SOLID STATE OPTRONICS

SMA4122

1 Form A
100V / 30mΩ
DC MOSFET Output Solid State Relay

Description

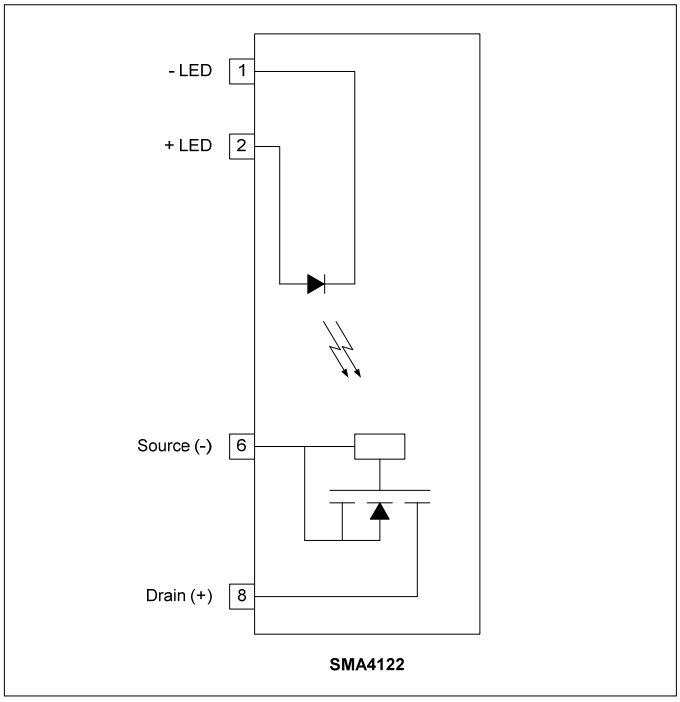
The SMA4122 is a DC, single-pole, single-throw, normally open solid-state relay in a 4 pin single inline package. The relay consists of an AlGaAs LED, optically coupled to a high performance Photo Diode Array (PDA), which in turn drives a low on-resistance, rugged source-to-source enhancement type DMOS transistor output. The SMA4122 has an extremely low on resistance of 15mΩ (TYP) and a very high continuous load current rating of up to 6 amps. The combination of low on-resistance, small package outline and high load current capabilities make the SMA4122 a unique, unparalleled solid state relay.

The SMA4122 comes standard in a 4 pin SIP package.

Applications

- Reed Relay / EMR Replacement
- Meter reading systems
- Data Acquisition
- Medical Equipment
- Battery Monitoring
- Home/Safety Security Systems

Schematic Diagram



Features

- $100V_{DC}$ Blocking Voltage
- Extremely Low On Resistance (15mΩ TYP)
- High Continuous Load Current (6 Amps)
- High Input-to-Output Isolation (up to $5kV_{RMS}$)
- Long Life / High Reliability
- RoHS / Pb-Free / REACH Compliant

Agency Approvals

UL:	File # E201932
C-UL:	File # E201932

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
SMA4122	4 pin SIP, (25/Tube)
SMA4122-H	$5kV_{RMS}$ V_{ISO}, 4 pin SIP, (25/Tube)

NOTE: Suffixes listed above are not 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	-	10	15	mA	I_O = 2A (within 10mS)
Turn-Off Current	I_{FOFF}	-	2	-	mA	I_O = 2A
Output Specifications						
Blocking Voltage	V_B	100	-	-	V	I_F = 0mA, I_O = 1µA
Continuous Load Current	I_O	-	-	6	A	I_F = 15mA
On Resistance	R_{ON}	-	15	30	mΩ	I_F = 15mA, I_O = 2A
Leakage Current	I_{Oleak}	-	0.1	1	µA	I_F = 0mA, V_O = 100V
Offset Voltage	V_{OFFSET}	-	-	0.2	mV	I_F = 15mA
Coupled Specifications						
Turn-On Time	T_{ON}	-	10	15	mS	I_F = 15mA, I_O = 2A
Turn-Off Time	T_{OFF}	-	0.5	2	mS	I_F = 0mA, I_O = 2A
Coupled Capacitance	$C_{COUPLED}$	-	3	-	pF	
Contact Transient Ratio	-	2,000	7,000	0	V/µS	dV = 50V
Isolation Specifications						
Isolation Voltage	V_{ISO}	3750	-	-	V_{RMS}	RH ≤ 50%, t=1min
(-H Option)		5000	-	-		
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	V_{I-O} = 500V_{DC}

SMA4122 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

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

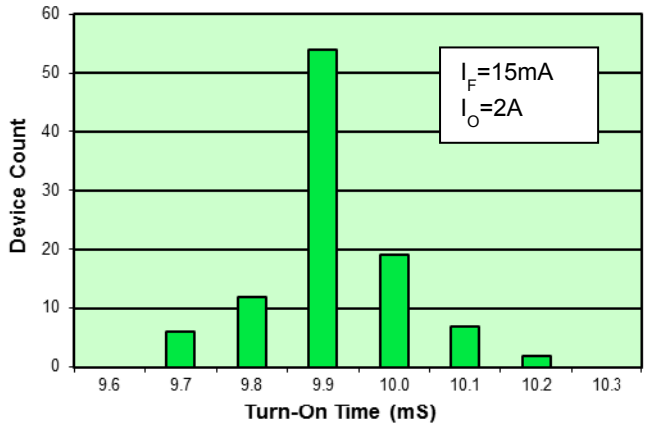


Figure 2: *Typical Turn-Off Time Distribution* (N = 100, T_a = 25ºC)

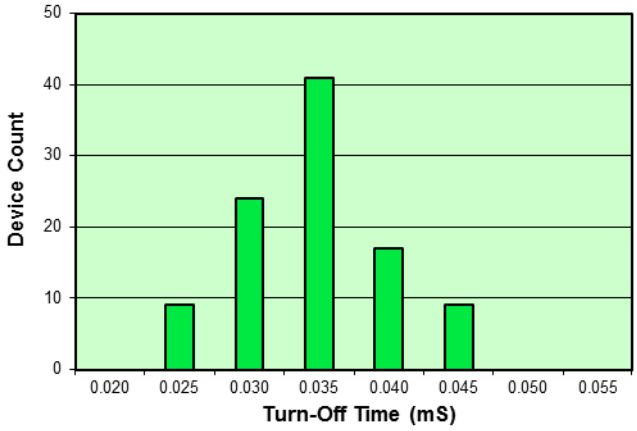


Figure 3: *Typical On-Resistance Distribution* (N = 100, T_a = 25ºC)

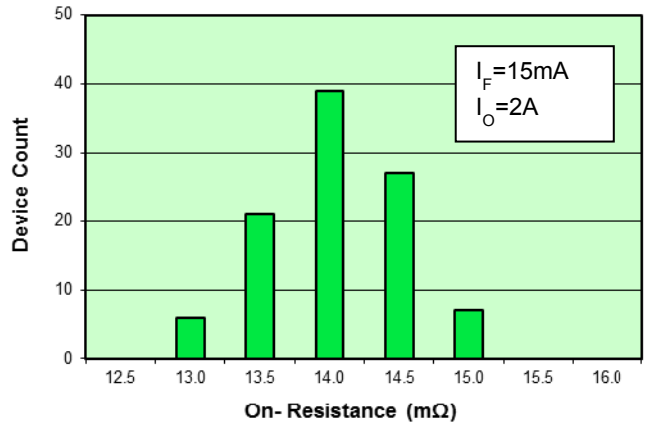


Figure 4: *Typical Output Leakage Current Distribution* (N = 100, T_a = 25ºC)

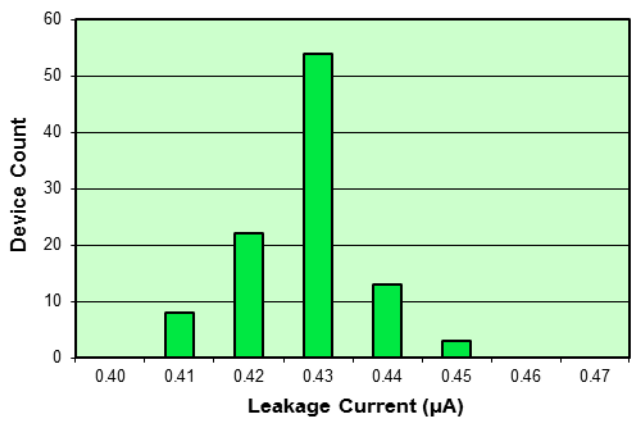


Figure 5: *Typical Blocking Voltage Distribution* (N = 100, Ta = 25ºC)

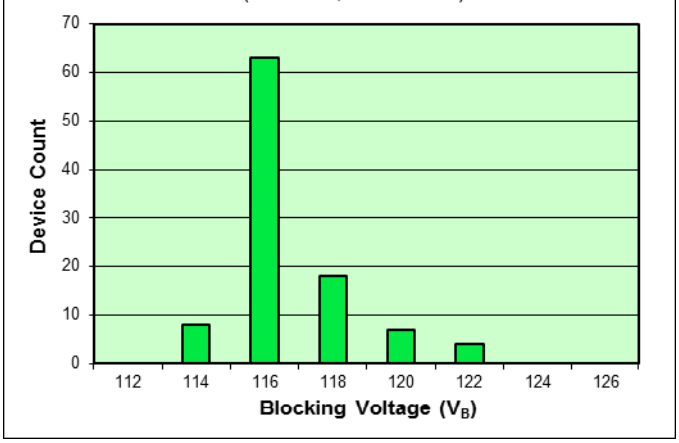
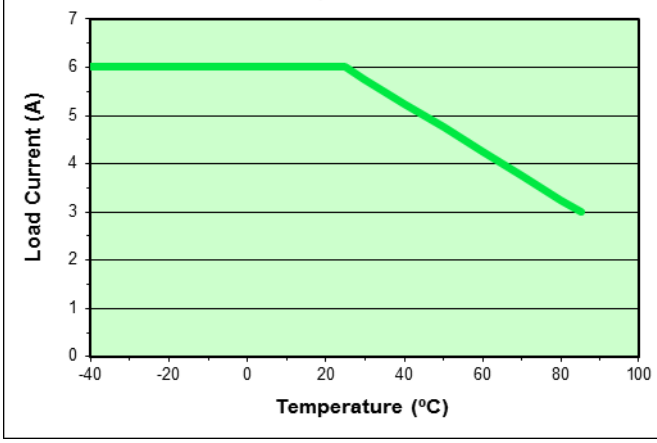


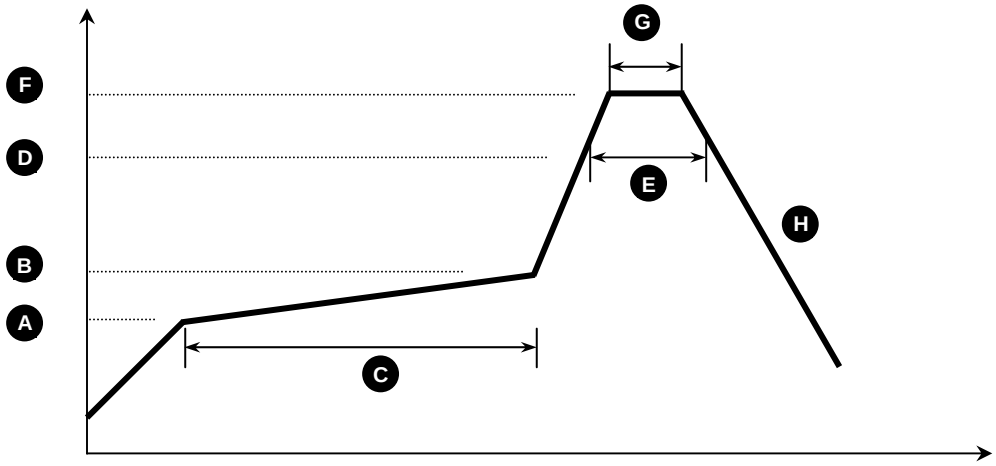
Figure 6: *Maximum Load Current vs. Temperature*



SMA4122 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	

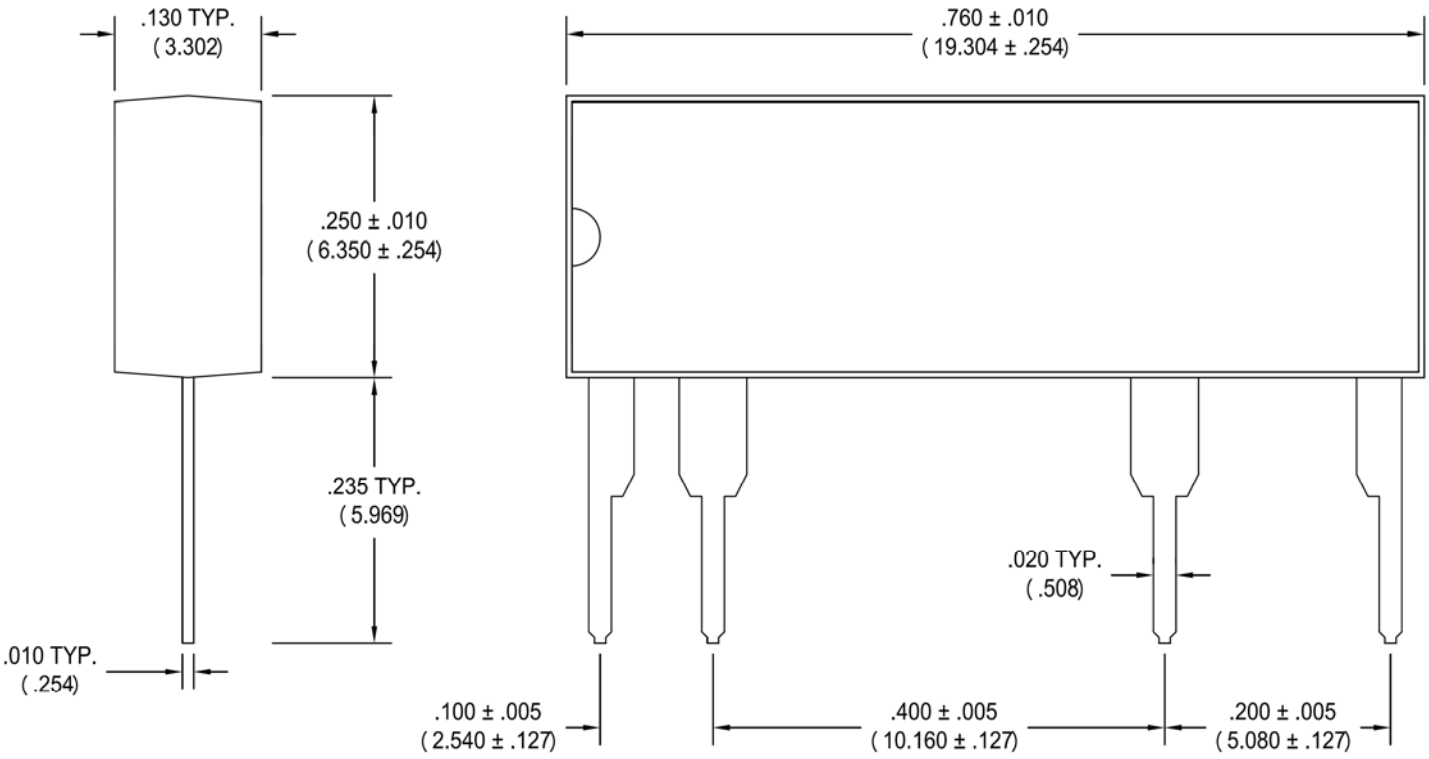
(3) *Hand Solder:*

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

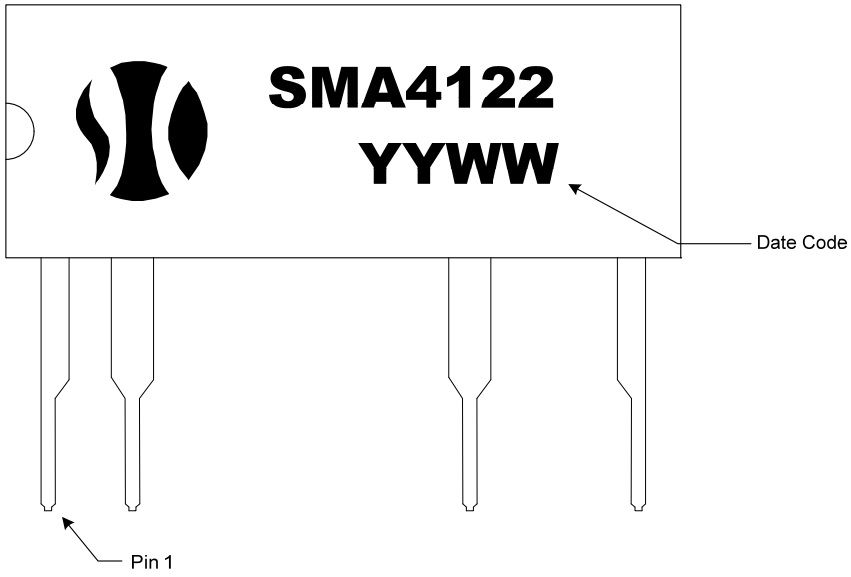
SMA4122 Package Dimensions

4 PIN SIP Package

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



SMA4122 Package Marking



SMA4122 Package Weights

Device	Single Unit	Full Tube (25pcs)	Full Pouch (10 tubes)
SMA4122-(H)	0.88	35	370

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

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