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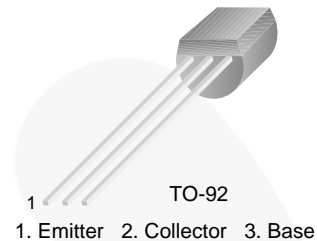
February 2015

# KSD1616A

## NPN Epitaxial Silicon Transistor

### Features

- Audio Frequency Power Amplifier and Medium Speed Switching
- Complement to KSB1116 / KSB1116A



### Ordering Information

Part Number	Top Mark	Package	Packing Method
KSD1616AYTA	D1616A	TO-92 3L	Ammo
KSD1616AGBU	D1616A	TO-92 3L	Bulk
KSD1616AGTA	D1616A	TO-92 3L	Ammo
KSD1616ALTA	D1616A	TO-92 3L	Ammo

### Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage	120	V
$V_{CEO}$	Collector-Emitter Voltage	60	V
$V_{EBO}$	Emitter-Base Voltage	6	V
$I_C$	Collector Current (DC)	1	A
$I_{CP}$	Collector Current (Pulse) <sup>(1)</sup>	2	A
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	-55 to 150	$^\circ\text{C}$

#### Note:

1. Pulse width  $\leq 10$  ms, duty cycle  $< 50\%$

**Thermal Characteristics<sup>(2)</sup>**

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Max.	Unit
$P_D$	Total Device Dissipation	0.75	W
	Derate Above $25^\circ\text{C}$	6	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	160	$^\circ\text{C}/\text{W}$

**Note:**

2. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

**Electrical Characteristics**

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \mu\text{A}$ , $I_E = 0$	120			V
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 1 \text{ mA}$ , $I_B = 0$	60			V
$BV_{EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100 \mu\text{A}$ , $I_C = 0$	6			V
$I_{CBO}$	Collector Cut-Off Current	$V_{CB} = 60 \text{ V}$ , $I_E = 0$			100	nA
$I_{EBO}$	Emitter Cut-Off Current	$V_{EB} = 6 \text{ V}$ , $I_C = 0$			100	nA
$h_{FE1}$	DC Current Gain	$V_{CE} = 2 \text{ V}$ , $I_C = 100 \text{ mA}$	135		400	
$h_{FE2}$	DC Current Gain	$V_{CE} = 2 \text{ V}$ , $I_C = 1 \text{ A}$	81			
$V_{BE(on)}$	Base-Emitter On Voltage <sup>(3)</sup>	$V_{CE} = 2 \text{ V}$ , $I_C = 50 \text{ mA}$	600	640	700	mV
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage <sup>(3)</sup>	$I_C = 1 \text{ A}$ , $I_B = 50 \text{ mA}$		0.15	0.30	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage <sup>(3)</sup>	$I_C = 1 \text{ A}$ , $I_B = 50 \text{ mA}$		0.9	1.2	V
$C_{ob}$	Output Capacitance	$V_{CE} = 10 \text{ V}$ , $I_E = 0$ , $f = 1 \text{ MHz}$		19		pF
$f_T$	Current Gain Bandwidth Product	$V_{CE} = 2 \text{ V}$ , $I_C = 100 \text{ mA}$	100	160		MHz
$t_{ON}$	Turn-On Time	$V_{CC} = 10 \text{ V}$ , $I_C = 100 \text{ mA}$ ,		0.07		$\mu\text{s}$
$t_{STG}$	Storage Time	$I_{B1} = -I_{B2} = 10 \text{ mA}$ ,		0.95		$\mu\text{s}$
$t_F$	Fall Time	$V_{BE(off)} = -2 \text{ V} \sim -3 \text{ V}$		0.07		$\mu\text{s}$

**Note:**

3. Pulse test: pulse width < 350  $\mu\text{s}$ , duty cycle  $\leq 2\%$  pulsed.

 **$h_{FE}$  Classification**

Classification	Y	G	L
$h_{FE1}$	135 ~ 270	200 ~ 400	300 ~ 600

## Typical Performance Characteristics

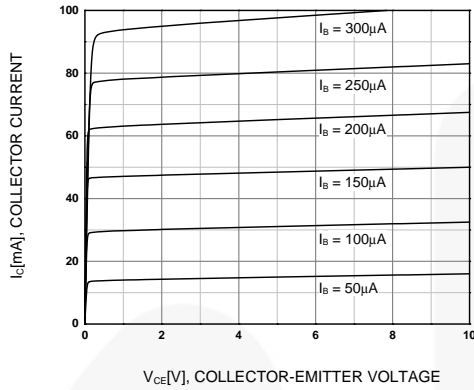


Figure 1. Static Characteristic

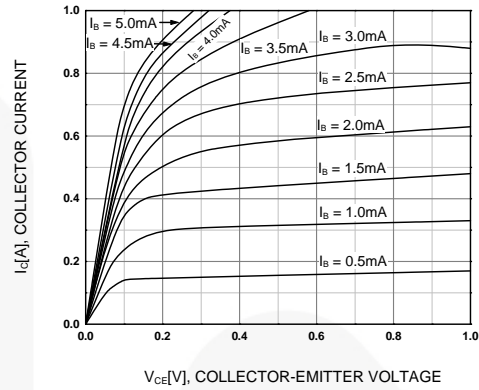


Figure 2. Static Characteristic

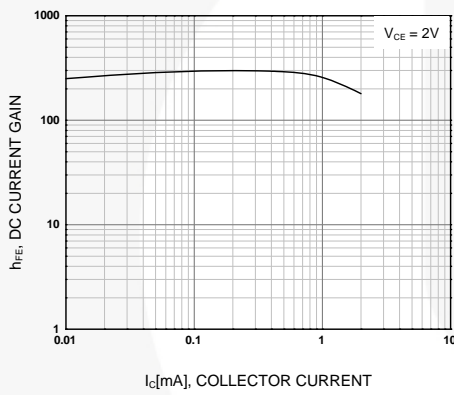


Figure 3. DC Current Gain

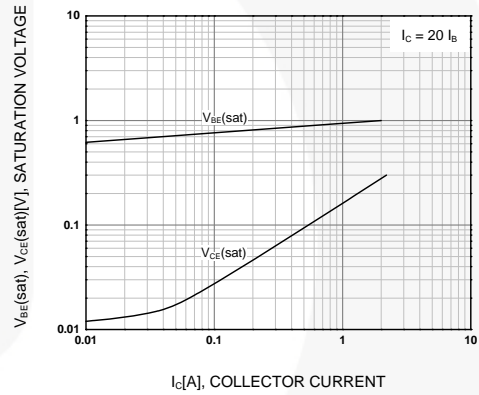


Figure 4. Base-Emitter Saturation Voltage and Collector-Emitter Saturation Voltage

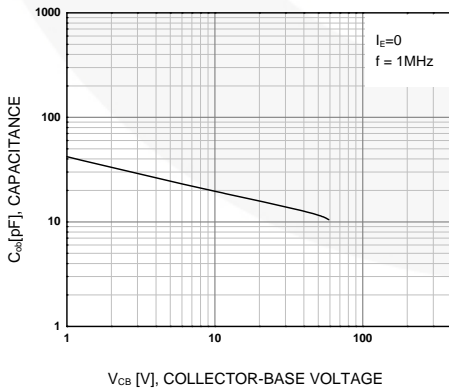


Figure 5. Collector Output Capacitance

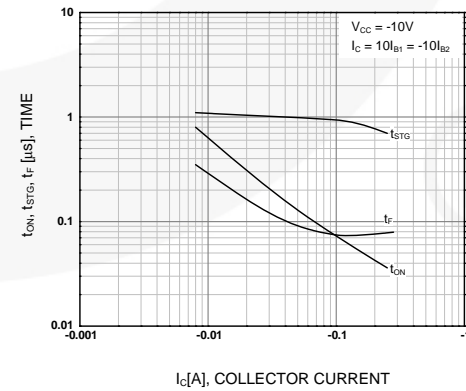


Figure 6. Switching Time

Typical Performance Characteristics (Continued)

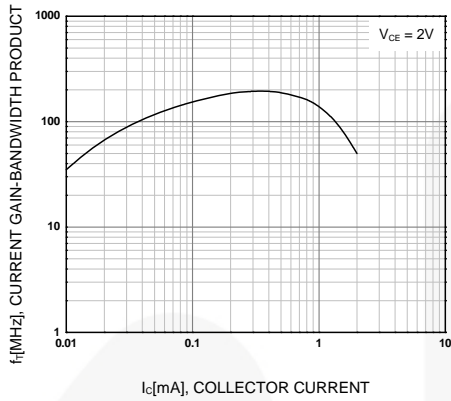


Figure 7. Current Gain Bandwidth Product

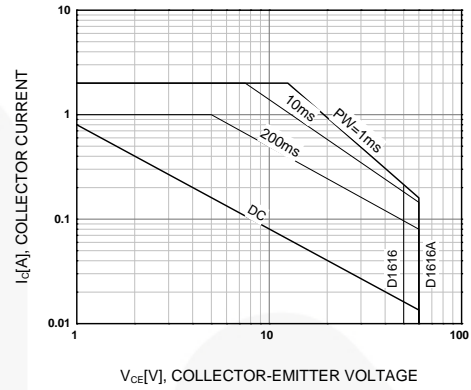


Figure 8. Safe Operating Area

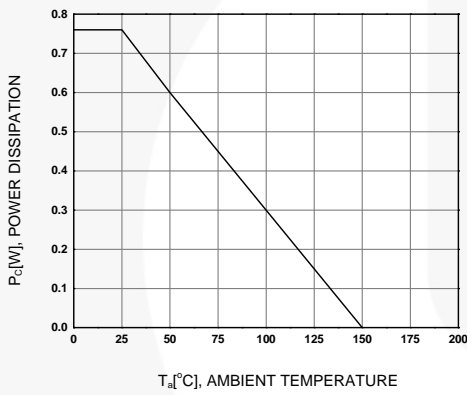
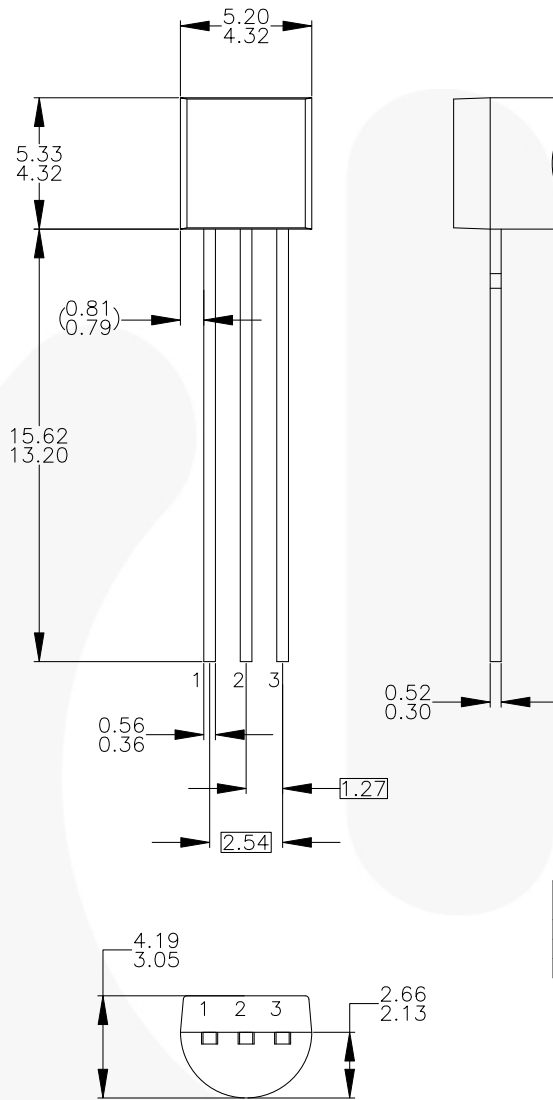


Figure 9. Power Derating

### Physical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-1994.
- D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

Pin	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

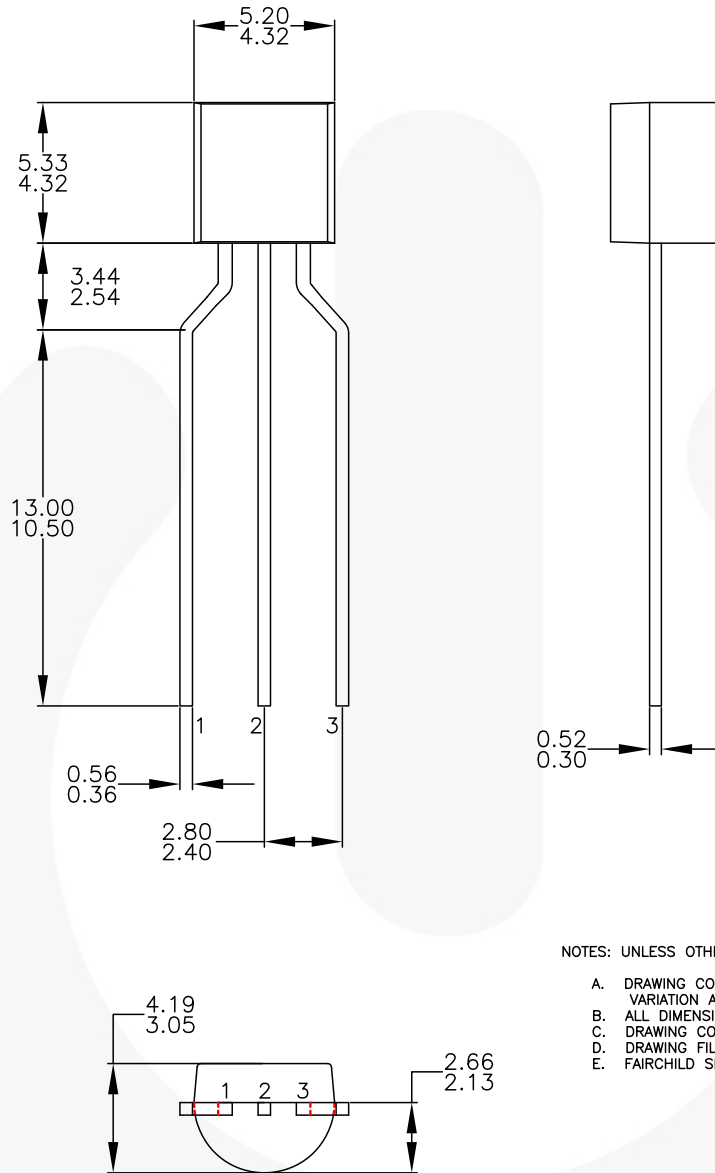
LEGEND:

- P - BIPOLAR
- F - JFET
- M - DMOS
- E - EMITTER
- B - BASE
- C - COLLECTOR
- D - DRAIN
- S - SOURCE
- G - GATE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEABLE AT JFET "F" OPTION.
- F) DRAWING FILENAME: MKT-ZA03DREV3.

**Figure 10. 3-Lead, TO-92, JEDEC TO-92 Compliant Straight Lead Configuration, Bulk Type**

Physical Dimensions (Continued)



NOTES: UNLESS OTHERWISE SPECIFIED






- A. DRAWING CONFORMS TO JEDEC MS-013, VARIATION AC.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5M-2009.
- D. DRAWING FILENAME: MKT-ZA03FREV3.
- E. FAIRCHILD SEMICONDUCTOR.

Figure 11. 3-Lead, TO-92, Molded, 0.2 In Line Spacing Lead Form, Ammo, Tape and Reel Type



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