

<div style="border: 1px solid black; padding: 5px; width: fit-content;">           Device 01 inactive for new design use QPL 38510/30110B--.         </div>		<b>REVISIONS</b>															
		LTR	DESCRIPTION	DATE	APPROVED												
		E	Remove vendor CAGE 18324. Correction on vendor CAGE 01295 part notation. Convert to Military Drawing format. Editorial changes throughout. Add LCC package. Remove vendor CAGE 27014.	19 JUNE 1987	<i>W. H. H. H.</i>												
		F	Add MIL-M-38510/ number for L&C package. Add QPL inactive label to front page. Change code ident. no. from 14933 to 67268. Editorial changes throughout.	11 AUG. 1987	<i>W. H. H. H.</i>												

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REV STATUS OF PAGES	REV	F	F	F	F	F	F	F	F	F	F	REV	F	F	F	F	F	F	F	F	F	F
	PAGES	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10

Defense Electronics Supply Center Dayton, Ohio  Original date of drawing:  23 March 1976  AMSC N/A	PREPARED BY <i>W. A. Kerby</i>	<div style="text-align: center; font-weight: bold; font-size: 1.2em;">MILITARY DRAWING</div> <p style="font-size: 0.8em;">This drawing is available for use by all Departments and Agencies of the Department of Defense</p> <hr/> <p style="font-size: 0.8em;">TITLE: MICROCIRCUITS, DIGITAL, LOW POWER SCHOTTKY TTL, FLIP-FLOP, MONOLITHIC SILICON</p> <hr/> <p style="font-size: 0.8em;">DWG NO. <span style="font-size: 1.2em;">76013</span></p> <hr/> <p style="font-size: 0.8em;">PAGE <span style="font-size: 1.2em;">1</span> OF <span style="font-size: 1.2em;">11</span></p>	
	CHECKED BY <i>DA Di Cenzo</i>		
	APPROVED BY <i>W. H. H. H.</i>		
	SIZE A		CODE IDENT. NO. <span style="font-size: 1.2em;">67268</span>
	REV F		

5962-E561

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DESC FORM 193

MAY 86

# 1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:

76013	01	E	X
┆	┆	┆	┆
┆	┆	┆	┆
┆	┆	┆	┆
┆	┆	┆	┆
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

1.2.1 Device type. The device type shall identify the circuit function as follows:

Device type	Generic number	Circuit
01	54LS76	Dual J-K negative edge-triggered flip-flop

1.2.2 Case outlines. The case outlines shall be as designated in MIL-M-38510, appendix C and as follows:

Outline letter	Case outline
E	D-2 (16-lead, 1/4" x 7/8"), dual-in-line package
F	F-5 (16-lead, 1/4" x 3/8"), flat package
2	C-2 (20-terminal, .350" x .350"), square chip carrier package

## 1.3 Absolute maximum ratings.

Supply voltage range	- - - - -	-0.5 V dc to +7.0 V dc
Input voltage range	- - - - -	-1.5 V dc at -18 mA to +5.5 V dc
Storage temperature range	- - - - -	-65°C to +150°C
Maximum power dissipation (P <sub>D</sub> ) per device 1/-	- - - - -	22 mW
Lead temperature (soldering, 10 seconds)	- - - - -	+300°C
Thermal resistance, junction-to-case (θ <sub>JC</sub> )	- - - - -	(See MIL-M-38510, appendix C)
Junction temperature (T <sub>J</sub> )	- - - - -	+175°C

## 1.4 Recommended operating conditions.

Supply voltage (V <sub>CC</sub> )	- - - - -	4.5 V dc minimum to 5.5 V dc maximum
Minimum high-level input voltage (V <sub>IH</sub> )	- - - - -	2.0 V dc
Maximum low-level input voltage (V <sub>IL</sub> )	- - - - -	0.7 V dc
Case operating temperature range (T <sub>C</sub> )	- - - - -	-55°C to +125°C

1/ Must withstand the added P<sub>D</sub> due to short-circuit test (e.g. I<sub>OS</sub>).

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## 2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

### SPECIFICATION

#### MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

### STANDARD

#### MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

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 shall take precedence.

## 3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

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

3.2.2 Truth table. The truth table shall be as specified on figure 2.

3.2.3 Logic diagram. The logic diagram shall be as specified on figure 3.

3.2.4 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

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

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 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 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T <sub>C</sub> < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
High-level output voltage	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V; V <sub>IL</sub> = 0.7 V; I <sub>OH</sub> = -400 μA; V <sub>IH</sub> = 2.0 V	1,2,3	2.5		V
Low-level output voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V; V <sub>IH</sub> = 2.0 V I <sub>OL</sub> = 4 mA; V <sub>IL</sub> = 0.7 V	1,2,3		0.4	V
Input clamp voltage	V <sub>IC</sub>	V <sub>CC</sub> = 4.5 V; I <sub>IN</sub> = -18 mA; T <sub>C</sub> = +25°C	1		-1.5	V
High-level input current at J or K	I <sub>IH1</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 2.7 V	1,2,3		20	μA
High-level input current at clock	I <sub>IH2</sub>		1,2,3		80	μA
High-level input current at preset or clear	I <sub>IH3</sub>		1,2,3		60	μA
High-level input current at J or K	I <sub>IH4</sub>		1,2,3		100	μA
High-level input current at clock	I <sub>IH5</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 5.5 V	1,2,3		400	μA
High-level input current at preset or clear	I <sub>IH6</sub>		1,2,3		300	μA
Low-level input current at J or K	I <sub>IL1</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 0.4 V	1,2,3		-400	μA
Low-level input current at clock, preset, or clear	I <sub>IL2</sub>		1,2,3		-800	μA
Short-circuit output current <u>1</u> /	I <sub>OS</sub>	V <sub>CC</sub> = 5.5 V; V <sub>OUT</sub> = 0.0 V	1,2,3	-6	-130	mA
Supply current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V	1,2,3		8	mA
Functional tests		See 4.3.1c	7			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T <sub>C</sub> < +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
Maximum clock <u>2/</u> frequency	F <sub>MAX</sub>	V <sub>CC</sub> = 5.0 V R <sub>L</sub> = 2 kΩ ±5%	C <sub>L</sub> = 15 pF ±10%	9	25		MHz
				10,11	18		MHz
			C <sub>L</sub> = 50 pF ±10%	9	20		MHz
				10,11	15		MHz
Propagation delay time, high-to-low-level <u>2/</u> clock, clear, or preset to Q or $\bar{Q}$	t <sub>PHL</sub>		C <sub>L</sub> = 15 pF ±10%	9		30	ns
				10,11		42	ns
			C <sub>L</sub> = 50 pF ±10%	9		35	ns
				10,11		49	ns
Propagation delay time, low-to-high level <u>2/</u> clock, clear, or preset to Q or $\bar{Q}$	t <sub>PLH</sub>	V <sub>CC</sub> = 5.0 V R <sub>L</sub> = 5 kΩ ±5%	C <sub>L</sub> = 15 pF ±10%	9		20	ns
				10,11		28	ns
			C <sub>L</sub> = 50 pF ±10%	9		25	ns
				10,11		35	ns

- 1/ Not more than one output should be shorted at a time, and the duration of the short-circuit condition should not exceed 1 second.
- 2/ Propagation delay time testing and maximum clock frequency testing may be performed using either C<sub>L</sub> = 15 pF or C<sub>L</sub> = 50 pF. However, the manufacturer must certify and guarantee that the microcircuits meet the switching test limits specified for a 50-pF load.

**MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO

SIZE  
A

CODE IDENT. NO.  
**67268**

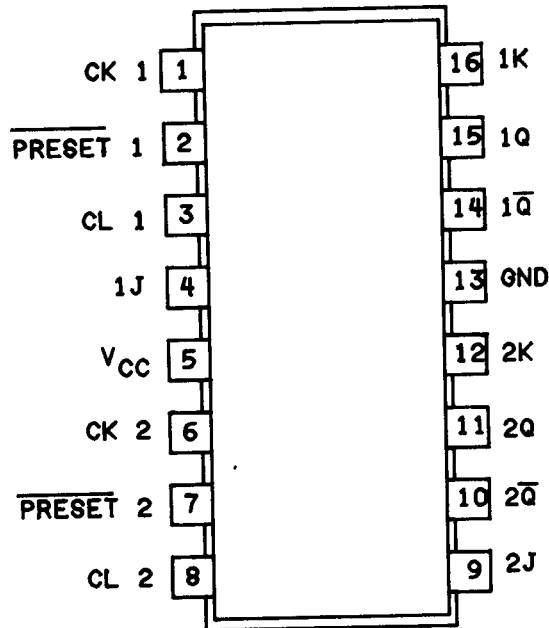
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Cases E and F



Case 2

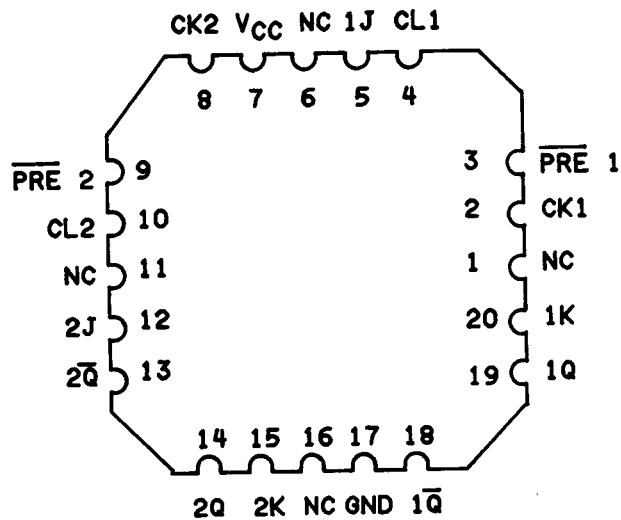


FIGURE 1. Terminal connections.

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Inputs					Outputs	
Preset	Clear	Clock	J	K	Q	$\bar{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	H*	H*
H	H	+	L	L	$Q_0$	$\bar{Q}_0$
H	H	+	H	L	H	L
H	H	+	L	H	L	H
H	H	+	H	H	Toggle	
H	H	H	X	X	$Q_0$	$\bar{Q}_0$

H = high level (steady state)

L = low level (steady state)

X = irrelevant

+ = transition from high to low level

$Q_0$  = the level of Q before the indicated steady state input conditions were established.

Toggle: Each output changes to the complement of its previous level on each + clock transition.

\*This configuration is nonstable, that is, it will not persist when preset and clear inputs return to their inactive (high) level.

FIGURE 2. Truth table.

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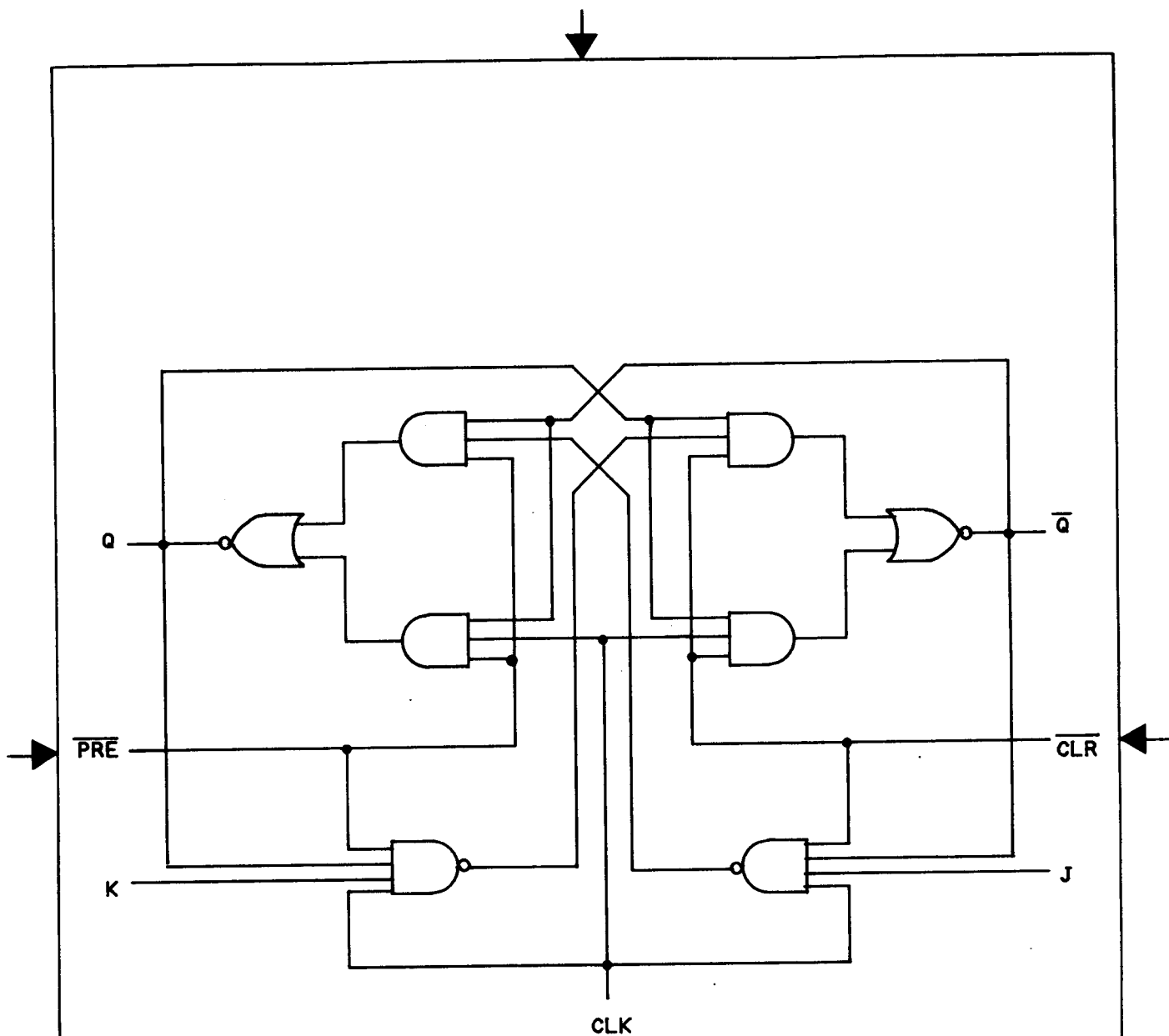


FIGURE 3. Logic diagram.

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3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC'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.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

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 using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2)  $T_A = +125^{\circ}\text{C}$ , 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.

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 4, 5, 6, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 7 tests shall verify the truth table.

##### 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 (method 1005 of MIL-STD-883) conditions:

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2)  $T_A = +125^{\circ}\text{C}$ , minimum.

(3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 9
Group A test requirements (method 5005)	1, 2, 3, 7, 9, 10, 11**
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

\* PDA applies to subgroup 1 (see 4.2c).

\*\* Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

## 6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Replaceability is determined as follows:

- Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.
- When a QPL source is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/301108--.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

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6.4 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>	Replacement military specification part number
7601301EX <u>2/</u>	01295 04713	SNJ54LS76AJ 54LS76A/BEXJC	M38510/301108EX
7601301FX <u>2/</u>	01295 04713	SNJ54LS76AW 54LS76A/BFXJC	M38510/301108FX
76013012X <u>2/</u>	01295 04713	SNJ54LS76AFK 54LS76AM/B2XJC	M38510/3011082X

1/ CAUTION: Do not use this number for item acquisition. Items acquired to the vendor similar part number only may not satisfy the performance requirements of this drawing.

2/ Inactive for new design. Use QPL-38510 product.

Vendor CAGE  
number

01295

04713

Vendor name  
and address

Texas Instruments, Incorporated  
P.O. Box 6448  
Midland, TX 79701

Motorola, Incorporated  
7402 South Price Road  
Tempe, AZ 85283

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