

Surface Mount Devices

National Semiconductor

Surface Mount Transistors

General Purpose Amplifiers and Switches—NPN

Type No.	Case Style	V _{CE0} (V) Min	V _{CE0} (V) Max	V _{EB0} (V) Min	I _{CB0} (nA) @ V _{CB} Max	h _{FE} @ I _C & V _{CE} Min Max	V _{BE(SAT)} (V) Max	V _{BE(SAT)} (V) Min	I _C (mA) @ V _{BE(SAT)} Max	C _{ob} (pF) Max	f _T (MHz) Min Max	I _C (mA) @ V _{BE(SAT)} Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
MMBT 100	TO-236 (49)	75	45	6	50	80 100 100 100	0.1 450 10 1	0.2	0.85 10 200	4.5	250 20	20		4	(Note 1)	10
MMBT 100A	TO-236 (49)	75	45	6	50	300 100 220	10 100 0.1	0.2	0.85 10 200	4.5	250 20	20		4	(Note 1)	10
MMBT 101	TO-236 (49)	75	45	6	50	60 75 50	0.1 375 100	0.2	0.85 10 200	4.5	250 20	20		4	(Note 1)	10
MMBT 2218	TO-236 (49)	60	30	6	10	20 20 40 35 25 20	500 150 150 10 10 0.1	0.4	1.3 150 500	8	250 20	20				10
MMBT 2218A	TO-236 (49)	75	40	6	10	25 20 40 35 25 20	500 150 150 10 10 0.1	0.3	0.6 12 150	8	250 20	20	285		(Note 7)	10
MMBT 2219	TO-236 (49)	60	30	5	10	30 50 100 75 50 35	500 150 300 150 10 0.1	0.4	1.3 150 500	8	300 20	20				10

Surface Mount Transistors

General Purpose Amplifiers and Switches—NPN (Continued)

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MMBT 2219A	TO-236 (49)	75	40	6	60	10	60	10	40 500 50 150 100 300 75 10 50 1 35 0.1	0.6	1.2	150	8	300 20	285		(Note 2)	10
MMBT 2221	TO-236 (49)	60	30	5	50	10	50	10	20 500 20 150 40 120 35 10 25 1 20 0.1	0.4	1.3	150	8	250 20				10
MMBT 2221A	TO-236 (49)	75	40	6	60	10	60	10	25 500 40 120 35 10 25 1 20 0.1	0.3	1.2	150	8	300 20	285		(Note 2)	10
MMBT 2222	TO-236 (49)	60	30	5	50	10	50	10	35 500 50 150 75 10 100 300 30 500 50 150	0.4	1.2	150	8	250 20				10*
MMBT 2222A	TO-236 (49)	75	40	6	60	10	60	10	35 500 50 150 75 10 100 300 40 500 50 150	0.3	1.2	150	8	300 20		4	(Note 3)	10

Surface Mount Devices

General Purpose Amplifiers and Switches—NPN (Continued)

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MMBT 2484	TO-236 (49)	60	5	10 45	250 800 1 5 5	0.35	1		6			3	(Note 13)	10
MMBT 2924	TO-236 (49)	25	5	100 25	150 300 2 10				10					10
MMBT 3392	TO-236 (49)	25	5	100 18	150 300 2 4.5				10					10
MMBT 3393	TO-226 (49)	25	5	100 18	90 180 2 4.5				10					10
MMBT 3414	TO-226 (49)	25	5	100 25	75 225 2 4.5	0.3	0.6 1.3 50							10
MMBT 3415	TO-226 (49)	25	5	100 25	180 540 2 4.5	0.3	0.6 1.3 50							10
MMBT 3416	TO-226 (49)	50	5	100 25	75 225 2 4.5	0.3	0.6 1.3 50							10
MMBT 3417	TO-226 (49)	50	5	100 25	180 540 2 4.5	0.3	0.6 1.3 50							10
MMBT 3566	TO-226 (49)	40	5	50 20	150 600 10 10 80 2 10	1.0		100 25	40 30					10
MMBT 3641	TO-226 (49)	60	5	50* 50	15 500 10 40 120 150 10	0.22		150 8	250 50					10
MMBT 3642	TO-226 (49)	60	5	50* 50	15 500 10 40 120 150 10	0.22		150 8	250 50					10
MMBT 3643	TO-226 (49)	60	5	50* 50	20 500 10 100 300 150 10	0.22		150 8	250 50					10

T-35-01

Surface Mount Transistors

General Purpose Amplifiers and Switches—NPN (Continued)

Type No.	Case Style	V _{CE0} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CBO} (nA) Max	I _{CB0} V _{CB} (nA) (V) Max	h _{FE} @ I _C & V _{CE} Min Max (mA) (V)	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min Max	I _C (mA) Min Max	C _{ob} (pF) Max	f _T (MHz) Min Max	I _C (mA) Min Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
MMBT 5128	TO-236 (49)	15	12	3	50	10	35 350 20 10	0.25	1.1	150	10	150 800	50				10
MMBT 5135	TO-236 (49)	30	25	4	300	15	50 600 15 2 10	1.0	1.0	150	35	40 300	50				10
MMBT 5136	TO-236 (49)	30	20	3	100	20	20 400 20 30 1	0.25	1.0	150	35	40 400	50				10
MMBT 5137	TO-236 (49)	30	20	3	100	20	20 400 20 30 1	0.25	1.1	150	35	40 400	50				10
MMBT 5172	TO-236 (49)	25	25	5	100	25	100 500 10 10	0.25		10	10						10
MMBT 5223	TO-236 (49)	25	20	3	100	10	50 800 2 10	0.7	1.2	10	4	150	10				10
MMBT 6515	TO-236 (49)	40	25	4	50	30	250 500 150 100 10	0.5		5.0	3.5						10
MMBT 6520	TO-236 (49)	40	25	4	50	30	200 400 100 0.1 10	0.5		50	3.5				3	(Note 10)	10
MMBT 6521	TO-236 (49)	40	25	4	50	30	300 600 150 0.1 10	0.5			3.5				3	(Note 10)	10
MMBT A20	TO-236 (49)		40	4	100	30	40 400 5 10	0.25		10	4	125	5				10

6-21

Surface Mount Devices

6

Surface Mount Transistors

General Purpose Amplifiers and Switches—NPN (Continued)

Type No.	Case Style	V _{CE0} (V) Min	V _{CE0} (V) Max	V _{EB0} (V) Min	V _{EB0} (V) Max	I _{CB0} (nA) Max	V _{CB} (V) Max	h _{FE} Min	I _C & V _{CE} (mA) (V) Min Max	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min Max	I _C (mA) Min Max	C _{ob} (pF) Max	f _T (MHz) Min Max	I _C (mA) Min Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
MMBT 4400	TO-236 (49)	60	40	6				20 40	1 10	0.4 0.75	0.95 1.2	150 500	6.5						13
MMBT 4401	TO-236 (49)	60	40	6				20 40 80 100 40	0.1 1 10 150 500	0.4 0.75	0.95 1.2	150 500	6.5	250	20				13
MMBT L01	TO-236 (49)	140	120	5		100	75	50	300	0.2 0.3	1.2 1.4	10 50	8	60	10				16
MMBT 5551	TO-236 (49)	180	160	6		50	120	80 30	250 50	0.15 0.20		10 50	6	100 300	10				16
MMBT 5830	TO-236 (49)	120	100	5		50	100	60 80 80	1 10 50	0.15 0.2 0.25	0.8 1.0 1.0	1 10 50	4	100 500	10				16
MMBT 5831	TO-236 (49)	160	140	5		50	100	60 80 80	1 250 50	0.15 0.2 0.25	0.8 1.0 1.0	1 10 50	4	100 500	10				16
MMBT 5833	TO-236 (49)	200	180	6		10	160	50 50 50	1 250 50	0.15 0.2 0.25	0.8 1.0 1.0	1 10 50	4	100 500	10				16
MMBT 5965	TO-236 (49)	200	180	5		50	160	50 50 50	1 250 50	0.15 0.2 0.25	0.8 1.0 1.0	1 10 50	4	100 500	10				16

Surface Mount Transistors

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MMBT 3693	TO-236 (49)	45	45	4	50	30				6	200	500	10			23
MMBT 3694	TO-236 (49)	45	45	4	50	30				6	200	500	10			23
MMBT 3903	TO-236 (49)	60	40	6			0.2	0.65	0.85	10	4	250	10		6 (Note 8)	23
MMBT 3904	TO-236 (49)	60	40	6			0.3	0.95	50	4	300	10			5 (Note 8)	23
MMBT 3946	TO-236 (49)	60	40	6			0.2	0.65	0.9	10	4	250	10		(Notes 6, 7)	23
MMBT 4123	TO-236 (49)	40	30	5	50	20	0.3	1.0	50	4	250	10			(Note 7)	23
MMBT 4124	TO-236 (49)	30	25	5	50	20	0.3	0.95	50	4	300	10			(Note 7)	23
MMBT 6514	TO-236 (49)	40	25	4	50	30	0.5		50	3.5						23

TEST CONDITIONS:

Note 1: I_C = 300 mA, V_{CC} = 10V, I_B = I_E = I_C = 30 mA
 Note 2: I_C = 150 mA, V_{CC} = 6V, I_B = I_E = I_C = 15 mA
 Note 3: I_C = 300 mA, V_{CC} = 15V, I_B = I_E = I_C = 30 mA
 Note 4: I_C = 300 mA, V_{CC} = 30V, I_B = I_E = I_C = 30 mA
 Note 5: I_C = 10 mA, V_{CC} = 3V, I_B = I_E = I_C = 1 mA
 Note 6: I_C = 100 mA, V_{CE} = 5V, f = 100 Hz
 Note 7: I_C = 30 mA, V_{CE} = 5V, f = 1 kHz
 Note 8: I_C = 100 mA, V_{CE} = 5V, f = 1 kHz

Note 9: I_C = 250 mA, V_{CE} = 5V, f = 1 kHz
 Note 10: I_C = 10 mA, V_{CE} = 5V, f = 1 kHz
 Note 11: I_C = 50 mA, V_{CC} = 30V, I_B = I_E = I_C = 5 mA
 Note 12: I_C = 150 mA, V_{CC} = 30V, I_B = I_E = I_C = 15 mA
 Note 13: I_C = 50 mA, V_{CC} = 10V, I_B = I_E = I_C = 5 mA
 Note 14: I_C = 500 mA, V_{CC} = 30V, I_B = I_E = I_C = 50 mA
 Note 15: I_C = 100 mA, V_{CE} = 10V, f = 1 kHz
 Note 16: I_C = 200 mA, V_{CE} = 5V, f = 1 kHz

Note 17: I_C/I_B = 40
 Note 18: I_C/I_B = 20
 Note 19: I_C = 250 mA, V_{CE} = 5V, f = 10 Hz - 10 kHz
 Note 20: I_C = 250 mA, V_{CE} = 5V, f = 100 Hz
 Note 21: I_C = 30 mA, V_{CE} = 5V, f = 1 kHz
 Note 22: I_C = 250 mA, V_{CE} = 5V, f = 10 kHz
 Note 23: I_C = 1 mA, V_{CE} = 10V, f = 1 MHz

T-35-01

Surface Mount Devices

6