



MMST440²

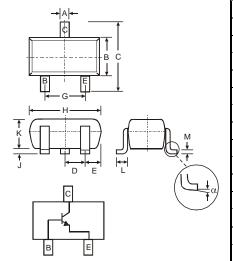
NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

Features

- **Epitaxial Planar Die Construction**
- Complementary PNP Type Available (MMST4403)
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant (Note 2)
- "Green" Device (Note 3 and 4)

Mechanical Data

- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking Information: K3X See Page 4
- Ordering & Date Code Information: See Page 4
- Weight: 0.006 grams (approximate)



SOT-323										
Dim	Min	Max								
Α	0.25	0.40								
В	1.15	1.35								
С	2.00 2.20									
D	0.65 Nominal									
E	0.30	0.40								
G	1.20	1.40								
Н	1.80	2.20								
J	0.0	0.10								
K	0.90	1.00								
L	0.25	0.40								
M	0.10	0.18								
α	0°	8°								
All Dimensions in mm										

Maximum Ratings @TA = 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 (Note 1)	Ic	600	mA		
Power Dissipation (Note 1)	P _d	200	mW		
Thermal Resistance, Junction to Ambient (Note 1)	$R_{ hetaJA}$	625	°C/W		
Operating and Storage Temperature Range	T _j , T _{STG}	-55 to +150	°C		

Notes:

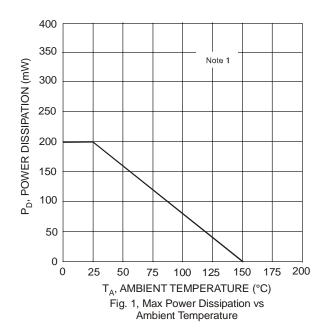
- 1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
- No purposefully added lead.
- Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
- Product manufactured with Date Code 0627 (week 27, 2006) and newer are built with Green Molding Compound. Product manufactured prior to Date Code 0627 are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

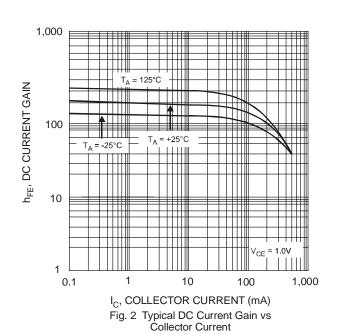


Electrical Characteristics @T_A = 25°C unless otherwise specified

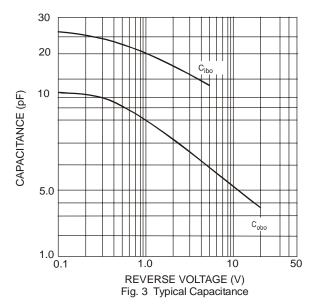
Characteristic	Symbol	Min	Max	Unit	Test Condition		
OFF CHARACTERISTICS (Note 5)							
Collector-Base Breakdown Voltage	V _{(BR)CBO}	60	_	V	$I_C = 100 \mu A, I_E = 0$		
Collector-Emitter Breakdown Voltage	V _{(BR)CEO}	40	_	V	$I_C = 1.0 \text{mA}, I_B = 0$		
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	6.0	_	V	$I_E = 100 \mu A, I_C = 0$		
Collector Cutoff Current	I _{CEX}	_	100	nA	$V_{CE} = 35V, V_{EB(OFF)} = 0.4V$		
Base Cutoff Current	I _{BL}	_	100	nA	$V_{CE} = 35V$, $V_{EB(OFF)} = 0.4V$		
ON CHARACTERISTICS (Note 5)	•	•		•	•		
		20	_		$I_C = 100 \mu A, V_{CE} = 1.0 V$		
		40	_		$I_C = 1.0 \text{mA}, V_{CE} = 1.0 \text{V}$		
DC Current Gain	h _{FE}	80	_	_	$I_C = 10 \text{mA}, V_{CE} = 1.0 \text{V}$		
		100	300		$I_C = 150 \text{mA}, V_{CE} = 1.0 \text{V}$		
		40	_		$I_C = 500 \text{mA}, V_{CE} = 2.0 \text{V}$		
Collector-Emitter Saturation Voltage	V _{CE(SAT)}		0.40	V	$I_C = 150 \text{mA}, I_B = 15 \text{mA}$		
Concetor Emitter Gataration Voltage	VCE(SAT)		0.75	V	$I_C = 500 \text{mA}, I_B = 50 \text{mA}$		
Base-Emitter Saturation Voltage	V _{BE(SAT)}	0.75	0.95	V	$I_C = 150 \text{mA}, I_B = 15 \text{mA}$		
g .	VBE(SAT)	_	1.2	V	$I_C = 500 \text{mA}, I_B = 50 \text{mA}$		
SMALL SIGNAL CHARACTERISTICS		,			,		
Output Capacitance	C _{ob}	_	8.5	pF	$V_{CB} = 5.0V$, $f = 1.0MHz$, $I_E = 0$		
Input Capacitance	C _{eb}	_	30	pF	$V_{EB} = 0.5V$, $f = 1.0MHz$, $I_{C} = 0$		
Input Impedance	h _{ie}	1.0	15	kΩ			
Voltage Feedback Ratio	h _{re} 0.1 8.0		8.0	x 10 ⁻⁴	$V_{CE} = 10V, I_{C} = 1.0mA,$		
Small Signal Current Gain	h _{fe}	40	500	_	f = 1.0MHz		
Output Admittance	h _{oe}	1.0	30	μS			
Current Gain-Bandwith Product	f _T	250	_	MHz	$V_{CE} = 10V, I_{C} = 20mA,$ f = 100MHz		
SWITCHING CHARACTERISTICS							
Delay Time	t _d	_	15	ns	V _{CC} = 30V, I _C = 150mA,		
Rise Time	t _r		20	ns	$V_{BE(OFF)} = 2.0V, I_{B1} = 15mA$		
Storage Time	ts	_	225	ns	V _{CC} = 30V, I _C = 150mA,		
Fall Time	t _r	_	30	ns	$I_{B1} = I_{B2} = 15mA$		

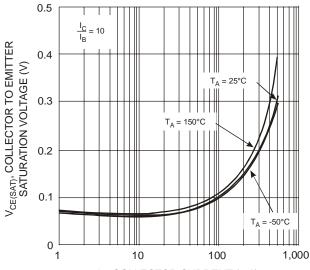
^{5.} Short duration pulse test used to minimize self-heating effect.











I_C, COLLECTOR CURRENT (mA)
Fig. 5 Collector Emitter Saturation Voltage
vs. Collector Current

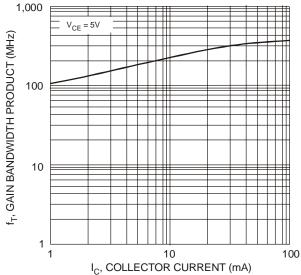


Fig. 7 Gain Bandwidth Product vs. Collector Current

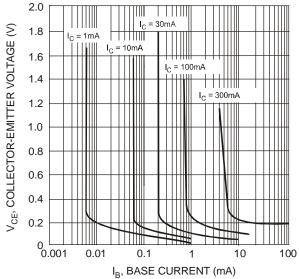


Fig. 4 Typical Collector Saturation Region

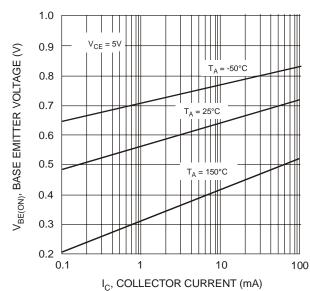


Fig. 6 Base Emitter Voltage vs. Collector Current

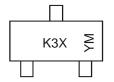


Ordering Information (Note 4 & 6)

Device	Packaging	Shipping			
MMST4401-7-F	SOT-323	3000/Tape & Reel			

6. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf. Notes:

Marking Information



K3X = Product Type Marking Code YM = Date Code Marking Y = Year ex: N = 2002 M = Month ex: 9 = September

Date Code Key

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Code	J	K	L	М	N	Р	R	S	Т	U	V	W	X	Υ	Z
Month	Jan	Fel	b	Mar	Apr	Мау	Ju	n	Jul	Aug	Sep	Oc	t	Nov	Dec
Code	1	2		3	4	5	6		7	8	9	0		N	D

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