Data Sheet

Programmable DDS Function Generator Series

Models 4084, 4085, 4086 & 4087

B&K Precision® models 4084, 4085, 4086 and 4087 are high performance laboratory grade synthesized function generators with a wide frequency range of up to 120 MHz. Direct digital synthesis (DDS) techniques are used to create stable, accurate output signals for all 27 built-in standard and complex (arbitrary) waveforms. The generators produce high purity, low distortion sine waves, square waves up to 40 MHz and provide a stable output of very small signals down to the 1mV - 10mV range. The instrument also provides a built-in 100 MHz universal counter with frequency measurement and totalize function.

The versatility and capabilities of this series make it an ideal tool for many general-purpose test and bench applications or for use in training and education.

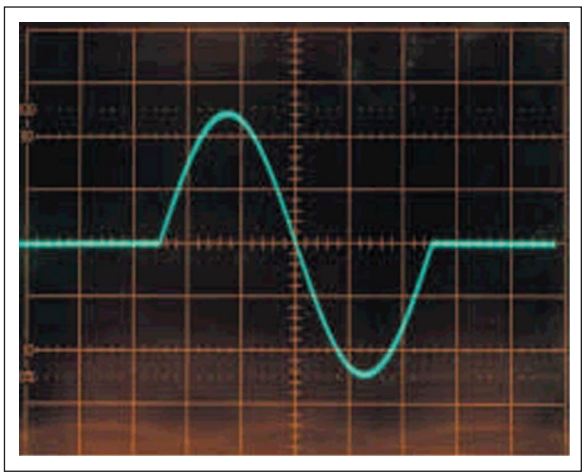

Fig.1 Single cycle burst, start phase=0°

Versatile modulation and trigger capabilities

The generators provide extensive modulation capabilities including AM, FM, FSK, PSK, pulse modulation and linear/logarithmic sweep. Internal and external modulation sources, as well as internal, external and gated trigger sources are supported. Modulation parameters can be set precisely and are adjustable over a wide range. For instance burst count is programmable in 1 burst increments up to 10000 bursts and burst phase is adjustable in 0.1° increments.

Convenient user interface and operation

You can adjust parameters via knob or numeric keypad. Enter amplitude values directly in Vpp, mVpp, Vrms, mVrms or dBm and display the correct voltage by entering the actual output configuration used (terminated with 50 Ohm or open circuit). You can enter frequency in terms of frequency or seconds using time values s, ms, Hz, kHz or MHz. Submenus are used for modulation modes and other complex functions. The generators are fully programmable via the standard RS232 interface, using SCPI commands. The instrument also provides 10 memories to store and recall instrument settings. Additionally the current state is saved at power off and can be restored at power up.

Technical data subject to change
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B&K PRECISION
ELECTRONIC TEST INSTRUMENTS

Specifications

Models	4084	4085	4086	4087
Frequency Characteristics				
Sine	1μHz ~ 20MHz	1μHz ~ 40MHz	1μHz ~ 80MHz	1μHz ~120MHz
Square	1μHz ~ 20MHz	1μHz ~ 40MHz	1μHz ~ 40MHz	1μHz ~40MHz
All Other waveforms	1μHz ~ 100kHz			
Frequency Stability	±1x10⁻⁶ (22°C ±5°C)			
Resolution	1μHz			
Accuracy	≤ ± 5x10⁻⁶ (22°C ±5°C)			
Data entry Units	s, ms, Hz, kHz, MHz			
Waveform Characteristics				
Main Waveforms (Sine, Square)				
Amplitude resolution	12 bits			
Sample Rate	200MSa/s			300MSa/s
Sine				
Harmonic Distortion of Sine Wave*	≤ - 50dBc (frequency ≤ 5MHz) ≤ - 45dBc (frequency ≤ 10MHz) ≤ - 40dBc (frequency ≤ 20MHz) ≤ - 35dBc (frequency ≤ 40MHz) ≤ - 30dBc (frequency > 40MHz)			
THD *	0.1% (20Hz ~ 100kHz)			
Square				
Rise and fall time*	≤ 15ns			
* = Note: Test conditions for harmonic distortion, sine distortion, rise/fall time Output Amplitude 2Vp-p, Environmental temperature: 25°C±5°C				
Others built-in waveforms				
27 build-in standard and complex waveforms	Sine, Square, Triangle, Positive Ramp, Falling Ramp, Noise, Pulse, Positive Pulse, Negative Pulse, Positive DC, Negative DC, Stair wave, Coded Pulse, Full wave rectified, Half-wave rectified, Sine transverse cut, Sine vertical cut, Sine phase modulation, Logarithmic, Exponential, Half-round, Sinx/x, Square root, Tangent, Cardiac, Earthquake, Combination			
Waveform Length	4096 dots			
Amplitude Resolution	10 bits			
Pulse				
Duty Cycle	0.1% ~ 99.9% (below 10kHz), 1% ~ 99% (10kHz ~ 100kHz)			
Rise/Fall Time	≤ 100ns (Duty Cycle 20%)			
DC signal characteristics				
DC range	≤ 10mV – 10V (high impedance)			
DC Accuracy	≤ ±5% of setting +10mV (high impedance)			
Arbitrary				
Non volatile memory	8 waveforms			
Waveform length	8~16000 points			
Amplitude resolution	10 bits			
Frequency range	1μHz~100kHz			
Sample rate	200MSa/s			
Amplitude Characteristics				
Amplitude Range				
For all models	Freq ≤ 40MHz: 2mV ~ 20Vpp (open circuit) , 1mV ~ 10Vpp (50Ω)			
4084, 4085, 4086	Freq > 40MHz: 2mV ~ 4Vp-p (open circuit), 1mV ~ 2Vpp (50Ω)			
4087	Freq > 40MHz: 0.1mV ~ 3Vpp (50Ω)			
Resolution	2μVpp (open circuit), 1μVpp (50Ω)			
Accuracy	± 1%+0.2mV (sine wave relative to 1kHz)			
Stability	±0.5 % /3 hours			
Flatness				
For amplitude ≤ 2Vpp	±3% (freq≤ 5MHz), ±10% (5MHz<freq≤ 40MHz)			
For amplitude >2Vpp:	±5% (freq≤ 5MHz), ±10% (5MHz<freq≤ 20MHz) ±20% (frequency>20MHz) ±1dBm (frequency>40MHz)			
Output Impedance	50Ω			
Output Units	Vpp, mVpp, Vrms, mVrms, dBm			
DC Offset Characteristics				
Offset Range (open circuit)	Freq ≤ 40MHz: ±10Vpk ac+dc (Offset ≤ 2 x pk - pk amplitude) Freq > 40MHz: ±2Vpk ac+dc (Offset ≤ 2 x pk - pk amplitude)			
Offset Resolution	2μV (open circuit), 1μV (50Ω)			
Offset Error	±5% of setting +10mV (Ampl. ≤ 2Vpp into open circuit) ±5% of setting +20mV (Ampl. > 2Vpp into open circuit)			

Modulation	
AM Characteristics	
Carrier Waveforms	Sine or Square
Modulation Source	Internal or external
Internal Modulating Waveform	Sine, Square, Triangle, Rising/Falling Ramp
Frequency of modulating signal	100μHz ~ 20kHz
Distortion	≤ 2%
Modulation Depth	1% ~ 120%, 1% ~ 80% (frequency>40MHz, Ampl > 2Vpp into open circuit)
Modulation Error	± 5%+0.2% (100μHz < frequency ≤ 10kHz) ±10%+2% (10kHz < frequency ≤ 20kHz)
Max. Amplitude of ext. input signal	3Vp-p (-1.5V~ +1.5V)
FM Characteristics	
Carrier Waveforms	Sine or Square
Modulation Source	Internal or external
Internal Modulating Waveform	Sine, Square, Triangle, Rising/Falling Ramp
Frequency of modulating signal	100μHz ~ 10kHz
Deviation	Max. 50% of carrier frequency for internal FM Max 100kHz (carrier frequency≥ 5MHz) for external FM, with input signal voltage 3Vp-p (-1.5V~+1.5V)
FSK Characteristics	
Carrier Waveform	Sine or Square
Control Model	Internal or external trigger (external: TTL level, low level F1, high level F2)
FSK Rate	0.1ms ~ 800s
PSK Characteristics	
Carrier Waveform	Sine or Square
PSK	Phase1 (P1) and Phase 2 (P2), range: 0.0 ~ 360.0°
Resolution	0.1°
PSK rate	0.1ms ~ 800s
Control Mode	Internal or external trigger (external: TTL level, low level P1, high level P2)
Burst Characteristics	
Waveform	Sine or Square
Burst Counts	1 ~ 10000 cycles
Time interval between bursts	0.1ms ~ 800s
Control Mode	Internal, single or external gated trigger
Frequency Sweep Characteristics	
Waveform	Sine or Square
Sweep Time	1ms ~ 800s (linear), 100ms ~ 800s (log)
Sweep Mode	Linear or Logarithmic
Start/ Stop Frequency	Same as frequency range of Sine & Square
External trigger signal frequency	DC ~ 1kHz (linear) DC~10Hz (log)
Control Mode	Internal or external trigger
Inputs/ Outputs	
Main Output	
Impedance	50Ω
Protection	Short circuit and overload protected
Output MOD OUT	
Frequency	100Hz ~ 20kHz
Waveform	Sine, Square, Triangle, Rising/Falling Ramp
Amplitude	5Vp-p ± 5%
Output Impedance	600Ω
Modulation IN	3Vpp = 100% Modulation
External Input Trig/FSK/Burst	Level - TTL
Universal Counter, Key Specs*	
Frequency Range	
Frequency Measurement	1Hz ~ 100MHz
Totalize mode	50MHz max
* For full specification of the counter section, refer to online manual at www.bkprecision.com	
General	
Power Supply	198~242V or 99~121V, Frequency: 47~ 63Hz
Power Consumption	<35VA
State Storage Memory	
Storage Parameters	frequency, amplitude, waveform, DC offset values, modulation parameters
Storage Capacity	10 user configurable stored states
Dimensions (W x H x D)	10" x 3.93" x 14.56" (255 x 100 x 370) mm
Weight	6.6 lbs (3 kg)
Remote Interface	RS232
Safety designed according to	EN61010
EMC tested according to	EN55022, EN55024, EN61326, EN601000

Three Year Warranty

Included Accessories: BNC to alligator cable, BNC to BNC cable, RS232 communication cable, power line cord, test report, spare fuse