

# 承認書

## APPROVAL SHEET

承認書編號:

SHEET NO: NDKT2626040901

客 戶

CUSTOMER

品 名

PARTNAME

KT26-602 TMRSAY

訂 單 號

PURCHASE ORDER

客 戶 料 號

CUSTOMER'S PART NO.

日 期

DATE

2026/4/9

客戶承認

Customer Approved by

供應商經辦

Supplier Handle by

發行章

\* 承認後請回簽一份 Please sign back after approval. THANKS!

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KT26 系列规格书

KT26 SERIES SPECIFICATION

适用机型：KT26 系列

日期：2026 年 4 月 10 日

**1. General 一般事项**

1-1 Scope 适用范围

This specification is applicable to TMR joystick used in electronic equipment.  
本规格书适用于电子设备使用之隧道磁阻摇杆。

1-2 Standard atmospheric conditions 标准大气状态

Unless otherwise specified, the standard range of atmospheric conditions for making measurements

and tests is as follows:

除另有规定外，量测应在以下大气条件下进行：

Ambient temperature	温度	: 15°C ~ 35°C
Relative humidity	相对湿度	: 25% ~ 85%
Air pressure	气压	: 86 KPa~ 106 KPa

If there is any doubt about the results, measurements should be made within the following limits:

如有任何疑虑时，量测应在以下条件下进行：

Ambient temperature	温度	: 20°C ± 1°C
Relative humidity	相对湿度	: 63% ~ 67%
Air pressure	气压	: 86 KPa~ 106 KPa
1-3 Operating temperature range		: -10°C ~ +70°C

适用温度范围

1-4 Storage temperature range : -30°C ~+80°C

保存温度范围

1-5 Operators shall wear electrostatic bracelets during operation

作业员操作时需戴静电手环

**Construction 构造**

2-1 Dimension 尺寸 : Refer to attached drawing 参见成品图

### 3. Mechanical characteristics

#### 机械性能

NO. 序号	ITEM 项 目	COND IT IONS 条 件	SPEC IF ICAT ION 规 格
1	Figure of lever operation 摇杆动作形式	/	Circular operating 圆形式
2	Operation angle of lever 摇杆使用有效角度	Add a fit force on the lever top to push it to max. angle of each direction when lever is released and reset position. 当摇杆处于自由复归位置时,在摇杆顶部施加一定力将摇杆推向任意方向最大角度。	22° max 最大22°
3	Operating force of lever 摇杆作用力	Test position is at more than 10 degrees deflection of lever. 摇杆偏斜10度以上之位置测定。	MIN:5.5±2mN.m (55±20gf) MAX:15±2mN.m (150±20gf) 最小值:5.5±2mN.m (55±20gf) 最大值:15±2mN.m (150±20gf)
4	Accuracy of reset position of lever 摇杆复归垂直度	Measure the angle between the lever and the axial center line after the lever pushed to the direction of X-X (Y-Y) and resets. 摇杆推向X-X(Y-Y)方向自由复归后测量摇杆与垂直中心线的角度。	90° ±3°
5	Knob strength 摇杆扭曲强度	Apply force on the lever perpendicular to the lever's rotation direction. 旋转于摇杆的力作用于摇杆上。	More than 3.0Kgf.cm 10 seconds min 大于3.0Kgf.cm, 至少10秒钟
6	Pull strength of lever 摇杆拉拔强度	Apply specified pull force on the lever upward. 作用于摇杆上,沿摇杆方向向上。	More than 50N 10 seconds min 大于50N, 至少10秒钟
7	Push Strength of lever 摇杆推强度	Apply specified push force on the lever downward. 作用于摇杆上,沿摇杆方向向下。	More than 100N 10 seconds min 大于100N, 至少10秒钟

#### 4. Electrical characteristics

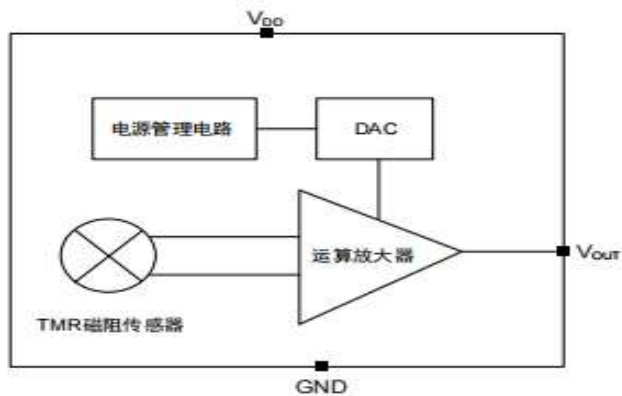
#### 电气特性

NO . 序号	ITEM 项 目	COND IT IONS 条件	SPEC IF ICAT ION 规格
1	Rated voltage 额定电压	$E = \sqrt{PR}$ E: 额定电压 Rated voltage (V) P: 额定功率 Rated power (W) R: 公称全阻值 Nominal total resistance ( $\Omega$ ) The rated voltage is calculated by above formula. When the rated voltage exceeds the maximum operating voltage, the maximum operating voltage should be the rated voltage. 额定电压按以上公式计算，当额定电压超过最大工作电压时，最大工作电压即为额定电压。	DC 1.8V & 3.3V
2	Temperature characteristic 阻抗温度特性	The without electrical load V.R should be stored at temperature of $70 \pm 3^\circ\text{C}$ for 5hrs and measure immediately. 将产品置于在 $70 \pm 3^\circ\text{C}$ 的恒温槽内以无负荷的条件下放置 5 小时后马上测量。	Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生, 无松动及开关性能损坏。
3	Voltage Divider Error 分压误差值	Voltage divider error is defined the ratio of the voltage terminals Output-GND to terminals VCC-GND after the drive arm rested. 3.0V & 3.3V D.C. shall be applied to the terminals between VCC and GND and then voltage divider error shall be measured with the drive arm operation on the line X-X and Y-Y. 分压误差值是摇杆自由复归后端子 Output-GND 与端子 VCC-GND 电压比例. 将 3.0V & 3.3V D.C 电压加在端子 VCC-GND 之间，分压误差值在摇杆运作于 X-X 和 Y-Y 方向到底复归后测试。	45%~55%

NO . 序号	ITEM 项 目	COND IT IONS 条件	SPEC IF ICAT ION 规格
4	Limit voltage value 极限电压值	<p>The limit voltage value is the voltage ratio between terminals Output-GND and VCC-GND after the rocker reaches the bottom. Add 3.0V &amp; 3.3V D.C voltage between terminals VCC-GND, and the limit voltage rocker operates in the x-x and Y-Y directions to the bottom</p> <p>极限电压值是摇杆到底后端子 Output-GND 与端子 VCC-GND 电压比例. 将 3.0V &amp; 3.3V D.C 电压加在端子 VCC-GND 之间, 极限电压摇杆运作于 X-X 和 Y-Y 方向到底测试.</p>	<p>MIN: Within 20% MAX: More than 80% 最小值: 20%以下 最大值: 80%以上</p>
5	VALUE OF RESET POS IT ION 复归值	<p>The absolute value of difference between the partial voltage error value measured after the free reset of the rocker in the upward direction and the partial voltage error value measured after the free reset of the rocker in the downward direction. The absolute value of difference between the partial voltage error value measured after the free reset of the rocker in the left direction and the partial voltage error value measured after the free reset of the rocker in the right direction</p> <p>摇杆推向上方向自由复位后测得分压误差值与摇杆推向下方向自由复位后测得分压误差值之差的绝对值。摇杆推向左方向自由复位后测得分压误差值与摇杆推向右方向自由复位后测得分压误差值之差的绝对值。</p>	<p>Within 3.5%. 3.5%以内</p>
6	Insulation resistance 绝缘阻抗值	/	<p>More than 100 MΩ. 100 MΩ 以上。</p>

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Functional  
Block  
Diagram  
功能图



8

Electrical  
Specifications  
电气规格

SYMBOL 符号	PARAMETERS 参数	TEST COND IT ION 实验条件	M IN 最小值	TYP 标准值	MAX 最大值	UN IT 单位
$V_{CC}$	Supply Voltage 电源电压		1.6	3.3	5.0	V
$I_{CC}$	Supply Current 供电电流	$T_a=25^{\circ}\text{C}$ $V_{DD}=1.8\text{V}$	300	400	500	$\mu\text{A}$
$T_{PO}$	Power on Time 开机时间	$T_a=25^{\circ}\text{C}$	-	-	100	$\mu\text{s}$
BW	Bandwidth 带宽	-3dB $C_L=1\text{nF}$	-	-	50	KHz
$R_L$	Load resistance 负载电阻	-	10	-	-	$\text{k}\Omega$
$C_L$	Load capacitance 负载电容	-	-	-	10	nF
$V_N$	Noise 噪声	$V_{DD} = 3.3\text{V},$ $BW = 5\text{kHz}$	-	6	-	mVpp
SEN	Sensitivity performance 灵敏度	-	标定			$\text{mV/V/Gs}$
TCS	Sensitivity temperature drift 灵敏度温度漂移	$T_A = -40^{\circ}\text{C} \sim 85^{\circ}\text{C}$	-	1000	-	$\text{PPM}/^{\circ}\text{C}$
VOFFSET	Zero point output voltage 零点输出电压	-	标定			$\text{mV/V}$
TCO	Zero point output voltage temperature drift 零点输出电压温度 漂移	$T_A = -40^{\circ}\text{C} \sim 85^{\circ}\text{C}$	-	0.12	-	$\text{mV}/^{\circ}\text{C}$

		NONL	Nonlinearity 非线性度	在 ±500 Gs 范围拟合	-	2	-	%FS
		HYS	Hysteresis 磁滞	在 ±500 Gs 范围拟合	-	2	-	%FS
9	VESD 耐静电	Symbol 符号	Min 最小值	Max 最大值	Unit 单位			
		VESD	-	4000	V			

## 5. Endurance characteristics

### 耐久性能

NO . 序号	ITEM 项 目	COND IT IONS 条件	SPEC IF ICAT ION 规格
1	Dry heat 耐热性	Temperature: $80 \pm 2^{\circ}\text{C}$ Time: 96 hours The controller shall be subjected to standard atmospheric conditions for 2 hours , after which measurement shall be made. 在温度 $80 \pm 2^{\circ}\text{C}$ 恒温槽中放置 96 小时, 取出后在正常状态下放置 2 小时后测试。	Mechanical characteristics: inaccordance with 3. 3、6. 1、6. 2 Electrical characteristics: inaccordance with 4. 3、4. 4、4. 5、6. 4 Feeling: Normal Appearance: Normal 机械性能: 符合 3. 3、6. 1、6. 2 电气性能: 符合 4. 3、4. 4、4. 5、6. 4 手感: 正常
2	Cold 耐寒性	Temperature: $60 \pm 2^{\circ}\text{C}$ Time: 96 hours Surface moisture shall be removed, and then the controller shall be subjected to standard atmospheric conditions for 2 hours, after which measurement shall be made. 在温度 $60 \pm 2^{\circ}\text{C}$ 恒温槽中放置 96 小时, 表面水份摄取后在正常状态下放置 2 小时后测试。	Mechanical characteristics: inaccordance with 3. 3、6. 1、6. 2 Electrical characteristics: inaccordance with 4. 3、4. 4、4. 5、6. 4 Feeling: Normal Appearance: Normal 机械性能: 符合 3. 3、6. 1、6. 2 电气性能: 符合 4. 3、4. 4、4. 5、6. 4 手感: 正常

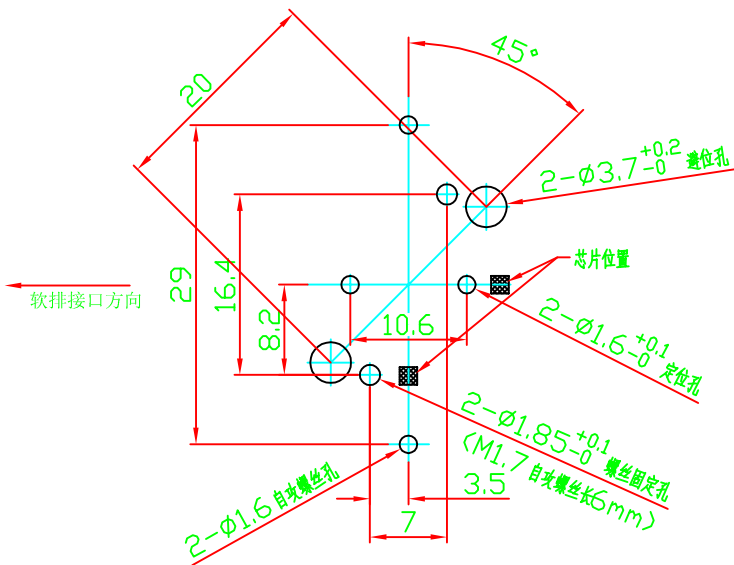
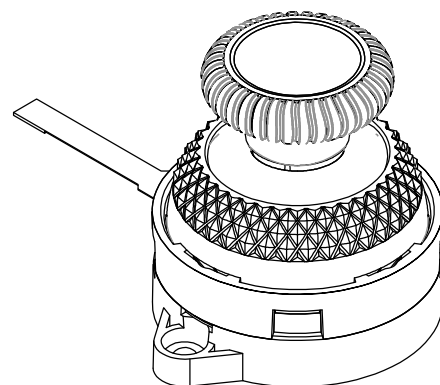
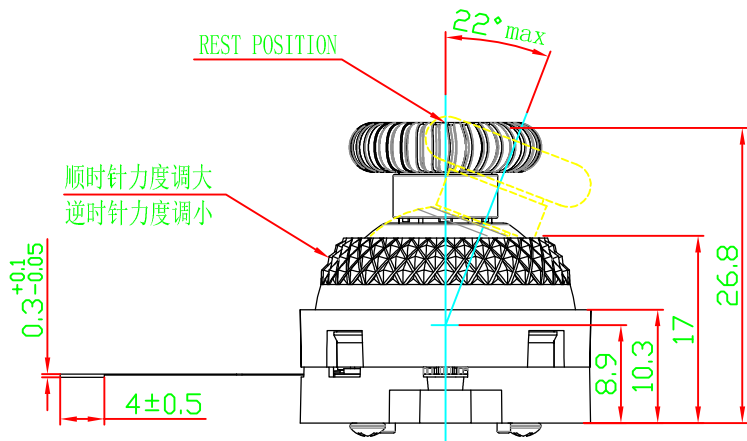
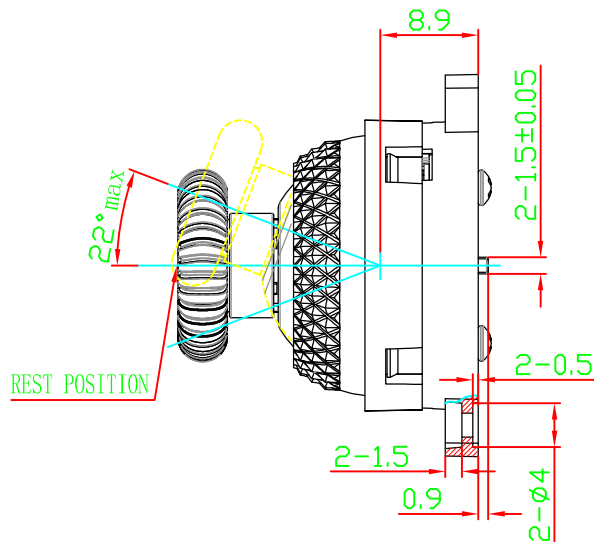
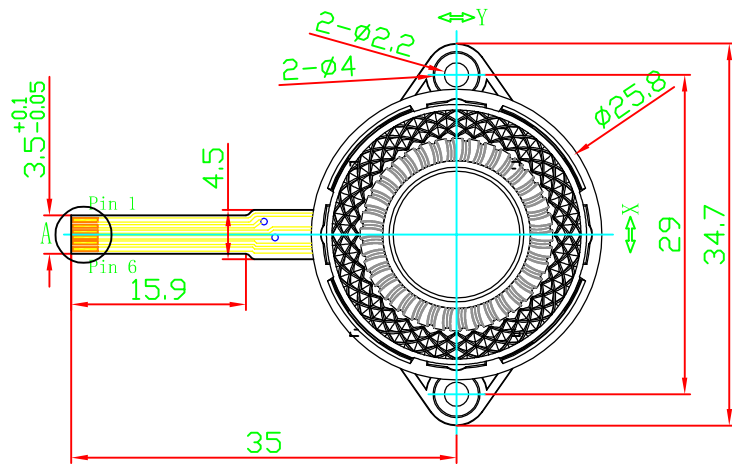
NO . 序号	ITEM 项 目	COND IT IONS 条件	SPEC IF ICAT ION 规格
3	Damp heat 耐湿性	Temperature: 60 ± 2°C Humidity: 90~95%RH Time: 96 hours Surface moisture shall be removed And then the controller shall be subjected to standard atmospheric conditions for 2hours, after which measurement shall be made. 在温度 60±2°C 90%~95%RH 恒温槽中放置96 小时，表面水份摄取后在正常状态下放置2 小时后测试。	Mechanical characteristics: inaccordance with 3.3、6.1、6.2 Electrical characteristics: inaccordance with 4.3、4.4、4.5、6.4 Feeling: Normal Appearance:Normal 机械性能:符合 3.3、6.1、6.2 电气性能:符合 4.3、4.4、4.5、6.4 手感:正常
4	Temperature cycling test 温度循环测试	Low temperature : -20±3°C 30 minutes High temperature: +60±3°C 30 minutes Number of cycles: 5 Surface moisture shall be removed, and then the controller shall be subjected to standard atmospheric conditions for 2 hours , after which measurement shall be made. 在低温为-20±3°C 恒温槽放置 30 分钟, 高温 60±3°C 放置30 分钟, 测试 5 次, 表面水份摄取后在正常状态下放 置 2 小时后测试。	Mechanical characteristics: inaccordance with 3.3、6.1、6.2 Electrical characteristics: inaccordance with 4.3、4.4、4.5、6.4 Feeling: Normal Appearance:Normal 机械性能:符合 3.3、6.1、6.2 电气性能:符合 4.3、4.4、4.5、6.4 手感:正常
5	Free falling 自由落下试验	Height: 75cm. Number of falls: 3 times 从高度为75厘米落下测试3次后。	Without damage and lever deformation, Without the looseness and failing function of witch. 无不良性能产生, 无松动及开关性能 损坏。
6	Number of cycles 耐久寿命	Mechanical life should be tested 5,000,000 cycles at the speed of one cycle per second without electrical load when joystick rotate 360° at 23° position. 无负载状态下以 1 圈/秒速度将摇杆推至 23.0° 位置进行 360° 旋转测试, 寿命5,000,000 圈。	Mechanical characteristics: inaccordance with 3.3 Electrical characteristics: inaccordance with 4.3、4.4、4.5 Feeling: Normal Appearance:Normal 机械性能:符合 3.3 电气性能:符合 4.3、4.4、4.5 手感:正常

## 6. Switch characteristics (FOR WITH-SWITCH TYPE)

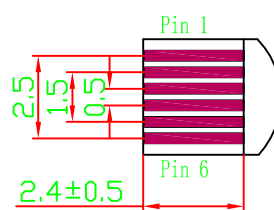
### 开关规格 (适用于带开关机种)

NO . 序号	ITEM 项 目	COND IT IONS 条件	SPEC IF ICAT ION 规格
1	Operating force 作动力	Apply side force perpendicular to the lever' s axial direction on the lever until the lever stops, measure the max force value. 将一个轴向力施加于摇杆上直到其不动为止,量取施力期间之最大值。	MIN:5.0±2.0N MAX:8.0±2.0N 最小值:5.0±2.0N 最大值:8.0±2.0N
2	Travel 移动量	Put the switch lever upward, apply 2 times of the static operating force over the lever' s axial direction of the lever, measure the variance of the switch stroke. 将开关操作部位(摇杆)置于静止位置,并在操作柄中央施加两倍于作动力之静负荷测量柄被压到不动时之移动距离。	0.40(+0.35/-0.2)mm
3	Maximum Ratings 最大定格电压	Within 70°C 70°C以内。	DC3.3V 1mA
4	Contact resistance 接触阻抗	Apply 2 times of the operating force of the static load on the vertical direction of the lever, measure the resistance by using the Contact Resistance Tester with 1KHZ, 20mV, 5~50mA of current. 将两倍于作动力之静负荷加于操作柄之中央以(1KHZ, 20mV, 5~50mA)微电流接触阻抗计测定。	Less than 200Ω 低于200Ω

NO . 序号	ITEM 项 目	COND IT IONS 条 件	SPEC IF ICAT ION 规 格
5	Switch number of cycles 开关寿命	<p>Under electrical load DC3.3V/5mA, compress 10N force to the lever which is released and reset to vertical position. Switch life should be tested more than 1,000,000 cycles at the speed of 2 cycles per second.</p> <p>负载状态下(DC3.3V/1mA), 在摇杆自由复归后的垂直方向施加 10N (1Kgf) 的按压力, 以2次/秒的速度 对开关进行测试, 寿命 1,000,000次 以上。</p>	<p>Contact resistance 200 Ω Max, No mechanical malfunction Be satisfied with 6.1 and 6.2</p> <p>接触阻抗最大200Ω, 机械方面能动作(符合第 6.1 条和第 6.2 条)。</p>



PCB安装孔详图



- Pin 1 (VDD-X)
- Pin 2 (VDD-Y)
- Pin 3 (OUT1-X)
- Pin 4 (OUT2-Y)
- Pin 5 (SWITCH)
- Pin 6 (GND)

A局部视图  
3:1

CIRCUIT

			江苏国科新昌科技有限公司 常州市新昌电子有限公司		
NO.	DESCRIPTION	DATE	Projected view	机种	哪吒摇杆 (TMR可调力度)
DRAWN BY	CHECKED BY	APPROVED BY	TOL UNLESS OTHERWISE STATED	品名	KT26-602 TMR SAY
			X < 10 ±0.3	图号	JF-KT26-602-001A
			10 < X < 30 ±0.5		
			30 < X < 100 ±1		
			ANGLE ±5°		