

# CXM3543AER

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### Description

The CXM3543AER is 3P10T antenna switch for quad bands GSM and quad bands UMTS dual mode. This IC has a decoder circuit which supports CMOS control. Sony JPHEMT GaAs process is utilized for low insertion loss and high linearity. (Applications: Quad bands GSM and quad bands UMTS dual mode phones)

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### Features

- ◆ Low insertion loss
- ◆ Low voltage drive: 2.5 to 3.3V
- ◆ Supports CMOS control
- ◆ High ESD resistance
- ◆ Eliminates Output DC Blocking Capacitors to RF ports
- ◆ Small package: VQFN-34P (3.8mm × 4.4mm × 0.85mm Max.)
- ◆ Lead-Free and RoHS Compliant

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### Package

VQFN-34P (3.8mm × 4.4mm × 0.85mm Max.)

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### Structure

GaAs Junction Gate pHEMT (JPHEMT) MMIC Switch, CMOS Decoder

This IC is ESD sensitive device. Special handling precautions are required.

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### Absolute Maximum Ratings

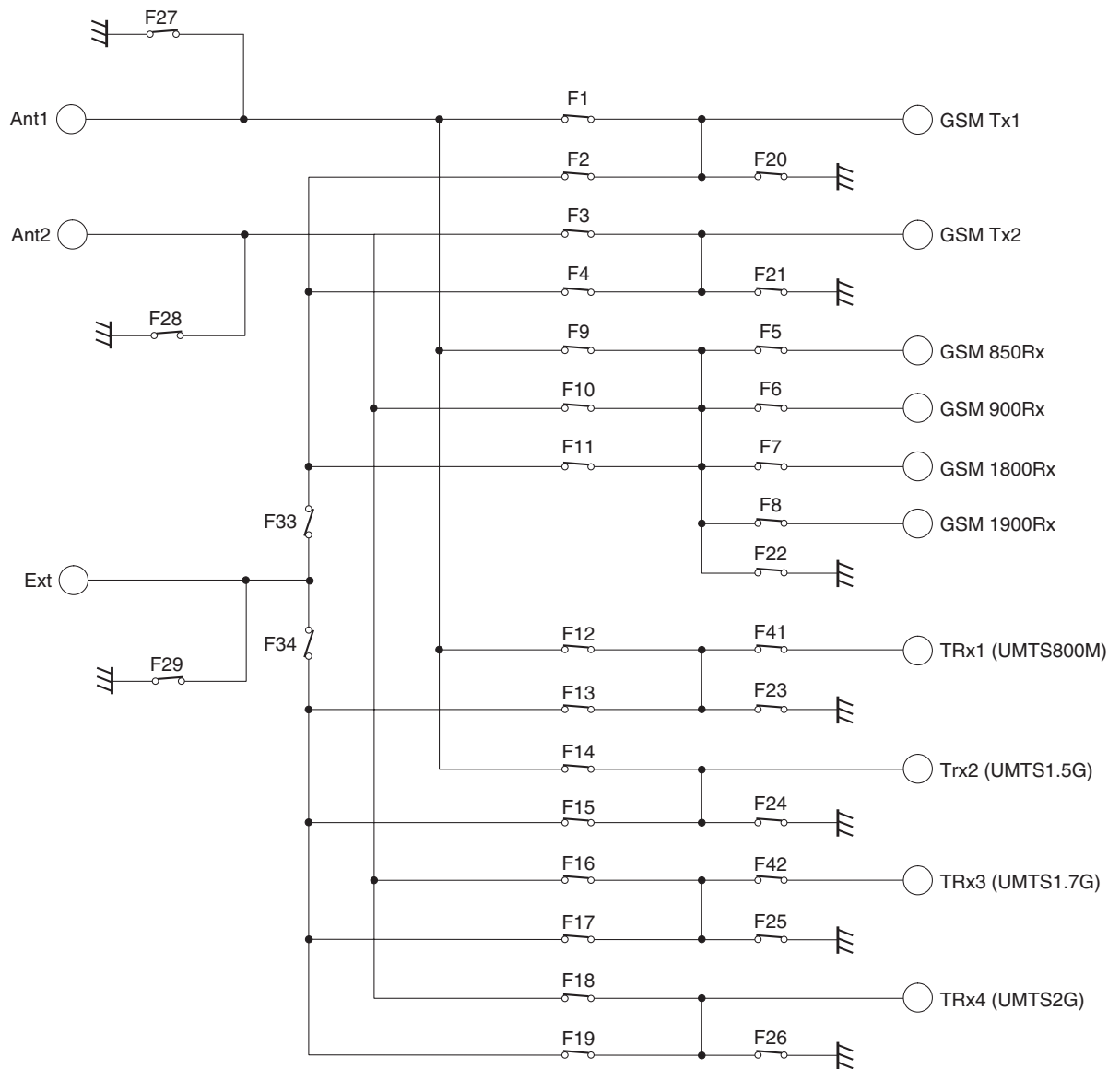
◆ Supply voltage	V <sub>DD</sub>	3.6	V	(Ta = 25°C)
◆ Control voltage	V <sub>ctl</sub>	3.6	V	(Ta = 25°C)
◆ Maximum input	[GSM Tx1]	36	dBm	(Duty cycle = 12.5%) (Ta = 25°C)
◆	[GSM Tx2]	34	dBm	(Duty cycle = 12.5%) (Ta = 25°C)
◆	[UMTS800M/1.5G/1.7G/2G]	32	dBm	(Ta = 25°C)
◆	[GSM850/900/1800/1900 Rx]	13	dBm	(Ta = 25°C)
◆ Operating temperature	T <sub>opr</sub>	-30 to +90	°C	
◆ Storage temperature	T <sub>stg</sub>	-65 to +150	°C	

### DC Bias Conditions

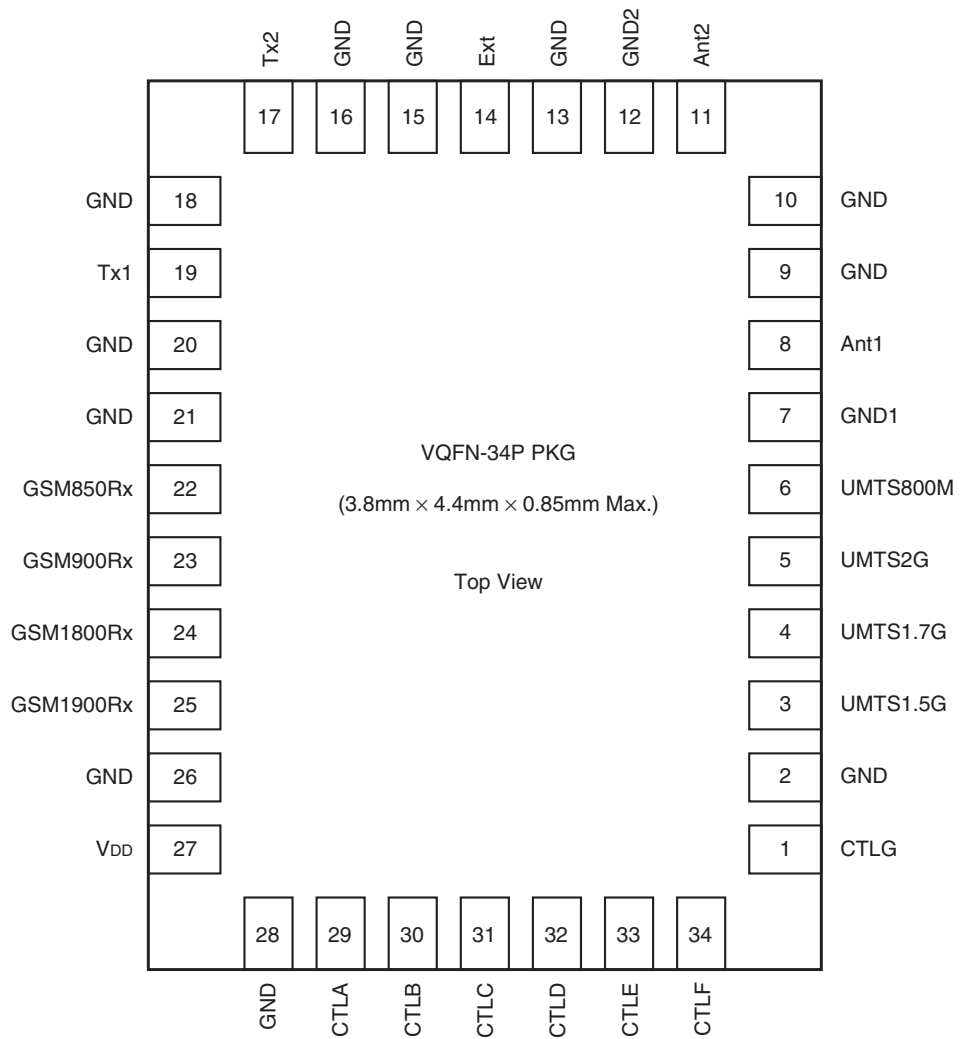
(Ta = -30 to +85°C)

Item	Min.	Typ.	Max.	Unit
V <sub>DD</sub>	2.5	2.9	3.3	V
V <sub>ctl</sub> (H)	1.5	2.9	3.3	V
V <sub>ctl</sub> (L)	0	—	0.3	V

Block Diagram



Pin Configuration





Electrical Characteristics 1

(Ta = 25°C)

Item	Freq [MHz]	Min.	Typ.	Max.	Unit	Conditions
Bias current	—		260	500	μA	V <sub>DD</sub> = 2.9V, V <sub>ctl</sub> = 0V
Ctrl current 1	—		0.01	10	μA	V <sub>DD</sub> = 2.9V, V <sub>ctl</sub> = 2.9V
Ctrl current 2	—		0.01	1	μA	V <sub>DD</sub> = 0V, V <sub>ctl</sub> = 2.9V
Wake up time	—		—	100	μs	V <sub>DD</sub> = 0 to 2.9V
Switching speed	—		—	5	μs	

UMTS800M

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 26dBm)

Item	Freq [MHz]	UMTS800M - Ant1			UMTS800M - Ext			Unit	Conditions	
		Min.	Typ.	Max.	Min.	Typ.	Max.			
Insertion loss * Mounted recommended circuit	824 to 849		0.52	0.67		0.62	0.85	dB		
	869 to 894		0.52	0.67		0.62	0.85	dB		
VSWR	824 to 849		1.1	1.5		1.1	1.5	—	UMTS800M Port	
			1.1	1.5		1.1	1.5	—	Ant1, Ext Port	
	869 to 894		1.1	1.5		1.1	1.5	—	UMTS800M Port	
			1.1	1.5		1.1	1.5	—	Ant1, Ext Port	
SW isolation	824 to 849	—	—	—	16	33		dB	When UMTS800M - Ant1 measurement	
		16	39		16	43		dB	When UMTS800M - Ant2 measurement	
		16	39		—	—	—	dB	When UMTS800M - Ext measurement	
	869 to 894	—	—	—	16	33		dB	When UMTS800M - Ant1 measurement	
		16	38		16	42		dB	When UMTS800M - Ant2 measurement	
		16	38		—	—	—	dB	When UMTS800M - Ext measurement	
In-Rx band spurious	869 to 894		—	-125		—	-125	dBm		
Harmonics	1648 to 1698		—	-44		—	-44	dBm		
	2472 to 2547		—	-44		—	-44	dBm		
	3296 to 3396		—	-44		—	-44	dBm		
ACLR	824 to 849	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	824 to 849	±10MHz		—	-55		—	-55	dBc	
IMD2 * Mounted recommended circuit	fblock = 45			-118	-111		-120	-111	dBm	PTx = 21dBm Pblock = -15dBm * The IMD characteristics are design guaranteed.
	fblock = 1715			-122	-111		-118	-111	dBm	
IMD3 * Mounted recommended circuit	fblock = 790			-110	-105		-110	-105	dBm	

**UMTS1.5G**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 26dBm)

Item	Freq [MHz]	UMTS1.5G - Ant1			UMTS1.5G - Ext			Unit	Conditions	
		Min.	Typ.	Max.	Min.	Typ.	Max.			
Insertion loss * Mounted recommended circuit	1428 to 1448		0.58	0.73		0.70	0.85	dB		
	1476 to 1496		0.60	0.75		0.70	0.85	dB		
VSWR	1428 to 1448		1.2	1.5		1.1	1.5	—	UMTS1.5G Port	
			1.2	1.5		1.1	1.5	—	Ant1, Ext Port	
	1476 to 1496		1.2	1.5		1.1	1.5	—	UMTS1.5G Port	
			1.2	1.5		1.1	1.5	—	Ant1, Ext Port	
SW isolation	1428 to 1448		—	—	16	36		dB	When UMTS1.5G - Ant1 measurement	
			16	30		16	39		dB	When UMTS1.5G - Ant2 measurement
			16	30		—	—	—	dB	When UMTS1.5G - Ext measurement
	1476 to 1496		—	—	—	16	36		dB	When UMTS1.5G - Ant1 measurement
			16	30		16	39		dB	When UMTS1.5G - Ant2 measurement
			16	30		—	—	—	dB	When UMTS1.5G - Ext measurement
In-Rx band spurious	1476 to 1496		—	-125		—	-125	dBm		
Harmonics	2856 to 2896		—	-44		—	-44	dBm		
	4284 to 4344		—	-44		—	-44	dBm		
	5712 to 5792		—	-44		—	-44	dBm		
ACLR	1428 to 1448	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	1428 to 1448	±5MHz		—	-55		—	-55	dBc	
IMD2 * Mounted recommended circuit	fblock = 48			-113	-106		-116	-106	dBm	PTx = 21dBm Pblock = -15dBm * The IMD characteristics are design guaranteed.
	fblock = 2924			-111	-106		-106	-101	dBm	
IMD3 * Mounted recommended circuit	fblock = 1390			-108	-103		-108	-103	dBm	
	fblock = 4362			-114	-106		-111	-106	dBm	

**UMTS1.7G**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 26dBm)

Item	Freq [MHz]	UMTS1.7G - Ant2			UMTS1.7G - Ext			Unit	Conditions	
		Min.	Typ.	Max.	Min.	Typ.	Max.			
Insertion loss * Mounted recommended circuit	1750 to 1785		0.64	0.77		0.87	0.99	dB		
	1845 to 1880		0.67	0.79		0.92	1.04	dB		
VSWR	1750 to 1785		1.2	1.5		1.05	1.5	—	UMTS1.7G Port	
			1.2	1.5		1.05	1.5	—	Ant2, Ext Port	
	1845 to 1880		1.2	1.5		1.05	1.5	—	UMTS1.7G Port	
			1.2	1.5		1.05	1.5	—	Ant2, Ext Port	
SW isolation	1750 to 1785	16	31		16	42		dB	When UMTS1.7G - Ant1 measurement	
		—	—	—	16	28		dB	When UMTS1.7G - Ant2 measurement	
		16	26		—	—	—	dB	When UMTS1.7G - Ext measurement	
	1845 to 1880	16	30		16	42		dB	When UMTS1.7G - Ant1 measurement	
		—	—	—	16	28		dB	When UMTS1.7G - Ant2 measurement	
		16	26		—	—	—	dB	When UMTS1.7G - Ext measurement	
In-Rx band spurious	1845 to 1880		—	-125		—	-125	dBm		
Harmonics	3500 to 3570		—	-44		—	-44	dBm		
	5250 to 5355		—	-44		—	-44	dBm		
	7000 to 7140		—	-44		—	-44	dBm		
ACLR	1750 to 1785	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	1750 to 1785	±10MHz		—	-55		—	-55	dBc	
IMD2 * Mounted recommended circuit	fblock = 95			-111	-106		-112	-106	dBm	PTx = 21dBm Pblock = -15dBm
	fblock = 3625			-110	-105		-106	-101	dBm	
IMD3 * Mounted recommended circuit	fblock = 1670			-111	-106		-107	-102	dBm	* The IMD characteristics are design guaranteed.
	fblock = 5390			-114	-106		-109	-104	dBm	



**UMTS2G**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, P<sub>in</sub> = 26dBm)

Item	Freq [MHz]	UMTS2G - Ant2			UMTS2G - Ext			Unit	Conditions	
		Min.	Typ.	Max.	Min.	Typ.	Max.			
Insertion loss * Mounted recommended circuit	1920 to 1980		0.63	0.75		0.87	0.99	dB		
	2110 to 2170		0.69	0.81		0.98	1.10	dB		
VSWR	1920 to 1980		1.2	1.5		1.05	1.5	—	UMTS2G Port	
			1.2	1.5		1.1	1.5	—	Ant2, Ext Port	
	2110 to 2170		1.2	1.5		1.1	1.5	—	UMTS2G Port	
			1.15	1.5		1.1	1.5	—	Ant2, Ext Port	
SW isolation	1920 to 1980	16	28		16	36		dB	When UMTS2G - Ant1 measurement	
		—	—	—	16	26		dB	When UMTS2G - Ant2 measurement	
		16	25		—	—	—	dB	When UMTS2G - Ext measurement	
	2110 to 2170	16	27		16	36		dB	When UMTS2G - Ant1 measurement	
		—	—	—	16	25		dB	When UMTS2G - Ant2 measurement	
		16	24		—	—	—	dB	When UMTS2G - Ext measurement	
Isolation Tx ⇒ Rx	1920 to 1980	22	61		22	58		dB	UMTS2G ⇒ GSM1900Rx	
In-Rx band spurious	2110 to 2170		—	-125		—	-125	dBm		
Harmonics	3840 to 3960		—	-44		—	-44	dBm		
	5760 to 5940		—	-44		—	-44	dBm		
	7680 to 7920		—	-44		—	-44	dBm		
ACLR	1920 to 1980	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	1920 to 1980	±10MHz		—	-55		—	-55	dBc	
IMD2 * Mounted recommended circuit	fblock = 190			-107	-102		-105	-100	dBm	P <sub>Tx</sub> = 21dBm P <sub>block</sub> = -15dBm * The IMD characteristics are design guaranteed.
	fblock = 4090			-108	-103		-105	-100	dBm	
IMD3 * Mounted recommended circuit	fblock = 1760			-109	-104		-108	-103	dBm	
	fblock = 6040			-116	-106		-114	-106	dBm	

**GSM Tx1**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, P<sub>in</sub> = 35dBm)

Item	Freq [MHz]	GSM Tx1 - Ant1			GSM Tx1 - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	824 to 915		0.43	0.58		0.55	0.7	dB	
VSWR	824 to 915		1.1	1.5		1.1	1.5	—	GSM Tx1 Port
			1.1	1.5		1.1	1.5	—	Ant1, Ext Port
SW isolation	824 to 915	—	—	—	25	45		dB	When GSM Tx - Ant1 measurement
		25	35		25	51		dB	When GSM Tx - Ant2 measurement
		22	28		—	—	—	dB	When GSM Tx - Ext measurement
Isolation Tx ⇒ Rx	824 to 915	31	46		31	41		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM850Rx
		31	58		31	53		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM900Rx
		31	61		31	57		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM1800Rx
		31	62		31	59		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM1900Rx
		31	44		31	71		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS800M
		31	38		31	46		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS1.5G
		31	37		31	45		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS1.7G
		29	34		31	44		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS2G
Isolation Tx ⇒ Ant	824 to 849	25	41		—	—		dB	Tx1 when selecting Ant1 - GSM850Rx ⇒ Ant1
		—	—		25	38		dB	Tx1 when selecting Ant1 - GSM850Rx ⇒ Ext
	880 to 915	25	38		—	—		dB	Tx1 when selecting Ant1 - GSM900Rx ⇒ Ant1
		—	—		25	40		dB	Tx1 when selecting Ant1 - GSM900Rx ⇒ Ext

**GSM Tx1**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 35dBm)

Item	Freq [MHz]		GSM Tx1 - Ant1			GSM Tx1 - Ext			Unit	Conditions
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Harmonics	1648 to 1830	2Tx		-50	-36		-45	-36	dBm	
	2472 to 2745	3Tx		-46	-34		-42	-34	dBm	
	3296 to 3660	4Tx		—	-36		—	-36	dBm	
	4120 to 4575	5Tx		—	-42		—	-42	dBm	
	4944 to 5490	6Tx		—	-46		—	-46	dBm	
	5768 to 6405	7Tx		—	-46		—	-46	dBm	
	6592 to 7320	8Tx		—	-46		—	-46	dBm	
	7416 to 8235	9Tx		—	-46		—	-46	dBm	
	8240 to 9150	10Tx		—	-46		—	-46	dBm	
	9064 to 10065	11Tx		—	-46		—	-46	dBm	
	9888 to 10980	12Tx		—	-46		—	-46	dBm	
	10712 to 11895	13Tx		—	-46		—	-46	dBm	
	11536 to 12810	14Tx		—	-46		—	-46	dBm	
	12360 to 13725	15Tx		—	-46		—	-46	dBm	

**GSM Tx2**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 32dBm)

Item	Freq [MHz]	GSM Tx2 - Ant2			GSM Tx2 - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	1710 to 1785		0.50	0.65		0.62	0.77	dB	
	1850 to 1910		0.55	0.70		0.67	0.82	dB	
VSWR	1710 to 1785		1.1	1.5		1.1	1.5	—	GSM Tx2 Port
			1.1	1.5		1.1	1.5	—	Ant2, Ext Port
	1850 to 1910		1.1	1.5		1.1	1.5	—	GSM Tx2 Port
			1.1	1.5		1.1	1.5	—	Ant2, Ext Port
SW isolation	1710 to 1785	22	30		22	46		dB	When GSM Tx2 - Ant1 measurement
		—	—	—	22	28		dB	When GSM Tx2 - Ant2 measurement
		19	24		—	—	—	dB	When GSM Tx2 - Ext measurement
	1850 to 1910	22	30		22	46		dB	When GSM Tx2 - Ant1 measurement
		—	—	—	22	28		dB	When GSM Tx2 - Ant2 measurement
		19	24		—	—	—	dB	When GSM Tx2 - Ext measurement
Isolation Tx ⇒ Rx	1710 to 1910	28	48		28	40		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM850Rx
		28	55		28	51		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM900Rx
		28	58		28	54		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM1800Rx
		28	59		28	56		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM1900Rx
		23	27		23	33		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS800M
		23	30		23	36		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS1.5G
		28	37		28	46		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS1.7G
		21	26		23	34		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS2G
Isolation Tx ⇒ Ant	1710 to 1785	22	28		—	—	—	dB	Tx2 when selecting Ant2 - GSM1800Rx ⇒ Ant2
		—	—	—	20	24		dB	Tx2 when selecting Ext - GSM1800Rx ⇒ Ext
	1850 to 1910	22	28		—	—	—	dB	Tx2 when selecting Ant2 - GSM1900Rx ⇒ Ant2
		—	—	—	20	24		dB	Tx2 when selecting Ext - GSM1900Rx ⇒ Ext

**GSM Tx2**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 32dBm)

Item	Freq [MHz]		GSM Tx2 - Ant2			GSM Tx2 - Ext			Unit	Conditions
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Harmonics	3420 to 3570	2Tx		-52	-39		-44	-39	dBm	
	3700 to 3820			-53	-39		-42	-37	dBm	
	5130 to 5355	3Tx		-53	-39		-50	-39	dBm	
	5550 to 5730			-54	-39		-50	-39	dBm	
	6840 to 7140	4Tx		—	-42		—	-42	dBm	
	7400 to 7640			—	-42		—	-42	dBm	
	8550 to 8925	5Tx		—	-45		—	-45	dBm	
	9250 to 9550			—	-45		—	-45	dBm	
	10260 to 10710	6Tx		—	-45		—	-45	dBm	
	11100 to 11460			—	-45		—	-45	dBm	
	11970 to 12495	7Tx		—	-45		—	-45	dBm	

**GSM850Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

Item	Freq [MHz]	GSM850Rx - Ant1			GSM850Rx - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	869 to 894		0.94	1.09		1.08	1.23	dB	
VSWR	869 to 894		1.2	1.5		1.2	1.5	—	GSM850Rx Port
			1.1	1.5		1.1	1.5	—	Ant1, Ext Port

**GSM900Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

Item	Freq [MHz]	GSM900Rx - Ant1			GSM900Rx - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	925 to 960		0.96	1.11		1.11	1.26	dB	
VSWR	925 to 960		1.2	1.5		1.2	1.5	—	GSM900Rx Port
			1.1	1.5		1.1	1.5	—	Ant1, Ext Port

**GSM1800Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

Item	Freq [MHz]	GSM1800Rx - Ant2			GSM1800Rx - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	1805 to 1880		1.01	1.16		1.2	1.35	dB	
VSWR	1805 to 1880		1.25	1.5		1.2	1.5	—	GSM1800Rx Port
			1.1	1.5		1.1	1.5	—	Ant2, Ext Port

**GSM1900Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

Item	Freq [MHz]	GSM1900Rx - Ant2			GSM1900Rx - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	1930 to 1990		1.00	1.15		1.19	1.34	dB	
VSWR	1930 to 1990		1.2	1.5		1.1	1.5	—	GSM1900Rx Port
			1.1	1.5		1.1	1.5	—	Ant2, Ext Port

Electrical Characteristics 2

(Ta = -30 to +85°C)

Item	Freq [MHz]	Min.	Typ.	Max.	Unit	Conditions
Bias current	—		290	550	μA	V <sub>DD</sub> = 2.9V, V <sub>ctl</sub> = 0V
Ctrl current 1	—		0.1	20	μA	V <sub>DD</sub> = 2.9V, V <sub>ctl</sub> = 2.9V
Ctrl current 2	—		0.1	2	μA	V <sub>DD</sub> = 0V, V <sub>ctl</sub> = 2.9V
Wake up time	—		—	100	μs	V <sub>DD</sub> = 0 to 2.9V
Switching speed	—		—	5	μs	

UMTS800M

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 26dBm)

Item	Freq [MHz]		UMTS800M - Ant1			UMTS800M - Ext			Unit	Conditions
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	824 to 849			—	0.77		—	0.95	dB	
	869 to 894			—	0.77		—	0.95		
VSWR	824 to 849			—	1.5		—	1.5	—	UMTS800M Port
				—	1.5		—	1.5	—	Ant1, Ext Port
	869 to 894			—	1.5		—	1.5	—	UMTS800M Port
				—	1.5		—	1.5	—	Ant1, Ext Port
SW isolation	824 to 849		—	—	—	16	—	—	dB	When UMTS800M – Ant1 measurement
			16	—	—	16	—	—		When UMTS800M – Ant2 measurement
			16	—	—	—	—	—		When UMTS800M – Ext measurement
	869 to 894		—	—	—	16	—	—	dB	When UMTS800M – Ant1 measurement
			16	—	—	16	—	—		When UMTS800M – Ant2 measurement
			16	—	—	—	—	—		When UMTS800M – Ext measurement
In-Rx band spurious	869 to 894			—	-125		—	-125	dBm	
Harmonics	1648 to 1698			—	-44		—	-44		
	2472 to 2547			—	-44		—	-44		
	3296 to 3396			—	-44		—	-44		
ACLR	824 to 849	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	824 to 849	±10MHz		—	-55		—	-55		
IMD2 * Mounted recommended circuit	fblock = 45			—	-108		—	-108	dBm	PTx = 21dBm Pblock = -15dBm
	fblock = 1715			—	-108		—	-108		
IMD3 * Mounted recommended circuit	fblock = 790			—	-102		—	-102	dBm	* The IMD characteristics are design guaranteed.
	fblock = 2550			—	-101		—	-101		

**UMTS1.5G**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 26dBm)

Item	Freq [MHz]	UMTS1.5G - Ant1			UMTS1.5G - Ext			Unit	Conditions	
		Min.	Typ.	Max.	Min.	Typ.	Max.			
Insertion loss * Mounted recommended circuit	1428 to 1448		—	0.83		—	0.95	dB		
	1476 to 1496		—	0.85		—	0.95	dB		
VSWR	1428 to 1448		—	1.5		—	1.5	—	UMTS1.5G Port	
			—	1.5		—	1.5	—	Ant1, Ext Port	
	1476 to 1496		—	1.5		—	1.5	—	UMTS1.5G Port	
			—	1.5		—	1.5	—	Ant1, Ext Port	
SW isolation	1428 to 1448	—	—	—	16	—	—	dB	When UMTS1.5G - Ant1 measurement	
		16	—	—	16	—	—	dB	When UMTS1.5G - Ant2 measurement	
		16	—	—	—	—	—	dB	When UMTS1.5G - Ext measurement	
	1476 to 1496	—	—	—	16	—	—	dB	When UMTS1.5G - Ant1 measurement	
		16	—	—	16	—	—	dB	When UMTS1.5G - Ant2 measurement	
		16	—	—	—	—	—	dB	When UMTS1.5G - Ext measurement	
In-Rx band spurious	1476 to 1496		—	-125		—	-125	dBm		
Harmonics	2856 to 2896		—	-44		—	-44	dBm		
	4284 to 4344		—	-44		—	-44	dBm		
	5712 to 5792		—	-44		—	-44	dBm		
ACLR	1428 to 1448	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	1428 to 1448	±10MHz		—	-55		—	-55	dBc	
IMD2 * Mounted recommended circuit	fblock = 48			—	-103		—	-103	dBm	PTx = 21dBm Pblock = -15dBm * The IMD characteristics are design guaranteed.
	fblock = 2924			—	-103		—	-98	dBm	
IMD3 * Mounted recommended circuit	fblock = 1390			—	-100		—	-100	dBm	
	fblock = 4362			—	-101		—	-101	dBm	



**UMTS1.7G**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, P<sub>in</sub> = 26dBm)

Item	Freq [MHz]	UMTS1.7G - Ant2			UMTS1.7G - Ext			Unit	Conditions	
		Min.	Typ.	Max.	Min.	Typ.	Max.			
Insertion loss * Mounted recommended circuit	1750 to 1785		—	0.87		—	1.09	dB		
	1845 to 1880		—	0.89		—	1.14	dB		
VSWR	1750 to 1785		—	1.5		—	1.5	—	UMTS1.7G Port	
			—	1.5		—	1.5	—	Ant2, Ext Port	
	1845 to 1880		—	1.5		—	1.5	—	UMTS1.7G Port	
			—	1.5		—	1.5	—	Ant2, Ext Port	
SW isolation	1750 to 1785	16	—		16	—		dB	When UMTS1.7G - Ant1 measurement	
		—	—	—	16	—		dB	When UMTS1.7G - Ant2 measurement	
		16	—		—	—	—	dB	When UMTS1.7G - Ext measurement	
	1845 to 1880	16	—		16	—		dB	When UMTS1.7G - Ant1 measurement	
		—	—	—	16	—		dB	When UMTS1.7G - Ant2 measurement	
		16	—		—	—	—	dB	When UMTS1.7G - Ext measurement	
In-Rx band spurious	1845 to 1880		—	-125		—	-125	dBm		
Harmonics	3500 to 3570		—	-44		—	-44	dBm		
	5250 to 5355		—	-44		—	-44	dBm		
	7000 to 7140		—	-44		—	-44	dBm		
ACLR	1750 to 1785	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	1750 to 1785	±10MHz		—	-55		—	-55	dBc	
IMD2 * Mounted recommended circuit	fblock = 95			—	-103		—	-103	dBm	PTx = 21dBm Pblock = -15dBm
	fblock = 3625			—	-102		—	-98	dBm	
IMD3 * Mounted recommended circuit	fblock = 1670			—	-103		—	-99	dBm	* The IMD characteristics are design guaranteed.
	fblock = 5390			—	-103		—	-101	dBm	

UMTS2G

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 26dBm)

Item	Freq [MHz]		UMTS2G - Ant2			UMTS2G - Ext			Unit	Conditions
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	1920 to 1980			—	0.85		—	1.09	dB	
	2110 to 2170			—	0.91		—	1.20	dB	
VSWR	1920 to 1980			—	1.5		—	1.5	—	UMTS2G Port
				—	1.5		—	1.5	—	Ant2, Ext Port
	2110 to 2170			—	1.5		—	1.5	—	UMTS2G Port
				—	1.5		—	1.5	—	Ant2, Ext Port
SW isolation	1920 to 1980		16	—		16	—		dB	When UMTS2G - Ant1 measurement
			—	—	—	16	—		dB	When UMTS2G - Ant2 measurement
			16	—		—	—	—	dB	When UMTS2G - Ext measurement
	2110 to 2170		16	—		16	—		dB	When UMTS2G - Ant1 measurement
			—	—	—	16	—		dB	When UMTS2G - Ant2 measurement
			16	—		—	—	—	dB	When UMTS2G - Ext measurement
Isolation Tx ⇒ Rx	1920 to 1980		22	—		22	—		dB	When UMTS2G ⇒ GSM1900Rx
In-Rx band spurious	2110 to 2170			—	-125		—	-125	dBm	
Harmonics	3840 to 3960			—	-44		—	-44	dBm	
	5760 to 5940			—	-44		—	-44	dBm	
	7680 to 7920			—	-44		—	-44	dBm	
ACLR	1920 to 1980	±5MHz		—	-50		—	-50	dBc	RBW = 30kHz, Channel power measurement (Bandwidth 3.84MHz)
	1920 to 1980	±10MHz		—	-55		—	-55	dBc	
IMD2 * Mounted recommended circuit	fblock = 190			—	-99		—	-97	dBm	PTx = 21dBm Pblock = -15dBm * The IMD characteristics are design guaranteed.
	fblock = 4090			—	-103		—	-97	dBm	
IMD3 * Mounted recommended circuit	fblock = 1760			—	-101		—	-100	dBm	* The IMD characteristics are design guaranteed.
	fblock = 6040			—	-103		—	-103	dBm	

**GSM Tx1**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 35dBm)

Item	Freq [MHz]	GSM Tx1 - Ant1			GSM Tx1 - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	824 to 915		—	0.68		—	0.8	dB	
VSWR	824 to 915		—	1.5		—	1.5	—	GSM Tx1 Port
			—	1.5		—	1.5	—	Ant1, Ext Port
SW isolation	824 to 915	—	—	—	25	—		dB	When GSM Tx1 - Ant1 measurement
		25	—		25	—		dB	When GSM Tx1 - Ant2 measurement
		22	—		—	—	—	dB	When GSM Tx1 - Ext measurement
Isolation Tx ⇒ Rx	824 to 915	31	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM850Rx
		31	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM900Rx
		31	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM1800Rx
		31	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ GSM1900Rx
		31	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS800M
		31	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS1.5G
		31	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS1.7G
		29	—		31	—		dB	Tx1 when selecting Tx1 - Ant1 and Tx1-Ext ⇒ UMTS2G
Isolation Tx ⇒ Ant	824 to 849	25	—		—	—		dB	Tx1 when selecting Ant1 - GSM850Rx ⇒ Ant1
		—	—		25	—		dB	Tx1 when selecting Ant1 - GSM850Rx ⇒ Ext
	880 to 915	25	—		—	—		dB	Tx1 when selecting Ant1 - GSM900Rx ⇒ Ant1
		—	—		25	—		dB	Tx1 when selecting Ant1 - GSM900Rx ⇒ Ext

**GSM Tx1**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 35dBm)

Item	Freq [MHz]		GSM Tx1 - Ant1			GSM Tx1 - Ext			Unit	Conditions
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Harmonics	1648 to 1830	2Tx		—	-36		—	-36	dBm	
	2472 to 2745	3Tx		—	-34		—	-34	dBm	
	3296 to 3660	4Tx		—	-36		—	-36	dBm	
	4120 to 4575	5Tx		—	-42		—	-42	dBm	
	4944 to 5490	6Tx		—	-46		—	-46	dBm	
	5768 to 6405	7Tx		—	-46		—	-46	dBm	
	6592 to 7320	8Tx		—	-46		—	-46	dBm	
	7416 to 8235	9Tx		—	-46		—	-46	dBm	
	8240 to 9150	10Tx		—	-46		—	-46	dBm	
	9064 to 10065	11Tx		—	-46		—	-46	dBm	
	9888 to 10980	12Tx		—	-46		—	-46	dBm	
	10712 to 11895	13Tx		—	-46		—	-46	dBm	
	11536 to 12810	14Tx		—	-46		—	-46	dBm	
	12360 to 13725	15Tx		—	-46		—	-46	dBm	

**GSM Tx2**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 32dBm)

Item	Freq [MHz]	GSM Tx2 - Ant2			GSM Tx2 - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	1710 to 1785		—	0.73		—	0.89	dB	
	1850 to 1910		—	0.78		—	0.94	dB	
VSWR	1710 to 1785		—	1.5		—	1.5	—	GSM Tx2 Port
			—	1.5		—	1.5	—	Ant2, Ext Port
	1850 to 1910		—	1.5		—	1.5	—	GSM Tx2 Port
			—	1.5		—	1.5	—	Ant2, Ext Port
SW isolation	1710 to 1785	22	—		22	—		dB	When GSM Tx2 - Ant1 measurement
		—	—	—	22	—		dB	When GSM Tx2 - Ant2 measurement
		19	—		—	—	—	dB	When GSM Tx2 - Ext measurement
	1850 to 1910	22	—		22	—		dB	When GSM Tx2 - Ant1 measurement
		—	—	—	22	—		dB	When GSM Tx2 - Ant2 measurement
		19	—		—	—	—	dB	When GSM Tx2 - Ext measurement
Isolation Tx ⇒ Rx	1710 to 1910	28	—		28	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM850Rx
		28	—		28	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM900Rx
		28	—		28	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM1800Rx
		28	—		28	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ GSM1900Rx
		23	—		23	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS800M
		23	—		23	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS1.5G
		28	—		28	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS1.7G
		21	—		23	—		dB	Tx2 when selecting Tx2 - Ant2 and Tx2-Ext ⇒ UMTS2G
Isolation Tx ⇒ Ant	1710 to 1785	22	—		—	—	—	dB	Tx2 when selecting Ant2 - GSM1800Rx ⇒ Ant2
		—	—	—	20	—		dB	Tx2 when selecting Ext - GSM1800Rx ⇒ Ext
	1850 to 1910	22	—		—	—	—	dB	Tx2 when selecting Ant2 - GSM1900Rx ⇒ Ant2
		—	—	—	20	—		dB	Tx2 when selecting Ext - GSM1900Rx ⇒ Ext

**GSM Tx2**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 32dBm)

Item	Freq [MHz]		GSM Tx2 - Ant2			GSM Tx2 - Ext			Unit	Conditions
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Harmonics	3420 to 3570	2Tx		—	-39		—	-39	dBm	
	3700 to 3820			—	-39		—	-37	dBm	
	5130 to 5355	3Tx		—	-39		—	-39	dBm	
	5550 to 5730			—	-39		—	-39	dBm	
	6840 to 7140	4Tx		—	-42		—	-42	dBm	
	7400 to 7640			—	-42		—	-42	dBm	
	8550 to 8925	5Tx		—	-45		—	-45	dBm	
	9250 to 9550			—	-45		—	-45	dBm	
	10260 to 10710	6Tx		—	-45		—	-45	dBm	
	11100 to 11460			—	-45		—	-45	dBm	
	11970 to 12495	7Tx		—	-45		—	-45	dBm	

**GSM850Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

Item	Freq [MHz]	GSM850Rx – Ant1			GSM850Rx – Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	869 to 894		—	1.19		—	1.33	dB	
VSWR	869 to 894		—	1.5		—	1.5	—	GSM850Rx Port
			—	1.5		—	1.5	—	Ant1, Ext Port

**GSM900Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

Item	Freq [MHz]	GSM900Rx - Ant1			GSM900Rx - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	925 to 960		—	1.21		—	1.36	dB	
VSWR	925 to 960		—	1.5		—	1.5	—	GSM900Rx Port
			—	1.5		—	1.5	—	Ant1, Ext Port

**GSM1800Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

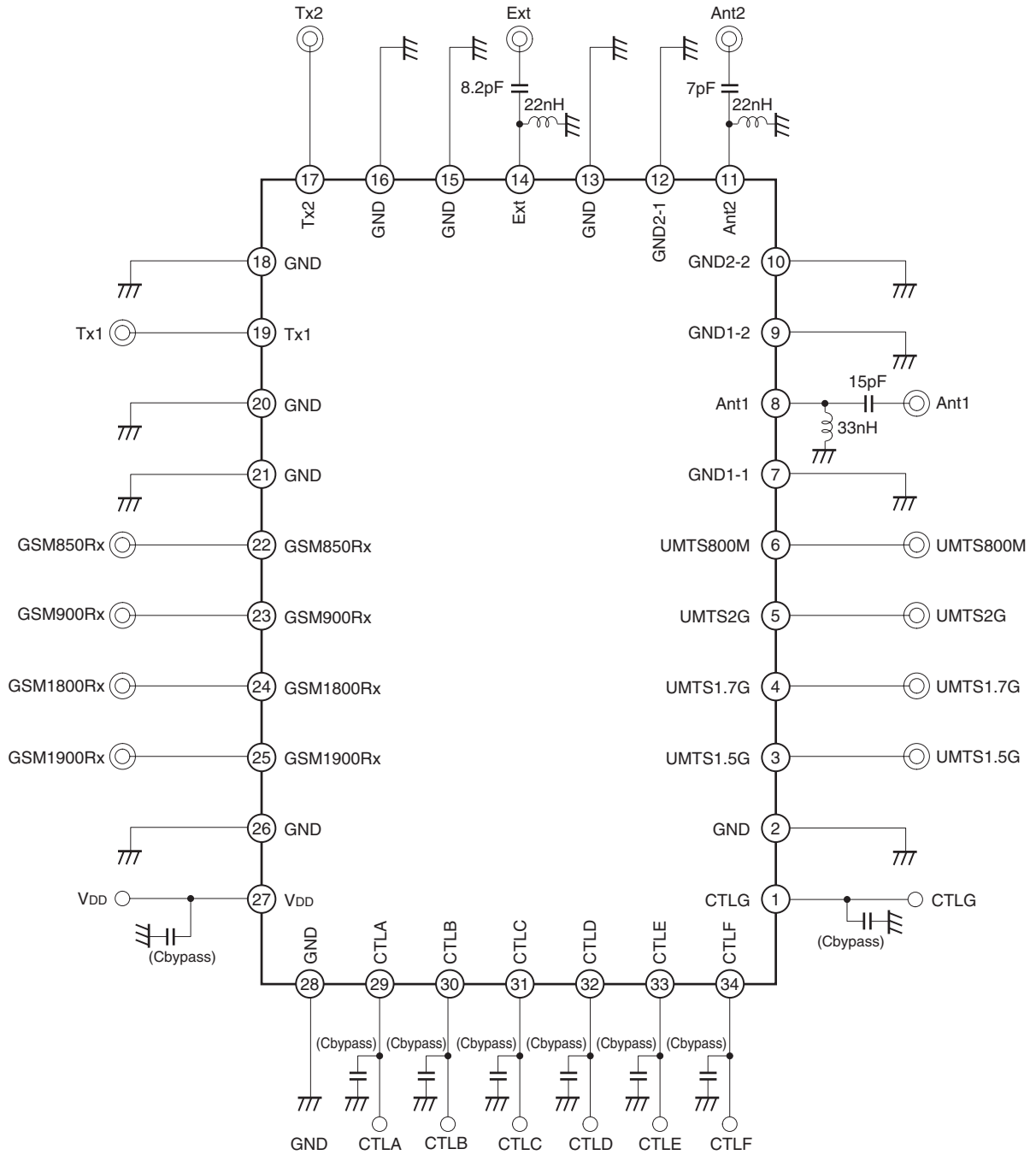
Item	Freq [MHz]	GSM1800Rx - Ant2			GSM1800Rx - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	1805 to 1880		—	1.26		—	1.45	dB	
VSWR	1805 to 1880		—	1.5		—	1.5	—	GSM1800Rx Port
			—	1.5		—	1.5	—	Ant2, Ext Port

**GSM1900Rx**

(V<sub>DD</sub> = 2.9V, V<sub>ctl</sub> = 0/2.9V, Pin = 0dBm)

Item	Freq [MHz]	GSM1900Rx - Ant2			GSM1900Rx - Ext			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Insertion loss * Mounted recommended circuit	1930 to 1990		—	1.25		—	1.44	dB	
VSWR	1930 to 1990		—	1.5		—	1.5	—	GSM1900Rx Port
			—	1.5		—	1.5	—	Ant2, Ext Port

Recommended Circuit



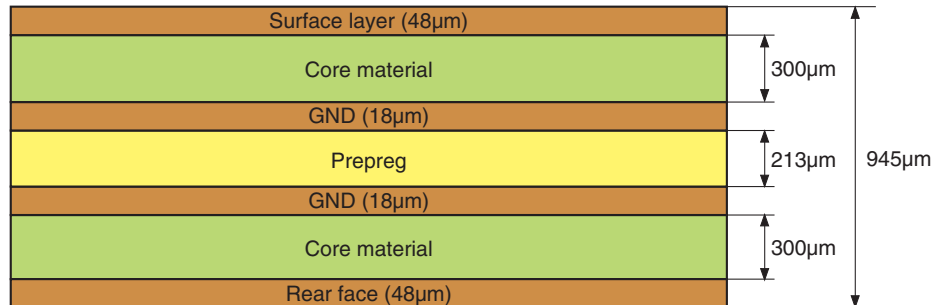
- \*1 When the DC level of the connected device is GND or open, no DC blocking capacitors are required.
- \*2 The DC level of each RF pin is GND.
- \*3 LC circuit is recommended for IMD2 (Rx-Tx) improvement and ESD protection to Antenna pins. (For constants, see above.)
- \*4Cbypass: This capacitor is used for DC line bypass (100pF is recommended.)



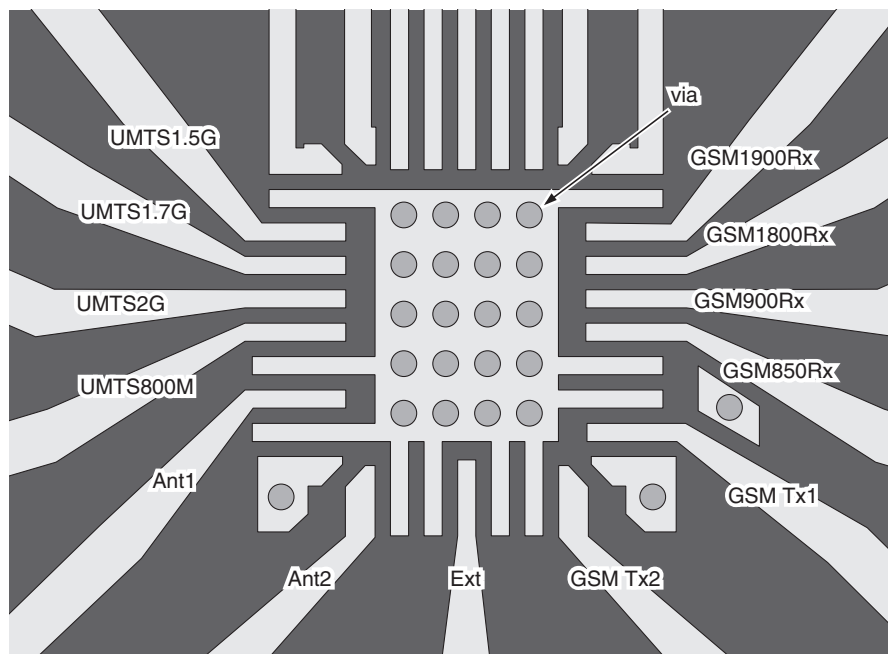
**Evaluation Board**

The board as shown below is used for the CXM3543AER characteristics measurement.

**<Layer structure>**

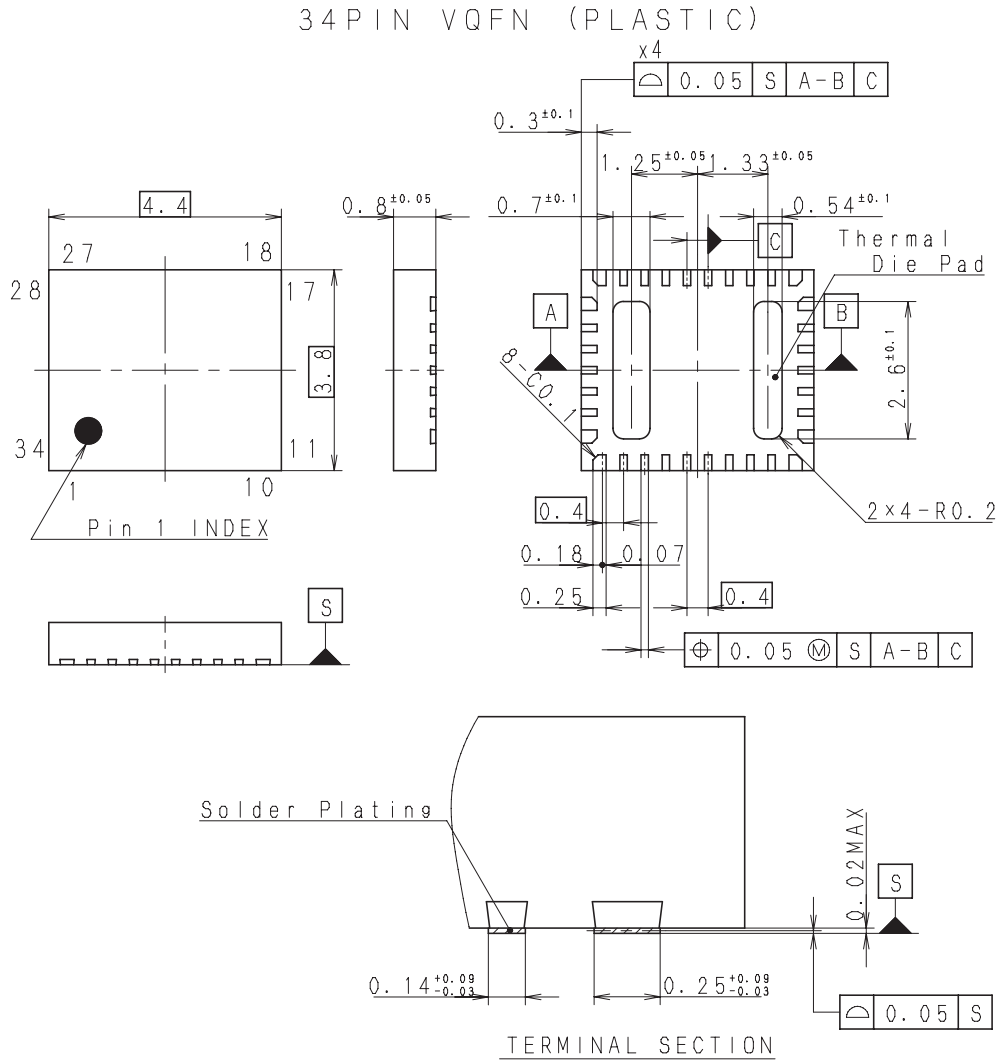


**<Surface layer pattern (Device-mounted area)>**



Package Outline

(Unit: mm)



Note:Cutting burr of lead are 0.05mm MAX.

SONY CODE	VQFN-34P-01
JEITA CODE	—
JEDEC CODE	—

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
TERMINAL TREATMENT	SOLDER PLATING
TERMINAL MATERIAL	COPPER ALLOY
PACKAGE MASS	0.04g

AP-4000-34001S Rev. 0

LEAD PLATING SPECIFICATIONS

ITEM	SPEC.
LEAD MATERIAL	COPPER ALLOY
SOLDER COMPOSITION	Sn-Bi Bi:1-4wt%
PLATING THICKNESS	5-18µm