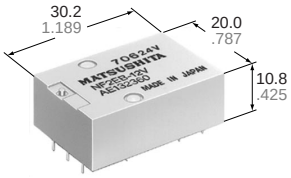
NAiS

FLATPACK AMBER RELAY WITH HIGH SENSITIVITY AND RELIABILITY

NF-RELAYS



mm inch

UL File No.: E43019 CSA File No.: LR26550

Sealed construction of the NFEB offers high reliability and prevents soldering flux vapors from entering the relay and condensing as an insulating film. So they are simple to clean with any degreaser and detergent cleaner due to the PBT case material, without affecting the maximum contact reliability of the relays.

SPECIFICATIONS

Contacts

Arrangement[1]			2 Form C, 4 Form C
Initial contact resistance (By voltage drop 6 V DC 1 A)		Max.	50 mΩ
		Typical	25 mΩ
Contact material		Movable contact	Gold-clad silver
		Stationary contact	Gold-clad silver
Rating, (resistive load)	Max. switching power		60 W 100 VA
	Max. switching voltage		220 V AC, DC
	Max. switching current		2 A
UL/CSA rating (Suffix A is necessary for CSA)			0.5 A 125 V AC, 2 A 30 V DC, 0.25 A 220 V DC
Expected life (min. operations)	Mechanical		10^8
	Electrical (Resistive)	2 A 30 V DC	2×10^5
		1 A 30 V DC	10^6
		0.5 A 30 V DC	10^7

[1] MBB types available: 2MBB & 4MBB
(See next page for contact positions.)

Coil

Minimum operating power, at 25°C	2C	Approx. 190 mW
	4C	Approx. 310 mW
Nominal operating power, at 25°C	2C	Approx. 300 mW
	4C	Approx. 480 mW
Max. operating power for continuous duty		Approx. 1 W at 40°C 104°F

Remarks

*1 Measurement at same location as "Initial breakdown voltage" section
*2 Detection current: 10 mA
*3 Excluding contact bounce time
*4 Half-wave pulse of sine wave: 11ms; detection time: 10μs
*5 Half-wave pulse of sine wave: 6ms
*6 Detection time: 10μs
*7 Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 49)

Characteristics (at 25°C, 50% R.H. seal level)

Max. operating speed			50 cps
Initial insulation resistance*1			1,000 MΩ at 500 V DC
Electrostatic capacitance	Contact/Contact		Approx. 4 pF
	Contact/Coil		Approx. 7 pF
	Contact/Ground		Approx. 6 pF
Initial breakdown voltage*2	Between open contacts		750 Vrms
	Between contact sets		1,000 Vrms
	Between live parts and ground		1,000 Vrms
	Between contacts and coil		1,000 Vrms
Operate time*3 (at nominal voltage)			Max. 15 ms (Approx. 10 ms)
Release time(without diode)*3 (at nominal voltage)			Max. 10 ms (Approx. 3 ms)
Contact bounce			Approx. 1.5 ms
Shock resistance	Functional*4	In de-energized condition	Min. 29.4 m/s² {3 G} (In contact direction) Min. 98 m/s² {10 G} (perpendicular to contact)
		In energized condition	Min. 196 m/s² {20 G}
	Destructive*5		Min. 980 m/s² {100 G}
Vibration resistance	Functional*6	In de-energized condition	29.4 m/s² {3 G}, 10 to 55 Hz at double amplitude of 0.5 mm (in contact direction) 98 m/s² {10 G} 10 to 55 Hz at double amplitude of 1.6 mm (perpendicular to contact)
		In energized condition	117.6 m/s² {12 G} 10 to 55 Hz at double amplitude of 2 mm
	Destructive		196 m/s² {20 G}, 10 to 55 Hz at double amplitude of 3.3 mm
Conditions for operation, transport and storage*7 (Not freezing and condensing at low temperature)		Ambient temp.	–40°C to + 65°C –40°F to +149°F
		Humidity	5 to 85%R.H.
Unit weight	2C		Approx. 14 g .49 oz
	4C		Approx. 15.5 g .55 oz

TYPICAL APPLICATIONS

NF relays are widely acceptable in applications where small size and high sensitivity are required.
Such applications include: Electronic equipment, Household applications, Alarm systems, Office machines, Communication equipment, Measuring equipment, Remote control systems, General control circuits, Machine tools, Industrial machinery, etc.

ORDERING INFORMATION

Ex. NF | 4 | EB | 4M | 48V | 1

Contact arrangement	Type classification	MBB function	Coil voltage (DC)	Contact metarial
2: 2 Form C 4: 4 Form C	EB: Amber sealed type	Nil: Form C type 2M: 2MBB (2 Form D) 4M: 4MBB (4 Form D)	5, 6, 12, 24, 48 V	Nil: Gold-clad silver 1: Gold-cap over silver palladium

(Notes) 1. For VDE recognized types, add suffix VDE.
2. For UL/CSA recognized type, add suffix-A, as NF2EB-12V-A whose ground terminal is cut off.
3. Standard packing Carton: 20 pcs.; Case: 200 pcs.

TYPES AND COIL DATA at 25°C 77°F

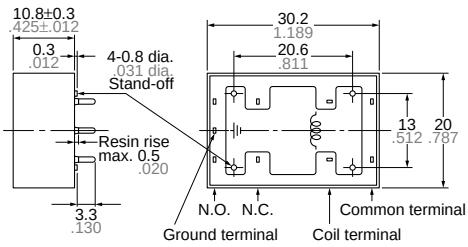
*Less than 1,000Ω: ±10%
More than 1,000Ω: ±15%

Part No.	Nominal voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (min.)	Max. allowable voltage, V DC (at 40°C)	Coil resistance,* Ω	Nominal operating power, mW	Inductance, H	
							Armature	
							Open	Close
NF2EB-5V	5	4.0	0.5	8.7	90	278	0.071	0.071
NF2EB-6V	6	4.8	0.6	10.5	137	260	0.093	0.094
NF2EB-12V	12	9.6	1.2	21	500	290	0.338	0.344
NF2EB-24V	24	19.2	2.4	42	2,000	290	1.29	1.31
NF2EB-48V	48	38.4	4.8	84	7,000	330	4.12	4.18
NF4EB-5V	5	4.0	0.5	7	53	472	0.029	0.029
NF4EB-6V	6	4.8	0.6	8.5	90	400	0.070	0.071
NF4EB-12V	12	9.6	1.2	17.0	330	440	0.22	0.23
NF4EB-24V	24	19.2	2.4	34	1,200	480	0.77	0.79
NF4EB-48V	48	38.4	4.8	68	4,200	550	2.22	2.25

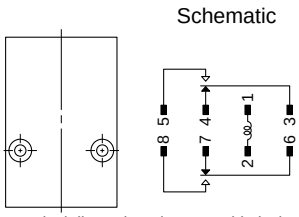
DIMENSIONS

mm inch

2 Form C



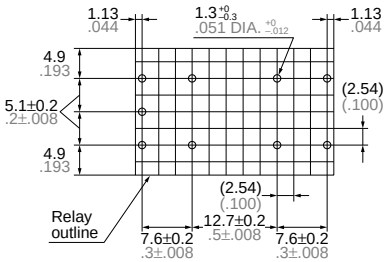
Schematic



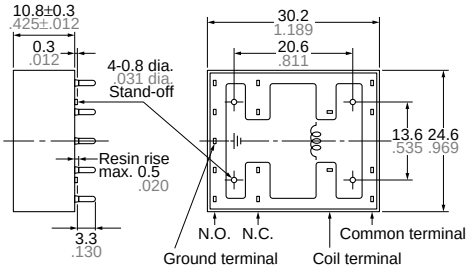
Terminal dimensions (except soldering)
Width: 0.8 .031
Thickness: 0.3 .012

MBB contact position
NF2-2M: terminal 6-7-8, 3-4-5

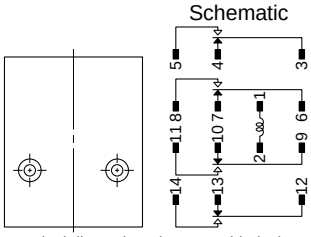
PC board pattern (Copper-side view)



4 Form C



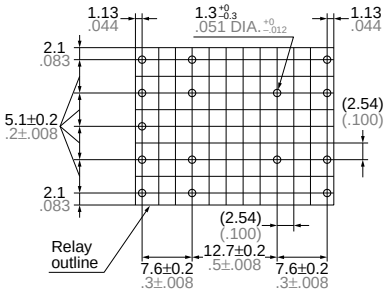
Schematic



Terminal dimensions (except soldering)
Width: 0.8 .031
Thickness: 0.3 .012

MBB contact position
NF4-2M: terminals 6-7-8, 9-10-11
NF4-2M: terminals 6-7-8, 3-4-5, 12-13-14, 9-10-11

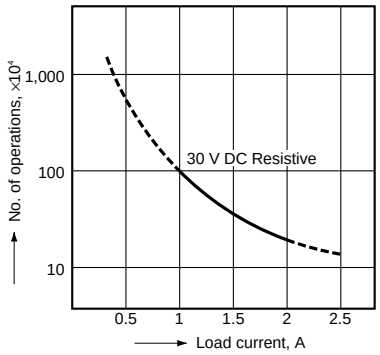
PC board pattern (Copper-side view)



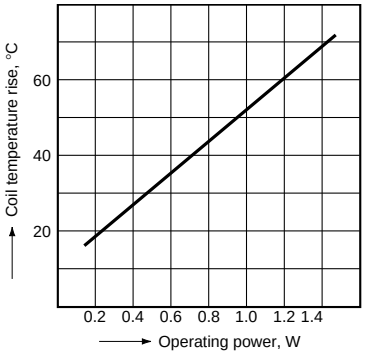
General tolerance: ±0.5 ±.020
(Except for the cover height)

REFERENCE DATA

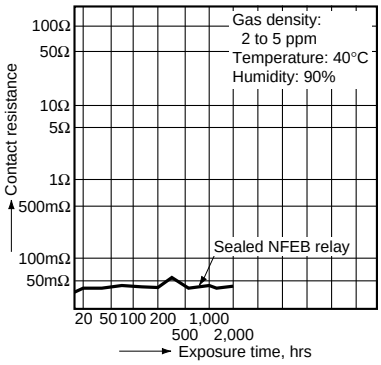
1. Life curve



2. Coil temperature rise (resistance method)



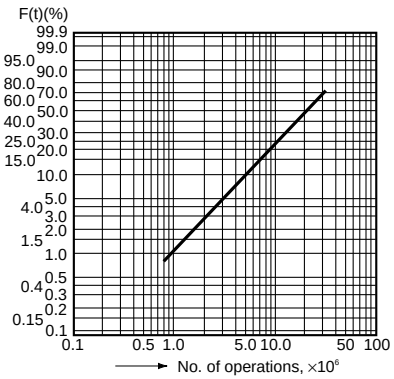
3. H_2S gas test



4. Contact reliability

Test conditions:

1. Contact current/voltage: 10 μA 100 mV 1 kHz
2. Cycle rate 20 cps.
3. Miscontact detection level: 1 mW (= 100Ω)
4. Detection method: Observation of all changeover contacts



Test result:

m = 1.5

$\mu = 21.2 \times 10^6$

95% confidence level = 3.1×10^6

17 contacts out of 20 achieved 10 million no miscontact operations.

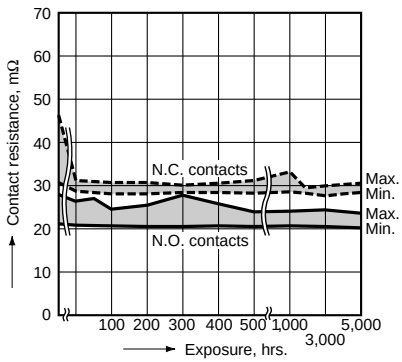
5. High temperature test

Test conditions:

Ambient temperature: 80°C ±2°C

Test method:

1. All contacts were switched for 100 operations on 2 A 30 V DC resistive load.
2. Samples then were exposed to 80°C temperature for 5,000 hours, continuous.



3. Contact resistance was measured with Hewlett-Packard testing equipment.

Test result:

Amber relays showed a stable spread of contact resistance within the initially specified 50 mΩ after 5,000 hours exposure.