



**THE DATASHEET OF
MMST3904-7-F**



Features

- $BV_{CEO} > 40V$
- $I_C = 200mA$ Collector Current
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- Complementary PNP Type: MMST3906
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

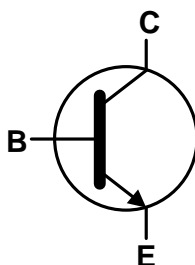
Mechanical Data

- Case: SOT323
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 **e3**
- Weight: 0.006 grams (Approximate)

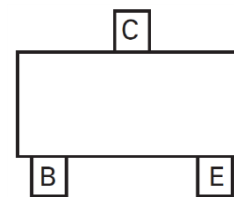
SOT323



Top View



Device Symbol



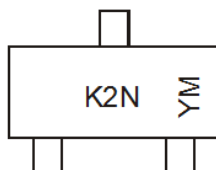
Pin-out Top View

Ordering Information (Notes 4 & 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
MMST3904-7-F	AEC-Q101	K2N	7	8	3,000
MMST3904Q-7-F	Automotive	K2N	7	8	3,000

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



K2N = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: F = 2018)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Code	F	G	H	I	J	K	L	M	N	O	P

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	V
Collector Current	I _C	200	mA

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

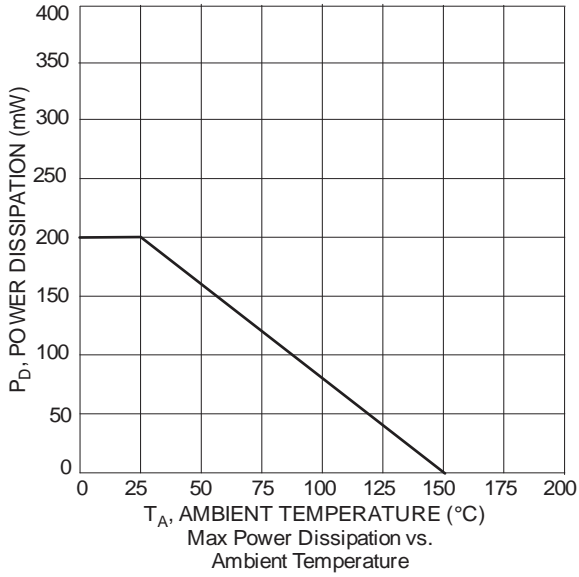
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P _D	200	mW
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	625	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 7)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted with the collector lead on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

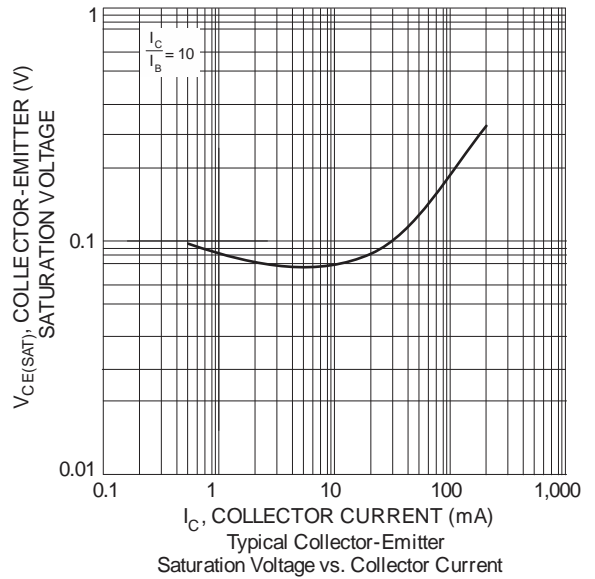
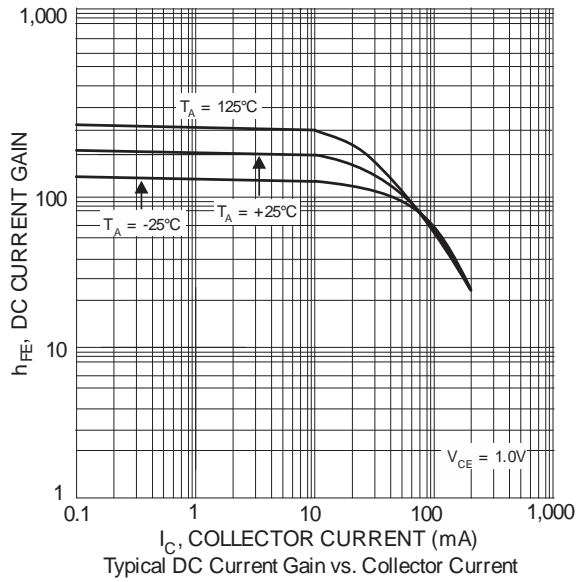
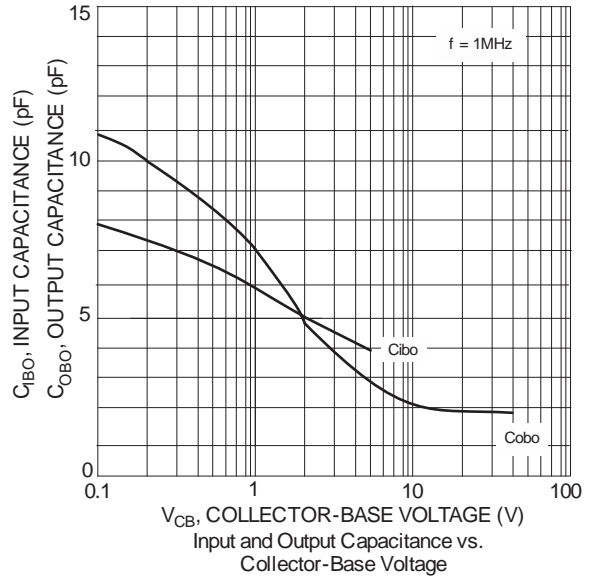
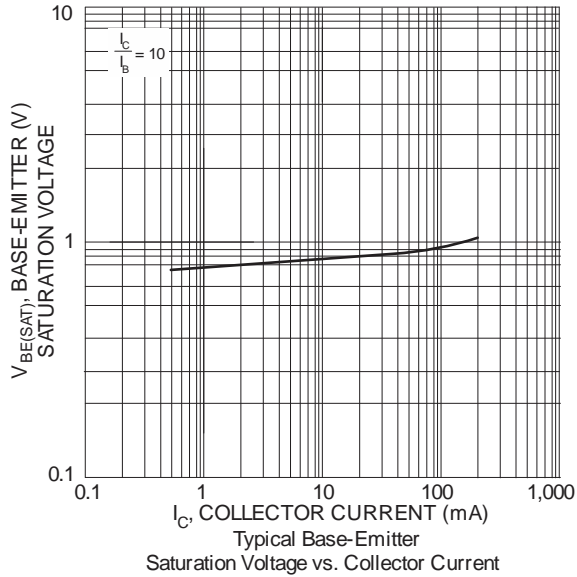


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 8)						
Collector-Base Breakdown Voltage	BV _{CBO}	60	—	V	I _C = 10μA, I _E = 0	
Collector-Emitter Breakdown Voltage	BV _{CEO}	40	—	V	I _C = 1mA, I _B = 0	
Emitter-Base Breakdown Voltage	BV _{EBO}	5	—	V	I _E = 10μA, I _C = 0	
Collector Cutoff Current	I _{CEX}	—	50	nA	V _{CE} = 30V, V _{EB(OFF)} = 3V	
Base Cutoff Current	I _{BL}	—	50	nA	V _{CE} = 30V, V _{EB(OFF)} = 3V	
ON CHARACTERISTICS (Note 8)						
DC Current Gain	h _{FE}	40	—	—	I _C = 100μA, V _{CE} = 1V	
		70	—			
		100	300			I _C = 1mA, V _{CE} = 1V
		60	—			I _C = 10mA, V _{CE} = 1V
		30	—			I _C = 50mA, V _{CE} = 1V I _C = 100mA, V _{CE} = 1V
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	—	0.25 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 = 1.0MHz, I _E = 0	
Input Capacitance	C _{ibo}	—	8	pF	V _{EB} = 0.5V, f = 1.0MHz, I _C = 0	
Input Impedance	h _{ie}	1	10	kΩ	V _{CE} = 10V, I _C = 1mA, f = 1.0MHz	
Voltage Feedback Ratio	h _{re}	0.5	8.0	x 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	dB	V _{CC} = 5V, I _C = 100μA, R _S = 1kΩ, f = 1MHz	
SWITCHING CHARACTERISTICS						
Delay Time	t _D	—	35	ns	V _{CC} = 3V, I _C = 10mA,	
Rise Time	t _R	—	35	ns	V _{BE(OFF)} = -0.5V, I _{B1} = 1mA	

Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

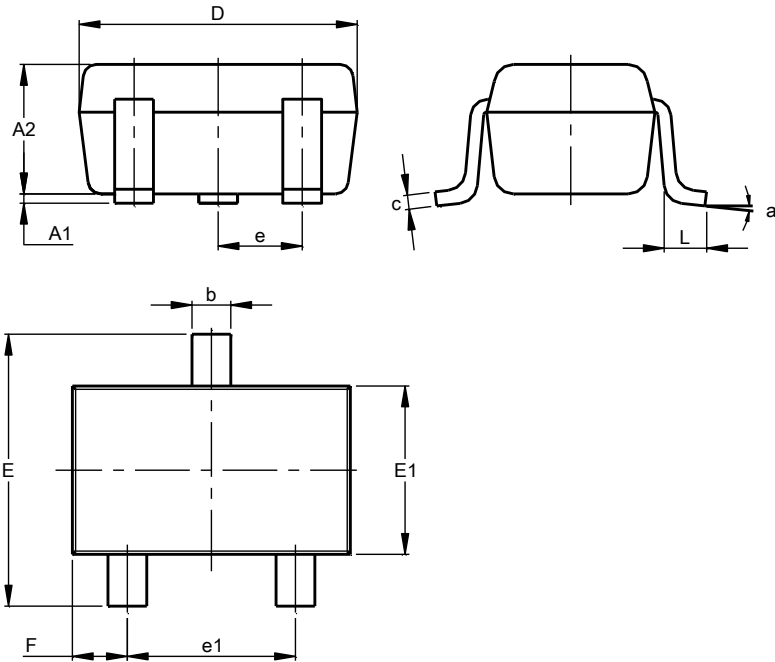
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

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

SOT323

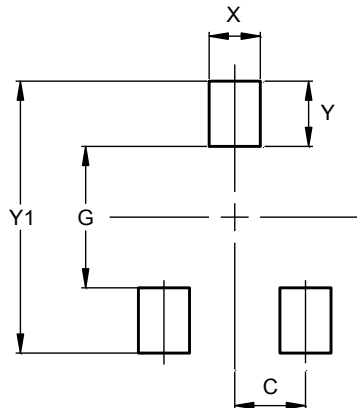


SOT323			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.25	0.40	0.30
c	0.10	0.18	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
e1	1.20	1.40	1.30
F	0.375	0.475	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT323



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.470
Y	0.600
Y1	2.500

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