

Features

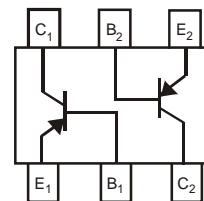
- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Ultra-Small Surface Mount Package
- Lead Free By Design/RoHS Compliant (Note 1)**
- Qualified to AEC-Q101 Standards for High Reliability**
- "Green" Device (Notes 4 and 5)



Top View



Bottom View



Device Schematic

Mechanical Data

- Case: SOT-563
- Case Material: Molded Plastic, "Green" Molding Compound. (Note 5) UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 20
- Terminals: Lead bearing terminal plating available. See Ordering information Page 3
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.003 grams (approximate)

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-40	V
Collector-Emitter Voltage	V _{CEO}	-40	V
Emitter-Base Voltage	V _{EBO}	-5.0	V
Collector Current - Continuous	I _C	-200	mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3) @ T _A = 25°C	P _D	150	mW
Thermal Resistance, Junction to Ambient (Note 3) @ T _A = 25°C	R _{θJA}	833	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Notes:

1. No purposefully added lead.
2. Package is non-polarized. Parts may be on reel in orientation illustrated, 180° rotated, or mixed (both ways).
3. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
4. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
5. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb₂O₃ Fire Retardants.

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)					
Collector-Base Breakdown Voltage	$V_{(\text{BR})\text{CBO}}$	-40	—	V	$I_C = -10\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(\text{BR})\text{CEO}}$	-40	—	V	$I_C = -1.0\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(\text{BR})\text{EBO}}$	-5.0	—	V	$I_E = -10\mu\text{A}, I_C = 0$
Collector Cutoff Current	I_{CEX}	—	-50	nA	$V_{\text{CE}} = -30\text{V}, V_{\text{EB}(\text{OFF})} = -3.0\text{V}$
Base Cutoff Current	I_{BL}	—	-50	nA	$V_{\text{CE}} = -30\text{V}, V_{\text{EB}(\text{OFF})} = -3.0\text{V}$
ON CHARACTERISTICS (Note 6)					
DC Current Gain	h_{FE}	60 80 100 60 30	— — 300 — —	—	$I_C = -100\mu\text{A}, V_{\text{CE}} = -1.0\text{V}$ $I_C = -1.0\text{mA}, V_{\text{CE}} = -1.0\text{V}$ $I_C = -10\text{mA}, V_{\text{CE}} = -1.0\text{V}$ $I_C = -50\text{mA}, V_{\text{CE}} = -1.0\text{V}$ $I_C = -100\text{mA}, V_{\text{CE}} = -1.0\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{SAT})}$	—	-0.25 -0.40	V	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$ $I_C = -50\text{mA}, I_B = -5.0\text{mA}$
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{SAT})}$	-0.65 —	-0.85 -0.95	V	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$ $I_C = -50\text{mA}, I_B = -5.0\text{mA}$
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{obo}	—	4.5	pF	$V_{\text{CB}} = -5.0\text{V}, f = 1.0\text{MHz}, I_E = 0$
Input Capacitance	C_{ibo}	—	10	pF	$V_{\text{EB}} = -0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$
Input Impedance	h_{ie}	2.0	12	k Ω	
Voltage Feedback Ratio	h_{re}	0.1	10	$\times 10^{-4}$	$V_{\text{CE}} = 10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$
Small Signal Current Gain	h_{fe}	100	400	—	
Output Admittance	h_{oe}	3.0	60	μS	
Current Gain-Bandwidth Product	f_T	250	—	MHz	$V_{\text{CE}} = -20\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$
Noise Figure	NF	—	4.0	dB	$V_{\text{CE}} = -5.0\text{V}, I_C = -100\mu\text{A}, R_S = 1.0\text{k}\Omega, f = 1.0\text{kHz}$
SWITCHING CHARACTERISTICS					
Delay Time	t_d	—	35	ns	$V_{\text{CC}} = -3.0\text{V}, I_C = -10\text{mA},$
Rise Time	t_r	—	35	ns	$V_{\text{BE}(\text{off})} = 0.5\text{V}, I_{B1} = -1.0\text{mA}$
Storage Time	t_s	—	225	ns	$V_{\text{CC}} = -3.0\text{V}, I_C = -10\text{mA},$
Fall Time	t_f	—	75	ns	$I_{B1} = I_{B2} = -1.0\text{mA}$

Notes: 6. Short duration pulse test used to minimize self-heating effect.

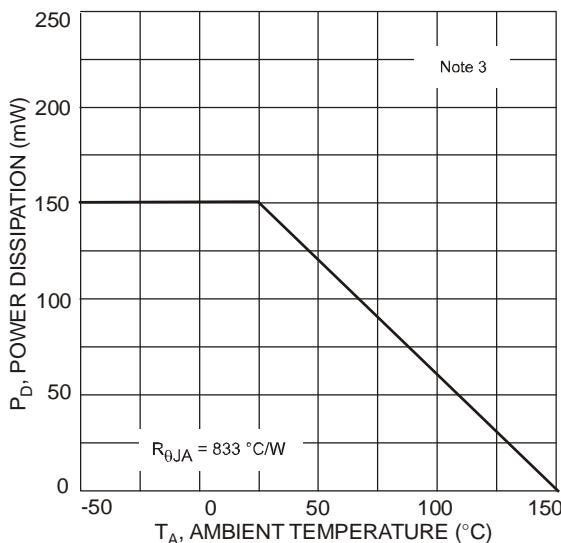


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 3)

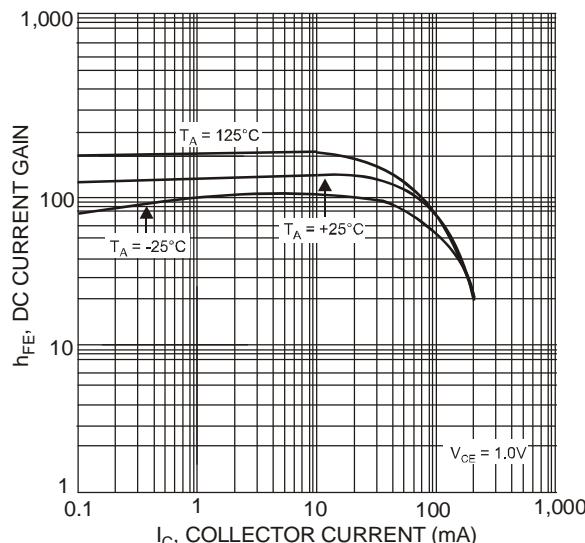


Fig. 2 Typical DC Current Gain vs. Collector Current

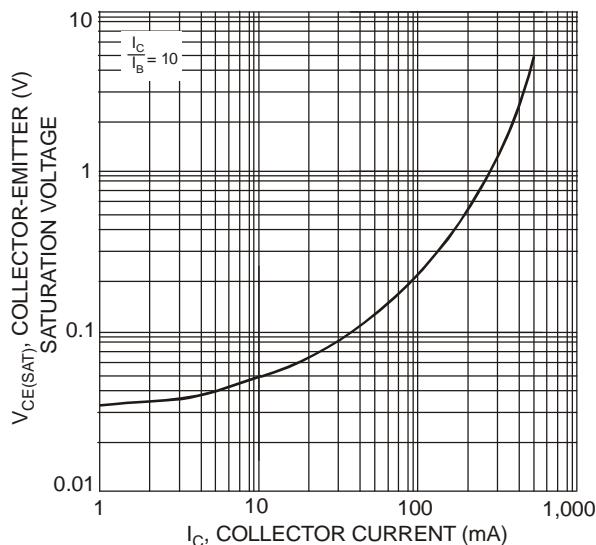


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

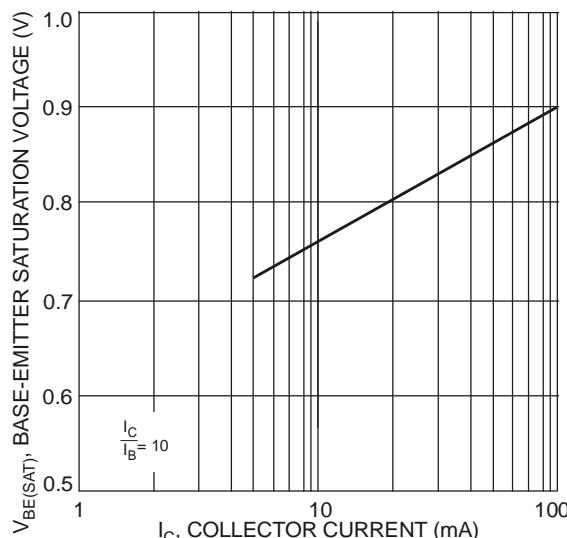


Fig. 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

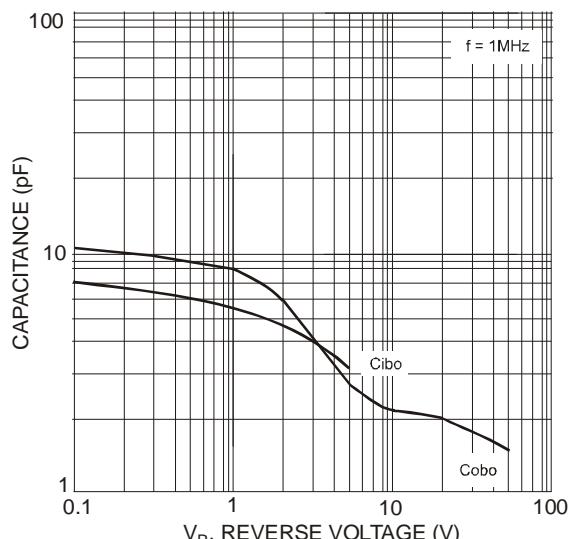


Fig. 5 Typical Capacitance Characteristics

Ordering Information (Note 7)

Part Number	Case	Packaging
MMDT3906V-7	SOT-563	3000/Tape & Reel

Notes: 7. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information

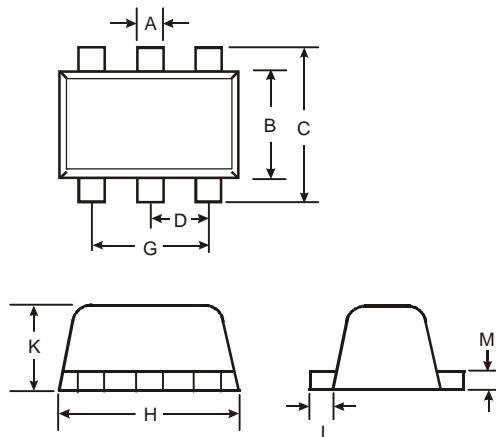


KAR = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: T = 2006)
M = Month (ex: 9 = September)

Date Code Key

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Code	S	T	U	V	W	X	Y	Z	A	B	C	
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

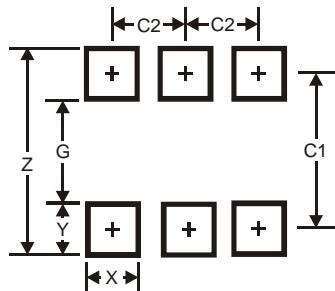
Package Outline Dimensions



SOT-563			
Dim	Min	Max	Typ
A	0.15	0.30	0.20
B	1.10	1.25	1.20
C	1.55	1.70	1.60
D	-	-	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
K	0.55	0.60	0.60
L	0.10	0.30	0.20
M	0.10	0.18	0.11

All Dimensions in mm

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2009, Diodes Incorporated

www.diodes.com