HEWLETT PACKARD

T-31-01

General Purpose Transistors HXTR-3001 Chip

Technical Data

HXTR-3101, TX and TXV
2N6838 (HXTR-3103, TX and TXV)
HSMX-3131
HSMX-3151

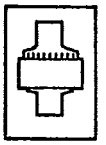
Features

- **High Gain**
  15 dB Typical $|S_{21E}|^2$ at 1 GHz
- **High Output Power**
  21 dBm P_{1dB} Typical at 1 GHz
- **Low Noise Figure**
  1.5 dB Typical at 1 GHz
- **Large Gold Bonding Pads**
- **Available in Low Cost Hermetic and Surface Mount Packages**

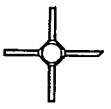
Recommended Die Attach and Bonding Procedures

Eutectic Die Attach at a stage temperature of 410 ± 10°C under an N_2 ambient. Chip should be lightly scrubbed using a tweezer or collet and eutectic should flow within five seconds.

Thermocompression Wire Bond at a stage temperature of 310 ± 10°C, using a tip force of 30 ± 5 grams with 0.7 or 1.0 mil gold wire. A one mil minimum wire clearance at the passivation edge is recommended. (Ultrasonic bonding is not recommended.)



Generic Chip
HXTR-3001

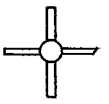


HPAC-100X

Part No.	Marking "X"
HXTR-3101	U
2N6838 (HXTR-3103)	T

SOT-23
HSMX-3131

SOT-143
HSMX-3151



HXTR-3185
HXTR-3186

Note: See the Package Outline section, page 16-7, for complete dimensions.

Description

The HXTR-3001 is a low cost NPN silicon bipolar transistor chip designed for high gain and wide dynamic range at VHF, UHF, and microwave frequencies. The chip is silicon nitride passivated, and is provided with large gold bonding pads for ease of use in most hybrid applications.

The HXTR-3001 is available in several package styles. The HXTR-3101 and 2N6838 (HXTR-3103) are supplied in the HPAC-100X, a rugged low cost metal/ceramic package capable of meeting the environmental requirements of MIL-S-19500 and the test requirements of MIL-STD-750/883.

The HSMX-3131 and HSMX-3151 are the low cost plastic package versions that are supplied in the SOT-23 and SOT-143 surface mount packages respectively.

The HXTR-3001 chip is also offered in an 85-mil micro-plastic package with copper leads as the HXTR-3185 and HXTR-3186 (bent lead version). These devices replace the 100-mil micro-plastic HXTR-3121 part with alloy 42 leads.

Electrical Specifications (HXTR-3001, HXTR-3101, HXTR-3103)

Symbol	Parameters and Test Conditions	Test Method MIL-STD-750	Units	HXTR-3001[1]			HXTR-3101[2]			HXTR-3103[2]		
				Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
BV_{CBO}*	Collector-Base Breakdown Voltage at I_C = 100 μA	3001*	V				30			30		
BV_{CEO}	Collector-Emitter Breakdown Voltage at I_C = 10 mA	3001*	V							16		
I_{CEO}	Collector-Emitter Leakage Current at V_{CE} = 15 V	3041**	nA			500						100
I_{CBO}	Collector-Base Cutoff Current at V_{CB} = 15 V	3036**	nA			100			500			50
h_{FE}	Forward Current Transfer Ratio HXTR-3001: V_{CE} = 15V, I_C = 15 mA HXTR-3101, -3103: V_{CE} = 10 V, I_C = 10 mA	3076*	–	50	100	220	50		180	50		180
f_T	Gain Bandwidth Product at V_{CE} = 10 V, I_C = 15 mA		GHz					6		5.0	7.0	
$\|S_{21E}\|^2$	Transducer Gain at f = 1000 MHz V_{CE} = 10 V, I_C = 15 mA		dB					15.0		13.5	15.0	
NF_{MIN}	Minimum Noise Figure HXTR-3001: V_{CE} = 10 V, I_C = 7 mA Pkg. Devices: V_{CE} = 10 V, I_C = 10 mA	3246	dB		1.2 f = 500 MHz 1.5 1000 MHz 2.2 2000 MHz			1.8			1.8	2.3
$NF_{(50\Omega)}$	Noise Figure with 50 Ohm Source V_{CE} = 10 V, I_C = 10 mA		dB		f = 500 MHz 1000 MHz						1.7 2.1	
MAG	Maximum Available Gain HXTR-3001: V_{CE} = 15 V, I_C = 15 mA Pkg. Devices: V_{CE} = 10 V, I_C = 15 mA		dB		f = 1000 MHz 16.0 2000 MHz			19.5				
P_{1dB}	Power Output at 1 dB Gain Compression HXTR-3001: V_{CE} = 15 V, I_C = 25 mA Pkg. Devices: V_{CE} = 10 V, I_C = 15 mA		dBm		f = 1000 MHz 21.0 19.0 2000 MHz						16.0	
G_{1dB}	Associated 1 dB Compressed Gain V_{CE} = 10 V, I_C = 15 mA		dB		f = 1000 MHz						16.0	
C_{cb}	Reverse Transfer Capacitance I_C = 0 mA, V_{CB} = 10 V		pF		f = 1 MHz			0.33			0.33	

Notes:
1. T_A = 25°C
2. T_{CASE} = 25°C

*300 μs wide pulse measurement at ≤ 2% duty cycle
**Measured under low ambient light conditions, for chip only.

Electrical Specifications (HSMX-3131, HSMX-3151)

Symbol	Parameters and Test Conditions	Test Method MIL-STD-750	Units	HSMX-3131[1]			HSMX-3151[1]		
				Min.	Typ.	Max.	Min.	Typ.	Max.
BV_{CBO}	Collector-Base Breakdown Voltage at I_C = 100 µA	3001*	V	25			30		
I_{CBO}	Collector-Base Cutoff Current at V_{CB} = 15 V	3036**	nA			500			500
h_{FE}	Forward Current Transfer Ratio HSMX-3131: V_{CE} = 15 V, I_C = 15 mA HSMX-3151: V_{CE} = 10 V, I_C = 10 mA	3076*	–	40	80	250	40	80	250
f_T	Gain Bandwidth Product at V_{CE} = 10 V, I_C = 15 mA		GHz		6			6	
$\|S_{21E}\|^2$	Transducer Gain at f = 1000 MHz V_{CE} = 10 V, I_C = 15 mA		dB		11.3			14.2	
NF_{MIN}	Minimum Noise Figure f = 1000 MHz 2000 MHz V_{CE} = 10 V, I_C = 10 mA	3246	dB		1.8			2.0 2.5	
G_A	Associated Gain of Minimum Noise Figure, f = 1000 MHz I_C = 10 mA, V_{CE} = 10 V		dB					14.9	
MAG	Maximum Available zGain f = 1000 MHz V_{CE} = 10 V, I_C = 15 mA		dB		14			19	
P_{1dB}	Power Output at 1 dB Gain Compression f = 1000 MHz 2000 MHz V_{CE} = 10 V, I_C = 15 mA		dBm		14			17.1 14.6	
G_{1dB}	Associated 1 dB Compressed Gain f = 1000 MHz 2000 MHz V_{CE} = 10 V, I_C = 15 mA		dB		12			16.0 11.1	
C_{cb}	Reverse Transfer Capacitance f = 1 MHz I_C = 0 mA, V_{CB} = 10 V		pF		0.36			0.36	

*300 µs wide pulse measurement at ≤ 2% duty cycle
**Measured under low ambient light conditions, for chip only.

Note:
1. T_{CASE} = 25°C

Absolute Maximum Ratings*

Symbol	Parameter	HXTR-3001[1] (T_A = 25°C)	HXTR-3101/3103[2] (T_{CASE} = 25°C)	HSMX-3131/3151[3,4] (T_A = 25°C)
V_{CBO}	Collector to Base Voltage	30 V	30 V	25 V
V_{CEO}	Collector to Emitter Voltage	20 V	18 V	15 V
V_{EBO}	Emitter to Base Voltage	1.5 V	1.5 V	1.5 V
I_C	DC Collector Current	70 mA	70 mA	70 mA
P_T	Total Device Dissipation	900 mW	600 mW	250 mW
T_J	Junction Temperature	200°C	200°C	150°C
T_{STG}	Storage Temperature	-65°C to +300°C	-65°C to +150°C	-65°C to +150°C
–	Lead Temperature (Solder-ring 10 seconds each lead)		+250°C	+260°C

*Operation in excess of any one of these conditions may result in permanent damage to this device.

Notes:
1. Power dissipation derating should include a θ_{JB} (Junction-to-Back contact thermal resistance) of 65°C/W. Total θ_{JA} (Junction to Ambient) will be dependent upon the heat sinking provided in the individual application.
2. A θ_{JC} maximum of 130°C/W should be used for derating and junction temperature calculations ($T_J = P_D \times \theta_{JC} + T_{CASE}$).
3. A θ_{JA} of 500°C C/W should be used for derating and junction temperature calculations ($T_J = P_D \times \theta_{JA} + T_A$).
4. Maximum soldering temperature is 260°C for 5 seconds.

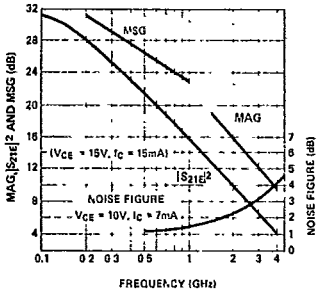


Figure 1. Typical MAG, $|S_{21E}|^2$, Maximum Stable Gain (MSG), and Noise Figure (NF_{MIN}) vs. Frequency for the HXTR-3001.

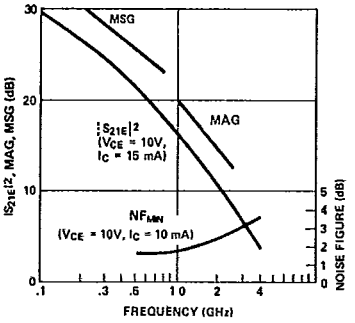


Figure 2. Typical $|S_{21E}|^2$, MAG, Maximum Stable Gain (MSG), and Noise Figure vs. Frequency for the HXTR-3101 and HXTR-3103.

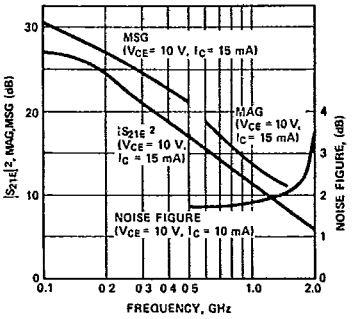


Figure 3. Typical $|S_{21E}|^2$, MAG, MSG, and Noise Figure vs. Frequency for the HSMX-3131.

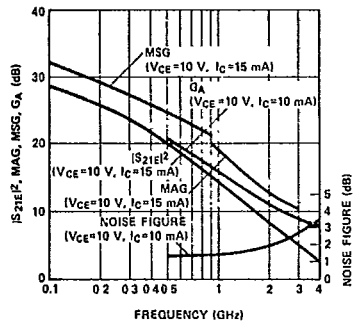


Figure 4. Typical $|S_{21E}|^2$, MAG, MSG, Noise Figure, and G_A vs. Frequency, for the HSMX-3151.

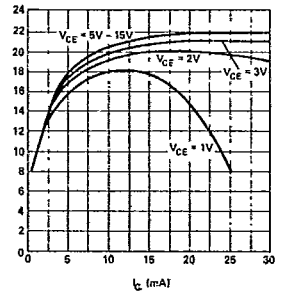


Figure 5. Typical $|S_{21E}|^2$ vs. Collector Current at 500 MHz, for the HXTR-3001.

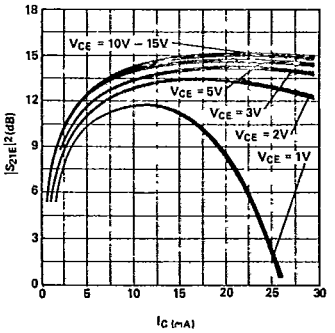


Figure 6. Typical $|S_{21E}|^2$ vs. Collector Current at 1000 MHz for the HXTR-3101 and HXTR-3103.

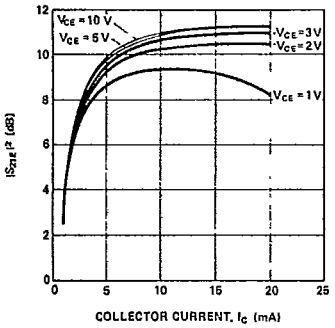


Figure 7. Typical $|S_{21E}|^2$ vs. Collector Current at 1000 MHz for the HSMX-3131.

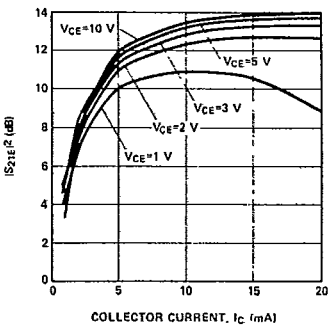


Figure 8. Typical $|S_{21E}|^2$ vs. Collector Current at 1 GHz, for the HSMX-3151.

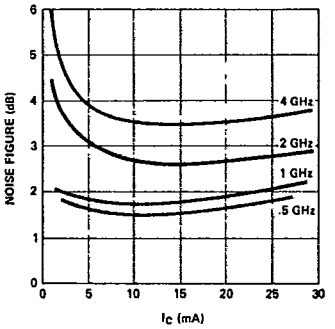


Figure 9. Typical Noise Figure vs. Collector Current (V_{CE} = 10 V), for the HXTR-3101.

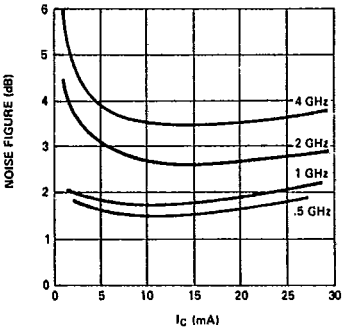


Figure 10. Typical Noise Figure vs. Collector Current for the HXTR-3103.

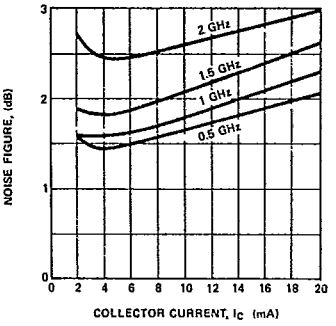


Figure 11. Typical Noise Figure vs. Collector Current (V_{CE} = 10 V) for the HSMX-3131.

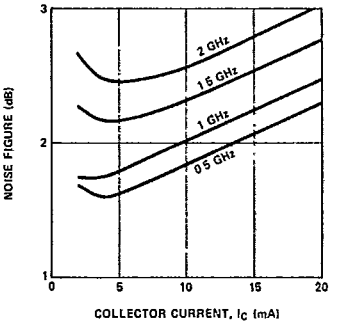


Figure 12. Typical Noise Figure vs. Collector Current, V_{CE} = 10 V, for the HSMX-3151.

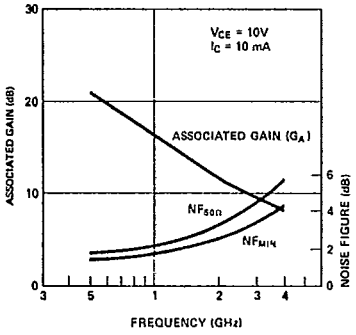


Figure 13. Typical Noise Figure vs. Frequency for the HXTR-3103.

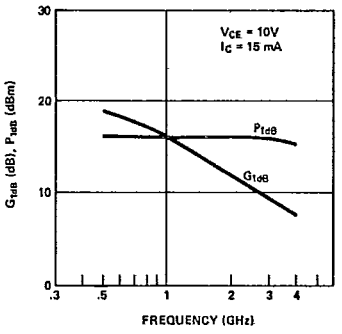


Figure 14. Typical Power Output at 1 dB Gain Compression vs. Frequency for the HXTR-3103.

Typical Noise Parameters (V_{CE} = 10 V, I_C = 10 mA)

HXTR-3103

Freq. (GHz)	NF_{MIN} (dB)	Γ_o		R_N (Ohms)
		Mag.	Angle	
0.5	1.4	0.121	96	114.4
1.0	1.7	0.301	121	15.2
2.0	2.5	0.461	173	5.2
3.0	3.3	0.553	-157	8.4
4.0	4.2	0.648	-139	13.4

HSMX-3131

Freq. (GHz)	NF_{MIN} (dB)	G_A dB	Γ_o Source		Γ_L Load		R_N (Ohms)
			Mag.	Angle	Mag.	Angle	
0.5	1.7	18.2	0.36	-10	0.36	-25	60
1.0	1.8	12.5	0.45	-130	0.20	1.09	2
1.5	2.1	9.7	0.32	31	0.30	-87	7
2.0	3.3	5.6	0.50	-171	0.96	67	10

HSMX-3151

Freq. (GHz)	NF_{MIN} (dB)	G_A dB	Γ_o Source		Γ_L Load		R_N (Ohms)
			Mag.	Angle	Mag.	Angle	
0.5	1.9	20.0	0.07	91	0.52	15	19
1.0	2.0	14.9	0.23	127	0.56	35	9
1.5	2.3	12.2	0.39	145	0.63	53	5
2.0	2.5	10.7	0.36	180	0.54	62	10

HXTR-3001 Typical Common Emitter S-Parameters (V_{CE} = 15 V, I_C = 15 mA)*

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.651	-74	30.6	34.04	146	-37.2	0.014	59	0.851	-23
200	0.714	-113	27.8	24.66	125	-33.9	0.020	43	0.659	-33
300	0.741	-132	25.3	18.41	114	-32.9	0.023	36	0.539	-36
400	0.754	-143	23.2	14.46	107	-32.3	0.024	33	0.471	-36
500	0.761	-151	21.5	11.84	102	-32.0	0.025	31	0.429	-35
600	0.765	-155	20.0	10.00	98	-31.7	0.026	32	0.405	-34
700	0.767	-159	18.7	8.63	95	-31.5	0.027	32	0.389	-34
800	0.768	-162	17.6	7.59	93	-31.2	0.028	33	0.377	-34
900	0.769	-164	16.6	6.77	91	-31.0	0.028	34	0.370	-34
1000	0.770	-166	15.7	6.11	89	-30.7	0.029	35	0.365	-34
1500	0.770	-171	12.2	4.10	81	-29.3	0.034	41	0.358	-38
2000	0.769	-174	9.8	3.06	74	-28.0	0.040	44	0.364	-43
2500	0.766	-176	7.8	2.46	69	-26.8	0.046	47	0.375	-49
3000	0.763	-177	6.2	2.05	63	-25.7	0.052	48	0.389	-55
3500	0.760	-178	4.9	1.75	58	-24.7	0.058	48	0.405	-61
4000	0.756	-179	3.7	1.53	53	-23.8	0.064	48	0.423	-66

*Values do not include any parasitic bonding inductances and were generated by use of a computer model.

RF Equivalent Circuit See page 3-7.

HXTR-3101/3103 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 10 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.70	-50	27.7	24.26	149	-36.7	0.015	60	0.90	-20
200	0.64	-86	25.6	19.05	129	-32.2	0.025	49	0.74	-31
300	0.60	-110	23.5	14.96	116	-30.4	0.030	43	0.62	-37
400	0.57	-127	21.6	12.02	108	-29.6	0.033	41	0.54	-38
500	0.56	-139	20.1	10.11	102	-28.9	0.036	41	0.49	-40
600	0.55	-149	18.7	8.61	97	-28.5	0.038	42	0.46	-40
700	0.56	-157	17.5	7.49	93	-27.9	0.040	43	0.44	-42
800	0.55	-162	16.5	6.68	89	-27.4	0.043	44	0.43	-42
900	0.55	-168	15.5	5.95	85	-26.9	0.045	46	0.41	-43
1000	0.57	-169	14.5	5.33	78	-25.7	0.052	42	0.40	-40
1500	0.57	174	11.2	3.62	63	-23.6	0.066	48	0.39	-48
2000	0.59	162	8.9	2.77	49	-21.9	0.080	48	0.39	-57
2500	0.61	153	7.2	2.28	37	-20.4	0.096	48	0.39	-71
3000	0.61	143	5.7	1.93	25	-18.8	0.115	45	0.42	-81
3500	0.65	134	4.5	1.67	13	-17.5	0.134	43	0.42	-94
4000	0.63	125	3.5	1.48	1	-16.2	0.155	39	0.47	-107

HXTR-3101/3103 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 15 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.64	-60	29.5	29.85	144	-37.6	0.013	57	0.86	-24
200	0.58	-98	26.9	22.13	124	-33.4	0.021	47	0.67	-34
300	0.56	-122	24.5	16.78	112	-31.8	0.026	44	0.55	-38
400	0.54	-138	22.4	13.18	104	-30.9	0.029	43	0.48	-39
500	0.54	-149	20.7	10.83	98	-30.1	0.031	44	0.44	-40
600	0.53	-157	19.3	9.22	94	-29.5	0.033	47	0.41	-40
700	0.54	-164	18.1	8.03	90	-28.7	0.037	49	0.39	-41
800	0.54	-168	17.1	7.16	87	-28.1	0.039	50	0.38	-41
900	0.54	-173	16.1	6.38	84	-27.4	0.043	52	0.37	-42
1000	0.56	-175	15.1	5.70	77	-26.4	0.048	49	0.36	-39
1500	0.56	171	11.8	3.86	62	-23.6	0.066	54	0.35	-47
2000	0.58	159	9.4	2.95	49	-21.6	0.083	52	0.35	-56
2500	0.61	151	7.7	2.42	38	-20.0	0.100	51	0.35	-70
3000	0.61	142	6.3	2.05	26	-18.4	0.120	47	0.38	-81
3500	0.64	133	5.0	1.78	14	-17.1	0.139	44	0.38	-94
4000	0.63	124	4.0	1.58	2	-15.9	0.160	39	0.43	-106

HSMX-3131 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 5 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.77	-31	21.6	11.95	154	-32.5	0.024	154	0.93	-14
200	0.65	-55	20.0	10.03	135	-28.1	0.039	135	0.82	-21
300	0.53	-75	18.3	8.22	121	-26.0	0.050	121	0.73	-26
400	0.45	-91	16.7	6.80	110	-24.7	0.058	110	0.66	-28
500	0.39	-104	15.2	5.74	102	-23.7	0.065	102	0.62	-29
600	0.34	-116	13.9	4.93	96	-22.8	0.072	96	0.59	-29
700	0.31	-126	12.7	4.33	90	-22.0	0.079	90	0.58	-30
800	0.29	-135	11.7	3.85	85	-21.3	0.086	85	0.56	-31
900	0.27	-144	10.8	3.45	81	-20.6	0.094	81	0.56	-33
1000	0.26	-152	10.0	3.14	77	-19.9	0.102	77	0.55	-34
1100	0.25	-159	9.2	2.89	73	-19.2	0.110	73	0.55	-35
1200	0.25	-166	8.6	2.68	70	-18.5	0.118	70	0.55	-36
1300	0.24	-172	8.0	2.50	67	-17.9	0.127	67	0.54	-38
1400	0.24	-179	7.4	2.45	64	-17.3	0.136	64	0.55	-39
1500	0.23	176	6.9	2.21	61	-16.7	0.146	61	0.55	-41
2000	0.23	148	4.8	1.73	47	-14.0	0.199	47	0.55	-49

HSMX-3131 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 10 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.62	-43	25.4	18.69	144	-33.5	0.021	71	0.86	-19
200	0.47	-70	22.9	13.91	124	-29.6	0.033	65	0.71	-25
300	0.36	-91	20.4	10.42	110	-27.3	0.043	64	0.61	-27
400	0.30	-107	18.3	8.22	102	-25.7	0.052	66	0.56	-27
500	0.26	-119	16.6	6.75	95	-24.3	0.061	67	0.53	-27
600	0.23	-130	15.1	5.72	90	-23.1	0.070	68	0.52	-28
700	0.22	-140	13.9	4.97	86	-22.0	0.079	69	0.51	-28
800	0.20	-149	12.8	4.39	81	-21.0	0.089	70	0.50	-29
900	0.19	-157	11.9	3.92	78	-20.1	0.099	70	0.50	-30
1000	0.19	-164	11.0	3.56	74	-19.3	0.109	71	0.49	-32
1100	0.18	-171	10.3	3.27	71	-18.5	0.119	71	0.49	-33
1200	0.18	-178	9.6	3.02	68	-17.8	0.129	71	0.49	-34
1300	0.18	177	9.0	2.81	65	-17.2	0.139	71	0.49	-35
1400	0.18	171	8.4	2.63	62	-16.5	0.149	71	0.50	-37
1500	0.17	165	7.9	2.47	60	-15.9	0.160	70	0.50	-39
2000	0.18	140	5.7	1.93	47	-13.3	0.215	68	0.51	-47

HSMX-3131 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 15 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.54	-51	27.0	22.50	138	-34.2	0.020	70	0.71	-21
200	0.38	-80	23.8	15.51	118	-30.4	0.030	67	0.64	-26
300	0.29	-101	21.0	11.18	105	-27.9	0.040	68	0.56	-26
400	0.24	-117	18.8	8.67	98	-26.1	0.050	70	0.52	-26
500	0.21	-129	17.0	7.06	92	-24.5	0.059	71	0.50	-25
600	0.19	-140	15.5	5.94	87	-23.2	0.070	72	0.49	-26
700	0.18	-150	14.2	5.14	83	-22.0	0.080	72	0.48	-26
800	0.17	-158	13.1	4.54	80	-20.9	0.090	73	0.48	-27
900	0.17	-166	12.2	4.05	76	-20.0	0.100	73	0.48	-29
1000	0.16	-173	11.3	3.67	73	-19.1	0.111	73	0.48	-30
1100	0.16	-179	10.5	3.36	70	-18.3	0.121	73	0.48	-31
1200	0.16	175	9.8	3.11	67	-17.6	0.132	72	0.48	-33
1300	0.16	170	9.2	2.89	64	-16.9	0.143	72	0.48	-34
1400	0.16	164	8.6	2.70	62	-16.3	0.153	71	0.48	-36
1500	0.16	159	8.1	2.54	59	-15.7	0.164	71	0.48	-37

HSMX-3151 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 5 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.73	-31	21.8	12.31	160	-34.9	0.018	71	0.96	-11
200	0.68	-59	20.7	10.89	144	-29.9	0.032	62	0.88	-19
300	0.65	-82	19.6	9.52	130	-27.7	0.041	53	0.79	-25
400	0.63	-101	18.4	8.27	120	-26.4	0.048	45	0.73	-29
500	0.61	-116	17.2	7.21	111	-25.8	0.051	41	0.67	-31
600	0.60	-127	16.0	6.30	104	-25.4	0.054	40	0.64	-33
700	0.59	-137	14.9	5.57	99	-25.0	0.056	38	0.61	-34
800	0.58	-145	13.9	4.98	93	-24.7	0.058	38	0.59	-35
900	0.58	-152	13.0	4.49	89	-24.6	0.059	37	0.57	-37
1000	0.58	-158	12.2	4.07	85	-24.3	0.061	37	0.56	-38
1100	0.58	-164	11.5	3.75	81	-24.2	0.062	38	0.55	-38
1200	0.58	-168	10.8	3.48	77	-23.9	0.064	38	0.55	-40
1300	0.58	-173	10.1	3.21	74	-24.0	0.063	38	0.55	-41
1400	0.58	-177	9.5	2.99	71	-23.7	0.065	40	0.54	-42
1500	0.58	180	9.0	2.82	68	-23.7	0.066	41	0.54	-44
2000	0.59	165	6.6	2.14	54	-22.4	0.076	47	0.54	-50
2500	0.59	152	4.7	1.72	43	-21.2	0.087	53	0.55	-57
3000	0.60	140	3.2	1.45	32	-19.6	0.105	56	0.56	-64
3500	0.61	129	2.0	1.25	22	-18.0	0.126	57	0.57	-71
4000	0.63	118	0.8	1.10	12	-16.4	0.152	56	0.58	-79

HSMX-3151 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 10 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.60	-48	26.2	20.30	153	-35.6	0.017	68	0.92	-17
200	0.56	-84	24.3	16.39	134	-31.6	0.026	56	0.78	-26
300	0.55	-110	22.5	13.26	120	-29.7	0.033	50	0.67	-32
400	0.55	-127	20.7	10.86	110	-28.8	0.036	47	0.60	-34
500	0.55	-140	19.2	9.08	102	-28.3	0.038	46	0.55	-35
600	0.55	-149	17.8	7.78	97	-27.6	0.042	45	0.52	-36
700	0.55	-156	16.6	6.78	92	-27.2	0.044	46	0.50	-37
800	0.55	-163	15.6	6.00	87	-26.7	0.046	48	0.48	-37
900	0.55	-168	14.6	5.36	84	-26.5	0.047	47	0.47	-38
1000	0.55	-172	13.7	4.86	80	-25.7	0.052	49	0.47	-39
1100	0.55	-176	12.9	4.42	77	-25.4	0.054	48	0.47	-40
1200	0.55	-180	12.3	4.11	74	-25.2	0.055	52	0.46	-42
1300	0.55	177	11.5	3.78	71	-24.5	0.059	53	0.46	-43
1400	0.55	173	10.9	3.52	68	-24.1	0.062	53	0.46	-44
1500	0.56	171	10.4	3.30	65	-23.8	0.064	55	0.46	-45
2000	0.56	158	8.0	2.50	53	-21.9	0.081	58	0.47	-52
2500	0.57	147	6.1	2.02	42	-20.2	0.098	60	0.49	-59
3000	0.57	136	4.6	1.69	32	-18.4	0.120	58	0.50	-66
3500	0.58	126	3.3	1.47	22	-17.0	0.141	58	0.51	-73
4000	0.60	115	2.2	1.29	13	-15.5	0.168	56	0.52	-81

HSMX-3151 Typical Common Emitter S-Parameters (V_{CE} = 10 V, I_C = 15 mA)

Freq. (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.53	-61	28.1	25.42	148	-36.6	0.015	64	0.88	-20
200	0.52	-101	25.7	19.21	128	-32.9	0.023	55	0.72	-29
300	0.53	-125	23.4	14.86	114	-31.2	0.028	50	0.61	-33
400	0.54	-141	21.5	11.83	105	-30.3	0.031	50	0.54	-34
500	0.54	-151	19.8	9.73	98	-29.6	0.033	50	0.50	-34
600	0.54	-159	18.4	8.28	93	-28.7	0.027	51	0.47	-35
700	0.54	-165	17.1	7.17	89	-28.1	0.039	52	0.46	-35
800	0.54	-170	16.0	6.32	85	-27.6	0.042	55	0.45	-36
900	0.54	-175	15.0	5.64	82	-27.1	0.044	55	0.44	-37
1000	0.55	-178	14.2	5.11	78	-26.2	0.049	56	0.44	-38
1100	0.55	178	13.3	4.64	75	-25.9	0.051	54	0.44	-39
1200	0.55	175	12.6	4.29	72	-25.5	0.053	58	0.43	-40
1300	0.55	172	11.9	3.94	69	-24.7	0.058	59	0.43	-41
1400	0.55	169	11.3	3.67	67	-24.3	0.061	59	0.44	-43
1500	0.55	167	10.8	3.45	64	-23.9	0.064	61	0.44	-44
2000	0.56	155	8.3	2.60	53	-21.7	0.082	63	0.45	-51
2500	0.56	145	6.4	2.10	42	-19.9	0.101	63	0.47	-58
3000	0.57	134	4.9	1.76	31	-18.1	0.124	60	0.48	-65
3500	0.58	124	3.6	1.52	22	-16.8	0.145	59	0.49	-73
4000	0.59	113	2.5	1.34	13	-15.3	0.173	57	0.51	-80

Ordering Information

See page 16-2 for information on ordering surface mount devices.

High Reliability Testing*

Two basic levels of High-Reliability testing are offered.

1. The TX suffix indicates a part that is preconditioned and screened to the program shown in Table II and III, and is marked with an orange dot.
2. The TXV suffix indicates that an internal visual inspection per MIL-STD-750 Method 2072 is included as part of the preconditioning screening and is marked with a green dot.

Group B quality conformance inspections are performed on each inspection lot in accordance with Table IVb. Group C quality conformance inspections are performed periodically at six month intervals in accordance with Table V.

Part Number System for Order and RFQ Information

Part Number Prefix	Screening Level
HXTR-3101 2N6838 (HXTR-3103)	Commercial
HXTR-3101TX 2N6838TX (HXTR-3101TX)	100% Screen (per Tables II and III)
HXTR-3101TXV 2N6838TXV (HXTR-3103TXV)	100% Screen and Internal Visual

*Please refer to MIL-S-19500 for Tables II, III, IVb, and V. High power visual performed on die prior to assembly.

100% Screen	Screened per MIL-S-19500, Table II, TX or TXV with the following specified tests and conditions:		
	HTRB Test (Screen 10)*	Delete HTRB	
	Pre Burn In Tests (Screen 11)*	All DC parameters; BV_{CBO}, BV_{CEO}, I_{CBO}, I_{CEO} and h_{FE} at 25°C, per data sheet Electrical Specifications table	
	Burn In Conditions (Screen 12)*	P_T = 300 mW, T_A = 25°C	
	Post Burn In Tests (Screen 13)*	HXTR-3101	All DC parameters; BV_{CBO}, I_{CBO}, I_{CEO}, and h_{FE} at 25°C, per data sheet Electrical Specifications table
		HXTR-3103	All DC parameters; BV_{CBO}, BV_{CEO}, I_{CBO}, I_{CEO}, and h_{FE} at 25°C, per data sheet Electrical Specifications table
Group A	Per MIL-S-19500, Table III, and the following:		
	Subgroup 2	HXTR-3101	BV_{CEO}, I_{CBO}, I_{CEO} and h_{FE} at 25°C per data sheet Electrical Specifications table
		HXTR-3103	BV_{CBO}, BV_{CEO}, I_{CBO}, I_{CEO} and h_{FE} at 25°C per data sheet Electrical Specifications table
	Subgroup 3	T_A = +150°C, I_{CBO} = 5 µA at V_{CB} = 15 V T_A = -55°C, h_{FE} = 20 minimum at I_C = 10 mA, V_{CE} = 10 V	
	Subgroup 4	HXTR-3101	Not applicable
		HXTR-3103	f_T, $\|S_{21E}\|^2$ and NF_{MIN} per data sheet Electrical Specifications table
	Subgroups 5, 6, and 7 are not applicable.		
Group B	Per MIL-S-19500, Table IVb. End point tests per Group A Subgroup 2, with the following conditions and exceptions:		
	Subgroup 3	Operating Life conditions same as 100% burn-in.	
	except Subgroup 4	SEM, done prior to assembly	
	except Subgroup 5	Thermal resistance, per MIL-STD-750 Method 3151	
Group C	Per MIL-S-19500, Table V. No exceptions. End point tests per Group A Subgroup 2, and with the following conditions:		
	Subgroup 6	Operating Life conditions same as 100% burn-in.	

*Refer to MIL-S-19500 screen numbers.