

## Features

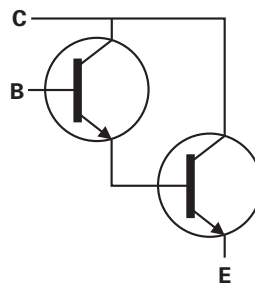
- $BV_{CES} > 80V$
- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- High Current Gain
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

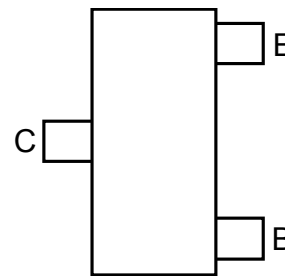
- Case: SOT23
- Case Material: molded plastic, "Green" molding compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight 0.008 grams (approximate)



Top View



Device Symbol



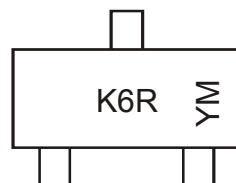
Top View  
Pin-Out

## Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MMBTA28-7-F	AEC-Q101	K6R	7	8	3,000
MMBTA28-13-F	AEC-Q101	K6R	13	8	10,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



K6R = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: B = 2014)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017
Code	X	Y	Z	A	B	C	D	E

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

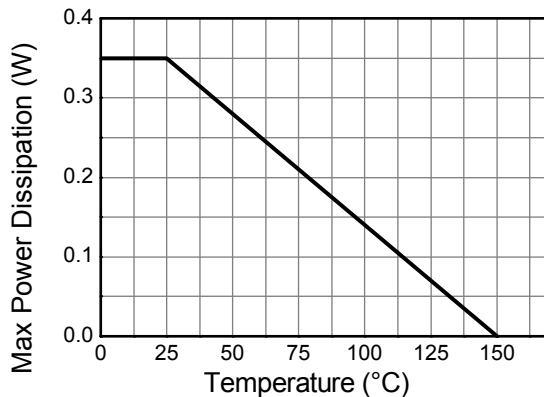
**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	80	V
Collector-Emitter Voltage	V <sub>CES</sub>	80	V
Emitter-Base Voltage	V <sub>EBO</sub>	12	V
Continuous Collector Current	I <sub>C</sub>	500	mA

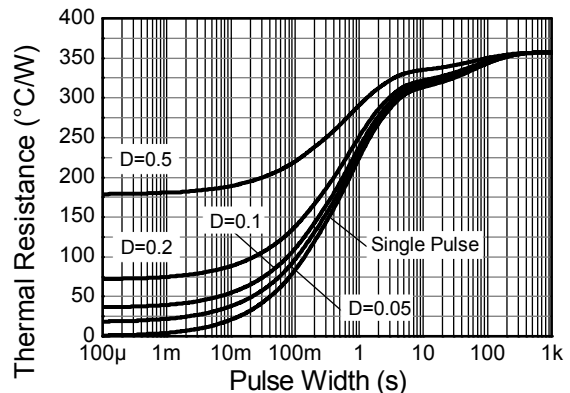
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	310	mW
		350	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	403	°C/W
		357	
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	350	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

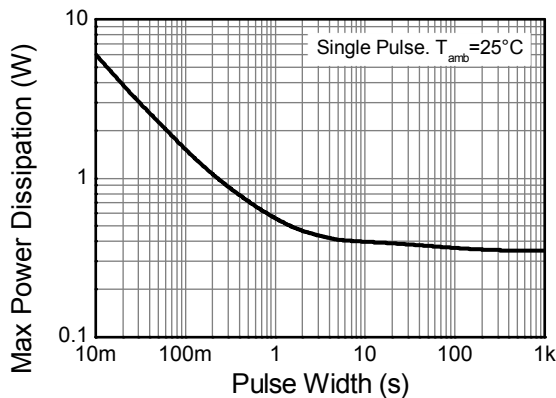
- Notes:
- For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - Same as note (5), except the device is mounted on 15 mm x 15mm 1oz copper.
  - Thermal resistance from junction to solder-point (at the end of the leads).



**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	80	—	—	V	$I_C = 100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 8)	$BV_{CES}$	80	—	—	V	$I_C = 100\mu\text{A}, V_{BE} = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	12	—	—	V	$I_E = 100\mu\text{A}, I_C = 0$
Collector cut-off current	$I_{CBO}$	—	—	100	nA	$V_{CB} = 60\text{V}, I_E = 0$
	$I_{CES}$	—	—	500	nA	$V_{CE} = 60\text{V}, V_{BE} = 0$
Emitter-base Cut-off Current	$I_{EBO}$	—	—	100	nA	$V_{EB} = 10\text{V}, I_C = 0$
<b>ON CHARACTERISTICS (Note 8)</b>						
Static Forward Current Transfer Ratio	$h_{FE}$	10,000 10,000	—	—	—	$I_C = 10\text{mA}, V_{CE} = 5\text{V}$ $I_C = 100\text{mA}, V_{CE} = 5\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	1.2 1.5	V	$I_C = 10\text{mA}, I_B = 10\mu\text{A}$ $I_C = 100\text{mA}, I_B = 100\mu\text{A}$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	—	2.0	V	$I_C = 100\text{mA}, V_{CE} = 5\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS (Note 8)</b>						
Current Gain-Bandwidth Product	$f_T$	125	—	—	MHz	$I_C = 10\text{mA}, V_{CE} = 5\text{V},$ $f = 100\text{MHz}$
Output Capacitance	$C_{obo}$	—	8.0	—	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}, I_E = 0$
Input Capacitance	$C_{ibo}$	—	15.0	—	pF	$V_{EB} = 0.5\text{V}, f = 1\text{MHz}, I_C = 0$

Note: 8. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

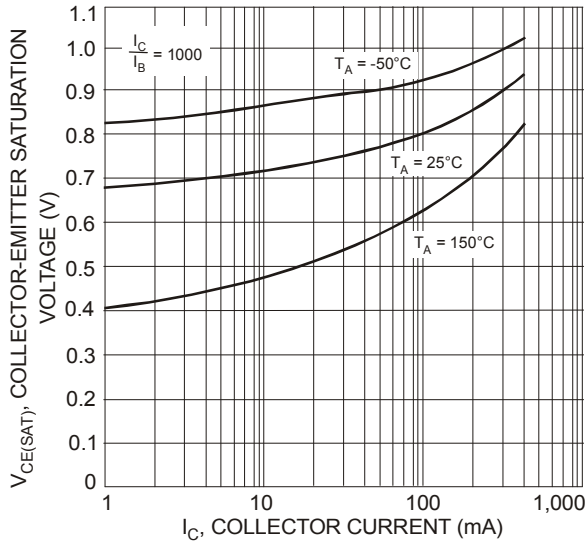


Fig. 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

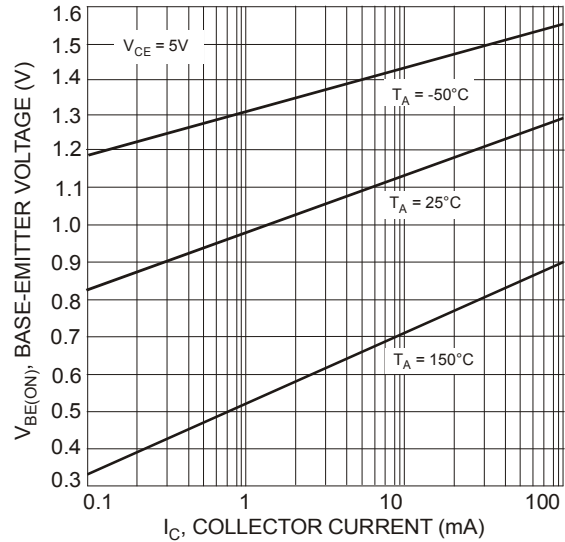


Fig. 3 Typical Base-Emitter Voltage vs. Collector Current

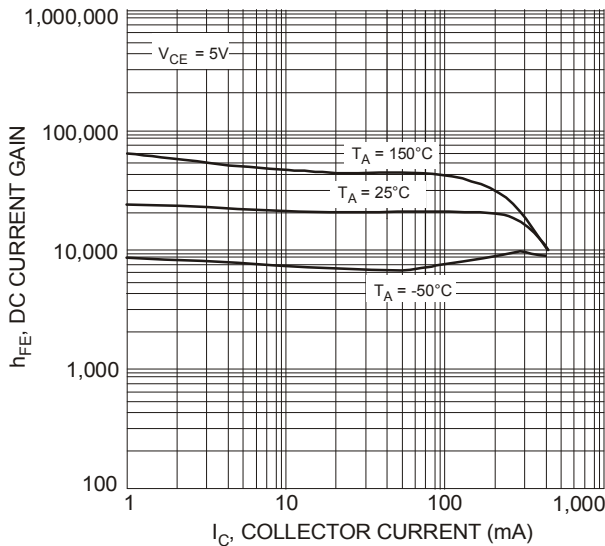


Fig. 4 Typical DC Current Gain vs. Collector Current

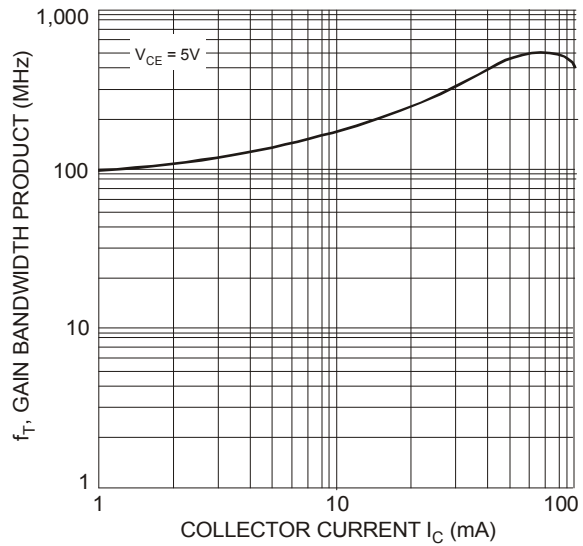
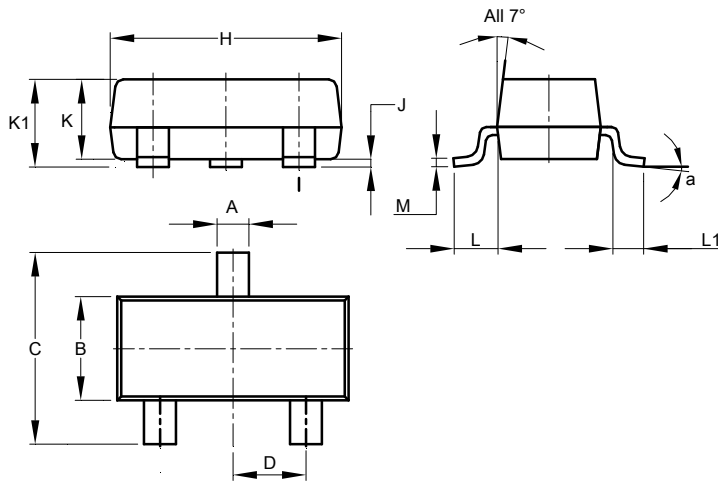


Fig. 5 Typical Gain Bandwidth Product vs. Collector Current

**Package Outline Dimensions**

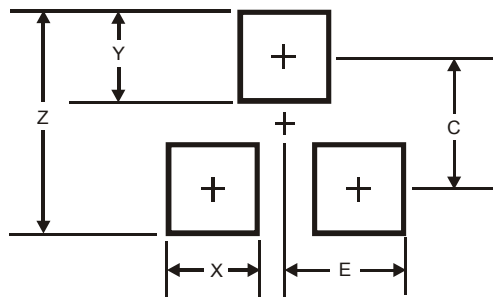
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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