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August 12, 2004

MEMORANDUM FOR MILITARY/INDUSTRY DISTRIBUTION

SUBJECT: Initial Draft of MIL-PRF-21038/27E Amendment 2, Transformer, Pulse, Low Power.
Project Numbers 5950-1188.

Attached subject document is being proposed. Please review this document and provide concurrence or comments to this office.

Amendment 2 was generated to: 1) Change lead diameter from AWG #24 to a dimension with a tolerance. 2) Add an optional flat lead for configurations D and E and 3) A new proposed test circuit for figure 3.

The initial draft for the subject document is now available for viewing and downloading from the DSCC-VA Web site:

<http://www.dsccl.dla.mil/programs/milspec/>

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Comments should be returned to this Center no later than 60 days from the date of this letter. Any further coordination concerning these documents will be circulated only to firms and organizations that furnish comments or reply that they have an interest.

If there are any questions, please contact Mr. Ken Beymer, by electronic mail at ken.beymer@dlamil (preferred method); by telephone at 614-692-0557, DSN 850-0557; by facsimile 614-692-6939; or my mail at Defense Supply Center Columbus, Electronic Components Team DSCCC-VAT, P.O. Box 3990, Columbus, OH 43216-5000.

Signature on file

KENDALL A. COTTONGIM
Chief
Electronics Component Team

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Cc:
William Heckman DSCC-VSS
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INCH-POUND

MIL-PRF-21038/27E
W/AMENDMENT 2
Draft
SUPERSEDING
MIL-PRF-21038/27E
AMENDMENT 1
30 January 2004

PERFORMANCE SPECIFICATION SHEET

TRANSFORMERS, PULSE, LOW POWER

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

The requirements for acquiring the products described herein shall consist of this specification and MIL-PRF-21038.

REQUIREMENTS:

Dimensions and configuration: See figure 1 and table 1.

Operating temperature: -55°C to +130°C.

Case: The case shall be nonmetallic (e.g., epoxy).

Weight: 5 grams, maximum.

Terminal strength: Method 211 of MIL-STD-202, test condition A, 2 pounds applied force.

Terminals: Solderable printed circuit type terminals, see figure 1. Flat terminals can be used as an alternative to round terminals for configuration D and E only.

Electrical characteristics:

Turns ratio: See table I.

Common mode rejection (CMR): In accordance with table 1 when tested as specified on figure 2.

Pulse width of output: 2 microseconds nominal. The transformers shall be tested as specified on figure 3.

Overshoot and ringing: ± 1 volt maximum. The transformers shall be tested as specified on figure 3 with the resulting waveform shown on figure 4.

Droop: In accordance with table I when tested as specified on figure 3 with the resulting waveform shown on figure 4.

Comments, suggestions or questions on this document should be addressed to Defense Supply Center Columbus, ATTN: VAT, Post Office Box 3990, Columbus, OH 43216-5000), or emailed to Transformer@dsc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

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Rise time and fall time of output pulse: Shall be less than 150 nanoseconds except dash numbers -25, -26, -27, -30, and -31 shall be less than 250 nanoseconds maximum and dash numbers -9, -10, -15, -20, -24 shall be less than 200 nanoseconds maximum. The transformers shall be tested as specified on figure 3 with the resulting output waveform shown on figure 4.

Input impedance: The input impedance shall be as specified in table I when tested as specified on figure 5 at the frequencies of 75 kHz and at 1 MHz at $-55^{\circ}\text{C} \pm 2^{\circ}\text{C}$; $+25^{\circ}\text{C} \pm 2^{\circ}\text{C}$; and $+130^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

DC resistance: The maximum dc resistance shall be in accordance with table I.

Dielectric withstanding voltage: Method 301 of MIL-STD-202, 100 V rms.

Insulation resistance: Method 302 of MIL-STD-202, test condition B. Not less than 1,000 megohms at 250 V dc.

Shock (specified pulse): Method 213 of MIL-STD-202, test condition I.

Vibration, high frequency: Method 204 of MIL-STD-202, test condition B.

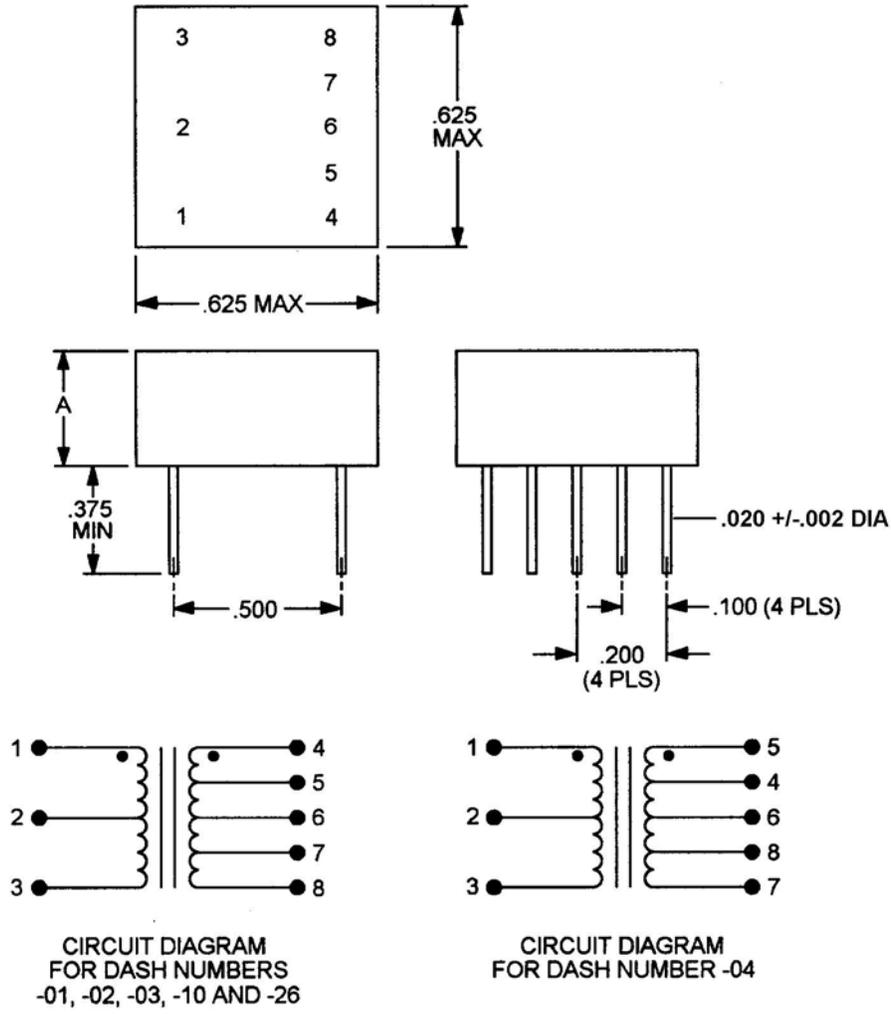
Part or Identifying Number (PIN): Three levels of product are available in accordance with MIL-PRF-21038, level C, level M, and level T. For the use of flat terminals on configurations D and E, the letter "F" shall follow the part number. The PIN shall be coded as follows:

M21038/27-(dash no from table I) C	denotes C level part with round terminals (e.g., M21038/27-01C)
M21038/27-(dash no. from table I)	denotes M level part (e.g., M21038/27-01)
M21038/27-(dash no. from table I)TF	denotes T level part with flat terminals (e.g., M21038/27-01TF)

Extension of qualification: Extension of qualification shall be in accordance with MIL-PRF-21038. Manufacturers may submit additional proposals for extension of qualification for review and approval by the qualifying activity. One way to obtain family approval of products in this specification is outlined below:

Qualify M21038/27-02	extends qualification to M21038/27-01 to -01 to -31.
Qualify M21038/27-12	extends qualification to M21038/27-11 to -20, and -27 and -31.

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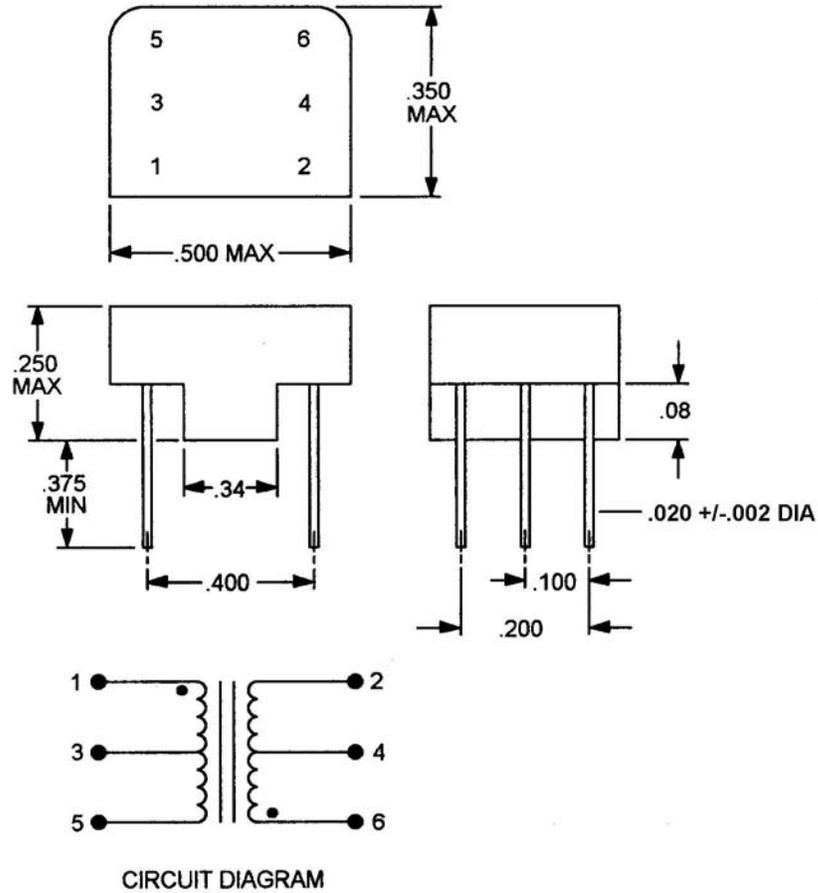


CONFIGURATION A

Dash no.	A max
-01, -04	.300
-02,-03,-10, -26	.250

FIGURE 1. Dimensions, configurations, and circuit diagrams.

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CONFIGURATION B

FIGURE 1. Dimensions, configurations, and circuit diagrams - Continued.

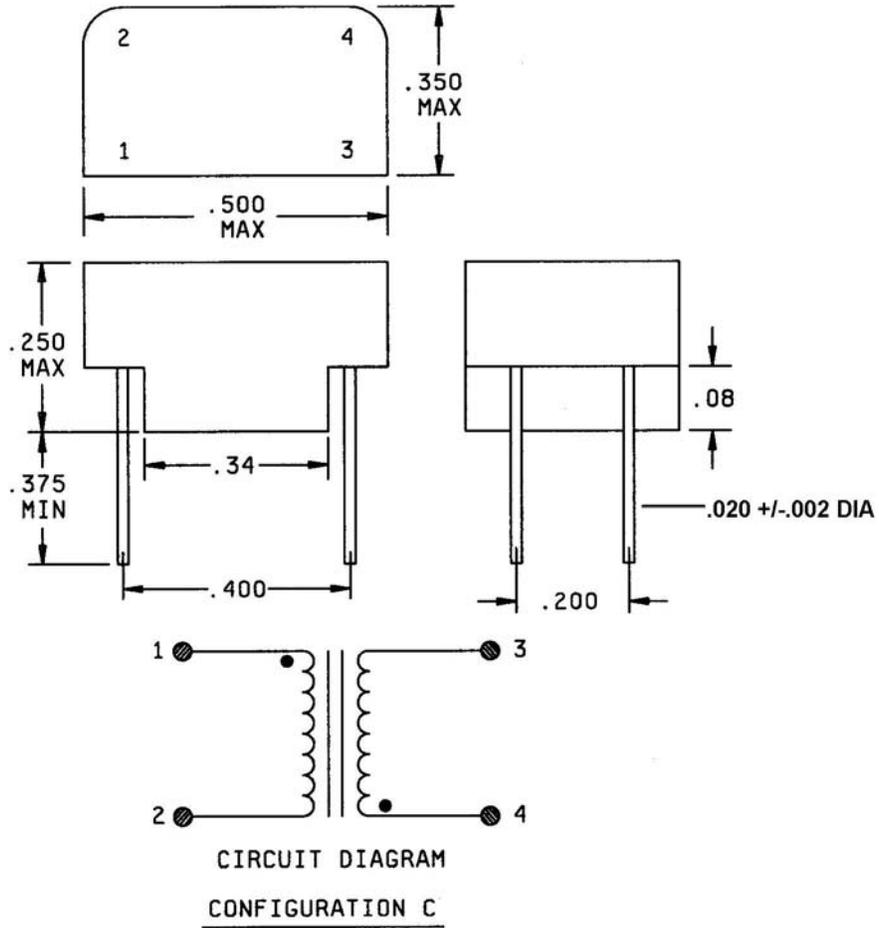
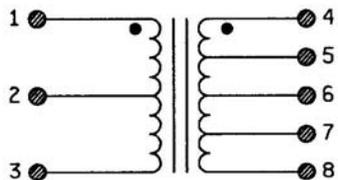
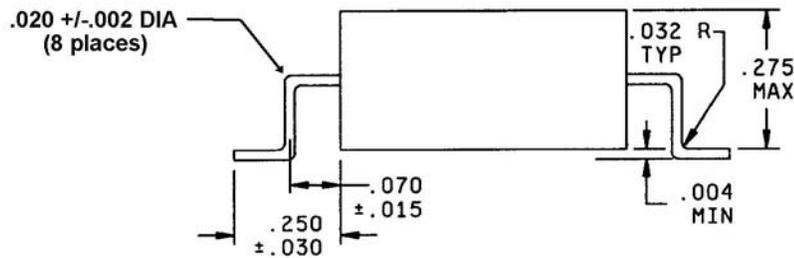
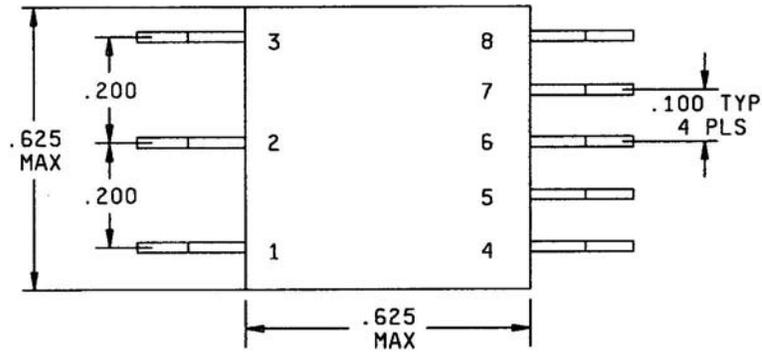
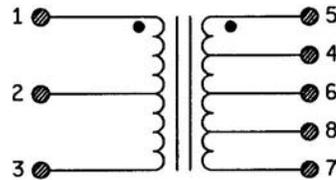


FIGURE 1. Dimensions, configurations, and circuit diagrams - Continued.

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CIRCUIT DIAGRAM FOR DASH NUMBERS
-11, -12, -13, -15 AND -27



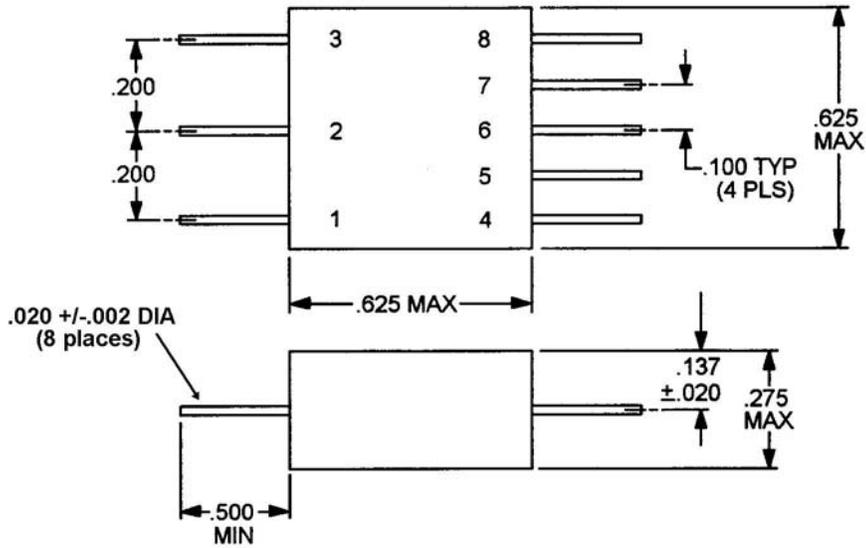
CIRCUIT DIAGRAM FOR DASH NUMBER -14

CONFIGURATION D

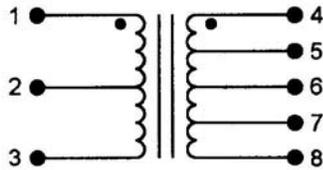
NOTE: Optional flat terminals (.020 x .020) can be used in place of the round through hole type terminals.

FIGURE 1. Dimensions, configurations, and circuit diagrams - Continued.

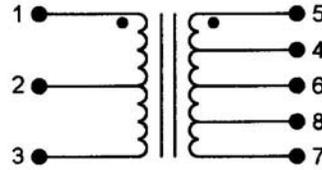
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TOLERANCE .XXX = $\pm .008$



CIRCUIT DIAGRAM
FOR DASH NUMBERS
-16, -17, -18, -20 AND -31

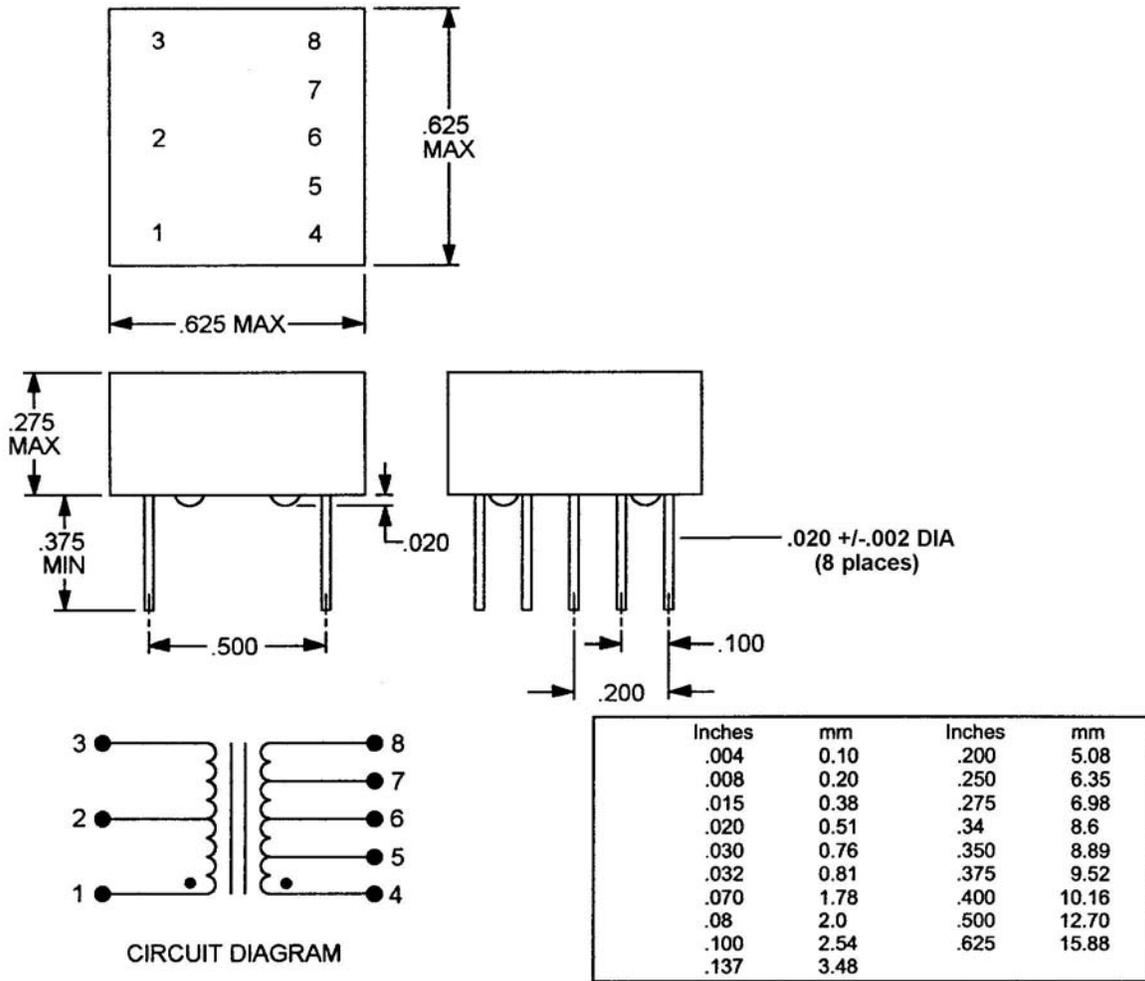


CIRCUIT DIAGRAM
FOR DASH NUMBER -19

CONFIGURATION E

NOTE: Optional flat terminals (.020 x .020) can be used in place of the round through hole type terminals.

FIGURE 1. Dimensions, configurations, and circuit diagrams - Continued.



CONFIGURATION F

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ± 0.010 inch (0.25 mm).
4. Marking shall be on top of the case, unless space is insufficient then marking can appear on the sides.
5. Terminal identification shall be marked on the transformer as shown.
6. Standoff location is for reference only.

FIGURE 1. Dimensions, configurations, and circuit diagrams - Continued.

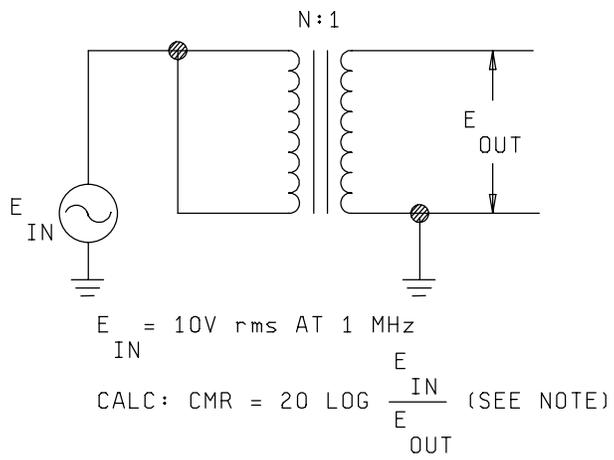
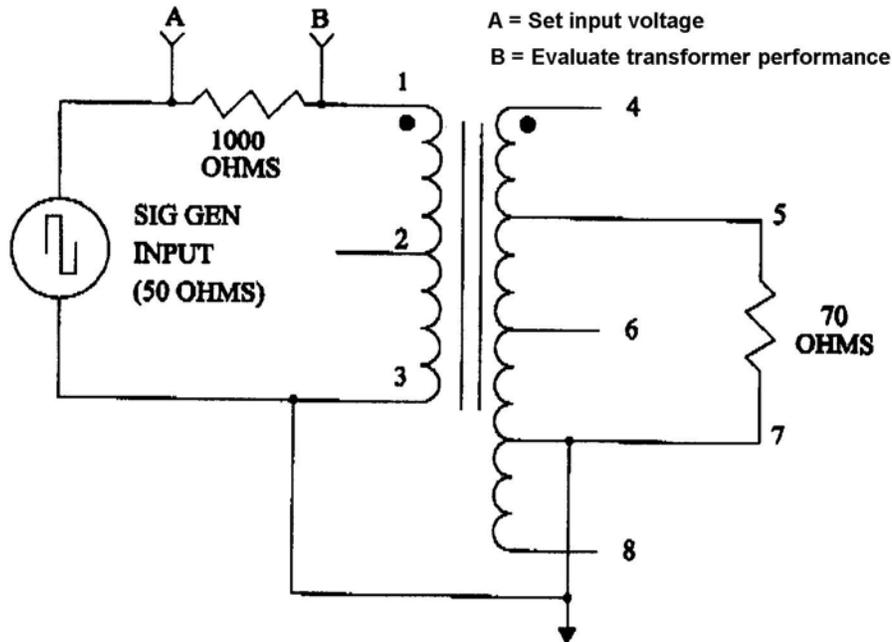


FIGURE 2. Test circuit for common mode rejection.



E_{IN} = 250 KHz square wave, 27.0 volts peak to peak with a rise time of 90ns \pm 5ns.

CALC: DROOP = $(E_D/E_{OUT}) \times 100\%$. (See figure 4 for E_D)

NOTES:

1. The resistors should be ½ watt 1% metal film types.
2. The components shall be direct mounted on a 3M type 224-1275-00 test socket or equivalent.
3. The signal generator can be any type that can generate a square wave of less than or equal to 150 nanoseconds and has a 50 ohms output impedance. A generator capable of a reasonable high voltage output is desired so that all dash numbers can be evaluated. It is desirable to apply as much voltage as possible to the input (within the resistors rating) so that appreciable voltage will be applied to the transformer. This will allow the transformer to be tested for any saturation effects.
4. The probe can be 1X or 10X depending on the selected oscilloscope input sensitivity. It is imperative that the scope compensation be correctly adjusted prior to any measurements.

FIGURE 3. Test circuit for droop, rise time, pulse width, overshoot, and life test.

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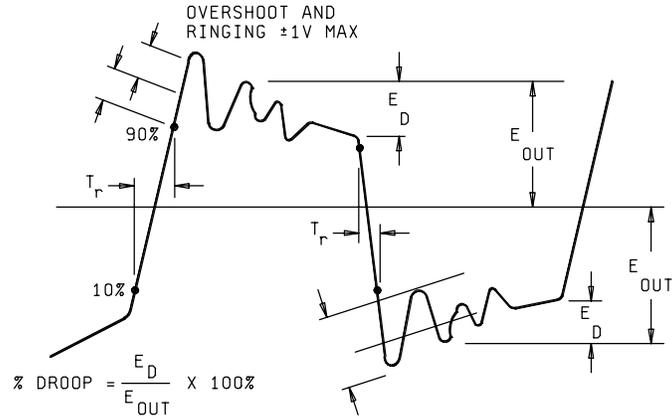
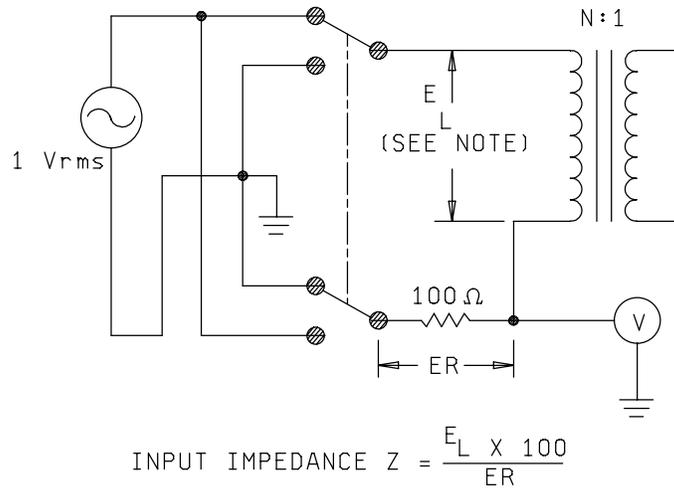


FIGURE 4. Output wave form for test circuit on figure 3.



NOTE: Input to be applied to high-turn side of all dash numbers. Self impedance may also be measured using HP4277a LCZ meter or equivalent. N represents the highest turn winding.

FIGURE 5. Test circuit for input impedance.

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TABLE I. Electrical characteristics and configurations.

Dash number	Turns ratio (±3%) 1/	Primary	Secondary	Percent droop (max)	CMR (min)	DC resistance ohms (max)	Impedance ohms (min)	Configuration
-01	1:1 1:1.707	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.0 4-8 3.0	(1-3) 4,000	A
-02	1.4:1 2:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.5 4-8 3.0	(1-3) 7,200	A
-03	1.25:1 1.66:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.2 4-8 3.0	(1-3) 4,000	A
-04	2.3:1 3.2:1	4-8 5-7	1-3 1-3	20	45 dB	1-3 1.2 4-8 3.0	(5-7) 3,000	A
-05	1:1.41	1-2	3-4	20	45 dB	1-2 2.2 3-4 2.7	(3-4) 3,000	C
-06	1:1	1-5	2-6	20	45 dB	1-5 2.5 2-6 2.8	(1-5) 3,000	B
-07	1:1.41	1-5	2-6	20	45 dB	1-5 2.2 2-6 2.7	(2-6) 3,000	B
-08	1:1.66	1-5	2-6	20	45 dB	1-5 1.5 2-6 2.4	(2-6) 3,000	B
-09	1:2	1-5	2-6	20	45 dB	1-5 1.3 2-6 2.6	(2-6) 3,000	B
-10	1:2.12 1:1.5	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 4,000	A
-11	1:1 1:1.707	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.0 4-8 3.0	(1-3) 4,000	D
-12	1.4:1 2:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.5 4-8 3.0	(1-3) 7,200	D

See footnote at end of table.

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TABLE I. Electrical characteristics and configurations - Continued.

Dash number	Turns ratio ($\pm 3\%$) 1/	Primary	Secondary	Percent droop (max)	CMR (min)	DC resistance ohms (max)	Impedance ohms (min)	Configuration
-13	1.25:1 1.66:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.2 4-8 3.0	(1-3) 4,000	D
-14	2.3:1 3.2:1	4-8 5-7	1-3 1-3	20	45 dB	1-3 1.2 4-8 3.0	(5-7) 3,000	D
-15	1:2.12 1:1.5	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 4,000	D
-16	1:1 1:.707	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.0 4-8 3.0	(1-3) 4,000	E
-17	1.4:1 2:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.5 4-8 3.0	(1-3) 7,200	E
-18	1.25:1 1.66:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.2 4-8 3.0	(1-3) 4,000	E
-19	2.3:1 3.2:1	4-8 5-7	1-3 1-3	20	45 dB	1-3 1.2 4-8 3.0	(5-7) 3,000	E
-20	1:2.12 1:1.5	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 3,000	E
-21	1:1 1:.707	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.0 4-8 3.0	(1-3) 4,000	F
-22	1.4:1 2:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.5 4-8 3.0	(1-3) 7,200	F
-23	1.25:1 1.66:1	1-3 1-3	4-8 5-7	20	45 dB	1-3 3.2 4-8 3.0	(1-3) 4,000	F
-24	1:2.12 1:1.5	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 4,000	F
-25	1:2.5 1:1.79	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 4,000	F

See footnote at end of table.

TABLE I. Electrical characteristics and configurations - Continued.

Dash number	Turns ratio ($\pm 3\%$) <u>1/</u>	Primary	Secondary	Percent droop (max)	CMR (min)	DC resistance ohms (max)	Impedance ohms (min)	Configuration
-26	1:2.5 1:1.79	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 4,000	A
-27	1:2.5 1:1.79	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 4,000	D
-28	1:1.5	1-5	2-6	20	45 dB	1-5 .90 2-6 2.5	(2-6) 3,000	B
-29	1:1.79	1-5	2-6	20	45 dB	1-5 .90 2-6 2.5	(2-6) 3,000	B
-30	1:2.5	1-5	2-6	20	45 dB	1-5 1.0 2-6 2.8	(2-6) 3,000	B
-31	1:2.5 1:1.79	1-3 1-3	4-8 5-7	20	45 dB	1-3 1.0 4-8 3.5	(4-8) 4,000	E

1/ Primary, secondary on all parts except M21038/27-05, shall have center tap balance to ± 5 percent.

Amendment notations: 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.

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Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5950-1188)

Review activities:
Army - AM, CR4, MI
Navy - AS, MC, OS, SH
Air Force - 19, 99

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