

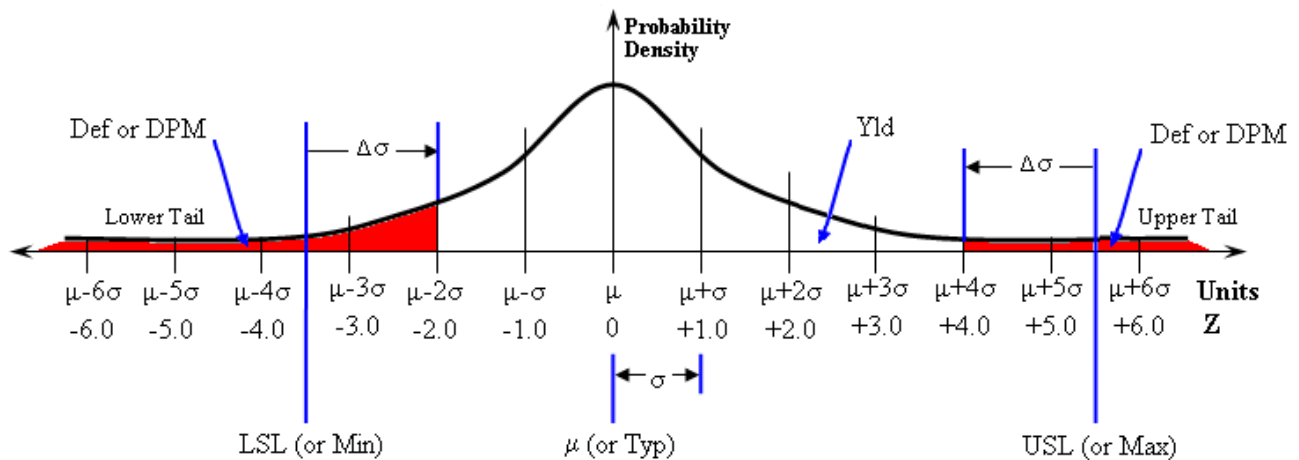
# SPCC Quick Reference Guide

Statistical Process Control Calculator (SPCC) is a program for the HP50g calculator that aids in the prediction and analysis of process yield. Each parameter can be entered or found.

## Parameters

1. Yield (**Yld**) is the percentage of a population that is free of defects.
2. Defect (**Def**) is the percentage of a population that is defective.
3. Defects Per Million (**DPM**) is the number of defects found per million of a population.
4. Long Term Process Shift ( $\Delta\sigma$ ) is a fudge-factor used to account for changes in process over time. This shift results in a decrease in yield over the long term
5. Standard Deviation ( $\sigma$ ) is a measure of the variation in a distribution around the Mean.
6. Mean ( $\mu$ ) is the most likely value to occur. It is the average value of a population.
7. Lower Specification Limit (**LSL**) is a value above which performance of a product is acceptable.
8. Upper Specification Limit (**USL**) is a value below which performance of a product is acceptable.

## Normal Distribution Curve with SPCC Parameters



## Equations

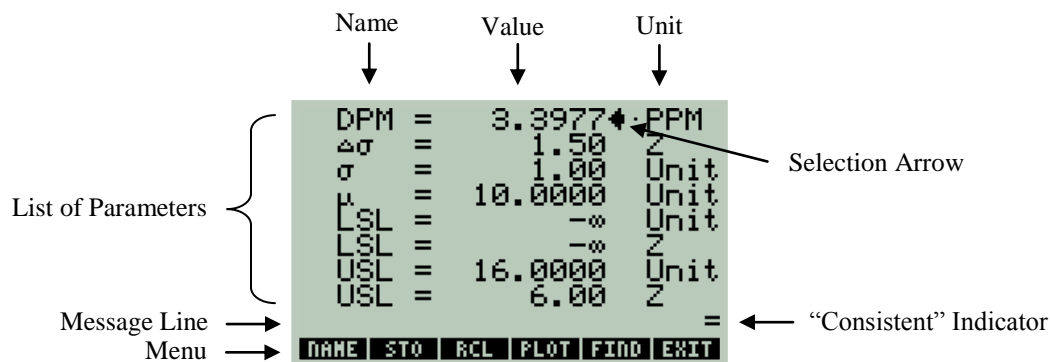
Probability Density: 
$$pd = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

Yield: 
$$Yld = \frac{100}{\sigma\sqrt{2\pi}} \int_{LSL+\Delta\sigma\cdot\sigma}^{USL-\Delta\sigma\cdot\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx$$

Defects: 
$$DPM = 10,000 \cdot Def = 10,000 \cdot (100 - Yld)$$

Z-score: 
$$LSL_z = \frac{LSL_u - \mu}{\sigma} \quad USL_z = \frac{USL_u - \mu}{\sigma}$$

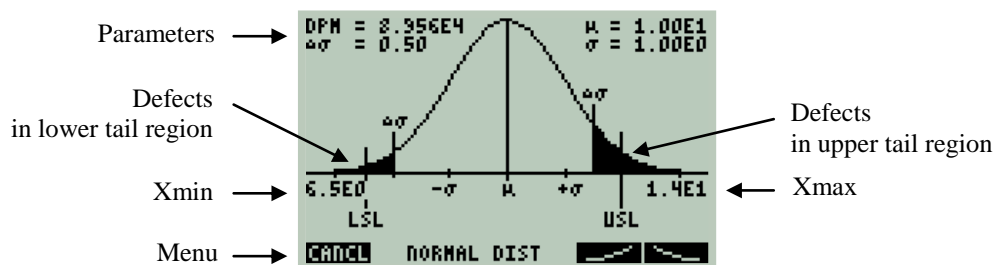
## Parameter Display and Commands



- or select a parameter, as indicated by the selection arrow.
- display an alternative parameter (indicated by a small dot right of the selection arrow)
- (insert) insert a parameter value. Press **ENTER** when finished.
- (delete) delete a parameter value. Press **ENTER** when finished.
- F1** () display a description of the selected parameter in the message line
- F1** () display the full precision of the selected parameter in the message line
- F2** () store all parameters
- F3** () recall all stored parameters
- F4** () plot the probability density specified by the parameters
- F5** () find the selected parameter
- F6** () or **ON** (Cancel) exit the program
- F6** () launch previous run calculator (for physical calculators only - requires CALC)
- ON** turns off the calculator
- NXT** **F1** () display the equations used by SPCC
- NXT** **F2** () export the selected parameter to the stack upon exiting
- NXT** **F3** () import a number present in level 1 of the stack when SPCC was launched, to the selected parameter. The import value is automatically displayed on the message line.
- NXT** **F4** () enter all default parameter values. Parameters are not stored until is executed.

The equal sign (=) indicates all the parameters are consistent with each other and will appear following a **F5** () command. The not equal sign ( $\neq$ ) appears following an entry, indicating that the parameters may not be consistent.

## Plot Display and Commands



- F1** () return to the parameter display
- F5** or **F6** () plot the lower tail
- F5** or **F6** () plot the whole probability density
- F5** or **F6** () plot the upper tail