

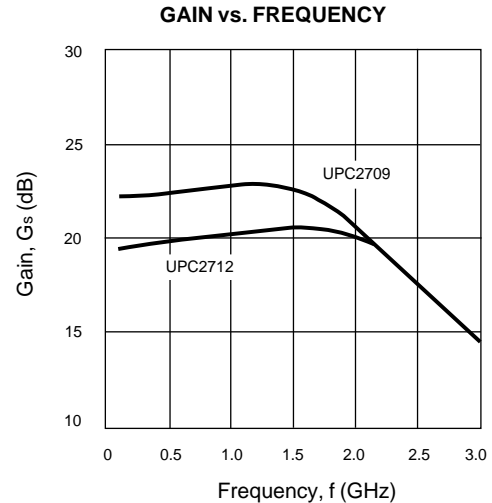
FEATURES

- **WIDE FREQUENCY RESPONSE:** 2.5 GHz
- **HIGH GAIN:** 23 dB (UPC2709T)
- **SATURATED OUTPUT POWER:** +11.5 dBm (UPC2709T)
- **INTERNAL CURRENT REGULATION MINIMIZES GAIN CHANGE OVER TEMPERATURE**
- **5 V SINGLE SUPPLY VOLTAGE**
- **SUPER SMALL PACKAGE**
- **TAPE AND REEL PACKAGING OPTION AVAILABLE**

DESCRIPTION

The UPC2709T and UPC2712T are Silicon Monolithic integrated circuits manufactured using the NESAT III process. These devices are suitable as buffer amplifiers for wide-band applications. They are designed for low cost gain stages in cellular radios, GPS receivers, DBS tuners, PCN, and test/measurement equipment.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.



ELECTRICAL CHARACTERISTICS (T_A = 25°C, f = 1 GHz, V_{CC} = 5 V)

PART NUMBER PACKAGE OUTLINE			UPC2709T T06			UPC2712T T06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
I _{CC}	Circuit Current (no signal)	mA	19	25	32	9	12	15
G _s	Small Signal Gain	dB	21	23	26.5	18	20	23.5
f _U	Upper Limit Operating Frequency (The gain at f _U is 3 dB down from the gain at 0.1 GHz)	GHz	2.0	2.3		2.2	2.6	
ΔG _s	Gain Flatness, f = 0.1 ~ 1.8 GHz f = 0.1 ~ 2.0 GHz	dB		±1.0			±0.8	
P _{SAT}	Saturated Output Power	dBm	9	11.5		0	3	
P _{1dB}	Output Power at 1 dB Compression Point	dBm		7.5			-2.5	
NF	Noise Figure	dB		5	6.5		4.5	6
RL _{IN}	Input Return Loss	dB	7	10		9	12	
RL _{OUT}	Output Return Loss	dB	7	10		10	13	
ISOL	Isolation	dB	26	31		28	33	
ΔG _T	Gain -Temperature Coefficient	dB/°C		-0.002			-0.003	
R _{TH}	Thermal Resistance (Junction to Ambient)	°C/W			200			200

UPC2709T, UPC2712T

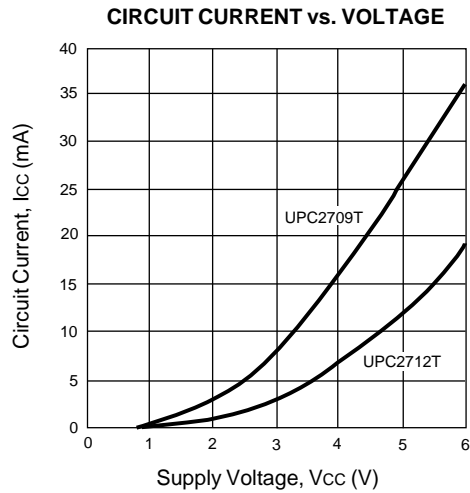
ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CC}	Supply Voltage	V	6
I _{CC}	Total Circuit Current UPC2709T UPC2712T	mA mA	60 30
P _{IN}	Input Power	dBm	+10
P _T	Power Dissipation ²	mW	280
T _{OP}	Operating Temperature	°C	-40 to +85
T _{STG}	Storage Temperature	°C	-55 to +150

Notes:

- Operation in excess of any one of these parameters may result in permanent damage.
- Mounted on 50 x 50 x 1.6 mm epoxy glass PWB (T_A = +85°C).

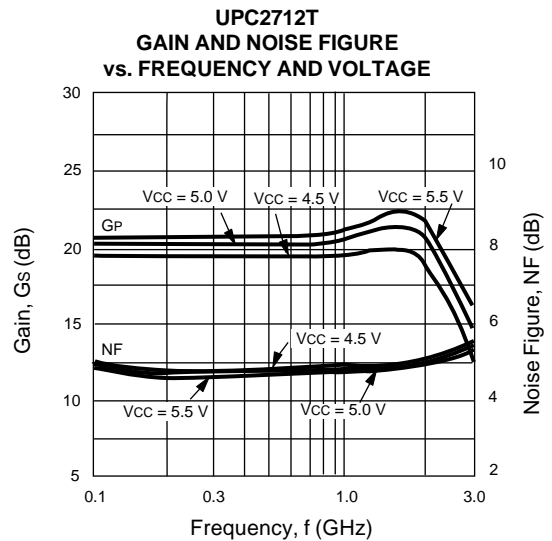
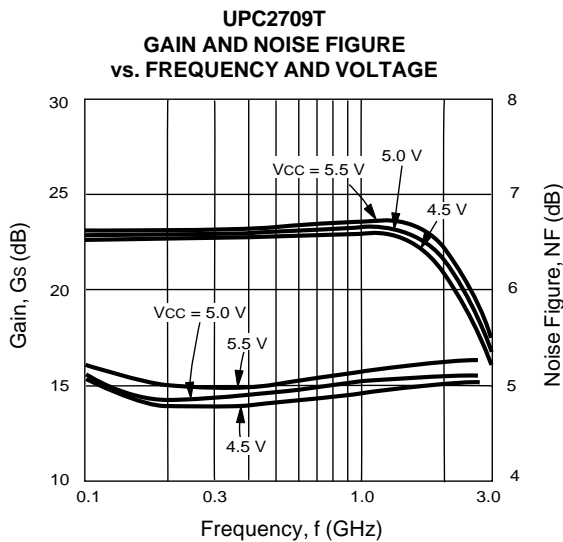
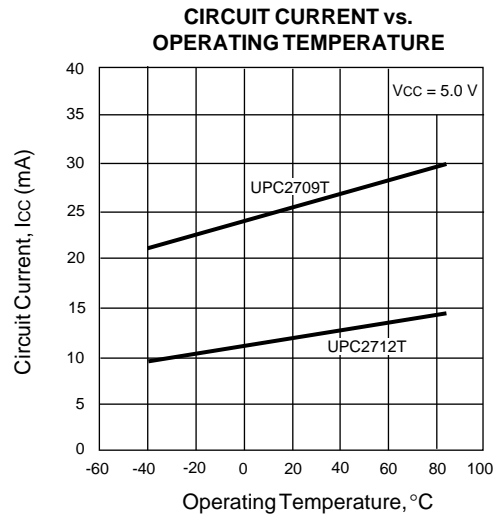
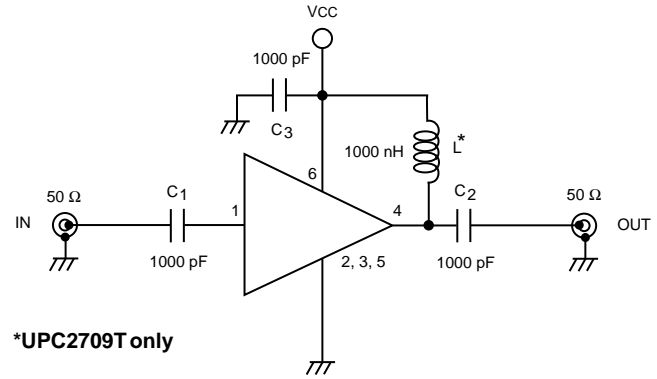
TYPICAL PERFORMANCE CURVES (T_A = 25°C)



RECOMMENDED OPERATING CONDITIONS

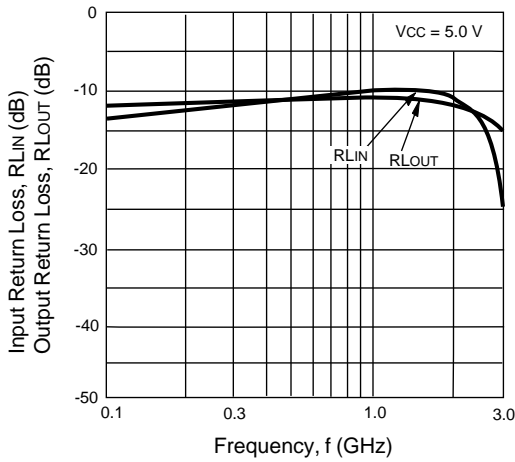
SYMBOL	PARAMETER	UNITS	MIN	TYP	MAX
V _{CC}	Supply Voltage	V	4.5	5.0	5.5

TEST CIRCUIT

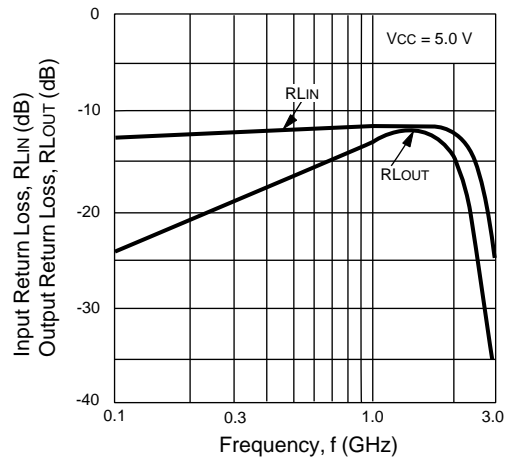


TYPICAL PERFORMANCE CURVES (TA = 25°C)

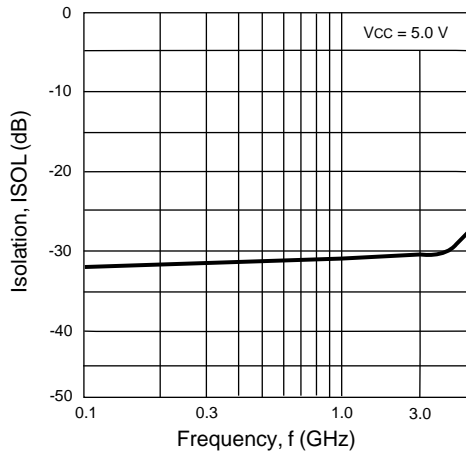
UPC2709T
INPUT RETURN LOSS AND OUTPUT RETURN LOSS vs. FREQUENCY



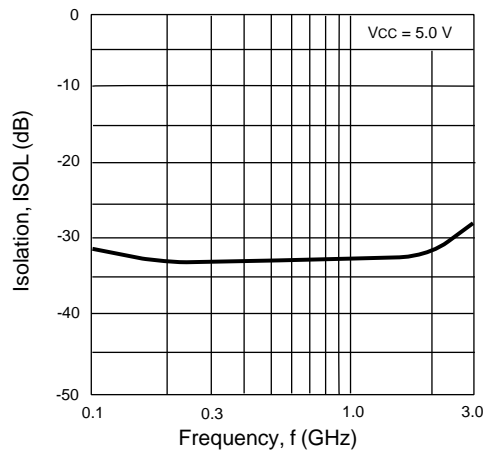
UPC2712T
INPUT RETURN LOSS AND OUTPUT RETURN LOSS vs. FREQUENCY



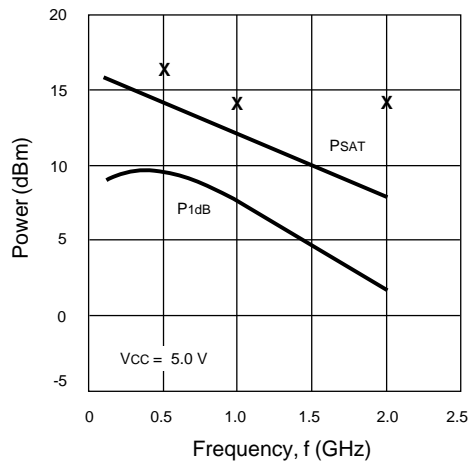
UPC2709T
ISOLATION vs. FREQUENCY



UPC2712T
ISOLATION vs. FREQUENCY

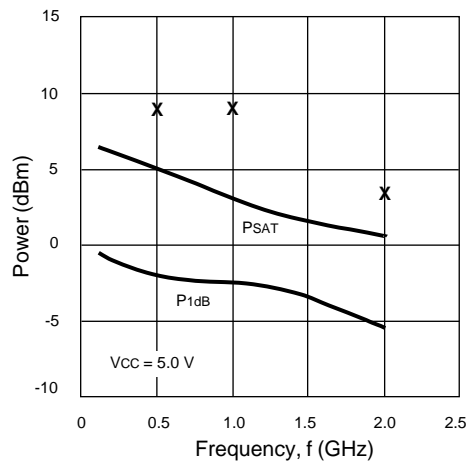


UPC2709T
POWER vs. FREQUENCY



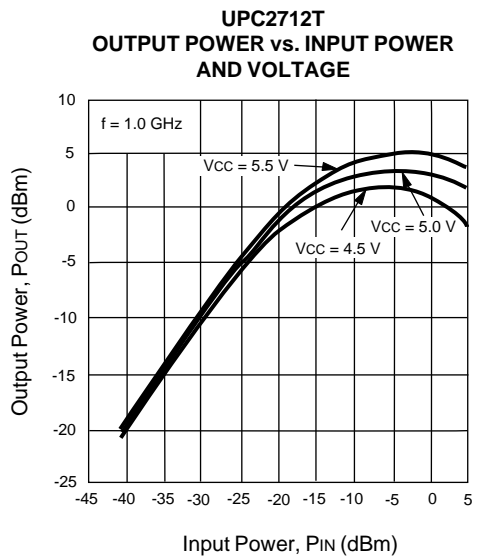
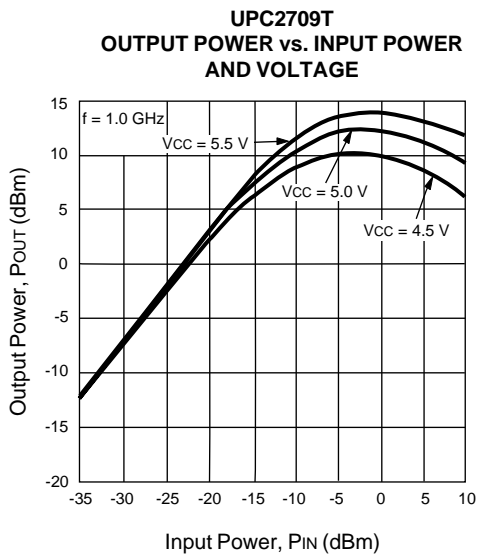
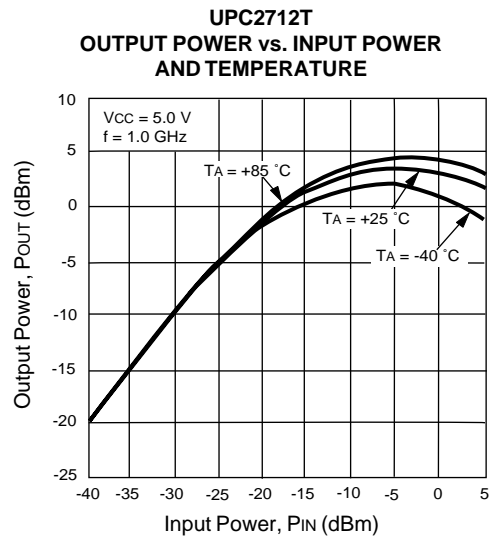
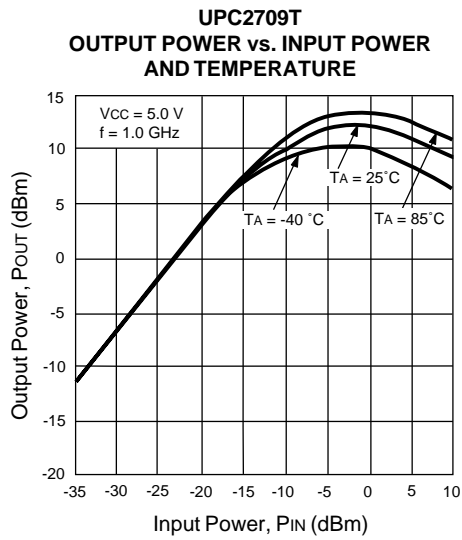
X: Typical SSB Third Order Intercept Point

UPC2712T
POWER vs. FREQUENCY



X: Typical SSB Third Order Intercept Point

TYPICAL PERFORMANCE CURVES (TA = 25°C)



UPC2709T, UPC2712T

TYPICAL SCATTERING PARAMETERS (T_A = 25°C)

UPC2709T

V_{CC} = 5 V, I_{CC} = 25 mA

FREQUENCY (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K ¹	S ₂₁ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.10	0.258	-4.1	12.7	-3.7	0.022	7.5	0.234	-4.6	1.66	22.1
0.20	0.261	-2.9	12.8	-12.2	0.024	3.1	0.240	-6.9	1.52	22.1
0.30	0.266	-3.4	12.9	-19.6	0.025	6.3	0.251	-9.6	1.45	22.2
0.40	0.271	-4.6	13.0	-27.0	0.025	6.5	0.260	-13.5	1.42	22.3
0.50	0.272	-6.8	13.1	-34.2	0.026	5.6	0.272	-17.9	1.36	22.3
0.60	0.275	-8.1	13.3	-41.3	0.026	10.5	0.288	-22.1	1.32	22.5
0.70	0.277	-10.4	13.5	-49.2	0.026	9.9	0.303	-28.6	1.29	22.6
0.80	0.278	-12.7	13.6	-57.4	0.026	11.0	0.312	-33.5	1.27	22.7
0.90	0.279	-14.0	13.7	-65.7	0.026	11.8	0.319	-38.4	1.25	22.7
1.00	0.279	-15.2	13.8	-72.3	0.027	15.6	0.324	-43.4	1.20	22.8
1.10	0.279	-18.1	13.9	-81.1	0.027	15.8	0.328	-51.2	1.19	22.9
1.20	0.276	-20.7	14.0	-90.3	0.027	17.7	0.332	-59.0	1.19	22.9
1.30	0.271	-23.3	13.9	-99.8	0.027	16.7	0.332	-67.1	1.20	22.9
1.40	0.263	-25.6	13.8	-109.3	0.027	19.2	0.326	-75.1	1.22	22.8
1.50	0.255	-26.9	13.6	-118.5	0.027	20.4	0.314	-82.5	1.25	22.7
1.60	0.246	-28.6	13.2	-128.3	0.028	20.6	0.302	-90.6	1.27	22.4
1.70	0.238	-30.2	12.7	-138.0	0.029	21.6	0.282	-98.9	1.30	22.1
1.80	0.237	-31.7	12.3	-147.5	0.030	27.9	0.254	-106.8	1.33	21.8
1.90	0.232	-33.1	11.7	-157.2	0.030	31.0	0.226	-113.6	1.40	21.4
2.00	0.222	-33.6	11.0	-166.1	0.031	33.2	0.198	-120.8	1.47	20.8
2.10	0.209	-34.4	10.3	-174.3	0.032	34.6	0.168	-126.7	1.54	20.3
2.20	0.194	-33.1	9.7	-177.5	0.033	35.8	0.143	-132.5	1.61	19.7
2.30	0.184	-30.3	9.0	-169.5	0.034	36.1	0.114	-137.7	1.69	19.1
2.40	0.176	-26.8	8.4	-162.0	0.034	38.5	0.089	-144.4	1.81	18.5
2.50	0.173	-23.2	7.8	-154.8	0.035	39.2	0.065	-150.6	1.90	17.8

UPC2712T

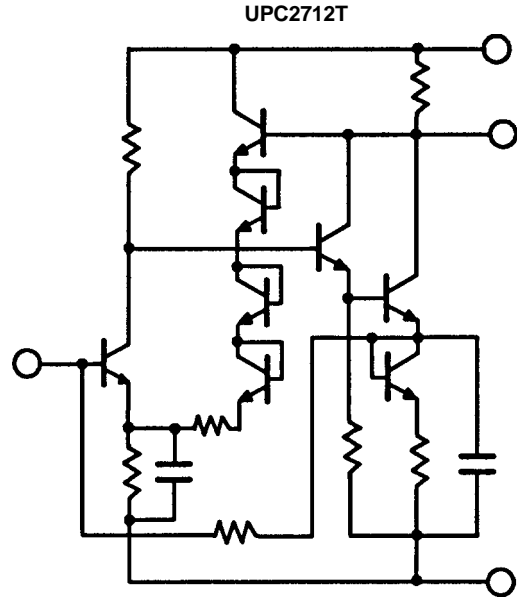
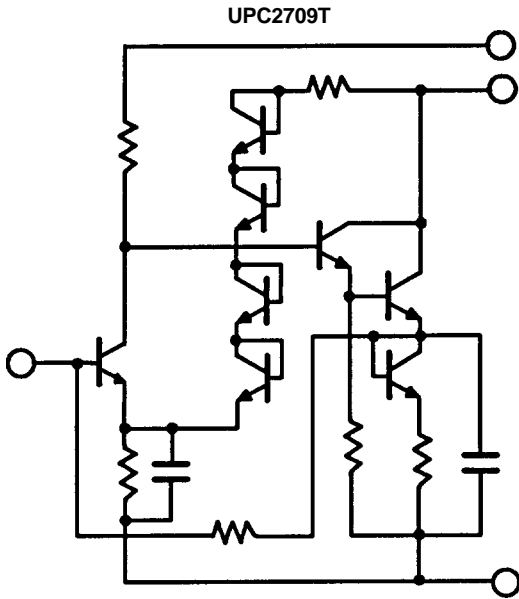
V_{CC} = 5 V, I_{CC} = 12 mA

FREQUENCY (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K ¹	S ₂₁ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.10	0.262	-9.3	9.3	-6.4	0.021	-1.6	0.071	7.8	2.46	19.3
0.20	0.261	-12.3	9.4	-17.4	0.022	-3.3	0.078	7.2	2.33	19.5
0.30	0.260	-17.0	9.5	-27.7	0.022	-5.1	0.091	6.4	2.29	19.6
0.40	0.258	-21.9	9.6	-37.5	0.023	-6.8	0.110	4.3	2.16	19.7
0.50	0.257	-27.1	9.8	-46.9	0.024	-8.5	0.128	-1.1	2.05	19.8
0.60	0.255	-32.0	9.9	-56.4	0.024	-10.2	0.146	-6.8	2.01	19.9
0.70	0.254	-38.1	10.0	-65.7	0.025	-12.0	0.166	-14.9	1.90	20.0
0.80	0.252	-41.9	10.2	-75.9	0.026	-13.7	0.181	-22.9	1.80	20.1
0.90	0.250	-46.5	10.3	-86.0	0.026	-15.4	0.194	-32.7	1.77	20.3
1.00	0.248	-51.0	10.4	-96.4	0.027	-17.2	0.204	-40.5	1.69	20.4
1.10	0.246	-57.5	10.6	-106.4	0.028	-18.9	0.212	-50.9	1.62	20.5
1.20	0.240	-62.5	10.6	-117.7	0.028	-20.6	0.221	-59.7	1.60	20.5
1.30	0.236	-67.8	10.7	-128.9	0.029	-22.3	0.235	-70.9	1.54	20.6
1.40	0.232	-72.4	10.8	-140.6	0.030	-24.1	0.244	-81.3	1.48	20.6
1.50	0.224	-77.7	10.8	-152.7	0.031	-25.8	0.247	-94.4	1.44	20.7
1.60	0.218	-82.1	10.9	-164.9	0.031	-27.5	0.246	-106.3	1.44	20.7
1.70	0.210	-86.2	10.9	-177.6	0.032	-29.3	0.240	-119.4	1.42	20.7
1.80	0.201	-89.3	10.7	-169.5	0.033	-31.0	0.234	-131.5	1.42	20.6
1.90	0.190	-93.5	10.5	-156.4	0.033	-32.7	0.221	-143.3	1.46	20.4
2.00	0.180	-96.9	10.3	-143.7	0.034	-34.4	0.210	-159.0	1.46	20.3
2.10	0.173	-98.4	10.0	-129.8	0.035	-36.2	0.187	-173.4	1.48	20.0
2.20	0.169	-101.3	9.7	-119.3	0.035	-37.9	0.169	-167.5	1.54	19.7
2.30	0.161	-100.3	8.8	-107.2	0.036	-39.6	0.156	-151.8	1.63	18.9
2.40	0.157	-100.0	8.4	-95.8	0.037	-41.3	0.134	-132.8	1.69	18.4
2.50	0.156	-99.4	7.7	-84.9	0.037	-43.1	0.125	-114.0	1.80	17.8
2.60	0.156	-100.0	7.3	-75.4	0.038	-44.8	0.118	-99.8	1.85	17.3
2.70	0.159	-98.4	6.8	-64.5	0.038	-46.5	0.108	-85.4	2.00	16.6
2.80	0.164	-101.7	6.5	-56.1	0.039	-48.3	0.110	-70.2	2.02	16.2
2.90	0.168	-100.1	5.8	-47.0	0.039	-50.0	0.122	-52.2	2.21	15.3
3.00	0.172	-101.1	5.5	-36.2	0.040	-51.7	0.136	-35.6	2.28	14.8

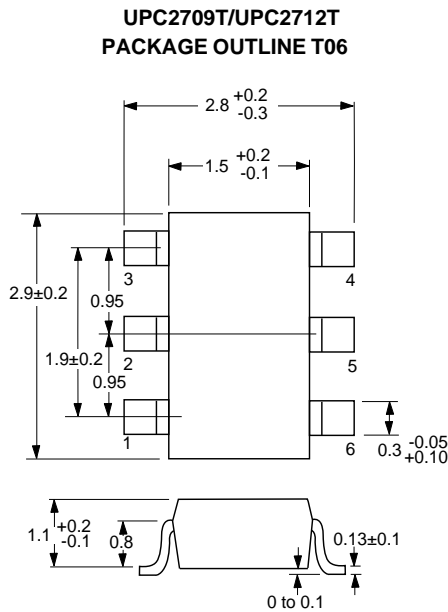
Note:

1. K factor calculations:
$$K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}$$
, $\Delta = S_{11} S_{22} - S_{21} S_{12}$

EQUIVALENT CIRCUIT



OUTLINE DIMENSIONS (Units in mm)



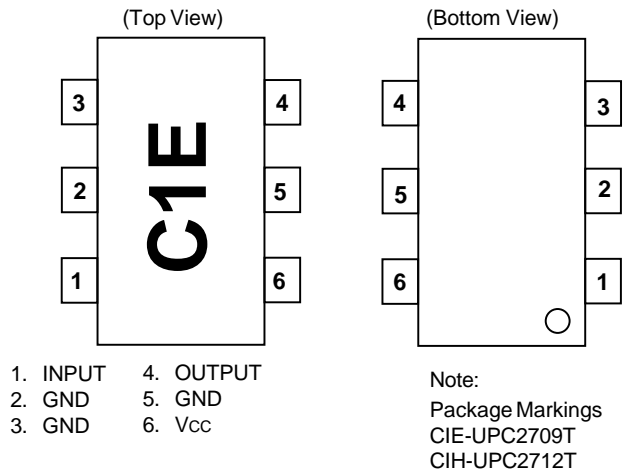
Note:
All dimensions are typical unless otherwise specified.

ORDERING INFORMATION

PART NUMBER	QTY
UPC2709T-E3	3K/Reel
UPC2712T-E3	3K/Reel

Embossed Tape, 8 mm wide.

LEAD CONNECTIONS



RECOMMENDED P.C.B. LAYOUT (Units in mm)

