

B+K MODEL 4050/4051 TECHNICAL SPECIFICATIONS



AUTO-RANGING COUNTER:

Input Characteristics:
 Impedance: 1 M Ohm / 100 pF
 Coupling: AC (Ext. counter BNC input)/DC (logic probe input)
 Max. Overload Protection: ± 260 V AC/DC
 Sensitivity: ≤ 0.45 Vrms
 Triggering Threshold: Selectable for TTL, CMOS, Logic threshold or 0-3.5 V continuously adjustable triggering level.

FREQUENCY COUNTER (Display shown "EXT. CNTR")
 Range: 10 Hz to 35 MHz Auto-ranging
 Resolution: 0.01, 0.1, 1, 10, 100 Hz
 Max. Display: 6 digits
 Input Port: Logic Probe or EXT. CNTR BNC Jack

LOW FREQUENCY COUNTER (Display shown "EXT. CNTR TOTAL")
 Range: 0.04 Hz to 1 Hz
 Resolution: 0.01, 0.001 Hz
 Max. Display: 4 digits
 Input Port: Logic Probe only

TRANSITION (TOTALIZE) COUNTER (Display shown "TOTAL")
 Range: DC to 5.0 KHz
 Max. Display: 6 digits
 Reset Key: "CAL"
 Input Port: Logic Probe signal input from Ext. CNTR BNC Jack. The frequency must be greater than 3Hz.

AUTO-RANGING DVM:

Input Range: 0 to $\pm 2,500$ V, ± 25.00 V DC, ± 250.0 V Auto-ranging
 Resolution: 1 mV, 10 mV, 100 mV
 Accuracy: $\pm 0.5\%$
 Input Protection: Max. ± 260 V DC/AC
 Impedance: 1 M Ohm
 Max. Display: 4 digits

UNIVERSAL LOGIC PROBE:

Logic Threshold:

	TTL	CMOS
High Threshold	$2.0V \pm 10\%$	$70\% VDD \pm 15\%$
Low Threshold	$0.8V \pm 10\%$	$30\% VDD \pm 15\%$

*Vdd is controlled by C-Level

MAX. Repetitive Frequency Response: 35 MHz (with probe miniature clip to GND)
 Min. Single Pulse Detection: 12 ns (with probe miniature clip to GND)
 Display Format: Logic High, Logic Low, Square clock, Positive Going Pulse, Negative Going Pulse, Tri-state.

TRIPLE OUTPUT DC POWER SUPPLY:

	Vcc	+Vs	-Vs
Output Voltage	5 V/3.3 V	0-24 V	0-34 V
Output Current	Typical	5.0 A	1.5 A
	Max.	1.5 A	2.0 A
DVM display	3-digit	4-digit	4-digit
Overload Protection	Short Circuit, Over-current, Over-voltage, Reverse Polarity, Over-temperature		
Load Regulation	80 mV	80 mV	80 mV
Ripple & Noise	10 mVrms	10 mVrms	10 mVrms
Dual Tracking*	N/A	YES	YES
Ripple & Noise	1 mVrms	1 mVrms	1 mVrms
Dual Tracking*	N/A	YES	YES

* -Vs tracks +Vs or independent adjustment

PHYSICAL PROPERTIES:

Dimensions: 5.1" x 9.5" x 10.5"
 Shipping Weight: 2.5 lbs (1.1 kg)
 Power Requirements: 115 VAC or 210 VAC, 10% 50 Hz or 60 Hz, Approx.
 Accessories: Operational manual, AC power cord, BNC cable with clips, Logic Probe
 Options:
 1) RS-232C D-sub 9-pin Male to Female interface cable
 2) Universal Solderless Breadboard Kit with Banana Plugs (connects to Model 4051 directly)

FUNCTION GENERATOR:

FREQUENCY CHARACTERISTICS
 Wave Forms: Sine, Square, Triangle, μ Pulse, μ Kamp
 Range: 0.15 Hz to 20 MHz in 8 ranges
 Resolution: 0.01, 0.1, 1, 10, 100 Hz Display
 Tuning Range: Coarse: 10:1, Fine: $\pm 3\%$ of Coarse Setting
 Variable Duty Cycle: 15:85:15 Continuously variable
 Operating Modes: Normal, Sweep, VCG, AM, FM, Single Burst, Multiple Burst
 Frequency Stability: $\pm 0.2\%$ of the tuning frequency

OUTPUT CHARACTERISTICS
 Impedance: 50 ohm $\pm 10\%$
 Levels: 20 mV to 20V p-p Open-circuit, 10V p-p into 50 ohm to 10 MHz
 Amplitude Control: Variable, 40 dB range typical
 DC Offset: Proved: ± 10 V typical, Variable: ± 10 V open-circuit, ± 5 V into 50 ohm

Sine Wave
 Distortion: $< 1.0\%$ THD from 10 Hz to 100 KHz
 Flatness: $\pm 3\%$ (0.3 dB) 0.15 Hz to 200 MHz
 $\pm 5\%$ (0.45 dB) 200 K to 10 MHz
 $\pm 20\%$ (2.0 dB) 10 MHz to 20 MHz

Square Wave
 Symmetry: $< 2\%$ 0.15 Hz to 100 KHz
 Rise Time: ≤ 30 ns
 Overshoot & Undershoot: $\leq 5\%$

Triangle Wave
 Linearity: 98% up to 100 KHz

TTL OUTPUT (Open - Circuit Condition for Frequencies ≤ 2 MHz)
 Max. Logic Low Level Voltage: ≤ 0.4 V
 Min. Logic High Level Voltage: ≥ 2.6 V
 Rise Time: ≤ 15 ns
 Duty Cycle: 50% typical

CMOS OUTPUT (Open - Circuit Condition for Frequencies ≤ 2 MHz)
 Level: Output from 3.0 V to 16.0 V ± 0.5 Vp-p
 Rise Time: ≤ 100 ns

VCG (Voltage Controlled Generator) INPUT
 Input Voltage: 0-10V ± 0.5 V causes a 10:1 frequency change
 Impedance: 10K ohm $\pm 5\%$

SWEEP OPERATION
 Mode: LFN, LOG
 Source: Internal, External
 Width: 10:1, continuously variable
 Rate: 10 ms to 1 sec, continuously variable
 Sweep Output: 0 to 2 V
 Start/Stop Frequency: By digital setting

AM MODULATION CHARACTERISTICS
 Source: Internal, External
 Modulation Ratio: 5% to 100%
 INT. Modulation: 1 KHz
 EXT. Modulation: DC to 500 KHz
 EXT. Sensitivity: Less than 10Vp-p for 100% modulation

FM MODULATION CHARACTERISTICS
 Source: Internal, External
 Deviation: 0 to 5%
 INT. Modulation: 1 KHz
 EXT. Modulation: DC to 500 KHz
 EXT. Sensitivity: Less than 10 Vp-p for 100% modulation

BURST CHARACTERISTICS
 Mode: Multiple, Single, or Key controlled one shot
 Source: Internal, External
 Burst Width: Continuously variable from 5% to 90% of int. gating freq.
 Repetition Rate: 0.5 Hz to 50 Hz, internal or DC to 500 KHz external
 Burst Frequency: Determined by the main generator frequency setting.
 Tone burst is in integral cycles of gated frequency.

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BK PRECISION® MODEL 4050/4051 PROGRAMMABLE MULTIFUNCTION GENERATOR

A complete testing solution featuring five lab instruments in one low cost and portable package for maximum precision and convenience



The B+K 4050 series programmable multifunction generator is an exceptionally versatile and economical instrument for applications in R&D, Manufacturing Test, Service Repair and Training. Featuring an adjustable triple output power supply and waveform generator, it has the ability to provide power and signal sources for a circuit while the universal logic probe, auto-ranging frequency counter, and digital voltmeter allows you to simultaneously analyze and measure circuit activity. This compact device combines the functionality of five standard laboratory instruments into one integrated unit, making the task of switching instruments as easy as pressing a button.

Five instruments in one!

- 20 MHz Sweep/Function Generator
- 35 MHz Universal Logic Probe
- 80 W Adjustable Triple Output Power Supply with Display*
- Autoranging frequency and Totalize Counter
- Autoranging Digital Voltmeter

*Note: Only the B+K 4051 model comes equipped with a power supply.

INTRODUCING THE VERSATILE 5-IN-1 B+K 4050 SERIES PROGRAMMABLE MULTIFUNCTION GENERATOR

FEATURES:

System Integration:

For unparalleled convenience, the **B+K 4050 Series** integrates five different instruments into one unified system ground, eliminating ground loop currents to provide accurate and hassle-free measurements.

User Friendly Interface:

The **B+K 4050 Series'** elaborately designed software interface allows for one touch access to adjusted quantities from previously used functions. Switch functions with the press of a key and use the digital encoder to make new adjustments on up to eighteen saved quantities.

Cost Effective:

Integrating the circuitry of five different testing instruments into one multifunctional device enables B+K to deliver all five for the price of one.

Memory Backup:

The Memory Backup feature allows the **B+K 4050 Series** to work just like a conventional mechanical switch operated instrument. All previous modes, settings, and quantities adjustments are restored immediately after power up. Up to ten different data programs can be stored to memory, allowing quick changes from one operation to another.

LCD Back-Light Display:

The **B+K 4050 Series'** high brightness, uniform cold cathode fluorescent lamp back-lighting provides a high contrast display that's easily readable from multiple angles and even from a distance.

RS-232C Serial Port:

A built-in RS-232C serial port enables network connectivity. Use the **B+K 4050 Series** over a network to perform remote monitoring or control of sensors or actuators in corrective or analysis applications. In training applications, multiple units can be set-up through the network by an instructor.

Auto Frequency Locking Capability:

Unlike conventional function generators, the output frequency of the **B+K 4050 Series** can be automatically locked within $\pm 0.2\%$ range at the tuned frequency, without drifting problems due to effects of temperature, moisture or component degeneration.



Multi-Function Simultaneous Operations:

For most uses, the **B+K 4050 Series** is capable of performing multiple testing operations simultaneously. (Example: The B+K 4051 can output a signal from the function generator, while the logic probe shows logic activity, the autoranging DVM displays the voltage and the power supply delivers the appropriate power to the circuit being tested. The frequency measurement can also be implemented with a keypress.)

- 1 **CAL Key:** Resets the function generator to 50% duty cycle and DC offset to zero. Controls "Tracking" adjustment mode for Positive (+Vs) and Negative (-Vs) Power Supply. Recalls data setting from program memory.
- 2 **SOURCE Key:** Selects internal or external control signal for sweep, burst, and modulation functions. Also accesses program memory.
- 3 **SWEEP Key:** Selects "linear" or "logarithm" frequency sweeping modes.
- 4 **BURST Key:** Selects "Single" or "Multiple" burst for the output signal.
- 5 **MOD Key:** Select "Frequency" modulation or "Amplitude" modulation mode.
- 6 **SET Key:** Turns ON/OFF the back light of the LCD display, as the function generator is set into Sweep, Burst, or Modulation function mode, this key provides the capability to strobe each step and quantity during set up process. Also stores current setting to program memory.
- 7 **RNG UP Key:** Increase the output frequency by a decade.
- 8 **RNG DN Key:** Decreases output frequency by a decade.

- 9 **WAVEFORM Key:** Selects output signal (Sine, Square, or Triangle).
- 10 **Digital Encoder:** Adjusts up to 18 different quantities (displayed by bar graphic) for each desired function.
- 11 **Amplitude Pot:** Adjusts the amplitude of the output signal.
- 12 **SYM Key:** Enables the Duty Cycle adjustment function.
- 13 **OFFSET Key:** Enables the DC Offset adjustment function. Also steps backwards while in multi-function sequence mode.
- 14 **LOGIC Key:** Selects the Logic signal output and the threshold level of the logic probe, triggering level of the counter, and logic power supply into TTL, 5V, 3.3V or CMOS logic.
- 15 **+Vs:** Variable positive supply output from 0 to +24V.
- 16 **-Vs:** Variable negative supply output from 0 to -24V.
- 17 **GND:** Power supply and system ground terminal.
- 18 **+5V/3.3V:** Logic supply +5V or +3.3V output.
- 19 **FUNCTION Key:** Controls Function and Display. Press to advance one function at a time in the following sequence:
Upon entering this multifunction sequence, the "FUNCTION" key will step forward, the "OFFSET" key will step backward, and the "ADJUST" key will abort the sequence.
Function Generator->Freq. Counter(EXT CNTR)->Low Freq. Counter(EXT CNTR TOTAL)->TOTALIZE Counter(TOTAL)->Digital Voltmeter (DVM)->CMOS level(C-LEVEL)->Positive Supply(+Vs)->Negative Supply(-Vs)->Logic Supply(Vcc)
- 20 **ADJUST Key:** Select the Coarse or Fine frequency adjust mode, press to abort any other function and enter into function generator coarse frequency adjust mode. The message display above key indicates the quantity being adjusted by the digital Encoder.
- 21 **LCD:** 5"x1.5" Liquid Crystal Display with CCFL Back Light. Messages displayed next to corresponding keys as functions are enabled. Flashing messages indicate the quantity being adjusted by the encoder.
- 22 **LOGIC/DVM PROBE:** The furnished logic probe is connected here for convenient voltage, frequency measurement, and logic circuit analysis.
- 23 **50 OHM Output:** Main function generator output with superimposed DC offset and Duty Cycle adjustment.
- 24 **TTL/CMOS Output:** Provides logic signal output with same frequency and Duty Cycle as the 50 OHM Output.
- 25 **Ext. Counter:** Input for external frequency measurement with AC coupling built.
- 26 **Burst Input:** Input external gating signal for Burst operation.
- 27 **Vcc/MOD Input:** Input external control signal for Sweep or Modulation operation.
- 28 **RS-232C Serial Port:** Connects to computer for remote operation.
- 29 **CV Output:** Generator Control Voltage output. Voltage proportional to generator frequency.
- 30 **Heat Activated Cooling Fan:** For quieter operation, temperature sensitive cooling system activates only when needed.