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G3VM-21HR/31HR/31HR1/41HR

MOS FET Relays SOP 6-pin, High-current and Low-ON-resistance Type

MOS FET Relays in SOP 6-pin packages that achieve the low ON resistance and high switching capacitance of a mechanical relay

- **Load voltage: 20 V, 30 V or 40 V**
- **20-V Relay (21HR): Continuous load current of 2.5 A (5 A) max. ✻**
- **30-V Relay (31HR): Continuous load current of 4 A (8 A) max. ✻**
- **30-V Relay (31HR1): Continuous load current of 4.5 A (9 A) max. ✻**
- **40-V Relay (41HR): Continuous load current of 2.5 A (5 A) max. ✻**

✻ Values in parentheses are for connection C.



Note: The actual product is marked differently from the image shown here.

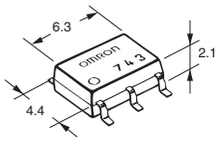
RoHS Compliant

■Application Examples

- **Semiconductor test equipment**
- **Communication equipment**
- **Test & Measurement equipment**
- **Security equipment**
- **Industrial equipment**
- **Power circuit**
- **Amusement equipment**

■Package (Unit : mm, Average)

SOP 6-pin



Note: The actual product is marked differently from the image shown here.

■Model Number Legend

G3VM-□□□□□
1 2 3 4 5

1. Load Voltage
2 : 20 V
3 : 30 V
4 : 40 V

2. Contact form
1 : 1a (SPST-NO)

3. Package
H : SOP 6-pin

4. Additional functions
R: Low ON resistance

5. Other informations
When specifications overlap, serial code is added in the recorded order.

■Ordering Information

Package	Contact form	Terminals	Load voltage (peak value) ✻	Continuous load current (peak value) ✻		Stick packaging		Tape packaging	
				Connection A, B	Connection C	Model	Minimum package quantity	Model	Minimum package quantity
SOP6	1a (SPST-NO)	Surface-mounting Terminals	20 V	2.5 A	5 A	**G3VM-21HR**	75	**G3VM-21HR(TR)**	2,500
			30 V	4 A	8 A	**G3VM-31HR**		**G3VM-31HR(TR05)**	500
			30 V	4.5 A	9 A	**G3VM-31HR1**		**G3VM-31HR1(TR05)**	
			40 V	2.5 A	5 A	**G3VM-41HR**		**G3VM-41HR(TR)**	2,500

✻ The AC peak and DC value are given for the load voltage and continuous load current.
Note: To order tape packaging for Relays with surface-mounting terminals, add “(TR)” or “(TR05)” to the end of the model number.

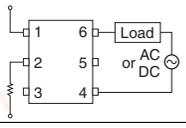
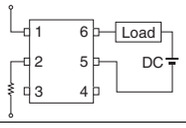
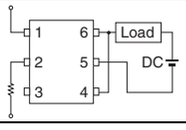
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■Absolute Maximum Ratings (Ta = 25°C)

Item			Symbol	G3VM-21HR	G3VM-31HR	G3VM-31HR1	G3VM-41HR	Unit	Measurement conditions
Input	LED forward current		I_F	30				mA	
	LED forward current reduction rate		ΔI_F/°C	-0.3				mA/°C	Ta ≥ 25°C
	LED reverse voltage		V_R	5		6	5	V	
	Connection temperature		T_J	125				°C	
Output	Load voltage (AC peak/DC)		V_{OFF}	20	30		40	V	
	Continuous load current	Connection A	I_O	2500	4000	4500	2500	mA	Connection A: AC peak/DC Connection B and C: DC
		Connection B							
		Connection C		5000	8000	9000	5000		
	ON current reduction rate	Connection A	ΔI_O/°C	-33.3	-40	-45	-33.3	mA/°C	G3VM-31HR/31HR1: Ta ≥ 25°C Others: Ta ≥ 50°C
		Connection B							
		Connection C		-66.7	-80	-90	-66.7		
	Pulse ON current		Iop	7.5	12	13.5	7.5	A	t=100 ms, Duty=1/10
	Connection temperature		T_J	125				°C	
Dielectric strength between I/O ✻			V_{I-O}	1500				Vrms	AC for 1 min
Ambient operating temperature			Ta	-40 to +85		-40 to +110	-40 to +85	°C	With no icing or condensation
Ambient storage temperature			Tstg	-55 to +125				°C	
Soldering temperature			–	260				°C	10 s

✻ The dielectric strength between the input and output was checked by applying voltage between all pins as a group on the LED side and all pins as a group on the light-receiving side.

Connection Diagram

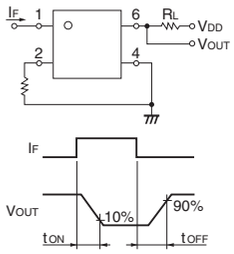
Connection A	
Connection B	
Connection C	

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■Electrical Characteristics (Ta = 25°C)

Item			Symbol		G3VM-21HR	G3VM-31HR	G3VM-31HR1	G3VM-41HR	Unit	Measurement conditions
Input	LED forward voltage		V_F	Minimum	1.18		1.50	1.18	V	I_F=10 mA
				Typical	1.33		1.65	1.33		
				Maximum	1.48		1.80	1.48		
	Reverse current		I_R	Maximum	10				μA	V_R=5 V
	Capacitance between terminals		C_T	Typical	70				pF	V=0, f=1 MHz
	Trigger LED forward current		I_{FT}	Typical	–	0.3		0.4	mA	G3VM-31HR1 : I_O=1000 mA Others : I_O=100 mA
				Maximum	3					
	Release LED forward current		I_{FC}	Minimum	0.1				mA	I_{OFF}=10 μA
Output	Maximum resistance with output ON	Connection A	R_{ON}	Typical	0.02	0.02	0.022	0.03	Ω	G3VM-31HR: I_F=5 mA I_O=4 A (Connection A, B) I_O=8 A (C connections), t<1s G3VM-31HR1: I_F=5 mA I_O=4.5 A (Connection A, B) I_O=9 A (C connections), t<1s Others: I_F=5 mA I_O=2 A (Connection A, B) I_O=4 A (C connections), t<1s
		Connection B			0.01	0.008	0.011	0.015		
		Connection C			0.005	0.004	0.006	0.008		
		Connection A		Maximum	0.05	0.04	0.03	0.06		
		Connection B			0.025	0.02	0.015	0.03		
		Connection C			–	0.01	0.008	–		
	Current leakage when the relay is open		I_{LEAK}	Typical	–				nA	V_{OFF}= Load voltage ratings
				Maximum	10	1000		10		
	Capacitance between terminals		C_{OFF}	Typical	1000	1100	1200	1000	pF	V=0, f=1 MHz
				Maximum	–					
Capacitance between I/O terminals			C_{I-O}	Typical	0.8				pF	f=1 MHz, V_S=0 V
Insulation resistance between I/O terminals			R_{I-O}	Minimum	1000				MΩ	V_{I-O}=500 VDC, RoH≤60%
				Typical	10^8					
Turn-ON time			t_{ON}	Typical	1.5	1.1	0.6	1.0	ms	G3VM-21HR : I_F=5 mA, R_L=200 Ω, V_{DD}=10 V ✻ Others : I_F=5 mA, R_L=200 Ω, V_{DD}=20 V ✻
				Maximum	5		2	5		
Turn-OFF time			t_{OFF}	Typical	0.1		0.15			
				Maximum	1		0.5	1		

✻ Turn-ON and Turn-OFF Times



■Recommended Operating Conditions

For usage with high reliability, Recommended Operation Conditions is a measure that takes into account the derating of Absolute Maximum Ratings and Electrical Characteristics.

Each item on this list is an independent condition, so it is not simultaneously satisfy several conditions.

Item	Symbol		G3VM-21HR	G3VM-31HR	G3VM-31HR1	G3VM-41HR	Unit
Load voltage (AC peak/DC)	V_{DD}	Maximum	20	24		40	V
Operating LED forward current	I_F	Minimum	5				mA
		Typical	10			7.5	
		Maximum	20	25		20	
Continuous load current (AC peak/DC)	I_O	Maximum	2000	4000	4500	2000	
Ambient operating temperature	Ta	Minimum	-20				°C
		Maximum	65		85	65	

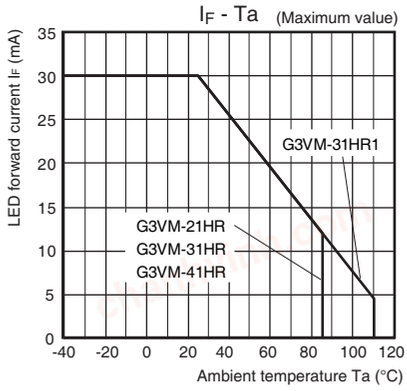
■Spacing and Insulation

Item	Minimum	Unit
Creepage distances	4.0	mm
Clearance distances	4.0	
Internal isolation thickness	0.1	

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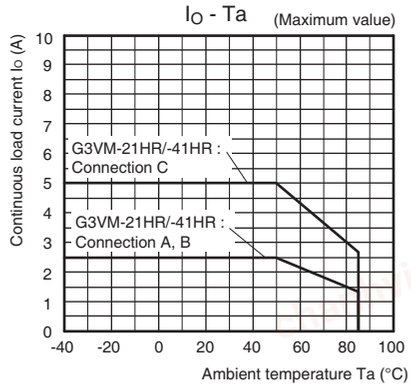
■Engineering Data

●LED forward current vs. Ambient temperature

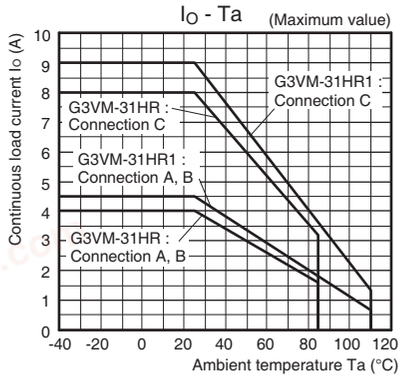


●Continuous load current vs. Ambient temperature

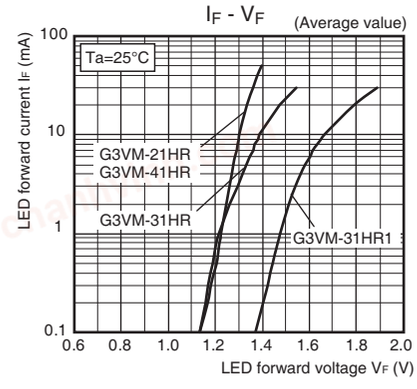
G3VM-21HR/41HR



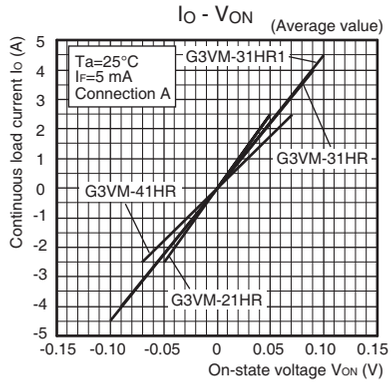
G3VM-31HR/31HR1



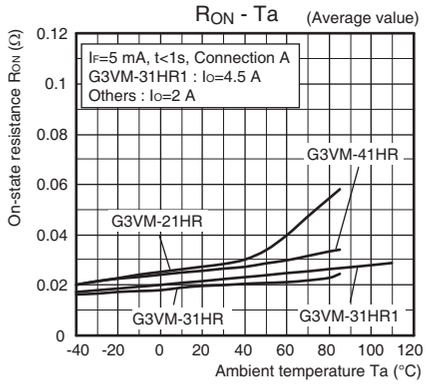
●LED forward current vs. LED forward voltage



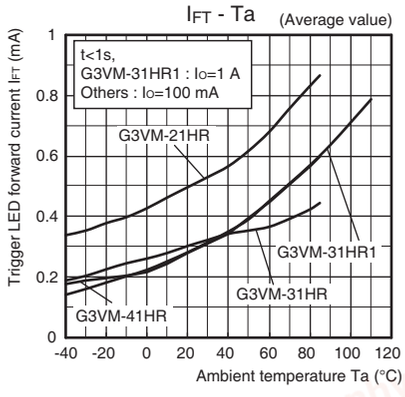
●Continuous load current vs. On-state voltage



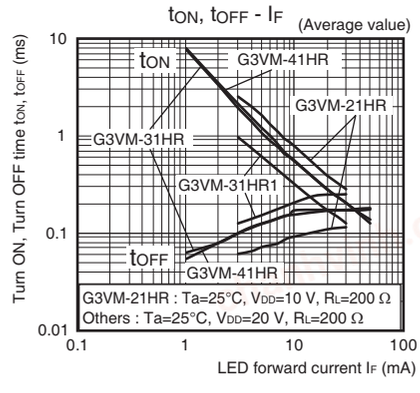
●On-state resistance vs. Ambient temperature



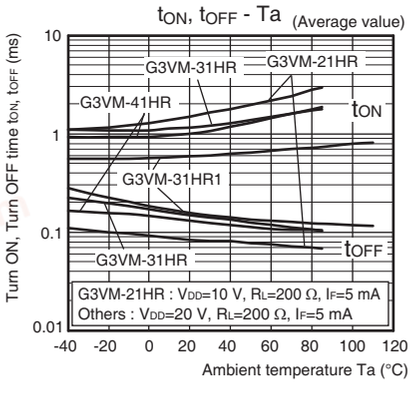
●Trigger LED forward current vs. Ambient temperature



●Turn ON, Turn OFF time vs. LED forward current



●Turn ON, Turn OFF time vs. Ambient temperature

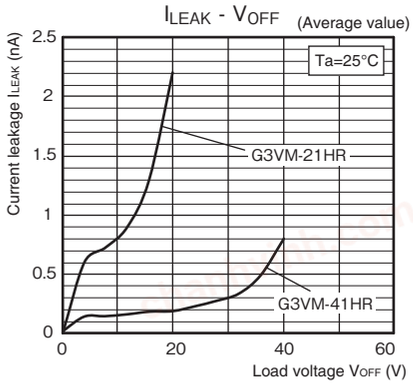


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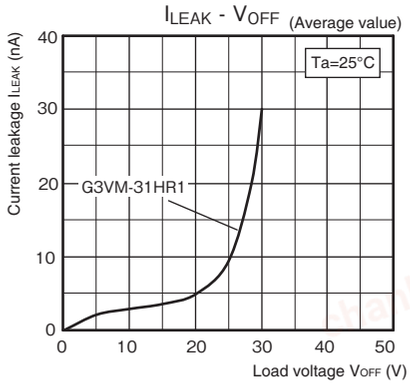
■Engineering Data

●Current leakage vs. Load voltage

G3VM-21HR/41HR

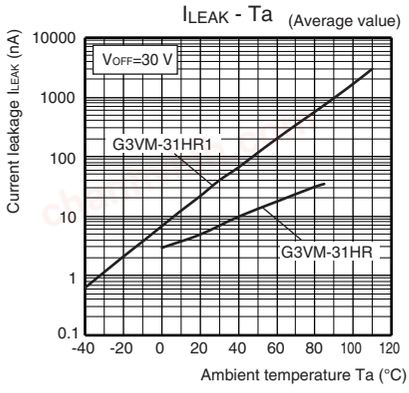


G3VM-31HR1



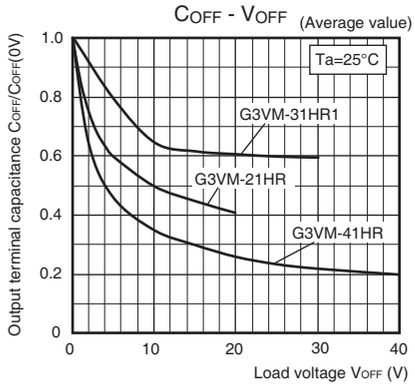
●Current leakage vs. Ambient temperature

G3VM-31HR/31HR1



●Output terminal capacitance vs. Load voltage

G3VM-21HR/31HR1/41HR



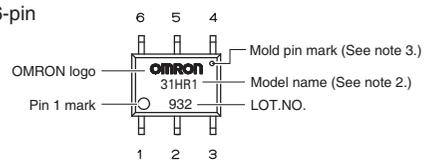
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■Appearance / Terminal Arrangement / Internal Connections

●Appearance

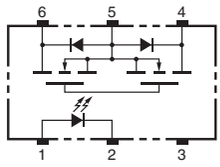
SOP (Small Outline Package)

SOP 6-pin

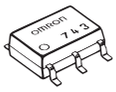


Note: 1. The actual product is marked differently from the image shown here.
Note: 2. "G3VM" does not appear in the model number on the Relay.
Note: 3. The indentation in the corner diagonally opposite from the pin 1 mark is from a pin on the mold.

●Terminal Arrangement/Internal Connections (Top View)

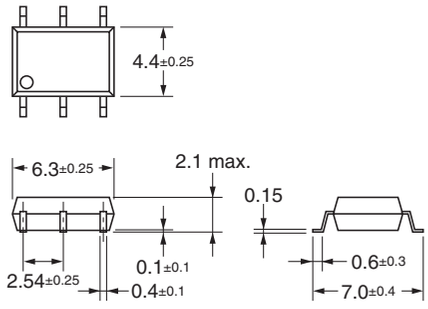


■Dimensions (Unit: mm)



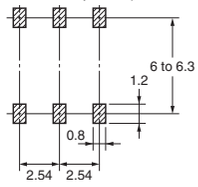
Surface-mounting Terminals

Weight: 0.13 g



Actual Mounting Pad Dimensions

(Recommended Value, Top View)



Note: The actual product is marked differently from the image shown here.

■Approved Standards

UL recognized

Approved Standards	Contact form	File No.
UL (recognized)	1a (SPST-NO)	E80555

■Safety Precautions

• Refer to the *Common Precautions for All MOS FET Relays* for precautions that apply to all MOS FET Relays.

Please check each region's Terms & Conditions by region website.

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