Terms & Acronyms

A

AC Alternating Current; electric current that continually reverses direction at a fixed frequency

alloy A metal created by combining two or more different metals to obtain a desired physical property

alternate action Commonly describing pushbutton switches; remaining in a given circuit condition after removal of actuating force; when actuating force is applied a second time, the opposite circuit is engaged; also known as push-push switching action; may or may not be latchdown

ambient temperature range Operating temperature range

angle of throw Used with rockers and toggles to indicate total travel arc measured in degrees

annealed Relieved of mechanical stress through the application of heat and gradual cooling; for example, annealed copper is less brittle

ANSI American National Standards Institute; a standard-setting agency of the United States which approves the design and/or performance of electrical/electronic components that are distributed in the world market

arcing The flow of electric current between opening or closing switch contacts

AWG American Wire Gauge. Sizes may be determined by measuring the diameter of the conductor (the bare wire) with the insulation removed.

B

bifurcated contact A two-pronged, wiping movable contact

bounce The repeated rebounding of the movable contact during the transfer from one throw to the next; measured in milliseconds

brass An alloy of zinc and copper

break before make Interrupting one circuit of a pole before completing another of the same pole (nonshorting contact)

C

capacitive load A load in which the initial current on make is higher than steady state; upon break it is less than steady state. Current leads voltage in capacitive loads

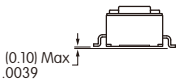
clad The joining of two dissimilar materials by welding or bonding

cleaning Automated cleaning for process sealed devices, manual cleaning for unsealed devices. Cleaning is needed to remove flux from terminals and PC boards

contact resistance The resistance across a pair of closed contacts which is in series with the load; this resistance increases with the age of the switch at a rate varied by environment, frequence of use, voltage, and load conditions; measured in milliohms

convection reflow Automated soldering of surface mount devices by running the PC board with the attached components through a soldering convection oven

coplanarity The profile of the surface tolerance establishes a tolerance zone defined by two parallel planes some distance apart within which all considered surfaces must lie



HP03 Series

All other SMTs

creepage The unwanted flow of electrical current from one conductive part to another

CSA Canadian Standards Association

cULus Underwriters Laboratories Inc. - indicates compliance with both Canada and US requirements

cycle The complete sequence of indexing through all successive switch positions and returning to the original position

D

DC Direct Current; electric current that flows only in one direction

detent A mechanical positioning device for stopping actuator travel at each successive electrical circuit; for example, a spring-operated ball and groove

dielectric strength The ability of an insulating material to withstand high voltage without electrical degradation

differential travel The distance an actuator moves between the point where contacts snap over and where they snap back, or where a contact makes and then breaks

DIP Dual Inline Package, indicating .100" center-to-center terminal spacing and .300" row-to-row spacing

double break Having two pairs of contacts (shorting bar) that open the circuit at two places; having this added contact material improves heat dissipation and increases life; desirable in DC circuit applications

DP Double Pole; see pole

dry circuit A low energy circuit condition where no arcing occurs during contact switching; for example, 0.4VA maximum @ 28V AC/DC maximum; see logic level

DSP National Defense Standards of Japan; NKK file numbers C 6310B & C 6313

DT Double Throw; see throw

dust cover Protects switch in an environment where small particles and dust exist; switch is operable with dust cover in place

E

environmentally sealed Protected for use in harsh environments

F

flash plating A very thin or "instant plating" of usually less than 10 microinches in thickness

flow soldering Automated soldering of through-hole devices on PC boards, also known as wave soldering

flux Chemical used for cleaning metal surfaces so that solder will flow out on the metal; fluxes change a passive, contaminated metal surface into an active, clean, solderable surface

forward voltage (V_F) The typical voltage drop across the LED at the typical forward current.

G

gull wing A type of surface mount terminal which extends from side of switch and has an L-shaped bend at the end

H

horsepower Horsepower, a unit of work, is often found as a rating on electrical motors. One horsepower is equal to 746 watts.

I

inductive load A load in which the initial current on make is lower than steady state and upon break is greater than steady state. The long arcing time, due to stored energy in the inductor at the time of breaking, is severe on the switch contacts.

IEC International Electrotechnical Commission
3 Rue de Varembe
P. O. Box 131
1211 Geneva 20, Switzerland

Terms & Acronyms

IECQ IEC's Quality Assessment System for Electronic Components, created in 1983 to facilitate national and international trade in certified electronic components; a worldwide certification system which provides a method whereby electronic components made and handled by approved manufacturers and distributors can be used anywhere without further testing.

infrared reflow A method of mass soldering surface mount devices with some form of infrared (IR) thermal radiation, such as a lamp IR system where PCB and components are heated largely by radiant energy from IR lamps

inrush The initial, transitory high-level of current through contacts upon making (closing); can cause severe degradation of contacts; applicable to resistive and capacitive loads

insulation resistance The electrical resistance between two normally insulated parts; measured at a specific high potential; usually greater than 1 megohm

IP Ingress Protection (IP) rating system for definition of level of water and dust protection

ISO ISO, International Standards Organization, is a network of the national standards institutes of 146 countries, on the basis of one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system

isolated lamp circuit Independent of switching circuit; lamp is operated on a circuit separate from the switch circuit

J

JEITA Japan Electronics and Information Technology Industries Association

JETL Japan Electrical Testing Laboratory

JIS Japan Industrial Standard; Japan Industrial Standards Committee (JISC)
Agency of Industrial Science and Technology

L

lamp load (tungsten) Most notably characterized by the high inrush current at make (approximately 10 to 16 times the steady state)

latchdown One type of alternate action in which the pushbutton is mechanically fastened in the down position; the pushbutton is at "normal" position for one circuit and latched down position for the other circuit condition

LED Light Emitting Diode; provides illumination with advantages of long life and low power consumption

logic level An application in which power levels do not cause arcing, melting, or softening of contacts; also referred to as dry circuit or low energy; specified 0.4VA maximum @ 28V AC/DC maximum; typically requiring gold contacts for reliability

low level Devices that are used in a low level circuit (low voltage and low current) have not been tested by UL and/or CSA. When used as intended in a low level circuit, the results do not produce hazardous energy.

luminous intensity The luminous intensity is the luminous flux emitted from a point per unit solid angle into a particular direction. Standard unit of luminous intensity is Candela (cd), also expressed as Lumen per Steradian (lm/sr).

M

maintained action Remaining in a given circuit condition until actuated to the opposite circuit condition where it is again maintained; opposite momentary action

make before break Completing one circuit of a pole before interrupting another of the same pole (shorting contact)

maximum forward current (I_{FM}) The maximum continuous operating current at 25°C that the LED can withstand. Exceeding the recommended voltage results in serious degrading or destruction of the LED. Operation should be well below the limit.

maximum reverse voltage (V_{RM}) The maximum voltage in the opposite direction that the LED can withstand. Exceeding the recommended voltage results in serious degrading or destruction of the LED. Operation should be well below the limit.

MITI Ministry of Industry & Trade Institute (Japan)

momentary action Mechanically returning from a temporary circuit condition to the normal circuit condition as soon as the actuating force is removed

motor load Most electric motors are designed to run at 50% to 100% of rated load. Maximum efficiency is usually near 75% of rated load. Thus, a 10-horsepower (hp) motor has an acceptable load range of 5 to 10 hp; peak efficiency is at 7.5 hp. A motor's efficiency tends to decrease dramatically below about 50% load.

MSCP Mean Spherical Candle Power; a unit of measure of light intensity

N

NC Normally Closed contacts; circuit is closed when actuator is in relaxed or normal position

NEMA National Electrical Manufacturers Association, an agency of the United States setting standards for products distributed worldwide; applied to switches in their degrees of protection against the intrusion of liquids, dust, other contaminants

Newton The unit of measure for operating force abbreviated N; see the conversion tables in the previous section

NO Normally Open contacts; circuit is open when actuator is in relaxed or normal position; applies to momentary or alternate action switches

nominal The result of the calculated actual value range

nonshorting contacts Contacts which break before make

nonswitching rating The power carrying capability of a switch after contact closure and at the end of contact bounce; usually much higher than the switching rating

O

opaque Condition that prevents the passage of light

overtravel The distance an actuator moves beyond the point at which electrical contacts transfer

P

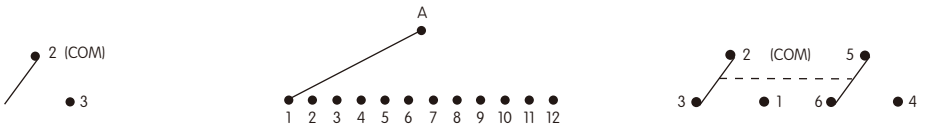
panel seal Liquid is prevented from reaching the switch contacts from front of the panel if panel is subjected to spills orsplashing

PCB Printed Circuit Board; thin copper traces on a plastic laminate providing low cost, low current mass wiring

PF Power Factor; a means of determining contact capability when used with inductive loads relative to the standard resistive load rating; for example, if PF = 1.0 the inductive load is 100% of the resistive load, or if PF = 0.6 the inductive load is 60% of the resistive load

photo interrupter Light source being interrupted and thus changing the status of an electrical circuit

pole A single common electrical input having one or more outputs



Single Pole (with 1 output) **Single Pole** (with 12 outputs) **Double Pole** (with 2 outputs)

position The mechanical detents of a switch actuator

PPS Polyphenylene sulfide; a thermoplastic resin which is chemical and flame resistant

pretravel The distance an actuator moves before a change in the electrical condition is made

process compatible Capable of subjection to automated cleaning procedures after wave soldering; often noted as "washable"

process sealed Sealed to withstand the entire automated processing including the final cleaning

protective guard Prevents accidental actuation; switch is not operable when protective guard is in place

push-push Also known as alternate action; is not latchdown

Terms & Acronyms

R

RCJ Reliability Center for Electronic Components of Japan, member of EXACT (International Exchange of Authenticated Electronic Component Performance Test Data)

resistive load The easiest load to switch because current and voltage are in a steady state on make and drop instantly to zero on break; produces minimal arcing which maximizes contact life

RMS Root Mean Square

RoHS Restriction of Hazardous Substances in Electrical and Electronic Equipment directive restricting the use of lead, cadmium, mercury, hexavalent chromium and PBB/PBDE flame retardant materials in electrical and electronic products sold in Europe beginning July 1, 2006

S

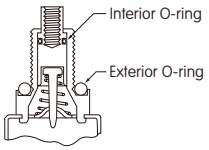
shorting contacts Contacts which make before break

silicone rubber Rubber made from silicone elastomers and noted for its retention of flexibility, resilience, and tensile strength over a wide temperature range

SIP Single Inline Package, indicating .100" center-to-center terminal spacing with terminals aligned in one row

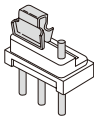
snap action The abrupt transfer of contacts from one position to another; this action is relatively independent of the speed of actuator travel

splashproof Prevents entry of liquids at front panel generally by means of one or two internal o-rings, as illustrated here



SPST Single Pole Single Throw; see pole, also throw

STC Sliding Twin Contact, a mechanism with two movable contact surfaces which pinch the stationary contacts. The STC contact mechanism provides smooth, positive detent actuation, unparalleled logic-level reliability, and more contact stability than conventional mechanisms. Continued reliability is assured since the gold-plated contacts are wiped clean with each actuation. Furthermore, if one side of the twin contacts should fail to conduct, the other side functions as a backup or a fail-safe path for the current. The combination of rounded movable and stationary contacts provides the smooth contact feel not found previously in sliding contact type mechanisms.



surface mount SMD or SMT Component terminals are soldered to pads on the surface of the PC boards as opposed to using holes for mounting; terminal shapes vary – gull wing, J-bend, and others

synchronous lamp circuit Lamp is operated on a circuit in phase with the switch; the switch contains a separate circuit to open or close the lamp circuit simultaneously with the switching circuit

T

tactile feedback The switching action felt by an operator

tamperproof Designed to prevent tampering or provide evidence of tampering; impervious to tampering

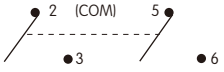
tamper resistant Designed to make tampering difficult or resistive

thermal shock The state of a component that is undergoing an excessive temperature change, particularly in reference to movement from one process to another in soldering and cleaning

thermoplastic A plastic which is flexible and easily molded when heated and which becomes hard and regid when cooled

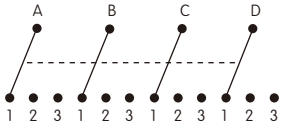
thermoset A plastic which becomes hard and rigid when heated or cured

throw The number of electrical circuits within a pole



Single Throw (with 2 poles)

Double Throw (with 1 pole)



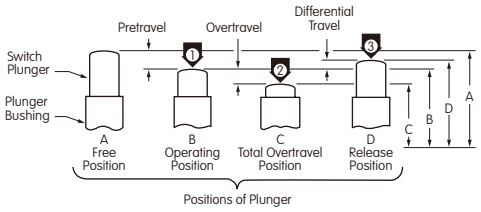
Three Throw (with 4 poles)

total travel — Sum of pretravel and overtravel; full distance an actuator moves from relaxed position past the point of electrical contact and to the end of travel

translucent — Transmitting and diffusing light so that objects beyond cannot be seen clearly

transparent — Transmitting light without appreciably scattering so that objects lying beyond are entirely visible

travel — The distance the actuator moves to effect the change of electrical circuits; see also differential travel, pretravel, overtravel, and total travel



two circuit — Circuit in which one circuit is completed in one position and another separate circuit is completed in the other position

typical forward current (I_F) — The test condition at 25°C. It is recommended that the current be at or below the Typical Forward Current.

U

UL — Underwriters Laboratories Inc.; many of NKK's switches are UL Recognized

undercoating — A coating used for preparation of a surface for plating or used to prevent corrosion when the finish plating develops pinholes; thickness of an undercoating is determined by its purpose

V

vapor phase — A process well-suited to soldering surface mount devices; it combines infrared preheating with condensation heating for reflow, advantageous for eliminating overheating of components and PCB

VDE — Verband Deutscher Elektrotechniker of Germany

W

watertight — Impermeable to water except when subjected to immersion; not waterproof

wavelength — The color of visable light is measured by its wavelength. The Greek symbol "lambda"is used to represent wavelength, the unit of measure is nm.

wave soldering — A method of soldering in which a wave of molten solder contacts surfaces as the PC board with components is conveyed through the process; wave width, travel speed, dwell time, etc. are varied to achieve desired results

WEEE — Waste Electrical and Electronic Equipment
Directive aims at prevention of WEEE and its reuse, recycling and recovery, so as to reduce the disposal of this type of waste. The directive sets targets for the separate collection of WEEE, along with standards for treatment and targets for recycling and recovery.

wiping action — Sliding of contacts over one another resulting in cleaning of the surfaces

FEDERAL SUPPLY CODE

NKK Switches has been assigned the
FSC Number 63426
and is classified as a
Commercial and Governmental Entity (CAGE)
by the Defense Logistics Agency
in Battle Creek, Michigan.