



2026

# 10 kHz to 2.4 GHz MultiSource Generator

*Up to three fully functional signal generators in one unit offering a unique solution for complex tests on receivers, components and systems*



- Two or three high quality RF signal generators in a space efficient format
- Ideal for intermodulation and receiver characterization
- Wide frequency coverage:- 10 kHz to 2.4 GHz
- + 24 dBm RF output for effective component testing
- Support for an external signal generator
- Application specific test modes simplify measurement procedures
- User defined tracking between signal sources
- Adjustable carrier phase to allow peaking of three tone intermodulation
- Built-in switched combiner network improves measurement uncertainty

The 2026 is a multiple source generator which offers two RF signal generators in one box with a third source available as an option. Each source is a fully functional RF signal generator with AM, FM,  $\Phi$ M, 2FSK, 4FSK and pulse modulation capability.

The 2026 is ideal for use in R&D and manufacturing where there is a need for two or three combined sources for conducting tests such as intermodulation and selectivity performance of components and receiver assemblies.

To aid the user to undertake difficult test

procedures simply and without ambiguity, the 2026 provides application-specific modes of operation. Application modes include amplifier two and three-tone intermodulation, receiver intermodulation and receiver selectivity. A rotary control and up/down keys allow easy modification of the selected parameters.

### Measurement Accuracy

The use of a built in combiner, switches and cables eliminates many of the measurement uncertainties introduced by connecting together separate signal generators. The 2026 thereby guarantees the level of intermodulation products introduced during amplifier or receiver intermodulation testing.

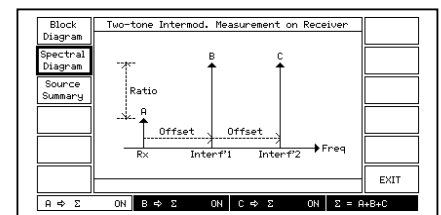
All alignment processes, including the internal frequency standard and the correction factors for the signal source RF paths, are digitally derived so realignment can be undertaken without removal of external covers. Digital adjustment also eliminates the use of mechanical adjusters, minimizing long term drift and vulnerability to mechanical shock.

### Application Modes

The 2026 has a Set Up Key to enable the applications to be selected. Each Set Up is displayed as a pictorial representation of the internal signal source routing. A spectral diagram is used to show the parameters to be entered in each application in well known engineering terminology.

For example, selecting 'Intermodulation on a Receiver Test' allows the signal sources to be automatically set by entering the receiver input frequency and level, the ratio of the level of the two interferers (relative to the receiver input level) and the

offset frequency (channel spacing).



*Spectral diagram of two tone intermodulation on a receiver*

Summary		Two-tone Intermod. Measurement on Receiver	
Rx Freq	Rx Level	Rx Freq : 1.000 000 000 GHz	Rx Level : -137.0 dBm
Interf Mod'n	Offset Freq	Interf Mod'n : ON	Offset Freq : +100.000 kHz
Int Mod'n	Interferer Ratio	Int Mod'n : ON/OFF	Interferer Ratio : +6.0 dB
2nd Tone		2nd Tone : ON/OFF	

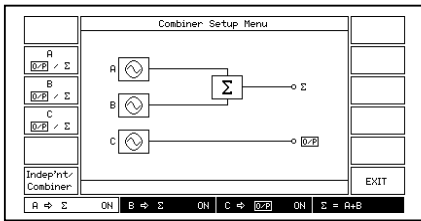
*Application mode for intermodulation test on a receiver*

Other application modes include 2 and 3 tone intermodulation tests on amplifiers, and receiver selectivity.

### Flexible Source Routing

Each of the signal sources can either be routed to a separate output connector or switched to the input of an RF combiner network before being fed to the combiner output connector. The combiner routing is set up quickly and effectively using the Combiner Set Up menu. The flexibility of the signal routing allows the 2026 to accept an external signal generator, such as the 2050 Digital and Vector Generator, to substitute for one of the internal

sources, to enable different forms of carrier signals to be produced.

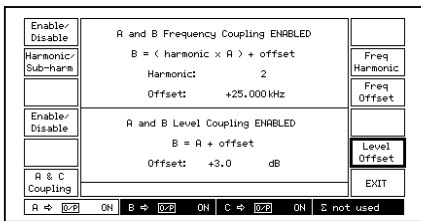


Setting up the source and combiner routing

### Automatic Source Coupling

As an alternative to the application modes, the 2026 MultiSource Generator allows the frequency and level of the internal RF sources to be coupled together with a user defined offset. The source frequencies can have an offset with an additional harmonic (or sub-harmonic) relationship to simplify the testing of harmonic converters and divider systems.

The coupling factors are entered by an easily understood format using a dedicated coupling menu.



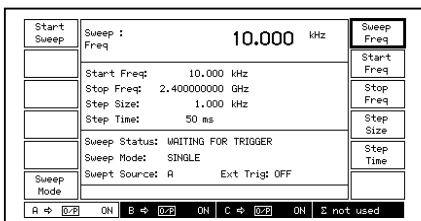
Setting up coupling

The ability to set sources to track each other greatly simplifies the testing of mixers, multipliers and dividers by reducing the number of active controls required.

### Sweep

The 2026 allows one of the RF sources to be frequency swept with user defined start, stop, and step values to reduce the amount of operator time or GPIB overhead. By enabling the coupling facility, sweeping one source will simultaneously sweep the other internal RF sources to allow automated swept measurements on frequency conversion devices to be made.

The sweep can be performed with modulation enabled for swept measurements of receiver immunity characteristics.



2026 sweep menu

### HIGH RF OUTPUT

The high RF level of the individual outputs is ideal for testing components and ensures that the 2026 can generate high

RF levels at the combiner output while maintaining low levels of intermodulation.

### Comprehensive Modulation

Each signal source is capable of being independently modulated from its own fully programmable modulation source to ensure maximum flexibility. The internal modulation sources are each capable of generating sine, triangle or square wave signals.

Amplitude, frequency and phase modulated carriers can be generated from the internal modulation sources or from the independent external inputs. The frequency modulation system provides excellent performance in the DC coupled mode with very low carrier frequency error and stability ensuring that the generator can accurately test receivers sensitive to small frequency errors.

### Pulse Modulation

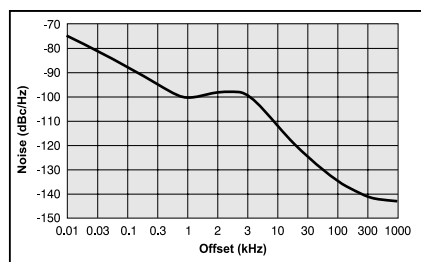
Each source is capable of being independently pulse modulated to allow the simulation of TDD or TDMA RF signal bursts with pulse on/off ratios of better than 40 dB and a rise time of less than 10 μs.

### FSK

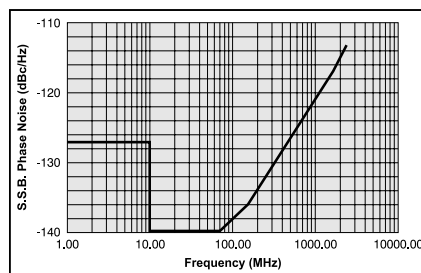
In addition to the analog FM facilities, the 2026 MultiSource Generator supports 2 and 4-level FSK signals from external logic inputs. The FM deviation generated is set by keyboard entry of the required deviation. The facility is ideal for testing paging receivers and RF modems.

### HIGH SPECTRAL PURITY

Measurement of receiver selectivity and ultimate signal-to-noise ratio requires good spectral purity. The 2026 has a low residual FM of typically 3 Hz and typical sideband noise of -121 dBc/Hz at 20 kHz offset from 1 GHz, to allow demanding measurements to be made.



Typical SSB Phase Noise at 1 GHz



Typical Phase Noise at 20 kHz offset

### Programming

A GPIB interface is fitted so that all standard signal generator functions are controllable over the bus. The protocol and syntax of GPIB commands has been designed in accordance with IEEE 488.2 standard to facilitate the generation of ATE programs.

### Low Cost of Ownership

An electronic trip protects the individual source outputs against the accidental application of reverse power.

Careful attention to the thermal design and the use of well-proven signal generator modules gives high reliability and calibration validity.

The use of flash memory and software download via the RS-232 interface means the 2026 can be upgraded with its covers fitted.

### OPTIONS

#### Third Source

The 2026 as standard is supplied with two RF sources. A version with 3 sources is available as an option to support applications such as intermodulation tests on a receiver.

#### Rear Panel Connections

The RF connectors for all sources, their associated modulation and pulse inputs and the combiner output connector can be mounted on the rear panel for ease of use within an ATE environment, as a factory option.

#### OCXO

For applications requiring improved frequency stability and close-in phase noise, the standard TCXO can be replaced by a high performance OCXO.

## Specification

### General Description

The 2026 MultiSource Generator is a synthesized signal generator offering up to three independent RF sources with separate outputs or one or more of the signals routed via a combiner. Each signal source covers the frequency range 10 kHz to 2.4 GHz. An external signal generator can be fed into the standard 2-source 2026.

Each signal source can be controlled independently in frequency and level and each has its own amplitude, frequency, phase and pulse modulation capability. All parameters can be entered from the front panel keyboard and a rotary control can be used to adjust most settings.

The following signal generator specifications apply to all the sources fitted and are applicable to units containing version 10.0 or higher, software.

### Carrier Frequency

**Range**  
10 kHz to 2.4 GHz with a resolution of 1 Hz

**Accuracy**  
As frequency standard

### RF Output

**Range**  
Individual outputs  
-137 dBm to +24 dBm<sup>(1)</sup>  
Combiner outputs<sup>(2)</sup>  
-137 dBm to +4 dBm<sup>(3)</sup> (settable to +10 dBm)  
Maximum output is reduced by 5 dB when pulse modulation is selected and/or by up to 6 dB when AM is selected dependent upon AM depth.

**Resolution**  
0.1 dB

**RF Level Units**

Units may be set to  $\mu$ V, mV, EMF or PD; dB relative to 1  $\mu$ V, 1 mV, EMF or PD; or dBm. Conversion between dB and linear units may be achieved by pressing the appropriate units key (dB or V, mV,  $\mu$ V). The output level can be normalized for 75  $\Omega$  operation with an optional external impedance converter (applies to all outputs simultaneously).

**Accuracy**

Up to 1.2 GHz (over temp range 17 to 27°C)

RF level	-127 dBm to + 6 dBm	+ 6 dBm to + 24 dBm <sup>(4)</sup>
Individual outputs	$\pm 0.8$ dB	$\pm 1.0$ dB
RF level	> -127 dBm <sup>(5)</sup> to + 4 dBm	
Combiner output	$\pm 1.0$ dB	

**Accuracy**

Up to 2.4 GHz (over temp range 17 to 27°C)

RF level	-127 dBm to + 6 dBm	+ 6 dBm to + 20 dBm
Individual outputs	$\pm 1.6$ dB	$\pm 2.0$ dB
RF level	> -127 dBm to 0 dBm	
Combiner output	$\pm 2.0$ dB	
Temp stability	< 1.2 GHz	> 1.2 GHz
dB/°C	< $\pm 0.02$	< $\pm 0.04$

**RF level tracking (over temp range + 17 to + 27°C)**

Relative level accuracy between any two or more combined signals (of equal amplitude), is typically: <sup>(6)</sup>

RF level	1 MHz to 1.2 GHz	1.2 GHz to 2.4 GHz
-18 dBm	$\pm 0.3$ dB	$\pm 0.6$ dB
to + 4 dBm		
< -18 dBm	$\pm 0.6$ dB	$\pm 1.2$ dB

**Attenuator hold**

Inhibits operation of the step attenuator from the level at which the key is enabled. Useable for a level reduction of at least 10 dB. Typical accuracy  $\pm 3$  dB.

**VSWR**

Individual outputs  
For output levels less than -5 dBm, output VSWR is less than 1.5:1 for carrier frequencies up to 1.2 GHz and less than 1.7:1 for carrier frequencies up to 2.4 GHz.  
Combined output  
Output VSWR is less than 1.22:1 for carrier frequencies between 1 MHz to 1.2 GHz and less than 1.32:1 for carrier frequencies up to 2.4 GHz.

**RF Output connector**

50  $\Omega$  type N connector to MIL 390123D.

**Output protection**

Individual outputs  
Protected from a source of reverse power up to 50 W from 50  $\Omega$  or 25 W from a source VSWR of 5:1. Protection circuit can be reset from the front panel or via the GPIB or RS-232 interface.  
Combined output  
No reverse power protection. Maximum total safe power 0.5 W.

**Spectral Purity**

**Harmonics**

Individual outputs:  
Typically better than -30 dBc for RF level up to + 6 dBm, typically better than -25 dBc for RF levels up to + 18 dBm (+ 14 dBm above 1.2 GHz).  
Combined output:  
Typically better than -30 dBc for RF level up to -14 dBm, typically better than -25 dBc for RF levels up to + 4 dBm. (0 dBm above 1.2 GHz).  
Harmonics unspecified below 1 MHz.

**Non-Harmonics (for offsets > 3 kHz)**

Better than -70 dBc to 1 GHz, better than -64 dBc above 1 GHz, better than -60 dBc above 2 GHz.

**Isolation**

Better than 80 dB between individual outputs in use  
Better than 60 dB from a used individual output and the combiner output  
Better than 40 dB between the combiner output and

an unused individual output

**Intermodulation**

At an RF output level of 0 dBm on the combiner into a load VSWR of 2.1 or better.

Frequency Range	Two Tone Intermodulation*
10 MHz to 2.4 GHz	< -80 dBc
5 MHz to 10 MHz	< -75 dBc
Useable but unspecified down to 1 MHz	

\*Third order intermodulation products. Intermodulation levels reduce with reducing RF Level.

**Residual FM (FM off)**

Less than 4.5 Hz RMS deviation in a 300 Hz to 3.4 kHz unweighted bandwidth at 1 GHz. Typically < 1 Hz at 249 MHz, < 2 Hz at 501 MHz < 3 Hz at 1001 MHz < 6 Hz at 2001 MHz.

**SSB phase noise**

Better than -124 dBc/Hz at 20 kHz offset from a carrier frequency of 470 MHz, typically -121 dBc/Hz at 20 kHz offset from a carrier frequency of 1 GHz.

**Carrier Leakage**

Less than 0.5  $\mu$ V PD at the carrier frequency in a two turn 25 mm diameter loop, 25 mm from the surface of the signal generator.

**External RF input**

The following applies when an external input is connected at the rear panel and the combiner set up for 'independent' external RF input.  
Insertion loss 14.75 dB  $\pm$  1 dB  
Frequency range 10 kHz to 4 GHz<sup>(7)</sup>  
Return loss > 20 dB to 2.4 GHz  
Max input power 0.5 W

**Modulation Capability**

FM, AM or phase modulation can be applied to the carriers generated by each signal source from independent internal or external modulation sources. The internal modulation sources are capable of generating two simultaneous signals into any one of the modulation channels. Each internal and external modulation source can be simultaneously enabled to produce combined amplitude and frequency (or phase) modulation.  
Pulse modulation can be applied to each of the carriers from external pulse sources. The pulse modulation can be used in combination with the other forms of modulation.  
2 level or 4 level FSK modulation can be applied to each carrier using data from an external source.

**Frequency Modulation**

**Deviation**

0 to 100 kHz

**Resolution**

3 digits or 1 Hz

**Accuracy at 1 kHz**

$\pm 5\%$

**Bandwidth (1 dB)**

DC to 100 kHz (DC coupled)  
10 Hz to 100 kHz (AC coupled)  
20 Hz to 100 kHz (AC coupled with ALC)

**Group delay**

Less than 5  $\mu$ s to 100 kHz

**Carrier frequency offset (DC coupled)**

Less than 1% of the set frequency deviation

**Distortion**

Less than 1% at 1 kHz rate for deviations up to 100 kHz  
Typically  $\leq 0.3\%$  at 1 kHz rate for deviations up to 10 kHz  
Less than 3% at 1 kHz rate and deviations upto 100 kHz for carrier frequencies below 50 MHz

**Modulation source**

Internal modulation oscillator or external via front panel BNC

**FSK**

**Modes**

2 level or 4 level FSK

**Data source**

External data input via a 25 way rear panel D Type connector

**Frequency shift**

Variable up to  $\pm 100$  kHz

**Accuracy**

As FM deviation accuracy

**Timing jitter**

$\pm 3.2$   $\mu$ s

**Filter**

8th order Bessel, -3 dB at 20 kHz

**Phase Modulation**

**Deviation**

0 to 10 radians

**Resolution**

3 digits or 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 10 radians at 1 kHz modulation rate. Typically < 0.5% for deviations up to 1 radian at 1 kHz

**Modulation source**

Internal LF generator or external via front panel BNC.

**Amplitude Modulation**

**Individual Outputs**

For carrier frequencies < 500 MHz useable to 1.5 GHz

**Combined Output**

Unspecified below 5 MHz useable to 1 MHz, otherwise as individual outputs.

**Range**

0 to 99.9%

**Resolution**

0.1%

**Accuracy<sup>(6)</sup>**

$\pm 5\%$  of set depth at 1 kHz, over temperature range 17°C to 27 °C  
Temperature coefficient < 0.02%/°C

**1 dB Bandwidth**

DC to 30 kHz (DC coupled)  
10 Hz to 30 kHz (AC coupled)  
20 Hz to 30 kHz (AC coupled with ALC)

**Distortion<sup>(6)</sup>**

< 1.5% at 1 kHz rate for modulation depths up to 30%  
< 2.5% at 1 kHz rate for modulation depths up to 80%

**Modulation source**

Internal LF generator or external, via front panel BNC

**PM on AM**

Typically 0.1 radians at 30% depth at 470 MHz

**Pulse Modulation**

**Frequency range**

32 MHz to 2.4 GHz, useable to 10 MHz

**RF level range**

Maximum guaranteed output is reduced by 5 dB when pulse modulation is selected

**RF level accuracy**

When pulse modulation is enabled, adds  $\pm 0.5$  dB to the RF level accuracy specification

**Control**

Pulse input is on a front panel BNC with 10 K $\Omega$  nominal input impedance  
A logic 0 (0 V to 1 V) turns the carrier off, a logic 1 (3.5 V to 5 V) turns the carrier on  
Maximum input is  $\pm 15$  V

**On/off ratio**

Better than 45 dB below 1.2 GHz, better than 40 dB above 1.2 GHz

**Rise and fall times**

Less than 10  $\mu$ s

**Overshoot**

< 1 dB

## Modulation Oscillator

The internal modulation oscillator for each signal source is capable of generating one or two modulation tones simultaneously in one modulation channel.

### Frequency range

0.01 Hz to 20 kHz with a resolution of 0.01 Hz

### Frequency accuracy

As frequency standard

### Distortion

Less than 0.1% THD at 1 kHz

### Waveforms

Sine wave to 20 kHz and a triangular or square wave to 3 kHz

### Square wave jitter

< 6.4  $\mu$ s on any edge

### Audio Output

The modulation oscillator signal from each source is available on the front panel Modulation Input/Output BNC connector at a nominal level of 2 V RMS EMF from a 600  $\Omega$  source impedance.

## External Modulation

Input on the front panel Modulation Input/Output connector. The modulation is calibrated with 1.414 V peak (1V RMS sine wave) applied. Input impedance is 100 k $\Omega$  nominal. Maximum safe input  $\pm$  15 V.

### MODULATION ALC

The external modulation input can be levelled by a peak levelling ALC system over the input voltage range of 0.75 V to 1.25 V RMS sine wave. High and low indicators in the display indicate when the input is outside levelling range.

### SWEEP MODE

The carrier frequency of one source can be swept. To enable more than one source to be swept the coupling facility must be invoked.

### Control parameters

Start/stop values of carrier frequency, frequency step size and time per step.

### Step time

50 ms to 10 s per step

### Trigger

A trigger input is available on a rear panel BNC connector and can be used in single, continuous, start/stop or single step mode.

## Frequency Standard

### FREQUENCY STANDARD

#### TCXO

10 MHz

#### Temperature Stability

Better than  $\pm$  5 in  $10^7$  over the operating range of 0 to 55°C

#### Ageing rate

Less than  $\pm$  1 in  $10^6$  per year

#### External input/output

Rear panel BNC connector accepts an external input of 1 MHz or 10 MHz at a level of 220 mV RMS to 1.8 V RMS into 1 k $\Omega$ . Rear panel BNC connector provides an output of 10 MHz at a nominal level of 2 V pk-pk into 50  $\Omega$ .

## General

### GPIO INTERFACE

All signal source parameters except the supply switch are remotely programmable

### Capabilities

Designed in accordance with IEEE 488.2.

The GPIB interface complies with the following subsets as defined in IEEE standard 488.1: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2.

### RS-232

All signal source parameters except the supply switch are remotely programmable. Connector is 9 way D type, baud rate 300 to 9600 bits per second. Handshake hardware is DTR, RTS, CTS and DSR and software is XON and XOFF. Electrical interface is to EIA-232-D.

### ELECTROMAGNETIC COMPATIBILITY

Conforms with the protection requirements of Council Directive 89/336/EEC. Complies with the limits specified in the following standards:  
EN55011 Class B CISPR II  
EN50082-1 IEC 801-2,3,4  
AS/NZS 2064.1/2 AS/NZS 4252.1  
EN60555-2 IEC 555-2

### SAFETY

Complies with IEC 1010-1, BS EN61010-1 for class 1 portable equipment and is for use in a pollution degree 2 environment. The instrument is designed to operate from an installation category 2 supply.

### RATED RANGE OF USE

(Over which full specification is met unless otherwise indicated).

#### Temperature

0 to 55°C

#### Humidity

Up to 93% at 40°C

#### Altitude

Up to 3050 m (10,000 ft)

### CONDITIONS OF STORAGE AND TRANSPORT

#### Temperature

-40 to + 71°C

#### Humidity

Up to 93% at 40°C

#### Altitude

Up to 4600 m (15000 ft)

### POWER REQUIREMENTS

#### AC Supply

90 to 132 V or 188 to 255 V  
47 Hz to 63 Hz  
250 VA maximum

### CALIBRATION INTERVAL

2 years

### DIMENSIONS AND WEIGHT

(over projections but excluding front panel handles)

Height	Width	Depth	Weight
177 mm	419 mm	488 mm	16 kg

## Options

### 3 Source Signal Generator

Includes 3 signal sources

### HIGH STABILITY FREQUENCY STANDARD

Replaces the internal TCXO with a high stability OCXO. Specification as standard instrument with the following exceptions:

#### Ageing rate

$\pm$  2.5 in  $10^{-7}$  per year, <  $\pm$  5 in  $10^{-9}$  per day after two months continuous use

#### Stability

Better than  $\pm$  5 in  $10^8$  over the temperature range 0 to 50°C

#### Warm up time

Within 2 in  $10^7$  of final frequency 10 minutes after switch on at a temperature of 20°C

### REAR PANEL INPUTS

RF output, modulation input and LF output connectors are transferred to the rear panel. The signal generator specification is not altered.

## Versions and Accessories

When ordering please quote the full ordering number information.

### Ordering Numbers

2026

Option 1

Option 3

Option 4

43129/003

46882/294

54311/208

46880/077

46884/293

46884/294

46884/931

46662/614

43129/189

59999/724

46884/650

46884/649

54112/165

### Versions

10 kHz to 2.4 GHz MultiSource Generator (2 internal sources)

### Options

Add third internal source

High stability frequency standard

Rear panel outputs

### Supplied with

AC power supply lead

Operating Manual

### Optional Accessories

50/75  $\Omega$  adapter

Service manual

Rack mounting kit, depths from 480 mm to 680 mm

Rack mounting kit, depths from 680 mm to 840 mm

Rack mounting kit containing front panel brackets only

Soft carrying case

1.5 m GPIB lead

TEM Cell

RS-232 Cable 9 way female to a 9 way female 1.5m

RS-232 Cable 9 way female to a 25 way female 1.5m

Hard carrying case

<sup>(1)</sup> Level uncalibrated above + 20 dBm for frequencies > 1.2 GHz.

<sup>(2)</sup> Output power is uncalibrated for all levels for carrier frequencies below 1 MHz

<sup>(3)</sup> Level uncalibrated above + 4 dBm for frequencies > 1.2 GHz.

<sup>(4)</sup> Level accuracy is unspecified below 100 kHz for levels > + 6 dBm.

<sup>(5)</sup> Accuracy is unspecified below 1 MHz.

<sup>(6)</sup> Does not apply to external RF input signals to combiner.

<sup>(7)</sup> Usable to 5 GHz.

<sup>(8)</sup> For RF levels not exceeding + 10 dBm (individual output) or -4 dBm (combined output).