



Micro Commercial Components  
 21201 Itasca Street Chatsworth  
 CA 91311  
 Phone: (818) 701-4933  
 Fax: (818) 701-4939

# MMBTA13 MMBTA14

## NPN Darlington Amplifier Transistor

### Features

- Operating And Storage Temperatures  $-55^{\circ}\text{C}$  to  $150^{\circ}\text{C}$
- $R_{\theta JA}$  is  $556^{\circ}\text{C/W}$  (Mounted on FR-5 PCB  $1.0'' \times 0.75'' \times 0.062''$ )
- Capable of 225mWatts of Power Dissipation
- Marking Code: MMBTA13 ---K2D; MMBTA14 ---- 1N

### Electrical Characteristics @ $25^{\circ}\text{C}$ Unless Otherwise Specified

Symbol	Parameter	Min	Max	Units
--------	-----------	-----	-----	-------

#### OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage* ( $I_C=100\mu\text{Adc}$ , $I_B=0$ )	30		Vdc
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	30		Vdc
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	10		Vdc
$I_C$	Collector Current-Continuous	300		mAdc
$I_{CBO}$	Collector Cutoff Current ( $V_{CB}=30\text{Vdc}$ , $I_E=0$ )		100	nAdc
$I_{EBO}$	Emitter Cutoff Current ( $V_{EB}=10\text{Vdc}$ , $I_C=0$ )		100	nAdc

#### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain*			
MMBTA13 MMBTA14	( $I_C=10\text{mAdc}$ , $V_{CE}=5.0\text{Vdc}$ )	5000 10000		
MMBTA13 MMBTA14	( $I_C=150\text{mAdc}$ , $V_{CE}=1.0\text{Vdc}$ )	10000 20000		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ( $I_C=100\text{mAdc}$ , $I_B=0.1\text{mAdc}$ )		1.5	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ( $I_C=100\text{mAdc}$ , $V_{CE}=5.0\text{Vdc}$ )		2.0	Vdc

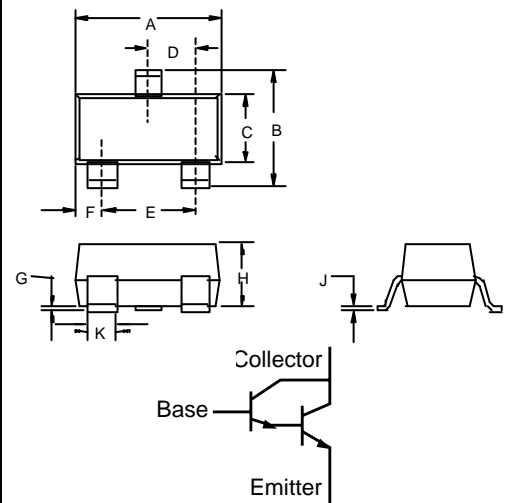
#### SMALL-SIGNAL CHARACTERISTICS

$f_T$	Current Gain-Bandwidth Product ( $I_C=10\text{mAdc}$ , $V_{CE}=5.0\text{Vdc}$ , $f=100\text{MHz}$ )	125		MHz
$C_{obo}$	Output Capacitance ( $V_{CB}=10\text{Vdc}$ , $I_E=0$ , $f=1.0\text{MHz}$ )		8.0	pF
$C_{ibo}$	Input Capacitance ( $V_{BE}=0.5\text{Vdc}$ , $I_C=0$ , $f=1.0\text{MHz}$ )		15	pF

#### SWITCHING CHARACTERISTICS

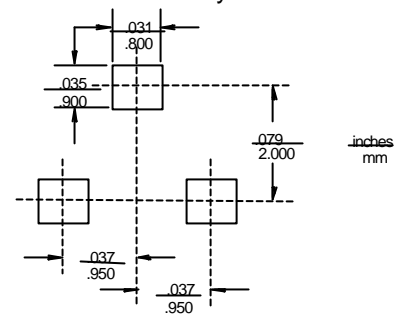
$t_d$	Delay Time	( $V_{CC}=30\text{Vdc}$ , $V_{BE}=0.5\text{Vdc}$ )	10	ns
$t_r$	Rise Time	( $I_C=150\text{mAdc}$ , $I_B=15\text{mAdc}$ )	25	ns
$t_s$	Storage Time	( $V_{CC}=30\text{Vdc}$ , $I_C=150\text{mAdc}$ )	225	ns
$t_f$	Fall Time	( $I_{B1}=I_{B2}=15\text{mAdc}$ )	60	ns

### SOT-23



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.04	
B	.083	.098	2.10	2.64	
C	.047	.055	1.20	1.40	
D	.035	.041	.89	1.03	
E	.070	.081	1.78	2.05	
F	.018	.024	.45	.60	
G	.0005	.0039	.013	.100	
H	.035	.044	.89	1.12	
J	.003	.007	.085	.180	
K	.015	.020	.37	.51	

### Suggested Solder Pad Layout



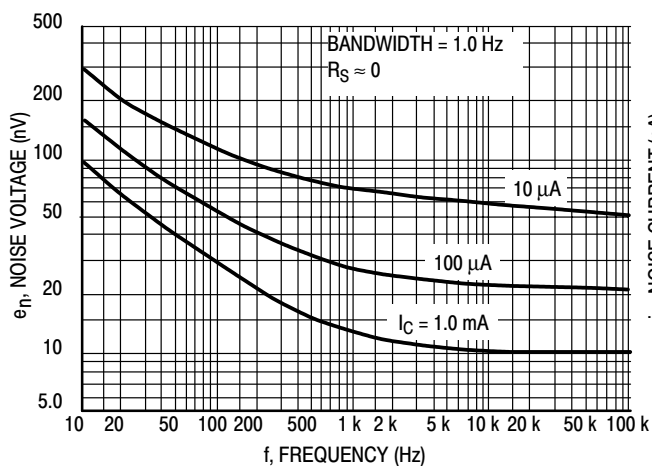


Figure 2. Noise Voltage

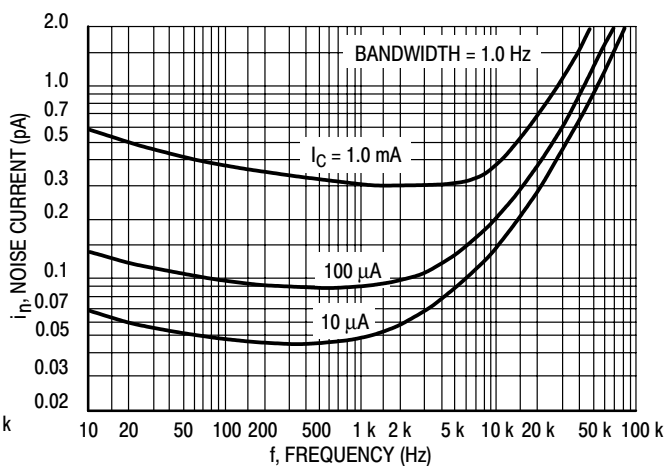


Figure 3. Noise Current

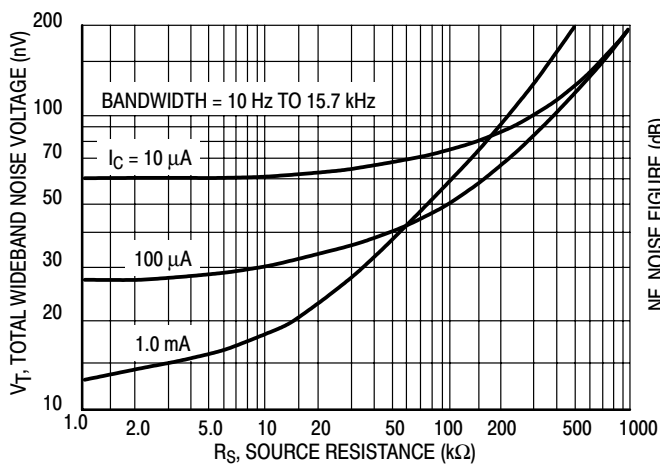


Figure 4. Total Wideband Noise Voltage

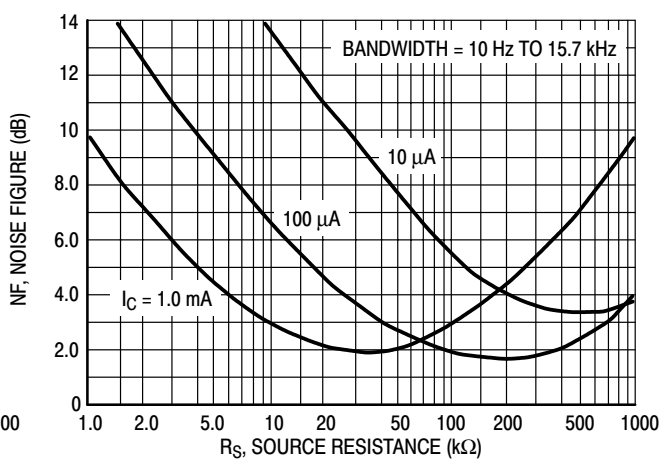


Figure 5. Wideband Noise Figure

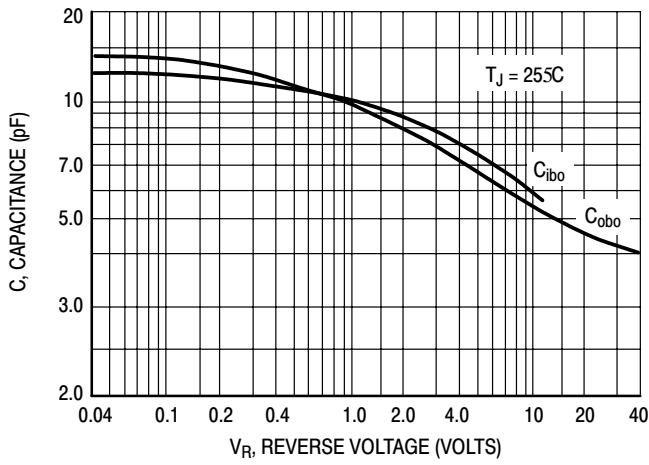


Figure 6. Capacitance

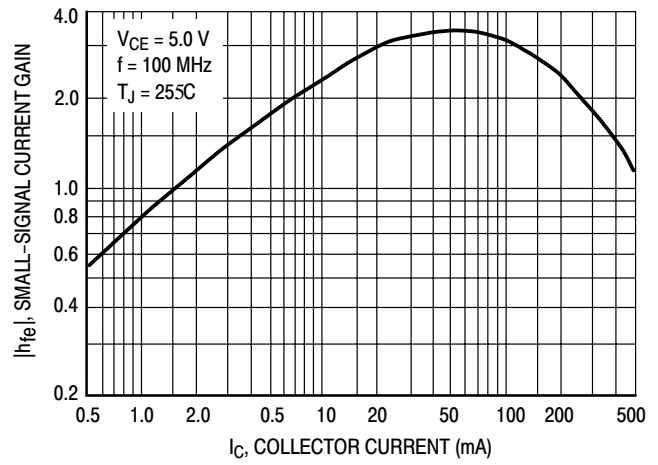


Figure 7. High Frequency Current Gain

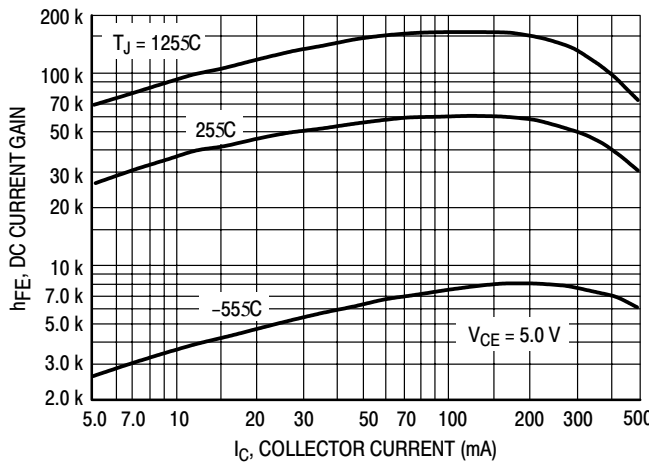


Figure 8. DC Current Gain

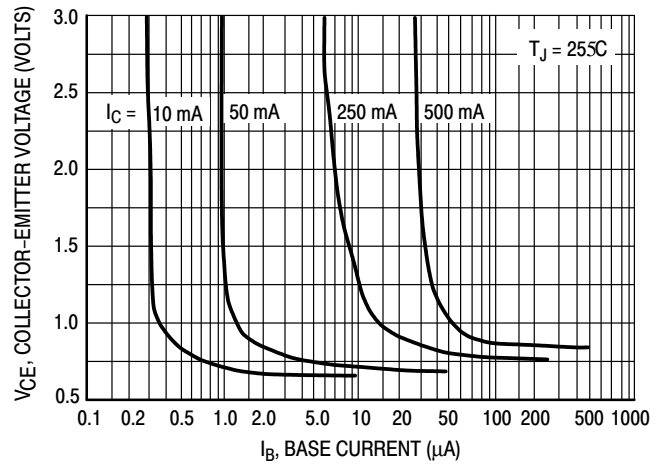


Figure 9. Collector Saturation Region

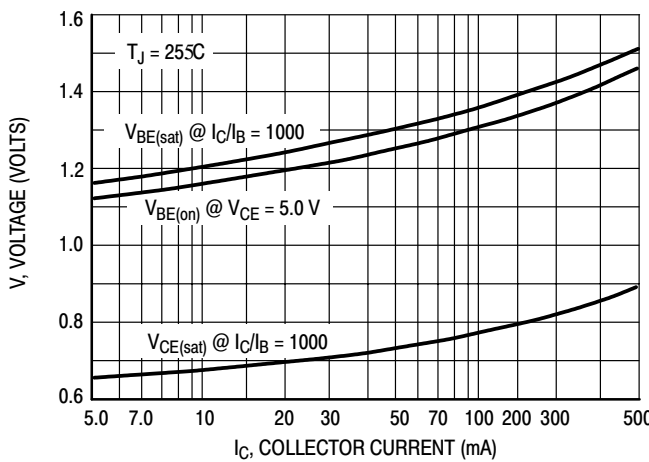


Figure 10. "On" Voltages

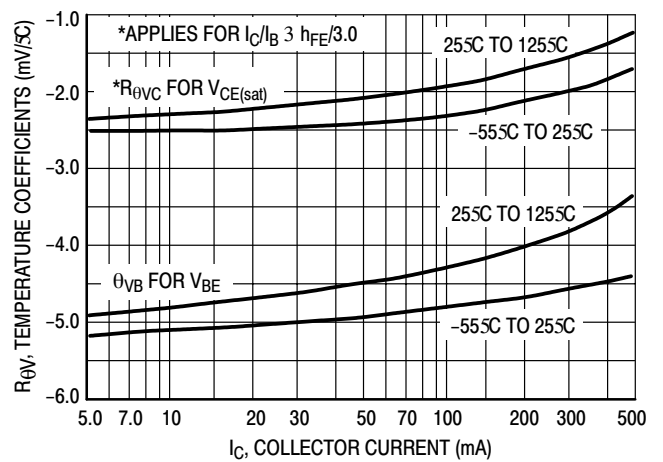


Figure 11. Temperature Coefficients

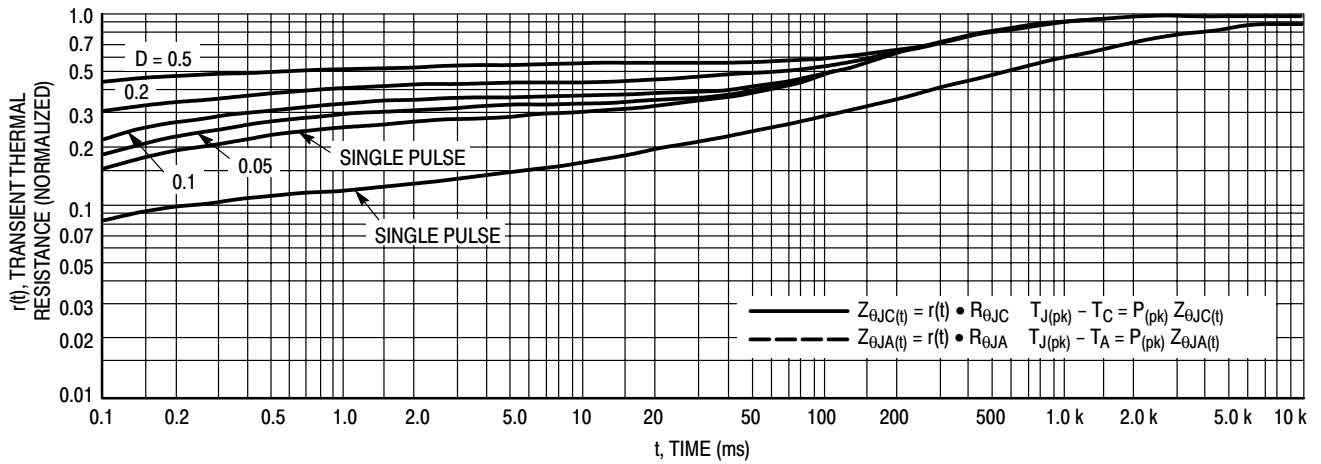


Figure 12. Thermal Response

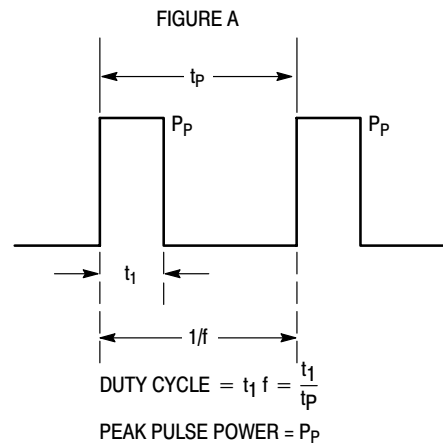
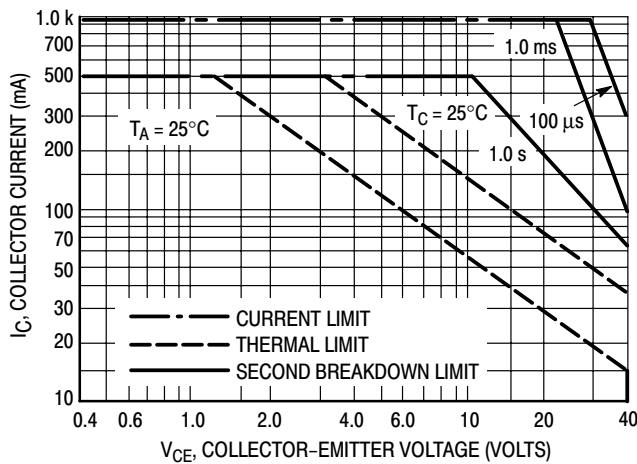


Figure 13. Active Region Safe Operating Area    Design Note: Use of Transient Thermal Resistance Data