Elektronische Bauelemente

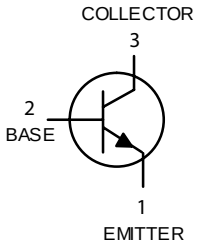
MPS2222A

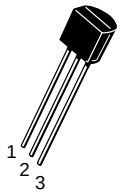
NPN Silicon
General Purpose Transistor

RoHS Compliant Product

A suffix of "-C" specifies halogen & lead-free

TO-92





● FEATURES

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MPS2907A)
- Ideal for Medium Power Amplification and Switching

● MAXIMUM RATINGS

RATING	SYMBOL	VALUE	UNIT
Collector - Emitter Voltage	V_{CEO}	40	V
Collector - Base Voltage	V_{CBO}	75	V
Emitter - Base Voltage	V_{EBO}	6.0	V
Collector Current - Continuous	I_C	600	mA
Total Device Dissipation @ T_A = 25 ℃ Derate Above 25 ℃	P_D	625 5.0	mW mW / ℃
Total Device Dissipation @ T_C = 25 ℃ Derate Above 25 ℃	P_D	1.5 12	Watts mW / ℃
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-55 ~ +150	℃

● THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	℃ / W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	℃ / W

● ELECTRICAL CHARACTERISTICS (T_A = 25 ℃ unless otherwise noted)

CHARACTERISTIC	SYMBOL	Min.	Max.	UNIT
OFF CHARACTERISTICS				
Collector - Emitter Breakdown Voltage (I_C = 10 mA, I_B = 0)	$V_{(BR)CEO}$	40	-	V
Collector - Base Breakdown Voltage (I_C = 10 µA, I_E = 0)	$V_{(BR)CBO}$	75	-	V
Emitter - Base Breakdown Voltage (I_E = 10 µA, I_C = 0)	$V_{(BR)EBO}$	6.0	-	V
Collector Cutoff Current (V_{CE} = 60 V, $V_{EB(oFF)}$ = 3.0 V)	I_{CEX}	-	10	nA
Collector Cutoff Current (V_{CB} = 60 V, I_E = 0) (V_{CB} = 60 V, I_E = 0, T_A = 150 ℃)	I_{CBO}	- -	0.01 10	µA
Emitter Cutoff Current (V_{EB} = 3.0 V, I_C = 0)	I_{EBO}	-	10	nA
Collector Cutoff Current (V_{CE} = 10 V)	I_{CEO}	-	10	nA
Base Cutoff Current (V_{CE} = 60 V, $V_{EB(oFF)}$ = 3.0 V)	I_{BEX}	-	20	nA

●ELECTRICAL CHARACTERISTICS (T_A = 25 ℃ unless otherwise noted) (Continued)

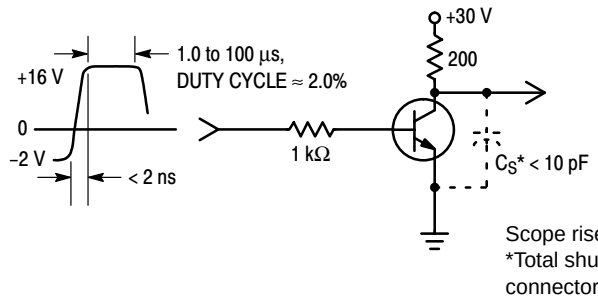
CHARACTERISTIC	SYMBOL	Min.	Max.	UNIT
ON CHARACTERISTICS				
DC Current Gain				
(I_C = 0.1 mA, V_{CE} = 10 V)	h_{FE}	35	-	-
(I_C = 1.0 mA, V_{CE} = 10 V)		50	-	
(I_C = 10 mA, V_{CE} = 10 V)		75	-	
(I_C = 10 mA, V_{CE} = 10 V, T_A = -55 ℃)		35	-	
(I_C = 150 mA, V_{CE} = 10 V)(1)		100	300	
(I_C = 150 mA, V_{CE} = 1.0 V)(1)		50	-	
(I_C = 500 mA, V_{CE} = 10 V)(1)		40	-	
Collector - Emitter Saturation Voltage(1)	$V_{CE(sat)}$			V
(I_C = 150 mA, I_B = 15 mA)		-	0.3	
(I_C = 500 mA, I_B = 50 mA)		-	1.0	
Base - Emitter Saturation Voltage(1)	$V_{BE(sat)}$			V
(I_C = 150 mA, I_B = 15 mA)		0.6	1.2	
(I_C = 500 mA, I_B = 50 mA)		-	2.0	
SMALL - SIGNAL CHARACTERISTICS				
Current - Gain - Bandwidth Product(2) (I_C = 20 mA, V_{CE} = 20 V, f = 100 MHz)	f_T	300	-	MHz
Output Capacitance (V_{CB} = 10 V, I_E = 0, f = 1.0 MHz)	C_{obo}	-	8.0	pF
Input Capacitance (V_{EB} = 0.5 V, I_C = 0, f = 1.0 MHz)	C_{ibo}	-	25	pF
Input Impedance	h_{ie}			KΩ
(I_C = 1.0 mA, V_{CE} = 10 V, f = 1.0 KHz)		2.0	8.0	
(I_C = 10 mA, V_{CE} = 10 V, f = 1.0 KHz)		0.25	1.25	
Voltage Feedback Ratio	h_{re}			X 10^{-4}
(I_C = 1.0 mA, V_{CE} = 10 V, f = 1.0 KHz)		-	8.0	
(I_C = 10 mA, V_{CE} = 10 V, f = 1.0 KHz))		-	4.0	
Small - Signal Current Gain	h_{fe}			-
(I_C = 1.0 mA, V_{CE} = 10 V, f = 1.0 KHz)		50	300	
(I_C = 10 mA, V_{CE} = 10 V, f = 1.0 KHz)		75	375	
Output Admittance	h_{oe}			µmhos
(I_C = 1.0 mA, V_{CE} = 10 V, f = 1.0 KHz)		5.0	35	
(I_C = 10 mA, V_{CE} = 10 V, f = 1.0 KHz)		25	200	
Collector Base Time Constant (I_E = 20 mA, V_{CB} = 20 V, f = 31.8 KHz)	r_b, C_C	-	150	ps
Noise Figure (I_C = 100 µA, V_{CE} = 10 V, R_S = 1.0 KΩ, f = 1.0 KHz)	N_F	-	4.0	dB

SWITCHING CHARACTERISTICS

Delay Time	(V_{CC} = 30 V, $V_{BE(off)}$ = -2.0 V,	td	-	10	ns
Rise Time	I_C = 150 mA, I_{B1} = 15 mA) (Figure 1)	tr	-	25	ns
Storage Time	(V_{CC} = 30 V, I_C = 150 mA,	ts	-	225	ns
Fall Time	I_{B1} = I_{B2} = 15 mA) (Figure 2)	tf	-	60	ns

1. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0 %.
2. f_T is defined as the frequency at which | h_{fe} | extrapolates to unity.

● SWITCHING TIME EQUIVALENT TEST CIRCUITS



Scope rise time < 4 ns
*Total shunt capacitance of test jig, connectors, and oscilloscope.

Figure 1. Turn–On Time

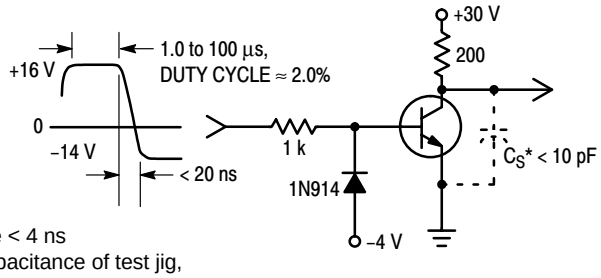


Figure 2. Turn–Off Time

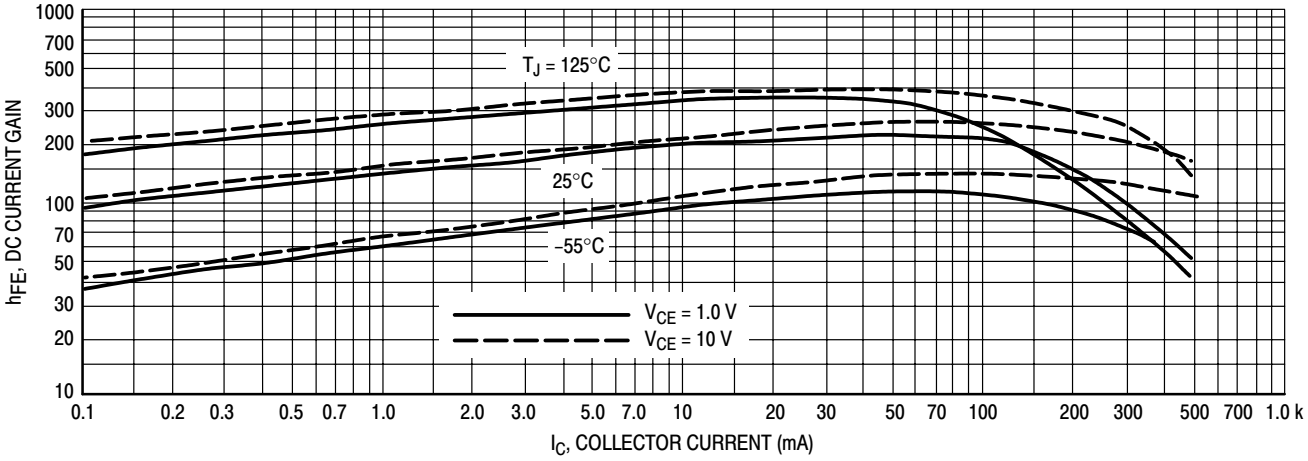


Figure 3. DC Current Gain

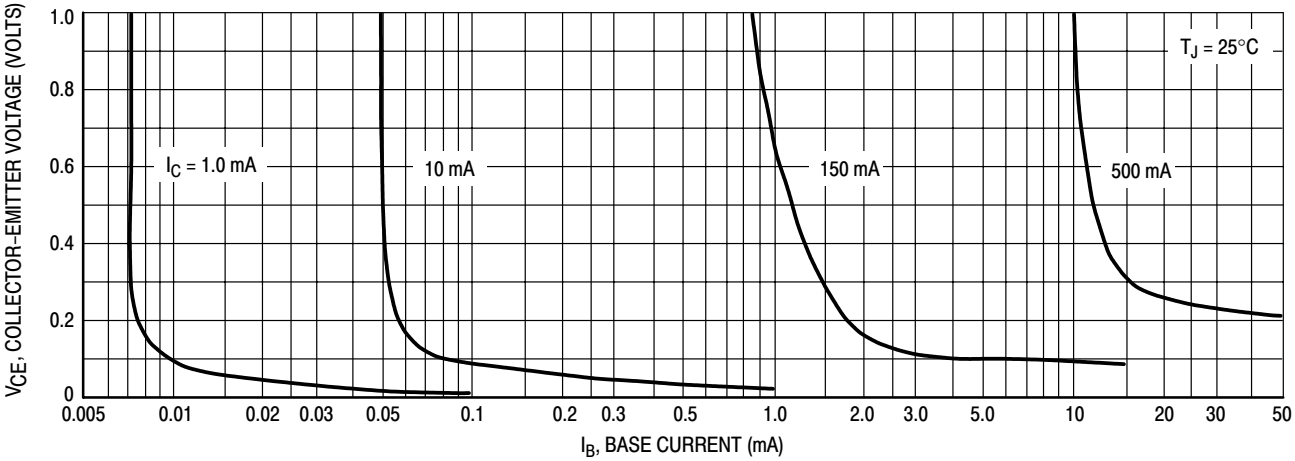


Figure 4. Collector Saturation Region

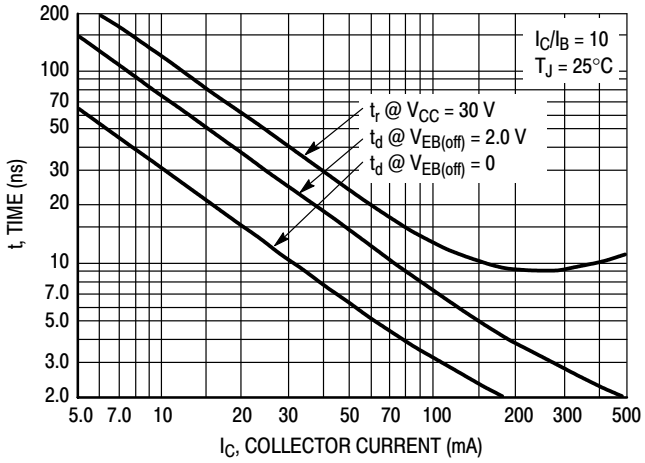


Figure 5. Turn–On Time

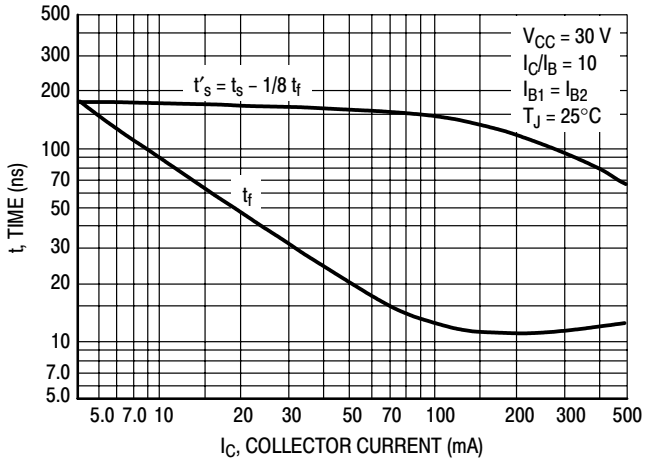


Figure 6. Turn–Off Time

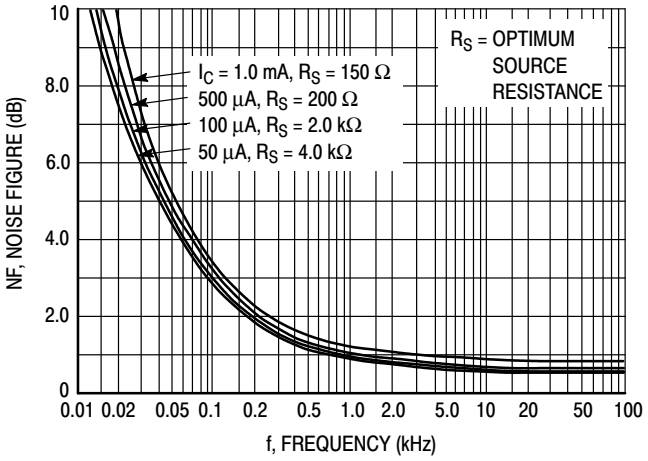


Figure 7. Frequency Effects

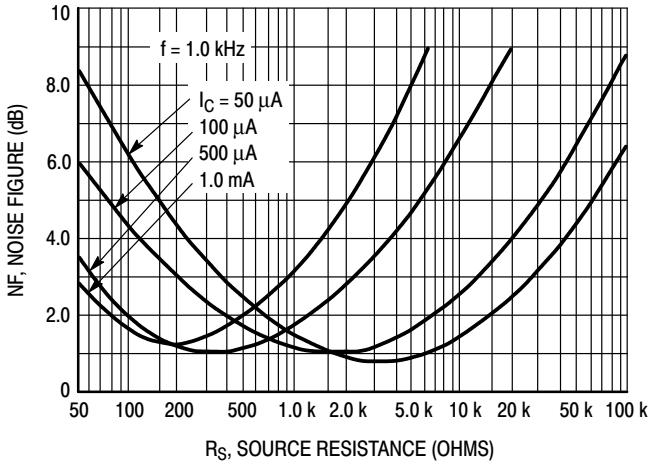


Figure 8. Source Resistance Effects

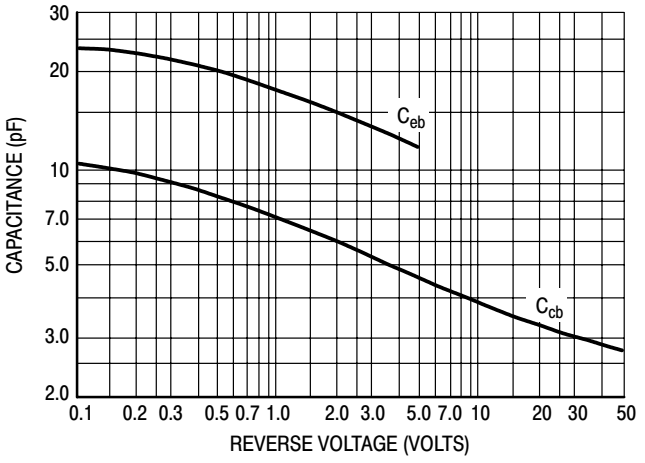


Figure 9. Capacitances

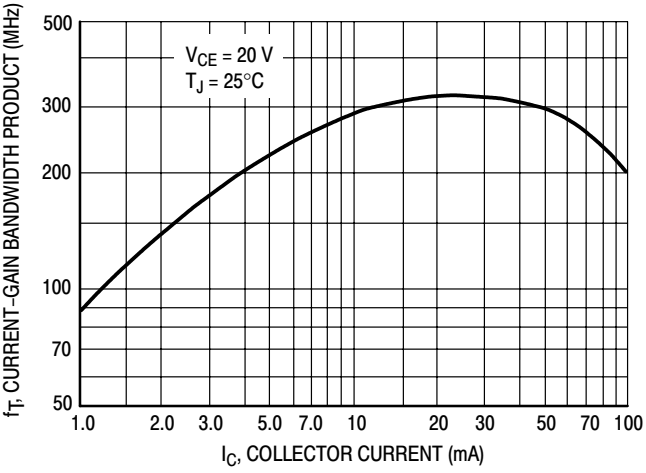


Figure 10. Current–Gain Bandwidth Product

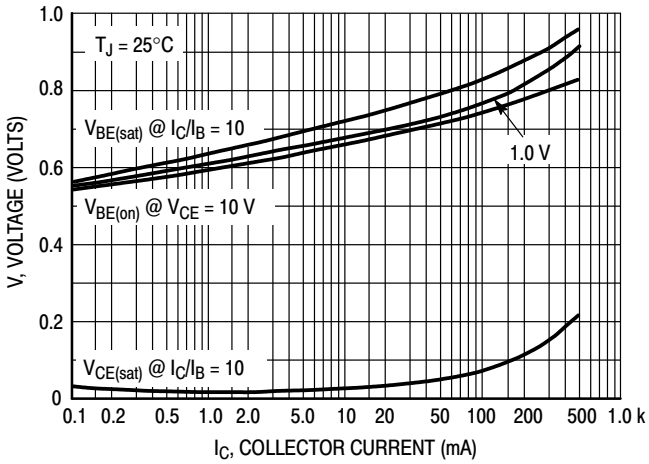


Figure 11. "On" Voltages

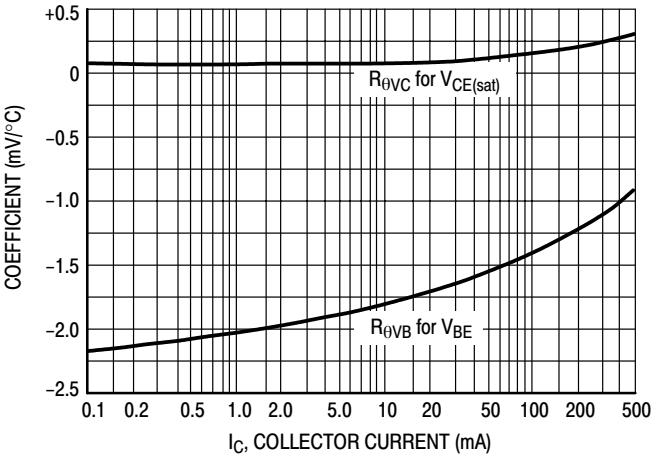


Figure 12. Temperature Coefficients

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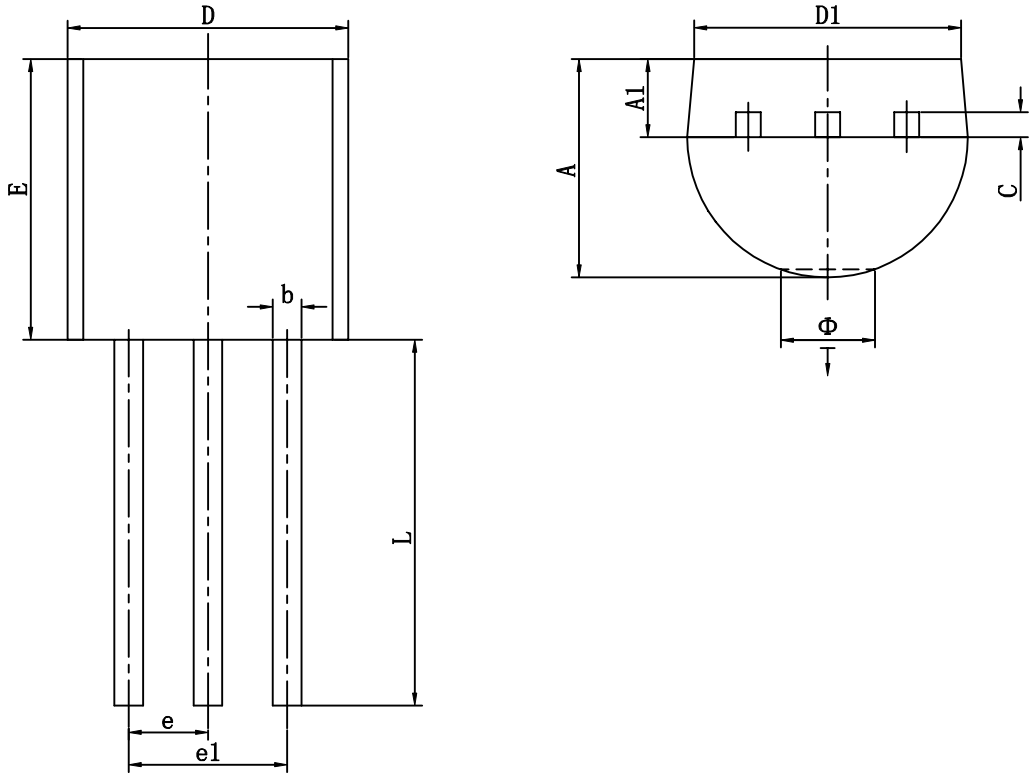
●TO-92 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.400	4.700	0.173	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270TYP		0.050TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Ö		1.600		0.063
⏚	0.000	0.380	0.000	0.015