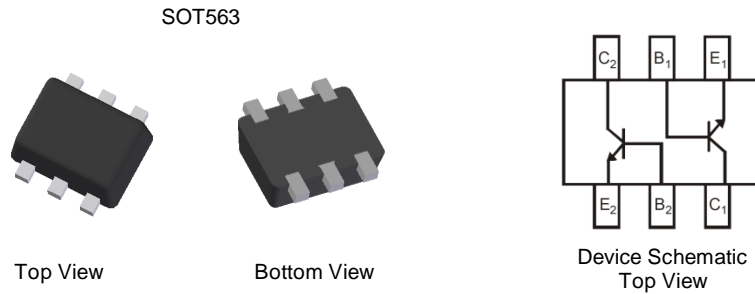


Features

- $BV_{CEO} > 40V$
- $I_C = 200mA$ High Collector Current
- Epitaxial Planar Die Construction
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **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 [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

- Package: SOT563
- 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 Finish; Solderable per MIL-STD-202, Method 208
- Weight: 0.003 grams (Approximate)

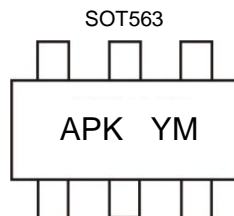


Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
MMDT3904VC-7	Standard	APK	7	8	3000

- 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



APK = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: J = 2022)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	I	J	K	L	M	N	O	P	R	S	T	U

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°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	I _C	200	mA

Thermal Characteristics

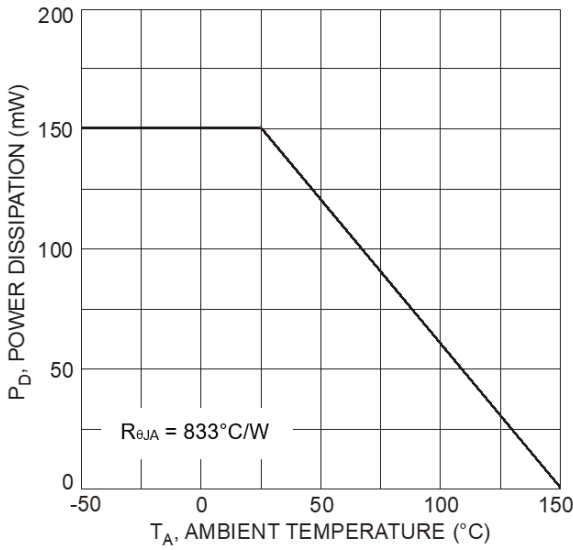
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	150	mW
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	833	°C/W
Operating and Storage and Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 6)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge—Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge—Machine Model	ESD MM	400	V	C

- Notes:
- For the device mounted on minimum recommended pad layout FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristic and Derating Information



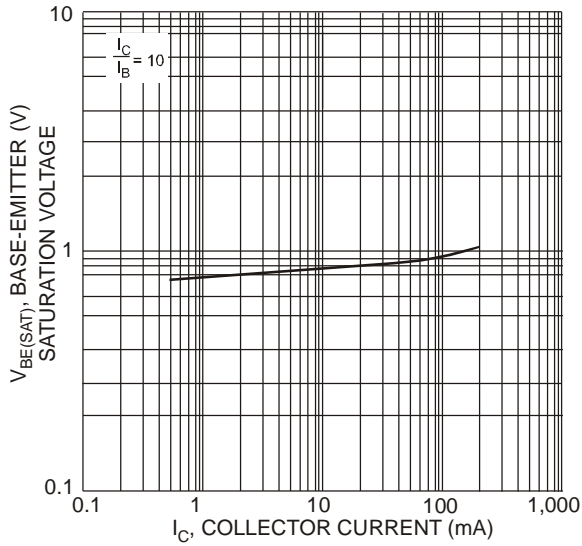
Derating Curve - Total

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

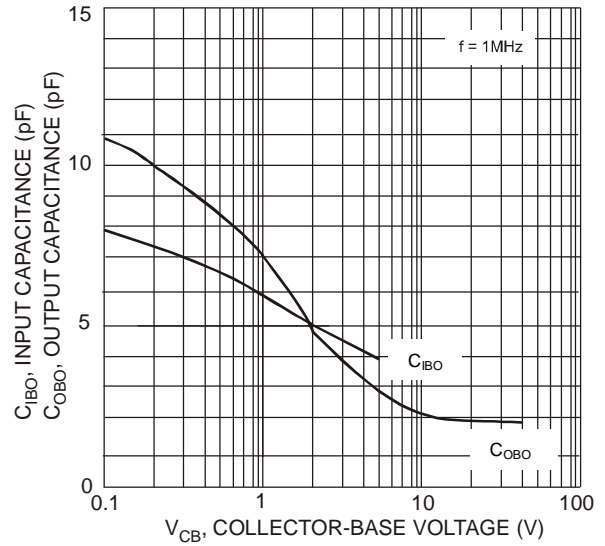
Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage	BV _{CBO}	60	—	V	I _C = 100μA, I _E = 0
Collector-Emitter Breakdown Voltage (Note 7)	BV _{CEO}	40	—	V	I _C = 1mA, I _B = 0
Emitter-Base Breakdown Voltage	BV _{EBO}	6	—	V	I _E = 100μA, I _C = 0
Collector-Emitter Cut-Off Current	I _{CEV}	—	50	nA	V _{CE} = 30V, V _{EB(OFF)} = 3V
Emitter-Base Cut-Off Current	I _{EBO}	—	50	nA	V _{EB} = 6V
ON CHARACTERISTICS (Note 7)					
DC Current Gain	h _{FE}	40	—	—	I _C = 100μA, V _{CE} = 1V
		70	—		
		100	300		
		60	—		
		30	—		
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	0.20 0.30	V	I _C = 10mA, I _B = 1mA I _C = 50mA, I _B = 5mA
Base-Emitter Saturation Voltage	V _{BE(sat)}	0.65 —	0.85 0.95	V	I _C = 10mA, I _B = 1mA I _C = 50mA, I _B = 5mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C _{obo}	—	4	pF	V _{CB} = 5V, f = 1MHz, I _E = 0
Input Capacitance	C _{ibo}	—	8	pF	V _{EB} = 0.5V, f = 1MHz, I _C = 0
Input Impedance	h _{ie}	1	10	kΩ	V _{CE} = 10V, I _C = 1mA, f = 1kHz
Voltage Feedback Ratio	h _{re}	0.5	8.0	× 10 ⁻⁴	
Small Signal Current Gain	h _{fe}	100	400	—	
Output Admittance	h _{oe}	1	40	μS	
Current Gain-Bandwidth Product	f _T	300	—	MHz	V _{CE} = 20V, I _C = 10mA, f = 100MHz
Noise Figure	NF	—	5.0	dB	V _{CE} = 5V, I _C = 100μA, R _S = 1kΩ, f = 1kHz
SWITCHING CHARACTERISTICS					
Delay Time	t _d	—	35	ns	V _{CC} = 3V, I _C = 10mA, V _{BE(OFF)} = -0.5V, I _{B1} = 1mA
Rise Time	t _r	—	35	ns	
Storage Time	t _s	—	200	ns	V _{CC} = 3V, I _C = 10mA, I _{B1} = -I _{B2} = 1mA
Fall Time	t _f	—	50	ns	

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

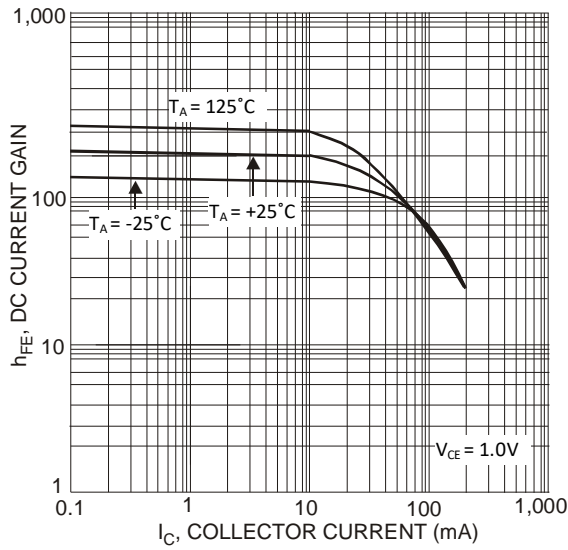
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



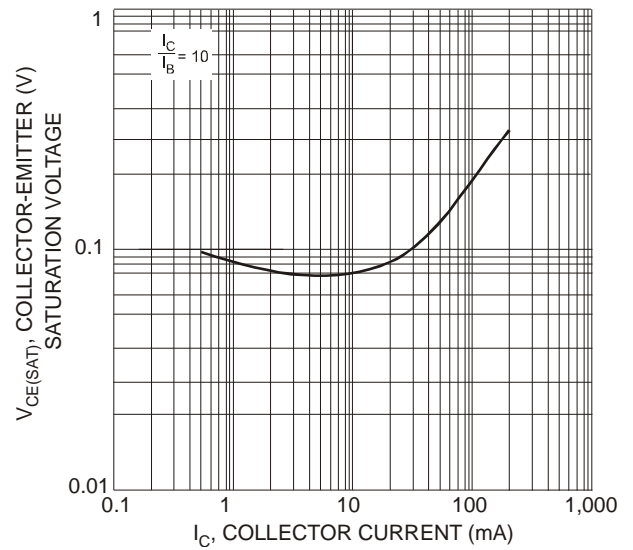
Typical Base-Emitter Saturation Voltage vs. Collector Current



Input and Output Capacitance vs. Collector-Base Voltage



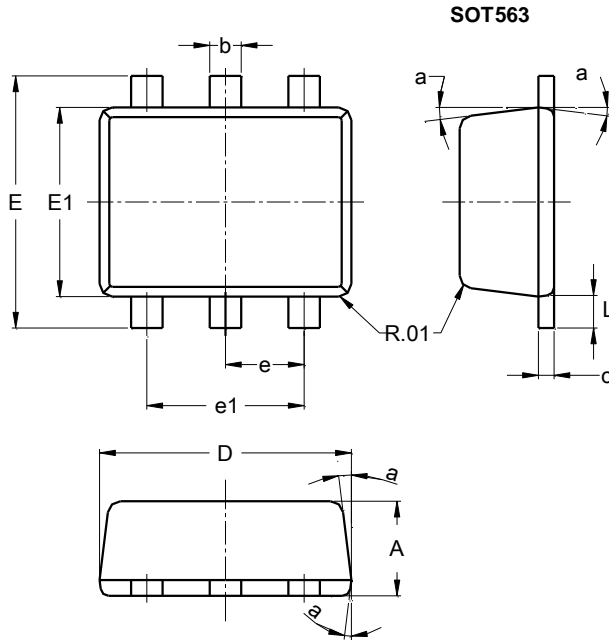
Typical DC Current Gain vs. Collector Current



Typical Collector-Emitter Saturation Voltage vs. Collector Current

Package Outline Dimensions

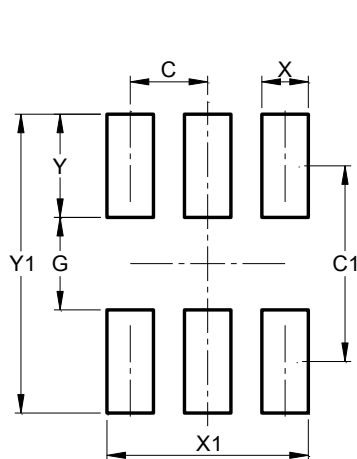
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT563			
Dim	Min	Max	Typ
A	0.55	0.60	--
b	0.15	0.30	0.20
c	0.10	0.18	0.11
D	1.50	1.70	1.60
E	1.55	1.70	1.60
E1	1.10	1.25	1.20
e	--	--	0.50
e1	0.90	1.10	1.00
L	0.10	0.30	0.20
a	8°	9°	7°
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
C	0.500
C1	1.270
G	0.600
X	0.300
X1	1.300
Y	0.670
Y1	1.940

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