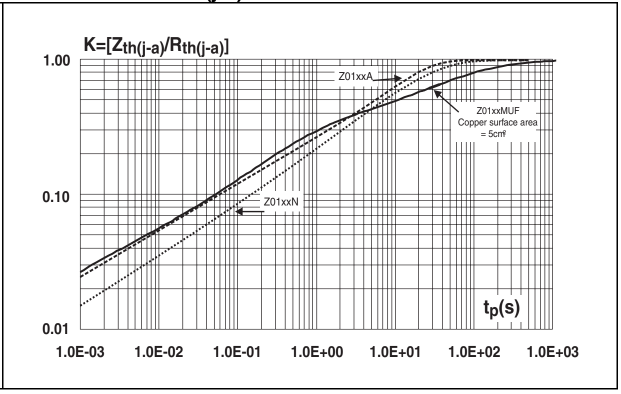


Figure 5. Relative variation of holding current and latching current versus junction temperature (typ. values)

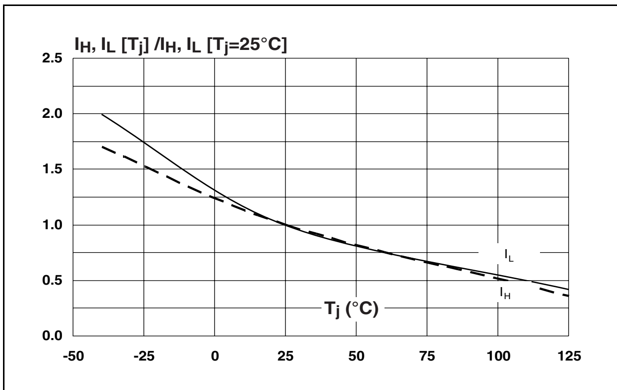


Figure 6. Relative variation of gate trigger current (I_{GT}) and voltage (V_{GT}) versus junction temperature

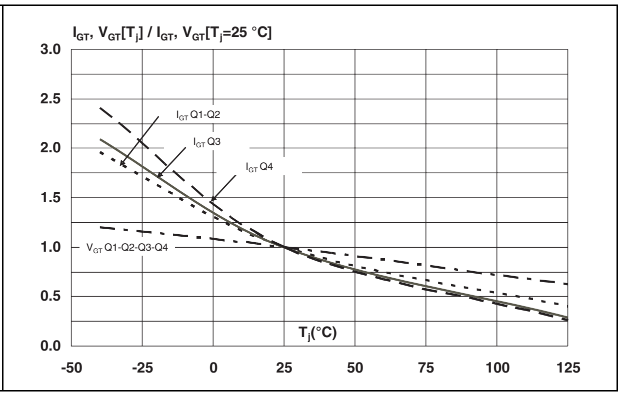


Figure 7. Surge peak on-state current versus number of cycles

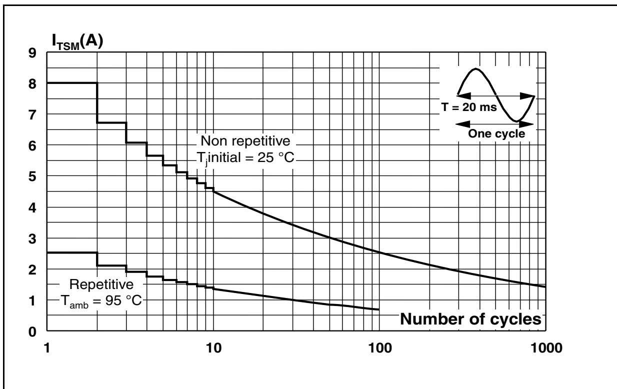


Figure 8. Non-repetitive surge peak on-state current and corresponding value of I^2t sinusoidal pulse width

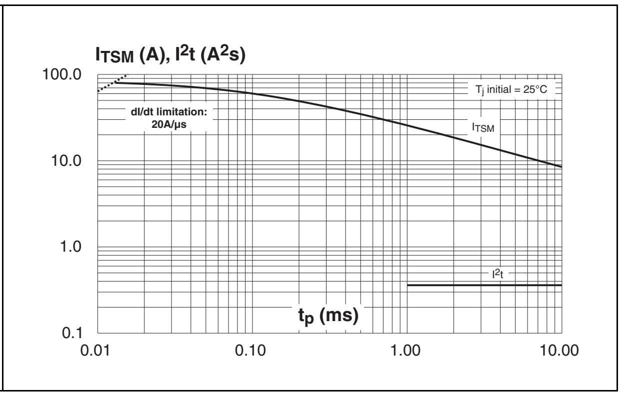


Figure 9. On-state characteristics (maximum values) ($I_{TM} = f(V_{TM})$)

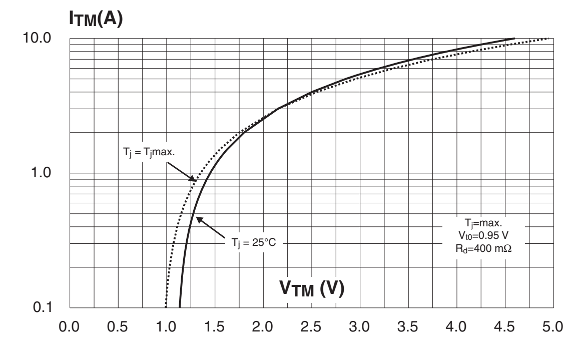


Figure 10. Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$

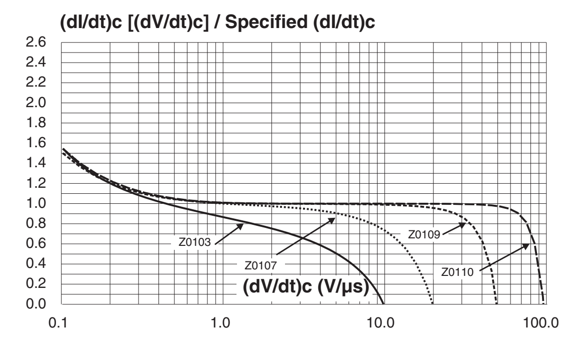


Figure 11. Relative variation of critical rate of decrease of main current (dI/dt) versus junction temperature

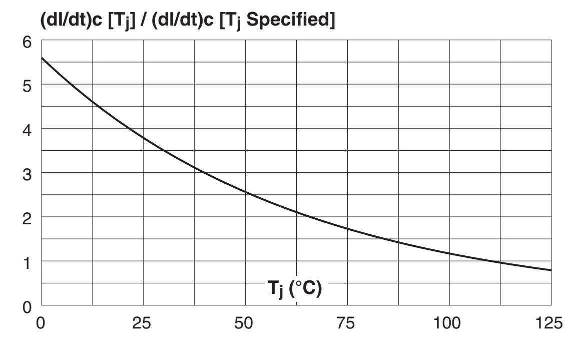


Figure 12. SOT-223 and SMBflat-3L thermal resistance junction to ambient versus copper surface under case

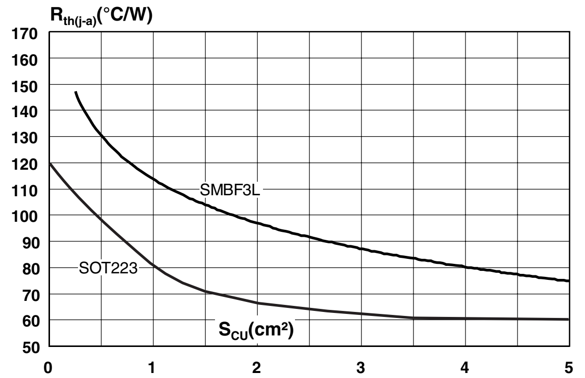
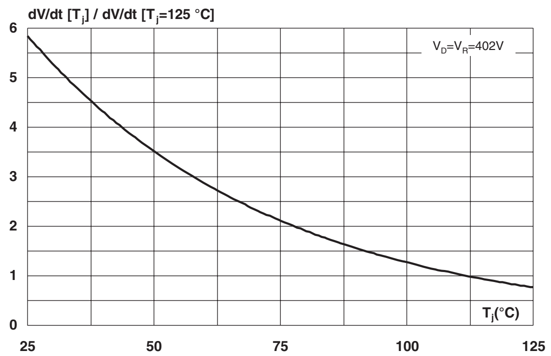


Figure 13. Relative variation of static dV/dt immunity versus junction temperature (gate open)



2 Ordering information scheme

Figure 14. Ordering information scheme

Z 01 03 M A [BLANK] 1AA2

Triac series

Current
01 = 1 A

Sensitivity
03 = 3 mA
07 = 5 mA
09 = 10 mA
10 = 25 mA

Voltage
M = 600 V
N = 800 V

Package
A = TO-92
N = SOT-223
UF = SMBF3L

Packing mode
1AA2 = TO-92 bulk
2AL2 = TO-92 ammopack
5AL2 = TO-92 tape and reel
5AA4 = SOT-223 tape and reel 7”
6AA4 = SOT-223 tape and reel 13”
Blank = SMBflat-3L tape and reel 13”

Table 5. **Product Selector**

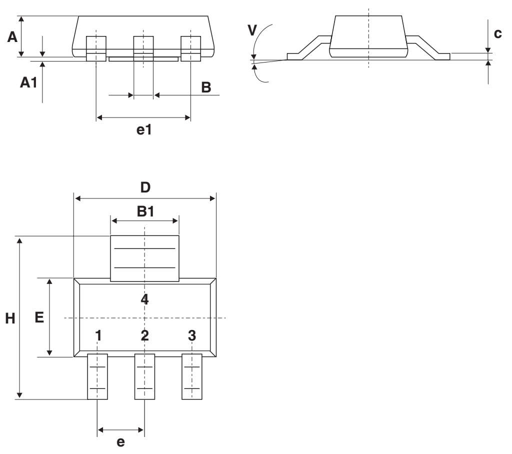
Order code	Voltage		Sensitivity	Type	Package
	600 V	800 V			
Z0103MA	X		3 mA	Standard	TO-92
Z0103MN	X		3 mA	Standard	SOT-223
Z0103NA		X	3 mA	Standard	TO-92
Z0103NN		X	3 mA	Standard	SOT-223
Z0107MA	X		5 mA	Standard	TO-92
Z0107MN	X		5 mA	Standard	SOT-223
Z0107NA		X	5 mA	Standard	TO-92
Z0107NN		X	5 mA	Standard	SOT-223
Z0109MA	X		10 mA	Standard	TO-92
Z0109MN	X		10 mA	Standard	SOT-223
Z0109NA		X	10 mA	Standard	TO-92
Z0109NN		X	10 mA	Standard	SOT-223
Z0110MA	X		25 mA	Standard	TO-92
Z0110MN	X		25 mA	Standard	SOT-223
Z0110NA		X	25 mA	Standard	TO-92
Z0110NN		X	25 mA	Standard	SOT-223
Z0103MUF	X		3 mA	Standard	SMBflat-3L
Z0107MUF	X		5 mA	Standard	SMBflat-3L
Z0109MUF	X		10 mA	Standard	SMBflat-3L

3 Packaging information

- Epoxy meets UL94, V0
- Lead-free packages

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. ECOPACK® is an ST trademark.

Table 6. SOT-223 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.80			0.071
A1		0.02	0.10		0.001	0.004
B	0.60	0.70	0.85	0.024	0.027	0.033
B1	2.90	3.00	3.15	0.114	0.118	0.124
c	0.24	0.26	0.35	0.009	0.010	0.014
D(1)	6.30	6.50	6.70	0.248	0.256	0.264
e		2.3			0.090	
e1		4.6			0.181	
E(1)	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V	10° max					

1. Do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (0.006inches)

Figure 15. SOT-223 footprint dimensions (in millimeters)

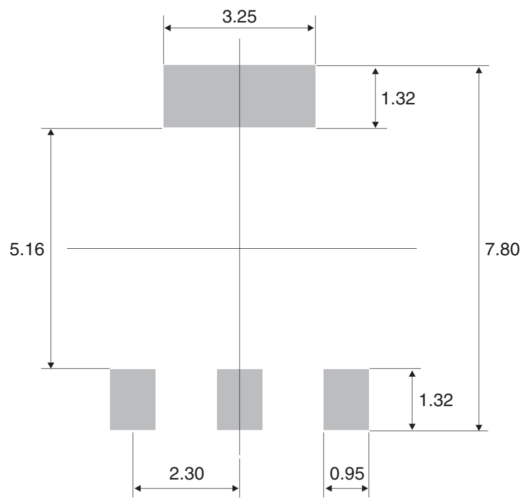
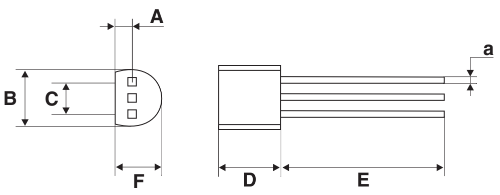
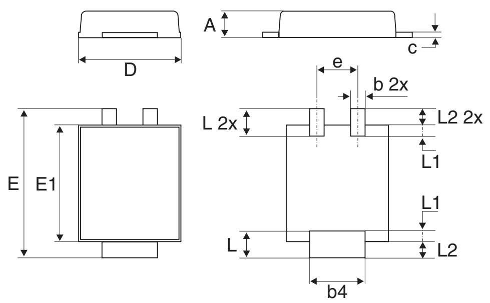


Table 7. TO-92 dimensions



REF.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		1.35			0.053	
B			4.70			0.185
C		2.54			0.100	
D	4.40			0.173		
E	12.70			0.500		
F			3.70			0.146
a			0.50			0.019

Table 8. SMBflat-3L dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
b	0.35		0.65	0.014		0.026
b4	1.95		2.20	0.07		0.087
c	0.15		0.40	0.006		0.016
D	3.30		3.95	0.130		0.156
E	5.10		5.60	0.201		0.220
E1	4.05		4.60	0.156		0.181
L	0.75		1.50	0.030		0.059
L1		0.40			0.016	
L2		0.60			0.024	
e		1.60			0.063	

Figure 16. SMBflat-3L footprint dimensions

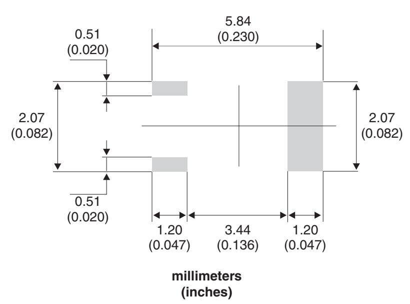
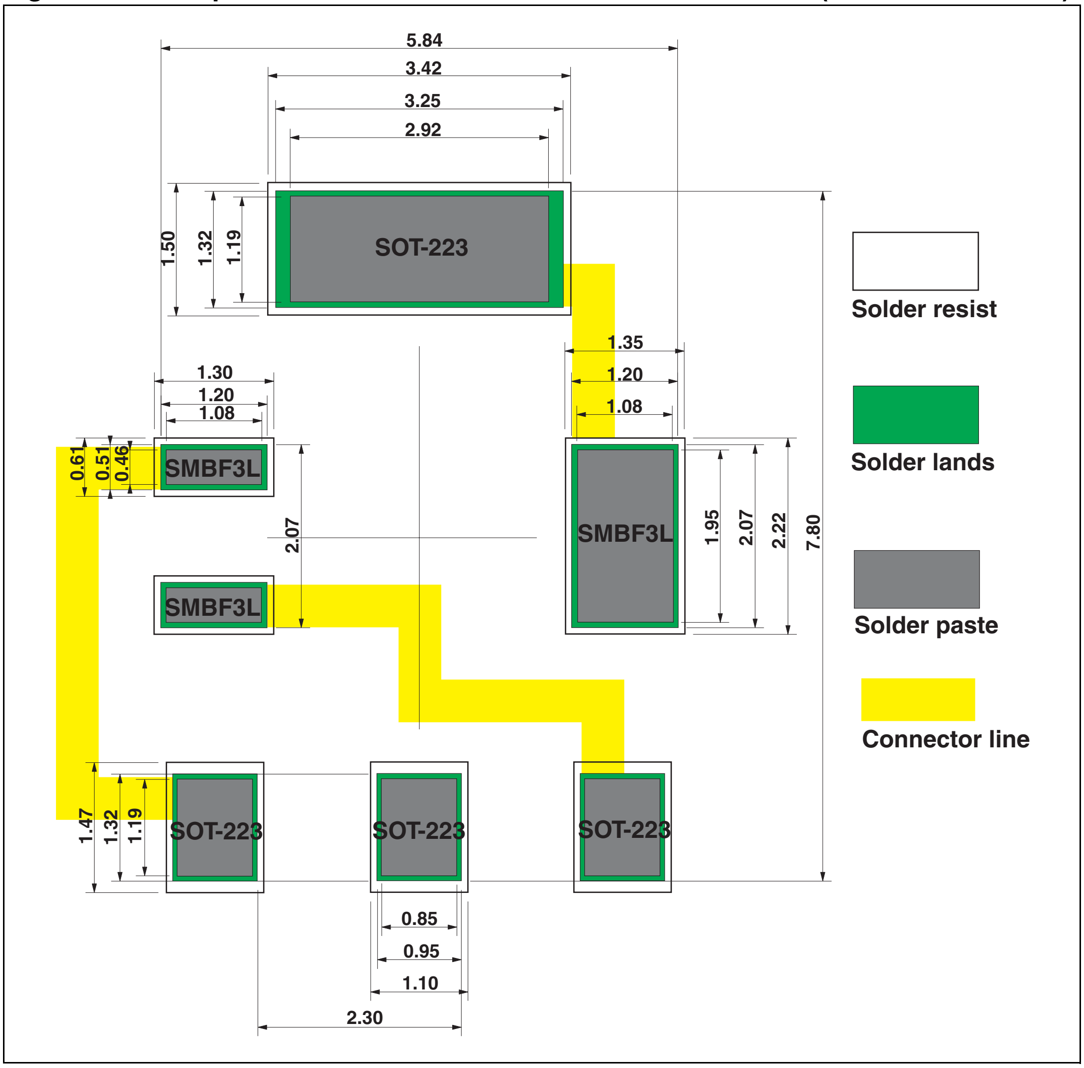


Figure 17. Footprint and connectors for SOT-223 or SMBflat-3L (dimensions in mm)



4 Ordering information

Table 9. Ordering information

Order code(1)	Marking(1)	Package	Weight	Base quantity	Delivery mode
Z01xxyA 1AA2	Z01xxyA	TO-92	0.2 g	2500	Bulk
Z01xxyA 2AL2	Z01xxyA	TO-92	0.2 g	2000	Ammopack
Z01xxyA 5AL2	Z01xxyA	TO-92	0.2 g	2000	Tape and reel
Z0103yN 5AA4	Z3y	SOT-223	0.12 g	1000	Tape and reel
Z0107yN 5AA4	Z7y	SOT-223	0.12 g	1000	Tape and reel
Z0109yN 5AA4	Z9y	SOT-223	0.12 g	1000	Tape and reel
Z0103MUF	Z3M	SMBflat-3L	46.78 mg	5000	Tape and reel
Z0107MUF	Z7M	SMBflat-3L	46.78 mg	5000	Tape and reel
Z0109MUF	Z9M	SMBflat-3L	46.78 mg	5000	Tape and reel

1. xx = sensitivity, y = voltage

5 Revision history

Table 10. Document revision history

Date	Revision	Changes
Oct-2001	4	Last update.
10-Feb-2005	5	Package: TO-92 tape and reel delivery mode 5AL2 added.
09-May-2005	6	Table 4 on page 2: typo. mistake corrected 1. (dV/dt)c instead of (dI/dt)c 2. V/µs unit instead of A/ms
21-Apr-2006	7	Reformatted to current standard. Table 2 on page 2: Typo corrected. Values for I_{GT} split into two separate rows.
10-Oct-2006	8	Table 2: modified test conditions for $(dV/dt)_c$. Changed “ambient” to “lead or tab” in Figure 2.
20-Oct-2010	9	Package: SOT-223 13” tape and reel added = 6AA4
14-Dec-2010	10	Added package SMBflat-3L. Updated dimensions in *Table 6*. Updated *Figure 3* and *Figure 12*. Updated *Table 5: Product Selector*.

Please Read Carefully: