ICOM

iDAS™
ICOM DIGITAL ADVANCED SYSTEM

dPMR digital™

Open Standard, Maximum Flexibility

- Single/Multi-site Trunking
- Spectrum & Cost-Efficient
- Peer to Peer
- Conventional Repeater Systems
- Scalable Networks
- ETSI Open Standard

What is dPMR™? Why Digital?

What is dPMR™?

dPMR is a 6.25 kHz FDMA based digital radio protocol described in the ETSI technical standards TS 102 490 and TS 102 658. The TS 102 490 standard defines dPMR 446 license-free radio and the TS 102 658 defines Mode 1 peer-to-peer mode, Mode 2 repeater mode and Mode 3 digital trunking. dPMR is specifically targeting highly functional solutions by using lower cost and less complex technology. Details of the dPMR protocol can be found on the dPMR Association website. (http://www.dpmr-mou.org)

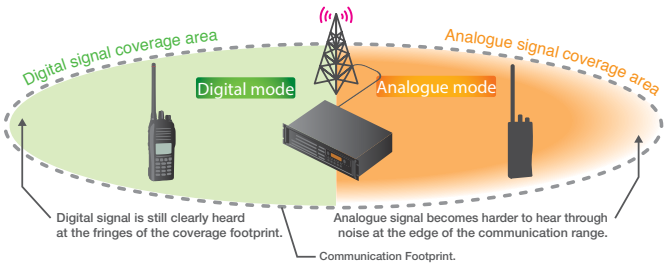
ETSI Standards	Tier	Mode	Descriptions
TS 102 490	Tier 1	–	License-free (dPMR 446)
TS 102 658	Tier 2	Mode 1	Direct Peer-to-peer Mode
		Mode 2	Conventional Repeater Mode
		Mode 3	Digital Trunking Mode

Why Digital?

Currently, the broad range of products and services including telecommunication, broadcast and information services use digital technology and the PMR (Private Mobile Radio) market is no exception. The move toward digital systems started over a decade ago and this trend is still growing rapidly. The merits of moving from analogue to digital are outlined below.

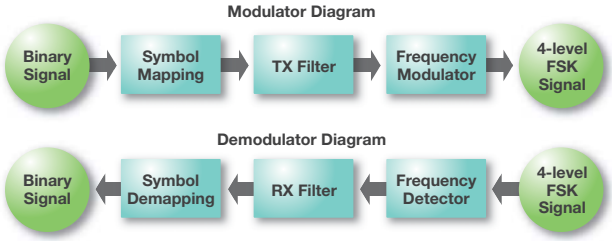
• Wider communication coverage

When compared to an analogue FM signal, digital easily out-performs analogue at the fringes of the communication range, thus providing more intelligible audio over a greater total area, even if the coverage footprint is the same as analogue FM.



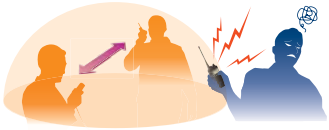
• Better audio quality

dPMR radios incorporate the industry standard DVSI AMBE+2™ vocoder. The vocoder converts the analogue audio signal to a digital signal and reduces unwanted signals such as background noise and acoustic echo to deliver better voice quality and clarity.



• Secure conversation

Using digital modulation, dPMR radios cannot be easily monitored with an analogue receiver. A 15-bit digital scrambler also adds to the enhanced security of dPMR radios.



Cannot be easily monitored

• Flexible migration and upgrade path

The dPMR system allows you to scale migration to a digital system at your own pace and needs, while running your existing system. If the radio users increase in the future, or you require expanded communication coverage, the dPMR conventional system can be upgraded to a multi-site system, or grow into a Mode 3 trunking system while using the same subscribers*. This provides investment protection for your communication system.

* Depending on radio model/firmware revision.

• IP network connectivity

Since the dPMR system uses digital signals, these can be easily converted and transferred to an IP network or IP based applications. This means an increase in communication coverage.

dPMR™ Calling Features

Voice Services

Selective call and group call: Radio to radio, radio to group and radio to all users calls are supported.

Broadcast call: One-way voice call to a pre-programmed talkgroup.

All call: Radio to all users calls.

Gateway call: This is any call through a gateway to or from line connected destinations such as Telephone or SIP Phones. External gateway device required.

Data Services

Short Data Message (SDM): A data service that supports a variety of standard formats – Binary Code, Text and GPS.

Status call: 32 preprogrammed status messages can be sent and received. The status call can be used as a trigger for special functions such as ambience listening, remote stun/kill/revive and GPS data delivery.

Transparent data call: This function uses a dPMR radio as a data modem allowing data communication on a 6.25kHz channel such as for a remote telemetry system or data applications.

GPS data delivery: Sends GPS position data with Status, SDM and emergency calls. Position data can be used for GPS-based vehicle management applications.

Features	Mode 3	Mode 1/2
Individual Call	✔	✔
Group Call	✔	✔
Broadcast Call	✔	✔
All Call	✔	✔
Gateway Call	✔	✔
Short Data Message (SDM)	✔	✔
Status Call	✔*	✔
Transparent Data Call	✔	✔
GPS Data Delivery	✔	✔
Emergency Call & Alert	✔	✔
Pre-emptive Emergency	✔	–
Ambience Listening	✔	✔
Remote Kill/Stun/Revive	✔	✔
Call Back* (* Radio function)	✔ (Maximum 10 stack)	–
Call Queue	✔	–
Digital Voice Scrambler* (* Radio function)	✔	✔
ANI* (* Radio function)	✔	✔
Late Entry to Group Call	✔	✔
Call Set-up	✔	✔

* Individual call only.

Supplementary Service

Emergency call: The highest priority type of call. In a dPMR Mode 3 system, the network will attempt to connect this type of call as quickly as possible.

Pre-emptive emergency: If all traffic channels are busy, this call service clears down the existing call and gives the highest priority for the emergency call.

Ambience listening: The ambience listening function allows the dispatcher to turn on the PTT from a remote location and transmit anything the microphone hears for a preprogrammed period.

Remote kill: This function disables a lost or stolen radio over the air, eliminating security threats from undesired listeners.

Remote stun/revive: The remote stun function temporary locks out a radio until the revive command is received, or the user password is entered.

Call back (Radio function): Up to ten missed incoming calls can be stored to return the call later.

Call queue: If a called party or channel is busy, the call queue automatically connects the call when it becomes available.

Digital voice scrambler: A built-in digital voice scrambler provides about 32,000 codes scrambler for secure conversations.

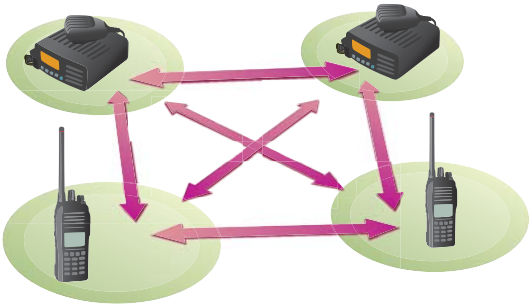
ANI (Automatic Number Identification): The ANI function shows the alias ID number on the LCD while receiving a call, allowing the radio user to identify who is calling.

Late entry: If a group call is in progress when a member of the group turns on the radio or comes into the radio coverage area, this function shows the caller's name, and allows the user to join the conversation.

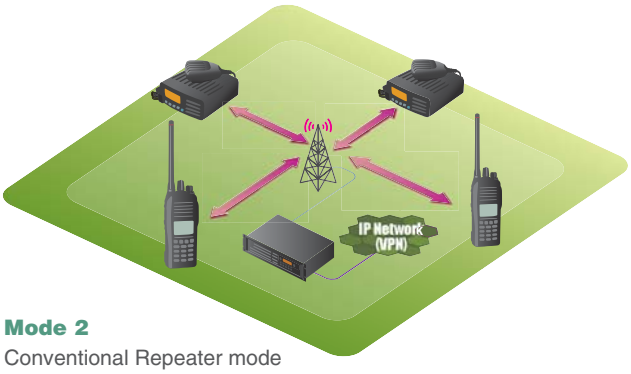
dPMR™ Conventional Modes

dPMR™ Conventional Mode (Mode 1/ Mode 2)

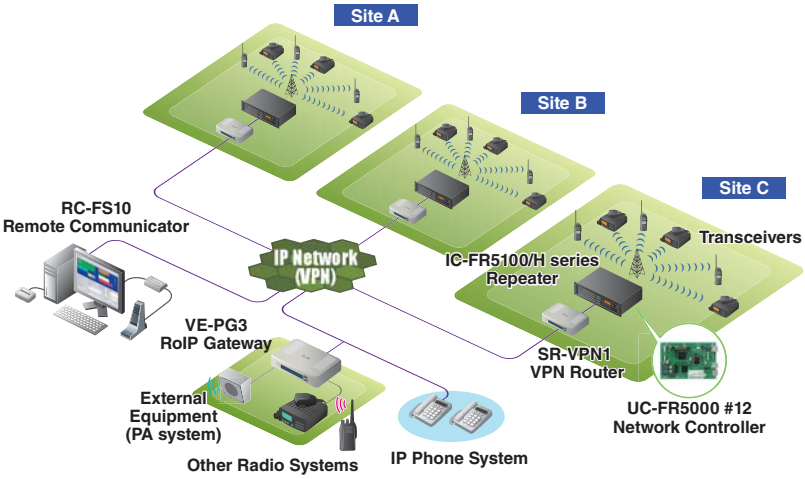
dPMR Mode 1 and Mode 2 are the digital conventional modes for small user systems and/or for low density traffic systems. Mode 1 is peer-to-peer communications and Mode 2 is repeater/infrastructure added to Mode 1.
The analogue PMR system users who are mainly running 5-Tone or BIIS signaling can easily migrate to the digital conventional mode. "Call setup and clear down" operation is implemented for familiarity for analogue users. dPMR radios are designed to coexist with analogue radio systems, and can receive both analogue and digital mode signals on a single channel.
In Mode 2 conventional systems, up to 16 repeater sites can be interconnected over an IP network, and you can build low complexity multi-site systems.



Mode 1
Peer-to-peer mode



Mode 2
Conventional Repeater mode



Up to 16 repeater sites can be connected over an IP network.

- Flexible migration solution from analogue to digital
- Up to 16 site Networks • Up to 60,000 subscribers
- Web based system administration
  System software updates and configuration online
- Status call • Data call (SDM)
- Transparent data call
- Digital/Analogue dual mode*

* The Mode 2 conventional IP network cannot relay voice traffic over the IP network if the uplink is analogue.

- RC-FS10 creates a IP-based virtual radio station on a PC and works as a simple dispatch
- Interconnect with IP phone, analogue radio and IP advanced radio systems with the VE-PG3 RoIP gateway

Examples of dPMR™ End Users

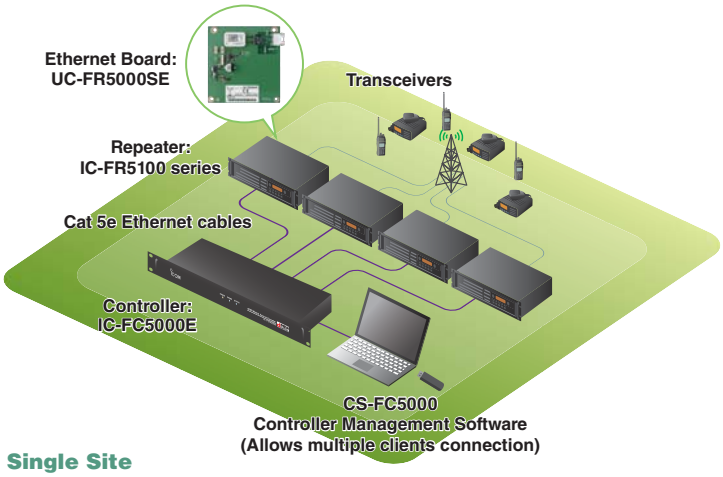
The following are some examples of dPMR™ implementations around the world.

- Local governments (City councils)
- Humanitarian Users
- Utilities (Power Plants)
- SMR services
- Security/Prisons
- B&I Users (Manufacturers)
- Airports/Transportation

dPMR™ Mode 3 Digital Trunking

dPMR™ Mode 3 Digital Trunking

In a dPMR Mode 3 digital trunking system, when a user requests a call through a dedicated control channel, the trunking controller automatically allocates one of the traffic channels and sets up the call. The system can accommodate a large number of users on a limited number of repeater channels with high efficiency. The System Control Software can interconnect multiple trunking controllers over an IP network, so the system can be expanded from a single site system to multiple sites and increases coverage.

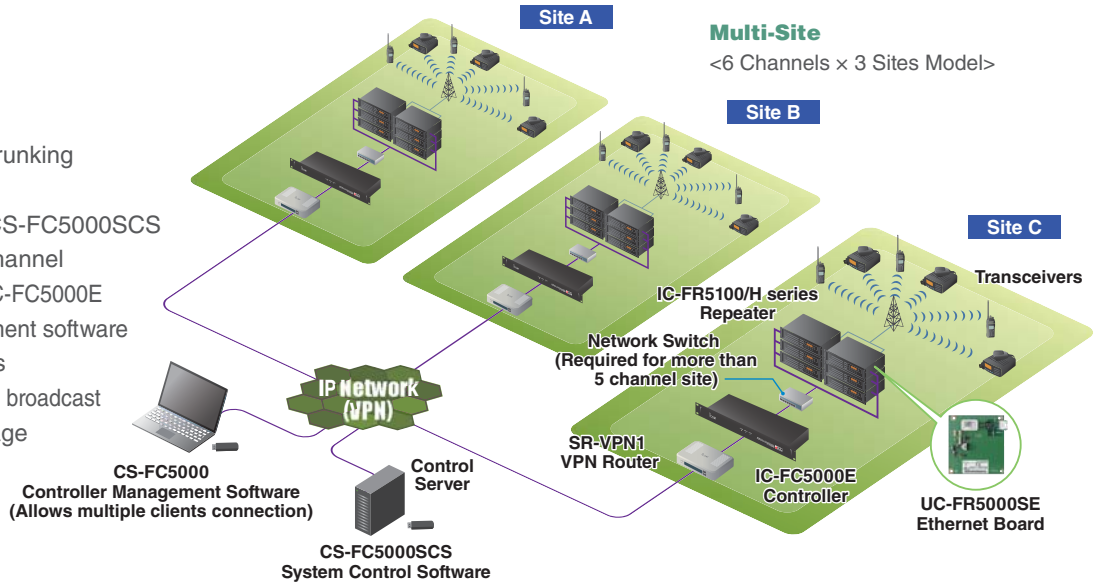


Single Site
<4 Channels × 1 Site Model>

Centralized Control Channel Trunking

The dPMR Mode 3 trunking system uses a centralized control channel system. The control channel is independent of the traffic channels and continuously transmits a control signal. The system allocates a traffic channel for the whole duration of a call and can provides quick response during a series of calls. The dPMR Mode 3 trunking system is suited to controlling a large number of users and congested traffic channels.

- Up to 32 channels per site
- Minimum 2 channel single site trunking
- Up to 32 site multi-site trunking with System Control Software, CS-FC5000SCS
- Channel license system. Four channel activation key is supplied with the IC-FC5000E
- CS-FC5000 web based management software allows to connect multiple clients
- Individual and group calls, including broadcast
- Status call • Short data message
- Call Queuing
- Emergency Call with Pre-emption



Multi-Site
<6 Channels × 3 Sites Model>

Continued Feature Enhancements (Planned)

In combination with various applications or external devices, the following services will be provided.

• Telephone interconnect • 3rd party application interface • Voice recording • System administration enhancements

VHF HANDHELD TRANSCEIVERS

IC-F3262DT (5W)
IC-F3262DS (5W)

UHF HANDHELD TRANSCEIVERS

IC-F4262DT (5W)
IC-F4262DS (5W)

IP67

GPS

Rugged MIL-STD 810

Left: S Series (Simple keypad)
Right: T Series (10-keypad)

» IDAS™ Features

- dPMR Mode 1, 2 and 3 compatible
- Individual and group selective call
- Broadcast call • Ambience listening
- Status call and data call (Short Message)
- Transparent data call
- Emergency call and alert
- Remote kill, stun and revive
- Digital voice scrambler

» General and Analogue Features

- 136–174MHz, 5W • 400–470MHz*, 5W
  (* Other frequency versions may also be available in some countries.)
- 512 memory channels with 128 zones
- Menu-driven user interface
- IP67 dust-tight and waterproof
- MIL-STD rugged construction
- Large capacity Lithium-Ion battery pack
- 800mW loud audio with BTL amplifier
- 14-pin accessory connector with BTL amplifier output
- Mode dependent scan • Priority scan
- 8 DTMF autodial memories
- Lone worker function
- Integrated GPS receiver and man down function* (* Depending on version)
- 5-Tone, 2-Tone, CTCSS and DTCS capability
- Built-in audio compander
- Inversion voice scrambler

VHF HANDHELD TRANSCEIVER

IC-F1000D (5W)

UHF HANDHELD TRANSCEIVER

IC-F2000D (4W)

IP67

Rugged MIL-STD 810

IC-F1000D

» IDAS™ Features

- dPMR Mode 1 and 2 compatible
- Individual/Group call • PTT ID (TX)
- Ambience listening • Emergency (TX)
- SDM (Short Data Message)/Status RX beep
- Remote kill, stun and revive (RX)
- Digital voice scrambler

» General and Analogue Features

- 136–174MHz, 5W • 400–470MHz, 4W
- 16 memory channels with voice announcement
- IP67, dust-tight and waterproof protection
- Operating time: 18 hours* (approx. with BP-280 battery pack)
  * Tx: Rx: standby=5:5:90. Power save on.
- 52.2 (W) × 111.8 (H) × 30.3 (D) mm compact body (with BP-280)
- Motion detection, man down and lone worker functions
- BIIS 1200 functions: PTT ID and emergency call
- Surveillance function
- 5-Tone, 2-Tone, CTCSS and DTCS capability
- DTMF autodial memory
- 800mW (typ.) loud companded audio
- Optional GPS microphone, HM-171GPW

IECEx/ATEX INTRINSICALLY SAFE RADIO

VHF HANDHELD TRANSCEIVER

IC-F3202DEX (1W)

UHF HANDHELD TRANSCEIVER

IC-F4202DEX (1W)

IP67

Rugged MIL-STD 810

IC-F3202DEX

» IEC Certifications

Mining : Ex ib I Mb
Gas : Ex ib IIC T4 Gb
Dust : Ex ib IIIC T110°C Db
–20°C≤Ta≤+55°C
IEC 60079-0 (2011), IEC 60079-11 (2011)

» ATEX Certifications

Mining : I M2 Ex ib I Mb
Gas : II 2G Ex ib IIC T4 Gb
Dust : II 2D Ex ib IIIC T110°C Db
–20°C≤Ta≤+55°C
EN 60079-0 (2012), EN 60079-11 (2012)

» Features

- 136–174MHz, 1W • 400–470MHz, 1W
- dPMR Mode 1 and 2 compatible
- 16 memory channels
- Lone worker and man down functions
- Low electrical resistivity body; Carrying case is not required
- IP67 dust-tight and waterproof
- Operating time: 21.5/19 hours* (VHF/UHF, approx. with BP-277EX battery pack)
  * Tx: Rx: Standby=5:5:90. Power save on.
- 2-Tone, 5-Tone, CTCSS and DTCS capability
- BIIS 1200 PTT ID transmission
- Option speaker-microphone
- Channel announcement function

dPMR™ 446/PMR446 TRANSCEIVER

IC-F29DR (500mW ERP)

LICENCE FREE

IP67

Rugged MIL-STD 810

IC-F29DR

» Features

- dPMR 446 and analogue PMR 446 compatible
- Digital and analogue dual mode
- No licence* is required to use the radio
- IP67, dust-tight and waterproof protection
- 800mW (typ.) loud audio
- Operating time: 26 hours* (approx. with BP-280 battery pack)
  * Tx: Rx: standby=5:5:90. Power save on.
- Call-Ring function provides 12 types of ring tone
- Answer back call function (analogue mode)
- Voice announcement
- Tone scan (analogue mode)
- CTCSS, DTCS and digital common ID for group call communication
- Operating channel, CTCSS, DTCS and common ID are programmable in the field (without PC programming)
- 52.2 (W) × 186.1 (H) × 30.3 (D) mm compact, slim body (with BP-280)
- 270g lightweight body (with BP-280 and MB-133)
- 500mW output power (ERP)
  * Simple licence or application may be required in some countries.

VHF MOBILE TRANSCEIVER
IC-F5062D (25W)

UHF MOBILE TRANSCEIVER
IC-F6062D (25W)

IP54
Only controller and RMK-3.

Rugged MIL-STD 810

The above photo includes optional seperation kit, RMK-3, and separation cable, OPC-609.

» IDAS™ Features

- dPMR Mode 1, 2 and 3 compatible • Individual and group selective call
- Broadcast call • Ambience listening • Status call and data call (Short Message) • Transparent data call • Emergency call and alert
- Remote kill, stun and revive • Digital voice scrambler

» General and Analogue Features

- 136–174MHz, 25W • 400–470MHz*, 25W
  (* Other frequency versions may also be available in some countries.)
- 512 memory channels with 128 zones
- Menu-driven user interface
- Backlit dot-matrix display • Power on password
- IP54 dust-protection and splash resistance (Controller only)
- Detachable front panel (Optional RMK-3 and separation cable required)
- MIL-STD rugged construction • DTMF autodial
- Front mounted speaker • Lone worker function
- D-SUB 25-pin accessory connector • Ignition sensing line
- Mode dependent scan • Built-in inversion voice scrambler
- 5-Tone, 2-Tone, CTCSS and DTCS capability
- Built-in audio compander • Radio kill, stun and revive function

VHF HANDHELD TRANSCEIVER
IC-F3102D (5W)

VHF MOBILE TRANSCEIVER
IC-F5122D (25W)

UHF HANDHELD TRANSCEIVER
IC-F4102D (4W)

UHF MOBILE TRANSCEIVER
IC-F6122D (25W)

IP54

Rugged MIL-STD 810

Rugged MIL-STD 810

IC-F3102D

IC-F5122D

» IDAS™ Features

- dPMR Mode 1 and 2 compatible • PTT ID • Individual/Group call
- Remote kill, stun and revive (RX)
- Emergency (TX) • Ambience listening (RX) • Digital voice scrambler
- Status call and data call (Short Data Message)(IC-F5122D series)
- Transparent data call (Xon/Xoff)(IC-F5122D series)

» General and Analogue Features

- 136-174MHz and 400-470MHz coverage
- 128 memory channels with 8 zones (IC-F5122D series)
  16 channels with channel announcement (IC-F3102D series)
- MIL-STD rugged construction
- 5-Tone, 2-Tone, CTCSS and DTCS capability
- BIIS PTT ID transmission • DTMF autodial memories
- D-Sub 25-pin accessory connector with optional OPC-2078 (IC-F5122D series)
- Optional GPS microphone, HM-171GP (IC-F3102D series)

REMOTE COMMUNICATOR
RC-FS10

» Features

- The RC-FS10 is a remote communicator software for use in the dPMR™ Mode 2 and analogue radio system with the VE-PG3. It creates a virtual radio/simple dispatch station on a Windows®-based PC with the CT-24 digital voice converter and a microphone and speaker.
- Up to 8 different IDAS or VE-PG3 systems can be programmed
- Up to 40 function buttons are programmable, including individual call, group call, selective call, all call, status call, status polling, and so on
- Caller ID/alias name, called ID/alias name and call type information are displayed on the ANI area for easy recognition
- SDM (short data message), status message and DTMF code can be sent and received

RoIP GATEWAY
VE-PG3

» Features

- Interconnect between dPMR™ Mode 2, analogue radio system and IP Advanced Radio System
- RoIP and SIP gateway functions
- Telephone interconnection with IP phone and PSTN lines
- Direct dialing from radio user* (* Limited to radios with DTMF capability)
- Public address system, siren, warning light and external equipment can be connected to the VE-PG3
- IP router function: PPPoE/IPv6 bridge, NAT, dynamic DNS, VPN pass through, IP filter, SNMP and SYSLOG

VPN ROUTER
SR-VPN1

» Features

- Up to 32 IPsec VPN tunnels (3DES, AES-128, AES-192 or AES-256)
- IPsec wizard focuses on the basic setting items for a VPN connection, and provides simple step-by-step instructions
- High-speed 1000BASE-T gigabit Ethernet connection
- 4 gigabit LAN ports with switch function
- Dynamic DNS client function

VHF REPEATERS

IC-FR5100 (25W)
IC-FR5100H (50W)

UHF REPEATERS

IC-FR6100 (25W)
IC-FR6100H (50W)

Options

UR-FR5100 (136–174MHz, 25W)
UR-FR6100 (400–470MHz, 25W)
CHANNEL MODULES

Features

- 136–174, 400–470MHz coverage*
  (* Other frequency versions may also be available in some countries.)
- 12-digit dot-matrix display and 32 memory channels
- 19-inch rack mount design, 2U height low profile design
- Multiple CTCSS, DTCS tone and CC decode
- IC-FR5100H/FR6100H: 50W output at 100% duty cycle*
  IC-FR5100/FR6100: 25W output at 100% duty cycle*
  (* 25°C ambient temperature)
- ±0.5ppm high stability oscillator
- "2 channel in 1 box" configuration
  (Optional UR-FR5100/UR-FR6100 required)
- Base station operation
  (Analogue and dPMR Mode 2 only)
- 5-Tone and DTMF encoder/decoder
  (5-Tone is for the analogue FM mode)
- D-Sub 25-pin connector
- Built-in inversion voice scrambler and optional UT-109R/UT-110R for higher security (For the analogue FM mode)
- CW ID transmitter
- IC-FR6200H: high power, full duty repeater with heatsink chassis version (Export version)

UR-PA5000 (VHF 50W, 100% duty),
UR-PA6000 (UHF 50W, 100% duty)
POWER AMPLIFIERS

OPC-2202 CONNECTION CABLE
Connect between the repeater and the PA unit.

UC-FR5000 (#12)
NETWORK CONTROLLER
For dPMR Mode 2 multi-site networking

UC-FR5000SE
ETHERNET BOARD
Required for each repeater to connect with IC-FC5000E

dPMR™ MODE 3 EXTERNAL CONTROLLER

IC-FC5000E

Features

- Up to 32 channels per site
  One control channel, up to 31 traffic channels
- Up to 32 site multi-site trunking with CS-FC5000SCS System Control Software*
  * Additional site capacity under consideration.
- Four channel activation key is supplied with the IC-FC5000E
- 1U (44mm) rack mount height
- Subscriber registration
- CS-FC5000 web based management software allows to connect multiple clients
- CS-FC5000 supports localized language for system labels
- Firmware update over an IP network
- Remote reboot of the trunking controller over an IP network
- Repeater anomaly detection and alert
- A traffic channel can be configured as a secondary control channel

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