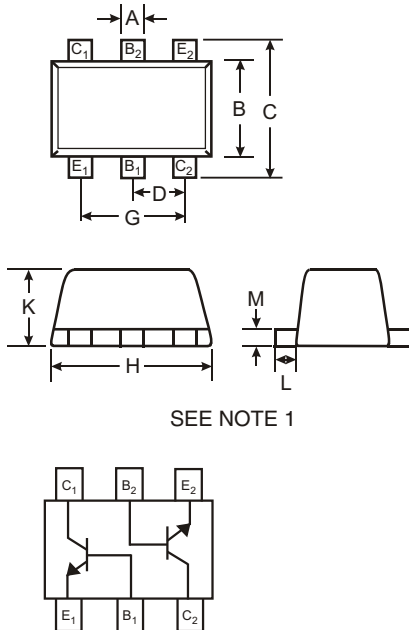


Features

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Ultra-Small Surface Mount Package
- Lead Free By Design/RoHS Compliant (Note 4)**
- "Green Device" (Note 5)**

Mechanical Data

- Case: SOT-563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Finish - Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking (See Page 2): APK
- Ordering Information: See Below
- Date Code Information: See Page 2
- Weight: 0.003 grams (approximate)



SOT-563			
Dim	Min	Max	Typ
A	0.15	0.30	0.25
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	0.56	0.60	0.60
L	0.10	0.30	0.20
M	0.10	0.18	
All Dimensions in mm			

Maximum Ratings @ T_A = 25 C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	60	V
Collector-Emitter Voltage	V _{CEO}	40	V
Emitter-Base Voltage	V _{EBO}	6.0	V
Collector Current - Continuous	I _C	200	mA
Power Dissipation (Note 2)	P _d	200	mW
Thermal Resistance, Junction to Ambient	R _{JA}	625	C/W
Operating and Storage Temperature Range	T _j , T _{STG}	-55 to +150	C

Ordering Information (Note 3)

Device	Packaging	Shipping
MMDT3904VC-7	SOT-563	3000/Tape & Reel

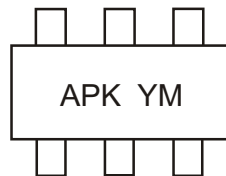
- Notes:
1. Package is non-polarized. Parts may be on reel in orientation illustrated, 180° rotated, or mixed (both ways).
 2. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.
 4. No purposefully added lead.
 5. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.

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

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60		V	$I_C = 10\text{ A}, I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40		V	$I_C = 1.0\text{ mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5.0		V	$I_E = 10\text{ A}, I_C = 0$
Collector Cutoff Current	I_{CEX}		50	nA	$V_{CE} = 30\text{ V}, V_{EB(OFF)} = 3.0\text{ V}$
Base Cutoff Current	I_{BL}		50	nA	$V_{CE} = 30\text{ V}, V_{EB(OFF)} = 3.0\text{ V}$
ON CHARACTERISTICS (Note 6)					
DC Current Gain	h_{FE}	40 70 100 60 30	300		$I_C = 100\mu\text{A}, V_{CE} = 1.0\text{ V}$ $I_C = 1.0\text{ mA}, V_{CE} = 1.0\text{ V}$ $I_C = 10\text{ mA}, V_{CE} = 1.0\text{ V}$ $I_C = 50\text{ mA}, V_{CE} = 1.0\text{ V}$ $I_C = 100\text{ mA}, V_{CE} = 1.0\text{ V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$		0.20 0.30	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	$V_{BE(SAT)}$	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}		4.0	pF	$V_{CB} = 5.0\text{ V}, f = 1.0\text{ MHz}, I_E = 0$
Input Capacitance	C_{ibo}		8.0	pF	$V_{EB} = 0.5\text{ V}, f = 1.0\text{ MHz}, I_C = 0$
Input Impedance	h_{ie}	1.0	10	k	$V_{CE} = 10\text{ V}, I_C = 1.0\text{ mA}, f = 1.0\text{ kHz}$
Voltage Feedback Ratio	h_{re}	0.5	8.0	$\times 10^{-4}$	
Small Signal Current Gain	h_{fe}	100	400		
Output Admittance	h_{oe}	1.0	40	S	
Current Gain-Bandwidth Product	f_T	300		MHz	
Noise Figure	NF		5.0	dB	$V_{CE} = 5.0\text{ V}, I_C = 100\text{ }\mu\text{A}, R_S = 1.0\text{ k}\Omega, f = 1.0\text{ kHz}$
SWITCHING CHARACTERISTICS					
Delay Time	t_d		35	ns	$V_{CC} = 3.0\text{ V}, I_C = 10\text{ mA}, V_{BE(off)} = -0.5\text{ V}, I_{B1} = 1.0\text{ mA}$
Rise Time	t_r		35	ns	
Storage Time	t_s		200	ns	$V_{CC} = 3.0\text{ V}, I_C = 10\text{ mA}, I_{B1} = I_{B2} = 1.0\text{ mA}$
Fall Time	t_f		50	ns	

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

Marking Information



APK = Product Type Marking Code
 YM = Date Code Marking
 Y = Year ex: R = 2004
 M = Month ex: 9 = September

Date Code Key

Year	2005	2006	2007	2008	2009	2010	2011	2012
Code	S	T	U	V	W	X	Y	Z

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

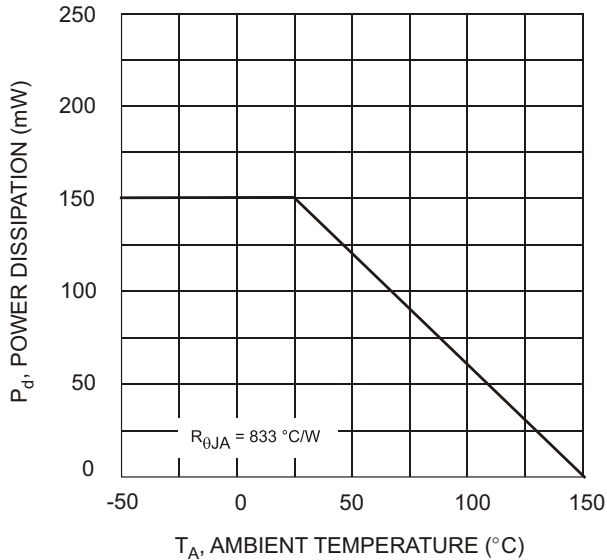


Fig. 1, Derating Curve - Total

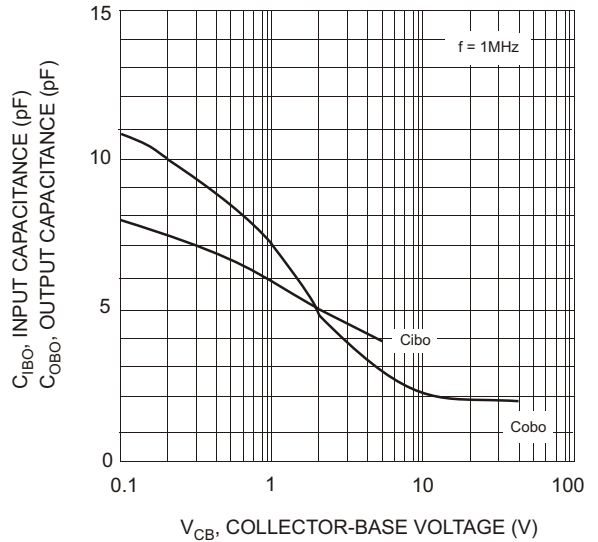


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

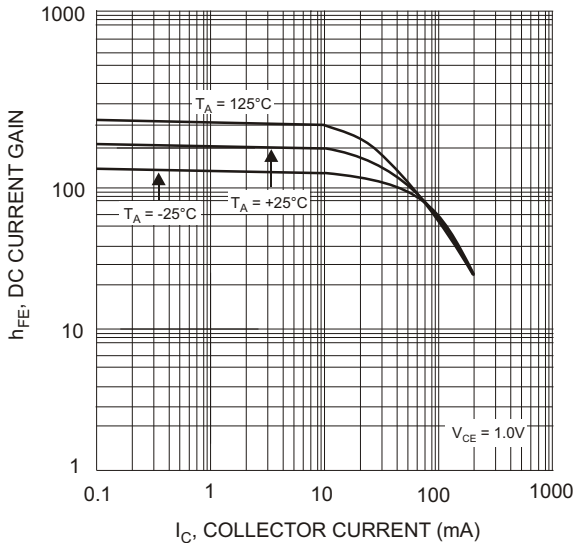


Fig. 3, Typical DC Current Gain vs Collector Current

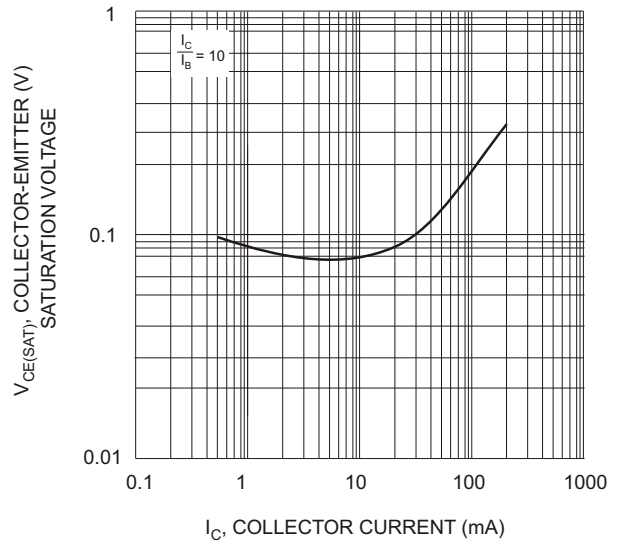


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

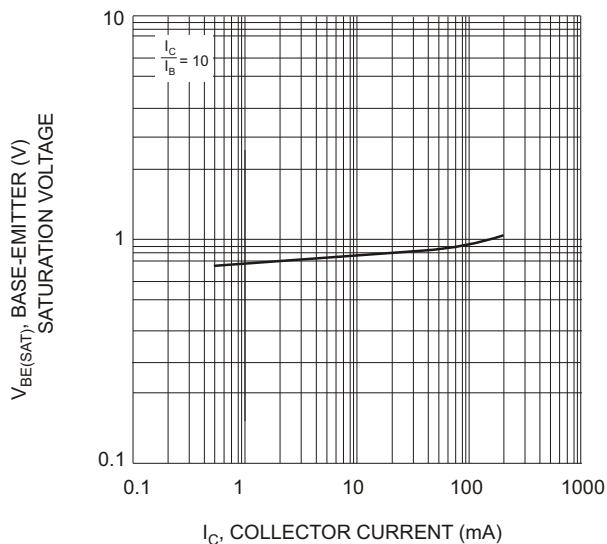


Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

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