REVISIONS

LT	DESCRIPTION	DATE	APPROVED
A	Add new dash numbers 0012 through 0015.	3 MAR 1988	David E. Moore
B	Add a new vendor. Editorial changes throughout.	27 JUN 1988	David E. Moore
C	Add new dash numbers. Editorial changes throughout.	26 JUL 1988	David E. Moore
D	Add new dash numbers. Editorial changes throughout.	14 FEB 1991	David E. Moore
E	Revise section 4. Editorial changes throughout.	20 APR 1992	David E. Moore
F	Add new dash numbers 0025 through 0028. Editorial and policy changes throughout.	3 JUL 1997	David E. Moore
G	CAGE code in footer of document shall remain 14933. Paragraph 6.5, delete vendor type numbers 301254 and 301257 and substitute 301257 and 301258.	10 SEP 1997	David E. Moore
H	Add new source of supply and associated vendor similar PIN's (see 6.5).	22 MAR 2000	Kendall Cottongim
J	Add derating curve. Editorial changes throughout.	1 MAY 2002	Kendall Cottongim
K	Changes in accordance with NOR 5905-E408	14 MAY 2002	Kendall Cottongim
L	Remove vendor plant address. Add pure tin prohibition paragraph. Figure 1 to be shown with standoff. Corrections to matched ratios in table I. Editorial changes throughout.	9 NOV 2007	Michael Radecki
M	Add vendors. Add manufacturer eligibility and high power pulse paragraphs. Editorial changes throughout.	16 DEC 2009	Michael Radecki
N	Vendor address change. Editorial changes throughout.	17 MAY 2013	Michael Radecki
P	Change vendor's CAGE code. Add QR code. Editorial changes throughout.	12 FEB 2016	Michael Radecki

CURRENT DESIGN ACTIVITY CAGE CODE 037Z3
HAS CHANGED NAMES TO:
DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990

Prepared in accordance with ASME Y14.100

REV STATUS OF PAGES																		
	REV	P	P	P	P	P	P	P	P									
	PAGES	1	2	3	4	5	6	7	8									

PMIC N/A

Original date of drawing

6 August 1987

PREPARED BY
Allan Knox

CHECKED BY
David Withrow

APPROVED BY
David E. Moore

DESIGN ACTIVITY:
DEFENSE ELECTRONIC SUPPLY CENTER
DAYTON, OHIO 45444-5000

TITLE

RESISTOR NETWORK, FIXED, FILM, 3-PIN

SIZE	CODE IDENT. NO.	DWG NO.
A	14933	87026

REV P

PAGE 1 **OF** 8

1. SCOPE

1.1 Scope. This drawing describes the requirements for a fixed, film, 3-pin resistor network.

1.2 Part or Identifying Number (PIN). The complete PIN is as follows:

87026	-	0001
Drawing number (See table I)		Dash number

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-55182	-	Resistor, Fixed, Film, Nonestablished Reliability, Established Reliability, and Space Level, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-690	-	Failure Rate Sampling Plans and Procedures.
MIL-STD-790	-	Standard Practice for Established Reliability and High Reliability Qualified Products List (QPL) Systems for Electrical, Electronic, and Fiber Optic Parts.

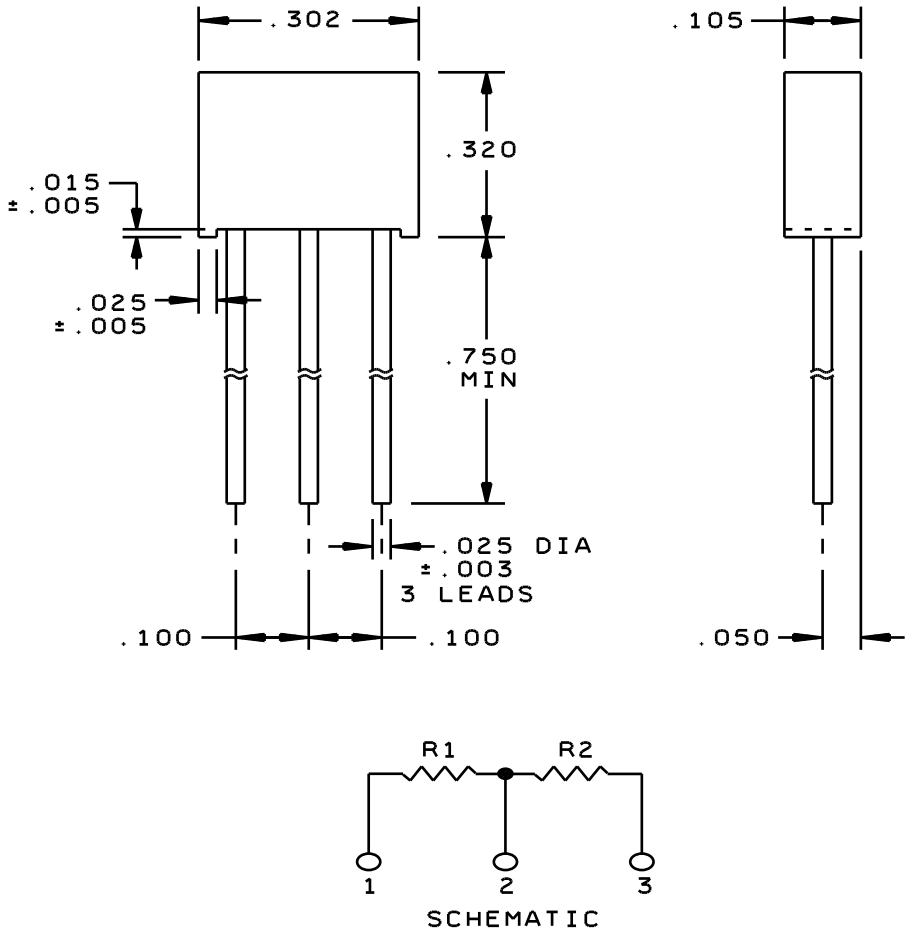
* (Copies of these documents are available online at http://quicksearch.dla.mil.)

2.2 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence unless otherwise noted. 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 requirements shall be in accordance with MIL-PRF-55182 and as specified herein.

3.2 Interface and physical dimension requirements. Resistors shall meet the interface and physical dimensions as specified in MIL-PRF-55182 and herein (see figure 1).



Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
.003	0.07	.015	0.38	.050	1.27	.105	2.67	.320	8.13
.005	0.13	.025	0.64	.100	2.54	.302	7.67	.075	19.05

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.010 (0.25 mm).

FIGURE 1. Resistor network.

3.3 Electrical characteristics.

3.3.1 Resistance. The resistance values shall be in accordance with table I.

3.3.2 Resistance tolerance. Resistors are available in resistance tolerances as specified in table I.

TABLE I. Resistance values.

Dash number	Resistance and tolerance	Matched ratio	Dash number	Resistance and tolerance	Matched ratio
0001	R1 = 10.0 k ±1% R2 = 10.0 k ±1%	$\frac{R1}{R2}$ = 1.000 ±0.01%	0015	R1 = 9.00 k ±0.01% R2 = 1.00 k ±0.01%	$\frac{R1}{R2}$ = 9.0000 ±0.01%
0002	R1 = 4.8148 k ±1% R2 = 9.99 k ±1%	$\frac{R1}{R2}$ = 0.48196 ±0.01%	0016	R1 = 10.0 k ±1% R2 = 10.0 k ±1%	$\frac{R1}{R2}$ = 1.0000 ±0.01%
0003	R1 = 10.0 k ±1% R2 = 10.0 k ±1%	$\frac{R1}{R2}$ = 1.000 ±0.005%	0017	R1 = 20 k ±1% R2 = 16.129 k ±1%	$\frac{R1}{R2}$ = 1.2400 ±0.01%
0004	R1 = 10.0 k ±1% R2 = 9.0 k ±1%	$\frac{R1}{R2}$ = 1.1111 ±0.005%	0018	R1 = 10 k ±0.1% R2 = 1.931 k ±0.1%	$\frac{R1}{R2}$ = 5.1787 ±0.05%
0005	R1 = 9.166 k ±1% R2 = 10.0 k ±1%	$\frac{R1}{R2}$ = 0.9166 ±0.005%	0019	R1 = 10 k ±0.1% R2 = 18.37 k ±0.1%	$\frac{R1}{R2}$ = 0.54437 ±0.05%
0006	R1 = 10.0 k ±1% R2 = 10.0 k ±1%	$\frac{R1}{R2}$ = 1.000 ±0.03%	0020	R1 = 6.84 k ±0.01% R2 = 3.16 k ±0.01%	$\frac{R1}{R2}$ = 2.1646 ±0.01%
0007	R1 = 20.0 k ±1% R2 = 20.0 k ±1%	$\frac{R1}{R2}$ = 1.000 ±0.03%	0021	R1 = 10.0 k ±0.1% R2 = 20.0 k ±0.1%	$\frac{R1}{R2}$ = 0.500 ±0.1%
0008	R1 = 1.3 k ±1% R2 = 1.3 k ±1%	$\frac{R1}{R2}$ = 1.000 ±0.01%	0022	R1 = 2.5 k ±0.01% R2 = 3.0 k ±0.01%	$\frac{R1}{R2}$ = 0.8333 ±0.01%
0009	R1 = 20.0 k ±1% R2 = 15.0 k ±1%	$\frac{R2}{R1}$ = 0.7500 ±0.01%	0023	R1 = 3.15 k ±0.01% R2 = 3.15 k ±0.01%	$\frac{R1}{R2}$ = 1.0 ±0.01%
0010	R1 = 5.0 k ±1% R2 = 5.0 k ±1%	$\frac{R1}{R2}$ = 1.000 ±0.01%	0024	R1 = 1.0 k ±0.01% R2 = 9.0 k ±0.01%	$\frac{R1}{R2}$ = 0.1111 ±0.01%
0011	R1 = 6.0 k ±1% R2 = 3.0 k ±1%	$\frac{R1}{R2}$ = 2.000 ±0.01%	0025	R1 = 10k ±0.1% R2 = 1.93k ±0.1%	$\frac{R1}{R2}$ = 5.1814 ±0.05%
0012	R1 = 10.0 k ±0.01% R2 = 12.1 k ±0.01%	$\frac{R1}{R2}$ = 0.8265 ±0.01%	0026	R1 = 5.6k ±1.0% R2 = 13.68k ±1.0%	$\frac{R2}{R1}$ = 2.4429 ±0.1%
0013	R1 = 8.75 k ±0.01% R2 = 1.25 k ±0.01%	$\frac{R1}{R2}$ = 7.0000 ±0.01%	0027	R1 = 2.49k ±0.1% R2 = 4.87k ±0.1%	$\frac{R1}{R2}$ = 0.5113 ±0.01%
0014	R1 = 8.00 k ±0.01% R2 = 20.0 k ±0.01%	$\frac{R1}{R2}$ = 0.4000 ±0.01%	0028	R1 = 4.02k ±1.0% R2 = 4.02k ±1.0%	$\frac{R1}{R2}$ = 1.00 ±1.0%

3.3.3 Power rating. The network shall have a power rating of 0.2 watt at +105°C divided proportionally between the resistors as the resistance is divided, derated in accordance with figure 2.

3.3.4 Temperature range. The operating temperature range shall be -55°C to +105°C.

3.3.5 Resistance temperature characteristic. The resistance temperature characteristic shall be ±5 parts per million (ppm)/°C.

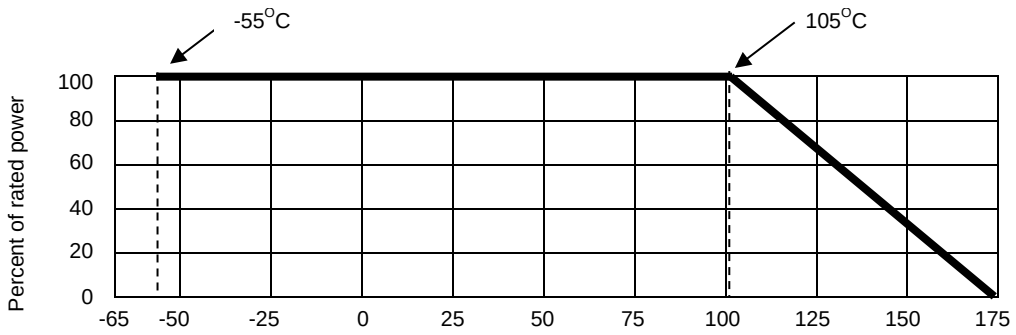


FIGURE 2. Derating curve for high ambient temperatures.

3.3.6 TC tracking. Dash numbers 0001 to 0012, 0016 to 0020, and 0023, R2 shall track R1 within ±1 ppm/°C; dash numbers 0013 to 0015, 0021, 0022, and 0024 to 0028, R2 shall track R1 within ±1.5 ppm/°C from -55°C to +105°C.

3.3.7 Operating voltage. The maximum operating voltage shall not exceed 200 Vdc.

3.3.8 Thermal shock. When resistors are tested in accordance with MIL-PRF-55182, the change in resistance shall not exceed ±0.05 percent.

3.3.9 Overload. When resistors are tested in accordance with MIL-PRF-55182, the change in resistance shall not exceed ±0.05 percent.

3.3.10 Low temperature operation. When resistors are tested in accordance with MIL-PRF-55182, there shall be no evidence of mechanical damage and the change in resistance shall not exceed ±0.05 percent.

3.3.11 Terminal strength. The terminal strength shall be in accordance with MIL-PRF-55182, except the applied force shall be 2 pounds. The change in resistance shall not exceed ±0.02 percent.

3.3.12 Dielectric withstanding voltage. When tested in accordance with MIL-PRF-55182, using 450 V root mean square (rms) at atmospheric conditions. Resistors shall show no evidence of deterioration and resistance change shall not exceed ±0.01 percent. When tested at barometric pressure (reduced), with 200 V rms applied, the change in resistance shall not exceed ±0.02 percent. The method of mounting for both tests shall be a flat metallic plate in lieu of the V block.

3.3.13 Insulation resistance. When tested as specified in MIL-PRF-55182, the insulation resistance shall not be less than 10,000 megohms. A flat metallic plate shall be used in lieu of a V block, and test condition B shall be applicable.

3.3.14 Resistance to soldering heat. When resistors are tested as specified in MIL-PRF-55182, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ±0.02 percent.

3.3.15 Moisture resistance. When resistors are tested as specified in MIL-PRF-55182, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ±0.05 percent.

3.3.16 Life. The maximum allowable change in resistance shall be ±0.005 percent when each resistor network is subjected to 2,000 hours of operation at +100°C ±5°C ambient while each resistor network dissipates 100 milliwatts of power divided proportionally between resistors as the resistance is divided, or a change of ±0.05 percent for 10,000 hours operation under the same conditions.

3.3.17 Shock (specified pulse). When tested as specified in MIL-PRF-55182, there shall be no evidence of mechanical damage or electrical discontinuity. The resistance shall not exhibit a change of more than ±0.01 percent.

3.3.18 Vibration, high frequency. When tested in accordance with MIL-PRF-55182, there shall be no evidence of mechanical damage or electrical discontinuity. The change in resistance shall not exceed ±0.02 percent.

3.4 Pure tin. The use of pure tin, as an underplate or final finish is prohibited both internally and externally. Tin content of resistor components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.3).

3.5 Marking. Resistors shall be marked with the PIN assigned herein (see 1.2) and manufacturer's identification code (CAGE or logo). Pin 1 indicator shall be located adjacent to pin 1.

* 3.6 Recycled, recovered, environmentally preferable or biobased materials. Recycled, recovered, environmentally preferable or biobased materials should be used to the maximum extent possible provided that the materials meet or exceed the operational and maintenance requirements, and promote economically advantageous life cycle costs.

3.7 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall perform the group A and group B inspections specified herein on a sample of parts agreed upon by the manufacturer and DLA Land and Maritime-VAT.

3.7.1 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be an approved source of supply.

3.8 Workmanship. Resistors shall be processed in such a manner as to be uniform in quality and free from defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Qualification inspection. Qualification inspection in accordance with MIL-PRF-55182 is not applicable to this document.

4.2 Reliability assurance program. The reliability assurance program specified in MIL-PRF-55182 and maintained in accordance with MIL-STD-790 are not applicable to this document.

4.3 Failure rate qualification. Failure rate qualification in accordance with MIL-PRF-55182 and MIL-STD-690 is not applicable to this document.

4.4 Conformance inspection.

4.4.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A (ER level) and group B inspections.

4.4.1.1 Group A inspection. Group A inspection (ER level) shall be in accordance with MIL-PRF-55182. Part per million testing and verification as specified in MIL-PRF-55182 is not applicable to this document.

4.4.1.2 Group B inspection. Group B inspection shall be in accordance with MIL-PRF-55182.

4.4.1.2.1 Certification. The acquiring activity, at its discretion, may accept a certificate of compliance with group B requirements in lieu of performing group B tests (see 6.2d).

4.5 Inspection of packaging. Inspection of packaging shall be in accordance with MIL-PRF-55182.

5. PACKAGING

5.1 Packaging. For acquisition purpose, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military services system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES
(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Resistor networks described herein are intended to be used in electronic circuits where miniaturization is required.

6.2 Ordering data. The contract or purchase order should specify the following:

a. Complete PIN (see 1.2).

b. Requirements for delivery: One copy of the conformance inspection data or a certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.

c. Requirements for packaging and packing.

d. Whether the manufacturer performs the group B tests or provides certification of compliance with group B requirements (see 4.4.1.2.1).

6.3 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin).

6.4 Pulse applications. Designers are CAUTIONED on using the above resistors in high power pulse applications. Since they have not been qualified nor tested for such applications, damage and premature failure are possible. These resistors only see a one hour overload as part of the group A inspection of MIL-PRF-55182.

6.5 User of record. Coordination of this document for future revisions is coordinated only with the approved source of supply and the users of record of this document. Requests to be added as a recorded user of this drawing may be achieved online at resistor@dla.mil or in writing to: DLA Land and Maritime, ATTN: VAT, P.O. Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-8754 or DSN 850-8754.

* 6.6 Approved source of supply. Approved source of supply is listed herein. Additional sources will be added as they become available. Assistance in the use of this drawing may be obtained online at resistor@dla.mil or contact DLA Land and Maritime, ATTN: VAT, P.O. Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-8754 or DSN 850-8754.

DLA Land and Maritime drawing PIN 87026-	Vendors similar designation or type number 1/	DLA Land and Maritime drawing PIN 87026-	Vendors similar designation or type number 1/	Vendor CAGE	Vendor's name and address
0001	301222	0015	301258	0066A	Vishay Precision Group, Inc. 3 Great Valley Parkway Suite 150 Malvern, PA 19355-1417 Plants: Vishay Advanced Technologies, Ltd. 2 Dr. Felix Zandman Street Holon 58125, Israel
0002	301232	0016	301447		
0003	301233	0017	301448		
0004	301234	0018	301449		
0005	301235	0019	301450		
0006	301236	0020	301451		
0007	301237	0021	301452		
0008	301238	0022	301453		
0009	301239	0023	301454		
0010	301240	0024	301455		
0011	301241	0025	301759		
0012	301255	0026	301760		
0013	301256	0027	301761		
0014	301257	0028	301762		

Table continues on next page

DLA Land and Maritime drawing PIN 87026-	Vendors similar designation or type number 1/	DLA Land and Maritime drawing PIN 87026-	Vendors similar designation or type number 1/	Vendor CAGE	Vendor's name and address
0001	SM1X10K00FT-S1	0015	SM2X9K000/1K000TT-S1	SB481	Alpha Electronics Corporation Ikenohata MG Bldg. 1-2-18 Ikenohata, taito-ku Tokyo, Japan110-0008 Plant: Alpha Electronics Corporation 238-1 Aza Itaizawa, Nakatashiro, Yurihonjyo-shi Akita, Japan 018-0901
0002	SM2X4K8148/9K990FT-S1	0016	SM1X10K00FT-S1		
0003	SM1X10K00FV-S1	0017	SM2X20K00/16K129FT-S1		
0004	SM2X10K00/9K000FV-S1	0018	SM2X10K00/1K931BA-S1		
0005	SM2X9K166/10K00FV-S1	0019	SM2X10K00/18K37BA-S1		
0006	SM1X10K00FQ-S1	0020	SM2X6K840/3K160TT-S1		
0007	SM1X20K00FQ-S1	0021	SM2X10K00/20K00BB-S1		
0008	SM1X1K300FT-S1	0022	SM2X2K500/3K000TT-S1		
0009	SM2X20K00/15K00FT-S1	0023	SM1X3K150TT-S1		
0010	SM1X5K000FT-S1	0024	SM2X1K000/9K000TT-S1		
0011	SM2X6K000/3K000FT-S1	0025	SM2X10K00/1K930BA-S1		
0012	SM2X10K00/12K10TT-S1	0026	SM2X5K600/13K680FB-S1		
0013	SM2X8K750/1K250TT-S1	0027	SM2X2K490/4K870BT-S1		
0014	SM2X8K000/20K00TT-S1	0028	SM1X4K020FF-S1		
0001	FA2918-1	0015	FA2918-15	56637	RCD Components, INC. 520 East Industrial Park Drive Manchester, NH 03109
0002	FA2918-2	0016	FA2918-16		
0003	FA2918-3	0017	FA2918-17		
0004	FA2918-4	0018	FA2918-18		
0005	FA2918-5	0019	FA2918-19		
0006	FA2918-6	0020	FA2918-20		
0007	FA2918-7	0021	FA2918-21		
0008	FA2918-8	0022	FA2918-22		
0009	FA2918-9	0023	FA2918-23		
0010	FA2918-10	0024	FA2918-24		
0011	FA2918-11	0025	FA2918-25		
0012	FA2918-12	0026	FA2918-26		
0013	FA2918-13	0027	FA2918-27		
0014	FA2918-14	0028	FA2918-28		
0001	TX2593-0001	0015	TX2593-0015	2X034	Texas Components Corporation 1716 West Sam Houston Parkway North Houston, TX 77043
0002	TX2593-0002	0016	TX2593-0016		
0003	TX2593-0003	0017	TX2593-0017		
0004	TX2593-0004	0018	TX2593-0018		
0005	TX2593-0005	0019	TX2593-0019		
0006	TX2593-0006	0020	TX2593-0020		
0007	TX2593-0007	0021	TX2593-0021		
0008	TX2593-0008	0022	TX2593-0022		
0009	TX2593-0009	0023	TX2593-0023		
0010	TX2593-0010	0024	TX2593-0024		
0011	TX2593-0011	0025	TX2593-0025		
0012	TX2593-0012	0026	TX2593-0026		
0013	TX2593-0013	0027	TX2593-0027		
0014	TX2593-0014	0028	TX2593-0028		

1/ Parts must be purchased to this DLA Land and Maritime PIN to assure that all performance requirements and tests are met.