

# PNP GENERAL PURPOSE

**TABLE 2 PNP SILICON PLANAR GENERAL PURPOSE TRANSISTORS**

The devices shown in this table are general purpose transistors designed for small and medium signal, low and medium power amplification from D.C. to radio frequencies in Commercial, Industrial and Military equipments.

These transistors are particularly suitable for use as Audio Frequency Amplifiers, Driver and Output Stages, Oscillators and General Purpose Switches.

The devices are listed in order of decreasing Breakdown Voltages ( $V_{CB}$  and  $V_{CEO}$ ), decreasing Collector Currents ( $I_C$ ), Power Dissipation ( $P_{tot}$ ), etc.

Type	$V_{CB}$ V	$V_{CEO}$ V	Max $I_C$ mA	Max $V_{CE(sat)}$ at			hFE at			Min $f_T$ at		$P_{tot}$ at $T_{amb}$ =25°C mW	Package	Comple- ment
				V	$I_C$ mA	$I_B$ mA	Min	Max	$I_C$ mA	MHz	$I_C$ mA			
ZT211	90	65	1000	0.65	150	15	40	120	150	60	50	1000	TO-39	ZT90/95
2N4036	90	65	1000	0.65	150	15	40	140	150	—	—	1000	TO-39	2N2102
ZT189	70	70	500	0.2	50	5	75	250	10	150	10	300	TO-18	ZT89
BC161	60	60	1000	1.0	1000	100	40	250	100	50	50	3700†	TO-39	BC141
BCY77	60	60	100	0.25	10	0.25	120	460	2	180*	10	1000†	TO-18	BCY65E
2N2605	60	45	30	0.5	10	0.5	150	—	0.5	30	0.5	400	TO-46	—
2N2604	60	45	30	0.5	10	0.5	60	—	0.5	30	0.5	400	TO-46	—
ZT210	60	40	1000	1.4	150	15	20	100	150	60	50	1000	TO-39	ZT94
2N4037	60	40	1000	1.4	150	15	50	250	150	—	—	1000	TO-39	2N3053
BC177	50	45	200	0.2	10	0.5	120	460	2	130	10	300	TO-18	BC107
BCY70	50	40	200	0.25	10	1	—	100	10	250	10	350	TO-18	—
2N1131	50	35	600	1.5	150	15	20	45	150	—	—	600	TO-39	2N696
2N1132	50	35	600	1.5	150	15	30	90	150	—	—	600	TO-39	2N697
ZT183	45	45	500	0.4	50	5	38	85	10	150	10	300	TO-18	ZT83
ZT184	45	45	500	0.4	50	5	75	170	10	150	10	300	TO-18	ZT84
BCY79	45	45	200	0.25	10	0.25	120	460	2	180*	10	1000†	TO-18	BCY59
BCY71	45	45	200	0.25	10	1	100	400	10	250	10	350	TO-18	—
ZT181	45	35	500	0.2	10	1	38	162	10	150	10	300	TO-18	ZT81
ZT182	45	35	500	0.2	10	1	75	260	10	150	10	300	TO-18	ZT82
BC160	40	40	1000	1.0	1000	100	40	250	100	50	50	3700†	TO-39	BC140
BCY78	32	32	200	0.25	10	0.25	120	630	2	180*	10	1000†	TO-18	BCY58
BCY72	30	25	200	0.25	10	1	100	—	10	250	10	350	TO-18	—
BC178	30	25	200	0.2	10	0.5	120	800	2	130	10	300	TO-18	BC108
ZT180	25	25	500	0.2	10	1	38	162	10	150	10	300	TO-18	ZT80
ZT187	25	25	500	0.2	10	1	75	250	10	150	10	300	TO-18	ZT87
ZT152	20	20	500	0.2	10	1	50	200	10	—	—	300	TO-18	—

† At  $T_{case}=45^\circ C$  \* Typical

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The devices shown in this table are general purpose transistors designed for small and medium signal, low and medium power amplification from D.C. to radio frequencies in Commercial, Industrial and Military equipments.

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The devices are listed in order of decreasing Breakdown Voltages ( $V_{CB}$  and  $V_{CEO}$ ), decreasing Collector Currents ( $I_C$ ), Power Dissipation ( $P_{tot}$ ), etc.

Type	$V_{CB}$ V	$V_{CEO}$ V	Max $I_C$ mA	Max $V_{CE(sat)}$ at			$h_{FE}$ at			Min $f_T$ at		$P_{tot}$ at $T_{amb} = 25^\circ C$ mW	Package	Comple- ment
				V	$I_C$ mA	$I_B$ mA	Min	Max	$I_C$ mA	MHz	$I_C$ mA			
ZT211	90	65	1000	0.65	150	15	40	120	150	60	50	1000	TO39	ZT90/95
2N4036	90	65	1000	0.65	150	15	40	140	150	—	—	1000	TO39	2N2102
ZT189	70	70	500	0.2	50	5	75	250	10	150	10	300	TO18	ZT89
BC161	60	60	1000	1.0	1000	100	40	250	100	50	50	3700†	TO39	BC141
BCY77	60	60	100	0.25	10	0.25	120	460	2	180*	10	1000†	TO18	BCY65E
2N2605	60	45	30	0.5	10	0.5	150	—	0.5	30	0.5	400	TO46	—
2N2604	60	45	30	0.5	10	0.5	60	—	0.5	30	0.5	400	TO46	—
ZT210	60	40	1000	1.4	150	15	20	100	150	60	50	1000	TO39	ZT94
2N4037	60	40	1000	1.4	150	15	50	250	150	—	—	1000	TO39	2N3053
BC177	50	45	200	0.2	10	0.5	120	460	2	130	10	300	TO18	BC107
BCY70	50	40	200	0.25	10	1	—	100	10	250	10	350	TO18	—
2N1131	50	35	600	1.5	150	15	20	45	150	—	—	600	TO39	2N696
2N1132	50	35	600	1.5	150	15	30	90	150	—	—	600	TO39	2N697
ZT183	45	45	500	0.4	50	5	38	85	10	150	10	300	TO18	ZT83
ZT184	45	45	500	0.4	50	5	75	170	10	150	10	300	TO18	ZT84
BCY79	45	45	200	0.25	10	0.25	120	460	2	180*	10	1000†	TO18	BCY59
BCY71	45	45	200	0.25	10	1	100	400	10	250	10	350	TO18	—
ZT181	45	35	500	0.2	10	1	38	162	10	150	10	300	TO18	ZT81
ZT182	45	35	500	0.2	10	1	75	260	10	150	10	300	TO18	ZT82
BC160	40	40	1000	1.0	1000	100	40	250	100	50	50	3700†	TO39	BC140
BCY78	32	32	200	0.25	10	0.25	120	630	2	180*	10	1000†	TO18	BCY58
BCY72	30	25	200	0.25	10	1	100	—	10	250	10	350	TO18	—
BC178	30	25	200	0.2	10	0.5	120	800	2	130	10	300	TO18	BC108
ZT180	25	25	500	0.2	10	1	38	162	10	150	10	300	TO18	ZT80
ZT187	25	25	500	0.2	10	1	75	250	10	150	10	300	TO18	ZT87
ZT152	20	20	500	0.2	10	1	50	200	10	—	—	300	TO18	—

† At  $T_{case} = 45^\circ C$  \* Typical

# PNP SWITCHING

**TABLE 4 SILICON PLANAR MEDIUM AND HIGH SPEED SWITCHING TRANSISTORS**

The devices shown in this table are characterised for general medium voltage, medium and high speed switching applications in Commercial, Industrial and Military equipments.

The devices are listed in order of decreasing Breakdown Voltage ( $V_{CE0}$ ), decreasing Collector Current ( $I_C$ ), Power Dissipation ( $P_{tot}$ ), etc.

Type	$V_{CE0}$ V	Max $I_C$ mA	Max $V_{CE(sat)}$ at			$h_{FE}$ at			$f_T$ Min at		Switching Times (Max) at			Package	Comple- ment
			V	$I_C$ mA	$I_B$ mA	Min	Max	$I_C$ mA	MHz	$I_C$ mA	$t_{on}$ ns	$t_{off}$ ns	$I_C$ mA		
ZT189	70	500	0.2	50	5	75	250	10	150	10	120*	250*	20	TO-18	ZT89
2N4036	65	1000	0.65	150	15	40	140	150	—	—	110	700	150	TO-39	2N2102
2N2904A	60	600	0.4	150	15	40	120	150	200	50	45	100	150	TO-39	2N2218A
2N2905A	60	600	0.4	150	15	100	300	150	200	50	45	100	150	TO-39	2N2219A
2N2906A	60	600	0.4	150	15	40	120	150	200	50	45	100	150	TO-18	2N2221A
2N2907A	60	600	0.4	150	15	100	300	150	200	50	45	100	150	TO-18	2N2222A
BCY77	60	100	0.25	10	0.25	120	460	2	180*	10	150	800	10	TO-18	BCY65E
ZT183	45	500	0.4	50	5	38	85	10	150	10	120*	250*	20	TO-18	ZT83
ZT184	45	500	0.4	50	5	75	170	10	150	10	120*	250*	20	TO-18	ZT84
BCY79	45	200	0.25	10	0.25	120	460	2	180*	10	150	800	10	TO-18	BCY59
2N2904	40	600	0.4	150	15	40	120	150	200	50	45	100	150	TO-39	2N2218
2N2905	40	600	0.4	150	15	100	300	150	200	50	45	100	150	TO-39	2N2219
2N2906	40	600	0.4	150	15	40	120	150	200	50	45	100	150	TO-18	2N2221
2N2907	40	600	0.4	150	15	100	300	150	200	50	45	100	150	TO-18	2N2222
ZT181	35	500	0.2	10	1	38	162	10	150	10	120*	250*	20	TO-18	ZT81
ZT182	35	500	0.2	10	1	75	260	10	150	10	120*	250*	20	TO-18	ZT82
BCY78	32	200	0.25	10	0.25	120	630	2	180*	10	150	800	10	TO-18	BCY58
ZT180	25	500	0.2	10	1	38	162	10	150	10	120*	250*	20	TO-18	ZT80
ZT187	25	500	0.2	10	1	75	250	10	150	70	120*	250*	20	TO-18	ZT87
2N2894	12	200	0.15	10	1	40	150	30	400	30	60	90	30	TO-18	—

\* Typical

# PNP SWITCHING

**TABLE 4 SILICON PLANAR MEDIUM AND HIGH SPEED SWITCHING TRANSISTORS**

The devices shown in this table are characterised for general medium voltage, medium and high speed switching applications in Commercial, Industrial and Military equipments.

The devices are listed in order of decreasing Breakdown Voltage ( $V_{CE0}$ ), decreasing Collector Current ( $I_C$ ), Power Dissipation ( $P_{tot}$ ), etc.

Type	$V_{CE0}$ V	Max $I_C$ mA	Max $V_{CE(sat)}$ at			$h_{FE}$ at			$f_T$ Min at		Switching Times (Max) at			Package	Comple- ment
			V	$I_C$ mA	$I_B$ mA	Min	Max	$I_C$ mA	MHz	$I_C$ mA	$t_{on}$ ns	$t_{off}$ ns	$I_C$ mA		
ZT189	70	500	0.2	50	5	75	250	10	150	10	120*	250*	20	TO18	ZT89
2N4036	65	1000	0.65	150	15	40	140	150	—	—	110	700	150	TO39	2N2102
2N2904A	60	600	0.4	150	15	40	120	150	200	50	45	100	150	TO39	2N2218A
2N2905A	60	600	0.4	150	15	100	300	150	200	50	45	100	150	TO39	2N2219A
2N2906A	60	600	0.4	150	15	40	120	150	200	50	45	100	150	TO18	2N2221A
2N2907A	60	600	0.4	150	15	100	300	150	200	50	45	100	150	TO18	2N2222A
BCY77	60	100	0.25	10	0.25	120	460	2	180*	10	150	800	10	TO18	BCY65E
ZT183	45	500	0.4	50	5	38	85	10	150	10	120*	250*	20	TO18	ZT83
ZT184	45	500	0.4	50	5	75	170	10	150	10	120*	250*	20	TO18	ZT84
BCY79	45	200	0.25	10	0.25	120	460	2	180*	10	150	800	10	TO18	BCY59
2N2904	40	600	0.4	150	15	40	120	150	200	50	45	100	150	TO39	2N2218
2N2905	40	600	0.4	150	15	100	300	150	200	50	45	100	150	TO39	2N2219
2N2906	40	600	0.4	150	15	40	120	150	200	50	45	100	150	TO18	2N2221
2N2907	40	600	0.4	150	15	100	300	150	200	50	45	100	150	TO18	2N2222
ZT181	35	500	0.2	10	1	38	162	10	150	10	120*	250*	20	TO18	ZT81
ZT182	35	500	0.2	10	1	75	260	10	150	10	120*	250*	20	TO18	ZT82
BCY78	32	200	0.25	10	0.25	120	630	2	180*	10	150	800	10	TO18	BCY58
ZT180	25	500	0.2	10	1	38	162	10	150	10	120*	250*	20	TO18	ZT80
ZT187	25	500	0.2	10	1	75	250	10	150	70	120*	250*	20	TO18	ZT87
2N2894	12	200	0.15	10	1	40	150	30	400	30	60	90	30	TO18	—

\* Typical

# PNP LOW NOISE

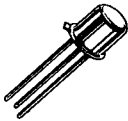
**TABLE 6 PNP SILICON PLANAR LOW NOISE TRANSISTORS**

The transistors shown in this table are characterised for low noise, low level amplification and are particularly suitable for audio pre-amplifiers as well as universal applications.

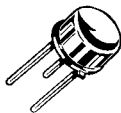
The devices are listed in order of decreasing Breakdown Voltage ( $V_{CE0}$ ), decreasing Collector Current ( $I_C$ ), Power Dissipation ( $P_{tot}$ ), etc.

Type	$V_{CE0}$ V	Max $I_C$ mA	Max $V_{CE(sat)}$ at			$h_{FE}$ at			$f_T$ Min at		Noise Figure at			Package	Comple- ment
			V	$I_C$ mA	$I_B$ mA	Min	Max	$I_C$ mA	MHz	$I_C$ mA	N dB	$I_C$ $\mu A$	f Hz		
ZT189	70	500	0.2	50	5	75	250	10	150	10	6	100	1K	TO-18	ZT89
BCY77	60	100	0.25	10	0.25	120	460	2	180*	10	<6	200	1K	TO-18	BCY65E
ZT183	45	500	0.4	50	5	38	85	10	150	10	6	100	1K	TO-18	ZT83
ZT184	45	500	0.4	50	5	75	170	10	150	10	6	100	1K	TO-18	ZT84
BCY79	45	200	0.25	10	0.25	120	460	2	180*	10	<6	200	1K	TO-18	BCY59
BCY71	45	200	0.25	10	1	100	400	10	250	10	<6	100	10-10K	TO-18	—
BCY70	40	200	0.25	10	1	100	—	10	150	10	<6	100	10-10K	TO-18	—
2N2605	45	30	0.5	10	0.5	150	—	0.5	30	0.5	<3	10	10-15.7K	TO-46	—
2N2604	45	30	0.5	10	0.5	60	—	0.5	30	0.5	<4	10	10-15.7K	TO-46	—
ZT181	35	500	0.2	10	1	38	162	10	150	10	6	100	1K	TO-18	ZT81
ZT182	35	500	0.2	10	1	75	260	10	150	10	6	100	1K	TO-18	ZT82
BCY78	32	200	0.25	10	0.25	120	630	2	180*	10	<6	200	1K	TO-18	BCY58
BCY72	25	200	0.25	10	1	100	—	10	250	10	<2	100	10-10K	TO-18	—
ZT180	25	500	0.2	10	1	38	162	10	150	10	6	100	1K	TO-18	ZT80
ZT187	25	500	0.2	10	1	75	250	10	150	10	6	100	1K	TO-18	ZT87
BC179	20	50	0.2	10	0.5	180	800	2	130*	10	<4	200	30-15K	TO-18	BC109

\* Typical



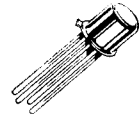
TO-18



TO-39



TO-46



TO-72

# PNP LOW NOISE

**TABLE 6 PNP SILICON PLANAR LOW NOISE TRANSISTORS**

The transistors shown in this table are characterised for low noise, low level amplification and are particularly suitable for audio pre-amplifiers as well as universal applications.

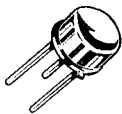
The devices are listed in order of decreasing Breakdown Voltage ( $V_{CEO}$ ), decreasing Collector Current ( $I_C$ ), Power Dissipation ( $P_{tot}$ ), etc.

Type	$V_{CEO}$ V	Max $I_C$ mA	Max $V_{CE(sat)}$ at			hFE at			$f_T$ Min at		Noise Figure at			Package	Comple- ment
			V	$I_C$ mA	$I_B$ mA	Min	Max	$I_C$ mA	MHz	$I_C$ mA	N dB	$I_C$ $\mu A$	f Hz		
ZT189	70	500	0.2	50	5	75	250	10	150	10	6	100	1K	TO18	ZT89
BCY77	60	100	0.25	10	0.25	120	460	2	180*	10	<6	200	1K	TO18	BCY65E
ZT183	45	500	0.4	50	5	38	85	10	150	10	6	100	1K	TO18	ZT83
ZT184	45	500	0.4	50	5	75	170	10	150	10	6	100	1K	TO18	ZT84
BCY79	45	200	0.25	10	0.25	120	460	2	180*	10	<6	200	1K	TO18	BCY59
BCY71	45	200	0.25	10	1	100	400	10	250	10	<6	100	10-10K	TO18	—
BCY70	40	200	0.25	10	1	100	—	10	150	10	<6	100	10-10K	TO18	—
2N2605	45	30	0.5	10	0.5	150	—	0.5	30	0.5	<3	10	10-15.7K	TO46	—
2N2604	45	30	0.5	10	0.5	60	—	0.5	30	0.5	<4	10	10-15.7K	TO46	—
ZT181	35	500	0.2	10	1	38	162	10	150	10	6	100	1K	TO18	ZT81
ZT182	35	500	0.2	10	1	75	260	10	150	10	6	100	1K	TO18	ZT82
BCY78	32	200	0.25	10	0.25	120	630	2	180*	10	<6	200	1K	TO18	BCY58
BCY72	25	200	0.25	10	1	100	—	10	250	10	<2	100	10-10K	TO18	—
ZT180	25	500	0.2	10	1	38	162	10	150	10	6	100	1K	TO18	ZT80
ZT187	25	500	0.2	10	1	75	250	10	150	10	6	100	1K	TO18	ZT87
BC179	20	50	0.2	10	0.5	180	800	2	130*	10	<4	200	30-15K	TO18	BC109

\* Typical



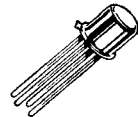
TO-18



TO-39



TO-46



TO-72