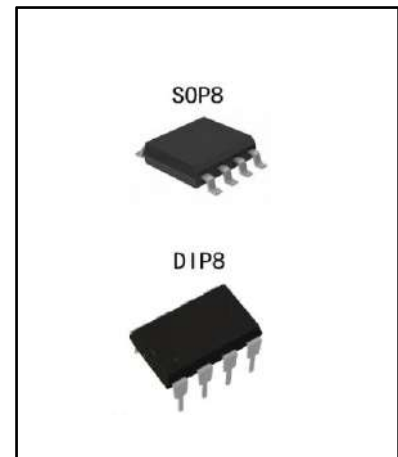


Earth Leakage Current Detector

CYP54123

General Description

CYP54123 is designed for use in earth leakage circuit interrupters for operation directly off the AC line in breakers; It includes voltage regulator, amplifier, Latch, etc. The circuits can absorb the external surge voltage and improve the anti-interference ability of the chip in high voltage, spike pulse and high-frequency electromagnetic. Improve the chip Stable reliability



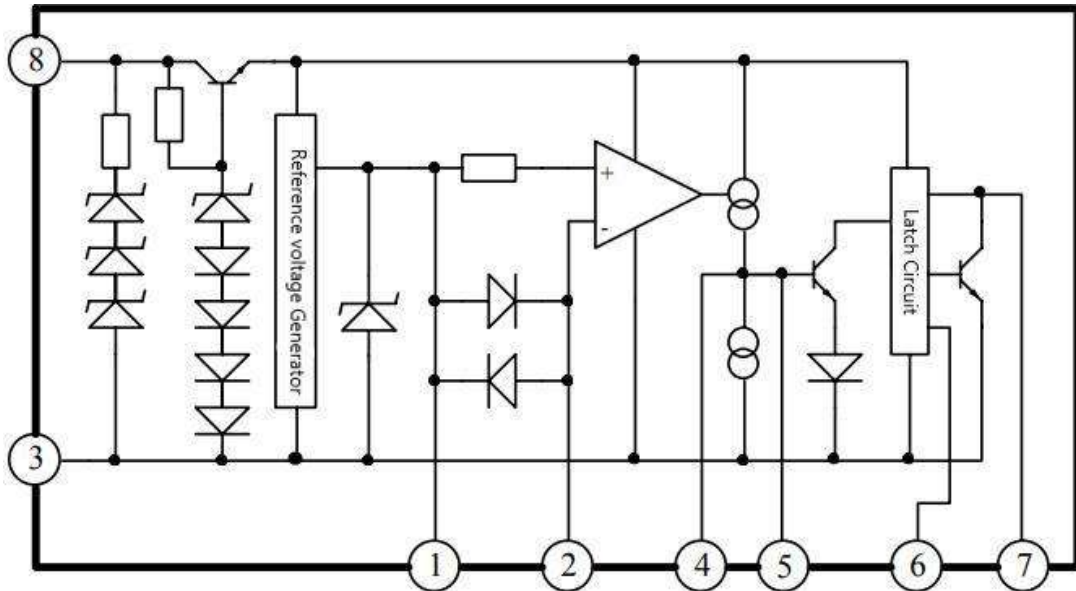
Features

- High input sensitivity : $V_T=6.1\text{mV}$ (Typ.)
- Simple peripheral circuit
- Good anti-interference, electromagnetic interference protection capability
- Suitable for 110V~220V AC power leakage protection applications
- Wide temperature range : from $-20\text{ }^\circ\text{C}$ to $+80\text{ }^\circ\text{C}$
- SOP8 and DIP8 package

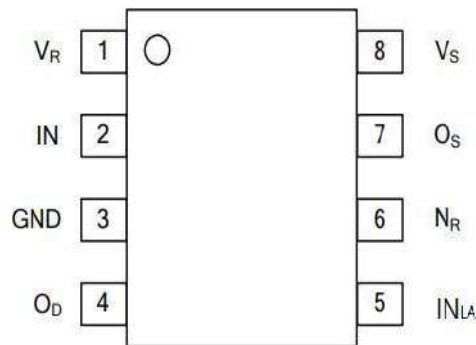
Order Information

Part No	Package	Manner of Packing	Devices per reel/tube
CYP54123S	SOP8	Reel	2500PCS/reel
CYP54123D	DIP8	Tube	100PCS/tube

Block Diagram



Pin Arrangement Diagram and Pin Assignment



DIP-8 / SOP-8

Pin No.	Pin Name	Description	Pin No.	Pin Name	Description
1	V _R	Reference voltage terminal	5	IN _{LA}	Latch input terminal
2	IN	Input terminal	6	N _R	Terminal for noise absorption
3	GND	Ground	7	O _S	Output terminal
4	O _D	Differential amplifier output terminal	8	V _S	Supply voltage terminal

Functional Description

CYP54123 is a universal integrated circuit (IC) for leakage protection switch. It can be used in such applications as leakage protection circuit breakers.

Absolute Maximum Ratings

Unless otherwise specified, $T_{amb} = 25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Value	Unit
Supply Voltage Input	I_S		8	mA
V_R Pin Current	I_{VR}	$V_R \sim IN$	20	mA
		$V_R \sim GND$	2	mA
		$IN \sim V_R$	-20	mA
IN Terminal Current	I_{IN}	$IN \sim V_R$	20	mA
		$IN \sim GND$	2	mA
		$V_R \sim IN$	-20	mA
IN_{LA} Terminal Current	I_{INLA}		5	mA
Power Dissipation	P_D		200	mW
Operating Temperature	T_{amb}		-25~80	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-55~125	$^{\circ}\text{C}$

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Current value between V_R and IN , and between IN and V_R is less than 1ms in the pulse width, and duty cycle is less than 12%.

Thermal Information

($T = -20^{\circ}\text{C} \sim 80^{\circ}\text{C}$)

Parameter	Symbol	Recommended Value			Unit
		Min	Typ	Max	
Supply Voltage When Latch Circuit Is Off-State	V_S	12			V
External Capacitor Between V_S and GND	C_{VS}	1	2.2		μF
External Capacitor Between O_S and GND	C_{OS}		0.047	1	μF

Electrical Characteristics

Unless otherwise specified, $T_{amb} = 25^{\circ}\text{C}$

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
			Test Circuits				
Supply Current 1	I_{S1}	$V_S=12\text{V}$, $V_R-V_i=30\text{mV}$	1		300	500	μA
Trip Voltage	V_T	V_R-V_i (Note 1)	2	4	6.1	9	mV
Timed Current 1	I_{TD1}	$V_{OD}=1.2\text{V}$, $V_R-V_i=30\text{mV}$	3	-20		-35	μA
Timed Current 2	I_{TD2}	$V_{OD}=0.3\text{V}$, $V_R=V_i$	4		4		μA
Output Current	I_O	$I_S=400\mu\text{A}$, $V_{INLA}=1.4\text{V}$, $V_{OS}=0.8\text{V}$	5	-100	-250		μA
INLA "ON" Voltage	V_{LAON}	(Note 2)	6	0.7		1.4	V
INLA Input Current	I_{LAON}	$V_S=12\text{V}$	7			5	μA
Output Low-Level Current	I_{OL}	$V_S=12\text{V}$, $V_{OS}=0.2\text{V}$	8	200	800		μA
Input Clamp Voltage	V_{ICL}	$V_S=12\text{V}$, $I_{IC}=20\text{mA}$	9		14		V
Differential Input Clamp Voltage	V_{IDCL}	$I_{IDC}=1\text{mA}$	10	1		2	V
Maximum Current Voltage	V_{SM}	$I_{SM}=7\text{mA}$	11	20		28	V
Supply Current 2 (Note 3)	I_{S2}	V_R-V_i , $V_{OS}=0.6\text{V}$ (Note 4)	12		700	900	μA
Latch Circuit is Off-State Supply Voltage	V_{soff}	(Note 5)	13		4.9		V
Operating Time	T_{ON}	$V_R-V_i=0.3\text{V}$ (Note 6)	14		5		ms

Note 1: When standard value of voltage (50Hz) between V_R and V_i is minimum, and output O_s is low-level, or when standard value of voltage (50Hz) between V_R and V_i is maximum, and output O_s is high-level.

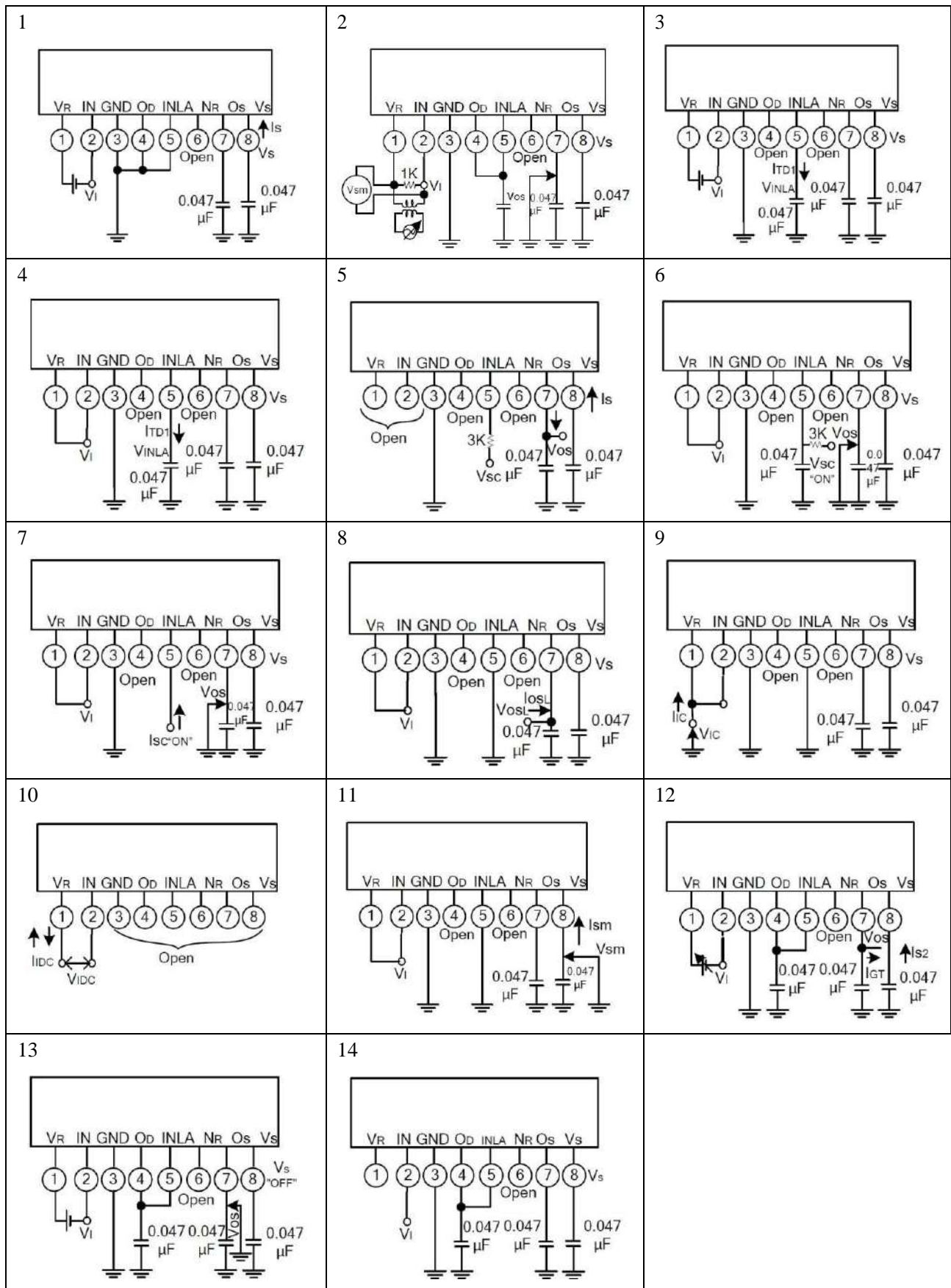
Note 2: When standard value of voltage V_{LAON} is minimum, and output O_s is low-level, or when standard value of voltage V_{LAON} is maximum, and output O_s is high-level.

Note 3: Supply current 2 is necessary to keep high in output O_s .

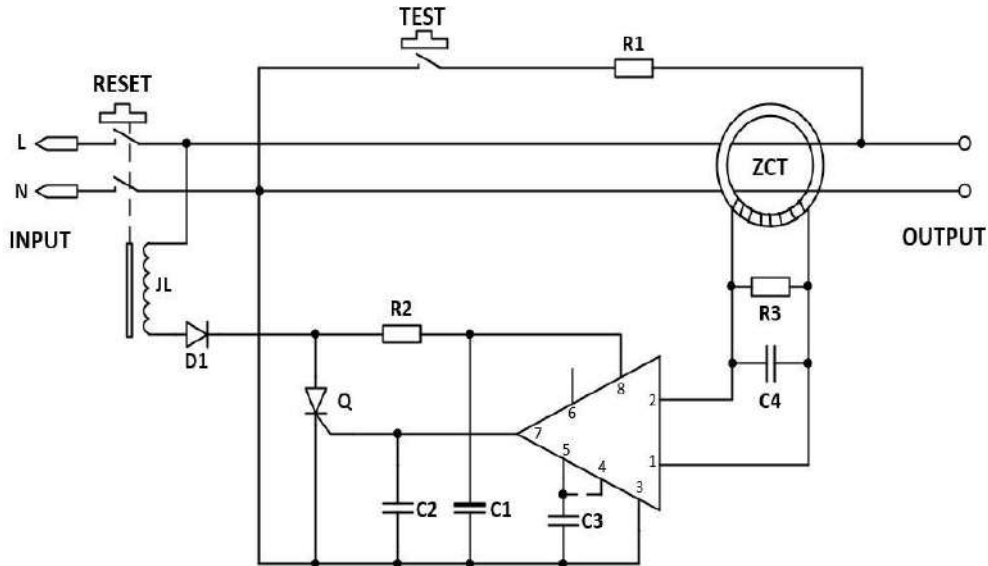
Note 4: After applying 30mV between V_R and V_i and shorting between them.

Note 5: After the 12V supply voltage is applied and the output is set to high level, reduce the supply voltage output to low level and measure the voltage drop.

Note 6: Operating time is a time from applying fixed input till operating latch circuit in $0.047\mu\text{F}$ between OD and GND.

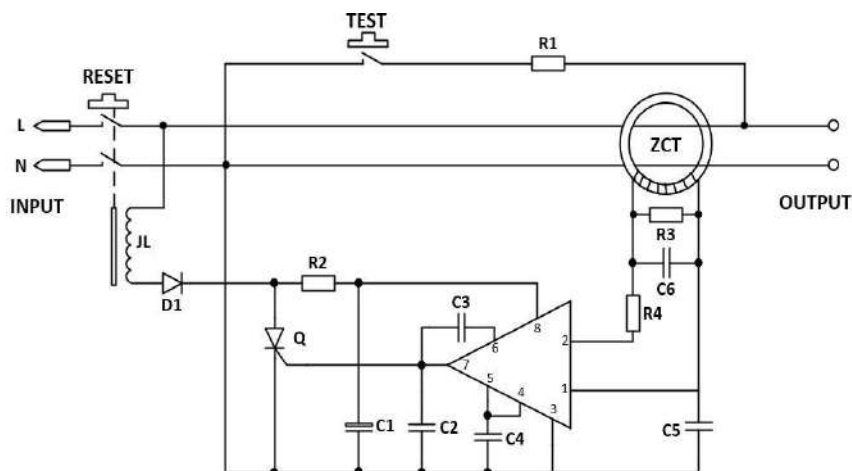
Test Circuits


Application Circuits

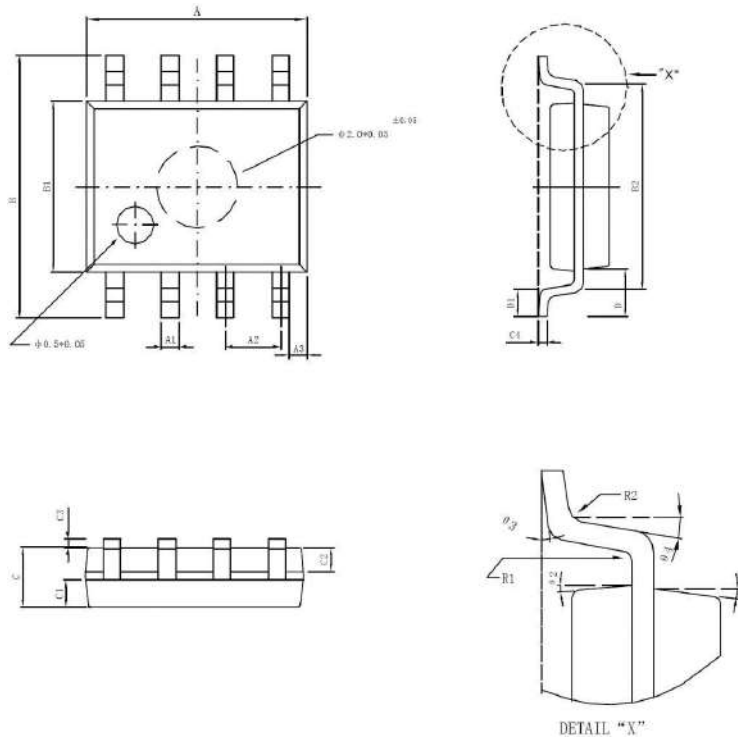


- (1) ZCT is zero current transformers
- (2) The value of R2, C1 should be chosen in order to keep at least 12V in V_s (Pin8) . R2 and C1 can be selected according to the used grid voltage and rectifier circuit mode;
- (3) Please connect C1 ($>1\mu\text{F}$) and C2 ($<1\mu\text{F}$);
- (4) R3 regulates sensitivity current;
- (5) Pin 5 must be connected to the C3 capacitor. Pin 4 and Pin 5 is short-circuited or unconnected.

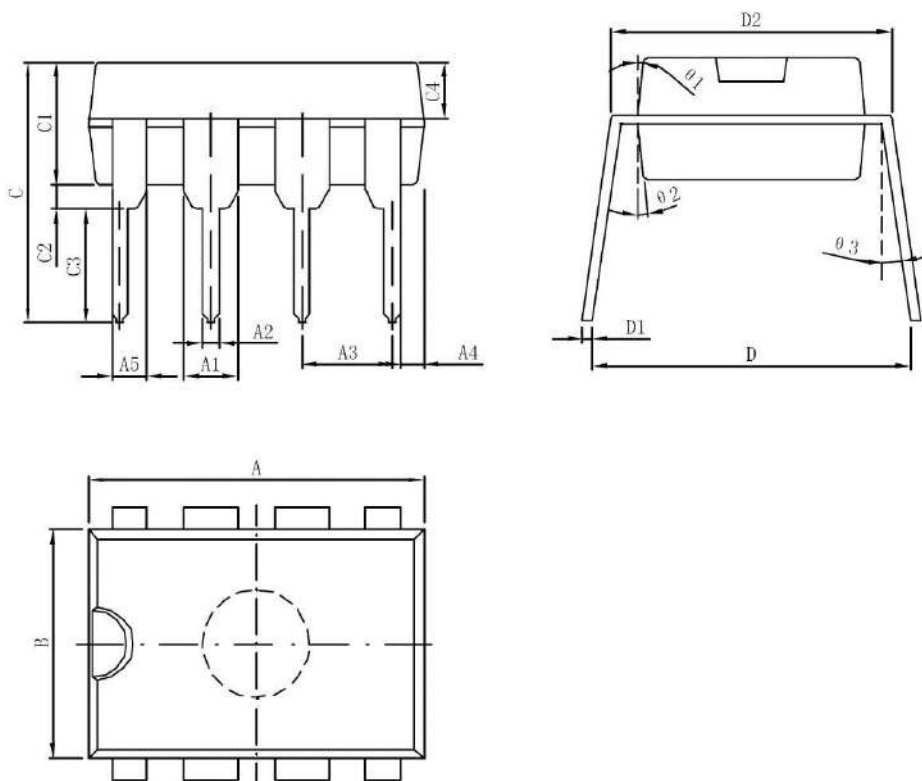
Compared with other Product Circuits



Compared with the ordinary IC circuit without optimization, the peripheral components of CYP54123 reduce R4, C3 and C5, so the application circuit is simpler and the use cost is lower.

Package Information (SOP8)


Symbol	Min.(mm)	Max.(mm)	Symbol	Min.(mm)	Max.(mm)
A	4.95	5.15	C3	0.10	0.20
A1	0.37	0.47	C4	0.20TYP	
A2	1.27TYP		D	1.05TYP	
A3	0.41TYP		D1	0.50TYP	
B	5.80	6.20	R1	0.07TYP	
B1	3.80	4.00	R2	0.07TYP	
B2	5.0TYP		$\theta 1$	17°TYP	
C	1.30	1.50	$\theta 2$	13°TYP	
C1	0.55	0.65	$\theta 3$	4°TYP	
C2	0.55	0.65	$\theta 4$	12°TYP	

Package Information (DIP8)


Symbol	Min.(mm)	Max.(mm)	Symbol	Min.(mm)	Max.(mm)
A	9.30	9.50	C3	0.50	
A1	1.524		C4	3.3	
A2	0.39	0.53	D	1.57TYP	
A3	2.54		D1	8.20	8.80
A4	0.66TYP		R1	0.20	0.35
A5	0.99TYP		R2	7.62	7.87
B	6.3	6.5	θ1	8°TYP	
C	7.20		θ2	8°TYP	
C1	3.30	3.50	θ3	5°TYP	



Special Instructions

The company reserves the right of final interpretation of this specification.

Version Change Description

Version: V1.0

Author: Yang

Time: 2022.4.1

Modify the record:

1. Re-typesetting the manual and checking some data
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