

## SDH SERIES CRD

### DESCRIPTION

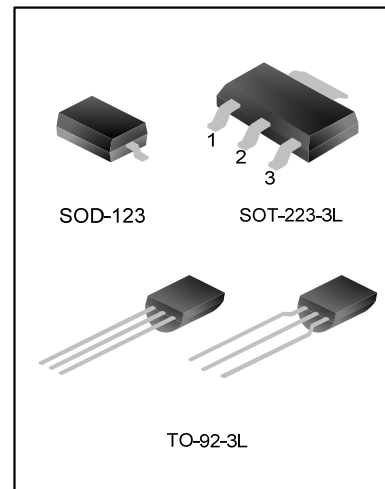
SDH series current regulative diode (CRD) is based on Silan's planar JFET process.

It features low start-up stabilized current supply voltage, stable constant-current characteristics and high forward breakdown voltage for its advanced process and smart design.

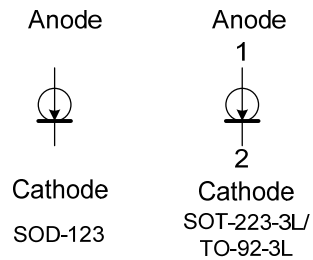
SDH series CRD has powerful anti-interference capacity of surge current between the anode and cathode, and no other assistant components are needed in application.

SDH series CRD supplies constant current to an electric circuit and is widely used in the constant-current LED driver, modules in phone circuitry, etc.

It is available in SOD-123, SOT-223-3L and TO-92-3L packages.



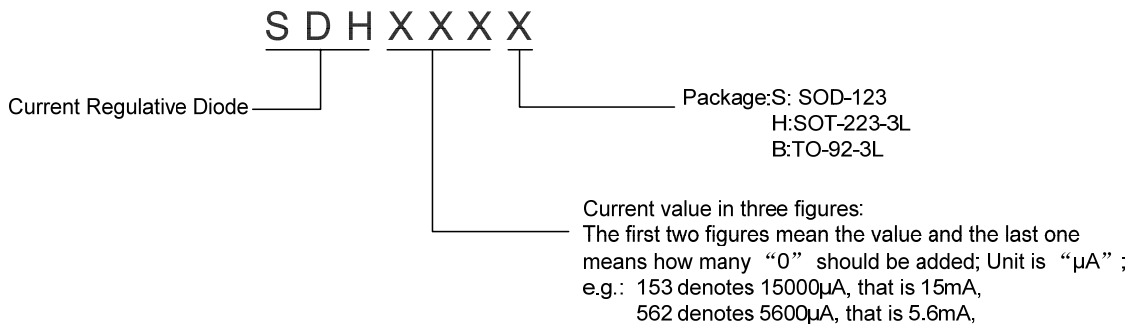
### CRD Device symbol



### FEATURES

- \* Low start-up stabilized current supply voltage
- \* High dynamic impedance
- \* Constant-current range: 1mA-40mA.
- \* Be paralleled for current extension.
- \* Negative temperature coefficient for LED protection under high temperature

### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SDHXXXSTR	SOD-123	XXXS	Pb free	Tape&Reel
SDHXXXHTR	SOT-223-3L	SDHXXXH	Pb free	Tape&Reel
SDHXXXBTR	TO-92-3L	XXXB	Pb free	AMMO

**ABSOLUTE MAXIMUM RATINGS** (Unless otherwise specified, T<sub>c</sub>=25°C)

Characteristics	Symbol	Range	Unit	
Power Dissipation	P <sub>D</sub>	SOD-123	350	mW
		TO-92-3L	200	mW
		SOT-223-3L	100	mW
Chip-To-Ambient Thermal Resistance	R <sub>θJA</sub>	300	°C/W	
Maximum Operating Voltage	V <sub>max</sub>	See the table below	V	
Operating And Storage Junction Temperature	T <sub>stg</sub>	-30~+150	°C	

**ELECTRICAL CHARACTERISTICS** (Unless otherwise specified, T<sub>c</sub>=25°C)

Specification	Constant current range <sup>note</sup>		Start saturation current <sup>note</sup>		Max. voltage – current ratio I <sub>VMAX</sub> /I <sub>p</sub>	Temperature coefficient [%/°C]	Max. voltage V <sub>max</sub> (V)
	Test voltage	I <sub>p</sub> (mA)	V <sub>k</sub> [ V ]	I <sub>k</sub> [ mA ]			
102	10V	0.88~1.32	1.7	Min.0.8I <sub>p</sub>	max.1.1	-0.10~ -0.37	100
152	10V	1.28~1.72	2.0	Min.0.8I <sub>p</sub>	max.1.1	-0.13~ -0.40	100
202	10V	1.68~2.32	2.3	Min.0.8I <sub>p</sub>	max.1.1	-0.15~ -0.42	100
272	10V	2.28~3.10	2.7	Min.0.8I <sub>p</sub>	max.1.1	-0.18~ -0.45	100
352	10V	3.00~4.10	3.2	Min.0.8I <sub>p</sub>	max.1.1	-0.20~ -0.53	100
452	10V	3.90~5.10	3.7	Min.0.8I <sub>p</sub>	max.1.1	-0.25~ -0.45	100
562	10V	5.00~6.50	4.5	Min.0.8I <sub>p</sub>	max.1.1	-0.25~ -0.53	100
822	10V	6.56~9.84	3.1	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	50
103	10V	8~12	3.5	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	50
123	10V	9.6~14.4	3.8	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	50
153	10V	12~18	4.3	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	50
183	10V	16~20	4.6	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	50
213	10V	18~24	5.0	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	45
253	10V	22~28	5.5	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	45
303	10V	27~33	6.0	Min.0.8I <sub>p</sub>	max.1.0	-0.25~ -0.45	45

**Note:** pulse testing for 380μS.

**TYPICAL CHARACTERISTIC CURVE**

Figure 1. V-A characteristics curve

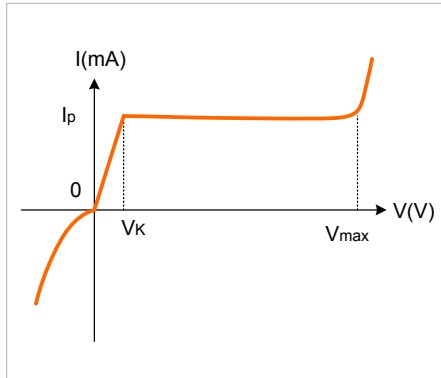


Figure 2. Typical forward characteristics curve

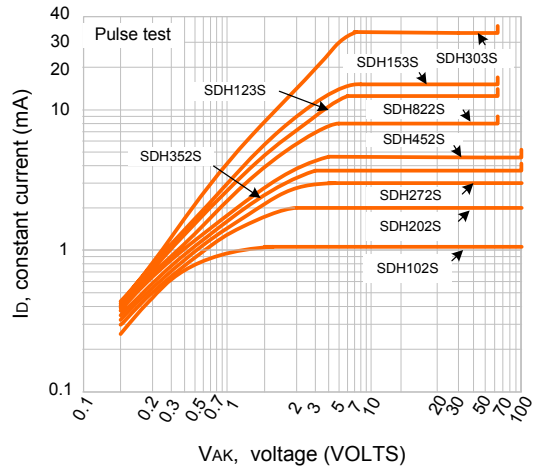


Figure 3. Steady-state current & time

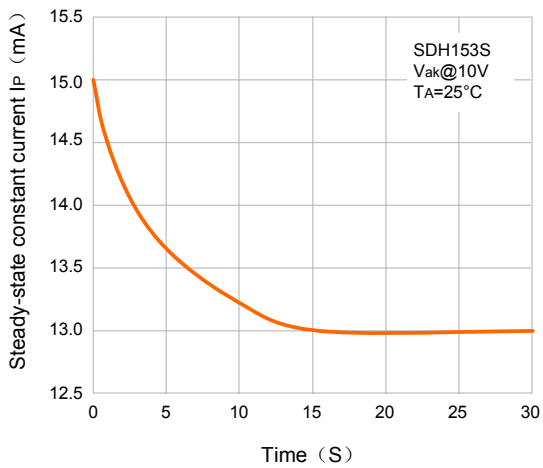


Figure 4. Pulse testing constant current & steady-state constant current

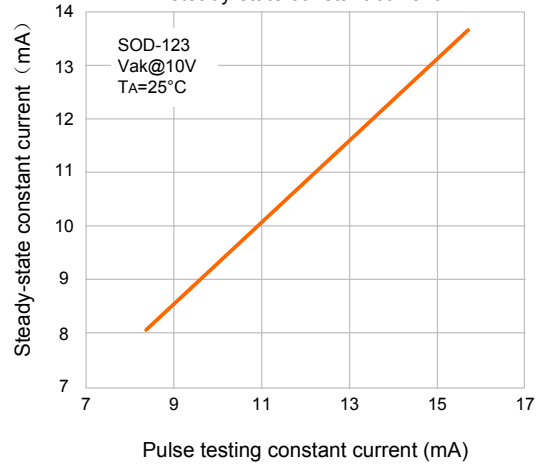


Figure 5. Steady-state current & time

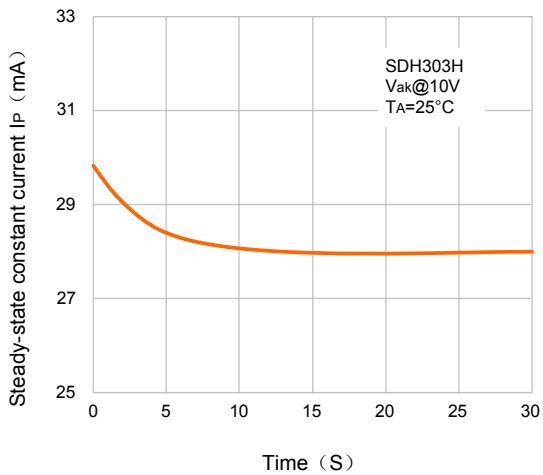
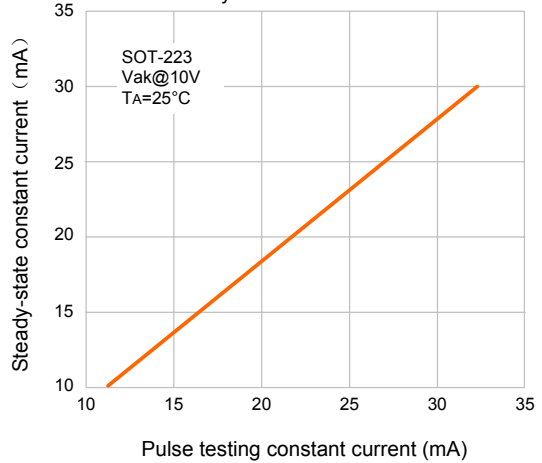


Figure 6. Pulse testing constant current & steady-state constant current



**APPLICATION INFORMATION**

**1. Temperature characteristics of SDH series CRD**

Due to SDH series CRD uses the JFET structure and has negative temperature coefficient; more attention should be paid to the test time when the constant current characteristic of CRD is evaluated. If the test time is long, the heat generated will affect the test data.

The SDH series constant current values listed in “ELECTRICAL CHARACTERISTICS” table are tested by pulse mode under the conditions that  $V_{ak}=10V$  with  $380\mu S$  test pulse width. The same test conditions are recommended for customers.

In “TYPICAL CHARACTERISTICS CURVE”, the relation between steady-state constant current and rated current after stabilization is given.

When in real applications, the customers should use proper CRD according the real application environments (ambient temperature, voltage drop on CRD)

**2. SDH series CRD used for LED constant-current control**

Using single CRD is OK for small current (1~25 mA) as shown in figure 1. For example, three 15mA LEDs can be driven by one SDH183 with 15mA steady-state current and corresponding supply voltage is decided by the voltage drop on three LEDs (suppose that LEDVF is 3.3V @ 15mA) plus the voltage drop on CRD (typical value of SDH183  $V_k$  is 4.6V), that is  $3 \times 3.3V + 4.6V = 14.5V$ .

Using paralleled CRDs for large current more than 25mA as shown in figure 2. For example, 50 mA current can be achieved by two paralleled SDH303 with 25mA steady-state current, or by four paralleled SDH153 with 13mA steady-state current. It should be pointed out that when several CRDs are paralleled, the initial voltage of constant current source is equivalent to the maximum voltage among these CRDs, while the forward breakdown voltage is equivalent to the minimum voltage among them. In addition, at the same time of current extension, the dynamic impedance of constant current source is decreased.

In the application of SDH series CRD, the steady-state current of CRD is decided at first by the constant current needed by the application circuit, and then the specification, quantity of CRDs and the connection circuit are decided according to the relation between steady-state current and pulse test current.

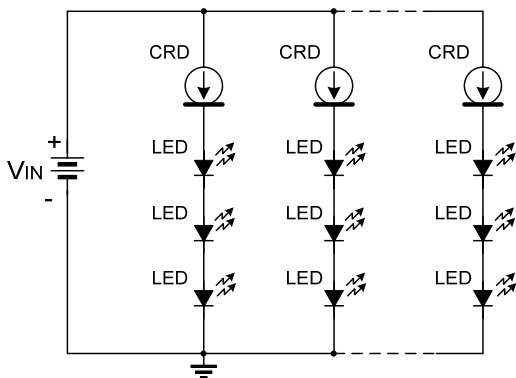


Figure 1

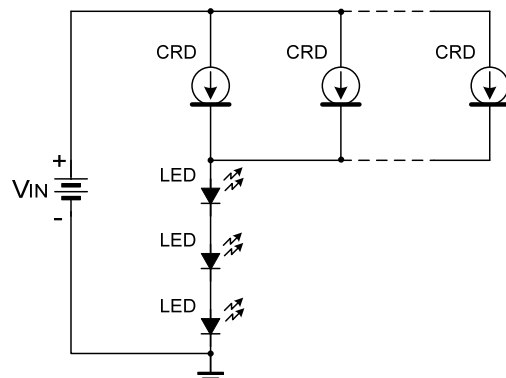
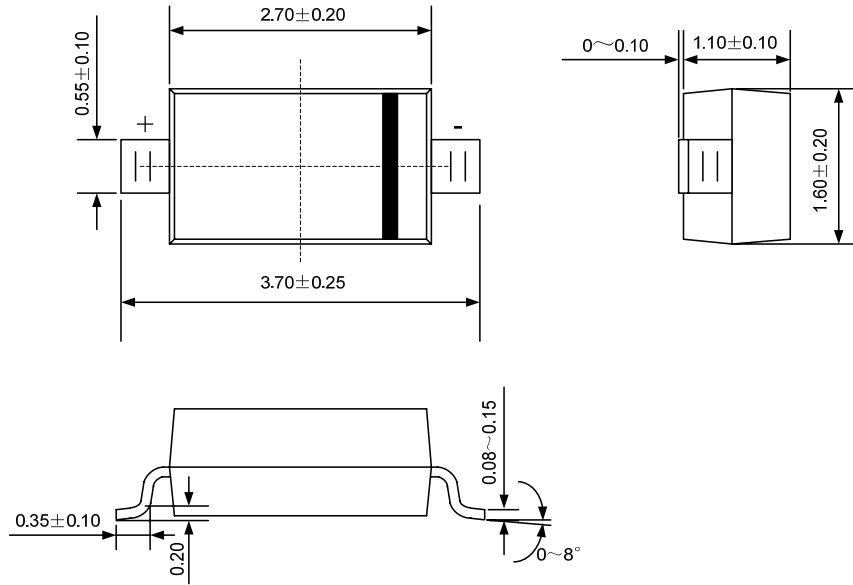


Figure 2

**PACKAGE OUTLINE**

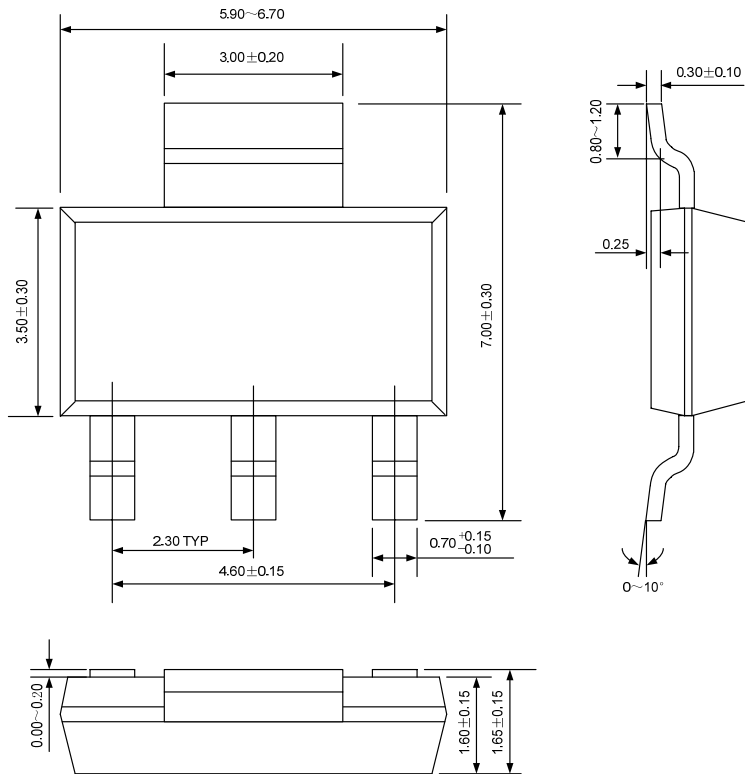
**SOD-123**

**UNIT: mm**

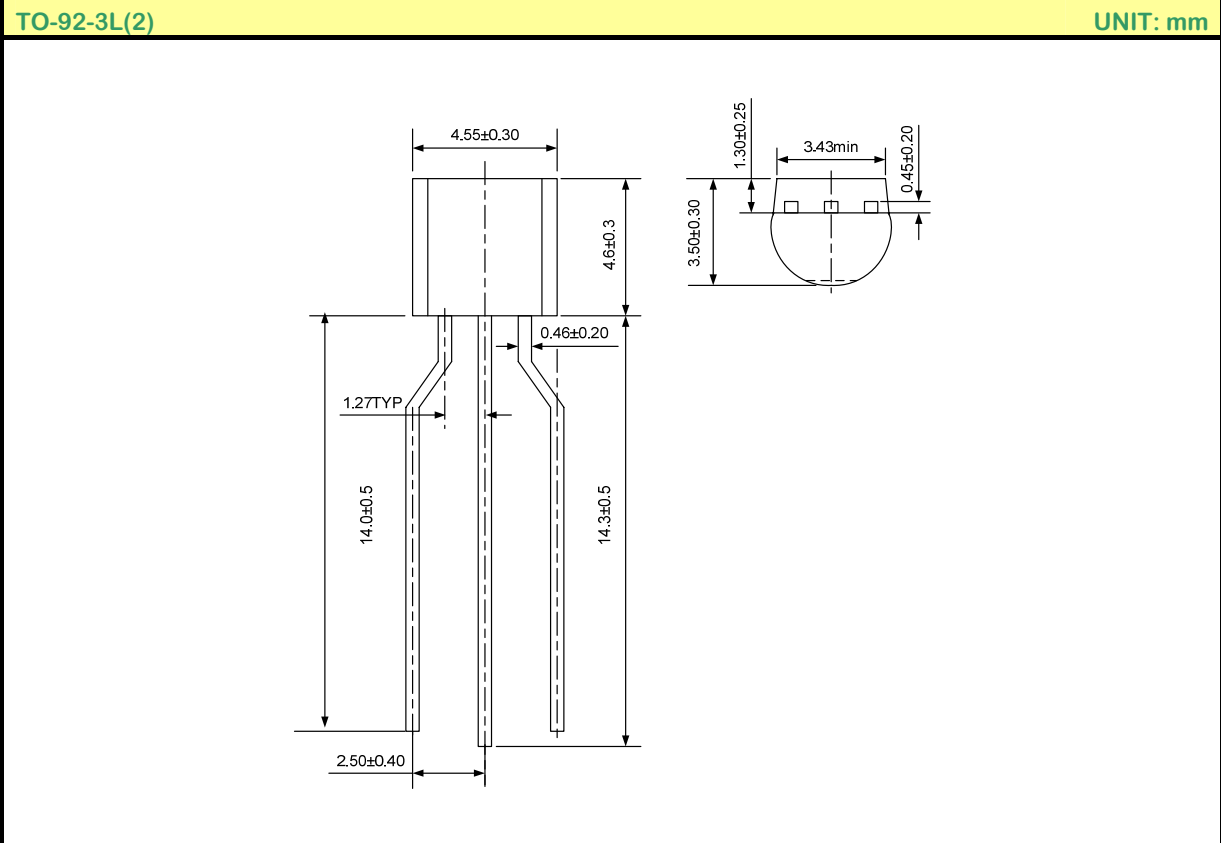
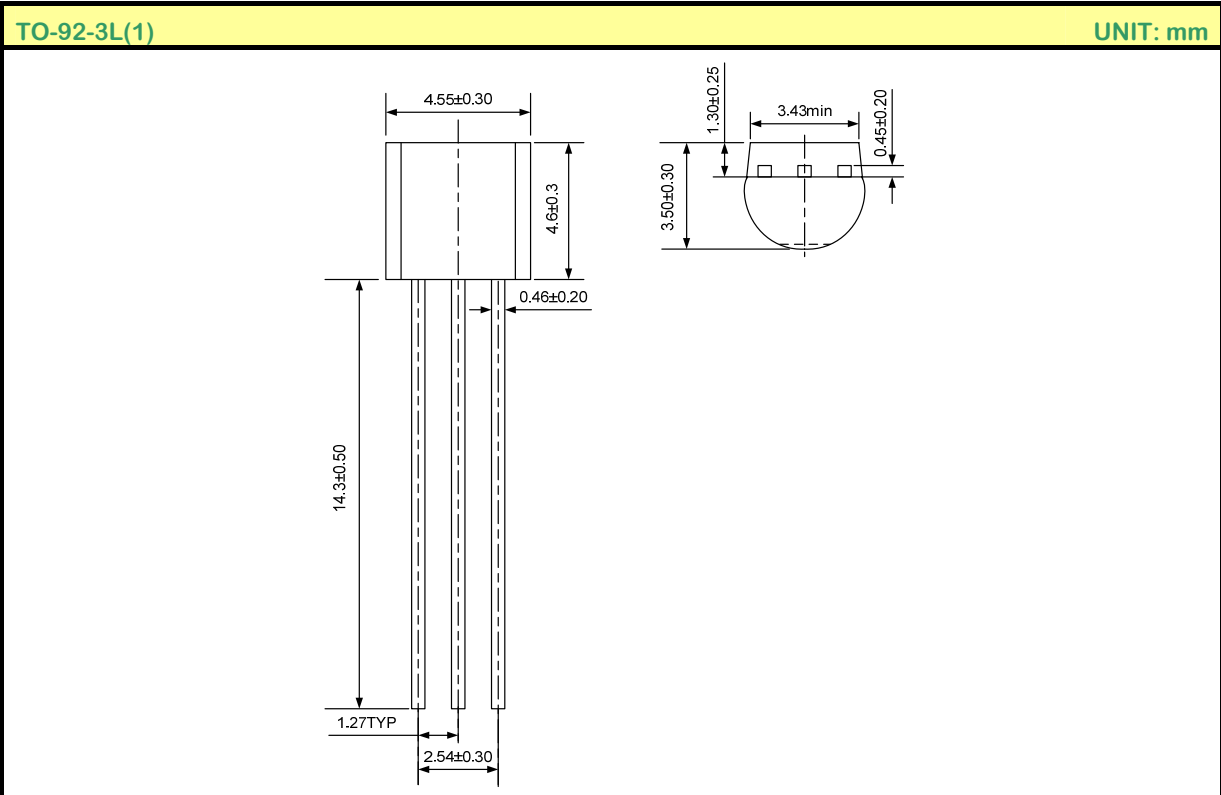


**SOT-223-3L**

**UNIT: mm**



**PACKAGE OUTLINE(Continued)**





**Disclaimer:**

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- Silan will supply the best possible product for customers!

**ATTACHMENT**

**Revision History**

Date	REV	Description	Page
2010.09.29	1.0	Original	
2011.01.05	1.1	Modify the template of datasheet	