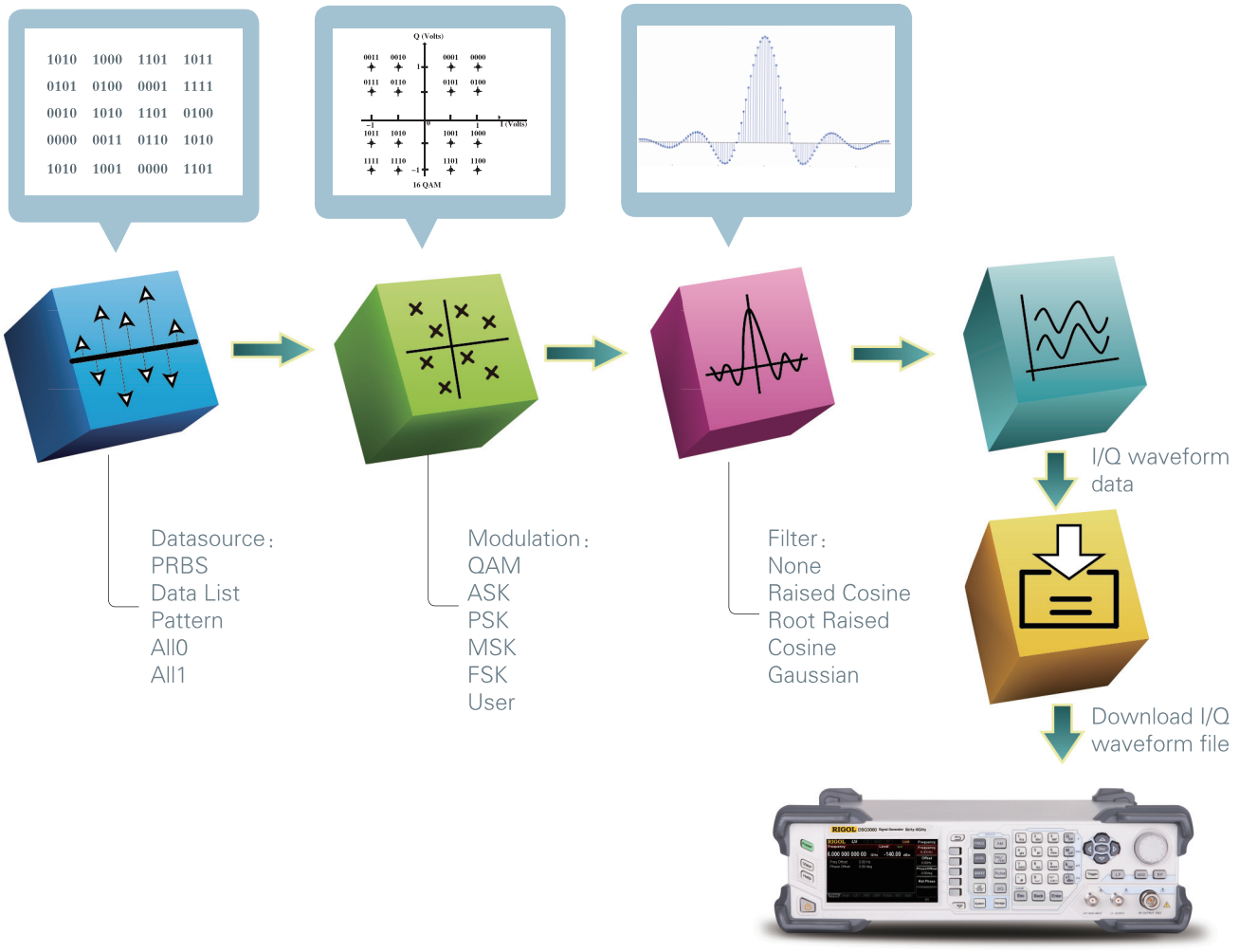
RIGOL
Beyond Measure

IQ Modulation Data Sheet

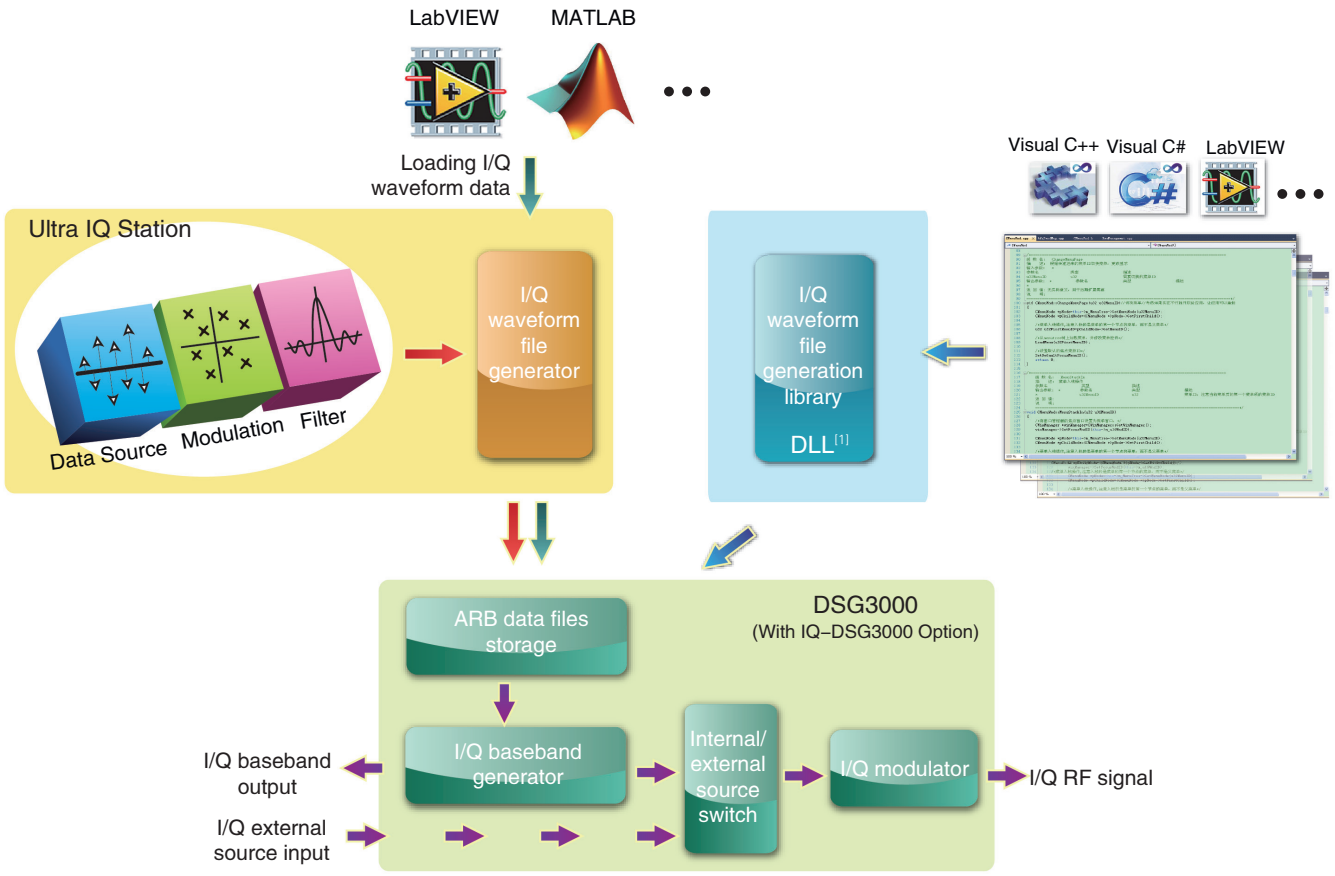
Ultra IQ Station PC Software
DSG3000 Series RF Signal Generator
IQ-DSG3000 Option



Product Features

- Provides wide variety of data source types, including PRBS, Data List, Pattern, All0 and All1
- The modulation mode includes QAM, ASK, PSK, FSK, MSK and User
- Provides rectangular filter, raised cosine filter, root raised cosine filter, and Gaussian filter
- Diverse waveform display modes: i(t)/q(t), FFT Magnitude and Constellation; waveform zooming in or out function
- Supports three kinds of ARB file download methods: use Ultra IQ Station software to edit and download, load the ARB file edited by other software using Ultra IQ Station software, program by recalling function to edit and download
- Supplement and save the external ARB data
- Ease–to–use graphical user interface
- IQ modulation which supports internal and external modulation modes and IQ baseband output

I/Q Signal Generation and Download (Three Methods)



The ARB file is edited and downloaded into DSG3000 by the Ultra IQ Station PC software.

The ARB file edited by other software (e.g. MATLAB, LabView, MathType and so on) is loaded into DSG3000 using the Ultra IQ Station PC software.

The ARB file is generated and downloaded into DSG3000 under Visual C++, Visual C# and LabVIEW environment on the basis of I/Q dynamic link library.

NOTE: [1] For more information about IQ dynamic link library and IQ Modulation Programming Guide, please visit www.rigol.com to download.

▶ Specifications (Ultra IQ Station PC Software)

Data Source	
Data source type	PRBS, Data List, Pattern, All0, All1
Data source length	1~2M symbols
Symbol rate	100 ~10M syms/s
Coding mode	Default, Gray

Modulation Mode	
QAM	16QAM, 32QAM, 64QAM, 128QAM, 256QAM
ASK	2ASK, 4ASK, 8ASK, 16ASK, 32ASK
PSK	BPSK, QPSK, π/4–QPSK, π/4–DQPSK, 8PSK
FSK	MSK, 2FSK, 4FSK
User	The *.map file defined by user[1]
Filter	
Filter type	Raised Cosine, Root Raised Cosine, Gaussian
Roll of factor	0.05~1.00 (Raised Cosine and Root Raised Cosine)
B*T (Bandwidth*PatternPeriod)	0.15~1000.00 (Gaussian)
Impulse length	1~128 symbols
Oversampling	2~32

Graph View	
Display mode	i(t)/q(t), FFT Magnitude, Constellation
FFT length	128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536
Window function type	Rectangle, Hanning, Flat Top, Blackman

NOTE: [1] The *.map file loaded must comply with the format of the constellation graph corresponding to theQAM modulation type (such as 16QAM, 32QAM, 64QAM, 128QAM or 256QAM).

▶ Appendix (IQ-DSG3000 Option)

I/Q Modulation (Option IQ–DSG3000)		
Modulation source	External, internal	
Bandwidth (RF)	External modulation	
	Baseband (I or Q)	⩽ 120MHz (nom.)
	RF (I + Q)	⩽ 240MHz (nom.)
	Internal modulation	
	Baseband (I or Q)	⩽ 30MHz (nom.)
	RF (I + Q)	⩽ 60MHz (nom.)
Carrier suppression[1]	Carrier frequency range:50MHz ⩽ f ⩽ 6GHz	⩾ 40dBc (typ.)
Suppression of image sideband[2]	Modulation bandwidth up to ±10MHz	⩾ 40dBc (typ.)
External I/Q inputs	VSWR	<1.5
	Full scale input	$\sqrt{I^2+Q^2}=0.5Vrms$
Internal modulation		
EVM	16QAM , root cosine filter (α=0.22), 4MSps	
	50MHz ⩽ f ⩽ 3GHz (level ⩽ 4dBm)	⩽ 0.7%rms (typ.)
	3GHz < f ⩽ 6GHz (level ⩽ 0dBm)	⩽ 1.2%rms (typ.)
	QPSK , root cosine filter (α=0.22), 4MSps	
	50MHz ⩽ f ⩽ 3GHz (level ⩽ 4dBm)	⩽ 0.7%rms (typ.)
	3GHz < f ⩽ 6GHz (level ⩽ 0dBm)	⩽ 1.2%rms (typ.)
External modulation		
EVM	CDMA2000/1xEV–D0, 1.2288 Mcps, frequency 800 to 900MHz, 1800 to 1900MHz, level ⩽ 4dBm	⩽ 1.2%, ⩽ 0.8% (typ.)
ACPR		⩾ 70dB

NOTE: [1] [2] The parameter is measured at room temperature. When the temperature is difference from room temperature, the specification will deteriorate.

I/Q Baseband Generator (Option IQ–DSG3000)			
Output impedance	50Ω (nom.)		
Output voltage	Setting range		$0.1V_{pp}$ to $1.5V_{pp}$
	Resolution		1mV
Frequency response	Referenced to 1MHz	≤ 10MHz	<0.5dB (nom.)
		≤ 30MHz	<1dB (nom.)
I/Q imbalance	Magnitude	≤ 10MHz	<0.1dB (nom.)
		≤ 30MHz	<0.2dB (nom.)
	Nonlinear phase	≤ 10MHz	200ps (nom.)
		≤ 30MHz	500ps (nom.)
SFDR	Sine	≤ 30MHz	>50dB (nom.)
Waveform memory	Waveform length		1 sample to 8 Msample in one–sample steps
	Resolution		14 bits
	Loading time 1Msample		<10 s[1] (nom.)
	Nonvolatile memory		1G Bytes
Sample rate	Setting range		1 kHz to 50 MHz,100 MHz
	Resolution		0.01 Hz
Trigger	Triggering		Auto, trigger key, external, bus(GPIB, USB, LAN)
	Operating modes		Retrig, armed auto, armed retrig, single
	External trigger delay		
	Setting range		0 to $(2^{16} - 1)$
	Resolution		1
	External trigger inhibit		
	Setting range		0 to $(2^{16} - 1)$
	Resolution		1
	External trigger pulse width		>20 ns (nom.)

NOTE: [1] Load from flash internal non–volatile memory.

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