

# Signal Sources

## 2050T Series Signal Generators

**AEROFLEX**  
A passion for performance.



Setting the standard for low adjacent channel power for TETRA modulation

- $< -70$  dBc Adjacent Channel Power TETRA modulation
- Excellent vector accuracy
- Rayleigh & Rician fading
- Burst control
- Internal PRBS data source
- Baseband IQ outputs
- IQ vector modulation

*The new 2050T series are variants of the successful 2050 series of digital and vector signal generators. They have been designed to satisfy the challenging needs of TETRA radio development and production but without compromising any of the 2050's original features.*



### Adjacent Channel Power

For TETRA radio development and production, a new level of signal generator performance is demanded. For selectivity testing of TETRA radio receivers, the level of adjacent channel power from the interfering source (TETRA T2) must be lower than  $-70$  dBc.

Throughout all areas of TETRA development, the problem of adjacent channel power is a key issue

which the 2050T series have been specifically designed to address.

The 2050T series offer better than  $-70$  dBc adjacent channel power across the RF frequency range 100 MHz to 490 MHz and throughout their RF level range whilst maintaining a RMS vector error of better than 1.5%.

### TETRA Modulation

The modulation characteristics of TETRA are faithfully reproduced within the 2050T series.  $\pi/4$  Differential QPSK is only one of many modulation types provided. In Advanced Digital Mode the modulation parameters are fixed to those demanded by TETRA. In Normal Digital Mode it is possible to modify subtle aspects of the modulation such as filter alpha coefficients or modulation data rates.

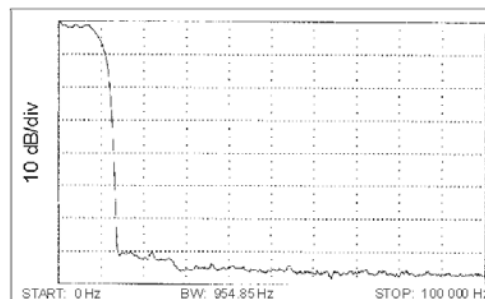


Figure 1 : TETRA ACP Spectrum

### Rayleigh and Rician Fading

It is easy to introduce Rayleigh or Rician fading together with modulation impairments, such as IQ imbalance, skew and carrier leakage to each of the baseband, IF and RF outputs.

### Burst Control

The TDMA characteristics of TETRA can be readily simulated. Using the 2050T series Envelope Control, bursts of modulation with

over 80 dB dynamic range are possible. The Envelope Control features a linear modulator allowing careful definition of burst ramps. Alternatively if the 2050T series are used with an external data source, RF bursts may be defined digitally by a simple TTL or CMOS control which produces controlled ramp profiles.

### Digital Data Source

The 2050T series feature an internal data generator able to produce various PRBS sequences as per CCITT V.52 recommendations. Alternatively, it is possible to input serial or parallel TTL/CMOS data sequences in real time from an external data source. External data may be clocked in using Bit and Symbol clocks supplied internally from the 2050T series or from external sources.

### IQ Outputs

The 2050T series feature an IQ vector modulator which may be driven from external I and Q analog drives or from internally DSP generated signals. The internally generated I and Q filtered signals, together with any fading and selected impairments, are available as I and Q analog outputs. They may then be used to drive external modulators or used as test signals in cartesian feedback designs.

### Electronic Attenuator

An electronic attenuator option is available to meet demanding extended life requirements for repetitive switching, found in high volume production applications.

## SPECIFICATION

### GENERAL DESCRIPTION

2050T series signal generators have a large screen dot matrix display with softkey function selection which allows flexibility of operation. Hardkey and data entry key together with a rotary control knob are also provided. The output may be modulated using  $\Phi$  M, FM, AM, IQ vector or complex digital modulation. Pulse modulation is optional.

### CARRIER FREQUENCY

#### Range

10 kHz to 1.35 GHz (2050T)  
 10 kHz to 2.7 GHz (2051T)  
 10 kHz to 5.4 GHz (2052T)

In digital and vector modes the lowest frequency is 10 MHz and for 2052T the highest frequency is reduced to 2.7 GHz.

#### Selection

By keyboard entry of data. Variation by up/down keys and by rotary control.

#### Indication

11 digits with annunciators.

#### Resolution

0.1 Hz.

#### Accuracy

As frequency standard.

#### Phase incrementing

The carrier phase can be advanced or retarded in steps of 1.5° using the rotary control.

## RF OUTPUT

### Range (Analog mode)

-144 dBm to +13 dBm. Max guaranteed output above 2.7 GHz is +11 dBm.

With AM selected, the maximum output level reduces linearly with AM depth to +7 dBm at maximum AM depth.

### Range (Digital or Vector mode)

-138 to +6 dBm\* peak envelope power.

RF level is defined with a PRBS modulation applied in digital mode or with 0.5 V applied to either the I or Q input in vector mode.

\*Maximum level is reduced to -6 dBm PEP when in advanced digital mode

### Selectable Overrange Mode

Uncalibrated levels up to +19 dBm in analog mode.

### Selectable Extended Hysteresis

Uncalibrated RF level control over a range of 24 dB (maximum) without level interruption.

### Selection

By keyboard entry of data. Variation by  $\uparrow$ / $\downarrow$  keys and by rotary control. Units may be  $\mu$ V, mV, V, EMF or PD; dB relative to 1  $\mu$ V, 1 mV, EMF or PD; dBm.

### Indication

4 digits with unit annunciators.

### Resolution

0.1 dB.

### Accuracy

At 22°C  $\pm$ 5°C in non Digital or Vector modes:

<1.35 GHz	<2.7 GHz	<5.4 GHz	
>0 dBm	$\pm$ 0.5 dB	$\pm$ 0.7 dB	$\pm$ 1 dB
>-50 dBm	$\pm$ 0.85 dB	$\pm$ 1 dB	$\pm$ 1.5 dB
>-127 dBm	$\pm$ 0.85 dB	$\pm$ 1 dB	-
Temperature stability dB/°C	0.005	0.01	0.02

In Digital or Vector Mode:

At a temperature of 22°C  $\pm$ 5°C

<2 GHz  $\pm$ 1.5 dB

<2.7 GHz  $\pm$ 2 dB

Temperature coefficient : < 0.04 dB/°C

### VSWR

For output levels less than 0 dBm:

<2.2 GHz	<1.25:1 (19.1 dB return loss)
<2.7 GHz	<1.4:1 (15.6 dB return loss)
<5.4 GHz	<1.5:1 (14 dB return loss)

### Output Protection

Reverse power of 50 W from a source VSWR of upto 5:1

## SPECTRAL PURITY (ANALOG MODE)

---

At RF levels up to +7 dBm in CW and analog modulation modes:

### Harmonics

	≤1 GHz	1 GHz to 1.35 GHz	>1.35 GHz
2050T & 2051T	<-30 dBc	<-27 dBc	<-27 dBc
2052T	<-30 dBc	<-27 dBc	<-25 dBc

---

### Sub-harmonics

<-90 dBc to 1.35 GHz, < -40 dBc to 2.3 GHz,  
<-30 dBc to 5.4 GHz.

### Non-harmonics

<-70 dBc at offsets from the carrier frequency of 3 kHz or greater.

### Residual FM

Less than 7 Hz RMS deviation in a 300 Hz to 3.4 kHz unweighted bandwidth at 470 MHz.

### SSB phase noise

Less than -116 dBc/Hz (typically -122 dBc/Hz) at an offset of 20 kHz from a carrier frequency of 470 MHz.

### RF Leakage

Less than 0.5 μV PD at the carrier frequency in a two turn 25 mm loop, 25 mm or more from any part of the case.

### FM on AM

Typically less than 100 Hz for 30% AM depth at a modulation frequency of 1 kHz and a carrier frequency of 500 MHz.

### ΦM on AM

Typically less than 0.1 radians at a carrier frequency of 500 MHz for 30% AM depth for modulation rates up to 10 kHz.

## SPECTRAL PURITY (DIGITAL AND VECTOR MODES)

---

Modulation is generated by converting a 120 MHz, 132 MHz, 160 MHz or 176 MHz intermediate frequency (IF) to the required carrier frequency.

Additional signals are present at the local oscillator frequency, image frequency and frequencies equivalent to the harmonics of the IF mixed with the local oscillator.

### Phase noise

In vector mode: As analog modulation and CW modes.

In digital mode: As analog modulation modes for offsets >100 kHz; < -108 dBc/Hz at 20 kHz offset from a 1 GHz carrier.

## MODULATION MODES

---

Seven modulation modes are available:

### Single

FM, Wideband FM, Φ M, AM or pulse (optional).

### Dual

Two independent channels of differing modulation type (e.g. AM with FM).

### Composite

Two independent channels of the same modulation type (e.g. FM1 with FM2).

### Dual composite

A combination of Dual and Composite modes providing four independent channels (e.g. AM1 with AM2 and FM1 with FM2).

### Vector

Provides IQ modulation facility.

### Digital

Accepts digital inputs and converts the signal to QAM, PSK, GMSK or FSK formats.

### Advanced Digital

Accepts digital inputs and converts the signal to accurate TETRA modulation with low levels of adjacent channel power.

## FREQUENCY MODULATION

---

### Deviation

Peak deviation from 0 to 1 MHz for carrier frequencies up to 21.09375 MHz. Peak deviation from 0 to 1% of carrier frequency above 21.09375 MHz.

### Selection

By keyboard entry of data. Variation by ↑↓ keys and by rotary control.

### Indication

3 digits with annunciators.

### Displayed Resolution

1 Hz or 1 least significant digit, whichever is greater.

### Accuracy at 1 kHz

±5% of indication ±10 Hz excluding residual FM.

### Bandwidth (1 dB)

DC to 300 kHz (DC coupled).

10 Hz to 300 kHz (AC coupled).

Input is capable of accepting external sources of FSK signals. Typical 3 dB bandwidth is >1 MHz.

### Group delay

Less than 1 μs from 3 kHz to 500 kHz.

### Carrier Frequency Offset

In DC FM less than ± (1 Hz + 0.1% of set deviation) after using DC FM nulling facility.

### Distortion

Using external modulation without ALC: Less than 3% at maximum deviation for modulation frequencies up to 20 kHz. Less than 0.3% at 10% of maximum deviation for modulation frequencies up to 20 kHz.

### Modulation source

Internal LF generator or external via front panel sockets.

## WIDEBAND FM

---

### Deviation

As FM.

### Indication

3 digits with annunciators.

### Selection

By keyboard entry of data. The sensitivity is controlled in 3 dB steps and the display will indicate the nearest value of deviation to that requested.

### Input level

1.414 V peak (1 V RMS sine wave) to achieve indicated deviation.

### Accuracy

As FM.

### 3 dB Bandwidth

Typically 10 MHz (DC or AC coupled).

### Group Delay

Less than 0.5  $\mu$ s from 3 kHz to 10 MHz.

### Modulation Source

External via rear panel socket (50  $\Omega$  impedance).

## PHASE MODULATION

---

### Deviation

0 to 10 radians.

### Selection

By keyboard entry of data. Variation by up/down keys (or  $\uparrow/\downarrow$ ) and by rotary control.

### Indication

3 digits with annunciators.

### Resolution

0.01 radians.

### Accuracy at 1 kHz

$\pm 5\%$  of indicated deviation excluding residual phase modulation.

### 3 dB Bandwidth

100 Hz to 10 kHz.

### Distortion

Less than 3% at maximum deviation at 1 kHz modulation rate.

### Modulation Source

Internal LF generator or external via front panel sockets.

## AMPLITUDE MODULATION

---

For carrier frequencies up to 1 GHz.

### Range

0 to 99.9%.

### Selection

By keyboard entry of data. Variation by up/down keys (or  $\uparrow/\downarrow$ ) and by rotary control.

### Indication

3 digits with annunciator.

### Resolution

0.1%.

### Accuracy

$\pm 4\%$  of setting  $\pm 1\%$ .

### 1 dB Bandwidth

With modulation ALC off; DC to 30 kHz in DC coupled mode and 10 Hz to 30 kHz in AC coupled mode.

Typical modulation bandwidth exceeds 50 kHz.

### Distortion

For a modulation rate of 1 kHz: Less than 1% total harmonic distortion for depths up to 30%, less than 3% total harmonic distortion for depths up to 80%.

### Modulation source

Internal LF generator or external via front panel connectors.

## DIGITAL MODULATION

---

In digital mode the instrument can be used over the carrier frequency range 10 MHz to 1.35/2.7 GHz and accepts internal or external data to modulate the RF output. The modulation can be applied in common digital formats and the channel filter characteristics specified.

### Internal Data

All 0's, 1's or selectable PN 2 to 7, 9, 10, 11 or 15 PRBS sequence.

Note with GSM selected PRBS is limited to PN9 & 15. All 0's and all 1's are available.

### External data

Accepts data as a serial input or parallel input from a 25 way auxiliary D Type connector on the rear panel. Accepts symbols containing 1 to 8 data bits with internally or externally generated clock sources. All inputs and outputs are TTL/CMOS logic compatible.

Note, in GSM mode, external data must be supplied as 8 bit parallel.

### Symbol Rate

---

Mod Type	min sym/s	max sym/s	Filter
PSK, QAM	1900	34000	Nyquist/Root Nyquist
PSK, QAM	1900	25000	Gaussian
FSK,	1900	25000	Nyquist/Root Nyquist
FSK, GMSK	512	25000	Gaussian
OQPSK	1900	16000	All filters

---

Symbol source can be internal or external, internal symbol rate is adjustable in steps of 0.1 symbols/s. Symbol rate must be within 2% of external symbol rate to maintain modulation accuracy.

### Generic Modulation types

Can select PSK, Differential PSK, Differential Phase Offset PSK (i.e  $\pi/4$  DQPSK), Time Offset QPSK, QAM, GMSK and FSK. The number of bits per symbol can be selected from 2 to 8 for QAM, 1 to 3 for PSK and 1 or 2 for FSK systems.

### RF Channel Filters

Root raised cosine, raised cosine or Gaussian. Filter bandwidth can be selected as follows: Raised cosine or root raised cosine for a from 0.2 to 0.8 in 0.01 steps. Gaussian 3 dB bandwidth from 0.4 of the symbol rate (0.2 of symbol rate as IQ baseband filter) up to a maximum of 22.6 kHz.

### Pre-defined Modulation Types

The following can be selected:

---

Type	System
$\pi/4$ DQPSK	NADC (DAMPS), PDC (JDC), TETRA, TFTS, APC025
GMSK	GSM, Mobitex, CDPD, MC9, DSRR, MD24-192N/W, Modacom
OQPSK	Inmarsat M
FSK	POCSAG, CITYRUF
4FSK	ERMES, APC025
8DPSSK	VDR (VDL)

---

## Modulation Accuracy

At the decision points with the envelope input at 1 V or disabled and filter above 0.25 for raised cosine filters and 0.3 for root raised cosine filters:

- PSK & QAM <1.5% RMS vector error
- NADC, PDC <1% RMS vector error (EIA, RCR 27A method)
- GSM & CDPD <3° RMS phase error (typical)

## FSK/GMSK

Frequency deviation can be set with 1 Hz resolution across the range 100 Hz to 20 kHz.

Accuracy : <1% of set deviation .

## Modulation errors

Modulation errors can be added to simulate:

*IQ skew from 0 to ± 20° in 0.1° steps*

*IQ imbalance from 0 to ±10 dB in 0.1 dB steps*

*Carrier leak from 0 to 10% in 0.1% steps*

*Range of errors allowed is limited by the peak envelope power.*

Note: modulation errors are not available in either GSM or OQPSK modes.

## IQ Outputs

Baseband IQ output signals available on the front panel at a level of 0.5 V p.d. nominal into 50 Ω.

Levels are reduced by 12 dB in advanced digital mode.

## Burst control

Available on the rear panel D Type connector. A logic 1 on the burst control turns the RF on over a time interval corresponding to 3 data symbols. Propagation delay is matched to the data path delay. Can be used with the Envelope input.

Burst control is not available with GMSK and FSK modulation types.

## ON/OFF Ratio

Greater than 80 dB.

## ADVANCED DIGITAL MODULATION

In advanced digital mode the instrument will produce TETRA modulation, π/4 DQPSK at 1.8 ksymbols/s through a Root Raised Cosine Filter with α of 0.35.

## Adjacent Channel Power

Adjacent Channel Power across RF frequency range 100 MHz to 490 MHz and temperature range +25° ±5°C with IQ errors and fading disabled <70 dBc at +25 kHz offset

## Carrier Leak

Better than -35 dBc (typically <-38 dBc)

## VECTOR MODULATION

Provides for IQ modulation of the carrier output from an external source for carrier frequencies of 10 MHz to 1.35/2.7 GHz.

## Carrier Leakage and SSB Image Rejection

Following self-calibration, the RF carrier leakage and SSB image rejection are typically 50 dB.

## Vector inputs

IQ inputs on the front panel. The RF level requested is obtained with 0.5 V DC applied to one of the inputs. Input impedance is selectable between 50 Ω and 300 Ω.

## DC Vector accuracy

For carrier frequencies up to 2 GHz:

±1% amplitude of FS.

±1° angle at FS.

For carrier frequencies above 2 GHz:

±1.5% amplitude of FS.

±1.5° at FS.

## Vector bandwidth

±0.5 dB wrt DC for modulation frequencies up to 3 MHz.

±1 dB wrt DC for modulation frequencies up to 10 MHz and carrier frequencies up to 2 GHz. ±1.3 dB wrt DC for carrier frequencies up to 2.7 GHz.

## IQ MODULATION CALIBRATION

The signal generator can calibrate the IQ modulator automatically. After a 0.5 hour warm up period the calibration remains valid for at least 3 hours over a temperature range of ±5°C. The instrument displays a warning if the calibration validity time or temperature range has been exceeded. Calibration is valid for both digital and vector modes.

## FADING SIMULATION

Rayleigh and Rician fading can be simulated in both Vector and Digital modulation modes. Doppler speed can be entered from 0 to 200 Hz with a maximum ratio of 2:1 between direct and scattered speed. Path ratio can be set to ±50 dB.

Note: Fading is not available in either GSM or OQPSK modes.

## ENVELOPE CONTROL

The RF level can be varied by applying a control voltage to the envelope input in digital and vector modes. The input may be used to shape the rise and fall of an RF burst and simulate the effect of varying RF levels being received from mobiles in TDMA systems. Applying 1 V gives the set RF level and 0 V suppresses the carrier.

## Linear range

Greater than 30 dB.

Linearity typically better than 0.5 dB at -20 dBV (100 mV input).

## ON/OFF ratio

Greater than 80 dB.

## Envelope delay

<10 μs, typically 6 μs.

## Rise/fall time

Less than 13 μs to -70 dBc.

## IF OUTPUT

An IF output is available on the rear panel which is modulated by the selected digital or vector modulation. The IF output can be inhibited by software control. The IF output can be used to provide modulated carriers at higher frequencies by external frequency conversion. The RF output from the front panel connector can be used as an LO for external frequency conversion.

## MODULATION OSCILLATOR

### Frequency range

0.1 Hz to 500 kHz.

### Selection

By keyboard entry of data. Variation by ↑↓ keys and by rotary control.

### Indication

7 digits with annunciators.

### Resolution

0.1 Hz.

### Frequency accuracy

As frequency standard.

### Distortion

Less than 0.1% THD in sine wave mode at frequencies up to 20 kHz.

### Alternative waveform

A triangular wave is available in addition to the sine wave for frequencies up to 100 kHz.

### Signalling tones

The modulation oscillator can be used to generate sequential (up to 16 tones) or sub-audible signalling tones in accordance with EIA, ZVEI, DZVEI, CCIR, EURO 1, EEA, NATAL and DTMF\* standards.

Facilities are also available for creating and storing user defined tone systems.

\* Requires second modulation oscillator (option 001) to be fitted.

## EXTERNAL MODULATION

---

Two independent inputs on the front panel with BNC connectors, EXT MOD 1 and EXT MOD 2. The modulation is calibrated with 1.414 V peak (1 V RMS sine wave) applied. Input impedance 100 k $\Omega$  nominal.

### MODULATION ALC

The EXT MOD 1 and EXT MOD 2 modulation inputs can be levelled by an ALC system.

### Level Range

1 V to 2 V peak (0.7 to 1.4 V RMS sine wave).

### Distortion

Less than 0.1% additional distortion for frequencies up to 20 kHz (typically less than 0.1% up to 50 kHz).

### 1 dB Bandwidth

Typically 10 Hz to 500 kHz.

## LF OUTPUT

---

Front panel BNC connector. The output may be configured in the LF Generator Mode to give an output from the internal modulation oscillator and in the LF Monitor Mode to give an output from the internal modulation signal paths.

### Selection

By keyboard entry of data. Variation by  $\uparrow$   $\downarrow$  keys and by rotary control.

### Indication

7 digits with unit annunciators for frequency and 4 digits with unit annunciators for level.

### Level

100  $\mu$ V to 5 V RMS with a load impedance of greater than 600  $\Omega$ .  
100  $\mu$ V to 1.4 V RMS with a load impedance of greater than 50  $\Omega$ .

### Source impedance

5.6  $\Omega$  nominal.

### Level accuracy at 1 kHz

With a load impedance of greater than 10 k $\Omega$ : LF  $\pm$ 5% for levels above 50 mV LF  $\pm$ 10% for levels from 500  $\mu$ V to 50 mV.

### Frequency response

Typically  $< \pm 1$  dB from 0.1 Hz to 300 kHz.

## SWEEP

---

### Control modes

Start/stop values of selected parameter. Number of steps. Time per step.

### Step time

1 ms to 20 s per step.

### Sweep ramp

Synchronized analog ramp with a nominal amplitude of 0 to 10 V peak on rear panel BNC connector.

### Markers

User selectable markers for frequency or level provide an indication when specified parameter values have been reached. Output 0 V to +5 V from 600  $\Omega$  on rear panel BNC socket.

### Trigger

Rear panel BNC connector. Applying 0 V or a switch closure starts the sweep. Connector is internally connected via 10 k $\Omega$  pull-up resistor to +5 V.

## FREQUENCY STANDARD

---

### Frequency

10 MHz.

### Temperature stability

Better than  $\pm 5$  in  $10^8$  in the operating range of 0 to 50°C.

### Warm up time

Within 2 in  $10^7$  final frequency within 10 minutes from switch on at 20°C ambient.

### Ageing rate

Better than 2 in  $10^7$  per year.

### Output

Rear panel BNC socket provides an output at frequencies of 1, 5 or 10 MHz with a nominal 2 V pk-pk level into 50  $\Omega$ . Output can be disabled.

### External input

Rear panel BNC socket accepts an input at 1, 5 or 10 MHz with an input level in the range 220 mV to 1.8 V RMS into 1 k $\Omega$ .

## GENERAL

---

### GPIB INTERFACE

A GPIB interface is fitted. All functions except the supply switch and display contrast are remotely programmable.

### Capabilities

Designed in accordance with IEEE488.2.

Complies with the following subsets as defined in IEEE Std. 488.1. SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2.

### ELECTROMAGNETIC COMPATIBILITY

Conforms with the protection requirements of the EEC Council Directive 89/336/EEC. Conforms with the limits specified in the following standards:

IEC/EN61326-1 : 1997, RF Emission Class B, Immunity Table 1, Performance Criteria B

## SAFETY

Conforms with the requirements of EEC Council Directive 73/23 EEC (as amended) and the product safety standard IEC / EN 61010-1 : 2001 + C1 : 2002 + C2 : 2003 for class 1 portable equipment, for use in a Pollution Degree 2 environment. The instrument is designed to be operated from an Installation Category 2 supply.

**RATED RANGE OF USE** (Over which full specification is met unless otherwise stated)

### Temperature

0 to 55°C.

### Humidity

Up to 93% at 40°C.

## CONDITIONS OF STORAGE AND TRANSPORT

### Temperature

-40°C to +71°C.

### Humidity

Up to 93% relative humidity at 40°C.

### Altitude

Up to 4600 m (15,000 ft).

## POWER REQUIREMENTS

### AC supply

Four voltage settings covering:

100 V~ (Limit 90 - 115 V~)  
120 V~ (Limit 105 - 132 V~)  
220 V~ (Limit 188 - 242 V~)  
240 V~ (Limit 216 - 264 V~)

Frequency: 50 - 400 Hz (Limit 45 - 440 Hz) 180 VA max

## CALIBRATION INTERVAL

2 years.

## DIMENSIONS AND WEIGHT

(Over projections but excluding handles)

Height	Width	Depth	Weight
152 mm	425 mm	525 mm	21 kg
6 in	16.6 in	20.5 in	46 lb

## OPTIONS

### OPTION 1 - SECOND MODULATION OSCILLATOR OPTION

Specification as Modulation Oscillator.

### OPTION 2 - PULSE MODULATION OPTION

#### Modulation Modes

Pulse modulation may be used alone or in conjunction with FM,  $\Phi$  M, Wideband FM, Vector or Digital Modulation.

#### Rise / Fall Time

25 ns.

#### Control

0 V for carrier off, +5 V for carrier on. Threshold level is typically +2.5 V.

#### ON/OFF Ratio

Better than 70 dB.  
Input impedance 50  $\Omega$ .

### OPTION 105 - SLOW RISE TIME PULSE MODULATION

Modifies pulse modulation option for a typical rise and fall time of 1  $\mu$ s.

### OPTION 6 - AVIONICS

See separate sheet.

### OPTION 8 - RF PROFILE AND COMPLEX SWEEP

See separate sheet.

### OPTION 12 - ELECTRONIC ATTENUATOR

#### Carrier Frequency Range

250 kHz\* to 1.35 GHz (2050T),  
250 kHz\* to 2.7 GHz (2051T).

\* Useable to 10 kHz (50 MHz in Digital, Advanced Digital or Vector modes, useable to 10 MHz)

#### RF Output

Range (Analog mode)

-138 dBm to +10 dBm When AM is selected the maximum output level reduces linearly with AM depth to +4 dBm at maximum AM depth.

Range (Digital or Vector mode)

-132 dBm to +3 dBm peak envelope power.

Range (Advanced digital mode)

-144 dBm to -9 dBm

#### Accuracy

$\pm 1.2$  dB in non Digital or Vector modes for output levels  
> -127 dBm at 22°C  $\pm 5^\circ$ C

#### Temperature Stability

$\pm 0.01$  dB/°C

#### VSWR

< 1.5:1 for output levels less than 0 dBm.

#### Reverse Power Handling

1 W from a source VSWR of up to 5:1.

#### Amplitude Modulation

Standard specification applies for carrier frequencies above 50 MHz  
(Above 100 MHz for Option 6)

## VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

### Ordering Numbers

#### Versions

2050T	10 kHz to 1.35 GHz Digital and Vector Signal Generator.
2051T	10 kHz to 2.7 GHz Digital and Vector Signal Generator.
2052T	10 kHz to 5.4 GHz Digital and Vector Signal Generator.

#### Supplied with

AC supply lead.  
Operating manual on CD ROM

#### Options

Option 001	Second modulation oscillator
Option 002	Pulse modulation.
Option 006	Avionics (must be ordered with Option 001).
Option 008	RF Profiles and complex sweep
Option 012	Electronic attenuator (2050T and 2051T only).
Option 105	Increased pulse modulation rise and fall time (must be ordered with Option 002).
Option 112	External modulation inputs (2) 600 $\Omega$ impedance

### Optional Accessories

46882/296	Operating manual (paper copy)
44991/144	Break out box. Converts auxiliary D type connector to 8 data, 1 burst line, and a it/symbol clocks on BNC connectors. Daisy chain connection allows the monitoring of the signals (on BNC connectors).
43139/042	RF connector cable, 50 $\Omega$ , 1.5 m, BNC.
54311/092	Coaxial adapter N male to BNC female.
59999/163	Precision coaxial adapter N male to SMA female.
54311/095	RF connector cable, 1 m, type N connectors.
43129/189	GPIB Lead assembly.
46883/408	IEEE/IEC Adapter block for GPIB socket.
46884/291	Rack mounting kit (with slides) for rack cabinets with depths from 480 mm to 680 mm.
46884/292	Rack mounting kit (with slides) for rack cabinets with depths from 680 mm to 840 mm.
46884/541	Rack mounting kit containing front mounting brackets only.
46884/444	Maintenance kit 2030/40/50 Series.
46662/525	Transit case.
54112/164	Soft carry case.
54499/044	DECT Filter.
46880/062	Service manual.

#### CHINA Beijing

Tel: [+86] (10) 6539 1166  
Fax: [+86] (10) 6539 1778

#### CHINA Shanghai

Tel: [+86] (21) 5109 5128  
Fax: [+86] (21) 5150 6112

#### 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 Cambridge

Tel: [+44] (0) 1763 262277  
Fax: [+44] (0) 1763 285353

#### 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

As we are always seeking to improve our products, the information in this document gives only a general indication of the product capacity, performance and suitability, none of which shall form part of any contract. We reserve the right to make design changes without notice. All trademarks are acknowledged. Parent company Aeroflex, Inc. ©Aeroflex 2006.

[www.aeroflex.com](http://www.aeroflex.com)  
[info-test@eroflex.com](mailto:info-test@eroflex.com)



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