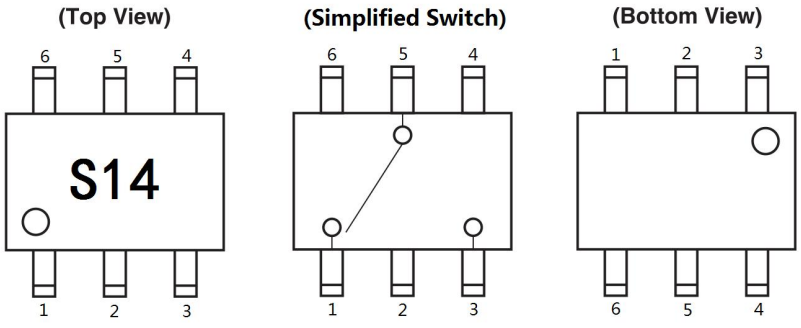
1. DESCRIPTION

The XA2214-S14 is a GaAs MMIC for L, S-band SPDT (Single Pole Double Throw) switch which was developed for mobile phone and another L, S-band application.
This device can operate 2 control switching by control voltage 1.8 to 5.3 V. This device can operate frequency from 0.05 to 3.0 GHz, having the low insertion loss and high isolation.
This device is housed in a 6-pin SOT363 package. And this package is able to high-density surface mounting.

2. FEATURES

- Switch control voltage : $V_{cont\ (H)}$ = 1.8 to 5.3 V (3.0 V TYP.)
  : $V_{cont\ (L)}$ = −0.2 to +0.2 V (0 V TYP.)
- Low insertion loss : L_{ins1} = 0.25 dB TYP. @ f = 0.05 to 0.5 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins2} = 0.25 dB TYP. @ f = 0.5 to 1.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins3} = 0.30 dB TYP. @ f = 1.0 to 2.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins4} = 0.35 dB TYP. @ f = 2.0 to 2.5 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins5} = 0.35 dB TYP. @ f = 2.5 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : ISL1 = 32 dB TYP. @ f = 0.05 to 0.5 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : ISL2 = 28 dB TYP. @ f = 0.5 to 1.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : ISL3 = 27 dB TYP. @ f = 1.0 to 2.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : ISL4 = 26 dB TYP. @ f = 2.0 to 2.5 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : ISL5 = 24 dB TYP. @ f = 2.5 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : $P_{in\ (1\ dB)}$ = +27.0 dBm TYP. @ f = 0.5 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : $P_{in\ (1\ dB)}$ = +20.0 dBm TYP. @ f = 0.5 to 3.0 GHz, $V_{cont\ (H)}$ = 1.8 V, $V_{cont\ (L)}$ = 0 V
- High-density surface mounting : 6-pin super minimold package (SOT363 , 2.0 × 1.25 × 0.9 mm)

3. PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name
1	OUTPUT1
2	GND
3	OUTPUT2
4	V_{cont2}
5	INPUT
6	V_{cont1}

4. TRUTH TABLE

V_{cont1}	V_{cont2}	INPUT–OUTPUT1	INPUT–OUTPUT2
Low	High	ON	OFF
High	Low	OFF	ON

5. ABSOLUTE MAXIMUM RATINGS(TA = +25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V_{cont}	+6.0 Note	V
Input Power	P_{in}	+30	dBm
Operating Ambient Temperature	T_A	–40 to +85	°C
Storage Temperature	T_{stg}	–50 to +150	°C

Note Vcont1 − Vcont2 ≤ 6.0 V

6. RECOMMENDED OPERATING RANGE(TA = +25°C, unless otherwise specified)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Switch Control Voltage (H)	$V_{cont\ (H)}$	1.8	3.0	5.3	V
Switch Control Voltage (L)	$V_{cont\ (L)}$	–0.2	0	0.2	V

7. ELECTRICAL CHARACTERISTICS

(TA = +25°C, Vcont (H) = 3.0 V, Vcont (L) = 0 V, DC cut capacitors = 100 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	L_{ins1}	f = 0.05 to 0.5 GHz Note 1	–	0.25	0.45	dB
Insertion Loss 2	L_{ins2}	f = 0.5 to 1.0 GHz	–	0.25	0.45	dB
Insertion Loss 3	L_{ins3}	f = 1.0 to 2.0 GHz	–	0.30	0.50	dB
Insertion Loss 4	L_{ins4}	f = 2.0 to 2.5 GHz	–	0.35	0.55	dB
Insertion Loss 5	L_{ins5}	f = 2.5 to 3.0 GHz	–	0.35	0.60	dB
Isolation 1	ISL1	f = 0.05 to 0.5 GHz Note 1	29	32	–	dB
Isolation 2	ISL2	f = 0.5 to 1.0 GHz	25	28	–	dB
Isolation 3	ISL3	f = 1.0 to 2.0 GHz	24	27	–	dB
Isolation 4	ISL4	f = 2.0 to 2.5 GHz	23	26	–	dB
Isolation 5	ISL5	f = 2.5 to 3.0 GHz	21	24	–	dB
Input Return Loss 1	RL_{in1}	f = 0.05 to 0.5 GHz Note 1	15	20	–	dB
Input Return Loss 2	RL_{in2}	f = 0.5 to 3.0 GHz	15	20	–	dB
Output Return Loss 1	RL_{out1}	f = 0.05 to 0.5 GHz Note 1	15	20	–	dB
Output Return Loss 2	RL_{out2}	f = 0.5 to 3.0 GHz	15	20	–	dB
0.1 dB Loss Compression Input Power Note 2	$P_{in\ (0.1\ dB)}$	f = 2.0/2.5 GHz	+21.0	+23.0	–	dBm
		f = 0.5 to 3.0 GHz	–	+23.0	–	dBm
1 dB Loss Compression Input Power Note 3	$P_{in\ (1\ dB)}$	f = 0.5 to 3.0 GHz	–	+27.0	–	dBm
2nd Harmonics	$2f_0$	f = 2.0 GHz, P_{in} = +15 dBm	–	–55	–47	dBc
		f = 2.5 GHz, P_{in} = +15 dBm	–	–55	–47	dBc
3rd Harmonics	$3f_0$	f = 2.0 GHz, P_{in} = +15 dBm	–	–55	–47	dBc
		f = 2.5 GHz, P_{in} = +15 dBm	–	–55	–47	dBc
Intermodulation Intercept Point	IIP_3	f = 0.5 to 3.0 GHz, 2 tone, P_{in} = +16 dBm, 5 MHz spicing	–	+58	–	dBm
Switch Control Current	I_{cont}	–	–	4	25	μA
Switch Control Speed	t_{SW}	50% CTL to 90/10% RF	–	20	200	ns

Notes 1. DC cut capacitors = 1 000 pF at f = 0.05 to 0.5 GHz

2. $P_{in\ (0.1\ dB)}$ is measured the input power level when the insertion loss increases more 0.1 dB than that of linear range.

3. $P_{in\ (1\ dB)}$ is measured the input power level when the insertion loss increases more 1 dB than that of linear range.

ELECTRICAL CHARACTERISTICS(continued)

(TA = +25°C, Vcont (H) = 1.8 V, Vcont (L) = 0 V, DC cut capacitors = 100 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 6	L_{ins6}	f = 0.05 to 0.5 GHz Note 1	–	0.25	0.50	dB
Insertion Loss 7	L_{ins7}	f = 0.5 to 1.0 GHz	–	0.25	0.50	dB
Insertion Loss 8	L_{ins8}	f = 1.0 to 2.0 GHz	–	0.30	0.55	dB
Insertion Loss 9	L_{ins9}	f = 2.0 to 2.5 GHz	–	0.35	0.60	dB
Insertion Loss 10	L_{ins10}	f = 2.5 to 3.0 GHz	–	0.35	0.65	dB
Isolation 6	ISL6	f = 0.05 to 0.5 GHz Note 1	27	30	–	dB
Isolation 7	ISL7	f = 0.5 to 2.0 GHz	23	27	–	dB
Isolation 8	ISL8	f = 2.0 to 2.5 GHz	21	25	–	dB
Isolation 9	ISL9	f = 2.5 to 3.0 GHz	20	24	–	dB
Input Return Loss 3	RL_{in3}	f = 0.05 to 3.0 GHz Note 1	15	20	–	dB
Output Return Loss 3	RL_{out3}	f = 0.05 to 3.0 GHz Note 1	15	20	–	dB
0.1 dB Loss Compression Input Power Note 2	$P_{in\ (0.1\ dB)}$	f = 2.0/2.5 GHz	+14.0	+17.0	–	dBm
		f = 0.5 to 3.0 GHz	–	+17.0	–	dBm
1 dB Loss Compression Input Power Note 3	$P_{in\ (1\ dB)}$	f = 0.5 to 3.0 GHz	–	+20.0	–	dBm
Switch Control Current	I_{cont}	–	–	4	20	μA
Switch Control Speed	t_{SW}	50% CTL to 90/10% RF	–	20	200	ns

Notes 1. DC cut capacitors = 1 000 pF at f = 0.05 to 0.5 GHz

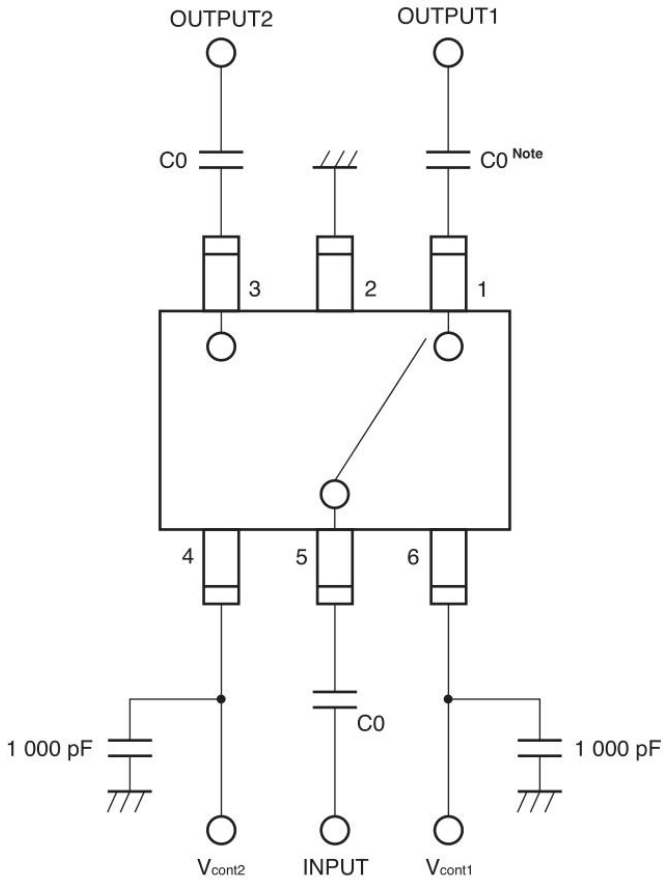
2. $P_{in\ (0.1\ dB)}$ is measured the input power level when the insertion loss increases more 0.1 dB than that of linear range.

3. $P_{in\ (1\ dB)}$ is measured the input power level when the insertion loss increases more 1 dB than that of linear range.

Caution This device is used it is necessary to use DC cut capacitors.

The value of DC cut capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC cut capacitor value is less than 100 pF.

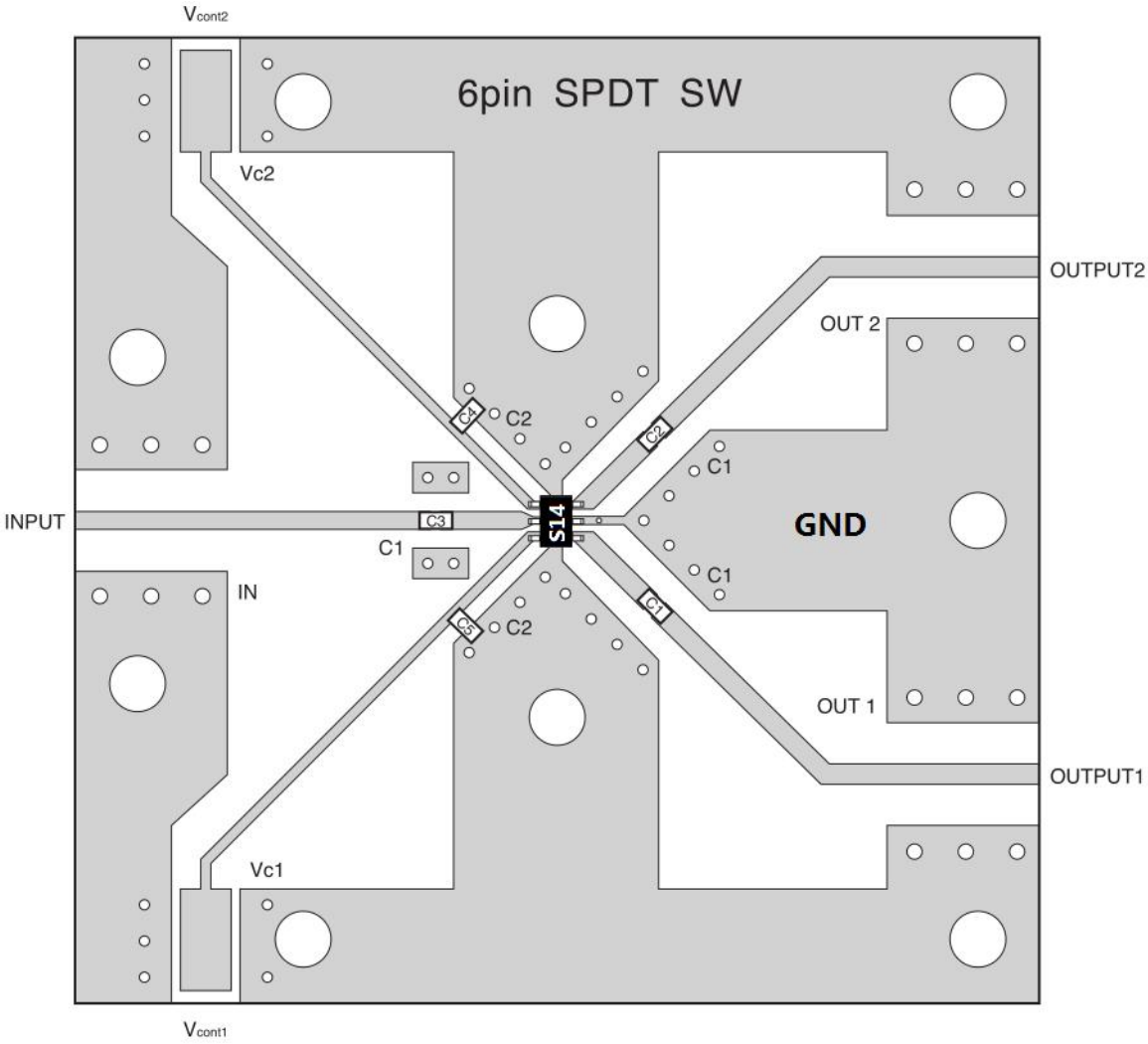
8. EVALUATIOB CIRCUIT



Note C0 : 0.05 to 0.5 GHz 1 000 pF
: 0.5 to 3.0 GHz 100 pF

The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

9. ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD



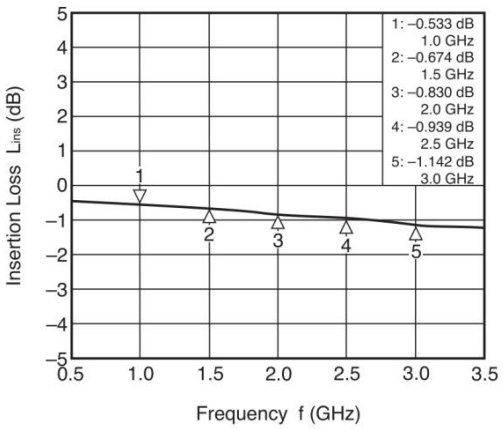
10. USING THE NEC EVALUATION BOARD

Symbol	Values
C1, C2, C3	100 pF
C4, C5	1 000 pF

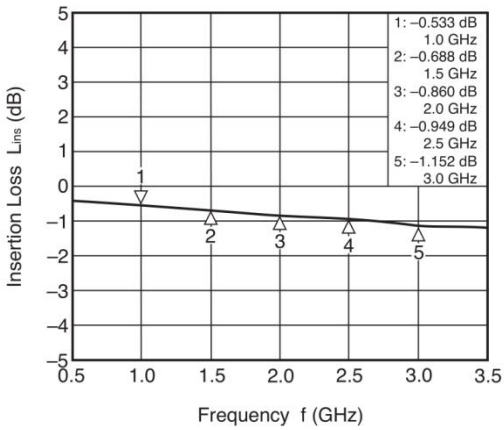
11. TYPICAL CHARACTERISITICS

(T_A = +25°C, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V, DC cut capacitors = 100 pF, unless otherwise specified)

INPUT-OUTPUT1
INSERTION LOSS vs.FREQUENCY



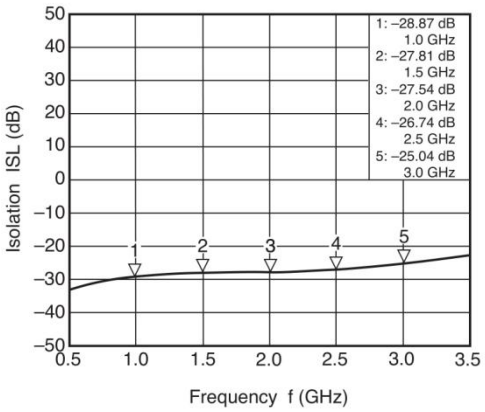
INPUT-OUTPUT2
INSERTION LOSS vs.FREQUENCY



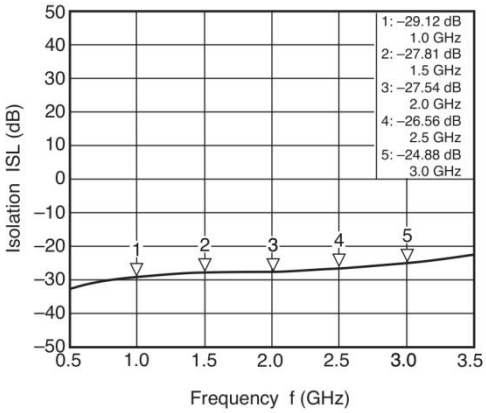
Remark The graphs indicate nominal characteristics.

Caution These characteristics values include the losses of the NEC evaluation board.

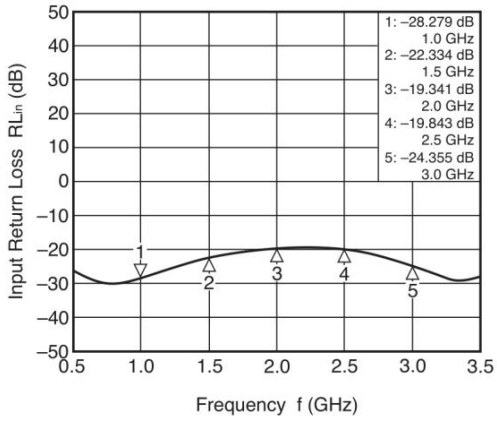
INPUT-OUTPUT1
ISOLATION vs.FREQUENCY



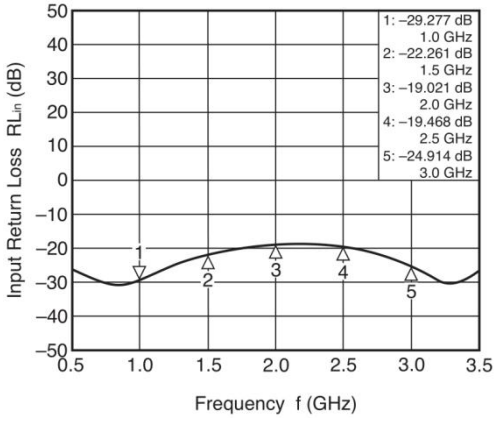
INPUT-OUTPUT2
ISOLATION vs.FREQUENCY



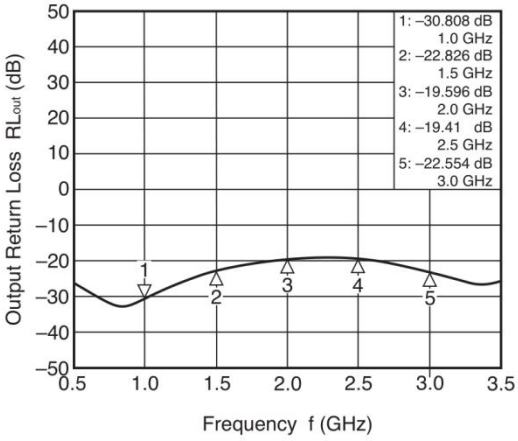
INPUT-OUTPUT1
INPUT RETURN LOSS vs. FREQUENCY



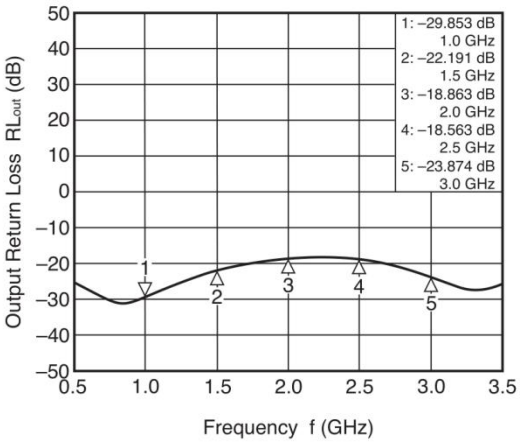
INPUT-OUTPUT2
INPUT RETURN LOSS vs. FREQUENCY



INPUT-OUTPUT1
OUTPUT RETURN LOSS vs. FREQUENCY

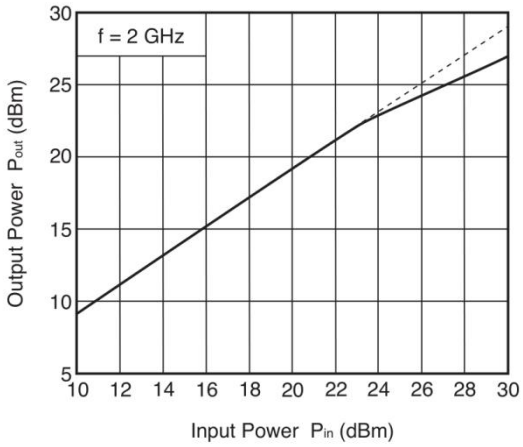


INPUT-OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



Remark The graphs indicate nominal characteristics.

OUTPUT POWER vs. INPUT POWER



Remark The graph indicate nominal characteristics.

12. ORDERING INFORMATION

Ordering Information

Part Number	Device Marking	Package Type	Body size (mm)	Temperature (°C)	MSL	Transport Media	Package Quantity
XA2214-S14	S14	SOT363	2.10 * 1.22	- 40 to 85	MSL3	T&R	3000

13. DIMENSIONAL DRAWINGS