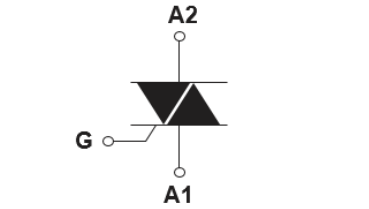
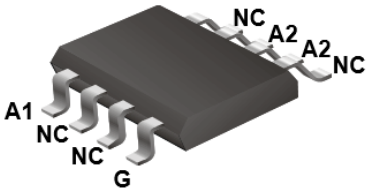
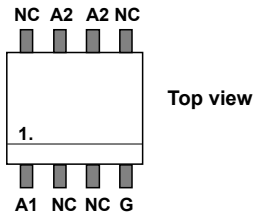
1 A, 10 mA, 4-triggering quadrant Triac in SO-8





SO-8

NC = Not connected



Top view

Product status link
Z0109M1

Product summary	
$I_{T(RMS)}$	1 A
V_{DRM}/V_{RRM}	600 V
V_{DSM}/V_{RSM}	700 V
I_{GT}	10 mA

Features

- Low current Triac, $I_{T(RMS)}$ = 1 A
- Logic level 4-triggering quadrants
- SMD package with 4.9 x 6 mm^2 total size
- 4 mm A1-A2 creepage distance compatible with IEC 60664-1 pollution degree 3 at 250 V, overvoltage category 2, material group 3a and 3b
- ECOPACK2 compliant component
- Dual footprint compatible with SO-8 and SOT-223

Applications

- General purpose AC line load switching
- Actuator AC drive circuit such as electro-valve, dispenser, pump, fan
- LED / lamps control
- High voltage solenoid drive circuit such as breaker interrupter and relay
- Major and small home appliances
- Home and industrial automation systems

Description

The Z0109M1 Triac, housed in SO-8 surface mount package, enables compact power control designs compatible with automated assembly lines.

This device achieves an on/off and phase angle control where low triggering energy is required.

It can be controlled directly from a microcontroller and is able to drive resistive or inductive low current AC loads.

Table 1. Table pin name

Symbol	Type	Description	Pin
G	Drive	Gate	4
A1	Power	Anode1	1
A2	Power	Anode2	6, 7
NC		Not connected	2,3,5,8

1 Characteristics

Table 2. Absolute maximum ratings (limiting values, T_j = 25 °C unless otherwise stated)

Symbol	Parameters			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	SO-8	T_{LEAD} = 90 °C	1	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C)	f = 50 Hz	t_p = 20 ms	8	A
		f = 60 Hz	t_p = 16.7 ms	8.5	
I^2t	I^2t value for fusing	t_p = 10 ms		0.35	A^2s
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage		T_j = 125 °C	600	V
V_{DSM}/V_{RSM}	Non Repetitive peak off-state voltage	t_p = 10 ms	T_j = 25 °C	700	V
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT} , $t_r \leq$ 100 ns	f = 120 Hz	T_j = 25 °C	50	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	0.1	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +125	°C

Table 3. Electrical characteristics (T_j = 25 °C, unless otherwise specified)

Symbol	Parameters	Quadrant		Value	Unit
I_{GT}(1)	V_D = 12 V, R_L = 30 Ω	I - II - III - IV	Max.	10	mA
V_{GT}			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.	10	mA
I_L	I_G = 1.2 I_{GT}	I - III - IV	Max.	15	mA
		II	Max.	25	
dV/dt(2)	V_D = 67 % V_{DRM} gate open, T_j = 110 °C		Min.	50	V/µs
(dV/dt)c(2)	(dI/dt)c = 0.44 A/ms, T_j = 110 °C		Min.	2	V/µs

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

Table 4. Static electrical characteristics

Symbol	Test conditions	T_j		Value	Unit
V_T(1)	I_{TM} = 1.4 A, t_p = 380 µs	25 °C	Max.	1.60	V
V_{TO}(1)	Threshold on-state voltage	125 °C	Max.	0.95	V
R_d(1)	Dynamic resistance	125 °C	Max.	0.43	Ω
I_{DRM}	V_D = V_R = V_{DRM} = V_{RRM}	25 °C	Max.	5	µA
I_{RRM}		125 °C		0.5	mA

1. *For both polarities of A2 referenced to A1*

Table 5. Thermal resistance

Symbol	Parameters		Value	Unit
$R_{th(j-l)}$	Junction to lead (AC), leads #6 and #7		19	°C/W
$R_{th(j-a)}$	Junction to ambient	Scu = 1 cm²	140	
		Scu = minimum footprint	190	

1.1 Characteristics (curves)

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

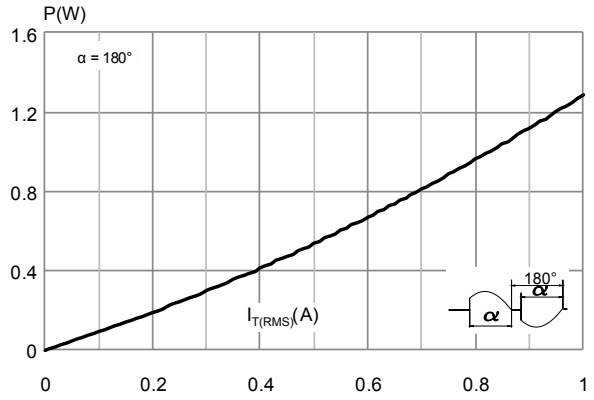


Figure 2. On-state RMS current versus lead pin# 6 and 7 temperature (full cycle)

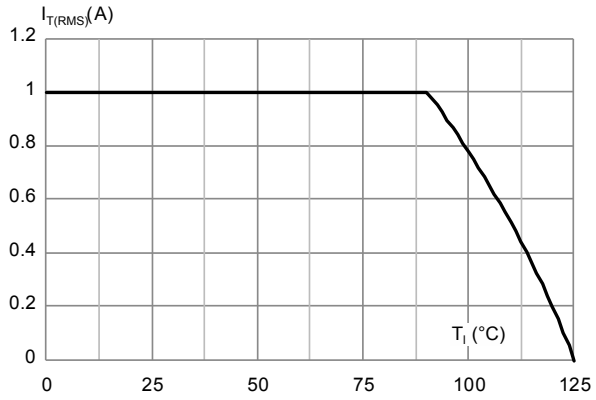


Figure 3. On-state RMS current versus ambient temperature (free air convection, full cycle)

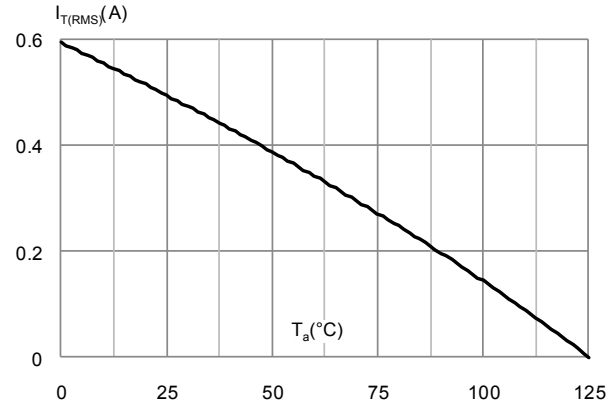


Figure 4. Relative variation of thermal impedance versus pulse duration

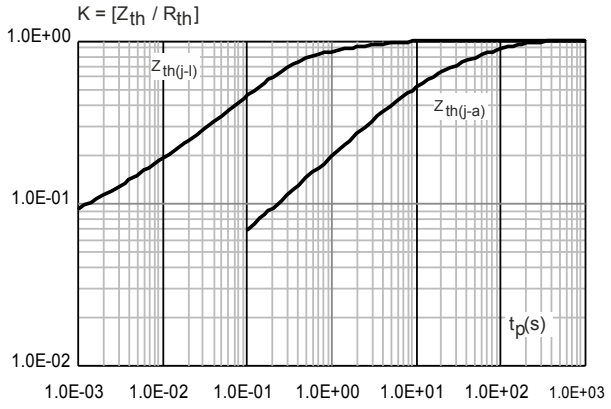


Figure 5. Surge peak on-state current versus number of cycles

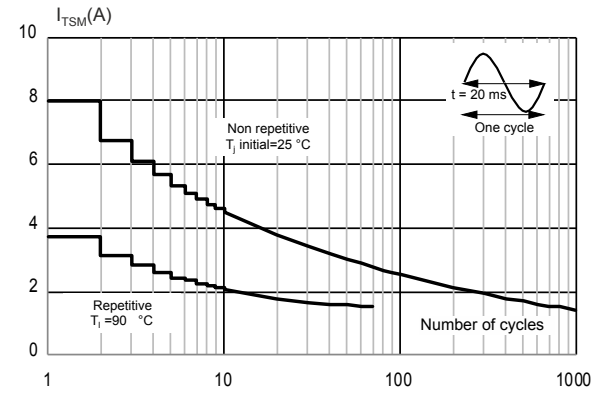


Figure 6. Non-repetitive surge peak on-state current for sinuzoidal pulse with width t_P < 10 ms

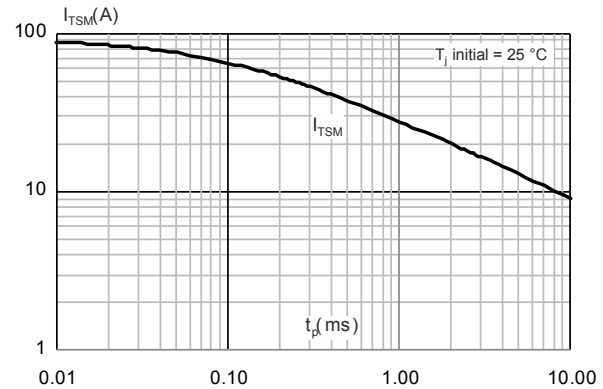


Figure 7. On-state characteristics (maximum values)

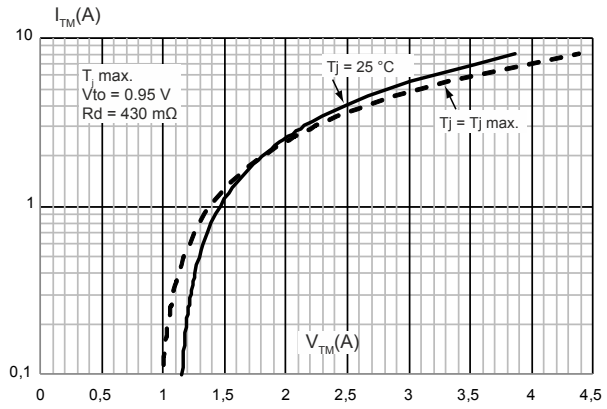


Figure 8. Relative variation of holding current and latching current versus junction temperature (typical values)

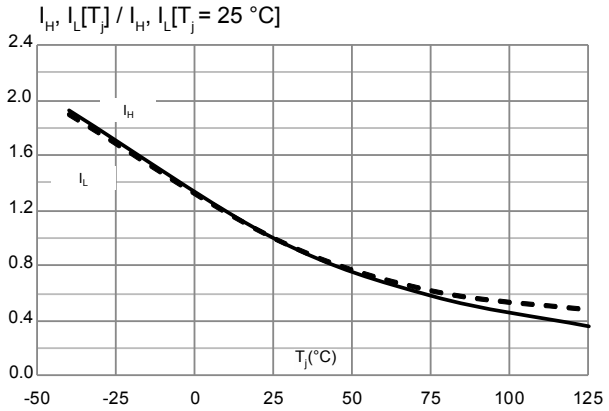


Figure 9. Relative variation of gate trigger current (I_{GT}) and voltage (V_{GT}) versus junction temperature (typical values)

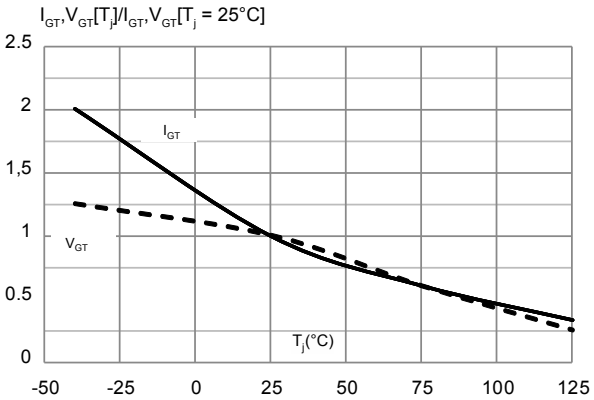


Figure 10. Relative variation of critical rate of decrease of main current (dI/dt)c versus reapplied (dV/dt)c

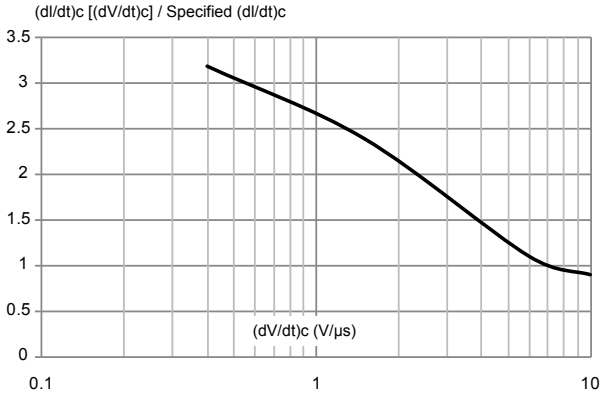


Figure 11. Relative variation of static dV/dt immunity versus junction temperature (typical values)

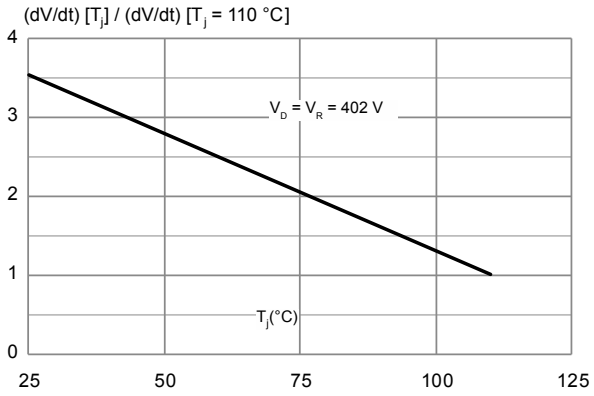


Figure 12. Relative variation of critical rate of decrease of main current (dI/dt)c versus junction temperature

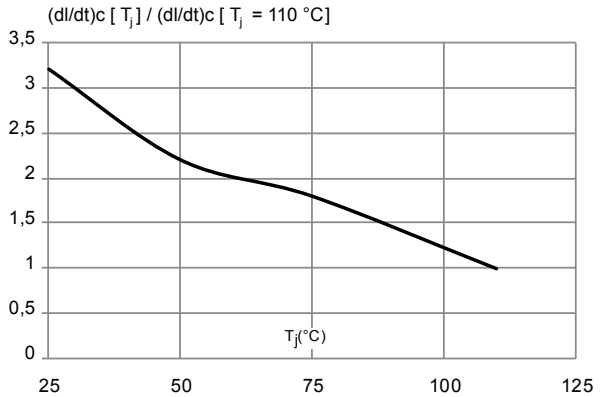


Figure 13. Relative variation of leakage current versus junction temperature

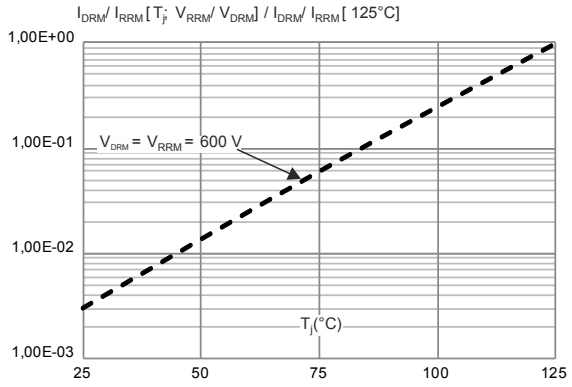
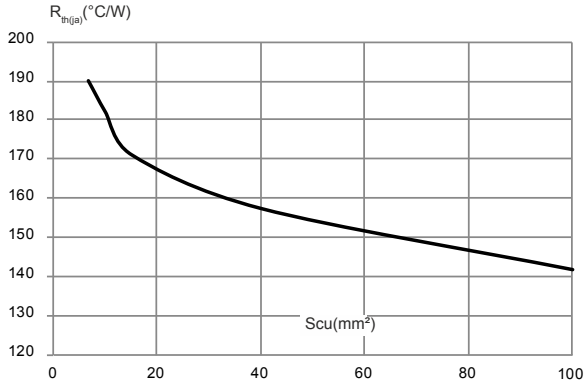


Figure 14. SO-8 Thermal resistance junction to ambient versus copper surface under pin 6 and 7



2 Package information

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.

2.1 SO-8 package information

Figure 15. SO8 package outline

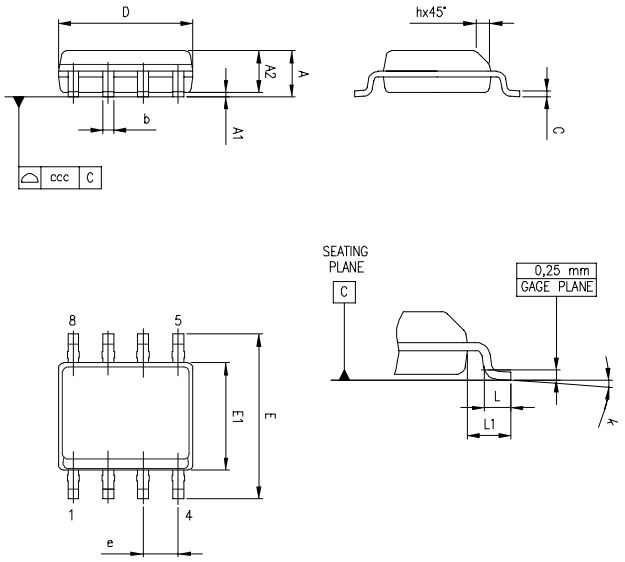


Table 6. SO-8 mechanical data

Symbol	Milimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.0680
A1	0.10		0.25	0.0030		0.0090
A2	1.25			0.0490		
b	0.28		0.48	0.0110		0.0180
c	0.17		0.23	0.0060		0.0090
D	4.80	4.90	5.00	0.1890	0.1920	0.1960
E	5.80	6.00	6.20	0.2280	0.2360	0.2440
E1	3.80	3.90	4.00	0.1490	0.1530	0.1570
e		1.27			0.0500	
h	0.25		0.50	0.0090		0.0190
L	0.40		1.27	0.0150		0.0500
L1		1.04			0.0400	
k	0°		8°	0°		8°
ccc			0.10			0.004

1. *Values in inches are converted from mm and rounded to 4 decimal digits.*

Figure 16. **Recommended SO-8 Triac footprint in mm**

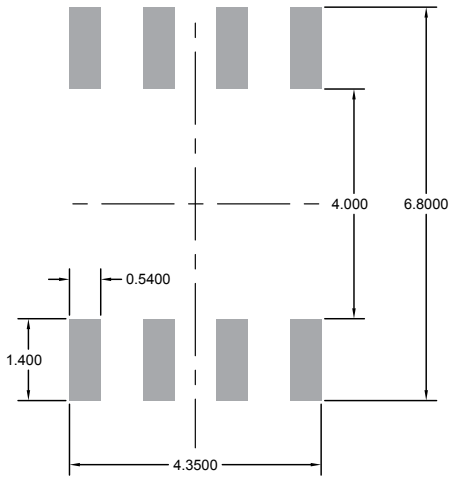
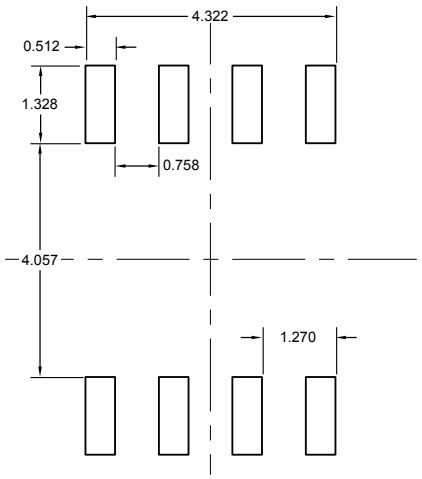


Table 7. **Product pin assignment**

Pin #	1	2	3	4	5	6	7	8
Assignment	A1	NC	NC	G	NC	A2	A2	NC
NC = Not connected								

Figure 17. **SO-8 stencil definitions (dimensions are in mm)**



3 Application recommendation

By using the following dual footprint your design will be compatible with both SO-8 and SOT-223 packages.

Figure 18. Recommended dual footprint in mm

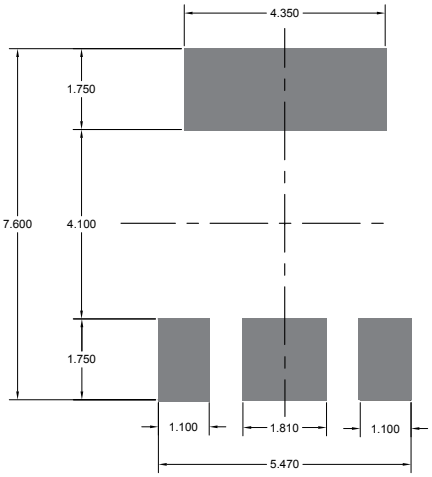


Figure 19. Recommended dual footprint in mm for compatibility with SO-8 and SOT-223 packages

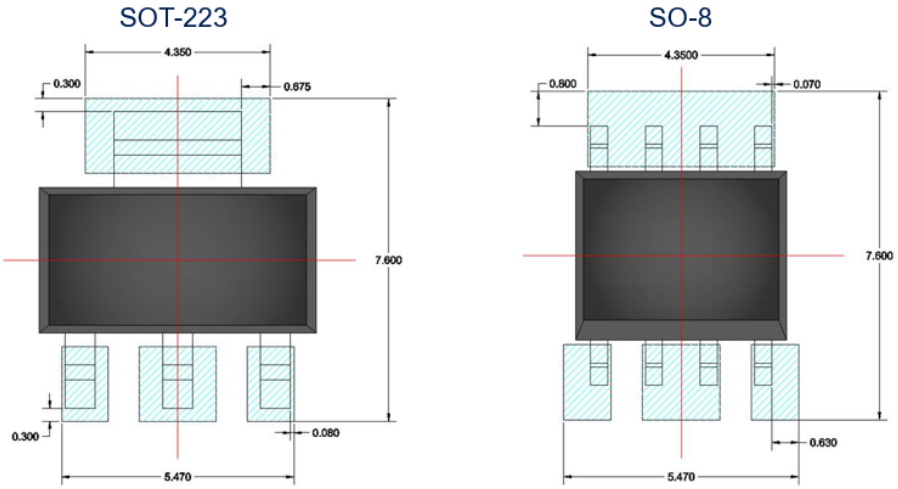
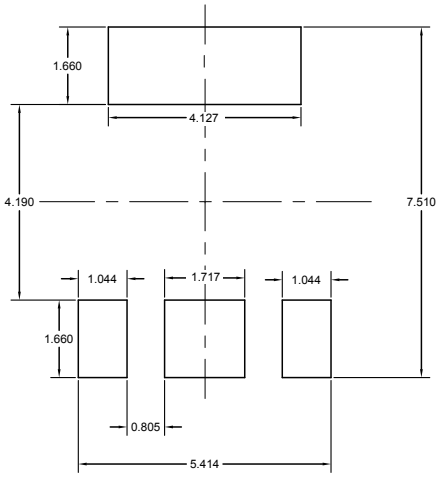


Figure 20. **Dual footprint stencil definitions (dimensions are in mm)**



4 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
Z0109M1	Z0109M1	SO-8	0.1 g	2500	Tape and reel 13"

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
15-Nov-2019	1	Initial release.