



CELEBRATING 25 YEARS OF INNOVATION

*Empowering Networks. Enabling Nations*

# RF & IBS SYSTEM Product Catalog



# ABOUT US

**CCL Optoelectronics**, an **ISO 9001:2015 certified** company based in **Mumbai, India**, is a trusted name in the field of Optical and Electronic components, specializing in the design, manufacturing, and supply of high-performance **Optical Products & RF (Radio Frequency)** for a wide range of industrial and commercial applications.

With a strong legacy of engineering excellence and a commitment to quality, CCL Optoelectronics offers a comprehensive portfolio of RF components including **Antennas, RF Jumpers, RF Combiners, Splitter/Couplers, Attenuators, Terminations and Custom RF solutions**. Designed to deliver superior signal integrity, reliability and durability, our RF products have wide applications in areas like telecommunications, defense, aerospace, automotive, instrumentation, and wireless communication systems.

At CCL Optoelectronics, quality and customer satisfaction are at the core of everything we do. Our ISO 9001:2015 certification reflects our dedication to consistent manufacturing standards, stringent quality control, and continuous improvement. We work closely with clients to develop customized RF solutions that meet specific technical and environmental requirements while ensuring timely delivery and competitive pricing.

With advanced infrastructure, a skilled technical team, and a customer-centric approach, **CCL Optoelectronics** continues to be a trusted partner for organizations seeking dependable and cost-effective RF components.

## Our Vision

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To empower seamless, high-performance wireless connectivity everywhere bridging coverage gaps and enabling the digital future through innovative, scalable IBS System.

## Our Mission

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CCL Optoelectronics is committed to creating an extraordinary customer experience by delivering high quality, innovative connectivity solutions.

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# ANTENNA

An Antenna is a device that transmits or receives electromagnetic waves, converting electrical signals into radio waves (for transmission) or radio waves into electrical signals (for reception). It's a critical part of any wireless communication system.

## Applications:

- Wireless communication
- Satellite communication
- Broadcasting
- Automotive
- Industrial and IoT
- Internet and Networking

## Features:

- Low Insertion loss
- Supports wide frequency range
- Low PIM (Passive Intermodulation)

## Omni Antenna

An omni antenna radiates or receives RF signals in all directions (360°).

## Features:

- Supports Multiple 4G/5G Bands
- Low PIM & low VSWR
- Wide area coverage, Suitable for large, Open spaces.
- Best for Indoor/Outdoor DAS (Distributed Antenna Systems).

## Specifications:

Model	CCL-OM-740-DS0-XX
Technology	SISO
Frequency Range (MHz)	698-4000
Gain(dBi)	2/4
VSWR	≤2.0
Horizontal Beamwidth	360°
Vertical Beamwidth	65°±10°
Polarization	Vertical
PIM (3rd Order)	≤-130dBc@2x33dBm
Power Handling	50W
Connector	N-F/4.3-10F/DIN-F
Pigtail Cable	RG141/RG58/LMR200



Model	CCL-OM-740-FS0-XX
Technology	SISO
Frequency Range (MHz)	698-4000
Gain(dBi)	2/5
VSWR	≤1.5
Horizontal Beamwidth	360°
Vertical Beamwidth	75°±10°
Polarization	Linear Horizontal
PIM (3rd Order)	≤-153dBc@2x43dBm
Power Handling	50W/100W
Connector	N-F/4.3-10F/DIN-F
Pigtail Cable	RG141/RG58/LMR200

Model	CCL-OM-740-FM2-XX
Technology	2X2 MIMO
Frequency Range (MHz)	698-4000
Gain(dBi)	2/5
VSWR	≤1.8
Horizontal Beamwidth	360°
Vertical Beamwidth	75°±10°
Polarization	Linear Horizontal
PIM (3rd Order)	≤-153dBc@2x43dBm
Power Handling	50W/100W
Connector	N-F/4.3-10F/DIN-F
Pigtail Cable	RG141/RG58/LMR200



**Note:** The parameter XX specifies the connector type used.

# Panel Antenna

A panel antenna is a directional antenna that focuses its RF signal in a specific direction.

## Features:

- Low PIM & low insertion loss
- Provide focused and targeted signal coverage.
- Directional radiation pattern, in a specific direction.
- Ideal for sector signal delivery and point to point communication.

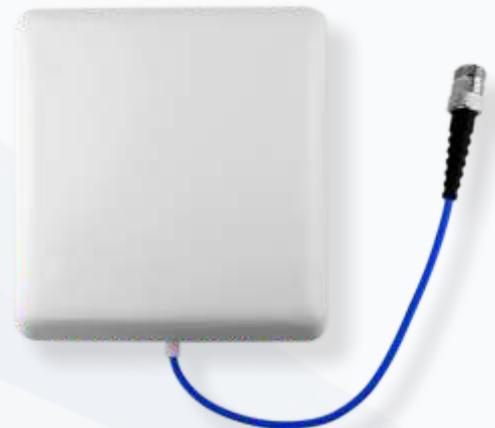
## Specifications:

Model	CCL-PL-727-RS0-XX
Technology	SISO
Frequency Range (MHz)	698-2700
Gain(dBi)	7/9
VSWR	≤1.8
Horizontal Beamwidth	90°±10°
Vertical Beamwidth	75°±10°
Polarization	Vertical
PIM (3rd Order)	≤-153dBc@2x43dBm
Power Handling	50W / 100W
Connector	N-F/4.3-10F/DIN-F
Pigtail Cable	RG141/RG58/LMR200



## Specifications:

Model	CCL-PL-740-RS0-XX
Technology	SISO
Frequency Range (MHz)	698-4000
Gain(dBi)	7/9
VSWR	≤1.8
Horizontal Beamwidth	90°±10°
Vertical Beamwidth	75°±10°
Polarization	Vertical
PIM (3rd Order)	≤-153dBc@2x43dBm
Power Handling	50W / 100W
Connector	N-F/4.3-10F/DIN-F
Pigtail Cable	RG141/RG58/LMR200



## Specification:

Model	CCL-PL-740-RM2-XX
Technology	2X2 MIMO
Frequency Range (MHz)	698-4000
Gain(dBi)	7/9
VSWR	≤2.0
Horizontal Beamwidth	85°± 10 °
Vertical Beamwidth	75°±10°
Polarization	Vertical
PIM (3rd Order)	≤-153dBc@2x43dBm
Power Handling	50W / 100W
Connector	N-F/4.3-10F/DIN-F
Pigtail Cable	RG141/RG58/LMR200



## Specification:

Model	CCL-PL-1626-RM4-4F
Technology	4X4 MIMO
Frequency Range (MHz)	1695-2690
Gain (dBi)	14 ± 1
Polarization	4° ± 45
Horizontal Beamwidth	65° ± 5
Vertical Beamwidth	14° ± 3
VSWR	≤1.5
Front-to-back Ratio at 180°	>25
PIM (3rd Order)	≤-150dBc@ 2x43dBm
Maximum Power (W)	100
Antenna Dimension (mm)	500 x 280 x 80
Weight (kg)	4.5
Radome Material and Color	U-PVC
Connector type and Location	4 x 4.3-10 Female, Bottom
Mounting Hardware	Φ45 ~ ϕ90
Operating Humidity	< 95%
Operational Wind Speed	200 km/h
Operating Temperature	-40 to +60



**Note:** The parameter XX specifies the connector type used.

# Log Periodic Dipole Array (LPDA)

A Log-Periodic Dipole Array (LPDA), also known as a log-periodic array or log-periodic aerial, is a multi-element, directional antenna designed to operate over a wide band of frequencies. The LPDA consists of a number of half-wave dipole driven elements of gradually increasing length, each consisting of a pair of metal rods.

## Specification:

Model	CCL-LP-727-XX
Frequency Range(MHz)	698-960/1710-2700
Polarization	Vertical
Gain(dBi)	9/11
Horizontal Beamwidth	90°
Vertical Beamwidth	60°
VSWR	≤1.8
Front to Back Ratio	≥15dB
Impedance	50 Ω
Maximum Input Power	50 W
PIM (3rd Order)	≤-120/ ≤-150/ ≤-153 dBc@2x43dBm
Connector Type	N-F/4.3-10F
Radome Material	ABS



**Note:** The parameter XX specifies the connector type used.

# High Gain Antenna

An antenna designed to focus energy tightly in one direction to achieve higher signal strength.

## Features:

- Narrow beam or concentrated radiation pattern.
- Designed for precise signal directionality over long distances.
- Ideal for applications like satellite communication, radar, long-distance Wi-Fi, and backhaul links.

## Specifications:

Model	CCL-PA-738-4F		
Frequency Range (MHz)	698-960	2170-2690	3300-3800
Gain (dBi)	11±1	14±1	14±1
Polarization	Vertical		
Horizontal Beamwidth	65°±5°	65°±5°	60°±5°
Vertical Beamwidth	35°±5°	14° ±2°	14°±2°
VSWR	≤2.0		
Front to Back ratio at 180°	>25		
PIM (3 <sup>rd</sup> order)	≤-150dBc@2x43dBm		
Maximum Power	100 W		
Antenna Dimension(mm)	800 x 280 x 125		
Radome Material and Color	U-PVC		
Connector type and location	1 x 4.3-10 - Female Bottom		



# SPLITTERS

An RF splitter is used to split input signal into equal two or more output signals, with minimal loss.

## Applications:

- Satellite and Cable TV
- Cellular and Wireless Systems
- Radio Broadcasting
- Industrial and Commercial Systems

## Features:

- Wide Frequency band 698-3800MHz
- 2G/3G/4G/LTE Coverage
- Low VSWR & Insertion loss
- Widely used for in-building solution.

	2-Way Splitter	3-Way Splitter	4-Way Splitter
<b>Model</b>	<b>CCL-SP-738-2W-NF</b>	<b>CCL-SP-738-3W-NF</b>	<b>CCL-SP-738-4W-NF</b>
Frequency Range(MHz)	698-3800	698-3800	698-3800
Insertion Loss	≤3.3 dB	≤5.2 dB	≤6.5 dB
VSWR	≤1.3	≤1.3	≤1.35
In-band Ripple	≤0.3dB	≤0.45dB	≤0.5dB
PIM (3 <sup>rd</sup> Order)	≤-150dBc@2x43dBm	≤-150dBc@2x43dBm	≤-150dBc@2x43dBm
Power Handling	300 W	300 W	300 W
Connector	N-Female	N-Female	N-Female
Material	Connector - Brass	Connector - Brass	Connector - Brass



# COUPLERS

An RF coupler is a passive device that splits a signal with unequal power distribution. The most of power entered from the input flows straight to the output port and a small portion is coupled to coupled port. This happens via electromagnetic field generated between parallel transmission lines. The coupler is used for the balanced signal power distribution at the end.

## Features:

- High Isolation
- Supports high RF power
- IP-rated and lightning-protected for harsh conditions



## Specifications:

Model	CCL-CP-738-XX-NF						
Coupling(dB)	5dB	6dB	7dB	10dB	12dB	15dB	20dB
Frequency Range (MHz)	698-3800 MHz						
Insertion Loss(dB)	≤2.1	≤1.7	≤1.3	≤1.0	≤0.9	≤0.8	≤0.4
Accuracy(dB)	±1.0	±1.0	±1.0	±1.2	±1.2	±1.2	±1.5
Directional(dB)	≥18						
VSWR	≤1.3 : 1						
PIM (3rd Order)	≤-150dBc@2x43dBm						
Power(W)	200 W/Port						
Impedance	50 Ω						
Connectors	N-Female						
Dimensions (mm)	103×34×15(without connector)						
Weight (KGS)	0.106						
Application	Indoor IP55						
Operating Temperature (°C)	-30~+55						
Colour	Black						

**Note:** The parameter XX specifies the value of coupler.

# COMBINERS

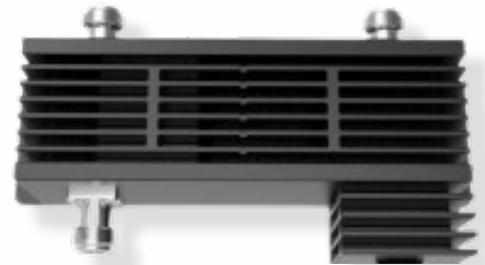
The combiner is a radio frequency device that combines two or more radio frequency signals from different transmitters into a radio frequency device to send to the antenna for transmission. Another main function is to achieve strong suppression of microwave signals of different frequency bands passing through the device.

## Features:

- Supports combining of 2, 3, 4, or more frequency bands.
- Supports wide frequency ranges.
- High Isolation.
- Handle high power RF signals.
- Simple installation.

### 2x1 Wideband Combiner

Model	CCL-CMB-21-XX-01
Frequency Range(MHz)	698-3800
VSWR	$\leq 1.3$
Insertion Loss	$3.0 \pm 1.0$ dB
Average Power	200 W per Port
Isolation	$\geq 23$ dB
PIM (3rd Order)	$\leq -160$ dBc@2x43dBm
Connector	N-F/DIN-F
Application	Indoor/ Outdoor, IP65



### 2x2 Wideband Combiner

Model	CCL-CMB-22-XX-01
Frequency Range(MHz)	698-3800
VSWR	$\leq 1.3$
Insertion Loss	$3.1 \pm 0.8$ dB
Average Power	100 W per Port
Isolation	$\geq 23$ dB
PIM (3rd Order)	$\leq -160$ dBc@2x43dBm
Connector	N-F/DIN-F
Application	Indoor / Outdoor, IP65



### 4x1 Wideband Combiner

Model	CCL-CMB-41-XX-01
Frequency Range(MHz)	698-3800
VSWR	≤1.3
Insertion Loss	6.1±1.8 dB
Average Power	200 W per Port
Isolation	≥ 22 dB
PIM (3rd Order)	≤-160dBc@2x43dBm
Connector	N-F/DIN-F
Application	Indoor / Outdoor, IP65



### 4x4 Wideband Combiner

Model	CCL-CMB-44-XX-01
Frequency Range (MHz)	698-3800
VSWR	≤1.3
Insertion Loss	6.1±1.4 dB
Average Power	100 W per Port
Isolation	≥ 23 dB
PIM (3rd Order)	≤-160dBc@2x43dBm
Connector	N-F/DIN-F
Application	Indoor / Outdoor, IP65



### Dual-Band Combiner

Model	CCL-DC-DF-01-S
Frequency Range (MHz)	698-2170 / 2300-2700 1710-1880 / 1920-2170
VSWR	1.3
Insertion Loss	≤0.5 dB
Average Power	200 W per Port
Isolation	40dB (Min.)
PIM (3rd Order)	≤-160dBc@2x43dBm
Connector	DIN-F
Application	IP67



**Note:** The parameter XX specifies the connector type used.

### Tri-Band Combiner

Model	CCL-TC-DF-01-S
Frequency Range (MHz)	698-960 / 1710-1880 / 1920-2170 1710-1880 / 1920-2170 / 2300-2690
VSWR	1.3
Insertion Loss	≤0.5 dB
Average Power	200 W
Isolation	40 dB (Min.)
PIM (3rd Order)	≤-160dBc@2x43dBm
Connector	DIN-F
Application	IP67



### Quad-Band Combiner

Model	CCL-QC-DF-02-S
Frequency Range (MHz)	698-960 / 1920-2170 / 2300-2700 / 3300-3800
VSWR	1.3
Insertion Loss	≤0.5 dB
Average Power	200 W
Isolation	50 dB (Min.)
PIM (3rd Order)	≤-153dBc@2x43dBm
Connector	DIN-F
Application	IP67



### Penta-Band Combiner

Model	CCL-PC-DF-02-S
Frequency Range (MHz)	698-960 / 1710-1880 / 1920-2170 / 2500- 2700 / 3400-3800
VSWR	1.3
Insertion Loss	≤0.5 dB
Average Power	200 W
Isolation	50 dB (Min.)
PIM (3rd Order)	≤-153dBc@2x43dBm
Connector	DIN-F
Application	IP67



# DUMMY LOAD

Dummy load is a device which is used to provide stable and predictable load. Its important for dummy load to match the impedance rating.

## Features:

- Wide Frequency Band
- 2G/3G/4G/LTE/5G Coverage
- Low Port VSWR
- Low Passive Intermodulation
- Easy Installation in Projects
- Widely Used in In-Building Solutions

Model	CCL-DM-100-040-01
Frequency Range (MHZ)	DC - 4000
VSWR	≤1.25
PIM (3rd Order)	≤-160dBc@2x43dBm
Average Power (W)	100
Impedance	50 ohm
Connector	DIN-Male
Color	Black
Working Temperature	DIN-Male
Relative Humidity	5% - 95%
Application	Indoor & Outdoor Ip65
Dimension (mm)	200*200*64 (Connector Excluded)



# CO-AXIAL CABLES

RF coaxial cables are a type of cable used to transmit radio frequency (RF) signals from one point to another with minimal loss. In telecom, they're essential for carrying high-frequency signals (like those in cellular, TV, satellite, or Wi-Fi systems) between components such as antennas, radios, amplifiers, and baseband units.

## Features:

- Low Attenuation
- Wide frequency range
- Stable VSWR

### 1/2" Super Flexible Cable

Model	CCL-HFSC-9D
Inner Conductor	Copper Clad Aluminum Wire
Dielectric	Foamed Polyethylene
Outer Conductor	Annularly corrugated Copper
Jacket	LSZH
Outer Diameter(mm)	13.6
Pulling Force(Kg)	65
Bending Radius(mm)	32
Velocity(%)	81
Max Operating Frequency(GHz)	10
Crush Resistance(Kg/mm)	1.7
Return Loss	28
Characteristic Impedance( $\Omega$ )	50
Peak Power Rating(KW)	15.6



## 1/2" Flexible Cable

Model	CCL-HFC-12D
Inner Conductor	Copper Clad Aluminum Wire
Dielectric	Foamed Polyethylene
Outer Conductor	Annularly corrugated Copper
Jacket	LSZH
Outer Diameter(mm)	16
Pulling Force(Kg)	113
Bending Radius(mm)	125
Velocity(%)	89
Max Operating Frequency(GHz)	8.8
Crush Resistance(Kg/mm)	2.0
Return Loss	28
Characteristic Impedance( $\Omega$ )	50
Peak Power Rating(KW)	40



## 7/8" Flexible Cable

Model	CCL-HFC-22D
Inner Conductor	Smooth Copper Tube
Dielectric	Foamed Polyethylene
Outer Conductor	Annularly corrugated Copper
Jacket	LSZH
Outer Diameter(mm)	27.9
Pulling Force(Kg)	147
Bending Radius(mm)	250
Velocity(%)	89
Max Operating Frequency(GHz)	4.9
Crush Resistance(Kg/mm)	2.4
Return Loss	28
Characteristic Impedance( $\Omega$ )	50
Peak Power Rating(KW)	91



# CONNECTORS

RF connectors are specialized connectors used to connect coaxial cables in Radio Frequency (RF) systems typically handling signals.

## Common Types of RF Connectors

### N Type Connector

Model	CCL-CNT-NM-78	CCL-CNT-NF-78	CCL-CNT-NM-12	CCL-CNT-NF-12
Frequency Range (MHz)	DC-5000			
Insertion Loss	≤0.25 dB			
Impedance	50 Ω			
VSWR	≤1.20			
PIM (3rd Order)	≤-155dBc @ 2x43dBm			
Pin Center Contact	Brass/ Silver Plated	Tin Bronze/ Silver plated	Brass/ Silver Plated	Tin Bronze/ Silver plated
Outer Body	Brass/ Trimetal Plated			
Dielectric	TPX			
Gasket	Silicon Rubber			
Sealing Class	IP68			



N-Male for 7/8"  
Flexible Cable



N-Female for 7/8"  
Flexible Cable



N-Male for 1/2"  
Flexible Cable



N-Female for 1/2"  
Flexible Cable

## 7/16" Type Connector

Model	CCL-CNT-716M-78	CCL-CNT-716F-78	CCL-CNT-716M-12	CCL-CNT-716F-12
Frequency Range (MHZ)	DC-5000			
Insertion Loss	≤0.20 dB			
Impedance	50 Ω			
VSWR	≤1.20			
PIM (3rd Order)	≤-160dBc @ 2x43dBm			
Pin Center Contact	Brass/ Silver Plated	Tin Bronze/ Silver plated	Brass/ Silver Plated	Tin Bronze/ Silver plated
Outer Body	Brass/ Trimetal Plated			
Dielectric	TPX	TPX	PTFE	PTFE
Gasket	Silicon Rubber			
Sealing Class	IP68			



7/16 DIN Male for 7/8"  
Flexible Cable



7/16 DIN Female for 7/8"  
Flexible Cable



7/16 DIN Male for 1/2"  
Flexible Cable



7/16 DIN Female for 1/2"  
Flexible Cable

# RF CABLE ASSEMBLIES

It is widely used for the interconnection and intercommunication between the modules of the antenna feeder subsystems. Jumper cable is a small length and easily bendable (super-flex) corrugated cable used to connect antennas and other components of cellular network. It often connects BTS/RRU to antennas. Jumper cables are used in areas that require extremely small bending radius such as on the connection between main feeders and antennas or between main feeders and RF- equipment.

## Features:

- Wide Frequency Band
- High Pull-Off strength
- Low insertion loss
- Excellent VSWR performance
- Low and stable intermodulation

## Cable Assembly:

- 1/2" Super-flex Feeder Cable
- RG-316 Cable
- RG-401 Cable
- RG-402 Cable

## Connector Type:

- N-Type
- DIN-Type
- 4.3/10 Type
- SMA Type
- QMA Type
- TNC/BNC/MCX Type



# RET AISG CABLE

RET cable stands for Remote Electrical Tilt cable. It is used to connect the Base Station (or controller) to the antenna's RET system, which allows operators to remotely adjust the tilt (or angle) of the antenna's beam without physically going to the site.

## RET Control Jumper Cable with AISG Connector

### Features:

- Compatible with AISG connectors
- Outdoor IP68 Compliant
- Flame Retardant
- Simple installation



## RET Control Jumper Cable with DB9 Male AISG Female

### Features:

- Compatible with AISG & DB9 connectors
- Outdoor IP68 Compliant
- Flame Retardant
- Simple installation



## RET Control Jumper Cable with DB15 Male AISG Female

### Features:

- Compatible with AISG & DB15 connectors
- Outdoor IP68 Compliant
- Flame Retardant
- Simple installation



# ABBREVIATIONS

Sr. No.	Short Form	Long Form
1	IBS	In Building Solution
2	PIM	Passive Intermodulation
3	IOT	Internet Of Things
4	RF	Radio Frequency
5	VSWR	Voltage Standing Wave Ratio
6	DAS	Distributed Antenna System
7	SISO	Single Input Single Output
8	MIMO	Multiple Input Multiple Output
9	LPDA	Log Periodic Dipole Array
10	ABS	Acrylonitrile Butadiene Styrene
11	U-PVC	Unplasticized Polyvinyl Chloride
12	LTE	Long Term Evolution
13	IP	Ingress Protection
14	LSZH	Low Smoke Zero Halogen
15	DC	Direct Current
16	TPX	Thermoplastic Polymer
17	PTFE	Polytetrafluoroethylene
18	BTS	Base Transceiver Station
19	RRU	Remote Radio Unit
20	RG	Radio Guide
21	SMA	SubMiniature version A
22	QMA	Quick-lock Medium Access
23	TNC	Threaded Neill–Concelman
24	BNC	Bayonet Neill–Concelman
25	MCX	Micro CoaXial
26	RET	Remote Electrical Tilt
27	AISG	Antenna Interface Standards Group
28	DB	D-subminiature B





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**SCAN FOR OUR  
PRODUCT RANGE**

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