

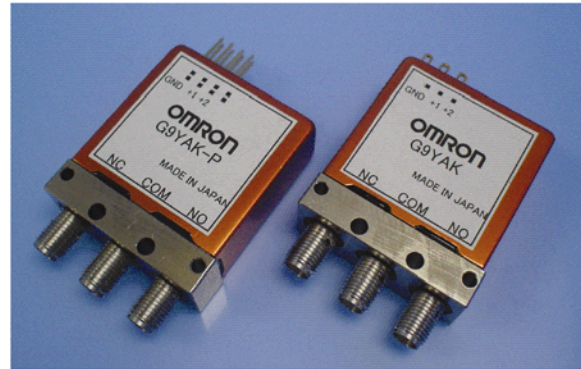
OMRON**OMRON ELECTRONIC COMPONENTS LLC**

PRODUCT, MARKETING, AND BUSINESS NEWS

**MARKETING
UPDATE****NO: RL-115**
DATE: August 2005**PRODUCT: G9YA HF Switching Relays**
TYPE: Product Release

G9YA Coaxial HF Relay, Rated to 26.5 GHz, Meets Needs of Mobile Communications and Broadcast Infrastructure

Omron's new G9YA HF relay with coaxial connector opens sales opportunities across the entire bandwidth (1 to 26.5 GHz) by providing outstanding high-frequency performance and offering the lowest power consumption on the market. The race to revitalize wireless communication infrastructure will generate significant interest in G9YA.



Key Features and Benefits

- **Superior high-frequency characteristics**, such as an isolation of 60 dB min., insertion loss of 0.8 dB max., and V.SWR of 1.7 max. at 26.5 GHz (50 Ω).
- **Three relay function types:** Failsafe, Dual Coil Latching and TTL-driven dual coil latching
- **Capable of carrying up to 120 W** of power at 3 GHz while operating within an ambient temperature range of -55°C to +85°C
- **Lowest coil power consumption switch in the world:** At 700 mW (Failsafe) and 500 mW (Dual Coil Latching and TTL-Driven Dual Coil Latching).
- **Long service life** (5 million operations minimum) at 3 GHz, 5 W, resistive load
- **Wide choice of terminations:** Solder Terminals, Pin Terminals and Connector Cables.
- **RoHS compliant**

Typical Applications

- Mobile phone stations and antenna devices
- Wireless devices, wireless LAN, and disaster prevention wireless
- Test equipment, measuring equipment, and jigs
- Broadcasting facilities (digital TV, cable TV, and satellite broadcasting)

Literature Support

The G9YA data sheet provides complete specifications and shows the full range of part numbers. It is available in PDF format on Omron's www.components.omron.com website in the Document Library. Just type G9YA into the search engine.

Competition

Major US competitors with strong offerings of coaxial HF relays include Agilent, Teledyne, and DowKey. The overview below shows the global market players and their relative strengths and weaknesses.

Com petitor	M atsu shi ta	H iro se	H itachi D ens hi T ech no sys tem s	S anyu	K M W
Vari at ion num ber	Sm all	Sm all	Large	M edium	m edium
P rice	M iddle	H igh	Low	H igh	Low
D eliv ery	Short	M iddle	Short	M iddle	M iddle
Q uality	Good	Good	Bad	Bad	M iddle
Spec	H igh	Low	Low	Low	M iddle
Serv ice	Good	Good	M iddle	M iddle	Bad
Fea ture		C onnect er m aker		R eed sw itch	K orean



Com petitor	T eledyne	A gilent	D B P	D M T	D ow key
Vari at ion num ber	Large	Large	Large	Large	Large
P rice	H igh	H igh	Low	Low	M iddle
D eliv ery	Long	Long	Long	Long	Long
Q uality	Good	Good	M iddle	Good	Good
Spec	H igh	H igh	H igh	H igh	H igh
Serv ice	Bad	Bad	Bad	Bad	Bad
Fea ture	strong in m ilitary	strong in T ester	strong in A ircraft		No.1 m aker



The following pages provide detailed feature comparisons among the competitors.

Manufacturer (Country) Type		Omron (Japan) G9YA			Panasonic (Japan) RD1/5			Hirose Electric Co. (Japan) HCS2			HitachiDenshiTechnosystem (Japan) CX-230		
1. Dimensions		37.8(H)*34.0(W)*13.2(L) (mm)			39.0(H)*34.0(W)*13.2(L) (mm)			35.3(H)*36.0(W)*14.4(L) (mm)			29.9(H)*34(W)*12.7(L) (mm)		
2. Rated voltage		12V/24V/28V			4.5V (Fail-safe & Latching) 5V (TLL inputs)/12V/24V			10V/12V/17V/20V/26V			12V/24V/48V		
3. power consumption	Fail-safe	700mW			840mW (Ø70mW DC24V)			320 to 2940mW fits different in Voltage spec.			○		
	Latching	500mW			700mW (DC4.5)/750mW (DC12V)/900mW (DC24V)						○		
4. Operating function	Fail-safe				---			---			---		
	Latching				Normal, Self-Cutoff (TLL inputs)			---			---		
5. Option	TTL	○			○ (Latching)			---			Under development		
	Indicator	○			Standard equipment			○			Under development		
	Seal type	○			○			---			---		
	Positive + Com				---			---			---		
6. Operating terminal		Solder terminal			Solder terminal Connector cable			Harness			Solder terminal		
7. Packaging		---			○ Data packaging			---			---		
8. Contact material		Au coating			Au coating			Au coating			---		
9. Contact resistance		100mΩ Max.			100mΩ Max.			Voltage drop 4mV Max. (at DC1A)			50mΩ Max.		
10 High-frequency characteristic	Frequency band	DC to 26.5GHz			RD1: DC to 18GHz, RD5: DC to 26.5GHz			DC to 15GHz			DC to 14GHz		
		V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation
	to 1GHz	1.1	0.1	85	1.1	0.2	85	---	---	---	---	---	---
	1 to 4GHz	1.15	0.2	80	1.15	0.2	80	1.2	0.2	---	---	---	---
	4 to 8GHz	1.25	0.3	70	1.25	0.3	70	1.25	0.3	---	1.2 (to 10GHz)	0.2 (to 5GHz)	70 (to 6GHz)
	8GHz to 12.4GHz	1.35	0.4	65	1.35	0.4	65	1.4	0.4	---	---	---	---
	12.4GHz to 18GHz	1.5	0.5	60	1.5	0.5	60	1.5 (to 15GHz)	0.5 (to 15GHz)	60 (to 15GHz)	1.3 (to 14GHz)	0.3 (to 14GHz)	60 (to 14GHz)
18GHz to 26.5GHz	1.7	0.8	60	1.7	0.8	55	---	---	---	---	---	---	
11. Contact carry power		120W (at 3GHz, V.SWR 1.15 Max., Ambient temp. 40°C)			20W (at 3GHz, V.SWR 1.15 Max., Ambient temp. 40°C)			15W (Maximum operate power)			30W (Carry power)		
12. Operating time		15m sec Max.			15m sec Max.			30m sec Max.			30m sec Max.		
13. Insulation resistance		1000MΩ Min. (at DC 500V)			1000MΩ Min. (at DC 500V)			5000MΩ Min. (at DC 500V)			Contacts and Earth 500MΩ以上 (at DC 500V) Between Contacts 100MΩ以上		
14. Dielectric strength	Between contacts	AC 500V 1m in (10mA)			AC 500V 1m in (10mA)			Not dielectric breakdown (AC 100V 1m in)			AC 500V 1m in 50Hz		
	Coil and contacts										---		
	Earth and contacts										AC 1000V 1m in 50Hz		
	Coil and earth										---		
15. Shock resistance	Malfunction	500m/s ² (Half sine wave 30ms/10μs Max.)			500m/s ² (Half sine wave 11ms/10μs Max.)			490m/s ² (Half sine wave, 1μs Max.)			---		
	Destruction	1000m/s ² (Half sine wave 11ms)			1000m/s ² (Half sine wave 11ms)			---			---		
16. Vibration resistance	Malfunction	10 to 55Hz 3.0mm Double amplitude (10μs以下)			10 to 55Hz 3.0mm Double amplitude (10μs以下)			10 to 55Hz 1.52mm Double amplitude 2H and 10 to 500Hz 49m/s ² 3H (1μs Max.)			---		
	Destruction	10 to 55Hz (5.0mm Double amplitude)			10 to 55Hz (5mm Double amplitude)			---			---		
17. Mechanical endurance		5,000,000 operations Min. at 5Hz			5,000,000 operations Min. at 3Hz			No assist contact 30,000 operations assist contact 10,000 operations			---		
18. Electrical endurance		5m il 0 operations Min. 5W 3GHz V.SWR 1.2 m in. (at 0.33Hz)			5m il 0 operations Min. 5W 3GHz V.SWR 1.2 m in. (at 0.33Hz)			---			100,000 operations		
19. Ambient	temperature	-55 to 85°C			-55 to 85°C			-0 to 50°C			-20 to 60°C		
	Humidity	Operating: 5% to 85%RH			Operating: 5% to 85%RH			Operating: 90%RH Max.			---		
20. Weight		50g			50g			50g			35g		
21. Standard		---			---			---			---		
22. Manufacturing quantity (01)		---			3000 pcs			5000 pcs			20000 pcs		
23. Current customer		---			---			---			---		
24. Remarks		---			For communication base station The share of sales is 100% in Japan.			The share of sales both area of test equipment and communication base station is almost 50% each other. The issue of endurance is 30000 operations			The main sales is for communication base station in Japan. Somewhere else, there are for measuring equipment and communication of a few aeronautical stations. Arrangement with Dow-Key is failure.		

Manufacturer (Country)		DowKey Microwave (USA California)											
Type		401			403			919			909		
1. Dimensions		35.6/45.7(H)*34.0(W)*13.2(L) (mm)			30.0/35.6(H)*34.0(W)*13.2(L) (mm)			29.21/35.6(H)*34.0(W)*12.7(L) (mm)			33.1/38.1(H)*34.0(W)*12.7(L) (mm)		
2. Rated voltage		12V/15V/20V/24V/28V			←			28V			28V		
3. power consumption	Failsafe	12V 2340mW/28V 2660mW			←			3360mW			×		
	Latching	12V 2760mW/28V 3360mW			---			---			2660mW		
4. operating function	Failsafe	Failsafe/Failsafe with Suppression Diode			←			---			---		
	Latching	Pulse Latching,Latching Self Cutoff, Pulse Latching with Suppression Diodes			---			---			Standard,Pulse Latch		
5. option	TTL	○ TTL High,TTL LOW, JANTX TTL High(Failsafe)			○ TTL High			○ TTL High			○ TTL High		
	Indicator	○			---			○			○		
	Seal type	○ Immersion Seal(Epoxy Seal)			○ Immersion Seal			---			---		
	Positive + Com	○ (Latching)			---			---			○		
Others		High Power,DC Connector,26.5GHz,5mS,-55 to 85°C,Pins-PCB-M			High Power, 26.5GHz, -55~85°C, Pins-PCB-M			High Power			High Power		
6. operating terminal		Solder terminal			Solder terminal (side)			Solder terminal (side)			Solder terminal		
7. Packaging		---			←			←			←		
8. Contact material		---			←			←			←		
9. Contact resistance		---			←			←			←		
10 High-frequency characteristic	Frequency band	DC to 18GHz/DC to 26.5GHz (Type K)			←			DC to 18GHz			DC to 18GHz		
		V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation
	to 1GHz	1.1	0.1	85	←	←	←	1.15	0.15	80	1.15	0.15	80
	1 to 4GHz	1.15	0.15	80	←	←	←	1.25	0.2	80	1.25	0.2	80
	4 to 8GHz	1.2	0.2	70	←	←	←	1.35	0.35	70	1.35	0.35	70
	8GHz to 12.4GHz	1.3	0.3	65	←	←	←	1.45	0.45	60	1.45	0.45	60
12.4GHz to 18GHz	1.35	0.35	60	←	←	←	1.5	0.5	60	1.45	0.45	60	
18GHz to 26.5GHz	1.5	0.5	55	←	←	←	---	---	---	---	---	---	
11. Contact carry power		---			←			←			←		
12. operating time		15m sec Max.			←			20m sec Max.			20m sec Max.		
13. Insulation resistance		---			←			←			←		
14. Dielectric strength	Between contacts	---			←			←			←		
	Coil and contacts	---			←			←			←		
	Earth and contacts	---			←			←			←		
15. Shock resistance	Coil and earth	---			←			←			←		
	Malfunction	---			←			←			←		
Destruction	50G/1/2 Sine/11ms			←			←			←			
16. Vibration resistance	Malfunction	10G RMS/20-2000Hz			←			20g's sine/random			20g's sine/random		
	Destruction	---			←			←			←		
17. Mechanical endurance		1,000,000 operations			←			←			←		
18. Electrical endurance		---			←			←			←		
19. Ambient	temperature	-25 to 65°C (-55°C to 85°C Type T)			←			-55°C to 85°C			-55°C to 85°C		
	Humidity	---			←			←			←		
20. Weight		71g			42g			57g			57g		
21. Standard		---			←			←			←		
22. Manufacturing quantity (01)		Very small quantity			50,000pcs			200,000pcs			50,000pcs		
23. Current customer		CHAOYUEWUXIAN (401A)			---			---			---		
24. Remarks		<p>The start of development for first coaxial switch is in 1952. The user appreciates their works compared competitor as the veteran coaxial manufacturer.</p> <p>Half of all manufacturing quantity is supplied for communication base station. The characteristic is 40% of supplying average for space and military related.</p> <p>This company is the biggest supplier for military related. Now in Japan, SHOSHIN Co. are selling as their distributor.</p> <p>It is 54 and 919 series that single manufacturing quantity is large, and the quantities are 250Kpcs/year and 200Kpcs/year.</p>											

Manufacturer (Country)		Agilent Technologies (USA California)			Ducommun Technologies (USA California)								
Type		8765A/B			D1			D3			D13		
1. Dimensions		41.63(H)*37.84(W)*13.97(L) (mm)			22.35 to 42.67(H)*38.1(W)*13.21(L)			22.35 to 42.67(H)*31.75(W)*13.21(L)			35.05(H)*34.04(W)*13.21(L)		
2. Rated voltage		5V/10V/15V/24V			28V			28V			28V		
3. power consumption	Failsafe	---			4480mW			4480mW			4480mW		
	Latching	1925 to 3000mW (It's different in Voltage spec.)			○			○			---		
4. Operating function	Failsafe	---			---			---			---		
	Latching	---			Pulse-Latching, Latching with Self De-energizing Circuit			Pulse-Latching, Latching with Self De-energizing Circuit			---		
5. Option	TTL	---			○ TTL High, TTL LOW			○ TTL High, TTL LOW			---		
	Indicator	---			---			---			---		
	Seal type	---			---			---			---		
	Positive + Common	○ Positive-, Negative-, Polarity-Common)			---			---			---		
Others		---			High Power			---			---		
6. Operating terminal		Harness terminal Connector cable (20.3cm, 40.6cm)			Harness			Harness (Top/Side)			Harness		
7. Packaging		Commercial calibration certificate with test data			---			---			---		
8. Contact material		---			---			---			---		
9. Contact resistance		---			---			---			---		
10. High-frequency characteristic	Frequency band	8765 A DC to 4GHz/B DC to 20GHz			DC to 22GHz			DC to 22GHz			DC to 22GHz		
		V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation
	to 1GHz	---	0.2+0.025f	110 to 2.25f	---	---	---	---	---	---	---	---	---
	1 to 4GHz	1.2			1.2 (to 3GHz)	0.2 (to 3GHz)	80 (to 3GHz)	1.2 (to 3GHz)	0.2 (to 3GHz)	80 (to 3GHz)	1.2	0.2	80
	4 to 8GHz	1.35			1.3	0.3	70	1.3	0.3	70	1.3 (to 3GHz)	0.3 (to 3Hz)	70 (to 3GHz)
	8GHz to 12.4GHz	1.35			1.4	0.4	60	1.4	0.4	60	1.4	0.4	60
	2.4GHz to 18GHz	1.45			1.5	0.5	60	1.5	0.5	60	1.5	0.5	60
	8GHz to 26.5GHz	1.7 (~20GHz)			1.6 (to 22GHz)	0.6 (to 22GHz)	55 (to 22GHz)	1.6 (to 22GHz)	0.6 (to 22GHz)	55 (to 22GHz)	1.6	0.6	55
11. Contact carry power		100W (non-switching)/2W (switching)			Need to confirm			Need to confirm			Need to confirm		
12. Operating time		15m sec Max.			15m sec Max.			15m sec Max.			20m sec Max.		
13. Insulation resistance		---			---			---			---		
14. Dielectric strength	Between contacts	---			---			---			---		
	Coil and contacts	---			---			---			---		
	Earth and contacts	---			---			---			---		
15. Shock resistance	Malfunction	50g's (6ms/6direction)			---			---			---		
	Destruction	Half sine :500g's@0.5ms, 3drops/direction/18total			---			---			---		
16. Vibration resistance	Malfunction	7g's 5to2000Hz 0.25" P-P			---			---			---		
	Destruction	20g's 20to2000Hz@0.06" P-P 4in/cycle, 4cycle/axis 2.41 g (ms) 10min/axis			---			---			---		
17. Mechanical endurance		10 Mil Operations Min.			1 Mil Operations Min.			1 Mil Operations Min.			1 Mil Operations Min.		
18. Electrical endurance		500 Mil Operations Min. (2W) Ins 0.03 Max.			---			---			---		
19. Ambient	temperature	-25~75°C			-35~85°C			-35~85°C			-35~85°C		
	Humidity	---			---			---			---		
20. Weight		---			---			---			---		
21. Standard		MIL-STD-202F/461C			MIL-E-5400, MIL-S-3928, MIL-C-26074, MIL-G-45204			MIL-E-5400, MIL-S-3928, MIL-C-26074, MIL-G-45204			---		
22. Manufacturing quantity (01)		8765A :80,000pcs/8765B :70,000pcs			D140000pcs			D30			D13 :0		
23. Current customer		---			---			---			---		
24. Remarks		8765C (26.5GHz) uses <u>3.5mm</u> connector. 8765D (40GHz) uses <u>2.4mm</u> connector. Main product is 8761A/B of low cost. The manufacturing quantity is 260Kpcs each other in 2001. Measurement equipment (75%)/Communication base station (6%) General consumer			Ducommun Technologies Co. is positioned as one company of 5 companies under the control of Ducommun Inc.. All companies under the control supply their products for airline industry as their main business. Because Ducommun Inc. has grown that they supplied the materials for airline industry. The main product is DX1/DX3 at 26.5GHz which was developed for switching signal of aiplane. This manufacturing quantity is 30% of the total. <u>APC3.5</u> is used as the connector. And, Quantity of low cost type for communication equipment is 65% of the total The product at 40GHz is lineup, too. (Using <u>K-connector</u>)								

Manufacturer (Country)		Teledyne Wireless (USA California)						DB Products (USA California)					
Type		CCR-33/CCR-53 (COMMERCIAL)			CR-33/CR-53 (ELITE)			2S/2SE			2R/2RE		
1. Dimensions		33.0/45.7(H)*38.1(W)*13.2(L) (mm) 33.0/45.7(H)*34.0(W)*13.2(L) (mm) Narrow Type			33.0/45.7(H)*38.1(W)*12.7(L) (mm) 33.0/45.7(H)*34.0(W)*13.2(L) (mm) Narrow			31.75 to 46.48(H)*32.26(W)*12.7(L) (mm) R-Type W : 47.75			31.75 to 57.15(H)*44.45(W)*18.29(L) (mm)		
2. Rated voltage		12V/15V/28V			←			5V/12V/15V/24V/28V			←		
3. power consumption	Failsafe	2400mW DC12V,DC15V/2520mW DC28V)			←			3600mW (3780mW DC28V)			3500 to 3900mW		
	Latching	1680mW DC12/1725mW DC15V/1820mW DC28V)			←			2325 to 2660mW			2325 to 2660mW		
4. operating function	Failsafe	X			←			Standard/Diodes			←		
	Latching	Standard/Self Cutoff Only			←			Pulse Latching/Latching Self-Cut-Off (Both selectable Diodes)			←		
5. option	TTL	○ With Diodes			←			○ TTL High,TTL LOW			○ TTL High,TTL LOW Latching Self-Cut-Offは1種類		
	Indicator	○			←			○			←		
	Seal type	△ Immersion Seal/Moisture Seal Available			Moisture Seal Available			○ Moisture Seal			←		
	Positive + Com Others	○ Narrow Width Type			←			○ (Negative,Positive,Not Applicable) Solder Terminal-Shell Connector, High Temperature,R-Type			Solder Terminal-Shell Connector, High		
6. operating terminal		Harness						L type terminal					
7. Packaging		---						---					
8. Contact material		---						---					
9. Contact resistance		---						---					
10. High-frequency characteristic	Frequency band	CCR-33 DC to 22GHz/CCR-53 DC to 26.5GHz			CR-33 DC to 22GHz,CR-53 DC to 26.5GHz			2S DC to 18GHz/2SE DC to 26.5GHz			2R DC to 18GHz/2RE DC to 26.5GHz		
		V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation	V.SWR	Insertion Loss	Isolation
	to 1GHz	---	---	---	←	←	←	---	---	---	---	---	---
	1 to 4GHz	---	---	---	←	←	←	1.25	0.2	80	1.2	0.2	80
	4 to 8GHz	1.25 (to 6GHz)	0.2 (to 6GHz)	70 (to 6GHz)	←	←	←	1.25	0.25	75	1.25	0.25	75
	8GHz to 12.4GHz	1.4	0.4	60	←	←	←	1.3	0.3	70	1.3	0.3	75
	2.4GHz to 18GHz	1.5	0.5	60	←	←	←	1.35	0.4	60	1.35	0.4	70
8GHz to 26.5GHz	1.8 (CCR-33 :1.6)	0.7 (CCR-33 :0.6)	50	1.8 (CR-33 :1.6)	0.7 (CR-33 :0.6)	←	1.5 (2SE)	0.5 (2SE)	50 (2SE)	1.5 (2RE)	0.5 (2RE)	60 (2RE)	
11. Contact carry power		150W at 1GHz (extract from Graph)			←			Need to confirm			←		
12. operating time		20m sec Max. (Latching 10m sec Max.)			←			15m sec Max.			←		
13. Insulation resistance		---						---					
14. Dielectric strength	between contacts	---						←					
	Coil and contacts	←						←					
	earth and contacts	←						←					
15. Shock resistance	Malfunction	---						←					
	Destruction	ML-STD-202 Me213 ConD (500G)			←			---			←		
16. Vibration resistance	Malfunction	---						←					
	Destruction	ML-STD-202 Me214 ConD (10G RMS)			←			---			←		
17. Mechanical endurance		2 years or 5,000,000 operations						1 Mil 0 operations Min.					
18. Electrical endurance		---						←					
19. Ambient	temperature	-25~65°C			-54~85°C			failsafe :-55 to 85°C/Latching :-25 to 85°C			-25 to 65°C		
	Humidity	---						←					
20. Weight		47g						←					
21. Standard		ML-STD-202, ML-HDBK-217F			←			60g			128g		
22. Manufacturing quantity (01)		CCR-33 280,000pcs/CCR-53 460,000pcs			CR-33 10,000pcs,CR-53 30,000pcs			---			2SE 5000pcs		
23. Current customer		Amplis CCR0-33S60-N)			---			Tektronix (2SE), CHAOYUEWUXIAN (2S1A3)			---		
24. Remarks		Product lineup divides into commercial type (for general purpose) and elite type (high reliability) depending on width of ambient temperature. General purpose type is 65% of the total for mobile base station. High reliability type is 30% for military, space, measurement field. CCR-53 as main product account for about 50% of manufacturing quantity.						Total manufacturing quantity of the year is 20K pcs level. The average of supplying for space field is high. It is about 30%. Tektronix changed from RD to DBP. The request of the size is 1.275(w) x 1.25(h) x 0.5(d)					