Bipolar High fT Low Voltage NPN Silicon Transistors

MP4T3243 Series

V4.00

Features

- Designed for 3-5 Volt Operation
- Useable to 6 GHz in Oscillators
- Useable for Low Noise, Low Voltage Driver Amplifiers Through 3 GHz
- Useful for Class C Amplifiers
- Available as Chips and in Hermetic and Surface Mount Packages
- Can be Screened to JANTX, JANTXV Equivalent Levels (ceramic pacakges)
- Tape and Reel Packaging Available for packaged devices.

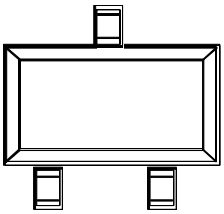
Description

The MP4T3243 series of high f_T low voltage NPN medium power silicon bipolar transistors is designed for usage in battery operated systems with 3-5 volt collector bias. They are useful as low phase noise oscillator transistors through 6 GHz and as moderate power driver amplifiers through 3 GHz.

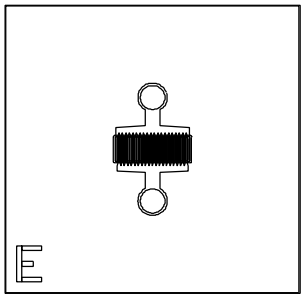
These transistors are available as chips for hybrid oscillators or in ceramic packages for military or commercial usage. Both the chips and hermetic packages can be screened to JANTX equivalent levels.

These transistors use high temperature gold, platinum, titanium metalization with silicon dioxide and silicon nitride passivation. The chip is emitter ballasted with polysilicon resistors to prevent current concentration at high current operation.

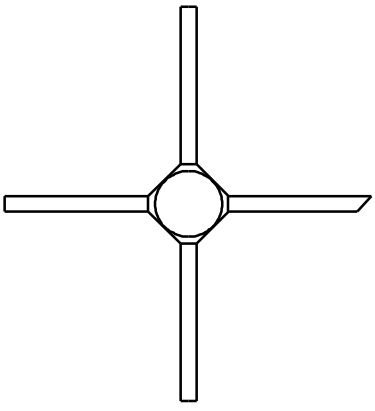
Case Style



SOT-23



Chip



Micro-X

M-Pulse Microwave
576 Charcot Avemue, San Jose, California 95131

Tel (408) 432-1480 Fax (408)) 432-3440

Maximum Ratings

Parameter	Symbol	Unit	MP4T324300 Chip	MP4T324333 SOT-23	MP4T324335 Micro-X
Collector-Base Voltage[1]	V_{CBO}	Volts	8	8	8
Collector-Emitter Voltage[1]	V_{CE}	Volts	6	6	6
Emitter-Base Voltage[1]	V_{EB}	Volts	1.5	1.5	1.5
Collector Current[1]	I_C	mA	110	110	110
Junction Temperature	T_j	°C	200	125	200
Storage Temperature	T_{STG}	°C	-65 to +175°C	-65 to +125°C	-65 to +175°C
Power Dissipation[1,3]	P_T	mW	600	250	400
Operating Temperature[2]	T_{CP}	°C	150	125	150

1. At 25°C case temperature (packaged transistors) or 25°C mounting surface temperature (chip transistors).
2. Case or bonding surface temperature. Derate maximum power dissipation rating linearly to zero watts at maximum operating temperature.
3. The thermal resistance of the MP4T324300 junction/case is 50°C/watt nominal.

Electrical Specifications @ +25°C

Parameter	Condition	Symbol	Units	MP4T324300 Chip	MP4T324333 SOT-23	MP4T324335 Micro-X
Gain Bandwidth Product	V_{CE} = 3 volts I_C = 50 mA	f_T	GHz	6 typ	6 typ	6 typ
Insertion Power Gain	V_{CE} = 3 volts I_C = 40 mA f = 1 GHz f = 2 GHz	$\|S_{21E}\|^2$	dB	 7 min 3 typ	 6 min 2.5 typ	 7 min 3 typ
Noise Figure	V_{CE} = 3 volts I_C = 10 mA f = 1 GHz	NF	dB	 2.2 max	 2.4 max	 2.2 max
Unilateral Gain	V_{CE} = 3 volts I_C = 40 mA f = 1 GHz f = 2 GHz	GTU (max)	dB	 10 typ 6 typ	 9 typ 4 typ	 10 typ 6 typ
Maximum Available Gain	V_{CE} = 3 volts I_C = 40 mA f = 2 GHz	MAG	dB	 8.5 typ	 7 typ	 8.5 typ
Power Out at 1 dB Compression	V_{CE} = 3 volts I_C = 50 mA f = 2 GHz f = 3 GHz	P_{1dB}	dBm	 20 typ 15 typ	 19 typ 15 typ	 20 typ 15 typ

M-Pulse Microwave
576 Charcot Avemue, San Jose, California 95131
Tel (408) 432-1480 Fax (408)) 432-3440

Electrical Specifications @ +25°C

MP4T3243 Series

Parameter	Condition	Symbol	Min	Typical	Max	Units
Collector Cut-off Current	V_{CB} = 4 volts I_E = 0 µA	I_{CBO}	—	—	10	µA
Emitter Cut-off Current	V_{EB} = 1 volt I_C = 0 µA	I_{EBO}	—	—	1	µA
Forward Current Gain	V_{CE} = 3 volts I_C = 20 mA	h_{FE}	20	125	250	—
Collector Base Junction Capacitance	V_{CB} = 3 volts I_E = 0 µA f = 1 MHz	C_{OB}	—	0.8	1.0	pF

Typical Scattering Parameters in the MIcro-X Package

MP4T324335

V_{CE} = 3 Volts, I_C = 10 mA

Frequency	S_{11E}		S_{21E}		S_{12E}		S_{22E}	
(MHz)	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
1000	0.647	172	2.480	73.2	0.137	51.4	0.311	-165.8
2000	0.666	149	1.408	51.2	0.225	49.0	0.365	172.5
3000	0.694	128	1.135	34.1	0.336	43.8	0.366	156.0
4000	0.714	109	1.005	17.3	0.427	32.1	0.412	142.1
5000	0.748	90	0.948	4.0	0.507	22.8	0.453	127.2
6000	0.772	70	0.930	-9.1	0.605	11.8	0.499	111.9

MP4T324335

V_{CE} = 3 Volts, I_C = 20 mA

Frequency	S_{11E}		S_{21E}		S_{12E}		S_{22E}	
(MHz)	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
1000	0.661	168	2.632	73.3	0.137	60.8	0.373	178.5
2000	0.677	146	1.493	53.1	0.238	53.0	0.421	161.3
3000	0.697	125	1.210	36.5	0.359	44.8	0.415	144.6
4000	0.715	107	1.067	19.3	0.451	31.0	0.450	130.3
5000	0.744	89	1.007	5.4	0.525	20.7	0.480	115.5
6000	0.762	69	0.990	-8.5	0.619	9.1	0.510	101.6

M-Pulse Microwave
576 Charcot Avemue, San Jose, California 95131

Tel (408) 432-1480 Fax (408)) 432-3440

Typical Scattering Parameters in the Micro-X Package (Cont'd)

MP4T324335

V_{CE} = 3 Volts, I_C = 40 mA

Frequency	S_{11E}		S_{21E}		S_{12E}		S_{22E}	
(MHz)	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
1000	0.675	164	2.678	73.3	0.139	66.2	0.424	176.6
2000	0.692	143	1.528	54.1	0.244	55.0	0.470	158.6
3000	0.707	121	1.230	37.7	0.368	45.9	0.455	141.6
4000	0.719	104	1.095	20.8	0.463	31.5	0.481	128.1
5000	0.749	86	1.035	6.5	0.537	20.4	0.504	113.3
6000	0.763	66	1.017	-7.8	0.629	8.4	0.523	99.2

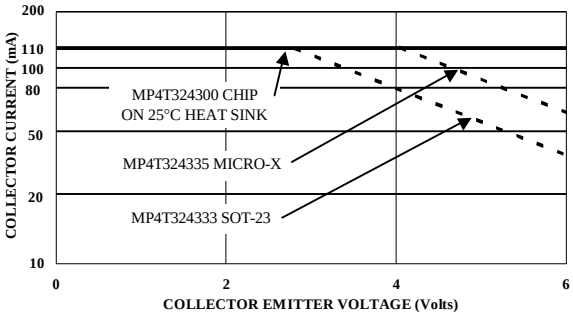
MP4T324335

V_{CE} = 3 Volts, I_C = 60 mA

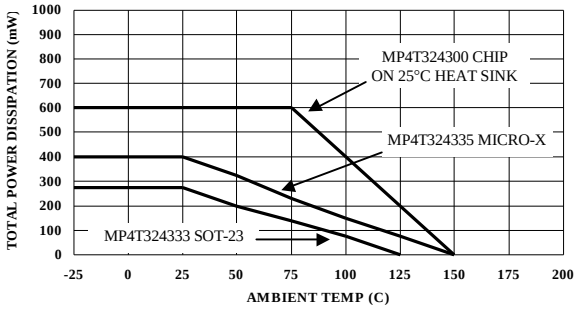
Frequency	S_{11E}		S_{21E}		S_{12E}		S_{22E}	
(MHz)	Mag.	Angle	Mag.	Angle	Mag.	Angle	Mag	Angle
1000	0.685	164	2.678	73.1	0.140	68.1	0.446	173.9
2000	0.698	143	1.528	54.2	0.251	56.1	0.492	156.8
3000	0.719	122	1.245	37.7	0.380	45.6	0.480	139.4
4000	0.727	104	1.103	20.7	0.474	31.0	0.502	125.4
5000	0.754	86	1.045	6.5	0.549	19.8	0.520	110.6
6000	0.767	67	1.025	-7.9	0.641	7.4	0.540	96.0

Typical Performance Curves

DC SAFE OPERATING RANGE at 25℃



NOMINAL POWER DERATING CURVES

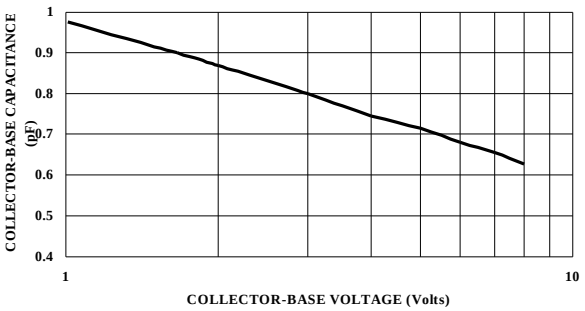


M-Pulse Microwave
576 Charcot Avemue, San Jose, California 95131

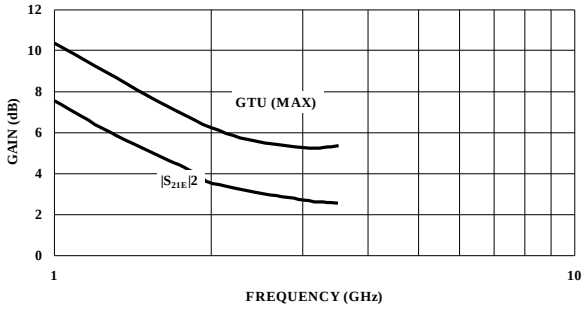
Tel (408) 432-1480 Fax (408)) 432-3440

Typical Performance Curves (Cont'd)

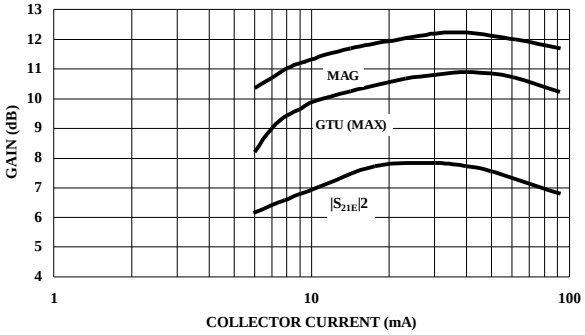
NOMINAL COLLECTOR-BASE CAPACITANCE (C_{OB}) vs COLLECTOR-BASE VOLTAGE (MP4T324335)



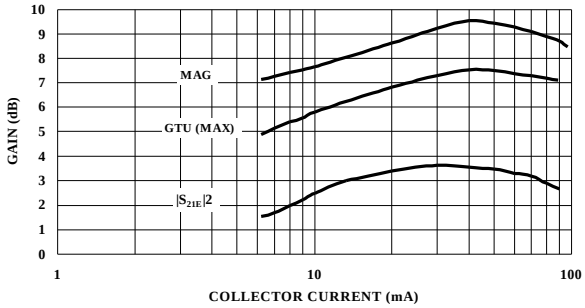
NOMINAL GAIN vs FREQUENCY at V_{CE} = 3 VOLTS AND I_C = 20 mA (MP4T324335)



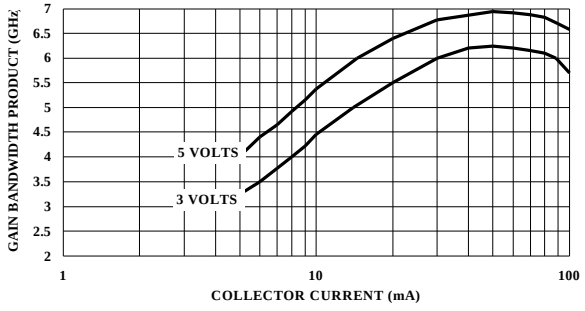
NOMINAL GAIN vs COLLECTOR CURRENT at f=1 GHz and V_{CE} = 3 VOLTS (MP4T324335)



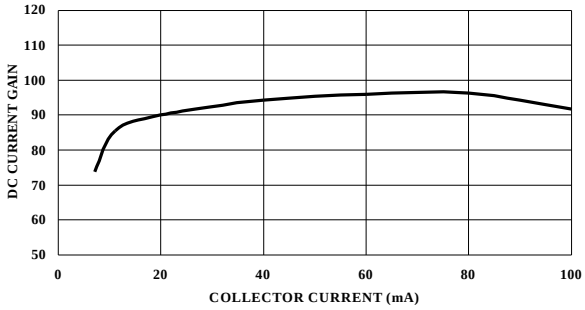
NOMINAL GAIN vs COLLECTOR CURRENT AT f=2 GHz and V_{CE} = 3 VOLTS (MP4T324335)



NOMINAL GAIN BANDWIDTH PRODUCT (f_T) vs COLLECTOR CURRENT at V_{CE} = 3 and 5 VOLTS (MP4T324335)



NOMINAL DC CURRENT GAIN (h_{FE}) vs COLLECTOR CURRENT at V_{CE} = 3 VOLTS (MP4T324335)

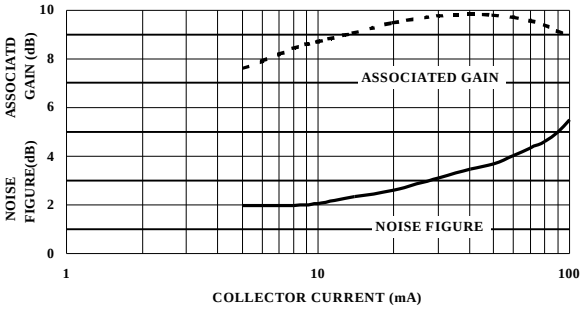


M-Pulse Microwave
576 Charcot Avemue, San Jose, California 95131

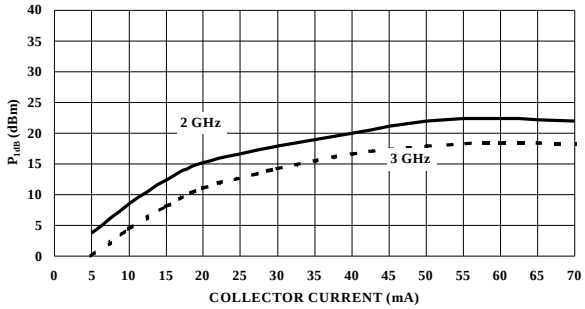
Tel (408) 432-1480 Fax (408)) 432-3440

Typical Performance Curves (Cont'd)

NOMINAL NOISE FIGURE and ASSOCIATED GAIN at 1 GHz at V_{CE} = 3 VOLTS vs COLLECTOR CURRENT in mA (MP4T324335)

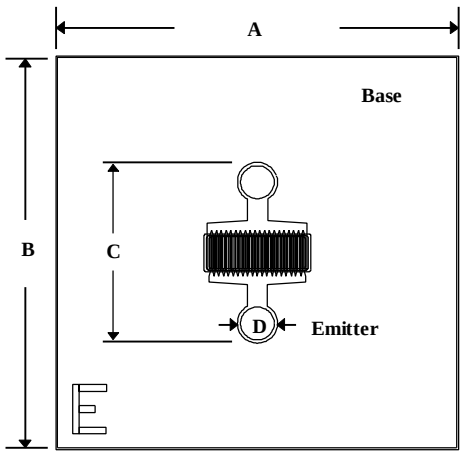


NOMINAL OUTPUT POWER at the 1 dB COMPRESSION POINT vs COLLECTOR CURRENT at f = 2 and 3 GHz and V_{CE} = 3 VOLTS (MP4T324335)



Case Styles

MP4T324300 (Chip)



MP4T324300

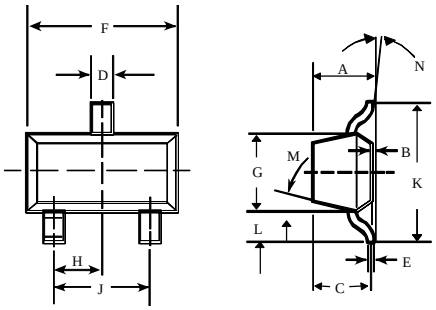
NOMINAL DIM.	INCHES	MILLIMETERS
A	0.013	0.330
B	0.013	0.330
C	0.005	0.127
D (Dia.)	0.002	0.050
E (Chip Thickness)	0.0045	0.114

M-Pulse Microwave
576 Charcot Avemue, San Jose, California 95131

Tel (408) 432-1480 Fax (408)) 432-3440

Case Styles (Cont'd)

MP4T324333 (SOT-23)



MP4T324333

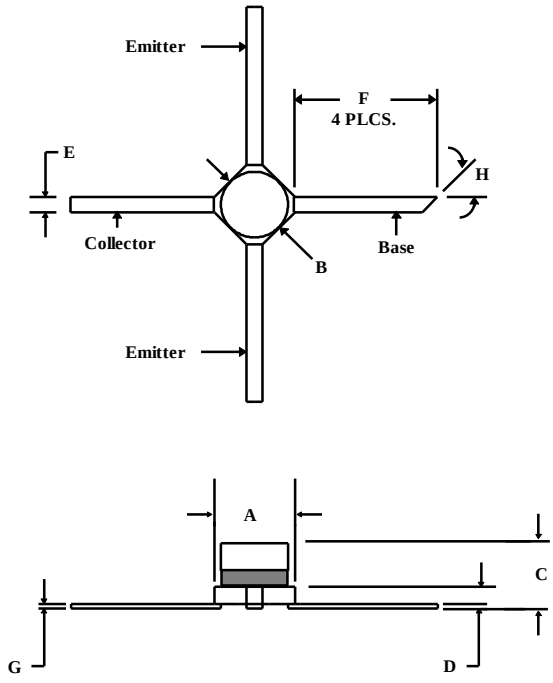
DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	—	0.044	—	1.12
B	—	0.004	—	0.10
C	—	0.040	—	1.00
D	0.013	0.020	0.33	0.50
E	0.003	0.006	0.08	0.15
F	0.110	0.119	2.80	3.00
G	0.047	0.056	1.20	1.40
H	0.037 typical		0.95 typical	
J	0.075 typical		1.90 typical	
K	—	0.103	—	2.60
L	—	0.024	—	0.60

DIM.	GRADIENT
M	10° max. [1]
N	2° . . . 30°

Note:

1. Applicable on all sides.

MP4T324335 (Micro-X)



MP4T324335

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.092	0.108	2.34	2.74
B	0.079	0.087	2.01	2.21
C	—	0.070	—	1.78
D	0.019	0.025	0.48	0.64
E	0.018	0.022	0.46	0.56
F	0.150	—	3.81	—
G	0.003	0.006	0.08	0.15
H	45°		45°	

M-Pulse Microwave
576 Charcot Avemue, San Jose, California 95131

Tel (408) 432-1480 Fax (408)) 432-3440