SMA4123

1 Form A
60V / 200mΩ
MOSFET Output Solid State Relay

Description

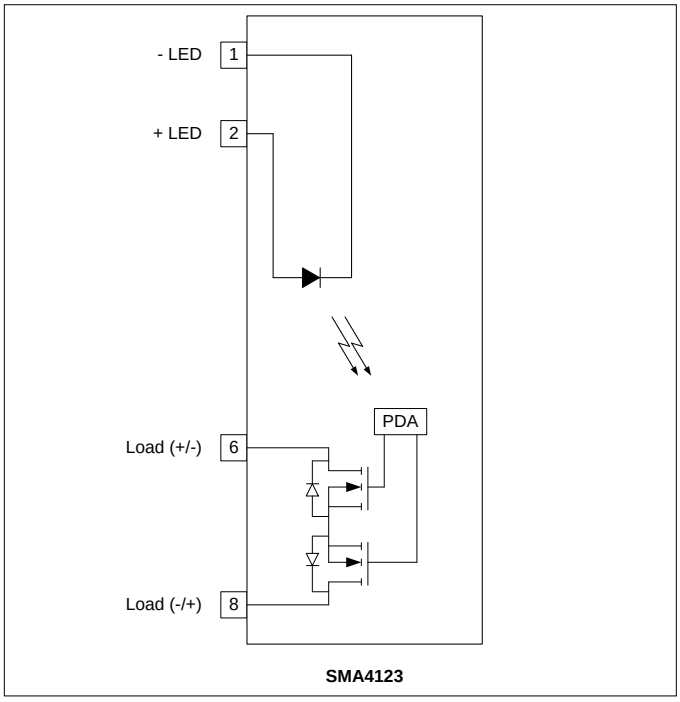
The SMA4123 is a single-pole, single-throw, normally open multipurpose solid state relay. The circuit is composed of an infra-red LED on the input side optically coupled to a Photo Diode Array which drives back-to-back low on resistance enhancement type DMOS transistors on the output. The SMA4123 has a low on resistance of 160mΩ (TYP) and a high continuous load current rating of up to 2.2 amps.

The SMA4123 comes standard in a 4 pin SIP package.

Applications

- Reed Relay Replacement
- Mechanical Relay Replacement
- Medical Equipment
- Battery Monitoring
- Multiplexers
- Test Equipment

Schematic Diagram



SMA4123

Features

- High Load Current (2.2A MAX)
- Low Input Control Current (1.5mA TYP)
- Low On Resistance (160mΩ TYP)
- High Input-to-Output Isolation (5kV option)
- Long Life / High Reliability
- RoHS / Pb-Free / REACH Compliant

Agency Approvals

UL/C-UL:	File # E90096
VDE:	File # 40035191 (EN 60747-5-2)

Absolute Maximum Ratings

The values indicated are absolute stress ratings. Functional operation of the device is not implied at these or any conditions in excess of those defined in electrical characteristics section of this document. Exposure to absolute Maximum Ratings may cause permanent damage to the device and may adversely affect reliability.

Storage Temperature .....-55 to +125°C
Operating Temperature .....-40 to +85°C
Continuous Input Current.....50mA
Transient Input Current.....500mA
Reverse Input Control Voltage 5V
Input Power Dissipation.....40mW
Total Power Dissipation 1.2W
Solder Temperature – Wave (10sec).....260°C
Solder Temperature – IR Reflow (10sec).....260°C

Ordering Information

Part Number	Description
SMA4123	4 pin SIP, (25/Tube)
SMA4123-H	$5kV_{RMS}$ V_{ISO}, 4 pin SIP, (25/Tube)

NOTE: (-H) suffix listed above may not be included in marking on device for part number identification

Electrical Characteristics, T_A = 25°C (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Input Specifications						
LED Forward Voltage	V_F	-	1.4	1.8	V	I_F = 10mA
LED Reverse Voltage	BV_R	5	-	-	V	I_R = 10µA
Input Reverse Current	I_R	-	-	10	µA	V_R = 5V
Turn-On Current	I_F	-	1.5	5	mA	I_O = 2.2A
Turn-Off Current	I_{FOFF}	-	0.5	-	mA	I_O = 2.2A
Output Specifications						
Blocking Voltage	V_B	60	-	-	V	I_F = 0mA, I_O = 1µA
Continuous Load Current	I_O	-	-	2.2	A	I_F = 5mA
On Resistance	R_{ON}	-	160	200	mΩ	I_F = 5mA, I_O = 2.2A
Leakage Current	I_{Oleak}	-	0.1	1	µA	I_F = 0mA, V_O = 600V
Output Capacitance	C_{OUT}	-	20	-	pF	V_O=25V, f=1.0MHz
Offset Voltage	V_{OFFSET}	-	-	0.2	mV	I_F = 10mA
Coupled Specifications						
Turn-On Time	T_{ON}	-	1	2	mS	I_F = 5mA, I_O = 2.2A
Turn-Off Time	T_{OFF}	-	0.1	1	mS	I_F = 0mA, I_O = 2.2A
Coupled Capacitance	$C_{COUPLED}$	-	2	-	pF	
Contact Transient Ratio	-	2,000	7,000	0	V/µS	dV = 50V
Isolation Specifications						
Isolation Voltage	V_{ISO}	3,750	-	-	V_{RMS}	RH ≤ 50%, t=1min
-H Option		5,000	-	-		
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	V_{I-O} = 500V_{DC}

SMA4123 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

Figure 1: *Typical Turn-On Time Distribution*
(N = 100, T_a = 25ºC)

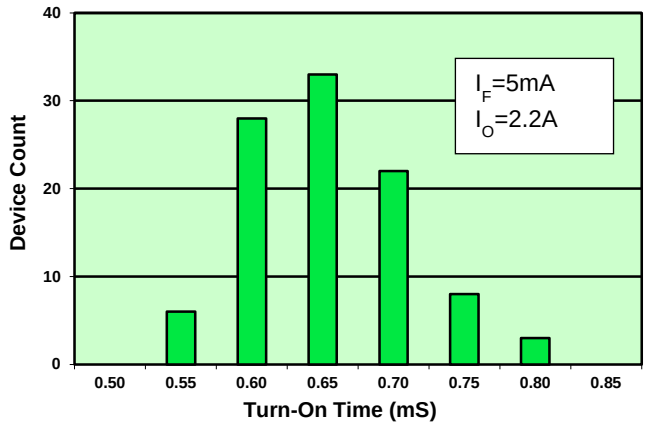


Figure 2: *Typical Turn-Off Time Distribution*
(N = 100, T_a = 25ºC)

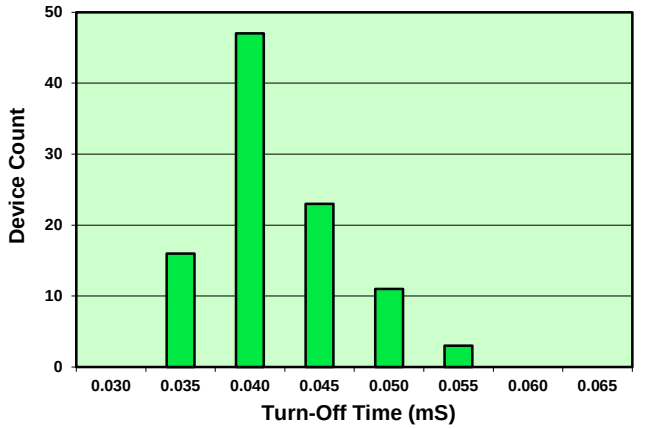


Figure 3: *Typical On-Resistance Distribution*
(N = 100, T_a = 25ºC)

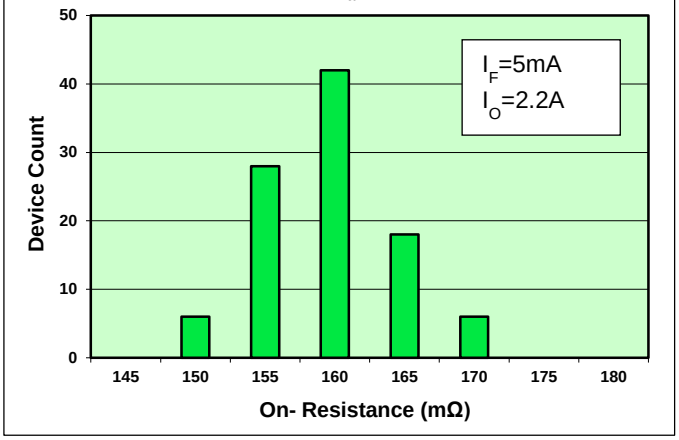


Figure 4: *Typical Output Leakage Current Distribution* (N = 100, T_a = 25ºC)

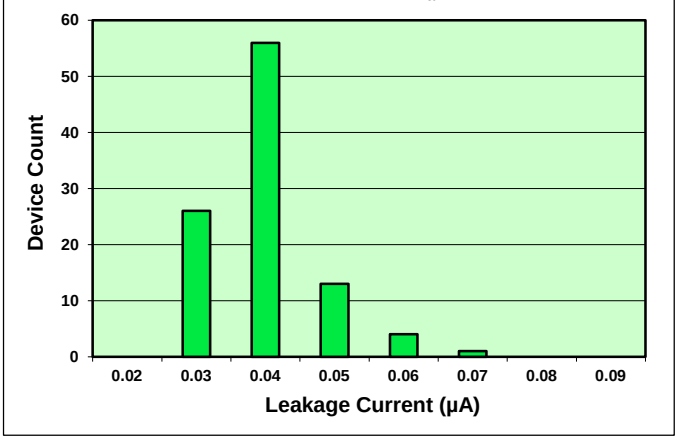


Figure 5: *Typical Blocking Voltage Distribution*
(N = 100, Ta = 25ºC)

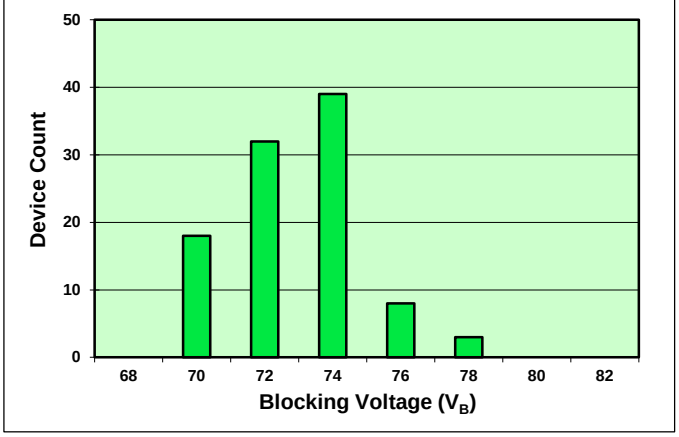
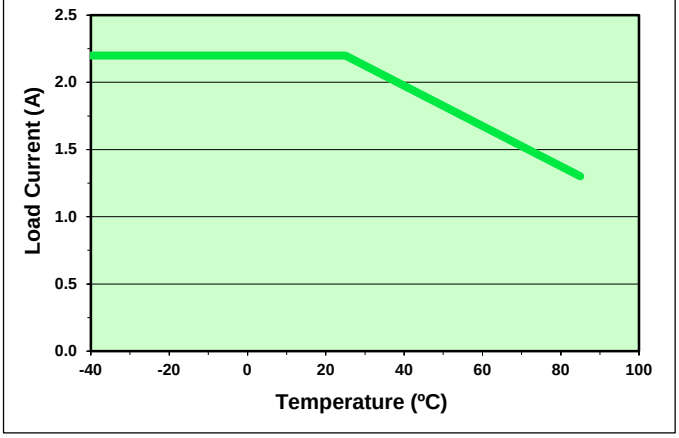


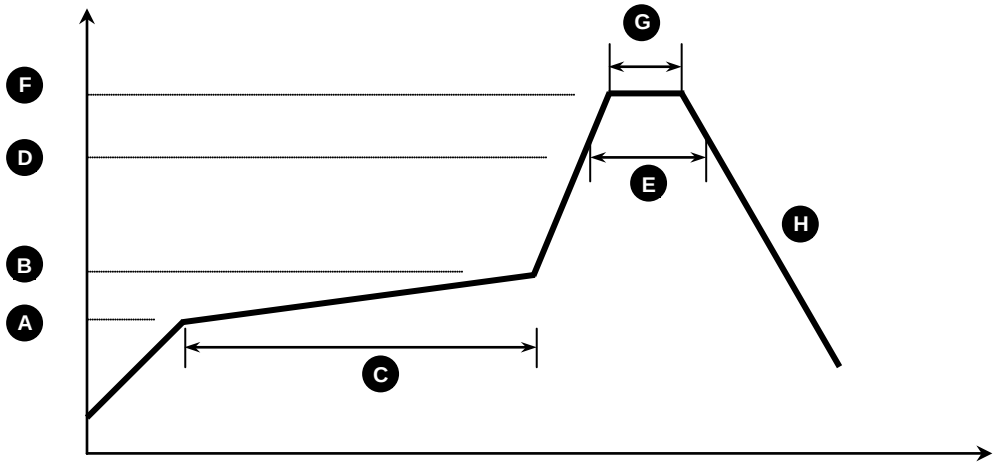
Figure 6: *Maximum Load Current vs. Temperature*



SMA4123 Solder Reflow Temperature Profile Recommendations

(1) *Infrared Reflow:*

Refer to the following figure as an example of an optimal temperature profile for single occurrence infrared reflow. Soldering process should not exceed temperature or time limits expressed herein. Surface temperature of device package should not exceed 250ºC:



Process Step	Description	Parameter
A	Preheat Start Temperature (ºC)	150ºC
B	Preheat Finish Temperature (ºC)	180ºC
C	Preheat Time (s)	90 - 120s
D	Melting Temperature (ºC)	230ºC
E	Time above Melting Temperature (s)	30s
F	Peak Temperature, at Terminal (ºC)	260ºC
G	Dwell Time at Peak Temperature (s)	10s
H	Cool-down (ºC/s)	<6ºC/s

(2) *Wave Solder:*

Maximum Temperature:	260ºC (at terminal)
Maximum Time:	10s
Pre-heating:	100 - 150ºC (30 - 90s)
Single Occurrence	

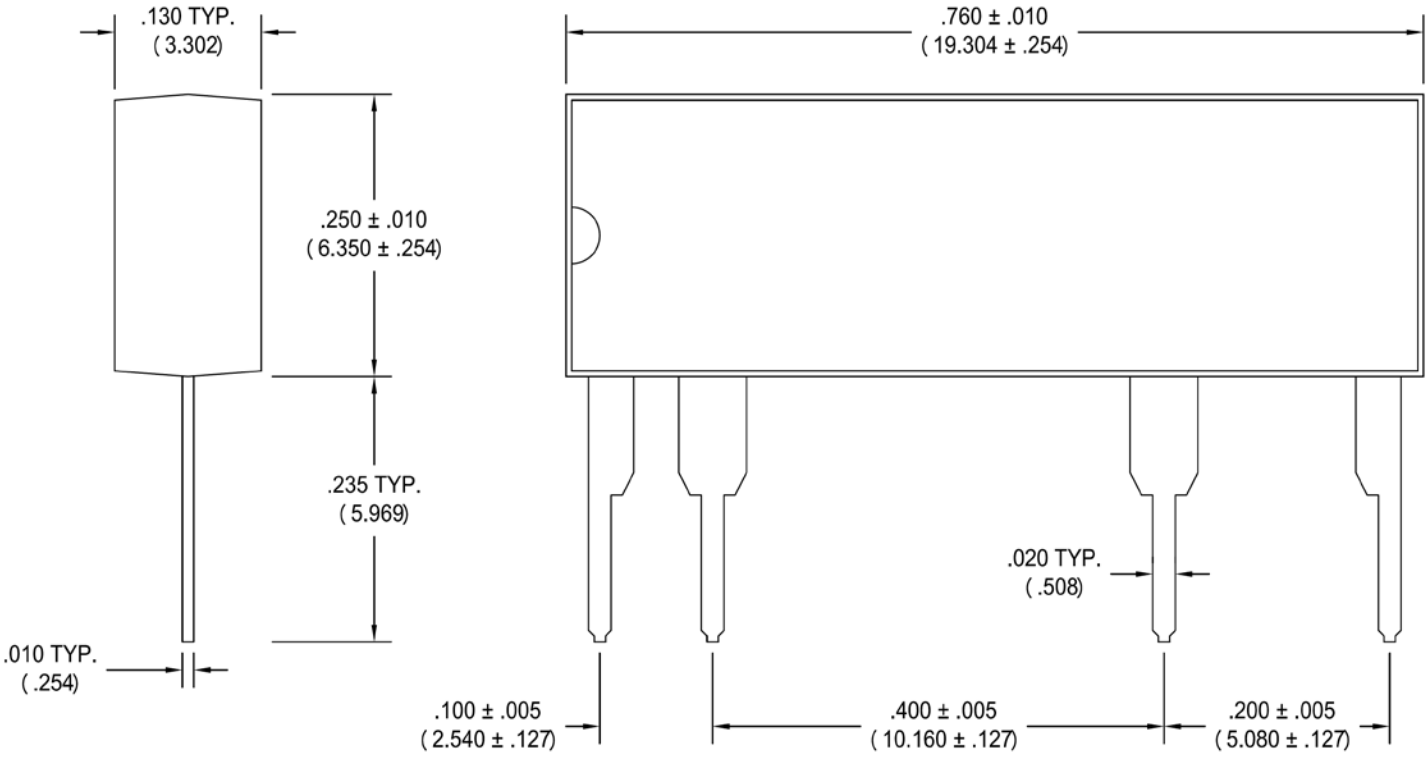
(3) *Hand Solder:*

Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

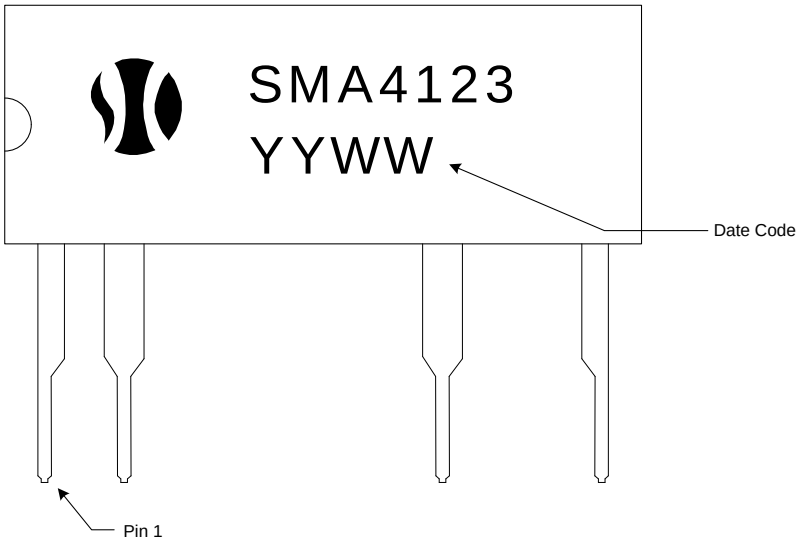
SMA4123 Package Dimensions

4 PIN SIP Package

Note: *All dimensions in inches with millimeters [mm] in parenthesis ()*



SMA4123 Package Marking



SMA4123 Package Weights

Device	Single Unit	Full Tube (25pcs)	Full Pouch (10 tubes)
SMA4123	0.88	35	370

Note: *All weights above are in GRAMS, and include packaging materials where applicable*