Solid-State Amplifier Solutions for Military and Commercial Applications

CTT INC
A KRATOS Company

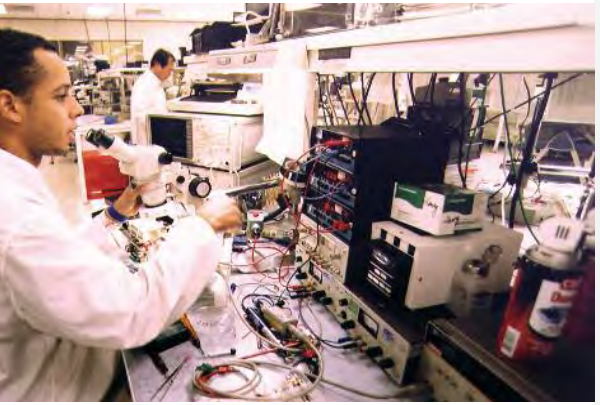
Limiting Amplifiers
100 MHz to 18 GHz

- **Solid-State Designs**
- **Frequency Coverage from 100 MHz to 18 GHz**
- **MIC Thin-Film Design for High Reliability**
- **Custom Designs Available**

Limiting amplifiers operate in the saturated region of their transfer function, thereby, minimizing output power variations and providing constant output over a wide input dynamic range. They are especially effective at minimizing the harmonic content of output power under limiting conditions and reproducing pulsed input signals with high fidelity by minimizing overshoot and recovery times.

Limiting amplifiers are useful in applications, which require tightly controlled power delivered over a wide range of input drive or over wide frequency ranges or even wide temperature ranges. Typical applications include:

- Local oscillator networks
- Microwave phase/frequency discriminators
- Protecting circuitry from overdrive damage
- Removing amplification modulation from FM signals
- Instantaneous frequency measurement (IFM) receivers



Model Number	Frequency Response (GHz)	Gain (dB)	Gain Flatness (±dB)	Noise Figure (dB)	Psat (+dBm)	VSWR In/Out	Volts (DC)	DC Current (mA)	CTT Case Outline
	Min	Min	Max	Max	Min-Max	Max	Typ	Typ	
LSM/020-1630	0.5-2	30	1.25	7.0	16-20	2:1	12	180	HC2
LSM/020-1640	0.5-2	40	1.50	6.0	16-20	2:1	12	300	HC4
LSM/020-1670	0.5-2	70	2.00	7.0	16-20	2:1	12	500	HC4/HC4
LSO/040-1640	2-4	40	1.50	3.5	16-20	2:1	12	320	HC4
LSM/060-1627	2-6	27	1.50	7.0	16-20	2:1	12	240	HC2
LSM/060-1635	2-6	35	1.50	6.0	16-20	2:1	12	320	HC2
LSM/060-1660	2-6	60	2.00	7.0	16-20	2:1	12	560	HC2/HC2
LSM/080-1627	2-8	27	1.50	6.0	16-20	2:1	12	240	HC2
LSM/080-1635	2-8	35	1.50	4.0	16-20	2:1	12	320	HC4
LSO/080-1735	4-8	35	1.50	4.5	17-21	2:1	12	320	HC4
LSX/0218-1730	2-18	30	2.00	7.5	17-21	2:1	12	500	HX4
LSX/0218-1740	2-18	40	2.00	7.5	17-21	2:1	12	600	HX6
LSX/0218-1770	2-18	70	3.50	7.5	17-21	2:1	12	1200	HX4/HX6
LSM/180-1435	6-18	35	1.50	7.5	14-18	2:1	12	450	HX4
LSM/180-1445	6-18	45	2.25	7.5	14-18	2:1	12	520	HX6
LSM/180-1480	6-18	80	3.50	7.5	14-18	2:1	12	960	HX4/HX6

Comments:

1. Harmonics: -10 dBc typical at the input power up to +10 dBm.
2. Pulse response:
   - Overshoot: 0.5 dB, max
   - Recovery time: 50 ns, max
   - Settling time: 25 ns, max
   - Rise time: 20 ns, max
3. Temperature compensation, signal suppression and phase matching are optional.
4. All units contain built-in voltage regulator and reverse voltage protection diode.
5. Performance of all Limiting Amplifiers are application-specific. Consult the factory with your requirements.

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For applications where normal amplifier gain variations as a function of environmental temperature range exceed the allowable system limits. CTT offers amplifier designs whose gain variations have been reduced to one half that of uncompensated designs.

CTT Utilizes two techniques for compensating for gain variations:

- Integrating a PIN diode attenuator or FET (field effect transistor)
- Bias current compensation

In the first approach, the control current of a PIN diode attenuator is automatically decreased by means of a thermistor so that at high temperatures there is less attenuation. This compensates for the decreased gain due to an increase in ambient temperature. The attenuator is placed between the gain stages of the amplifiers so that noise figure and output power performance is minimally degraded.

In the second approach, the FET itself is compensated. In regions of low bias current, the FET gain is proportional to the current. The FET bias current is automatically increased by means of a thermistor at high temperatures to increase the gain, in order to compensate for a decrease in gain as a result of the increase in the ambient temperature.

Temperature Compensated Amplifiers
100 MHz to 18 GHz

- **Solid-State Designs**
- **Frequency Coverage from 100 MHz to 18 GHz**
- **-54°C to +85C**
- **MIC Thin-Film Design for High Reliability**
- **Optimum Compensation Techniques**
- **Custom Designs Available**

Model Number	Frequency Response (GHz)	Gain (dB)	Gain Flatness (±dB)	Noise Figure (dB)	P1dB (+dBm)	VSWR In/Out	Volts (DC)	DC Current (mA)	CTT Case Outline
	Min	Min-Max	Max	Max	Min	Max	Typ	Typ	
ATM/020-4036	.5-2	36-40	1.25	4.0	15	2:1	12	200	HC4
ATM/020-4033	.5-2	33-37	1.50	4.0	20	2:1	12	320	HC4
ATM/060-4033	2-6	33-37	1.50	4.0	15	2:1	12	240	HC4
ATM/060-4031	2-6	31-35	1.50	4.0	20	2:1	12	350	HC4
ATM/080-5020	2-8	20-24	1.50	5.0	12	2:1	12	250	HC2
ATM/080-7520	2-8	20-24	1.50	7.5	20	2:1	12	280	HC2
ATM/080-5036	2-8	36-40	1.50	5.0	15	2:1	12	300	HC6
ATM/080-5033	2-8	33-37	1.50	5.0	20	2:1	12	350	HC6
ATX/0218-8522	2-18	22-28	2.50	8.5	10	2.2:1	12	450	HX4
ATX/0218-8536	2-18	36-44	2.75	8.5	10	2.2:1	12	600	HX6
ATM/180-5020	6-18	20-24	1.50	5.0	12	2:1	12	250	HX2
ATM/180-6026	6-18	26-30	1.75	6.0	15	2:1	12	300	HX4
ATM/180-7518	6-18	18-22	1.50	7.5	20	2:1	12	320	HX4
ATM/180-6030	6-18	30-35	2.00	6.0	20	2:1	12	450	HX6
ATO/180-6026	8-18	26-30	1.50	6.0	15	2:1	12	300	HX4
ATO/180-6030	8-18	30-35	2.00	6.0	20	2:1	12	450	HX6

Comments:

1. Maximum input power level will be +17 dBm CW. +20 dBm optional.
2. 0.32 inches thick flat package is optional.
3. SMA female connectors are standard.
4. All units contain built-in voltage regulator and reverse voltage protection diode.
5. Consult the factory for any special gain, noise figure, power, voltage, etc.

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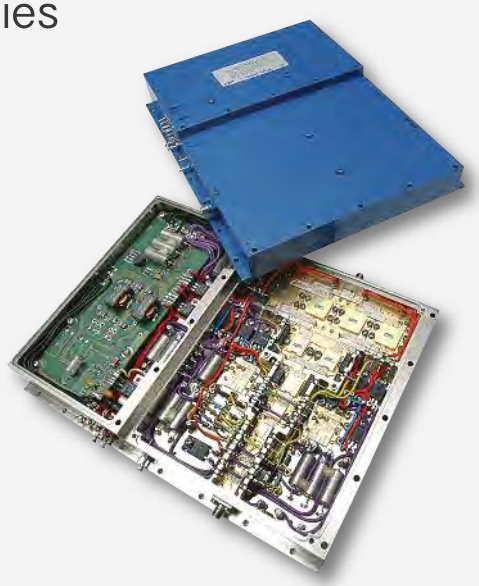
Multi-Function Subassemblies
100 MHz to 40 GHz

- **Military and Commercial Expertise**
- **Frequency Coverage from 100 MHz to 40 GHz**
- **Complete Subsystem Integration**
- **Proprietary Component Library**
- **MIC Thin-Film Design for High Reliability**
- **Custom Engineered Options (CEOs)** (See page 36)



CTT multi-function integrated subassemblies are designed for flexibility to ensure ease of manufacturing by utilizing thin-film circuits that incorporate the latest in GaN and GaAs FET device technology.

CTT's design approach also provides cost effective methods that limit the customer "investment" as well as development time required during the engineering phase of development. Here CTT can optimize product performance to insure customer objectives are met. A key ingredient in the design of integrated assemblies is the ability to provide optimum component performance. CTT's design staff with the help of analytical software, accomplish in-depth system analysis and provide performance trade-offs that result in quick results and provides customers with data that can be used in their system analysis.

These amplifier-driven assemblies are designed for use in applications that include wideband EW systems, as well as high power, high dynamic range radar systems plus the latest high reliability cost effective commercial communication systems and microwave radios, such as T/R Module and Transceiver.

To meet customer's special needs, such subsystems may consist of integration of the following microwave components:

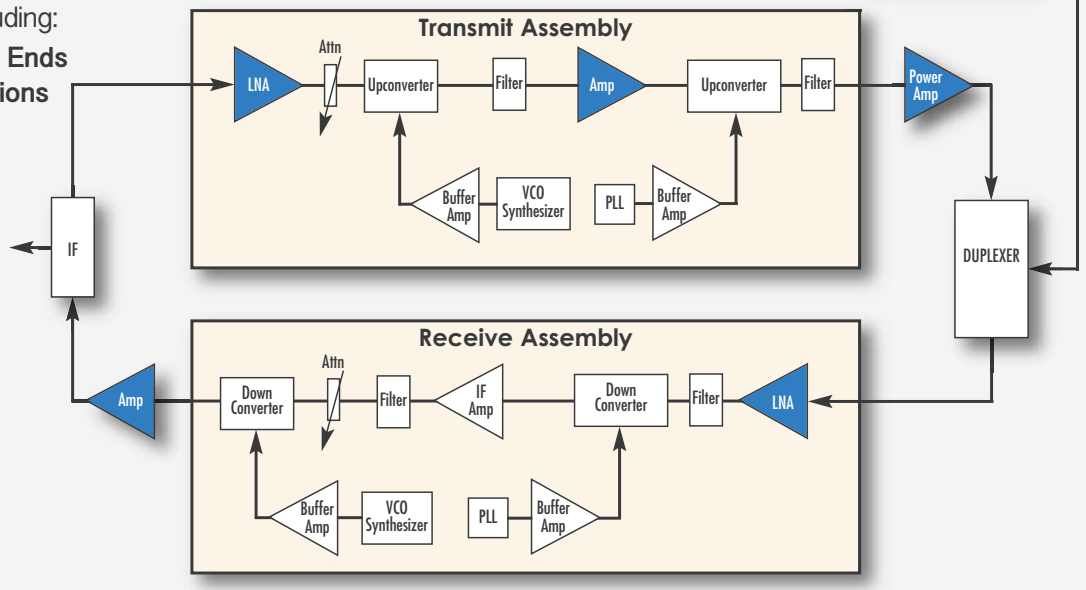
- Detectors • Couplers
- Power Dividers • Attenuators
- Limiters • Switches • Filters
- Mixers • Low-noise amplifiers
- Amplifier gain blocks
- High power amplifiers
- Oscillators • Phase shifters,
- Gain/phase equalizers • etc.

CTT's subassembly operation has been producing complex integrated assemblies including:

- **FM/CW Altimeter Front Ends**
- **Missile Seeker RF Sections**
- **0.5—18 GHz EW RWR MW Front Ends**
- **Datalink Transceivers**

CTT has the in-house design and manufacturing capabilities and has the skills and experience in performing the integration of microwave subsystems in a timely and cost effective manner.

Typical Wireless Transceiver Block Diagram



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