CTS COMPONENTS TAIWAN, LTD.

ENGINEERING SPECIFICATION		SPEC NO. EN-SPE-252005D
SPECIFICATION : 252 SERIES STICK CONTROLLER (HIGH TORQUE)	DATE 07-17-00'	PAGE OF 1 5

1.0 GENERAL:

1.1 THIS SPECIFICATION APPLIES TO THE STICK CONTROLLER (POTENTIOMETER TYPE) WHICH CARBON COMPOSITION RESISTOR, USED IN ELECTRONIC EQUIPMENT.

1.2 OPERATING TEMPERATURE RANGE : -10℃ TO +70℃

1.3 STORAGE TEMPERATURE RANGE : -30℃ TO +80℃

1.4 WITHOUT SW IS ALSO AVAILABLE.

2.0 MECHANICAL CHARACTERISTICS :

2.1 OPERATION ANGLE OF DRIVE ARM :
OPERATION ANGLE IS THE ANGLE OPTIONAL DIRECTION FROM DRIVE ARM VERTICAL POSITION. NO LOAD SHALL BE APPLIED AT THE TIP OF DRIVE ARM IN THE AXIAL DIRECTION. PLEASE DO NOT MOVE THE DRIVE ARM 30° OVER FROM VERTICAL POSITION. IF DRIVE ARM IS MOVED OVER 30° FROM VERTICAL POSITION, BAD OPERATION FEELING WILL BE OCCURRED.

2.2 OPERATIONAL TORQUE OF DRIVE ARM : 200 ±80 gf.cm at 10 degrees deflection

2.3 MECHANICAL SLOP (ACCURACY OF RESET POSITION) : ±3°
IT IS THE ANGLE BETWEEN VERTICAL LINE OF THE BASE AND THE DRIVE ARM THAT SHALL BE RELEASED AND RESET TO VERTICAL POSITION FROM OPTIONAL POSITION. MEASUREMENT SHALL BE DONE ON THE LINE X-X AND Y-Y.

2.4 DRIVE ARM STRENGTH :
HOLD THE STICK CONTROLLER. AND THEN RESET THE DRIVE ARM TO VERTICAL POSITION. THE LOAD AND TORSION MOMENT SHALL BE APPLIED TO THE DRIVE ARM.
PUSH STRENGTH : 10.0 kgf. 3sec. MIN.
PULL STRENGTH : 5.0 kgf. 3sec. MIN.
TORSION MOMENT : 3.0 kgf.cm. 3sec. MIN.

SYM	REVISION	DATE	BY	SYM	REVISION	DATE	BY
C	ITEM 2.3 WAS ±5°	02-09-02'	HY	D	ITEM2.2 was 173+/-80gf-cm ITEM5.1 was 720+/-260gf	05-03-02'	HY
B	ITEM5.2 was 0.5+0.5-0.4mm	11-16-01'	HY	B	ITEM3.9 MECHANICAL HYSTERESIS ADDED	11-16-01'	HY
A	4.8 UPDATED	10-30-00'	HY	B	ITEM2.2 was 173.5+102-102gf-cm	11-16-01'	HY
0	RELEASE	07-03-00'	HY	B	ITEM5.1 was 653+345-265gf	11-16-01'	HY

Written By : H.Y. Lin	Customer :
Reviewed By : T. S. Chang	Distribution :
Approved By : Ben Chen	

3.0 ELECTRICAL CHARACTERISTICS:

3.1 RESISTANCE TOLERANCE : SHOWN AS THE PARTS DRAWING.

3.2 RESISTANCE TAPERS : LINEAR TYPE (SHOWN AS THE PARTS DRAWING).

3.3 POWER RATING : 0.0125W AT 50℃ DERATED TO NO LOAD AT 85℃.

3.4 VOLTAGE RATING : OPERATING VOLTAGE 50V A.C. OR 5V D.C. MAX

3.5 OUTPUT VOLTAGE :
OUTPUT VOLTAGE IS DEFINED THE RATIO OF THE VOLTAGE TERMINALS 1-2 TO TERMINALS 1-3. 5V D.C. SHALL BE APPLIED TO THE TERMINALS BETWEEN 1 AND 3 AND THEN OUTPUT VOLTAGE SHALL BE MEASURED WITH THE DRIVE ARM OPERATION ON THE LINE X-X AND Y-Y. (TERMINAL 1-2/ TERMINAL 1-3 X 100%)

THT POSITION OF DRIVE ARM :	OUTPUT VOLTAGE :
WHEN THE DRIVE ARM IS OPERATED 25° TO TERM.1 SIDE	21.6% MAX.
WHEN THE DRIVE ARM IS OPERATED 22° TO TERM.1 SIDE	26.5% MAX.
WHEN THE DRIVE ARM IS RELEASED AND TEST TO VERTICAL POSITION	38~62% THE DIFFERENCE OF OUTPUT VOLTAGE FROM RELEASE POSITION IS ACCEPTABLE IN 20% RATIO.
WHEN THE DRIVE ARM IS OPERATED 25° TO TERM.3 SIDE	78.4% MIN.
WHEN THE DRIVE ARM IS OPERATED 22° TO TERM.3 SIDE	73.5% MIN.

3.6 NOISE : LESS THAN 300mV p-p OR ENR : LESS THAN 10% OF OVERALL RESITANCE.
RATED VOLTAGE SHALL BE APPLIED (D.C.) TO THE TERMINALS BETWEEN 1 AND 3.
AND THE NOISE SHALL BE MEASURED BY CIRCULAR OPERATION WITH DRIVE ARM OPERATED 25°
SPEED OF CIRCULAR OPERATION : 1 CYCLE/SEC.

3.7 INSULATION RESISTANCE : 100 MegΩ MIN.
250V D.C. IS APPLIED BETWEEN TERMINALS AND THE MOUNTING PORTION FOR 1 MINUTE.

3.8 DIELECTRIC STRENGTH : WITHOUT BREAKDOWN
250V A.C. 60Hz SHALL BE APPLIED BETWEEN TERMINALS AND THE MOUNTING PORTION FOR 1 MINUTE. LEAK CURRENT IS 2mA. MAX.

3.9 MECHANICAL HYSTERESIS : ±3°
FIXTURE WHICH LIMITS TRAVEL TO +/- 20 DEGREES. CALCULATE ELECTRICAL CENTER (MIN.+MAX.)/2 BY MOVING T-STICK TO MAXIMUM RANGE. RETURN TO CENTER ELECTRICAL VALUE TO BE RECORDED AND TRANSLATED TO DEGREES.

4.0 <u>ENDURANCE CHARACTERISTICS:</u>

4.1 SOLDERABILITY TEST : TOTAL RESISTANCE CHANGE --- ±5% ELECTRICAL, SWITCH CHARACTERISTICS SHALL BE SATISFIED.

IMMERSING THE TERMINALS 3mm FROM THE TIP INTO ROSIN FLUX (DENSITY 25%) 5-10 SEC. THEN DIP INTO SOLDER BATH 250 ±5℃ FOR 3 ±1 SEC SOLDERABILITY OF IMMERSION PORTION SHOULD BE COVERS WITH NEW SOLDER ABOVE 95%.

4.2 FLUX PENETRATION TEST : SAME AS 4.1

4.3 HUMIDITY TEST : TOTAL RESISTANCE CHANGE --- ±20%
INSULATION RESISTANCE --- 20 MΩ MIN.
NOISE --- LESS THAN 300 mV p-p OR ENR : LESS THAN 10% OF OVERALL RESITANCE.
SWITCH CONTACT RESISTANCE --- 200 mΩ MAX.
SWITCH INSULATION RESISTANCE --- 10 MΩ MIN.
AFTER 96 HOURS 65℃& 95% R.H. WITH 2 HRS AIR DRY WITH NO LOAD.

4.4 TEMPERATURE CYCLING TEST : TOTAL RESISTANCE CHANGE ---±20%
INSULATION RESISTANCE --- 100 MΩ MIN.
-20 ±3℃ FOR 30 MINUTES AND +60 ±3℃ FOR 30 MINUTES EACH CYCLE, TOTAL 5 CYCLES WITH 2 HRS AIR DRY WITH NO LOAD.

4.5 RESISTANCE TO SULFURATION : TOTAL RESISTANCE --- THE CHANGE OF TOTAL RESISTANCE TO THE VALUE OF BEFORE TEST IS 2 TIMES MAX.
AFTER 240 ±4 HOURS, +40℃& 70~75%R.H. .1PPM DENSITY OF HYDROGEN SULFIDE WITH 2 HRS AIR DRY WITH NO LOAD.

4.6 DRY HEAT TEST : TOTAL RESISTANCE CHANGE --- + 6% /-30%
MECHANICAL, ELECTRICAL, SWITCH CHARACTERISTICS SHALL BE SATISFIED.
AFTER 96 HOURS +80 ±2℃ WITH 2 HRS AIR DRY.

4.7 COLD TEST : TOTAL RESISTANCE CHANGE ---- ±20%
MECHANICAL, ELECTRICAL, SWITCH CHARACTERISTICS SHALL BE SATISFIED.
AFTER 96 HOURS –30 ±2℃ WITH 2 HRS AIR DRY.

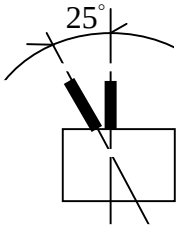
4.8 FREE FALLING TEST : STICK CONTROLLER SHOULD MECHANICALLY (APPEARANCE, CONSTRUCTION AND SHAPE) HAS NO ABNORMALITY.
- 4.8.1 ASSEMBLE STICK CONTROLLER INTO APPLICATION UNIT WEIGHTED LESS THAN 400g
- 4.8.2 FOR IMPACT BOARD IS A 30mm THICK LAUAN
- 4.8.3 FALL THE APPLICATION UNIT 1 TIME PER EACH OF SIX SURFACES FROM A 75CM HEIGHT.

4.9 LIFE TEST:

RESISTOR PART

LOAD : WITHOUT LOAD
DIRECTION : 360° , DRIVE ARM AT 25°POSITION
SPEED : 1 CYCLES/ SEC.
DRIVE ARM MOTION ANGLE : END TO END
NUMBER OF CYCLES : 2,000,000 CYCLES

TOTAL RESISTANCE CHANGE --- ±20%
NOISE --- LESS THAN 300mV p-p
OR ENR : LESS THAN 10% OF OVERALL RESITANCE.



2 cycles

SWITCH PART

LOAD : 5V D.C. 5Ma
DIRECTION : AXIAL DIRECTION TO THE DRIVE ARM WHICH IS RELEASED AND RESET TO VERTICAL POSITION.
SPEED : 2~3 CYCLES / SEC
DEPRESSION FORCE : 5.2 N

CONTACT RESISTANCE --- 200 mΩ MAX.
INSULATION RESISTANCE --- 10 MΩ MIN.
BOUNCE --- 10msec MAX.

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5.0 SWITCH CHARACTERISTICS :

5.1 OPERATION FORCE : 800±260 gf
THE MAXIMUM LOAD REQUIRED FOR DRIVE ARM TO COME TO A STOP IN VERTICAL DIRECTION SHALL BE MEASURED.

5.2 TRAVEL : 0.9 ±0.4 mm

5.3 CONTACT RESISTANCE : 100 mΩ MAX.

5.4 INSULATION RESISTANCE : 100 MΩ MIN AT 100V D.C. FOR ONE MINUTE.

5.5 DIELECTRIC STRENGTH : 250V A.C. 50 Hz/ 60Hz FOR ONE MINUTE.

5.6 POWER RATING: 5V D.C. 5 mA max. 500,000 CYCLESS.