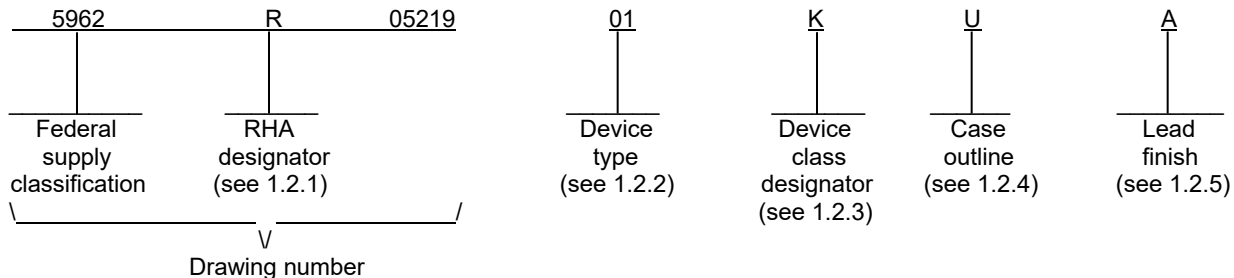


1. SCOPE

1.1 Scope. This drawing documents five product assurance classes as defined in paragraph 1.2.3 and MIL-PRF-38534. A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels is reflected in the PIN.

1.2 PIN. The PIN is as shown in the following example:



1.2.1 Radiation hardness assurance (RHA) designator. RHA marked devices meet the MIL-PRF-38534 specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

Device type	Generic number	Circuit function
01	8601, 8602	Dual voltage regulator, positive and negative, adjustable
02	8603, 8604	Dual voltage regulator, positive and negative, adjustable
03	8607, 8608	Dual voltage regulator, positive, adjustable
04	8609, 8610	Dual voltage regulator, negative, adjustable

1.2.3 Device class designator. This device class designator is a single letter identifying the product assurance level. All levels are defined by the requirements of MIL-PRF-38534 and require QML Certification as well as qualification (Class H, K, and E) or QML Listing (Class G and D). The product assurance levels are as follows:

Device class	Device performance documentation
K	Highest reliability class available. This level is intended for use in space applications.
H	Standard military quality class level. This level is intended for use in applications where non-space high reliability devices are required.
G	Reduced testing version of the standard military quality class. This level uses the Class H screening and In-Process Inspections with a possible limited temperature range, manufacturer specified incoming flow, and the manufacturer guarantees (but may not test) periodic and conformance inspections (Group A, B, C and D).
E	Designates devices which are based upon one of the other classes (K, H, or G) with exception(s) taken to the requirements of that class. These exception(s) must be specified in the device acquisition document; therefore the acquisition document should be reviewed to ensure that the exception(s) taken will not adversely affect system performance.
D	Manufacturer specified quality class. Quality level is defined by the manufacturers internal, QML certified flow. This product may have a limited temperature range.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 2

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
X	See figure 1	6	Dual-in-line
Y	See figure 1	6	Surface Mount

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. ^{1/}

Input-Output differential voltage:	
Positive regulator	
Device types 01, 02 and 03	40 V
Negative regulator:	
Device types 01 and 04	-30 V
Device type 02	-40 V
Operating junction temperature range	-55°C to +150°C
Thermal resistance, junction-to-case (θ_{JC}) each regulator	5°C/W
Lead temperature (soldering, 10 seconds)	300°C
Storage temperature range	-65°C to +150°C

1.4 Recommended operating conditions.

Output voltage range:	
Positive voltage regulator	
Device types 01, 02, and 03	+1.2 V to +37 V dc
Negative voltage regulator:	
Device type 01 and 04	-1.2 V to -27 V dc
Device type 02	-1.2 V to -37 V dc
Case operating temperature range (T_c)	-55°C to +125°C

1.5 Radiation features.

Device types 01, 03, and 04: ^{2/}	
Maximum total dose available (dose rate = 50 - 300 rads(Si)/s)	100 krad (Si) ^{3/}
Maximum total dose available (dose rate \leq 10 mrad(Si)/s)	50 krad (Si) ^{4/}

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

- ^{1/} Stresses above the absolute maximum ratings may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
- ^{2/} Bipolar device types may degrade from displacement damage from radiation which could affect RHA levels. These device types have not been characterized for displacement damage.
- ^{3/} The active elements that make up the devices on this drawing have been tested for Total Ionizing Dose (TID) in accordance with MIL-STD-883 test method 1019 condition A. The active element will be re-tested after design or process changes that can affect RHA response of these devices. RHA testing of the active elements covered on this SMD were done in alternate packages (TO3) and (TO39), not the packages as specified in paragraph 1.2.4.
- ^{4/} The active elements that make up the devices on this drawing have been tested for Enhanced Low Dose Rate Sensitivity (ELDRS) in accordance with MIL-STD-883, Method 1019 condition D for initial qualification. No ELDRS effect was observed. The devices will be re-tested after design or process changes that can affect RHA response of these devices. RHA testing of the active elements covered on this SMD were done in alternate packages (TO3) and (TO39), not the packages as specified in paragraph 1.2.4.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 3

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard for Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at <https://quicksearch.dla.mil/>.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 shall include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. The manufacturer may eliminate, modify or optimize the tests and inspections herein, however the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class. In addition, the modification in the QM plan shall not affect the form, fit, or function of the device for the applicable device class.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Block diagram. The block diagram shall be as specified on figure 3.

3.2.4 Radiation exposure circuit. The radiation exposure circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing and acquiring activity upon request.

3.2.5 Maximum power dissipation verses case temperature table. The maximum power dissipation verses case temperature is specified in table IB.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking of device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DLA Land and Maritime -VA) upon request.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C V _{IN} - V _{OUT} = 5 V, I _{OUT} = 0.5 A, P ≤ P _{MAX} unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
POSITIVE REGULATOR							
Reference voltage <u>1/</u>	V _{REF}	3 V ≤ (V _{IN} - V _{OUT}) ≤ V _{DIFF} Max, 10 mA ≤ I _{OUT} ≤ I _{MAX}	1,2,3	01-03	1.20	1.30	V
Line regulation <u>1/ 2/</u>	$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	3 V ≤ (V _{IN} - V _{OUT}) ≤ V _{DIFF} Max, I _{OUT} = 10 mA	1,2,3	01,03		0.03	%V
				02		0.05	
Load regulation <u>1/ 2/</u>	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	10 mA ≤ I _{OUT} ≤ I _{MAX} , V _{OUT} ≤ 5 V	1,2,3	01-03		60	mV
		10 mA ≤ I _{OUT} ≤ I _{MAX} , V _{OUT} ≥ 5 V				1.2	%
Thermal regulation <u>3/</u>		I _{OUT} = 1.5 A, (V _{IN} - V _{OUT}) = 13.3 V, 20 ms pulse, 20 W, T _C = +25°C	1	01-03		0.07	%/W
Ripple rejection ratio <u>3/</u>		V _{OUT} = 10 V, f = 120 Hz, C _{ADJ} = 10 μf	1,2,3	01-03	66		dB
Adjustment pin current <u>1/</u>	I _{ADJ}		1,2,3	01-03		100	μA
Adjustment pin current change <u>1/</u>	ΔI _{ADJ}	10 mA ≤ I _{OUT} ≤ I _{MAX}	1,2,3	01-03		5	μA
		3.0 V ≤ (V _{IN} - V _{OUT}) ≤ 40 V, I _{OUT} = 10 mA					
Minimum load current <u>1/ 3/</u>	I _{MIN}	(V _{IN} - V _{OUT}) = 40 V	1,2,3	01-03		5	mA
Current limit <u>1/</u>	I _{MAX}	(V _{IN} - V _{OUT}) ≤ 15 V	1,2,3	01-03	1.5		A
		(V _{IN} - V _{OUT}) = 40 V, T _C = +25°C	1		0.30		
Long term stability <u>3/</u>	$\frac{\Delta V_{OUT}}{\Delta TIME}$	T _A = +125°C	2	01-03		1	%
Thermal resistance, each regulator, <u>3/</u> junction-to-case	θ _{JC}		1,2,3	01-03		5	°C/W

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C V _{IN} - V _{OUT} = 5 V, I _{OUT} = 0.5 A, P ≤ P _{MAX} unless otherwise specified	Group A subgroups	Device type	Limits		Unit	
					Min	Max		
NEGATIVE REGULATOR								
Reference voltage <u>1/</u>	V _{REF}	3 V ≤ (V _{IN} - V _{OUT}) ≤ V _{DIFF} Max, 10 mA ≤ I _{OUT} ≤ I _{MAX}	1,2,3	01,02,04	-1.200	-1.300	V	
Line regulation <u>1/ 2/</u>	$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	3 V ≤ (V _{IN} - V _{OUT}) ≤ 30 V	1,2,3	01,04		0.02	%V	
		3 V ≤ (V _{IN} - V _{OUT}) ≤ 40 V		02		0.05		
Load regulation <u>1/ 2/</u>	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	10 mA ≤ I _{OUT} ≤ I _{MAX} , V _{OUT} ≤ 5 V	1,2,3	01,02,04		25	mV	
		10 mA ≤ I _{OUT} ≤ I _{MAX} , V _{OUT} ≥ 5 V		01,04		0.5		%
				02		1		
Thermal regulation <u>3/</u>		I _{OUT} = 1.5 A, (V _{IN} - V _{OUT}) = 13.3 V, 20 ms pulse, 20 W, T _C = +25°C	1	01,02,04		0.02	%/W	
Ripple rejection ratio <u>3/</u>		V _{OUT} = -10 V, f = 120 Hz, C _{ADJ} = 10 μf	1,2,3	01,02,04	66		dB	
Adjustment pin current <u>1/</u>	I _{ADJ}		1,2,3	01,02,04		100	μA	
Adjustment pin current change <u>1/</u>	ΔI _{ADJ}	10 mA ≤ I _{OUT} ≤ I _{MAX}	1,2,3	01, 02, 04		5	μA	
		3.0 V ≤ (V _{IN} - V _{OUT}) ≤ 30 V		01, 04		5		
		3.0 V ≤ (V _{IN} - V _{OUT}) ≤ 40 V		1,2,3	02			5
Minimum load current <u>1/ 3/</u>	I _{MIN}	(V _{IN} - V _{OUT}) = 30 V	1,2,3	01, 04		5	mA	
		(V _{IN} - V _{OUT}) ≤ 10 V		01,02,04		3		
		(V _{IN} - V _{OUT}) = 40 V		02		5		

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 6

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C V _{IN} - V _{OUT} = 5 V, I _{OUT} = 0.5 A, P ≤ P _{MAX} unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
NEGATIVE REGULATOR -Continued							
Current limit <u>1/</u>	I _{MAX}	(V _{IN} - V _{OUT}) ≤ 15 V,	1,2,3	01, 04	1.5		A
		(V _{IN} - V _{OUT}) = 30 V, T _C = +25°C	1	01, 04	0.24		
		(V _{IN} - V _{OUT}) = 40 V, T _C = +25°C	1	02	0.24		
Long term stability <u>3/</u>	$\frac{\Delta V_{OUT}}{\Delta TIME}$	T _A = +125°C	2	01,02,04		1	%
Thermal resistance, each regulator, <u>3/</u> junction-to-case	θ _{JC}		1,2,3	01,02,04		5	°C/W

- 1/ The active elements that make up these devices have been tested to the requirements of RHA designator level "R" (100 krad(Si)) of Method 1019, condition A of MIL-STD-883 and low dose rate tested to the requirements of Method 1019, condition D of MIL-STD-883 to 50 krad(Si) at +25°C for these parameters. No ELDRS effect was observed. The devices will be re-tested after design or process changes that can affect RHA response of these devices. RHA testing of the active elements covered on this SMD were done in alternate packages (TO3) and (TO39), not the packages as specified in paragraph 1.2.4.
- 2/ Regulation is measured at a constant junction temperature, using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation. Measurements taken at the output lead must be adjusted for lead resistance.
- 3/ Parameter shall be tested at initial device characterization and after design or process changes. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 7

Table IB. Maximum power dissipation verses case temperature table.

Case Temperature (°C)	Maximum power dissipation (Watts)	
	One regulator "ON"	Both regulators "ON"
0	30	53
5	29	51
10	28	49
15	27	48
20	26	46
25	25	44
30	24	42
35	23	41
40	22	39
45	21	37
50	20	35
55	19	34
60	18	32
65	17	30
70	16	28
75	15	26
80	14	25
85	13	23
90	12	21
95	11	19
100	10	18
105	9	16
110	8	14
115	7	12
120	6	11
125	5	9
130	4	7
135	3	5
140	2	4
145	1	2
150	0	0

**STANDARD
MICROCIRCUIT DRAWING**
DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990

SIZE
A

REVISION LEVEL
F

5962-05219

SHEET **8**

Case outline X - Continued.

Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A		.220		5.59
∅b	.028	.032	0.71	0.81
∅b3	.085	.095	2.12	2.41
D	.650	.660	16.51	16.76
D1	.410	.420	10.41	10.67
e	.100	BSC	2.54	BSC
e1	.200	BSC	5.08	BSC
e2	.108	BSC	2.74	BSC
eA	.700	.740	17.78	18.80
E	.410	.420	10.41	10.67
F	.035	.045	0.90	1.14
G1	.123	BSC	3.12	BSC
G2	.2025	.2125	5.144	5.408
L1	.230		5.84	
L2	.150	REF	3.81	REF
∅p	.140	.150	3.56	3.81
Q	.122	TYP	3.10	TYP
R	.065	TYP	1.65	TYP
S1		.028		0.71

NOTES:

1. The U.S. preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. The package contains a BeO substrate.
3. The case is electrically isolated.

FIGURE 1. Case outline(s) - Continued.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 10

Case outline Y.

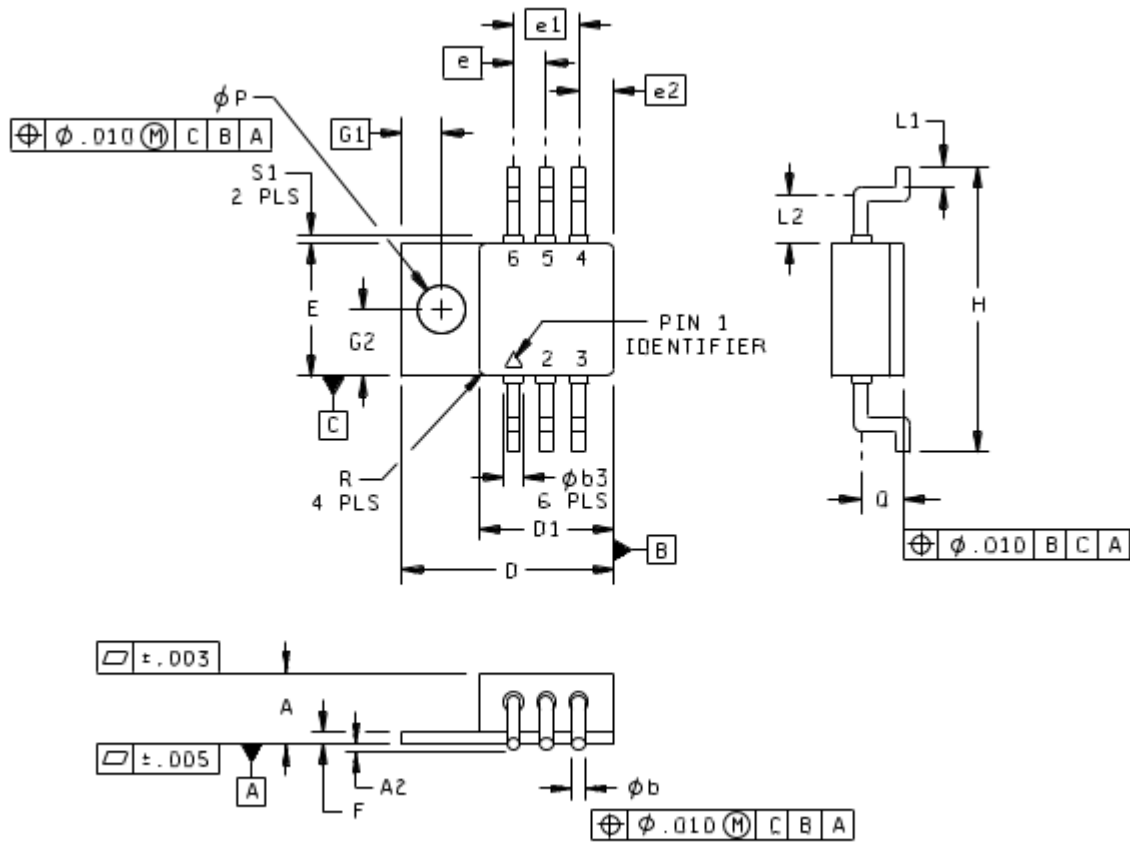


FIGURE 1. Case outline(s) - Continued.

**STANDARD
MICROCIRCUIT DRAWING**
DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990

SIZE
A

5962-05219

REVISION LEVEL
F

SHEET **11**

Case outline Y - Continued.

Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A		.220		5.59
A2	.015	.025	0.38	0.64
Øb	.028	.032	0.71	0.81
Øb3	.085	.095	2.12	2.41
D	.650	.660	16.51	16.76
D1	.410	.420	10.41	10.67
e	.100 BSC		2.54	BSC
e1	.200 BSC		5.08	BSC
e2	.108 BSC		2.74	BSC
E	.410	.420	10.41	10.67
F	.035	.045	0.90	1.14
G1	.123 BSC		3.12	BSC
G2	.2025	.2125	5.144	5.408
H	.866	.906	22.00	23.01
L1	.055	.065	1.40	1.65
L2	.150 REF		3.81	REF
Øp	.140	.150	3.56	3.81
Q	.122 TYP		3.10	TYP
R	.065 TYP		1.65	TYP
S1		.028		0.71

NOTES:

1. The U.S. preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. The package contains a BeO substrate.
3. The case is electrically isolated.

FIGURE 1. Case outline(s) - Continued.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 12

Device types	01 and 02	03	04
Case outlines		X and Y	
Terminal number		Terminal symbol	
1	Positive ADJ	POS_ADJ_1	NEG_ADJ_1
2	Positive V_{OUT}	POS_V _{OUT} _1	NEG_V _{OUT} _1
3	Positive V_{IN}	POS_V _{IN} _1	NEG_V _{IN} _1
4	Negative ADJ	POS_ADJ_2	NEG_ADJ_2
5	Negative V_{IN}	POS_V _{IN} _2	NEG_V _{IN} _2
6	Negative V_{OUT}	POS_V _{OUT} _2	NEG_V _{OUT} _2

FIGURE 2. Terminal connections.

Device types 01 and 02

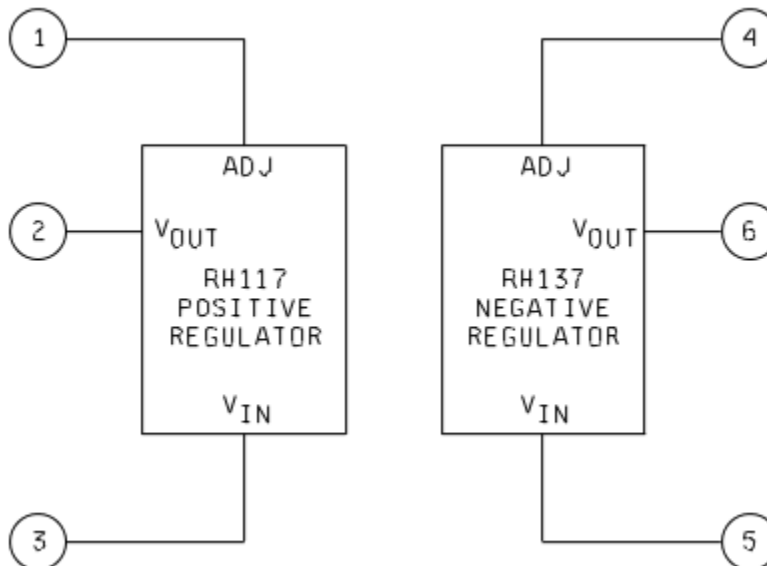
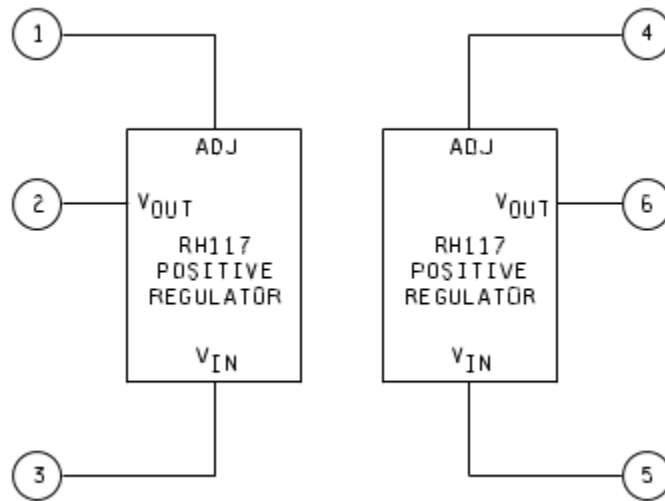


FIGURE 3. Block diagram.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 13

Device type 03



Device type 04

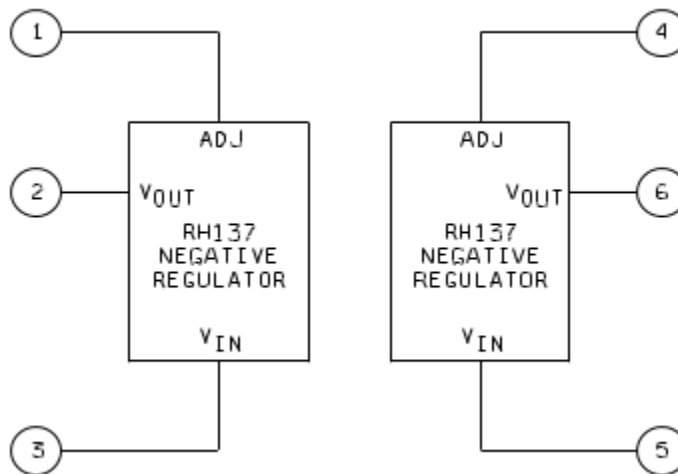


FIGURE 3. Block diagram - Continued.

**STANDARD
MICROCIRCUIT DRAWING**
DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990

SIZE
A

5962-05219

REVISION LEVEL
F

SHEET **14**

TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	
Final electrical parameters	1,2,3
Group A test requirements	1,2,3
Group C end-point electrical parameters	1,2,3
End-point electrical parameters for Radiation Hardness Assurance (RHA) devices	1

* PDA applies to subgroup 1.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DLA Land and Maritime -VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. The following additional criteria shall apply:

- a. Burn-in test, method 1015 of MIL-STD-883.
 - (1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to DLA Land and Maritime-VA or acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.
 - (2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.
- b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 15

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 4, 5, 6, 7, 8A, 8B, 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test, method 1005 of MIL-STD-883.
 - (1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DLA Land and Maritime -VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.
 - (2) TA as specified in accordance with table I of method 1005 of MIL-STD-883.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

4.3.5 Radiation hardness assurance (RHA). RHA qualification is required only for those devices with the RHA designator as specified herein. See table IIIA and table IIIB.

Table IIIA. Radiation Hardness Assurance Method Table.

RHA method Employed	Testing at 2X rated total dose		Worst Case Analysis Performed No				End points after dose is achieved includes minimum maximum, and room temperatures	
	Element Level	Hybrid Device Level	Includes temperature effects	Combines temperature and radiation effects	Combines total dose and displacement effects	End-of-life	Element Level	Hybrid device level
	Yes	N/A	N/A	N/A	N/A	N/A	N/A	No

See notes on next page.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 16

Table IIIB. Hybrid level and element level test table.

	Radiation Test								
	Total Dose			Heavy Ion		Proton		Neutron	
	Low Dose Rate	High Dose Rate (HDR)	ELDRS	SEU (upset)	SEL (latch-up)	Low Energy	High Energy	SEE (upset)	Displacement Damage (DD)
Hybrid	N/A	N/A	N/A	(N)	(N)	(N)	(N)	(N)	(N)
Element									
Bipolar, linear or mixed signal > 90 nm	X (50 krad)	X (100 krad)	X (50 krad)	(N)	(N)	(N)	(N)	(N)	(N)

NOTES:

- X = Radiation testing done (Level)
- G = Guaranteed by design or process
- (N) = Not yet tested
- N/A = Not applicable for this SMD

4.3.5.1 Radiation Hardness Assurance (RHA) inspection. RHA qualification is required for those devices with the RHA designator as specified herein. End-point electrical parameters for radiation hardness assurance (RHA) devices shall be specified in table II. Radiation testing will be in accordance with the qualifying activity (DLA Land and Maritime -VQ) approved plan and with MIL-PRF-38534, Appendix G.

- a. The hybrid device manufacturer shall establish procedures controlling component radiation testing, and shall establish radiation test plans used to implement component lot qualification during procurement. Test plans and test reports shall be filed and controlled in accordance with the manufacturer's configuration management system.
- b. The hybrid device manufacturer shall designate a RHA program manager to oversee component lot qualification, and to monitor design changes for continued compliance to RHA requirements.

4.3.5.1.1 Hybrid level qualification.

4.3.5.1.1.2 Total ionizing dose irradiation testing. Hybrid level and component level testing are the same for the devices on this SMD since the active elements are independent of each other and accessible to the device leads for test. The qualification was performed on the active components, independent of the hybrid.

4.3.5.1.2 Component level qualification.

4.3.5.1.2.1 Total ionizing dose irradiation testing. A minimum of twenty samples of each element is tested at initial qualification and after any design or process changes which may affect the RHA response of the device type. Five biased and five unbiased are tested at High Dose Rate (HDR) in accordance with condition A of method 1019 of MIL-STD-883 to 100 krad(Si). Another ten devices are tested at Low Dose Rate (LDR) in accordance with condition D of method 1019 of MIL-STD-883 to 50 krad(Si). The resulting data is evaluated in accordance with Condition D, ELDRS characterization.

4.3.5.2 Lot Acceptance. Each lot of active elements shall be evaluated for acceptance in accordance with MIL-PRF-38534 and herein.

4.3.5.2.1 Total Ionizing Dose. Samples from every wafer lot will be assembled into a representative device type and tested for wafer lot acceptance RLAT (Radiation Lot Acceptance Testing). Four biased and four unbiased devices are tested in accordance with condition A, of method 1019 of MIL-STD-883 to 100 Krad(Si).

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 17

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished using DD Form 1692, Engineering Change Proposal, or email communication.

6.4 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and the applicable SMD to that system. DLA Land and Maritime will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DLA Land and Maritime-VA, telephone (614) 692-8108.

6.5 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-1081.

6.6 Sources of supply. Sources of supply are listed in MIL-HDBK-103 and QML-38534. The vendors, listed in MIL-HDBK-103 and QML-38534, have submitted a certificate of compliance (see 3.7 herein) to DLA Land and Maritime-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-05219
		REVISION LEVEL F	SHEET 18

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 23-06-05

Approved sources of supply for SMD 5962-05219 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38534 during the next revision. MIL-HDBK-103 and QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DLA Land and Maritime-VA. This information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38534. DLA Land and Maritime maintains an online database of all current sources of supply at <https://landandmaritimeapps.dla.mil/programs/smcr/>.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-0521901KXA 5962R0521901KXA 5962-0521901KXC 5962R0521901KXC 5962-0521901KYA 5962R0521901KYA 5962-0521901KYC 5962R0521901KYC	88379 88379 88379 88379 88379 88379 88379 88379	VRG8601-201-2S VRG8601-901-2S VRG8601-201-1S VRG8601-901-1S VRG8602-201-2S VRG8602-901-2S VRG8602-201-1S VRG8602-901-1S
5962-0521902KXA 5962-0521902KXC 5962-0521902KYA 5962-0521902KYC	<u>3/</u> <u>3/</u> <u>3/</u> <u>3/</u>	VRG8603-201-2S VRG8603-201-1S VRG8604-201-2S VRG8604-201-1S
5962-0521903KXA 5962R0521903KXA 5962-0521903KXC 5962R0521903KXC 5962-0521903KYA 5962R0521903KYA 5962-0521903KYC 5962R0521903KYC	88379 88379 88379 88379 88379 88379 88379 88379	VRG8607-201-2S VRG8607-901-2S VRG8607-201-1S VRG8607-901-1S VRG8608-201-2S VRG8608-901-2S VRG8608-201-1S VRG8608-901-1S
5962-0521904KXA 5962R0521904KXA 5962-0521904KXC 5962R0521904KXC 5962-0521904KYA 5962R0521904KYA 5962-0521904KYC 5962R0521904KYC	88379 88379 88379 88379 88379 88379 88379 88379	VRG8609-201-2S VRG8609-901-2S VRG8609-201-1S VRG8609-901-1S VRG8610-201-2S VRG8610-901-2S VRG8610-201-1S VRG8610-901-1S

- 1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.
- 2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.
- 3/ Not available from an approved source of supply.

Vendor CAGE
number

88379

Vendor name
and address

Frontgrade Technologies Inc.
35 South Service Road
Plainview, NY 11803-4117

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in the information bulletin.