HFKAH/HFKAH-T AUTOMOTIVE RELAY

Typical Applications

High voltage pre-charge relay applications for electric vehicles (HEV, PHEV, BEV, FCV), etc.

Features

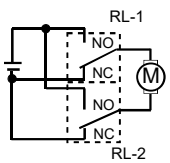
- 25A motor locked load
- Extremely small relay
- Form A and Form C available
- Single and twin version available
- 30A fuse available
- Reflow soldering version available (HFKAH-T)
- RoHS & ELV compliant

CHARACTERISTICS

Contact arrangement	1C , 2C , 1A , 2A
Voltage drop(initial)[1]	Typ.:50mV(at 10A) Max.:250mV(at 10A)
Max. continuous current[2]	33.8A 10min/25A continuous(23℃) 31A 10min(85℃) HFKAH-T:29A 10min(125℃) Monostable and low power consumption: 40.5A 30min(23℃)
Max. switching current[3]	NO:60A，NC:30A
Max. switching current[4]	16VDC
Min. contact load[5]	1A 12VDC
Electrical load	See "CONTACT DATA"
Mechanical endurance	1×10⁷ OPS 300ops/min
Insulation resistance(initial)	100MΩ(500VDC)
Withstand voltage(initial)[6]	Between contacts：500VAC Coil & contacts：500VAC
Operate time(initial)	Typ.:2.5ms(at nomi. vol.) Max.:10ms(at nomi. vol.)
Release time[6]	Typ.:1.2ms, Max.: 10ms
Ambient temperature	HFKAH:-40℃ to 85℃ HFKAH-T:-40℃ to 125℃
Vibration resistance[7]	10Hz to 500Hz, 49m/s²
Shock resistance[7]	98m/s²
Termination	PCB[8]
Construction	Plastic sealed,Flux proofed
Unit weight	Single relay: Approx.4g Twin relay: Approx.8g

1) Initial value, Equivalent to the max. initial contact resistance is 100mΩ (at 1A 6VDC).
2) The test under the follow conditions:
   a. The relay is mounted on the PCB, the coil is applied with 100% rated voltage;
   b. The PCB board is a double layer board, the thickness of the copper foil is 4 oz(140μm), the width if each copper foil is 3.76×(1±5%)mm, the length of the copper foil is 50 mm±1 mm, and the Tg value of the PCB is 150℃;
   c. Not suitable for double relay adding load simultaneously.
   d. It varies by connection conditions. Additionally, reliable performance under repeated power-on cannot be guaranteed. Verify based on actual operating conditions during use.
3) 23℃,14VDC(100OPS,Resistive).
4) See "Load limit curve" for details.
5) Lower limit target for on-off operation at low load. This value varies by on-off frequency, environmental conditions and expected reliability level; verify with actual load during use;
6) 1 min, leakage current less than 1mA.
7) The value is measured when voltage drops suddenly from nominal voltage to 0VDC and coil is not paralleled with suppression circuit.
8) When not excited, the closing time of the normally closed contact is less than 10μs. At the same time, the normally open contact cannot be closed; During excitation, the opening time of the normally open contact is less than 10μs.
9) Since it is an environmental friendly product,please select lead-free solder when welding.The recommended soldering temperature and time is (260±3)℃,(5±0.5)s.

CONTACT DATA[1]

Load voltage	Load type[2]		Load curren A		On/Off ratio		Electrical endurance ops	Load wiring diagram
			1C, 2C		On s	Off s		
			NO	NC				
13.5VDC	Motor	Make[1]	25	—	0.5	9.5	1x10⁵	
		Break	25	—				
	Simulate window operation	Make[1]	25	—	0.2	4	1x10⁵	
		Stable	10	—	2.3			
		Break	25	—	0.5			
	Simulate motor free operation	Make[1]	27	—	0.02	1.8	1x10⁵	
		Transient	17	—	0.03			
		Break	8	—	0.15			

Notes:1)Corresponds to the peak inrush current on initial actuation (motor).
2)When applied in flasher, a special silver alloy ($AgSnO_2$) contact material should be used and the customer special code should be (170) as a suffix. Please heed the anode and cathode's request when wired, common terminal should connect with anode.
3)When the load voltage is at 24VDC or higher, or the application conditions are different from the table above, please submit the detailed application conditions to Hongfa to get more support.
4)When the load requirement is different from content of the table above, please contact Hongfa for relay application support.

COIL DATA

Coil Power	Nominal voltage VDC	Pick-up voltage VDC max.			Drop-out voltage VDC min.			Coil resistance ×(1±10%)Ω			Power consumption W
		23˚C	85˚C	125˚C	23˚C	85˚C	125˚C	23˚C	85˚C	125˚C	23˚C
Monostable and low power consumption	12	7.5	9.4	10.6	1.0	1.2	1.4	300	374.4	422.4	0.48
Monostable and standard	12	7.2	9.0	10.2	1.0	1.2	1.4	225	280.8	316.8	0.64
Monostable and high power consumption	12	6.5	8.2	9.2	1.0	1.2	1.4	180	224.6	253.4	0.8

ORDERING INFORMATION

HFKAH / 12 -1H S L T (XXX)

Type	**HFKAH**：Standard **HFKAH-T**： Reflow soldering version/ High-temperature version
Coil voltage	**12**：12VDC
Contact arrangement	**1H**：1 Form A **1Z**：1 Form C **2H**：2 Form A **2Z**：2 Form C
Construction[1)]	**S**：Plastic sealed[1)] **Nil:** Flux proofed
Coil Power	**P**：Monostable and high power consumption **L**：Monostable and low power consumption **Nil:** Monostable and Standard
Contact material	**T**：$AgSnO_2$
Special code[2)]	**XXX**：Customer special requirement **Nil:** Standard

Notes:1) Contact us for suitable soldering conditions and product specifications if post-soldering cleaning or surface treatment is required after the relays are soldered onto the PCB.
2) The customer special requirement express as special code after evaluating by Hongfa.For example:The performance parameters of products with characteristic numbers shall be subject to the specific specifications provided by Hongfa.

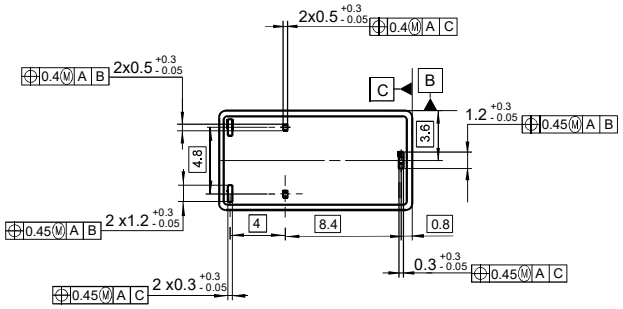
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

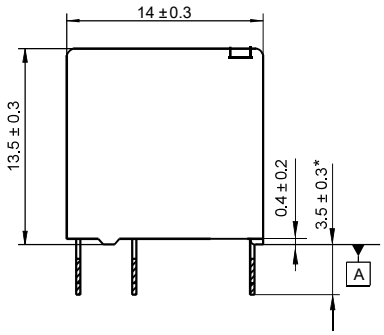
Unit: mm

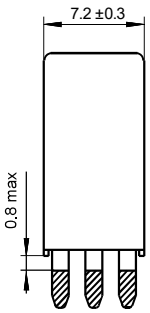
Outline Dimensions

HFKAH(Standard)

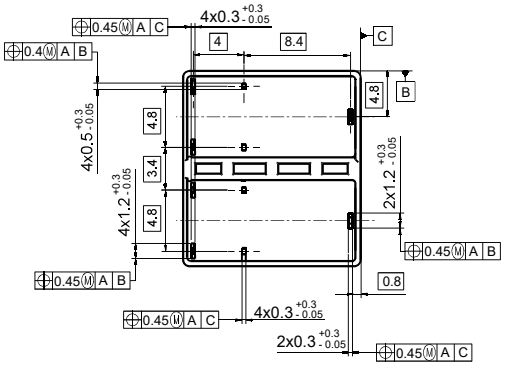
1Z: 1 Form C (Single version)

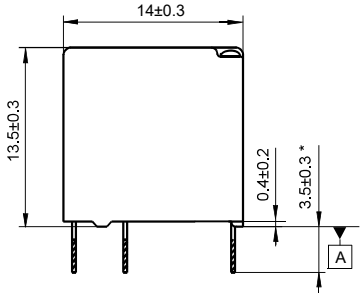


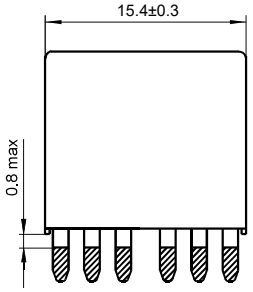




2C: 2 Form C (Twin version)







Remark: * The additional tin top is max. 1mm.

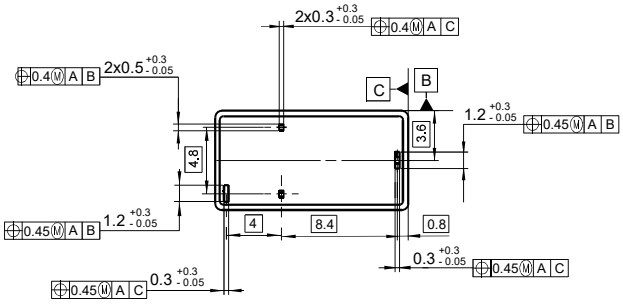
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

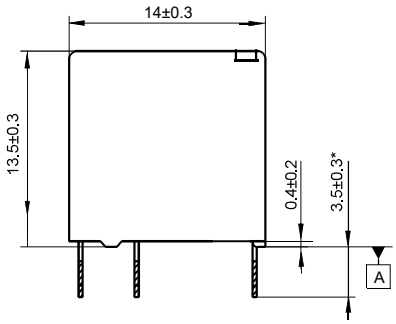
Unit: mm

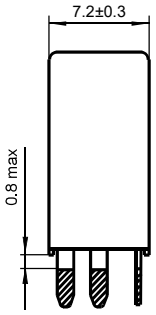
Outline Dimensions

HFKAH(Standard)

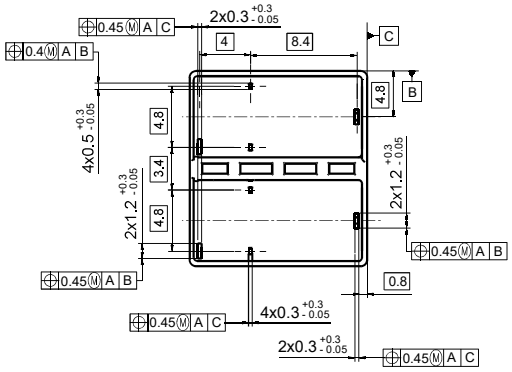
1H: 1 Form A (Single version)

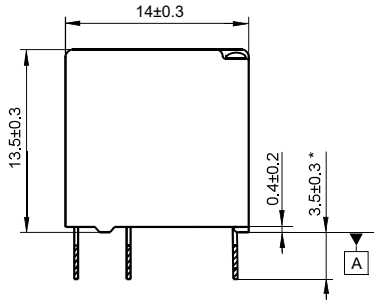


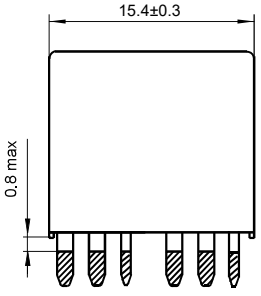




2H: 2 Form A (Twin version)







Remark: * The additional tin top is max. 1mm.

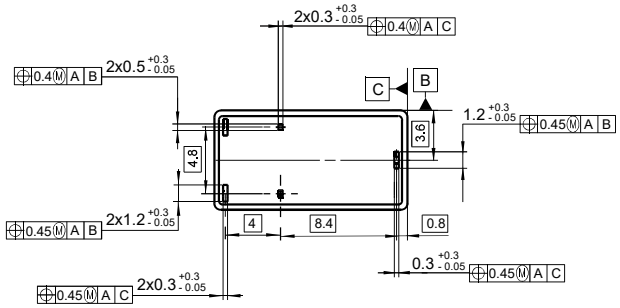
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

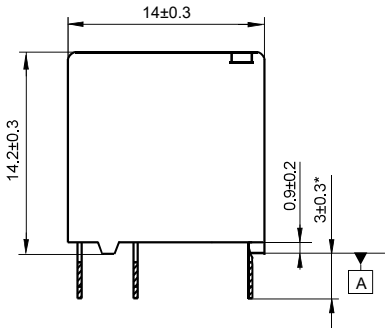
Unit: mm

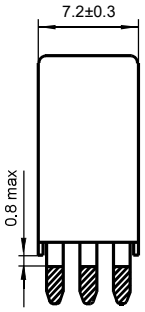
Outline Dimensions

HFKAH-T (Reflow soldering version / High-temperature version)

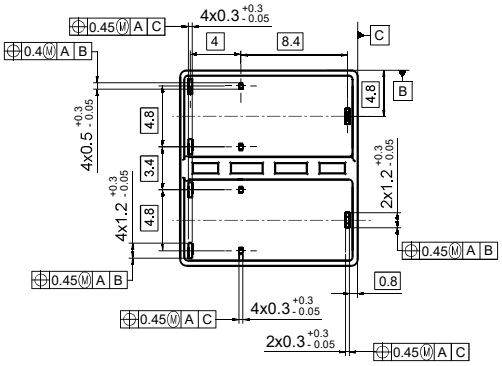
1Z: 1 Form C (Single version)

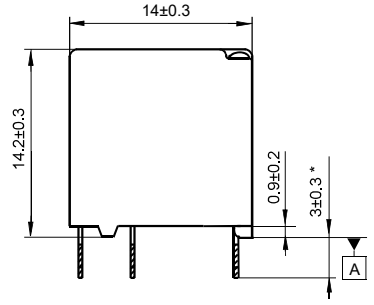


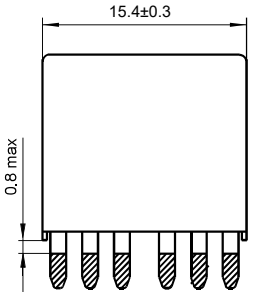




2Z: 2 Form C (Twin version)







Remark: * The additional tin top is max. 1mm.

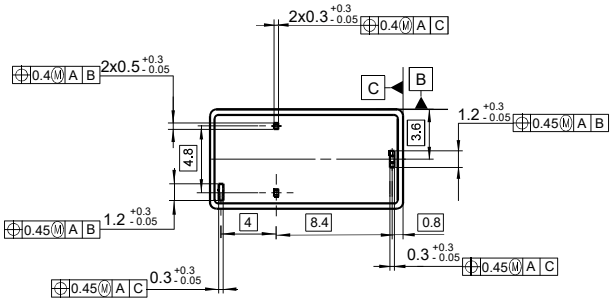
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

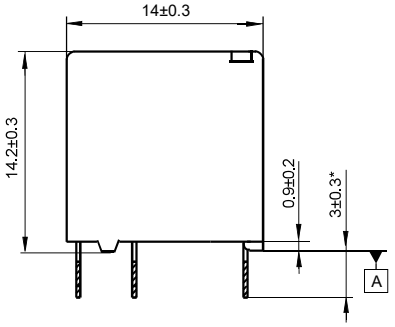
Unit: mm

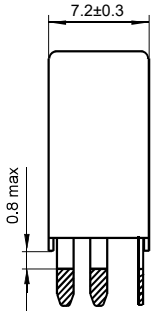
Outline Dimensions

HFKAH-T (Reflow soldering version / High-temperature version)

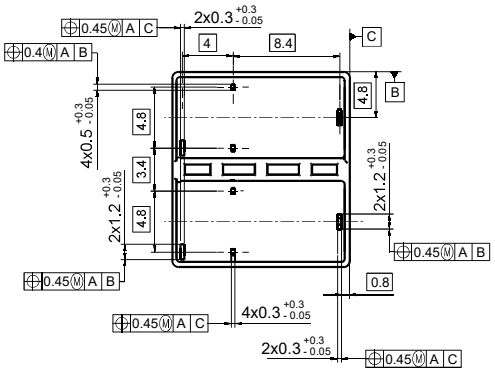
1H: 1 Form A (Single version)

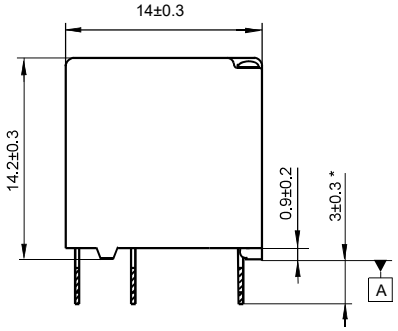


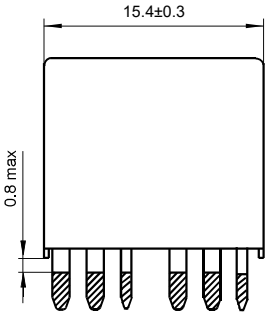




2H: 2 Form A (Twin version)







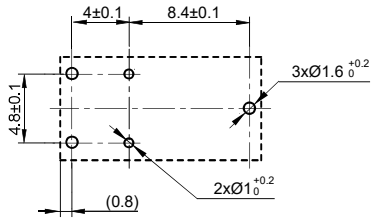
Remark: * The additional tin top is max. 1mm.

OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

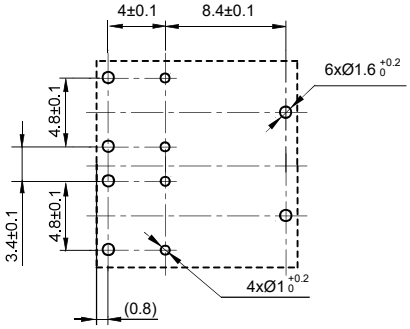
Unit: mm

PCB Layout(Bottom view)

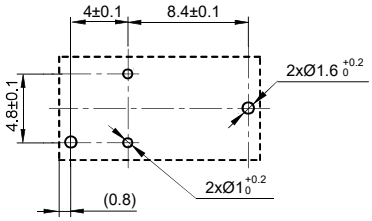
1 Form C (Single version)



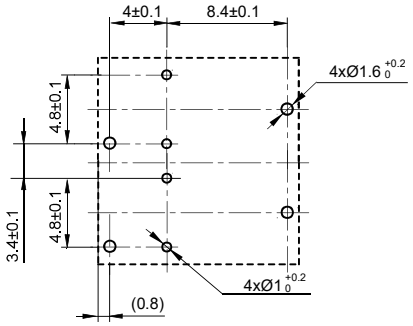
2 Form C (Twin version)



1 Form A (Single version)

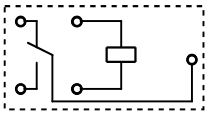


2 Form A (Twin version)

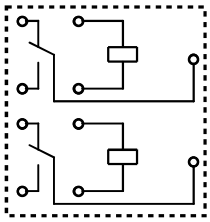


Wiring Diagram(Bottom view)

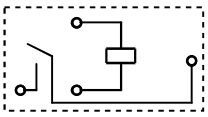
1 Form C (Single version)



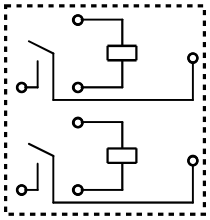
2 Form C (Twin version)



1 Form A (Single version)



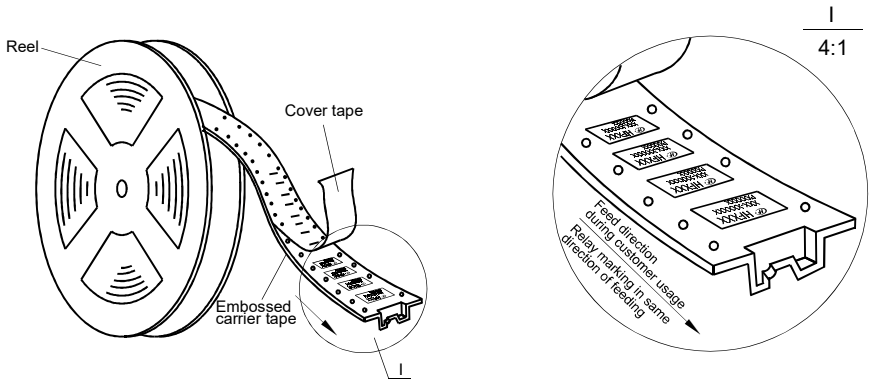
2 Form A (Twin version)

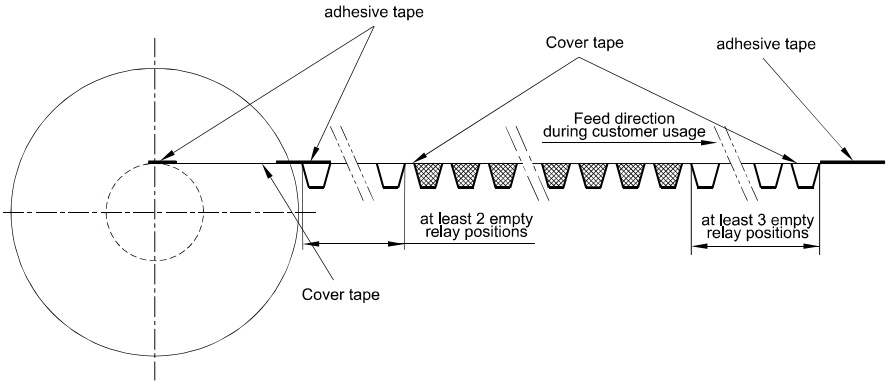


TAPE AND REEL PACKING

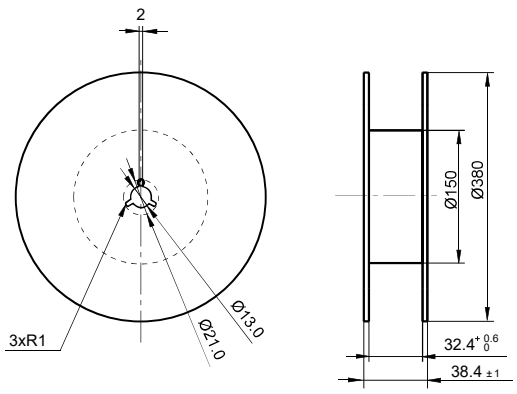
Unit: mm

Direction of Relay Insertion





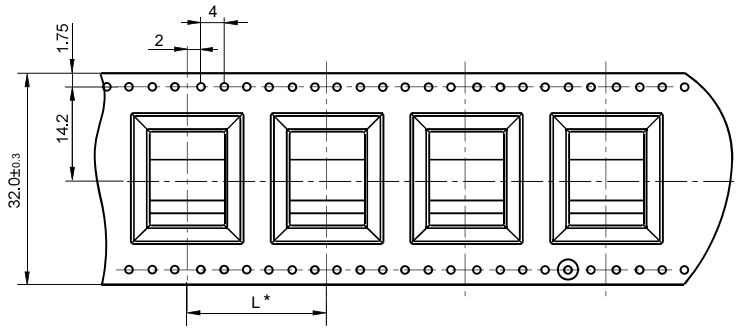
Reel Dimensions



TAPE AND REEL PACKING

Unit: mm

Tape Dimensions

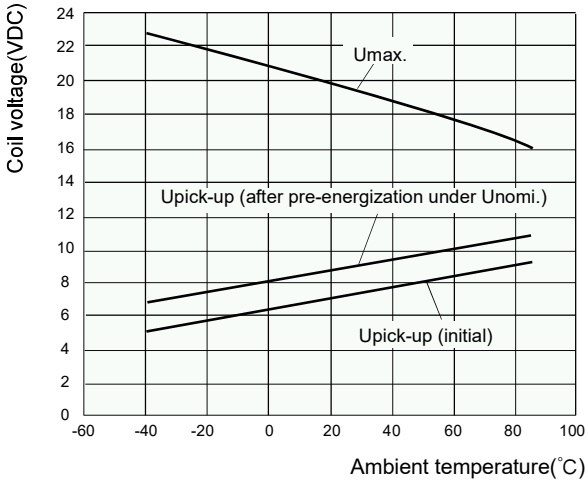


Remark: * For Single relay, L is 20mm; for Twin relay, L is 28mm.

CHARACTERISTIC CURVES

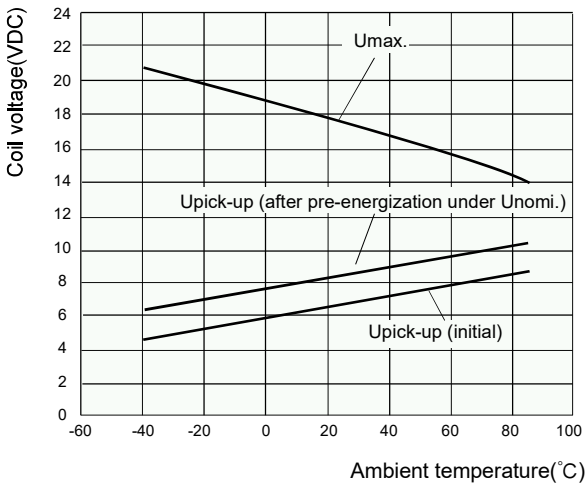
1. Coil operating voltage range

225Ω coil resistance



1)There should be no contact load applied when maximum continuous operation voltage is applied on coil.
2)The operating voltage is connected with coil pre-energized time and voltage. After pre-energized, the operating voltagewill increase.
3)The maximum allowable coil temperature is 180℃. For the coil temperature rise which is measured by resistance is average value, we recommend the coil temperature should be below 170° under the different application ambient, different coil voltage and different load etc.
4)If the actual operating coil voltage is out of the specified range, please contact Hongfa for further details.

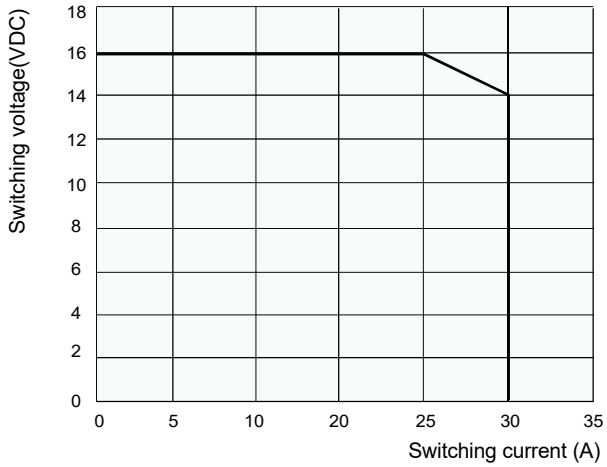
180Ω coil resistance



1)There should be no contact load applied when maximum continuous operation voltage is applied on coil.
2)The operating voltage is connected with coil pre-energized time and voltage. After pre-energized, the operating voltagewill increase.
3)The maximum allowable coil temperature is 180℃. For the coil temperature rise which is measured by resistance is average value, we recommend the coil temperature should be below 170° under the different application ambient, different coil voltage and different load etc.
4)If the actual operating coil voltage is out of the specified range, please contact Hongfa for further details.

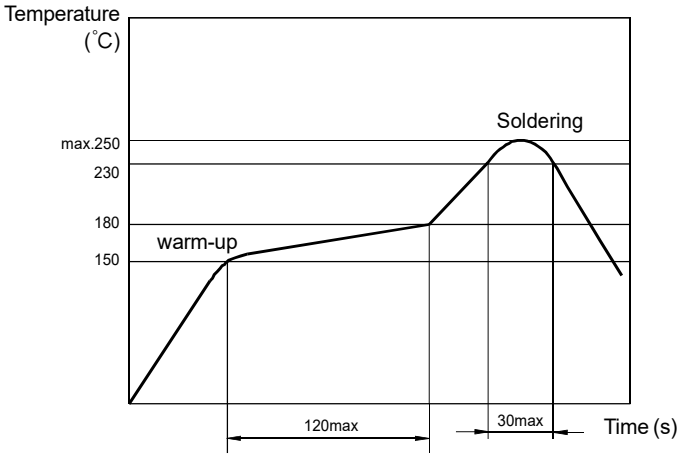
CHARACTERISTIC CURVES

2.Load limit curve (at 23℃)



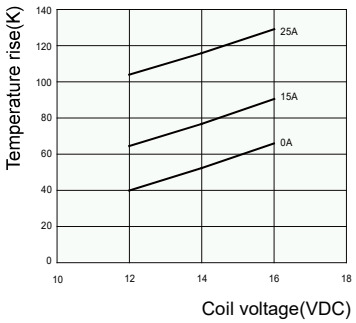
1) This chart takes NO contact, resistive load as example.
2) The load and electrical endurance tests are made according to “CONTACT DATA” parameters table. If actual load voltage, current or operate frequency is different from “CONTACT DATA” table, please arrange corresponding tests for confirmation.

3.Reflow soldering, temperature on PCB board.
(Recommended soldering temperature, only for reflow soldering version)

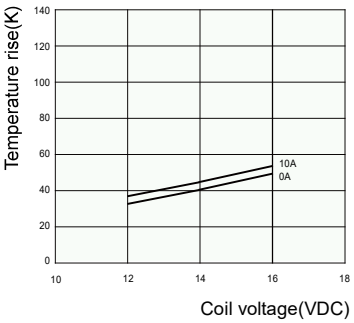


4.Coil temperature rise

1) Coil temperature rise (23℃)
Experiment: HFKAH-T/12-1ZT

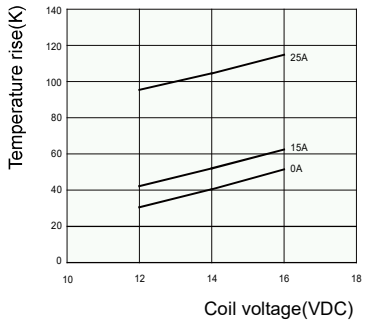


2) Coil temperature rise (125℃)
Experiment: HFKAH-T/12-1ZT

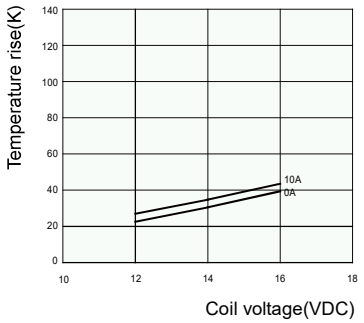


CHARACTERISTIC CURVES

3) Coil temperature rise (23℃)
Experiment: HFKAH-T/12-1ZSLT(377)(908)



4) Coil temperature rise (125℃)
Experiment: HFKAH-T/12-1ZSLT(377)(908)



Remark: The coil temperature rise test requires the relay to be installed on the PCB. The PCB is double-layered. The thickness of the copper foil is 4 oz (140μm), the width of each copper foil is 3.76 x(1 ± 5%) mm, the length of the copper foil is 50mm±1mm, and the Tg value of the PCB board is 150℃.The installation spacing between relay samples is 100mm.。