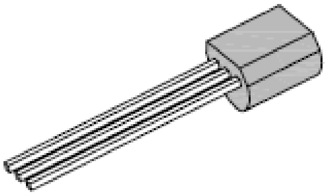
Small Signal Low Noise Transistors (NPN)

Features



- NPN silicon epitaxial transistor for switching and amplifier applications
- This device is designed for low noise, high gain, general purpose applications at collector currents from 1μA to 50mA
- RoHS compliance

TO-92

Mechanical Data

Case:	TO-92, Plastic Package
Terminals:	Solderable per MIL-STD-202G, Method 208
Weight:	0.18 gram

Absolute Maximum Ratings* *(T $_{Ambient}$=25ºC unless noted otherwise)*

Symbol	Description	2N5088	2N5089	Unit
V_{CEO}	Collector-Emitter Voltage	30	25	V
V_{CBO}	Collector-Base Voltage	35	30	V
V_{EBO}	Emitter-Base Voltage	4.5		V
I_C	Collector Current Continuous	100		mA
T_J ,T_{STG}	Operation and Storage Junction Temperature Range	-55 to +150		° C

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

Notes

1. These ratings are based on a maximum junction temperature of 150 degrees C.

2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics *(T Ambient=25ºC unless noted otherwise)*

Symbol	Description	2N5088	2N5089	Unit
P_D	Power Dissipation at T_A=25°C	625		mW
	Derate above 25°C	5.0		mW/° C
P_D	Power Dissipation at T_C=25°C	1.5		W
	Derate above 25°C	12		mW/° C
$R_{\theta JA}$	Thermal Resistance Junction to Ambient Air (Note 1)	357		° C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	125		° C/W
T_J ,T_{STG}	Operation and Storage Junction Temperature Range	-55 to +150		° C

Note: 1. Measured with the device soldered into a typical printed circuit board.

Electrical Characteristics *(T Ambient=25ºC unless noted otherwise)*

Off Characteristics

Symbol	Description	2N5088		2N5089		Unit	Conditions
		Min.	Max.	Min.	Max.		
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	35	-	30	-	V	I_C=100µA, I_E=0
$V_{(BR)CEO}$*	Collector-Emitter Breakdown Voltage	30	-	25	-	V	I_C=1mA, I_B=0
I_{CBO}	Collector Cut–Off Current	-	50	-	50	nA	
		V_{CB}=20V, I_E=0		V_{CB}=15V, I_E=0			
I_{EBO}	Emitter Cut–Off Current	-	50	-	100	nA	
		V_{EB}=3V, I_C=0		V_{EB}=4.5V, I_C=0			

On Characteristics

Symbol	Description	2N5088		2N5089		Unit	Conditions
		Min.	Max.	Min.	Max.		
h_{FE}	D.C. Current Gain	300	900	400	1200		V_{CE}=5V, I_C=0.1mA
		350	-	450	-		V_{CE}=5V, I_C=1mA
		300	-	400	-		*V_{CE}=5V, I_C=10mA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	-	0.5	-	0.5	V	I_C=10mA, I_B=1mA
$V_{BE(on)}$*	Base Emitter Saturation Voltage	-	0.8	-	0.8	V	I_C=10mA, V_{CE}=5V

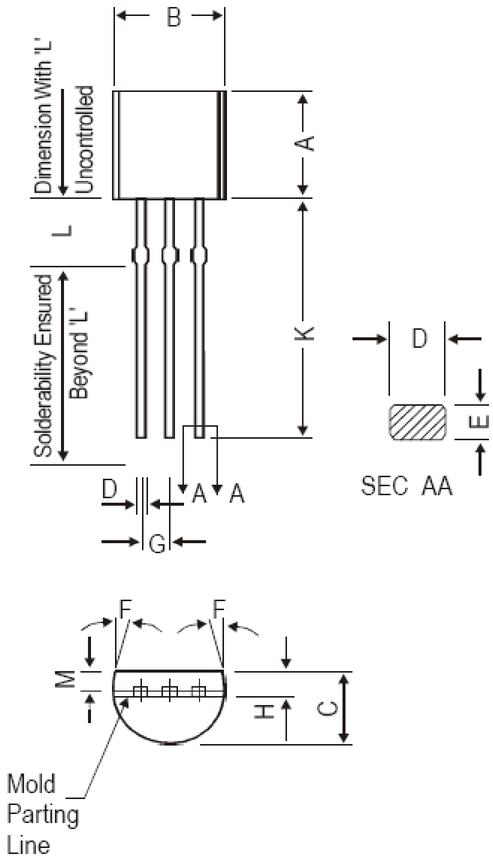
Small signal Characteristics

Symbol	Description	2N5088		2N5089		Unit	Conditions
		Min.	Max.	Min.	Max.		
f_T	Current Gain-Bandwidth Product	50	-	50	-	MHz	V_{CE}=5V, I_C=0.5mA, f=20MHz
C_{cb}	Collector-Base Capacitance	-	4.0	-	4.0	pF	V_{CB}=5V, f=100KHz
C_{eb}	Emitter-Base Capacitance	-	10	-	10	pF	V_{EB}=0.5V, f=100KHz
h_{fe}	Small Signal Current Gain	350	1400	450	1800		V_{CE}=5V, I_C=1mA f=1KHz
NF	Noise Figure	-	3.0	-	2.0	dB	V_{CE}=5V, I_C=100μA, Rs=10KΩ, f=10Hz to 15.7 KHz

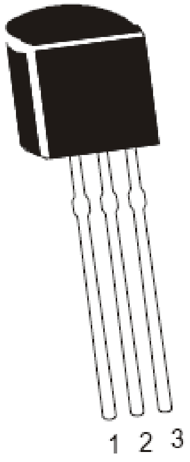
*Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Dimensions in mm

TO-92



DIM	MIN.	MAX.
A	4.32	5.33
B	4.45	5.20
C	3.18	4.19
D	0.41	0.55
E	0.35	0.50
F	5 DEG	
G	1.14	1.40
H	1.20	1.40
K	12.70	—
L	1.982	2.082
M	1.03	1.20



PIN CONFIGURATION
1. EMITTER
2. BASE
3. COLLECTOR

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