

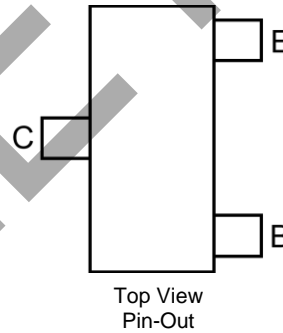
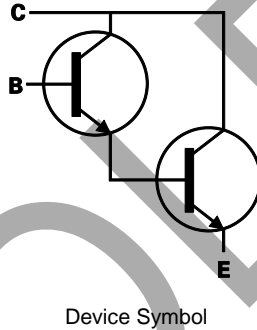
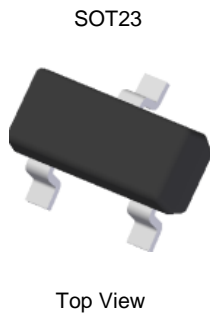
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Features

- $BV_{CES} > 80V$
- 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)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

- Package: SOT23
- Package 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 (A3)
- Weight 0.008 grams (Approximate)

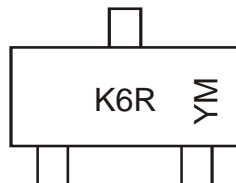


Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
MMBTA28-7-F	SOT23	K6R	7	8	3,000	Reel
MMBTA28-13-F	SOT23	K6R	13	8	10,000	Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



K6R = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: K = 2023)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2008	-	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	V	-	K	L	M	N	P	R	S	T	U	V
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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CB0}	80	V
Collector-Emitter Voltage	V_{CES}	80	V
Emitter-Base Voltage	V_{EBO}	12	V
Continuous Collector Current	I_C	500	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	310	mW
		350	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	403	$^\circ\text{C/W}$
		357	
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	350	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- 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 15mm x 15mm 1oz copper.
 - Thermal resistance from junction to solder-point (at the end of the leads).

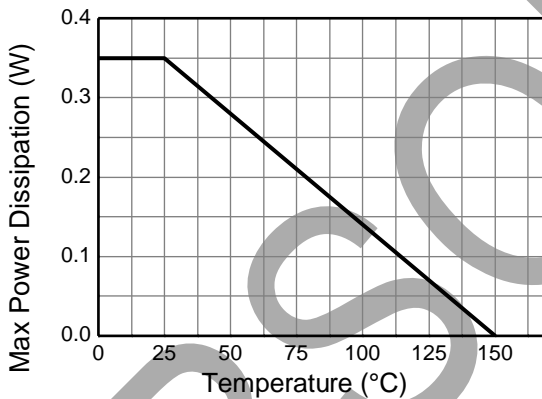


Figure 1. Derating Curve

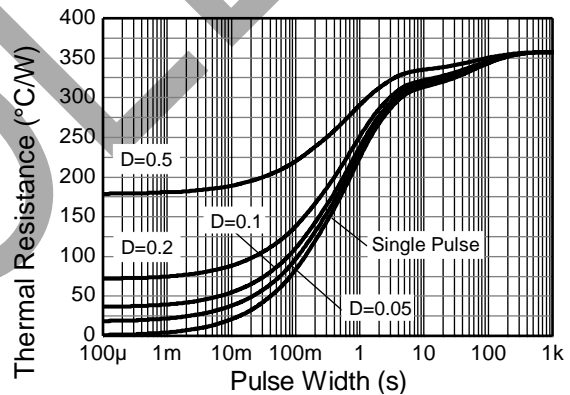
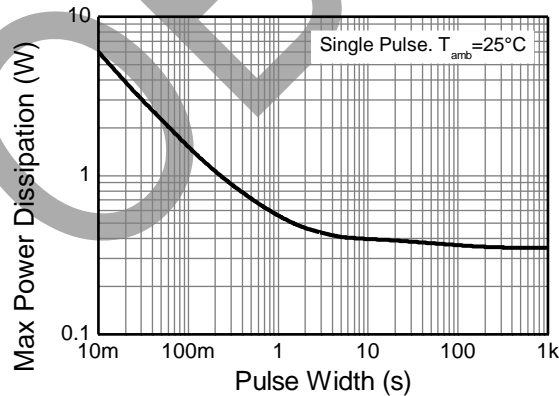


Figure 2. Transient Thermal Impedance



Pulse Power Dissipation
Figure 3. Pulse Power Dissipation

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
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	$V_{EB} = 10\text{V}, I_C = 0$
ON CHARACTERISTICS (Note 8)						
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	$I_C = 100\text{mA}, V_{CE} = 5\text{V}$
SMALL SIGNAL CHARACTERISTICS (Note 8)						
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 $\leq 2\%$.

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

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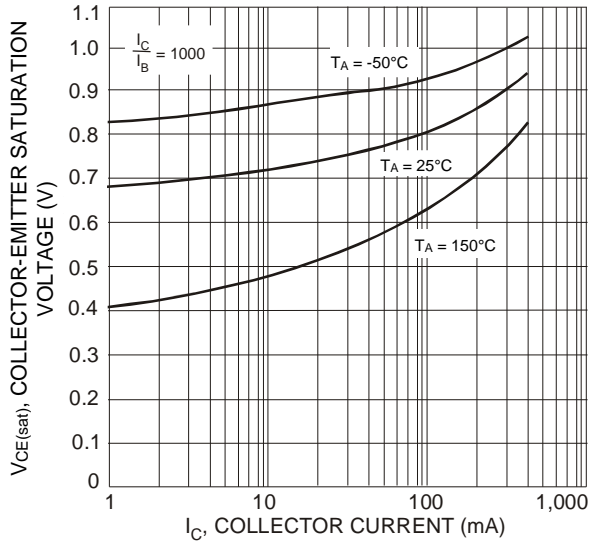


Figure 4. Typical Collector-Emitter Saturation Voltage vs. Collector Current

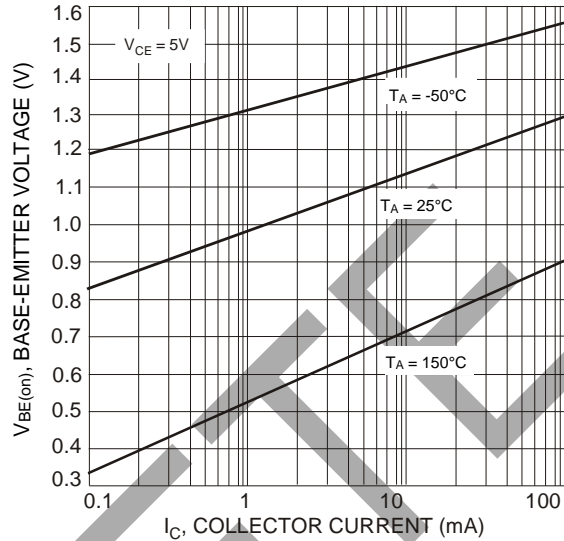


Figure 5. Typical Base-Emitter Voltage vs. Collector Current

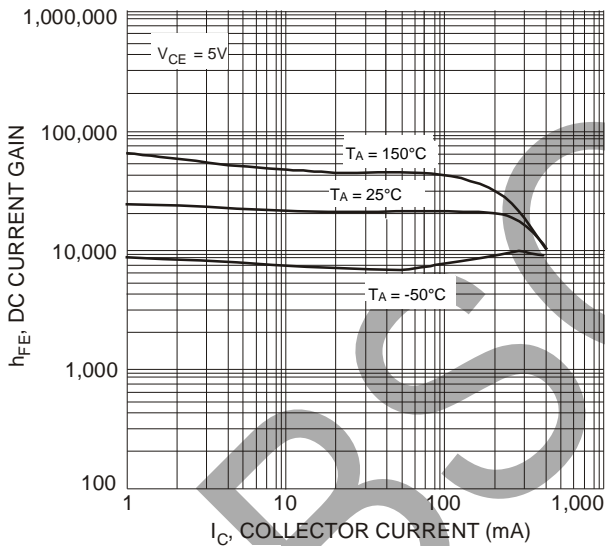


Figure 6. Typical DC Current Gain vs. Collector Current

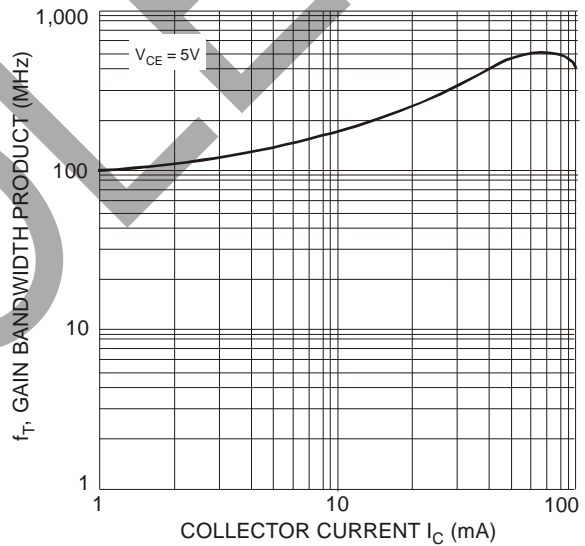
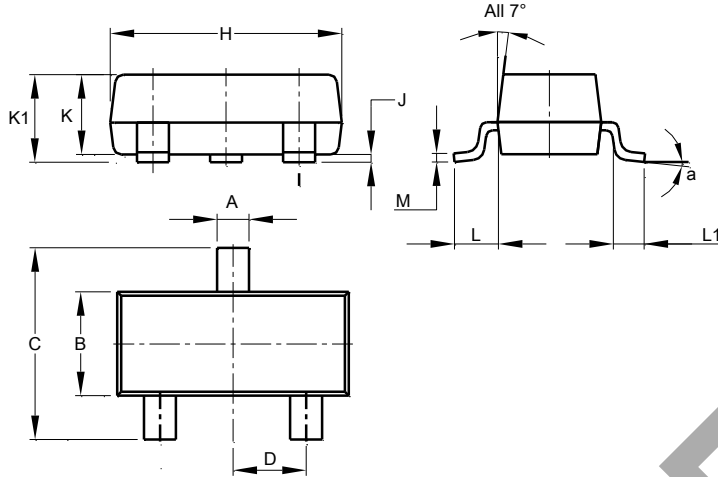


Figure 7. Typical Gain Bandwidth Product vs. Collector Current

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23

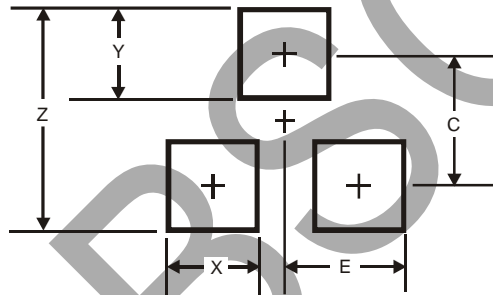


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



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

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