


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
- Complementary NPN Type: MMDT3904Q
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The MMDT3906Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

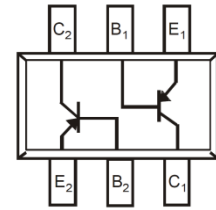
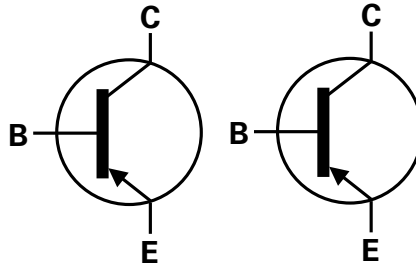
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Package: SOT363
- 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: 0.006 grams (Approximate)



Top View



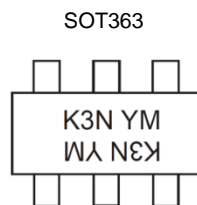
Device Schematic
Top View

Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
MMDT3906Q-7	SOT363	K3N	7	8	3,000	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



K3N = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: L = 2024)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2022	-	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	J	-	L	M	N	P	R	S	T	U	V	W

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}	-40	V
Collector-Emitter Voltage	V _{CEO}	-40	V
Emitter-Base Voltage	V _{EBO}	-6	V
Collector Current	I _C	-200	mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	200	mW
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	625	°C/W
Operating and Storage 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 - Charged Device Model	ESD CDM	1000	V	C3

- Notes:
- 5. For a device mounted on minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state.
 - 6. Refer to JEDEC specification JS-001 and JS-002.

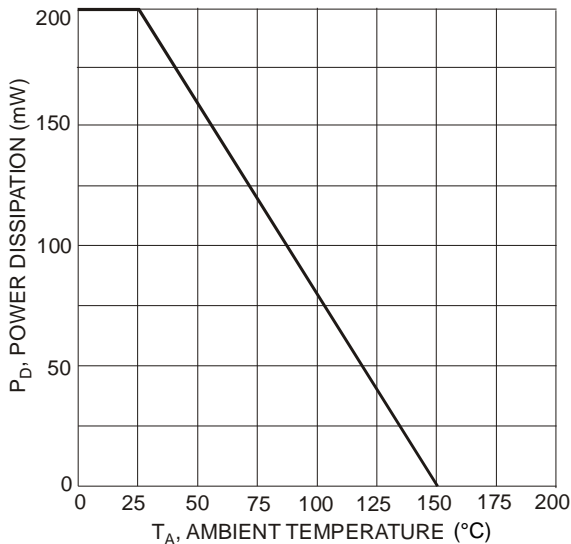


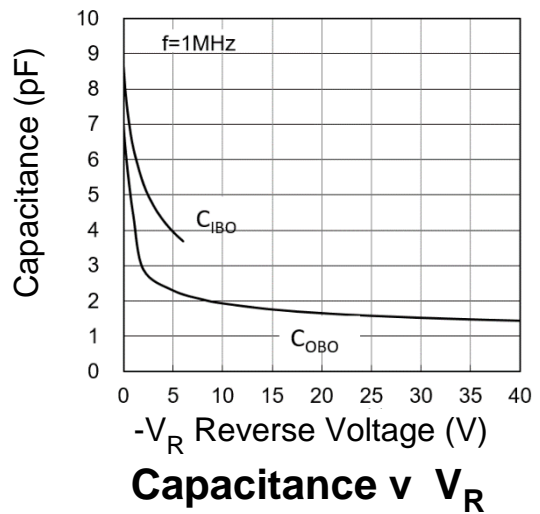
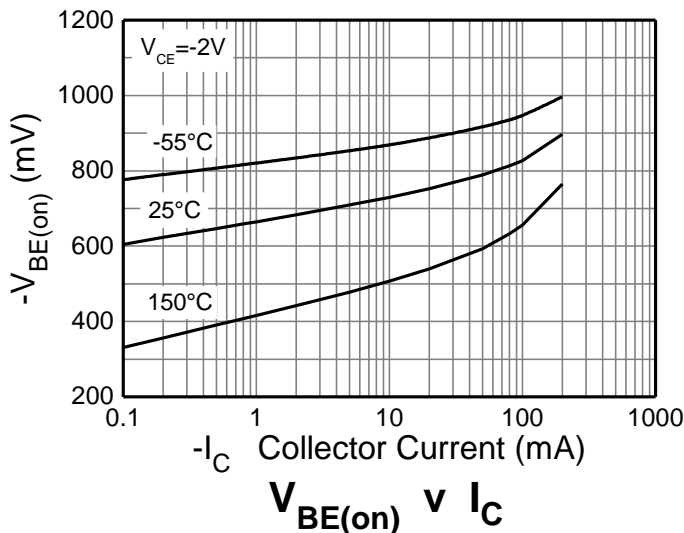
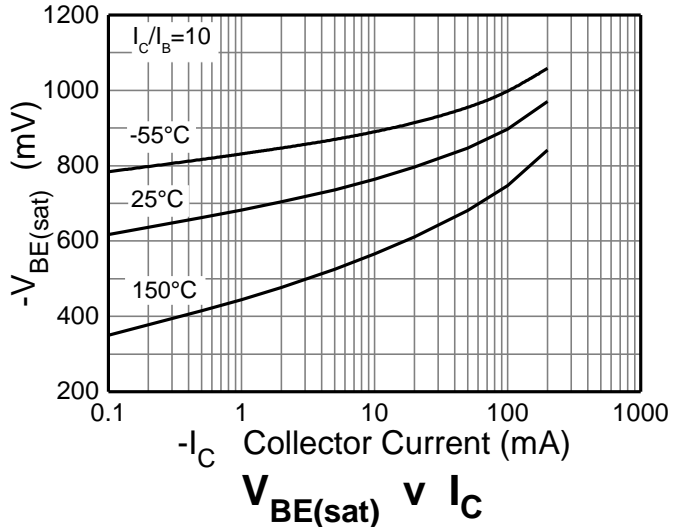
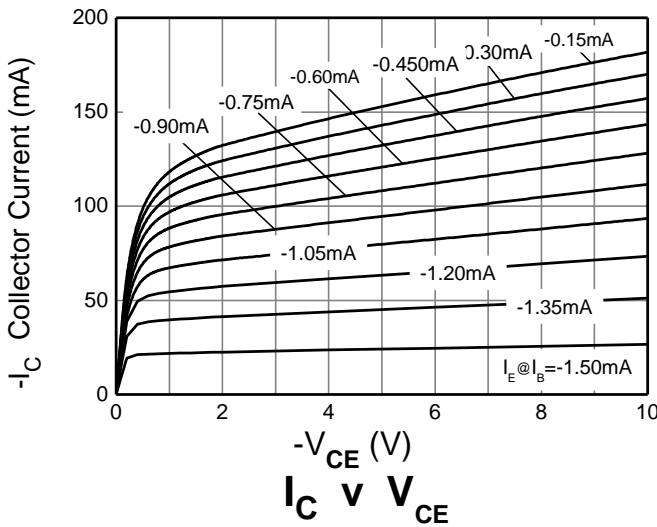
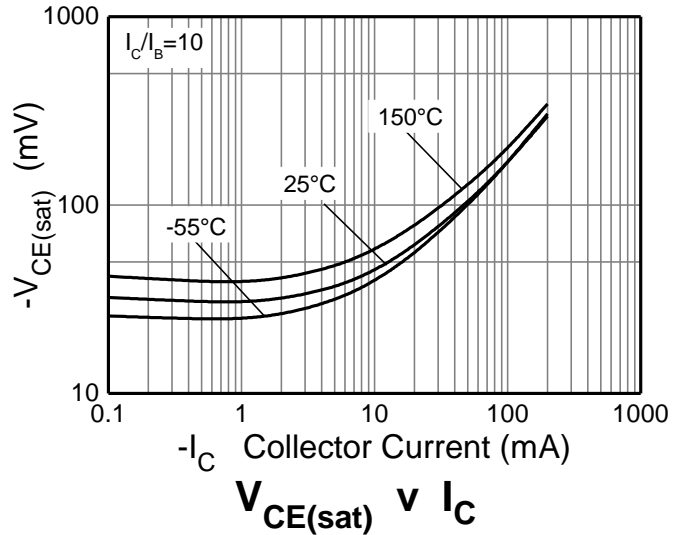
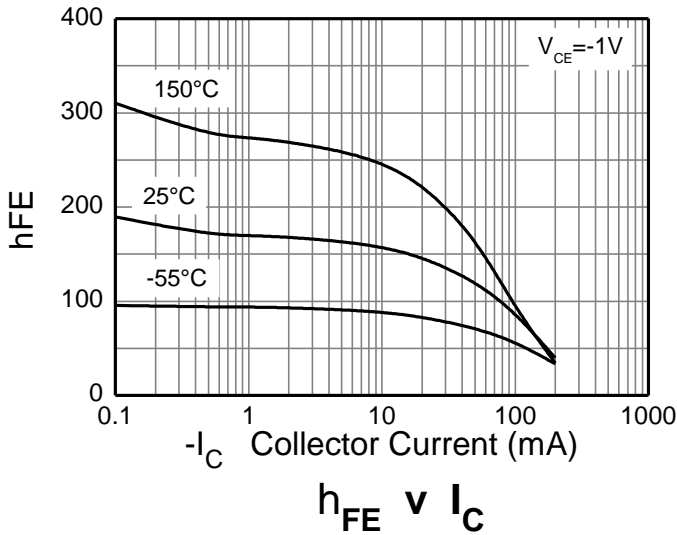
Fig. 1, Power Dissipation vs. Ambient Temperature (Total Device)

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

Characteristic	Symbol	Min	Max	Unit	Test Condition	
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV _{CB0}	-40	—	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 Cut-Off Current	I _{CEX}	—	-50	nA	V _{CE} = -30V, V _{EB(off)} = -3.0V	
Base Cut-Off Current	I _{BL}	—	-50	nA	V _{CE} = -30V, V _{EB(off)} = -3.0V	
ON CHARACTERISTICS (Note 7)						
DC Current Gain	h _{FE}	60	—	—	I _C = -100μA, V _{CE} = -1V	
		80	—			I _C = -1.0mA, V _{CE} = -1V
		100	300			I _C = -10mA, V _{CE} = -1V
		60	—			I _C = -50mA, V _{CE} = -1V
		30	—			I _C = -100mA, V _{CE} = -1V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	-0.25 -0.40	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}	—	4.5	pF	V _{CB} = -5.0V, f = 1.0MHz, I _E = 0	
Input Capacitance	C _{IBO}	—	10	pF	V _{EB} = -0.5V, f = 1.0MHz, I _C = 0	
Input Impedance	h _{ie}	2	12	kΩ	V _{CE} = -10V, I _C = -1.0mA, f = 1.0kHz	
Voltage Feedback Ratio	h _{re}	0.1	10	x 10 ⁻⁴		
Small-Signal Current Gain	h _{fe}	100	400	—		
Output Admittance	h _{oe}	3	60	μS		
Current Gain-Bandwidth Product	f _T	250	—	MHz	V _{CE} = -20V, I _C = -10mA, f = 100MHz	
Noise Figure	N _F	—	4.0	dB	V _{CE} = -5.0V, I _C = -100μA, R _S = 1.0kΩ, f = 1.0kHz	
SWITCHING CHARACTERISTICS						
Delay Time	t _d	—	35	ns	V _{CC} = -3.0V, I _C = -10mA, I _{B1} = -I _{B2} = -1.0mA	
Rise Time	t _r	—	35	ns		
Storage Time	t _s	—	200	ns		
Fall Time	t _f	—	50	ns		

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

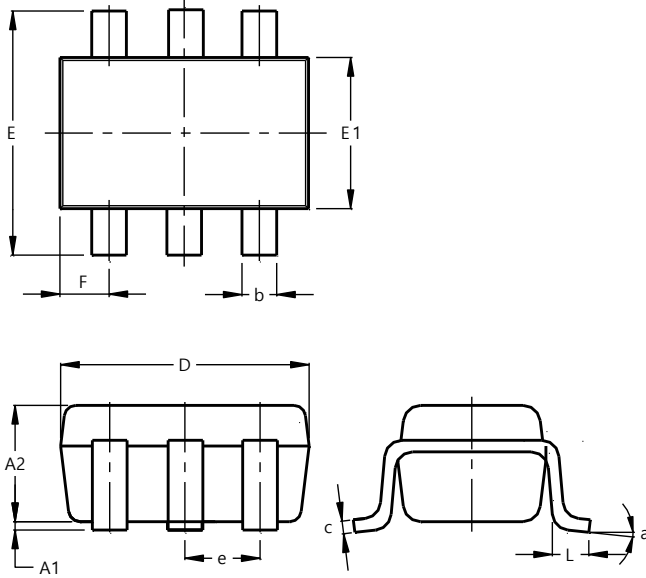
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

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

SOT363

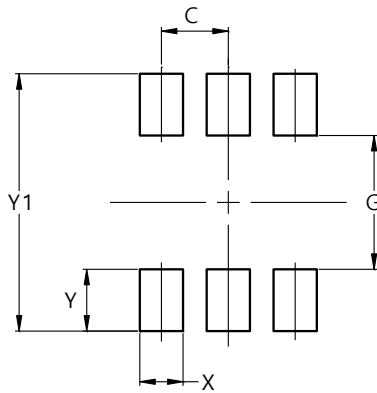


SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT363



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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