Miniaturization/
Circuit Integration

1980s

[SAW Filter]
First SAW Filter from Murata

〈 Application 〉
10.7 MHz filter for intermediate frequencies of FM radios

[LTCC-Based Component]
Multilayer LC Filter
Enables Cordless Phone BPF.

The basic design structure for a multilayer LC filter is established for use in the cordless phone BPF.

[SAW Filters]
Hermetic SAW Filters

〈 Applications 〉
VIFSAW (58 MHz) for TVs
150 MHz double-super RF SAW for pagers
254/380 MHz RF SAW for cordless phones

1990s

[LTCC-Based Components]
Switchplexer
(Diode Switch)

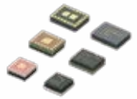
Murata commercializes front-end modules integrating active and passive components featuring LTCC substrates for modules.

[SAW Filters]
Cavity Ceramic Package
SAW Filters

〈 Applications 〉
Interstage SAW in the 800 MHz RF for cellular phones
Module type SAWDPX
EAMPS-compatible SAWDPX

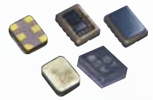
2000s

[LTCC-Based Components]
Switchplexer devices (GaAs Switches), FEMs, and WiFEMs



[SAW Filters]
Flip Chip-Type RF SAW Filters,
Single-Package SAWDPX,
and Resin-Sealed CSP SAW Filters

Murata starts rolling out the CSP Platform.



Increasing Connectivity and Accelerating Innovation!

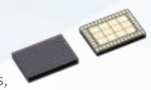
It all began with SAW filters for FM radios
and shifted toward mobile phones and other mobile products.
Devices are increasingly miniaturized and integrated,
while modules integrate ever more components and functions.
High-speed large-capacity communication technology will ensure
even closer connections between people and between things.

Integration of Multiple/
Components and Functions

2000s

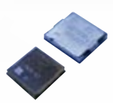
[PAs]
PAs for TX modules,
Multimode/multiband PAs,
and PAs for 3G Devices

GSM mulitbanding, resin molding, GaAs switches/LNAs/PAs (Wi-Fi®), and GaAs WiFEM



[Connectivity Modules]
Bluetooth® Modules
for Mobile Phones and
Wi-Fi® Modules for Mobile Phones

Bluetooth® functions are now available in mobile phones.
Wi-Fi® functions are integrated in applications for wireless headsets.



1990s

[PAs]
LDMOS's
GSM Single PAMs

Murata starts in-house semiconductor production
〈 Applications 〉
GaAs PAs for cordless phones
GaAs LNAs for cordless phones

[PAs]
Leadless PAs

【Glossary】
- FEM: CMOS switch+SAW filter
- FEMid: CMOS switch+SAW duplexer
- DiFEM: FEM for diversity
- PAMid: PA module-integrated duplexer
- WiFEM: FEM for Wi-Fi®
- LFEM: LNA+FEM
- HBT: heterojunction bipolar transistor
- BiFET: bipolar+FET

2010s

[PAs]
PAs Using HBTs and LTE-Enabled PAs

CMOS switch (Wi-Fi®)

[Connectivity Modules]
Bluetooth®+Wi-Fi® Modules for Smartphones

Smartphones appear, most featuring Wi-Fi® functions.
A rapid increase in throughput
(11b/g⇒11n⇒11a/11ac, 1x1⇒2x2)
Bluetooth®/Wi-Fi® functions are increasingly available in mobile devices (digital still cameras and audio players).

2015

[PAs]
CMOS WiFEMs
and BiFET WiFEMs

[Connectivity Modules]
BLE Modules Integrating Software
and Antennas, and Wi-Fi® Complete Modules

Initial wireless communication is available in IoT devices.

2016 and Beyond
Wireless Solution
Sensing Solution
Power Solution

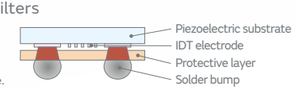
Evolving toward 5G phones and IoT, connectivity technologies already form part of our society's information infrastructure. Murata technology helps create new solutions in rapid succession.

2010s

[LTCC-Based Components]
FEMid's and DiFEMs

[SAW Filters]
DPX Banks and WLP SAW Filters

WLP: wafer level package
WLP uses the piezoelectric substrate directly as part of the package to ensure compact size and a low profile.



2015

[LTCC-Based Components]
PAMid's and LFEMs

[SAW Filters]
Quadplexers for Carrier Aggregation

Topics

PAMid

In addition to its traditionally strong technologies for SAW duplexers and LTCC substrates, Murata has now obtained technologies for PAs and RF switches. In-house production of all key devices used at the RF front-end has allowed us to combine them freely to create high-performing modules.