WLCSP MMICs for Micro/Millimeter-wave Applications

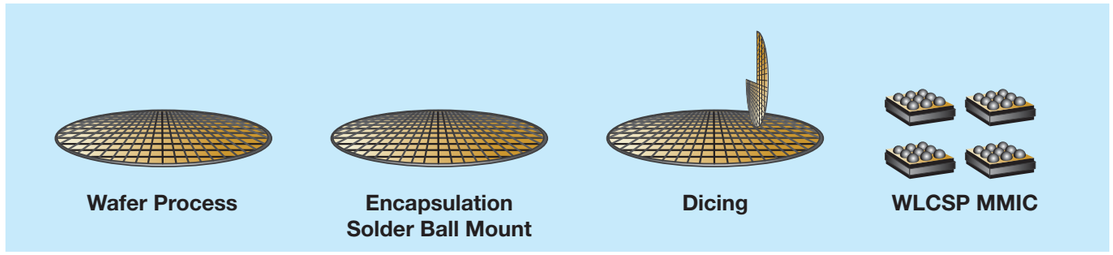
New Products

SEI/SEDI proposes the WLCSP (Wafer Level Chip Scale Package) technology for the solution of the next generation device.
This technology achieved a very excellent frequency performance by uniting with 3- D MMIC technology, and can apply from C to E-band applications.
The WLCSP chip is the flip chip form with the solder ball and it is mountable in the SMT production line. It is unnecessary the wire bonding, it can achieve high mass productivity up to high frequency range.

Features

- Low Cost Surface Mount Type Device
- Flip Chip Form with Solder Ball
  Solder Ball Diameter: 165 mm
  Solder Ball Pitch: 400mm
- Applicable from C to E-Band application.
- Small Size
- Highly Integrated
- Chip Level Protection against Humidity
- RoHS Compliance

♦Process

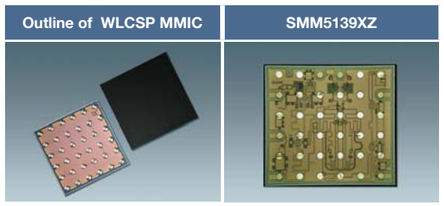


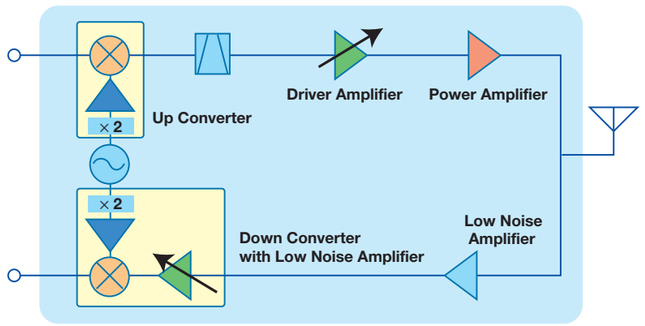
Product Lineup

	13/15GHz	18/23GHz	24/30GHz	Spec
Low Noise Amp	SMM5722XZ	SMM5723XZ*	SMM5724XZ*	P10
Down Converter	SMM5139XZ	SMM5142XZ*	SMM5144XZ*	P15
Up Converter	SMM5138XZ	SMM5141XZ*	SMM5143XZ*	P15

*Under Development

Package Photo





Ku to V Band Low Noise Amplifier MMICs

Sumitomo Electric provides GaAs Low Noise amplifier MMICs are designed for VSAT and radio link receiver applications. The performance of low noise figure and high associated gain are achieved using pHEMT technology and EB lithography process. Sumitomo Electric has line-ups of MMIC products specified from Ku-band through V-band.

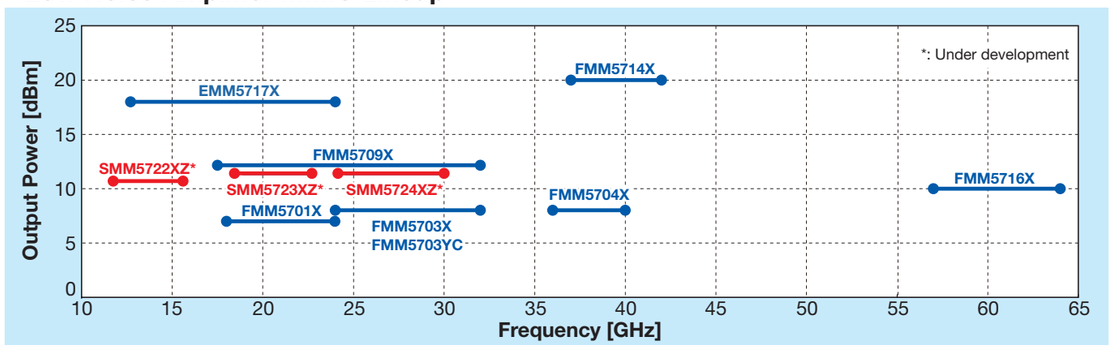
Features

- Input and Output Internally Matched Zin/Zout = 50Ω
- Low Noise Figure
- High Gain
- Wide Band
- High Reliability Bare Die (X)
- Low Cost Surface Mount Device (XZ)

Naming Rules

EM M 5717 X
- X: Package Code
- 5717: Serial Number
- M: Monolithic IC
- EM: Microwave

♦Low Noise Amplifier MMIC Lineup



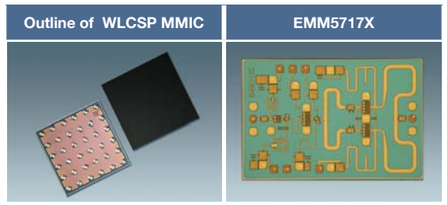
Specifications

Ta=+25°C

Part Number	Frequency Range f (GHz)	Drain-Source Voltage VDD (V)	Noise Figure NF dB (Typ.)	Associated Gain Gas dB (Typ.)	Output Power at 1dB G.C.P. P1dB dBm (Typ.)	Drain Current IDD mA (Typ.)	Outline/ Package Code	Application
SMM5722XZ	12–16	5	2.3	20	11	30	WLCSP	VSAT and Radio Link
EMM5717X	12.7–24	3	2.5	23	18	180	Chip	
FMM5709X	17.5–32	3	2.5	23	12.5	60	Chip	
SMM5723XZ*	18–23	5	2.7	20	12	30	WLCSP	
FMM5701X	18–28	5	1.5	13.5	7	12	Chip	
FMM5703X	24–32	3	2	18	9	20	Chip	
SMM5724XZ*	24–30	5	3.2	20	13	75	WLCSP	
FMM5704X	36–40	3	2	18	9	20	Chip	
FMM5714X	37–42	3	3	22	17 (f=37GHz) 20 (f=42GHz)	200	Chip	
FMM5716X	57–64	3	5	22	10	30	Chip	

G.C.P.: Gain Compression Point
*Under Development

Package Photo



C to Ka Band Power Amplifier MMICs (Packages)

Sumitomo Electric provides GaAs power amplifier MMICs mounted in a suitable high frequency package with output power 50mW - 2W at frequencies ranging from C-band to Ka-band. Sumitomo Electric provides various types of packages including highly reliable hermetically sealed types, low cost surface mount types and very low cost QFN types.
These MMICs can be packaged to meet the customer's cost/performance requirements.

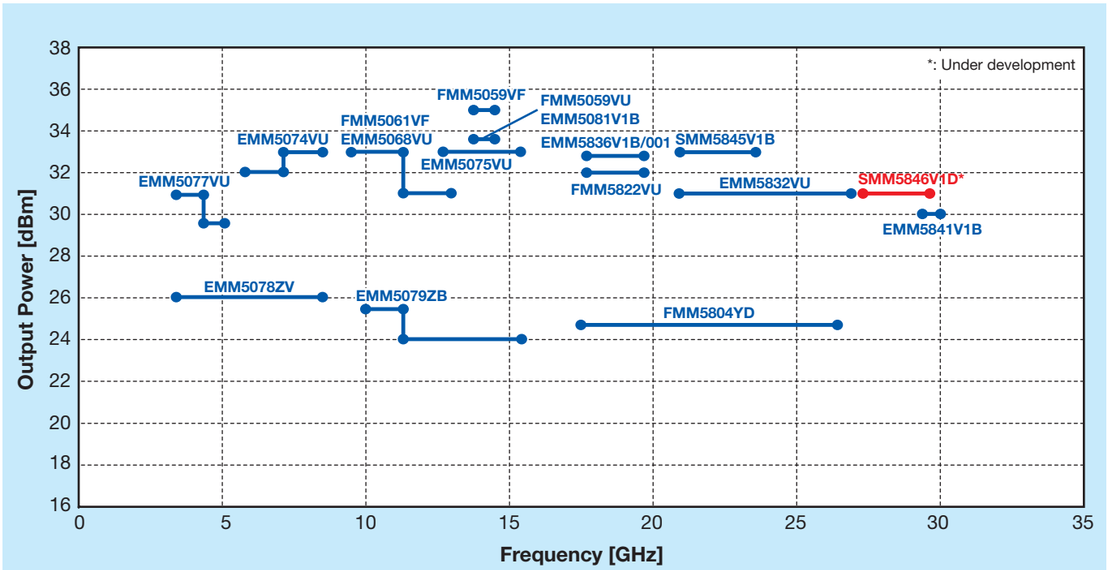
Features

- Input and Output Internally Matched Zin/Zout = 50Ω
- High Output Power (Up to 2W)
- High Gain
- Low Distortion
- Small Hermetically Sealed Package (V1B/V1D/VU/VF)
- Low Cost Surface Mount Package (ZV/ZB/V1B/V1D/VU/YD)

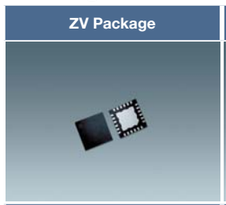
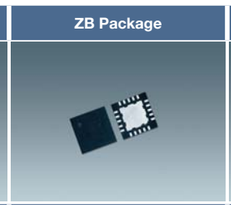
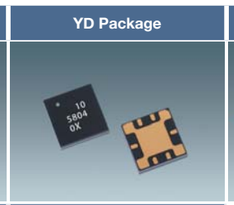
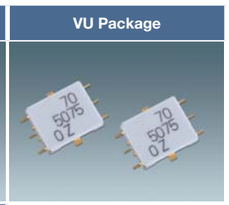
Naming Rules

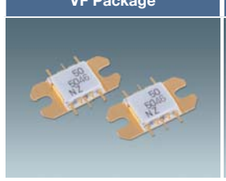
EM M 5078 ZV
- ZV: Package Code
- 5078: Number
- M: Monolithic IC
- EM: Microwave

♦Power Amplifier MMIC Lineup (Package)



Package Photo

ZV Package	ZB Package	YD Package	VU Package
			

VF Package	V1B Package	V1D Package
		

Wireless Devices: MMICs

C to Ka Band Power Amplifier MMICs (Packages)

Specifications

Ta=+25°C

Part Number	Frequency Range f (GHz)	Output Power at 1dB G.C.P. P1dB dBm (Typ.)	Gain at 1dB G.C.P. G1dB dB (Typ.)	3rd. Order Intercept Point OIP3 dBm (Typ.)	Drain-Source Voltage VDD (V)	Drain Current at 1dB G.C.P. IDD mA (Typ.)	Outline/ Package Code	Function/ Application
EMM5078ZV	3.4–8.5	26	29	35	6	350	ZV	Driver Amp., LO Buffer Amp. C-Band VSAT and Radio Link
EMM5077VU	3.4–5.0	31 (f=3.4–4.2GHz) 29.5 (f=4.2–5.0GHz)	25	39.5 (f=3.4–4.2GHz) 38 (f=4.2–5.0GHz)	6	1200 (f=3.4–4.2GHz) 1250 (f=4.2–5.0GHz)	VU	Power Amp. Radio Link
EMM5074VU	5.8–8.5	32 (f=5.8–7.1GHz) 33 (f=7.1–8.5GHz)	26	41	6	1400 (f=5.8–7.1GHz) 1450 (f=7.1–8.5GHz)	VU	Power Amp. C-Band VSAT and Radio Link
FMM5056VF	5.8–7.2	34	28	-	10	1100	VF	
EMM5057VF	7.1–8.5	34	26	-	10	1100	VF	Power Amp. Radio Link
EMM5068VU	9.5–13.3	33 (f=9.5–11.7GHz) 31 (f=11.7–13.3GHz)	25 (f=9.5–11.7GHz) 23 (f=11.7–13.3GHz)	40	6	1500 (f=9.5–11.7GHz) 1400 (f=11.7–13.3GHz)	VU	
FMM5061VF	9.5–13.3	33 (f=9.5–11.7GHz) 31 (f=11.7–13.3GHz)	26 (f=9.5–11.7GHz) 24 (f=11.7–13.3GHz)	41.5	6	1700 (f=9.5–11.7GHz) 1500 (f=11.7–13.3GHz)	VF	
EMM5079ZB	10–15.4	25.5 (f=10–11.7GHz) 24 (f=11.7–15.4GHz)	22	31 (f=10–11.7GHz) 35 (f=11.7–15.4GHz)	6	380	ZB	Driver Amp., LO Buffer Amp. Ku-Band VSAT and Radio Link
EMM5075VU	12.7–15.4	33	25	42	6	1500	VU	Power Amp. Ku-Band VSAT and Radio Link
EMM5081V1B	13.75–14.5	33.5	29	39.5	6	1400	V1B	Power Amp. Ku-Band VSAT
FMM5059VU	13.75–14.5	33.5	29	39.5	6	1400	VU	
FMM5059VF	13.75–14.5	35	28	40	7	1600	VF	
FMM5804YD	17.5–26.5	24.5	16	-	6	350	YD	Driver Amp. Ka-Band VSAT and Radio Link
FMM5822VU	17.7–19.7	32	21	38.5	6	1100	VU	Power Amp. Radio Link
EMM5836V1B/001	17.7–19.7	32.5	22	40	6	1800	V1B	
SMM5845V1B	21.2-23.6	33	21	41	6	1800	V1B	
EMM5832VU	21.2–26.5	31	19	36.5	6	1000	VU	
SMM5846V1D*	27.5-29.5	31	19	39	6	1450	V1D	
EMM5841V1B	29.5-30.0	30	14	-	6	850	V1B	Power Amp. Ka-Band VSAT

G.C.P.: Gain Compression Point
*Under Development

C to V Band Power Amplifier MMICs (Chip)

Sumitomo Electric is providing a full line-up of GaAs power amplifier MMIC chips with output power at 50mW to 3W. These MMICs are designed for VSAT (Very Small Aperture Terminal) and radio link transmitter applications that require high power, high gain and low distortion in a 50Ω system. Sumitomo Electric has a full line-up of MMIC products specified from C-band through V-band.

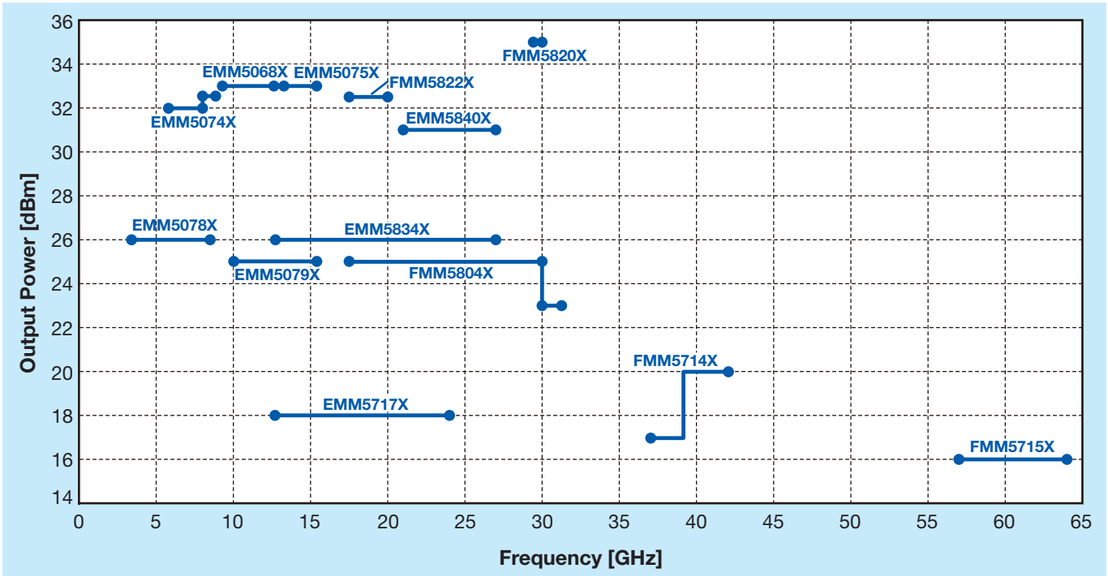
Features

- Input and Output Internally Matched Zin/Zout = 50Ω
- High Output Power (Up to 3W)
- High Gain
- Low Distortion
- High Reliability

Naming Rules

EM M 5078 X
- X: Chip
- Number
- Monolithic IC
- Microwave

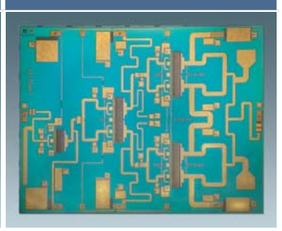
♦Power Amplifier MMIC Lineup (Chip)



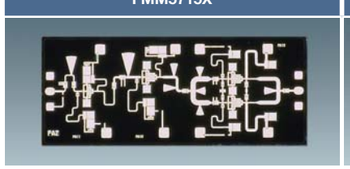
Package Photo

FMM5820X

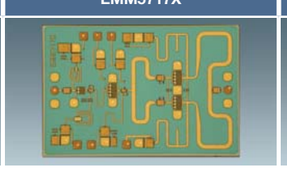
EMM5075X



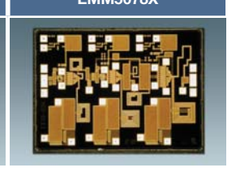
FMM5715X



EMM5717X



EMM5078X



C to V Band Power Amplifier MMICs (Chip)

Specifications

Ta=+25°C

Part Number	Frequency Range f (GHz)	Output Power at 1dB G.C.P. P1dB dBm (Typ.)	Gain at 1dB G.C.P. G1dB dB (Typ.)	3rd. Order Intercept Point OIP3 dBm (Typ.)	Drain-Source Voltage VDD (V)	Drain Current at 1dB G.C.P. IDD mA (Typ.)	Function/Application
EMM5078X	3.4–8.5	26	29	35	6	350	Driver Amp., LO Buffer Amp. C-Band VSAT and Radio Link
EMM5074X	5.8–8.5	32 (f=5.8–7.1GHz) 32.5 (f=7.1–8.5GHz)	27	41	6	1450	Power Amp. C-Band VSAT and Radio Link
EMM5068X	9.5–13.3	33	25	42.5	6	1500	Power Amp. Radio Link
EMM5079X	10–15.4	25	22.5	31 (f=10–11.7GHz) 35 (f=11.7–15.4GHz)	6	350	Driver Amp., LO Buffer Amp. Ku-Band VSAT and Radio Link
EMM5717X	12.7–24	18	22	-	3	180	
EMM5834X	12.7–27	26	23	32.5	6	370	
EMM5075X	12.7–15.4	33	26	43.5	6	1300	Power Amp. Ku-Band VSAT and Radio Link
FMM5804X	17.5–31.5	25 (f=17.5–30GHz) 23 (f=30–31.5GHz)	18	-	6	300	Driver Amp. Ka-Band VSAT and Radio Link
FMM5822X	17.5–20	32.5	21	41	6	1000	Power Amp. Radio Link
EMM5840X	21–27	31	24	39	6	1000	
FMM5820X	29.5–30	35	23	-	7	2200	Power Amp. Ka-Band VSAT and Radio Link
FMM5714X	37–42	17 (f=37GHz) 20 (f=42GHz)	21	26.5 (f=37GHz) 29 (f=42GHz)	3	200	Power Amp. Ku-Band VSAT
FMM5715X	57–64	16	17	-	3	150	Power Amp. Radio Link

G.C.P.: Gain Compression Point

Ku to Ka Band Converter MMICs

Sumitomo Electric provides Mixer MMICs that are designed for VSAT and radio link applications. These devices use an up-converter for the transmitter and a down-converter for the receiver.
These MMICs include a local buffer amplifier integrated on MMIC chip.

Features

- Wide Frequency Range
- High Conversion Gain
- High Integrated
- Low Distortion
- Low Cost Surface Mount Device (XZ)
- Flip Chip Form (XZ)

Naming Rules

FM M 5116 X
- Package Code
- Serial Number
- Monolithic IC
- Microwave

Specifications

Ta=+25°C

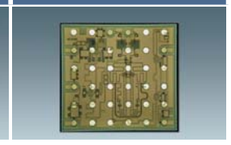
Part Number	RF Frequency Range f (GHz)	Drain-Source Voltage VDD (V)	Conversion Gain (dB)	Current Consumption (mA)	Outline/ Package Code	Function
FMM5116X	20–32	5	-10	140	Chip	with Doubler, Up Converter
SMM5138XZ	12–16	5	-12	35	WLCSP	Up Converter
SMM5139XZ	12–16	5	+10	75	WLCSP	Down Converter
SMM5141XZ*	18–23	5	-12	110	WLCSP	with Doubler, Up Converter
SMM5142XZ*	18–23	5	+10	145	WLCSP	with Doubler, Down Converter
SMM5143XZ*	24–30	5	-12	110	WLCSP	with Doubler, Up Converter
SMM5144XZ*	24–30	5	+12	200	WLCSP	with Doubler, Down Converter

*Under Development

Package Photo

FMM5116X

SMM5139XZ



Ku to V Band Multiplier MMICs

These multipliers were developed for the local oscillator of a radio link transmitter/receiver. This MMIC is designed for a wide frequency range with high conversion gain.

Features

- Wide Frequency Range
- High Conversion Gain

Naming Rules

FM M 5118 X
- Chip
- Number
- Monolithic IC
- Microwave

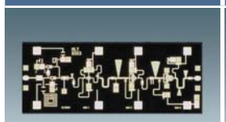
Specifications

Ta=+25°C

Part Number	RF Frequency Range f (GHz)	Drain-Source Voltage VDD (V)	Conversion Gain (dB)	Current Consumption (mA)	Function
FMM5118X	20–32	5	14	130	Doubler
FMM5125X	57–64	5	-5	100	Quadrupler

Package Photo

FMM5125X



FMM5118X

Oscillator MMICs

EMM5206LP is an oscillator for Ku-band to K-band sensor applications. This device shows negative resistance in the frequency band and operates with a single positive bias voltage.

Features

- High Output Power: Pout = 5dBm @Vdd = 4V (Typ.)
- Low Power Consumption: Idd = 20mA @Vdd = 4V (Typ.)
- Low Phase Noise: ∅n = -100dBc/Hz @100kHz offset, fosc = 24GHz
- Low Spurious Level: RJ2nd = -40dBc (Typ.)

Naming Rules

EM M 5206 LP
- Package Code
- Number
- Monolithic IC
- Microwave

Specifications

Ta=+25°C

Part Number	Oscillation Frequency fosc (GHz)	Drain-Source Voltage VDD (V)	Output Power Pout dBm (Typ.)	Drain Current Idd mA (Typ.)	Phase Noise at 100kHz offset ∅n dBc (Typ.)	2nd Harmonic Rejection RJ2nd dBc (Typ.)	Outline/ Package Code	Application
EMM5206LP	15–24.5	4	5	20	-100	-40	LP	Microwave Sensor

Package Photo

EMM5206LP