

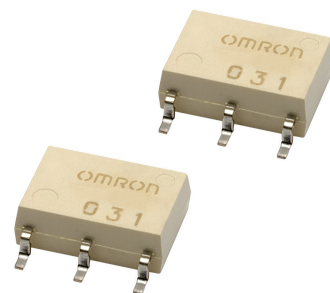
G3VM-21HR/31HR/31HR1/41HR

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.

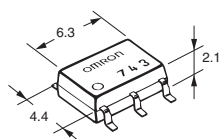
Application Examples

- 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. Contact form | 3. Package |
| 2 : 20 V | 1 : 1a (SPST-NO) | H : SOP 6-pin |
| 3 : 30 V | | |
| 4 : 40 V | 4. Additional functions | 5. Other informations |
| | R : Low ON resistance | 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.

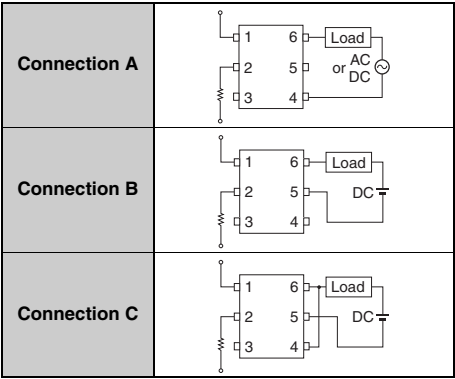
Note: To order tape packaging for Relays with surface-mounting terminals, add "(TR)" or "(TR05)" to the end of the model number.

■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	T _a ≥ 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: T _a ≥ 25°C Others: T _a ≥ 50°C
		Connection B							
		Connection C		-66.7	-80	-90	-66.7		
	Pulse ON current		I _{OP}	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				V _{RMS}	AC for 1 min	
Ambient operating temperature		T _a	-40 to +85		-40 to +110	-40 to +85	°C	With no icing or condensation	
Ambient storage temperature		T _{stg}	-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.

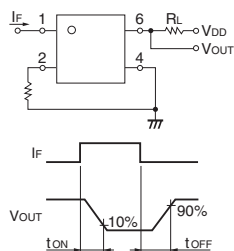
Connection Diagram



■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.

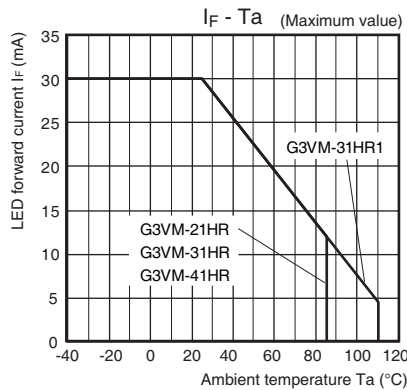
Item	Symbol		G3VM-21HR	G3VM-31HR	G3VM-31HR1	G3VM-41HR	Unit
Load voltage (AC peak/DC)	V _{DD}	Maximum	20	24		40	V
Operating LED forward current	I _F	Minimum	5				mA
		Typical	10			7.5	
		Maximum	20	25	20		
Continuous load current (AC peak/DC)	I _o	Maximum	2000	4000	4500	2000	
Ambient operating temperature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

■Spacing and Insulation

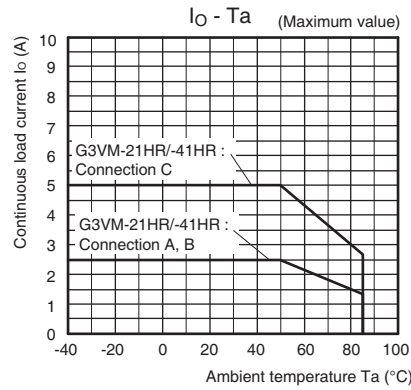
Item	Minimum	Unit
Creepage distances	4.0	mm
Clearance distances	4.0	
Internal isolation thickness	0.1	

Engineering Data

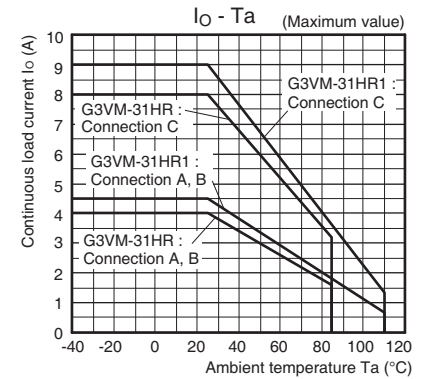
LED forward current vs. Ambient temperature



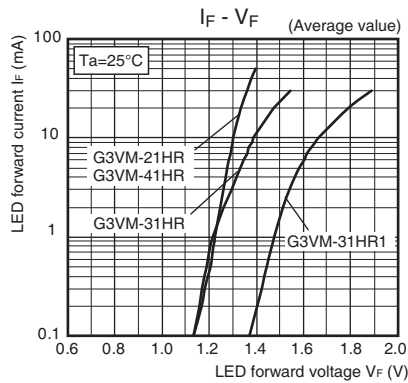
Continuous load current vs. Ambient temperature G3VM-21HR/41HR



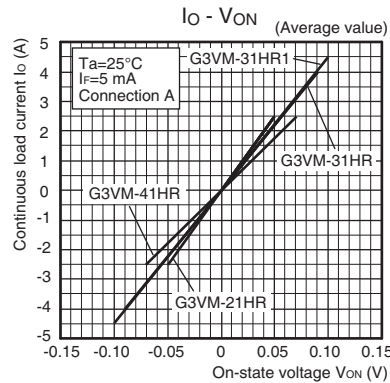
G3VM-31HR/31HR1



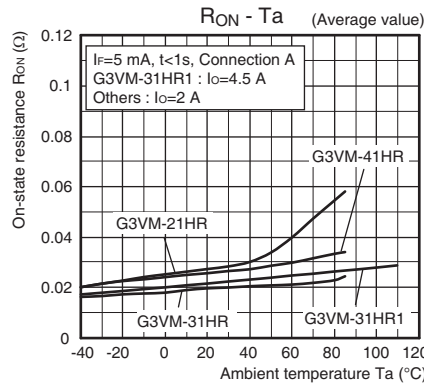
LED forward current vs. LED forward voltage



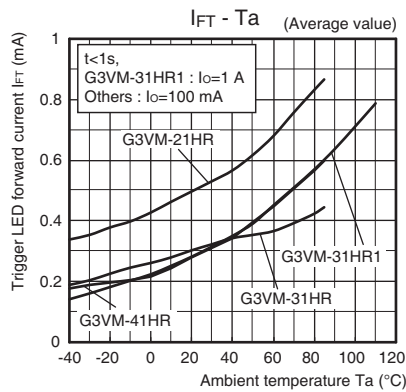
Continuous load current vs. On-state voltage



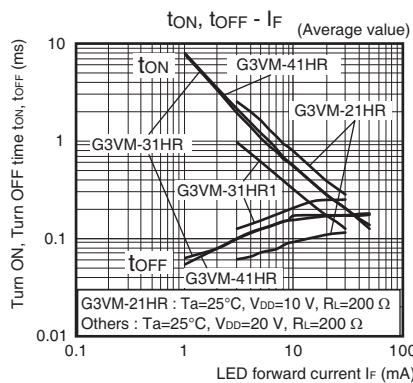
On-state resistance vs. Ambient temperature



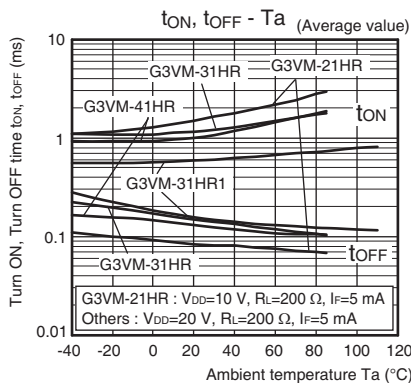
Trigger LED forward current vs. Ambient temperature



Turn ON, Turn OFF time vs. LED forward current

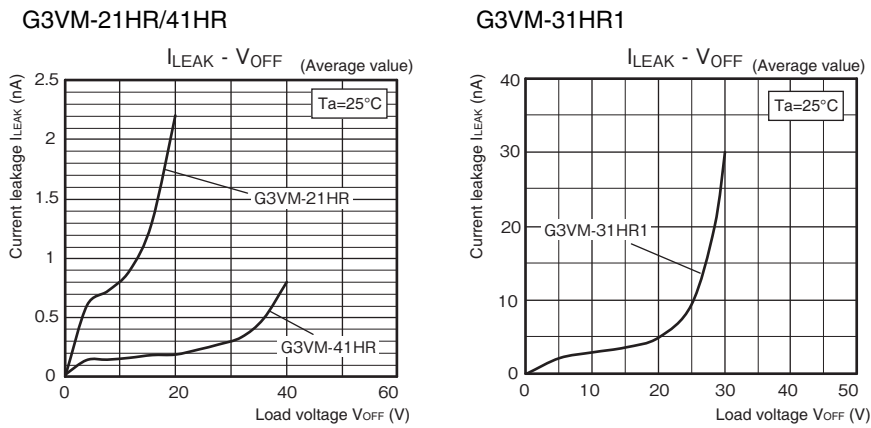


Turn ON, Turn OFF time vs. Ambient temperature

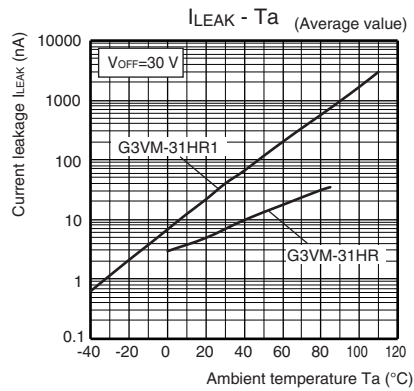


Engineering Data

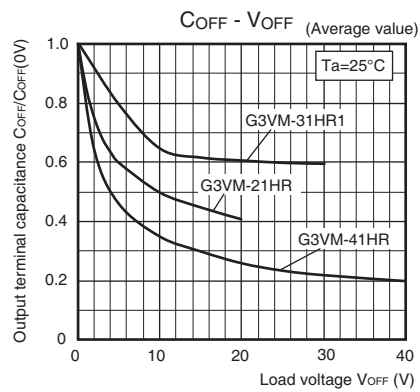
Current leakage vs. Load voltage



Current leakage vs. Ambient temperature
G3VM-31HR/31HR1



Output terminal capacitance vs. Load voltage
G3VM-21HR/31HR1/41HR

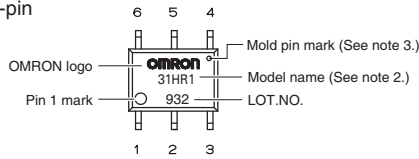


■Appearance / Terminal Arrangement / Internal Connections

●Appearance

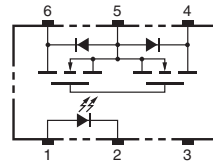
SOP (Small Outline Package)

SOP 6-pin

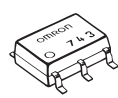


- Note: 1.** The actual product is marked differently from the image shown here.
Note: 2. "G3VM" does not appear in the model number on the Relay.
Note: 3. The indentation in the corner diagonally opposite from the pin 1 mark is from a pin on the mold.

●Terminal Arrangement/Internal Connections (Top View)

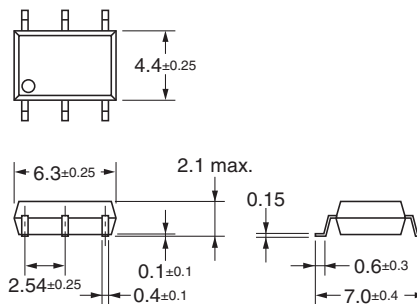


■Dimensions (Unit: mm)



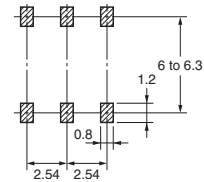
Surface-mounting Terminals

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.

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