

Esterline  **Power Systems**

Featuring **LEACH**® Products



HIGH-RELIABILITY FOR HIGH RELIABILITY APPLICATIONS



esterline.com/powersystems

With a heritage in high-reliability that spans more than four decades, Leach relays have been the No. 1 choice for engineers who put our products to work for them, no matter the mission.

ADVANTAGES:

- No Source Control Drawing (SCD) required
- Part numbers can be assigned using Esterline Power Systems' catalog and specifications
- Manufacturing is standardized and based on the military specification version of the part with an established ATP/QTP
- Once qualified, test data can be shared, saving on cost of qualification
- ATP, ATP + Group B, ATP + Qualification can be specified within the part number
- Standardization provides potential benefits from Leach inventory.



International Space Station

LEACH® RELAY PART NUMBER SYSTEM FOR SPACE APPLICATIONS

Scope: The -254 indicator establishes a dedicated method for specifying a Leach part number for many Leach subminiature relays used in space applications. By utilizing the following three digit dash number and assurance levels, a standardized set of test and process requirements are established, based on MIL-Spec and Leach standard procedures. This system allows customers to specify requirements without a Source Control Drawing and establishes method for procuring Leach high-reliability relays.

Part Number: The part number is specified as shown in the following example:

KL – J2A	–254	U
Leach base part number	Designator	Assurance Level

Applicable Documents

- MIL-PRF-6106 *Relay Performance Specification*
- MIL-PRF-83536 *Relay Performance Specification*
- 500-1124-000-000 *Leach Performance Specification for High Reliability Relays*

LEACH® SERIES	MIL-SPEC
J	M83536/9 & /10
JC	M83536/36 & /37
JCL	M6106/20
JL	M83536/12 & /13
K	M83536/15 & /16
KC	M83536/32 & /33
KCL	M6106 (MS27742)
KD	M6106/13
KDL	M6106/12
KL	M83536/18 & 19
KX / KXL / KXD / KXDL	Meets M6106 performance
X	M83536/1 & /2
XC	Meets M6106 performance
XCL	Meets M6106 performance
XL	M6106/38
Y	M83536/5 & /6
YC	M83536/21 & /22
YCL	M6106/40
YL	M6106/39

List of LEACH® Sub-miniature relay series applicable to this program with corresponding MIL-specification

MODEL NUMBER DESIGNATOR TO SPECIFIC REQUIREMENTS

- All –254 product receive full ATP to applicable requirements with recorded data, and they are serialized and marked with manufacturing lot ID. Parts shall be manufactured to a single lot date code
- All relays are Millipore cleaned, 100% Pre-Can inspected, PIND tested, and X-rayed
- Customer source inspection
- No arc barriers are installed in this series
- Relays meet MIL requirements for Tin-Lead
- Tested for vibration & mechanical shock

ATP, Group B, or Qualification testing shall be performed when required by the part number assurance level. The balance of detailed requirements shall be specified in the Leach Product Control Drawings (PCD) that are issued for individual part numbers.

Relays produced to the following Assurance Levels are intended for high-reliability applications.

Assurance Letter Designator for Specific Requirements:

DESIGNATOR	SCREENING TYPE
U or M	ATP, QTP, DPA, XRAY
V or N	ATP, Group B, DPA, XRAY
W or P	ATP, DPA, XRAY

ASSURANCE LEVELS (For painted models)	
PART NUMBER (example)	ASSURANCE LEVEL REQUIREMENTS
KXDL-A2A-254 (W)	ATP, DPA
KXDL-A2A-254 (V)	ATP, Group B, DPA
KXDL-A2A-254 (U)	ATP, QTP, DPA
ASSURANCE LEVEL FOR PLATED MODELS	
KXDL-A2A-254 (M)	ATP, DPA
KXDL-A2A-254 (N)	ATP, Group B, DPA
KXDL-A2A-254 (P)	ATP, QTP, DPA

The temperature rating for high current subminiature relays with plated housing shall be as indicated below. See the following list for affected models:

	MODEL	TEMPERATURE RATING (Life Testing)
a	KC / KCL	+100° C
b	KD / KDL	+100° C
c	JC / JCL	+100° C
d	XC / XCL	+85° C
e	YC / YCL	+85° C
f	KX / KXD / KXDL / KXL	+85° C

HERMETICALLY SEALED, HIGH RELIABILITY RELAYS

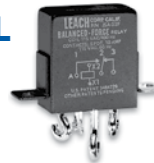
Series X and XL 2PDT, non-latch and latching versions, low level to 5 amps



Qualified to MIL-PRF-83536/6106

Series is rated for 100,000 operations at rated resistive load and 400,000 operations at 25% rated load.

Series JC and JCL 1PDT, non-latch and latching versions, low level to 25 amps



Qualified to MIL-PRF-83536/6106

Series is rated for 50,000 operations at rated resistive load and 200,000 operations at 25% rated load.

Series KC and KCL 3PDT, non-latch and latching versions, low level to 25 amps



Qualified to MIL-PRF-83536/6106

Series is rated for 50,000 operations at rated resistive load and 200,000 operations at 25% rated load.

Series XC and XCL 1PDT, non-latch and latching versions, low level to 10 amps



Designed to the performance standards of MIL-PRF-6106

Series is rated for 50,000 operations at rated resistive load and 200,000 operations at 25% rated load.

Series J and JL 2PDT, non-latch and latching versions, low level to 25 amps



Qualified to MIL-PRF-83536

Series is rated for 100,000 operations at rated resistive load and 400,000 operations at 25% rated load.

Series KD and KDL 3PST/NO+aux, nonlatch & latching version, low level to 25 amps



Qualified to MIL-PRF-6106

Series is rated for 50,000 operations at rated resistive load and 200,000 operations at 25% rated load.

Series Y and YL 4PDT, non-latch and latching versions, low level to 5 amps



Qualified to MIL-PRF-83536/6106

Series is rated for 100,000 operations at rated resistive load and 400,000 operations at 25% rated load.

Series K and KL 4PDT, non-latch and latching versions, low level to 12 amps



Qualified to MIL-PRF-83536

Series is rated for 100,000 operations at rated resistive load and 400,000 operations at 25% rated load.

Series YC and YCL 3PDT, non-latch and latching versions, low level to 10 amps



Qualified to MIL-PRF-83536/6106

Series is rated for 50,000 operations at rated resistive load and 100,000 operations at 25% rated load.

Series KX, KXD, KXDL, and KXL 1PST/NO-DB, non-latch and latching versions, up to 75 amps

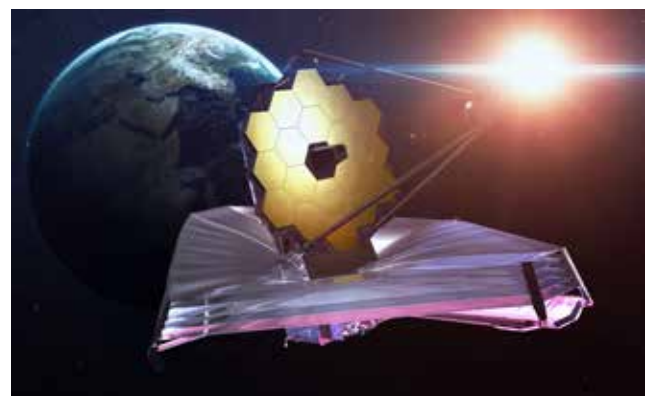


Designed to the performance standards of MIL-PRF-6106

Series is rated for 20,000 operations at rated resistive load and 200,000 operations at 25% rated load.

Note: To ensure relay reliability, Leach tests beyond industry and MIL-Spec standards. Our products meet requirements for high and low level life, mechanical half-sine shock, and vibration survivability. Our relays are also laser-welded, hermetically sealed, and fine leak tested utilizing radioisotopes. We also conduct hot-switch overload and rupture testing to ensure the relay's capability during fault mode conditions.

APPLICATION	ON BOARD
Launch vehicles	YES
Rovers	YES
Space Station (ISS)	YES
Satellites	YES
Shuttles	YES
Planetary Probes	YES
Space Telescope	YES



James Webb

EUROPEAN QUALIFIED RELAYS

The ESA/SCC integrated specification system for electrical, electromechanical, and electronic components has been used worldwide for many years. While there are approximately 1,200 generic and detailed specifications in existence today, this rapidly expanding system continues to be revised by the European Space Components Coordination (ESCC) in order to provide an internationally harmonized set of ESA/SCC specifications. LEACH ESA/SCC-qualified relays were first solicited by ESA and are produced in our ISO9001-certified facility in Niort, France. This manufacturing facility passed the ESA survey, which is more stringent than MIL-spec or ISO standards. The first phase of ESA Qualification is the Step Stress test. Designed to determine the maximum environmental levels the component can withstand and to ensure it far exceeds requirements, this testing process involves incrementally

increasing the test level on the component until failure (for example; Sinusoidal Vibration at 30g, 40g, 50g, etc.). In addition, stringent "Space Level" reliability tests are performed on the product before qualification is granted. By specifying LEACH ESA/SCC-qualified products, customers can be assured that they are utilizing space-proven relays that meet or exceed all industry-standard Space Level performance specifications. Customers also benefit from significant time and monetary savings, eliminating or greatly reducing "Source Controlled Specification" requirements and eliminating "Export of Technology" concerns.



ESA APPROVED CRYSTAL CAN RELAYS QUALIFIED PRODUCTS

D-Series
2PDT, latching,
1 amp@28vdc,
1/6 size can



(ESA/SCC: 3602/019) Crystal can configured, grid spaced alternative to latching TO-5s. Due to its better shock and vibration characteristics, the D-series has replaced TO-5s in numerous space applications. The D-series offers designers the advantage of more relays per square inch due to its size and shape. The D-series is rated for 100,000 operations at rated resistive load and 1,000,000 operations at low level.

E-Series
2PDT, non-latch,
1 amp@28vdc,
1/6 size can



(ESA SCC: 3601/012) Crystal can configured, grid spaced alternative to the TO-5 relay. Due to its better shock and vibration characteristics, the E-series has replaced TO-5s in numerous space applications. The E-series offers designers the advantage of more relays per square inch due to its size and shape. The E-series is rated for 100,000 operations at rated resistive load and 1,000,000 operations at low level.

GP2-Series
2PDT, latching,
2 amp@28vdc,
1/2 size can



(ESA/SCC: 3602/003) Considered the preeminent latching 1/2 crystal can relays, the GP2 series all brazed internal construction offers superior shock and vibration performance. The GP2 is rated for 100,000 operations at rated resistive load and 1,000,000 operations at low-level loads.

GP5-Series
2PDT, nonlatch,
2 amp@28vdc,
1/2 size can



(ESA/SCC: 3601/003) Considered the preeminent nonlatching crystal can relay, the GP5 series all brazed internal construction offers superior shock and vibration performance. The GP5 is rated for 100,000 operations at rated resistive load and 1,000,000 operations at low-level loads.

GP250-Series
2PDT, latching,
2 amp@50vdc,
1/2 size can



(ESA/SCC: 3602/010) Using the same all brazed internal construction as the GP2 and GP5, the GP250 displays the same superior shock and vibration characteristics. The GP250 offers a unique high voltage DC switching capability in a very compact, industry standard package. The GP250 is rated for 100,000 operations at 2 amp resistive and 50VDC.

Note: All the series listed are rated for 30G Sinusoidal Vibration and 100G Shock per ESA/SCC requirement. "Step Stress" Test Data on higher levels of shock and vibration for both operational and survivable conditions is available on request. In addition to providing 6,12,26 Vdc coils required by the ESA spec, Esterline Power Systems can also apply the same level of manufacturing processes and high reliability requirements for space applications to our other types of relays, including 48Vdc.

HERMETICALLY SEALED, HIGH RELIABILITY SUBMIN RELAYS

ESA/SCC SPECIFICATIONS

The ESA system comprises Basic, Generic and Detail specifications. **The Basic specifications** provide test methods, qualification methodology and general requirements applicable to all ESA/SCC components. **The Generic specifications** provide the requirements for screening, lot acceptance and qualification testing for individual families of components. **The Detail specifications** provide the performance requirements for individual or ranges of particular components. Specifications are not restricted to European components and, for example, a number of major United States component companies accept the ESA/SCC specification requirements.

Relay Plating Materials

RELAY	CAN	HEADER	PINS	PLATING
GP2/5/250	CuNi	Fe	FeNi	SnPb 90/10 2/4 µm
E/D	CuNi	FeNi	FeCoNi	SnPb 90/10 2/4 µm

Pure tin plating can result in reliability issues due to the growth of whiskers over time. The allowance of SnPb 90/10 is enough to prevent whisker growth. Before SnPb plating, a 4/6 µm Cu layer is applied to guarantee a good solderability for up to seven years storage.

ESA/SCC Qualified Leach Relays and Their Associated Specifications

RELAY	LATCHING CONFIGURATION	CONTACT RATING	CONTACT CONFIGURATION	PACKAGE TYPE	COIL VOLTAGE DC	ESA/SCC QUALIFICATION SPECIFICATION
GP5	Non-latching	2A at 28VDC	2PDT	½ Size Crystal Can	6, 12, 26	SCC 3601-003
GP2	Latching	2A at 28VDC	2PDT	½ Size Crystal Can	6, 12, 26	SCC 3601-003
GP250	Latching	2A at 28VDC	2PDT	½ Size Crystal Can	6, 12, 26	SCC 3602-010
E	Non-latching	1A at 28VDC	2PDT	1/6 Size Crystal Can	6, 12, 26	SCC 3601-012
D	Latching	1A at 28VDC	2PDT	1/6 Size Crystal Can	6, 12, 26	SCC 3602-019

EEE–INST–002 (NASA/GODDARD) QUALIFIED RELAYS

As an enhancement to our 500-1124-000 screening program, Esterline Power Systems maintains 10 and 25 ampere series product on the GFSC-311 Qualified Parts List Directory (QPLD). The GFSC QPLD is intended for procurement purposes and governed by NASA specifications. These documents are prepared whenever an acceptable relay for a high reliability application cannot be procured to a MIL or other government controlled specification.

The purpose of this EEE-INST-002 document is to establish baseline criteria for selection, screening, qualification, and derating of EEE parts for use on NASA GSFC space flight projects. The document provides a mechanism to assure that appropriate parts are used in the fabrication of high reliability hardware that will meet mission reliability objectives within budget constraints.

NASA/GSFC utilizes S-311-P-754, MIL-PRF-6106, MIL-PRF-83536, MIL-PRF-39016, SCD and Commercial specifications serve as baseline documents for relays fabricated by the OEM's "high reliability" or "space grade" flow. The EEE-INST-002 indicates 3 distinct levels of screening as part of inspection and test. Relay types include, hermetically sealed, electromagnetic, latching and nonlatching, low level to 25 amperes.

Design

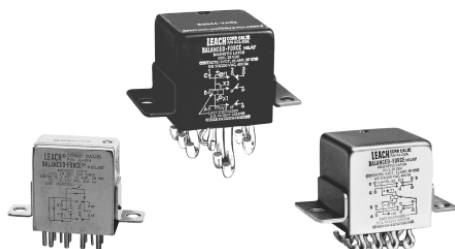
Leach high-reliability relays are engineered to meet high performance standards. Agency and tier 1 approved product are ruggedized and manufactured that meet space flight and terrestrial applications.

Features

- Fully qualified, drop-in replacement for existing Commercial or MIL spec relays
- Low input power requirements
- Hot-switch rated
- Small package design
- Hermetically sealed
- Radiation resistant for deep Space applications

Benefits

- Experienced technical support staff for hi-rel applications
- No model number obsolescence
- Access to manufacturing lines
- Track record for space applications
- MIL spec based design
- Single lot date code, lot ID, and individually serialized



For more information, please contact the factory.
leachinfo@esterline.com

TECHNICAL OPERATING REPORT (TOR)

In addition to our GSFC QPL relays, Esterline Power Systems has met the basic requirements for relays rated 25 amperes or less administered by the TOR (Technical Operating Report).

The TOR is published by The Aerospace Corporation for electronic parts, materials, and processes used in Space and Launch Vehicles, and is utilized for procurement of space, launch, and experimental programs for Space and Missile Systems Center, Air Force Space Command. TOR establishes the minimum technical requirements for electronic parts, materials, and process (electronic PMP) used in the design, development and fabrication of space and launch vehicles. Additionally, the TOR establishes the baseline performance for electronic PMP, quality, and reliability assurance requirements.

Features

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- Low input power requirements
- Hot-switch rated
- Small package design
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Benefits

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leachinfo@esterline.com



Mars Rover

ESTERLINE POWER SYSTEMS-LEACH INTERNATIONAL

From its inception in 1919, Leach has consistently developed products in anticipation of industry needs and has provided custom design capability for individual customer applications. The original company was founded by Val Leach, a former Navy radio operator, who recognized the need for an automatic antenna switch and power relay. The company's first product—the Leach “break-in” relay—was developed to meet specific customer needs. It was quickly adopted by a major manufacturer of radio transmitters and was supplied by them as standard equipment.

In 1929, the Leach Relay Company, predecessor to the present corporation, was moved from San Francisco to Los Angeles where its engineers produced the first power relays designed specifically for aircraft use.

When war came in 1941, Leach expanded to the military aircraft market. During the following years Leach made many notable achievements, including the invention of the “Balanced Armature” and “Balanced Force” relays. These designs soon became industry benchmarks for quality, reliability and capability.

In 2004 Leach International joined the Esterline Family and became known as Esterline Power Systems-Leach International.

Today, Esterline Power Systems-Leach International has more than 1,800 employees and representatives in over 20 countries and Leach brand products continue their long history of industry leadership.

CERTIFICATIONS AND QUALIFICATIONS

ISO9001/AS9100	CFR 21	EEE-INST-002
MIL-STD-790	CFR/JAR 145	M83536
FAA Certified Repair Station	JAR 21 & JAR 45	M6106
EASA Part 145 Certification	QUALIFAS/A	M83726
Boeing D6-82479	ESA/SCC	M39016

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