Citation XX

Citation, 240 Crossways Park West, Woodbury, New York 11797

SEARCH FOR THE ULTIMATE AMPLIFIER

You, the music lover, are constantly in search of the ultimate in musically accurate sound reproduction. Citation completely agrees with this desire. Towards that end, we introduced the Citation XX -- the Ultimate Amplifier -- the very heart of every audio system.

In order to achieve such a high goal, Citation sought out the finest engineering minds in the fields of electronics, acoustics, psychoacoustics, physics, plus a group of the most puristic musicians of the present era. To head this team of scientists and guide the research to its final goal, Citation commissioned the foremost engineer in the audio design field, Dr. Matti Otala of Finland. Dr. Otala is world famous for his research and writings on the subject of Transient Intermodulation Distortion, an audible distortion problem he discovered in 1970 and then resolved.

Dr. Otala's engineering genius concerning TIM is found in most sophisticated amplifiers today. It was these phenomenal achievements that led Citation to engage his services for this noble project. Dr. Otala earned a degree from the University of Technology, Helsinki in 1963, earned the M.S.C. in engineering at Oulu University in 1969, and in 1975 became the Director of the Electronics Division of the Technical Research Centre of Finland. In 1978, Citation commissioned Dr. Otala to direct their research group in their search for the ultimate amplifier -- a three year, multi-million dollar undertaking.

We, at Citation, owe a great deal to Dr. Otala's philosophies because they have solved many intricate design problems encountered in our quest for the ultimate amplifier. Dr. Otala brought to us his six precepts for achieveing the goal of the ultimate amplifier:

1. Previous amplifiers were substandard.

2. No problem is incurable.

3. Audio is not a fashion.

4. The simpler the solution to a problem, the better.

5. The dynamic (music) state's importance over the steady (test tone) state.

6. Evaluate results with human ears, not just test equipment.

The intensity of these thoughts require some further examination and explanation, since their impact is the actual basis of the technology used to create the desired result. First, Dr. Otala strongly believes that the degree of "perfection" found in previous amplifiers was substandard, meaning that there was a vast area for audible improvements upon which he and his group of experts could concentrate. The Second philosophy was that no problem was insurmountable. When a question arose, the answer was to thoroughly research and understand the area being investigated, accept what is fact,

and determine reasonable theoretical, experimental and measurement techniques accordingly. So, when existing techniques could not provide the solution, the recourse was to develop new test methods. The final result is new technology for which several U.S. patents are now pending.

The Third and Fourth philosophies of Dr. Otala dealt with principles of circuit design. He is a firm believer that audio should not be style or fashion oriented to suit a marketing whim, but should be designed only for the ultimate in sound quality. By utilizing the concept that "The simpler the solution to a problem, the better", he felt that circuit complication was like a beautiful woman using heavy makeup; it would obscure her natural beauty. This uncluttered thinking led to clear-cut circuit layouts, keeping in mind only the sonic properties.

But it was his Fifth philosphy which led to many of the discoveries and innovations incorporated in the final design. This was his concept of dynamic design and measurement versus the steady state. Dr. Otala determined that an amplifier's performance while handling music (dynamic state) differs drastically from its performance while utilizing sine wave test tones (steady state). The dynamic state is especially difficult to design for, because most standard and commonly understood test methods are of a steady state nature. Therefore, complex evaluation techniques and performance criteria were first created in order to test the dynamic (music) state of a given circuit design. Dr. Otala's design, to achieve his ultimate goal, had to perform exceptionally well in the dynamic state.

Finally, the strongest of Dr. Otala's beliefs is that the educated listener is the supreme and final judge of sound quality, regardless of clinical electronic measurement. This philosophy was many times the force behind new achievements and innovations that are incorporated in the Citation XX, the ultimate amplifier.

Four Design Parameters That Make The Difference

1. High Current Capability (HCC)

   The concept of the dynamic state plays an important role in the design of an amplifier's power capability. When an amplifier's power characteristics are measured by conventional test signals (steady state), it means only half the story is told. The Standard technique for measuring power output utilizes a static 8 ohm resistor to simulate a speaker system. But speaker impedances actually vary greatly according to the content of the input signal. The impedance characteristic of a loudspeaker is measured by feeding it a sine wave test tone that slowly changes in frequency. From this raw data, a "nominal" value is determined. This nominal value is the specified; or rated impedance.

   But, under dynamic conditions, the nominal steady state impedance rating has little relevance. The speaker system may require a huge amount of power for a very short period of time, such as a few ten-thousandths of a second. During this short period, the speaker system

may require the same amount of current as a 1-2 ohm resistor. It is critical that an amplifier provide the current required to give loudspeakers accurate dynamic range and transient response. This is why Citation XX is designed with 200 amperes of instantaneous current capability, enabling the amplifier to react to constant impedance variations caused by the dynamic characteristics of the music signal. Citation delivers 14,000 watts per channel into a .35 ohm load under transient conditions. This dynamic power output is exclusive to Citation XX!! HCC enables the amplifier to accurately control speaker cone movement by delivering the energy necessary to force the speaker cone to precisely react to transients. This performance has significant importance in high fidelity reproduction.

2. Phase Intermodulation Distortion (PIM)

Phase intermodulation distortion can be an unwanted by-product of negative feedback. Negative feedback, which is used in every amplifier, routes part of the output signal back to the input, 180 degrees out-of-phase with the original signal. The combination of these two signals, out-of-phase with each other, creates an error-correction signal that greatly reduces the steady state harmonic distortion inherent in the amplifier. However, a high amount of negative feedback creates a high (and very audible) amount of Phase Intermodulation distortion (PIM) in place of the harmonic distortion it eliminates. This was proven by Dr. Otala and presented to the Audio Engineering Society in 1980 at a convention in Hamburg.

Since negative feedback merely transforms one type of distortion to another, the Citation XX is designed to have minimal inherent distortion. The result is very low PIM and THD.

3. Interface Intermodulation Distortion (IIM)

Interface Intermodulation Distortion, or IIM in abbreviated form, occurs in the speaker/amplifier interface. The moving cone and coil structure in the speaker generates its own voltage which returns to the output stage of the amplifier. This voltage is called the Back Electromotive Force (Back EMF). Once this voltage passes the output stage, it travels through the negative feedback circuit and returns to the input stage where it combines with the input signal. This mixing of the legitimate musical input signal and the Back EMF speaker generated signal results in increased dynamic distortion. This creates excessive IIM which results in an obscured lower mid-range, which makes the sound appear vague and lacking in definition. The minimization of IIM in Citation is carried out by reducing the negative feedback, and by decreasing the internal resistance of the output stage. The result is that Citation XX has clear mid and low frequency reproduction, which is pure and well balanced.

4. Transient Intermodulation Distortion (TIM)

Transient Intermodulation Distortion or TIM, as it is referred to, occurs when fast transients -- such as in dynamic music passages -- pass through an amplification stage prior to the return of the output signal via the negative feedback. These transients then overload the first stage sufficiently to cause internal clipping - hence, TIM. The Citation XX counters the negative aspects of TIM with three special design parameters:

A. The Citation XX utilizes a super-low distortion driver stage which exhibits localized feedback (feedback within each stage versus feedback around the entire circuit).

B. The introduction of transistors with extremely quick response speed, excellent linearity, and a large, safe operating area.

C. The incorporation of a dual power supply system with high and low voltage sources. The high voltage source, dedicated to the driver, has the ability to supply the proper voltage under any condition.

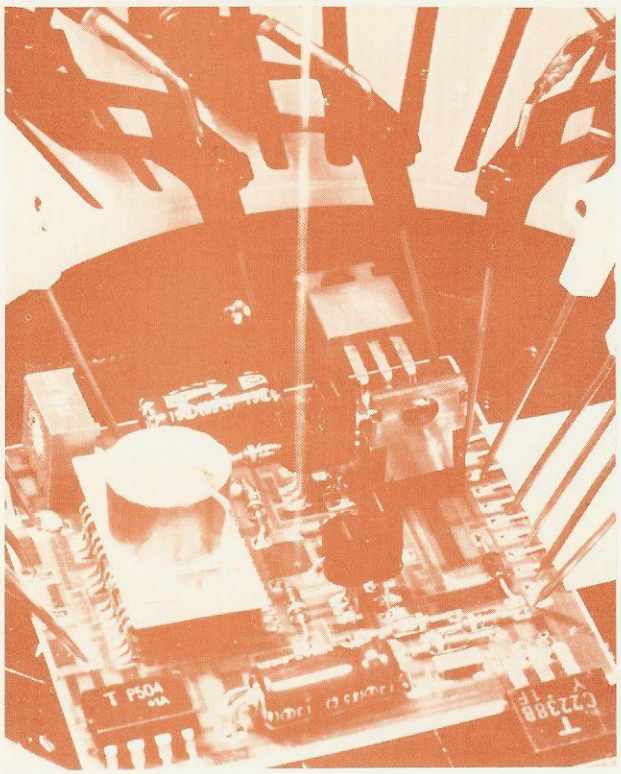
Controlling negative feedback and utilization of circuitry not dependent on negative feedback enables the Citation XX to virtually eliminate TIM.

It is the combination of these four critical engineering achievements, combined with new production technology, that sets the Citation XX totally in a class of its own - The Ultimate Amplifier.

Uncompromising New Circuit Technology

1. Custom Engineered Hybrid Circuitry (U.S. patent pending)

The heart of the Citation XX is a thick film hybrid circuit specifically developed by the Technical Research Centre of Finland. The thick film hybrid consists of transistors and thick film resistors whose electronic values are measured by a highly sophisticated computer. Special test signals are fed into the hybrid circuit and as the computer measures the distortion produced, a laser beam is shot into the hybrid circuitry trimming the values of the components. This makes the components accurate within less than .03%. Due to the exceptionally high accuracy of the components within the hybrid circuit, audible distortions are reduced to virtually nothing.



2. Dual Independent Power Transformers

The massive power supply section is comprised of dual toroidal transformers with a total electrolytic capacitance of 80,0000 microfarads. This power supply design is capable of delivering the current necessary to meet the 200 ampere HCC requirements of the new circuitry, yielding the ultimate in dynamic range, transient response and sound quality.

3. 24-Karat Gold-Plated Transmission Line

Conventional large diameter wiring inductance greatly restricts the flow of high frequency current from the power supply to the output transistors. To overcome this limitation, a transmission line consisting of three thick copper plates was designed, which provides a low impedance path for the positive and negative power supplies, and ground. Each plate is 24-Karat gold-plated which further enhances high frequency conductivity.

4. Self-Correcting Circuitry

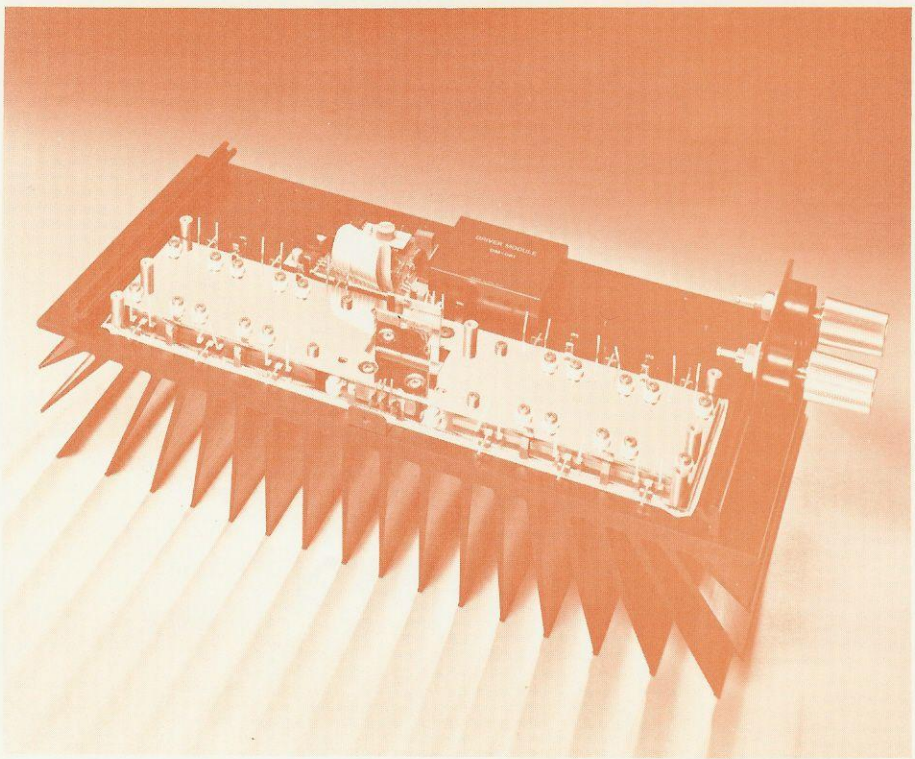
Each amplification stage has been designed to have self-correcting ability with regard to temperature matching, keeping thermal induced distortion to a minimum.

5. Protection Circuitry (U.S. patent pending)

The Citation XX has a completely electronic protection circuit which operates without compromising sonic quality. The protection circuitry is capable of ultra-high speed cut-off in all circuits, insuring safety in the event of shorted speakers or speaker cables.

6. Custom Designed Heat Sinks

To complement each power transistor assembly, there is a custom designed heat sink. These special heat sinks have a contact wall thick enough to absorb instantaneous heat generation, thus preventing thermal distortion.



7. Three-Position Bias Switch

Naturally, the ultimate amplifier must be ideal for all user situations. Therefore, Citation has incorporated a new operating feature, a three-position bias switch. This adjustment enables the user to choose the best biasing for the given application. The higher the bias, the lower the distortion of the amplifier; however, there will also be greater heat generated. With the three-position switch, the user can adjust the bias current according to the power output level required, and the ambient temperature of the room or the amplifier storage area, to achieve adequate cooling and optimum acoustical results. With the Citation XX there is no predetermined compromise in sound qulity. The user can opt for the finest sound reproduction.

8. Ultrasonic Filter

For improved linearity at low output levels and reduced distortion at greater output levels the Citation XX has an extremely broad bandwidth of 550kHz. As a result, RF (radio frequency) signals from local broadcasters have the possiblity of being reproduced in the amplifier. To prevent such interference, Citation has incorporated a sonically superior, phase-linear Bessel filter with a cutoff frequency of 400kHz, eliminating RF from the input. There is a front panel warning light to indicate the presence of RF below 400kHz. This alerts the user to activate the Ultrasonic Filter Switch on the front panel, which reduces the cutoff frequency to 100kHz. The extreme wide bandwidth of the Citation XX also allows the Ultrasonic warning light to function as a clipping indicator, to warn the user to reduce the output level of the preamplifier.

Infrasonic Filter

9. As a preventative measure against speaker damage, the Citation XX has a DC component filter, which is designed to be initiated by the user -- alerted by a front panel warning indicator.

The supreme technology and circuit design, coupled with State-of-the-Art electronic components, has been culminated in the Citation XX, the ultimate amplifier, by Dr. Matti Otala.

Citation

DIGITAL COMPUTERS TEST CITATION XX CIRCUITS. LASER BEAMS MAKE THEM DISTORTION FREE.(U.S. PATENT PENDING.)

The accuracy and precise matching of all the electronic components in an amplifier's music signal path is extremely important, because the less accurate the values of the components are, the more distortion increases. Although quality resistors with .1% accuracy and capacitors with 2% accuracy are available, the actual component values required to achieve minimum distortion must be much more accurate. Also, each unit requires different values of resistors in critical points in the circuitry, due to the differences between the transistors used.

The unique way CITATION achieves this is as follows:

(A) CITATION's circuit boards are connected to a digital computer which is programed to measure specific types of distortion.

(B) Special test signals are then fed into CITATION's circuit board.

(C) While test signals are fed into CITATION's circuitry and the digital computer is measuring the distortion.....

(D) Laser beams are shot into CITATION's circuitry, trimming the values of the components until distortion has been minimized. CITATION's components have now become accurate to within .03%!

(E) CITATION's laser beam-trimmed circuitry is custom manufactured in Finland. A U.S. patent is pending on the unique technology.

CITATION is so special in important design areas, there are two other U.S. patents pending: One is for CITATION's special circuit design, and the other is for CITATION's analog computer protection circuitry. Both of these exceptional features create superb sound quality and reliability.

In addition to CITATION's high-accuracy laser beam-trimmed components, the special material used in the construction of the amplifier's circuit boards further improves performance:

Citation

(A) Normally, the circuit boards in an amplifier's audio signal path are made either of phenolic or fiberglass material. When the amplifier heats up, it causes these circuit boards to expand and "flex" which degrades the mechanical integrity and can increase distortion

(B) CITATION's hybrid circuit boards are made of ground saphire, which like diamond, is extremely rigid, and does not expand or flex when heated. This eliminates mechanical stress on the circuitry which ensures long-term reliability.

(C) The metal-film resistors in CITATION's circuitry are made of silver palladium, a rare earth metal which never corrodes thereby keeping resistor values perfect forever.

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Citation

IN CRITICAL AREAS, CITATION XX IS CONSTRUCTED OF GOLD-PLATED OXYGEN FREE COPPER TO PROVIDE EXCEPTIONAL PERFORMANCE AND RELIABILITY.

Listed below are the advantages of CITATION's construction:

A) The power supply current that is fed to the power transistors in other amplifiers travels through wire. Wire creates "collector lead inductance" which degrades the stability of amplifiers, narrows their frequency response, and slows down their ability to produce high power very quickly -- which music often demands. The music signal fed to CITATION's power transistors travels through thick, gold-plated copper strips which eliminates the "collector lead inductance" problems that wire causes.

B) Power transistors are normally insulated from an amplifiers heat sinks by mica-absestos. This insulating material varies in thickness, causing each power transistor to dissipate different amounts of heat, creating crossover and thermal distortions. In CITATION, the power transistors contact the gold plated copper strips directly, eliminating the distortions that mica-asbestos causes in power transistors.

C) The grounding signal path of amplifiers is also very critical. In conventional amplifiers the whole chassis (chassis, brackets front panel, rear panel, plated sheet metal screws, etc.) is the grounding signal path, creating excessive resistance and inductance which limits power output and reduces clarity in the treble region. CITATION's grounding signal path is directly at the gold-plated copper strip area, rather than throughout the entire chassis, which audibly improves accurate power output in the treble region.

D) CITATION XX has two separate power supplies (for left and right channels). Here again, the use of wire has been eliminated because of the resistance and inductance problems that wires cause in high power amplifiers. Each of CITATION's power supplies are connected to the circuitry via thick, gold-plated copper, which completely overcomes "wire problems" that occur in other power supplies.

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E) To accurately deliver all of its very high power to loudspeakers (which all sophisticated speakers demand, especially when played at high volume), CITATION speaker terminals are constructed of large diameter, gold-plated copper bars. Conventional speaker terminals are typically either too small or are made of thin metal (such as banana jacks), neither of which could accurately send CITATION's power to loudspeakers.

F) Conventional protection circuits have metal relay switches in the music signal path which typically degrade sound quality. CITATION has an "Opto-coupler" which optically monitors the music signal path, thus eliminating the degradation of music that ordinary relays normally cause.

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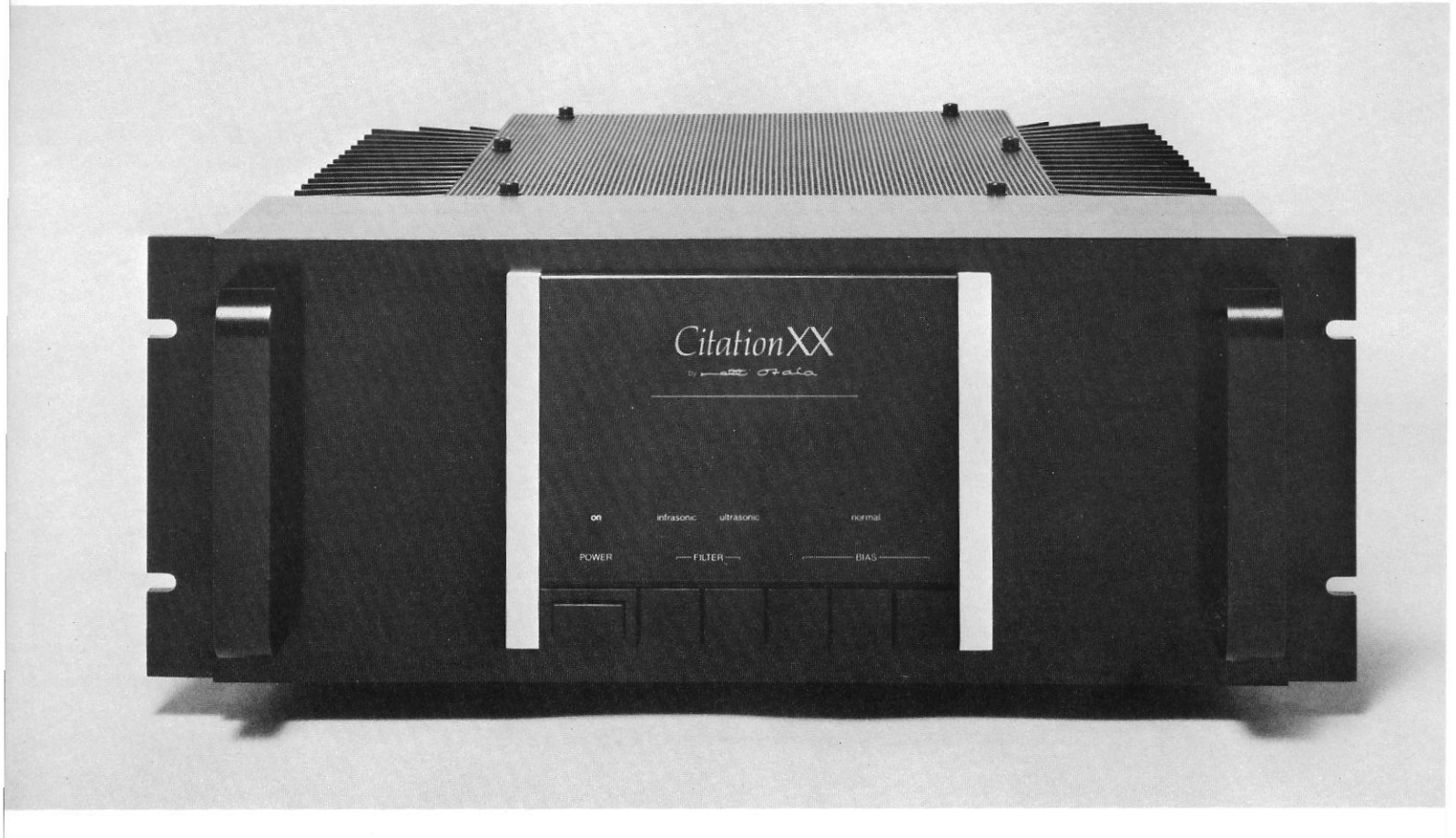
Citation XX

SPECIFICATIONS



FTC Power Disclosure:

250 Watts RMS per channel from 10Hz—100kHz, into 8 Ohms, with no more than 0.1% THD

440 Watts RMS per channel from 10Hz—100kHz, into 4 Ohms, with no more than 0.1% THD

Frequency Response:
DC to 220kHz +0, -3dB

Slew Rate: 200 volts/microsecond

Rise Time: 1.6 microsecond

Square Wave Tilt (20Hz): unmeasurable

Open-loop (no feedback) Bandwidth:
DC to 110kHz +0, -3dB

Input Sensitivity/impedance: 1V/ 15k Ohms

Signal-to-noise Ratio (REF. rated Power): 104dB

Dimensions:

Height	7⅞" (19.4cm)
Width	19" (48.3cm)
Depth	21⅞" (55.5cm)

EIA Standard 7"x19" Rack Mount

Weight 92.4 lbs. (42kg)

All specifications and features subject to change without notice.

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