



概述

ET3157 是一款基于 CMOS 工艺的模拟开关。具有低功耗、低传输延迟和低输出阻抗的良好特性。模拟信号和数字信号的电压输出范围可从 V_{CC} 至 GND。Select 输入端有过压保护, 允许输入电压高过 V_{CC} , 最高可达 7V 而管脚不会被烧毁。

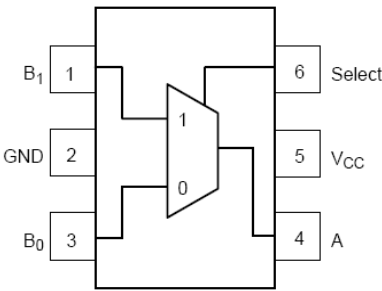
功能特点

- 低功耗
- 高传输速度
- 标准 CMOS 的逻辑电平翻转
- 高带宽, 线性度高
- 可用于 NTSC/PAL 视频, 音频, SPDIF 和 HDTV 的开关
- 可用于时钟开关和数据选择开关
- 低输出阻抗
- 先断后开保护,防止短路
- 工作温度 $-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$
- 封装形式 SO-70-6(SOT-363)

应用场景

- 移动电话
- 便携式设备
- 电池供电
- 计算机外围设备
- 模拟集成电路设计
- 音频和视频信号路由

管脚排列图



SOT-363(SC-70-6)

管脚说明

管脚	I/O	功能
A, B ₀ , B ₁	I/O	数据端口
Select	I	控制选择
V _{CC}	—	电源端
GND	—	地



极限参数

参数	符号	范围	单位
电源电压	V_{CC}	$-0.5 \sim +7.0$	V
开关电压（注释 1）	V_S	$-0.5 \sim V_{CC} + 0.5$	V
输入电压（注释 1）	V_{IN}	$-0.5 \sim +7.0$	V
输入钳位二极管电流@ $V_{IN} < 0V$	I_{IK}	-50	mA
输出电流	I_{out}	128	mA
电源到地电流	I_{CC}/I_{GND}	100	mA
存储温度范围	T_{stg}	$-65 \sim +150$	°C
最高结点温度	T_J	150	°C
导线温度（焊接, 10 秒内）	T_L	260	°C
总功耗(85°C)	P_D	180	mW

超过 DC 极限参数的最大值可能造成电路的不可修复的损坏。如无特殊情况，确保整个工作系统下的电源电压，工作温度，输入/输出的负载特性在上述范围内。

注释 1：输入/输出的负电压可根据输入/输出的钳位二极管电流范围有所超出。

工作环境(注释 2)

参数	符号	最小	最大	单位
电源电压	V_{CC}	1.65	5.5	V
Select 端输入电压	V_{IN}	0	V_{CC}	V
开关端输入电压	V_{IN}	0	V_{CC}	V
输出电压	V_{OUT}	0	V_{CC}	V
工作温度	T_A	-55	+125	°C
输入上升和下降时间 输入电压 $V_{CC}=2.3V-3.6V$ 输入电压 $V_{CC}=4.5V-5.5V$	t_r, t_f	0 0	10 5.0	ns/V

注释 2：Select 端输入电压必须设为高电平或低电平，不能悬空。

热阻数据

参数	符号	数值	单位
热阻	θ_{JA}	270	°C/W

功能说明

Select 输入端	功能
L	B_0 连接到 A
H	B_1 连接到 A



电参数

参数	标识	测试条件	V _{CC}	T _A =25℃			T _A =-40℃～+85℃		单位
				最小	标准	最大	最小	最大	
DC 特性									
V _{IH}	高电平输入		1.65-1.95				0.75V _{CC}		V
			2.3-2.8				1.5		
			3-4.2				2.4		
			4.5-5.5				0.6 V _{CC}		
V _{IL}	低电平输入		1.65-1.95					0.25V _{CC}	V
			2.3-2.8					0.4	
			3-5.5					0.3 V _{CC}	
I _{IN}	输入漏电流	0< V _{IN} <5.5V	0-5.5		±0.05	±0.1		±1	uA
I _{OFF}	关闭状态漏电流	0< A,B< V _{CC}	1.65-5.5		±0.05	±0.1		±1	uA
I _{CC}	静态电流	V _{IN} =V _{CC} or GND I _{OUT} =0	5.5			1.0		10	uA
	模拟电平输入范围		V _{CC}	0		V _{CC}	0	V _{CC}	V
R _{ON}	开关导通电阻（注释3）	V _{IN} =0V, I _O =30mA	4.5		3.0			7.0	Ω
		V _{IN} =2.4V, I _O =-30mA			5.0			12	Ω
		V _{IN} =4.5V, I _O =-30mA			7.0			15	Ω
		V _{IN} =0V, I _O =24mA	3.0		4.0			9.0	Ω
		V _{IN} =3V , I _O =-24mA			10			20	Ω
		V _{IN} =0V, I _O =8mA	2.3		5.0			12	Ω
		V _{IN} =2.3V, I _O =-8mA			13			30	Ω
		V _{IN} =0V, I _O =4mA	1.65		6.5			20	Ω
		V _{IN} =1.65V, I _O =-4mA			17			50	Ω
R _{RANGE}	全信号范围导通电阻（注释3）(注释7)	I _A =-30mA 0≤V _{Bn} ≤V _{CC}	4.5					25	Ω
		I _A =-24mA 0≤V _{Bn} ≤V _{CC}	3					50	Ω
		I _A =-8mA 0≤V _{Bn} ≤V _{CC}	2.3					100	Ω
		I _A =-4mA 0≤V _{Bn} ≤V _{CC}	1.65					300	Ω



ΔR_{ON}	通道间导通电阻匹配(注释3)(注释4)(注释5)	$I_A=-30mA$ $V_{Bn}=3.15$	4.5		0.15				Ω
		$I_A=-24mA$ $V_{Bn}=2.1$	3		0.2				Ω
		$I_A=-8mA$ $V_{Bn}=1.6$	2.3		0.5				Ω
		$I_A=-4mA$ $V_{Bn}=1.15$	1.65		0.5				Ω
R_{FLAT}	导通电阻平坦度(注释3)(注释4)(注释6)	$I_A=-30mA$ $0 \leq V_{Bn} \leq V_{CC}$	5		6.0				Ω
		$I_A=-24mA$ $0 \leq V_{Bn} \leq V_{CC}$	3.3		12				Ω
		$I_A=-8mA$ $0 \leq V_{Bn} \leq V_{CC}$	2.5		28				Ω
		$I_A=-4mA$ $0 \leq V_{Bn} \leq V_{CC}$	1.8		125				Ω

AC 特性

t_{PHL} t_{PLH}	传输延迟(注释8)	图1 $V_I=OPEN$	1.65-1.95						nS
			2.3-2.7					1.2	nS
			3.0-3.5					0.8	nS
			4.5-5.5					0.3	nS
t_{PZL} t_{PZH}	打开时间(A到Bn)	图1 $V_I=2*V_{CC}$ for t_{PZL} , $V_I=0V$ for t_{PZH}	1.65-1.95			23	7.0	24	nS
			2.3-2.7			13	3.5	14	nS
			3.0-3.5			6.9	2.5	7.6	nS
			4.5-5.5			5.2	1.7	5.7	nS
t_{PLZ} t_{PHZ}	关闭时间(A端口到B端口)	图1 $V_I=2*V_{CC}$ for t_{PLZ} , $V_I=0V$ for t_{PHZ}	1.65-1.95			12.5	3.0	13	nS
			2.3-2.7			7.0	2.0	7.5	nS
			3.0-3.5			5.0	1.5	5.3	nS
			4.5-5.5			3.5	0.8	3.8	nS
t_{B-M}	先断后通时间(注释7)	图2, $C_L=50pF$, $R_L=600\Omega$	1.65-1.95				0.5		nS
			2.3-2.7				0.5		nS
			3.0-3.5				0.5		nS
			4.5-5.5				0.5		nS
Q	电荷注入(注释7)	图3, $C_L=0.1nF$, $V_{GEN}=0V$, $R_{GEN}=0\Omega$	5.0		7.0				pC
			3.3		3.0				pC
OIRR	关闭隔离(注释9)	图4, $R_L=50\Omega$, $f=10MHz$	1.65-5.5		-57				dB
Xtalk	串扰	图5, $R_L=50\Omega$, $f=$	1.65-5.5		-54				dB



		10MHz							
BW	-3dB 带宽	图 8, $R_L=50\Omega$	1.65-5.5		350M				Hz
THD	总谐波失真 (注释 7)	$R_L=600\Omega$, $0.5V_{P-P}$ $f=600\text{Hz}—20\text{k Hz}$	5.0		0.011				%
C_{IN}	输入端电容 (注释 10)		0		2.3				pF
C_{IO-B}	B 端口关断时的 断开电容 (注释 10)	图 6	5.0		5.0				pF
C_{IOA-ON}	A 端口打开时的 导通电容 (注释 10)	图 7	5.0		15.5				pF

注释 3: 通过测量 A, B 两端口之间的电压差与流过两端口的电流之比来获得。导通电阻由 A, B 两端口上电压较低的端口决定。

注释 4: 不包含因封装而引入的负载特性。

注释 5: 在给定的 V_{CC} , 温度和电平范围下 $\Delta R_{ON} = R_{ON\max} - R_{ON\min}$ 。

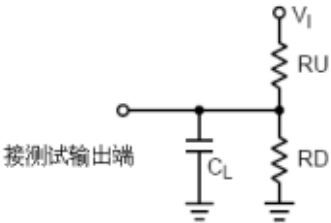
注释 6: 导通电阻平坦度是指在规定条件范围下, 导通电阻的最大值与最小值之差。

注释 7: 设计仿真值。

注释 8: 该项参数是设计仿真值而非实测值。在理想电压源（零输出负载）情况下, 传输延迟将好于负载为 50pF 的负载电容的情况。

注释 9: 关闭隔离= $20\log_{10}[V_A/V_{Bn}]$ 。

注释 10: $T_A=+25^{\circ}\text{C}$, $f=1\text{MHz}$, 不包含因封装而引入的负载电容。



电阻都为 50Ω , C_L 包括负载电容和杂散电容
输入 PRR = 1.0 MHz; $t_W = 500\text{ ns}$



测试电路

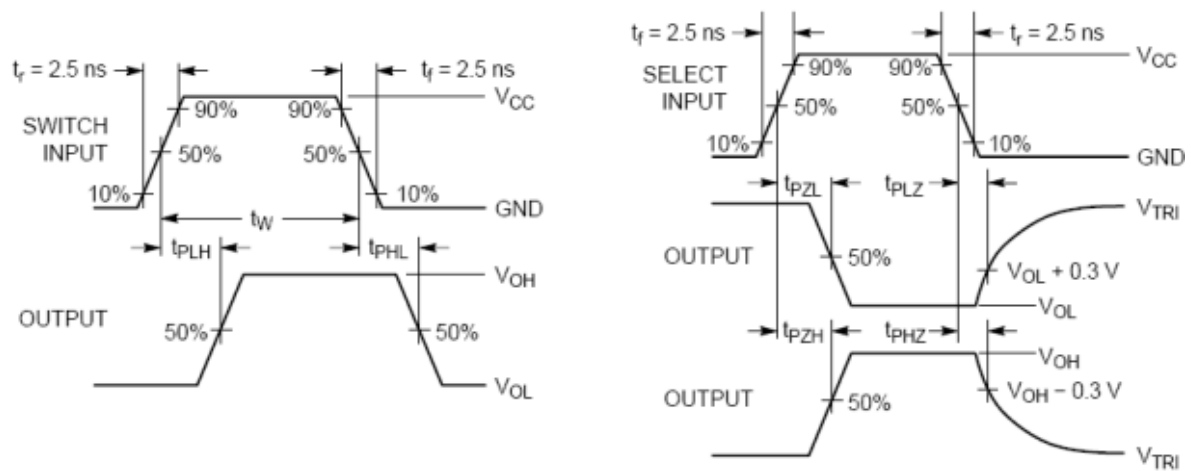


图 1 传输延时、打开时间、关闭时间



图 2 先断后开时间

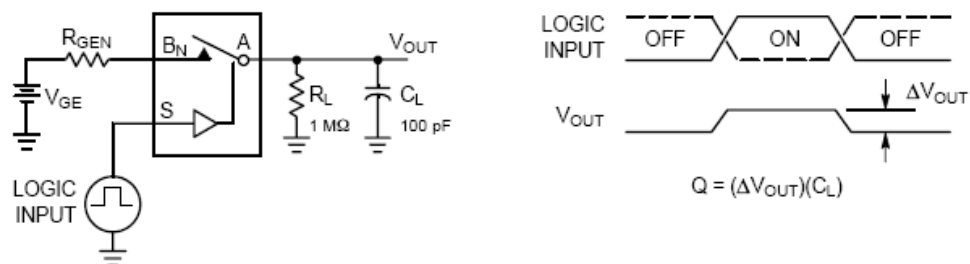


图 3 电荷注入测试

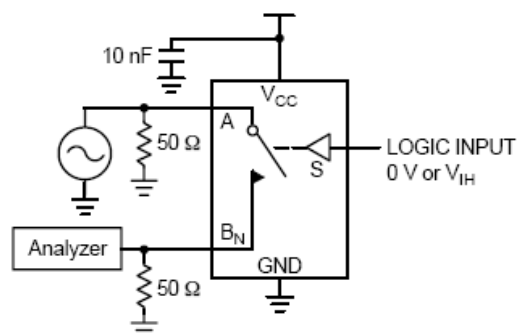


图 4 关闭隔离

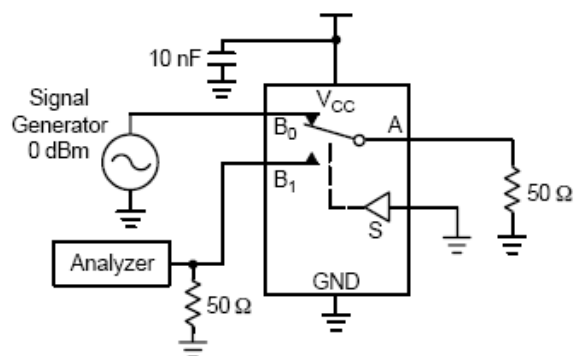


图 5 串扰

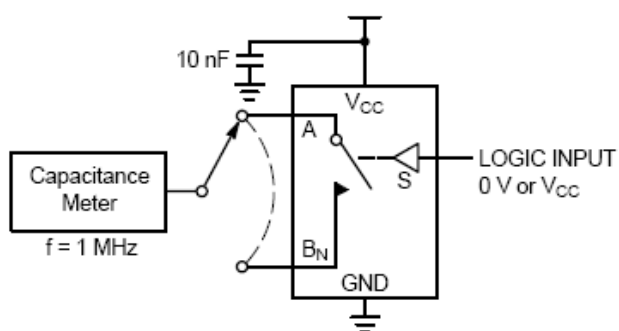


图 6 通道关闭时的输出电容

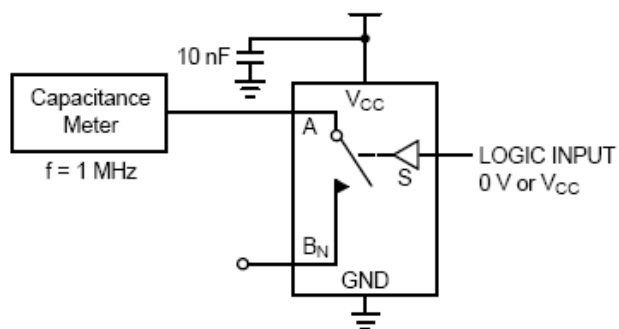


图 7 通道打开时的输出电容

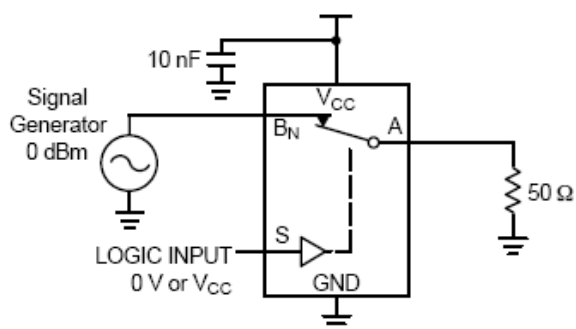
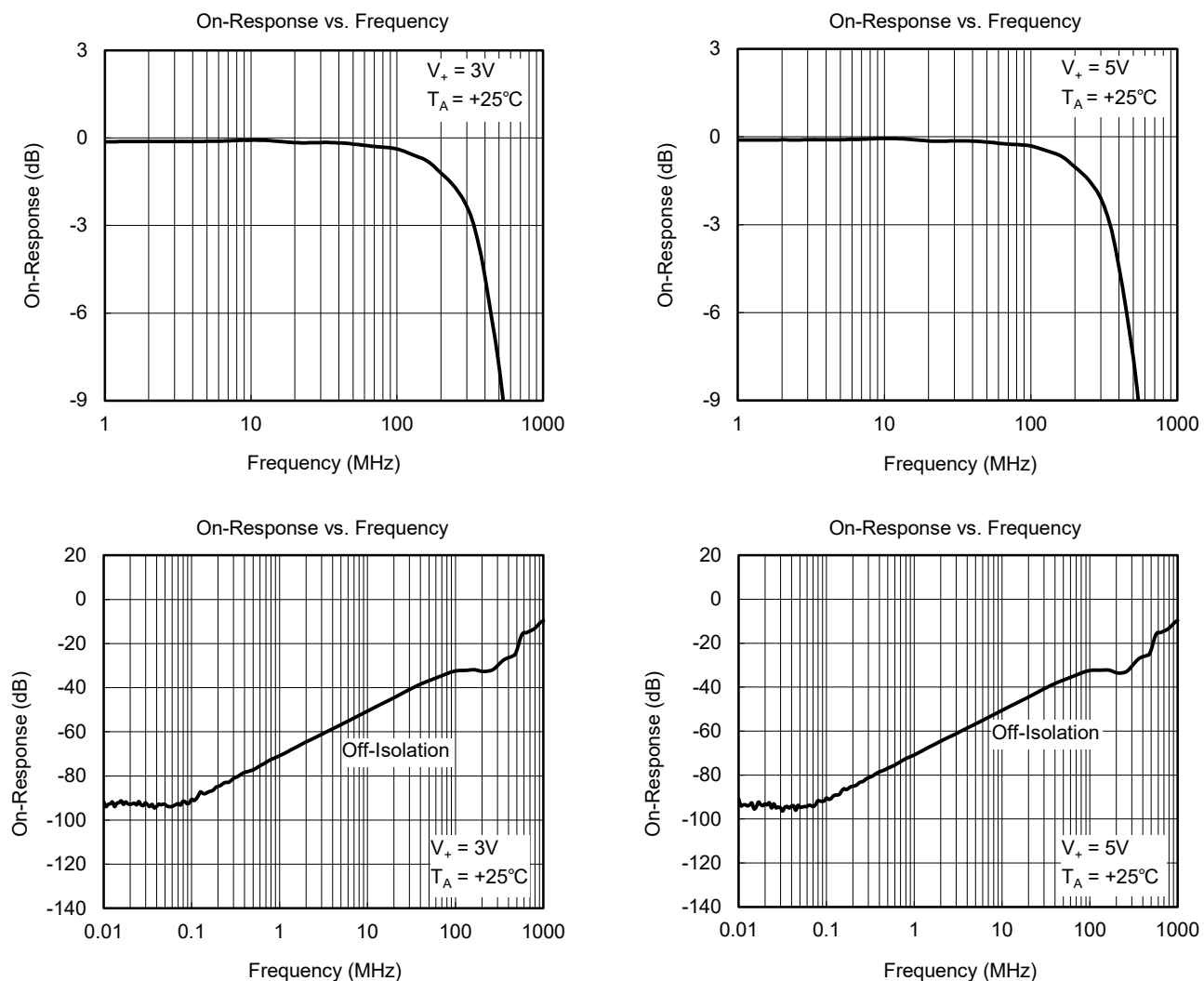


图 8 带宽



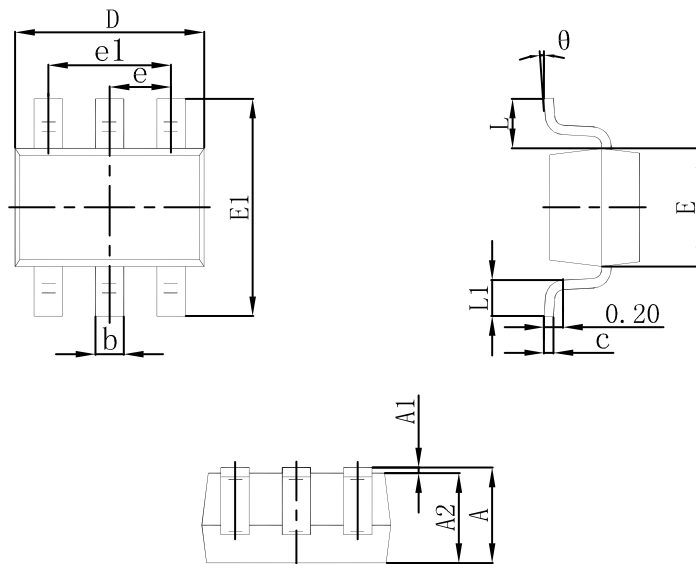
典型性能曲线图





封装尺寸

SOT-363(SC-70-6)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.100	0.150	0.004	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.400	0.085	0.094
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°



Attention

- Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
- HUA XUAN YANG ELECTRONICS assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.
- Specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of HUA XUAN YANG ELECTRONICS CO.,LTD.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.