

INCH-POUND

MIL-PRF-83536/22B
w/AMENDMENT 1
2 June 2004
SUPERSEDING
MIL-PRF-83536/22B
23 September 2003

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, 3PDT,
LOW LEVEL TO 10 AMPERES, PERMANENT MAGNET DRIVE, HERMETICALLY SEALED,
ALL WELDED, TRANSIENT SUPPRESSED DC COILS

This specification is approved for use by all Departments and Agencies
of the Department of Defense.

The requirements for acquiring the product described herein shall
consist of this specification sheet and MIL-PRF-83536.

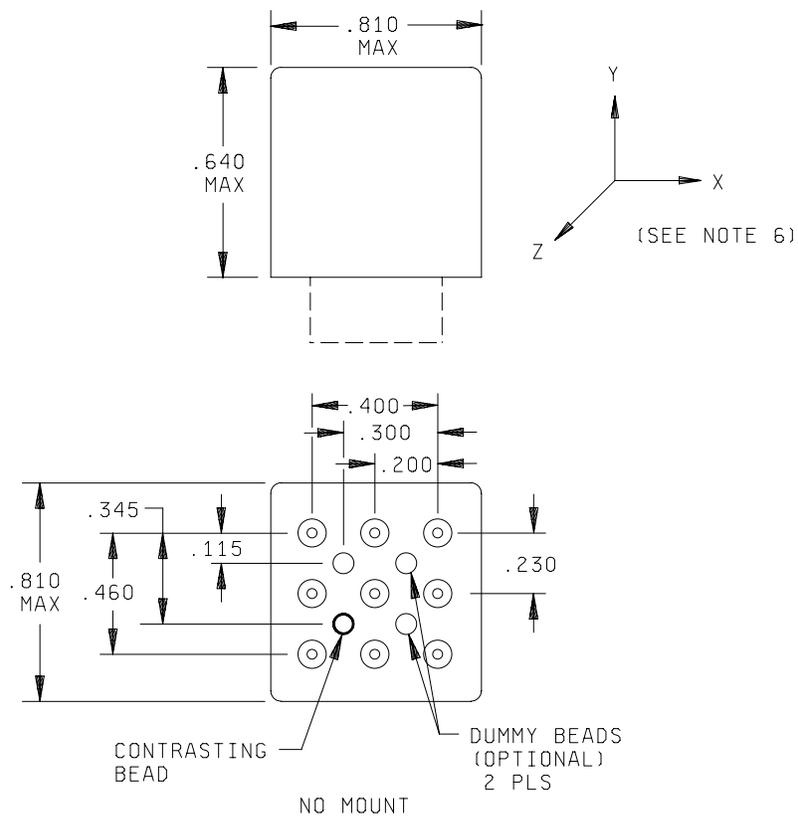


FIGURE 1. Dimensions and configurations.

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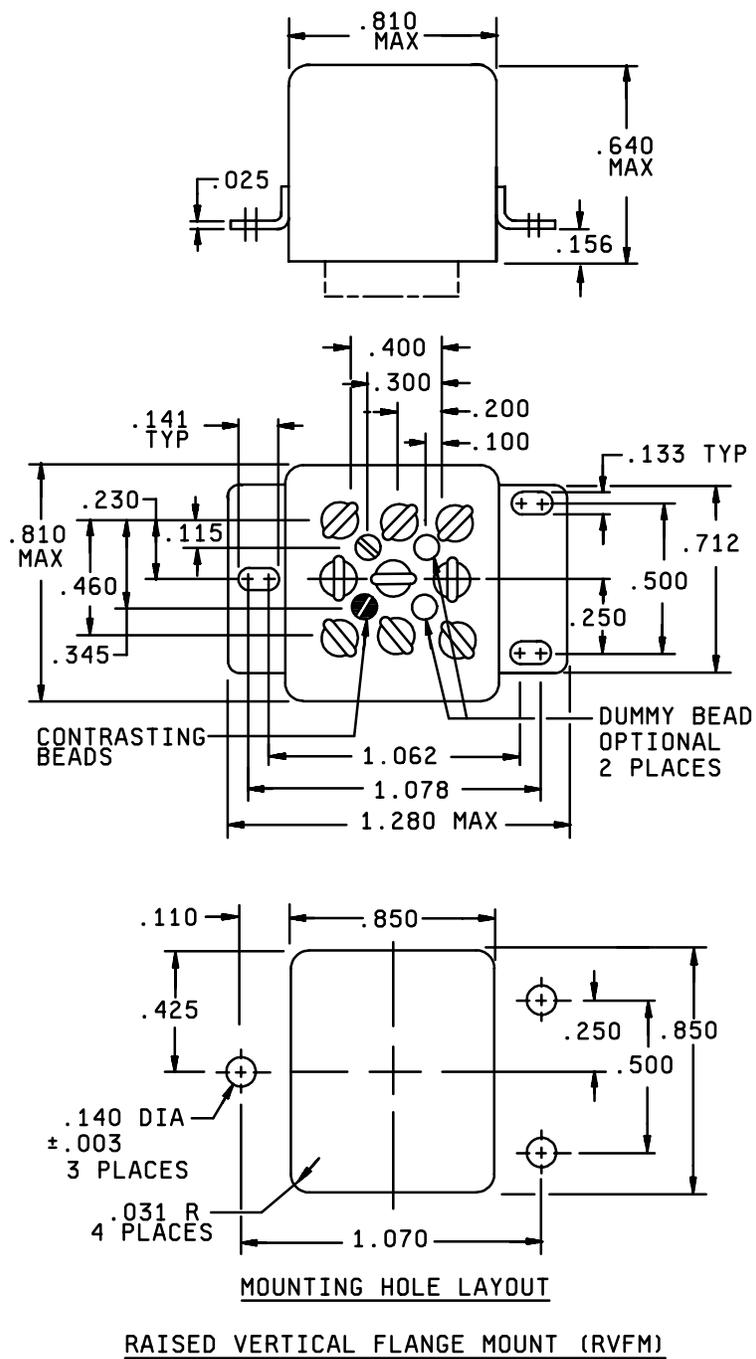


FIGURE 1. Dimensions and configurations - Continued.

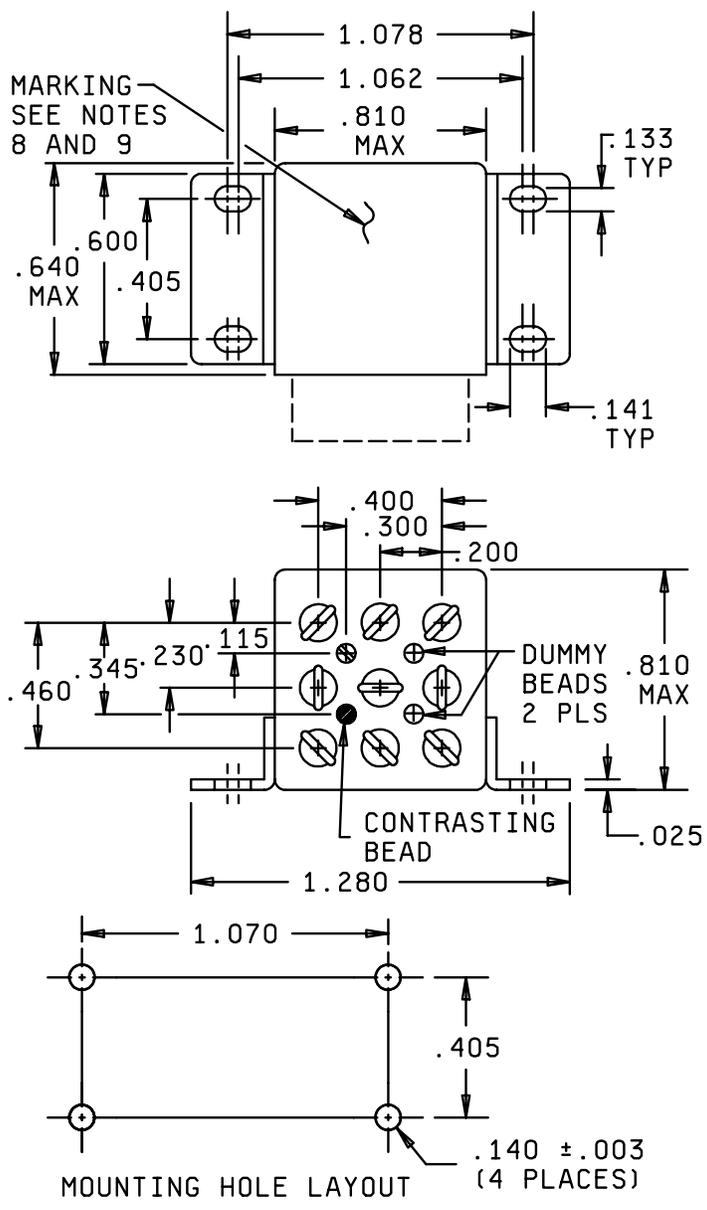


FIGURE 1. Dimensions and configurations - Continued.

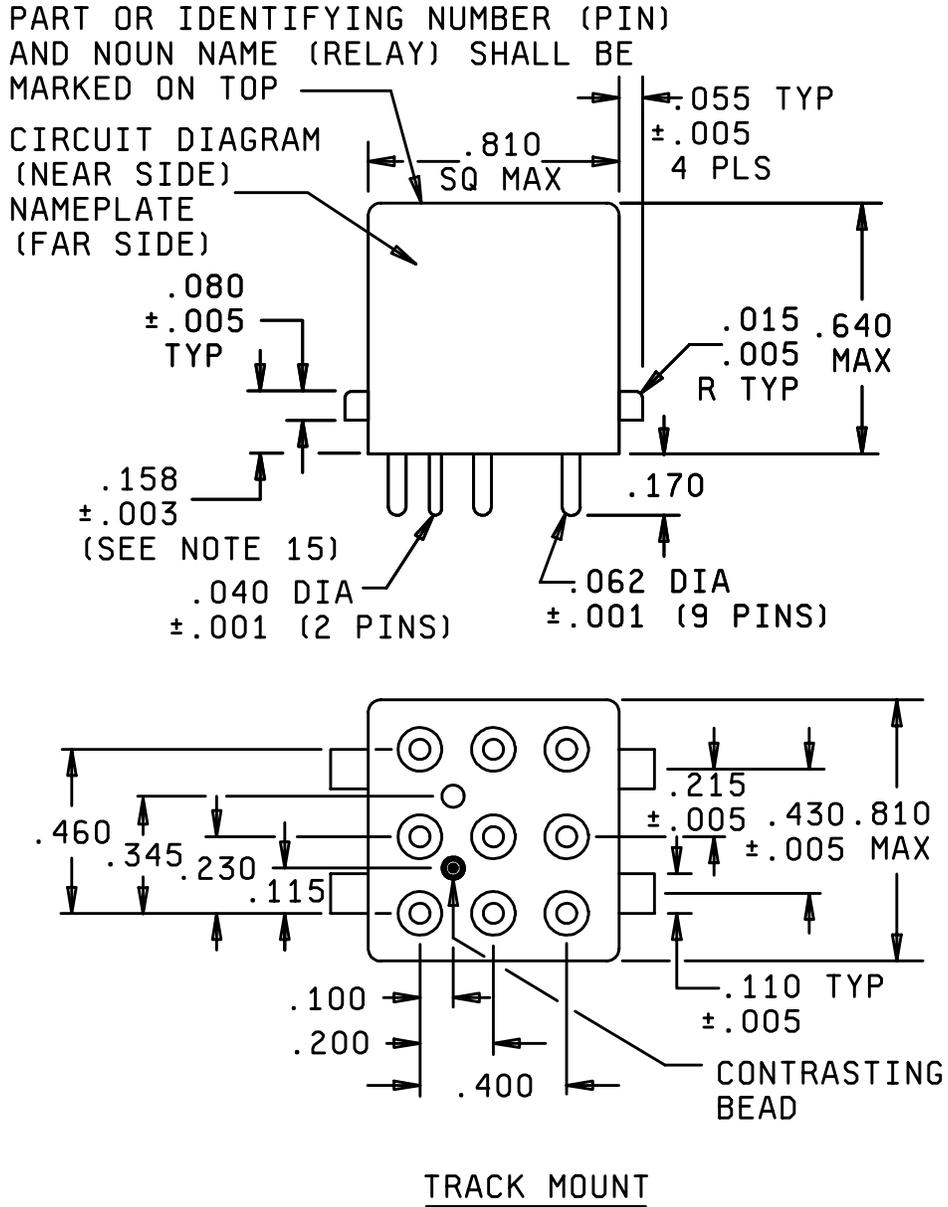
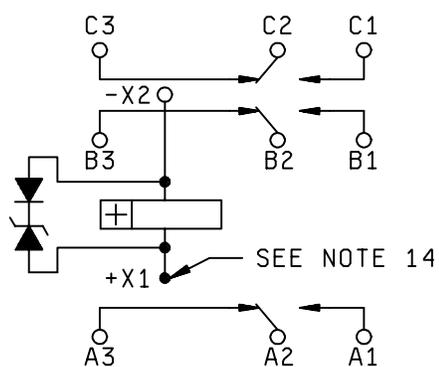
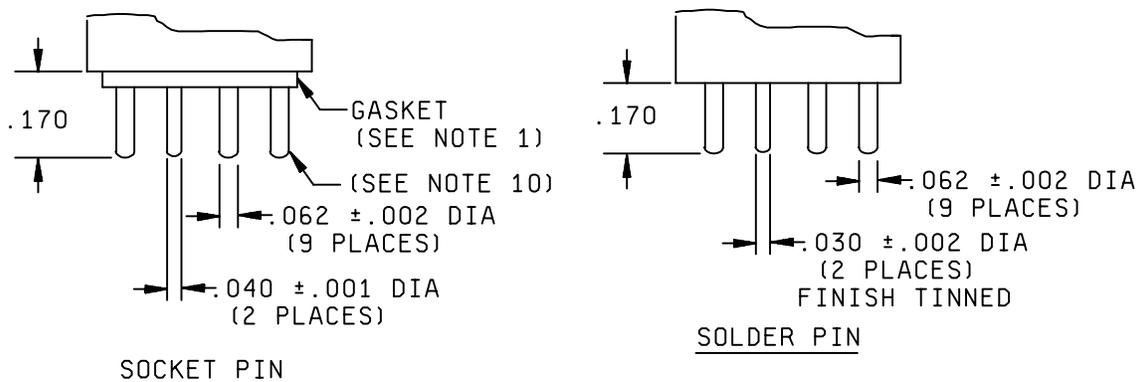


FIGURE 1. Dimensions and configurations - Continued.

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CIRCUIT DIAGRAM
(ALTERNATE INTERNAL
DIODE CONFIGURATION)

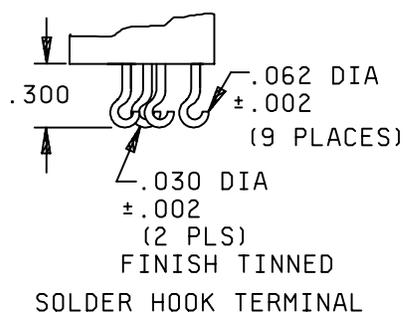


FIGURE 1. Dimensions and configurations - Continued.

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Inches	mm	Inches	mm	Inches	mm	Inches	mm
.001	0.03	.080	2.03	.215	5.46	.500	12.70
.002	0.05	.110	2.79	.230	5.84	.600	15.26
.003	0.08	.115	2.92	.250	6.35	.640	16.26
.005	0.13	.133	3.38	.300	7.62	.712	18.08
.015	0.38	.140	3.56	.345	8.76	.810	20.57
.025	0.64	.141	3.58	.400	10.16	.850	21.59
.030	0.76	.156	3.96	.405	10.29	1.062	26.97
.031	0.79	.158	4.01	.425	10.80	1.078	27.38
.040	1.02	.170	4.32	.430	10.92	1.280	32.51
.055	1.39	.200	5.08	.460	11.68		

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ (0.25mm).
4. There shall be affixed to the relay a suitable legible circuit diagram that identifies each terminal location specified.
5. These relays are polarized monostable.
6. This relay shall not be damaged by reverse polarity.
7. Permanent magnet drive consists of a permanent magnet with its flux path switched and combined with the electro-magnet flux.
8. Applicable to horizontal flange mount only. The circuit diagram, manufacturer's PIN, and the military PIN shall be marked on the near side. The remaining portion of the nameplate data shall be marked on the far side.
9. Applicable to horizontal flange mount only. Relays shall be marked with the manufacturer's name or CAGE code and date code. Marking shall be with the bottom of the print adjacent to the near side.
10. Socket pin terminals shall provide the operational, environmental, and interface characteristics to provide a reliable interconnect to gold-plated contacts. Terminals shall be gold plated. One system for gold plating that may be used is ASTM B488, type 3, class 1.25 with a nickel underplate of 50 to 150 microinches thick. The gold plating system shall enable the product to meet the performance requirements of this specification and shall be approved by the qualifying activity.
11. Gasket shall provide a reliable seal between the relay and mating socket that will meet the environmental, operational, and interface requirements of the relay with the mating socket. The gasket shall have shore hardness 15 to 35, thickness .050 \pm .005. Gasket material according to SAE-AMS3332 has been considered acceptable. Gaskets are not supplied with track mount relays.
12. Back EMF (transient voltage): 42 V dc maximum.
13. JANTX or equivalent screened semiconductors or hybrid devices shall be used for internal coil suppression. Relays using suppression devices shall continue to operate should the suppression circuits be in a failure mode. Diodes shall have a peak inverse voltage of 600 V dc minimum.
14. Indicated terminal shall be identified by a contrasting bead.
15. Measure from surface of header.
16. Plane of critical motion for vibration and shock is Y-axis.

FIGURE 1. Dimensions and configurations - Continued.

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REQUIREMENTS:

Contact data:

Load ratings: See table I.

Low level: 10 to 50 μ A at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Mixed loads: Applicable.

TABLE I. Rated contact load and cycles (amperes per pole).

Type of load (high level)	Cycles x 10 ³	28 V dc	115 V ac 1 phase 400 Hz	115/2200 V ac 3 phase 400 Hz
Resistive	50	10	10	10
Inductive	10	6	N/A	N/A
Inductive	20	N/A	8	8
Motor	50	4	4	4
Lamp	50	2	2	N/A

Life: 50,000 cycles, unless otherwise specified (see table I).

Contact voltage drop or resistance:

Initial contact voltage drop: 0.100 volt maximum. Rated resistive current at 6 V dc or peak ac. Relays shall not make or break this load.

Initial contact resistance: 0.010 ohm maximum. 50 mA max at 6 V dc or peak ac.

High level life (contact voltage drop):

During life: 10 percent open circuit voltage maximum.

After life: 0.125 volt maximum.

Intermediate current (contact resistance):

During intermediate current: 3 ohms maximum.

After intermediate current: 0.150 ohm maximum.

Low level (contact resistance):

During low level: 100 ohms maximum.

After low level: 0.150 ohm maximum at 100 mA and 28 V dc.

Contact bounce: 1.0 millisecond maximum.

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Contact stabilization time: 2.5 milliseconds maximum.

Break bounce (normally open contacts): 0.1 millisecond maximum.

Overload current: 30 amperes dc 60 amperes ac.

Rupture current: 40 amperes dc, 80 amperes ac.

Time current relay characteristics: See table II.

TABLE II. Time current relay characteristics. 1/

Successive application	Amperes	Time
1	20	1 hour
2	30	20 seconds
3	75	2 seconds
4	150	0.53 second

1/ All relays shall withstand overload and fault currents. Relays must be able to sustain five applications (make and carry only) of power concurrently on adjacent poles at each of four different current levels in the sequence listed in table II. Separate relays shall be tested at 28 V dc and 115/200 V ac, 400 Hz 3-phase. Cooling time between successive applications shall be 30 minutes. Tests shall be performed on both normally open and normally closed contacts. There shall be no failures or evidence of welding or sticking and relays shall pass contact voltage drop at the conclusion.

Coil data 1/ 2/: See table III.

Operate time: 6 milliseconds maximum with rated coil voltage at 25°C. 7 milliseconds maximum with rated coil voltage over the temperature range.

Release time: 6 milliseconds maximum from rated coil voltage at 25°C. 7 milliseconds maximum from rated coil voltage over the temperature range.

Duty rating: Continuous.

Coil transient suppression: Applicable (42 V dc maximum).

Neutral screen: Not applicable.

1/ CAUTION: Due to possible interaction of relay magnetic fields, the following spacing requirements, as a minimum, shall be considered in dense packaging situations:

- a. Row to row assisting fields: .125 (3.18 mm).
- b. Row to row opposing fields: .1875 (4.763 mm).
- c. Side to side alternating fields: .0625 (1.588 mm).
- d. Side to side like fields: .125 (3.18 mm).

TABLE III. Dash numbers and characteristics. 1/

Dash number <u>2/</u>			Mount	Coil data										
Solder pin	Solder hook	Socket pin		At 25°C						Over temperature range			Maximum pickup voltage	
				Coil voltage (V dc) <u>3/</u>		Coil resistance (ohms) minimum	Specified pickup voltage (V dc) <u>4/</u>	Specified hold voltage (V dc) <u>4/</u>	Specified dropout voltage (v dc) <u>4/</u>	Specified pickup voltage (V dc) <u>4/</u>	Specified hold voltage (V dc) <u>4/</u>	Specified dropout voltage (V dc) <u>4/</u>	High temperature test	Continuous current test
				Rated	Max									
001	002	003	No mount	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
004	005	006	RVFM	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
007	008	---	HFM	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
009	010	011	No mount	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
012	013	014	RVFM	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
015	016	---	HFM	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
017	018	019	No mount	28	29 <u>5/</u>	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
020	021	022	RVFM	28	29 <u>5/</u>	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
023	024	---	HFM	28	29 <u>5/</u>	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
---	---	<u>6/ 7/ 025</u>	Track	28	29 <u>5/</u>	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
026	027	028	No mount	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
029	030	031	RVFM	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
032	033	---	HFM	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0

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See footnotes on next page.

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TABLE III. Dash numbers and characteristics - Continued. 1/

- 1/ Each relay possesses high level and low level capabilities. However, relays previously tested or used above 10 mA resistive at 6 V dc maximum or peak ac open circuits are not recommended for subsequent use in low level applications.
- 2/ The suffix letter L, M, P, or R to designate the applicable failure rate level shall be added to the applicable listed dash number. Failure rate level (percent per 10,000 cycles): L, 3.0; M, 1.0; P, 0.1; R, 0.01. Example: 001L, 002R.
- 3/ CAUTION: The use of any coil voltages less than the rated coil voltage will compromise the operation of the relay.
- 4/ Pickup dropout voltage as shown is for test purposes only and is not to be used for design criteria.
- 5/ When maximum ambient temperature does not exceed +85°C, the maximum coil voltage shall be 32 V dc.
- 6/ For qualification only, the relay shall meet the test requirements of this specification when installed in relay socket mount MIL-DTL-12883/52 and relay bracket mount MIL-DTL-12883/53 except shock shall be 50 g's for 11 ±1 milliseconds. No contact opening or closing in excess of 10 microseconds.
- 7/ Internal visual: Accomplish on a 100 percent basis prior to final encapsulation of the device to detect and eliminate devices with internal defects or foreign particles that could lead to device failure. The inspection equipment shall include optical equipment of at least 10X magnification and visual standards to permit the inspector to make objective decisions as to the acceptability of the device being examined.

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Electrical data:

Insulation resistance:

Initial: 100 megohms minimum at 500 V dc.

After life or environmental tests: 50 megohms at 500 V dc.

Dielectric withstanding voltage 2/:

	Coil to case	All other points
Sea level:		
Initial:	1000	1250
After life:	750	1000
Altitude:		
At 80,000 feet:	250	250
At 300,000 feet:	500	500

Environmental characteristics:

Temperature range: -70°C to +125°C.

Maximum altitude rating: 300,000 feet.

Acceleration: Applicable, except 15 g's.

Shock (specified pulse): Applicable, MIL-STD-202, method 213, test condition C, 200 g's for 6 ±1 ms, except horizontal flange mount peak g value shall be 100 g's for 6 ±1 ms. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts. For track mounting, see table III, footnote 6.

Vibration (sinusoidal): Applicable, MIL-STD-202, method 204, 30 g's, except frequency range shall be 70 to 3,000 Hz. Horizontal flange mount shall be 20 g's, 57 to 3,000 Hz. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (sinusoidal): Applicable to track mount only. Test in accordance with MIL-STD-202, method 204. 0.06 inch double amplitude, 10 to 55 Hz; 10 g's, 55 to 500 Hz; 20 g's, 500 to 3,000 Hz. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (random): Applicable to qualification and group C inspection. Test in accordance with MIL-STD-202, method 214, test condition IG (0.4 g²/Hz, 50 to 2000 Hz). For horizontal flange mount test condition IE (0.2 g²/Hz, 50 to 2000 Hz). Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (random): Applicable to track mount only. Applicable to qualification only. Test in accordance with MIL-STD-202, method 214, test condition IF, (0.3 g²/Hz, 50 to 2000 Hz). Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

2/ Dielectric may be improved by suitable insulation of terminals and wiring after installation.

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Physical data:

Dimensions and configurations: See figure 1.

Weight: .062 pound (28.15 grams).

Terminal strength:

Solder hook terminals:

Pull force: 5 pounds \pm 0.5 pound.

Bend: Not applicable.

Twist: Not applicable.

Solder pin terminals:

Pull force:

For .030 diameter terminals: 3 pounds \pm 0.3 pound.

For .062 diameter terminals: 10 pounds \pm 1.0 pound.

Bend: Not applicable.

Twist: Not applicable.

Socket pin terminals.

Pull force:

For .040 diameter terminals: 5 pounds \pm 0.5 pound.

For .062 diameter terminals: 10 pounds \pm 0.5 pound.

Bend: Not applicable.

Twist: Not applicable.

Terminal solderability: Applicable to solder pin and solder hook terminals only.

Seal: Hermetic.

Marking: Applicable.

Part or Identifying Number (PIN): M83536/22 (dash number from table III and suffix letter designating failure rate level). PIN is a new term encompassing previous terms used in specifications such as part number, type designator, and identification number.

Qualification inspection:

Qualification inspection and sample size: See table IV.

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TABLE IV. Qualification inspection and sample size. 1/

Single submission	Group submission	
18 units plus 1 open unit for level L at C = 0 2/ 33 units plus 1 open unit for level M at C = 0 2/ Qualification inspection as applicable	M83536/22-008	18 units plus 1 open unit for level L at C = 0 2/
	M83536/22-008	33 units plus 1 open unit for level M at C = 0 2/
	M83536/22-008	Qualification inspection as applicable
	M83536/22-018	2 units, qualification inspection table,
	M83536/22-023	Q2, shock, vibration, acceleration, terminal strength, and seal
	M83536/22-023	
	M83536/22-002	2 units, qualification inspection table, Q2
M83536/22-014		
M83536/22-032		

- 1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-PRF-83536/21 may be used in addition to MIL-PRF-83536/22 data. Prior to performance of retention of qualification testing, the relay manufacturer shall preselect the sampling plan.
- 2/ The number of units required for qualification testing shall be increased as required in table II, Q5 of MIL-PRF-83536, if the contractor elects to test the number of units permitting one or more failures. Prior to performance of qualification testing, the relay manufacturer shall preselect the sampling plan.

Supersession data: See table V.

TABLE V. Supersession data.

Superseded PIN M6106/	Replacement PIN M83536/22-
24-003	025
29-003	017
29-004	017
29-007	018
29-008	018
29-011	019
29-012	019
29-015	020
29-016	020
29-019	021
29-020	021
29-023	022
29-024	022
29-027	023
29-028	023
29-031	024
29-032	024

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Referenced documents. In addition to MIL-PRF-83536, this document references the following:

MIL-DTL-12883/52, /53
MIL-PRF-83536/21
MIL-STD-202
SAE AMS3332
ASTM B488

The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Custodian:

Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:

DLA - CC

(Project 5945-1272)

Review activities:

Air Force - 99

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