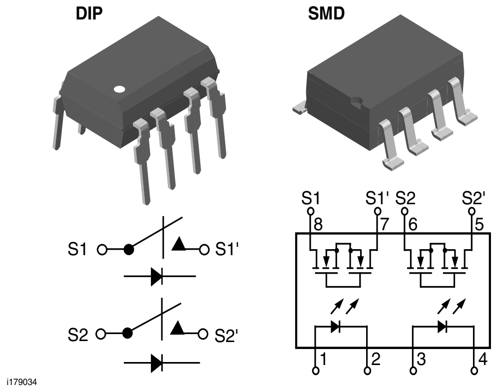
Dual 1 Form A Solid State Relay

Features

- Two Independent Relays
- Current Limit Protection
- Isolation Test Voltage 5300 V_{RMS}
- Typical R_{ON} 15 Ω
- Load Voltage 250 V
- Load Current 120 mA
- High Surge Capability
- Linear, AC/DC Operation
- Clean Bounce Free Switching
- Low Power Consumption
- High Reliability Monolithic Receptor
- SMD Lead Available on Tape and Reel



Agency Approvals

- UL - File No. E52744
- CSA - Certification 093751
- BSI/BABT Cert. No. 7980
- DIN EN 60747-5-5 (VDE 0884):2003-01 Available with Option 1
- FIMKO Approval

Applications

General Telecom Switching
- On/off Hook Control
- Ring Delay
- Dial Pulse
- Ground Start
- Ground Fault Protection
Instrumentation
Industrial Controls

Description

The LH1505 contains two normally open switches that can be used as two independent SPST relays or as one DPST relay. The relay is constructed using a GaAlAs LED for actuation control and integrated monolithic dies for the switch outputs. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuity, and DMOS switches. In addition, the LH1505 relay employs current limiting circuitry, enabling it to pass FCC 68.302 and other regulatory voltage surge requirements when overvoltage protection is provided.

Order Information

Part	Remarks
LH1505AAC	SMD-8, Tubes
LH1505AACTR	SMD-8, Tape and Reel
LH1505AB	SMD-8, Tubes

Absolute Maximum Ratings, T_{amb} = 25 °C

Stresses in excess of the absolute Maximum Ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute Maximum Ratings for extended periods of time can adversely affect reliability.

SSR

Parameter	Test condition	Symbol	Value	Unit
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10\ \mu A$	V_R	8.0	V
DC or peak AC load voltage	$I_L \leq 50\ \mu A$	V_L	250	V
Continuous DC load current , one pole operating		I_L	130	mA
Continuous DC load current , two poles operating		I_L	120	mA
Peak load current (single shot), Form B	t = 100 ms	I_P	[2]	
Ambient operating temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 150	°C
Pin soldering temperature	t = 10 s max	T_{sld}	260	°C
Input/output isolation test voltage	t = 1.0 s, I_{ISO} = 10 μA max	V_{ISO}	5300	V_{RMS}
Pole-to-pole isolation voltage (S1 to S2) [1], (dry air, dust free, at sea level)			1600	V
Output power dissipation (continuous)		P_{diss}	600	mW

[1] Breakdown occurs between the output pins external to the package.

[2] Refer to Current Limit Performance Application Note for a discussion on relay operation during transient currents.

Electrical Characteristics, T_{amb} = 25 °C

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
LED forward current, switch turn-on	I_L = 100 mA, t = 10 ms	I_{Fon}		1.0	2.0	mA
LED forward current, switch turn-off	V_L = ± 200 V	I_{Foff}	0.2	0.9		mA
LED forward voltage	I_F = 10 mA	V_F	1.15	1.26	1.45	V

Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
ON-resistance	I_F = 5.0 mA, I_L = 50 mA	R_{ON}	10	15	20	Ω
OFF-resistance	I_F = 0 mA, V_L = ± 100 V	R_{OFF}	0.5	5000		GΩ
Current limit	I_F = 5.0 mA, t = 5.0 ms, V_L = ± 6.0 V	I_{LMT}	170	200	280	mA
Off-state leakage current	I_F = 0 mA, V_L = ± 100 V			0.02	200	nA
	I_F = 0 mA, V_L = ± 250 V				1.0	μA

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Output capacitance	I_F = 0 mA, V_L = 1.0 V			55		pF
	I_F = 0 mA, V_L = 50 V			10		pF
Pole-to-pole capacitance (S1 to S2)	I_F = 5.0 mA			0.5		pF
Switch offset	I_F = 5.0 mA			0.15		V

Transfer

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Input/output capacitance	V_{ISO} = 1.0 V	C_{ISO}		1.1		pF
Turn-on time	I_F = 5.0 mA, I_L = 50 mA	t_{on}		1.4 1)	4.0 1)	ms
Turn-off time	I_F = 5.0 mA, I_L = 50 mA	t_{off}		0.7 1)	4.0 1)	ms

1) I_L = 100 mA

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

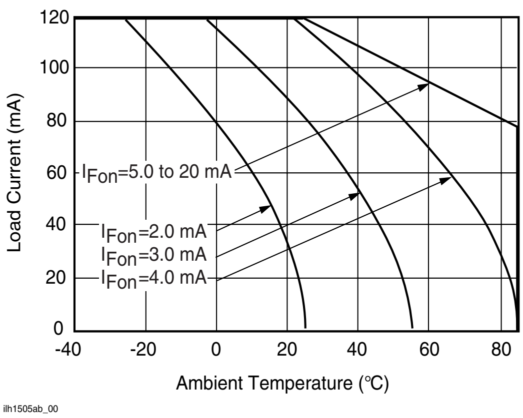


Figure 1. Recommended Operating Conditions

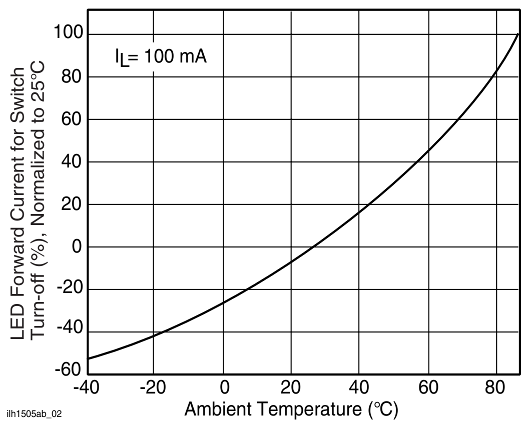


Figure 3. LED Current for Switch Turn-on vs. Temperature

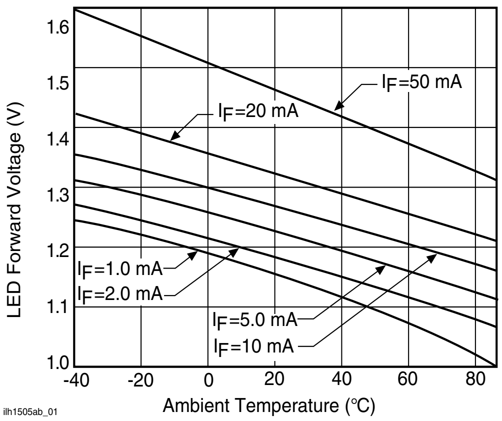


Figure 2. LED Voltage vs. Temperature

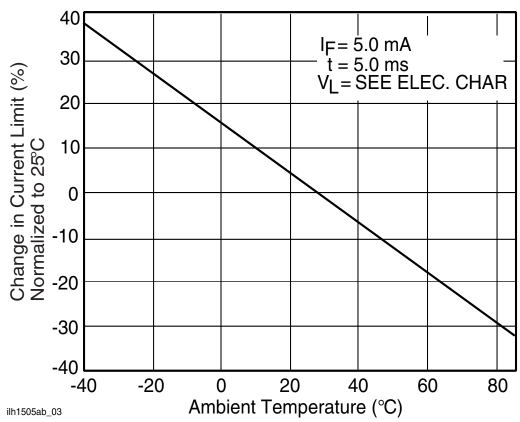


Figure 4. Current Limit vs. Temperature

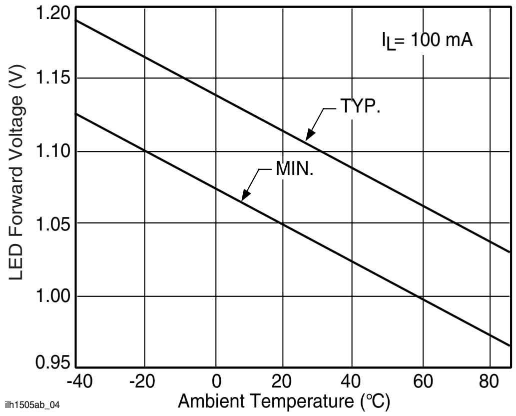


Figure 5. LED Dropout Voltage vs. Temperature

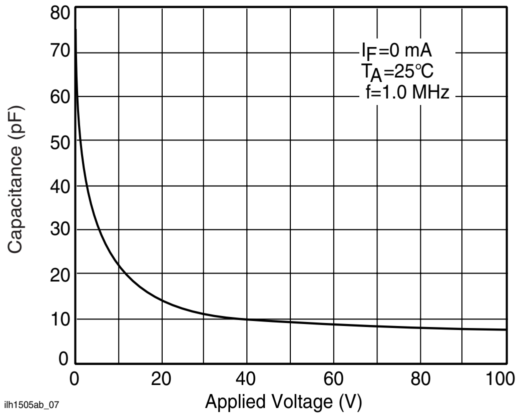


Figure 8. Switch Capacitance vs. Applied Voltage

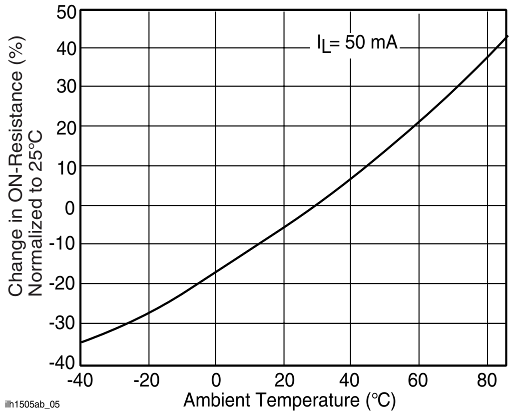


Figure 6. ON-Resistance vs. Temperature

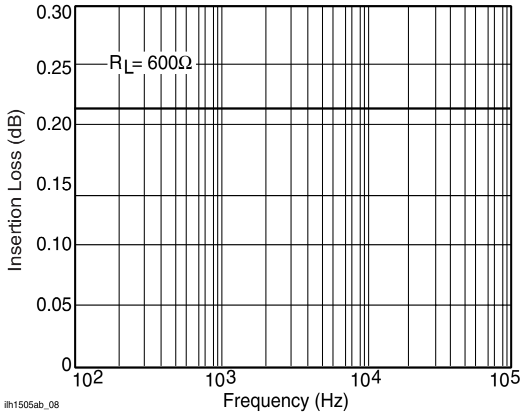


Figure 9. Insertion Loss vs. Frequency

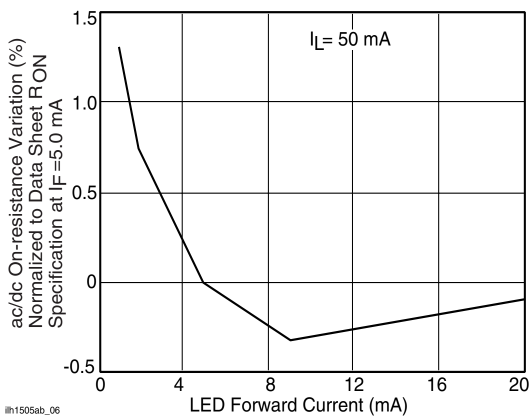


Figure 7. Variation in ON-Resistance vs. LED Current

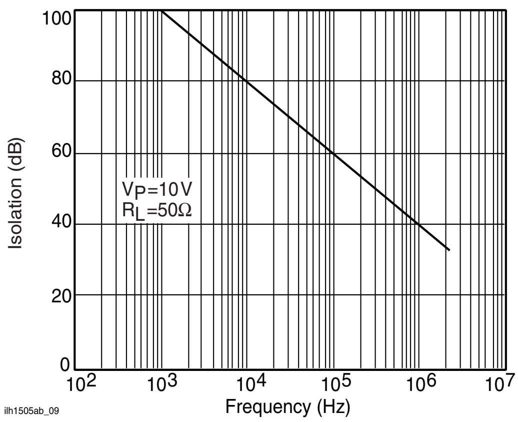


Figure 10. Output Isolation

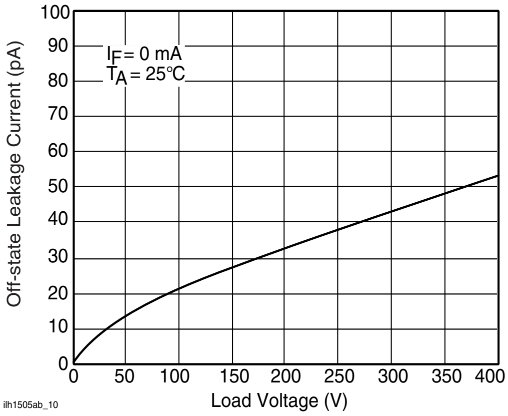


Figure 11. Leakage Current vs. Applied Voltage

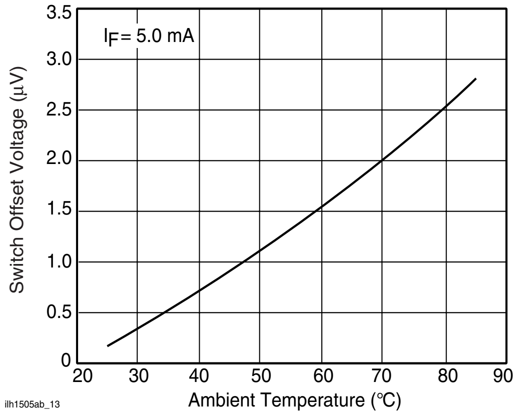


Figure 14. Switch Offset Voltage vs. Temperature

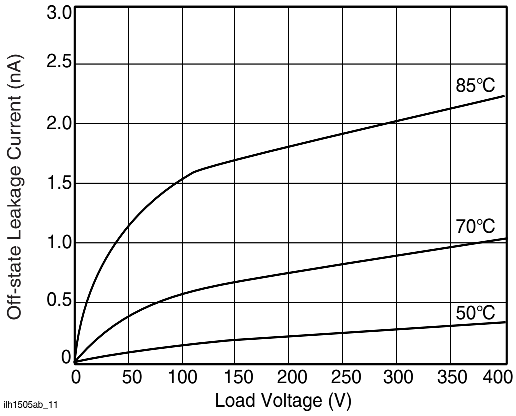


Figure 12. Leakage Current vs. Applied Voltage at Elevated Temperatures

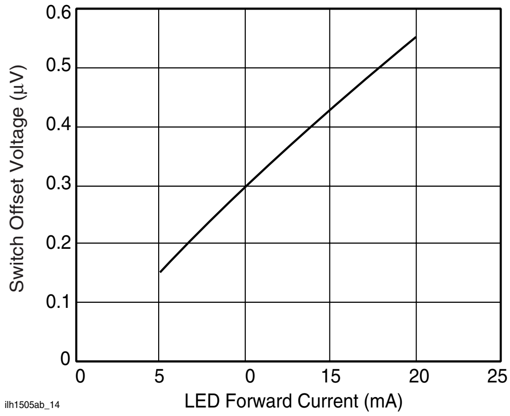


Figure 15. Switch Offset Voltage vs. LED Current

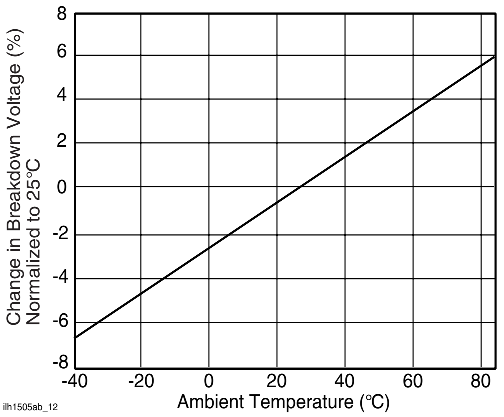


Figure 13. Switch Breakdown Voltage vs. Temperature

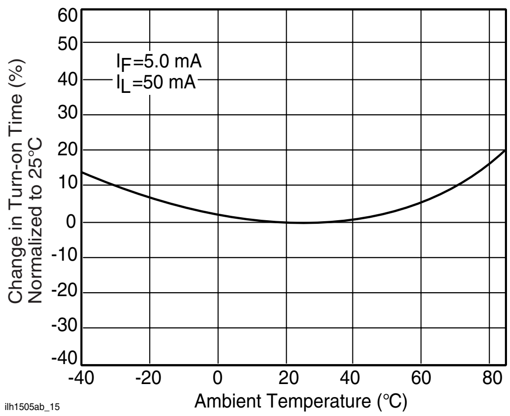


Figure 16. Turn-on Time vs. Temperature

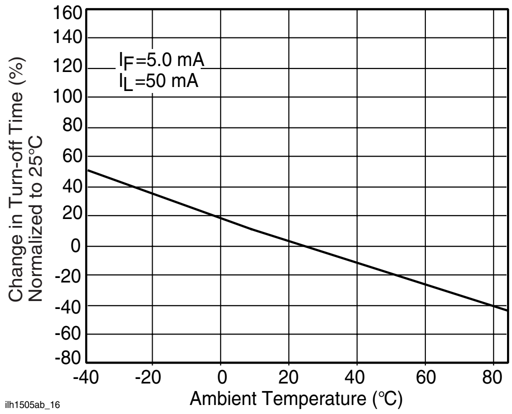


Figure 17. Turn-off Time vs. Temperature

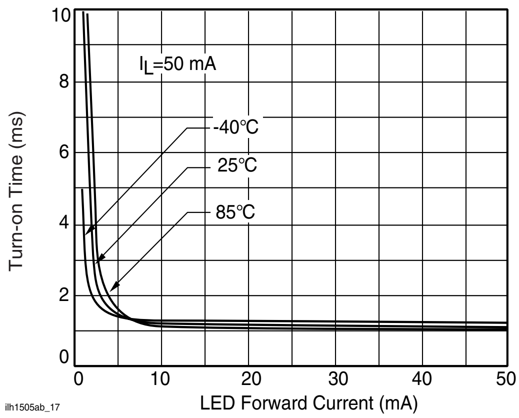


Figure 18. Turn-on Time vs. LED Current

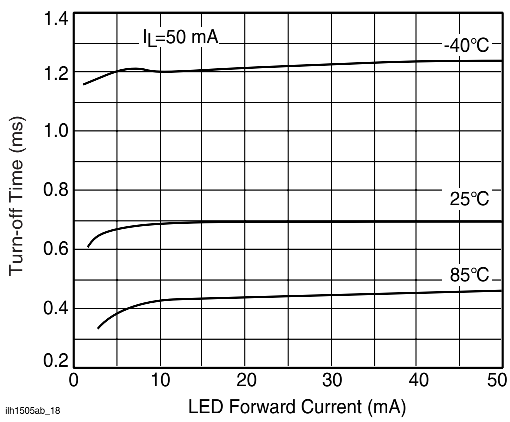
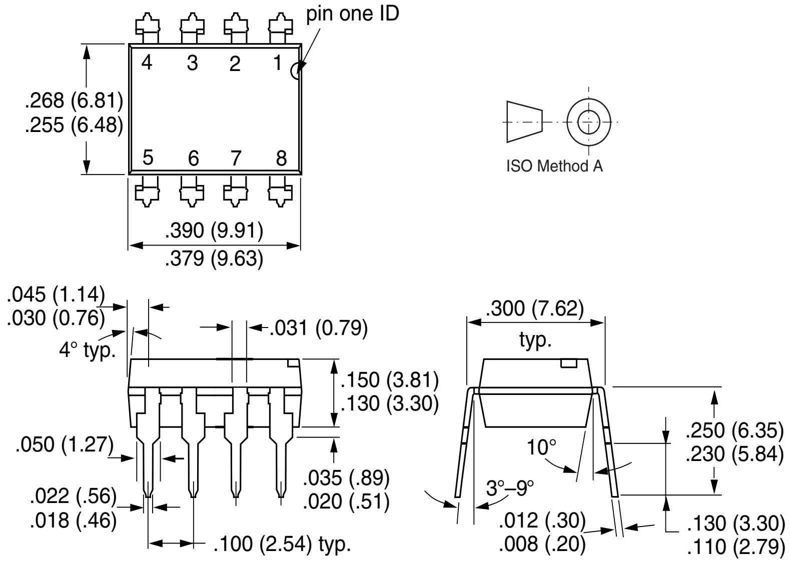


Figure 19. Turn-off Time vs. LED Current

Package Dimensions in Inches (mm)

DIP



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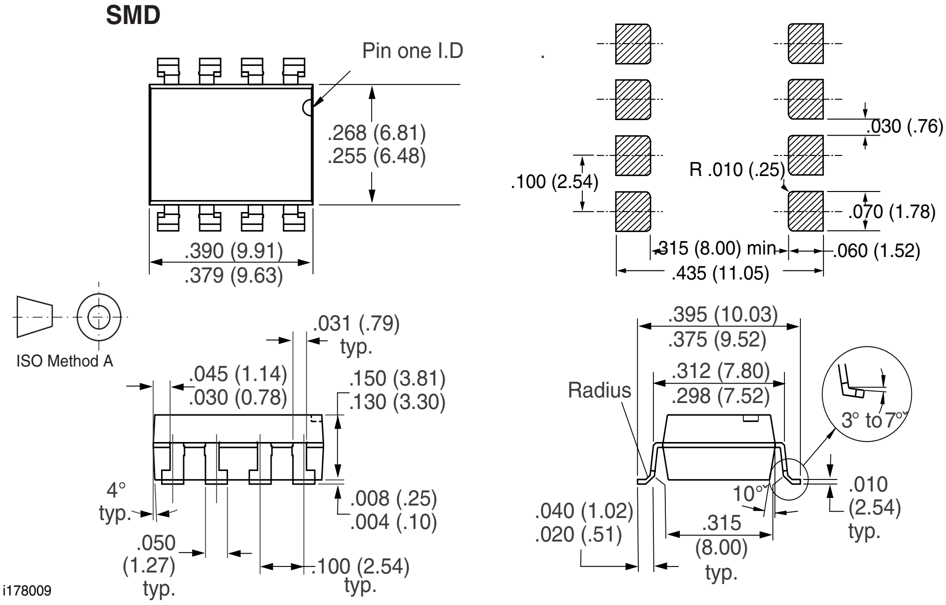

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Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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