

PLASTIC SILICON SMALL-SIGNAL TRANSISTORS

CURRENT versus VOLTAGE SELECTOR GUIDE

I_C	50 μ A - 5.0 mA		5.0 mA - 25 mA		25 mA - 75 mA		75 mA - 500 mA	
V_{CE0} Volts (Min)	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN
<10			MPS3639					
10		MPS918 MPS2711 MPS2712 MPS2713 MPS2714 MPS2715 MPS2716 MPS2926 MPS3721	MPS3640	2N4264 2N4265 MPS706 MPS2369 MPS3563		MPS3646		
19								
20	2N4126 MPS6519 MPS6579 MPS6580	2N4124 2N5089 MPS2923 MPS2924 MPS2925 MPS3392 MPS3393 MPS3394 MPS3395 MPS3396 MPS3397 MPS3398 MPS6507 MPS6514 MPS6515 MPS6539 MPS6542 MPS6546 MPS6547 MPS6571	MPS3638 MPS3638A	MPS6511 MPS2923 MPS6552 MPS6553 MPS6554 MPS6555 MPS6541 MPS6543 MPS6548 MPS6568 MPS6569 MPS6570	MPS3702	MPS3706	MPS6562 MPS6563	MPS6560 MPS6561
29								
30	2N4125	2N4123 2N5088 MPS3707 MPS3708 MPS3709 MPS3710 MPS3711 MPS3712 MPS3713 MPS6540 MPS6573 MPS6574		MPS5834	MPS3703	MPS3704 MPS3705	MPS6535	MPS6532
39								
40	MPS6516 MPS6517 MPS6518	MPS6575 MPS6576	2N3905 2N3906	2N3903 2N3904 MPS3693 MPS3694 MPS3826 MPS3827 MPS6564 MPS6565 MPS6566 MPS6567		MPS6544 MPS6545	2N4402 2N4403 MPS6533 MPS6534	2N4400 2N4401 MPS6530 MPS6531
49								
>50	2N5086 2N5087	2N4409 2N4410						

PLASTIC SILICON SMALL-SIGNAL TRANSISTORS — SELECTOR GUIDES

On the following pages the plastic silicon small-signal devices subsequently characterized by complete data sheets have been grouped by applications for which they merit first consideration.

GENERAL PURPOSE SWITCHES & AMPLIFIERS — All devices in Case 29 (1)

Type NPN	MAXIMUM RATINGS		ELECTRICAL CHARACTERISTICS (T _A = 25°C unless otherwise noted)																		
	V _{CE0}	V _{EB}	I _{CB0}	h _{FE} Min Max							V _{CE(sat)} & V _{BE(sat)}		• I _C	f _T	• I _C	C _{ob}	Switching Times ns				• I _C /I _B
	Volts	Volts	μA(Max)	• I _C (mA)							Volts(Max)		mA	MHz	mA	pF(Max)	t _d	t _r	t _s	t _f	mA
				0.1	1.0	2.0	10	50	100	150	500										
2N3903	40	6.0	0.05	20	35	—	50	30	15	—	0.20 0.30	0.85 0.95	10 50	250	10	4.0	35	35	175	50	10/1.0
2N3904	40	6.0	0.05	40	70	—	100	60	30	—	0.20 0.30	0.85 0.95	10 50	300	10	4.0	35	35	200	50	10/1.0
2N3905*	40	5.0	0.05	30	40	—	50	30	15	—	0.25 0.40	0.85 0.95	10 50	200	10	4.5	35	35	200	60	10/1.0
2N3906*	40	5.0	0.05	60	80	—	100	60	30	—	0.25 0.40	0.85 0.95	10 50	250	10	4.5	35	35	225	75	10/1.0
2N4123	30	5.0	0.05	—	—	50	—	25	—	—	0.30	0.95	50	250	10	4.0	24	13	125	11	10/1.0
2N4124	25	5.0	0.05	—	—	120	—	80	—	—	0.30	0.95	50	300	10	4.0	24	13	125	11	10/1.0
2N4125*	30	4.0	0.05	—	—	50	—	25	—	—	0.40	0.95	50	200	10	4.5	25	18	140	15	10/1.0
2N4126*	25	4.0	0.05	—	—	120	—	80	—	—	0.40	0.95	50	250	10	4.5	25	18	140	15	10/1
2N4400	40	6.0	0.1	—	20	—	40	—	—	50	0.40 0.75	0.95 1.20	150 500	200	20	6.5†	15	20	225	30	150/15
2N4401	40	6.0	0.1	20	40	—	80	—	—	100	0.40 0.75	0.95 1.20	150 500	250	20	6.5†	15	20	225	30	150/15
2N4402*	40	5.0	0.1	—	30	—	50	—	—	50	0.40 0.75	0.95 1.20	150 500	150	20	8.5†	15	20	225	30	150/15
2N4403*	40	5.0	0.1	30	60	—	100	—	—	100	0.40 0.75	0.95 1.20	150 500	200	20	8.5†	15	20	225	30	150/15
MP33638*	25	4.0	—	—	—	—	20	30	—	—	0.25 1.00	1.10 2.00	50 300	100	50	20	20	70	140	70	300/30
MP33638A	25	4.0	—	—	80	—	100	100	—	—	0.25 2.00	1.10 2.00	50 300	150	50	10	20	70	140	70	300/30
MP33702*	25	5.0	0.1	—	—	—	—	60	—	—	0.25	—	50	100	50	12	—	—	—	—	—
MP33703*	30	5.0	0.1	—	—	—	—	30	—	—	0.25	—	50	100	50	12	—	—	—	—	—
MP33704	30	5.0	0.1	—	—	—	—	100	—	—	0.60	—	100	100	50	12	—	—	—	—	—
MP33705	30	5.0	0.1	—	—	—	—	50	—	—	0.80	—	100	100	50	12	—	—	—	—	—
MP33706	20	5.0	0.1	—	—	—	—	30	—	—	1.00	—	100	100	50	12	—	—	—	—	—
MP36530	40	5.0	0.05	—	—	—	30	—	40	25	0.50	1.00	100	390	50	5.0	—	—	—	—	—
MP36531	40	5.0	0.05	—	—	—	60	—	90	50	0.30	1.00	100	390	50	5.0	—	—	—	—	—
MP36532	30	5.0	0.1	—	—	—	—	—	30	—	0.50	1.20	100	390	50	5.0	—	—	—	—	—
MP36533*	40	4.0	0.05	—	—	—	30	—	40	25	0.50	1.00	100	260	50	6.0	—	—	—	—	—
MP36534*	40	4.0	0.05	—	—	—	60	—	90	50	0.30	1.00	100	260	50	6.0	—	—	—	—	—
MP36535	30	4.0	0.1	—	—	—	—	—	30	—	0.50	1.20	100	260	50	6.0	—	—	—	—	—
MP36585	45	4.0	0.1	—	—	—	40	—	—	—	0.40	—	10	200	10	3.5	—	—	—	—	—
MP36586	45	4.0	0.1	—	—	—	100	—	—	—	0.40	—	10	200	10	3.5	—	—	—	—	—

† C_{cb}

† I_C = 300 mA

RF AMPLIFIERS

Type NPN	Case	MAXIMUM RATINGS		ELECTRICAL CHARACTERISTICS									
		V_{CEO}	V_{EB}	$I_{CBO} @ V_{CB}$		$h_{FE} @ I_C$		NF @ I_C & f			f_T	Feedback Capacitance	V_{AEC}
		Volts	Volts	nA (Max)	Volts	Min/Max	mA	Typ/Max	dB	MHz	Min/Max	pF (Max)	(30 dB Gain Reduction)
MPS918	29 (1)	15	3.0	10	15	20	3.0	-6.0	1.0	60	600/-	$C_{ob} = 1.7$	-
MPS3563	↓	12	2.0	50	15	20	8.0	-	-	-	600/-	$C_{ob} = 1.7$	-
MPS3693	↓	45	4.0	50	35	40/160	10	-	-	-	200/-	$C_{ob} = 3.5$	-
MPS3694	↓	45	4.0	50	35	100/400	10	-	-	-	200/-	$C_{ob} = 3.5$	-
MPS6539	29 (2)	20	3.0	50	15	20	4.0	-4.5	4.0	100	500/-	$C_{re} = 0.7$	-
MPS6568	29A	20	3.0	50	10	20	4.0	-3.3	-	200	375/800	$C_{cb} = 0.5$	4.0/5.0
MPS6570*	29 (2)	18	3.0	100	15	20	2.0	-4.5	2.0	100	250/-	$C_{re} = 1.0$	-
2N5208	29 (2)	25	3.0	10	10	20/120	2.0	13.0	2.0	100	300/-	$C_{cb} = 1.0$	-

MIXERS AND OSCILLATORS

Type NPN	Case	MAXIMUM RATINGS			ELECTRICAL CHARACTERISTICS (T _A = 25°C)								
		V _{CE0}	V _{CB}	V _{EB}	I _{CBO} @ V _{CB}		h _{FE} @ I _C		V _{CE(sat)} @ I _C / I _B		@ V _{CB} = 10 V	f _T	
		Volts	Volts	Volts	μA (Max)	Volts	Min/Max	mA	Volts (Max)	mA	pF (Max)	MHz (Min)	
MPS918	29 (1)	15	30	3.0	0.01	15	20/-	3.0	0.4	10/1.0	C _{ob} = 1.7	600	
MPS6507	↓	20	↓	3.0	0.05	↓	25/-	2.0	-	-	C _{ob} = 2.5	700	
MPS6541	↓	↓	↓	4.0	↓	↓	25/-	4.0	-	-	C _{ob} = 1.7	600	
MPS6542	29 (2)	↓	↓	3.0	↓	↓	25/-	2.0	-	-	C _{re} = 0.33 (Typ)	700	
MPS6543	↓	25	35	↓	0.1	25	25/-	4.0	0.35	10/1.0	C _{ob} = 1.0	750	
MPS6546	↓	↓	↓	↓	↓	↓	20/-	2.0	↓	↓	C _{re} = 0.45	600	
MPS6547	↓	↓	↓	↓	↓	↓	20/-	2.0	↓	↓	C _{re} = 0.35	600	
MPS6548	↓	↓	30	↓	↓	↓	25/-	4.0	0.5	4.0/0.4	C _{re} = 0.7	650	
MPS6580*	↓	↓	25	↓	↓	20	20/-	2.0	0.5	10/1.0	C _{re} = 1.0	350	

IF AMPLIFIERS

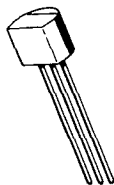
Type NPN	Case	MAXIMUM RATINGS			ELECTRICAL CHARACTERISTICS									
		V_{CEO}	V_{CB}	V_{EB}	$I_{CBO} @ V_{CB}$		$h_{FE} @ I_C$		Feedback Capacitance $@ V_{CB} = 10, I_C = 0$	$Z_{out} @ I_C \& f$			V_{AEC} (30 dB Gain Reduction)	
		Volts	Volts	Volts	nA (Max)	Volts	Min/Max	mA	pF (Max)	k Ohms (Min)	mA	MHz	Min/Max	
MP86511	29 (1)	20	30	3.0	50	15	25/-	10	$C_{ob} = 2.5$	-	-	-	-	
MP86544	29 (2)	45	60	4.0	500	35	20/-	30	$C_{re} = 0.65$	10	10	45	-	
MP86545	29 (2)	45	60	4.0	↓	35	20/-	30	$C_{re} = 0.58$	10	10	45	-	
MP86564	29 (1)	45	45	5.0		40	25/-	10	$C_{ob} = 4.0$	100(Typ)	2.0	4.5	-	
MP86567	29 (2)	40	40	5.0	↓	35	25/-	10	$C_{re} = 0.7$	100	2.0	4.5	-	
MP86569	29A	20	20	3.0	50	10	20/200	4.0	$C_{cb} = 0.5$	-	-	-	4.4/5.4	
MP86570	29A	20	20	3.0	↓	10	20/200	4.0	$C_{cb} = 0.5$	-	-	-	5.2/6.2	
MP83693	29 (1)	45	45	4.0	↓	35	40/160	10	$C_{ob} = 3.5$	-	-	-	-	
MP83694	29 (1)	45	45	4.0		35	100/400	10	$C_{ob} = 3.5$	-	-	-	-	
MP86540	29 (2)	30	30	4.0	100	25	25/-	2.0	$C_{cb} = 0.65$	80	2.0	10.7	-	

AUDIO DRIVERS AND AUDIO OUTPUTS

Type NPN	Case	MAXIMUM RATINGS		ELECTRICAL CHARACTERISTICS									
		V_{CEO}	V_{EB}	$I_{CBO} @ V_{CB}$		$h_{FE} @ I_C$		$V_{BE(sat)} @ I_C$		$V_{CE(sat)} @ I_C / I_B$		C_{ob}	f_T
		Volts	Volts	nA (Max)	Volts	Min/Max	mA	Volts (Max)	mA	Volts (Max)	mA	pF (Max)	Min/Typ
MPS3704	29 (1)	30	5.0	100	20	100/300	50	1.0	100	0.6	100/5.0	12	100/-
MPS3705	↓	30	↓	↓	↓	50/150	↓	↓	↓	0.8	↓	↓	↓
MPS3706	↓	20	↓	50	40	30/600	↓	↓	↓	1.0	↓	↓	↓
MPS6530	↓	40	↓	50	40	40/120	100	-	-	0.5	100/10	5.0	-/390
MPS6531	↓	40	↓	50	40	90/270	↓	-	-	0.3	↓	↓	↓
MPS6532	↓	30	↓	100	30	30/-	↓	-	-	0.5	↓	↓	↓
MPS6533*	↓	40	4.0	50	40	40/120	↓	-	-	0.5	↓	↓	↓
MPS6534*	↓	40	↓	50	↓	90/270	↓	-	-	0.3	↓	↓	↓
MPS6535*	↓	30	↓	100	20	30/-	↓	-	-	0.5	↓	↓	↓
MPS6560	↓	20	5.0	↓	↓	50/-	500	1.2	500	500/50	30	↓	-
MPS6561	↓	↓	↓	↓	↓	50/-	350	↓	350	350/35	↓	↓	-
MPS6562*	↓	↓	↓	↓	↓	50/-	500	↓	500	500/50	↓	↓	-
MPS6563*	↓	↓	↓	↓	↓	50/-	350	↓	350	350/35	↓	↓	-

MPS6530	}	NPN (SILICON)
MPS6531		
MPS6532		

MPS6533	}	PNP
MPS6534		
MPS6535		



CASE 29(1)
(TO-92)

Silicon annular transistors designed for use in complementary amplifier circuits.

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	NPN	PNP	Unit
Collector-Base Voltage MPS6530, MPS6531 MPS6532 MPS6533, MPS6534 MPS6535	V_{CB}	60 50	40 30	Vdc
Collector-Emitter Voltage MPS6530, MPS6531 MPS6532 MPS6533, MPS6534 MPS6535	V_{CEO}	40 30	40 30	Vdc
Emitter-Base Voltage	V_{EB}	5	4	Vdc
Collector Current	I_C	600	600	mAdc
Total Device Dissipation @ $T_A = 60^\circ\text{C}$ @ $T_A = 25^\circ\text{C}$	P_D	210 310	210 310	mW
Thermal Resistance, Junction to Ambient	θ_{JA}	0.357	0.357	$^\circ\text{C}/\text{mW}$
Junction Temperature	T_J	135	135	$^\circ\text{C}$

MPS6530 thru MPS6535 (continued)

MPS6530 thru MPS6532 (NPN)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}$, $I_E = 0$)	MPS6530, MPS6531 MPS6532	BV_{CBO}	60 50	-	-	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 10\text{ mAdc}$, $I_B = 0$)	MPS6530, MPS6531 MPS6532	BV_{CEO}	40 30	-	-	Vdc
Emitter-Base Breakdown Voltage ($I_B = 10\text{ }\mu\text{Adc}$, $I_C = 0$)		BV_{EBO}	5	-	-	Vdc
Collector Cutoff Current ($V_{CB} = 40\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$)	MPS6530, MPS6531 MPS6532	I_{CBO}	- -	- -	0.05 0.1	μAdc
($V_{CB} = 40\text{ Vdc}$, $I_E = 0$, $T_A = 60^\circ\text{C}$) ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$, $T_A = 60^\circ\text{C}$)	MPS6530, MPS6531 MPS6532		- -	- -	2.0 5.0	
DC Current Gain ($I_C = 10\text{ mAdc}$, $V_{CE} = 1\text{ Vdc}$)	MPS6530 MPS6531	h_{FE}	30 60	75 120	- -	-
($I_C = 100\text{ mAdc}$, $V_{CE} = 1\text{ Vdc}$)	MPS6530 MPS6531 MPS6532		40 90 30	85 150 -	120 270 -	
($I_C = 500\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MPS6530 MPS6531		25 50	60 80	- -	
Collector-Emitter Saturation Voltage ($I_C = 100\text{ mAdc}$, $I_B = 10\text{ mAdc}$)	MPS6530, MPS6532	$V_{CE(sat)}$	-	0.2 0.13	0.5 0.3	Vdc
Base-Emitter Saturation Voltage ($I_C = 100\text{ mAdc}$, $I_B = 10\text{ mAdc}$)	MPS6530, MPS6531 MPS6532	$V_{BE(sat)}$	-	0.82 0.85	1.0 1.2	Vdc
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 100\text{ kHz}$)		C_{ob}	-	3.5	5.0	pF
Current-Gain-Bandwidth Product ($I_C = 50\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)		f_T	-	390	-	MHz

MPS6533 thru MPS6535 (PNP)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}$, $I_E = 0$)	MPS6533, MPS6534 MPS6535	BV_{CBO}	40 30	-	-	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 10\text{ mAdc}$, $I_B = 0$)	MPS6533, MPS6534 MPS6535	BV_{CEO}	40 30	-	-	Vdc
Emitter-Base Breakdown Voltage ($I_B = 10\text{ }\mu\text{Adc}$, $I_C = 0$)		BV_{EBO}	4	-	-	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 20\text{ Vdc}$, $I_E = 0$)	MPS6533, MPS6534 MPS6535	I_{CBO}	- -	- -	0.05 0.1	μAdc
($V_{CB} = 30\text{ Vdc}$, $I_E = 0$, $T_A = 60^\circ\text{C}$) ($V_{CB} = 20\text{ Vdc}$, $I_E = 0$, $T_A = 60^\circ\text{C}$)	MPS6533, MPS6534 MPS6535		- -	- -	2.0 5.0	
DC Current Gain ($I_C = 10\text{ mAdc}$, $V_{CE} = 1\text{ Vdc}$)	MPS6533 MPS6534	h_{FE}	30 60	70 110	- -	-
($I_C = 100\text{ mAdc}$, $V_{CE} = 1\text{ Vdc}$)	MPS6533 MPS6534 MPS6535		40 90 30	85 140 -	120 270 -	
($I_C = 500\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MPS6533 MPS6534		25 50	55 70	- -	
Collector-Emitter Saturation Voltage ($I_C = 100\text{ mAdc}$, $I_B = 10\text{ mAdc}$)	MPS6533, MPS6535 MPS6534	$V_{CE(sat)}$	-	0.2 0.13	0.5 0.3	Vdc
Base-Emitter Saturation Voltage ($I_C = 100\text{ mAdc}$, $I_B = 10\text{ mAdc}$)	MPS6533, MPS6534 MPS6535	$V_{BE(sat)}$	-	0.84 0.87	1.0 1.2	Vdc
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 100\text{ kHz}$)		C_{ob}	-	4.8	6.0	pF
Current-Gain-Bandwidth Product ($I_C = 50\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)		f_T	-	260	-	MHz