

INCH-POUND

MIL-PRF-39016/54D  
19 September 2006  
SUPERSEDING  
MIL-PRF-39016/54C  
20 July 1988

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, HERMETICALLY SEALED,  
4PDT, LOW LEVEL TO 2 AMPERES (.150-INCH TERMINAL SPACING)  
WITH INTERNAL DIODE FOR COIL TRANSIENT SUPPRESSION  
AND REVERSE POLARITY PROTECTION

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-39016.

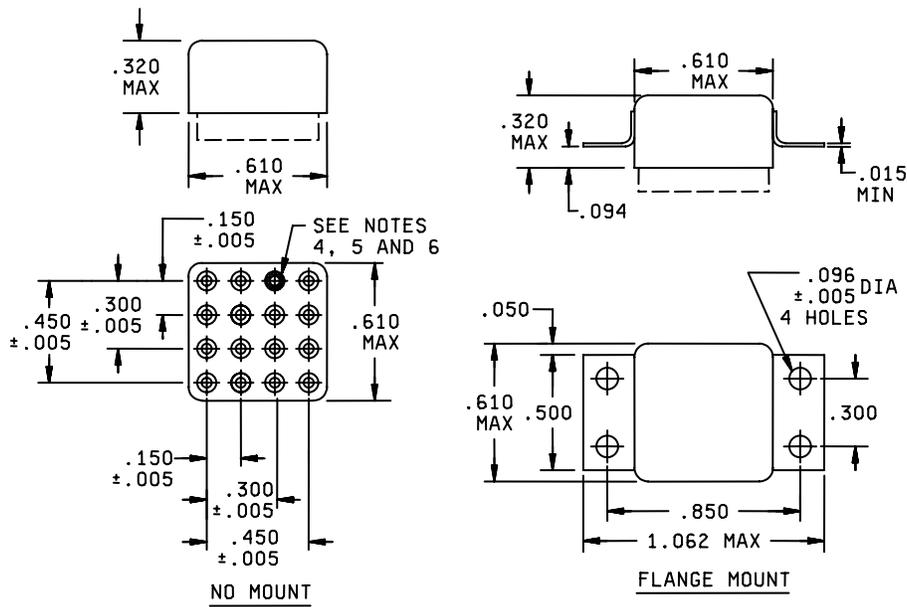
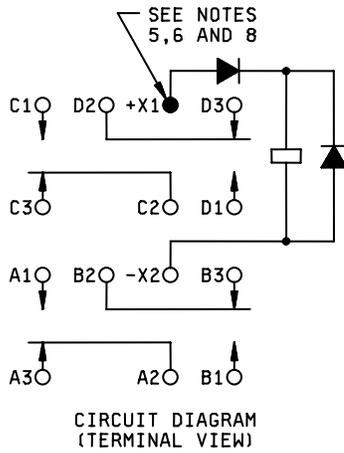
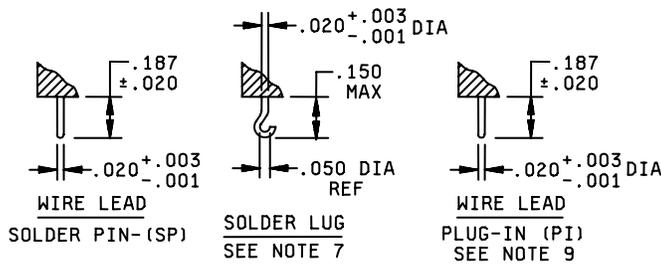


FIGURE 1. Configuration and circuit diagram.



Inches	mm	Inches	mm
.001	0.03	.100	2.54
.002	0.05	.150	3.81
.003	0.08	.187	4.75
.005	0.13	.300	7.62
.015	0.38	.320	8.13
.020	0.51	.450	11.43
.030	0.76	.500	12.70
.050	1.27	.610	15.49
.080	2.03	.850	21.59
.094	2.39	1.062	26.97
.096	2.44		



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is  $\pm 0.010$  (0.25 mm).
4. Terminal locating dimensions shown are applicable to all type mounts.
5. Terminal numbers in circuit diagram are for reference only. Numbers do not appear on relay.
6. Indicated terminal shall be identified with contrasting bead.
7. The shape of lug terminals is optional.
8. Coil symbol is optional in accordance with MIL-STD-1285.
9. Finish: Finish shall provide the operational, environmental, and interface characteristics to provide a reliable interconnect to gold plated contacts. One system for gold plating that may be used is ASTM B488, type 3, class 1.25, knoop hardness shall be a minimum of 200 to 240, nickel underplate 50 to 150 microinches thick. The gold plating shall enable the product to meet the performance requirements of this specification and shall be approved by the qualifying activity.

FIGURE 1. Configuration and circuit diagram - Continued.

REQUIREMENTS:

Contact data:

Load ratings:

High level (relay case grounded):

Resistive: 2 amperes at 28 V dc; 0.125 ampere at 115 V ac, (60 and 400 Hz); 0.5 ampere at 115 V ac, (60 and 400 Hz) with case not grounded.

Inductive: 0.5 ampere at 200 millihenries inductive at 28 V dc.

Lamp: 0.10 ampere at 28 V dc.

Low level: 10  $\mu$ A to 50  $\mu$ A at 10 mV to 50 mV dc or peak ac.

Intermediate current: Applicable.

Contact resistance or voltage drop:

Initial: 0.050 ohm maximum.

High level:

During life: Not more than 5 percent of open circuit voltage.

After life: 0.150 ohm maximum.

Low level:

During life: 33 ohms maximum.

After life: 0.150 ohm maximum.

Intermediate current:

During intermediate current: 1 ohm maximum.

After intermediate current: 3 ohms maximum.

Contact bounce: 2.0 milliseconds (ms) maximum. (Applicable to failure rate level "L").

Contact stabilization time: 2.5 ms maximum. (Applicable to failure rate levels M, P, and R).

Overload (high level only): 4 amperes resistive at 28 V dc, 1.0 ampere inductive at 28 V dc. (AC not applicable).

Coil data: See table I.

Operate time: 4.0 ms maximum over temperature range with rated coil voltage.

Release time: 6.0 ms maximum over temperature range from rated coil voltage.

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Electrical data:

Insulation resistance: 1/ 10,000 megohms minimum, except the resistance between coil and case at high temperature shall be 1,000 megohms minimum.

Dielectric withstanding voltage: 1/

	Sea level V rms (60 Hz)	Altitude V rms (60 Hz)
Between case, frame, or enclosure, and between all contacts in the energized and deenergized position - -	750	} 350 All terminals to case
Between case, frame, or enclosure and coil(s)- - - - -	500	
Between all contacts and coil(s)- - - - -	750	
Between open contacts in the energized and and deenergized positions - - - - -	500	
Between contact poles - - - - -	750	

Diode characteristics: 2/

Maximum negative transient: 1.0 V.

Breakdown voltage: 100 V dc at 10 microamperes ( $\mu$ A).

Maximum leakage current: 1  $\mu$ A at 50 V dc.

Coil transient suppression: Applicable.

Semiconductor in process screening: Applicable, visual inspection of semiconductors shall be in accordance with MIL-STD-750, method 2074.

Environmental data:

Temperature range: -65°C to +125°C.

Vibration (sinusoidal): MIL-STD-202, method 204. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (random): MIL-STD-202, method 214, test condition IG. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts (Applicable to qualification and group C testing only).

Shock (specified pulse): MIL-STD-202, method 213, test condition C (100 g's). Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

1/ Insulation resistance and dielectric withstanding voltage tests must always precede all other specified measurements. Connect all coil terminals together to avoid damage to the diodes.

2/ In all tables relating to qualification testing and group A testing, delete coil resistance and substitute the following test: Diode breakdown and block integrity with applicable voltage applied to the relay coil circuit in the reverse direction, monitor leakage current with dc microammeter or oscilloscope. Leakage current shall not exceed the specified value.

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Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: Applicable.

Physical:

Terminals: See figure 1 and table I.

Terminal strength:  $1.5 \pm 0.2$  pounds (pull).

Solderability: Applicable (except to gold plated terminals).

Terminal twist test: Applicable to wire leads.

Dimensions and configuration: See figure 1 and table I.

Weight: 8.5 grams (0.30 ounce) maximum.

Identification marking (full): Applicable.

Life test requirements:

High level: 100,000 cycles.

Low level: 100,000 cycles plus 900,000 cycles mechanical life.

Part or Identifying Number (PIN): M39016/54-(dash number from table I and suffix letter designating failure rate level).

TABLE I. Dash numbers and characteristics. 1/

Dash number 2/	Mount	Leads	Coil voltage V dc 3/		At 25°						Over temperature range		
			Rated	Max	Coil resistance (Ref only) Ohms ±10%	Max coil current (mA)	Min coil current (mA)	Specified pickup value (voltage) (V dc)	Specified hold value (voltage) (V dc)	Specified dropout value (voltage) (V dc)	Specified pickup value (voltage) (V dc)	Specified hold value (voltage) (V dc)	Specified dropout value (voltage) (V dc)
001 002 015 016	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	6	7	28	218.25	162.34	3.7	2.3	0.5	4.8	2.9	0.4
003 004 017 018	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	9	11	73	129.38	99.63	5.2	3.2	0.6	6.6	4.1	0.5
005 006 019 020	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	12	14	115	111.11	86.96	6.4	3.9	0.8	8.6	5.0	0.6
007 008 021 022	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	18	22	280	69.44	55.19	9.4	5.7	1.0	12.2	7.4	0.7
009 010 023 024	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	22	27	430	55.56	44.40	11;3	6.7	1.2	15.0	8.7	0.8
011 012 025 026	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	26.5	35	720	40.12	32.20	14.5	8.8	1.7	19.0	11.5	1.1
013 014 027 028	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	36	42	1,040	37.93	30.59	18.2	11.1	2.1	23.8	15.0	1.3

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 circuit 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 - - - - 003R.

3/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.

4/ Coil resistance not directly measurable at relay terminals. When rated voltage is applied to the coil terminals, the coil circuit current shall be within the limits shown. Measure at 25°C at nominal voltage for 5 seconds maximum.

Qualification inspection:

Qualification inspection and sample size: See table II.

TABLE II. Qualification inspection and sample size.

Single submission		Group submission
22 units plus 1 open unit for level L at C = 0 <u>1/</u>	M39016/54-011	22 units plus 1 open unit for level L at C = 0 <u>1/</u>
33 units plus 1 open unit for level M at C = 0 <u>1/</u>		33 units plus 1 open unit for level M at C = 0 <u>1/</u>
Qualification inspection as applicable.		Qualification inspection as applicable.
	M39016/54-001 M39016/54-003 M39016/54-007 M39016/54-009 M39016/54-013	2 units, each PIN, qualification inspection table, Q1.
	M39016/54-006 M39016/54-026	2 units, qualification inspection table, Q1, and shock, vibration, acceleration, terminal strength, and seal.

1/ The number of units required for qualification testing will be increased as required in Q5, table II, MIL-PRF-39016, if the relay manufacturer elects to test the number of units permitting one or more failures. Prior to performance of qualification inspection testing; the relay manufacturer shall preselect the sample size.

Referenced documents: In addition to MIL-PRF-39016, this document references the following:

MIL-STD-202                      MIL-STD-750                      MIL-STD-1285                      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 - 11  
DLA - CC

Preparing activity:  
DLA - CC  
  
(Project 5945-1298-000)

Review activities:  
Army - AR  
Navy - AS, MC, OS, SH  
Air Force - 19

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