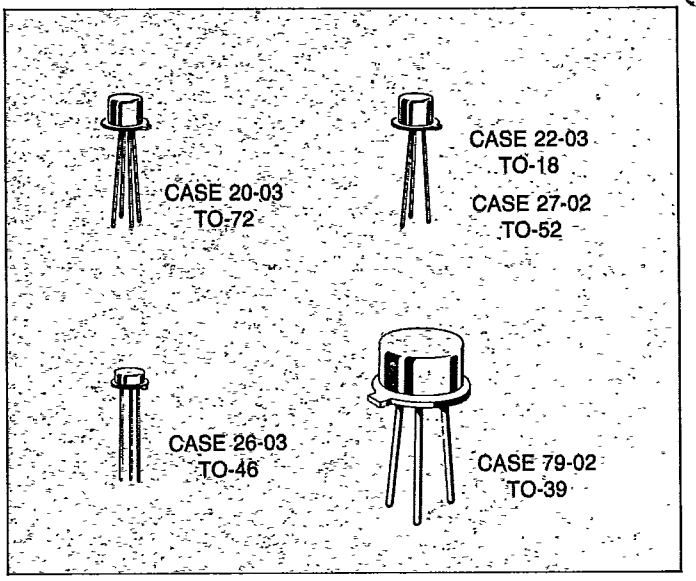
Low Frequency — Small-Signal Metal



Motorola Small-Signal Metal Can Transistors are designed for use as General-Purpose Amplifiers, High-Speed Switches, High-Voltage Amplifiers, Low-Level/Low-Noise Amplifiers, High-Frequency Oscillators, Choppers, and Darlingtons. These devices are manufactured in a variety of packages, i.e., TO-18, TO-39, TO-46, TO-52, and TO-72.

The following selector guide tables also indicate metal can transistors which are qualified to MIL-19500 high-rel requirements. Devices are available in the JAN, JANTX, JANTXV and JANS versions as specified.

Switching Transistors

Devices are designed for general-purpose switching and amplifier applications, listed in order of decreasing turn-on time (t_{on}).

Package	Device	t_{on} ns & Max	t_{off} ns Max	@ I_C mA	$V_{(BR)CEO}$ Volts Min	I_C mA Max	h_{FE} @ Min	@ I_C mA	$V_{CE(sat)}$ Volts Max	@ I_C mA	@ I_B mA	f_T MHz Min	@ I_C mA
NPN													
TO-18	2N2540	40	40	150	30		100	150	0.45	150	15	250	20
	2N914**	40	40	200	15	150	12	10	0.7	200	20	300	20
	2N706*	40	75		15	50	20	10	0.6	10	1.0	200	10
	2N708*	40	70		15		30	10	0.4	10	1.0	300	10
	2N4014	35	60	500	50	1000	35	500	0.52	500	50	300	50
	2N4013	35	60	500	30	1000	35	500	0.42	500	50	300	50
	2N2501	15	25	300	20		10	500	0.3	50	5.0	350	10
	2N2369	12	18	100	15	500	20	100	0.25	10	1.0	500	10
	2N2369A†	12	18	10	15	200	40	10	0.2	10	1.0	500	10
	2N3227**	12	18	100	20	50	30	100	0.25	10	1.0	500	10
TO-39	2N3444**	50	70	500	50		20	500	0.6	500	50	175	50
	2N3253**	50	70	500	40		25	500	0.6	500	50	175	50
	2N3735#	48	60	1000	50	1500	20	1000	0.5	500	50	250	50
	2N3734	48	60	1000	50	1500	30	1000	0.5	500	50	250	50
	2N3252	45	70	500	30		30	500	0.5	500	50	200	50
	2N3506#	45	90	1500	40	3000	40	1500	1.0	1500	150	60	100
	2N3507#	45	90	1500	50	3000	30	1500	1.0	1500	150	60	100
	2N3725	35	60	500	50	2000	35	500	0.52	500	50	300	50
	2N3725A	35	60	500	30	1200	35	500	0.52	500	50	300	50
	2N3724	35	60	500	30	2000	35	500	0.42	500	50	300	50
	2N3724A	35	60	500	30	1200	35	500	0.42	500	50	300	50
	MM5262	30	60	1000	50	2000	25	1000	0.8	1000	100	350(typ)	50
	2N5861	25	60	500	50	2000	25	500	0.5	500	50	200	50
	2N3303	15	25	1000	—	1000	20	10	0.7	1000	100	450	100

*JAN available **JAN/JANTX available #JAN/JANTX/JANTXV available †JAN/JANTX/JANTXV/JANS available (continued)

Switching Transistors (continued)

Package	Device	t_{on} ns & t_{off} ns Max	@ I_C mA	$V_{(BR)CEO}$ Volts Min	I_C mA Max	h_{FE} @ I_C mA Min	$V_{CE(sat)}$ Volts @ I_C mA @ I_B mA Max	f_T MHz @ I_C mA Min
NPN (continued)								
TO-46	2N3736	48 60	1000	30	1500	30 1000	0.5 500 50	250 50
	2N3737#	48 60	1000	50	1500	20 1000	0.5 500 50	250 50
	2N3647#	20 25	150	10	500	25 150	0.4 150 15	350 15
	2N3648	16 18	150	15	500	30 150	0.4 150 15	450 15
	2N3508	12 18	10	20	500	40 10	0.25 10 1.0	500 10
	2N3509	12 18	10	20	500	100 10	0.25 10 1.0	500 10
TO-52	MM1748	6.0 15	10	—	150	20 10	— — —	600 5.0
	MM1748A	10 15	10	—	150	20 10	— — —	600 5.0
	2N3014	16 25	300	20	200	30 30	0.18 30 3.0	350 30
	2N3013**	15 25	300	0.5	200	30 30	0.18 30 3.0	350 30
PNP								
TO-18	2N2894	60 90	30	12	200	40 30	0.2 30 3.0	400 30
	2N869A**	50 80	30	18	200	40 30	0.2 30 3.0	400 10
	2N3546	40 30	50	12		25 50	0.25 50 5.0	700 10
	2N4208	15 20	10	12	200	30 10	0.15 10 1.0	700 10
	MM4258	15 20	10	12	80	30 10	0.15 10 1.0	700 10
	2N4209	15 20	10	15	50	40 50	0.6 50 5.0	850 10
TO-39	2N3634#	400 600	50	140	1000	50 50	0.5 50 5.0	150 30
	2N3635#	400 600	50	140	1000	100 50	0.5 50 5.0	200 30
	2N3636#	400 600	50	175	1000	50 50	0.5 50 5.0	150 30
	2N4030	100 240(typ)	500	60	1000	15 1000	1.0 1000 100	100 50
	2N4031	100 240(typ)	500	80	1000	10 1000	0.5 500 50	100 50
	2N4032	100 240(typ)	500	60	1000	40 1000	1.0 1000 100	150 50
	2N4033#	100 240(typ)	500	80	1000	25 1000	0.5 500 50	150 50
	2N4406	75 225	1000	80	1500	20 1000	0.7 1000 100	150 50
	2N4407	75 225	1000	80	1500	30 1000	0.7 1000 100	150 50
	2N3245	55 165	500	50	1000	30 500	0.6 500 50	150 50
	2N3244	50 185	500	40	1000	50 500	0.5 500 50	175 50
	2N3467#	40 90	500	40	100	40 500	0.5 500 50	175 50
	2N3468#	40 90	500	50	1000	25 500	0.6 500 50	150 50
	2N3762#	43 115	1000	40	1500	30 1000	0.9 1000 100	180 50
	2N3763#	43 115	1000	60	1500	20 1000	0.9 1000 100	150 50
	2N4404	40 210	500	80	1000	30 500	0.5 500 50	200 50
	2N4405#	40 210	500	80	1000	50 500	0.5 500 50	200 50
	2N5022	40 90	500	—	500	25 1000	0.8 1000 100	170 50
	2N5023	40 90	500	—	500	40 1000	0.7 1000 100	200 50
TO-46	2N4453**	50 80	30	18	200	40 30	0.25 30 1.5	400 10
	2N3765#	12 115	1000	60	1500	40 150	0.9 1000 100	
	2N3764#	12 115	1000	40	1500	40 150	0.9 1000 100	

High-Gain Low-Noise Transistors

Devices are designed for high-gain and low-noise applications, listed in decreasing order of NF.

Package	Device	NF Wideband Typ* Max dB	$V_{(BR)CEO}$ Volts Min	I_C mA Max	h_{FE} Min	h_{FE} Max @ I_C µA mA	f_T MHz @ I_C mA Min
NPN							
TO-18	2N2484#	8.0*	60	50	100	500 10	15 0.05
	2N930A	3.0	45	30	100	300 10	45 0.5
	2N930**	3.0	45	30	100	300 10	30 0.5

*JAN available **JAN/JANTX available #JAN/JANTX/JANTXV available †JAN/JANTX/JANTXV/JANS available

High-Gain Low-Noise Transistors (continued)

Package	Device	NF Wideband Typ* Max dB	$V_{(BR)CEO}$ Volts Min	I_C mA Max	h_{FE} Min	h_{FE} Max	@ I_C μA mA	f_T MHz Min	@ I_C mA
PNP									
TO-18	2N3962	10	60	200	100	450	1.0	40	0.5
	2N3963	10	80	200	100	450	1.0	40	0.5
	2N3965	8.0	60	200	250	600	1.0	50	0.5
	2N3964	4.0	45	200	250	600	1.0	50	0.5
	2N3798	3.5	60	50	150	450	500	30	0.5
	2N3799	2.5	60	50	300	900	500	30	0.5
TO-46	2N2604	4.0	45	0	40	120	0.01	30	0.5
	2N2605#	4.0	45	30	100	300	0.01	30	0.5

High-Frequency Amplifiers/Oscillators

UHF, VHF

Devices are listed in decreasing order of $V_{(BR)CEO}$.

Package	Device	$V_{(BR)CEO}$ Volts Min	h_{FE} Min	@ I_C mA	G_{pe} dB Min	NF dB Max	@ f MHz	f_T MHz Min	@ I_C mA	C_{obo} pF Max
NPN										
TO-18	MM1941	20	25	10	7.0	—	—	600	10	2.5
TO-72	2N918†	15	20	3.0	15	6.0	60	600	4.0	1.7
PNP										
TO-18	2N3307	35	40	2.0	17	4.5	200	300	2.0	1.3
TO-72	2N4261#	15	30	10	—	—	—	1600	10	2.5
	2N4260	15	30	10	—	—	—	2000	10	2.5

High-Voltage/High-Current Amplifiers

Standard devices with high Collector-Emitter Breakdown Voltage, listed in decreasing order of $V_{(BR)CEO}$ within each package type.

Package	Device	$V_{(BR)CEO}$ Volts Min	I_C mA Max	h_{FE} Min	@ I_C mA	$V_{CE(sat)}$ Volts Max	@ I_C mA	& I_B mA	f_T MHz Min	@ I_C mA
NPN										
TO-18	2N6431	300	50	50	30	0.5	20	2.0	50	10
	2N6430	200	50	50	30	0.5	20	2.0	50	10
TO-39	MM8520	500	1000	15	10	1.5	10	2.0	5.0	10
	2N3439#	350	1000	40	20	0.5	50	4.0	15	10
	MM421	325	1000	25	30	5.0	30	3.0	15	10
	2N3742	300	50	20	30	1.0	30	3.0	30	10
	2N5058	300	150	35	30	1.0	30	3.0	30	10
	MM420	250	1000	25	30	5.0	30	3.0	15	10
	2N3440#	250	1000	40	20	0.5	50	4.0	15	10
	MM3003	250	50	20	10				150	10
	2N4927	250	50	20	30	2.0	30	3.0	30	10
	2N5059	250	150	30	30	1.0	30	3.0	30	10
	MM3002	200	50	20	10				150	10
	2N4926	200	50	20	30	2.0	30	3.0	30	10
	MM3009	180	400	40	10				50	20

*JAN available **JAN/JANTX available #JAN/JANTX/JANTXV available †JAN/JANTX/JANTXV/JANS available

(continued)

High-Voltage/High-Current Amplifiers (continued)

Package	Device	$V_{(BR)CEO}$ Volts Min	I_C mA Max	h_{FE} @ I_C mA Min		$V_{CE(sat)}$ Volts @ I_C mA & I_B mA Max			f_T MHz @ I_C mA Min	
NPN (continued)										
TO-39 (cont.)	MM3001	150	200	20	10				150	10
	2N3114	150	200	30	30	1.0	50	5.0	40	30
	2N3500#	150	300	40	150	0.4	150	15	150	20
	2N3501#	150	300	100	150	0.4	150	15	150	20
	2N3712	150	200	30	30	2.0	50	5.0	40	30
	2N5682	120	1000	40	250	0.6	250	25	30	100
	MM3008	120	400	40	10				50	20
	2N657	100		30	200	4.0	200	40		
	2N3498#	100	500	40	150	0.6	300	30	150	20
	2N3499#	100	500	100	150	0.6	300	30	150	20
	2N4924	100	200	40	150	0.4	50	5.0	100	20
	MM3007	100	2500	50	250	0.35	150	15	50	50
	2N5681	100	1000	40	250	0.6	250	25	30	100
	MM3006	80	2500	50	200	0.35	150	15	50	50
	2N4239	80	3000	30	250	0.3	500	50	2.0	100
	MM3005	60	2500	50	150	0.35	150	15	50	50
	2N656	60	—	30	200	4.0	200	40		
	2N4238	60	3000	30	250	0.3	500	50	2.0	100
	2N4237	40	3000	30	250	0.3	500	50	2.0	100
PNP										
TO-18	2N6433	300	1000	30	30	0.5	20	2.0	50	10
	2N6432	200	1000	30	30	0.5	20	2.0	50	10
	2N3497	120	100	40	10	0.35	10	1.0	150	20
	2N3496	80	100	40	10	0.3	10	1.0	200	20
TO-39	2N3743#	300	50	25	30	8.0	30	3.0	30	10
	2N5416#	300	1000	30	50	2.5	50	5.0	15	10
	MM4003	250	500	20	10	5.0	10	1.0	—	—
	2N4931#	250	500	20	20	5.0	10	1.0	20	20
	MM4002	200	500	20	10	5.0	10	1.0	—	—
	2N4930#	200	500	20	20	5.0	10	1.0	20	20
	2N5415#	200	1000	30	50	2.5	50	5.0	15	10
	2N3637#	175	1000	100	50	0.5	50	5.0	200	30
	2N3636#	175	1000	50	50	0.5	50	5.0	150	30
	2N4929	150	500	25	10	0.5	10	1.0	100	20
	MM4001	150	500	20	10	0.6	10	1.0	—	—
	2N3635#	140	1000	100	50	0.5	50	5.0	200	30
	2N3634#	140	1000	50	50	0.5	50	5.0	150	30
	2N3495	120	100	40	10	0.35	10	1.0	150	20
	2N5680	120	1000	40	250	0.6	250	25	30	100
	MM4000	100	100	20	10	0.6	10	1.0	—	—
	MM5007	100	2000	50	250	0.5	150	15	30	50
	2N4928	100	100	25	10	0.5	10	1.0	100	20
	2N5679	100	1000	40	250	0.6	250	25	30	100
	MM5006	80	2000	50	200	0.5	150	15	30	50
	2N3494	80	100	40	10	0.3	10	1.0	200	20
	2N4236	80	3000	30	250	0.6	1000	125	3.0	100
	MM5005	60	2000	50	150	0.5	150	15	30	50
	2N4235	60	3000	30	250	0.6	1000	125	3.0	100
	2N4234	40	3000	30	250	0.6	1000	125	3.0	100

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*JAN available **JAN/JANTX available #JAN/JANTX/JANTXV available †JAN/JANTX/JANTXV/JANS available