



SAW Modules

Preliminary Data Sheet M034F

Data Sheet

A large, stylized, 3D-rendered graphic of the EPCOS logo. The letters "EPCOS" are rendered in a glowing, metallic, sans-serif font, appearing to be part of a curved, layered structure that resembles a SAW module. The background is dark and textured, suggesting a globe or a complex surface.

EPCOS



SAW Components

M034F

SAW Frontend Module for Mobile Communication

850/900/1800/1900 MHz

Preliminary Data Sheet



ISSUE:	ORIGINATOR:	DETAIL SPEC CHANGES:	DATE:
1.0	W. Puffer	Preliminary Data Sheet	27.08.2003



Features

- Low-loss SAW frontend module for mobile telephone system
- Multifunctional Ceramic base material for **Surface Mounted Technology (SMT)**
- Covering GSM850, EGSM, GSM1800 and GSM1900 bands
- Integration of TX low pass filters, switches and diplexer
- Integration of GSM850, EGSM, GSM1800 and GSM1900 RX SAWs
- Internal switching of GSM850 and EGSM RX SAW inputs
- Internal diplexing of GSM850 and EGSM RX SAW outputs
- Internal diplexing of GSM 1800 and GSM 1900 RX SAW inputs
- Balanced outputs of GSM850, EGSM, GSM1800 and GSM1900 RX ports
- Integration of bias chokes and resistors
- Integration of DC blocking capacitors (Tx 2GHz, Rx GSM850/EGSM outputs not DC blocked)
- Terminals NiAu-plated

Pin configuration

1	ANT
2, 4, 5, 16, 17, 18, 19	Ground
3	GSM1800/GSM1900 TX input
6	GSM850/EGSM TX input
7	Vc1
8	Vc2
9	Vc3
10, 11	GSM1800 RX, balanced output
12, 13	GSM1900 RX, balanced output
14, 15	GSM850/EGSM RX, balanced output

Type	Ordering code	Marking and Package according to	Packing according to
M034	-	-	-

Electrostatic Sensitive Device (ESD)



SAW Components	M034F
SAW Frontend Module for Mobile Communication	850/900/1800/1900 MHz

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Maximum Ratings

Operable temperature range	T	-15 / +75	°C	
Storage temperature range	T_{std}	-30 / +100	°C	
DC voltage max. (ANT, RX)	V_{DC}	3.0	V	
DC voltage max. (TX)	V_{DC}	3.0	V	
Input power max. (TX GSM850/ TXEGSM)	P_{IN}	36	dBm	source and load impedance 50 Ω peak power of GSM signal
Input power max. (TX 1800/TX 1900)	P_{IN}	33	dBm	source and load impedance 50 Ω peak power of GSM signal
Input power max. (RX)	P_{IN}	10	dBm	source and load impedance 50 Ω peak power of GSM signal
Duty Cycle max.		1:2		

Control Logic

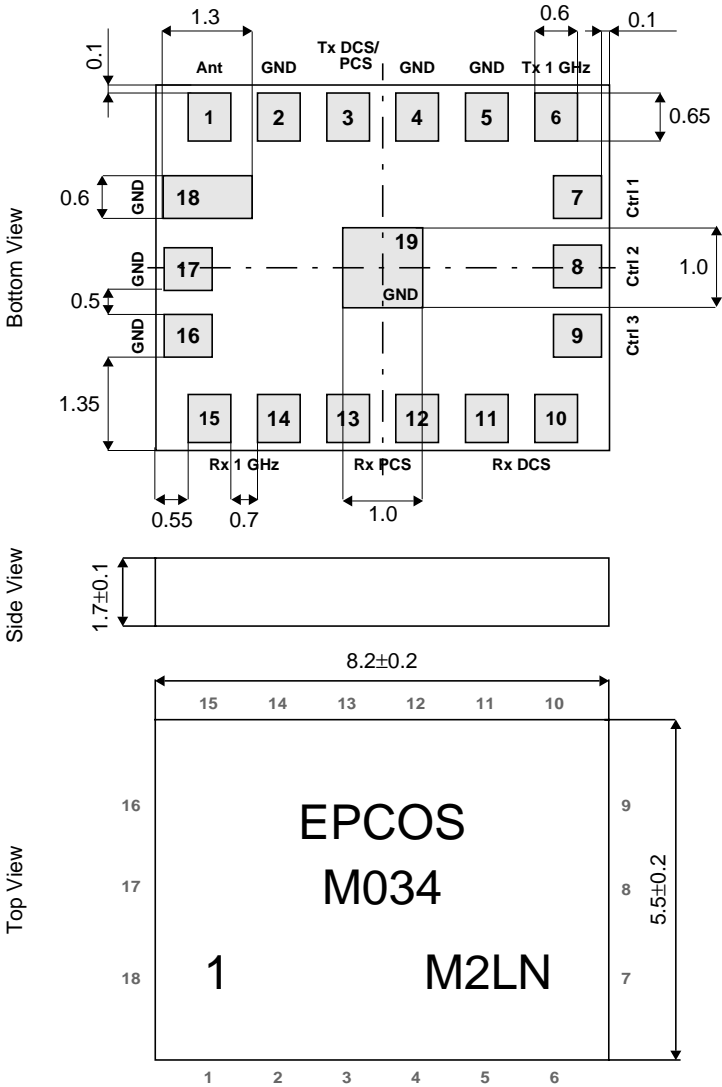
Switch Mode	<i>CTRL1</i>	<i>CTRL2</i>	<i>CTRL3</i>
GSM850 RX	Low	Low	High
GSM850/EGSM TX	High	Low	Low
EGSM RX	Low	Low	Low
PCS/DCS RX	Low	Low	Low
PCS/DCS TX	Low	High	Low

Control Characteristics

Control voltage High	V_{DC}	2.75 +/-0.1	V
Control voltage Low	V_{DC}	0...0.1	V
Control current max. (GSM850/EGSM TX)	I_{DC}	9	mA
Control current max. (DCS/PCS TX)	I_{DC}	8	mA
Control current max. (GSM850 RX)	I_{DC}	8	mA
Control current max. (EGSM/DCS/PCS RX)	I_{DC}	50	μ A
Switching Speed	T	<3	μ s



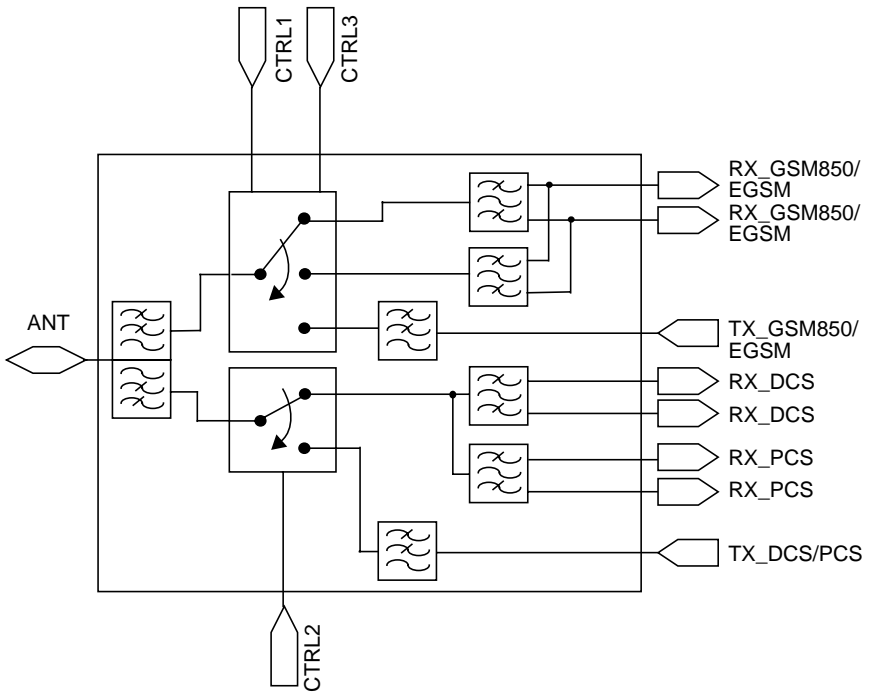
Ceramic base MC190A



Dimensions in mm, approx. weight tbd



Block Diagram




Characteristics GSM850/EGSM TX-> ANT (Switch Mode GSM850/EGSM TX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 50 \text{ } \Omega$

				min.	typ.	max.	
Maximum insertion attenuation							
			α_{\max}				
	824.0 ... 849.0		MHz	—	1.45	1.6	dB
	880.0 ... 915.0		MHz	—	1.55	1.65	dB
Amplitude ripple (p-p)							
			$\Delta\alpha$				
	824.0 ... 849.0		MHz	—	0.02	0.4	dB
	880.0 ... 915.0		MHz	—	0.15	0.4	dB
Attenuation							
			α				
<i>2fc</i>	1648.0 ... 1698.0		MHz	28	30	—	dB
	1760.0 ... 1830.0		MHz	33	34	—	dB
<i>3fc</i>	2472.0 ... 2745.0		MHz	30	37	—	dB
<i>4fc</i>	3296.0 ... 3660.0		MHz	27	37	—	dB
<i>5fc</i>	4120.0 ... 4575.0		MHz	27	40	—	dB
<i>6fc</i>	4944.0 ... 5490.0		MHz	27	33	—	dB
VSWR11							
	824.0 ... 849.0		MHz	—	1.45	1.6	—
	880.0 ... 915.0		MHz	—	1.3	1.5	—
VSWR22							
	824.0 ... 849.0		MHz	—	1.5	1.6	—
	880.0 ... 915.0		MHz	—	1.3	1.5	—
Input Power							
						35	dBm
Output Harmonics							
<i>2fc</i>	1648.0 ... 1830.0		MHz		-82	-75	dBc
<i>3fc</i>	2472.0 ... 2745.0		MHz		-95	-75	dBc
<i>4fc</i>	3296.0 ... 3660.0		MHz		<-100	-75	dBc
<i>5fc</i>	4120.0 ... 4575.0		MHz		<-100	-75	dBc
<i>6fc</i>	4944.0 ... 5490.0		MHz		<-100	-75	dBc



Characteristics GSM1800/1900 TX-> ANT (Switch Mode GSM1800/1900 TX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 50 \text{ } \Omega$

				min.	typ.	max.	
Maximum insertion attenuation							
			α_{\max}				
	1710.0 ... 1785.0		MHz	—	1.35	1.6	dB
	1850.0 ... 1910.0		MHz	—	1.55	1.7	dB
Amplitude ripple (p-p)							
			$\Delta\alpha$				
	1710.0 ... 1785.0		MHz	—	0.05	0.4	dB
	1850.0 ... 1910.0		MHz	—	0.2	0.4	dB
Attenuation							
			α				
<i>2fc</i>	3420.0 ... 3820.0		MHz	25	29	—	dB
<i>3fc</i>	5130.0 ... 5730.0		MHz	28	31	—	dB
VSWR11							
	1710.0 ... 1785.0		MHz	—	1.35	1.5	—
	1850.0 ... 1910.0		MHz	—	1.5	1.7	—
VSWR22							
	1710.0 ... 1785.0		MHz	—	1.35	1.5	—
	1850.0 ... 1910.0		MHz	—	1.75	1.9	—
Input Power							
						32	dBm
Output Harmonics							
<i>2fc</i>	3420.0 ... 3820.0		MHz		-85	-75	dBc
<i>3fc</i>	5130.0 ... 5730.0		MHz		<-100	-75	dBc



Characteristics Isolations

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 150 \text{ } \Omega$ (1GHz) / $50 \text{ } \Omega$ (2GHz)

		min.	typ.	max.	
Isolation GSM850/EGSM TX -> GSM850/EGSM RX (Switch Mode GSM850/EGSM TX)	α				
824.0 ... 849.0 MHz		45	65	—	dB
880.0 ... 915.0 MHz		28	32	—	dB
Isolation GSM850/EGSM TX -> GSM1800 RX (Switch Mode GSM850/EGSM Tx)	α				
824.0 ... 915.0 MHz		50	55	—	dB
1805.0 ... 1880.0 MHz		35	38	—	dB
Isolation GSM850/EGSM TX -> GSM1900 RX (Switch Mode GSM850/EGSM Tx)	α				
824.0 ... 915.0 MHz		50	65	—	dB
Isolation GSM850/EGSM TX -> Ant (Switch Mode EGSM/GSM1800/1900 RX)	α				
880.0 ... 915.0 MHz		20	25	—	dB
Isolation GSM850/EGSM TX -> Ant (Switch Mode GSM850 RX)	α				
824.0 ... 849.0 MHz		20	29	—	dB
Isolation GSM1800/1900 TX -> Ant (Switch Mode GSM850/EGSM TX)	α				
1648.0 ... 1698.0 MHz		16	17	—	dB
1760.0 ... 1830.0 MHz		20	25	—	dB
2472.0 ... 2547.0 MHz		20	22	—	dB
2640.0 ... 2745.0 MHz		20	25	—	dB
3296.0 ... 3396.0 MHz		15	19	—	dB
3520.0 ... 3660.0 MHz		20	24	—	dB
Isolation GSM 1800/1900 TX -> GSM 1800 RX (Switch Mode GSM1800/1900 TX)	α				
1710.0 ... 1785.0 MHz		34	42	—	dB
1850.0 ... 1910.0 MHz		30	32	—	dB



Characteristics Isolations

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 150 \text{ } \Omega$ (1GHz) / $50 \text{ } \Omega$ (2GHz)

	min.	typ.	max.	
Isolation GSM1800/1900 TX -> GSM850/EGSM RX (Switch Mode GSM1800/1900 TX)				
α				
1710.0 ... 1910.0 MHz	50	55	—	dB
Isolation GSM1800/1900 TX -> Ant (Switch Mode EGSM/GSM1800/1900 RX)				
α				
1710.0 ... 1910.0 MHz	17	24	—	dB



Characteristics ANT -> GSM850 RX (Switch Mode GSM850 RX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 150 \text{ } \Omega$ balanced

		min.	typ.	max.	
Center frequency	f_C	—	881.5	—	MHz
Maximum insertion attenuation	α_{\max}	—	4.3	4.5	dB
869.0 ... 894.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	1.5	1.8	dB
869.0 ... 894.0 MHz					
Attenuation	α				
100.0 ... 849.0 MHz		25	50	—	dB
914.0 ... 1738.0 MHz		25	26	—	dB
1738.0 ... 1788.0 MHz		32	55	—	dB
1788.0 ... 2607.0 MHz		30	47	—	dB
2607.0 ... 2682.0 MHz		36	45	—	dB
2682.0 ... 3476.0 MHz		28	46	—	dB
3476.0 ... 3576.0 MHz		26	53	—	dB
3576.0 ... 4345.0 MHz		26	45	—	dB
4345.0 ... 4470.0 MHz		24	47	—	dB
4470.0 ... 5214.0 MHz		24	46	—	dB
5214.0 ... 5364.0 MHz		22	45	—	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)		-10	2	10	degree
869.0 ... 894.0 MHz					
Output amplitude balance (S_{31}/S_{21})			0.8	1.0	dB
869.0 ... 894.0 MHz					
VSWR11		—	1.8	2.2	—
869.0 ... 894.0 MHz					
VSWR22		—	1.7	2.2	—
869.0 ... 894.0 MHz					

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Characteristics ANT -> GSM850 RX (Switch Mode GSM850 RX)

Operating temperature range:	$T = -15 \dots +75 \text{ }^\circ\text{C}$
Terminating source impedance:	$Z_S = 50 \text{ } \Omega$
Terminating load impedance:	$Z_L = 180 \text{ } \Omega$ balanced

		min.	typ.	max.	
Center frequency	f_C	—	881.5	—	MHz
Maximum insertion attenuation	α_{\max}	—	4.25	4.5	dB
869.0 ... 894.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	1.5	1.8	dB
869.0 ... 894.0 MHz					
Attenuation	α				
100.0 ... 849.0 MHz		25	50	—	dB
914.0 ... 1738.0 MHz		25	26	—	dB
1738.0 ... 1788.0 MHz		32	55	—	dB
1788.0 ... 2607.0 MHz		30	47	—	dB
2607.0 ... 2682.0 MHz		36	45	—	dB
2682.0 ... 3476.0 MHz		28	46	—	dB
3476.0 ... 3576.0 MHz		26	53	—	dB
3576.0 ... 4345.0 MHz		26	45	—	dB
4345.0 ... 4470.0 MHz		24	47	—	dB
4470.0 ... 5214.0 MHz		24	46	—	dB
5214.0 ... 5364.0 MHz		22	45	—	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)		-10	2	10	degree
869.0 ... 894.0 MHz					
Output amplitude balance (S_{31}/S_{21})			0.8	1.0	dB
869.0 ... 894.0 MHz					
VSWR11		—	1.75	2.2	—
869.0 ... 894.0 MHz					
VSWR22		—	1.7	2.2	—
869.0 ... 894.0 MHz					


Characteristics ANT -> EGSM RX (Switch Mode EGSM RX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 150 \text{ } \Omega$ balanced

		min.	typ.	max.	
Center frequency	f_C	—	942.5	—	MHz
Maximum insertion attenuation	α_{\max}				
925.0 ... 960.0 MHz		—	4.3	4.5	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
925.0 ... 960.0 MHz		—	1.0	1.5	dB
Attenuation	α				
100.0 ... 915.0 MHz		25	28	—	dB
980.0 ... 1850.0 MHz		25	34	—	dB
1850.0 ... 1920.0 MHz		32	53	—	dB
1920.0 ... 2775.0 MHz		30	43	—	dB
2775.0 ... 2880.0 MHz		36	47	—	dB
2880.0 ... 3700.0 MHz		28	48	—	dB
3700.0 ... 3840.0 MHz		26	50	—	dB
3840.0 ... 4625.0 MHz		26	46	—	dB
4625.0 ... 4800.0 MHz		24	40	—	dB
4800.0 ... 5550.0 MHz		24	44	—	dB
5550.0 ... 5760.0 MHz		22	45	—	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)					
925.0 ... 960.0 MHz		-10	5.0	10	degree
Output amplitude balance (S_{31}/S_{21})					
925.0 ... 960.0 MHz			0.5	1.0	dB
VSWR11					
925.0 ... 960.0 MHz		—	1.9	2.2	—
VSWR22					
925.0 ... 960.0 MHz		—	1.6	2.0	—

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Characteristics ANT -> EGSM RX (Switch Mode EGSM RX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 180 \text{ } \Omega$ balanced

		min.	typ.	max.	
Center frequency	f_C	—	942.5	—	MHz
Maximum insertion attenuation	α_{\max}	—	4.25	4.5	dB
925.0 ... 960.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	1.0	1.5	dB
925.0 ... 960.0 MHz					
Attenuation	α				
100.0 ... 915.0 MHz		25	28	—	dB
980.0 ... 1850.0 MHz		25	34	—	dB
1850.0 ... 1920.0 MHz		32	53	—	dB
1920.0 ... 2775.0 MHz		30	43	—	dB
2775.0 ... 2880.0 MHz		36	47	—	dB
2880.0 ... 3700.0 MHz		28	48	—	dB
3700.0 ... 3840.0 MHz		26	50	—	dB
3840.0 ... 4625.0 MHz		26	46	—	dB
4625.0 ... 4800.0 MHz		24	40	—	dB
4800.0 ... 5550.0 MHz		24	44	—	dB
5550.0 ... 5760.0 MHz		22	45	—	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)		-10	5.0	10	degree
925.0 ... 960.0 MHz					
Output amplitude balance (S_{31}/S_{21})			0.5	1.0	dB
925.0 ... 960.0 MHz					
VSWR11		—	1.8	2.2	—
925.0 ... 960.0 MHz					
VSWR22		—	1.6	2.0	—
925.0 ... 960.0 MHz					



Characteristics ANT -> GSM 1800 RX (Switch Mode GSM1800 RX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 50 \text{ } \Omega$ balanced

				min.	typ.	max.	
Center frequency			f_C	—	1842.5	—	MHz
Maximum insertion attenuation			α_{\max}				
	1805.0 ... 1880.0		MHz	—	4.4	4.8	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	1805.0 ... 1880.0		MHz	—	0.8	1.5	dB
Attenuation			α				
	100.0 ... 1705.0		MHz	30	35	—	dB
	1705.0 ... 1785.0		MHz	15	19	—	dB
	1920.0 ... 1980.0		MHz	15	23	—	dB
	1980.0 ... 3610.0		MHz	25	28	—	dB
	3610.0 ... 3760.0		MHz	32	40	—	dB
	3760.0 ... 5415.0		MHz	30	36	—	dB
	5415.0 ... 5640.0		MHz	28	53	—	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)							
	1805.0 ... 1880.0		MHz	-11	9	11	degree
Output amplitude balance (S_{31}/S_{21})							
	1805.0 ... 1880.0		MHz		1.6	2.0	dB
VSWR11							
	1805.0 ... 1880.0		MHz	—	1.6	1.8	—
VSWR22							
	1805.0 ... 1880.0		MHz	—	1.85	2.0	—

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Characteristics ANT -> GSM 1800 RX (Switch Mode GSM1800 RX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 40 \text{ } \Omega$ balanced

		min.	typ.	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	α_{\max}				
1805.0 ... 1880.0 MHz		—	4.3	4.7	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1805.0 ... 1880.0 MHz		—	0.8	1.5	dB
Attenuation	α				
100.0 ... 1705.0 MHz		30	35	—	dB
1705.0 ... 1785.0 MHz		15	19	—	dB
1920.0 ... 1980.0 MHz		15	23	—	dB
1980.0 ... 3610.0 MHz		25	28	—	dB
3610.0 ... 3760.0 MHz		32	40	—	dB
3760.0 ... 5415.0 MHz		30	36	—	dB
5415.0 ... 5640.0 MHz		28	53	—	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)					
1805.0 ... 1880.0 MHz		-11	9	11	degree
Output amplitude balance (S_{31} / S_{21})					
1805.0 ... 1880.0 MHz			1.6	2.0	dB
VSWR11					
1805.0 ... 1880.0 MHz		—	1.5	1.8	—
VSWR22					
1805.0 ... 1880.0 MHz		—	1.7	2.0	—



Characteristics ANT -> GSM 1900 RX (Switch Mode GSM1900 RX)

Operating temperature range: $T = -15 \dots +75 \text{ }^\circ\text{C}$
 Terminating source impedance: $Z_S = 50 \text{ } \Omega$
 Terminating load impedance: $Z_L = 50 \text{ } \Omega$ balanced

		min.	typ.	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	α_{\max}	—	4.25	4.5	dB
1930.0 ... 1990.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.85	1.5	dB
1930.0 ... 1990.0 MHz					
Attenuation	α				
100.0 ... 1830.0 MHz		30	40	—	dB
1830.0 ... 1910.0 MHz		11	15	—	dB
2010.0 ... 2070.0 MHz		11	15	—	dB
2070.0 ... 2090.0 MHz		25	38	—	dB
2090.0 ... 3860.0 MHz		30	35	—	dB
3860.0 ... 3980.0 MHz		32	50	—	dB
3980.0 ... 5790.0 MHz		30	48	—	dB
5790.0 ... 5970.0 MHz		28	51	—	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)					
1930.0 ... 1990.0 MHz		-13	10	13	degree
Output amplitude balance (S_{31}/S_{21})					
1930.0 ... 1990.0 MHz			1.8	2.2	dB
VSWR11					
1930.0 ... 1990.0 MHz		—	1.5	1.8	—
VSWR22					
1930.0 ... 1990.0 MHz		—	1.6	2.0	—



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