

MA200 thru MA206 (GERMANIUM)



CASE 31(1)
(TO-5)

Germanium PNP transistor designed for high-voltage applications in the audio frequency range, such as neon driver, solenoid or relay driver applications.

All leads isolated from case

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

Rating	Symbol	MA200 MA202	MA201 MA203	MA204	MA205	MA206	Unit
Collector-Base Voltage	V_{CB}	105	105	90	75	60	Vdc
Collector-Emitter Voltage	V_{CE}	105	105	90	75	60	Vdc
Emitter-Base Voltage	V_{EB}	10	20	20	20	10	Vdc
Collector Current	I_C	200					mAdc
Emitter Current	I_E	200					mAdc
Junction and Storage Temperature Range	T_J, T_{stg}	-65 to +100					$^\circ\text{C}$
Thermal Resistance	θ_{JA}	0.5					$^\circ\text{C}/\text{mW}$
Collector Dissipation at $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	150 2.0					mW mW/ $^\circ\text{C}$

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

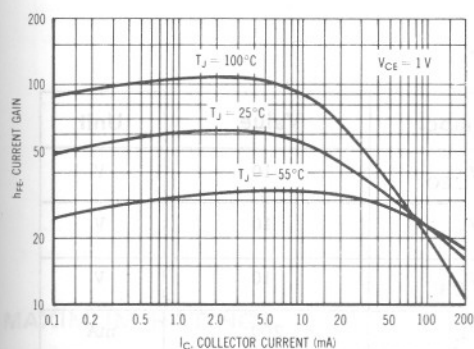
Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Base Cutoff Current ($V_{CB} = 105\text{ V}, I_E = 0$) MA 200 thru MA203	I_{CBO}	—	12.0	50	μA
($V_{CB} = 90\text{ V}, I_E = 0$) MA204		—	—	—	
($V_{CB} = 75\text{ V}, I_E = 0$) MA205		—	—	—	
($V_{CB} = 60\text{ V}, I_E = 0$) MA206		—	—	—	
Collector-Base Cutoff Current ($V_{CB} = 2.5\text{ V}, I_E = 0$)	I_{CBO}	—	5.0	14	μA
Emitter-Base Cutoff Current ($V_{EB} = 10\text{ V}, I_C = 0$) MA200, MA202, MA206	I_{EBO}	—	3.0	50	μA
($V_{EB} = 20\text{ V}, I_C = 0$) MA201, MA203, MA204, MA205		—	3.0	50	
Collector-Emitter Saturation Voltage ($I_C = 5\text{ mAdc}, I_B = 0.25\text{ mAdc}$)	$V_{CE(sat)}$	—	0.11	0.35	Vdc
Base-Emitter Saturation Voltage ($I_C = 5\text{ mAdc}, I_B = 0.25\text{ mAdc}$)	$V_{BE(sat)}$	—	0.22	0.40	Vdc
DC Current Gain ($I_C = 5\text{ mAdc}, V_{CE} = 0.35\text{ Vdc}$) MA200, MA201, MA204, MA205, MA206 MA202, MA203	h_{FE}	20 40	— —	— —	—
DC Collector-Emitter Punch-Through Voltage (V_{CB} necessary to obtain V_{EB} of -1 V max, using instrument with $Z_{in} > 11$ megohm to measure V_{BE}) MA200, MA201, MA202, MA203	V_{PT}	105 90 75 60	— — — —	— — — —	Vdc
Small-Signal Short-Circuit Forward Current Transfer Ratio Cutoff Frequency ($V_{CB} = 6\text{ Vdc}, I_E = 1\text{ mAdc}$)	f_{ob}	—	1.0	—	MHz

MA200 thru MA206 (continued)

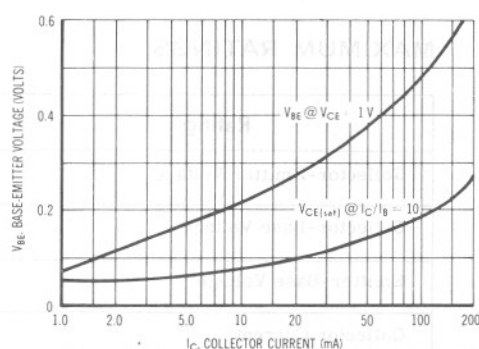
DC CHARACTERISTICS

($T_J = 25^\circ\text{C}$ unless otherwise noted)

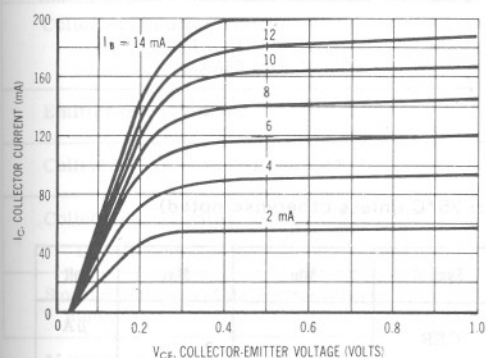
CURRENT GAIN



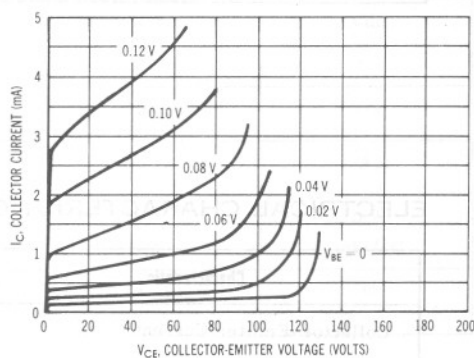
"ON" VOLTAGES



COLLECTOR SATURATION REGION



COLLECTOR HIGH VOLTAGE REGION



MA286 thru MA288 (GERMANIUM)

(continued)



CASE 31(1)
(TO-5)

PNP germanium transistors for very economical circuit applications. Available with a wide variety of gain ranges.

All leads isolated from case

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	10	V
Collector-Base Voltage	V_{CB}	10	V
Emitter-Base Voltage	V_{EB}	10	V
Collector Current	I_C	200	mA
Storage Temperature Limits	T_{stg}	-55 to +85	°C
Power Dissipation ($T_A = +25^\circ\text{C}$)	P_D	175	mW

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

Characteristic	Symbol	Min	Max	Unit
Collector-Emitter Current ($V_{CE} = 10\text{ V}$ $R_{BE} = 10\text{ K}\Omega$)	I_{CER}	-	600	μA
Small Signal Current Gain ($V_{CE} = 6\text{ V}$, $I_C = 1\text{ mA}$)	h_{fe}	14 30 180	40 250 -	-

MA286
MA287
MA288

MA881 thru

CASE 31(1)
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All leads isolated from case

MAXIMUM RATINGS

Collector-Base Voltage
Collector-Emitter Voltage
Emitter-Base Voltage
Collector Current
Collector Dissipation Derate above $T_A = 25^\circ\text{C}$
Storage and Operating Temperature Range

*Limited by power dissipation

MA881 thru MA889 (GERMANIUM)

(continued)

PNP germanium transistors for audio amplifier and medium-speed switching applications. Recommended as driver transistors for 50-60 Volt power transistors.



CASE 31(1)
(TO-5)

All leads isolated from case

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Base Voltage MA881 thru MA884 MA885 thru MA889	V_{CB}	60 50	Vdc
Collector-Emitter Voltage MA881 thru MA884 MA885 thru MA889	V_{CES}	60 50	Vdc
Emitter-Base Voltage	V_{EB}	15	Vdc
Collector Current (Continuous)*	I_C^*	500	mA dc
Collector Dissipation at $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	200 2.67	mW mW/ $^\circ\text{C}$
Storage and Operating Temperature Range	T_{stg}, T_J	-50 to +100	$^\circ\text{C}$

*Limited by power dissipation

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

Characteristic	Symbol	Min	Max	Unit
Collector-Base Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$)	I_{CBO}	---	10	μAdc
MA881 thru MA884 ($V_{CB} = 60\text{ Vdc}$, $I_E = 0$)		---	100	
MA881 thru MA884 ($V_{CB} = 25\text{ Vdc}$, $I_E = 0$)		---	15	
MA885 thru MA889 ($V_{CB} = 50\text{ Vdc}$, $I_E = 0$)		---	100	
Emitter-Base Cutoff Current ($V_{EB} = 15\text{ Vdc}$, $I_C = 0$)	I_{EBO}	---	10	μAdc
MA881 thru MA884 MA885 thru MA889		---	15	
Collector-Emitter Leakage Current ($V_{CE} = 60\text{ Vdc}$, $R_{BE} = 0$)	I_{CES}	---	100	μAdc
MA881 thru MA884 ($V_{CE} = 50\text{ Vdc}$, $R_{BE} = 0$)		---	100	
Output Capacitance ($V_{CB} = 6\text{ Vdc}$, $I_E = 0$, $f = 1\text{ MHz}$)	C_{ob}	---	25	pF
Input Impedance ($V_{CB} = 6\text{ Vdc}$, $I_E = 1\text{ mAdc}$, $f = 1\text{ kHz}$)	h_{ib}	26	40	ohms
Output Admittance ($V_{CB} = 6\text{ Vdc}$, $I_E = 1\text{ mAdc}$, $f = 1\text{ kHz}$)	h_{ob}	0.1	1.0	μmhos
DC Current Gain ($V_{CE} = 1\text{ Vdc}$, $I_C = 10\text{ mAdc}$)	h_{FE}	30	---	----
MA881		40	---	
MA882		75	---	
MA883		125	---	
MA884				
Small-Signal Current Gain ($V_{CE} = 6\text{ Vdc}$, $I_E = 1\text{ mAdc}$, $f = 1\text{ kHz}$)	h_{fe}	30	70	----
MA881, MA886		50	120	
MA882, MA887		100	225	
MA883, MA888		190	400	
MA884, MA889		15	40	
MA885				
Small-Signal Current Gain Cutoff Frequency ($V_{CB} = 6\text{ Vdc}$, $I_E = 1\text{ mAdc}$)	f_{ab}	0.75	---	MHz
MA881, MA886		1.0	---	
MA882, MA887		1.25	---	
MA883, MA888		1.75	---	
MA884, MA889		0.5	---	

MA909, MA910 (GERMANIUM)



PNP Germanium transistors for high-voltage neon driver, solenoid and relay driver circuits.

CASE 31(1)
(TO-5)

All leads isolated from case

MAXIMUM RATINGS

Rating	Symbol	MA909	MA910	Unit
Collector-Base Voltage	V_{CB}	75	90	Volts
Collector-Emitter Voltage	V_{CEO}	75	90	Volts
Emitter-Base Voltage	V_{EB}	35	45	Volts
Collector Current	I_C	200		mA
Collector Dissipation at $T_C = 25^\circ\text{C}$	P_D	150		mW
Junction and Storage Temperature	T_J, T_{stg}	100		$^\circ\text{C}$

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

Characteristic	Symbol	Min	Max	Unit
Collector-Base Cutoff Current ($V_{CB} = 2.5 \text{ Vdc}, I_E = 0$)	I_{CBO}	-	14	Adc
($V_{CB} = 75 \text{ Vdc}, I_E = 0$)			50	
($V_{CB} = 90 \text{ Vdc}, I_E = 0$)			50	
Emitter-Base Cutoff Current ($V_{EB} = 35 \text{ Vdc}, I_C = 0$)	I_{EBO}	-	50	Adc
($V_{EB} = 45 \text{ Vdc}, I_C = 0$)			50	
Collector-Emitter Leakage Current ($V_{CE} = 75 \text{ Vdc}, R_{BE} = 0$)	I_{CES}	-	100	Adc
($V_{CE} = 90 \text{ Vdc}, R_{BE} = 0$)			100	
Collector-Emitter Saturation Voltage ($I_C = 5 \text{ mAdc}, I_B = 0.25 \text{ mAdc}$)	$V_{CE(sat)}$	-	0.35	Vdc
Base-Emitter Saturation Voltage ($I_C = 5 \text{ mAdc}, I_B = 0.25 \text{ mAdc}$)	$V_{BE(sat)}$	-	0.40	Vdc
DC Current Gain ($I_C = 5 \text{ mAdc}, V_{CE} = 0.35 \text{ Vdc}$)	h_{FE}	20	-	-
Collector-Emitter Punch-Thru Voltage ($V_{fl} = 1.0 \text{ Vdc}, R_{in} \text{ of VTVM} - 10 \text{ to } 12 \text{ Megohms}$)	V_{pt}	75	-	Vdc
		90	-	