



MMDT3904VC

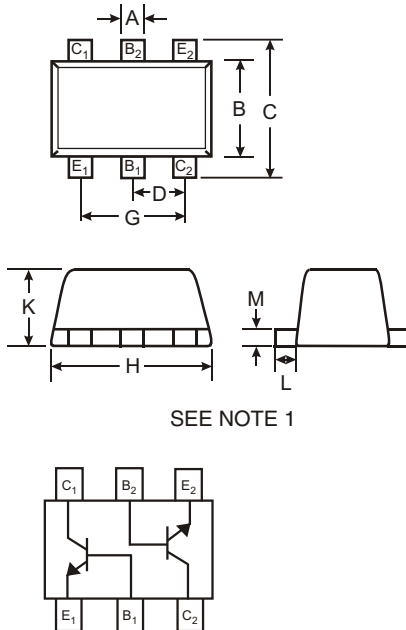
DUAL NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

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 @ $T_A = 25^\circ\text{C}$ 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)

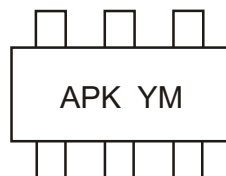
Device	Packaging	Shipping
MMDT3904VC-7	SOT-563	3000/Tape & Reel

- Notes:
- Package is non-polarized. Parts may be on reel in orientation illustrated, 180° rotated, or mixed (both ways).
 - 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>.
 - For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.
 - No purposefully added lead.
 - Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ 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	$V_{CE} = 20\text{V}, I_C = 10\text{mA},$ $f = 100\text{MHz}$
Noise Figure	NF		5.0	dB	$V_{CE} = 5.0\text{V}, I_C = 100\text{ A},$ $R_S = 1.0\text{k } f = 1.0\text{kHz}$
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.

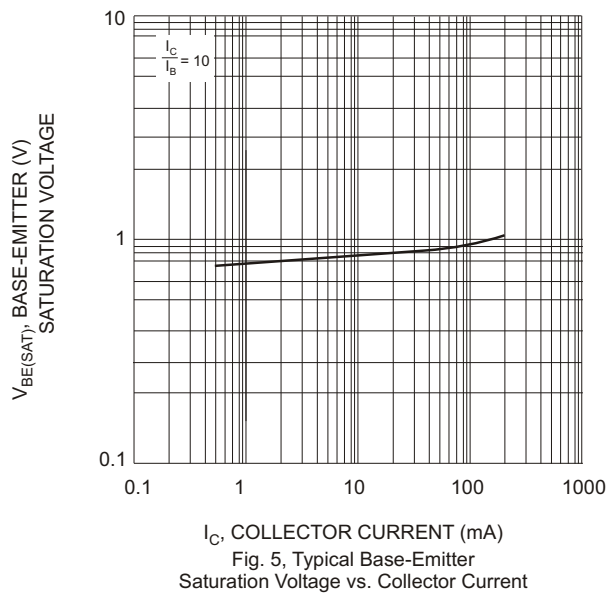
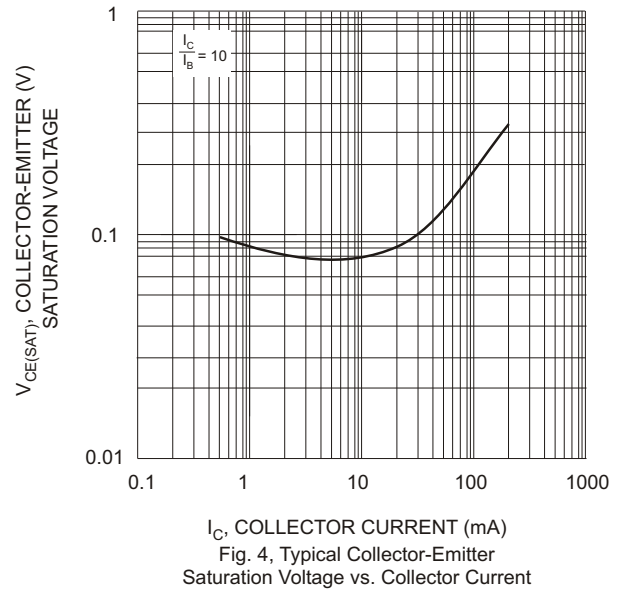
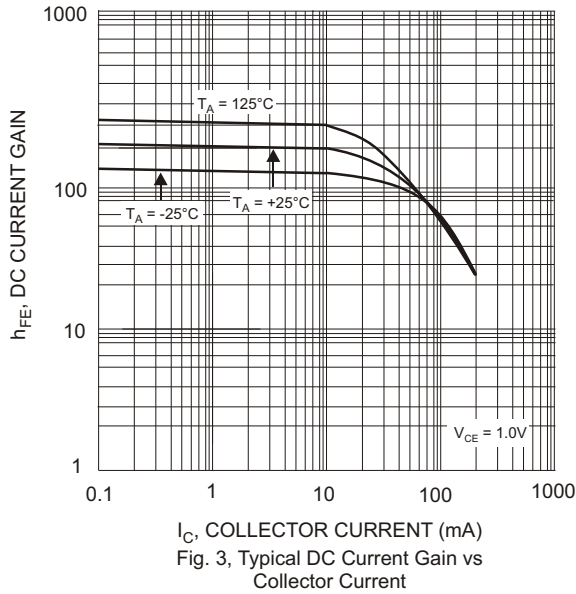
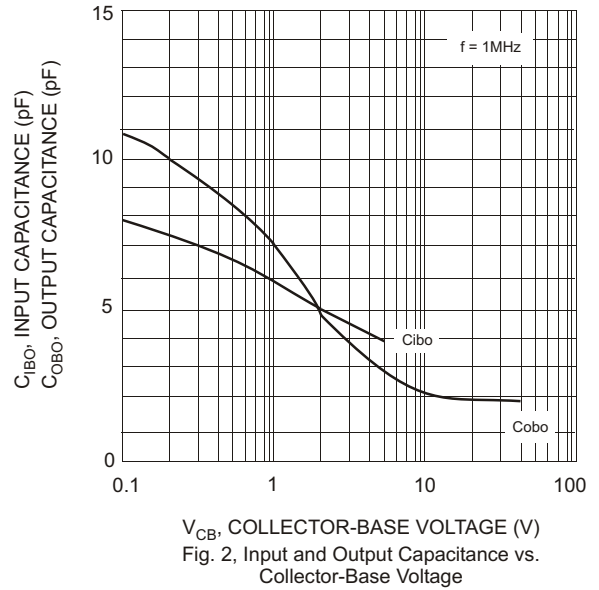
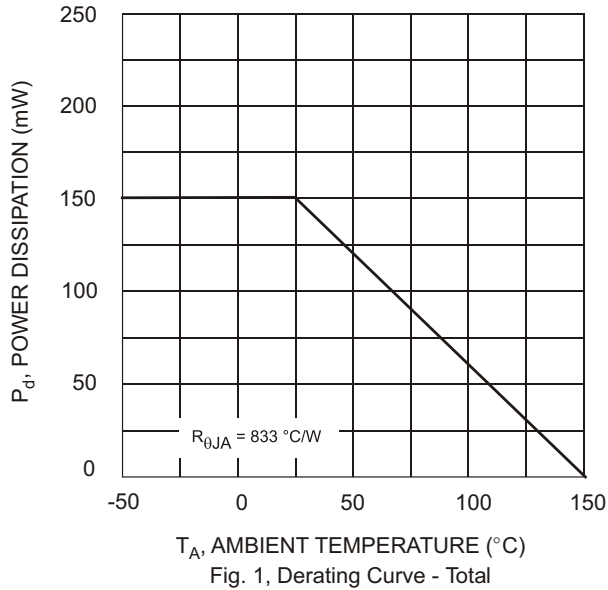
Marking Information


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



IMPORTANT NOTICE

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. Diodes Incorporated does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. The user of products 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 our website, harmless against all damages.

LIFE SUPPORT

Diodes Incorporated products are not authorized for use as critical components in life support devices or systems without the expressed written approval of the President of Diodes Incorporated.