PXI Modules

3025 Digital RF Signal Generator

Fully featured PXI digital RF signal generator module for applications in communications system test

- Frequency range 86 MHz to 6 GHz
- Level range -120 to + 5 dBm maximum
- Level accuracy ±0.3 dB typical cw
- Analog, digital and vector modulation
- List mode for fast switching
- Dual-channel deep memory AWG (32 Msample)
- IQCreator waveform creation software
- AWG waveform sequencer
- Data interface for digital IQ streaming
- Low phase noise typically -115 dBc/Hz at 20 kHz offset
- Versatile triggering
- Optional analog I & Q inputs and I & Q outputs
- Used with 3010/3011 PXI RF synthesizer module

Creating high quality complex RF test signals has never been more flexible or cost effective.

The combination of PXI modules 3025 and 3010 form a compact 3U high precision RF signal generator with integrated dual-channel arbitrary waveform generator, (AWG) occupying just 3 slots. Together their functionality and performance are ideally matched to the needs of RF test systems for manufacturing or design verification.

The versatile 2 slot wide 3025 RF signal generator covers the entire frequency range from 86 MHz to 6 GHz with an RF output level ranging from –120 dBm to +5 dBm (maximum). Comprehensive modulation capability is provided including internal analog AM/FM, digital and IQ vector modulation modes. Digital modulation with an I and Q bandwidth of up to 14 MHz is supported either with a built in dual-channel AWG supplied as standard or via an external digital IQ data interface. Optional vector modulation analog I and Q inputs increase the IQ bandwidth to over 25 MHz. The dual-channel AWG can be used either as an internal modulation source or a baseband source. Baseband outputs are optional, they can be configured to provide differential I and Q outputs simultaneously with a CW RF output signal. The single slot wide 3010/3011 RF synthesizer module provides the low phase noise, frequency agile local oscillator input to the 3025.

Complex modulation waveforms can be designed using IQCreator. This software application provides design templates for all common digital radio systems including GSM, EDGE, UMTS, IS136, IS95, cdma2000, and IEE 802.11a, b and g WLAN as well as custom waveform templates for FSK, PSK and QAM modulation types. IQCreator also provides tools to package waveforms into a format compatible with the AWG. This enables waveforms designed using other design tools such as MatLab or MathCad to be loaded.

Advantages of 3025 and PXI

The 3025 digital RF signal generator offers significant economies compared to other general purpose rack and stack instruments while maintaining high performance and broad functionality. In part this is achieved by exploiting the benefits of the PXI specification, an industry standard open architecture for modular instrumentation. Using PXI enables faster measurement speed, smaller size and greater flexibility for integration and future system evolution.

Preliminary

Applications

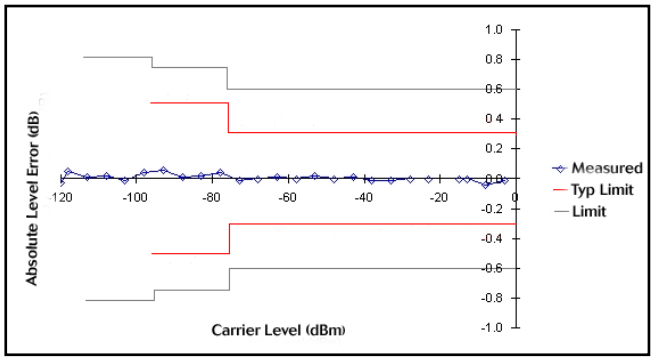
The 3025 is an essential component within any automated development or manufacturing RF test system designed around the needs of advanced digital communications standards as used in WLAN, WMAN and cellular communications as well as applications in satellite and terrestrial TV broadcasting and military communications. Whether the application is for measurement or system emulation, the 3025 delivers the functionality and performance required. When used in conjunction with other Aeroflex PXI RF modules, complete RF test systems can be designed. The 3025 digital RF signal generator is complementary to the 3035 RF digitizer which provides wideband high dynamic range A to D conversion of RF input signals up to 6 GHz.

Performance Highlights

Wide Frequency Range: The 3025 covers all licensed and unlicensed operating bands for WLAN, WMAN, mobile phones and more with its continuous frequency range from 86 MHz to 6 GHz with 1 Hz resolution below 3 GHz and 2 Hz above 3 GHz.

Low Noise and Frequency Agile: The 3025 module is designed to be used with either a PXI 3010 or 3011 RF synthesizer module. This provides a low noise agile local oscillator signal from which the 3025 phase noise is defined. Phase noise at 20 kHz offset from carrier is typically –116 dBc/Hz at 2 GHz and –108 dBc/Hz at 5 GHz while the noise floor at 2 GHz is typically –135 dBc/Hz from 10 MHz offset. Frequency settling can be achieved in typically 250 μs (3010 opt 01 fitted). This makes the 3025 ideal for high productivity RFIC testing or as a stimulus to frequency hopping radios.

Accurate RF Level: The output level is variable in fine 0.01 dB increments from –120 dBm to a maximum level of + 5 dBm up to 3 GHz and 0 dBm above 3 GHz. An all digital levelling control loop ensures that even with modulated signals the output signal is maintained at an accurate level. Levelling control is combined with an electronic high speed RF attenuator making the 3025 very reliable for volume manufacturing. High dynamic range modulated RF bursts can be generated to simulate TDMA signal characteristics as used in a variety of cellular and other wireless applications.



Typical 3025 level accuracy at 1 GHz

Stability: Frequency and power settings remain stable across both time and temperature variation ensuring consistent measurement results time and time again. Using the 3011's internal OCXO 10 MHz reference, frequency stability is typically 0.01 ppm across 0 to 50 degrees C.

IQ Digital Modulation: High quality digital modulation is provided with I and Q bandwidths of 14 MHz. IQ calibration ensures that modulator carrier leakage and sideband suppression are typically –50 dBc. Modulation linearity for UMTS W-CDMA (downlink test model 1) is better than 55 dB making the 3025 ideally suited for testing mobile amplifiers. The source of modulation can be either from the internal dual-channel Arbitrary Waveform Generator (AWG), or from external digital IQ data. The VHDCI data interface can be used to input 14 bit digital IQ data and associated control and timing signals.

Optional Analog I & Q Outputs and Analog I & Q Inputs: With this option fitted, the 3025 can provide outputs at base band simultaneously with a CW output at RF making it ideal for testing RFIC modulators. Analog I & Q outputs from the dual-channel AWG can be used as singled ended or differential. Differential output level can be set in the range 100 mV to 4 V pk with or without additional DC biasing control to +/-3V and differential offset voltage control to +/- 600 mV with a limit of 6 V total EMF.

IQ Vector Modulation: Analog I & Q vector modulation inputs provide 25 MHz of IQ bandwidth and permit wideband modulation from external analog I & Q sources including test instruments and device outputs (Analog I & Q inputs for vector modulation are provided as an option together with analog I & Q outputs).

Arbitrary Waveform Generator: The dual-channel AWG has a large 128 Mbytes (32 Msamples) sample memory, each 32 bit sample word consisting of 14 bit I, 14 bit Q and 4 bit marker data. The AWG memory can be used to store either a single long waveform or any number of smaller waveforms up to the limit of the sample memory. Transfer of waveforms between the controller and the AWG is fast by virtue of the wide bandwidth of the PXI backplane and once loaded switching between waveforms can be almost instantaneous when using list mode. Through innovative design, the dual-channel AWG can achieve a single file playback time in excess of 30 minutes by incorporating a real time interpolating decimation filter. Even longer file playback is possible by sequencing the AWG files in list mode.

Triggering and Synchronization: The 3025 is equipped with a variety of triggering facilities to maximize flexibility for synchronous measurements. Trigger scenarios can be configured making it possible for different trigger events to impact different hardware responses. These can be used for a variety of simple or complex switching/control applications including addressed selection or stepped increment of RF frequency, level, AWG file, marker/trigger routing from the front panel to PXI backplane or vice versa, control of modulation on/off, RF on/off status, and RF levelling loop. Trigger sources can be via the front panel or the PXI backplane. The front panel supports triggering from a TTL input or via the LVDS interface. The LVDS interface can be used to supply single line or addressed triggers as well as supporting marker inputs and outputs. Similarly the 3025 supports all PXI backplane trigger sources. The 3025 trigger inputs may be routed to the 3010 using the PXI local bus.

The LVDS front panel connector provides a real time digital IQ data interface in which case clock and IQ select lines are included.

List Mode: In list mode all 3025 internal hardware settings are precalculated making it possible to select a new frequency in typically

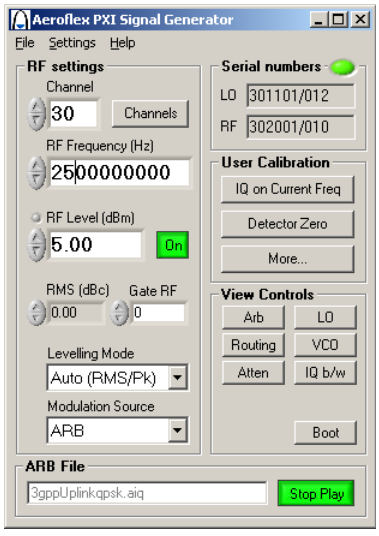
250 μs while maintaining RF output accuracy. This feature is ideally suited for fast receiver alignment applications and is complemented by similar features in the 3035 RF digitizer in support of the corresponding fast transmitter alignment. list mode supports 128 combinations of different frequency and level settings. The list address can be sourced externally or from an internal counter or register driven by the application controlling the 3025.

* with 3010 opt 01 fitted

AWG Sequencing: Using AWG sequencing makes it possible to construct very long play sequences and by combining AWG file sequencing with list mode, the 3025 provides total flexibility in frequency, level and waveform selection/sequencing in conjunction with a variety of trigger sources. The sequence can contain up to 128 addresses. At each address the file can be played a user defined fixed number of times or continuously until triggered to the next sequence step. AWG sequencing is highly flexible. An AWG file play sequence can also be constructed to include periods of unmodulated or no signal output. Stepping between list address can be triggered as an immediate event or set up to wait for the current waveform file to end before playing the next file. This configuration option ensures continuous baseband generation from the AWG when sequencing through list mode and hence can avoid switching transients being generated.

Software

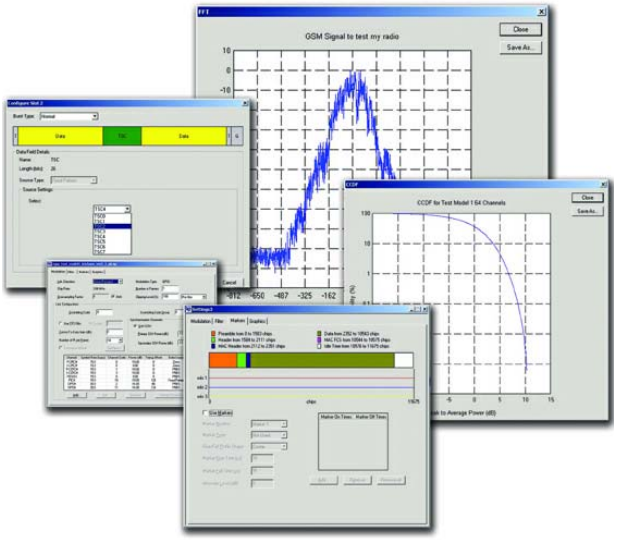
The 3025 is supplied with an easy to use Active X control and associated soft front panel. This provides control of both the 3025 and 3010/11 modules to help simplify integration or can be used in conjunction with a third party LO source driver in the absence of the 3010. Additionally, VXI PNP drivers and associated soft front panels are supplied independently for each of the 3025 and 3010/11 modules. The soft front panel enables manual control of all key features to aid de-bugging during program development.



SIGGEN soft front panel

IQCreator, Windows™ 9x, 2000, XP application:

IQCreator enables the design of a wide range of user defined or system specific complex digital modulation waveform files for use with the 3025 AWG. Generic capabilities include FSK, MSK, PSK and QAM modulation types with user defined symbol rates and a choice of filter characteristics. Data sources can be PRBS, fixed pattern or user defined. In addition, the user can enter deliberate IQ errors. Also included are standard waveforms and design templates for 2G, 2.5G and 3G TDMA and CDMA digital cellular standards together with WLAN and cordless telephone standards. IQCreator also supports the development of multi-tone, multi-carrier and multi-standard waveforms. For testing 3G receivers with specific C/N input levels, IQCreator permits AWGN interference to be combined with the modulation waveform. IQCreator provides graphical illustration of waveform, spectrum and CCDF characteristics.



IQCreator GSM/EDGE waveform templates

IQCreator is a "free to download" application from the Aeroflex website. Loading waveforms created using IQCreator into the 3025 requires the enable IQCreator option 100 in the 3025. In the absence of the enable IQCreator option, the software may still be used to package customer files, e.g. from MATLAB or Mathcad into the correct format for use in the 3025.

Customer Support

Users can elect to purchase PXI modules with optional warranty extensions.

Standard extended warranty provides either 36 months or 60 months warranty period plus the benefits of guaranteed product repair times in the event of failure.

Standard extended warranty can also be provided inclusive of scheduled calibration.

On request Aeroflex can provide customized premium warranty support designed around your specific needs.

SPECIFICATION

3025

All 3025 specifications are defined when used in conjunction with a 3010/11 RF synthesizer PXI module.

RF OUTPUT

FREQUENCY

Range

100 MHz to 6 GHz

Lower frequency extended to 86 MHz with internal modulation on

Resolution

Below 3 GHz; 1 Hz
Above 3 GHz; 2 Hz

Accuracy

As per frequency reference

Settling Time

Time taken to be settled at final frequency

List mode with 3010 BW set to Normal loop and option 01 fitted:

Below 3 GHz, typically 250 µs settled to 0.7 ppm or 1 kHz whichever is the smaller

Above 3 GHz typically 250 µs settled to 2 kHz

3010 BW set to Normal loop:

Typically 1.1 ms

3010 BW set to Narrow loop:

Typically 10 ms

LEVEL

Output Power Range

Below 3 GHz: -120 to +5 dBm (peak)
Above 3 GHz: -120 to +0 dBm (peak)

Resolution

±0.01 dB

Accuracy (for CW signals) 23°C ±5°C

100 MHz to 3 GHz:

>-78 dBm, <±0.6 dB (typically ±0.3 dB)
>-93 dBm, <±0.75 dB (typically ±0.5 dB)
>-113 dBm, <±1.0 dB (typically ±0.5 dB)

Above 3 GHz:

>-100 dBm, <±1.0 dB

Switching time *(within ±0.3 dB of final value)*

List mode hardware triggered:

< 3 ms

Output Impedance

50 Ω

Output VSWR

Below 3 GHz: 1.5:1 for output levels <–1 dBm
Above 3 GHz: 1.6:1

Reverse Power Handling

Not to exceed +20 dBm

LIST MODE

List Mode Channel Parameters

RF frequency, RF level, RF levelling mode, RMS offset, RF out (on/off), Modulation mode, AWG file selection

List Addresses

128 numbered 0 to 127

Settling Time

See frequency and level data

Address Sources

Manual (software commanded)
External (hardware triggered)
Internal (counter timer)

External Mode Trigger Sources

PXI Trigger bus, Star trigger, PXI local bus, LVDS Aux 1 to 5, TTL+ve, TTL-ve

Counter Mode (internal)

Dwell time 250 µs to 10 seconds with resolution 10 µs

Dwell time may be overridden depending upon AWG sequencer settings.

SPECTRAL PURITY

SSB Phase Noise

Typical at 2 GHz and at ambient room temperature

3010/11 Loop Bandwidth	Narrow	Wide (normal)
Offset	dBc/Hz	dBc/Hz
100 Hz	-54	-84
1 kHz	-84	-102
10 kHz	-113	-102
20 kHz	-115	-109
100 kHz	-132	-129
1 MHz	-135	-135
10 MHz	-135	-135

Phase noise below 100 Hz is dependent upon reference phase noise.

Typical phase noise at 5 GHz –108 dBc/Hz 20 kHz offset

Noise Floor (2 GHz)

Typically -135 dBc/Hz at 10 MHz offset

Non-Harmonic Related Spurious (<0 dBm output)

Typically –60 dBc from >10 kHz offset
Typically –70 dBc for C.W signals

Sub-Harmonics (0 dBm output)

-30 dBc, typically -55 dBc

Harmonics (0 dBm output)

2nd harmonic,<-30 dBc, typically -45 dBc
3rd harmonic, <-30 dBc, typically -55 dBc

MODULATION

Modulation Modes:

Internal analog AM or FM
Internal digital IQ, (AWG)
External analog IQ (optional)
External digital IQ (LVDS)

INTERNAL AMPLITUDE MODULATION

Modulation Generator

Sinusoidal single tone

Modulation Rate

1 kHz to 50 kHz

Resolution

1 Hz

Mod Depth Range

0% to 99%

Resolution

1%

Accuracy (1 kHz mod rate)

±4% of set depth ±1%

Total Harmonic Distortion (1 kHz mod rate)

<1% for depths of <30%
<2% for depths <80%

INTERNAL FM MODULATION

Modulation Generator

Sinusoidal single tone

FM Modulation Rate

1 kHz to 50 kHz

Resolution

1 Hz

FM Deviation Range

10 Hz to 500 kHz

Resolution

1 Hz to 1 kHz, 10 Hz above

Accuracy (1 kHz mod rate)

<±3% of set deviation

Total Harmonic Distortion (at 1 kHz max deviation)

<1.5% at max deviation

DIGITAL MODULATION

I and Q Bandwidth

Digital modulation 14 MHz (-3 dB) using the internal AWG / LVDS

Vector modulation 25 MHz (-3 dB) using external I and Q (3020 option 01 fitted)

Residual Carrier Leak[1]

Typically -50 dBc

IQ Image Suppression[1]

Typically -50 dBc for a 10 kHz modulation tone

Linearity

>55 dB ACPR on WCDMA signals (Downlink test model 1)

Meets 802.11a/g spectral mask with >10 dB standoff

Third Order and Intermodulation Distortion
(2 tone with spacing >25 kHz at -6 dBm per tone)

<-50 dBc relative to each tone

Error Vector Magnitude

Below 3 GHz: <1.5% EVM on WCDMA signals, typically 0.5% EVM on GSM EDGE signals

Up to 6 GHz: <2% EVM on IEE 802.11a, b, g signals

ARBITRARY WAVEFORM GENERATOR

Memory

*32 Msamples I Q * 14 bit + 4 markers*

AWG File Source Data

IQCreator (requires option 100)

*ASC11, 16/32 bit integer, 32 bit floating point**

**using IQCreator waveform packager to convert into a 3025 compatible format*

Sample Rates

14.323 kHz to 33 MHz, 44 MHz to 66 MHz

AWG SEQUENCER

Number of Segments

128

Segment Type

AWG file, CW (Mod Off), RF Off**

**When used in conjunction with list mode*

Number of AWG Files

1 to 64

Length of Segment

Up to limit of AWG memory (32 Msample)

Number of Segment Repeats

1 to 4095

Sequence Trigger Modes

Stepped, Single, Continuous

Sequence Trigger Sources

PXI trigger bus, Star trigger, PXI local bus, LVDS Aux 1 to 5, TTL+ve, TTL-ve, Software commanded

AWG File Selection Time

AWG completion On – Seamless AWG completion Off – Defined by sample rate

REAL TIME IQ INTERFACE

Input Level

LVDS (Low voltage differential signalling ANSI/TIA/EIA-644)

Input Data

14 bit IQ data + 4 markers, 5 aux, clock, IQ select

Output Data

4 markers, 5 aux, clock, IQ select

Sampling Rate

14.323 kHz to 33 MHz, 44 MHz to 66 MHz

3025 OPTION 01: ANALOG I & Q INPUTS AND I & Q OUTPUTS

I & Q ANALOG OUTPUTS

Single ended I & Q outputs, 50 ohms
Differential I & Q outputs, 100 ohms

Output Level Range

Single ended: 50 mV to 2 V pk
Differential: 100 mV to 4 V pk

Output Level Resolution

100 µV

Output Level Accuracy

<2% at 20 kHz, typ 1.5%, excludes termination errors

I/Q Level Imbalance Adjust

±4 dB nominal continuously variable

Output Bias Range

±3 V

Output Bias Resolution

1.5 mV

Output Bias Accuracy

<±2% ±4 mV max; ±1% ±2 mV typical

Differential Offset Range

0 V to ±600 mV

Differential Offset Resolution

100 µV

Differential Offset Accuracy

<±2% ±3.3 mV max, ±1% ±0.7 mV typical

Differential Signal Balance

Typically 0.15 dB @ 10 MHz

Frequency Response

15 MHz 3 dB bandwidth at max output level

Spectral Purity (2 V pk-pk set voltage at 1 MHz)

2nd harmonic <–70 dBc
3rd harmonic <–65 dBc
IMD <–70 dBc (100 kHz tone spacing)

I & Q ANALOG INPUTS

Single ended I & Q inputs, selectable 50 Ω or 100 kΩ

Input Level

0.5 Vrms on I or Q for nominal set RF level (unlevelled)

Bandwidth

>25 MHz (50 Ω only)

INTERFACES

3010/11:

LO output (SMA)
10 MHz reference I/O (SMAx 2)
PCI bus interface including PXI triggering functions

3025:

RF output (SMA)
LO input 1.5 GHz to 3 GHz, nominally 0 dBm (SMA) 50 Ω
10 MHz reference input for sampling clock (SMA)
10 MHz reference link through (SMA)
Data IQ interface (VHCDI)
Ext. trigger In: LVDS, TTL (SMB) or PXI
Trigger out: LVDS or PXI
PCI bus interface including PXI triggering functions
I & Q In (SMB x 2,) –I, +I, –Q, +Q Out (SMB x 4) with 3020 option 01 fitted

POWER CONSUMPTION (TYPICAL)

	3010/3011	3025
+3.3 V	50 mA(1)	1 A
+5 V	650 mA	1.6 A
+12 V	50 mA(2)	210 mA
-12 V	30 mA	280 mA

(1) 250 mA transiently during power up

(2) 3011 OCXO requires 300 mA startup reducing to 150 mA after 5 minutes

DIMENSIONS AND WEIGHT

Dimensions

3010/11	Single width 3U PXI module
3025	Double width 3U PXI module

Weight

3010	375 g (0.8 lbs)
3011	390 g (0.86 lbs)
3025	675 g (inc option 01) (1.5 lbs)

FREQUENCY REFERENCE IN

Source

3010/11	External SMA
3025	External SMA and external PCI

Input

0.4 V to 4 V pk-pk into 50 ohms or looped through

Frequency

10 MHz ± 100 Hz

GENERAL

The following general specifications are common to the 3010, 3011 and 3025.

RF Leakage

<5 µV PD at the carrier frequency into a single turn 25 mm loop, 25 mm or more from the front panel

Standard Warranty

24 months

Calibration Interval

Recommended 24 months

Electromagnetic Compatibility

EN 61326-1:1997, Emissions Class A, Immunity Table 1 – Performance Criteria B

Safety

EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1, General requirements

Driver Software

VXIpnp compliant software driver

RATED RANGE OF USE

Operating Temperature

0 to 50°C. Meets IEC-60068-2-1 and 60068-2-2

Operating Humidity

10 to 90% non-condensing. Meets IEC-60068-2-56

CONDITIONS OF STORAGE AND TRANSPORT

Storage Temperature

-20 to +70°C. Meets IEC-60068-2-1 and 60068-2-2

Storage Humidity

5 to 93% non-condensing. Meets IEC-60068-2-56

Shock

30 g peak, half sine, 9 ms pulse. Tested in accordance with IEC-60068-2-27

Random vibration 5 Hz to 500 Hz, 2.46 g rms non-operating. Tested in accordance with IEC-60068-2-64

COMPLIANCE

PXI Specification, Revision 2.1 VXIplug&play specifications (VPP-2, VPP-3.x, VPP-4.x and VPP-7)

3010/3011 SPECIFIC SPECIFICATIONS

Specifications are common to the 3010 and 3011 unless otherwise stated.

LOCAL OSCILLATOR OUT

Frequency Range

1.5 GHz to 3.0 GHz

Resolution

1 Hz

Accuracy

As frequency standard

Output Power

Fixed level in the range -4 dBm to +3 dBm

Output Impedance

50 Ω Nominal

VSWR

<2:1

FREQUENCY REFERENCE OUT (3011 ONLY)

Level

2 V pk-pk nominal square wave into 50 Ω

Frequency

10 MHz

Aging Rate

1 in 10^9 per day 1 in 10^7 per year

Temperature Stability (0 to 50°C)

Typically better than ±1 x 10^{-8}

Warm-Up Time

<5 minutes

VERSIONS, OPTIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers	Versions
3025	PXI Digital RF Signal Generator (6 GHz)
3010	PXI RF synthesizer
3011	PXI RF synthesizer (including OCXO 10 MHz reference)

Supplied with

The 3025 and 3010/11 are each supplied with:

CD ROM containing VXI PNP driver, soft front panel and user documentation.

2 SMA link cables

SMA connector saver

Options

3020 Opt 01	Analog I & Q inputs and I & Q outputs
3010/11 Opt 01	High speed frequency switching

Waveform Creation Application Software

3020 Opt 100	Enable IQCreator (2)
3020 Opt 101	Enable IQCreator 2G CDMA (3)
3020 Opt 102	Enable IQCreator 2G CDMA + 3G CDMA (3)

When purchased as an upgrade, then order as:

RTROPT100/3020 Enable IQCreator

RTROPT101/3020 Enable IQCreator 2G CDMA

RTROPT102/3020 Enable IQCreator 2G CDMA + 3G CDMA

Service Options

W3010/103	Standard extended warranty 36 months
W3020/103	Standard extended warranty 36 months
W3010/103C	Standard extended warranty 36 months with scheduled calibration
W3020/103C	Standard extended warranty 36 months with scheduled calibration
W3010/105	Standard extended warranty 60 months
W3020/105	Standard extended warranty 60 months
W3010/105C	Standard extended warranty 60 months with scheduled calibration
W3020/105C	Standard extended warranty 60 months with scheduled calibration

Optional Accessories

23435/698	68 way VHDCI to SCSI-3 cable assembly 1.8 m
23435/699	68 way VHDCI to VHDCI cable assembly 1.8 m
43138/421	SMA link cable
46885/224	SMA connector saver
46662/767	PXI hard carry case (for use with 82536, 82544)
82536	PXI assy, 8 slot chassis with 2.2 GHz P4 embedded controller (Windows XP)
82544	PXI assy, 8 slot chassis with MXI-4 PCI-PXI interface
82538	PXI assy, 18 slot chassis with 2.2 GHz P4 embedded controller (Windows XP)
82545	PXI assy, 18 slot chassis with MXI-4 PCI-PXI interface

Notes

(1) After warm-up and self calibration valid for temp range 5°C

(2) Supplied with CD ROM containing IQCreator Windows application

(3) Requires option 100

CHINA Beijing
Tel: [+86] (10) 6467 2716
Fax: [+86] (10) 6467 2821

CHINA Shanghai
Tel: [+86] (21) 6282 8001
Fax: [+86] (21) 62828 8002

FINLAND
Tel: [+358] (9) 2709 5541
Fax: [+358] (9) 804 2441

FRANCE
Tel: [+33] 1 60 79 96 00
Fax: [+33] 1 60 77 69 22

GERMANY
Tel: [+49] 8131 2926-0
Fax: [+49] 8131 2926-130

HONG KONG
Tel: [+852] 2832 7988
Fax: [+852] 2834 5364

INDIA
Tel: [+91] 80 5115 4501
Fax: [+91] 80 5115 4502

KOREA
Tel: [+82] (2) 3424 2719
Fax: [+82] (2) 3424 8620

SCANDINAVIA
Tel: [+45] 9614 0045
Fax: [+45] 9614 0047

SPAIN
Tel: [+34] (91) 640 11 34
Fax: [+34] (91) 640 06 40

UK Burnham
Tel: [+44] (0) 1628 604455
Fax: [+44] (0) 1628 662017

UK Stevenage
Tel: [+44] (0) 1438 742200
Fax: [+44] (0) 1438 727601
Freephone: 0800 282388

USA
Tel: [+1] (316) 522 4981
Fax: [+1] (316) 522 1360
Toll Free: 800 835 2352

AEROFLEX
A passion for performance.

www.aeroflex.com

info-test@aeroflex.com

Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.

Part No. 46891/242, Issue 1, 09/05