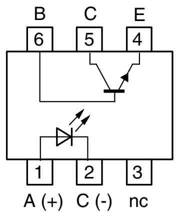
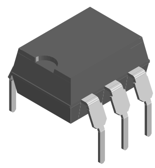
Optocoupler, Phototransistor Output, with Base Connection





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DESCRIPTION

The CNY17G consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 6 pin plastic dual inline package.
The elements are mounted on one leadframe providing a fixed distance between input and output for highest safety requirements.

VDE STANDARDS

These couplers perform safety functions according to the following equipment standards:

- **DIN EN 60747-5-5**
  Optocoupler for electrical safety requirements
- **IEC EN 60950/EN 60950**
  Office machines (applied for reinforced isolation for mains voltage ≤ 400 V_{RMS})
- **VDE 0804**
  Telecommunication apparatus and data processing
- **IEC 60065**
  Safety for mains-operated electronic and related household apparatus

AGENCY APPROVALS

- UL1577, file no. E76222 system code A, double protection
- BSI: BS EN 41003, BS EN 60065 (BS 415), BS EN 60950 (BS 7002), certificate number 7081 and 7402
- DIN EN 60747-5-5
- FIMKO (SETI): EN 60950, certificate no. 12399

FEATURES

- Isolation test voltage 5300 V_{RMS}
- Isolation materials according to UL94-VO
- Pollution degree 2 (DIN/VDE 0110 part 1 resp. IEC 60664)
- Climatic classification 55/100/21 (IEC 60068 part 1)
- Special construction: therefore, extra low coupling capacity of typical 0.3 pF, high common mode rejection
- Low temperature coefficient of CTR
- Rated impulse voltage (transient overvoltage) V_{IOTM} = 6 kV peak
- Isolation test voltage (partial discharge test voltage) V_{pd} = 1.6 kV
- Rated isolation voltage (RMS includes DC) V_{IOWM} = 600 V_{RMS} (848 V peak)
- Rated recurring peak voltage (repetitive) V_{IORM} = 600 V_{RMS}
- Thickness through insulation ≥ 0.75 mm
- Creepage current resistance according to VDE 0303/ IEC 60112 comparative tracking index: CTI = 275
- CTR offered in 4 groups
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

APPLICATIONS

- Switch-mode power supplies
- Line receiver
- Computer peripheral interface
- Microprocessor system interface
- Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):
  - for appl. class I - IV at mains voltage ≤ 300 V
  - for appl. class I - III at mains voltage ≤ 600 V
  according to DIN EN 60747-5-5

ORDER INFORMATION

PART	REMARKS
CNY17G-1	CTR 40 to 80 %, DIP-6
CNY17G-2	CTR 63 to 125 %, DIP-6
CNY17G-3	CTR 100 to 200 %, DIP-6
CNY17G-4	CTR 160 to 320 %, DIP-6

Note
G = leadform 10.16 mm; G is marked on the body.

ABSOLUTE MAXIMUM RATINGS [1]				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	5	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	3	A
Power dissipation		P_{diss}	100	mW
Junction temperature		T_j	125	°C
OUTPUT				
Collector emitter voltage		V_{CEO}	32	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
Collector peak current	$t_p/T = 0.5$, $t_p \leq 10$ ms	I_{CM}	100	mA
Power dissipation		P_{diss}	150	mW
Junction temperature		T_j	125	°C
COUPLER				
Isolation test voltage (RMS)		V_{ISO}	3750	V_{RMS}
Total power dissipation		P_{tot}	250	mW
Ambient temperature range		T_{amb}	- 55 to + 100	°C
Storage temperature range		T_{stg}	- 55 to + 125	°C
Soldering temperature [2]	2 mm from case, $t \leq 10$ s	T_{sld}	260	°C

Notes

[1] T_{amb} = 25 °C, unless otherwise specified.
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 the time can adversely affect reliability.

[2] Refer to wave profile for soldering conditions for through hole devices.

ELECTRICAL CHARACTERISTCS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 50 mA	V_F		1.25	1.6	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j		50		pF
OUTPUT						
Collector emitter voltage	I_C = 1 mA	V_{CEO}	32			V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7			V
Collector emitter cut-off current	V_{CE} = 10 V, I_F = 0	I_{CEO}		10	100	nA
COUPLER						
AC isolation test voltage (RMS)	f = 50 Hz, t = 1 s	V_{ISO}	3750			V_{RMS}
Collector emitter saturation voltage	I_F = 10 mA, I_C = 1 mA	V_{CEsat}			0.3	V
Cut-off frequency	V_{CE} = 5 V, I_F = 10 mA, R_L = 100 Ω	f_c		110		kHz
Coupling capacitance	f = 1 MHz	C_k		0.3		pF

Note

T_{amb} = 25 °C, unless otherwise specified.
Minimum and maximum values were tested requierements. 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.

CURRENT TRANSFER RATIO							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I_C/I_F	V_{CE} = 5 V, I_F = 10 mA	CNY17G-1	CTR	40		80	%
		CNY17G-2	CTR	63		125	%
		CNY17G-3	CTR	100		200	%
		CNY17G-4	CTR	160		320	%
	V_{CE} = 5 V, I_F = 1 mA	CNY17G-1	CTR	13			%
		CNY17G-2	CTR	22			%
		CNY17G-3	CTR	34			%
		CNY17G-2	CTR	56		200	%

MAXIMUM SAFETY RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward current		I_F			130	mA
OUTPUT						
Power dissipation		P_{diss}			265	mW
COUPLER						
Rated impulse voltage		V_{IOTM}			6	kV
Safety temperature		T_{si}			150	°C

Note

According to DIN EN 60747-5-5 (see figure 1). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

INSULATION RATED PARAMETERS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Partial discharge test voltage - routine test	100 %, t_{test} = 1 s	V_{pd}	1.6			kV
Partial discharge test voltage - lot test (sample test)	t_{Tr} = 60 s, t_{test} = 10 s, (see figure 2)	V_{IOTM}	6			kV
		V_{pd}	1.3			kV
Insulation resistance	V_{IO} = 500 V	R_{IO}	10^{12}			Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	10^{11}			Ω
	V_{IO} = 500 V, T_{amb} = 150 °C (construction test only)	R_{IO}	10^{9}			Ω

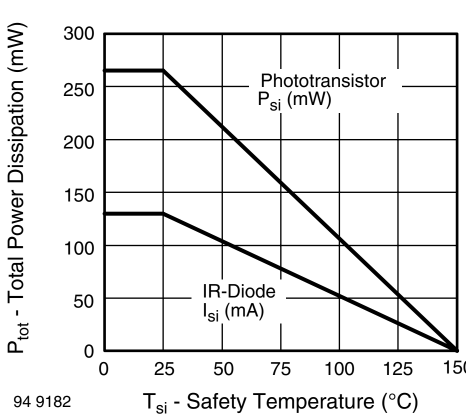


Fig. 1 - Derating Diagram

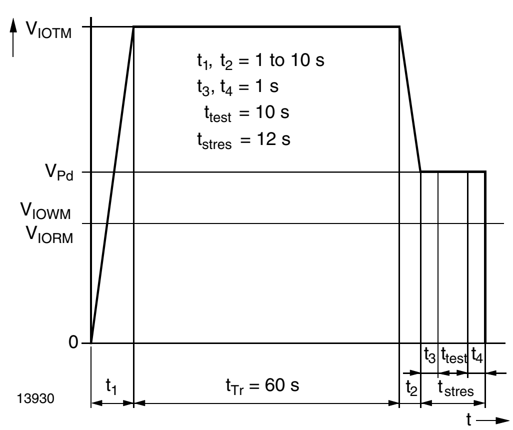


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5/DIN EN 60747-; IEC60747

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Delay time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see figure 3)	t_d		4.0		µs
Rise time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see figure 3)	t_r		7.0		µs
Fall time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see figure 3)	t_f		6.7		µs
Storage time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see figure 3)	t_s		0.3		µs
Turn-on time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see figure 3)	t_{on}		11.0		µs
Turn-off time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see figure 3)	t_{off}		7.0		µs
Turn-on time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 4)	t_{on}		25		µs
Turn-off time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 4)	t_{off}		42.5		µs

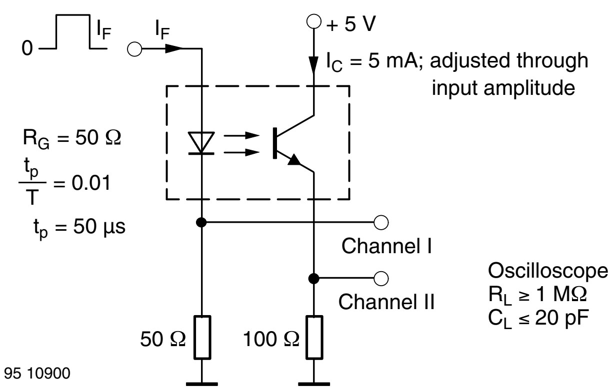


Fig. 3 - Test Circuit, Non-Saturated Operation

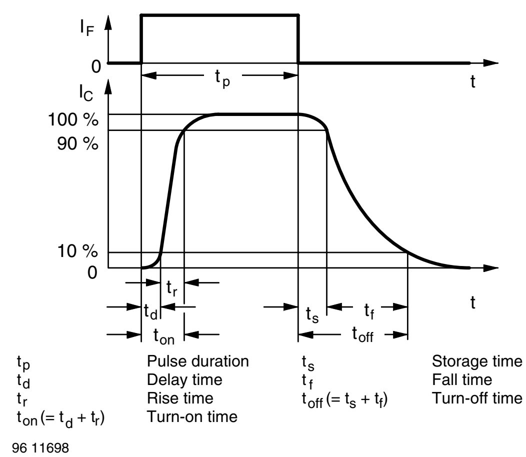


Fig. 5 - Switching Times

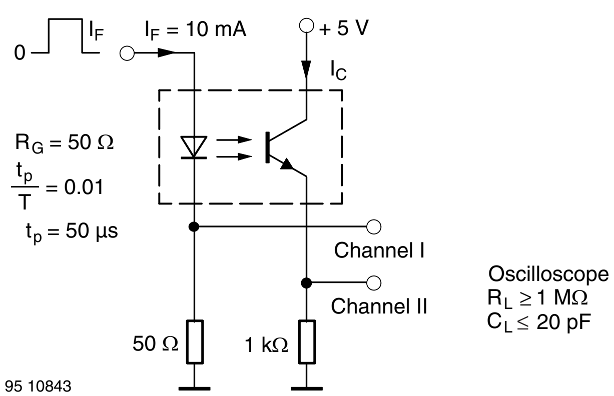


Fig. 4 - Test Circuit, Saturated Operation

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

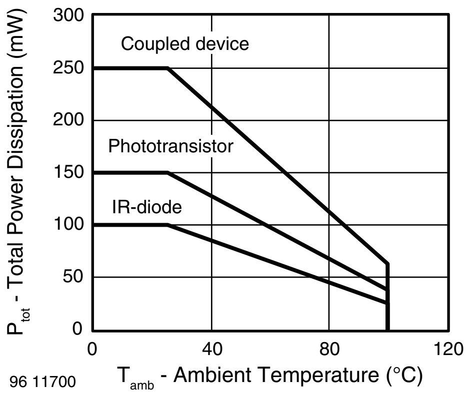


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

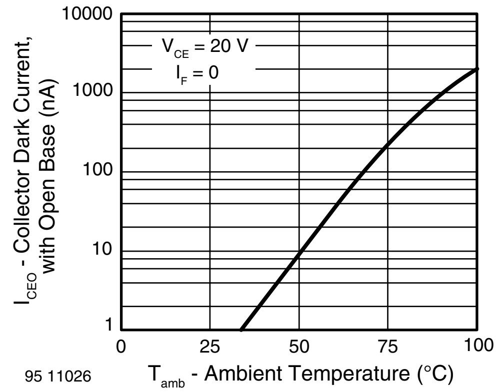


Fig. 9 - Collector Dark Current vs. Ambient Temperature

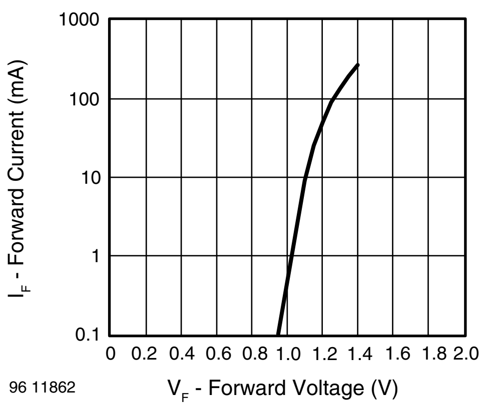


Fig. 7 - Forward Current vs. Forward Voltage

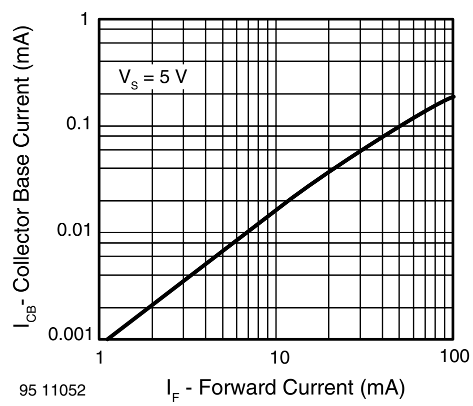


Fig. 10 - Collector Base Current vs. Forward Current

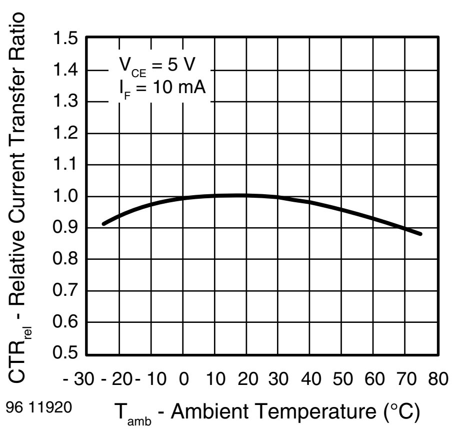


Fig. 8 - Relative Current Transfer Ratio vs. Ambient Temperature

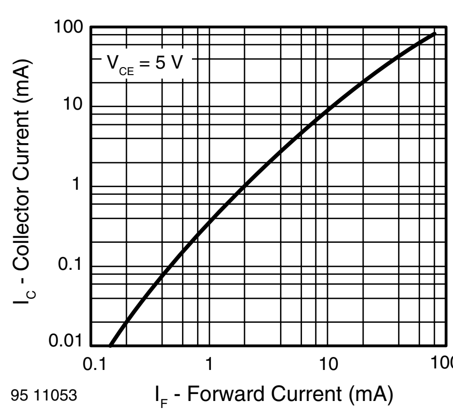


Fig. 11 - Collector Current vs. Forward Current

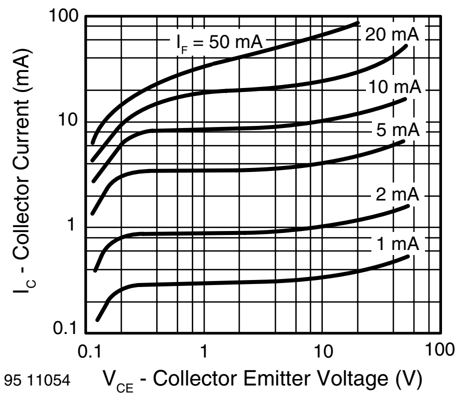


Fig. 12 - Collector Current vs. Collector Emitter Voltage

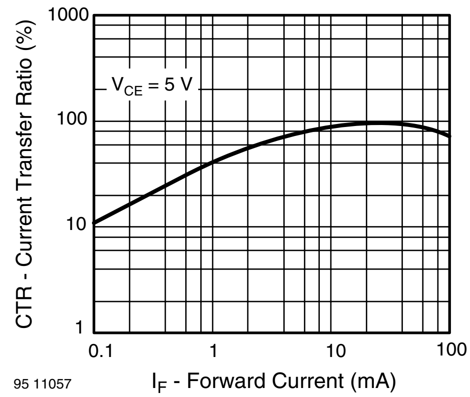


Fig. 15 - Current Transfer Ratio vs. Forward Current

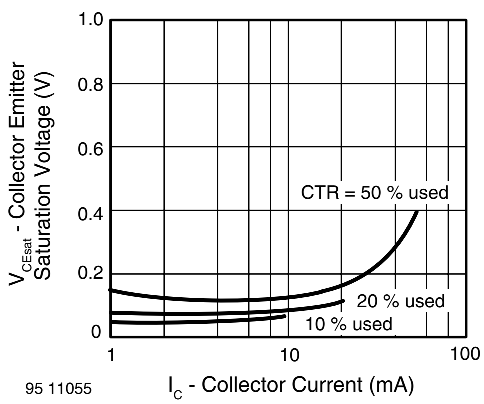


Fig. 13 - Collector Emitter Saturation Voltage vs. Collector Current

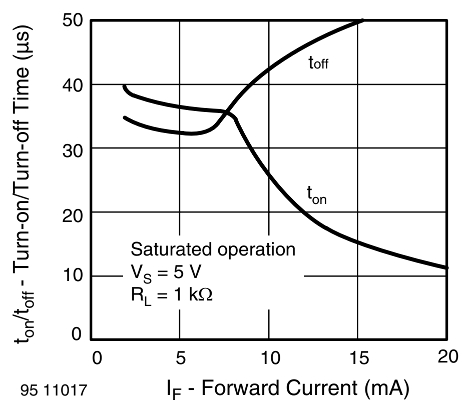


Fig. 16 - Turn-on/off Time vs. Forward Current

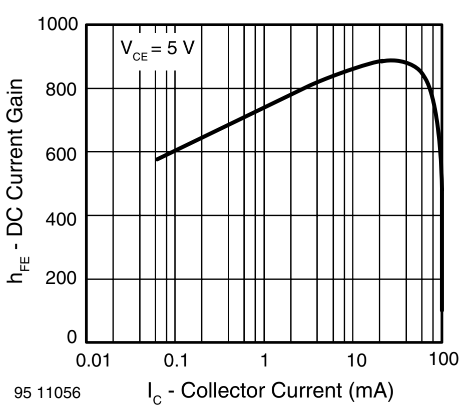


Fig. 14 - DC Current Gain vs. Collector Current

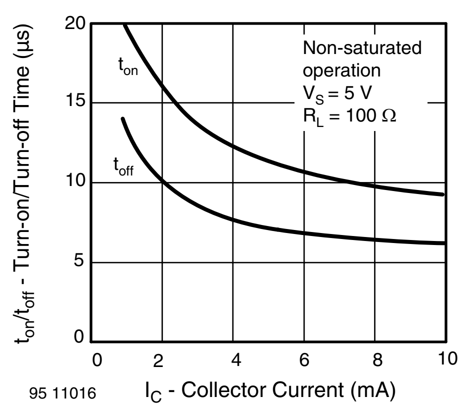
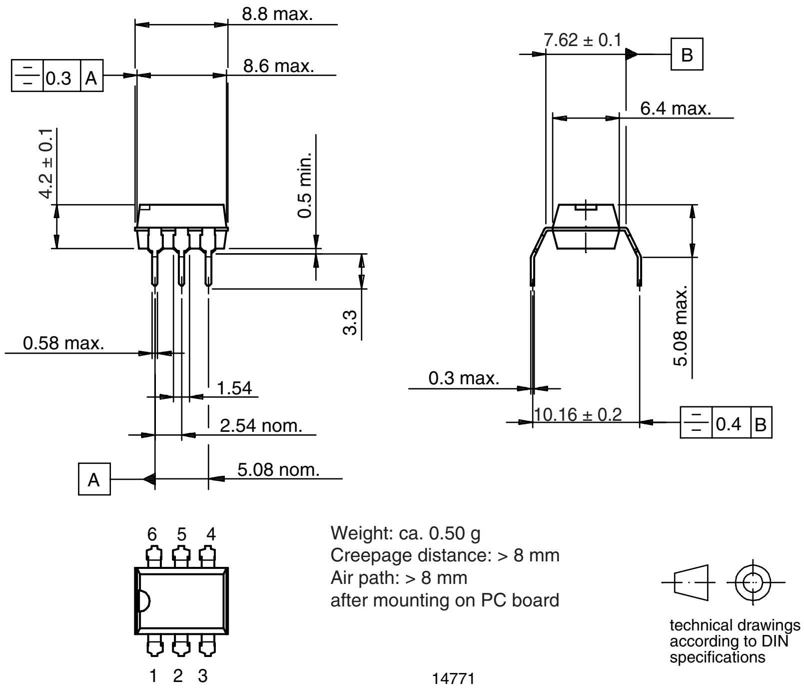


Fig. 17 - Turn-on/off Time vs. Collector Current

PACKAGE DIMENSIONS in millimeters



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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 operating systems 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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