

## TFG3600E Series Arbitrary Function Generator

### Introduction

The TFG3600E series are arbitrary waveform/function generators with maximum frequency of 5MHz, 10MHz, 15MHz and 20MHz. The TFG3600E series are based on DDS (Direct Digital Synthesis) technology providing flexible performance and system features for basic scientific and industrial requirements.

The 8 bits resolution, 100MSa/s sampling rate, 1024 pts memory length, 32 built-in waveforms and 8 user-defined arbitrary waveforms create various waveforms for different needs. A free PC software for USB and RS232 interfaces control for creating and analyzing waveforms. The TFG3600E series have additional functions of multiple modulations (AM, FM, FSK, ASK), 200MHz external counter, 40 sets memories and multiple protections. Stable output frequency, high accuracy and low distortion make TFG3600E series an ideal solution for an accurate and affordable signal source for industrial, scientific research and educational applications.

### Features

- ✓ Max. output frequency 5MHz/10MHz/15MHz/20MHz
- ✓ 2 output channels
- ✓ 3.5-inch TFT LCD display
- ✓ Direct Digital Synthesis technology (DDS)
- ✓ Sampling rate 100MSa/s, vertical resolution 8 bit, waveform length 1024 points
- ✓ Arbitrary waveform function, 8 sets of users defined waveforms
- ✓ Output waveforms: 32 built-in waveforms and 8 sets of user defined waveforms
- ✓ 40 sets panel setting save & recall
- ✓ Min. 1mV (50Ω) waveform output with good stability
- ✓ Modulations: FM, FSK, PSK, ASK
- ✓ Frequency sweep, burst, TTL output
- ✓ Over voltage protection, over current protection, short circuit protection, reverse voltage protection
- ✓ Standard parts: RS-232 interface, 200MHz frequency counter
- ✓ Optional parts: power amplifier

### Product photo

TFG-3605E



## Specifications

| Model                                  | TFG-3605E   | TFG-3610E          | TFG-3615E              | TFG-3620E          |
|--|---|--------------------|------------------------|--------------------|
| <b>Frequency range</b>                 | <b>1μHz~5MHz</b>  | <b>1μHz ~10MHz</b> | <b>1μHz ~15MHz</b>     | <b>1μHz ~20MHz</b> |
| <b>Waveform (CHA)</b>                  |   |                    |                        |                    |
| Waveform types                         | 32 pre-stored waveforms and 8 user defined arbitrary waveforms including: Sine, Square, Triangle, Ramp, Pulse etc.                |                    |                        |                    |
| Waveform length                        | 1024 points   |                    |                        |                    |
| Vertical resolution                    | 8 bits  |                    |                        |                    |
| Sampling rate                          | 100MSa/s  |                    |                        |                    |
| Sine harmonic distortion               | ≥40dBc (<1MHz, )<br>≥35dBc (1MHz~20MHz)   |                    |                        |                    |
| Sine wave total distortion             | ≤1% (20Hz~200kHz)   |                    |                        |                    |
| Square wave                            | Rise/fall edge time: ≤35ns<br>Overshoot: ≤10%<br>Duty cycle: 1%~99%   |                    |                        |                    |
| <b>Frequency (CHA)</b>                 |   |                    |                        |                    |
| Frequency range                        | Sine wave: 1μHz~Max.frequency<br>Other waveforms: 1μHz~1MHz   |                    | Square wave: 1μHz~5MHz |                    |
| Resolution                             | 1μHz  |                    |                        |                    |
| Accuracy                               | ±5×10 <sup>-5</sup>   |                    |                        |                    |
| Stability                              | ±5×10 <sup>-6</sup> /3hours   |                    |                        |                    |
| <b>Amplitude (CHA)</b>                 |   |                    |                        |                    |
| Amplitude range                        | 2mVpp~20Vpp, 1μHz~10MHz (high impedance)<br>2mVpp~15Vpp, 10MHz~15MHz (high impedance)<br>2mVpp~8Vpp, 15MHz~20MHz (high impedance) |                    |                        |                    |
| Resolution                             | 20mVpp (amplitude>2Vpp), 2mVpp (amplitude<2Vpp)   |                    |                        |                    |
| Accuracy                               | ± (1%+2mV rms) (high impedance, RMS, frequency 1kHz)  |                    |                        |                    |
| Stability                              | ±0.5% /3hours   |                    |                        |                    |
| Flatness                               | ±5% (frequency of 10MHz or below ), ±10% (frequency above 10MHz)  |                    |                        |                    |
| Output impedance                       | 50Ω   |                    |                        |                    |
| <b>DC Offset (CHA)</b>                 |   |                    |                        |                    |
| Offset range                           | ±10V (high impedance, attenuation 0 dB)   |                    |                        |                    |
| Resolution                             | 20mVdc  |                    |                        |                    |
| Accuracy                               | ±(1%+20mVdc)  |                    |                        |                    |
| <b>Sweep (CHA)</b>                     |   |                    |                        |                    |
| Sweep type                             | Frequency sweep, amplitude sweep  |                    |                        |                    |
| Sweep range                            | Free to set starting point and end point  |                    |                        |                    |
| Sweep step                             | Higher than any value of the resolution   |                    |                        |                    |
| Sweep rate                             | 10ms~60ms/step  |                    |                        |                    |
| Sweep direction                        | Up, Down, Up-Down   |                    |                        |                    |
| Sweep mode                             | Linear, logarithmic   |                    |                        |                    |
| Control mode                           | Auto sweep or manual sweep  |                    |                        |                    |
| <b>Frequency Modulation (FM) (CHA)</b> |   |                    |                        |                    |
| Carrier signal                         | CHA waveforms   |                    |                        |                    |
| Modulation signal                      | Internal signal of CHB or External signal   |                    |                        |                    |
| Modulation deviation                   | 0%~20%  |                    |                        |                    |
| <b>Burst (CHA)</b>                     |   |                    |                        |                    |
| Carrier signal                         | CHA signal  |                    |                        |                    |
| Trigger signal                         | TTL_A signal  |                    |                        |                    |
| Burst counts                           | 1~65000 cycles  |                    |                        |                    |
| Burst mode                             | Internal TTL, External, Single  |                    |                        |                    |
| <b>Shift keying (CHA)</b>              |   |                    |                        |                    |
| FSK                                    | Free to set carrier waveform frequency and hopping frequency  |                    |                        |                    |
| ASK                                    | Free to set carrier waveform amplitude and hopping amplitude  |                    |                        |                    |
| PSK                                    | Hopping phase: 0~360°, Max. resolution: 1°  |                    |                        |                    |
| Alternative rate                       | 10ms~60s  |                    |                        |                    |

| Model                             | TFG-3605E   | TFG-3610E   | TFG-3615E   | TFG-3620E   |
|-----------------------------------|---|-------------|-------------|-------------|
| Frequency range                   | 1μHz~5MHz   | 1μHz ~10MHz | 1μHz ~15MHz | 1μHz ~20MHz |
| <b>CHB output characteristics</b> |   |             |             |             |
| Waveform                          | 32 pre-stored waveforms and 8 user defined arbitrary waveforms including: Sine, Square, Triangle, Ramp, Pulse etc.<br>Length: 1024 points<br>Sampling range : 12.5Msa/s<br>Amplitude resolution : 8 bits<br>Square wave duty cycle : 1%~99% |             |             |             |
| Frequency                         | Range: Sine wave: 1μHz~1MHz; Other waveforms: 1μHz~100kHz<br>Resolution: 1μHz<br>Accuracy: $\pm 1 \times 10^{-5}$   |             |             |             |
| Amplitude                         | Range: 50mVpp~20Vpp (high impedance)<br>Resolution: 20mVpp<br>Output impedance : 50Ω  |             |             |             |
| Burst                             | Carrier signal: CHB signal<br>Trigger signal: TTL_B signal<br>Burst count : 1~65000 cycles<br>Burst mode : Internal TTL, External, Single   |             |             |             |
| <b>TTL output</b>                 |   |             |             |             |
| Waveform characteristics          | Square wave, rise/fall time $\leq 20\text{ns}$  |             |             |             |
| Frequency characteristics         | 40MHz~1MHz  |             |             |             |
| Amplitude characteristics         | TTL and CMOS compatible, low<0.3V, high>4V  |             |             |             |
| <b>Frequency counter</b>          |   |             |             |             |
| Testing frequency range           | 1Hz~200MHz  |             |             |             |
| Input signal amplitude            | 100mVpp~20Vpp   |             |             |             |
| Remote control                    | RS-232 serial interface   |             |             |             |
| <b>Power amplifier (optional)</b> |   |             |             |             |
| Max. output power                 | 7W (8Ω), 1W (50Ω)   |             |             |             |
| Max. output voltage               | 22Vpp   |             |             |             |
| Frequency bandwidth               | 1Hz~200kHz  |             |             |             |
| <b>General</b>                    |   |             |             |             |
| Operation characteristics         | Key operation for all functions, menu display, rotary dial adjustment   |             |             |             |
| Display                           | Display: TFT LCD<br>Language: English, Chinese (simplified), Chinese (traditional)  |             |             |             |
| Power requirements                | Power Requirements: AC220V (1±10%) / AC110V (1±10%)<br>Frequency: 50Hz/60Hz(1±5%)<br>Power Consumption: <50VA   |             |             |             |
| Environmental condition           | Temperature: 0~40°C<br>Humidity: <80%   |             |             |             |
| Standard accessories              | Power cord ×1, Operation manual ×1, Software CD ×1, RS-232 cable ×1, BNC-BNC cable ×1, Test lead ×1   |             |             |             |
| Dimension                         | 415×295×195mm   |             |             |             |
| Weight                            | 3.5kg   |             |             |             |