

Single Nano Relay (THT – THR)



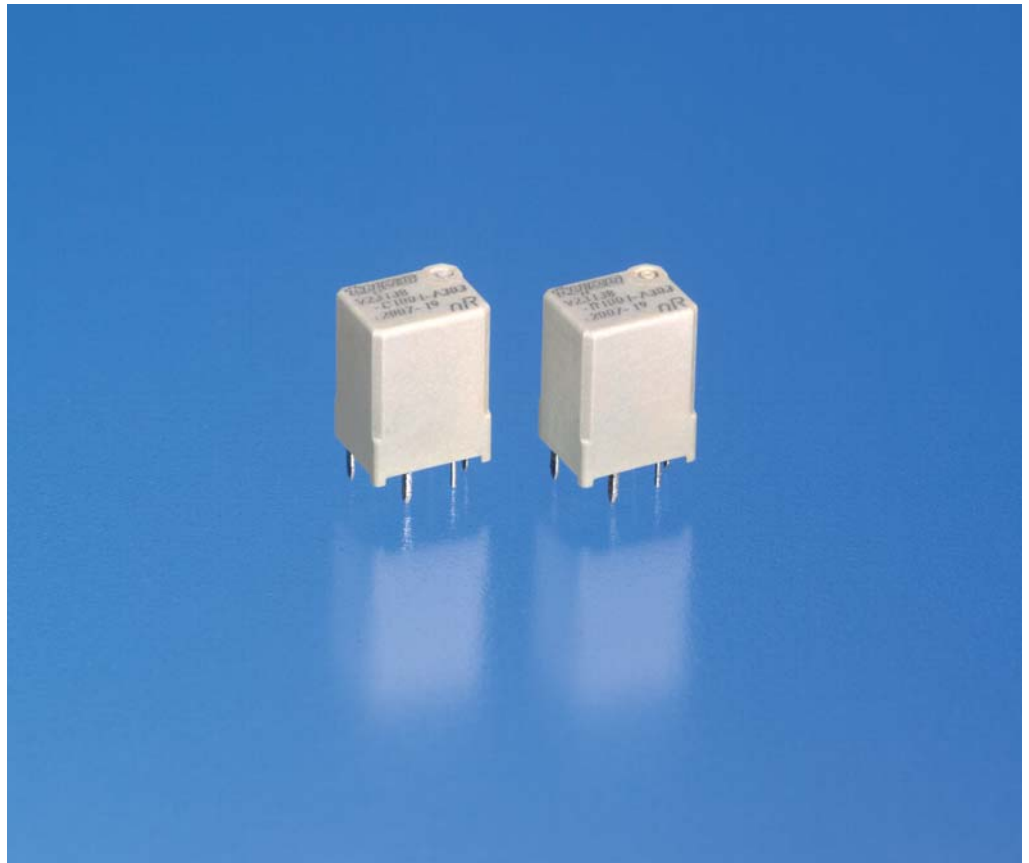
**Features**

- Smallest automotive PCB relay in its class:
  - Minimum PCB area required: 81 mm<sup>2</sup>
  - Dimensions: L x H x W (mm)  
10.2 x 14.0 x 8
  - Minimal height: 14.0 mm
  - Minimal weight
- First automotive relay using overmolding technology
- Highest reliability due to overmolding process
- Limiting continuous current 30 A
- Very easy routing of PCB-layout
- Power-saving high-impedance coil
- Low noise operation
- Wave (THT) and reflow (THR/pin-in-paste) solderable versions
- For twin version refer to Nano Relay

**Typical Applications**

- Car alarm
- Door lock
- Heated rear screen
- Horn
- Immobilizer
- Interior lights
- Seat control

Please contact Tyco Electronics for relay application support.



138\_C-R1\_3D1

**Design**

- ELV/RoHS/WEEE compliant
- THT: sealed type washable
- THR: sealed type open vent hole

**Weight**

Approx. 4 g (0.14 oz.)

**Nominal Voltage**

12 V

**Terminals**

PCB terminals for assembly on printed circuit boards

**Conditions**

All parametric, environmental and endurance tests are performed according to EIA Standard RS-407-A at standard test conditions unless otherwise noted:  
23°C ambient temperature,  
20 - 50% RH, 998.9 ±33.9 hPa.

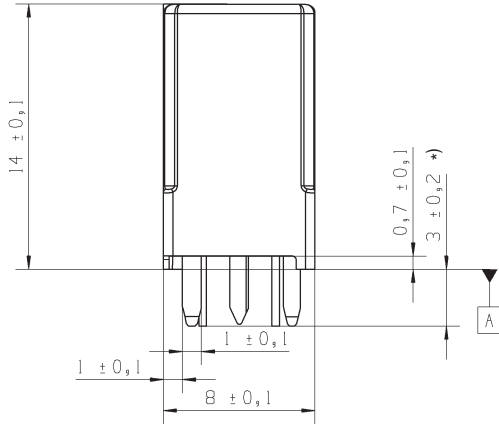
For general storage and processing recommendations please refer to our Application Notes and especially to *Storage* in the “Glossary” page 23 or at <http://relays.tycoelectronics.com/appnotes/>

**Disclaimer**

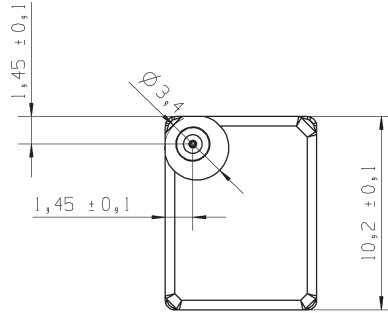
All technical performance data apply to the relay as such, specific conditions of the individual application are not considered. Please always check the suitability of the relay for your intended purpose. We do not assume any responsibility or liability for not complying herewith. We recommend to complete our questionnaire and to request our technical service. Any responsibility for the application of the product remains with the customer only. All specifications are subject to change without notification. All rights of Tyco Electronics are reserved.

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**Dimensional Drawing**



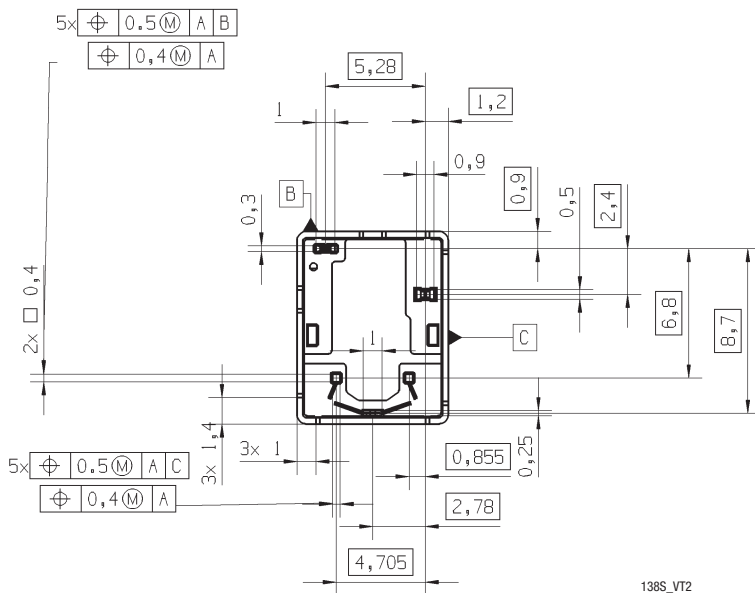
138S\_DD1



138S\_DD2


\*) Additional tin tops max. 1 mm

**View of the Terminals (bottom view)**



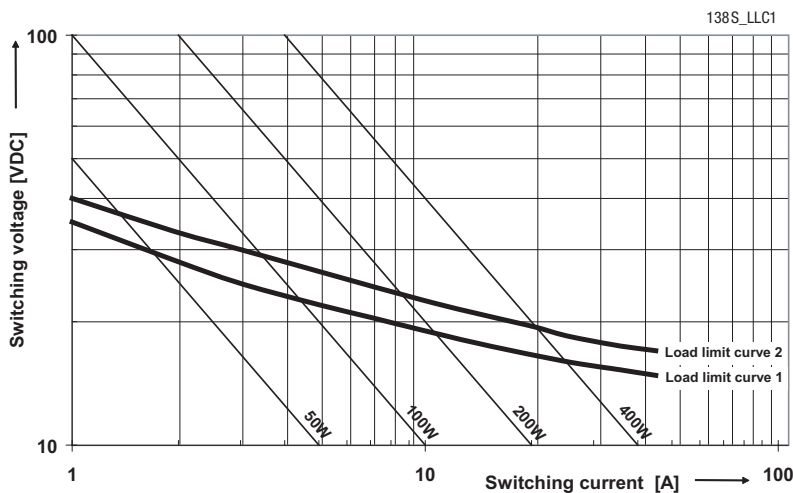
138S\_VT2

Single Nano Relay (THT – THR)

Contact Data		Resistive/inductive load
Typical areas of application		1 Changeover contact /
Contact configuration		1 Form C
Circuit symbol (see also Pin assignment)		
Rated voltage		12 V
Rated current		NC/NO 15 A/20 A
Limiting continuous current	23°C 85°C 105°C	25 A/30A 15 A/20 A 10 A/12 A
Contact material		Silver based
Max. switching voltage/power		See load limit curve
Max. switching current <sup>1)</sup>		NC/NO
On <sup>2)</sup>		30 A
Off		30 A
Min. recommended load <sup>3)</sup>		1 A at 5 V
Voltage drop at 10 A (initial) for NC/NO contacts		Typ. 30 mV, 300 mV max.
Mechanical endurance (without load)		> 5 x 10 <sup>6</sup> operations
Electrical endurance at cyclic temperature –40/+23/+85°C and 13.5 V		Motor reverse blocked: > 10 <sup>5</sup> operations at 25 A, 0.77 mH inductive load

<sup>1)</sup> The values apply to a resistive or inductive load with suitable spark suppression and at maximum 13.5 V for 12 V load voltages.  
<sup>2)</sup> For a load current duration of maximum 3 s for a make/break ratio of 1:10.  
<sup>3)</sup> See chapter Diagnostics of Relays in our Application Notes page 31 or consult the internet at <http://relays.tycoelectronics.com/appnotes/>

**Load Limit Curve**

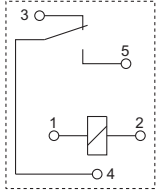


Load limit curve 1 ≙ arc extinguishes during transit time  
 Load limit curve 2 ≙ safe shutdown, no stationary arc

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**Circuit Diagram**

1 Changeover contact/1 Form C



138S\_PA3

Coil Data	
Available for nominal voltages	12 V
Nominal power consumption of the unsuppressed coil at nominal voltage	0.8 W
Test voltage winding/contact	500 VAC <sub>rms</sub>
Maximum ambient temperature range <sup>1)</sup>	-40 to +105°C
Operate time at nominal voltage	Typ. 3 ms
Release time at nominal voltage <sup>2)</sup>	Typ. 1.5 ms

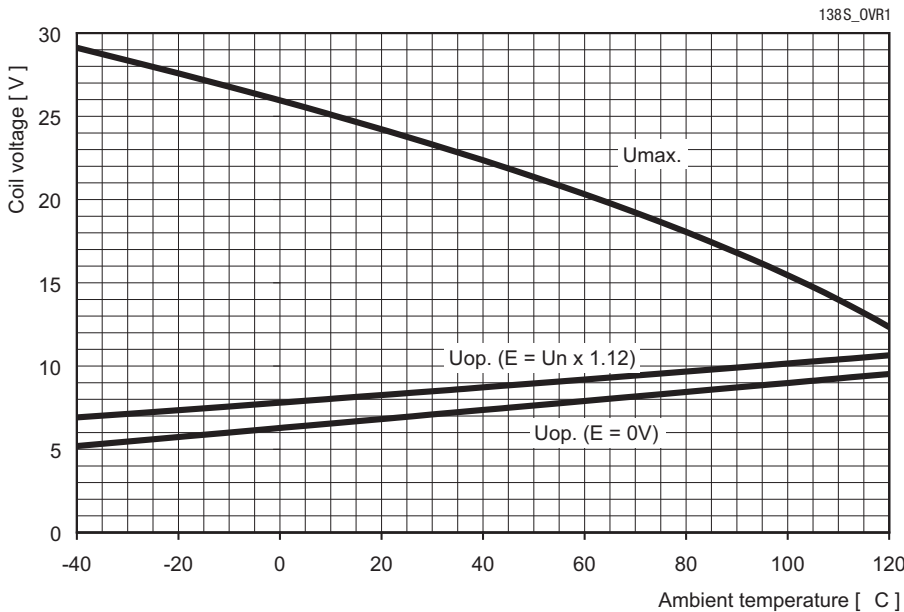
<sup>1)</sup> Permanent use above 85°C could be critical, see also operating voltage range diagram.

<sup>2)</sup> For unsuppressed relay coil.

**Note:**

A low resistive suppression device in parallel to the relay coil increases the release time and reduces the lifetime caused by increased erosion and/or higher risk of contact tack welding.

**Operating Voltage Range**



Does not take into account the temperature rise due to the contact current  
E = pre-energization

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Environmental Conditions					
Temperature range, storage		Refer to <i>Storage</i> in the “Glossary” catalog page 23 or <a href="http://relays.tycoelectronics.com/appnotes/">http://relays.tycoelectronics.com/appnotes/</a>			
Test		Relevant standard	Testing as per	Dimension	Comments
Cold storage		IEC 68-2-1		1000 h	-40°C
Dry heat		IEC 68-2-2	Ba	1000 h	125°C
Climatic cycling with condensation					
	THT	EN ISO 6988		20 cycles	Storage 8/16 h
Thermal change		IEC 68-2-14	Nb	35 cycles	-40/+125°C
Thermal shock		IEC 68-2-14	Na	1000 cycles	-40/+125°C Dwell time 1 h
Damp heat					
cyclic	THT	IEC 68-2-30	Db, Variant 2	6 cycles	40°C/55°C/93%
constant	THT	IEC 68-2-3	Method Ca	56 days	40°C/93%
Corrosive gas					
		IEC 68-2-42 IEC 68-2-43		10 days 10 days	
Vibration resistance		IEC 68-2-6 (sine pulse form)		10 - 500 Hz 6 g	No change in the switching state > 10 μs
Shock resistance		IEC 68-2-27 (half sine form single pulses)		6 ms up to 30 g	No change in the switching state > 10 μs
Solderability					
	THT	IEC 68-2-20	Ta, Method 1	Hot dip 5 s 215°C	Aging 3 (4 h/155°C)
	THR	IEC 68-2-58		245°C	for leaded process (T <sub>m</sub> = 183°C) for Pb-free process (T <sub>m</sub> = 217°C)
Resistance to soldering heat					
	THT	IEC 68-2-20	Ta, Method 1A	Hot dip 10 s 260°C	with thermal screen
	THR	IEC 68-2-58		260°C	Preheating min 130°C
Sealing					
	THT	IEC 68-2-17	Qc, Method 2		1 min/70°C
	THR				Open vent hole

Ordering Information

Part Numbers (see table below for coil data)		Contact Arrangement	Contact Material	Enclosure	Soldering Technology
Relay Description	Part Number				
V23138-C1005-A403	9-1414964-1	1 Form C	Silver based	Sealed	THT
V23138-R1005-A403	1-1414960-7	1 Form C	Silver based	Open vent hole	THR

Coil Versions

Coil Data for Nano Single	Rated Coil Voltage (V)	Coil Resistance ±10% (Ω)	Must Operate Voltage (V)	Must Release Voltage (V)	Allowable Overdrive <sup>1)</sup> Voltage (V)	
					at 23°C	at 105°C
V23138-**005-****	12	180	6.9	1.0	24	14.7

<sup>1)</sup> Allowable overdrive is stated with no load applied and minimum coil resistance.

**Standard Delivery Packs** (orders in multiples of delivery pack)

Nano Single: 2600 pieces