

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Complete document revision – also added device types 02, 03, 04, 05.	78-02-03	N. A. HAUCK
B	Complete document revision: deleted type 02.	79-07-11	N. A. HAUCK
C	Add condition C to burn-in. Format changes.	80-07-11	D. HILL
D	Types 01, 03, and 04 INACTIVE for New Design. Use M38510/11501, 11502, and 11503, respectively, for case "X"; and M38510/11505, 11506, and 11507 respectively, for case "Y". Type 05 still active.	82-07-20	N. A. HAUCK
E	Add case outlines H, P, and 2. Add vendor CAGE 01295 as a supplier for 01HX, 01PX, and 012X. Delete vendor CAGE numbers 07263 and 27014 from drawing. Engineering and editorial changes throughout.	93-05-04	M. A. FRYE
F	Drawing updated to reflect current requirements. -rrp	05-12-06	R. MONNIN
G	Update drawing as part of five year review. -rrp	12-02-21	C. SAFFLE
H	Update drawing to current MIL-PRF-38535 requirements. -rrp	17-04-18	C. SAFFLE



CURRENT CAGE CODE 67268

THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED.

REV																				
SHEET																				
REV	H	H	H																	
SHEET	15	16	17																	
REV STATUS OF SHEETS				REV	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
				SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
PMIC N/A				PREPARED BY WILLIAM E. SHOUP				DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil												
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A				CHECKED BY C.R. JACKSON																
				APPROVED BY N. A. HAUCK				MICROCIRCUIT, LINEAR, NEGATIVE, FIXED, VOLTAGE REGULATOR, MONOLITHIC SILICON												
				DRAWING APPROVAL DATE 77-08-19																
				REVISION LEVEL H				SIZE A	CAGE CODE 14933	77040										
									SHEET 1 OF 17											

1. SCOPE

1.1 Scope. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

1.2 Part or Identifying Number (PIN). The complete PIN is as shown in the following example:

<u>77040</u>	<u>01</u>	<u>H</u>	<u>A</u>
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	7905/ LM120-5	Negative, voltage regulator, fixed -5 volts
03	7912/ LM120-12	Negative, voltage regulator, fixed -12 volts
04	7915/ LM120-15	Negative, voltage regulator, fixed -15 volts
05	7924/ LM120-24	Negative, voltage regulator, fixed -24 volts

1.2.2 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>
H	GDFP1-F10 or CDFP2-F10	10	Flat pack
P	GDIP1-T8 or CDIP2-T8	8	Dual-in-line
X	MACY1-X3	3	TO-5 can
Y	MBFM1-P2	2	TO-3 flange mount
2	CQCC1-N20	20	Square leadless chip carrier

1.2.3 Lead finish. The lead finish is as specified in MIL-PRF-38535, appendix A.

1.3 Absolute maximum ratings.

Input voltage (V_{IN}):

Device types 01, 03, 04	-35 V
Device type 05	-40 V

Storage temperature range -65°C to +150°C

Lead temperature (soldering, 10 seconds) 300°C

Power dissipation (P_D): 1/, 2/

Case outline H	0.675 W
Case outline P	1.050 W
Case outline X	2.0 W
Case outline Y	20.0 W
Case outline 2	1.375 W

Design output current (I_D):

Case outlines H, P, X, and 2	0.5 A
Case outline Y	1.0 A

Thermal resistance, junction-to-case (θ_{JC}):

Case outlines H, P, and 2	See MIL-STD-1835
Case outline X	15°C/W
Case outline Y	3°C/W

1/ Must withstand the added P_D due to short circuit test; e.g., I_{OS} .

2/ For temperatures above 25°C, derate at a factor of 5.4 mW/°C for case outline H, 8.4 mW/°C for case outline P, and 11 mW/°C for case outline 2.

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

SIZE
A

77040

REVISION LEVEL
H

SHEET
2

1.3 Absolute maximum ratings – Continued.

Thermal resistance, junction-to-case (θ_{JA}):

Case outline H	185°C/W
Case outline P	119°C/W
Case outline X	150°C/W
Case outline Y	35°C/W
Case outline 2	65°C/W

1.4 Recommended operating conditions.

Input voltage range (V_{IN}):

Device type 01	-7 V to -25 V
Device type 03	-15 V to -32 V
Device type 04	-18.5 V to -35 V
Device type 05	-28 V to -38 V

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.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard 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 <http://quicksearch.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094).

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.

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

SIZE
A

77040

REVISION LEVEL
H

SHEET
3

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-PRF-38535 is required to identify when the QML flow option is used.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535, appendix A and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

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 ambient 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 described in table I.

3.5 Marking. Marking shall be in accordance with MIL-PRF-38535, appendix A. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device.

3.5.1 Certification/compliance mark. A compliance indicator "C" shall be marked on all non-JAN devices built in compliance to MIL-PRF-38535, appendix A. The compliance indicator "C" shall be replaced with a "Q" or "QML" certification mark in accordance with MIL-PRF-38535 to identify when the QML flow option is used.

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-HDBK-103 (see 6.6 herein). The certificate of compliance submitted to DLA Land and Maritime -VA prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DLA Land and Maritime -VA shall be required for any change that affects this drawing.

3.9 Verification and review. DLA Land and Maritime, DLA Land and Maritime's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		77040
		REVISION LEVEL H	SHEET 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Cases H, P, and 2							
Output voltage	V _{OUT}	V _{IN} = -7 V to -25 V, I _L = 5 mA to 350 mA	1, 2, 3	01	-5.25	-4.75	V
Line regulation	V _{RLINE}	V _{IN} = -7 V to -25 V, I _L = 350 mA	1	01	-50	+50	mV
		V _{IN} = -8 V to -18 V, I _L = 350 mA	2, 3		-30	+30	
Load regulation	V _{RLOAD}	V _{IN} = -10 V , I _L = 5 mA to 500 mA	1, 2, 3	01	-100	+100	mV
Standby current drain	I _{SCD}	V _{IN} = -10 V, I _L = 350 mA	1, 2, 3	01		2	mA
Standby current drain change vs. line voltage	ΔI _{SCD} / (line)	V _{IN} = -8 V to -25 V, I _L = 350 mA	1, 2, 3	01	-0.4	+0.4	mA
Standby current drain change vs. load current	ΔI _{SCD} / (load)	V _{IN} = -10 V, I _L = 5 mA to 350 mA	1, 2, 3	01	-0.4	+0.4	mA
Output short circuit current	I _{OS}	V _{IN} = -30 V	1, 2, 3	01		600	mA
Peak output current <u>2/</u>	I _{PK}	V _{IN} = -10 V, T _A = 25°C	1	01	0.5	1.4	A
Ripple rejection <u>2/</u>	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -8 V to -18 V, I _L = 100 mA, f = 120 Hz	4, 5, 6	01	50		dB
		V _{IN} = -8 V to -18 V, T _A = 25°C, I _L = 300 mA, f = 120 Hz	4	01	54		
Output noise voltage <u>2/</u>	V _{NO}	V _{IN} = -10 V, T _A = 25°C, I _L = 350 mA, f = 10 Hz to 100 kHz	1	01		400	μV
Temperature coefficient of output voltage <u>2/</u>	V _{RTH}	V _{IN} = -10 V, I _L = 5 mA	1, 2, 3	01	-1.5	+1.5	mV/°C
Dropout voltage	V _{DROP}	V _{IN} = -10 V, I _L = 350 mA	1, 2, 3	01		2.3	V

See footnotes at end of table.

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

SIZE
A

77040

REVISION LEVEL
H

SHEET
5

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case X							
Output voltage	V _{OUT}	V _{IN} = -8 V, I _L = 5 mA, 0.5 A	1, 2, 3	01	-5.25	-4.75	V
		V _{IN} = -20 V, I _L = 5 mA, 0.5 A	1, 2, 3		-5.25	-4.75	
		V _{IN} = -30 V, I _L = 5 mA, 50 mA	1, 2, 3		-5.25	-4.75	
		V _{IN} = -10 V, I _L = 5 mA, T _A = 150°C	1, 2, 3		-5.30	-4.70	
Line regulation	V _{RLINE}	-30 V ≤ V _{IN} ≤ -8 V, I _L = 50 mA	1, 2, 3	01	-150	150	mV
		-25 V ≤ V _{IN} ≤ -8 V, I _L = 350 mA			-50	50	
Load regulation	V _{RLOAD}	V _{IN} = -10 V, 5 mA ≤ I _L ≤ 500 mA	1, 2, 3	01	-100	100	mV
		V _{IN} = -30 V, 5 mA ≤ I _L ≤ 50 mA			-150	150	
Standby current drain	I _{SCD}	V _{IN} = -10 V, I _L = 5 mA	1, 2, 3	01	0.5	3.0	mA
		V _{IN} = -30 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} / (line)	-30 V ≤ V _{IN} ≤ -8 V, I _L = 5 mA	1, 2, 3	01	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} / (load)	5 mA ≤ I _L ≤ 500 mA, V _{IN} = -10 V	1, 2, 3	01	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -25 V	1, 2, 3	01	0.00	1.50	A
		V _{IN} = -30 V			0.00	1.00	
Peak output current	I _{PK}	V _{IN} = -8 V, forced ΔV _{OUT} = 0.48 V	1, 2, 3	01	0.5	2.0	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -10 V, I _L = 125 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	01	45		dB
Output noise voltage	V _{NO}	V _{IN} = -10 V, T _A = 25°C, I _L = 50 mA	1	01		250	μV _{rms}
Thermal regulation	V _{RTH}	V _{IN} = -15 V, I _L = 500 mA, T _A = 25°C	1	01	-50	50	mV
Voltage start up	V _{START}	V _{IN} = -20 V, R _L = 10 Ω	1, 2, 3	01	-5.25	-4.75	V
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -10 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	01		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -10 V, I _L = 50 mA, ΔI _L = 200 mA, T _A = 25°C	4	01		2.5	mV/mA

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
6

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case Y							
Output voltage	V _{OUT}	V _{IN} = -8 V, I _L = 5 mA,1.0 A	1, 2, 3	01	-5.25	-4.75	V
		V _{IN} = -20 V, I _L = 5 mA, 1.0 A			-5.25	-4.75	
		V _{IN} = -30 V, I _L = 5 mA, 0.1 A			-5.25	-4.75	
		V _{IN} = -10 V, I _L = 5 mA, T _A = 150°C			-5.30	-4.70	
Line regulation	V _{RLINE}	-30 V ≤ V _{IN} ≤ -8 V, I _L = 0.1 A	1, 2, 3	01	-150	150	mV
		-25 V ≤ V _{IN} ≤ -8 V, I _L = 0.5 A			-75	75	
Load regulation	V _{RLOAD}	V _{IN} = -10 V, 5 mA ≤ I _L ≤ 1.0 A	1, 2, 3	01	-100	100	mV
		V _{IN} = -30 V, 5 mA ≤ I _L ≤ 0.1 A			-150	150	
Standby current drain	I _{SCD}	V _{IN} = -10 V, I _L = 5 mA	1, 2, 3	01	0.5	3.0	mA
		V _{IN} = -30 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} (line)	-30 V ≤ V _{IN} ≤ -8 V, I _L = 5 mA	1, 2, 3	01	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} (load)	5 mA ≤ I _L ≤ 1.0 A, V _{IN} = -10 V	1, 2, 3	01	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -25 V	1, 2, 3	01	0.00	3.50	A
		V _{IN} = -30 V			0.00	2.00	
Peak output current	I _{PK}	V _{IN} = -8 V, forced ΔV _{OUT} = 0.48 V	1, 2, 3	01	1.0	4.50	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -10 V, I _L = 350 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	01	45		dB
Output noise voltage	V _{NO}	V _{IN} = -10 V, T _A = 25°C, I _L = 0.1 A	1	01		250	μVrms
Thermal regulation	V _{RTH}	V _{IN} = -15 V, I _L = 1.0 A, T _A = 25°C	1	01	-50	50	mV
Voltage start up	V _{START}	V _{IN} = -20 V, R _L = 5 Ω	1, 2, 3	01	-5.25	-4.75	V
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -10 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	01		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -10 V, I _L = 100 mA, ΔI _L = 400 mA, T _A = 25°C	4	01		2.5	mV/mA

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
7

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case X							
Output voltage	V _{OUT}	V _{IN} = -15 V, I _L = 5 mA, 0.5 A	1, 2, 3	03	-12.60	-11.40	V
		V _{IN} = -27 V, I _L = 5 mA, 0.5 A			-12.60	-11.40	
		V _{IN} = -35 V, I _L = 5 mA, 50 mA			-12.60	-11.40	
		V _{IN} = -17 V, I _L = 5 mA, T _A = 150°C			-12.72	-11.28	
Line regulation	V _{RLINE}	-35 V ≤ V _{IN} ≤ -15 V, I _L = 50 mA	1, 2, 3	03	-360	360	mV
		-32 V ≤ V _{IN} ≤ -15 V, I _L = 350 mA			-120	120	
Load regulation	V _{RLOAD}	V _{IN} = -17 V, 5 mA ≤ I _L ≤ 500 mA	1, 2, 3	03	-240	240	mV
		V _{IN} = -35 V, 5 mA ≤ I _L ≤ 50 mA			-360	360	
Standby current drain	I _{SCD}	V _{IN} = -17 V, I _L = 5 mA	1, 2, 3	03	0.5	3.0	mA
		V _{IN} = -35 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} (line)	-35 V ≤ V _{IN} ≤ -15 V, I _L = 5 mA	1, 2, 3	03	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} (load)	5 mA ≤ I _L ≤ 500 mA, V _{IN} = -17 V	1, 2, 3	03	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -25 V	1, 2, 3	03	0.00	1.50	A
		V _{IN} = -35 V			0.00	1.00	
Peak output current	I _{PK}	V _{IN} = -15 V, forced ΔV _{OUT} = 1.13 V	1, 2, 3	03	0.5	2.0	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -17 V, I _L = 125 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	03	50		dB
Output noise voltage	V _{NO}	V _{IN} = -17 V, T _A = 25°C, I _L = 50 mA	1	03		250	μVrms
Thermal regulation	V _{RTH}	V _{IN} = -22 V, I _L = 500 mA, T _A = 25°C	1	03	-120	120	mV
Voltage start up	V _{START}	V _{IN} = -27 V, R _L = 24 Ω	1, 2, 3	03	-12.60	-11.40	V

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
8

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case X – Continued							
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -17 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	03		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -17 V, I _L = 50 mA, ΔI _L = 200 mA, T _A = 25°C	4	03		2.5	mV/mA
Case Y							
Output voltage	V _{OUT}	V _{IN} = -15 V, I _L = 5 mA, 1.0 A	1, 2, 3	03	-12.60	-11.40	V
		V _{IN} = -27 V, I _L = 5 mA, 1.0 A			-12.60	-11.40	
		V _{IN} = -35 V, I _L = 5 mA, 0.1 A			-12.60	-11.40	
		V _{IN} = -17 V, I _L = 5 mA, T _A = 150°C			-12.72	-11.28	
Line regulation	V _{RLINE}	-35 V ≤ V _{IN} ≤ -15 V, I _L = 1.0 A	1, 2, 3	03	-360	360	mV
		-32 V ≤ V _{IN} ≤ -15 V, I _L = 0.5 A			-120	120	
Load regulation	V _{RLOAD}	V _{IN} = -17 V, 5 mA ≤ I _L ≤ 1.0 A	1, 2, 3	03	-240	240	mV
		V _{IN} = -35 V, 5 mA ≤ I _L ≤ 0.1 A			-360	360	
Standby current drain	I _{SCD}	V _{IN} = -17 V, I _L = 5 mA	1, 2, 3	03	0.5	3.0	mA
		V _{IN} = -35 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} (line)	-32 V ≤ V _{IN} ≤ -15 V, I _L = 5 mA	1, 2, 3	03	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} (load)	5 mA ≤ I _L ≤ 1.0 A, V _{IN} = -17 V	1, 2, 3	03	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -32 V	1, 2, 3	03	0.00	3.50	A
		V _{IN} = -35 V			0.00	2.00	
Peak output current	I _{PK}	V _{IN} = -15 V, forced ΔV _{OUT} = 1.13 V	1, 2, 3	03	1.0	4.0	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -17 V, I _L = 350 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	03	50		dB
Output noise voltage	V _{NO}	V _{IN} = -17 V, T _A = 25°C, I _L = 0.1 A	1	03		600	μV _{rms}
Thermal regulation	V _{RTH}	V _{IN} = -22 V, I _L = 1.0 A, T _A = 25°C	1	03	-120	120	mV

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
9

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case Y - Continued							
Voltage start up	V _{START}	V _{IN} = -27 V, R _L = 12 Ω	1, 2, 3	03	-12.60	-11.40	V
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -17 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	03		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -17 V, I _L = 100 mA, ΔI _L = 400 mA, T _A = 25°C	4	03		2.5	mV/mA
Case X							
Output voltage	V _{OUT}	V _{IN} = -18.5 V, I _L = 5 mA, 0.5 A	1, 2, 3	04	-15.75	-14.25	V
		V _{IN} = -30 V, I _L = 5 mA, 0.5 A			-15.75	-14.25	
		V _{IN} = -35 V, I _L = 5 mA, 50 mA			-15.75	-14.25	
		V _{IN} = -20 V, I _L = 5 mA, T _A = 150°C			-15.90	-14.10	
Line regulation	V _{RLINE}	-35 V ≤ V _{IN} ≤ -18.5 V, I _L = 500 mA	1, 2, 3	04	-150	150	mV
Load regulation	V _{RLOAD}	V _{IN} = -20 V, 5 mA ≤ I _L ≤ 500 mA	1, 2, 3	04	-300	300	mV
		V _{IN} = -35 V, 5 mA ≤ I _L ≤ 50 mA			-450	450	
Standby current drain	I _{SCD}	V _{IN} = -20 V, I _L = 5 mA	1, 2, 3	04	0.5	3.0	mA
		V _{IN} = -35 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} (line)	-35 V ≤ V _{IN} ≤ -18.5 V, I _L = 5 mA	1, 2, 3	04	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} (load)	5 mA ≤ I _L ≤ 500 mA, V _{IN} = -20 V	1, 2, 3	04	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -25 V	1, 2, 3	04	0.00	1.50	A
		V _{IN} = -35 V			0.00	1.00	
Peak output current	I _{PK}	V _{IN} = -18.5 V, forced ΔV _{OUT} = 1.43 V	1, 2, 3	04	0.5	2.0	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -20 V, I _L = 125 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	04	50		dB
Output noise voltage	V _{NO}	V _{IN} = -20 V, T _A = 25°C, I _L = 50 mA	1	04		300	μVrms
Thermal regulation	V _{RTH}	V _{IN} = -25 V, I _L = 500 mA, T _A = 25°C	1	04	-150	150	mV
Voltage start up	V _{START}	V _{IN} = -30 V, R _L = 30 Ω	1, 2, 3	04	-15.75	-14.25	V

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
10

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case X - Continued							
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -20 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	04		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -20 V, I _L = 50 mA, ΔI _L = 200 mA, T _A = 25°C	4	04		2.5	mV/mA
Case Y							
Output voltage	V _{OUT}	V _{IN} = -18.5 V, I _L = 5 mA, 1.0 A	1, 2, 3	04	-15.75	-14.25	V
		V _{IN} = -30 V, I _L = 5 mA, 1.0 A			-15.75	-14.25	
		V _{IN} = -35 V, I _L = 5 mA, 0.1 A			-15.75	-14.25	
		V _{IN} = -20 V, I _L = 5 mA, T _A = 150°C			-15.90	-14.10	
Line regulation	V _{RLINE}	-35 V ≤ V _{IN} ≤ -18.5 V, I _L = 0.5 A	1, 2, 3	04	-150	150	mV
Load regulation	V _{RLOAD}	V _{IN} = -20 V, 5 mA ≤ I _L ≤ 1.0 A	1, 2, 3	04	-300	300	mV
		V _{IN} = -35 V, 5 mA ≤ I _L ≤ 0.1 A			-450	450	
Standby current drain	I _{SCD}	V _{IN} = -20 V, I _L = 5 mA	1, 2, 3	04	0.5	3.0	mA
		V _{IN} = -35 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} (line)	-35 V ≤ V _{IN} ≤ -18.5 V, I _L = 5 mA	1, 2, 3	04	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} (load)	5 mA ≤ I _L ≤ 1.0 A, V _{IN} = -20 V	1, 2, 3	04	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -20 V	1, 2, 3	04	0.00	3.50	A
		V _{IN} = -35 V			0.00	2.00	
Peak output current	I _{PK}	V _{IN} = -18.5 V, forced ΔV _{OUT} = 1.43 V	1, 2, 3	04	1.0	4.0	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -20 V, I _L = 350 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	04	50		dB
Output noise voltage	V _{NO}	V _{IN} = -20 V, T _A = 25°C, I _L = 0.1 A	1	04		700	μVrms
Thermal regulation	V _{RTH}	V _{IN} = -25 V, I _L = 1.0 A, T _A = 25°C	1	04	-150	150	mV
Voltage start up	V _{START}	V _{IN} = -30 V, R _L = 15 Ω	1, 2, 3	04	-15.75	-14.25	V

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
11

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case Y - Continued							
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -20 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	04		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -20 V, I _L = 100 mA, ΔI _L = 400 mA, T _A = 25°C	4	04		2.5	mV/mA
Case X							
Output voltage	V _{OUT}	V _{IN} = -28 V, I _L = 5 mA, 0.5 A	1, 2, 3	05	-25.20	-22.80	V
		V _{IN} = -38 V, I _L = 5 mA, 0.5 A			-25.20	-22.80	
		V _{IN} = -40 V, I _L = 5 mA, 50 mA			-25.20	-22.80	
		V _{IN} = -30 V, I _L = 5 mA, T _A = 150°C			-25.44	-22.56	
Line regulation	V _{RLINE}	-40 V ≤ V _{IN} ≤ -28 V, I _L = 50 mA	1, 2, 3	05	-720	720	mV
		-38 V ≤ V _{IN} ≤ -28 V, I _L = 350 mA			-240	240	
Load regulation	V _{RLOAD}	V _{IN} = -30 V, 5 mA ≤ I _L ≤ 500 mA	1, 2, 3	05	-480	480	mV
		V _{IN} = -40 V, 5 mA ≤ I _L ≤ 50 mA			-720	720	
Standby current drain	I _{SCD}	V _{IN} = -30 V, I _L = 5 mA	1, 2, 3	05	0.5	4.0	mA
		V _{IN} = -40 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} (line)	-40 V ≤ V _{IN} ≤ -28 V, I _L = 5 mA	1, 2, 3	05	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} (load)	5 mA ≤ I _L ≤ 500 mA, V _{IN} = -30 V	1, 2, 3	05	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -30 V	1, 2, 3	05	0.00	1.50	A
		V _{IN} = -40 V			0.00	1.00	
Peak output current	I _{PK}	V _{IN} = -28 V, forced ΔV _{OUT} = 2.28 V	1, 2, 3	05	0.5	2.0	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -30 V, I _L = 125 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	05	50		dB
Output noise voltage	V _{NO}	V _{IN} = -30 V, T _A = 25°C, I _L = 50 mA	1	05		500	μVrms
Thermal regulation	V _{RTH}	V _{IN} = -34 V, I _L = 500 mA, T _A = 25°C	1	05	-240	240	mV

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
12

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case X - Continued							
Voltage start up	V _{START}	V _{IN} = -38 V, R _L = 48 Ω	1, 2, 3	05	-25.20	-22.80	V
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -30 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	05		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -30 V, I _L = 50 mA, ΔI _L = 200 mA, T _A = 25°C	4	05		2.5	mV/mA
Case Y							
Output voltage	V _{OUT}	V _{IN} = -28 V, I _L = 5 mA, 1.0 A	1, 2, 3	05	-25.20	-22.80	V
		V _{IN} = -38 V, I _L = 5 mA, 1.0 A			-25.20	-22.80	
		V _{IN} = -40 V, I _L = 5 mA, 0.1 A			-25.20	-22.80	
		V _{IN} = -30 V, I _L = 5 mA, T _A = 150°C			-25.44	-22.56	
Line regulation	V _{RLINE}	-40 V ≤ V _{IN} ≤ -28 V, I _L = 0.1 A	1, 2, 3	05	-200	200	mV
		-38 V ≤ V _{IN} ≤ -28 V, I _L = 0.5 A			-100	100	
Load regulation	V _{RLOAD}	V _{IN} = -30 V, 5 mA ≤ I _L ≤ 1.0 A	1, 2, 3	05	-100	100	mV
		V _{IN} = -40 V, 5 mA ≤ I _L ≤ 0.1 A			-200	200	
Standby current drain	I _{SCD}	V _{IN} = -30 V, I _L = 5 mA	1, 2, 3	05	0.5	4.0	mA
		V _{IN} = -40 V, I _L = 5 mA			0.5	4.0	
Standby current drain change vs. line voltage	ΔI _{SCD} (line)	-40 V ≤ V _{IN} ≤ -28 V, I _L = 5 mA	1, 2, 3	05	-1.0	1.0	mA
Standby current drain change vs. load current	ΔI _{SCD} (load)	5 mA ≤ I _L ≤ 1.0 A, V _{IN} = -30 V	1, 2, 3	05	-0.5	0.5	mA
Output short circuit current	I _{OS}	V _{IN} = -30 V	1, 2, 3	05	0.00	3.00	A
		V _{IN} = -40 V			0.00	2.00	
Peak output current	I _{PK}	V _{IN} = -28 V, forced ΔV _{OUT} = 2.28 V	1, 2, 3	05	1.0	4.0	A
Ripple rejection	ΔV _{IN} / ΔV _{OUT}	V _{IN} = -30 V, I _L = 350 mA, e _i = 1 V _{rms} at f = 2400 Hz	4, 5, 6	05	50		dB
Output noise voltage	V _{NO}	V _{IN} = -30 V, T _A = 25°C, I _L = 0.1 A	1	05		1000	μVrms

See footnotes at end of table.

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

SIZE
A

REVISION LEVEL
H

77040

SHEET
13

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Case Y - Continued							
Thermal regulation	V _{RTH}	V _{IN} = -34 V, I _L = 1.0 A, T _A = 25°C	1	05	-240	240	mV
Voltage start up	V _{START}	V _{IN} = -38 V, R _L = 24 Ω	1, 2, 3	05	-25.20	-22.80	V
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = -30 V, I _L = 5 mA, V _{PLUS} = -3.0 V, T _A = 25°C	4	05		30.0	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = -30 V, I _L = 100 mA, ΔI _L = 400 mA, T _A = 25°C	4	05		2.5	mV/mA

1/ Pulse-testing techniques are used to maintain the virtual junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2 μF capacitor across the input and a 1 μF capacitor across the output.

2/ Guaranteed, if not tested, to the limits specified in table I herein.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. 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 the preparing or acquiring activity upon request. 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 = +125°C, minimum.

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.

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

SIZE
A

77040

REVISION LEVEL
H

SHEET
14

Device types	01			01, 03, 04, and 05	
Case outlines	H	P	2	X	Y <u>1</u> /
Terminal number	Terminal symbol				
1	NC	GROUND	NC	GROUND	GROUND
2	GROUND	NC	GROUND	OUTPUT	OUTPUT
3	NC	NC	NC	INPUT	----
4	NC	OUTPUT	NC	----	----
5	OUTPUT	NC	NC	----	----
6	NC	INPUT	NC	----	----
7	INPUT	NC	NC	----	----
8	NC	NC	NC	----	----
9	NC	----	NC	----	----
10	NC	----	OUTPUT	----	----
11	----	----	NC	----	----
12	----	----	NC	----	----
13	----	----	NC	----	----
14	----	----	NC	----	----
15	----	----	INPUT	----	----
16	----	----	NC	----	----
17	----	----	NC	----	----
18	----	----	NC	----	----
19	----	----	NC	----	----
20	----	----	NC	----	----

1/ Case is "INPUT" terminal.

FIGURE 1. Terminal connections.

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

SIZE
A

77040

REVISION LEVEL
H

SHEET
15

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)
Interim electrical parameters (method 5004)	----
Final electrical test parameters (method 5004)	1*, 2, 3, 4
Group A test requirements (method 5005)	1, 2, 3, 4, 5, 6
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 7, 8, 9, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test conditions, 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 the preparing or acquiring activity upon request. 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) $T_A = +125^{\circ}\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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

SIZE
A

77040

REVISION LEVEL
H

SHEET
16

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535, appendix A.

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.

6.4 Record of users. Military and industrial users shall 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 microelectronics 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) 692-0540.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-HDBK-103 and QML-38535 . The vendors listed in MIL-HDBK-103 and QML-38535 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DLA Land and Maritime-VA.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		77040
		REVISION LEVEL H	SHEET 17

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 17-04-18

Approved sources of supply for SMD 77040 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 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-38535. 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> /	Reference military specification PIN
7704001HA	<u>3</u> /	μA79M05MUB	
7704001PA	<u>3</u> /	μA79M05MJGB	
7704001XA	<u>3</u> /	IP79M05H-DESC	M38510/11501BXA
	<u>3</u> /	μA79M05HM	
	<u>3</u> /	LM120H-5.0	
7704001YA	<u>3</u> /	IP7905K-DESC	M38510/11505BYA
	<u>3</u> /	μA79M05KM	
	<u>3</u> /	LM120K-5.0	
77040012A	<u>3</u> /	μA79M05MFKB	
7704003XA	U3158	IP120MH-12-DESC	M38510/11502BXA
	<u>3</u> /	μA79M12HM	
	<u>3</u> /	LM120H-12	
7704003YA	U3158	IP120K-12-DESC	M38510/11506BYA
	<u>3</u> /	μA7912KM	
	<u>3</u> /	LM120K-12	
7704004XA	U3158	IP120MH-15-DESC	M38510/11503BXA
	<u>3</u> /	μA79M15HM	
	<u>3</u> /	LM120H-15	
7704004YA	U3158	IP120K-15-DESC	M38510/11507BYA
	<u>3</u> /	μA7915KM	
	<u>3</u> /	LM120K-15	
7704005XA	<u>3</u> /	μA79M24HM	M38510/11504BXA
	<u>3</u> /	LM120H-24	
7704005YA	<u>3</u> /	μA7924KM	M38510/11508BYA
	<u>3</u> /	LM120K-24	

- 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.

STANDARD MICROCIRCUIT DRAWING BULLETIN – Continued.

DATE: 17-04-18

Vendor CAGE
number

U3158

Vendor name
and address

Semelab PLC
Coventry Road, Lutterworth
Leicestershire LE174JB
United Kingdom

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