

NAIS

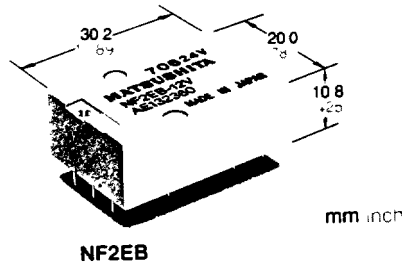
FLATPACK RELAY WITH HIGH SENSITIVITY AND RELIABILITY

NF-RELAYS

UL File No.: E43019

VDE File No.: VDE-Reg.-Nr. 2770

CSA File No.: LR26550



- Low profile—Stands only 10.2 mm (.402 inches) high
Ideal for high density packaging
- Low power—Minimum operating power
- 1,500 V FCC surge between open contacts
- Long life— 10^8 mechanical operations
- M.B.B. (From D) contact types

SPECIFICATIONS

Contacts

Arrangement ¹¹	2 Form C, 4 Form C
Rating, resistive load	60 W 100 VA
Max. switching power	220 V AC, DC
Max. switching voltage	2 A
Max. switching current	
UL rating	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 (2 A 30 V DC Resistive)	2×10^5
Electrical (1 A 30 V DC Resistive)	10^6
Contact bounce	Approx. 1.5 msec
Contact material	
Movable contact	Gold-clad silver
Stationary contact	Gold-clad silver
Initial contact resistance (By voltage drop 6 V DC 1 A)	
Maximum	50 mΩ
Typical	25 mΩ

¹¹ MBB types available: 2MBB & 4MBB
(See page 162 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

Characteristics

Maximum cycle rate	50 cps.
Operate time	Approx. 10 msec.
Release time	Approx. 5 msec.

Electrostatic capacitance	
Contact/Contact	Approx. 4 pF
Contact/Coil	Approx. 7 pF
Contact/Ground	Approx. 6 pF
Breakdown voltage	
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
Initial insulation resistance	1,000 MΩ at 500 V DC
Ambient temperature ²¹	-40° to +65°C -40 to +149 F
Ambient pressure	760 mmHg ±20%
Shock resistance	
Functional	
In deenergized condition	3 G (in contact direction) 10 G (perpendicular to contact)
In energized condition	20 G
Destructive	100 G
Vibration resistance	
Functional	
In deenergized condition	3 G, 10 to 55 Hz at double amplitude of 0.5 mm (in contact direction) 10 G, 10 to 55 Hz at double amplitude of 1.6 mm (perpendicular to contact)
In energized condition	12 G, 10 to 55 Hz at double amplitude of 2 mm
Destructive	20 G, 10 to 55 Hz at double amplitude of 3.3 mm
Unit weight	2C. Approx. 14 g .49 oz 4C Approx. 16 g .56 oz

²¹Total temperature (temperature rise in coil plus ambient temperature) should be kept less than 105°C 221 F max. (No freezing below 0°C 32 F)

ORDERING INFORMATION

Ex. NF 4 EB 4M 48V 1

Contact arrangement	Type classification	MBB function	Coil voltage (DC)	Contact material
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, 60 V	Nil: Gold-clad silver 1: Gold-cap over silver palladium

(Notes) 1. For UL or VDE recognized types, add suffix UL or VDE.

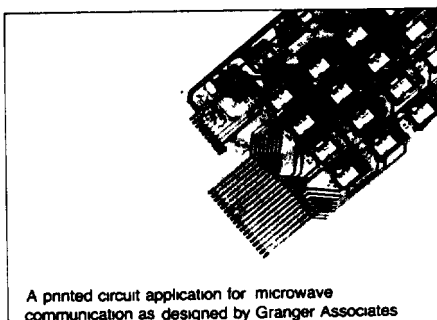
2 Standard packing Carton. 20 pcs Case: 200 pcs

TYPICAL APPLICATIONS

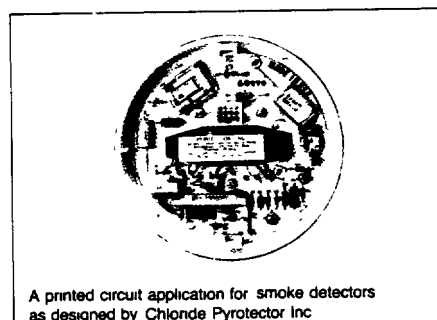
NF relays are widely acceptable in applications where small size and high sensitivity are required.

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.



A printed circuit application for microwave communication as designed by Granger Associates



A printed circuit application for smoke detectors as designed by Chionde Pyrotec Inc.

Sealed construction offers more 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.

TYPES AND COIL DATA at 25°C 77°F

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

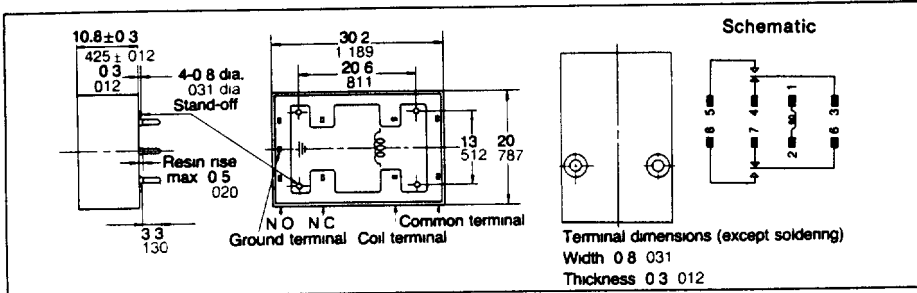
Part No.	Nominal voltage, VDC	Pick-up voltage, VDC (max.)	Drop-out voltage, VDC (min.)	Max. allowable voltage, VDC (at 40°C)	Coil resistance,* Ω	Nominal operating power, mW	Inductance, H	
							Armature	
							Open	Close
NF2EB-5V	5	4.0	0.5	8.7	90	278	0.071	0.071
NF2EB-6V	6	4.8	0.6	10.5	137	260	0.093	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
NF2EB-60V	60	48.0	6.0	105	9,700	370	5.29	5.38
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
NF4EB-60V	60	48.0	6.0	85	7,000	510	4.12	4.18

DIMENSIONS

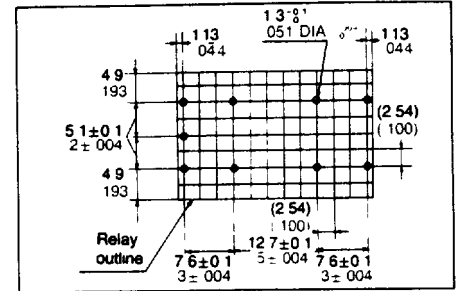
2 Form C

General tolerance $\pm 0.5 \pm 0.20$
(Except for the cover height)

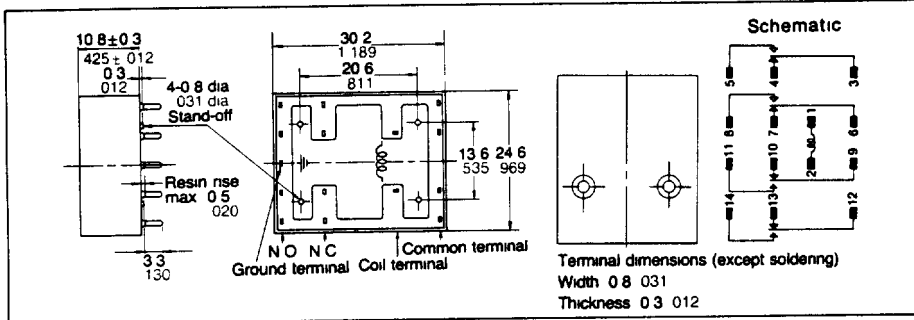
mm inch



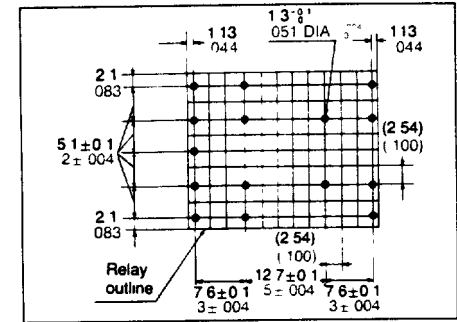
PC board pattern (Copper-side view)



4 Form C

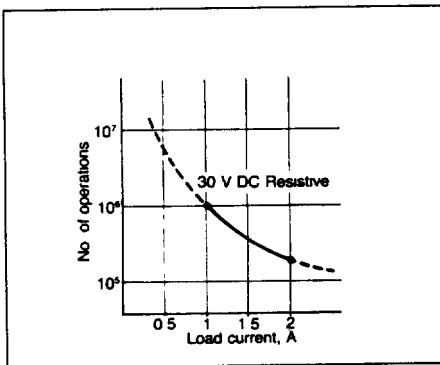


PC board pattern (Copper-side view)

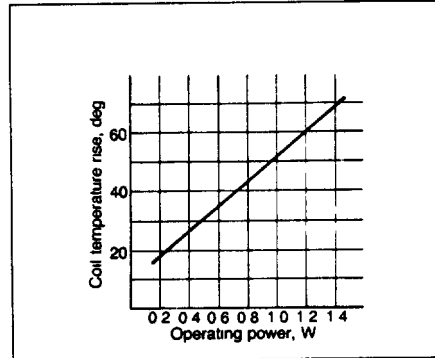


DATA

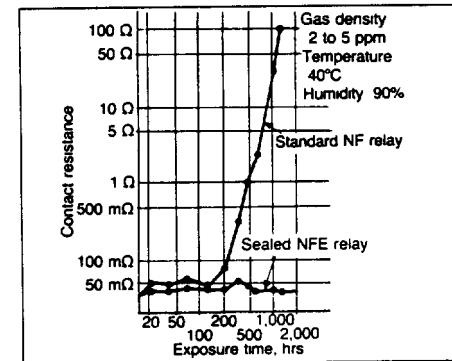
Life curve



Coil temperature rise (resistance method)



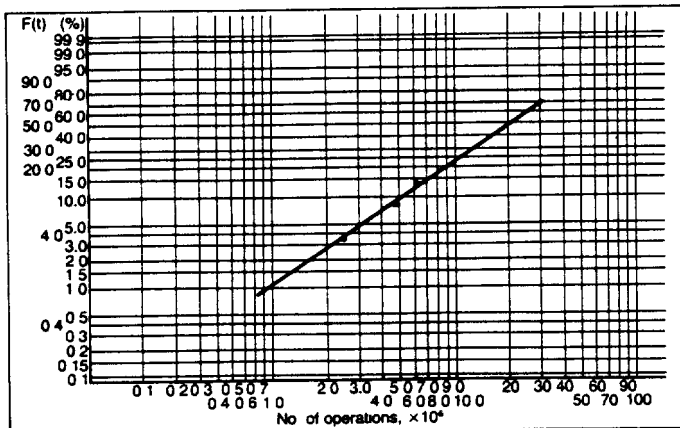
H₂S gas test



Contact reliability

Test conditions:

1. Contact current/voltage: 10 μ A 100 mV 1 kHz
2. Cycle rate: 20 cps.
3. Miscontact detection level: 1 mV (= 100 Ω)
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.

High temperature test

Test conditions:

Ambient temperature: 80°C \pm 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.

