概述 Description

M306X系列是 SOP4 封装的过零型可控硅光耦，产品由一个红外线发射二极管和光电可控硅芯片组成，可实现不同电路之间的电气隔离和信号传输，产品广泛应用于家电领域中。

M306X series are zero-cross photo triac in SOP4 package, consisting of an infrared emitting diode and photoelectric SCR chip ;The devices can realize electrical isolation and signal transmission between different circuits, Products are widely used in the field of home appliances;

特性 Features

输入-输出隔离电压：✧V_{ISO}=3750Vrms)

High isolation voltage between input and output✧V_{ISO}=3750Vrms)

DC 输入，过零可控硅输出

DC input with zero-cross photo triac output

峰值击穿电压

Peak breakdown voltage

600V： M306X；

爬电距离>5.0mm

Creepage distance > 5.2mm

工作温度最高可达+ 100 ℃

Operating temperature up to +100°C

防潮等级 class1；

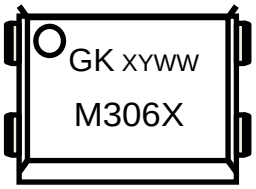
MSL class1

产品适用于海拔 5000 米及以下

Products are suitable for the elevation of 5000 meters and below

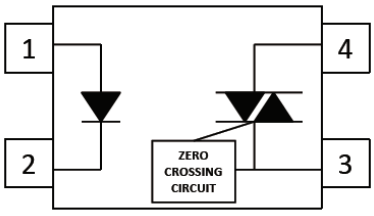
产品符合RoHS、REACH及HF等环保法规要求；

The products comply with RoHS, REACH and HF；





框架结构



Pin Configuration
1.Anode
2.Cathode
3. Terminal
4. Terminal

电性参数 Electrical Characteristics

最大绝对额定值 (常温=25℃)

Absolute Maximum Ratings (Temperature=25°C)

参数名称 Parameter			符号 Symbol	数值 Rating	单位 Unit
输入 Input	正向电流 Forward Current		I_F	60	mA
	反向电压 Reverse Voltage		V_R	6	V
	功耗 Power Dissipation		P_D	100	mW
输出 Output	断态输出端电压 Off-state Output Terminal Voltage	M306X	V_{DRM}	600	V
	峰值重复浪涌电流 Peak Repetitive Surge Current PW=100μs, 120pps		I_{TSM}	1	A
	导通 RMS 电流 On-State RMS Current		$I_{T(RMS)}$	100	mA
	功耗 Power Dissipation		P_c	300	mW
总功率消耗 Total Power Dissipation			P_{tot}	400	mW
*1 隔离电压 *1 Isolation Voltage			V_{iso}	3750	Vrms
工作温度 Operating Temperature			T_{opr}	-55 ~ + 100	℃
存贮温度 Storage Temperature			T_{stg}	-55 ~ + 125	
*2 焊锡温度 *2 Soldering Temperature			T_{sol}	260	

* 注：

*1.交流测试，时间 1 分钟，湿度. =40~60%；

*1.AC For 1 Minute, R.H. = 40 ~ 60%;

隔离电压测试的方法如下：

Isolation voltage shall be measured using the following method:

（1）将产品的两端短路；

（1）Short between anode and cathode on the primary side and between collector and emitter onthe secondary side;

（2）测试隔离电压时无电流通过；

（2）The isolation voltage tester with zero-cross circuit shall be used;

（3）测试时加正弦波形电压。

（3）The waveform of applied voltage shall be a sine wave.

*2.锡焊时间为 10 秒

*2. Soldering time is 10 seconds

电性参数（温度=25℃）：

Electrical Characteristics (Temperature=25 ℃)

参数名称 Parameter			符号 Symbol	条件 Condition	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
输入 Input	正向电压 Forward Voltage		V_F	I_F=20mA	---	1.2	1.4	V
	反向电流 Reverse Current		I_R	V_R=6V	---	---	10	μA
	输入电容 Input Capacitance		C_{in}	V=0, f=1KHz	---	8.5	250	pF
输出 Output	*1 断态峰值电流 *1 Peak Off-state current		I_{DRM}	V_{DRM}=Rated V_{DRM} IF=0	---	---	500	nA
	峰值导通电压 Peak On-state Voltage		V_{TM}	I_{TM}=100mA	---	---	3.0	V
	断态电压临界上升率 Critical Rate of Rise of Off-state Voltage		dV/dt	V_{PEAK} =Rated V_{DRM}	1000	---	---	V/μs
传输特性 transfer characteristic	LED 触发电流 LED Trigger Curren	M3061	I_{FT}	Terminal Voltage = 3V I_{TM}=100mA			15	mA
		M3062					10	
		M3063					5	
	维持电流 Holding Current		I_H	---	---	280	---	μA
	绝缘电阻 Isolation resistance		R_{iso}	DC500V 40~60%R.H.	1×10^{12}	---	---	Ω
	浮动电容 Floating Capacitance		C_{IO}	V=0, f=1MHz	---	0.4	1.0	pF
过零特性 Zero-Crossing characteristic	抑制电压 Inhibit Voltage		V_{INH}	I_F=Rated I_{FT}	---	---	20	V
	抑制状态漏电流 Leakage in Inhibited State		I_{DRM2}	I_F=Rated I_{FT} V_{DRM}=Rated V_{DRM}			500	μA

注：*1 测试电压必须在 dV/dt 额定值范围内。
*1 Test voltage must be applied within dV/dt rating.

RATING AND CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Ambient Temperature

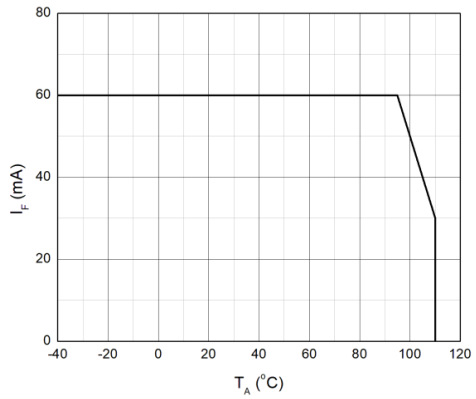


Fig.2 On-state Terminal Current vs. Ambient Temperature

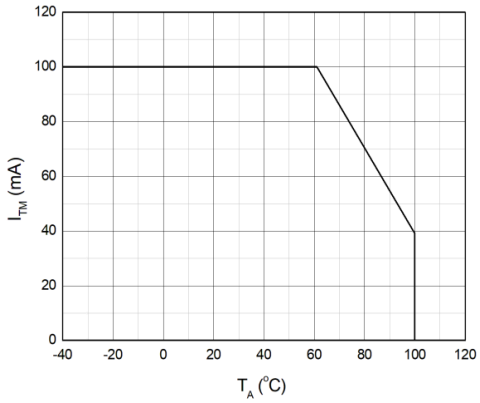


Fig.3 Forward Current vs. Forward Voltage

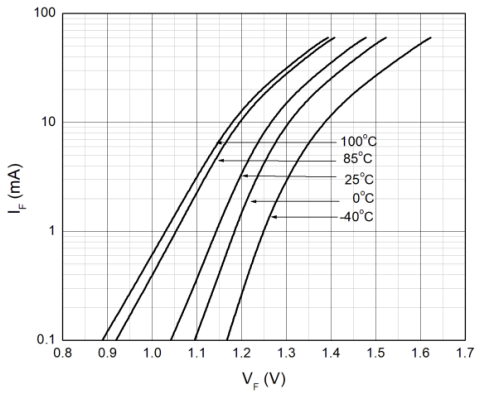


Fig.4 Off-state Terminal Current vs. Ambient Temperature

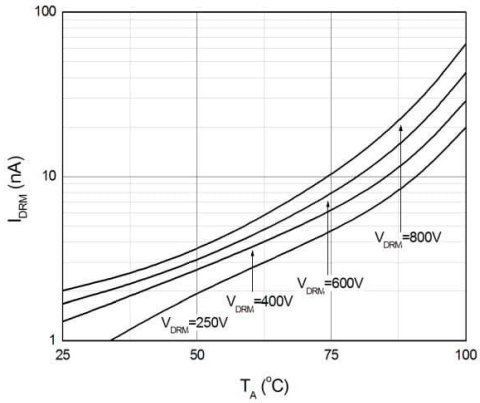


Fig.5 Normalized Off-state Terminal Voltage vs. Ambient Temperature

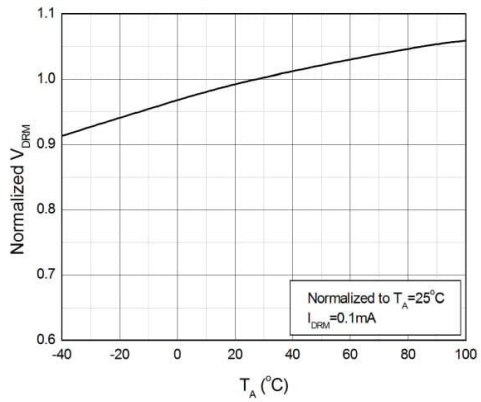
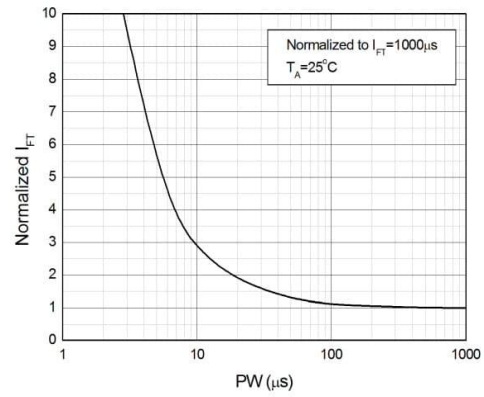


Fig.6 Normalized Trigger Current vs. LED Trigger Pulse Width



RATING AND CHARACTERISTIC CURVES

Fig.7 Normalized Trigger Current vs. Ambient Temperature

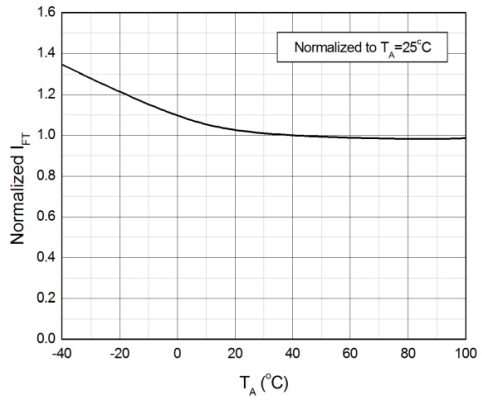


Fig.8 On-state Terminal Voltage vs. Ambient Temperature

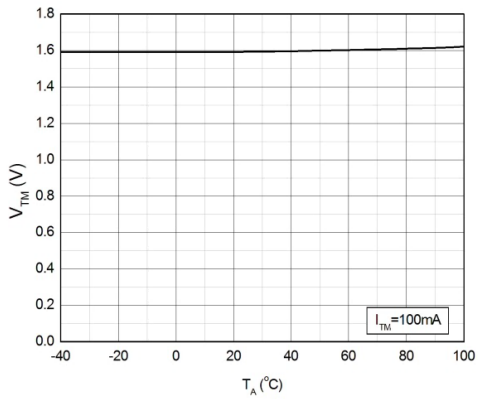


Fig.9 On-state Terminal Voltage vs. On state Terminal Current

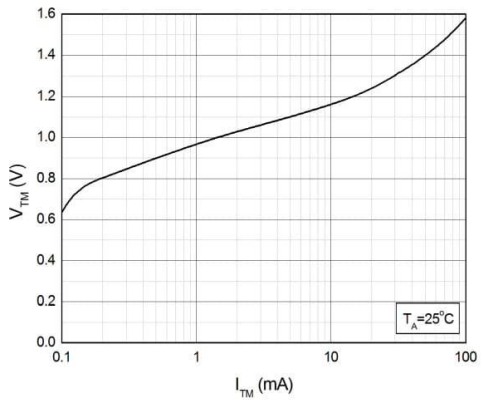


Fig.10 Holding Current Ambient Temperature

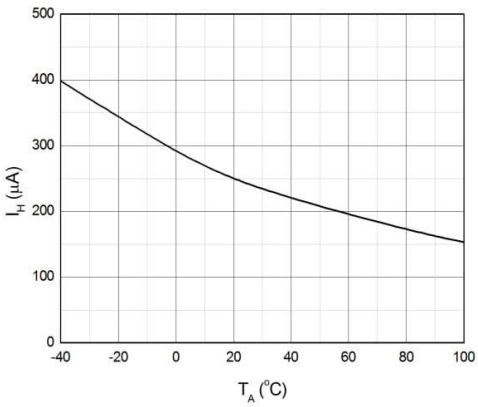


Fig.11 Normalized Inhibit Voltage vs. Ambient Temperature

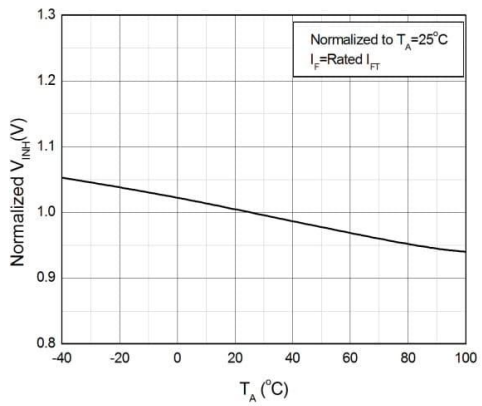
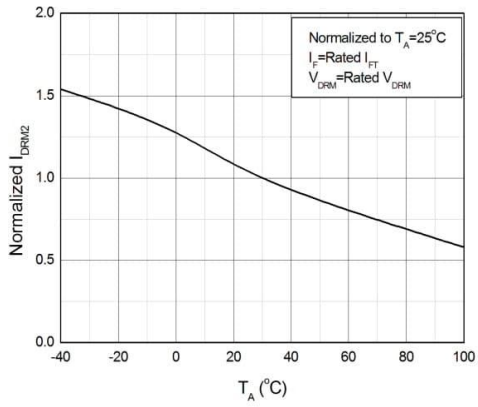


Fig.12 Normalized Leakage in Inhibit State Ambient Temperature



RATING AND CHARACTERISTIC CURVES

Fig.13 Turn On Time vs. Forward Current

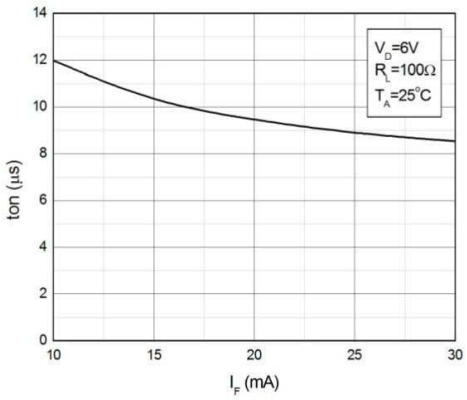
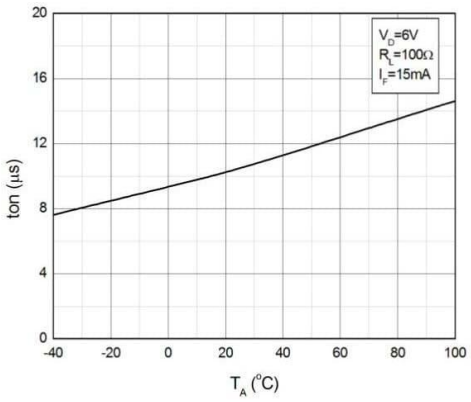


Fig.14 Turn On Time vs. Ambient Temperature



TEST CIRCUITS

Fig.15 Test Circuits of Turn On Time

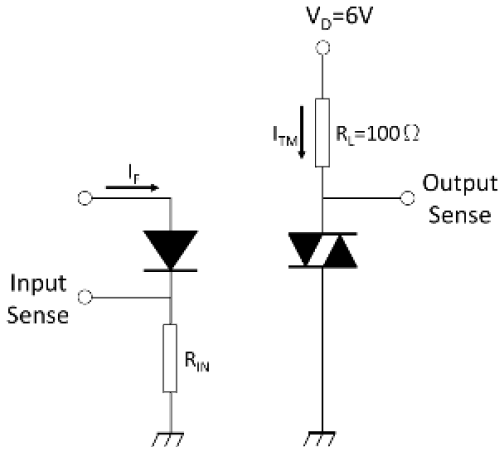


Fig.16 Waveforms of Turn On Time

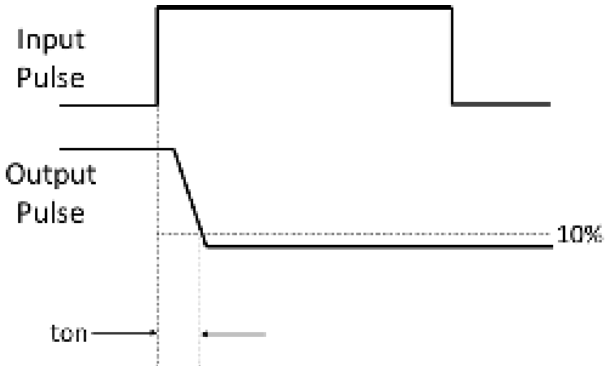


Fig.17 Test Circuits of dV/dt

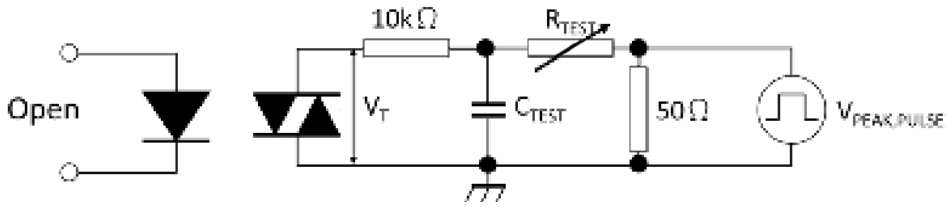
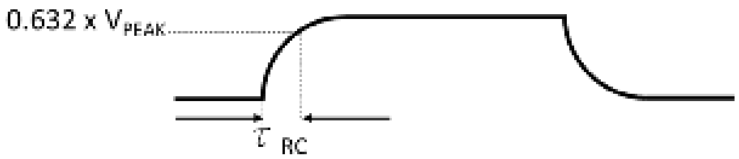


Fig.18 Waveforms of dV/dt

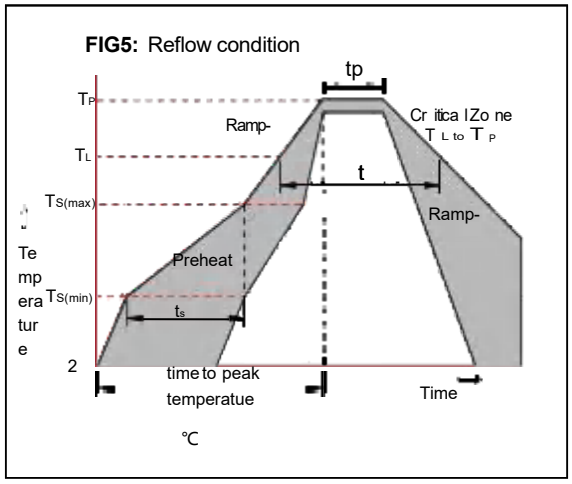


$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

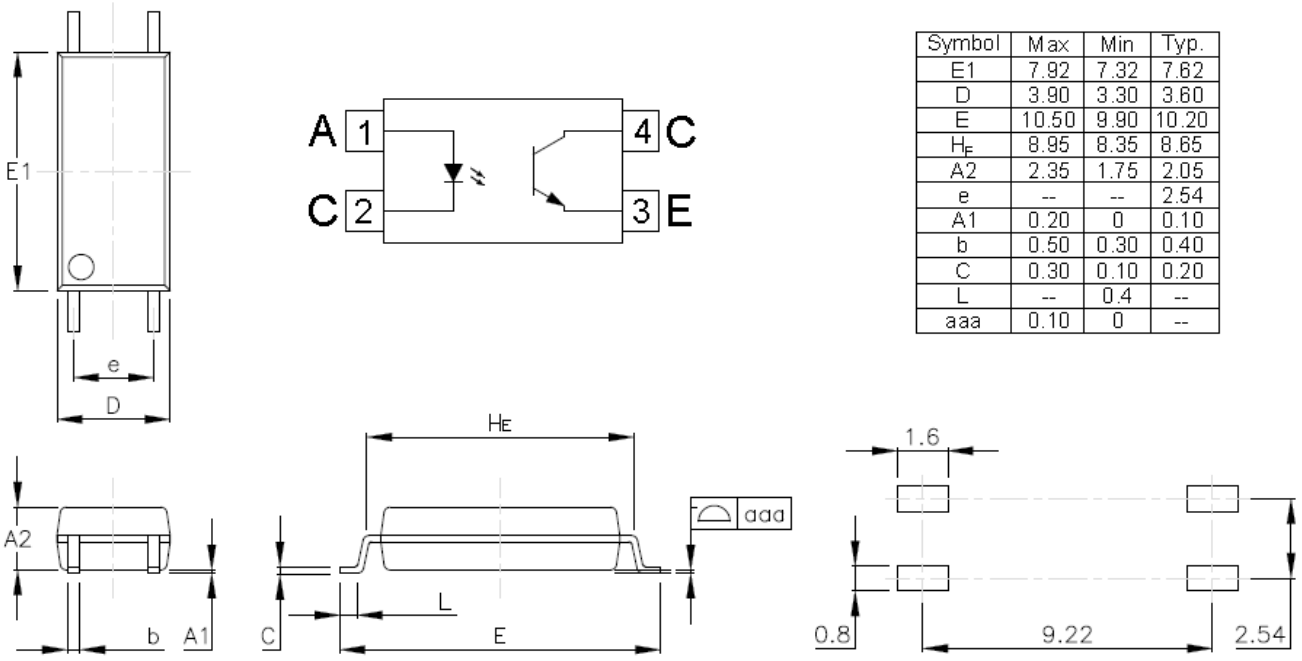
Soldering parameters

Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

FIG5: Reflow condition



Package Dimensions & Suggested Pad Layout



Symbol	Max	Min	Typ.
E1	7.92	7.32	7.62
D	3.90	3.30	3.60
E	10.50	9.90	10.20
H_E	8.95	8.35	8.65
A2	2.35	1.75	2.05
e	--	--	2.54
A1	0.20	0	0.10
b	0.50	0.30	0.40
C	0.30	0.10	0.20
L	--	0.4	--
aaa	0.10	0	--