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INCH-POUND

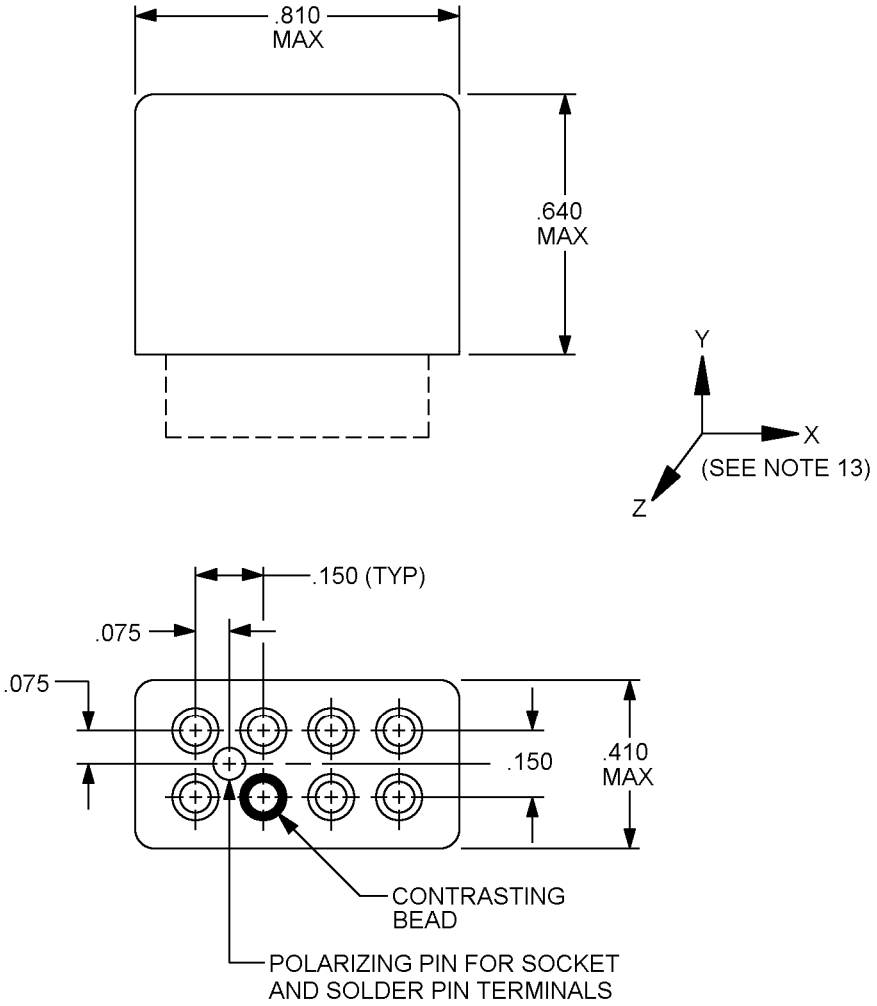
MIL-PRF-83536/1B
29 September 2011
SUPERSEDING
MIL-PRF-83536/1A
7 June 2004

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT, LOW LEVEL TO 5 AMPERES, PERMANENT MAGNET DRIVE, HERMETICALLY SEALED, ALL WELDED, 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 the latest issue of MIL-PRF-83536.



NO MOUNT

FIGURE 1. Dimensions and configurations.

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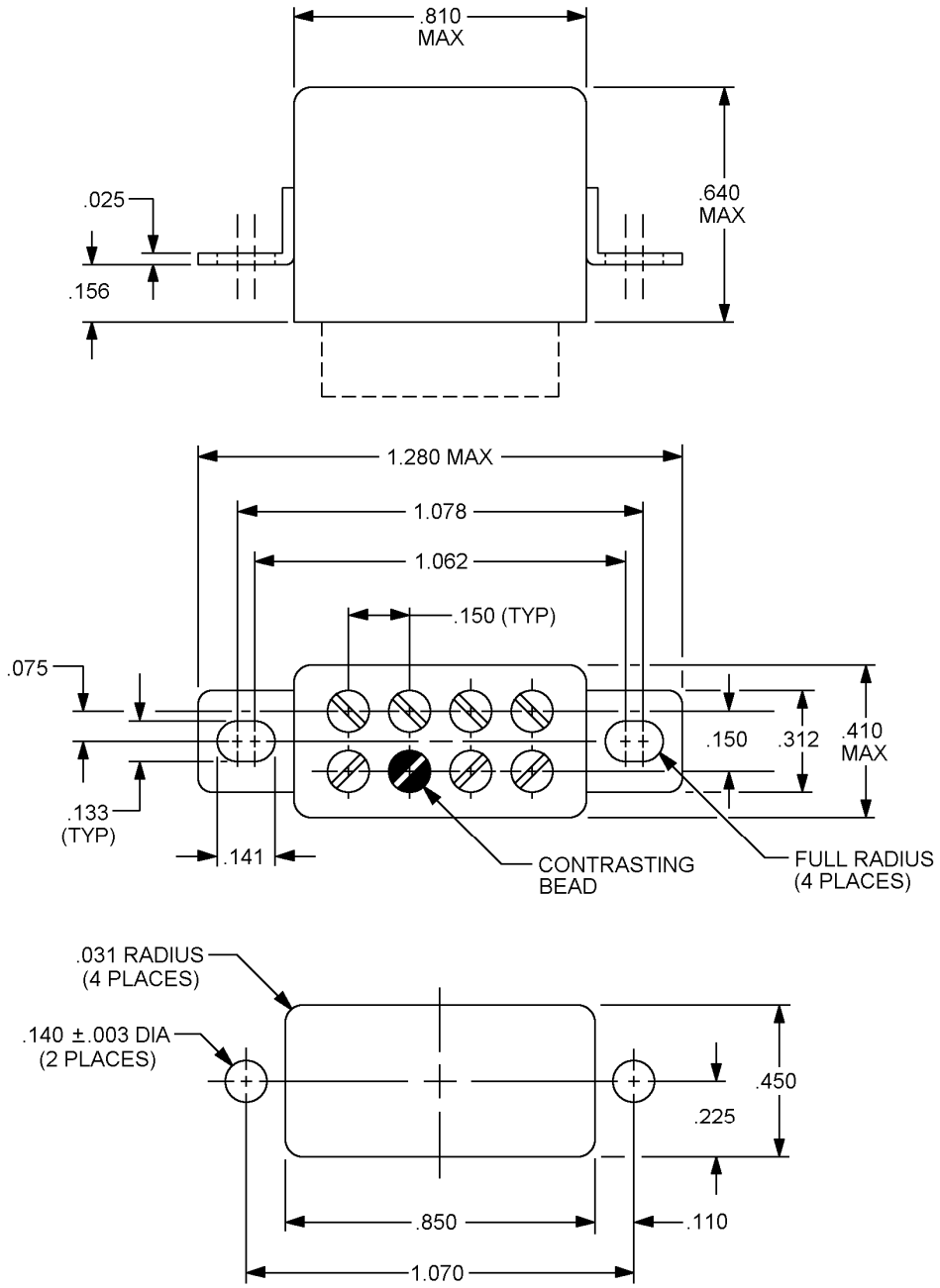

MOUNTING HOLE LAYOUT

RAISED VERTICAL FLANGE MOUNT (RVFM)

FIGURE 1. Dimensions and configurations - Continued.

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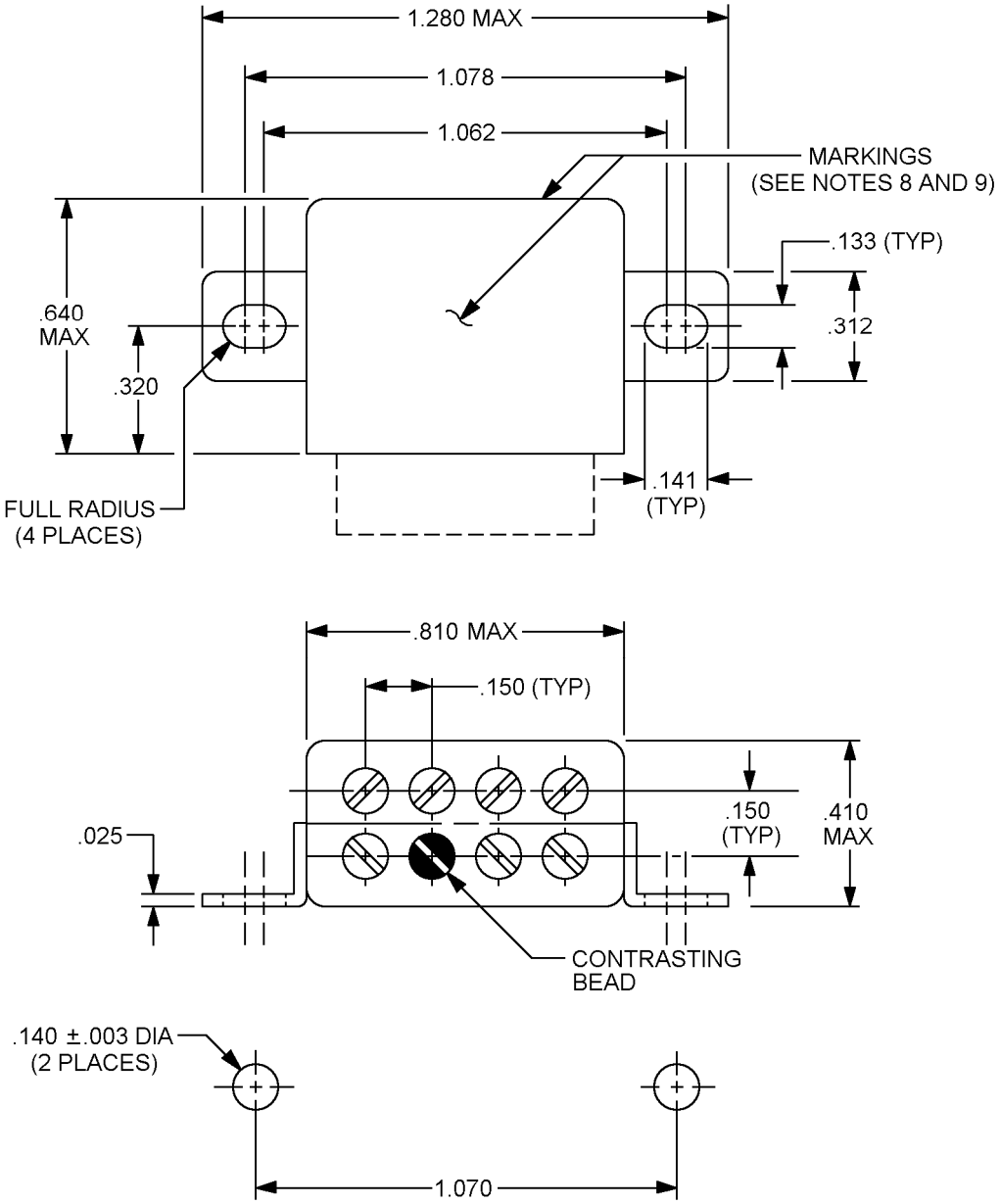

MOUNTING HOLE LAYOUT

HORIZONTAL FLANGE MOUNT (HFM)

FIGURE 1. Dimensions and configurations - Continued

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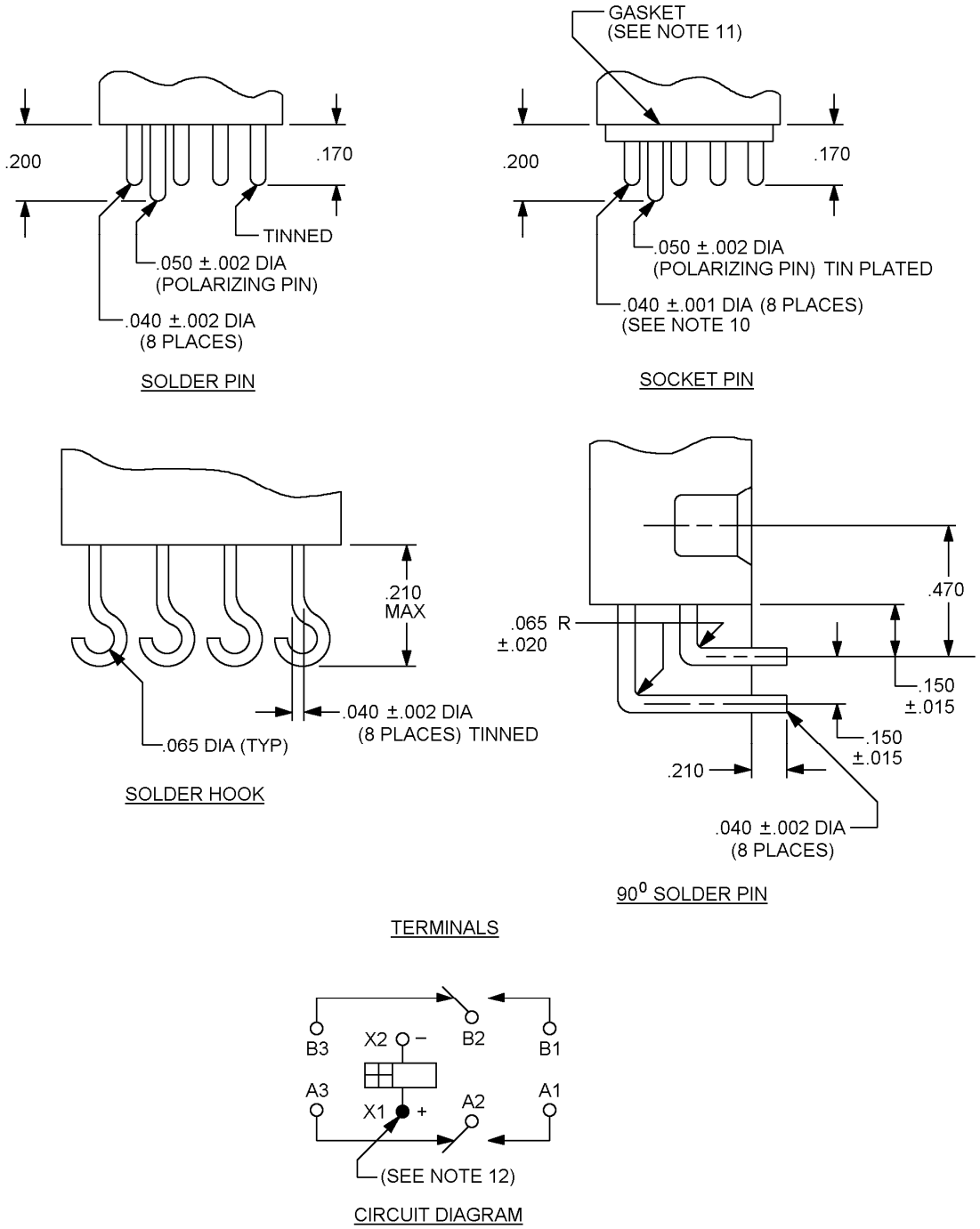

FIGURE 1. Dimensions and configurations - Continued.

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Inches	mm	Inches	mm	Inches	mm
.001	0.03	.110	2.79	.320	8.13
.002	0.05	.133	3.38	.410	10.41
.003	0.08	.140	3.56	.450	11.43
.015	0.38	.141	3.58	.470	11.94
.020	0.51	.150	3.81	.640	16.26
.025	0.64	.156	3.96	.810	20.57
.031	0.79	.170	4.32	.850	21.59
.040	1.02	.200	5.08	1.062	26.97
.050	1.27	.210	5.33	1.070	27.18
.065	1.65	.225	5.72	1.078	27.38
.075	1.90	.312	7.92	1.280	32.51

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.010 (0.25 mm).
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 operate or 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, except the polarizing pin, 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 ± .005. Gasket material according to SAE-AMS3332 has been considered acceptable.
12. Indicated terminals shall be identified with a contrasting bead.
13. Plane of critical motion for vibration and shock is Y-axis.

FIGURE 1. Dimensions and configurations – Continue

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REQUIREMENTS:

Contact data:

Load ratings: See table I.

Low level: 10 to 50 μA 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	115/200 V ac 3 phase 400 Hz
Resistive	100	5	5	5
Inductive	20	3	5	5
Motor	100	2	3	3
Lamp	100	1	N/A	N/A

Life: 100,000 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: 0.050 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.

Contact stabilization time: 2.5 milliseconds maximum.

Overload current: 20 amperes dc, 30 amperes ac.

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Rupture current: 25 amperes dc, 40 amperes ac.

Time current relay characteristics: See table II.

TABLE II. Time current relay characteristics. 1/

Successive application	Amperes	Time
1	10	1 hour
2	15	20 seconds
3	37.5	2 seconds
4	75	.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/: See table III.

Operate time: 5 milliseconds maximum with rated coil voltage at 25°C. 6 milliseconds maximum with rated coil voltage over the temperature range.

Release time: 5 milliseconds maximum from rated coil voltage at 25°C. 6 milliseconds maximum from rated coil voltage over the temperature range.

Duty rating: Continuous.

Coil transient suppression: Not applicable.

Neutral screen: Not applicable.

Electrical data:

Insulation resistance:

Initial: 100 megohms at 500 V dc.

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

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).

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TABLE III. Dash numbers and characteristics. 1/

Dash number 2/				Mount	Coil data										
					At 25°C						Over temperature range			Maximum pickup voltage	
Solder pin	Solder hook	Socket pin	90° solder pin		Coil voltage (V dc) 3/		Coil resistance (ohms) (minimum)	Specified pickup voltage (V dc) 4/	Specified hold voltage (V dc) 4/	Specified dropout voltage (V dc) 4/	Specified pickup voltage (V dc) 4/	Specified hold voltage (V dc) 4/	Specified dropout voltage (V dc) 4/	High temperature test	Continuous current test
					Rated	Max									
001	002	003	---	No mount	6	7.3	18	3.3	1.6	0.5	4.5	2.3	0.25	5.0	5.7
004	005	006	---	RVFM	6	7.3	18	3.3	1.6	0.5	4.5	2.3	0.25	5.0	5.7
007	008	---	009	HFM	6	7.3	18	3.3	1.6	0.5	4.5	2.3	0.25	5.0	5.7
010	011	012	---	No mount	12	14.5	85	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
013	014	015	---	RVFM	12	14.5	85	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
016	017	---	018	HFM	12	14.5	85	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
019	020	021	---	No mount	28	5/ 29	440	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
022	023	024	---	RVFM	28	5/ 29	440	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
025	026	---	027	HFM	28	5/ 29	440	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
028	029	030	---	No mount	48	50	1400	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
031	032	033	---	RVFM	48	50	1400	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
034	035	---	036	HFM	48	50	1400	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0

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, hold, and dropout voltages as shown are for test purposes only and are 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.

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Dielectric withstanding voltage 2/:

Sea level:	Coil to case	All other points
Initial:	1,000	1,000
After life:	750	750
Altitude:		
At 80,000 feet:	250	250
At 300,000 feet:	500	500

Environmental characteristics:

Temperature range: -70°C to +125°C.

Shock (specified pulse): Applicable, MIL-STD-202, method 213, test condition C except peak value shall be 200 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.

Vibration (sinusoidal): Applicable, MIL-STD-202, method 204, 30 g's except frequency range shall be 70 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 g^2/Hz, 50 to 2,000 Hz). Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Acceleration: Applicable, except 15 g's.

Physical data:

Dimensions and configurations: See figure 1.

Weight: 0.034 pound (15.4 grams).

Terminal strength:

Solder hook terminals:

Pull force: 5 pounds ±0.5 pound.

Bend: Applicable.

Twist: Not applicable.

Solder pin terminals:

Pull force:

For .040 diameter terminals: 5 pounds ±0.5 pound.

For .050 diameter terminals: 10 pounds ±0.5 pound (applicable to polarizing pin only).

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

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Bend: Applicable.

Twist: Not applicable.

Socket pin terminals:

Pull force:

For .040 diameter terminals: 5 pounds ±0.5 pound.

For .050 diameter terminals: 10 pounds ±0.5 pound (applicable to polarizing pin only).

Bend: Applicable.

Twist: Not applicable.

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

Seal: Hermetic.

Marking: Applicable.

Part or Identifying Number (PIN): M83536/1 (dash number from table III and suffix letter designating failure rate level).

Qualification inspection:

Qualification inspection and sample size: See table IV.

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	M83536/1-024 M83536/1-024 M83536/1-024 M83536/1-020 M83536/1-025 M83536/1-027 M83536/1-002 M83536/1-015 M83536/1-036	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 2 units, qualification inspection table, Q2, shock, vibration, acceleration, terminal strength, and seal. 2 units, qualification inspection table, Q1.

1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-PRF-83536/2 may be used in addition to MIL-PRF-83536/1 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 Q5, table II 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.

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Qualification inspection (reduced testing) (sample size - 2 units each coil voltage and 1 unsealed unit) See table V.

If the relays produced for MIL-PRF-83536/1 are similar in construction and design except for the suppression network to the relays produced for MIL-PRF-83536/2, then reduced testing for qualification of MIL-PRF-83536/1 relays may be performed concurrent with or subsequent to successful qualification of MIL-PRF-83536/2 relays. For reduced testing, see table V.

TABLE V. Qualification inspection (reduced testing).

Inspection
2 units each coil voltage Q1 of qualification inspection table 1 unsealed sample unit for internal inspection

Supersession data: See table VI.

TABLE VI. Supersession data.

Superseded PIN M6106/27-	Replacement PIN M83536/1-
001	019
002	019
005	020
006	020
009	021
010	021
013	022
014	022
017	023
018	023
021	024
022	024
025	025
026	025
029	026
030	026
037	027
038	027

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

MIL-PRF-83536/2 MIL-STD-202 SAE-AMS3332 ASTM B488

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. 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 and relationship to the last previous issue.

Custodians:
Army - CR
Navy - EC
Air Force - 85
DLA - CC

Review activities:
Air Force - 99

Preparing activity:
DLA - CC

(Project 5945-2011-058)

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